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Sometimes it seems that we bassoonists spend over half our practice time making reeds and the other half trimming them (and if we don't, we wish we had when the reeds aren't cooperating). Those flute players don't know how good they've got it! I used to think that the ideal reed was one that plays the entire range of the bassoon in every dynamic needed. Wishful thinking!

As a free-lance player in the Los Angeles area, I do so many different kinds of playing that it serves me well to have reeds for every possible situation. I teach at CalArts where we have a faculty new music group (*New Century Players*) and a Baroque group (*Bach's Circle*). Around Los Angeles, I play principal bassoon in two part-time orchestras (Long Beach and New West Symphonies). I also work in the recording studios for motion picture and television sound tracks. In the summers, I perform at several chamber music festivals (some at high altitudes). So, it pays to be prepared for anything. Over the years, I have developed reeds to meet these various needs—orchestral reeds, high note reeds, low note reeds and a reed design for high altitude playing.

I will outline my various reed styles in this article with the hope that the concepts presented may be useful to others. Through my teaching and professional work, I have found that a reed that works for one player may not work for another because each of us has our own concept of sound and uses a somewhat different approach to air and embouchure — not to mention the differences in our instruments. In spite of differences in playing styles, perhaps these reed designs may solve problems for you, since they have often been helpful to my colleagues and students. I will discuss my basic reed (which is the starting point for the other designs), a cut reed for low note response, an inverted gouged reed for high note response, and a reed design for high altitude playing. It has been my good fortune to have studied with terrific reed makers, **Harold Goltzer** and **Louis Skinner**. Plus, I am grateful to have had the opportunity to work closely with **Mark Eubanks**, whose reed-making book *Advanced Reed Design & Testing Procedure for Bassoon* is always in my bassoon case. The harmonic tests outlined in Mark's book are a godsend when doing the final trim on a reed. The remarkable thing is that they work for any player, any embouchure, and any bassoon, and in any climate.

Lou Skinner used to say that one could make a good reed out of any kind of cane, soft or hard. That

may be true — although I do prefer medium-hard cane. Lately I have been experimenting with various kinds of cane because I am running out of the cane I bought from Skinner years ago. It certainly can be frustrating to change cane, and I've thrown away a lot of reeds lately, but I've learned a few things in the process. With softer cane, it is helpful to use a thinner gouge (1.10 mm or 1.15 rather than 1.25 or 1.30) because the cane closer to the bark is harder. In addition, since soft cane has less resistance to vibration, I have found that if I profile soft cane a little thicker I can increase the resistance in my reeds by leaving more pyramided (sloped) fibers in the tip (fingernail) of the reed. Therefore my profilers are set at 1.0mm in the back of the reed and 55mm at the tip for softer cane, at 95mm and 50mm for medium hard cane and a little lighter for hard cane (85mm to 45mm). I use a Rieger profiler or my old straight Pfeiffer profiler. I set the Rieger profiler to the thinner setting and put pieces of tape under the legs to adjust for heavier settings. I try to avoid changing the set screws because there is no way to measure how much to change them.

MY BASIC REED

My basic reed is a compilation of Goltzer and Skinner ideas and is similar to Skinner's "tip-taper" reed. It is a reed with a nearly straight taper (mostly parallel fibers) from the back to the front third of the reed and a taper (with sloped or pyramided fibers) in the front of the reed. This basic reed is used to create all my various reed styles. The shapers I use most often are the Skinner/Prestini Knockenhauer straight shaper or the Goltzer shaper (a fold-over shaper - available now from Satco). The Knockenhauer shaper measures 8.5mm wide at the collar (30mm up from the butt end) and 15mm wide at the tip. I often slide the cane over to make the shape .5mm wider when I am making an orchestra reed because the wider reed gives me a bigger sound. For a change in sound I sometimes use a Berdon #3- a bellied shape that is darker and flatter, or Mark Popkin's new shaper (#2) which makes a brilliant, lively sounding reed.

My reed measurements are outlined in the chart below. [See figure 1] The blade length measurements will vary depending upon the pitch level needed (longer blade for lower pitch) and the bocal used (shorter blade for longer bocal) and the softness/hardness of the cane (shorter blade for softer cane).



Changing the length of the reed from the butt to the first wire is like changing the length of the vocal. My reeds usually measure 57mm total length with the collar at 30mm from the butt and a blade length of 29mm (measured from the edge of the first wire to the tip). My wire measurements (measured from the butt) for all my reed styles are as follows: 1st wire at 28mm, 2nd wire at 19mm, and 3rd wire at 7mm. The chart below gives blade thickness measurements for reeds currently in my reed box. Measurements will vary from reed to reed, so please use the chart as a general guide, or for comparison only.

MAKING THE BLANK

There are a number of excellent books that describe the mechanics of making a good blank. Methods vary but the important thing to remember is that a carefully constructed blank with a nice round tube and even tip opening will produce a more responsive and supple reed. A finished reed with an asymmetrical aperture (tip opening) will likely have problems with slurring, flexibility, and response (especially ppp playing). I throw away any blank that does not have an even aperture, especially if the unevenness is caused by a construction problem in the blank. Here are some of the things that I check for if I am having problems with asymmetrical apertures.

PROBLEM SOLVING

THE BEVEL. Unevenness in the bevel can affect the tip opening. There are many methods (including not beveling). I use the Goltzer method of beveling the reed. I sand with a sanding stick (available at hobby stores) at a 60-degree angle to the cane (30-degree angle to the vertical edge of the cane) from the collar to the back on all four sides of the shaped cane. When I fold the reed over, I check to see that the bevels are even on all sides, that the bevel blends evenly into the

blade of the reed (no hole or gap). I also check that the reed blades are aligned evenly. If they are not, I correct the unevenness with my sanding stick.

A ROUND TUBE. When forming the reed, I am careful to crimp the reed tube with pliers so that a round tube is created from the second wire back. I like to wrap a string around the reed (from the second wire to the back) and pull hard on the string to make the reed conform to the mandrel. Some reed styles call for an oval second wire. With such a reed, I make sure that the oval is symmetrical at both first and second wires.

THE GOVERNOR FLARE. The flare at the back of the shape (called governor flare by Lou Skinner) adjusts the tip opening. The flare closes the tip and is very important if you live in a humid climate or are using cane from small tubes. If I accidentally cut off the flare on one corner of the butt, I try to match all four corners of the shaped cane, or if I need some flare, I match opposite corners of the shaped cane. If I accidentally take the flare off both corners on one side of the reed, that usually gives me a reed with a bulge on one side of the tip opening (an asymmetrical aperture).

SYMMETRICAL RAILS ON BOTH SIDES OF THE REED. Uneven or unmatched rails can cause uneven tip openings. Luckily, this problem is usually fixable. The rails can be evened with a sanding stick or if too much is taken off one rail, the reed can be narrowed.

FINISHING THE BASIC REED

I use two different styles of finishing the tip of my basic reed. [See figure 2] I have discovered (after shredding the tips of reeds made of soft cane) that softer cane requires a slightly thicker tip edge (for stability) and more pyramided (sharply sloped) fibers in the fingernail portion of the tip of the reed (to increase resistance). Harder cane on the other hand is naturally stronger and more resistant so reeds can be trimmed

Measurements from the collar	at collar	at 5mm	at 10mm	at 15mm	at 20mm	at 25mm	at 27mm (the tip)	
The Basic Reed	0.034 0.86	0.03 0.76	0.027 0.70	0.025 0.64	0.022 0.57	0.01 0.25	0.005 0.14	inches millimeters
The Cut Reed	0.0375 0.96	0.285 0.73	0.0295 0.75	0.029 0.74	0.025 0.65	0.019 0.48	0.005 0.14	inches millimeters
The High Note Reed	0.035 0.89	0.032 0.81	0.030 0.78	0.028 0.72	0.028 0.63	0.025 0.30	0.005 0.14	inches millimeters

formation (with heavier rails near the tip, more taken out of the channels, a slight spine in the center, and a thinner tip edge). This produces a flexible resonant sounding reed. To favor high note response leave less in the rails in the front of the reed, and to favor low note response

leave more cane in the rails. Reeds made with harder cane can be trimmed with a very thin tip edge, which gives a quick and supple responding reed for fast tonguing, and ppp attacks. While finishing the reed, I continually check for balance and evenness in both blades. One quick way to check for evenness along the blade is to press the thumbnail into the reed at various points along the spine and watch to see if the aperture closes evenly. Unevenness at any point may mean that the blade is unbalanced in the area where one is pressing. I test and tune reeds as I finish them with the harmonic tests in Mark Eubanks' book.

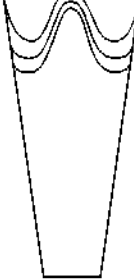
MY CUT REED - FOR FLATTER LOW NOTES

The cut reed design I use was given to me by bassoonist **Dave Riddles** who got it from **Michael O'Donovan** (both are active studio musicians here in Los Angeles). Michael says he was inspired to create the design by some eighteenth- or nineteenth-century cut reeds he saw in the Bate Collection in Oxford, England, and by other modern bassoonists who sometimes use cut reeds. This cut reed [see photo] is designed to be dark and stable and to play soft, in-tune low notes. The cuts in the front of the reed give it resistance and stability, while a window (thinner spot) in the center of the back give it flexibility and drop the pitch

Pyramided
Fibers



Fingemail Tip



W-Shaped Tip

Sloped or
Pyramided
Fibers

Figure 2

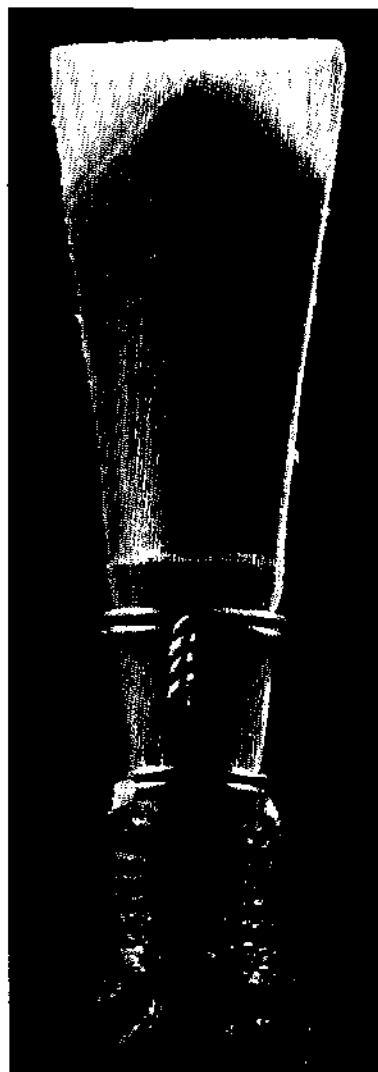


Photo by Merlin Petroff

The thinner the window, the flatter the low notes, but beware, the window in the back will drop the pitch of the tenor register as well. Reeds are always a compromise! A cut reed without the window in the back will play comfortably in all registers but will not have

the flexibility of an uncut reed.

I start with my basic reed (a blank that is a bit too soft to become a good orchestra reed is a good choice for this reed if your interest is primarily in flat low notes). I mark lines in pencil for the cuts. [See figure 3]. After trying many variations, the straight-line measurement that I have settled upon is 11mm back from the tip. The angled lines can vary; the sound of the reed changes a bit depending upon the angle and placement of these cuts. I usually start the angled lines 7mm back from the tip (on the side) and draw them to a point 1.5 to 2.5mm back from the tip in the center. Feel free to experiment with the placement of the score lines. **David Riddles** is now using a rounded tip in front instead of the point. He says this makes a more flexible reed.

To make the lines, first make a light score mark with a single-edged razor. Next make a light cut back to the score mark by laying the razor blade flat to the surface of the cane. Then with a sanding stick, sand to the lines and define the score marks. The cuts increase resistance and add stability to the reed. When defining the straight line across the reed, be cautious to not take too much wood out of the center of the reed.



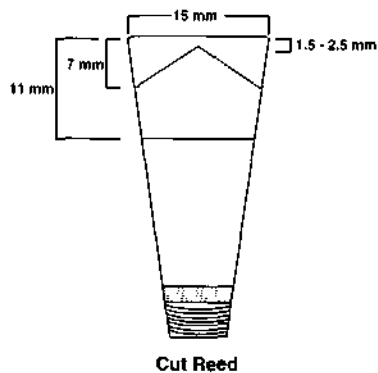


Figure 3

CUT REED FINISHING TIPS

Here are some tips for finishing cut reeds.

1. For quick easy response, create a thin tip edge in front of the angled lines with a sanding stick (available at hobby stores).
2. Control the dampening of the tip opening by taking out cane in the channels behind the angled score marks.
3. Sand the rails evenly so that the reed does not leak on the sides.
4. To drop the pitch of the low notes, make a window in the back of the reed 2mm in front of the collar and several mm long. The thinner the window, the flatter the low notes; but beware, the tenor register drops in pitch along with the low notes. With experience you can discover how much to take out of the center of the back to drop the low notes without making the tenor register too flat to manage.
5. Tune the reed using Mark Eubanks' harmonic tests.
6. If the reed is too flat and flabby sounding, there may not be enough wood in the front of the reed. Try a slightly thicker profile in front.
7. I have had success making cut reeds from Rieger's shaped and profiled cane, as long as the piece of cane is not too soft. I usually re-shape the Rieger cane to my shaper.

When playing a cut reed, I pull the tenor register up by using a firmer embouchure and a slightly closed vowel shape ("e" instead of "ah") inside my mouth. I find these reeds to be indispensable for playing continuo (especially when the harpsichord is dropping in pitch!). Playing the opening of Tchaikowsky's 6th in tune with the basses is a snap with one of these reeds

the reeds usually play at A440 with a blade length (measured from first wire to the tip) of 28mm or 29mm. I have cut reeds of various lengths in my reed box with some set up to play as low as A438. Figure 3.

MY HIGH NOTE REED

My high note reed is a variation of an inverted gouge reed taught to me by **Lou Skinner**. The inverted gouge is thinner in the center of the piece of cane than on the sides. The theory is that a reed made with an inverted gouge will have a center opening carved into it and will stay open when the player closes the embouchure around the reed to play high notes. When not biting on it, the reed will behave normally and play like any other reed. It works!

MAKING THE HIGH NOTE REED

Here are the steps I use for making a high note reed.

1. Start with a piece of concentric gouged cane. Concentric gouged cane, sometimes called German gouge, is equally thick on the sides as in the center. A thicker gouge is better for this reed (up to 1.50mm). Use cane gouged no thinner than 1.25mm.
2. Shape the gouged cane with a straight shaper.
3. Measure and make pencil lines on the inside of the cane at the point where the collars will be.
4. Thin the center of the reed between the collar marks using a piece of dowel or other short tubular object (10mm to 20mm in diameter) wrapped in 220 sandpaper or use one of Lou Skinner's smaller scrapers (#16 to #24). Sand or scrape the center part of the reed between the marks until the gouge measures 1.00 or 1.10 mm thick (.20 to .25 mm less than the starting gouge) in the area between marks. The size of the dowel or scraper may change the shape of the aperture of the reed. Experiment to see what size dowel or scraper makes the best high note reed for you.
5. After sanding or scraping, there will be a ridge between the sanded or scraped middle area and the rest of the blade. Sand the ridges smooth.
6. Profile the cane and proceed as normal.
7. One note of caution, be sure to keep the thinned part of the gouge centered on your

easier to see that the work stays centered.

I find that a pyramided (sharply sloped) tip trim with a thin tip edge (for response) is best for this reed. The W-shaped tip emphasizes the low vibrations and therefore counteracts the purpose of this reed, which is to pop out high notes. Collapsed wing areas and/or collapsed channels in the tip will accentuate the high notes and cut out some of the low response. The inverted gouged reed that I learned from Lou Skinner was based on his Knockenhauer model reed. It uses an oval first and second wire and has a curved collar to bring out low resonance in the high range. His first and second wire placements (1st at 27mm and 2nd at 20mm from the butt) are closer together on this reed to better support the oval throat. You can find detailed instructions for making Lou Skinner's Knockenhauer model reed in *The Bassoon Reed Manual: Lou Skinner's Theories and Techniques*. Please note that if you use a flattened second wire, the tenor register will be flat unless you ream the interior of the reed (under the second wire) round using a throat reamer. Skinner used a spiral 3/16th-inch drill bit to ream out reeds under a flattened second wire. My inverted gouged reed is created from my basic reed (no flattened second wire) because I am usually looking for a darker sounding reed. I find the Skinner model, with its oval second wire, a bit too brilliant sounding.

MY HIGH ALTITUDE REED

The problems that occur when playing at high altitudes are related to thin air and low humidity. I've noticed that when I thin the tip and sides enough to respond to the thinner air, the reed tends to collapse leaving me with a reed that is overly dark. It plays high notes well but has no low resonance. So after years of struggling with this, I came up with the following design elements to help counteract these problems.

1. I use concentric gouged cane from smaller tubes for more resilience to support the tip opening.
2. I remove most of the flare at the back of the shape to hold the tip open in the dry climate.
3. I trim the tip with a W-shape trim instead of the usual fingernail shape. This means I leave the rails a little heavy at the tip to support the tip opening and to create more lows in the sound.
4. If necessary, I create a window (thinner spot) in the center of the back of the reed 2mm or 3mm in front of the collar. The window will allow more low vibration and will also pop open the tip a bit. A window

ter, so trim cautiously.

5. I use my normal profile but prefer to use slightly harder cane for these reeds. The harder cane can be trimmed thinly and will not collapse so easily.
6. I use Mark Eubanks' harmonic tests to carefully tune the reed. For some reason reeds tune differently at high altitudes so I check and re-check the harmonic tests to create a reed that is in-tune with itself. A current graduate student at CalArts, **Amber Ferenz**, performed on a fellowship at the Aspen Festival this past summer. Amber is a terrific reedmaker (having done her undergraduate work with **Mark Popkin**). She reported that using the high altitude reed scrape outlined below, she was able to play comfortably her first day in Aspen (altitude 7900').

The reeds outlined here work for me with my approach to sound, air and embouchure, and with my bassoon (made by Benson Bell) and bocal (Heckel #2CC) in this Southern California climate. Please note that the measurements in the chart and in the body of the article are included as a reference or a starting point, since the needs and preferences of individual players will vary widely. It is my hope that others will be able to adapt these reed styles and variations to their own use, and that they will continue to share their discoveries and knowledge in this journal.



Julie Feves



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Advanced Reed Design & Testing Procedure for Bassoon, by Mark G. Eubanks, Arundo Research Company, Portland, OR.

Lou Skinner presented two basic reed designs, the "tip-taper" model mentioned above, and a "straight-taper" or heavy-backed reed that uses a continuous taper from back to front. I have not tried to use the "straight-taper" model as the basis for my various reed styles. I do not know how they would work using such a reed.

Many of my students use **Mark Popkin** and **Loren Glickman's** book *Bassoon Reed Making* (copyright 1987 and published by The Instrumentalist Publishing Company, 200 Northfield Road, Northfield, Illinois). For a guide to Lou Skinner's construction techniques use *The Bassoon Reed Manual: Lou Skinner's Theories and Techniques* by **James R. McKay** & contributing authors **Russell Hinkle** and **William Woodward** (Indiana University Press, Bloomington and Indianapolis, copyright 2000 by James R. McKay).

