

**A COMPARISON OF THE TECHNIQUES USED FOR ADJUSTING THE
SINGLE REED ON THE SAXOPHONE**

A Research Paper

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INTRODUCTION

The reed is by far the most variable aspect of the saxophone. Each reed exhibits individual characteristics that may or may not suit a player's liking. Furthermore a reed will undergo a series of changes as it matures, with factors such as humidity, age and a player's embouchure causing transform.¹ An unstable reed creates an uncomfortable position for the performer. The resistance, tone, intonation as well as the ease of playing can begin to fluxgate. Any serious performer will benefit from an in-depth study of reed adjustment. With the vast amount of literature available on the subject, the need for a comparison of significant works presents itself.

The purpose of this study is to collect and compare five prominent books or articles on the topic of reed adjustment to identify which manuscript is the most comprehensive and understandable. The works being compared include: Larry Teal's *The Art of Saxophone Playing*, Ray Reed's *The Advanced Art of Reed Adjustment*, Dave Leibman's *Developing a Personal Saxophone Sound*, Paul Berler's article *Basic Saxophone Skills: Reeds Part I and II*, and Kalman Opperman's book *Handbook for Making and Adjusting Single Reeds*. This study is limited to the methods of these five individuals. Throughout the review of literature section, extensive citation is used demonstrating the differences in writing style for each author.

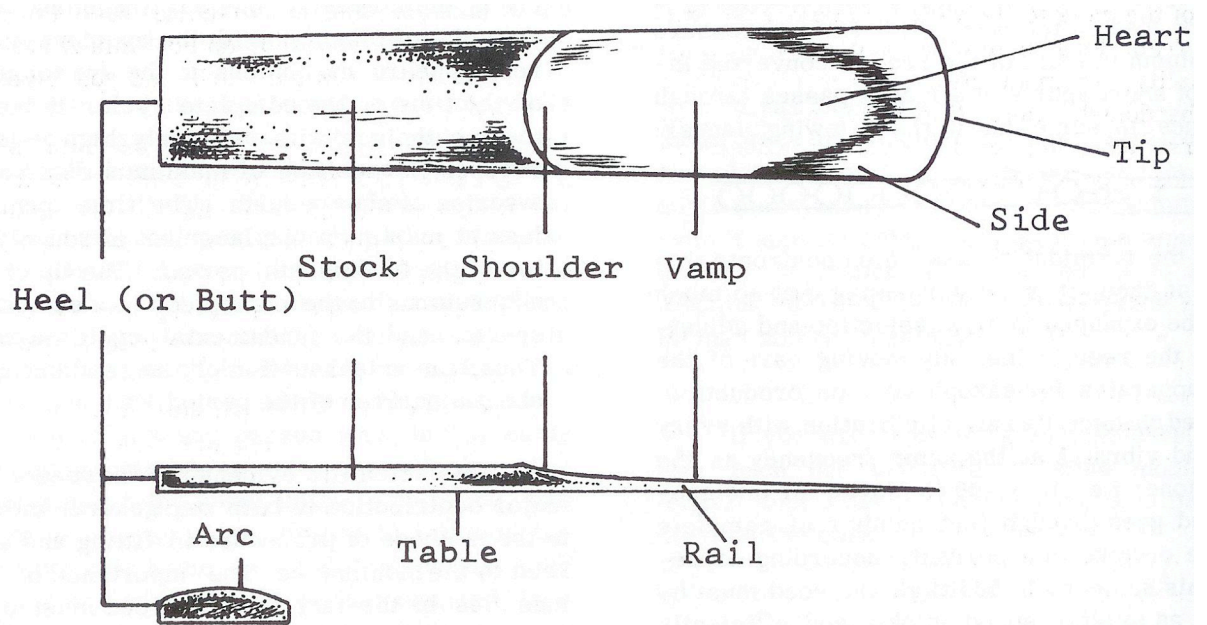
For this study, the works are divided into six categories: background, selecting the best cane, reed break-in procedures, tools, areas of adjustment and special tricks. Since there

¹ Charles Stier, *Clarinet Reeds: Definitive Instructions in an Elusive Art* (Silver Springs, MA, by the author, 1991), 16.

are hundreds of books published focused exclusively for the saxophone reed, this review is limited to the aforementioned authors. However, this study does integrate additional published materials by prominent authors, as is reflected in the bibliography.

This study presumes that the reader is familiar with the concepts and vocabulary used by musicians and saxophonists. A diagram describing reed anatomy is included to briefly illustrate the terms used throughout this research paper. The vamp is also referred to as Upper Blade and Lower Blade. The table is also referred to as the Lay, and the point where the teeth intersect the vamp is termed the Bite Line.

Table 1. Parts of the Saxophone Reed.²



² Larry Teal. *The Art of Saxophone Playing* (Syracuse: Summy-Birchard Music, 1963), 22.

REVIEW OF LITERATURE

LARRY TEAL

Background

Larry Teal (1905-1984) was a noted saxophone instructor. He was the first full-time professor of saxophone at the University of Michigan-Ann Arbor from 1953 until his retirement in 1974. He published several books during his career, and his proteges have included Donald Sinta, Patrick Meighan and John Sampen.

Selecting The Best Cane

Teal acknowledges that a systematic approach to selecting reeds “may improve your batting average in choosing playable reeds.”³ He highlights ten suggestions for reed-selection:

“1) Purchase only standard-make reeds such as Vandoren, LaVoz, Roy Maier, Vibrator, Selmer or Ciccone. 2) Select a medium or medium soft strength until you determine what is best for you. Grade markings are not uniform for all brands, so seek advice in this manner. 3) A reed that is slightly hard will usually weaken after a short period of playing, so be wary of the reed that blows easily at first. 4) If you have the privilege of selecting reeds from the box, look for a fine-grain reed with straight fibers that run all the way down to the tip. Beware of dark streaks in the grain of the cut part. These can be seen by holding the reed up to the light. 5) Dark flecks in the

³ Ibid., 23.

smooth bark of the reed are no indication that the reed is poor. These spots are normal in the bark of the cane, and this condition is preferable by many players. However if there are dark pits in the vamp or table, reject the reed. 6) A slightly golden or cream color in the vamp is a sign of good seasoning. Beware of the green cast or a brown shade. 7) When you find an off color reed in a box which has been purchased, do not immediately throw it away. It just *might* work, and you have nothing to lose. 8) Look for an even taper on both sides, with a greater thickness in the center, the dark shadow blending into light in the form of an inverted U. 9) The shoulder of the reed should break away from the stock uniformly on both sides. A cut that is off-center indicates wrong size out-of-round cane that should have been rejected by the manufacturer. 10) Examine the shape of the arc on the butt of the reed. This indicates the size of the stalk from which the reed was cut. Neither a high nor flat arc will produce satisfactory results.”⁴

By soaking the “butt end of the reed...in about an inch of water for a few minutes.”⁵ a reed’s maturity arch can be seen. If a reed does not display a brownish-orange arch under the stock, the reed will need to be aged for “a year or more.”⁶ “While wetting the butt of the reed...blow on the butt end, small bubbles will appear along the vamp of the reed.”⁷ This technique is used to determine the density of the fibers. The size and number of bubbles will

⁴ Ibid., 23.

⁵ Ibid., 24.

⁶ Ibid.

⁷ Ibid., 25.

display the density of the fibers and “a little experimentation as to the proper amount will prove helpful.”⁸

Reed Break-in Procedures

When initially moistening a reed, “a reed will sometimes wave or curl at the tip, but will straiten again in two or three minutes. This is caused by the soft material between the fibers absorbing moisture at varying rates.”⁹ Teal recommends storing reeds in a reed case with a flat surface; thus minimizing the tip curling effect.

Teal states, “Chemicals in human saliva (will) react to the soft inter-fibre structure and upset the proper relationship between the hard and soft materials. . . this ultimately results in the reed wearing out.”¹⁰

“Reed cane is composed of a series of small hollow tubes known as fibres which run lengthwise and are held together by a softer pithy substance that absorbs moisture and forms the bed on which the fibers vibrate.”¹¹ During the cutting of the reed, the fibres or “fibers” are cut open; exposure to saliva causes premature degradation. During the breaking-in cycle, a reed’s life can be extended greatly by sealing the fibers closed, thus making them less penetrable by the saliva. This can be done with a hard surface such as the shank of a pen or other hard object.

⁸ Ibid., 25.

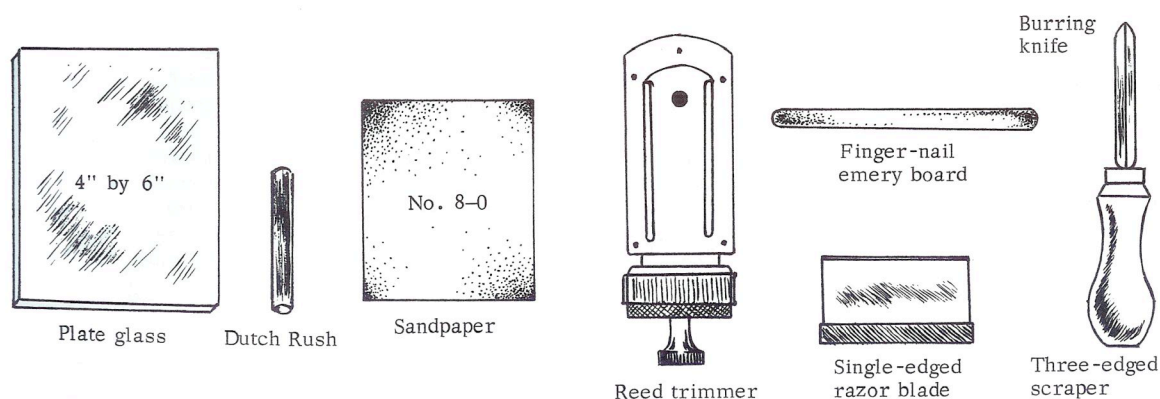
⁹ Ibid., 24.

¹⁰ Ibid.

¹¹ Ibid.

Tools

Table 2. Minimum Tools For Reed Adjustment.¹²



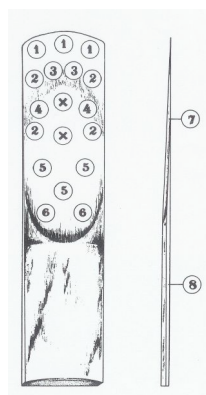
Before reed adjustment can begin, the following tools are needed: “a piece of plate glass, a reed trimmer, a scraping or burring knife, Dutch rush, sandpaper, a single edged razor blade, fingernail emery boards.”¹³

Areas of Adjustment

According to Teal, the first step in adjusting reeds is to determine what modifications are needed. Teal illustrates how to check if a reed is too stiff or too soft by pressing it to the thumbnail. This technique also shows whether the reed is balanced or not. It is through the use of an anatomical reed diagram, accompanied by a table of reed symptoms that Teal describes adjustment (below). Generally, if a reed is too stiff, material is removed to reduce its resistance. Conversely, if a reed is too soft, the tip is clipped, moving the stock closer to the mouthpiece tip, making it more resistant.

¹² Ibid., 25

¹³ Ibid.

Table 3. Anatomical Reed Diagram and Table of Symptoms and Remedies.¹⁴

Fault	Area	Tool	Remarks
Too soft	Tip	Trimmer	Clip small amount. Test after each clip.
Buzzy or edgy	Tip	Trimmer	Same as above.
Lack of resonance	1 & 2	Dutch Rush	Balance.
Dull sound when playing softly	1 & 2	Dutch Rush	Balance; take more off both sides if still too hard.
Blows hard	2	Dutch Rush	Thin both sides and balance.
Lower register lacks resonance	2	Dutch Rush	Balance and thin if necessary.
Tip too thick after clipping	Under side of tip	Sandpaper	Lay sandpaper on glass and stroke lightly with grain on the flat table side of reed to about 3/8 inch back from tip.
Reed whistles	2	Dutch Rush	Balance.
High tones hard to attack softly	2 & 1	Dutch Rush	Thin gradually with light stroke.
Thin high register	3	Dutch Rush	Test after each few strokes.
Lacks projection in upper register	3	Dutch Rush	Move 3 back from the tip. (This may shorten the life of the reed.)
Lack of resonance in middle register	4	Dutch Rush	Lightly on 3 also.
Heavy low register	6	Scraping knife	Finish with Dutch Rush.
General lack of resonance	7 & 8	Sandpaper on glass	Sand rails of reed if reed is too wide for mouthpiece.
After balancing, reed plays well but blows hard	6-5-4-3	Scraper	Thin evenly all indicated areas.
Table not flat	Table	Razor blade	Stroke lightly towards tip.
Table not smooth	Table	Sandpaper on glass	Rub lightly back and forth, always in the direction of the grain.

Special Tricks

Teal mentions an interesting technique to revive a reed which has begun to show the signs of degradation.

“Deteriorating reeds may be restored somewhat by soaking them overnight in a 3% solution of hydrogen peroxide, which is available at any drugstore. The reed should then be rinsed with water and left to dry before using. A very light scraping with a

¹⁴ Ibid., 28-9.

knife or razor blade will remove much of the surface sediment that may collect on the vamp but must be done with caution to prevent changing the balance.”¹⁵

Professor Paul Wagner validates this procedure of soaking a reed in a hydrogen peroxide solution.¹⁶ Wagner is a full time faculty member in the woodwind department at Berklee College of Music and columnist for the *Saxophone Journal*. Steve Goodson, reed maker and clinician, also believes a reed can be revived, if only for a short time, by soaking in hydrogen peroxide solution.¹⁷

¹⁵ Ibid., 24.

¹⁶ Professor Paul Wagner of Berklee College of Music, interview by author, 26 October 2006, Boston, In Person, Berklee College of Music, Boston.

¹⁷ Owner Steve Goodson of SaxGourmet Reed Co., interviewed by author, 16 October 2006, San Diego, phone call, San Diego State University, San Diego.

RAY REED

Background

Ray Reed is a multi instrumentalist who compiled his life's work in the book entitled, *The Advanced Art of Reed Adjustment*. "The findings in this book are the result of over thirty years' experience preparing reeds for performance in intense musical environments; such as, Stan Kenton, Supersax, Louie Belson, Bill Holman, Bob Florence, Hollywood studios, and many other organizations whose names are not listed here. So be assured that the proving grounds for these reeds have been rigorous and diverse."¹⁸

Selecting The Best Cane

While selecting reeds, Reed visually identifies the deficiencies a reed might possess, then offers suggestions on repairing them.

"All reeds are individual objects; and to achieve uniform performance qualities from them, they must be treated as such. That is, if all reeds for a specific mouthpiece were cut to the same dimensions, proportions and thickness, they would all display differences in tone quality, strength, and intonation. These differences would be caused by material variations in each piece of cane; such as, density, grain structure, and warping tendencies."¹⁹

The primary inconsistency that Reed mentions a saxophonist should be cognizant of when selecting reeds is one that has been cut off center from the tube. The resulting

¹⁸ Ray Reed. *The Saxophone Reed: The Advanced Art of Adjusting Single Reeds* (West Conshohocken: Infinity Publishing, 2004), 157.

¹⁹ *Ibid.*, v.

imbalance of blade-edge hardness may not be critical to the reed's performance. "But if off-center cutting or a natural malformation in the tube results in an uneven shoulder thickness, the stock must be filed down."²⁰

Reed Break-in Procedures

Reed says, "Since there is no practical way to prevent the reed from expressing its natural warping and swelling actions, the main purpose of the break-in process will be to provoke the reed into displaying these detrimental tendencies. Then the problems may be corrected as much as possible by applying the adjustment techniques."²¹

Reed outlines the first of a three-day break-in session as five minutes of playing with a normal embouchure, followed by an examination of the reed with a straight edge. If any warping tendencies are observed, immediate correction should occur. After making any necessary corrections, the reed is to be played again for five minutes and then allowed to rest. This adjustment phase will occur after each playing session until the reed's structural integrity has solidified. The first session should not exceed ten minutes of playing.

The second session is similar to the first, a five-minute playing interval and subsequent adjustment. Reed cautions not to over cut the primary warp during the second session, this ensures the reed does not become too weak. Reed advises to again stop after ten minutes of playing and allow the reed to rest overnight.

The third session is then extended to a ten-minute initial playing interval, followed by additional adjustments. Again Reed advises alertness to the possibility of over cutting the primary warp. After its final adjustments, the reed is returned to the mouthpiece and

²⁰ Ibid., 2.

²¹ Ibid., 99.

subjected to “an hour or more playing time to provide its first experience in prolonged playing.”²² Reed recommends that after the final break in session, the reed be stored on the mouthpiece.

“The need for repeated adjustment sessions” will remain as a reed matures through the reeds playing life. “No matter how thorough the lower areas are balanced on the first playing session, the internal tension of the fibers will pull the reed back to its static shape when it is allowed to rest for several hours. And leaks will return and require additional recutting of the lower areas.”²³

Tools

Reed concurs that “reeds may be successfully adjusted with easy-to-use tools like files and sandpaper. But however skillfully these tools may be applied, imbalances are likely to remain in each reed. Furthermore, the upper blades of all new reeds will be closely matched, introduces a margin of confusion to the player.”²⁴ He instead condones the use of only two tools, the dial indicator and the reed knife.

The dial indicator is a “clockwork-type micrometer that is used in conjunction with a measuring grid work.”²⁵ Grid work refers to a method of plotting measurement points made across the vamp of a reed for easy comparison to a predetermined depth.

Reed chooses to use the reed knife over other tools because of the superiority in its unbeveled edge, asserting, “A knife shaped in this fashion will automatically seek high spots on the reed surface and powder them down to specifications without accidentally cutting into

²² Ibid., 110.

²³ Ibid., vii.

²⁴ Ibid., ix.

²⁵ Ibid., ix.

adjacent areas.”²⁶ According to Reed, when using a reed knife properly, the accuracy one can achieve is very high “to 1 ten-thousandth of an inch (.0001), ten strokes will remove 1 thousandth of an inch (.001), and so on.”²⁷

Areas of Adjustment

Reed focuses a great deal of his book on repairing a reed’s natural warping tendencies. The primary source of reed warpage is caused by “The distance between the centerline and the center of mass (of a reed) ... this imbalance is the source of the primary warp.”²⁸ Reed illustrates how to check for each of the four warp types, primary, concave, tangent, and pocket, and recommends remediation.

The primary warp is identified by “the pitch rising, increased bite length, extreme notes cutting out, and an audible bubbling or hissing of escaping air.”²⁹ This is caused when the backside of the reed bows out, creating air gaps between the reed and mouthpiece rails. The warp is ostensible by holding a strait edge against the reed’s table and sighting down it with a light in the background. Reed’s solution to a primary warp is to flatten the reed’s table with sandpaper against a flat surface, or a flat mill file.

The concave warp is detected when a reed will “...lie on the mouthpiece in a rocking chair-like fashion...and include an insecure bite.”³⁰ Removing the contrary material that you would for a primary warp proves to be the most effective way to remedy a concave warp.

²⁶ Ibid.

²⁷ Ibid.

²⁸ Ibid., 11.

²⁹ Ibid., 20.

³⁰ Ibid., 21.

The symptoms of the tangent warp “are identical to those of the primary warp. Additionally, the tangent warp is likely to perform like a rocking chair on the mouthpiece bed.”³¹ The tangent warp is repaired the same way as a primary warp, by flattening the table with sandpaper or a mill file.

A pocket warp is identified by a “...severe weakening of the tone quality.”³² Pressure caused by the ligature creates a pocket in the forward area of the stock, located directly under the ligature. Removing material further down from the warp’s location, on the reed’s table, will reduce the effects of a pocket warp. Removing wood from the areas adjacent to the pocket warp will also diminish its effects.

Special Tricks

Reed advises an optional modification process he calls thinning the stock. He recommends this procedure for reeds that exhibit profound primary warp tendencies. It is a process of removing most of the stock or bark of the reed using a double edge reed knife. The benefit of this is two fold. The reed’s centerline and center of mass (centerline or equal division of mass) are brought closer together, essentially neutralizing warping tendencies. The second benefit of this modification is that the reed becomes very responsive and open. The act of removing the unnecessary stock vastly increases the reed’s vibrations.³³

³¹ Ibid., 23.

³² Ibid., 24.

³³ Ibid., 27.

Table 4. Comparing Front and Cross Section Views of Thinned Stocks.³⁴

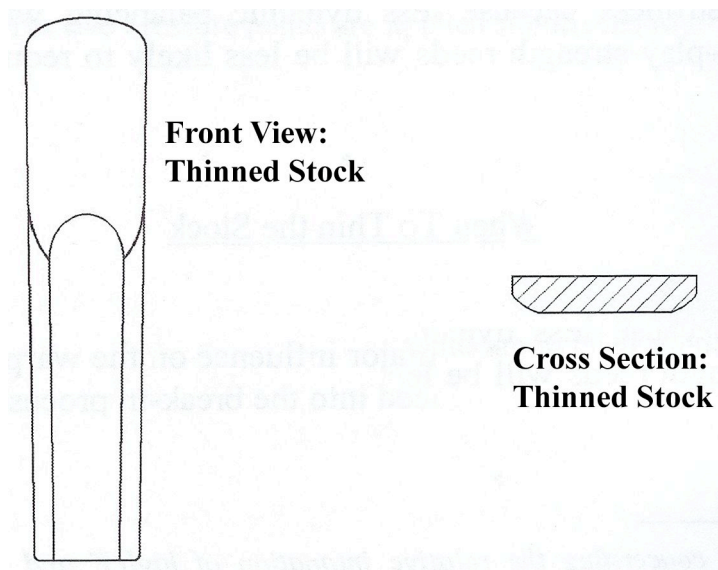
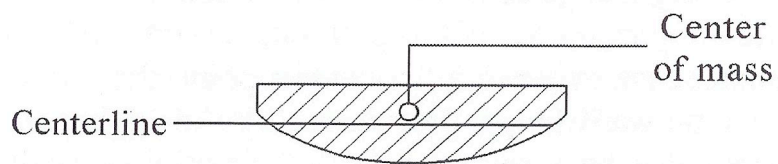


Table 5. Illustrating the Cross Section and Centerline of a Reed.³⁵



³⁴ Ibid., 28.

³⁵ Ibid., 11.

DAVID LEIBMAN

Background

David Liebman is a New Yorker, and graduate of New York University. He learned to play the piano, saxophone and flute, but, since 1980, has played soprano saxophone exclusively. He has performed all over the world with musicians such as Pete La Roca, Chick Corea, Dave Holland, Steve Swallow, and many others. He also was a member of the Miles Davis group in the early seventies. Liebman can be heard with Davis on the albums: “On the Corner,” “Big Fun,” “Dark Magus,” and “Get Up With It.” Aside from being an internationally recognized performer, Liebman is a jazz educator and published writer. He has authored many books and articles spanning different aspects of music and the saxophone.

Selecting The Best Cane

Liebman states that reeds are notoriously inconsistent, making reed-selection difficult. The diminishing quality of cane can be observed by its change in color from “from a tan or yellowish cast to very white.”³⁶ Choosing reeds that are more tan or yellowish is the initial step in selecting reeds. Liebman offers a few other suggestions to selecting a reed:

“Check the tip for hairline cracks by lightly pressing the nail of your thumb along the back of the edge. Check resistance in the same way. The tip should bend slightly, although there may be a difference between each corner. Hold the reed against the light; look for an upside down ‘U’ shape of darkness in the middle of the reed. The darker color suggests more resistance, which in turn means that adjustments can be

³⁶ David Liebman. *Developing a Personal Sound* (Medfield: Dorn Publications, 1994), 31.

made. Looking at the reed from the side, check the angle of inclination from where the vamp ends and the actual vibrating material begins. It should be as gradual as possible. As closely as it could be, the edge of the reed should adhere to the curve of your mouthpiece; after all this is the surface that the reed closes down upon. Try to pick a reed with a greater number of fibers. These are the lines running up and down the reed. The white spaces in between are the pulp. It is the fibers that actually vibrate. Again, hold the reed up to a light source for examination.”³⁷

Reed Break-in Procedures

Before beginning work on a new reed, Liebman advises to “soak it for at least twenty minutes in water and let it dry. Doing this allows the fibers to expand and contract which is what naturally occurs during and after playing.”³⁸ Because adjusting a reed is a process of removing material, Liebman advises buying reeds that are one half size larger than what is comfortable for the player. Observing this practice will ensure that once material is removed, a sufficient amount of resistance will remain in the reed.

Tools

Leibman does not specifically list the tools he uses to adjust reeds. He does mention tools throughout his adjustment chapter: a reed knife or a regular knife, Emery cloth, grit 400-600 sandpaper, and reed rush.

³⁷ Ibid.

³⁸ Ibid., 32.

Areas of Adjustment

Liebman remarks that although you cannot place fibers into a reed, you can selectively cut them down. Making reeds from scratch is an option, but is very time consuming; he instead recommends improving commercially available reeds.

As mentioned earlier, Liebman suggests getting reeds that are one half size larger. He also cautions against clipping the tip of a reed to make it stiffer. Clipping the reed shortens the length of the fibers, which will “decrease the vibrational capacity.”³⁹ Although clipping a reed will make it appear stiffer, it also muffles the sound.

The first adjustment is to remove some of the bark from the reed, similar to a French cut reed. Doing this will free the reed’s vibrations without actually lessening the strength. “Using either a reed or regular knife, with gentle strokes, take the bark off the sides of the center on the top surface of the reed. Take enough off so the obvious brown bark disappears.”⁴⁰ After cutting the bark off, he advises examining the inclination of the vamp, which should be very gradual and even. If needed, remove more material to make the vamp as uniform as possible.

Liebman then recommends to check the balance of the reed by playing an “open C sharp and by tilting your head, open up one side of the mouthpiece so that you are only vibrating the other. Do this for both sides and notice if there is a difference in response and openness of the sound.”⁴¹ If a difference is noticed, balancing or evening the tip resistance is required.

³⁹ Ibid., 32.

⁴⁰ Ibid.

⁴¹ Ibid.

Once adjustments are complete, Liebman advises sealing the fibers closed by “Pressing down the fibers on the back and front (of the reed) with a spoon or other metal object. This will cause the fibers to close down. Then use the back of your sandpaper or any smooth white paper to rub a sort of sheen onto the surface of the reed.”⁴² Liebman suggests that this procedure creates a wax-like finish, which keeps saliva from penetrating the fibers thus lengthening the life of the reed.

Final adjustments can be made throughout a reed’s life to fine-tune it. If the reed is stuffy or too resistant in the “upper register, use Emery cloth, carefully rub from 1/16th of an inch below the top edge upward in order to take cane off. For stuffy low notes, take off cane 1/16th to ¼ of an inch in from a reed’s sides at first. As a last resort, carefully sand the heart itself.”⁴³ Liebman also advises that if the entire reed is stuffy, sand the backside of the reed, reducing all areas evenly.

Special Tricks

One special trick that Liebman mention’s a test designed to check if a reed is mating properly with the mouthpiece. Liebman illustrates, “Holding the mouthpiece in one hand, place the palm of the other hand over the mouthpiece opening, in effect cutting off the air supply. Then suck the remaining air out. When you take the mouthpiece out of your mouth quickly, there should be a popping sound.”⁴⁴ This test ensures that the sides and tip of the reed is creating an adequate seal to the mouthpiece. If a reed does not make this popping sound, it is

⁴² Ibid., 33.

⁴³ Ibid.

⁴⁴ Ibid.

generally a sign that the reed is warped or has lost its resistance. Liebman says that this condition may be remedied with sandpaper.

PAUL BERLER

Background

Paul Berler has been Assistant Conductor of The Concord Band since 2002, and is currently Director of the Marching Band and the Wind Ensemble in the North Andover school system, and Director of The Chelmsford Community Band.

Berler holds a Bachelor's degree in Music Education from the University of New Hampshire and a Master of Music degree from the New England Conservatory. He has studied conducting with Frank Battisti and Stanley Hettinger. Mr. Berler has served on the Executive Boards of both the New Hampshire and Massachusetts Music Educators Associations.

Selecting The Best Cane

Understanding the physics of matching a reed to the mouthpiece is an important step in selecting reeds. Berler describes variances in mouthpieces and illustrates how different tip openings are better suited to different reed strengths. “The more open your mouthpiece facing (i.e., jazz mouthpieces), the softer your reed strength should be. The more closed facing (classical mouthpieces), the harder the reed.”⁴⁵ Knowing this gives an inexperienced player an informed starting point when selecting a reed.

Berler recommends selecting cane that has an even distribution of fibers, a yellow color, a shiny hue, as well as having a visible heart as the first step. Concerning green colored reeds that have not been properly aged, Berler recommends storing them in a “. . .dry

⁴⁵ Paul Berler, “Basic Saxophone Skills: Reeds, Part I,” *The Saxophone Journal* 338 (January/February 1996): 54

place for about one year.”⁴⁶ Collecting and storing reeds, allowing them to age is a practice that can present some great results, according to Berler. Berler remarks that labeling each reed with a number or letter will aid in identifying the reeds. Also, by placing the reeds in a particular order in a storage case will assist in keeping track of the best ones.

Reed Break-in Procedures

Berler highlights reed conditioning as a process of soaking a reed, playing it for a few minutes and then allowing it to dry. Berler states, “a new reed should be introduced to the stresses of playing vibrations gradually. If it is not, the vibrations can lead to damage of the reed fibers, thus reducing the reed’s playing life.”⁴⁷

Berler explains his four-step break in process: During sessions one, a new reed is placed “butt end...in the water for a few seconds. Berler then advises to, “Put the reed (back) in the water, tip-first, leaving about one-half inch above the water line.”⁴⁸ After soaking the reeds thoroughly, Berler advises:

“start the initial playing test with long, sustained tones in the lowest register at a medium-soft to medium-loud dynamic level, then gradually moving to the middle register still at the same dynamic level. High register tones and loud dynamic levels should be reserved for later playing tests. The first playing period should only last between five and ten minutes, and remember to play each new reed for an equal length of time and dynamic level.”⁴⁹

The second session, which should occur one day after the first, is very similar to the

⁴⁶ Ibid.

⁴⁷ Ibid., 55.

⁴⁸ Ibid.

⁴⁹ Ibid.

first session. “Soak each reed in the glass for about ten minutes. Then in the playing session, play each reed for about fifteen to twenty minutes, extending into the upper ranges of pitch and dynamic level. Again, save the extremes, such as the altissimo register for subsequent sessions.”⁵⁰ During the third and fourth sessions, the reed should be soaked for “about ten minutes.”⁵¹ After soaking, the reeds should be brought to performance readiness on the mouthpiece. It is after this preparation that the reed is ready to begin adjustment.

Tools

Before beginning reed adjustment, one needs to have some basic tools and supplies such as: “**1.** Some sort of reed storage case, preferably one in which the reeds remain flat and dry. **2.** A plate of glass or Plexiglas, to use as a surface for working on the reeds (and make sure the sharp edges have been smoothed). **3.** Some sandpaper, four hundred to six hundred grit. **4.** A reed knife, which can be purchased from most instrument shops.”⁵²

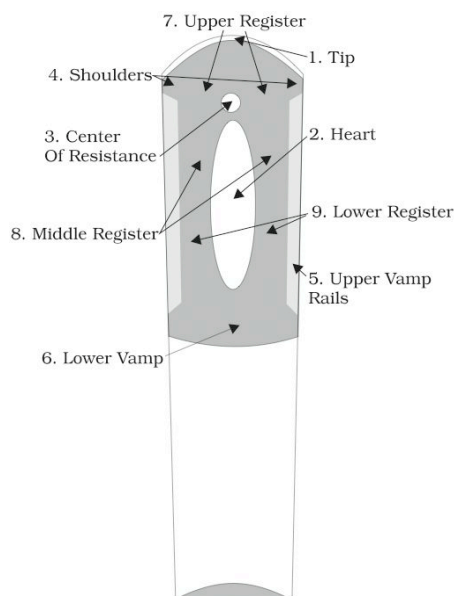
Areas of Adjustment

It is through the use of an anatomical reed diagram, accompanied by a table of reed symptoms, that Berler illustrates areas of adjustment. Berler uses a summarized paragraph explaining his reasoning for the adjustments.

⁵⁰ Ibid., 55.

⁵¹ Ibid.

⁵² Paul Berler, “Basic Saxophone Skills: Reeds, Part II,” *The Saxophone Journal* 338 (March/April 1996):

Table 6. Berler's Anatomical Reed Diagram.⁵³

“1. THE TIP This is the thinnest and most delicate region of the reed. It is responsible for the airtight seal created against the tip of the mouthpiece, thus its uniformity of size and thickness is essential for good reed performance, general response of the instrument, and tone quality. This area should be a “last resort.” Make all adjustments to other parts of the reed before making any adjustments to the tip. And even then, those adjustments should be minimal. Try to leave a little extra cane in this area whenever possible, for if the tip becomes too thin, the reed will be rendered useless. 2. THE HEART This area in the center of the reed is responsible for the volume, projection, and tone quality of the reed. Adjustments, like the tip, are almost never made to the heart area. If necessary, tiny adjustments can be made, but only for a general effect. 3. THE CENTER OF RESISTANCE This small area is responsible for the uniform transmission of vibrations from the thinner parts of the reed to the heart. Adjustments made in this area and

⁵³ Ibid., 69.

around the heart region affect. 4. THE SHOULDERS If a reed is thicker or thinner on one side than on the other, this is the region to adjust. The uniform thickness of this area is essential to quality reed performance and response. Also, if you want to be really scientific, the thickness of this area relative to other areas will determine the reed's response in specific registers and at specific dynamic levels. 5. THE UPPER VAMP The upper vamp rails. The entire section of the reed we are using to make adjustments on is generally known as the vamp. It is divided into two sections, upper and lower, determined by the placement and size of the heart region. The smooth area (without the grain), which we do not adjust, is called the stock. Removal of cane from one side or the other of this area will affect the reed's balance, response, and resonance. Be careful to make your adjustments to this area gradual and balanced. If you remove a certain amount of cane from one side, do the same to the other side. 6. THE LOWER VAMP Some reeds have some extra wood in this region. Removing this excess cane can help to make hard reeds a little more soft and flexible and usually improves response in the lower register. Also, a general sanding of the entire lower vamp region (the area from the bottom of the heart to the stock) will improve response in the lower register. 7, 8, 9. UPPER, MIDDLE, AND LOWER REGISTER ADJUSTMENT AREAS Adjustments made to these specific regions of the reed, made after general conditioning and balancing of the reed, and made in conjunction with the other regions of the reed, will help with response and tone quality in specific registers. Check the backside of the reed for flatness. If the back seems at all warped, uneven, or dull, you will have to sand the reed in the following manner: Put the sandpaper on your glass plate, abrasive side up. Hold the sandpaper in place with one

hand, and stroke the reed in a similar fashion to that of polishing the reed. Stroke the upper register. Be careful, however, because even the smallest of ships are: Area 7 with areas 4 and 1; area 8 with areas 4 and 5; area 9 with areas 4 and 6."⁵⁴

Special Tricks

Berler's work is a condensed piece of literature, and it is speculated that he did not include a special trick for reasons of brevity. One might say his special trick was managing to arrange all of his information into just four pages of the *Saxophone Journal*. But alas, his article does not lend itself to sharing a special trick.

⁵⁴ Ibid., 69.

KALMAN OPPERMAN

Background

Kalmen Opperman (born 1919) is an American clarinetist. He is a noted performer, teacher, conductor, mouthpiece and barrel maker, composer, and writer of numerous clarinet studies. For many years he was a performer on Broadway and has written over 10 highly acclaimed study books for the clarinet, including his multi-volume Daily Studies and Velocity Studies. Opperman is most notably a private clarinet teacher in his studio in New York City. He has taught at such schools as Boston University, Hartt School of Music, and Indiana University. His handmade mouthpieces and barrels are highly sought after items for professional clarinetists for their quality workmanship and sound.

Selecting The Best Cane

Opperman states “There is no positive way to determine the merits of a commercially cut reed without playing on it.”⁵⁵ He outlines a number of guidelines to visually inspect a reed’s potential. “The important points to be considered are the taper of the sides from the shoulder to the tip, a well defined U shadow at the center of resistance, the conformity of the tip to the curve of the mouthpiece, equal resilience and thickness across the tip, and a fine strait grain through the tip.”⁵⁶

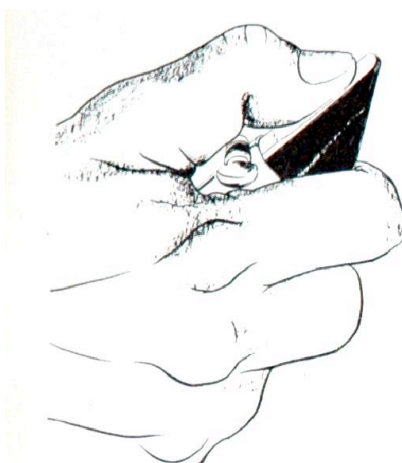
⁵⁵ Kalman Opperman, *Handbook for Making and Adjusting Single Reeds: For All Clarinets and Saxophones* (New York: Chappell Music Company, 1956), 32.

⁵⁶ Ibid.

Reed Break-in Procedures

Opperman states that “before making the first playing tests, the user of commercial reeds should soak his selected reeds with saliva several times each day for three or four days, and dry them with the flat side up.”⁵⁷ He also states the reed should be thoroughly soaked for at least three to five minutes prior to being secured to the mouthpiece. The focus of the initial playing session is only to test the responsiveness of the lower register.

Table. 7. Opperman Adjusting Reed on Mouthpiece.⁵⁸



Opperman recommends adjusting the reed to different positions on the mouthpiece to find the optimum location. “Try setting the reed above the tip of the mouthpiece, then slightly below it. Also try moving it a trifle to the right, then to the left. One of these shifts will reveal the best playing position of the reed.”⁵⁹ According to Opperman the responsiveness of a reed will change within the first day or two of being played. He recommends waiting for the reed to settle before making final adjustments.

⁵⁷ Ibid.

⁵⁸ Ibid., 44.

⁵⁹ Ibid., 33.

Tools

Opperman advises having quality tools such as, a reed knife, a small piece of glass, a variety of grit sandpaper, a flat mill file, needle files, reed rush, and pouncing paper.

Opperman highlights that knowing how to properly use and sharpen a reed knife makes it the most essential tool. He recommends using a knife made of high carbon steel, as it will hold its edge longer. Opperman also suggests having two knives, “one for spitting the tube, rough trimming, skinning the bark, making the primary cuts, cutting the convex curve, and for rough scraping; the other, with a comfortable handle as a prime requisite, for fine finish scraping and adjusting.”⁶⁰

Opperman includes detailed instructions on sharpening the knife. He recommends a number “111 Carborundum sharpening stone” citing that it has “sufficient abrasiveness for a good honing job.”⁶¹ Opperman states when sharpening the knife:

“It is important to note the angle at which the knife is held when honing each side of the blade. Use the smoother side of the stone for the finish honing. During the sharpening process, a slow deliberate rhythm should be employed. The blade is perfectly flat at all times...Apply pressure with the index finger on each stroke...Some may prefer to use a razor strop for final honing.”⁶²

⁶⁰ Ibid., 11.

⁶¹ Ibid., 10.

⁶² Ibid., 11.

Table 8. Opperman Illustrates Proper Knife Sharpening.⁶³



Areas of Adjustment

Opperman focuses his reed adjustment discussion on corrections for unresponsive low register, insufficient resonance, a warped lay, and adjustment for a choked off sound. When one encounters a “tubby” or unresponsive low register, Opperman recommends maneuvering the reed down from the mouthpiece tip as this will sometimes fix the problem. If still unresponsive, use a scraping knife or rush to remove a small amount of reed material “along the vamp from the shoulder to the halfway point.”⁶⁴ Opperman follows by saying, “If this does not remove the difficulty completely, stroke the vamp with rush from the halfway point to the tip.”⁶⁵

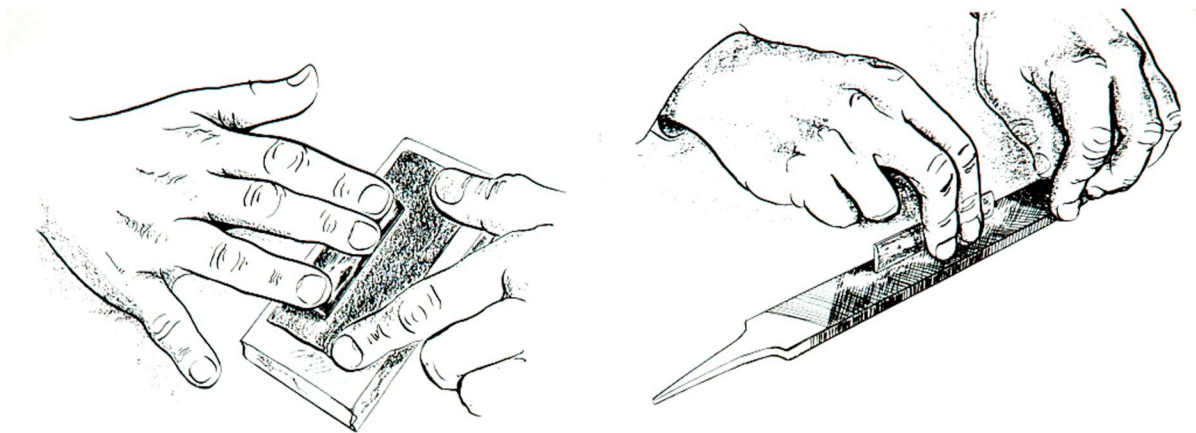
⁶³ Ibid., 11.

⁶⁴ Ibid., 33.

⁶⁵ Ibid.

Insufficient resonance is caused when the reed is generally too thin or when a state of imbalance resides in the tip. Opperman cautions, “Very free blowing reeds are better left temporarily unadjusted.”⁶⁶ When repairing a reed that is too thin Opperman suggests, “lengthening the vamp and clipping a little from the tip.”⁶⁷

Table 9. Opperman Illustrates Proper Hand Position While Using a Flat Mill File and Pouncing Paper on Glass.⁶⁸



The reason of more pressure application than normal is typically an indication that a reed has a warped lay. To remedy this condition, Opperman recommends wetting the reed, pressing it to the mouthpiece, and allowing it to dry. If this does not work, Opperman states “...try sanding the lay lightly with pouncing paper or rubbing on the flat file, applying more pressure towards the heel.”⁶⁹

A choked-off sound is caused when the lay of the reed becomes warped towards the mouthpiece, thus, diminishing the tip opening. If this condition occurs Opperman states that it is best to “discard the reed” for the cane has become too weak. If adjustment is needed, it

⁶⁶ Ibid., 34.

⁶⁷ Ibid.

⁶⁸ Ibid., 14-16.

⁶⁹ Ibid., 35.

is best to “sand the lay lightly with pouncing paper or rub it on the flat file, applying more pressure towards the center.”⁷⁰

Special Tricks

Opperman states, a doubler (i.e., one who plays multiple instruments) is subject to vast differences in resistance between their instruments’ reeds. Switching between instruments with differing resistance creates an environment that is quite detrimental to one’s embouchure and tone. To minimize this, Opperman advises matching resistance of the reeds and mouthpieces between the instruments. The approach “should be to match the secondary instrument to the principal instrument of the player.”⁷¹ One special trick Opperman mentions for doublers is to reduce larger reeds to dimensions that fit the other instruments. For example, “A B-flat clarinet reed will reduce to the size of an E-flat clarinet, and an alto sax reed will reduce to fit a soprano.”⁷² Opperman identifies this tactic as especially useful when reed blanks are difficult to locate.

⁷⁰ Ibid., 36.

⁷¹ Ibid., 38.

⁷² Ibid.

SUMMARY, CONCLUSIONS, AND SUGGESTIONS FOR FURTHER RESEARCH

After reading the preceding techniques for adjusting the single reed on the saxophone, the following questions arise. Whose techniques should be used? Which book is the “right” one? Which set of instructions is best for me? Systematically attempting each of these techniques is the only way to thoroughly know which is best for an individual’s liking. Because adjusting reeds is a personalized craft, the answers to the above questions lie in the journey that one travels, delineating which technique is ideal for them.

Because of the nature of the study-focus, some techniques the reviewed were very similar, if not identical. Interestingly, the surveyed materials did not directly contradict each other.

Background

Summarizing the backgrounds of each author included in this comparison reveal that each possesses rich and diverse backgrounds. All have extensive experience performing in contemporary or classical settings and have appeared with America’s finest orchestras and commercial groups. The authors have each released recordings either as a soloist, or with contemporary musical groups. The diversity in their performance backgrounds creates variety in the perspective that each embodies.

Selecting the Cane

All authors acknowledge that initially selecting quality reeds is an important step before beginning adjustments. The consensus is to locate a fine-grained reed that contains straight fibers running all the way down to the tip. The color should be a yellow or tan hue, avoiding green altogether. The reed should have no obvious flaws; the factory cut should have even dimensions and a gradual taper. Visually inspecting to ensure the reed contains a dark heart by holding it up to a light source is an agreed upon practice.

Reed Break-in Procedures

Once ideal reeds have been selected, with the exception of Teal, all agree the reed should be subject to a wetting and drying process to loosen the fibers and prepare them for vibration. While Teal does not mention wetting in his book, Berler, Opperman and Reed outline a regimented three or four day break in session; Leibman mentions a twenty-minute soaking. The reeds should be played only for a few minutes, and in a limited range. This playing interval is increased over the next few days before it is introduced to the normal rotation. It is also recommended that during the break-in session, the reeds are numbered and placed in a reed case for later identification. Placing the reeds in a particular order is also important, as the marking may be inadvertently removed during the adjustment phase.

Tools

Having quality tools is a very important aspect of reed adjustment. The tools mentioned in order of importance were a reed knife, a piece of glass, varying grit sandpaper, a reed clipper, a flat mill file, Dutch rush, a dial indicator, needle files, and pouncing paper. Some alternate tools mentioned were an emery board, straight razor blade, a regular knife,

and a three-edged scraper. Opperman was the sole author who stressed maintaining sharp tools; he detailed the proper way to sharpen a reed knife. Reed pointed out, in the hands of a skilled adjuster, a sharp knife and dial indicator are the only tools necessary for reed adjustment.

Areas of Adjustment and Special Tricks

There are many similarities among authors in the area of reed adjustment. As it appears throughout, there are only a few fundamental rules to reed adjustment. When a reed is too stuffy and stiff, it is too hard and material should be removed. When a reed is too flimsy and bright, it is too soft and the tip will need to be clipped. Three of the authors included an anatomic reed diagram delineating which area of a reed should be adjusted; each was principally identical to the others in their conclusions.

Special Tricks

Because of the inherit individuality of each author, the section dedicated to special tricks did not lend itself to summary. The authors had several important ideas, which, through this heading, added a new dimension. It was in the special tricks section that some of the richest ideas were found.

CONCLUSIONS

Ray Reed aptly named his book *The Advanced Art of Single Reeds* in that adjusting reeds is exactly that, an art. Another example of this idea comes from an interview with Professor Paul Wagner, from Berklee College of Music. When asked about the process of reed adjustment he remarked, “nobody really knows...and if someone tells you otherwise, you’ll know they know even less than you do.”⁷³

Reed adjustment is analogous to playing music; it is a process of acquiring, developing, and mastering a skill set. Music students must first learn their scales, fingerings, and nomenclature as a preliminary step to creating music. Similarly, a reed worker must first acquire the physical tools and finesse associated with cutting. They must also understand the anatomy and physics of a reed before cutting will begin to make improvements. Once the skills are accomplished, it is then a process of trial and error, testing and recutting. An individual progresses through many stages before becoming a master of these procedures; the skills must be repeated until becoming fully realized.

The books compared here were written with an intent to provide the reader a springboard from which to explore and develop his or her own techniques. The authors did not attempt to create an all-encompassing manual for repairing any reed defect that one might encounter. They instead created a set of guidelines or suggestions based on the real life experience of doing precisely what was being written about. All of the information was

⁷³ Professor Paul Wagner of Berklee College of Music, interview by author, 26 October 2006, Boston, In Person, Berklee College of Music, Boston.

written by primary sources. Since all writers surveyed are primarily performers, they first experimented with reeds, and then conveyed their ideas through these documents.

In conclusion, each book surveyed here possesses attributes making it more or less suitable for different readers. The Teal and Liebman portions are excerpts taken out of a larger work, intended to advance many facets of saxophone performance. The literature provides a solid foundation and is easy to read; both authors avoid excess description. It would be beneficial to recommend either of these works to a beginning or intermediate student.

Reed's book is the most comprehensive guide, containing over two hundred pages of superior descriptions and illustrations. The book presumes the reader already has a solid foundation in reed adjustment, only briefly mentioning preliminary procedures. Reed instead devotes the majority of his book to advanced adjustments. This book is most useful in the hands of a professional with a strong background in reed adjustment.

Opperman's book is primarily focused on reed making. The section devoted to reed adjustment is only a small portion of the whole. This book has outstanding illustrations created by artist Vera Yeager that give the reader another perspective. A more visual learner might benefit greatly from this book. It is recommended for a professional with a strong background in reed adjustment who is seeking material on reed making.

Lastly, Berler's articles are the most condensed, appearing on only four pages. His techniques are all concise and his writing style is elementary. Because of its readability, reduced physical size and basic techniques, it could be easily reproduced for students in private lessons. Both articles are found within the public domain and are easily accessible

on the Internet. Berler's articles are recommended for beginning or intermediate students in need of a basic handout.

It would be presumptuous to assume these books are exhaustive in their techniques, tools, and processes. However, the reviewed literature does appear to have a strong representation of some of the leading theories and procedures in modern-day reed-adjustment. Again, in conclusion, one must systematically attempt each techniques to arrive at a congruous-fit. Further to continue in one's professional growth, experimentation with new tools and reed adjustment techniques is a must.

SUGGESTIONS FOR FURTHER RESEARCH

There are some revolutionary techniques not mentioned by any of the evaluated books but are worthy of mention and further research. Human saliva is a major contributor to reed degradation. Because of this, reed maker Randall Paul has experimented with sealing the reed with olive oil, paraffin wax, and bees wax making it less permeable. Paul has experimented with soaking the reed in olive oil overnight and concludes the reed is darker in sound. Rubbing paraffin wax onto the sandpaper while final finishing the table fills the gaps and crevices with wax, thus making it less permeable and brighter in tone. Beeswax appears to have a similar osmotic effect as the paraffin wax, but adds less brightness to the tone than the paraffin wax.

The natural warping process that a reed's table undergoes is a major discovery written about by Ray Reed. In his book, Reed talks about a process of making a reed's table concave, thus avoiding the inevitable warped table and subsequent leaks. It is truly remarkable what this adjustment will do to the playability of a reed. Reed does outline a process to remedy this, but unfortunately, the angle and depth of this cut are truly difficult. Future research and development should go into developing a tool that could be used for this procedure. Recently, mouthpiece makers have come to this realization and begun to manufacture the table of a mouthpiece convex. This is another remedy to the warping problem, but few mouthpiece makers are employing this practice.

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