A PISTON TRUMPETER'S GUIDE TO THE ROTARY TRUMPET

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Section 1

Introduction

The use of rotary trumpet in the United States is becoming increasingly more common for certain pieces in the orchestral repertoire, but the rotary has been the default instrument in Germany and Austria since its invention in the 19th century. Some of the most famous orchestras, such as the Berlin Philharmonic and the Vienna Philharmonic use rotary trumpets almost exclusively. Many conductors prefer the balance and blend that the rotary trumpet offers, especially for German and Austrian repertoire, because of their broadness of tone, smoothness of slurs, and differing tone colors in various dynamic ranges.

The differences in sound between piston and rotary trumpets can be attributed to the construction and design of the instruments. Though the rotary and piston trumpet share more similarities than differences, much like the cornet and trumpet, the player will notice that the two instruments are different in significant ways. If a player approaches the rotary trumpet with the same concept of sound as the piston trumpet, this will lead to sub-optimal results. Additionally, the rotary trumpet can be used as a pedagogical tool to diagnose and correct some common playing problems.

This document is designed to be a concise guide for intermediate or advanced trumpeters looking to familiarize themselves with the nuances of the rotary trumpet. This will be done by presenting historical information, showcasing physical differences between the instruments with a section specifically dedicated to mouthpiece selection, pedagogical applications, and playing exercises. Additionally, a list of commonly requested orchestral excerpts for which rotary trumpet may be appropriate is included.

Section 2

History

The first half of the 19th century was an important time in the instrument's history. During this period, the trumpet transformed from the valve-less instrument that had existed for hundreds of years into the modern trumpet used today. A detailed history of the developments made during this period is beyond the scope of this project, but a brief overview will be useful in understanding some of the differences between piston and rotary trumpets. For a more thorough history of the trumpet, consult Edward Tarr's *The Trumpet* or Philip Bate's *The Trumpet and Trombone.*

Before the application of valves to trumpets in the early 19th century, trumpets were essentially long, straight tubes with a mouthpiece on one end and a flared bell on the other. The tubing was often coiled or folded to aid players in holding these instruments because they were very long; twice as long as modern trumpets in the same key. We have come to refer to trumpets without valves as natural trumpets. These instruments could only execute the notes that lie within the instrument's harmonic series, except for occasional passing notes which were infrequent enough that they could be "lipped" to the correct pitch. Many of the most well-known composers of the baroque era, such as J.S. Bach and Telemann, wrote beautiful solos for the natural trumpet. The trumpet of the time was only able to produce melodic material in the extreme upper register, sometimes referred to as the *clarino* register, and this style of high playing was very difficult and only appropriate for solo pieces such as sonatas and concerti. Therefore, the trumpet's role in other types of music, such as orchestral music, was generally confined to reinforcement of the tonic and dominant. Experiments with adding valves to brass instruments began around 1815, although other experiments with chromatic trumpets such as the stopped trumpet, the keyed trumpet, and the English slide trumpet began at least 40 years prior. Anton

Weidinger's keyed trumpet is without a doubt the most famous example of an attempt at a fully chromatic trumpet before the application of valves. Two of the most famous concerti for trumpet, those by Haydn and Hummel, were written for Weidinger and both works remain an important part of the repertoire to this day. However, the keyed trumpet ultimately proved to be largely unsatisfactory due to its uneven tone. The notes within the instrument's harmonic series sounded clear and powerful, but the notes outside this series sounded weaker. Though these imperfections could be overcome to some extent by skilled performers such as Weidinger, experimentation with valves in the early 19th century had already begun to produce superior results.

During the period from 1815 to 1840, instrument manufacturers began to produce brass instruments with a number of different kinds of valves. Some types of valves applied to brass instruments at this time include the Stoelzel valve, the box valve, the tubular valve, and the Vienna valve. The two valves relevant to the current discussion, however, are the rotary and piston valves. Viennese instrument maker Joseph Riedl patented the rotary valve in 1835, although there is some evidence in the literature that indicates Riedl had been making this type of valve since 1832. Reidl referred to his invention as the "wheel valve" or *rad-maschine* because of the way the valve rotates inside the valve casing. The piston valve evolved from the tubular valve, which is similar to the modern piston valve. The design of the tubular valve however, had the drawback of introducing sharp corners into the air column that adversely effected sound production. The piston valve corrected this flaw, and it was patented in France in 1839 by Francois Perinet.[1] Perinet's piston valve gained popularity in France and England while Riedl's rotary valve remained popular in Germany and Austria. Though other designs were introduced after the piston and rotary, players gravitated toward these designs due to their simplicity, reliability, and ease of operation. Additionally, the difficulties presented by these types of

[1] Edward Tarr, *The Trumpet* (London: Batsford, 1988), 158-61.

valves are relatively easy to overcome.[2] Though numerous incremental improvements have been made to the mechanisms of the rotary and piston valves since their invention, their design has remained largely unchanged.

Although trumpets with rotary valves have remained most common in Germany, Austria, and several countries in eastern Europe since the time of their invention, there are some interesting exceptions.[3] The Vienna Philharmonic used piston trumpets in the early 20th century, and there are videos made in Berlin in the 1930s that show piston trumpets being used under the conductor Erich Kleiber. The exact reason for the use of piston instruments in these rotary-dominant regions at this time is not known, but it could be due to the popularity of certain French trumpet manufacturers, particularly Courtois and Besson. The exact timing and motivation behind the introduction of rotary trumpets in American orchestras is also somewhat uncertain. Some American orchestras began using rotary trumpets for certain German and Viennese repertoire sometime during the 1970s. The Chicago Symphony Orchestra may have been the first American orchestra to use rotary instruments, beginning sometime around 1975.[4] The music director at the time was George Solti, who was familiar with the sound of rotary trumpets from his time in Frankfurt and Munich earlier in his career. The use of rotary trumpets in the U.S. has expanded considerably since this time. Almost every major orchestra in the United States now uses rotary trumpets for the music of Haydn, Mozart, Beethoven, Brahms, and other German and Austrian composers. Due to some similarities in construction with earlier natural trumpets that will be discussed later, rotary trumpets sound more like their predecessors than piston trumpets. Rotaries are therefore commonly used to perform pieces that were composed before valves existed.

[2] Philip Bate, *The Trumpet and Trombone: An Outline of Their History, Development, and Construction* (London: E. Benn, 1978), 183.
[3] Tarr, *The Trumpet*, 17.
[4] Tarr, *The Trumpet*, 189.

Section 3

Instrument Differences

Valve Construction

The design of the valves is the most obvious difference between the rotary and piston trumpet. The primary difference is that piston valves move vertically in the valve casing while rotary valves spin, but other differences also exist that effect how the instrument feels to the player. Most piston trumpet players have probably noticed the slight bumps in the internal tubing of the valves, but they may not be aware why these protuberances exist. The bumps are necessary because piston valves must have three airways for the valve to function properly, whereas rotary valves only need two. The piston itself, however, needs to be kept as small as possible to avoid excessive friction in the valve casing. In order to put three airways in a relatively small valve, manufacturers must compromise by constructing the valves with small imperfections in some of the airways. The small bumps are barely noticeable with only one valve down, but the problem compounds when more valves are used. These discontinuities in the airway are typically only noticed in the notes that use all three valves, low F-sharp and low C-sharp, resulting in a stuffy or dull sound, especially on student or intermediate model instruments. Rotary valves, only needing two airways, can be constructed without any additional obstructions inside the valves. While a difference in resistance between all open and all three valves down can still be felt on a rotary trumpet, it is much less significant than on a piston trumpet. Recently, a company called M.A. Wilk Brass has patented a valve system called the MAW valve. The company claims that these valves have all the benefits of rotary valves, but in a piston valve design. This is accomplished by removing metal from the valve so that it is no longer a perfect cylinder; it has cutaway sections that allow the air

to pass through the valve without the bumps that are standard in piston valves.[5] These valves are currently being used in trumpets made by Lotus.

There are many other distinctions between rotary and piston trumpets aside from the valve mechanism. Though it is practically impossible to attribute any particular sound quality or playing difference to one specific element in instrument construction, all these variances combine to create a substantially different playing experience overall.

Valve Location

One design feature that has shown to be a significant contributing factor to the difference in sound qualities between piston and rotary trumpet is not the type of valves, but the location of the valves in the instrument. In piston trumpets, the air travels through a relatively long leadpipe, through the tuning slide, and then into the valve section. Rotary trumpets, however, feature a much shorter leadpipe that feeds directly into the valve section. This means that on a piston trumpet, the air travels through about 70 to 80 centimeters of tubing before the valve section is reached, whereas rotary trumpets only have 20 to 30 centimeters of tubing before the valve section.[6] Experiments by the Weiner Klangstil Institute have shown that the valve placement contributes more to the rotary trumpet's ability to slur smoothly than the type of valve. Rotary and piston valves were placed at different points along the instrument's tubing, and this revealed that the two types of valves produce practically identical slurs

[5] Information about M.A Wilk Brass Company and MAW valves from mawvalve.com

[6] These measurements were taken from the Wiener Klangstil study and appear to indicate measurements for B-flat instruments with mouthpieces attached, though the exact instrument type is not indicated in the study

when placed at the same location. It also showed that the closer the valves were placed to the mouthpiece, the smoother the slurs became.[7]

Bore Size

Bore size is one common area of confusion between the two types of instruments. An instrument's bore size refers to the internal diameter of the tubing at a certain point within the instrument's length. There is contradictory information available about which instruments feature a larger bore. Some notable American players who primarily play piston instruments have stated that they sometimes prefer to warm up on rotary Bb trumpet because it is the "biggest" instrument. While technically incorrect, at least in terms of bore size, the rotary trumpet does feel bigger and more open than the piston trumpet. Part of the confusion stems from where the bore of the instrument is measured. The bores of both piston and rotary trumpets are measured at the entrance to the valves, but since the valves are located at different lengths along the tubing as described in the section above, different measurements are expected. The bore at the valves of a rotary trumpet is significantly smaller than the bore at the valves of a piston trumpet, but measuring the bore at the same location on tubing of the instrument produces much closer results.

Further compounding the confusion, many prominent American trumpet players prefer large bore C trumpets and medium-large bore Bb trumpets. This preference is so strong that some piston trumpet manufacturers only produce large bore C trumpets.[8] Rotary trumpets generally have the same bore size regardless of whether the instrument is in C or Bb, but there are some bore size variances between manufacturers. The most common bore sizes are 11.65.

[7] Grego Wildholm, *Wiener Klangstil: Facts and Background Information on the Particular Sound of the Vienna Philharmonic,* (Vienna: IWK), 20-3.

[8] All piston C trumpets currently produced by Bach, Yamaha, and Shires are large bore instruments unless they are customized. Schilke is the only major U.S. manufacturer that produces smaller bores on instruments in C.

mm for piston Bb trumpets, 11.73 mm for piston C trumpets, and between 11.0 and 11.5 for rotary instruments. 11.2 mm seems to be the most common bore size for rotary trumpets.[9]

Keys

Another visible difference between the piston and rotary trumpet is that many rotary instruments have extra keys or *clappen* located on the main tuning slide. These keys have long levers that are operated by the pinky of the right hand. All rotaries have at least one key, which is also the water valve, but they can have up to four keys. A tuning slide with three keys is the most popular configuration, and these keys are used to reduce the resistance the trumpeter feels while playing certain pitches in the upper register. This leads to both a better sound and more comfortable high register. The operation of the keys and which notes utilize them will be discussed in the pedagogy and playing exercise sections. Some players feel that the added weight of the key-mechanism and the tension in the springs reduces the resonance of the instrument. For this reason, most rotary trumpet manufacturers offer optional tuning slides with varying numbers of keys.

Bells

The bells of rotary trumpets are different in two significant ways – their size and the use of crowns. Virtually all piston trumpets made by the most popular manufacturers have 123 mm diameter bells, whereas the most popular rotary trumpets have 130 mm bells.[10] This difference is one of the factors that gives the rotary trumpet its characteristic sound. Although it is of little practical value, it is

[9] Rotary trumpet manufacturers used to gather bore sizes and other specifications were Schagerl, Thein, and Weimann. Piston trumpet specifications come primarily from Bach and Yamaha.
[10] Piston trumpet bell measurements were taken from Bach, Yamaha, Shires, and Schilke. Rotary trumpet measurements were taken from Schagerl, Weimann, Oberrauch, and Yamaha.

interesting to note that the larger bell of the rotary also makes the first partial, or pedal register, more in tune than piston counterparts. Most players find the pedal register on piston instruments unusably flat (sometimes by more than a whole step), but the larger bell of the rotary helps raise the pitch and may allow the player to explore that register more easily. The preference for larger bells on rotary trumpets is not universal, however. There are some rotary trumpets, such as those made by the manufacturer Lechner, that have smaller 123-mm bells.

Another difference regarding the bells of rotary and piston trumpets is the use of a *kranz*, which can also be called a crown or a garland. Before the invention of valves, these pieces of metal were affixed to the bells of natural trumpets because the process of hammering the bell flair made the metal thin and brittle. The extra material was added as a necessary structural reinforcement, but the crowns were also elaborately decorated by some makers. This tradition of bell construction continued in countries that primarily use the rotary trumpet. Many rotary trumpets have an extra piece of metal, usually nickel silver, on the outside of the bell. The added weight to the bell gives these instruments a darker sound. Almost all rotary trumpet manufactures offer a crown as an option on their instruments. Some piston trumpets from the middle of the 20th century, such as the Olds Super Recording, which is no longer in production, also had a crown on the bell. Crowns on modern piston trumpets are extremely rare – Bach, Yamaha, Schilke, and most other popular modern manufacturers do not offer crowns as an option on their instruments.

All these physical factors combine to give rotary trumpets a distinctive sound. There are more similarities in sound between rotary and natural trumpets than there are between piston and natural trumpets. The tone quality of rotary instruments is darker and the attack is slightly rounder and less percussive. For these reasons, rotary instruments are often preferred for music written before the invention of valves, such as the symphonies of W.A. Mozart and his contemporaries.

Mouthpiece Selection

One of the most important factors in achieving the desired rotary trumpet sound is proper mouthpiece selection. Rotary trumpets use the same mouthpiece shank as standard piston trumpets. As such, the player can use the same mouthpiece they use on their piston trumpets, but it may not produce optimal results. Using a piston trumpet mouthpiece on a rotary trumpet often produces a tone that is too bright or edgy, and the intonation of the instrument also suffers. Generally, proper rotary trumpet mouthpieces are slightly more funnel-shaped than piston mouthpieces, which tend to be more bowl-shaped. The throats of traditional rotary mouthpieces are larger than standard piston mouthpieces, and the backbores are shaped differently. The shape of the cup combined with the bigger throat are two of the main factors that contribute to the more open and free-blowing sound of the rotary trumpet. Many German mouthpiece manufacturers do not provide equivalencies to popular American equipment, so a chart has been constructed below to provide a helpful starting point. Because many factors, such as rim shape and backbore size and shape, cannot be easily quantified, this chart is meant to serve only as a beginning reference point. If a player is new to rotary and looking for an appropriate mouthpiece to start, the Breslmair G2, the Weimann BMV 1.5, or the Yamaha 15E4 are highly recommended. The Breslmair G2 is recommended because it is very close in size to one of the most popular American mouthpieces, the Bach 1 1/2C, and because it is played by many professional players in Germany and Austria due to its sound quality. Another highly recommended rotary mouthpiece is the Weimann 1.5, which shares many similarities to the Breslmair mouthpiece, but it is produced by the American company Pickett Brass so it may be easier for American players to find. The reason the recommended Yamaha mouthpiece has a smaller cup diameter is because the Yamaha E cup is very deep - much deeper than the Weimann and Breslmair. The deep cup gives the mouthpiece a warm, dark sound, but can make certain aspects of technique, such as high register playing and articulation, more difficult for

some players. When consulting this chart, it is important to note that every mouthpiece manufacturer's measurements are taken at different points, so their sizes do not always compare in a meaningful way.

Popular Piston Mouthpieces		**Popular Rotary Mouthpieces**			
Bach	**Yamaha**	**Breslmair**	**Weimann**	**Josef Klier**	**Yamaha**
5C	14C4	G4	None	7B	14E4
3C	15B4	G3	BMV 2	6B	15E4
1 1/2C	16C4	G2	BMV 1.5	5B	16E4
1 1/4C	17B4	G1	BMV 1.25	None	None
1C	17C4	G1W	BMV 1	4B	None

Figure 1 – mouthpiece comparison chart[11]

Some American mouthpiece manufacturers, such as Pickett and Parke, can make a mouthpiece with rotary-style components, but with the same rim they offer on their standard mouthpieces.

[11] This chart was compiled using data collected from the various manufacturers' websites combined with personal experience.

Section 4

Pedagogical Applications

There are several pedagogical issues that may be more easily addressed on rotary trumpets than on piston trumpets. When experimenting with these issues, it is advisable to alternate between the instruments to try to apply these concepts immediately and frequently. Intellectually knowing that there is a problem and experiencing the problem are two very different things and using a rotary trumpet can help a player experience a change that may otherwise be difficult to access. One of the most famous and successful brass pedagogues of the 20th century, Arnold Jacobs, was known for saying "strangeness is your friend -- sameness is your enemy." The rotary trumpet offers an excellent opportunity to experience strangeness in a way that will allow them to develop various aspects of their technique.

Air

While rotary trumpets are more forgiving in some respects, the most notable way in which they are not forgiving is the application of air. Due to the differences in instrument construction, players can often get away with deficiencies in their air delivery on piston trumpets that will not produce acceptable results on rotary instruments. This is especially evident at both the soft and loud ends of the dynamic spectrum. Regular rotary trumpet practice can help players overcome several different air problems because, in general, the "sweet spot" of air delivery is much narrower on rotary trumpet. The air stream must not be over-compressed or pressurized, soft playing must be more supported, and loud playing cannot be overblown.

The more open feeling of the rotary trumpet can be used to help players blow with freer and looser air. This can have a tremendous positive impact on the player because nearly every aspect of trumpet playing is related to the use of air. Players who have problems with a "bottled-up" or over-pressurized airstream can benefit greatly by adding rotary trumpet to their practice routine. Even executing air patterns feels different on rotary trumpet. Playing short phrases while alternating between instruments is an easy way to find more openness and looseness in the air delivery. Focusing on letting the sound float without pushing the air can help the player discover an easier method of tone production.

Soft dynamics are challenging for many players, and the rotary trumpet can help to rebalance air to embouchure workload at softer dynamics. A common issue is a lack of support in the air stream at softer dynamics, resulting in a thin, unpleasant sound. Rotary trumpet will immediately highlight this shortcoming in technique. Because rotary responds slower, an under-supported *piano* dynamic that may respond on piston trumpet may not come out at all on rotary trumpet.

Rotary trumpet can also be used to help players who tend to over-blow. Due to the more mellow and broad tone of the rotary trumpet, an overblown sound will be immediately apparent. This overblown sound is crass or "blatty" and very often paired with flat intonation. Keeping the feeling of warm air, even at the loudest dynamics, will help ensure that the sound remains warm and full.

Flow – Smoother Slurs

As previously stated, experiments have shown that slurs on rotary trumpet are smoother than on piston trumpet due to the placement of the valve section in the length of the pipe. Playing any exercise or etude that focuses on smoothness of playing, such as Cichowicz's Flow Studies, on a rotary trumpet is an excellent way for a player to experience the difference in the instrument's slurring

capabilities. While slurs on piston trumpet will likely never be as fluid and "liquid" as they are on rotary, by focusing on the quality of slurs while playing rotary, the player will have a more vivid aural concept to strive for. Another philosophy of Arnold Jacobs and many other well-known brass pedagogues is that a student must first have a strong aural concept for any new skill that they wish to acquire. Experiencing the natural, fluid smoothness of slurs on rotary first-hand is an easy way to establish this aural concept.

Hand Position

When learning to play the rotary, holding the instrument is often awkward for piston trumpet players. The balance of the rotary trumpet is very different than piston trumpet, and each player will need to experiment to find his or her best grip. Like with piston trumpet, every player's grip is individual and will depend on the model and key of the instrument used and the player's hand size, but there are two commonly accepted hand positions that most players should begin with. The photos below show the two most common placements of the left hand. With any grip that is used, the most important considerations are:

1. None of the fingers on the left hand should interfere with the rotary mechanism, especially on the third valve.
2. The thumb on the left hand should be free to use the trigger mechanism.
3. The pinky on the right hand should be free to use the keys.

Because there is no hook for the right-hand pinky on a rotary trumpet, the left hand must support most of the weight of the instrument. The right thumb can be used under the pipe to add balance, especially during periods of heavy valve or key work. Almost all the mass of a rotary trumpet is closer to the left hand, so this hand will need to be able to support most of the instrument's weight. The player should experiment and choose whichever grip is most comfortable. Figure 2 shows the left hand with two fingers on top of the bell, the ring finger in the hook, and the pinky below the third valve. Using this grip

allows the instrument to be held with just the left hand. Players such as Gabor Tarkovi and Hans Gansch use this grip. Figure 3 shows the left hand with three fingers on top of the bell and the pinky in the hook. Using this grip will usually mean that the thumb of the right hand will be needed to add more support than the other grip. Matthias Hofs uses this grip. Each grip has its own advantages and disadvantages. The author prefers the first grip because it offers more stability and more freedom for the left thumb to operate the triggers.

Figure 2 – Grip 1 – Two finger above the bell

Figure 3 – Grip 2 – three fingers above the bell

With any grip used, it is best to try to let the instrument balance itself in the hand rather than clenching the fingers tightly around the bell, hook, or valve casing. The left hand should be as loose and relaxed as possible. The photo below shows an example of an incorrect grip. The hand is tight and the ring finger is wrapped around the hook in such a manner that it will interfere with the third valve operation.

Figure 4 – incorrect grip – interference with valves

The right hand is relatively simple in terms of placement, but it will need to be able to operate the keys in addition to the valves. Exercises to practice operating the keys will be included later in this document. The right-hand thumb should be placed somewhere under the pipe with the other fingers above the appropriate valves, just as with piston trumpet. Because the vertical distance the valve mechanism travels is significantly shorter on rotary, the player may need to play scales, arpeggios, Clarke studies, or any type of etude that focuses on valve work to get used to this feeling. Figure 5 shows the correct placement of the right hand.

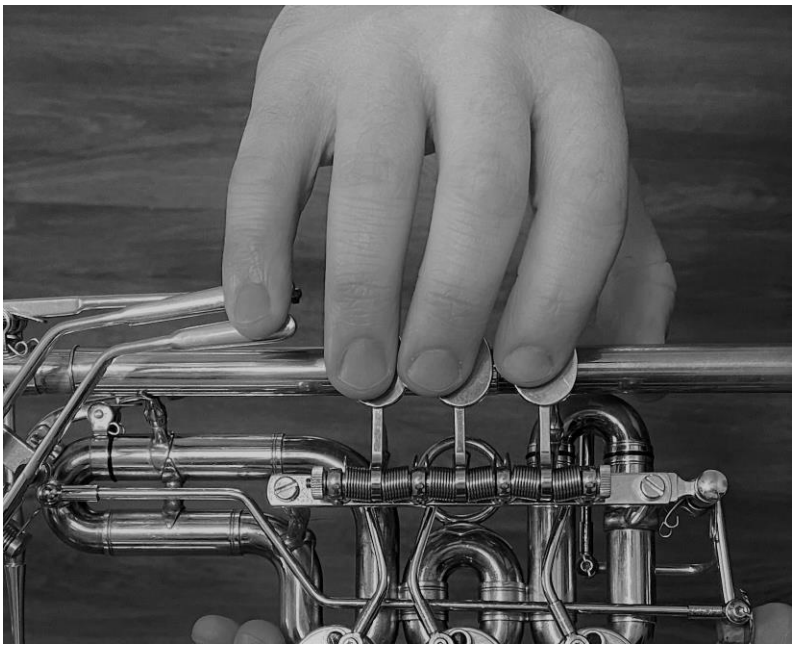


Figure 5 – right hand position

Getting used to the grip of the rotary is initially one of the more uncomfortable aspects of the instrument. Initially, the player may experience mild discomfort or soreness when holding the instrument for long periods of time. This will pass after a few practice sessions, provided a correct grip is being used. While the manner in which the player holds the rotary trumpet will not directly apply to piston instruments, it will directly affect the next topic of consideration – mouthpiece pressure.

Mouthpiece Pressure

Excessive mouthpiece pressure on the embouchure is a common problem with trumpeters of nearly every age and ability level. Even though the use of excessive pressure may be the result of an underlying problem, such as an under-supported airstream or an aperture size issue, experimenting on rotary trumpet can help a player experience the feeling of playing with less pressure. This can be particularly beneficial to players who may have used excessive pressure for many years. The problem with this habit is the same problem we face with many habits – as soon as the player thinks about something else, they fall back into their old way of playing. Rotary trumpet, however, is so different in construction that the player will not be able to resort to their standard grip, and therefore, their usual amount of mouthpiece pressure. This difference can be utilized to discover a more efficient approach to mouthpiece pressure resulting in improved tone production.

There are two factors that make mouthpiece pressure different on rotary than on piston trumpet. The first has already been discussed, and that is grip. Piston players who are in the habit of using the right finger hook to apply mouthpiece pressure can benefit immediately by playing rotary trumpet. Since rotary trumpets do not have a hook or any other apparatus that can be used to apply pressure with the right hand, all mouthpiece pressure must be applied with the left hand. Holding the rotary with a loose, relaxed left hand and letting the instrument balance itself, as recommended in the grip section, will also alleviate the habit of applying too much pressure. This alone can be a great benefit as the left hand is typically less dominant, but the second way in which mouthpiece pressure is different on rotary is probably even more important.

Unequal distribution between the top and bottom lip is a common problem on the piston trumpet. This often results in too much pressure being applied to the top lip, which is more delicate and

more easily bruised or injured than the bottom lip. David Hickman has shown that the left-hand grip is the main contributing factor to uneven mouthpiece pressure. Hickman also offers several alternatives to the standard grip that can help alleviate this issue.[12] According to Hickman, the valve cluster essentially acts as a handle to the instrument. With a piston trumpet, this handle is significantly lower than the leadpipe, which means that any pressure applied to the mouthpiece will not necessarily be even from top to bottom. The downward angle of the instrument for most players further compounds the issue of unevenly distributed pressure. The center-force line on rotary trumpet is much higher because it is practically in-line with the leadpipe, so pressure will be more evenly distributed on the top and bottom lips no matter the player's instrument angle. The sensation of more balanced pressure on the embouchure may feel very uncomfortable or unstable at first, but practicing on this instrument can help players develop new sensations. Hopefully, if those new sensations produce better results, the new feeling can be transferred to their primary instrument.

High Register and Vienna Keys

The extra keys found on the tuning slide of the rotary trumpet are usually the first thing one notices about the instrument. When engaged, these keys act to alter the acoustic impedance of certain notes in the high register. The effect on the performer is that these keys reduce the resistance and therefore hopefully increase the accuracy and quality of the note. These keys are operated by the pinky finger on the right hand, and the keys are only used one at a time – never simultaneously. All rotary trumpets have one key, which is the water key with an extended lever. The most common configuration is the standard water key plus two more keys, but some manufacturers offer more keys as an option. It is important to note that the use of these keys is not required. Any note can be played with the standard

[12]David Hickman, *Trumpet Pedagogy: A Compendium of Modern Teaching Techniques* (Chandler, Hickman Music Editions, 2006), 116-18.

piston trumpet fingering, and sometimes this is the best choice, especially for rapid passages. The keys are most helpful for large leaps into the high register, sustained high notes, and passages that repeat the same pitch. The easiest way to explore the use of these keys is by playing simple octaves or arpeggios. Since the keys alleviate a lot of the resistance of high notes and many players struggle to find balance with this resistance, experimentation with their use can be beneficial in unlocking the high register. Beginning a note with the key engaged and then releasing it simulates the feeling of the note on piston trumpet, so this could be used as a strategy to begin applying the easier feeling of the upper register on any trumpet.

Figure 5 shows one of the most common key configurations. The key on the left, labeled 1, also serves as the water key and is standard on all rotary trumpets. The other keys are numbered in order of most to least common. Additional keys are available from some manufacturers, but since their placement and operating levers are not standardized, this document will only focus on these three keys.

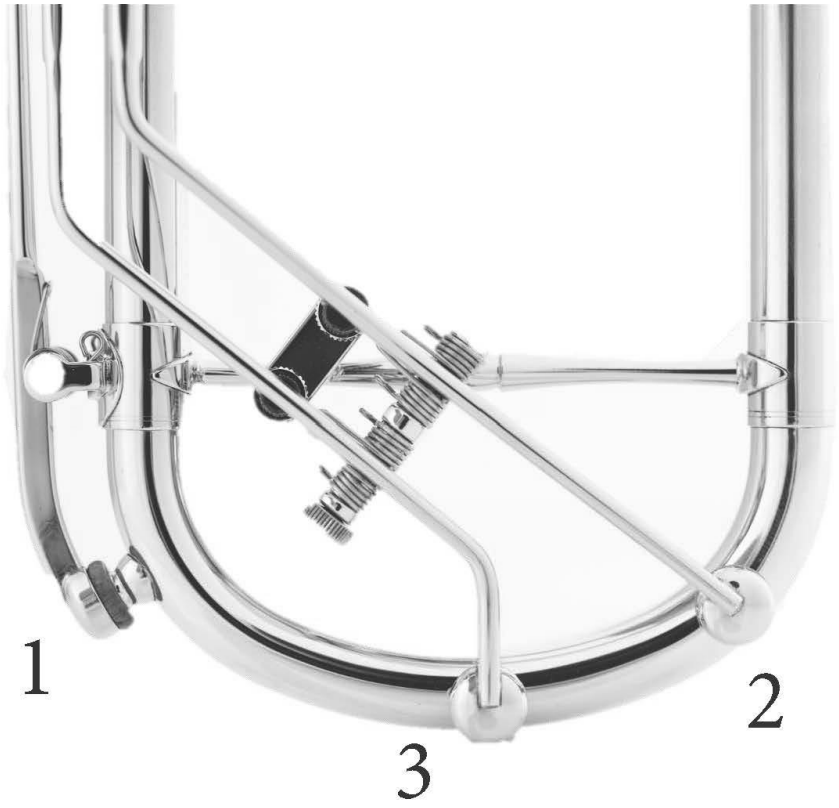


Figure 6 – key configuration and numbering

Key 1 is used for F5, Bb5, and D6

Key 2 is used for Eb/D#5, Ab/G#5, and C6

Key 3 is used for E5, A5, and C#/Db6

Section 5

Playing Exercises

Crescendo and Diminuendo

These very simple, but deceptively difficult exercises highlight one of the major ways in which rotary trumpets feel different. The author recommends playing these exercises on piston and then immediately on rotary to notice the difference in how the instruments react at different dynamics. Piston trumpets have an even tone color whether they are played soft or loud. Rotary trumpets, on the other hand, exhibit different tonal qualities depending on the required dynamic. Softer dynamics are warm and mellow, while the louder end of the dynamic range maintains a sense of warmth, but with less mellowness and more brilliance. Some players have described this *forte* rotary trumpet sound as having a lot of heat in the tone. Overall, the rotary sound should remain warmer and darker than the piston trumpet.

Playing these exercises on piston and rotary back to back shows the difference in tone qualities. These exercises should be transposed throughout the range of the instrument, and special care should be given to intonation during the *crescendo* and *diminuendo*. While it is generally recommended to always focus on achieving the most beautiful sound possible, it can sometimes be beneficial to take these exercises too far – to the point of an overblown sound. This can give the player an idea of where each instrument's limits lie so that they don't accidentally cross this threshold in performance. Practice of these exercises in this manner, however, should be done sparingly.

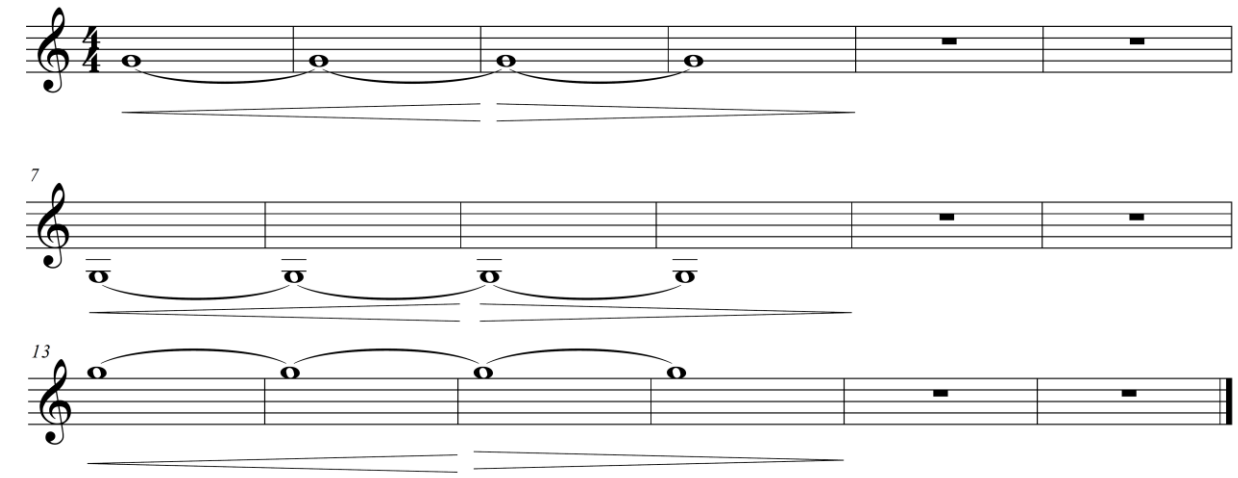


Figure 7 – Exercise 1

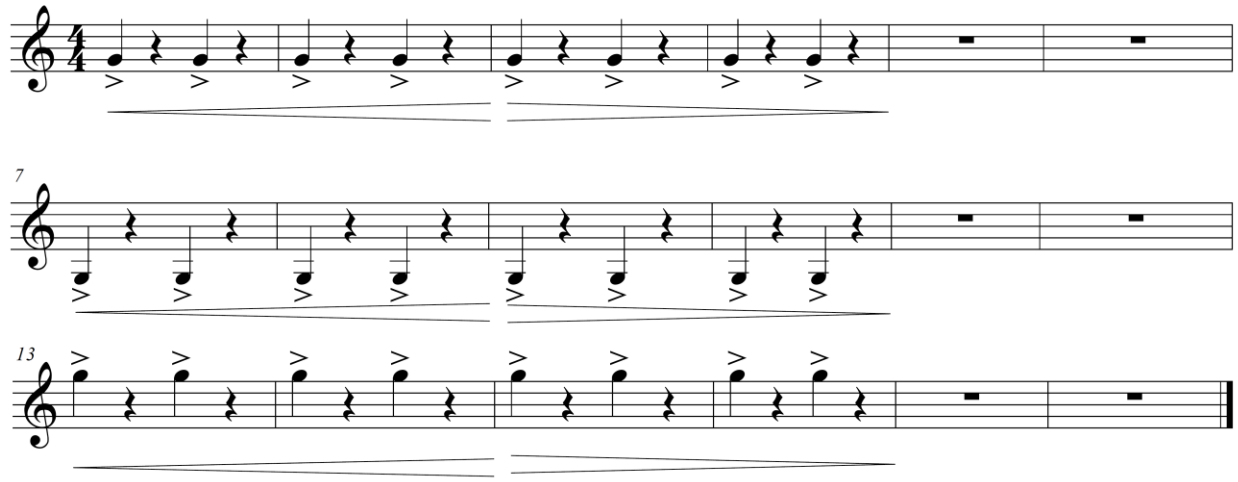


Figure 8 – Exercise 2

Articulation

Compared to piston trumpet, articulating on a rotary trumpet feels more like a cornet or flugelhorn. There is less “pop” at the beginning of the notes, which is one of the characteristics that make rotary instruments blend better with horns and with the wind section. Soft, delicate entrances that could feel very cautious on piston trumpet, such as the opening of Schumann’s Second Symphony,

are much easier on rotary. The following exercise is adapted from exercises in John Daniels' book *Special Studies for Trumpet.* The eighth-note pickup should be played as a breath attack. The player can either think of a "hoo" or "poo" articulation. The following quarter note should be articulated as normal. Playing this exercise can help the player find exactly when the note wants to speak. It is important in this exercise not to force the breath attack note to speak, but to let it speak when it wants to. As with the previous exercise, this study should be done throughout the range of the instrument.

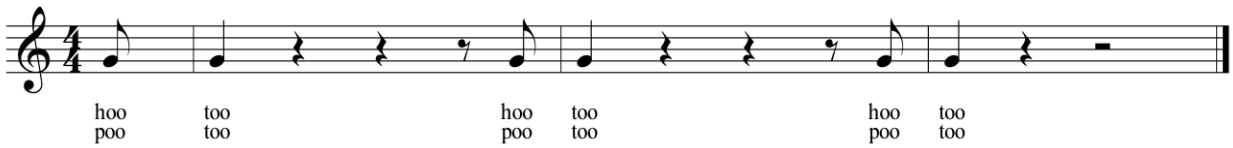


Figure 9 – Exercise 3

Because the rotary trumpet responds differently, multiple tonguing feels somewhat dissimilar to the technique on piston trumpet. Any multiple tonguing exercises from standard study material should be practiced on rotary trumpet. The method books by Arban, Saint-Jacome, Vizzutti, Clarke, and others all contain a wealth of multiple tonguing exercises. Players that struggle to multiple tongue lightly on the piston trumpet can use the more forgiving nature of the rotary to again discover a new aural concept that can be strived for on their primary instrument. Those who tend to multiple tongue too lightly, however, will be able to modify their current technique on the slower-responding and more forgiving rotary trumpet before implementing this change on piston trumpet.

Vienna key Exercises and Etudes

The following exercises will acquaint the player with the use of the keys. Consult page 21 of this document for the numbering system used here; the number of the key that should be used is printed under the note. Some players may find that they prefer to only use the keys on the top note of the arpeggio exercises. Additionally, try starting the notes with the key depressed and then release the key.

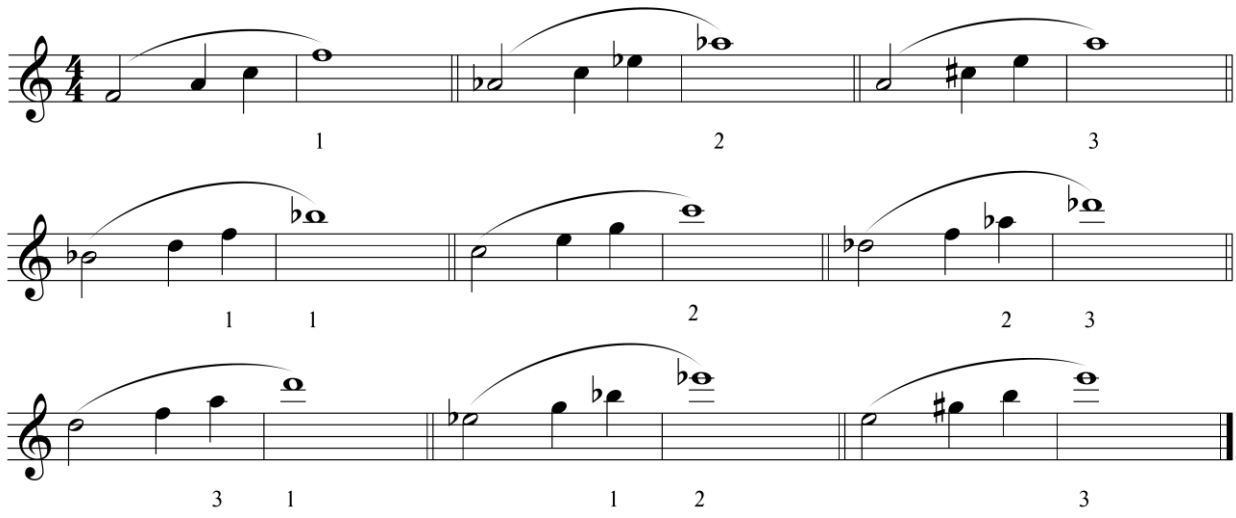
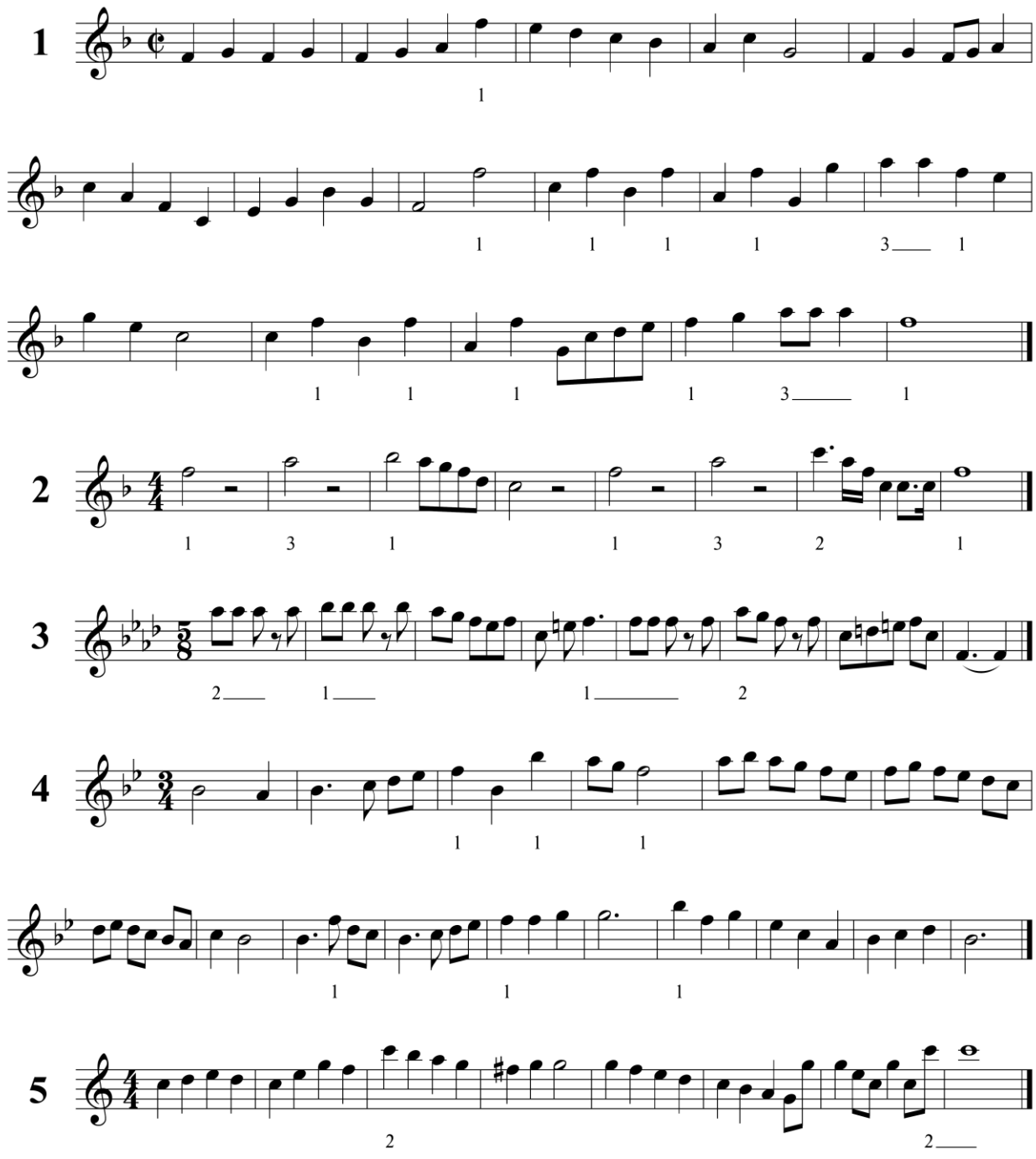


Figure 10 – Exercise 4 - Vienna Key arpeggios

The following etudes were written by the author. They were composed almost entirely diatonically and without any articulation or dynamics so that the player can focus on correct operation of the keys. As comfort with the keys increases, the player should use a variety of articulations, styles, and dynamics. Any book containing simple etudes can be used to practice using the keys, provided they are transposed into the upper register.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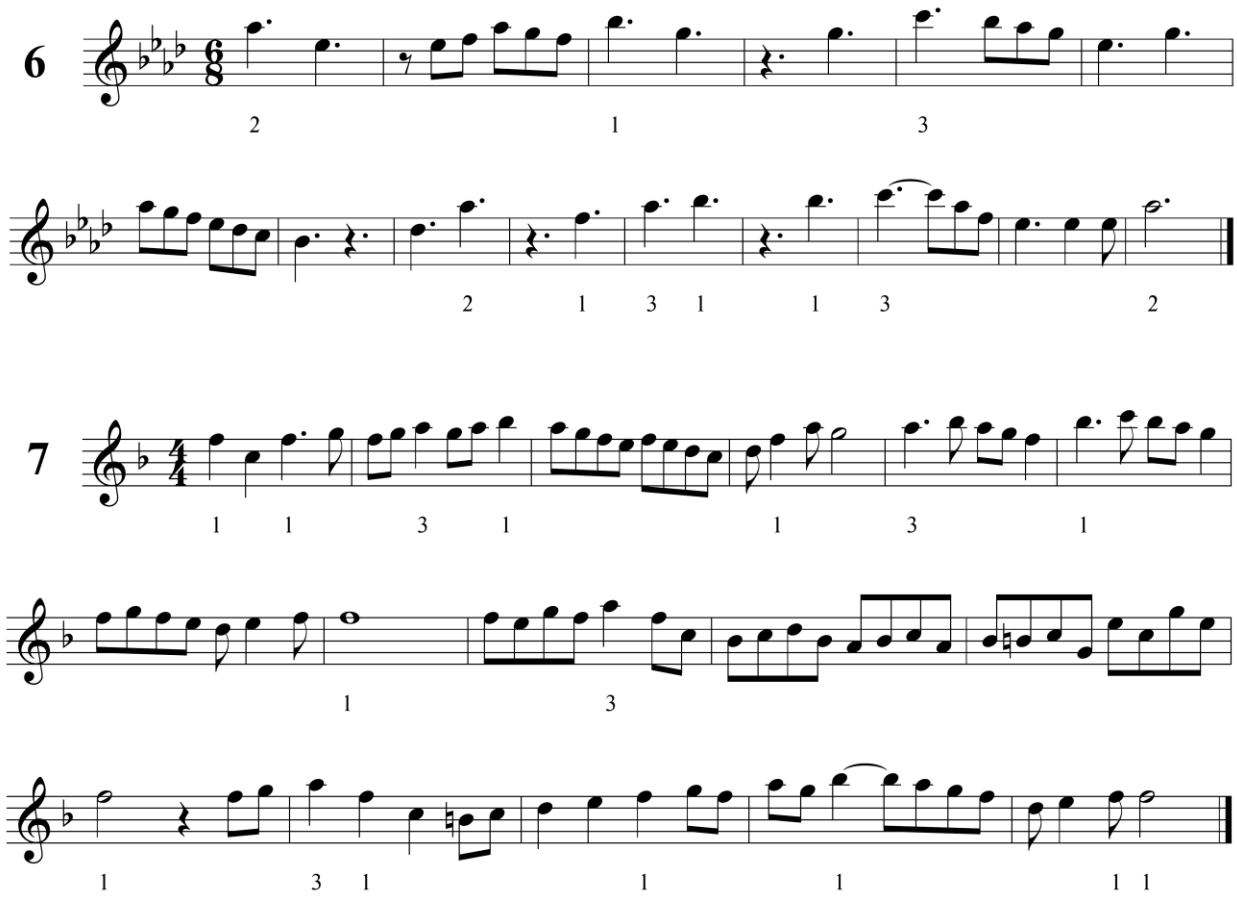

Figure 11 – Vienna key etudes

Section 6

Excerpts

Below is a list of orchestral excerpts that are commonly requested in U.S. orchestral auditions. These excerpts are sometimes listed as rotary optional or rotary required excerpts.

Beethoven	**Symphony No. 5**
	Mvt. II
	Mvt. IV
Beethoven	**Symphony No. 9**
	Mvt. IV
Brahms	**Academic Festival Overture**
	mm. 63 – mm. 89
	mm.359-end
Brahms	**Symphony No. 2**
	Mvt I. – mm 282-298 and mm. 513-3nd
	Mvt. IV – mm (11^{th} m of P to the end)
Bruckner	**Symphony No. 4**
	Mvt. IV E-F and M-O
Bruckner	**Symphony No. 7**
	Mvt I. m.91-m.99
	Mvt II. m.171-m.182
	Mvt IV m. 199-S
Dvorak	**Symphony No. 8**
	Mvt II. 7 before E to F
	Mvt. IV Beginning to A
Dvorak	**Symphony No. 9**
	Mvt. IV Beginning to 1
Haydn	**Symphony No. 100 (second trumpet)**
	Mvt 2 Allegretto 112-End
Schumann	**Symphony No. 2**
	Opening 1 – 13

Wagner **Gotterdammerung**

Sigfried's funeral music – 4 before Reh 42-44

Wagner **Parsifal**

Nine measures after 1 to 14. m. after 2

Wagner **Tannhauser Overture**

One measure before M to end

Section 7

Conclusion

Though trumpets of the piston and rotary variety share more similarities than differences, their differences are substantial enough that they warrant consideration by the advanced player. Rotary trumpets also provide pedagogical opportunities to those willing to explore the instrument's intricacies. The pedagogical opportunities include the application of air, smooth slurs, mouthpiece pressure, and high register development. With rotary trumpet becoming more commonplace in American orchestras, the study of rotary instruments will likely continue to increase in the future. By approaching the instrument in a thoughtful and creative way, the trumpeter will develop skills that can benefit many areas of technique on any type of trumpet.

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