

Warmup and Intonation

(article to accompany “Daily Warmup Routine for Clarinetists”)

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A warmup routine has long been professed as the most important part of a daily practice because it prepares our muscle groups for the challenges we encounter during performance. But besides being prepared for the physical demands of clarinet performance, it is also important to ready our minds so we can control these muscle groups to produce a fine musical performance. My own warmup routine, which combines aspects of both of these areas, is drawn from various sources and experiences to form a single and efficient warmup procedure.

These exercises can be easily included as a starting point to any warmup routine. (Spring 1995) The printed exercise contains three parts. The first takes advantage of long tones arranged in open fifths, fourths and octaves; the second adds the second and third in a higher octave to fill out the first part of a major scale; and the third continues into a higher range including the remaining scale tones of the sixth and seventh. When practiced carefully, this preliminary warmup procedure will ready your performance in areas that include a number of different technical and musical areas - namely, tone and embouchure development, breath control, legato fingering, phrasing, and tempo and pitch awareness. This first warmup step should precede exercises that concentrate on digital dexterity and articulation.

The most unique part of this warmup is its concentration on intonation. For this, you will need a tuner that can generate a steady, reliable pitch to tune against. Another important feature of a tuner is calibration. For proper warmup and tone production, it is important not to stress the embouchure beyond what is reasonable in order to play in tune. A cold instrument will play flat, and so the tuner must be calibrated to tune to the instrument. As the instrument warms, its pitch will rise gradually, and thus the calibration of the tuner must be raised until it reaches A-440. After this point, adjustments need to be made to the clarinet to match the A-440 standard sounding from the tuner.

Before attempting this exercise as an intonation study, it is important to understand why we use equal temperament as a tuning standard. Tempered tuning became an issue when the organ was becoming an important musical instrument in the late 1400s. (Randel 1986, p. 837) Up to this time, there was no need for a tempered scale since the major instruments of the time (mainly the voice) were able to tune each note to perfect intervals prescribed by Pythagoras centuries earlier. This is something a keyboard instrument was not able to accomplish since its pitches were not immediately serviceable. As keyboard instruments became more popular, and music more complex, the intonation of these instruments had to be tempered to make them acceptable for performance in different keys. Many versions of tempered scales were created along with considerable debates over which were best. Eventually, the tuning standard settled on equal temperament to which all western instruments are tuned today. The important thing to remember is that temperament was developed to make the tuning of keyboard instruments acceptable for the performance of music in all keys. Studies have shown that musicians who play instruments with serviceable pitches (eg, unfretted strings, woodwinds, etc.) tend to play in just and Pythagorean intervals rather than equal temperament even though their instruments are tuned to equal temperament. (Backus 1969, p. 130)

Exclusive use of the tuner's visual meter as a tuning aid will do little good unless we intend to perform exclusively with pianos. Tuning one note against another involves reacting to beats and difference tones that are acoustically generated when two pitches are sounded simultaneously. Some pitches may require considerable adjustment in order to sound in tune. For example, a D5 played as a fifth of G4 will be treated differently than as a third of B-flat4. (The octave notation used in this article is U.S.A. Standard transposed to B-flat unless otherwise noted) Our ears are the best judge of this pitch placement, since the meter on a tuner will show your pitch deviation against a standard matching its internal equal temperament.

The Exercise

The exercise is in three parts. The first contains three bar units with intervals of fourths, fifths and octaves. There are eleven of these units each starting a half step higher than the last. The last unit of this part starts on an E-flat4.



Ex. 1 Intonation exercise Part 1. All intervals tuned eliminating beats.

The tuner emits a tone matching the first note of each unit. The goal in this section is to eliminate any beats created between these perfect intervals.

The second part starts on an E3, and adds the sixth and seventh degrees of the scale in the clarinet register. This unit is repeated, each time transposed one half step higher, the last unit starting on B-flat3.



Ex. 2 Intonation exercise Part 2. Note heads in parenthesis show the difference tones that sound as a result of the difference in frequency between your pitch and the tuner's

The tuner sounds an E4 as it continues to rise chromatically out of the first part. Set the tuner to E3 (see bracketed note above) if the intervals are difficult to hear. By listening carefully, you should hear the tones created as a result of the difference in frequency between your pitch and the pitch emitted from the tuner (see notes in parenthesis above). The clarity of these difference tones may depend on your proximity to the tuner. If you can't hear them plainly, try moving around the tuner. Make adjustments to

your pitch to precisely tune these notes. If you have a free hand (or a friend who is willing to help), switch the tuner to visual meter to see how your acoustically tuned pitch compares to the tuner's equal temperament. Depending on the interval, you may notice a discrepancy between what you tune acoustically and what the meter reads. Trust your ears!

The third part is an extension of the second adding the second and third scale steps in the clarinet register. As in Parts 1 and 2, each unit is repeated transposed one half step higher than the last. The last unit can be as high as you feel comfortable.

Ex. 3 Intonation exercise Part 3. Difference tones are shown in parenthesis. Arrows and numbers show deviation in cents from equal temperament.

Again, pitches in parenthesis illustrate the difference tones created as a result of the difference in frequency between your pitch and the tuner's. Because this part includes the second and third degrees of the major scale, treatment of these notes will be different than any other yet played. Arrows above the notes show which direction you need to play your pitches in order to tune the difference tones. Numbers above the arrows illustrate approximate deviation in cents from the tuner's equal temperament.

Procedure

1. Set the tuner to allow the meter to measure your pitch. At this point your instrument will be cold and could sound as much as 20 cents flat. Play your most reliable note (usually C4 or D4) and notice where the needle reads. Calibrate the tuner to match this reading. When switched back to visual meter, your reliable note will now read at zero as if it is in tune. In this way, you are setting the tuner to tune to you.
2. Set your metronome to 60 beats per minute, and set the tuner to play back concert D3 (clarinet low E3), the first note of the exercise. Now that the tuner is calibrated low, it will emit a flat D3 concert. The aim here is to avoid "pinching" your notes sharp to match the tuner's pitch, thus, allowing you to play every note with a full centered tone. As your instrument warms up, you will need to gradually calibrate the tuner up to A-440. Once the tuner is calibrated to this point, any further changes should be made by adjusting the length of the clarinet.
3. Play the warmup while listening to the comparison of your pitch with the pitch sounding from the tuner. Make adjustments with your embouchure to tune the intervals by eliminating beats or tuning difference tones. At the same time, be very careful to follow the metronome closely.
4. Take four beats of rest between the units - two beats to expel excess air from your lungs and two to take a deep, low breath, filling your lungs completely. During this time, you will also need to change the pitch of your tuner up by one half step to match the first pitch of the next unit.

Continue in this way until you have completed the entire exercise. As you learn where the notes of your clarinet lie, you will want to add a gradual crescendo and diminuendo to each unit.

Suggestions for further reading

Backus, John, "Intervals, Scales, Tuning, and Temperament," chap. 8 in *The Acoustical Foundations of Music*. New York: Norton & Company, Inc., 1969. p. 115.

Lindley, Mark, "Temperaments" (and related articles) *The New Grove Dictionary of Music and Musicians*, vol. 18, p. 660.

Randel, Don, ed., *The Harvard Dictionary of Music*, 1986 ed., s.v. "Temperament."

Spring, Robert, "Clarinet Warmup," *The Online Clarinet Resource*, ed. Stanley Geidel. Internet: <http://www.iquest.net/~sgeidel/>.

Taylor, Charles, "Harmony and Discord," from chap. 1 in *Exploring Music*. Bristol and Philadelphia, Institute of Physics Publishing, 1992, p. 30.

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