

Brass Instruments: General Topics

“Universal” Technical Issues

The embouchure/lip vibration. The sound on a brass instrument is produced when air passes through the lips, causing the upper and lower lips to vibrate together. The most efficient embouchure formation closely resembles the resting position of the mouth, though with the corners held more firmly and, in most cases, slightly downward. As air is blown through the lips and they begin to vibrate, a small opening produced by the air passing through the lips, called the aperture, is formed. The rate of vibration, determined by the velocity of the air passing through the lips, determines the level (high or low) of the pitch, with faster air being used to create a higher pitch, and vice versa. Students should in most cases be discouraged from trying to consciously manipulate the aperture using the embouchure muscles.

Volume. Louder dynamics are created by passing a greater volume of air through the instrument, and vice versa. The aperture will be somewhat larger for a given note at a louder volume than at a softer one. Again, though, do not give too much thought to the aperture.

** (It should be noted that the effects of air velocity and air volume on the sound produced are more complex and interrelated than the above statements imply. The above is an oversimplification, but tends to work in practice.)**

Mouthpiece placement. For essentially all the brass instruments the vertical placement of the mouthpiece on the lips varies between 1/2 upper lip—1/2 lower lip and 2/3 upper lip—1/3 lower lip. The horn is an exception to this, with the predominantly upper lip placement being largely preferred. Predominantly lower lip placements are not recommended except in cases where a student’s face and jaw structure demand such a placement (for example, if the student has an underbite). Forcing such students to use a predominantly upper lip placement will cause them to have difficulty playing. Remember that students will most often find the best placements for them with given only very broad guidance. Warn students against pressing the mouthpiece against the face with excessive pressure. Rather, students should use no more pressure than is necessary to create a proper seal between the lips and mouthpiece—to do otherwise is physically taxing and can cause long-term damage.

The oral cavity. The size and shape of the oral cavity is vitally important in determining both pitch and quality of tone. Regarding pitch, the shape or “vowel” or “syllable” used, besides causing obvious changes in the relative tension of various muscles, changes the velocity of the air and, consequently, the pitch. A closed syllable, like *ee*, will cause a fast air speed and, consequently, a higher pitch. A more open one, like *oh* or *aw*, will cause a slower airspeed and, consequently, a lower pitch. *Ah* seems to be a good, “middle of the road” syllable. Additionally, having as open an oral cavity as possible for a given pitch allows for the most resonant tone possible—excess tension will result in a tense, unpleasant sound, while being too open will cause the sound to become woofy. Creating and maintaining an open oral cavity can occur quite efficiently with correct breathing. (Also, observe the above note regarding oversimplification when discussing the effect of air velocity on pitch, etc.)

The breath. The breath must be as full, yet as relaxed as possible. Regarding the oral cavity, breathing with an open mouth is the most efficient means of creating an open, relaxed oral cavity; after that one only needs to bring the lips together and blow. An elaborate ritual of setting the embouchure is unnecessary and counterproductive. Regarding the amount of air taken in, the typical adult can take in 5-6 liters of air, if he fills

the lungs completely. Avoid making an overly determined effort to take in one's full capacity while playing (though in certain breathing exercises this makes for effective overtraining), as this can create a great deal of tension. Simply open the mouth and allow air to rush in; if there is no artificial tension air will fill the lungs without tremendous effort to force it to do so. Remember that all areas of the lungs inflate simultaneously, like a balloon, rather than "from the bottom up," as when filling a container with water. There should be expansion in all directions throughout the torso, but keep in mind that the lungs are in the upper chest, not the abdomen. The abdominal muscles should remain loose at all times, though a small amount of effort from these muscles is needed in the upper register and will occur automatically without a conscious effort to engage the abdomen. Inhale continuously and in time until beginning the note, as holding the air creates tension, creates (or results from) timing problems, and usually results in an explosive attack. When playing, many students will try to do more work with the embouchure than with the air and tongue, producing a thin, strident sound. Have students use the air to manipulate the embouchure, rather than putting a great deal of direct pressure on the lips. This will help maintain a better tone quality and also gives students more playing stamina.

Articulation. "Tonguing" occurs when the tip of the tongue briefly disrupts the outward airflow, causing a "t" "attack" on the beginning of a note. For the basic articulation on a brass instrument, the tongue strikes near where the upper teeth meet the gum, as when one says *tah*. This can be modified to *tee*, *toh*, etc. as the needs for oral cavity size necessitate. Some also advocate *dah*—this is often helpful, even though the *d* is not appreciably different from the *t* (the tongue strikes in essentially the same place). A harder articulation can be achieved by allowing the tongue to remain "planted" somewhat longer, causing an air buildup; softer by allowing the tongue to only briefly graze the gum. Alternative softer consonants can be helpful in the extreme lower registers; *thaw* and even *naw* might be recommended articulations for pedal tones.

- Legato vs. Staccato. This is an area in which there is more misinformation than information among brass players. The difference between staccato and legato lies primarily in the nature of the END of the note (is it connected to the beginning of the next note, or separated from it?). What does this have to do with how hard or soft a note is articulated? Almost nothing. Young trombonists especially are frequently taught to "tongue softly for legato." No good teacher will say "tongue hard for staccato," but this is what students assume when taught that "legato = soft tonguing." The difference between staccato and legato lies primarily not in how hard or soft the attack is (though, granted, legato tonguing is usually *slightly* softer than normal tonguing), but in whether or not the end of one note is connected to the beginning of the next note by means of CONTINUOUS AIRFLOW. The airflow should be kept constant when a legato articulation is desired, and separated when a staccato articulation is desired. When that focus is in place questions about how hard or soft the tonguing should be easily resolve themselves. (This concept, by the way, also aids in slurring on valved instruments and woodwinds—often we learn that slurring is "the absence of tonguing," without coupling that with continuous air. Focus on keeping the air steady when slurring and the best sound will be achieved.)
- Multiple tonguing. Obviously, one can only say *tah* repeatedly up to a certain rate of speed; eventually one can go no faster. Use what is called "multiple tonguing" to allow for faster articulation. This is achieved by interjecting a *kah* syllable in the articulation pattern, using patterns such as *ta-ka* for double-tonguing and *ta-ta-ka* or *ta-ka-ta* for triple-tonguing.

Acoustics and Intonation. Brass instruments are constructed so that they operate on a certain harmonic series. Trombones and three-valve brasses, for example, have seven fundamental pitches (extra valves add more of them); other pitches are produced by "overblowing" to the different overtones or "partials" of these pitches. These partials each have certain intonation tendencies, as indicated in the overtone charts included with the Low Brass Methods course materials.

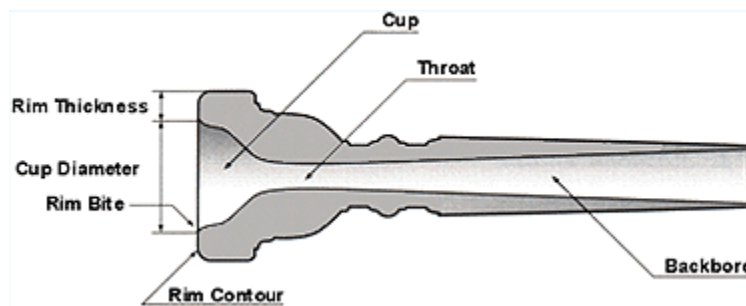
- Slide position length/fingering problems. The lower one goes, the more distance is required to move from one fundamental to the next. Because of this, each successive trombone slide position is increasingly farther from the previous one, and when valves or added, this difference is even

greater. Because these corrections can't be made as efficiently on valved instruments, any valve combination will have inherent pitch problems (usually sharpness). Extending/pulling slides and compensating systems alleviate this somewhat.

- Temperature has an effect on brass instrument intonation, as well. Cold weather causes flatness, and hot weather causes sharpness.

The Mouthpiece. The effects of are certain mouthpiece dimensions are as follows:

- Cup Diameter. Typically, an individual with thick, fleshy lips should choose a mouthpiece with a wide cup diameter, and *vice versa*. One that is too wide will cause upper register problems with a woofy lower register. One that is too narrow will eliminate the lower register and MIGHT help the upper register to a point, but tends to stifle playing altogether.
- Cup Shape. A bowl shape will tend toward a brighter sound, a funnel shape will be a bit darker. Most mouthpieces try to achieve a combination of these two shapes.
- Rim Thickness and Contour. A narrow rim tends to enhance flexibility, but limit endurance, and *vice versa*.
- Bite. Sharp bites enhance accuracy, but reduce flexibility and endurance, and *vice versa*.
- Cup Depth. Deeper improves low range, but hinders upper range and tone in upper register. Shallower enhances upper register, but brightens sound, especially in lower register.
- Throat. Large throats allow for greater volume, but require more air and make control difficult because of lack of resistance. Smaller throats limit volume, but are easier to control.
- Backbore. Differences similar to those of throat—quick opening allows greater volume, darker sound, if you can control it. Gradual opening causes more centered, but softer and sometimes brighter sound.



Mouthpiece Dimensions (from Yamaha)

Vibrato. On brass instruments vibrato should normally be executed by oscillating with the lip and jaw, i.e. saying “yah-yah-yah.” In some (usually popular) genres, slide vibrato is acceptable on the trombone. Vibrato executed by manipulating the airstream is commonly practiced by flautists but is normally not advisable for brass instruments.

A daily warm-up routine of some sort is a must for all brass players, as this not only prepares the player for the day's playing, but also reinforces the fundamental aspects of playing and even helps to prevent injuries from overexertion. Make fundamental exercises a part of each band rehearsal, but also encourage students to play warm-up exercises in individual practice.

Scales and arpeggios, as an extension of the daily routine, should be learned, memorized, and practiced daily. Make sure players learn at least a short chromatic scale as early as possible. While this is not practical for woodwind players, this will help brass players—trombonists in particular—to avoid a great many difficulties later, as students will be familiar with a fuller spectrum of notes and fingerings (and, for trombonists, the locations of all the slide positions!).

Choosing and Starting on Instruments

Before starting on instruments, spend a few weeks teaching basic music fundamentals (finding the beat, hearing pitch, notation, etc.). This will save you difficulties later. If general music instruction at the elementary level has been of high quality this can be done for a shorter period; if such instruction is missing or poor it should be for a more extended period.

When auditioning students on different brass instruments, have them buzz the mouthpieces only first, then the instruments themselves. See the individual instrument readings for suggestions on choosing players for each instrument. Give students the opportunity to try all the instruments in which they are interested, and while you should try to nudge them toward the instruments that they play best (and/or that you need the most), give them the final choice whenever possible. Students will be more likely to excel and continue on instruments that they actually like.

When students finally do get instruments, conduct your first “playing day” as follows:

- Before students get anything out, have them do simple breathing exercises. This should be a part of your daily routine.
- Next, have them match pitches with you on the mouthpiece only. Doing a bit of mouthpiece buzzing each day strengthens the lips and the ear.
- On the first day, “walk students through” the processes of assembly and lubrication with you, and take care to demonstrate each step clearly. This will help to avoid damage.
- Now, the warm-up. Teach notes/slide positions/fingerings for exercise number 1 in the warm-up booklet by rote first, then show the students what they’ve played. Ideally, they will have studied notes, etc. a bit prior to this. You want to get ALL the slide positions and fingerings, as well as notes for at least one octave, covered from day one. After they’ve been through the exercise by rote once, have them do it afterwards while reading from the sheet, so that they begin to associate written notes with fingerings and sounds.
- At the end of class, “walk through” the process of disassembly (which will simply be the reverse of the assembly process).
- Please note that this manner of teaching chromatics from Day One will only work in a brass-only beginner class. The fingerings to accomplish all of this on woodwind instruments are too difficult to teach on the first day. If at all possible, try to have your beginners divided into brass, woodwind, and percussion classes (if not into even smaller groups). This will allow you to teach them most efficiently.

More detailed instructions and advice on choosing students for each instrument and on conducting the first “with instruments” day of class are found in the readings for each instrument.