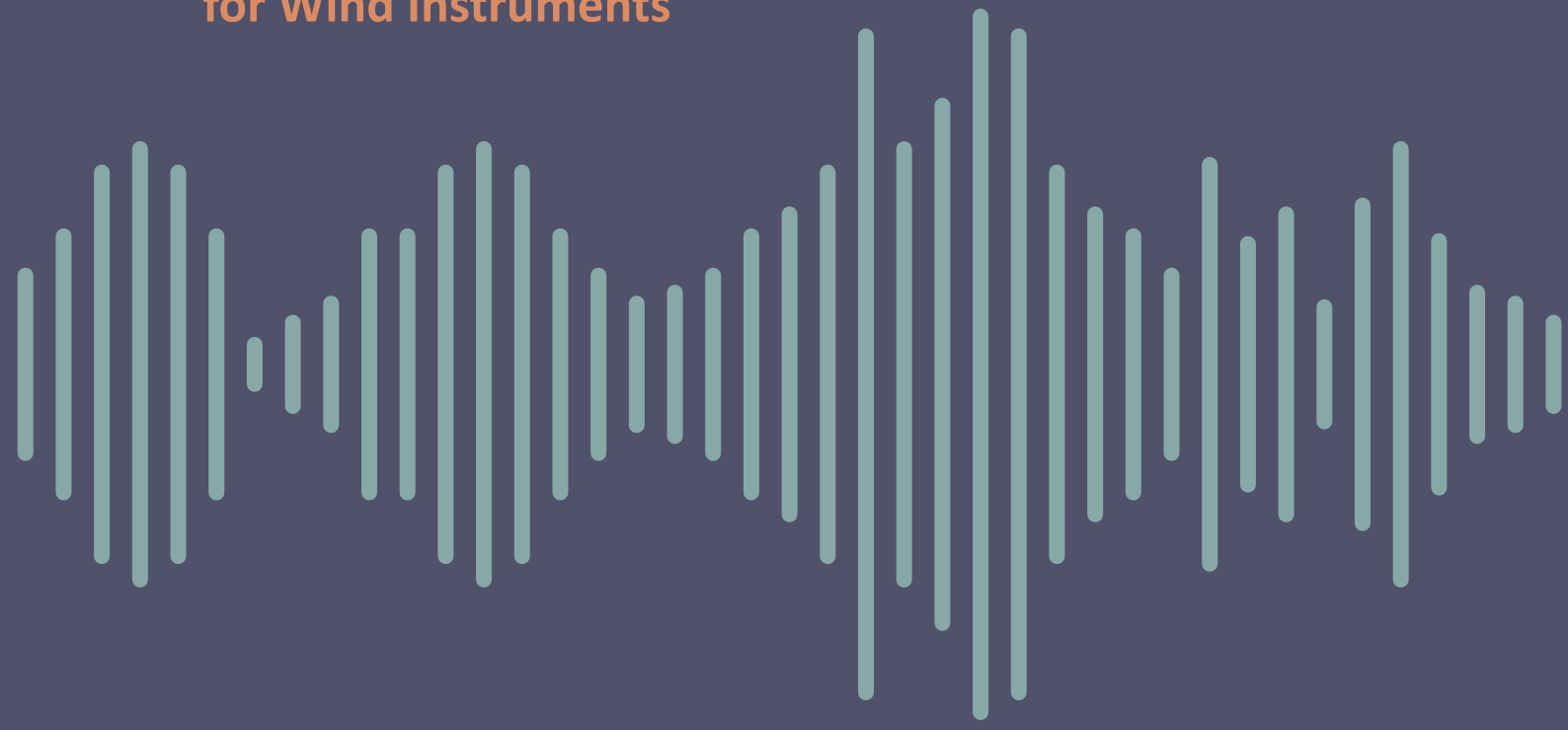
Fundamentals *of* Instrument Intonation

An Introductory Guide to the Overtone Series, Pitch Tendencies, and Instrument Tendencies for Wind Instruments



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MUS 616.A01 Seminar: Pedagogy

About the Candidate

Kelly Connell is a passionate band director with over 10 years of experience teaching at the elementary, middle, and high school levels. She is currently a Band Director at Conroe ISD in The Woodlands, Texas.

Kelly's career has been enriched by a diverse range of experiences, from teaching in a small inner-city charter school in Massachusetts to directing in one of the largest, most competitive and well-supported music education communities in the United States. All of Kelly's experiences have informed her directing style. She is a passionate advocate for music education and believes that music can be a powerful force for good in the world.

In her previous roles, Kelly has led her students to consistent success at festivals, competitions, evaluations. Every band under her direction of the past eight years have earned superior ratings at UIL Concert and Sightreading Evaluation. Her students have consistently won top honors at local and regional festivals. She has also been recognized for her teaching and leadership, receiving numerous awards and honors, including the Dr. David Gottlieb Education Microgrant, Aldine ISD Teacher of the Year, and American Band College Outstanding Graduate Student.

She received her Bachelors in Music Education with instrumental emphasis and urban education certification and Bachelors in Human Rights with minor in Philosophy, with honors, from the University of Dayton in Dayton, Ohio. She also holds a Masters in Music Education from the American Band College at Central Washington University in Ashland, Oregon. She is a National Board Certified Teacher in Music-Early Adolescence through Young Adulthood/ Band.

Foreword

The purpose of this guide is to introduce the overtone series, overtone patterns, pitch tendencies, instrument tendencies, and provides a breakdown of each wind instrument in relation to these concepts. The overview of each brass instrument will include the overtone series for each valve combination and slide position, pitch tendencies, and instrument tendencies. The overview of woodwind instruments will include tuning procedures, troubleshooting general intonation concerns, and alternative fingerings when applicable.

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An Introduction to the Overtone Series

The Overtone Series is a pattern of sound frequencies based on the lowest notes of a given instrument's range. The frequency pattern is the same across all instruments, but the lowest note, or fundamental, can differ.

Breaking down this concept further, the overtone series is based on the seven lowest notes of an instrument's range. The seven lowest notes serve as the foundation for the overtone series and are called the fundamentals.

When a musician plays a given fundamental on their instrument, a series of partial tones resonate above it. The partials are not normally heard because they all vibrate simultaneously as a chord so they appear aurally as a single note. The series of partials played above the fundamental are called overtones. Overtones are partials that maintain a specific interval pattern between each note above the fundamental

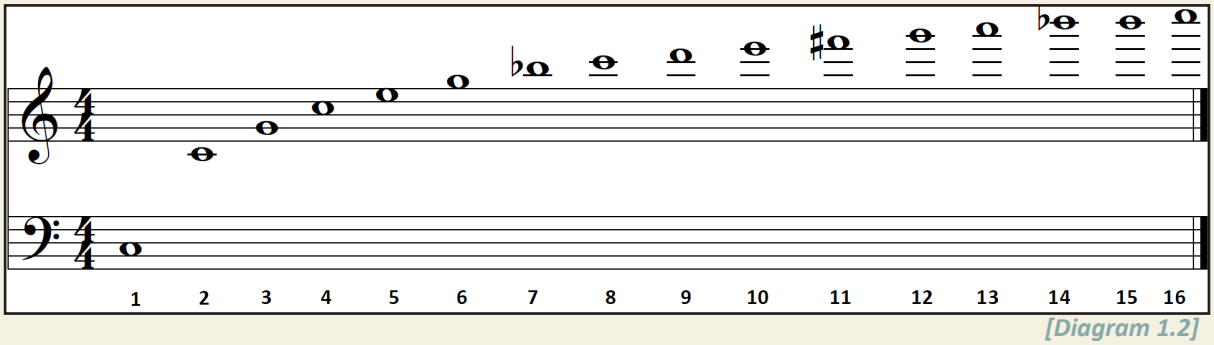
When a wind instrument is playing a fundamental, they can overblow their air, changing the frequency of sound, and audibly sound the next overtone in the series. The more air is intensified, the smaller the sound frequencies are, sounding higher notes in the overtone series.

As mentioned earlier, overtones maintain a specific pattern above the fundamental. Diagram 1.1 outlines the pattern of partials used in the overtone series.

Diagram 1.2 displays the overtone series based on the C fundamental. It can be seen that as frequencies increase, intervals between partials get progressively smaller.

Partial	Interval Above the Fundamental
1 (Fundamental)	Perfect unison
2	Perfect octave
3	Perfect octave + Perfect 5th
4	2 Perfect octaves
5	2 Perfect octaves + Major 3rd
6	2 Perfect octaves + Major 5th
7	2 Perfect octaves + Minor 7th
8	3 Perfect octaves
9	3 Perfect octaves + Major 2nd
10	3 Perfect octaves + Major 3rd
11	3 Perfect octaves + Augmented 4th
12	3 Perfect octaves + Perfect 5th
13	3 Perfect octaves + Major 6th
14	3 Perfect octaves + Minor 7th
15	3 Perfect octaves + Major 7th
16	5 Perfect octaves

[Diagram 1.1]



[Diagram 1.2]

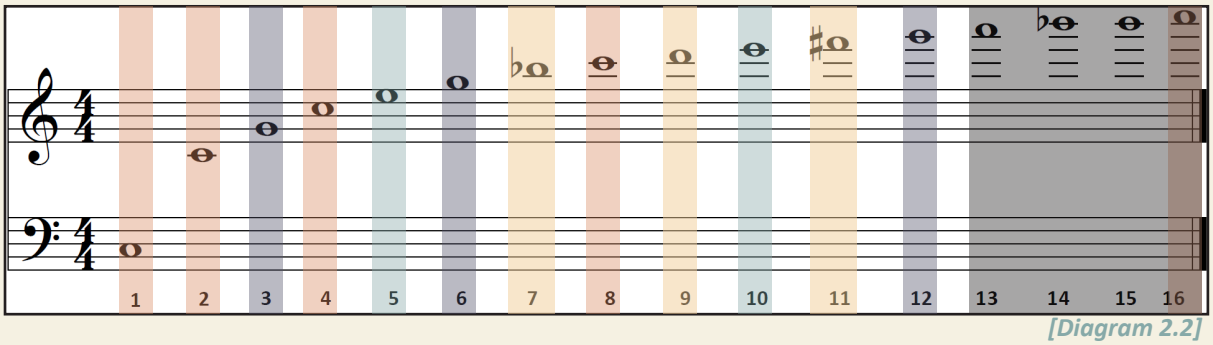
Overtone Patterns

Partials	Pattern
1, 2, 4, 8, 16	Perfect octave
3, 6, 12	Perfect 5th
5, 10	Major 3rd
7, 9, 11	No pattern: 7th = Minor 7th 9th = Major 2nd 11th = Augmented 4th
13, 14, 15	Chromatic: 13th = Major 6th 14th = Minor 7th 15th = Major 7th

[Diagram 2.1]

At first glance, the overtone series can be an intimidating concept, but in actuality, there is a very basic pattern that makes it easy for band directors to master.

The pattern of partials repeat each other. The fundamental and partials divisible by two are all a perfect octave. All remaining partials divisible by three are a perfect fifth. Partials divisible by five are a perfect third. The exceptions to this pattern are the seventh, ninth, and eleventh partials, which are not divisible. The last four partials in the overtone series continue chromatically.



[Diagram 2.2]

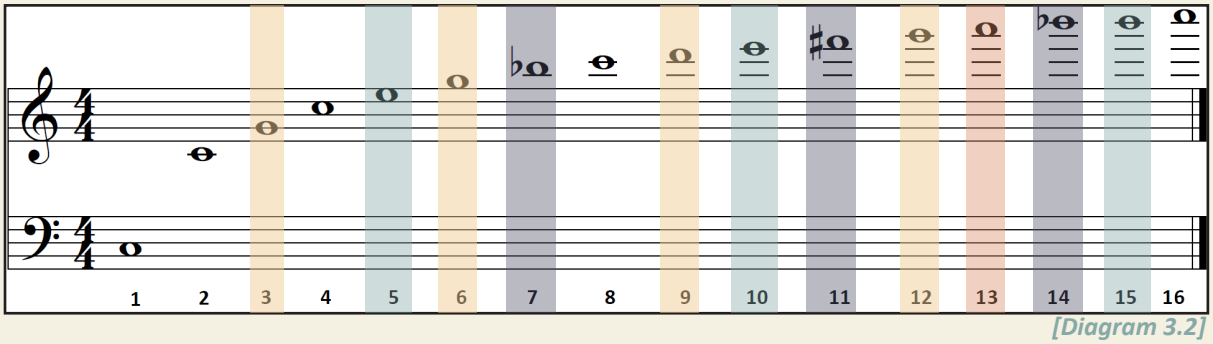
Pitch Tendencies

The importance of overtone series lies in its relationship to pitch tendencies. Even when an instrument is thoroughly warmed up, played with good technique and air support, and properly tuned, there will be notes that tend to be sharp, flat, or in tune based on the placement in the overtone series.

Partials	Pitch Tendency
13	Very Sharp
3, 6, 9, 12	Slightly Sharp
1, 2, 4, 8, 16	In Tune
5, 10, 15	Slightly Flat
7, 11, 14	Very Flat

[Diagram 3.1]

Every partial in the overtone series has a pitch tendency that is consistent for every instrument. The first, second, fourth, eighth, sixteenth partials are in tune. The third, sixth, and twelfth partials are sharp, the fifth and tenth are flat, and the seventh and fourteenth parial are very flat.



[Diagram 3.2]

Instrument Tendencies

The design of the musical instruments is a very precise science, but not an exact one. Therefore, the imperfectness of man-made instruments create a whole different set of pitch tendencies aside from the overtone series. To achieve good intonation, both the pitch tendency of the partial and the instrument's tendency need to be addressed.

Instrument tendencies are consistent across valve and slide brass instruments as seen in Diagram 4.1. Each valve combination and slide position has a pitch tendency that will sound in tune, sharp, or flat, if adjustments are not made.

Brass Valve Combination/ Slide Position	Pitch Tendency
1 - ● ● ●	In tune
2 - ● ○ ●	In tune
3 - ○ ● ●	In tune
4 - ○ ○ ●	Sharp
5 - ● ○ ○	Flat
6 - ○ ● ○	Sharp
7 - ○ ○ ○	Sharp

[Diagram 4.1]

Woodwind instruments are significantly more complicated and vary because of their unique shapes and finger combinations.

The remainder of this guide will provide a breakdown of each wind instrument in the band:

An overview of each brass instrument will include the overtone series for each valve combination or slide position, pitch tendencies, and instrument tendencies.

Due to the meticulous nature of woodwinds, we will focus on troubleshooting general intonation concerns, pitch tendencies of particular "problem" notes, and adjustment suggestions to guide directors and musicians toward good intonation.

Compensating System

It is common for euphoniums and tubas to have a compensating system to help with tuning 6th and 7th valve combinations, which are very sharp. Instruments with a compensating system have a fourth valve and extra tubing. The fourth valve makes for much better intonation overall. Below are suggested fingerings for better intonation instead of 6th and 7th valve combinations if an instrument with a compensating system is available:

Non-Compensating System	Compensating System
○ ○ ○	○ ○ ○ ○
○ ○ ○	○ ○ ○ ○

[Diagram 4.2]

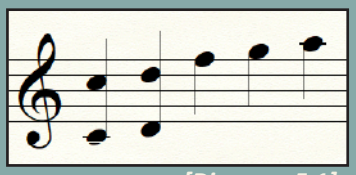
Though the trumpet does not have a compensating system, it has first and third valve slides that should be extended when playing 6th and 7th valve combinations to create extra tubing and lower the overall pitch.

Trombone does not have a compensating system either, but with the flexibility of a moving slide, all positions can be adjusted to be in tune so long as the musucian playing has adequate aural skills.

Flute

Tuning Procedure

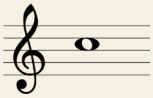
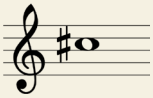
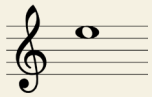
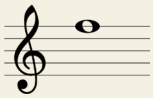
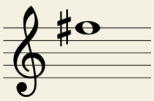
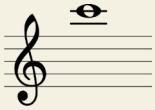
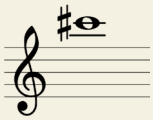
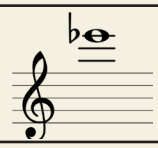
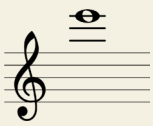
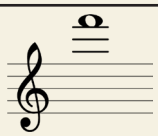
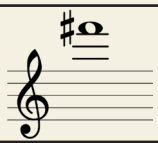
Warm up the instrument properly before making any adjustments.

1. When assembling the flute, have the headjoint pulled out an eighth of an inch. This space allows the player to adjust tuning for both sharp and flat intonation later.	**2.** A cold flute is extremely flat. By warming up for at least ten minutes the flute will adjust to the player's body temperature.	**3.** Tune the flute to a pitch in the range the flutist will be primarily play in. There are a myriad of suggested tuning notes. Some suggested tuning notes are given below:  *[Diagram 5.1]*

General Intonation Concerns

Embouchure and Air Direction	RAISING PITCH can be achieved by directed air higher across the tone hole, or bringing the lips forward as if to say, "oo." LOWERING PITCH can be achieved by directing air down into the flute or slightly dropping the jaw as if to say, "ahh."
Dynamics	FORTE dynamic requires the flute aperture to expand, creating a larger column of air. Fast air is required to support the larger flow of air between the lips. PIANO dynamic requires the flute aperture to contract, creating a smaller column of air. Fast, supportive air is required so the tone quality does not go stale nor flat.
Playing Position	Slouching posture reduces the breath support and air speed, causing the overall pitch to go FLAT. Playing the flute at an acute angle that causes the air to blow over the tone hole at an angle, inhibiting the natural tendencies of the flute. Encourage students to sit or stand with good posture and bring the flute TO their bodies - do not adjust the body to the flute.
Lip Plate Placement	If the lip plate is too low on the lip, the pitch will be FLAT. If the lip plate is too high, the pitch will be SHARP. The lip plate should always be placed just above the edge of the lower lip.
Mechanical Factors	Always monitor the condition of keys, pads, and rods. All keys should open and close at the same height. A key that is too closed will LOWER the pitch. A key that is too open will RAISE the pitch. Keys that do not seal completely will sound airy and SHARP. The cork should be exactly 17.3 millimeters from the center of the aperture hole and should be checked regularly. The player will be consistently out of tune regardless of adjustment if the cork is not set properly.

Alternate Fingerings

Note	Tendency	Alternate Fingering	Rationale
	Slightly Sharp		Adding the right hand will LOWER the pitch.
	Very Sharp		Adding the right hand will LOWER the pitch.
	Slightly Flat		Lifting the Eb key will RAISE the pitch.
	Slightly Flat		Adding the 6th finger will RAISE the pitch.
	Slightly Flat		Replacing 6th finger with 5th finger will RAISE the pitch.
	Slightly Sharp		Adding the 6th finger will LOWER the pitch.
	Moderately Sharp		Adding the right hand will LOWER the pitch.
	Very Sharp		Using the Eb5 fingering and overblowing will LOWER the pitch.
	Slightly Sharp		Lifting the Eb key will LOWER the pitch.
	Slightly Flat		Adding the 6th finger will RAISE the pitch.
	Slightly Flat		Replacing 6th finger with 5th finger will RAISE the pitch.

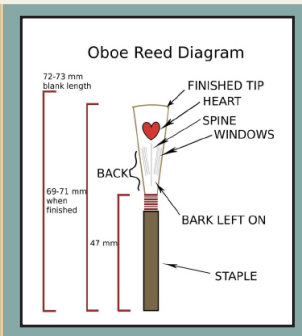
Oboe

Tuning Procedure

Unlike other woodwinds, the oboe cannot make physical adjustments to intonation because all adjustments are made with the embouchure and reed.

1. Soak the reed in room temperature water for thirty to ninty seconds. The reed should face down into the water and be submerged up to the thread.

2. A well balanced reed will make a good 'crow' sound. The crow is a multi-pitched sound. A stable octave 'C' crow is desired.

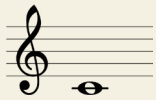
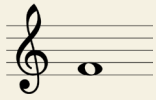
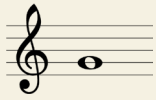
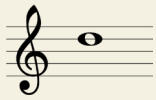
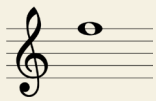
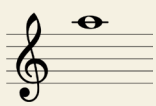


[Diagram 6.1]

General Intonation Concerns

Reed	SOFT REEDS tend to play FLAT, particularly in the highest and lowest ranges of the oboe. The one quality of a reed too soft is harsh and will not respond to embouchure adjustments. Clipping a very small amount of the tip of the reed will made the reed harder. HARD REEDS tend to play SHARP. A reed that is too hard for a player will be difficult to control with the embouchure. Scrape the heart of the reed lightly to soften the reed and flatten the pitch. Though some machine-made reeds are relatively good for younger players, hand-made reeds are preferred as they respond well to adjustments made to improve intonation.
Embouchure	RAISING the pitch can be achieved by inscreasing embouchure pressure or in creasing the amount of reed in the mouth slightly. LOWERING the pitch can be achieved by relaxing embouchure pressure or decreasing the amount of reed in the mouth slightly. "Biting" the reed is a tendency caused by using a reed that is too hard and will cause the pitch to be very SHARP. The corners of the mouth should be touching the sides of the reed. This allows the reed support so it can vibrate to its full ability.
Playing Position	The oboe should always be held at a forty degree angle. If the angle is too high or the head is down, the overall pitch will be FLAT. If the horn angle is too close to the body the overall pitch will she SHARP.
Mechanical Factors	Always monitor the condition of keys, pads, and rods. All keys should open and close at the same height. A key that is too closed will LOWER the pitch. A key that is too open will RAISE the pitch. Keys that do not seal completely will sound airy and SHARP. The half-hole key and the third finger in the left hand can have dirt build up. They can be cleaned out by inserting a toothpick gently into the opening, then using a swab or feather to remove any dirt that may have entered the bore.

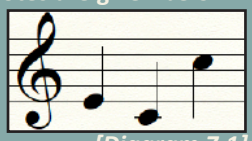
Alternate Fingerings

Note	Tendency	Alternate Fingering	Rationale
	Slightly Flat		Using the left Eb key and put more reed in the mouth will RAISE the pitch.
	Slightly Sharp		Using forked F fingering and the right Eb key will LOWER the pitch.
	Slightly Sharp		Adding the B lever will LOWER the pitch.
	Slightly Sharp		Adding the B lever will LOWER the pitch.
	Slightly Sharp		Using the forked F fingering and lifting the right Eb key will LOWER the pitch.
	Moderately Sharp		Adding Ab key will LOWER the pitch.

Clarinet

Tuning Procedure

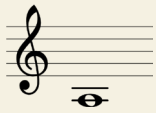
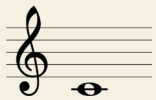
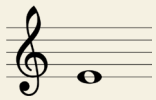
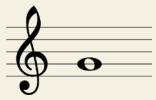
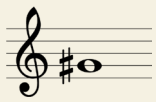
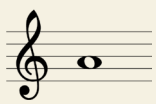
Warm up the instrument properly before making any adjustments.

1. When assembling the clarinet, have the barrel pulled out an eighth of an inch. This space allows the player to adjust tuning for both sharp and flat intonation later.	**2.** A cold clarinet is extremely flat. By warming up for at least ten minutes the clarinet will adjust to the player's body temperature.	**3.** Tune the clarinet to a pitch in the range the clarinetist will be primarily play in. There are a myriad of suggested tuning notes. Some suggested tuning notes are given below:  *[Diagram 7.1]*

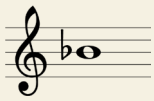
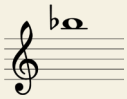
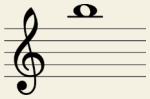
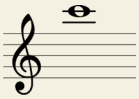
General Intonation Concerns

Reed	SOFT REEDS tend to play FLAT. A soft or old reed leans into the clarinet's natural pitch tendencies and do not respond well to embouchure adjustments. Clipping the reed or switching to a harder reed will help. HARD REEDS tend to play SHARP. If a student has to pull the barrel out a significant amount, their reed is too stiff. Sanding the reed or switching to a softer reed will help. Regularly monitor the quality of playing reeds. Clarinetists should be playing on newer reeds as old reeds tend to wear and soften over time and become ineffective to adjustments.
Embouchure	RAISING the pitch can be achieved by taking in less mouthpiece into the mouth and or applying more bottom lip pressure to the reed. It can also be achieved by firming the embouchure around the mouthpiece. Firming is not the same as biting. LOWERING the pitch can be achieved by taking in more mouthpiece into the mouth and or applying less bottom lip pressure to the reed. Loosing the embouchure slighly can also help in lowing the pitch slightly. If the clarinet is held above a forty-degree angle, the embouchure cannot provide the correct amount of pressure on the reed, making the intonation flat.
Dynamics	FORTE dynamic LOWERS the pitch because lower lip pressure becomes more relaxed. To counter this, increase lip pressure around the entire embouchure to RAISE the pitch. PIANO dynamic RAISES the pitch because it is common to pinch the reed with the lower lip (biting) causing less of the reed to vibrate. To counter this, keep the lower lip flat and firm, and create an "OH" shape with the mouth, allowing more of the reed to vibrate and naturally lower the pitch.
Mechanical Factors	All keys should open and close at the same height. A key that is too closed will LOWER the pitch. A key that is too open will RAISE the pitch. Keys that do not seal completely will sound airy and SHARP. Bent keys will contribute to LOWERED pitch. A dirty mouthpiece can also affect intonation and tone quality. Keeping tone holes free of debris will also aid in easier playing and intonation. Also check that the bridge key works properly in sealing the upper joint. The upper "A" key also often out of adjustment. Make sure the adjustment screw allows the key to fully dampen with little to no play. The left and right low "E" keys also need to properly lower the "F" key.

Alternate Fingerings

Note	Tendency	Alternate Fingering	Rationale
	Moderately Sharp		Adding the right F key and left E key will LOWER the pitch.
	Slightly Sharp		Adding the right F key will LOWER the pitch.
	Slightly Flat		Adding the right F key will RAISE the pitch.
	Slightly Sharp		Adding the right hand will LOWER the pitch.
	Moderately Sharp		Adding the right hand will LOWER the pitch.
	Moderately Sharp		Adding the 2nd and 3rd fingers in the left hand will LOWER the pitch. *The first finger, third finger, and F key in the right hand can also be added for additional support.*

Alternate Fingerings

Note	Tendency	Alternate Fingering	Rationale
	Very Sharp		Adding the 2nd and 3rd fingers in the left hand will LOWER the pitch. *The first finger, third finger, and F key in the right hand can also be added for additional support.*
	Slightly Sharp		Adding fingers 1 and 4 will LOWER the pitch.
	Very Sharp		Lightly covering 2nd finger to pitch will LOWER the pitch as needed.
	Very Sharp		Adding the right hand will LOWER the note.

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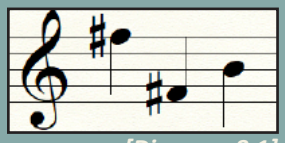
Saxophone

Tuning Procedure

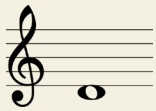
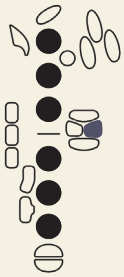
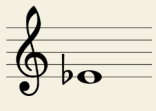
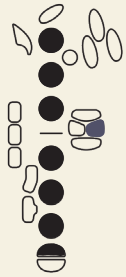
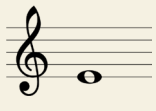
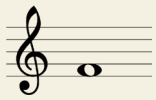
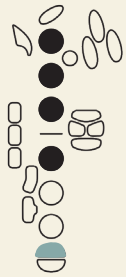
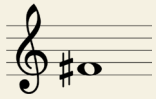
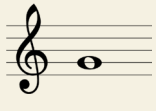
Warm up the instrument properly before making any adjustments.

1. When assembling the saxophone, have the mouthpiece cover about half of the cork. This space allows the player to adjust tuning for both sharp and flat intonation later.	**2.** A cold saxophone is extremely flat. By warming up for at least ten minutes the saxophone will adjust to the player's body temperature.	**3.** Tune the saxophone to a pitch in the range the saxophonist will be primarily play in. There are a myriad of suggested tuning notes. Some suggested tuning notes are given below:  *[Diagram 8.1]*

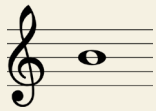
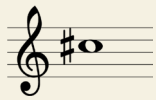
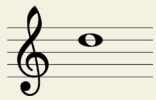
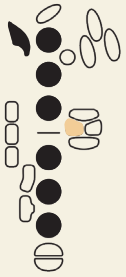
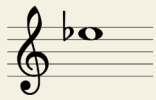
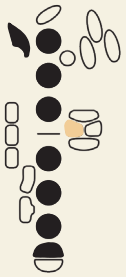
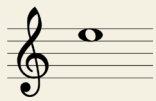
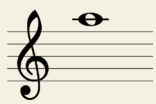
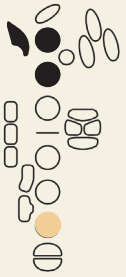
General Intonation Concerns

Reed	SOFT REEDS tend to play FLAT. A soft reed leans into the saxophone's natural pitch tendencies and do not respond well to embouchure adjustments. Clipping the reed or switching to a harder reed will help. HARD REEDS tend to play SHARP. If a student has to pull the mouthpiece out a significant amount, their reed is too stiff. Sanding the reed or switching to a softer reed will help. Regularly monitor the quality of playing reeds. Saxophonists should be playing on newer reeds as old reeds tend to wear and soften over time and become ineffective to adjustments.
Embouchure	RAISING the pitch can be achieved by taking in less mouthpiece into the mouth and or applying more bottom lip pressure to the reed. LOWERING the pitch can be achieved by taking in more mouthpiece into the mouth and or applying less bottom lip pressure to the reed. "Lipping" a note flat or sharp can be done to make slight adjustments to an individual pitch. "Lipping down" is done by relaxing the jaw, LOWERING the pitch. "Lipping up" is done by slightly increasing pressure of the jaw, RAISING the pitch.
Dynamics	FORTE dynamic LOWERS the pitch because lower lip pressure becomes more relaxed. To counter this, increase lip pressure around the entire embouchure to RAISE the pitch. PIANO dynamic RAISES the pitch because it is common to pinch the reed with the lower lip causing less of the reed to vibrate. To counter this, drop the jaw and clow the speed of air entering the saxophone. Dropping the jaw will allow te reed to vibrate properly.
Mouthpiece Angle	If the saxophone saddle is too far forward, the mouthpiece will go straight into the mouth. At at straight angle, the embouchure cannot support the reed, making the pitch FLAT. If the saxophone saddle is too far back, the mouthpiece will be at too much of an upward angle, causing the lower lip to not support the reed, causing the pitch will be SHARP.
Mechanical Factors	Always monitor the condition of keys, pads, and rods. All keys should open and close at the same height. A key that is too closed will LOWER the pitch. A key that is too open will RAISE the pitch. Keys that do not seal completely will sound airy and SHARP. Bent keys will contribute to LOWERED pitch. A dirty mouthpiece can also affect intonation and tone quality.

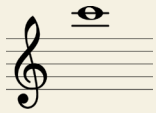
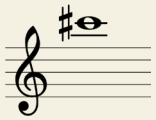
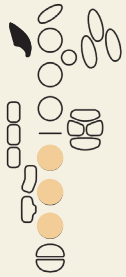
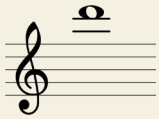
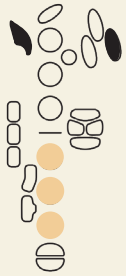
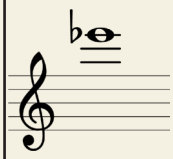
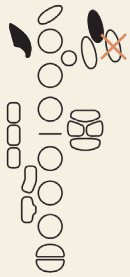
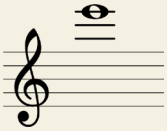
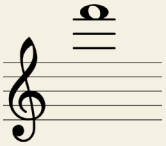
Alternate Fingerings

Note	Tendency	Alternate Fingering	Rationale
	Moderately Flat		Adding the C# key will RAISE the pitch.
	Moderately Flat		Adding the C# key will RAISE the pitch.
	Moderately Flat	 *Only add 1 of the 3 alternate keys at a time.	Adding the Eb key, -OR- Adding the B key, -OR- Adding the left Bb key will RAISE the pitch.
	Slightly Flat		Adding the Eb key will RAISE the pitch.
	Slightly Flat		Using 6th finger in-stead of 5th finger will RAISE the pitch.
	Slightly Flat		Adding the chromatic F# key will RAISE the pitch.

Alternate Fingerings

Note	Tendency	Alternate Fingering	Rationale
	Slightly Flat		Addomg the left Bb key will RAISE the pitch.
	Slightly Flat		Adding side-key 2 will RAISE the pitch.
	Moderately Sharp		Adding the left B key will LOWER the pitch.
	Moderately Sharp		Adding the Eb key will RAISE the pitch.
	Moderately Sharp		Adding the Bb key will LOWER the pitch.
	Moderately Sharp		Adding 6th finger will LOWER the pitch.

Alternate Fingerings

Note	Tendency	Alternate Fingering	Rationale
	Moderately Sharp		Adding the right hand will LOWER the pitch.
	Moderately Sharp		Adding the right hand will LOWER the pitch.
	Moderately Sharp		Adding the right hand will LOWER the pitch.
	Very Sharp		Lifting the first palm key will LOWER the pitch.
	Very Sharp		Lifting the first palm key will LOWER the pitch.
	Very Sharp		Lifting the second palm key will LOWER the pitch.

Bassoon

Tuning Procedure

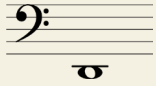
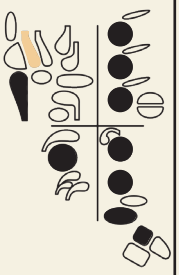
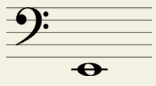
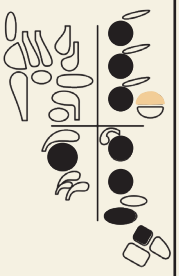
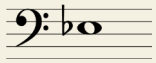
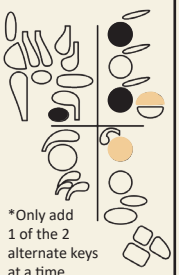
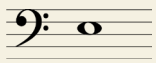
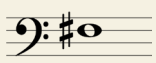
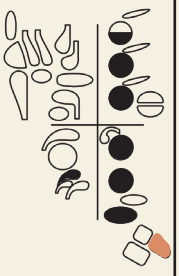
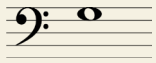
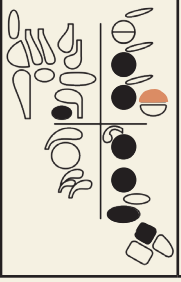
Unlike other woodwinds, the bassoon cannot make physical adjustments to intonation because all adjustments are made with the embouchure and reed.

1. Soak the reed in room temperature water for thirty to ninty seconds. The reed should face down into the water and be submerged up to the thread.	**2.** A well balanced reed will make a good 'crow' sound. The crow is a multi-pitched sound. A stable octave 'E' or 'Eb' crow is desired.	**3.** A cold bassoon is extremely flat. By warming up for at least ten minutes the bassoon will adjust to the player's body temperature.

General Intonation Concerns

Reed	SOFT REEDS tend to play FLAT, particulatly in the highest and lowest ranges of the bassoon. The one quality of a reed too soft is harsh and will not respond to embouchure adjustments. Clipping a very small amount of the tip of the reed will made the reed harder. Squeezing the first wire with needle nosed pliers from the side will open the reed and RAISE the pitch as well. HARD REEDS tend to play SHARP. A reed that is too hard for a player will be difficult to control with the embouchure. Scrape the heart of the reed lightly to soften the reed and flatten the pitch. Squeeze the first and second wire to close the opening and soften the reed to LOWER the pitch, but beware - the tone might get thinner. Though some machine-made reeds are relatively good for younger players, hand-made reeds are preferred as they respond well to adjustments made to improve intonation.
Embouchure	RAISING the pitch can be achieved by inscreasing embouchure pressure or bringing the jaw slightly forward. LOWERING the pitch can be achieved by relaxing embouchure pressure or bringing the jaw slightly back.
Playing Position	To play properly, the bassoon needs to be held in a way that the reed enters the mouth at the slightest upward angle. If the reed is at an incorrect angle, the pressure on the reed will be off and intonation problems are more challenging to control. Make sure the strap is towards the front of the chair, the bassoon goes across the body, and the bocal and reed are adjusted to go into the mouth at the correct angle.
Dynamics	FORTE dynamic RAISES the pitch because the increased air speed is often controlled with a tighter embouchure. To counter this, maintain a fast air spreed while relaxing the embouchure. PIANO dynamic LOWERS the pitch because the decreased air speed is often left unsupported. To counter this, firm the embouchure slightly to close the tip opening while using the same air speed.
Mechanical Factors	Always monitor the condition of keys, pads, and rods. All keys should open and close at the same height. A key that is too closed will LOWER the pitch. A key that is too open will RAISE the pitch. Keys that do not seal completely will sound airy and SHARP.

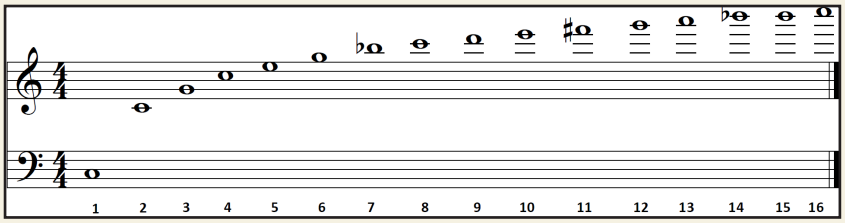
Alternate Fingerings

Note	Tendency	Alternate Fingering	Rationale
	Slightly Sharp		Adding the low B key will LOWER the pitch.
	Slightly Sharp		Adding the Eb key will LOWER the pitch.
	Slightly Sharp	 *Only add 1 of the 2 alternate keys at a time.	Adding the Eb key, -OR- Adding the 4th finger will LOWER the pitch.
	Slightly Flat		Adding the 6th finger will RAISE the pitch.
	Very Sharp		Adding the F# key will LOWER the pitch.
	Very Sharp		Adding the Eb key will LOWER the pitch

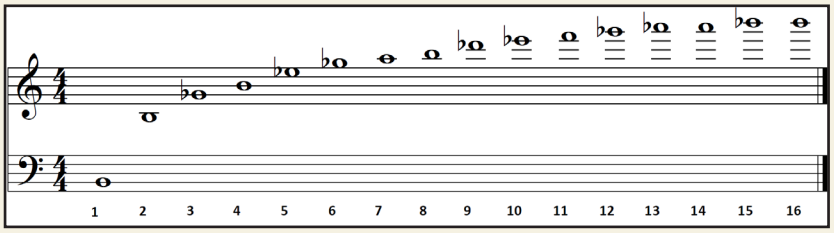
Trumpet

The first three valve combinations have the tendency to be most in tune. For that reason, it is recommended to use valve combinations with the least valves for best intonation in general playing.

1st Valve Combination
Tendency to be IN TUNE

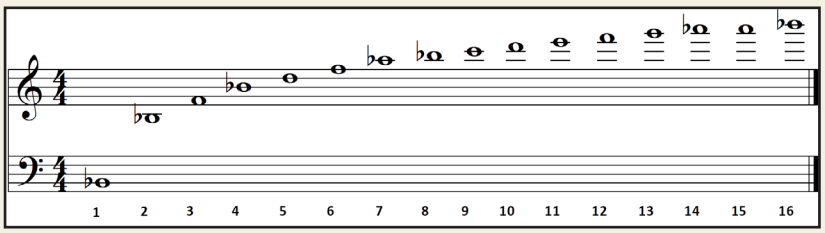


2nd Valve Combination
Tendency to be IN TUNE



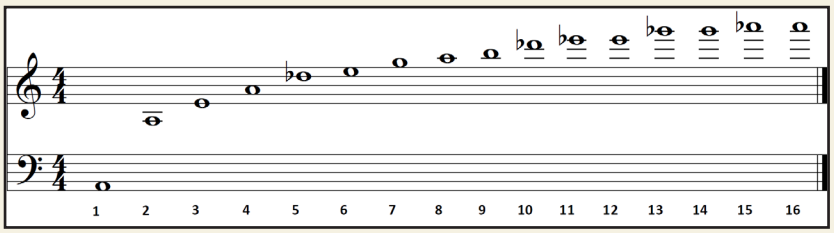
Alternate fingerings for certain notes, particularly in the upper register, can often assist with extreme pitch tendencies.

3rd Valve Combination
Tendency to be IN TUNE



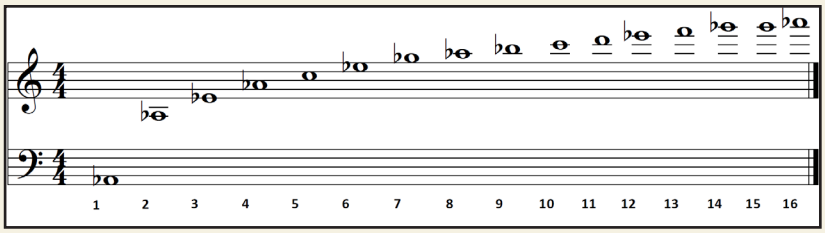
Consider making slight adjustments to the embouchure to change the pitch. If a note has the tendency to be flat, firm the corners of the embouchure slightly, bring the lips closer together, and increase air speed will help bring the pitch up. If a note has the tendency to be sharp, lip the note down by keeping the corners of the embouchure firm and dropping the jaw as if to say, "AH."

4th Valve Combination
Tendency to be SHARP

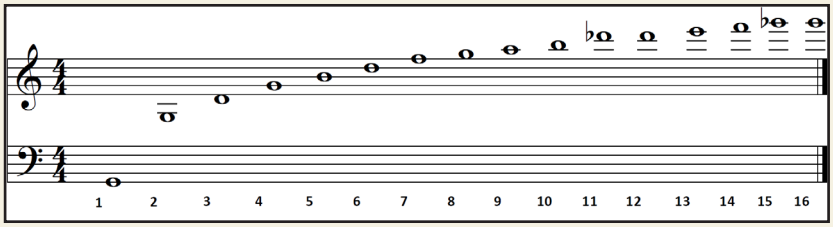


When making adjustments, maintain the shape and integrity of the embouchure so tone quality is not compromised.

5th Valve Combination
Tendency to be FLAT

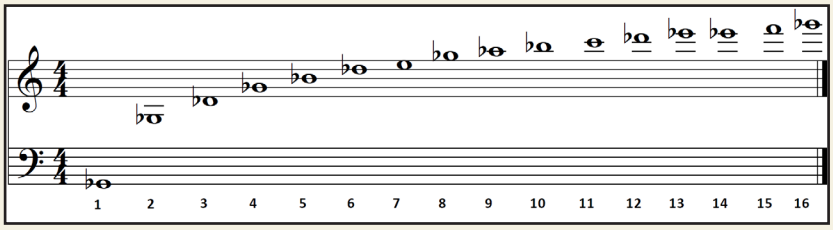


6th Valve Combination
Tendency to be SHARP



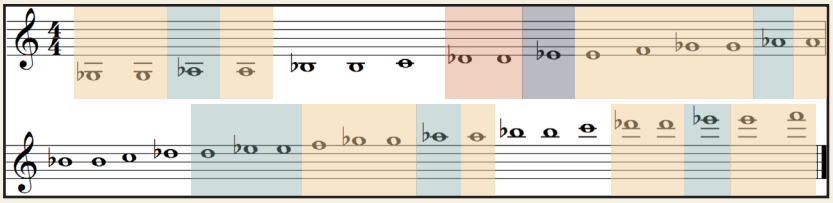
It is important to utilize the third valve slide when using 6th and 7th valve combinations on trumpet. Extending the third valve slide lowers the pitch and makes the overall intonation more in tune.

7th Valve Combination
Tendency to be SHARP



Although the 7th valve combination pitch tendency is sharp, the 7th overtone series partial is incredibly flat. Avoid playing it!

Pitch Tendency As It Relates to the Preferred Fingering and Overtone Series Placement



Very Sharp | Slightly Sharp | In Tune | Slightly Flat | Very Flat

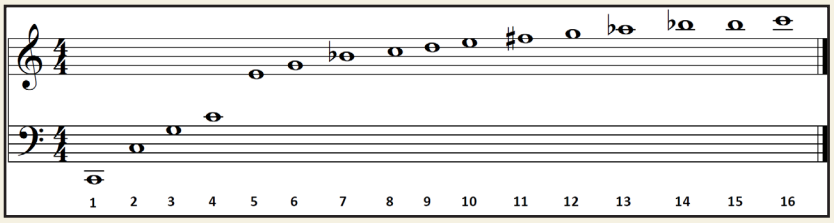
Horn in F

The first three valve combinations have the tendency to be most in tune. For that reason, it is recommended to use valve combinations with the least valves for best intonation in general playing.

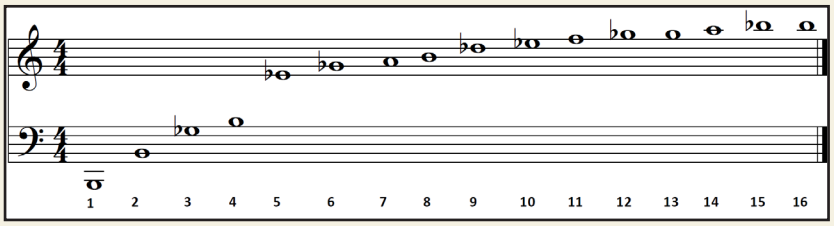
Due to most partials played on the horn being so close together, consider making slight adjustments to the embouchure to change the pitch. If a note has the tendency to be flat, lipping the note up by firming the embouchure slightly will help bring the pitch up. If a note has the tendency to be sharp, lipping the note down by relaxing the embouchure will help bring the pitch down.

When making adjustments, maintain the shape and integrity of the embouchure so tone quality is not compromised.

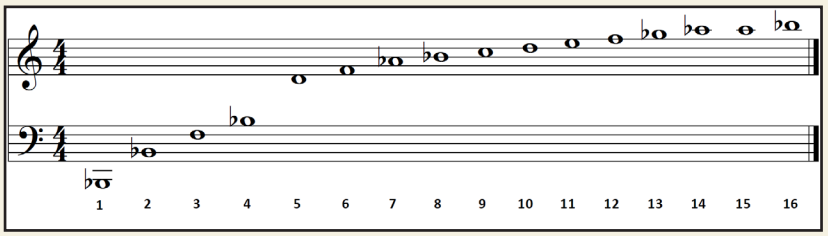
1st Valve Combination
Tendency to be IN TUNE



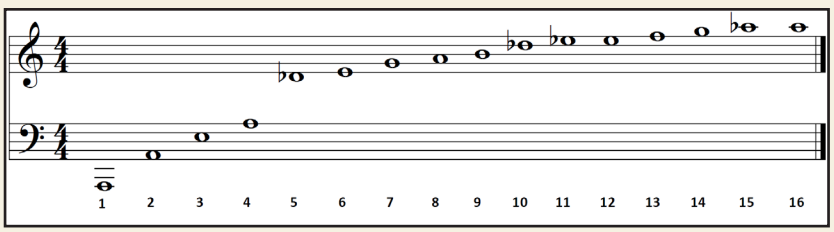
2nd Valve Combination
Tendency to be IN TUNE



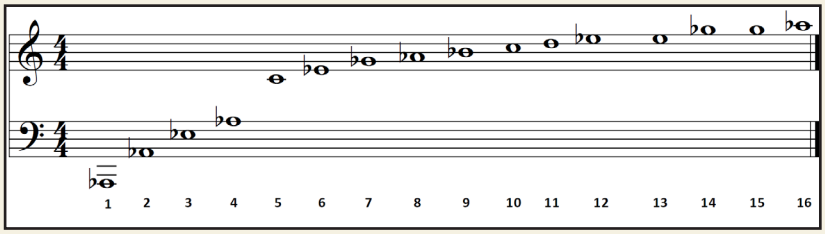
3rd Valve Combination
Tendency to be IN TUNE



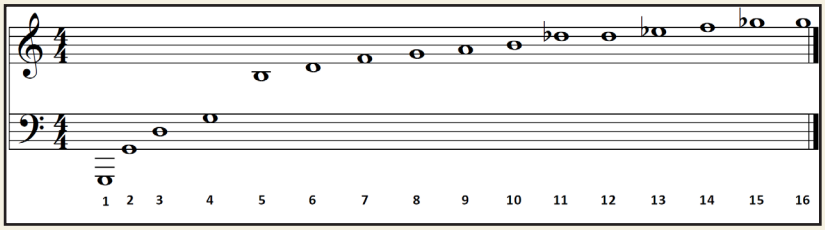
4th Valve Combination
Tendency to be SHARP



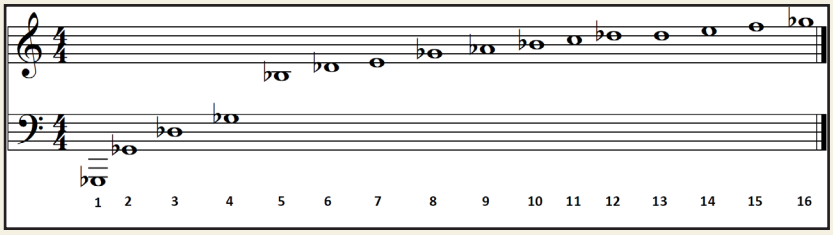
5th Valve Combination
Tendency to be FLAT



6th Valve Combination
Tendency to be SHARP

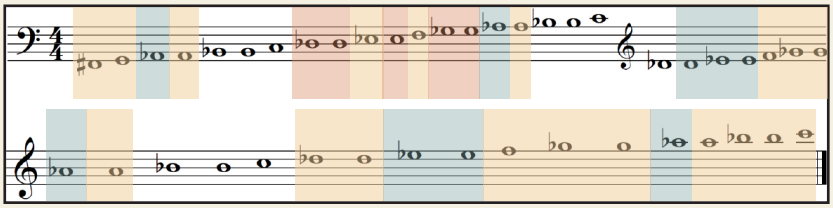


7th Valve Combination
Tendency to be SHARP



Although the 7th valve combination pitch tendency is sharp, the 7th overtone series partial is incredibly flat. Avoid playing it!

Pitch Tendency As It Relates to the Preferred Fingering and Overtone Series Placement



Very Sharp | Slightly Sharp | In Tune | Slightly Flat | Very Flat

Being mindful about using proper fingerings will have a strong effect on the pitch and overall sound of the horn. Correct use of trigger is important as it allows for greater accuracy in the higher register and facilitates good tone production in the low register.

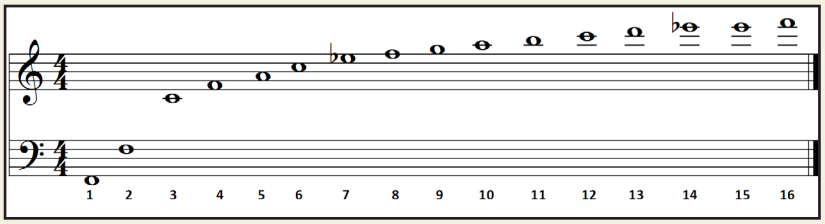
Horn in Bb

The first three valve combinations have the tendency to be most in tune. For that reason, it is recommended to use valve combinations with the least valves for best intonation in general playing.

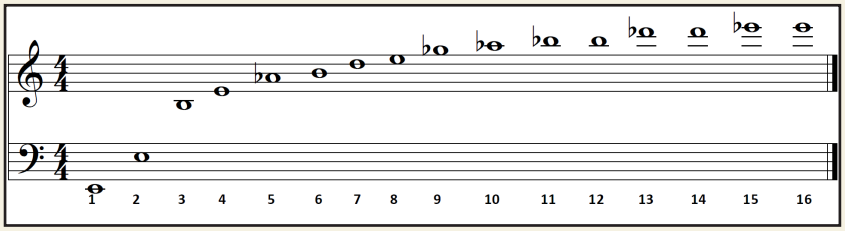
Due to most of the partials played on the horn being so close together, consider making slight adjustments to the embouchure to change the pitch. If a note has the tendency to be flat, lipping the note up by firming the embouchure slightly will help bring the pitch up. If a note has the tendency to be sharp, lipping the note down by relaxing the embouchure will help bring the pitch down.

When making adjustments, maintain the shape and integrity of the embouchure so tone quality is not compromised.

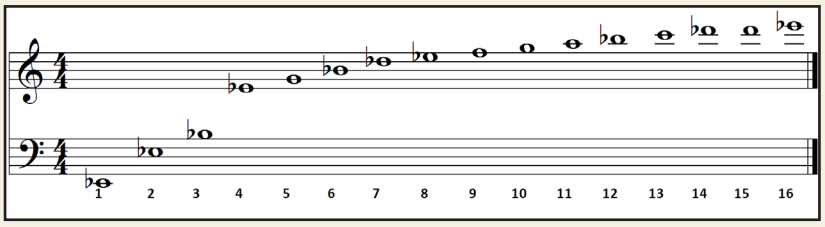
1st Valve Combination
Tendency to be IN TUNE



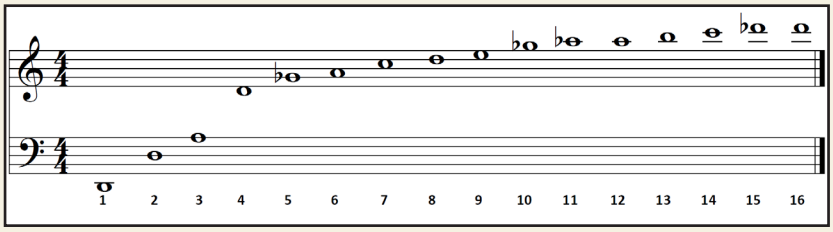
2nd Valve Combination
Tendency to be IN TUNE



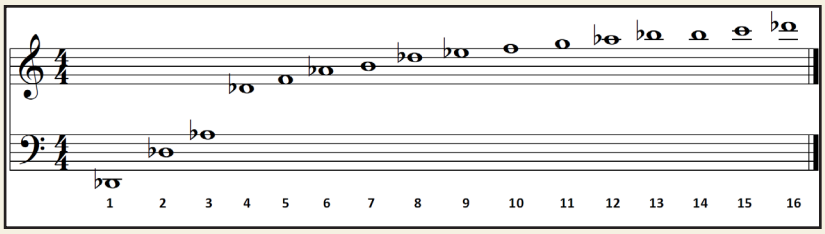
3rd Valve Combination
Tendency to be IN TUNE



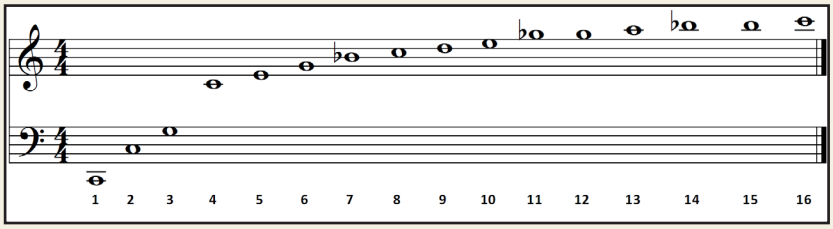
4th Valve Combination
Tendency to be SHARP



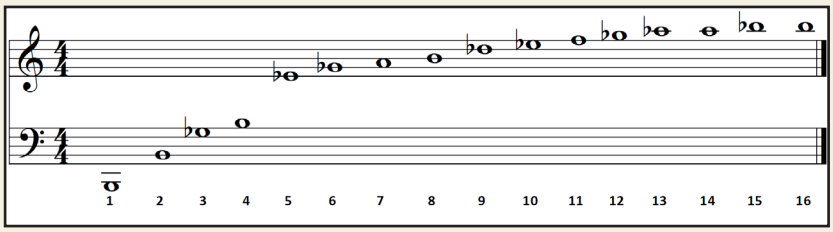
5th Valve Combination
Tendency to be FLAT



6th Valve Combination
Tendency to be SHARP

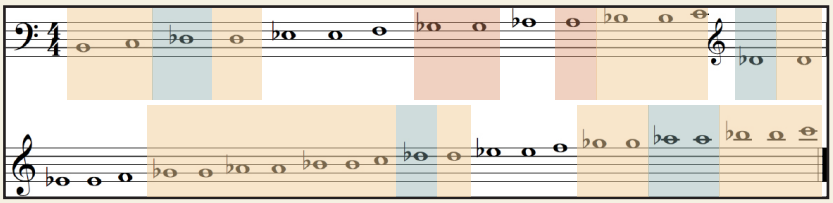


7th Valve Combination
Tendency to be SHARP



Although the 7th valve combination pitch tendency is sharp, the 7th overtone series partial is incredibly flat. Avoid playing it!

Pitch Tendency As It Relates to the Preferred Fingering and Overtone Series Placement



Very Sharp | Slightly Sharp | In Tune | Slightly Flat | Very Flat

Being mindful about using proper fingerings will have a strong effect on the pitch and overall sound of the horn. Correct use of trigger is important as it allows for greater accuracy in the higher register and facilitates good tone production in the low register.

Trombone

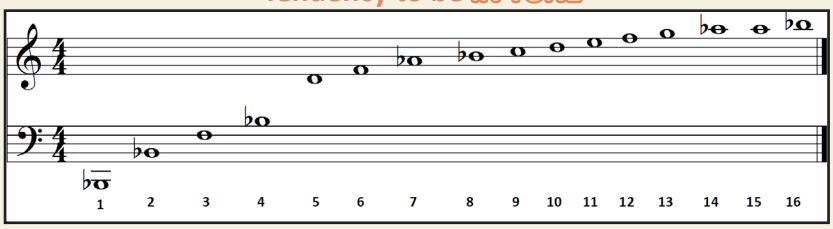
Precise slide position have a massive effect on the pitch and sound of the trombone. Notes that have a tendency to be flat should be played with a slightly shorter slide position in order to compensate for the naturally flat pitch tendencies created by the overtone series.

Consider making slight adjustments to the embouchure to change the pitch. If a note has the tendency to be flat, firm the corners of the embouchure slightly, bring the lips closer together, and increase air speed will help bring the pitch up. If a note has the tendency to be sharp, lip the note down by keeping the corners of the embouchure firm and dropping the jaw as if to say, "AH."

When making adjustments, maintain the shape and integrity of the embouchure so tone quality is not compromised.

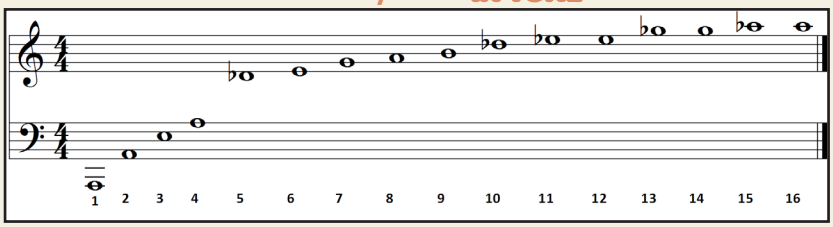
1st Position

Tendency to be IN TUNE



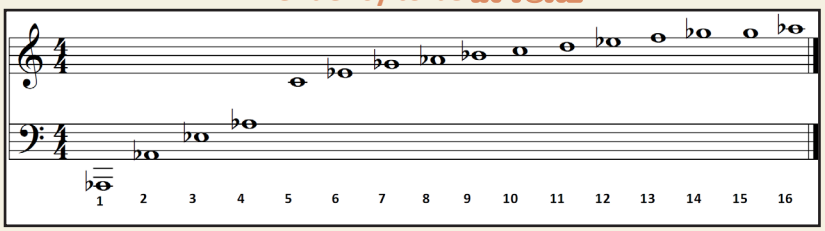
2nd Position

Tendency to be IN TUNE



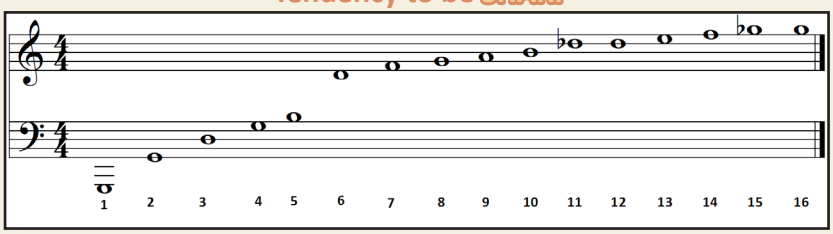
3rd Position

Tendency to be IN TUNE



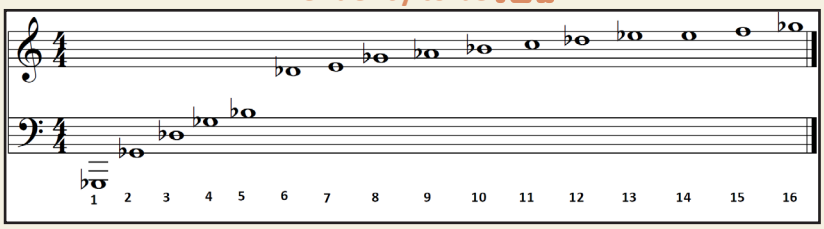
4th Position

Tendency to be SHARP



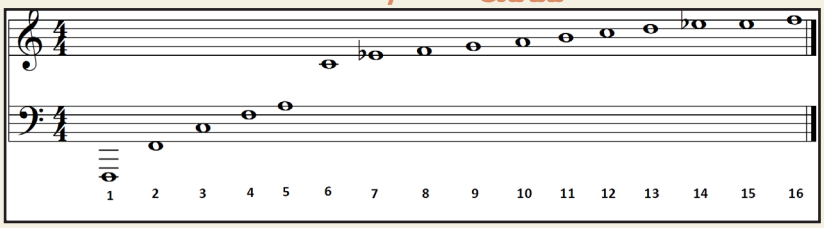
5th Position

Tendency to be FLAT



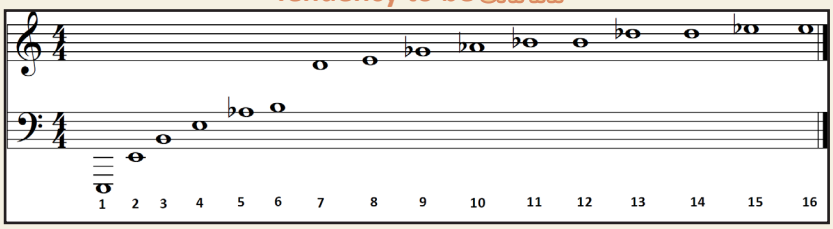
6th Position

Tendency to be SHARP

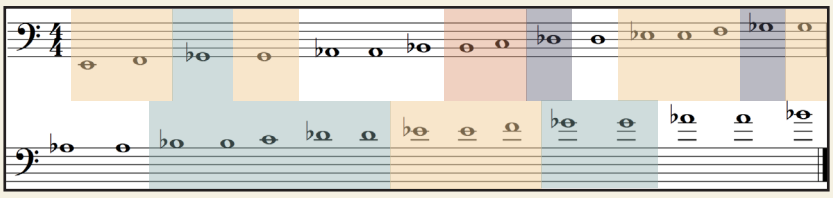


7th Position

Tendency to be SHARP



Pitch Tendency As It Relates to the Preferred Slide Position and Overtone Series Placement



Very Sharp | Slightly Sharp | In Tune | Slightly Flat | Very Flat

As mentioned earlier, musical instruments are imperfectly made. To that point, it is common for 1st position "F" on trombone to be naturally very sharp, despite it's pitch tendency to be in tune. For that reason, it is suggested to play 1st position with the slide extended out a quarter to an inch to counter the instrument related pitch issues.

Although the 7th position pitch tendency is sharp, the 7th overtone series partial is incredibly flat. Avoid playing it!

Unlike valved instruments, trombone has a built in "tuning slide" so pitch tendencies can be easily adjusted with strong aural skills.

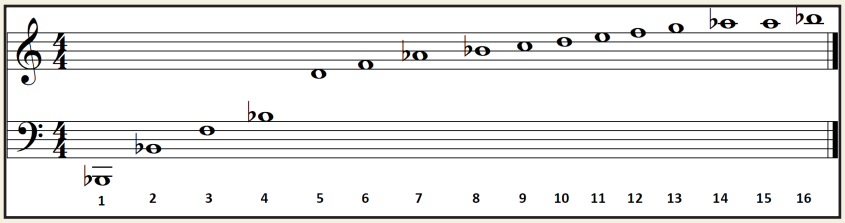
Euphonium

The first three valve combinations have the tendency to be most in tune. For that reason, it is recommended to use valve combinations with the least valves for best intonation in general playing.

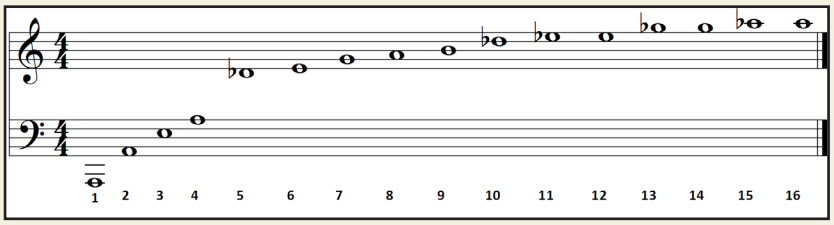
Consider making slight adjustments to the embouchure to change the pitch. If a note has the tendency to be flat, firm the corners of the embouchure slightly, bring the lips closer together, and increase air speed will help bring the pitch up. If a note has the tendency to be sharp, lip the note down by keeping the corners of the embouchure firm and dropping the jaw as if to say, "AH."

When making adjustments, maintain the shape and integrity of the embouchure so tone quality is not compromised.

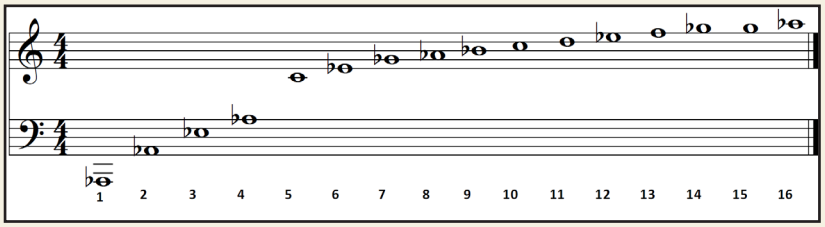
1st Valve Combination
Tendency to be IN TUNE



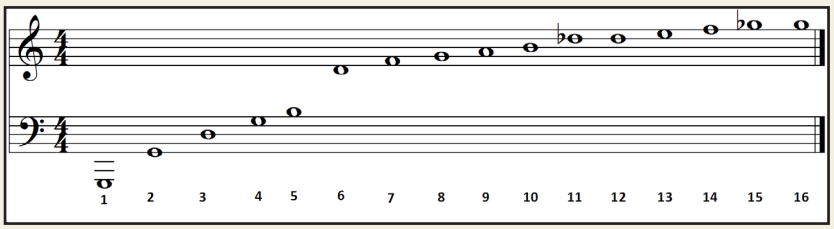
2nd Valve Combination
Tendency to be IN TUNE



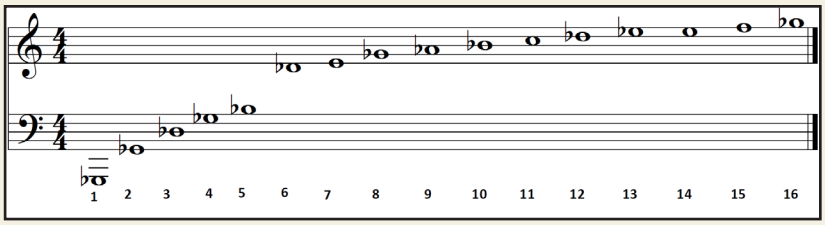
3rd Valve Combination
Tendency to be IN TUNE



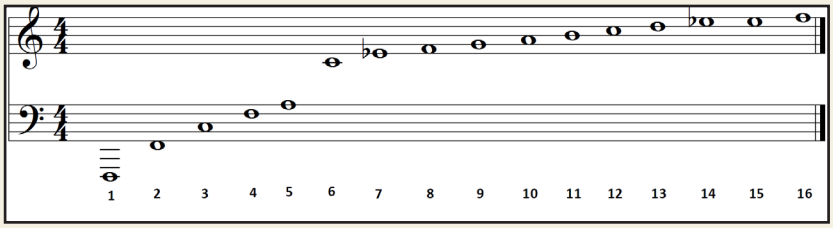
4th Valve Combination
Tendency to be SHARP



5th Valve Combination
Tendency to be FLAT



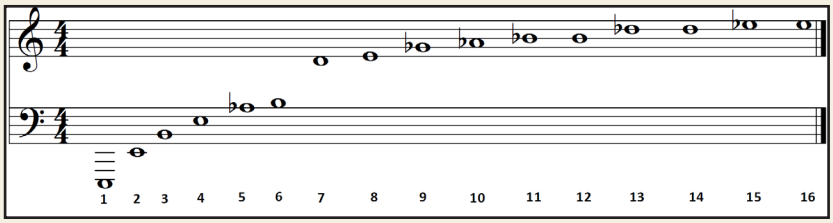
6th Valve Combination
Tendency to be SHARP



If the euphonium being played has a 4th valve, consider using the alternative valve combinations for better intonation:

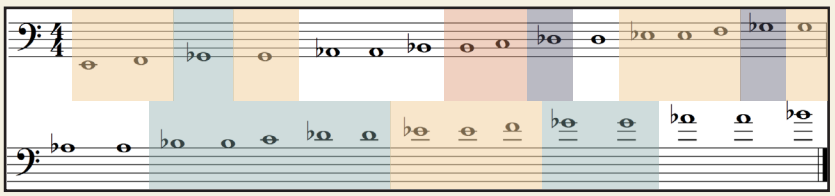
4th valve instead of 6th valve combination
2nd + 4nd valve instead of 7th valve combination.

7th Valve Combination
Tendency to be SHARP



Although the 7th valve combination pitch tendency is sharp, the 7th overtone series partial is incredibly flat. Avoid playing it!

Pitch Tendency As It Relates to the Preferred Fingering and Overtone Series Placement



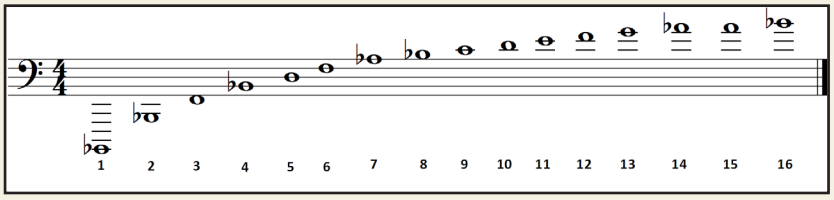
Very Sharp | Slightly Sharp | In Tune | Slightly Flat | Very Flat

Being mindful about using proper fingerings will have a strong effect on the pitch and overall sound of the horn. Correct use of trigger is important as it allows for greater accuracy in the higher register and facilitates good tone production in the low register.

Tuba

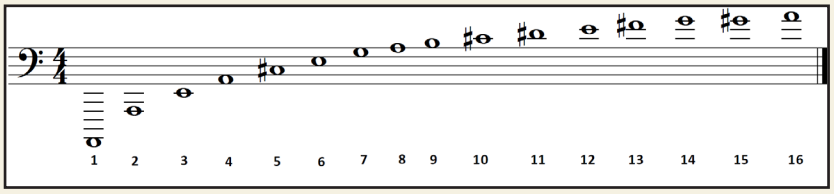
The tuba will play sharp in the upper range whenever the player exerts too much pressure to obtain the pitch. Work up to the high range with long tones, utilizing a good embouchure and air support.

1st Valve Combination
Tendency to be IN TUNE

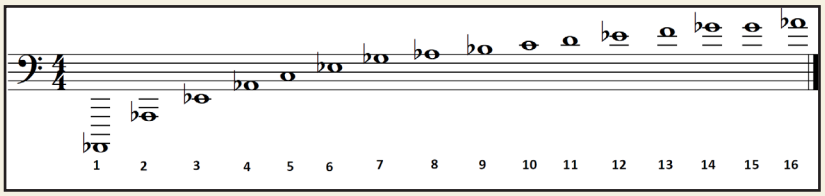


The first three valve combinations have the tendency to be most in tune. For that reason, it is recommended to use valve combinations with the least valves for best intonation in general playing.

2nd Valve Combination
Tendency to be IN TUNE

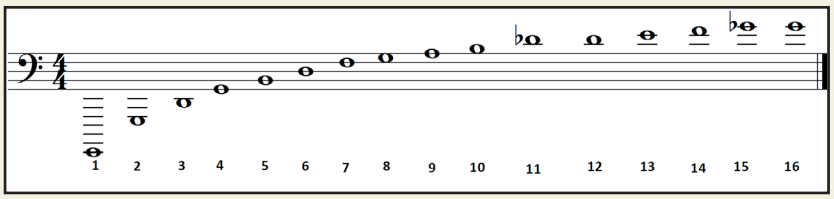


3rd Valve Combination
Tendency to be IN TUNE



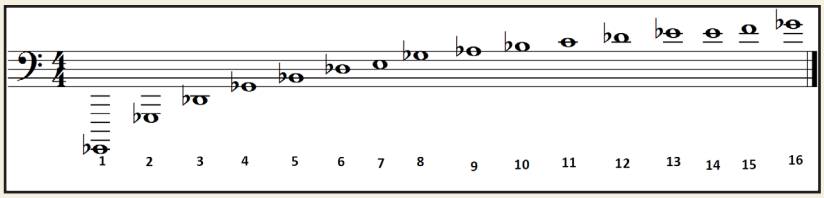
Consider making slight adjustments to the embouchure to change the pitch. If a note has the tendency to be flat, firm the corners of the embouchure slightly, bring the lips closer together, and increase air speed will help bring the pitch up. If a note has the tendency to be sharp, lip the note down by keeping the corners of the embouchure firm and dropping the jaw as if to say, "AH."

4th Valve Combination
Tendency to be SHARP

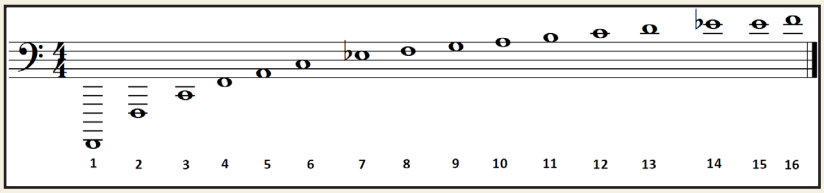


When making adjustments, maintain the shape and integrity of the embouchure so tone quality is not compromised.

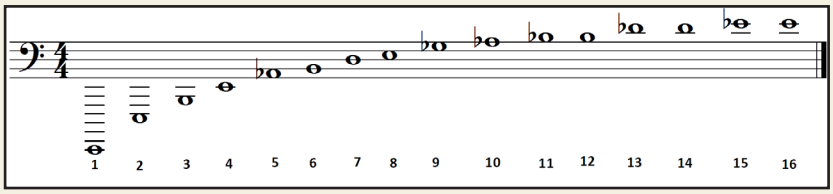
5th Valve Combination
Tendency to be FLAT



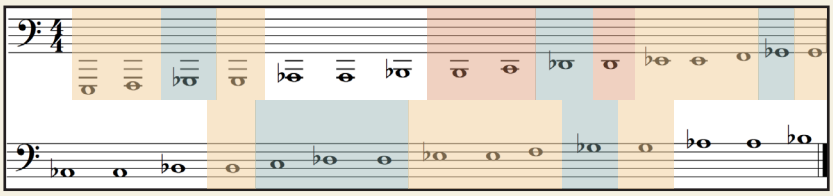
6th Valve Combination
Tendency to be SHARP



7th Valve Combination
Tendency to be SHARP



Pitch Tendency As It Relates to the Preferred Fingering and Overtone Series Placement



Very Sharp | Slightly Sharp | In Tune | Slightly Flat | Very Flat

If the tuba being played has a 4th valve, consider using the alternative valve combinations for better intonation:

4th valve instead of 6th valve combination
2nd + 4nd valve instead of 7th valve combination.

Although the 7th valve combination pitch tendency is sharp, the 7th overtone series partial is incredibly flat. Avoid playing it!

Just because some notes may have the tendency to be in tune, that does not guarantee good intonation if correct air support and embouchure development are not being utilized. Use a tuner to train the ears to aurally anticipate good intonation and pitch tendencies on the tuba.

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