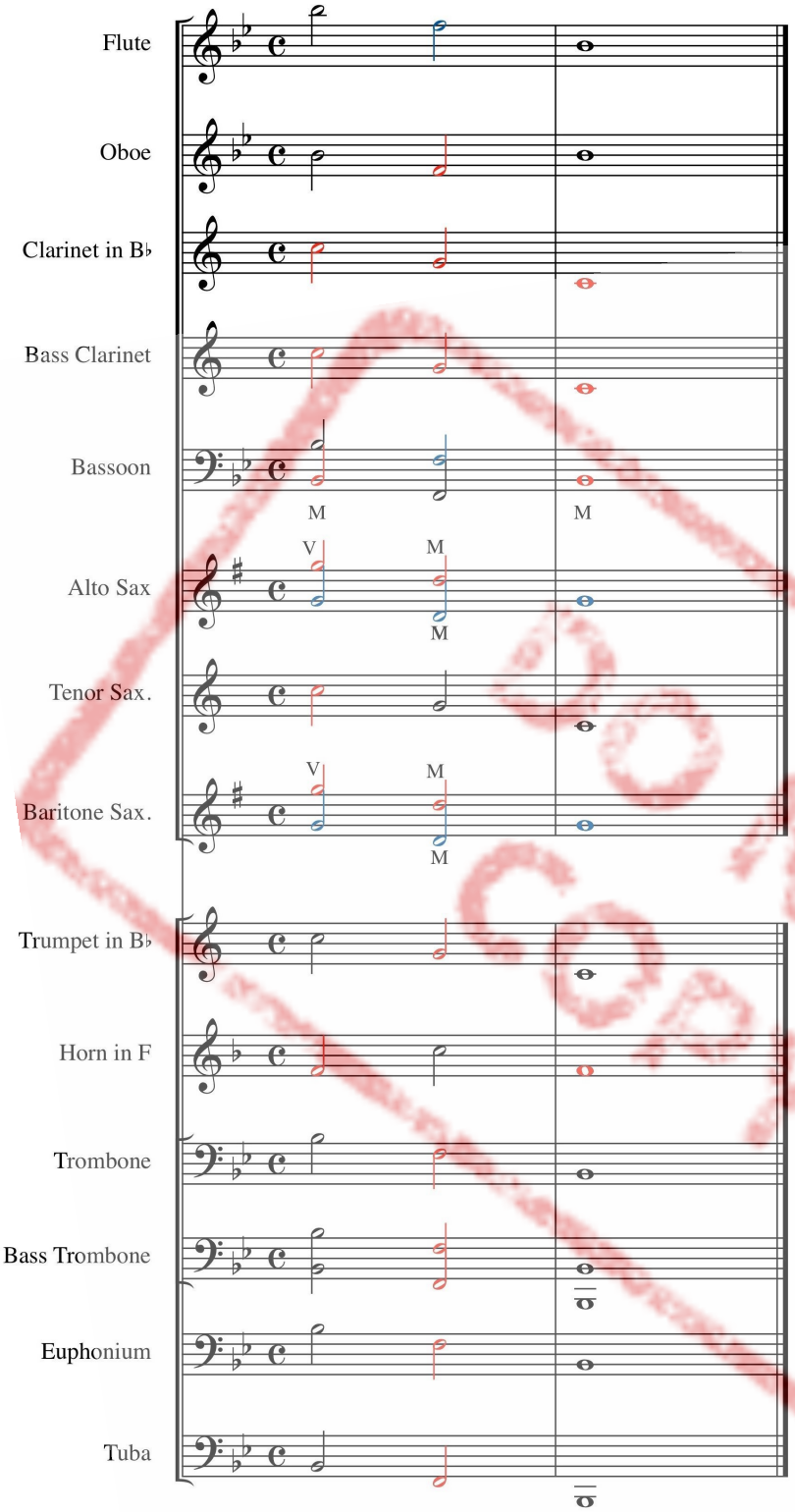
Exercise #1 Perfect Intervals



Teaching Hints:

Tuning Each Instrument 1st Note:

Flute: If the pitch is sharp pull head joint out, if pitch is flat push head joint in.

Oboe: If all notes are flat, take less reed in mouth. If all notes are sharp, take more reed in mouth.

Clarinet: C is sharp. Have clarinets tune to G, tune G by adjusting the barrel. High C and low C should be adjusted between the upper and lower joint. This will help the clarinet play more consistently in tune in the entire range.

Bassoon: Tune to upper B♭. Pitch is dependent on correct embouchure formation. If you are always sharp buy a longer bocal such as a #3.

Alto & Bari Sax: It is difficult to tune to G. Low G is flat. High G is very sharp. Tune to concert A (your F♯) instead. Adjust high G by adding low B and C keys ●●●|○○○ to lower the pitch and/or voice "oo".

Tenor Sax: Tune to concert A, which is your B.

Trumpet: Tune to upper C. Adjust tuning slide.

French Horn: See appendix

Double Horn Tuning Sequence

Trombone: Tune to High B♭. Adjust main tuning slide. Tune B♭ a little out from 1st position so when you have to go to 1st quickly, you do not hit your face with the slide. **Valves:** Tune F to F and G♭ to G♭.

Baritone/Euphonium/Tuba: Tune to upper B♭. Use main tuning slide.

Brass Instruments: If your tuning slide is stuck, your instrument is broken. Get is fixed immediately.

Concert F: 2nd note

Do not tune your band to concert F. There are too many inconsistencies among the instruments.

Flute, Bassoon, Low Alto & Bari are flat.

Trumpet, Trombone, Baritone, Tuba, High Higher Octave Alto and Bari are sharp.

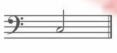
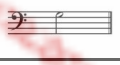
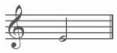
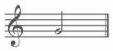
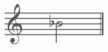
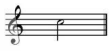
Solfege:

Do - Sol - Do

Understanding Intonation: Pythagoras

For centuries, musicians have spoken of the problems of our tuning system. They have been perplexed and wondered, "How do we play in tune?"

Consider long ago during Roman times. Pythagoras (570 B.C. to 495 B.C.), who discovered the numerical basis for acoustics, heard hammers being struck by a blacksmith. The crash of the hammers against anvils created different intervals. Using bells, Pythagoras constructed the overtone series. Then he used mathematics to represent the intervals.

Vibrating Frequency	64	128	192	256	320	384	448	512
Note								
Order of Overtones	1	2	3	4	5	6	7	8
% of string used for pitch	1	1/2	1/3	1/4	1/5	1/6	1/7	1/8

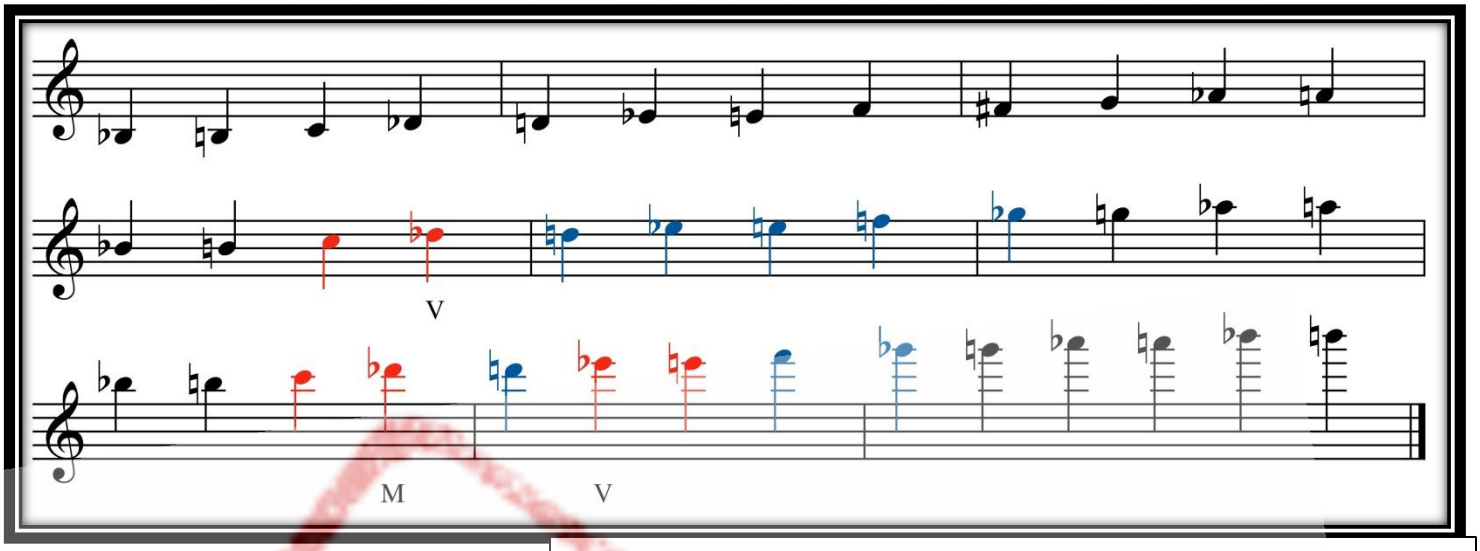
Rehearsal Technique: Practice with a Drone

Play a drone with a tone generator such as "*TE Tuner*", the app I like to use, or you can even use a Peterson Strobe Tuner.

Once your students have established a consistent pitch with the drone, have different sections play the drone. This will give everyone the chance to listen and play the different intervals. Students are practicing listening and hearing intervals in these exercises.

Later try my chorales, but for now start with one thing at a time—intervals before chords.

Flute Pitch Tendency Chart



These pitch tendencies are for many but not all instruments, check yours.

Red Notes = Sharp Blue Notes = Flat M = Moderately V=Very

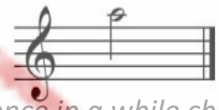
Intonation Issues and Solutions

Overall Pitch

If all notes are flat = Push head joint in.

If all notes are sharp = Pull head joint out.

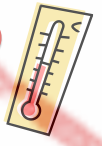
Pitch of Head Joint

A 

Every once in a while check your head joint. Stick cleaning rod in head joint backwards and center the mark in the tone hole.

Room Temperature

Hot = Sharp

Cold = Flat 

The Flute gets warm faster so as it warms up it will go sharper faster than everyone else.

Balancing Flute

Keep embouchure hole and keys facing up.

Air

Air stream directed higher = Sharper

Air stream directed lower = Flatter

Even air is your friend.

Dynamics

Loud = Sharp

Soft = Flat 

Alignment

Align center of right hand keys with center of embouchure hole.

Individual Pitch Guide

See Appendix 1

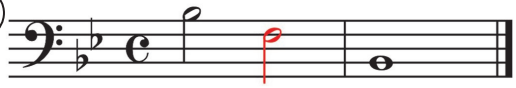
Pitch Tendency Exercises

Euphonium

Red Notes = Sharp
Blue Notes = Flat

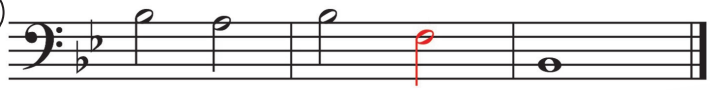
M = Moderately
V = Very

1



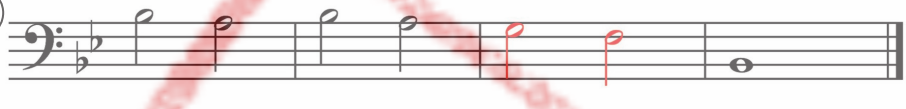
Tuning the Euphonium: Tune to upper B♭. If sharp, slightly pull the tuning slide out. If flat, slightly push tuning slide in. If your tuning slide does not work then it is broken and needs repaired.

2



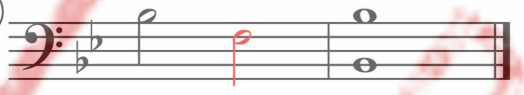
F is a little sharp because the 3rd partial is sharp. Listen and match pitch with the band.

3



G is sharp, because the fingering combination 🎺🎺🎺 is a little sharp. You can lip it down or you can adjust it using 1st valve tuning slide if yours is adjustable.

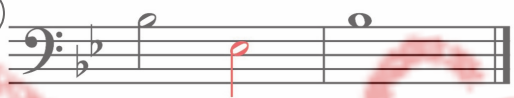
4



Listen and adjust octave B♭.

Mouthpiece Exercise: Play some of these exercises with just your mouthpiece. Listening and matching pitch with your lips and air is the best way to make sure you are always in tune when playing with your instrument.

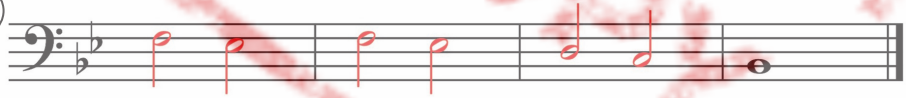
5



Flat or Sharp **See Intonation Issues and Solutions.**

Remember that as you fix pitch do things to adjust pitch that give you better tone, good tone is one of the most important parts of playing an instrument.

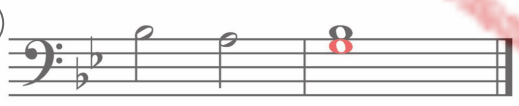
6



M

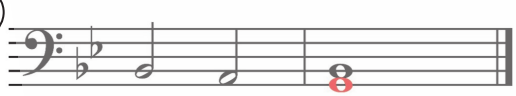
Just Intonation means you should play the third of the key (D in key of B♭)14 cents flat to be in tune. 4th partial (F, E, E♭, D, D♭, C, and B) are naturally sharp in the overtone series.

7



Just Intonation: The 6th of the key (A) should be lowered by 16 cents to be in tune in your key of C.

8



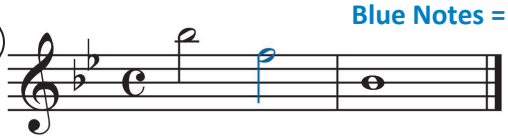
Pitch Tendency Exercises

Flute

Red Notes = Sharp
Blue Notes = Flat

M = Moderately
V = Very

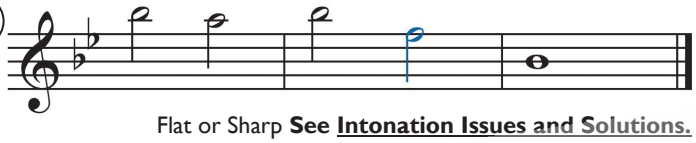
1



Tuning the Flute: If the pitch is sharp pull head joint out, if pitch is flat push head joint in.

Flexible Embouchure: being able to move lips in and out and actively listening will help you match pitch. Bringing lips in and directing air down lowers the pitch. Moving lips out and raising air stream raises pitch.

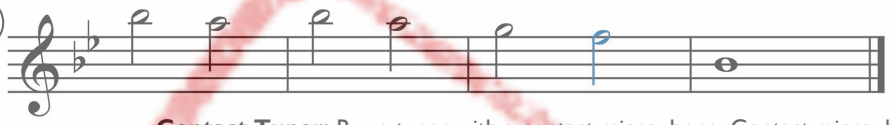
2



Flat or Sharp **See Intonation Issues and Solutions.**

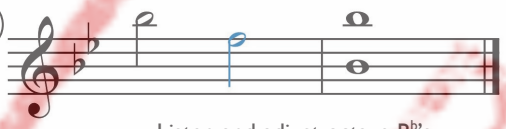
Remember that as you fix pitch do things to adjust pitch that give you better tone, good tone is one of the most important parts of playing an instrument.

3



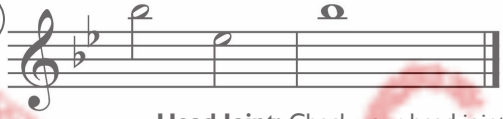
Contact Tuner: Buy a tuner with a contact microphone. Contact microphones can pick up your sound even when others are playing, this will help you see which notes are out of tune even during rehearsal.

4



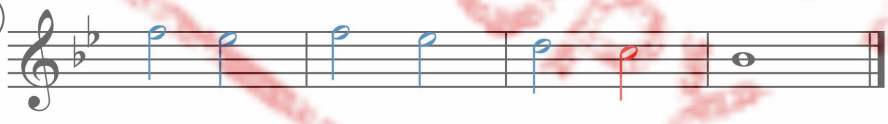
Listen and adjust octave B♭'s.

5



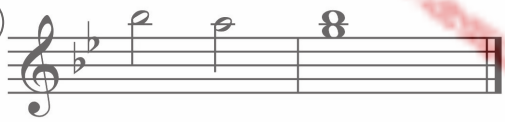
Head Joint: Check your head joint to see if cork is in the correct spot.
Stick cleaning rod in head joint and center the mark in the tone hole.
Adjust the pitch of flute by moving the cork; clockwise lowers the pitch, counter clockwise raises the pitch.

6



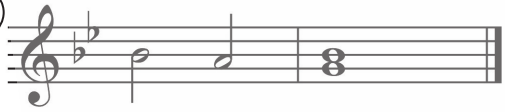
D is a little flat, this is actually good if you are trying to play in **Just Intonation.**
Just Intonation means you should play the third of the key (D in B♭)14 cents flat to be in tune.

7



Just Intonation: The 6th of the key (G) should be lowered by 16 cents to be in tune in the key of B♭.

8



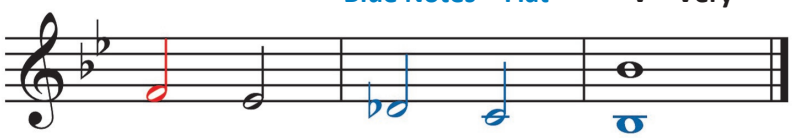
Pitch Tendency Exercises

Oboe pg.2

Red Notes = Sharp
Blue Notes = Flat

M = Moderately
V = Very

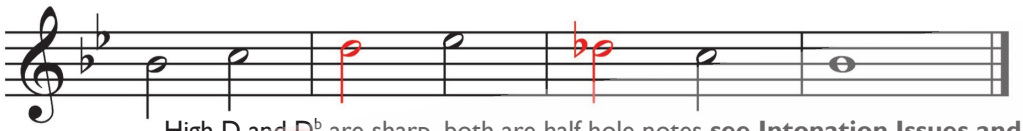
9



Just Intonation: D♭ is the minor 3rd in the key of B♭. Minor 3rds should be raised 16 cents to be beatless.

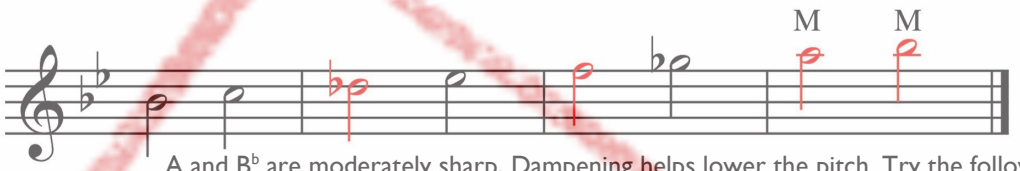
D♭ is a little flat, try adding the banana C key to help raise the pitch.

10



High D and D♭ are sharp, both are half hole notes **see Intonation Issues and Solutions** for how to adjust the pitch. Rolling your lips a little as you play can bring the reed in and out, which can help adjust the pitch. Thus roll in a little on D♭ and D to try and bring them in tune.

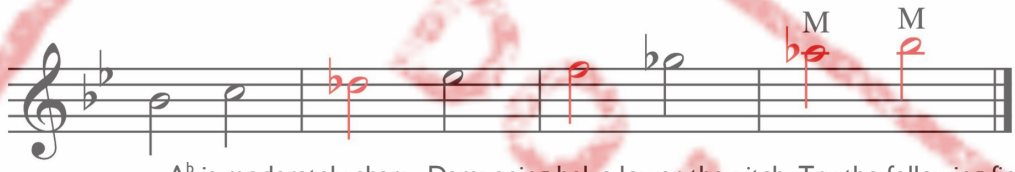
11



A and B♭ are moderately sharp, Dampening helps lower the pitch. Try the following fingerings to help dampen the pitch. Basic A  dampened A or

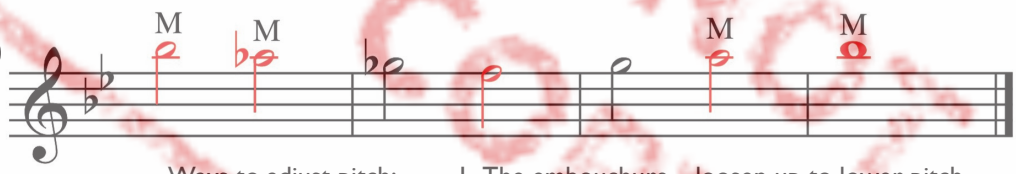
Basic High B♭ dampened High B♭ or alt B♭ or

12



A♭ is moderately sharp, Dampening helps lower the pitch. Try the following fingerings to help dampen the pitch. Basic A♭ Trill A♭ Dampened A♭

13

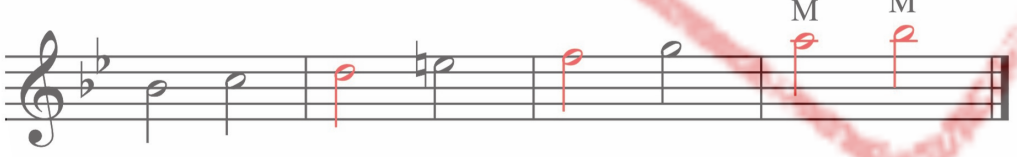


Ways to adjust pitch;

1. The embouchure—loosen up to lower pitch.
2. Reed placement on lips—more reed in mouth to lower pitch.
3. Holding position—higher angle lowers pitch.
4. Alternate fingerings.

14

15



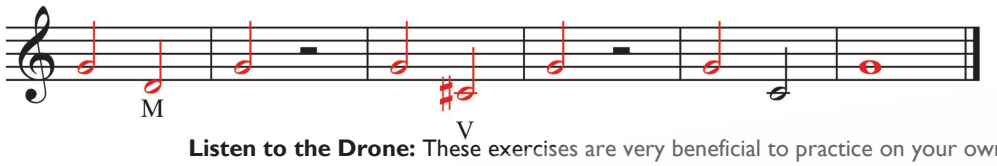
Pitch Tendency Exercises

Trumpet pg.3

Red Notes = Sharp
Blue Notes = Flat

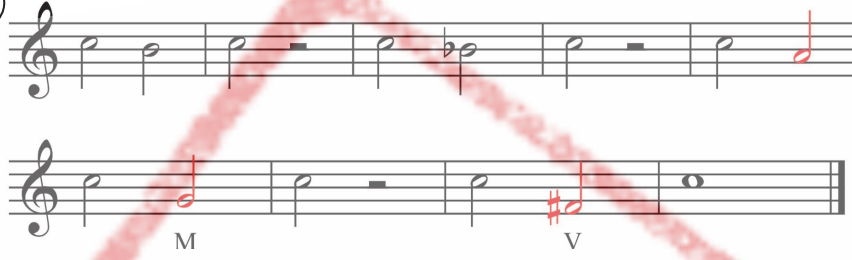
M = Moderately
V = Very

16



Listen to the Drone: These exercises are very beneficial to practice on your own with a drone so you can hear exactly how you are doing, not be covered up by the entire band.

17



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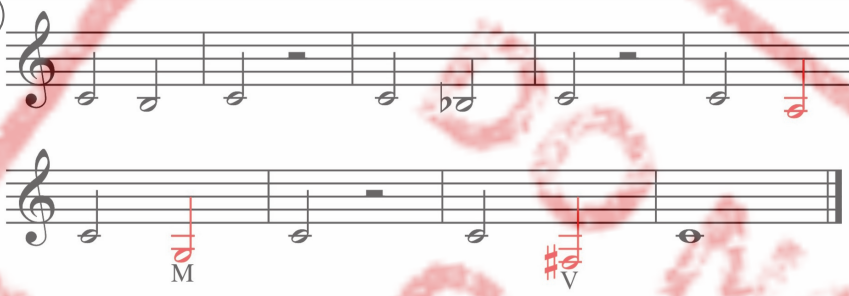
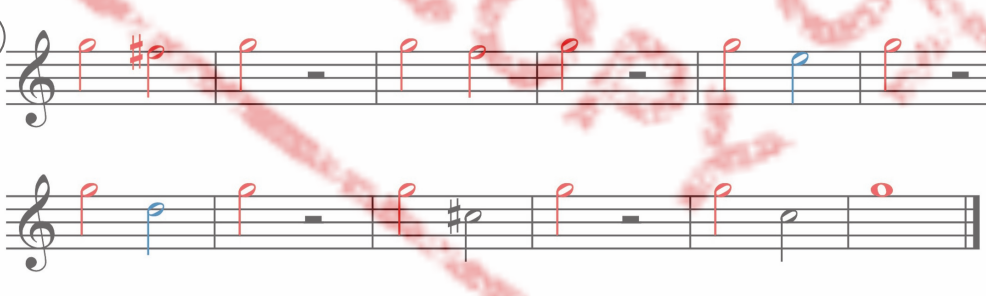
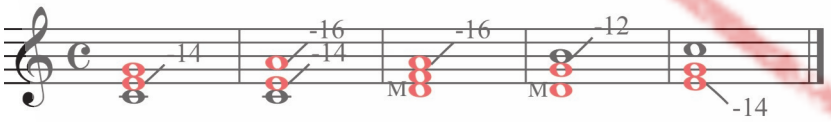


19



Play #16 and #19 at the same time with another brass player. Matching pitch with low notes then switch parts and practice the other octave.

Chorale #1

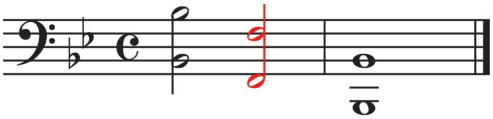


Pitch Tendency Exercises

Bass Trombone

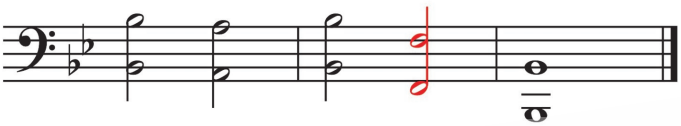
Red Notes = Sharp M = Moderately
Blue Notes = Flat V = Very

1



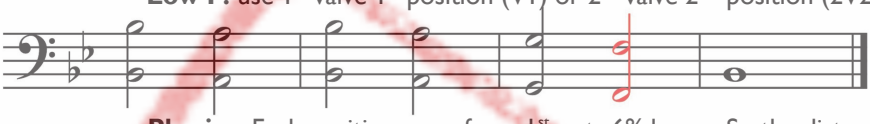
Tuning the Trombone: Tune to upper B♭. If sharp, slightly pull the tuning slide out. If flat, slightly push tuning slide in. I tune 1st position out just a little so I have room to adjust the pitch sharper.
Tuning other slides: F attachment: Tune to F and C. **G♭ attachment:** Tune D♭ and G♭.

2



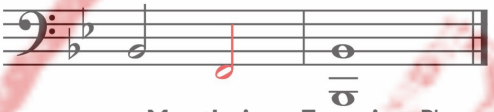
F is a little sharp because the 3rd partial is sharp. Listen and match pitch with the band, play F a little flatter then normal 1st position.
Low F: use 1st valve 1st position (V1) or 2nd valve 2nd position (2V2). I prefer (2V2).

3



Physics: Each position away from 1st gets 6% larger. So the distance between 2nd and 3rd is 6% larger than 1st to 2nd. Make sure as you go further out that each position gets exponentially larger.
Valves: Physics effects valves even more. F valve is the same as being in 6th position so the difference between 1 and 2 is the same distance as 6 to 7 with valves. **See Bass Trombone Fingering Chart.**

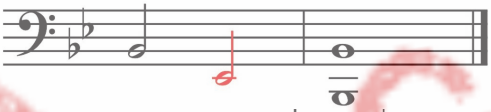
4



Listen and adjust octave B♭.

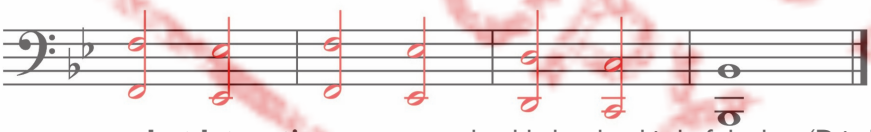
Mouthpiece Exercise: Play some of these exercises with just your mouthpiece. Listening and matching pitch with your lips and air is the best way to make sure you are always in tune when playing with your instrument.

5



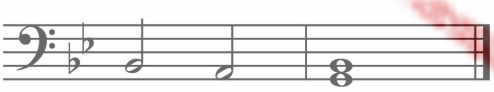
Alternate B♭: Play B♭ in the same position as low E♭, a little flat 3rd position with 1st valve (V3). If your B♭ is in tune E♭ will be also and it is an alternate for quick moves between those two notes.

6



Just Intonation means you should play the third of the key (D in key of B♭)14 cents flat to be in tune.
Low D: is played in F valve flat 4th position (Vb4) or both valves 1st position (VV1).
Low C: will be played in flat 7th position (Vb7) or both valves 4th position (VV4).

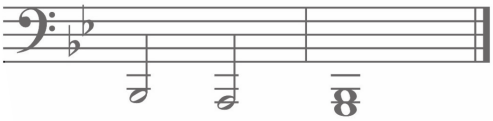
7



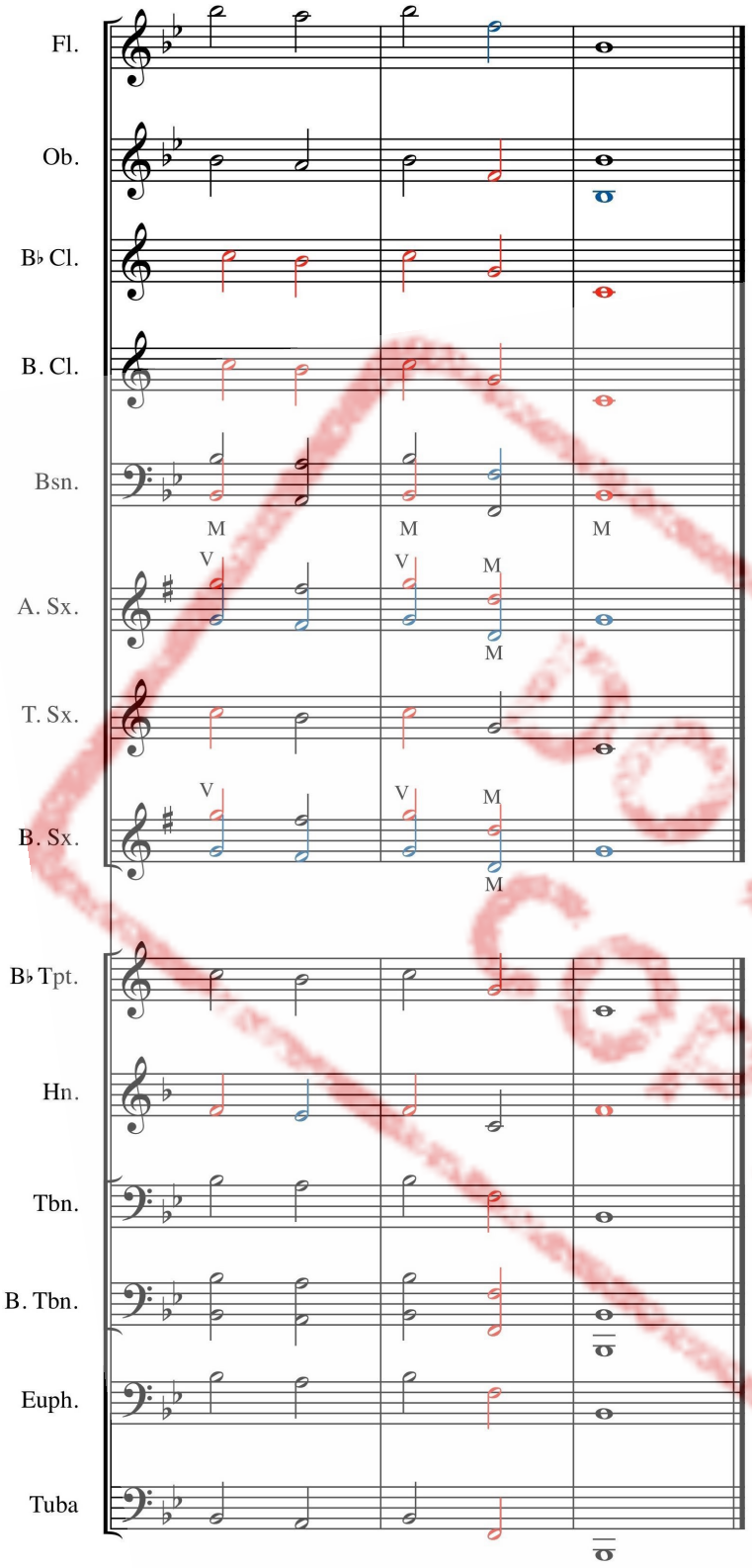
Just Intonation: The 6th of the key (A) should be lowered by 16 cents to be in tune in the key of B♭.
Flat or Sharp **See Intonation Issues and Solutions.**

Remember that as you fix pitch do things to adjust pitch that give you better tone, good tone is one of the most important parts of playing an instrument.

8



Exercise #2 Add the 7th



Teaching Hints:

Concert B^{b}: The Root

Remind students to listen to B^{b}. It is easy to become distracted and not go back to the same note where they started. Ensure low B^{b} is in tune with high B^{b}.

Oboe:

Low B^{b} is a little flat. Not all oboes have a mechanism to play low B^{b}. Use the following fingering in combination with covering the lower two holes of the bell with your knees.

With mechanism the fingering is

Alto & Bari:

High D is moderately sharp. To lower pitch, add the low B key and/or voice "oo".

Low D is flat, raise the pitch using the C$^{\#}$ key and/or voice "ee".

Concert A: Leading Tone

Learn more:

Did you know the leading tone should be lowered in the chord to make it sound more in tune? Want to learn how to play more beautiful harmony? Learning how to play **Just Intonation** can be very difficult, but there is a solution. Practice this book to learn it then buy **Just Chorales** to apply it at:

www.sevierband.com

Just Intonation: Major 7th

In the key of B^{b} the major seventh (leading tone) is A. Just Intonation says that the major seventh should be lowered 12 cents to be beatless (in tune).

A for concert pitch.
E for F instruments.
B for B^{b} instruments.
F$^{\#}$ for E^{b} instruments.

Bass Trombone:

Low F use 1st valve 1st position (V1) or 2nd valve 2nd position (2V2). I prefer (2V2).

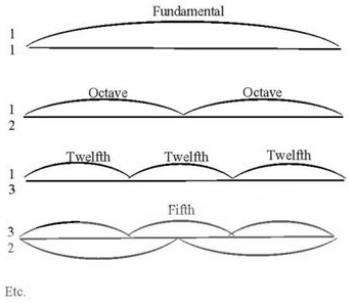
Solfege:

Do - Ti - Do - Sol - Do

Understanding Intonation: Reproducing Intervals

Using a monochord—a one-string sound board with a sliding bridge to produce pure tones—you can reproduce all of the following intervals with the proportions shown:

Fundamental 1:1
Octave 2:1
Fifth 3:2
Fourth 4:3
Major 3rd 5:4
Minor 3rd 6:5
Major 6th 5:3
Minor 6th 8:5



Rehearsal Technique: Singing

Singing can be an amazing method to help students match pitch on their instrument. Use solfege to learn this exercise. Your band can instantly improve at matching pitch.

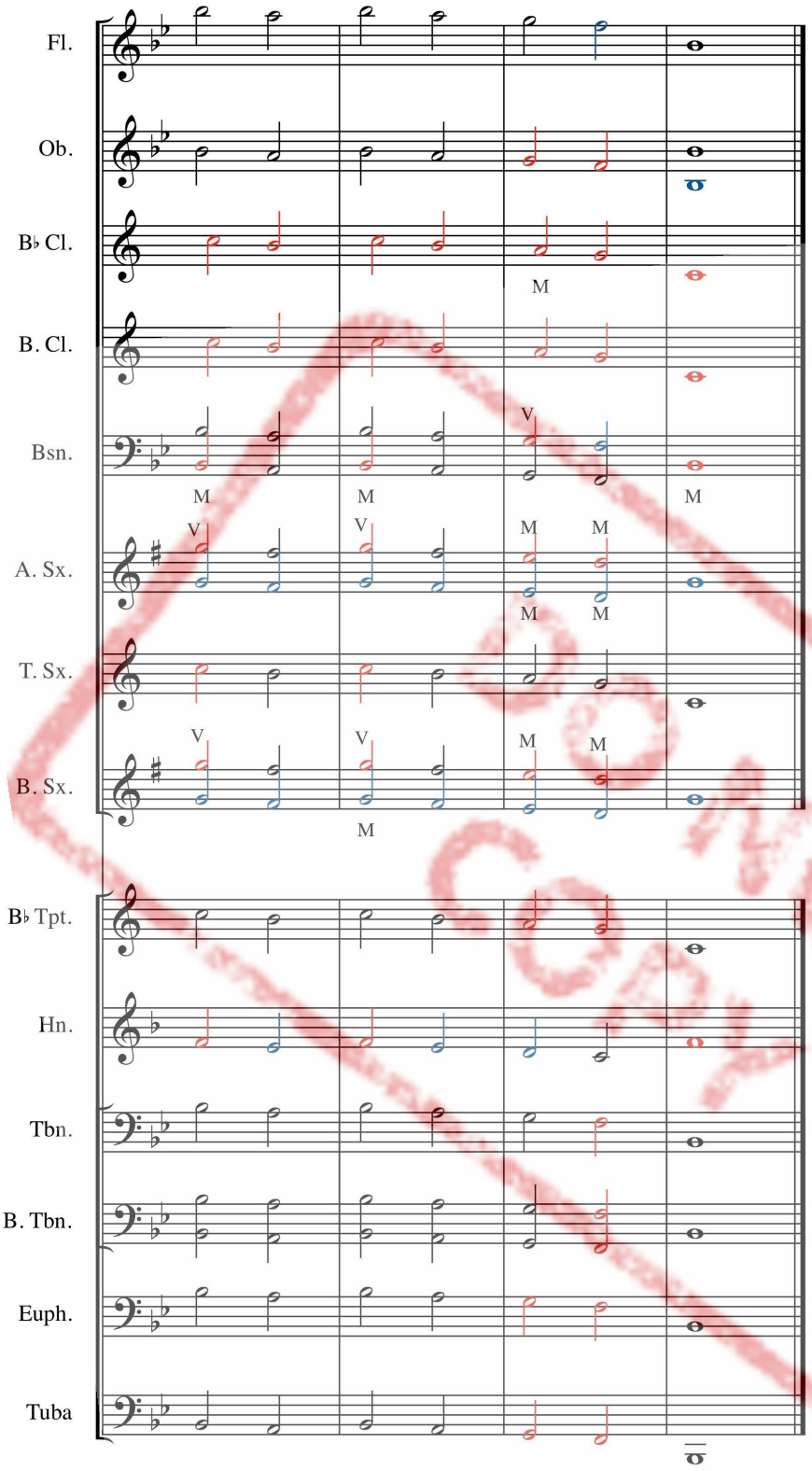
Solfege: Pronunciation:

Do = D "oh"
Re = R "ay"
Ri = R "ee"
Me = M "ay"
Mi = M "ee"
Fa = F "aa"
Sol = S "ohl"
La = L "aa"
Li = L "ee"
Te = T "ay"
Ti = T "ee"

This method will only help if the students can sing. If your students do not sing well, it can make things worse! Use your judgment. Be patient with the tone deaf students. They will improve but not immediately.

"Take baby steps as you teach your students to tune."

Exercise #3 Major 6th



Teaching Hints:

Just Intonation: Major 6th

Lower the major 6th by 16 cents. See more at www.sevierband.com

Clarinet:

Throat tone A is moderately sharp. It is also a difficult note to have good tone and play in tune. Lower pitch by adding right hand to the fingering.

Bassoon:

G is very sharp. This is a half-hole note. Try using voicing to bring the pitch down. **Voicing** means to change the shape of your mouth to affect the pitch: "ee" raises pitch, "oo" lowers pitch.

Alto Sax & Bari:

High E is sharp. To lower pitch add the low C key and/or voice "oo". Low E is flat. To raise the pitch use the D# key and/or voice "ee".

French Horn:

E is on flat on F side, but if you use the B♭ side it is more in tune.

On D it is flat on F side and sharp on the B♭ side, so use your hand to adjust it. Farther in lowers the pitch, and farther out raises the pitch.

Trombone:

Physics: Each position away from 1st gets 6% larger. So the distance between 2nd and 3rd is 6% larger than 1st to 2nd. Make sure as you go further out that each position gets exponentially larger.

Valves: Physics effects valves even more. F valve is the same as being in 6th position so the difference between 1 and 2 is the same distance as 6 to 7 with valves.

Solfege:

Do - Ti - Do - Ti - La - Sol - Do

Understanding Intonation: Pythagorean Scale

Theoretically, taking the mathematical ratio for 12 perfect fifths and adding them together should produce the same exact note as where we started, or at least the same note up 7 octaves. But we get:

C1 to G1	G1 to D2	D2 to A3	A3 to E3	E3 to B4	B4 to $F^{\#}4$	$F^{\#}4$ to $C^{\#}5$	$C^{\#}5$ to $G^{\#}5$	$G^{\#}5$ to $D^{\#}6$	$D^{\#}6$ to $A^{\#}7$	$A^{\#}7$ to F7	F7 to C8	
3/2	3/2	3/2	3/2	3/2	3/2	3/2	3/2	3/2	3/2	3/2	3/2	
1.5 x	1.5 x	1.5 x	1.5 x	1.5 x	1.5 x	1.5 x	1.5 x	1.5 x	1.5 x	1.5 x	1.5 =	129.746

On the other hand, add the ratios of 7 octaves, and we get:

C1 to C2	C2 to C3	C3 to C4	C4 to C5	C5 to C6	C6 to C7	C7 to C8	
2/1 x	2/1 x	2/1 x	2/1 x	2/1 x	2/1 x	2/1 =	128

The octaves do not match. C8 overshoots the octave by about a quarter of a half step. This can create an excruciating octave to the ears which is so out of tune that it renders the note unusable. Pythagorean tuning also creates fast beating thirds, sixths, and smaller diatonic semitones, i.e. seconds and sevenths.

Technique: When should I teach intonation?

"Always!"

When do you recommend using these exercises?

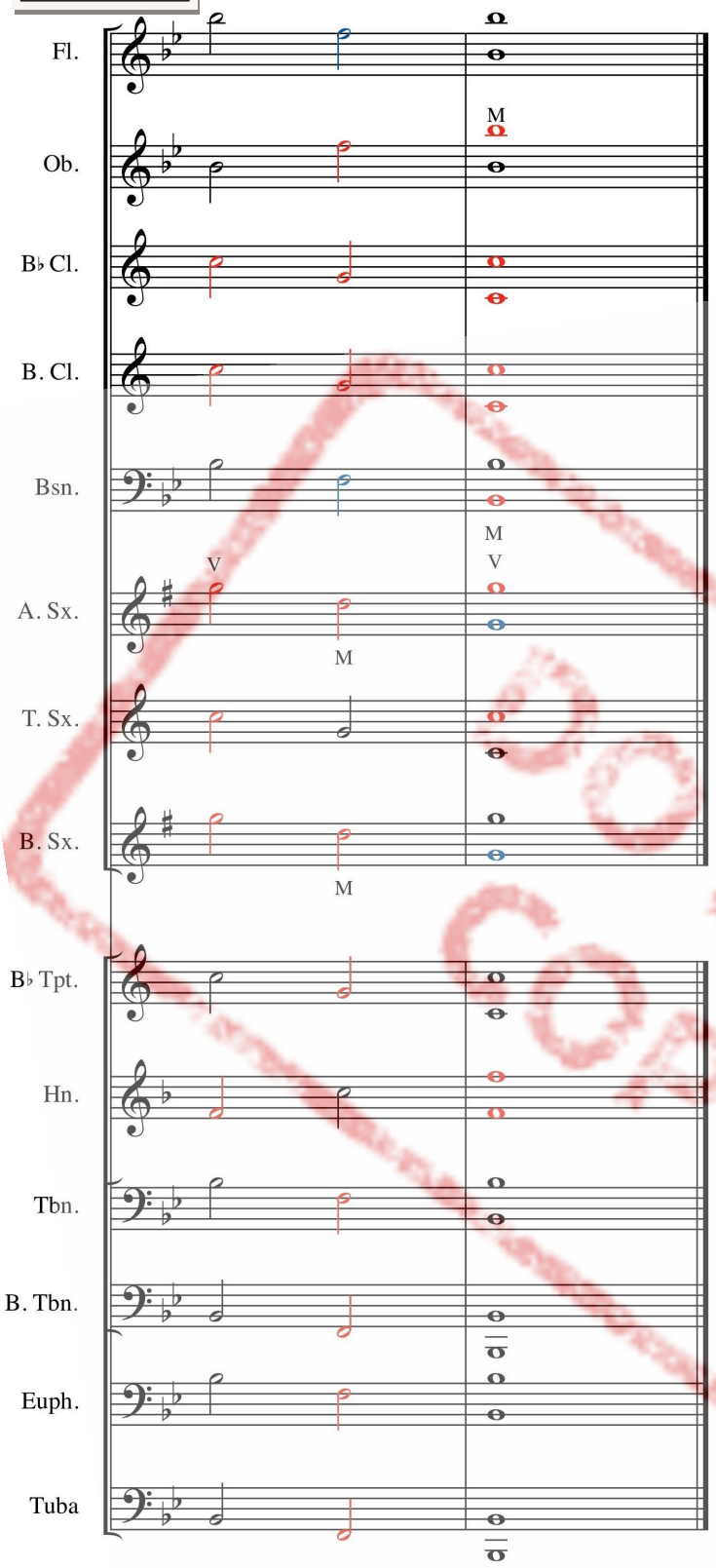
I have used these exercises from beginning band to college level. Obviously, some of the notes are too high for beginning band, but by the end of the year, if they can play with a steady tone, try some of the easier exercises.

At the college level, this is a great way for students to truly understand pitch tendencies and how to make the chords beautiful with **Just Intonation**.

Shameless plug: Try out my other chorales and exercises at:

www.sevierband.com

Exercise #4 Perfect 4th



Teaching Hints:

Concert B♭: Octaves

Listen to and adjust octaves to match pitch.

Oboe:

There are several fingerings for High B♭. Find the one that works best and is the most in tune for your oboe .

Tuning Single Reed Mouthpieces:

If you have the correct embouchure, formation of inside of mouth, and reed combination, then you should play the following note (this can help with better tone):

Clarinet C above the staff.
Bass Clarinet F at the top of the staff.
Alto Sax A in the staff.
Tenor Sax G at the top of the staff.
Bari Sax D at the top of the staff.

Brass Mouthpiece Exercises:

Play some of these exercises with just your mouthpiece. Listening and matching the pitch with your lips and air is the best way to make sure you are always in tune.

Solfege:

Do - Sol - Do