Woodwind Fingering Systems

Here's the problem: Twelve chromatic pitches per octave, ten fingers. If only we had twelve fingers, then each finger could be assigned to a specific key for that chromatic pitch. But since we don't have access to genetic engineering, we need to design the instrument to allow some fingers, or combination of fingers to handle the extra pitches. While each of the woodwinds vary in their key structure, there are constants among them. Knowledge of this allows one to learn new instruments more quickly.

Early instrument dealt with the chromatic problem by playing some notes through a system of "cross fingerings." This meant that one would press a series of holes, skip some, and cover lower tone holes, thus lowering the pitch chromatically. Cross fingerings are more awkward, and are not optimal for intonation.

Woodwind instruments are unique in that each chromatic pitch is assigned a specific fingering. Brass instruments will allow a variety of alternate fingerings or allow one to play several notes with the same fingering. String instruments and piano offer the option of playing a passage with a variety of fingering combinations.

Woodwind constants

- Hand position. In order for the fingers to move quickly, they must remain relaxed. When pressing the keys, they should only apply the least necessary pressure, and when they lift, the motion should be as minimal as is possible. Relaxed hands is evidenced by gently-curved fingers, and minimal finger pressure evidenced by the absence of any buckling of the knuckles.

- Sliding the same finger between two notes is a slow and awkward process, and therefore, alternate keys are frequently available. At times, these alternate keys operate the exact same tone hole, so the quality of the note itself will not vary. At other times, the alternate key will operate a separate tone hole, and the quality may be different. The decision to use these keys must be made by weighing the advantages/disadvantages of fingering ease with pitch/tone quality.

- Octave venting. All the woodwind instruments, except the clarinet, overblow at the octave. This means that the fingerings for the second octave will remain the same, though some assistance to play the second harmonic will be necessary. This assistance is met by either one or more octave keys, altering the higher octave fingering by modifying the left-hand first finger, or by air and embouchure adjustment.

- Crossing the Break. When one ascends from the highest note on the woodwind tube to the lowest in the next octave or register, several fingers must be pressed at the same time. This procedure is known as "crossing the break," and presents a challenge in that not only must several fingers find their place, but they must also accomplish it simultaneously.

- Small auxiliary or trill keys. When the first three fingers of either hand are called upon to operate more than one key, the special key is above the normal position for that finger. Thus, a key between L2 and L3 will be pressed by L3, not L2. The only fingers called upon to stretch away from the other fingers are the pinkies.

Boehm System

Theobold Boehm developed his fingering system for the flute in the 19th Century. His ideal was that each pitch would have a hole drilled specifically for that note. In order to solve the problem of reaching these holes with the fingers, and to deal with the twelve pitch/ten finger problem, Boehm developed a series of keys to cover each tone hole. Because the fingers no longer needed to directly cover the tone holes, Boehm could now have vary large tone holes, creating a bigger sound. Boehm's principles were also applied to the clarinet and the saxophone.

Conservatory System

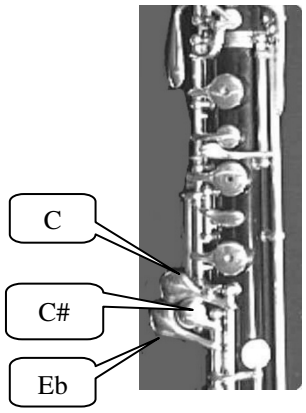
Standardized by oboes used at the Paris Conservatory in the 19th Century, this system found on most modern oboes.

Heckel System

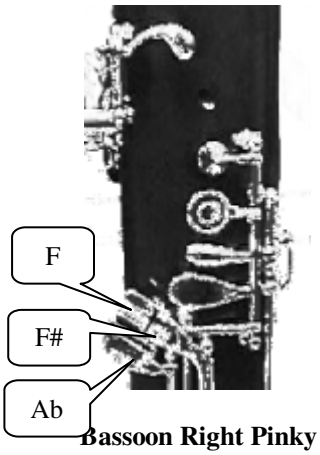
Also known as a German system, it was developed by the German bassoon factory of the same name, this system is standard for bassoons used throughout the world except in France (where the "French System" bassoon is used).

Similarities and Differences

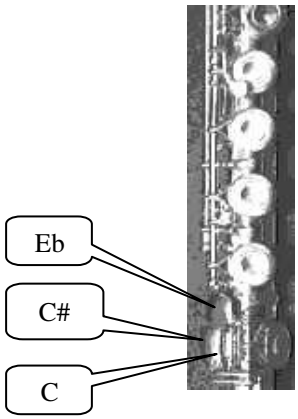
The right-hand little finger cluster is similar on the oboe and bassoon, though transposed down a Perfect 5th (plus an octave) for the bassoon. This is a mirror to the Boehm system instruments, where one reaches the pinky for the lower pitch, and E-flat (A-flat) is found closest to the right third finger as it is on flute, clarinet and saxophone.



Oboe Right Pinky

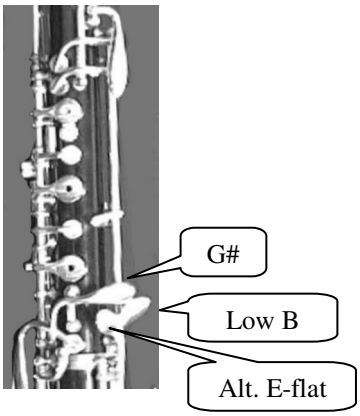


Bassoon Right Pinky

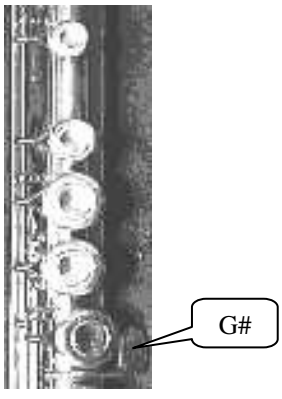


Flute Right Pinky

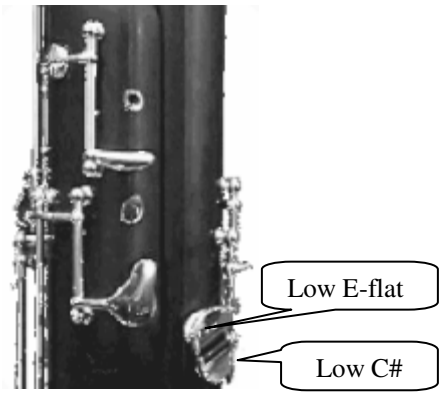
The left pinky on the flute creates the G# (like saxophone, and C#/G# on the clarinet). On the oboe, the left pinky is also used to play the G#, and that finger is also called upon to produce a low B as well as an alternate E-flat, and on better instruments, low B-flat and an alternate F. The Heckel system is completely different in this area, and is used to help create low E-flat and low C#.



Oboe Left Pinky

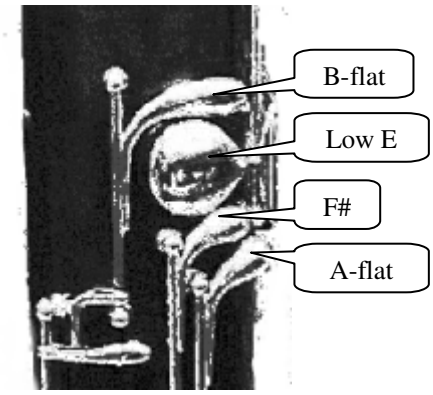


Flute Left Pinky

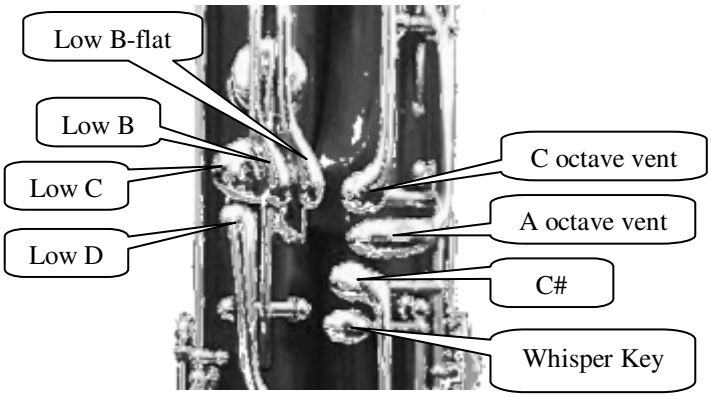


Bassoon Left Pinky

The Bassoon is unique in its requirements for the thumbs. The right thumb is used to play B-flat, low E, as well as alternates for F# and A-flat. The left thumb is used for notes below low E, as well as the "reverse octave" Whisper key and vent keys for higher notes.



Bassoon Right Thumb



Bassoon Left Thumb

Octave Keys

Ideally, there would be one octave vent for each chromatic pitch, but to minimize the keywork, a few keys suffice for all.

On the oboe, there are three mechanisms to assist in overblowing the octave: the "half-hole" (where the left first finger is slid downward to uncover the small hole, while still pressing the left first-finger key), is used for C#, D and E-flat. The first octave key is used for E through G#, and the second octave key is used for A through C.

The bassoon uses a "reverse" octave key, known as the whisper key. Instead of pressing a key to vent the upper octave, the whisper key is pressed to close the vent key, and is used in the lower octave. Like the oboe, the bassoon uses the half hole, (this time merely venting the open tone hole partially) for F#, G and A-flat, while still pressing the whisper key. As one climbs the scale, the whisper key is removed. Optionally, some of the other thumb keys help facilitate the second octave notes, not by holding down the keys, but my "flicking" the key with the initial attack of the note. The "A key" is used for A and B-flat, the "C-key" for B and C, and the D key (when available) for D.

The flute also vents the initial second-octave notes, not with a half-hole, but by uncovering the left first finger key entirely for D and E-flat. Higher notes in the second octave are accomplished not by additional octave keys, but by air and embouchure adjustments.

The saxophone has two octave keys, though the mechanism is automated and using one thumb key works both of the octave vent keys.

The clarinet uses a thumb vent key, though because the instrument overblows at the twelfth, not the octave, the key is called a "register key."

It is easy to overlook the correct use of these octave mechanisms, as the student may be able to play the correct notes with incorrect fingerings, though tone quality will be sacrificed. The teacher needs to be observant in their use so that the students will develop correct use initially. Most common problems are:

- Bassoon – the student will not uncover the half hole sufficiently, giving those notes a "raspy" quality. It is also common for the student to remove the octave key when crossing the break, and thus not pressing it for those half-holed notes.
- Oboe – once again, the student will not use the half-hole. Students are often not careful to use the second octave key for A and above.
- Flute – a common problem is to leave the left first finger down for D and E-flat. It is also common for the student to forget to replace that fingering when moving to another note.