**The Secrets of Orchestration**

**Part One. Orchestral Chord Voicings**

**Chapter 2. Brass section**

**10. French horn**

Hello and welcome.

Today I am going to discuss the French horn.

Before starting to talk about the modern French horn, we have to explore the past of this instrument. Because older horns are different than modern ones due to their construction and playing capability.

Generally, two kinds of horns have been used during all periods of music history. 1. Natural horn with crooks; 2. Valve horn.

The natural horn tubing was made conical and was coiled four times, making the instruments easier to handle.

Players performed it using the natural overtone series and with the different crooks which tuned the horn to different pitches.

Natural horns were not equipped with valves or pistons to play a variety of pitches, as they are today.

Instead, the performer executed different pitches on these "natural" instruments by overblowing the fundamental tone of that instrument, which produced the upper partials of the fundamental's overtone series.

The fundamental tone is also called a pedal tone.

By overblowing the tube, the player produced the fundamental's overtones. An eight-foot-long tube, theoretically capable of sounding C2 as its fundamental, produces the following series of tones:

As you can see, some notes are missing in the **C** overtone series.

To get these missing tones, the player should change a fundamental tone by a semitone or whole tone down or up using his right hand-stopping technique.

And this caused some notes to sound out of tune.

Also, the great disadvantage of this type of horn was the difficulty of replacing the crooks.

You may ask why we should know about the natural horns if they are not used in modern orchestras. Because, natural horns were used, at least occasionally, up to the beginning of the twentieth century. On the other hand, many composers wrote as thought for natural horns even when they knew about the valve horn would be employed.

And if you want to analyze the horn parts of the classical and romantic time scores, you should know how to transpose them to the C score.

For example, Beethoven wrote his 5th symphony with the Eb horn.

The 7th symphony by Anton Dvorak. There are two kinds of horns that have been used: Horn in F and D.

Here is the list of different crooks of the natural horn.

Each crook produced a horn in a different transposition.

The following crooks were the most popular during the eighteenth century and the early part of the nineteenth century.

When the Viennese valve horn was invented, it became easier to play.

These valves are operated by the 2nd, 3rd, and 4th fingers by the left hand.

Then the mechanism has been upgraded.

So, our modern instrument is basically an F valve horn.

The low and middle range of the F horn is very easy to play.

But, the disadvantage of the F horn is that the top notes of the high range are difficult and tiring to the embouchure, because of the high partials of the harmonic series.

That’s why players used the B-flat valve horn for the high registers.

Let me explain this with a simple example as Samuel Adler mentioned in his book.

Let's analyze what happens if the composer needs the **F5** on his score.

To get an **F5** on the F horn, a player takes the fundamental **F** and overblows on the harmonic series. So, the **F5** will be the 16th partial on the **F pedal tone.**

This is difficult to play it.

What about the B-flat horn.

To get an **F5** on the B-flat horn, a player takes the fundamental **B-flat** and overblows on the harmonic series. So, the **F5** will be the 12th partial on the **B-flat** pedal tone.

Now the **F5** is very easy to obtain and is more secure.

That’s why players prefer to use the B-flat horn to perform the top notes in the scores, instead of the F horn.

Finally, a new model of the French horn was invented.

This is a combination of the F and B-flat horns into one instrument, which is called the double horn.

Through the use of both the F and B-flat divisions, it is possible to correct almost all of the defective notes on one or the other.

Due to this construction, the low, middle, and high ranges are easy to play.

Most orchestras use this model of the French horn.

Let’s talk about the mechanism of this model.

The double horn consists of 4 main constructions: the F and B-flat tubes, embouchure, 3 valves, and 1 trigger.

The player keeps the lips loose for low notes and tightens them as he moves up into the high registers.

To achieve the different overtone series, the player should take different pedal tones by using the valves. The pedal tone is also called the fundamental tone.

Some of the pedal tones are on the F division, while others are on the B-flat division.

Without fingering the double horn gives the F overtone series.

Pressing the second valve, which is the middle key, the player lowers the fundamental by one semitone. The player gets the E overtone series.

The first valve, which is operated by the upper key gives the E-flat overtone series.

The third valve lowers the fundamental tone by three semitones. The player gets the D overtone series.

All other fundamentals are obtained by combined valves.

So, the player gets the following fundamentals on the F division: F, E, E-flat, D, D-flat, C, B.

Pressing the thumb valve, which is called the trigger, the double horn mechanism switches to the B-flat division. Now the fundamental tone is the **B-flat.**

The combination of the thumb valve with different fingerings gives the following fundamentals: **A** harmonic series, **A-flat** harmonic series, **G** harmonic series, **F#** harmonic series, **F** harmonic series**,** **E** harmonic series.

Depending on the player's skill the lower note is indefinite.

Using the right hand-stopping technique a player can change a fundamental tone by a semitone or whole tone down or up.

Overblowing each of these pedal tones, a player gets other tones.

For example, If the needed soundis **B1**, a player uses the fundamental **B0.**

So, the **B1** is the second partial on the fundamental **B0.**

Using different partials of these fundamentals a player can achieve a very wide range.

This instrument can even go up to **Bb5**. But they are not secure and should be avoided. So the top limit is the **F5.**

In addition, periodic rests should be written into the part if the high register is used continuously.

The same approach should be taken with pedal tones.

It should be considered that depending on the player's skill some of the fundamentals can be sound out of tune.

The **Bb1,** **A1, Ab1,** may be **G1** might be the lower limit of this instrument.

Generally, these kinds of lower notes should be given to the tuba or the bass trombone.

Let’s say, you want to use these fundamentals in your score. How to do it?

In this case, the successive fundamentals should be used with a long duration as a sustained chord. Any short and rapid notation should be avoided.

These kinds of sounds are also used to make a thunder effect in the orchestra.

For example. This is an arrow-shaped note-head which are frequently used in modern concert and film music.

These aleatoric note-heads are written for the highest and lowest notes possible on a given instrument.

In this score, the brass players should play the lowest possible fundamental on their instruments. I need just the chaotic and random cluster sounding instead of an exact tone.

Depending on the player's skill, someone will play the fundamental **D1,** while the other one **C#1**, and so on.

This type of scoring is called "Aleatoric" writing.

Let’s back to the topic.

Be aware that this approach belongs to using the pedal tones.

Because the partials of each pedal tone are quite easy to play with fast notation.

Through the use of both the F and B-flat divisions, it is possible to correct almost all of the defective notes on one or the other.

For example, you can find the videos, of how the horn player performs “The flight of the bumblebee”.

Due to its F and B-flat divisions, all chromatic notes are playable on the double horn.

Let’s talk about the notation rules of this instrument.

When writing for double horn the composer or orchestrator simply notates for F horn, which the parts should be written a perfect fifth higher than sounding. The performer will choose whether to play on the F or B-flat division.

The French horn is written in bass and treble clef. There are 2 types of notation for this instrument: new notation and older notation. Notation in treble clef is the same in both notations, which written perfect fifth higher than sounding. But in bass clef they are different. In new notation, you have to write perfect fifth higher, but in older notation perfect fourth lower than sounding.

It is very important to know both notation types because some older scores were written in older notation. You come across it frequently.

The second important piece of information is about the staff notation. 2 types of staff notation are used frequently. First type: 1st and 2nd horns in the high staff, 3rd and 4th in the low staff in the first notation type.

Second type: 1st and 3rd horns in the high staff, 2nd and 4th horns in the low staff. But, in both notation 1st and 3rd horns take high notes, 2nd and 4th horns take low notes of the chord. This is a common rule in orchestration. Since this instrument has a huge range, it is difficult to get all of the instruments with the same loudness, and quality. Even the best players will either play in the high or the low range. Hence, some orchestra horn players are well to play in the low range, while other ones are in the high range. To get the best result they are divided as “high horn player” and “low horn player”. So, the 1st and 3rd players are high horn players, while the 2nd and 4th players are the low horn player.

The third important piece of information is that, unlike other transposing instruments such as the clarinet, the horn has always been written without a key signature at the beginning of the staff. Accidentals were written into the score.

So, at the end of this lecture, we can arrive at this conclusion.

The safe and professional sounding range of the horn is from **B1** to **F5**.

All notes above the **F5** are risky and should be avoided.

Some pedal tones can be used in chord voicing. Just avoid writing fast passages.

Due to its F and B-flat divisions, all chromatic notes are playable in double horn.

Regardless of what kind of horn (horn in F; horn in B-flat; double horn) is used, a notation should be P5 higher than sounding.

Horn parts should be written without a key signature at the beginning of the staff.

So we have done our lecture. The next video will be about how to voice the chords for 4 French horns.

Thanks for watching. Goodbye.