

Working With the Spectrotone Chart

Organization

This first section covers briefly the organization of the 70th Anniversary Edition of the Spectrotone Instrumental Tone-Color Chart™.

Musical and Technical Communication

All instrument ranges and the tone-colors within each individual instrument's range are expressed by:

- MIDI Note Numbers
- Musical pitches (on a modified Grand Staff)
- A piano-like keyboard extending the lower range into the Sub Bass (pipe organ)
- Hz Frequencies

Thus, the Spectrotone Chart can be used by music creators and engineers to better communicate with one another, even if neither are at ease with musical notation, and also by producer/directors needing a common language to communicate with composers.

Instrument Ranges

In addition to other enhancements, this 70th Anniversary Edition of the Spectrotone Instrumental Tone-Color Chart shows updated instrument ranges from the original 1943 version to reflect current *professional* usage. This means some ranges have been extended down while others have been extended up.

All the ranges reflect where the instrument sounds, *not* where it's written.

Four examples:

Piccolo parts - written in music notation an octave lower than presented on the Spectrotone Chart, but when played sounds as shown on the Spectrotone Chart (an octave higher).

Celeste parts - written in music notation an octave lower than presented on the Spectrotone Chart, but when played sounds as shown on the Spectrotone Chart (an octave higher).

String Bass parts - written in music notation an octave higher than presented on the Spectrotone Chart, but when played sounds as shown on the Spectrotone Chart (an octave lower).

Contra-Bassoon - written in music notation an octave higher than presented on the Spectrotone Chart, but when played sounds as shown on the Spectrotone Chart (an octave lower).

If you're using the Spectrotone Chart to write for live ensembles, please consult *Professional Orchestration Volume 1: Solo Instruments and Instrumentation Notes* to compare professional ranges to school and community orchestra ranges.

Instrument Groups

Going from top to bottom, there are five families of instruments covering 32 orchestral instruments:

- Woodwinds
- Saxes
- Brass (with and without mutes)
- Harp, Piano, Timpani, and Pitched Percussion
- Strings (including the 5-string bass going down to C1)

Tone-Colors and Quick Guides

To the left and right are two Quick Guides. The Quick Guide to the left gives you the color, the tone-color description, and adjectives describing the timbre depending on the instrument selected and its articulation. The Quick Guide to the right summarizes Perfect and Close Combinations, which account for 80% or better of instrumental combinations within the orchestra and other band ensembles.

Basic and Complementary

With the exception of the Trumpet, Tenor Trombone, and Bass Trombone which are all Basic, the remaining instruments have both Basic and Complementary range bars. Roughly 95% of your work will be with Basic, as Complementary is used to create more exotic combinations and set up highly coloristic ensembles.

Tone-Color Ranges

The changes between tone-colors shown on the Spectrotone Chart do not occur abruptly. The tone-color will be at its fullest in its lowest register for that particular color. As it ascends, it gradually adopts the characteristic of the next tone-color.

For example, the Trumpet at 58 is in the *warm* tone-color of **Brown**. As it approaches 64 it gradually changes to the *glowing* tone-color of **Red**. As the Trumpet rises in pitch, similar transitions take place from *glowing* (**Red**) to *golden* (**Orange**), then from *golden* (**Orange**) to *bright* (**Yellow**), and finally from *bright* (**Yellow**) to *brilliant* (**White**), as it rises through each ascending tone-color.

Timbre

Tone-color is not affected by the articulation of an instrument, only by its pitch. Different articulations will modify the normal timbre of an instrument's sound, while maintaining the same tone-color. The timbre of an instrument can change depending on the manner of articulation and the register in which it's used. The **Timbre** column on your Spectrotone Chart gives a list of modifying timbres and how they relate to each tone-color. Refer to the **Intensity** column in your *Spectrotone Articulation Tables PDF* to view timbre changes, by instrument, by tone-color.

Tone-Color Combinations Table

Type Combination	Type of Contrast
Perfect: Homogenous blend of tone-colors created by matching tone-colors from the Basic bar.	No Contrast
Close: Semi-homogenous blend of tone-colors created from the Basic bar that are closely related to one another.	Very Little Contrast
Complementary: Created by taking the tone-color directly below the Basic bar (Complementary), and combining it with the matching tone-color in another instrument's Basic bar.	Contrasting
Remote: Created by matching Complementary to Complementary tone-colors.	Very Contrasting

Understanding the Combinations

1. Perfect Combinations

A Perfect Combination produces an homogenous blend of tone-color achieved **only** by combining two or more instruments in the exact same **Basic** tone-color, **Blue** with **Blue**, **Green** with **Green**, **Purple** with **Purple**, and so on.

The Perfect Combination of tone-color requires confinement of the musical material to the different registers of the instruments which are in the same tone-color. For example, Clarinet - **Blue**, Violin D-String - **Blue**, Cello G-String - **Blue**, and so on.

While the timbre and the intensity description may not always match, the tone-color blend will nevertheless be homogenous.

2. Close Combinations

A Close Combination produces a semi-homogenous blend of tone-colors created from the **Basic** bar that are closely related to one another. Here are the tone-color groupings:

- **White** with **Yellow** - for example: see Flute, Piccolo, and Violins
- **Yellow** with **Green** - for example: see Flute, Bassoon, Cello D-String
- **Green** with **Blue** - for example: see Flute, Bassoon, Soft Mute Trumpet, Cello G-String
- **Blue** with **Purple** - for example: see Flute, Harp, French Horn, Violin G-String
- **Yellow** with **Orange** - for example: see Flute, Trumpet, Xylophone
- **Orange** with **Red** - for example: see Oboe and Open Trumpet
- **Red** with **Brown** - for example: see Alto Flute and Open Trumpet
- **Brown** with **Purple** - for example: see Alto Flute and Strings

Naturally, such semi-homogenous combinations widen the scope for musical expression without sacrificing a more-or-less homogenous blend.

Note: no Close Combinations are created with the Dull and Indefinite tone-colors.

3. Complementary Combinations

A Complementary Combination is created by taking the tone-color directly below the Basic bar (**Complementary**), and combining it with the matching tone-color in another instrument's **Basic** bar.

For example, looking at the Spectrotone Chart, the Basic tone-color of the Flute between 59-71 is **Blue**. The Complementary tone-color directly beneath it is **Brown**. This means that the Flute tone-color can be combined with any other **Basic** (top bar) **Brown** tone-color like the French Horn between MIDI Note Numbers 55 to 68, and the Trumpet between 58 and 64.

While Complementary Combinations don't produce homogenous or semi-homogenous blends, they are, however, compatible and complementary.

4. Remote Combinations

Remote combinations are produced by matching an instrument's **Complementary** tone-color (the lower bar) to another instrument's **Complementary** tone-color in the same color. Even though the combined instruments' Basic tone-colors will not indicate a homogenous sound, the fact that their Complementary tone-colors match means that those instruments will still be compatible when combined.

Example - Look at the Spectrotone Chart.

1. The **Complementary** tone-color of the Bb Clarinet between MIDI Note Numbers 50-67 is **Green** and the **Complementary** tone-color of the Cello's A-string is also **Green** (MIDI Note Numbers 57-69).
 2. Because the **Complementary** tones are the same color, this means that the **Basic** tone-colors of these two instruments can be combined with good effect, even though the Basic tone-color of the Bb Clarinet is **Blue**, and the Basic tone-color of the Cello's A-string is **Yellow**.
 3. Let's look at another method of forming combinations using the complementary tone-colors.
 4. The Complementary tone-color of the Oboe between 67-80 is **Green**. The Complementary tone-color of the Violin E-string between 76-89 is also **Green**, as is the Complementary tone-color of the Soprano Saxophone between 56 and 75.
 5. This means that the Basic tone-colors of these instruments may be combined, which are: Oboe and Soprano Saxophone in the **Orange** tone-color, and the Violin in the **Yellow** tone-color. In this instance, the combination of **Orange** and **Yellow** in the Basic bars of these instruments produces a Close Combination.
-

Tone-Colors and Orchestral Balance

When orchestrating, you ideally want to blend all the tone-colors of the orchestra so that all the musical material and its component parts are adequately represented. The tone-colors of the instruments are an integral part of the composition process. Within the orchestra, there are independent groupings of instruments, such as woodwinds, saxophones, brass, horns, and strings, that are little instrumentalities of themselves, and require balancing within their own group. The following section gives instrumentation notes on achieving balance within each grouping.

Woodwinds Balance

In the large symphony orchestra there may be as many as four Clarinets. You might have a Clarinet trio or quartet that needs to be balanced in three- or four-part harmony. The most simple and effective way to do this is to confine the musical material to one tone-color, such as **Blue** in the low registers, or **Green** in the middle registers.

Where you only have two Clarinets, you can achieve the same effect by adding one or two Bassoons to produce a trio or quartet. Here, you'll use a Complementary Combination. For example, the low register of the Bb Clarinet has a Basic tone-color of **Blue** (top bar) with a Complementary tone-color of **Green** (lower bar). This means that you can successfully combine the Bb Clarinet in the low register with the Bassoon, whose Basic tone-color is **Green** and will give you a more or less homogenous blend.

The same applies to the Oboe family, which usually consists of two Oboes and one English Horn in the symphony orchestra. The middle-high register in both instruments is in the Basic **Orange** tone-color, while the Complementary tone-color is **Green**. This means that if you only have one Oboe or one English Horn available, you can use the A-string of the Violin as a substitute because its Basic tone-color is **Green** in the same register.

Saxophone Balance

The Saxophone family is more or less equally balanced with the exception of the Soprano Saxophone. However, the **Orange** tone-color of this instrument and the **Red** tone-color of the Alto and Tenor Saxophones produce a Close Combination.

Brass Balance

In the average symphony orchestra you'll find three Trumpets and three Trombones, with the third Trombone being a Bass Trombone. Looking at the Spectrotone Chart, you'll see the wide top band for the Basic tone-color of the Open Trumpet and Trombones. The narrow bands underneath represent how the Basic tone-color changes when the various mutes are applied. The use of the terms "hard" and "soft" mute refers to the type of material used, such as metal, fiber, wood, leather, etc. and the corresponding effect it has on the instrument's tone.

Because so many tone-colors are possible by means of the various mutes, the Trumpet and Trombone can be made to blend with almost any existing combination. For this reason, no Complementary tone-colors are indicated for these instruments on the Spectrotone Chart.¹

¹ For advanced work in this area, you're referred to Henry Brant's *Textures and Timbres: An Orchestrator's Handbook*.

Brass Chords

When writing Brass chords, how they are balanced depends on which register each instrument is assigned to. As an example, if you want to produce a Perfect Combination brass chord for three Trumpets and three Trombones in the **Red** tone-color you'll need to confine the notes as follows:

<u>Instrument</u>	<u>Tone-Color</u>	<u>MIDI Note Range</u>
Trumpet	Red	between 64 - 70
Tenor Trombone	Red	between 53 - 64
Bass Trombone	Red	between 41 - 55

Use this same method of confinement to produce a Perfect Combination in the **Orange** and **Brown** tone-colors.

You'll notice that the high register of the Trumpet (between 78-86) has tone-colors of **Yellow** and **White** that can't be achieved on the Tenor or Bass Trombone. In its high register, the Trumpet has a piercing timbre. Used alone, or as a group, it is very compatible with the high woodwinds in their **Yellow** and **White** tone-colors, especially when used to form chords.

French Horn Balance

In the symphony orchestra, four French Horns are normally used, while in a small orchestra, only two. When four Horns are available they can be assigned to two-, three- or four-part harmony or in many cases, all in unison.² When used in four-part harmony they should be assigned to a Perfect Combination of tone-color wherever possible. Close Combinations are also effective.

If you only have two French Horns available but you want to achieve the effect of three- or four-part harmony, there are two methods you can use, depending on the register of the musical material.

Method 1 Example:

In a four-note chord, two notes are assigned to two Horns in the **Brown** tone-color between 55 and 68. The Complementary tone-color is **Red**.

The two remaining notes can therefore be played by the two Trumpets in their Basic **Red** tone-color between 64 and 70.

The tone-color of the Horns and Trumpets will produce a Close Combination, but the intensity of the instruments will not be balanced and must be corrected.

Look at the **Intensity** column in your *Spectrotone Articulation Tables PDF*. On the **Brown** table you'll see the timbre for the French Horn is "resonant" and the intensity is "normal." Now turn to the **Red** table and look at the Trumpet (Open). The timbre is "resonant" but the intensity is "strong." This means that the two Trumpets will overpower the two French Horns and the balance of the four-part chord will not be equal.

We can solve this problem of unequal intensity by reinforcing the French Horns. The two Horns can be doubled by two Bassoons to amplify the intensity. Because the Complementary tone-

² See *Professional Orchestration 2B: Orchestrating the Melody Within the Woodwinds and Brass*.

color of the Bassoon is **Brown**, and the Basic tone-color of the French Horn between 55 and 68 is **Brown**, their doubling produces a Complementary Combination. This reinforces the intensity of the French Horn notes without destroying the Horn timbre.

Method 2 Example:

In a four-note chord, you could assign two notes to the Bassoons and two notes to the Horns in an interlocked position (Bassoons on chord notes 1 and 3 / Horns on chord notes 2 and 4), or in juxtaposition (Bassoons on chord notes 1 and 2 / Horns on chord notes 3 and 4). If only one Bassoon is available, a Flute or Alto Flute may be substituted for the missing Bassoon.

The Flute will work because its Complementary tone-color is **Brown** between 59 and 71. The Complementary **Brown** tone-color of the Flute with the Basic **Brown** tone-color of the French Horn produces a Complementary Combination, making the two compatible.

The Alto Flute, with its Basic **Brown** tone-color between 55 and 67 produces a Perfect Combination that will give a natural and homogenous blend. The Baritone Saxophone in its **Brown** tone-color between 36 and 53 is also a Perfect Combination that will give a natural and homogenous blend with the Horns.

Note on the Bass Tuba

The Basic tone-color of the Bass Tuba is not in common with the Basic tone-colors of the Trombone. Consequently, it's false thinking to look to the Bass Tuba to be the perfect "bottom" to the Brass section. Realistically, the Bass Tuba is more the perfect bass to the French Horn, as the Spectrotone Chart reveals.³

Looking at the chart, you'll see that not only are the Basic tone-colors for both the Bass Tuba and the French Horn in the **Purple** category, but also the **Brown** Complementary tone-color of the Bass Tuba is in a Close Combination with the Horn between 55-68. However, the Bass Tuba shouldn't be excluded from expressing broad, brassy chords. When combining it with the other brasses, it should be used to add depth to the brass tone-colors, but never relied upon to supply a missing bass note.

The bass voice of a brass chord should always be represented in a tone-color more or less homogenous to the other brass tone-colors.

This naturally indicates that such bass notes logically belong to the Bass Trombone to which the Tuba can be added an octave lower to give the entire chord the desired depth.

Strings Balance

In balancing the strings, the string section as a whole must be divided into three registers:

Register	MIDI Note Range
Low Register	between 24 - 60
Middle Register	between 55 - 76
High Register	between 69 - 100

³ Because of the conical design.

The three ranges overlap each other, and the middle register has the greatest mixture of tone-colors. The high register is mostly confined to **Yellow** and **White**, while the low register is mostly in the **Purple** and **Blue** tone-colors.

Because the middle register contains such a great mixture of tone-colors, there's a tendency for a single tone-color to become obscured in this register. The *timbre* will be solid, but not the *tone-color*. In this state, it may be considered the core of the string ensemble.

The high register, with its purer tone-colors of **Yellow** and **White**, creates a definite contrast to the middle register. However, the low register creates a lesser contrast to the middle register, even though it also has purer tone-colors of mostly **Purple** and **Blue**.

There is a great contrast between the high register and the low register. This means that melodic and contrapuntal lines written in the high register will naturally stand out against the middle and low register background, not because of their *intensity*, but because of their purity and definition of *tone-color*.

To produce such a definition, when the musical material is exclusively confined to the middle register, it is necessary to assign the melodic or contrapuntal material to one contrasting tone-color. It's also possible to achieve such definition by assigning the material to a unison of all the tone-colors in the middle register, which will make it stand out by the sheer amplification of timbre against a high or low register background.

String Intensities

One string instrument used alone would be weak in intensity if depended on to create an adequate balance with the other instruments of the orchestra. For this reason, the symphony orchestra employs a large number of strings, which usually includes:

16 First Violins

14 Second Violins

10 Violas

8 Cellos

8 Basses

Each department of strings must be considered as a single instrumentality in themselves, with each department expressing a tone-color in unison.

While each of these departments may be divided into many parts, doing so would weaken the intensity of a certain tone-color and should be avoided when looking to achieve an equal balance of the entire orchestra. This is especially true in *tutti* passages where every instrument of the orchestra is playing.

In quieter passages, where the *strong* intensities of the brasses are not present, you can effectively use divisi writing within each string department, and the weakened intensity of the strings will not present a problem.

Tutti Balance

The Spectrotone Chart reveals the fact that the orchestra is made up of many widely different tone-colors. These tone-colors can be combined to produce a more or less homogenous sound, but each different tone-color will nevertheless be apparent as an individual tone-color.

In a grand *tutti* that follows standard orchestration principles, the balance of tone-colors and intensities is partly taken care of by the multiple overtones created by the volume of all the different instruments playing together.

In a simple composition consisting of *melody*, *bass*, and *inner harmonic structure*, the orchestration will balance itself if all three elements are equally represented. The melody, bass, and inner harmonic structure essentially belong to three different registers, and therefore represent the different tone-colors of those registers.

<u>Musical Element</u>	<u>Register</u>	<u>Tone-Color</u>
Melody	Upper Register	White, Yellow, high Green
Inner Harmonic Structure	Middle Register	Orange, Red, lower Green, upper Brown, Blue
Bass	Low Register	Purple, Brown, Blue

The above structure is very elementary and not very transparent. To create *transparency* within a *tutti* (producing a “see-through” texture where different instruments can be clearly heard) you should confine each element of melody, bass, and inner harmonic structure to one or two tone-colors, preferably in Close Combination, e.g.

<u>Musical Element</u>	<u>Tone-Color</u>
Melody	White and Yellow
Inner Harmonic Structure	Red and Brown
Bass	Blue and Purple

When confining the parts to these tone-colors, we find that the Orange and Green tone-colors are missing, and that some of the instruments in the Basic Green and Orange tone-colors (e.g. Bassoon, Xylophone) are unable to comply with the above tone-color demands. Where this happens, you can *tacet* (silence) these instruments, or double them with those instruments that create a Complementary Combination with Orange and Green.

In the above, two tone-color, transparent orchestration example, the melody doesn't have to be confined to the upper register because the White and Yellow tone-colors cover a playing range from MIDI Note Number 57 (Cello A-string) to 108 (top of keyboard range). The inner harmonic structure has a playing range of 22 (Contra-Bassoon) to 80 (Alto Flute) in the Red and Brown tone-colors.

This means that the melodic line may be interlocked with the inner harmonic structure without destroying their different tone-color values.

When the bass is added to an interlocked tone-color balance like this, it should remain in a register that will not conflict with the melodic and inner harmonic registers. This means confining the bass to the low registers of the **Blue** and **Purple** tone-colors.

The Contra-Bassoon, which is in the **Brown** tone-color, may be added to the bass because its complementary tone-color is **Purple**.

Transparent Balance

Orchestral compositions need to have contrast to be attractive, interesting, and effective. Orchestral contrast can be achieved either by dynamic contrast of soft to loud, or through the economical use of orchestral tone-colors.

For example, after a *tutti* lasting eight or sixteen bars, a sudden transition can be made to only a few instruments, and then you can gradually add more instruments to create a crescendo back to a *tutti*.

In creating such contrasting nuances, the art of tone-color mixtures is a very delicate one that requires careful balancing, particularly during passages where only a few instruments are playing. In such light passages, *tone-color* as well as *timbre* becomes very transparent.

As stated earlier, the orchestra is made up of many small independent groupings of instruments, each capable of expressing a complete musical idea. The musical material may involve only the woodwinds or the brass. It may involve only a few of the string instruments, or perhaps a few instruments from each section of the orchestra.

For example, a Violin solo accompanied by two Clarinets and a Bassoon; a muted Trumpet solo accompanied by Violas and Cellos; a Flute or Oboe solo accompanied by strings, etc.

In each of these cases, a balance must be effected between the instruments used. This balance may call for a homogenous tone-color effect, or a contrasting tone-color effect.

Contrasting Tone-Color Balance

Referring to the tone-color combinations of *perfect*, *close*, *complementary*, and *remote*, these can be used as a basis for creating different degrees of instrumental contrast within the orchestra—from no contrast to very contrasting.

Perfect Combination	=	No Contrast
Close Combination	=	Very Little Contrast
Complementary Combination	=	Contrasting
Remote Combination	=	Very Contrasting

When we translate these into tone-color values, we get the following combinations:

NO CONTRAST:

White with White
 Yellow with Yellow
 Green with Green
 Et Cetera

VERY LITTLE CONTRAST:

White with Yellow
 Yellow with Green
 Green with Blue
 Blue with Purple
 Yellow with Orange
 Orange with Red
 Red with Brown
 Brown with Purple

CONTRASTING:

White with Green
 Yellow with Blue
 Green with Purple
 Orange with Brown
 Red with Purple
 Red with White

VERY CONTRASTING:

White with Blue
 White with Purple
 White with Brown
 Yellow with Purple
 Yellow with Brown
 Green with Brown
 Green with Purple

In any of the above-listed contrasting tone-color combinations, one of the two tone-colors can act as a background for the other. Not only are contrasting combinations effective where only a few instruments are used, but also where the entire orchestra is employed.

Application to Existing Scores

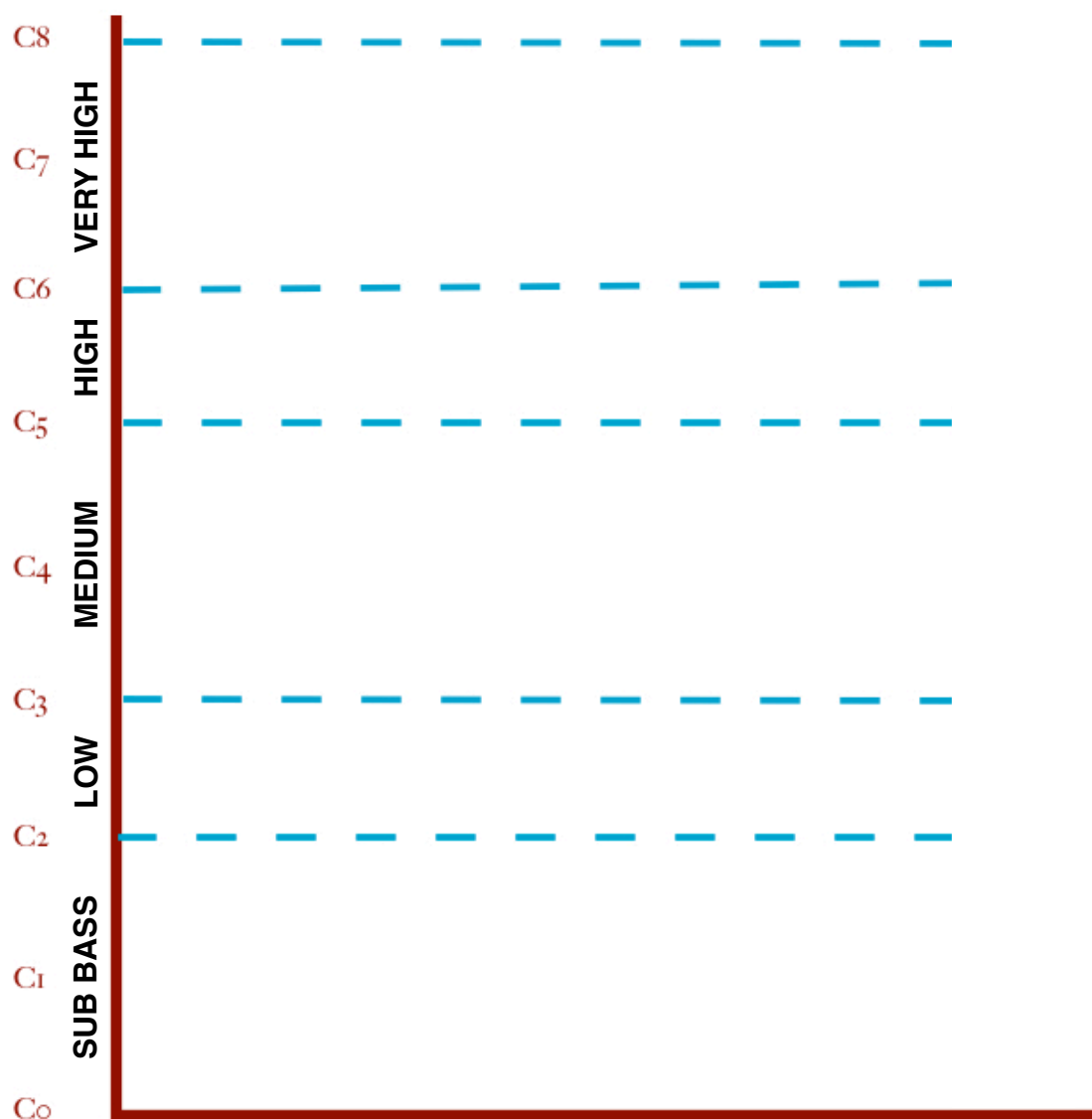
By using the Spectrotone Instrumental Tone-Color Chart to analyze existing scores, you'll learn how their tone-colors blend and are balanced across the orchestra.

Remember, that the Spectrotone Chart shows where the instruments sound, not where they are written, so if you're working from an orchestral study score you'll need to compensate for the transposing instruments.

Span of Orchestration

Span of Orchestration is the most important addition to the 70th Anniversary Edition Spectrotone Chart. It divides the *total orchestral range*, lowest note to highest note, into five registers: **Sub Bass**, **Low**, **Medium**, **High**, and **Very High**. Understanding Span of Orchestration helps to create balance within coloristic ensembles, and to create even more professional sounding string, brass, and woodwind voicings.

Span of Orchestration Observation Chart



Middle C = C4

Additional Notes on Instrument Ranges

All of the 32 orchestral instruments on the original (1943) Spectrotone Chart have been reviewed and updated, and in the case of the alto flute, a third tone-color added (Orange - Basic, Green - Complementary). In regard to the ranges, with the exception of the strings, they all reflect professional ranges not student nor community orchestra suggested ranges. Our research found that most often, Lange's instrument ranges again, in 1943, matched those produced by Rimsky-Korsakov and Forsyth's *Orchestration* (available from Dover Publications). Where there were minor differences between the two, Mr. Lange no doubt discussed ranges with the Hollywood studio musicians of his day.

In actual arranging and orchestration for live instruments, a professional writer doesn't just look at the total range. Instead, he often looks at the effective range (as found in most orchestration books) to help make wise decisions to assure himself (and those contracting him or her) that the parts are playable the first time they hit the music stands.

All of the ranges are written "where sounds" which is a common way to show them, and this approach works well with sample libraries.

In assessing our ranges, we looked at manufacturer web sites, and other orchestration sources including jazz arranging texts. The reader should be aware that there is wide disagreement in many courts regarding the exact lowest and highest pitches of certain instruments, and this often comes as a result of manufacturing differences between one instrument maker and another, and the varying abilities from one musician to another.

The reader should be aware that there are, for example, three different size Xylophones. The Spectrotone Chart reflects the 3.5 Octave Xylophone.

There can be, budgets permitting, up to five Timpani in a live performance or recording session. The Spectrotone Chart reflects two Timpani sizes. One larger Timpani can be added, extending the Bass range down to MIDI Note Number 36 (C2) without changing the tone-color, although the very bottom pitches could be described as dull/loose. Two smaller Timpani's can extend the upper range as high as MIDI Note Number 61 (C-Sharp 4). Note that when using slightly higher-pitched Timpani they can have a tendency to sound more hollow and thin, moving into the dull tone-color from approximately MIDI Note Number 55 (G3) upwards.

In reviewing several major sample libraries with Timpani, the majority do not group the ranges by individual Timpani, instead you get a range of pitches. Some, also transpose the Timpani up an octave on the keyboard, presumably for a more comfortable playing range.

In a jazz ensemble, the lead player can also be known as a scream Trumpet player with a range up to double high C. On the Spectrotone Chart, the Trumpet range reflects concert playing not that of a scream Trumpet player.

There are several different sized Tubas. The Spectrotone Chart reflects the Bass Tuba, which is often used in sample libraries.

Based on the work of Arthur Lange, republished with kind permission of Cambria Music.

Copyright © 2012 by Peter Lawrence & Caroline Jane Alexander

Copyright © 2016 by Caroline J. Alexander. All Rights Reserved.

www.alexanderpublishing.com