

Spectrotone Chart

Articulation Tables

Intensity

Whether orchestrating or arranging, you must always be aware of both *volume* and *intensity*. Volume has to do with loudness. Intensity has to do with color change and carrying power as the player moves higher on the harmonic overtone series.

Looking at the Spectrotone Instrumental Tone-Color Chart™ tells you:

- Where (by specific note) the color change transitions
- The different colors per instrument as the player moves higher up the overtone series
- That Perfect Combinations fall in different ranges on each instrument
- That not all instruments in all ranges create Perfect Combinations

The combination of tone-color and timbre will produce a certain intensity of tone. Such intensities must be measured so as to determine their carrying power when merged into one symphonic body. The carrying power of an instrument depends mainly on the characteristic of the timbre and how loudly or softly it's played.

All instruments have their natural intensities, and when comparing these intensities with each other, we find them to be unequal in carrying power. These natural intensities may be increased or diminished by the use of dynamics (*p-mf-f*), or by the use of more or less instruments.

This creates different degrees of *volume* which must not be confused with natural *intensity*. To establish a norm by which to compare natural intensities with each other, let it be assumed that the norm is ***mf*** in volume.

Brass - While an instrument may be articulated *mf* across its entire register, the intensity won't always remain the same. This applies particularly to brass instruments where the intensity depends on the length of tubing. In the middle register the intensity is always *strong* because the instrument is so constructed and tuned as to produce the fullest expression of timbre characteristics in this register. So, when the tubing is shortened by means of a valve to produce the higher tones, the timbre takes on a *pinched* and *piercing* quality. However, when the tubing is lengthened to produce lower tones, the timbre will take on a *loose* and *hollow* quality.

Strings - Strings are different. Differences of pitch are partly taken care of by the four differently pitched strings. This means that the natural intensity of each string instrument is balanced out over its own specific playing range.

When string instruments are *muted*, the tone-color doesn't change, but the timbre and intensity are affected. The timbre characteristic is *softened*, which means that the intensity is *weakened*.

The *ponticelli* articulations (played close to, or on the bridge) on string instruments affect the timbre, giving it a rather *glassy* quality.

Harmonics, when produced in high registers, are *cold*, *clear*, and *thin*; and are *weak* in intensity.

Harmonics beyond the ranges shown on the Spectrotone Chart are in the White tone-color and will have a *brilliant*, *clear*, and *thin* timbre, also with a *weak* intensity. The tone-color of harmonics must be judged by the register in which the harmonies actually sound, not in the register in which they are written or played.

Woodwinds - On woodwind instruments where the tubing is shortened or lengthened by covering the apertures, the timbre quality changes as with the brass.

Piano and Harp - The same principle applies since the strings on each instrument are graduated in length.

Percussion - On percussion instruments like the Xylophone, Celeste, Vibraphone and Glockenspiel, the tuned objects are graduated in length. However, in these instruments, the timbre characteristic remains more or less fixed while the tone-color change takes care of the difference of intensity between the higher tones and the lower tones.

The Timpani - Tuned by tightening or loosening the head. They vary very little in intensity and tone-color.

Spectrotone Tables

In the following tables, the terms **strong**, **normal** and **weak** are used to describe intensity in terms of the instrument's carrying power within the corresponding range of tone-color and timbre. As stated earlier, to establish a norm by which to compare natural intensities with each other, let it be assumed that the norm is *mf* volume. Range by register per Span of Orchestration has been added. Hz Frequencies and MIDI Note Numbers are for you to add. All information is based on the Basic tone-color bar.

White (Based on BASIC)

Instrument	Articulation	Qualities	Intensity	Register	Hz Range	MIDI Note Number
Violin	arco	brilliant	resonant - normal	Very High		
Violin	pizzicato	brilliant	brittle - normal	Very High		
Viola	arco	brilliant	resonant - normal	High to Very High		
Viola	pizzicato	brilliant	brittle - normal	High to Very High		
Cello	arco	brilliant	resonant - normal	Medium to High		
Cello	pizzicato	brilliant	brittle - normal	Medium to High		
Piccolo	natural	brilliant	shrill - strong	High to Very High		
Clarinets	natural	brilliant	piercing - strong	High to Very High		
Trumpet	open or hard mute	brilliant	pinched - normal	High to Very High		
Glockenspiel	hard mallets	brilliant	metallic - strong	Very High		
Celeste	natural	brilliant	metallic - normal	Very High		
Piano	natural	brilliant	clear - strong	Very High		

Yellow (Based on BASIC)

Instrument	Articulation	Qualities	Intensity	Register	Hz Range	MIDI Note Number
Violin	arco	bright	resonant - normal	High to Very High		
Violin	pizzicato	bright	brittle - normal	High to Very High		
Viola	arco	bright	resonant - normal	Medium to High		
Viola	pizzicato	bright	brittle - normal	Medium to High		
Cello	arco	bright	resonant - normal	Medium		
Cello	pizzicato	bright	brittle - normal	Medium		
Piccolo	natural	bright	piercing - normal	High		
Flute	natural	bright	piercing - strong	High to Very High		
Oboe	natural	bright	nasal - pinched - strong	High to Very High		
Clarinets	natural	bright	clear - strong	High		
Saxophones	natural	bright	strident - strong	High		
Trumpet	open or hard mute	bright	strident - strong	High		
Trombones	hard mutes	bright	strident - strong	Medium to High		
Celeste	natural	bright	metallic - iridescent - normal	Very High		
Harp	natural	bright	brittle - normal	Very High		
Piano	natural	bright	resonant - strong	Very High		

Green (Based on BASIC)

Instrument	Articulation	Qualities	Intensity	Register	Hz Range	MIDI Note Number
Violin	arco	pleasant	resonant - normal	Medium to High		
Violin	pizzicato	pleasant	tonal - normal	Medium to High		
Viola	arco	pleasant	resonant - normal	Medium		
Viola	pizzicato	pleasant	tonal - normal	Medium		
Cello	arco	pleasant	resonant - normal	Medium		
Cello	pizzicato	pleasant	tonal - normal	Medium		
Bass	arco	pleasant	resonant - normal	Low		
Bass	pizzicato	pleasant	tonal - normal	Low		
Flute	natural	pleasant	resonant - normal	Medium to High		
Clarinets	natural	pleasant	clear - normal	Medium to High		
Bassoon	natural	pleasant	resonant - normal	Sub Bass to Medium		
Trumpet	soft mute	pleasant	delicate - normal	Medium to High		
Trombones	soft mute	pleasant	delicate - normal	Medium		
Glockenspiel	hard mallet	pleasant	metallic - penetrating	Very High		
Celeste	natural	pleasant	iridescent - normal	High		
Harp	natural	pleasant	resonant - normal	Very High		
Piano	natural	pleasant	resonant - normal	High		

Blue (Based on BASIC)

Instrument	Articulation	Qualities	Intensity	Register	Hz Range	MIDI Note Numbers
Violin	arco	rich	resonant - normal	Medium		
Violin	pizzicato	rich	tonal - normal	Medium		
Viola	arco	rich	resonant - normal	Medium		
Viola	pizzicato	rich	tonal - normal	Medium		
Cello	arco	rich	resonant - normal	Low		
Cello	pizzicato	rich	tonal - normal	Low		
Bass	arco	rich	resonant - normal	Low		
Bass	pizzicato	rich	vibrant - normal	Low		
Flute	natural	rich	hollow - weak	Medium		
Clarinets	natural	rich	resonant - normal	Medium		
Trumpet	soft mute	rich	delicate - weak	Medium		
Trumpet	covered bell	rich	resonant - normal	Medium		
Tenor Trombone	soft mute	rich	delicate - weak	Medium		
French Horn	muted or stopped	rich	iridescent - tense - weak	Medium		
Glockenspiel	hard mallet	rich	metallic - normal	High to Very High		
Celeste	natural	rich	iridescent - hollow - weak	Medium		
Vibraphone	soft mallet	rich	vibrant - hollow - normal	High to Very High		

Instrument	Articulation	Qualities	Intensity	Register	Hz Range	MIDI Note Numbers
Piano	natural	rich	resonant - normal	Medium		
Timpani	soft mallet	rich	percussive - resonant - normal	Medium		
Timpani	hard mallet	rich	percussive - brittle - strong	Low		

Orange (Based on BASIC)

Instrument	Articulation	Qualities	Intensity	Register	Hz Range	MIDI Note Numbers
Violin	arco	golden	tense - normal	High		
Violin	pizzicato	golden	brittle - weak	High		
Alto Flute	natural	golden	tense - normal	High to Very High		
Oboe	natural	golden	nasal - strong	Medium to High		
English Horn	natural	golden	nasal - strong	Medium to High		
Saxophones	natural	golden	strident - strong	Medium to High		
Trumpet	open	golden	strident - strong	Medium to High		
Trumpet	hard mute	golden	strident - normal	Medium to High		
Trumpet	covered bell	golden	tense - strong	High		
Trombones	open	golden	strident - strong	Medium to High		
Trombones	hard mutes	golden	strident - normal	Medium		
Xylophone	hard mallets	percussive	brittle - strong	High to Very High		
Xylophone	soft mallets	percussive	brittle - normal	High to Very High		
Harp	natural	golden	vibrant - normal	Medium to High		

Red (Based on BASIC)

Instrument	Articulation	Qualities	Intensity	Register	Hz Range	MIDI Note Numbers
Violin	arco	glowing	resonant - strong	Medium to High		
Violin	pizzicato	brittle	pinched - normal	Medium to High		
Alto Flute	natural	glowing	tense - strong	Medium to High		
Oboe	natural	glowing	nasal - strong	Medium		
English Horn	natural	glowing	nasal - strong	Medium		
Saxophones	natural	glowing	sonorous - strong	Low to Medium		
French Horn	natural	glowing	sonorous - strong	Medium to High		
Trumpet	open	glowing	resonant - strong	Medium		
Trumpet	covered bell	glowing	tense - normal	Medium to High		
Trombones	open	glowing	resonant - strong	Medium		
Trombones	covered bell	glowing	tense - normal	Medium		

Brown (Based on Basic)

Instrument	Articulation	Qualities	Intensity	Register	Hz Range	MIDI Note Numbers
Bass	arco	warm	resonant - normal	Sub Bass to Low		
Bass	pizzicato	warm	vibrant - normal	Sub Bass to Low		
Alto Flute	natural	warm	hollow - normal	Medium		
Contra-Bassoon	natural	warm	Vibrant - normal	Sub Bass to Medium		
Baritone Sax	natural	warm	resonant - strong	Low to Medium		
French Horn	open	warm	resonant - normal	Medium		
Trumpet	open	warm	resonant - normal	Medium		
Trombones	open	warm	resonant - normal	Medium		
Trombones	covered bell	warm	tense - normal	Medium		
Harp	natural	warm	resonant - normal	Low to Medium		

Purple (Based on BASIC)

Instrument	Articulation	Qualities	Intensity	Register	Hz Range	MIDI Note Numbers
Violin	arco	mellow	resonant - normal	Medium		
Violin	pizzicato	mellow	vibrant - normal	Medium		
Viola	arco	mellow	resonant - normal	Medium		
Viola	pizzicato	mellow	vibrant - normal	Medium		
Cello	arco	mellow	resonant - normal	Low		
Cello	pizzicato	mellow	vibrant - normal	Low		
Bass	arco	mellow	resonant - normal	Sub Bass to Low		
Bass	pizzicato	mellow	vibrant - normal	Sub Bass to Low		
French Horn	open	mellow	resonant - strong	Low to Medium		
Trumpet	covered bell	mellow	tense - normal	Medium		
Tenor Trombone	covered bell	mellow	tense - normal	Medium		
Bass Tuba	open	mellow	sonorous - strong	Sub Bass to Medium		
Vibraphone	soft mallet	mellow	iridescent - normal	Medium		
Harp	natural	vibrant	loose - weak	Sub Bass to Low		
Piano	natural	mellow	resonant - strong	Sub Bass to Medium		

Gray (Based on BASIC)

Instrument	Articulation	Qualities	Intensity	Register	Hz Range	MIDI Note Numbers
Violin	arco	dull	tense - weak	High to Very High		
Viola	arco	dull	tense - weak	Medium to High		
Cello	arco	dull	tense - weak	Medium		
Bass	arco	dull	tense - weak	Sub Bass to Low		
Clarinets	natural	dull	veiled - normal	Medium		
French Horn	open	dull	loose - weak	Sub Bass to Low		
French Horn	muted	dull	loose - weak	Sub Bass to Medium		
Trumpet	open or muted	dull	loose - weak	Medium		
Trombones	open or muted	dull	loose - weak	Low		
Bass Tuba	natural	dull	loose - weak	Sub Bass		
Piano	natural	dull	resonant - normal	Sub Bass		

Black (Based on BASIC)

Instrument	Articulation	Qualities	Intensity
All Brasses	top registers	indefinite	pinched - weak
All Brasses	bottom registers	indefinite	loose - weak

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