

## FINDING THOSE ELUSIVE COMBINATION TONES

Until now we have explored overtones and sympathetic vibrations found in a melodic, single note context. Another equally important and quite separate phenomenon governs intonation when two or more tones are sounded simultaneously.

Paul Hindemith<sup>1</sup> has written that when a stringed instrument plays a double stop, additional tones are invariably produced which bear the name "combination tones". They are usually so weak that the superficial ear does not perceive them. They are, however, of great importance to the subconscious ear because they bear a direct mathematical relationship to the two directly produced tones, serving to define these tones harmonically. The string player hears them as soft bass tones when playing double stops. Once the ear has become aware of them, it hears them easily.

The existence of combination tones provides a point of reference by which the directly produced tones can be evaluated for their purity of intonation. When the two directly produced tones are consonant with the combination tone, the resulting intonation is pure and harmonious. As with sympathetic vibrations, exquisitely tuned combination tones can greatly enhance the resonance of your tone.

It is important to clearly understand the difference between overtones and combination tones.

**Overtones are produced in varying number by a single sounding tone and resonate to the perfect tuning of the open strings. Combination tones arise only when two or more tones are sounded simultaneously. Both overtones and combination tones have a profound effect upon intonation.**

The sounding of combination tones produces additional but less intense combination tones, thus creating several orders of tones. It is only the first two orders which are sufficiently prominent to be heard.

<sup>1</sup>Paul Hindemith: THE CRAFT OF MUSICAL COMPOSITION, Chapter 2, Copyright 1945, Associated Music Publishers, Inc., New York

# Combination Tone Chart

| <u>Interval</u>     | <u>First Order</u>            | <u>Second Order</u>  |
|---------------------|-------------------------------|----------------------|
| <u>Unison:</u>      | Unison                        | Unison               |
| <u>Minor 3rd:</u>   | 2 Oct. & M3 Below Bottom Note | M3 Below Bottom Note |
| <u>Major 3rd:</u>   | 2 Oct. " " "                  | P4 " " "             |
| <u>Perfect 4th:</u> | 1 Oct. & P5 " " "             | P5 " " "             |
| <u>Perfect 5th:</u> | 1 Oct. " " "                  | 1 Oct. " " "         |
| <u>Minor 6th:</u>   | M 6 " " "                     | Oct. & M3 " " "      |
| <u>Major 6th:</u>   | P 5 " " "                     | Oct. & P5 " " "      |
| <u>Octave:</u>      | Unison                        | Unison               |

## Combination Tone Table

Directly Produced Pitches ○

Combination Tones of the First Order ◆

Combination Tones of the Second Order ◇

Gerald Fischbach

| Unison | m3 | M3 | P4 | P5 | m6 | M6 | Octave |
|--------|----|----|----|----|----|----|--------|
|        |    |    |    |    |    |    |        |
|        |    |    |    |    |    |    |        |