



MICROPHONE CABLES

WHAT IS PHASE SHIFT? (PART 1)

Phase shift is a term describing the displacement of two signals in time. When we described the two sides of a balanced line as being of opposite polarity, we could have said that they are 180 degrees out of phase with each other. Each time an AC waveform completes a cycle from zero to positive peak to zero to negative peak and back to zero, it travels through 360 degrees (just like a circle). A simple 1 kHz (1,000 cycles per second) sine wave travels through this 360-degree rotation in one millisecond. If we consider its starting point to be zero, it will reach its positive peak one-quarter of a millisecond later, cross zero in another one-quarter of a millisecond, reach its negative peak a quarter-millisecond after that, and return to zero after a fourth quarter of a millisecond has elapsed. Thus, each quarter of a millisecond equals 90 degrees of phase difference. When two identical signals are in phase with one another, their zero crossings and peaks are the same, and summing (combining) the two will double the amplitude of the signal. When they are 180 degrees out of phase, summing them will result in cancellation of both signals.

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WHAT IS PHASE SHIFT? (PART 2)

...continued from Part 1

This property is very straightforward when considering simple sine waves. Sine waves consist only of a single fundamental frequency and have no harmonics. Harmonics are multiples of the fundamental, and are the elements of which complex waveforms are composed. An excellent example of complex waveforms is called music. The reason a middle C note on a piano sounds different from the same note played on a flute is because the two instruments generate different waveforms - the harmonics of the piano are present in different amounts and have different attack and decay characteristics than the harmonics of the flute.

When complex waveforms are traveling in a cable, it would be ideal if the amplitude and phase relationships they enter the cable with are the same as those they exit the cable with. When the effects of phase shift alter those relationships - when the upper harmonics that define the initial “pluck” of a string, for instance, are delayed with respect to the fundamental that forms the “body” of the note - a sort of subtle “smearing” begins to occur, and the sense of immediacy and realism of the music is diminished.