Standardized Audio Levels

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In the audio world, there are 4 signal amplitude levels that we deal with: mic, instrument, line, and speaker level.

Mic level is the lowest, or weakest amplitude level signal of the four and requires a preamplifier to bring it up to the standardized line level.

Mic level is generally about 2 mV (0.002 volts) to about .2 V depending on how loud the source is, and on how sensitive the mic is, as well as its output level capability.

Instrument level signals are between mic and line level signals and have the most variation due to a lack of standardization among manufacturers within the industry. You typically see this kind of signal come from keyboards, synths, and from "some" electric guitars. (Many electric guitar outputs are considered to be mic level.) Instrument level requires a form of amplification to come up to line level.

Instrument level is typically 0.1 V to 0.6 V for passive guitar pick-ups and consumer keyboards, and up to 1 V for active guitar pick-ups and professional keyboards.

Generally, instrument level should be connected to a line level input with variable gain capability to bring instrument level up to line level. Sometimes – if you know the voltage output of the transducer or pick-up from the electric guitar is at the lower amplitude output, you can connect the guitar to the mic input of the mixing console, however, EXTREME CAUTION is needed to not overdrive the input of a mic preamplifier or the mic input of a mixing console, as this can cause serious damage.

Line level signals are the highest amplitude level signals before the power amplifier stage, and are higher amplitudes than instrument level.

Typical line level amplitudes range from .32 to .42 V for consumer gear (unbalanced circuitry), and approximately 1.23 V for professional gear (balanced circuitry).

Consumer line level (0 VU) is commonly rated -10 dBV (where reference value (0 dB) = 1 volt. Therefore −10 dBV = 1 x 10^−(10/20) volts = 1 x 10^−0.5 volts = 1 x 0.316 volts = ~ 0.32 volts.) Some manufacturers have pushed this level to .42 volts.

Professional line level (0 VU) is commonly rated +4 dBu (where reference value (0 dB) = 0.775 volts (775 millivolts). The "u" stands for "unloaded", and today is used almost universally in preference to dBv. Therefore +4 dBu = 0.775 x 10^(4/20) volts = 0.775 x 10^0.2 volts = 0.775 x 1.58 volts = 1.23 volts.

The one thing you really need to remember when working in a Professional Line Level Studio is 0 VU = +4 dBu = 1.23 V = -18 dBFS. Be EXTREMELY CAREFUL when interconnecting professional gear with consumer gear as this can cause distortion, noise, and/or significant damage. Proper interconnection of professional gear with consumer gear (and vice versa) requires the use of a **line level shifter**. The use of this box eliminates all problems. Also, be very careful when interconnecting audio devices with different metering systems!! O dB is <u>not</u> equivalent to 0 VU. 0 VU = -18 dB, and 0 dB = ~ +22 VU!!!!!! Know your metering systems!

Speaker level signals are post power amplification. After a line level signal enters a power amplifier, speaker level signals are output to your non-powered loudspeakers. These signals are much higher in voltage than line level (measured in watts), require heavier gauge speaker cables for safe signal transfer, and are designed to physically move the output transducer back and forth to convert audio signals to SPL. *You should never plug a speaker level signal into a source expecting anything less than a speaker level signal.*