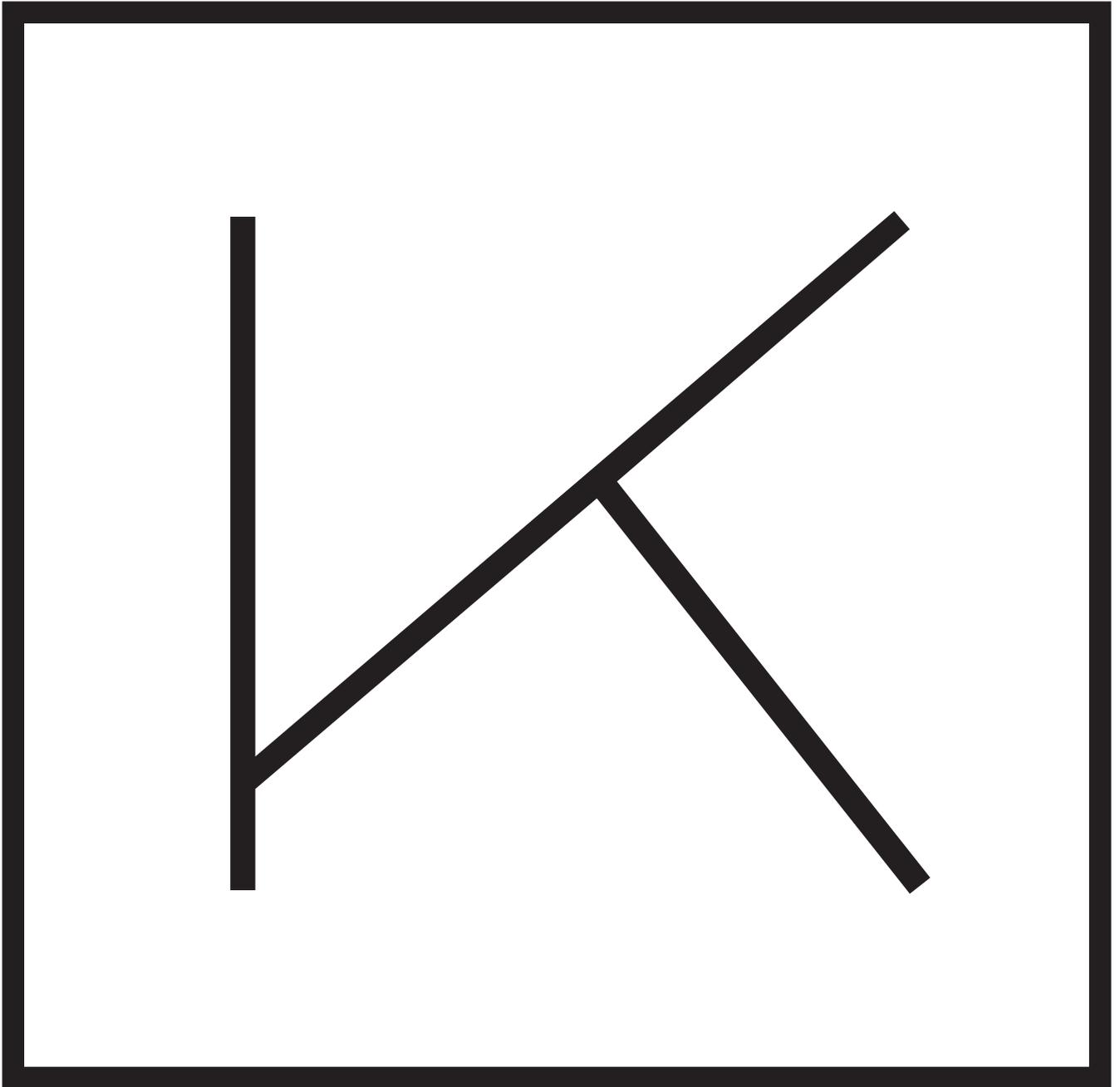


# Analog



**Analog Input**  
***Oscilloscope***  
Extended Play  
***Equalization***  
Flux Capacitor  
***Stroboscopic***  
Electromagnet  
***Signal to Noise***  
Gramophone  
***Transistor Radio***

**SUBHARMONIC  
*ELECTROMAGNET***

**PHONOGRAPH**

***ELECTROLYTIC***

**THERMOPLASTIC**

***SHORT CIRCUIT***

**SUPERCAPACITOR**

***HIGH FIDELITY***

**VARIOCOUPLER**

***OUTPUT VOLTAGE***

## BASIC ALPHABET

ABCDEFGHIJKLM  
 NOPQRSTUVWXYZ  
 abcdefghijklm  
 nopqrstuvwxyz

## DIACRITICS

À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ  
 Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ ß à á â ã  
 ä å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ ß  
 à á â ã ä å æ ç è é ê ë ì í î ï ñ ò ó ô õ ö ø ù ú û ü ý þ ß  
 ù ú û ü ý þ ß

## PUNCTUATION AND SYMBOLS

# @ & ! ; ? % ' " , : ; . . . . . " " " " " \* ^ ~ < > « » • ( ) [ ]  
 { } / | \ \_ + # @ \$ % & ' " , : ; . . . . . " " " " " \* ^ ~ < > « » • ( ) [ ]  
 π μ ∫ ∞ √ ≈ ∠ + - ± × ÷ = ≠ < > ≤ ≥ - ← → ↑ ↓

## LIGATURES

fi ff ffi fj ffj fl ffi

## OLD-STYLE PROPORTIONAL &amp; TABULAR FIGURES

0 1 2 3 4 5 6 7 8 9 \$ ¢ € £ ₹ ¥ f  
 0 1 2 3 4 5 6 7 8 9 \$ ¢ € £ ₹ ¥ f

## LINING PROPORTIONAL &amp; TABULAR FIGURES

0 1 2 3 4 5 6 7 8 9 \$ ¢ € £ ₹ ¥ f  
 0 1 2 3 4 5 6 7 8 9 \$ ¢ € £ ₹ ¥ f

## SUPERIOR AND INFERIOR

0 1 2 3 4 5 6 7 8 9 (.,+="/) 0 1 2 3 4 5 6 7 8 9

## PRESET AND ARBITRARY FRACTIONS

1/2 1/4 3/4 3 7/6 / 9 5 8

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24 PT THIN

An analog signal uses some attribute of the medium to convey the signal's information. For example, an aneroid barometer uses the angular position of a needle as the signal to convey the information of changes in atmospheric pressure.

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18 PT THIN

Electrical signals may represent information by changing their voltage, current, frequency, or total charge. Information is converted from some other physical form (such as sound, light, temperature, pressure, position) to an electrical signal by a transducer which converts one type of energy into another (e.g. a microphone).

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Another method of conveying an analog signal is to use modulation. In this, some base carrier signal has one of its properties altered: amplitude modulation (AM) involves altering the amplitude of a sinusoidal voltage waveform by the source information, frequency modulation (FM) changes the frequency. Other techniques, such as phase modulation or changing the phase of the carrier signal, are also used.

In an analog sound recording, the variation in pressure of a sound striking a microphone creates a corresponding variation in the current passing through it or voltage across

it. An increase in the volume of the sound causes the fluctuation of the current or voltage to increase proportionally while keeping the same waveform or shape.

Mechanical, pneumatic, hydraulic and other systems may also use analog signals.

Analog systems invariably include noise; that is, random disturbances or variations, some caused by the random thermal vibrations of atomic particles. Since all variations of an analog signal are significant, any disturbance is equivalent to a change in the original signal and so appears as noise. As the signal is copied and

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**10 PT THIN**

re-copied, or transmitted over long distances, these random variations become more significant and lead to signal degradation. Other sources of noise may include external electrical signals or poorly designed components. These disturbances are reduced by shielding, and using low-noise amplifiers.

Since the information is encoded differently in analog and digital electronics, the way they process a signal is consequently different. All operations that can be performed on an analog signal such as amplification, filtering, limiting, and others, can also be duplicated in the digital domain. Every digital circuit is also an analog circuit, in that the behaviour of any digital circuit can be explained using the rules of analog circuits.

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14 PT BOLD OBLIQUE

***The signals take any value from a given range, and each unique signal value represents different information. Any change in the signal is meaningful, and each level of the signal represents a different level of the phenomenon that it represents. For example, suppose the signal is being used to represent temperature, with one volt representing one degree Celsius. In such a system 10 volts would represent 10 degrees, and 10.1 volts would represent 10.1 degrees.***

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12 PT BOLD OBLIQUE

**Another method of conveying an analog signal is to use modulation. In this, some base carrier signal has one of its properties altered: amplitude modulation (AM) involves altering the amplitude of a sinusoidal voltage waveform by the source information, frequency modulation (FM) changes the frequency. Other techniques, such as phase modulation or changing the phase of the carrier signal, are also used.**

**In an analog sound recording, the variation in pressure of a sound striking a microphone creates a corresponding variation in the current passing through it or voltage**

**across it. An increase in the volume of the sound causes the fluctuation of the current or voltage to increase proportionally while keeping the same waveform or shape.**

**Mechanical, pneumatic, hydraulic and other systems may also use analog signals.**

**Analog systems invariably include noise; that is, random disturbances or variations, some caused by the random thermal vibrations of atomic particles. Since all variations of an analog signal are significant, any disturbance is equivalent to a change in the original signal and so appears as noise. As the**

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**signal is transmitted over long distances, these random variations become more significant and lead to signal degradation. Other sources of noise may include external electrical signals or poorly designed components. Disturbances can be reduced with shielding and low-noise amplifiers.**

**Since the information is encoded differently in analog and digital electronics, the way they process a signal is consequently different. All operations that can be performed on an analog signal such as amplification, filtering, limiting, and others, can also be duplicated in the digital domain. Every digital circuit is also an analog circuit, in that the behaviour of any digital circuit can be explained using the rules of analog circuits.**

**The first electronic devices invented and mass produced were analog. The use of**

**microelectronics has reduced the cost of digital techniques and now makes digital methods feasible and cost-effective such as in the field of human-machine communication by voice.**

**Because of the way information is encoded in analog circuits, they are much more susceptible to noise than digital circuits, since a small change in the signal can represent a significant change in the information present in the signal and can cause the information present to be lost. Since digital signals take on one of only two different values, a disturbance would have to be about one-half the magnitude of the digital signal to cause an error; this property of digital circuits can be exploited to make signal processing noise-resistant. In digital electronics, because the information is quantized, as long as**

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