12.4.3 Data systems

Amplifier bandwidth

The range of signal frequencies over which an amplifier is capable of undistorted or unattenuated transmission.

Amplifier noise

This can be of two kinds. *White noise* is random signal fluctuations whose power spectrum contains all frequencies equally over a specified bandwidth whereas in *pink noise* the frequencies diminish in a specified fashion over a specified range.

Analogue signal

This is a signal which can be expressed as a continuously variable mathematical function of time or some other parameter.

Data acquisition

The process of transforming representations of (spectrometer) signals from their original form into suitable representations, with or without modifications.

Data logging

This is a specific form of data acquisition implying data collection from more than one relatively low frequency source with storage of the collected data for subsequent processing.

Differential amplifier

An (operational) amplifier which has two inputs of opposite-sense gain polarity with respect to its output.

Digital signal

A signal that represents information in a computer-compatible form as a sequence of (binary) numbers which may describe discrete samples of an analogue signal.

Firmware

Computer programs stored in semi-permanent form, usually semiconductor memory, and used repeatedly without modification. Firmware can only be changed by changing or removing hardware.

Hardware

The term used for the physical components of a computer system.

Hard wired

A preprocessor may be hard wired, that is, capable of performing only certain defined tasks and no others without physical modification.

Off-line

In this method of data acquisition there is a discontinuity in time and space in the transfer or transformation of the signal representations.

On-line

In this method of data aacquisition there is no discontinuity in time and space in the transfer or transformation of signal representations.

Operational amplifier

A high gain DC voltage amplifier with high input impedance, low output impedance and the capability of producing a bipolar output from a bipolar input.

Pink noise

See *amplifier noise*.

Pre-processor

A device in a data acquisition system which performs a significant amount of data reduction, extracting specific information from raw signal representations, in advance of the main processing operation.

Pre-programmed

A pre-processor may be pre-programmed, that is, it can be a general purpose device incorporating specific, but readily alterable, instructions to perform a particular task.

Real time

In data acquisition in *real time* the digital signal representations are generated in step with the time frame of the original experiment.

Signal conditioning

The process of altering the relationship of a transducer (spectrometer) output with respect to time or other parameter such as frequency, voltage or current.

Signal processing

The mechanism of analyzing, routing, sampling or changing the representation of a signal.

Software

This term refers to the computer programs, whether inside or outside a computer, and whether they are machine readable or normally legible.

White noise

See *amplifier noise*.