

Data Acquisition System

Data acquisition system is a group of various devices that are combined in an orderly fashion to perform necessary operations on relevant data.

Usually a data acquisition system is an assembly of the following sensors/transducers, signal conditions, data conversion, data handling, data processing units, multiplexing circuits and data transmission, data storage and data display systems.

Data acquisition systems are used to measure and record analog signals that originate either from the transducers or from the direct measurement of electrical parameters.

The block diagram of a general Data Acquisition System (DAS) is shown in the figure below. It consists of the following elements,

1. Transducer
2. Signal conditioner
3. Multiplexer
4. Analog to Digital (A/D) converter
5. Recorders and display devices.

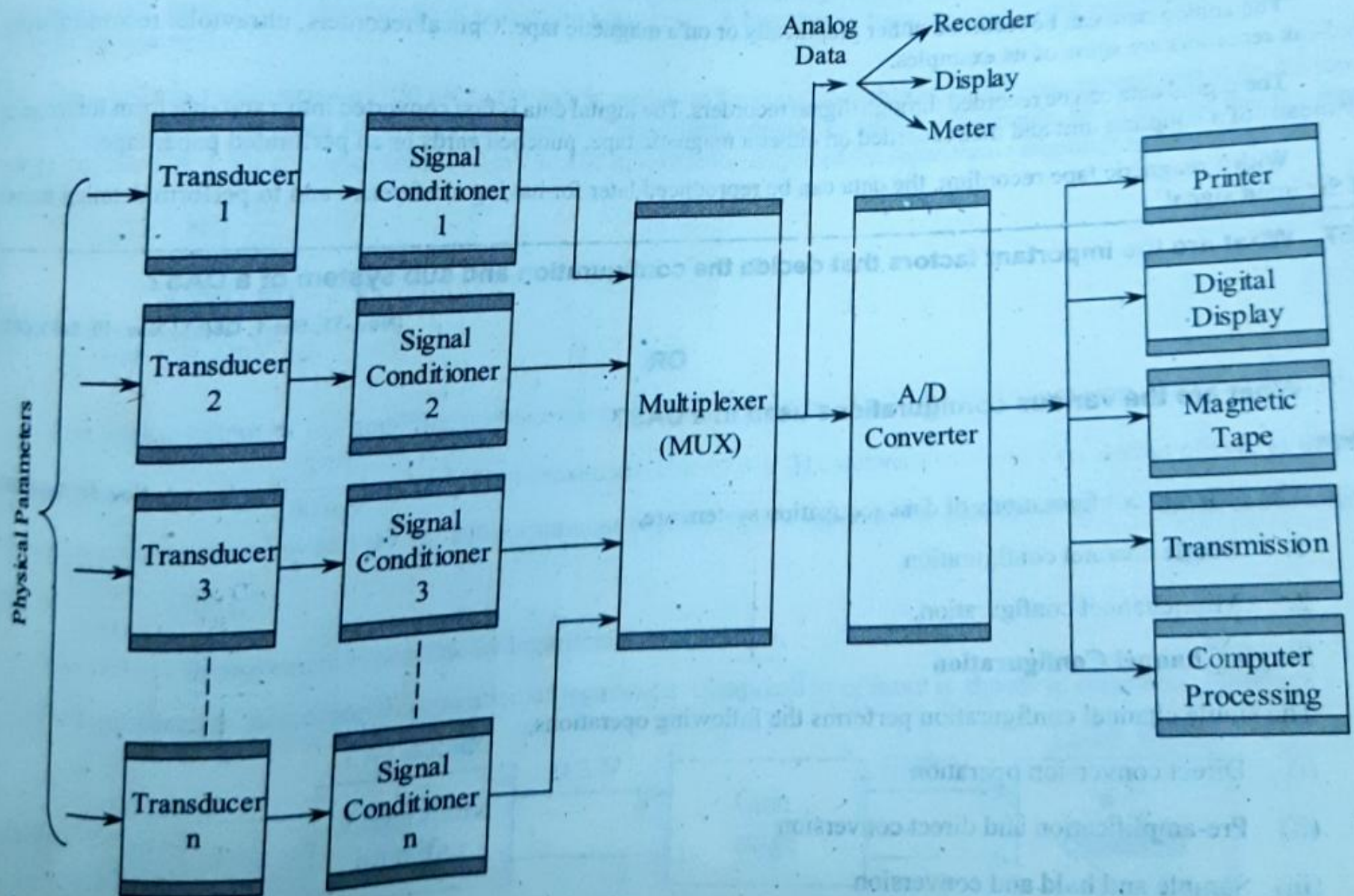


Figure: Generalized Data Acquisition System

1. Transducer

A transducer is used to convert the physical parameters coming from the field into electrical signals or it is used to measure directly the electrical quantities such as resistance, voltage, frequency, etc.

2. Signal Conditioner

Usually the output signals of the transducer will be of very low level (weak) signals which cannot be used for further processing. In order to make the signals strong enough to drive the other elements signal conditioners such as amplifiers, modifiers, filters etc., are used.

3. Multiplexer

The function of the multiplexer is to accept multiple analog inputs (after signal conditioning) and provide a single output sequentially according to the requirements.

4. Analog-to-Digital (A/D) Converter

The analog-to-digital (A/D) converter is generally used to convert the analog data into digital form. The digital data is used for the purpose of easy processing, transmission, digital display and storage.

Processing involves various operations on data such as comparison, mathematical manipulations, data is collected, converted into useful form and utilized for various purposes like for control operation and display etc.

The transmission of data in digital form is possible over short distances as well as long distances of and has advantages over transmission in analog form. The data can be stored permanently or temporarily and can be displayed on a CRT or digital panel.

5. Recorders and Display Devices

In display devices the data is displayed in a suitable form in order to monitor the input signals. Examples of display devices are oscilloscopes, numerical displays, panel meters, etc.

In order to have either a temporary or permanent record of the useful data recorders are used.

The analog data can be recorded either graphically or on a magnetic tape. Optical recorders, ultraviolet recorders, styles-and-ink recorders are some of its examples.

The digital data can be recorded through digital recorders. The digital data is first converted into a suitable form for recording by means of a coupling unit and then recorded on either a magnetic tape, punched cards or an perforated paper tape.

With a magnetic tape recording, the data can be reproduced later for having a reference and to perform detailed analysis of the input signal.