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:- Digital Multimeter :-

Comparison of analog and digital instruments -

Digital hard ware allows programmable operation; therefore it is possible to modify the functions of an instrument through the software, which increases flexibility and reliability. However, it is worth mentioning that some signals with extremely wide band widths require intensive real-time processing in the digital environment. In these cases, analong instruments may be the only solution.

Many modern digital instruments have built-in intelligence; hence, they can make self calibrations, self diagnosis, and corrections in acquired data. A New trend is that calibrations of instruments can be conducted over the Internet by using appropriate sites of manufacturers and standars authorities.

Digital instruments are suitable in applications where multille measurements are necessary, as in the case of process indastry, for two main reasons;

(1.) Ease in communication and networking by means of remote communication methods such as RF, microwave, the Internet, and optical techniques.

(2) Availability of Almost Infinite Memory for Data storage in digital instruments, however, Converting an analog signal allows certain errors to be introduced. The extent of error depends on the sampling rates and number of bits of the A/D converter, By the same token, digital instruments minimize the reading error that can occur in analog displays. Errors such as Parallax and shadowing are also eliminated. Digital instruments also reduce the margin for error due to inaccurate interpolation. Analog meters can be very sensitive to movement or rough handling, while digital meters are immune to such dynamic effects.

One of the distinct advantages of analog instruments is the easy interpretation of displays. The operator can get an intuitive feel about the vanibles being measured at a glance. There is no such spatial reference with digital displays, which require mental

interpretation. This requires an additional step in the thought process and also some familiarity with the equipment. This additional step of interpretation may not be tolerable in some applications, such as driving cars, where instantaneous decisions may need to be made. In addition, analog instruments are relatively cheaper for the same functionality due their simplicity.

* Comparison between Analog and Digital Instruments

Analog	Digital
① low Precision.	① High Precision.
② continuous stepless deflection.	② Numerical readout.
③ More flexible.	③ Limited flexibility, different instruments for various ranges and application.
④ Frequency response is large, from DC or low-frequency range to high-frequency range.	④ Frequency response can also be very high.
⑤ Parallax error in readout is Possible.	⑤ NO such error due to digital display.
⑥ NO direct PC or µP or µC Compatibility	⑥ Compatibility with µP, µC, and PC is Possible

N.B ⇒ Micro Processors (µP), microcontrollers (µC), Personal computers (PC)

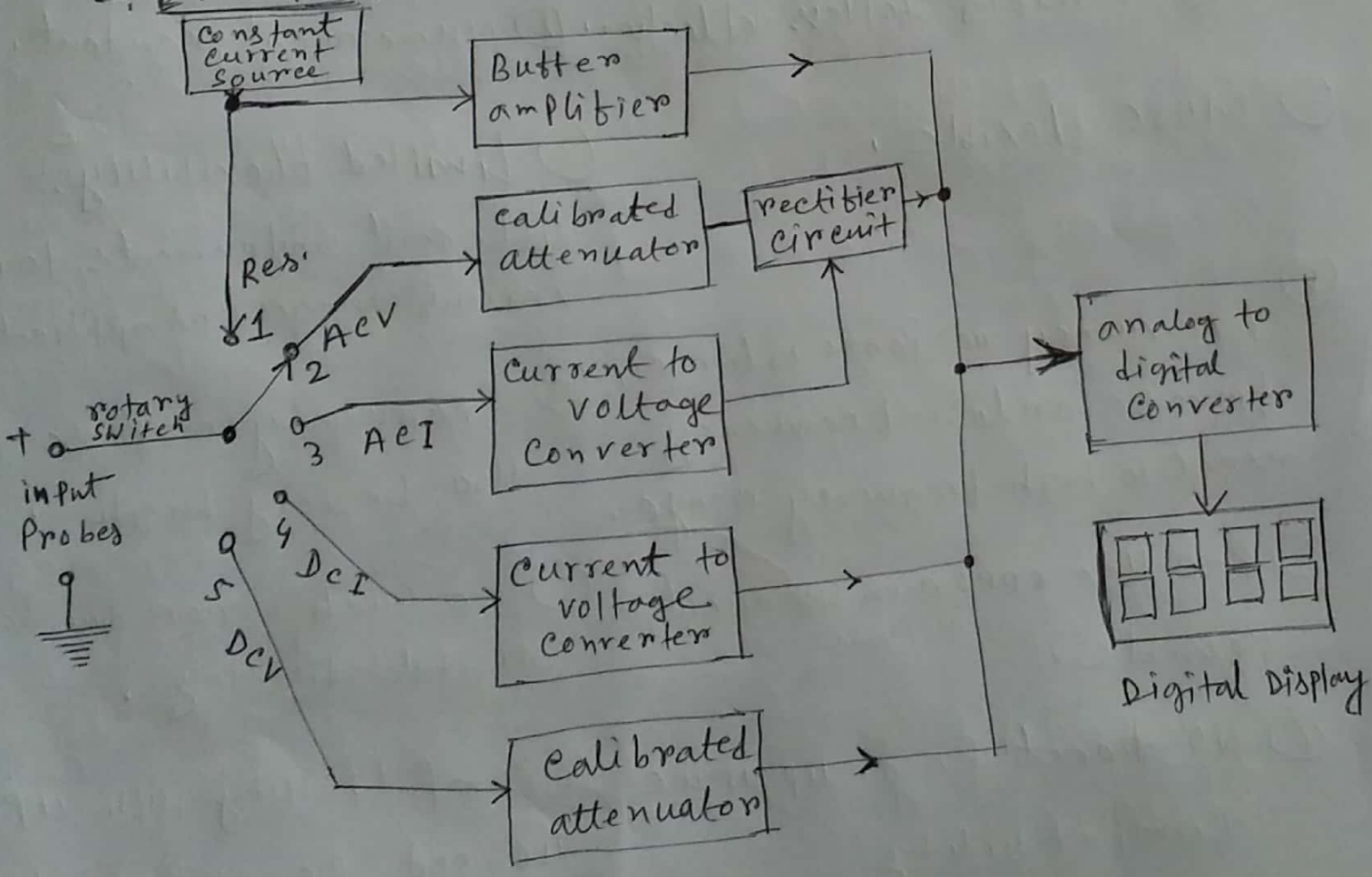
Block diagram of digital multimeter :-

A block diagram is a system description using a subset of functional blocks.

For a digital multimeter you would need to identify all the functional blocks and then indicate how they are interconnected, to achieve the system function.

There is no formal detail level of functional block diagrams, they can be very simple having a couple of blocks to very detailed diagrams with many blocks down to the IC level.

:- Example :-



Analog Multimeter:-

An Analog Multimeter is a device used to measure limited electrical quantities such as current, voltage and Resistance etc.

Digital Multimeter:-

Digital Multimeter is a device used to measure multiple electrical quantities such as current, voltage, Resistance, capacitance, Diode values, Transistors etc.