ELECTRICAL 2ND YEAR

DATE -01/05/2020 SUBJECT- INDUSTRIAL INSTRUMENTATION AND CONTROL 11:20-12:10

Topic- Signal Recording and Display

6.4. X-Y type recorders

- A strip chart recorder records the variations of a quantity w.r.t. time while a X-Y recorder is an instrument which gives a graphic record of the relationship between two variables.
- In X-Y recorders, an emf is plotted as a function of another emf. This is done by having one self-balancing potentiometer control the position of the rolls while another self-balancing potentiometer controls the position of the recording pen (stylus).
- In some X-Y recorders, one stylus moves in the X direction and second stylus moves in the Y direction at right angles to the X direction, while the paper remains stationary.
- With the help of X-Y recorders and appropriate transducers, a physical quantity may be plotted against another physical quantity.

- Hence, an X-Y recorder consists of a pair of servo-system, driving a recording pen and moving arm arrangement, with reference to a stationary paper chart. Attenuators are used to bring the input signals to the levels acceptable by the recorder.
- Figure 6.5 below shows a block diagram of a typical X-Y recorder.

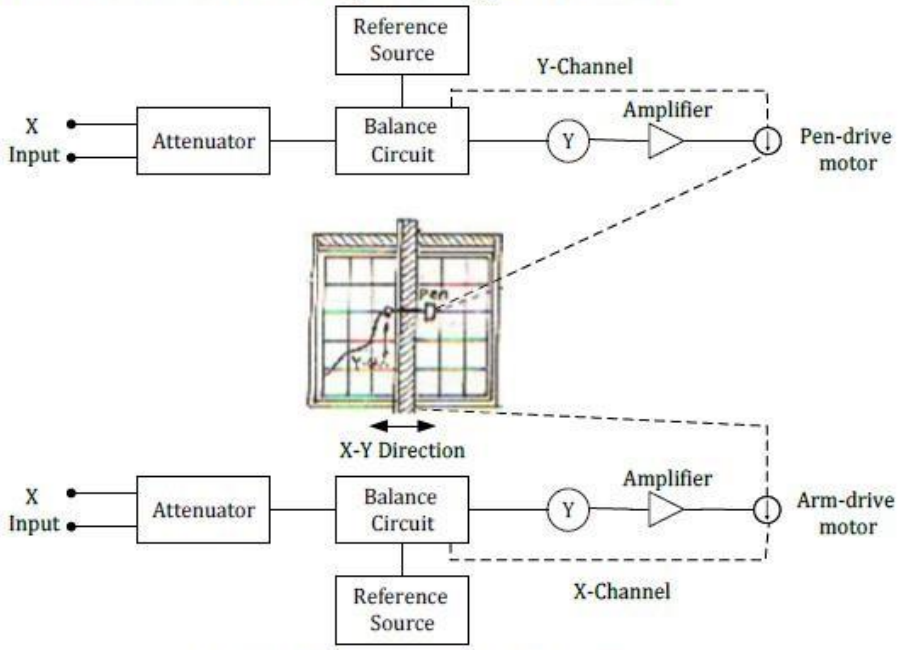

Figure 6. 5 Block diagram of a typical X-Y recorder

- A signal enters each block of the two channels. The signals are attenuated to the inherent full scale range of the recorder, the signal then passes to a balance circuit where it is compared with an internal reference voltage. The error signal and the reference voltage is fed to a chopper which converts d.c. signal to an a.c. signal. The signal is then amplified in order to actuate a servomotor which is used to balance the system and hold it in balance as the value of the quantity being recorded changes.
- The action described above takes place in both axes simultaneously. Thus we get a record of one variable w.r.t. another.
- The use of X-Y recorders in laboratories greatly simplifies and expedites many measurements and tests. A few examples are being given below:
    - Speed torque characteristics of motors
    - Lift drag wind tunnel tests
    - Plotting of characteristics of vacuum tubes, Zener diodes rectifier and transistors etc.
    - Regulation curves of power supplies
    - Plotting stress-strain curves, hysteresis curves and vibrations amplitude against swept frequency