ROHINI
COLLEGE OF ENGINEERING AND TECHNOLOGY
Approved by AICTE and affiliated to Anna University,(An ISO Certified Institution)
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DEPARTMENT OF BIOMEDICAL ENGINEERING

III Semester

BM3301 SENSORS AND MEASUREMENTS

UNIT – 5

5.5 Servo Recorders

Servo Recorders, also known as X-Y recorder or a plotter, is a device that uses two servo motors to move a pen or other writing instrument across a surface in two dimensions, typically on a sheet of paper. These recorders are used for creating graphs, charts, and other visual representations of data. Fig. 5.5.1 shows the servo/X-Y recorder.

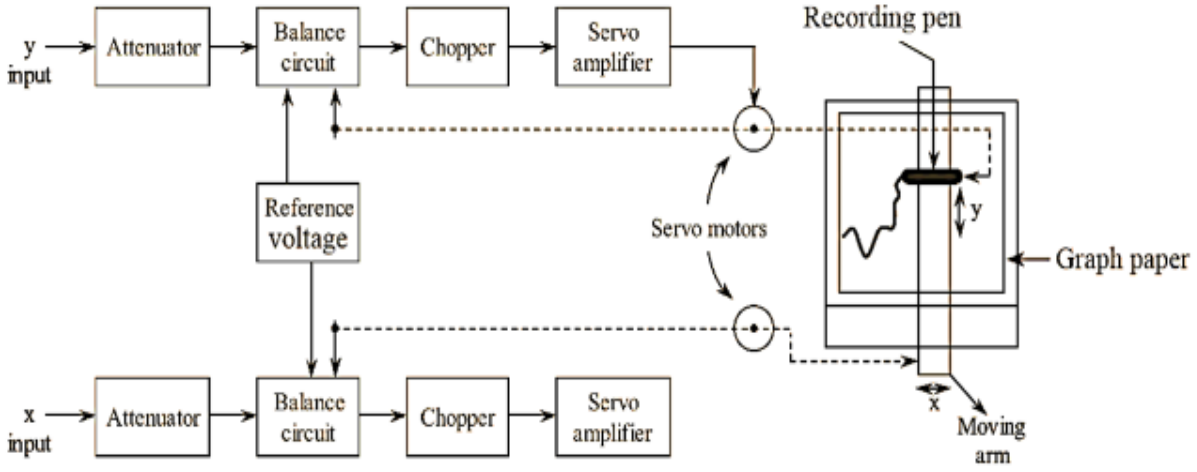

Fig. 5.5.1 Servo / X-Y Recorder

Construction:

i. In X-Y recorder, one variable is plotted against another variable.

ii. The writing head is deflected in either the x-direction or the y-direction on a fixed graph chart paper.

iii. The graph paper used is generally squared shaped, and is held fixed by electrostatic attraction or by vacuum.

iv. The writing head is controlled by a servo feedback system or by a self-balancing potentiometer.

v. The writing head consist of one or two pens, depending on the application. In practice, one emf is plotted as a function of another emf in an X-Y recorder.

vi. In some cases, the X-Y recorder is also used to plot one physical quantity (displacement, force, strain, pressure, etc.) as a function of another physical quantity, by using an appropriate transducer, which produces an output (EMF) proportional to the physical quantity.

vii. The motion of the recording pen in both the axis is driven by servo-system, with reference to a stationary chart paper. The movement in x and y directions is obtained through a sliding pen and moving arm arrangement.

Working:

i. The input signals are attenuated in the range of 0-5 mV, so that it can work in the dynamic range of the recorder.

ii. The balancing circuit then compares the attenuated signal to a fixed internal reference voltage.

iii. The output of the balancing circuit is a dc error signal produced by the difference between the attenuated signal and the reference voltage.

iv. This dc error signal is then converted into an ac signal with the help of a chopper circuit.

v. This ac signal is not sufficient to drive the pen/arm drive motor; hence, it is amplified by an ac amplifier.

vi. This amplified signal (error signal) is then applied to actuate the servo motor so that the pen/arm mechanism moves in an appropriate direction in order to reduce the error, thereby bringing the system to balance.

vii. Hence as the input signal being recorded varies, the pen/arm tries to hold the system in balance, producing a record on the paper.

viii. The action described above takes place in both the axes simultaneously. Hence a record of one physical quantity with respect to another is obtained.

Applications of X-Y Recorders:

These recorders are used to measure the following.

1. Speed-torque characteristics of motors.
2. Regulation curves of power supply.
3. Plotting characteristics of active devices such as vacuum tubes, transistors, zener diode, rectifier diodes, etc.
4. Plotting stress-strain curves, hysteresis curves, etc.
5. Electrical characteristics of materials, such as resistance versus temperature.

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