

EIPC (NEE-403)

Unit-4

Display Devices &
Recorders

X-Y recorders

- The X-Y recorder uses two servo mechanisms connected to the same writing assembly, but at right angles to each other.
- The X-axis servomechanism moves the pen-bar assembly back and forth across the paper in the horizontal plane, while the Y-axis servomechanism moves the pen vertically up and down along the bar.

X-Y recorders

- The paper itself does not move. It is held in place either by clamp or, in high-quality instruments by a vacuum pump that is used to evacuate a hollow chamber below the paper platform.
- Holes in the platform create the negative pressure needed to keep the paper in place.
- One advantage of the X-Y recorder is that almost any type of paper may be used.

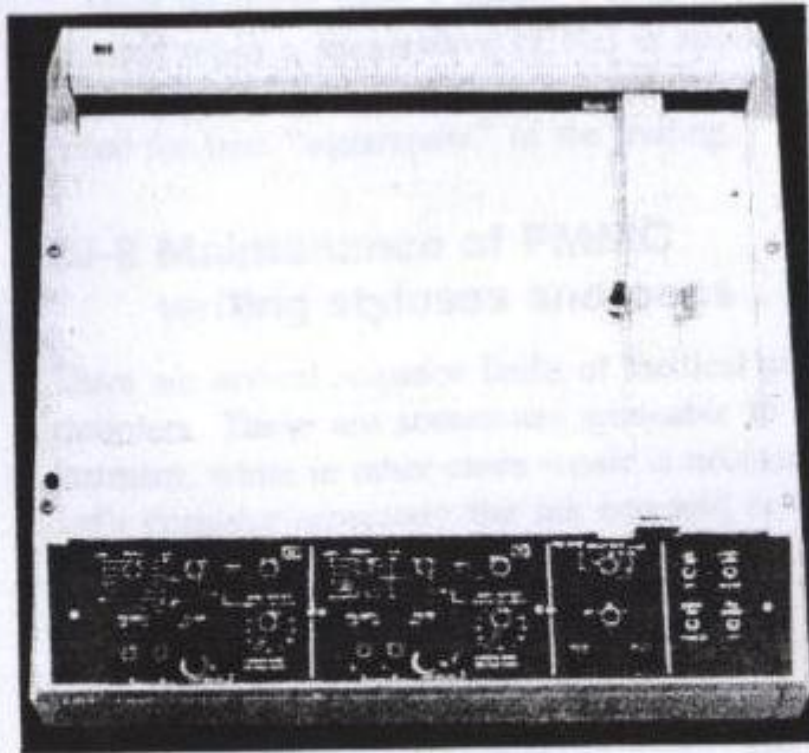
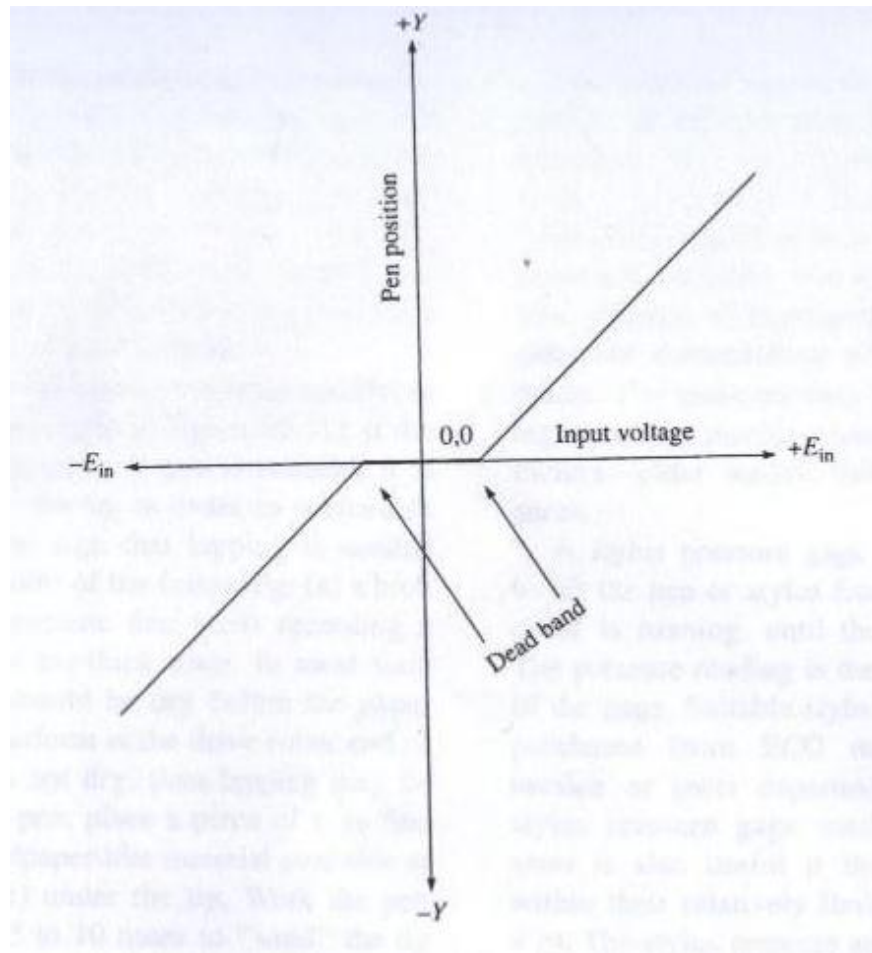


Figure 20-7
X-Y recorder. (Reprinted courtesy of Hewlett-Packard)

Problem of recorder design

- 1- A dead band signal: largest signal to which the recorder will not respond due to pen assembly mass (inertia). Sufficient pre-amplification of the signal is required
- 2- Overshooting and undershooting of the recorded trace.
- 3- Under critically damped reader will overshoot the correct point and then hunt back and forth across the correct point for a few cycles until it hones in and settles properly
- 4- Over critically damped recorder is sluggish the pen approaches the correct position very slowly .

Deadband



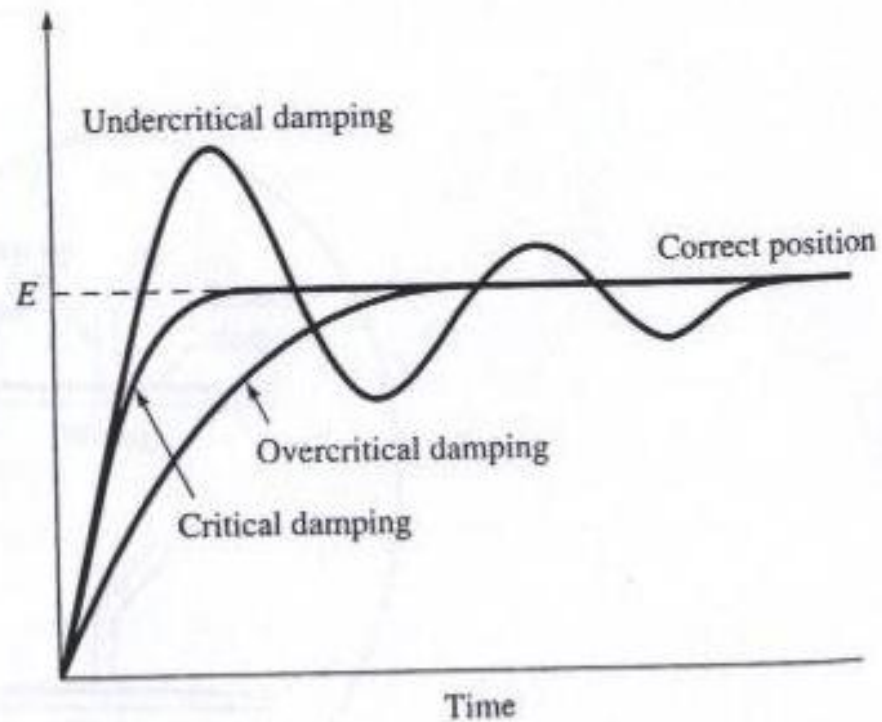


Figure 20-9

Types of responses found in recorders—critical, overcritical, and undercritical damping.

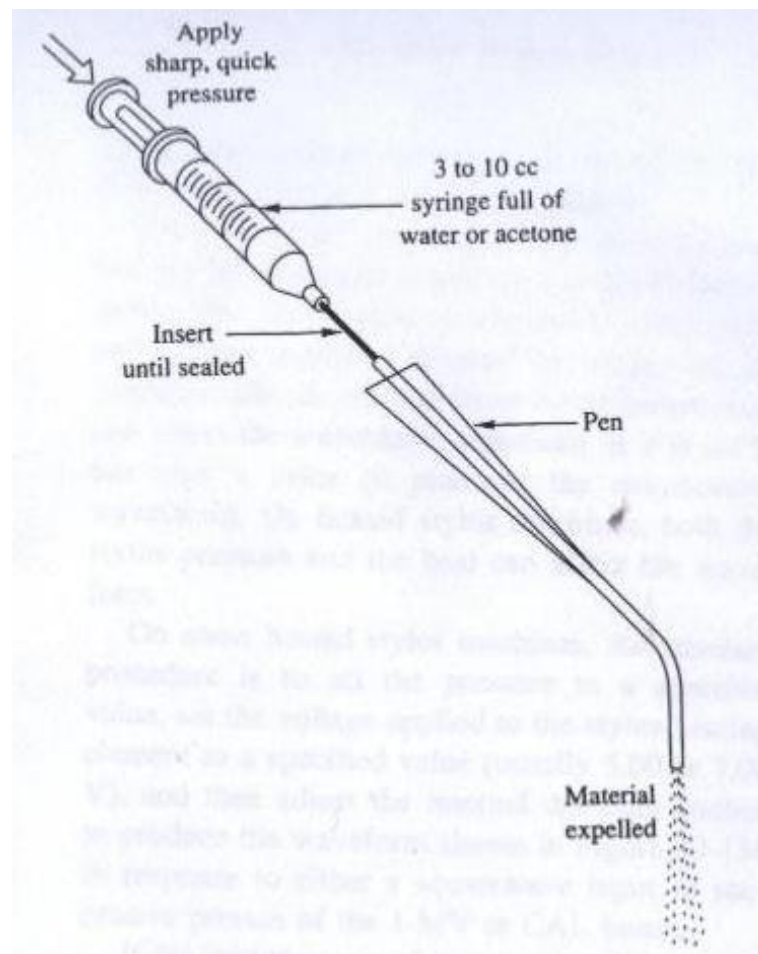
- Pen assemblies are often damaged if they strike the limits-of-travel steps at a high speed.
- A pair of Zener diodes connected back to back across the PMMC coil are sometimes used to accomplish the same job.
- The Zener potential of the diodes is selected so that the bodies break over and conduct current only when a voltage greater than the normal full-scale potential is applied to the input of the amplifier

Maintenance of the PMMC writing stylus and pens

- Figure shows how to remove an ink blockage from an ink pen recorder that has been allowed to stand too long without being used.
- As a general rule, such recorders should be run for about five minutes or so once a week when not in regular service.
- Fill a 3- to 10-cc syringe with water (or acetone for certain type of ink)

Maintenance of the PMMC writing stylus and pens

- Insert end into the ink inlet
- The pen has to be removed from the machine for this operation.
- Quickly, and with a single sharp motion, drive the plunger “home” so that a high pressure jet of water or acetone is forced into the pen. The ink clot should be forced out the other end.



Precautions

- Always wear protective-goggles and protective clothing.
- Make sure that the pen is aimed downward into a sink
- As always when dealing with needles, be careful not to stick yourself.

Precautions

- The thick high-viscosity ink strains every thing it touches and a nearly impossible to remove.
- Ink pen tips are designed to operate parallel to the paper surface

- If the pen is worn or when a new pen is installed, it is necessary to lap the tip in order to reestablish the parallelism.
- The sign that lapping is needed will be either (or both) of the following:
 - A- a blob of ink when the machine first starts a waveform, or
 - B- a too-thick trace
- To lap the pen, place a piece of fine Emery cloth (sandpaper) under the tip.
- Work the pen tip back and forth 5 to 10 times to sand the tip parallel to the paper

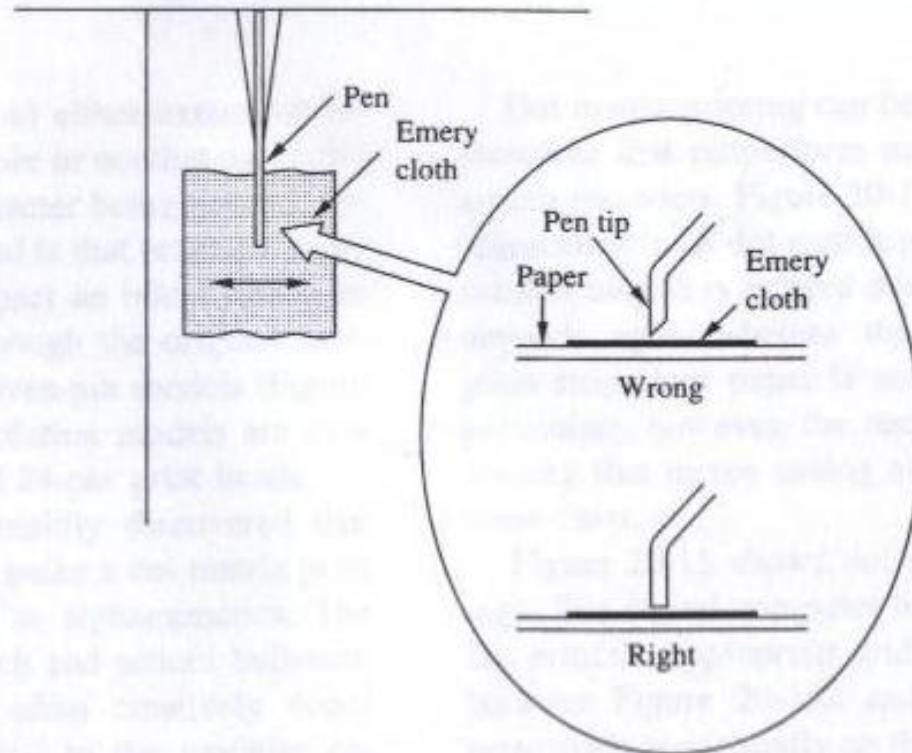


Figure 20-11
Lapping a pen tip to make it parallel to the paper.

- The pressure of the stylus or pen is also important.
- If the pressure is not correct, then the waveform may be distorted
- In medical equipment it is possible to make a normally healthy lead-1 ECG as though the patient has.
- Suitable stylus ECG gages can be purchased from ECG machine manufactures.
- The stylus pressure adjustment is made using a screw that is usually located on the rear of the stylus or the assembly that holds it in place.

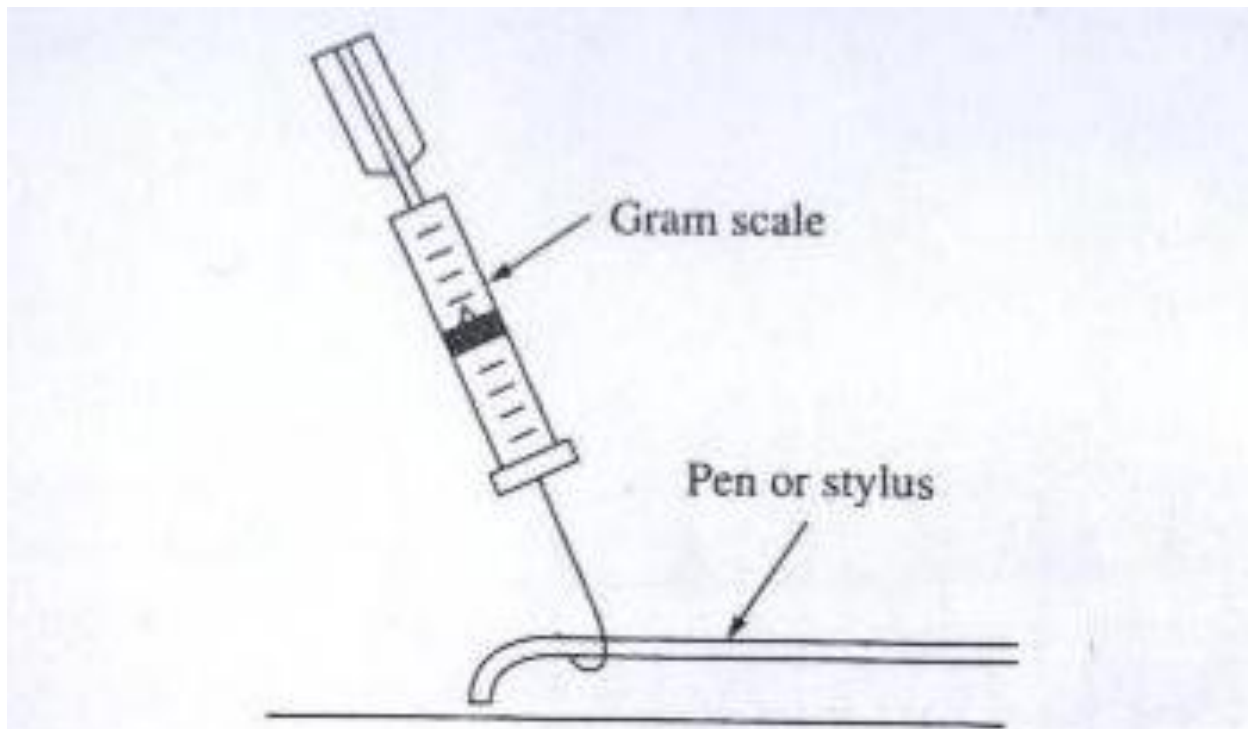


Figure 20-12

Measuring stylus or pen pressure in analog recorder.

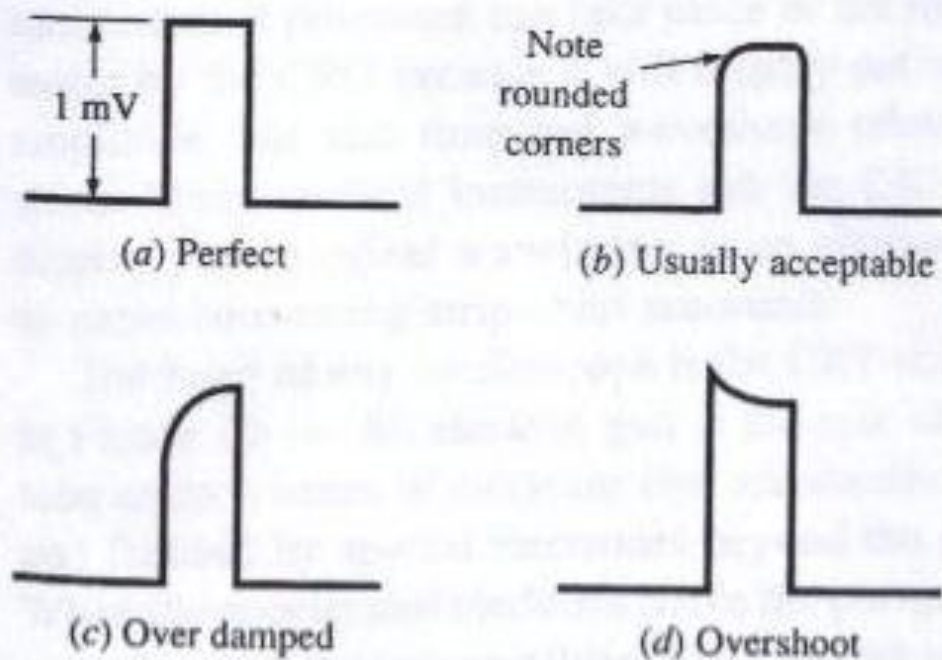


Figure 20-13
1-mV calibration pulses. (a) Ideal shape. (b) Slightly rounded figures normally seen. (c) Overdamped pulse. (d) Underdamped pulse.

Thank You