Topics for Today:

- [http://www.ece.mtu.edu/faculty/bamork/EE5223/index.htm](http://www.ece.mtu.edu/faculty/bamork/EE5223/index.htm)
- Labs - EE4224/5224 - Begins Wed of Week 2
- How to read a one-line (cont’d). See handout “Sub Schem”
- Instrument transformers: VTs, CTs, CCVTs, MOCTs, etc.
- CTs - pedestal vs. bushing
- CT saturation & accuracy, ratios, multi-ratio Cts
- Next:
  - Print out “CT” handout, Study Chapter 5 info on CT saturation & accuracy
  - Radial Protection (read sections 12.5, 12.6), G&S Ch.10)
DEVICE NOS:

Ch. 1 §1.4: Device Nos
(typos in older - 2-digit numbers
printings) - identify the relay
4th printing is ok. Or type of protective
1st " " bad. device.

Ex:

50 - Inst. O.C.
51 - "Time O.C." (inverse)

67 - Directional O.C.
21 - Impedance (also directional)
Relay Schematics

1) AC
   - HV Lines, Equip, Connections
   - Int. Xfmrs (CTs, VTs, etc)
   - Relays
   - Basic Control Functions.

2) DC Control
   - Relay Logic, And/or
   - CB close/trip
   - Battery System, eg. 126V DC.

3) Station Power, Aux
"3-Line Diagram"

CT
HV Bus

～I_a
～I_n

～I'_a
～I'_n

～I_A
～I_B
～I_C

φA
φB
φC

"Residual Current"

= 3~I_ao

= Zero Seq. Current

Relay, Meter, TDCR, etc.
Bushings - HV Lead

Connections into equipment:

4-Bolt Pad

Porcelain Bushing

Dry: Porcelain

"Wet": Oil-Filled

Bushing Well

Sheet metal tank

Collar

Bolted/Clamped

High current

Low current

EE 5210 - Power Systems Protection

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