Ongoing List of Topics:

- **URL:** [http://www.ece.mtu.edu/faculty/bamork/EE5223/index.htm](http://www.ece.mtu.edu/faculty/bamork/EE5223/index.htm)
- **Term Project** -
  - Follow timeline, see Term Project Guidelines on web page.
- **Ch.10: Bus protection - 87B** (print out “Bus Prot” at Week 11)
  - Review of Bus configurations, Sections 10.1 thru 10.10.
  - Low, Medium, and High-Impedance relays
  - Partial bus protection using 51 relay (distribution bus w/radial feeders)
- **Next: Protection of Shunt Capacitor Banks** (print out “Cap Bank Prot” at Week 12)
  - Basic application, reason for using shunt cap banks
  - Cap bank configurations, methods of protection
- XFMR Rel. - 87T
- Bus Diff. - 87B
  - Low Z
  - Mod Z
  - High Z
- Gen Diff., Gen Prot. - 87G
- Cap Bank (Shunt)
  - O.C.
  - Volt Diff.
Single Bus, Single Breaker

\[ \sum I_{in} = 0 \]

115kV

12.47-kV

87B

I = 0 normally.
I \to 0 for fault.

Low Z \sim 0.1 \Omega
Med Z \sim 5-15 \Omega
High Z \sim 2600 \Omega

 redhead

ABB

KAB

"Summing nodes"
Burdens

\[
\begin{align*}
C_{800} & \Rightarrow 8.52 \\
C_{100} & \Rightarrow 1.52 \\
C_{50} & \Rightarrow 0.52
\end{align*}
\]

- Avoid Z0 related to cables
- Faster detection, trip
- More secure than Low-Z 878

±10% accuracy @ 20x rated (160A)
For MR CTS:

- All CTS at same ratio.
- Use full (max) ratio for best results.
- CTS should be LOCxxx, i.e. uniformly distributed secondary windings.
SEL-487B Bus Protection Relay
Busbar and Breaker Failure Protection, Automation, and Control System

Applications

- Use one SEL-487B for buses with 1–6 terminals. Interconnect three relays for protection of buses with 7–18 terminals.
- Provide integrated breaker failure protection for each terminal on the bus. Internal open-phase detection and SELogic® control equations provide for simplified local and remote backup tripping.
- Apply station automation and control with tripping outputs for all circuit breakers and status inputs for all disconnect switches and auxiliaries. The massive input and output capabilities of the SEL-487B provide an ideal platform for system integration.
- Improve and simplify relay interconnections using Mirrored Bts™ communications of internal logic points between SEL relays.
- Monitor each terminal current and station voltage from a single location. Simplify data acquisition by using one relay for analog and digital status monitoring.

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