

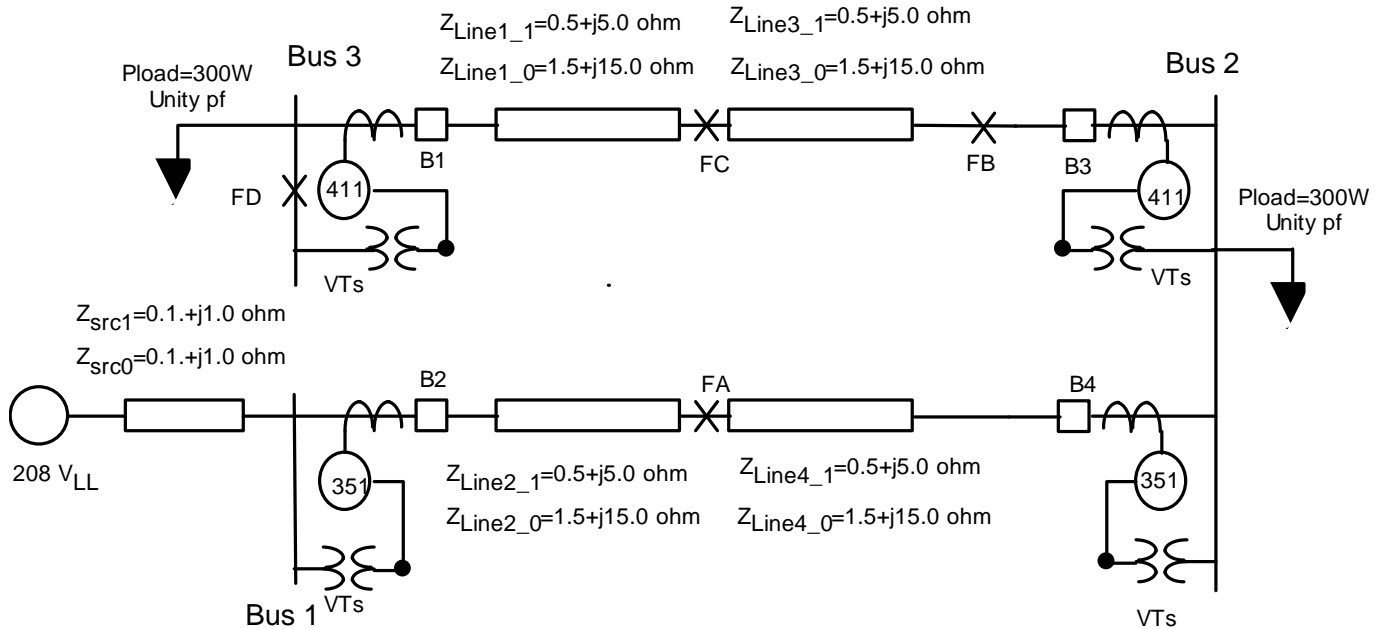
## ECE 525: Engineering Outreach Lab 2, PART A

### Inverse Time Overcurrent Protection

*Due: November 19*

- The simulated CT's have a CTR of 1:1
- The voltage transformers on the upper line have a VTR of 1:1

#### System One line



#### Lab 2A Procedure:

1. Calculate minimum pick up and time settings for phase (P) and ground (G) inverse time overcurrent relays controlling breaker B2 and breaker B3 (you can view these as being implemented in the SEL 351 at Bus 1 and the 411L at Bus 2). You will be using an ANSI/IEEE U3 (very inverse) curve.
  - A. Set the source impedance to  $0.1 + j1$  ohms as shown
  - B. There are two loads, each rated at  $P_{3ph} = 300W$  unity power factor (they draw 300W if 208V LL is applied)
  - C. Set minimum pickup and TD 51P and 51G for both relays (disable 51Q elements)
  - D. Your minimum time dial setting is 0.5
  - E. Set your CTI at 10 cycles
2. Test your relay settings by applying the following COMTRADE files for the following faults (3 phase, SLG, LL, DLG). Test enough to ensure good coordination.
  - A. 50% of the Line 2-Line 4 combination (watch impact of imbalanced voltages due to this fault on load currents seen by B3)
  - B. Fault at Bus 2
  - C. Bus 3
3. Your lab report should contain your settings both relays, a table showing how your settings did (indicating which elements tripped, and whether or not you achieved coordination).
4. Extra credit: include 51Q elements.