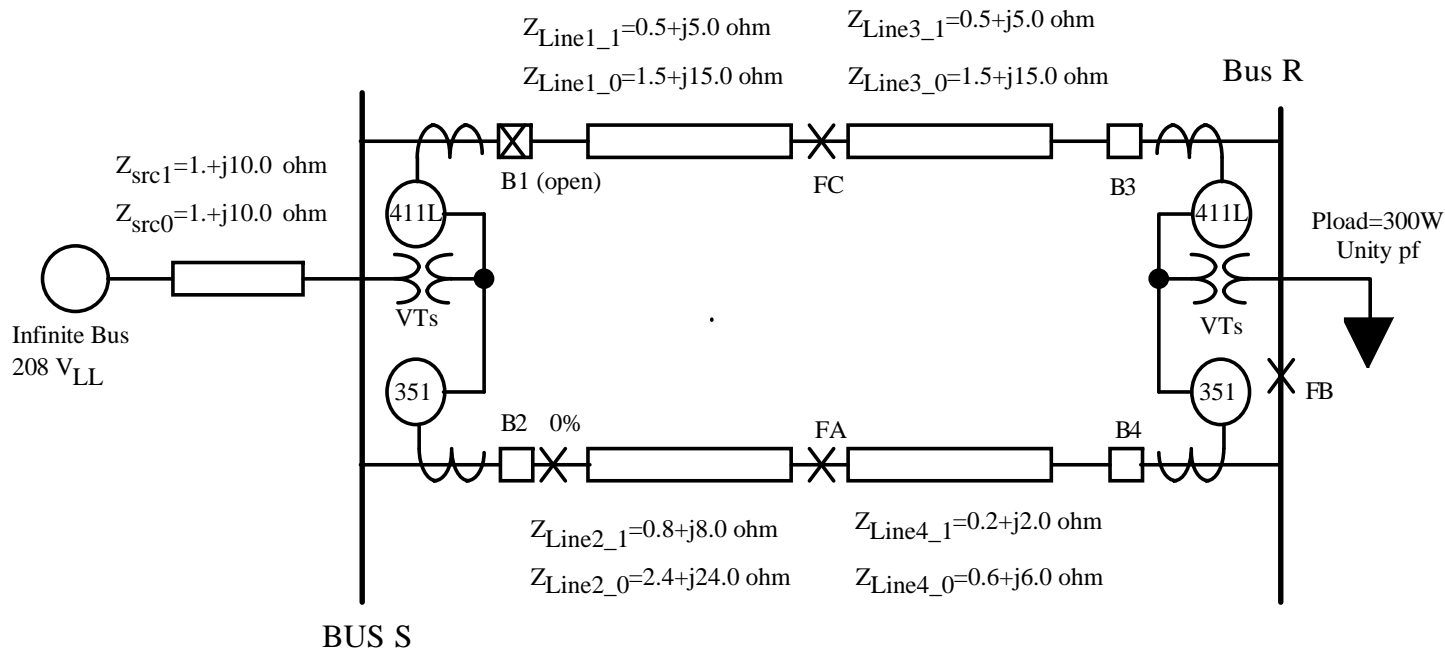


ECE 525: Engineering Outreach Lab 1

Report Due: Nov 6

The power system can be configured as shown below, with a single source supplying two parallel lines. Each line segment has a series impedance of $1 + j10 \Omega$, divided more or less equally between 10 taps. The source impedance can also be varied with taps and is set at its maximum.

- Enter settings into the relay modeled in the MathCAD or MathCAD Prime sheet
 - Verify the performance of these settings by observing the relay response to fault data provided in COMTRADE files. All data will be given in secondary Amperes and secondary Volts.
1. If you have the local facilities you can also implement your own test set up, and use the COMTRADE files to generate inputs.
 2. You can also create your own system in ATP or PSCAD/EMTDC and perform the lab



MathCAD Relay model option

- Download the MathCAD relay model from the course web site.
- The simulated CT's have a CTR of 1:1 in the MathCAD relay model since the data is referred to the secondary
- The voltage transformers have a VTR of 1:1 since data is referred to the secondary

Transient Program Relay model option

- Download the ATPDraw or PSCAD/EMTDC relay model from the course web site along with instructions

Lab 1 Procedure:

1. Determine relay settings for instantaneous overcurrent elements (phase, negative sequence and ground) for the 351 relay at bus S.
 - A. Instantaneous trip faults up to 80% of the lower line (Line 2 + Line 4) as shown above (location FA)
 - B. Time delayed trip (5 cycles) for faults between 80% and 150% (half way down the series set Line 1 + Line 3 (FC))
2. Modify trip equation at the end of this file (if needed)
3. Download COMTRADE files for faults at points FA, FB, and FC. You will have 3 phase, SLG, LL and DLG at each location. These will be placed on the web page as zip files (each with a *.hdr, *.cfg, *.dat) file.
4. Load each of the Comtrade files into the MathCAD relay model and test your settings.

Report:

1. Your report should list your relay settings
2. Table with summarizing the MathCAD results demonstrating that the relay settings operate correctly.
3. General summary comments