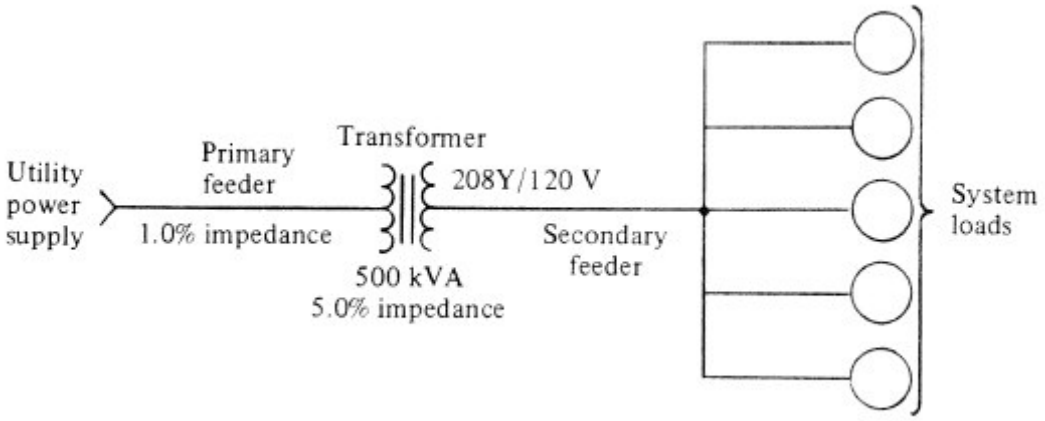
ECE471 INDUSTRIAL POWER SYSTEMS

Homework # 3

From chapter 6 of the course text, turn in problems 4 and 5.

4. Refer to Figure 6.2(a). The transformer is 1000 kVA, its impedance is 5.75%, the primary feeder impedance is 0.75%, and the secondary voltage is 480Y/277 V. Calculate the short-circuit current on the secondary of the transformer under three-phase bolted fault conditions.

5. Repeat Problem 4, except the transformer is 1500 kVA, its impedance is 5.0%, and the primary feeder impedance is 0.5%.



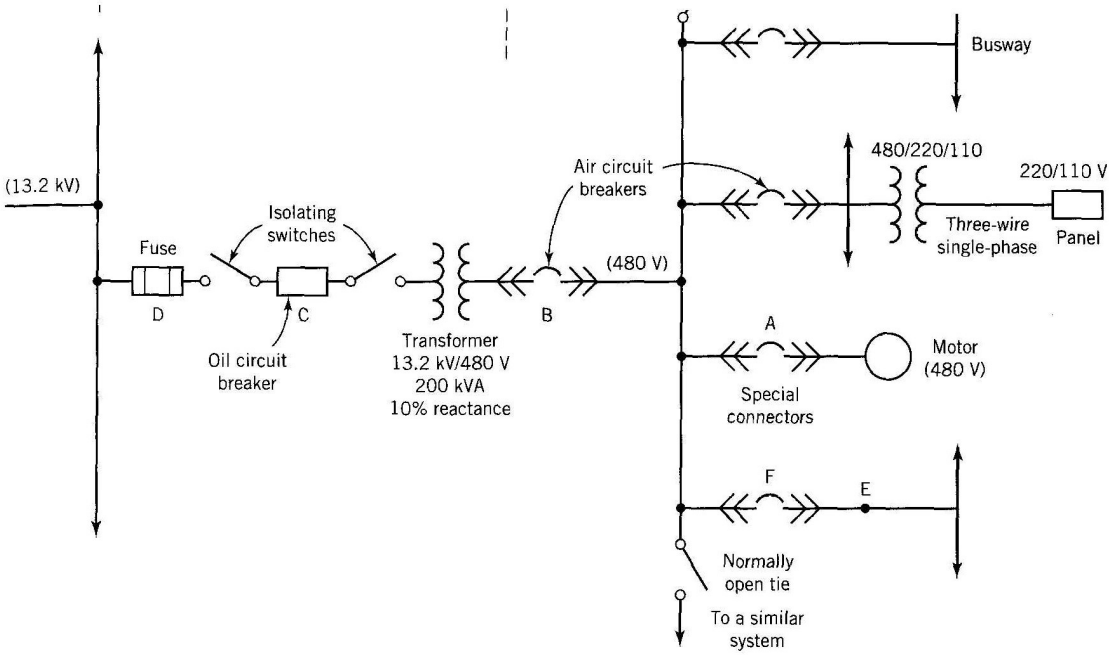
(a) One-line diagram of an electrical system

From chapter 16 of the course text, turn in problems 2 and 3.

2. Power is supplied over a primary feeder to a 13,800-208Y/120 V, 500 kVA unit substation. The impedance of the transformer is 5.0%. The utility system short-circuit capability is 150,000 kVA. Assume 50% of the load is motors. Calculate the available short-circuit current at the main secondary bus of the substation.

3. Repeat Problem 2, except the secondary voltage is 480Y/277 V and motor load is 100%.

The next problems refer to the following diagram, in which the four load groups on the right-hand side take respectively: 34 kVA @ 0.84 lag (non-motor), 20 kVA @ 0.97 lag (non-motor), 60 kVA (motor) @ 0.78 lag, and 38 kVA @ 0.89 lag (non-motor).



1.
What is the current and power factor at the 13.2 kV supply?

2.
What is the pu loading on the main 200 kVA transformer?

3.
If the three-phase fault level at the 13.2 kV bus is 26.4 kA, what will be the fault level at the 480 V bus?