

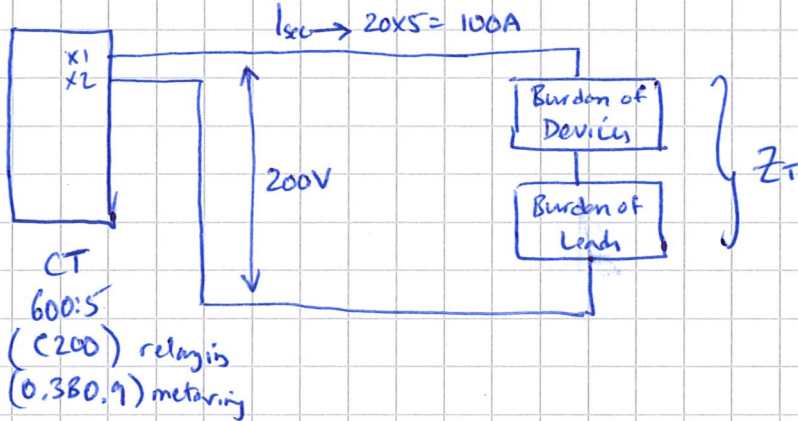
C

minimum  $V_{sec}$  @  $20 \times I_{nominal}$   
w/o exceeding 10% ratio error

CT Burden

- BO.1
- BO.2
- BO.5
- BO.9
- B1-8

metering only?



$$V = IR$$

$$200 = 100 \cdot R$$

$$R = 2 \Omega \text{ (max. external burden)}$$

$$Z_T = R_{CT} + R_L + Z_D$$

$\uparrow$                        $\uparrow$                        $\uparrow$   
 CT secondary resistance winding    resistance of leads    device impedance in  $\Omega$ .

$Z_D$

SEL787 Burden =  $< 0.1 \text{ VA @ 5A}$

$$VA = VI \rightarrow 0.1 = I^2 R$$

$$V = IR \rightarrow 0.1 = 5^2 R$$

$$R = \frac{0.1}{5^2}$$

$$R = \underline{\underline{0.004 \Omega}}$$

$$R_{CT} = 0.349 \Omega \text{ (from CT datasheet)}$$

DCR

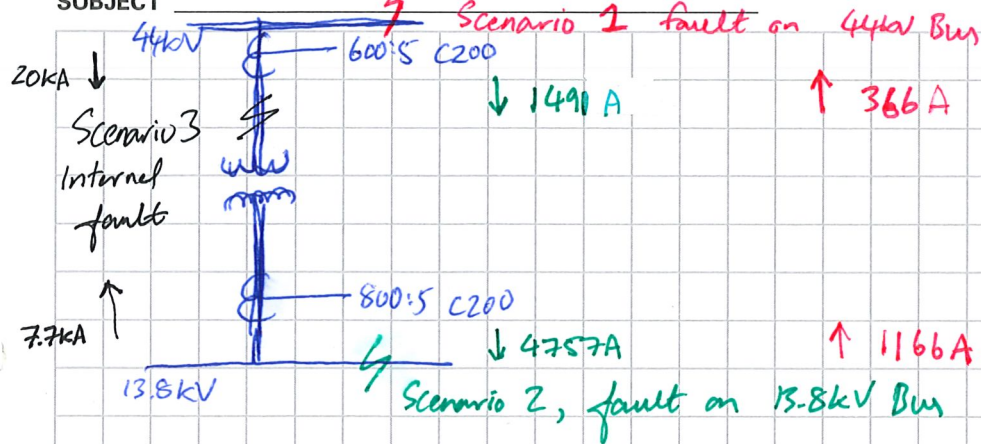
$R_L$  #10 AWG.

Resistance of cable from CT to relay & back  $\Rightarrow$  500 ft / 152 m.

From Amixtor, #10 mc cable = 1.31  $\Omega$  / 1000 ft

$$\text{So actual } R = \frac{1.31 \Omega}{1000 \text{ ft}} \times 500 \text{ ft} = 0.655 \Omega$$

$$Z_T = 0.004 + 0.349 + 0.655 = 1.008 \Omega$$



## EXTERNAL FAULTS

Scenario 1:

$$366 \text{ A on primary} = 3 \text{ A on secondary} \sim 3 \text{ A} \times 12 \text{ V} = 3 \text{ V} < 20 \times$$

$$1166 \text{ A on primary} = 7 \text{ A on secondary} \sim 7 \text{ A} \times 12 \text{ V} = 7 \text{ V} \text{ no saturation}$$

Scenario 2:

$$1491 \text{ A on primary} = 12.4 \text{ A on secondary} \sim 12.4 \text{ A} \times 12 \text{ V} = 12 \text{ V} < 20 \times$$

$$4757 \text{ A on primary} = 29 \text{ A on secondary} \sim 29 \text{ A} \times 12 \text{ V} = 29 \text{ V} \text{ no saturation}$$

## INTERNAL FAULT

C37.110-1996

7.2.3.2

Rule of thumb:  $I_f \times Z < \frac{1}{2} C$  voltage rating (for external faults)

Rule of thumb: ~~CT~~ Instantaneous should operate before (for internal faults) CT saturates.

Scenario 3:

$$20 \text{ kA on primary} = 166 \text{ A on secondary} \sim 166 \text{ A} \times 1.008 \Omega = 166 \text{ V} > \frac{1}{2} C200 \text{ but still } < C200$$

$$7.7 \text{ kA on primary} = 48 \text{ A on secondary} \sim 48 \text{ A} \times 1.008 \Omega = 48 \text{ V} < \frac{1}{2} C200$$

MET

✓ MET

✓ MET