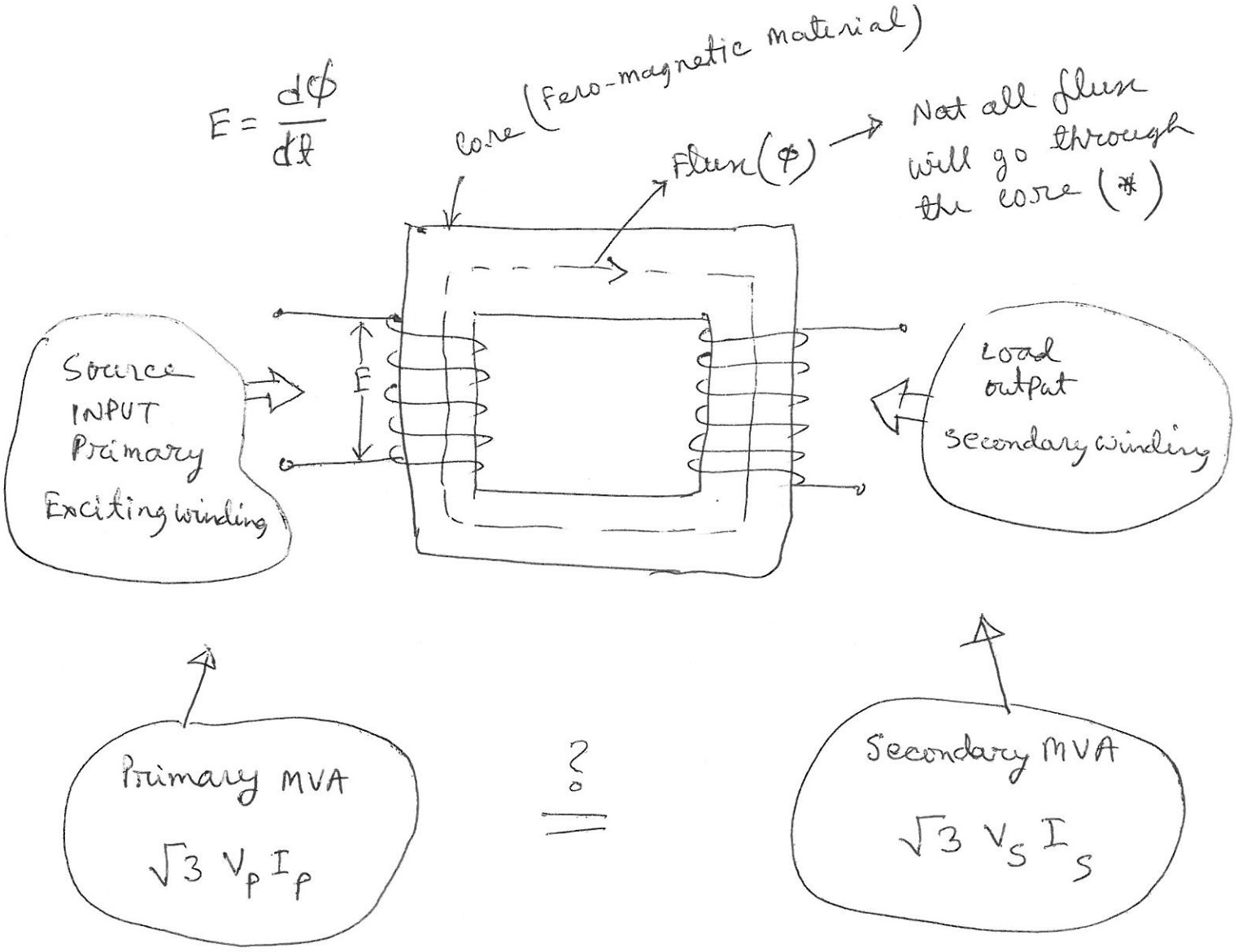
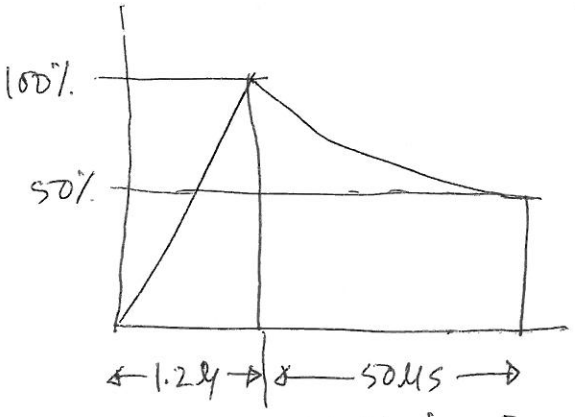
$$E = \frac{d\phi}{dt}$$



(*) Some flux will leak out of the core.
These fluxes are called leakage flux

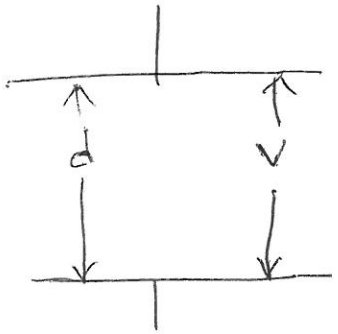
Lightning



Lightning Impulse

X_C = close, X_L = open } Transformer behaves like a capacitor when Lightning hits the Tx.

Capacitor is nothing but two Parallel Plates



$$E = \frac{V}{d}$$

(E is Electrical stress

$$T = \frac{1}{f}$$

$T = 1\mu s$

$f = 10^6$ (too high with respect to 60Hz)

$$X_C = \frac{1}{2\pi f C} \qquad X_C \xrightarrow{f = 10^6} \text{close}$$

$$X_L = 2\pi f L \qquad X_L \xrightarrow{f = 10^6} \text{open}$$

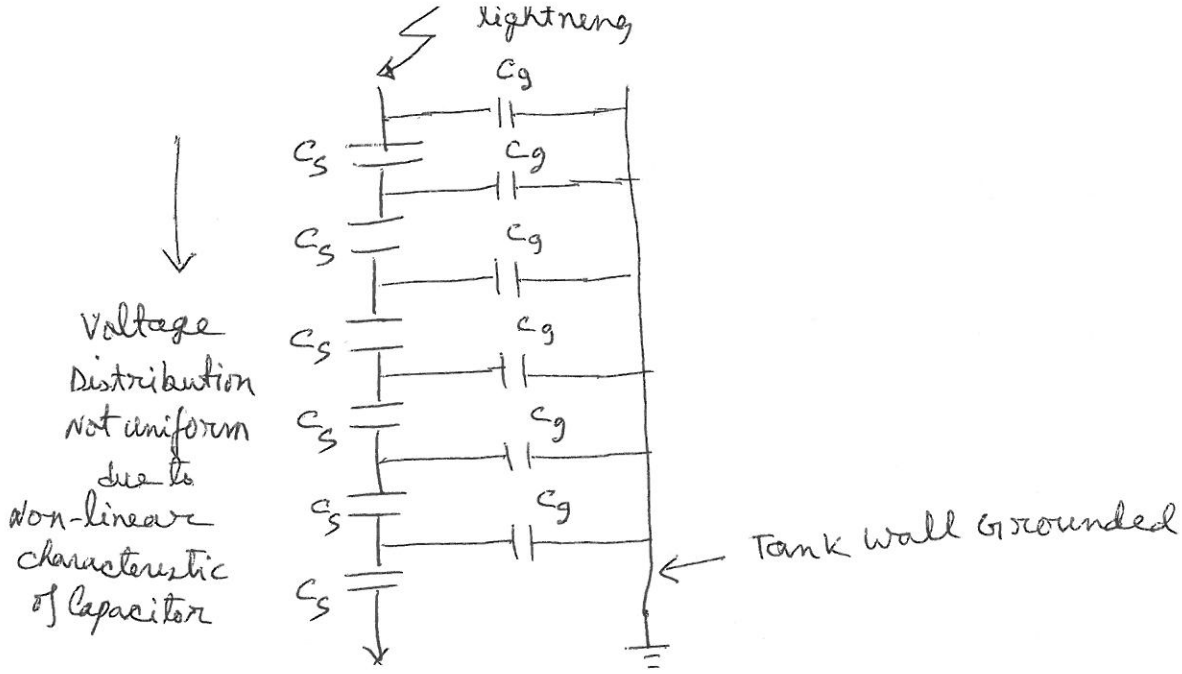
Switching

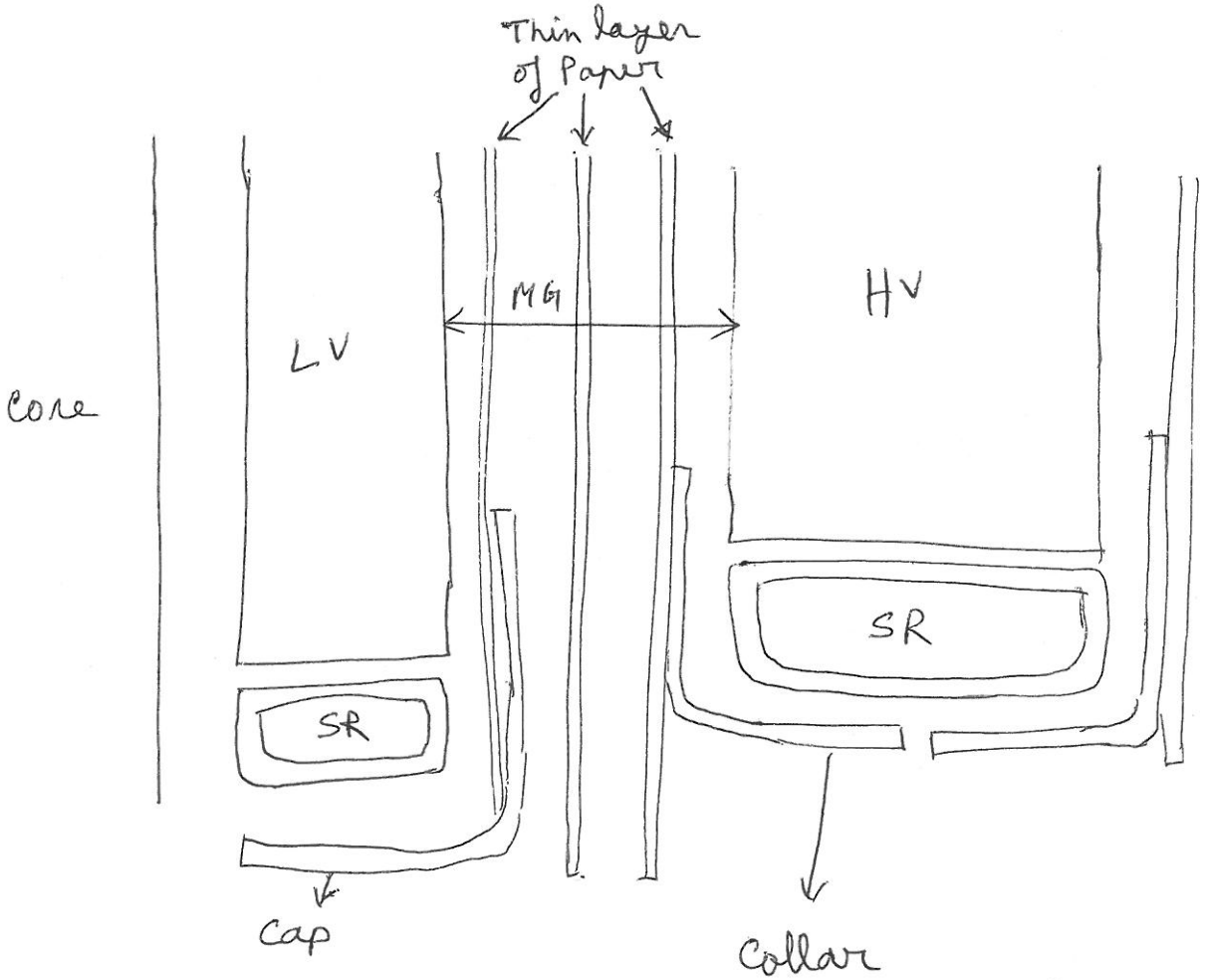
Now $T = 250\,\mu s$

$f = 4 \times 10^3 < 10^6$

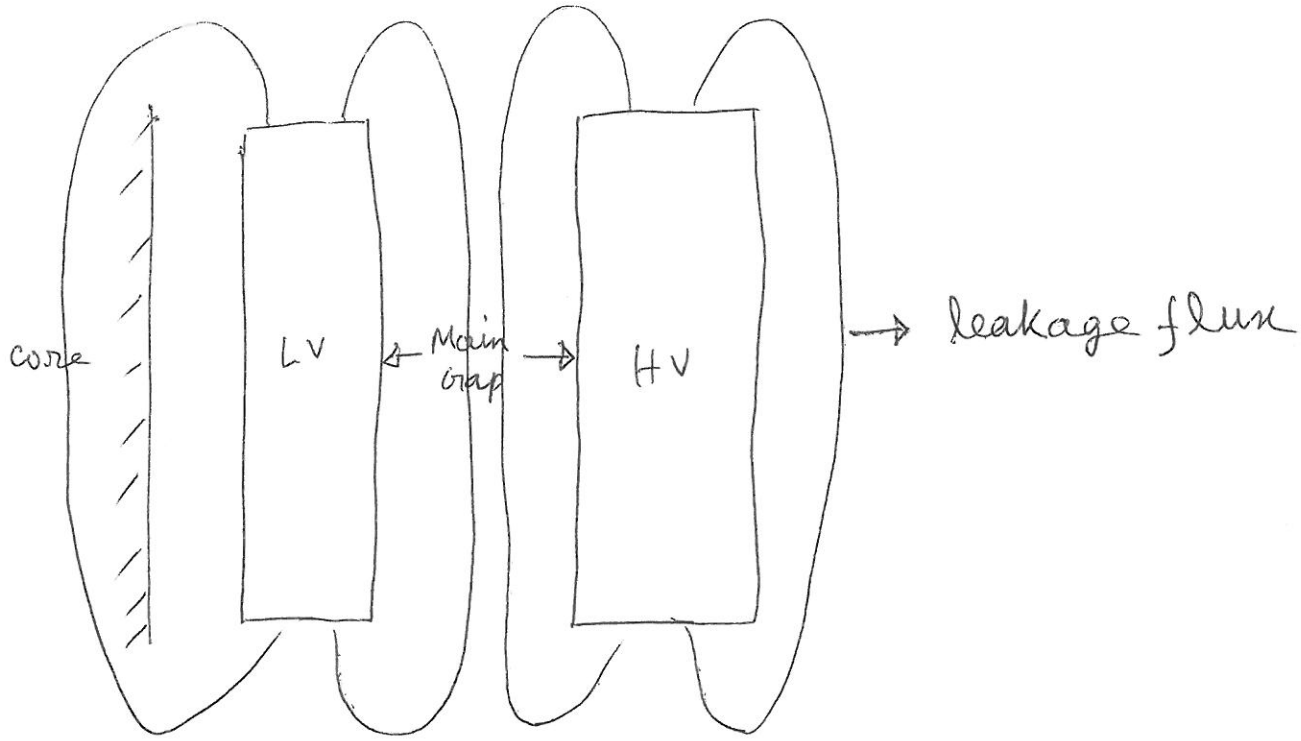
Now both X_C and X_L will be in the circuit

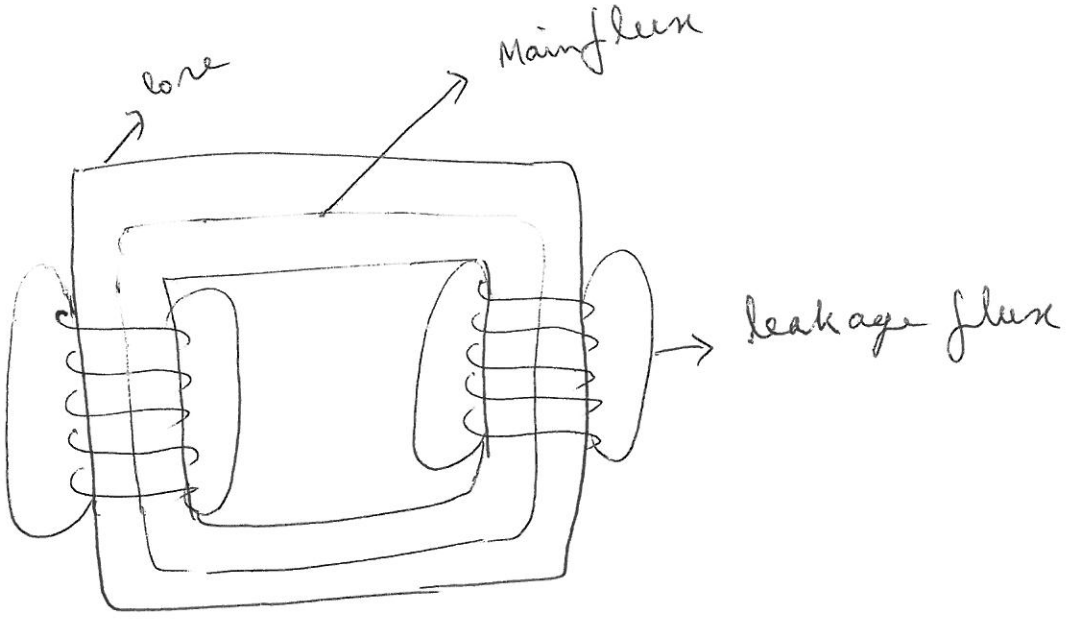
Transformer will behave like an R-L-C circuit





* SR = Stress Ring * MG = Main Gap





$$I_{SC} = \frac{I_{Rated}}{Z}$$

Tx impedance At 1-G Fault

$$Z = Z_P + Z_N + Z_0$$

$$= 2Z_P + Z_0 \quad (Z_P = Z_N)$$

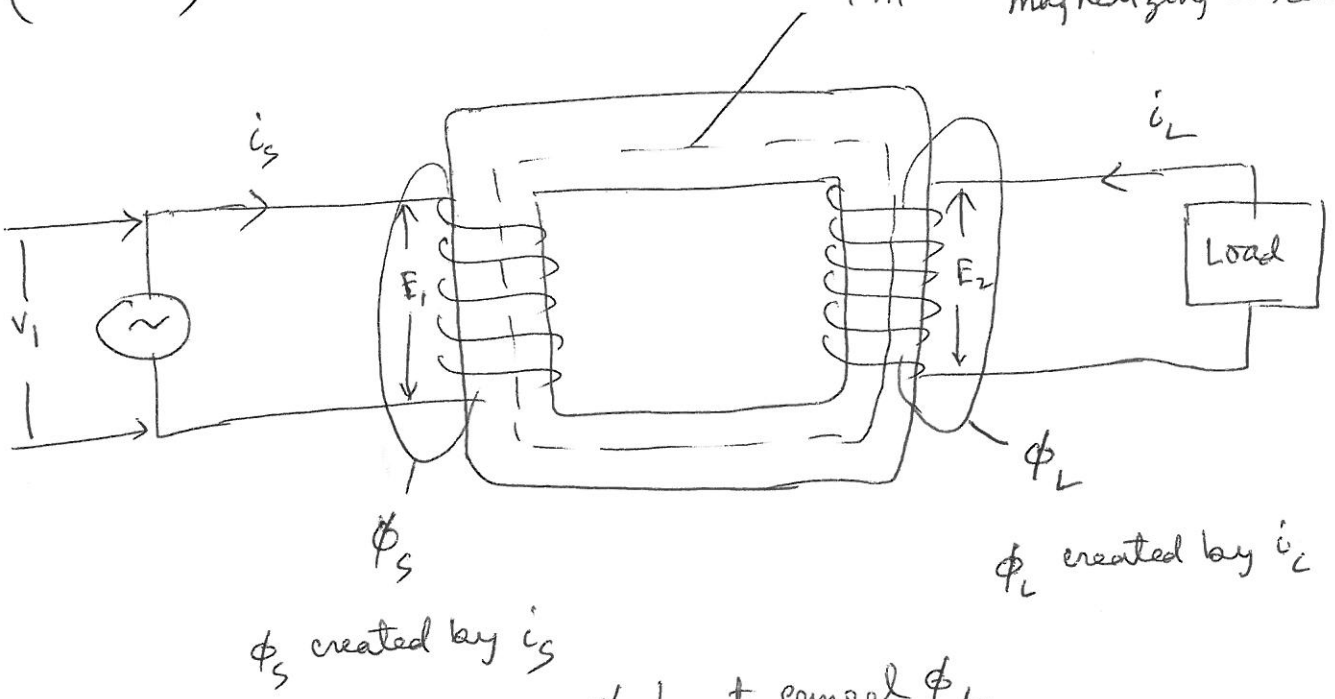
$$\downarrow$$

$$\approx 90\% - 110\%$$

$$F \propto i^2$$

NL Noise = 60 dB

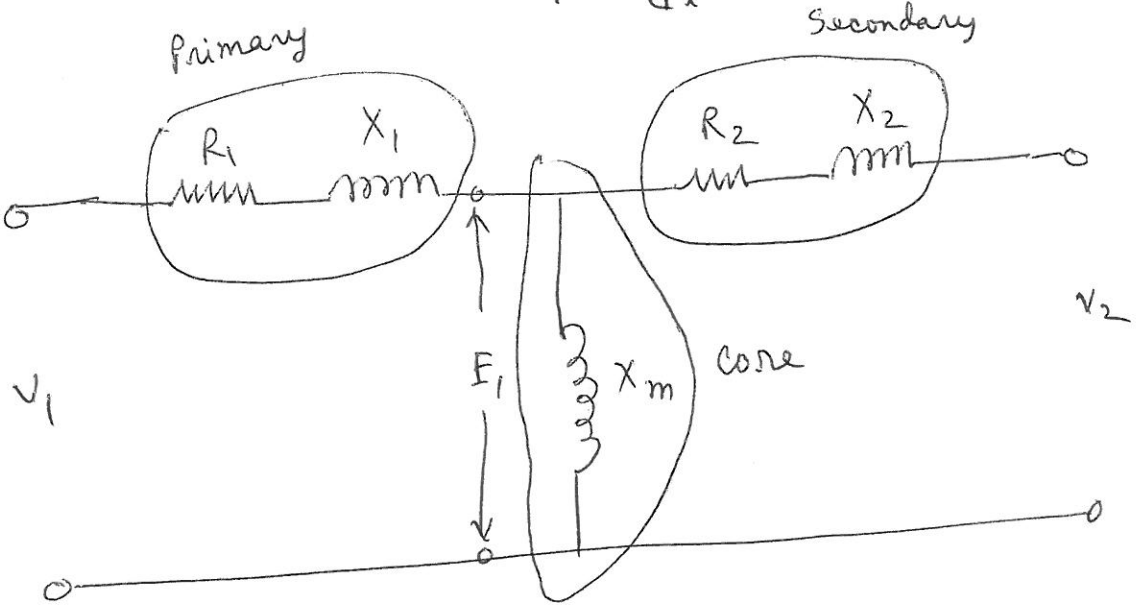
UL (underload) Noise = ??



ϕ_s has to cancel ϕ_L

Core will be left with ϕ_m

$$E_1 = \frac{d\phi_m}{dt}$$

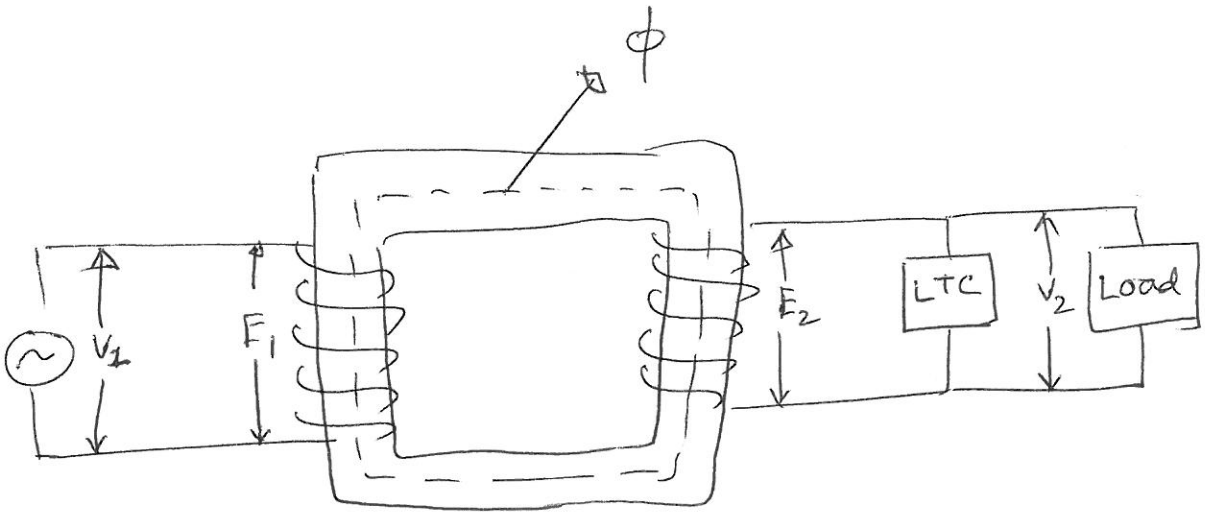


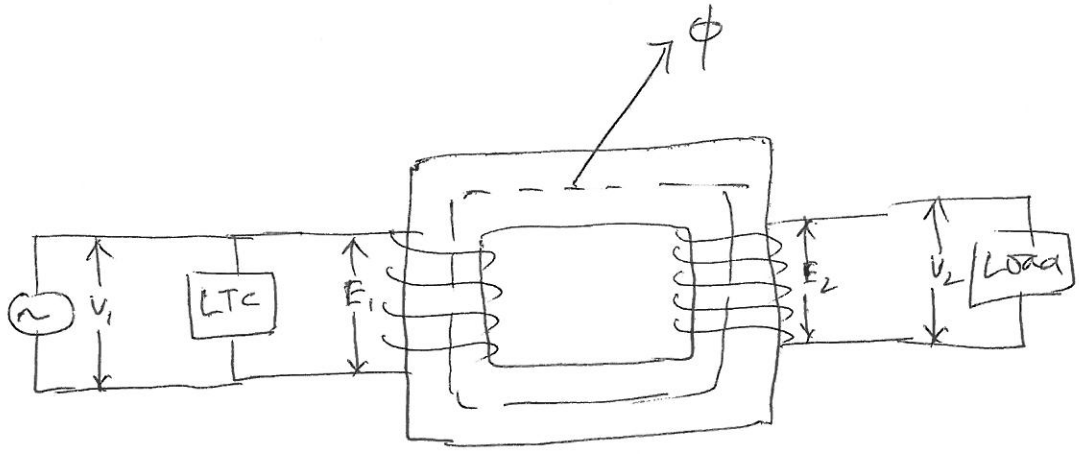
At No load condition $V_1 = E_1$

① Load Regulation

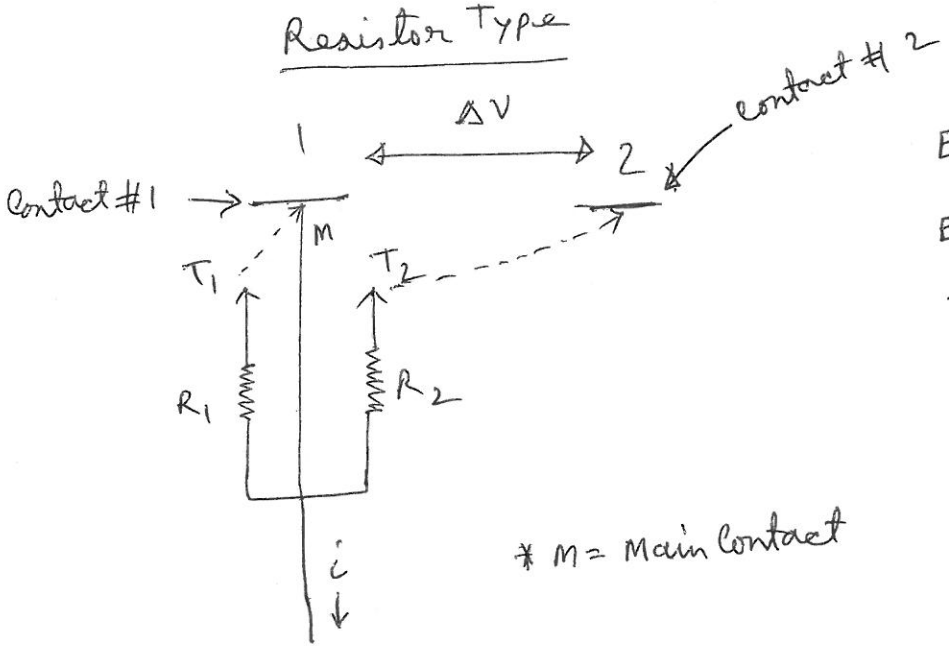
② Input Voltage Variation

Load Regulation





Resistor Type



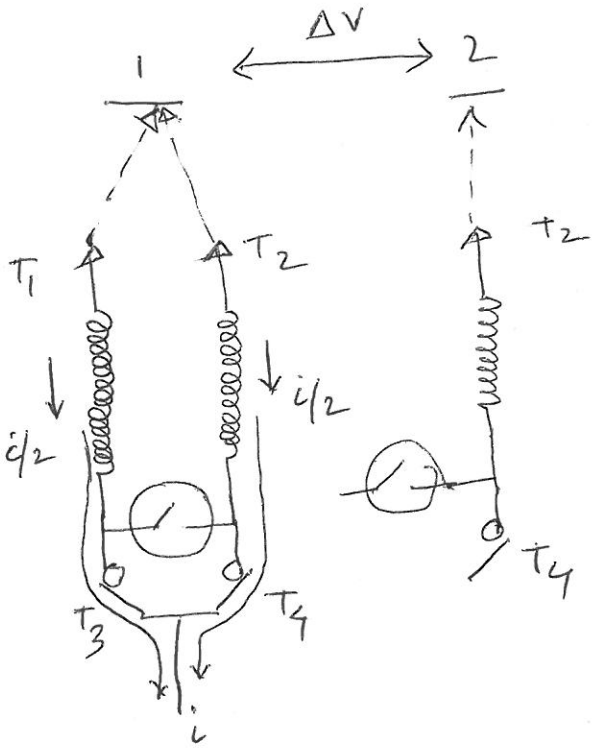
$E = i^2 t$

E is energy

t is time

* M = Main Contact

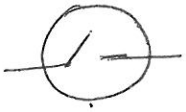
Reactor Type



$E = i^2 t$

E is energe

t is Time



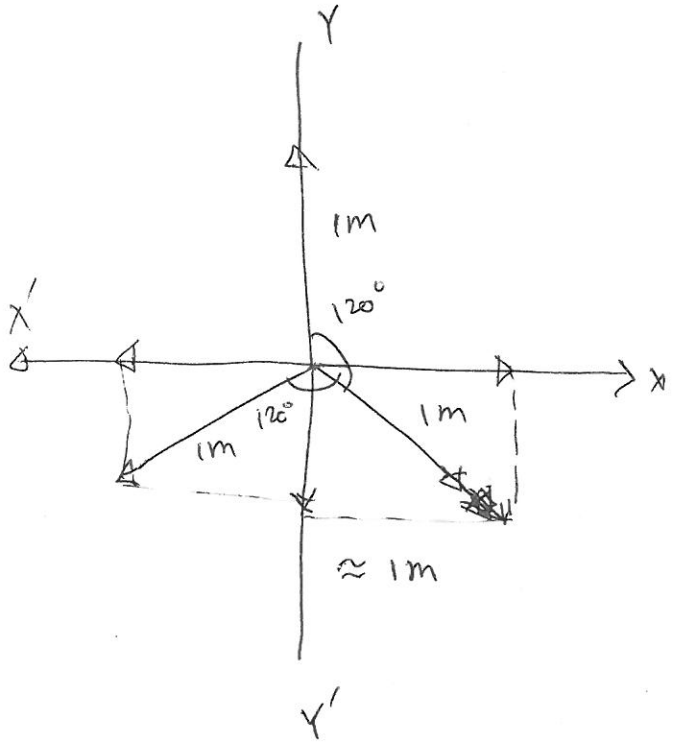
Vacuum interrupter

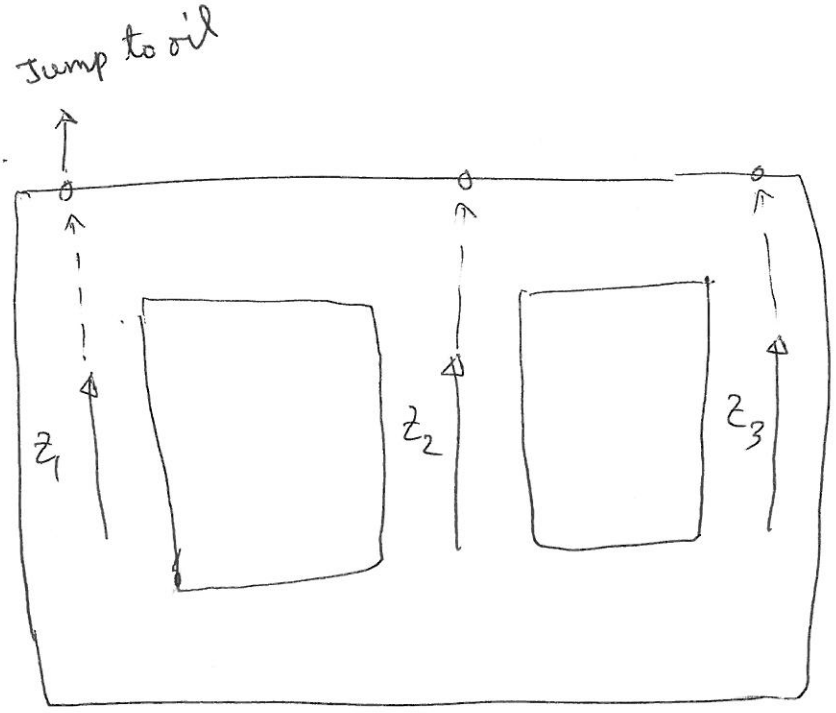
1-G Fault can be represented as 3 Symetric components

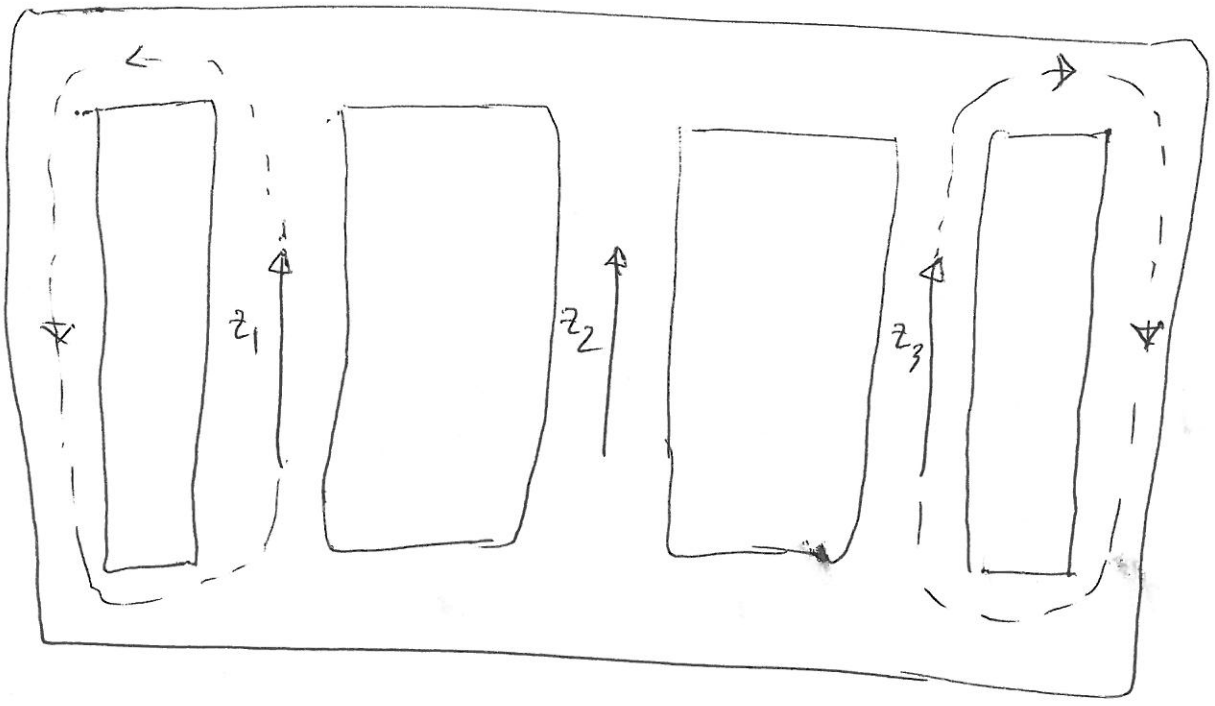
Positive(P), Negative(N) and Zero(Z)

P = N

Y Y connection




Jump to oil
z_1
z_2
z_3


z_1
z_2
z_3