EXP. No (6)
Determine the Transmission Line Parameters by ABCD Constants

Object:

To find experimentally the magnitude and angle of each of the four general constants of T.L.

The relationship between the parameters of the four terminal work is:

$$Vs = A\,Vr + B\,Ir \quad \text{----------} \quad (1)$$

$$Is = C\,Vr + D\,Ir \quad \text{----------} \quad (2)$$

Where:

$$A = |A| \angle \alpha$$

$$B = |B| \angle \beta$$

$$C = |C| \angle \theta$$

$$D = |D| \angle \delta$$

Procedure:

1- To determine the constant of (A):

a- Connect the circuit diagram as shown in the fig (1), no load test.

b- Read the value of (Vs, Vr, and Vdrop).

c- Calculate the magnitude of A as:

$$|A| = \frac{|Vs|}{|Vr|} \quad \text{----------}$$

And its angle from the plot as:

$$\alpha = \angle A \quad \text{----------}$$

2- To determine the constant of (B):

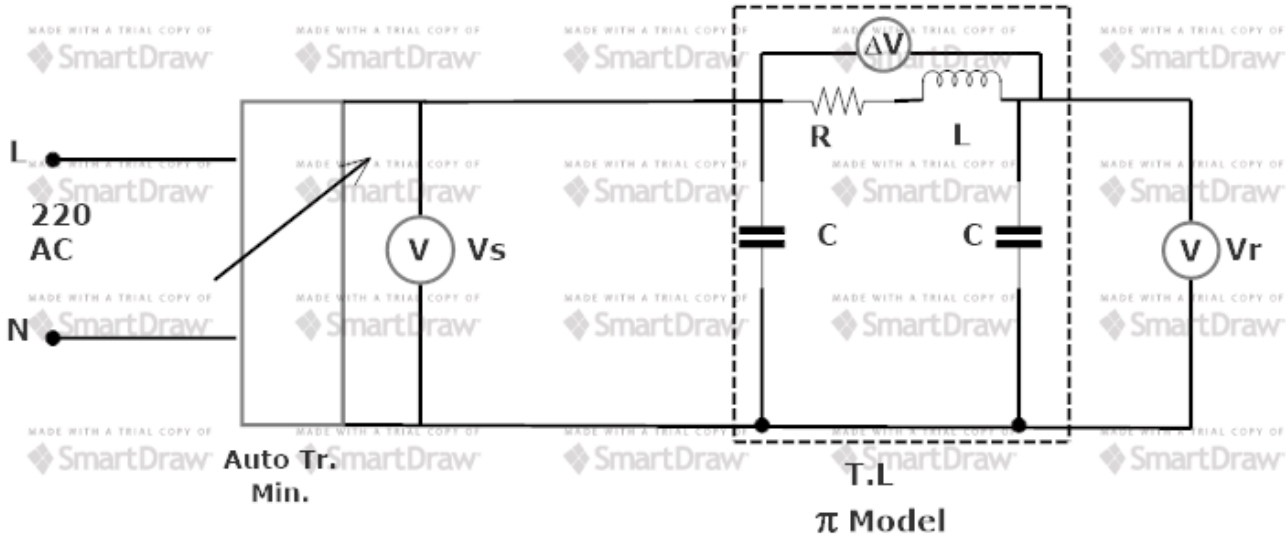
The receiving end should be short circuited as shown in fig (2) and read Vs, Is and P.

And the angle (β) is determined as:

$$Ps = Vs\,Ir \cos\beta \quad \text{----------}$$

And hence B can be determined as:

$$|B| = \frac{|Vs|}{|Ir|} \quad \text{----------}$$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Vs
ΔV
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C
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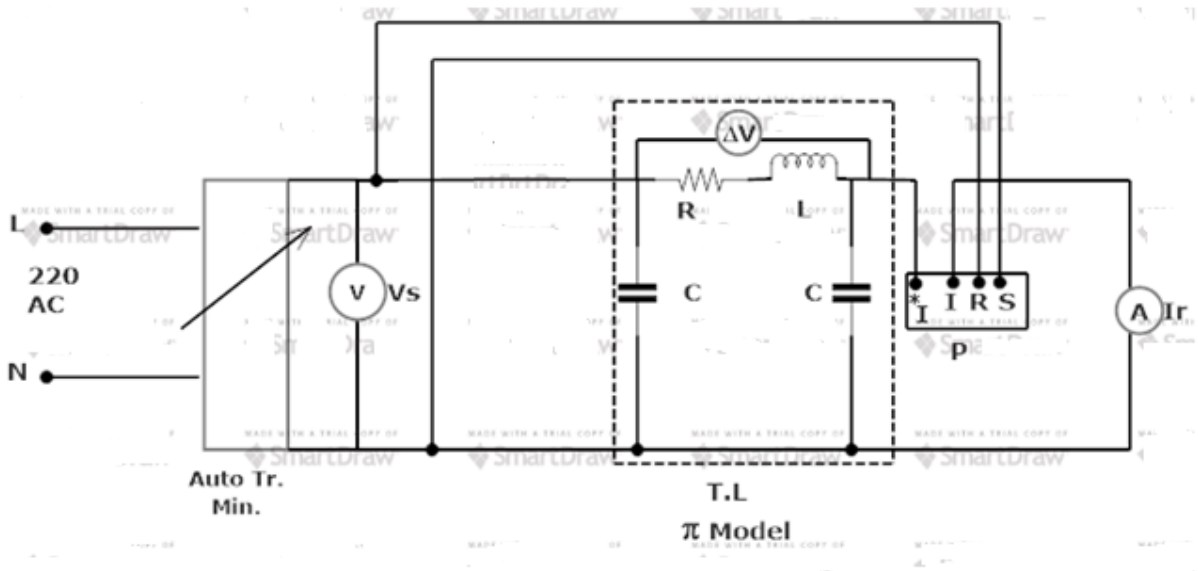
Auto Tr.
Min.
T.L
π Model

Fig(1)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π Model

Fig(2)

3- To determine the constant of (C):

a-Connect the circuit as shown in fig (3), (no load test) but introducing the wattmeter as shown in the diagram. Read the meters and then calculate:

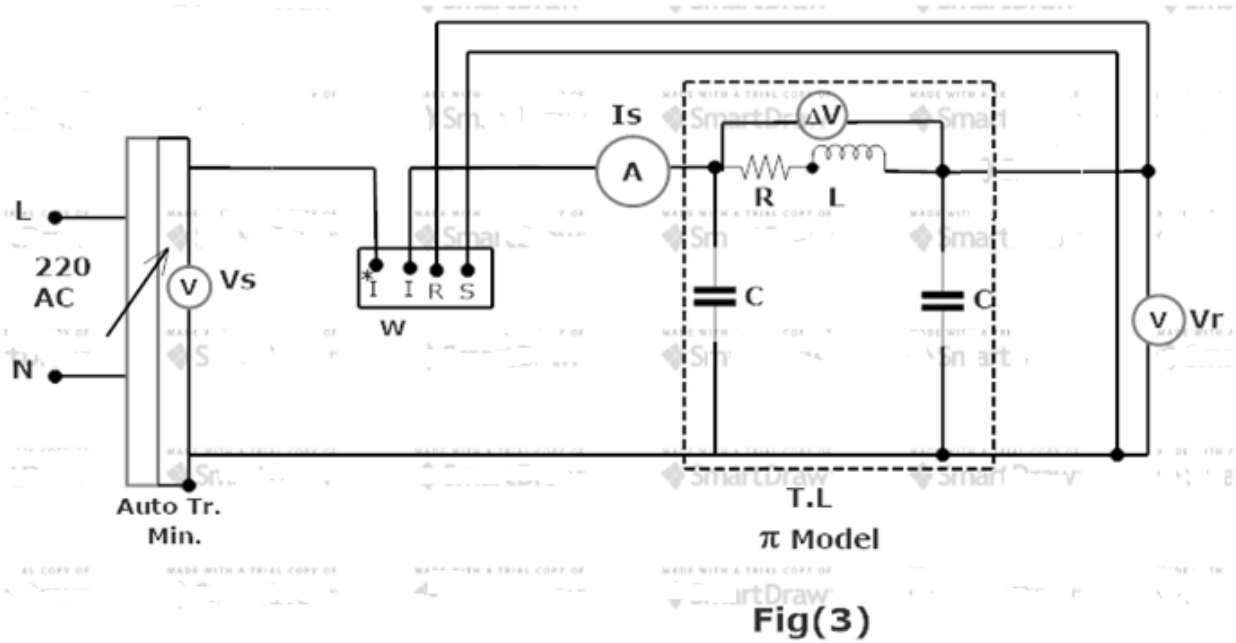
$$|C|=\frac{|Is|}{|Vr|} \quad \text{----------}$$

To find θ: **P=Vs Ir cos θ** ----------

4- To determine the constant of (D):

In the transmission lines the constant D is identical as A:
Verify the relation:

AD-BC=1 ----------



Fig(3)