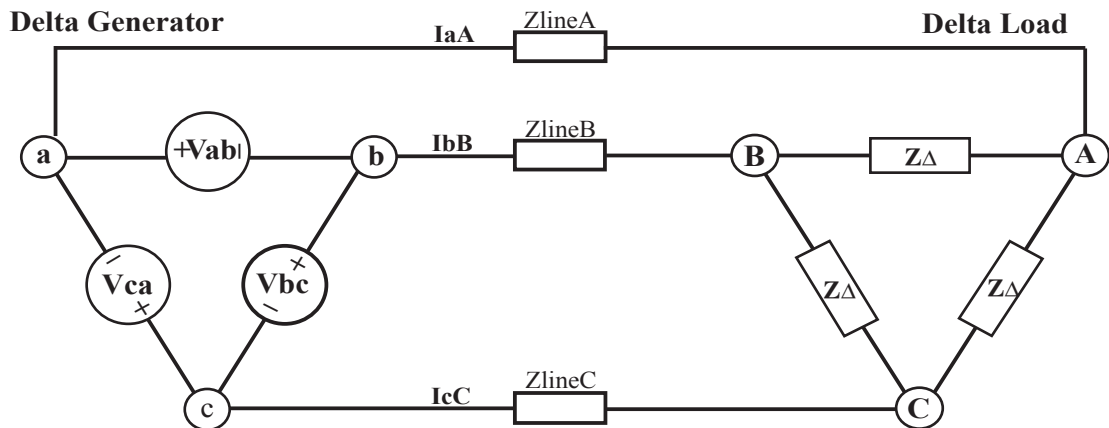
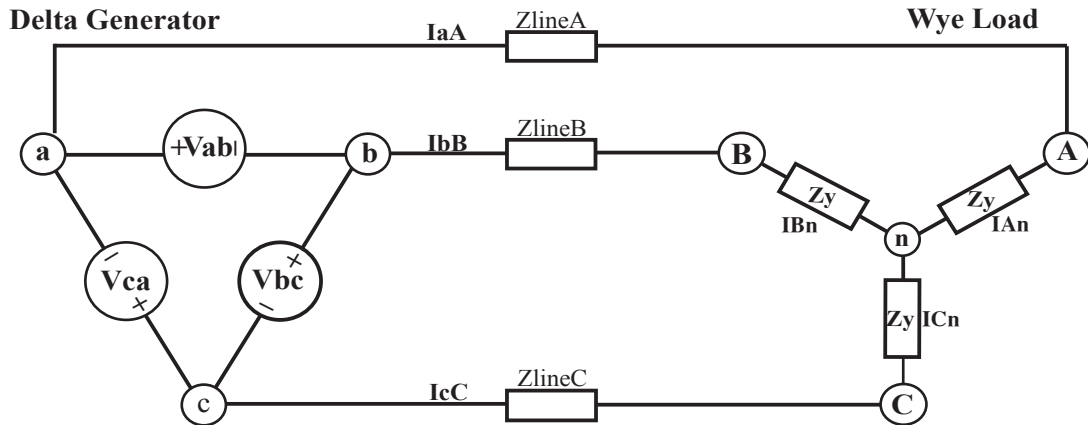
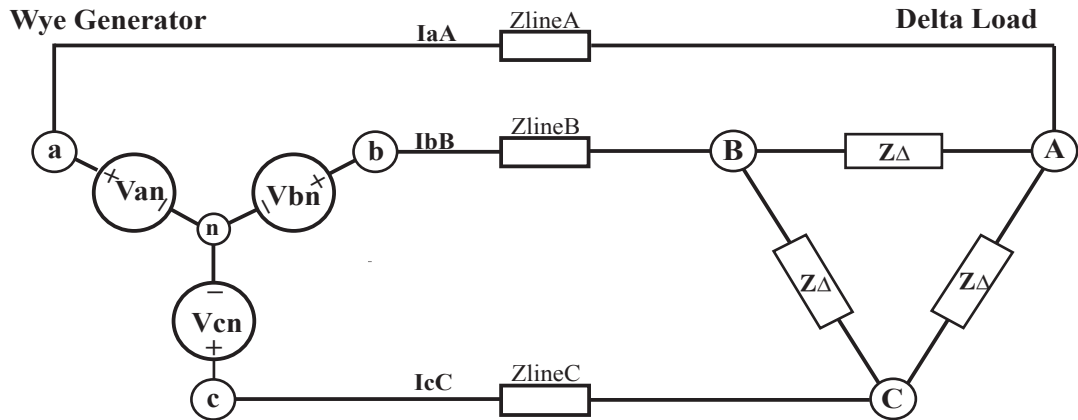
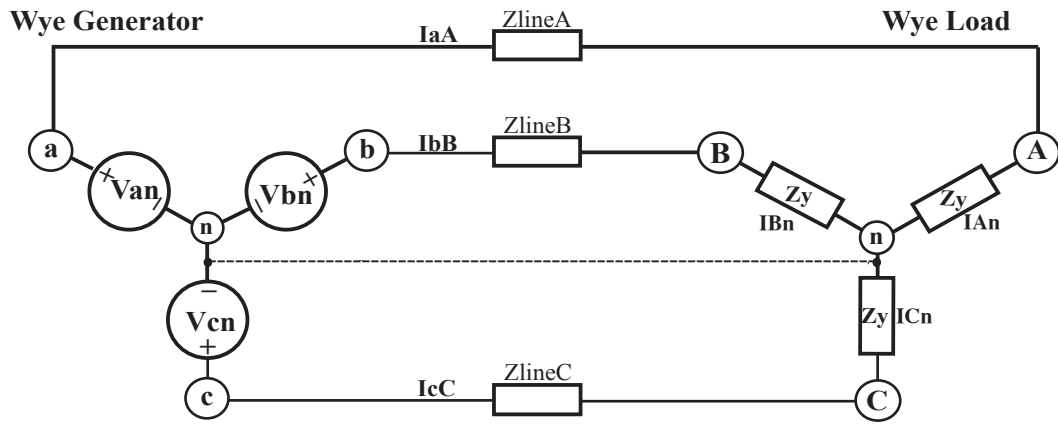


# Polyphase Balanced Three Phase Circuits BM



# Polyphase/Balanced Three-Phase Circuits

## 1- Program Options:

- 1- Bal. Wye-Gen., Wye Load
- 2- Bal. Wye-Gen, Delta Load
- 3- Bal. Delta-Gen., Wye Load
- 4- Bal. Delta-Gen., Delta Load
- 5- Clear all Input Vars
- 6- 5- Back to Main Menu
- 7- Quit EE\_Analysis

## 1- Clear all Input variables.

The variables used as INPUTS (Z1 to Z0) are Global and are dedicated to the variables below.  
(Van=Z0, Vbn=Z1, Vcn=Z2, Zy=Z6, Zline=Z8. Vab=Z3, Vbc=Z4, Vca=Z5, ZΔ=Z7, Zline=Z8.)

- All input values may be entered in mixed Polar or Rectangular form.
- The value  $\theta_1 = 0$ , may appear in the printed results as  $\theta_1 = 8.75E-11$ .
- Z10 to Z24 are LOCAL and used in the calculation area only.
- In the variables 'Van', the subscript 'a' is the positive node and 'n' the negative.
- In 'Vab', the subscript 'a' is positive and 'b' is negative.
- If the LOAD impedance is given as 50\_ohms, 0.2\_H at 60\_Hz, you can convert it to Z by using the Impedance calculator in Section 6- Imp, Reson, Transient, without leaving the program, prior to running the Polyphase section. Also I had to group the 3 sections above to avoid key overlap in the Prog List. This process may be repeated in future UPDATES.

In the result area, notice that the values for VaA, VbB, VcC are identical voltages and need not be repeated.

```

Terminal
IaA,IbB,IcC = 260.9_A
θ1= -53.13, θ2= -173.1, θ3= 66.87_V
VAn,VBn,Vcn = 869.6_V
θ1= -5.35E-11, θ2= -120, θ3= 120
VaA,VbB,VcC = 130.4_V
θ1= -8.785E-11, θ2= -120, θ3= 120_V
VAB,VBC,VCA = 1506_V
θ1= 30, θ2= -90, θ3= 150_V

P(t)=204.2_kW Qx=272.2_kVAR

[Enter]
    
```

Only the angles differ and need be displayed separately.

- 2- The Wye-Gen, Wye Load. (see diagram) is solved directly without conversion.

Wye-Gen., Wye Load 11:27

Van∠θ1 1.000

Vbn∠θ2 1.000∠-120

Vcn∠θ3 1.000∠120

Zy 62.62∠37.7

Zline 0.5∠53.13

Enter value for Van∠θ1

Edit Cancel OK

INPUT screen

Terminal 11:28

IaA,IbB,IcC = 15.85\_A  
 θ1= -37.82, θ2= -157.8, θ3= 82.18\_V  
 VAn,VbB,VcC = 992.4\_V  
 θ1= -0.1208, θ2= -120.1, θ3= 119.9  
 VaA,VbB,VcC = 7.924\_V  
 θ1= 15.31, θ2= -104.7, θ3= 135.3\_V  
 VAB,VBC,VCA = 1719\_V  
 θ1= 29.88, θ2= -90.12, θ3= 149.9\_V  
 P(t)=18.63\_kW Qx=14.46\_kVAR  
 [Enter]

OUTPUT screen

- 3- The Delta-Gen, Delta Load is solved by converting the Delta-Gen and Delta load. .

Delta-Gen, Delta Load 10:47

Vab∠θ1 1.000∠30

Vbc∠θ2 1.000∠-90

Vca∠θ3 1.000∠150

ZΔ 30+6\*i

Zline 0.3+0.4\*i

Enter value for Vab∠θ1

Edit Cancel OK

Terminal 10:47

Van,Vbn,Vcn = 577.4\_V --Y circuit--  
 θ1= -6.431E-11, θ2= -120, θ3= 120\_V  
 VAn,VbB,VcC = 556.7\_V --Y circuit--  
 θ1= 28.19, θ2= -91.81, θ3= 148.2  
 IaA,IbB,IcC = 54.59\_A  
 θ1= -13.12, θ2= -133.1, θ3= 106.9  
 VaA,VbB,VcC = 27.3\_V  
 θ1= 40.01, θ2= -79.99, θ3= 160  
 VAB,VBC,VCA = 964.3\_V  
 θ1= 28.19, θ2= -91.81, θ3= 148.2  
 IAB,IBC,ICA = 31.52\_A  
 θ1= 16.88, θ2= -103.1, θ3= 136.9  
 P(t)=44.7\_kW Qx= 8.941\_kVAR [Enter]

- 4 The Wye-Gen, Delta Load is solved by converting the Delta Load to a Wye Load.

Wye-Gen, Delta Load 10:55

Van∠θ1 577.4∠-6.431E-11

Vbn∠θ2 577.4∠-120

Vcn∠θ3 577.4∠120

ZΔ 30+6\*i

Zline 0.3+0.4\*i

Enter value for Van∠θ1

Edit Cancel OK

Terminal 10:56

Vab,Vbc,Vca = 1000\_V  
 θ1= 30, θ2= -90, θ3= 150\_V  
 IAB,IBC,ICA = 32.69\_A  
 θ1= 18.69, θ2= -101.3, θ3= 138.7  
 IaA,IbB,IcC = 54.59\_A  
 θ1= 18.69, θ2= -101.3, θ3= 138.7\_V  
 VAB,VBC,VCA = 1000\_V  
 θ1= 30, θ2= -90, θ3= 150\_V  
 VaA,VbB,VcC = 27.3\_V  
 θ1= 40.01, θ2= -79.99, θ3= 160\_V  
 P(t)=48.08\_kW Qx= 9.615\_kVAR  
 [Enter]

- 5 The Delta-Gen, Wye Load is solved by converting the Delta-Gen to a Wye Gen.

Delta-Gen, Wye Load 11:20

Vab  $\angle$   $\theta_1$  1,000  $\angle$  30

Vbc  $\angle$   $\theta_2$  1,000  $\angle$  -90

Vca  $\angle$   $\theta_3$  1,000  $\angle$  150

Zy 10+2*i*

Zline 0.3+0.4*i*

Enter value for Vab  $\angle$   $\theta_1$

Edit Cancel OK

Terminal 11:21

Van,Vbn,Vcn = 577.4\_V  
 $\theta_1 = -6.431^\circ$ ,  $\theta_2 = -120^\circ$ ,  $\theta_3 = 120^\circ$ \_V  
IaA,IbB,IcC = 54.59\_A  
 $\theta_1 = -13.12^\circ$ ,  $\theta_2 = -133.1^\circ$ ,  $\theta_3 = 106.9^\circ$   
VAn,VBn,VCn = 556.7\_V  
 $\theta_1 = -1.807^\circ$ ,  $\theta_2 = -121.8^\circ$ ,  $\theta_3 = 118.2^\circ$ \_V  
VaA,VbB,VcC = 27.3\_V  
 $\theta_1 = 40.01^\circ$ ,  $\theta_2 = -79.99^\circ$ ,  $\theta_3 = 160^\circ$ \_V  
P(t) = 44.71\_kW Qx = 8.941\_kVAR  
[Enter]