Electrical Transient Analyzer Program

Short-Circuit Analysis

ANSI Standard

3-Phase, LG, LL, & LLG Fault Currents

1/2 Cycle Network

	Swing	V-Control	Load	Total
Number of Buses:	1	1	12	14

	XFMR2	XFMR3	Reactor	Line/Cable/ Busway	Impedance	Tie PD	Total
Number of Branches:	2	0	0	12	0	0	14

	Synchronous Generator	Power Grid	Synchronous Motor	Induction Machines	Lumped Load	Total
Number of Machines:	2	0	0	0	0	2

System Frequency:	60.00
Unit System:	English
Project Filename:	8_bus_pco
Output Filename:	C:\Users\Nahendra\Desktop\college\project\pco\modeling\Untitled.SA2S

Adjustments

Tolerance	Apply Adjustments	Individual /Global	Percent
Transformer Impedance:	Yes	Individual	
Reactor Impedance:	Yes	Individual	
Overload Heater Resistance:	No		
Transmission Line Length:	No		
Cable / Busway Length:	No		

Temperature Correction	Apply Adjustments	Individual /Global	Degree C
Transmission Line Resistance:	Yes	Individual	
Cable / Busway Resistance:	Yes	Individual	

Bus Input Data

Bus					Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
Bus1	SWNG	13.800	13.800	1	100.00	0.00
Bus2	Load	230.000	230.000	1	100.00	0.00
Bus3	Load	230.000	230.000	1	100.00	0.00
Bus4	Load	230.000	230.000	1	100.00	0.00
Bus5	Load	230.000	230.000	1	100.00	0.00
Bus6	Load	230.000	230.000	1	100.00	0.00
Bus7	Gen.	15.000	15.000	1	100.00	0.00
Bus8	Load	230.000	230.000	1	100.00	0.00
F2	Load	230.000	230.000	1	100.00	0.00
F3	Load	230.000	230.000	1	100.00	0.00
F4	Load	230.000	230.000	1	100.00	0.00
F5	Load	230.000	230.000	1	100.00	0.00
F6	Load	230.000	230.000	1	100.00	0.00
F7	Load	230.000	230.000	1	100.00	0.00

14 Buses Total

All voltages reported by ETAP are in % of bus Nominal kV.
Base kV values of buses are calculated and used internally by ETAP.

Line/Cable/Busway Input Data

ohms or siemens per 1000 ft per Conductor (Cable) or per Phase (Line/Busway)

Line/Cable/Busway			Length									
ID	Library	Size	Adj. (ft)	% Tol.	#/Phase	T (°C)	R1	X1	Y1	R0	X0	Y0
Line2			98425.2	0.0	1	75	0.024384	0.1524		0.024384	0.1524	
Line2m			98425.2	0.0	1	75	0.024384	0.1524		0.024384	0.1524	
Line3			82021.0	0.0	1	75	0.024384	0.1524		0.024384	0.1524	
Line3m			82021.0	0.0	1	75	0.024384	0.1524		0.024384	0.1524	
Line4			98425.2	0.0	1	75	0.024384	0.1524		0.024384	0.1524	
Line4m			98425.2	0.0	1	75	0.024384	0.1524		0.024384	0.1524	
Line5			196850.4	0.0	1	75	0.024384	0.1524		0.024384	0.1524	
Line5m			98425.2	0.0	1	75	0.024384	0.1524		0.024384	0.1524	
Line6			98425.2	0.0	1	75	0.024384	0.1524		0.024384	0.1524	
Line6m			98425.2	0.0	1	75	0.024384	0.1524		0.024384	0.1524	
Line7			82021.0	0.0	1	75	0.024384	0.1524		0.024384	0.1524	
Line7m			82021.0	0.0	1	75	0.024384	0.1524		0.024384	0.1524	

Line / Cable / Busway resistances are listed at the specified temperatures.

2-Winding Transformer Input Data

Transformer	Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	MVA	Prim. kV	Sec. kV	% Z	X/R	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
T1	250.000	13.800	230.000	0.10	99999.00	0	0	0	0	0	0.10	YNd	0.00
T2	300.000	15.000	230.000	0.10	99999.00	0	0	0	0	0	0.10	YNd	0.00

2-Winding Transformer Grounding Input Data

Transformer	Rating			Grounding								
				Conn.	Primary				Secondary			
ID	MVA	Prim. kV	Sec. kV	Type	Type	kV	Amp	ohm	Type	kV	Amp	ohm
T1	250.000	13.800	230.000	D/Y					Solid			
T2	300.000	15.000	230.000	D/Y					Solid			

Branch Connections

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVAb			
ID	Type	From Bus	To Bus	R	X	Z	Y
T1	2W XFMR	Bus1	Bus2	0.00	0.04	0.04	
T2	2W XFMR	Bus7	Bus6	0.00	0.03	0.03	
Line2	Cable	F2	Bus3	0.45	2.84	2.87	
Line2m	Cable	Bus4	F2	0.45	2.84	2.87	
Line3	Cable	Bus5	F3	0.38	2.36	2.39	
Line3m	Cable	F3	Bus4	0.38	2.36	2.39	
Line4	Cable	F4	Bus5	0.45	2.84	2.87	
Line4m	Cable	Bus6	F4	0.45	2.84	2.87	
Line5	Cable	Bus6	F5	0.91	5.67	5.74	
Line5m	Cable	F5	Bus4	0.45	2.84	2.87	
Line6	Cable	F6	Bus2	0.45	2.84	2.87	
Line6m	Cable	Bus8	F6	0.45	2.84	2.87	
Line7	Cable	Bus8	F7	0.38	2.36	2.39	
Line7m	Cable	F7	Bus4	0.38	2.36	2.39	

Synchronous Generator Input Data

Synchronous Generator		Rating			Positive Seq. Impedance					Grounding			Zero Seq. Impedance		
							% Xd"								
ID	Type	MVA	kV	RPM	X"/R	% R	Adj.	Tol.	% Xd'	Conn.	Type	Amp	X/R	% R0	% X0
Gen1	Steam Turbo	235.294	13.800	1800	19.00	1.000	19.00	0.0	28.00	Wye	Solid		7.00	1.000	7.00
Gen2	Steam Turbo	235.294	15.000	1800	19.00	1.000	19.00	0.0	28.00	Wye	Solid		7.00	1.000	7.00

Total Connected Synchronous Generators (= 2): 470.588 MVA

SHORT- CIRCUIT REPORT

Fault at bus: F4

Prefault voltage = 230.000 kV = 100.00 % of nominal bus kV (230.000 kV)
= 100.00 % of base kV (230.000 kV)

Line-To-Line-To-Ground Fault

Contribution		% Voltage at From Bus						Current at From Bus (kA)								
From Bus	To Bus	Va		Vb		Vc		Ia		Ib		Ic		Sequence Current (kA)		
ID	ID	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	I1	I2	I0
F4	Total	56.50	-2.6	0.00	0.0	0.00	0.0	0.000	0.0	4.146	139.3	4.102	52.9	2.632	0.629	2.004
Bus5	F4	58.71	-2.5	11.93	-132.0	11.89	127.3	0.193	-80.3	1.043	147.1	1.039	46.4	0.749	0.177	0.378
Bus6	F4	54.29	-2.8	35.64	-142.4	35.14	136.0	0.193	99.7	3.115	136.7	3.072	55.1	1.884	0.451	1.625

# Indicates fault current contribution is from three-winding transformers.

Short-Circuit Summary Report

1/2 Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of the Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			*Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
F4	230.000	0.304	-3.228	3.242	0.501	-4.245	4.274	2.831	0.317	2.849	-3.143	2.704	4.146

All fault currents are symmetrical (1/2 Cycle network) values in rms kA.
* LLG fault current is the larger of the two faulted line currents.

Sequence Impedance Summary Report

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Fault Zf (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
F4	230.000	3.84163	40.77901	40.95956	5.13760	39.45348	39.78658	1.94863	12.32770	12.48075	0.00000	0.00000	0.00000