



**etap**<sup>®</sup>  
Thinking Power



# AC Network

# ETAP Overview



- One-Line Diagram
- Toolbar Format
- Dumpster
- Project View
- Project Toolbar
- Mode Toolbar
- System Toolbar
- Study Case Toolbar
- Message Log

**Select Mode**  
**Edit Mode:** Drag/Drop & Connect Elements  
**Study Mode:** Load Flow, Short-Circuit, ... etc.



**Project View**

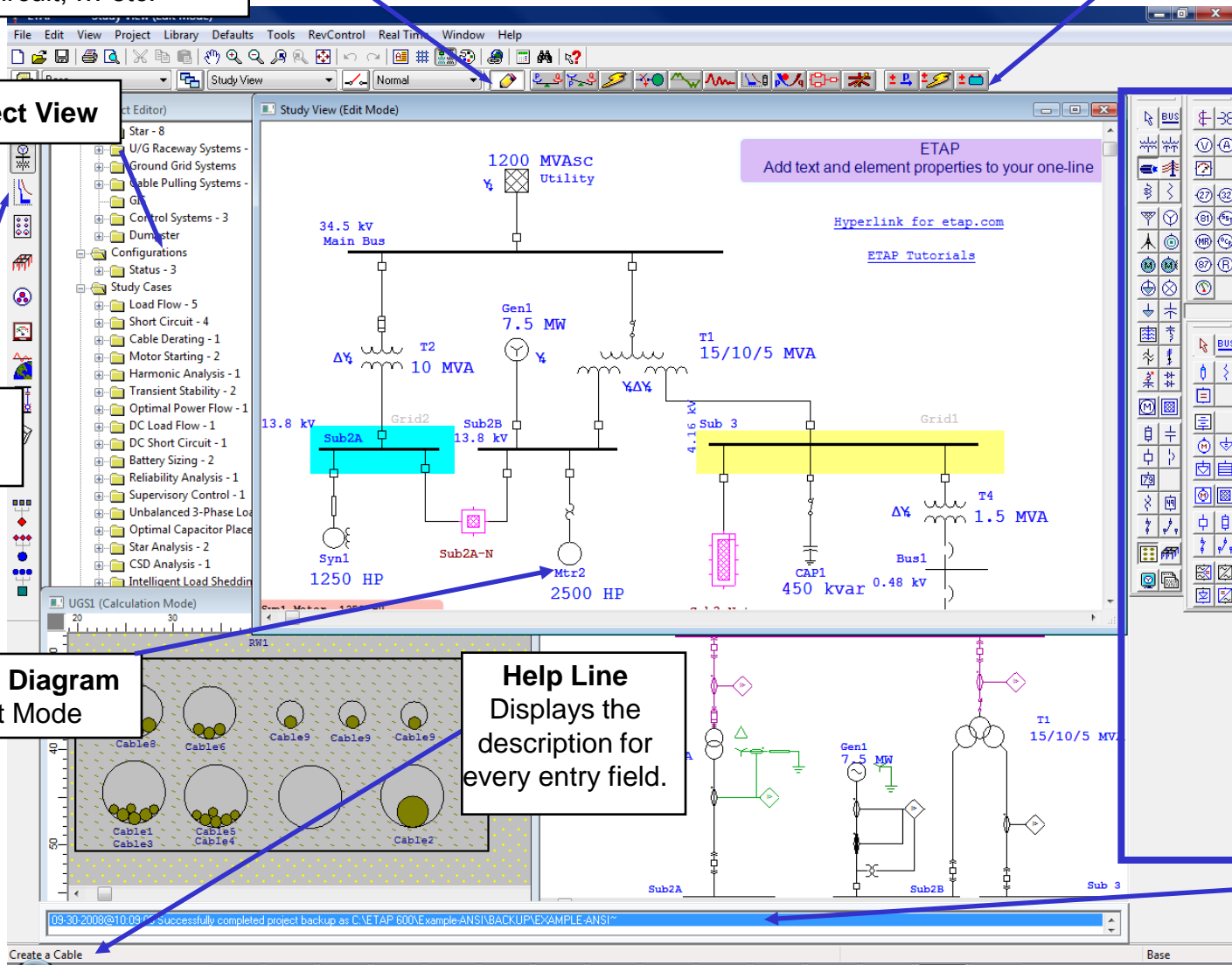
**System Toolbar**

**Edit Toolbar**  
 AC Elements  
 DC Elements  
 Instrument  
 Devices

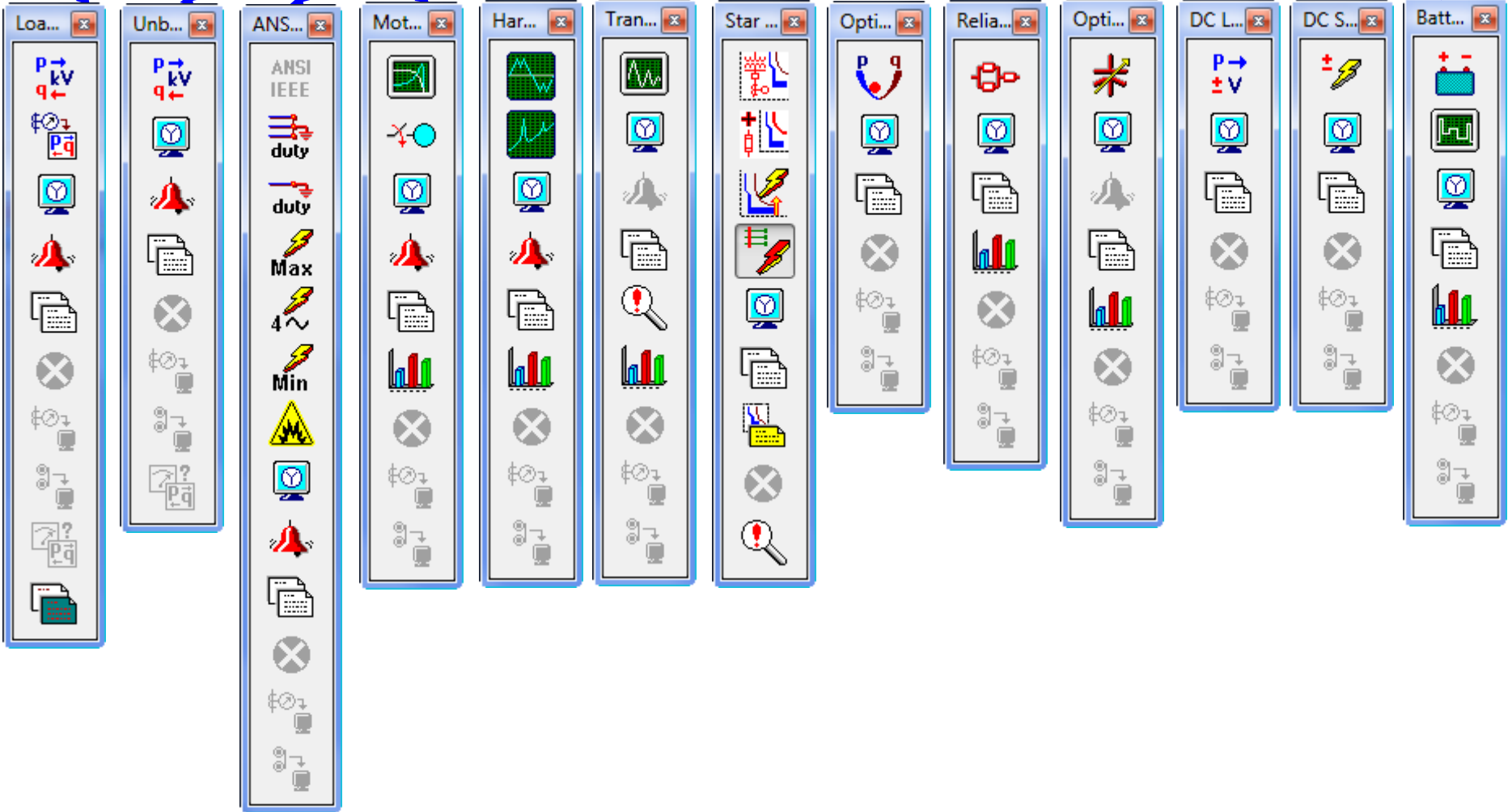
**Message Logger**  
 View the latest messages related to ETAP Projects. It can be expanded or reduced.

**One-Line Diagram**  
 In Edit Mode

**Help Line**  
 Displays the description for every entry field.



# Mode Toolbar Format



# Analysis Toolbar Format



**Analysis toolbars have the following sections:**



**1. Run the Calculation**

**2. Display Options**

**3. Display Alerts**

**4. View the Generated Reports**

**5. Stop the Calculation**

**6. Get On-Line Data**

**7. Get Archived Data**

**All ETAP analysis toolbars follow this general format.**



**AC Edit**

	<b>BUS</b>

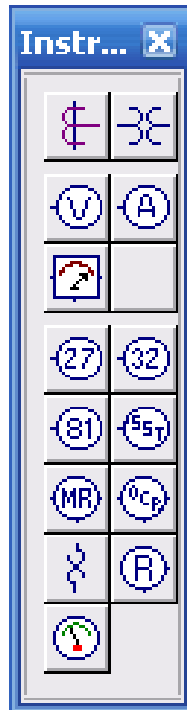
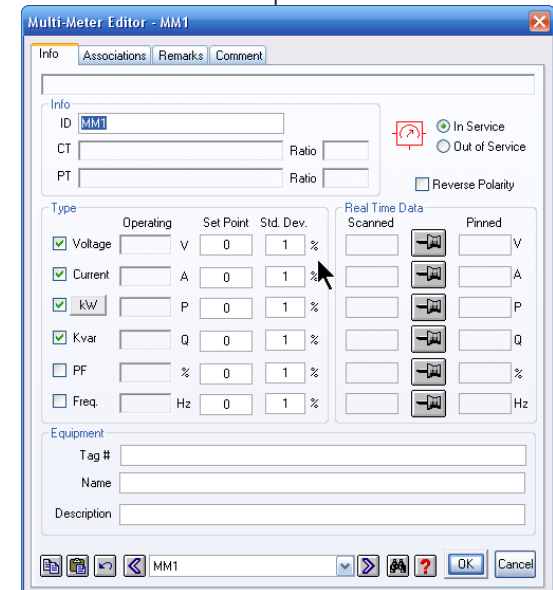
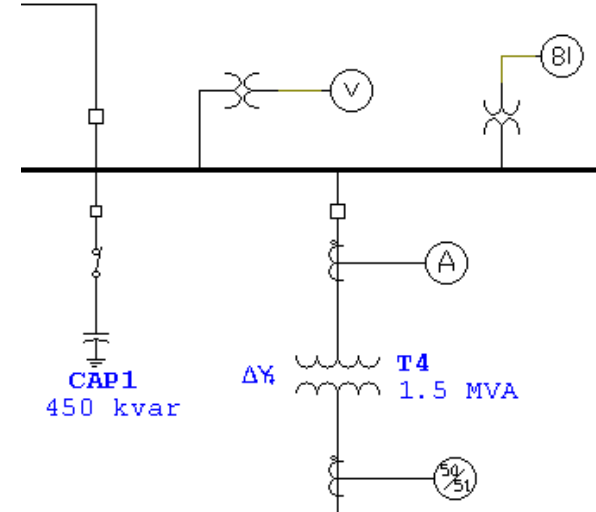
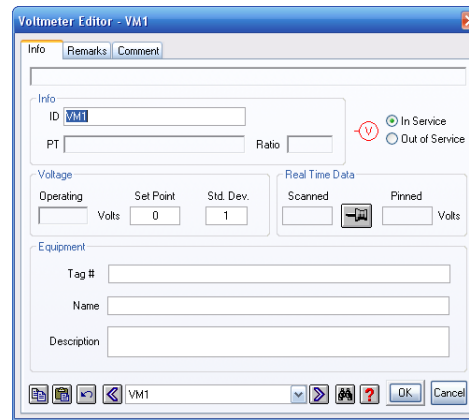
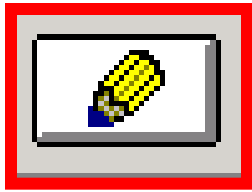
**DC Edit**

	<b>BUS</b>

- Pointer
- 2W XFMR
- Cable
- Reactor
- Power Grid
- Wind Turbine Gen
- Induction Machine
- Lumped Load
- Static Load
- Panels
- Remote Connector
- SVC
- Composite Motor
- Fuse
- HVCB
- Recloser
- Overload Heater
- SPST
- Instrumentation
- Display Options

- Bus
- 3W XFMR
- Trans. Line
- Impedance
- Generator
- MG Set
- Synch. Motor
- MOV
- Capacitor
- Harmonic Filter
- Phase Adapter
- HVDC
- Composite Network
- Contactor
- LVCB
- In-Line Overload Relay
- SPDT
- Ground Grid
- Schedule Report Manager

- Pointer
- Cable
- Converter
- Battery
- Motor
- Lumped Load
- Composite Motor
- CB
- SPST
- UPS
- Charger
- Bus
- Impedance
- Static Load
- Elementary Diagram
- Composite Network
- Fuse
- SPDT
- VFD
- Inverter



**Current Transformer**

**Voltmeter**

**Multimeter**

**Voltage Relay 27 / 59**

**Frequency Relay 81**

**Motor Relay**

**Overload Heater**

**Taglink**

**Potential Transformer**

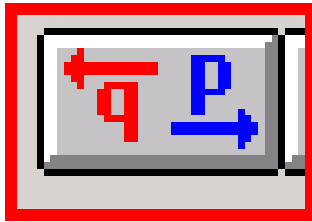
**Ammeter**

**Reverse Power Relay**

**Solid State Trip Relay**

**Overcurrent Relay 50/51/67**

**Multi Function Relay**



Run Load Flow Calculation

RCAS

Display Options

Load Flow Alerts

Load Flow Report Manager

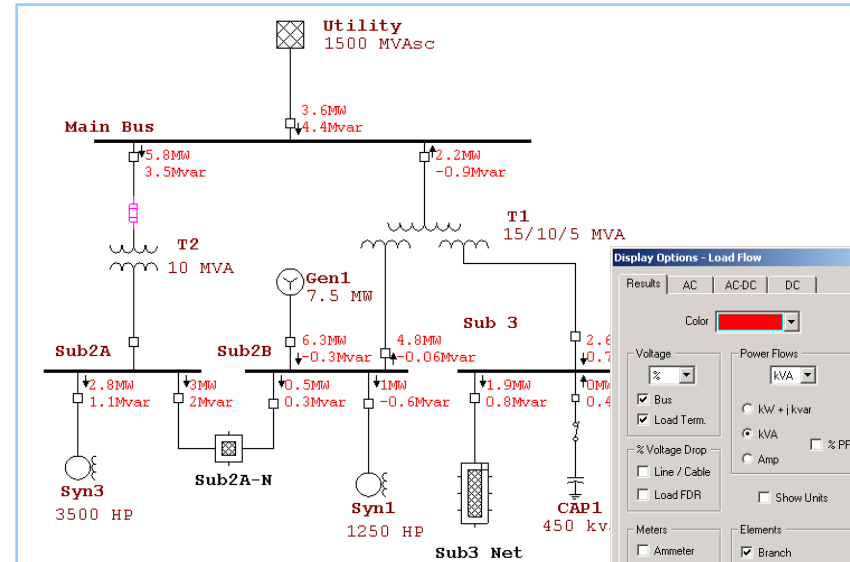
Stop Calculation

Get On-Line Data

Get Archived Data

Load Flow Comparator

Load Flow Result Analyzer



Load Flow Analysis Alert View - Output Report: Lfreport

Study Case: LF 100A      Data Revision: Base  
 Configuration: Normal      Date: 03-15-2002

Critical					
Device ID	Type	Rating	Calculated	% Value	Con
Cable2	Cable	225 Amp	286.564	126.8	Ove
Fuse2	Fuse	225 Amp	241.401	107.3	Ove
Fuse7	Fuse	800 Amp	928.193	116	Ove
Sub3 Swgr	Bus	225 Amp	286.564	127.4	Ove
T3	Transformer	0.007 MVA	0.844	12058.3	Ove

Marginal					
Device ID	Type	Rating	Calculated	% Value	Con
Bus1	Bus	0.48 kV	0.469	97.8	Und
Bus2	Bus	0.48 kV	0.464	96.6	Und
Fuse1	Fuse	125 Amp	113.256	90.6	Ove
LVBus	Bus	0.48 kV	0.461	96.1	Und
Sub22	Bus	3.45 kV	3.353	97.2	Und

Display Options - Load Flow

Results | AC | AC-DC | DC

Color: [Red]

Power Flows: [kVA]

Bus  
 Load Term.  
 % Voltage Drop  
 Line / Cable  
 Load FDR

Meters:
   
 Ammeter
   
 Voltmeter
   
 Multi-Meter

Elements:
   
 Branch
   
 Source
   
 Load
   
 Composite Motor
   
 Composite Network

Load Flow Report Manager

Complete | Input | Result | Summary

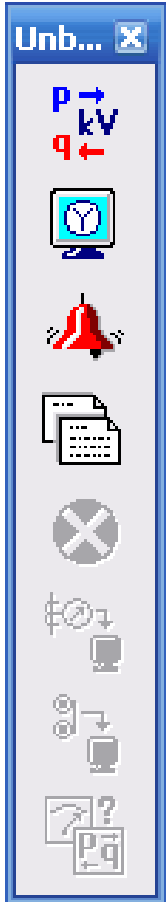
Alert-Complete  
 Alert-Critical  
 Alert-Marginal  
 Branch Loading  
 Bus Loading  
 Losses  
 Summary

Output Report Name: Lfreport

Path: E:\ETAP 402\PowerStation\Example

Help | OK | Cancel





Run Unbalanced Load Flow

Display Options

Load Flow Alerts

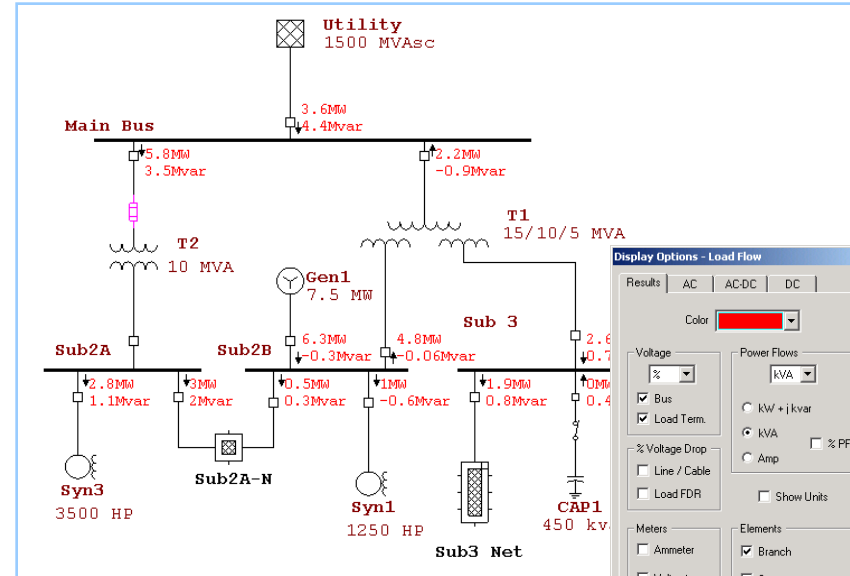
Load Flow Report Manager

Stop Calculation

Get On-Line Data

Get Archived Data

Load Flow Comparator



Load Flow Analysis Alert View - Output Report: LFreport

Study Case: LF 100A      Data Revision: Base  
 Configuration: Normal      Date: 03-15-2002

Critical					
Device ID	Type	Rating	Calculated	% Value	Con
Cable2	Cable	225 Amp	286.564	126.8	Ove
Fuse2	Fuse	225 Amp	241.401	107.3	Ove
Fuse7	Fuse	800 Amp	928.193	116	Ove
Sub3 Swgr	Bus	225 Amp	286.564	127.4	Ove
T3	Transformer	0.007 MVA	0.844	12058.3	Ove

Marginal					
Device ID	Type	Rating	Calculated	% Value	Con
Bus1	Bus	0.48 kV	0.469	97.8	Und
Bus2	Bus	0.48 kV	0.464	96.6	Und
Fuse1	Fuse	125 Amp	113.256	90.6	Ove
LVBUS	Bus	0.48 kV	0.461	96.1	Und
Sub22	Bus	3.45 kV	3.353	97.2	Und

Display Options - Load Flow

Results | AC | AC-DC | DC

Color: [Red]

Voltage: [kV]

Power Flows: [kVA]

Bus  
 Load Term.  
 % Voltage Drop  
 Line / Cable  
 Load FDR

Meters:  
 Ammeter  
 Voltmeter  
 Multi-Meter

Elements:  
 Branch  
 Source  
 Load  
 Composite Motor  
 Composite Network

Branch Losses:  
 [kW + jkvar]

Load Flow Report Manager

Complete | Input | Result | Summary

Alert-Complete  
 Alert-Critical  
 Alert-Marginal  
 Branch Loading  
 Bus Loading  
 Losses  
 Summary

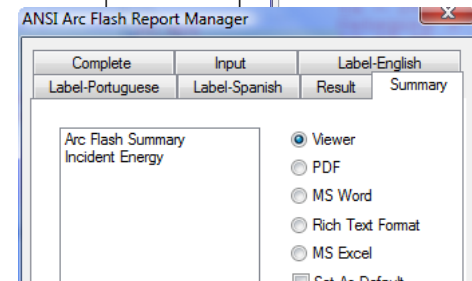
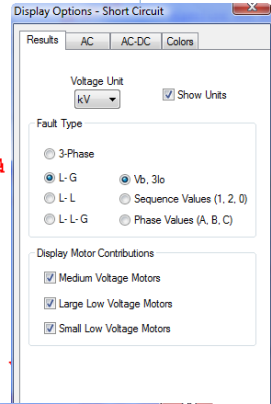
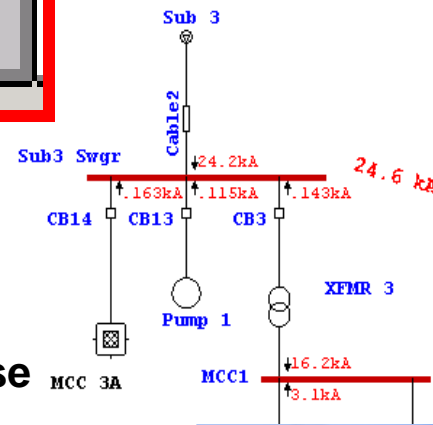
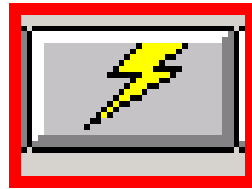
Output Report Name: LFreport

Path: E:\NETAP 402\PowerStation\Example

Help | OK | Cancel



- 3-Phase SC Duty Calculation**
- 1-Phase SC Duty Calculation**
- 1/2 Cycle Unbalanced LG, LL, LLG & 3-Phase**
- 1/2 to 4 Cycle Unbalanced LG, LL, LLG & 3-Phase**
- 30 Cycle Unbalanced LG, LL, LLG & 3-Phase**
- Arc Flash Analysis (NFPA 70E & IEEE 1584)**
- Short-Circuit Display Options**
- Short-Circuit Alerts for Buses & PDs**
- Short-Circuit Report Manager**
- Stop Calculation**
- Get On-Line Data**
- Get Archived Data**



Short Circuit Analysis Alert View - Output Report: ANSI-Duty

Study Case: ANSI Duty      Data Revision: Base  
 Configuration: Normal      Date: 09-30-2008

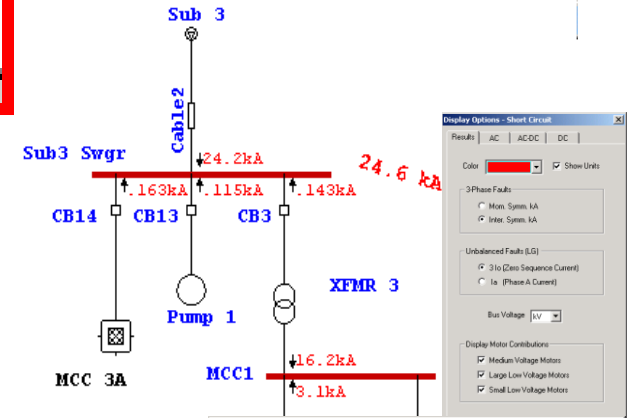
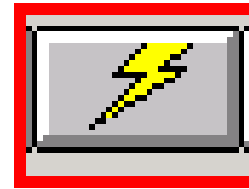
Critical						
Device ID	Type	Condition	Rating/Limit	Operating	% Operating	
CB15	LV CB	Interrupting	22 kA	22.797	103.6	
CB28	LV CB	Interrupting	18 kA	19.046	105.8	
Fuse1	Fuse	Interrupting	10 kA	23.884	238.8	

Marginal						
Device ID	Type	Condition	Rating/Limit	Operating	% Operating	
CB17	LV CB	Interrupting	25 kA	22.797	91.2	
CB18	HV CB	Interrupting	33.462 kA	31.359	93.7	
CB9	HV CB	Interrupting	33.462 kA	31.359	93.7	
Sub3 Swgr	Bus	Bracing Asy...	39 kA	36.798	94.4	
Sub3 Swgr	Bus	Bracing Crest	65.81 kA	62.057	94.3	



- 3-Phase SC IEC Duty Calculation**
- 1-Phase SC IEC Duty Calculation**
- 909 Unbalanced LG, LL, LLG & 3-Phase**
- Transient IEC 363**
- Arc Flash Analysis (NFPA 70E & IEEE 1584)**
- Short-Circuit Display Options**
- Short-Circuit Alerts for Buses & PDs**
- Short-Circuit Report Manager**
- IEC 363 Plots / Export COMTRADE**
- Stop SC Calculations**
- Get On-Line Data**
- Get Archived Data**



**ANSI 3-Phase SC Report Manager**

Complete | Input | Result | SC Arc Flash | Summary

Interrupting Duty-Complete  
 Interrupting Duty-Exceeded  
 Interrupting Duty-Marginal  
 Interrupting Duty-MVA  
 Momentary Duty-Complete  
 Momentary Duty-Exceeded  
 Momentary Duty-Marginal  
 Momentary Duty-MVA  
 Summary

Output Report Name  
 SC-Duty

Path  
 PowerStation\Example

OK Cancel

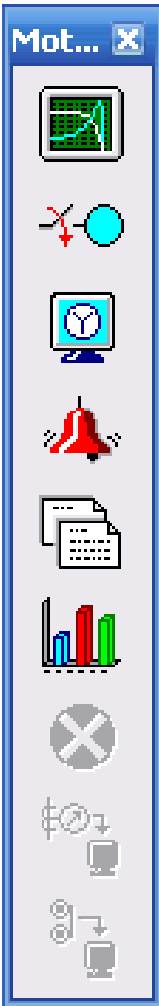
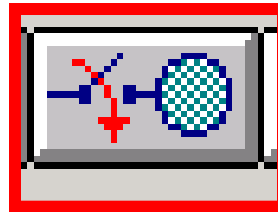
**Short Circuit Analysis Alert View - Output Report: SC-Duty**

Study Case: ANSI Duty      Data Revision: Base  
 Configuration: Normal      Date: 03-15-2002

Critical					
Device ID	Type	Rating	Calculated	% Value	Condition
CB15	LV CB	22 kA	24.442	111.1	Interrupting

Marginal					
Device ID	Type	Rating	Calculated	% Value	Condition
CB17	LV CB	25 kA	24.442	97.8	Interrupting
CB18	HV CB	33.462 kA	33.064	98.8	Interrupting
CB9	HV CB	33.462 kA	33.064	98.8	Interrupting
Sub3 Swgr	Bus	39 kA	36.305	93.1	Bracing As...
Sub3 Swgr	Bus	65.81 kA	61.729	93.8	Bracing Crest



**Run Dynamic Motor Acceleration**

**Run Static Motor Starting**

**Motor Starting Display Options**

**Motor Starting Alerts**

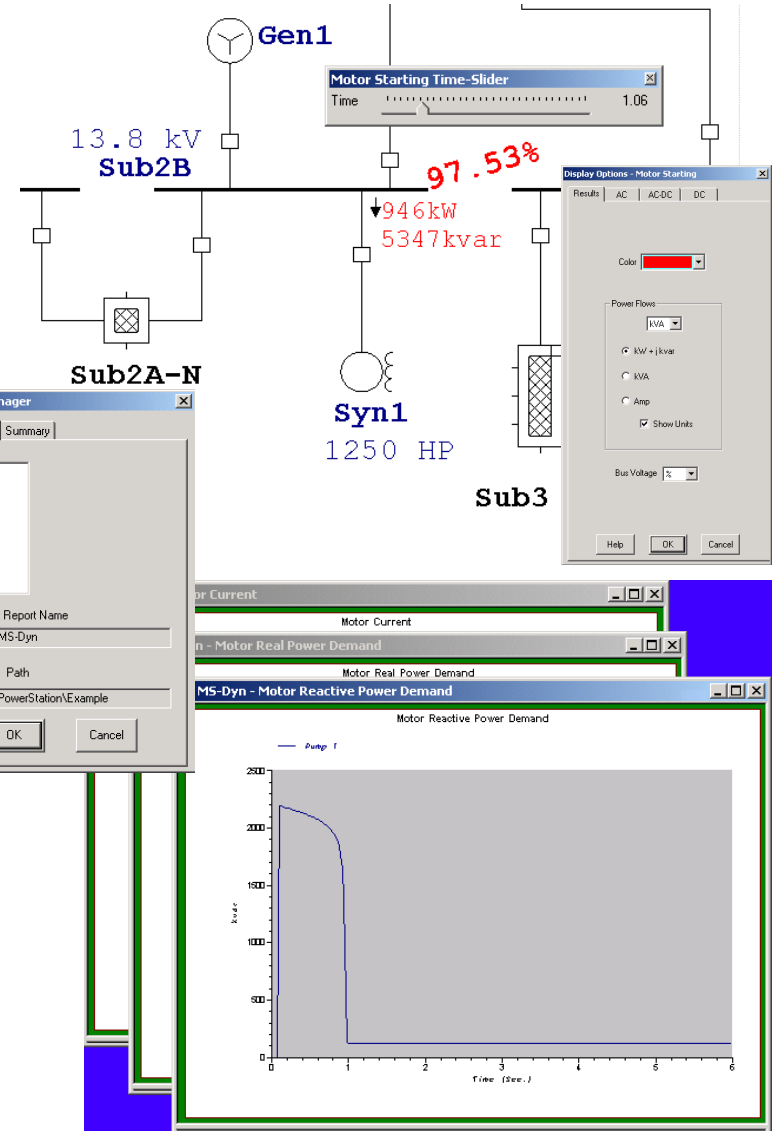
**Motor Starting Report Manager**

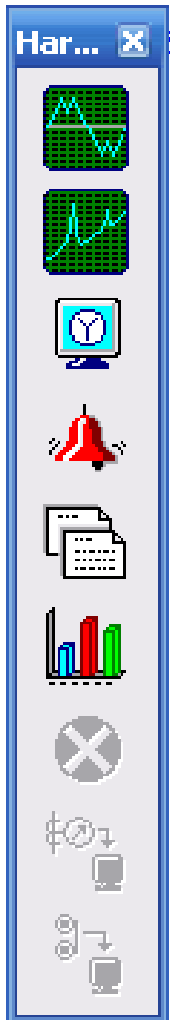
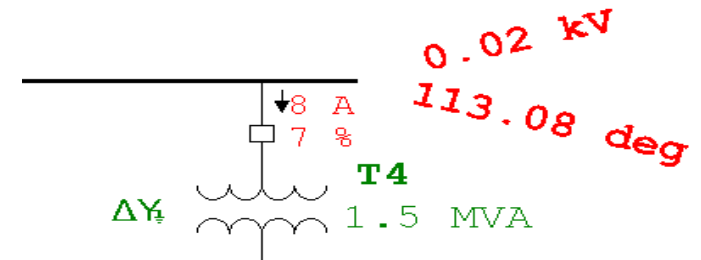
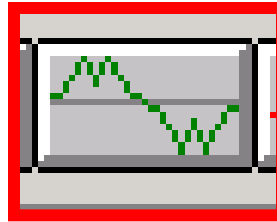
**Motor Starting Plot Options**

**Stop Motor Starting Calculation**

**Get On-Line Data**

**Get Archived Data**





Run Harmonic Load Flow Calculation

Run Frequency Scan

Harmonic Analysis Display Options

Harmonic Analysis Alerts

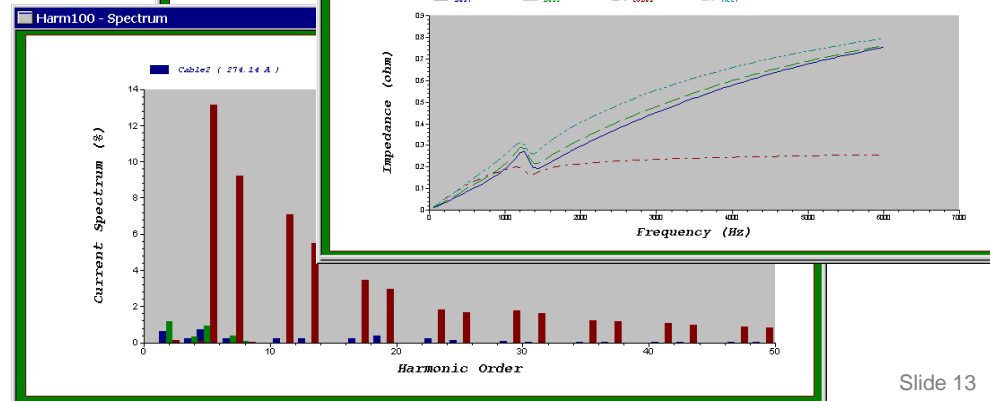
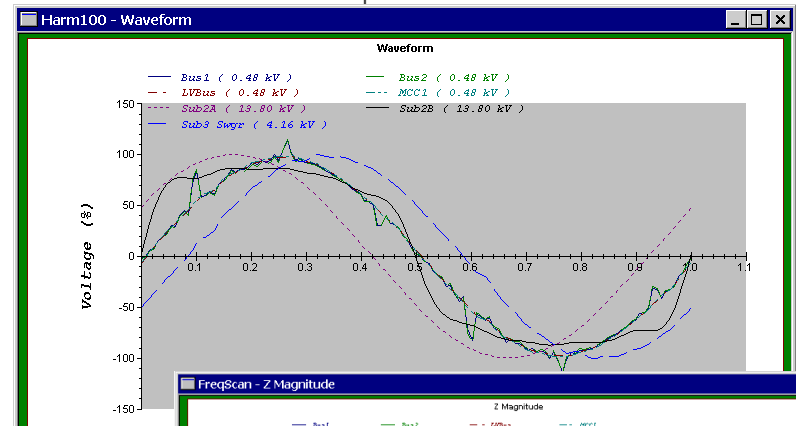
Harmonic Analysis Report Manager

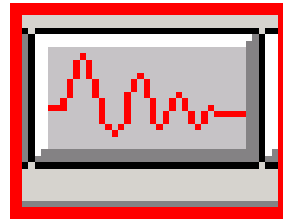
Harmonic Analysis Plots

Stop HA Calculation

Get On-Line Data

Get Archived Data





Run Transient Stability Calculation

TS Display Options

TS Alerts (Future)

TS Report Manager

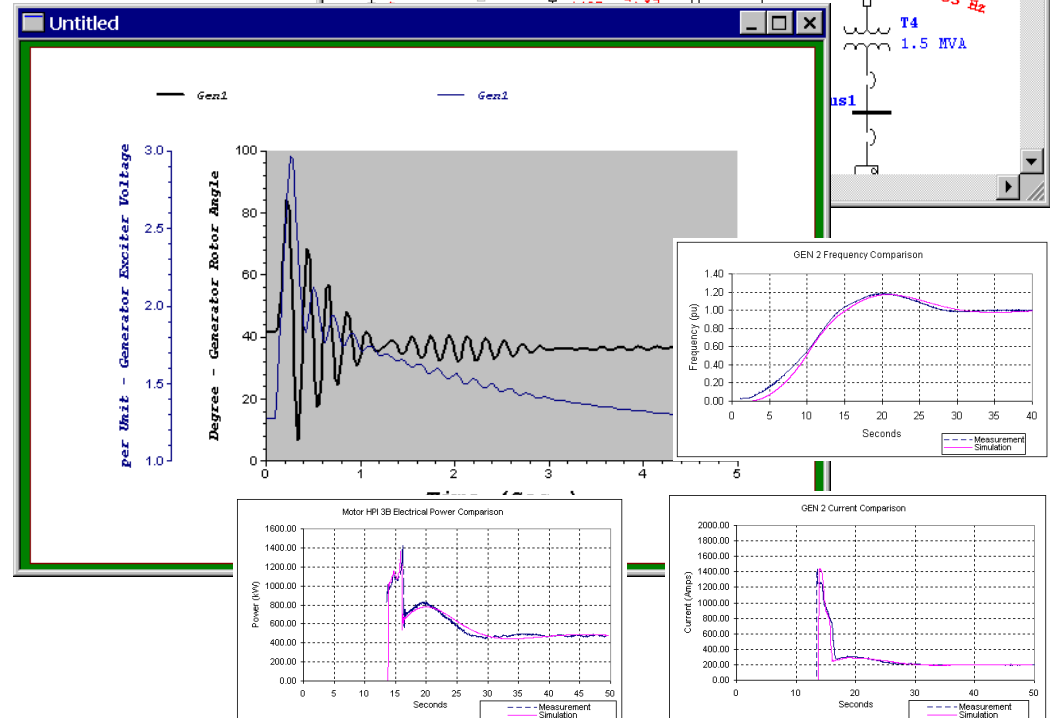
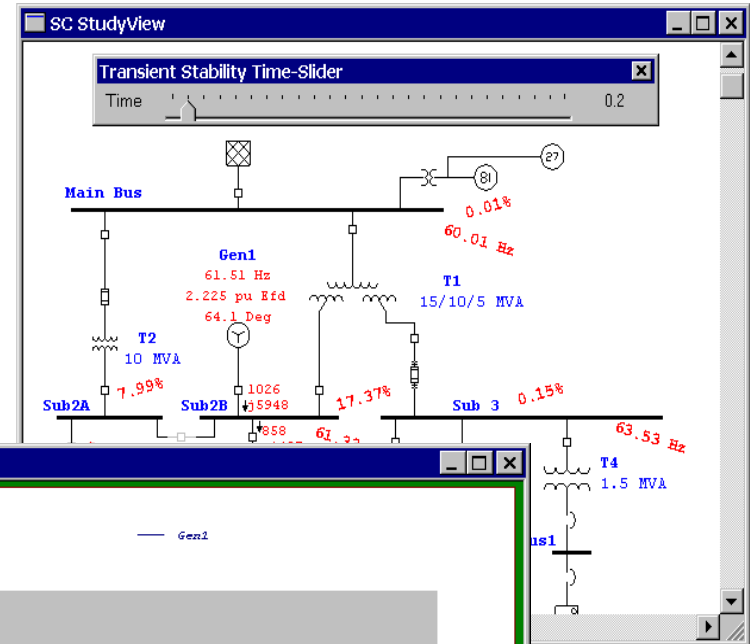
TS Action List

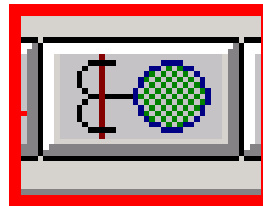
Transient Stability Plots

Stop TS Calculation

Get On-Line Data

Get Archived Data





**Create STAR View**

**Append to STAR View**

**Run / Update SC Clipping kA**

**Sequence of Operation**

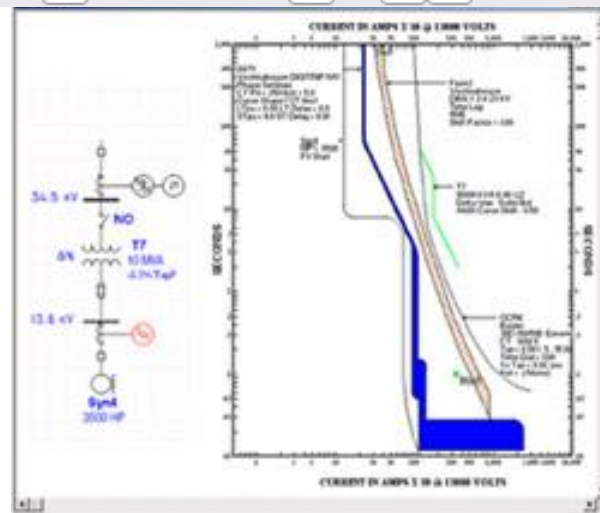
**Display Options**

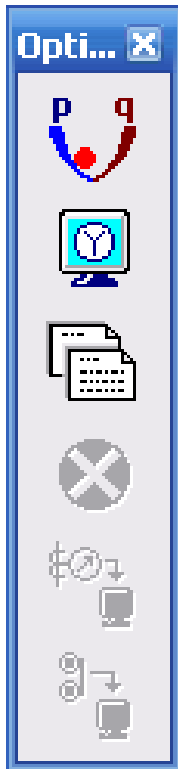
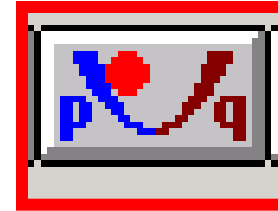
**Report Manager**

**Device Settings Report**

**Stop Calculation**

**Sequence Viewer**





**Run Optimal Power Flow**

**OPF Display Options**

**OPF Report Manager**

**Stop OPF Calculation**

**Get On-Line Data**

**Get Archived Data**

### Optimal Power Flow Study Case

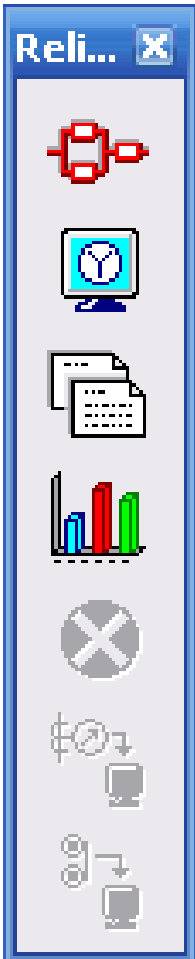
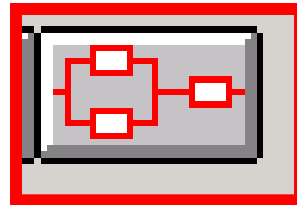
LTC | Generator AVR | Generator MW | Shunt Comp | Adjustment  
Info | Objective | Bus Voltage Constraint | Branch Flow Constraint

Objective Selection

	Weight	Exponent
<input checked="" type="checkbox"/> Minimize Real Power Losses	100	
<input checked="" type="checkbox"/> Minimize Reactive Power Losses	90	
<input type="checkbox"/> Minimize Swing Bus Power	100	
<input type="checkbox"/> Minimize Shunt var Devices	100	
<input type="checkbox"/> Minimize Fuel Cost	100	
<input type="checkbox"/> Minimize Series Compensation	100	
<input type="checkbox"/> Minimize Load Shedding	100	
<input type="checkbox"/> Minimize Control	100	
<input type="radio"/> Movement <input type="radio"/> Adjustment		
<input type="checkbox"/> Optimize Voltage Security Index	100	1
<input type="checkbox"/> Optimize Line Flow Security Index	100	1
<input type="checkbox"/> Flat Voltage Profile	100	

< OPF > | Help | OK | Cancel





**Run Reliability Assessment Calculation**

**RA Display Options**

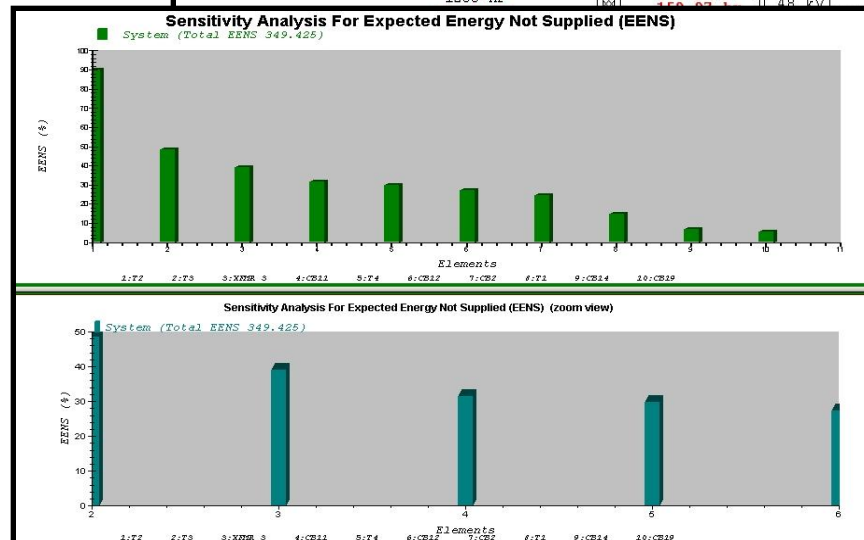
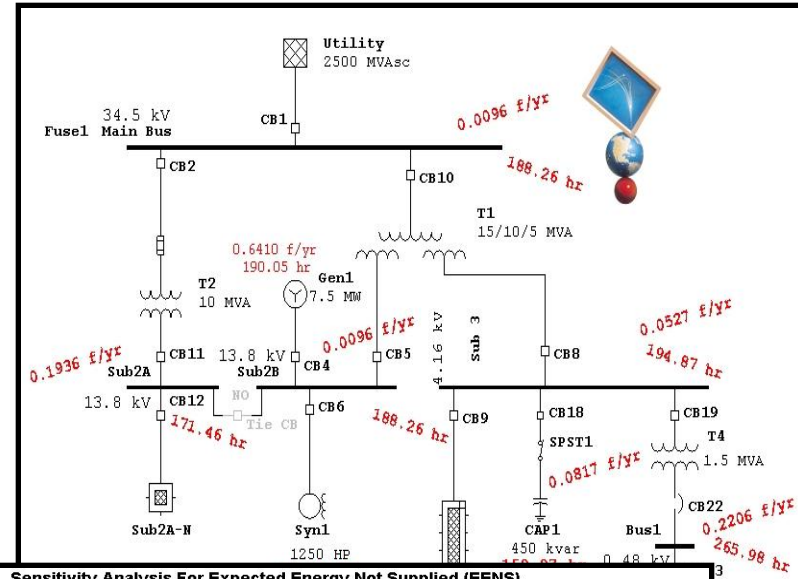
**RA Report Manager**

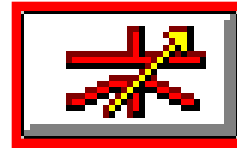
**RA Plots**

**Stop RA Calculation**

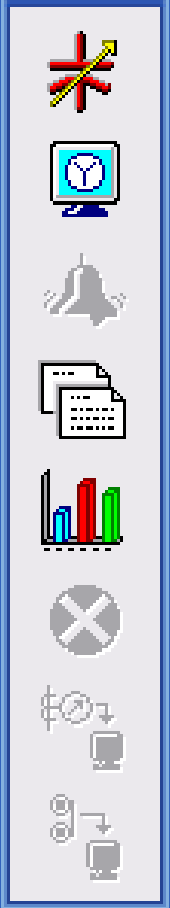
**Get On-Line Data**

**Get Archived Data**





Opti... X



Run Optimal Capacitor Placement

OCP Display Options

OCP Alerts

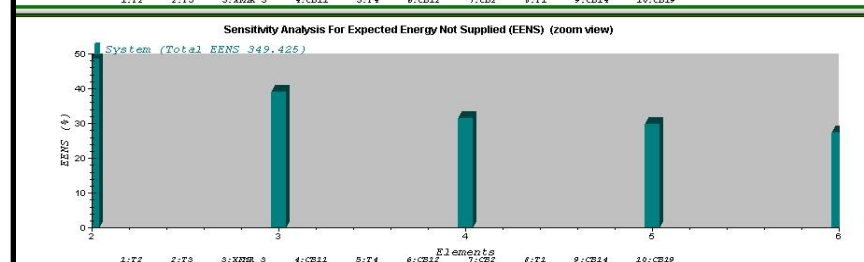
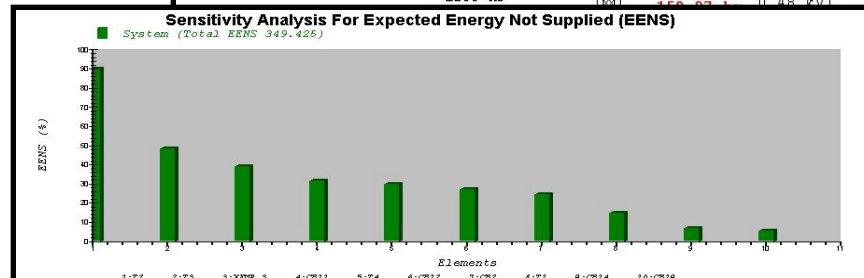
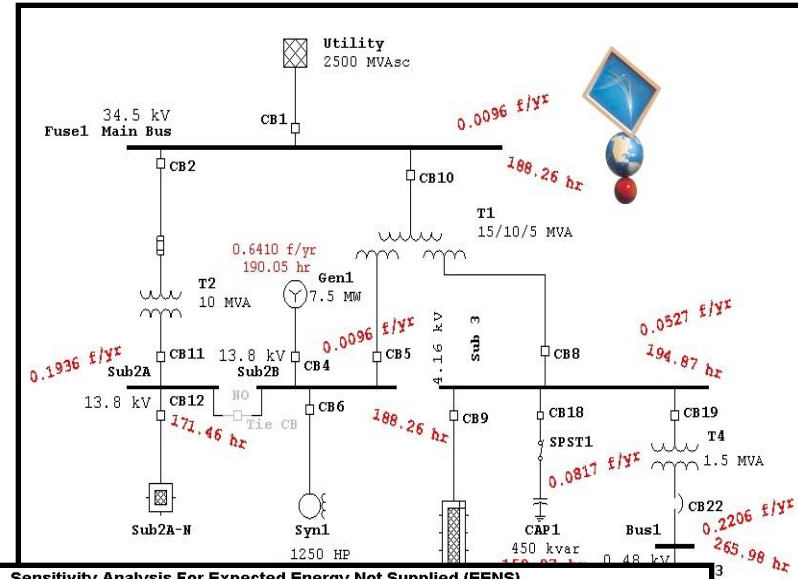
OCP Report Manager

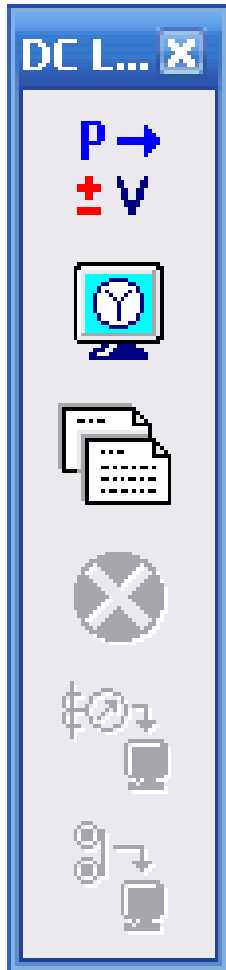
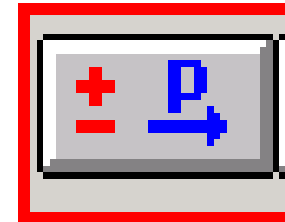
OCP Plots

Stop OCP Calculation

Get On-Line Data

Get Archived Data





**Run DC Load Flow Calculation**

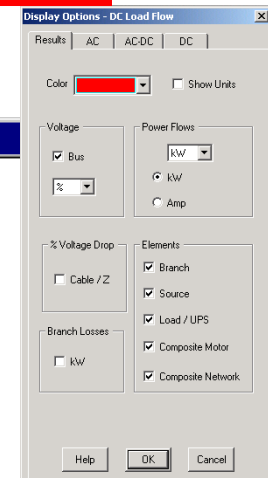
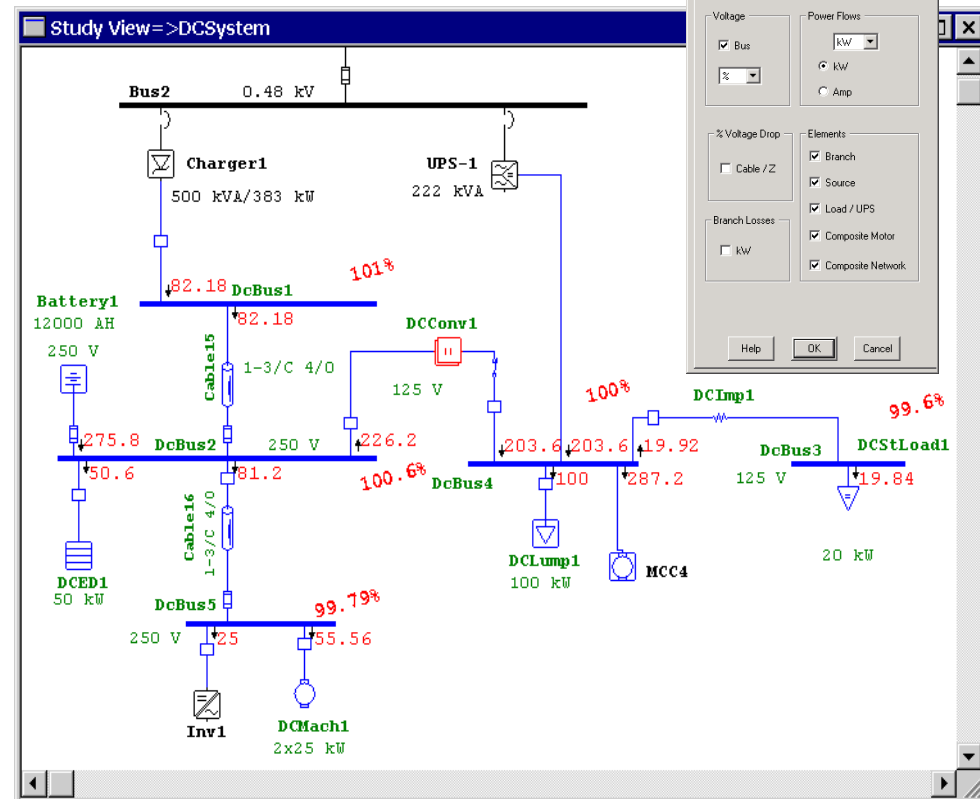
**DCLF Display Options**

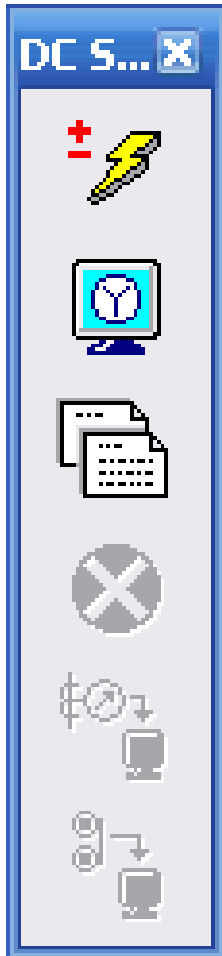
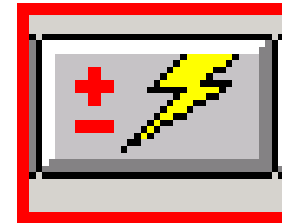
**DCLF Report Manager**

**Stop DCLF Calculation**

**Get On-Line Data**

**Get Archived Data**





**Run DC Short-Circuit Calculation**

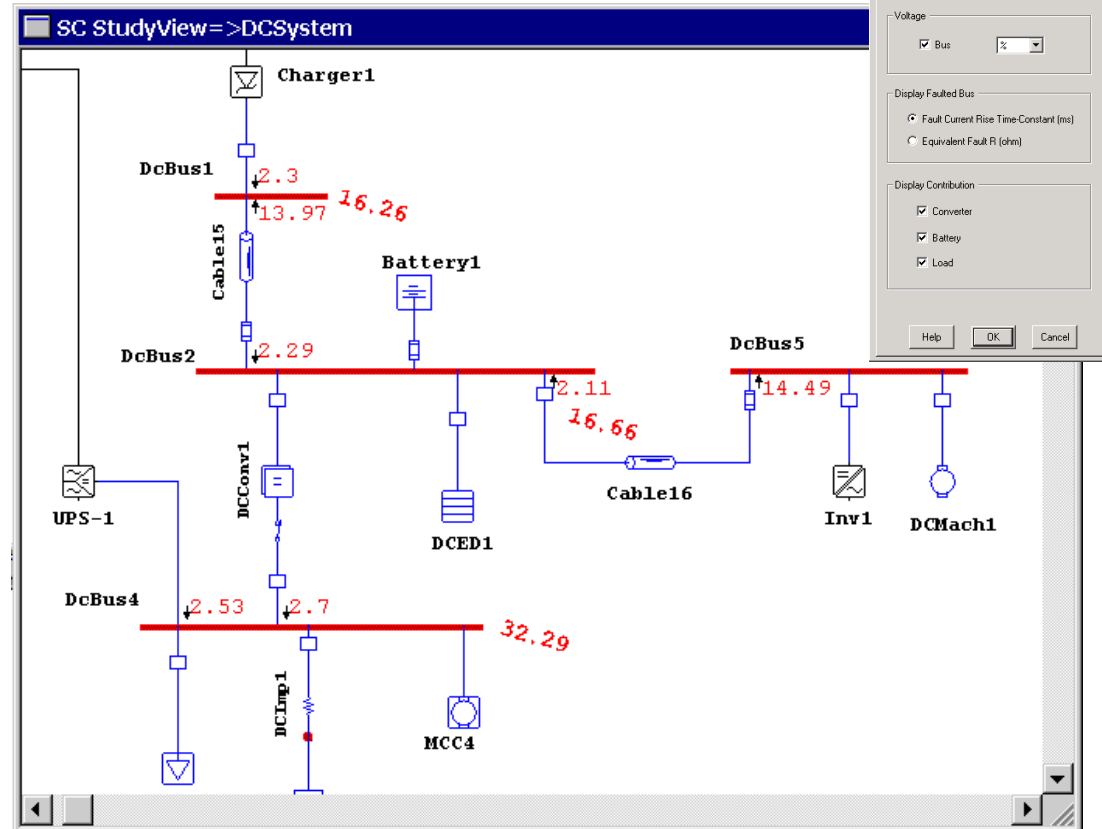
**DCSC Display Options**

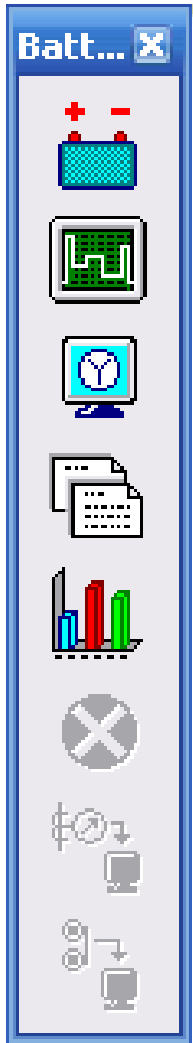
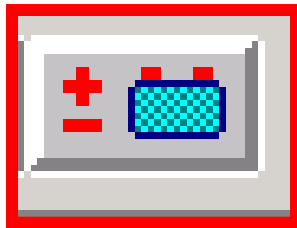
**DCSC Report Manager**

**Stop DCSC Calculation**

**Get On-Line Data**

**Get Archived Data**





Run Battery Sizing

Run Battery Discharge

Battery Size / Discharge Display Options

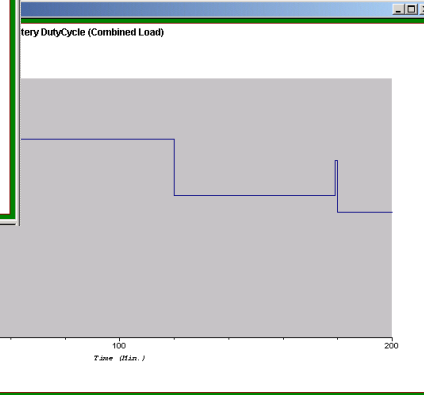
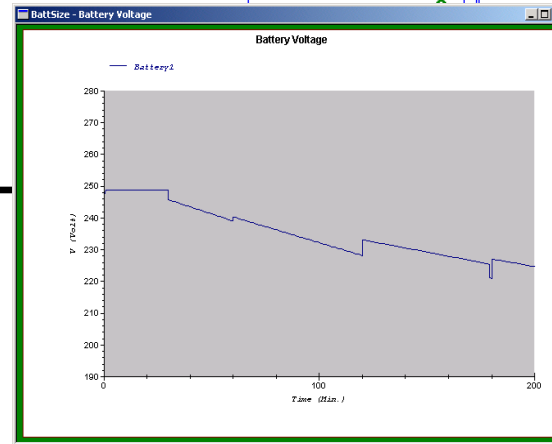
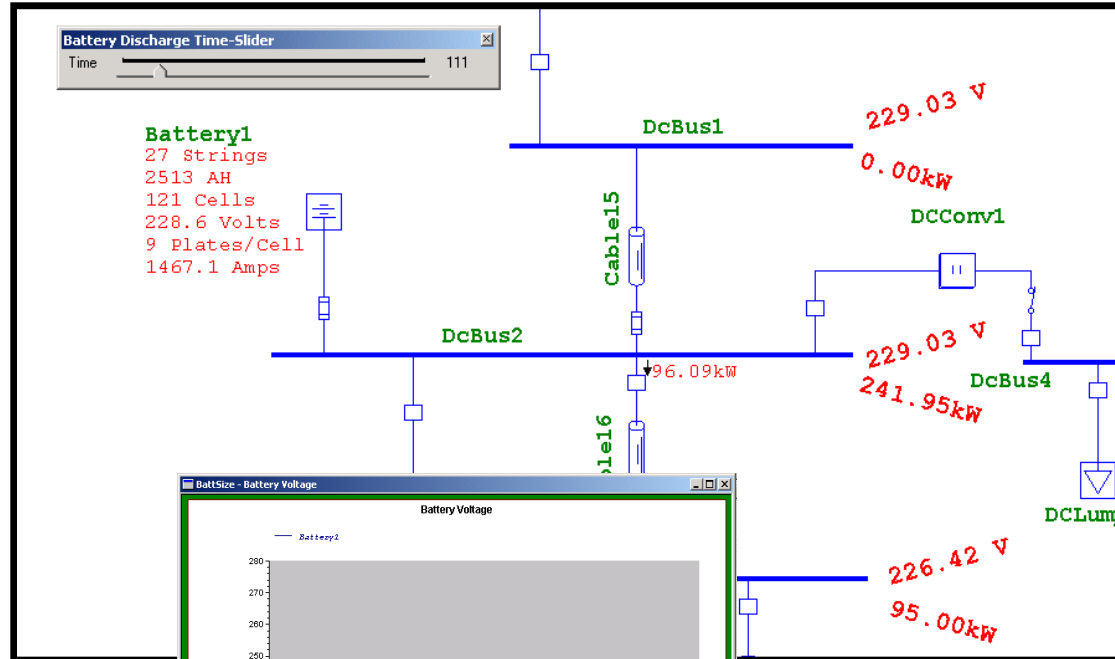
DCBS / DCBD Report Manager

Battery Discharge Plots

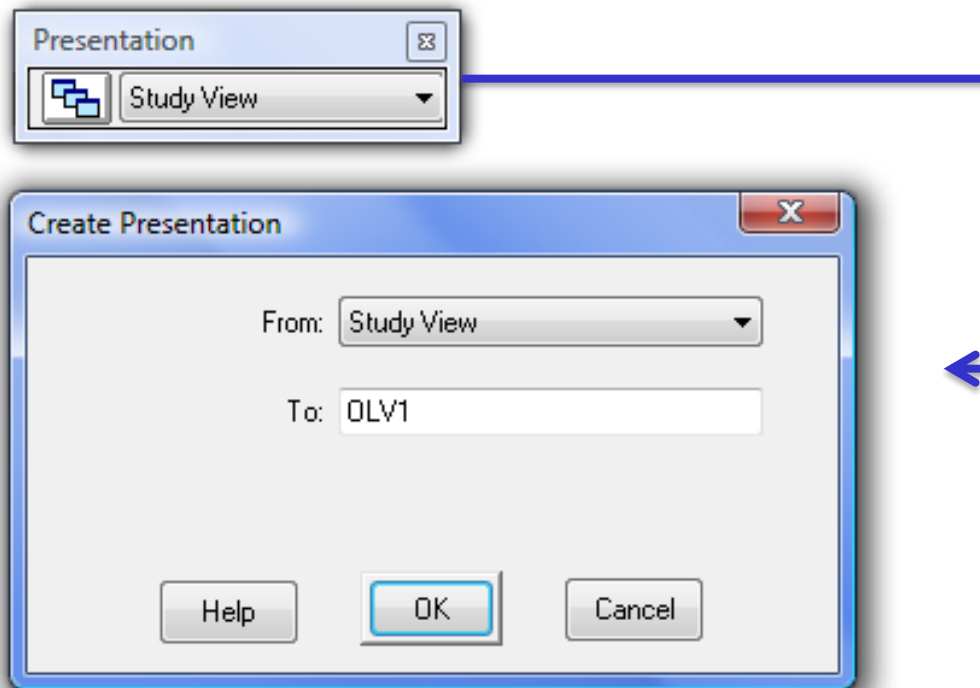
Stop DCBS/DCBD Calculation

Get On-Line Data

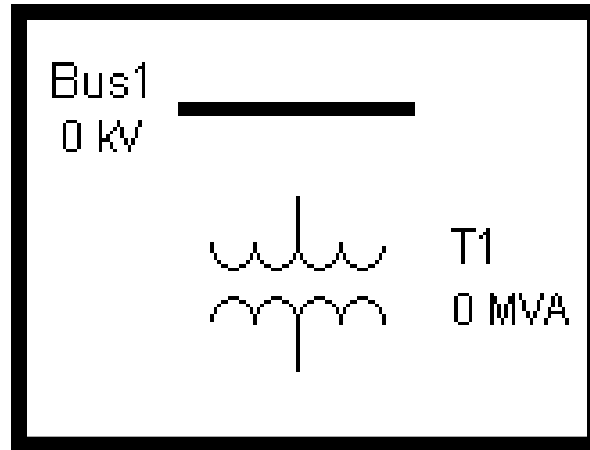
Get Archived Data



# Create a New Presentation



# Add Elements



Bus ID = (Default ID) + (A Unique Number) = Bus + 1 = Bus1

# Connect Element - Bus



- Place the cursor over the pin of an element (pin appears in red).
- Drag an element and place its pin on a bus.
- Drop a new element with its pin on top of a bus.
- Buses are considered to be one long pin. Connections are always made from elements to buses.
- Relays cannot be connected to buses.
- Only one pin of an element can be connected to the same bus.



# Connect Element - Element



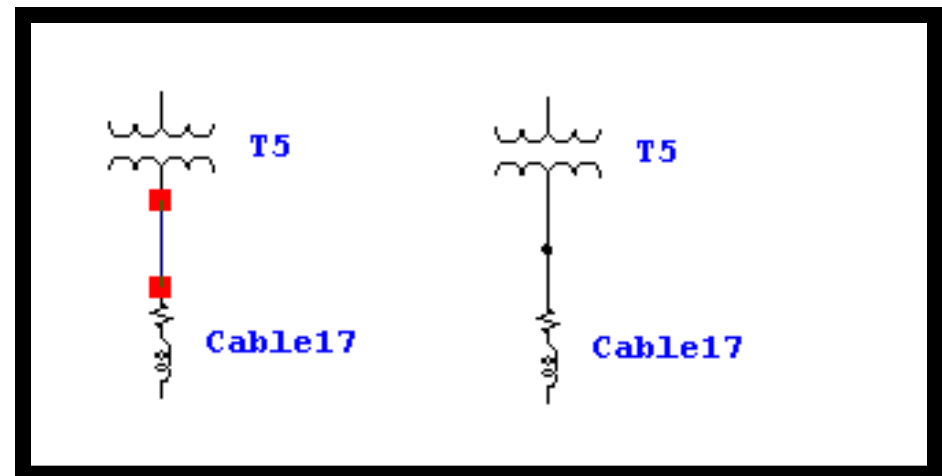
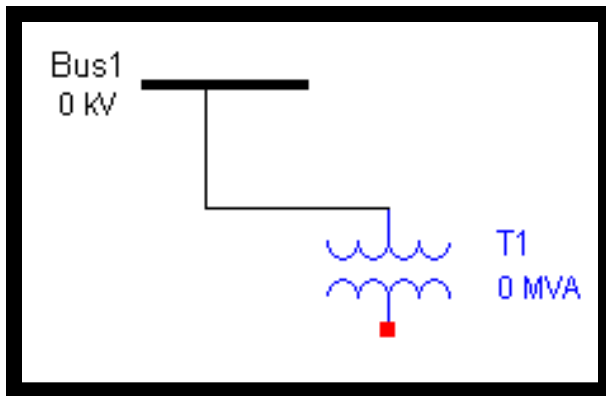
- Place the cursor on the pin of an element. Click and drag the mouse to the element you want to connect. When the latter element's pin turns red, release the left button.
- Drag & drop a protective device with its pin placed on top of the pin of any branch or load element.
- Drag & drop a protective device onto a connection.
- Branches **CANNOT** be connected to each other; PowerStation automatically inserts a bus between them.

# Connect Element - Element

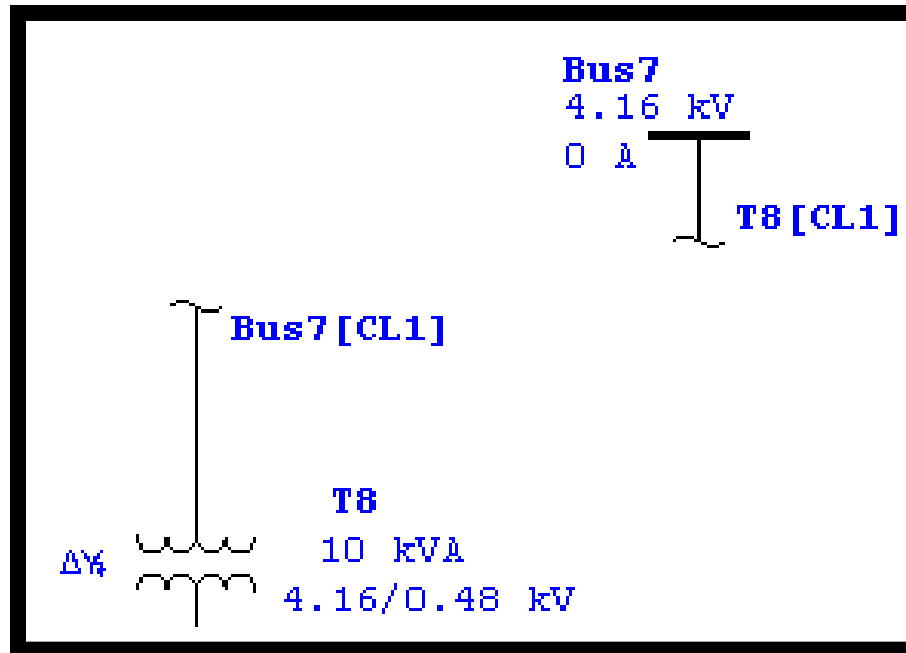


- Branches CANNOT be connected to each other; PowerStation automatically inserts a bus between them.
- Branches CANNOT be connected to loads, utilities, composite motors, and composite networks.
- Relays can only be connected to current transformers (CT) or other relays.
- You CANNOT directly connect two buses with a connector or current transformer.

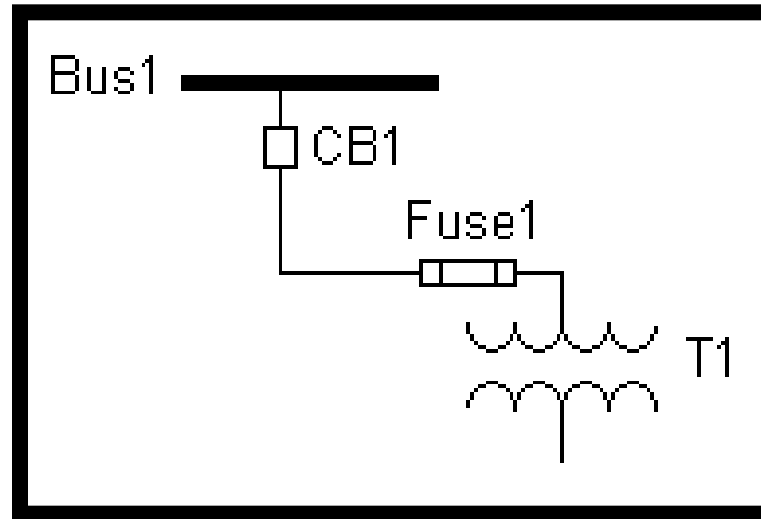
# Connect Element - Element



# The Remote Connector



# Insert Protective Devices



## Example

**A Circuit Breaker and Fuse are Inserted Between Bus1 and T1**

# Move From Dumpster



- Elements can be moved from the Dumpster into the one-line diagram with the same IDs by two methods:
  - Right-click on the one-line diagram and select Move From
  - Click on Edit on the Menu Bar and select Move From

# Move From Dumpster



- Rules:
  - Move From Dumpster can be done only in Edit mode when Base Data is active.
  - Move CANNOT be done if there are no Cells (element groups) in the Dumpster.
  - When you move a Dumpster Cell to the one-line diagram, the desired cell needs to be active and it gets deleted from the Dumpster after being moved.

# Move From Dumpster



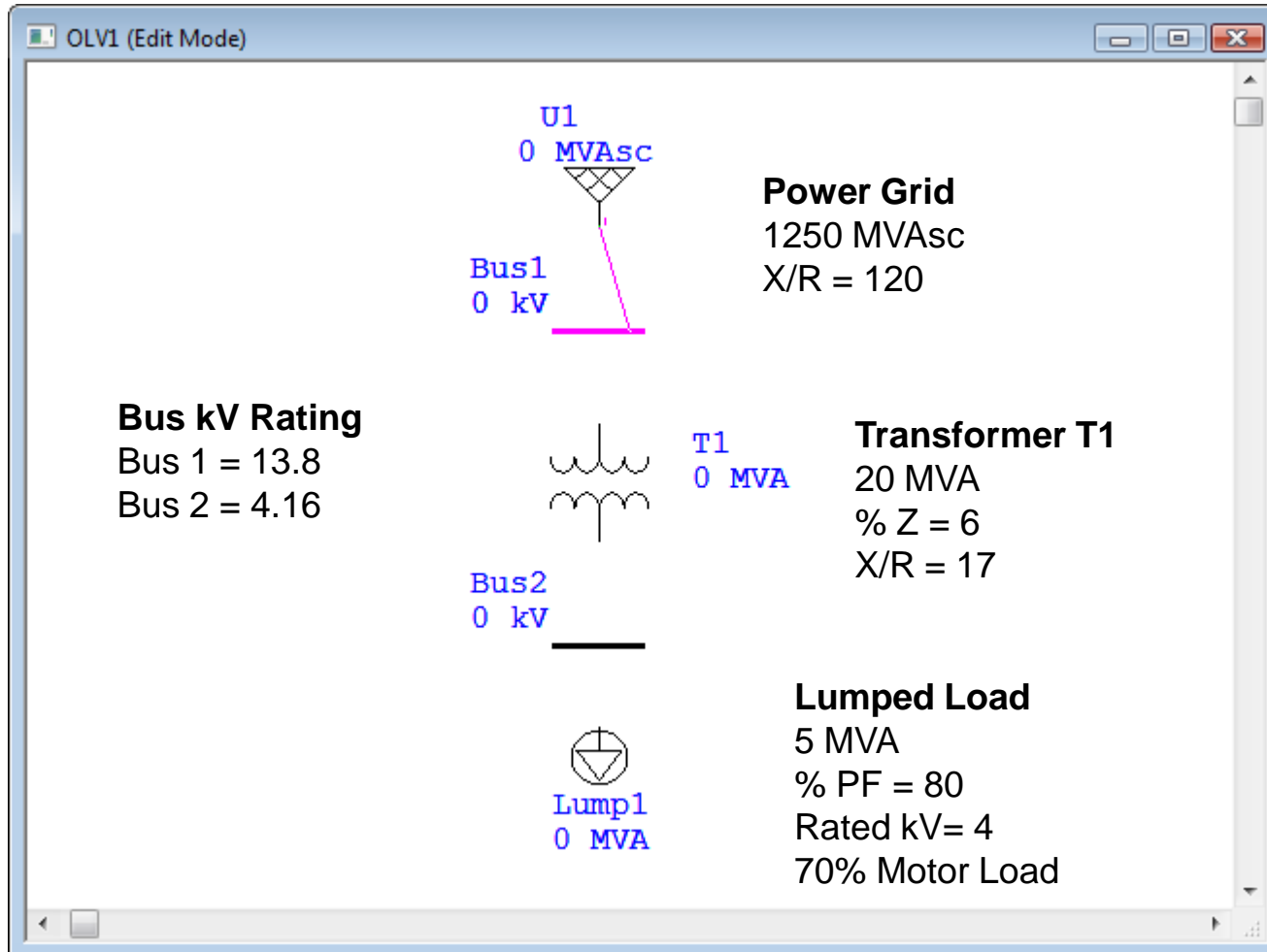
- Move any Dumpster Cell you desire by making it active from the Dumpster presentation
- Entire contents of a cell are moved
- Move any Dumpster Cell into any Composite Network (cannot move cells that contain buses and branches into a composite motor)
- Sections 1 and 2 of the Remote Connector must be moved from the dumpster at the same time
- IDs of the moved elements, along with the connections, status, and properties are preserved



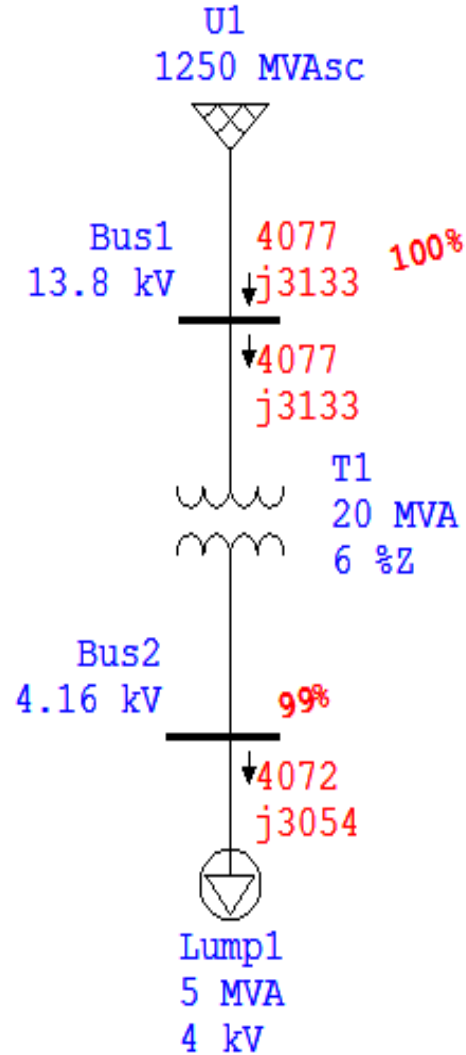
# Creating a Project



Enter four new elements into the one-line diagram and proceed to enter the input data for each element



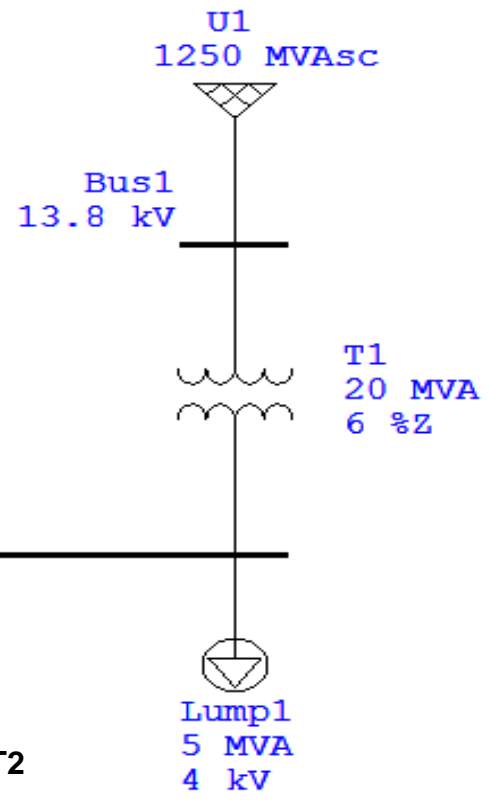
Once all the elements have been connected and the input data has been entered, you may proceed to run a **Load Flow** Calculation.



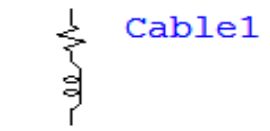


- Enter four more elements into the one-line diagram.
- Extend the size of Bus2
- Proceed to connect them and enter the required LF data.

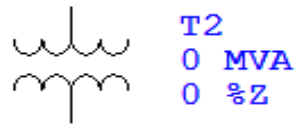
Bus2  
4.16 kV



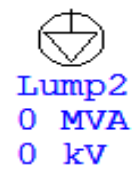
**Cable**  
 NEC EPR 133%  
 5.0kV Mag  
 3/C CU  
 Size= 4/0  
 Length=200ft



**Transformer T2**  
 MVA= 1  
 Typical %Z & X/R



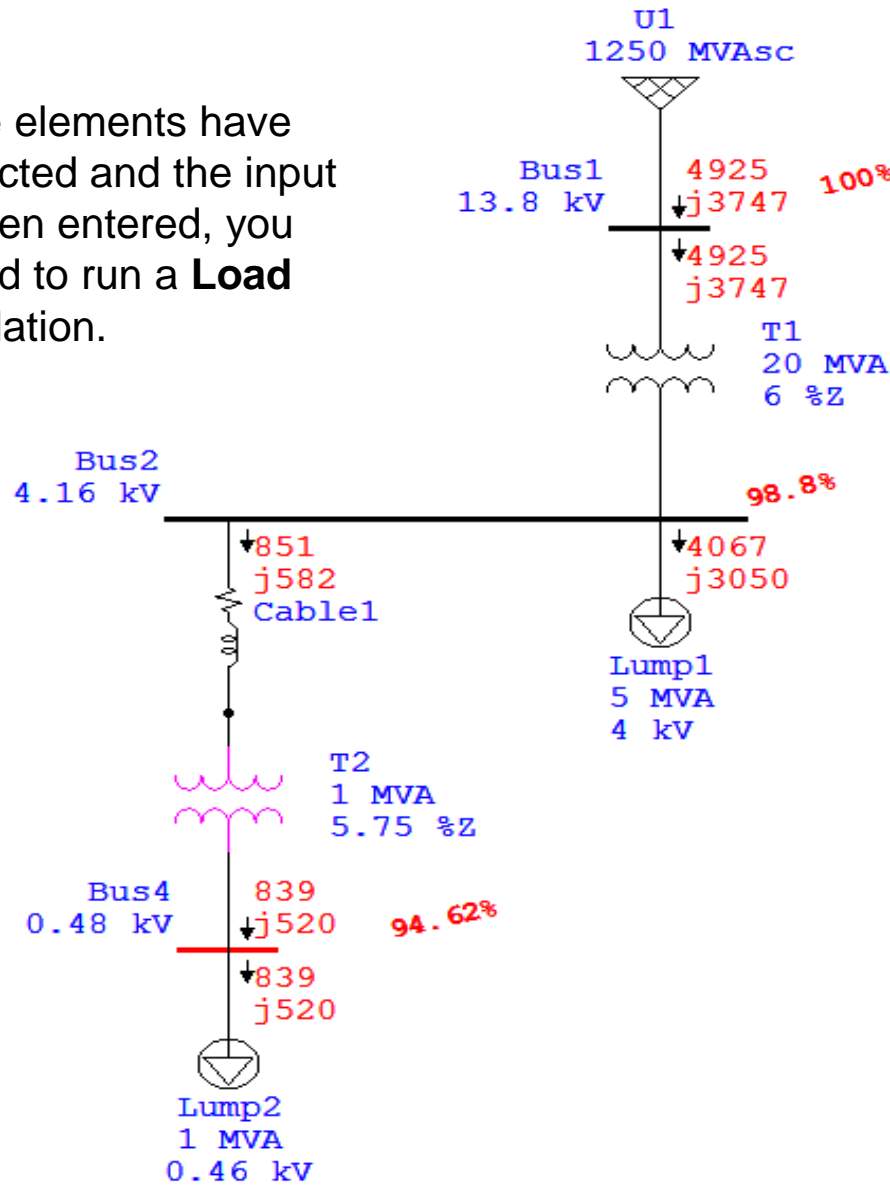
**Bus kV Rating**  
 Bus3= 4.16  
 Bus4= 0.480

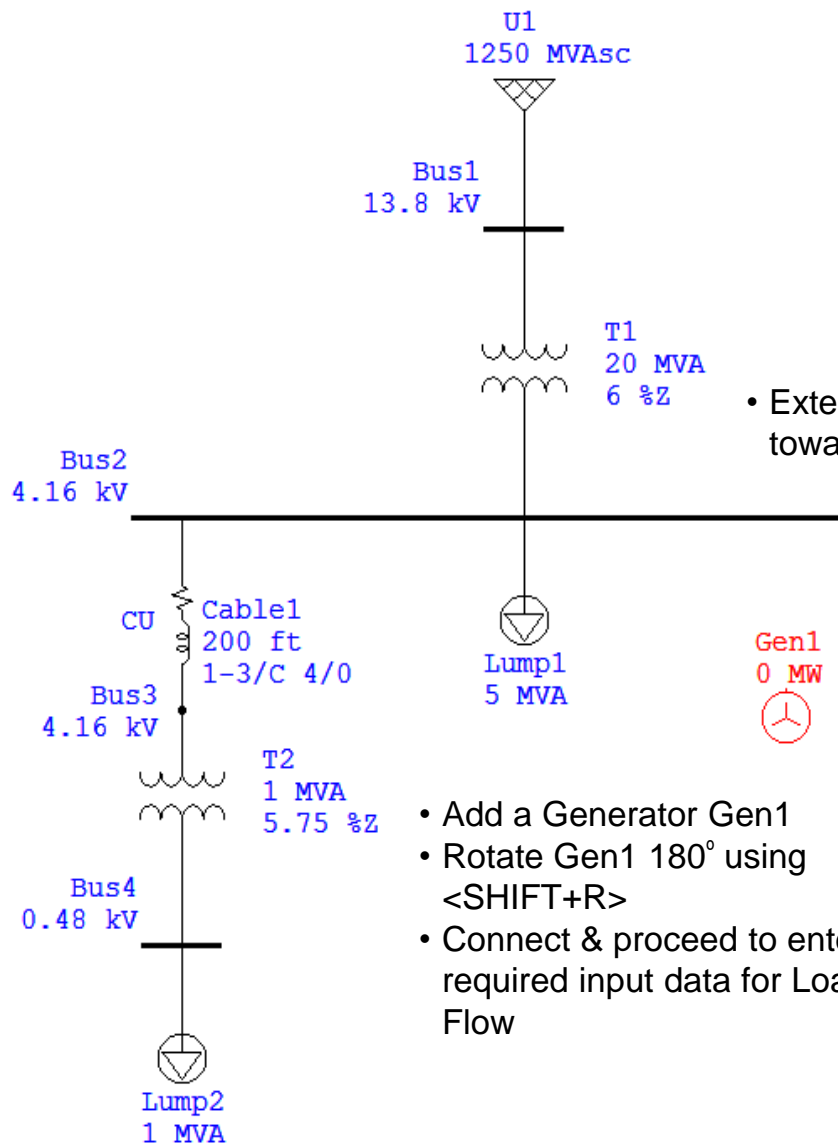


**Lumped Load Lump2**  
 MVA= 0.5  
 %PF=85  
 Rated kV = 0.46  
 50% Motor Load



Once all the elements have been connected and the input data has been entered, you may proceed to run a **Load Flow** Calculation.





- Extend the length of Bus2 towards the right side.

- Add a Generator Gen1
- Rotate Gen1 180° using <SHIFT+R>
- Connect & proceed to enter required input data for Load Flow

**Gen1**

**Rating:**

5 MW

Voltage Control

%PF = 80

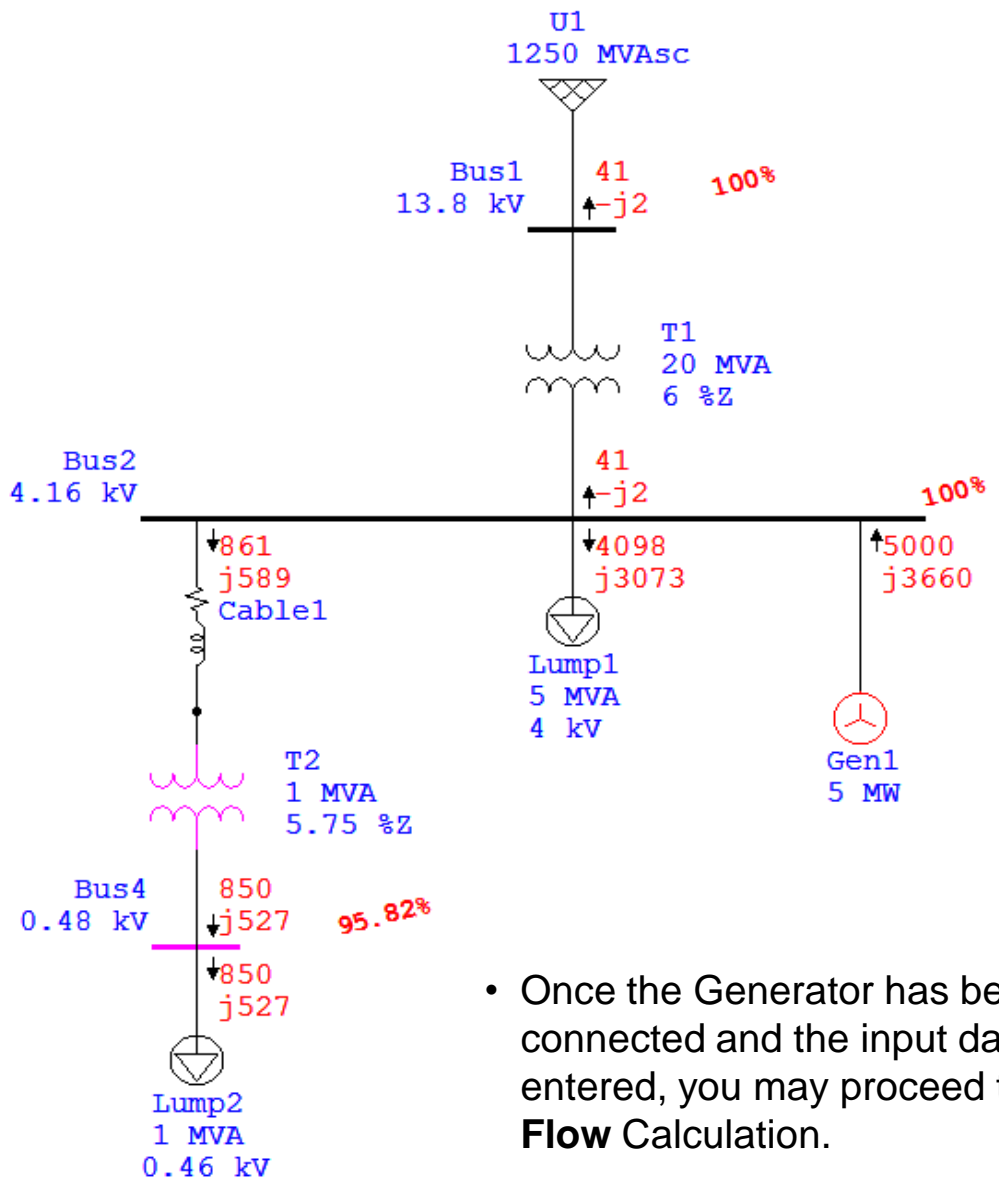
**Generation Category:**

Design

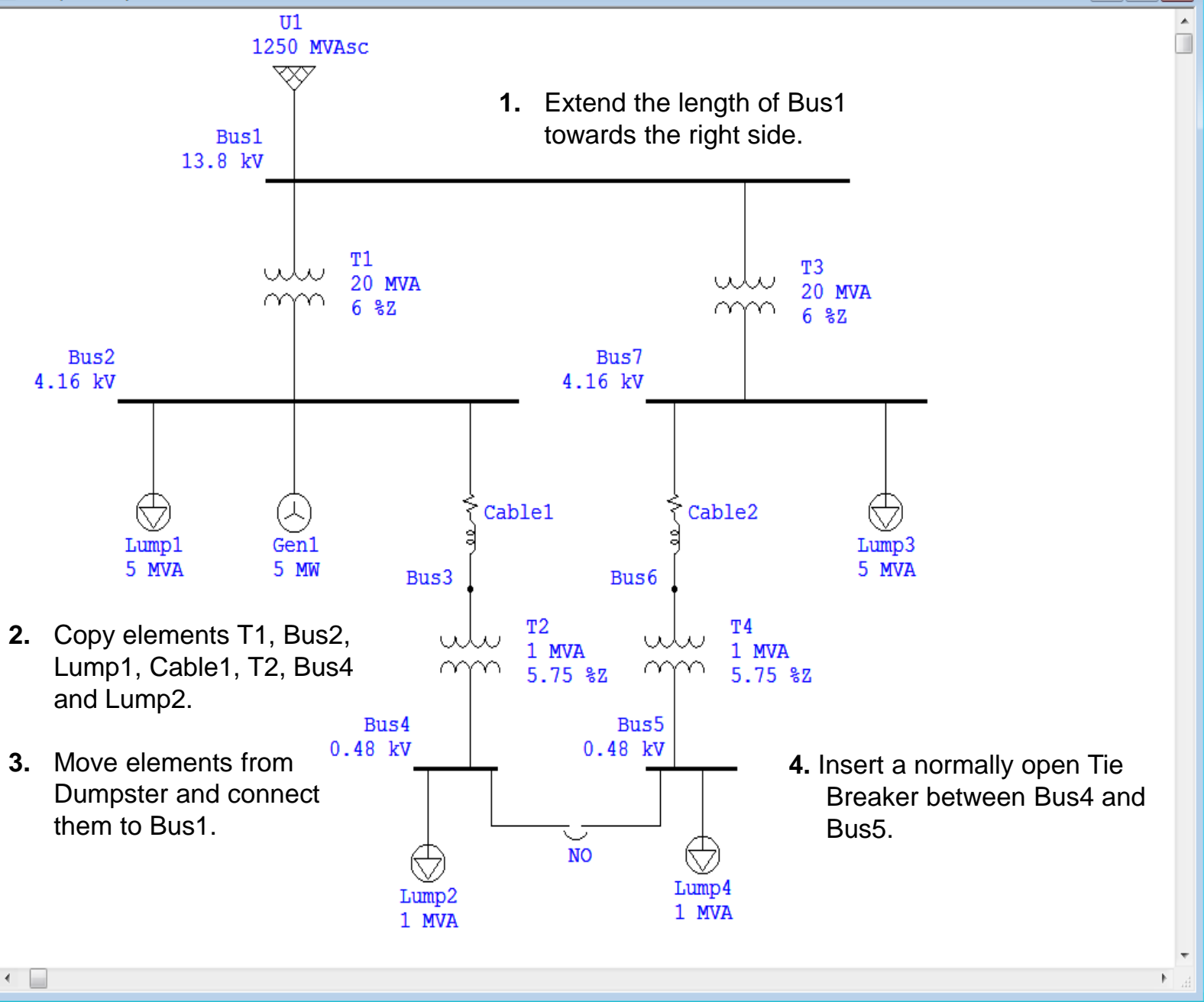
MW = 5

Qmax = 5

Qmin = 1



- Once the Generator has been connected and the input data has been entered, you may proceed to run a **Load Flow Calculation**.

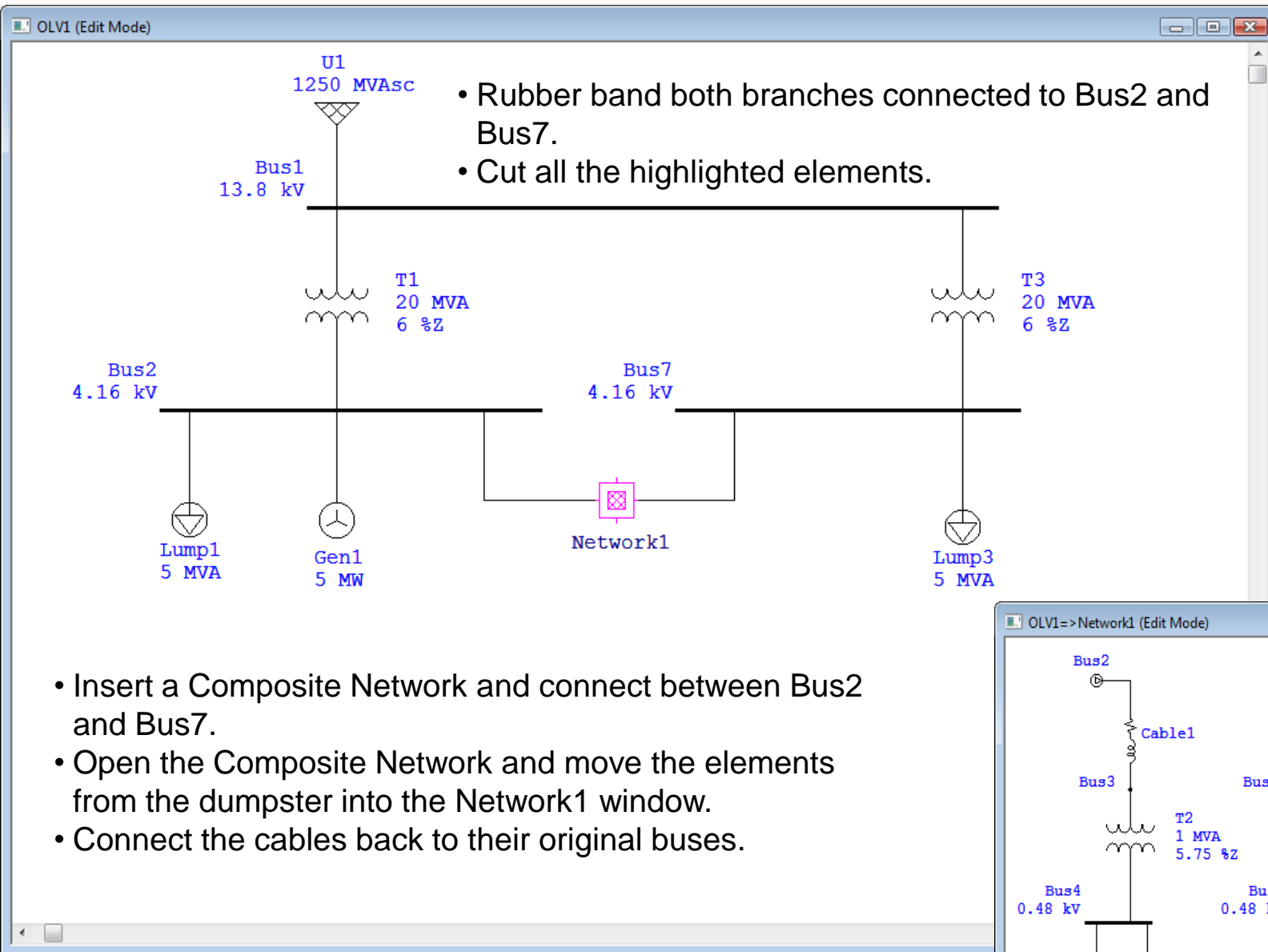


1. Extend the length of Bus1 towards the right side.

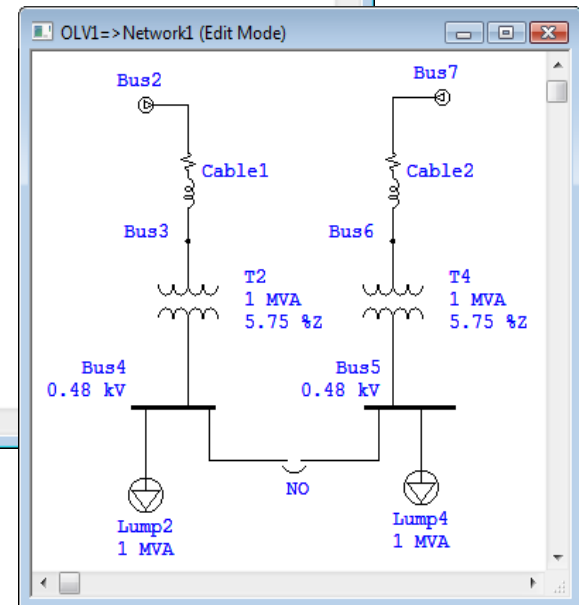
2. Copy elements T1, Bus2, Lump1, Cable1, T2, Bus4 and Lump2.

3. Move elements from Dumpster and connect them to Bus1.

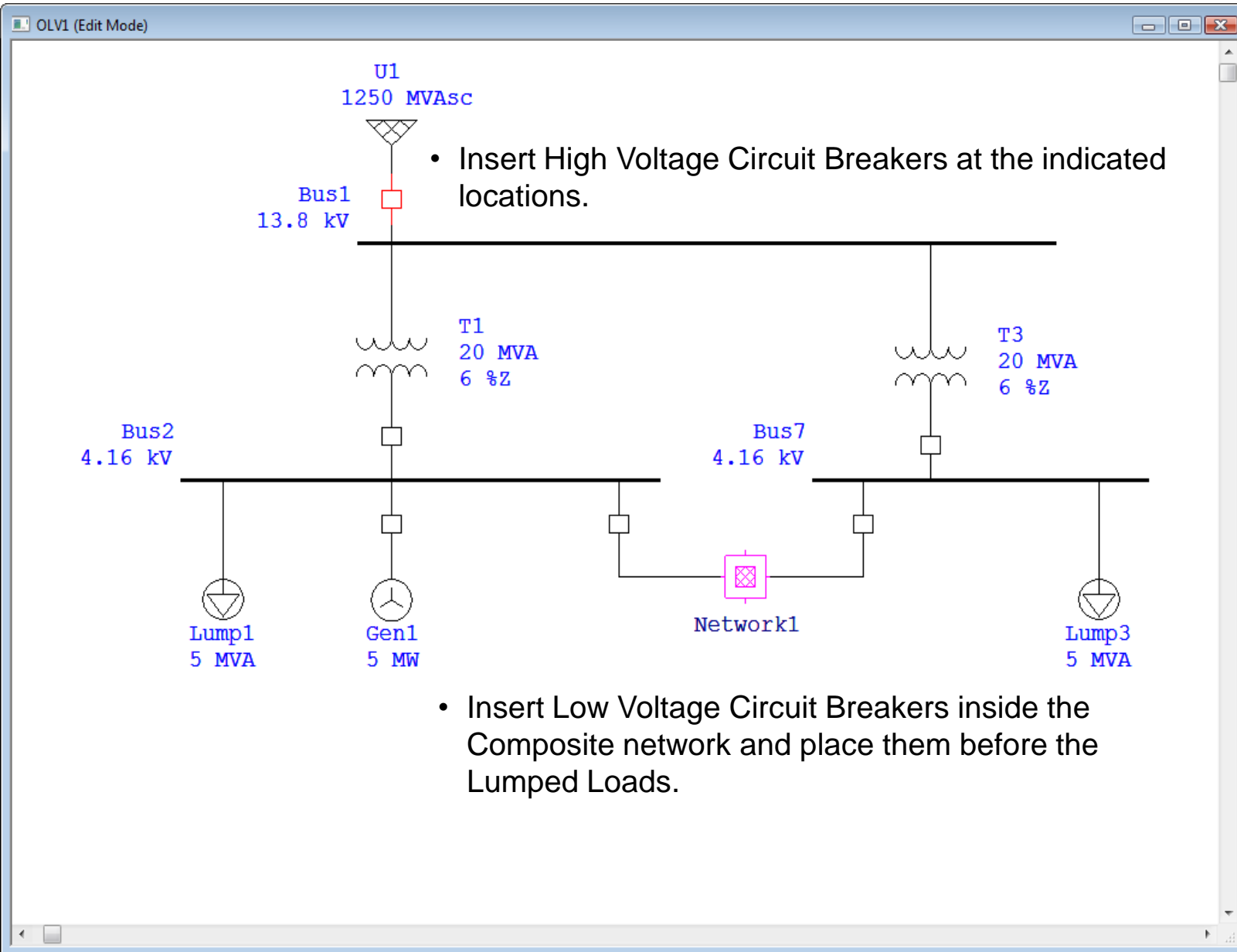
4. Insert a normally open Tie Breaker between Bus4 and Bus5.

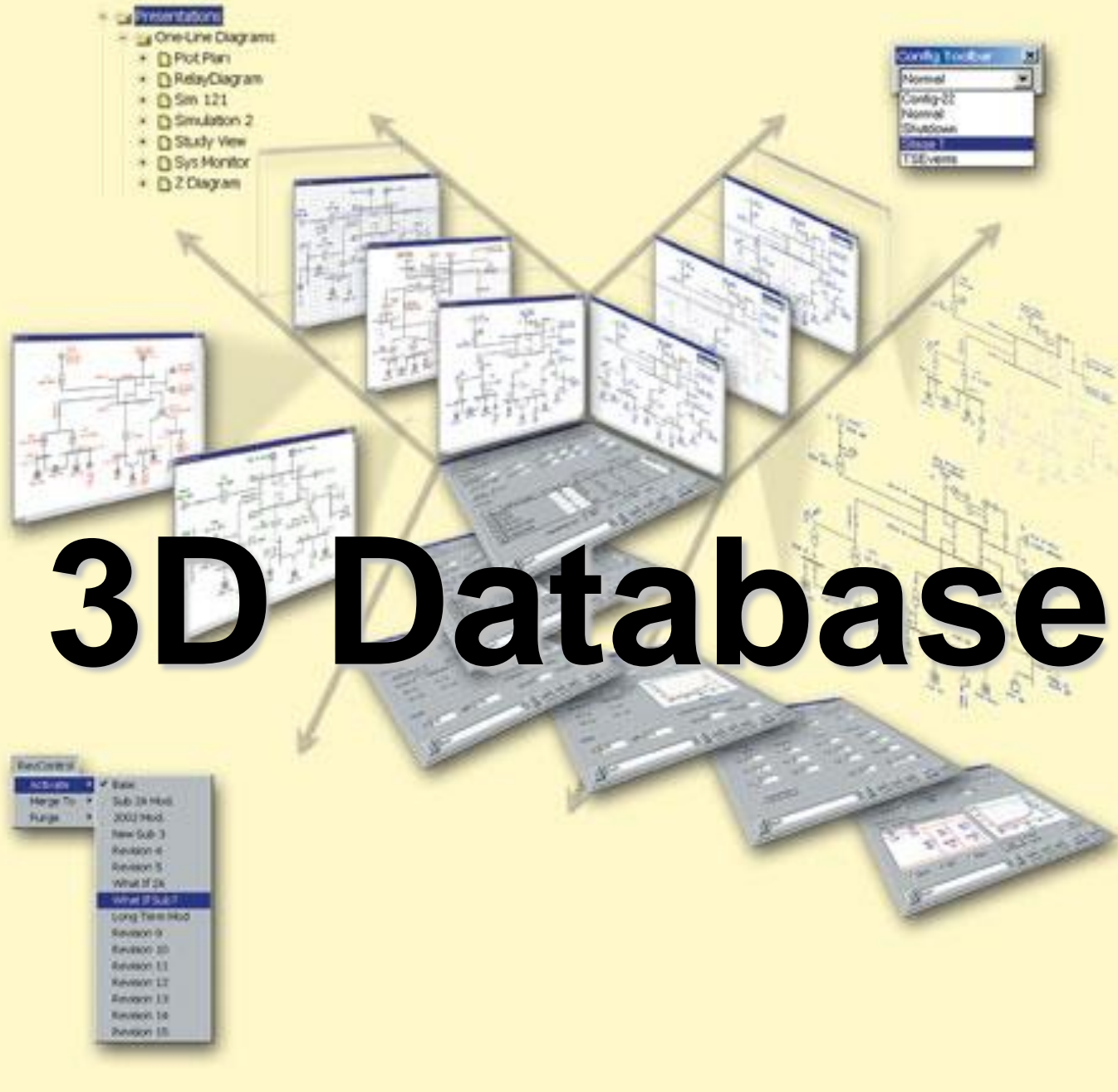


- Insert a Composite Network and connect between Bus2 and Bus7.
- Open the Composite Network and move the elements from the dumpster into the Network1 window.
- Connect the cables back to their original buses.







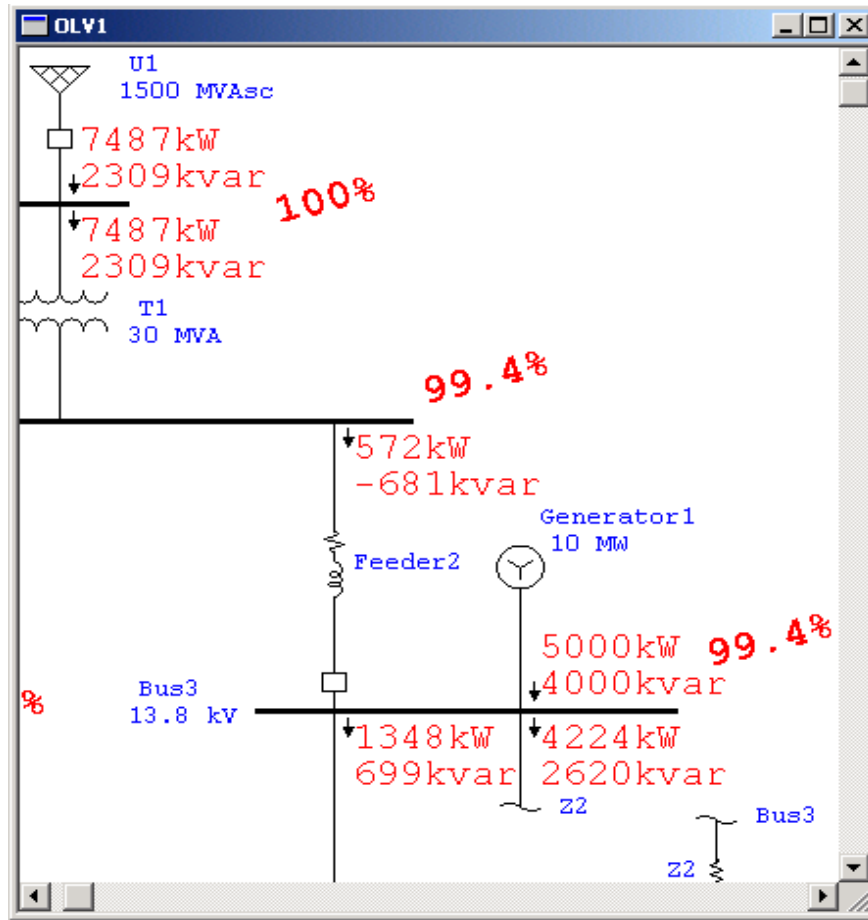


# 3D Database

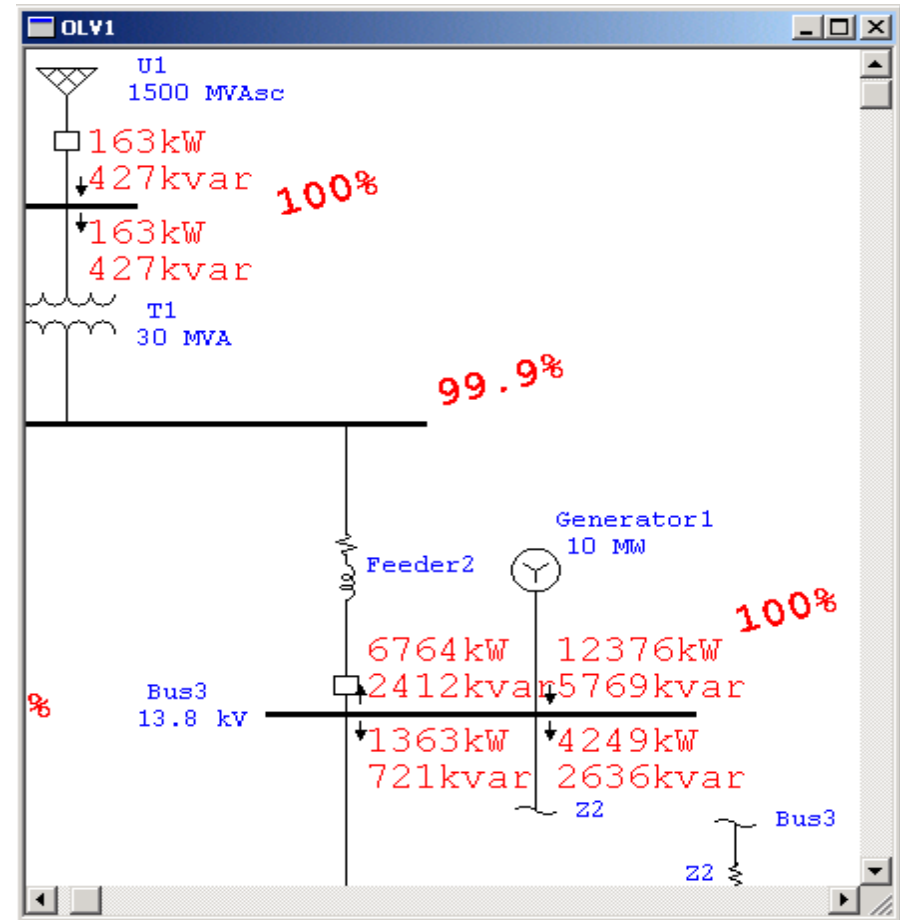
# Study Conditions



- Different Operating Requirements



**Generator 1 in Voltage Control Mode**

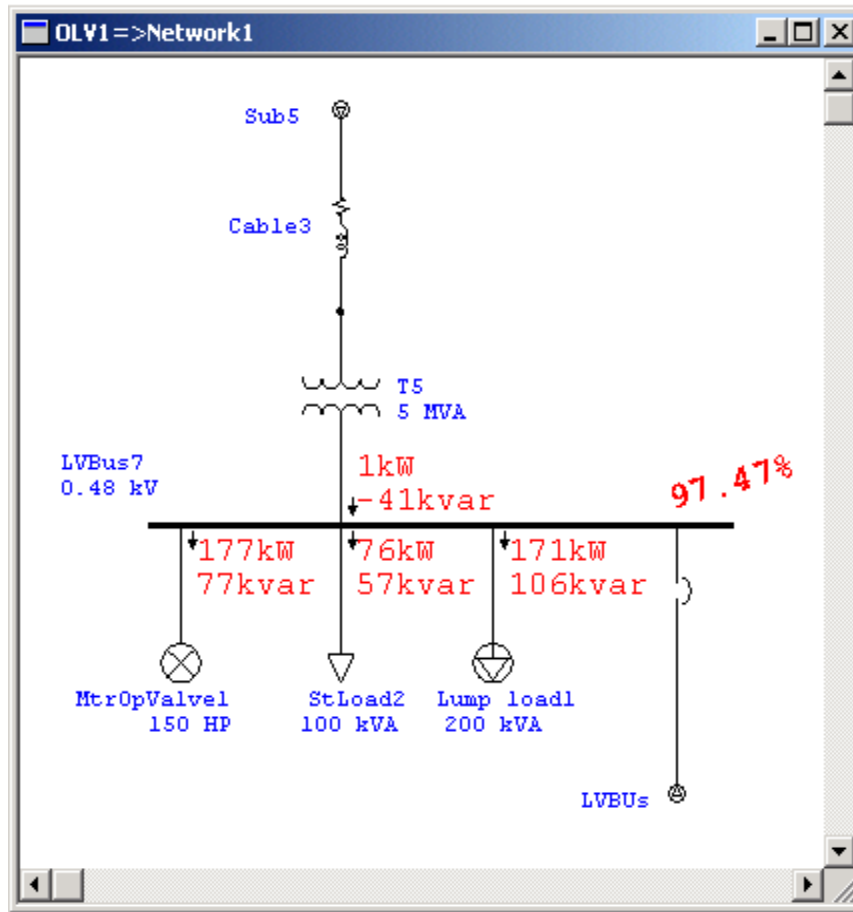


**Generator 1 in Swing Mode**

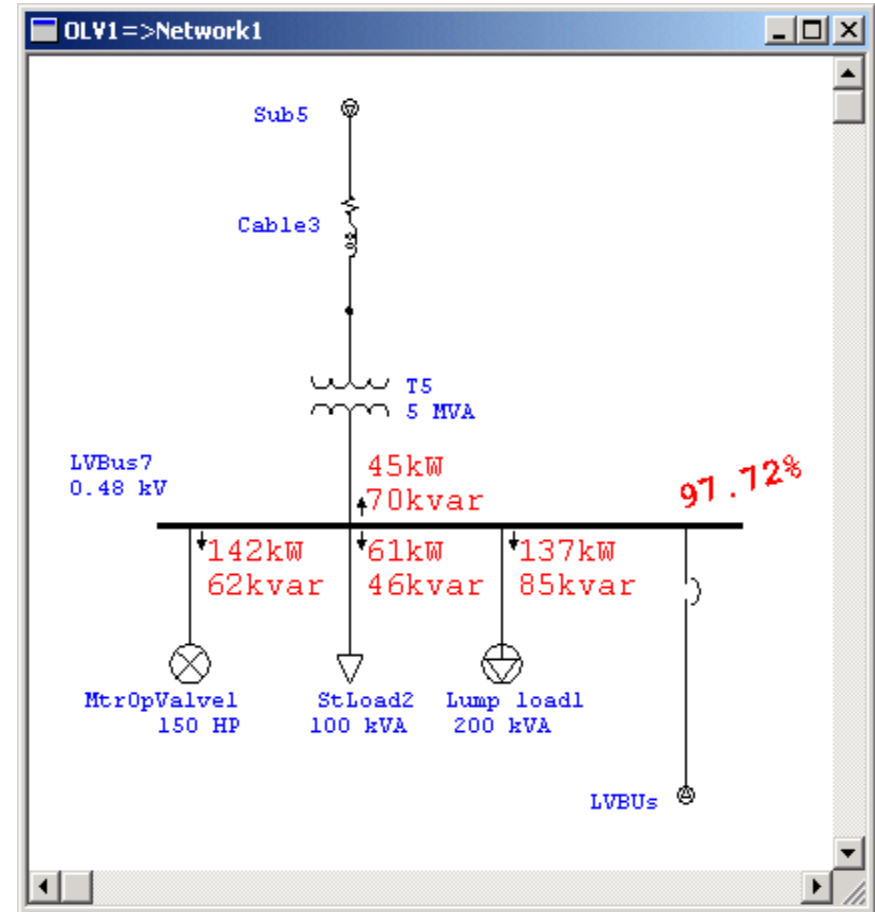
# Study Conditions



- Different Loading Conditions



## Summer Loading

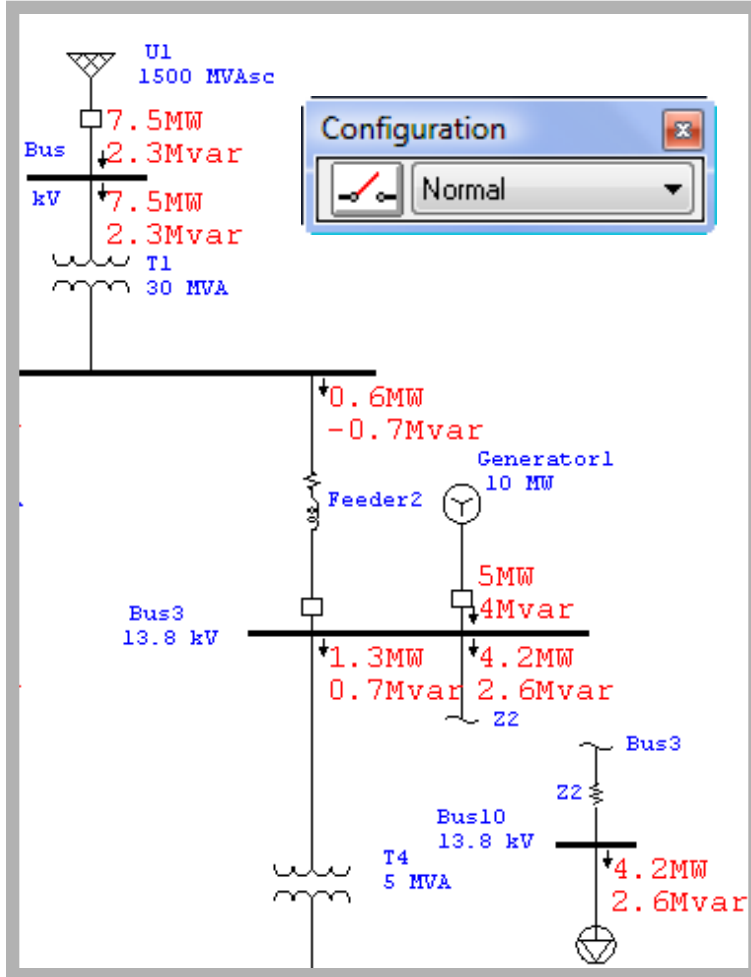


## Winter Loading

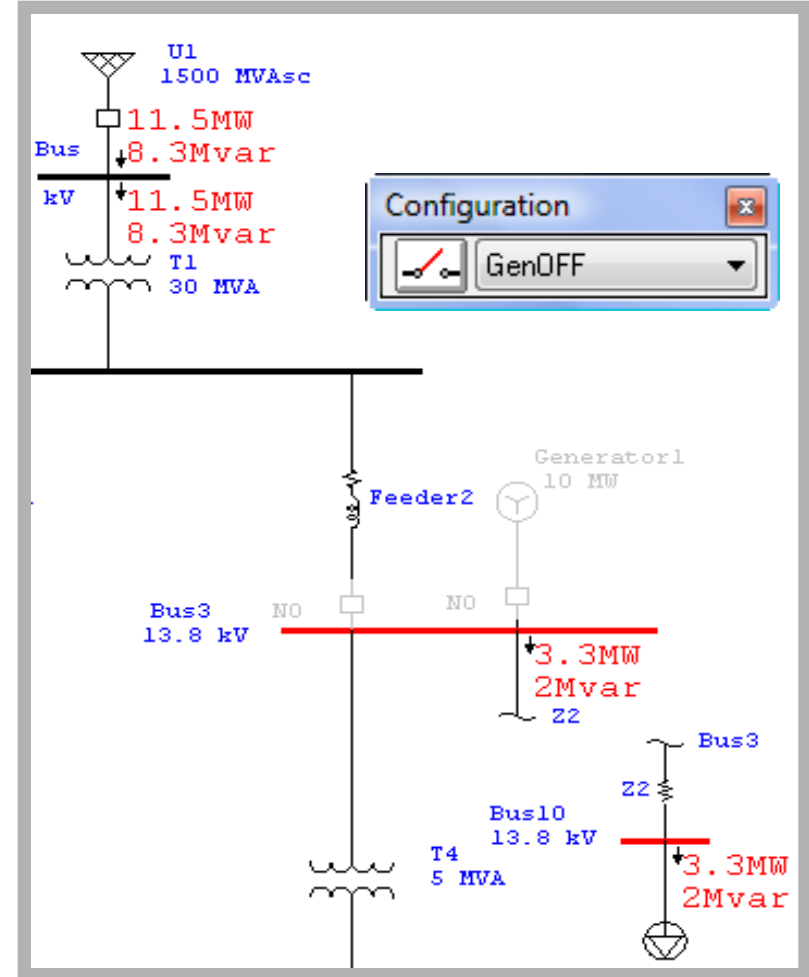
# Study Conditions



- Different Configurations



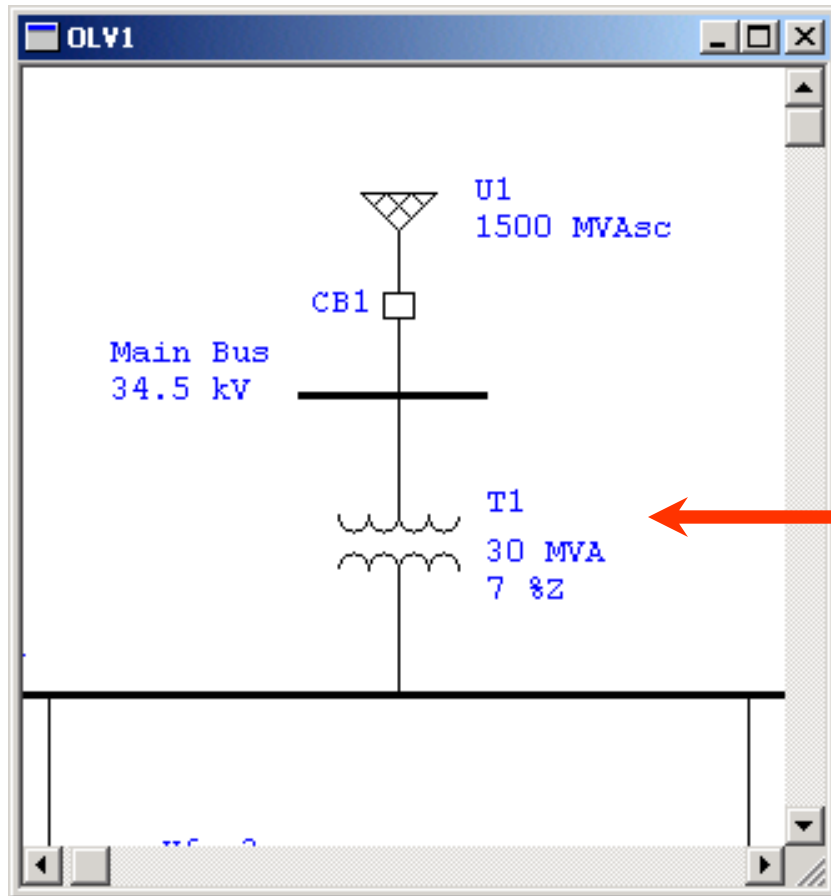
**Configuration Normal**



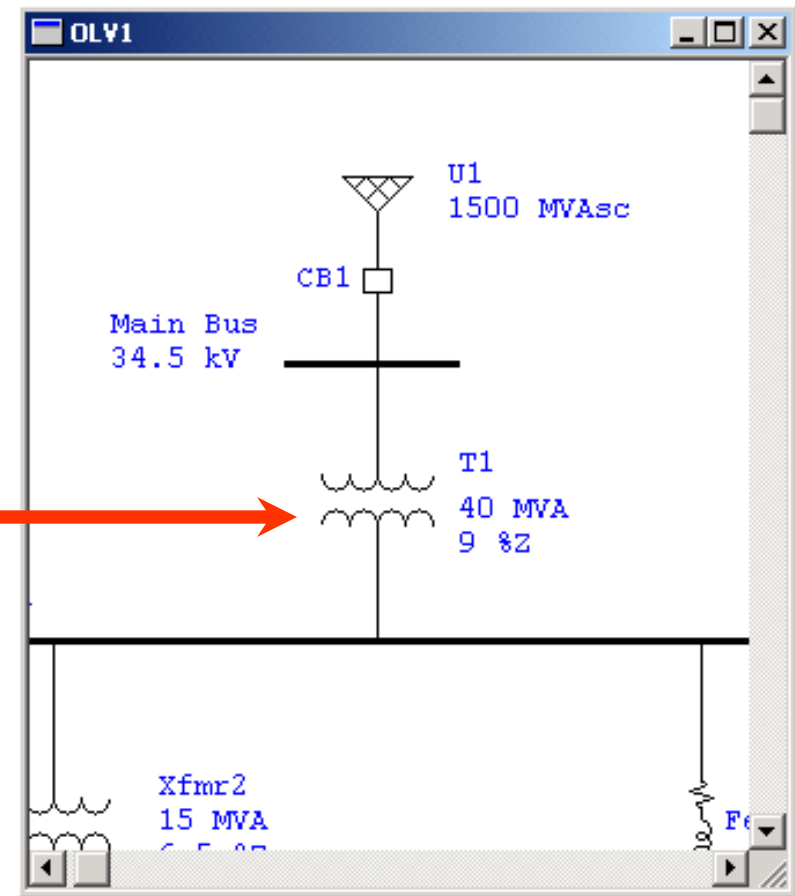
**Configuration GenOFF**

# Study Conditions

- Different Engineering Data



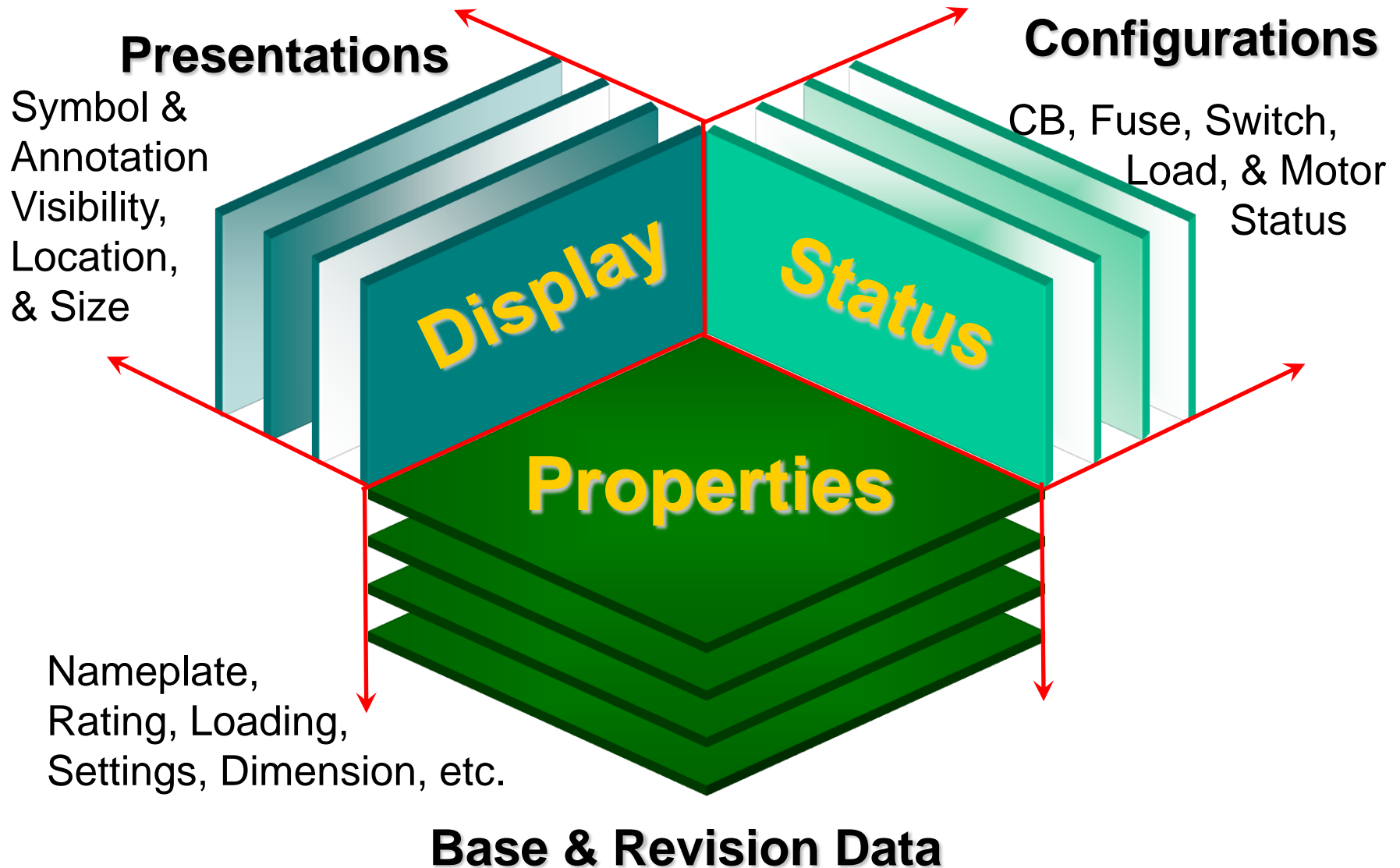
Revision Base



Revision Sub2a Mod



# 3-D Database

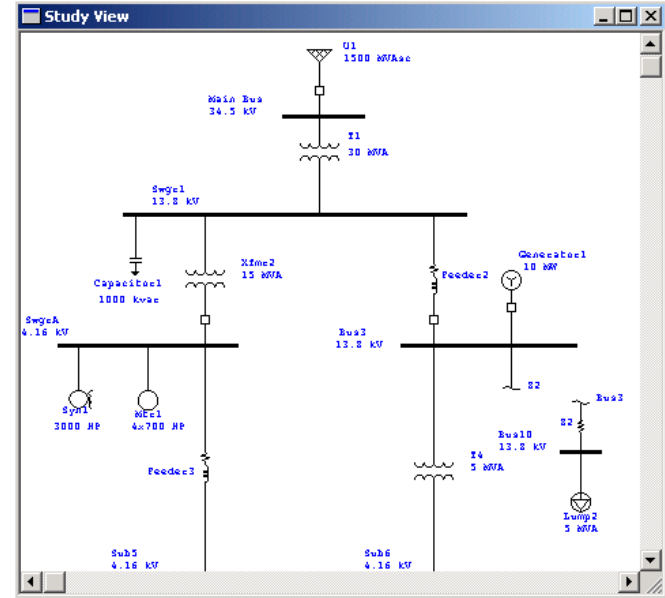
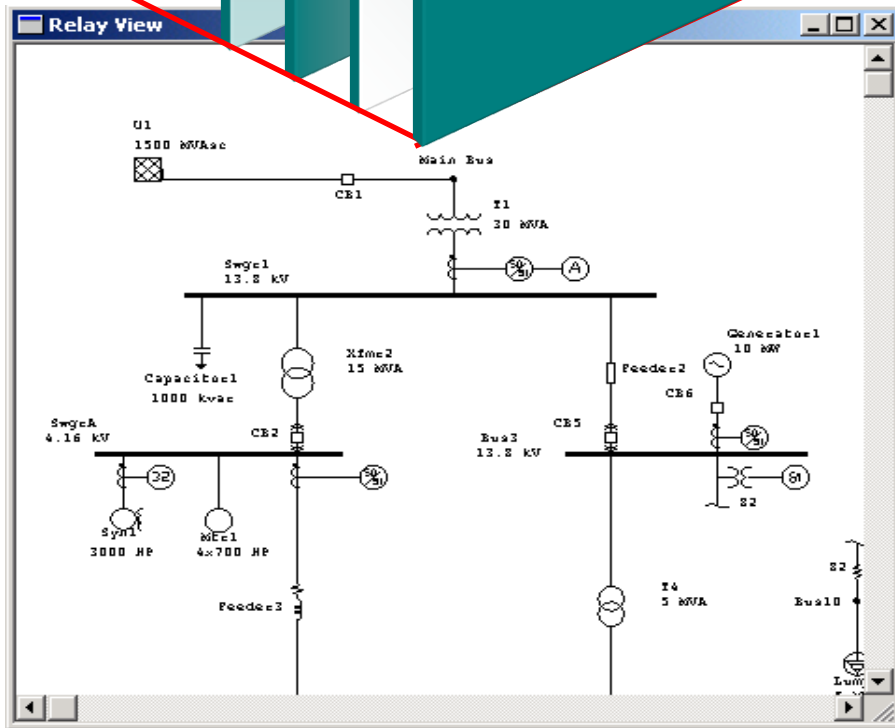


# Presentations

Symbol &  
Annotation

Visibility,  
Location,  
& Size

Display

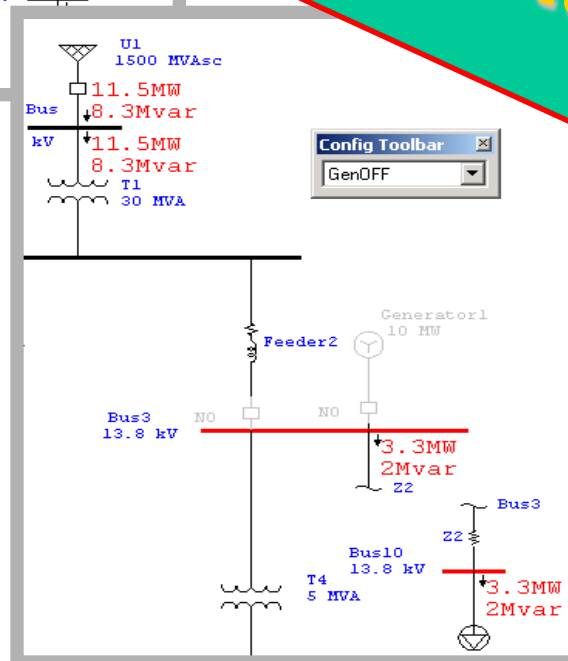
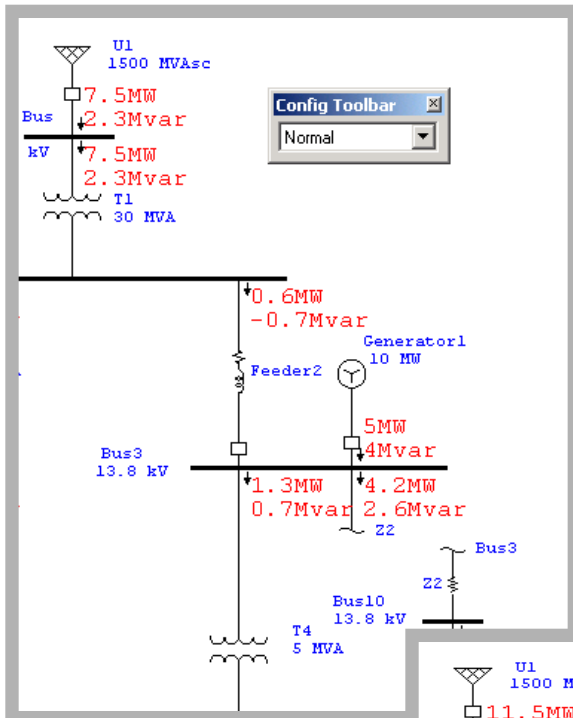
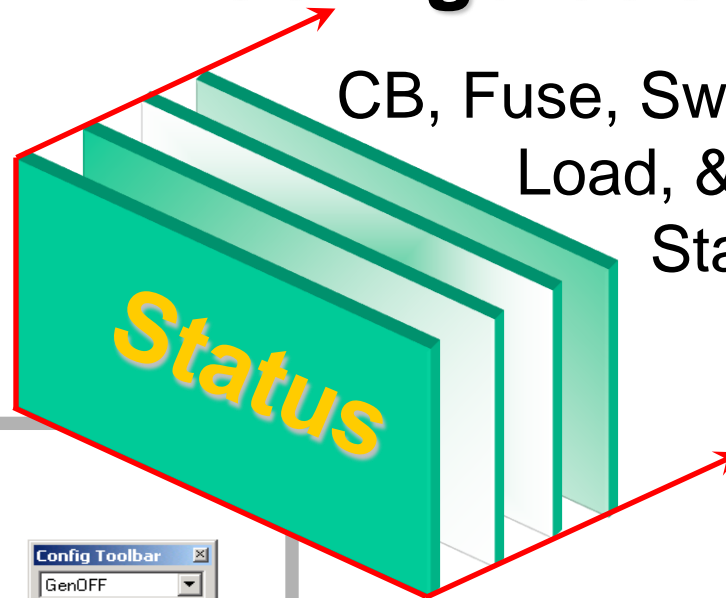


- ◆ One-Line Diagrams
- ◆ Impedance Diagrams
- ◆ Relay Diagrams
- ◆ Physical Diagrams
- ◆ Study Diagrams



# Configurations

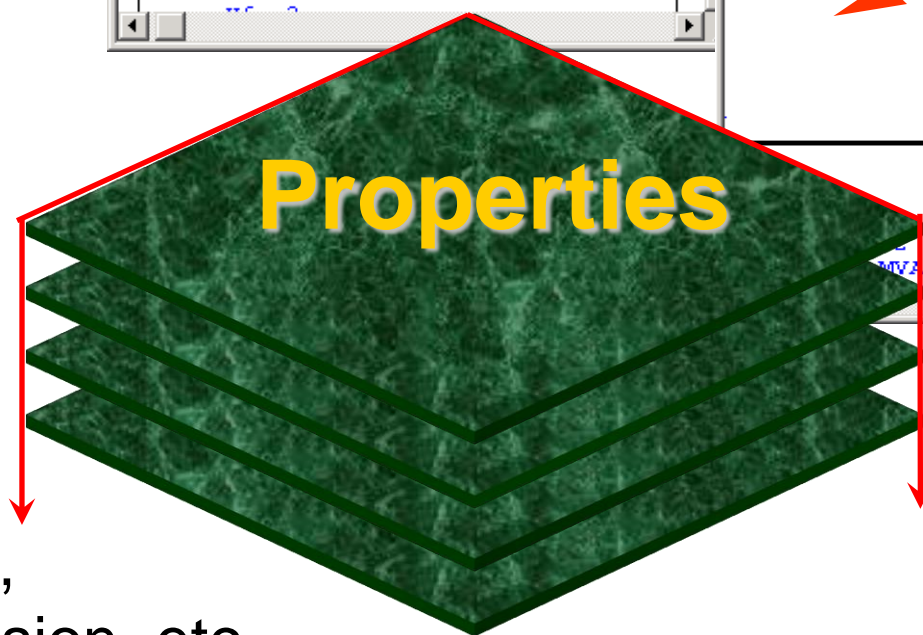
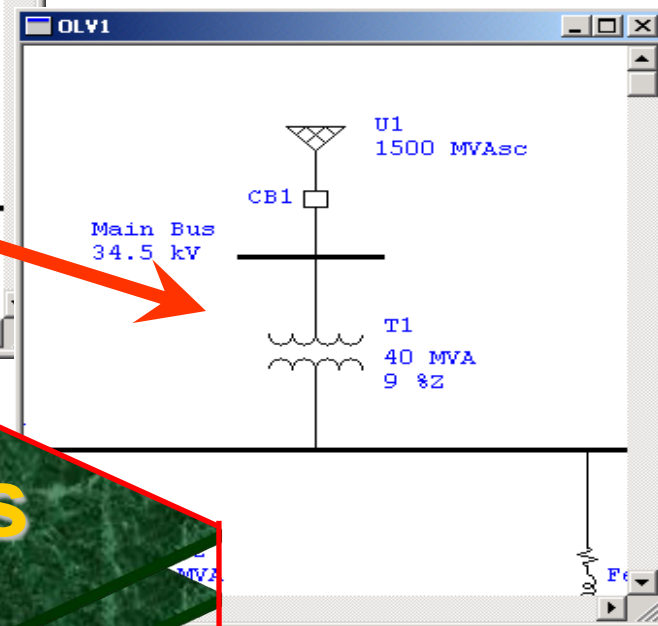
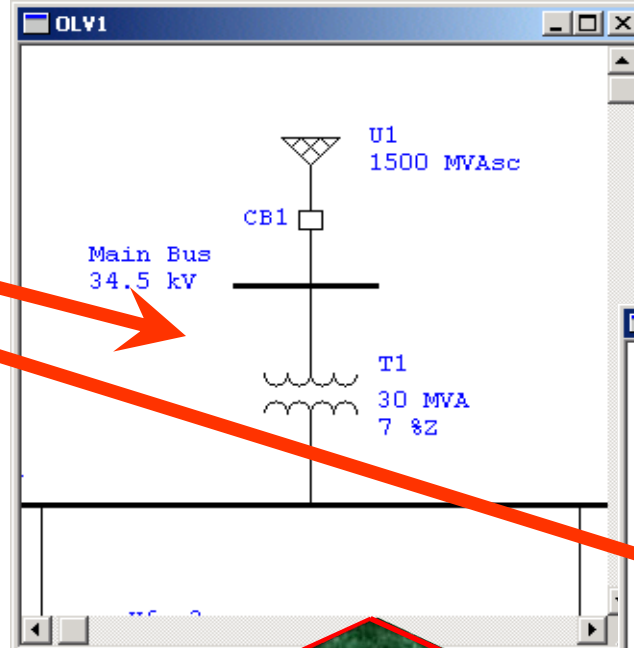
CB, Fuse, Switch,  
Load, & Motor  
Status



Revision

Base

- Base
- Sub 2a Mod.
- 1997 Mod.
- New Sub 3
- Revision 4
- Revision 5
- Revision 6
- Revision 7
- Revision 8
- Revision 9
- Revision 10
- Revision 11
- Revision 12
- Revision 13
- Revision 14
- Revision 15
- Sub 2b Mod.



Nameplate,  
Rating, Loading,  
Settings, Dimension, etc.

## Base & Revision Data

# User Access Management



## Group 1 Functions

**Move Elements**

**Change Element Size**

**Change Element Symbol**

**Change Element Orientation**

**Edit Engineering Properties**

**Change Operating Status**

**Hide or Show Protective Devices**

**Autoroute Connections**

**Change Bus to Node Symbols**

**Purge Data Revisions**

**Merge Data Revisions to Other Revisions**

The image shows a dialog box titled "Select Access Level" with a close button (X) in the top right corner. It contains two text input fields: "Project File" with the value "WrkShopEX2" and "User Name" with the value "Etapuser". Below these is a section labeled "Access Level" containing a list of radio button options: "Administrator", "Project Editor" (which is selected), "Base Editor", "Revision Editor", "Checker", "Browser", "Librarian", "Controller", and "Operator". At the bottom of the dialog are three buttons: "Help", "OK", and "Cancel".

# User Access Management



## Group 2 Functions

A screenshot of a software dialog box titled "Select Access Level". It has a blue header bar with a close button (X) on the right. Below the header, there are two text input fields: "Project File" containing "WrkShopEX2" and "User Name" containing "Etapuser". Below these is a section labeled "Access Level" containing a list of radio button options: "Administrator", "Project Editor" (which is selected and has a dotted border), "Base Editor", "Revision Editor", "Checker", "Browser", "Librarian", "Controller", and "Operator". At the bottom of the dialog are three buttons: "Help", "OK", and "Cancel".

**Add (Drop) Elements**

**Cut (Delete) Elements to Dumpster**

**Copy Elements from Dumpster**

**Paste Elements from Dumpster**

**Move Elements from Dumpster**

**Connect Elements**

**Purge Elements from Dumpster**

**Re-sizing Elements (UGS)**

**Merge Data Revision to Base Data**

**Graphical Adjustment of STAR Views**

# User Access Management

A screenshot of a Windows-style dialog box titled "Select Access Level". It has a close button (X) in the top right corner. The dialog contains two text input fields: "Project File" with the value "WrkShopEX2" and "User Name" with the value "Etapuser". Below these is a section labeled "Access Level" containing a list of radio button options: "Administrator", "Project Editor" (which is selected), "Base Editor", "Revision Editor", "Checker", "Browser", "Librarian", "Controller", and "Operator". At the bottom of the dialog are three buttons: "Help", "OK", and "Cancel".

## Group 3 Functions

**Change Phase/Ground mode in Star View.**

**Compute Time Difference in Star View.**

**View Alerts.**

**View Device Setting Reports.**

# User Access Management



## Project Editor

	Can Change	Cannot Change
User Access Management		X
Project Data / Defaults	X	
Base Data	X	
Revision Data	X	
Group 1 Changes	X	
Group 2 Changes	X	
Group 3 Changes	X	
Configuration Status	X	
Library Data	X	
Library Path	X	

Select Access Level

Project File: WrkShopEX2

User Name: Etapuser

Access Level:

- Administrator
- Project Editor
- Base Editor
- Revision Editor
- Checker
- Browser
- Librarian
- Controller
- Operator

Buttons: Help, OK, Cancel

# User Access Management

## Base Editor



	Can Change	Cannot Change
User Access Management		X
Project Data / Defaults	X	
Base Data	X	
Revision Data	X	
Group 1 Changes	X	
Group 2 Changes	X	
Group 3 Changes	X	
Configuration Status	X	
Library Data		X
Library Path	X	

**Select Access Level**

Project File: WrkShopEX2

User Name: Etapuser

Access Level:

- Administrator
- Project Editor
- Base Editor
- Revision Editor
- Checker
- Browser
- Librarian
- Controller
- Operator

Buttons: Help, OK, Cancel

# User Access Management



## Revision Editor

Can Change      Cannot Change

User Access Management		X
Project Data / Defaults		X
Base Data		X
Revision Data	X	
Group 1 Changes	X	
Group 2 Changes	X	
Group 3 Changes	X	
Configuration Status		X
Library Data	X	
Library Path		X

Select Access Level

Project File: WrkShopEX2

User Name: Etapuser

Access Level:

- Administrator
- Project Editor
- Base Editor
- Revision Editor
- Checker
- Browser
- Librarian
- Controller
- Operator

Buttons: Help, OK, Cancel



# User Access Management Checker



**Can  
Check**      **Cannot  
Change**

<b>User Access Management</b>		<b>X</b>
<b>Project Data / Defaults</b>		<b>X</b>
<b>Base Data</b>	<b>X</b>	<b>X</b>
<b>Revision Data</b>	<b>X</b>	<b>X</b>
<b>Group 1 Changes</b>		<b>X</b>
<b>Group 2 Changes</b>		<b>X</b>
<b>Group 3 Changes – Can Change</b>		
<b>Configuration Status</b>		<b>X</b>
<b>Library Data</b>		<b>X</b>
<b>Library Path</b>		<b>X</b>

**Select Access Level**

Project File: WrkShopEX2

User Name: Etapuser

Access Level:

- Administrator
- Project Editor
- Base Editor
- Revision Editor
- Checker
- Browser
- Librarian
- Controller
- Operator

Buttons: Help, OK, Cancel

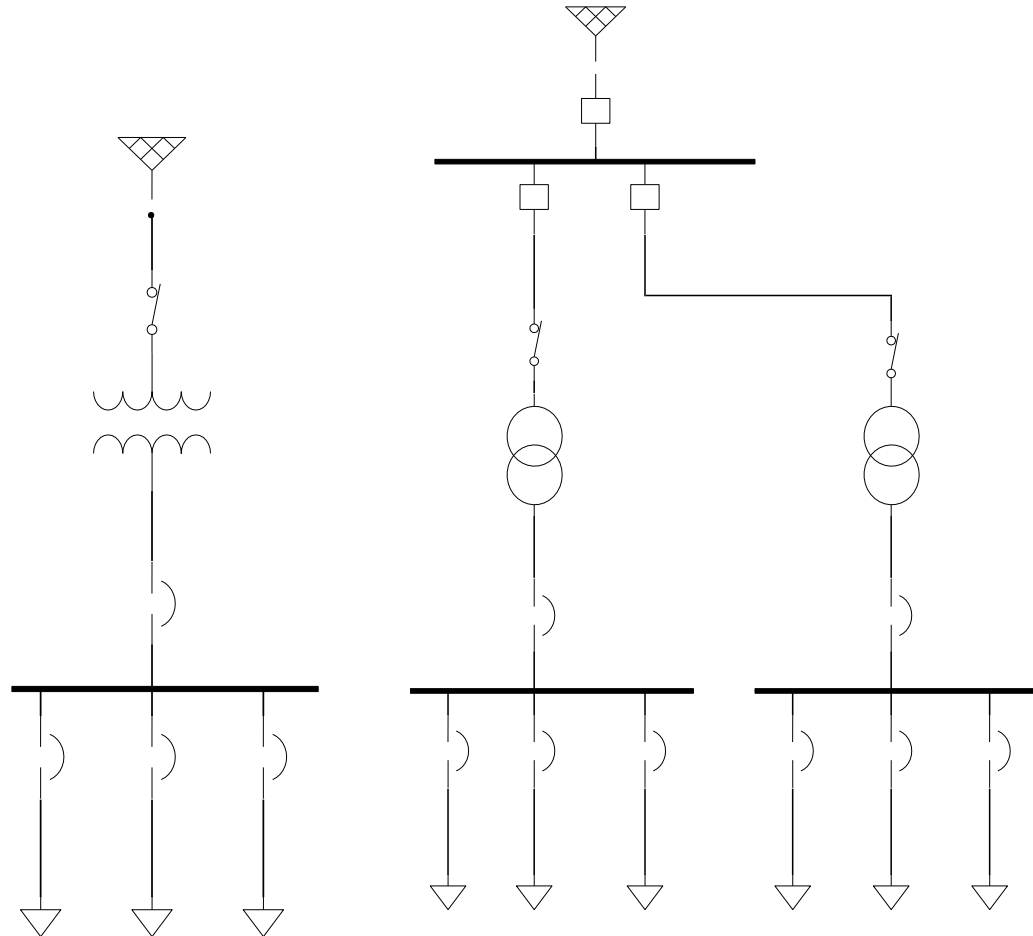
# Circuit Arrangements



- Radial System
- Loop System
- Primary Selective System
- Secondary Selective System

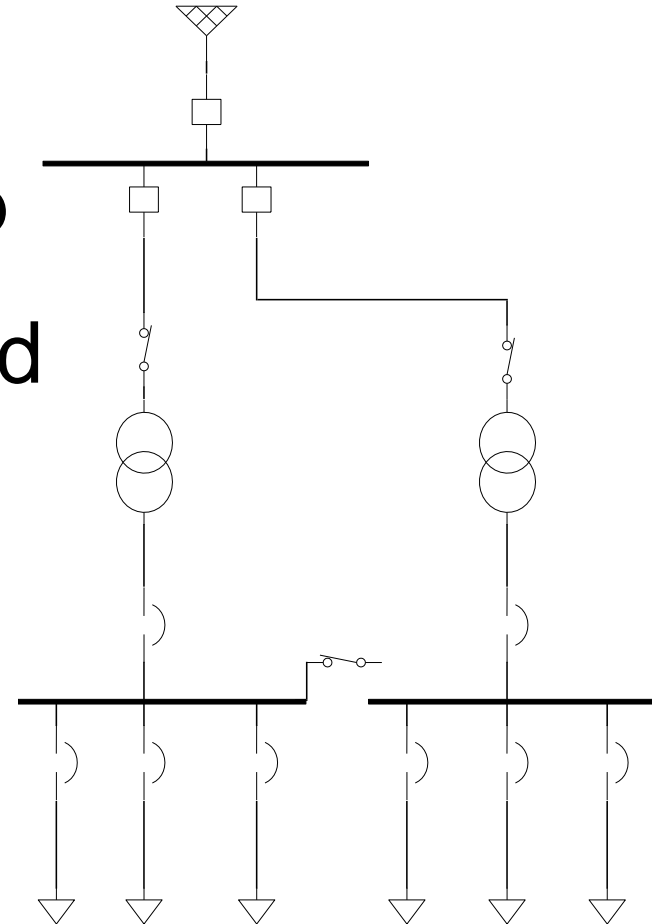
# Radial System

- Simple or Expanded Radial
  - Inverted tree
  - No duplications
  - Least Expensive
  - Simple in operation
  - Easy to analyze



# Loop System

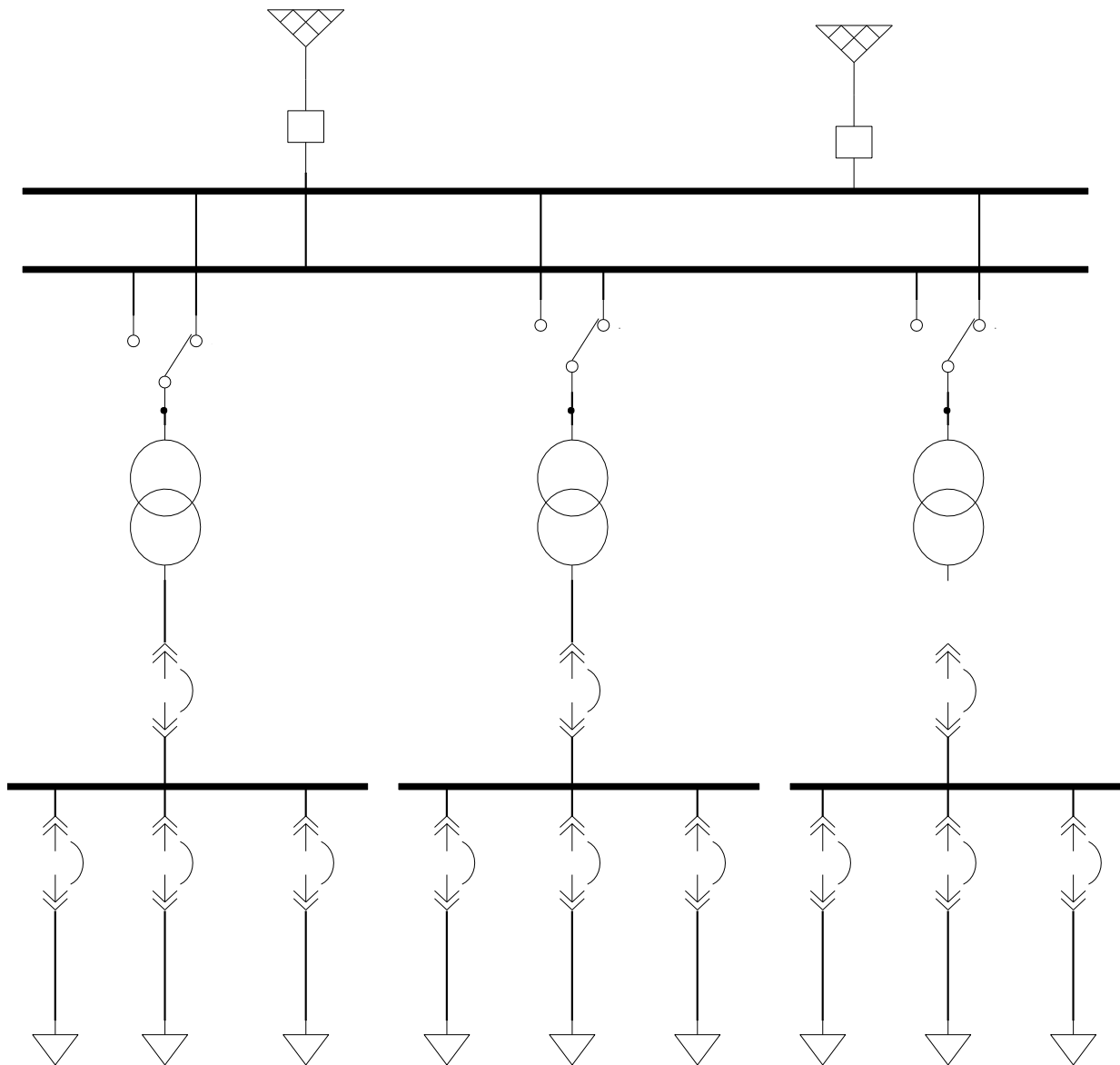
- Interconnected / Open Point
- Loads are tapped of the loop
- Loop could be open or closed
- More difficult for analysis
- Reliable



# Primary Selective System



- Each transformer is supplied by two sources
- Normal operation is to supply half the load from one source
- Manual or Automatic transfer of load
- Recommended



# Primary Selective System

# Secondary Selective System



- Each load can be supplied from either one of the transformers
- The tie breaker is usually normally open
- If one of the transformers is out of service, the tie breaker is closed and the total load is supplied by the remaining transformer
- Very reliable system