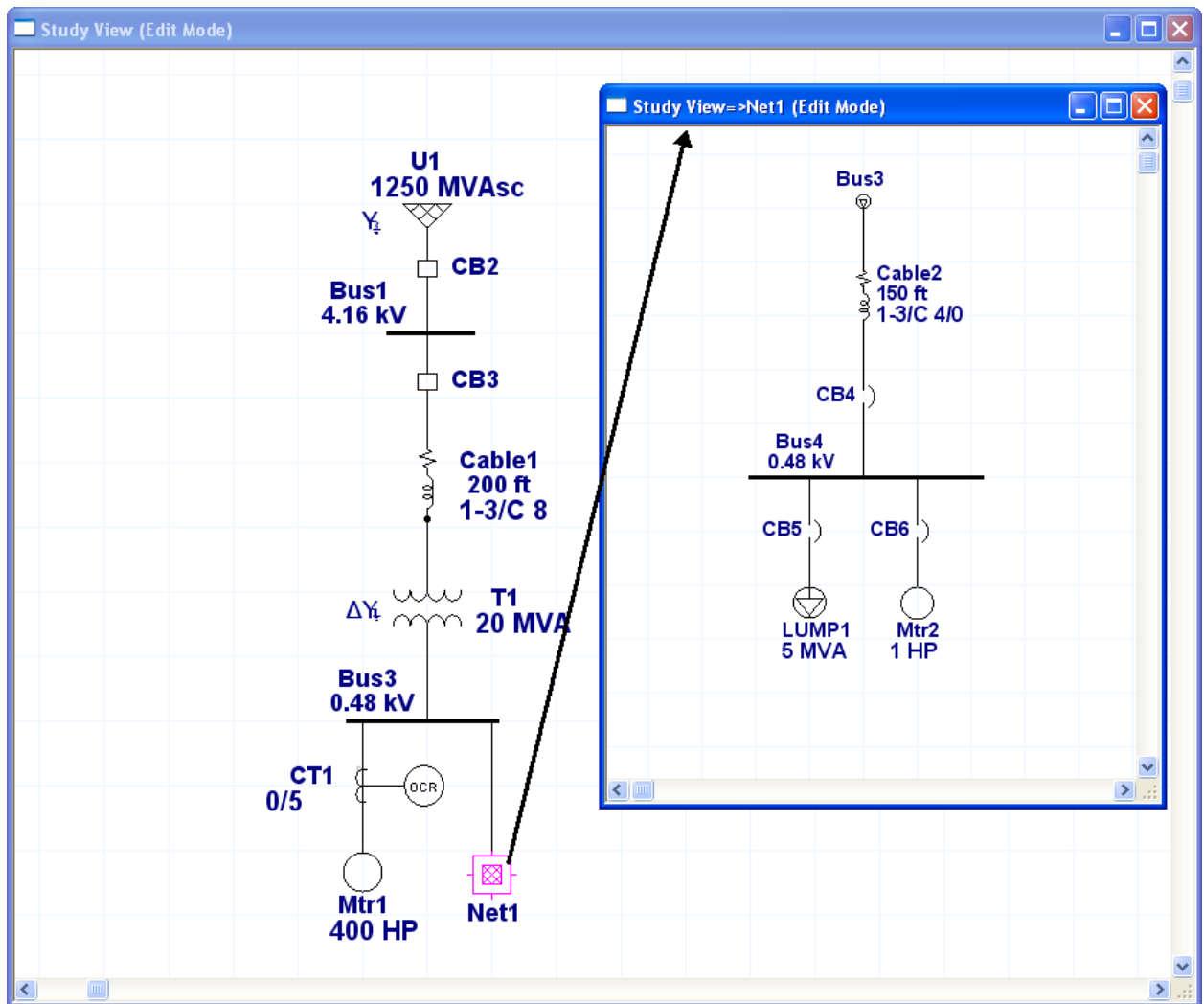



# Creating a One-line Diagram

The purpose of this tutorial is to show the fundamentals of building and manipulating a one-line diagram in ETAP. Various elements will be added to the one-line view (OLV), and an introduction to composite networks will be made. The figure below displays the one-line which we will create.



Final one-line diagram

## Creating a New Project

 Start ETAP Demo and select the option “New Project” for this tutorial.

## Adding Elements to the One-Live View

- To build or edit a one-line diagram in ETAP, you must be in Edit Mode. Click the Edit button on the Mode toolbar.






- On the AC Edit toolbar, select a Power Grid (Utility) element by clicking on the Power Grid button. The cursor will change to the Power Grid icon when moving over the OLV. Click anywhere in the OLV to place a Utility on your one-line diagram.

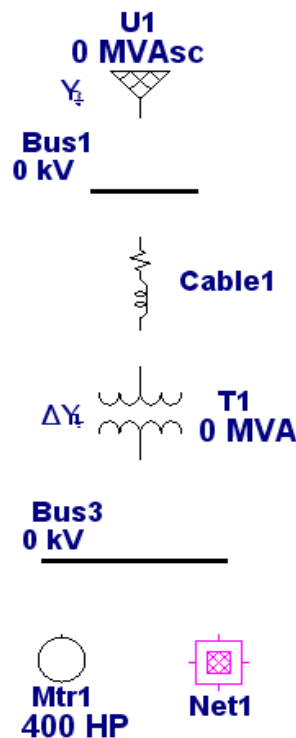
- By following the same procedure, insert the following elements until your one-line appears as follows:

### ☺ Helpful Tips...

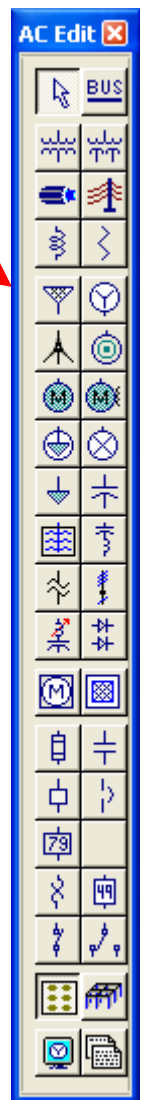
Double-clicking on an element button allows you to drop it more than once. When finished just press the Esc key.

### ☺ Helpful Tips...

You can zoom in , zoom out , and zoom to fit page  the OLV by clicking on the respective buttons located in the Project Toolbar.



Power Grid 

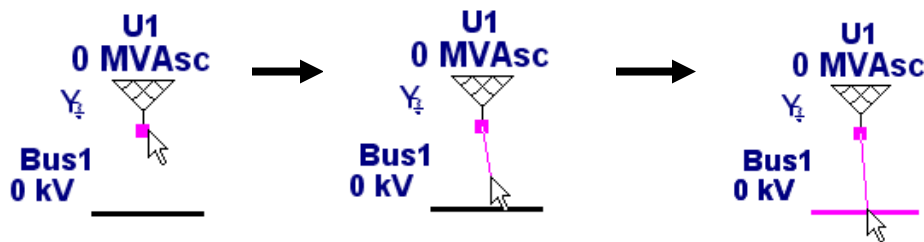


- You can stretch buses by placing the mouse pointer over either end of the bus, until a double arrow appears. Then click and drag to the desired length.



## Connecting Elements

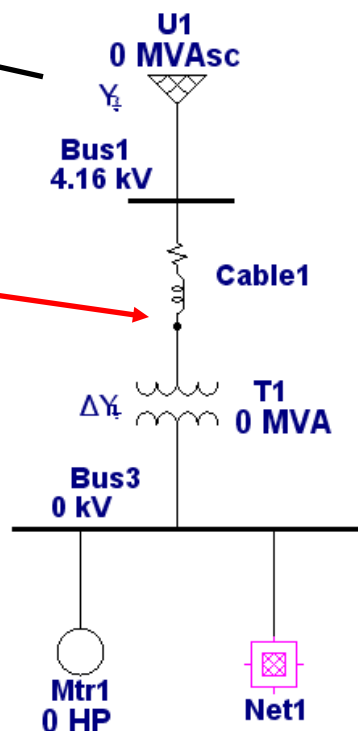
☞ Now connect the elements in the one-line. Place the mouse pointer over the connection pin of an element, and it will turn red. Then click and drag to the connection pin of another element. Follow this procedure to connect all the elements on the one-line. In the case of buses, the entire element graphic functions as a connection point. Notice that a node is automatically inserted when connecting the cable to the transformer.



### ☺ Helpful Tips...

You can change the size, orientation and symbol standard for an element by right-clicking on the element and selecting the attribute you would like to change.

Node automatically inserted



**Power Grid U1**  
1250 MVAAsc  
X/R = 120

**Cable1**  
NEC 5.0kV 3/C  
CU, 133%  
Size = 4/0  
Length = 200ft

**Transformer T1**  
Prim. kV = 4.16kV  
Sec. kV = 0.48kV  
20 MVA  
%Z = 6  
X/R = 17

**Motor Mtr1**  
400 HP

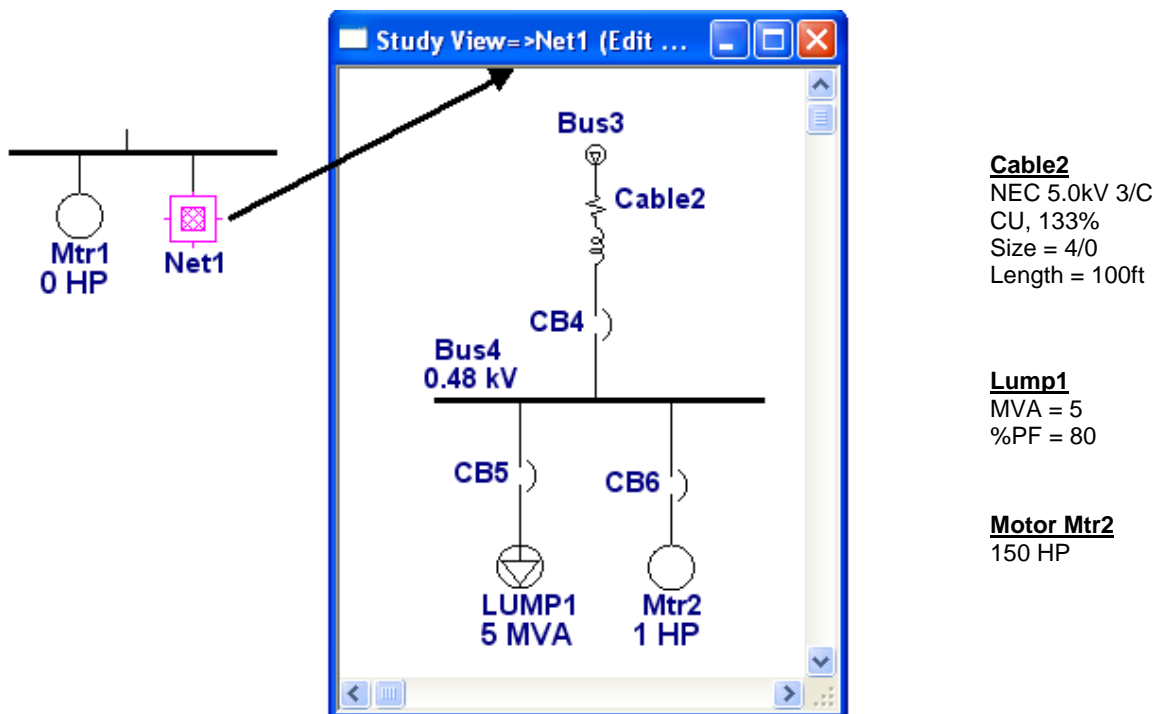
- Enter the values for the elements shown in the figure above referring to the Editing Element Properties leaflet. Notice how the voltage of the buses are automatically updated to the value of the primary and secondary kV entered into the transformer properties.

## Adding Elements into a Network

- Populating a composite network is very similar to populating the first one-line. To open the composite network, double-click it's graphic. The title of this window will be OLV1=>Network1. You may change its name by double-clicking anywhere inside the network's OLV or by right-clicking on its graphic and selecting Properties. Connect the elements shown below to create a one-line diagram as was done previously. Now, to make this one-line look cleaner, you can right-click and select Hide Unconnected Pins.

### ☺ Helpful Tips...

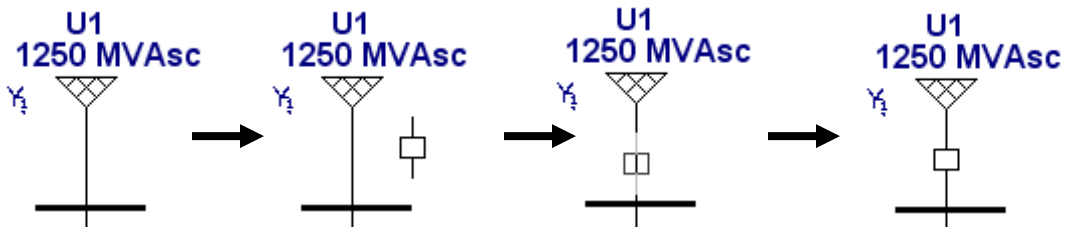
Using composite networks helps making large one-line diagrams manageable.




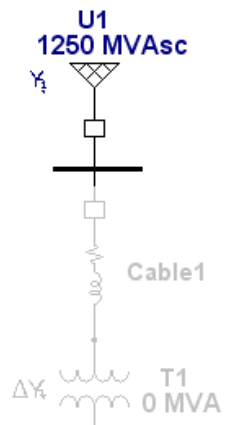
## Adding a Protective Device (PD) to your One-Line

- Ensure that there is enough room between the elements you wish to add a PD. Adding a PD to your one-line does not require you to delete the line connecting the elements, instead, insert the PD on to the line where you like it to be. The PD will automatically

connect to the line. Follow this procedure to add the remaining PDs shown in the final one-line.



To check if an element is energized click on the continuity icon  located in the project toolbar. All elements that are not energized will be grayed out. For example, with the continuity check on, open CB4. As shown in the figure to the right, CB4 and elements downstream are grayed out



Creating a one-line diagram in ETAP is fast and easy. Once complete, you can take full advantage of all the powerful tools that ETAP has to offer.