Power Management Based on Smart Grid Substation by Using Plc & Scada

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Abstract- Automated substations provide the information needed to maintain uninterrupted power to the customer at a low maintenance cost. Substation's function and operation can be monitored and controlled from remote location by using PLC(programmable logic controller) and obtained supervisory control and data acquisition(SCADA) data collection and control capabilities at substation. In power management, the control of low voltage and turn on the generator set automatically which is installed at the substation in case of low voltage and monitors all electrical parameters on PC by using SCADA is done and plc control the voltage. Further electricity cost further reduces by use of solar power generation as a smart grid which is a modern electric power grid infrastructure. The application implemented in PLC is on ladder logic using RS logix and RS Links software and SCADA software used is factory talkview .

Keywords- RS logix software, RS Links software, Scada software, PLC (Allen Bradley, micrologix 1400), Solar Panel, Inverter, Current to Voltage converter.

I. INTRODUCTION

The basic idea behind the power management project is to manage the power in different loads .These loads are models for the various areas of the city. If the load in any area get increase then the chances of failure or power station trip cxincreases so to avoid it we formed this circuit which disconnect any of the load when load increases.

Disconnection of load depends upon priority which varies as per time. we can assign priority as per current requirement for charging of load. Because of increase in excess loads the power plant may get trip. But the amount of money required for restarting this power plant is much more . So when the load increases it is advisable to disconnect excess load from the total load . And we developed this process of connecting and disconnecting loads automatically in our power management project.

## II. BLOCK DIAGRAM OF POWER MANAGEMENT SYSTEM
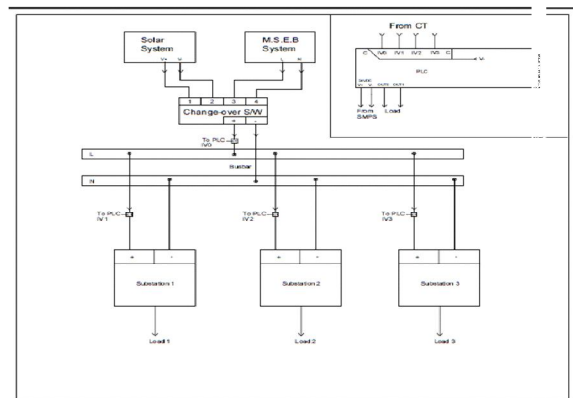
III. CIRCUIT DIAGRAM
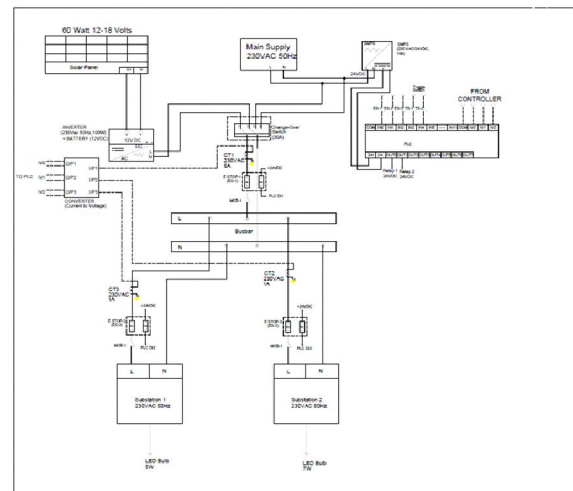
IV. LADDER DIAGRAM

When start button pressed process will on. The SCP instruction (scale with parameters) is used for scaling the analog value of current transformer. Total three current transformer are used one for master station and other two for substation. As the load connected to substation the values of current transformer will changes . We will get the values in

the form of voltage 0 to 10V ,as the PLC analog card in voltage mode
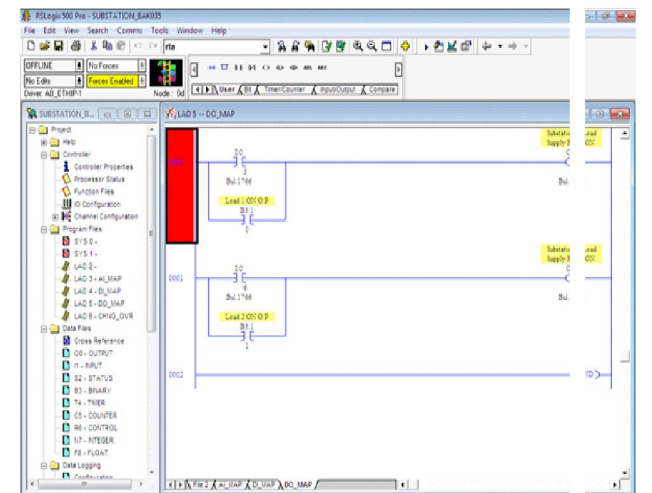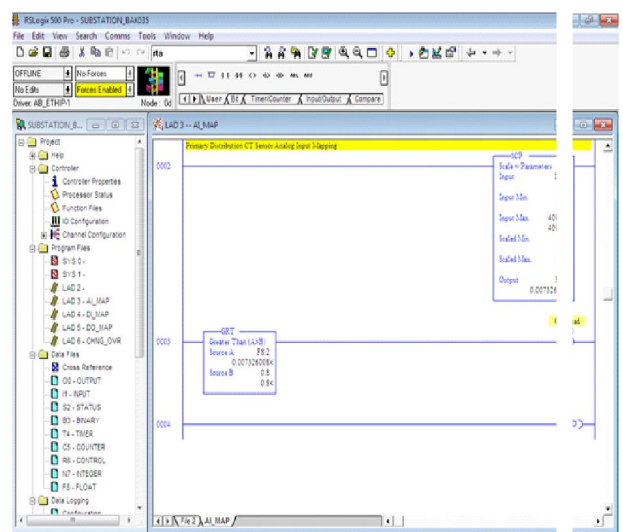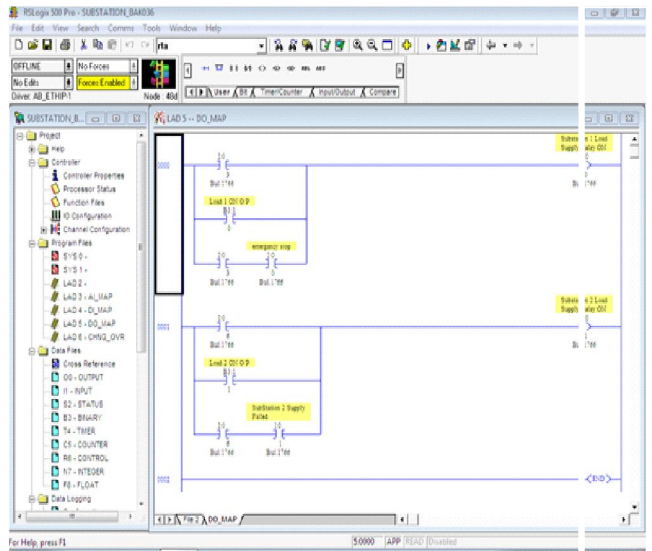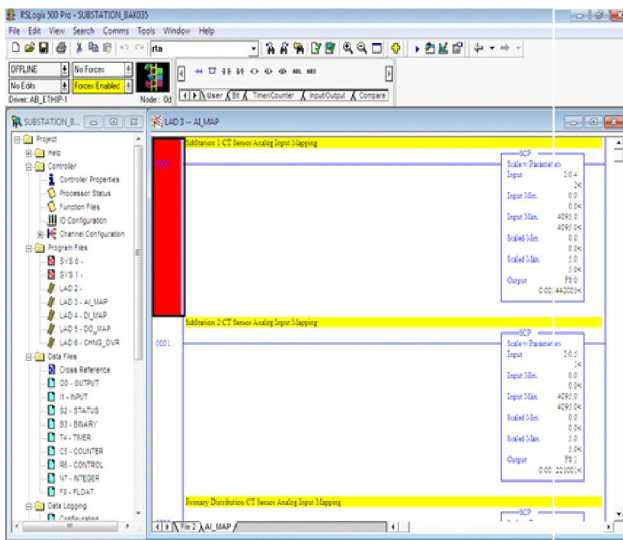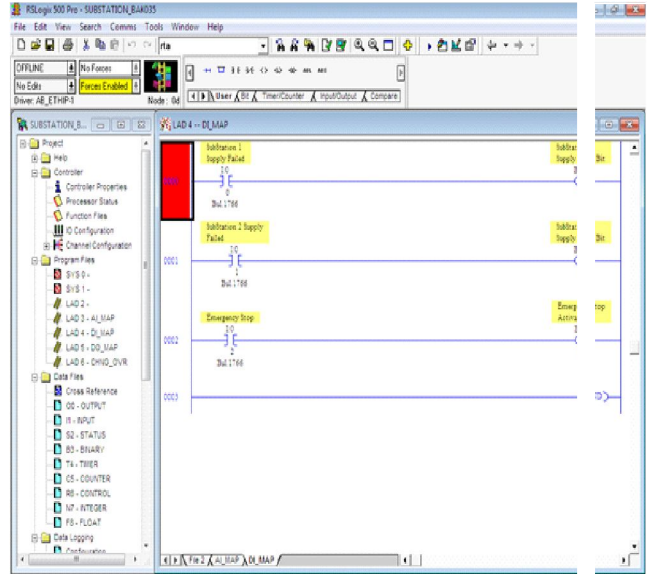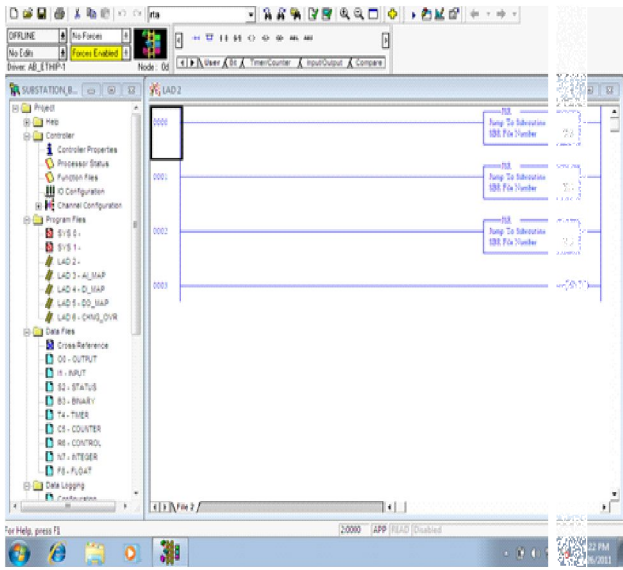
We set the overload condition that when CT value crosses 3, It will be overload and when it is below 1 under load condition set. When overload condition set , we get indication in ladders and also in hardware . For this overload condition power can be used from another substation. As load to substation changes power , requirement changes . The values of SCP instruction is stored output which is compared by using compare instructions like greater than and less than to show the load value.

V. APPLICATION

It can be used for State estimation.
It can control voltage VAR.
It is used for Operation monitoring.
It can be used for Fault management and system restoration.
It can balance load via feeder reconfiguration.

VI. ADVANTAGES

Automatic or the manual control is possible.

The substation automation approach is very reliable, user friendly using PLC and SCADA.

Only pressing a single switch on the control panel the whole substation will operate automatically.

Speed of the operation of the equipments also increases.

Fault tracing in any part become quite easy.

Ease of maintenance

VII. RESULT

Cutting off supply and diverting the flow of supply if a line is faulty , protecting the load from getting damaged

Reduction in the overall generation cost of the system by using solar energy for power generation which improved flexibility of the smart grid, permits greater penetration of highly variable renewable energy sources.

Management of power and automatic detection of low voltage at the substation, so that we can reduce poor performance of lights, fans, computers etc. and for the online monitoring of the various electrical parameters.

VIII. HARDWARE OF POWER MANAGEMENT SYSTEM
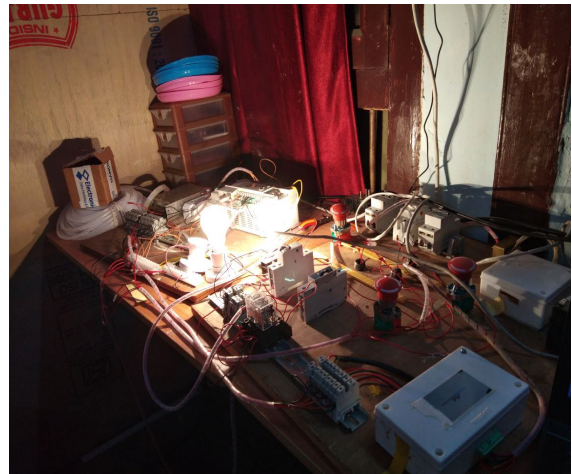
IX. CONCLUSION

The aim of our power management project is to manage load automatically or connect or disconnect them according to priority or requirement. These loads are models for the different areas of the city. If the load in any area increases then the power station may get trip due to excess load which is more than its capacity. The amount of money required to restarting such power station is large. So for avoiding such problem the excess load must me disconnect. So this process for connecting n disconnecting of load automatically has implemented in our POWER MANAGEMENT project. We have developed a circuit for such operation. With this there is reduction in the overall generation cost of the system by using solar energy for power generation which improved flexibility of the smart grid, permits greater penetration of highly variable renewable energy sources.

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