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PLC SCADA based Distribution Monitoring & Control

Abstract

In today's world most of the systems are operate on automation. Because of that the automotive systems are most efficient. Automation means use of Programmable Logic Controller(PLC) & Supervisory Control And Data Acquisition(SCADA) instead of electromechanical devices.PLC & SCADA based distribution monitoring & control means use of automotive system in electrical distribution system for monitoring the electrical parameters(like voltage, current, power factor, etc) & controlling if any fault occurs in electrical system with the help of personal computer(PC).

Main concept of our paper is data acquisition & controlling by using SCADA software PLC. Here PLC is a medium between electrical system & Personal Computer for SCADA to take input and output bits. . Automating electrical distributions systems by implementing a supervisory control and data acquisition (SCADA) system is the one of the most cost-effective solutions for improving reliability, increasing utilization, increasing efficiency and saving costs. Nowadays consumer requires more reliable & efficient power supply. So we can use automation systems as per the consumer requirement.

Keywords: *Data acquisition and supervisory control, distribution system, programmable logical control(P.L.C)*

1. INTRODUCTION

Now days there are various electronic equipments available for remote operation of power distribution system control. However, the main disadvantage of these systems is that they can be operated only from short ranges and also less reliable. Thus, to overcome the above drawbacks, we are using SCADA system.

"PLC and SCADA Based Power Distribution Monitoring" the name itself says that the electrical parameters (voltage, current and power factor) can be monitored in Computer (PC) by using SCADA Software. In this paper the PLC works as a mediator between L.T. power distribution and PC at second level. PLC will collect data related to electrical power and build a link with the consumer side i.e. the Windows OS based PC then it gives the continuous power monitoring according to the used load on SCADA.

2. LITERATURE SURVEY

The present day Supervisory Control and Data Acquisition (SCADA) systems consisting of SCADA hosts, Remote Terminal Units (RTUs) and field devices monitor and control process equipment and systems from multiple locations and exchange data from various distributed control systems along the local and wide area networks.
Main concept of our paper is "Data Acquisition and Control using PC". We are going to read the electrical data by the use of PLC and SCADA. Then the entire data will be displayed on SCADA. According to the readings controlling actions will be taken by the operator.

3. SYSTEM BLOCK DIAGRAM

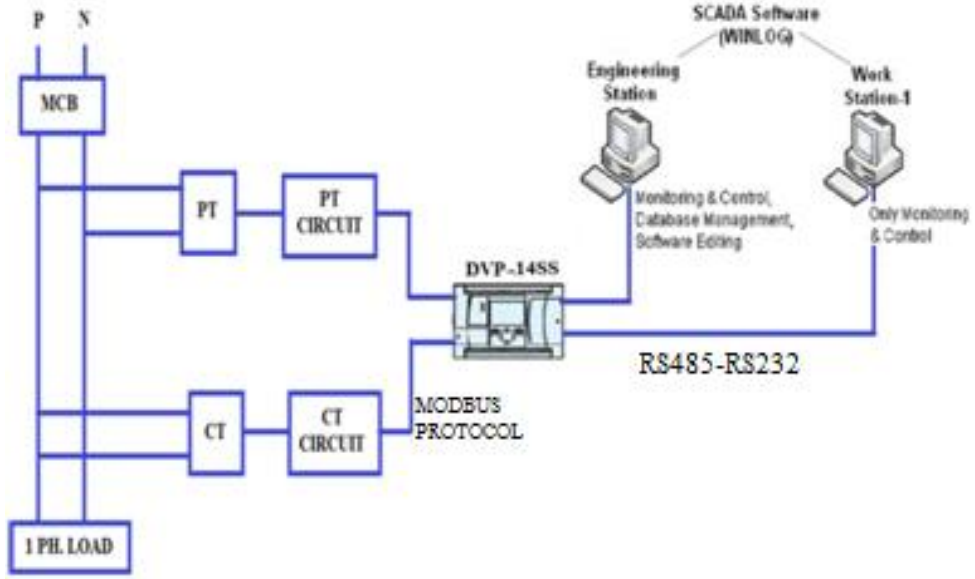

Fig.1 System Block Diagram

3.1 Working Principle

1. In this block diagram we consider only a single phase load for monitoring & controlling. Here we used various equipments for monitoring & controlling. A single phase two wire supply is given to load .
2. After MCB, current transformer is connected in series with load& potential transformer is connected across phase and neutral, the secondary of PT and CT are connected to 'Voltage and Current Measurement Circuit'. The output terminals of this circuit are connected to analog input of PLC.
3. Then output terminals are brought out to connect single phase load.
4. Then we can monitor & control the load from engineering station & work station with the help of SCADA

4. HARDWARE USED

1. Programmable logical controller(PLC)
2. Miniature circuit breaker(MCB)
3. Potential Transformer (PT)
4. Current Transformer (CT)
5. PT & CT Circuit

5. PLC INTERFACING WITH SCADA

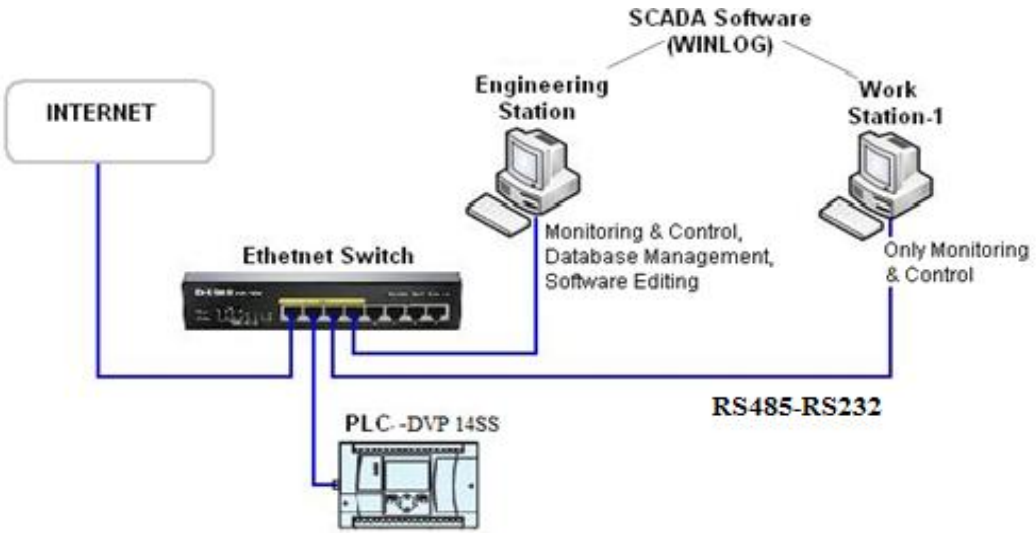

Fig 2. Interfacing of PLC with SCADA

6. COMMUNICATION PROTOCOL

6.1 MODBUS PROTOCOL

6.1.1 Introducing Modbus Protocol

This protocol defines a message structure that controllers will recognize and use, regardless of the type of networks over which they communicate. It describes the process a controller uses to request access to another device, how it will respond to requests from the other devices, and how errors will be detected and reported. It establishes a common format for the layout and contents of message fields. Fig. 5 shows how devices might be interconnected in a hierarchy of networks that employ widely differing communication techniques. In message transactions, the Modbus protocol imbedded into each network's packet structure provides the common language by which the devices can exchange data.

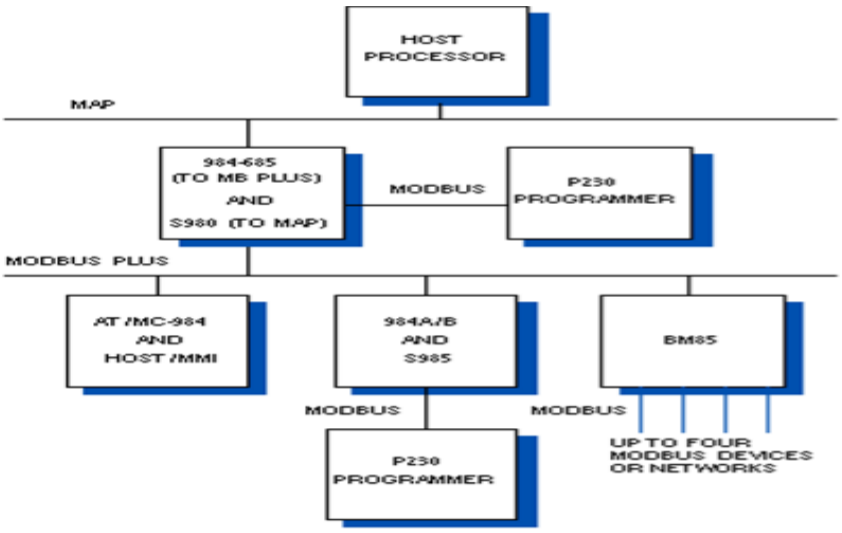

Fig.3. Overview of Modbus Protocol Application [7]

6.1.2 The Two Serial Transmission Modes

Controllers can be setup to communicate on standard Modbus networks using either of two transmission modes: ASCII or RTU. Users select the desired mode, along with the serial port communication parameters (baud rate, parity mode, etc), during configuration of each controller. The mode and serial parameters must be the same for all devices on a Modbus network.

The selection of ASCII or RTU mode pertains only to standard Modbus networks. It defines the bit contents of message fields transmitted serially on those networks. It determines how information will be packed into the message fields and decoded.[8]

7. FLOW CHART FOR PLC PROGRAM EXECUTION

The ladder program is then executed rung-by-rung. Scanning the program and solving the logic of various ladder. determine the outputs states & the output values held in memory are used to set and reset the physical output of plc ,simultaneously at the end of program scan, the software monitors the real time electrical parameters (like voltage, current, power factor, etc) with the help of PLC and SCADA

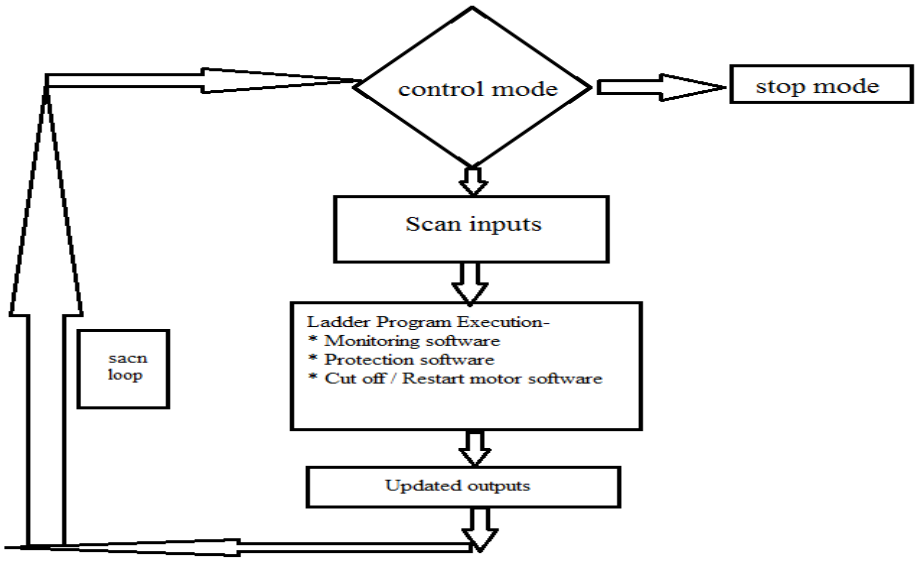

Fig.4 flowchart of the Main Block Diagram

8. CONCLUSION

PLC and SCADA System is used for monitoring the various electrical parameters (voltage, current, power factor etc). By using these parameters, we can easily control any load in our system to improve system operation, system reliability, etc. alternatively, SCADA and PLC communication system make it possible to integrate protection control and monitoring electrical parameter together for maximum benefit.

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