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Study on Industrial Automation: PLC Control System

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Abstract: *In today's world most of the systems are operate on automation. Control and particularly Electrical Control, forms an Integral part of any industry, be it a big process Because of that the automotive systems are most efficient. Automation means use of Programmable Logic Controller (PLC) of electromechanical devices. PLC based distribution monitoring and control means use of automotive system in electrical distribution system for monitoring the electrical parameters (like voltage, current, power factor, etc.) and controlling if any fault occurs in electrical system with the help of personal computer (PC).*

Keyword: *Industrial automation; Programmable Logic Controller; Electromechanical Devices*

1.INTRODUCTION

The A PLC can be considered as a versatile version of such a controller. It is device, which can accept multiple inputs, of different kinds, of different voltage levels, from various different devices and different parts of a process or a machine.

The programming of a PLC is generally done though programming software or a dedicated programming terminal. Because of this flexibility of programming that a PLC offers a PLC finds much different, almost endless application in the industry. This is mainly because of the advantages that automation offers.

Some of these advantages include:

- ✓ Increase in Productivity
- ✓ Reduction in Running Cost
- ✓ Precision in Control
- ✓ Efficient Operation
- ✓ Early/Predictive Fault Notification
- ✓ Safely in Operation for both Man and Machine

2.PROGRAMMABLE LOGIC CONTROLLER (PLC)

A programmable logic controller, PLC is a digital computer used for automation of typically industrial electromechanical processes, such as control of machinery on factory assembly lines etc. It is a solid state user programmable control system with functions to control logic, sequencing, timing, arithmetic data manipulation and counting.

2.1 PLC Inside

The PLC chiefly consists of a mainframe, memory areas, and applicable circuits to receive input/output knowledge. We are able to truly think about the PLC

To be a boxpacked with lots of or thousands of and knowledge storage locations. Counter and timers can be thought of software package Counters, timers etc. These relays square measure simulated through bit locations in registers.

2.1.1 Applications

Process control system, Complex control system, heavy industrial control

2.2 Architecture of a PLC

PLC architecture is similar to that of a computer or any other microprocessor based device. General Architecture of a PLC is shown in Figure 1. It consists of:

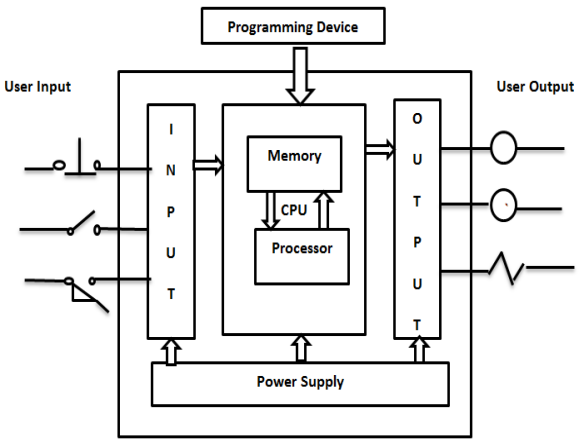

Figure 1 General Architecture of a PLC

Input Side: Through which a PLC can receive signals from various device such as Push Buttons, Proximity Sensors, and Limit Switches etc.

Output Side: Through which a PLC can control various devices such as Motor Starters ,Indicator

Lamps, Actuators etc.it is only the input and the output side that facilitate electrical interface of a PLC with the field devices.

CPU: Which consists of **Memory**: Where all the programs and data are stored for processing. This data could be the initial data received from field, the intermediate results generated by the program, the program itself, or the data ready to be transferred to the field. This memory is pre-formatted in a PLC to give a proper segregation the program area, the data area, and the area reserved for internal processing.

Processor: Which processes the data as per the program stored in the memory and generates appropriate results.

Power Supply: Which facilitates power supply for the entire PLC assembly to operate. A point worth mentioning here is that PLC is a device, Which has been designed to suit the industry.

2.3 PLC Operations and Working Principle:

A PLC works by frequently scanning a program. We can factor of this scan cycle as consisting of 3 necessary steps. There are generally over 3 however we will specialize in the necessary elements and not worry regarding the others. Typically, the others are checking the system and updating the present internal counter and timer values.

Check input status: Initial the PLC takes a glance at every input to see if it's on or off in different words, is that the device connected inputs on however regarding the second input then there on checks all the connected input. It checks all the connected inputs.it records this knowledge into its memory to be used throughout the step.

Execute Program: Next the PLC executes your program, one instruction at a time. is also your program a for mentioned that if {the initial |the primary} input was on then it ought to activate the primary output ought to be turned on supported the state of first input. It will store the execution results to be used later throughout subsequent step.

Update Output standing: Finally the PLC updates the status of the outputs supported that inputs were on throughout the primary step and results of death penalty your program throughout the second step. Supported the instance in step two it might currently activate the primary output as a result of the primary input was on and your program aforementioned to show on the primary output once this condition is true. Once the third step, the PLC goes back to step one and repeats the steps continuously. One scan time is defined as the time it takes it executes the 3 steps.

Ordering Specification:
Power Supply: AC/DC, 220V AC/24 V DC.
Configuration: Total Input and Output Details-Digital and Analog. PLC Series must be selected.

2.4 PLC Schematic

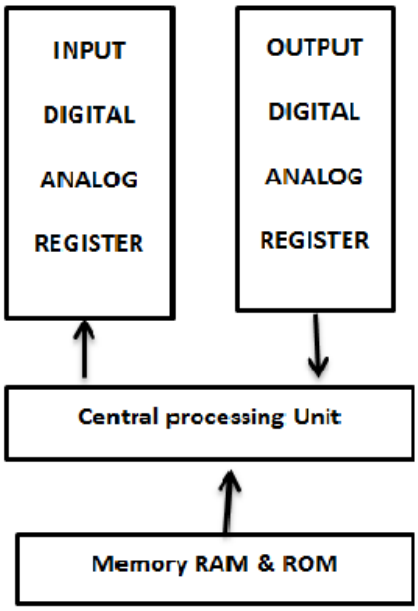

Figure 2 PLC Schematic

Central Processing Unit: Central Processing Unit is a microprocessor-based unit that executes the logical program stored in the memory.

Memory RAM & ROM: Memory unit generally consists of RAM & ROM unit allows the CPU to internet the program stored in the RAM and executes it. The RAM is backed by on board dry cell or rechargeable batteries, which retains the program stored in it, in case of Power Switch OFF of a PLC. In the latest versions of PLC, Electrically Erasable Programmable Read Only Memory is used in RAM to store the program, which does not require battery backup. The program is developed by using special software & PC or by using specially designed Programming Units.

Digital Input: Digital Inputs are given in terms of DC Voltage. Depending on the requirement, one can choose the option amongst various voltage levels. Resistive circuitry, TTL Logics or Opt couplers are used providing good flexibility in PLC Input modules. Discrete input is also known as Digital or Binary Input and is given in terms of single 0 or 1 to CPU.

Digital Output: Digital Output is given by PLC by using Low-level TTL logics or high voltage DC levels or AC levels by using SCRs. In some cases Relay contacts are also made available. Analog

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Output is given in terms of standard 0~10V dc or 4~20Ma dc levels.

Digital Input & Output: Digital Input & Output need to be configured as either NPN or PNP Configurations. They are also known as Sinking & Sourcing configuration respectively. PLC Schematic shown in Figure 2.

2.5 PLC Cycle

During the normal course of action of a PLC, Which also known as run mode for a PLC, it goes through a set of different steps, which it keeps on repeating again and again. This set of steps is termed as an operating cycle.

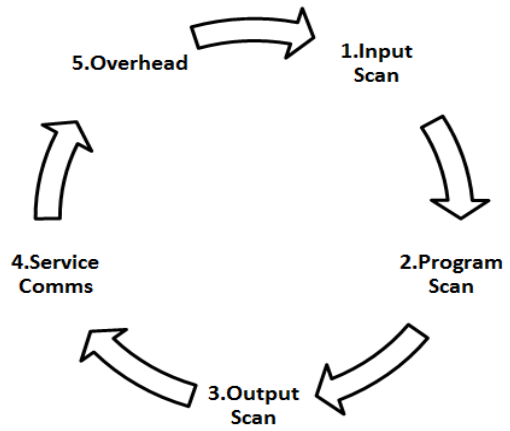

Figure 3 PLC operating cycle

Input Scan: The operating cycle start with the input Scan. During this scan a PLC scans all the input modules that are connected to the PLC and updates their status in the input data file. In effect the PLC creates a logical image of the inputs connected to the PLC. Thus the Input data table is also known as an Input Image Table. A PLC typically completes the input scan within a few microseconds.

Program Scan: Once the PLC scans the inputs it has all data ready for processing. It is now performs a program can. It reads the input image table, executes all the instructions in the program of the inputs, generates the appropriate results and writes the status of outputs to the output image table. Usually all the PLCs have an internal timer called a watchdog timer.

Output Scan: Once the PLC has updated the output data file, it transfers all the data in the output data table, to the physical outputs present on the PLC. The status of the outputs will now be as per output data table, which is why the output table is also known as the output Image Table. Just as the input scan the output scan is also completed within a few microseconds.

Service Communications: During this part of the operating cycle the PLC takes care of all its communications with external devices such as another master or a slave PLC, operator interfaces.

Overhead: Overhead includes testing I/O module integrity, validating the user program logic hasn't modified ,that the pc itself hasn't latched up (via a watchdog timer) and any necessary communications.

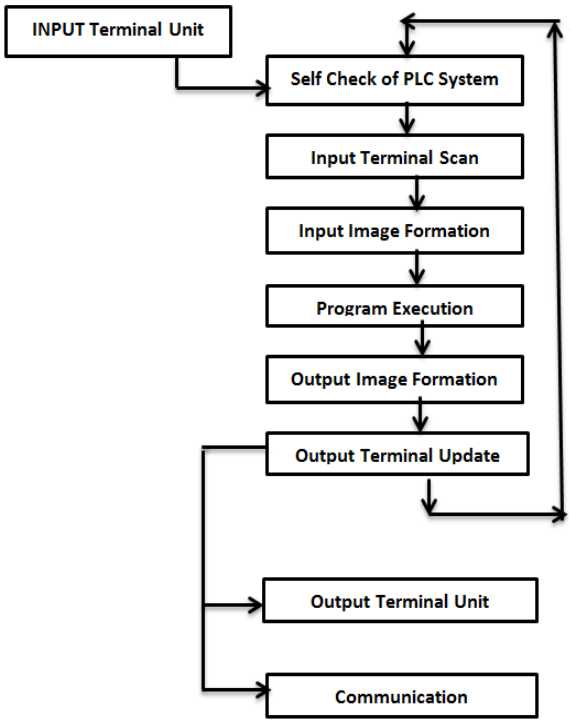

Figure 4 PLC cycle

3. CONCLUSION

PLC 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. PLC communication systems make it possible to integrate protection control and monitoring electrical parameter together for maximum benefit. PLC based control system to implement for power distribution system has been developed.

REFERENCES

[1] Daneels, Axel, and Wayne Salter. "Technology Survey Summary of Study Report." Draft, CERN (1998).
[2] Daneels, A. and Salter, W., 1999, October. Selection and evaluation of commercial SCADA systems for the controls of the CERN LHC experiments. In Proceedings of the 1999 International Conference on Accelerator and Large Experimental Physics Control Systems, Trieste (p. 353).
[3] MCCLANNHAN and IP IS NETWORK convergence recall, IEEE Industry application magazine 2003.
[4] Becker, D Falk, H Gillman J, Mouser S, Patmore R, Schneberger, L.IEEE Computer application power,2000.

[5] A. Goal and R.S. Mishra remote data acquisition using wireless system international journal of engineering 2009.
[6] IEEE STD C37.1-2007. IEEE standard for automation systems.
[7] Design system based on PLC and configuration software 2012 international conference.

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