

# The Principle of Programmable Logic Controller and Its Role in Automation

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## ABSTRACT

**This paper introduce programmable logic controller, discusses the topic of PLC. This paper also discusses the role of plc in automation engineering which is a cross sectional discipline that require proportional knowledge in hardware and software development and their application.**

**Keywords: PLC, ladder logic, automation.**

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## INTRODUCTION

This system and processes requiring “on/off” control abound in modern commerce and industry, but such control systems are rarely built from either electromechanical relays or discrete logic gates .instead digital computers fill the need which may be programmed to do a variety of logical functions. The purpose of PLC was to directly replace electromechanical relays as logic elements substituting instead a solid state digital computer with a stored program, able to emulate the interconnection of many relays to perform certain logic tasks.

A programmable logic controller, PLC or programmable controller is a digital computer used for the automation of electromechanical processes. The programmable logic controller is basically a computer. Even the smallest plc has a microprocessor, which qualifies it as a computer. PLCs are used in many industries and machine. Unlike general purpose computers, the plc is designed for multiple inputs and outputs arrangements extended temperature ranges immunity to electrical noise and resistance to vibration and impact. An plc has many input terminal through which it interprets high and low logical states from sensor and switches.

It also has many outputs terminals through which it output high and low signals to power lights solenoids, contactors, small motors and other devices lending themselves to on/off control. In effort to make PLCs easy to program their programming language was designed to resemble ladder logic diagrams. Thus an industrial electrician or electrical engineer accustomed to reading ladder logic schematics would feel comfortable programming a plc to perform the same control functions. The following illustration shows a simple plc as it might appear from a front view. Two screw terminals provide connection to 120 volts ac for powering the PLCs internal circuitry, labeled L1 and L2. Six screw terminals on the left-hand side provide connection to input devices each terminal representing a different input channel with its own X label .the lower left screw terminal is common connection which is generally connected to L2 of the 120v power source.

**A. Features-** the main difference from other computer that PLC are armored for severe conditions and have the facility for extensive input/output arrangements. These connect the plc to sensor and actuators. PLCs read a set of digital and analog inputs, process logic statements and generate analog and digital outputs to the industrial automation process.

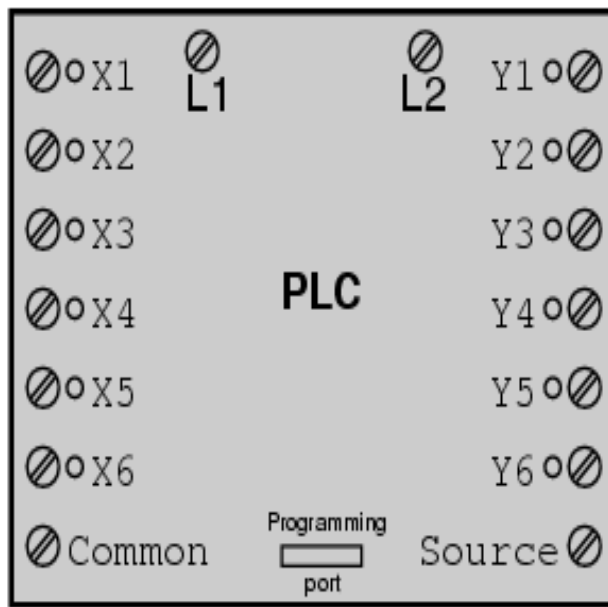


Fig.1



Fig.2

**B. Programming-** PLCs are programmed using application software on personal computers. The computer is connected to the plc through Ethernet RS 232, RS 485 cabling. The programming software allows entry and editing of the ladder style logic. Ladder logic is a programming language that represents a program by a graphical diagram based on the circuit diagram of the relay logic hardware. It is primarily used to develop software for the programmable logic controller used in the industrial application. The name is based on the observation that program in this language resemble ladders, with two vertical rails and a series of horizontal rungs between them. Here are a few examples of how the ladder logic program might look likes. In real world applications, there may be hundreds of thousands of rungs.

**C. Scan time** – a plc performs a repetitive cycle of operations. First the plc sequentially scans the input devices and updates a memory table indicating their status. Next the plc executes its control programming or ladder logic. As it processes the ladder logic the plc updates the memory table which indicates whether the output device is on or off. Finally the plc uses the output table to actually change the condition of the output devices.

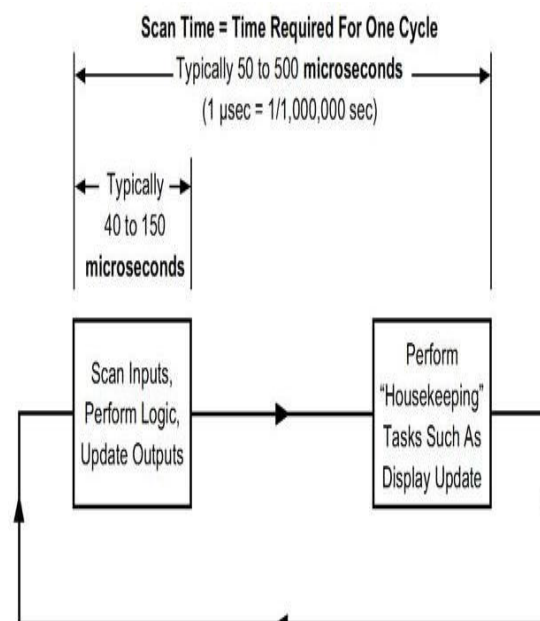


Fig.3

Engineers can now have numerical control over automated devices. The result has been a rapidly expanding range of applications and human activities. Information technology together with industrial machinery and processes can assist in the design, implementation and monitoring of control system.

### CONCLUSIONS

Programmable Logic controllers (PLC's) are widely used in motion control, positioning control and torque control. The main intensions of this paper are fully unfolded. The Programmable Logic is the one of most influential inventions of this Century. The impact of the Automation in the Industry is realized more now than ever in this field of manufacturing.

### ACKNOWLEDGMENTS

We thank Mahindra Riva Electric Vehicles Pvt Ltd for cooperating with us. We also thank faculty Mr. Ch. Sree Vardhan for his valuable contribution in preparing this paper and helping us out many a time when we needed guidance. We are indebted to the Department of Electronics and Communication Engineering of KL University for providing the software and support required.

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