Novateur Publication's
International Journal of Research Publications in Engineering and Technology (ISSN No: 2454-7875)
Conference Proceedings of A National Conference on "Modern Trends in Electrical Engineering"
(NCMTEE-2K17) 27th March 2017

PRIORITY BASED AUTOMATIC MULTI SOURCE SWITCHING USING PLC

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ABSTRACT
The main purpose of this project is to provide continuous power supply to the load by switching the supply. In case if anyone of the source is absent from the following four sources namely solar, inverter, mains and generator. Automatically other three provides backup & shares the load .The graph of need of electric supply is growing day by day and the frequent power disconnection of electricity are causing many issues in different areas like banks, colleges/schools, hospitals, houses and industries. Thus there is requirement of Energy source for an alternate arrangement of power supply. In this project arrangement has been designed by using Allen Bradely PLC and relays. When a source, say mains fails the power supply to the load then automatically it shifts to next priority source generator and so on. LEDs are used to indication purpose for running source which is used to provide the supply.

KEYWORDS: PLC (Programmable Logic Control), LED (Light Emitting Diode), FILTERS, RELAY, TRANSEFORMRE, RECTIFIERS.

INTRODUCTION

An important requirement of electric power distribution systems is the need for automatic switching interconnection operation. In this particular, the rapid and reliable transfer of power to the system from one source to another during certain system faults is important to achieving the reliability goals.

In the existing system, four switches are used to demonstrate the corresponding failure of the power supply. Absence of that particular source can be found out by pressing any one of the switch. The switches are connected as input signals to PLC. In recent years, extensive research has been done towards the design of Backup Power systems to provide clean, flexible transmission, and uninterruptible power to industrial equipment and Information technological sectors are critical applications where it contains servers and storage systems, medical equipment, personal computers, industrial and commercial controls, telecommunication systems, etc. under essentially any abnormal or normal backup power switching conditions. In order to supply continuous power to the load at the absence of electric power supply, there should be minimized fluctuation of electric supply to the load.

I. BLOCK DIAGRAM

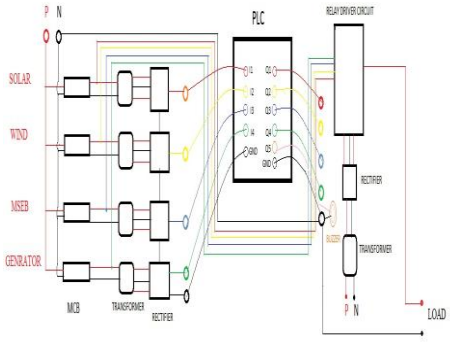


Figure 1: Block diagram

II. HARDWARE:

- PLC: ALLEN BRADELY PICO 1760-L18BWB-EX
- Relay Driver Circuit
- Relays
- Lamp Load
- MCB (Miniature Circuit Breaker)
- Transformer
- Diode
- LED's
- Capacitors
- Cords & Wires

A. HARDWARE PICTURE:

Figure 1: Actual Hardware

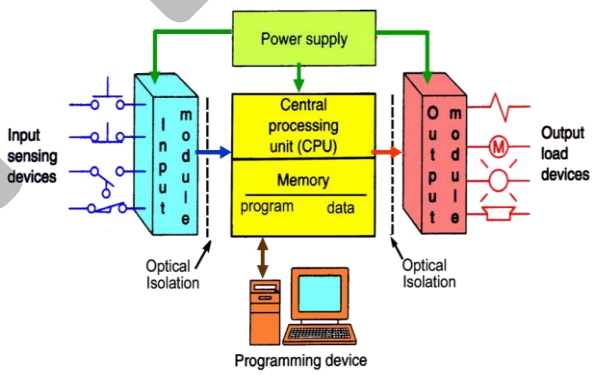
ABOUT PLC

Programmable Logic Controller (PLC) is a device containing CPU, I/O Cards and Communication modules. This Combinational circuit is operated by programming through Text Languages, Ladder Logic. PLC Consideration is done by on its Memory & I/O Capacity. PLCs are universally used in modern systems for 5 critical reasons:

1. Ease of trouble shooting
2. Ease of modifying the functionality of the transfer logic
3. Integration with power monitoring and control system to annunciate the status of the circuit breaker and power sources
4. Self-check and diagnostic logic can be easily programmed
5. Forensic re-construction of events can be easily programmed Modern Industrial grade PLC equipment is robust and has a proven reliability record in tough Environments. However, these devices are dependent on the availability of control power, which must be supplied from the most reliable source within the facility. Uninterruptible power supply (UPS) equipment, DC battery sources and various simple transfer schemes can and should be utilized to increase the reliability of the control power supply.

Control power must ride through all power anomalies such that the PLC can record the sequence of operations of the equipment even if the main power transfer is not successful. The sequence of events can be used in identifying the weak links in the transfer system and pinpoint the cause of transfer malfunction. Therefore, the reliability of the control power supply must be higher than the overall reliability of the power transfer system itself.

B. THE STRATEGIC PLANNING PROCESS



C. SYSTEM REQUIREMENT

1. In case of solar source failure detection, disconnect the loads from the solar.
2. Start the consuming power from wind energy unit.
3. Incase wind source failure then transfer to greed supply.
4. Suddenly greed source is interrupted then give signal to generator starting relay and parallel load connect to battery (which is charged by renewable sources)
5. If the generator output voltage is stable and reach the required value, then connect the loads to the generator.

6. If the any one source is back and stable, disconnect the loads from the generator then connect them back to that source
7. Stop the generator unit.

III. WORKING PRINCIPLE

This project uses arrangement of four different sources of supply which are channelized to a load so as to have an uninterrupted operation of the load. As it is not practicable to get four sources of supply such as solar supply, wind supply, MSEB supply and generator supply, we used one source and a set of relays. We have taken first source with solar supply and assumed as if being fed from four different sources by connecting all the four incoming sources in parallel. The ac source to the lamp is connected to four relays by making the entire normally open contacts parallel and all the common contacts in parallel. Four push button switches are used which represent failure of corresponding supply respectively and are interfaced to the plc.

Initially we have given high input signal to the plc, so as a result the controller generates a low output to activate the first relay driver which will result in the relay being energized and the lamp glows. While the push button for solar is pressed that represents failure of solar supply as a result the supply is provided from the next source and the plc receive high input and generates low output to activate the second relay driver which will result in the second relay being energized and the lamp glows . When we operate wind supply button as open, it

indicates the wind supply or fails to operate and the supply comes from the next source and the next source will supply high input to the plc and which will provide low signal to the third relay and the lamp switches ON and when we operate the third push button the supply will chose next source now the fourth source will provide input to the plc and plc activates the fourth relay and the load will get the supply and the lamp continues to glow. When all the relays are off leaving no supply to the lamp, the lamp is switched off.

The following table shows mechanism and priority for supplying load.

IV. PLC PROGRAMMING

A. LADDER DIAGRAM

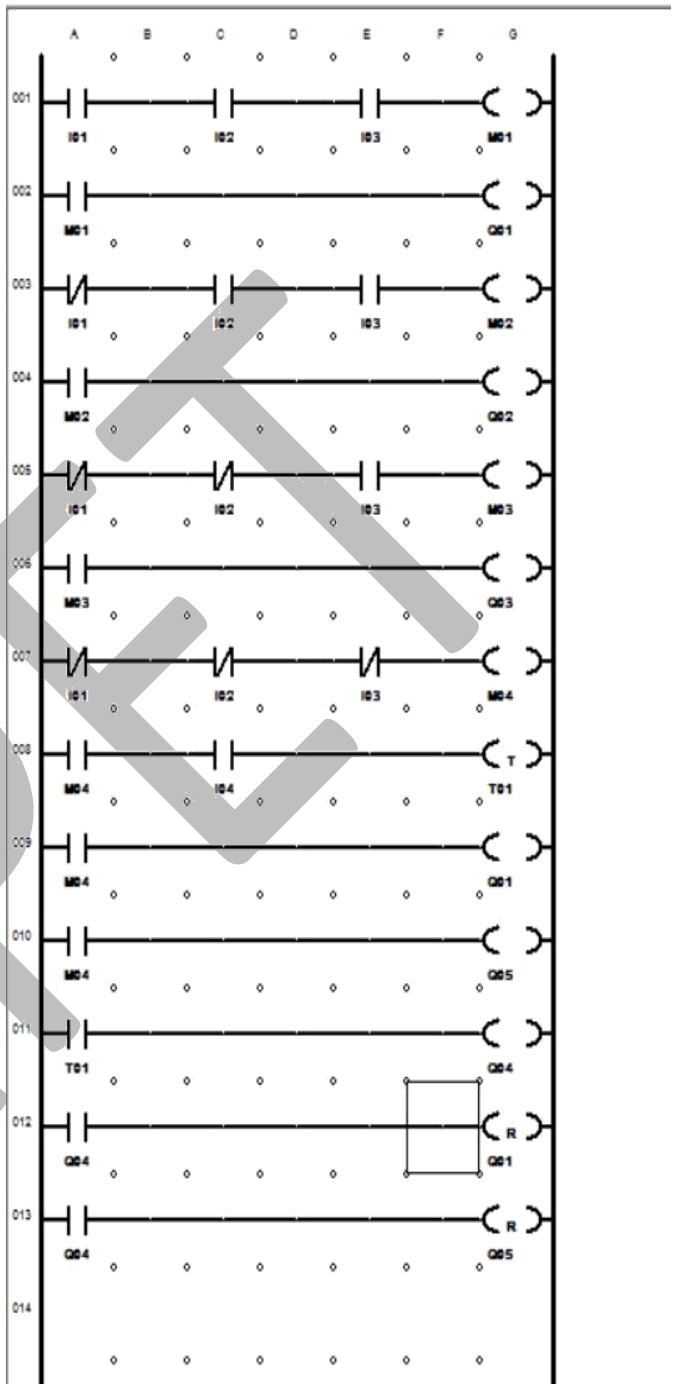


Figure 4: Ladder Diagram

B. TABLE

TABLE: PRIORITY & WORKING OF PROJECT

CONDITIONS	SOLAR	WIND	MAINS	GENERATOR	LOAD	
					Q1	Q2
CONDITION 1	✓	✓	✓	X	✓	X
CONDITION 2	✓	X	✓	X	✓	X
CONDITION 3	✓	✓	X	X	✓	X
CONDITION 4	X	✓	✓	X	✓	X
CONDITION 5	X	X	✓	X	✓	X
CONDITION 6	X	X	X	✓	✓	X
CONDITION 7	X	X	X	X	X	✓

V. ADVANTAGES OF PROJECT

- Automatic Power Source Selection.
- Easy to use, Self-explanatory kit
- Ladder digram changing in PLC is possible as per requirement
- to provide uninterrupted power supply from any of the available supply
- Flexibility in programming and reprogramming

VI. CONCLUSION

In the "Power supply from four different sources: Solar, Inverter, Main and Generator" has been explained in this project with all its features and details. It will enhance the productivity due to auto switching and also will increase the speed of operation so no interruption will occurs. The significance of this project lies in its various advantages and wide places of applications such as Industries, Hospitals, Banks; etc. It has been developed by integrating Colleges/Schools, etc. It has been developed by integrating features of all the hardware components used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit.

Various types of switching techniques are also discussed in every thesis. There are many techniques in automatic multi source switching. Although automatic multi source switching of source using PLC based system is proposed.

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