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Auto Changeover from MSEB to DG SET and vice versa by using PLC

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***Abstract*— Power failure is the major issue that causes constant electric power-dependent public utilities to stop operation, by making it paramount to have backup or various electrical power sources to confirm the continuity of operation of these utilities. The power outage break experienced once these public utilities are switched from a failing electrical power supply to AN available backup power supply yet because the stress of manual change, makes the operation of those utilities inefficient. Whenever we are considering power failure, most of the industries, factories and academic institutions use the generators for backup power supply. Manually in generators ON and OFF controls are there. To perform this operation man power is required. In this paper, we have described when there is a power failure in the mains supply; we provide an automatic switching mechanism that transfers the consumer loads to a power source from a generator. Automatically, it detects when power has been restored to the mains supply and returns the loads to this source. It turns off the power from the generator set. It has an important key which provides a continuous power supply through a near seamless switching between the mains supply and an alternative standby backup source like the generator set.**

Index Terms*— *Automatic changeover system, Programmable Logic Controller(PLC), Electricity Board(MSEB), Generator System(DG).

I. INTRODUCTION

Electricity is the major factor; it plays a key role in economic development of a nation. It formed the basis of this study with consideration in human, infrastructural and economic development. In most developing parts of the world, the electricity provided for industrial, commercial and domestic use is highly unstable. It gives rise to the use of alternative sources of power supply to meet up with the energy demands. The introduction of these alternative sources of supply brings the challenge of switching smoothly and timely between the mains supply and the alternative sources whenever there is a failure on the mains source. Let's take the example of factory, as the factory has many sections and the generators are placed at distance place so the methods of ON the generator get some time delay. As we do it manually, some important works get delay. This method isn't
suitable for all the time like all vital function in a industrial plant, because we have a tendency to take the time to ON the

generator by the distance place. To overcome these issues we introduce this proposal[14].
Today is the world of automation and automation mostly used in industry. When we are talking about automation, we must think about PLC. PLC finds its application in each and every automation control in industry application like water filling plant, different process plants, chemical filling plant, and pharmaceutical industry. We can control the important industrial loads which are plays very important roll. So working of load done by use of PLC Control of process plant can be possible through LAN[1]. A source changeover system is not efficient for applications that need a continuous supply of electric power (the examples such as airports, hospitals, banks and government facilities, etc.). This system is used in case of mains failure to switch load on DG setup. The system provides automatic changeover whenever mains fails with synchronization and load sharing with other DG Sets. This panel is used in various industrial, commercial and domestic areas wherever grid supply and DG sets are in use. The system are supplied and commissioned with DG Sets in various industrial plants. For a quick changeover the system has a space saving design with PLC control.

II. LITERATURE SURVEY

Important Terms:

A. Manual source-changeover system

This is the most easy type. it is controlled manually by an operator and consequently the time needed to change from the conventional to the replacement supply will vary. A manual source-changeover system is formed of 2 or 3 automatically interlocked manually-operated circuit breakers or switch-disconnections[15].

B. Remote-operated source-changeover system

This is the foremost ordinarily utilized system for devices with high ratings (above four hundred A). No human intervention is needed. Transfer from the traditional to the replacement supply is controlled electrically. A remote-controlled source-changeover system is formed of 2 or 3 circuit breakers or switch-disconnections connected by an electrical

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interlocking system that will have totally different configurations. Additionally, a mechanical interlocking system protects against electrical malfunctions and incorrect manual operations[15].

C. Automatic source-changeover systems

An automatic controller could also be additional to a remote-operated supply-changeover system for automatic source control consistent with programmable operative modes.

This answer ensures optimum energy management:

- Transfer to a replacement supply in keeping with external needs
- Management of power sources
- Regulation
- Emergency supply replacement, etc.

The automatic controller could also be fitted with an choice for communication with a supervisor[15].

III. WORKING

1. If MSEB power supply is 'ON' at that time DG1, DG2 and DG3 are in auto mode and ACB1, ACB2 & ACB3 are 'OFF' and BC1, BC2 & BC3 are 'ON'.
2. If MSEB power supply is 'OFF' at that time DG1, DG2 and DG3 are in auto mode and ACB1, ACB2 & ACB3 are functionally closed (ON) and BC1, BC2 and BC3 are normally open (OFF) and power supply from DG to load.

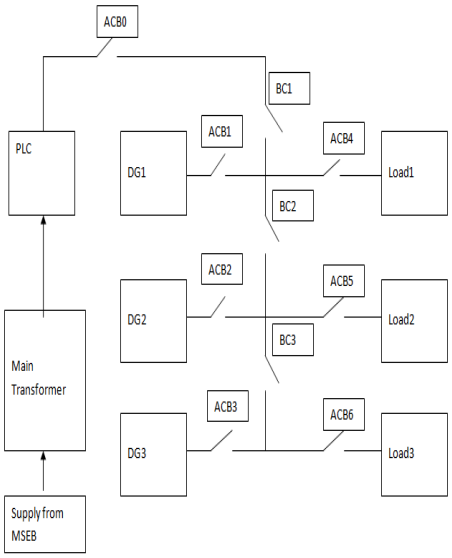

Figure 1: Block diagram-Auto changeover of MSEB & DG using PLC

3. In case DG1 is fail (NOT WORKING PROPERLY) at that time load connected to the DG1 is 'OFF'. But industry want load is in 'ON' condition always. Supply goes from DG2 to the load1,load2, load3.
4. In case DG2 is fail (NOT WORKING PROPERLY) at that time load connected to the DG2 is 'OFF'. But industry want load is in 'ON' condition always. Supply goes from DG3 to the load1, load2, load3.
5. In case DG3 is fail (NOT WORKING PROPERLY) at that time load connected to the DG3 is 'OFF'. But industry want load is in 'ON' condition always. Supply goes from DG3 to the load1, load2, load3. In this way we can control the different important load use in industry. In case MSEB power supply 'OFF' and any one DG is fail.

The following table shows mechanism and priority for supplying load.

MSEB	DG-1	DG-2	LOAD
✓	X	X	MSEB
X	✓	X	DG-1
X	X	✓	DG-2
✓	✓	X	SWITCH DG-1 TO MSEB
✓	X	✓	SWITCH DG-2 TO MSEB
✓	✓	✓	MSEB
X	X	X	OFF

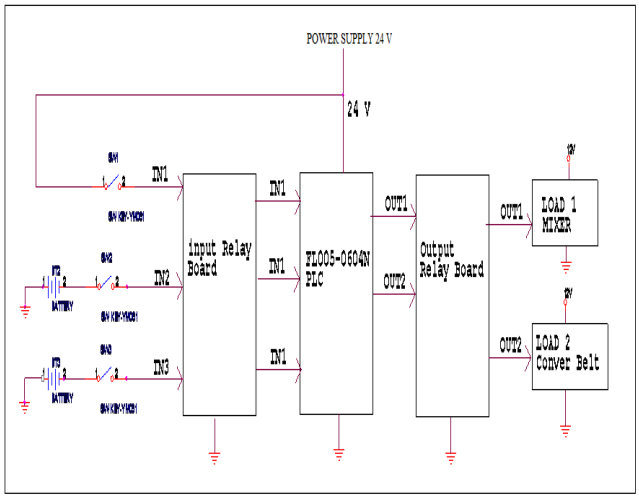

Figure 2: Circuit diagram of Auto Changeover System

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IV. PROGRAMMABLE LOGIC CONTROLLER

A programmable logic controller is a digitally operating electronic apparatus which uses a programmable memory for the internal storage of instructions for implementing specific functions, such as logic, sequencing, timing, counting and arithmetic, to control through digital or analog input and output, various types of machines or process. PLC is also

referred to as programmable controllers that are used in commercial and industrial applications. It consists of input modules, a Central Processing Unit (CPU), and output modules. The PLC accepts inputs from switches and sensors that measures or senses from the system.

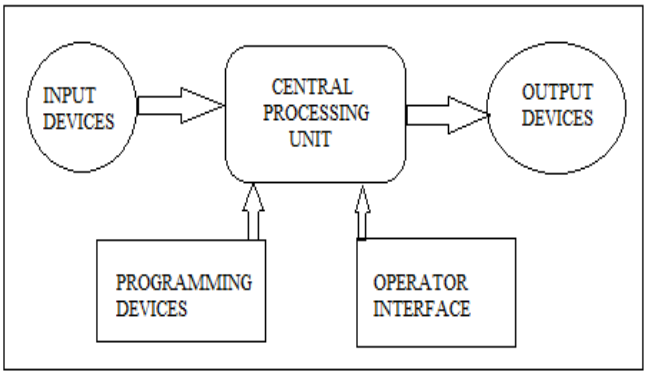

Figure 3: Block diagram of PLC

An input module accepts a variety of digital or analog signals from various field devices (sensors) and converts them into a logic signal that can be used by the CPU[2][4]. The Central Processing Unit (CPU) evaluates, makes decisions and executes these signals based on a program instructions or logic sequence. Output module converts control instructions from the CPU into a digital or analog signal that can be used to control various field devices such as a machine or process[4][8].

PLC SPECIFICATION:

1. Program Capacity: 33 K Steps
2. Total Program Memory: 288 KB
3. Execution Speed : 60.0 ns / contact
   i. 240.01 ns /coil
   ii. 373.35 ns/16 bit transfer
   iii. 366.68 ns/16 bit signed addition
4. Temperature; 0 to 600 C (operating),
   i. -20 to 850 C (storage)
5. Humidity: 10 to 90 % non condensing
6. Vibration immunity: IEC60068-2-6
7. Shock immunity: IEC60068-2-27
8. Dimensions (mm): 100 (H) X 26 (W) X 70 (D)
9. Weight: 150 g (Approx.)
10. Isolation: Isolation between communication ports, power and I/O is 500 V DC for 1 Min.

V. PROGRAMMING

The PLC FL005 supports the following programming methods[3]:

1) LD (Ladder Diagram) and Quick LD (Ladder Diagram)
2) FBD (Functional Block Diagram)
3) SFC (Sequential Functional Chart)
4) IL (Instruction List)

Following images shows the ladder diagram programming used in PLC

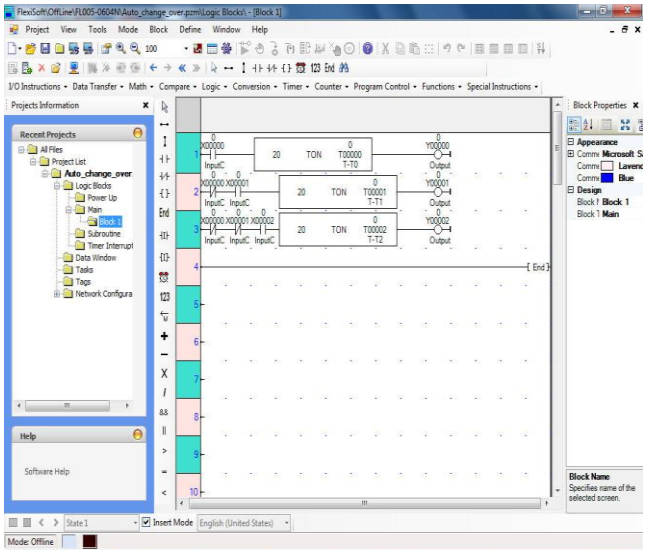

Figure 4: Ladder diagram programming used in PLC

VI. CONCLUSION

This project has wide variety of applications in security access control systems. It will enhance the productivity due to auto switching and also will increase the speed of operation so no interruption will occurs. This project will replace the conventional systems of security access in the near future due to constant backup operation will streamlined.

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