Automatic Changeover of Generator for Power Supply

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Abstract— The process plants are continuously operating round the clock. Any power supply interruption will result in process stoppage leading to severe productivity loss and financial losses. In the event of any failure of the main supply, the standby power should come in line without much time delay. For fulfill this requirement an automatic changeover of generator for power supply arrangement is required for automatically changing over the power supply from utility power supply to generator power supply.

Key words: generator, automatic switching, timer, relay, utility power supply, contactor

I. INTRODUCTION

The poor state of power supply in developing countries calls for alternatives sources of power generation to back up the utility supply. In this case the automation of electrical power supply has become so vital as the rate of power outage is high. As a result of this power supply cut out in developing country the development process is slowdown in both the public and private sectors of their economy. [1]

This project implements an automatic changeover of generator for power supply is an automatic switching or starting the generator whenever the utility power supply is failure. The system was designed to automatically change power supply back to the utility power supply moments after the AC mains are restored and to switch off the generator this implementation of project is remove the stress of manually starting the generator when the utility power supply is restored. [2]

Whenever we use manual changeover at that time the starting of generator is delay with some time. This time is importance for the production in industry. However, if the starting of the generator is automatically done by a relay which switches the battery voltage to ignition coil of the generator while the main power relay switches the load to either utility power supply or generator power supply. The reduce time to automatic starting of generator is useful to the industries for continue production. A manual changeover is requiring a switch box or a person to start and stop the generator which is unnecessary. [3]

In electrical system the switching is having done by two types.

- Mechanical locking
- Electrical locking

Mechanical locking is a manual locking which is having a person to require for done the switching. It is a key type locking. It is not started automatically. It is required operator for switching operation.

The electrical locking is a relay locking which is automatically done. Electrical locking is an electromagnetic locking. In this type the relay is powered and due to this operation the switching is done.so, this type of locking is automatically.it does not need to start manually.

We have made a simple design using electromagnetic relays, electromagnetic contactor and timer.

This project is also like a single phase preventer. If the single phase of the utility power supply is damaged and disconnect with any reason at that time the automatic changeover of generator for power supply is operate and disconnect the utility power supply contactor and start the diesel generator.

II. BLOCK DIAGRAM

![Block Diagram for Automatic Changeover of Generator for Power Supply](image)

Fig. 1: Block Diagram for Automatic Changeover of Generator for Power Supply

III. PROJECT COMPONENT

- Electromagnetic contactor
- Electromagnetic relays
- Electrical Timer
- Three position selector switch
- Push button (green, red)
- 12 v dc battery
- Contactor NC auxiliary

IV. COMPONENT DESCRIPTION

A. Electromagnetic relays:

![MY4N relay](image)

Fig. 2: MY4N relay
Fig. 3: Relay base
This is an electromagnetic relay. It is work like sensor. This is used to identify the supply voltage is available or not in the system. It is placed on the relay base.

B. Timer:

Fig. 4: Timer
This is the electrical timer. It is use for delay the connection time and operates the relay based on timing. This timer is having many features like multifunction, multi range, front knob for time range and time setting.

In this project it is use for time setting for generator starting and generator stopping time voltage supply is connect to the generator self or leaver respectively.

C. Electromagnetic contactor:

Fig. 5: Electromagnetic Contactor
A contactor is an electrically controlled switch which is used for switching an electrical power to the load. It is controlled by an electric coil which ratings are very low. When the power supply is passing through the coil at that time the contactor is operate.

D. Three position selector switch:

Fig. 6: Three Position Selector Switch
This is the selector switch. It is 3 position selector switches.
- Automatic condition
- off condition
- Manual condition

E. Pushbutton:

Fig. 7: Pushbutton
Push button is a simple switch mechanism for controlling some aspect of a machine.

V. WORKING OF THE PROJECT
When the utility power supply is available at that time the relay sensing card is sense the voltage and the contactor is connected to the load. At this time the timer 1 is running condition and the generator is in stop condition.

relay sensing unit having three relay which are used for three phase supply.
Now, the utility power supply is having some problem and due to this problem the supply is cut out or the one phase is out of the service.
In this condition the relay card is sense the one of the relay is in off condition. It mean it is signal for 12v dc relay to operate. That 12v dc relay is connected to timer 2 and battery. The timer 2 is operate and the battery is connected to the diesel generator self and due to this process the diesel generator is started. At the same time the utility power contactor is deenergized.
Now, the generator is in running condition. The generator is generating the electricity. It is connected to the generator contactor. And due to this power in the generator contactor coil it is connected to the load.
When the utility power supply is restored at that time the relay card is worked properly and it is operate the timer 1. That timer 1 is connected with the lever of the diesel generator. When it is operate the generator is stop. Timer is use for control the lever for generator stop condition.
At that time the diesel generator contactor is deenergized due to stopping the generator and the utility power supply contactor is energized and it is connected to the load.
That both contactors are interlocking with each other. Which mean when the utility power contactor is in working condition at the same time the diesel generator contactor is never working and vice versa. That interlocking is done by NONC locking of the contactor.
It is use for safety feature of the project. Otherwise the both contactor are energized at the same time there are blast occur in the diesel generator set.
This project is having three position selector switches also. This switch is work automatically, off and manual connection. If we are not requiring the generator at that time we can set the off condition in selector switch. If we
require quickly power restoration then we set automatically in selector switch. If we operate manual to the generator then set the selector switch to manual. At that time the pushbutton is use for starting and stopping of the generator.

VI. ADVANTAGES

- It reduces the changeover time to minimum due to its fast response for power restoration.
- Its switching requires no human contact with the changeover, thus eliminating human errors.
- This project is portable, easy, safe to install

VII. PROJECT IMPLEMENTATION

![Project Implementation Image]

Fig. 8: project implementation

VIII. CONCLUSION

Automatic changeover of generator starting and stopping facility has been design to help to reduce the manpower the time of starting and stopping the generator is reduced by using the automatic changeover of generator for power supply. We also recommend this changeover to the entire field where electrical supply is highly needed and even to the small and medium consumer that the automatic changeover of generator for power supply with generator starting and stopping down facility will help them.

REFERENCES