

Automatic Synchronization Of Two Alternators Unit As Per The Load Fluctuation

Amruta S. Dhumal¹, Yogita B. Gaikwad², Shweta S. Jadhav³

^{1,2,3}Students, ⁴Asst.Prof. At SVPM's COE, Malegaon (BK)

Department of Electrical Engineering, Savitribai Phule Pune University.

SVPM's COE, Malegaon (bk), Baramati, (India)

ABSTRACT

In this paper, a microcontrolled based system is developed for the parallel operation of alternators as per the load variation. Two alternators connected parallel automatically with the developed circuitry. The voltage, frequency, and phase sequence of incoming alternator is compared with reference alternator with the help of PIC. The system does not require additional measuring tools for monitoring and control process. The developed automatic synchronization unit is fast, reliable, does not required skilled operator. This paper work is made to overcome drawbacks of manually operating and time consuming synchronization methods.

Keywords— *Synchronization, Synchronous Generator, Peripheral Interface Controller (PIC), Infinite Bus Bar and Prime mover, current transformer, potential transformer.*

I. INTRODUCTION

The method of connecting two or more alternator in parallel to each other or one alternator to the infinite busbar is known as synchronization. There are many benefits of operating many alternators in parallel to each other like reliability, flexibility etc. single alternator is not capable of supply large loads. Several alternator must be shut down and those remaining operate at or near full load and thus more efficiently. In order to meet the increasing future demand of load more machine can be added automatically. Synchronization by means of manually operated switching is not suitable. Hence there is need of automatic synchronization of alternators unit as per the load demand. In automatic synchronization process, adjustment of magnitude of voltage, frequency and phase sequence of incoming alternator done automatically. When all the parameters of synchronization are satisfied closing of relay circuit of incoming alternator is done by PIC control unit. The proper introduced here is for the complete automation of synchronization. The device displays sufficient electrical parameters of two alternators. When all requirement of synchronization are satisfied, closing of relay switch of operation take place.

II. BLOCK DIAGRAM

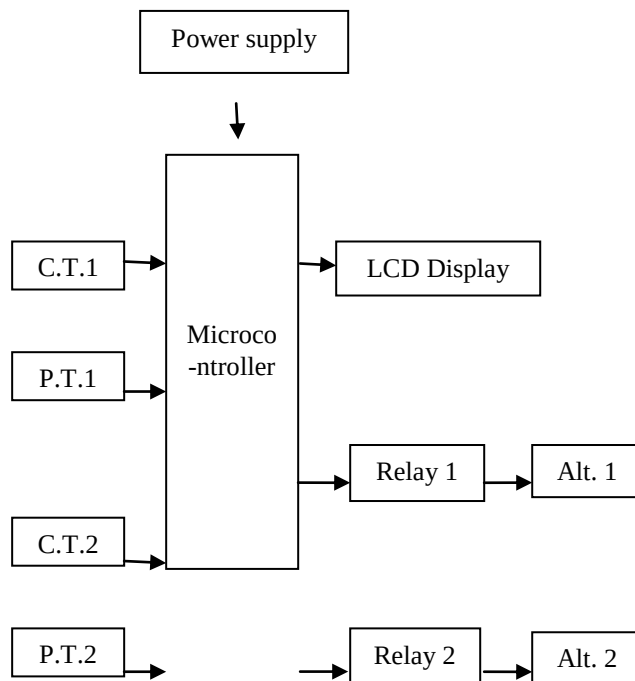


Fig1. Block diagram of synchronization unit

Figure 1 shows the block diagram of synchronization of alternators. This diagram consist of two alternator blocks, incoming and reference alternator block. The phase voltage of reference alternator block is given to current transformer and potential transformer, through them it is given to PIC. Power supply block is provided to supply 5V DC to the PIC. LCD (16x2) will display the output result of the PIC. Relay is used for switching purpose in order to fulfill the varying load demand.

The voltage of three phases of both the units are monitored using PIC, the difference in the voltage is then displayed on the LCD. As the difference between reference alternator quantities and incoming alternator quantities becomes zero then relay get activated and synchronization as per the load requirement takes place.

III. PARALLEL OPERATION OF ALTERNATORS

The parallel operation of alternators are used when load demand is not able to fulfill by single unit. For connected alternator parallel with system follow conditions are need to be checked.

1. Voltage must be equal.
2. Frequency must be equal.
3. Phase sequence must be equal.

IV.AUTOMATIC SYNCHRONIZATION UNIT

In this paper prototype model is developed by using PIC18F458. It will check the necessary conditions and if single unit is not able to fulfill load demand PIC will synchronize other unit. This system will continuously give record of else parameters like voltage, current, power etc. using LCD display. The system is reliable, and does not require manual operation.

V.CONCLUSION

In this paper, the automatic synchronization of two alternators is achieved by satisfying synchronizing parameters by making voltage, frequency and phase sequence of the incoming alternator. This synchronizing system is designed to control the voltage and frequency of the incoming alternator. The frequency can be varied manually as well by increasing or decreasing the speed of the prime mover.

REFERENCES

- [1] Automatic Synchronization Unit For Parallel Operation Of Two Alternators Using Cortex-M0 Parshvi Shah, Bhautik Rabadiya, Grishma Mistry, Hiren Shah.
- [2] Michael J. Thompson, Schweiter Engineering Laborites, Inc. "Fundamentals and Advancements in Generator Synchronizing Systems". Power-GEN International, in Las Vegas.
- [3] Shawon sen1, Prasenjit Mazumder2, Md. Hasibul Jamil, Rahul Chowdhury "Design and Construction of a low cost quasi automatic synchronizer for alternators".
- [4] Implementation of parallel synchronization methods of generators for power and cost saving in university of gujrat.
- [5] Erdal Bekiroglu, Member, IEEE; Alper Bayrak, Student Member, IEEE; "Automatic synchronization unit for the parallel operation of synchronous generators"