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Automatic Synchronization of Alternator

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ABSTRACT:- This paper represents automatic synchronization of alternators. This unit is developed for the parallel connection of alternators. This unit is developed to overcome on the disadvantages of conventional methods of synchronization. In this unit the voltage, frequency of the incoming alternator is compared with the reference alternator with the help of Peripheral Interface Controller (PIC).So now a days the demand of electricity is increasing, we can meet such a huge load demand by using this unit.

Keywords:- *Synchronisation, Alternator, Peripheral Interface Controller (PIC), and Prime Mover.*

I. INTRODUCTION

Synchronisation of alternator is the method in which two or more alternators are connected in parallel. The purpose of synchronisation is to increase the capacity of the interconnected system. If we use only one alternator, we cannot meet huge load requirement. So it is necessary to connect the alternators in parallel, this method of synchronisation is having several advantages such as, we can increase efficiency of the system, we can meet huge load requirements and automatic synchronisation of alternator is helpful to achieve the fast action of synchronisation.

II. AUTOMATIC SYNCHRONISATION UNIT

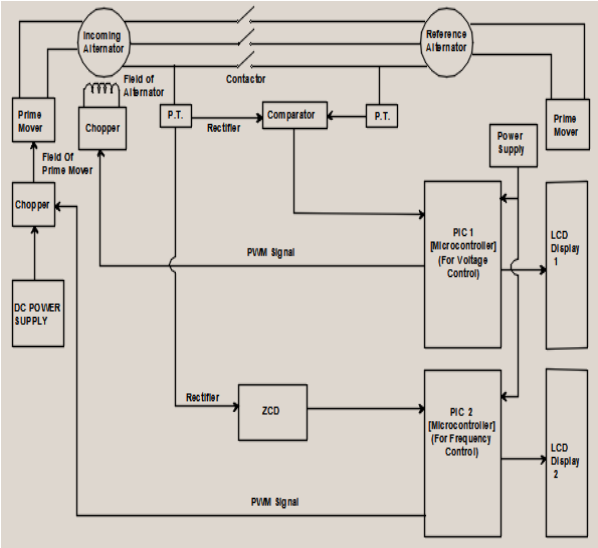

Fig 1:- block diagram of automatic synchronization unit

Figure (1) shows the block diagram of automatic synchronization unit. Here we are using two alternators one is incoming alternator whose frequency and voltage we are comparing with the other alternator known as reference alternator. The output voltage of both the alternators is very high, such a high voltage we can't give it to the microcontroller. So we are stepping down the level of the output voltage using potential transformer. This output voltage is given to the PIC microcontroller-1 for voltage control through the comparator. The function of the comparator is it will compare both the voltages (voltage output of incoming and reference alternator), and it will generate the error signal if they are not equal. This error signal is given to the PIC microcontroller-1.

Depending upon the error signal PIC microcontroller-1 generates the PWM (Pulse Width Modulation) signal for the DC chopper. This signal will make the output of incoming alternator equal to the reference voltage.

Similarly the output of both the alternator is given to the PIC microcontroller-2 through ZCD (Zero Crossing Detector). The ZCD is set to a particular frequency and it will measure the frequency of incoming alternator and the reference alternator and it will compare both the frequencies, if they are not equal it will generate error signal. This is given to the PIC microcontroller-2. From which we get the PWM signal that will adjust the speed of the prime mover to adjust the frequency of the alternator. This is proportional to its speed [f=PN/120].

The LCD (Liquid Crystal Display) is used to display the output of the microcontrollers. Before the output is given to the comparator and ZCD, it will step-down by using a rectifier (220/5V) and then it is given to the microcontrollers.

III. ADVANTAGES

- Speed of operation is very fast.
- The system is highly accurate & reliable.
- The system is precise to use for monitoring, control & measurement.
- The system is cost effective.
- No need of skilled operators.

IV. DISADVATNTAGES

- If there is some malfunction in the main PIC, the system may misbehave.
- Individual protection circuit is required for each alternator.

V. CONCLUSION

The automatic synchronisation of alternator is having several advantages over the manual conventional methods by synchronizing the alternators the capacity of the grid can be increased to meet huge load demand. And also we can improve

the whole power scenario. The automatic synchronisation is achieved by using the PIC microcontroller, by automatically adjusting the magnitude of voltage and frequency.

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