

AUTOMATIC LOAD SHARING BY PARALLEL TRANSFORMER USING PIC MICRO-CONTROLLER

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Abstract: This paper presents the innovative solution of the Load management at distribution side or consumer side. An automated load sharing technique is proposed to share the load of one consumer side transformer to other slave transformer at the time of peak load or at the time of faulty condition. Transformer is the heart of the power system, it converts the voltage levels. It is basically a static device that transfers the electrical power from one circuit to another circuit with the desired change in voltage and current at a constant frequency. It is only one device that operates at the highest efficiency at full load conditions. But abnormal condition occurs at overloading condition which may result in severe problem in future. Thus by shearing load on transformer the transformer is protected for that we use another transformer in parallel through PIC micro-controller This parallel transformer supplies the load when overloading occurs on the main transformer unit, which switches automatically by PIC. Which results in efficient loading of both transformer. Also when the load is normal both transformers can be switched on to supply the load alternately. This will avoid the thermal overloading of the transformer. So load shearing provides sufficient protection to distribution transformers under overloaded condition

KEYWORDS: DIODE, LCD, PIC MICROCONTROLLER, POTENTIOMETER, PROTEUS, RELAY.

INTRODUCTION

A Transformer is a passive electrical device that transfer electrical energy from one circuit to another through the process of electromagnetic induction. It is a static device which converts energy at one voltage level to another voltage level without change in frequency. The Paper is all about the methods of protection of transformer under overload condition. The problem of overloading is very common in transformer as with the increasing in demand of electrical power the existing systems have become overloaded and main transformer get overloaded and Due to overload on the transformer, the efficiency drops and the windings gets over heated and may get burnt so The purpose of our project is to protect the transformer when the load exceeds during peak hours from overloading and overheating by connecting the another transformer parallelly with the main transformer using the microcontroller and a relay which shares the excess load of the main transformer. The main transformers and parallel transformer are switched alternatively to avoid thermal overloading. Therefore, two transformers both together work efficiently under overload condition and damage can be prevented.

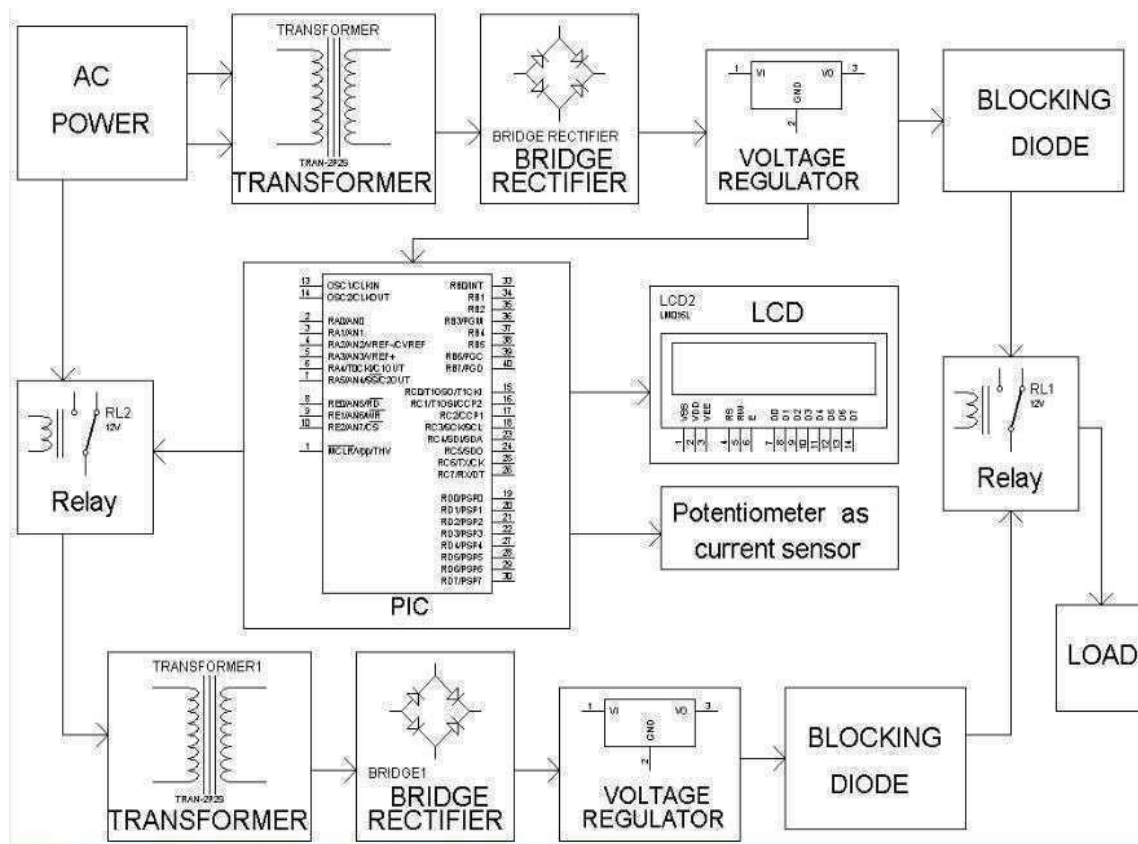
LITERATURE REVIEW

The transformer is main equipment of power system and it is very bulky and costly. It feeds the load for 24 hours. The method of protection that is "Automatic load sharing of transformer by parallel transformer using PIC microcontroller" includes the importance protection of transformers. Many of the researchers focused on the effective load sharing of status of the system and hence to solve the problem of voltage collapse. In this regard, voltage stability index of each transmission line becomes a useful measure of power system monitoring. Sometimes the condition may occurs the load on the transformer is increases suddenly above the set value. The main aim of the research is to provide the uninterrupted power supply to the consumer and also increase the reliability of whole the power system. Distribution transformers distributes power to the low- voltage users directly so it is an important part of the power system, and its operation condition is important for the entire distribution network operation. By implementation of this scheme the problem of interruption of supply due to transformer overloading or overheating can be avoided [1]. Transformer is the electrical device which

operates at highest efficiency at full load condition but abnormal condition occurs at overloading condition which may result in severe problem in future such as damage to the circuit. To avoid such condition, we are using another transformer which supplies the load when overloading occurs on main transformer unit, which switch on automatically by PIC Microcontroller. This will result in efficient loading of both transformers. Also when load is normal both transformers can be switched on to supply the load alternately.[2] PIC Microcontroller is connected between the two transformers. PIC Microcontroller compares the voltage with its reference voltage. Protection against fault in power systems is very essential and vital for its reliable performance. Thus to protect the transformers from overloads and overheating, the concept of load sharing has been proposed, wherein, automatic load sharing occurs whenever the rated conditions are exceeded. This will avoid the thermal overloading of transformer. Also this arrangement will provide proper maintenance facility for both transformers and gives the protection to transformer and to the circuit.[3]

BLOCK DIAGRAM

In this we are using the two transformers connected in parallel to automatically shares the load where one is the main transformer and other is the standby transformer, two relays, PIC microcontroller, voltage regulator, bridge rectifier and LCD as shown in the given diagram. Load switching network is connected to the load bank to on off the transformer.



Block Diagram

3.1 Transformer

Transformer is the static electrical device which transfers the electrical power between the two or more circuits without change in the frequency. It is also called the “Heart of the Power System”. Its works on the principle of “Electromagnetic Induction”.

3.2 Relay

A relay is an electrically operated switch which allow low power circuit to operate high current application circuits. It is use where several circuits must be controlled by one signal. The relay used here is of electromagnetic type.

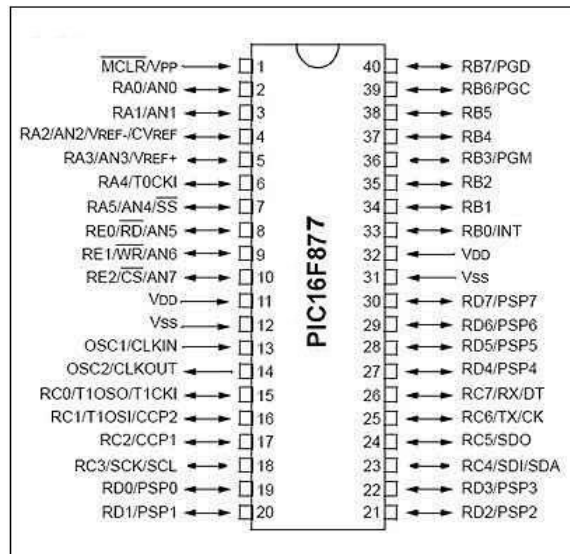
3.3 LCD

LCD indicate the value of current and it also shows the increasing and decreasing values of load.

3.4 PIC Microcontroller

The name PIC initially referred to Peripheral Interface Controller, and is currently expanded as Programmable Intelligent Computer. It is based on RISC architecture. It is mostly popular for low cost, wide availability, large user base, free development tools and serial programming capacity so we using PIC microcontroller.

Pin configuration of PIC Microcontroller



OPERATION

In the circuit the main transformer and the other transformer is connected parallelly. The main transformer is also called the master transformer and the transformer we connect parallelly is also called the slave transformer. Initially we gives the supply to the circuit and step down transformer step down it up to the required value then that rectified voltage is rectified by the bridge rectifier and then filtered by the filter. The current transformer measures the load current and feed to the PIC microcontroller. Comparator is having the two inputs one is from shunt and other is from the reference voltage and the current limit is set by the user and it is indicated by the LCD screen. Initially when current value is in the within the set limit only main transformer works in the circuit but during the peak hours when load demand increases. At this condition the PIC microcontroller gives a controller signal to energize the relay coil and relay coil switches the other transformer which connected in parallelly in the circuit. So the parallel transformer will share the load equally since the transformers are of same ratings. When the load demand decreases up the set current limit value then automatically parallel transformer get disconnected and circuits works only with main transformer. In this way by distributing the load we protect the transformer from the damage that may be occurs by overloading and from the burning due to overheating.

ADVANTAGES

1 Automatically load is sheard by the transformer.

- 2 It gives better outcome.
- 3 With less cost power can be transfer for long distance.
- 4 Un-interrupted power supply to the consumers is supplied.
- 5 It prevents the main transformer from damage due overload and burning due to overheats.
- 6 Risk of manual error is eliminated.

CONCLUSION

As we know that the transformer the main important equipment in the power system so it is necessary to keep it protected from the damages. In this paper we saw the method of protection of transformer and observed that if load on one transformer is increases then the relay will sense the change in current & PIC microcontroller operates & parallel transformer comes automatically in operation to share the load. with the help of this method we protect the transformer from overloading and from damage that occurs due to overloading.

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