MICROCONTROLLER BASED TAP CHANGER FOR POWER TRANSFORMER

Ismail k Pota [1], Sonali Bhatti[2], Irfan Rathod[3], Pradip Sadiya [4], Senta Rohit[5].
[1] Assistant Professor [2,3,4,5]Student
[1,2,3,4,5]Department of Electrical Engineering,
Dr. Subhash Technical Campus , Junagadh , Gujarat, India

Abstract: In this project the electronic tap changer probable solution for current day and future influence grid, since they provide automatic voltage regulation. This project work prototype work with a relay as the switching devices and micro controller as control circuit has been built. The on load tap changing transformer can maintain voltage has desired level by changing the tapping of the transformer according to the level. Economic analysis approach of this system less expensive than previous struggles to reliable solid state tap changer.

Keywords: microcontroller, transformer, voltage regulation.

1. INTRODUCTION

One of the main concerns of any power services is the quality of the power supplied to the customers, as these customers demand an uninterrupted supply with a minimum case of disruption. By addressing these concerns, the power utilities can reduce the cost related in generating, transmitting, distributing and maintaining the power system.

There are several measures that have been taken to rectify these problems, such as by employing voltage regulator, capacitor and dc stored energy. In this paper, focus is being

Give to the power transformer with tap changer; on-load and off-load. The earlier is preferable, as there is no disconnection of the power transformer when changing the tap setting, thus the operation of supplying the load demand is uninterrupted. Online monitoring of power transformer has become of interest to the power utilities, as the power transformer is one of the most expensive single elements of the high voltage transmission system

On-load tap changer power transformers are an essential part of any fresh power system, since they allow voltages to be maintained at desired levels despite the load changes .Although the first on-load tap changers were developed in the early part of this century, modern versions still have not altered radically from these designs and in essence, they are complex mechanical device.

The application of semiconductor or solid state devices in designing the tap changer have the advantage of faster response, almost virtually maintenance free and better performance in term of power quality when compared to its conventional counterpart. The only setback of solid-state devices is cost efficiency and high conduction loss. Furthermore, as solid-state devices must be permanently connected in the circuit, some sort of protection against high voltage surges travelling down the transformer winding is required.

In this project, the improvement is concentrated on maintaining the voltage supply by changing tap setting via microcontroller through relay selector. The results obtained from this experiment show that the proposed semiconductor tap changer is able to monitor the voltage supply and maintain it within the definite range.

2. Block diagram

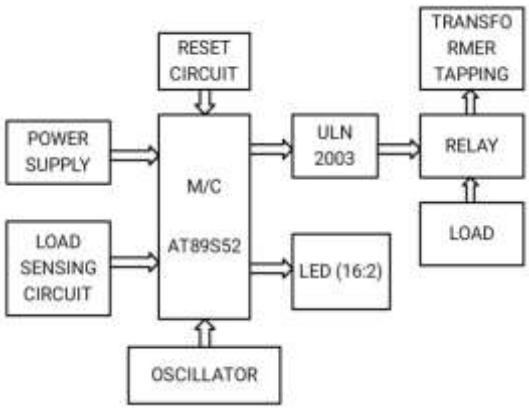

Fig1. Block Diagram of System

The main block and function of our block diagram is power supply, microcontroller AT89s52 family of 8051 microcontroller, oscillator, reset circuit, ULN 2003, load sensing circuit, relay unit, load, LCD display and transformer tapping.,
First of all the microcontroller is supplied by 5v and other controller circuit is supplied by 12v DC supply for operation of the circuit.

3. Circuit Diagram & Analysis

The microcontroller is the main device of the circuit which is operated at 5v DC supply. It is control the whole circuit and operation of the circuit. The oscillator is provide the operating frequency of the controller. Which generate the 11.0592MHz frequency to operate the microcontroller? The reset circuit is providing to reset the microcontroller. In operation of our project there is transformer is used of 230v to 6v/9v/12v with the tapping of step down. The main function is to change the tapping as per change in load. As load is increase then the tapping is also increase and when load is decrease then also transformer tapping is should be decrease. There is no live load for operation therefore we used resistor as a load.

There is three resistors of 220k are used in parallel arrangement. It is connect parallel as per our requirement for load increasing purpose. The load sensing circuit is used to sense the load. There is 6v tapping is selected by default. And first resistance is connected as a load. Relay is used as a switch for load changing. Relay is connected to the controller. If we increase the load by connecting the resistance in parallel then the load sensing circuit is sense the load increment and it is give signal to micro controller.

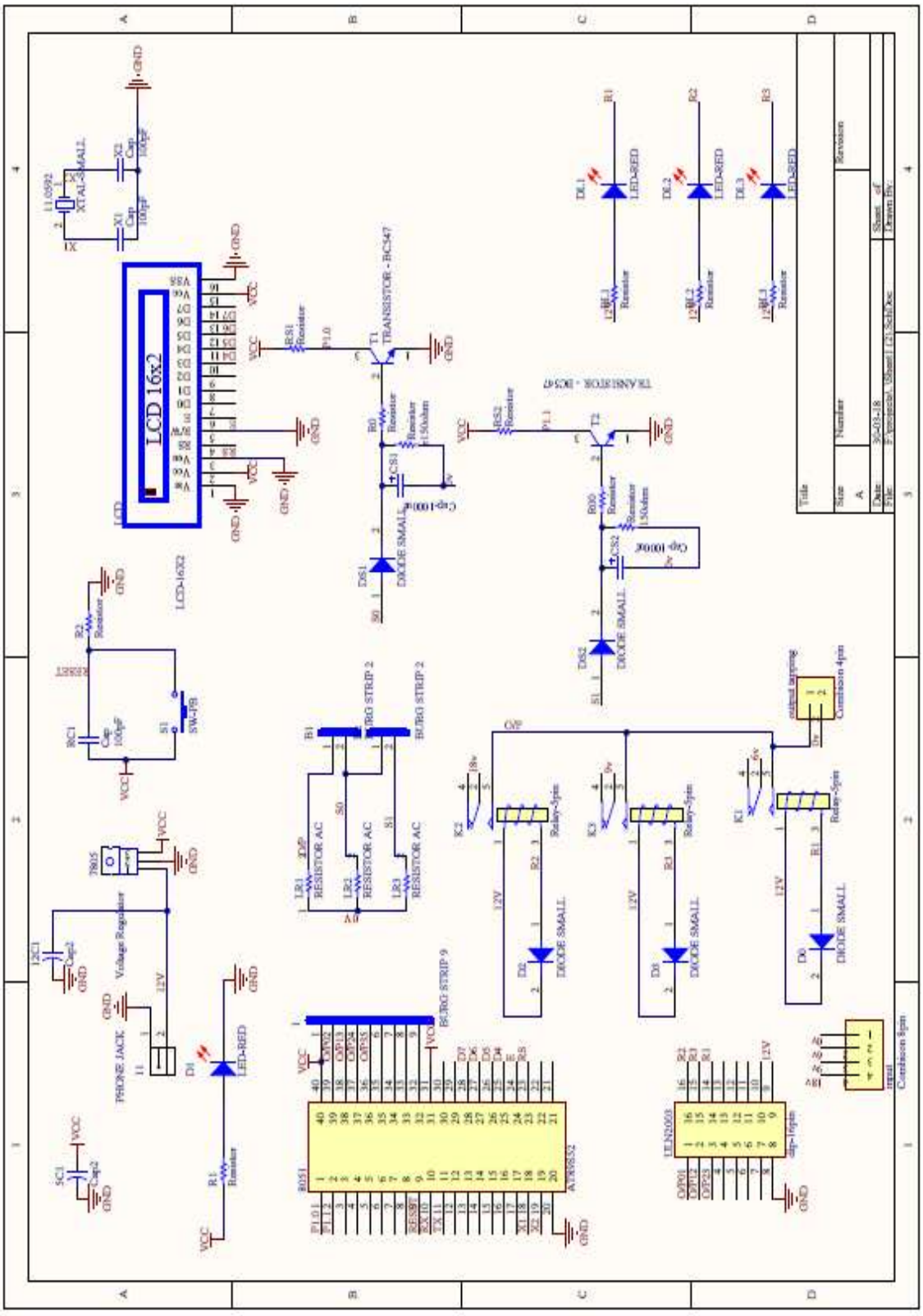

Fig.2. Circuit Diagram

The micro controller is programmed as per circuit operation. As the load sensing circuit is sense the load is increase the controller is increase the level of voltage and change the number of tapping and if the load circuit is sense the load is decrease then the controller is decrease the voltage level and number of tapping on transformer. Therefore the controller is give command as per programmed to the relay circuit and increase and decrease the voltage level and increase and decrease the tapping of transformer. The ULN 2003 is used for providing connection in between 12v relay circuit and 5v microcontroller. The microcontroller is operating on 5v dc only.

The 16:2 LCD display is connected with the control circuit to display the current voltage level and number of tapping selected on transformer.

This is main operation of this circuit. The main concept of this project is regulating the voltage level as per desired value with the smooth operation using relay and microcontroller.

4. Implementation of Hardware

The operation of these submersible motor under this condition such as Dry-running and overloading for long time will reduce their life significantly high temperature of motor, occurring faults. It should be control by starter of the motor, but Dry running condition is not controlled by starter. The project consist a smart electronic monitoring devices attached to the submersible motor device is microcontroller and sensors attached.

5. Advantages

- Faster response.
- Better efficiency
- This prevents arcing on the main contacts and can lead to a longer service life.
-.Easily operation

6. Conclusion

A microcontroller based electronic on-load tap changer use a relay devices as the switching device that have eliminated all disadvantages of arching, contact wear and maintenance that associated with conventional mechanical tap changer. With these semiconductor devices and microcontroller as the processing element, the response time of the tap changer has been improved. The result obtained from the experiment has showed that the tap changer was able to maintain output voltage level by varying the tap setting each time the input voltage changes.

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