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Auto Phase Displacement in Three Phase Supply System

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Abstract —*The main concept of this project is to maintain continuous AC supply to single phase load by an auto – changeover load from the missing phase to any available phase in a three phase system. The proposed system uses a rectified power supply. In this system, three phases are connected to the control circuit through an microcontroller after reducing the voltage level and rectifying it to DC using a step down transformer and a half wave rectifier respectively. The load is selected from any of the available three phases, automatically, using relays, which are interfaced to the relay driver IC. The Microcontroller circuit is used for detecting the availability of the phase.*

Keywords-*Three phase supply, three phase load, Phase displacement, Relay, Microcontroller, Keil, Proteus*

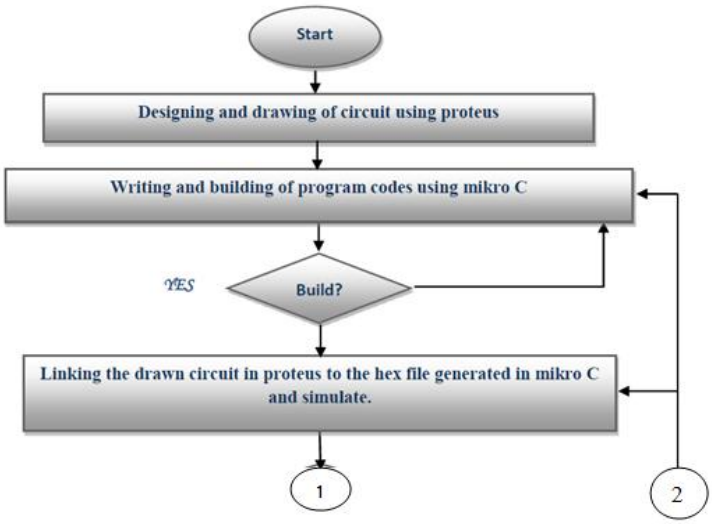
I. INTRODUCTION

Now a days, to control on power output there is often noticed that power interruption in distribution system is major about 70% for single phase failure occur while other two phases are in normal condition. Thus, in any luxurious power supply system where three phases is obtainable, it is better to have an unconscious phase changeover system for uninterrupted power to critical loads in the occasion of missing phase. Three phase motors are generally used in industries if there is a one phase failure in three phases motor and if motor is running and only lightly loaded it will carry on to run on dual levels. If heavily loaded it will stall or burn. When one phase is cut off from 3 phase supply to motor, motor speed decreases because supply voltage to the motor is less than rated voltage due to this there is a possibility that stator and rotor may get locked each other and motor may get damage. So for protection of motor at single phase failure fault we have only choice to shut down the motor but now, for continuing working condition of motor these phenomena should be considered. When the single phase fault occurs we have to generate one new phase by using healthy phases.

According to this project, we have connected relay to the supply phase and also used microcontroller for controlling all over the circuit and relay's condition in supply circuit. There are given bypass connection to microcontroller from phases. For this we have connected bridge rectifier circuit in that bypass way to give connection to microcontroller. The controller circuit senses the fault and according to that working of relay should be done.

II. METHODOLOGY

The methodology is illustrated in flow chart as shown in fig 1.



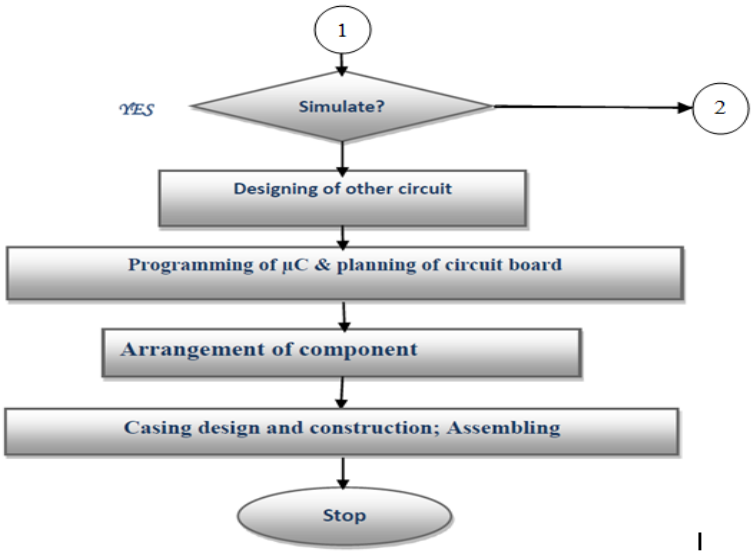


Figure 1 Flow Chart

III. BASIC OF AUTO PHASE DISPLACMENT SYSTEM

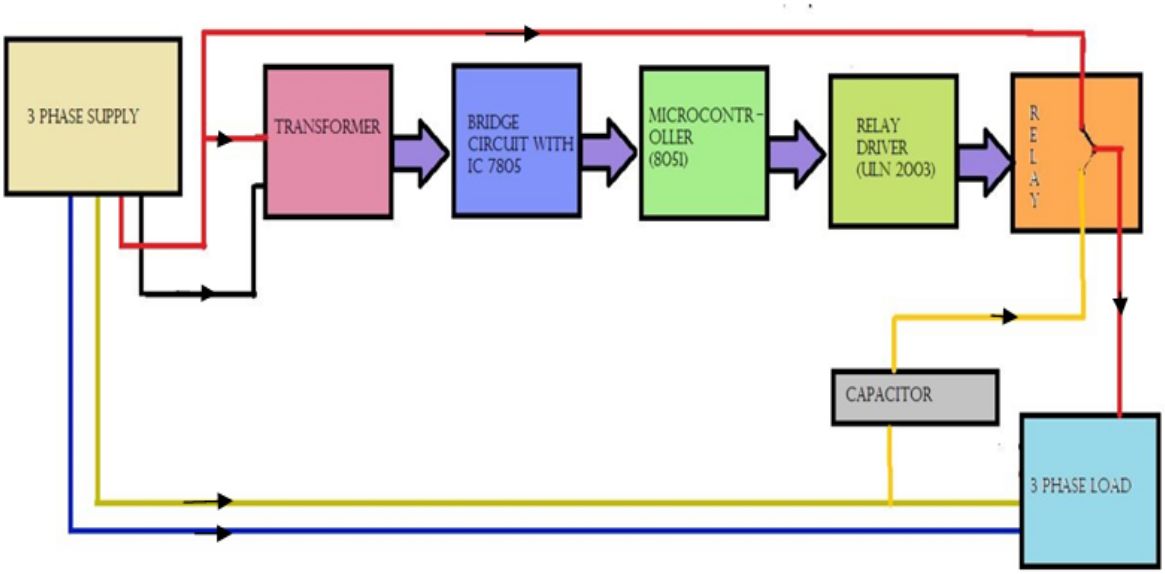


Figure 2 Block diagram foe Auto phase displacement circuit

Table 1 Phase color specification

Color specification	Phase specification
	R phase
	Y phase
	B phase
	Neutral

As per the block diagram, Transformer is jointed to the Signal phase line to step-down the Voltage. Here we connect the transformer to R phase. Output of the transformer is given to the Rectifier as input to get 5 volt Regulated output. Here Bridge rectifier circuit with IC 7805 is use to get regulated output. This Regulated output is sufficient to run microcontroller circuit. Relay driver used for controlling of working relay by using microcontroller circuit. In normal Condition Relay is energized by R phase or it is in normally open condition and uninterrupted supply is continuously given to the load. But when the fault is occurred in signal phase (Here R phase) output of the transformer is 0 than rectifier output is also 0 according to this microcontroller circuit have zero input than relay is going on its normally

closed contact connection at normally closed contact the capacitor is connected. One terminal of the capacitor is connected through other second phase (here Y phase) .According to this there are generate The phase to Given supply to the motor and motor continuously run on 2 phases and one generated phase by using another phase. By using this circuitry load does not damage than equipment jointed to the load are protected.

IV. DESIGN

The circuit diagram of three phase supply circuit is as shown in figure.

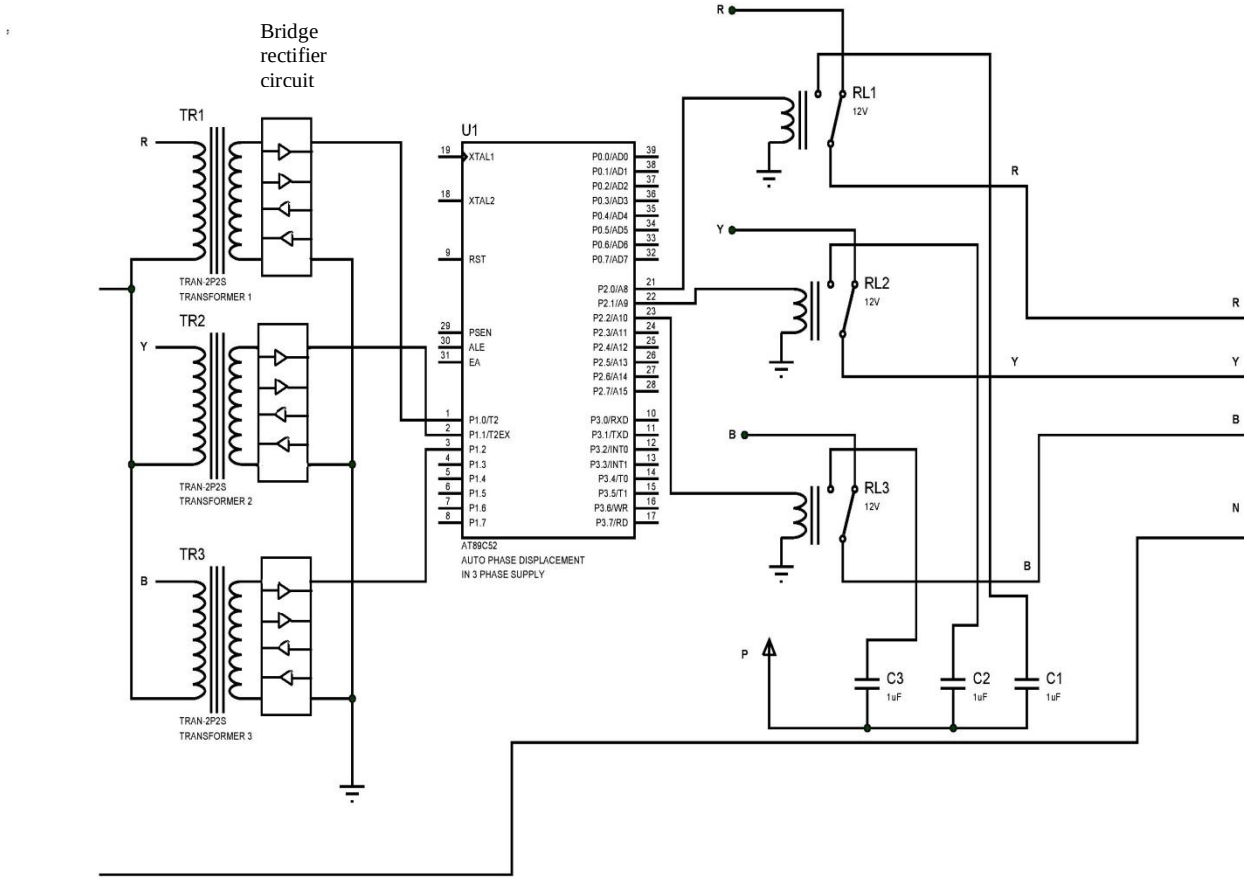


Figure 3 Complete Circuit diagram

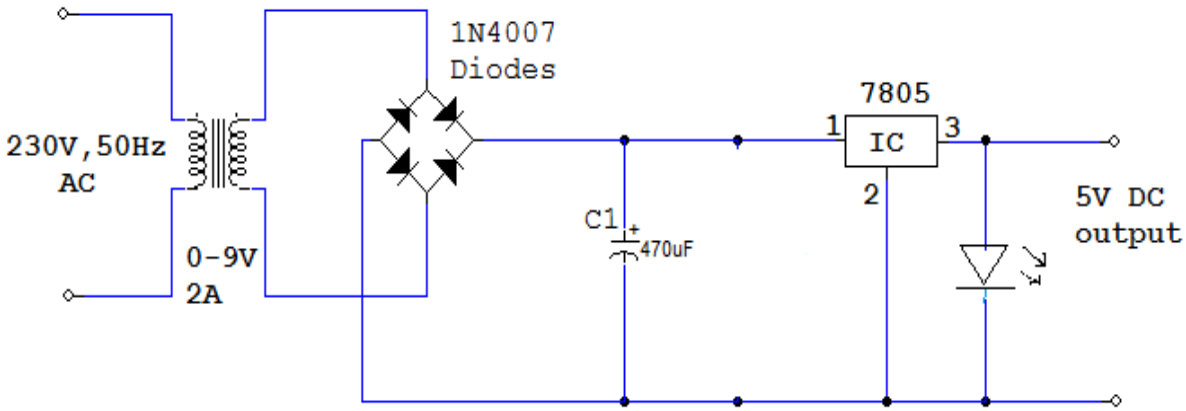


Figure 4 Bridge Rectifier circuit

4.1 The Central Processing Unit:

This unit is designed to be implemented using a 8051 microcontroller (Atmel 89C51) and some complimentary components whose choices are based on specifications by the manufacturer on the data sheet. These components include a crystal oscillator of rating 11.0592 MHz, a 10k pull-up resistor and two stabilizing capacitors. The At89C51 is programmed using the basic programming language to take charge of most control in the system. The program is developed in C language using the micro C pro. The flowchart of the program is shown in figure 1.

4.2 The Switching Unit:

The switching units of this design comprise a two no. of Electro-mechanical contactor with the following specifications whose choice is based on the proposed design specification of the automatic change-over switch. Its trigger signal is outputted from the CPU via a 5V relay. Here we use ULN Driver also.

4.3 Component list

Transformer (230 to 12-0-12)
Diodes (IN 4007)
Capacitor (1000 µF, 22pF)
IC 7805 (voltage regulator)
8051 Microcontroller
ULN driver 2003 or Relay Driver
Relay (5 V)
Connecting wires
LED (Red Color /Red Body)
GPP

V. HARDWARE IMPLEMENTATION

Figure 5 Hardware Implementation

VI. CONCLUSION AND FUTURE WORK

Project is very useful for single phase failure in 3-ϕ supply system as damage of 3-ϕ load may result in high expenditure and by using auto phase displacement circuit continuous supply to load can be maintain. Auto phase displacement Circuit is economical, safe as electronic components are used and cheap so it is also applicable for domestic use. However the above design is still subject to improvement as more features could be added. In future this circuit is also establishing for two phase fault. But either by making auto phase displacement by using only one phase is quite difficult so there are may be use any external circuits for auto phase displacement for two phase fault.

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