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AUTOMATIC PHASE CHANGER USING MICRO-CONTROLLER 89C52

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Abstract

In three phase applications, if low voltage is available in any one or two phases, and you want your equipment to work on normal voltage, this circuit will resolve this issue. However a proper rating fuse needs to be used in the input lines (R, Y & B) of each phase. The circuit provides correct voltage in the same power supply lines through relay from the other phase where correct voltage is available using it all the equipment's can be operated even when correct voltage is available on a single phase in the building. The circuit is build around a transformer, comparator, transistor and a relay

Keywords: R, Y, B, ATMEL, ADC, PCB

Introduction

Today is the world of automation. When we are talking about automation we must think about microcontroller. Microcontroller finds its application in each and every automatic control like remote controller, hand held communication devices, automatic and semi automatic washing machine, security system, telephone printing machine, automobiles, indicating and measuring instrument.

The project described here being also a microcontroller based project used for automatic phase changer. The use of microcontroller in this project is used to store the data, process data and change data according to the user requirement. This is possible because microcontroller has CPU, memory, I/O ports, timer/counters, ADC/DAC, serial ports, interrupt logic, oscillator circuitry, and many more functional blocks on single chip. Hence it reduces the cost of hardware.

Also there is no need to connect external RAM for memory storage. This is the most important feature of microcontroller. There are various types of microcontroller available in market. The examples are Intel MCS-51, PIC family by microchip, Atmel 89cxx, 89cxx51. The microcontroller used for this project is Atmel 89c52. Now a day many times out of three phases one of the phase cut's off and the circuit breaker trips at that time the MSEB operator has to operate it manually by turning on the at the time of office hours at that time the hooter shouts and gives us an alert. Keeping in mind the day to day life of human being, the circumstances which occur due to power instability issues we decided to design such a system which would overcome these issues ultimately and help to reduce human efforts too.

Secondly in order to overcome the various phase change issue and avoid damages in industries and automation area plus Hospitals & airports

LITERATURE SURVEY:

The system developed by Steven M. Hietpas "Automatic Voltage Regulator " using ac voltage – voltage convertor which load great flexibility in the voltage regulation for power distribution systems but had high complexity [1].Then the system named as Automatic Phase Shift Method for finding Detection Of Grid Connected Photo Voltaic inverter in 2003 used photo-voltaic inverter but the statistical analysis were complicated to achieve in single detection[2].Then the system named as "Grid Current Regulation OF Three Phase Voltage Source Inverter With LC Input Filter" in 2003 may used simple series inductor as the filter interface between VSI and Grid

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network .But due to harmonic distortion it does not proved to be more advantageous[3]. Then the next system was proposed by Mariuz Malinowkshi named as "Simple Direct Power Control Of Three Phase PWM Rectifier Using Space Vector Modulation(DPC-SVM) in April 2004 but due to variable switching frequency and violation in polarity there was a need to design such a system which would overcome all of above system drawbacks[4]. Our concentration was to develop a system which can reduce the problems or difficulties in our life. Also one more thing was in mind that to develop a system which can be applied for several applications associated with modern science and developments in technology.

So the concept of automatic phase changer was selected which can be used in 3- phase applications. In 3 phase applications, if low voltage is available in any one of two phases and want equipment to work in normal voltage this circuit will solve your problem. It is a simple circuit. The circuit consists a comparator ,transistor, transformer and relay. This allows it to compare two input voltages

PROBLEM STATEMENT

A. SELECTION

Our concentration was to develop a system which can reduce the problems or difficulties in our life. Also one more thing was in mind that to develop a system which can be applied for several applications associated with modern science and developments in technology, So the concept of automatic phase changer was selected which can be used in 3- phase applications. In 3 phase applications, if low voltage is available in any one of two phases and want equipment to work in normal voltage this circuit will solve your problem. It is a simple circuit. The circuit consists a comparator, transistor, transformer and relay. This allows it to compare two input voltages off the whole network.

B. SOLUTION:

The change-over switch box separate the source between the generator and public supply, when there is power supply outage from public supply, someone has to go and change the line to generator. Thus when power supply is restored, someone has to put OFF the generator and then change the source line from generator to public supply. In view of the above manual change-over switch system that involves manpower by using ones energy in starting the generator and switching over from public supply to generator and vice-versa when the supply is restored. The importance attached to cases of operation in hospitals and air ports in order to save life from generator as fast as possible makes it important for the design and construction of an automatic change-over switch which would solve the problem of manpower and the danger likely to be encountered changeover.

BLOCK DIAGRAM:

There are three phases R, Y, B which are given to signal conditioning block as shown in fig. 1. The output of the signal conditioning block is given to the analog to digital convertor. This block is used to convert the analog to digital signal which is then pass to the microcontroller 89c52 which is interface with LCD and keyboard. A relay driver circuitry as shown in the fig 1 is mainly the electrically operated switch. The main purpose behind using such a relay circuitry is the complete electrical isolation between input and output, and to control the low power signal. The output of this system is in the form of an electric bulb which glows for the correct output voltage

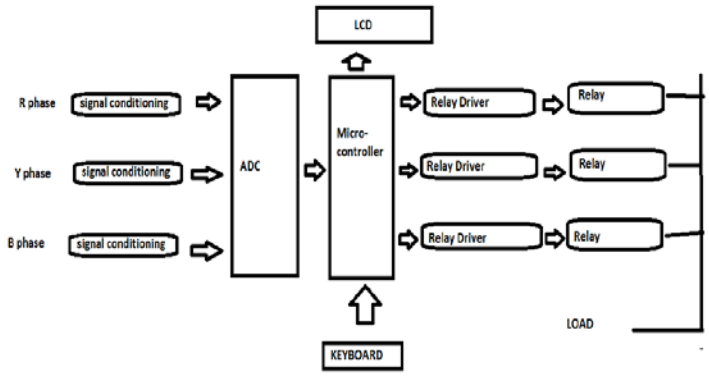

Figure a: Block Diagram for Automatic Phase Changer.

A.LOGICAL ANALYSIS:

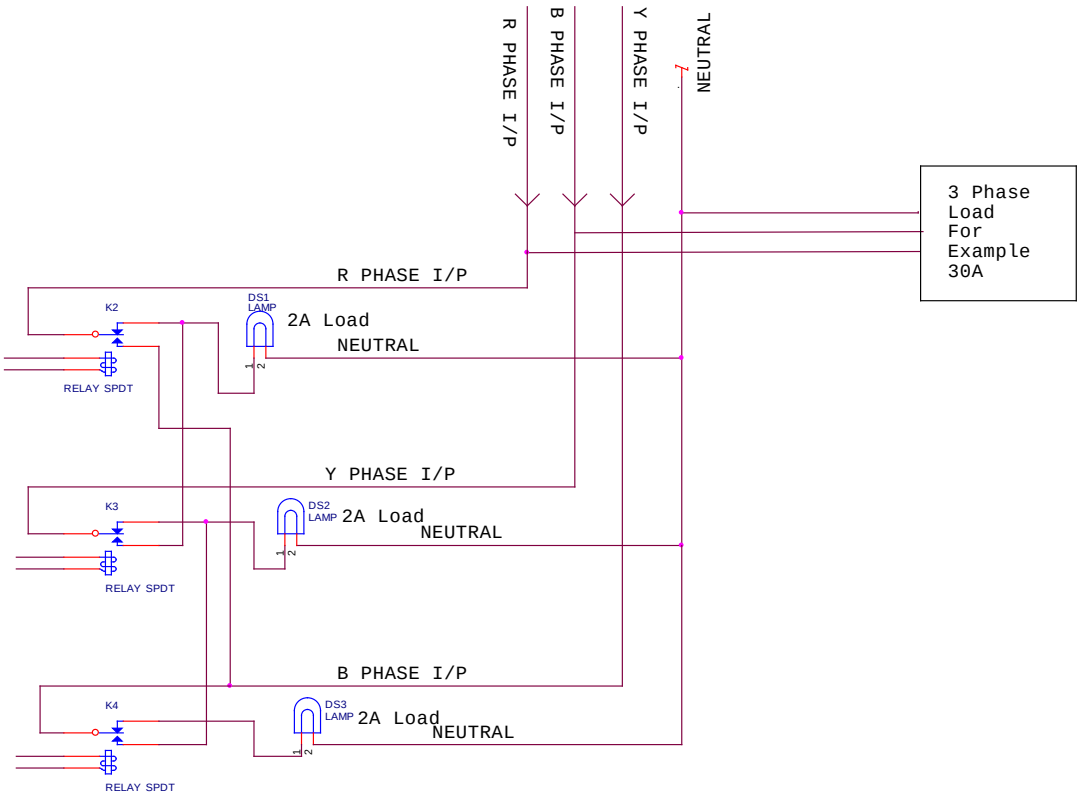

Figure b: Demonstration of total load

Total Load = single Phase+ 3 Phase Load
= R phase + Y Phase + B Phase
= (2A + 2 A +2 A) single Phase +30A
= 36A
So each Phase Current is Total Current /3 = 36/3 =12 A
If R phase absent in Normal Condition
Total Load = single Phase+ 3 Phase Load
= R phase + Y Phase + B Phase + 3 Phase Load
= (0A + 2 A +2 A) single Phase +0A
= 4A
If R phase absent in Automatic Phase Changer Condition
Total Load = single Phase+ 3 Phase Load
= R phase + Y Phase + B Phase
= (0A + (2 A +2 A) +2A single Phase +0A (3 Phase)
= 6A is less than 12 A so no problem.
Maximum Capacity is 12A

ADVANTAGE:

No manual errors, Remote location operation can be done, Auto switching of MSEB & DG, PLC with monitor continues input supply and taking automatic decision, Load continues on when MSEB supply is present or not, switching input supply is very fast using PLC.

DISADVANTAGES:

Costly for general application, this system is not battery operated, Fuel low indication not monitoring, Battery voltage is not displayed on LCD/ 7- segment

APPLICATIONS:

In various large processing plants, Pharmaceutical industry, Water filling plant, Industry (assembly lines, engine rooms on ships, critical auxiliaries in thermal power stations, etc.), Infrastructure (port and railway installations, runway lighting systems, control systems on military sites, etc.), Commercial and Service Sector (operating rooms in hospitals, safety systems for buildings, computer rooms for banks and insurance companies, lighting and emergency lighting systems in malls, etc.), Industry and Infrastructure.

CONCLUSION:

Hence using this project a correct voltage level at output using same power lines through relay is achieved. In short the control of voltage level at the output of three phase circuitry (i.e. low level to

normal voltage level) can be done. The circuit also provides an automatic phase change in the circuitry (i.e. R, Y, B). Hence using these circuitry human efforts are reduced and the motive of phase change is achieved automatically with the help of microcontroller which leads to various industrial, medical power plant usages. Moreover the circuit break up issue is also avoided in this project. In short it's an intelligent system which has the ability to monitor, control and switch the system between phases. Avoids power failure from mains without the aid of operator and the switching between mains and the generator access in micro secondsUltimately by implementing such a circuit various life's in hospitals can be saved moreover the power failure issue are resolved and in order to complete.

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