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AUTO SELECTION OF ANY AVAILABLE PHASE, IN THREE PHASE SUPPLY SYSTEM

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ABSTRACT:- *In many cases we have three phase supply where also we use single phase to run the single phase equipment. such as load of operation theater in hospitals, commercial internet servers. We have to use proper relay logic circuits with arduino programming then reduce these problems. Here, the three phase system should be change as single phase. That may be as one phase or two phase, both phases are act as a single phase for single phase machines using arduino programming with relay circuit. So, the losses are reduced and single phase equipment are run by this method.*

KEYWORDS: Transformers, Relay circuits, Filters, Arduino UNO programming board, LED lamps, Switches.

INTRODUCTION:

In developing countries power instability phase failure has posed serious problem to their economic development. I.e. to say, where there is an erratic power supply, there is no development. This is one of the factors that boost economic of country is the availability of steady and power supply.

However industrial, commercial and even domestic are dependent on public power supply such as phase failure, total power failure due to one or more technical problem in power generation, transmission, distribution. Hence there is need for automatic phase change during phase failure in order to safe consumer appliances from unbalanced power supply.

In the above topic we are going to propose the automatic phase selector by relay logic using arduino programming. In this topic load is shifted on different phases according to availability of phase. For that relay is used to develop phase shifter or phase selector which select the phase according to availability of phase and avoid the short circuiting of three phase available here that provide under voltage protection.

The system operates by step down 220/12Volts, rectify and feed to the filter circuits using L7805 through voltage divider circuits. The filter circuits using L7805 works for the under voltage and over voltage protection and switch the relay through transistor driver. The automatic phase changer is made from some electronics components in which diodes, relays and fuses are include. Result obtained during test shows that whenever there is failure of phase, under voltage condition then the load gates shifted on another phase instantly.

Here, we are used LCD displays for indicates which phase is present. And also it is used as shows supplying current in amps and voltage in volts. It also shows load side current and voltage. So, it indicates all the 3 phases (i.e.,) R,Y,B.

METHODOLOGY:

In this project the load shifted on different phase according to the phase selector. So avoid the short circuit using relay. Also we connect LED lights are providing which indicates which phase is running. Also LCD display provided for indicating current and voltage ratings.

LITRETURE SURVEY:

1. AUTOMATIC PHASE DETECTOR IN THREE PHASE SUPPLY:

When a three-phase supply is fed to this system, it compares the voltages of each phase and active phase appears across the output. As a results an active phase is automatically selected among the three phases (R, Y, B) when one of those phases is absent. That active phase is connected to the load. Automatic phase selector consists of a selector circuit & a changeover mechanism. Selector circuit compares the voltage of each phase. The changeover mechanism consists of a gear motor and one conductor. When any of the phases is absent, it gives the signal to the changeover mechanism through electromagnetic relay. The gear motor starts to rotate until the conductor reaches to the next phase. As per the circuit diagram

three phase supply is given to the changeover mechanism and the single phase output is taken out for supplying a single-phase load. One part of this output is stepped down by a 220V/12V step down transformer. After that it is rectified by bridge rectifier and filtered by capacitor. After filtration, the signal is given to pin no 3 of op-amp (IC 741), pin no 3 is already connected to a 12V DC supply. If the connected phase is active, the output of op-amp is zero.

2. AUTOMATIC ACTIVE PHASE SELECTOR FOR SINGLE PHASE LOAD FROM THREE PHASE SUPPLY:

The LPC2148 depend on a 16/32 bit ARM7TDMl-S CPU with constant imitating and implanted follow bolster, together with 128/512 kilobytes of installed rapid glimmer memory. A 128-piece wide memory interface and an interesting quickening agent design empower 32-bit code execution at most extreme clock rate. For basic code estimate applications, the option 16-bit Thumb Mode decreases code by more than 30% with negligible execution punishment. With their minimal 64 stick bundle, low power utilization, different 32-bit clocks, 4-channel 10-bit ADC, USB POBT, PWM channels and 46 GPIO lines with up to 9 outer intrude on pins these microcontrollers are especially reasonable for mechanical control, restorative frameworks, get to control and purpose of-offer.

3. **AUTOMATIC PHASE SELECTOR FOR MULTI SOURCE POWER SUPPLY:**

In this paper, a real-time automatic phase selector was designed using logic gates and power electronic devices. A prototype of the design was constructed and tested at the lab for the purpose of evaluation and assessment. Results proved that, the selection was successful in terms of speed among the three phase combination. Miniaturization of digital circuits and scalability of other electronic circuits are, therefore, recommended to improve upon such designs and development.

4. **AUTOMATIC CHANGE OVER OF GENERATOR FOR POWER SUPPLY:**

Relay card is sense the one of the relay is in off condition.it mean it is signal for 12v dc relay to operate. That 12v dc relay is connected to timer 2 and battery. The timer 2 is operate and the battery is connected to the diesel generator self and due to this process the diesel generator is started. At the same time the utility power contactor is de energized. Now, the generator is in running condition. The generator is generating the electricity. It is connected to the generator contactor. And due to this power in the generator contactor coil it is connected to the load. When the utility power supply is restored at that time the relay card is worked properly and it is operate the timer 1. That timer 1 is connected with the lever of the diesel generator. When it is operate the generator is stop. Timer is use for control the lever for generator stop condition. At that time the diesel generator contactor is de energized due to stopping the generator and the utility power supply contactor is energized and it is connected to the load. That both contactors are interlocking with each other. Which mean when the utility power contactor is in working condition at the same time the diesel generator contactor is never working and vice versa. That interlocking is done by NONC locking of the contactor.

5. DESIGN AND CONSTRUCTION OF AUTOMATIC THREE PHASE POWER SYSTEM SELECTOR:

If the phase selector is connected to the main power supply say, red phase R; it is stepped down by transformer X_1 to deliver 12 V, 300mA, which is ratified by diode D_1 and filtered by capacitor C_1 to produce the operating voltage for the operating amplifier IC_1. The voltage at the inverting pin 2 of Op-amp IC_1 is taken from the voltage divider circuit of resistor R_1 and the preset resistor VR_1 is used to set the reference voltage according to the requirement. The reference voltage at non-inverting pin 3 is fixed to 5.1 V through zener diode ZD_1. The voltage at the inverting pin 2 of IC_1 remains high (i.e. more than reference voltage of 5.1 V) in as much as the voltage in Red phase is in the range of 200-230 volt and its output pin also remains high. As a result, transistor T_1 does not conduct; relay RL_1 remains de-energized and red phase, R supplies power to the load L_1 via normally closed contact of relay RL_1. Moreover, as soon as phase R voltage goes below 200V, the voltage at inverting pin 2 of IC_1 goes below reference voltage of 5.1 V, and its output goes low. Then because of this, transistor T_1 conducts and relay RL_1 energizes and load L_1 is disconnected from phase R and connected to yellow phase, Y through relay RL_2. Similarly, the automatic phase changing of the remaining two phases, through yellow phase and blue phase, B works accordingly. The designed circuit and the truth table for the three phase power selector are shown in figure 3 and table 1 respectively.

6. **OC, UV, OV PROTECTED ADVANCED AUTOMATIC PHASE SELECTOR WITH INVERTER SUPPORT:**

The distribution system is three phase whereas majority of all house hold electrical loads are single phase loads. The improper allocation of these single - phase loads in three phase system will lead to current imbalances of the power system. The unbalanced system will increase the power quality issues. Almost all houses now require to use inverter. If an equipment is starting, then the to which phase it is to be connected can be determined and this idea is the key point to this paper. This can

also protect the whole system from open circuit, under voltage and over voltage problems which may lead to brown out or a complete black out.

7. AUTOMATIC ACTIVE PHASE SELECTOR:

During normal operation that is when all the phases are in live condition all the load are ON and they are working on their respective phases. The working condition of the phases can be seen on LCD. But when the fault occurs on say „R" phase then the relay operates and the critical load will be switched automatically on „Y" phase. When the fault is removed the system begins to work normally. Also when there is fault on say „Y" phase then the load is shifted on „B" phase. Similarly, the load on „B" phase is shifted on „R" phase. The sequence of the switching can be changed according to the connections made and the program installed.

8. **DESIGN OF AN AUTOMATIC POWER PHASE SELECTOR:**

Phase selector is a mechanism used in alternating or switching between power phases with respect to the availability of power on any of the phases. Over the decades, there has been frequent phase failure in the power phases resulting to manual switching of the fuse from one phase to the other. However, this paper focuses on the design of a phase selector using automatic switching mechanism. This during its operation, transfers the consumer's loads to the available power source in the case of power failure in the power supply from the national grid and automatically detects when power is restored to the failed phase and returns the loads to this source. In the course of this design, several tests were carried out such as the continuity test of contactor and relay coils to ascertain low resistance, continuity test on the contacts of the materials used to ensure free flow of current, conductivity of the wires and the whole system was also simulated using the Proteus electronics software.

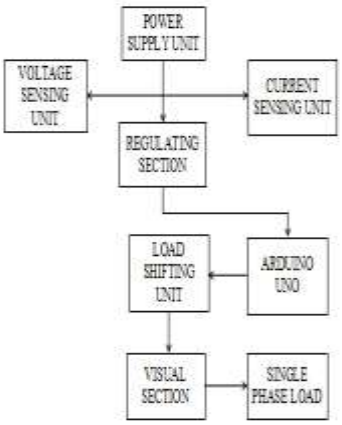
9. **AUTOMATIC PHASE SELECTOR USING MICRO - CONTROLLER 89C52:**

In three phase equipment's, if supply voltage is low in any of the one phase and you if you wish to run all the equipment properly. This equipment will help you to rescue this situation. However proper rating fuse need to be used in three phase i.e. R, Y, and B inputs lines. Where the correct voltage is available that time. Other low voltage phase shift to correct voltage in same manner, to run all the equipment on the single phase in the building. The circuit consist of relay comparator, transformer.

10. **DESIGN AND SIMULATION OF AUTOMATIC PHASE SELECTOR AND CHANGE OVER FOR 3 - PHASE SUPPLY:**

This project work is on the design and construction of automatic phase selector and changeover switch for 3 - phase power supply. It provides a means of switching from one phase of AC mains to another in the case of failure in the existing phase, it also change over to generator if there is failure in all the three phases of the AC mains. The circuit also senses the restoration of any or all the three phases of the mains and change over without any notice of power outage. This project has been improved on the existing types of electro mechanical device that has being in use over the years. Hence this has been achieved by the use of 1 - of - 4 analogue multiplexers (CD4052), analogue to digital converter (ADC0804), AT89C51 micro controller and relay switches.

BLOCK DIAGRAM:



OPERATION:

- **POWER SUPPLY:**
  - Here, the three phase supply given to the circuit.
  - Each supply have separate step down transformer that is 220V/12V because of the demo project.
  - So, these transformers are step down the presented supplies.
- **FILTER SECTION:**
  - In this section, the presented supplies are send through the L7805 (Regulator) and rectifiers.
  - So, the harmonics are rectified and regulated supply has flow through the circuit.
  - And, it send supply to the relay circuits.
- **CURRENT &VOLTAGE SENSING UNIT:**
  - Both supply and load, current and voltage are sensed by the current and voltage sensors for indication purpose.
- **RELAY SECTION:**
  - The relay circuits are connected with series connection, because load changing purpose. It is helps as if, one phase is absent then another two supplies are change over single phase supply.
  - The relay circuit contains transients, resistors, rectifiers, diodes, LEDs and relays are used.
- **VISUAL SECTION:**
  - In this visual section contains LCD display for the purpose of indicating voltage and current ratings.
  - And also LED lights are used in relay circuit for which phase is present.
- **SINGLE PHASE OUTPUT:**
  - Finally, the single phase is taken from available phase in three phase system.
  - And it given to the loads.

CONCLUSIONS:

Using this paper, a correct voltage level at result is provided to the required phase. In - short the uninterrupted power supply can be provided. The circuit also provides an automatic phase change in the system (i.e., R, Y, and B). Hence using this circuit human effort is reduced and the motive of phase change is achieved automatically with the help of advanced controller that is arduino which leads to various industrial and commercial usages.

It is an intelligent system which has the ability to monitor, control and switch the system between phases. It is also less expensive and easily available. It reduces the stress and saves time. It also provides better protection as compared to the manual practice because of the use of overload is the changeover system.

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