



Active Smart Phase Selector for Single Phase from Three Phase Supply

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Abstract

Absence of Phase is a very common and severe problem in any industry, home or office and many locations. Many times one or two phases may not be live in three phase supply. Because of this many times some electrical appliances will be on in one room and OFF in another room. Because of that single phasing will occur which is cause to burn out the devices like Induction motors, Lamp loads and etc. This creates a big disturbance to our routine work. This project is designed to check the availability of any live phase and the load will be connected to the particular live phase only. Even a single phase is available and then also the load will be in ON condition. This project is designed with ARM Microcontroller. This controller continuously checks for live condition of all phases connected to it. If two or three phases are live the load will be connected to phase I only. This project uses regulated 12V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage regulation and provide better efficiency of the system.

Index Terms: Transformer, Optocoupler, Voltage Regulator, ARM Microcontroller etc.

1. INTRODUCTION

The invention and advancement in the electrical field makes the applications of the electricity very vast Unfortunately though the poor availability of public utility power the public faces so much problem therefore, the intention of project is that to provide uninterrupted AC mains supply i.e.230 volt to a single phase load. This is achieved by automatic changeover of the load from the missing phase to the next available phase in a 3 phase system. It is often noticed that power interruption in distribution system is about 70% for single phase faults while other two phases are in normal condition. Thus, in any commercial or domestic power supply system where 3 phase is available, it is advisable to have an automatic changeover system for uninterrupted power to critical loads in the event of missing phase. In this system auto selection is achieved by using a set of relays interconnected in such a way that if one of the relay feeding to the load remains energized always. Further the project can be enhanced by incorporating power semiconductor devices such as thyristors /IGBTs for instantaneous changeover to the next available phase. This overcomes the drawback of the changeover time generally witnessed by relay switching operations.

2. LITRATURE REVIEW

Oduobuk, E. J., E. B. Etta, and E. E. Ekpenyong. "Design and Implementation of Automatic Three Phase Changer Using LM324 Quad Integrated Circuit LM324 integrated circuit (comparator) and 2N2222 transistors were used as active components alongside other passive components. Result shows that, when the three phase ac inputs: Red phase (R), yellow phase (Y) and blue phase (B) from public utility supply was fed to the system, the system compared the inputs with regard to phase imbalances, and the input with the highest voltage appears across the output.

Ghosh, Ayan, Shamik Chattaraj, Snehashis Das, and Kaustav Mallick. "Design of Automatic Phase Selector from Any Available Three Phase Supply.Although, there are many designs that can perform almost similar functions like, single phase change-over switches, two phase automatic transfer switch and three phase automatic change-over switch, but this model is about an Automatic phase switchover (phase selector) which is designed for only three phase A.C input power to single phase output applications.

3. SYSTEM ARCHITECTURE

Display "ACTIVE PHASE SELECTOR SYSTEM" On LCD. When Phase I is active at that time relay 1 Active To ON the

Load, Wait for the message Phase I is active to be displayed on the LCD. When Phase II is active at that time relay 2 active to ON the Load, Wait for the message Phase II is active to be When Phase III is active at that time relay 3 active to ON the Load, Wait for the message Phase III is active to be displayed on the LCD. So Phase I is selected from the 3 phases by default in order to run the single phase load when all phase will active. In the absence of Phase I, Phase II is selected and the same message is displayed on the LCD. If the phase II is absent then the phase III is selected to run the single phase loads. In the presence of the first phase the phase selection will be switched to the first phase though it is being presently run by the second or third phase displayed on the LCD.

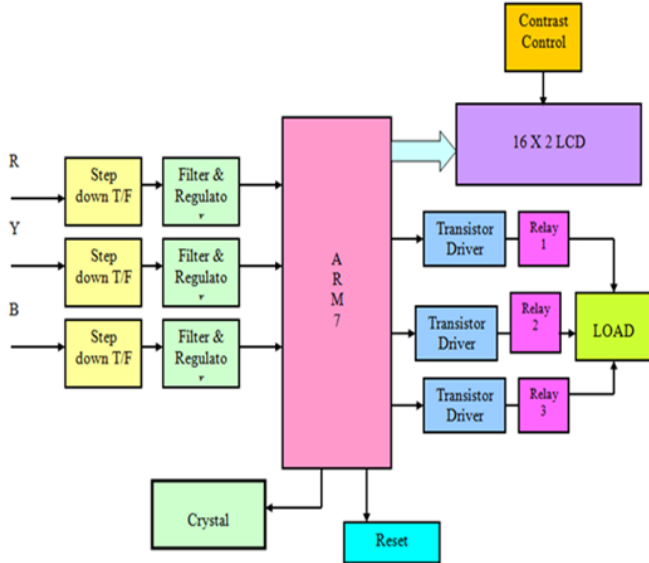


Fig-1: Block diagram

4. SYSTEM REQUIREMENT

4.1 ARM 7 LPC2148

The LPC2148 depend on a 16/32 bit ARM7TDMI-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.

4.2 Power Supply

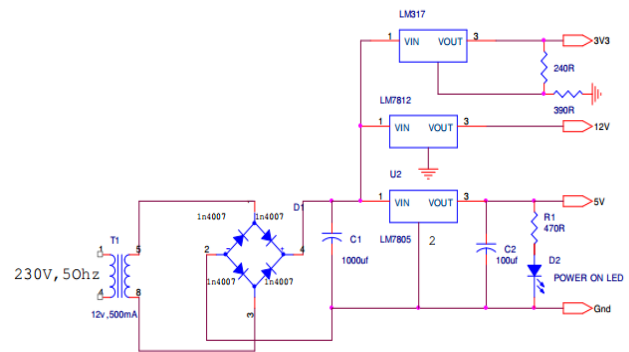


Fig-2: Power Supply

To get 5V regulated output we use LM7805. Output voltage of LM7805 regulator is 5V. Dropout Voltage of LM7805 is 2V, So minimum input voltage required at input of regulator To get 5V output is
 Output of LM7805 + Dropout voltage = 5 + 2 = 7V
 So minimum input voltage is 7V and maximum input voltage is 35V (Ref. Datasheet)
 For which LM7805 gives 5V regulated output

Transformer Design:

RMS secondary output voltage of transformer is
 $V_s = (V_m + n \cdot 1) / 1.42$
 $n = 1$ for FWR or HWR
 $n = 2$ for BWR.
 But $V_m = V_{dc} \cdot \pi / 2 = 14.13 = 15$
 So,
 $V_s = (15 + 2) / 1.42$
 $V_s = 12V$

4.3 PIN Configuration

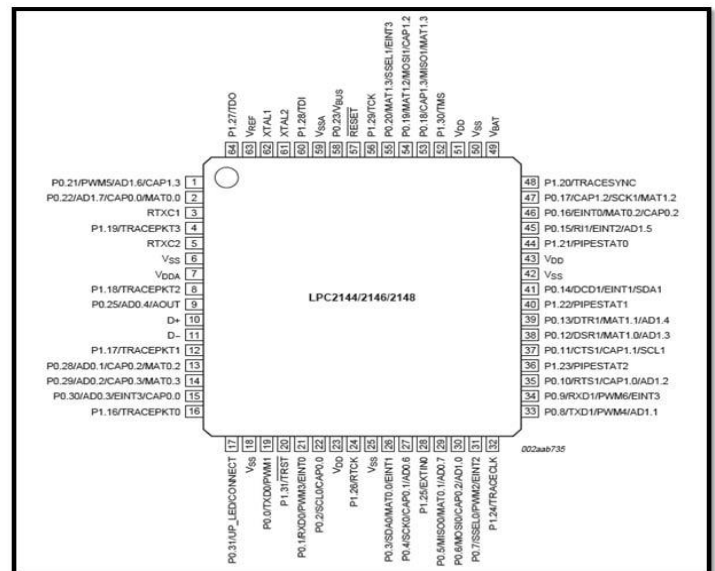


Fig-3: PIN Configuration

Above figure shows the schematic pin diagram of a ARM (Advance Risk Machine) 64 pins.

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4.4 LCD (LIQUID CRYSTAL DISPLAY)

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome.[1] LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and 7-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements. The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters. Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data. Ease of programming for characters and graphics

5. RESULT

Get desired output from the auto phase selector. Automatically it is selecting the active phase when the Connected phase is absent.

6. CONCLUSION

Unfortunately though the poor availability of public utility power in the developing countries has pushed her citizens to seek alternatives and dependent means of electricity .This has resulted in individuals buying wind turbines, solar panels, generating sets and so on. Unavoidably this requires careful selection of the one to be ON to their use – alternative power or public power utility.

REFERENCES

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