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# THREE PHASE SEQUENCE CHECKER FOR THREE PHASE SUPPLY WITH RELAY CIRCUIT

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## ABSTRACT

*Phase sequence is the order in which the rotated voltage or current generated by 3-phase system attain peak or maximum value. Each sequence voltage is 120 degree apart. Therefore, the maximum value achieved by each sequence is at the definite time interval. Based on this individual response time a technique of phase detection system is discussed in this paper. When phase sequence are reverses at that time a relay system operates and a three phase sypply gets turns off. A micro-controller is used to incorporate the algorithm into it*

***Index Terms—Phase Sequence Indicator, Phase Detection, 3*-phase Sequence, Micro-controller.**

## I. INTRODUCTION

In industry there are lots of machinery presents.In this there are more in quantity a rotionational Machinery presents. Phase sequence meter is used for detecting the sequence of the supply in three-phase electric circuits. Since the direction of rotation of three phase electric motors can be changed by changing the phase sequence of supply. And also the correct operation of measuring instruments like 3 phase energy meter and automatic control of devices also depend on the phase sequence. Different types of phase sequence testers are available in today's market like contact or non contact, static or rotating, etc., in a wide range of voltage or power ratings. The main aim is To check incoming 3 phase supply sequence by Rotating Project kit LED in Clockwise Directions. If 3 phase supply is present in RYB state the start the further circuits. Otherwise If 3 phase supply is not present in RYB (eg.RBY) state the trip/stop of the supply and show as a Line fault Indication with Rotating Project kit LED in Anticlockwise Directions.

### 1.1 Effects of Wrong Phase Sequence

1. Reverse Rotation of Motors
2. Reverse Pumping.
3. Change in Efficiency of Motors.
4. Dry Running of large power motors.
5. Large running maintenance.
6. Overheating of Motors and Burning of Motors Winding.

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**BLOCK DIAGRAM**

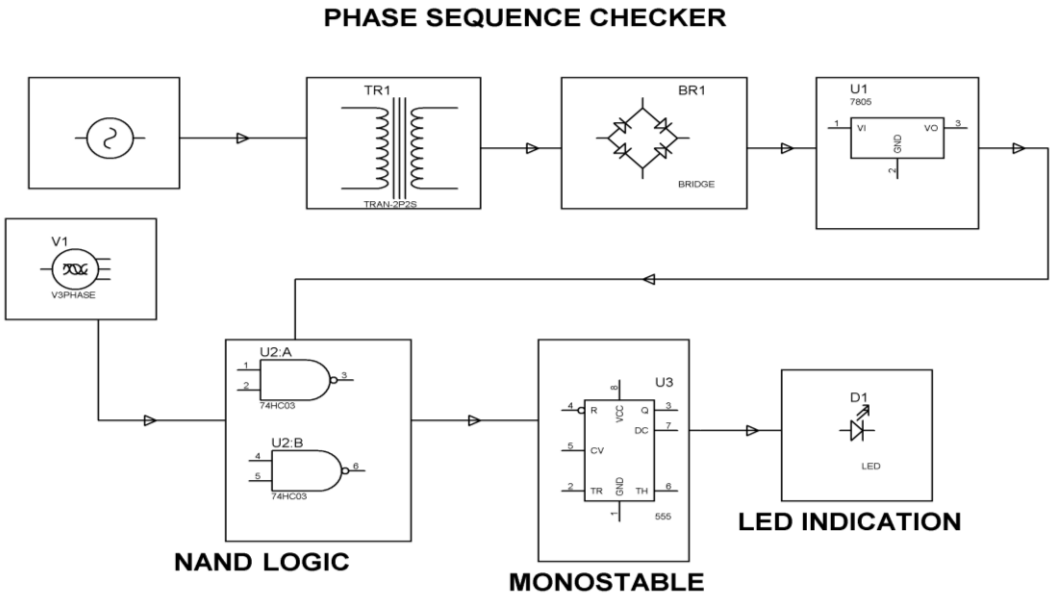


**Fig-1 Main Block Diagram**

### 1.2 Working concept

A 3-ph supply of 440V AC 50Hz is fed to a logic circuit comprising of NAND gates and OR gates to detect the sequence of R, Y, B by triggering a monostable timer 555.

While the sequence is not there the triggering to the timer is missed which is indicated by an LED driven from the output of the 555 timer. If phase sequence reverses Tripping signal generates from Nand Gate and IC555 Timer .The tripping signal fed to PLC,Microprocessor or any relay circuit for removing circuit against reverse phase sequence

## II. COMPONENT DESCRIPTION

### 2.1 Nand Gate

In digital electronics, a NAND gate (negative-AND) is a logic gate which produces an output which is false only if all its inputs are true; thus its output is complement to that of the AND gate. A LOW (0) output results only if both the inputs to the gate are HIGH (1); if one or both inputs are LOW (0), a HIGH (1) output results. It is made using transistors and junction diodes. By De Morgan's theorem, AB=A+B, and thus a NAND gate is equivalent to inverters followed by an OR gate

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**CIRCUIT DIAGRAM**

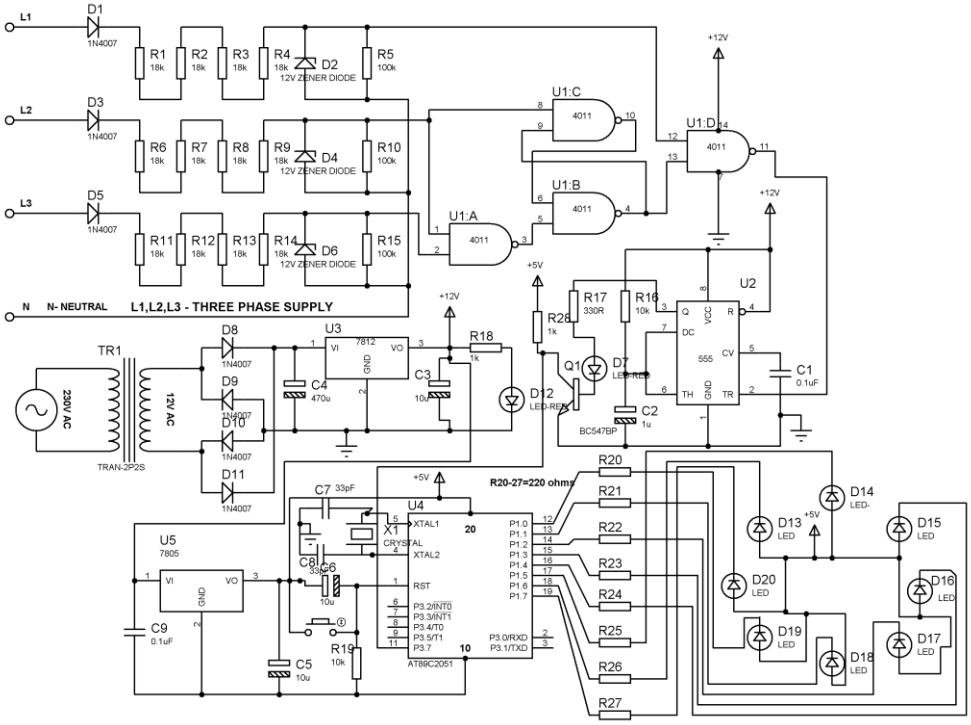


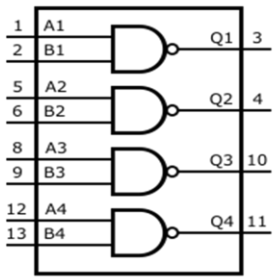

**Fig-2 Main Circuit Diagram**

# CD4011-NAND GATE

*NAND gate truth table*

| *input B* | *input A* | *output* |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

## Functional Diagram of CD4011



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### 2.2 IN4007 Diode

These diodes are used to convert AC into DC these are used as half wave rectifier or full wave rectifier. Three points must he kept in mind while using any type of diode. Maximum forward current capacity , Maximum reverse voltage capacity, Maximum forward voltage capacity

### 2.3 555 TIMER

The 555 timer IC is an integrated circuit (chip) used in a variety of timer, pulse generation, and oscillator applications. The 555 can be used to provide time delays, as an oscillator, and as a flip-flop element. Derivatives provide up to four timing circuits in one package.

The 555 can operate as an electronic oscillator. Uses include LED and lamp flashers, pulse generation, logic clocks, tone generation, security alarms, pulse position modulation and so on. The 555 can be used as a simple ADC, converting an analog value to a pulse length (e.g., selecting a thermistor as timing resistor allows the use of the 555 in a temperature sensor and the period of the output pulse is determined by the temperature).

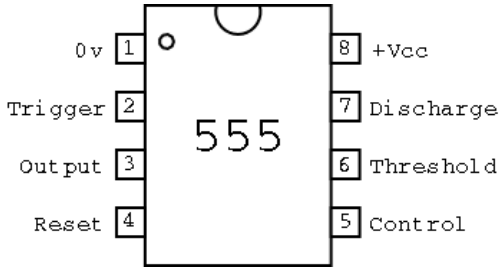


**Fig 2.PIN DIAGRAM.**

1. The 555 timer IC is a simple 8 pin DIL package IC.
2. It can:
3. be used as a monostable
4. be used as an astable
5. source or sink 100mA
6. use supply voltages of 5v to 15v
7. disrupt the power supply - use a decoupling capacitor!

- **Monostable mode IC 555**

in this mode, the 555 functions as a "one-shot" pulse generator. Applications include timers, missing pulse detection, bounce-free switches, touch switches, frequency divider, capacitance measurement, pulse-width modulation (PWM) and so on.

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# POWER SUPPLY

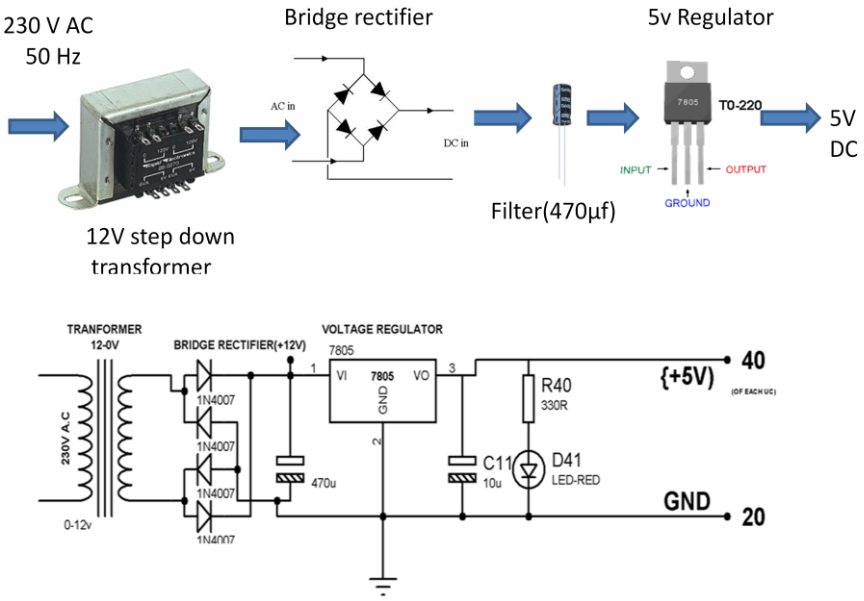


**Fig- Power supply**

## 2.4 Relaying System

In this relaying system, there are Directional type relays & phase sequence comparative relay works for phase sequence checking of the system of three phase supply. Such type of relays are does not shows a position of incoming phase supply to circuit. It operates when any types of connectional change occurs in a circuit. When a change in connection occurs then it disconnects the motoring load of a system. That is becomes a protection of motor to run in reverse direction. Also after getting the proper phase supply to incoming supply system then the motoring loads operates properly.


**Fig 2.4 Relay for operate in wrong phase sequence.**

## 3 Advantages

1. It is More reliable and efficient.
2. Easy detection of phase sequence supply
3. Three phase motor can be prevented from burning.
4. This equipment can be available in low cost.

5. Easy to understand all features of equipments.
6. Increases working life of motoring applications.
7. Low running maintenance of motors & its pump.
8. Reduces losses in motors.

## III. FUTURE SCOPE

1. In future work of our system we can connect number of rotating machinery system such as cutting tool machinery.
2. Also we can give the message of phase sequence fault to respective operator and technician..
3. It is mostly used to avoid future major accidents. From phase sequence.

## IV. CONCLUSION

In industrial sectors there is large motors are working in machinery, Due to Dry running of motors and Large amount of heat produce. This heat causes Burning of motor winding. This Three phase sequence checker can available in low price and Reduces Motor winding Damages running Maintenance.

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