Three Phase Fault Analysis Autoreset On Temporary Fault Or Permanant Trip Otherwise.

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ABSTRACT
The project is intended to improve an automatic tripping mechanism for the three phase supply system. The project output resets automatically after a brief stoppage in the event of short-term fault while it remains in tripped condition in case of long-lasting fault. The electrical substation which supply the power to the consumers i.e. industries or domestic can have failures due to some faults which can be short-term or long-lasting. These faults lead to considerable damage to the power system equipment. In India it is common to witness the let-downs in supply system due to the faults that occur during the transmission or distribution. The errors might be LG (Line to Ground), LL (Line to Line), 3L (Three lines) in the supply systems and these errors in three phase supply system can affect the power system. To stunned this problem a system is built, which can sense these errors and automatically separates the supply to avoid large scale impairment to the control gears in the grid sub-stations.

This scheme is built using three single phase transformers which are wired in star input and star output, and 3 transformers are connected in delta networks, having input 220 volt and output at 12 volt. This idea low voltage testing of fault conditions is followed as it is not suitable to create on mains line. 555 timers are used for handling short period and long period error conditions. A set of switches are used to make the LL, LG and 3L fault in low voltage side, for activating the falling mechanism. Short period fault returns the supply to the load instantaneously called as temporary trip while long period shall result in permanent trip. The idea in the future can be extended to developing a device to send message to the authorities via SMS by interfacing a GSM modem.

Keywords
Transformer, voltage regulator, LM358/555 timer, relay, comparator, resistor, capacitor

1. INTRODUCTION
The project is intended to improve an automatic tripping mechanism for the three phase supply system. The project output resets automatically after a brief stoppage in the event of short-term fault while it remains in tripped condition in case of long-lasting fault. The electrical substation which supply the power to the consumers i.e. industries or domestic can have failures due to some faults which can be short-term or long-lasting. These faults lead to considerable damage to the power system equipment. In India it is common to witness the let-downs in supply system due to the faults that occur during the transmission or distribution. The errors might be LG (Line to Ground), LL (Line to Line), 3L (Three lines) in the supply systems and these errors in three phase supply system can affect the power system. To stunned this problem a system is built, which can sense these errors and automatically separates the supply to avoid large scale impairment to the control gears in the grid sub-stations.

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2. PROPOSED SYSTEM AND BLOCK DIAGRAM

The block diagram presenting plan arrangement of three phase fault analysis autoreset on temporary fault or permanent trip otherwise.

![Block Diagram](image)

**Fig. 1: block diagram of implemented scheme**

The single phase supply is step down and it is transformed into 12v dc. The fault occur on the line when the capacitor are charge there rated value that time the temporary fault are occur on the line after that the fault clearance the relay are in normally open position. But in permanent fault condition the capacitor will be charge then over current will flow through comparator the comparator compares the value capacitor charge and line voltage or rated voltage. That time the relay goes into permanent trip position the load current will be trip.

3. DEVELOPMENT OF PROPOSED SYSTEM

3.1. History of project

In an electric power system, a error or error current is any unusual electric current. For example, a short circuit is a error in which current avoids the normal load. An open-circuit error occurs if a circuit is intermittent by some failure. In three-phase systems, a error may involve one or more phases and ground, or may occur only between phases. In a "ground fault" or "earth fault", current flows into the earth. The short circuit current of a anticipated error can be calculated for most conditions. In power systems, defending devices can detect fault conditions and operate circuit breakers and other devices to edge the loss of service due to a let-down.

3.2. Principle of operation

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3.2.1. Transformer

Transformers are a static scheme which carries power from one path to another path according to the principle of mutual induction. Transformer converts AC current from one voltage to another with a tiny loss of power. Step-up transformers rise voltage, step-down transformers decrease voltage. Most power supplies use a step-down transformer to decrease the hazardously high voltage to a harmless low voltage.

3.2.2. Voltage regulator

A voltage regulator is intended to automatically maintain a constant voltage level. A voltage regulator may be a simple feed forward scheme or may include negative response control loops. It may practice an electromechanical device, or electronic modules.

3.2.4. LM358/555 Timer

The LM358/555 Timer series involves of two self-governing, high achievements internally frequency compensated Operational amplifiers which were intended specifically to operate from a single power supply over a Wide variety of voltages. Operation from divided power supplies is also possible and the low power supply Current drain is self-governing of the magnitude of the power supply voltage.
Application areas contain transducer amplifiers, dc achievement blocks and the whole conventional op-amp Circuits which now can be more easily applied in single power supply systems. For example, the LM358 series can be directly functioned off of the standard +5V power supply voltage which is used in digital systems and will easily provide the essential interface electronics without requiring the additional ±15V power supplies. [3]

3.2.5 Relay

A relay is an electrically functioned switch. Many relays use an electromagnet to function as switching device mechanically, but other functioning principles are also used. Relays are used where it is necessary to switch a circuit by a low-power signal (with complete electrical separation between control and controlled circuits), or where some circuits must be controlled by one signal. [4]

3.2.6 Comparator

Op amps and comparators look very comparable but a comparator gives a logic output representing the relative potentials on its two inputs. An op amp amplifies the variance voltage between its two inputs – and is intended always to be used in closed-loop applications. Potential dividers are linked to the inverting and non inverting inputs of the op-amp to give particular voltage at these terminals. Supply voltage is given to +v and −v is linked to ground. The output of this comparator will be logic high (i.e. Supply voltage) if the non-inverting terminal input is superior than the inverting terminal input of the comparator. If the inverting terminal input is superior than the non-inverting terminal input then the output of the comparator will be logic low (i.e. Gnd).[6]

3.2.7 Resistor

A resistor is a two-terminal electronic module intended to oppose an electric current by creating a voltage drop between its terminals in quantity to the current, that is in accordance with Ohm’s law: \( V = IR \). Resistors are used as part of electrical systems and electronic circuits. They are extremely common place in most electronic apparatus. Practical resistors can be made of numerous compounds and films, as well as resistance wire (wire prepared of a high-resistivity alloy, such as nickel/chrome).[7]
4. HARDWARE TESTING

4.1 Continuity Test
In electronics, a continuity test is the examination of an electric circuit to see if current runs (that it is in fact a complete path). A continuity test is accomplished by placing a small voltage (wired in sequence with an LED or noise-producing module such as a piezoelectric speaker) across the selected path. If electron flow is withdrawn by broken conductors, damaged mechanisms, or extreme resistance, the circuit is "open". Devices that can be used to execute continuity tests contain multi meters which measure current and specialized continuity testers which are inexpensive, more simple devices, generally with a simple light bulb that lights up when current runs. An significant application is the continuity test of a bundle of wires so as to find the two ends belonging to a specific one of these wires; there will be a insignificant resistance between the ‘right’ ends, and only between the ‘right’ ends. This test is the accomplished just after the hardware soldering and configuration has been accomplished. This test aims at outcome any electrical open tracks in the circuit after the soldering. Many a times, the electrical continuity in the path is lost due to unsuitable soldering, wrong and rough treatment of the PCB, unsuitable usage of the soldering iron, module disappointments and occurrence of bugs in the path diagram. We use a multi meter to achieve this test. We keep the multi meter in signal mode and connect the ground terminal of the multi meter to the ground. We attach both the terminals across the path that needs to be checked. If there is continuance then you will hear the beep sound.[1]

4.2 Power On Test
This test is accomplished to check whether the voltage at dissimilar terminals is according to the necessity or not. We take a multi meter and put it in voltage manner. Remember that this test is achieved without ICs. Firstly, if we are using a transformer we check the production of the transformer; whether we get the essential 12V AC voltage (depends on the transformer used in for the circuit). If we use a battery then we check if the battery is totally charged or not according to the stated voltage of the battery by using multi-meter. Then we apply this voltage to the power supply circuit. Note that we do this test without IC’s because if there is any extreme voltage, this may lead to damage the ICs. If a circuit involves of voltage regulator then we check for the input to the voltage regulator (like 7805, 7809, 7815, 7915)i.e., are we receiving an input of 12V and a essential output depending on the regulator used in the circuit. EX: if we are using 7805 we get output of 5V and if using 7809 we get 9V at production pin and so on. This output from the voltage regulator is given to the power supply pin of precise ICs. Hence we Check for the voltage level at those pins whether we are getting essential voltage. Similar, we check for the other terminals for the essential voltage. In this way we can guarantee that the voltage at all the terminals is as per the condition. [1]

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