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THREE PHASE FAULT ANALYSIS WITH AUTO RESET ON TEMPORARY FAULT AND PERMANENT TRIP OTHERWISE

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ABSTRACT

This Project develops an automatic tripping mechanism for the three phase supply system. The project output resets automatically after a brief interruption in the event of a temporary fault while it remains in tripped condition in case of permanent fault. The electrical substations which supply the power to the consumers, have failures due to some faults which can be temporary or permanent. These faults lead to substantial damage to the power system equipment. In India It is common, The faults might be LG (Line to Ground), LL (Line to Line), 3L(Three lines) in the supply systems and these faults in three phase supply systems can affect the power system. To overcome this problem a system is built, which can sense these faults and automatically disconnects the supply to avoid large scale damage to the control gears in the grid sub-stations.. Using combination of timer ICs we measure the time, when the phase fails then the load is turned off immediately, if the phase returns before 8-10 seconds then the load is switched on since the failure is detected as temporary, but if the time of failure exceeds 8-10 seconds then it is treated as permanent failure as it can cause a problem in the load connected so this time it is switched off permanently, only when the user presses the reset button again the system restarts. Hence, in case of a temporary fault the output of the project resets and in case of permanent fault it acquires permanent trip condition. This three-phase fault analysis system automatically differentiates between a temporary disturbance and a permanent fault and appropriately cuts the supply for a short duration or long duration respectively.

Keyword: *- 555 Timer, Voltage regulator (LM7805), Relays, Comparator, Transformer (230 V– 12V AC)*

1. INTRODUCTION

The faults on most overhead lines are transient. The transient fault is an insulator flashover, this fault which is cleared by immediately tripping of circuit breakers to isolate fault. The Faults tend to be less transient at lower, in distribution voltages and more transient at higher, sub transmission and transmission voltages. Lightning is a common cause of transient faults, partially resulting from insulator flashovers from high transient voltages made by the lightning. The possibility is swing wires to the temporary contact with a foreign object. So transient faults are cleared by de-energizing the line, to allow the fault to clear, Auto reclosing then restore service of the line. The Permanent faults will not clear up the tripping and reclosing.

2. RESEARCH METHODOLOGY

2.1 Proposed System

Progressively easing Disappointment in three stage frameworks are very normal flaws experienced by three stage gadgets, disappointment of any stage will prompt drop in working voltage which will make either gadget quit working or three stage engine to run at lower voltages accordingly diminishing the speed and expanding vibration because of it. Our framework is intended to take care of this issue and thus saving the apparatus from harm. Utilizing mix of clock ICs we measure the time, when the stage flops then the heap is switched off right away, on the off chance that the stage returns before 8-10 seconds, the heap is turned on since the disappointment is distinguished as transitory, yet on the off chance that the hour of disappointment surpasses 8-10 seconds, it is treated as long-lasting disappointment as it can cause an issue in the heap associated so this time it is turned off forever, just when the client presses the reset button again the framework restarts. Subsequently, in the event of an impermanent shortcoming the result of the venture resets and if there should be an occurrence of extremely durable issue it gains long-lasting outing condition. This three-stage issue investigation framework naturally separates between a brief unsettling influence and a long-lasting shortcoming and suitably cuts the inventory for a brief span or long term individually.

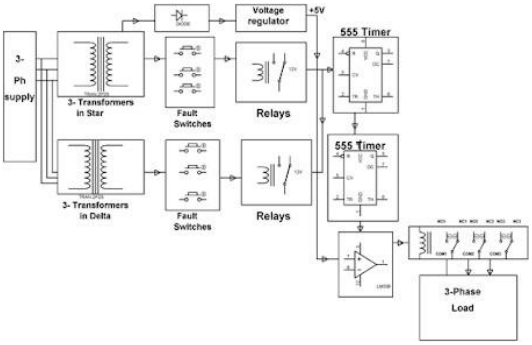

Fig -1: Three Phase Fault Analysis Block Diagram

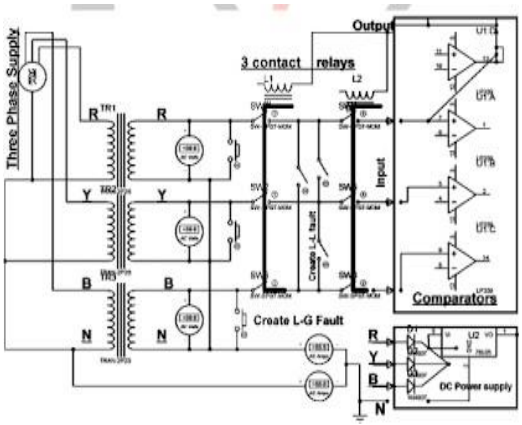

Fig -2: Three Phase Fault Analysis Circuit Diagram

3. WORKING:

There are six step down transformers which are connected to the board producing 12 volts to the circuit. These six transformers are divided into two groups, first one group is connected in star-star connection and later is connected in star-delta connection. The output of all the six transformers is rectified and filtered individually and are given to 6 relay coils. 6 push buttons one each connected across the relay coil is meant to create a fault condition. The NC contacts of all the relays are made parallel while all the common points are grounded. The parallel connected point of NC is then connected to pin2 of 555 timer through a resistor R5 i.e. wired in mono stable mode the output (pin3) of the same timer is connected to reset (pin4) of the other 555 timer wired in as table mode. LED's are connected at their output to indicate their status. The output (pin1) of 555 timer (U3) is given to op-amp LM358 through wire 11 and d12 (1N4007) to the non-inverting input (pin3) which acts as a comparator. It compares the value of pin 2 (inverting input) and pin 3 (non-inverting input) of LM358. The voltage of pin 2 is kept at fixed/constant voltage with the help of a potential divider. It is generally kept higher than the pin 3 of the operational amplifier so that pin 1 i.e. output of LM358 develops low (zero logic) which fails to operate 3CO relay through the transistor Q, and the same is used for disconnecting the load used in fault condition.

4. ADVANTAGES:

1. Advantages of three phase fault analysis with auto reset on temporary fault and permanent trip otherwise as follows:
2. This invention will accurately identifies hazardous faults requiring line de-Energization, and also accurately discriminates, or distinguishes, a hazardous fault from other events for which the line should remain energized.
3. The invention encompasses such a load analysis system which minimizes unnecessary power service interruptions and outages.
4. By using this system the secondary arc current can be abruptly reduced.
5. This system is even appropriate for long transmission line transmitting high voltage.
6. A timer is also provided to identify weather the fault is temporary or permanent . By doing so frequent tripping of the system can be avoided as temporary faults are self-correcting.
7. An individual re-closure to every phase so that if there is fault in any one phase then that phase only is deactivated keeping the other phases in working condition by doing so the efficiency of the system increases .
8. This invention provides relatively low cost and reliable apparatus for the intended purpose.
9. The invention will respond correctly to phase-ground faults occurring simultaneously on two of the three phase lines.
10. By using this proposed circuitry work should be completed from time to time . Also auto reclosing can significantly reduce the outage time due
11. to faults and provide a higher level of service continuity to the customer. It helps to maintain system stability.

5. DISADVANTAGES:

If any fault occurs due to natural calamities then this invention will not able to overcome the fault.

6. RESULT:

L-G and L-L faults have been created to develop an automatic tripping mechanism for the three phase supply system while temporary and permanent faults occur. Here timer 555 has been used with relay for the fault analysis short duration fault returns the supply to the load immediately called a temporary trip while long duration shall result in permanent trip as this project is advantageous compare to other protection system it can be used for protection of transmission line faults which occur in power system hence this system is more economical, automatic and hazards free compared to other type of protecting system against three phase fault. This project design in the form of hardware for six single phase transformers to 230v to 12v of output to develop an automatic tripping mechanism for the three phase supply system while temporary fault and permanent fault occurs in the system. During a temporary fault it returns the supply to the load immediately, otherwise it results in a permanent trip.

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