

Auto Reset and Tripping Technique for Temporary and Permanent Fault Analysis

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Abstract— This Paper is represents to develop an automatic tripping mechanism for the three phase supply system. As various faults occurs on the power system. They are either temporary or permanent faults, which may damage and disturb the power system components. Hence they need to be identified and cleaned. In this paper, the proposed technique provides the output as if the fault is temporary then automatically tripping occurs after a brief interruption in the event of temporary faults, while it remains in tripped condition in case of permanent fault. The fault may be permanent as well as temporary faults occurred in system. Single L-G fault, also two is more faults are occurred in the system and system can be affected by such faults. For this necessity, the proposed mechanism is useful. This control system comes in action by sensing fault and isolates the load or connected equipment from main supply system.

Key words: Tripping, Timer, Transformer, Temporary Fault

I. INTRODUCTION

In order to supports today's reliable operation of power system. A system can be considered as, where no breakdown of wire in transmission line and no short circuit of two phases. But it is not practically happens. Due to variable loading operation of power system, also by lightning contact with foreign object the short circuit as well as breakdown of wire is occurs. These faults are temporary or same cases act as permanent fault category. The electrical substation which supply the power to the consumer. The equipment under operating state and domestic can have failure due to such faults which can be temporary or permanent. This faults lead to substantial damage to the power system equipment. In India it is common to observe the failure of supply system due to faults that occur during transmission and distribution. The frequency of occurrence of faults is L-G and LL-G type. Thus, transient faults can be cleared by momentarily de-energizing the line, in order to allow the fault to clear. Auto reclosing can then restore service to the line. The remaining 10 - 30% of faults is semi-permanent or permanent in nature. A small branch falling onto the line can cause a semi-permanent fault.

Also due to some cases a very high transients are occurs in transmission line, and then it is not possible to operate circuit breaker in short time period. It will take some time delay which may be harmful or effect on stability of system. It may affect the heavy and relatively costly equipment to which 3 phase supply is connected. Hence for the instant isolation of this equipment is important. This proposed paper is used as to immediate disconnected from supply of line and protect the 3 phase load. The output is reset automatically after a brief interruption in event temporary fault while it remains in tripped condition in case of permanent fault. A broken wire causing a phase to open, or a broken pole causing the phases to short together is

example of permanent fault. Faults on underground cables should be considered permanent. Cable faults should be cleared without auto reclosing and the damaged cable repaired before service is restored. Thus, auto reclosing can significantly reduce the outage time due to faults and provide a higher level of service continuity to the customer to maintain the system stability the high speed auto reclosing is an important factor.

II. HARDWARE DESCRIPTION

A. Transformer Bank:

The primaries of 3 single phase transformers each rated 500 MVA are powered by 3 phase supply which is connected in star configuration, while secondary also connected in star configuration. It is used to step down the supply, for handling circuitry at 12 volt supply.

B. 3-Contact Electronics Relay:

The output of the 3 single phase transformers are rectified and filtered individually and given to three relay coils. The NC is short circuited and fed to pin 2 of 555 Timer IC which is wired as mono stable made. Also load relays are used to power the load. The load is connected to the NC point of the load relay. The coil of load relay is parallel connected.

C. Voltage Regulator:

The LM78XX/LM78XXA series of three- terminal positive regulators are available in the TO- 220/D-PAK package and with several fixed output voltages, making them useful in a Wide range of applications. Each type employs internal current limiting, thermal shutdown and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output Current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

D. 555 Timer:

The 555 timer IC is an 8 pin DIL package IC. It can be used as mono stable and astable mode use supply voltages of 5v to 15 volt disrupt the power supply use a decoupling capacitor. Timer is also use as a buffer circuit. The circuit is act like an inverter or NOT gate. When the input is held low, the output is high and will provide (source) current. When the input is held high, the output is low and will sink current. The 555 timer can be used to drive relay and transistor circuit.

E. Comparator:

IC LM358 is used as a Comparator. Voltage at inverting terminal is fixed by potential divider. The capacitor 'C' is connected across pin 3 and pin 4. As capacitor charge above the voltage fix at inverting terminal of comparator, the

output is continuously high, which permanently ON the load relay, until capacitor discharge through reset button. The voltage at inverting terminal is fixing by using potential divider. 6; Push button:

It is used to create fault and it is placed at secondaries of single phase transformers.

III. BLOCK DIAGRAM

“Fig. 1” shows that block diagram of control circuitry.

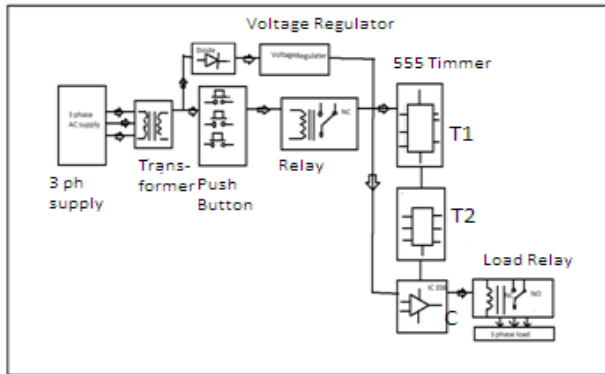


Fig. 1: Block Diagram

IV. OPERATING EXPLANATION

These 3 transformers are connected in star connection of both primary as well as secondary side of transformer. The output of that 3 transformer is given to the 3 relay coils with rectified and filtered individually. The 3 push buttons are used to create a fault condition and they are connected across the each relay coils. These 3 push buttons are created a single L-G fault and LL-G fault simultaneously. The NC contact is connected in parallel and all the common points are connected to ground. The parallel connected NC output is given to the pin 2 through a resistor R5 to a timer IC 555 i.e. wired in mono stable mode. The output of that timer is given to the reset pin 4 of another timer 555 wired it is having in actable mode. The input of op-amp LM 358 is taken from pin 3 and which is the output of U3 timer 555 through wire 11 and d12 to the non-inverting input pin 3, the inverting input is kept at a fixed voltage by a potential divider. The input voltage at pin 2 is coming from the potential divider is having greater than the pin 3 of op-amp used as a comparator. So that pin 1 produces zero logic in that condition the relay gets fails through the transistor Q1. The relay Q3 is a 3 contact relay that is disconnecting the load indicating fault conditions.

V. ADVANTAGES

By using this proposed circuitry work should be completed time to time. Also auto reclosing can significantly reduced the outage time due to faults and provide a higher level of service continuity to the customer. It helps to maintain system stability.

VI. CONCLUSION

This paper gives an idea to design in the form of Hardware for three single phase transformers 230v to 12V of output for to develop an automatic tripping mechanism for the three phase supply system while temporary fault and permanent fault occurs. Here we used 555 timers with relay for the

fault is temporary or permanent. Short duration fault returns the supply to the load immediately called as temporary trip while long duration shall result in permanent trip. The concept in the future can be extended to developing a mechanism to send message to the authorities via SMS by interfacing a GSM modem

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