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Detection of Fault by Three Phase Technique

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Abstract—
In almost all the industries, three phase supply is used. In power systems, distribution transformer is electrical equipment which distributes power to the low-voltage users directly, and its operation condition is an important component of the entire distribution network operation. Their life is significantly reduced if they are subjected to overloading, resulting in unexpected failures and loss of supply to a large number of customers thus effecting system reliability. Overloading and ineffective cooling of motor are the major causes of failure in motor. Alternative method of conventional fuse system is used as an economic solution.These methods are costly or the time of acquisition and operation parameters is too long, and testing speed is not fast enough. Hence, we are trying to make an universal protection system for any three phase load. This will protect any system from open circuit, short circuit, overshoot voltage, under voltage and temperature.

Keywords— Transmission loss allocation; Power flow tracing, Optimal power flow, Trace usage coefficients

I Introduction

Now a day, because of the open access environment, each of the loads has an advantage to use the power from the required generator. Due to this, the complexity of power system is increasing and sometimes leads to insecure condition such as system collapse. Similarly, the transmission losses in a system are increased drastically and the cost of this should be allocated to generators or loads based on the contractual agreements. To solve this, it is necessary to trace the power flow in a given system, to allocate the transmission losses to generators or loads based on the amount of generation or amount of the power consumed by the load.this document is a template. An electronic copy can be downloaded from the conference website. For questions on paper guidelines, please contact the conference publications committee as indicated on the conference website. Information about final paper submission is available from the conference website an attempt was made to get relationship between the generator (or loads) and power flows by means of sensitivity analysis, that is by determining how the flow is influenced a change in a nodal With which, share of each generator in each line flow and load can be The major factors in the location spot pricing is transmission loss allocation amounting 3-5% of total generation \

II Fault studied

Over Voltage:
Electronic and electrical devices are designed to operate at a certain maximum supply voltage, and considerable damage canbecausedbyvoltagethat is higher than that for which the devices are rated. When the voltage in a circuit or part of it is raised above its upper limit, this is known as overvoltage.

Under voltage:
In the case of an under voltage, the low voltage causes the torque developed to reduce. This results in an increase of slip and are duction in speed.The motor tries to reduce the slip by drawing more current. This overloads the motor and can cause overheating.

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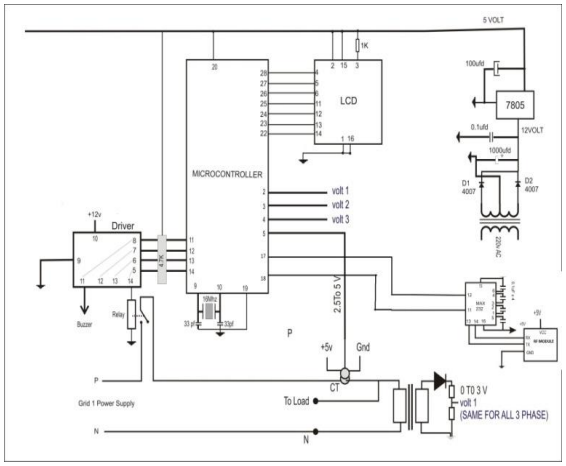
Temperature :
Hot spot of the winding is the maximum limit of the load capability.Previously the hot spot is calculated by knowing the measurementofoil temperature and of load of current. Abnormaltemperature readings almost always indicate some type of failure in a transformer. For this reason, hasbecome common practice to monitor the hot spot, main tank,and bottom tank temperatures on the shell of a transformer.

Moisture:
The presence of water in the oil can lead to reduction in the dielectric strength of transformer oil also ageing of oil is also affected Thus all this can lead electrical breakdown of transformer oil. This is very critical situation therefore continuous monitoring of operation is required to protect transformer from all of this.

III HARDWARE DESIGN



- **Fuse** is the primary protecting device. Manual replacement of wire is necessary once it blowout. It is only useful for detection for overshoot voltage parameter.

- **Transformer measurement system** generally detects a single transformer parameter, such as power, current, voltage, and phase. While some ways could detect multi-parameter, the time of acquisition and operation parameters is too long, and testing speed is not fast enough.

- **OVCD** is connected at before the equipment in use. Incoming current will first pass through OVCD then into the equipment. OVCD continuously monitors the line voltage. Whenever the voltage is above or below the set voltage limits the OVCD simply cuts the voltage to the equipment thereby saving it from the line disturbance. It reacts within fraction of second to the disturbance. It prevents the initial harmful transient that may damage the Equipment. It is high in cost.

- Thus a particular monitoring system is either dedicated to a particular application or has high cost. These have high maintenance cost and requires constant manual supervision.

- It is possible to minimize causes like human errors, but not environmental changes. Fault clearing is a crucial task in power system network. If we manage to disrupt or break the circuit when fault arises, it reduces the considerable damage to the equipments and also property.

- The project is designed to develop an automatic tripping mechanism for the three phase supply system. The project output resets automatically after a brief interruption in the event temporary fault while it remains in tripped condition in case of permanent 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 temporary or permanent. These faults lead to substantial damage to the power system equipment. [5]

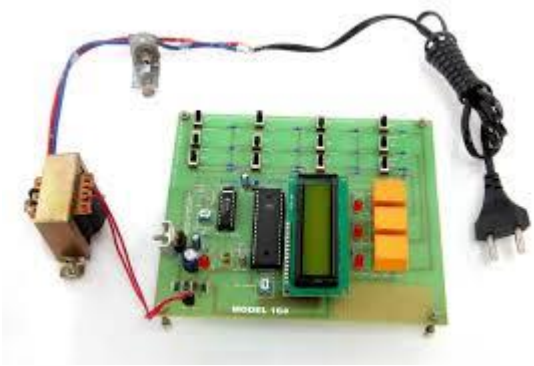
- In India it is common to observe the failures in supply system due to the faults that occur during the transmission or distribution.[5]

1V METHODOLOGY SCHEME

Phase Failure Fault: In case of any abnormality the phase voltage is seen to be affected first. The• value of phase voltage decreases which leads to abnormal and faulty operation. In case if any of the 3 phase's viz. R, Y, B fails then such kind of phase failure•

fault is detected and is displayed on the LCD screen. If the fault persists for a longer time, LCD keeps displaying the type of fault and• it also displays the respective faulty phase. Also the following display is seen on the LCD screen• In case if any of the phase is detected to be faulty then that phase initial is not• seen in the ok section. R Y B ok R faulty and Y B ok 2. SPARK DETECTION:- Normally, the protective devices are not capable of detecting the faults that• occurs due to sparking or heating during normal working conditions. Such abnormal heating leads to faulty currents and heat loss which can also result in damage of the circuit sometimes. On passage of time if such kind of a fault is not detected the heat rises to an• uncontrollable value leading to damage or fire. A UV detector (sensor) is used in the device to sense the sparking or heat• produced in the surrounding. UV DETECTED International Journal of Advancements in Research & Technology, Volume 1, Issue 5, October-2012 6 ISSN 2278-7763 Copyright © 2012 SciResPub. IJOART 3. EARTH FAULT DETECTION:- Generally ELCBs are used for detecting the earth faults and tripping the circuits.• We have used a earth fault detection circuit which functions same as that of ELCB but the main advantage of this circuit is that it also displays the type of fault. Here the value of input voltage and output voltage is compared and in case if any• of the tripping signal is given to the relay. If the input voltage obtained at one of the electrodes does not find a way back to the circuit i.e. it is earthed then a tripping signal is passed onto the relay. The display on the LCD screen in case of earth fault would be 'EARTH• DETECTED'. R Y B ok Earth fault Detected 4. SHORT CIRCUIT DETECTION:- In case of short circuit the value of current increases which leads to unnecessary• stress on the equipment's. Hence the equipment's may get damaged and would lead economic losses. So it is necessary to protect such equipment's. Now this circuit detects such short circuit gives the tripping signal to the relay• and it also displays on the display screen. Thus the load is disconnected from the supply by the sugarcane type of• electromagnetic type of relay and hence the equipment is protected. R Y B ok Short C

V PCB LAYOUT



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A 230 V AC supply is required for the operation of the device. A 6-0-6 transformer or a 12-0-12 is connected to step down the voltage to 12 volts.• Two terminals viz(6-6) are connected and a 12 V AC supply is fed to the• electromagnetic sugarcane type of relay connected for sensing and isolating the circuit. The relay is then connected to the load. In our device we have used a lamp load to• show the operation of relay. Now, the AC supply is used to get a 3 phase looped supply by a switch named R Y• B in the project. It is used to get a three phase supply done by looping the three terminals of the switch and getting three different phase voltages. The three phases are then fed to the CT- PT (combined CT PT) whose rating is 220• / 4 volts. The applications of combined CT PT includes Clip-on meter. It is used to measure both the current and the voltage values. A half wave and full wave rectifier circuits consisting of diodes and current limiting• resistors are also connected in the circuit to get a regulated DC output voltage. Full wave Rectifier Bridge is across the main supply fed to the LCD and in turn fed• to the voltage regulator IC 7805 which gives a regulated +5 V output. Before that a optocoupler circuitry is also connected which is used to trigger the• circuit. A resistor is attached to the optocoupler circuit as it would not resist the high current passing through it. So, it becomes a kind of "protective device" in a protective device circuit.• Various LED's are also connected at the end of the optocoupler circuit to ensure the• normal operation of the circuit and

display the working of that line. Microcontroller circuit is fed by a +5 V supply and the ports are assigned their• respective operations as shown in the pin diagram. The unused ports such as TX RX are not used in the project.• The relay senses the type of fault and through the program loaded in the• microcontroller the result is displayed on the LCD screen. The ports as assigned their respective functions works accordingly and gives a• output on the LCD screen which is a 16 port device whose working is dependent upon the interfacing done between the microcontroller and LCD. LCD Microcontroller interfacing is being done and hence depending upon the• program loaded in the microcontroller the output is seen on the LCD screen. Different phase sensing ports as assigned in the port diagram senses the failure and• gives the fault of phase failure. Same is the case with the Earth and UV detection faults. Individual Faults are seen as below with display on the LCD screen.

VI RESULT & CONCLUSION

With the help of this model one can know what kind of fault has occurred in which phase and also one knows the exact working of microcontroller and LCD circuit in detail. The main advantage of this circuit is that any lay man can use this circuit and can know the type of fault. Henceforth it finds its application at various medical hospitals, industries and• places where high protection is needed for saving the costly equipments connected to the main line. By studying the working of transformers and relay one can easily device new• circuitry with some research work. It gives a detailed and wide application along with knowledge of each and every• element attached in the circuit. By some variations in the circuit one can devise a new protective system for each• individual phase too! Other variations include connecting various relays for different applications and• making a larger protective devise hence increasing its application and use. By using the microcontroller circuitry the project is compact and easy to use.• With deep and profound knowledge of the connection diagrams one can get to• know the exact working and operation of each and every element which helps in understanding the purpose and the necessity of the project. It being cheap finds application at many house hold applications too.• Instead of setting different devices at different levels of the system one can use• this device and can easily protect the system connected in line. The main advantage of this circuitry as compared to other protective devices• available in the market is that it consists of a UV detector which senses any kind of spark or excessive heat radiation in the surroundings. Hence concluding, the device designed can solve many industrial real life• problems and can be applied majorly for filling a patent for its economical

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