Impact Factor (SJIF): 5.301

International Journal of Advance Research in Engineering, Science & Technology

e-ISSN: 2393-9877, p-ISSN: 2394-2444

Volume 5, Issue 3, March-2018

GENERATOR PROTECTION SYSTEM USING MICROCONTROLLER

S.Ashok[1], E.S.Pradheep[2],Dr.K.Umamaheshwari[3]

[1] UG Scholar, EEE Department, Dr.Mahalingam College of engineering and technology
[2] UG Scholar, EEE Department, Dr.Mahalingam College of engineering and technology
[3]Assistant Professor, EEE Department, Dr.Mahalingam College of engineering and technology

Abstract — This project proposes a new ideology in protecting generator system in various aspects such as excitation voltage, over voltage, differential voltage, reverse power, core temperature and bucholz trip automatically. In present days, the abnormal condition is measured continuously and generator is tripped off manually in case of faults. This system analyses and displays the voltage to prevent the generator from faults. The circuit will trip automatically when the excitation voltage reaches the set value. Differential voltage is difference in voltage between the positive and complimentary conductors of a transmission. When a differential fault occurs, the relay coil operates by differential voltage and it automatically trip the circuit. In reverse power condition, the generator will act as a motor. The excitation voltage varies with respect to frequency and core temperature. In Bucholz relay, air bubbles due to the overcurrent fault is identified through alarms and it will trip the circuit. This proposed system introduce the automatic tripping of the generator is done by using PIC microcontroller during abnormal conditions. It displays the voltage, frequency and the faults continuously. This can be installed in all the generator applications.

I.INTRODUCTION

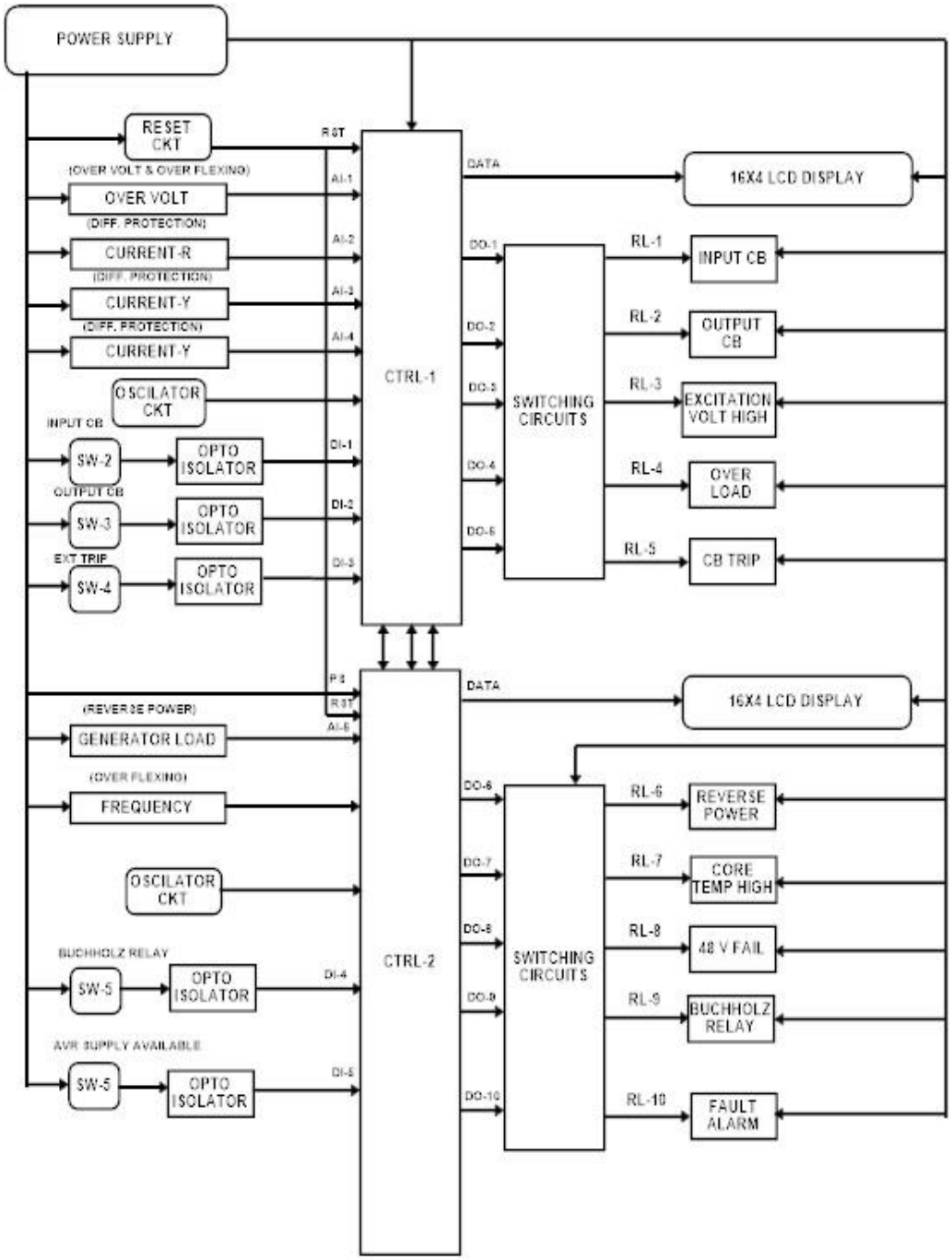
In the design of electrical power transmission and distribution system, there are various factors that need to be considered in the quest to satisfy the needs of electricity consumers. Electrical power systems experience faults at various times due to various reasons. These faults must be foreseen and safety precautions applied to the power system. The power systems engineer must include in his design, safety measures in order to avert any destructive occurrences that the system may undergo at any given time. Power system protection is very essential and necessary for a dependable electrical power supply. It ensures that the system is protected from itself and that the consumer is also safe as he benefits from the electrical power supply. An electrical power system consists of various components such as generators, switches, transmission cables, transformers, capacitor banks among other components. It cannot therefore operate without an effective protective device to keep these components safe and the system stable. Faults in a power system refer to the undesired conditions that occur in the electrical power system. These conditions may include short circuit, over current, overvoltage, high temperatures among others. It is clear that over time, there has been an increase in human population, economic growth and technological advancement. This has continuously made the demand for electrical power to go high because as technology, human population and economy grows; there is an increase in demand for power as many more electrical loads are introduced into the supply line. An increase in load leads to a lot of current drawn from the power line. At times the demand goes above what the power distributor can supply. The consequence of this is that electrical power overload cases ᵠᵠbecome common thus posing danger to power system components. This therefore throws in the need for devices that can monitor the rate of power consumption in accordance with the level that a given system is designed to sustain. Such a device must be designed to cut off consumption if the system oversteps its ability thus being dangerous to users and the components. In this project, we look at the protection of power transformer from various faults that may occur and may be destructive to the component if left undetected. The transformer is a very important component in an electrical power system as distribution of electrical power to consumers is more efficiently effected. Every transformer is designed to comfortably supply a given load. Cases of overload or short circuits can lead to transformer being damaged. To combat such occurrence, an elaborate system that monitors these excesses in supply parameters needs to be built. Such a device controls the flow of electrical power to the load so that the transformer is not overworked. Over current relays and overvoltage relays have been used for a long period of time and have been electromechanically controlled. In this system, a microcontroller is used to monitor cases of electrical faults and communicate to a switch to isolate the transformer from the system.

II.POWER SYSTEM PROTECTION

An electric Power system refers to a network that constitutes electrical components/machines used in the supply, transmission and consumption of electric power. The diagram below illustrates a complete electric power system. It involves generation, transmission and distribution of electric power to various categories of consumers. The generation plant is normally located far from the load centre. There are different levels of electric power consumption depending on the purpose for which a consumer uses electricity. Electrical power consumers may be industrial, commercial or domestic. These consumers require different levels of electric power supply. In order to meet their specific needs, certain devices that adjust the voltage levels accordingly have to be used. Some of those components include: step up and step down transformers, capacitor banks, protective devices etc.A branch of electrical power engineering that deals with

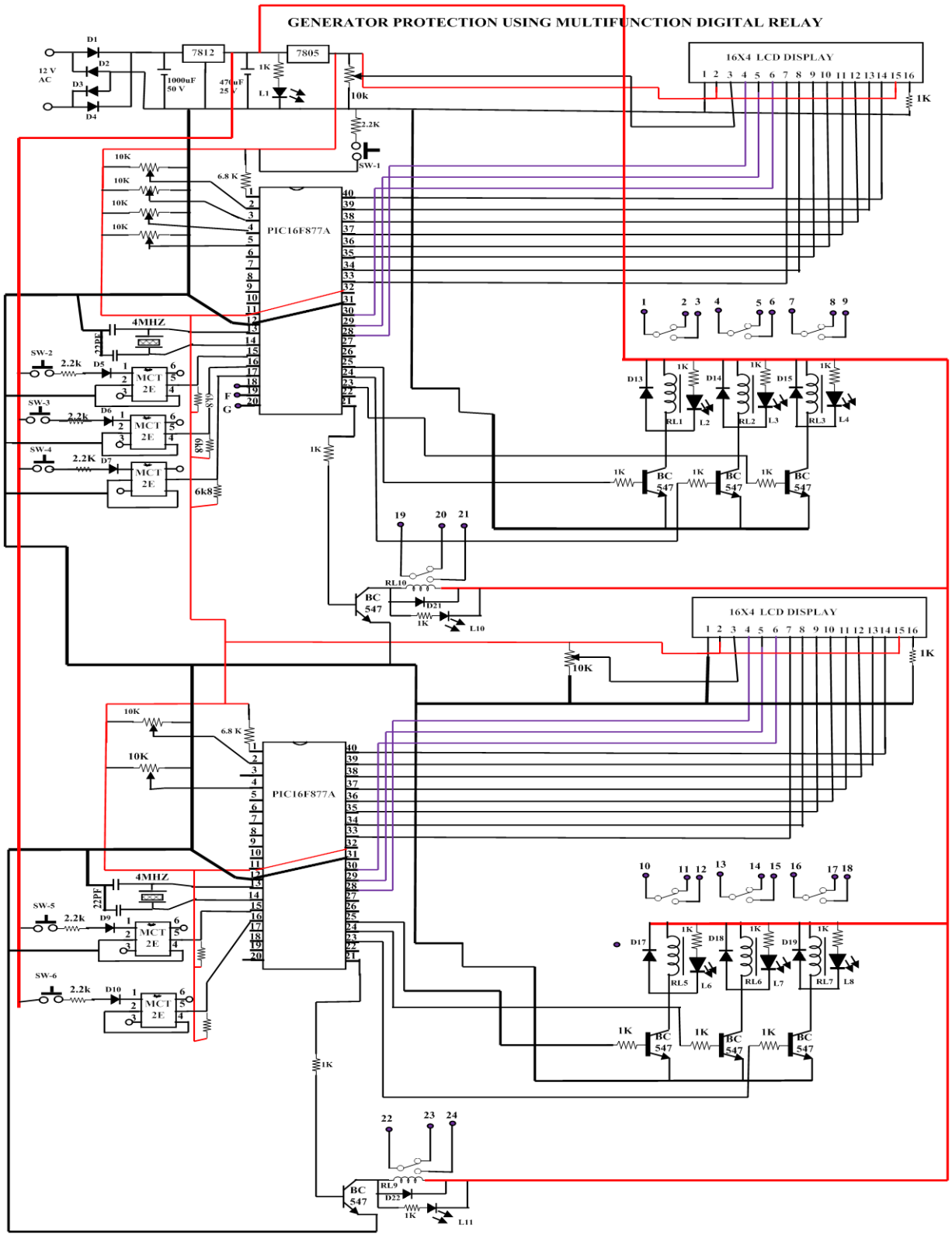
protection of Power system from faults is known as power system protection. It does this by isolating the faulted parts of the system from the rest of healthy electrical network. The main aim of power system protection scheme is to switch off a section that is faulty in the system from the remaining live system. This ensures that the remaining portion is able to function satisfactorily locking out chances of damage that may be caused by fault current. A circuit breaker closes automatically as a result of trip signals it receives from the relay whenever a fault is detected. The basic philosophy of a power protection system is that system faults cannot be prevented from flowing in the system but can be stopped from spreading in the system.

III.BLOCK DIAGRAM



The above diagram shows the block diagram of the protection system of alternators.The model consists of opto isolators,circuit breakers,oscillator circuits,micro controllers,relays,alarm circuits and LCD displays.

III. CIRCUIT DIAGRAM



III. HARDWARE DESCRIPTION

7.1 INTRODUCTION

Printed circuit boards, or PCBs, from the core of electric equipment aemoestic and industrial .
Some of the areas where PCBs are intensively used are computers, process control, telecommunications and instrumentation.

7.2 MANUFATCURING

The manufacturing process consists of two methods, print and etch, and print and etch. The single sided PCBs are usually made using the print and etch method. The double sided plate through-hole(PTH) boards are made by the print plate and etch method.

7.3 SOFTWARE

The software used in our project to obtain the schematic layput is MICROSIM.

7.4 PANELISATION

Here the schematic tansformed in to the working positive/negative films. The circuit is repeated conveniently to accommodate economically as many circuits as possible in a panel, which cann be operated in every sequence of subsequent steps in the PCB process. This is called penalization. For the PTH boards, the next operation is drilling.

7.5 DRILLING

PCB drilling is a state of the art operation. Very small holes are drilled with high speed CNC drilling machines, giving a wall finish with less or no smear or epoxy, required for void free through hole planting.

7.6 PLANTING

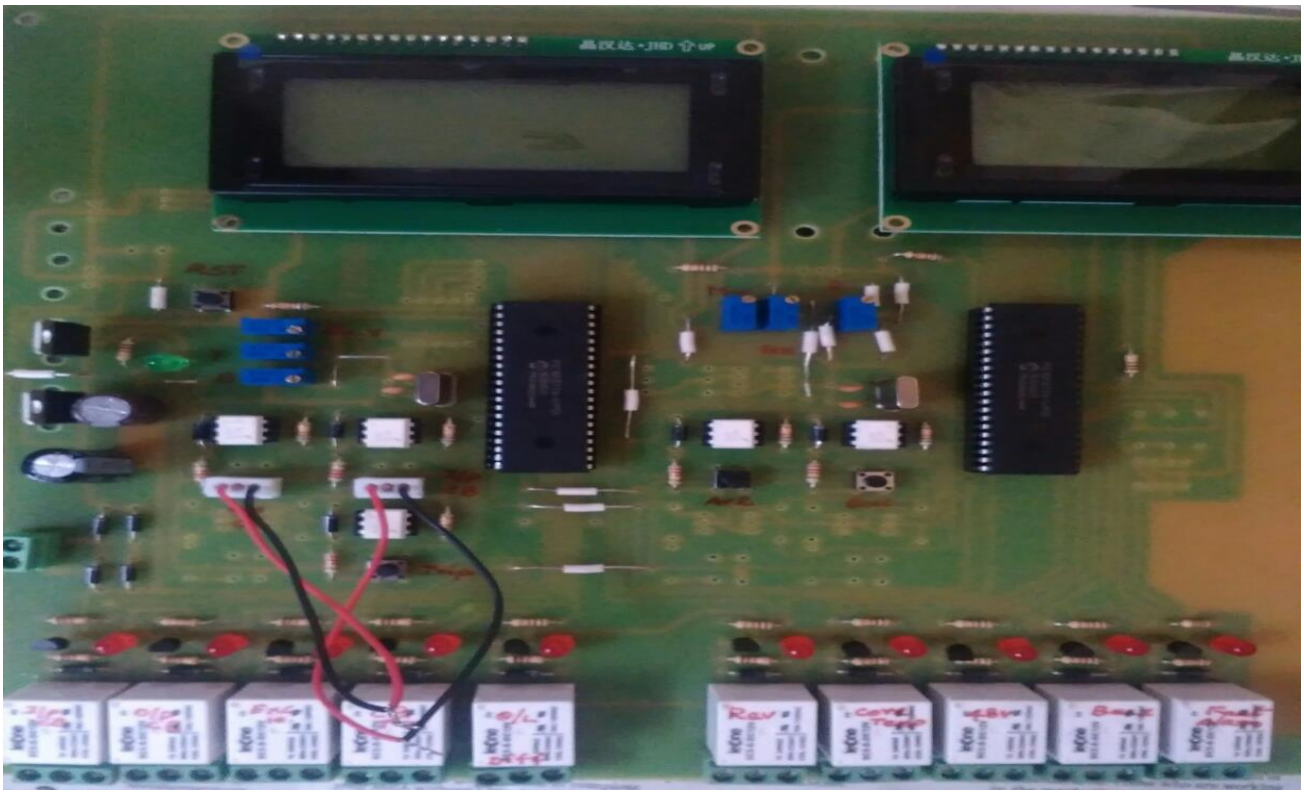
The art of the PCB manufacturing process. The holes drilled in the board are treated both mechanically and chemically before depositing the copper by the electro less copper planting process.

7.7 ETCHING

Once a multiplayer board is drilled and electro less copper deposited, the image available in the form of a film is transferred on to the out side by photo printing using a dry film printing process. The boards are then electrolytic planted on to the circuit pattern with copper and tin. The tin-plated deposit serves an etch resist when copper in the unwanted area is removed by the conveyors spray etching machines with chemical etch ants. The etching machines are attached to automatic dosing equipment which analysis and controls etch ants concentrations.

7.8 SOLDERMASK

Since a PCB design may call for very close spacing between conductors, a solder mask has to be applied on the both sides of the circuitry to avoid the bridging of conductors. The solder mask ink is applied by screening. The ink is dried, exposed to UV, developed in a mild alkaline solution and finally cured by both UV and thermal energy.



IV. CONCLUSION

Microcontroller based power generator protector is an attractive option for solving major problem of the generator failure. i.e. the problem the over voltage, excitation voltage, differential voltage, reverse voltage, core temperature, bucholz condition in circuit. use of the protector device also increase the safety of the circuit and power generator system also. This the expected that this project with provide inside into proper generator protection system with the over all control of this parameters ion future. Thus the propose system is expected to reduce the man power and frequent fault in generator side

REFERENCES

1. P.M Anderson and M. Mirheydar, "an adaptive method for setting underfrequency load shedding relays," IEEE Trans. On powersystems, 1992.
2. A Molina-Garcia, F. Bouffard and D. S. Kirschen, "Decentralized demand-side contribution to primary frequency control, "IEEE Trans. On Power Systems, 2001.
3. D.S. Callaway and I.A. Hiskens, "Achieving controllability of electric loads, "Proceedings of the IEEE, 2011.
4. M. Ilic and Q. Liu, "Toward sensing, communications and control architectures for frequency regulation in systems with highly variable resources," Control and optimization Theory for Electric smart Grids, 2011.
5. D. Trudnowski, M. Donnelly and E. Lightner, "Power-system frequency and stability control using decentralized intelligent loads, "May 2006.
6. J. Dong, J. Zuo, L. Wang, K.S. Kook, I. Chung, Y. Liu, et al., "Analysis of power system disturbance based on wide-area frequency measurements, "Jun.2007.
7. G. Strabac and ILEX Energy Consulting, Quantifying the system Costs of Additional Renewables in 2002.
8. V.N. Chuvychin, N.S Gurov, S.S Venkata and R.E. Brown, "An adaptive approach to load shedding and spinning.