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AN IMPROVED TECHNIQUE FOR DETECTION AND LOCATION OF FAULTS IN TRANSMISSION LINE

[1]D.Rehnu , [2]G.D. Abitha , [3]S.Jagadeeswari , [4]Prof. P.Sharmila
[1,2,3]UG Students, Department of EEE , Sri Sairam Engineering College , Anna University, West Tambaram, Chennai., [4]M.E, Department of EEE, Sri Sairam Engineering College, Anna University, West Tambaram, Chennai.

ABSTRACT: **The converters used in the system will be turned off during the faulted conditions so as to protect the entire power system from huge damage, hence locating the fault is too difficult in the transmission lines. This project proposes an improved protection technique to detect and isolate faults in the transmission line and identify the fault location. The fault location is done by using probe power unit (DC-DC converter) which injects sufficient voltage to sense the current variation and measure the fault distance. Once the fault occurs, the source is disconnected and the current in the transmission line is given as the input to the microcontroller. The microcontroller then gives command to the probe power unit according to the type of the fault. The probe power unit injects the sufficient voltage in the transmission line, when the load and the source are disconnected. For line to line fault, small amount of voltage(20%duty cycle) and for the line to earth fault, large amount of voltage is injected (70% duty cycle)is injected in the transmission line. Depending on the fault location, the current varies, which is sensed and the corresponding distance at which the fault occurred is detected. The fault location which is detected is then displayed in the LCD.**

KEYWORDS: **Transmission line, DC-DC Converter, fault location, probe power unit**.

I. INTRODUCTION

The power systems are designed for a required function that performs continuously except when undergoes its preventive measures or other protection schemes or due to the lack of external resources. Although the protection for the entire system is provided consisting of generators, transformers, switch gears etc. there are some failures occur somewhere in the system. The inability of the functions of the power system is due to the faults, that can occur at any location and at any time in the components present in the system.
The commonly found faults are

- Line to line fault
- Line to earth fault

These faults are generally detected and rectified by de-energising the entire system manually. The exact fault location is not known instantly for the rectification of the transmission lines. The fault occurrence probability is more on overhead transmission lines.

The main objective of the proposed system is such that the fault location is detected with the help of probe power unit that injects the sufficient voltage in the lines that senses the amount of current flowing in the transmission line by using the current sensor.

The conceptual diagram is given in fig.1that explains the detailed study of detection and isolating the faulty sections by tripping the circuit breakers instantly without de-energising the entire system.

In case of AC system, the power that is usually consumed by the entire power lines is measured based on the RMS values whereas in DC system it is completely based on constant voltage and current.

II. FAULTS IN DC DISTRIBUTION FEEDER

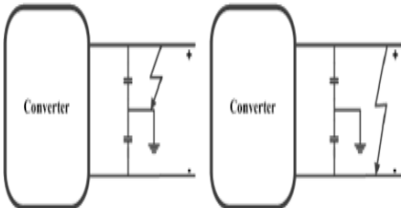

fig.1

The representation of the different types of faults are shown in fig.2 and it is observed that the line to line fault and line to ground faults has more % of occurrence in the transmission line.

In case of AC system, the power that is usually consumed by the entire power lines is measured based on the RMS values whereas in DC system it is completely based on constant voltage and current.

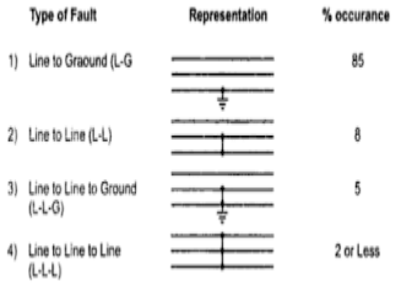

fig.2

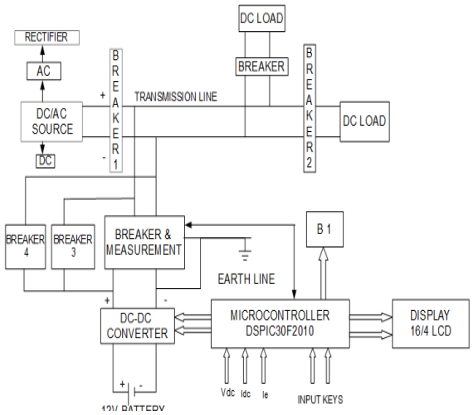

Fig. 3

DISTANCE (KM)	DISPLAY UNIT
1	3.0
2	2.0
3	1.0
4	0.0

- Power supply to the system is given in the range of 220V. The supply may be either AC or DC input
- The reset button can be used to reset the input data in the hardware section.
- M file is attached in the programming section.
- LED switches are controlled by the microcontroller I/O pins by turning ON/OFF for controlling the voltage and current flow.
- DSPIC30F2010 Microcontroller contains various pins that performs the functions based on the input source voltage, current sensor and voltage sensor. The I/O data's as stored in the flash memory of the controller.
- According to the magnetic field response, the output voltage varies. It senses switching, positioning and current sensing applications.
- LCD's are used for the display purposes.
- The current sensor and the voltage sensor are used for sensing the amount of current and voltage in the transmission line respectively.

III. SIMULATION

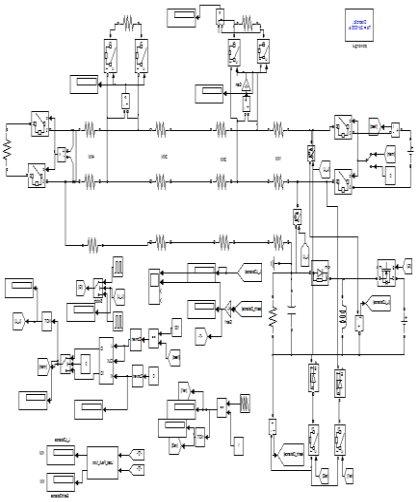

Fig.4

The simulation is done by using MATLAB Simulink software. The L-L fault distance and L-Earth fault distance is shown in the display instantly, when the fault occurs in the transmission line. When the L-L fault is occurred, the display unit shows

the earth fault shows negative value and vice-versa. In fig.4, the fault is occurred beyond 4kms distance hence the display shows values in the range of 0.00. As the distance decreases, the value of the display increases. Thus by analysing the value of display unit, the fault location is detected and faulty part is isolated to avoid huge damage in the power system.

IV. CONCLUSION

The line to line and line to ground fault detection has been proposed in this system. Usually the fault location is determined and rectified manually by de-energising the entire faulted area, which is a major drawback in the power stations. The system which is proposed here gives us the location of the fault instantly by using the probe power unit.

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