ISSN (Online) 2395-2717

International Journal of Engineering Research in Electrical and Electronic Engineering (IJEREEE)
Vol 3, Issue 2, February 2017

Underground Cable Fault Detection using PIC Controller

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***Abstract*— This paper represents the method of determining the faults in underground cable by using PIC microcontroller. This is based upon a principal of ohms law. Whenever the fault are present in the underground cable, it displays the location of fault .The resistor and capacitors are used as current sensing device in the line. When open or short circuit is presents in the cable depending upon the voltage change across resistor the fault distance can be calculated. This paper also indicates whether the line is receiving the current or not.**

***Keywords:--* PIC , Current sensing unit, Display.**

I. INTRODUCTION

Now a days the for transmission of power is mostly done by using underground cables. As compare to overhead transmission system underground cable system is superior and reliable. As overhead cables are affected by adverse weather conditions like rainfall, snow and thunderstorms while underground cables does not affected by these parameters. Fault detection in underground cable is difficult as compare to the overhead line. For finding fault in the underground cable we have to analyze large area.

Figure 1. Faulty Cable

This project used to detect open circuit and short circuit fault occurring in the underground cable at a particular distance and result displaying on the LCD display using ohms law. The proposed system finds exact location of fault.

II.TYPES OF UNDERGROUND CABLE FAULT:

Fault in a cable is nothing but abnormal condition of cable which may cause failure of component or device. Insulation failure, overvoltage and breakdown of conductor are the main causes of underground cable fault.

Types of cable fault:

- ***Open circuit fault:***

When the breakdown of cable or conductor occurs, open circuit fault takes place.

- ***Short circuit fault:***

Due to breakdown of insulation, conductors comes in contact with each other.Thus it is called as short circuit fault.

- ***Various methods of underground fault detection:***

1. Sectionalizing: In this method the faulty cable is cutted into two parts and according the voltage drop across the cables the faulty cable part is detected. The faulty cable shows the lower voltage drop as compare to the healthy cable.
2. Thumping: In this high voltage signal is given to the faulted cable ,the resulting high arcing current make loud noise which is audible for human being.
3. Time Domain Reflectometry (TDR): In this the low energy signal is given to the cable, if no fault is present in the cable then the signal receives at the receiving end is in phase with input.

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III.BLOCK DIAGRAM:

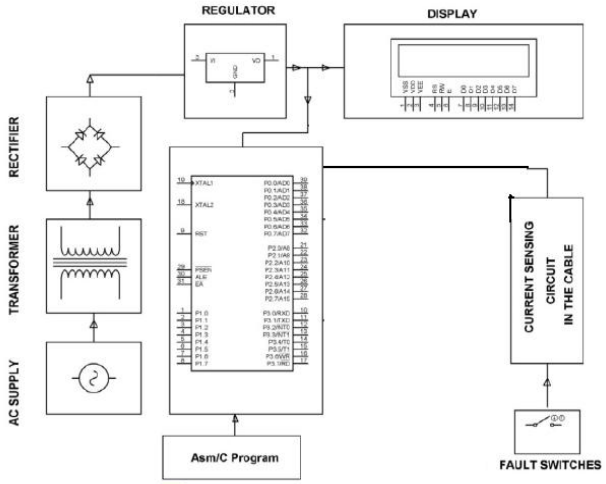

Figure 2. Block Diagram

3.1 Power supply:

230V AC supply is given to the 12-0-12 step-down transformer.The 12V AC supply is further given to the bridge rectifier.Rectifier converts the AC voltage into DC voltage. 7805 regulator is used for obtaining the constant 5V DC supply which is fed to controller and display unit.

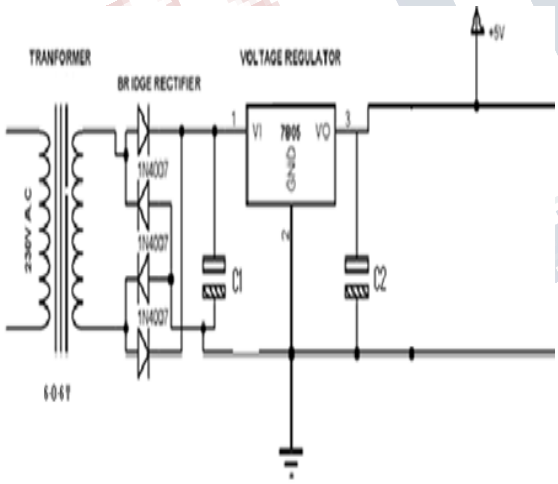

Figure 3. Power Supply

3.2 PIC Microcontroller:

Figure 5. PIC Microcontroller

The **PIC** stands for "peripheral interface controller." PIC receives the signal from current sensing unit .It also performs the function of ADC that is it converts analog signal into digital signal. This data is useful for the further calculations inside the PIC microcontroller.

3.3 Display:

16*2 LCD display unit is interfaced with the microcontroller. LCD module is a very common type of LCD model that is used in 8051 based embedded project. It consists of 16 rows and 2 columns of 5*7 or 5*8 LCD dot matrices.

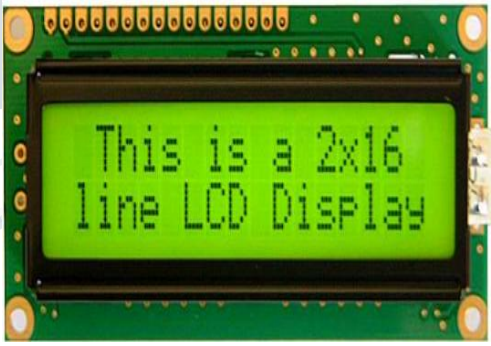

Figure 6. LCD Display

3.4 Current sensing unit:

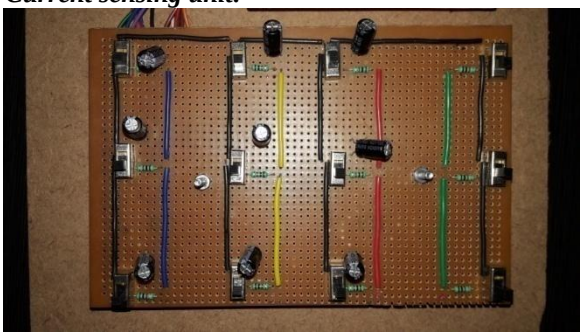

Figure 7. Current sensing Hardware

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Current sensing unit is consisting of set of resistors and capacitors. The analog signal from the current sensing unit is given to the controller. The voltage drop across the resistors and capacitors is used for the location of fault from the station. The fault is created by using switches which are placed in series with the cables.

IV. ADVANTAGES

1. Less maintenance.
2. It has fast process of fault detection.
3. This method is applicable for all types of cable faults.
4. It is applicable for cable ranging from 1KV to 500KV.
5. Improved public safety.

V. CONCLUSION:

This project is to detect the exact location of open circuit and short circuit faults in underground cables from feeder end.

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