CABLE FAULT METER MEASUREMENT

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***Abstract*: A cable fault location instrument was developed based on the detection of travel wave currents. It is different from traditional pulse radar method depending on the voltage detection. Measurement is automated, and pushing only one switch shows the distance of the fault point. In a branch or crossbond line, the fault point cabe positioned without branched or crossbond interference. Its scope is limited to the power cables and accessory cables used in connection with these, in which the pilot and telephone cable are included, but the defects are limited. The paper is related to the main reasons for failure and the exact location requirement of cable defects, and describes the methods used to achieve it.**

***Keywords*: Fault indicator, Electric fault**

I. INTRODUCTION

Accurate equipment is used in various industries to detect defects in cable wires and other similar applications. Excellent features like impeccable quality and error-free functionality of our equipment make them the most preferred choice for many private and government organizations involved in electricity and allied industries. Our highly tolerant and long-lasting equipment is also available in customized designs according to the specifications and drawings provided by our customers. A cable fault location instrument was developed based on the detection of travel wave currents. It is different from traditional pulse radar method depending on the voltage detection.

A system that includes analysis, primary test and confirmation testing has been developed, and years of experience have confirmed the sound of this method. Finally, a brief description of pulse-reflection method is given using an oscilloscope. The development work on this method, especially in Europe, has resulted in the production of useful practical equipment.

In a branched or crossbound line, the fault point may be located without interference from a branched or crossbowed point. Tests conducted in both real and fake lines confirmed the practical usefulness of this device.

1.1Fault Indicator

Overhead indicator is used to visualize the phenomenon of electrical defects on the overhead electrical system. Underground indicators detect faults on an underground system. Often these devices are located in an underground vault. Some fault indicators communicate back to a central location using radio or cellular signals. A fault indicator is a device that gives visual or remote indication of a fault on the electric power system. It is also called Fault Circuit Indicator (FCI), this device is used to automatically detect and identify the defects in the electrical energy distribution network.

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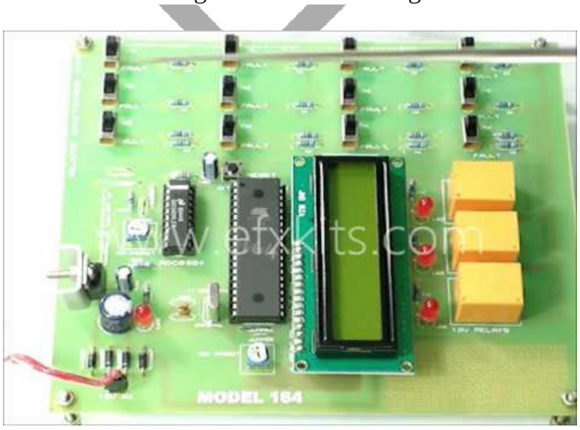

Fig1: Underground cable fault detection

1.2 Electrical fault

During an electrical fault on a grounded system, additional electrical current through a conductor induces a magnetic field, which is detected by fault indicator, which is a state change on the mechanical target flag, LED or remote indication device Causes. Ground fault indicators for the ground system understand the current vector yoga and seek an imbalance which indicates the fault on one or more of the three steps. Advanced fault indicators should monitor the live line to separate fault streams from the normal current bounce. They only ensure with the feeding circuit breaker / fuse that the flow of electricity has been cut and the line is de-energized. To monitor the live line, some fault indicators only see the magnetic field due to the load current. To be independent of load current, look for some FI on the e-field to directly check the voltage.

This feature is used to reset the indicator after re-activating the line. Such indicators can also separate permanent defects from transient flaws. Some modern network security systems eg. GFN has the time to clean up a mistake as far as 60 below, so the fault indicators should not only be highly sensitive and directional, but should be very fast besides this. Modern fault indicators can detect defects with a cycle of 18-20 ms. In a network of low Earth fault levels, the indicator needs to be set at lower prices.

II. LITERATURE SURVEY

Cable fault location is the process of finding periodic defects, such as insulation defects in underground cables, and an application of electrical measurement systems. In this process, Mobile Shock Discharge Generators are among the tools to be used. Cable defects damage the cable which affect a resistance to the cable. If allowed to continue, this can break the voltage. There are various types of cable defects, which should be classified before being placed first. Insulation of the cable plays an important role in it. While paper-correlated cables are particularly susceptible to external chemical and thermal effects, the conductor polyethylene insulation in high voltage PE or XLPE cables is affected by which partial breakdowns and cracks are "eaten" insulation ".

Screening defects: A contact between the conductor and the screen generates a different resistance

Phase fault: The contact between several conductor generates a different resistance.

Making Mistakes: The sheath defect is the loss of cable sheath which allows the surrounding contact with the cable screen.

Due to Humidity: The water enters the cable sheath and connects to the conductor. The impedance changes at the fault location make more difficult measurements. Resistance is usually in the high-ohmic range.

In insulated neutral systems and systems with earthing through a Petersen Coil, ground faults cannot be located with classical FI's at all. Capacitive current appears in overall faulted system so directional fault location devices are required.Upon energization of the lines there could be high inrush current which may lead the fault indicators to false operation. Some fault indicators can block inrush current. In the networks with low earth fault levels the indicators are required to be set to low values. In such cases the user should consider the downstream capacitive discharge current to avoid false operation of the non-directional indicators.

The first defect indicators came in the market from Horstman (Germany) in 1946. E.O. The Schwitzer Manufacturing Company (now a division of Schwitzer Engineering Laboratories, Inc.) introduced a product in the United States in 1948. The first mistake indicators were the manual reset device. Later error indicators are automatically reset upon system restoration or after a set period of time. Nortral (Norway) came into the market in 1977, using the conductor mount and pole-mounted fault indicator to reduce the di / dt technic and sensitivity to 2.5 Amps. More recent fault indicators communicate their status (triped or reset) via a cell signal or radio through a central station, handheld device or pole-mounted receiver.

2.1Transient fault

In the transient mode, the breakdown of the cable malfunction is turned on. This affects the short circuit with fewer resistance to some milliseconds. This, in turn, spreads two travel waves in opposite directions. These waves are reflected on the ends of the cable so that they move towards each other again in the direction of cable defect.Route tracing is used to determine whether the defective cable is the process of determining the exact position of false and false pinpointing cable. Because of the arc produced by short circuits, waves can not pass by mistake, hence they are again reflected with pulse reflection method, which results in polarity effect as a result of burning a short circuit. There are different ways to reduce and analyze these infections.

Fig2 Fault measurement reading

III.TEST FOR CABLE FAULT

3.1 **Murray loop test**

Murray employs the theory of Wheatstone Bridge to detect loop test error. To perform this test, it is necessary to run a sound cable with faulty cable. One end of the defective cable is connected through a pair of resistors for the voltage source. Apart from this, a tap detector is connected. The other end of the cable is small. Circuit is shown in the shape on the right. Bridges are brought to balance by changing the values of RB1 and RB2. Then by solving the bridge equation, the distance of the fault space is calculated. See also: Dead Loop Bridges

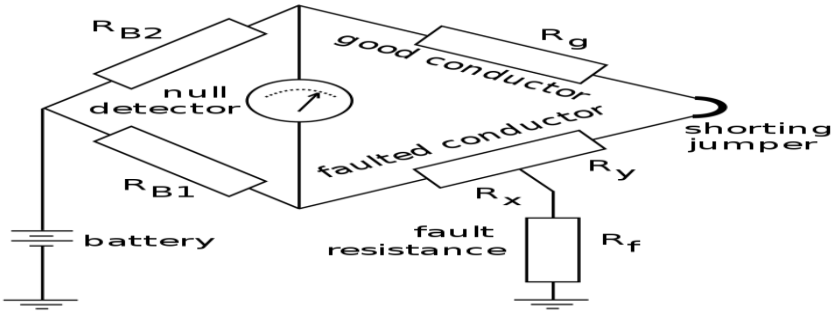

Fig3: loop indicating murray test

3.2Varley loop test

Similar Werly Loop uses fixed resists for RB1 and RB2, and incorporates variable resistor into felt leg. Test set for cable testing can be added to bridge technology. If the fault resistance is high, then the sensitivity of the dead bridge decreases and the Worli loop may be more suitable.

IV.UNDERGROUND CABLE FAULT LOCATOR

4.1KM-CFPL-620 /620B

The "KUSAM-MECO" underground cable fault pre-locator is an automated cable fault locator which adopts ARM, FPGA and dot matrix color LCD display technology. This tester combines Pulse Reflecting Technology (TDR) and Intelligent Bridge Testing (Bridge) (Model-KM-CFPL-620B) to measure exact defect location, such as broken lines, cross fault, earthing (bad insulation and bad contact) Lead cover cable as well as plastic cable. (Model-KM-CFPL-620B)).

It is a microprocessor based fault locator with a user-friendly menu. It's easy to operate. It tests almost all electric cables, telecommunications and signal cables. There is an English menu that is easy to understand and use. This enables insulation resistance and loop resistance with megometers and ohmeters. There is aUSB port for uploading test data to the computer.

Fig4:KMCPL underground fault detecter

V.CONCLUSION

This project was aimed at detecting the fault at underground level .Using various equipment and fault detecting instruments faults at different level can be identified. After identifying the cable fault and being located, it is possible to use the "burn device", by using burner equipment, in other words, to convert it from high-impedance defect to a low-impedance defect. Burn ATG 2 Burn Down Transformer or similar device like Burn Down Instrument can be used for this. A burn down instrument has a voltage generator connected through the transformer and allows the individual control of output voltage and current, an important step to burn high impedance defects.Moreover the fault detector instrument plays a key role in identification of the system fault. For site situations, there is a unique flexible operating mode to help you decide the correct mode for your location app. Intelligent utility locator monitors the level of signal interference in all available modes and recommends which one is used for best results.Thus fault detector instrument can be helpful for any type of underground fault detection.

REFERENCES

[1] E. C. Bascom, "Computerized underground cable fault location expertise" in Proc. IEEEPower Eng. Soc. General Meeting, Apr. 10–15,1994, pp. 376–382. J. Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rded., vol. 2. Oxford: Clarendon, 1892, pp.68–73.

[2] K.K. Kuna, Prof. K. Warwick, "Real-time expert system for fault location on high voltageunderground distribution cables", IEEE PROCEEDINGS-C, Vol. 139, No. 3, MAY 1992.

[3] J. Densely, "Ageing mechanisms and diagnostics for power cables—an overview," IEEEElectr Insul. Mag., vol. 17, no. 1, pp. 14–22, Jan./Feb. 2001.

[4] T. S. Sidhu and Z. Xu, "Detection of incipient faults in distribution underground cables",IEEE Trans. Power Del., vol. 25, no. 3, pp. 1363–1371, Jul. 2010.

[5] K.K. Kuna, Prof. K. Warwick, "Real-time expert system for fault location on high voltageunderground distribution cables", IEEE PROCEEDINGS-C, Vol. 139, No. 3, MAY 1992.
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[6] H. Kawarada, "Hydrogen-terminated diamond surfaces and interfaces," Surface Science Report, Vol. 26, No. 7, 1996, pp. 205-259