MULTIPLE OUTPUTS QUEUE SWITCHING FOR DETECTION FAULTY CABLE BY USING PULSED TECHNIQUE

Project report is represent in partial of fulfillment for the award of the
Bachelor of Electrical Engineering (Hons)
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ACKNOWLEDGEMENT

Firstly I would like to express my gratefulness to ALLAH S.W.T for I have finally finished my final project report of Multiple Outputs Queued Switching for Detection of Faulty Cable by gratitude and appreciations to my project ad Using Pulsed Method. I would like to express my sincere gratitude and appreciation to my project advisor, Prof. Madya. Dr Ngah Ramzi bin Hamzah for her continued support, generous guidance, help, patience and encouragement in duration for the preparation of this final project until its completion. I would also like to take this opportunity to appreciate the important contributions of the following persons;

1. My family for continuously praying for my success,
2. My group members, Fauzi Musa, Mohd Faisal Jamalludin, Mohd Ozahir Mat Palal, Hamizan Ali and Aznaidi Bakar.
3. Mr. Zamnihar and Mr. Sallehudin, high voltage pulse lab technician for their help and coorperation during the experiments,
4. Mr Mohd Sukri, Research assistance P.M. Dr Ngah Ramzi, for their helps.
5. All my colleagues, all my friend and everybody who have either been directly or indirectly involved in completing this final project report.

Once again, thank you all for helping me finish this final project report, and only Allah S.W.T can reciprocate at your helps.

ABSTRACT

This project develops the implementation of technique to control the inspection wires in pilot cable by using multiple output queued switch. This MOQ switching has a selector that sorts the multiple outputs switching to connect the specific input to the single output. The specific input mean the pulse signal that generated by time-domain reflection (TDR) module. The TDR module generates a voltage edge in form of pulses waveform with a fast risetime and continuously.

In this project the MOQ switching is able to send the pulses to multiple pilot wires, one pulse to one pilot wire in sequence by adjusting to a proper timing setting. That means the total energy that produce can totally sending into cable without any losses to other channel. The time taken to detect the fault cable at multiple pilot wires can be shorted.

The second improvement is on the generation of pulse at previous work [1]. The improvements in this circuit are modified at space-mark ratio at the input of generating pulse and resistor at output of pulse signal generator. The changing at input are to control 'HIGH' and 'LOW' timing pulses and at output from multiple output to single output that will increase drive current and stability of pulse output. The pulse width of the pulse generation will modified to increase the capability of detection fault cable at longer cable.

In testing process the digital sampling oscilloscope (DSO) equipped with TDR module and MOQ switching. The TDR module generates pulse signal and the MOQ switching will sort the multiple inspection wire to be inject pulse signal and then the DSO records that edge and signal reflected back to the TDR module. By analyze the shape of reflected pulse signal (in step waveform) and other data using oscilloscope the type and location of fault cable can be determined.

This idealized multi-tasking switching is available to modified input voltage of TDR at any value. The most important thing in this project is the MOQ switching is capable to detect type and location fault cable. A computer program is developed so that it can transfer all the data that appeared on the oscilloscope and straightly save in computer. As a result, the analysis of the data which is reflected waveform can easily be performed. The software called Labview™ was chosen to apply for this programming. This MOQ switching is implemented to use as tester switch for low-voltage and high-voltage circuit.

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CHAPTER 1

INTRODUCTION

1.1 Introduction to Pilot Cable

The pilot cable normally using for control signaling, telecommunication, protection and data transmission purposed associated with power distribution and transmission system. Pilot cable is complying with the customer requirement of Tenaga Nasional Berhad (Malaysia Utility Company). Pilot cable provide channel between electricity supply substations for communication and for protective relaying of high voltage overhead and underground lines. These cables must function under condition where they are subjected to long trains of high voltages, induced by electromagnetic induction from zero sequence fault currents in the overhead phase conductors.

In the pilot cable there are bundle of wires enclosed in wire amour or single core round hard drawn aluminum wires applied helically (spiral-shaped) over them and covered by dual insulation with an inner core of cellular polyethylene and outer skin of solid polyethylene. An over voltage in pilot cable cores may compromise alarm systems, resulting the severe damage to the power system and prevent equipment. However, the problem will occurs when the pilot cable running along with transmission line enters swampy areas as water might seep into it and can cause damage to it. Also there are other problems such as broken conductor, water damage, crimps, loose connectors, sheath fault, smashed or dented cables and a variety of other fault conditions.

In this project the common instrument for evaluating a transmission line is the network analyzer. In this case the multiple outputs queued switching will control the inspection wires in pilot cables to detect the fault cable by using TDR technique and the time-domain reflection (TDR) module generates a voltage edge with fast risetime and continuous, whose pulse is swept to stimulate the device under test (DUT). The TDR method provides a more intuitive and direct look at the device under test characteristics. Using TDR module and oscilloscope, a fast and continuous edge launched into the transmission line under investigation. The incident and reflected voltage waves are monitored by the oscilloscope at a particular point on the line. The TDR also