Proc. Annual Symposium on Research & Industrial Training, 01(2014)151-156
Department of Electronics - Wayamba University of Sri Lanka

PORTABLE, MULTITASK, SUBSCRIBER LINE TEST BOARD FOR PUBLIC SWITCHING TELEPHONE NETWORK

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ABSTRACT

Sri Lanka Telecom is the largest telecommunication service provider in Sri Lanka. The company provides the variety of domestic and corporate services to the customer. Customer caring, trustworthy, innovative, responsive, team work, excellence and results driven are the SLT values. Line testing is the main duty in test room and this is the way to provide the SLT values to the customer. Line test board is basically used in line fault detection. In here, the voltage source is connected in series with the local loop and voltage drop across the loop is checked using a voltmeter. Although this is quite anoldand bulky equipment, still it is used in SLT Main Distribution Frame (MDF) and it has a very complex circuit arrangement. The other disadvantage of using this equipment is time consuming. Thereforethis test board cannot be used for Multi-Service Access Node (MSAN), Distribution Point (DP) and Cabinet. Because it isa bulkyequipment and operating voltage is 230 Vac. By considering these problems portable, multitask, subscriber line test board was designed and it can be used for any of MSAN, DP, Cabinet or MDF and also it is a user friendly equipment.

Keywords: *MDF, Line testing, DP, Cabinet, MSAN*

1.0 INTRODUCTION

The Main Distribution Frame (MDF) provides the main point of cross connection between the OSP (Outside Plant Network) cable pairs and the exchange. It provides a great flexibility over the line testing functions as well as electrical protection. Thisis normally a rack of tag blocks, which is used for line termination. Total of the cable can be categorized as primary and secondary. The primary cable is drawn from cabinet to MDF while the secondary cable is going from cabinet to customers.

Tip (leg A) and Ring (leg B) are the two wire of a telephone line. These wires started from MDF and passes through the Man Hole (MH), Cabinet, Hand Hole (HH), DP, Station protector and Rosette to the telephone line. In this path sometimes wires passes through the underground (UG) or overhead. Therefore many faults can be occurred due to this path and line test board is used to identify these faults. The commonly found faults on telephone lines are earth fault, short fault, disconnection fault, contact faults and current online[1].

The telephone company maintains large battery systems that supply dc line voltage for the operation of analog telephone service at customer locations. The voltage supplied is a compromise between operational needs for reliable service and safety precautions for customers and service personnel.

The length of the line to a customer telephone interface presents a resistance across which the central office voltage experiences a drop and therefore the voltage at the customer site may be vary. The nominal value is 48 V, but the central office common battery is adjusted between 50 and 52 V[2].

Originally, the potentials on the wires are positive with respect to earth (ground). This is called negative ground, since the negative side of the battery is grounded to earth. The Telephone companies discovered that, with positive voltage on the copper wires, copper wires experienced corrosion due to electrolysis. Operating in reverse, positive ground (negative voltage on the wires), the copper is protected from corrosion, this process is called cathodic protection.

During ringing, in place of dc, an ac voltage of 70 to 80 V(at 17 to 25 Hz) is present across the telephone line. When the subscriber lifts the handset, the same is sensed by the telephone exchange and the ringing ac voltage is disconnected and dc is reconnected to the line. Lifting of the handset from the telephone cradle, results in shunting of the lines two wires by low impedance of the telephone instrument. As a result, 48 V dc level drops to about 12 V across the telephone instrument. During conversation, the audio gets superimposed on this dc voltage[3].

2.0 METHODOLOGY

2.1 Telephone line testing

Subscriber line test board was designed by considering the ringing circuit of the telephone internal circuit. A bell and a capacitor were consisted in a ringing circuit.

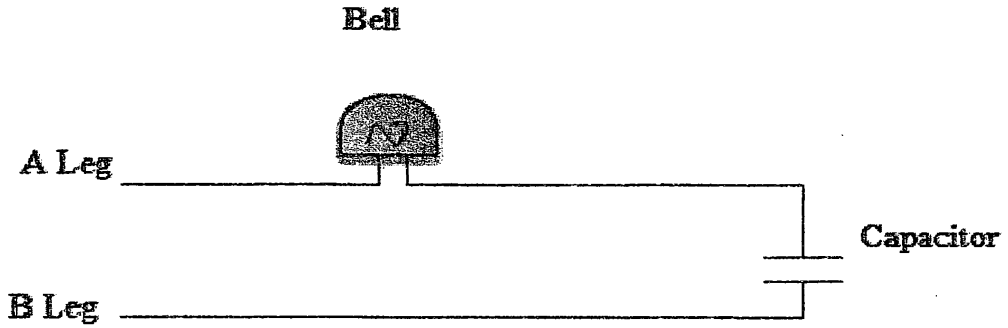

Figure 1: Ringing circuit

The -48 V dc power supplies with current capability of at least 50-60 mA was provided the subscriber telephones line to checked the condition of the line. In here a voltage source was connected in series with the local loop and voltage drop across the loop was checked using a voltmeter.

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12 V dc battery was used as the supply power to circuit, is an one advantage.

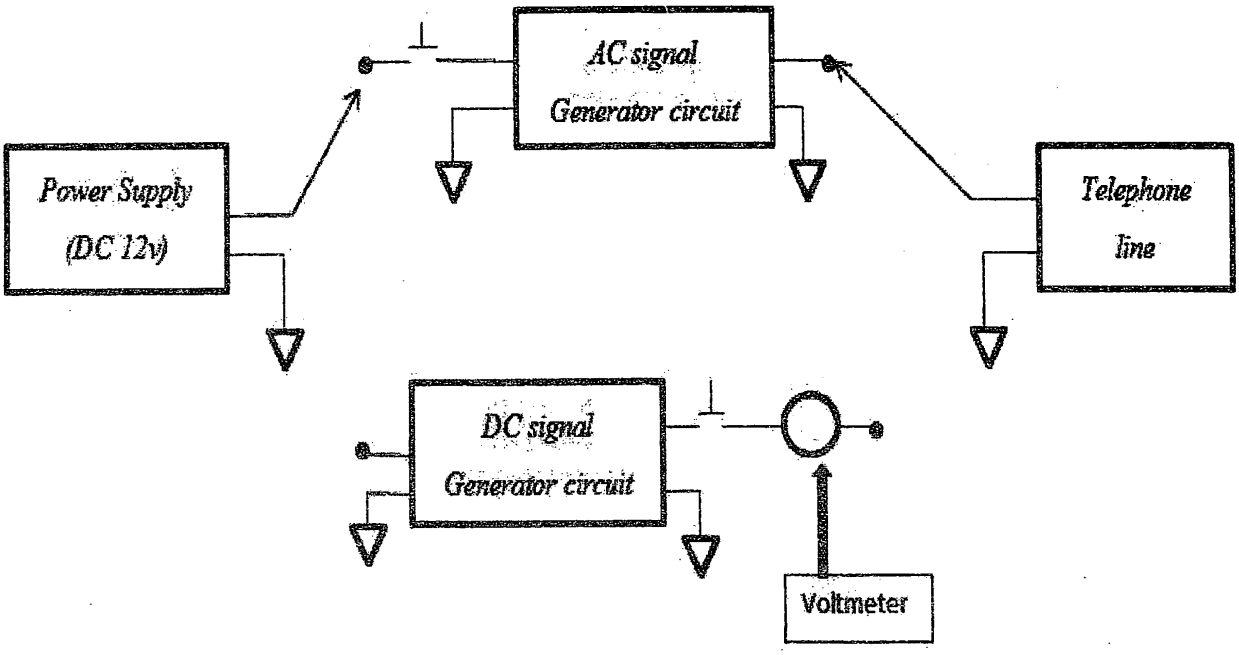

Figure 2: Block diagram of portable test board

3.0. RESULTS ND DISCUSSION

3.1. Results

The set up was arranged as shown in figure 3. This set up was considered as the too far end of the subscriber telephone line the mentioned capacitor was the capacitor of the bell path.

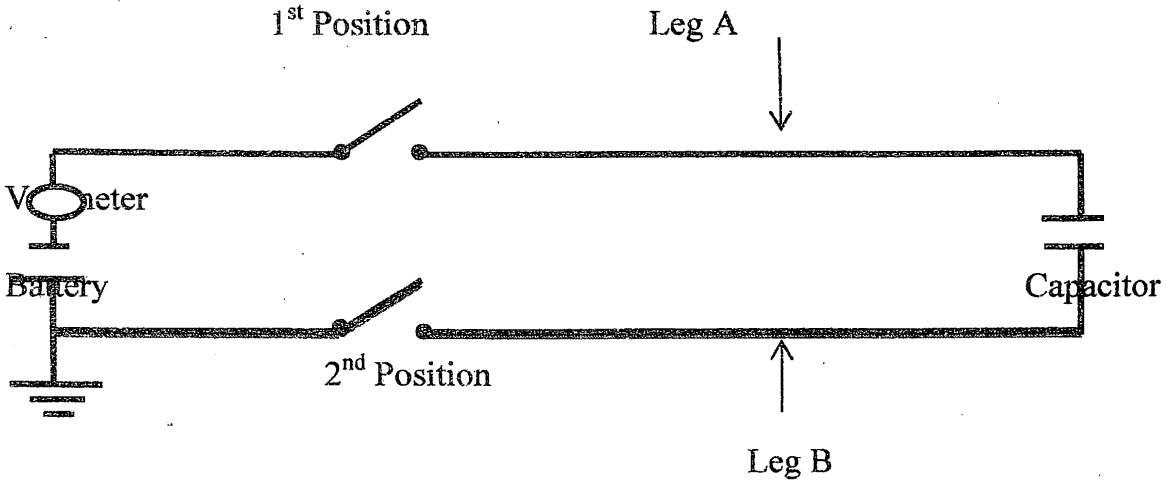

Figure 3: Both legs are open

One leg of the line was connected to the voltmeter (1st position) if the leg had an earth fault, the voltmeter was shown some reading because a path provided the current flows from the battery. If there is no proper earth or disconnecting occurs voltmeter does not show any reading. It was same for leg B as well.

When leg A was connected to 2nd position allowing leg B to be at the 1st position, at this time complete path for the battery will be provided via the condenser. When both legs were in good condition, the voltmeter showeda reading at once and gradually it was become zero, because of the charging of the capacitor.

When the line was short circuited, the voltmeter was shown some constant reading because of the complete path provided for the battery by the short circuit.

3.2. Discussion

Portable multi task subscriber line test board is very important instrument fortheSri Lanka Telecom PLC today. When subscriber line fault occurred, the relevant technical assistant should go to the customer's home and check the telephone. Then come back to the cabinet or MSAN and inform MDF to check the customer line by using current line test board. After identifying the fault, the technical assistant has to repair it. This process takes a lot of time therefore it is a time consuming. This is the disadvantage of the current test board which is using at SLT today

By using portable, multi task line test board the relevant technical assistant can go by step by step. As the first step to recover a fault using portable test board a technical assistant can check the dial tone at DP. If the dial tone is receiving, the fault must have occurred in customers' home side. If not fault is in cabinet or MSAN side. After identifying the path technician can go to the cabinet or MSAN and test the subscribers' line using portable test board which also helps to identify the fault type and identify solution for it. This is advantage of portable test board compared to current line test board

4.0. CONCLUSION

Line test board was used to identify the subscriber line faults for public switching telephone networks. The two types of voltage values were supplied by using the test board to the customer telephone line and their conditions were checked by using the voltmeter. This portable test board was the most important equipment to the Sri Lanka Telecom PLC and it was the law cost, reliable and efficient equipment.

ACKNOWLEDGEMENT

The authors would like convey their gratitude to the staff of Department of Electronics, Faculty of Applied Sciences,Wayamba University of Sri Lanka.

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