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### RESEARCH ARTICLE

#### Digital Wiring Harness Tester.

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#### Abstract

This paper consists of a distributed cable harness tester. It has a few functions such as connection and detection of a wire, proper connections of wire etc. In this project, application is designed in order to improve the tester's performance, and the software design of upper computer and the framework of hardware of tester nodes are introduced in details. The tester is designed to ensure quality and reliability of cable harness. In detection process early failure products such as breakage circuit, short circuit can be rejected. We can also print the data regarding the Harness. It improves the efficiency of system, decreases the length of cable, the cubage and weight of the equipment and makes the test and maintenance convenient and fast.

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#### Introduction:-

A cable harness, also known as a wire harness, cable assembly, wiring assembly or wiring 100m. It is an assembly of cables or wires which transmit signals or electrical power. A wiring harness can be very small in size such as a small group of wires found in your computer or car. A wiring harness can also be very huge such as some of the ones that Interconnect manufactures for aircraft. These huge wiring harnesses may have thousands of wires in them and hundreds of connectors. Wiring harnesses have many different names including: electrical wiring harnesses, looms, cable assemblies, coax cables, RF cables, injection molded cable assemblies, fiber optic cables, and many times are simply called harnesses. It is much easier and faster to route a group of wires already bundled together than routing them individually.

A cable harness tester it has a few functions such as connection detection of a wire, diode orientation testing and resistor's etc. The application is designed in order to improve the tester's performance, and the software design of upper computer and the framework of hardware of tester nodes are introduced in details. The tester is designed to ensure quality and reliability of cable harness. In detection process early failure products such as breakage circuit, short circuit and wrong conductor arrangement can be rejected. It improves the efficiency of system, decreases the length of cable, the cubage and weight of the equipment and makes the test and maintenance convenient and fast.

Faulty End Recognition tool identifies wiring faults and their physical location of the product. This tester is fast, accurate and easy to use and saves a lot of time involved in manual checking. Harness testers have a unique, patented graphic display to pin-point problems when wiring errors are detected, and offer one second pass/fail testing for production environments. Quickly locate intermittent-connection and identify their position in the cable.

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Harness Testers are commonly used in automobiles, as well as construction machinery, cable harnesses provide several advantages over loose wires and cables. For example, many aircraft, automobiles and spacecraft contain many masses of wires which would stretch over several kilometers if fully extended. By binding the many wires and cables into a cable harness, the wires and cables can be better secured against the adverse effects of vibrations, abrasions, and moisture. By constricting the wires into a non-flexing bundle, usage of space is optimized, and the risk of a short is decreased. Since the installer has only one harness to install (as opposed to multiple wires), installation time is decreased and the process can be easily standardized. Binding the wires into a flame-retardant sleeve also lowers the risk of electrical fires. Perform high speed electrical interconnect testing on cables and harnesses for wiring correctness and insulation quality.

### Block diagram:-

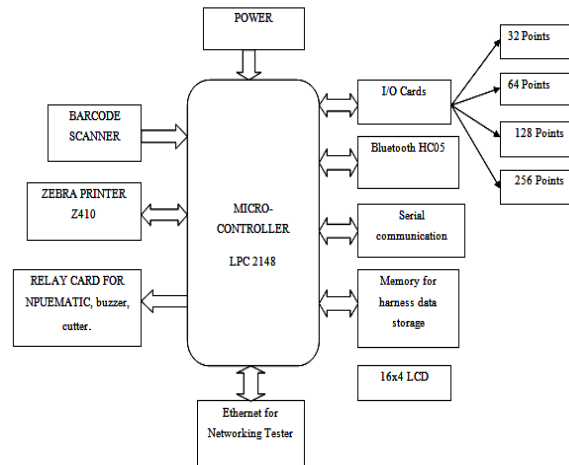


Figure 1: Block diagram of Harness Tester

Working: The wires are first cut to the desired length, usually using a special wire-cutting machine. The wires may also be printed on by a special machine during the cutting process or on a separate machine. After this, the ends of the wires are stripped to expose the metal (or core) of the wires, which are fitted with any required terminals or connector housings. The cables are assembled and clamped together on a special workbench, or onto a pin board (assembly board), according to the design specification, to form the cable harness.

LPC2148 Controller has limited i/o pins, but we needed large no. of i/o pins, so we can use the i/o cards. Which is extended the i/o pins. That is depends on the how many inputs or cables can be checked. i/o cards are use for expanding the input output connections.

These are four points for checking the wires/cables like A, B, C, D. In first case: If A point connected to C point and B point connected to D point then the message displayed is "harness is OK" on LCD. In second case: If A point connected to D point and B point connected to C point then the message displayed is "harness is EXCHANGED" on LCD. In third case: If A point connected to C point & B point is not connected to D point then the message displayed is "harness is OPEN" or no connections between B & D.

In this project we can use barcode scanner, which is used for scanning the barcode of product and they display the specifications or any other information of that product.

Ethernet is used in LAN connection, it means as earlier one man use to supervise going to every machine, now it can be supervised on one PC connected to other PC's on other machines. Printer is used in order to print any data of the product needed on papers. Thus we are reducing man power and making task earlier by having many functions on one device.



Figure 2: Digital Harness Tester

**Results:-**

There are many results we can display on LCD as follows:

1. Firstly the options are displayed on LCD that are,TEST WIRE, SET RTC, TIME/DATE, SEND HRN(Harness)DATA.



2. In second case we can check the points. Suppose two points are open then it will display that as OPEN POINT. In below picture point 1 13 are opened.



3. In third case we can check the faulty points. Suppose some faults occur in harness then it will display that as FAULTY POINTS. In below picture point 4 16 are faulty.



4. In fourth case we can check the interchange connections. Suppose point 1 is connected to point 15 and point 2 connected to point 16 then there is interchange between that points. But in below picture all points are connected to correct points so there is NO INTERCHANGE.



5. In fifth case suppose some connections are required between points then it will display REQUIRED POINTS. Shown as below.



6. In sixth case we can check the harness. If data is not passed through harness then it will display HARNESS FAIL. Shown as below



7. In seventh case we can check the harness and if harness is ok or good then it will display HARNESS PASS. As shown below.



### **Advantages:-**

1. All functions are available in one device.
2. Less time consumption.
3. Reduced man power.
4. Accuracy.

### **Applications:-**

1. Complex wiring testing (open circuit, wrong connection, wire interchange)
2. Electronic devices. (oven, fridge, washing machines etc.)
3. Automobile Industries. (vehicles etc.)
4. Aircrafts.

### **Conclusion:-**

Hence in this project we solved the problems of time consumption, man power etc. which occurred in earlier projects of Harness tester. Harness Tester is designed to test a harness by Checking each point with each other point. IT learns the harness and Compare with the already stored harness information and locates open points, extra points, group short. Cable Harness Tester facilitates two modes of testing (auto / manual) harnesses. Testing speed of harness is high .It also facilitates indirect saving of space by accommodating different types of harnesses on rig.

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