A COST EFFECTIVE SYSTEM FOR CONNECTING
MULTIWIRE CABLES TO PRINTED WIRING
BOARDS

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A COST EFFECTIVE SYSTEM FOR CONNECTING MULTIWIRE CABLES TO
PRINTED WIRING BOARDS

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Prepared by F. H. Lewis

A method to reduce wiring errors and assembly time when installing cables to printed wiring boards has been developed at Bendix Kansas City. The method uses a Component Locator System (Work Director) to identify eyelet or hole location on a printed wiring board and a Cable Scanner system to select the correct wire from a cable to be installed. The Cable Scanner is programmed by the Work Director slide.

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SUMMARY

The high density wiring used on newer electronic devices requires an improved processing technique to eliminate wiring errors and difficulties in reworking assemblies. For example, one subassembly has three cables and three connectors containing approximately 130 wires that terminate on a printed wiring board (PWB). The board is approximately 50.8 mm wide by 101.6 mm long, contains about 20 components, and interconnects with 8 to 10 wires from other printed wiring assemblies (PWAs).

Using a Component Locator System manufactured by Contact System, Inc. of Danbury, Connecticut as the basic component and a specially designed type of Cable Scanner, Bendix Kansas City developed a unique system flexible enough to meet present and future work requirements. The Component Locator System usually is referred to as a Work Director at Bendix.

The Work Director shows the exact location for installing the wire on the PWB and codes the Cable Scanner for the correct wire. The Cable Scanner then provides an audible signal when the operator touches the correct wire. This combination of Component Locator System and Cable Scanner eliminates the following operations:

- Marking wires for identification;
- Sorting marked wires when attaching to connectors;
- Electrically checking wire number versus pin number;
- Identifying wires by markings when installing them in the PWB; and
- Determining the proper PWB hole location from a visual aid.

DISCUSSION

SCOPE AND PURPOSE

The purpose of this project was to develop a more cost effective process for connecting multiwire cables to printed wiring boards.

ACTIVITY

This project started with the concept of a system that would eliminate wiring errors when attaching cables to printed wiring boards. The developed system eliminated a number of manufacturing and inspection steps required by present operation methods. The Work Director and an original design Cable Scanner (Figure 1) work as follows.

Using a number of coded slides, the Work Director shines a light on the PWB and spots the exact hole for the wire to be installed. Reading and decoding the code on the slide, the Cable Scanner applies a low voltage to the correct wire. When the grounded operator touches the correct wire, the circuit is complete and an audio signal is given.

The Work Director slide (Figure 2) is a special type of visual aid device used in locating components on PWB assemblies. The slides are used in pre-programmed assembly sequence performed on a Work Director. Slides are made from a full size master, which may originate from a photo-tool, blueprint, or other suitable graphic showing circuitry. The individual slides are produced by cutting an opening in a reproduction of the master and identifying the specific location for a component. With the addition of a series of punched holes on the edge of the slide, it is possible to encode, read the code, and then sensitize the correct wire from a cable assembly.

The coded slide is read by using light sensitive diodes (Figure 3) which drive a Schmitt trigger network. The Schmitt trigger decodes the signal and drives any of four multiplexers. Each multiplexer has an output of 16 channels or lines. A total of 64 output lines from the multiplexers are attached to a cable with mating connectors for the cables to be installed.

The grounded operator scans the cables by touching the stripped end of wires to be installed. A continuity detector supplies a +10V signal to a preselected wire, and sounds an audio signal when the operator completes the circuit by touching the correct wire. The operator then installs the wire in the specific location on the PWB indicated by the Work Director.

Figure 1. System Block Diagram

ACCOMPLISHMENTS

Results from evaluation of the system show it is reliable, accurate, and consistent. With the use of the coded slides, it is possible to change the sequence of wire installation without re-programming or re-making new slides by simply resorting the deck of slides.

WORK DIRECTOR PROGRAM SHEET																				
DEPT.	PROCESS ENGINEER				PROJECT				PART NAME				WD NUMBER WD-				SLIDE

WD	ISS	DATE	PROC	ENG	PLANNER	VA/QC	WD	ISS	DATE	PROC	ENG	PLANNER	VA/QC	WD	ISS	DATE	PROC	ENG	PLANNER	VA/QC

Figure 2. Work Director Program Sheet

Figure 3. System Schematic Diagram