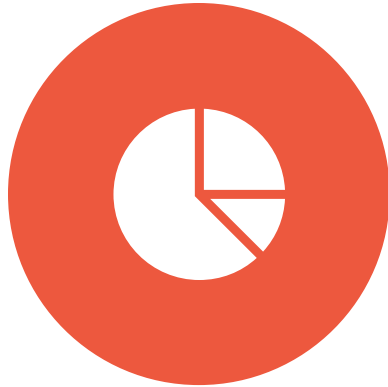# HT-128 Pilot Project

AEROSPACE APPLICATION FOR WIRE HARNESS INSTALLATION TESTING

Objectives

DEMONSTRATE FEASIBILITY OF HT-128 AT POINT OF INSTALLATION

INCORPORATE TOOLING AND METHODS TO OPTIMIZE USE FOR PRODUCTION

IMPROVE HARNESS INSTALLATION FIRST PASS YIELDS AND REDUCE REWORK AND TROUBLESHOOTING TIME

USE CASE 1

Issue: Chronic mis-wire (cross-wire) issues on RF system installation found at flightline causing inability to activate RF system in factory environment.
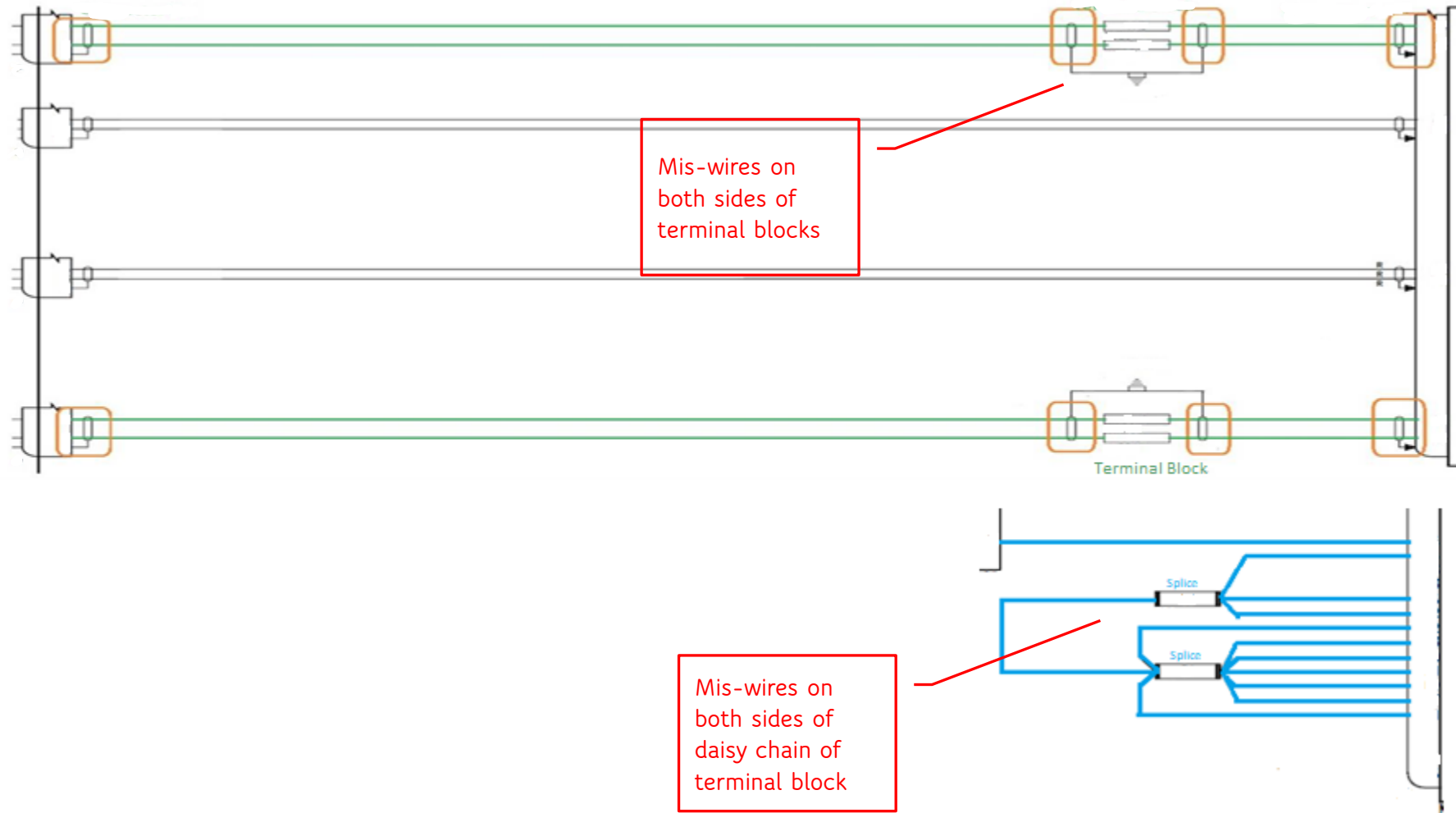
Findings: HT-128 prevented downstream troubleshooting and rework. Study indicated that HT-128 saved between 20 and 80 hours of total rework and repair time over four incidents. Average savings per incident ranged from $437 to $1,750.*

Recurring Costs: Total set-up, test, run, and disconnect time for HT-128 system averaged one hour.

* All hourly rates presented in this document are based on industry averages

USE CASE 1 Schematic View

Mis-wires on both sides of terminal blocks

Terminal Block

Mis-wires on both sides of daisy chain of terminal block

Representative HT-128 Test Program

18-Mar-21

CABLE P/N	E20	
TEST ID	VOLTTEST	
CONTINUITY	5 Ohms	Be sure to follow all instructions for entering data.
ISOLATION	200 Kohms	Blue text is example data and can be deleted or overwritten.
MEASUREMENT DELAY	100 mil second	
AUTOCONNECT_ADAPTER	HOST	243
AUTOCONNECT_ADAPTER	2A	374
AUTOCONNECT_ADAPTER	2B	196

The HT-128 AUTO-CONNECT feature simplifies production set-up and testing for multiple tester configurations

WIRE	ADAPTOR ID	ADAPTOR PIN	CABLE PIN	CABLE PIN	ADAPTOR PIN	ADAPTOR ID	HI CONT. LIMIT	LOW CONT. LIMIT
START OF WIRELIST								
W1	HOST	24	H-24	2A-24	24	2A		
W2	HOST	25	H-25	2A-25	25	2A		
W3	HOST	1	H-1	H-2	2	HOST		
W4	HOST	28	H-28	2B-1	1	2B		
W5	HOST	29	H-29	2B-2	2	2B		
W6	HOST	3	H-3	H-2	2	HOST		
W7	HOST	4	H-4	H-2	2	HOST		
W8	HOST	26	H-26	2A-26	26	2A		
W9	HOST	30	H-30	2B-3	3	2B		

HT-128 Test Set-Up

HT-128 TESTER CONFIGURATION SHOWING THREE TESTERS OUT OF FOUR ATTACHED TO THE WIRE-HARNESS-UNDER-TEST. THE FINAL TESTER IS APPROXIMATELY 25 FEET OUT OF FRAME.

TECHNICIANS USE THE HT-128 ICON DRIVEN INTERFACE TO SELECT THE TEST PROGRAM.

AUTO-CONNECT FEATURE WIRELESSLY LINKS THREE TESTERS TOGETHER AND INITIATES TESTING

HT-128 RUNS TEST AND DISPLAYS TEST RESULTS. A DOWNLOADABLE TEST REPORT IS GENERATED FOR EACH RUN
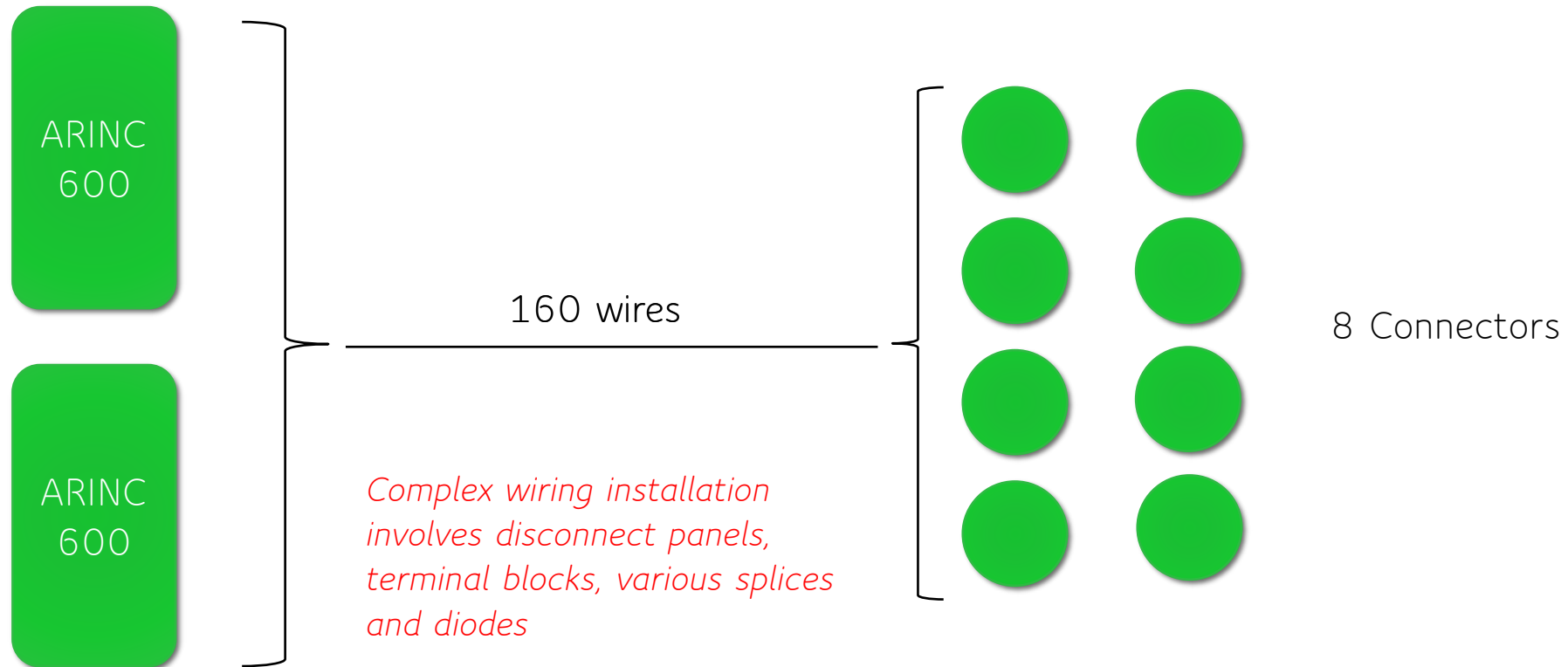
USE CASE 2

Issue: Production could not run system functional test on P-System causing downstream issues with LRU installation

Findings: HT-128 was able to detect a multitude of issues including mis-wires, missing wires, and bent pins. Trouble shooting, repair and rework cost reached a maximum 63 hours. Total cost savings exceeded $5,000 for complex faults.

Recurring Costs: Total set-up, test, run, and disconnect time for HT-128 system averaged one hour.

USE CASE 2 Simplified Wiring Overview

ARINC 600

ARINC 600

160 wires

Complex wiring installation involves disconnect panels, terminal blocks, various splices and diodes

8 Connectors

Representative HT-128 Test Report


```
Software Version: 10.49
Test Status: PASS
Cable P/N: ZZZ
Cal: 65139
Connection Type: Wireless
Meas Delay: Disabled
Test ID:
Test Notes:
Template Version: 1.0
Type: FAULT
ISO Test Enabled: No

TSN  Adaptor ID
---------------
0341 XXXX
0342 YYY_P1
0343 YYY_P2
0344 YYY_P1
---------------

Global Continuity Threshold : Def,      5.0 Ohms
Global Isolation Threshold  : Def,      200 KOhms

Number of failures:
  NC: 0
   I: 0
  HR: 0
  LR: 0
  MW: 0
  DR: 0

Errors:
End of errors

Continuity Test Results:
--------------------------------------------
           Wire   Measured
--------------------------------------------
        A-H12,4-F             1.2   Ohms
        A-J12,4-G             1.2   Ohms
        A-G11,4-A-            1.2   Ohms
```

HT-128 set-up uses 4 testers in this case allowing up to 512 test nodes or 256 wires.

Test Report documents all forms of faults including NC-opens, I-shorts, HR–high resistance, LR–low resistance, MW–mis-wire, DR-diode reverse, DM-diode Missing, **HV–high voltage, LV–low voltage**

Test Report records measured results (OHMS or VOLTS) for all 160 wires included in USE CASE 2. *Only three lines are shown here due to report size.*

Note: Reference designators changed due to confidentiality

USE CASE 3 Terminal block Wiring Defects

Issue: Terminal blocks are the highest-ranking attribute on the factory defect frequency chart. Faults include mis-wires, missing grounds, and incorrect or reversed diode installation.
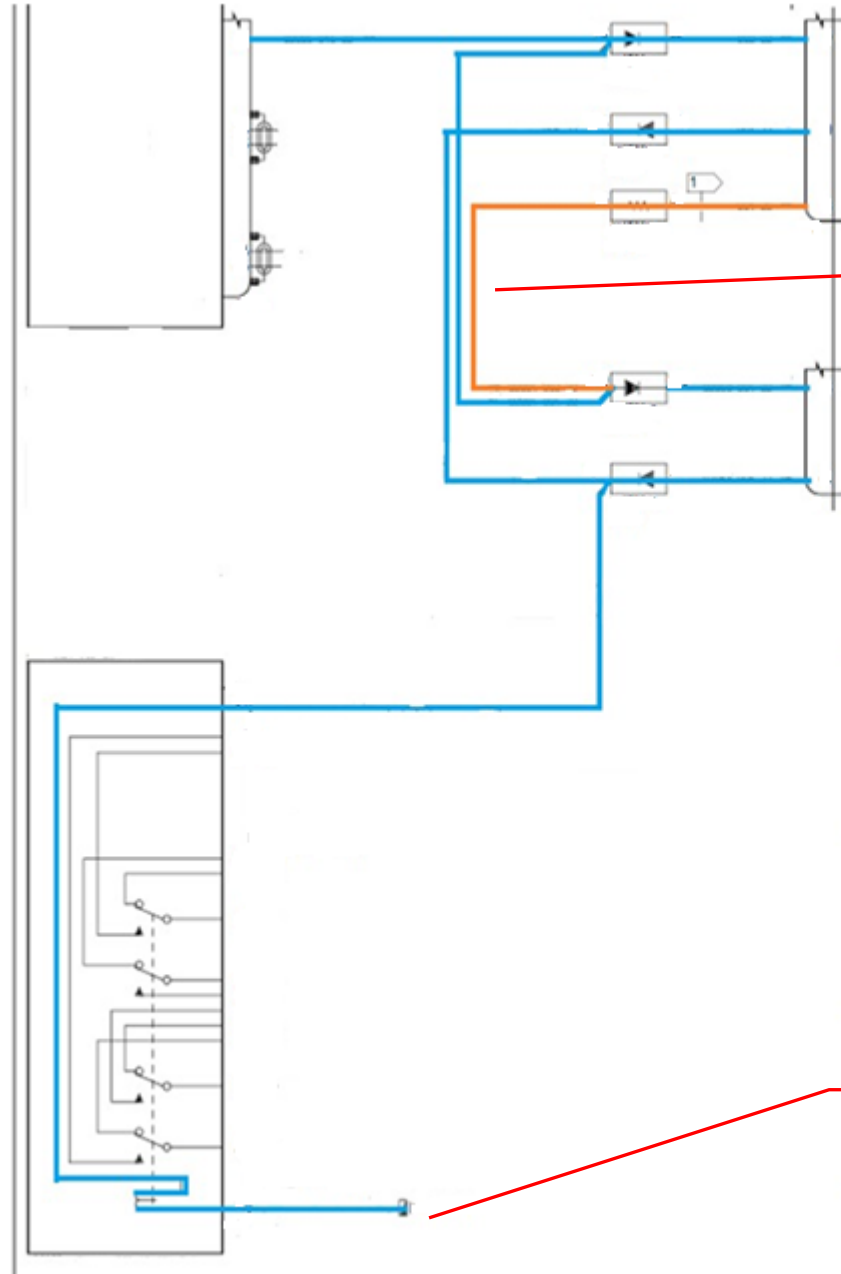
Findings: HT-128 aided in diagnosing and communicating faults significantly reducing troubleshooting time. Savings ranged from 10 to 20 hours or $875.00 to $1,750

Recurring Costs: Total set-up, test, run, and disconnect time for HT-128 system averaged one hour.

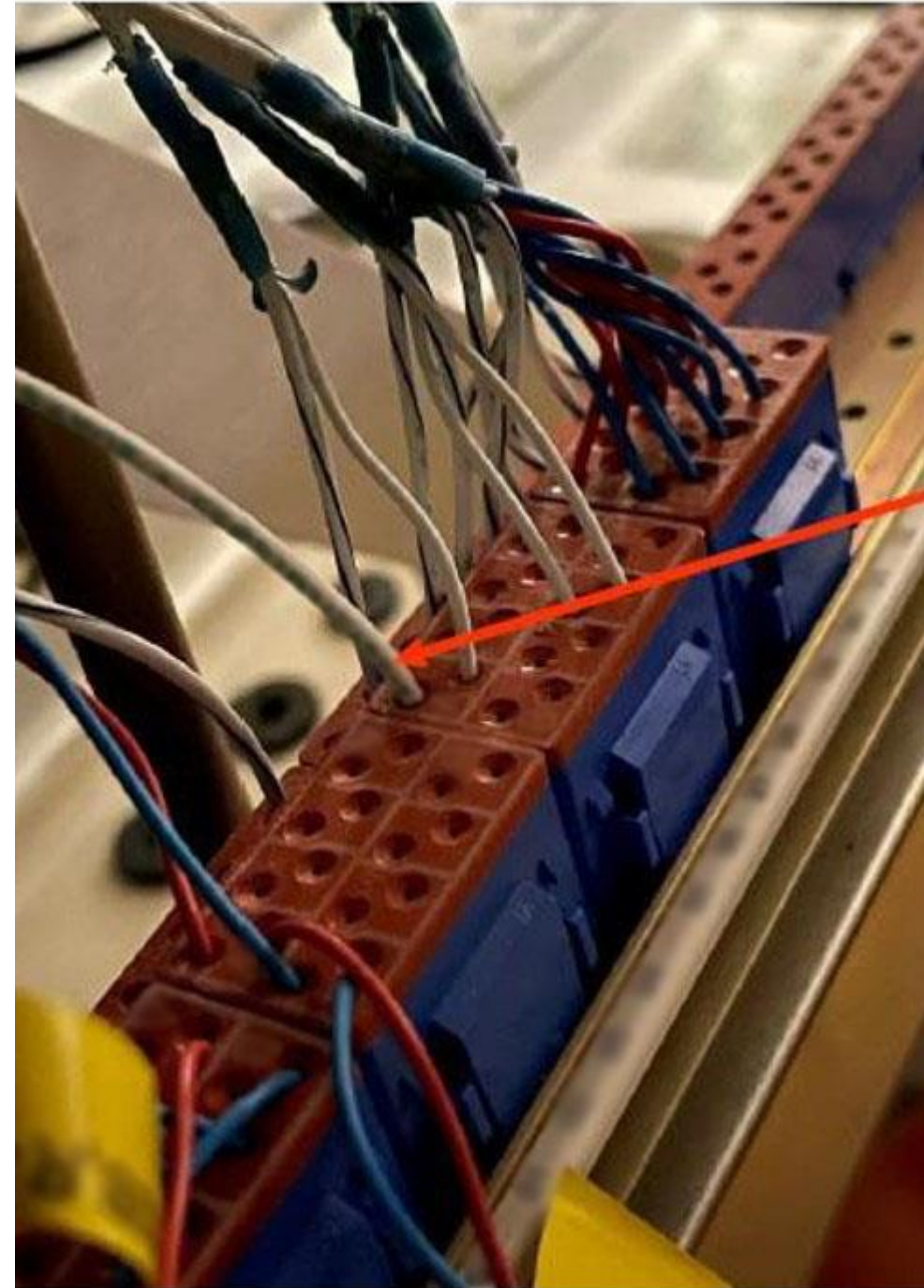# USE CASE 3
Schematic View

HT-128 uses its Voltage measurement feature to verify resistor-diode circuitry incorporated into terminal block

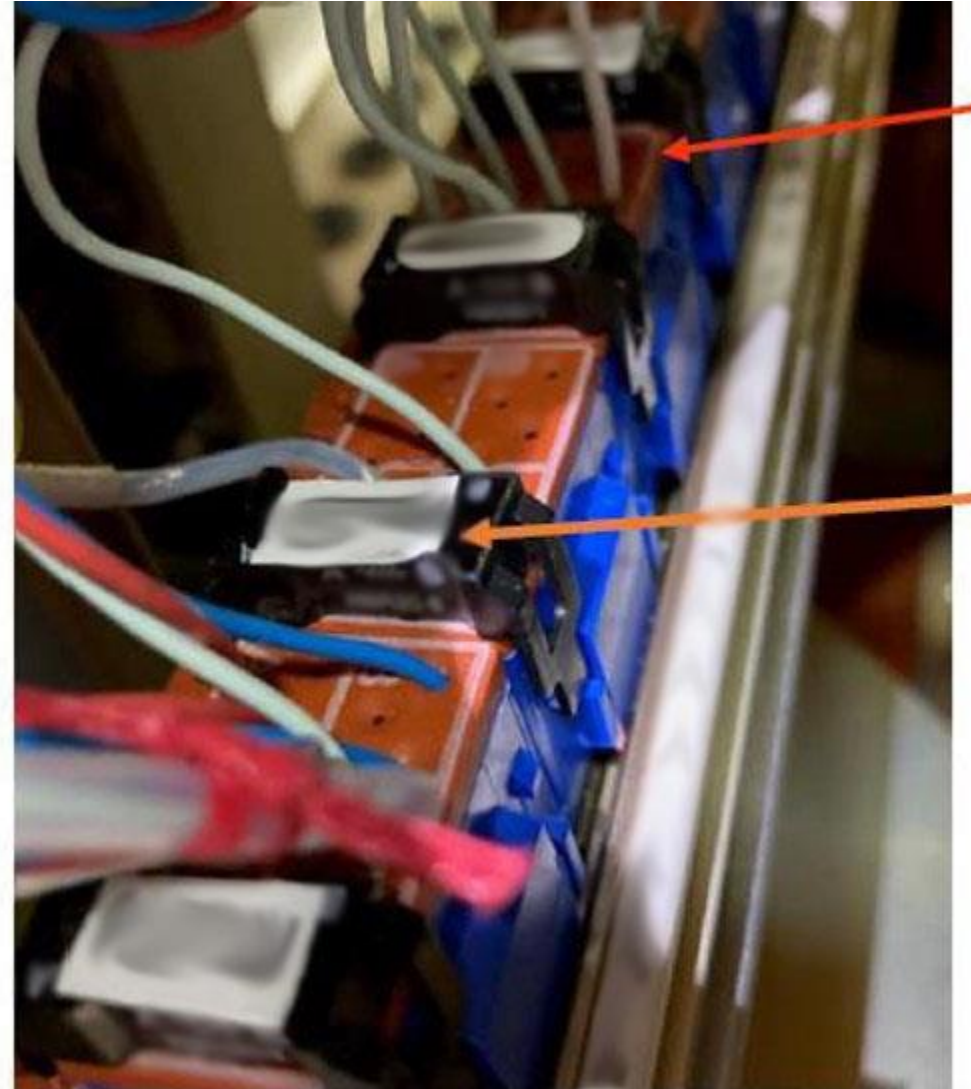HT-128 verifies both signal and ground wiring

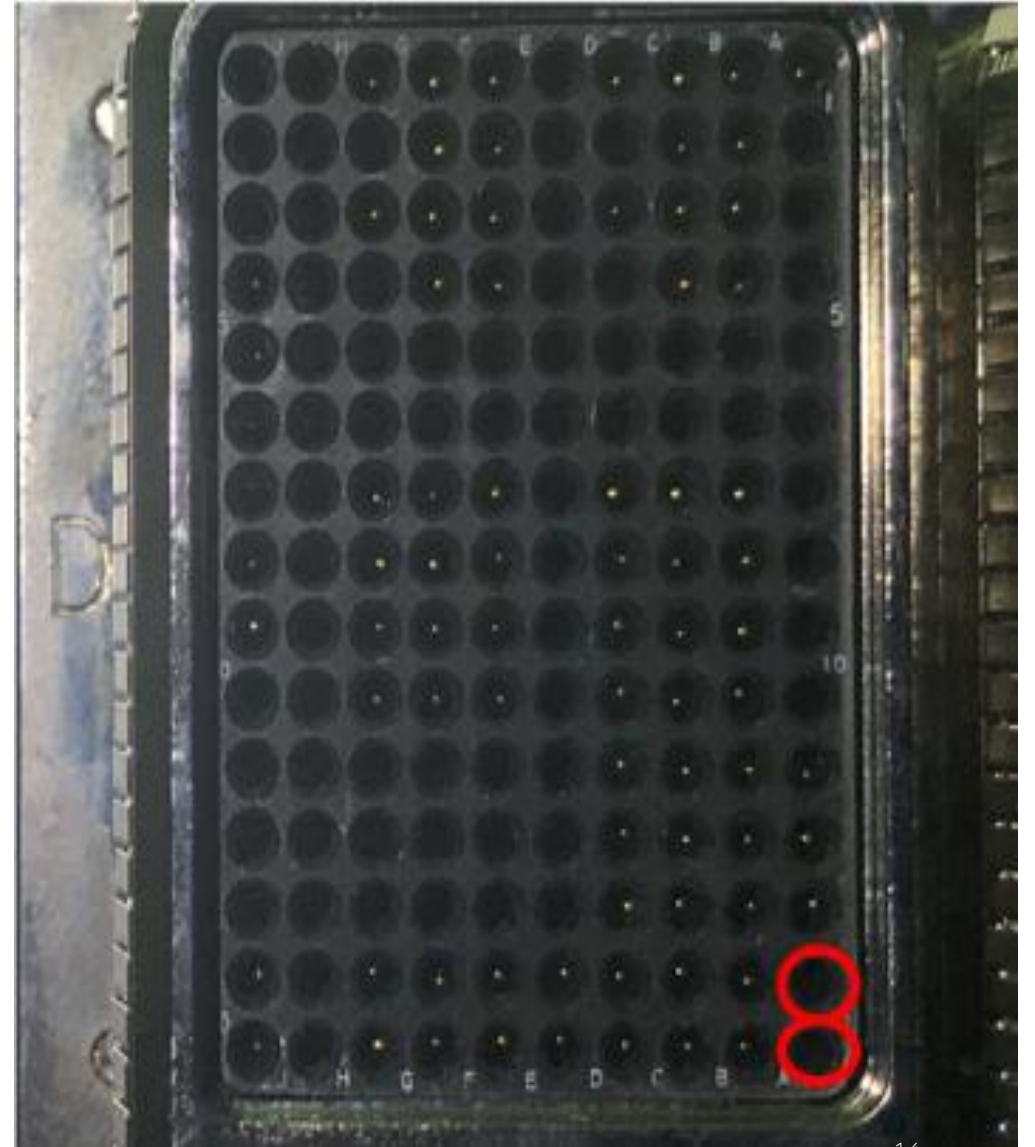# HT-128 Fault Detection Example

Missing Ground Wire

HT-128 Fault Detection Example
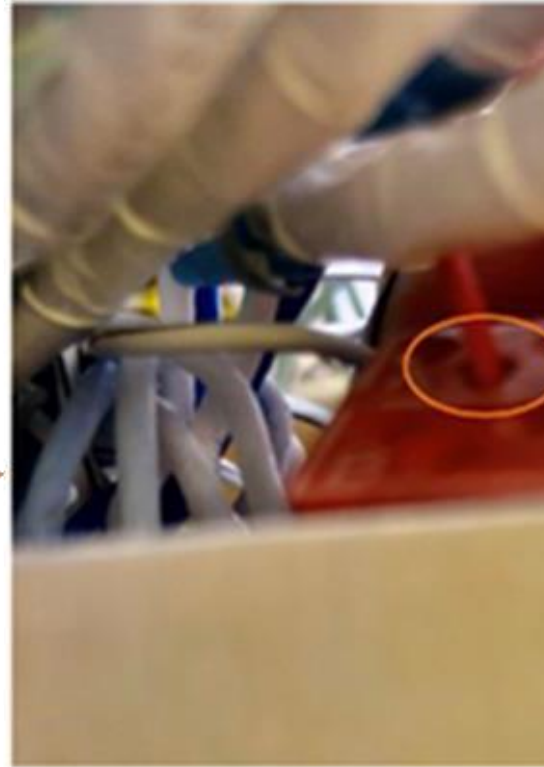

Missing Diode &
Improper Labeling

HT-128 Fault Detection Example

Missing Wires

HT-128 Fault Detection Example

Terminal Block Mis-wired

As the left most image demonstrates, wiring systems are often large and complex. The HT-128 simplified troubleshooting allowing repair to be made at the point-of-installation avoiding costly downstream repairs.

"Passing defects to downstream internal customers often involves a time-consuming processes of manually "tracking down' wiring issues by removing multiple access panels."

- Engineer

Findings & Conclusions

- HT-128 allowed point-of-installation fault detection. No more passing wiring defects downstream.

- Wireless connection simplifies set-up and testing.

- Handheld, lightweight, and icon driven testers are easy to program and run in a production environment.

- Wiring fault incident costs ranged from 10 to 80 hours to resolve prior to HT-128 implementation.

- HT-128 detected the number one production fault listed in the factory defect frequency chart.

- The HT-128 has an excellent cost-benefit comparison.

Pilot Project data supports the HT-128 as an operational tool.