



Huntron Diagnostic Systems

Flexible, automated diagnostic solutions to help people solve circuit card problems

ProTrack
ProTrack Scanner
TrackerPXI

Access Automated Probing Station
Huntron Workstation software



As density and complexity increase, printed circuit assemblies become tougher to probe and test.

Huntron complements conventional test equipment with access and test tools that catch the elusive problems other methods often miss.

The keys are physical and virtual access, which translates into meaningful results such as shorter design cycles, improved production yield and lower warranty costs.

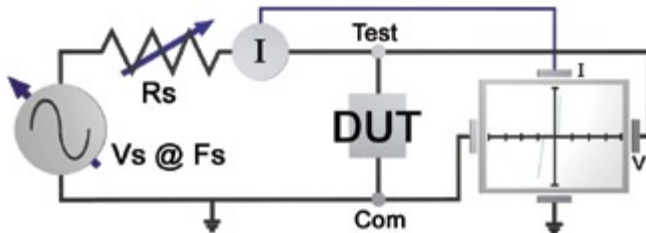
When you need to test, diagnose or troubleshoot complex circuit boards, Huntron lets you **access**, **explore** and **discover** more.

HUNTRON
Access Explore Discover

PCA Troubleshooting for Manufacturing, Rework and Service

Since 1976, Huntron has been developing a range of test instrumentation specifically designed for component level troubleshooting on PCAs (printed circuit assemblies) in rework, repair, and remanufacturing. The Huntron® Tracker® utilizes the power-off testing methodology of Tracker Signature Analysis. The development of the Huntron ProTrack® I has taken power-off troubleshooting to a much higher level.

Huntron® Tracker® Signature Analysis



The combination of voltage (V_s), resistance (R_s) and frequency (F_s) form the basis for a Huntron Tracker test range

A current-limited AC signal is applied across two points of an electronic component or circuit. The resulting current/voltage waveform is presented on a display using vertical deflection for current and horizontal deflection for voltage providing a unique signature that represents the overall “health” of the DUT (device under test).

Basic Tracker Signatures

Tracker signatures can be categorized based on the four basic component types. These signatures are **resistive**, **capacitive**, **inductive** and **semiconductive** signatures. All signatures will exhibit at least one of these characteristics but more often include combinations that are referred to as **composite** signatures.



1. **Resistive** signatures have a linear response with the angle of the trace determined by the value of resistance.



2. **Capacitive** signatures have an elliptical response with the width of the trace determined by the value of capacitance.



3. **Inductive** signatures have an elliptical response. The trace width is determined by the value and the angle by component resistance. Inductors often exhibit a distorted shape.



4. **Semiconductive** signatures show the conducting and non-conducting states. Approximate breakdown voltages can be determined using the horizontal graticule.

The Benefits of Power Off Testing

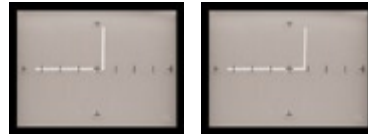
- Troubleshoot circuitry that cannot be powered due to a catastrophic failure
- Test without the risk of accidental shorting that could cause further damage
- Work effectively on PCAs with mixed technology, i.e. digital and analog components
- Perform preventative diagnosis by seeing component flaws that could lead to premature failures

Getting Down to Basics

Comparing Tracker signatures can be accomplished manually or with the aid of a computer for signature storage using the Huntron Workstation software. All Huntron Trackers utilize dual channel interfaces for easy side-by-side comparison of good versus suspect circuit boards. Using this **comparison method**, suspect components can be quickly identified.



The curved portion of the zener diode signature on the right indicates slow biasing



This signature comparison shows the diode on the right conducting at the wrong voltage



The signature of the capacitor on the right is showing resistance indicating current leakage



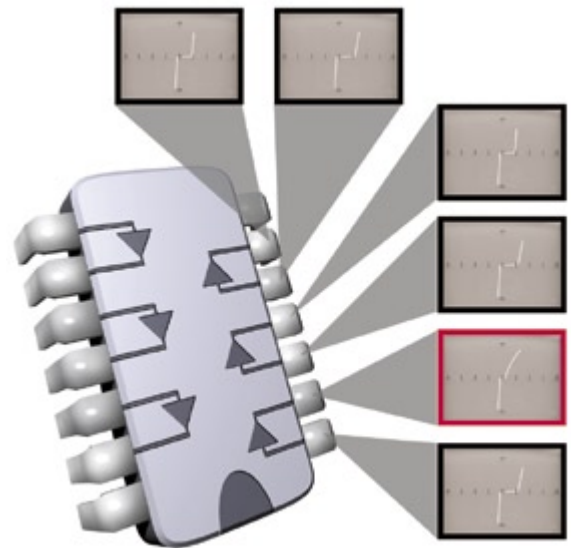
These signatures from good and bad comparator ICs show that damaged PN junctions are easily recognizable

All ProTrack systems come with the Huntron Workstation software thus eliminating the need to have a known good reference board available for comparison. Signature comparisons are made automatically with the failed signatures displayed for interpretation.

Looking for Differences

Troubleshooting with Tracker signatures is possible without the use of documentation or known good circuit boards. This is accomplished by searching for patterns in the signatures that are displayed on like pins of a component or bus.

An example would be to compare all of the input pins on an inverter IC with each other and compare all of the output pins of the inverter with each other looking for variances in the signature patterns. The input and output pins should compare favorably with similar pins. Any deviations in the pattern could indicate a real problem. This same technique can be applied to address and data bus lines and circuit boards that have duplicated circuitry such as multi-channel boards.



The Benefits of Tracker Signature Analysis

- Troubleshoot without the use of documentation or a known good board
- Quickly locate problems with digital IC protection circuitry by comparing similar pins
- Effectively search for component failures regardless of the overall board function

The Huntron ProTrack I

The Huntron ProTrack I enables the user to set the applied voltage, frequency and source resistance to best match the circuit characteristics and display the optimum Tracker signature. Connecting to a personal computer will allow for creation of complete test routines and signature storage.



The Huntron ProTrack I

Huntron ProTrack I Features

- CRT with graticule overlay
- LCD for range and menu display with menu selection buttons
- Encoder for range and menu selection and control
- A and B channel connections with channel selection controls
- Built-in Pulse Generator for biasing switched devices

The Value of Variable Test Ranges (V + R + F)

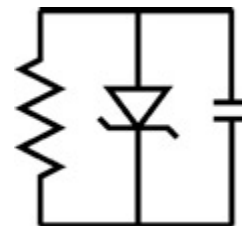
Three variables make up a Tracker test range: voltage (V), internal Tracker resistance (R) and AC sinewave frequency (F). By adjusting any of these three variables, either individually or in combination, characteristics of the Tracker signature can be changed. The examples below show a simple circuit made up of a diode, resistor and capacitor in parallel. Note how the Tracker range parameters are varied to bring different aspects of the signature into focus.



Voltage: 15V
Resistance: 10KΩ
Frequency: 100Hz
Effects from all of the components are shown in the signature shape



Voltage: 200mV
Resistance: 10KΩ
Frequency: 200Hz
Using a voltage below 600mV eliminates the diode from the signature



Component values:

Zener Diode: 5.1V
Resistor: 10KΩ
Capacitor: .047μF



Voltage: 15V
Resistance: 10KΩ
Frequency: 20Hz
By changing frequency, only the diode and resistor affect the signature shape



Voltage: 200mV
Resistance: 10KΩ
Frequency: 20Hz
Adjusting the frequency reduces the capacitive effect in the signature



Voltage: 10V
Resistance: 100Ω
Frequency: 60Hz
Changing the resistance removes the resistive effect from the signature

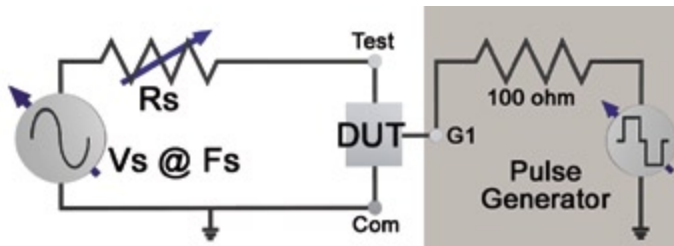


Voltage: 200mV
Resistance: 1KΩ
Frequency: 5KHz
Changing the resistance reduces the effect of the resistor in the signature

The creation of ProTrack test ranges involves selecting a voltage initially based on the component source voltage. Resistance is selected based on circuit impedance. Frequency is set depending on the presence and value of reactive components. The goal is to achieve an even ratio of horizontal versus vertical signature deflection.

Using the Huntron ProTrack Pulse Generator

The Huntron ProTrack I has a built-in pulse generator for triggering gate-fired devices such as SCRs (silicon controlled rectifiers), TRIACs, optocouplers and relays. By driving the control input of the device under test while using the ProTrack I to monitor the signature of the outputs, a dynamic test of the component can be performed. Gate-fired components can effectively be turned on and off to check their functionality.



The gate output of the pulse generator is connected to the gate of the device. The device output terminals are connected to the ProTrack I test and common leads. The pulse generator voltage is then increased until the device turns on. The example below shows the **off** and **on** state of a common SCR.

The pulse generator can apply either a DC voltage or a pulsed square wave to the gate-fired device. The amplitude is variable and can be controlled manually or using the Huntron Workstation software.



The **OFF** state of the SCR shows an open signature



The **ON** state of the SCR shows a diode signature as the device is triggered

Huntron ProTrack Scanner

The Huntron ProTrack Scanner accessory allows the testing of components using standard IC clips and cables. This combination allows for faster testing by scanning up to 128 pins.

The ProTrack Scanner consists of two 64 pin channels with IDC headers for cable connections and ZIF (zero-insertion force) sockets for testing discrete ICs. The ProTrack I and ProTrack Scanner combination can be used as a stand-alone system to make quick comparisons between two PCAs. When connected to a personal computer running Huntron Workstation software, the ProTrack I and Scanner can scan and store component signatures for later reference when testing suspect boards.



Huntron ProTrack with the ProTrack Scanner accessory

The Benefits of the ProTrack Scanner

- Connect to PCA connectors for a quick "first pass" test
- The standard IDC headers simplify connecting to external fixtures such as a bed-of-nails
- Screen ICs in the ZIF socket prior to PCA insertion

Huntron TrackerPXI

Integrate a Huntron Tracker into your PXI based test System

The Huntron TrackerPXI is designed to add component level diagnostics to your existing PXI test platform. Take advantage of ProTrack style signature analysis capabilities to help you troubleshoot printed circuit board (PCB) faults to the component level. Reduce potential damage by using power-off test prior to powering a PCB. Support existing test systems by further reducing the size of component ambiguity groups.

The Huntron TrackerPXI is controlled using the Huntron Workstation Software for test database creation and signature capture. Signatures from known good PCBs are stored in the test database and used for comparison when troubleshooting suspect PCBs. The TrackerPXI has the same range capabilities as the Huntron ProTrack so tests created using either platform are interchangeable.



Interfacing the Huntron TrackerPXI to test points can be accomplished manually using Huntron Microprobes or automatically when used with a Huntron Robotic Prober such as the Huntron Access Automated Probing Station. Connections are made using standard shrouded banana plugs or BNC connectors. The auxiliary connection breaks out additional lines such as Trigger IN, Trigger OUT, Signal ON, Line IN and Line OUT for added test control.

Huntron TrackerPXI Specifications

Electrical

Open Circuit Voltage (Vs: 24 selections of peak voltage):

200mV, 400mV, 600mV, 800mV
1V to 20V in 1V steps
including 10V (Low), 15V (Med 1), 20V (Med 2)

Source Resistance (Rs: 16 selections of resistance):

10Ω, 20Ω, 50Ω, 100Ω, 200Ω, 500Ω, 1kΩ, 2kΩ, 5kΩ, 10kΩ, 20kΩ,
50kΩ, 100kΩ, 54Ω (Low), 1.2kΩ (Med 1), 26.7kΩ (Med 2)

Maximum Current: 200 mApk (Vs/Rs; short circuit current)

Frequency (Fs: 40 selections of frequency):

20Hz to 190Hz in 10Hz steps
200Hz to 1.9kHz in 100Hz steps
2kHz to 5kHz in 1kHz steps

Channels

Number	1
Overvoltage Protection	Circuit breaker

Connections

Signal	1 BNC; 1 shrouded banana
Common	1 BNC; 1 shrouded banana
AUX	9 pin mini jack

GENERAL

Dimensions	6.3" W x 3.9" H (16cm W x 10cm H)
Platform	PXI/Compact PCI 3u slot
Warranty	1 year limited

The Benefits of the Huntron TrackerPXI

- Add Huntron Tracker power-off testing capabilities to existing PXI-based test applications
- Interface to PCB test points manually or using a Robotic Prober
- Control using the Huntron Workstation Software

Huntron Robotic Probers

Huntron offers Robotic Probers for use in automated test development. Automatic probing has been demonstrated to significantly reduce test times over manual test methods.

No expensive fixtures are required and most complex SMT devices can be accessed. Huntron Probers act as a universal fixture and, because of its fast time to test, can be used in first article test applications before the permanent fixture is built.



High resolution color camera provides a clear view of the PCA for optimal test point positioning. The camera is used for PCA alignment and teaching XY pin positions.



Laser encoding on the X and Y axes ensures precise 20 micron accuracy and 10 micron movement resolution.



Standard bed-of-nails style test probes can easily be interchanged depending on your application.



Huntron Access Automated Probing Station



Circuit boards are mounted at one of three slot levels using standard mounting accessories or custom board holders. The bottom plate can be removed for access from underneath.

Robotic Probers utilize a built-in color camera system to target component pins for testing. Component positions are referenced to alignment points selected at the beginning of the test creation. Teaching package types such as dual-inline, single-inline, quad and multi-row is made easy by targeting on-screen cross hairs on component pins or pads. Key points on the component such as the first and last pins of each row are used to quickly locate and teach the remaining pins. Utilizing optional CAD tools allows you to import CAD data to quickly create base tests including component information and XY pin locations. Using CAD data for test creation can save up to eighty percent in test development time.

Components can be scanned individually or by test sequence. The component signatures are stored for comparison for use when scanning suspect circuit boards.

The Benefits of Huntron Robotic Probers

- Interface to components down to sub 20 mils (0.020") lead spacing
- Significantly decrease test development and run times compared to manual methods
- Standard BNC connectors enable the use of external test equipment such as oscilloscopes
- Extend the testing capabilities by combining with a Huntron ProTrack Scanner for interfacing to additional common reference points, i.e. bed-of-nails, PCA connectors

Huntron Hardware Specifications

ProTrack I Model 20

Electrical

Open Circuit Voltage (Vs: 24 selections of peak voltage):

200mV, 400mV, 600mV, 800mV

1V to 20V in 1V steps

including 10V (Low), 15V (Med 1), 20V (Med 2)

Source Resistance (Rs: 16 selections of resistance):

10Ω, 20Ω, 50Ω, 100Ω, 200Ω, 500Ω, 1kΩ, 2kΩ, 5kΩ, 10kΩ, 20kΩ,

50kΩ, 100kΩ, 54Ω (Low), 1.2kΩ (Med 1), 26.7kΩ (Med 2)

Maximum Current: 200 mApc (Vs/Rs; short circuit current)

Frequency (Fs: 40 selections of frequency):

20Hz to 190Hz in 10Hz steps

200Hz to 1.9kHz in 100Hz steps

2kHz to 5kHz in 1kHz steps

Channels

Number

2

Display modes

A, B, Alt, A+B

Overvoltage Protection

Circuit breaker

Pulse Generator

Level

0 to ±10V

Width (pulse mode)

2% to 50% duty cycle

Source resistance

100Ω

Maximum current

100mA max.

Displays

CRT

monochrome, 2.8" (7cm) diagonal

LCD

full graphic, 128 x 64 pixels

Power Requirements

Line Voltage/Freq.

100VAC to 250VAC / 47Hz to 63Hz

Power

35W

GENERAL

Dimensions

11.6" W x 4.5" H x 15" D

(30cm W x 11.5cm H x 38cm D)

Weight

10 lbs. (4.5kg)

Warranty

All ProTrack products,

1 year limited

ProTrack Scanner I

Electrical

Channels

Number

2

Pins

Test

64 per channel

Common

64 per channel

Connectors

IDC

64 pins each channel

ZIF

40 pins each channel

Power Requirements

Line Voltage

100VAC to 240VAC

Frequency

47Hz to 63Hz

Power

10W

GENERAL

Dimensions

12" W x 3" H x 19.5" D

(30.5cm W x 7.6cm H x

49.5cm D)

Weight

5 lbs. 8 oz. (2.5kg)

Warranty

1 year limited

Huntron Access Prober

Maximum Board-Under-Test Size 19.4" x 14" (49.3cm x 35.6cm)

Maximum Board-Probing Area 15.3" x 12.9" (38.9cm x 32.6cm)

Maximum Allowable Component

Height on Board Under Test 2.375" (6.03cm)

Minimum Probe Speed 4 inches/second (10cm/second)

Accuracy ±0.0007874" (±20 microns)

Minimum Step Resolution

(using Huntron Workstation) 0.0003937" (10 microns)

Maximum Z Travel 2.21" (5.6cm)

Linear encoder resolution 0.0003937" (10μm)

Vision System

Color CCD 811 x 508 pixels

Light Source

Adjustable white LED array

Camera card

High resolution frame grabber

754x480 pixel max. resolution

Lens System

25mm C-mount; adjustable

Camera Adjustments

Manual focus, manual aperture

Power Requirements

Line Voltage

115VAC or 230VAC; 50/60 Hz

Power

100W

Dimensions

26.5" W x 13" H x 24.5" D

(67.3cm W x 33cm H x 62.3cm D)

Weight

63 lbs. (28.6kg)

Warranty

1 year limited

Minimum PC Specifications for Huntron Workstation Software

- PC with 1Ghz or faster processor
- Microsoft Windows 2000 or XP (XP required for CAD tools)
- 512MB RAM or higher
- 1GB available hard drive space
- 800x600 video resolution with 16bit or higher color

- CDROM or DVD drive
- Keyboard and mouse
- Available USB port (for ProTrack)
- Available PCI slot (for Prober Frame Grabber card)
- Available serial port (for Huntron Prober)

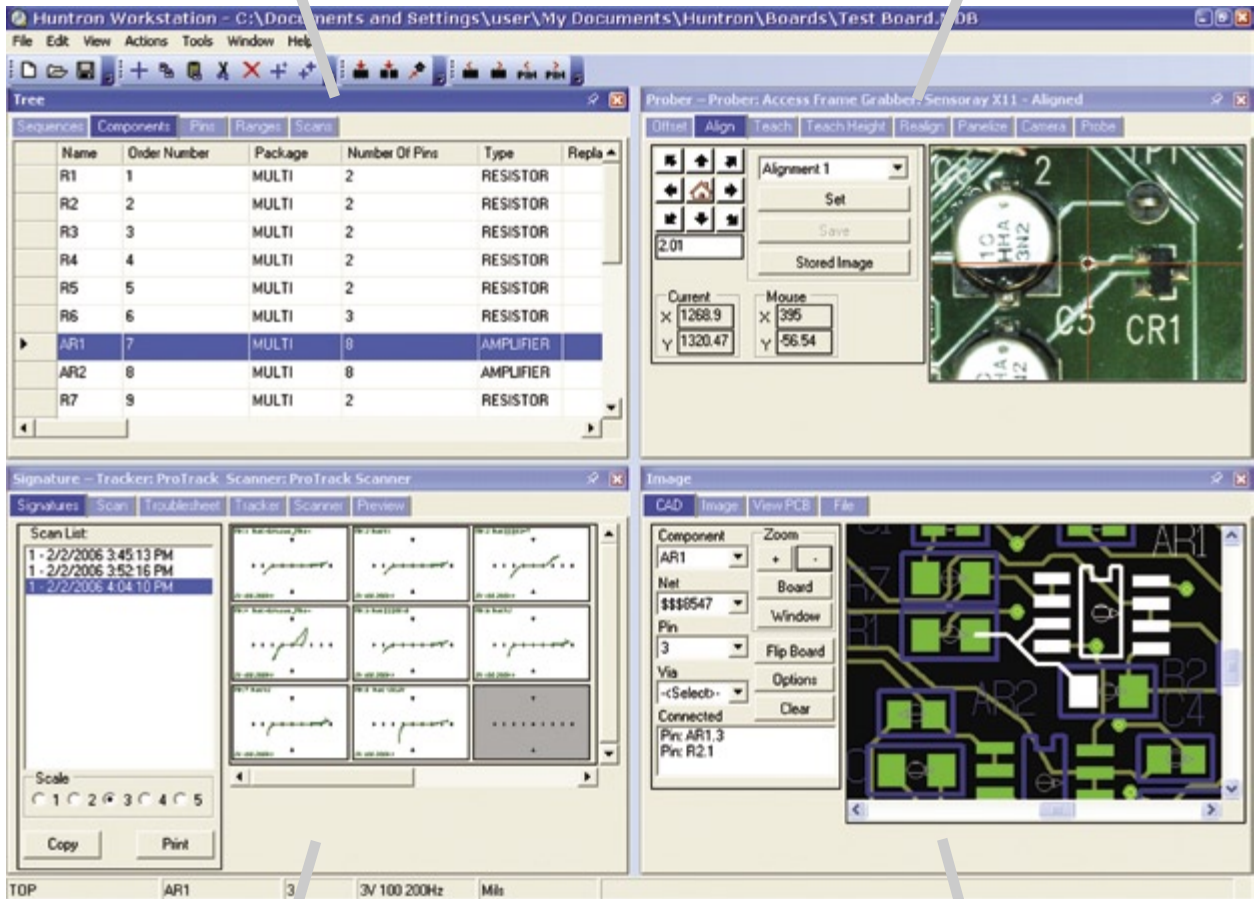
Huntron Workstation Software

The Huntron Workstation Software is designed to bring a high level of efficiency and flexibility to board test creation and troubleshooting. The multiple pane layout of Huntron Workstation allows for fast test creation, quick viewing of component signatures, control of robotic probers and CAD viewing tools that update on the fly.



Tree pane: Using a spreadsheet style format, the creation of test sequences is quick and easy. Fine tune component test parameters to the pin/range level and combine components into custom test sequences.

Prober pane: Selecting tools for robotic prober control is as easy as clicking the appropriate tab. Features include PCB alignment, test point location and automated panelization tools.



Signature pane: Configure the signature scale to display several columns of signatures at one time. Multiple signature scans can be stored and viewed simultaneously at any time.

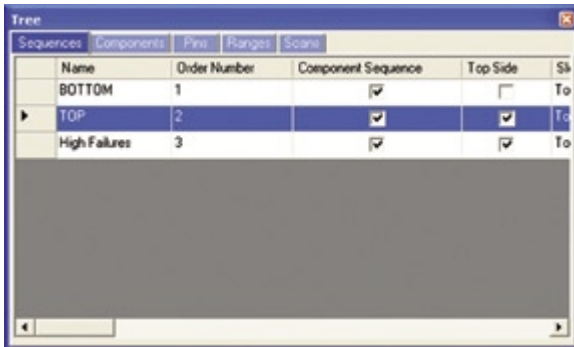
Image pane: View linked CAD data, board image and stored XY data points. Create an image of the entire PCB and use it to navigate with a Robotic Prober.

Huntron Workstation Features

- Create custom test routines for low volume manufacturing, repair and rework applications
- Support of optional utilities for test creation using PCB CAD data
- Easily create, modify and save Microsoft Access based test databases
- View, print and store test results immediately
- Interactive application panes automatically update as selections are made
- Includes an easy to use Test Only pane better suited to test execution in a production environment

Huntron Workstation Software

Test Creation using the Tree Pane



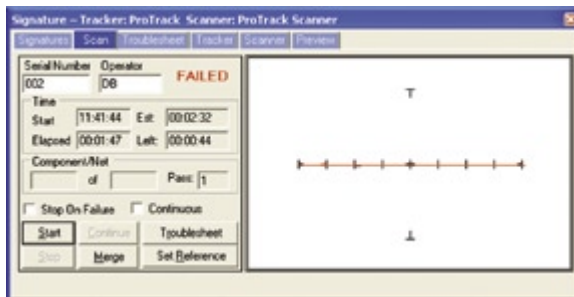
The Sequences tab of the Tree Pane is where test sequences are created, selected and edited.



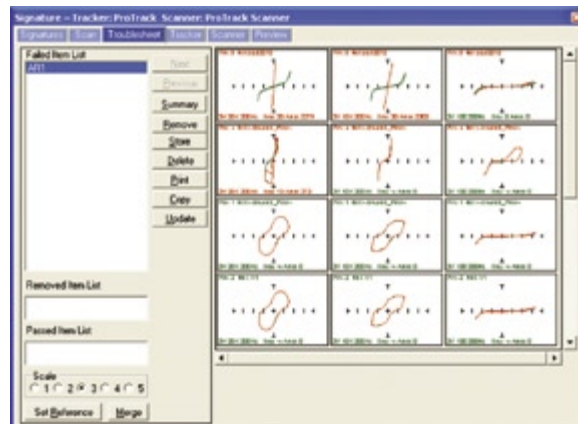
The Ranges tab of the Tree Pane is where component test ranges (voltage, resistance and frequency) are created, selected and edited.

- Create as many Test Sequences as needed based on board side, a specific set components or a user-defined test set
- Quickly edit Sequence, Component, Pin and Range parameters in a familiar spreadsheet style layout
- Configure important Component parameters such as type and pin spacing
- Fine tune Component Pin settings including Pulse Generator control, channel selection and enable or disable scanning of the pin
- Manage all Scans performed and configure which scans are used for signature comparison
- Application panes will automatically update to reflect selections made in the Tree pane

Hardware Control and Signature Storage using the Signature Pane



The Scan tab of the Signature Pane displays signatures during scanning and the test results.

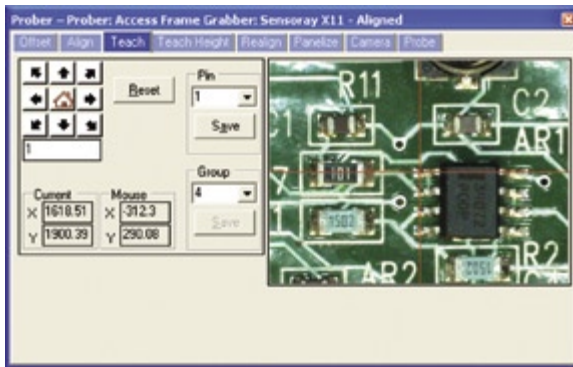


The Troubleshoot tab of the Signature Pane displays the signatures of a failed test sequence.

- View and save multiple component signature scans to help eliminate false failures caused by differences in component manufacturers
- Observe the test signatures during scanning along with start time, elapsed time, estimated finish time and a Component/Net counter
- PASS or FAILED test results are clearly displayed at the conclusion of a test sequence scan
- View, print and edit the Troubleshoot signatures or add signatures as stored test reference
- Control the ProTrack or TrackerPXI hardware in realtime and Preview signatures when selecting ranges

Huntron Workstation Software

Robotic Prober Control using the Prober Pane



The Teach tab of the Prober Pane is used when teaching component XY locations to be scanned.



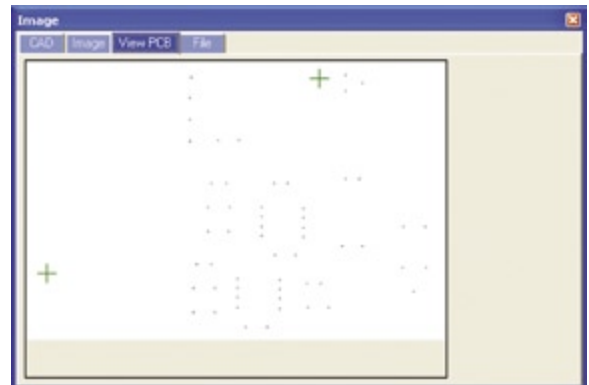
The Panelize tab of the Prober Pane allows for setting multiple panels based on the location of the first panel. Component XY information is carried over to the new panels.

- Control Prober functions such as Camera Offset, Alignment and Teach from one pane
- Select Prober movement units in inches, mils, millimeters or microns
- Teach mode allows for easy selection, editing and correction of XY test locations
- Component XY pin positions are set by teaching groups of pins based on their row arrangement
- Easily reassign alignment points using the functions in the Realign tab
- Create multiple panel tests by creating a test for one panel and duplicating the test with an offset distance from the original

Image Control using the Image Pane



The Image tab of the Image Pane displays a mosaic image captured by the Prober's built-in color camera.



The View PCB tab of the Image Pane shows the alignment points and all points that could be tested for the selected test sequence.

- View PCB CAD layout images including layer and board side selection
- Select component pins or net points to display net name and connected component net points
- Use the Image tab features to create a mosaic image of the PCB and clicking a point in the image will drive the Prober to that area
- View test point information in the View PCB tab and save the image for use in other programs
- View picture files in many formats using features in the File tab

Customer Services

Huntron staff and representatives are available throughout the pre-sale and post-sale processes of your test equipment purchase. We are ready to assist in the selection process including cost justification, the design process including test program generation, and the installation process including operator training and fine tuning of test procedures.

Service and Support

Huntron products are supported worldwide through our network of sales and service facilities.

Whether it is sales questions, hardware repair or technical support, we are ready to get you up and running with a minimum of delay.

Training

Send your technicians to Huntron's in-house training facility near Seattle, WA, for an intensive three day program. Our lab is equipped with a full complement of Huntron ProTrack products allowing each student the maximum hands-on opportunity. Attendees are required to bring typical circuit boards they are responsible for testing. This allows them to develop test routines and come away with solutions they can apply immediately.



Test Program Generation

Huntron offers custom test programming services to develop base line programs for your printed circuit assemblies. Our Technical Support personnel have many years of troubleshooting experience in real world applications and will provide a good starting point for your test program. All you will need to do is the final adjustments to customize the procedure, thus significantly reducing your test development times.

Contact our Technical Support group at 1-800-426-9265 for more details regarding our programming and training services or visit our web site at www.huntron.com.

Huntron products are available worldwide through our network of Representatives. For the name of the Sales Office near you, call 1-800-426-9265 or visit our web site at www.huntron.com.

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31-0087 Rev. D 5/2006

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