Glossary

This is a general glossary for all Probe Card Analyzer Workstations. It includes some probe card terms, some general electronic symbols and terms, and terms used throughout this manual.

Abbreviation	Definition
AC (ac)	Alternating Current
ADC	Analog-to-Digital Converter
DAC	Digital-to-Analog Converter
DC (dc)	Direct Current
EPROM	Erasable Programmable Read Only Memory
ESC	Escape Key
FT	First touch
HPCA	Hinge Probe Card Adapter
I/O	Input/Output: Data input or output connections.
ID	Identification: Example = User ID.
KB or **Kbyte**	Kilobyte (1024)
LCL	Lower Control Limit (SPC)
mA	Milliampere
Mb or **Mbit**	Megabit
MB or **Mbyte**	Megabyte
MUX or Mux	Multiplexer
N/A	Not Applicable or Not Available
NIST	National Institute of Science and Technology (US standards authority)
OD	Overdrive
OR	Over Range
Pos	Position = measurement: Positive = voltage (+)
PROM	Programmable Read-Only Memory
PSI	Pounds per Square Inch
RAM	Random Access Memory
ROM	Read-Only Memory
SPC	Statistical Process Control
UCL	Upper Control Limit (SPC)

Abbreviation	Definition
V	Voltage
VAC or **Vac**	Voltage Alternating Current
VDC or **Vdc**	Voltage Direct Current

Symbol	Definition
Ω	Ohms: unit of resistance
nA	Nanoampere: unit of current
µA	Microampere: unit of current
µF	Microfarad: unit of capacitance
µm or **µ**	Micrometer = micron (25.4 microns = 1 mil)
¤	Indicates a required space when inputting a command.

Term	Definition
55100	Unclamped inductive load tester. Performs ruggedness testing of power MOSFETs and IGBTs as well as several other tests.
Accuracy	The ability to produce measurements that are equal to the true value.
AIM	Alternating input module: Output supplies DC power to control power supply.
Alignment	A probe card test that measures the exact XY coordinates of each probe tip and compares each probe tip's position to the data stored in the Test Program file. Generally measured by the resulting scrub mark left on a pad.
Alignment Error Methods	Probilt measures every probe's positional alignment. All alignment tests capture the probe at First Touch position and final overdrive position. A combination of the following error methods can be specified to analyze a probe card's alignment. XY Error Method, Radius Error Method, Pad Overlay Error Method, Scrub Area Error Method, Scrub Length Error Method, and Scrub Angle Error Method.
ASCII	American Standard Code for Information Interchange: a standard code that uses numbers to represent characters such as letters, numerals, symbols, and control instructions.
Average	See Mean
Backplane	A printed circuit board with slots into which other cards are plugged. A backplane is typically just a connector and does not usually have many active components on it. This contrasts with a motherboard, which is the main board of a computer, usually containing the circuitry for the central processing unit, keyboard, and monitor and often having slots for accepting additional circuitry.
Ballast	An electrical device for starting and regulating fluorescent and discharge lamps.

Term	Definition
Bar graph	A graphic representation of data; bar length represents the value of the data.
Best Fit Line	The pass/fail criteria is based on where the probes are located along a two dimensional line. This method is used when probes can be individually adjusted (cantilever)
Best Fit Plane	The pass/fail criteria is based on where the probes are located along a 3 dimensional plane. This method is used when probes must be adjusted by moving an entire probe head or quadrant (P4, Cobra, Formfactor). The plane includes up, down, front, and back.
BestfitLine	See Planar Methods
BestfitPlane	See Planar Methods
Binary	A number system of base two. Digital logic is typically binary because it can only have two states.
Bit	The fundamental unit of digital information. A contraction derived from Binary digit. Each bit can be either a 1 or a 0.
Board Insert	The board insert is the mounting ring that holds the space transformer to the printed circuit board. The board insert also forms the mounting surface for the Cobra head
BombSighting	A method of determining the exact XY coordinates of each probe tip on a card using either a correctly aligned probe card or a die that the probe card is designed to test.
Bond Pad	See Pad
Boot	To start or restart a computer system by loading instructions from a storage device into memory.
Bulk testing	Testing of all probes for electrical contact.
Bussed Probes	Two or more probes electrically connected to the same edge. (This does not include connections made through components.) Condition where multiple probes are connected to a single edge. Bussed
Bussed Probes - Planar Methods	See Planar Methods - Bussed Probes
Byte	A unit of information that consists of 8 bits. One byte can have 256 possible values, and can hold one letter or number in ASCII code.
Cable Port	A standard Multiplexer has four Multiplexer (MUX) boards installed that connect the probe card's probes to the measurement circuits one port at a time. Each Multiplexer board has four Cable Ports, and each port has 32 Sense pins and 32 forcing (Drive) function pins. Cable ports are labeled 1A through 1D for Multiplexer #1 and 4A through 4D for Multiplexer #4.
Calibration plate	A planarity calibration tool that is specific to each motherboard.
Capacitance	The property of an electrical nonconductor that permits the storage of energy.

Term	Definition
Card (file or record)	This file defines the physical layout and test parameters of a probe card. It defines the number of probes on the card, their XY coordinates, what each probe is (name), and where it connects (trace) to the card. It also defines which probes are Edge Sensors, and which probes have what type of component attached to them. In addition, it allows test specifications for one or more probes to be overridden, allowing special test considerations for one or more individual probes. A Card file, which is part of a Test Program file, is usually used to test one device type, but there may be several identical probe cards that have different serial number and vendor pair identification that are differentiated on the Test Card tab of the Run Test dialog box.
Card Edge	See Edge
Cartesian Coordinate System	Two coordinates that locate a point on a plane and measures its distance from either of two intersecting straight-line axes along a line parallel to the other axis. This is the same coordinate system as the pad positions, so it is easy to coordinate the actual direction of the alignment error to the die.
Centroid	Center of mass, center of gravity, and center of brightness - The "brightness centroid" of an image is the centroid (center of gravity) of the image where each pixel is weighted by brightness.
Channel	A conductive path that connects from a probe card edge through the motherboard to Probilt's Mux. system. One of many electrical (Nerve) endings on Probilt. Matches up with the Motherboard. Numbered 0 through the highest system channel number.
Chuck	See Measurement Chuck
Cleaning Patterns	Available patterns are: Orbital Vertical Touchdown Unidirectional Bi-directional Pattern selection is specified by the Test Program file and cannot be changed without editing the file.
Closed loop system	A control system with a feedback loop that is active.
Cobra Offset	Specifies the distance added to the joystick offset, align move offset, and maximum pin height moves if the probe card has the Cobra offset feature set. This offset is from the First Touch position.
Cobra Probes	The contact that touches the wafer with one end and the space transformer with the other

Term	Definition
Contact	Refers to the probe tip's point that touches the wafer pad or Measurement Chuck during testing.
Contact Force	The force (measured in grams) exerted by the probe tip (measured in mils or microns) on the contact area. Tip force is primarily controlled by prober overdrive. Contact resistance will continue to decrease as pressure increases, then level off to level off to the nominal contact resistance of the two metals,
Contact Resistance	A probe card test that determines the resistance of a probe tip when is in contact with a conductive material. Path resistance of the probe tip
Coordinate Systems	Probilt allows the user to select from the following coordinate systems: Cartesian Coordinate System, Pad Relative Coordinate System, or Scrub Relative Coordinate System.
CPLD	Complex programmable logic device
Cres	Contact resistance
Data	An ordered collection of information. Used to refer to information processed by a computer or written and read from and to a disk.
Database	Any file or file system that is used to store persistent data.
Deck plate	Base assembly containing the mux cards. It is used to interface the backplane to the motherboard. That plate which is planarized when using the Card Rails or the manual HPCA. The Deckplate is built into the elevator HPCA and Expandable HPCA.
DIP switch	n: (computer science) one of a set of small on-off switches mounted in computer hardware; used in place of jumpers to configure the machine for a user [syn: DIP switch, dual inline package switch]
DnOT	Down Overtravel - Green LED when the elevator in not resting on the HPCA support balls. Goes out when the HPCA is resting on the HPCA support balls.
DUT	Device Under Test
Edge	Edge refers to the probe card's connector that connects the probe card to either an adapter board or a motherboard. Connections made to a probe card are either through a card edge connector or through a special plug. Usually a raw probe card has one edge name for each probe. If probes are bussed, one edge can connect to multiple probes.
Edge Sensor	Some probe cards have a special type of probe that indicates when the probes are over the die. Probilt supports two types of Edge Sensors: Two-wire, Non-Isolated, and Three-Wire, Isolated.
Elevator Push Buttons interlock	Prevents operation of the elevator unless both buttons are pressed so that the operator cannot have a hand in the robotics-restricted area when the elevator is moving.
Emergency Machine Off (EMO)	Switched remove power to the workstation. These interlocks are both process and safety types. Terminates all AC power on the workstation

Term	Definition
Expandable Mux System	The Expandable Mux system provides more probe card channels. It is designed so the Expandable Mux boards plug into the HPCA, providing easier access to the Mux boards. A standard Expandable Mux system is expandable to 12,000 channels.
External Capacitance	Capacitance that is external to the circuit in question.
External Resistance	Resistance that is external to the circuit in question.
First Touch Methods	First Touch is the process of moving the stage toward the probes by predefined amounts until a probe has made contact with the Chuck. Probilt allows two First Touch methods: • **First Touch:** method uses the first probe tip that touches the Measurement Chuck as the First Touch (contact) distance. • **Median:** method uses the probe that is determined by sorting from highest to lowest and then eliminating a high and a low probe until the mid-point probe (median) is found. If there are an odd number of tips, the one selected is one-half of the count rounded off to the lowest probe. (Example: If 50 or 51 tips are sorted from high to low, tip 25 is selected as the median in both cases.).
Flip	Flip Interlock - Green LED when the HPCA Pylon Vacuum is released and in either Normal or Reverse position.
Floating Probe	Probe physically exists, but is not electrically connected to an edge.
Forcer	The linear motor concept is simple: take a conventional rotary servo motor and unwrap it. What was once the stator is now a forcer and the rotor is now a magnetic rail.
Ganged Edges	Condition where multiple edges are connected to a single probe.
Ganged Probe	One probe electrically connected to two or more edges. (This does not include connections made through components.) Ganged
Gerber file	This is the industry standard photo plotting language, and is a vector based format used by GerbTools, ViewMate and CamTastic as a simple way of transferring printed circuit board information to a wide variety of devices
Gram force	Gram force of a probe is a function of the beam length, tip length, etch rate and tip diameter. The largest contributor to the gram force is the beam length. The longer the beam is, the less force a probe will have, the inverse also being true.
Gram Force Pin	A pin that is connected to a strain gauge. It is used to measure the force excreted by a probe tip when overdriven to the proper test height. Used to measure the strength of individual probes
Ground Probe	Device connected to Probilt. Used by Probilt Operator to touch and identify channel, edge, and probe names.
Hall Effect	Generation of an electric potential perpendicular to both an electric current flowing along a conducting material and an external magnetic field applied at right angles to the current upon application of the magnetic field.

Term	Definition
HAM	Harmonic attenuator module: Output feeds all power supplies except PC power supply.
HDD	Hard disc drive
Hinged Probe Card Adapter	An adapter that holds a motherboard and its associated probe cards. The complete assembly can be inverted to allow access to both sides of a probe card..
Hot Chuck	For testing at temperatures up to 125 degrees.
HPCA	Hinge Probe Card Adapter
HPCA Mux System	There are two types of HPCA Mux Systems: Mini-Mux or HPCA Mux and Expandable Mux. Both Mux systems can use the elevator HPCA but the Expandable Mux system must use the elevator HPCA.
HPCA Normal/Reverse interlock	Prevents the HPCA from raising or lowering the probe card until the HPCA is in one of the two working positions. In addition, the stage (robot) motors are disabled unless the HPCA is down, in the Normal position and the pylon vacuum is applied (Latched).
IGBT	Insulated Gate Bipolar Transistor
Initialization	The process of translating the probe card's coordinates to Probilt coordinates. Done prior to testing to determine lowest probe location, array orientation, and verify isolation pin height.
Integrity Test	The Integrity test checks the operation of Probilt on power up. If no problems are found Probilt automatically continues after the integrity test has completed. In either case, Probilt stops if the integrity test fails to allow the user to decide what should be done.
ISA	Industry Standard Architecture (PC slot type) A bus standard for IBM compatibles that extends the XT bus architecture to 16 bits. It also allows for bus mastering although only the first 16 MB of main memory is available for direct access. In reference to the XT bus architecture, it is sometimes referred to as "AT bus architecture".
Isolation pin	The pin that is used to individually test probes. Probilt allows for two types of Isolation Pins: A **Flush Mounted** Isolation Pin **is** isolated from the chuck. A **Raised** Isolation Pin **is not** isolated from the chuck. It can be used to test and retest planarity, contact resistance, wire check, and gram force. Primary purpose is to isolate bussed probes for testing.
Joystick Offset	Specifies the distance the stage drops when moving the stage in the XY over the lower camera if the card is not a Cobra card. This offset is from the first touch position.
Keep Limits Set	Keep Limits Set prevents the X, Y, and Theta axes from moving if the stage is above the following height: First Touch Position + an offset.

Term	Definition
Kelvin test	Measurement of contact resistance without measuring the lead resistance, by using a 4-wire bridge. This method uses a pair of wires to supply constant current to the device under test (DUT). A separate pair of wires measures the voltage drop across the DUT. This method allows the system to void the resistance of the measuring leads.
Leakage	A probe card test that determines the leakage between a probe tip and any other probe tip or probe card component.
Leakage current	Since any dielectric, even air, is not a perfect insulator, a small current known as LEAKAGE CURRENT flows between the two wires. In effect, the insulator acts as a resistor, permitting current to pass between the two wires.
Leakage test	Checking for leakage current between two conductors.
Light curtain interlock	Stops the downward operation of the elevator if the light beam is interrupted. The interlock must be reset by releasing the elevator push buttons and repressing them to restart the elevator motor.
Lower Camera Window	Allows the lower camera to view probe tips from the bottom.
Lower Die	The bottom piece of Cobra head assembly, probes stick out of the lower die. The lower die holds the probes in alignment with the wafer.
Major Axis - Ellipse	The Major axis is the longest distance between two edges of the captured tip. The Major axis is not defined according to the X or Y axis. It is only based on the longest distance between tip edges of a continuous tip capture blob.
Mapping plate	Glass plate with a precision grid of dots, which is used for alignment of XY movement of the stages.
Maximum Overdrive	Sets the maximum amount of overdrive that can be set in a card file.
Mean	The average value arrived at by adding all the numbers and then dividing by the number of numbers added.
Measurement Chuck	That flat, conductive surface where probe tips are touched down for First Touch, Contact Resistance, and Planarity measurements.
Median	Median is the probe that is determined by sorting from highest to lowest and then eliminating a high and a low probe until the mid-point probe (median) is found. If there are an odd number of tips, the one selected is one-half of the count minus one. (Example: If there are 50 or 51 sorted tip values, tip value 25 is selected as the median.)
Megabyte	Approximately one million bytes or 1,048,576 bytes.
Microamp	One-millionth of an ampere.
Microinch	One-millionth of an inch.
Micron	One-millionth of a meter. (25.4 microns = 1 mil)
Microscope safe position interlock	Protects the microscope from being bumped by the elevator HPCA. It must be activated before the elevator can be moved in the up direction.

Term	Definition
Microsecond	One-millionth of a second.
Mil	One-thousandth of an inch. (1 mil = 25.4 microns)
Millisecond	One-thousandth of a second.
Minor Axis - Ellipse	The Minor axis is the longest distance between two edges of the capture probe tip that is perpendicular to the Major axis.
MOSFET	Metal Oxide Semiconductor Field-Effect Transistor
Motherboard	The name give by ITC to any board or adapter that connects a probe card to Probilt. It can be for either the Card Rails, HPCA-Mux, or Expandable-Mux Systems.
Motherboard Offset	If a motherboard is installed in either the card rails or in the HPCA Mux System, the probe card's zero reference point may be higher or lower than the workstation's zero reference point. For this reason, a Motherboard offset value is provided that allows the user to inform Probilt of this value so probe depth can be accurately specified and measured.
MSR	Microscope Safe Right - Green when the microscope has been moved fully the right so that the lift mechanism can't hit it. Yellow when not fully right
Multiple Probe Capture	Probilt analyzes all probes captured with one camera image. This reduces the number of touchdowns performed on the card. If this feature is not used, Probilt moves each probe to the center of the camera and analyzes only that probe.
Multiplexer	An electronic selector that can select one of a number of inputs for outputting. Three Multiplexer types can be installed: Standard, HPCA-Mux, and Expandable-Mux.
MUX	Multiplexer
Mux Channel	A unique identifier that specifies a Mux address. On a standard Mux system it is formed by combining the cable port and channel. The HPCA and Expandable Mux systems do not have cable ports; therefore, the channel is the identifier.
Network card	<hardware, networking> (NIC or "network interface card") An adapter circuit board installed in a computer to provide a physical connection to a network.
Noise	Meaningless electrical signals that can interfere with the data signals.
Nonvolatile RAM	Random Access Memory that has its own internal or external battery backup so that data is retained when system power is removed.
Optical Sensor	An optical sensor detects the intensity or brightness of light, or the intensity of red, green, and blue for color systems.

Term	Definition
Orthogonality	Perpendicularity
Overdrive	The process of moving the stage up against the probes by a predefined amount after First Touch is found.
Overdriven Leakage	Probe tips are overdriven on a non-conductive pad. The overdrive amount is equal to the overdrive set for the Contact Resistance Test for the probe card under test.
Pad	Designated area on a die for the purpose of bonding a connecting wire to a package lead. Pad represents the actual name given to the pad that the probe card's probe touches during wafer testing. Usually, each pad connects to a probe and each probe connects to one trace.
Pad Name	The name used to identify the pad on a die.
Pad Overlay Error Method	This Alignment error method constructs a bounding box around the center position for first and last contact and verifies that it does not intersect the bounding box around the invalid region. It is assumed that the tip diameter is the same at first contact as at final overdrive position. **NOTE:** The area can be specified as a rectangle or as a radius. Pad Capture@ Final Overdrive Capture @ First Touch

Term	Definition
Pad Relative Coordinate System	When Probilt expresses the alignment error using the Pad Relative system, it always shows the probe angular placement error in the X and the scrub or probe length placement error in the Y. This makes it easy to compare data from all probes to a common standard. 180 Degree Pad Pad Rel Y Pad Rel X Pad Rel X + Angle Pad Rel Y 270 Degree Pad Zero Degree Polar Coord Pad Rel Y 90 Degree Pad Pad Rel X Pad Rel X Cartesian X Pad Rel Y Zero Degree Pad Cartesian Y
PB1200	A low cost bench top system for fast and easy probe repair.
PB1500	Probe card analyzer that supports up to 1024 Mux channels in 64 channel increments, but with fewer functions than the PB3500.
PB3500	Probe card analyzer that supports up to 3,072 Mux channels in 64 channel increments.
PB6500	Probe card analyzer that supports up to 12,032 Mux channels in 64 channel increments.
PB6800	Probe card analyzer that supports up to 12,032 Mux channels in 64 channel increments and tests probe arrays up to 300mm in diameter.

Term	Definition
PCI bus	A standard for connecting peripherals to a personal computer, designed by Intel and released around Autumn 1993. PCI is supported by most major manufacturers including Apple Computer. It is technically far superior to VESA's local bus. It runs at 20 - 33 MHz and carries 32 bits at a time over a 124-pin connector or 64 bits over a 188-pin connector. An address is sent in one cycle followed by one word of data (or several in burst mode).PCI is used in systems based on Pentium, Pentium Pro, AMD 5x86, AMD K5 and AMD K6 processors, in some DEC Alpha and PowerPC systems, and probably Cyrix 586 and Cyrix 686 systems. However, it is processor independent and so can work with other processor architectures as well.
PGA	Programmable gain amplifier
Planar Line	A line calculated by Probilt that is at the mid point of the Planar window. A **BestfitLine** is a planar line that is calculated so that the most probe tips are within the planar window.
Planar Line	A line through the center of the Planar Window.
Planar Methods	Probilt allows for several different planar methods when calculating the planar line: • **e_BestfitLine:** Moves the planar window so that the most probes are within spec. Planarity results are relative to a line (Planar Line) through the center of the Planar Window. Use to repair the fewest probes and when probes can be individually adjusted (cantilever). • **e_BestfitPlane:** Calculates a three-dimensional plane that corresponds to the tilt of the card. Planarity results are relative to the point where each probe intersects with the plane. Use to view the co planarity of the tips and when probes must be adjusted by moving an entire quadrant (P4, Cobra, Form Factor). The plane includes up, down, front, and back. • **e_TiltCorrectionPlane:** Calculates the point where the center of the card intersects the 3-dimentional plane calculated by e_BestfitPlane. This point is then used as the z height reference from which all tip heights are measured. Use to view planarity so results can be used for tilt correction and it is used for cards where Tilt Correction adjusts planarity. • **e_FirstContact: :** Planarity results are relative to the lowest probe. Planar Window starts from first contact. All results are positive with first contact at zero. Use to view planarity relative to a fixed point. • **e_LastContact:** Planarity results are relative to the highest probe. Planar Window starts from last contact. All results are negative with last contact at zero. Use to view planarity relative to a fixed point. • **e_MidPoint:** Planar results are relative to one-half of the value of First Contact and the Last Contact. Use to view planarity results relative to the mid-point range of the results. • **e_Mean:** Planar results are relative to the average planarity values. Use to view planar results relative to the location where most probes are found. • **e_Median:** selects the probe that is determined by sorting from highest to lowest and then eliminating a high and a low probe until the mid-point probe (median) is found. Use to view planar results evenly distributed above and below the planar line.

Term	Definition
Planar Methods - Bussed Probes	Two methods are provided for testing bussed probes: • **Bulk planarity**: tests the bussed probes on the chuck. Therefore, when one of the bussed pins touches, they will all be seen. When this method is used, the results for bussed probes are considered non applicable. • **Individually:** each bussed probe's planarity is measured using the currently selected Isolation pin. If alignment has been run then the alignment data is used when moving a probe to the Isolation pin.
Planar Window	This window is a value that is plus and minus a user defined amount from the Planar Line. The specification for the Planar Window is dependent on several factors: • the practical limit of the user to adjust the probes, • the Overdrive (OD) which is used in the actual wafer probe, • the reference for OD at wafer probe and the scrub length (L) versus overdrive.
Planarity	A state of being level and parallel to some reference. A probe card test that determines the height of all probe tips. The vertical range between all probe tips and a predetermined horizontal reference plane. Planarity test determines the best planar window based on the Planar Method specified in the card's test program file. The Planarity test is performed to make sure that all probes reside on an acceptable plane in relationship to each other. A probe card that is out of planarity may trigger other tests to fail by the probe being too low or too high. The relationship of probes in relation to each other in the Z axis, from first contact to the overdrive specification.
Planarity Step Size	Sets the distance the stage is moved during every step of the planarity test and it is specified on the Travel Offsets tab in the System Preferences dialog box.
Planarity test	Measures the depth of each probe and determines the best planar window based on the Planar Method specified in the card's Test Program File. Planarity test results can be aversely affected by probe tip conditions. If the probe tip is not clean of oxidation and any other foreign material, the planarity of the tip may be inaccurate.
Planarization	A process of making items level and parallel to some reference.
PMU	Precision Measurement Unit
Pogo pin	Spring loaded connector pin.
Port	That portion of a computer that is used to transmit or receive data.
Power off delay interlock	Allows time for the stage axis (robot) to go to their home position before dc power is removed from the workstation in normal operation,.
Power on key switch interlock	Insures that the workstation cannot be operated by unauthorized personnel.
Primary Edge	That edge that is assigned to the probe in the Card Probes area of the General Information in the card's Test Program file.

Term	Definition
Probe	A spring-type contact that actually makes the electrical connection between the device pads and the test equipment during wafer probing. Probes are installed on the probe card in a pattern that match the pads deposited on the device.
Probe bend angle	Expressed in degrees, and is the inside angle of the probe after bending. Too wide an angle will cause the probe tip to skid off the bond pad without plowing through the oxide and making good contact, too small an angle can cause the probe tip to punch through the bond pad.
Probe Card	This is the physical probe card that is installed on the Probilt for analyzing. Each probe card **must** have a Test Program definition file created and input into the database before the probe card can be analyzed. A probe card is usually used to test one device type, but there may be several identical probe cards that have different serial number/vendor pair identification that are differentiated in the Run Test dialog box.
Probe Card ID	After a probe card has a specific number of probes installed and connected in a specific method or has components added that allow the card to test a specific device type, such as a 7400, the card is given an ID that identifies that particular card type.
Probe Card Style	A probe card style is the template of the basic raw printed wiring board before any probes or modifications are performed. (See Style.)
Probe Port	A probe port refers to the connector identification to which the cable from the Multiplexer port connects on either a probe card adapter or motherboard. This port is only defined in the Style data file and may be temporarily defined on the Ports tab of the Run Test dialog box for a Standard Mux System.
Probe Technology	Probe technology is the term used to describe the type of probe being used along with the technology which it supports. (i.e. cobra, cantilever, resilient contact, P4 are several examples.).
Probe Tip	Identifies the part of a probe card that touches the wafer.
Probe Tip Depth	The distance of the probe tip's planar line below the reference plane of the probe card. The reference plane of a probe card is usually the bottom of the card. CARD RAILS PROBE CARD PROBE DEPTH PROBE TIPS

Term	Definition
Probe Tip Diameter	Tip diameter should be based on a new probe tip plus or minus a tolerance that allows for tip wear. (The tip becomes larger as it is worn during wafer testing and probe card repair.) Probilt is capable of measuring each probe tip's diameter, using one of three methods: • **Rectangle:** a rectangle is drawn around the blob in the systems coordinates. The program calculates the X and Y dimensions of that rectangle. The diameter is reported as an X and Y value. • **Ellipse:** assumes that the probe tip is shaped like an ellipse. A **major** and **minor** axis is reported. • **Radius:** is the longest distance from the probe tip's center to the probe tip's edge. With this method, both the X and Y-axis are the same size.
Probe Tip Exercising	Simulates wafer touchdowns; the user can specify the overdrive and the number of cycles.
Probe Tip Sanding	Cleaning the probe tips on a Clean pad. The user can specify the overdrive, the number of cycles, and the cleaning method.
Probe Tracker	Automated microscope integrated with the software.
Profile	A security profile is a name to which a set of permission settings is attached. Profiles allow many users to have the same access to the workstation. In addition, profiles allow the access of a group of users to be edited as a group instead of having to edit each individual user if they are attached to the same profile. Probilt allows an unlimited number of profiles.
Radius Error Method	This Alignment error method works like the XY method except the radius from the specified point to the probe is calculated instead of the X and Y components. The following equation is used: $Error_x = (Probe\ Center)_x - (Pad\ Center)_x$ $Error_y = (Probe\ Center)_y - (Pad\ Center)_y$ $Error_{radius} = ((Error_x)^2 + (Error_y)^2)^{½}$
Record	The data file for a specific card or test data for a specific card and specific test contained within Probilt's database.

Term	Definition
Repeatability	The ability to obtain small variations when multiple measurements are taken on the same part under precisely the same conditions over a short period of time.
RTD	Resistance temperature device/detector
Safe XY Limit	Safe XY Limit sets a protective barrier to prevent the probe tips from making accidental contact with either the Isolation or Gram Force Pin when the joystick is used to move the tip in XY during card initialization. Safe XY Limit assumes the following: • The center of the probe card is the center of the machine. • One-eight inch is added to probe card size to keep it away from the tips. • Either the card's die size or size of the card's array based on its coordinates is used, depending on which one is bigger. **NOTE:** Probilt uses the bigger of die size or array size when determining how big an area to use for the SafeXY area. If there appears to be a problem with SafeXY because the array is not near the Isolation or Gram Force pin, make sure that the die size is correct in the card data file.
Sand Pad	Any conductive or non-conductive material that meets Probilt specifications for tip cleaning.
Sanding Pad	Used to clean probe tips by sanding at user specified cycles.
Save Incoming	The results from a probe card tests that are performed before the probe card is repaired are automatically stored.
Save Outgoing	The results from a probe card tests that are performed after the probe card is repaired are automatically stored.
Scrub	The mark a probe tip makes on a die's pad when the tip is overdriven to make contact. It is also a test method that determines the tip is properly aligned for testing a die without damaging the die's substrate. To insure a good electrical contact during probing, it is necessary for the probe action to scrub through any surface oxidation to reach the base material, reduce contact resistance, and ensure reliable measurements.
Scrub Angle	The probe tip's angle of attach across a pad from First Touch to the overdrive position.
Scrub Angle Error Method	Probilt calculates the scrub angle relative to X-Y of the probe array. **NOTE:** +Y is in direction of the scrub; X is perpendicular to Y. **NOTE:** Scrub Relative angle is always 90 degrees.
Scrub Area	The area of the pad disturbed by the probe. (Probe Diameter x Scrub Length + Probe Radius)

Term	Definition
Scrub Area Error Method	Scrub area is the area affected by the scrub. A couple assumptions are made when calculating scrub area: 1. Tip diameter is the same for first and last contact. 2. Scrub will be a straight line from the first to the last contact position. Scrub area can be calculated by calculating the area of the tip diameter and a box width of tip radius X distance from the first to last contact. The following equation is used: Tip Diameter Area = π(Tip Radius)^2 Movement$_x$ = (Last Contact Center)$_x$ - (First Contact Center)$_x$ Movement$_y$ = (Last Contact Center)$_y$ - (First Contact Center)$_y$ Scrub Area = Tip Diameter Area + $\sqrt{(Movement X)^2 + (Movement Y)^2} * TipDiameter$ Last Contact First Contact
Scrub Length	The distance the probe's tip moves in the horizontal plane, after initial contact, due to overdrive deflection and bending. PROBE OVERDRIVE (OD) SCRUB LENGTH L
Scrub Length Error Method	Scrub length specifies the distance between the initial and final contact positions. It is assumed that the first touch and final overdrive tip diameter is the same. Two methods are available: • **Scrub Length** is the length of the scrub line for probe tip's starting center position to the tip's end center position. • **Full Scrub Length** is the length of the scrub line, which is the same as Scrub Length plus two times the probe tip's radius. The following equation is used: Movement$_x$ = ABS((Last Contact Center)$_x$ - (First Contact Center)$_x$) + (Tip Diameter)$_x$ Movement$_y$ = ABS((Last Contact Center)$_y$ - (First Contact Center)$_y$) + (Tip Diameter)$_Y$ Scrub Length = $\sqrt{(Movement X)^2 + (Movement Y)^2} + TipDiameter$

Term	Definition
Scrub Relative Coordinate System	This coordinate system looks at the error relative to the actual scrub angle and eliminates any consideration of probe angle (design) with respect to the pad. **NOTE:** +Y is in direction of the scrub; X is perpendicular to Y. Scrub Relative angle is always 90 degr
Secondary Edge	Any edge that is found to connect to a Primary Edge. A Secondary Edge can be an edge that is ganged to a Primary Edge, an edge that is incorrectly connected to the Primary Edge, or an edge that connects to the Primary Edge through a component.
Space Transformer	The space transformer is mounted in the printed circuit board. It holds the probe card wires in location. A space transformer is a major component of a probe card. It provides pitch reduction, high routing density and localized mid-frequency decoupling.
Spin Edit	A spin edit control is a small edit field with an associated pair of arrow buttons (up arrow and down arrow). The edit field contains a numeric value that can be directly edited or incremented/decremented by clicking on the up or down arrows.
Stage motor stop switch	This switch kills step pulses to all stage motors when the switch is pressed.
Standard Deviation	A statistic used as a measure of the dispersion of variation in a distribution: equal to the square root of the arithmetic mean of the squares of the deviations from the arithmetic mean. **Simplified Definition:** A measurement of the extent to which numbers differ from one another.
Stepper Motor	A motor (especially an electric motor) that moves or rotates in small discrete steps.
Style	A Style, which is part of a Test Program file, is a map of electrical connections; it defines all possible edge connections that may be on a given motherboard or adapter. It includes information for identification, revision history, channels, and edges. Channels connect to the mux system and edges connect to the probe card. Equals the Motherboard name. Usually the same name as the test head.
Style File	Converts Channel numbers into Edge names.
Test Program	Also known as card file. Contains all testing information for a specific card name. Contains XY coordinates, test specifications, component and relay information.
Test Program File	A file that contains the Style and Card data for a motherboard and a probe card.

Term	Definition
The Standard Measurement Chuck	The chuck is the primary testing instrument, and is a precision surface area. It can be up to 12" in diameter. Located on the chuck are isolation pin/s, gram force pin/s, the camera unit, and cleaning material/s. The sapphire lens represents the center of the stage, and is used for alignment and tip diameter tests. Isolation pins come in various shapes: raised, flush mounted, and pop-up. These are generally used to test individual bussed probes.
Theta	A Greek name representing an angle (math) or a difference.
Three-wire, Isolated Edge Sensor	Edge Sensor probe B, which makes electrical contact with the wafer, is electrically isolated from sensor Switch probe C by a glass bead. Sensor Sense probe A and sensor Switch probe C form a normally closed switch. When probe B is pushed up by making contact with the wafer, it pushes up Switch C, breaking contact with Sense probe A. When this contact breaks, it indicates that sufficient overdrive is applied to probe B.
Tilt Correction Plane	Calculates a line through the center of the card where it intersects the 3 dimensional plane as calculated by the Best Fit Plane method. This method is used for cards where Tilt Correction adjusts planarity
TiltCorrectionPlane	See Planar Methods
Tip Diameter	See Probe Tip Diameter
Tip diameter	Edge to edge measurement across the widest part of the contacting surface of a probe tip.
Top Hat	Assembly that sits above the probe card when heating it for testing under elevated thermal conditions.
Touchdown	The act of a probe tip touching a surface.
Trace	A trace is an etched electrical connection that connects between the card connector and one or more probes. Trace names are usually silkscreened on the probe card board.
Two-Wire, Non-Isolated Edge Sensor	The Edge Sensor probe is in contact with a switch probe, forming a normally closed switch. The Sensor probe contacts the die's edge and the tip's resistance can also be measured be measured. There can be a right- or left-handed two-wire, non-isolated Edge Sensor.
UpOT	Up Over travel - Green LED while in normal elevator range of motion and will go Yellow if the lift goes beyond its upper limit

Term	Definition
Upper Die Plate	The top piece of Cobra head assembly, the upper die holds the tops of the Cobra probes in alignment with the space transformer.
User	A User consists of a User ID, an optional password, and an optional, attached Profile with permission settings. A User can be Blank if an administrator so desires. A Blank user does not require a User ID or a Password, but a profile should be assigned to ensure access to all workstation function. If a profile is assigned, the profile determines the User's access. If there is no profile, access is specific to that user. When that user logs out, the access permission settings revert to None for the next user. Probilt allows an unlimited number of users.
Vacuum Groove	Holds a wafer in place allowing the user to visually align probe tips with die pads or to bombsite the wafer pad locations.
Verify Chuck Planarity	Probilt automatically verifies the chuck's planarity each time the card initialization process is performed by measuring the height of three points on the chuck. The Chuck Tolerance is used to determine if the chuck is planar. **NOTE:** Three-point chuck verify only works if the center of the probe card's array is at machine 0,0.
Wafer	A small thin circular slice of a semi conducting material, such as pure silicon, on which an integrated circuit can be formed.
Wafer Chuck	See Measurement Chuck
Wire Check	A test that verifies that all connections between the probe card and the workstation are correct and operational. Identifies the electrical connections of a probe card.
XY Error Method	This Alignment error method compares the probe's captured position to either the specified First Touch position, final overdrive position, or the pad's center position (depending on the card data file). The following equation is used to calculate the X and Y error: $Error_x = (Probe\ Center)_x - (Pad\ Center)_x$ $Error_y = (Probe\ Center)_y - (Pad\ Center)_y$
Zero Reference Plane	Probilt's Z-Axis zero position. This is the position from which the probe depth is referenced. See Motherboard Offset for a typical example. Pad Capture @ 1/2 Alignment Overdrive Y Error Pad Center Probe Center X Error
Z-limit switch interlock	Protects the probes on a probe card from being crushed by the Measurement Chuck. Switch must be adjusted to each probe card's probe depth.