



ProTrack® Prober Models II, III, IIc, IIIc

USER'S MANUAL

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SECTION 1

INTRODUCTION

1-1 What is a Robotic Prober?

A Huntron Robotic Prober is a universal test fixture for accessing test points on printed circuit boards without the need for test clips and cables. When connected to the Huntron ProTrack I model 20 (hereafter referred to simply as ProTrack), the Prober allows fully automatic power off testing of surface mount, pin-grid-array, discreet through-hole components, DIPS, SIPS, QPFs, SOICs, and edge connectors on printed circuit boards. This provides a complete personal troubleshooting workstation for automatic testing of unpowered fine pitched and through hole devices on printed circuit boards.

The Robotic Prober can also be connected to external troubleshooting instruments, such as a digitizing multi-meter. The TEST terminal from the multi-meter can be connected to a BNC connector at the Prober's back panel. This connector is internally wired to the test probe.

1-2 How does it work?

The Robotic Prober basically consists of three axis which moves a test probe along an XY plane. Once the probe reaches an XY co-ordinate, an up or down Z movement is automatically initiated so that the test probe makes contact with a test point on the target printed circuit board. Each X, Y and Z stage is stepper motor driven. A vision system mounted on the Z axis allows the operator to "teach" the appropriate test points by targeting a PC mouse or trackball pointer over the center of the image of the test point visible on the PC monitor. The software makes it easy to teach test points of DIPS, SIPS, Pin-Grid-Arrays, SOICs, Quad packages, etc. The user does not necessarily have to teach every test point one at a time for these device types. In this way any PCB with accessible test points can be setup for automatic probing. The Z axis, up and down profiles, can be setup for all the components on the board at one time.

Once the test points are setup, the user can choose the appropriate test ranges and then scan the board. This causes the prober to automatically move the test probe to the appropriate test nodes, apply the test signal and record the response on the PC. In this way the entire board can be scanned and the test data can then be stored on the PC hard disk.

When testing a suspect board, the stored data is automatically compared with the suspect data and a report is produced with the most significant difference listed as a priority. The user can apply additional troubleshooting techniques to decide which component is causing the problem. Huntron Robotic Probers come in various configurations allowing you to test tiny boards as small as 2 inches (5.08 cm) square or larger boards of 22" by 23" (55.88 cm by 58.42 cm) in size. No matter which Prober you use, the ProTrack is still used as the primary test signal source.

1-3 HARDWARE FEATURES

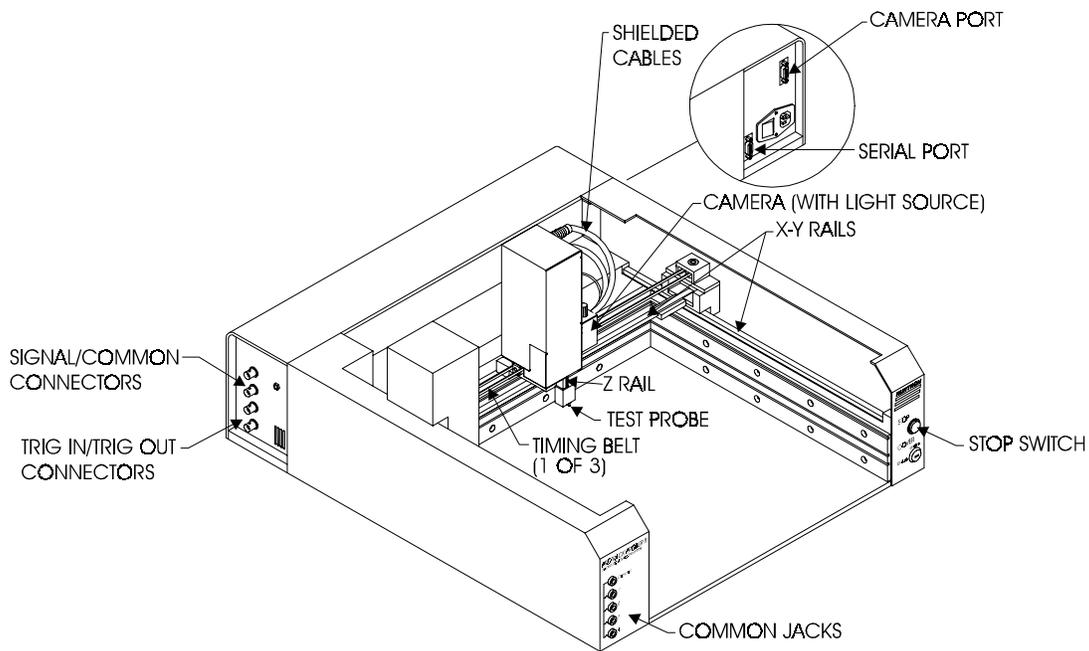
A complete troubleshooting workstation consists of a PC, Robotic Prober and a ProTrack.

The Prober Hardware features are discussed below.

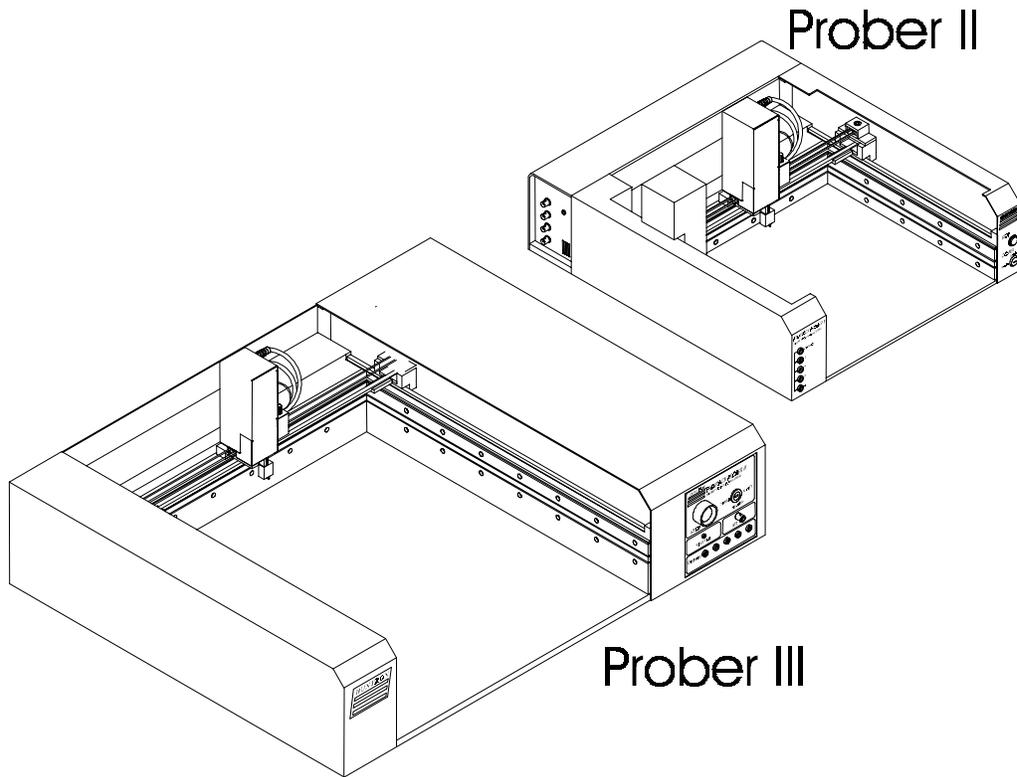
- The XYZ stages are stainless steel linear raceways providing an accurate means of moving a light load.
- The linear stages use fine pitched toothed timing belts which are driven by three stepper motors.
- A versatile clamping system provides an easy means of clamping the Printed Circuit Assembly so that the moving probe can access either the solder or component side without the need for additional fixturing.
- Connection to the ProTrack or any external tester is via two BNC connectors mounted at the back of the Prober. One BNC connector is for the Signal from ProTrack or external tester, and the other is for Common to the ProTrack or external tester. This common line is then connected to a signal reference point on the board-under test.
- The Signal BNC connector is routed to the test probe via a flexible low impedance co-axial cable.
- A miniature camera mounted on the Z axis produces a digitized image of an area of the Printed Circuit Assembly on the PC monitor.
- A PC mouse or trackball allows the positioning of it's pointer over the image of the test point displayed on the PC monitor for recording the X and Y co-ordinates.
- The light source for the camera consists of super-bright LEDs.
- Magnetic proximity limit switches are used to define the "home" position. The software allows two reference points from the Printed Circuit Assembly to be digitized relative to the home position. All test point co-ordinates are then automatically referenced and adjusted for boards that may not be in the same position as the golden board from which the test point coordinates were originally setup.
- The test probe tip mounted on the Z axis is removable, allowing standard "bed-of-nails" type spring loaded probe tips to be used. Different probe tips are supplied covering conformal coating applications to fine pitched crown pointed tips.
- All flexible cables are shielded.

- An emergency STOP switch allows immediate suspension of Prober operation.
- There are 5 Common connectors accessible at the front panel which allows connection to the Printed Circuit Assembly signal reference points.

The rear or side panel provides Trig-In and Trig-Out connectors for providing hardware handshaking with external test instruments other than the ProTrack.



1-4 SPECIFICATIONS OF THE PROBER II AND III



The table below outlines the specific differences between each Prober model.

	Prober II	Prober III	Comments
Physical Dimensions	20" W, 24" D, 12" H. (50.8 x 60.96 x 30.48 cm)	36" W, 29" D, 14" H (91.4 x 73.66 x 35.56 cm)	
Max. board-under-test size	14" by 14" (35.56 x 35.56 cm)	22" by 23" (55.88 x 58.42 cm)	Max thickness is 100 mils(2.54mm)
Max board probing area	12" W by 14" L (30.48 x 35.56 cm)	22" W by 19" L (55.88 x 48.26 cm)	
Max allowable component height	2.375" H (6.03 cm)	4" H (10.16 cm)	Measured from the lowest slot
# of pcb guide slots	3	3	
Minimum resolution	0.001" (25.4 microns)	0.002" (50.8 microns)	
Max Z Travel	3" (7.62 cm)	3" (7.62 cm)	
Weight	50 lbs (22.68 kg)	140 lbs (86.18 kg)	

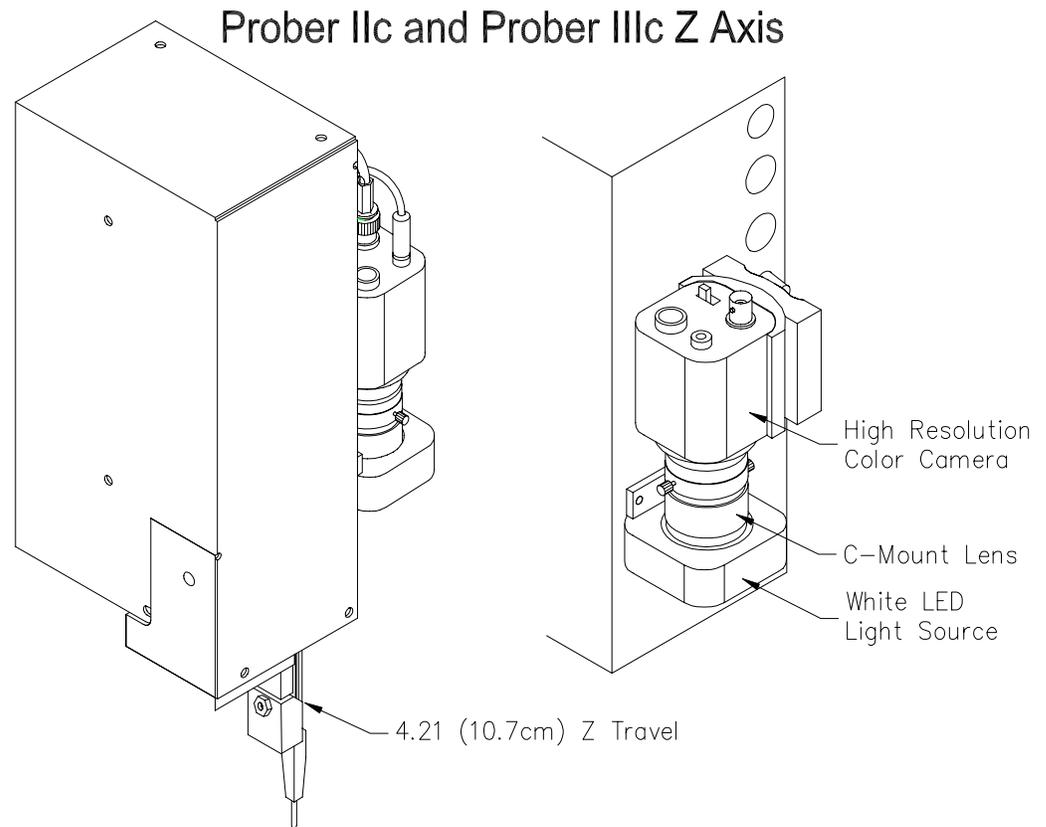
The following specifications apply to II and III

Specification	Prober II and Prober III
Linear speed	4 inches/sec (10.16 cm/sec)
Probing Accuracy	+/- 0.004" (+/- 101.6 microns)
Vision system	CCD 192 by 165 pixels, Monochrome
Light Source	Dual red LED, 660nm, or dual white LED
Power requirements	115VAC or 230 VAC line voltage. 60 W Max.
Computer interfaces	RS232 and custom camera interface.
Ideal Operating temperature	59 degrees F to 86 degrees F (+15 degrees C to +30 degrees C)
Storage temperature	-58 degrees F to 140 degrees F (-50 degrees C to +60 degrees C)
Humidity	0 to 50% R.H.
Safety considerations	Front panel STOP switch for emergency stop.

1-5 SPECIFICATIONS OF THE PROBER IIC AND IIIC

Prober IIC and Prober IIIC models are different from the Prober II and Prober III. New features are listed below:

- 1) Color camera with color PCI frame grabber card.
- 2) White LED light source with adjustable intensity
- 3) New Z axis assembly with 4.2”(107mm) Z travel for Prober IIIC
- 4) Prober IIIC has an extra Printed Circuit Assembly slot



Specifications for the Huntron Prober IIc

Specification	Prober IIc	Comments
Physical Dimensions	20" W, 24" D, 14" H. (50.8 cm W, 60.96 cm D, 35.56 cm H)	
Maximum board-under-test size	14.5" W by 14" D (36.83 cm W by 35.56 cm D)	Max thickness is 100 mils (2.54mm)
Maximum board probing area	10.5" W by 12.9" D (26.67 cm by 32.77 cm)	Area of the board that the probe can reach without re-adjusting the position of the board.
Maximum allowable component height	2.375" H (6.03 cm H)	Measured from the lowest slot
# of pcb guide slots	3	
Max Z Travel	2.21" (5.61cm)	Maximum allowable up/down movement
Linear speed	4 inches/sec (10.16 cm/sec)	Speed in the X or Y direction
Minimum resolution	0.001" (25.4 microns)	Minimum allowable movement in the X or Y direction
Probing Accuracy	+/- 0.004" (+/- 101.6 microns)	Measured over a travel distance of 10" (25.4 cm)
Vision system	CCD 811(H) x 508 (V) Color	
Light Source	White LED array w/adjustable Intensity	
Lens system	25mm Focal Length C mount with adjustable focus and aperture	
Frame Grabber	Color, PCI Bus with 754 x 480 Pixels (NTSC, RS-170) max resolution	Requires full height free PCI slot in computer.
Weight	50 lbs (22.68 kg)	Unit only
Mechanical Drive System	3.175 mm wide Kevlar reinforced timing belt. Steel linear raceways.	
Power requirements	115VAC or 230VAC,50Hz or 60HZ ,100W Max	
Computer interfaces	RS232 and PCI camera interface	PCI interface is part of Frame Grabber
Operating temperature	59 degrees F to 86 degrees F (+15 degrees C to +30 degrees C)	
Storage temperature	-58 degrees F to 140 degrees F (-50 degrees C to +60 degrees C)	
Humidity	0 to 50% R.H.	
Safety considerations	Front panel STOP switch for emergency stop	

Specification for the Huntron Prober IIIc.

Specification	Prober IIIc	Comments
Physical Dimensions	36" W, 29" D, 15.7" H (91.44 cm W, 73.66 cm D, 39.88 cm H)	
Max. board-under-test size	22" W by 23" D (55.88 cm W by 58.42 cm D)	Max thickness is 100 mils (2.54mm)
Max board probing area	18.6" W by 22.4" D (47.24 cm W x 56.90 cm D)	Area of the board that the probe can reach without re-adjusting the position of the board.
Max allowable component height	4" H (10.16 cm H)	Measured from the lowest slot
# of pcb guide slots	4	
Max Z Travel	4.21" (10.7cm)	Maximum allowable up/down movement
Linear speed	4 inches/sec (10.16 cm/sec)	Speed in the X or Y direction
Minimum resolution	0.002" (50.8 microns)	Minimum allowable movement in the X or Y direction
Probing Accuracy	+/- 0.004" (+/- 101.6 microns)	Measured over a travel distance of 10 cm)
Vision system	CCD 811(H) X 508 (V) Color	
Light Source	White LED array w/adjustable Intensity	
Lens system	25mm Focal Length C mount with adjustable focus and aperture	
Frame Grabber	Color, PCI Bus with 754 x 480 Pixels (NTSC, RS-170) max resolution	Requires full height free PCI slot in computer.
Weight	140 lbs (63.64 kg)	Unit only
Mechanical Drive System	3.175 mm wide Kevlar reinforced timing belt. Steel raceways.	
Power requirements	115VAC or 230VAC,50Hz or 60HZ, 100W Max	
Computer interfaces	RS232 and PCI camera interface	PCI interface is part of Frame Grabber
Operating temperature	59 degrees F to 86 degrees F (+15 degrees C to +30 degrees C)	
Storage temperature	-58 degrees F to 140 degrees F (-50 degrees C to +60 degrees C)	
Humidity	0 to 50% R.H.	
Safety considerations	Front panel STOP switch for emergency stop	

1-6 SAFETY INFORMATION

Symbols: The following symbols are used either in this manual or on the unit:



CAUTION
Refer to Manual

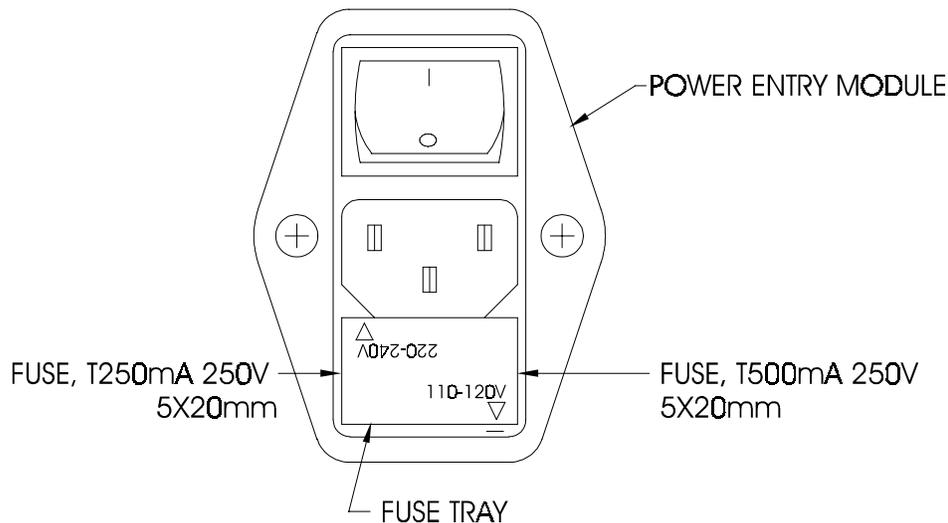


Protective Ground
(Earth) Terminal



Line Fuse Replacement:

Voltage Select/Line Fuse tray: The power entry module on all Probers includes the power switch (0 = OFF, 1 = ON), power cord connector, and a removable tray which selects the line voltage and holds the line fuses.



Make sure that replacement fuses are of the type and current rating specified. If necessary, insert the specified fuse (T250mA or T500mA according to IEC 127) that matches the line voltage setting into the fuse tray.

SECTION 2

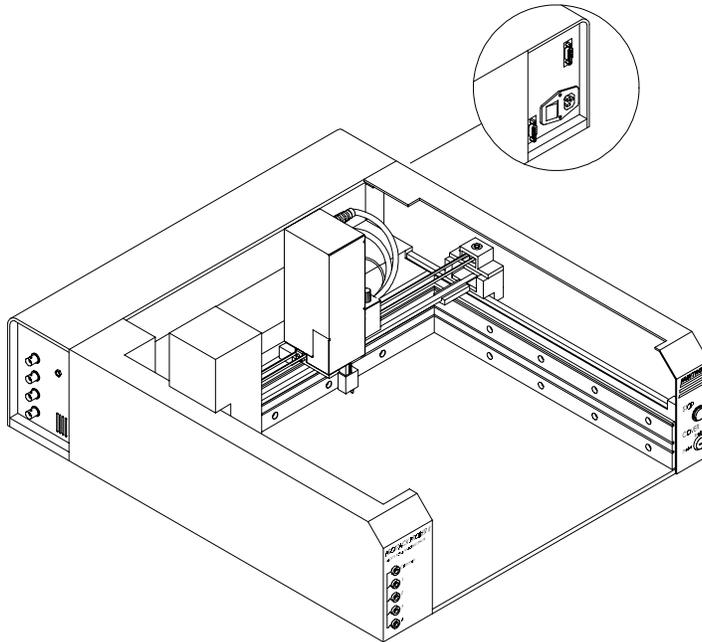
THEORY OF OPERATION

2-1 INTRODUCTION

This section describes how various components of the Prober system work. The purpose of this section is to simply explain the functional characteristics of the main components of the Prober system.

2-2 FUNCTIONAL OVERVIEW

The following figure shows the components of the Prober system.



The probe connected to the Z axis is directly connected to the BNC Signal connector located at the Prober back or side panel. The purpose of the XYZ stage is to accurately place the probe at a particular location for the ProTrack to perform the test. The vision system displays an image of a small area of the board-under-test on the PC monitor for setting up the XY locations of test points.

2-3 STEPPER MOTOR CONTROLLER

The Stepper Motor Controller receives ASCII commands from the PC. The controller applies direction pulses for clockwise or counter-clockwise rotation and step pulses at different frequencies to the motor driver.

2-4 STEPPER MOTOR DRIVERS

The purpose of the Motor Drivers is to supply sufficient and regulated current to each phase of the motor winding. The motor drivers are Bipolar Chopper type, supplying current in either direction through the same motor phase winding and regulating the current by high speed on-off switching of the DC supply voltage. Bipolar Chopper Drivers are high efficiency Drivers that produce a maximum amount of torque at relatively high stepper speeds.

The Stepper Motor Controller is capable of half stepping. This produces half the rotational distance per step of a full step motor. The Stepper Motor produces 0.9 degrees of rotational movement per full step. In half step mode the motor produces 0.45 degrees of rotational movement. The total number of incremental steps produced by the motor is 800 steps per revolution. Depending on the timing belt pulley pitch diameter, the motor produces 0.002 or 0.001 inches of linear movement.

2-5 VISION SYSTEM FOR PROBER II and PROBER III.

The vision system uses a monochrome CCD mounted in a remote housing. Two different light sources and two different filters have been used.

The red light source is at a wavelength of 660nm. The red optical filter is a 660nm +/- 10nm bandpass filter. This ensures that external light whose frequency is below 650 and above 670nm does not interfere with the camera image. The white light source has a peak wavelength of 550nm. The blue filter is infra-red blocking. The light intensity can be varied by a simple potentiometer adjustment.

The lens is a multi-element system producing a focal length of 10.7 mm with an f-stop of 2.8. The lenses are arranged for Chromatic Aberration correction allowing multi-colored objects to be in consistent focus. The focusing system is manual.

The CCD is remotely wired to the camera body which consists of a video amplifier. The camera body is mounted on the back panel of the Prober and is connected to a camera interface card which plugs into an 8-bit slot in the PC. The camera interface card consists of an A to D converter which sends data to the PC bus.

The image from the camera system is displayed on the PC monitor. A PC mouse or trackball is used to point to a particular pixel on the camera image. The position of the pointer and the position of the motors provide accurate data for storing the position of each test point. Based on this data and the two user defined alignment points, it is possible to ensure accurate repeatability even when the board is not placed in the exact position as the original "golden" board.

2-6 VISION SYSTEM FOR PROBER IIc and PROBER IIIc.

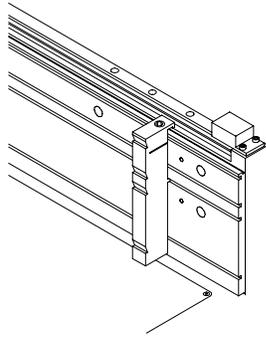
The vision systems consist of a high-resolution color analogue camera mounted on the Z-axis. The color camera is capable of 480 lines of horizontal resolution in the NTSC (rs-170) format. It has automatic background compensation, which allows for digital brightness control on low or highlighting conditions. The camera uses a standard 25 mm C mount lens that has aperture and focus control. The aperture and focus adjustments can be locked into position via setscrews or knobs.

The camera output is available via a co-axial cable with a BNC connector. The output is fed into a PCI bus frame grabber which is installed in a computer. The frame grabber is capable of displaying 60 frames per sec on the PC monitor. Images are in full color.

A new light source with intensity control is mounted in front of the camera. It uses 8 super bright white LEDs which produce diffuse and evenly distributed white light.

2-7 Higher Z for Prober IIIc.

The Z-axis on these models consists of a longer Z head allowing for probing printed circuit assemblies that contain higher components. This is especially useful in the Prober IIIc model where an extra board slot exists near the bottom. Printed circuit assemblies with large transformers or high heat-sinks can now be mounted in the Prober clamping system.



SECTION 3

INSTALLATION

3-1 PC Requirements

The following requirements are provided to assist you in purchasing the correct computer system to use with the Huntron Personal Troubleshooting Workstation™.

These are the recommended minimum computer requirements:

- IBM Compatible PC with Pentium class CPU.
- Microsoft Windows™ ,98, ME, 2000, XP.
- CDROM drive.
- 128MB RAM
- One hard disk with at least 500 MB free space.
- Windows 16 bit color capable VGA graphics card.
- VGA color monitor.
- 1 Parallel printer port.
- 2 Serial ports. (One for the Prober and one for the serial mouse or trackball) or 1 Serial port and 1 mouse port.
- The ISA camera version requires 2 spare PC-AT bus expansion slots. (One for Camera Interface Board and one for an optional 2nd Parallel Interface Port) The PCI camera version requires 2 spare full height PCI expansion slots. (One for the Camera Interface Board and one for an optional second parallel interface port.)
- Prober IIc and Prober IIIc use a full height PCI color camera interface card. An additional full height PCI slot may be required for an optional PCI Parallel Interface card.

3-2 Installing the Huntron Workstation Software

NOTE: Install the software before installing the PCI Camera card.

Refer to the readme.txt file on the Huntron Workstation CD. Detailed instructions are included for each operating system.

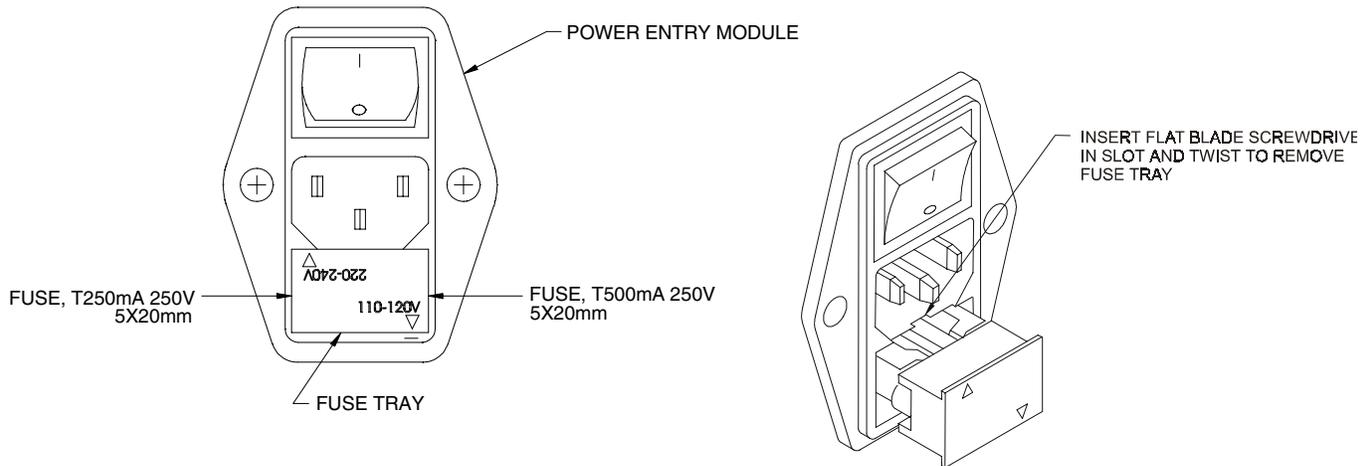
1. Power up your computer. Insert the software CD into the CDROM drive.
2. To install the Huntron software, run the **SETUP.EXE** program on the CDROM. You can do this by clicking **Start** and then **Run** from Windows. Now type in **D:\setup.exe** if your CDROM drive is Drive D. A readme.txt file will be displayed. Click **OK** to install the software. The Welcome window will be displayed. Click **Next** to continue.

The Choose Destination Location will be displayed. You can enter the folder name you wrote down in the above step or click **Next** if the default **C:\WINHUNT** folder is correct. Click **Next** to accept the backup folder. Click **Next** to install the software.

The software installation is complete, but may still require a PCI Camera Interface card driver. Follow the steps below before installing the driver.

3-3 Installing the Hardware

1. Locate the unpacking sheet that was supplied with the Prober.
2. Follow the unpacking steps as outlined in the unpacking sheet.
3. Place the Prober on a firm table or desk. The ProTrack should be positioned on the left side of Prober II. Place the computer monitor on either side of the Prober. For Prober III, place the ProTrack on the right side of the Prober.
4. Remove the **Red Shipping Stoppers** using the Hex Allen tool supplied in the tool kit. Do not discard these blocks. You will need them again if you transport the Prober to another location. **Also remove the tape on the Z axis block which holds the probe up.**
5. **Voltage Select/Line Fuse tray:** The power entry module on all Probers includes the power switch (0 = OFF, 1 = ON), power cord connector, and a removable tray which selects the line voltage and holds the line fuses.



220-240VAC Voltage Selection.

NOTE: The above voltage setting indicates **110-120V AC power (arrow pointing towards the — mark.)** If your line voltage is 220–240VAC, you will need to change the Voltage Select/Line Fuse Tray setting. Remove the AC power cord. There is a slot below the AC ground terminal. Insert a flat screw driver into the slot and pull the tray out. Make sure that replacement fuses are of the type and current rating specified. If necessary, insert the specified fuse (T250mA or T500mA according to IEC 127) that matches the line voltage setting into the fuse tray. Insert the tray into the power module so that the 220-240VAC arrow points to the — mark. Insert the AC power cord and connect to a 220-240 Volt AC supply.

3-4 Installing the Camera Interface card

Two different Camera Interface cards are being used, ISA and PCI. Installation will vary slightly with operating system used and type of card.

INSTALL CAMERA BOARD ONLY IN UL LISTED, CSA CERTIFIED, OR TUV/VDE LICENSED PERSONAL COMPUTERS WITH ENCLOSED POWER SUPPLIES WITH SELV NON-ENERGY HAZARDOUS OUTPUTS AND USER INSTRUCTIONS DETAILING THE INSTALLATION OF CARD CAGE ACCESSORIES.

With the computer power turned off, install the card into the computer by positioning it over the correct type (ISA or PCI) slot and pressing it firmly downward. There is no need to set any addresses or interrupts.

Secure the camera card to the computer back panel using the available screw.

3-5 Connecting the ProTrack to the Prober

Unpack the ProTrack as outlined in the unpacking instructions. Install the hardware as outlined in the ProTrack User's Manual. Locate the Parallel IEEE cable included in the ProTrack package.

Power off the computer and connect the parallel IEEE cable from the COMPUTER connector on the ProTrack to the primary Printer Port on the Computer. If you are using a printer with the computer, a secondary printer port will have to be added. Refer to the ProTrack User Manual, Section 9, Remote Mode for information on using a printer for reporting Protrack data. See diagram on page 3-4.

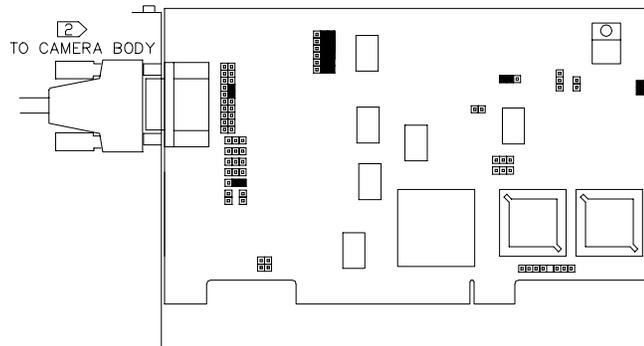
Connect the BNC cables included in the Prober package to the back panel of the ProTrack. Connect the COMMON terminal on the ProTrack to the COMMON terminal on the Prober. Connect the CHANNEL A terminal on the ProTrack to the SIGNAL terminal on the Prober. See diagram on page 3-4.

Connect the power cords to the ProTrack and the Prober.

3-6 Connecting the Camera interface card to the Prober

Locate the included camera interface cable and connect the correct end to the Prober Camera port. Connect the other end to the Computer Camera Interface card port.

PCI Camera Interface Card

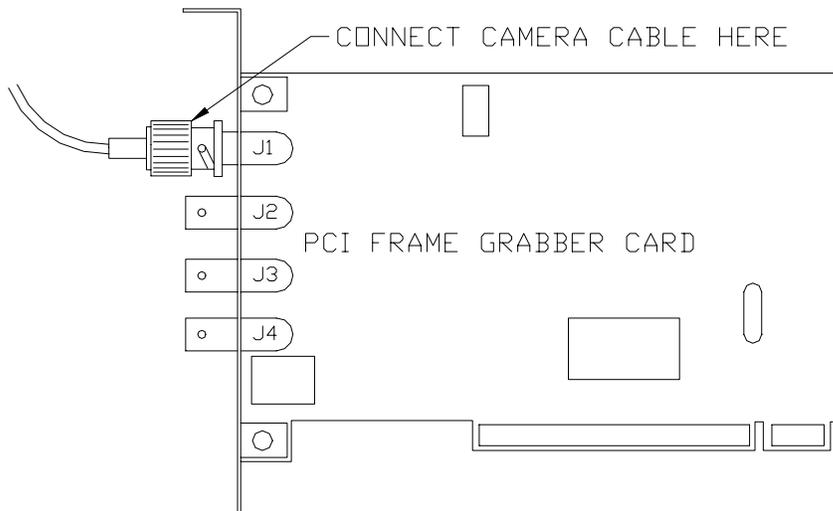


For the PCI Camera Version, connect the Camera Cable to the connector as shown. Ensure that the locking thumb screws on the connector are tight and secure. **DO NOT PLUG A VIDEO DISPLAY MONITOR INTO THIS CARD.**

For Prober IIc and Prober IIIc models

A co-axial cable is supplied with these models. The PCI camera card has four BNC connectors allowing up to 4 cameras to be connected. Connect one end to the top BNC

connector as shown. Connect the other end to the BNC port on the Prober marked **“Camera”**

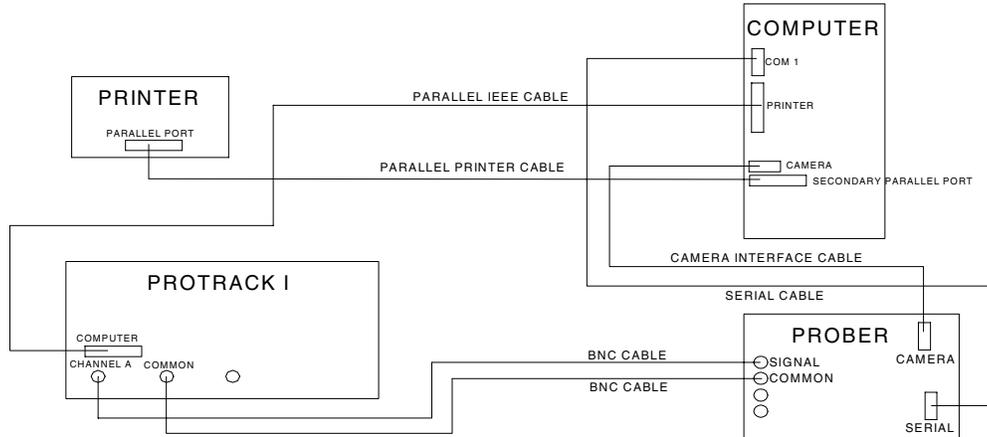


3-7 Connecting the Prober Serial Interface to the Computer

If your computer does not have a mouse port, you will need two serial ports, one for the Prober and the other for a serial mouse or trackball. If you have another type of port (USB) for the mouse, then you will need only 1 serial port for the Prober.

Locate the serial cable and connect the correct end to the Prober Serial port. Connect the other end to the appropriate serial port on the computer (COM1, COM2, COM3 or COM4). See diagram on page 3-5.

Power up the ProTrack and the Prober. The Prober front panel STOP light will switch on and a startup message is displayed on the ProTrack LCD panel.



HUNTRON PERSONAL TROUBLESHOOTING WORKSTATION CABLE HOOKUP
USING THE SECONDARY COMPUTER PARALLEL PORT

3-8 Installing PCI Camera Card Drivers for the monochrome camera (Prober II and Prober III only)

For Windows 98/ME Installation After the Windows Boot-up process is completed, Windows will detect the PCI Camera Interface Card and will prompt you to install a driver. When you turn on the computer, an error message **may** indicate that the file EDC2000.VXD is not found. The driver file EDC2000.INF (which will install the .VXD file) is located in the root directory of the CDROM. Enter the CDROM drive if the default **D:** is not your CDROM drive. For example, if your CDROM is drive E:, enter **E:** and click **OK**. Click **Finish** when the driver installation is complete. If your mouse cursor returns after the hourglass display, the driver has been successfully installed.

For Windows 2000/XP Installation After the Windows Boot-up process has completed, Windows will detect the PCI Camera Interface Card and prompt you for driver installation. The driver will not be found. Finish without installing the driver. Start the Huntron Workstation software.

Refer to the help menu in the software. Ensure that the hardware setting is saved before exiting this routine.

3-9 Installing the PCI drivers for the Color Camera (Prober IIc and Prober IIIc only)

For Windows 98/ME: Insert the **Huntron Workstation CD** in your CD drive. If you have installed the Huntron Workstation Software (Section 3-2) and then installed the PCI Color Interface card (Section 3-4), you are now ready to install the drivers.

- 1) Turn on your computer and allow Windows to boot. An **Add New Hardware** wizard prompts you to install a **“PCI Multimedia Video Device”**. Click **Next**.
- 2) If the wizard prompts you to search for drivers, click **Next**. Check the CDROM drive for the search path and **uncheck all the other options**. Click **Next**.
- 3) The wizard will search the CDROM drive and prompt you to install the **“Sensoray 611 Frame Grabber”**. Click **Next**, Click **Finish**. Click **“Yes”** to restart your computer.
- 4) Another Add New Hardware wizard prompts you to install the **“Sensoray x11 Frame Grabber Component”**. Click **Next**. Click **Next** and click **Finish**. Restart your computer. If no messages appear regarding the Color Camera driver, the installation is complete. Start the Huntron Workstation software.

For Windows 2000/XP

- 1) Insert the **Huntron Workstation CD** in your CD drive. If you have installed the Huntron Workstation Software (**Section 3-2**) and then installed the PCI Color Interface card (**Section 3-4**), you are now ready to install the drivers.
- 2) Turn on your computer and allow Windows to boot. An **Add New Hardware** wizard prompts you to install a **“Sensoray 611 Frame Grabber”**. Click **Next**.
- 3) If the wizard prompts you to search for drivers, click **Next**. Check the CDROM drive for the search path and **uncheck all the other options**. Click **Next**.
- 4) When a message appears, indicating that the driver has not passed Windows Logo testing, click **“Continue anyway”**. Click **Finish**.
- 5) You will be prompted to install the **“Sensoray X11 Frame Grabber Component”**. Click **Next**. When a message appears indicating that the driver has not passed Windows Logo testing, click **“Continue anyway”**. Click **Finish**. Remove your Huntron Workstation CD. You are now ready to use the software.

3-10 Camera Offset Routine

This routine is necessary for setting up the distance between the camera center and the probe tip. **Refer to Section 4-3 for camera image adjustments.**

Set up a sample board for the Top slot. **Refer to the “Tree Building” section in the Help Menu for details on how to setup a board.**

Add a System, Board and Section name from the Tree Menu. In the Section Screen, ensure that the Top slot is selected.

Click **Control** and then click **Camera Offset**. Click **Help** and then click **Teach Camera Offset**. The basic concept is to move the camera head to the center of the camera offset cross hair and store this position. Then move the probe to the center point of the cross hair and store that position. The software will then calculate the exact Z height and offset position and store it for future reference whenever a board is being tested in the top slot. It is not necessary to run the Camera Offset routine whenever you are testing a similar type board.

For fine pitched devices, it is advisable to run this routine using the board-under-test. You can choose any point on your board as a Camera Offset point, ensuring that the point has a clear center which can be identified in the camera image.

For Prober IIIc only.

NOTE: Using the standard length probe will not allow you to probe boards in the **Base Slot**. Install the **30 Degree Spear Point Probe (P/N 07-2106)** into the **Probe Holder** according to the instructions in the **User Manual Section 4-5**. This is an extended length probe required for probing boards that are mounted in the **Base Slot** (lowest slot).

3-11 (OPTIONAL) Sample Board Setup

This procedure is intended to teach you the basic procedure for setting up a board and scanning the components for testing. More details are provided in the Help section of the Software. Choose a sample board that has 4 DIP type components. This procedure assumes that each component consists of 28 pins.

- Ensure that your sample board is clamped into the top slot.
- You will now add 4 components to the board that was setup for the Camera Offset routine in the previous section.

Click **Component**. Since nothing was setup here, click **Tree** and then click **Add new Component**. In the Name field, enter U1 (or any other name that matches your component) and set the number of pins for this DIP to match your component.. Click **OK**. Add U2, U3 and U4 in a similar way. You have now setup a board with 4 components. We still have to teach the positions of the pin locations and then scan the board to record the actual signatures.

Setup two alignment points.

Now click **Control** and then click **Align**. The Prober's Z-axis will automatically move to the back-right corner. You are now ready to set up the first alignment point. Choose a cross hair or fiducial on your sample board. Press the **Left** button and the Probe will move 1000 mils (default Travel) to the left. **Click the Help button and then click on Teach Alignment to get more information on how to use the Align routine.**

When the cross hair is visible in the Camera Image Window, use the mouse and position the cursor over the point that you want the camera to move to. Click the Left mouse button and the camera will move to that position. This step also records the XY position.

Ensure that the Camera image cross-hair (red) is centered on the actual image of the cross hair on the Printed Circuit Assembly. Click **Set** to set the XY position of the first Alignment point.

Use a different crosshair or fiducial in the opposite corner of your board for the second Alignment point. Press **Last** to change the pin number to 2 and move the camera head until the image of cross hair appears in the Camera Image window. Center the red cross hair on the actual cross hair on the PCB and press **Set** to store it.

Check the two alignment points.

Check the two alignment points by pressing **First** and then **Last**. You can make fine adjustments if necessary. This is done by changing the travel distance to 2 mils for example, and pressing the appropriate left, right, back, and forward keys. You can also

move the cursor to the desired point and press the left mouse button. The Prober's Z-axis will move to the new position and the camera image will be updated. Always press **Set** to record the new position. Press **OK** to exit the Align screen.

Setup the XY positions of U1 (first component)

Click **Control**, then click **Teach** to set up the XY locations of the component pins.

Setup the XY locations of U1. Click **Help** and then click **Teach Instruction**. Click **Teach DIP**. Follow the instructions to setup the first, last and diagonal pins. Press **Set All** to allow the software to calculate the XY positions of all the other pins.

Setup the Z profile.

Press the **Height** button. Click **Help** and then click **Teach Height**. The Height dialog is displayed. Follow the instructions to setup the **Section Down** position. This position applies to all the components of the section. Setup the **Section Up** position which is the position of the probe when the probe is moving from one pin to the next. This position is normally set so that it at least is higher than any nearby components.

Check the Z positions.

Press the **Stored Down** button. The probe should move down to the test point and should be making good contact with the test point. The best Stored Down position is when the probe is actuated about 50-80 mils more than when it first makes contact with the test point.

Press **Stored Up**. The probe should move to the Stored Up position.

Press the **Home** button. The Z probe should move all the way up. Press **Stored Down** to check the Down position. Press **Stored Up** to check the Up position. Press **OK** to store and exit the Teach Height screen.

Setup the XY locations of U2.

Click ↓ next to the Component field. Select U2 and move the camera head to the first pin of U2. Press **Set** and setup the Last and Diagonal pins in a similar way. Click **Set All**. The height positions do not need to be setup after every component. The previously stored Section Up and Section Down positions will be used for all the components of this section.

Setup U3 and U4.

Click **↓** next to the Component field and setup the XY locations of U3 and U4. Click **OK** to exit the Teach screen. You are now ready to scan the board.

Scan the board to record the good signatures.

Ensure that the common cable is connected to the Common node on the your sample board. The banana plug of this cable should be plugged into “COM” terminal on the proper front panel.

Click **Control** and then select **Scan Component**. Type in a serial number and click **OK**. The probe will move to pin 1 of U1 and the signature will be recorded. All the other pin signatures will be automatically recorded in this way. You can look at the signatures by pressing **Signatures** in the Save Signatures screen. To store the signatures, click **OK**.

Scan U2.

Select U2 in the component field. Click **Control** and click **Scan Component**. Store the signatures after the scan cycle is complete.

Scan U3 and U4 in a similar way.

Test the good board.

To test the good board, Click **Control** and then click **Scan Section**. Type in a serial number and click **OK**.

U1, U2, U3 and U4 will now be automatically tested. The completed test will then display “PASSED”.

Simulate open pins and look at the “failed” signatures.

Run the test again and while it is testing the first component, disconnect and reconnect the Common cable. This will simulate a few open circuit conditions.

The open pins window will be displayed. Click **Close** to move to the scan results window.

The test results will then display “FAILED”. You can look at the signatures at this point. Click **Troubleshoot** at the Scan Results screen. The red trace is the failed signature. The green trace is the original signature. You can now page through all the failed signatures by clicking on the up/down or left/right scroll bars. Click **Close** to exit this screen. Click **Close** to go back to the main screen.

3-12 Help on Help

The above section was an introduction to the general procedure of setting up a board for automatic testing. The help menu provides detailed information on each of the menu buttons. Whenever you need detailed information, click **Help** in the appropriate screens. The help feature is context sensitive, so you can click on the green highlighted text to get additional information on related topics.

If you need further assistance, call the Huntron Technical support at
1-(800)-426-9265 or (425) 743 3171
email: support@huntron.com

NOTES:

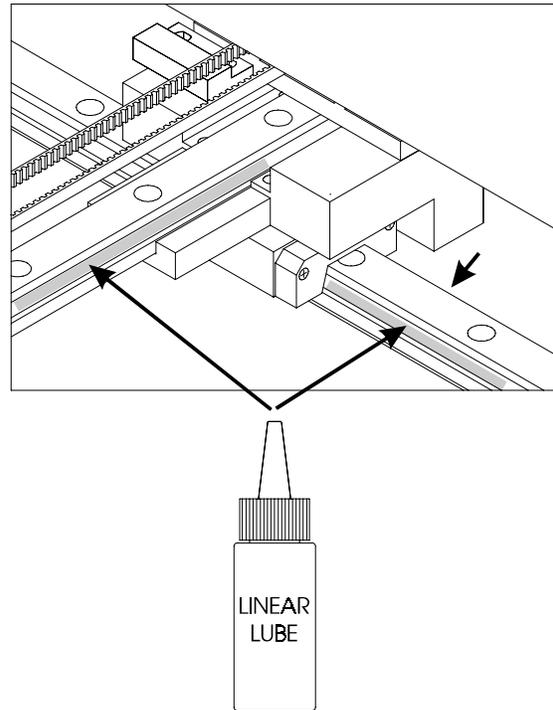
SECTION 4

GENERAL HARDWARE MAINTENANCE

4-1 RAIL LUBRICATION

The linear raceways have to be lubricated using the supplied “linear lube” which is included in your Tool kit. Do not experiment with any other lubricant. Turn the Prober power off. Apply a generous amount of lubricant along each side of the rail as shown below. Manually move the Z axis left and right and then back and forth in order to spread the lubricant along the raceways.

We recommend lubricating the rails at least once a month. You should wipe clean the rail surface with a lint-free cloth if excessive dust is visible prior to lubricating rails.



4-2 CAMERA IMAGE ADJUSTMENTS (FOR ISA CAMERAS ONLY)

This procedure allows you to adjust the Camera system's brightness and contrast parameters so that an adequate image is produced on the PC monitor.

Note: Each system is calibrated to factory specifications. However, the image quality on various computers and monitors may differ at the customer site. The ambient light conditions may also affect the overall camera image. This procedure explains how to adjust the brightness and contrast of the camera image once you have installed all the hardware needed to run the Prober. It is assumed that the software is running and the camera image does appear on the PC monitor.

Dark green masked PCBs exhibit dark images on the PC monitor. The image quality can be manipulated by changing the LED intensity, blocking out external interfering light, changing the brightness and contrast of your PC monitor, changing the exposure time in the Control/Manual/Camera Window of the main menu, and changing the brightness and contrast setting on the camera interface card.

This procedure describes how all of the above can be done to get the best possible image on your system.

1. Adjust the PC monitor brightness and contrast.
Do this first since it is the easiest. A too bright level will introduce too much gray in the overall image. The Contrast level adjustment will have the greatest impact on the overall image quality.
2. If the LED intensity is too high, white "streaks" will reflect off shiny solder joints. Turn the intensity down to reduce these reflections.
3. Remove external light in the area around the Prober. Bright Halogen light will have the most effect on the camera image. Overhead Florescent light too close to the prober can cause some interference. The most ideal conditions would be dim fluorescent ceiling type lights.
4. The default exposure time in the software is 200 msec. The exposure time can be set by clicking **Control**, **Manual** and then **Camera**. Enter the new exposure time and click **Set Exposure**. A 500 msec exposure time will make the overall image brighter but may introduce unwanted grays.
5. Change the brightness and contrast level on the camera interface card. This adjustment has the maximum effect on the overall quality of the image.

Note: The brightness and contrast levels are already factory preset to produce the best overall image. It is not necessary to do this step as part of the hardware installation procedure. However, some computers may produce a white image. Step 5d describes how to resolve this problem.

- a) Open the computer so that you have access to the top part of the Camera interface card. There are two potentiometers on the top end.
Do not remove the card. You will need to adjust these potentiometers while running the Prober software.
- b) Clamp the darkest pcb that you have in the top slot of the Prober clamping system.

Set up a dummy component with 2 pins by clicking **Tree** and then adding all the information for a 2 pin component. It is not necessary to set up actual alignment points since we just want to display an image of the PCB on the PC monitor. In the Align routine, a camera image of your PCB will be displayed. Using the cursor keys, move the Z axis until a suitable image of an IC is displayed. Observe the pins of the IC. If the overall image appears washed out with too much gray and not enough contrast then it is necessary to adjust the potentiometers. You may want to adjust the potentiometer setting to look for any improvement.

- c) Ensure that the image appears focused. Click **Live** to display a live image of the PCB. Turn the Focus knob on the Z axis if necessary to produce a clear image.

Using a volt-meter, measure the DC voltage between TP1 on the Camera Interface card and the chassis ground. TP1 is a single pin test point located near the two potentiometers. Chassis ground could be any grounded part of the computer chassis.

This voltage should read 1.9 Volts. To adjust this voltage, locate potentiometer R8 which is the one nearest the back of the computer. To increase this voltage, rotate R8 clockwise. Do not be concerned about the image clarity at this time.

- d) Now turn the LED intensity to it's maximum setting.

Locate potentiometer R9 on the card. This is the second potentiometer from the back end of the card.

If the image appears too bright and washed out, rotate R9 clockwise 1/4 turn. To check whether this setting is suitable, turn the LED brightness down to the mid-setting. The image should still be clearly visible. The image should appear dim when the LED brightness is all the way down. This R9 setting sets the maximum brightness of the image.

If the image appears too dim and unclear while the LED intensity is at it's maximum, rotate R9 counter-clockwise to increase the brightness of the image. A 1/4 turn at a time is sufficient.

Now check the voltage at test point TP1 again and adjust if necessary to 1.9 Volts.

Turn the LED intensity to the maximum level and check the image quality. It should be bright at the maximum LED intensity. Turn the LED intensity down 1/4 turn and ensure that a clear image is displayed.

If it was necessary to rotate R9, always check R8 for a 1.9 Volts reading.

If you still are getting an unsuitable image, try to adjust R9 so that TP1 reads between 1.6 and 1.9 volts. This adjustment is the contrast setting. The best image should be at the mid-point LED intensity setting.

When the LED intensity is at it's minimum, the image should still be visible. Pins of an IC should still appear white although the overall image should appear dim.

Use another PCB of a different type to check if the image a still suitable.

Repeat step 5 if you get undesirable images for different colored PCBs.

The camera calibration is now done.

Exit the software and install the computer cover.

4-3 CAMERA IMAGE ADJUSTMENTS (for the PCI Monochrome Camera only)

This procedure allows you to adjust the PCI Camera system's brightness and contrast parameters so that an adequate image is produced on the PC monitor. Refer to Section 4-3 if you have an ISA camera system.

Note: Each system is calibrated to factory specifications. However, the image quality on various computers and monitors may differ at the customer site. The ambient light conditions may also affect the overall camera image. This procedure explains how to adjust the brightness and contrast of the camera image once you have installed all the hardware needed to run the Prober. It is assumed that the software is running and the camera image does appear on the PC monitor.

Dark green masked PCBs exhibit dark images on the PC monitor. The image quality can be manipulated by changing the LED intensity, blocking out external interfering light, changing the brightness and contrast of your PC monitor, changing the Exposure Time, Gain and Bias in the **Control/Manual/Camera** window of the main menu.

This procedure describes how all of the above can be done to get the best possible image on your system.

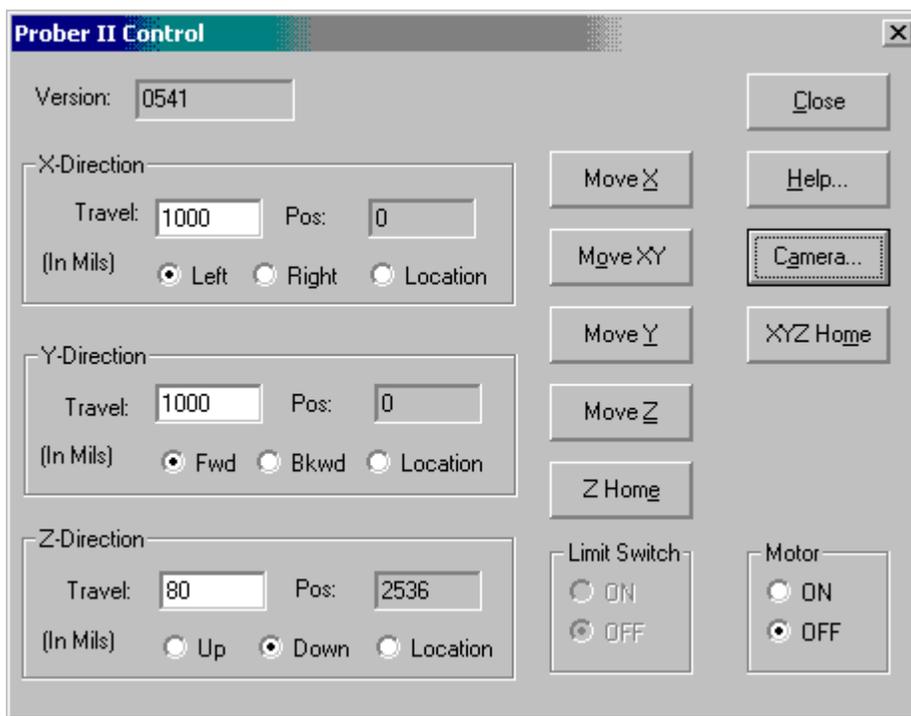
1. Adjust the PC monitor brightness and contrast.
Do this first since it is the easiest. A too bright level will introduce too much gray in the

overall image. The Contrast level adjustment will have the greatest impact on the overall image quality.

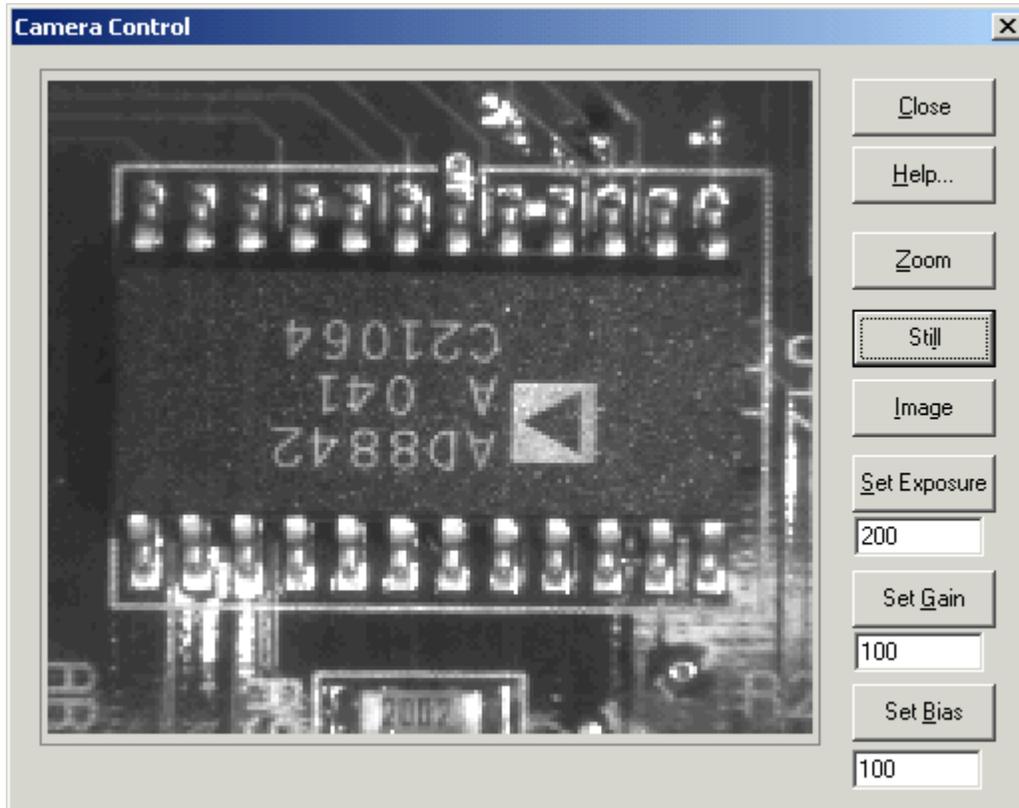
2. If the LED intensity is too high, white "streaks" will reflect off shiny solder joints. Turn the intensity down to reduce these reflections.
3. Remove external light in the area around the Prober. Bright Halogen light will have the most effect on the camera image. Overhead Florescent light too close to the prober can cause some interference. The most ideal conditions would be dim fluorescent ceiling type lights.
4. Adjust the Exposure time, Gain and Bias settings on the PCI Camera. These settings are software adjustable.

Note: The brightness and contrast levels (which are affected by the Exposure time, Gain and Bias settings) are already factory preset to produce the best overall image. It is not necessary to do this step as part of the hardware installation procedure. However, some computers may produce a white or dark image of your PCB, even after adjusting the Light Source Intensity and Focus setting. A simple software setting change may improve the camera image clarity. The following steps will describe how to change the camera settings:

- a) Clamp the darkest PCB that you have in the top slot of the Prober clamping system.
- b) Check the Camera image. From the Huntron Workstation for Windows software, click **Control**, then **Manual**, then **Prober**. Select the **Motor OFF** switch. The screen should look like this:



This will turn the X and Y axis motor power off so that you can manually move the Z-axis over the PCB. Click the **Camera** button. An image of your PCB will be displayed. An example screen is shown below:



Click **Live** to display a live image of the PCB. Turn the Focus knob on the camera head if it is necessary to produce a clear focused image.

- c) Now turn the Light Source intensity to the maximum setting. The image should appear bright. Now turn the light intensity down to the mid-point setting. The image should still be clearly visible. Now turn the light intensity all the way down. The image should appear dim. If the image is clear and satisfactory, there is no need to change any settings.
- d) To change the camera settings, do the following. **Note:** In Live mode, it is sometimes cumbersome to change any of the settings because the image is getting updated while you are attempting to change the settings. To avoid this, you can also get out of Live mode by clicking the **Still** button. The image will be frozen and now you can change the settings. Click the **Image** button which will update the image again but freezes it. Remember, after changing any settings, always click **Live** or **Image** to see the effect of the change. Once you exit from this screen, the new settings are automatically stored.

The default exposure time in the software is 200 msec. A higher value will make the image brighter but will slow down the Live-mode update of the image. Position the cursor in the box below Set Exposure. Use the **Backspace key** or **Delete key** to delete the old value and type in the new value. The maximum setting is 999. Click **Set Exposure**. A 500 msec

exposure time will make the overall image brighter but may introduce unwanted grays. Click **Image** or **Live** to see the effect of your change

The PCI camera also has Gain and Bias adjustments. The Gain setting modifies the signal gain from the CCD. The maximum is 999. The default for Gain is 100. A too high Gain value will make the image appear blurred and noisy with too many bright areas and white pixels. To change the Gain, position the cursor in the box below Set Gain. Use the **Backspace key** or **Delete key** to delete the old value and type in the new value. Click **Set Gain**. Click **Image** or **Live** to see the effect of your change

The default for Bias is 100. The Bias setting changes the relative brightness of dark pixels when no external light is present. The default setting should be sufficient. A too high value will cause black pixels to appear gray when no light is present. The maximum value is 999. To change the Bias, position the cursor in the box below Set Bias. Use the **Backspace key** or **Delete key** to delete the old value and type in the new value. Click **Set Bias**. Click **Image** or **Live** to see the effect of your change

Use another PCB to see if the changes you made are suitable. The Camera settings adjustments are now complete. Click **Close** and the settings will be automatically saved.

CAMERA IMAGE ADJUSTMENT FOR PROBER IIc AND PROBER IIIc. Refer to Section 4-11 for details.

NOTE: There are no software adjustments for the camera image for these models. There are Focus and Aperture adjustments on the camera lens that will significantly affect the camera image. Always run the Camera Offset dialog after the Focus and/or Aperture is adjusted.

4-4 SPRING CONTACT TEST PROBES

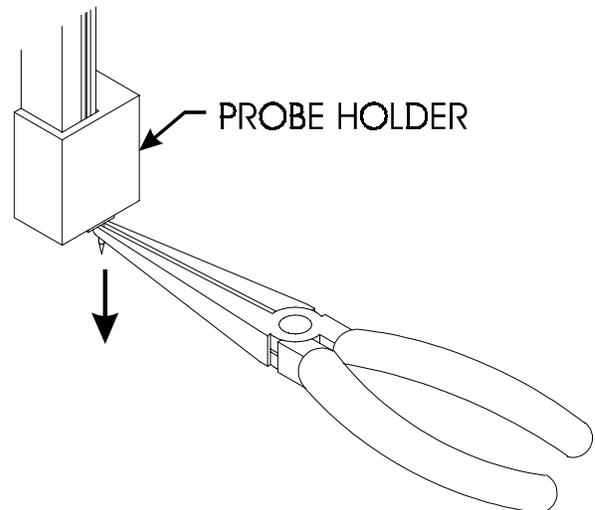
The Prober uses a spring loaded probe for making contact with a test point. Various probe styles are available depending on the type of components tested. These probes are commonly used in bed-of-nails fixtures and are readily available from a large number of manufacturers. Since the probe fits into a specific receptacle, only specific probe sizes can be used. The receptacle is press-fitted into the probe holder. It is a widely used industry standard size, so finding probes that fit into this receptacle should not be a problem. Manufacturers of these probes and the receptacle specifications are listed at the end of this section.

LIFE EXPECTANCY OF SPRING CONTACT PROBES

Generally, quality probes like those from Interconnect Devices Inc. (IDI) are rated at 1,000,000 cycles minimum. The life expectancy depends on proper use and maintenance of the probe. We recommend that you change the test probe once a month.

4-5 REPLACING THE PROBE

Use the needle nose pliers supplied with the Prober tool kit to pull the probe out of the receptacle. **It is not necessary to remove the probe holder to do this.** Simply grip the probe tip with the pliers and pull straight downward. The probe should come out easily.

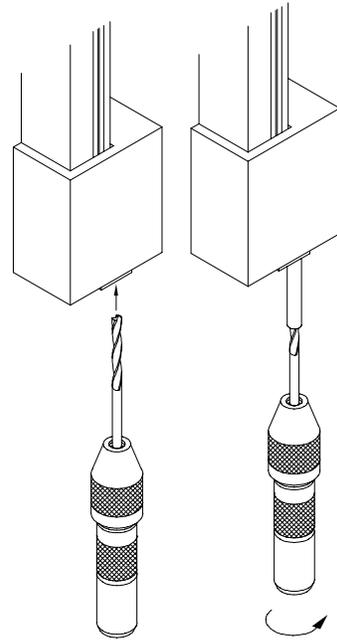


Note: Always run the Camera Offset routine whenever the probe is changed. In fact, if you change to a longer probe and do not run the camera offset, it is likely that your PCB could get scratched by the new tip because the software was not setup for the longer probe tip.

4-6 REPLACING BROKEN PROBE TIPS

It is not necessary to disassemble any parts for this operation. The probe tip may break off from the probe holder in such a way that you are unable to remove the entire part with needle nose pliers.

A small drill bit is provided in the Tool kit. Simply rotate the drill bit a few revolutions and when you feel some resistance, just pull downward. The rest of the broken tip will come out.



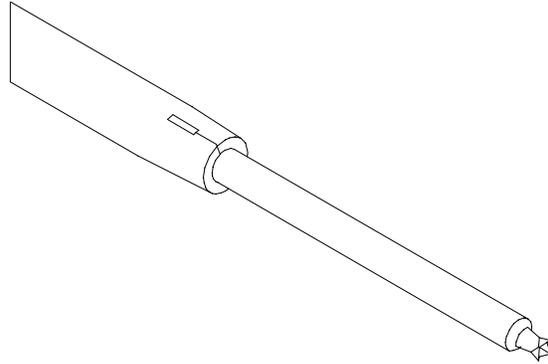
4-7 PROBE STYLES

A probe kit (P/N 98-0126) is supplied with the Prober. 5 of each of the following probes are included in this kit.

ICT, 4 POINT CROWN PROBE

Use this probe for fine pitched devices. (tip diameter = 18 mils) Best pointing accuracy of any probe.

IDI part number ICT-S25UR-5.5DGD-S
(Huntron P/N 07-2112)

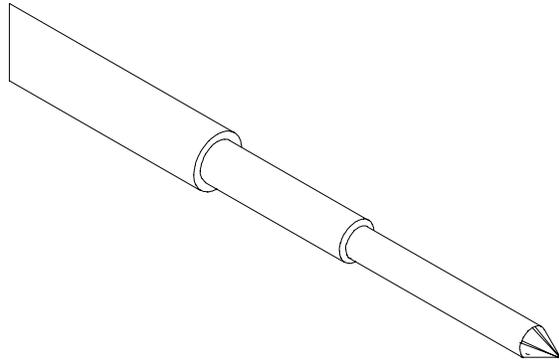


FLEX TIP SPEAR PROBE

Used for testing contaminated boards or conformal coatings.

Fine pitch devices can also be tested with this probe.

IDI part number S25FX-5.5DS
(Huntron P/N 07-2111)



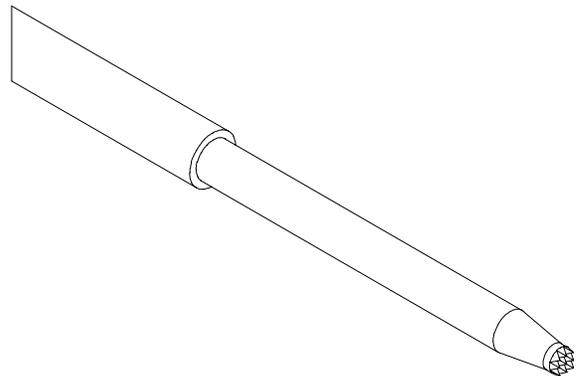
9 POINT TAPERED SERRATED PROBE

Used to test leads, lands and pads.

Used for densely populated boards and fine pitched devices.

Best for 50 mils or wider spaced leads or pads (tip diameter = 25 mils).

IDI part number S25HT-10DS
(Huntron P/N 07-2107)

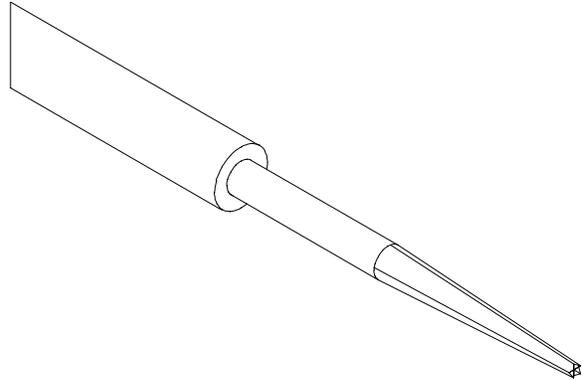


4 POINT TAPERED CROWN PROBE

Used to test leads, land and pads on densely populated boards.

Best for small pad or SMD testing
(tip diameter = 11 mils).

IDI part number S25UT-6.7G
(Huntron P/N 07-2120)

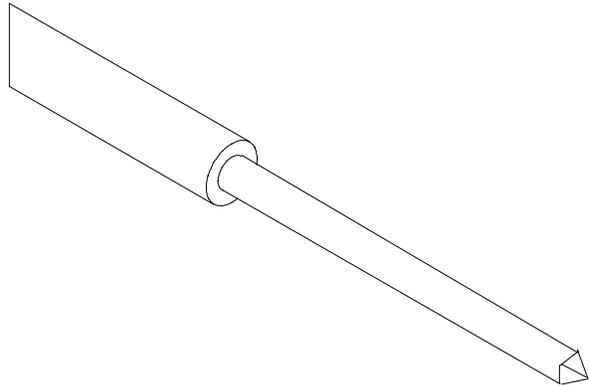


30 DEGREE SPEAR POINT PROBE

Use this probe for testing land pads and plated through holes. The spear point penetrates thin layers of oxides or contaminants.

Extended length for densely packed components.

IDI part number SR25B-6.3D
(Huntron P/N 07-2106)

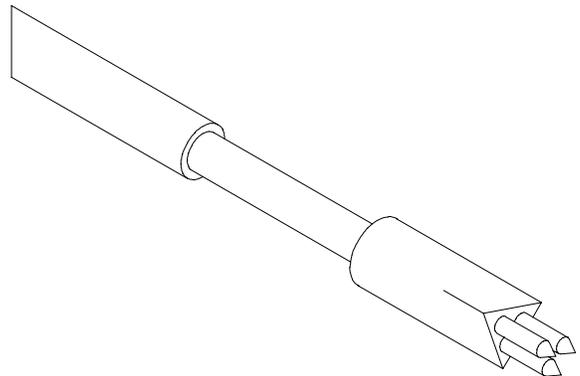


TRI-NEEDLE PROBE

Used to test contaminated boards or pierce conformal coatings.

Best for 100 mils or wider spaced leads or pads.

IDI part number 25TN-6.7EN
(Huntron P/N 07-2108)

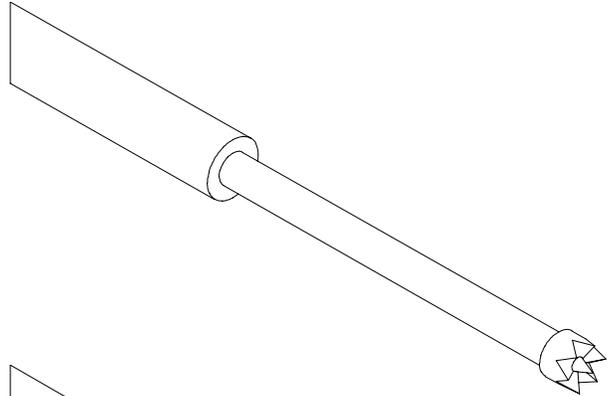


TULIP PROBE

Used to test long leads, terminals and wire wrap posts.

Best for 100 mils or wider spaced leads or pads (tip diameter = 55 mils).

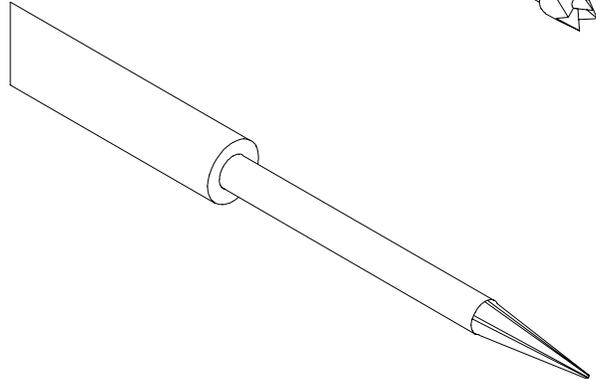
IDI part number SR25Y-6.3D
(Huntron P/N 07-2113)



SINGLE NEEDLE FLUX PENETRATING PROBE

Used for penetrating flux and conformal coated boards.

IDI part number S25SN-10DS
(Huntron P/N 07-2136)



4-8 SPECIFICATIONS FOR THE PROBE RECEPTACLE

The general specifications for the probe receptacle, which is press fitted into the Prober probe holder, are as follows:

The IDI part number of this receptacle is R-25-SC (Huntron P/N 07-2109).

Receptacle Size:	25
Connection Style:	SC - solder cup
Material:	Nickel/silver, gold plated
Total Length:	1.165 inch (29.59mm)
Overall Outside Diameter:	0.066 inch (1.68mm) outside
Use Spring Probes Size:	0.054 inch (1.37mm)

4-9 MANUFACTURERS OF CONTACT SPRING PROBES

Interconnect Devices, Inc. (IDI)
5101 Richland Avenue
Kansas City, Kansas 66106
Phone: (913) 342-5544 FAX: (913) 342-7043

*IDI part numbers are subject to change. If any of the above probes are not available, contact IDI for an equivalent or better part. To order from Huntron, please use the Huntron part number.

4-10 USING THE BURN-IN/OFFSET BOARD TO CHECK FOR PROPER HARDWARE FUNCTIONS

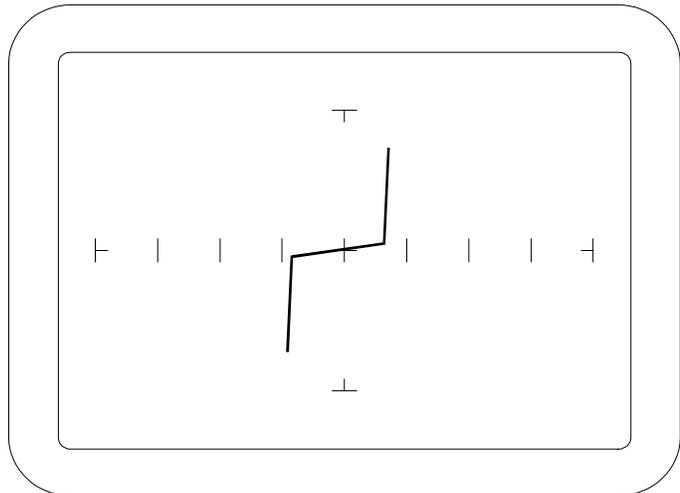
This optional board (p/n **06-3078**) can be used for checking the operation of your Prober. **Run the Camera Offset routine on this board.**

Set up all the 50 mils spaced components (U1 to U8) on the Burn-in/offset board. Connect the Common terminal to the node marked “Common” on this board.

Each alternate pin (1,3,5 etc.) is connected to the Cathode of Diode D1. The Anode of D1 is then connected to Common. Pins (2,4,6, etc. are all connected to the Anode of Diode D2. The Cathode of D2 is connected to Common. This simple circuit enables us to find the following failure modes:

If the Prober misses the IC pins, an OPEN Signature will be displayed.

If the Prober Shorts two adjacent pins, a signature of a typical “chair” pattern will be displayed as shown here.



The Prober should complete at least 10 passes on all the pins of the 50 mils spaced components.

If the Prober consistently misses all pins by approximately the same distance, then your Camera offset may not be correctly setup.

If the same pins fail consistently, you may have to check if the original pins were setup correctly.

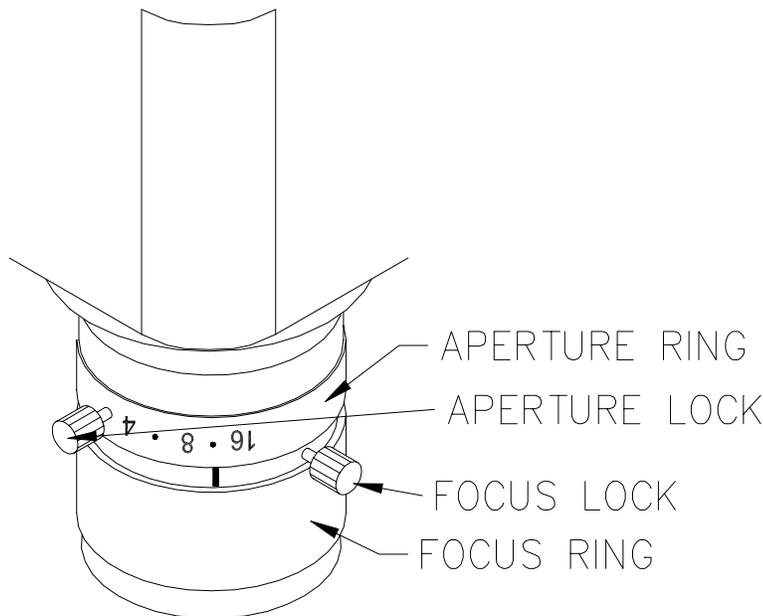
If the Prober misses pins randomly and is unable to make at least 10 passes, then call Huntron Technical Support for more troubleshooting tips.

4-11 Focus and Aperture adjustment on Prober models IIc and IIIc

The camera lens on the color camera have separate Focus and Adjustment rings. These adjustment rings can be locked via locking screws. The aperture setting is factory set to between 8 and 16 and will be locked. The setting is shown below. If the camera image appears dark even with maximum light intensity, it may be necessary to adjust the aperture. By using a larger aperture (decrease in F number), more light will enter the lens but the depth of field will be shorter. Components at various heights will appear unfocused. The best setting is to have the smallest aperture (F 16) and some external bright and evenly distributed light. A small florescent lamp would be sufficient as an additional external light source.

To change the **Aperture size** (F stop) loosen the top screw as shown and rotate to an appropriate setting. Ensure that live camera images are displayed on the PC monitor to check your setting. Tighten the knob when the adjustment is done.

To **focus** the image, simply loosen the bottom screw as shown and rotate until the image is focused. Remember to focus on the actual PCB where the probe will be making contact. If other components at different heights appear unfocused, do not attempt to change settings to get a most desirable setting. It is more important to get a focused image at the PCB level.



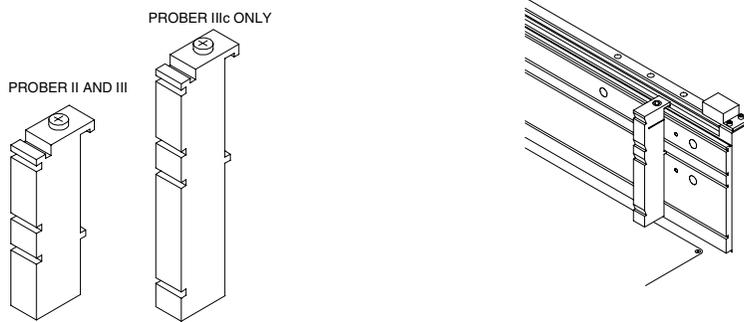
SECTION 5

PROBER TEST BOARD SUPPORT ACCESSORIES

PROBER TEST BOARD SUPPORT ACCESSORIES

This section describes the test board support accessories for use with a Prober I, II, and III. These accessories are used in various combinations to hold different types of boards in the Prober. The description of each accessory includes an illustration and some examples of typical uses. Huntron part numbers are shown at the end of this section.

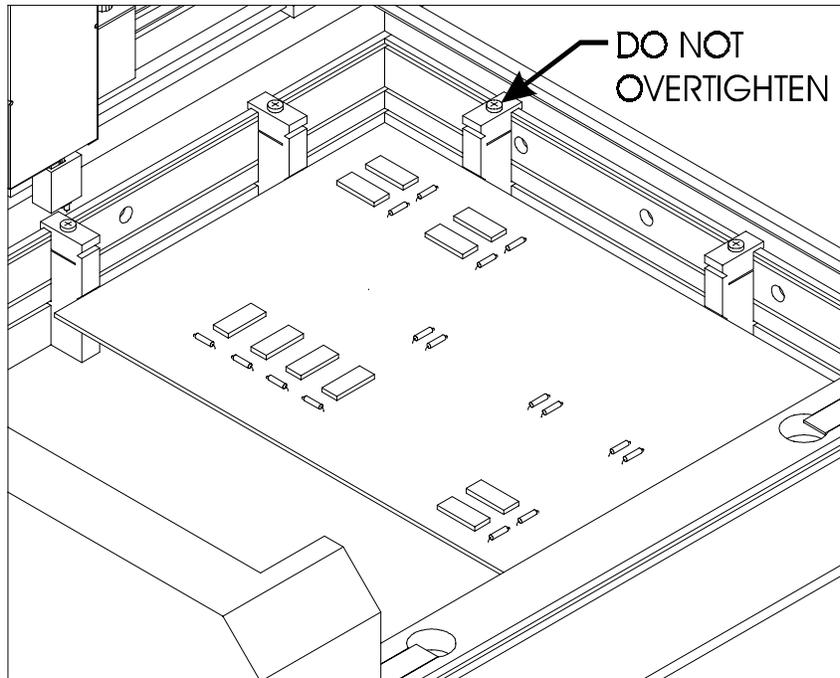
5-1 BOARD SPACERS



Prober IIIc additional slot shown with board spacer.

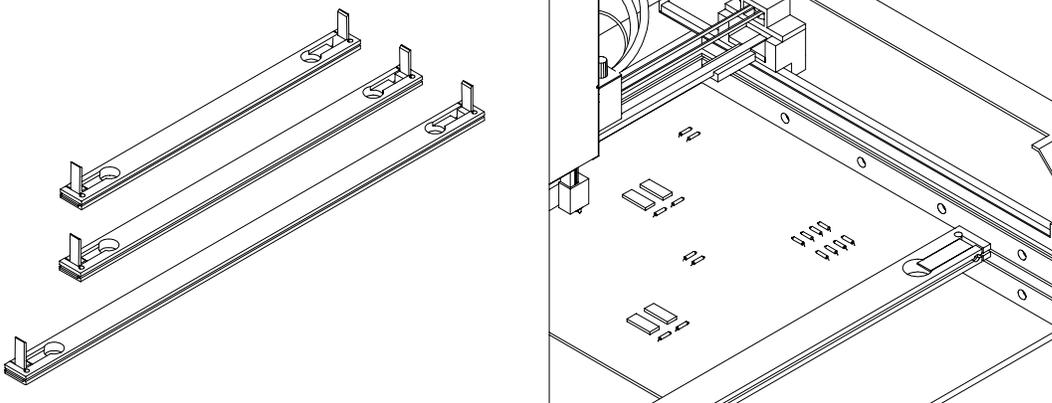
Board Spacers move the test board away from the slotted walls. The Prober can only probe components that are approximately 0.6" (15mm) away from the slotted walls of the Prober.

Board Spacers snap onto and slide along the slotted walls. They allow the probing of components on the edge of boards and the supporting of boards with protruding components. (4 board spacers are included in the Prober package)



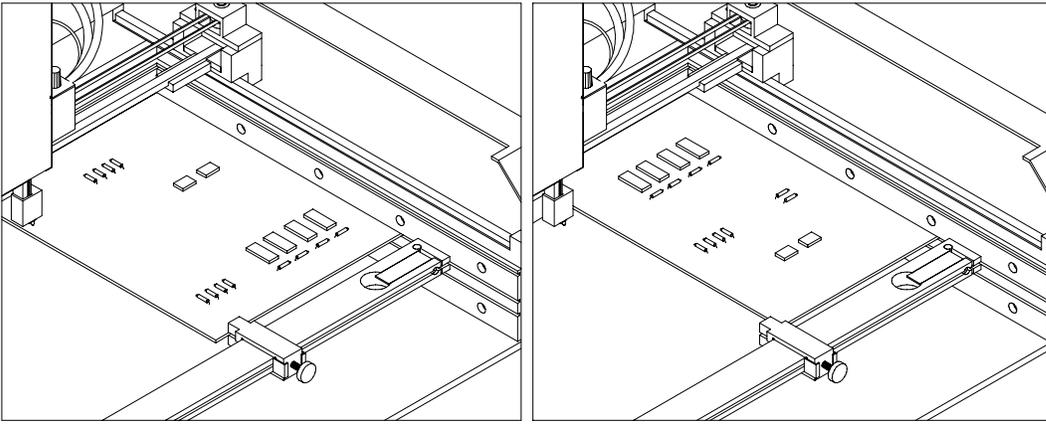
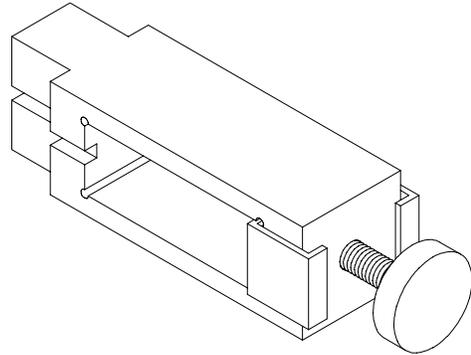
5-2 CROSSBAR

The Crossbar is normally used to hold the front side of the test board.
(1 Crossbar is included in the Prober package)



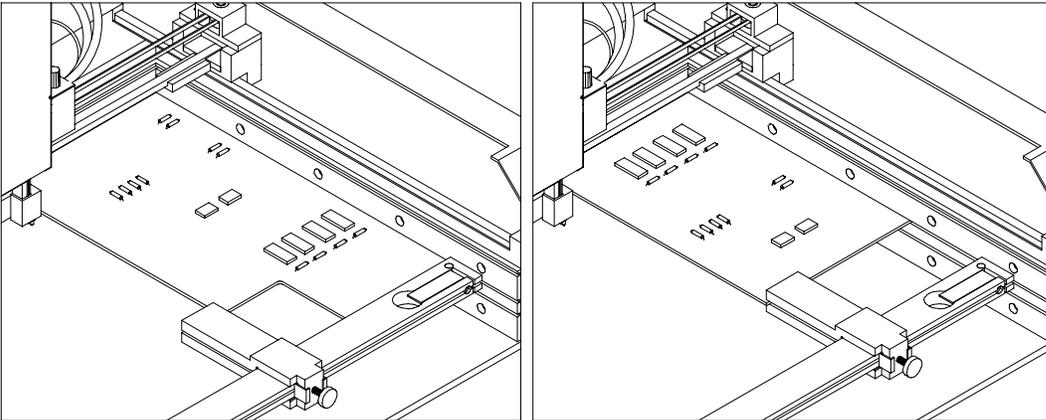
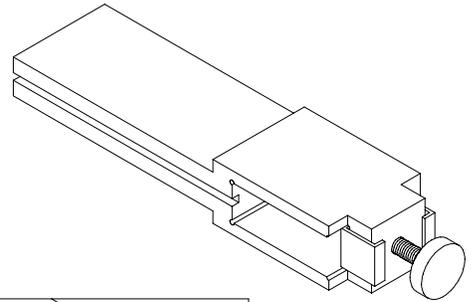
5-3 SLIDE BAR

The Slide Bar mounted on a Crossbar holds the left front corner of the test board. The front of a Slide Bar on a Crossbar can hold the Printed Circuit Assembly away from the Crossbar to allow components on the front edge of the board to be reached by the probe tip. Use a Slide Bar and a Slide Bar Extension mounted on a Crossbar to hold the unsupported side of the test board. (1 Slide Bar is included in the Prober package)



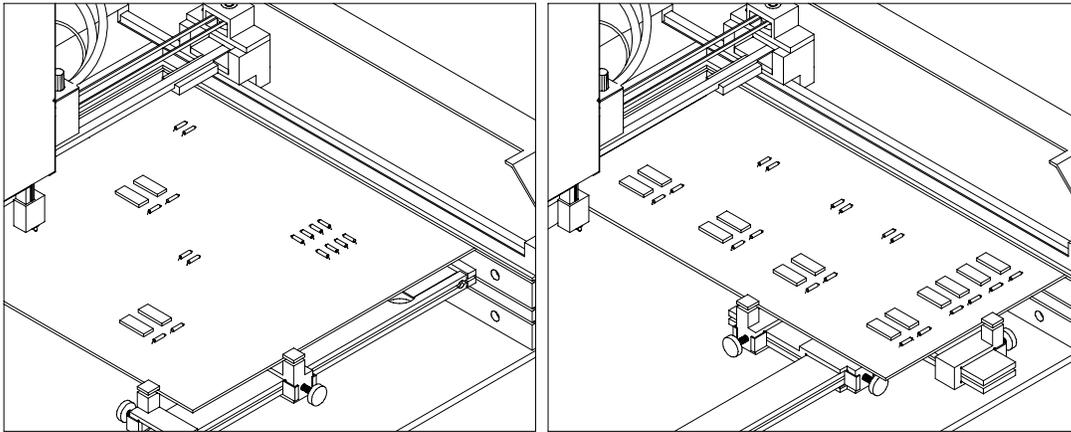
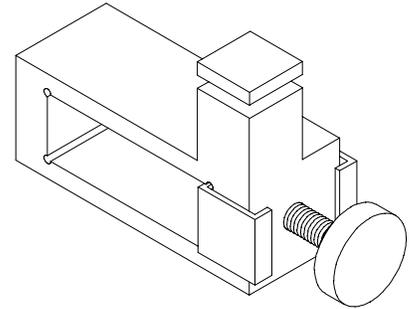
5-4 SLIDE BAR EXTENSION

The Slide Bar Extension mounted on a Crossbar can hold the unsupported side of the test board. The Slide Bar Extension can also be configured with a Slide Bar for additional support of the side of the test board. (1 Slide Bar Extension is included in the Prober package)



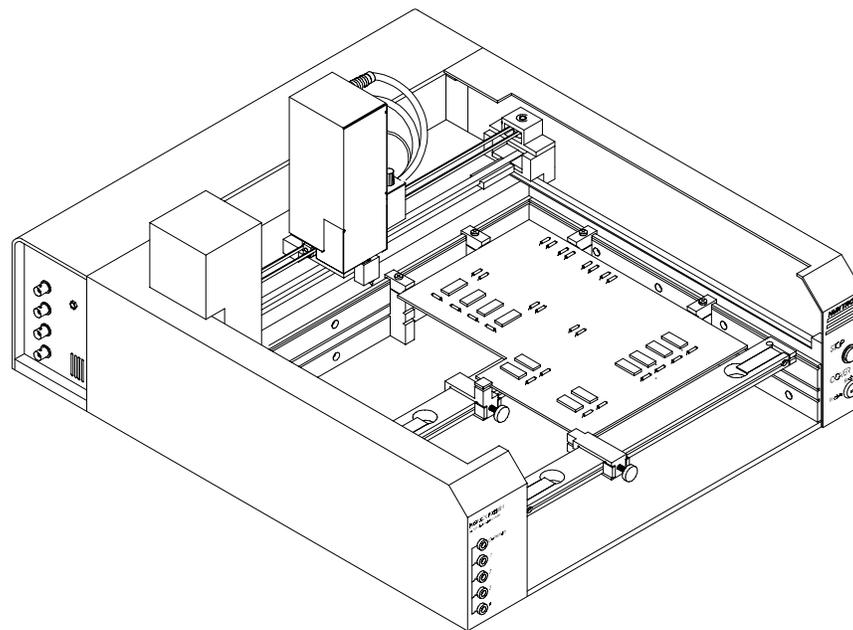
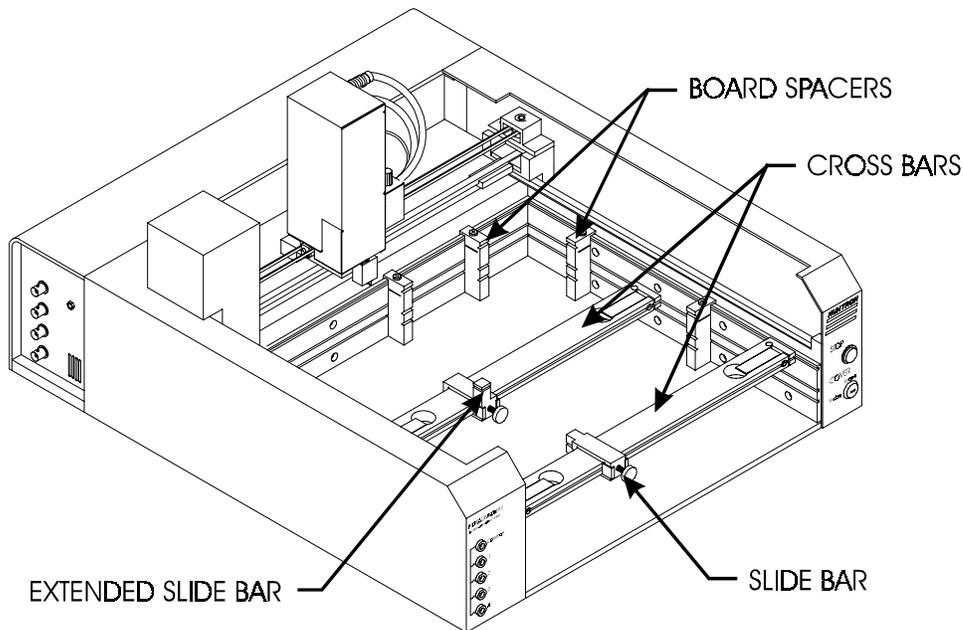
5-5 EXTENDED SLIDE BAR

A Crossbar in the middle slot underneath the test board with an Extended Slide Bar can give support to the unsupported side of the test board. Also, a Crossbar in the middle slot is the main support for holding Printed Circuit Assemblies in the top slot that protrude from the front of the Prober. In this case, use the Crossbar with two Slide Bar Extensions and two Extended Slide Bars. (1 Extended Slide Bar is included in the Prober II and III package)



This figure shows how to mount a board that is larger than the normal clamping area. By using Slide Bar Extensions and Extended Slide Bars, the effective clamping area for Prober II grows from 12.5" X 13.5" (31.75 cm by 34.29 cm) to 12.5" X 17.5" (31.75 cm by 44.45 cm). While the clamping area will be increased, the probing area will not change. If you use Board Spacers to allow probing out to the board edge which is next to the back wall of the Prober, the clamping area will only increase to 12.5" X 16.75" (31.75 cm by 42.45 cm). The additional Crossbar and Extended Slide Bar holds the middle of the unsupported edge of the board and prevent the board from flexing while being probed.

When using Extended Slide Bars, the board must be mounted in the top slot of the Prober. The Crossbars (which hold the Slide Bar Extensions and Extended Slide Bars) are then mounted in the middle slot.



Clamping an Irregularly Shaped Board

This figure shows how to mount either an irregularly shaped board or a long and narrow board. The additional Crossbar and Extended Slide Bar hold the middle of the unsupported edge of the board and prevent the board from flexing while being probed. The Board Spacers allow the Prober to probe components that are mounted within 0.6" (15mm) of the slotted wall edge of the board.

When using the Extended Slide Bar, the board must be mounted in the top slot of the Prober. The additional Crossbar (which holds the Extended Slide Bar) is then mounted in the middle slot.

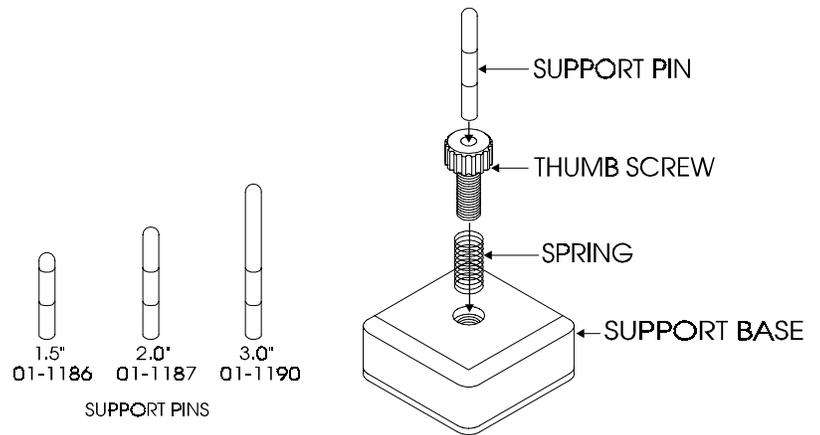
5-6 SUPPORT KIT FOR LARGE BOARDS

Two blocks are included in the Prober III Package. The block can hold three different length pins which are used to prevent large boards from flexing.

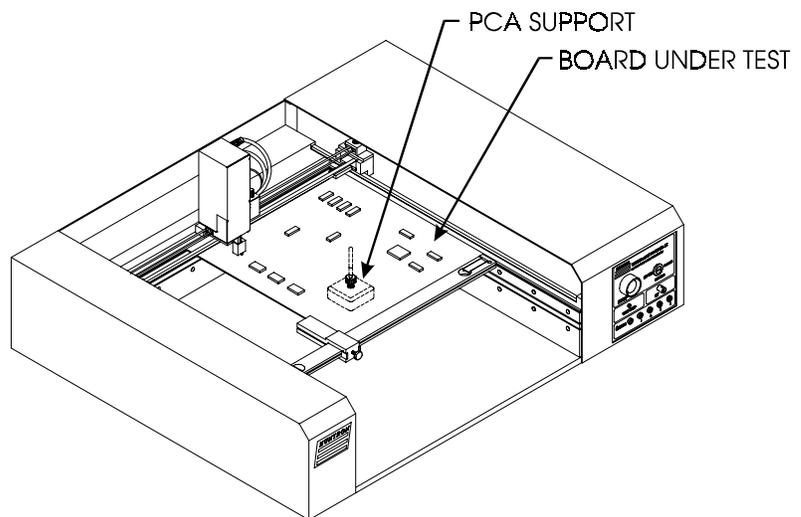
The 3" pin is used for boards mounted in the top slot.

The 2" pin is for the middle slot.

The 1.5" pin is for the bottom slot.



1. Insert pin with spring.
2. Place under board.
3. Rotate thumb screw to adjust pin height.



5-7 AUXILIARY PROBE ACCESSORY KIT

How to use the Auxiliary Probe Accessory kit for connecting an oscilloscope to a Huntron Prober.

Introduction

A Huntron Prober has a spring loaded test probe attached to the Z axis. This probe is directly connected to a flexible coaxial cable which is terminated with a BNC connector at the Prober back panel. An oscilloscope can be directly connected to the BNC connector allowing test signals to be displayed on the oscilloscope CRT. However, due to the length of the coaxial cable and the high cable capacitance, high frequency (above 20Mhz) measurements may not be possible in this configuration. For typical signal analysis using a 100 MHz oscilloscope, it will be necessary to use a 10X oscilloscope probe.

This accessory kit allows the connection of an oscilloscope probe to the spring loaded test probe on the Huntron Prober. The long coaxial cable in the Prober is essentially replaced with your oscilloscope probe cable and a much shorter coaxial cable.

The Auxiliary Probe Accessory P/N 98-0266 kit consists of the following parts:

Description	Huntron P/N
1 Auxiliary Probe Holder	01-1239
1 Coaxial Cable Assembly, F/M	06-4147
1 BNC Adapter	07-1338
2 Screws, 4-40 x 1/2" Philips PH w/washer	07-3085
2 Cable Ties, black, 4"	07-3094
1 Thumb Screw Knob	07-3108
1 Spiral Wrap, 1/2" OD	07-3153
1 Cable Clamp, 1"	07-3207
1 Plastic Bag	20-1027
1 Box	20-1071
1 Auxiliary Probe Instruction Sheet	21-2117
1 Bubble Pack	30-2037

The Auxiliary Probe Holder is used for attaching your oscilloscope probe to the Prober Z axis. The BNC Adapter plugs into the oscilloscope probe tip.

A short coaxial cable is used to connect the BNC Adapter to the Prober's spring loaded probe.

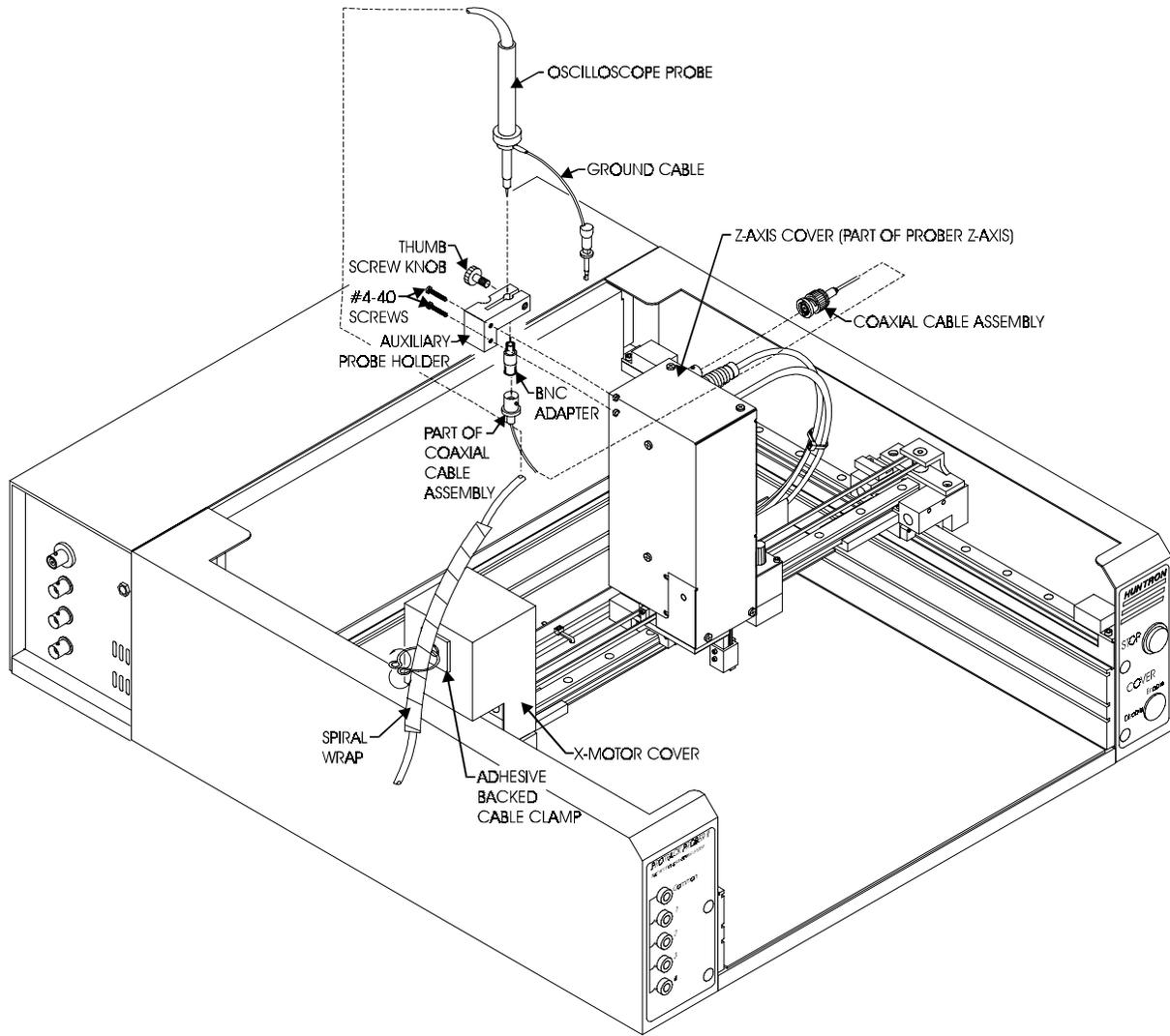


Figure 1. Installation of the Auxiliary Probe Kit on Prober II

NOTES:

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Installation of the Auxiliary Probe kit. (Refer to Figure 1)

1. Install the Auxiliary Probe Holder using the 2 supplied screws.
2. Insert your oscilloscope probe (not supplied with this kit) into the clamp hole of the Auxiliary Probe Holder and tighten the Thumb Screw Knob. The oscilloscope probe should now be firmly attached to the Prober Z axis.
3. Plug the supplied BNC Adapter into the tip of the oscilloscope probe.
4. Now plug the female end of the supplied Coaxial Cable Assembly into the other end of the BNC Adapter.
5. Disconnect the BNC connector on the right side of the Z axis cover. This cable will not be used for this application. Use a cable tie and attach the unused cable to the wire tray as shown in Figure 3.

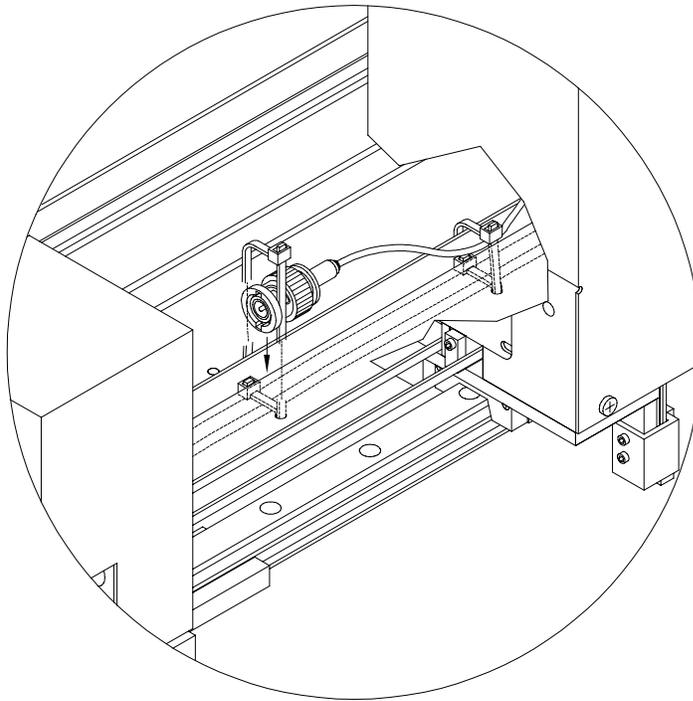


Figure 3. Attaching the unused coaxial cable to the wire tray.

6. Connect the other end of the Coaxial Cable Assembly to the BNC connector on the right side of the Z Axis Cover.
7. Attach the Spiral Wrap to the oscilloscope cable by twisting it so that it wraps around the cable as shown.
8. Install the adhesive backed cable clamp on the left side of the X-Motor Cover as shown. Attach the spiral wrapped oscilloscope cable to the clamp and twist the clamp teeth as shown.
9. Connect the BNC end of the oscilloscope cable to the oscilloscope.
10. Use the ground lead supplied with the oscilloscope to connect to the Ground or reference point of the board-under-test.

You are now ready to use the system.

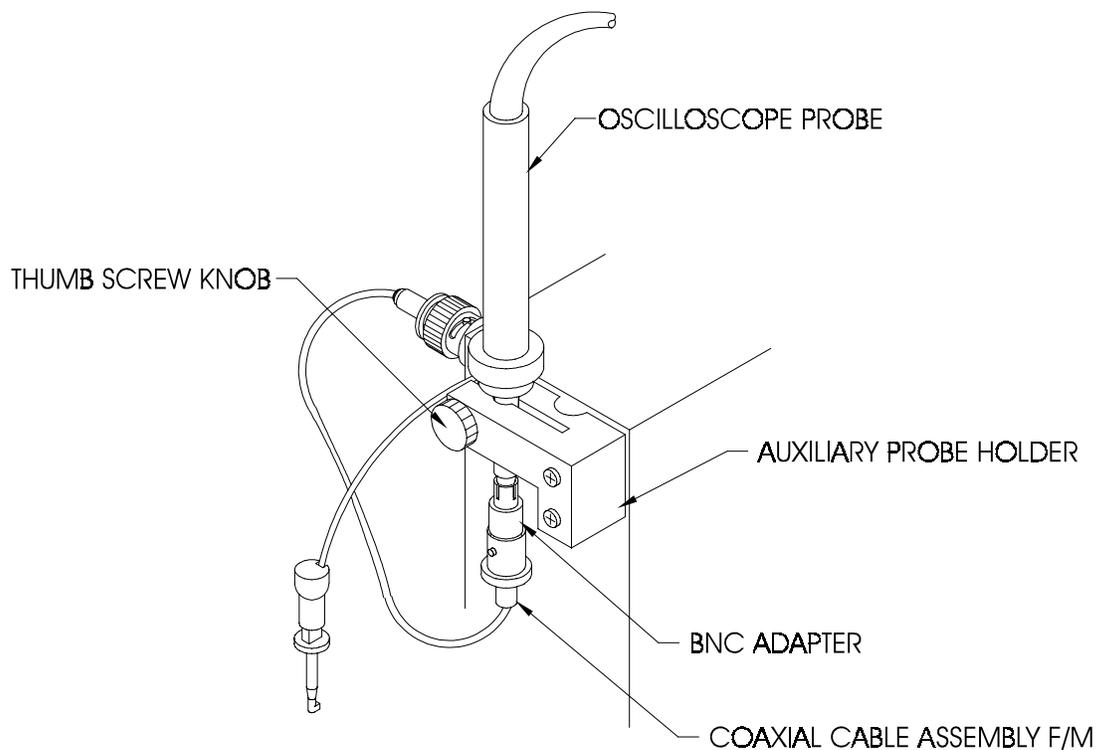


Figure 4. Rear View of assembled parts

Please use these Huntron part numbers for ordering additional accessories.

	Prober I	Prober II and IIc	Prober III	Prober IIIc
Board Spacer	98-0221	98-0111	98-0111	98-0292
Cross Bar w/Locks	98-0222	98-0110	98-0119	98-0019
Slide Bar	98-0109	98-0109	98-0109	98-0109
Slide Bar Extension	98-0132	98-0132	98-0132	98-0132
Extended Slide Bar	98-0133	98-0133	98-0133	98-0133
PCA Support Kit	none	none	98-0167	98-0167
Auxiliary Probe Accessory Kit	98-0266	98-0266	none	none

Notes:

SECTION 6

APPLICATION NOTES

6-1 HOW TO USE THE FRONT PANEL COMMONS

The Prober front panel commons are marked Common, COM1, COM2, COM3 and COM4. These common terminals are used for applications requiring more than one Common connection to the board-under-test. For example, you may want to setup a board so that some components are tested with respect to the Ground terminal and others with respect to Vcc or any other power supply rail. Even though no power source is applied to the board-under-test, signatures may appear significantly different with respect to different Common references.

The main common terminal Common on the Prober front panel is directly connected to the common BNC jack on the Prober side or back panel.

NOTE: Even though 4 Commons are available for physical connection to the board-under-test, only a combination of any 2 of those 4 Commons will get shorted to the main Common terminal. For example, connecting all the Commons to the board can allow the following test conditions:

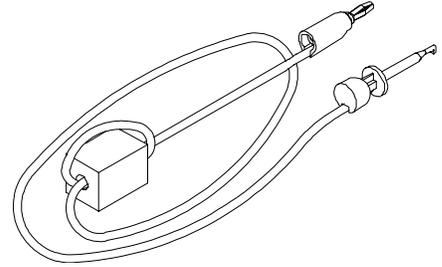
For example, component U1 can be tested relative to COM1 or COM2 or COM3 or COM4. You will have to set up 4 components, each with a different Common if you want to test it relative to all the above Commons.

Component U1 can be tested relative to COM1 and COM2. This will short COM1 and COM2 to the Common terminal. Any combination of **two** Commons can be set up in this way. This feature is useful when you want to short out the power supply rails to the Common circuit.

Component U1 could have been tested relative to COM1, and U2 relative to COM3 and COM4, and U3 relative to COM1 and COM2 etc. In each case, only two Commons are allowed to be shorted to the Common terminal which is wired to the Common terminal of the ProTrack.

6-2 USING THE COMMON CLIP CABLE WITH THE FERRITE NOISE SUPPRESSER

One of the Common cables supplied has a Ferrite suppresser looped around one end of the cable. Use this Common cable if you are testing at low voltages (below 3V). Low voltage testing is sensitive to external noise being coupled into the test system. This high frequency noise can be attenuated by using the ferrite coupled Common cable.



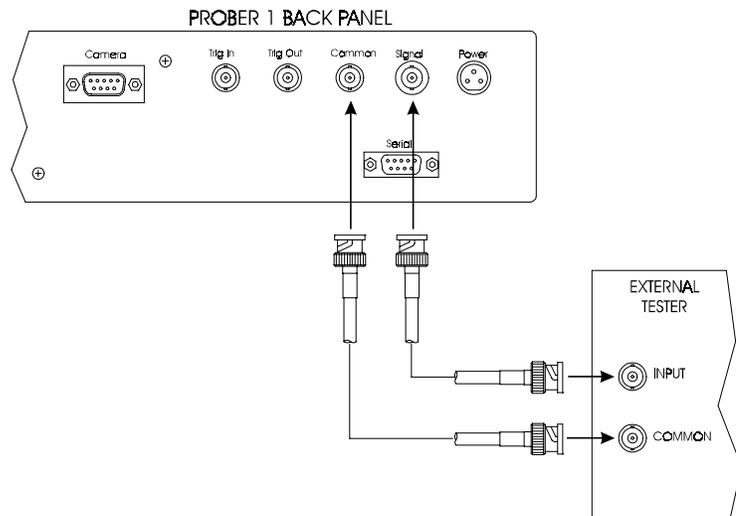
6-3 USING EXTERNAL TESTERS WITH THE ROBOTIC PROBER

The ProTrack can be regarded as an external tester. It provides a test signal to the test probe and records the response in the computer. Similarly, any tester capable of applying or monitoring test signals via the test probe can be connected to the Prober. To accomplish this, some custom software has to be developed in order to make the testing automatic.

The hardware connection to the Prober is via the Signal and Common BNC connectors at the back panel of the Prober. The external tester's signal is connected to the Signal BNC connector and the return or Common connection for a typical 2 wire measurement is connected to the Common BNC connector.

This type of connection automatically routes the external tester's signal to the spring loaded test probe on the Z axis. The board-under-test Common is connected to the tester's Common terminal.

The external tester could be a digitizing Oscilloscope, RCL Meter, Volt Meter, Impedance Meter, Analog to Digital Converter, Fault Simulator, Logic Probe, or even a functional tester with a guided probe.



6-4 HARDWARE HANDSHAKING

The Prober hardware also provides a TTL type output and input for allowing hardware handshaking with external testers. The Prober Trigger-Out and Trigger-In signals are available via BNC connectors at the Prober back panel.

6-5 PROBER TRIG IN/OUT SIGNALS

Prober Trigger-Out signal

The Trigger-Out signal is a 5 volt or 0 volt signal which can be used to indicate to the external tester to execute it's test routine. At this time the Prober test probe is in the down position, and is touching the test point on the board. The tester should now apply it's signal.

Prober Trigger-In signal

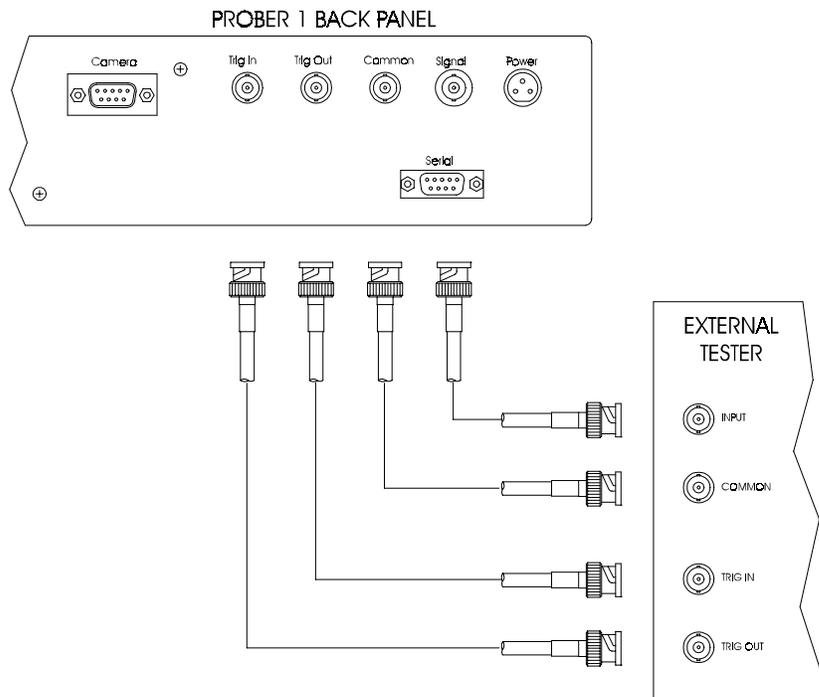
The Prober's Trigger-In signal is normally High. When this line is set to Low by an external tester, the Prober will move the probe up and proceed to the next test point.

6-6 Time Delay Duration

If the external tester has no Trigger In/Out capability, a time delay can be set so that the Probe will wait a specific number of milliseconds in the Down position. While the probe is Down, the tester must execute it's test routine. After the time delay duration expires, the Probe will move up and to the next test point.

6-7 EXAMPLE OF A CONCEPTUAL EXTERNAL TESTER

Let us assume that we have an external voltmeter that is capable of recording 64 readings and has a Trigger Input/Output capability. The voltmeter's Trigger Out line is setup so that it goes LOW whenever a reading is successfully recorded. The voltmeter's Trigger-In line is setup so that whenever a High signal is present, it should take another reading and record it.



Here is an example of the sequence of events for hardware handshaking.

- The XY positions of 64 test pins are set up using the Align, and Teach routines from the Huntron Workstation for Windows software.
- The appropriate parameters in the Settings and External menus are setup. Refer to the Help Menu for specific details on External Settings.
- After clicking Scan Component from the Control menu, the voltmeter is waiting for it's Trigger-In to go High so that it can take a reading.
- The probe moves to the first test point and is making contact with the test point on the board-under-test.
- The Prober's Trigger-Out line goes High, indicating to the voltmeter to take the reading.

- The voltmeter, upon detecting this signal, takes the reading and after the value is stored, set it's Trigger-Out to a Low state.
- The Prober detects it's Trigger-In as Low, indicating that the voltmeter is done taking the reading. The probe moves Up and then to the next test point, making contact with it. The Prober's Trigger-Out then goes High indicating to the voltmeter to take the next reading. This cycle is repeated until all 64 test points are accessed.

Setting a time delay Duration with Trigger-Out set to Active High.

In the External menu, set the Duration parameter to 200 ms.

This will allow the probe to wait for 200ms after issuing a High on it's Trigger-Out line while the probe is in the Down position. There is no monitoring of the Trigger-In signal.

Time delay Duration only.

If the time taken for the external tester is a known quantity, the simplest way to synchronize the testing is to set a time delay Duration. Here, there is no need to connect the Trigger lines. The Prober will simply wait for the time to expire while the Probe is in the Down position.

SECTION 7

CUSTOM APPLICATIONS

7-1 CUSTOM SOFTWARE FOR USE WITH EXTERNAL TESTERS

Huntron can provide Windows DLLs so that software developers can customize the Prober software to their external tester capabilities. These libraries will allow the user to have direct access to the stepper motor commands, thus enabling the custom application to move the probe to any specific location. The Prober's Camera image can also be accessed using appropriate libraries. The Trigger-In and Trigger-Out lines are available for hardware handshaking.

The developer will have to be familiar with C and Windows programming using DLLs.

7-2 IMPORTING CAD DATA FROM PRINTED CIRCUIT BOARD LAYOUT SOFTWARE TO THE HUNTRON WORKSTATION FOR WINDOWS FORMAT

This feature eliminates the "teach" task of setting up all the XY locations of test points. The basic concept involves creating specific data files in a format that the Huntron software can interpret. This format is a custom Huntron ASCII CAD file created by third party data conversion software.

A detailed description of the entire import process is discussed in the software Help file under the keyword "Import".

Once the "Import" process is successful, the user aligns the board using the first pin of the first component or net as the first Alignment point. The second Alignment point is the first pin of the last component or net. The board is then aligned to these points and the user can optionally re-align the board to new points if it is necessary. The Z Up/Down profile then needs to be setup from the Prober software. The new Z Up/Down profile will apply to all the imported test points. The board is then scanned and the signatures are stored on the PC hard disk. The system is now setup for testing the board.

7-3 HINTS AND TECHNIQUES FOR PROBING SURFACE MOUNTED COMPONENTS

Probing fine pitched devices can be difficult. The pins of these devices are sometimes smaller than the width of the test probe. J-leaded pins bend underneath the component, so no reliable access is available for probing at the pcb level. Some devices have Metric number spacing, thus forcing the software to round off the spacing numbers to the nearest 1/1000 of an inch leading to inaccurate calculations. Some devices are not placed exactly at the same location relative to the “golden board. However, it is still possible to probe these devices with the Prober. The following suggestions serves as a general guide for probing Surface Mount Devices.

1. Be sure all Prober rails are properly lubricated before you begin.
2. Be sure the printed circuit assembly is secure in all directions. Larger boards may need support from below to stop probe bounce. Smaller boards may need a custom support fixture.
3. Focus the camera at the beginning of the Camera Offset procedure and do not touch the focus knob again until the test routine is finished.
4. Perform the Camera Offset routine using the card under test rather than Burn in/Offset Board supplied. Use a magnifying glass to be sure that the probe is exactly on the offset point.
5. Select alignment points that are clearly visible. 90 degree angle foil runs are good examples of alignment points.
6. Program all position coordinates in one sitting. Do not jump in and out of the program making the numerous alignments necessary. Each interruption to the position programming and subsequent realignment increases the margin of error. **Always Align if the probe head returns to the Home position.**
7. Take care to locate cross hairs over the center of pins using the Zoom feature. Try to probe the board/pad rather than the neck of the pins.
8. Be aware that the camera offset is accurate only to the slot level selected. If you are probing test points much higher (more than 200 mils) than the slot level, then the Camera offsets will not be accurate. Try to test points on the pcb itself.
9. To probe devices that are spaced less than 25 mils, a smaller test probe is necessary. The current crown point recommended for SMDs has a tip diameter of 11 mils. This may short out two adjacent pins on certain fine pitched components. A single point version of the tri-needle probe may work better. For smd probing, use the 4 point tapered crown probe (P/N 07-2120) or the single needle flux penetrating probe (P/N 07-2136)

7-4 PROBING BOARDS WITH COMPONENTS THAT ARE MORE THAN 3 INCHES HIGH

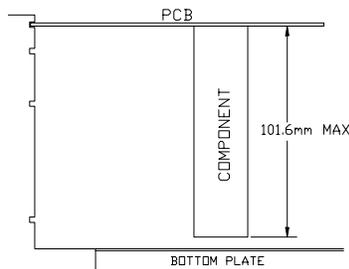
Some boards have components like capacitors, heat sinks, and transformers that are more than 3 inches high. Probing the component side of these boards is difficult due to the limited Z axis up/down travel. These boards have to be probed on the solder side. However, the component may be in the way when you try to clamp it into the board slot.

With Prober III the bottom slot is about 2 inches higher than Prober II.

The **Prober IIIc**, has an additional slot that will allow a maximum component height of 4.21 inches (10.7 cm). The printed circuit assembly can then be placed with the solder side up in the top slot with the tall components facing downward. The board can also be placed in the lowest slot with the component side up.

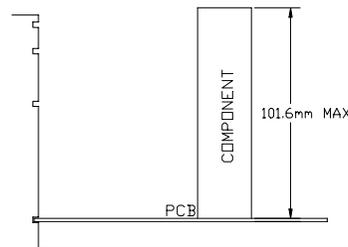
The drawings below show the various methods for installing a board with tall components.

PCB PLACED IN PROBER TOP SLOT WITH LARGE COMPONENT UNDER THE BOARD

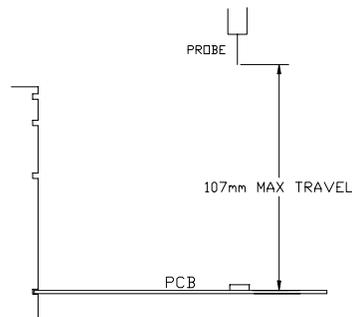


BY REMOVING THE BOTTOM PLATE, THE BASE OPENING BECOMES ACCESSIBLE AND COMPONENTS CAN EXTEND TO THE TABLE TOP ADDING ANOTHER 25mm TO MAX COMPONENT HEIGHT.

PCB PLACED IN PROBER BOTTOM SLOT WITH LARGE COMPONENT ON TOP OF THE BOARD



PCB PLACED IN PROBER BOTTOM SLOT WITH SMALL COMPONENT ON TOP OF THE BOARD

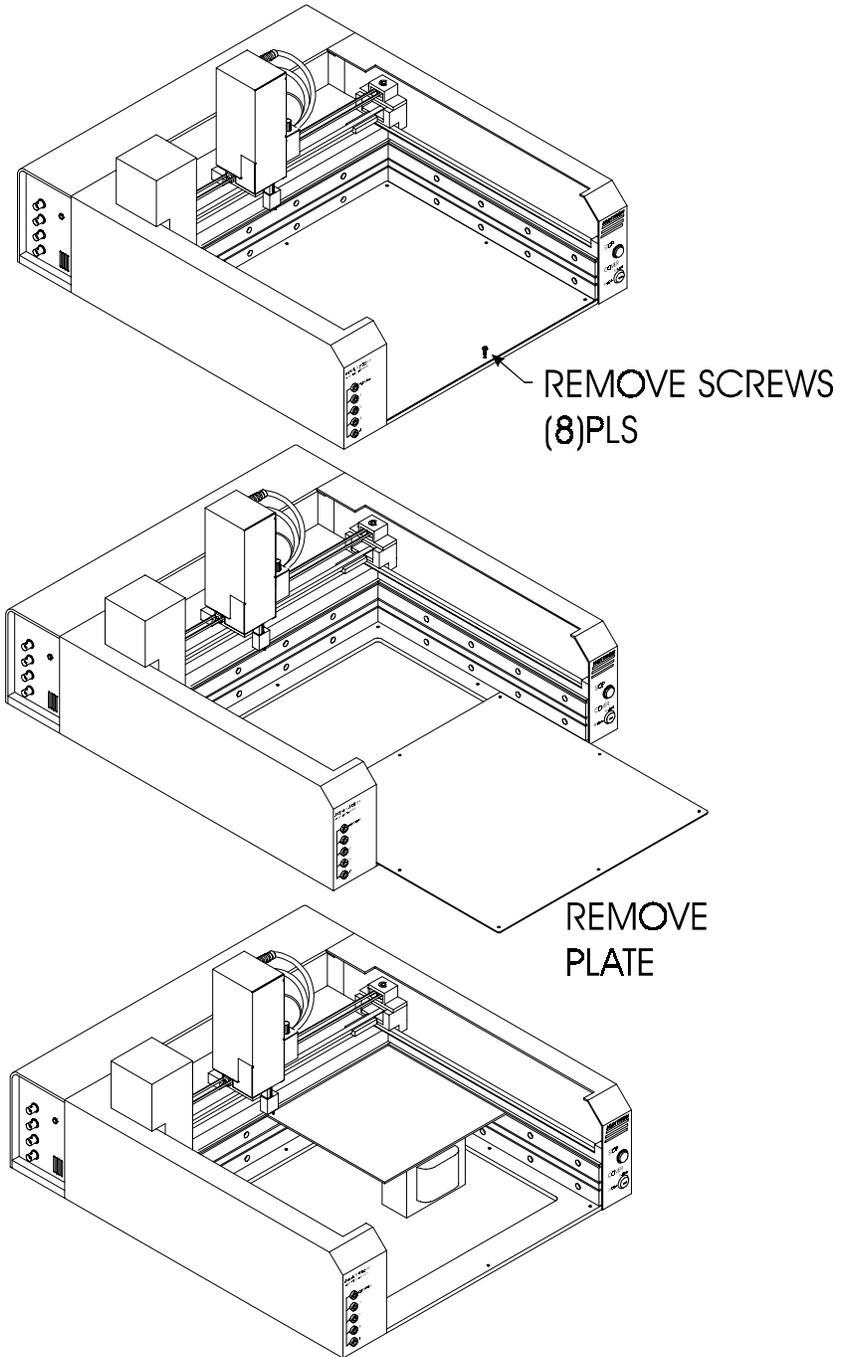


NOTE: To probe boards in the **Base Slot (lowest slot)**, a longer test probe has to be installed. Using the standard length probe will not allow you to probe boards in the **Base Slot**. Install the **30 Degree Spear Point Probe (P/N 07-2106)** into the **Probe Holder** according to the instructions in the **User Manual Section 4-5**. This is an extended length probe required for probing boards that are mounted in the **Base Slot (lowest slot)**.

Prober II, IIc, III and IIIc has an additional cutout in the base plate. This allows for additional clearance for the large components. Remove the plate as shown below. Mount your board so that the large components are now positioned inside the cutout. Sometimes, the common connections to the board-under test is difficult. The additional clearance may also make it easier to access the Common connections.

Re-install plate when this feature is not needed.

Prober II



End of document