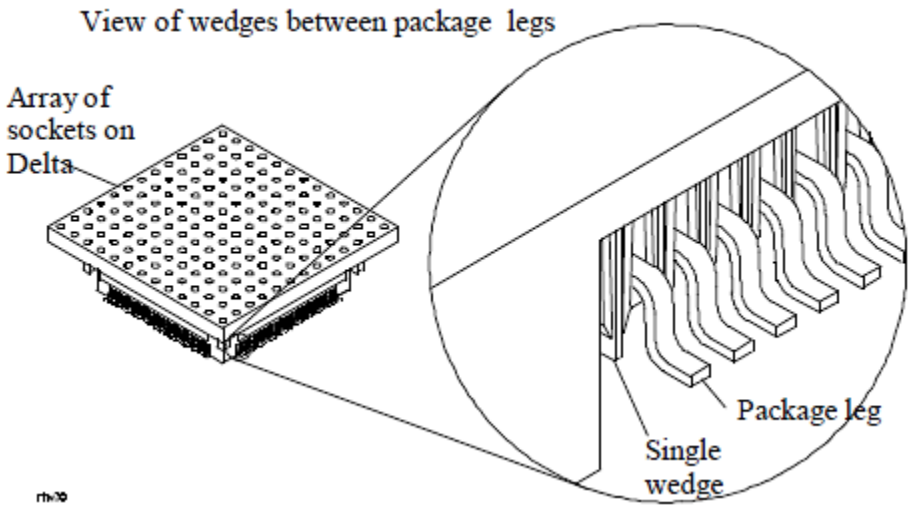
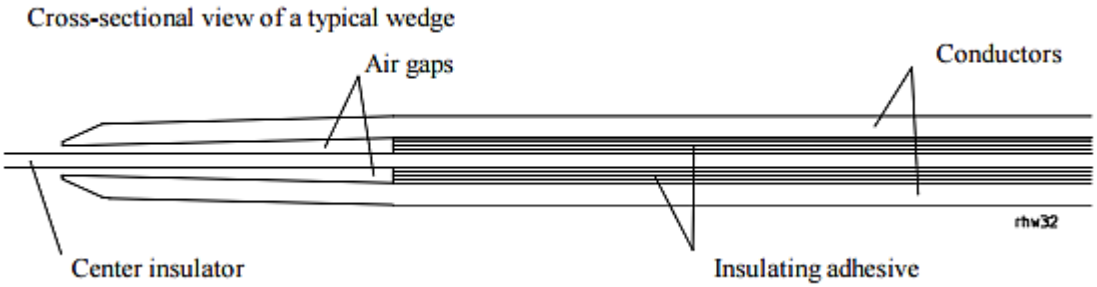
Wedge Clip Instruction Manual

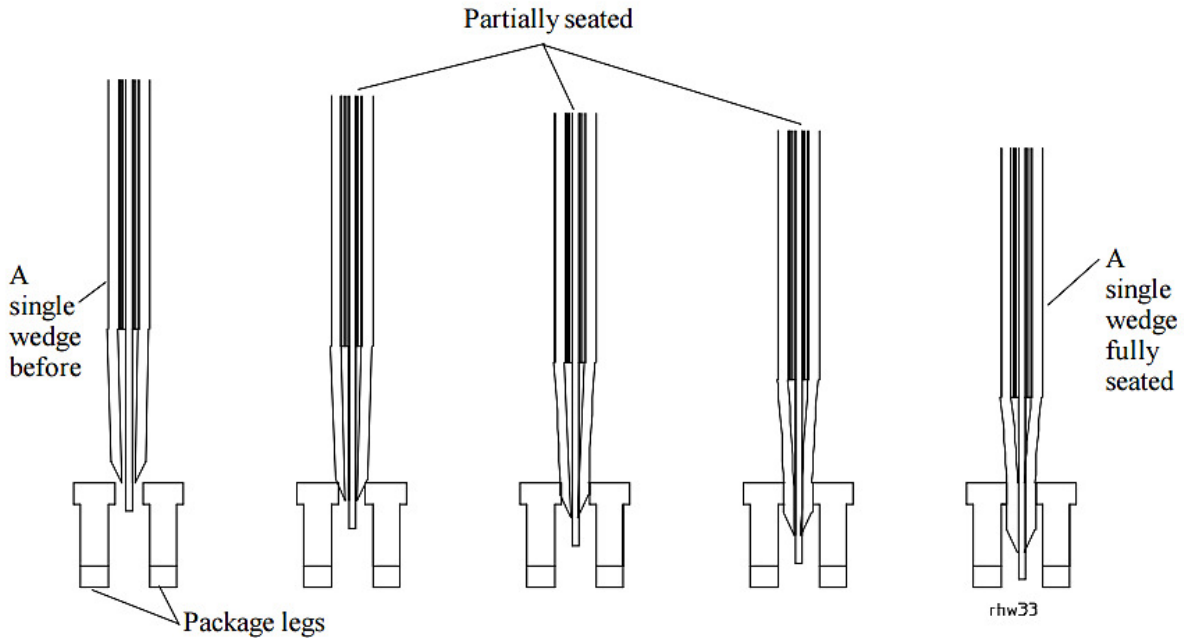
The Delta Probe is made up of an array of wedge shaped conductors that are fastened to a printed-circuit board containing a female socket with insertion points spaced at .100" intervals. The Delta Probe is designed to provide a snap-on connection to ICs contained in specific PQFP and TQFP packages while providing a simple, PGA interface to test tools such as logic analyzer analysis probes and microprocessor emulators. The Delta Probe makes contact to the legs of the package when the conductors penetrate the space between the legs. The conductors are connected to an array of sockets. The user may probe the sockets directly, use a generic flex cable, or other accessories (such as a double header with .030" diameter pins). Each wedge consists of two separate conductors insulated from each other by a center insulator.



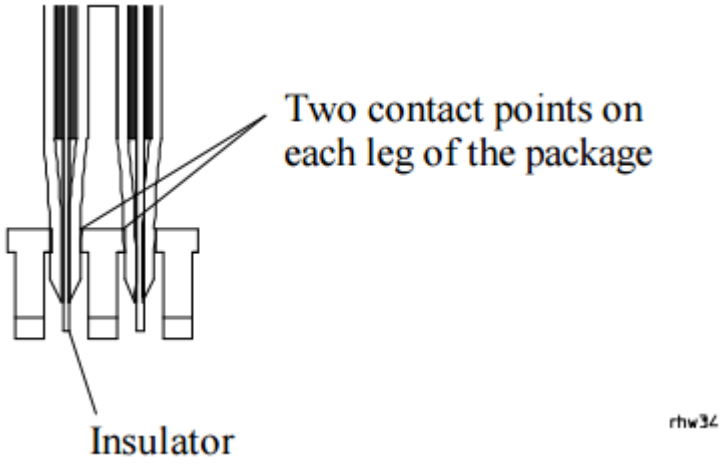
A shortened insulating adhesive between the center insulator and the outer conductors creates an air gap at the tip of the wedge.



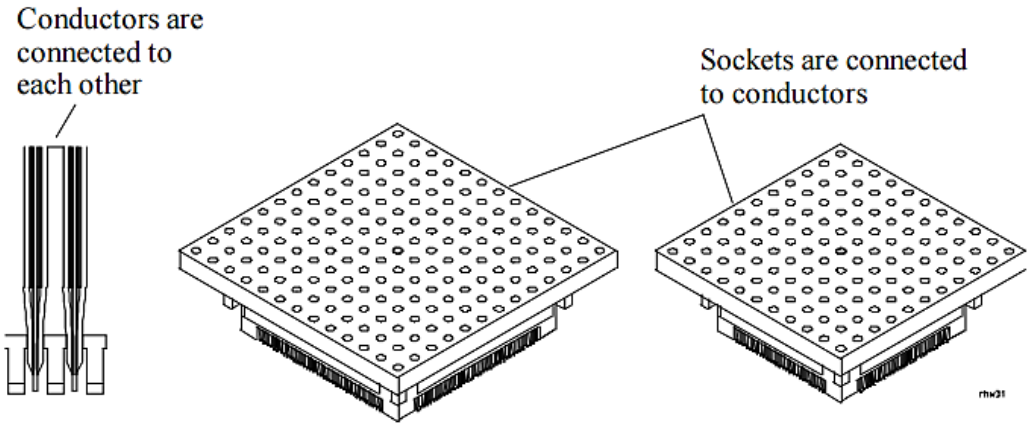
The air gap allows the conductors to conform to the package as the wedge is inserted between the package legs. The insertion force required to ensure positive contact can be as much as 20 pounds.



Each leg of the package has two contact points, one on each side of the leg. The redundant physical connection between the wedges and the legs on the package increases reliability of the electrical connection.

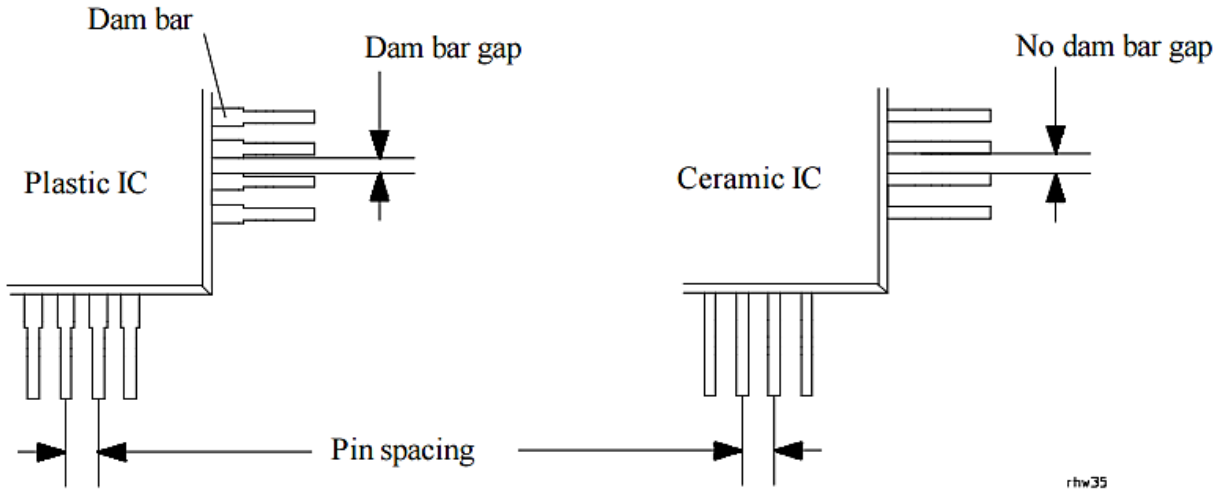


The conductors common to each leg of the package are electrically connected to each other and to a socket on the top surface of the Delta Probe.



Dam Bars, Gaps, and Leg spacing

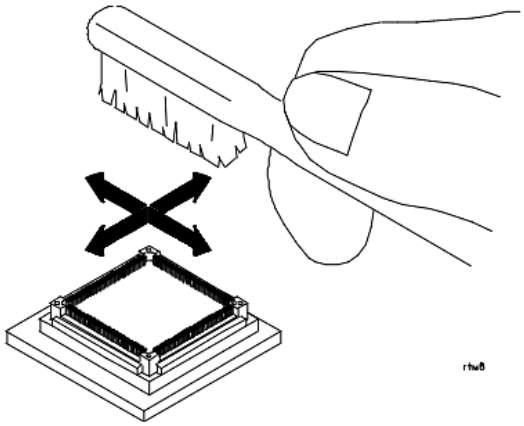
The manufacturing process for making TQFP/PQFPs necessitates the use of a “dam bar.” Dam bars prevent the plastic from spewing out between the legs of the part during the molding process. After the plastic injection process is completed, the residual metal dam bar is removed to allow electrical isolation of each leg, accomplished by a precision blanking die. The remaining gap between the legs of the part is commonly referred to as the “dam bar gap.” The dam bar gap is critical for this type of probing because the wedges actually make electrical contact with the legs of the TQFP/PQFP package in this area. When examining a TQFP/PQFP package for probing, check the width of the dam bar gap, and make sure it is free of excess solder. Wicking of solder up the leg and into the dam bar region reduces the dam bar gap width, which can prevent insertion of the wedges. Verification of leg spacing is necessary to ensure that the proper wedge is used in each case. Refer to the next section, “Supported ICs and their parameters,” for the dimensions of specific IC’s.



Cleaning the Delta Probe

Clean the Delta Probe contacts before each installation. Debris on the contacts can interfere with its function.

1) Use a common toothbrush to remove any dust between the wedges. The individual wedges are engineered to be durable; nevertheless take appropriate care when brushing them to avoid damage.

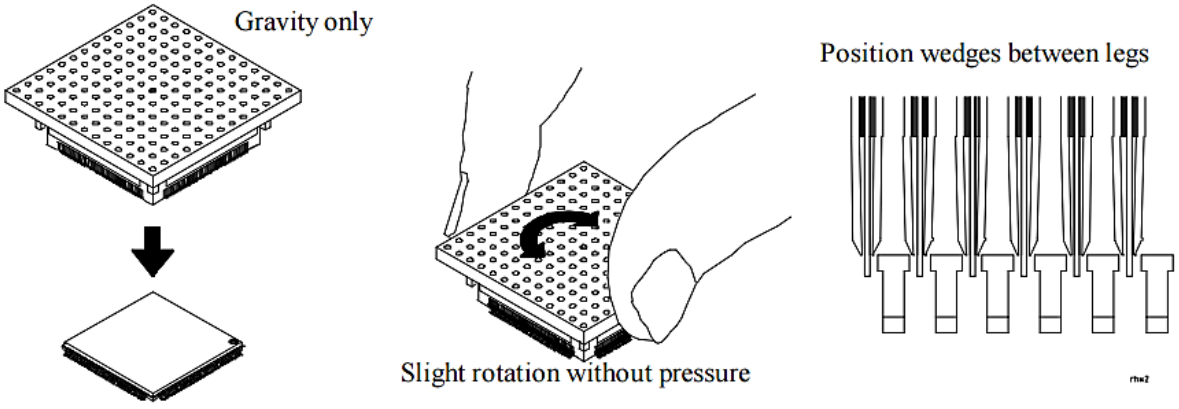


2) Use precision dusting cleaner (also known as inert dusting gas or compressed air in a can) to remove debris loosened by the brushing.

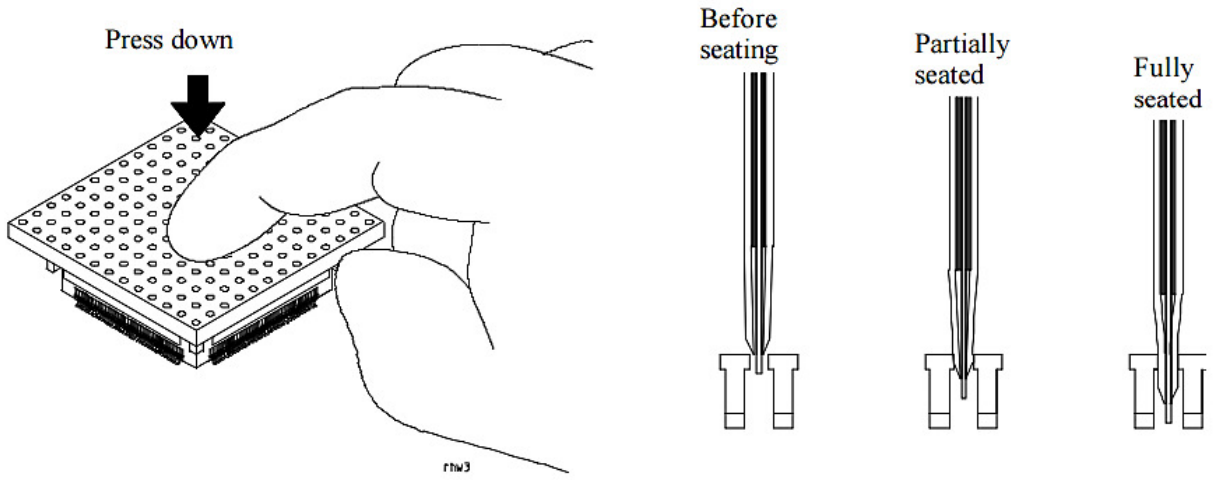
Installing the Delta Probe

Extra care is required the first time you install the Delta Probe. Since the TQFP/PQFP package has not had previous intrusion between the legs, more force than usual is required during installation. This is due to the fact that there is excess solder from the plating process on the sides of the legs. Once the Delta Probe has been inserted on a TQFP/PQFP package far less force will be required. ***CAUTION*** *Use grounded wrist straps and mats when installing or performing any service to your probe adapter. Electrostatic discharge can damage electronic components.*

1) Clean the Delta Probe as described above.
2) Allow the Delta Probe to seek its own alignment by resting it on the TQFP/PQFP package with no downward pressure applied.
3) Rotate the Delta Probe back and forth, to allow a tactile indication when the sharp tips of the wedges are correctly positioned between the legs of the TQFP/PQFP package. ***CAUTION*** *Installation of the Delta Probe with any improper alignment can result in damage to the TQFP/PQFP package legs and the Delta Probe itself. Avoid damage by ensuring proper positioning as shown below. If a transition board or PGA header are attached to the Delta Probe during installation, the tactile response is diminished and greater care must be taken with initial positioning.*

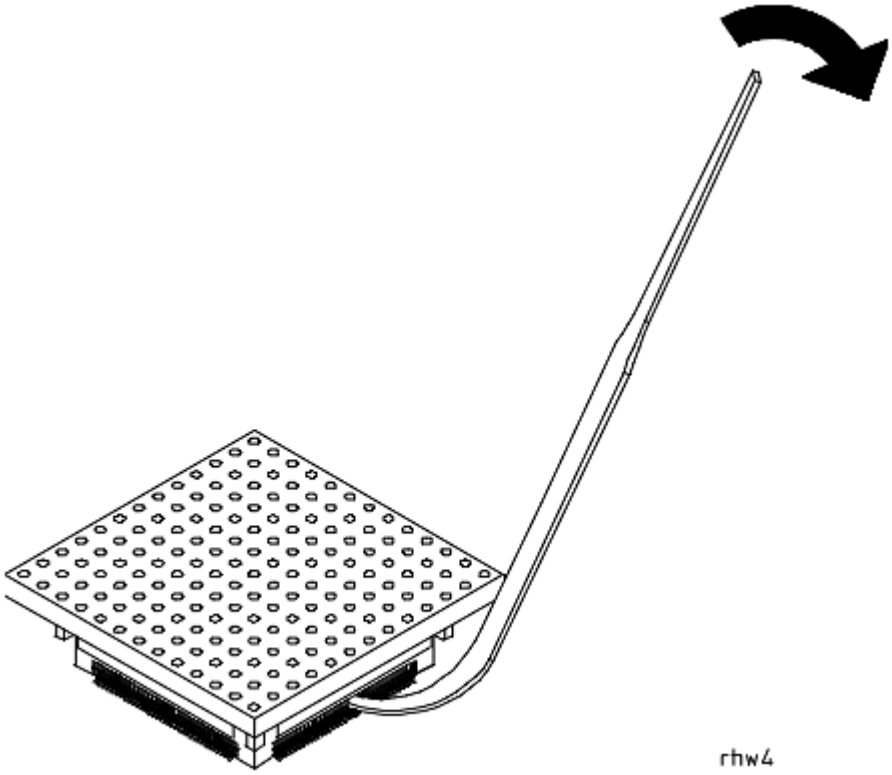


4) Apply a constant downward force after the wedges are centered between the legs. Proper seating of the wedges is proportional to the width of the dam bar gap which is described in this manual. The smaller the dam bar gap, the more downward force required. The forces required range from 10 to 20 pounds.
5) Apply additional downward pressure to ensure contact between each wedge and the adjacent legs of the TQFP/PQFP package. Support under the board where the TQFP/PQFP package is located may be helpful when applying this downward force. See reference information for individual wedge contact area parameters.



Removing the Delta Probe

CAUTION



Improper removal of the Delta Probe from the TQFP/PQFP package will result in damage to the legs of the TQFP/PQFP package.

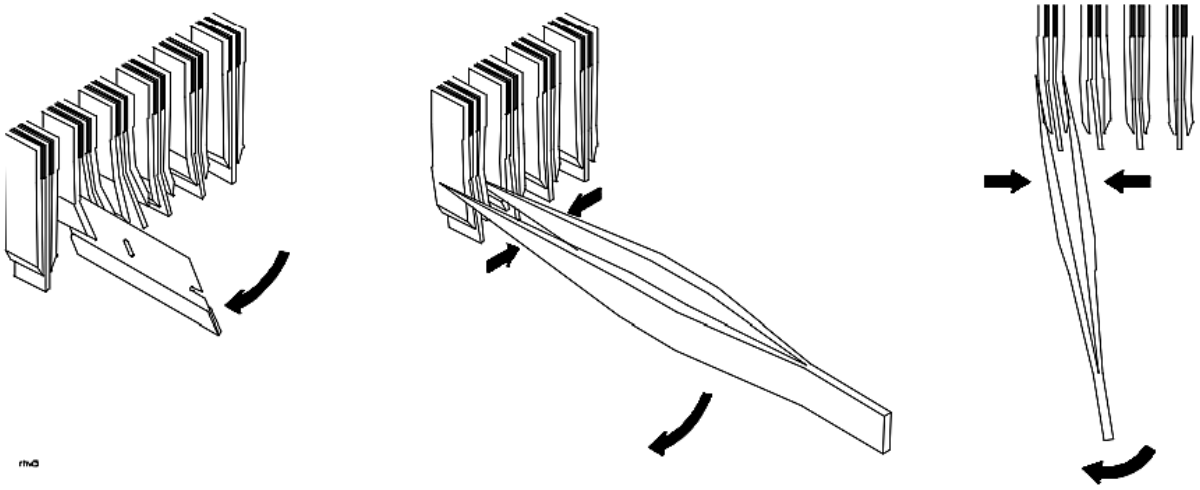
1) Place the extractor tool between the PC board and the bottom rail of the Delta Probe.
2) Pry up slightly on opposite sides of the Delta Probe to loosen it from your TQFP/PQFP package.
3) Repeat until you can lift the Delta Probe off of the part without damage to the legs of the TQFP/PQFP package.

Repairing the Delta Probe

Typical bent wedges

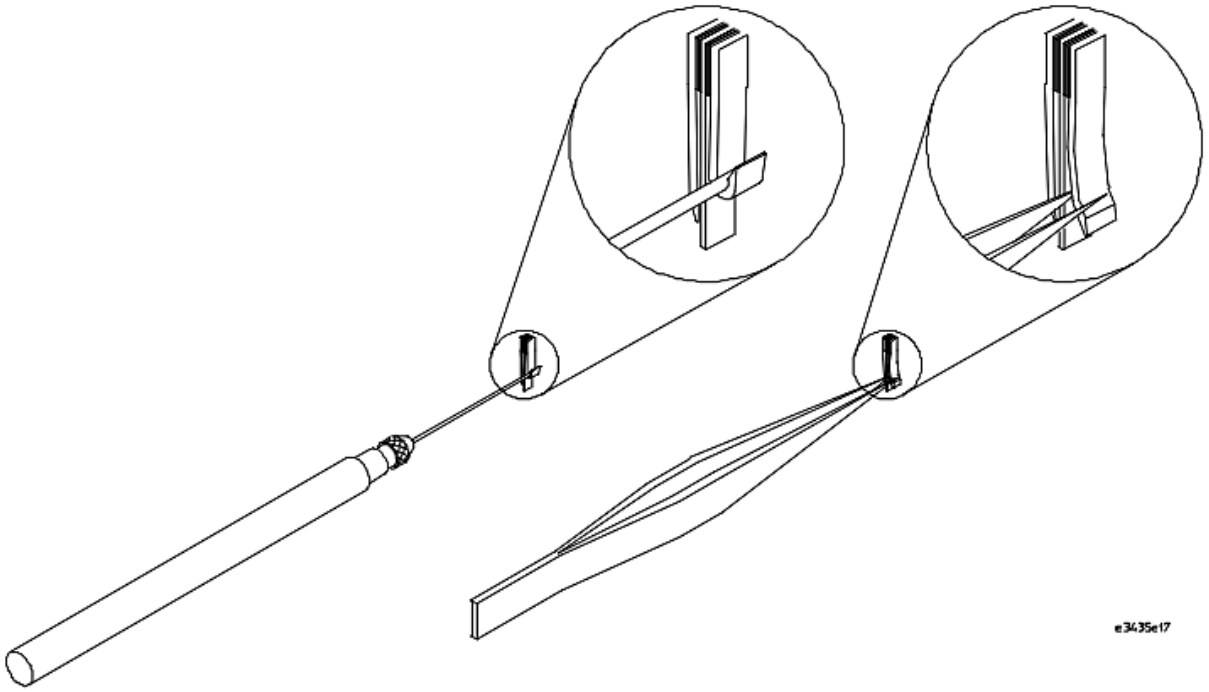
WARNING Possible injury. *Exercise care when using any sharp tool.*

1) Use a razor blade between the wedge conductors to straighten them as much as possible.
2) Repeat this on each bent wedge conductor.
3) Hold the wedge conductors tightly together with tweezers and flex to straighten each individual wedge.



Severely bent wedges

1) Use a x20 or x40 microscope so you can see the bent wedge conductor. A magnifying glass is provided with each Delta Probe which may also be helpful.



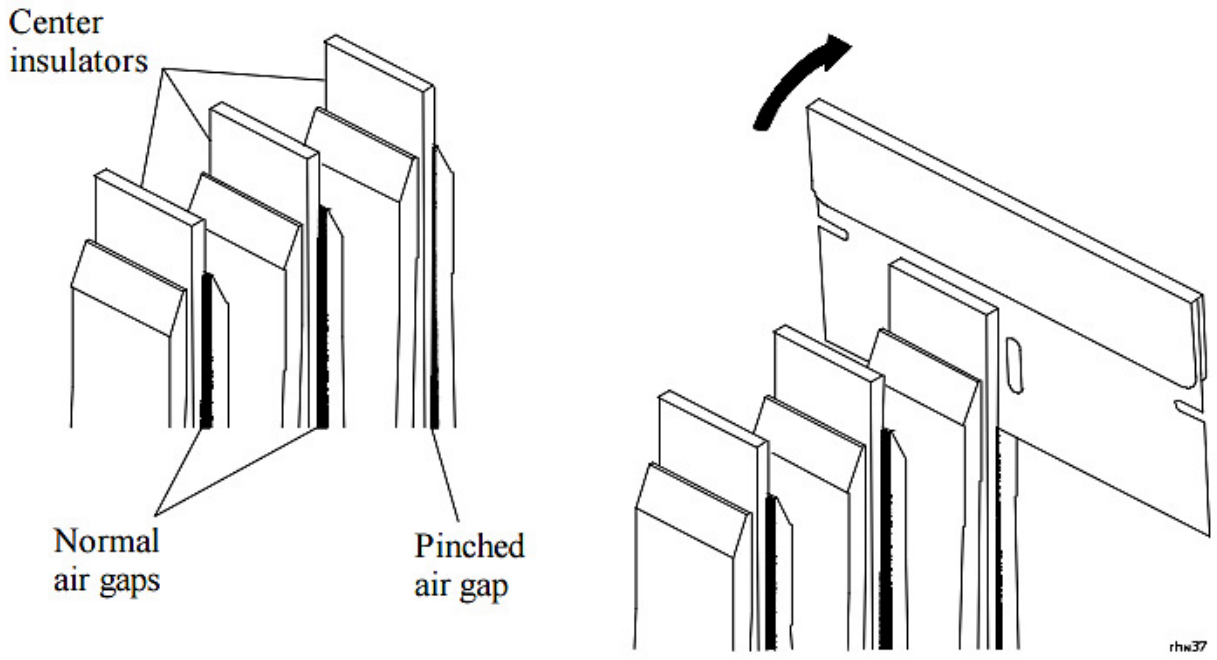
2) Use a needle probe to bend the wedge conductor enough that you can get tweezers on it.
3) Gently straighten out wedge conductors using tweezers as illustrated above.

NOTE ***Electrical connection often made.*** *Even though the bent section often breaks due to metal fatigue, an electrical connection is often made because there are two electrical contact points on each leg of the TQFP/PQFP package. For more information on how electrical connection is made, see the Theory of Operation section in the Reference chapter of this document.*

Pinched Air Gap

The air gap is described earlier in this manual. Wedges may fail to make contact if this air gap is closed. The following instructions tell you how to correct this problem.

1) Turn the Delta Probe so that the wedges are facing up.
2) Use a x20 or x40 microscope so you can see the pinched wedge.
   WARNING Possible injury. *Exercise care when using any sharp tool.*
3) Insert the edge of a razor blade between the center insulator and the conductor.
4) Gently pry the conductor away from the center insulator to open the gap.

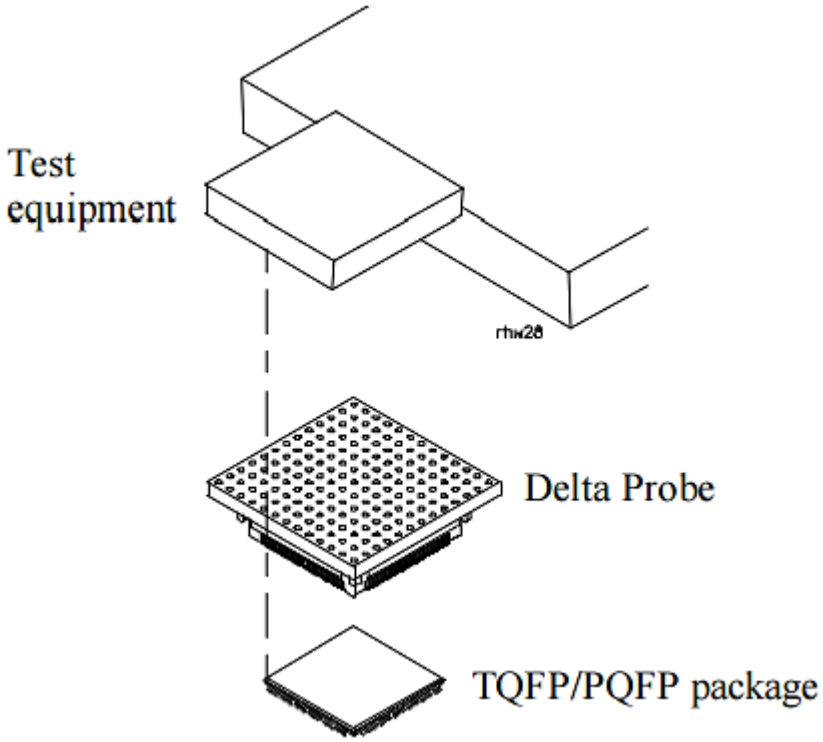


Using the Delta Probe with Your Test Equipment

The Delta Probe is designed to allow you to connect your target device to instrumentation such as an analysis probe (or pre-processor), microprocessor emulator, or logic analyzer.

Direct Connection

You can design your test equipment with pin-outs that match the pin-outs of the Delta Probe and connect directly to it as shown. If you already have a pre-defined PGA pattern present on your test instrumentation then a transition board may be needed. For detailed information on how a custom transition board can be used to connect the Delta Probe to your existing test instruments contact Emulation Technology.

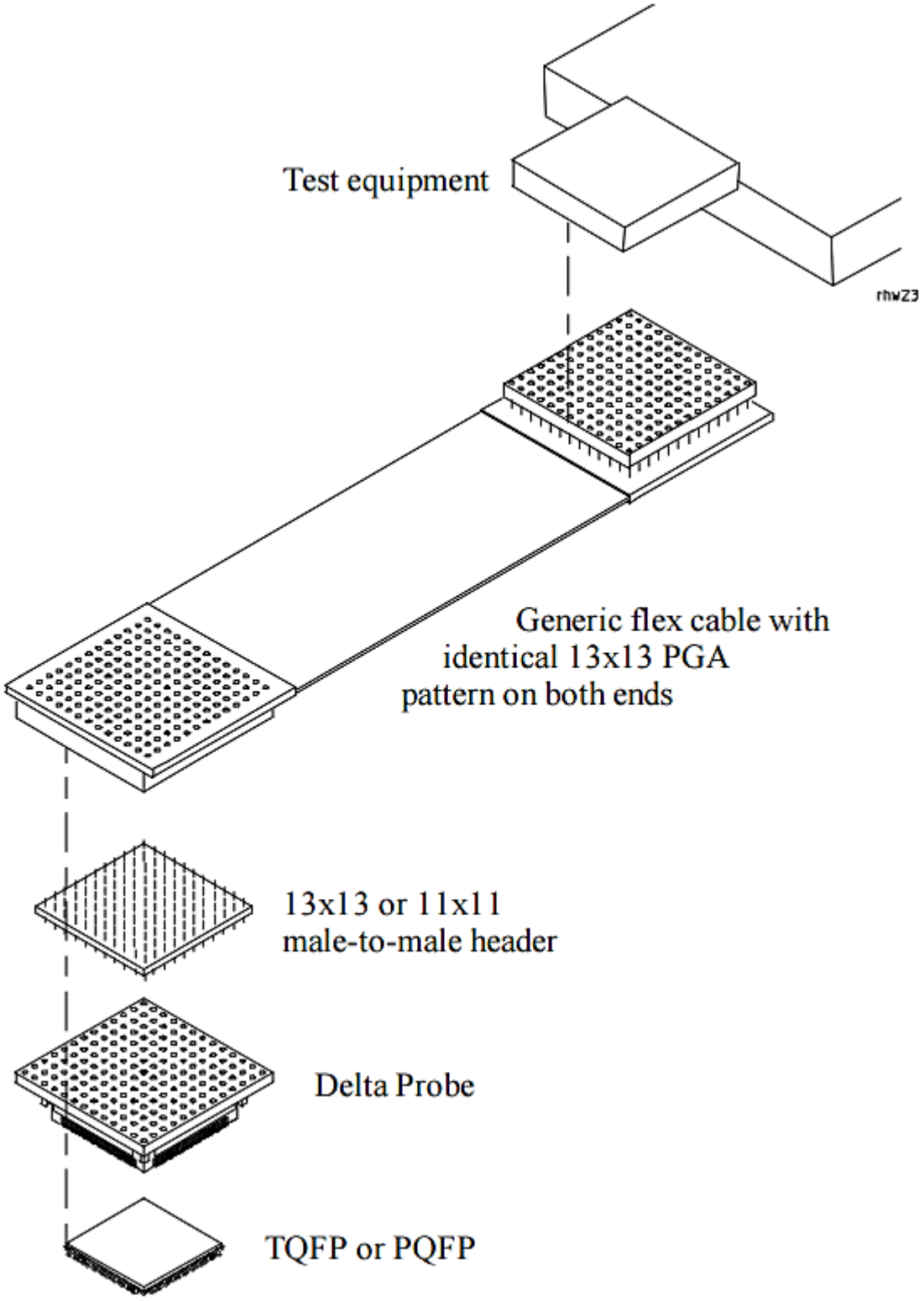


Generic Flex Cable

The 13x13 PGA sockets on both ends of the generic flex cable allow flexibility when target system components interfere with connecting to a Delta Probe. Both ends are identical. Pin 1 on one end is in the same position as pin 1 on the other end. This allows you to rotate the flex cable in any direction to avoid components on the target. The generic flex cables work with Delta Probes for up to 144 pins. For example, you can connect to the 144-pin Delta Probe using a 13x13 male-to-male header or connect to the 100-pin, and 100-pin rectangular Delta Probes using an 11x11 male-to-male header.

Installing the generic flex cable

1) Power-off the emulator, logic analyzer, or other test equipment as well as the target system.
2) Follow the steps shown earlier in this document to install the Delta Probe to the package. ***CAUTION*** *To prevent pin damage and ensure proper connection, make sure the pins are aligned and seated correctly.*
3) Plug the male-to-male header into the top of the Delta Probe. If your male-to-male header is 11x11, center it in the 13x13 PGA pattern on the probe.
4) Plug the generic flex cable into the male-to-male header. If your male-to-male header is 11x11, center it in the 13x13 PGA pattern on the flex cable.
5) Connect your test equipment to the generic flex cable.

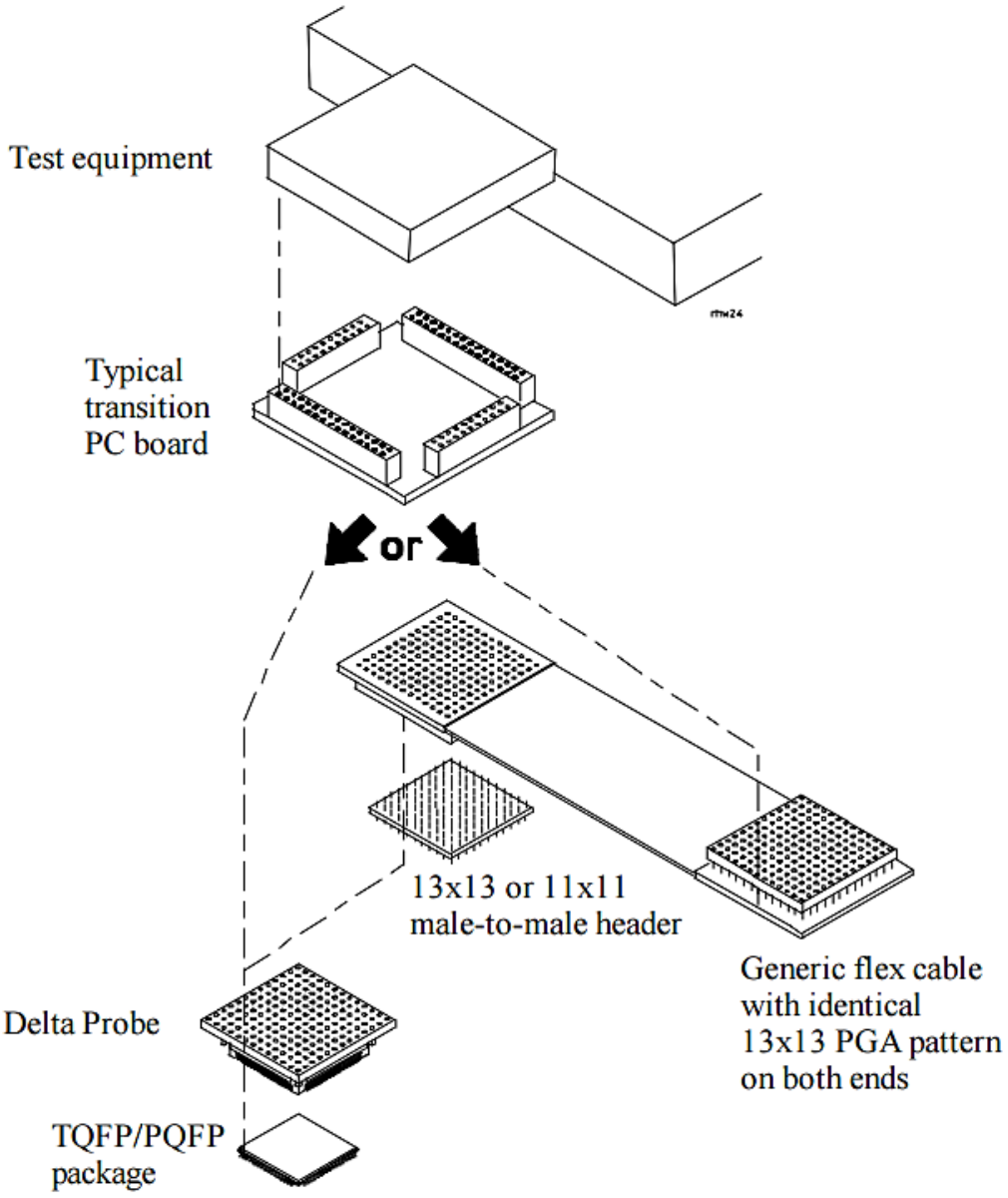

Test equipment
Generic flex cable with
identical 13x13 PGA
pattern on both ends
13x13 or 11x11
male-to-male header
Delta Probe
TQFP or PQFP

Direct Use Transition Boards

Direct use transition boards are designed to convert the pin-out of your test equipment to the pin-out of the Delta Probe. For detailed information on your transition board contact Emulation Technology.

Installing a transition board

1) Power-off the emulator, logic analyzer, or other test equipment as well as the target system.
2) Follow the steps shown earlier in this document to install the Delta Probe to the package.
   CAUTION *To prevent pin damage and ensure proper connection, make sure the pins are aligned and seated correctly.*
3) Plug the transition board directly into the Delta Probe or if components interfere with connection, use a generic flex cable and male-to-male header. *See the previous page for installing the generic flex cable and male-to-male header.*
4) Connect your test equipment to the transition board.

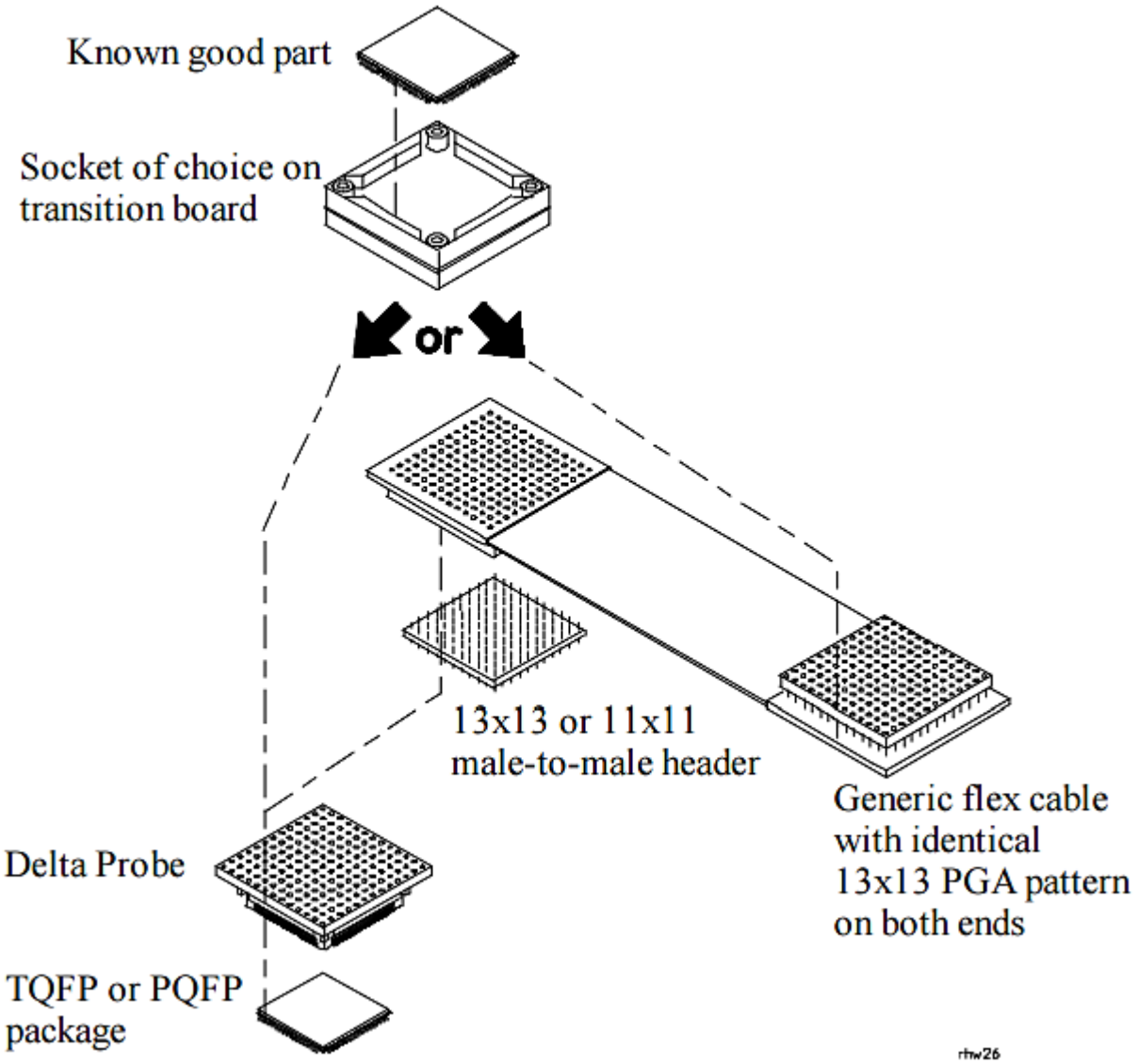


Mounted Sockets

In this application a known good part is inserted in a socket of choice that has been mounted on a transition board. For detail information on your transition board contact Emulation Technology.

Installing the mounted socket

1) Power-off the emulator, logic analyzer, or other test equipment as well as the target system.
2) Follow the steps shown earlier in this document to install the Delta Probe on the package.
3) Insert a known good part into the mounted socket.
4) Plug the mounted socket into the Delta Probe or if components interfere with connection, use a generic flex cable and male-to-male header. *See the previous section on "Using the generic flex cable" to install the generic flex cable and male-to-male header.*
5) Proceed with electrical analysis as required.

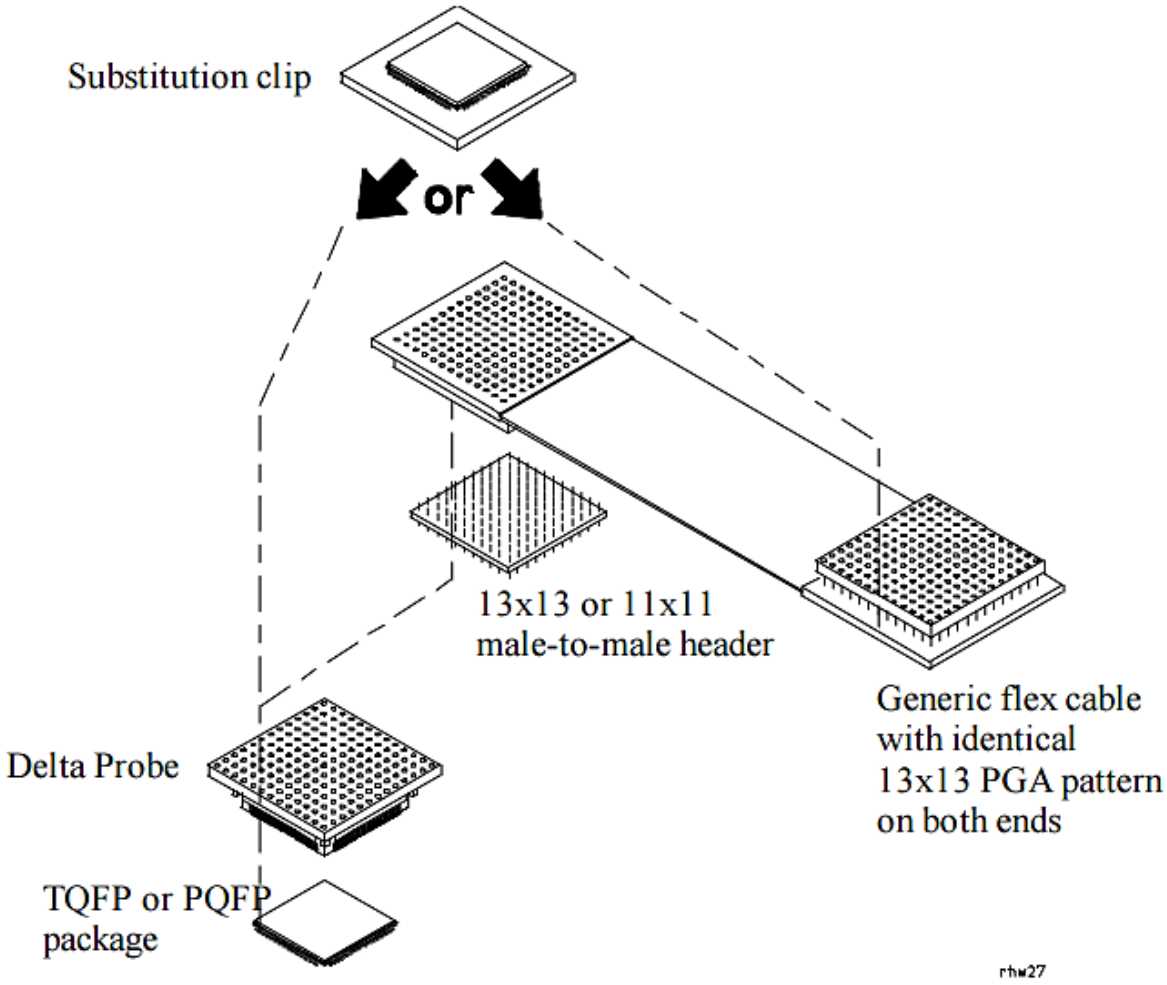


Substitution Clips

Substitution clips are transition boards which are ready for you to solder a known good part onto. For detail information on your transition board contact Emulation Technology.

Installing the substitution clip

1) Power-off the emulator, logic analyzer, or other test equipment as well as the target system.
2) Follow the steps shown earlier in this document to install the Delta Probe to the package.
3) Solder a known good part onto the transition board to make the substitution clip.
4) Plug the substitution clip directly into the Delta Probe or if components interfere with connection, use a generic flex cable and male-to-male header. *See the previous section on "Using the generic flex cable" to install the generic flex cable and male-to-male header.*
5) Tristate the part in question.
6) Proceed with electrical analysis as required.



Probe Reference Information

Performance Characteristics	
Operating voltage:	< 40 V (dc + peak ac)
Operating current:	0.5 amp maximum
Insulation resistance:	> 100 M Ω
Capacitance between contacts:	2 pF (typical)
Operating temperature:	0°C to +50°C
Self-inductance:	15 nH (typical)
Operating bandwidth:	dc - 600 MHz
Relative humidity:	75% maximum

Description of Product Offerings	
Delta Probe, 32 Pin TSOP Type I, .5mm. w/.05 header O/P	Delta Probe, 132 Pin PQFP, .635mm (INTEL)
Delta Probe, 40 Pin TSOP Type I, .5mm. w/.05 header O/P	Delta Probe, 144 Pin TQFP, .5mm
Delta Probe, 48 Pin TSOP Type I, .5mm. w/.05 header O/P	Delta Probe, 144 Pin PQFP, .65mm
Delta Probe, 32 Pin TSOP Type I, w/Transition board .5mmW/.10 OP	Delta Probe, 144 Pin TQFP, .65mm
Delta Probe, 40 Pin TSOP Type I, w/Transition Board, .5mm W/.10 O/P	Delta Probe, 160 Pin TQFP, .5mm
Delta Probe, 48 Pin TSOP Type I, w/Transition Board, . 5mm W/.10 O/P	Delta Probe, 160 Pin PQFP, .65mm
Delta Probe, 50 Pin TSOP Type II, .8mm. w/.05 header O/P	Delta Probe, 176 Pin TQFP, .5mm
Delta Probe, 54 Pin TSOP Type II, .8mm. w/.05 header O/P	Delta Probe, 184 Pin PQFP, .65mm
Delta Probe, 56 Pin TSOP Type II, .8mm. w/.05 header O/P	Delta Probe, 196 Pin BQFP, .635mm
Delta Probe, 50 Pin TSOP, Type II, w/Transition Board, .8mm W/.10 O/P	Delta Probe, 208 Pin PQFP, .5mm
Delta Probe, 54 Pin TSOP, Type II, w/Transition Board, . 8mm W/.10 O/P	Delta Probe, 240 Pin PQFP, .5mm
Delta Probe, 56 Pin TSOP, Type II, w/Transition Board, . 8mm W/.10 O/P	11x11 DBL HDR W/X .018" x .030"
Delta Probe, 66 Pin TSOP, Type II, .65mm, w/.10 header O/P	13x13 DBL HDR W/X
Delta Probe, 80 Pin TQFP, .5mm	15x15 DBL HDR W/X
Delta Probe, 80 Pin PQFP, .65mm	16x16 DBL HDR W/X
Delta Probe, 100 Pin TQFP, .5mm	11x11 DBL HDR Full
Delta Probe, 100 Pin PQFP, .65mm	13x13 DBL HDR Full .018" x .018"
Delta Probe, 100 Pin TQFP, .65mm	15x15 DBL HDR Full .018" x .018"
Delta Probe, 128 Pin PQFP, .8mm	16x16 DBL HDR Full .018" x .018"
Delta Probe, 128 Pin PQFP, .5mm	32-40-48 Trans Board
Delta Probe, 132 Pin BQFP, .635mm	50-54-56 Trans Board