

Figure 1

1. INTRODUCTION

This instruction sheet covers Die Packages used in PCB Singulation systems.

The dies contain bushings and perforators which remove breakaway tabs from a printed circuit board array.

NOTE

Dimensions in this document are in metric units [with U.S. customary units in brackets] unless otherwise specified.

Reasons for reissue of this instruction sheet are provided in Section 8, REVISION SUMMARY.

2. DESCRIPTION

The die packages are manufactured to specific length, width, and height (opening) requirements which are determined by PCB Singulation (depaneling) systems press in which it is to be used. Refer to 409–10031 for information concerning the press.

The maximum dimensions are 558.8 mm [22 in.] long, 508.0 mm [20 in.] wide, and 114.3 mm [4.5 in.] high and can weigh up to 49.89 kg [110 lbs].

Each die package contains two major assemblies: the lower assembly (die block); and the upper assembly (punch holder). See Figure 1.

The bottom assembly contains bushings which support the pc board. The bushings have profiled holes through which the perforators (punches) cut the breakaway tabs.

NOTE

Carrier trays are available which set down over the bushings below the printed circuit board panel. After singulation, the tray captures the individual circuit boards and panel scrap for easy removal.

The upper assembly contains the perforators (punches) which cut the breakaway tabs. The assembly also contains either hold down pins or a solid stripper plate with transfer pins (pressure pins). Both methods hold the board during the cutting process and during the retraction of the perforators from the bushings.

NOTE

Solid stripper plates are usually the standard. However, hold down pins are used when there are not enough component free areas to use a solid stripper plate. Hold down pins require less clamping area to properly trap the board.

Solid stripper plates and hold down pins *both* extend 2.54 mm [.100 in.] past the tips of the perforators.

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Both stripping types rely on the spring (spider) plate in the machine to provide sufficient force to trap the printed circuit board before the perforators begin to cut.

Due to the size and weight of the die packages, a cart is recommended to transport the die package from its storage location to the press (depaneling machine). An access guard on the press is opened and the die package is presented to the press using roller slides.

3. HANDLING

3.1. Uncrating

1. Remove the cover from the crate.



The die package can weight up to 49.89 kg [110 lbs]. In order to avoid personal injury, it is recommended that at least two people (or an adequate hoist) be used to lift the die package. In addition, be sure to wear all personal protective equipment (according to local practices).

2. Tilt the die package “up” in the front by lifting by the handle and sliding it forward.



The die package is shipped with the upper assembly and lower assembly together. Do not lift the die package by the top plate. Always lift using the handle and the other end of the lower assembly to prevent accidental die separation.

3. Lift up the rear of the lower assembly and remove the die package from the crate.

4. Place the die package on a work table.

5. Cut the band holding the upper assembly and the lower assembly together.

6. Separate the die package by gripping the upper assembly and lifting it off the lower assembly. Be sure to keep the upper assembly square.

7. Place the upper assembly — with the liner pins facing down — on the work table.

3.2. Inspection

1. With the lower assembly (die block) and the upper assembly (punch holder) on a work table, carefully inspect the die block for loose hardware, debris, and broken parts.

2. Tilt the punch holder on its side (a maximum of 90 degrees) and inspect the punch holder for loose hardware, debris, and broken parts.



*Tilting the punch holder **more** than 90 degrees may cause the hold downs/transfer pins (pressure pins) to fall out. If this occurs, simply replace the pins in the punch holder.*

3. Immediately inform the shipper and Tyco Electronics of any damage.

4. Remove the white grease (on the liner pins and bushings) used for shipping. Apply a silicon lubricant to the liner pins and bushings.

5. Reassemble the die package. It may now be placed in short term storage for future use.

4. MAINTENANCE AND INSPECTION

4.1. Items Required for Maintenance

— Metal spacer blocks used to set the top assembly (punch holder) on so that the liner pins do not touch the work table

— Silicone lubricant or very light weight machine oil



Silicone lubricant is preferable to oil, since debris does not accumulate on silicone like it does oil lubricant.

— White lithium grease (used instead of the silicone or oil if the die package is to be stored for any length of time)

— Spray cleaner and rags

4.2. Frequency of Maintenance and Inspection

Although the frequency of maintenance and inspection is dependent on the ambient working conditions in your facility and the skill of your personnel, it is generally recommended that die packages be cleaned, inspected for cut quality, and lubricated every time they are removed from the machine and placed in storage.

Die packages should be removed, cleaned, inspected, and lubricated, after every 40 hours of operation.

4.3. Maintenance Procedure

1. Separate the die package.

2. Place the upper assembly (punch holder) on the work table.

3. Clean any dust, debris, and old lubricant from the punch holder assembly.

4. Inspect the punches (perforators) for wear. If repair is required refer to Section 5 for repair and sharpening procedures.

5. Lubricate the liner pins.

6. Clean any dust, debris, and old lubricant from the Lower assembly (die block).

7. Inspect the bushings for wear. If repair is required, refer to Section 5.

8. Lubricate the liner pin bushings.

9. Reassemble the die package and place it in storage or back in service.

NOTE

White lithium grease should used instead of the silicone or oil if the die package is to be stored for any length of time. The lithium grease must be removed and the silicone or oil be applied before the die package is placed back in service.

10. Document this maintenance in your Maintenance Log.

5. REPAIR AND REPLACEMENT

The following information is provided for the repair and sharpening of the die package at your facility.

NOTE

NOTE THAT ONLY EXPERIENCED MACHINISTS SHOULD PERFORM THE REPAIR AND SHARPENING PROCEDURES.

For additional information and assistance, contact PCB Singulation Systems Customer Service at 1–888–782–3349.

5.1. Tooling Required for Repair

— Set of (standard) hex key wrenches

— Set of drift punches ($^1/_8$–in. dia to $^1/_2$–in. dia)

— Metal spacer blocks (to set the top assembly on in order to prevent the liner pins from touching the work table)

— Depth micrometer or equivalent measuring device

— Die Repair and Sharpening Log for the die package (as found in the documentation package for the dies)

5.2. Die Package Disassembly

NOTE

If it is necessary to stagger the lengths of the perforators be sure to maintain the staggered relationship during any repair.

DANGER

Die assemblies are heavy. To avoid personal injury, always use a hoist when lifting or moving the die assemblies.

1. Remove the upper assembly (punch holder) from the lower assembly (die block). Use a hoist if available. See Figure 2.

2. Carefully set the top assembly on spacer blocks, high enough so that tips of the liner pins do not touch your table. See Figure 3.

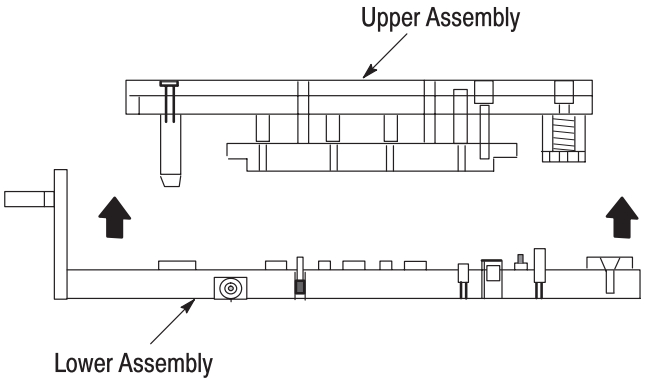


Figure 2

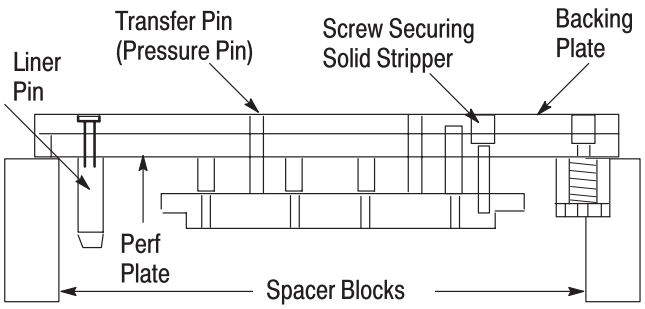


Figure 3

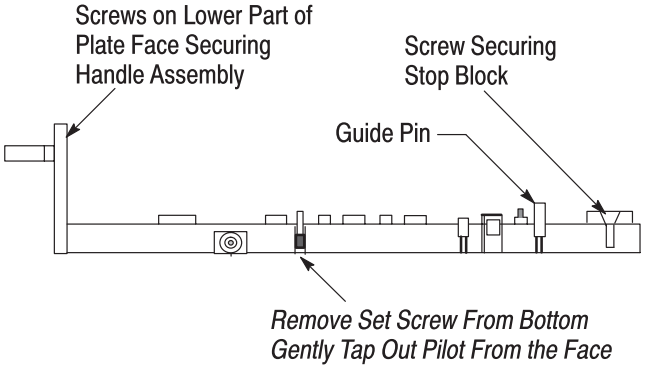


Figure 4

3. Remove all transfer pins (pressure pins).

4. Remove shoulder screws for solid stripper. Be sure to block “up” the stripper, otherwise it will fall when the last bolt is removed.

5. Remove shoulder screws from stop block assemblies. Remove the mounting screws holding the liner pins in place. Carefully tap the liner pins (completely) out.

6. Remove the guide pins, pilots, stop blocks and front handle assembly from the lower assembly. See Figure 4.

NOTE

The roller bearings may have to be removed if they will prevent setting the bottom of the die block flush with the face of the grinding table.

NOTE

If rollers are removed, be sure a washer is placed between the roller and the die block.

7. Sharpen or replace the parts as described in Paragraphs 5.3 and 5.4.

5.3. Sharpening

NOTE

ONLY EXPERIENCED MACHINISTS SHOULD PERFORM THE SHARPENING PROCEDURES.

NOTE

Be sure to keep the Die Repair and Sharpening Log (in the die package documentation package) up to date.

NOTE

Refer to the notes on the die package top assembly drawing as a supplement to the Die Repair and Sharpening Log.

A. Perforators

1. Using an angle diamond dressor, dress an angle into the grinding wheel. See Figure 5.

2. Place the punch (perforator) into perf bar. See Figure 6. Perf bars are available from Tyco Electronics (contact PCB Singulation Systems Customer Service at 1–888–782–3349). Perf bars can hold up to ten perforators at a time.

3. Place the perf bar and perforators on the grinding table as shown in Figure 7.

NOTE

Be sure there is sufficient clearance between the grinding wheel and the highest part of the perforators before placing them on the grinding table.

4. Before sharpening, be sure to measure from the face of the perforators to the face of the punch using a depth micrometer. Compare the measurements to those listed in the Die Repair and Sharpening Log. If the measurements are not the same, refer to the die package top assembly drawing for starting measurements.

5. Sharpen by removing enough stock from the perforator face to provide a clean, sharp cutting surface (normally 0.127 mm to 0.254 mm [.005 in. to .010 in.]).

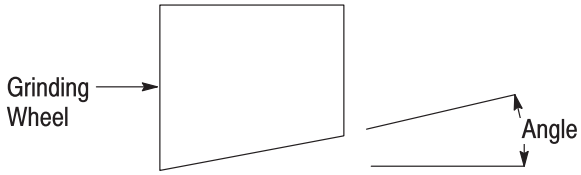


Figure 5

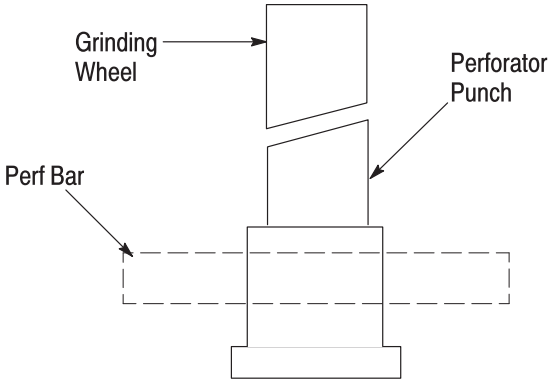


Figure 6

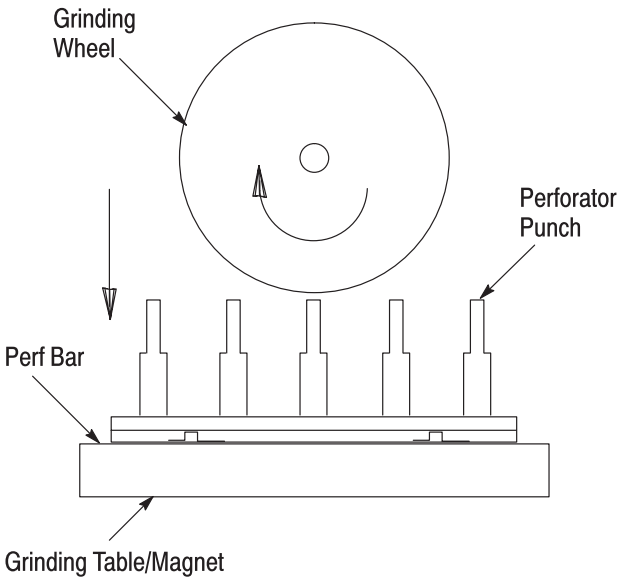


Figure 7

CAUTION

DO NOT remove more than 0.025 mm [.001 in.] at a time or the perforator punches may break.

6. After grinding the perforators, measure from the face of the perforators to the face of the punch using a depth micrometer. Record this number in Die Repair and Sharpening Log (in the die package documentation package) under the perforator length. Subtract this number from the previous entry to determine how much material has been removed. See Figure 8.

B. Die Bushings

1. Be sure the rollers are not in contact with the grinding table. Remove the rollers if necessary. Refer to Figure 9.

2. Place the bottom of the lower assembly (die block) on a clean, flat grinding chuck with bushings facing upward. Make sure there is sufficient clearance between the grinding wheel and the highest part of the die package before setting the die package on the grinding table.

3. Turn on the magnet and make sure the die package is properly held down.

4. Before sharpening, be sure to measure from the face of the die bushings to the face of the lower assembly (die block) using a depth micrometer. Compare these measurements to the last measurements listed in the Die Repair and Sharpening Log (in the die package documentation package). If measurements are not the same, refer to the die package top assembly drawing for starting measurements.

5. Sharpen by removing enough stock from the die bushing face to provide a clean, sharp, cutting surface (usually 0.050 mm to 0.127 mm [.002 in. to .005 in.]). See Figure 10.

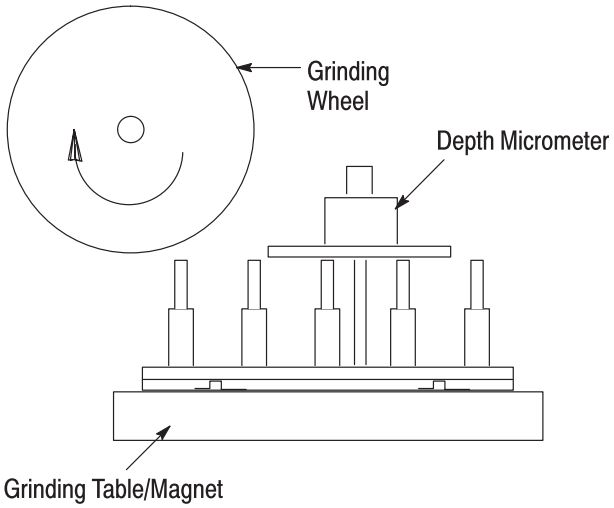


Figure 8

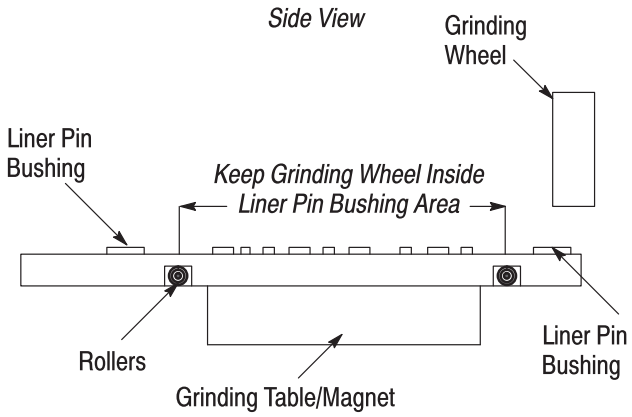


Figure 9

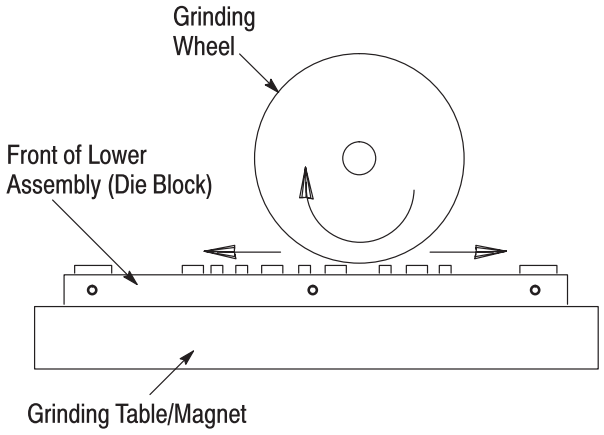


Figure 10

6. After grinding the die bushings, use a depth micrometer to measure and record the dimension in the Die Repair and Sharpening Log (found in the die package documentation package). Measure from the face of the die bushings to the face of the lower assembly (die block). Record this number in the Die Repair and Sharpening Log under bushing head thickness. Subtract this number from the previous entry to determine how much material has been removed. See Figure 11.

C. Stop Block Spacers

1. Remove the screws securing the stop block assemblies to the lower assembly.

Each stop block assembly consists of a shoulder screw, stop block spacer, hex stop block, and spring, as shown in Figure 12.

2. Before sharpening the stop block spacers, be sure to measure the height of the spacers. The dimension should be the same as those listed in the Die Repair and Sharpening Log. If the dimensions are not the same as those in the Die Repair and Sharpening Log, refer to the die package top assembly drawing for starting dimensions.

NOTE

The amount of material removed from the perforators and the amount of material removed from the die bushings must equal the amount of material that needs to be removed from the stop block spacers.

CAUTION

The stop block spacer is the ONLY part of the stop block assembly that should be sharpened/modified. NEVER REMOVE MATERIAL FROM THE HEX STOP BLOCKS.

3. Place all four stop block spacers on a grinding table. If necessary use safety blocks to hold the spacers in place. See Figure 13.

4. Grind the stop block spacers. See Figure 13.

5. After grinding the stop block spacers, measure and record the stop block spacer height in the Die Repair and Sharpening Log.

D. Rest Pads

If all of the die bushings are sharpened, all of the hex rest pads and pilot pin rest pads in the lower assembly (die block) must be modified by the same amount removed from the die bushings.

5.4. Die Package Re-Assembly

Replace all components in the order of disassembly, exactly as they were located prior to disassembly. If necessary, refer to the die package top assembly drawing for correct component placement.

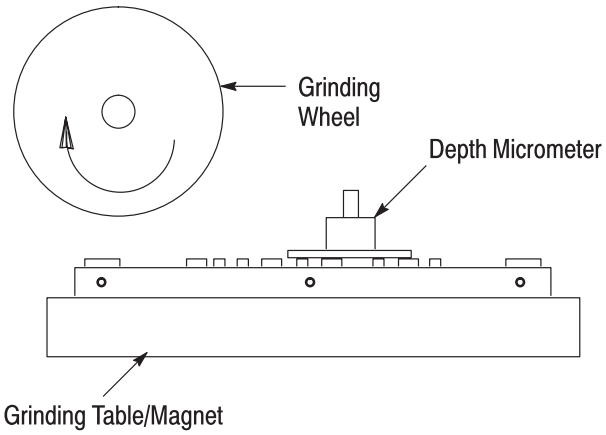


Figure 11

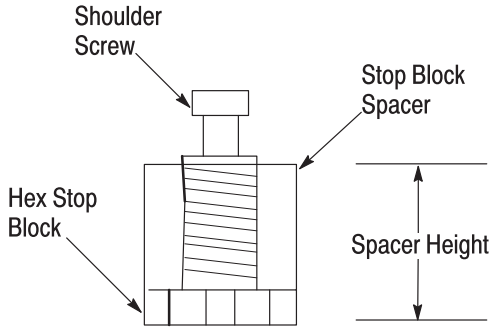


Figure 12

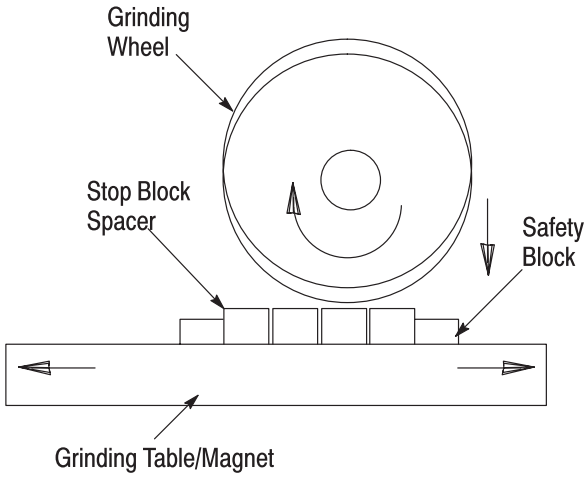


Figure 13

CAUTION

If components are NOT replaced exactly as they were originally located, tooling damage could occur.

6. REPAIR AND REPLACEMENT

6.1. Die Bushing or Perforator Replacement

If *several* die bushings, hold–downs, or perforators are replaced with new ones, the new ones must be ground to the same height as the existing ones.

If *all* the bushings and perforators are replaced:

1. All bottom and top hold–downs (if used) and all transfer pins used with the solid stripper, must be replaced and ground to the proper height.

2. The bottom hex rest pads, and pilot pin rest pads must also be replaced and ground to the bushing height. See Figure 14.

3. New stop block spacers will be required. Refer to Paragraph 5.3,C for sharpening procedures.

NOTE

Note that the stop block spacers must be sharpened so that the amount of material removed from the stop block spacers equals the amount of material removed from perforators and the die bushings.

6.2. Replacement

Request replacement parts by calling PCB Singulation Systems Customer Service at 1–888–782–3349.

7. FREQUENTLY ASKED QUESTIONS

Q. How many parts can be run before sharpening?

A. The number will vary depending on the type of material and thickness. Normally it is between 30,000 and 50,000 machine cycles can be run between sharpening. Singulated printed circuit boards should be routinely inspected for signs of tool wear and the die package should be inspected after every 40 hours of constant usage.

Q. How much material can be sharpened off the die bushings before replacement is required?

A. No more than 2.54 mm [.100 in.].

Q. How much material can be sharpened off the perforators before replacement is required?

A. No more than 3.175 mm [.125 in.].

8. REVISION SUMMARY

Revisions to this instruction sheet include:

- Updated document to corporate requirements
- Changed name of systems
- Changed contact information in Section 5, Step 2 of Paragraph 5.3.A, and Paragraph 6.2

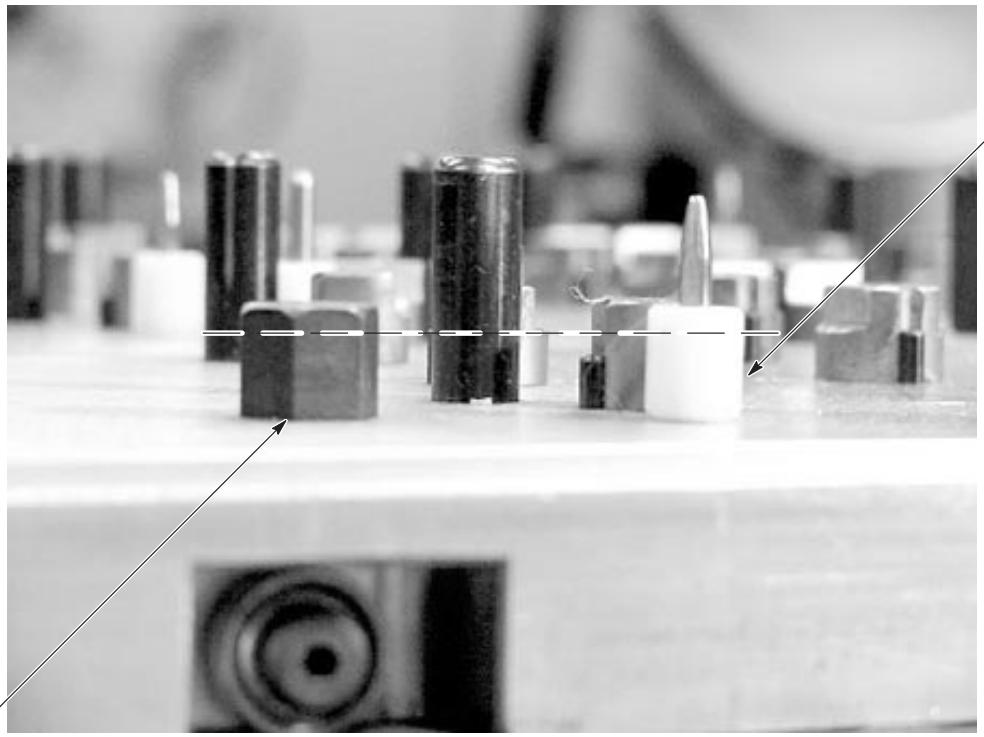


Figure 14