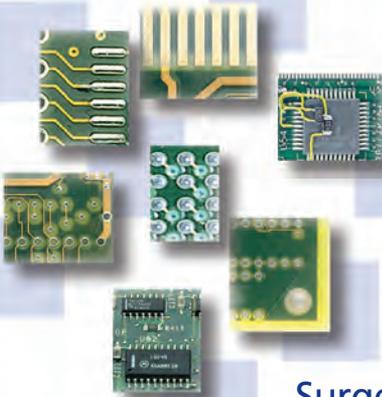


# Circuit Technology Center



Surgeon grade rework and repair,  
by the book and guaranteed.



# Is There An Alternative to Scrap?

It's tough to watch as your company's potential profit is tossed away, but that's what happens when you scrap damaged or outdated circuit boards. It's money thrown away, and the more complex and expensive the boards, the bigger the loss.

The fact is you simply can't eliminate the need for circuit board repair and rework. If you're struggling with the expense and demands of maintaining a modern repair and rework operation, there is an alternative, and it is Circuit Technology Center.

We are specialists in all aspects of circuit board repair and rework and we have saved our customers millions of dollars.

Whether you need help with one thousand boards or just a few, we can complete the job and get your boards back to you for a charge that's generally just a fraction of the board's value. Furthermore, every project is backed by our unconditional guarantee of reliability and top-quality workmanship.

The electronics marketplace is more competitive than ever, so before you send your circuit boards to the scrap barrel, call Circuit Technology Center, because today no company can afford to throw money away.



## A Few Customer Comments:

See a list of our key customer's comments:

[www.circuitrework.com](http://www.circuitrework.com)

*"Your repair service saved us \$128,460 but your cost was only \$2,031. More important, your quick turn around allowed us to meet a tight schedule. Thanks for a job well done."*

*"Whether we send you just one or two boards for repair, or 500, we always get the same high level of service and attention. We know that when we're looking for a solution to a tough problem, we can turn to Circuit Technology Center."*

*"Many thanks to you and your team for pulling through on this critical project. Your capabilities have given us a critical edge over the past years in the speed with which we can execute board-level changes."*

# Rework and repair, by the book and guaranteed.

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Circuit Technology Center continues to be recognized as the most innovative circuit board repair and rework company in the US. With the advancement of today's modern circuit board technology, it is more important than ever to have specialists available to help you at a moment's notice.

We're excited about the opportunity to offer our services to you. Rest assured, we will continue to move ahead, hone our skills and maintain the industry's best equipped rework and repair center. Our mission is to save you money, save you time, and make your company more profitable.

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# About Us

**Circuit Technology Center** is the largest and most experienced company providing repair and rework services for assembled and bare circuit boards in the World. We have been offering these services for over three decades.

Our rework services include removal and replacement of surface mount, BGA, and through hole components. We also install jumper wires, cut circuits, offer X-ray inspection, and a wide variety of other rework and upgrade services.

Repair services include correcting damage to surface mount pads, through hole circuits and pads, plated through holes, edge contacts, base board material, and coatings on assembled or bare circuit boards. Circuit Technology Center is unequalled at repair and rework on circuit boards; there is simply no other company with our level of knowledge and experience.

## Superior Quality

The complexity and sophistication of modern circuit board assemblies require highly skilled technicians to work on them. These skills can be gained only through years of hands-on experience. Our technicians are experts. They use the most sophisticated tools available, following time-tested IPC procedures.



## Proven Reliability

Since 1979 we've dedicated ourselves to the repair and rework of circuit boards. We have the most sophisticated repair facility in the US. Our work is consistent, reliable, and of the highest quality. It has helped us win and keep the business of hundreds of major electronics manufacturers.



## Time Savings

We know the importance of deadlines. You need it yesterday! If the nature of the repairs allows it, we can get your boards back to you in 24 to 48 hours. We do everything we can to meet your schedules.

## Cost Savings

We start by analyzing each project and then confirm to you the exact cost before we do any work. There will be no surprises; you will know in advance how much you will save by sending us your circuit boards for repair and rework.

## 100% Satisfaction Guaranteed

Our work is unconditionally guaranteed. If you're not completely satisfied, we'll provide a full refund.

# Engineering Changes and Modifications

The world of electronics manufacturing is certainly fast paced and deadline oriented. Engineering changes to board designs and upgrading boards to the latest revision level are labor intensive, schedule threatening issues facing OEMs and Contract Manufacturers alike.

The unpredictability of rework makes it impractical to always have the staff available to handle sudden bursts of work.

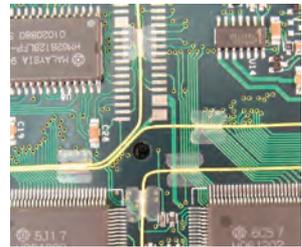
We have the most advanced rework and ECO service center in the World. Our technicians are adept at difficult, time consuming procedures, including removing and replacing all types of component packages, adding jumper wires to fine pitch devices, cutting internal circuits and other intricate operations that require pinpoint accuracy.



## Jumper Wires/Circuit Cuts

If your circuit board requires engineering changes calling for jumper wires, let us put our staff to work for you. We routinely add jumper wires, following a complete set of detailed illustrations. See our online guide at [www.circuitrework.com/wires](http://www.circuitrework.com/wires).

Engineering changes often require component leg lifts or the isolation of circuit patterns. We have several precision milling systems that provide pinpoint accuracy and exact depth control when cutting surface and internal circuits in dense areas.

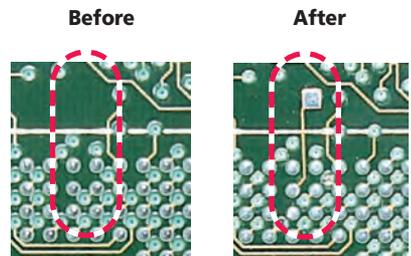


## Adding Circuit Patterns and Contacts

Sometimes design changes require the addition or reposition of circuit patterns or contacts. Common applications include adding gold edge contacts, rerouting signal connections, isolating vias and pads, or adding an entire component footprint.

## BGA Site Modification

We can rework BGA sites by adding new pads and circuits to the board surface. The pads and circuits are thermally bonded to the board surface. Whether it's rerouting a signal, or isolating a BGA pad, our expert operators routinely accomplish the task.



*BGA signal modification.*

# Component Rework

Removal and replacement of surface mount and through hole components are some of the most common rework processes performed on assembled circuit boards. Although sometimes routine, today's component packages and board features present an array of difficult component rework challenges.

We have over 100 pieces of equipment to meet your needs for surface mount, BGA and through hole component rework. Our trained and qualified technicians are ready to tackle the toughest rework projects.



## Surface Mount Component Rework

We use a combination of convection and conduction techniques for surface mount component removal. Many factors are considered, but most often, conduction methods are used to remove smaller components, while convection techniques are used to remove larger, more sensitive components. Point to point soldering methods are normally used to install surface mount components.

## Through Hole Component Rework

Selective solder reflow systems are used for demanding multi-lead rework projects. Reflow systems take great skill and experience to operate, but for high pin count through hole component rework, these systems can't be beat for reliability and efficiency. Vacuum desoldering systems are used for small through hole removal projects.



We're equipped with the latest BGA rework systems, and our staff of engineers and operators possess the knowledge and skills needed in the intricate world of BGA technology. A wide variety of services are offered, including:

- BGA component removal, replacement and salvage
- x-ray inspection services
- circuit pattern design changes at BGA footprints
- sealing or isolating adjacent vias with solder mask
- repairing lifted or missing BGA pads
- repair of solder mask breakdown at the BGA site.



## BGA Component Removal and Replacement

We have several top of the line BGA rework systems, and a fully trained staff of engineers and operators to support you. This combination ensures a repeatable process and high reliability. We're recognized as an industry leader in BGA services and have been qualified by major manufacturers around the globe. If you have one board or one thousand boards for rework, we're the company to turn to for BGA rework services.



## X-ray Inspection

X-ray inspection services for BGA component and site inspection is completed on every board we process for BGA rework to detect soldering defects, including shorts, opens and voids.

# Pad, Conductor and Plate Hole Repair

## Circuitry and Plated Hole Repair

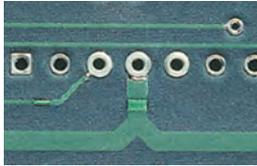
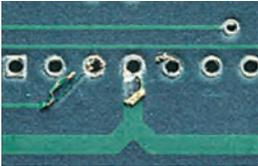
One method for repairing damaged circuitry is the Foil Jumper Method. This method uses pure copper ribbon for the replacement conductor. The new circuits are the same size as the original circuits. This IPC recommended technique is preferred to making circuit pattern repairs using jumper wires because it more closely duplicates the original fabrication process.

Damaged plated through holes are repaired using eyelets. The experts at Circuit Technology Center have also refined an IPC recommended method for repairing damaged plated holes on multilayer circuit boards that have inner connections.



**Before**

**After**



*Eyelets are used to repair damaged plated through holes on both double sided and multi-layer circuit boards.*

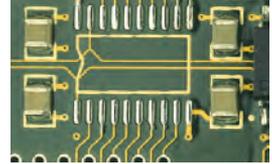
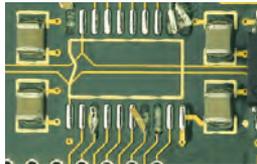
## Surface Mount and BGA Pad Repair

Surface mount and BGA pad repair are routine operation performed daily at Circuit Technology Center. Damaged pads are replaced with specially fabricated, adhesive backed pads that are thermally bonded to the board surface.

This reliable IPC recommended method eliminates the need for using messy liquid epoxies to bond replacement pads in place. We stock thousands of different sizes and shapes of replacement surface mount and BGA pads.

**Before**

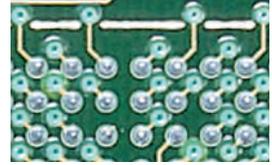
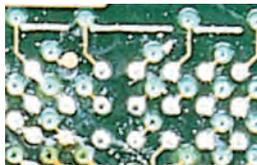
**After**



*Specially fabricated pads are thermally bonded in place to reliably repair damaged surface mount and BGA pads.*

**Before**

**After**



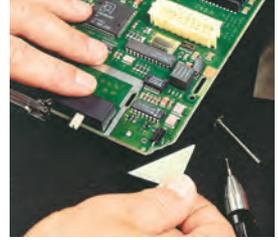
*Improper BGA rework can result in damage to pads and solder mask. Correcting these defects requires the highest degree of operator skill and experience.*

# Base Board and Coating Repair

## Base Board Repair

What happens to an assembled circuit board with a broken corner? Can it be repaired reliably? It certainly can if you have technicians who are trained and experienced at this expert level repair.

We can reliably repair base board defects including impact damage, burns, delamination, blistering, measling, warp, routing errors and more. We can also repair defects in coatings, solder mask and legend.



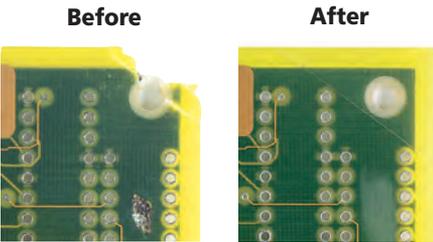
## Base Board Rework

Removing excess base board material due to errors or modifications is normally completed using milling machines. More challenging than removing base board material is the process of adding base board material.

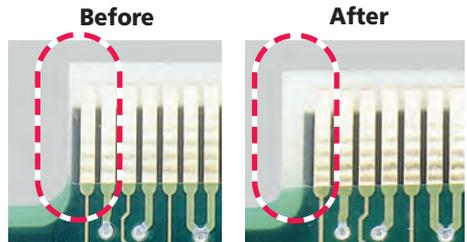
This is done by machining a groove in the circuit board edge and then bonding in replacement material, using a tongue and groove joining technique.

Other base board rework processes include:

- rebeveling edges
- reducing board thickness
- relocating slots and holes



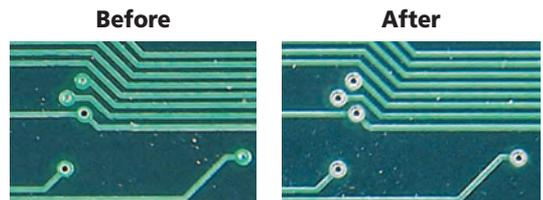
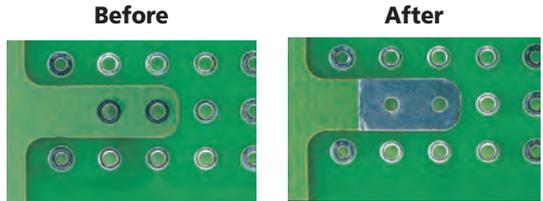
Base board defects are routinely repaired using IPC approved methods.



Board material added using a tongue and groove joining method to meet new dimensional requirement.

## Coating and Marking Rework

We can remove or add coatings and solder mask from selected areas. A variety of methods may be used for removal, from chemical stripping, to abrasion methods, to micro blasting. We can also add or remove legend marking and designations from the board surface.



Solder mask removal from large surfaces (above right), and test points (below right), is completed with a variety of methods from micro-blasting (above right) to machining (below right).

# Gold Edge Contact Repair

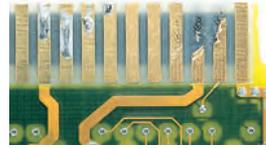
## Gold Edge Contact Repair

Gold edge contacts are particularly sensitive and prone to damage. When edge contacts on your circuit boards become scratched, torn or damaged, you can count on our staff.

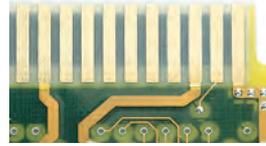
We replace damaged contacts with new contacts that have a dry film adhesive backing. These new contacts are thermally bonded in place. The new nickel and gold plated contacts are the same size and shape as the original. This IPC recommended method will restore your boards to their original level of performance and reliability.

When the gold edge contacts become contaminated with solder or if the plating is worn or does not conform to the specification, a multi-step brush plating process is used. The contaminated contacts are stripped down to the base metal and replated to meet the original thickness specification. Our electroplating process will restore damaged contacts to "like new" condition with full functional conductivity and durability.

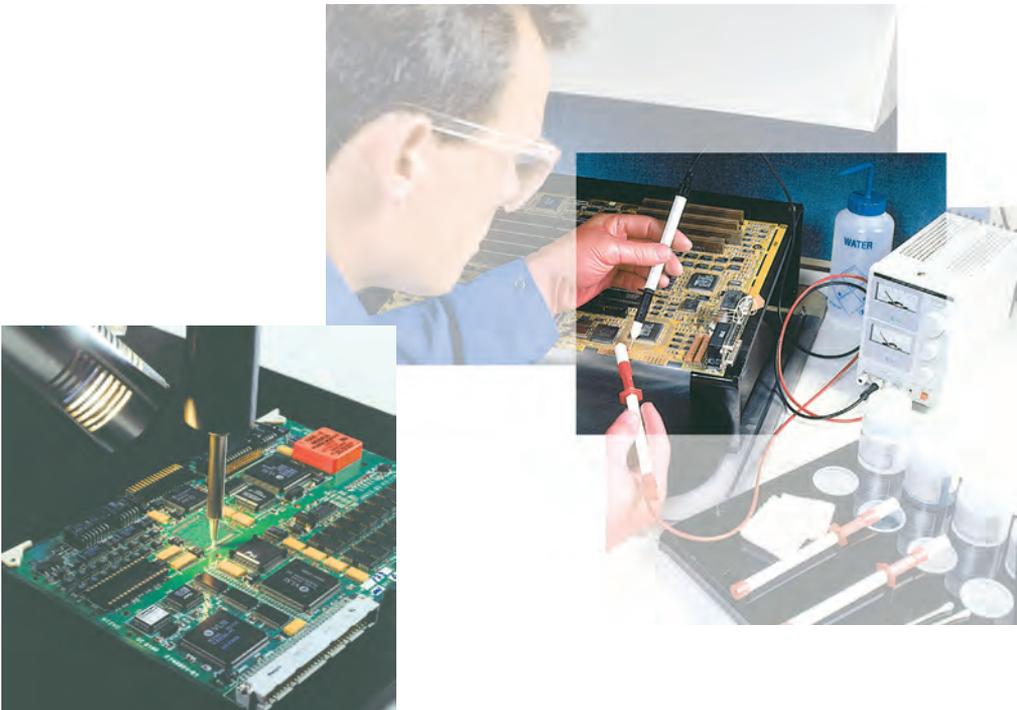
**Before**



**After**



*Whether contaminated with solder, or damaged, gold edge contacts are restored to original condition.*



## Prices

Prices for circuit board repair and rework services can be estimated via phone or email, but exact prices are quoted after a full evaluation. If there are critical specifications, these should be noted on the purchase order. Call for the latest prices and discounts.

## Payment Terms

Net 30 days is available to qualified accounts. Master Card, Visa, American Express, company check and C.O.D. are accepted

## Minimum Order Size

Minimum order size is \$50.00 US.

## Shipping Information

Within the continental United States all orders are shipped F.O.B. origin. Orders will be shipped by UPS ground, unless otherwise specified. Large orders will be shipped by common carrier "best way collect" unless specific routing is required. Shipping and handling charges may be added to service orders if proper return packaging materials are not provided.

### How To Send Circuit Boards For Service

1. Clearly identify the location of the defect on each circuit board or include detailed instructions.
2. Call or visit our web site and complete our Order Tracking Form.
3. Properly package the circuit boards and ship them as directed.
4. Upon receipt of your circuit boards we will promptly evaluate them and email you an order confirmation listing the repair charge for each circuit board and the scheduled ship date. We will await your authorization prior to repairing or reworking your circuit boards.
5. Upon completion, your circuit boards are inspected, packaged and shipped back to you.

## Satisfaction Guaranteed

Circuit Technology Center guarantees 100% acceptance of any contract service work. Notify Circuit Technology Center of any discrepancy within 30 days after receipt.



*Surgeon grade repair and rework by the book and guaranteed.*

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Technology  
Center**