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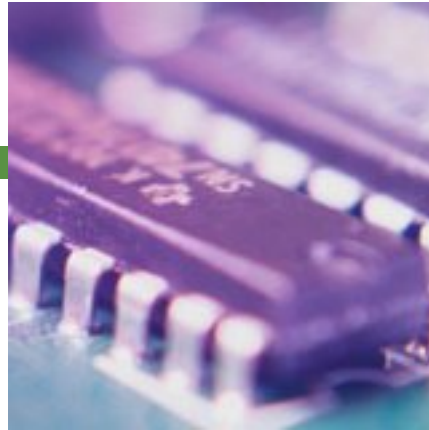


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Getting to Know “The Bible” for Rework and Repair IPC 7711/7721

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Document Overview

- Three sections:
 - General information and common procedures
 - 7711 Rework procedures
 - 7721 Modification and repair

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Definitions You Should Know

- **Rework:**
 - *The act of reprocessing non-complying articles, through the use of original or equivalent processing, in a manner that assures full compliance of the article with applicable drawings or specifications.*



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Definitions You Should Know

- **Modifications:**
 - *The revision of the functional capability of a product in order to satisfy new acceptance criteria. Modifications are usually required to incorporate design changes which can be controlled by drawings, change orders, etc. Modification should only be performed when specifically authorized and described in detail on the controlled documentation.*



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Definitions You Should Know

- Repair:
 - *The act of restoring the functional capability of defective article in a manner that does not assure compliance of the article with applicable drawings of specifications.*

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Touching the Board With a Solder Iron

- One needs to know all the different applications and conditions that will require the application of heat and how that action is handled relative to being part of the process --
 - Is it a rework?
 - Is it a repair?
 - Is it a modification? or
 - Is it part of the process?



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Definitions You Should Know

- From J-STD-001, para 6.1.4 Lead Trimming

When lead cutting is performed after soldering, the solder terminations shall³ either be reflowed or visually inspected at 10X to ensure that the original solder connection has not been damaged (e.g., fractured) or deformed. If the solder connection is reflowed this is considered part of the soldering process and not rework. This requirement does not apply to components which are designed such that a portion of the lead is intended to be removed after soldering (e.g., break-away tie bars).

(2) Class 1-Not Est Class 2-Defect Class 3-Defect
(3) Class 1-Not Est Class 2-Not Est Class 3-Defect



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Definitions You Should Know

11.1 Hardware Defects Requiring Disposition Hardware defects that require disposition are annotated throughout the standard and are summarized in Appendix A. A defect shall not¹ be reworked before it is documented per 12.1. Touch-up processes that include reheating are examples of rework operations.

(1) Class 1-Not Est Class 2-Not Est Class 3-Defect
--

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Definitions You Should Know

12.1 Rework of Unsatisfactory Solder Connections Rework for Classes 1 or 2 should be documented. The following requirements shall³ be followed for Class 3:

(3) Class 1-Not Est Class 2-Not Est Class 3-Defect
--

- A hardware defect is documented before rework.
- When rework is performed, each reworked and/or reflowed connection is inspected to the requirements of 4.14.

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Definitions You Should Know

12.2 Repair A hardware defect shall not⁴ be repaired until the discrepancy has been documented. The repair method shall⁴ be determined by agreement between the manufacturer and the user.

(4) Class 1-Not Est Class 2-Defect Class 3-Defect

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Where Does Lead-Free Come Into the Picture

- Lead free is not mentioned in the document, but must seriously be considered.
 - Higher process temperatures
 - Longer dwell times
 - RoHS compliant materials
 - Laminate changes
 - RoHS markings



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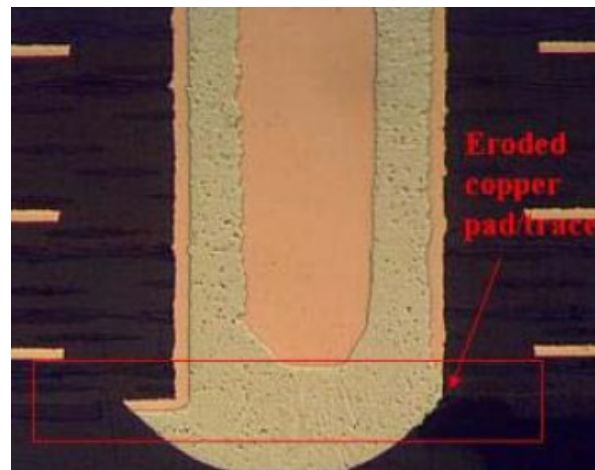
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Lead Free and Copper Dissolution

- The new high tin content materials are aggressive in dissolving copper, so attention must be paid to this phenomena.



INEMI LEAD-FREE MICRO-BGA, CBGA, MICTOR CONNECTOR AND THROUGH-HOLE PDIP REWORK EVALUATIONS

Jasbir Bath, Solectron Corporation,
Quyen Chu, Nabel Ghalib, and Bryant Bulao, Jabil Circuit Inc.,

Charlie Han and Greg Smith, LACE Technologies



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Skill Level

- Three categories:
 - **I – Intermediate**, basic soldering skills
 - **A – Advance**, has soldering and component rework experience but lacks experience
 - **E – Expert**, has advance soldering skills and component rework skills and lots of experience.



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Levels of Conformance

- This ties into the skill levels
 - It is based upon the degree of difficulty and skills required to do the particular operation.
 - The three levels are:
 - Low
 - Medium
 - High



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Compliance

- Products that have been processed must comply with the functional requirements for the product.
- If there is no acceptance from the customer then it is acceptable to apply the criteria of IPC-A-610 to the rework activities.



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Training Programs

- Operator Experience
- Training Experience

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Workbench Layout and Tools

- ESD static controls
- Fume extraction
- Safety glasses
- Heat guns
- Labels
- Magnifiers / microscopes
- Solder / flux / flux pens



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Workbench Layout and Tools

- Soldering iron repair stations
 - Heated vacuum hand piece
 - Solder iron
 - Solder tweezers
 - Solder iron tips of all configurations
- Soldering aids
- Solder pots
 - leaded and lead-free



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Workbench Layout and Tools

- Desoldering tips
- Desoldering braid
- Cleaning materials
 - Brushes
- Epoxies
- Eye loupes

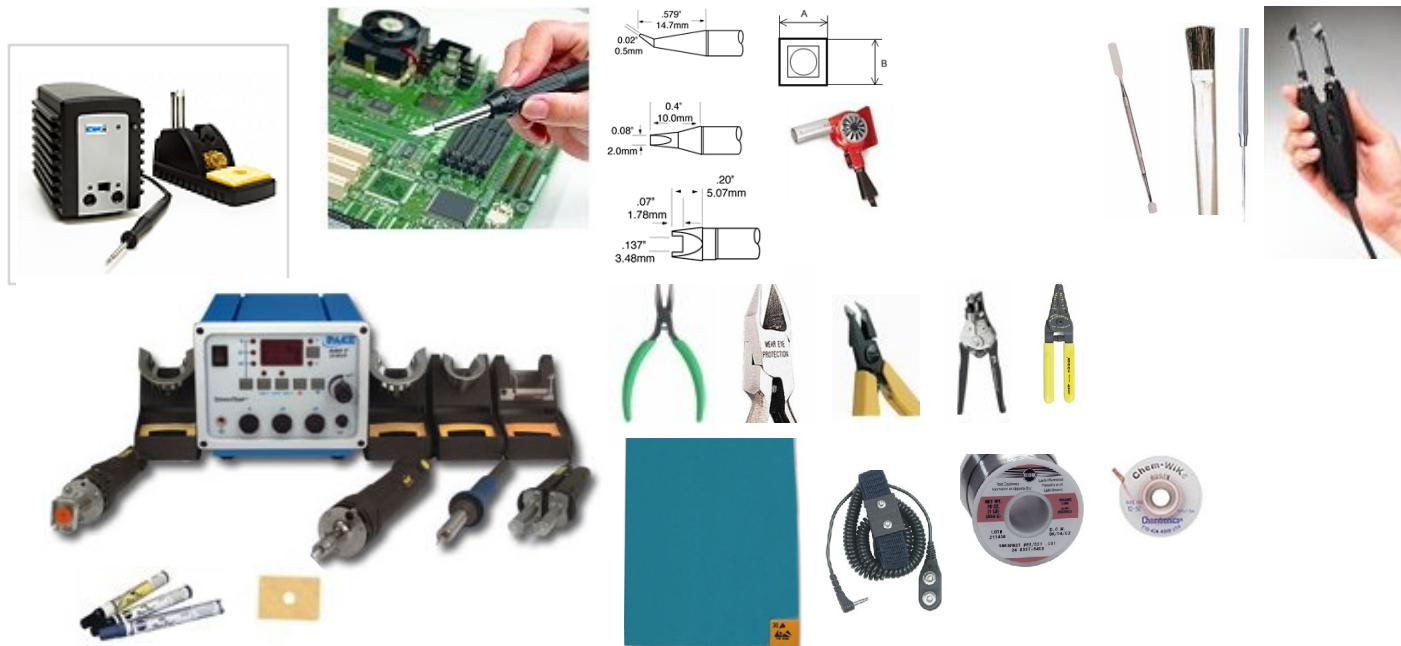


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Tools



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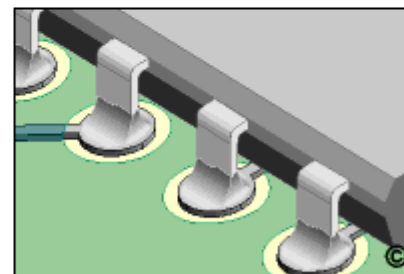
Example of Procedure for Component Removal

8.1.1 Component Removal, Through Hole Components, Vacuum Method

Printed Board Type: R/F/W/C
Skill Level: Intermediate
Conformance Level: High
Revision: E
Revision Date: Oct 18, 2001

OUTLINE

This procedure covers the general guidelines for through hole component removal using a powered vacuum desoldering tool. There is basically only one style of through hole component. Whether there are a few leads or many, or whether the component is large or small, the component removal principles are the same.



Through Hole Component

ACCEPTABILITY REFERENCES

IPC-A-610 5.0 Component Installation
IPC-A-610 6.0 Soldering

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Example of Procedure for Base Material Repair

3.5.1 Base Material Repair, Epoxy Method

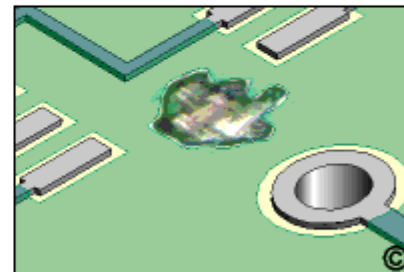
Printed Board Type: R/W
Skill Level: Advanced
Conformance Level: High
Revision: D
Revision Date: Jul 7, 2000

OUTLINE

This procedure is used to repair minor damage to circuit base board material. Scrapes and scratches in the base board material may be caused by accidents during handling. Burns in the base material may be caused by improper use of soldering and desoldering tools.

CAUTION

This method may be used when the damage extends deep into the base material, but not completely through. If the base board material is damaged completely through, see Procedure No. 3.5.2 or 3.5.3.



Damaged Base Material



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Number Of Procedures For Each Category

- Handling and cleaning (2)
- Coating removal (6)
- Coating replacement (2)
- Conditioning (1)
- Epoxy mixing (1)
- Markings (3)
- Tip care and maintenance (1)



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Number Of Procedures For Each Category

- Through hole desoldering (5)
- Surface mount removal (39)
- Pad-land preparation (6)
- Component installation (25)
- Modification and repair (41)
- Wire splicing (4)



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Crucial and Critical Elements

- Product cost
- Customer satisfaction
- Repeat business
- Process improvements
- Time to market
- Lead-free implementation



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Upcoming . . .

- June 18th --

The Printed Circuit Board Inspection Process

- What to Look For and Why
- Solder Flow
- SMT – PTH
- Rough Pass vs. Specific



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