



*THE INSTITUTE FOR
INTERCONNECTING
AND PACKAGING
ELECTRONIC CIRCUITS*

IPC-7711

Rework of Electronic Assemblies

IPC-7711

February 1998

A standard developed by the Institute for Interconnecting
and Packaging Electronic Circuits

Supersedes IPC-R-700C
January 1988

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Developed by the Electronic Assembly Rework Task Group (7-34b)
of the Institute for Interconnecting and Packaging Electronic Circuits

Users of this standard are encouraged to participate in the
development of future revisions.

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The Principles of Standardization

In May 1995 the IPC's Technical Activities Executive Committee adopted Principles of Standardization as a guiding principle of IPC's standardization efforts.

Standards Should:

- Show relationship to DFM & DFE
- Minimize time to market
- Contain simple (simplified) language
- Just include spec information
- Focus on end product performance
- Include a feed back system on use and problems for future improvement

Standards Should Not:

- Inhibit innovation
- Increase time-to-market
- Keep people out
- Increase cycle time
- Tell you how to make something
- Contain anything that cannot be defended with data

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The material in this standard was developed by the Electronic Assembly Rework Task Group (7-34b) of the Institute for Interconnecting and Packaging Electronic Circuits.

Foreword

IPC's documentation strategy is to provide distinct documents that focus on specific aspects of electronic packaging issues. In this regard document sets are used to provide the total information related to a particular electronic packaging topic. A document set is identified by a four digit number that ends in zero (0) (i.e., IPC-7710).

This standard is intended to provide information on the rework, repair and modification of printed boards and electronic assemblies. This information must also be supplemented by a performance specification that contains the requirements for the chosen technology. When used together, these documents should lead both manufacturer and customer to consensus in terms of acceptability.

These documents supersede the following:

IPC-7711 supersedes IPC-R-700C

IPC-7721 supersedes IPC-R-700C

As technology changes, a performance specification will be updated, or new focus specifications will be added to the document set. The IPC invites input on the effectiveness of the documentation and encourages user response through completion of "Suggestions for Improvement" forms at the end of each document.

Acknowledgment

Any Standard involving a complex technology draws material from a vast number of sources. While the principal members of the IPC Electronic Assembly Rework Task Group (7-34b) of the Product Assurance Committee are shown below, it is not possible to include all of those who assisted in the evolution of this standard. To each of them, the members of the IPC extend their gratitude.

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A Special Note of Appreciation

The following core group has volunteered much of their time and have made significant contributions to this document.

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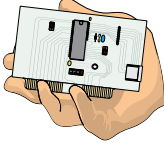
Miller, Christine A., FORE Systems Inc.
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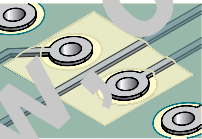
2 Handling/Cleaning

Procedure	Description		Product Class	Skill Level	Level of Conformance
2.1	Handling Electronic Assemblies		R,F,W,C	Intermediate	High
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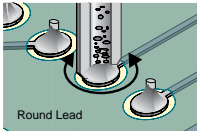
Procedure	Description		Product Class	Skill Level	Level of Conformance
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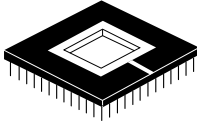
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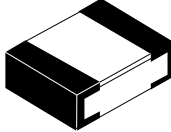
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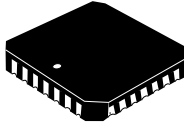
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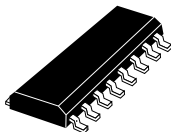
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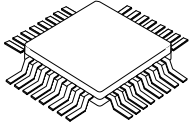
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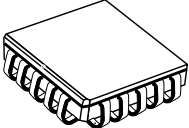
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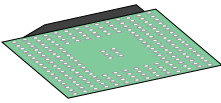
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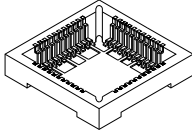
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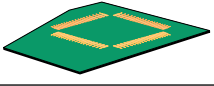
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4 Pad/Land Preparation

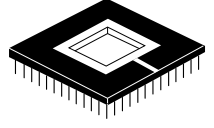
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5 Installation

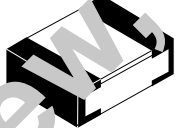
5.1 Through-Hole Installation

Procedure	Description	
	Install following the requirements of J-STD-001 and J-HDBK-001	

5.2 PGA and Connector Installation

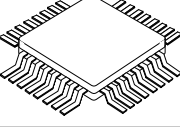
Procedure	Description		Product Class	Skill Level	Level of Conformance
5.2.1	Solder Fountain Method with PTH Prefilled		R,F,W,C	Expert	Medium

5.3 Chip Installation

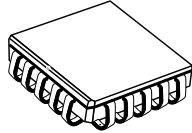
Procedure	Description		Product Class	Skill Level	Level of Conformance
5.3.1	Solder Paste Method		R,F,W,C	Intermediate	High

5.4 Leadless Component Installation (To be developed)

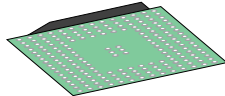
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Procedure	Description		Product Class	Skill Level	Level of Conformance
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5.5.3	Point-to-Point Method		R,F,W,C	Intermediate	High
5.5.4	Hot Air Pencil/Solder Paste Method		R,F,W,C	Advanced	High
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5.5.6	Blade Tip with Wire		R,F,W,C	Advanced	High


5.6 J-Lead Installation

Procedure	Description	Product Class	Skill Level	Level of Conformance
				
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5.6.3	Solder Paste Method/Hot Air Pencil	R,F,W,C	Advanced	High
5.6.4	Multi-Lead Method	R,F,W,C	Intermediate	High

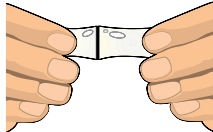
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8.1.2	Wrap Splice	N/A	Intermediate	Low
8.1.3	Hook Splice	N/A	Intermediate	Low
8.1.4	Lap Splice	N/A	Intermediate	Low

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Rework of Electronic Assemblies

1.0 General

1.1 Scope This document covers procedures for repairing and reworking printed board assemblies. It is an aggregate of information collected, integrated and assembled by the Repairability Subcommittee (7-34) of the Product Assurance Committee of the IPC.

1.2 Purpose This document prescribes the procedural requirements, tools and materials and methods to be used in the modification, rework, repair, overhaul or restoration of electronic products. Although this document is based in large part on the Product Class Definitions of ANSI/J-STD-001, this document should be considered applicable to any type of electronic equipment. When invoked by contract as the controlling document for the modification, rework, repair, overhaul or restoration of products, the requirements flowdown apply.

IPC has identified the most common equipment and process in order to affect a specific repair or rework. It is possible that alternate equipment and processes can be used to make the same repair. If alternate equipment is used, it is up to the user to determine that the resultant assembly is good and undamaged.

1.2.1 Definition of Requirements When the word *must* is used all requirements are mandatory for all product classes. When the word *shall* is used, the requirement is mandatory for class 3 products.

1.2.2 Requirements Flowdown The applicable requirements of this document must be imposed by each manufacturer or supplier on all applicable subcontracts and purchase orders. The manufacturer or supplier must not impose or allow any variation from these requirements on subcontracts or purchase orders other than those that have been approved by the user. Unless otherwise specified, the requirements of this document are not imposed on the procurement of off the shelf assemblies or subassemblies. However, the manufacturer of these items may comply as deemed appropriate.

1.3 Background Today's PC boards are more complex and microminiaturized than ever before. Despite this, they can be successfully modified, reworked or repaired if the proper techniques are followed. This manual is designed to help you repair, rework and modify PC boards reliably. The procedures in this document have been obtained from end product assemblers, printed board manufacturers and end product users who recognized the need for documenting commonly used rework, repair and modification tech-

niques. These techniques have, in general, been proven to be acceptable for the class of product indicated through testing and extended field functionality. Procedures contained herein were submitted for inclusion by commercial and military organizations too numerous to list individually. The Repairability Subcommittee has, where appropriate, revised procedures to reflect improvements.

Rework completed satisfactorily will meet the original specification and requirements of IPC-A-600 and IPC-A-610. But, by definition, modifications and repairs do not comply with the initial design or fabrication criteria. For modification and repair, the user must recognize that the criteria in IPC-A-600 Acceptability of Printed Boards and IPC-A-610 Acceptability of Printed Board Assemblies are not necessarily applicable to the procedures herein. Modifications and repairs should not compensate for the lack of proper processes and quality controls. Ultimate cost effectiveness is achieved using appropriate design, fabrication and assembly techniques that minimize the need for modification and repair.

1.4 Controls Although modification, rework and repair procedures may be very similar, the control of such procedures may not be the same, due to the conditions and objectives involved.

1. Modification

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. Modifications should only be performed when specifically authorized and described in detail on controlled documentation.

2. 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.

3. Repair

The act of restoring the functional capability of a defective article in a manner that precludes compliance of the article with applicable drawings or specifications.

Repairs are generally changes to an unacceptable end product to make it acceptable in accordance with original functional requirements. The control of repaired products should be by means of Material Review Board (MRB), or its equivalent, which may consist of