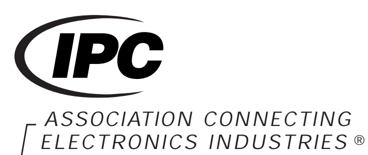

IPC-7711A/7721A

Rework of Electronic Assemblies

IPC-7711, Change 1 - February 2002
IPC-7711 - February 1998

Repair and Modification of Printed Boards and Electronic Assemblies

IPC-7721, Change 2 - April 2001
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These standards are now published in a single volume with three sections. Part 1 includes the general information and procedures that are common to both IPC-7711A and IPC-7721A. Part 2 includes all the rework procedures from IPC-7711A and Part 3 includes all the repair and modification procedures from IPC-7721A.

Developed by the Repairability Subcommittee (7-34) of the Product Assurance Committee (7-30) of IPC

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

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Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
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3.2 PGA and Connector Removal

Procedure	Description	Product Class	Skill Level	Level of Conformance
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Procedure	Description	Product Class	Skill Level	Level of Conformance
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3.7.2.1	Solder Wrap Method - Surface Tension	R,F,W,C	Intermediate	High
3.7.3	Flux Application Method - Vacuum Cup	R,F,W,C	Advanced	High
3.7.3.1	Flux Application Method - Surface Tension	R,F,W,C	Intermediate	High
3.7.4A	Bridge Fill Method - Tweezer	R,F,W,C	Advanced	High
3.7.5A	Solder Wrap Method - Tweezer	R,F,W,C	Advanced	High
3.7.6	Flux Application Method - Tweezer	R,F,W,C	Advanced	High
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3.8 J-Lead Removal

Procedure	Description	Product Class	Skill Level	Level of Conformance
3.8.1	Bridge Fill Method - Tweezer	R,F,W,C	Advanced	High
3.8.1.1	Bridge Fill Method - Surface Tension	R,F,W,C	Advanced	High
3.8.2	Solder Wrap Method - Tweezer	R,F,W,C	Advanced	High
3.8.2.1	Solder Wrap Method - Surface Tension	R,F,W,C	Advanced	High
3.8.3	Flux Application Method - Tweezer	R,F,W,C	Advanced	High
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Procedure	Description	Product Class	Skill Level	Level of Conformance
3.9.1	BGA/CSP Removal	R,F,W,C	Advanced	High
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3.10.3	Flux Application Method	R,F,W,C	Advanced	High
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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
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5.3.2	Point to Point Method	R,F,W,C	Intermediate	High

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5.5 Gull Wing Installation

Procedure	Description	Product Class	Skill Level	Level of Conformance
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5.5.4	Hot Air Pencil/Solder Paste Method	R,F,W,C	Advanced	High
5.5.5	Hook Tip w/Wire Layover (To be developed)	R,F,W,C	Intermediate	High
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5.6 J-Lead Installation

Procedure	Description	Product Class	Skill Level	Level of Conformance
5.6.1	Wire Solder Method	R,F,W,C	Advanced	High
5.6.2	Point-to-Point Method	R,F,W,C	Intermediate	High
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

5.7 BGA/CSP Installation

Procedure	Description	Product Class	Skill Level	Level of Conformance
5.7.1	Using Wire Solder to Prefill Lands	R,F,W,C	Advanced	High
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8.1.3	Hook Splice	N/A	Intermediate	Low
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Blisters and Delamination

Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
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Bow & Twist

Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
3.2	Bow and Twist Repair		R, W	Advanced	Medium

Hole Repair

Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
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Key and Slot Repair

Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
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3.4.2	Key and Slot Repair, Transplant Method		R, W	Expert	High

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Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
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Conductor Repair

Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
4.2.1A	Conductor Repair, Foil Jumper, Epoxy Method		R, F, C	Advanced	Medium
4.2.2	Conductor Repair, Foil Jumper, Film Adhesive Method		R, F, C	Advanced	High
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4.2.7	Conductor Repair, Inner Layer Method		R, F	Expert	High

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Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
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Lifted Land Repair

Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
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4.4.2	Lifted Land Repair, Film Adhesive Method		R, F	Advanced	Medium

Land Repair

Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
4.5.1	Land Repair, Epoxy Method		R, F	Advanced	Medium
4.5.2	Land Repair, Film Adhesive Method		R, F	Advanced	High

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4.6.3	Edge Contact Repair, Plating Method		R, F, W, C	Advanced	High

Surface Mount Pad Repair

Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
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Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
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Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
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Flexible Conductor Repair

Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
7.1.1	Flexible Conductor Repair		F	Expert	Medium

General Information and Common Proedures

1 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 The words *must* and *shall* have no special meaning beyond that commonly used in other IPC standards.

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 techniques. 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.