ASSOCIATION CONNECTING
ELECTRONICS INDUSTRIES®

IPC-7721 Change 2 Pages April 2001

Repair and Modification of Printed Boards and Electronic Assemblies

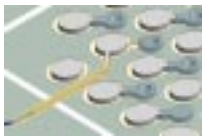
Developed by the Printed Board Repair Task Group (7-34a) of IPC

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

Contact:

IPC
2215 Sanders Road
Northbrook, Illinois
60062-6135
Tel 847 509.9700
Fax 847 509.9798

Jumpers

Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
6.1	Jumper Wires		R, F, W, C	Intermediate	N/A
6.2.1	Jumper Wires, BGA Components, Foil Jumper Method		R, F	Expert	Medium

Component Additions

Procedure	Description	Illustration	Product Class	Skill Level	Level of Conformance
6.3	Component Modifications and Additions		R, F, W, C	Advanced	N/A

IPC

7721

Repair and Modification of Printed Boards and Electronic Assemblies

Revision:

Date: **03/01**

Number: **6.3**

Component Modifications and Additions

Product Class: R,F,W,C

Skill Level: Advanced

Level of Conformance: N/A

OUTLINE

This procedure covers the general guidelines for modifications that involve adding components.

REFERENCES

1.0 Index
2.1 Handling Electronic Assemblies
2.2 Cleaning
2.5 Baking and Preheating

TOOLS & MATERIALS

Cleaner	Microscope System
Cleaning Wipes	Soldering Iron with Tips
Flux	Solder

GENERAL RULES

1. Added components may need to be secured with adhesive, or by other means, if the component leads or component body would be subjected to mechanical stress.
2. Leads of added components should not be inserted into plated holes occupied by another component lead.
3. Added components placed on the circuit board surface should be placed on the component side of the assembly or circuit board unless otherwise specified.
4. Added components shall not be raised above the board surface beyond allowable dimensions.
5. Added components shall not cover over pads or vias used as test points.
6. Added components shall not cover other component foot prints unless the layout of the assembly prohibits mounting in other areas.
7. Added component leads may require insulation to avoid contact with component body or other conductors.
8. Removal of existing solder from a connection point may be necessary to avoid bridging, or excess solder, in the final connection.
9. Consider design limitations and product use environments when stacking components.
10. Do not exceed minimum component lead bend radius.
11. When possible, component identification marking shall be legible.

IPC-7721	
Number: **6.3**	Subject: **Component Modifications and Additions**
Revision: Date: 03/01	

PROCEDURE

1. When required, form the component leads and clean the area.
2. When required, secure the component in place by bending leads or other mechanical means.
3. Apply flux to the connection.
4. Place the soldering iron tip at the connection between both leads. Apply a small amount of solder at the connection of soldering iron tip and lead to form a solder bridge.
5. Immediately feed solder into the joint from the side opposite the soldering iron tip until the proper fillet is achieved. Remove the solder and iron simultaneously.
6. When required, clean the flux residue.
7. Inspect.

Component Modification Examples

Figure 1 Radial lead component soldered to through hole component leads. Note: Leads of the radial component should not need to be inserted into the plated holes.

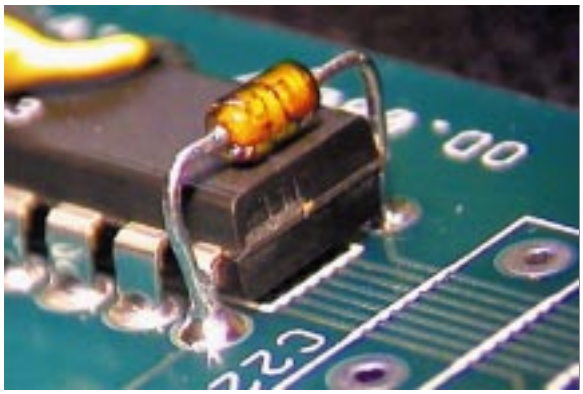


Figure 2 Axial lead component soldered to through hole component leads. Note: Leads of axial component should not be inserted into the plated holes.

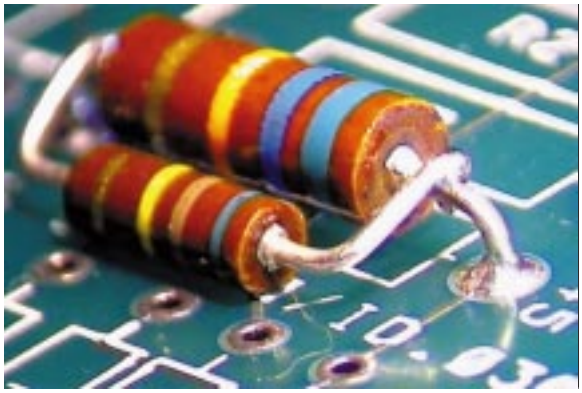


Figure 3 Axial lead component soldered to adjacent axial lead component. Note: Added component may be stacked vertically or horizontally.

Figure 4 Chip component soldered to surface mount component using jumper wires. Note: One lead of surface mount component is shown lifted.

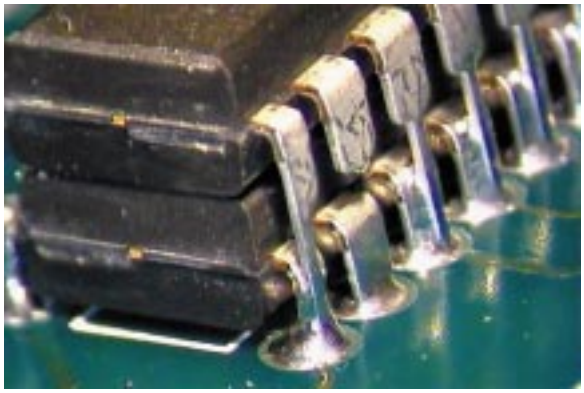


Figure 5 DIP component stacked and soldered onto another DIP component. One lead shown clipped. Note: Leads of added component should not be inserted into the plated holes.

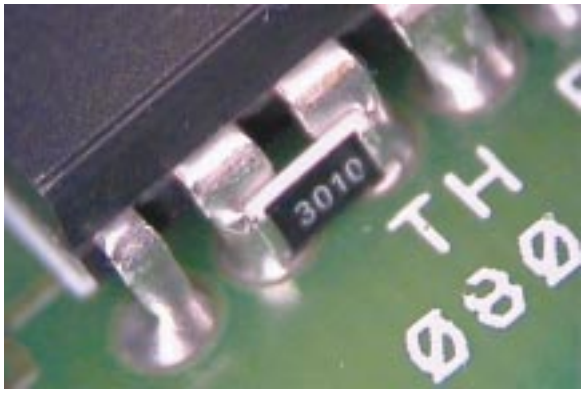


Figure 6 Chip cap bridging adjacent leads.

Component Modification Examples (continued)

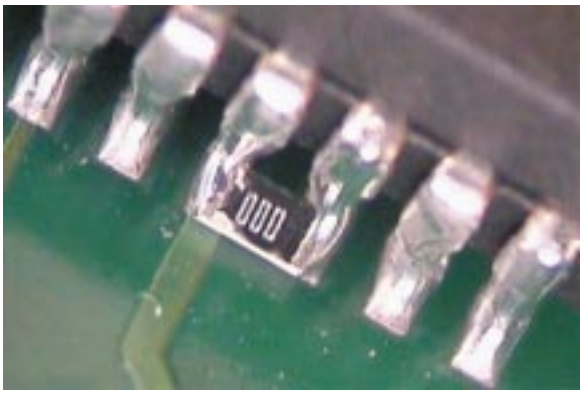


Figure 7 Chip component bridging leads of surface mount component.

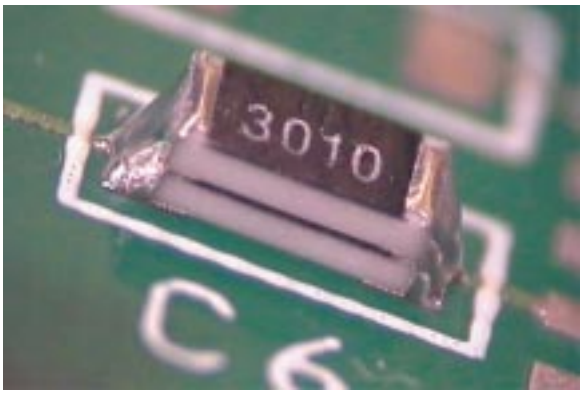


Figure 8 Chip component stacked onto another chip component.

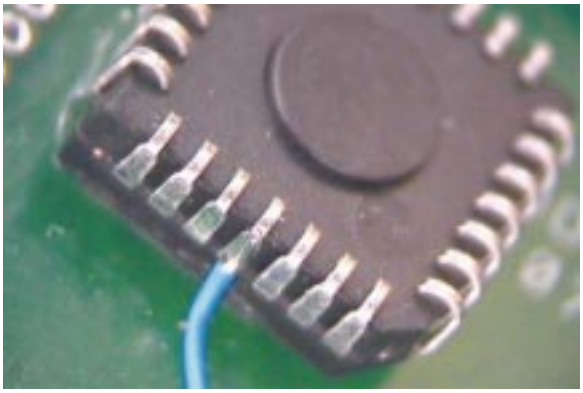


Figure 9 *Acceptable* Surface mount component mounted upside down with jumper wires attached. Note: One lead is bent outward.

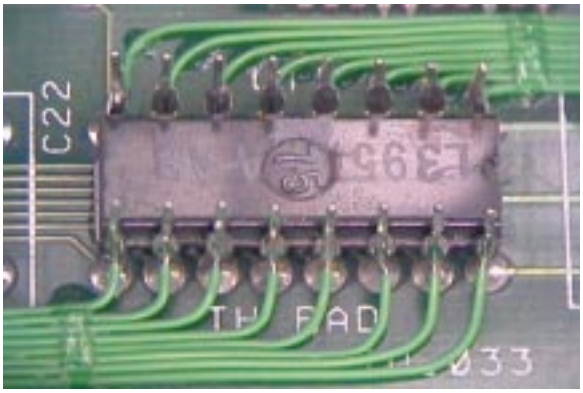


Figure 10 DIP component mounted upside down with jumper wires attached.

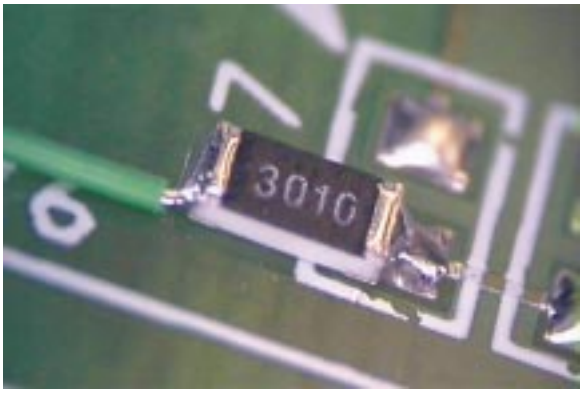


Figure 11 Chip component mounted to one pad only.

Figure 12 Radial lead component mounted upside down. Note: Insulate leads to avoid contact with component body.