Technical Note No. 106

Soldering and Desoldering Surface-Mount Chip Components

By Ted Iwanowski and Bob Perrin

Surface-mounting components is becoming increasingly popular because of the higher electronic speeds possible from shorter delay lines and the facility that surface mounting lends to an automated production line. Once a printed circuit board has been assembled, ordinarily there should not be any need to change the components. Z-World has prepared this technical note to guide customers in changing surface-mounted components such as chips and jumper wires in the course of configuring a programmable controller to their needs. The controllers are available from Z-World with the memories and jumpers already configured according to the options described in the controller manuals.

Recommended Tools and Supplies

- Low-wattage fast-recovery soldering iron with a fine tip. Recommend Weller EC1002 with an ETS long conical tip 0.4 mm (1/64") in diameter or the Weller MT1500 with an MT202 tip 0.030" x 1.0".
- Stainless steel fine-tipped tweezers. Recommend Techni-tool Type 1 general-purpose tweezers (part number 758TW454).
- Solder wick, No. 2 size, 0.030" wide, white color code, no-clean flux embedded in the wick.
- Soldering iron tip tinner.
- Clean, damp sponge.
- Acid brush made with pig bristles. Alternatively, Q-Tips® or Kimwipes® may be used.
- Isopropyl alcohol or denatured ethanol.
- Solder (60% Sn/40% Pb or eutectic) 0.015" in diameter
- Compatible liquid flux.
- 10X microscope, 10X jeweler's loupe, or 10X head-mounted magnifier.
- PLCC chip remover if chips are to be moved.

Removing a Surface-Mounted Component

Figure 1 shows a surface-mounted chip component.

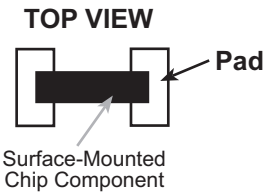

Figure 1. Surface-Mounted Chip Component

1. Lay the solder wick over one end lead of the component to be removed. Once the soldering iron has warmed up to 425°C (800°F), apply heat to the end lead. Watch for the solder to wick into the solder wick. Note that the wick will not remove all the solder from the pads; apply flux if necessary.
2. Repeat Step 1 for other pads to which the component is soldered.
3. To remove a discrete component such as a surface-mounted resistor or jumper wire, lay fresh wick over both ends of the component. Apply heat to the middle of the component. Push the component away from the circuit board or lift it off with the solder wick. Alternatively, the tip of the soldering iron may be placed across both ends of the component, as shown in Figure 2, to flick the component away. Note that any solder remaining on all the pads needs to be melted before attempting to remove the component so as not to peel the pad off the printed circuit board.

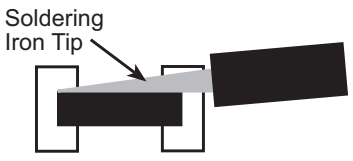

Figure 2. Laying Soldering Iron Tip Against Surface-Mounted Chip Component

4. Use the solder wick to dress the pads after the component has been removed.
5. Use the acid brush dipped in alcohol to remove any flux residues.

Soldering a Surface-Mounted Component

1. Use the acid brush dipped in alcohol to clean the pads where the component is to be mounted. Dry the area.
2. Flood the first pad with liquid flux. Place a solder bump on the pad as shown in Figure 3.

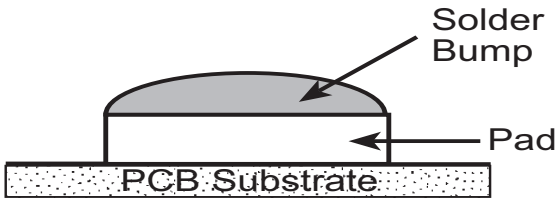

Figure 3. Creating a Solder Bump to Solder a Surface-Mounted Chip Component on a Pad

3. Use tweezers to position the component on the pads. Melt the solder on the bumped pad by heating only the pad with the soldering iron, as shown in Figure 4. It is important to heat only the pad to avoid pushing the surface-mounted component. Let the component settle on the pad.

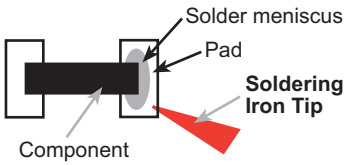

Figure 4. Use Soldering Iron to Heat Pad Where Shown

4. Remove the soldering iron and the tweezers. Allow the solder on the pad to solidify before continuing. Do not use the tweezers to hold the component in position while the solder solidifies. This prevents residual stress on the component end cap.
5. Place the soldering iron tip on the next pad to apply heat. Melt some solder against the pad and wait 2–3 seconds for the solder to wick up the end cap of the component.
6. Use the acid brush dipped in alcohol to clean up any flux that may have leaked.
7. Use the PLCC chip remover to removed any socketed PLCC components before washing the printed-circuit board. Figure 5 shows the tool holes for the PLCC chip remover. Note the locations on the board where these components came from since *they will have to be replaced without being interchanged.*

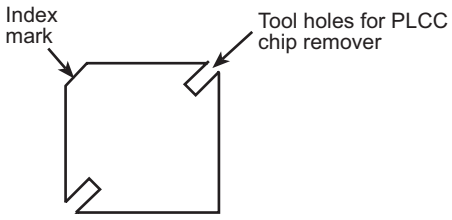

Figure 5. Locations of PLCC Tabs and Index Mark

8. Tape over any exposed piezoelectric beeper or speaker holes to keep water from getting into the piezoelectric elements. Rinse the printed circuit board in hot demineralized water. Allow the board to dry.
9. Replace the socketed flash memory chips. Take care to replace the chips **exactly where they came from**.

Figure 6 shows examples of good and bad solder joints.

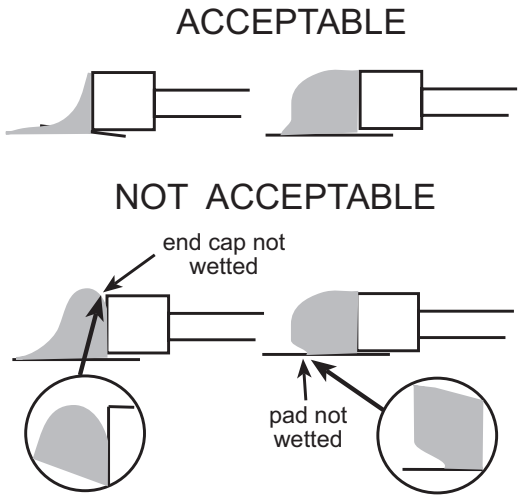

Figure 6. Examples of Good and Bad Solder Joints

Z-World Corporate Headquarters
2900 Spafford Street
Davis, California 95616-6800 USA
530.757.3737 • Fax: 530.753.5141

http://www.zworld.com