Soldering Basics Part III

1. In part soldering basics part II we briefly discussed soldering safety, equipment and began to discuss actually soldering. Here in part three we will pick up with actual soldering techniques. We were just in the process of initially applying the soldering iron's tip to the junction of the components to be soldered.

2. Within a few seconds of applying solder to the iron's tip, the tip should be applied to the junction of the components leads or pads. Assure the convex of solder, discussed in part II, flows into contact with the components leads as previously described. Within 1-2 seconds apply more solder to the junction of the irons' tip and component leads junction.

3. When soldering PC boards part of the melted solder may appear to disappear as it is absorbed into the plated thru hole that the components lead is in. Apply enough solder to assure the junction is completely covered with solder. A slight convex appearance of the solder on the leads will assure that adequate solder was applied. Concave appearance of solder in plated thru holes of PC boards should be avoided as this could be the result of insufficient heat or solder.

4. Unless soldering large components the time from applying the iron's tip to the component until solder has completely flowed into the junction should be five seconds or less. Smaller components should be as little as two seconds. If the junction does not appear correct after five seconds remove the iron's tip, allow the junction to cool for three to five minutes and try again.

5. Large components such as coax connectors may require 15-20 seconds of iron contact to assure sufficient transfer of heat. We will discuss this in more detail in a later tech talk.

6. Do not leave a peak of solder at the point that the tip was removed from. A peak can mean contamination in the joint or insufficient heat was applied. A turning twisting up and down or side ways motion of the irons tip when removing it will help prevent the solder peak. With high voltage or high altitude corona discharges or arcing can occur from these peaks.

7. Do not move or attempt to move the component or it's leads for at least 20 seconds after removing the irons tip. Doing so will cause a cold solder junction (joint). A cold joint will hinder electron flow and compromise integrity of the mechanical connection. Five to ten seconds after removing the tip you will notice the sheen or surface appearance of the soldered junction change. This is the solder changing from a liquid to solid as it cools. A cold solder joint is seen as lumpy, grainy and usually very dull. The joint may be actually mechanically loose in extreme cases. A good solder joint will be smooth and shiny with a bright silver to bright gray surface.

8. When soldering and especially on PC boards use extra care not to allow the solder to flow onto adjacent components, their leads or pads. Remove all such bridges with solder wick or your solder extractor. Applying a small amount of solder to the bridge as it is headed can be useful especially when using a solder extractor. Reapply solder to the intended junction as needed after removing the bridge. Assure the finished junction meets the criteria we just discussed. You should practice your desoldering techniques prior to needing them.

9. Solder wick is usually supplied in small rolls that facilitate handling. Usually it is not necessary to cut it from the roll prior to using. Avoid directly touching the solder wick as it will become very hot during the desoldering process. Clean the iron's tip, apply a small amount of solder to the tip, lay the wick directly on top of the bridge of solder to be removed. Press the tip of the iron directly on the wick directly above the solder to be removed and press down. This assures better contact among the tip, wick and solder. It may be helpful to hold the iron's tip at a low angle to help assure more surface contact. Be very careful not to touch adjacent components with the iron as they may be damaged by heat. Usually tip contact should be about twice as long to desolder as to solder the junction initially. As wick adds mass to the junction it takes longer to heat.

10. Using a solder extractor obviously does not involve solder wick and adjustments in time should be made. Small hand extractors available locally should be avoided. A large capacity extractor is much better. Better yet is a vacuum pump attached to a soldering iron. However, the cost of these usually prevents their use among casual amateur radio operators. When using the hand operated extractor have it cocked before applying it's tip to the melted solder. Practice cocking it by pushing the plunger again a table top of other solid object. It may take several extractions with the extractor to completely remove the solder. Extractor tips do become worn after much use and are usually replaceable at a small cost. Do not be overly concerned about jamming the tip into the melted solder.

11. The above desoldering procedure just discussed can be used with some success to remove components from PC boards and also for smaller connections not involving PC boards. It is not useful for larger components such as large gauge wire and coax. It is not very useful for components with several leads such as integrated circuits. Usually large gauge wire is best cut off and reformed and resoldered. If more length is necessary add the needed wire. Coax connectors are very difficult to desolder. Usually it is best to simply cut them off and reapply a connector. Allow service loops when measuring coax this will assure extra coax is available to replace connectors as needed.

12. If replacement IC's are available it is much easier to simply cut all it's lead and then remove the remaining leads from the PC board one at a time. If not available remove as much solder as possible using the process discussed above. Next carefully pry up on the IC. If it comes loose fine. If not again pry up on the IC while alternately applying heat to each pin on the opposite side of the board. A second person helping

can be a great asset here. Much effort may be required. Use heat sparingly and allow the IC to cool often. Be prepared to replace the IC as it may well be damaged from physical force or from heat.

13. Good soldering skills include the ability to correct your mistakes. Good desoldering skills should be learned concurrent with soldering skills.

14. When finished your soldering carefully inspect your work. Does it meet all the criteria discussed earlier? Does it meet your expectations? Would you be pleased to show it to your friends?

15. Practice is the only way to achieve quality soldering. Practice, time and patience is the only way to gain proficiency. Have a friend critique your work. Good luck and be safe.