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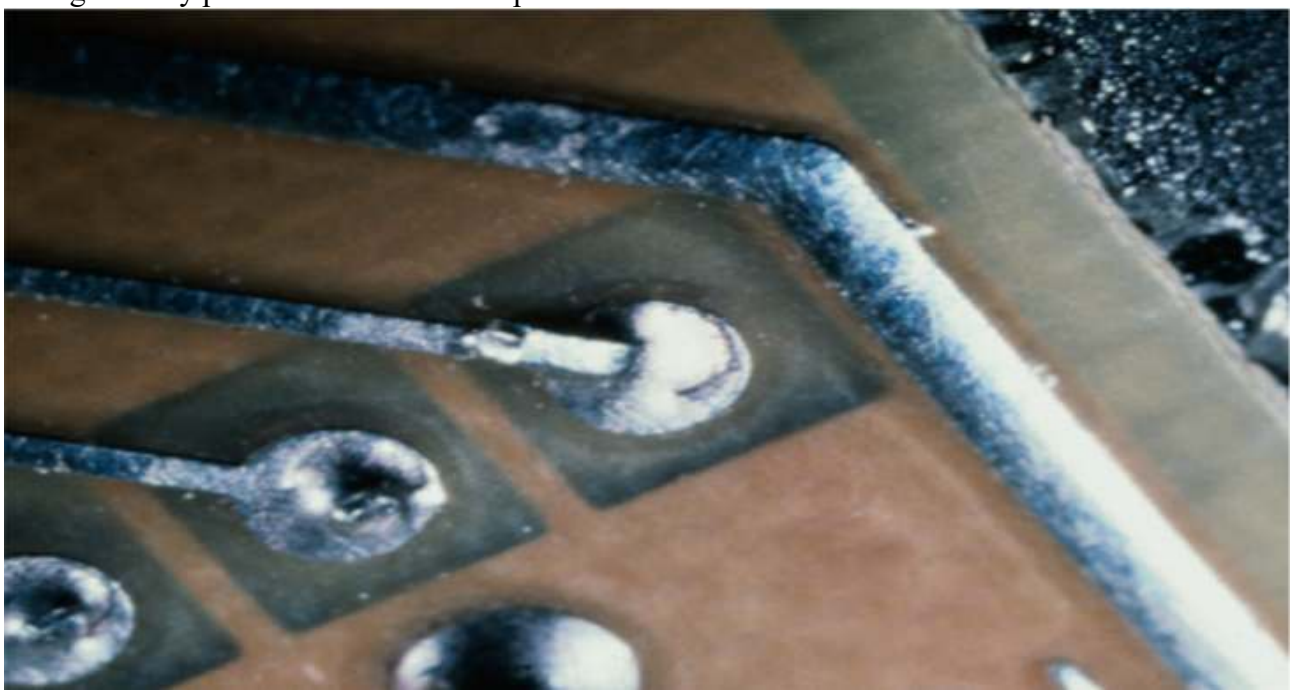
Types of Wave Solder Defects

- Non Wetting
- Dewetting
- Pin Holes
- Webbing
- White Haze
- Solder Balls
- Icycling
- Bridging
- Excess Solder
- Dull/Grainy Joints
- Cold/Disturbed Joints

Non Wetting

Recognized by pull back of solder to expose the surface to be soldered



Non Wetting - Possible Causes:
Grease, oil or dirt on the pre-soldered surface
Bleeding or misregistered soldered mask
Low temperature solder
Contaminated solder
Surfaces too heavily oxidized for flux being used
Contaminated flux
Poor application of flux

Remedy
Investigate each possible cause and correct suspected discrepancies one at a time until solderability is restored

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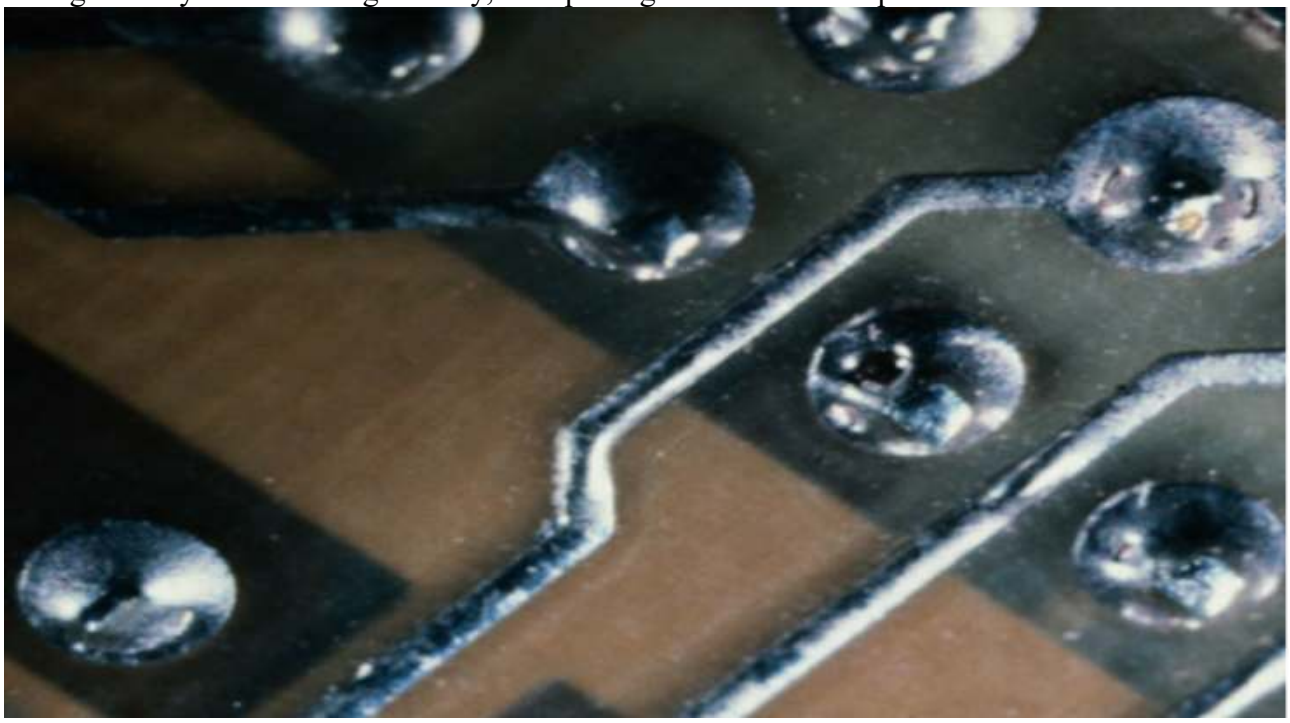
Dewetting

Recognized by metal wetting initially, then pulling back to form droplets of solder on the surface.



Dewetting - possible Causes:
Contamination of surface by abrasives
Poor plating
Poor hot air solder leveling during PCB manufacture

Remedy
Restore solderability of the surface

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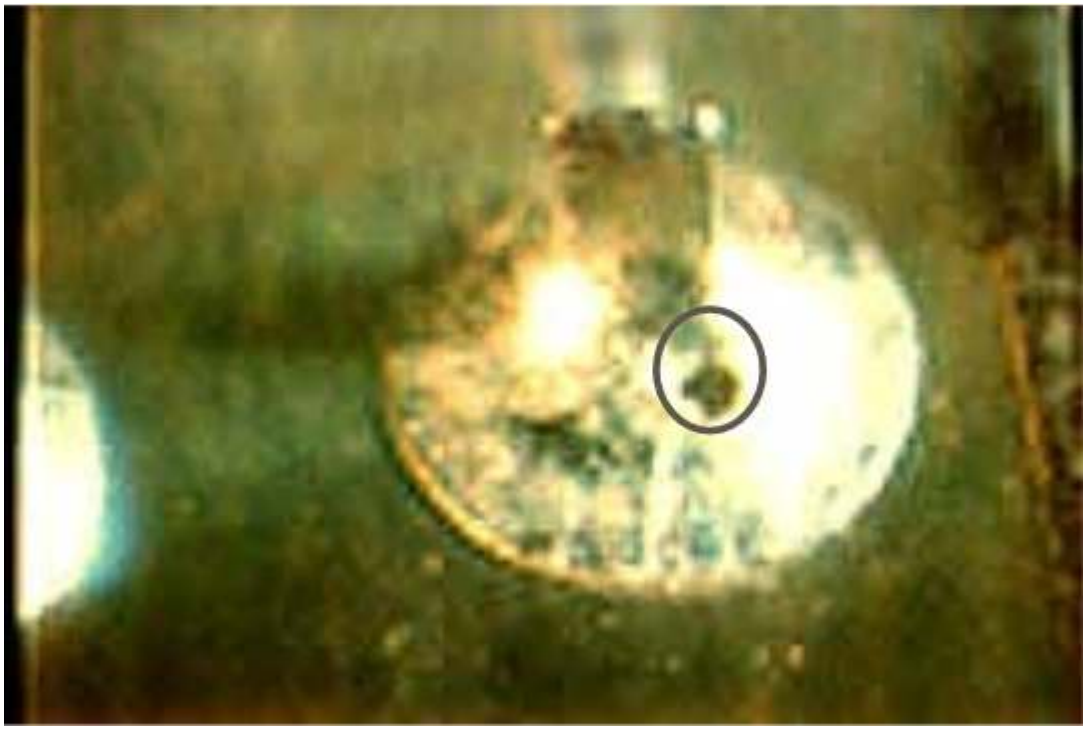
Pin Holes

Recognized by small holes or eruptions in the solder fillet.



Pin Holes - possible Causes:

Moisture or plating solution in the PCB laminate
Inadequate preheat to evaporate flux solvent
Flux has absorbed water
Physical blockage due to foreign body in hole
Top of Plated Through Hole prematurely solidifying

Remedy

Increase preheat to see if it eliminates problem
Put in new flux to see if it eliminates problem
Increase topside preheat and/or solder temperature to correct premature topside Plated Through Hole freezing
If all of these fail to correct the problem, have the PCBs baked and cross sectioned.

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Webbing

Recognized by a spider web like extension of solder across the non conductive portion of the PCB.

Possible Causes:
Improper curing of the laminate or solder mask
Inadequate flux (when accompanied by bridging or icycling)
Dross in the solder wave

Remedy
Baking the PCB will sometimes correct the improperly cured mask or laminate condition
Substituting a more viscous flux or increasing the quantity of flux put on the PCB
Correcting the drossing problem in the wave

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White Haze on Solder Mask

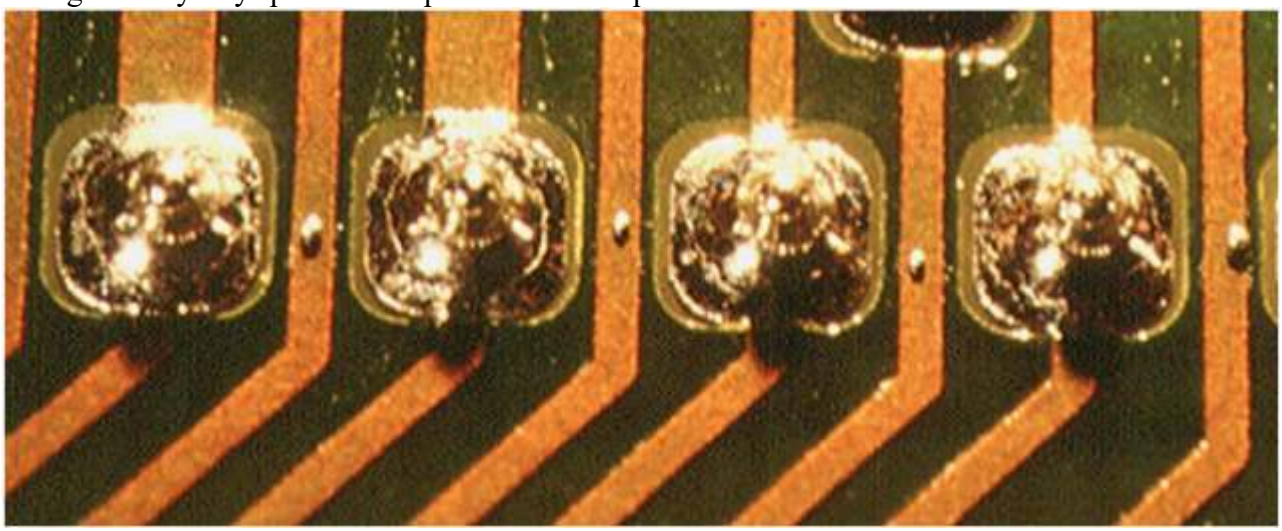
Recognized by a white haze on the non-conductive portion of the PCB that cannot be removed by washing.

White Haze on Solder Mask
Possible Causes:
Improper curing of the laminate or solder mask

Remedy
Baking the PCB will sometimes correct the improperly cured mask or laminate condition

Solder Balls

Recognized by tiny spherical shapes of solder dispersed over the surface of the PCB



Possible Causes:
Insufficient preheat
Plated Through Hole conditions that create pin holes, resulting in Solder Balls
High humidity in the manufacturing area
Moisture in the flux

Remedy:
Investigate each possible cause, correcting suspect causes one at a time until the problem is corrected.

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Icycling

Recognized by conical or flag shaped extensions of the solder fillet

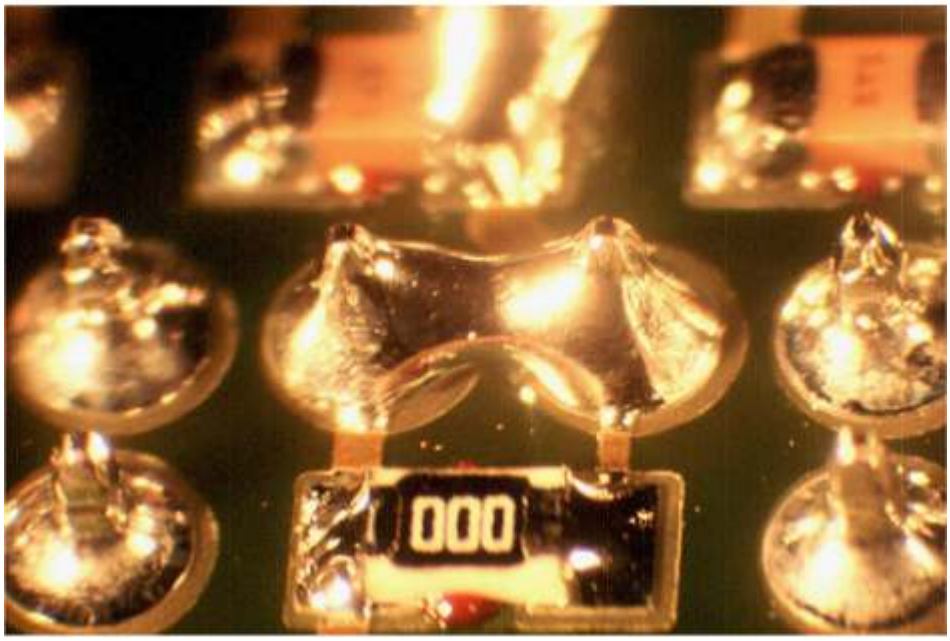
Possible Causes:
Any condition that causes the solder to solidify while in the process of draining, such as:
inadequate flux to promote quick drainage
pot temperature too low
soldering surface unusually heat absorbent
leads picking up dross in the wave
wrong Plated Through Hole to wire ratio

Remedy:

Investigate each possible cause and correct the suspect conditions one at a time until the problem is eliminated

Bridging

Recognized by solder extending from one lead to an adjacent lead, causing a short circuit



Possible Causes:
Component leads that are bent or too closely spaced
Excess solder
Inadequate flux remains to promote drainage
Board immersed too deep in the wave
Leads picking up dross in the wave
Contaminated solder
Poor component solderability

Remedy:
Investigate each possible cause and correct suspect conditions one at a time until the condition is eliminated

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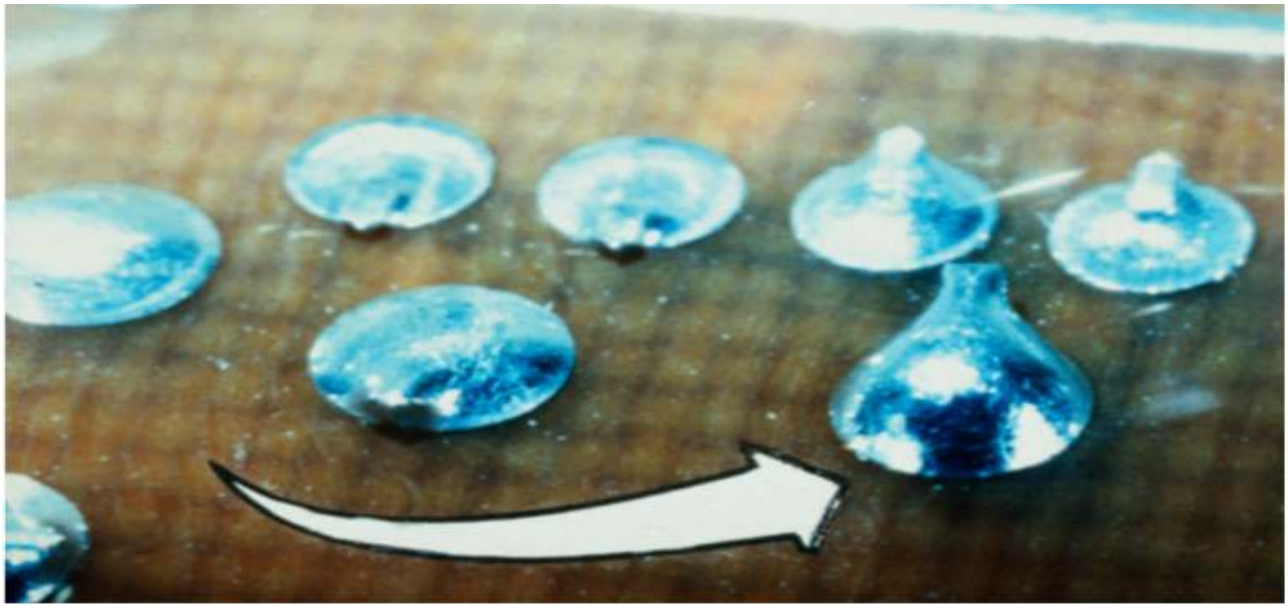
Excess Solder

Recognized by:
Bulbous appearance of fillet.
Unable to see contours of lead and land.



Possible Causes :
Any condition that contributes to poor drainage of the solder
Low temperature of solder or preheat
Contamination of solder
Insufficient flux to promote drainage
Incorrect wave exit angle or speed

Remedy:
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Investigate suspected causes and correct them one at a time until the problem is corrected

Dull or Grainy Joints

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Recognized by dark, non reflective, rough surfaces from an alloy that is normally bright and shiny.

Remedies:
Determine that the alloy is normally a shiny alloy
Examine a recent pot analysis or get one done
Conduct electrical and mechanical evaluation to see if rework is necessary
If solder meets J-STD-006 Purity Standards and joints are mechanically sound, there is no reason for rejection or touch up
If solder does not meet standard, it is a cold jointand should be replaced

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Cold/Disturbed Solder Joints

Recognized by rough and dull finish on the fillets in conjunction with unacceptable mechanical strength of the joint

Possible Causes:

Movement while joint is still molten caused by:
Conveyor mechanism erratic
Solder Temperature too high

Remedy:

Look for causes of vibration being transmitted to the PCB and correct them
Insure that solder reaches solidus temperature immediately after joint is completed