Manufacturing Audit of 20 B4 version XO computers. Dane Rogers

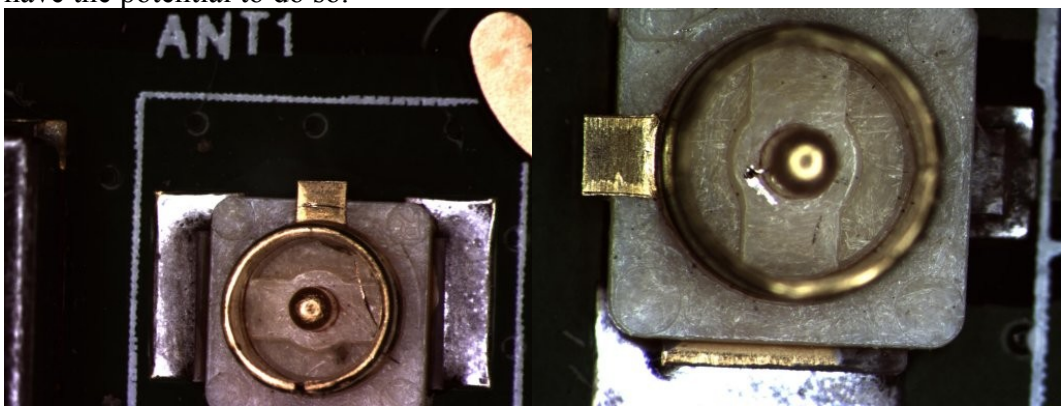
The machines arrived on July 17, 2007.

Following a detailed inspection, all machines were setup and booted to Sugar. Then rebooted into a looping configuration of the on board diagnostics. All machines operated for about three weeks with NO functional failures. After several days of operation, teardown inspections were started and a total of 10 machines were broken down completely and inspected in detail.

Findings:

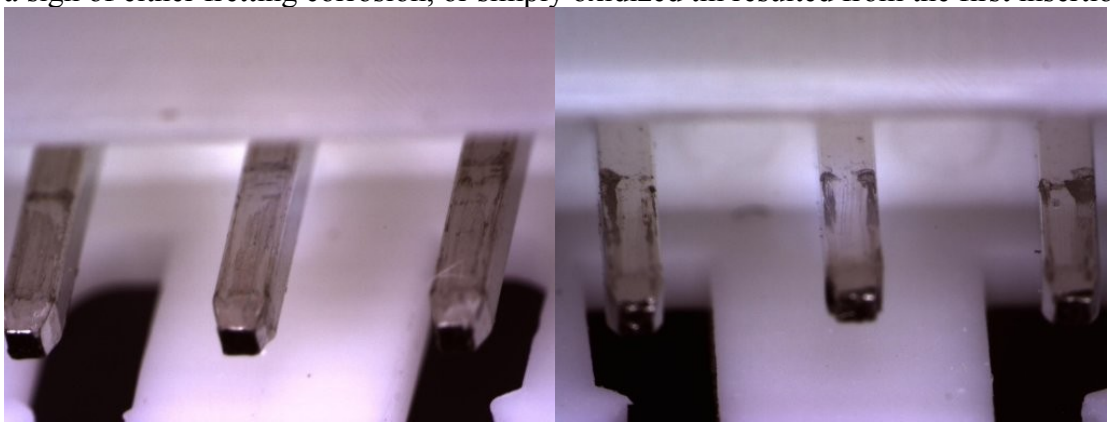
Packaging:
One box was damaged in shipment but the packaging protected the products very well with no product damage. However, two of the four boxes had broken tape across the bottom of the box. This bottom seal of the carton is much too weak and needs to be strengthened to prevent carton failure and spilling of product.

Connectors:
There were several observations regarding connectors.
Beginning with the WiFi antenna connectors. There were two combinations. The connectors on the board were always gold plated. There were two different vendors for the female connector used on the cable, one was gold plated and one looked tin plated. Of the four machines with a tin on gold connector combination, there were six metal slivers in or around the ANT1 and ANT2 connectors on the board. These slivers appear to be shavings of plating material. Of the six machines using gold on gold connectors, only two very small slivers were found. These clearly caused no problems but they do have the potential to do so.



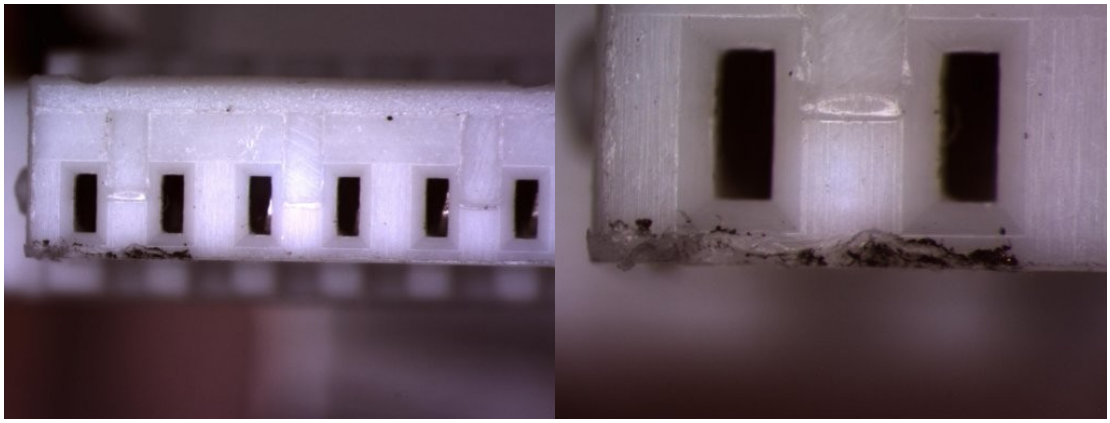
Several connector pairs have mismatched plating types, with gold on one side and tin on the other. And pairs are inconsistent with gold on gold in some machines while tin on gold in others. Gold flash is possible in some that appear tin, but it was not observed. This may be a supply issue but if you are paying for gold, you should get gold.

This brings up the potential of fretting corrosion on the tin on tin connectors (or tin on gold for that matter). The battery cable to cable connector mounted under the handle is a good example. Photos of this connector show dark deposits of tin oxide present which is a sign of either fretting corrosion, or simply oxidized tin resulted from the first insertion.

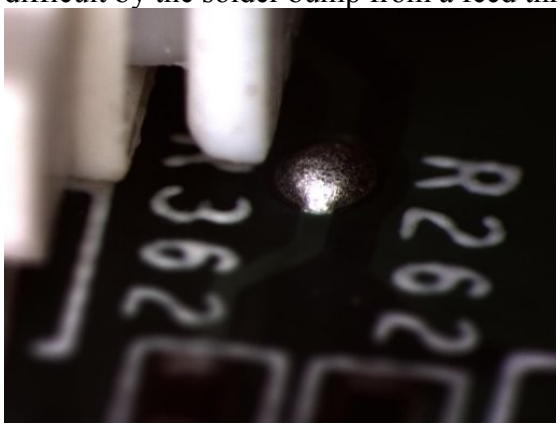


Machines which have experienced vibration and/or thermal cycling, should be disassembled and inspected for signs of fretting corrosion, especially on the battery cable connector. The floating nature of this design should prevent relative motion, and is good practice. Still, a resistance check and visual inspection of connectors from thermal and vibration test machines, will be important to verify the design.

Three machines had what appears to be solder and flux debris on the female side of CN23. Interestingly, there was no debris inside the male housings. Finding three examples in a small sample of only 10 machines, says there is probably an issue with cleanliness of a work area that handles this connector. Possibly a cable tester.

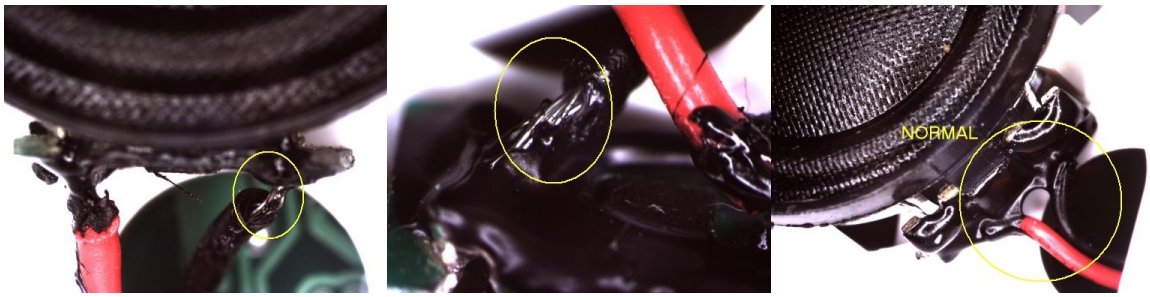


Connectors CN25 and CN26 are identical to CN22. Removing the cables from CN25 and CN26 is straight forward. However, removing the cable from CN22 is made more difficult by the solder bump from a feed through just in front of the female end.

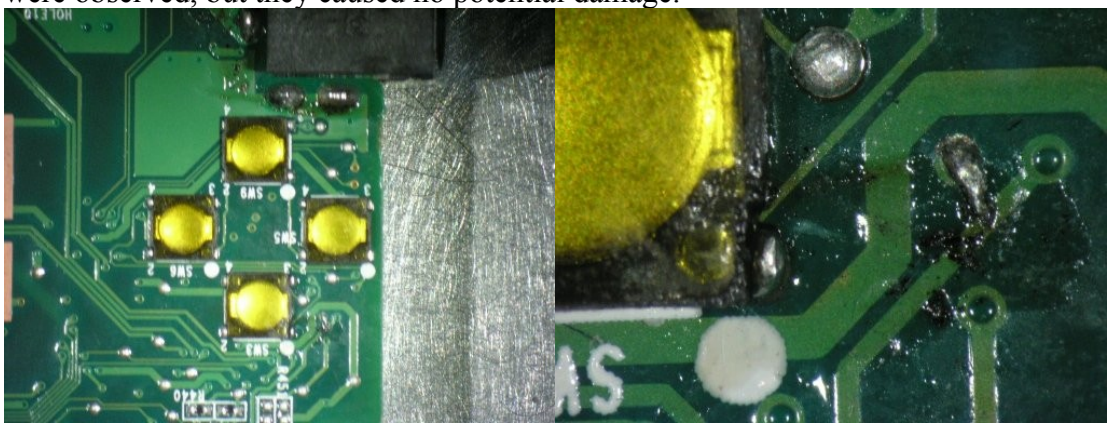


The locking detent feature is a bump on the bottom of the female connector and when pulled out, the detent needs to ride up out of its notch and will tip the outside edge down. The solder bump interferes with this motion and makes it difficult to withdraw. The tendency to pull on the wires rather than the connector housing has the potential to damage the connector contact pins and/or the housing. This may be a service issue as well as an issue on the production line. When the opportunity is available, moving this solder bump slightly would be advised.

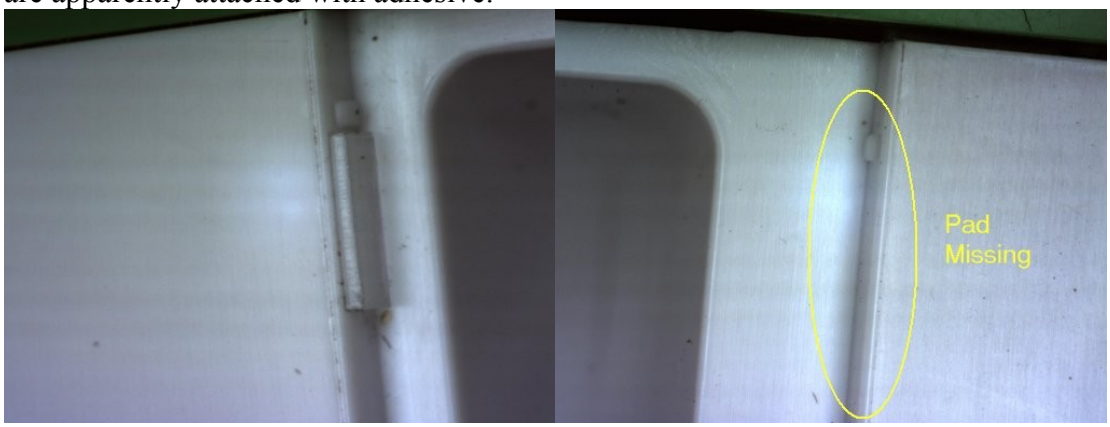
Another issue of pulling on wires to remove connectors, comes from a machine that had a production line mother board repair, the replacement LED D2. This required disassembly and board removal. Both sets of speaker wires appear to have been pulled on excessively to remove connectors CN25 and CN26. The speaker end of these cables has the solder joints covered with a soft black coating. I do not know the purpose for the coating over these connections. It is too soft to act as a strain relief. In this case, suspected tugging on these wires to remove connectors, has apparently damaged this sealing material. Unknown if this is a problem or not.



Production Process:
The large metal through hole mounting tabs for external connectors often require hand touch up to make sufficient solder joints. The soldering irons for this task are necessarily high power. In this case a solder splash from touchup of the DC input connector, fell in proximity to the scroll pad switches, either landing on or near switch SW3. When the same high power iron was used to remove the solder splash, it partially melted the housing on SW3. No functional problem resulted. However, operators should be instructed to do clean up work with a much smaller, low power soldering iron to avoid component damage. Two other similar solder splashes during through hole touch up were observed, but they caused no potential damage.



In the battery compartment, one machine had a missing spacer. These are small pads that are apparently attached with adhesive.



Gaps observed in some antennas, same as ticket #2251

Miscelaneous:
The scroll pad button has uneven feel in the left direction compared to other directions. This was submitted in ticket #2557.

I like the cleaver idea of mounting spare screws under the handle cover. I would like to suggest that if possible, one of the display shock absorbers be included. In ten machine disassemblies, I dropped and almost lost two shock absorbers.

My last note involves the included diagnostic. With the help of Mitch Bradley, I was able to boot the machines into a continuous looping diagnostic. However, when I halted the diagnostic, using the power button, I apparently caused substantial corruption of the nandflash and the machines had to be scrubbed and reloaded. Running the diagnostics will not be a normal use but may sometimes be attempted by adventurous students. Providing an obvious and graceful exit from the diagnostics would be helpful.