

Number 11 in this series deals with repairing computers. It is not that much different from repairing other types of electronic gadgets, including ham rigs. Here is a success story, showing that a little careful observation is sometimes all that is needed.

Someone gave me a broken 386 computer recently. The owner related that the building in which it resided was struck by lightning, and after the strike, the computer began acting strangely. It would work for a while, and then it would lock up and quit. After a few days of putting up with this intermittent craziness, the owner threw up his hands, bought a new computer, and "threw" the old one my way, knowing I would love to have the parts. When I got around to looking at it, to see what might be salvaged, I found two HD floppy drives (5¼" and 3½"), and a 140 Mb hard drive. Not bad, I thought, lets take a look.

I booted up the unit. Everything worked - the monitor, keyboard, and floppies. Not a bit of trouble formatting or reading disks. Furthermore, the hard drive could be accessed with no problem. At least I had some spare parts. Then it happened - lock up. Everything was on but the machine was totally unresponsive. Whatever had been on the screen just stayed there no matter what I typed. Even a warm boot (Ctrl-Alt-Del) command would not work. Hmmm. I turned it off, then back on, and it would not boot up.

Left it alone for a few days. Turned it on, and it booted. Worked fine for an hour, then locked up again. Hmmm. Time to apply good old ham style diagnostic procedure. Opened the case and poked around, checking all the connectors. Nothing loose. Turned it back on with the case still open. It booted fine. Hmmm. Then I noticed this particular brand of computer had a series of LEDs next to the power plug on the motherboard. They lighted up, showing +5, -5, +12 and -12 volts present on the motherboard from the power supply. Thoughtful of the engineers to provide them; not many computers sport that feature. Whoops! It locked up again. Looked at the LEDs; the +5 volt LED was unlit! Ahah. The lockup is a power supply problem!

I decided to "do it right". I pulled the drives and boards out of the machine, including the motherboard itself. It doesn't take a lot of electrical or mechanical skill to do all that. All one needs are a few tools, and the good sense to make a sketch of everything with copious notes so you can put it back together again. I burnished the edge connector contacts on every board using a soft white eraser (any other type is not suitable; they remove too much gold plating from the contacts). Then, using a small screwdriver, I slightly raised every IC out of the socket, not completely - just a little, and then pressed each one firmly down until it was firmly seated. The purpose? To combat "chip creep". Constant heating and cooling with each use of a computer can cause the integrated circuits to actually creep up out of their sockets with time, increasing the resistance of the contacts. Prying them up a little followed by reseating wipes oxidation off the pins and insures the contact between the pins and the socket is as low a resistance as is possible.

I removed the power supply and thoroughly cleaned the dust out of the fans, using a soft brush and some blasts of air (cough, cough). Then I spotted it! The connector from the power supply that mates with pins on the motherboard had three sockets that were badly discolored, as if they had been burned. I burnished the power connector pins. Then, using a very small needle file, I burnished the inside surface of the metal sockets the pins insert into. Finally, I used a dental probe to close up the metal sockets slightly, so the fit would be tight and the contact resistance low. Consulting my sketches and notes, I reassembled the computer in under 10 minutes.

On boot up, it worked perfectly. Let it run overnight. No lockup. Loaded a game on the hard drive and played it for an hour. No lockup. Voile! I had a perfectly good 386DX computer on hand, sporting two floppies, 4 Mbytes of RAM and a large hard drive. Not bad for a couple of hours work, which revealed nothing more than some faulty power contacts on a burned plug. Perhaps the surge from the lightning strike did it, perhaps not.

The moral of the story is, don't be afraid to disassemble a computer. It is nothing more or less than a bunch of printed circuit boards and a couple of drives, all hooked together and to a power supply. You can

do it. The only caveat is, you **MUST** take notes and make sketches, so you can reverse the teardown procedure. Note each and every plug, the color of the wires and their orientation. Pay particular attention to the orientation of those connectors that interface to drives - the wide multiconductor cables often have a red or black wire on one side, and the orientation of the plug that connects to the drive IS important. If they are keyed so they can go only one way, fine. But if not, the sketch will be your only resource to get them back together correctly. You won't damage anything if you put them together backwards, but the sketch can save you hours of experimenting to get things to work. Don't forget to make notes concerning which slot each circuit board was in. Sometimes the position is critical, even though a board may fit into several possible slots. I have seen boards that would not function properly unless they were in the very first slot, nearest to where the power supply leads connect to the motherboard. Take lots of notes!

A complete teardown might be a good idea when you pick up that \$50 XT at the next swapfest, before you put it into service. It is probably full of dust and dirt, which you can clean up during the procedure. An excellent way to insure proper operation is to remove the "dust devils" - they clog the pathways for air circulation, which can lead to overheating of the chips. Heat and dirt are two major enemies of computers. Have fun with it!