

## **How to Recycle a Computer (And learn something in the Process)**

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I am fortunate in that my pre-retirement employer saves discarded computers for me; I rebuild these and distribute them among my OZARES members for use in emergency communications via amateur packet.

The constant streams of used computers that come my way provide me with information not available to many people. It gives me a pretty good idea of the level of upgrade activity going on out there. Furthermore, another insight available to me is the type of computer that my 50-plus OZARES members (and other non-hams that I occasionally donate to) are willing to accept.

I point all this out to back up the following statement: the XT and 286 computers are dead as computing devices. No one, including most schools, wants them anymore. Essentially all of my hams are using 386, 486 or even Pentiums for packet service. You just cannot give away XT or 286 computers anymore.

So, what to do? It is definitely a bad thing to just put them out with the garbage. They will just wind up in a landfill, leaching copper from the wires, cadmium or mercury from the batteries and plating, tin, lead and even gold from the contacts. We don't need any more metallic ions polluting our water table. Therefore, I suggest you do a little personal recycling, which will greatly reduce (but not totally prevent) pollution from the device. It is even a learning experience. Here is how.

Remove the screws holding the cover on the case and take the cover off. Remove the cover screws holding on the plastic face and throw the plastic in the garbage. Look inside the case for any on-board batteries. In 286s, you will usually find them stuck with Velcro to the side of the power supply, with leads plugged in to pins very near the keyboard socket. Some XTs have "button batteries" (they look like watch batteries but are larger in diameter) in a socket on one of the adapter cards or right on the motherboard. Stick some tape on the battery contacts so they can't short out, and put them aside until your next trip to your hardware store. Most good hardware stores have a box for batteries that they mail to a recycling center when full. There is no charge to you or the hardware store for this service.

Next, remove every screw you can find. Pull those holding the adapter cards, the power supply, the hard and floppy drives, and don't forget the two holding in the motherboard. Unplug every plug you can find – speaker, drive cables, power plugs, and so on. Take everything out of the case. Put the disemboweled case and its cover aside. If your community has a steel-recycling bin (typically at the highway department), drop off the case and cover when you have a chance.

Roll up the floppy and hard drive cables into a tight, compact roll and use masking tape to hold them that way. Save them in your junk box – they may prove useful in the future (for example, the floppy drive cables from an old 286 will work just fine in a Pentium). Snip off the connectors from each end of all the other wire runs and save the wires for your next homebrew project. Take all the circuit boards to the next swapfest and put them on a table with a FREE sign. Give one or two to a science teacher to use with the unit on electronics; the motherboard would be a good

candidate for this. At the very least, pull all the little jumpers off the pins before discarding the boards. Someone, if not you, can use a stock of these tiny items. Store them in a pill bottle.

Open the power supply and remove every nut and machine screw in sight. Save the wire as you did before. Put the fuse in your junk box (yep, there is one in there; look for it). If you homebrew, desolder any 3-pin regulators, transistors or other parts you might use and put everything in your junk box. Put the steel case of the power supply with the computer case for recycling. Remove the fan and save it if it is a 12-volt model; many modern ham rigs use exactly the same fan to cool their interior. If the fan uses 110 volts, you can use it to move the air in your basement. I have two hanging from the rafters in my basement workshop that have been doing just that for over five years.

Before you disassemble the power supply, take a look at the specifications, which are always printed on a label pasted to the case of the supply. The label almost always tells you what color wire carries what voltage, and how much current it can handle. Even an old 100-watt XT supply can do good service in powering small rigs, or even HTs. Consider this use. If you decide to use the power supply in this way, first open the case and vacuum out the dust bunnies. **MAKE SURE IT IS NOT PLUGGED IN WHEN YOU DO THIS** (a self-evident, but necessary reminder). After the cover is replaced, you can test the supply, but you will need a load. Even the fan will not work if the supply has no load. A 12-volt automotive stoplight bulb will do fine. Be sure to connect it to the 12-volt leads! Six-volt bulbs will do a nice job of testing the 5-volt lines.

Next, deal with the floppy drives. If one is a 3½-inch model, try to determine if it has a 1.44 MB capacity. If so, save it – it can be used in a Pentium. Otherwise, treat it and any 5¼-inch drive as follows: Remove every machine screw, nut and any other fasteners and put them in your junk box. Throw away all plastic parts. Put sheet metal parts with the computer case for steel recycling. Put aluminum parts (including the main casting – almost always aluminum) in the recycling bin with your aluminum cans. Not sure if something is aluminum? Check it with a magnet. If it does not stick, it is probably aluminum.

Finally, the hard drive. If it was connected with two cables, it is a useless device, no matter what the capacity. Remove every screw for your junk box. Be prepared for a bunch of hex headed or Torxx headed screws. Put the platters in the aluminum bin. No matter what their color, they are made of aluminum (the tan, orange or black surface is just a very thin plating of magnetic oxide). That thick, spacer washer between the platters is aluminum, too. The housing is cast aluminum as well – it will make quite a few soda cans in its next life.

If the hard drive was connected with a single, 40-conductor cable, it might well be an IDE drive. If so, you could install it as a second drive in your new 300 MHz Pentium. On the other hand, you will need to know the jumper schemes to make your current drive a master and the little guy a slave. And you will need a double-ended IDE cable if your current machine doesn't already have one installed. Furthermore, after all that, it may only have a capacity of 100 MB or so, in which case you will be adding only a few percent to the storage capacity of your current system. It may well not be worth the effort. Give it away, or turn it into soda cans.

All done! What have you gained? Lots of screws and wire for your junk box, and goodies to be recycled. But I hope you have also taken the time to study each of the devices as you progressed through disassembly. If so, you have probably learned quite a bit about how each works. Think of all the engineering that went into each and every part you have handled. Especially amazing are the hard drives. They are probably the most complicated electromechanical devices ever produced on this planet. While their mechanical assembly is merely akin to a high precision phonograph record machine, the electronic control of reading and writing the magnetically recorded bits on those plated platters is very, very complex.

Hope you had fun, and learned a lot. Happy computing!