Refurbishing Steps for Success

Computer Triage

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Triaging computer donations

The topics covered in this presentation will include:

• What is triaging?
• What tools are needed?
• The steps needed to diagnose computers
  ▪ Booting the computer successfully
  ▪ Looking for bad capacitors
  ▪ Testing the power supply
  ▪ Listening during the boot up
  ▪ Checking out the memory
  ▪ Replacing the processor
  ▪ Determining processor and memory speeds
  ▪ Preparing the system summary
  ▪ An important last step
• The results of the triaging process
What is triaging?

Triaging is the process of sorting donations to decide what to do with them. Options could include to:

- Keep them for reuse
- Part them out for spare parts
- Send them to be de-manufactured or recycled

The guidelines of what to keep will change over time depending upon your space, available help and quality of donations.

**Notice to volunteers - sample**

- Keep working computers 1.0 GHz and faster
- Keep all Pentium IV computers
- Keep all working computers
- Non-working computers can be parted out for:
  - Memory, power supplies 300 watts or larger, CD burners, DVD drives, some slot covers and modems.
Check everything

• Don’t assume that the computer that looks very old – is old inside as well. Some have been upgraded with high end parts – video cards, sound cards – even new motherboards, processors and memory.

• When you finish your triage process, you should have an orderly workspace with all donations sorted as:
  - computers ready to be loaded
  - parts stored for future replacements in your operations
  - computers or parts to be de-manufactured for reuse
  - computers or parts to be recycled for its scrap value
What tools are needed?

Use a sturdy table in a non-carpeted room if possible. Carpet produces static electricity so you would need to wear a wrist strap or ground yourself on the case before exploring inside the computer.

Tools include:
- Paper clip to open CD drives when not powered up.
- Needle nosed pliers
- Flashlight
- Razor blade scraper to remove property tags or donor identification
- Torx drivers # 10 and # 15 (star driver)
- Phillips screw driver #1 and #2
- Flat head screw driver #1 and #2
- Heat sink grease or compound
- Power supply tester
- On board battery tester

You will also need a monitor, keyboard and power cord. It is helpful to use an extension cable on your monitor. After plugging it into so many video cards, the pins can become bent. You can easily replace the extension cable instead of replacing the monitor.
Diagnosing the computer – getting it to boot

First determine if you will remove the hard drive now or wipe it in the machine. Check out our discussion on wiping hard drives. DO NOT view an un-wiped drive. We won’t get donations if we can’t provide data security.

• Plug in the monitor, keyboard and power cord. Be certain that the keyboard is in the correct ps/2 connection. They can be in different locations on some models. Turn on the computer and monitor. You can hot-swap monitors while the computer is running. If you need to change the keyboard you must turn the computer off, change the keyboard and then turn the computer on once again.
• If the computer doesn’t start up:
  ▪ Make sure you have power to the computer.
  ▪ Has the off/on switch on the power supply been turned off?
  ▪ Do you see a light on the front of the computer?
  ▪ Can you hear a fan running? Is the fan part of the power supply or elsewhere in the computer?
• Check for bad capacitors on the mother board. This is explained in the next slide.
• If there is no power and you are sure the power cables are secure and the power supply is plugged into the motherboard, test the power supply.
• Make sure the memory, processor and all adapters are seated on the mother board as they may come loose in transit. If this is a higher end computer you may need to change the processor or Ram if the power supply has tested good.
Looking for bad capacitors

Capacitors have been a frequent problem with some makes and models of computers. A few years ago the IBM 450s had problems and more recently Dell GX260/270 have failed capacitors. The capacitor should look like a can of soup. The capacitor is bad if the top swells or there is leaking and corrosion.

Capacitors can be replaced if the system is worth the time and efforts in determining the correct specifications, ordering the capacitors and then soldering the new capacitors after de-soldering and removing the old. Unless you are skilled in soldering it may be best to salvage the parts and move on. If you receive a lot of computers with the same problem, it is time to learn a new skill.
Testing the power supply

This handy tool makes it very easy to test various power supplies. There are various connections to motherboards so get a tester that can handle a variety of connections.
Diagnosing the computer – listen

- When starting a computer, listen.
- Do you hear the power supply and fans running? If not check the power supply and power connections.
- Do you hear long beeps? This may indicate that the computer needs memory or has incompatible memory. At times donors remove the memory before donating or insert other memory in its place.
- Beep codes may indicate other problems as well such as bad video cards.
- If you hear a loud popping noise immediately unplug the computer. You will probably smell the odor of a short circuit. Look for a burned spot on the motherboard, memory or find that the power supply has burned out. Test the components to see if they have died because of the power surge.
- You can check on the website www.ComputersForClassrooms.org/ Tech Tips for a file on beep codes to help diagnose computer problems. A successful post will usually be followed by one or two short beeps.
Diagnosing the computer - memory

Be sure to insert the correct type of memory – check the notches to match the motherboard. Some models of computers can be picky about the brand of memory and you may need to try another kind. Rambus is very expensive to buy. It is usually used in pairs and a keeper may be needed. At times computers may be parted out so that the Rambus can be used in higher level computers. Some of the newer models use memory in pairs for faster performance.

When in doubt check the specifications online from the manufacturer of the computer or the motherboard. They will also specify the maximum amount of memory the board can use.
Replacing the processor

- If all else fails the processor can be replaced. The zif handle (zero insertion force) is gently swung out then up to release the processor. Look for pin 1 on the processor and the socket as it can only be seated in one way. The pins on the processor are fragile so take your time.

- Before attaching the heat sink, dab some heat sink compound evenly but sparingly on the processor. This will help to dissipate the heat and keep the processor from over-heating.
A note about processor and memory speeds

• What is meant by kilobyte, megabyte or gigabyte?
  - Kilobyte is 1,000 bytes – kilo means 1,000 = 1 kb
  - Megabyte is 1,000 kilobytes or 1,000,000 = 1.0 mb
  - Gigabyte is 1,000 megabytes or 1,000,000,000 bytes = 1 gb
  - Terabyte is 1,000 gigabytes or 1,000,000,000,000 bytes = 1 tb

• Since we don’t want to keep track of so many zeros we use a shorthand. When reading the processor speed in the bios we often write shorthand such as Pentium III, 866 MHz (866 megahertz) for the processor speed.

• When deciding upon the amount of memory, look at the extended memory listed in the bios. It will often not be exact but we know the amount will be a combination of: 8 MB, 16 MB, 32 MB, 64 MB, 128 MB, 256 MB, 512 MB and 1.0 GB (the same as 1,000 MB) depending upon the amount on each stick of memory.
Checking the bios – removing passwords

- Boot the computer and enter the bios by pressing F1, F2, F10, Del rapidly in succession if you do not know the correct function key to press. You can also add or remove memory and the computer will go to the bios.
- If the computer requires a password there are two fairly easy solutions
  - See if there is a password jumper on the motherboard. Move the jumper to the off position, start the computer, turn off the computer, reset the password jumper to the original position and re-boot the computer.
  - Remove the onboard battery and wait a couple of minutes for the onboard memory to be drained. When the battery no longer keeps the date and time it needs to be replaced – about every six years. A battery tester is very handy. You can keep good batteries for replacements when sending out systems for recycling.
  - When resetting the password on a laptop, remove both batteries if possible. The onboard batteries may be easily accessible from the rear of the laptop or may be impossible to remove without completely disassembling the laptop. You can always check with the computer manufacturer online for additional assistance with a particular model.
Preparing the system summary

• Write information about the computer’s processor such as: Pentium III 866 MHz or Celeron 1.2 GHz on a label that will go on the front of the computer.

• Write information about the amount of memory and type of memory such as: 512 MB DDR or 256 MB PC133.

• If you have not removed the hard drive, also list the size of the hard drive on the label.

CPU: Pentium IV 1.6 GHz
Memory: 512 MB DDR
Hard Drive: 30 GB
An important last step

- All computers that have passed your tests as keepers need to be blown out by an air compressor. Dust is one of the worst enemies of a computer. Fans and power supplies are often clogged.
- Don’t forget laptops. Anything with a fan that sucks in air is subject to clogging with accumulated dust.
- If a computer becomes wet for some reason it may be saved IF it isn’t turned on until it has had a chance to thoroughly dry out – possibly for a week or even longer.
The results of the triaging process

• After labeling all of the working computers, they can now be sorted depending upon your needs. There are benefits in stacking all similar models on one pallet to make the next step of loading programs easier.

• As time goes by you will receive newer models to work on and may change your guidelines of what you will keep or what you want to part out or send to recycling. This is a constantly changing program. By labeling your computers you will find it much easier to keep up with the entire process.

• At the end of the triage process, you will have computers to load, some spare parts to keep on hand and another stack of computers to be parted out or sent for recycling.

• There should be a continuous flow through your program. Computers should be refurbished and put to use rather than being stored in a warehouse.