Chapter 3 - Physical Tools, Personal Safety and Troubleshooting

This chapter will teach
1. Physical tools needed for the job
2. Personal Safety
3. Troubleshooting Methodology

In computer hardware class in college, I received a 36-piece toolkit. It is high quality and it was included in the tuition. Here is a picture of it.

It has most of the tools I regularly use. But the tool you will use most will be just the Phillips-head screwdriver, cross tip, for repairs. This tool kit comes with an anti-static strap. My first toolkit I owned did not come with an anti-static strap. Image below is my first toolkit I owned.

One thing missing in the 36-piece toolkit is a chip puller/IC extractor like seen in the second picture. It is not really necessary but one time I revived a dead older motherboard with a bad BIOS chip to reprogram it. Only maybe in a blue moon will it be necessary to do such a thing.

Over the years I have lost some tools, so it is good to have a couple of spare toolkits around. Or at least spare Philips-head (cross-tip) screwdriver.

Your smartphone is something you should always have fully charged and have free memory to light up and photograph screw locations, cable connections and settings on the monitor screen when servicing. Please get a smartphone with a good camera that has image stabilization. I have an iPhone and it takes great pictures all the time. Its zoom feature is great to look at small printed numbers and text on printed circuit boards (PCBs).

Extension magnet is a must to grab onto lost screws in hard-to-reach places dropped in the crevices of the computer case. You don't want to take hold of the large computer case and turn it upside down and shake free the lost screws in a messy cramped room.

If you are servicing mobile devices like smartphones and tablets, they may require a special tool kit with torx screws (star bit) with other uncommon bits and prying tools. Invest in a good special tool kit with quality strong bits that won't strip or break. When dealing with small bits and screws, you can easily strip them so be very careful. Go slow and press firmly. Always use the right bit fit for the screw otherwise stripping can happen.

You can source disassembly and repair videos online from YouTube. Google should have at least something. Also posting your problem on a popular computer technology forum can help. People may comment. You never know if there is someone else in the world with exactly your same problem so post anyways if you can't find anything right now.

Personal Safety
Most of the time we overlook personal safety and that is dangerous.

When we are young, we are very strong, flexible and quick. We tend to think we carry those attributes into older age. This belief is a cause for trouble. As I have aged, I have become less of all these attributes and have hurt my back carrying heavy things, tripping and falling being careless. Working with computers involves high electricity and high heat. There are so many things that can hurt us while working on computers. Also my vision has progressively gotten worse so that I get painful eye straining when I am staring at the monitor and small print all day.

Wearing appropriate clothes, shoes and safety equipment are the utmost important. You don't want to be carrying a heavy desktop computer and catch a door handle with your loose clothes or trip over because your sandals got snagged in a mess of computer cords strewn across the floor. Also some parts have sharp edges. Think safety first! If you do, things will go a lot smoother.

Do not wear jewelry and have long hair hanging out. These can get caught in fans or tight places in the computer.

I do not know if blue filtering on eyeglasses or on monitors is "healthier"? According to eye doctors, blue light does not do any harm to your eyes. But when I set the 'Night Light' function in Windows and wear my eyeglasses with blue filters, my eyes feel relaxed and I even feel sleepy. If you wear glasses, get a light pair with antireflective, anti scratch with blue filters. As a technician you actually move around a lot looking in and around computer devices so you need glasses to stay light and sturdy to your face.

If you have worked for someone else before, you must have gone through some training on safety. Please adhere to the regulations. If you are unsure of how to deal with something, please ask your employer or look it up on the government website or trusted organization. Remember, you can be dealing with hazardous or toxic materials found in new and old computer devices. For example, toner in laser printers is toxic, old CRT monitors contain lead, and batteries can leak acid.

Cable clutter can be a tripping hazard. Please do cable management to organize all cables. Ideally you should label all cable ends and use twist ties to wrap them up. I bought a huge roll of twist tie to cut my own length. It is inexpensive and helps you feel sane in the mess of cables you encounter. You can tag the cables with some masking tape and a Sharpie. You could use zip ties that lock if you don't intend to move things around in the near future. Please ask the person in charge of building if you are unsure what cable does.

Remember to always disconnect the computer from the electrical power source when servicing. That means disconnecting the laptop battery. In the case you must service a live computer, be cautious and have Class C fire extinguishers on hand in

case of a fire. Class C fires involve energized electrical equipment. Extinguishers with a C rating are designed for use with fires involving energized electrical equipment.

If you are using power tools please use appropriate protection equipment like air filter mask, gloves and safety goggles. For example, you might be cutting drywall to install a network jack outlet and use a drill.

Your health is of the utmost importance. You should never risk anything that will harm your health.

Troubleshooting Methodology
I assume everyone reading this is probably the 'IT person' in their family or group of friends. I also assume everyone knows how to 'Google' for fixes too. In that I mean usually the first or third/fourth comment on a forum question thread usually the answer is found.

Anyways the troubleshooting methodology is this:
1. Identify the Problem: Communicating to the user to find out how and when the problem took place
2. Find out the cause
3. Testing
4. Verifying
5. Documenting

Identify the Problem
Talk to the user to see what has gone bad. Is there an error code? Did you lose access to something? Is the computer hanging? Ask to get a general idea to start.

The first question you should ask is: "Has anything recently changed on the computer that might have made this problem appear?". This is a nice non-accusatory question to ask. Remember, you must not accuse the user of doing anything and troubleshoot the problem objectively so the user cooperates without feeling at fault. New software? Updates? Firmware updates? Also ask about the environment around them. Were there any new infrastructure changes? New wiring done? New devices installed?

Look at logs (system and application) for clues. Please make a backup of critical files before making changes if you can. Backups should be proper maintenance that every computer user should do regularly. If the user does not have a backup, please do a backup and let them know there will be a charge for it. It is very time consuming and we do not have all the free time in the world to do what the user should have been doing regularly. We are not responsible for everything.

*** For the CompTIA A+ exams, you must back up every time you work on a device even though that is not realistic.

Establish a Theory of Probable Cause (Question the Obvious)
Come up with a theory of what caused the issue. At this point, you may overlook the obvious thinking it may be a big issue. Could it be a new piece of questionable software? Is something physically broken? Is it even 'On'? Some users will not help or can not help. They might feel the IT guy should handle all the problems themself without their intervention. Some might be scared of the high level technicality and be afraid to break something. You might be fixing stuff all alone so be prepared for anything.

Research the situation. You can do external research by searching the Internet: Google. Use your phone data plan if the network is down. Google is your friend and also Microsoft Update Catalog: https://www.catalog.update.microsoft.com/home.aspx. You can do internal research by looking over past documented fixes for the same user, machine or problem. You can ask other techs on-site for help.

Look outside the case for clues. Use all your senses to see what could be the problem. It could be as easy as a cable unplugged. It could be a damaged cable or connector. Maybe a reset is needed?

When I was working at a computer repair store, most computers that come in are caked in dust and sometimes tar from cigarette smoke. This can cause the computer to overheat and run badly. Touch the computer case while it is running. Is it too

warm? Does the computer make a hum? A properly cleaned computer does not hum and is slightly warm. When a computer is running too hot it lets off the smell of ozone.

Test the Theory to Determine Cause
This is where you fix the problem hopefully. If not, establish a new theory to solve the problem.

You may not have the permission to make changes. Check first with policies and with your boss before doing anything. If you do not have permission then you escalate the problem to someone who deals with this problem. Ask a coworker to come check if you can. Two heads are better than one. It is normal to not have all the answers. Do not feel bad if you can not solve the problem. Learning is lifelong. You got this. This is your domain. You should be open to learning.

Establish a Plan of Action
This plan has all the required steps to carry out the solution. It may have steps to make a backup and buy required parts before solving.

Verify and Prevent
The problem is fixed and needs to be verified and prevented in the future. Ask the user to verify if the fix solved the problem and do preventative action to stop this from occurring again.

Watch the user go about doing their work and see if your solution has fixed the problem. Also learn what the user does. It is important to understand what the user does to help them in the future. Understand the work they do and how they use technology to do it.

Preventative actions would be like installing up-to-date antivirus software yearly to prevent viruses. Ask users to do weekly backups in event a hard drive dies normally. Educate the user of proper computer maintenance.

At the computer repair store, we offer yearly spring cleanup maintenance. We dust out the PC, diagnose and tune the system and update the antivirus subscription for a fair price. Most users are happy that we offer this and come back regularly. If we notice a fan or hard drive that needs replacing, we let them know and just charge them the replacement part without the labour charge. We just charge the yearly spring maintenance fee and replacement parts. We think this is a great service and it does work.

Document Findings, Actions and Outcomes
Document your findings. You can use them in the future to see what the common problems are so you can fix them if you encounter the same problem again. It is also good to see what parts you commonly need if parts are involved. It creates a history that you can refer to.

Documentation is important for liability. You are trusted to fix what is needed only so a user can not come back and say you messed a different part up in their system. This has happened a couple of times while I was working at a computer repair store.

Please file the documents for easy access for you and your coworkers. The information stored here is private so lock it away. You should remove passwords and customer personal information from these.

This is the end of my study guide currently. I believe if anyone wants to be a computer technician, they should know the rest as they are 'How-Tos'. I don't think I can add anything more to general walkthroughs and explanations you find on the web or in CompTIA A+ study textbooks.