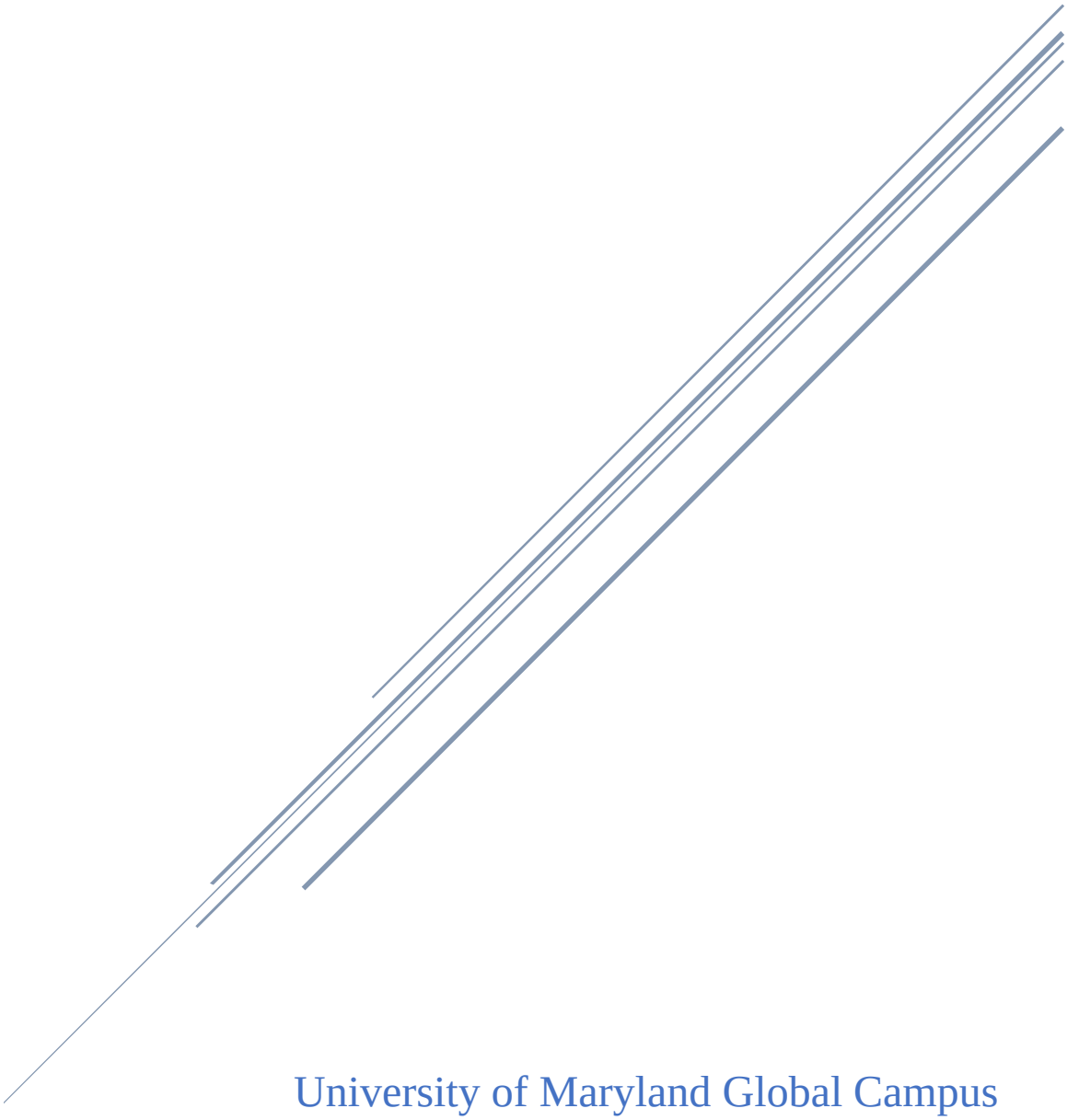
HOW TO BUILD A COMPUTER FROM SCRATCH

A PC Build Manual written by John Kucera



University of Maryland Global Campus
CMIT 202 Fundamentals of Computer Troubleshooting

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INTRODUCTION

In this guide, you will be led through twelve concise steps to help you build your own PC from scratch. This guide assumes basic knowledge of using common building tools, such as screwdrivers. This is fit for any entry-level technician with little to no experience in handling PC hardware. **This guide also assumes that the PC will be built for Home use.**

This guide encourages safety of both the technician and the hardware components. **Follow all steps in order** and **exactly as they are described** to maintain a working environment that will not damage the technician or components.

This guide assumes the technician has the components provided in the **LabSim 14.1: "Build a Computer from Scratch" Lab** on hand. The components required for this specific PC Build are the following:

Component	**Details**
System Case	ATX
Motherboard	Socket 1151
Processor	i5-8600K, 3.60 GHz, 9MB Cache, LGA1151, 95W
Fan	Heat Sink and Fan, Socket 1151
Power Supply	ATX, 20+4 pin, PCIe
Memory Module **x2**	DDR4 8 GB, DDR 4 2400
Hard Drive	Hard Drive, Internal, SATA
CD-DVD Drive	CD-DVD Drive, Internal, SATA
Video Card	DVI-I, HDMI, Crossfire, PCIe (16x)
Cable **x2**	Cable, SATA, 7-pin
Cable **x2**	AC Power Cable
Cable	HDMI to HDMI Connector
Monitor	
Keyboard	104 Key, USB
Mouse	USB
Windows 10	Microsoft OEM Windows 10 Home, 64-Bit, DVD

1. WORKSPACE PREPARATION

1.1. Workspace Environment

PC components may get damaged if they are exposed in an unfit environment. **Any environment that causes static electricity is unfit for the PC building because it can damage PC components by causing them to short circuit.**

Humidity is important to have because dry air allows static electricity. Make sure your workspace is in a room with humidity ideally at 35-70% and temperature around 72°-77°F.

Make sure the room is well-lit so that the details inside of the PC case are visible. Keep water, food, and other liquids away from your workspace. If they are spilled on the components, the latter could potentially be ruined.

Do not build your computer on carpet because carpets can cause static electricity. If the room you choose to build in is carpeted, place a static mat on the floor and under the PC case (more on static mat preparation in **1.2. Equipment**).

See Fig. 1 below for an ideal working environment. It is well-lit, has no carpeting, is indoors, and has a clean table.

FIGURE 1: PC BUILDING ENVIRONMENT (KUCERA, 2020)

1.2. Equipment

In addition to having the hardware components that will go into your PC build, you must have tools necessary to install each component. Make sure that you have the following ready:

- **Flashlight** (See Fig. 2): To bring visibility to darker areas in the PC
- **Slot screwdriver** (See Fig. 2): To screw and unscrew screws in PC
    - Ensure that your screwdriver size fits the screws provided with the PC components
- **Phillips head screwdriver** (See Fig. 2): To screw and unscrew screws in PC
    - Ensure that your screwdriver size fits the screws provided with the PC components
- **Needle nose pliers** (See Fig. 2): To pick up dropped screws that fall in PC
- **Two Static Mats** (See Fig. 3): To prevent static electricity during the build
- **ESD Wrist Strap** (See Fig. 4): To prevent static electricity during the build

FIGURE 2: FLASHLIGHT, PHILLIPS HEAD SCREWDRIVER, SLOT SCREWDRIVER, NEEDLE NOSE PLIERS (KUCERA, 2020)

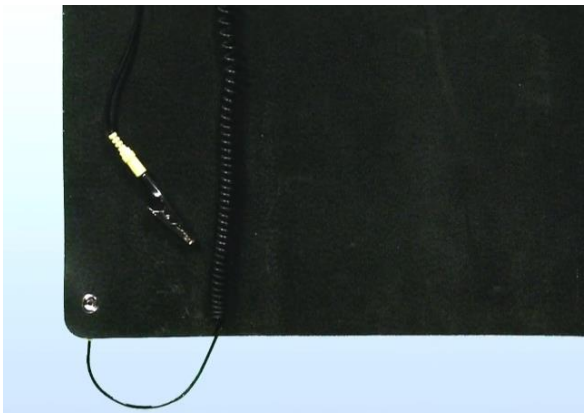

FIGURE 3: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 2.1.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

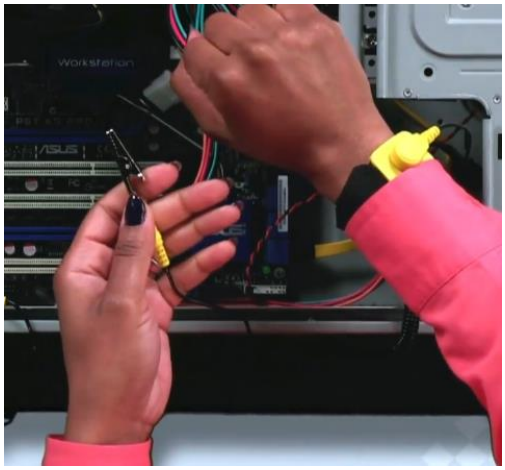

FIGURE 4: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 2.1.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

1.3. Setting up Static Mats and ESD Wrist Strap

1.3.1. Make sure the PC case is unplugged.

1.3.2. Ground the computer. On your worktable, put the PC case on a static mat and use the mat's alligator clip to ground the case to the mat (See Fig. 5).

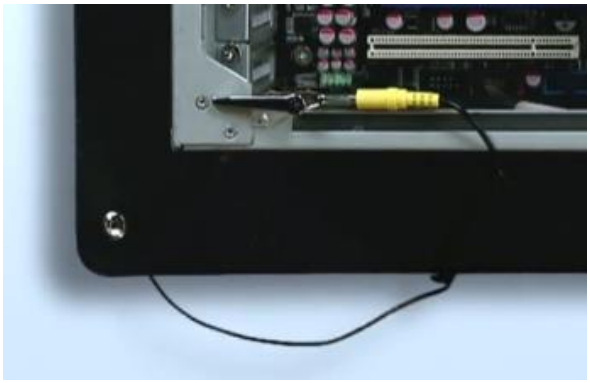

FIGURE 5: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 2.1.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

1.3.3. Ground yourself. Put the ESD Wrist Strap on your wrist. Then, connect the strap's alligator clip to the PC case (See Fig. 6).

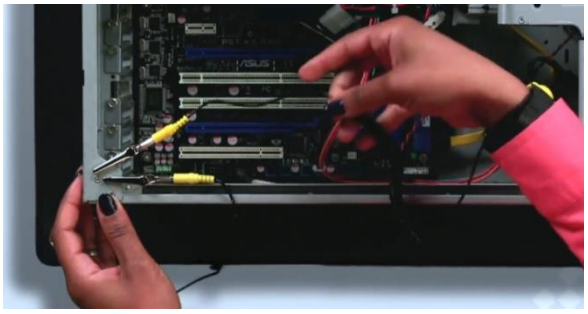

FIGURE 6: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 2.1.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

1.3.4. Put a second Static Mat on the floor where you will stand (See Fig. 7). As long as you are standing on this Static Mat during the build, no static charge will build up and no static electricity will be caused.

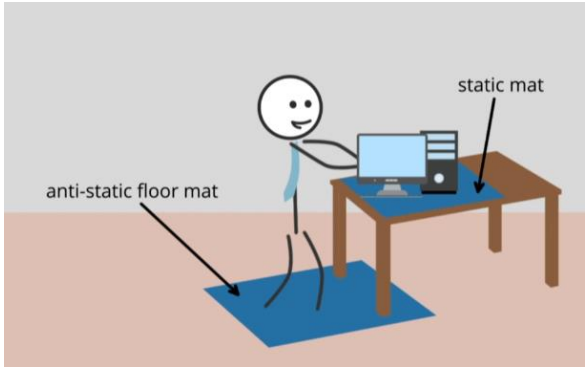

FIGURE 7: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 2.1.3). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

2. INSTALLING MOTHERBOARD

The motherboard to be installed for this PC Build is a Socket 1151 Motherboard. The package that the motherboard comes with will include fine thread screws, standoffs, and an I/O shield.

2.1. Install the I/O Shield

The I/O shield that the motherboard comes with is a silver-colored plate with openings for various I/O ports. To install, press it into the opening on the back of the case (See Fig. 8). It will snap into place if installed properly. The I/O Shield is necessary to seal off the back of the case and to prevent dust from entering.

FIGURE 8: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 3.3.3). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

2.2. Install the Motherboard Standoffs

Before the motherboard can be installed, there must be standoffs screwed in place for the motherboard to stand on. This ensures that the bottom of the motherboard will not be damaged from rubbing against the case. To install, use your fingers (a screwdriver is unnecessary) to screw the standoffs into place on the flat metal plate in the PC case (See Fig. 9). The holes for the standoffs are specified in Fig. 10.

FIGURE 9: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 3.3.3). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

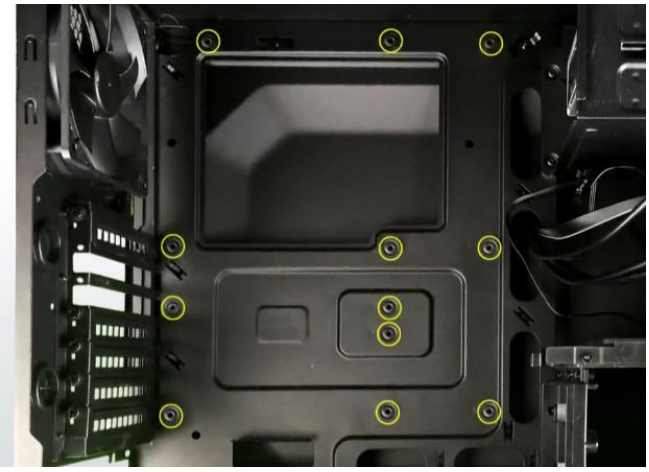

FIGURE 10: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 3.3.3). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

2.3. Install the Motherboard

2.3.1. Begin by lowering the motherboard above the standoffs, making sure that the I/O connectors will be able to meet the I/O shield (See Fig. 11). Once it is low enough, slide the I/O connectors on the motherboard into the I/O shield and push them through (See Fig. 12). Check to see if the standoffs are visible through the holes on the motherboard. The motherboard will be properly aligned when you can look through the motherboard holes and down to the standoff holes.

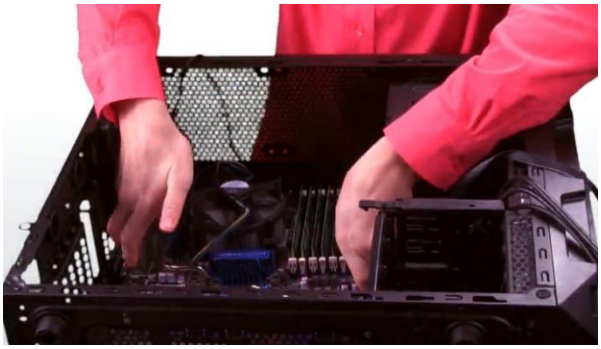

FIGURE 11: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 3.3.3). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

FIGURE 12: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 3.3.3). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

2.3.2. With a Phillips head screwdriver, secure the motherboard to the standoffs by installing the fine thread screws that came with the motherboard (See Fig. 13). Steadily screw them in so that you do not scratch and potentially damage the motherboard. Make sure the motherboard is firmly in place, but do not overtighten or the motherboard could get damaged.

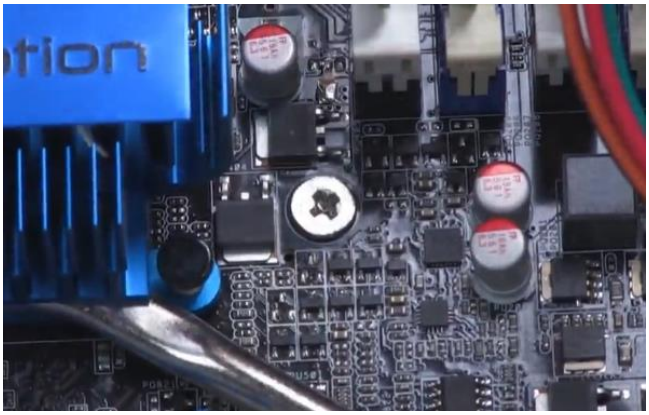

FIGURE 13: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 3.3.3). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

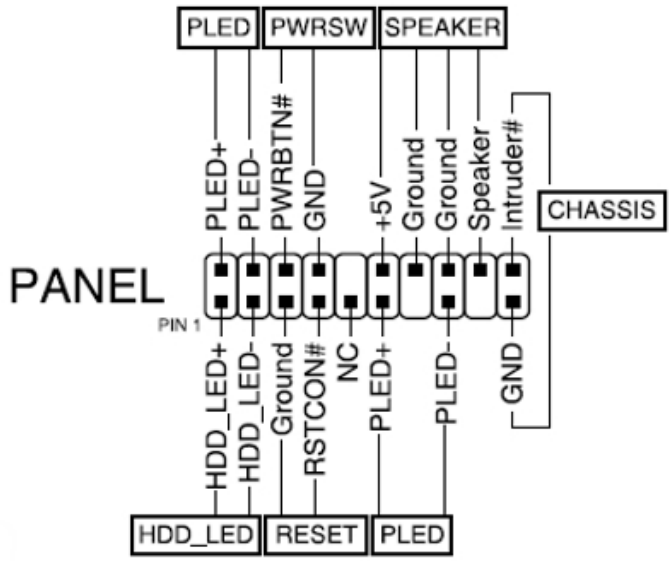

FIGURE 14: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

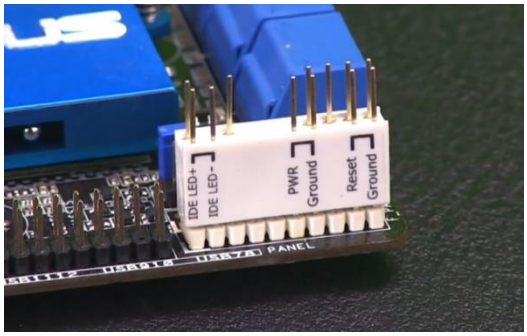

FIGURE 15: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 3.3.3). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

2.4. Connect Case Cables to the Motherboard

Look at Fig. 14 for a detailed guide that labels which pins are meant to connect to specific cables. The System Panel Connector pins are located on the lower right corner of the motherboard (See Fig. 15). The case's header cables are already connected to the case.

NOTE: As long as they are connecting to the correct pins, orientation of the header cables often does not matter. However, if the desired function does not work when the system is on, it may help to turn the cable the other way and insert it that way.

2.4.1. Begin by connecting the **Power Switch header cable** to the appropriate pins. This will enable the power switch on the PC case to function. The Power Switch header cable will be labeled POWER SW and have 2 holes (See Fig. 16).

FIGURE 16: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

The 2 appropriate pins will be labeled as PWRBTN# and GND or grouped together as PWRSW. If not labeled, see Fig. 14 to note that the cable will connect to pins 3 and 4 from the left on the top row.

2.4.2. Next, connect the **Power LED header cable** to the appropriate pins. This will provide power for the PC case's LED lights. The Power LED header cable will be labeled POWER LED and have either 2 close-together holes OR 2 holes with a gap between them (See Fig. 17). The former is referred to as 2 pin and the latter is referred to as 3-1 pin.

FIGURE 17: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

The 2 appropriate pins will be labeled as PLED+ and PLED- or grouped together as PLED. If your cable has holes for a 2-pin socket, see Fig. 14 to note that the cable will connect to pins 1 and 2 from the left on the top row. If your cable has holes for a 3-1 pin socket, see Fig. 14 to note that the cable will connect to pins 6 and 7 from the left on the bottom row.

2.4.3. Next, connect the **Case Speaker header cable** to the appropriate pins. This will enable the case speaker to function for beeping. The Case Speaker header cable will be labeled SPEAKER and have 4 holes (See Fig. 18).

FIGURE 18: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

The 4 appropriate pins will be labeled as +5V, Ground, Ground, and Speaker. They could also be grouped together as SPEAKER. If not labeled, see Fig. 14 to note that the cable will connect to pins 5, 6, 7, and 8 from the left on the top row.

2.4.4. Next, connect the **HDD LED header cable** to the appropriate pins. This will provide power for the hard disk drives' LED lights, which indicate their status. The HDD LED header cable will be labeled H.D.D LED and have 2 holes (See Fig. 19).

FIGURE 19: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

The 2 appropriate pins will be labeled as HDD_LED+ and HDD_LED- or grouped together as HDD_LED. If not labeled, see Fig. 14 to note that the cable will connect to pins 1 and 2 from the left on the bottom row.

2.4.5. Next, connect the **Front fan header cable** to the appropriate pins. This will provide power for the front fan to function. The Front fan header cable will be already connected to the fan on the front of the case and will have a red end with 3 holes (See Fig. 20).

FIGURE 20: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

The 3 appropriate pins will be on the left of the motherboard's System Panel Connector pins and will be labeled as 2_FAN. Connect the cable to the 3 pins on the right; there will be a 4th pin directly on the left that will not connect to the cable.

2.4.6. Next, connect the **Rear fan header cable** to the appropriate pins. This will provide power for the rear fan to function. The Rear fan header cable will be already connected to the fan on the back of the case and will have a red end with 3 holes (See Fig. 20).

The 3 appropriate pins will be in the center of the bottom of the motherboard and will be labeled as EXT_FAN. Connect the cable to the 3 pins on the right; there will be a 4th and 5th pin directly on the left that will not connect to the cable.

2.4.7. Next, connect the **USB 2.0 cable** to the appropriate pins. This will enable the computer to use USB 2.0 buses. The USB 2.0 cable will be already connected to the case and will have a black end with 9 holes (5 holes on top, 4 holes on bottom) (See Fig. 21).

FIGURE 21: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

The 9 appropriate pins will be labeled as USB1112 and will be on the left of the 2_FAN 4-pin socket. This pin formation is referred to as a 10-1 pin.

2.4.8. Next, connect the **USB 3.0 cable** to the appropriate pins. This will enable the computer to use USB 3.0 buses. The USB 3.0 cable will be already connected to the case and will be a blue cable with 19 holes (9 holes on top, 10 holes on bottom) (See Fig. 22).

FIGURE 22: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

The 19 appropriate pins will be labeled as U31G1_34 and will be on the left of the USB 2.0 sockets. This pin formation is referred to as a 20-1 pin.

2.4.9. Next, connect the **Audio cable** to the appropriate pins. The Audio cable will be already connected to the case and will have a yellow end with 9 holes (4 holes on top, 5 holes on bottom) (See Fig. 23).

FIGURE 23: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

The 9 appropriate pins will be at a 10-1 pin socket labeled as AAFP and will be located on the lower left corner of the motherboard.

3. INSTALLING POWER SUPPLY

The power supply to be installed for this PC build is an ATX, 20+4 pin, PCIe Power Supply. It will come with a large bundle of wires coming out of the power supply box. **DO NOT CUT OPEN THESE BUNDLES OF WIRES. They are meant to be grouped together for organization.**

3.1. Mount the Power Supply to the PC Case

NOTE: It is recommended for a second person should help with this installation. One person should hold the power supply and keep it aligned, and the other person should install the mounting screws until the power supply is secured.

In the back of the PC case, there is a spot for the power supply to be secured (See Fig. 24). Align the power supply to the 4 holes on the PC case. The side with the fan vent and power switch should be facing OUT of the PC case. The bundles of wires should be INSIDE of the PC case.

FIGURE 24: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 3.2.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

Then, with a Phillips head screwdriver, secure the power supply to the PC case using 4 mounting screws that came with either the power supply or the PC case. Make sure the power supply is firmly in place, but do not overtighten or the power supply could get damaged.

FIGURE 25: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

3.2. Connect Power Supply connectors to the motherboard

First, ensure that the power switch is OFF. Then connect the Power Supply's motherboard power connector to the motherboard. This is a 20+4 pin connector with a white end (See Fig. 26). Insert it into the 20+4 pin socket on the right end of the motherboard (See Fig. 25). This will provide power for the motherboard to function.

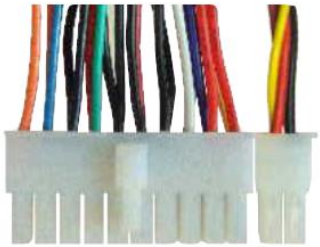

FIGURE 26: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

4. INSTALLING CPU

The CPU to be installed for this PC build is an i5-8600K, 3.60 GHz, 9MB Cache, LGA1151, 95W CPU. A Socket 1151 Heat Sink and Fan will be installed with it in this step.

4.1. Install the CPU

The silver-colored square approximately in the middle of the motherboard is the CPU socket and is where the CPU will be installed.

4.1.1. Lift the lever on the motherboard's CPU socket (See Fig. 27).

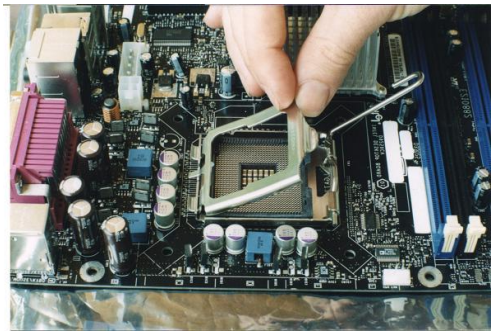

FIGURE 27: ROSENTHAL, M. (2018). BUILD YOUR OWN PC - STEP 2: INSTALLING THE CPU. RETRIEVED SEPTEMBER 03, 2020, FROM HTTPS://WWW.IFITJAMS.COM/IBUILD2.HTM

4.1.2. Place the CPU into the CPU socket (See Fig. 28). Match the small gold triangle on a corner of the CPU to the small gold triangle on a corner of the CPU socket. If not aligned this way, the CPU will fail to run properly.

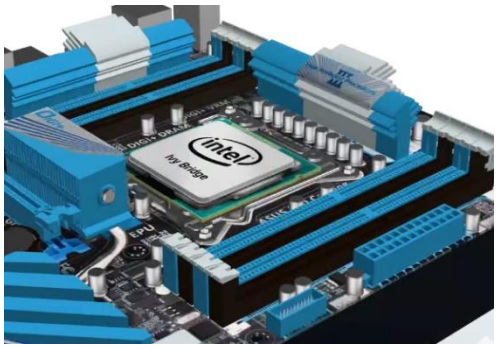

FIGURE 28: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 3.5.5). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

4.1.3. Close the lever and ensure that the CPU is secured in place (See Fig. 29). If the CPU is not secured, it can fall out which could damage both the CPU and other components.

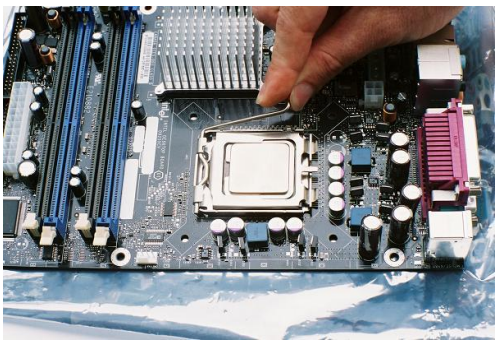

FIGURE 29: ROSENTHAL, M. (2018). BUILD YOUR OWN PC - STEP 2: INSTALLING THE CPU. RETRIEVED SEPTEMBER 03, 2020, FROM HTTPS://WWW.IFITJAMS.COM/IBUILD2.HTM

4.2. Install the Heat Sink and Fan

To cool the CPU when it runs, thermal paste is required to be placed on top of the CPU. It will be provided with the Heat Sink and Fan. Thermal paste transfers heat from the CPU to the heat sink to ensure that the CPU does not overheat.

4.2.1. Place Thermal Paste under the Heat Sink, at the area that will be directly on top of the CPU. If the thermal paste has already been placed there, take off the protective cover and leave the paste there (See Fig. 30).

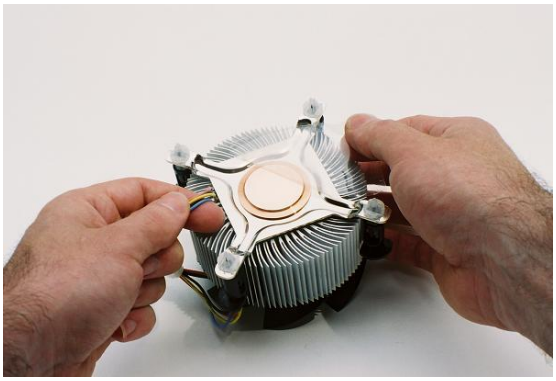

FIGURE 30: ROSENTHAL, M. (2018). BUILD YOUR OWN PC - STEP 2: INSTALLING THE CPU. RETRIEVED SEPTEMBER 03, 2020, FROM HTTPS://WWW.IFITJAMS.COM/IBUILD2.HTM

4.2.2. Place the Heat Sink and Fan on top of the CPU. The thermal paste should be directly between the Heat Sink and CPU (See Fig. 31). Align the 4-point connector on the corners of the Heat Sink and Fan with the 4 holes on the motherboard that are around the CPU socket.

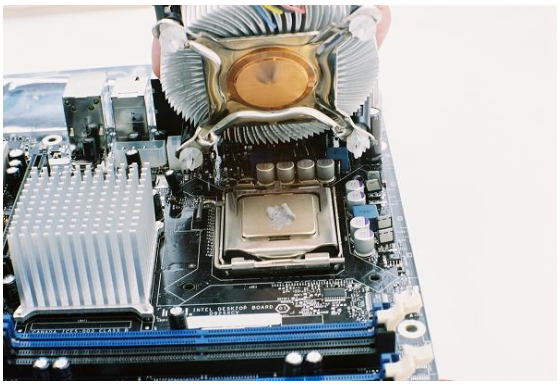

FIGURE 31: ROSENTHAL, M. (2018). BUILD YOUR OWN PC - STEP 2: INSTALLING THE CPU. RETRIEVED SEPTEMBER 03, 2020, FROM HTTPS://WWW.IFITJAMS.COM/IBUILD2.HTM

4.2.3. Secure the Heat Sink and Fan in place by using a screwdriver to screw the 4-point connector screws into the 4 motherboard holes. Your Heat Sink and Fan may also have snap-in fasteners that you only need to push down with your fingers until they click (See Fig. 32). If the Heat Sink and Fan are not secured, it could fail to cool the CPU and the CPU will overheat.

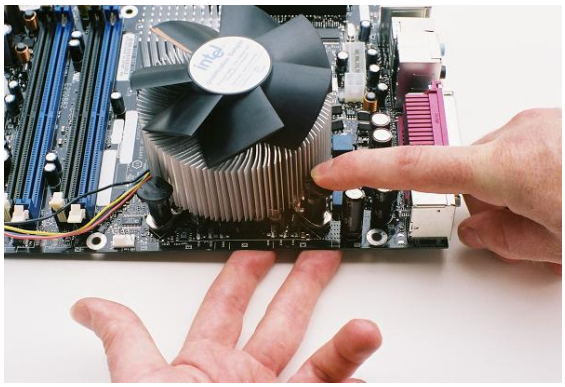

FIGURE 32: ROSENTHAL, M. (2018). BUILD YOUR OWN PC - STEP 2: INSTALLING THE CPU. RETRIEVED SEPTEMBER 03, 2020, FROM HTTPS://WWW.IFITJAMS.COM/IBUILD2.HTM

4.3. Connect the Heat Sink and Fan's Fan Connector to the Motherboard

The Heat Sink and Fan's Fan Connector is a cable already connected to it with a beige end and 4 holes for pins (See Fig. 34). Connect the Fan Connector to the 4-pin socket on the motherboard labeled CPU_FAN (See socket with red square around it in Fig. 33). It is located around the upper right area of the CPU area. This will provide power for the Heat Sink and Fan to function.

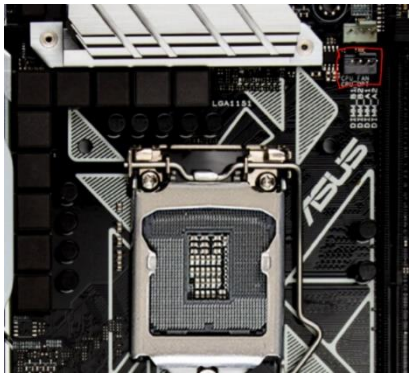

FIGURE 33: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

FIGURE 34: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

4.4. Connect the Power Supply's CPU Power Connector to the Motherboard

The Power Supply's CPU Power Connector is used to provide electricity for the CPU to run. First, ensure that the power switch is OFF. Then connect the Power Supply's CPU power connector to the motherboard. This is an 8-pin connector with a white end (See Fig. 36). Insert it into the 8-pin socket on the upper left of the motherboard (See Fig. 35). This will provide power for the CPU to function.

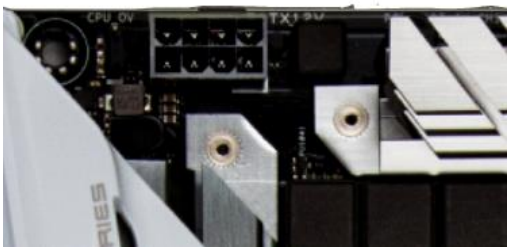

FIGURE 35: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

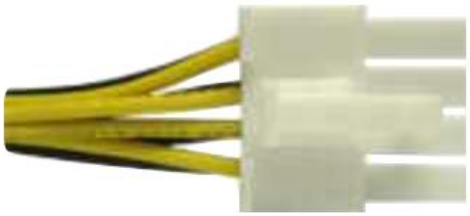

FIGURE 36: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

5. INSTALLING RAM

The RAM to be installed for this PC Build are two DDR4 8 GB, DDR 4 2400 Memory Modules as Dual-Channel configuration. Dual-channel configuration is used to double the bandwidth and therefore increase the amount of data that is transferred per second.

5.1. Align the first RAM into an appropriate memory slot. The memory slots are located to the right of the CPU socket. The memory slots to be used for this build are DIMM_B2 and DIMM_A2 (See Fig. 38). From the left, DIMM_B2 is the 2nd slot, and DIMM_A2 is the 4th slot. Ensure that the notch on the bottom of the RAM matches up with the slot (See Fig. 37).

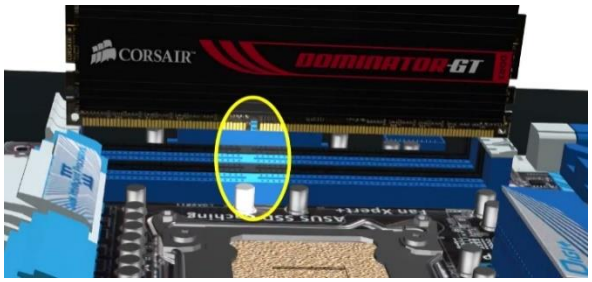

FIGURE 37: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 3.8.5). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

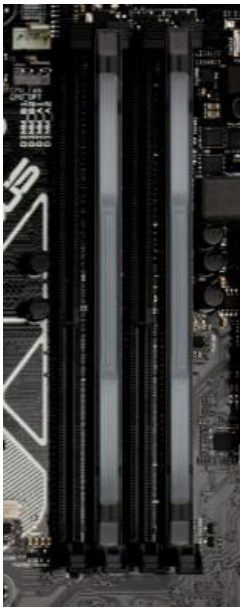

FIGURE 38: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

5.2. Once the RAM is properly aligned, push it into the slot until the tabs on the ends of the slot lock the RAM into place (See Fig. 39). If the tabs have not secured the RAM into place, the RAM could fall out and receive damage. Forcing the RAM into place can also damage the component. If you feel resistance, take the RAM out and again ensure that it is aligned with the memory slot.

5.3. Perform the same installation with the second RAM. If you installed the first RAM into slot DIMM_B2, install the second RAM into slot DIMM_A2. If you installed the first RAM into slot DIMM_A2, install the second RAM into slot DIMM_B2 (See Fig. 38). Installing the second RAM enables Dual-channel configuration.

FIGURE 39: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 3.8.5). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

6. INSTALLING HARD DRIVE

The Hard Drive to be installed for this PC build is a SATA Internal Hard Disk Drive (HDD). The HDD will be used to store larger quantities of data and common files that can be accessed with competent speed to be transferred to main memory. It will also hold the operating system and various applications.

Prepare a 7-Pin SATA data cable. It will be used to connect the motherboard and HDD.

6.1. Install the HDD

First, identify the Disk Drive Bay in the PC case (See Fig. 40). Choose a slot in the Disk Drive Bay that the 7-pin SATA data cable and SATA power connector can reach. The 7-pin SATA data cable will connect the motherboard and HDD, and the SATA power connectors will connect the power supply and HDD. If the HDD is installed in a slot that is too far away, it will not have access to the motherboard or power supply.

Insert the HDD in the chosen slot in the Drive Bay, aligning the screw-holes on the PC case with the screw-holes on the HDD and making sure to keep the HDD ports facing out (See Fig. 41). Then, with a Phillips head screwdriver, secure the HDD to the PC case using 4 mounting screws that came with the PC case. Make sure the HDD is firmly in place, but do not overtighten or the HDD could get damaged.

FIGURE 40: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 5.2.2). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

FIGURE 41: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 5.2.2). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

6.2. Connect a SATA data cable to the HDD

The SATA data cable is used to transfer data from a hard disk to the motherboard.

6.2.1. First, connect the 7-Pin SATA data cable to the HDD (See Fig. 42). The port on the HDD is L-shaped, matching the opening in the end of the cable. Make sure to align the keyed end of the cable to the HDD port. If it does not go in, do not try to press hard or it may damage the component. Check the alignment and smoothly push the cable in.

FIGURE 42: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 5.2.2). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

6.2.2. Then, connect the other end of the 7-Pin SATA data cable to the SATA 1 port on the motherboard. Since this HDD will hold the operating system, it is best practice to connect the HDD to SATA 1 (or the lowest number on the motherboard) which is where the CPU first looks for the operating system.

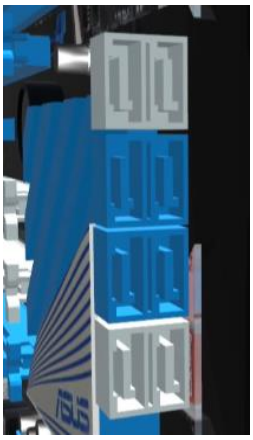

FIGURE 43: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 5.2.2). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

The SATA ports on the motherboard are L-shaped (See Fig. 43), matching the opening in the end of the cable, and are located on the right edge of the motherboard and below the 20+4 pin motherboard power supply socket. SATA 1 is the top left port among the SATA ports on the motherboard (See Fig. 44, circled in red). Make sure to align the keyed end of the cable to the HDD port. If it does not go in, do not try to press hard or it may damage the component. Check the alignment and smoothly push the cable in.

FIGURE 44: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

6.3. Connect a SATA power connector to the HDD

The 15-Pin SATA power connector is used to provide power for the HDD to function. The 15-Pin SATA power connector is already connected to the Power Supply and has a black end (See Fig. 45). Connect this SATA power connector to the HDD SATA power connector port. It will be next to the HDD SATA data cable port (See Fig. 46).

FIGURE 45: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

FIGURE 46: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 5.2.2). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

7. INSTALLING OPTICAL DRIVE

The Optical Drive to be installed for this PC build is a SATA Internal CD-DVD Drive. The Optical Drive will be used to read CDs and DVDs that store large quantities of data and move that data between the storage device and the motherboard.

Prepare a 7-Pin SATA data cable. It will be used to connect the motherboard and Optical Drive.

7.1. Install the Optical Drive

First, find the Optical Drive Bay in the PC case (See Fig. 47, circled in red). Choose a slot in the Optical Drive Bay that the 7-pin SATA data cable and SATA power connector can reach. The 7-pin SATA data cable will connect the motherboard and Optical Drive, and the SATA power connectors will connect the power supply and Optical Drive. If the Optical Drive is installed in a slot that is too far away, it will not have access to the motherboard or power supply.

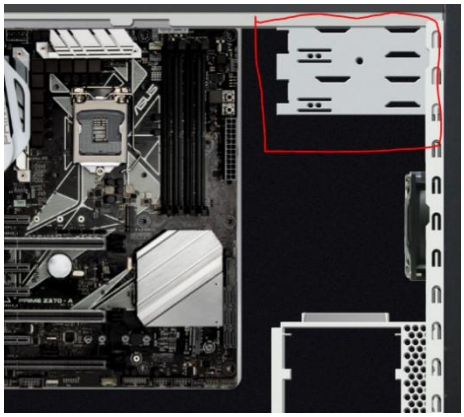

FIGURE 47: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

Insert the Optical Drive in the chosen slot in the Optical Drive Bay, aligning the screw-holes on the PC case with the screw-holes on the Optical Drive and making sure to keep the Optical Drive ports facing out (See Fig. 48). Then, with a Phillips head screwdriver, secure the Optical Drive to the PC case using 4 mounting screws that came with the PC case. Make sure the Optical Drive is firmly in place, but do not overtighten or the Optical Drive could get damaged.

FIGURE 48: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

7.2. Connect a SATA data cable to the Optical Drive

The SATA data cable is used to transfer data from a storage device inserted in the Optical Drive to main memory.

7.2.1. First, connect the 7-Pin SATA data cable to the Optical Drive (See Fig. 49). The port on the Optical Drive is L-shaped, matching the opening in the end of the cable. Make sure to align the keyed end of the cable to the Optical Drive port. If it does not go in, do not try to press hard or it may damage the component. Check the alignment and smoothly push the cable in.

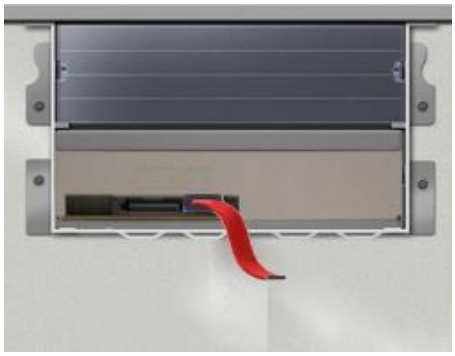

FIGURE 49: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

7.2.2. Then, connect the other end of the 7-Pin SATA data cable to the SATA 2 port on the motherboard. Since this Optical Drive will not hold the operating system, it is okay for it to be connected to any SATA port on the motherboard except for the lowest number.

The SATA ports on the motherboard are L-shaped (See Fig. 43), matching the opening in the end of the cable, and are located on the right edge of the motherboard and below the 20+4 pin motherboard power supply socket. SATA 2 is the top right port among the SATA ports on the motherboard (See Fig. 50, circled in red). Make sure to align the keyed end of the cable to the Optical Drive port. If it does not go in, do not try to press hard or it may damage the component. Check the alignment and smoothly push the cable in.

FIGURE 50: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

7.3. Connect a SATA power connector to the Optical Drive

The 15-Pin SATA power connector is used to provide power for the Optical Drive to function. The 15-Pin SATA power connector is already connected to the Power Supply and has a black end (See Fig. 45). Connect this SATA power connector to the Optical Drive SATA power connector port. It will be next to the Optical Drive SATA data cable port (See Fig. 51).

FIGURE 51: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

8. INSTALLING VIDEO CARD

The Video card to be installed in this PC build is a DVI-I HDMI Crossfire PCIe (16x) Video Card. The Video card will move graphical information as data from the motherboard to the external display.

8.1. Remove the appropriate PCI slot cover

The Video Card ports will be sticking out of the back of the PC case, similar to the motherboard I/O ports installed in Step 2.3.1. Therefore, one of the PCI slot covers in the back of the PC case must be removed.

This Video Card is PCIe x16 and will be installed in a PCIe x16 slot. Identify the PCIe x16 socket nearest to the CPU (See Fig. 52, circled in red). This is the slot in which this Video Card will be installed.

Using a Phillips head screwdriver, remove the screws on the PCI slot cover that is parallel to the chosen PCIe x16 slot. Then remove the PCI slot cover so there is an open space for the Video Card ports to stick out when it is installed (See Fig. 53). Save the screw(s) so they can be used to secure the Video Card in the Step 8.2.

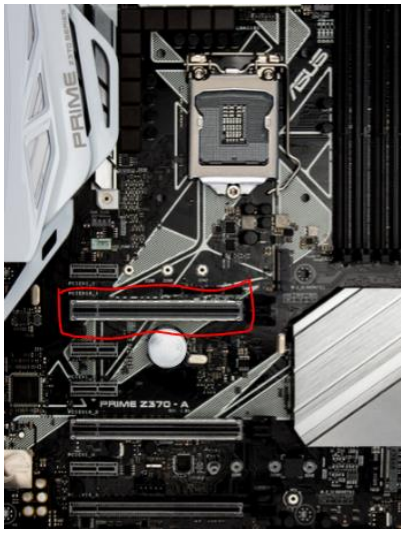

FIGURE 52: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

FIGURE 53: GASIOR, G. (2012). HOW TO BUILD A PC: THE TECH REPORT GUIDE. RETRIEVED SEPTEMBER 15, 2020, FROM HTTPS://TECHREPORT.COM/REVIEW/23624/HOW-TO-BUILD-A-PC-THE-TECH-REPORT-GUIDE/

8.2. Install the Video Card

In the chosen PCIe x16 slot (See Fig. 52, circled in red), insert the Video Card. It must be in the position where the ports on the side of the Video Card stick out of the back of the PC case in the space created from the PCI slot cover removal in Step 8.1 (See Fig. 54, circled in red). Align the notch on the motherboard connector at the bottom of the Video card with the notch of the PCIe x16 slot, then push down until there is a click (See Fig. 55). Forcing the Video card into place can also damage the component. If you feel resistance, take the Video cart out and again ensure that it is aligned with the PCIe x16 slot.

FIGURE 54: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

When inserted correctly, the screw-hole on the metal tab around the Video card ports will align with the open screw-hole on the back of the PC case. With a Phillips head screwdriver, reinstall the removed screw from Step 8.1, securing the Video card to the back of the PC case (See Fig. 56).

FIGURE 55: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 3.12.3). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

8.3. Connect the PCIe Power Connector to the Video Card

The Power Supply's PCIe Power Connector is used to provide electricity for a PCI Expansion card to run. First, ensure that the power switch is OFF. Then connect the Power Supply's PCIe power connector to the motherboard. This is a 6-pin connector with a black end (See Fig. 57). Insert it into the 6-pin socket on the top of the Video Card (See Fig. 58, circled in red). This will provide power for the Video card to function.

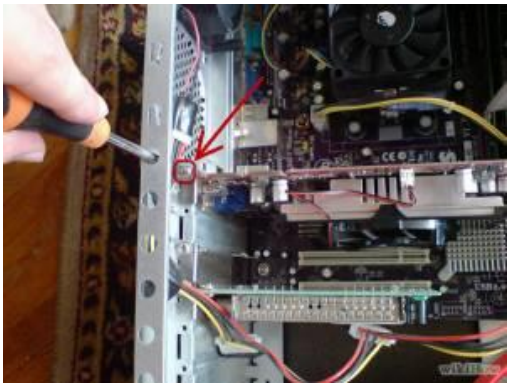

FIGURE 56: ALLINALLNEWS. (2015). HOW TO INSTALL VIDEO CARD TO YOUR DESKTOP COMPUTER. RETRIEVED SEPTEMBER 15, 2020, FROM HTTPS://WWW.ALLINALLNEWS.COM/GADGETS/HOW-TO-INSTALL-VIDEO-CARD

FIGURE 57: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

FIGURE 58: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 3.12.5). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

9. CONNECTING MONITORS, KEYBOARD, AND MOUSE

The peripherals to be installed in this PC build are a Monitor, a 104-key USB Keyboard, and a USB Mouse. The Monitor will be used as an external display for the user to view computer output. The Keyboard and Mouse will be used for the user to input commands into the computer.

Prepare an HDMI to HDMI connector cable and an AC power cable, both of which will be used to allow the Monitor to function.

9.1. Connect the Monitor to the PC

9.1.1. First, connect the Monitor to the Video Card using an HDMI to HDMI connector cable. Insert one end of the cable to the HDMI port in the back of the monitor (See Fig. 59, circled in red). Insert the other end of the cable to the HDMI port on the Video Card in the back of the PC (See Fig. 60, circled in red). This will move the output data from the CPU to the Monitor to be externally displayed.

FIGURE 59: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

FIGURE 60: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

9.1.2. Then, connect the Monitor to electricity using an AC power cable. Connect the Female end (no prongs) of the AC power cable to the power port in the back of the Monitor (See Fig. 61, circled in red). Connect the Male end (3 prongs) of the AC power cable to a wall socket. This will connect the Monitor to external electricity to provide it with power to function.

FIGURE 61: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

9.2. Connect the Mouse to the PC

Insert the USB Type A connector attached to the Mouse to a USB 2.0 port on the motherboard in the back of the PC (See Fig. 62, circled in red). This will allow input data to be moved from the Mouse to the motherboard. Although USB 3.0 has a higher data transfer rate, there is no difference in performance between connecting the Mouse to USB 3.0 and connecting the Mouse to USB 2.0.

9.3. Connect the Keyboard to the PC

Insert the USB Type A connector attached to the Keyboard to a USB 2.0 port on the motherboard in the back of the PC (See Fig. 62. circled in red). This will allow input data to be moved from the Keyboard to the motherboard. Although USB 3.0 has a higher data transfer rate, there is no difference in performance between connecting the Keyboard to USB 3.0 and connecting the Mouse to USB 2.0.

FIGURE 62: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

10. BIOS CONFIGURATION

BIOS is a program stored in a read-only memory chip that is installed by default on every modern motherboard. BIOS control the startup process when the system is powered on. It also loads the operating system is one exists yet in the computer.

10.1. Connect the PC to electricity turn on the PC

Before booting into BIOS, the PC must be connected to electricity and be turned on.

10.1.1. Connect the Power Supply to electricity using an AC power cable. Connect the Female end (no prongs) of the AC power cable to the Power Supply power port in the back of the PC (See Fig. 63, circled in red). Connect the Male end (3 prongs) of the AC power cable to a wall socket. This will connect the Power Supply to external electricity to provide the PC with power to function.

10.1.2. Toggle the Power Supply Voltage Switch (See Fig. 63, green arrow pointing at Voltage switch) to the 115V setting. 115V is the standard voltage setting used in North America PC systems.

10.1.3. Turn the Power Supply power switch to ON. The ON position will have the | symbol pressed down (See Fig. 63, circled in blue). This will allow electricity to flow into the power supply.

FIGURE 63: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

10.1.4. Press the Monitor power button to turn it ON (See Fig. 64, arrow pointing at Monitor power button). This will allow electricity to power the Monitor and prepare it for externally displaying the system output.

FIGURE 64: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

10.1.5. Press the PC Case power button to turn it ON (See Fig. 65, circled in red). This will activate the Power Supply to feed electricity to the internal PC components, giving all of them power to function.

NOTE: With no Operating System yet to boot from, **the system should automatically boot into BIOS.** If it does not, press F2 on the keyboard as the computer starts.

FIGURE 65: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

10.2. Configure General Settings

In General Settings, essential sections to check are System Information, Boot Sequence, and Date/Time.

10.2.1. Check System Information by going to Settings > General > System Information. You must ensure that each system component has been installed correctly by looking through this section and checking for the parts you installed. Compare your System Information with Fig. 66 and Fig. 67 below, which have accurate information. **If something is missing from your System Information page, shut the system off, unplug the power supply and open the PC case again to ensure that you have the component properly installed.**

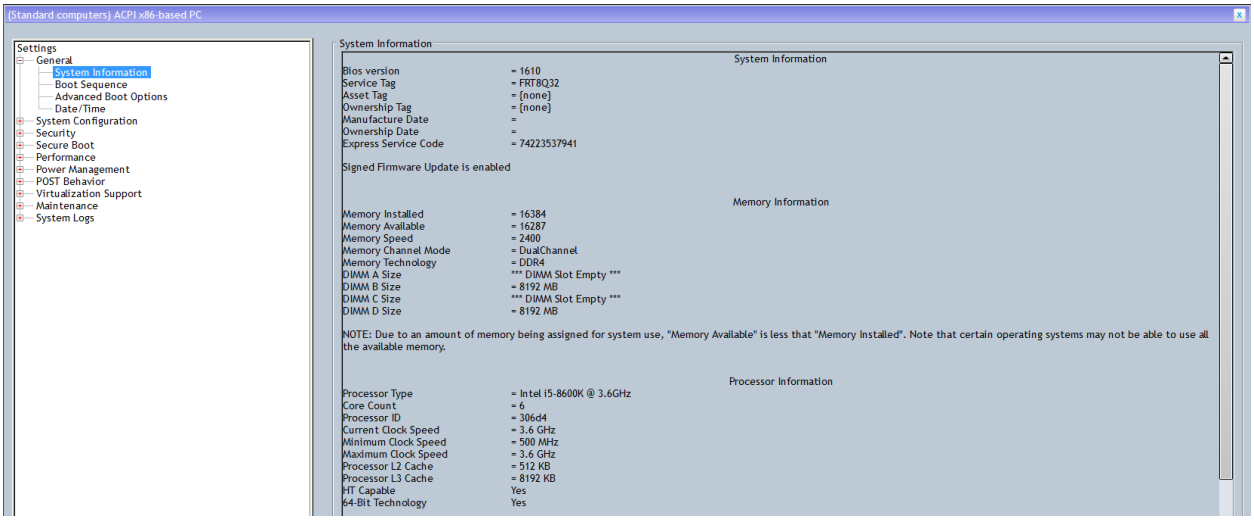

FIGURE 66: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

FIGURE 67: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

10.2.2. Configure Boot Sequence by going to Settings > General > Boot Sequence. In this section, the user identifies the Boot Sequence: the order in which the CPU searches data storage devices to load an operating system.

On the left, the user identifies which storage devices will be searched. Note that you will install Windows 10 operating system from a DVD in the optical drive. Make sure at least the CD/DVD/CD-RW Drive and Internal HDD are checked. See Fig. 68 for an example.

On the right, the Boot Sequence is specified with the storage device at the top of the stack being the first that the CPU searches in. Clicking the up and down arrows, ensure that CD/DVD/CD-RW Drive is at the top and Internal HDD is second after that. This is because you will initially load Windows 10 from the optical drive. See Fig. 68 for an example. Click the Apply button at the bottom of the screen when finished.

FIGURE 68: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

10.2.3. Set the Date and Time by going to Settings > General > Date/Time. This will ensure that the computer system displays the correct Date and Time, even after being restarted.

First, find a trusted source for the current Date and exact Time. This could be a Smartphone, a watch, or another working computer system.

Then, in the Date/Time section, ensure that the Date and Time are accurate. If not, click the numbers to edit them so they match the real Date and Time (See Fig. 69). Click the Apply button at the bottom of the screen when finished.

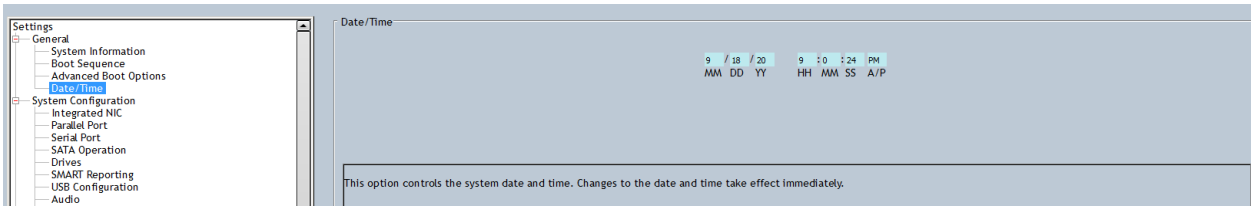

FIGURE 69: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

10.3. Configure System Configuration Settings

Editing System Configuration Settings is for ensuring that essential system devices and components are properly implemented.

10.3.1. Configure SATA Operation by going to Settings > System Configuration > SATA Operation. Here, the user chooses which setting they want to use for their SATA devices, one of which is the HDD you installed. Choose AHCI which is the technical standard for common computer systems (See Fig. 70), then Click the Apply button at the bottom of the screen when finished.

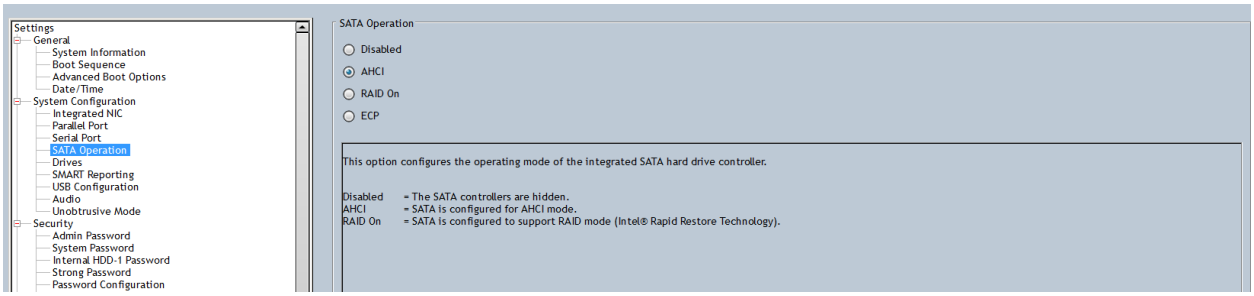

FIGURE 10: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

10.3.2. Configure Drives by going to Settings > System Configuration > Drives. Here, the user chooses which installed SATA devices they want to be used. Ensure that all SATA devices are checked so that the HDD and Optical Drive can be used (See Fig. 71). Click the Apply button at the bottom of the screen when finished.

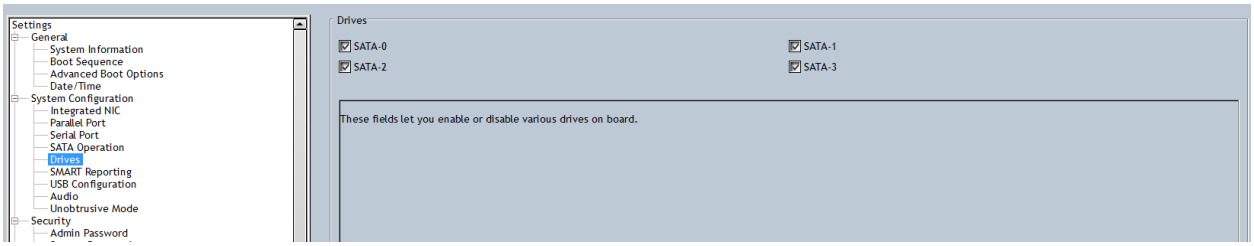

FIGURE 11: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

10.3.3. Enable SMART Reporting by going to Settings > System Configuration > SMART Reporting. SMART Reporting is a technology that alerts the user when hard drives and other hardware components are degrading. Ensure that it is checked (See Fig. 72). Click the Apply button at the bottom of the screen when finished.

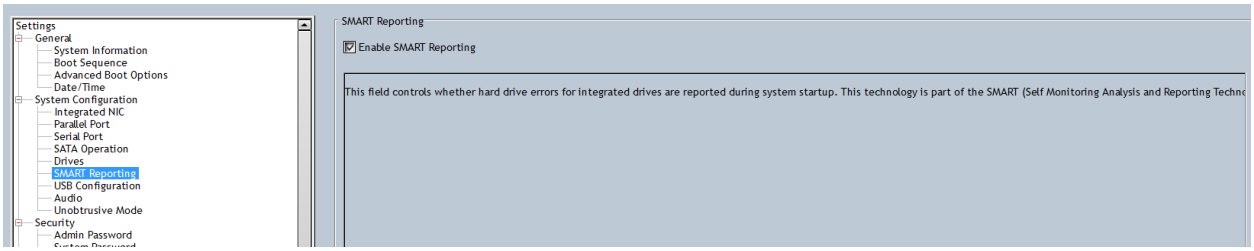

FIGURE 12: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

10.3.4. Enable USB Configuration by going to Settings > System Configuration > USB Configuration. Here, the user can manage which USB ports and types can be used for the computer. Ensure that all 3 checkboxes are checked so that standard USB ports and types can be utilized for this PC (See Fig. 73). Click the Apply button at the bottom of the screen when finished.

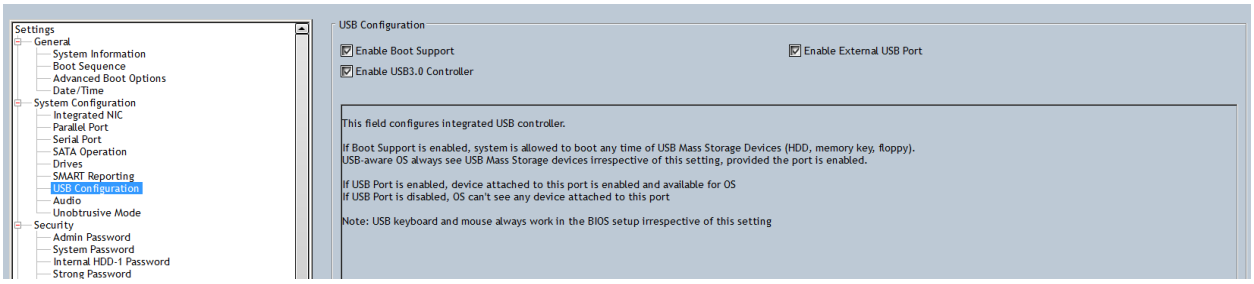

FIGURE 13: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

10.4. Configure Performance Settings

Editing Performance Settings is for ensuring that system components, especially the CPU, perform tasks that improve system performance.

10.4.1. Enable Multi Core Support by going to Settings > Performance > Multi Core Support. Here, users can choose if they want to enable Multi Core Support. Multi Core Support allows all 6 cores in this PC to be utilized to improve system performance and allow larger applications to run. Check the box (See Fig. 74), then click the Apply button at the bottom of the screen when finished.

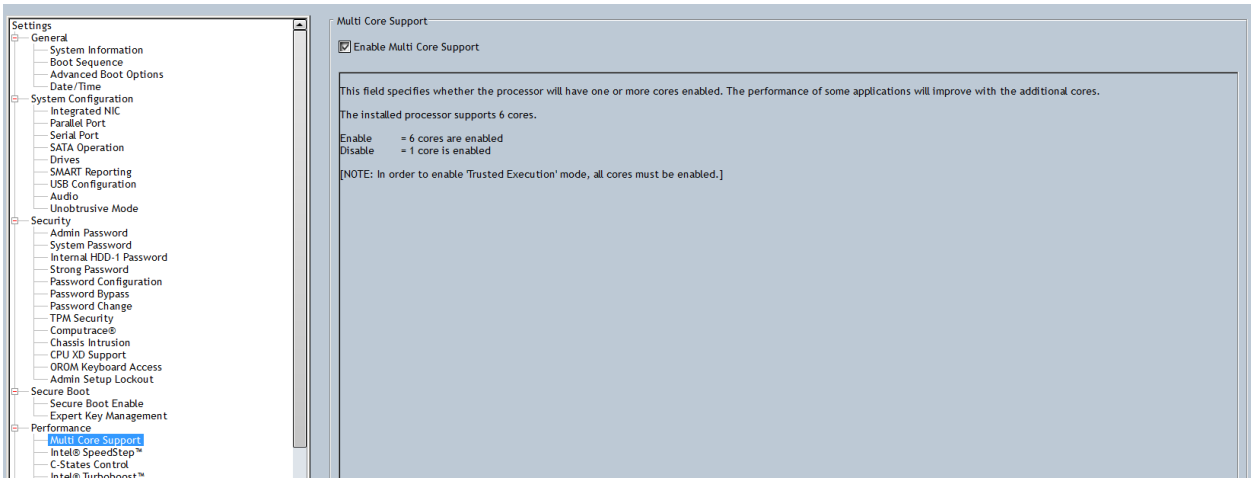

FIGURE 14: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

10.4.2. Enable HyperThread control by going to Settings > Performance > HyperThread control. Here, the user can manage is they want to enable HyperThread. With HyperThread, the CPU will run multiple process at once instead of just one, increasing system performance. Check the box (See Fig. 75), then click the Apply button at the bottom of the screen when finished.

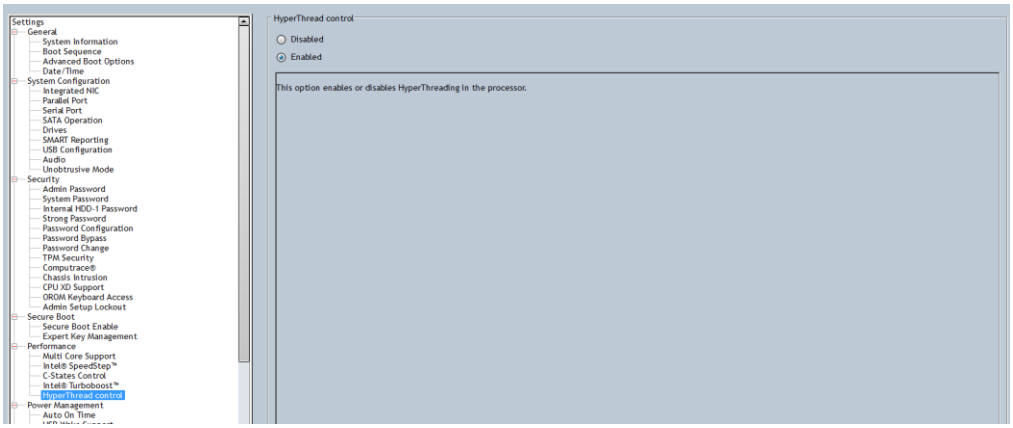

FIGURE 15: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

10.5. Configure BIOS POST Time

Configure BIOS POST Time by going to Settings > POST Behavior > Extend BIOS POST Time. Here, the user can edit how long the system will wait for the user to press F2 to enter BIOS when the system starts up. A common selection is 5 seconds, as it gives the user 5 seconds when the system is powered on to manually enter BIOS. Check the POST Time you would prefer (See Fig. 76), then click the Apply button at the bottom of the screen when finished.

FIGURE 16: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

11. INSTALLING WINDOWS 10

The Operating System to be installed for this PC Build is 64-bit Windows 10 Home edition, booted off a DVD. You can purchase a DVD of Microsoft OEM Windows 10 Home 64-bit from many retailer stores, including Best Buy, Amazon, and Micro Center.

This will be a clean install of Windows 10, as the HDD currently in the system is empty.

11.1. Exit BIOS and shut the system off

Click the Exit button at the bottom of the BIOS screen (See Fig. 77). Then, press the Power Button on the front of the PC case to turn the system off.

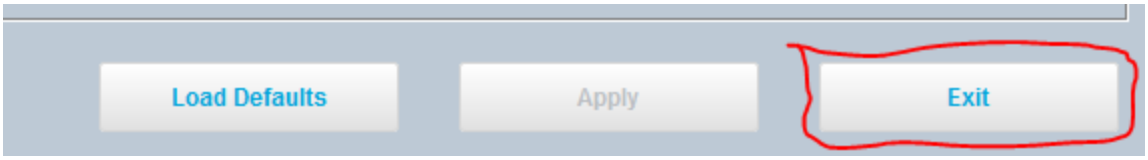

FIGURE 77: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

11.2. Insert the DVD into the Optical Drive and turn the system back on

Open the packaging of the Windows 10 DVD carefully, making sure not to damage the DVD. Then, open the Optical Drive installed in the PC and insert the Windows 10 DVD onto it. Next, close the Optical Drive with the DVD inside it (See Fig. 78).

Finally, press the Power Button on the front of the PC case to turn the system on.

In Step 10.2.2., we configured the Boot Sequence to prioritize booting from the Optical Drive. So, on this system startup, Windows 10 will be automatically booted from the DVD in the Optical Drive.

NOTE: From this point on during the Windows 10 installation, **do not power the system off**. It might corrupt the Windows 10 DVD which will lead to a failure in installing the operating system.

FIGURE 78: HEINZMAN, A. (2020). EVERYTHING YOU NEED TO PLAY, RIP, OR WRITE BLU-RAYS AND DVDS. RETRIEVED SEPTEMBER 24, 2020, FROM HTTPS://WWW.REVIEWGEEK.COM/31428/EVERYTHING-YOU-NEED-TO-PLAY-RIP-OR-WRITE-BLU-RAYS-AND-DVDS/

11.3. Windows 10 Setup & Installation

NOTE: Depending on which release of the Microsoft OEM Windows 10 Home 64-Bit DVD you purchased, these steps might be ordered differently for your system. If your Installation Setup has a different order than these steps, you can read ahead in this guide to see where the steps are discussed.

11.3.1. (See Fig. 79) On the first screen the boot brings you to, the screen will prompt you with Language, Time and currency format, and Keyboard or input method. Configure them according to your location and language and click the Next button.

FIGURE 79: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 10.3.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

11.3.2. (See Fig. 80) On the next screen, you will be prompted with a button that says Install Now. Click the button to start the Windows 10 installation. Wait for the next screen to appear.

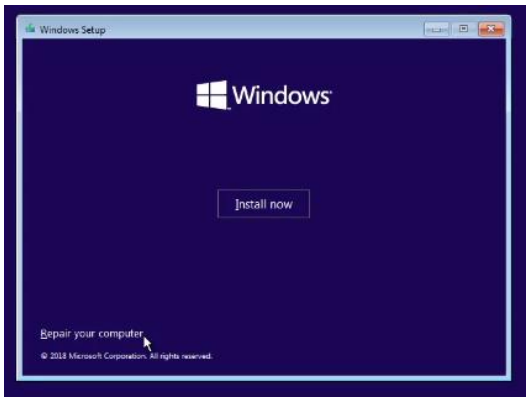

FIGURE 80: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 10.3.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

11.3.3. (See Fig. 81) On the next screen, you need to enter the product key in order to activate and allow your Windows 10 installation. The product key will be located on the package when you bought the Windows 10 DVD. Enter the product key into the text field and press the Next button.

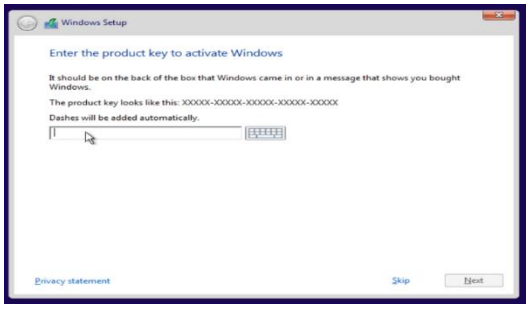

FIGURE 81: MDTECHVIDEOS (2015, AUGUST 6). WINDOWS 10 FORMAT AND CLEAN INSTALL FROM CD/DVD [TUTORIAL. RETRIEVED FROM HTTPS://WWW.YOUTUBE.COM/WATCH?V=RXECJMJJ0SW&T=187S

11.3.4. (See Fig. 82) On the next screen, you will be asked to accept the License Terms for your usage of Windows 10. Read the License terms, check the box that indicates “I accept the license terms”, and click the Next button.

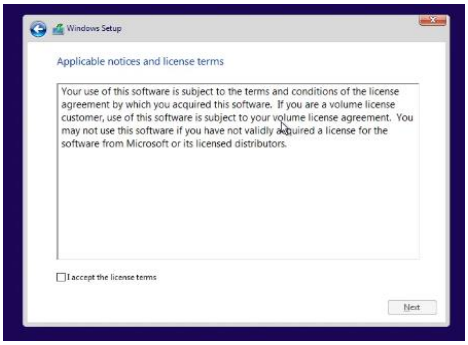

FIGURE 82: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 10.3.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

11.3.5. (See Fig. 83) On the next screen, you will be asked about which installation type you want: Upgrade or Custom. Since this is a clean install on a new and empty HDD, click “Custom: Install Windows Only (advanced)”.

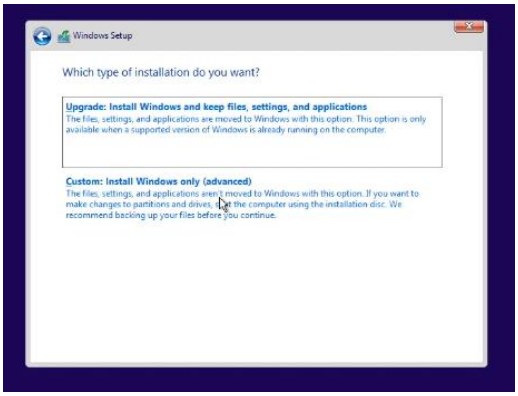

FIGURE 83: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 10.3.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

11.3.6. (See Fig. 84) On the next screen, you will be asked where you want to install Windows. After this installation, we will be booting Windows 10 from the HDD, so find the HDD “Drive 0 Unallocated Space” among the options and select it. Then click the Next button. There will be a relatively long loading time for the next screen as Windows files get readied for installation. Do not power the system off or the installation may fail.

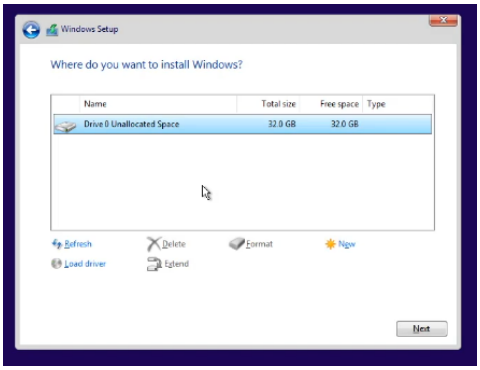

FIGURE 84: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 10.3.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

11.3.7. (See Fig. 85) On the next screen, you will be asked to select your region. Select your region, then click the Yes button.

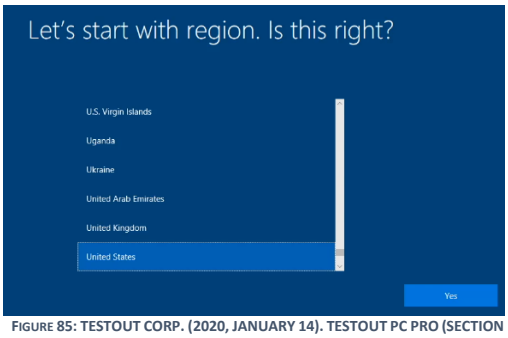

FIGURE 85: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 10.3.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

11.3.8. (See Fig. 86) On the next screen, you will be asked to reconfirm your keyboard layout. Ensure that it is the keyboard layout you would like, then click the Yes button.

On the next screen, you will be asked if you want to add a second keyboard layout. Skip this for now by clicking the Skip button. It can be configured once Windows is installed.

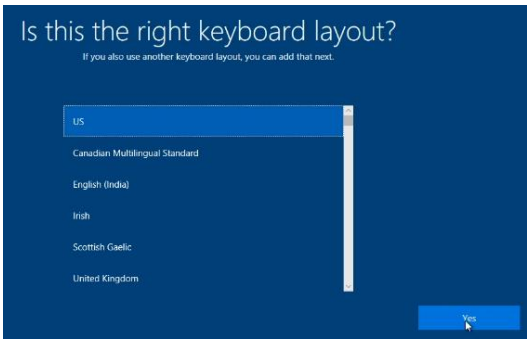

FIGURE 86: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 10.3.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

11.3.9. (See Fig. 87) On the next screen, you will be asked to configure an Internet/Network connection. This PC Build does not cover guidance on Internet connection. However, it is recommended that you connect to ethernet if it is available to you. There are essential steps for Windows 10 installation and configuration that require an internet connection.

If you do not have an Internet connection, click the Skip button. Once you acquire an Internet connection, you can go back anytime to configure the settings in this guide that require it, even after Windows installation.

FIGURE 87: HACHMAN, M. (2019). HOW MICROSOFT MADE IT HARDER TO CREATE WINDOWS 10 LOCAL ACCOUNTSRETRIEVED SEPTEMBER 24, 2020, FROM HTTPS://WWW.PCWORLD.COM/ARTICLE/3409788/HOW-MICROSOFT-MADE-IT-HARDER-TO-CREATE-WINDOWS-10-LOCAL-ACCOUNTS.HTML

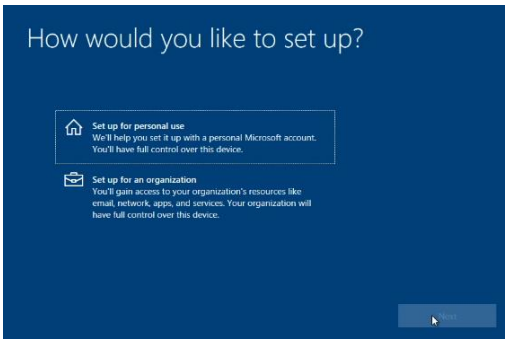

FIGURE 88: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 10.3.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

11.3.10. (See Fig. 88) On the next screen, you will be asked if you want the system set up for personal use or for an organization. This PC Build assumes that the user will be using the system for personal use. Click “Set up for personal use”, then click the Next button.

11.3.11. On the next screen, you will be asked to log in to your Microsoft Account. Enter your credentials, then click the Sign In button.

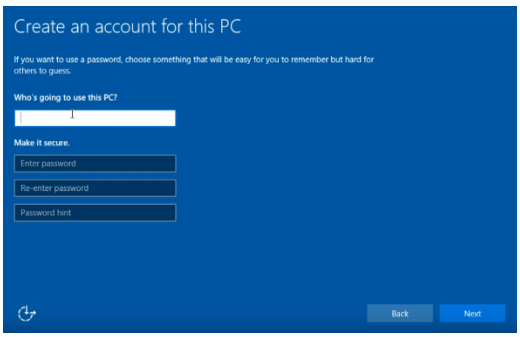

FIGURE 89: MDTECHVIDEOS (2015, AUGUST 6). WINDOWS 10 FORMAT AND CLEAN INSTALL FROM CD/DVD [TUTORIAL. RETRIEVED FROM HTTPS://WWW.YOUTUBE.COM/WATCH?V=RXECJMJJ0SW&T=187S

If you do not already have a Microsoft Account, it is recommended (for our purposes) to create a local account now and then create a Microsoft Account after it is installed.

(See Fig. 89) Creating a local account prompts you to enter a Username and Password. You will also be asked to create Security questions. Make sure you will always know the answers to these questions so you can recover your credentials if you ever lose them. Enter complex credentials, then click the Next button.

NOTE: Creating a Microsoft Account requires an Internet connection. If you do not currently have an Internet connection, you can create a Microsoft Account after you acquire a connection.

11.3.12. (See Fig. 90) On the next screen, you will be asked if you want to activate Cortana. Cortana is a voice-activated assistant on Windows. There is no microphone on this system yet, so click the No button. Cortana can also be configured after Windows Installation.

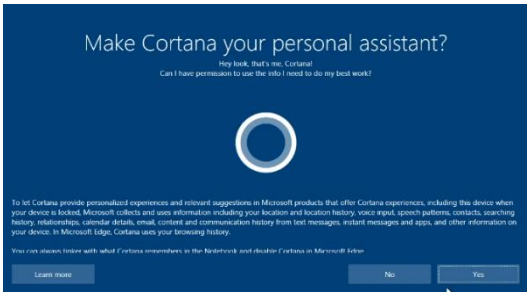

FIGURE 90: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 10.3.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

11.3.13. (See Fig. 91) On the next screen, you will be asked to set Privacy settings for this system.

Speech Recognition: Turn off since there is no microphone.

Find my device: Turn off since this PC will not be moving portably

Inking & Typing: Turn on since the unique dictionary will be helpful for Windows predicting your typing.

Ad ID: Turn off to avoid targeted advertising.

Location: Turn off since this PC will not be moving portably

Diagnostic Data: Turn off to increase privacy. Otherwise, data would be sent to Microsoft.

Tailored Experiences: Turn off to increase privacy. Otherwise, Microsoft would give personalized recommendations and offers based on your activity.

When done, click the Accept button.

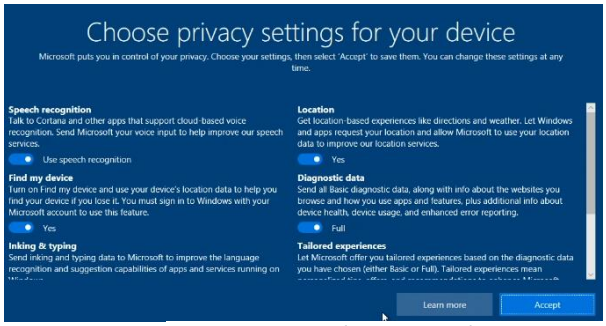

FIGURE 91: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 10.3.4). RETRIEVED FROM

11.3.14. (See Fig. 92) After Windows is fully done loading and installing, sign in with the credentials you chose in step 11.3.11.

FIGURE 92: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 10.3.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

12. CONFIGURING CRITICAL WINDOWS FEATURES

After you have signed into your account on this PC with the Windows 10 operating system, there are some critical Windows Features that must be first configured before any work or activity is done on the system. This is all done for the sake of increasing security and efficiency of the computer.

Some of these steps require an Internet connection. If you do not currently have an Internet connection, skip them for now and you can go still set these configurations up after you acquire an Internet connection.

12.1. Edit BIOS to boot off the HDD first

Press the Power Button to turn the system off. You can take the Windows 10 Home DVD out of the Optical Drive now and put it away into your own safekeeping.

Press the Power Button to turn the system back on, then boot into BIOS (Press F2 as the system starts up). Navigate to Settings > General > Boot Sequence. Then prioritize the Internal HDD to be the first storage device that the system will boot off, since the Internal HDD now contains the Windows 10 operating system. You can also uncheck CD/DVD/CD-RW Drive since you will likely not have to boot from the Optical Drive again anytime soon (See Fig. 93). If you are having trouble managing the boot sequence, read step 10.2.2 again where we first configured it.

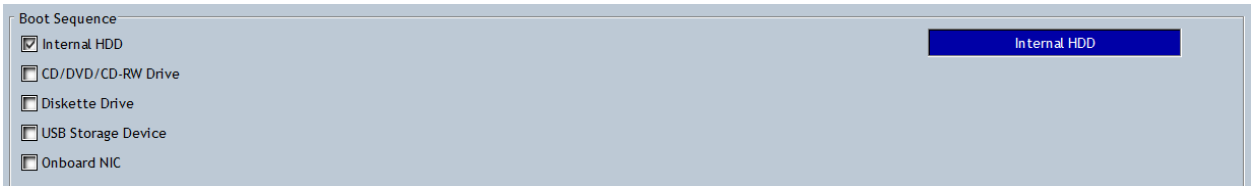

FIGURE 93: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 14.1). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

12.2. Configure Windows Updates

NOTE: Configuring Windows Updates requires an Internet Connection.

12.2.1. Now, exit BIOS and allow the system to boot into Windows.

Click the Windows icon in the bottom left to bring up the list of Applications. Type “Settings”, then click on the Setting Application (See Fig. 94). Then click on Updates & Security.

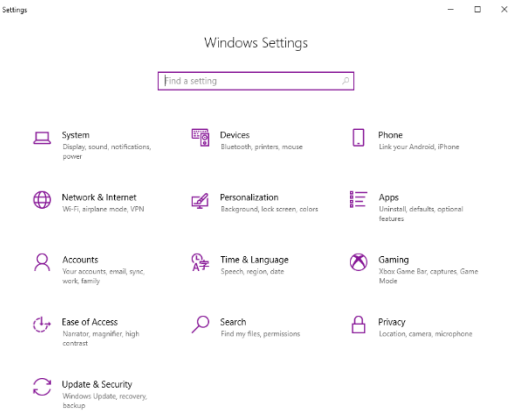

FIGURE 94: WINDOWS SETTINGS (KUCERA, 2020)

Click Check for updates to make sure your system is up to date (See Fig. 95). If there is an available update, download and install it.

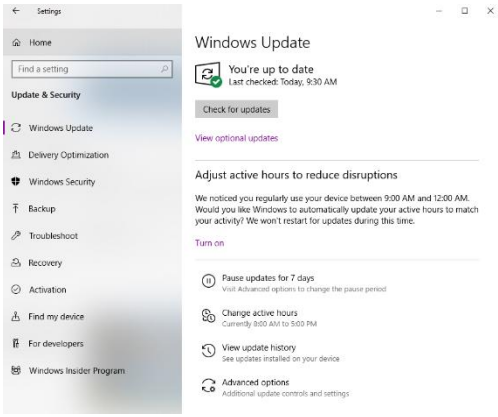

FIGURE 95: UPDATES & SECURITY (KUCERA, 2020)

12.2.2. Scroll down to and click on Change Active Hours. This will tell the system when you typically use the computer so that it does not start installing an update (and then restarting) during your active hours. Click change, then edit your typical Start time and End time for using the computer (See Fig. 96).

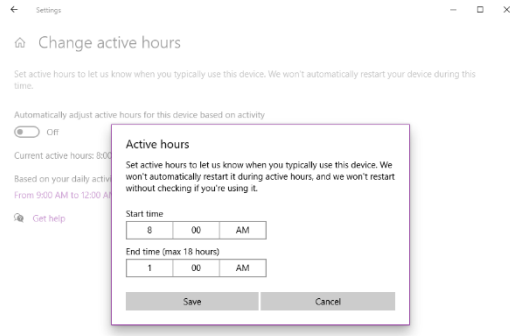

FIGURE 96: ACTIVE HOURS (KUCERA, 2020)

12.2.3. Click the back arrow to go back to Updates & Security, then click Advanced Options. Turn on “Receive updates for other Microsoft products when you update Windows” so that your whole system stays updated (See Fig. 97).

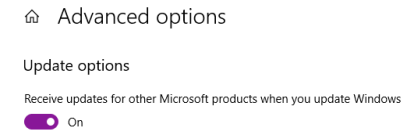

FIGURE 97: RECEIVE UPDATES (KUCERA, 2020)

12.3. Configure Power & Sleep

Click the back arrow to go back to Updates & Security, then click the back arrow again to go back to Windows Settings. Click System.

In System Settings, click Power & Sleep. (See Fig. 98) Here, adjust your preferred times for when you want the screen to turn off and when you want the system to go to sleep (after a certain period of inactivity). Make sure to keep the times relatively short so that the system will not be open for too long during inactivity. Being open for too long during inactivity is a security risk. Recommended is 5-10 minutes.

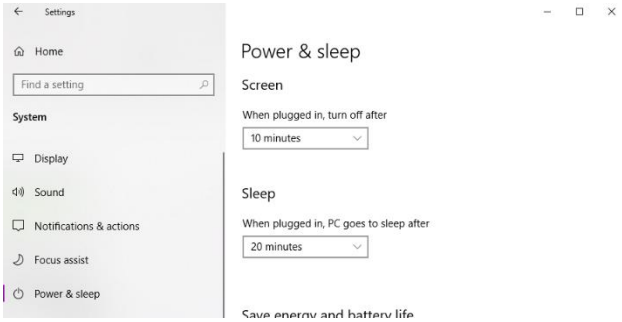

FIGURE 98: POWER & SLEEP (KUCERA, 2020)

12.4. Configure Date & Time

Click the back arrow to go back to Windows Settings. Click Date & Time.

In Data & Time, ensure that the correct time zone and time are set (See Fig. 99). To change them, turn off “Set time automatically” or “Set time zone automatically” so that you can select the correct options for you.

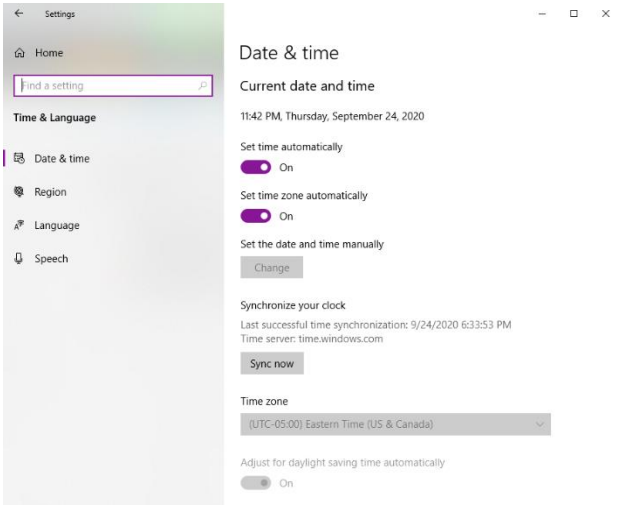

FIGURE 99: DATE & TIME (KUCERA, 2020)

12.5. Configure System Backups

NOTE: Configuring System Backups requires an additional memory storage device. This can include a second Internal HDD, an External HDD, a Flash Drive, or a Writeable CD/DVD.

We will configure a system backup to have data saved, just in case the main storage gets corrupted or fails in the future.

12.5.1. First, ensure that your secondary storage device is connected to the system. Go back to the Updates & Security Page (See step 12.2 for this). Click the Backup tab.

In Backup, click Add a drive (See Fig. 100). Choose the drive that you will store the BACKUP on. Then, make sure it is set to "Automatically back up my files". This will ensure that the Backup will have your fully up-to-date data.

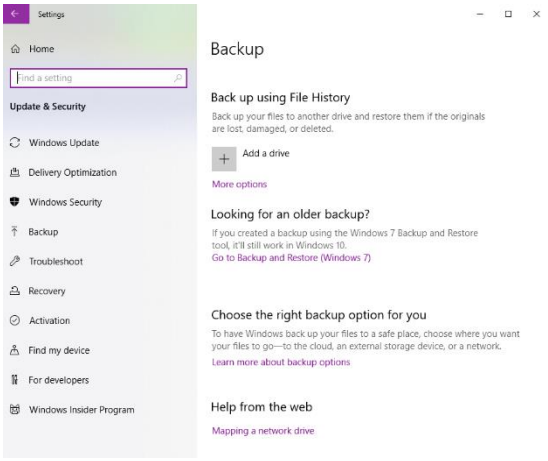

FIGURE 100: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 12.11.6). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

12.5.2. Click More options. Here, you configure the settings for the Backup. Choose how often you want your files to be backed up. Recommended is Daily so that the storage is always up-to-date.

Next, choose how long backups should be kept. Recommended is every 6 months so that space is not taken up by backups that are too old.

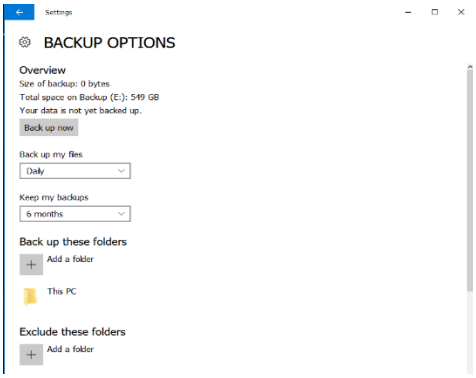

FIGURE 101: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 12.11.6). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

Next, choose the folder you want to be backed up. Click Add a folder, then select your main storage device (the Internal HDD that holds Windows).

Finally, click Back up now to immediately back up the data on your Internal HDD to the secondary storage device.

12.6. Configure Windows Firewall

NOTE: Configuring Windows Firewall requires a Network Connection.

We will configure Windows Firewall to control the traffic between the Internet and this system. It is a host-based Firewall that will protect this system from outsider attacks.

Go back to the Windows Settings page. Click Network & Internet. In the Status tab, scroll down to and click Windows Firewall (See Fig. 102). On the left pane, click “Turn Windows Firewall on or Off”.

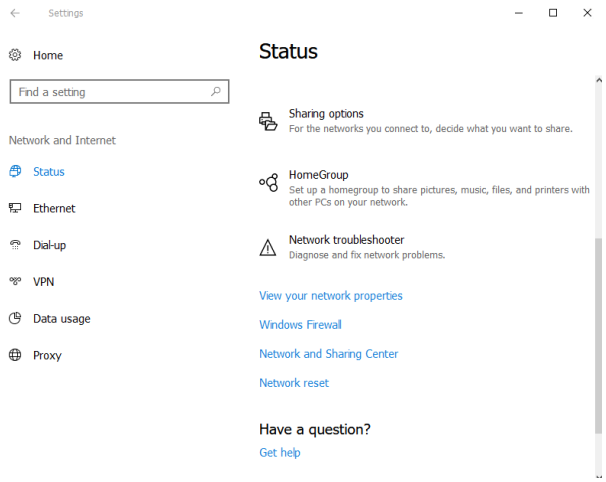

FIGURE 102: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 13.10.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

(See Fig. 103) Here, click “Turn on Windows Firewall” for both Private Network and Public Network. This will block all outsider attacks from reaching this system. Unless you have already joined a Domain, you do not need to turn the Windows Firewall on for Domain network. Click OK to save your settings.

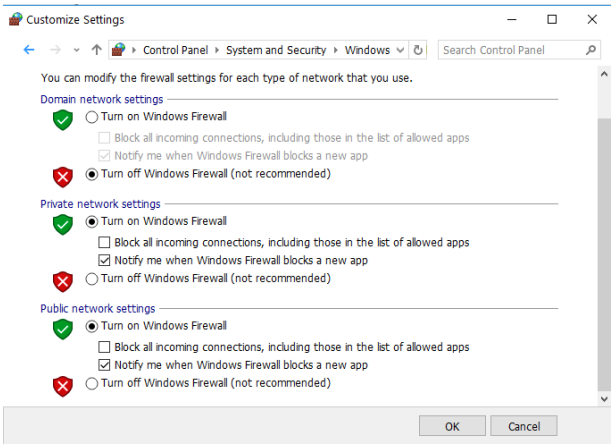

FIGURE 103: TESTOUT CORP. (2020, JANUARY 14). TESTOUT PC PRO (SECTION 13.10.4). RETRIEVED FROM HTTP://WWW.TESTOUT.COM

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