Name: _____ Date: _____ Lab Section: _____

Lab partner's name: _____ Lab PC Number: _____

Read the entire lab first before starting. Follow all the Lab Procedures!

- Ensure you have the anti-static wrist strap attached to your wrist and grounded to the PC when working inside the PC, with the PC unplugged from the AC mains power.
- Remove the wrist strap before you plug in or switch on the AC power for the PC.

Part I. Pre-installation system check and disassembly:

1) Your computer should be verified as fully functional before you proceed: Connect keyboard, mouse, and monitor *before* you power on your PC. You must never plug/unplug PS/2 keyboards or mice with the power on!
2) After connecting all the cables, power on your PC. Your computer should boot into Windows 98. Verify that the CD-ROM drive is listed as a device. See your instructor if the computer does not boot Windows 98 or if the CD-ROM drive is not listed as a device.
3) Shut down your PC and unplug it from AC mains (wall) power.
4) Using proper lab procedures, open up the PC and unplug and disconnect all the CD-ROM drive cables. Remember which way the cables plug in; make notes in your lab book.
5) Unscrew and remove the CD-ROM drive from the PC. Remember the cable and screw locations (make notes in your lab book) and save the screws. Note the type of screw used.
6) Unplug and disconnect all the hard disk cables. Remember which way the cables plug in; make notes in your lab book.
7) Unscrew and remove the hard disk drive from the PC. Remember the cable and screw locations (make notes in your lab book) and save the screws. Note the type of screw used.
8) Remove all IDE interface cables (one or two). Do not remove the floppy drive or cables.
9) Get your instructor to sign off now, before you continue:

S-1. Instructor sign off for CD-ROM and hard disk removal_____

Part II. Installing a new hard disk drive

Objectives: Installing a new hard disk drive; installing an MS-DOS operating system
Equipment: PC, monitor, keyboard, mouse, cables, second hard disk drive, Lab Toolkit, MS-DOS diskettes.

Step 1: Make sure the existing hard disk drive (the one that was originally in the computer and that has Windows 98 installed on it) has been removed and set aside. Do not confuse this original disk drive with the second disk drive you will get from your instructor!

Step 2: Get a *second* hard disk drive from your instructor and follow these steps:

2.1: Setting the drive jumper for Master

a) The new drive must be configured as a Master or Single drive. The bottom side of the drive where the controller is visible (the printed circuit board side) will have a set of jumper pins with such markings as '**SP, CS, …** '. (On newer drives, these jumpers are on the rear of the drive, not the bottom.) The printed top label side of the disk drive should have a diagram indicating the proper jumper settings for a Master or Single drive. Use this information to set the disk drive jumpers appropriately for a Master (or Single).

b) *Verify the jumper settings for the new hard disk:* Each IDE channel can have only one master and one slave. Two masters, or two slaves, or one slave, on the same channel will not work. It must be master only or master plus slave.

2.2: Finding the hard disk drive geometry

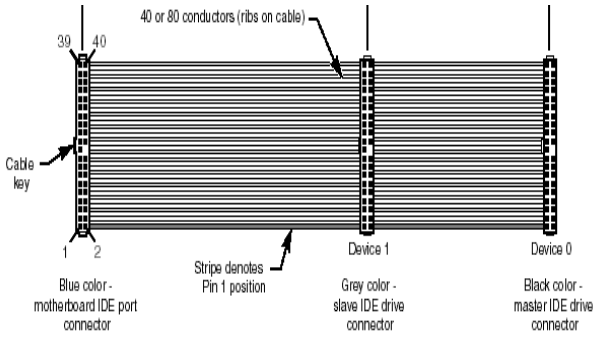
a) Look for the drive geometry values – Cylinder/Head/Sector or **C/H/S** info – on the top outside case of the new hard drive and write them down. Look for a small table, with the markings **C/H/S**, which will provide this information for this model of drive. You may not see this printed on all drives. You may need to refer to the BIOS drive auto-detection information to get the correct **C/H/S** values; see below for how to do that.

Cylinders:_____ Heads:_____ Sectors:_____

2.3: Installing the new hard drive (as Master on the Primary IDE)

a) Install the new disk drive, properly configured as Master, into the correct space inside the PC case. Secure it temporarily with one or two screws. (It won't be there for long.)

b) Use an IDE cable (one of the cables you removed) to connect the new hard drive to the Primary IDE interface slot. Install the motherboard end of the IDE cable first, and then plug the cable into the drive. Before you insert the IDE cable into a motherboard or drive socket, verify the cable orientation (red wire pin 1 to pin 1 – see diagram). Both the motherboard and the drive will have tiny hard-to-read markings indicating which side of the slot is “Pin 1”. Be gentle: forcing a cable onto an interface in reverse can damage it.



c) Install a light-coloured four-wire Molex power connector onto the hard drive. The power connector will only fit in one direction. Ensure the orientation of the connector is correct before pushing it firmly into the drive.

2.4: Verifying the hard drive installation:

a) Ensure the IDE cable and power connector are securely attached to the hard drive.

b) Ensure the IDE cable is properly attached to the motherboard, with pin 1 on the new hard drive connected to pin 1 on the Primary IDE interface on the motherboard.

2.5: Power on and detecting the hard drive in the BIOS:

a) Do not put the case cover back on. Connect the power cord, keyboard, and display to the PC. **Remove your wrist strap.**

b) Switch on the power to the system. When the BIOS startup screen first appears as the PC boots, quickly press the DEL key. You should see the text BIOS configuration screen. If this doesn't happen, reboot the computer and try the DEL key again.

c) The easiest method to configure the new hard disk drive is to use the ***Autodetect*** option in the BIOS. Find the BIOS configuration screen for the IDE interfaces. Select Autodetect for the Primary IDE interface, first device. (It may already be selected.) The configuration details on Cylinders, Heads and Sectors should automatically appear when you autodetect the drive. *Write this information down* (above) if you haven't already done so.

Step 3: While you are in the BIOS setup screens, go to the Boot screen and configure the BIOS to boot from the floppy disk (drive A) first, so that you may install MS DOS from floppy disks.

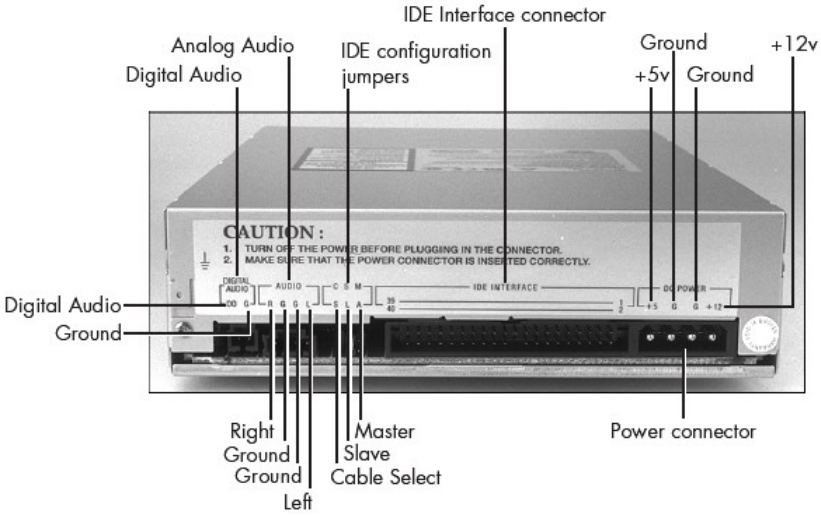
Obtain three MS-DOS floppy diskettes from your instructor. Place the first MS-DOS diskette into the machine and select the BIOS menu item ***save and exit*** to reboot the machine. The machine should reboot and start reading the floppy disk. Install MS DOS 6.2 on the hard disk drive using the three supplied floppy disks. After installing from all three floppy disks, remove the floppy disks and reboot. This time, the machine should reboot into MS DOS from the hard drive. Show your instructor that MS-DOS is running from the hard drive:

S-2. Instructor sign-off for disk geometry and MS-DOS install:_____

Part III. Re-installing the CD ROM drive and then installing Windows 98

Objectives: Install a CDROM drive; install an O/S on the hard disk drive
Equipment: PC, monitor, keyboard, mouse, cables, CD ROM drive, Lab Toolkit, Win98 CD

1. Installing a CD ROM Drive: Shut down your PC and ensure that the 110 volt AC mains power cable is disconnected from the PC. If your computer does not have a CD-ROM drive, obtain one from your instructor. Set the IDE configuration jumper on the CD-ROM drive so that it is the Master (see diagram). Re-install the CD-ROM drive into your PC using the four saved screws. (Make sure you use the correct screws!)



2. Connecting an IDE cable to the CD ROM drive: If your PC doesn't already have one, get a *second* IDE data cable from your instructor. Connect the second IDE cable to the Secondary IDE interface socket on the motherboard and to the CD-ROM. Make sure the red wire on the IDE cable is connected to pin 1 on the CD-ROM and pin 1 on the Secondary IDE connector on the motherboard. Always connect pin 1 to pin 1. Connect a four-wire Molex power connector to the CD-ROM. (The plug only inserts one way.) The CD-ROM drive will be the Master (only) device on the Second IDE interface. The hard disk will be the Master (only) device on the Primary IDE interface.

3. Configuring the BIOS: Remove your anti-static connection to the case. Connect the video, keyboard and mouse and plug in the main power cable. Do not touch anything inside the computer while the power is connected. Turn on the power. As the PC is booting up, quickly press the DEL key. You will now see the BIOS setup screen. Verify that the CD-ROM device is visible to the BIOS as the Master drive on the Second IDE interface. The hard disk drive should still be the Master on the Primary IDE interface. Go to the BIOS Boot screen. Change the boot sequence to boot first from the CD-ROM. Obtain a WIndows 98 CDROM disk from your instructor and insert the CDROM into the machine. Select the ***save and exit*** option in the BIOS to reboot your PC.

4. Installing Win 98 SE: After ***save and exit***, the PC should reboot from the Windows 98 installation CDROM (not from MS-DOS on the hard drive). To install Windows 98, the answers below will guide you:

a) Choose “typical” setup for Win 98.
b) Install the most common components.
c) Enter a computer name (you choose) and workgroup name (you choose).
d) Enter your name. For the company name enter anything you like (be polite).
e) Enter the 25 character Windows 98 license key.

After the installation has finished, remove the Windows 98 CDROM disk from the drive and ensure that you can boot Windows 98 directly from the hard drive. When Windows 98 finally boots from the hard drive and you are prompted for your password, choose ‘Cancel’. Windows may detect some new hardware. Get your instructor to sign off the Windows installation:

S-3. Instructor sign off for Windows 98 installation _____

Part IV. Replacing the original hard drive and re-cabling the disk and CD-ROM drive

Putting things back the way they were

a) Shut down and unplug your PC.
b) Completely disconnect and remove the hard drive. (Don't mix it up with the original one!)
c) Take the original hard drive and make sure it is configured as a Master drive. Re-install the original drive in the machine with four screws of the correct size and type.
d) Reconfigure the CD-ROM drive as a Slave device using the IDE jumpers at the back.
e) Remove the second IDE cable and return it to your instructor. Reconnect the CD-ROM and the original hard disk drive to the Primary IDE using the same IDE cable. The CD-ROM must be jumpered as Slave; the hard drive is Master on the Primary IDE.
f) Reboot, and ensure that the PC boots correctly to Windows 98 and that the CD-ROM drive also works. Are the CD-ROM and hard drive both secure? Make sure no parts are left over!
g) Return to the instructor the second hard disk drive and the second IDE cable.
h) Demonstrate that your PC is running the original version of Windows 98 from the original hard disk drive (as it was at the start of the lab), and that the CD-ROM device is present:

S-4. Instructor sign-off for drive/cable return and Win 98 reboot:_____

Part V. Cleanup procedure

a) Shut down your PC and disconnect the AC and all peripherals (mouse, keyboard, etc.).
b) Wrap all cables and put them neatly on the top shelf at your work area.
c) Push in your chair.
d) Return the extra hard disk, Windows 98 CDROM, MS-DOS diskettes, and extra IDE cables to your instructor.
e) Sign off with your instructor (five signatures, marked **S-1** through **S-5**) and make sure your attendance is marked.

S-5. Lab instructor signature (when all parts are complete):_____

Homework: Look up the answers to these questions in Chapter 1:

1. Your CPU at home runs at a clock speed of 2 GHz. Does it mean that it can execute 2 billion compute instructions per second. Explain why or why not. (p.8)
2. Name and describe the main characteristics of the von Neumann architecture. (p.31)
3. The von Neumann architecture, which is the basis for most digital computers today, suffers from the von Neumann bottleneck. What is it? Why is it a problem? (p.31)