




מצגות לימודיות להוראת מיקרו-מעבדים, אסמבלר, תקשורת, מערמות הפעלה.

שאל קובל
מבוא לתקשורת מחשבים
**** ספק כוח ** מודול 1**

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ערב טוב !!

2006		אפריל		מאי		יוני	
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ספק כוח ATX

Computer Maintenance
Power Supplies

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Enabling Objectives

- Power Supply Introduction
- Power Supply Warning
- Anatomy of the Power Supply
- Power Supply Cooling Fan
 - ♦ Power Supply Cooling Fan – Baby AT
 - ♦ Power Supply Cooling Fan –ATX
- Power Supply & Expandability
- Converting Power
- Connecting the Power
 - ♦ Connecting the Power - AT
 - ♦ Connecting the Power - ATX
 - ♦ Connecting the Power - Drives
- To Unplug Or Not To Unplug

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Power Supply Introduction

- The PC runs on DC power
- The computer's power supply converts AC power into the various DC voltages and signals used by the PC's components and circuits.
- The computer power supply is a switching power supply.
 - ♦ It reduces the 110/220V incoming voltage to the 3.3V, 5V, and 12V charges, used by the PC, by switching Pass-through charge off and on.
 - ♦ For instance, you get 20 watts from a 100 watt signal by leaving it on 20% of the time and off 80% of the time.
 - ♦ In this way, only the amount of power needed is generated.

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Power Supply Introduction

The PC power supply only functions when it has demand.

- ♦ It has to know how much power to produce from the switching process used to generate its DC voltages.

A power supply without some demand will not function properly and may even damage itself.

- ♦ Never "test" a power supply without connecting it to at least one 12V line – for example, a disk drive.

The power supply is a black or silver box with a fan inside and cables coming out of it.

- ♦ It is located either at the back of a desktop case or at the top of a tower or mini-tower case.
- ♦ It is distinctive because of its big yellow warning label.
 - The purpose of this label is to warn you not to try to fix a power supply.

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Power Supply Introduction

- A good quality power supply should last for years, assuming that it has been protected adequately.
- On the other hand, a low quality, faulty, or overloaded power supply can cause all kinds of problems in a system.
- A bad power supply can:
 - cause hard disks to develop bad sectors
 - Affect memory to cause what seem like software bugs
 - In short create problems that are hard to pin on the power supply

Power Supply Warning

- Inside the power supply is a 1,000 microfarad capacitor.
- Capacitors store electricity, even when the power is off.
- This particular capacitor performs line conditioning by absorbing too much power and replacing missing power.
- If you were to touch it, it would shock you – potentially with bodily harm or worse.
- Because a new power supply can be purchased for between \$25 and \$80, it is not worth the risk to fix it.

Anatomy of the Power Supply

- The primary power supply components are:
 - *Power cord*: for connecting to the AC outlet.
 - *Pass-through connectors*: located on back primarily used to plug in the monitor and enables you to turn the monitor on and off with the computer's power switch.
 - *Power switch*: In older PCs the switch extended through the case wall from the power supply on a back corner of the PC. More recently, the power switch is on the front of the case.
 - In the newer ATX power supply, the switch works differently altogether.
 - Instead of a physical on/off switch connected directly to the power supply, the switch is electronic.
 - You don't so much turn on or off the computer as you request the motherboard to do it.
 - *110V/220V Selector switch*: Allows you to select between the voltages. Be sure this is set correctly.

Power Supply Cooling Fan

- The power supply also contains the main cooling fan that controls air flow through the PC case.
- The power supply fan is the most important part of a PC's cooling system
- Air is forced to flow through the computer case and over the motherboard and electronic components (which generate heat as they work).
- Any interruption to the air flow can cause sensitive components to degrade or fail.
- The power supply fan should be kept clean and clear.
- Only with the case closed and intact will the PC cooling system function at its optimum.

Power Supply Cooling Fan – Baby AT

- There are two popular form factors for power supplies: the Baby AT and the ATX.
- These two types of power supplies cool the system differently.
 - The Baby AT:
 - Cools the system by pulling air out of the case and blowing it out through the fan.
 - You can feel the air blowing out of the fan on this type of power supply
 - The primary problem with this type of cooling is that dust, smoke, chalk in school settings, etc. are sucked into the computer and accumulate on grills, wires, components etc.

This buildup can impact the cooling system's capability to cool the motherboard and drives by restricting the air flow.



AT

Power Supply Cooling Fan –ATX

- The ATX:
 - Cools the system by sucking air into the case.
 - This method helps to keep the case clean by pressurizing the inside of the case.
 - The power supply is situated on the board so that air blows straight onto the processor.
 - This will help the CPU fan keep the CPU cool.
- In either case, all expansion slot filler slides should be in place and the case should be in place and intact to allow the cooling system to do its job.



ATX

Power Supply & Expandability

- The PC's power supply directly controls its expandability.
- Every power supply has a maximum power demand, expressed in watts, that it can support.
- When you upgrade a PC by adding an additional drive, replacing the motherboard, or installing a new processor, the responsibility falls on the power supply to produce the power the PC now requires.
- Power supplies are rated in watts *capacity*.
 - A 250 watt power supply has the capacity to convert up to 250 watts of power; but if its system only demands 100 watts, then it only converts 100 watts.
 - You can't burn up a system with a high wattage power supply.

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Converting Power

- What the power supply does is basically simple:
 - It converts AC to DC.
 - It must provide a variety of voltages at different strengths
 - It must manage some power-related signals for the motherboard
- The power supply provides the following voltages to the motherboard and drives
 - +5V: Standard voltage for motherboards for all 8086, 286, 386 and 486 processors below 100MHz and peripheral boards.
 - +12V: Used primarily for disk drive motors and similar devices.
 - -5V and -12V: For compatibility with older systems. Most modern motherboards don't use voltages.
 - +3.3V: A 486 100 MHz or above and all Pentium, Pentium Pro and equivalent chips run at 3.3V
 - Upgraded motherboards must convert the 5V signal from the power supply into 3.3V for the processor, requiring a voltage regulator on the motherboard.
 - Newer power supplies provide the 3.3V power for the CPU directly

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Connecting the Power

Motherboard connectors

- You can tell which form factor you have by the motherboard power connectors.
 - The Baby AT power supply has two 6-wire connectors
- The ATX has a single 20-wire keyed connector

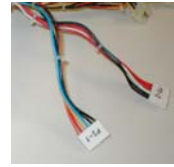


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Connecting the Power - AT

- Baby AT
 - The two connectors of the Baby AT power supply attach to the motherboard right next to each other
 - The P8 and P9 connectors are oriented correctly if all four of the black wires, or grounds (two on each plug) are together in the middle.
 - Any other orientation will likely damage the motherboard.



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ATX Connecting the Power - ATX

- The ATX power supply must be used with an ATX motherboard.
- Together they eliminate any confusion with the power connection with a single 20-wire keyed connector
- A keyed connector usually has a prong, lip or finger that prevents it from being connected incorrectly.
- The ATX power supply is always on. Power is supplied to the motherboard even when the system power is off.
 - Always disconnect the power cord from the back of the case before working on one.

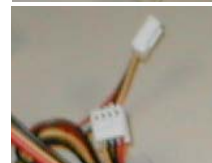


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Connecting the Power - Drives

- Most power supplies have either three or four four-wire power connectors for internal drives.
- Two types and sizes of connectors exist and are easy to tell apart.
 - The larger plug, a *Molex connector* is used to connect almost all hard drives, CD-ROM drives and 5¼ inch floppy drives.
 - The smaller plug, a *Berg connector*, is used by 3½ inch floppy drives and a few others.



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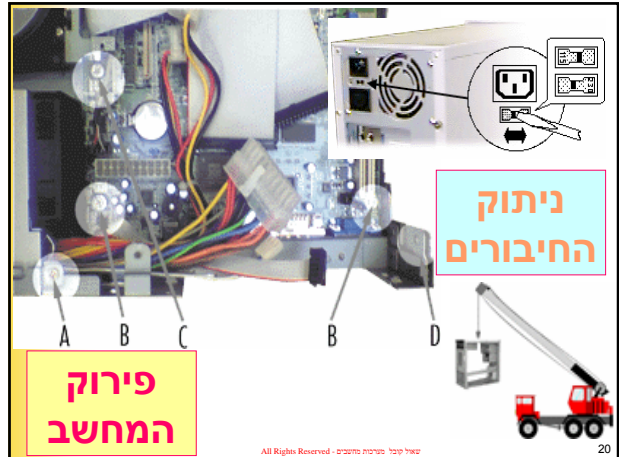
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To Unplug Or Not To Unplug

- If the power supply form factor is AT, the PC should be plugged in when you're working on it.
 - ♦ This provides a positive ground.
- If the power supply form factor is ATX, the PC should be unplugged when you're working on it.
 - ♦ ATX motherboards are "hot".
 - ♦ They have power going to them even when the power supply is powered off.

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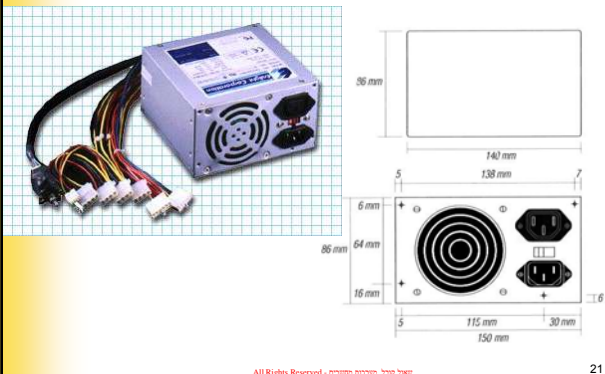
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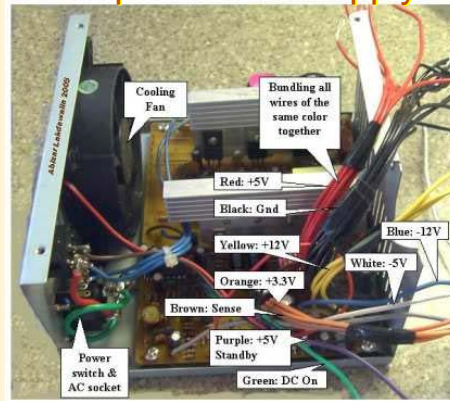
Power Supply of LPX



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Open Power Supply



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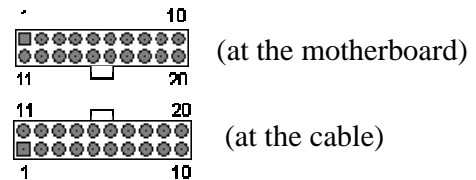
Connectors



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ATX Power Supply



20 PIN MOLEX 39-29-9202 at the motherboard
20 PIN MOLEX 39-01-2200 at the cable


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
Pin	Name	Color	Description
1	3.3V	Orange	+3.3 VDC
2	3.3V	Orange	+3.3 VDC
3	COM	Black	Ground
4	5V	Red	+5 VDC
5	COM	Black	Ground
6	5V	Red	+5 VDC
7	COM	Black	Ground
8	PWR_OK	Gray	Power Ok (+5V & +3.3V is ok)
9	5VSB	Purple	+5 VDC Standby Voltage (max 10mA)
10	12V	Yellow	+12 VDC
11	3.3V	Orange	+3.3 VDC
12	-12V	Blue	-12 VDC
13	COM	Black	Ground
14	/PS_ON	Green	Power Supply On (active low)
15	COM	Black	Ground
16	COM	Black	Ground
17	COM	Black	Ground
18	-5V	White	-5 VDC
19	5V	Red	+5 VDC
20	5V	Red	+5 VDC

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ATX Optional Power



(at the motherboard)



(at the cable)

6 PIN MOLEX 39-30-1060 at the motherboard
6 PIN MOLEX 39-01-2060 at the cable

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ATX Optional Power

Pin	Name	Color	Description
1	FanM	White	Fan Monitor
2	FanC	White/Blue	Fan Control
3	3.3V Sense	White/Brown	3.3V Sense Line
4	1394R	White/Black	IEEE-1394 Ground
5	1394V	White/Red	IEEE-1394 Voltage?
6	Reserved	n/a	

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250W or 300W

6 pin ATX AUX power connector at the cable



Pin	Name	Color	Description
1	COM	Black	Ground
2	COM	Black	Ground
3	COM	Black	Ground
4	3.3V	Orange	+3.3 VDC
5	3.3V	Orange	+3.3 VDC
6	5V	Red	+5 VDC

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P8

Pin	Name	Color	Description
1	PG	Orange	Power Good, +5 VDC when all voltages has stabilized.
2	+5V	Red	+5 VDC (or n/c)
3	+12V	Yellow	+12 VDC
4	-12V	Blue	-12 VDC
5	GN D	Black	Ground
6	GN D	Black	Ground

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P9

Pin	Name	Color	Description
1	GND	Black	Ground
2	GND	Black	Ground
3	-5V	White or Yellow	-5 VDC
4	+5V	Red	+5 VDC
5	+5V	Red	+5 VDC
6	+5V	Red	+5 VDC

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- Figure 11 shows the connector pinout for the **main ATX power connector**. This board-mounted header may be implemented with a Molex 39-29-9202 or equivalent. This mates with the power supply connector, Molex 39-01-2200 or equivalent. All signals and power rails on the main power connector are required to be implemented.
- During power-up and power-down transitions, it is recommended that the 3.3VDC rails always be held at a lower potential than the +5VDC rails. This allows for improved reliability of motherboard designs at a reduced cost.
- Proper implementation of PS-ON, 5VSB, and PW-OK is **required** for an ATX 2.01-compliant power supply.

3.3V	⊗	⊗	3.3V
-12V	⊗	⊗	3.3V
COM	⊗	⊗	COM
PS-ON	⊗	⊗	5V
COM	⊗	⊗	COM
COM	⊗	⊗	5V
COM	⊗	⊗	COM
-5V	⊗	⊗	PW-OK
5V	⊗	⊗	5VSB
5V	⊗	⊗	12V

Figure 11

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סיכומים וחזרות לחומר הלימוד

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? **Any Questions?** **הכל ברור?** ? ?

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