Automatic dc power supply to computer System when the power is off without using ups

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Abstract—A power supply unit (PSU) converts mains AC to low-voltage regulated DC power for the internal components of a computer. Modern personal computers universally use a switched-mode power supply. Some power supplies have a manual selector for input voltage, while others automatically adapt to the supply voltage. Most modern desktop personal computer power supplies conform to the ATX form factor. ATX power supplies are turned on and off by a signal from the motherboard. They also provide a signal to the motherboard to indicate when the DC power lines are correct so that the computer is able to boot up. While an ATX power supply is connected to the mains supply it provides a 5 V stand-by (5VSB) line so that the standby functions on the computer and certain peripherals are powered. The most recent ATX PSU standard is version 2.31 of mid-2008. The computer system will get power from UPS. The UPS supplies electricity to run our system. If the power is off, then the UPS will run only a certain period of time. Then the system will automatically shut down. To avoid this problem, we propose one electromagnetic motor to save current when the system is running and utilize the current when the power is off. Generally we are using two types of motors to give current to the component. One is Magnet electromotor and another one is electromagnetic. Electromagnet motor inside having electric fields. If the fields are in runs means it will generate electricity. This types of motors are mostly used in Turbine control and other system who wants battery powered power supply unit. This technique utilizes the new component reactor to save electricity. Monitor and CPU attached to this reactor. When power is off, then the reactor will automatically run and it supply current to both UPS and Monitor.

Without power supply we will run our system effectively.

Keywords- Electromagnet motor, connector, energy saving, reactor

1. Introduction

If there is any one component that is absolutely vital to the operation of a computer, it is the power supply. Without it, a computer is just an inert box full of plastic and metal. The power supply converts the alternating current (AC) line from your home to the direct current (DC) needed by the personal computer. In this article, we'll learn how PC power supplies work and what the wattage ratings mean.

In a personal computer (PC), the power supply is the metal box usually found in a corner of the case. The power supply is visible from the back of many systems because it contains the power-cord receptacle and the cooling fan. Power supplies, often referred to as "switching power supplies", use switcher technology to convert the AC input to lower DC voltages. The typical voltages supplied are:

- 3.3 volts
- 5 volts
- 12 volts

The 3.3- and 5-volts are typically used by digital circuits, while the 12-volt is used to run motors in disk drives and fans. The main specification of a power supply is in watts. A watt is the product of
the voltage in volts and the current in amperes or amps.

If you have been around PCs for many years, you probably remember that the original PCs had large red toggle switches that had a good bit of heft to them. When you turned the PC on or off, you knew you were doing it. These switches actually controlled the flow of 120 volt power to the power supply. Today you turn on the power with a little push button, and you turn off the machine with a menu option. These capabilities were added to standard power supplies several years ago. The operating system can send a signal to the power supply to tell it to turn off. The push button sends a 5-volt signal to the power supply to tell it when to turn on. The power supply also has a circuit that supplies 5 volts, called VSB for "standby voltage" even when it is officially "off", so that the button will work. See the next page to learn more about switcher technology.

2. Development

2.1 Original IBM PC, XT, AT standard

The original IBM PC power supply unit (PSU) supplied two main voltages: +5 V and +12 V. It supplied two other voltages, −5 V and −12 V, but with limited amounts of power. Most microchips of the time operated on 5 V power. Of the 63.5 watts these PSUs could deliver, most of it was on this +5 V rail.

The +12 V supply was used primarily to operate motors such as in disk drives and cooling fans. As more peripherals were added, more power was delivered on the 12 V rail. However, since most of the power is consumed by chips, the 5 V rail still delivered most of the power. The −12 V rail was used primarily to provide the negative supply voltage to the RS-232 serial ports. A -5 rail was provided for peripherals on the ISA bus, but was not used by the motherboard.

An additional wire referred to as Power Good is used to prevent digital circuitry operation during the initial milliseconds of power supply turn-on, where output voltages and currents are rising but not yet sufficient or stable for proper device operation. Once the output power is ready to use, the Power Good signal tells the digital circuitry that it can begin to operate.

Original IBM power supplies for the PC, XT and AT included a line-voltage power switch that extended through the side of the computer case. In a common variant found in tower cases, the line-voltage switch was connected to the power supply with a short cable, allowing it to be mounted apart from the power supply.

An early microcomputer power supply was either fully on or off, controlled by the mechanical line voltage switch, and energy saving low-power idle modes were not a design consideration of early computer power supplies. These power supplies were generally not capable of power saving modes such as standby or "soft off", scheduled turn-on, or "last state" power controls, as these concepts didn't exist yet.

Due to the always-on design, in the event of a short circuit, either a fuse would blow, or a switched-mode supply would repeatedly cut the power, wait a brief period of time, and attempt to restart. For some power supplies the repeated restarting is audible as a quiet rapid chirping or ticking emitted from the device.

2.2 ATX12V standard

As transistors become smaller on chips, it becomes preferable to operate them on lower supply voltages, and the lowest supply voltage is often desired by the densest chip, the central processing unit. In order to supply large amounts of low-voltage power to the Pentium and subsequent microprocessors, a special power supply, the voltage regulator module began to be included on motherboards. Newer processors require up to 100 amperes at 2 volts or less, which is impractical to deliver from off-board power supplies. Initially, this was supplied by the main +5 V supply, but as power demands increased, the high currents required to supply sufficient power became problematic. To reduce the power losses in the 5 V supply, with the introduction of the Pentium 4 microprocessor, Intel changed the processor power supply to operate on +12 V, and added the separate 4pin P4 connector to the new ATX12V 1.0 standard to supply that power.

Modern high-powered graphics processing units do the same thing, resulting in most of the power requirement of a modern personal computer being on the +12 V rail. When high-powered GPUs were first introduced, typical ATX power supplies were "5 V heavy", and could only supply 50–60% of their output in the form of 12 V power. Thus, GPU manufacturers, to ensure 200–250 watts of 12 V power (peak load, CPU+GPU), recommended power supplies of 500–600 W or higher. More modern ATX power supplies can
deliver almost all (typically 80–90%) of their total rated capacity in the form of +12 V power.

Because of this change, it is important to consider the +12 V supply capacity, rather than the overall power capacity, when using an older ATX power supply with a more recent computer.

Low-quality power supply manufacturers sometimes take advantage of this over specification by assigning unrealistically high power supply ratings, knowing that very few customers fully understand power supply ratings.[1]

**+3.3 V and +5 V rails**

These voltage supplies are rarely a limiting factor; generally any supply with a sufficient +12 V rating will have adequate capacity at lower voltages. However, a large quantity of hard drives or PCI cards will create a greater load on the +5 V rail. A linear regulator could be used to convert the +12 V rail into a +5 V rail for each hard drive if the +5 V rail is overloaded.

### 2.3 Entry-Level Power Supply Specification

Entry-Level Power Supply Specification' (EPS) is a power supply unit meant for high-power consumption computers and entry-level servers. Developed by the Server System Infrastructure (SSI) forum, a group of companies including Intel, Dell, Hewlett-Packard and others that works on server standards the EPS form factor is a derivative of the ATX form factor. The EPS standard provides a more powerful and stable environment for critical server based systems and applications. EPS power supplies have a 24-pin motherboard power connector and an 8-pin +12V connector. The standard also specifies two additional 4-pin 12V connectors for more power hungry boards (one required on 700–800W PSUs, both required on 850W+ PSUs). EPS power supplies are in principle compatible with standard ATX or ATX12V motherboards found in homes and offices but there may be mechanical issues where the 12V connector and in the case of older boards the main connector overhang the sockets. Many PSU vendors use connectors where the extra sections can be unclipped to avoid this issue. As with later versions of the ATX PSU standard there is also no -5V rail.

The latest specification is v2.93. Multiple +12 V rails. As power supply capacity increased, the ATX power supply standard was amended (beginning with version 2.0) to include:

#### 2.4 Power Limit / Hazardous Energy Levels

Under normal or overload conditions, no output shall continuously provide more than 240 VA under any conditions of load including output short circuit, per the requirement of UL 1950/CSA 950/EN 60950/IEC 950.

—ATX12V Power Supply Design Guide, version 2.2 this is a safety limit on the amount of power that may pass, in case of a fault, through any one wire. That much power can significantly overheat a wire, and would be more likely to melt the insulation and possibly start a fire. Each wire must be current limited to no more than 20 A; typical supplies guarantee 18 A without triggering the current limit. Power supplies capable of delivering more than 18 A at 12 V connect wires in groups to two or more current sensors which will shut down the supply if excess current flows. Unlike a fuse or circuit breaker, these limits reset as soon as the overload is removed. Ideally, there would be one current limit per wire, but that would be prohibitively expensive. Since the limit is far larger than the reasonable current draw through a single wire, manufacturers typically group several wires together and apply the current limit to the entire group. Obviously, if the group is limited to 240 VA, so is each wire in it. Typically, a power supply will guarantee at least 17 A at 12 V by having a current limit of 18.5 A, plus or minus 8%. Thus, it is guaranteed to supply at least 17 A, and guaranteed to cut off before 20 A.

These groups are the so-called "multiple power supply rails". They are not fully independent; they are all connected to a single high-current 12 V source inside the power supply, but have separate current limit circuitry. The current limit groups are documented so the user can avoid placing too many high-current loads in the same group. Originally, a power supply featuring "multiple +12 V rails" implied one able to deliver more than 20 A of +12 V power, and was seen as a good thing. However, people found the need to balance loads across many +12 V rails inconvenient. When the assignment of connectors to rails is done at manufacturing time it is not always possible to move a given load to a different rail.

Rather than add more current limit circuits, many manufacturers have chosen to ignore the requirement and increase the current limits above 20 A per rail, or provide "single-rail" power supplies that omit the current limit circuitry. (In some cases, in violation of their own advertising claims to include it. For one example of many, see) the requirement was deleted from version 2.3 (March 2007) of the ATX12V power supply specifications. Because of the above standards, almost all high-power supplies claim to implement separate rails, however this claim is often false; many omit the necessary current-limit circuitry, both for cost reasons and because it is an irritation to customers.
lack is sometimes advertised as a feature under names like “rail fusion” or “current sharing.”)

**12V-only supplies**

Since 2011, Fujitsu and other Tier 1 manufacturers have been manufacturing systems containing motherboard variants which require only a 12 V supply from a custom made PSU (typically rated at 250–300 W). DC-DC conversion, providing 5 V and 3.3 V, is done on the motherboard; the proposal is that 5 V and 12 V supply for other devices, such as HDDs, will be picked up at the motherboard rather than from the PSU itself (though this does not appear to be fully implemented as of January 2012). The reasons given for this approach to power supply are that it eliminates cross-load problems, simplifies and reduces internal wiring which can affect airflow and cooling, reduces costs, increases power supply efficiency and reduces noise by bringing the power supply fan speed under the control of the motherboard. Other advantages it offers is the potential ability to power a PC off a sealed lead-acid 12 volt battery, or from automotive power without using a power inverter.

**2.5 Power rating**

As all of the rails come from one transformer and primary-side switching components, there is an overall maximum power limit. Power requirements for a modern desktop personal computer may range from 300 watts to more than 1000 watts for a high-performance computer with multiple discrete graphics cards. The power rating of a PC power is rated by the manufacturer. Simple, general purpose computers rarely require more than 300–500 watts maximum.

It is possible to overload one voltage from a power supply well below the total rating of the power supply. For example, most PSUs create their 3.3 V output by regulating down their 5 V rail. As such, 3.3 V and 5 V typically have a combined limit as well. A 3.3 V rail may have a 10 A rating by itself (33 W), and the 5 V rail may have a 20 A rating (100 W) by itself, but the two together may only be able to output 110 W. In this case, loading the 3.3 V rail to maximum (33 W), would leave the 5 V rail only be able to output 77 W.

Since supplies are self-certified, a manufacturer’s claimed output may be double or more what is actually provided. Although a too-large power supply will have an extra margin of safety against overloading, a larger unit is often less efficient at lower loads and therefore wastes more electricity than a more appropriately sized unit. For instance, an 80 PLUS, 520 watt supply could still be 70% or less efficient at 60 watts (a typical idle power for a desktop computer). Some power supplies have no overload protection.

The most important factor for suitability for certain graphics cards is the PSUs total 12 V output. If the total 12 V output stated on the PSU is higher than the suggested minimum of the card, then that PSU can fully supply the card. However a system will have other loads on the 12 volt supply. Power supplies are usually sized so that the typical calculated system consumption is about 60% of the rated capacity, and the maximum system demand does not exceed the rated capacity of the supply. The power supply ratings often given by the manufacturer of single component, typically graphics cards, should be treated with skepticism. These manufacturers want to minimize support issues due to under rating of the power supply specifications and advise customers to use a more powerful power supply to avoid these issues.

**2.6 Efficiency**

A test in 2005 revealed computer power supplies are generally about 70–80% efficient. For a 75% efficient power supply to produce 75 W of DC output it would require 100 W of AC input and dissipate the remaining 25 W in heat. Higher-quality power supplies can be over 80% efficient; energy efficient PSU’s waste less energy in heat, and requires less airflow to cool, and as a result will be quieter.

As of 2012 some high-end consumer PSUs can exceed 90% efficiency at optimal load levels, though will fall to 87-89% efficiency during heavy or light loads. Google's server power supplies are more than 90% efficient. HP's server power supplies have reached 94% efficiency. Standard PSUs sold for server workstations have around 90% efficiency, as of 2010.

The energy efficiency of a power supply drops significantly at low loads. Therefore it is important to match the capacity of a power supply to the power needs of the computer. Efficiency generally peaks at about 50–75% load. The curve varies from model to model (examples of how this curve looks can be seen on test reports of energy efficient models found on the 80 PLUS website).

Various initiatives are underway to improve the efficiency of computer power supplies. Climate savers computing initiative promotes energy saving and reduction of greenhouse gas emissions by encouraging development and use of more efficient power supplies. 80 PLUS certifies power supplies that meet certain efficiency criteria, and encourages their use via financial incentives. Efficient power supplies also save money by wasting less power; as a result they use less electricity to power the same computer, and they emit...
less waste heat which results significant energy savings on central air conditioning in the summer. The gains of using an efficient power supply are more substantial in computers that use a lot of power. Appearance

Most desktop personal computer power supplies are a square metal box, and have a large bundle of wires emerging from one end. Opposite the wire bundle is the back face of the power supply, with an air vent and an IEC 60320 C14 connector to supply AC power. There may be a power switch or a voltage selector switch or both.

A label on one side of the box lists technical information about the power supply, including safety certifications and maximum output power. Common certification marks for safety are the UL mark, GS mark, TÜV, NEMKO, SEMKO, DEMKO, FIMKO, CCC, CSA, VDE, GOST R and BSMI. Common certificate marks for EMI/RFI are the CE mark, FCC and C-tick. The CE mark is required for power supplies sold in Europe and India. A RoHS or 80 PLUS can also sometimes be seen.

Dimensions of an ATX power supply are 150 mm width, 86 mm height, and typically 140 mm depth, although the depth can vary from brand to brand. Some power supplies come with sleeved cables, which are aesthetically nicer, makes wiring easier and cleaner and have less detrimental effect on airflow.

3. Modular Power Supplies

![Modular Power Supplies](image)

A modular power supply to the left and a non-modular power supply to the right.

A modular power has some permanent multi wire cables with connectors at the ends such as PC main and 4-pin molex but also has connectors mounted directly on it allowing for unused cables to be removed, and cables to be matched in length and type to the system layout. This reduces clutter and removes the risk of dangling cables interfering with other components. A small amount of extra resistance is introduced by the additional connector. [18] Airflow within a case may also be improved by eliminating superfluous cables.

3.1 How do we figure out my power supply?

- Trying to figure out what our computers power is in watts, looking to get a new video card and need to make sure it is over 400W. Any way to just use the computer information to figure that out? Or some other way to figure it out? Yes we are sure this sounds stupid, but we don't know where to check to figure that out.
- Protect our Valuable Computer from Voltage Fluctuations.
- We all need to open and look at our PSU. Our computer does not store data like that.

4. Save Energy Using Reactor

Generally we are using two types of motors to give current to the component. One is Magnet electro and another one is electro magnet. Electro magnet motor inside having electric fields. If the fields is runs means it will generate electricity. This types of motors are mostly used in Turban control and other system who wants battery powered power supply unit. If we are working in the computer system, the fan inside the system will runs. Then the electro magnet motor gets power from that and store it into a battery named reactor. This reactor works based on electricity saving algorithm which decide how much current the system needs. Because the electricity consumption is different for different systems. It means older system requires high electricity than new ones. So this algorithm inside the battery decides which system requires how much voltage for run. Up to 6 volts the battery will store power. In future we are trying to increase its capacity.

Monitor and CPU attached to this reactor. When power is off, then the reactor will automatically run and it supply current to both UPS and Monitor. Without power supply we will run our system effectively.

5. Acknowledgments

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