Power supply

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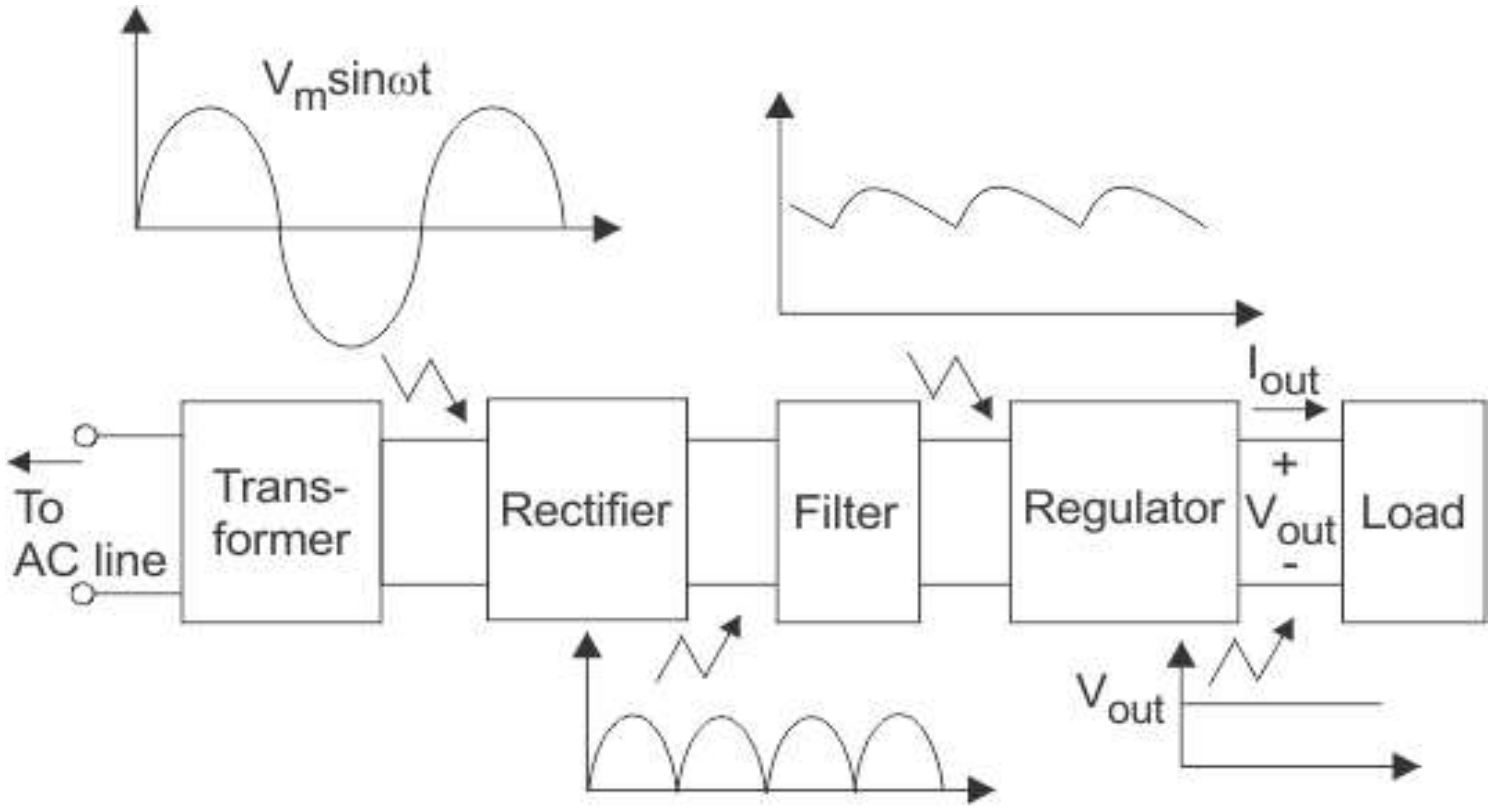
Introduction

- Power supply convert alternating current to the direct (DC) current mainly convert 110-240v AC
- Three types of power supply:
  - Linear power supply
  - Switched mode (SMPS
  - Uninterrupted (UPS)
  - power SMPS stands for **Switch Mode Power Supply**.
- This receives **230V AC** and translates it into different DC levels such as **+5V, -5V, +12V, -12V**.

Linear power supply

- **Linear power supply**: transformer is used to convert voltage.
- Transformer convert the line AC voltage to a smaller peak voltage
- Rectifies AC signal produces large waveforms , capacitor filter is used filter the rectified wave which contain small pulses (ripple).
- Depend on requirements regulator adjust the output voltage
- Good line and load regulation lower output voltage ripples

Linear power supply



Components of typical linear power supply

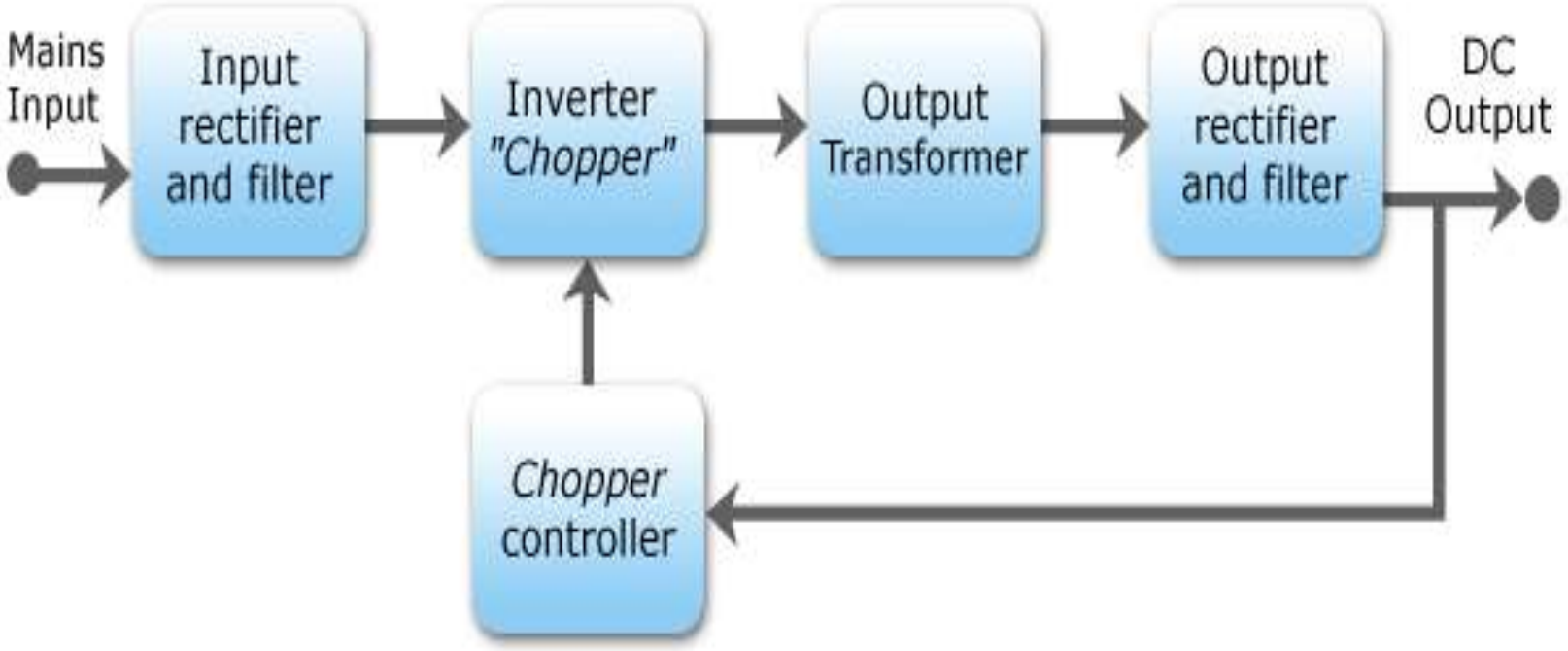
Operation

- The **power supplies** used in computers are switched mode power supplies.
- The primary power **received** from **AC** mains is **rectified and filtered** as high-voltage DC.

SMPS

- Switched mode : electronic power supply with **switching regulator**.
- power SMPS stands for **Switch Mode Power Supply**.
  - This receives **230V AC** and translates it into different DC levels such as **+5V, -5V, +12V, -12V**.
- it is switched to a high frequency approximately **10 to 100 KHz** by a bipolar transistor and fed to the primary side (P) of a **step-down transformer.**
- **Uses feedback mechanism**

SMPS schematic diagram



SMPS working

- Convert AC to DC voltage with rectifier
- Which is unregulated DC voltage sent it to filter
- Inverter convert DC to AC with help of power oscillator.
- Output transformer inverts AC voltage up to down to the required output level.
- Output rectifier and filter : AC output from transformer is rectified.
- For lower voltage uses silicon/schottky diodes used and smoothing the rectified output by using filter.

- This **reduces** the amount of the voltage passed through the transformer.

- So the output voltage will be maintained normally.

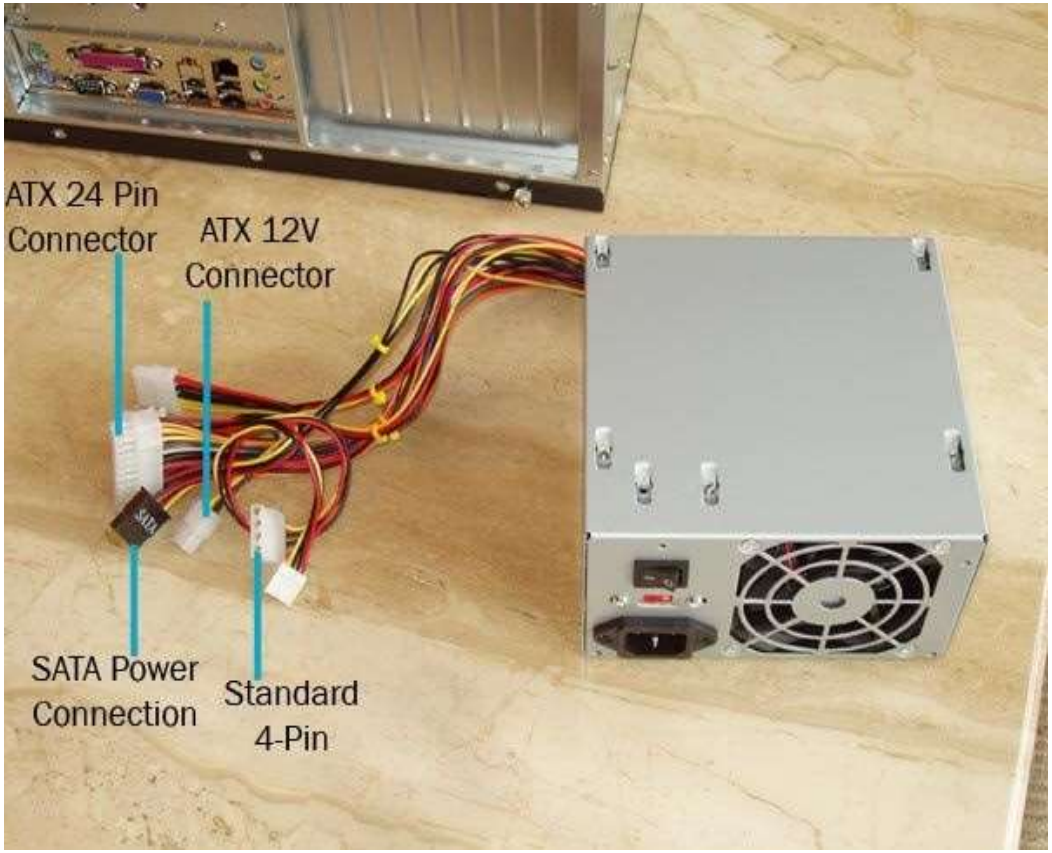
- Then it is sent to the **output of the power supply**.

- A sample of this output is sent back as **feedback signal for regulation**.

AT type SMPS

- Front side power connector to SMPS
- AT style SMPS provides DC output on two 6-pin connectors(carries DC power to motherboard) and two 4-pin connectors
- Power good flag is set

output voltage stable



Power Supply problems

- Blackouts: it is complete loss of electric power where voltage and current drop to 0,usually caused by physical interruption in the power line due to accidental damage by a person or act of nature, loss of AC will invariably shutdown the computer,loss of data, reduction productivity, corrupt file structure and damage files.

- Brownouts (Sag): The under voltage condition The high load items like air conditioners, welding machine, motor etc draw to much current that the AC voltage level drops.

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- power supply will fall out which resulting in intermittent system operation. file may be lost or corrupted on the hard drive.
- **Surge:** small over voltage conditions that take place over relatively long periods and regulate power to a desired level excess energy must be switched (in SMPS).
- **Spikes:** A spike is a large over voltage condition that occurs in the milliseconds. high energy switches can cause spikes on the AC line. Example equipment like drill machine, grinders, welding equipment etc. can produce power spikes.

Symptoms Supply problems

1. Flickering Lights, 2. Premature Component Failure, 3. Hard Drive Crashes, 4. The PC stalls, crashes, or reboots for no apparent reason.5. You suffer chronic or frequent hard drive failures or file access problems.

6. The CMOS RAM or modem NVRAM periodically looses its contents or becomes corrupted.

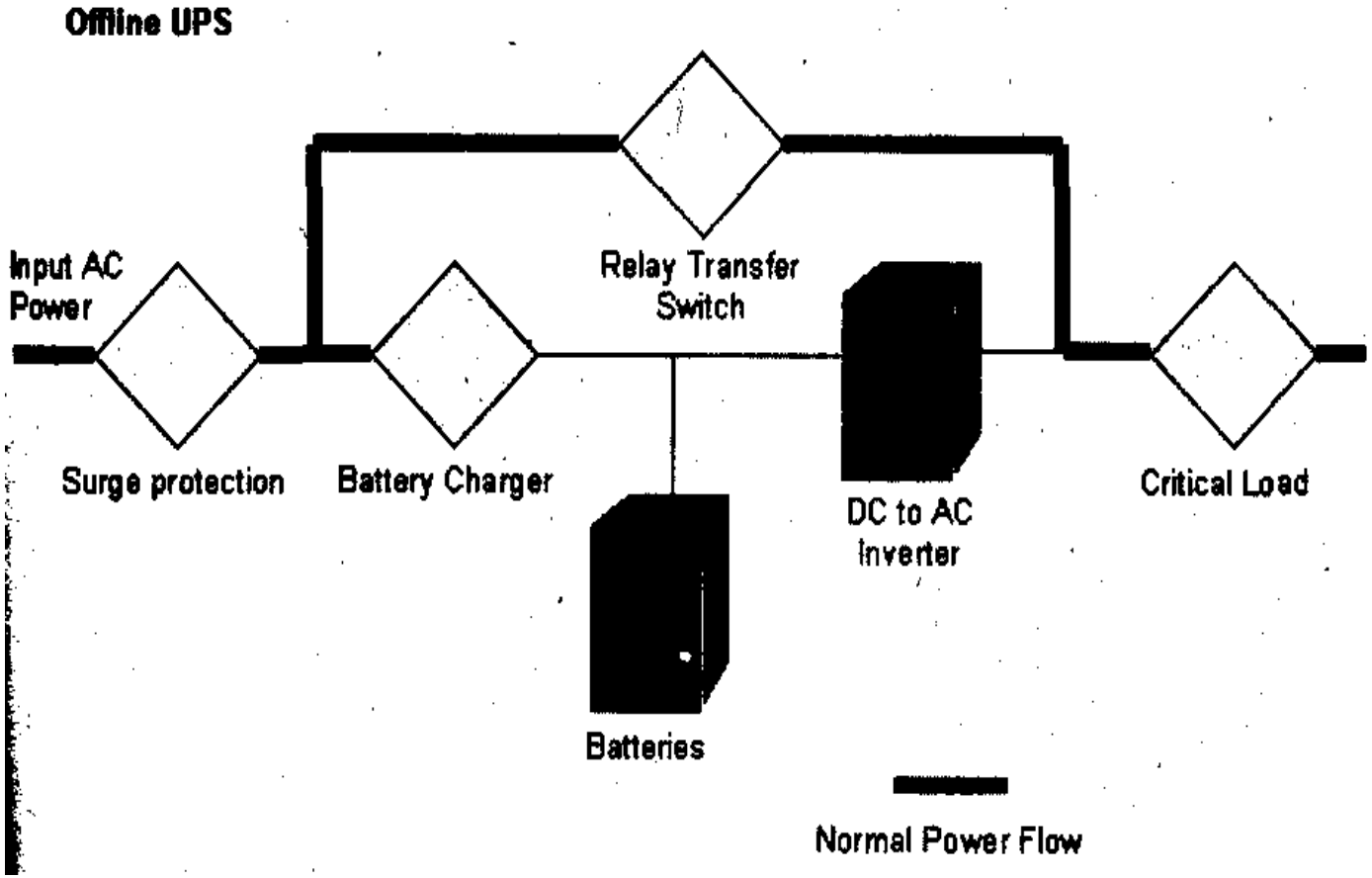
7. The PC behaves erratically when other high-energy devices are turned on.

8. The modem regularly looses its connection, or fails data transfers.

9. The monitor display flickers or waves.

Uninterrupted Power Supply (UPS)

- An UPS provides a back up power supply when there is a power failure from AC mains.



Uninterrupted Power Supply (UPS)

- On-line UPS.