

Chapter 7

Power Supplies

Episode 7.01

Episode **The Power Supply**
title:

Objective: A PC power supply takes AC power from the grid and transforms it into DC voltage the system needs to run. This episode explores modular and non-modular power supplies.

Lower 3rds

Power Supply Unit (PSU) - Delivers DC power to PC components.

Voltage Output - 12V, 5V, and 3.3V—used by CPU, drives, and chipset.

APFC (Active PFC) - Automatically detects and adjusts to AC input.

Modular vs. Non-Modular - Modular PSUs have removable cables for cleaner builds.

Lower 3rds

Wattage Rating - Max power output—choose based on system needs.

80 Plus Rating - Efficiency certification (higher = better energy use).

Redundant PSU - Two or more PSUs for backup—common in servers.

Non-Modular PSU

Output cables
permanently attached



Modular PSU

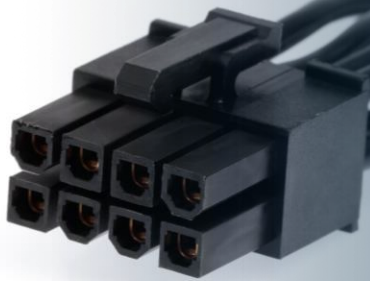
Varying number of connectors
cables connected as needed



24-pin motherboard connector

Connects PSU to the motherboard, power slots, RAM, and components





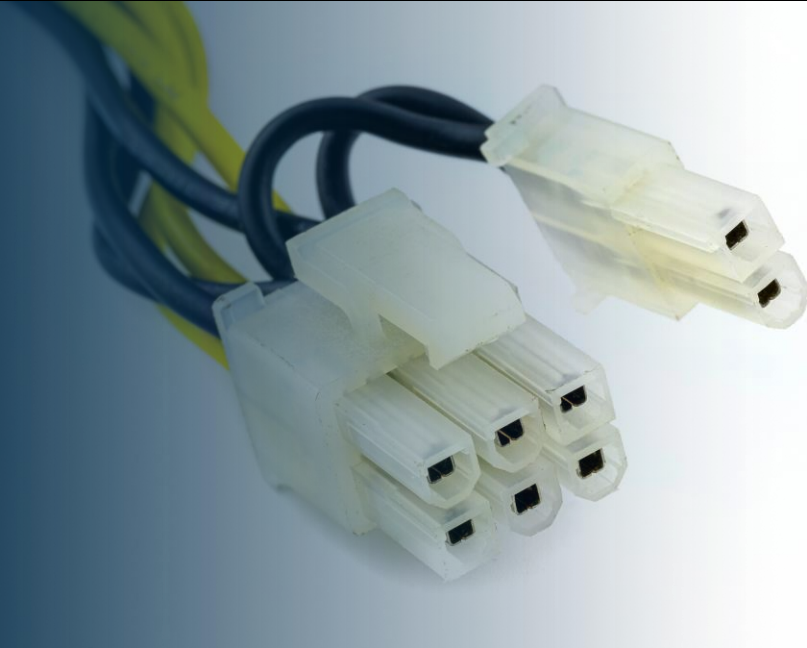
Connects to the motherboard to provide power to CPU

4+4-pin
CPU
power
connector

Connect to graphics
card or GPU

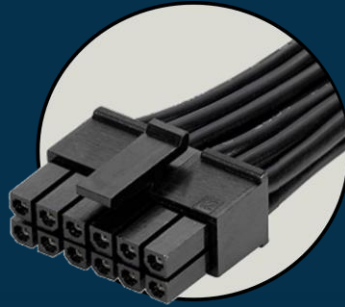
Some GPUs require
multiple PCIe power
connectors

PCIe 6+2 pin power connector



PCIe 12+4 Gen 5 power cable

Used to power GPUs



SATA power cable

Used to power hard disk drives
and SATA solid-state drives



Molex 4-pin connector

Used to power fans and other peripheral devices



Episode 7.02

Episode **Choosing a Power Supply**
title:

Objective: Power supplies come in a dizzying array of power ratings, sizes, and efficiencies. A good tech understands these factors to make sure a system has the power it needs.

80 Plus Rating System

Episode 7.03

Episode **Power Protection**
title:

Objective: Electrical power from our grid is imperfect. Sometimes it provides too little or too much power. We use tools such as surge suppressors and uninterruptible power supplies to protect our PCs.

Lower 3rds

No Power: Complete power loss; usually caused by unplugged cables, dead power supply, or a bad outlet.

Spike / Surge: Sudden high voltage that can damage components. Both terms mean the same thing.

Sag / Brownout: Temporary voltage drop that may cause system instability. Also the same thing.

Sine Wave: The ideal, consistent AC power signal (60 Hz in the U.S.).

Surge Protector: Protects devices by absorbing excess voltage from spikes or surges.

Lower 3rds

Trip Alert: Indicator or switch that signals the surge protector has triggered due to unsafe voltage.

UPS (Uninterruptible Power Supply): Battery backup that protects against spikes, sags, surges, and outages. Gives short-term power to shut down safely.

Battery Ports: Not all UPS outlets are battery-backed. Some only offer surge protection.

UPS Software: Monitors power use and battery runtime (shown in minutes).

Lower 3rds

Surge Protector Use: Good for printers, monitors, or non-essential gear.

UPS Use: Best for desktops, servers, and essential systems needing backup time.

Surge Protector Cost: Reliable models start around \$25–30; cheaper ones may offer no real protection.

Brand to Know: APC—common, trusted brand for UPS units.

Episode 7.04

Episode **Cooling Your System**
title:

Objective: Previously we discussed the types of heat sinks, fans, and liquid cooling that are used to lower component and system temperatures. Now we will look at keeping your system cool through even the most difficult of tasks.

Lower 3rds

Cooling Systems = Prevent Overheating of CPU, GPU, PSU

Air Cooling = Uses Fans to Push Air and Lower Temps

Fans = Pull Cool Air In & Push Hot Air Out

Heat Sink = Metal Block That Absorbs & Spreads Heat

Lower 3rds

Thermal Paste = Fills gaps to improve heat transfer

Heat Pipe = moves heat quickly from CPU to heatsink

Liquid Cooling = Pump + Coolant for quiet, efficient cooling

Lower 3rds

Closed-Loop = sealed liquid cooling, low maintenance

Open-Loop = custom liquid cooling, high maintenance

Thermal Throttling = CPU slows down to prevent overheating

Heat Sources = CPU, GPU, and PSU generate most heat

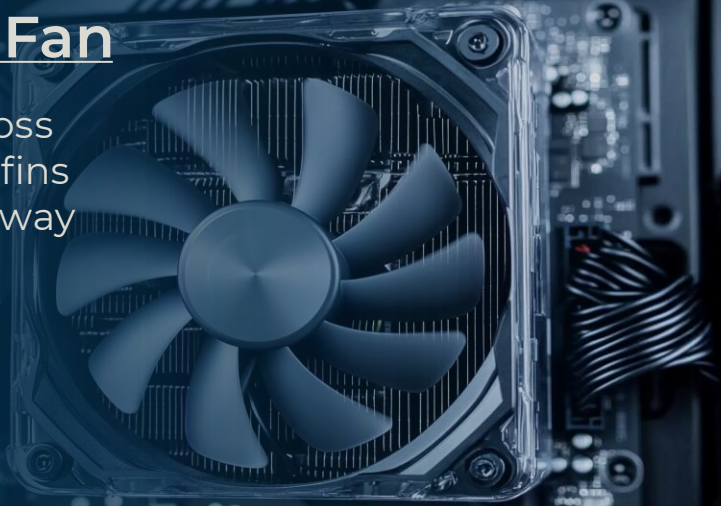
Lower 3rds

Air Cooling = Cheap, Easy, and Common

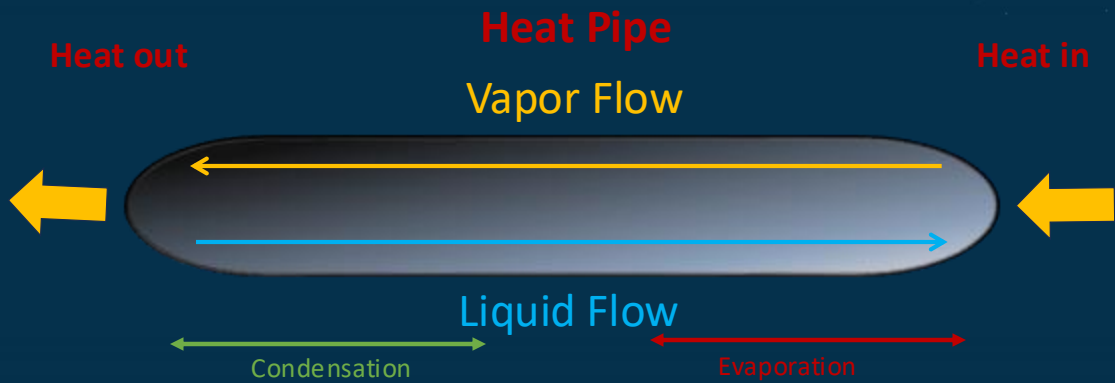
Liquid Cooling = Quiet, Efficient, but Costly

Heatsink Fan

Pushes air across the heatsink's fins to carry heat away and into the system airflow

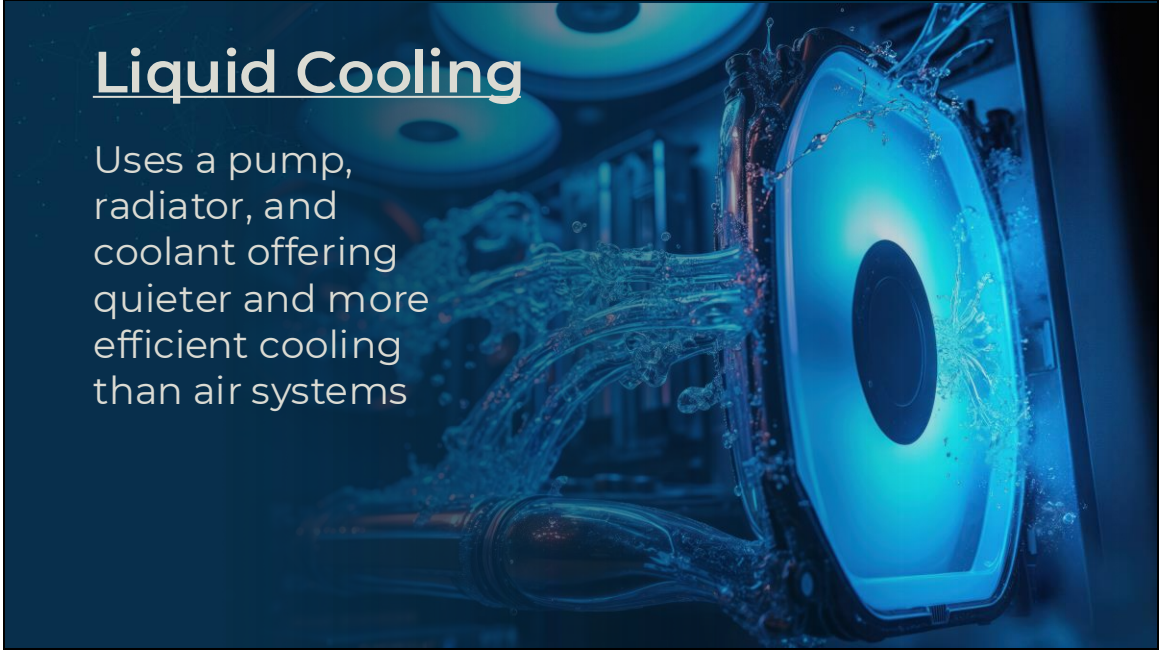


Heat Pipe



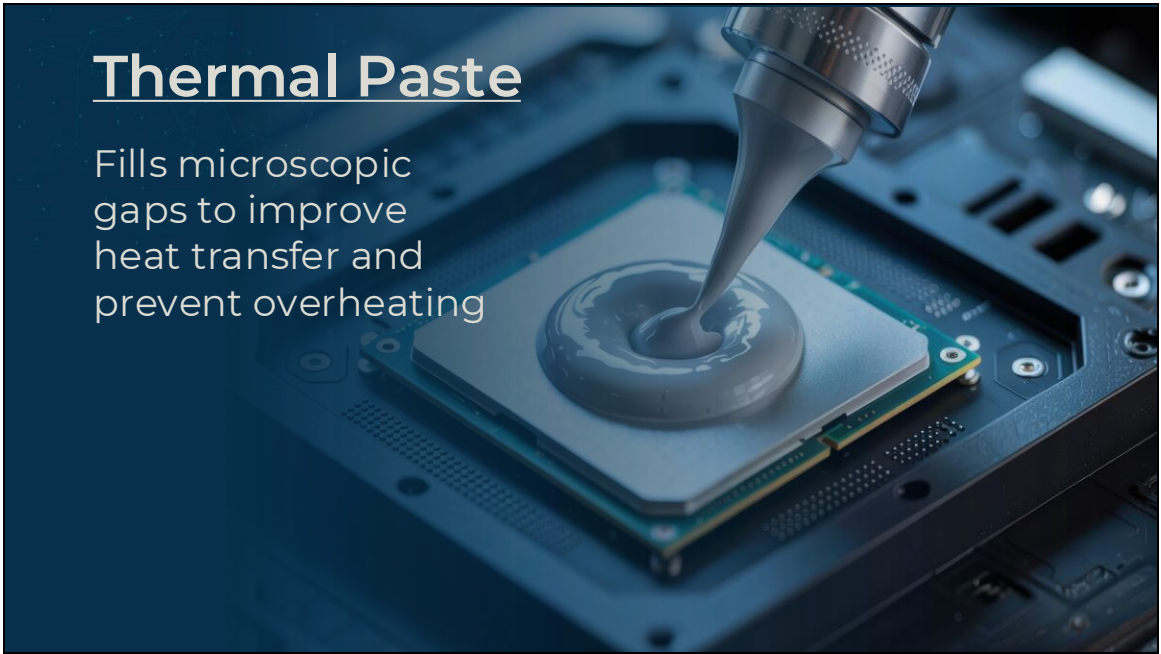
Liquid Cooling

Uses a pump, radiator, and coolant offering quieter and more efficient cooling than air systems



Thermal Paste

Fills microscopic gaps to improve heat transfer and prevent overheating



Episode 7.05

Episode title: **Installing and Troubleshooting a PSU**

Objective: Previously we discussed the types of heat sinks, fans, and liquid cooling that are used to lower component and system temperatures. Now we will look at keeping your system cool through even the most difficult of tasks.

Lower 3rds

PSU = Converts AC Wall Power to DC for Components

Input Voltage = 110–120V (US) or 220–240V (Intl)

Output Voltage = 3.3V, 5V, 12V for System Needs

ATX 24-Pin = Main Power Connector to Motherboard

Lower 3rds

CPU 4+4 Pin = Powers the CPU Directly

Modular PSU = Detachable Cables for Clean Builds

Non-Modular PSU = All Cables Are Permanently Attached

ATX Tester = Tool to Check PSU Output

Safety Tip = Unplug PSU Before Working Inside PC

Troubleshooting = Use CompTIA Steps to Diagnose Issues