The Printer

- Laser Printers
- Ink-Jet printers
- Dot Matrix Printers

Laser Printers

**Advantages/Disadvantages**

**Laser Printers**

- **Advantages**
  - Fast
  - Good image Quality
  - Reliable
  - Durable water resistant image
  - Excellent quality color

- **Disadvantages**
  - Expensive cartridge
  - Single copy at a time
  - Expensive hardware
  - Need warm-up time
  - Can’t do continuous forms

The six parts of Laser Printing

1. Cleaning—electrical & mechanical & Optical!
2. Conditioning—drum charged very negative
3. Writing—laser writes image on drum
4. Developing—toner to drum where laser been
5. Transferring—toner transferred from drum to paper
6. Fusing—toner melted into paper

The six steps of Printing

1. **Cleaning**
   - To remove all residual charge a bright light is applied universally to the entire surface.
   - Then the drum is cleaned of residual toner by scraping old toner off with a blade and then a brush.
Cleaning the drum

2. Conditioning

• Now, in the dark, a strong negative charge is applied to the surface of the drum with the Primary Corona Wire
• This is about negative 600 volts.

3. Writing

• A laser beam traces the image to be printed onto the drum.
• Where the laser strikes, that area becomes conductive causing the surface voltage to be – 100 volts. (Less negative than –600 volts)
• Physical principle is photoelectric conductivity.
• There is no visible image on the drum.

Writing

4. Developing

• Toner particles are charged to a voltage about -300 volts so that they are attracted to the area where the laser has been.
• The tiny ink particles are attracted to the relatively “positively charged” areas of the drum that were exposed to the laser light.
5. Transferring

- The strongly positive transfer Corona wire attracts the toner particles from the drum and onto the paper.
- The image is now on the paper, but it is highly charged, and like dust on the paper.

6. Fusing

- The image is now present on the paper, but can be easily smudged. Therefore the paper with the loose image on it is passed through two heated rollers.
- The ink particles are melted and fused into the paper with the heat & pressure of the rollers.

Laser Printer Problems
First Defense

- Check for power on
- Check that printer is “on line”
- Do printer self test
- Print test Page
More Complicated Problems
- Paper Feed Problems
- Image Problems
- Driver Problems
- Misc. Problems

Paper Feed Problems
- Buy quality paper for laser printers
  - Copier paper is frequently thinner
- Avoid vertical feed devices
- “Fluff” paper before inserting in printer
- Avoid bent, crumpled or folded paper
- Don’t let dust accumulate in the feed
- Sticky labels are problematic

Image Problems
- Entirely Black Page → Primary corona wire
- Entirely White Page → Transfer corona
- Image does not stick to page → Fusing roller
- Vertical streakiness → Refill/Replace toner cartridge

Driver Problems
- System crashes when the printer is used
  - Run SCANDISK
  - Update the Printer Driver
  - Re-install printer driver

Misc. Problems
- Check Cables for looseness
- Bi-directional Print Cables
- Have enough memory for print buffer
- Do a cold reboot

Ink-Jet Printers
- Advantages
  - Small size
  - Costs less than Laser
  - New technology: photo-quality ink-jet printers
- Disadvantages
  - Expensive cartridge
  - Lesser Image quality
  - Not water resistant
  - Slower than Laser
Ink-Jet Printers

How an Ink-Jet Printer Works

• A print head moves across the paper, creating one line of text at a time
• Puts ink on paper using a matrix of small dots
  – Tiny plates at the ends of ink tubes heat up
  – Tiny air bubble of ionized ink is ejected onto the paper

Ink-jet Cartridges

Supporting an Ink-Jet Printer

• Cleaning print cartridges and their cradles
  – Frequently software routine to clean jets
  – Consider graceful power off for printer
• Correcting missing lines or dots on the printed page
• Using software to align heads

Computer Color

• Printing Color
• Reflective Color
• CMYK
  – Cyan
  – Maroon
  – Yellow
  – Black
• Video Monitor
• Luminescent Color
• RGB
  – Red
  – Green
  – Blue
  – (#RRGGBB)—in hex!

Dot-Matrix Printers

• Advantages
  – Old reliable
  – Multiple copies
  – Tractor feed
  – Less expensive
  – Daisy Wheel—good quality print
• Disadvantages
  – Poor image quality
  – Noisy!
  – Messy Ribbon change
  – Slow
  – Poor/Awful Quality Graphics
How a Dot-Matrix Printer Works

- Uses a print head that moves across the width of the paper using pins to print a matrix of dots on the page
- Print head pins shoot against an ink soaked cloth ribbon, which hits the paper behind the ribbon, depositing the ink to the paper
- *Can make several carbon copies*

Dot-Matrix Printers

![Dot-Matrix Printer](image)

Figure 17-9: Keep the print head of a dot-matrix printer as cool as possible so that it will last longer

Common Pin counts

- 9—poorest print quality
- 18—intermediate
- 24—the sharpest quality

Printing Using Windows 9x

- Spooling (Like Buffering)
  - Placing print jobs in a print queue so that an application can be released from the printing process before printing is completed
  - An acronym for Simultaneous Peripheral Operations On-Line
- Click on the Printer icon in the System Tray

Improving Printer Performance

- Improve printer speed by
  - Adding more memory to the printer buffer
  - Lowering the printer resolution
  - Lowering the print quality
- Effect of paper quality – high quality paper especially important in color ink jet

Printing a Test Page & END

Start | Settings | Printers | Alt+Click Printer | Properties

![Test Page](image)

Figure 17-11: If a Print Test Page command is successful, then the OS, device drivers, communications, and the printer are all working properly