

**What's in Your Hard Drive:  
Here are the A, B, C's**

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2011**

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# First, Some History



# RAMAC from IBM

**The first computer (actually a  
“tabulator”) to use a hard  
drive**

# RAMAC- 1956

(**R**andom **A**ccess **M**ethod of **A**ccounting and **C**ontrol) The first hard disk computer. Introduced by IBM, All 50 of its 24" platters held a total of five million characters!

More Information:

<http://www.answers.com/topic/ramac#ixzz1UImEzhQS>




Moving to the early 1980s, we have the first commercially available desktop computers. Floppy drives only.

**THEN, HARD DRIVES BECOME  
AVAILABLE- A MAJOR IMPROVEMENT!!!**

# Desktop Computer Hard Drive- Early 1980s

Such a bargain-  
and LOOK at  
that capacity!



**\$3398  
10MB**

## THE HARD DISK YOU'VE BEEN WAITING FOR

**XCOMP** introduces a complete micro-size disk subsystem with more...

- MORE STORAGE
- MORE SPEED
- MORE VALUE
- MORE SUPPORT

S100 users... The XCOMP subsystem is now available with 10 megabytes of storage; 5 megabytes also available at \$2,898.00. Compare the price and features of any other 5 1/4-inch — or even 8-inch system, and you'll agree that XCOMP's value is unbeatable.

### OUTPERFORMS OTHER HARD DISKS

Floppy disk and larger, more expensive hard disks are no match for this powerful little system. More data is available on every seek: 64K on 10MB and 32K on 5MB. Faster seek time too — an average of 70MS. It provides solid performance anywhere with only 20 watts of power. Data is protected in the sealed enclosure, and the landing zone for heads provides another margin of safety. The optional power board plugs directly into the S100 bus and provides power for the drive.

### FAST CONTROLLER

The XCOMP controller is the key to this system's high efficiency operation. Speed-up features include interleave without table lookup, block deblock with controller buffer, and read lookahead. OEMs worldwide have already proven the outstanding performance of the XCOMP controller.

### MORE SOFTWARE

Included with the system is software for testing, formatting, I/O drivers for CP/M®, plus an automatic CP/M driver attach program. Support software and drivers for MP/M® and Oasis® are also available. Sophisticated formatting program assigns alternate sectors for any weak sectors detected during formatting, assuring the lowest possible error rate — at least ten times better than floppies.

### WARRANTY

The system has a full one-year warranty on parts and workmanship.

### ALSO AVAILABLE FROM XCOMP

- General Purpose controllers (8 bit interface), with easy interface to microprocessor-based systems.
- GP controller adapter that plugs directly into most Z80 computers.
- STR GP controller for the 5MB and 10MB drive above, with ST506 type interface.
- SG/R GP controller for storage module drives.
- SM/R GP controller for storage module drives, ST/S, SQ/S, and SM/S, same as above, for the S100 bus.

Quantity discounts available. Distributor, Dealer, and OEM inquiries invited.

See your local Dealer, or call:

XCOMP, Inc.  
7566 Trade Street  
San Diego, CA 92121  
Tel: (714) 271-8730  
Telex: 182786

Circle 406 on inquiry card.



So, what is a hard drive?



The hard disk drive (HDD) is a high-volume, disk-storage device with fixed, high-density, rigid media composed of relatively inflexible aluminum, glass platters, or disks.

This inflexibility led to the name hard disk drive. In the past, the hard drive was typically not removable, which is why IBM has referred to hard drives as fixed disk drives.

# Hard Disk Drive Parts



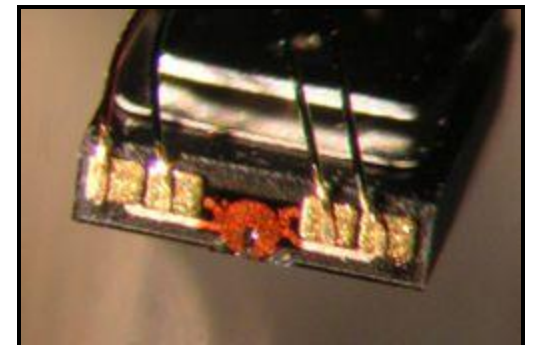
# Hard Drive Read Write “Head”



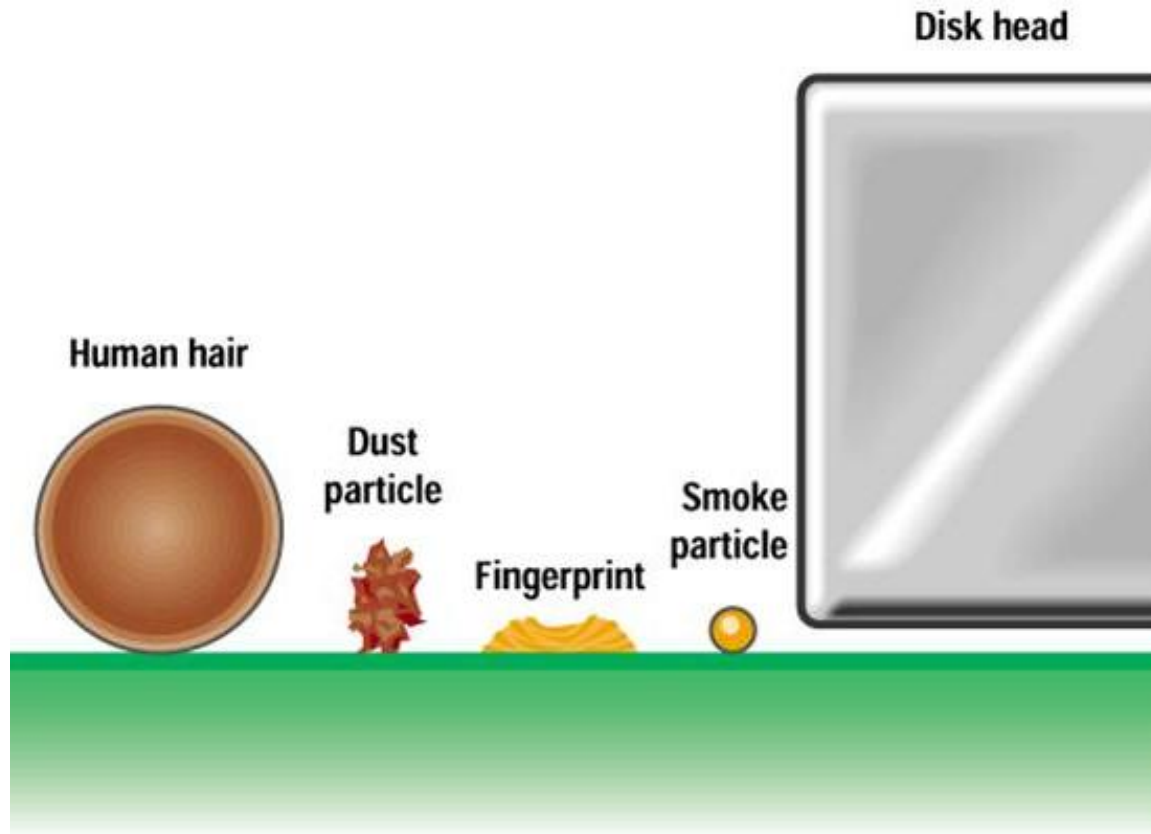
Hard Disk



Hard Disk Head



Hard Disk Head

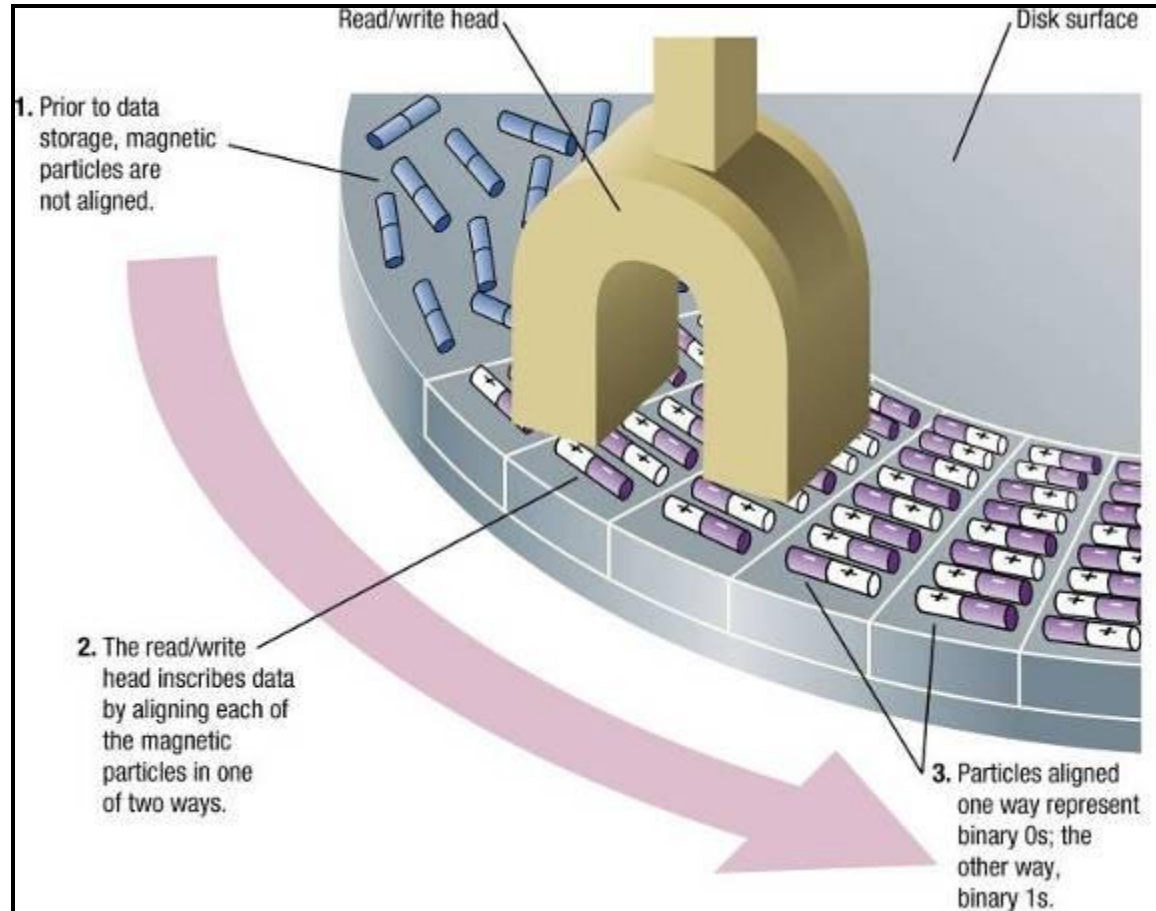


**BAD things that can make a hard drive crash. The read/write head(s) ride on a cushion of air within tens of nanometers of the surface. This is why hard drives are sealed units.**

# Reading a Disk

- Disks are read just like a record player
  - Data is stored on the disk
  - The disk spins
  - A head moves back and forth
  - Data is read and sent to the motherboard
- Data is stored magnetically as charged (on) or not charged (off)
- Video #1- hard drive operation.  
<http://www.youtube.com/watch?v=t6wTZhsffEE&feature=related>

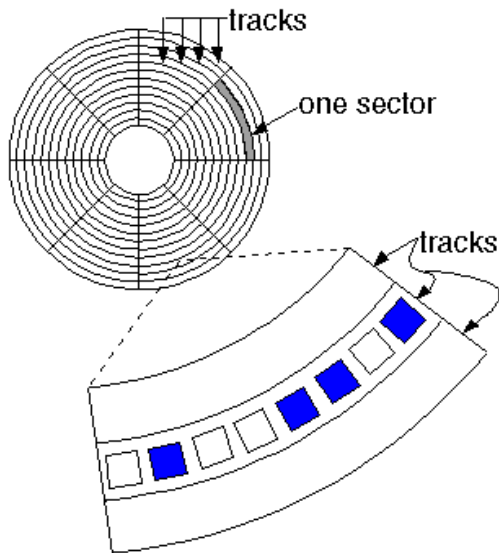
# Reading a Disk



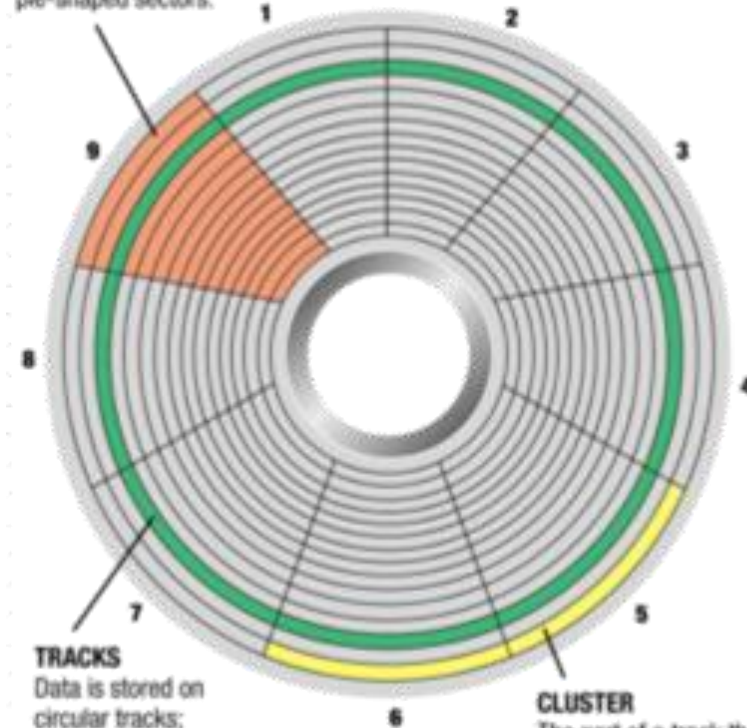
# Storing Data on a Disk

- Tracks
- Sectors

From Computer Desktop Encyclopedia  
© 1998 The Computer Language Co., Inc.



**SECTORS**  
A disk is divided into pie-shaped sectors.



**TRACKS**  
Data is stored on circular tracks; the 0s and 1s are represented magnetically.

**CLUSTER**  
The part of a track that crosses two or more adjacent sectors forms a cluster, the smallest addressable unit of disk storage.

# Data Storage Terminology

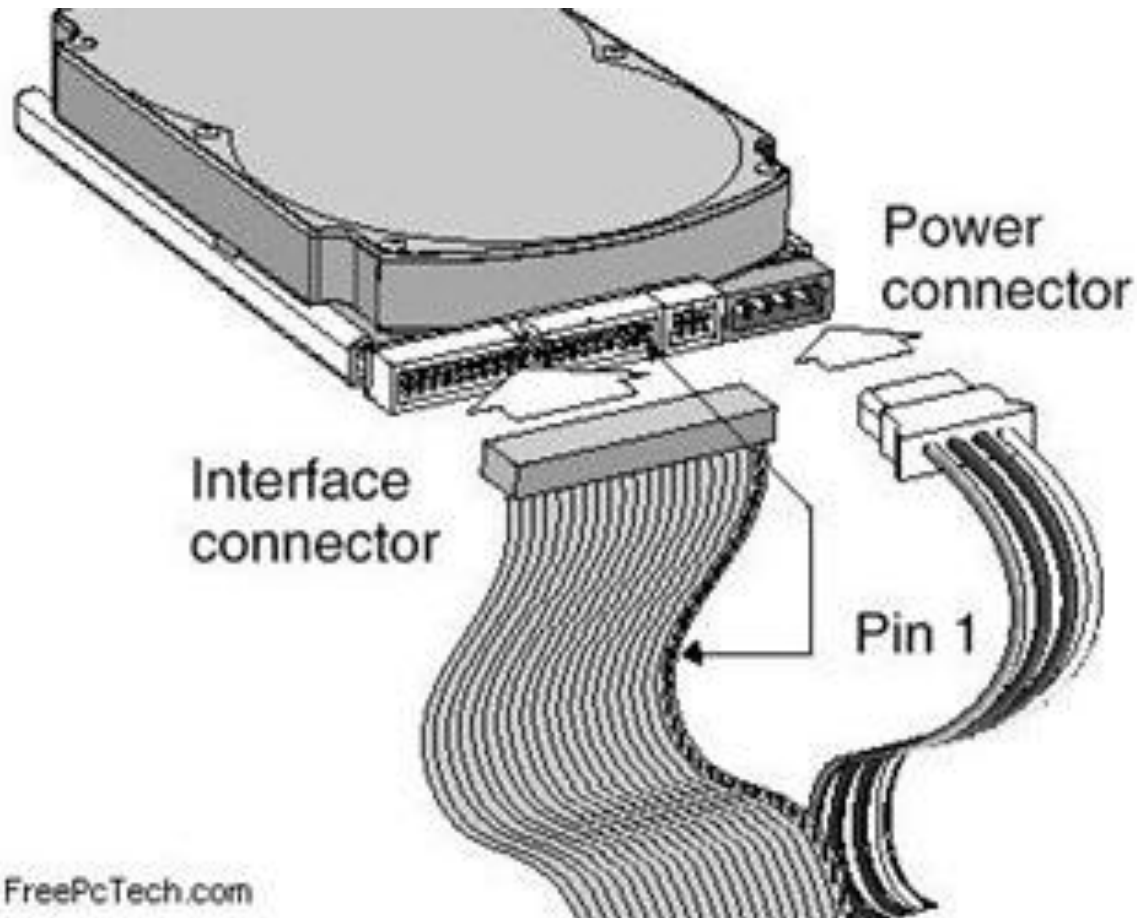
- Computer data- bits and bytes. A “bit” is one-eighth of a byte.
- Computers store information in “bytes”. One byte of information equals approximately 1 character
  - 1000 bytes = 1 kilobyte (kb)
  - 1000 kb = 1 megabyte (mb)
  - 1000 mb = 1 gigabyte (gb)
  - 1000 gb = 1 terabyte (tb)
- A one page typed letter  $\cong$  25 kb
- One average digital photo  $\cong$  1 – 5 mb (1000-5000 kb)
- One mp3 format song  $\cong$  4 mb
- A DVD movie  $\cong$  4.7 gb (4,700 mb)



# Personal Computer Hard Drive Connectors

**IDE- Integrated Drive Electronics  
and**

**SATA- Serial Advanced Technology  
Attachment**



FreePcTech.com

## **IDE- Integrated Drive Electronics**

Many computers still use this type of connector, but it has been replaced by SATA.



**SATA uses a smaller and faster data cable connection (the red one).**



What to look for when purchasing a new  
hard drive.

First, pick the correct interface  
for your computer- IDE or SATA?

READ THE MANUAL OR  
CHECK YOUR MACHINE SPECS  
ONLINE!

Drive size- usually 3.5 inches for  
a desktop machine.

2.5 inches for a laptop

# Rotational speed- faster is better

5400 rotations per minute (RPM) or  
7200 RPM.

On some specialized drives up to 10,000  
RPM- or faster.

Capacity- measured in gigabytes  
or terabytes.

Like Captain Kirk said in Star Trek,  
“Space, the Final Frontier.” Bigger is  
better, but check your manual! Some  
drives might be TOO big!



# Data transfer speed

Gbps- gigabits per second. 3 Gbps or even 6Gbps on SATA.

IDE drives will have speeds up to 100 Mbps.

BUT- *what speed does your system use?*

# Other specs that are important

Warranty- As much as three years, although some companies have gone to one year.

Buffer or Cache size- usually dependant on the size of the drive.

# Other specifications

Seek time- how long it takes to find data. Expressed in milliseconds (ms).

Access time- how long it takes to get data. Also expressed in ms.

Noise reduction- might be important.

MTBF- mean time between failures; usually someone's made up fantasy.

How to install a SATA drive in 1  
minute and twenty seconds.

**Video #2**

[http://www.youtube.com/watch?v=9  
hgiCnzbXrs&feature=related](http://www.youtube.com/watch?v=9hgiCnzbXrs&feature=related)



Some things you can do to extend the life of your hard drive.

# Hard Drive Maintenance

- Run Disk Cleanup, Scandisk, and Drive Defragmentation at least monthly. These activities can be scheduled, and there are many free software tools to help you, not just what is in the Windows OS.
- Keep your computer away from heat, high humidity and vibration.
- Properly shut down your computer- don't just switch it off or unplug it!
- Consider purchase of a UPS (uninterruptible power supply).



**REMEMBER- Hard drives are mechanical devices with amazing reliability. That is why they've been in use over 55 years. But they still wear out, and are subject to other disasters.**



**SO BACK UP YOUR FILES!**



QUESTIONS?????

