SCSI and IDE Technology

Data path of SCSI bus (not interface to AT, EISA, or MCA bus)	**SCSI-1** 8 bit	**SCSI-2** 8 bit	16 bit	32 bit
Maximum SCSI interface transfer rate (burst data transfer rate)	5 MB/sec	5 MB/sec or 10 MB/sec **(Fast)**	10 MB/sec **(Wide)** or 20 MB/sec **(Fast, wide)**	20 MB/sec **(Wide)** or 40 MB/sec **(Fast, wide)**
Tagged Command Queuing	None	Optional	Optional	Optional
Data Parity	Optional	Standard	Standard	Standard
Terminators	Passive	Active	Active	Active
Pins on cable	50/60	50	68	Future

SCSI COMPATIBILITY

- On an 8 bit SCSI-1 or SCSI-2 controller, can put any 8 bit SCSI-1/SCSI-2 device, but *no* 16 bit SCSI-2 device (all cables would be 50 pin).
- On a 16 bit SCSI-2 controller, can put any 8 bit SCSI-1/ SCSI-2 or 16 bit SCSI-2 device (cables would be 68 pin), but all 8 bit devices are at end of chain (16 bit devices should be closest to controller).
- The SCSI controller and SCSI device transfer data at the fastest speed supported by both (speed of slowest).

SCSI CABLES

- 50 pin cable used for 8 bit transfers.
  - ✧ 50 pin cable consists of a 2 row x 25 column connector.
  - ✧ IBM used 60 pin for back of SCSI-1 adapter because a 60 pin connector was a smaller size than a 50 pin connector (smaller size was needed on back of adapter).
  - ✧ More pins gives a smaller size cable.
- 68 pin cable for 16 bit transfers.
  - ✧ 68 pin cable consists of a 2 row x 34 column connector.
  - ✧ The 68 pin connector is smaller than the 50 pin and 60 pin connector (more pins is smaller).
- SCSI-2 requires **active terminators** which have regulators built in to maintain a constant termination (2.8 volts).

ENHANCED IDE (ATA-2)

Enhanced IDE (also known as ATA-2) may contain some or all of the following features:

- Larger capacity disks
  - ✧ Up to 8.4 GB per disk (from 528 MB limit)
- Faster data transfer rates (up to 16.6 MB/sec burst rate)

ANSI mode	Read/write cycle time	Burst data transfer rate
0	600 ns	3.3 MB/sec
1	383 ns	5.2 MB/sec
2	240 ns	8.3 MB/sec
3	180 ns	11.1 MB/sec
4	120 ns	16.6 MB/sec (proposed)

The transfer rate is set to the fastest rate that the slowest device on each connector can support (determined dynamically during POST)

IBM IDE disks support these PIO modes:

Part #	70g8488	364 MB IDE	Modes 0, 1, 2
	70g8486	527 MB IDE	Modes 0, 1, 2
	70g8511	728 MB IDE	Modes 0, 1, 2
	70g8512	1 GB IDE	Modes 0, 1, 2, 3

- Supports nondisk-drive peripherals
  - ✧ Supports IDE CD-ROM and IDE tape drives off single controller
- Supports additional IDE drives
  - ✧ Supports 4 IDE devices (from 2 IDE disk limit)
  - ✧ 4 devices requires 2 cables
- Maximum cable length of 18 inches

ATA-3 is a proposal to merge the ATA packet Interface (for CD-ROM) with ATA-2

SCSI DISK DEFINITIONS

Tagged Command Queuing - allows multiple commands to be sent to a SCSI-2 device concurrently (as opposed to having to complete first command before receiving next command).

Automatic Defect Reallocation - identifies and remaps defective sectors with good sectors in real time.

Predictive Failure Analysis - monitors key device parameters to determine if specifications are exceeded or changed excessively. Helps in early warning of imminent failure so that reliable performance is obtained. Utilized by SCSI hardfile while diagnostics is running the data integrity check.

Look-ahead buffer - read additional data ahead of the data currently requested and store in fast buffer memory.

Segmented look-ahead buffer - divides the total amount of buffer memory into smaller buffers so that data from more than one read can be stored at a time.

Adaptive buffering - allows disk to adjust the number and size of the buffer segments when disk logic determines that the buffer hit rate can be increased.

Write caching - uses disk buffer for writes (and reads) to increase throughput. Disk signals completion of write when received in buffer and before written to disk. The system then does other work while the disk writes the data.

Magneto-resistive heads allow greater areal density and contain a chip that is sensitive to magnetic fluctuations which gives it more precision in writing and reading data without making the head fly closer to the platter.

Latency - time the disk waits for correct sector to spin under the disk head.

Average access time = Average seek time + average latency

(1SCSI) Compiled by Roger Dodson, IBM. July 1994