Glossary

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A

Access — Retrieval of data from or transfer of data into a storage device or area such as RAM or a register.

Access Time — The amount of time, including seek time, latency and controller time, needed for a storage device to retrieve information.

Active Partition — The partition of the drive that contains the operating system. If the drive has multiple partitions, only the primary partition can be made active. A hard drive can have only one active partition.

Active Termination — Works to control the impedance at the end of the SCSI bus by using a voltage regulator. This reduces the susceptibility of the bus to noise, particularly when cables are long or when many devices are connected to the bus. Because it is active, regulating the power that it gets from the interface card, active termination is more stable than passive termination.

Actuator — A mechanical assembly that positions the read/write head over the appropriate track.

Actuator Arm — The part of the actuator assembly that includes the positioning arm and the read/write heads.

Adaptive Caching — A feature of Western Digital drives that enables the drive to determine the environment in which it's being used and optimize the way it handles commands and data.

Address — In the hard drive industry, there are several types of addresses; an address may refer to that of a drive, called a unit address; radial position, called a cylinder address; or circumferential position, referred to as a sector address.

AFR (Annualized Failure Rate) — A method of measuring failure rates or trends for a group of units at a site. The rates are based on the monthly total number of returned field failure units divided by the total cumulative installed base and multiplied by 12 (to annualize the failure rate).

Allocation — The method DOS uses to assign a specific area of the hard drive to a given file. (*See also* cluster.)

American National Standards Institute (ANSI) — A governmental body of the United States responsible for approving US standards in many areas, including computers and communications. ANSI is a member of the International Standards Organization (ISO).

Arbitrated Loop — Fibre channel topology where two or more ports can interconnect but only two ports can communicate at the same time.

Arbitration — The act of determining which command, device, or communication protocol controls the operating environment.

Areal Density — The number of bits of data that can be recorded onto the surface of a disk or platter usually measured in square inches. The areal density is calculated by multiplying the bit density (BPI- Bits Per Inch) by the track density (TPI - Tracks Per Inch).

Asynchronous Transmission — Each byte of information is synchronized individually through the use of request and acknowledge signals.

AT Bus Attachment (ATA-4) — The interface defined by IBM for the original AT disk controller. Western Digital designed the WD Caviar drives to be fully ATA-4 compatible.

Auto Defect Retirement — If the drive finds defective sectors during reads or writes, they are automatically mapped out and relocated.

Auto Park — Turning off the drive power causes the drive to move the read/write heads to a safe non-data landing zone and lock them in place.

Auto-Read Reallocation/Auto-Write Reallocation (ARRE/AWRE) - Error recovery feature that controls whether automatic reallocation takes place during read and write commands.

Average Access Time — The average length of time a drive takes to perform seeks, usually measured with 1/3 stroke.

Average Read Seek Time - Equal to the total time of a test divided by 50,000 random length and random head seeks.

B

Bandwidth — The amount of data that can be sent over a given circuit. *See also* buffer bandwidth.

BIOS (Basic input/output system) — A program or set of programs that control the basic functions of the computer.

Bit — An abbreviation for a binary digit which can be either 0 or 1. A bit is the basic data unit of all digital computers. It is usually part of a data byte, or data word; however, a single bit can be used to control or read logic ON/OFF functions. A bit is a single digit in a binary number. Bits are the basic unit of information capacity on a computer storage device. Eight bits equal one byte.

Bit density — Expressed as bits per inch (BPI), the number of bits that can be written onto one inch of track on a disk surface.

Block — A group of bytes handled, stored, and accessed as a logical data unit, such as an individual file record. A block in UNIX workstation environments is the smallest contiguous area that can be allocated for the storage of data. (Note: A different definition of the term is used when referring to the physical configuration of a hard drive.)

Boot — To start or restart your computer; loading the operating system.

BPI — Bits per inch. Indicates the density of information on a hard drive. *See* bit density.

Buffer — A temporary data storage area used to make up for a difference in data transfer rates and/or data processing rates between sender and receiver. For example, a printer buffer copies data from the computer and holds it until the printer is ready to print it.

Buffer Bandwidth — The speed of transferring data to or from the buffer.

Burst Mode Transfer Rate — The transfer rate into the buffer RAM of the hard disk. This rate does not factor in delays due to latencies or host delays. See also transfer rate.

Bus — The path that carries data between the computer (microprocessor) and peripheral devices. An IDE interface cable and a SCSI cable are both examples of a bus.

Bus Mastering — A high performance method of data transfer in which the host adapter's on-board processor handles the transfer of data directly to and from a computer's memory without intervention from the computer's microprocessor.

Byte — A sequence of eight binary digits or bits regarded to be a unit or binary word. The storage capacity of a disk drive is commonly measured in megabytes, which is the total number of storable bits divided by eight million.

C

Cable Select (CSEL) — An alternative option which can be used in place of setting Master/Slave jumpers in the designation of drives in a dual drive configuration. Master/Slave designation is based on the position of the drives relative to the cable. Special cabling is required by the system manufacturer to selectively ground the CSEL signal on one of the IDE cable connectors. For example, when one of the drives is connected to the grounded CSEL conductor, it configures itself as the Master. When the second drive is connected to the other connector, on which CSEL is not grounded, it becomes the slave. This eliminates the need for unique jumpering configurations between the Master and Slave drives.

Cache — High-speed RAM used as a buffer between the CPU and a hard drive. The cache retains recently accessed information to speed up subsequent accesses to the same data. When data is read from or written to disk, a copy is saved in the cache, along with the associated disk address. The cache monitors the addresses of subsequent read operations to see if the required data is already in the cache. If it is, the drive returns the data immediately. If it is not in the cache, then it is fetched from the disk and saved in the cache.

Capacity — The amount of information, measured in bytes, that can be stored on a hard drive. Also known as storage capacity.

Channel — A connection or socket on the motherboard or controller card. A motherboard may have one or two channels (primary and secondary). If your motherboard has only one channel, you may need to add a controller card to create a secondary channel.

Clean Room — An environmentally controlled, dust-free assembly or repair facility in which hard drives are assembled or opened for internal servicing.

Cluster —A cluster is defined as an allocation unit. At least one cluster is allocated to each file, regardless of the file's size, that is stored in the DOS environment. The cluster size increases with the partition size determined during formatting. With a 1024 MB partition, the cluster size is 32 KB. Each file stored consumes 32 KB of storage space, no matter how small the file. Create multiple, smaller partitions to avoid wasting space on small files. (This definition applies to FAT16).

CMOS Setup — A program supplied in most systems that allows you to configure internal and external devices.

Command Aging — A SCSI feature that prevents the command reordering algorithm from keeping I/O processes waiting in the command queue for extended periods of time.

Command Queuing — A feature that enables the drive to receive I/O processes from one or more initiators and execute them in an optimum sequence.

Command Reordering — A feature that allows the drive to reorder I/O processes in the command queue, which results in minimizing the seek time and rotational latency and thus increases throughput.

Controller — *See* disk controller, interface controller, and disk drive controller.

Controller Card — An adapter with the control electronics for one or more hard drives. Usually installed in a bus slot in the computer.

Correctable Error — An error that the drive can correct by using Error Detection and Correction schemes.

Customer Configuration Code (CCC) — A firmware revision tracking code that defines a major product change. This number increments as form, fit or function changes are implemented. The CCC code guarantees that the correct revision of drive product is provided to the customer.

Cyclic Redundancy Check (CRC) — Data stored or transmitted with data to detect corruption. By calculating the CRC data and comparing it to the original data sent, the receiver can detect some types of transmission errors.

Cylinder — The cylindrical surface formed by identical track numbers on vertically stacked disks.

Cylinder, Head, Sector (CHS) Addressing — A method of referencing the sectors on a drive as a collection of unique cylinder, head and sector addresses. Each block on the drive will have a unique cylinder, head and sector address.

D

Database — A collection of data stored on a computer system medium, such as a hard drive.

Data Lifeguard™ — A Western Digital exclusive data reliability feature that automatically detects, isolates and repairs problem areas on the hard drive before data loss can occur.

Data Synchronizer — An electronic circuit that produces a clock signal that is synchronous with the incoming data stream. The clock signal is then used to decode the data.

Data Transfer Rate - Speed at which data transfers to and from the disk media (actual disk platter); a function of the recording frequency. Typical units are bits per second (bps) or bytes per second. Modern hard drives have an increasing range of disk transfer rates from the inner diameter to the outer diameter of the disk. This is called a "zoned" recording technique.

Dedicated Landing Zone — The designated radial zone of the disk, usually at the inner portion of the disk, where the heads are stored to avoid contact with the data cylinders when power to the drive is off.

Defect Free — A term used to describe recording surfaces that have no detectable defects.

Defect Management — A general methodology of eliminating data errors on a recording surface by mapping out known defects on the media. The defective areas are rendered inaccessible, so that when information is written to the disk, it is stored to non-defective locations on the disk.

Desktop — A personal computer sized to fit on or under a desktop. Western Digital EIDE hard drives are designed to fit into a desktop PC.

Device Driver — A software program that enables a PC to communicate with peripheral devices such as fixed disk drives and CD-ROM drives. Each kind of device requires a different driver. Device driver programs are stored on a PC's fixed disk and are loaded into memory at boot time.

Differential SCSI — An electrical signal configuration which uses pairs of lines for data transfer. Each signal consists of two lines called "–Signal" and "+Signal". Commands and data are carried over two sets of wires, and the difference is taken between each set of signals. Two-wire signaling is a proven way to achieve reliable signal transmission in noisy environments and over long distances. Used primarily in applications requiring long cable lengths of up to 82 feet (25 meters).

Direct Memory Access (DMA) — A process for transferring data directly to and from main memory, without passing through the CPU. DMA improves speed and efficiency by allowing the system to continue CPU processing even while it is transferring data to/from the hard drive.

Disk — A rigid platter, usually constructed of aluminum or mylar, with a magnetic surface that allows the recording of data, that is stored inside the drive.

Disk Controller — The chip or circuit that controls the transfer of data between the disk and buffer. (*See also* disk drive controller and interface controller).

Disk Drive Controller — The hard disk drive controller electronics which include the disk controller and the interface controller. (*See also* disk controller and interface controller.)

Disk Operating System (DOS) — The computer program that controls the organization of data, files and processes on the computer.

Disk Transfer Rate — Speed at which data transfers to and from the disk media (actual disk platter); a function of the recording frequency. Typical units are bits per second (BPS), or bytes per second. Hard drives have an increasing range of disk transfer rates from the inner diameter to the outer diameter of the disk.

E

ECC On-the-Fly — A hardware correction technique that corrects errors in the read buffer prior to host transfer without any performance penalties. These error corrections are invisible to the host system because they do not require assistance from the drive's firmware.

E-coat - Electro-deposited organic coating applied to the base casting. This smooth coating reduces the particle count inside the drive housing, which results in a clean environment for MR heads.

EEPROM (Electrically Erasable Programmable Read Only Memory) — Devices that can be erased instantly.

EIDE (Enhanced Integrated Drive Electronics) — Improves the AT - IDE standard interface by overcoming device support and capacity limitations, improving data transfer rates, and allowing connection of CD-ROMs and other peripherals.

Embedded Servo Control — The embedded servo control design generates accurate feedback information to the head position servo system without requiring a full data surface (which is required with a "dedicated" servo control method) because servo control data is stored on every surface.

Encoding — The process of modifying data patterns prior to writing them on the disk surface.

Enterprise — The series of computers employed largely in high-volume and multi-user environments such as servers or networking applications; may include single-user workstations required in demanding design, engineering and audio/visual applications.

Error Correction Code (ECC) — A mathematical algorithm that detects and corrects errors in a data field by adding check bits to the original data.

Error Log — A record that contains error information.

Error Rate — The number of errors of a given type that occur when reading a specified number of bits.

Extended Partition — You can create multiple partitions on a hard disk, one primary partition and one or more extended partition(s). Operating system files must reside on the primary partition. An extended partition is a partition where non-system files (files other than DOS or operating system files) can be stored on a disk. You can also create logical drives on the extended partition.

F

FAT (File Allocation Table) — A data table stored at the beginning of each partition on the disk that is used by the operating system to determine which sectors are allocated to each file and in what order.

Fdisk — A software utility used to partition a hard drive. This utility is included with DOS and Windows 95 operating systems.

Fetch — The process of retrieving data.

Fibre Channel (FC) — The general name given to an integrated set of standards being developed by an ANSI-approved X3 group. This set of standards defines new protocols for flexible information transfer. Fibre channel supports three topologies: point-to-point, arbitrated loop, and fabric.

Fibre Channel Arbitrated Loop (FC-AL) — A subset of fibre channel network systems interconnection. A serial storage interface designed to meet the needs of high-end applications.

Firmware — Permanent instructions and data programmed directly into the circuitry of read-only memory for controlling the operation of the computer.

FIT (Functional Integrity Testing) — A suite of tests Western Digital performs on all its drive products to ensure compatibility with different hosts, operating systems, adapters, application programs, and peripherals. This testing must be performed before the product can be released to manufacturing.

Flow Control — In PIO transfers, the ability of an EIDE drive to control the speed at which the host transfers data to or from the drive by using the IORDY signal. The host temporarily stops transferring data whenever the drive deasserts the IORDY signal. When the drive reasserts the IORDY signal, the host continues the data transfer.

Format — A process that prepares a hard drive to store data. Low-level formatting sets up the locations of sectors so user data can be stored in them. Western Digital hard drives are low-level formatted at the factory and therefore do not need to be low-level formatted by the end user. You need to perform a high-level format (with EZ-Drive or the Format command) on your new Western Digital hard drive before you can use it. Formatting erases all the information on a hard drive and it sets up the file system needed for storing and retrieving files.

Formatted Capacity — The actual capacity available to store data in a mass storage device. The formatted capacity is the gross capacity minus the capacity taken up by the overhead data required for formatting the media.

Form Factor — The industry standard that defines the physical and external dimensions of a particular device.

Full-Duplex — A communication protocol that permits simultaneous transmission in both directions.

G

GB (Gigabyte) — Western Digital defines a gigabyte as 1,000,000,000 (one billion) bytes or 1000 (one thousand) megabytes.

Giant Magnetoresistive (GMR) Heads — WD Caviar drives incorporate giant magnetoresistive head technology to meet increasing capacity requirements. The GMR head structure incorporates a complex assembly of magnetic materials that provide greater sensitivity to changing disk magnetization. As a result, GMR heads achieve significant increases in areal densities and performance levels over either inductive thin film or MR heads.

H

Half-Duplex — A communications protocol that permits transmission in both directions but in only one direction at a time.

Half-Height Drives — Standard 3.5-inch hard drives are available in heights of 1.0-inch and 1.6-inches. Half-height drives measure 1.6-inches in height. *See also* low-profile.

Hard Drive — An electromechanical device used for information storage and retrieval, incorporating one or more rotating disks on which data is recorded, stored, and read magnetically. Western Digital's principal product.

Hard Error — An error that is repeatable every time the same area on a disk is accessed. A hard error cannot be corrected by the error recovery process.

Hard Reset (Hardware Reset) - ATA reset type in which the drive resets the interface circuitry as well as soft reset. Hard reset negates the RESET- signal in the ATA bus.

Hard Sectored — A technique that uses a digital signal to indicate the beginning of a sector on a track.

Head — The minute electromagnetic coil and metal pole which write and read back magnetic patterns on the disk. Also known as a read/write head. A drive with several disk surfaces or platters will have a separate head for each data surface. *See also* MR Head.

Head Crash — Refers to the damage incurred to a read/write head when the head comes into contact with the disk surface. A head crash might be caused by severe shock, dust, fingerprints, or smoke, and can cause damage to the surface of the disk and/or the head.

Head Disk Assembly (HDA) — The mechanical components of a hard drive, including the disks, heads, spindle motor and actuator.

Head Loading Zone — An area on the disk specifically reserved for the heads to use when taking off or landing when power to the drive is turned on or off. No data storage occurs in the head loading zone.

Head Stack Assembly — The electromechanical mechanism containing read/write heads and their supporting devices.

Headerless Format — The lack of a header or ID fields (track format). This enables greater format efficiency and increased user capacity.

High-Level Format — A high-level format must be performed (with EZ-Drive or the Format command) on your new Western Digital hard drive before you can use it. Formatting erases all the information on a hard drive and it sets up the file system needed for storing and retrieving files.

Host — The computer that other computers and peripherals connect to. *See also* initiator.

Host Adapter — A plug-in board that acts as the interface between a computer system bus and the disk drive.

Host Interface — The point at which the host and the drive are connected to each other.

Host Transfer Rate — Speed at which the host computer can transfer data across the SCSI interface; or, the speed at which the host computer can transfer data across the EIDE interface. Processor Input/Output (PIO) modes and Direct Memory Access (DMA) modes are defined in the ATA-4 industry specifications for the EIDE interface.

I

IDE (Integrated Drive Electronics) — A type of drive where the interface controller electronics are incorporated into the design of the hard drive rather than as a separate controller.

Index Pulse Signal — A digital pulse signal indicating the beginning of a disk revolution. An embedded servo pattern or other prerecorded information is present on the disk following index.

Initiator — A device in control of the SCSI bus that sends commands to a target. Most SCSI devices have a fixed role as an initiator or a target; however, some devices can assume both roles.

Initialization — *See* low-level formatting.

Input — The incoming data that the computer processes, such as commands issued by the user.

Input/output (I/O) — An operation or device that allows input and output.

Interface — A hardware or software protocol that handles the exchange of data between the device and the computer; the most common ones are AT (also known as IDE) and SCSI. (*See* AT and SCSI.)

Interface controller — The chip or circuit that translates computer data and commands into a form suitable for use by the hard drive and controls the transfer of data between the buffer and the host. (*See* disk controller and disk drive controller.)

Interleave — The arrangement of sectors on a track.

Interrupt — A signal sent by a subsystem to the CPU that signifies a process has either completed or could not be completed.

ISA — Industry Standard Architecture. The standard 16-bit AT bus designed by IBM for the PC/AT system. ISA was the only industry standard bus for PCs until the recent release of MCA (MicroChannel Architecture), EISA (Extended Industry Standard Architecture), and PCI (Peripheral Component Interconnect).

J

Jumper — In EIDE drives, a jumper is an electrically-conductive component that you place over pairs of pins that extend from the circuit board on the hard drive jumper block to connect them electronically. For example, a jumper is one way to designate a hard drive as master or slave. The jumper block is located next to the 40-pin connector on the hard drive.

K

Kilobyte (KB) — Usually, this is a unit of 1000 bytes. In the case of computer memory, which is partitioned into sizes that are a power of two, a kilobyte is equal to 2 10 or 1024 bytes.

L

Landing Zone — The heads move to this location on the inner portion of the disk when commanded, or when the power has been turned off. User data is not stored in this area of the disk.

Laser Textured Media — Laser textured disks minimize the wear and friction on a hard drive. The precision and consistency of the laser zone texturing process is a contributor to the robustness of Western Digital hard drives.

Latency — The period of time that the read/write heads wait for the disk to rotate to the correct position to access the desired data. For a disk rotating at 5400 RPM, the average latency is 5.5 milliseconds or the average time delay between the head arriving on track and the data rotating to the head. (Calculated as one-half the revolution period).

Local Area Network (LAN) — A system in which computer users in the same company or organization are linked to each other and often to centrally-stored collections of data in LAN servers.

Logical Address — A storage location address that may not describe the physical location; instead, it used as a means to request information from a controller. The controller converts the request from a logical to a physical address that is able to retrieve the data from an actual physical location on the storage device.

LBA (Logical Block Addressing) — A method of addressing the sectors on a drive. Addresses the sectors on the drive as a single group of logical block numbers instead of cylinder, head and sector addresses. It allows for accessing larger drives than is normally possible with CHS addressing.

Logical Drive — A logical drive is a section of the hard disk that appears to be a separate drive in a directory structure. You create logical drives on the extended partition of a hard disk. While 26 letters exist for logical drives, the first three are reserved. A and B are reserved for floppy disk drives, and C is reserved for the first primary DOS partition. Therefore, you can create up to 23 logical drives on your extended partition. Logical drives are usually used to group directories and files.

Low-level formatting — The process of creating sectors on the disk surface; this permits the operating system to use the regions needed to create the file structure. Also called initialization. Low-level formatting is performed at the Western Digital factory. There is no need for you to low-level format a Western Digital drive.

Low Profile (LP) — Standard 3.5-inch hard drives are available in heights of 1.0-inch and 1.6-inches. Low-profile hard drives measure 1.0-inches in height. *See also* half-height drives.

M

Magnetic flux — The pattern of magnetic pole directions of the bits written on the disk.

Master — The first drive in a dual drive combination. A master drive by itself (with no slave) is called a single drive.

MB (Megabyte) — Western Digital defines a megabyte as 1,000,000 (one million) bytes.

Mechanical Latencies — Include both seek time and rotational latency. Mechanical latencies are the main hindrance to higher performance in hard drives. The time delays of mechanical latencies are one hundred times higher than electronic (non-mechanical) latencies associated with the transferring of data. *See also* Seek Time, Rotational Latency.

Media — In hard drives, the disks and their magnetic coatings; sometimes refers to the coating material alone.

Memory — A device or storage system capable of storing and retrieving data.

MFM (Multiple Frequency Modulation) — A method of encoding analog signals into magnetic pulses or bits.

MR Heads (Magnetoresistive Heads) — MR heads were developed to increase areal density and improve drive performance. MR heads use separate read and write elements, as opposed to traditional inductive thin-film read-write heads. MR heads use an inductive element for writing data, and a separate magneto-resistive element for reading information. The read element has a magnetically sensitive material that detects data recorded on the magnetic disk surface. MR head construction results in a stronger signal than that produced by inductive thin film read-write heads, which permits it to read higher areal density data. Since the magneto-resistive element can only read data, a conventional thin-film inductive element writes data to the disk.

MTBF (Mean Time Between Failures) — Average time (expressed in hours) that a component works without failure. It is calculated by dividing the total number of operating hours observed by the total number of failures. Also, the length of time a user may reasonably expect a device or system to work before an incapacitating fault occurs.

MTTR (Mean Time to Repair) — The average time it takes to repair a drive in the field. In the field, only major subassemblies are changed (the PCB, sealed housing, etc.), excluding component level repairs as these are not performed in the field.

Multi-media — A simultaneous presentation of data in more than one form, such as by means of both visual and audio.

Multi-user — In information technology, a system that enables more than one user to access data at the same time.

N

Network Computer — A kind of computer that contains limited data storage capacity and is used to communicate with a central data storage facility such as a server or RAID system.

O

Operating System — Software that allows the user and programs installed on your system to communicate with computer hardware such as a hard drive.

P

Partition — A way to logically divide a hard drive so that an operating system treats each partition as a separate hard drive. Each partition has a unique drive letter.

Passive Termination — A termination architecture that is used to match the impedance at the end of the SCSI bus by using a voltage divider network of passive resistors.

PIO (Programmed I/O) — In a disk drive with an AT interface, data transfers between the drive and host using programmed I/O (PIO). The host uses PIO to write to the Command Block Registers (CBRs) when transmitting control information, such as the location of a read command.

Platform — A basic design from which a series of products is engineered and produced. Western Digital's new, 4.3 GB-per-platter platform, for example, is the basis for five products ranging in capacity from 4.3 to 13.0 gigabytes.

Platter — An actual metal (or other rigid material) disk that is mounted inside a fixed-disk drive. Many drives consist of multiple platters mounted on the spindle to provide more data storage surfaces. Each platter may use one or both surfaces to store data.

Port — A connection or socket on the motherboard or controller card. A motherboard may have one or two ports (primary and secondary). If your motherboard has only one port, you may need to add a controller card to create a secondary port.

POR (Power On Reset) -. ATA reset type in which the drive executes a series of circuit diagnostics, spins up the HDA, tests speed and other mechanical parametrics, and sets default values.

Pre-fetch — Instructions that are loaded into a queue when the processor's external bus is otherwise idle.

Primary Partition — The partition where the operating system files are stored. To start your operating system from a hard disk, it must have a primary partition. You must also make the primary partition active.

Protocol — A convention of data transmission that defines timing, control format, and data representation.

PRML (Partial Response Maximum Likelihood) — A read channel using sampled data, active equalization and Veterbi detection to accurately retrieve the user data off the disk.

Proximity Recording — A recording technology that increases recording density by allowing the read/write head to come in close proximity to the disk surface.

Q

Queue — A first-in-first-out (FIFO) data structure used to sequence multiple demands for a resource such as a printer, processor, or communications channel. The host adds objects to the end of the queue and takes them off the front.

R

Radial Path — The straight-line path from the center of the disk to the outer edge of the disk.

RAID (Redundant Arrays of Independent Disks) — Groupings of hard drives in a single system to provide greater performance and data integrity.

Random Access Memory (RAM) — Memory that allows any storage location to be accessed randomly, as opposed to tape drives, which are sequential access devices.

Read Channel — Performs the data encoding and conversions the drive needs to write computer generated information onto a magnetic medium and then read that information back with a high degree of accuracy.

Read Verify — A data accuracy check performed by having the disk read data to the controller, which in turn checks for errors but does not pass the data on to the system.

Read/Write Head — *See* Head.

Recoverable Error — A read error, transient or otherwise, that the drive can correct by ECC recovery or by re-reading the data.

RLL (Run Length Limited) — An encoding scheme used during write operations to facilitate data readback.

ROM (Read Only Memory) — Integrated circuit memory chip containing programs and data that the computer or host can read but cannot modify. The computer can read instructions out of ROM, but cannot store data in ROM.

Rotational Latency — The amount of delay in obtaining information from a disk due to the rotation of the disk. For a disk rotating at 5400 RPM, the average rotational latency is 5.5 milliseconds. *See also* Mechanical Latency.

RPM (Revolutions per Minute) — Rotational speed of the media (disk), also known as the spindle speed. Hard drives typically spin at one constant speed. The slower the RPM, the higher the mechanical latencies. Disk RPM is a critical component of hard drive performance because it directly impacts the rotational latency.

S

SCA-2 — SCA-2 (Single Connector Attach) interface incorporates a grounding contact, blindmate connector, direct plug misalignment tolerance, ESD protection, hot swap capability, and backplane connector options for SCSI devices. SCA-2 is commonly called the 80-pin SCSI connector.

SCSI Configure AutoMagically (SCAM) — Allows users to attach SCSI devices without worrying about configuration options (*See* Small Computer System Interface).

SCSI-1 — The Small Computer System Interface (ANSI document X3.131-1986).

SCSI-2 — The Small Computer System Interface (ANSI document X3.131-1994).

SCSI-3 — The ANSI X3T10 Working Documents (under development).

SCSI device — A host computer adapter, a peripheral controller, or an intelligent peripheral that can be attached to a SCSI bus (*See* Small Computer System Interface).

Sector — A 512-byte packet of data in EIDE and SCSI hard drives. This is the smallest amount of data that can be read or written to the drive from the host interface. On Macintosh and UNIX drives, sectors are usually grouped into blocks or logical blocks that function as the smallest data unit permitted. Since these blocks are often defined as a single sector, the terms block and sector are sometimes used interchangeably in this context. (Note: The meaning of the term block in connection with the physical configuration of the disk is different from its meaning at the system level. (*See also* block and cluster.)

Sector Slipping — A technique used to push-down defective sector sites during a format or reassignment operation to maintain sequential order of the data. Spares are located throughout the disk for this purpose.

Seek — The movement of a set of read/write heads to a desired location. The actuator moves the heads to the cylinder containing the track and sector where the data is stored.

Seek Time — A measure (in milliseconds) of how fast the hard drive can move its read/write heads to a desired location.

Self-Monitoring, Analysis, and Reporting Technology (S.M.A.R.T.) — A technology to assist the user in preventing possible system down time due to hard drive failure by attempting to predict imminent hard drive failure before it occurs.

Sequential Access — The reading or writing of data in a sequential order as opposed to random access. Magnetic tape drives store data in sequential blocks.

Serial Storage Architecture (SAA) — The general name given to a set of standards being developed by an ANSI-approved X3 group. The set of standards defines a new serial interface that provides a flexible addressing scheme.

Serpentine™ Seek Technology - Effectively reduces the overhead associated with actuator movement, thereby increasing sustained data throughput.

Server — A computer used primarily to store data, providing access to shared resources. Usually contains a network operating system.

Servo Burst — Provides positioning information to the actuator arm, found at equal intervals on each disk surface (embedded servo) or on an entire surface (dedicated servo).

Single-ended SCSI — The standard electrical interface for SCSI. Single-ended means an interface with one signal and one corresponding ground line for each SCSI signal. Used primarily in applications requiring cable lengths under 19 feet (6 meters).

Slave — The second drive in a dual drive combination.

Small Computer System Interface (SCSI) — An interface between a computer and peripheral controllers. Commonly used in enterprise computing and in Apple Macintosh systems. Usually pronounced as “scuzzy.” The equivalent interface system in most personal computers is Enhanced Integrated Drive Electronics, usually called EIDE.

Soft Error — An error that does not repeat when the same location is re-read. Can be corrected by the error recovery process.

Soft Reset - ATA reset type in which the drive resets the interface circuitry according to the Set Features command requirement.

Soft Sectored — A technique that allows the controller to determine the beginning of a sector by reading the format information from the disk.

SPC — SCSI Primary Commands.

Spindle — The center, rod-like axle on which the disks are mounted.

Spindle Motor — The motor that rotates the spindle and ultimately the disks.

Spindle Speed — *See* RPM.

Spindle Synchronization — A feature that causes SCSI hard drives in multiple-drive systems to rotate to the same address location at the same time.

Storage Capacity — The amount of data that can be stored on a hard drive.

Subsystem — A secondary or component part of a system, as a hard drive is a subsystem of a personal computer.

Surface — The top or the bottom side of a platter coated with a magnetic material required to record data. A platter may use one or both surfaces to store data.

Synchronous Transmission — Transmission in which the sending and receiving devices operate continuously at the same frequency and are held in a desired phase relationship by a correction device.

System Files — The files needed to run an operating system.

System Integrator — An independent professional who specifies and provides the necessary combinations of hardware and software in response to an end user's needs.

T

Tagged Queuing — The ability of the drive to receive multiple I/O processes from each initiator.

Task File — The set of I/O Host Interface Registers used to transfer status, commands, and data between the host and the drive for the EIDE interface.

Thin Client Architecture — A computer system in which data is stored centrally, with only limited storage capacity at the various points of use.

Thin Film — A type of coating deposited on a flat surface through a photolithographic process. Thin film is used on disk platters and read/write heads, as well as on the write element of MR heads.

Thin-Film Inductive Head (TFI) — A head technology that uses a thin-film inductive element to read and write data bits on the magnetic surface of the disk.

Thermal Asperity - A thermal asperity is a baseline shift in the readback signal due to heating of the magnetoresistive stripe on the head as a result of physical contact with the disk or a particle.

TPI (Tracks per inch) — The number of tracks written within each inch of the disk's surfaces, used to measure how closely the tracks are packed on a disk surface. Also known as track density.

Track — A concentric magnetic circle pattern on a disk surface used for storing and reading data.

Track-to-track Seek Time — The time that elapses when the read/write heads move from one track to an adjacent track.

Transfer Rate — The rate at which the hard drive sends and receives data from the controller. Processing, head switches, and seeks are all figured into the transfer rate in order to accurately portray drive performance. The burst mode transfer rate is separate from transfer rate, as it refers only to the transfer of data into RAM.

Translating BIOS — A system BIOS that allows access to EIDE drives larger than 528 MB.

U

Ultra ATA/33 — A high-speed host data transfer feature that transfers data at 33.3 MB per second.

Ultra ATA/66 - Data transmission protocol that delivers heightened data integrity to the EIDE interface through use of a 40-pin, 80-conductor cable. Ultra ATA/66 allows host computers to send and receive data at 66.6 MB/s, twice the 33.3 MB/s data transfer speed of Ultra ATA/33.

Ultra SCSI — Provides 20 MB/s transfers over an 8-bit bus or 40 MB/s transfers over a 16-bit Wide SCSI bus. Also known as Fast-20 SCSI, this feature is most commonly found in SCSI-3 drives.

Uncorrectable Error — An error that cannot be overcome using Error Detection and Correction or by re-reading the data when host retries are enabled.

Unformatted Capacity — The total number of usable bytes on a disk, including the space that is required to record location, boundary definitions, and servo data. (*See also* formatted capacity.)

Unrecoverable Error — A read error that cannot be overcome by an ECC scheme or by rereading the data when host retries are enabled.

Untagged Queuing — The ability of the drive to receive a maximum of one I/O process from each initiator.

Upgrade — In hard drives, the replacement of a hard drive with one offering greater capacity or performance, or both.

V

Viterbi Detection — An algorithm used in read channel technology that detects an entire sequence of data bits at a time and determines the most likely sequence of data bits by comparing actual sequence of data bit samples with sequences of possible data bit sample to accurately detect that data written to disk.

Voice Coil — An actuator motor; the force of the magnetic rotary voice coil produces a movement of the head that is proportionate to the force exerted by the coil.

W

WD Caviar™ — The trade name for Western Digital's line of hard drives for desktop personal computers.

WD Enterprise™ — The trade name for Western Digital's line of enterprise hard drives.

WD Expert™ — The trade name for Western Digital's line of high-performance, 7200 RPM hard drives for desktop personal computers.

Windows — Microsoft's series of operating systems for personal computers. Currently popular versions are Windows 95 and Windows 98.

Winchester Disk — Former code name for an early IBM hard disk model, sometimes still used to refer to the technology and design of most traditional hard drives.

Word — Two bytes that are processed together in a single operation.

Workstation — A personal computer with exceptional capacity and performance capabilities for use mainly in engineering, design and audiovisual applications demanding immediate access to data and the ability to manipulate it in technically sophisticated ways.

Write — The recording of flux reversals onto the magnetic surface of a disk.

Write Cache — High speed RAM used to buffer data transfer from the host to the hard drive.

Write Coalescing - Allows the drive to combine write commands that write data to sequential portions of the media into one operation.

Write Verify — Immediately after writing data to the disk, a drive with the Write Verify feature will verify that it can read the data it just wrote to the disk to ensure that it will be able to retrieve it later. If the drive is unable to read the data, it writes it to another area of the disk, where it attempts to write verify it again.

Y

Y2K (Year 2000 Problem) — The risk that computers will be disabled or perform incorrectly if they read the two-digit abbreviation “00” to mean the year 1900 instead of the year 2000, as intended. The problem is said to have originated when early computer programmers abbreviated year dates to save storage space that was scarce and costly at the time. Western Digital hard drives are designed to be “Year 2000-compliant,” and the company’s suppliers are required to demonstrate that their WD-linked communications and products are compliant as well.

Z

Zoned Recording — Increases the data density on the outer tracks of the drive where most of the sectors are located. This type of recording affords more disk capacity because there can be more sectors on the larger outer tracks than would be possible if the number of sectors per track were constant for the whole drive.