

APPENDIX

B

GLOSSARY

ABEL: A programming language for PLDs developed by Data I/O Corporation.

Absolute Addressing: This addressing mode specifies the address of data with the instruction.

Accumulator: Register used for storing the result after most ALU operations; available with 8-bit microprocessors.

Address: A unique identification number (or locator) for source or destination of data. An address specifies the register or memory location of an operand involved in the instruction.

Addressing Mode: The manner in which a microprocessor determines the effective address of source and destination operands in an instruction.

Address Register: A register used to store the address (memory location) of data.

Address Space: The number of storage location in a microcomputer's memory that can be directly addressed by the microprocessor. The addressing range is determined by the number of address pins provided with the microprocessor chip.

American Standard Code for Information Interchange (ASCII): An 8-bit code commonly used with microprocessors for representing alphanumeric codes.

Analog-to-Digital (A/D) Converter: Transforms an analog voltage into its digital equivalent.

AND gate: The output is 1, if all inputs are 1; otherwise the output is 0.

Arithmetic and Logic Unit (ALU): A digital circuit which performs arithmetic and logic operations on two n-bit numbers.

ASIC: Application Specific IC. Chips designed for a specific, limited application. Normally reduces the total manufacturing cost of a product by reducing chip count.

Assembler: A program that translates an assembly language program into a machine language program.

Assembly Language: A type of microprocessor programming language that uses a semi-English-language statement.

Asynchronous Operation: The execution of a sequence of steps such that each step is initiated upon completion of the previous step.

Asynchronous Sequential Circuit: Completion of one operation starts the next operation in sequence. Time delay devices (logic gates) are used as memory.

Asynchronous Serial Data Transmission: The transmitting device does not need to be synchronized with the receiving device.

Autodecrement Addressing Mode: The contents of the specified microprocessor register are first decremented by n (1 for byte, 2 for 16-bit, and 4 for 32-bit) and then the resulting value is used as the address of the operand.

Autoincrement Addressing Mode: The contents of a specified microprocessor register are used as the address of the operand first and then the register contents are automatically incremented by n (1 for byte, 2 for 16-bit, and 4 for 32-bit).

Barrel Shifter: A specially configured shift register that is normally included in 32-bit microprocessors for cycle rotation. That is, the barrel shifter shifts data in one direction.

Base address: An address that is used to convert all relative addresses in a program to absolute (machine) addresses.

Baud Rate: Rate of data transmission in bits per second.

Behavioral Modeling: Using hardware description languages such as Verilog and VHDL, a system can be described in terms of what it does and how it behaves rather than in terms of its components and their interconnections.

Binary-Coded Decimal (BCD): The representation of 10 decimal digits, 0 through 9, by their corresponding 4-bit binary number.

Bit: An abbreviation for a binary digit. A unit of information equal to one of two possible states (one or zero, on or off, true or false).

Block Transfer DMA: A peripheral device requests the DMA transfer via the DMA request line, which is connected directly or through a DMA controller chip to the microprocessor. The DMA controller chip completes the DMA transfer and transfers the control of the bus to the microprocessor.

Branch: The branch instruction allows the computer to skip or jump out of program sequence to a designated instruction either unconditionally or conditionally (based on conditions such as carry or sign).

Breakpoint: Allows the user to execute the section of a program until one of the breakpoint

conditions is met. It is then halted. The designer may then single step or examine memory and registers. Typically breakpoint conditions are program counter address or data references. Breakpoints are used in debugging assembly language programs.

Browser: Program in the personal computer to see contents on the web via http protocol.

Buffer: A temporary memory storage device designed to compensate for the different data rates between a transmitting device and a receiving device (for example, between a CPU and a peripheral). Current amplifiers are also referred to as buffers.

Bus: A collection of wires that interconnects computer modules. The typical microcomputer interface includes separate buses for address, data, control, and power functions.

Bus Arbitration: Bus operation protocols (rules) that guarantee conflict-free access to a bus. Arbitration is the process of selecting one respondent from a collection of several candidates that concurrently request service.

Bus Cycle: The period of time in which a microprocessor carries out read or write operations.

Cache Memory: A high speed, directly accessible, relatively small, semiconductor read/write memory block used to store data/instructions that the microcomputer may need in the immediate future. Increases speed by reducing the number of external memory reads required by the processor. Typical 32 and 64-bit microprocessors are normally provided with on-chip cache memory.

CD (Compact Disc) Memory: Optical memory. Uses laser and stores audio information.

Central Processing Unit (CPU): The brains of a computer containing the ALU, register section, and control unit. CPU in a single chip is called microprocessor.

Chip: An Integrated Circuit (IC) package containing digital circuits.

CISC: Complex Instruction Set Computer. The Control unit is designed using microprogramming. Contains a large instruction set. Difficult to pipeline compared to RISC.

Clock: Timing signals providing synchronization among the various components in a microcomputer system. Analogous to heart beats of a human being.

CMOS: Complementary MOS. Dissipates low power, offers high density and speed compared to TTL.

Combinational Circuit: Output is provided upon application of inputs; contains no memory.

Compiler: A program which translates the source code written in a high-level programming language into machine language that is understandable to the processor.

Condition Code Register: Contains information such as carry, sign, zero, and overflow based on ALU operations.

Control Unit: Part of the CPU; its purpose is to translate or decode instructions read (fetched) from the main memory into the Instruction Register.

Coprocessor: A companion microprocessor that performs specific functions such as floating-point operations independently from the microprocessor to speed up overall operations.

CPLD: Complex PLD. This chip contains several basic PLDs along with all interconnections.

Cycle Stealing DMA: The DMA controller transfers a byte of data between the microcomputer's memory and a peripheral device such as the disk by stealing a clock cycle of microprocessor.

Data: Basic elements of information represented in binary form (that is, digits consisting of bits) that can be processed or produced by a microcomputer. Data represents any group of operands made up of numbers, letters, or symbols denoting any condition, value, or state. Typical microcomputer operand sizes include: a word, which typically contains 2 bytes or 16-bits; a long word, which contains 4 bytes or 32 bits; a quad word, which contains 8 bytes or 64 bits.

Dataflow Modeling: Behavioral modeling with concurrent statements.

Data Register: A register used to temporarily hold operational data being sent to and from a peripheral device.

Debugger: A program that executes and debugs the object program generated by the assembler or compiler. The debugger provides a single stepping, breakpoints, and program tracing.

Decoder: A chip, when enabled, selects one of 2^n output lines based on n inputs.

Demultiplexer: Performs reverse operation of a multiplexer.

Digital to Analog (D/A) Converter: Converts binary number to analog signal.

Diode: Two terminal electronic switch.

Direct Memory Access (DMA): A type of input/output technique in which data can be transferred between the microcomputer memory and external devices without the microprocessor's involvement.

Directly Addressable Memory: The memory address space in which the microprocessor can directly execute programs. The maximum directly addressable memory is determined by the number of the microprocessor's address pins.

DRAM: See Dynamic RAM.

DVD Memory: Stands for Digital Video Disc or Digital Versatile Disc. Optical memory. Uses laser and stores both audio and video information.

Dynamic RAM: Stores data as charges in capacitors and therefore, must be refreshed since capacitors can hold charges for a few milliseconds. Hence, requires refresh circuitry.

EAROM (Electrically Alterable Read-Only Memory): Same as EEPROM or E²PROM. Can be programmed one line at a time without removing the memory from its sockets. This memory is also called read-mostly memory since it has much slower write times than read times.

Editor: A program that produces an error-free source program, written in assembly or high-level languages.

EEPROM or E²PROM: Same as EAROM (see EAROM).

Effective Address: The final address used to carry out an instruction. Determined by the addressing mode.

Emulator: A hardware device that allows a microcomputer system to emulate (that is, mimic) another microcomputer system.

Encoder: Performs reverse operation of a decoder. Contains a maximum of 2ⁿ inputs and n outputs.

EPROM (Erasable Programmable Read-Only Memory): Can be programmed and erased all programs in an EPROM chip using ultraviolet light. The chip must be removed from the microcomputer system for programming.

Equivalence: See Exclusive-NOR.

Exception Processing: Includes the microprocessor's processing states associated with interrupts, trap instructions, tracing, and other exceptional conditions, whether they are initiated internally or externally.

Exclusive-OR: The output is 0, if inputs are same; otherwise; the output is 1.

Exclusive-NOR: The output is 1, if inputs are same; otherwise, the output is 0.

Extended Binary-Coded Decimal Interchange Code (EBCDIC): An 8-bit code commonly used with microprocessors for representing alphanumeric codes. Normally used by IBM.

Firmware: Microprogram is sometimes referred to as firmware to distinguish it from hardwired control (purely hardware method).

Flag(s): An indicator, often a single bit, to indicate some conditions such as trace, carry, zero, and overflow.

Flash Memory: Utilizes a combination of EPROM and EEPROM technologies. Used in cellular phones and digital cameras.

Flip-Flop: One-bit memory.

FPGA: Field Programmable Gate Arrays. This chip contains several smaller individual logic blocks along with all interconnections.

Full-Adder: Adds three bits generating a sum bit and a carry bit.

Gate: Digital circuits which perform logic operations.

Half-Adder: Adds two bits generating a sum bit and a carry bit.

Handshaking: Data transfer via exchange of control signals between the microprocessor and an external device.

Hardware: The physical electronic circuits (chips) that make up the microcomputer system.

Hardwired Control: Used for designing the control unit using all hardware.

HCMOS: High speed CMOS. Provides high density and consumes low power.

Hexadecimal Number System: Base-16 number system.

High-Level Language: A type of programming language that uses a more understandable human-oriented language such as C.

HMOS: High-density MOS reduces the channel length of the NMOS transistor and provides increased density and speed in VLSI circuits.

Immediate Address: An address that is used as an operand by the instruction itself.

Implied Address: An address is not specified, but is contained implicitly in the instruction.

In-Circuit Emulation: The most powerful hardware debugging technique; especially valuable when hardware and software are being debugged simultaneously.

Index: A number (typically 8-bit signed or 16-bit unsigned) is used to identify a particular element in an array (string). The index value typically contained in a register is utilized by the indexed addressing mode.

Indexed Addressing: The effective address of the instruction is determined by the sum of

the address and the contents of the index register. Used to access arrays.

Index Register: A register used to hold a value used in indexing data, such as when a value is used in indexed addressing to increment a base address contained within an instruction.

Indirect Address: A register holding a memory address to be accessed.

Instruction: Causes the microprocessor to carry out an operation on data. A program contains instructions and data.

Instruction Cycle: The sequence of operations that a microprocessor has to carry out while executing an instruction.

Instruction Register (IR): A register storing instructions; typically 32 bits long for a 32-bit microprocessor.

Instruction Set: Lists all the instructions that the microcomputer can execute.

Interleaved DMA: Using this technique, the DMA controller takes over the system bus when the microprocessor is not using it.

Internal Interrupt: Activated internally by exceptional conditions such as overflow and division by zero.

Internet: Connects users from around the world via a web of data transmission lines.

Interpreter: A program that executes a set of machine language instructions in response to each high-level statement in order to carry out the function.

Interrupt I/O: An external device can force the microcomputer system to stop executing the current program temporarily so that it can execute another program known as the interrupt service routine.

Interrupts: A temporary break in a sequence of a program, initiated externally or internally, causing control to jump to a routine, which performs some action while the program is stopped.

I/O (Input/Output): Describes that portion of a microcomputer system that exchanges data between the microcomputer system and an external device.

I/O Port: A register that contains control logic and data storage used to connect a microcomputer to external peripherals.

Inverting Buffer: Performs NOT operation. Current amplifier.

Karnaugh Map: Simplifies Boolean expression by a mapping mechanism.

Keyboard: Has a number of push button-type switches configured in a matrix form (rows

x columns).

Keybounce: When a mechanical switch opens or closes, it bounces (vibrates) for a small period of time (about 10-20 ms) before settling down.

Large-Scale Integration (LSI): An LSI chip contains 100 to 1000 gates.

LED: Light Emitting Diode. Typically, a current of 10 ma to 20 ma flows at 1.7v to 2.4v drop across it.

Local Area Network: A collection of devices and communication channels that connect a group of computers and peripheral devices together within a small area so that they can communicate with each other.

Logic Analyzer: A hardware development aid for microprocessor-based design; gathers data on the fly and displays it.

Logical Address Space: All storage locations with a programmer's addressing range.

Loops: A programming control structure where a sequence of microcomputer instructions are executed repeatedly (looped) until a terminating condition (result) is satisfied.

Machine Code: A binary code (composed of 1's and 0's) that a microcomputer understands.

Machine Language: A type of microprocessor programming language that uses binary or hexadecimal numbers.

Macroinstruction: Commonly known as an instruction; initiates execution of a complete microprogram. Example includes assembly language instructions.

Macroprogram: The assembly language program.

Mask: A pattern of bits used to specify (or mask) which bit parts of another bit pattern are to be operated on and which bits are to be ignored or "masked" out. Uses logical AND operation.

Mask ROM: Programmed by a masking operation performed on the chip during the manufacturing process; its contents cannot be changed by user.

Maskable Interrupt: Can be enabled or disabled by executing typically the interrupt instructions.

Memory: Any storage device which can accept, retain, and read back data.

Memory Access Time: Average time taken to read a unit of information from the memory.

Memory Address Register (MAR): Stores the address of the data.

Memory Cycle Time: Average time lapse between two successive read operations.

Memory Management Unit (MMU): Hardware that performs address translation and protection functions.

Memory Map: A representation of the physical locations within a microcomputer's addressable main memory.

Memory-Mapped I/O: I/O ports are mapped as memory locations, with every connected device treated as if it were a memory location with a specific address. Manipulation of I/O data occurs in "interface registers" (as opposed to memory locations); hence there are no input (read) or output (write) instructions used in memory-mapped I/O.

Microcode: A set of instructions called "microinstructions" usually stored in a ROM in the control unit of a microprocessor to translate instructions of a higher-level programming language such as assembly language programming.

Microcomputer: Consists of a microprocessor, a memory unit, and an input/output unit.

Microcontroller: Typically includes a microcomputer, timer, A/D (Analog to Digital) and D/A (Digital to Analog) converters in the same chip.

Microinstruction: Most microprocessors have an internal memory called control memory. This memory is used to store a number of codes called microinstructions. These microinstructions are combined to design the instruction set of the microprocessor.

Microprocessor: The Central Processing Unit (CPU) of a microcomputer.

Microprocessor Development System: A tool for designing and debugging both hardware and software for microcomputer-based system.

Microprocessor-Halt DMA: Data transfer is performed between the microcomputer's memory and a peripheral device either by completely stopping the microprocessor or by a technique called cycle stealing.

Microprogramming: The microprocessor can use microprogramming to design the instruction set. Each instruction in the Instruction register initiates execution of a microprogram stored typically in ROM inside the control unit to perform the required operation.

Monitor: Consists of a number of subroutines grouped together to provide "intelligence" to a microcomputer system. This intelligence gives the microcomputer system the capabilities for debugging a user program, system design, and displays.

Multiplexer: A hardware device which selects one of n input lines and produces it on the output.

Multiprocessing: The process of executing two or more programs in parallel, handled by multiple processors all under common control. Typically each processor will be assigned specific processing tasks.

Multitasking: Operating system software that permits more than one program to run on a single microprocessor. Even though each program is given a small time slice in which to execute, the user has the impression that all tasks (different programs) are executing at the same time.

Multiuser: Describes a computer operating system that permits a number of users to access the system on a time-sharing basis.

NAND: The output is 0, if all inputs are 1; otherwise, the output is 1.

Nanomemory: Two-level ROM used in designing the control unit.

Nested Subroutine: A commonly used programming technique in which one subroutine calls another subroutine.

Nibble: A 4-bit word.

Non-inverting Buffer: Input is same as output. Current amplifier.

Nonmaskable Interrupt: Occurrence of this type of interrupt cannot be ignored by microcomputer and even though interrupt capability of the microprocessor is disabled. Its effect cannot be disabled by instruction.

Non-Multiplexed: A non-multiplexed microprocessor pin that assigns a unique function as opposed to a multiplexed microprocessor pin defining two functions on time-shared basis.

NOR: The output is 1, if all inputs are 0's; otherwise, the output is 0.

NOT gate: If the input is 1, the output is 0, and vice versa.

Object Code: The binary (machine) code into which a source program is translated by a compiler, assembler, or interpreter.

Octal Number System: Base 8-number system.

Ones Complement: Obtained by changing 1's to ' 0's, and 0's to 1's of a binary number.

One-Pass Assembler: This assembler goes through the assembly language program once and translates the assembly language program into a machine language program. This assembler has the problem of defining forward references. See Two-Pass Assembler.

Op Code (Operation Code): Part of an instruction defining the operation to be

performed.

Operand: A datum or information item involved in an operation from which the result is obtained as a consequence of defined addressing modes. Various operand types contain information, such as source address, destination address, or immediate data.

Operating System: Consists of a number of program modules to provide resource management. Typical resources include microprocessors, disks, and printers.

OR Gate: The output is 0, if all inputs are 0; otherwise, the output is 1.

Page: Some microprocessors, divide the memory locations into equal blocks. Each of these blocks is called a page and contains several addresses.

Parallel Operation: Any operation carried out simultaneously with a related operation.

Parallel Transmission: Each bit of binary data is transmitted over a separate wire.

Parity: The number of 1's in a word is odd for odd parity and even for even parity.

Peripheral: An I/O device capable of being operated under the control of a CPU through communication channels. Examples include disk drives, keyboards, CRT's, printers, and modems.

Personal Computer: Low-cost, affordable microcomputer normally used by an individual for word processing and Internet applications.

Physical Address Space: Address space is defined by the address pins of the microprocessor.

Pipeline: A technique that allows a microcomputer processing operation to be broken down into several steps (dictated by the number of pipeline levels or stages) so that the individual step outputs can be handled by the microcomputer in parallel. Often used to fetch the processor's next instruction while executing the current instruction, which considerably speeds up the overall operation of the microcomputer. Overlaps instruction fetch with execution.

Pointer: A storage location (usually a register within a microprocessor) that contains the address of (or points to) a required item of data or subroutine.

Polled Interrupt: A software approach for determining the source of interrupt in a multiple interrupt system.

POP Operation: Reading from the top or bottom of stack.

Port: A register through which the microcomputers communicate with peripheral devices.

Primary or Main Memory: Storage that is considered as part of the microcomputer. The microcomputer can directly execute all instructions in the main memory. The maximum size of the main memory is defined by the number of address pins in the microprocessor.

Privileged Instructions: An instruction which can only be executed by the microprocessor in the supervisor (operating system) mode.

Processor Memory: A set of microprocessor registers for holding temporary results when a computation is in progress.

Program: A self-contained sequence of computer software instructions (source code) that, when converted into machine code, directs the computer to perform specific operations for the purpose of accomplishing some processing task. Contains instructions and data.

Program Counter (PC): A register that normally contains the address of the next instruction to be executed in a program.

Programmable Array Logic (PAL): Contains programmable AND gates and fixed OR gates. Similar to a ROM in concept except that it does not provide full decoding of the input lines. PAL's can be used with 32-bit microprocessors for performing the memory decode function.

Programmable Logic Array (PLA): Contains programmable AND and Programmable OR gates.

Programmable Logic Device (PLD): Contains AND gates and OR gates.

Programmed I/O: The microprocessor executes a program to perform all data transfers between the microcomputer system and external devices.

PROM (Programmable Read-Only Memory): Can be programmed by the user by using proper equipment. Once programmed, its contents cannot be altered.

Protocol: A list of data transmission rules or procedures that encompass the timing, control, formatting, and data representations by which two devices are to communicate. Also known as hardware "handshaking", which is used to permit asynchronous communication.

PUSH Operation: Writing to the top or bottom of stack.

Random Access Memory (RAM): A read/write memory. RAMs (static or dynamic) are volatile in nature (in other words, information is lost when power is removed).

Read-Only-Memory (ROM): A memory in which any addressable operand can be read from, but not written to, after initial programming. ROM storage is nonvolatile (information is not lost after removal of power).

Reduced Instruction Set Computer (RISC): A simple instruction set is included. The RISC architecture maximizes speed by reducing clock cycles per instruction. The control

unit is designed using hardwired control. Easier to implement pipelining.

Register: A high-speed memory usually constructed from flip-flops that are directly accessible to the microprocessor. It can contain either data or a specific location in memory that stores word(s) used during arithmetic, logic, and transfer operations.

Register Indirect: Uses a register which contains the address of data.

Relative Address: An address used to designate the position of a memory location in a routine or program.

RISC: See Reduced Instruction Set Computer.

Routine: A group of instructions for carrying out a specific processing operation. Usually refers to part of a larger program. A routine and subroutine have essentially the same meaning, but a subroutine could be interpreted as a self-contained routine nested within a routine or program.

Scalar Microprocessor: Provided with one pipeline. Allows execution rate of one clock cycle per instruction for most instructions. The 80486 is a scalar microprocessor.

Scaling: Multiplying an index register by 1,2,4 or 8. Used by the addressing modes of typical 32- and 64-bit microprocessors.

Schmitt Trigger: An analog circuit that provides high noise immunity.

SDRAM: Synchronous DRAM. This chip contains several DRAMs internally. The control signals and address inputs are sampled by the SDRAM by a common clock.

Secondary Memory Storage: An auxiliary data storage device that supplements the main (primary) memory of a microcomputer. It is used to hold programs and data that would otherwise exceed the capacity of the main memory. Although it has a much slower access time, secondary storage is less expensive. Examples include floppy and hard disks.

Sequential Circuit: Combinational circuit with memory.

Serial Transmission: Only one line is used to transmit the complete binary data bit by bit.

Server: Large computer performing actual work on the Internet.

Seven-Segment LED: Contains an LED in each of the seven segments. Can display numbers.

Single-Chip Microcomputer: Microcomputer (CPU, memory, and input/output) on a chip.

Single-chip Microprocessor: Microcomputer CPU (microprocessor) on a chip.

Single Step: Allows the user to execute a program one instruction at a time and examine contents of memory locations and registers.

Software: Programs in a microcomputer.

Source Code: The assembly language program written by a programmer using assembly language instructions. This code must be translated to the object (machine) code by the assembler before it can be executed by the microcomputer.

SRAM: See Static RAM.

Stack: An area of read/write memory typically used by a microcomputer during subroutine calls or occurrence of an interrupt. The microcomputer saves in the stack the contents of the program counter before executing the subroutine or program counter contents and other status information before executing the interrupt service routine. Thus, the microcomputer can return to the main program after execution of the subroutine or the interrupt service routine. The stack is a last in/first out (LIFO) read/write memory (RAM) that can also be manipulated by the programmer using PUSH and POP instructions.

Stack Pointer: A register used to address the stack.

Standard I/O: Utilizes a control pin on the microprocessor chip typically called the M/\overline{IO} pin, in order to distinguish between input/output and memory; IN and OUT instructions are used for input/output operations.

Static RAM: Also known as **SRAM**. Stores data in flip-flops; does not need to be refreshed. Information is lost upon power failure unless backed up by battery.

Status Register: A register which contains information concerning the flags in a processor.

Structural Modeling: Using hardware description languages such as Verilog and VHDL, a schematic or a logic diagram can be described.

Subroutine: A program carrying out a particular function and which can be called by another program known as the main program. A subroutine needs to be placed only once in memory and can be called by the main program as many times as the programmer wants.

Superscalar Microprocessor: Provided with more than one pipeline and executes more than one instruction per clock cycle. The Pentium is a superscalar microprocessor.

Supervisor State: When the microprocessor processing operations are conducted at a higher privilege level, it is usually in the supervisor state. An operating system typically executes in the supervisor state to protect the integrity of “basic” system operations from user influences.

Synchronous Operation: Operations that occur at intervals directly related to a clock period.

Synchronous Sequential Circuit: The present outputs depend on the present inputs and the previous states stored in flip-flops.

Synchronous Serial Data Transmission: Data is transmitted or received based on a clock signal.

TCP/IP: Protocol used on the Internet.

Tracing: Allows single stepping. A dynamic diagnostic technique permits analysis (debugging) of the program's execution.

Transistor: Electronic switch; performs NOT; current amplifier.

Tristate Buffer: Has three output states: logic 0, 1, and a high-impedance state. This chip is typically enabled by a control signal to provide logic 0 or 1 outputs. This type of buffer can also be disabled by the control signal to place it in a high-impedance state.

Two's Complement: The two's complement of a binary number is obtained by replacing each 0 with a 1 and each 1 with a 0 and adding one to the resulting number.

Two-Pass Assembler: This assembler goes through the assembly language program twice. In the first pass, the assembler assigns binary addresses to labels. In the second pass, the assembly program is translated to the machine language. No problem with forward branching.

UART (Universal Asynchronous Receiver Transmitter): A chip that provides all the interface functions when a microprocessor transmits or receives data to or from a serial device. Converts serial data to parallel and vice versa. Also called ACIA (Asynchronous Communications Interface Adapter) by Motorola.

User State: Typical microprocessor operations processing conducted at the user level. The user state is usually at lower privilege level than the supervisor state. In the user mode, the microprocessor can execute a subset of its instruction set, and allows protection of basic system resources by providing use of the operating system in the supervisor state. This is very useful in multiuser/multitasking systems.

Vectored Interrupts: A device identification technique in which the highest priority device with a pending interrupt request forces program execution to branch to an interrupt routine to handle exception processing for the device.

Verilog: Not an acronym. Hardware design language developed by Gateway Design Automation in 1984 and later acquired by Cadence Design Systems. Verilog syntax is based mostly on C and some Pascal. Used for programming CPLD and FPGA chips.

Very Large Scale Integration (VLSI): a VLSI chip contains more than 1000 gates. More commonly, a VLSI chip is identified by the number of transistors rather than the gate count.

VHDL: Stands for VHSIC (Very High Speed Integrated Circuit) Hardware Description Language. Developed by US Department of Defense. Syntax is based on Ada. can be used to program CPLD and FPGA chips.

Virtual Memory: An operating system technique that allows programs or data to exceed the physical size of the main, internal, directly accessible memory of the microcomputer. Program or data segments/pages are swapped from external disk storage as needed. The swapping is invisible (transparent) to the programmer. Therefore, the programmer does not need to be concerned with the actual physical size of internal memory while writing the code.

Web: All the interconnected data sources that can be accessed by the personal computers on the Internet.

Wide Area Network: Data network connecting systems within a large area.

Word: The bit size of a microprocessor refers to the number of bits that can be processed simultaneously by the basic arithmetic and logic circuits of the microprocessor. A number of bits taken as a group in this manner is called a word.