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**S-100 bus** an industry standard BUS meaning that there are 100 connections to circuits in the system available on that bus.

**Sampling** a technique or circuit in which only some signals or data are read. They can then be interpreted to form a much wider conclusion, based on statistical sampling techniques. ◊ QUALITY CONTROL (QC).

**Satellite** a preprocessor, or computer which serves another more important computer. Certain configurations are known as attached support processors. ◊ PROCESSOR.

**Saturation** the maximum capacity of a component, device, circuit or system.

**Scaler** a device used in counting systems where an output is produced for every predetermined number of inputs, e.g. a binary scaler requires two inputs for one output, a decade scaler ten, and so on. In these cases binary and decade are known as the 'scaling factors'.

**Scan** the process of continually reading all signals or data, either as presented (in the case of optical character recognition) or automatically on a regular basis, as in the case of a time sharing system in which each terminal is polled in turn. The process may involve converting analog to digital signals or digitising shapes or images. ◊ BAR CODE.

**Scanner** the device used for scanning purposes. ◊ SCAN.

**Scatter** the distribution of readings at a single point around the norm of the plot. Used in mathematical techniques like multiple regression analysis and statistical sampling methods.

**Schematic** a line drawing indicating function, size, main components, inputs and outputs. It is generally used to illustrate concepts, not for production purposes.

**Schmitt trigger** used in binary logic circuits it involves a BISTABLE circuit from which a binary voltage output level is produced, based on the magnitude of the input level. Thus output can be interpreted as a zero or a one.

**Schottky effect** a very fast switching diode can be created by

substituting a metal barrier in place of a pn junction. The metal/semiconductor contacts acts as the barrier junction. ◊BARRIER EFFECT.

**Scratchpad** a term applied to a small fast computer memory, such as a register, which temporarily stores information, for example sub-totals which are required to be added together for a final total.

**Screen** the phosphor coated surface of a Cathode Ray Tube (CRT) in a video display unit or monitor.

**Screen handling** the software that enables a programmer to display data upon a screen and to tie several screens into a system, all capable of using the same program, inputting data into the same system running the same programs and enquiring on the same data base or files.

**Second source** an alternative, or one of a number of alternatives, for procurement of a critical component or device. For example, many of the most popular microprocessors are fabricated by second source suppliers, under licence from the original designers and prime suppliers.

**Segment** a cohesive and discrete part of a program which can be held in memory at one time but can be stored elsewhere separately from other segments of a program if necessary. Segmenting is used to break up larger programs so that they can be stored conveniently, rather than in one large contiguous block of memory. ◊VIRTUAL MEMORY.

**Select** where a manufacturing process for discrete elements or sub assemblies produces products with a wide range of output characteristics a special inspection and quality control system is established to grade and select the products by performance. The ratio between price and performance for such selected components is more likely to increase on a geometric scale rather than a linear scale, due to the high proportion of reject devices necessary to produce one device to a satisfactory performance specification.

**Selection** an automatic process in systems work where, based on certain input parameters, variables may be identified and reported upon. Used in such things as enquiry programming languages where, for example, a user might want to list all occasions where a certain condition has been met or exceeded.

**Semiconductor** a material such as silicon or germanium in

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which the electrical conductivity lies between that of conductors and insulators. It also has a crystal structure whose atomic bonds allow the conduction of current by either positive or negative carriers when the appropriate dopants are added, in which the degree of electrical conductivity of the material is especially sensitive. The major categories of semiconductor memories are bipolar, n-channel MOS (nMOS or NMOS) and p-channel MOS, (pMOS or PMOS).  
 ◇ TRANSISTOR, BIPOLAR, nMOS and pMOS.

**Sense** to read or examine an input to a circuit or system to determine presence or absence of signals or data. Can be applied to comparative values in which case only data falling within predefined limits (parameters) is accepted.

**Sensor** often a transducer, a device which converts physical data or phenomena into digital or analog signals. The signals are often capable of being read by a computer which in turn may produce an output signal or activate an output device, (an output transducer, for example). Any transducer or sensing element may be regarded as a sensor, often grandly known as sensory perceptrors. ◇ TRANSDUCER.

**Sensory perceptrors** ◇ SENSORS, TRANSDUCERS.

**Sentinel (Milestone)** a marker in a program or in a project management system symbolising a logical break point, or a sub-task completion.

**Sequential** a program, circuit or system in which the logic dictates that a known or predetermined sequence of events is to be followed, such as numeric, alphabetic, input/output, low/high, etc.

**Sequential Controller** ◇ PC, PROGRAMMABLE LOGIC CONTROLLERS.

**Serial communication (serial input/output)** describes the condition in which one bit of data at a time is transmitted over a line.  
 ◇ RS232C.

**Serial Input Output** ◇ SIO.

**Series (circuit)** a combination of components connected end to end in a circuit so that current flows along one prescribed path.

**Servo system** ◇ FEEDBACK.

**Shift** in arithmetic or multiplication on output, the decimal point is shifted left or right to indicate changes in power.

**Short** a short circuit.

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**Shunt** parallel connections to a pair of terminals enabling current to follow two routes (or more).

**SI** *Système Internationale*. ⇧ INTERNATIONAL SYSTEM.

**Sign bit** a binary digit (bit) which gives an arithmetic value its algebraic sign when held in binary form.

**Signal** in brief, any electrical pulse which can be interpreted as information.

**Signal conditioning** the process of filtering and purifying a signal; of protecting it from power surges and providing the exact signal strength to the circuit or system which requires the signal.  
⇧ POWER SUPPLY, POWER TRANSFORMER.

**Signal inverter** a device for converting Direct Current (DC) into Alternating Current (AC). Another use of the term is for a logic system where a high input signal results in a low input signal, and vice versa.

**Silicon (Si)** a very common element. In the form of Dioxide (or Silica) it is widely used as a semiconductor material. ⇧ QUARTZ.

**Silicon crystal** the pure form of Silicon, reduced from Silicon Dioxide. The crystal is grown from the molten Silicon by inserting a perfect single crystal seed and slowly turning and withdrawing it from the melt. When the process is complete the crystal is ground to a standard cylinder size of 3 inches or 100 millimetres diameter. The crystal is then sliced into wafers upon which integrated circuits are fabricated.

**Silicon on Sapphire** ⇧ SOS.

**SIL/SIP** Single In Line/ Single In Line Package. Refers to the alignment of connection pins from the plastic or ceramic casing surrounding a chip or integrated circuit in its packaged form.  
⇧ DIL/DIP.

**Simulate** to represent the behaviour of a system or process by a model. The model may be a hardware or a software device. The object is to obtain an evaluation of the behaviour of the system without the time, expense or risk inherent in the operation of the real system or process. For example, space launches may be simulated by a computer in order to test subsidiary systems.

**Simulator** the term given to the model that simulates something else. In the specific case of the microprocessor it is a special program

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that simulates the logical operations of another processor, thus enabling programs generated by a CROSS ASSEMBLER to be executed. Useful for validating programs prior to loading them into ROM.

**Sine wave** the wave form adopted by alternating current, following a known oscillation and amplitude, plotted against time. A sinusoidal curve.

**Single board microcomputer** the term given to a functioning microcomputer combined on a single printed circuit board. The board contains a central processor, memory, input/output interfaces and various other facilities, depending upon the sophistication of the board's specification.

**Sink** short for heat sink; a device to absorb unwanted thermal energy.

**SIO** Serial Input Output interface. A device for accepting serial input and converting to parallel output.

**Slash** ◇ BACKSLASH.

**Small-scale Integration (SSI)** a term applied to integrated circuits containing from one to twenty logic gates.

**Smoothing** a technique to flatten out peaks in a signal or data so that they fall within acceptable parameters.

**Soak** the process of submitting an electronic device or circuit to a continuous environmental loading. Can be applied to heat or power.

**Software** programs which can be changed and loaded at will. Software is the language used by the programmer to communicate with the computer. Software programs reside in Random Access Memory (RAM) and are entered from keyboard, paper or magnetic tape, disk or any other peripheral device. ◇ HARDWARE and FIRMWARE.

**Software emulation** to build a software model of another computer system. In this way programs written for another computer may be evaluated without the expense of buying a separate machine. ◇ MODELLING, SIMULATE.

**Software House** a computer business that obtains the major part of its income from the sale of software.

**Software Instruction** ◇ INSTRUCTION.

**Software package** ◇ APPLICATION PROGRAM.

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**Soldering** the normal method of providing a secure conductive adhesion between a printed circuit board and a chip or component. In production the printed circuit boards are mounted with components, their pins being inserted into holes drilled in the pcb, placed in a fixture and then passed over a fountain of liquid solder to secure them in position. This process is known as flow-soldering; it ensures a good electrical connection and secure attachment to the printed circuit board.

**Solenoid** a current-carrying coil containing an iron core. A current is passed through the coil, generating a magnetic field which moves the core backwards or forwards. A solenoid is used as a switch. There is no proportional control of the movement of the core thus it can only be used as a binary device, either in the on or off position.

**Solid state** the areas of physics which deals with materials in their solid form, and having no moving parts. All silicon semiconductors are solid-state devices.

**Solvent** the liquid used to wash away the etched portion of circuits produced by the photolithography and photoetching process. ♢ PHOTOLITHOGRAPHY.

**Sort** the generic name for the family of computer programs which can read and rearrange data into a predetermined sequence. Sort programs can be highly specialised and specific to particular tasks. The majority of sorts involve reading and writing data onto peripheral devices, often disks but by no means exclusively. Some data can be held and sorted in memory but only on the largest mainframes is it possible selectively to undertake the efficient core-sort. This implies loading all the data to be sorted directly into memory and completing the sort in memory.

**SOS** Silicon on Sapphire. The use of sapphire as opposed to silicon as an insulating substrate in METAL OXIDE SEMICONDUCTOR technology (MOS).

**Source** a semiconductor's electrode. ♢ DRAIN.

**Source code (Source program)** the original programming statements as they exist in the language that the programmer has used to write the program, i.e. the high or low level programming language. It is generally taken to mean the program as it exists after all error correction and debugging has been completed. It can also include

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patches where the program has been in use and contains amendments. The source program is then compiled, or assembled, to produce an object program which the computer can then execute. The computer cannot execute a source program; it has to be translated by the use of a compiler, assembler or translator.

**Specification** the parameters and performance characteristics which accurately define a product, process, component or system. See also REQUIREMENTS SPECIFICATION.

**Spike** an occasional massive voltage surge which passes through a circuit. If overload protection has not been included in the basic circuit construction a spike could easily destroy a device, hence the need for optical isolation and other overload protection techniques. Power supplies which are capable of producing occasional spikes are sometimes referred to as 'dirty'.

**SPOOL** an acronym of arguable parentage. One definition is Simultaneous Peripheral Operations OverLap. It refers to one method of improving a multiprogramming computer's operation. For example, input will be organised on reading. It will not be processed but is written onto disk. This is undertaken in the BACKGROUND partition on a low priority. When sufficient FOREGROUND time becomes available processing takes place, output being written onto disk again. When a printer becomes available a disk-to-print program then transfers data from the disk to the printer.

Spooling attempts to optimise the efficient use of a peripheral device and the central processor, and is widely used in large and commercial data processing facilities. Unless a microcomputer has an array of microprocessors as the computing unit it is doubtful whether the speed of any of the microprocessor peripherals, or the processor would benefit from a spooling system – yet!

**SQC** Statistical Quality Control. ⇧ QC (QUALITY CONTROL), SAMPLING.

**SSI** ⇧ SMALL SCALE INTEGRATION.

**Stable** a condition where no unwanted variations of signal occur. A state of equilibrium.

**Stack** a block of successive memory locations which is accessible from one end, on a LIFO or FIFO basis. Some systems permit many

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## 100 *Stack addressing*

stacks to reside in main memory, only two of them being capable of being used at one time.

**Stack addressing**    ◊ ADDRESSING MODE.

**Stack pointer**    the stack pointer keeps track of storage and retrieval of information in the stack; it is coordinated with the stack.

**Stand alone**    self contained system that exists and performs as an autonomous unit. Many electronic and computer devices operate either in a stand alone mode or as a peripheral device for a larger system, for example, intelligent terminals.

**Standardisation**    nationally and internationally agreed sets of rules for interfacing, dimensions, performance, measurement, limits and fits and interchangeability of parts.

**Standby**    back up equipment or routines that enable a system to keep operating even though an important element may be temporarily out of operation.

**Start-stop**    used in data communications. When transmitting data over a wire a signal is transmitted telling the receiver to receive data. At the end of transmission it sends a signal telling it to stop reading data. Effectively a logical on/off switch.

**Statements**    lines of code in a computer program. The content of the statement depends upon the programming language being used. Generally speaking the high level languages need fewer statements to achieve a working program. ◊ SOURCE CODE.

**Static**    either applied to a state of immobility or to electrical charges being present in a non moving conductor, i.e. static electricity, static discharge.

**Static memory**    Static RAM (Random Access Memory) holds the contents of memory as long as power is being input. Contrast to DYNAMIC MEMORY.

**Status codes**    indicators used to record the state of data in an accumulator, for example, zero, carry, minus and sum.

**Step and repeat**    a software technique, often used to find a precise value or state. A subroutine is used on each value or in equal numeric steps, or in a file or array until it finds the required value.

**Step function**    a mathematical term in which the number or function used has the effect of applying a dramatic increase in the calculated sum. Graphically, where the XY coordinate goes into a

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vertical line for a period before levelling off. ◊ QUANTUM JUMP.

**Step counter** used by the ARITHMETIC AND LOGIC UNIT (ALU) to keep track of the iterations or steps in arithmetic operations.

**Stepper motor** an electric motor in which speed can be regulated by a built-in gearbox. When connected to an external gearbox a proportionally controlled actuator may be constructed. Compare to SOLENOID.

**Stochastic** a programming term describing a learning process. In this case a discrete software model is created and the eventual totals in accumulators or registers can be used to form conclusions. This is a random learning technique. It may be used for such tasks as statistical analysis over a wide range of samples. ◊ HEURISTIC.

**Stop bit** in data transmission, the bit (binary digit) that is used to describe end of character so that the receiving system then inserts an intercharacter space.

**Storage** a word used synonymously with memory. Is also applied to any medium or device which can store information.

**Stored program** a computer program retained in memory, as opposed to being held on tape, cards or in a plug-board.

**Strain gauge** an instrument employing a TRANSDUCER which converts the strain measured at the surface of an object into a digital or analog value, by means of appropriate circuitry and display devices.

**String** a stream of sequentially organised data.

**Strobe (Strobe pulse)** a pulse which defines a specific window in time during which data may be transferred to another device or part of the circuit.

**Subroutine** part of a master routine or program. The object of a BRANCH or jump command. It needs to be returned to its own location in memory after used. ◊ ROUTINE.

**Subscript** used in mathematics and the physical sciences to denote an iota or qualifying letter or numeral written below the main script. ◊ INFERIORS.

**Subset** a selection of the full complement of data or the full instruction set of a programming language.

**Substrate** the material on which a circuit is constructed or fabricated. Can perform insulation, separation and various other

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secondary functions. ◊ INTEGRATED CIRCUIT.

**Sudden death** dramatic failure of a component.

**Superconductivity** the theoretical condition that exists when a conductor is cooled to zero degrees absolute. At this temperature electrical resistance should not exist. Thus the lower the temperature in a circuit the better conductor that circuit becomes. At present a theoretical condition. ◊ JOSEPHSON MEMORY, GLASSY METAL.

**Superiors** ◊ SUBSCRIPT, INFERIORS.

**Superscript** Qualifying characters written above the main script. ◊ SUBSCRIPT.

**Supersensitive** devices that operate under minimal power or stimulæ.

**Supervisor** one of the terms applied to the overall monitoring role of an OPERATING SYSTEM. That part of the operating system which enables an operator to 'talk' to the computer, via a console.

**Support** the generic term for the additional resources necessary to ensure the smooth and continuous operation of a computer installation. Generally referring to a supplier's staff and facilities, it includes programmers, education, maintenance, spares, etc.

**Surge** ◊ SPIKE, DROP OUT.

**Switch** any device, hardware or software which converts a system, device, product, process or program from an 'off' status to an 'on' status, or vice versa.

**Switch delay** the time taken from instructing a switch to perform its function to the resultant action.

**Switching circuit** a circuit which facilitates making, breaking or changing connections in a larger circuit. When combined together switching circuits can perform logical operations. See appendix for LOGIC CIRCUITS.

**Symbolic name** synonymous with LABEL.

**Synchronous (sync., in sync)** activities that take place in perfectly coordinated timing, often under the control of a clock or timer.

**Synchronous transmission** communication in which both sender and receiver are simultaneously open and operating in phase, with constant time intervals between messages.

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**Syntax** the grammar or rules of a particular computer language. All languages have strict conventions and many will refuse to compile or assemble a SOURCE LANGUAGE statement that contains misplaced symbols. Remembering that a space is interpreted by the computer as a symbol, if a comma has been omitted and only a space is read, certain compilers will halt due to syntactic error. This type of compiler is known as an intolerant compiler, (often as something much coarser by programmers). Other compilers will continue but list out that statement as having a syntax error, for correction on a subsequent run. The compiler messages are called 'diagnostics'.

**Systems analysis** the process of analysing the best solution to a problem, either in terms of problem analysis or systems design prior to programming. It can include a clear problem definition, block diagrams of the steps involved in any solution and detailed instructions to programmers on logic, file design and program structure.

**Systems design** the outline construction of a computer system; a necessary prerequisite to programming.

**Systems generation** the process of assembling a complex program by locating and positioning all the subroutines, utilities and specially written programs prior to processing data.

**Systems House** a computer business which assembles computer hardware from various sources and writes unique software to enable that hardware to perform its unique function.

**Systems Integrator** Synonymous with SYSTEMS HOUSE.

**Systems software** the basic software tools provided by the supplier. Includes operating system, programming languages, text editors, diagnostic and debugging aids.

**Systems test** the running of a complete system, hardware, firmware and software, using data where known output and results are already available, for comparative purposes. A necessary state in evaluation before acceptance. † PARALLEL RUN.

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**Table (Decision table)** where a point in a program involves making a decision the action to be taken is either written into (embedded) the program logic or it can point to a decision table. This table is a matrix, or array, held in memory at the time of program execution. By referring to a decision table the program compares the conditions that exist, reads out the action to be taken and then inserts that action into the program being executed.

Another use of the same term can be a description of the programming problem during the systems analysis phase.

**Tag connectors** a range of standard connectors, generally for industrial purposes, which are designed to plug into edge connectors or to make other conveniently positioned electrical connections.

**Tandem** connecting two outputs from one circuit to two inputs of the next circuit.

**Tap (Tapping)** a conductor that connects with a point on a coil. Different positions can be selected on a coil to give different tapings, as in the case of a LINE TRANSFORMER.

**Tape** the media, either paper or magnetic, which is used to store coded information for a computer system.

**Tape drive** the device which powers and controls the movement of magnetic tape past the read/write head.

**Target (machine)** the intended (or host) processor for which software is designed.

**Task** a specific job that a computer or system has to perform. A computer can be dedicated to a particular task (single tasking) or can be shared for several purposes (multi-tasking). These definitions are more usually applied to computers in a process control environment.

**TDM** Time Division Multiplexing the technique for transmitting different signals over the same line by separating the signals with standard time intervals. Thus several different sources of signal could use a time divided multiplexer to input to a corresponding number of devices over a shared path or communications line.

**Terminal** a peripheral device to a computer providing input or output capability, or both. Generally applied to interactive devices,

such as a video display unit but a more accurate interpretation is any device that terminates any input/output connection. In a specifically electronic sense a terminal is the connection point provided on a printed circuit board, electronic device or on wires and cables.

**Test data** the known data producing known results that provides the datum for testing a new or changed system.  $\diamond$  SYSTEMS TEST.

**Test gear** inspection equipment aimed at proving or gauging certain key characteristics for an electronic device, especially where it may be concerned with control over mechanical products.

**Test rig** an improvised version of test gear, or inspection equipment. Used in the laboratory or the field test environment.

**Text editor** a program which enables input and correction of the SYNTAX and SOURCE CODE statements without necessarily addressing the logic of the program. A boon to programmers who tend to make more mistakes in inputting a program than in its writing.

**Text processing** the processing of variable length alphabetic information for the purpose of composition. Includes complex hyphenation rules, text editing, justification, area make up, page make up and many special processes unique to the printing and publishing industry. Output is generally through a typesetter which produces photographic output media, ready for printing. This term applies strictly to text in variable length FIELDS. Data processing is normally, but not exclusively, performed on a fixed field length, mainly numeric data.

Word processing is a subset of text processing, largely applied to the production of letters and standard typed material.

**Thermistor** a resistor which exhibits a high coefficient of resistance to temperature, thus its change in resistance due to changes in temperature is repeatable and reliable. Two main types are available; one in which resistance increases with temperature rise, and the inverse, one in which resistance decreases with temperature rise.

**Thermocouple** a type of transducer in which two dissimilar conductive metals are bonded together. The effect of temperature change results in an electrical reaction which can be translated to give a digital or analog readout.

**Throughput** a measure of the volume of work which a system can accommodate. Used for comparative purposes.

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## 106 *Time Division Multiplexing*

**Time Division Multiplexing**    ◊ TDM.

**Time sharing**    a system where any and all users can gain immediate access to and apparently obtain immediate use of all the facilities of a computer. The operating system organises sharing of facilities to provide an acceptable level of service to all users. ◊ REAL TIME.

**Time slice**    a specific time interval during which a device has exclusive use (or priority use) of a systems resource, such as the processor. A technique used for polling (or interrogation) in some time-sharing systems.

**Time switch**    a circuit making or breaking device with a built in timer, to enable breaking or completion of a circuit to take place at predictable times.

**Timer**    ◊ REAL TIME CLOCK.

**Timing and control circuits**    the synchronising elements of a system which ensure that control signals, read/write signals, etc. are sent to the appropriate device so that reading and writing take place when requested by the processor.

**Timing loop**    a hardware or software ROUTINE which creates an exact timing delay, used for synchronisation, sampling, etc.

**Toggle switch**    a two position switch with a convenient lever which only allows one of the two positions to be selected.

**Trace (Edit trace)**    a record of previous states. For example, a trace containing an image of the register contents of the last few instructions provides a valuable diagnostic aid. When applied to text processing a trace of previous edited and sub-edited levels of text is a very useful aid to authors and editors.

**Track**    a path along which data is written or read on a magnetic disk. A jargon term for the path of a current-carrying conductor in a printed circuit.

**Transaction**    one coherent grouping of data which can update a file or record, or produce valid output from a program.

**Transducer**    sensory perceptors, sensors. Devices that convert (transduce) one physical variable into another. Transducers are not restricted to electrical signal conversion techniques, but these pre-dominate as electrical methods are the most widely applied. In effect a transducer employs an element that senses a physical change and

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converts that change into electrical energy which in turn activates mechanisms for recalling the display of the data, either in a digital or an analog form.

**Transformer** a device which accepts voltage and current at one value and outputs at different values, but at the same frequency. Line transformers can provide a variety of selectable output voltages.

**Transient** a random and infrequent surge, very brief, caused as the result of a sudden change in conditions.

**Transistor** an active semiconductor device with three electrodes (emitter, base and collector). Used as a switch or as an amplifier. The transistor is used as the basis for logic gates and memory fabrication. ◊ BIPOLAR, INTEGRATED CIRCUIT.

**Transistor-Resistor Logic** ◊ TRL.

**Transistor-Transistor Logic** ◊ TTL.

**Translate** to change from one computer language to another whilst retaining the original meaning.

**Transmission** sending signals or data along a known path or circuit.

**Trap** a software routine, or a special circuit, that seeks out and separates particular values.

**Trickle charging** the means by which a battery is kept at optimum performance by the main power supply. It is charged up at odd intervals or by very minute voltages during the process. Generally intended to maintain a battery back-up unit at optimum performance level over a very long period. Can also be used to recharge any battery unit.

**Trigger** an initiating signal or routine; can be applied to software or hardware.

**TRL** Transistor-Resistor Logic. A form of electronic-based logic which makes use of discrete components. Has now largely been superseded by Transistor-Transistor Logic. ◊ TTL.

**Truncate** to cut short.

**Truth tables** the arrays that display the switching conditions or logical relationship in BOOLEAN ALGEBRA for logic operations. ◊ KARNAUGH MAP. See appendix for LOGIC CIRCUITS.

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**TTL** Transistor-Transistor Logic. A form of logic circuit design, common in logic integrated circuits. It requires +5 volt power supply to  $\pm 5\%$  accuracy. TTL is the lowest cost approach to logic design but suffers as a result. It is relatively simple, is intolerant of NOISE, has high power dissipation (hence heat) and is among the slowest of available technologies. Schottky TTL has improved its speed, performance and cost.  $\diamond$  SCHOTTKY EFFECT.

**TTY Teletype** a family of products produced by the Teletype Corporation. TTY is a standard convention for communicators, originally based on paper tape code. TTY devices include consoles, punches, readers, printers and data communications equipment. TTY standard transmission rate is 110 baud.

**Tuning (fine tuning)** to adjust input or output levels to obtain the exact required responses.

**Turnkey** the provision by a supplier of a complete computer service, from design to installation. The supplier has total responsibility for hardware, software, installation and training.

**Twisted pair** a two wire cable.  $\diamond$  CABLE.

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