

# CCTV Glossary

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## A

**Aberration.** A term from optics that refers to anything affecting the accuracy of the image when compared with the original scene.

**AC.** Alternating Current.

**Activity detection.** Refers to a method built into some multiplexers for detecting movement within the camera's field of view (connected to the multiplexer), which is then used to improve camera recording update rate. It should not be confused with video motion detection.

**AC/DC.** Usually applied where a power supply can be either Alternating Current or Direct Current.

**A/D (AD).** Usually refers to analog to digital conversion.

**ADC.** Analog to digital conversion. This is usually the very first stage of an electronic device that processes signals into digital format, i.e. converting a constantly time varying signal into a binary signal. The signal can be video, audio, control output and similar.

**ADSL.** Asymmetric Digital Subscriber Line: Modems attached to twisted pair copper wiring that transmit up to 8 Mbps downstream (to the subscriber) and up to 1Mbps upstream (from the subscriber), depending on line distance, loop plant condition, electrical noise, and technology and implementation options. It is known as Asymmetric because of the different data rates upstream and down stream.

**AGC.** Automatic Gain Control. A section in an electronic circuit that has feedback and regulates the output voltage level to fall within predetermined margins. Often used in a camera to give a constant one volt peak-to-peak video output, when light levels reduce after the lens' auto iris is fully open.

**AIT.** Advanced Intelligent Tape (AIT) a type of tape drive sometimes used for storage of digital video images.

**ALC.** Automatic Level Control. A section of the electronics of an automatic iris lens that sets the operating level, about which the lens will operate.

**Aliasing.** An occurrence of interference where an analogue signal has been digitised. This can occur in images from a CCD chip camera where it is looking at a lots of vertical lines spaced closely together (high frequency), it is also known as Moiré patterning.

**Alphanumeric video generator (also text inserter or character generator).** A device for providing additional information, normally superimposed on the picture being displayed; this can range from one or two characters to full-screen alphanumeric text. Such generators use the incoming video signal sync pulses as reference point for the text insertion position, which means if the video signal is of poor quality, the text stability will also be of poor quality.

**Amplitude.** The instantaneous value of a varying waveform.

**Analog signal.** Representation of data by continuously varying quantities, with respect to time. An analog electrical signal has a different value of volts or amperes, or phases of either, for electrical representation of the original excitement (sound, light) within the dynamic range of the system.

**Anti-aliasing.** A procedure employed to eliminate or reduce (by smoothing and filtering) the aliasing effects.

**APD.** Avalanche Photo Diode. A type of detector used in fibre optic receivers.

**Aperture.** The opening of a lens that controls the amount of light reaching the surface of the pickup device. The size of the aperture is controlled by the iris adjustment. By increasing the F-stop number (F/1.4, F/1.8, F/2.8, etc.) less light is permitted to pass to the pickup device.

**Archive.** Long-term off-line storage. In digital systems, pictures are generally archived onto some form of hard disc, magnetic tape, floppy disk or DAT cartridge, CDROM or DVD.

**ASCII.** American Standard Code for Information Interchange. A 128-character set that includes the upper case and lower-case English alphabet, numerals, special symbols and 32 control codes. A 7-bit binary number represents each character. Therefore, one ASCII-encoded character can be stored in one byte of computer memory.

**Aspect ratio.** This is the ratio between the width and height of a television or cinema picture display. The present aspect ratio of the normal television screen is 4: 3, which means four units wide by three units high. Such aspect ratio was elected in the early days of television, when the majority of movies were of the same format. The new, high definition television format proposes a 16: 9 aspect ratio ( $4^2: 3^2$ ).

**Aspherical lens.** A lens that has an aspherical (not spherical) surface. It is harder and more expensive to manufacture, but it offers certain advantages over a normal spherical lens such as a lower F number.

**Astigmatism.** The uneven foreground and background blur or horizontal / vertical blur that is in an image. It is caused by distortions in the lens surface.

**Asynchronous.** Lacking synchronization. In video, a signal is asynchronous when its timing differs from that of the system reference signal. A foreign video signal is asynchronous before a local frame synchronizer treats it.

**ATM.** Asynchronous Transfer Mode. A transporting and switching method in which information does not occur periodically with respect to some reference such as a frame pattern.

**Attenuator.** A circuit that provides reduction of the amplitude of an electrical signal without introducing appreciable phase or frequency distortion.

**ATSC.** Advanced Television System Committee (the NTSC equivalent of HDTV). An American committee involved in creating the high definition television standards.

**Attenuation.** The decrease in magnitude of a wave, or a signal, as it travels through a medium or an electric system. It is usually measured in decibels (dB).

**Auto iris (AI).** An automatic method of varying the size of a lens aperture in response to changes in scene illumination.

**AWG.** American Wire Gauge. A wire diameter specification based on the American standard. The smaller the AWG number, the larger the wire diameter. Alternatively: - the measure of the diameter of a conductor. AWG is the U.S. standard measuring gauge for certain conductors, including copper. The higher the AWG number the thinner the wire. This measure stems from the fact that the original measurement represented the number of times the wire was run through a wire machine which thus reduced the diameter of the wire. Thus a 24-gauge wire

was thinner than an 18-gauge wire because it was run through a wire machine 6 more times than the 18-gauge wire, reducing the overall diameter.

## B

**Back-focus.** A procedure of adjusting the physical position of the CCD-chip/lens to achieve the correct focus for all focal length settings (especially critical with zoom lenses).

**Back porch.** 1. The portion of a video signal that occurs during blanking from the end of horizontal sync to the beginning of active video.

2. The blanking signal portion that lies between the trailing edge of a horizontal sync pulse and the trailing edge of the corresponding blanking pulse. In CCIR and PAL it is 5.8µs long. Chroma burst is located in the back porch.

**Balanced signal.** In CCTV this refers to a type of video signal transmission (or data transmission) through a twisted pair cable. It is called balanced because the signal travels through both wires in anti-phase, with no reference to Earth, thus being equally exposed to the external interference, common mode interference is cancelled out. It needs a differential receiver.

**Balun.** This is a transformer used to match or transform an unbalanced coaxial cable to a balanced twisted pair system, or visa versa.

**Bandwidth.** The complete range of frequencies over which a circuit or electronic system can function with minimal signal loss, usually measured between the 3 dB points (half power) at each end of the frequency spectrum. In PAL systems the bandwidth is generally accepted as 5.5MHz.

**Baseband.** The frequency band occupied by the aggregate of the signals used to modulate a carrier before they combine with the carrier in the modulation process. In CCTV the majority of signals are in the baseband.

**Baud.** The rate at which data is transferred. Named after Maurice Emile Baud. The Baud rate is equivalent to bits per second in cases where each data event represents exactly 1 bit. To communicate the baud rates of the equipment must be set the same. Note the baud rate and bit rate in a system can be different.

**BER.** Bit Error Rate. The ratio of received bits that are in error relative to the total number of bits received bit stream. The BER is expressed as a powers of 10 (usually multiples of 3 i.e. k, M etc) egg, a 1 bit error in 1 million bits is a BER of  $10^{-6}$ .

**Betamax.** Sony's domestic video recording format, a competitor of VHS, with better resolution in colour. The format is still popular in the USA.

**Bias.** Current or voltage applied to a circuit to set a reference operating level for proper circuit performance, such as the high frequency bias current applied to an audio recording head to improve linear performance and reduce distortion.

**Binary.** A base 2 numbering system using the two digits 0 and 1 (as opposed to ten digits [0-9] in the decimal system). In computer systems, the binary digits are represented by two different voltages or currents, one corresponding to zero and another corresponding to one, positive logic uses a positive voltage to represent binary 1 and zero volts to represent binary 0.

**Bipolar.** A signal containing both positive-going and negative-going amplitude. May also contain a zero amplitude state.

**Bit.** A contraction of Binary digit. Elementary digital information that can only be 0 or 1. The smallest part of information in a binary notation system. A bit is a single 1 or 0. In computer terms, a group of 4 bits is a nibble, 8 bits is a byte and 16 bits a word.

**Bitmap (BMP).** A pixel-by-pixel description of an image. Each pixel is a separate element. Also a computer file format for pictures.

**Bit rate.** Bps = Bytes per second, bps = bits per second. The digital equivalent of bandwidth, bit rate is measured in bits per second. It is used to express the rate at which the compressed bit stream is transmitted. The higher the bit rate, the more information that can be carried.

**Blackburst (colour-black).** A composite colour video signal. The signal has composite sync, reference burst and a black video signal.

**Black level.** A part of the video signal, close to the sync level, but sometimes slightly above it (usually 20 mV - 50 mV) in order to be distinguished from the blanking level. This is called a pedestal. It electronically represents the black part of an image, whereas the white part is equivalent to 0.7 V from the sync level.

**Blanking level.** The beginning of the video signal information in the signal's waveform. It resides at a reference point taken as 0 V, which is 300 mV above the lowest part of the sync pulses.

**Blooming.** The defocusing of regions of a picture where brightness is excessive.

**BNC.** BNC stands for Bayonet-Neil-Concelman connector, and it is the "standard" connector in CCTV and broadcast TV for transmitting a basic bandwidth video signal over a coaxial cable. It can also be used as abbreviations for British Naval Connector or Bayonet Nut Connector.

**B-picture.** Bi-directionally predictive coded picture; an MPEG term for a picture that is coded using motion compensated prediction from a past and/or future reference picture.

**Braid.** A number of metallic strands interwoven to form a tubular structure that may be applied over one or more wires or flattened to form a strap.

**Brightness.** In PAL and NTSC video signals, the brightness information at any particular instant in a picture is conveyed by the corresponding instantaneous DC level of active video. Brightness control is an adjustment of setup (black level, black reference).

**Burst (colour burst or chroma burst).** Ten cycles (PAL) or seven to nine cycles (NTSC) of sub-carrier placed near the end of horizontal blanking to serve as the phase (colour) reference for the modulated colour sub-carrier. It enables the monitors' Phase Locked Loop to synchronize and track the change of phase during every line of video.

**Bus.** In computer terminology, a path (often bi-directional) over which binary data travels internally among the various components of a system and is available to each of the components connected to the bus.

**Byte.** Is 8 binary bits (ones and zeroes). The greater multiples of bytes are shown below

Kilobyte (1,024 bytes)

Megabyte (1,024 kilobytes, 10488576)

Gigabyte (1,024 Megabytes 1073741824 bytes)

Terabyte (1,024 Gigabytes 1099511627776 bytes)

Petabyte (1,024 Terabytes 1125899906842624 bytes)

Exabyte (1,024 Petabytes 1152921504606846976 bytes)

Zettabyte (1,024 Exabytes 1180591620717411303424 bytes)

Yottabyte (1,024 Zettabytes 1208925819614629174706176 bytes)

## C

**Cable equalization.** The process of altering the frequency bands of a video signal to compensate for the loss of high frequency in a cable. The video equivalent to a graphic equalizer in a stereo system.

**CAD.** Computer Aided Design. This usually refers to a design of system that uses computer specialized software to model reality in a controllable fashion.

**CATV.** Community Antenna Television.

**C-band.** A range of microwave frequencies, 3.7~4.2 GHz, commonly used for satellite

communications.

**CCD.** Charge-Coupled Device. A "bucket brigade" shift register device which when combined with photodiodes is the modern imaging device, replacing the old tubes. When first invented in the 1970s, it was designed to be used as a memory device, as an analogue shift register.

Most often used in cameras, but also in telecom, fax machines, scanners, etc.

**CCD Iris.** A term used by some manufacturers to describe automatic shutter control, to compensate for changes of lighting in a scene, without having any moving parts.

**CCIR.** Comité Consultatif International des Radiocommuniés, which is the European standardization body that has set the standards for television in Europe. It was initially monochrome; therefore, today the term CCIR is usually used to refer to monochrome cameras that are used in PAL countries.

**CCIR 601.** An international standard (renamed ITU 601) for component digital television that was derived from the SMPTE RP1 25 and EBU 3246E standards. ITU 601 defines the sampling systems, matrix values and filter characteristics for Y, Cr, Cb and RGB component digital television. It establishes a 4:2:2 sampling scheme at 13.5 MHz for the luminance channel and 6.75MHz for the chrominance channels with eight bit digitizing for each channel. These sample frequencies were chosen because they work for both 525 line 60Hz and 625 line 50Hz component video systems. The term 4:2:2 refers to the ratio of the number of luminance channel samples to the number of chrominance channel samples; for every four luminance samples, the two chrominance channels are each sampled twice.

**CCTV.** Closed Circuit Television. A television system intended as a "closed" system, rather than broadcast, to be viewed by only a very limited number of viewers e.g. 1 camera to 1 monitor in its simplest form.

**CCTV camera.** A unit containing an imaging device that produces a video signal in the baseband form, usually with synchronization pulses and colour information (composite video).

**CCTV installation.** A CCTV system, or an associated group of systems, together with all necessary hardware, auxiliary lighting, etc., located at a site to be monitored.

**CCTV system.** An arrangement comprising of a camera and lens with all ancillary equipment required for the surveillance of a specific area.

**CCVE.** Stands for Closed Circuit Video Equipment. An alternative acronym for CCTV created by a manufacturer.

**CD.** Compact Disc. A standard of media as proposed by Philips and Sony, where music is stored in digital form.

**CD-ROM.** Compact Disk Read Only Memory. The total capacity of a CD-ROM when storing data is up to 700 MB (including header information).

**CDS.** Correlated Double Sampling. A technique used in the design of some CCD cameras that reduces the video signal noise generated by the chip.

**Celsius.** The Systeme Internationale (SI) unit of temperature equivalent to the Centigrade scale. It does not use the prefix "degrees".

**CFA.** Colour Filter Array. A set of optical filters (usually individual pixel sized) used in single chip colour CCD cameras to produce the colour components of a video signal.

**Chip.** An integrated circuit in which all the components (resistors capacitors and semiconductors) are micro-fabricated on a tiny piece of silicon or specialist material (silicon on sapphire). Often used to refer to the detector in a CCD camera.

**Chroma Burst.** See Colour carrier

**Chroma crawl.** An artefact of encoded video, also known as dot crawl or cross-luminance. It occurs in the video picture around the edges of highly saturated colours as a continuous series of crawling dots and is a result of colour information being confused as luminance information by the decoder circuits.

**Chroma gain (chroma or colour, saturation).** In video, the gain of an amplifier as it pertains to the intensity of colours in the active picture.

**Chroma key (colour key).** A video key effect in which one colour or video signal is inserted in place of all areas of a particular colour in another video signal.

**Chrominance.** The colour information of a colour video signal.

**Chrominance-to-luminance intermodulation (crosstalk, cross-modulation).** An undesirable change in luminance amplitude caused by superimposition of some chrominance information on the luminance signal. Appears in a TV picture as unwarranted brightness variations caused by changes in colour saturation levels.

**CIE.** Commission Internationale de l'Eclairag . This is the International Committee for Light, established in 1965. It defines and recommends light units.

**CIE Model.** A colour model based on human perception developed by the CIE (Commission Internationale de l'Eclairage) committee. While widely regarded as the most accurate colour model, CIE is unsuitable for many technologies, including colour printing and colour monitors. Consequently, these systems need to use other colour models, such as CMYK and RGB. There is a growing trend, however, to make all colour models relative to the CIE model. This would make it easier to translate from one model to another.

**CIF.** Common Intermediate Format. A video format used in videoconferencing systems that easily supports both NTSC and PAL signals. CIF is part of the ITU H.261 videoconferencing standard. It specifies a data rate of 30 frames per second (fps), with each frame containing 288 lines and 352 pixels per line. A related standard, QCIF (Quarter CIF), transfers one fourth the amount of data and is suitable for videoconferencing systems that use telephone lines.

**Clamping (DC).** The circuit or process that restores the DC component of a signal. A video clamp circuit, usually triggered by horizontal synchronizing pulses, re-establishes a fixed DC reference level for the video signal. DC clamping can, in some cases remove of low-frequency interference, especially mains hum.

**Cladding.** The outer part of an optical fibre cable, which is also glass but with a different refractive index to the central core. It enables "total internal reflection" so that the light transmitted through the central core stays, inside that core.

**Clipping Level.** An electronic limit to avoid overdriving the video portion of the television signal.

**C-mount.** Cine mount. The first standard for CCTV lens screw mounting. It is defined with the thread of 1" (25.4 mm) in diameter and 32 threads/inch, and the back flange-to-CCD distance of 17.526 mm (0.69"). The C-mount description applies to both lenses and cameras. C-mount lenses can be put on both, C-mount and CS-mount cameras, but must use a C-mount adaptor when used on a CS-mount camera. If a C adaptor is used on a C-mount camera the image will only focus at very short range, it can then be considered as an economy macro adaptor.

**C-mount adaptor.** An adaptor used to convert a CS-mount camera to C-mount to accommodate a C-mount lens. It is simply a ring 5 mm thick, with a male thread on one side and a female on the other side. It has a 1" diameter and 32 threads/inch, as the cameras and lenses. It often comes packaged with the newer type (CS-mount) of cameras.

**CMYK.** A 4 colour encoding system used by many computer printers, in which colours are expressed by the "subtractive primaries" (cyan, magenta and yellow) plus black (called K). The black layer is added to give increased contrast and range.

**Coaxial cable.** The most common type of cable used for copper transmission of video signals. It has a coaxial (sharing the same axis) cross-section, where the centre core is the signal conductor, while the outer shield protects it from external electromagnetic interference.

**CODEC.** Coder/Decoder. An encoder plus a decoder is an electronic device that compresses and decompresses digital signals. It is also used to refer to conditional refresh video equipment.

**Colour bars.** A pattern generated by a video test generator, consisting of eight equal width colour bars. Colours are white (75%), black (7.5% setup level), 75% saturated pure colours red, green and blue, and 75% saturated hues of yellow, cyan and magenta (mixtures of two

colours in 1:1 ratio without third colour). The colours appear in the order White, Yellow, Cyan, Green, Magenta, Red, Blue, and Black.

**Colour carrier.** The sub-carrier frequency in a colour video signal (4.433619 MHz for PAL & 3.58MHz for NTSC) that is phase modulated with the colour information. The colour carrier frequency is chosen so its spectrum interleaves with the luminance spectrum with minimum interference. This signal is superimposed on the luminance level. The amplitude of the colour sub-carrier represents saturation and phase angle represents hue.

**Colour difference signal.** A video colour signal created by subtracting luminance and/or colour information from one of the primary colour signals (red, green or blue). In the Betacam colour difference format, for example, the luminance (Y) and colour difference components (R-Y and B-Y) are derived as follows:

$$Y = 0.3 \text{ Red} + 0.59 \text{ Green} + 0.11 \text{ Blue} \quad \text{also (Y)}$$

$$R-Y = 0.7 \text{ Red} - 0.59 \text{ Green} - 0.11 \text{ Blue} \quad \text{also (U)}$$

$$B-Y = 0.89 \text{ Blue} - 0.59 \text{ Green} - 0.3 \text{ Red} \quad \text{also (V)}$$

The G-Y colour difference signal is not created because it can be calculated from the other three signals. The colour difference signals are, sometimes, wrongly referred to as component video signals. That term is reserved for the RGB colour components.

**Colour phase.** The timing relationship in a video signal that is measured in degrees and keeps the hue of a colour signal correct.

**Colour temperature.** Indicates the hue of the colour. It is derived from photography where the spectrum of colours is based upon a comparison of the hues produced when a black body (as in Physics) is heated from red through yellow to blue, which is the hottest. Colour temperature measurements are expressed in Kelvin (not degrees Kelvin).

**Comb filter.** An electrical filter circuit that passes a series of frequencies and rejects the frequencies in between, it combs out the frequencies. Used on a composite video signal, to separate the chrominance signal and reject the luminance signal, or to select the luminance signal and reject the chrominance signal. This filter is found in S-VHS VCRs to separate the chrominance and luminance so that a composite video input can be recorded in S-VHS format. These filters can also be found in some multiplexers to give a Y - C output for recording on an S-VHS recorder.

**Composite sync.** A signal consisting of horizontal sync pulses, vertical sync pulses and equalizing pulses only, with a no-signal reference level.

**Composite video signal CVS.** A signal in which the luminance and chrominance information have been combined using one of the coding standards NTSC, PAL, SECAM, etc.

**Concave lens.** A lens that has negative focal length, i.e., the focus is virtual (in front of the lens) and it reduces the objects. A concave lens cannot project an image.

**Contrast.** A common term used in reference to the video picture dynamic range, i.e., the difference between the darkest and the brightest parts of an image.

**Convex lens.** A convex lens has a positive focal length, i.e., the focus is real (behind the lens). It is usually called magnifying glass, since it magnifies the objects. It can be used to project an image.

**CPU.** Central Processing Unit. A common term used in computers.

**CRO.** Cathode Ray Oscilloscope (see Oscilloscope).

**Crosstalk.** A type of interference where one signal is present in some measure on a second signal in a system. The amount of crosstalk is measured as a ratio and expressed in dB. It can be caused by unintentional capacitance (AC coupling) or more commonly by bad Earth connections on a connector panel.

**CRT.** Cathode Ray Tube. A vacuum tube used for visual displays.

**CS-Mount.** Cine Short mount. The newer standard for lens mounting. It uses the same physical thread as the C-mount, but the back flange-to-CCD distance is reduced to 12.5 mm. The lenses are smaller, more compact and less expensive. CS-mount lenses can only be

used on CS-mount cameras.

## D

**D/A (also DA).** Opposite to A/D, i.e., digital to analogue conversion.

**Dark current.** Leakage signal from a CCD sensor in the absence of incident light.

**Dark noise.** Noise caused by the random (quantum) nature of the dark current.

**DAT (Digital Audio Tape).** A system developed initially for recording and playback of digitized audio signals, maintaining signal quality equal to that of a CD. Recent developments in hardware and software have led to a system for archiving digitized video signals.

**dB.** Decibel. A logarithmic ratio of two signals or values, usually refers to power, but also voltage and current. When it is calculated for power it is  $10\log_{10} (P_1/P_2)$  and for voltage in a constant impedance situation  $20\log_{10} (V_1/V_2)$ .

**DBS.** Direct Broadcast Satellite. Broadcasting from a satellite directly to a consumer user, usually using a small aperture antenna.

**DC.** Direct current. Current that flows in only one direction, as opposed to AC.

**DCT.** Discrete Cosine Transform. Mathematical algorithm used to generate frequency representations of a block of video pixels. The DCT is an invertible, discrete orthogonal transformation between time and frequency domain. It can be either forward discrete cosine transform (FDCT) or inverse discrete cosine transform (IDCT). It is part of the JPEG compression algorithm.

**DD.** Direct Drive. A method of controlling one form of auto iris lens (the other is video iris), where the electronic has been removed from the lens and is built into the camera. To use a DD lens with a camera, the camera must have a DD output.

**Decoder.** A device used to recover the component signals from an encoded source.

**Degauss.** To demagnetize or randomize magnetic particles in a tape.

**Delay line.** An artificial or real transmission line or equivalent device designed to delay a wave or signal for a specific length of time.

**Demodulator.** A device that separates the signal from the carrier frequency onto which it was modulated.

**Depth of field.** The area in front of and behind an object in perfect focus, that appears sharp on the screen. The depth of field increases with the decrease of the focal length, i.e., the shorter the focal length the longer the depth of field. The depth of field decreases with an increase in aperture i.e. a smaller F no. The depth of field is always greater behind the objects in focus, than in front of it (roughly 1/3 in front and 2/3 behind).

**Dielectric.** An insulating (non-conductive) material usually when used in a capacitor or specific insulating situation such as in a coaxial cable.

**Differential gain.** A change in sub-carrier amplitude of a video signal caused by a change in luminance level of the signal. The resulting TV picture will show a change in colour saturation caused by a simultaneous change in picture brightness.

**Differential phase.** A change in the sub-carrier phase of a video signal caused by a change in the luminance level of the signal. The hue of colours in a scene change with the brightness of the scene.

**Digital video recorder.** A system that allows the recording of video images in a digital form on one of many digital storage formats such as computer hard disc, Digital VHS, DV, DAT or DVD. It is acceptable in English Courts for evidential purposes.

**Digital signal.** An electronic signal where every different value is expressed as a different binary code.

**DIN.** Deutsche Industrie-Normen. Germany's standards body, equivalent to the British Standards Institution.

**Disk (as in hard or floppy disc).** A flat circular plate, coated with a magnetic material, on which data may be stored by selective magnetization of portions of the surface, representing binary ones or zeroes. May be a flexible, floppy disc or rigid hard disk. It can also be a plastic sandwich of a metal to be optically read by reflection or scattering of laser light e.g. a compact disc (CD) or Digital Versatile Disc (DVD).

**Distortion.** No proportional representation of an original.

**DOS.** Disk Operating System. A software package that makes a computer work with its hardware devices such as hard drive, floppy drive, screen, keyboard, etc.

**Dot pitch.** The distance in millimeters between centers of individual phosphor dots on a monitor screen. The smaller the dot pitch the better, since it allows for more dots to be displayed per inch and thus better resolution. The dot pitch defines the resolution of a monitor.

**DSP.** Digital Signal Processing. It usually refers to the electronic circuit section of a camera capable of processing or enhancing signals.

**DTE.** Data Terminal Equipment

**DTMF (Dual Tone Multi Frequency)** is the dialing signal that you generate when you press an ordinary telephone's keys. It is known as "Touchtone" phone (formerly a registered trademark of AT&T). With DTMF, each key you press on your phone generates two tones of specific frequencies. So that a voice can't imitate the tones, one tone is generated from a high-frequency group of tones and the other from a low frequency group. It is sometimes used as a telemetry control signaling system.

**Dubbing.** Transcribing from one recording to another which may include a change of medium.

**Duplex.** A communication system that can carry information in both directions, at the same time is called a duplex system. In CCTV, duplex is often used to describe the type of multiplexer that can perform two functions simultaneously, recording in multiplex mode and playback in multiplex mode. It can also refer to duplex data communication between a matrix switcher and a telemetry receiver.

**DVD.** Digital Versatile Disc, originally Digital Video Disc. An optical medium that stores binary digital information by the reflection or scattering of laser light.

**D-VHS.** A new standard proposed by JVC for recording digital signals on a VHS video recorder.

**DWDM.** Dense Wavelength Division Multiplexing, a recently introduced system for increasing the number of channels in a fibre optic system. The spacing between wavelengths can be as little as 10nm.

**DXF.** Drawing Exchange File. A computer graphics file format, for drawings created by Autodesk.

**Dynamic range.** The difference between the smallest amount and the largest amount that a system can process. including the colour information and syncs.

## E

**Encoder.** A device that superimposes electronic signal information on other electronic signals.

**Encryption.** The rearrangement of the bit stream of a previously digitally encoded signal in a systematic fashion to make the information unrecognizable until restored on receipt of the necessary authorization key. This technique is used for securing information transmitted over a communication channel with the intent of excluding all other than authorized receivers from interpreting the message. Can be used for voice, video and other communications signals.

**EI.** Electronic Iris. Electronic circuits in a camera that enable the camera shutter mode to be automatically controlled to vary the output video level, much as an auto iris in the lens would do. It enables manual iris lenses to be used where light levels vary.

**ENG camera.** Electronic News Gathering camera. Refers to CCD cameras in the broadcast industry used for outside broadcasts when gathering news.

**EPROM.** Erasable and Programmable Read Only Memory. An electronic chip used in many different security products that stores software instructions for performing various operations.

**Equalizer.** Equipment designed to compensate for loss and delay frequency effects within a system. A component or circuit that allows for the adjustment of a signal across a given band.

**Ethernet.** A local area network used for connecting computers, printers, workstations, terminals, etc. within the same building. Ethernet operates over twisted wire and coaxial cable at speeds up to 100 Mbps (100 Base T).

**External synchronization.** A means of ensuring that all equipment is synchronized to the one source.

**EXABYTE.** When written in capital letters, it is the name of a manufacturer of a tape based mass storage device. When in lower case it is 2 to the 60th power [2<sup>60</sup> or 1,152,921,504,606,846,976] bytes. One Exabyte is equal to 1,024 Pet bytes.

## F

**FDDI.** Fibre Distributed Data Interface.

**FFT.** Fast Fourier Transformation, see Fourier transformation.

**Fibre optics.** A technology designed to transmit signals in the form of light. A Fibre Optic system uses Optical Fibers. Optical Fibre cable is noted for its properties of electrical isolation and resistance to electrostatic and electromagnetic interference.

**Field.** Refers to one-half of the TV frame that is composed of either all odd or even lines. In CCIR systems each field is composed of  $625/2 = 312.5$  lines (20ms), in EIA systems  $525/2 = 262.5$  lines (16.66ms). There are 50 fields/second in CCIR/PAL, and 60 in the EIA/NTSC TV system.

**Fixed focal length lens.** A lens with a predetermined fixed focal length, a focusing control and a choice of iris functions.

**Flash memory.** Nonvolatile, digital storage. Flash memory has slower access than SRAM or DRAM.

**Flicker.** An annoying picture distortion, mainly related to vertical syncs and video fields display. Some flicker normally exists due to interlacing; more apparent in 50 Hz systems (PAL). Flicker shows also when static images are displayed on the screen such as computer generated text transferred to video. Poor digital image treatment, found in low-quality system converters (going from PAL to NTSC and vice versa), creates an annoying flicker on the screen. There are several electronic methods to minimize flicker.

**Fly back.** The period where the scanning beam returns to the starting point for the next scan.

**F-number.** In lenses with an adjustable iris, the maximum iris opening is expressed as a ratio (focal length of the lens)/(maximum effective diameter of aperture). This maximum iris will be marked on the front ring of the lens.

**Focal length.** The distance between the optical centre of a lens and the principal convergent focus point.

**Focusing control.** A means of adjusting the lens to allow objects at various distances from the camera to be sharply defined.

**Foot-candle.** An illumination light unit used mostly in American CCTV terminology. It equals 10.76 times the illumination value in lux ( $1\text{m}^2 = 10.76\text{ sq ft}$ ).

**Fourier Transformation.** Mathematical transformation of time domain functions into frequency domain.

**Frame.** (See also Field). Refers to a composition of lines that make one TV frame. In CCIR/PAL TV system one frame is composed of 625 lines (2 fields of 312.5 lines), while in EIA/NTSC TV system 1 frame is 525 lines (2 fields of 262.5 lines). There are 25 frames/second in the CCIR/PAL and 30 frames /second in the EIA/NTSC TV system.

**Frame integration** Is mis-named. It is actually field integration and is the technique of adding successive fields together to enhance an image in low light conditions. Integration over more than a few fields will cause motion blur to become an issue.

**Frame store.** An electronic device that digitizes a TV frame (or TV field) of a video signal and stores it in memory. Multiplexers, fast scan transmitters, Quad displays and even some of the latest colour cameras have built-in frame stores.

**Frame switcher.** Another name for a simple multiplexer, which can record multiple cameras on a single VCR (and play back any camera in full screen) but does not usually have a multi screen image display. Note : all cameras must be synchronized

**Frame transfer (FT).** Refers to one of the principles of charge transfer in CCD chips. The other two are interline and frame-interline transfer.

**Frame-interline transfer (FIT).** Refers to one of the principles of charge transfer in CCD chips. It combines the principles of both frame transfer and interline transfer to give the benefits of both, without their disadvantages.

**Frequency.** The number of complete cycles of a periodic waveform that occur in a one second period. Usually specified in Hertz (formerly cycles per second).

**Frequency modulation (FM).** The modulation of a carrier wave by varying its frequency in accordance with amplitude variations of the modulating signal.

**Front porch.** The blanking signal portion that lies between the end of the active line period and the leading edge of line sync (horizontal sync),  $1.5\mu\text{s}$  long in a CCIR/PAL system.

## G

**Gain.** Any increase or decrease in strength of an electrical signal. Gain is often measured in terms of decibels, the logarithmic ratio of input to output.

**Gamma.** A correction of the linear response of a camera in order to compensate for the monitor phosphor screen non-linear response. It is measured with the exponential value of the curve describing the non-linearity. A typical monochrome monitor's gamma is 2.2, and a camera needs to be set to the inverse value of 2.2 (which is 0.45) for the overall system to respond linearly (i.e., unity).

**Gamut.** The range of voltages allowed for a video signal, or a component of a video signal. Signal voltages outside of the range (i.e., exceeding the gamut) may lead to clipping, crosstalk or other distortions.

**Gen-lock.** A way of locking the video signal of a camera to an external generator of synchronization pulses.

**GHz.** Giga Hertz. One thousand million (American billion) cycles per second.

**GB.** Gigabyte. Unit of computer memory consisting of about one thousand million bytes (a thousand megabytes). The actual value is 1,073,741,824 bytes.

**GND.** Ground (electrical).

**Grey scale.** A series of shades of grey that range from true black to true white, usually expressed in 8 or 10 steps.

**Ground loop. (Also known as an Earth Loop)** An unwanted interference in the copper electrical signal transmissions with shielded cable, which is a result of ground currents when the system has more than one ground point. For example, in CCTV, when we have a different earthing resistance at the camera end to that at the switcher or monitor end. It must NEVER be cured by removing either ground connection, it should be removed using an isolation transformer or other isolating device, e.g. opto-isolator.

**GUI.** Graphical User Interface. A computer type display giving system status information it may also include touch screen control.

## H

**HAD.** Hole Accumulated Diode. A type of CCD sensor with a layer designed to accumulate holes (in the electronic sense), thus reducing noise level.

**HDD.** Hard Disk Drive. A magnetic medium for storing digital information on most computers and electronic equipment that process digital data.

**HDDTV.** High Definition Digital Television. The upcoming standard of broadcast television with extremely high resolution and aspect ratio of 16:9. It is an advancement from the analogue high definition, already used experimentally in Japan and Europe. The picture resolution is nearly 2000×1000 pixels, and uses the MPEG-2 standard.

**HDSL.** High-bit-rate Digital Subscriber Line. A digital transmission path that can be used for the transmission of CCTV pictures (1 camera) at up to 2Mbps. Up to 5 cameras can be transmitted but the data rate is shared (i.e. 384kbps for each camera).

**HDTV.** High Definition Television. It usually refers to the analogue version of the HDDTV.

**Headend.** The electronic equipment located at the start of a cable television system, usually including antennas, earth stations, preamplifiers, frequency converters, demodulators, modulators and related cable transmission equipment.

**Helical scan.** A method of recording video information on a tape that increases the "density" of recorded information on tape, when compared with linear recording. It is used commonly in both home and professional VCRs.

**Horizontal Drive (also Horizontal sync).** This signal is derived by dividing sub-carrier by 227.5 and then doing some pulse shaping. The signal is used by monitors and cameras to determine the start of each horizontal line.

**Horizontal resolution.** Chrominance and luminance resolution (detail) expressed horizontally across a picture tube, it is often given as Television Lines (TVL). This is usually expressed as a number of black to white transitions or lines that can be differentiated. Limited by the bandwidth of the video signal or equipment.

**Herringbone.** Patterning caused by driving a colour-modulated composite video signal (PAL or NTSC) into a monochrome monitor. It is also often a characteristic of Radio Frequency Interference (RFI) picked up along a coaxial cable length.

**Horizontal retrace.** At the end of each horizontal line of video, a brief period when the scanning beam returns to the other side of the screen to start a new line, sometimes called fly back.

**Horizontal sync pulse.** The synchronizing pulse at the end of each video line that determines the start of horizontal retrace.

**Hertz.** The unit that measures the number of cycles per second. Named after Heinrich Rudolph Hertz, a physicist.

**Housings, environmental.** Usually refers to the containment of the camera and lenses and associated accessories, such as heaters, washers and wipers, to meet specific environmental conditions.

**HS.** Horizontal synchronization.

**Hue (tint, phase, chroma phase).** One of the characteristics that distinguishes one colour from another. Hue defines colour on the basis of its position in the spectrum, i.e., whether red, blue, green or yellow, etc. Hue is one of the three characteristics of television colour: see also Saturation and Luminance. In PAL and NTSC video signals, the hue information at any particular point in the picture is conveyed by the corresponding instantaneous phase of the active video subcarrier.

**Hum.** A term used to describe an unwanted induction of mains frequency.

**Humbug.** A trade name for an isolation transformer (to remove earth or ground loops).

**Hyper-HAD.** An improved version of the CCD HAD technology, utilizing on-chip micro-lens technology to provide increased sensitivity without increasing the pixel size.

**IDE.** Interface Device Electronics. Software and hardware communication standard for interconnecting peripheral devices to a computer.

**I/O.** Input/Output.

**I/P.** Input. A signal applied to a piece of electric apparatus or the terminals on the apparatus to which a signal or power is applied.

**I<sup>2</sup>R.** Formula for power in watts (W), where I is current in amperes (A), R is resistance in ohms.

**IEC.** International Electrotechnical Commission (also CEI).

**Imaging device.** A vacuum tube or solid state-device in which the vacuum tube light sensitive face plate or solid-state light sensitive array provides an electronic signal from which an image can be created.

**Impedance.** A property of all metallic and electrical conductors that describes the total opposition to current flow in an electrical circuit. Resistance, inductance, capacitance and conductance have various influences on the impedance, depending on frequency, dielectric material around conductors, physical relationship between conductors and external factors. Impedance is often referred to with the letter Z. It is measured in ohms, whose symbol is the Greek letter omega.

**Input.** Same as I/P.

**Inserter (also alphanumeric video generator).** A device for providing additional information, normally superimposed on the picture being displayed; this can range from one or two characters to full-screen alphanumeric text. Usually, such generators use the incoming video signal sync pulses as a reference point for the text insertion position, which means if the video signal is of poor quality, the text stability will also be of poor quality.

**Interference.** Disturbances of an electrical or electromagnetic nature that introduce undesirable responses in other electronic equipment.

**Interlaced scanning.** A technique of combining two television fields in order to produce a full frame. The two fields are composed of only odd and only even lines, which are displayed one after the other but with the physical position of all the lines interleaving each other, hence interlace. This type of television picture creation was proposed in the early days of television to have a minimum amount of information yet achieve flickerless motion.

**Interline transfer.** This refers to one of the three principles of charge transferring in CCD chips. The other two are frame transfer and frame-interline transfer.

**IP.** Index of Protection. A 2, (sometimes 3) digit numbering system that describes the quality of protection of an enclosure from outside influences, such as dust and moisture (the third digit relates to impact).A

**IRE.** Institute of Radio Engineers. Units of measurement dividing the area from the bottom of sync to peak white level into 140 equal units. 140 IRE equals 1Vpp. The range of active video is 100 IRE.

**IR. light.** Infrared light, invisible to the human eye. It usually refers to wavelengths longer than 700 nm. Monochrome (B/W) cameras have extremely high sensitivity in the near infrared region (715 to 800nm) of the light spectrum.

**Iris.** A means of controlling the size of a lens aperture and therefore the amount of light passing through the lens.

**ISDN.** Integrated Services Digital Network. The newer generation telephone network, usually ISDN2e which has 2 x B channels each of 64 kbps speed of transmission giving a total of 128kbps (being a digital network, the signal bandwidth is not expressed in kHz, but rather with a transmission speed). This is much faster than a normal PSTN telephone line. To use the ISDN network you have to talk to your communications provider, but in general a special

interface unit called a terminal adaptor is required, modems cannot be used on an ISDN line.

**ISIT.** Intensified Silicon Intensified Target. A type of detector tube for use in very low light conditions such as starlight.

**ISO.** International Standardization Organization.

**ITU.** International Telecommunications Union (also UIT).

## J

**JPEG.** Joint Photographic Experts Group. A group that has recommended a compression algorithm for still digital images that can compress with ratios of over up to 30:1 giving a file size of approximately 20 Kbytes per field of video. It is also the name of the format itself. There is a variant called Motion JPEG (MJPEG). The latest version is JPEG2000.

## K

**Kangaroo Lens.** A lens with only two fixed iris positions one fully open and the other partly closed. Designed for use with Electronic Iris (Auto Electronic Shuttering or CCD Iris) cameras as a way of controlling the output video level. It should only be used with compatible cameras.

**kb/s.** Kilobits per second. Thousand bits per second. Also written as kbps.

**K codes.** A binary code inserted in the vertical interval of a video signal, by a multiplexer. The binary number represents the input number of the multiplexer is usually one line per binary bit.

**Kelvin.** One of the basic physical units of measurement for temperature. The scale is the same as the Celsius, but the 0 K starts from  $-273.16^{\circ}\text{C}$  (0 K on the Kelvin scale or  $0^{\circ}\text{R}$  on the Rankine scale or  $-459.60^{\circ}\text{F}$  on the Fahrenheit scale). Also the unit of measurement of the colour temperature of light is expressed in Kelvin or K. In colour recording, light temperature affects the colour values of the lights and the scene that they illuminate.

**kHz.** Kilohertz. Thousand Hertz.

**Kilobaud.** A unit of measurement of data transmission speed equaling 1000 baud.

**Kilobyte.** 1024 bytes.

## L

**Lambertian source or surface.** A surface is called a Lambert radiator or reflector (depending whether the surface is a primary or a secondary source of light) if it is a perfectly diffusing surface.

**LAN.** Local Area Network. A short distance data communications network (typically within a building or campus) used to link together computers and peripheral devices (such as printers, CD ROMs, file servers and modems) under some form of standard control.

**Laser.** Light Amplification by Stimulated Emission of Radiation. A laser produces a very parallel and coherent light (all wave fronts in phase) of a single frequency.

**LED.** Light Emitting Diode. A semiconductor diode, that produces light when a certain low voltage, forward bias, is applied to it. Like a normal diode it conducts only in one direction.

**Lens.** An optical device for focusing a desired scene onto the imaging device in a CCTV camera.

**Level.** When relating to a video signal it refers to the video level in volts. In CCTV optics, it refers to the auto iris level setting of the electronics that processes the video signal in order

to open or close the iris.

**Line-locked.** In CCTV, this usually refers to multiple cameras being powered by a common alternative current (AC) source (either 24 V AC, 110 V AC or 240 V AC) and consequently have field frequencies locked to the same AC source frequency (50 Hz in CCIR systems and 60 Hz in EIA systems).

**LCD.** Liquid Crystal display. A screen for displaying text/graphics based on a technology called liquid crystal, where minute currents change the reflectiveness or transparency of the by changing the polarization angle. The advantages of LCD screens are very small power consumption (can be easily battery driven) and low price of mass-produced units. The disadvantages are narrow viewing angle, slow response, invisibility in the dark unless the display is back lighted, and difficulties displaying true colors with colour LCD displays.

**Lumen [lm].** A light intensity produced by the luminosity of 1 candela in one radian of a solid angle (steradian - sr).

**Luminance.** Refers to the video signal information about the scene brightness. The measurable, luminous intensity of a video signal. Differentiated from brightness in that the latter is non-measurable and sensory. The colour video picture information contains two components, luminance- Y (brightness and contrast) and chrominance - C (hue and saturation).

**Look-up table.** A cross-reference table in the computer memory that will return an output value for any given input value. It can be a programmed algorithm or data entered in a table.

**Lux [lx].** Light unit for measuring illumination. It is defined as the illumination of a surface when luminous flux of 1 lumen falls on an area of 1 m<sup>2</sup>. It is also known as lumens per square meter. One lux is equal to approximately 0.09290 foot candle.

## M

**Manual iris.** A lens with a manual method of varying the size of the aperture.

**Matrix.** A mathematical array. A logical network configured in a rectangular array of intersections of input/output channels.

**Matrix switcher.** A device for switching more than one camera, VCR, video printer and similar, to more than one monitor, VCR, video printer and similar. Much more complex and more powerful than simple video switchers.

**MATV.** Master Antenna Television.

**MB.** Megabyte. Unit of measurement for computer memory consisting of approximately one million bytes. Actual value is 1,048,576 bytes. Kilobyte × Kilobyte = Megabyte.

**MB/s.** Megabytes per second. Million bytes per second or 8 million bits per second. Also written as MBps. **Mb/s.** Megabits per second. Million bits per second. Also written as Mbps.

**MHz.** Megahertz. One million hertz.

**Microwave.** One definition refers to the portion of the electromagnetic spectrum that ranges between 300 MHz and 3000 GHz. The other definition is when referring to the transmission media where microwave links are used. Frequencies in microwave transmission are usually between 4 GHz and 60 GHz.

**MOD.** Minimum Object Distance. Feature of a fixed or a zoom lens that indicates the closest distance an object can be from the lens's image plane, expressed in meters. Zoom lenses have MOD of around 1 m, while fixed lenses usually much less, depending on the focal length.

**Modem.** This popular term is made up of two words: Modulator and Demodulator. The function of a modem is to connect a device (usually computer) via an audio (usually) telephone line to another device with a modem. It converts the digital computer signal to audio tones.

**Modulation.** The process by which some characteristic (i.e., amplitude, phase) of one wave (carrier wave) is varied in accordance with another wave (modulating or message signal).

**Moiré pattern.** An unwanted effect that appears in the video picture when a high-frequency (lines close together) pattern is looked at with a CCD camera that has a pixel pattern close to (but lower) the object pattern.

**Monochrome.** Black-and-white video. A video signal that represents the brightness values (luminance) in the picture, but not the colour values (chrominance).

**MPEG.** Motion Picture Experts Group. An ISO group of experts that has recommended manipulation of digital motion images. Today there are a couple of MPEG recommendations, of which the most well known are MPEG-1 and MPEG-2. The latter one is widely accepted for high definition digital television, as well as multimedia presentation. MPEG-1. Standard for compressing progressive scanned images with audio. Bit rate is from 1.5 Mbps up to 3.5 Mbps. MPEG-2. The standard for compression of progressive scanned and interlaced video signals with high quality audio over a large range of compression rates with a range of bit rates from 1.5 to 100 Mbps. Accepted as a HDTV and DVD standard of video/audio encoding.

**Multiplexing.** In CCTV it is correctly named Time Division Multiplexing and is the technique used to enable a number of video inputs (up to 34) to be recorded onto a single tape. Frequency Division Multiplexing is a technique used to allocate individual frequencies within a band of frequencies. In fibre Optic systems there is also Wavelength Division Multiplexing WDM, and Dense Wavelength Division Multiplexing DWDM where a number of wavelengths of light can share the same fibre, to enable more information to be communicated.

## N

**Nano.** A one thousand millionth  $10^{-9}$ .

**ND Filter.** A filter that attenuates all colours of light in the visible spectrum, equally.

**ND Spot.** A graduated "spot" filter in a lens that restricts the amount of light passing through the lens at small apertures.

**Nit.** A measurement of luminance = 1 candela/ m<sup>2</sup>.

**Noise.** Any unwanted signal produced by all electrical circuits working above the absolute zero. Noise cannot be eliminated but only minimized.

**No interlaced.** The process of scanning whereby every line in the picture is scanned during the vertical sweep.

**NTSC.** National Television Systems Committee. American committee that set the standards for colour television as used today in the US, Canada, Japan and parts of South America. NTSC television uses a 3.57945 MHz sub-carrier whose phase varies with the instantaneous hue of the televised colour and whose amplitude varies with the instantaneous saturation of the colour. NTSC employs 525 lines per frame and 59.94 fields per second (usually taken as 60 fields per second).

**Numerical aperture.** A number that defines the light gathering ability of a specific optical fibre. The numerical aperture is equal to the sine of the maximum acceptance angle.

## O

**O/p.** Output.

**Objective.** The very first optical element at the front of a lens.

**Ocular.** The very last optical element at the back of a lens (the one closest to the detector).

**Ohm.** The unit of resistance. The electrical resistance between two points of a conductor where a constant difference of potential of 1 Volt applied between these points produces in the conductor a current of 1 Ampere, the conductor not being the source of any electromotive force.

It can be represented by the formula  $V = I \times R$ , where:  $V$  = Voltage  $I$  = Current  $R$  = Resistance.

**Oscilloscope (also CRO, from Cathode Ray Oscilloscope).** An electronic device that can display changes of voltage on the vertical scale against time horizontally. The single most important piece of test equipment in CCTV.

**Overcan.** A video monitor condition in which the raster extends slightly beyond the physical edges of the CRT screen, cutting off the outer edges of the picture.

**Output impedance.** The impedance a device presents to its load. The impedance measured at the output terminals of a transducer with the load disconnected and all impressed driving forces taken as zero.

## P

**PAL.** Phase Alternate (sometimes alternating) Line. Describes the colour phase change in a PAL colour signal. PAL is the European colour encoding TV system featuring 625 lines per frame, 50 fields per second and a 4.43361875 MHz sub-carrier (4.43 MHz). Used mainly in Europe, China, Malaysia, Australia, New Zealand, the Middle East and parts of Africa.

**Pan and tilt head (P/T head).** A motorized unit permitting vertical and horizontal positioning of a camera and lens combination. Usually AC motors (24 VAC, 110 VAC, & 240 VAC) of fixed speed, are used in such P/T heads, but increasingly DC variable speed motors are being installed.

**Pan unit.** A motorized unit permitting horizontal positioning of a camera. PCM. Pulse Coded Modulation. A technique used in analogue to digital conversion.

**Peak-to-peak (pp).** The amplitude (voltage) difference between the most positive and the most negative excursions (peaks) of an electrical signal.

**Peak White Inverter.** An electronic circuit that turns white parts (highlights) of a picture, above a set threshold, to black or a shade of grey.

**Pedestal (or set-up).** Where in a video waveform, at the start of the active line period, the level steps up by up to 100mV, to differentiate between blanking level and black level. It is not often found in CCTV waveforms nowadays.

**Phase Locked Loop (PLL).** A circuit containing an oscillator whose output phase or frequency locks onto and tracks the phase or frequency of a reference input signal. To produce the locked condition, the circuit then detects any phase difference between the two signals and generates an error voltage which can be used independently or to correct its own oscillator phase or frequency.

**Phot.** A photometric light unit for very strong illumination levels. One phot is equal to 10,000 lux.

**Photodiode.** A type of semiconductor device in which a PN junction diode acts as a photo sensor.

**Photo-effect.** Also known as photoelectric-effect. This refers to a phenomenon of ejection of electrons from a metal whose surface is exposed to light.

**Photon.** A representative of the quantum nature of light. It is considered as the smallest unit of light.

**Photopic vision.** The range of light intensities, from  $10^5$  lux down to nearly  $10^{-2}$  lux, detectable by the human eye.

**Pigtail.** A length of optical fibre with one "bare end" and the other end terminated in a connector.

**Pinhole lens.** A fixed focal length lens, for viewing through a very small aperture, used in discrete surveillance situations. The lens normally has no focusing control but may offer a

choice of iris functions.

**PIP.** Picture in Picture

**Pixel.** Derived from Picture Element. Usually refers to the CCD chip unit picture cell. It comprises a photo sensor plus its associated control gates.

**Pixel or picture element.** The smallest visual unit that is handled in a raster file, generally a single cell in a grid of numbers describing an image.

**Photo multiplier.** A highly light-sensitive device. Advantages are its fast response, good signal-to-noise ratio and wide dynamic range. Disadvantages are fragility (vacuum tube), high voltage and sensitivity to interference.

**Polarizing filter.** An optical filter that transmits light in only one direction (perpendicular to the light path), out of 360° possible. The effect is such that it can eliminate some unwanted bright areas or reflections, such as when looking through a glass window or the surface of water. In photography, polarizing filters are used very often to darken a blue sky.

**POTS.** Plain Old Telephone Service: the only name recognized around the world for basic analogue telephone service. Telephone System takes the lowest 4kHz of bandwidth on twisted pair wiring. Any service sharing a line with Telephone System must either use frequencies above Telephone System or convert Telephone System to digital and interleave with other data signals.

**P-picture (or P frame).** Prediction-coded picture. An MPEG term to describe a picture that is coded using motion-compensated prediction from the past reference picture.

**Preset positioning.** A function of a pan and tilt unit, including the zoom lens, where a number of certain viewing positions can be stored in the system's memory (usually this is in the telemetry receiver) and can be recalled when required, either upon an alarm trigger, programmed or manual recall.

**Primary colours.** A small group of colours light that, when combined, can produce a broad spectrum of other colours. In television, red, green and blue are the primary colours from which all other colours in the picture are derived. White light is a summation of 11% blue, 30% red and 59% green.

**Principal point.** One of the two points that each lens has along the optical axis. The principal point closer to the imaging device (CCD chip in our case) is used as a reference point when measuring the focal length of a lens.

**PROM.** Programmable read only memory. A ROM that can be programmed by the equipment manufacturer (rather than the PROM manufacturer).

**Protocol.** A specific set of rules, procedures or conventions relating to format and timing of data transmission between two devices. A standard procedure that two data devices must accept and use to be able to understand each other. The protocols for data communications cover such things as framing, error handling, transparency and line control.

**PSTN.** Public Switched Telephone Network.

**PSU.** Power Supply Unit.

**PTZ camera.** Pan, Tilt and Zoom camera.

**PTZ site driver (or telemetry receiver or decoder).** An electronic device, usually located with the camera equipment, which receives telemetry control signals in order to operate pan, tilt, zoom and focus functions.

**Pulse.** A current or voltage that changes abruptly from one value to another and back to the original value in a finite length of time. Used to describe one particular variation in a series of wave motions.

## Q

**QAM.** Quadrature Amplitude Modulation. Method for modulating two carriers. The

carriers can be analogue or digital.

**QCIF.** Quarter Common Intermediate Format. A videoconferencing format that specifies data rates of 30 frames per second (fps), with each frame containing 144 lines and 176 pixels per line. This is one fourth the resolution of Full CIF. QCIF support is required by the ITU H.261 videoconferencing standard.

**Quad display.** Equipment that simultaneously displays four images from four separate sources on a single monitor each occupying a quadrant of the screen.

## R

**Radio frequency (RF).** A term used to describe incoming radio signals to a receiver or outgoing signals from a radio transmitter (above 150 Hz). Even though they are not properly radio signals, TV signals are included in this category.

**RAM.** Random access memory. Electronic chips, usually known as memory, holding digital information while there is power applied to it. Its capacity is measured in kilobytes. This is the computer's work area.

**RAID.** Redundant array of inexpensive disks. This a technology of connecting a number of hard drives into one mass storage device, which can be used, among other things, for digital recording of video images.

**Random interlace.** In a camera that has a free-running horizontal sync as opposed to a 2:1 interlace type.

**Refraction.** The deflection away from or towards the normal, of a beam of light as it passes between two media of differing densities.

**Registration.** An adjustment associated with colour sets and projection TV's to ensure that the electron beams of the three primary colours of the phosphor screen are hitting the proper colour dots/stripes.

**Resolution.** A measure of the ability of a camera or television system to reproduce detail. The number of picture elements that can be reproduced with good definition. Usually measured in Television Lines.

**Retrace.** Also known as fly back. The return of the electron beam in a CRT to the starting point after scanning. During retrace, the beam is typically turned off. The Sync pulses are generated during this time.

**Remote control.** A transmitting and receiving of signals for controlling remote devices such as pan and tilt units, lens functions, wash and wipe control and similar. It may also refer to the hand held controls for some VCRs and other CCTV equipment.

**RETMA.** Former name of the EIA association. Some older video test charts carry the name RETMA Chart.

**RF signal.** Radio frequency signal that belongs to the region up to 300 GHz.

**RG-11.** A video coaxial cable with 75 Ohm characteristic impedance with larger conductors than the popular RG-59. With RG-11 much longer distances can be achieved than with RG-59, but it is more expensive and harder to work with.

**RG-58.** A coaxial cable designed with 50 Ohm characteristic impedance; therefore, not suitable for CCTV.

**RG-59.** A video coaxial cable with 75 Ohm characteristic impedance. A type of coaxial cable that is most common in use in small to medium-size CCTV systems. It has an outer diameter of approx. 6 mm and it is a good compromise between maximum distances achievable (up to 266m) and good transmission.

**Rise time.** The time taken for a signal to make a transition from one state to another; usually measured between the 10% and 90% completion points of the transition. Shorter or faster rise times require more bandwidth in a transmission channel.

**RMS.** Root Mean Square. A measure of effective (as opposed to peak) voltage of an AC waveform. For a sine wave it is 0.7071 times the peak voltage. For any periodic waveform, it is the square root of the average of the squares of the values through one cycle. For a fixed resistive load, the RMS voltage will give an equivalent heating effect to the DC voltage of the same value as the RMS voltage.

**ROM.** Read Only Memory. An electronic chip, containing digital information that does not disappear when power is turned off.

**Routing Switcher.** An electronic device that routes a user-supplied signal (audio, video, etc.) from any input to any user-selected output. This is a broadcast term for matrix switchers, as we know them in CCTV.

**RS.** Recognised Standard. A set of specifications for data transmission written by the Electronics Industries Association (EIA).

**RS-125.** A SMPTE parallel component digital video standard.

**RS-170.** A document prepared by the Electronics Industries Association describing recommended practices for NTSC colour television signals in the United States.

**RS-232.** A format of digital communication using a three wire unbalanced presentation. The RS-232 standard defines the presentation and voltages for asynchronous communications, but it does not define how the data should be represented by the bits, i.e., it does not define the overall message format and protocol. It is very often used in computers, CCTV and communications between keyboards and matrix switchers.

**RS-422.** This is an advanced format of digital communication when compared to RS-232. A major difference is that the presentation is balanced line and the signaling is differential. In simple terms, the signal transmitted is read at the receiving end as the difference between the two wires without a reference to earth. So if there is common mode noise induced along the line, it will be cancelled out. RS-422 can drive lines of up to 1200m and distribute data on to up to 10 receivers.

**RS-485.** This is an advanced format of digital communications compared to RS-232. It is a balanced line transmission system. The major improvement over RS422 is in the number of receivers that can be driven with this format, up to 32. It is classically a half duplex 2 wire presentation.

## S

**Saturation (in colour).** The intensity of the colours in the active picture. The degree by which the eye perceives a colour as departing from a grey or white scale of the same brightness. A 100% saturated colour does not contain any white; adding white reduces saturation. In NTSC and PAL video signals, the colour saturation at any particular instant in the picture is conveyed by the corresponding instantaneous amplitude of the active video sub-carrier.

**Scanning.** The rapid movement of the electron beam in the CRT of a monitor or television receiver. It is formatted line-for-line across the photo-sensitive surface to produce or reproduce the video picture. When referred to a PTZ camera, it is the panning or the horizontal camera motion.

**Scanner.** 1. When referring to a CCTV device it is the, pan only, head. 2. When referring to an imaging device it is the device with CCD chip that scans documents and images. SCART (or Peritel SCART). SCART stands for Syndicat Français des Constructeurs d'Appareils Radio et Télévision. A connector commonly found on television sets and video recorders, with standard connections for audio, composite and component video in and out.

**Scene illumination.** The average light level incident upon a monitored area. Normally measured for the visible spectrum with a light meter having a spectral response corresponding closely to that of the human eye and is quoted in lux.

**Scotopic vision.** Illumination levels below 10-2 lux, thus invisible to the human eye.

**SCSI.** Small Computer Systems Interface. A computer standard that defines the software and hardware methods of connecting more external devices to a computer bus.

**SECAM.** Sequential Couleur Avec Memoire, sequential colour with memory. A colour television system with 625 lines per frame (used to be 819) and 50 fields per second developed by France and the former U.S.S.R. Colour difference information is transmitted sequentially on alternate lines as an FM signal.

**Serial data.** Time-sequential transmission of data along a single wire. In CCTV, it is known as telemetry and is the most common method of communicating between keyboards, matrix and PTZ cameras. It may be synchronous or asynchronous.

**Serial interface.** A digital communications interface in which data are transmitted and received sequentially along a single wire or pair of wires. Common serial interface standards are RS-232 and RS-422.

**Serial port.** A computer I/O (input/output) port through which the computer communicates with the external world. The standard serial port is RS-232 based and allows bi-directional communication on a 3 wire connection, as a serial data stream.

**Sidebands.** The frequency bands on both sides of a carrier within which the energy produced by the process of modulation is carried.

**Signal-to-Noise ratio (S/N).** The S/N ratio is the ratio of noise to actual total signal, and it shows how much higher the signal level is than the level of noise. It is expressed in decibels (dB), and the bigger the value is, the crisper and clearer the picture (and/or sound) will be during playback. An S/N ratio is calculated with the logarithm of the normal signal and the RMS value of the noise. A S/N ratio can be given for the luminance signal, chrominance signal and audio signal.

**Silicon.** The material of which modern semiconductor devices are made.

**Simplex.** In general, it refers to a communications system that can transmit information in one direction only. In CCTV, simplex is used to describe a method of multiplexer operation where only one function can be performed at a time, e.g., either recording or playback individually.

**Single-mode fibre.** An optical glass fibre that comprises a core of very small diameter. A typical single-mode fibre used in CCTV has a 9  $\mu\text{m}$  core and a 125  $\mu\text{m}$  outer diameter. Single-mode fibre has less attenuation and therefore transmits signals at longer distances (easily up to 40km unrepeated). Such fibers are normally used only with laser sources because of their very small acceptance cone.

**SIT.** Silicon Intensified Target. A high sensitivity monochrome camera usable in bright starlight.

**Skin effect.** The tendency of high frequency alternating current to travel only on the surface of a conductor. The higher the frequency the greater the effect. At high frequency, high current the effect is overcome using bunched conductors or Litz wire (many small conductors).

**Slow scan.** The transmission of a series of frozen images by means of analogue or digital signals over limited bandwidth media, usually telephone.

**Smear (or Transfer Smear).** An unwanted side effect of vertical charge transfer in a CCD chip. It shows as vertical white (or sometimes red) stripes in parts of the image where there are very bright highlights. In some modern chip sets smear is minimized to almost undetectable levels.

**SMPTE.** Society of Motion Picture and Television Engineers.

**SMPTE time code.** In video editing, time code that conforms to SMPTE standards. It consists of an 8-digit number specifying hours: minutes: seconds: frames. Each number identifies one frame on a videotape. SMPTE time code may be of either the drop-frame or non-drop-frame type.

**Snow.** Random video noise on the display screen, often resulting from dirty VCR heads, weak

broadcast video reception or AGC amplifiers working at high gain.

**S/N ratio.** See Signal-to-Noise ratio.

**Spectrum.** In electromagnetics, the spectrum of a signal refers to the description of a signal's amplitude versus its frequency components. In optics, spectrum refers to the various light frequencies composing the white light which can be seen as rainbow colours, when separated.

**Spectrum analyser.** An electronic device that can show the frequency spectrum of an electric signal, i.e. plots amplitude (vertically) against frequency (horizontal).

**SPG.** Sync pulse generator. A source of synchronization pulses.

**Split-screen unit.** Equipment that simultaneously displays parts or more than one image on a single monitor. It usually refers to two images displayed on a single screen.

**STP.** Shielded Twisted Pair.

**Staircase pattern.** The monochrome equivalent of colour bars. A pattern generated by the TV generator, consisting of equal width luminance steps of 0, +20, +40, +60, +80, and +100 IRE units and a constant amplitude chroma signal at colour burst phase. Chroma amplitude is selectable at 20 IRE units (low stairs) or 40 IRE units (high stairs). The staircase pattern is useful for checking linearity of luminance and chroma gain, differential gain and differential phase and correctly setting up monitors.

**Start bit.** A bit preceding the group of bits representing a character used to signal the arrival of the character in an asynchronous transmission.

**Steradian sr.** The steradian is the cone of light spreading out from the source which would illuminate one square meter of the inner surface of a sphere of 1 m radius around the source.

**Sub-carrier (SC).** Also known as SC: 4.43 MHz for PAL, 3.58 MHz for NTSC. These are the basic signals in all PAL and NTSC sync signals. The actual frequencies are 4.43361875 MHz (PAL) and 3.579545 MHz (NTSC). Sub-carrier is usually divided down from a primary crystal frequency. All other synchronizing signals are directly divided down from sub-carrier.

**S-VHS.** Super Video Home System format in video recording. A newer standard developed by JVC, preserving the backwards compatibility with the VHS format. It offers much better recorded

horizontal resolution, for colour, up to 400 TV lines. This is due to the colour being separated from the luminance and use of high quality video heads and better tapes.

**SWG.** Standard Wire Gauge. The Imperial equivalent of AWG. The smaller the number the larger the diameter of wire.

**Sync.** Short for synchronization.

**Sync generator (sync pulse generator, SPG).** Device that generates synchronizing pulses needed by video source equipment to provide proper signal timing. Pulses typically produced by a sync generator could be sub-carrier, sync, blanking, H and V drives and colour black. Most commonly used in CCTV are H and V drives.

## T

**T1 channels.** In North America, a digital transmission channel carrying data at a rate of 1.544 Mbps. In Europe, a digital transmission channel carrying data at a rate of 2.048 Mbps.

**TBC.** Time Base Correction. Synchronization of various signals inside a device or system, such as a multiplexer or a time base corrector.

**TCP/IP** Transmission Control Protocol / Internet Protocol

**TDG.** Time and Date Generator.

**TDM.** Time Division Multiplexing. Time-sharing of a transmission channel by assigning each user a dedicated segment of each transmission cycle. Video Multiplexers in CCTV use TDM techniques to record many signals onto a single tape.

**Tearing.** A lateral displacement of the video lines due to sync instability. It appears as though parts of the images have been torn away.

**Teleconferencing.** Electronically linked meeting conducted among groups in separate geographic locations.

**Telemetry.** Serial data used for the remote control (or monitoring) of a system. Usually comprises a digital encoded data, which is represented by voltages on the line. Sometimes the signal can be audio tones, such as Frequency Shift Keying (FSK) or Dual Tone Multi Frequency (DTMF). It is intended to control pan, tilt, zoom, focus, preset positions, wash, wipe and similar. Being digital, it is usually sent via twisted pair cable but it can also be transmitted over the video coaxial cable, in the opposite direction to the video.

**Telephoto.** A lens where the focal length is longer than the physical length of the lens, not to be confused with a zoom lens.

**Termination.** 1. The connection of a discreet impedance at the end of a transmission line. When the characteristic impedance of the cable (75 Ohms in CCTV) is the value used (as should always be the case) the maximum power is transferred with no reflections.

2. It can refer to the physical act of terminating a cable with a special connector, which for coaxial cable is usually BNC. For optical fibre cable, the most common Termination in CCTV is the ST connector. TFT. Thin-Film-Transistor. This technology is used mainly for manufacturing flat computer and video screens that are superior to the classic LCD screens. Colour quality, fast response time and resolution are excellent for video.

**Time lapse VCR (TL VCR).** A video recorder, most often in VHS format, that can prolong the video recording on a single tape up to 960 hours (this refers to a 180 min tape). This type of VCR is often used in CCTV systems. The principle of operation is very simple - instead of having the video tape travel at a constant speed of just under 24mm/s (which is the case with the domestic models of VHS VCRs), it moves with discrete steps that can be controlled. TL VCRs can have a number of other special functions for use in CCTV systems.

**Time lapse video recording.** The intermittent recording of video signals at intervals to extend the recording time of the recording medium. It is usually measured when using a 3-hr (180-min) tape.

**T-pulse to bar.** A term relating to frequency response of video equipment. A video signal containing equal amplitude T-pulse and bar portions is passed through the equipment and the relative amplitudes of the T-pulse and bar are measured at the output. A loss of response is indicated when any portion of the signal is lower in amplitude than the other. The test signal is called a Pulse and Bar signal and often includes a 2T a 10T a bar and a ramp signal, which contains low medium and high frequencies.

**Touch screen.** A computer type screen that enables selection similar to a computer mouse but operates by touching the screen. The operation is usually either based on capacitance or Surface Acoustic Waves (SAW).

**Tracking.** The angle and speed at which the tape passes the video heads.

**Transcoder.** A device that converts one form of encoded video to another, e.g., to convert NTSC video to PAL. Sometimes mistakenly used to mean translator.

**Transducer.** A device that converts one form of energy into another. For example, in fibre optics, a device that converts light signals into electrical signals.

**Translator.** A device used to convert one component set to another, e.g., to convert Y, R-Y, B-Y signals to RGB signals.

**Transponder.** The electronics of a satellite that receives an uplinked signal from the earth, amplifies it, converts it to a different frequency and returns it to the earth.

**TTL.** 1. Transistor-Transistor Logic. A term used in digital electronics mainly to describe the ability of a device or circuit to be connected directly to the input or output of digital equipment. Such compatibility eliminates the need for interfacing circuitry. TTL signals are usually limited to binary i.e.. two states, low and high, and are thus much more limited

than analogue signals. 2. Thru-The-Lens viewing, metering or colour measuring.

**TVL.** Television Lines. The measure of resolution of either a camera output or a monitor display. It is limited by the frequency response of the system or the Chroma sub carrier.

**Twisted-pair.** A cable composed of two small insulated conductors twisted together. Since both wires have nearly equal exposure to any interference, common mode noise is high, but the differential noise is slight thus common mode noise is rejected in a twisted pair line. Twisted pair cable is used for balanced line transmission.

## U

**UHF signal.** Ultra High Frequency signal. In television it is defined to belong in the radio spectrum between 470 MHz and 850 MHz.

**Unbalanced signal.** In CCTV, this refers to a type of video signal transmission through a coaxial cable. It is called unbalanced because the signal travels through the centre core and returns via an earthed conductor. One conductor is a fixed voltage i.e. earth and only the other moves. In a balanced line system neither conductor is referenced to earth.

**Under scan.** Decreases raster size in both H and V so that all four edges of the picture are visible on the monitor.

**UPS.** Uninterruptible Power Supply. These are power supplies used in the majority of high security systems, whose purpose is to back-up the system when the mains power fails. The duration of this depends on the size of the UPS, usually expressed in output VA (or kVA), and the hold up time expected from fully charged batteries. There are two common types, "off line" and "on line". Off line uses a switch to change from mains to battery operation, thus there can be a short break in the output. On Line UPSs are a type where the convertor is always working, hence there is no switch over break at the output..

**UTP.** Unshielded Twisted Pair. A cable medium with one or more pairs of twisted insulated copper conductors bound in a single sheath, with no overall or individual screen. Now the most common method of bringing telephone signals and data to the desktop.

## V

**Variable bit rate.** Operation where the bit rate varies with time during the decoding of a compressed bit stream. Used in MPEG 1.

**Vari-focal.** A lens type that the focal length can be infinitely varied to give the exact image desired. It is similar to a manual zoom lens, except that a vari-focal lens cannot be zoom tracked.

**VDA.** See Video Distribution Amplifier.

**Vectorscope.** An instrument similar to an oscilloscope, that is used to check and/or align amplitude and phase of the three colour signals (RGB). It has a circular, rather than rectangular screen, to show the phase angles of the component colours.

**Velocity of propagation.** Speed of signal transmission. In free space, electromagnetic waves travel at the speed of light (C). In coaxial cables, this speed is reduced by the dielectric material.

Commonly expressed as percentage of the speed in free space i.e. 0.8C which is  $0.8 \times 3 \times 10^8$ .

**Vertical interval.** The portion of the video signal that occurs between the end of one field and the beginning of the next. During this time, the electron beams in the monitors are turned off (invisible) so that they can return from the bottom of the screen to the top to begin another scan. It is a time period where information can be inserted such as teletext, K codes and telemetry.

**Vertical interval switcher.** A sequential or matrix switcher that switches from one camera to another exactly in the vertical interval, thus producing roll-free switching. This is possible only if the various camera sources are synchronized.

**Vertical resolution.** Chrominance and luminance detail expressed vertically in the picture tube. Limited by the number of scan lines and the Kell factor (a probability factor). The limit in a 625 line, 2:1 interlace system is 409.5 lines. In a non or random interlace system the resolution will be worse.

**Vertical retrace.** The return of the electron beam to the top of a television picture tube screen or a camera pickup device target at the completion of the field scan.

**Vertical shift register.** The mechanism in CCD technology whereby charge is read out from the photo sensors of an interline transfer or frame interline transfer sensor.

**Vertical sync pulse (also field sync pulse).** A portion of the vertical blanking interval which is made up of blanking level lines of video. Synchronizes vertical scan of television receiver to composite video signal. Starts each frame at same vertical position. In total the vertical interval is 20 line long (CCIR & PAL).

**Vestigial sideband transmission.** A system of transmission wherein the sideband on one side of the carrier is transmitted only in part.

**VGA.** Video Graphics Array.

**Video bandwidth.** The difference between the lowest and the highest signal frequency that a specific video signal can reach. The greater the video bandwidth, the better the quality of the picture. A video recorder that can reproduce a very broad video bandwidth generates a very detailed, high quality picture on the screen. The accepted bandwidth in CCTV is 5.5MHz for a colour signal.

**Video Distribution Amplifier (VDA).** A special amplifier for buffering the video signal so that it can be supplied to a number of items of equipment at the same time. Each output will need to be individually terminated at 75 Ohms.

**Video gain.** The amplification factor through any piece of equipment. Many loopthrough items are passive, i.e.. no gain.

**Video equalization corrector (video equalizer).** A device that corrects for the high frequency losses and/or phase errors in the transmission of a video signal along long lengths of cable.

**Video frame store.** A device that enables digital storage of one or more images for a "frozen" display on a video monitor.

**Video in-line amplifier.** A device providing amplification of a video signal.

**Video matrix switcher (VMS).** A device for switching more than one camera, VCR, video printer and similar to more than one monitor, VCR, video printer and similar. Much more complex and more powerful than simple sequential video switchers.

**Video monitor.** A device for converting a video signal into an image.

**Video printer.** A device to produce a hard copy printout from a video signal. It may be either a monochrome (B/W) or colour printer. They come in different format sizes and often special paper and inks are needed. Many computers now can be fitted with a video capture card, which means the print can be produced using a normal computer printer.

**Video signal.** An electrical signal containing all of the elements of the image produced by a camera or any other video source.

**Video switcher.** A device for switching more than one camera to one or more monitors manually, automatically or upon receipt of an alarm condition.

**VITS.** Vertical Interval Test Signals. Specially shaped electronic signals inserted in the invisible lines (in the case of PAL, usually between lines 6 & 18) that can be used for the measurement of many quality factors of a system.

**Video wall.** A video wall is a large screen made up of several monitors placed close to one another, so when viewed from a distance, they form a single large video screen or wall.

**VOD.** Video On Demand. A service that allows users to view whatever program they want

whenever they want it with VCR-like control capability such as pause, fast forward and rewind.

**VHF.** Very High Frequency. A signal encompassing frequencies between 30 and 300 MHz.

In television, VHF band I uses frequencies between 45 MHz and 67 MHz, and between 180 MHz and 215 MHz for Band III. Band II is reserved for FM radio from 88 MHz to 108 MHz.

**VHS.** Video Home System. As proposed by JVC, a video recording format used most often in homes but also in CCTV. Its limitations include the speed of recording, the magnetic tapes used and the color separation technique. Most of the CCTV equipment, today, exceeds VHS resolution.

**VLF.** Very Low Frequency. Refers to the frequencies in the band between 10 and 30 kHz.

**VMD.** Video Motion Detector. A detection device generating an alarm condition in response to a change in the video signal, usually motion, but it can also be change in light. Very difficult to set up for use externally but can be useful in carefully controlled situations. Modern VMD systems can learn the scene and ignore such things as tree and foliage movement.

**VR.** Virtual Reality. Computer-generated images and audio that are experienced through high-tech display and sensor systems and whose imagery is under the control of a viewer.

**VS.** Vertical Sync.

## W

**WAN.** Wide Area Network.

**Waveform Monitor.** An oscilloscope used to display the video waveform, usually having a line counter built in to trigger and display only one line of a video image.

**Wavelet.** A particular type of video compression that is especially suitable for CCTV. Offers higher compression ratio with equal or better quality to JPEG.

**White balance.** An electronic process used in video cameras to retain true colours. It is performed electronically and is set on the basis of a white object in the picture.

**White level.** This part of the video signal electronically represents the white part of an image. It is a voltage of 1V peak to peak (assuming a sync of 0.3V) or 100 IRE whereas the black level is 0.3V peak to peak or 0 IRE.

**Wow and flutter.** Wow refers to low frequency variations in pitch while flutter refers to higher-frequency variations in pitch caused by variations in the tape-to-head speed of a tape machine.

**W-VHS.** A new Wide-VHS standard proposed by JVC, featuring a high resolution format and an aspect ratio of 16:9.

## X

**X-ray.** Very short wavelength electromagnetic radiations. Very penetrating and used for photographing skeletal structures of people.

## Y

**Y/C.** A video format found in Super-VHS video recorders. Luminance is marked with Y and is produced separate to the C, which stands for chrominance. Thus, an S-VHS output Y/C requires two equal length coaxial cables for a perfect output.

**Y, R-Y, B-Y.** The general set of colour difference signals used in the PAL system as well as for some encoder and most decoder applications in NTSC systems; Y is the luminance signal, R-Y is the first color difference signal and B-Y is the second color difference signal, also known

as YUV.

**Y, U, V.** Luminance and color difference components for PAL systems; Y, B-Y, R-Y with new names; the derivation from RGB is identical.

## Z

**Z.** In electronics and television this is usually an abbreviation for impedance.

**Zoom lens.** A camera lens that can vary the focal length while keeping the object in focus, giving an impression of coming closer to or going away from an object. It is usually controlled by a keyboard with buttons that are marked zoom-in and zoom-out. The change in focal length of the lens does not result in a physical length of the lens.

**Zoom ratio.** A mathematical expression of the two extremes of focal length available on a particular zoom lens.