Glossary of Camera terminology

0 LuxShot: Technique allowing pictures to be shot without visible light. The camera is switched to its infrared sensitivity mode and infrared lighting (built-in to Sony IR sensitive cameras) is used to illuminate the scene. As the picture is only infrared, no significant color information is displayed. The picture looks slightly greenish, like an image intensifier picture.

NOTE: In 0 LuxShot mode, the iris remains in a fully open position, and the
high-speed shutter feature does not function.

4:4:4 / 4:2:2 / 4:1:1: Indicates the sampling applied to the Y/R-Y/B-Y components of an analog video signal when it is converted into a digital signal. The three numbers indicate the ratio of the sampling rates applied to the individual signals. 4:4:4 indicates that the same sampling rate has been applied to all three signals, 4:2:2 means that the sampling rate of the R-Y and B-Y color difference signals is half that of the luminance signal Y, while 4:1:1 indicates that the sampling rate is one quarter that of the Y signal.

AE (Auto Exposure): Combined use of AGC and iris motor control allows shooting in a broad range of lighting conditions. AGC amplifies the video signal in low light conditions, iris reduces it in high light conditions. Motor iris control can be replaced by the CCD IRIS control.

AF (Autofocus): Available in cameras equipped with motorized focus, this feature provides automatic adjustment of the focus. AF operates by varying the focus to maximize the high frequency content of the central area of the picture by reference to high luminance and strong contrast elements. In some cameras, AF can be set to High or Low sensitivity modes. AF mode is not recommended for continuous 24-hour operation. See also One-push AF, Interval AF, Zoom triggered AF.

AGC (Automatic Gain Control): Circuitry that automatically adjusts the electronic amplification of the video signal to compensate for varying levels of scene illumination.

Aliasing: Interference phenomenon which occurs when a sampled signal contains frequencies that are higher than half the sampling frequency. A CCD samples the picture spatially. An optical low-pass filter is used to avoid aliasing, especially in color applications.

Aperture correction: Camera signal processing function which adjusts the enhancement of edges of objects in a picture.

Aspect Ratio: The ratio of width over height of an image, 4:3 for a standard TV image, 16:9 for wide screen.

Asynchronous transmission mode: IEEE 1394 data transmission mode without a guaranteed data delivery time. Used in IEEE 1394 cameras for control functions and reports.

ATW (Auto Tracking White balance): In ATW mode, white balance is continuously being adjusted according to the color temperature of the scene illumination.

Backlight compensation: Special compensation option in AE (Auto Exposure) mode. When the background is too bright and/or when the subject is too dark, backlight compensation modifies the action of Auto Exposure to make the subject appear clearer.

Bayonet mount: Type of camera mount in which there is 38 mm or 48 mm clearance between the lens rear mounting surface and the camera's CCD.

Black stretch / Black Compress Control: A function of Digital Signal Processing technology that enables the contrast of the black area of an image to be variable adjusted. The black stretch function emphasizes contrast in the dark areas while black compress enhances or deepens darkness.

CCD (Charge Coupled Device): Semiconductor device made of a matrix (or lines) of individual photosensitive elements, called pixels. The optics focus the scene onto the matrix and each pixel accumulates an electric charge proportional to the local intensity of received light and to the integration time. At read out time, all charges are transferred at the same time to an output matrix protected from light, where a sequential reading may take place while a new picture starts integrating. The output matrix size is half that of the sensitive matrix size for interlaced mode CCDs, and the same size for progressive scan CCDs.

CCD IRIS: Special operating mode of the electronic shutter of a CCD camera. The shutter timing is automatically adjusted to maintain the same video output level, irrespective of the scene illumination. Can only reduce the camera sensitivity. Allows the use of a fixed iris lens under variable lighting conditions. Often combined with AGC.

CCIR: B/W video standard with 625 lines / frame, 2 interlaced fields / frame, 25 frames / second. Monochrome version of PAL.

CCU (Camera Control Unit): The CCU provides a means of controlling a remote camera. So that the remote camera can be as small and light as possible, the CCU also includes all electronic circuits that do not have to be fitted inside the remote head, these are typically signal processing circuitry, input/output interfaces and power supply.

Chrominance: Color part of the composite video signal. Also called C. Separately transmitted in Y/C (S-video). It is the combination of the two color difference signals (U or R-Y) and (V or B-Y) modulated on to a subcarrier. See also YUV.

CHU (Camera Head Unit): In a remote head camera system, the CHU is a small unit that only includes the sensor, its optical interface, the cable coupling to a CCU and the minimum amount of electronic circuitry.

C-Mount: Type of camera mount in which there is 17.526 mm clearance between the lens rear mounting surface and the camera's CCD.

Composite sync: Combination of the HD and VD in one signal. Commonly used as a synchronizing or genlock signal in B/W systems.

Depth of field: Distance between the nearest and farthest points in a scene that are in focus as viewed by a particular lens. Affected by choice of lens focal length and iris aperture. Increases with both decreasing lens focal length and decreasing iris aperture.

Donpisha: Means "immediate" in Japanese. CCD sensor shuttering technology for asynchronous shooting of fast moving objects without a time delay.

DSP (Digital Signal Processing): Inside a camera, sensor signals must be processed in several steps before they can be displayed / transmitted. Typical processing steps are amplification, gamma correction, black level correction, highlight compression/clipping, edge enhancement, color processing, color balance, color correction, output signal encoding. Picture quality is highly dependent on the accuracy and the stability of these processes. In DSP technology, the sensor signal is converted to digital form after initial amplification, and all processing is achieved digitally, ensuring high quality and no drift. Output signals remain in digital form or are converted back to analog depending on the camera output mode.

DynaLatitude Process: A unique feature function available when using Digital Signal Processing (DSP) technology. It manages the contrast of each pixel according to a histogram of video signal level distribution in order to utilize the limited dynamic range of the video signal standard. This function is used in the DXC-390/P camera.

Dynamic Contrast Control Plus (DCC+): A function of Digital Signal Processing (DSP) technology that virtually eliminates hue factor distortion – phenomenon that is particularly obvious in extreme high light conditions. The DCC+ function manages video signal data at three levels – brightness, hue and saturation that results in reproduced images with suitable knee correction while virtually eliminating hue factor distortion. This function is used in the DXC-390/P camera.

E-Donpisha: Enhanced asynchronous shutter. Available with external and internal synchronization modes. The camera CCD starts to accumulate electrons on receipt of an external trigger pulse. Shutter speed is selected by a switch or menu setting.

E-Donpisha - II: Asynchronous shutter mode. Available in external sync mode only. Timing of accumulation and shutter speed are controlled by the external trigger signal. Shutter speed is controlled by the width of the pulse and VD controls the timing for image output.

EIA (Electronics Industries Association): B/W video standard with 525 lines / frame, 2 interlaced fields / frame, 30 frames / second. Monochrome version of NTSC video signal. Also referred to as RS-170.

Electronic shutter: CCD camera operating mode where the integration time can be shortened without any mechanical device. Used for blur reduction when capturing fast moving objects, and for camera sensitivity reduction in high levels of scene illumination.

Exwave HAD technology: Technology with a nearly gapless OCL (On-chip-lens) located over each pixel of the CCD resulting in more than twice the sensitivity and 1/50 the smear compared to Hyper HAD technology.

F Stop, F Number: Calibrated measure of lens iris aperture. Common F stops are F1.4, F2, F2.8, F4, F5.6, F8, F11, F16, F22. The higher the number, the smaller the iris aperture and the less light falling on the imager.

Field: Half of a TV picture consisting of only the odd or only the even lines. NTSC/EIA features 60 fields of 262.5 lines / second. PAL/CCIR features 50 fields of 312.5 lines / second. Odd / even field pairs recombine on screen as frames due to picture tube and human eye memory.

Field / frame integration: Two different pixel readout techniques in CCDs designed for interlaced output. Refers to the total integration time, field duration (16.6 ms NTSC/EIA or 20 ms PAL/CCIR) or frame duration (33.3 ms NTSC/EIA or 40 ms PAL/CCIR). Both modes give the same sensitivity.

In field integration, pixels of two adjacent lines are read out together as one. The full CCD is read every field, achieving higher picture refresh rate but lower vertical resolution. Mostly used in current applications to achieve optimum capture of movement. Adjacent lines are combined differently for odd (1+2, 3+4, . . .) and even field (2+3, 4+5, . . .) outputs. In frame integration, pixels are read out separately. The complete CCD is read after two fields. Full vertical resolution is achieved. Progressive scan CCDs operate only in frame integration.

Focal length: Distance between the optical center of a lens and the image focal point. Fixes the magnification and the angle of view of a lens. Vari-focal and zoom lenses have a variable focal length.

Frame: One complete TV picture consisting of two sequential interlaced scanned fields. NTSC/EIA has 30 frames of 525 lines per second. PAL/CCIR has 25 frames of 625 lines per second.

Gain: The electronic amplification factor of a signal.

Gamma: Correction law introduced in the camera output signal to compensate for the non-linearity of the CRT (Cathode Ray Tube) in video monitors. A typical gamma value is 0.45, which results in the brightness component of the CRT picture appearing to be linear.

Genlock: Circuitry that synchronizes one video signal to another video signal. There are three types of genlock: V-lock, HV-lock and full color.

- V-lock is useful when simply switching from one B/W color source to another
- HV-lock is used for full synchronization of B/W cameras, and requires a HD + VD input, composite sync input or composite VS video signal input. In the case of color cameras, this type of synchronization can be used when cutting between pictures, but not for mixing between them.
- Full color genlock is used when pictures have to be mixed without color degradation. It needs VBS composite video input.

HAC: Host Adapter Card.

HAD (Hole Accumulated Diode): CCD technology with improved performance in spectral response, vertical smear and sensitivity. The HAD sensor also introduced a higher pixel count and electronic shuttering capability.

HD (Horizontal Drive): Signal used to synchronize the line scan rate of the camera to an external source. Mostly used in B/W applications together with VD.

High rate scanning: Capability of a camera to output less than its maximum number of horizontal lines, but at a higher rate. Unlike partial scanning, the lines output in high rate scanning are symmetrical about the optical sensor center. This means that there is normally no need to re-aim the camera when changing from normal to high rate scanning.

Horizontal Resolution: Number of equally spaced vertical black-to-white or white-to-black transitions that the camera is able to reproduce, divided by the aspect ratio (usually 4:3) to make a comparison between horizontal and vertical resolution easier. Usually expressed as TV lines per picture height. Indicates the amount of horizontal details that can be perceived. Horizontal resolution is limited by the number of pixels in one line and by the type of color filter used, if any.

Hyper HAD: A derivative of the HAD sensor that incorporates microscopic lenses mounted over each sensing pixel. Hyper HAD sensors have no perceptible smear and are nearly twice as sensitive as HAD sensors.

ICR (IR Cut Removable): This function is useful in low light environments. With the IR cut filter removed, the sensitivity of the camera to IR illumination is increased.

IEEE 1394: A digital networked serial interface for high-speed data transmission. Available speeds are 200 and 400 Mb/s, and 800 Mb/s speed is planned in the near future. IEEE 1394 is an ideal interface between a computer and audio/video products because of its ability to transfer a real-time data stream at low cost, with high reliability and ease of use.

Interlaced scanning: Scanning method in which half of the lines are scanned in one field (odd-numbered lines), and the other half are scanned in the next field (even-numbered lines). Thus adjacent lines of a complete picture (one frame) belong to successive fields. Interlaced scanning doubles the screen refresh rate as seen by the viewer and reduces flicker. At screen refresh rates significantly higher than the 25/30 frames/second used in TV systems, interlaced scanning may not be necessary.

Interval AF: AF (Auto Focus) mode is periodically switched ON, then OFF (fixed focus). The duration of the on and off intervals is separately adjustable.

IT (Interline Transfer): In IT CCD technology, the charges on exposed pixels are transferred to light-shielded vertical readout zones embedded in the sensitive area. IT devices are simpler to manufacture and are therefore less costly than FT or FIT devices. Mostly used in industrial and consumer cameras.

Iris: An adjustable sized aperture in a camera lens that controls the amount of light reaching the imager. Compensates for changing lighting conditions. Iris control may be either manual or automatic, depending on the application and the type of camera. When iris is fixed, a variable electronic shutter can be used instead (CCD Iris).

Isochronous transmission mode: IEEE 1394 data transmission mode featuring guaranteed transmission timing and bandwidth. Appropriate for just-in-time transmission of video and audio and computer data.

Long-term integration: Special camera mode similar to the 'B' setting of a photographic camera shutter. The CCD integrates over a long (user-defined) period, providing very high sensitivity. Object must be stationary, external camera control and a frame memory are needed.

Luminance: The part of a composite video signal that expresses brightness. Also called Y. Separately transmitted in Y/C (S-video).

Lux (lux): The SI measurement of light intensity taken at the surface which the light source is illuminating. The measure of the total lumens falling upon a unit of area. 1 lumen per square meter. One Foot-candle equals 10.76 lux.

Minimum illumination: Minimum light level needed to achieve a 50% or 100% video output level when the camera is at maximum gain and the lens iris fully open. Can be computed from the nominal sensitivity, lens characteristics and maximum gain.

MOD (Minimum Object Distance): A lens parameter that defines the minimum distance from a camera lens to the point where an object can still be in focus.

MD (Motion Detector): Camera feature where a reference field is compared with current fields. If a difference is detected, the camera outputs a pulse. An ideal feature for security application.

MTF (Modulation Transfer Function): Defines the resolution capability of a lens. Most lenses exhibit their best MTF when operated in the middle of their iris aperture range.

ND Filter (Neutral Density Filter): A grey filter added in front of a lens to reduce the amount of incoming light into the camera lens. It has no influence on color.

NF Mount: Type of camera mount in which there is 12 mm clearance between the lens rear mounting surface and the camera's CCD.

NTSC (National Television System Committee): Color video standard, used mainly in the United States and Japan. NTSC uses 525 scanning lines per picture, 30 pictures (frames) per second, each frame is made up of two sequential fields containing respectively the even and the odd lines (interlace).

One-push AF (One-push Auto Focus): Focus hold mode that can be automatically readjusted as required by the user (One-push AF Trigger) assuming that the required subject is within the focusing limits of the camera lens.

One-push WB (One-push White Balance): Fixed white balance mode that can be automatically readjusted as required by the user (One-push WB Trigger), assuming that a white object, in suitable lighting conditions and occupying more than half of the image area, is seen by the camera.

PAL (Phase Alternation, Line): Color video standard pioneered in Europe but also used in many other parts of the world. PAL uses 625 scanning lines per picture, 25 pictures (frames) per second, each frame is made up of two sequential fields containing respectively the odd and the even lines (interlace).

Partial Enhance: An advanced function of the Digital Signal Processing (DSP) technology that allows a particular color to be selected and its hue, saturation and detail altered. This function gives the subject a pleasing complexion with a softer image while maintaining the sharpness of other areas, and vice versa. The designated active area of partial enhance can be set with the digital circuits by simply adjusting the Area Detect Cursor.

Pixel: Picture element.

PowerHAD: PowerHAD is further improvement of the Hyper HAD CCD technology, where the microscopic lenses focus more light onto the light sensors thus increased sensitivity and reduced smear.

Progressive Scan: CCD design that allows the acquisition of both odd and even fields at the same time. Progressive scan makes full vertical resolution possible in Donpisha mode.

RGB (Red, Green, Blue): The primary colors of light that produce a color video image. In video, RGB refers to a system in which these three primary colors are kept isolated and delivered from the source to the display device over separate wires. This system results in high-quality pictures. RGB signals are used in some broadcast video equipment and computers.

Restart / Reset: Special mode in which the CCD readout cycle is stopped and restarted in synchronization with an external event. In the Stop mode, the CCD still accumulates picture information.

RS-232C: Serial data transmission standard for computers which can also be used to control camera functions.

Scalable scanning: Capability of a camera to output a picture corresponding to an user defined sub-zone of the sensor. Applied in IEEE 1394 digital cameras featuring the Format_7 output option (XCD-X700, XCD-SX900).

Screen Mode: Partial see-through mode on HMD allowing the user to view the surrounding environment by adjusting the transparency of the screen in the area only around the picture.

SDK: Software Development Kit.

S-Donpisha: Asynchronous shutter mode used with external HD/VD sync. CCD starts to accumulate electrons when the external trigger pulse is received and stops when the VD pulse is received. Therefore the accumulation time (shutter speed) is decided by the length of time between the trigger pulse and VD input.

Sensitivity: Lens iris aperture required to provide a video output signal of standard level at a specified light input. In general, sensitivity is measured using an 89.9% reflectance grey scale chart illuminated by a 3200∞ K illuminance at 2000 lux (color camera) or 400 lux (B/W camera), for a video output level of 100%.

S/N (Signal to Noise Ratio): The ratio, usually expressed in dB (decibels), between the normal signal output and the noise level within an electronic signal.

Smear: Undesirable artifact of CCDs that appears in the picture as a vertical streak above and below a very bright object in the scene. Smear is caused by parasitic light getting into the vertical transfer registers. It is greatly reduced by the microlens-type of CCD used in Hyper HAD and Power HAD sensors. Almost suppressed in FIT CCDs.

Slow shutter: Shutter mode with an integration time longer than 1/50 s (PAL) or 1/60 s (NTSC). Like long-term integration, the slow shutter function increases camera sensitivity when shooting slow-moving or fixed subjects. Unlike long-term integration, continuous normal video is output in slow shutter mode by use of a built-in video memory. The output picture is compatible with normal monitors and recorders.

Square pixel: Used to qualify a CCD sensor where the centers of the pixels are equally spaced horizontally and vertically. Pictures captured from this type of non-square pixel sensor need to be software corrected in order to achieve the correct picture geometry.

Strobe Synchronization : This function is designed to capture fast moving, full frame images by firing a strobe light in a dark lighting condition. The camera synchronizes the timing of the external trigger and can output a full frame image. Using an external frame memory synchronized with the input of external trigger signal, the Write Enable (WEN) pulse is output. The use of the WEN pulse allows for easy capture of full frame still images. This function requires a frame grabber board.

Sync (Synchronization): When synchronized, the horizontal and vertical timing of a camera output are locked to an external signal coming, for example, from another camera. Picture outputs from both sources are then precisely synchronized and can be mixed. When mixing color signals, the subcarriers of the two signals also have to be in synchronism.

Subcarrier: The 4.43 MHz (PAL) or 3.59 MHz (NTSC) signal that is used as a carrier for the color information. This subcarrier is modulated in amplitude by the color saturation and in phase by the color hue. A sample of the unmodulated subcarrier is placed before the start of each horizontal line, and is called the Color Burst.

U and V: The names given to the two video color difference signals (R-Y and B-Y) in their coded form in the PAL or NTSC color systems.

See also Y/R-Y/B-Y.

Ultra mount: Type of camera mount in which there is 6.7 mm clearance between the lens rear mounting surface and the camera's CCD.

VBS (Video + Burst + Sync): The composite video signal, including color information.

VD (Vertical Drive): Signal used to synchronize the field rate of a camera to an external source. Mostly used in B/W together with HD (Horizontal Drive).

Vertical Resolution: Number of equally spaced horizontal black-to-white or white-to-black transitions that a camera is able to reproduce. Indicates the amount of vertical details that can be perceived. Vertical resolution is limited by the number of scanning lines that are fixed by the TV standard.

VISCA' (Video System Control Architecture): RS-232C serial control protocol intended to interface up to seven items of video equipment on one computer link.

V-Lock Sync: see Genlock.

VS (Video + Sync): The composite monochrome video signal commonly used as the genlock signal in B/W systems.

WB (White Balance): In a color camera, white balance is the process of adjusting the values of its color differences signals so that a white object in a scene illuminated by a particular source of illumination is displayed as a white or grey (i.e. no chrominance). The normal color reference illuminant has a color temperature of 3200 K, equivalent to a halogen lamp.

The human eye is a subjective device, constantly readjusting its color balance according to the lighting context (our eye knows what must be seen as white). Unlike the human eye, a camera is an absolute measurement device, and its color balance has to be adjusted to suit the color temperature of the light illuminating the scene, for example sunlight is different from 3200 K. Several adjustment modes are available, fixed values (pre-adjusted), One-push, automatic tracking.

See also One-push WB and ATW.

Y/C (also called S-Video): Separate signals for the Luminance and Chrominance parts of the video signal. Allows higher picture resolution and suppresses cross color effects. Connector is the 4-pin mini-DIN.

Y/R-Y/B-Y: Three signals, luminance (Y) and two color difference signals R-Y (red minus luminance) and B-Y (blue minus luminance) which together carry the brightness and color information of color images . Color difference signals have no light intensity information, and cannot be displayed separately from Y. Compared to RGB signals, they can travel over longer cables lengths without significant resolution loss, and allows different spatial resolutions for luminance and color. Typically used for high-end visual applications. Also known as component signals.

See also U and V signals.

Zoom Triggered AF: The camera is normally in fixed focus mode, but AF (Auto Focus) is temporarily switched on each time the zoom ratio of the camera lens is changed.