

Interlaced Scan Black and White Technology

In the late '80s, Sony introduced revolutionary solid-state sensors, called CCDs (Charge Coupled Devices). These devices were an outstanding improvement over the then current thermionic pick-up tubes. They were smaller, required less power, were highly resistant to shocks and vibration, immune to external magnetic fields, no image 'sticking' with bright objects, no charges overflow from overexposed points to adjacent image zones – and they provided consistent performance. Back then, those characteristics were ideal for many demanding applications.

However, the most exciting feature of a CCD for industrial users, was its ability to build up a picture where all the points were acquired at the same time in a fixed geometrical array. Only the read-out process was an interlaced scanning type to conform with the requirements of TV standards. In pick-up tubes, based on a scanning beam reading a photo-mosaic area, individual parts of the picture were not synchronous, and the geometrical accuracy of the readout was highly unpredictable and dependent on frequent readjustment.

Due to its capability of capturing an instantaneous image with high accuracy, the CCD boosted the use of cameras in factory automation and picture processing applications. At that time, Sony developed CCD cameras integrating a special feature – the capability to synchronize the acquisition and read-out of external events. Different techniques such as restart-reset, shuttering, asynchronous shuttering, and Donpisha modes were introduced step-by-step as the needs of industry evolved.

Over a decade later, these cameras are still widely used by industrial customers and represent a major part of our success. Sony therefore decided not only to keep many of these products in production, but also to progressively introduce a technological update of the full camera range that still matches our customers' requirements: small size, easy setting, mechanically robust, several sensor sizes (including 2/3 type), easy connection and operation with a range of capture boards.

The first step of this technological update was the launch of the XC-ST Series. The XC-ST70/70CE are the successor models of the well-known 2/3 type XC-77/77CE cameras. In addition, the XC-ST50/50CE (1/2 type) and the XC-ST30/30CE (1/3 type) were introduced. All models share the same housing and features (please refer to page 13 for further details). A cost-effective power adapter (the DC-700/700CE) was introduced for these models (please refer to page 17 for further details).

The second step in this product update program was the introduction of the XC-ES and XC-EI Series cameras which replaced the well-known XC-75/75CE and XC-73/73CE cameras. These are made up of four models, the XC-ES50/50CE, XC-ES30/30CE, XC-EI50/50CE and XC-EI30/30CE. They present major improvements in size and in spectral sensitivity (please refer to pages 11 and 12 for further details). The DC-700/700CE power adapter is recommended for these camera modules (please refer to page 17 for further details).

Technical update: external controlled shuttering modes

Name	Description	Comments	External signals needed	Applicable models
Restart-Reset by VD	Sensor keeps integrating light while readout and output are stopped/restarted	First output depends on past illumination. 2 step process induces a delay. Useful for long-term integration	External HD Several external VD	Previously used in XC-77 Series, XC-75 Series, XC-73 Series Currently used in XC-55 Series, XC-ST Series, XC-ES Series XC-EI Series
Restart-Reset by trigger	As above	As above. Internal generation of several VD by menu or switch selection	Trigger only	Currently used in XC-7500 XC-8500CE
Donpisha	Sensor is kept empty with camera in wait mode. Integration starts immediately trigger is received. Picture is ready for output at end of integration	No capture delay		Generic description First implemented in XC-77RR/CE
S-Donpisha	Donpisha with integration time the difference between ext trigger and ext VD	Needs external hardware for accurate integration time control	External HD, external trigger, external VD. Special mode without ext VD, fixed shutter	Previously used in XC-75 Series XC-73 Series
E-Donpisha	Donpisha. Integration time can be selected internally or by trigger pulse width	Extended features. Dual integration time selection. Synchro reset and non-reset modes	External HD, external trigger, external VD. Simplified trigger by use of CMA-87	Currently used in XC-7500 XC-8500CE
E-Donpisha II	Donpisha. Integration time controlled by trigger pulse width	Simplified version. Reset mode only. Easy switch to non-triggered mode by trigger input	External HD, external trigger, external VD	Currently used in XC-55 series
Easy trigger	Donpisha. Integration time controlled by rear panel switches or by trigger pulse width	Ease of use. Dual integration time selection. Synchro reset and non-reset modes. Picture out may be delayed. Easy switch to non-triggered mode by trigger input	External HD, external trigger, external VD. New reset mode with only one external signal: trigger	Currently used in XC-ST Series XC-ES Series XC-EI Series