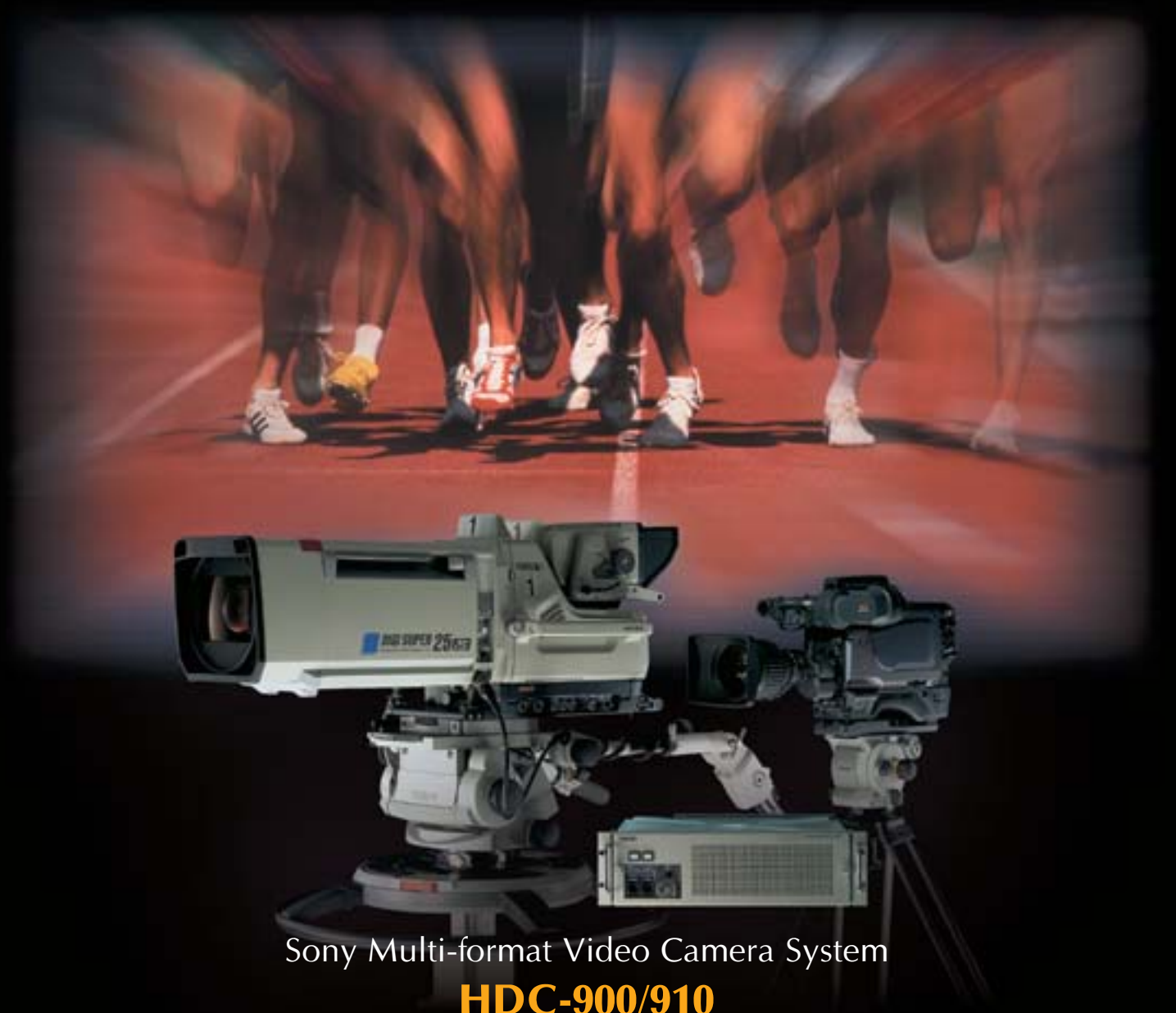
SONY

High Definition Video System

Digital HDVS



Sony Multi-format Video Camera System

HDC-900/910
HDC-950/930
HDCU-900/950

Big Pictures for Global Coverage

For over a decade, Sony has been pioneering the development of high definition video equipment. Today, its High Definition Video System (HDVS®) includes cameras, switchers, routers, VTRs and camcorders. This system now includes an extensive range of studio camera products — the HDC-900/910 studio camera, the HDC-950/930 associated portable camera, and the HDCU-900/950 camera control unit. The worldwide movement towards the introduction of advanced digital video broadcast services requires the origination of program material with very high video and audio quality. DTV in the USA encompasses both HDTV and SDTV, DVB in Europe presently is SDTV but there is growing interest in HDTV. Sony has very carefully considered this movement in designing its new-generation HD cameras, and has developed a true multi-purpose camera system that is compatible with the various international formats that will be used in these enhanced services. The HDC-900/910/950/930 family has been designed to deliver a variety of choices of HDTV and SDTV to meet these multiple global digital origination formats. In particular, the HDC-900 Studio Camera and it's associated HDC-950 portable camera provide maximum flexibility and expandability by accommodating all existing interlace and progressive scan formats. The HDC-910 Studio Camera and it's associated HDC-930 portable camera on the other hand, specifically focuses on interlace origination for 1080/60i, 1080/59.94i and 1080/50i to purely target TV broadcasters while retaining cost effectiveness.

There are several important design criteria required in a new HD camera to ensure that it not only provides the features required for these new services, but also has compatibility with existing broadcast environments:

- True multi-standard operation, from 1080/24P to analog composite (HDC-900/950)
- Similar in operation to current color video cameras
- Easy to integrate into conventional systems
- As cost-effective in daily use as current equipment

These design requirements are completely met in HDC-900/910 and HDC-950/930 cameras:

- Operational controls and connectors are located in similar positions to those on current Sony HDC and BVP Series cameras, so operators accustomed to these models immediately find the HDC-900/910/950/930 familiar and easy to use
- Existing Sony MSUs, CNUs and RCPs can be used with the HDC-900/910/950/930. Current menu control systems and auto set-up functions are also compatible
- Capital cost is not significantly greater than Sony standard definition camera equipment

Common Image Format Operation

A seminal new global digital HD standard was born in 1999 – the culmination of more than fifteen years of international collaboration within the ITU. The global agreement that was reached – on all parameters relating to the still HD image having a singular set of numbers – represented a giant step forward for HD program origination and International Programme Exchange. This is now called the widescreen 16:9 digital HD 1920 x 1080 Common Image Format standard.

The only remaining variables within this worldwide standard are the picture capture rates – those field and frame rates that recognize the long-established regional differences of 50 and 60 Hz, and the new recognition of the singular global 24P progressive format.

In 2000 Sony proudly introduced the new HDC-900/950 camera family as the first worldwide HD camera system conforming to this new ITR-R 709-3 Recommendation for High Definition Production and International Programme Exchange. It captures all imagery according to the now internationally standardized 16:9 Widescreen 1920 x 1080 sampling structure. The cameras can be switched to originate this format at 24P, 25P, or 30P progressive scan frame rates, or at the established 50i and 60i interlaced field rate. Thus, of the seven field and frame rates stipulated in ITU 709, these cameras have implemented five. As a result, one camera system can be employed anywhere in the world – a major step forward in professional equipment evolution and one that will introduce valuable manufacturing economies of scale in the future.

1080/24P has become a significant new origination format for high-end production for HDTV, DVB, DVD and CineAlta™ productions – constituting an important new creative and cost-effective alternative to motion picture film origination for feature, prime time television program and television commercial production. The Sony HDC-900/950 system supports this format to provide high definition material for the many new digital program distribution channels.

The HDC-900/950 system also recognized the emergence of multiple digital scanning formats. In addition to facilitating HD capture according to different picture capture rates, the cameras can also be configured to supply a multiplicity of digital production scanning formats – both HD and SD. Thus, the HDC-900 and HDC-950 embody sophisticated digital down-conversion options within their camera control unit – the HDCU-900 – that deliver a variety of choices in other production formats simultaneously with the selected primary 1920 (H) x 1080 (V) HD output. For the USA, the HDCU-900 can include a board option that digitally converts a 1920 (H) x 540 (V) at 60P origination to the alternate 1280 (H) x 720 (V) at 60P desired by some major US broadcasters. Standard definition signals are also available, 480/60i and 480/30P pictures for widescreen or 4:3 SDTV, or for 4:3 NTSC broadcasting, and 576/50i and 576/25P pictures for DVB and PAL-based systems. Whatever the format, the camera signal is available via HD-SDI and SDI outputs, so there is no quality loss as the signal is transferred from the HDCU-900 control unit.

With its multi-format signal interfaces, the HDC-900/950 system is equally suitable for HD production, cinematic 24P shooting, and broadcasting in the worldwide SDTV, NTSC and PAL formats. A distinct advantage of this camera is that the down conversion of the "super-sampled" HD origination produces standard definition 480 and 576-line SDTV/PAL /NTSC signals having technical performances that are superior to those were they originated in their native formats (their horizontal and vertical MTFs are higher and the associated scanning aliasing are less).

Sony recognizes another important market place dynamic – namely, the rapidly expanding global movement to High Definition Broadcasting within both the 60 Hz and the 50 Hz regions. The critical imperative for the marketplace is cost-effective HD production equipment to spur the growth of these new HD services.

Accordingly, Sony has added to its HD studio camera line an important new system tailored to the larger needs of these broadcasters. Maintaining the spirit of the international standard Common Image Format, Sony proudly introduced the HDC-910 Studio camera and its associated HDC-930 portable camera-a cost effective HD studio camera solution. These models narrowed the available choice of picture capture rates to the 1080/59.94i and 1080/60i desired by broadcasters in the 60 Hz regions, and are also switchable to

1080/50i operation for broadcasters in the 50 Hz world.
Both the HDC-910/930 use significant new CCD imager – an innovative breakthrough in IT (Interline Transfer) design that significantly closes the gap with the traditional advantages of FIT technology. The easier to manufacture IT imager allows an important cost reduction. In combination with a new high-technology half-rack Camera Control Unit – the new HDCU-950 – an HD studio camera system is now available in the competitive price range as a high-end SD studio camera system. It is Sony's hope that this breakthrough will add significant impetus to the advance of digital HD services worldwide.

New Technologies

Improvements in Digital Signal Processing (DSP), a newly developed 2.2-million pixel CCD and 12-bit A/D conversion are at the heart of the HDC-900/910/950/930 camera system. 12-bit A/D conversion improves gradation analysis by a factor of four compared to 10-bit conversion, significantly improving control over picture tonal reproduction, and accuracy of color reproduction. A 600% dynamic range in combination with the 12-bit A/D and the superior DSP processing ensure superb processing of overexposed picture information and the handling of specular highlights. Some of the important new technologies used in the HDC-900/910/950/930 system are described below.

Exclusive HAD Sensor Technology

A new design of CCD has been developed for the HDC-900 and HDC-950. Based on Sony HAD sensor technology and using the on-chip lens structure of the latest Power HAD™ sensors, this CCD is based on the 1920 x 1080 CIF (Common Image Format) and is switchable between progressive mode and interlace mode readout. With its light collecting capability dramatically improved, this 2/3-inch type 2.2 million-pixel FIT CCD used in the HDC-900/950 offers an industry-leading sensitivity of f10 at 2,000 lux. It has a limiting horizontal resolution of 1000 TVL/ph, a signal-to-noise ratio of 54 dB (unweighted over 30 MHz) and the outstandingly low vertical smear level of –135 dB*. The cost effective 2/3-inch type 2.2 million-pixel IT CCD used in the HDC-910/930 provides equivalent performance as the FIT version CCD excluding the vertical smear level which is provided at –125 dB*

*Typical numbers.

12-bit A/D Conversion and ADSP
(Advanced Digital Signal Processing)

The combination of 12-bit A/D conversion and the new 2.2-million sensor CCD provides excellent color rendition and overall picture quality.

The powerful ADSP circuitry enables camera set-up parameters to be adjusted over a wide range. Menus are used to select the required parameters, such as gain, gamma, flare, pedestal and detail, and adjustments made from a central Master Set-up Unit (MSU) Parameter settings can be transferred to other cameras in a system for perfect picture matching.

Further developments in Sony LSI technology have reduced power consumption by 75%* compared to conventional gate array LSIs.

*Sony measurement.

Ergonomic Body Design

For over two decades, Sony has been designing and manufacturing broadcast video cameras and camcorders. In creating these designs, great importance has always been given to achieving control layouts based on the practical, operational requirements of the user. The control layout of the HDC-900/910 therefore naturally follows that of other HDC and BVP Series cameras. For example, the V/F adjustment and controls for the intercom system, V/F return selection, lens filter selection, etc. are all located in similar positions to previous models, so that operators with experience of Sony cameras can operate this new model intuitively.
The HDC-950/930 portable model features a body that is so compact and lightweight that it opens up new and exciting possibilities in location camera work. Newly developed ADSP LSIs drastically reduces its power consumption, which helps comfortable and stable operation of entire system. Ingenious design with a low optical axis and superb weight distribution means that the camera can be carried comfortably on the shoulder without causing fatigue. Tripod operation is just as easy, and the HDC-950/930 has all its controls and connectors located in similar positions to those on Sony BVP cameras. Even with a viewfinder, microphone and a standard ENG lens, the total weight of the HDC-950/930 is only around 7 kg (about 16 pounds).

Optical Filter Wheels

Independent ND and CC optical filters are provided on both the HDC-900/910 and HDC-950/930. The filter drives provided for both 900/910 and 950/930 are exactly the same, so that common operation is enabled between the hard camera and the portable type when the filter settings are adjusted remotely on a RCP, MSU or RM-B750/B150 Remote Control Unit.

Electronic Shutter

The electronically operated shutter provides speeds of 1/100, 1/250, 1/500/, 1/1,000, and 1/2,000 of a second (1080/60i mode).

Clear Scan and ECS (Extended Clear Scan)

The well-proven Clear Scan and ECS* functions eliminate banding effects when shooting monitor displays by allowing the shutter speed to be adjusted so that it exactly matches the various scanning frequencies that are in use. The clear scan shutter speed range is 60.1 to 4300 Hz (1080/60i mode). The ECS function is especially effective under the frequency of 60 Hz.

*The ECS function is equipped by the HDC-900 and HDC-950

Super EVS

Super EVS (Enhanced Vertical-definition System) raises vertical picture resolution, while minimizing line flicker*. It is ideal for shooting of a stationary subject or still images – the method used for the "Claymation" process, for instance.

*The Super EVS functions when operated at Interlace mode.

Standard 2/3-inch type Lens Mount

Either an HD lens or a standard definition 2/3-inch type format lens can be mounted. This allows standard lenses that are in everyday use with Sony cameras and camcorders to be used with the HDC-900/910 and HDC-950/930.

SONY
1
1

System Components for Creative Control

The HDC-900/910/950/930 Camera and HDCU-900/950 CCUs system is fully compatible with existing Sony command network systems and provides the same high level of creative control of camera functions.

Master Set-up Units — MSU-700A and MSU-750

These MSUs provide a centralized technical control position in a multi-camera system.
The MSU-700A is designed for use mounted with its control panel horizontal while the MSU-750 is designed for mounting vertically.
They have been designed to allow comprehensive, wide ranging, technical supervision and alignment of a complex camera system from a single centralized panel.
If it is desirable to extend this supervision to more than one control location (for example separate operational and engineering/maintenance control centers) then a number of MSU panels can form part of a large camera system. The MSU-700A and the MSU-750 are designed to work in conjunction with the Command Network Units CNU-700 and CNU-500. However, in a single-camera system, these MSUs can operate alone. They provide rapid, finger-tip access to all controls relating to the smooth functioning of an operational system, including:

- Technical alignment controls for the entire camera chain
- Picture and waveform monitor switching
- System configuration
- Control data filing
- Precise picture adjustment

Some of the important control functions that can be made from these MSUs are now described.

MSU-750

MSU-700A

Remote Control Unit – RM-B750

The RM-B750 Remote Control Unit has been designed to establish a highly mobile and fully controllable camera system in the field by integrating control capability equivalent to a Master Set-up Unit into a compact unit powered from the device to be controlled.
The RM-B750 can be connected directly to the any HDC-900 Series camera, attached to the half-rack HDCU-950 Camera Control Unit or connected to an HDW-250 portable VTR used with these components. The combination of an LCD touch-panel screen and direct push buttons enables full parameter adjustment of the camera to be controlled. When necessary, basic tape transport functions of a portable VTR can be controlled. For further operational convenience, the RM-B750 has a Memory Stick media card slot so that various setup parameters can be stored and transferred between camcorders.

RM-B750

The RM-B750
attached to the HDCU-950

HD CCD Block Adaptor—HKC-T950

The HKC-T950 HD CCD block adapter is a unique accessory of the HDC-950 and HDC-930 portable cameras. It allows the CCD block to be extended from the camera body by up to 10 m (up to 50 m with an optional cable). More creative camera shooting angles and the freedom to place the imaging assembly in areas where a full size camera would be restricted are achieved. The HKC-T950 will expand the spectrum of HD camera applications in area such as snorkel lenses, helicopter mounts or mini jibs.

HKC-T950 connected to the HDC-950

Extension Head Block without handle/VF

Camera Control Units – HDCU-900/950

Two camera control units are available for use with the HDC-900/910/950/930 – the full size HDCU-900 and half rack HDCU-950. The HDCU-900 has been designed to support both the HDC-900/910 Studio Camera and HDC-950/930 Portable Camera in fixed environments for maximum expandability, flexibility, and full controllability. The compact HDCU-950 CCU is intended for mobile use but provides controllability almost equivalent to HDCU-900. As standard, HDCU-900 has four sets of HD SDI SMPTE 292M signal outputs and V/F return inputs, plus four sets of digitally down-converted SDI SMPTE 259M outputs and four digitally up-converted V/F return inputs. HDCU-950 has three sets of input/output interface for HD SDI SMPTE 292M signal outputs and V/F return inputs, and digitally down-converted SDI SMPTE 259M outputs and up-converted V/F return inputs.

A variety of optional interface expansion boards are available for both units. The HKCU-901, HKCU-902, HKCU-903 and HKCU-904 are for use with the HDCU-900, and the HKCU-951 and HKCU-953 are for the HDCU-950. As for the HDCU-900, the HKCU-901 SD Encoder Boards provide analog NTSC and PAL VBS signal outputs and V/F return inputs, and analog component output. The HKCU-902 HD Analog Interface Board enables HD Analog output and input (as defined by SMPTE 240M). Furthermore, the HKCU-903 Frame Converter Boards provide 2:3 pull-down to change the picture format between 24P and progressive 30 frames. And lastly, the HKCU-904 Line Converter Board has the capability to convert 1080-line pictures into 720-line pictures, and provides four sets of HD-SDI outputs and V/F return inputs. The HKCU-951 and HKCU-953 used with the portable HDCU-950 CCU provide equivalent functions to the above HKCU-901 and HKCU-903.

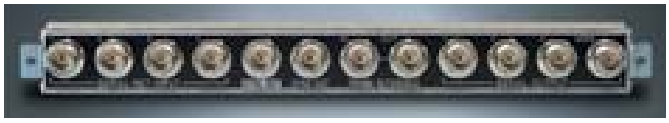
HDCU-900

HDCU-900 Rear Panel

HKCU-901 SD Encoder Unit

HKCU-902 HD Analog Interface Unit

HKCU-903 Frame Rate Converter Unit



HKCU-904 Line Converter Unit

HDCU-950

HDCU-950 Rear Panel

HKCU-951 SD Encoder Unit

HKCU-953 Frame Rate Converter Unit

High Definition Origination

HD Production Format	1080/60i	1080/50i	1080/30P	1080/25P	1080/24P	720/60P	
Camera Head Capture Format	1080/60i	1080/50i	1080/30P	1080/25P	1080/24P	1080/60i	540/60P
HDCU-900/950 Output Format							
HD-SDI (Reserved slot)	1080/60i	1080/50i**	1080/30P**	1080/25P**	1080/24P**	1080/60i	540/60P
Down-converted SDI (Removable slot)	480/60i**	576/50i**	480/30P**	576/25P**	480/60i**	480/60i	480/60i
HKCU-903/953 Frame Converter (Optional)	No	No	No	No	1080/60i**	No	No
HKCU-904 Line Converter (Optional)	No	No	No	No	No	720/60P	720/60P**
HKCU-901/951 SD Encoder (Optional)	NTSC**	PAL**	NTSC*	PAL*	No	No	No

* Monitoring quality only.
** Entries printed in red are recommended choices.
*** HDC-910/930 only supports interlace formats.

Standard Definition Production

Production Format	480/60i	480/30P	576/50i
Camera Head Capture Format	1080/60i	1080/30P	1080/50i
HDCU-900/950 Output Format			
HD-SDI (Reserved slot)	1080/60i**	1080/30P**	1080/50i**
Down-converted SDI (Removable slot)	480/60i**	480/30P**	576/50i**
HKCU-903/953 Frame Converter (Optional)			
HKCU-904 Line Converter (Optional)			
HKCU-901/951 SD Encoder (Optional)	NTSC**	NTSC*	PAL**

* Monitoring quality only.
**Entries printed in red are recommended choices.
*** HDC-910/930 only supports interlace formats.

Optical Fiber Digital Transmission

The cable connecting the HDCU-900/950 CCU to an HDC-900/910 or HDC-950/930 camera uses two single-mode optical fiber lines, two control lines, and two power lines to carry digitized video, audio, control signals and power to the camera. An extremely high-quality, all-digital bi-directional video and audio signal can be transmitted up to a distance of 3 km (1.86 miles)* with HDCU-900 and 1.2 km (0.75 miles)* with HDCU-950. This cable and connector conforms to the SMPTE standard.

*When supplying power to the camera via the optical fiber cable, the maximum cable length varies with the camera system configuration and lens type, the size of the optical fiber cable and the number of cable connectors.

Safety Oriented Power Supply

As safety is a major design concept of every Sony design, the HDCU-900/950 continuously checks the camera cable for open or short circuits. An alarm is given if a fault is found and some appropriate precautionary actions taken, case by case.

An additional safety feature is that a low voltage is initially supplied from the HDCU-900 optical fiber connector when the unit is switched on. Only when the system check has verified that an appropriate camera is connected is the normal operating voltage output.

Locking to External Reference Signals

The HDCU-900/950 can be locked to an external reference signal. Either a HD tri-level sync signal (according to SMPTE 240M), or an SD black burst signal can be used as the reference signal.

Memory Stick™

Sony **Memory Stick™** technology provides a new function on both the HDC-900/910 and HDC-950/930.

Camera operators can store their personal preferences for a number of camera set-up parameters and V/F indicators in a personal Memory Stick. Whenever one of these memory devices is inserted into its slot on a HDC-900/910/950/930 camera, the operator's particular settings are instantly recalled. All the data stored in one or more Memory Sticks also can be registered and stored in a standard PC, so that each set of preferences can then used to initialize individual or groups of cameras.

HDC-900/910

MSA-16A

HDC-950/930

Multi Matrix

This function enables a particular color in a scene to be selected and its hue and saturation changed.

Multi Matrix ON

Adaptive Highlight Control
(Auto Knee mode)

The Sony ADSP system intelligently monitors the brightness of all areas of the picture and automatically adapts the knee point/slope for optimum reproduction at that particular scene location within the picture. A typical example is shooting an interior scene which includes a sunlit exterior seen through a window.

Auto Knee ON

Three-channel Skin Tone Detail Correction

Skin Tone Detail Correction controls the detail level of those objects in a scene with specific color tones. The HDC-900/910/950/930 allows detail to be set independently for each of three separate color ranges. These colors are not limited to skin tones, but can be set for any color. Detail may be increased or decreased relative to the normal level.

Skin Tone Detail ON

Knee Saturation Function

This function works similar to well-established Sony TruEye™ processor which is one of the most innovative features that Sony ADSP allows, then makes possible to reproduce very natural colors of high contrast scene content. When knee correction is individually applied to the RGB channels, it can lead to color distortion in highlight areas, for example skin tones can tend to look yellow. Knee Saturation processing automatically retains accurate color in these highlight areas to maintain the saturation in those picture areas compressed by the Knee function.

Knee Saturation ON

Low-key Saturation

The Knee Saturation function is also effective for low-key pictures, maintaining saturation to give color reproduction characteristics.

Selectable Gamma and Initial Gain

Several Pre-set Gamma curves and Initial Gain settings are provided to emulate standardized video gamma transfer characteristics.
These gamma tables are always accessible and interchangeable via camera set-up menu.

Standard Video Gamma

Variable Black Gamma Range ON

Variable Black Gamma Range

The Variable Black Gamma Range function helps to control shadow areas with precision. It can help to bring out details from the dark areas of the picture without affecting mid-tones and keeping the absolute black level unchanged. 12-bit A/D and the low noise CCD have extended the prowess of this important subjective picture control.

Black Stretch

Limits the Black Gamma function to picture luminance.

Level Dependent Detail

This function provides natural detail enhancement on extreme highlights by automatically limiting the amplitude of edge signals when they occur in high contrast signals.

Level Dependent Detail Control Function ON

Camera Command Network Units — CNU-500 and CNU-700

The CNU-700 and CNU-500 Camera Command Network Units form the technical "nerve center" of a star-shaped camera control network, providing communication between all the units in the system. A RISC-based microprocessor system provides high-speed transfer of command signals to the HDCU-900/950 CCU for rapid response.

The CNU-500 is for use in systems with up to six cameras and the CNU-700 is for use in larger systems. One CNU-700 can also control six cameras, but can be expanded to control up to 12 cameras when fitted with an optional expansion board. Several CNU-700 units can be connected to the camera control network in a large system.

CNU-700

CNU-500

Remote Control Panels – RCP-750/751

Two types of RCP-750 Series Remote Control Panels are also available, providing a range of control functions from the basic to very sophisticated for operational adjustments of an HDC-900/910/950/930. Each type is available with either a joystick or dial type iris control.

RCP-750

RCP-751

Viewfinder Options

LCD HD Color Viewfinder — HDVF-C30W

The new HDVF-C30W, 2.7-inch type HD LCD color viewfinder has been designed for the HDC-950/930 portable camera to provide the optimum visual information with a full-color and flicker-free TFT-LCD providing a resolution of 960 pixels horizontally x 540 pixels vertically for each R, G and B color component, luminance level of 300 cd/m^2 and 200:1 contrast ratio. In addition, the HDVF-C30W has several unique features to improve operability as following.

- Gray scale signal can be generated for camera operators to easily adjust the exposure to the appropriate level in addition to zebra function.
- 2x magnification function will greatly assist easy focus operation especially when prime lenses are used.
- Detachable eye-piece construction allows camera operator for direct viewing.
- Lightweight construction and low power consumption characteristic will tremendously improve the operability under battery-powered mobile applications.

HDVF-C30W

LCD panel for direct viewing

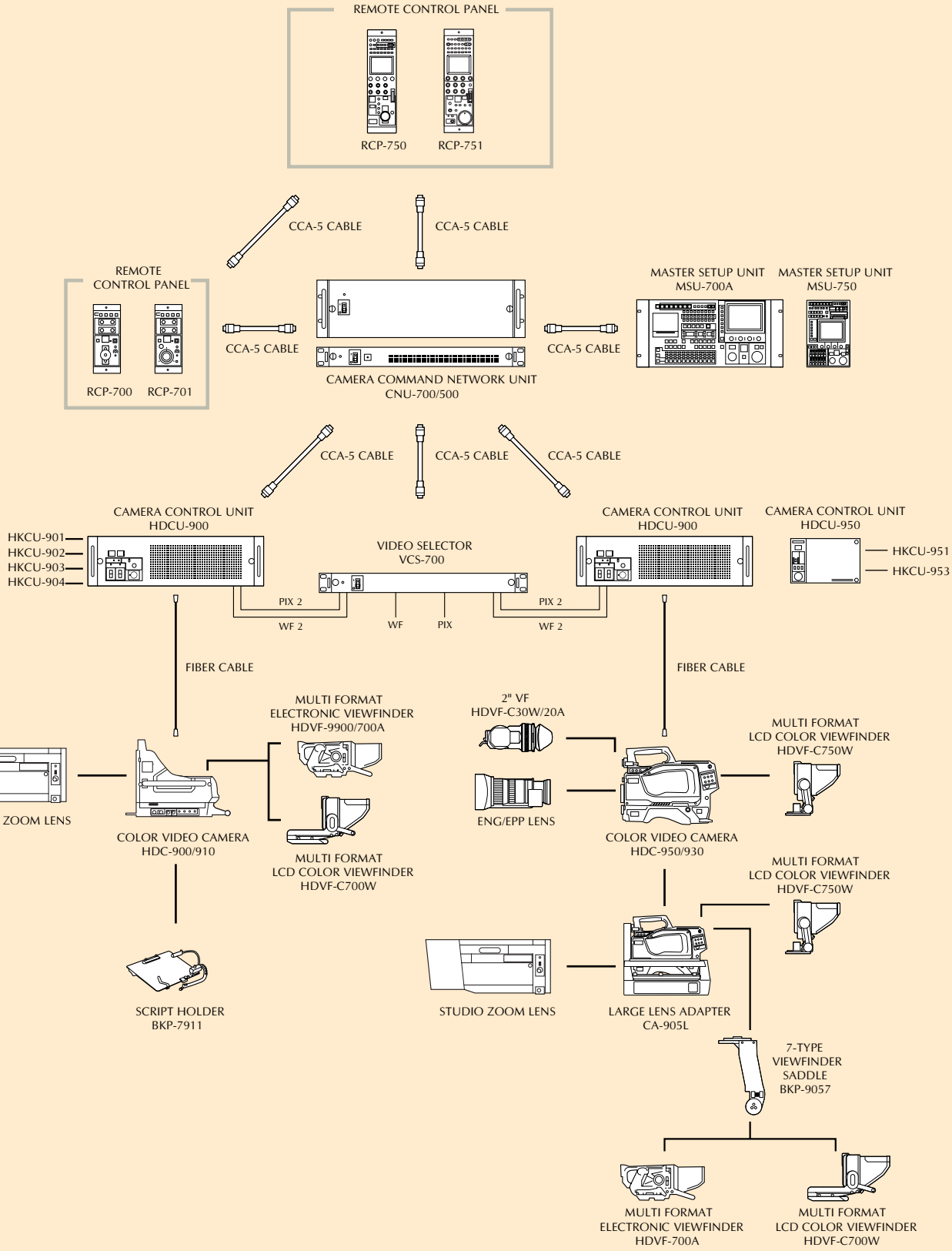
HD CRT Color Viewfinder — HDVF-9900

The HDVF-9900 is a new 9-inch type HD CRT color viewfinder for use with the HDC-900/910 studio camera. The large 9-inch display is especially helpful for camera operators when viewing 16:9 aspect ratio images.
The HDVF-9900 supports 1080/59.94i, 60i, 50i and 24PsF formats.

Optional Viewfinder Line up

	CRT B/W	CRT Color	LCD Color
HDC-900/910	HDVF-700A	HDVF-9900	HDVF-C700W
HDC-950/930	HDVF-20A	–	HDVF-C30W
			HDVF-C750W

System Configuration



HDC-900/910 and HDC-950/930 Specifications

	HDC-900	HDC-910	HDC-950	HDC-930
Pickup device	3-CCD 2/3-inch type 16:9 FIT	3-CCD 2/3-inch type 16:9 IT	3-CCD 2/3-inch type 16:9 FIT	3-CCD 2/3-inch type 16:9 IT
Picture elements	2.2 million pixels			
Spectrum system	F1.4 prism system			
Color correction filter-A	Cross			
Color correction filter-B	3200 K			
Color correction filter-C	4300 K			
Color correction filter-D	6300 K			
Color correction filter-E	8000 K			
Neutral density filter-1	Clear			
Neutral density filter-2	1/4 ND			
Neutral density filter-3	1/8 ND			
Neutral density filter-4	1/16 ND			
Neutral density filter-5	1/64 ND			
Servo filter control	Yes			
Sensitivity	f 10 at 2000 lux (3200 K, 89.9 % reflectance)			
Minimum illumination	10 lux (F 1.4, +12 dB gain up)			
Singal to noise ratio	54 dB (typical)			
Horizontal resolution	1000 TV lines			
Dynamic range (1080/60i mode)	600 %			
Registration	Within 0.02 % (all zones, without lens)			
Shutter speed selection (1080/60i)	1/100, 1/125, 1/250, 1/500, 1/1000, 1/2000 (s)			
Gain selection	-3, 0, +3, +6, +12 dB			
Clear Scan selection	60.1 to 4300 Hz			
Extented Clear Scan (HDC-900/950)	30.3 to 58.3 Hz			
Modulation depth	45 % or more horizontally (800 TV lines at center, 27.5 MHz, with typical lens)			
Smear level	-135 dB	-125 dB	-135 dB	-125 dB
Frequency response	Within ±0.5 dB, 10 to 25 MHz			
	Within ±1.0 dB, 25 to 30 MHz			
Lens mount	Sony hanger mount		Sony bayonet mount	
Mass (approx.)	20 kg (44 lb. 9 oz, without VF and lens)		5.1 kg (11 lb. 11 oz, without VF and lens)	
Dimentions (W x H x D, approx)	368 x 381 x 442 mm		133 x 276 x 360 mm	
Operating temperature	-20 °C to +45 °C (-4 °F to +113 °F)			
Storage temperature	-20 °C to +50 °C (-4 °F to +122 °F)			
Input connector	Audio in: XLR-3-31 type (Female x 2), selectable phamtom +48 V, line DC in: XLR 4-pin type (Male x 1) Return Control: 6-pin		Front Mic in: XLR-3-31 type (Female x1) A Audio in: XLR-3-31 type (Female x 2) phantom +48 V, 600 Ω, balanced Return control: 6-pin DC in: XLR 4-pin type (Male x 1)	
Output connector	Test out: BNC type, 1.0 Vp-p, 75 Ω Prompter out: BNC type, 1.0 Vp-p, 75 Ω HD SDI out: BNC type Viewfinder connector: D-sub 25-pin DC out: 4-pin, 5 W/ 12 V DC AC utility out: Max 200 VA		Test out: BNC type, 1.0 Vp-p, 75 Ω HD SDI out: BNC type for RET DC out: 4-pin, 10.5 to 17 V, Max. 200 mA Earphone: Minijack, 8 Ω	
Input/output connectors	CCU: Optical fiber connector Lens: 36-pin Tracker: 20-pin Remote: 8-pin (for RCP-700 Series) Memory Stick slot (x 1) Intercom: XLR 5-pin, (Female x 2) VTR out: CCZ type, 26-pin		CCU: Optical fiber connector Lens: 12-pin Viewfinder connector: 20-pin Remote: 8-pin (for RCP-700 Series) External I/O: 20-pin (for CA-905L) Memory Stick slot (x 1) VTR out: CCZ-type, 26-pin, (Female x 2) Genlock/Return in/Prompter out(Selectable): BNC type	
Supplied accessories	Operation manual (1) Front Cover (1) Number plate: For up tally (1) For side panel (2) For rear panel (1) Belt for cable clamp (2) Angle adjustment fitting (2)		Operation manual (1)	
Optional accessories	HDVF-C700W, 6-inch type LCD Color Viewfinder for HDC-900/910 HDVF-C30W, 2.7-inch type LCD Color Viewfinder for HDC-950/930 HDVF-C750W, 6-inch type LCD Color Viewfinder for HDC-950/930 HDVF-700A, 7-inch type CRT B/W Viewfinder for HDC-900/910 HDVF-20A, 2-inch type CRT B/W Viewfinder for HDC-950/930 CA-905L and BKP-9057, Large Lens Adapter and 7-inch type Viewfinder Saddle (HDC-950/930) BKP-7911, Script Holder BKP-7912, Script Holder CAC-6, Return Video Selector CAC-12, Mic Holder RM-B750, Remote Control Unit RM-B150, Handheld Remote Control Unit RCP-750/751, Remote Control Panel RCP-700/701, Remote Control Panel BKW-401, Viewfinder Rotation Bracket HKCU-901, SD Encoder Unit for HDCU-900 HKCU-902, HD Analog Interface Unit for HDCU-900 HKCU-903, Frame Rate Converter Unit for HDCU-900 HKCU-904, Line Converter Unit HKCU-951, SD Encoder Unit for HDCU-950 HKCU-953, Frame Rate Converter Unit for HDCU-950			

HDCU-900 Specifications

General	
Power supply	AC 100/110-120/220/240 V, 50 Hz/60 Hz
Current consumption	5 A (at 100 V AC, entire system active)
Operating temperature	+5 °C to +40 °C (+41 °F to +104 °F)
Storage temperature	-20 °C to +60 °C (-4 °F to +140 °F)
Dimensions (Approx. W x H x D)	424 x 133 x 460 mm (16 3/4 x 5 1/4 x 18 1/8 inches)
Mass (Approx.)	20 kg (44 lb. 1 oz)
HD input/outputs	
HD SDI output	BNC type (x 3), SMPTE 292M, 1080/50i, 60i, 30P, 25P, 24P
HD monitor output	BNC type (x 1), SMPTE 292M, 1080/50i, 60i, 30P, 25P, 24P
HD SDI return input	BNC type (x 4), SMPTE 292M, 1080/50i, 60i, 30P, 25P, 24P
SD outputs	
SD SDI output	BNC type (x 4), SMPTE 259M, Serial digital component, 480/576-lines
SD analog monitor output	BNC type, WF (x 1), PIX (x 1), Analog R/G/B, 480/576-lines
Sync	
Reference input	BNC type (x 1, with loop-through), HD tri-level sync or SD Black Burst
Sync output	BNC type (x 1), HD tri-level sync or SD Sync
Intercom/Tally/PGM	
Intercom PD & ENG	D-sub 25-pin (x 1), 4W/RTS/CC selectable
PGM1/PGM2	0/-20 dBu selectable
R-Tally/G-Tally	24 V power in/make contact
Audio	
MIC1/MIC2 output	XLR-3-31 type (Female x 2), 0/-20 dBu selectable
Digital audio output	BNC type (x 1), AES/EBU format, 20-bit/48 kHz
Prompter	
Prompter in	BNC type (x 1, with loop-through), Analog, NTSC/PAL/HD-Y
Others	
RCP/MSU/CNU interface	8-pin (x 1), Sony Camera Command Network Protocol (for entire camera system control)
WF mode	4-pin, Stair step (for SD composite Waveform monitor)
WF control	D-sub 15-pin (x 1), GPI (for SDI component WF control)
System expansion I/O	D-sub 15-pin (x 2), GPI (for system control with external GPI interface)
Trunk line	D-sub 9-pin, RS-232C, (remote line for CHU equipment)
Camera	
Optical fiber cable interface	SMPTE 304M based optical fiber connector (x 1), 1.5 Gb/s optical fiber digital transmission, SMPTE 292M, AC 240 V

Optional input/output board for HDCU-900

HKCU-901 SD Encoder Unit	
SD inputs/outputs	
VBS output	BNC type (x 2), NTSC/PAL
VBS return input	BNC type (x 4), NTSC/PAL
Analog component output	BNC type (x 3 for 1 set), Y/R-Y/B-Y or R/G/B selectable
Monitor output	BNC type, WF (x 1), PIX (x 1), G/B/R/Encoder
Sync	
Sync output	BNC type (x 1), Black Burst, NTSC/PAL
HKCU-902 HD Analog Interface Unit	
HD input/outputs	
Analog HD output	BNC type (x 2 sets), SMPTE 240M, Y/PB/PR or G/B/R selectable
Analog HD return input	BNC type (x 4), SMPTE 240M, HD-Y
Analog HD PIX output	BNC type (x 1), SMPTE 240M, G/B/R/Y
Sync	
HD sync output	BNC type (x 1), SMPTE 240M, HD Tri-level sync
HKCU-903 Frame Rate Converter Unit	
HD input/output	
HD SDI output	BNC type (x 4 including 1 monitor output), SMPTE 292M, 1080/50i, 60i, 30p, 25p, 24p
HD SDI return input	BNC type (x 4), SMPTE 292M, 1080/50i, 60i, 30P, 25P, 24P
Sync	
HD sync output	BNC type (x 2), Frame rate converted sync
Frame reference input	BNC type (x 1 with loop-through), full pull-down sequence lock
HKCU-904 Line Converter Unit	
HD input/output	
HD SDI return input	BNC type (x 4), 720P
HD SDI output	BNC type (x 4), 720P
Sync	
HD sync output	BNC type (x 2), Line converted sync

HDVF-C30W/HDVF-9900 Specifications

	HDVF-C30W	HDVF-9900
Picture device	2.7-inch type TFT LCD 960 (H) x3(RGB) x 540 (V)pixel TFT LCD	9-inch type CRT 0.25mm Super Fine Pitch Trinitron
Screen diagonal	59.04 (H) x 33.21 (V) mm (2 3/8 x 1 5/16 inches)	155.4 (H) x 87.4 (V) mm (6 1/8 x 3 1/2 inches)
Horizontal resolution	500 TV lines or more	340 TV lines (16:9)
Brightness	300 cd/m²	
Color tenperature	6500 K	
Power Requirments	DC 10.5 - 17.0 V (from camera head)	
Power Consumption	5.5 W	60 W
Operating temperature	0°C to 45°C (32°F to 115 °F)	
Storage temperature	-20°C to 60°C (-4°F to 140 °F)	
Mass	800 g (1 lb 13 oz)	8 kg (17lb 10 oz) without hood
Indication	R Tally, G Tally, BATT, MAG, SAVE, !	R Tally, G Tally, ! FAN ALARM

HDCU-950 Specifications

General	
Power supply	AC 90-260 V, 50 Hz/60 Hz
Current consumption	3 A (at 100 V AC, entire system active)
Operating temperature	-10 °C to +40 °C(+41°F to +104°F)
Storage temperature	-20 °C to +60 °C(-4°F to +140°F)
Dimensions (Approx. W x H x D)	200 x 127 x 410 mm (8 x 5 1/9 x 16 1/4 inches)
Mass (Aprox.)	6.5kg
HD input/outputs	
HD SDI output	BNC type (x 2), SMPTE 292M, 1080/50i, 60i, 30P, 25P, 24P
HD monitor output	BNC type (x 1), 1080/50i, 60i, 30P, 25P, 24P
SD outputs	
SD SDI output	BNC type (x 2), SMPTE 259M, Serial digital component, 480/576-lines
SD analog monitor output	BNC type, WF (x 1), PIX (x 1), 480/576-lines
Return inputs	
HD SDI/SD SDI/Analog VBS return input	BNC type (x 3), HD/SD/VBS selectable
Sync	
Reference input	BNC type (x 1, with loop-through), HD tri-level sync or SD Black Burst
Sync output	BNC type (x 1), HD tri-level sync or SD sync
Intercom/Tally/PGM	
Intercom PD & ENG	D-sub 25-pin (x 1), 4W/RTS/CC selectable
PGM1/PGM2	0/-20 dBu selectable
R-Tally/G-Tally	24 V power in /make contact
Audio	
MIC1/MIC2 output	XLR-3-31 type (Female x 2), 0/-20 dBu selectable
Prompter	
Prompter in	BNC type (x 1, with loop-through), Analog, NTSC/PAL/HD-Y
Others	
RCP/MSU/CNU interface	8-pin (x 1), Sony Camera Command NetworkProtocol (for entire camera system control)
WF mode	4-pin, Stair step (for SD composite Waveform monitor)
MIC REMOTE (or WF control)	D-sub 15-pin (x 1), GPI (or SDI component WF control)
Camera	
Optical fiber cable interface	SMPTE 304M based optical fiber connector (x 1) 1.5 Gb/s optical fiber digital transmission, SMPTE 292M, DC 180 V

Optional input/output board for HDCU-950

HKCU-951 SD Encoder Unit	
Analog VBS outputs	BNC type (x 1) (total 3 VBS outputs using SDI output connector)
Analog component output	BNC type (x 3 for 1set), Y/R-Y/B-Y or R/G/B selectable
HKCU-953 Frame Rate Converter Unit	
HD SDI outputs	BNC type (x 2), SMPTE 292M, 1080/50i, 60i, 30P, 25P, 24P
Frame reference input	BNC type (x 1) with loop-through), full pull-down sequence lock

RM-B750 Specifications

General	
Power Requirements	DC 10.5 - 30 V (max) (supplied from camera/camcorder/CCU
Operating Temperature	+5°C to +40 °C
Storage Temperature	-20°C to +55°C
Dimensions	197 mm x 62 mm x 124 mm (W x H x D)
Mass	Approx. 0.7 kg
Inputs	
Control interface	8-pin (x 1), Sony Camera Command Network Protocol
Monitor in	BNC type (x 1) VBS (No HD signal capable)

HKC-T950 Specifications

General	
Current consumption	13.0 to 17.0 V DC
Operating temperature	-20 °C to +45 °C
Operating humidity	10% to 90% (no condensation)
Dimentions (Approx. W x H x D)	Cable adapter: approx. 0.5 kg (1 lb 2 oz) CCD block adapter: approx. 0.85 kg (1 lb 14 oz) (adapter only) approx. 1.65 kg (3 lb 10 oz) (with the CCD block)
CCD block adaptor I/F	
Camera cable	CCZ type 26 pin (Male)
MIC IN	XLR-3 (Female)
VIDEO OUT (HD Y)	BNC x 1
LENS	12 Pin
VF	20 Pin
INCOM	XLR-5 (Female)
Cable adaptor I/F	
Camera cable	CCZ type 26pin (Female)
MIC OUT	XLR-3 (Male)
VF	20 Pin
INCOM	XLR-5 (Male)
Supplied accessories	
	HDCZ-A10 cable (10 m) (1),VF relay cable (1), MIC relay cable (1),INCOM relay cable (1), Top cover (1),Operation manual (1)
Optionla accessories	
	HDCZ-A25 (25 m) Part number: 1-823-616-11 HDCZ-A50 (50 m) Part number: 1-523-617-11

Other Options

CA-905L and BKP-9057,
Large Lens Adapter and 7-type
Viewfinder Saddle for HDC-950/930

BKP-7911,
Script Holder

CAC-6,
Return Video Selector

CAC-12,
Mic Holder

RM-B150,
Hand-held Remote Control Unit

RCP-700,
Remote Control Panel
(Joystick control)

RCP-701,
Remote Control Panel
(Dial control)

VCT-14,
Tripod Adapter

Viewfinder Eye-piece for HDVF-20A
A-8314-798-A
(High performance, with soft cushion)

Viewfinder Eye-piece for HDVF-20A
A-8262-537-A (High magnification)
A-8262-538-A (Low magnification)
A-8267-737-A (Standard magnification with special compensation for aberrations)

BKW-401,
Viewfinder Rotation Bracket
for HDVF-20A

HKCU-901,
SD Encoder Unit for HDCU-900

HKCU-902,
HD Analog Interface Unit
for HDCU-900

HKCU-903,
Frame Rate Converter Unit
for HDCU-900

HKCU-904,
Line Converter Unit
for HDCU-900

HKCU-951,
SD Encoder Unit for HDCU-950

HKCU-953,
Frame Rate Converter Unit
for HDCU-950

HDVF-20A,
CRT B/W Viewfinder
for HDC-950/930

HDVF-700A,
CRT B/W Viewfinder
for HDC-900/910

HDVF-C750W,
LCD Color Viewfinder
for HDC-950/930

SONY

Distributed by

V-11120-C
MK07348V6SMC03MAR

Printed in Japan