

# SONY

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## XDCAM EX Family

PMW-350 Series

PMW-320 Series

PMW-EX3

PMW-EX1R



**XDCAM EX**

**Exmor**  
FULL HD 3CMOS

**CINEALTA**



# XDCAM EX Series – Comprehensive Line-up Opens New Horizons of Visual Expression, Delivers New Levels of Convenience

They support DVCAM format\* recording, which is the de facto standard for business and industrial video production, facilitating migration, and opening doors to new creative possibilities. With the optional CBK-CE01 50-pin interface, multi-camera and Satellite transmission applications are also supported.

Since 2007 and the introduction of the first camcorder in this line-up, Sony XDCAM EX™ Series has achieved wide acclaim among creative professionals, and now grows from strength to strength, opening up new horizons of visual expression and delivering new levels of convenience.

The series already includes two outstanding camcorders – the PMW-EX1 and PMW-EX3 – which realise full-HD pictures of amazingly high quality by adopting three 1/2-inch-type “Exmor™” full-HD CMOS sensors in a compact body. An advanced workflow, based on “SxS PRO™” memory card as the recording media, ensures effective file-based operation.

Now Sony evolves this XDCAM EX line-up with the introduction of three new camcorders.

Two long-awaited shoulder camcorders have joined the XDCAM EX Series portfolio: the powerful, affordable new PMW-350 and PMW-320.

The other new camcorder is the PMW-EX1R, the direct successor of the PMW-EX1. It includes as standard an SD recording and playback function, as well as numerous improvements over the PMW-EX1.

All new camcorders support not just SxS PRO memory card but also the more affordable “SxS-1™” media. There is also an innovative on-site backup solution with the PXU-MS240 – enhancements which improve workflow and expand user convenience.

This full Sony XDCAM EX line-up provides stunning HD picture quality and efficient nonlinear operation, expanding the creative possibilities in every type of HD video production. Added to this, new horizons of visual expression and new levels of convenience can be achieved at affordable price points.

\* The PMW-350 requires an optional hardware key, CBK-SD01.



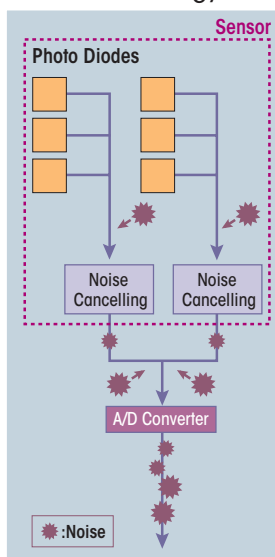
# XDCAM EX – A New Generation of HD Recording System

## Enhanced Functionality with “Exmor” CMOS

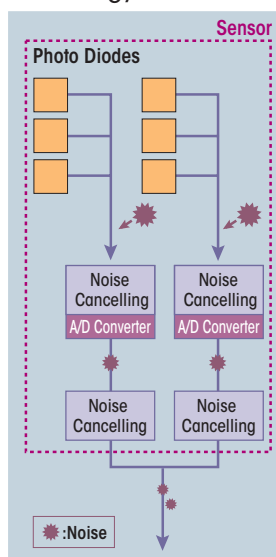
In XDCAM EX camcorders, multiple A/D converters on each pixel row convert analog signals to digital as soon as they are generated, unlike traditional technology that only has one A/D converter on each chip. “Exmor” effectively eliminates the influence of any external noise that enters the signal chain during transfer to the A/D converter, resulting in high-quality digital signals with extremely low noise. This significantly enhances shooting in low-light environments.

**Exmor**  
FULL HD 3CMOS

Current Technology



Technology of “Exmor”



## New Nonlinear Recording Media – SxS Memory Card – For Greater Efficiency and Operability

The XDCAM EX Series adopts the SxS memory card as its recording media. This is an ultra-compact nonlinear medium using flash memory; it offers a number of distinguishing features:

**SxS**

- Compatible with the ExpressCard/34 standard
- Uses the PCI Express interface, and achieves an extremely high data transfer speed of 800 Mbps\*
- Large storage capacity: up to 32-GB
- Most new Macintosh and PC computers are equipped with ExpressCard slots
- Compact size: approx. 75 x 34 x 5 mm (3 x 1 3/8 x 7/32 inches) excluding projecting parts; about half the size of a conventional PC card
- Low power consumption

In addition to the conventional SxS PRO memory card, there is now a new member of the SxS memory card family, the SxS-1\*\*. It maintains the superb usability and high-speed transfer rate of SxS PRO card, at



SxS PRO Memory Card



SxS-1 Memory Card

an affordable price. A high-capacity SBS-32G1 (32-GB) memory card is available.

\* This data is read-speed measured with benchmark software. Actual data transfer speeds may vary according to measurement conditions. Please refer to <http://www.sony.net/SxS-Support/> for information on measuring methods.

\*\* SxS-1 memory card supports fewer re-writes than SxS PRO memory card. Notification is given when an SxS-1 memory card approaches its end of life. PMW-EX3 and PMW-EX30 camcorders require an upgrade (available now) to use SxS-1 memory card.

## 1920 x 1080 HD Recording Using the MPEG-2 Long GOP Codec

XDCAM EX products record 1920 x 1080 HD images using the MPEG-2 Long GOP codec, which conforms to the MPEG-2 MP@HL compression standard. This highly efficient codec, also adopted in XDCAM™ HD Series and HDV™ 1080i Series products, enables users to record stunning-quality HD video and audio over a long period of time, thanks to efficient data compression.

**MPEG HD**

## Selectable Format and Bit Rates

A choice of bit rate is offered with XDCAM EX products – either 35 Mbps (HQ mode) or 25 Mbps (SP mode) – depending on the desired picture quality and recording time.

In addition to conventional 1920 x 1080 and 1280 x 720 resolutions, the PMW-350 and PMW-EX1R also offer a new 1440 x 1080 resolution in HQ mode, with interoperability at 35 Mbps between XDCAM EX and XDCAM HD systems. Clip Browser software can rapidly convert MP4 files recorded by XDCAM EX products into MXF files for XDCAM HD products, since no transcoding process is required between these two systems.

SP mode supports 1440 x 1080 resolution at 25 Mbps, providing compatibility with HDV 1080i products. Footage recorded in SP mode can be seamlessly integrated into HDV-compatible editing systems by connecting the camcorder via an i.LINK\* (HDV) interface. It can also be recorded on an XDCAM HD optical disc using supplied Clip Browser software.

\* i.LINK is a trademark of Sony Corporation used only to designate that a product contains an IEEE 1394 connector. Not all products with an i.LINK connector will necessarily communicate with each other. For information on compatibility, operating conditions, and proper connection, please refer to the documentation supplied with any device with an i.LINK connector. For information on devices that include an i.LINK connection, please contact your nearest Sony office or authorised dealer.

## Recording and Playback in DVCAM™ Mode (PMW-EX1R, PMW-320 & PMW-350 Only)

In addition to HD mode, the PMW-EX1R, PMW-320 and PMW-350\* support SD recording and playback in DVCAM mode. This is extremely useful for those currently using an SD production system who need a smooth migration path to a future HD production system. An AVI Type 2 file is recorded, which is a highly interoperable file format for nonlinear editing systems.

**DVCAM**™

\* The PMW-350 requires an optional hardware key, CBK-DV01.

## Long Recording Time

Combining the moderate bit rates produced by efficient MPEG-2 Long GOP compression and a large-capacity SxS memory card, XDCAM EX products record high-quality HD images for a long recording time of 140 minutes on a single 32-GB SxS memory card in SP mode.

When a clip spans two cards, the transition is seamless, without any artifacts or frame loss. The SxS memory card can be hot-swapped while shooting, without interrupting the recording. This feature makes XDCAM EX products ideal for a wide variety of long-form content-production applications.

Recording Time (approx.)* (on 32-GB memory card)	HQ mode, 35 Mb/s VBR	100 minutes
	SP mode, 25 Mb/s CBR	140 minutes
	SD mode	

\* When recording in HQ (35 Mbps) mode, actual recording times may vary according to the bit rate adopted during VBR encoding.

## Multiple-format Recording: 1080/720 and Interlace/Progressive Switchable Operation

XDCAM EX products offer a wide array of recording formats for multiple content-creation applications. Recording mode is switchable between 1920 x 1080, 1280 x 720, and 1440 x 1080 resolutions. The scanning system is also selectable from interlace and progressive, such as 59.94i, 50i, 59.94p, and 50p.

In addition, XDCAM EX camcorders\* offer native 23.98p progressive recording in 1920x1080 and 1280x720 modes, while the XDCAM EX deck\*\* offers 23.98p in 1920x1080 mode.

The PMW-EX30 supports the Record function in 29.97p/25p/23.98p mode and the EE/PB function in 29.97PsF/25PsF/23.98PsF mode through HD-SDI input/output\*\*. XDCAM EX camcorders do not support a PB function, but do support an EE function in 23.98PsF mode. An SxS memory card can simultaneously hold a mix of multiple files in any of these recording formats, including DVCAM files – a new capability of PMW-350 and PMW-EX1R camcorders only – allowing flexible memory card use\*\*\*.

\* Images are handled on XDCAM EX camcorders as 23.98p, and recorded as 59.94i signals via 2-3 pull-down in 1440x1080/23.98p (SP) mode.

\*\* An early version of the PMW-EX30 requires upgrade to achieve these capabilities. Please contact your local Sony service representative for further details.

\*\*\* Memory card with material recorded by PMW-350, PMW-320 or PMW-EX1R camcorders in HQ 1440x1080 or DVCAM mode cannot be read by PMW-EX3 and PMW-EX30 camcorders.

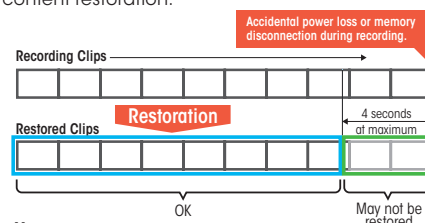
## High-quality Uncompressed Audio Recording

XDCAM EX products support high-quality, two-channel, 16-bit, 48-kHz linear PCM uncompressed audio. In addition, the PMW-350 and PMW-320 camcorder records four-channel audio and, when this is replayed from memory card by other XDCAM EX products, the user must select from CH-1/2 or CH-3/4.

## High Reliability Memory

SxS memory card resists considerable shock (1500 G) and vibration (15 G). Adopting this memory recording system, the unit's mechanism is simplified. Also, a unique Salvage function serves to restore content that is damaged by power loss or memory disconnection during recording\*.

\* In some cases, images recorded just before an accident may not be restored (four seconds maximum). No warranty is given on always achieving content restoration.



## IT Friendly

With XDCAM EX products, recordings are made as data files in ISO-standardized MP4 format. File-based recording allows material to be handled with great flexibility in an IT-based environment for copying, transferring, sharing, and archiving. These operations are accomplished without loss, and without any re-digitising process.

The recording system also allows for material to be viewed directly on a Macintosh or PC – the user simply inserts the SxS memory card into a computer's ExpressCard slot and uses the supplied Clip Browser Version 2.6 and compatible nonlinear editing software, to view, edit, and search metadata. This helps to improve workflow efficiency.

## Acquisition Metadata (HD mode only)

As part of a variety of metadata such as shooting Date/Time, OK status, Title, Creator name, Description and Essence Mark, XDCAM EX camcorders have a unique capability of recording camera parameters onto the recording media while shooting – such as Focus, Zoom, Iris, Shutter, Gain, White Balance and Gamma.

Clip Browser V2.6 allows to review these acquisition metadata in viewing clips, which is useful as a reference for editing process or next shooting.

	Mode	Sampling	Resolution	PMW-350 / PMW-EX1R		PMW-EX3		PMW-EX30	
				NTSC area	PAL area	NTSC area	PAL area	NTSC area	PAL area
HD	HQ 35 Mbps (VBR)	4:2:0	1920x1080	59.94i, 29.97p 23.98p	50i, 25p	59.94i, 29.97p 23.98p	50i, 25p	59.94i, 29.97p 23.98p	50i, 25p
			1440x1080	59.94i, 29.97p 23.98p	50i, 25p	–	–	–	–
			1280x720	59.94p, 29.97p 23.98p	50p, 25p	59.94p, 29.97p 23.98p	50p, 25p	59.94p	50p
	SP 25 Mbps (CBR)		1440x1080	59.94i, 23.98p (Pull Down)	50i	59.94i, 23.98p (Pull Down)	50i	59.94i	50i
SD*	DVCAM 25 Mbps (CBR)	4:1:1	720x480	59.94i, 29.97PsF	–	–	–	–	–
		4:2:0	720x576	–	50i, 25PsF	–	–	–	–

\* The PMW-350 requires an optional hardware key, CBK-DV01.



# XDCAM EX Camcorder

## PMW-350

## PMW-320



**PMW-350K**  
(supplied with lens)  
**PMW-350L**  
(supplied without lens)

**PMW-320K**  
(supplied with lens)  
**PMW-320L**  
(supplied without lens)

### Impressive Body Design

Designed to be very compact and ergonomically well-balanced, the PMW-350 and PMW-320 provide a high level of mobility and comfort in various shooting situations. In particular, the main body of the PMW-350 weighs only 3.2 kg (7lb 1 oz), and it is one of the lightest shoulder camcorders with three 2/3-inch-type full-HD imagers.

These camcorders have a low center of gravity, ensuring outstanding stability on the shoulder. The low-profile design provides a wide space between the main frame of the camera and the handle, and an unobstructed view to the right-hand side of the camera operator. The position of the shoulder pad can be adjusted to provide users with optimum weight balance even if the camera is docked with any type of lens or camera adaptor.



Sony employs its considerable technical capabilities and know-how in the design of energy-efficient products. The PMW-350 is a good example of the company's camcorders in the networked HD domain. Designed to be environmentally friendly, the PMW-350 camcorder offers power consumption around 60% lower than conventional HD camcorders from Sony\*, and its energy-saving design results in lower CO<sub>2</sub> emissions.

\* As compared with the HDW-700 full-HD shoulder camcorder from Sony with a 2/3-inch image sensor.

### Three "Exmor" Full-HD CMOS Sensors

**Exmor**  
FULL HD 3CMOS

The PMW-350 and PMW-320 are equipped with three "Exmor" CMOS sensors, which deliver superior picture performance with full-HD resolution. The PMW-350 has a 2/3-inch-type image sensor, and the PMW-320 has a 1/2-inch-type image sensor. Both sensors provide an excellent sensitivity (F12 for the PMW-350 and F10 for the PMW-320), a remarkable signal-to-noise ratio (59 dB for the PMW-350 and 54dB for the PMW-320), and high horizontal resolution of 1,000 TV lines\*. These high-performance sensors result in high-quality digital signals with extremely low noise. This significantly enhances shooting in low-light environments. Additionally, these large sensors can capture images with a shallower depth of field, giving users more freedom of creative expression.

\* In HD-SDI, HQ 1080 mode.



### Low Power Consumption

There is no fan motor to ventilate the inside of the body, and power consumption is only 15W\*.

\* Body only in recording mode.

### Lens Package Choice (PMW-350K and PMW-320K only)

The PMW-350K and PMW-320K models come equipped with an HD lens with a standard bayonet interface. This lens features unique focus operation, as described below:

- The lens is equipped with two independent focus wheel mechanisms, which can be switched between Auto Focus mode and Full Manual Focus mode by sliding the focus ring itself back and forth.
- The MF Assist function helps to precisely focus on the target subject when shooting in MF mode. In this mode, Auto Focus is momentarily activated when the user stops adjusting the focus ring.



### AF Assist

The AF (Auto Focus) Assist function of the PMW-350K enables operators to manually change focus positions using the focus ring in AF mode. This means that AF reference focus positions can be shifted manually to a new position.

### 23.98p Native Recording

**CINEALTA**

The PMW-350 and PMW-320 offer a native 23.98p\* recording capability. This feature, accompanied by other creative features, makes the camcorder ideal for cinema production.

\* In 1440x1080/23.98p (SP) mode, images are handled as 23.98p and recorded as 59.94i signals via 2-3 pull-down.

### ALAC

#### (Automatic Lens Aberration Compensation)

This feature decreases any chromatic aberration caused by the lens\*. ALAC is activated only with the supplied lens and with certain third-party lenses that incorporate compensation data\*.

\* Please check with other lens manufacturers for ALAC support.

### Slow & Quick Motion Function

The PMW-350 and PMW-320 offer a Slow & Quick Motion function that enables users to create unique 'looks' by slow- and fast-motion effects. The camcorders can capture images at frame rates selectable from 1 frame per second (fps) to 60 fps in 720p mode and from 1 fps to 30 fps in 1080p mode, in increments of 1 fps. For example, when viewed at 23.98p, images captured at 60 fps appear two-and-a-half times slower than normal. Conversely, images captured at 4 fps appear six times faster than normal. With this function, images are recorded natively with no padded frames and at full resolution.

### Slow Shutter Function

The maximum accumulation period is at a 64-frame shutter speed.

### Selectable Gamma Curves

The PMW-350 and PMW-320 offer a wide variety of gamma curves to flexibly handle contrast, and give a specific 'look' to an image. In addition to six types of standard gamma curves, there are four types of Hyper Gamma which are identical to those on high-end CineAlta™ camcorders.

### Interval Recording Function

The Interval Recording function intermittently records one frame at pre-determined intervals. This is convenient for shooting over long periods of time, and also when creating special effects with extremely rapid motion.

## Frame Recording Function

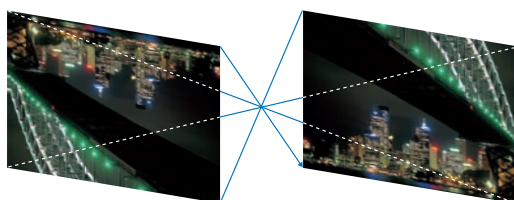
The Frame Recording function is a unique function that is particularly useful for clay animation shooting.

## ATW (Auto Tracing White Balance) & Hold

The Auto Tracing White Balance function automatically adjusts the camera's colour temperature according to changes in lighting conditions. If required, the user can hold auto tracing at a desired colour balance via an assignable switch.

## Image Inverter

With a DOF (Depth of Field) adaptor to attach a cinema or still-camera lens to the camera, the image is rotated 180 degrees. This Image Inverter function normalises the image by reverse scanning.



## Turbo Gain

The gain can be chosen from a wide range of preset values between -3 dB and +42 dB\*.

\* The range for the PMW-320 is between -3 dB and +24 dB.

## DVCAM Recording and Playback



To realise smooth migration from current SD operation to near-future HD operation, the PMW-320 supports DVCAM format recording and playback as the standard function. For the PMW-350, an optional hardware key, the CBK-DV01, is required.

## Picture Cache Recording

With the Picture Cache Recording function, up to 15 seconds of audio and video signals are buffered into the camcorder's internal memory even before the record start button is pressed. This helps to prevent loss of any unexpected yet important events.

## Freeze Mix Function

The Freeze Mix function superimposes a previously recorded image on the viewfinder. This allows the operator to quickly and easily frame or reposition a subject when a shot must be taken from the same position, or in the same framework, as a previous take.

## Four-channel Audio\*

The PMW-350 and PMW-320 come equipped with four channels of 16-bit, 48-kHz, linear PCM uncompressed audio recording. Each channel level can be controlled individually.

\* When an SxS memory card with four-channel audio is replayed by the PMW-EX1, PMW-EX1R, PMW-EX3, or PMW-EX30, only CH-1/2 or CH-3/4 can be replayed.

## Scene File System

The Scene File feature allows camera operators to easily call up customised picture-tonal settings - such as the parameters of matrix, detail, gamma, and knee - to suit particular shooting conditions. This gives users greater operational efficiency. SxS memory cards can be used for storing and loading scene files.

## Viewfinder with 3.5-inch\* Colour LCD

The PMW-350 and PMW-320 have a large, easy-to-view, colour LCD with a high resolution of 1920 x 480 pixels, which simplifies focusing. The viewfinder can also be used to instantly review recorded footage, as well as access and view the camera's set-up menus, thumbnails, and status indications. Both camcorders also have an interface for the DXF-20W, DXF-51, and DXF-C50W\*\*.

\* Viewable area measured diagonally.

\*\* The supplied viewfinder and DXF viewfinder cannot be used concurrently.



## HDMI



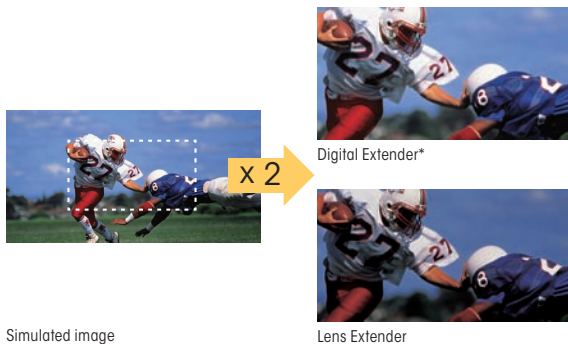
The PMW-350 and PMW-320 are equipped with an HDMI connector.

## 50-pin Interface and Digital Extender Function

The CBK-CE01, a 50-pin interface option\*, offers a Digital Extender\*\* function, which digitally doubles images in size. Unlike lens extenders, this function does not lose image sensitivity, often referred to as the F-drop phenomenon.

\* The CBK-CE01 will be available in the end of October 2010, and the Digital Extender function will be activated at the beginning of 2011.

\*\* Use of the Digital Extender function reduces image resolution by half. The Digital Extender function can not operate with Slow & Quick function.



## Camera Adapter for Multi-camera Operation

The CBK-CE01 also offers PMW-350 and PMW-320 connection to the XDCA-55, Camera Adaptor. This newly-designed camera adaptor and the XDCU-50, Camera Extension Unit enable control of the camcorders from a distance of 100 m, and expands the potential of these camcorders for multi-camera operation.

\* The XDCA-55 and XDCU-50 will be available in end of October 2010.

## Affordable MPEG TS Option for Field and Satellite Transmission

The HDCA-702 MPEG TS adaptor, which can be directly docked onto the PMW-350 and PMW-320, transmits an MPEG Transport Stream (TS) of MPEG via a DVB-ASI output. This function also requires the CBK-CE01; HDCA-702 activation will be at the beginning of 2011.

## Planning Metadata

To realise an innovative metadata workflow, these camcorders will support planning metadata. The built-in USB connector (host) will link to the CBK-WA01\*, a new Wi-Fi adapter, transferring planning metadata, and completing the wireless workflow using mobile devices.

\* The activation of CBK-WA01 for the PMW-350 and PMW-320 will be in the Spring of 2011.

## Acquisition Metadata (HD mode only)

As part of a variety of metadata, XDCAM EX camcorders have a unique capability of recording camera parameters onto the recording media while shooting - such as Focus, Zoom, Iris, Shutter, Gain, White Balance and Gamma. The supplied software Clip Browser V2.6 allows users to review these acquisition metadata in viewing clips, which is useful as a reference for the editing process or the next shooting.

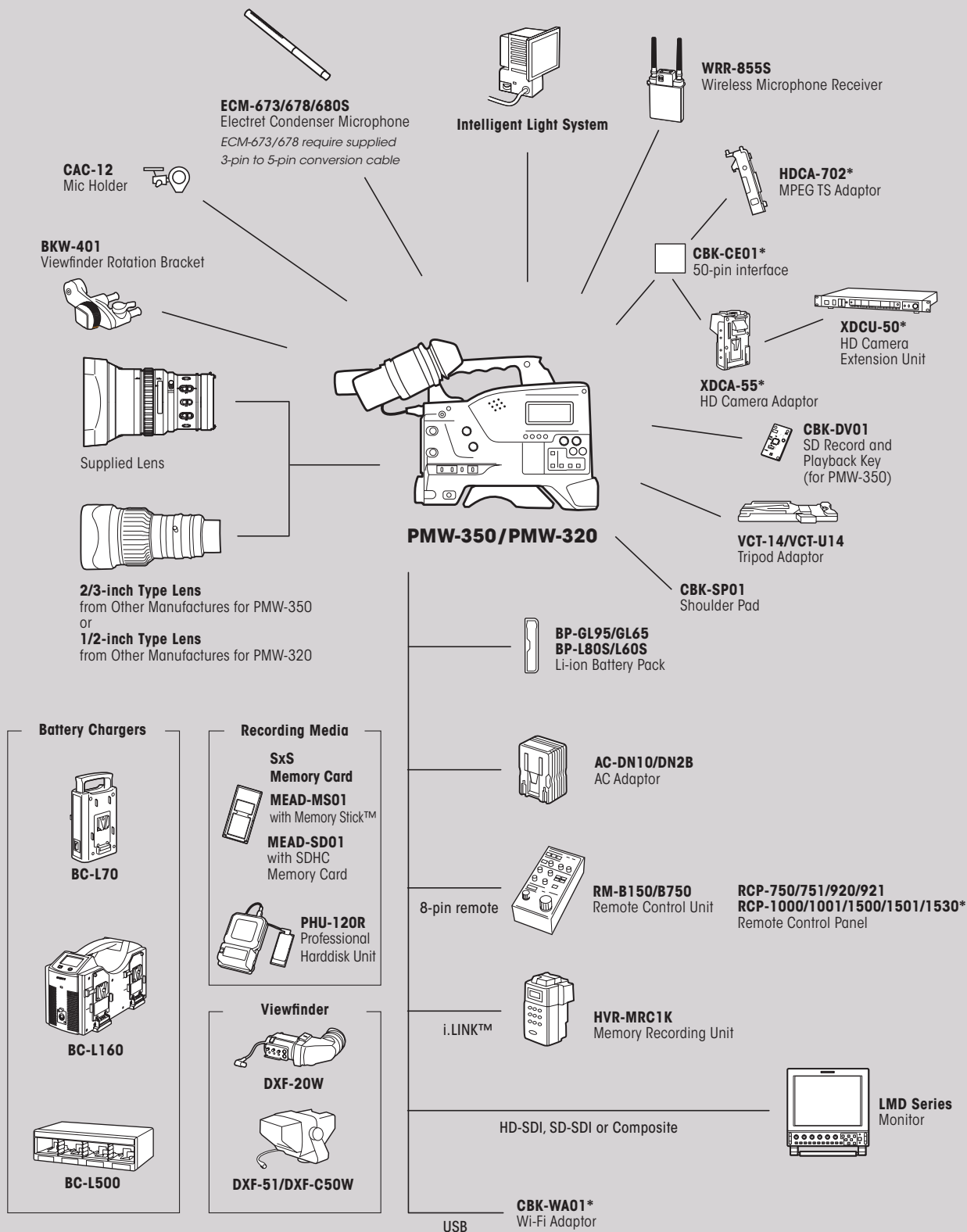
## Camera Remote Control

A Sony 8-pin remote interface is supplied with the PMW-350 and PMW-320. Various camera settings can be remotely controlled using an optional Remote Control Unit, RM-B150, or RM-B750, or an optional Remote Control Panel, RCP-750, RCP-751, RCP-920, RCP-921, RCP-1000, RCP-1001, RCP-1500, RCP-1501, or RCP-1530 via its 8-pin remote connector\*. Composite output is always available for monitoring purposes, regardless of HD/SD output selection.

\* Some controls on the remote control unit are not supported by the PMW-350 and PMW-320. Activation of RCP-1000/1001/1500/1501/1530 will be in end of October 2010.



# Camcorder System Diagrams



\* XDCA-55, XDCU-50, CBK-CE01, and RCP-1000/1001/1500/1501/1530 will be available in end of October 2010. The activation of HDCA-702 will be at the beginning of 2011. The activation of CBK-WA01 will be in the Spring of 2011.

## XDCAM EX Camcorders

# PMW-EX3

# PMW-EX1R



PMW-EX3



PMW-EX1R

The shotgun microphone is an optional accessory.

## Cutting-edge Camera Technology

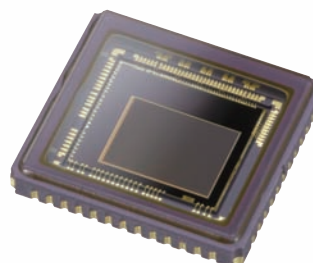
### Three 1/2-inch-type "Exmor" Full-HD CMOS Sensors

The PMW-EX1R and PMW-EX3 are equipped with three 1/2-inch-type "Exmor" CMOS sensors, each with an effective pixel count of 1920 (H) x 1080 (V). This technology delivers superior picture performance with full-HD resolution. Furthermore, this type of sensor allows the camcorder to provide an excellent sensitivity of F10, a remarkable signal-to-noise ratio of 54 dB, and a high horizontal resolution of 1,000 TV lines\*.

Other benefits include greatly reduced power consumption and associated heat dissipation in the PMW-EX1R and PMW-EX3, qualities which made possible the unique use of 1/2-inch-type sensors on these compact camcorders. In addition, this type of sensor can capture images with a shallower depth of field, giving users more freedom of creative expression.

\*In HD-SDI, HQ 1080 mode.

**Exmor**  
FULL HD 3CMOS



# Unique Lens Operation

## Supplied Wide-angle Fujinon 14x Zoom Lens

Both camcorders are equipped with a high-quality, high-definition Fujinon 14x zoom lens specifically designed to offer optimum picture performance and unprecedented functionality.

The lens offers a wide viewing angle of 5.8 mm (equivalent to 31.4 mm on a 35-mm lens), and many convenient features for diverse shooting situations.

## Unique Focus Ring Mechanism - Professional Manual Focus and Auto Focus

The lens adopts a unique focus ring mechanism, which offers two types of manual focus, plus auto focus operation. The lens is equipped with two independent focus wheel mechanisms, which can be switched by sliding the focus ring itself back and forth.

When the focus ring is in the front position, the lens works as an auto focus lens. In this case, either Manual or Auto Focus mode can be selected using the AF/MF switch on the lens. On the other hand, when the focus ring is set to the back position, the lens has an absolute focus position. In addition to the focus ring, the lens is equipped with independent rings for zoom and iris adjustment; all have physical stops and absolute markings, permitting precise adjustments. The location, rotational range, and feel are identical to other manual high-end HD lenses. This gives users a high level of familiarity and operational comfort.



Front : AF/MF

Back : Full MF

### AF/MF Mode

- Full AF
- One-push AF
- MF
- AF/MF Assist

### Full MF Mode

- Full MF (absolute focus position)

## AF Assist

The AF (Auto Focus) Assist function of the PMW-EX1R and PMW-EX3 enables operators to manually change focus positions using the focus ring in AF mode. This means that AF reference focus positions can be shifted manually to a new position.

## MF Assist

The MF (Manual Focus) Assist function of the PMW-EX1R and PMW-EX3 helps to precisely focus on the target subject when shooting in MF mode. When MF Assist is enabled, auto focus is momentarily activated when the user stops adjusting the focus ring. The camera then finely focuses on the subject that's closest to the focal point of the lens at that time.

## One-push Auto Iris (PMW-EX1R Only)

A One-push Auto Iris button has been added to the lens of the PMW-EX1R, allowing the user to go into Auto Iris mode only when this button is pushed.



## Interchangeable Lens System (PMW-EX3 Only)

The PMW-EX3 camcorder incorporates a 1/2-inch-type EX-mount interchangeable lens system that allows the lens to be as compact and lightweight as possible while maintaining high optical performance. This mount system supports a variety of 1/2-inch-type HD lenses available from major manufacturers with the PMW-EX3 camcorder via the supplied lens adaptor, expanding the spectrum of creative expression\*.

A 2/3-inch-type lens\*\* can also be used with the PMW-EX3 camcorder via the mount system; this requires a 2/3-inch-type lens adaptor\*\*\* equipped with a 12-pin lens connector. This illustrates the breadth of lens choice, including even cinema-style lenses, to suit every specific shooting requirement.

\*The 1/2-inch-type lens adaptor supplied with the PMW-EX3 camcorder is equipped with a hot-shoe lens mount connector only. Automatic lens iris control is achieved only if the lens has hot-shoe connectors. Some lens functions are not supported by the PMW-EX3. For more details, please contact each lens manufacturer.

\*\*In this configuration, the resulting focal length will be 1.37 times the actual focal length of the lens.

\*\*\*When using 2/3-inch-type lenses with the PMW-EX3 camcorder, a Fujinon ACM-21 lens mount adaptor is required.

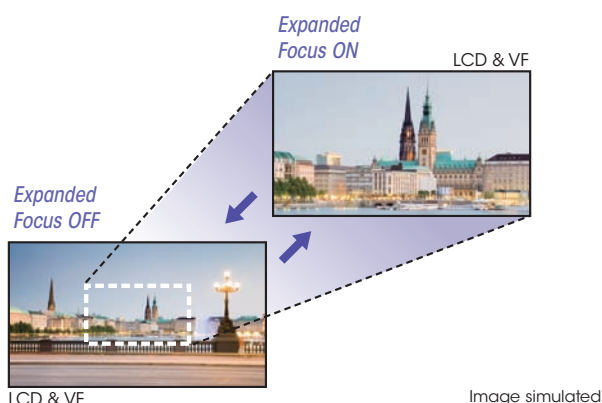


## Optical Image Stabiliser

To minimise the blurring effect caused by a shaking hand, the lens incorporate an Optical Image Stabiliser function.

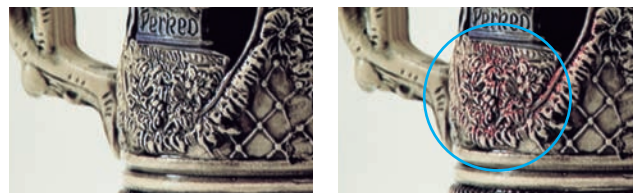
## Expanded Focus

At the touch of a button, the center of the screen on the LCD monitor and viewfinder of the PMW-EX1R and PMW-EX3 can be magnified to about twice of the normal size, making it easier to confirm focus settings during manual focusing.



## Selectable Peaking

The Peaking function of the PMW-EX1R and PMW-EX3 can help operators to quickly and accurately adjust the camera's focus by altering the way pictures are displayed on the LCD monitor and viewfinder. It can enhance the outline of the image which the camera focuses on most, and change its colour to make it stand out. Enhance levels can be selected from three levels, and the outline colour from four colours.



Peaking OFF

Peaking ON

# Creative Recording Modes and Settings

## 23.98p Native Recording

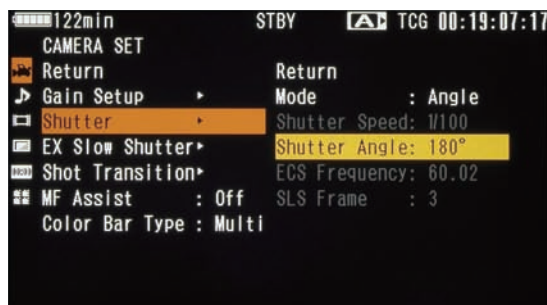
CINEALTA

The compact PMW-EX1R and PMW-EX3 offer a native 23.98p\* recording capability. This feature, accompanied by other creative features, makes these camcorders ideal for cinema production.

\*In 1440 x 1080/23.98p (SP) mode, images are handled as 23.98p and recorded as 59.94i signals via 2-3 pull-down.

## Shutter Angle Settings

As well as traditional electronic shutter speed controls, adjustable in fractions of a second, the PMW-EX1R and PMW-EX3 also offer shutter angle control, which is familiar to filmmakers.



## Slow Shutter Function

The PMW-EX1R and PMW-EX3 offer a Slow Shutter function for capturing clear images in low-light environments. The Slow Shutter function not only increases camera sensitivity but also produces a special blurring effect when shooting a moving object, for enhanced shooting creativity. The shutter speed is selectable from 2, 3, 4, 5, 6, 7, 8, 16, 32, and 64-frame accumulation periods.

## Interval Recording Function

These camcorders offer an Interval Recording function that records one frame at pre-determined intervals. This is convenient for shooting over long periods of time, and also when creating special effects with extremely rapid motion.

## Frame Recording Function

Frame Recording is unique to the PMW-EX1R, PMW-EX3, and PMW-350 – a function that is especially useful for clay animation shooting. Using this function, images for pre-determined frames are recorded every time the record button is pressed.



# Creative Recording Modes and Settings

## Slow & Quick Motion Function

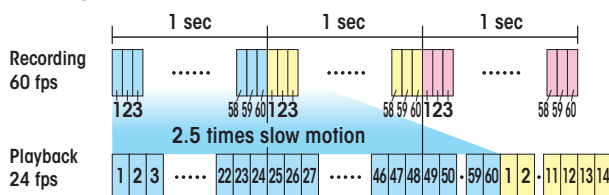
The PMW-EX1R and PMW-EX3 offer a powerful Slow & Quick Motion function – commonly known by filmmakers as over-cranking and under-cranking – that enables users to create unique 'looks' as well as slow- and fast-motion special effects.

The PMW-EX1R and PMW-EX3 can capture images at frame rates selectable from 1 fps (frame per second) to 60 fps in 720p mode, and from 1 fps to 30 fps in 1080p mode, in increments of 1 fps.

For example, when viewed at 23.98p, images captured at 60 fps appear two and a half times slower than normal. Conversely, images captured at 4 fps appear six times faster than normal.

With this Slow & Quick Motion function, images are recorded natively and at full resolution. The obtained quality of slow- and fast-motion images is significantly higher than those created in the editing process.

### Example of slow motion mechanism



## One-push S&Q Switch (PMW-EX1R Only)

For the PMW-EX1R, a new S&Q (Slow & Quick Motion) button has been added to the inside panel. It allows the user to switch quickly between Normal mode and S&Q mode. In S&Q mode, a blue LED on the button lights up. When the switch is pressed, S&Q mode is activated, and the recording format and frame rate are instantly changed to the conditions previously set via the menu.



# Operational Versatility

## DVCAM Recording (PMW-EX1R Only) **DVCAM**

A newly added feature in the PMW-EX1R – SD recording in DVCAM mode – offers those currently using SD systems a smooth migration path to HD production. By introducing the PMW-EX1R as a DVCAM acquisition camcorder, the conventional ingesting process to nonlinear systems becomes dramatically more efficient. Once a nonlinear system is HD-capable, the PMW-EX1R can continue to be deployed for HD acquisition.

## Picture Profile™ Feature

The Picture Profile feature of the PMW-EX1R and PMW-EX3 allows camera operators to easily call up customised picture-tonal settings to suit particular shooting conditions, rather than having to readjust the camera each time, giving users greater operational efficiency. Up to six different pictures – tonal settings such as the parameters of matrix, colour correction, detail, one of eight gamma curves, and knee – can be saved on SxS memory card. These settings are displayed on the LCD monitor at the touch of a button.

## ATW and Hold (PMW-EX1R Only)

The ATW (Auto Tracing White Balance) function of the PMW-EX1R and PMW-EX3 automatically adjusts the camera's colour temperature according to changes in the lighting conditions. This function is useful when recording outside for long periods, and the lighting changes gradually over time. The PMW-EX1R also has an ATW Hold function, which allows the operator to hold auto tracing at a desired colour balance via an assignable switch.

## Image Inversion Function (PMW-EX1R Only)

When the cinema lens or still-camera lens is attached to the camera with a DOF (Depth of Field) adaptor, the image is rotated 180 degrees. Image Inversion is the function that normalises the image.

## IR Remote Control On Rear (PMW-EX1R Only)

The PMW-EX1R has a newly added IR remote control receptor on the rear of its handle. This allows the user to control the PMW-EX1R with a remote commander™ both from the front and rear of the camcorder.

# Operational Versatility

## Additional Aspect Markers For Cinema Operation (PMW-EX1R Only)

Several new aspect markers such as 1.66:1, 1.85:1, 2.35:1, and 2.4:1 are added for more convenient cinema operation.

## Cache Recording Function (PMW-EX1R Only)

A Cache Recording function is newly added in the PMW-EX1R. Audio and video signals are buffered to the camcorder's internal memory before the record button is pressed. Once the record button is pushed, the cached portion is recorded onto memory media. This portion is added in front of the clip.

The caching period can be adjusted by menu setting up to 15 seconds. When in Cache Recording mode, an indicator on the inside panel lights up.



## Camera Remote Control (PMW-EX3 Only)

The PMW-EX3 camcorder comes equipped with a remote control interface. Various camera settings can be remotely controlled using an optional RM-B150 or RM-B750 Remote Control Unit via its 8-pin remote connector\*.

\*Some controls on the RM-B150 and RM-B750 are not supported by the PMW-EX3.

## Adjustable Shoulder Pad and Cheek Pad (PMW-EX3 Only)

The position of the PMW-EX3 camcorder's shoulder pad can be selected from two positions. In addition, the PMW-EX3 is supplied with a detachable cheek pad. Operators can always attain a comfortable and well-balanced camera position, even when the camcorder is docked with long lenses.



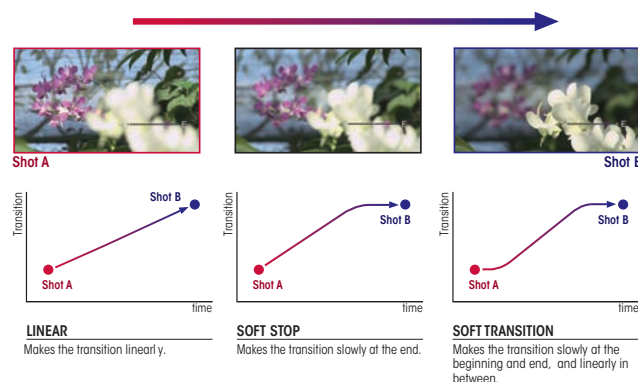
## HDMI Output (PMW-EX1R Only)

The standard HDMI connector (Type A) allows the user to show the picture on a consumer display or professional monitor equipped with an HDMI input. Non-compressed video and two channels of audio can be output. When HDMI output is selected, the other output is not available.

## Shot Transition™ Function

The Shot Transition function of the PMW-EX1R and PMW-EX3, with a simple push of a button, enables smooth, precise, and repeatable automatic scene transitions. The operator can program the duration and select from three transition profiles: Linear, Soft Stop, and Soft Transition.

Many lens parameters such as the start and end settings for zoom, focus, and/or camera parameters such as white balance and gain can be programmed to transition in unison. It works by automatically calculating the intermediate values during scene transition.



## HD-SDI and Other Versatile Interfaces

The PMW-EX1R and PMW-EX3 come equipped with a wide range of interfaces optimized for a variety of operational needs, wide interoperability, and flexible workflow. These include an HD-SDI output and, in E-to-E mode, 10 bits of 4:2:2 signal can be output from the connector. For versatile usage, there is also a down-converted SD-SDI output, i.LINK (HDV/DVCAM)\*, and analog composite/component output. Additionally, the PMW-EX3 camcorder is equipped with a timecode input/output and genlock input, allowing the camcorder to be used in a multi-camera system.

\*PMW-EX1R supports i.LINK (HDV/DVCAM). DVCAM input is available for monitoring use only, not for recording use. PMW-EX3 only supports i.LINK (HDV) only.

## 3.5-inch\* Colour LCD

Both of these camcorders are equipped with a large, easy-to-view, colour LCD with a high resolution of 1920 x 480 pixels. This screen can be flexibly rotated for accessible viewing from any shooting angle. The ease of focusing offered by this high-resolution panel, and its location and adjustability, enables it to be used as a viewfinder or camera assistant operator panel. It can also be used to instantly review recorded footage, as well as access the camera's set-up menus, view thumbnails, and display status indications.

\*Viewable area measured diagonally.



# Operational Versatility

## Four Assignable Buttons

Frequently used functions can be programmed to four assignable buttons on the PMW-EX1R and PMW-EX3, allowing operators to make rapid changes when working in the field.



## 0.45-inch\* Colour LCD Viewfinder (PMW-EX1R Only)

The PMW-EX1R comes equipped with a new colour LCD viewfinder, which displays high-resolution colour pictures of approximately 1,226,000 pixels in a wide-screen aspect ratio of 16:9, which simplifies focusing. Operators can switch between Colour and Monochrome Display modes, according to their preference.

\*Viewable area measured diagonally.

## On-handle Zoom Switch and Record Start/Stop Button

To facilitate zoom control and recording operation during low-angle shooting, an additional zoom switch and record start/stop button are located on the carrying handle of the PMW-EX1R and PMW-EX3. In addition, the PMW-EX1R has a new zoom transition menu which ensures smooth transitions – the user simply selects “Soft” to enable the on-handle zoom to start and stop more smoothly.



## Rotary Grip

The hand grip of the PMW-EX1R and PMW-EX3 can rotate approximately 120 degrees, which allows camera operators to flexibly adjust the angle of the grip. This gives users greater control and comfort when holding the camera in any shooting position. The grip for the PMW-EX1R has a new, enhanced shape that better fits the user's hand.



## Built-in Stereo Microphone and Two-channel Audio Input

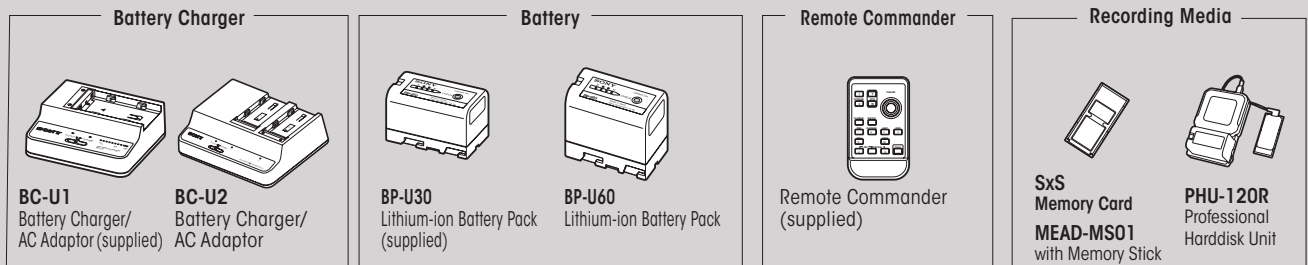
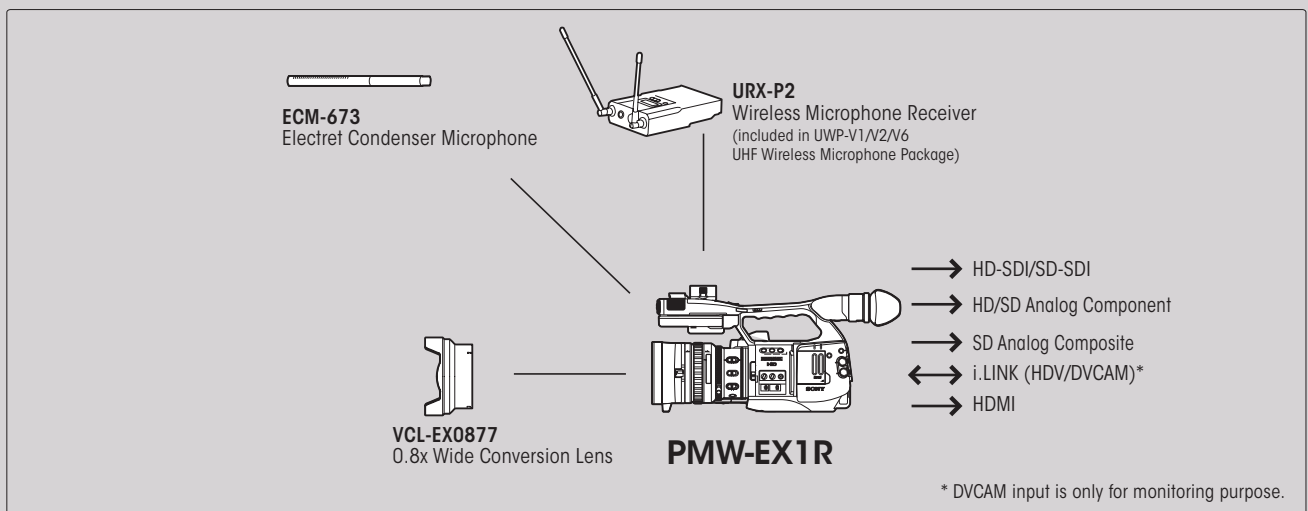
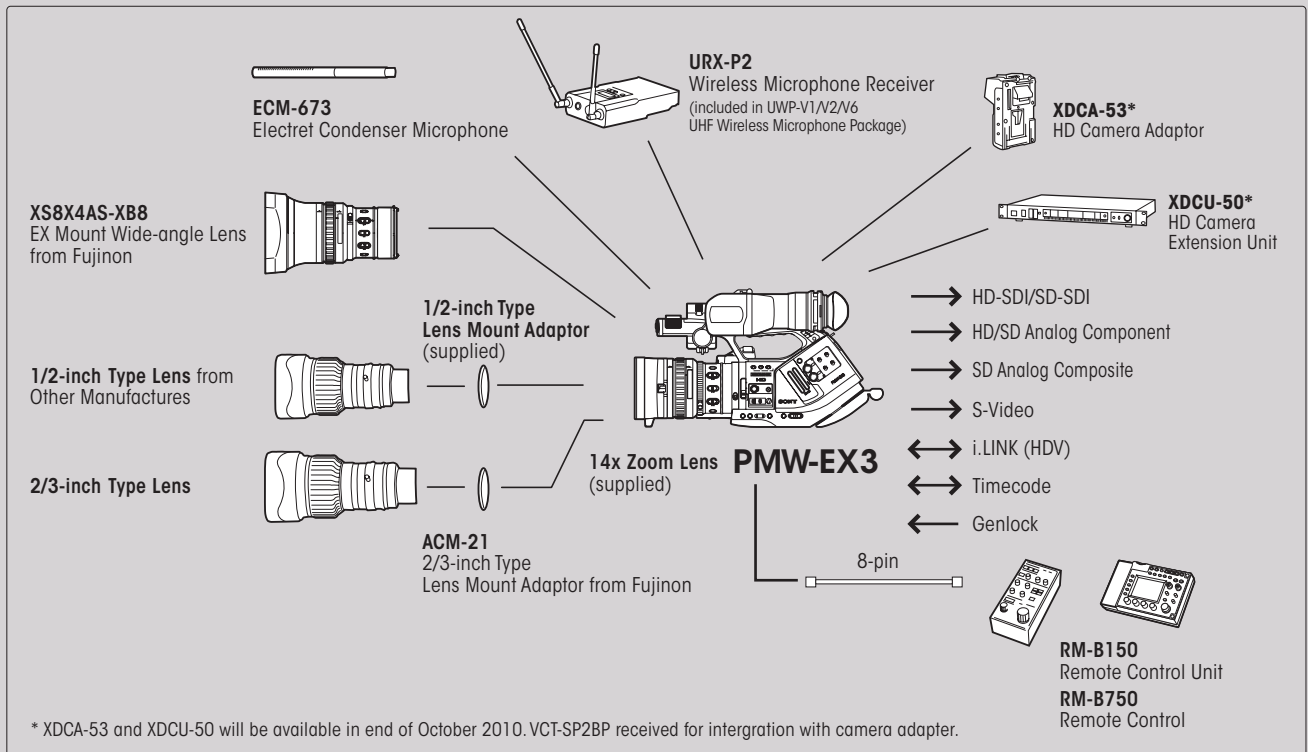
Both camcorders have a built-in stereo microphone and two XLR audio input connectors for connecting professional microphones or feeding an external-line audio source. These allow high-quality, two-channel 16-bit, 48-kHz linear PCM uncompressed audio to be recorded.

## Other Features

- Built-in ND filter wheel: OFF: Clear, 1: 1/8ND, 2: 1/64ND
- Selectable gain: -3, 0, 3, 6, 9, 12, 18 dB
- High-speed picture search: x4, x15
- Freeze Mix function
- Skin-tone detail control
- Low-key saturation

# Camcorder System Diagrams

Unless specified as "supplied", all the components below are optional.





# XDCAM EX Application Software

XDCAM EX products come with two application software packages for powerful yet easy and intuitive management of recorded content. Included are two versions (Macintosh and PC) of Clip Browser as well as XDCAM Transfer application software for Apple Final Cut Pro nonlinear editing systems.



## Clip Browser Version 2.6

### Features

- Browse video clips recorded by XDCAM EX products, including those in newly added formats, such as in HQ 1440x1080 mode, four-channel audio, and DVCAM mode
- Copy XDCAM EX clip files from SxS memory card to other devices such as hard disk drives
- Combine segmented clips recorded across two SxS memory cards
- Display Acquisition Metadata recorded in MP4 files
- Detect and correct for Flash Bands
- Convert file formats from MP4 to other file formats, such as MXF format\*, DV format, AAF format, H.264/AVC format (for field viewing on Sony PSP™, Apple iPod and Apple iPhone devices), and WMV format\*
- Create sub clips with Mark IN/OUT operation
- Register metadata for clips, such as "title", "creator", and "comments"
- Register shot mark metadata for instant cue-up to desired scenes
- Capture and create still-image files (BMP files) for desired scenes

\*Requires optional plug-in software from MainConcept AG

(<http://www.mainconcept.com/plugin4clipbrowser>)



### System Requirements

#### MS Windows OS:

Windows XP SP3 or later (32-bit version)  
Windows Vista SP1 or later (32-bit version, 64-bit version)  
Windows 7 (32-bit version, 64-bit version)

#### CPU:

Intel Pentium 4 2.0-GHz (minimum)  
Intel Core 2 Duo Processor 2.0-GHz or higher (recommended)

#### RAM:

1 GB (minimum), 2 GB or more (recommended)

#### Mac OS:

Mac OS X 10.4.11 or later  
Mac OS X 10.5.1 or later  
Mac OS X 10.6 or later

#### CPU

Intel Core 2 Duo Processor 2.0-GHz (minimum), Intel Core 2 Duo Processor 2.4-GHz, or higher (recommended)

#### RAM

1 GB (minimum), 2 GB or more (recommended)



Clip Browser GUI (Windows)



Clip Browser GUI (Macintosh)

## PDZK-P1\* Ver. 2.11 XDCAM Transfer for Apple Final Cut Pro

The PDZK-P1 XDCAM Transfer is plug-in software for Apple Final Cut Pro nonlinear editing systems that provides support for MP4 files recorded by XDCAM EX products. With this software installed on a Macintosh computer, XDCAM EX products or SxS memory card can be mounted directly onto Mac Finder, and users can seamlessly import and edit recorded material.

\*The latest version of this software can be downloaded from Sony websites. Please contact your nearest Sony office or authorized dealer for further information.

PDZK-P1 does not support DVCAM (AVI) files recorded with PMW-EX1R or PMW-350 camcorders.

Without using PDZK-P1, those files can be imported by drag & drop operation from Finder to Browser window of Final Cut Pro.



### System requirements

#### OS

Mac OS X 10.4.11 or later  
Mac OS X 10.5.8 or later

#### CPU

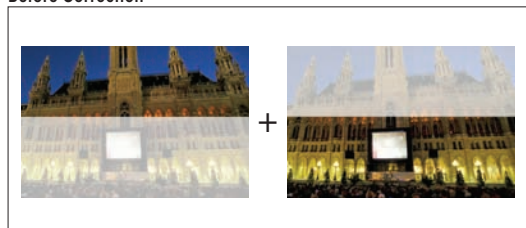
PowerPC G5 2-GHz, or higher  
Intel Core 2 Duo 2-GHz, or higher  
Intel Xeon 2-GHz, or higher

#### RAM

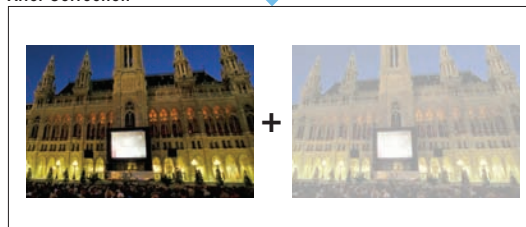
1 GB or more

## Flash Band Correction

### Before Correction



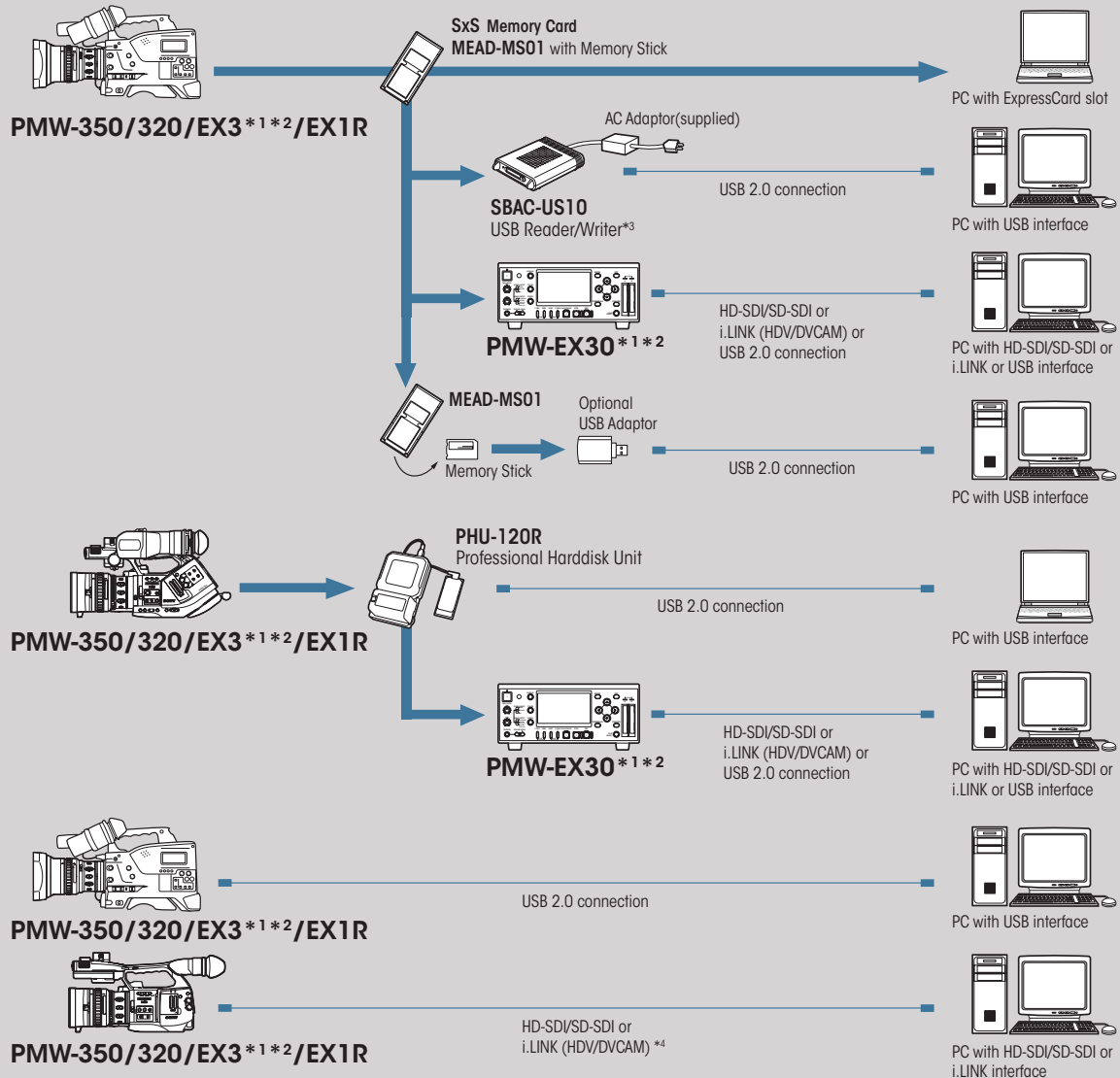
### After Correction



Simulated image

# Workflow Examples

## Ingest



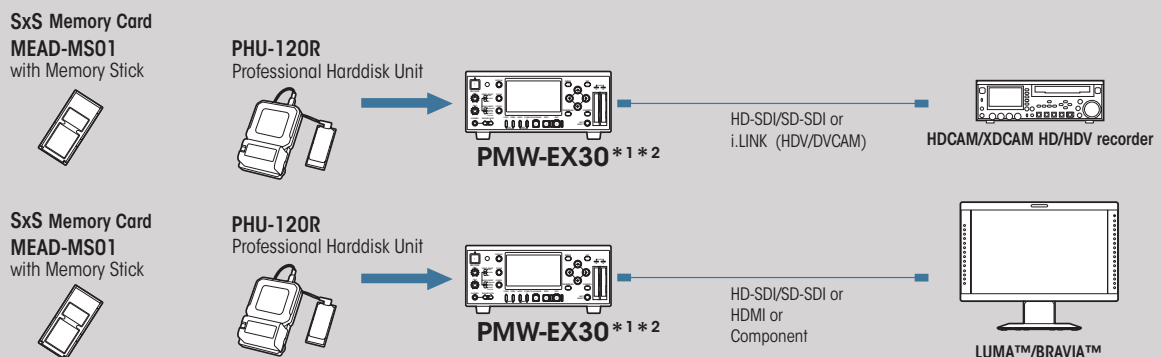
\*1 PMW-EX3 and PMW-EX30 do not support either HQ 1440x1080 mode or DVCAM mode.

\*2 PMW-EX3 and PMW-EX30 will support SxS-1 memory card and MEAD-MS01 after firmware upgrade which is planned in Spring 2010.

\*3 SBAC-US10 does not support MEAD-MS01.

\*4 PMW-EX3 does not support i.LINK (DVCAM).

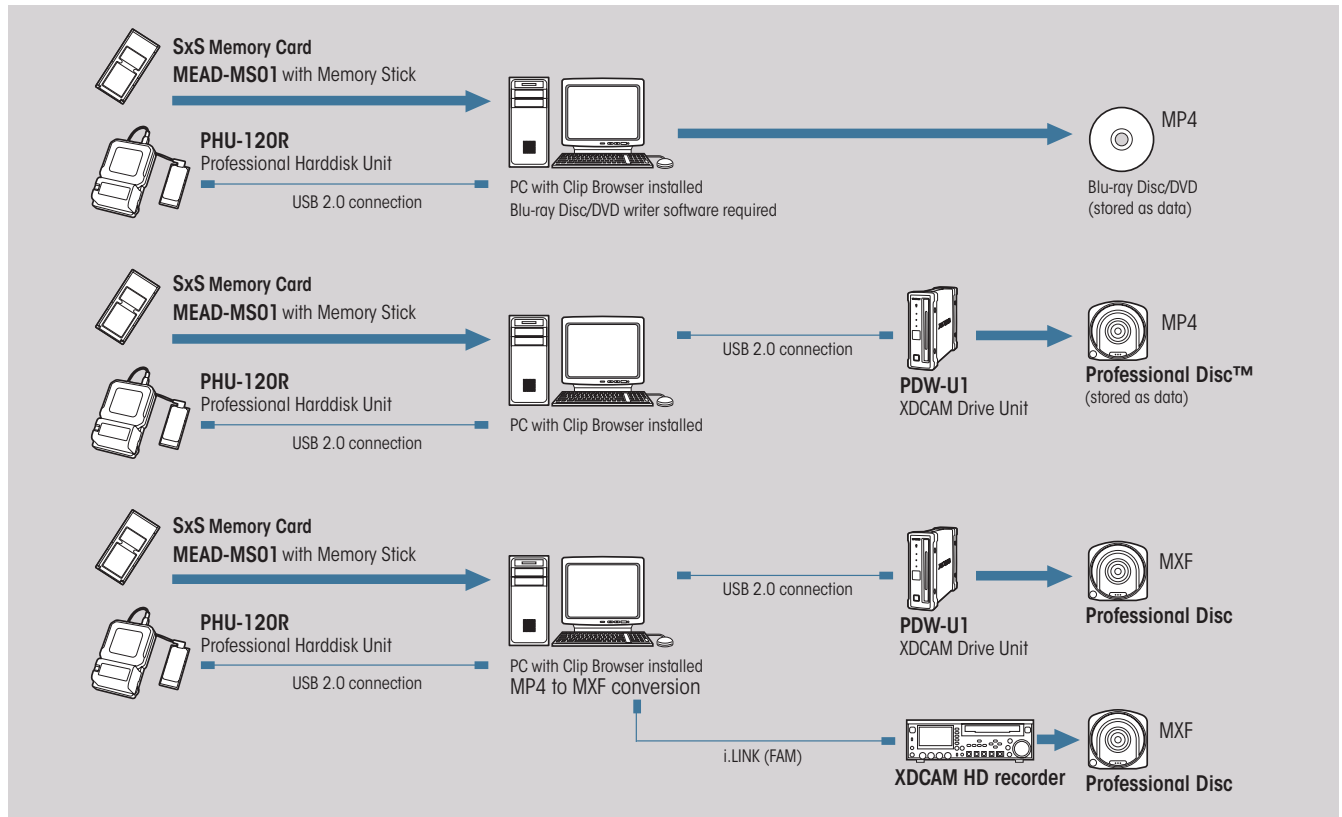
## Viewing and Dubbing



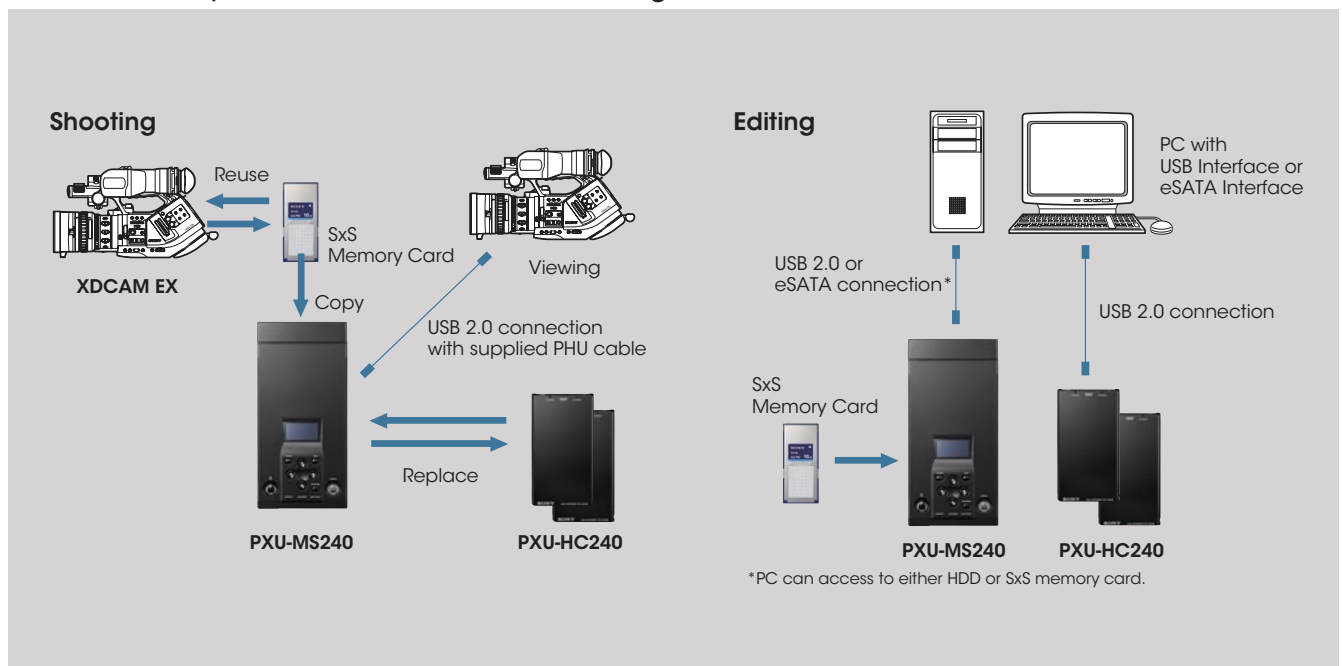
\*1 PMW-EX30 does not support either HQ 1440x1080 mode or DVCAM mode.

\*2 PMW-EX30 will support SxS-1 memory card and MEAD-MS01 after firmware upgrade which is planned in Spring 2010.

## Archiving



## Workflow Example with PXU-MS240 Mobile Storage Unit



## Optional Accessories for PMW-350 Series and PMW-320 Series

**SBP-32/16**  
SxS PRO Memory Card



**SBS-32G1**  
SxS-1 Memory Card



**MEAD-MS01**  
Media Adaptor



**MEAD-SD01**  
Media Adaptor



**PHU-120R**  
Professional Harddisk Unit



**PXU-MS240**  
Mobile Storage Unit



**PXU-HC240**  
HDD Cartridge



**HVR-MRC1K**  
Memory Recording Unit



**SBAC-US10**  
SxS Memory Card USB Reader/Writer



**BP-GL95/GL65/L80S/L60S**  
Lithium-ion Battery Pack  
Photo Shows BP-L80S/L60S



**AC-DN10/DN2B**  
AC Adaptor  
Photo Shows AC-DN10



Photo Shows AC-DN10

**BC-L500/L160/L70**  
Battery Charger  
Photo Shows BC-L500



Photo Shows BC-L500

**RM-B150**  
Remote Control Unit



**RM-B750**  
Remote Control Unit



**RCP-750/751/920/921**  
Remote Control Panel  
Photo Shows RCP-920



Photo Shows RCP-920

**RCP-1000/1001/1500/1501/1530\***  
Remote Control Panel



Photo Shows RCP-1000

**ECM-680S**  
Shotgun-type Electret Condenser Microphone



Photo Shows ECM-678, Requires 3-pin to 5-pin conversion cable

**ECM-678/673**  
Shotgun-type Electret Condenser Microphone



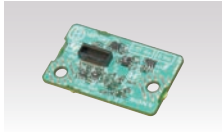
**WRR-855S**  
Wireless Microphone Receiver



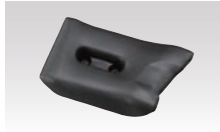
**CBK-WA01\***  
Wi-Fi Adaptor



**CBK-DV01**  
SD Recording and Playback Key  
(for PMW-350)



**CBK-SP01**  
Shoulder Pad



**VCT-14/VCT-U14**  
Tripod Adaptor



**DXF-20W**  
2.0-type Monochrome Viewfinder



**DXF-51**  
5-type Monochrome Viewfinder



**DXF-C50W**  
5-type LCD Color Viewfinder



**BKW-401**  
Viewfinder Rotation Bracket



**CAC-12**  
Mic Holder



**LC-H300**  
Carrying Case (Hard)



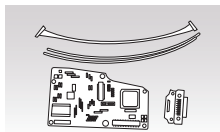
**LC-DS300SFT**  
Carrying Case (Soft)



**HDCA-702\***  
MPEG TS Adaptor



**CBK-CE01\***  
50-pin Interface and Digital Extender



**XDCA-55\***  
HD Camera Adaptor



**XDCU-50\***  
HD Camera Extension Unit



\* XDCA-55, XDCU-50, CBK-CE01, and RCP-1000/1001/1500/1501/1530 will be available in end of October 2010. The activation of HDCA-702 will be at the beginning of 2011. The activation of CBK-WA01 will be in the Spring of 2011.



## Optional Accessories for PMW-EX3/EX1R

### SBP-32/16

SxS PRO Memory Card



### SBS-32G1

SxS-1 Memory Card



### MEAD-MS01

Memory Stick Adaptor



### PHU-120R

Professional Harddisk Unit



### PXU-MS240

Mobile Storage Unit



### PXU-HC240

HDD Cartridge



### HVR-MRC1K

Memory Recording Unit



### BP-U30

Lithium-ion Battery Pack (28 Wh)



### BP-U60

Lithium-ion Battery Pack (56 Wh)



### BC-U1

Battery Charger (for BP-U30/U60)



### BC-U2

Battery Charger



### VCL-719BXS/B

19x Focus Servo Lens  
(for PMW-EX3)



### VCL-EX0877

0.8x Wide Conversion Lens  
(for PMW-EX1R)



### RM-B150

Remote Control Unit  
(for PMW-EX3)



### RM-B750

Remote Control Unit  
(for PMW-EX3)



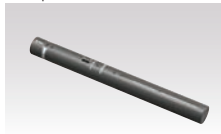
### ECM-680S

Shotgun-type Electret Condenser  
Microphone



### ECM-673

Shotgun-type Electret Condenser  
Microphone



### URX-P2

UHF Diversity Tuner



Requires 5-pin to 3-pin x2 conversion cable

### UWP-V1

UHF Wireless Microphone  
Package



### UWP-V2

UHF Wireless Microphone  
Package



### UWP-V6

UHF Wireless Microphone  
Package



### VCT-SP2BP

Camcorder Support



## 1/2-inch Type HD Lenses From Other Manufacturers

### Canon KH20x6.4 KRS\*



### Canon KH13x4.5 KRS\*



### Fujinon XS17x5.5BRM/BRD\*



### Fujinon XS13x3.3BRM/BRD\*



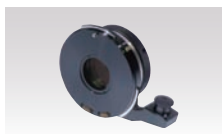
### Fujinon XS8X4AS-XB8 (EX Mount Wide-angle Lens)



\* Requires the lens mount adaptor supplied with the PMW-EX3 camcorder to attach these lenses to the PMW-EX3. Some lens functions are not supported by the PMW-EX3 camcorder. For details of the lenses, please contact each manufacturer.

## Other Lens Accessory

### Fujinon ACM-21\*



\* When using 2/3-inch type lenses with the PMW-EX3 camcorder, the Fujinon ACM-21 lens mount adaptor must be used. For details, please contact the manufacturer.

# XDCAM EX Camcorder Specifications

	PMW-EX1R	PMW-EX3*
General		
Mass	2.4 kg (5 lb 4 oz) (body) 2.8 kg (6 lb 2 oz) (with lens hood, large eye cup, BP-U30 battery, one SxS PRO memory card)	1.9 kg (4 lb 2 oz) (without lens) 3.6 kg (7 lb 9 oz) (with lens, lens hood, eye piece, BP-U30 battery, one SxS PRO memory card)
Dimension (W x H x D)	179 x 199 x 308 mm (7 1/8 x 7 7/8 x 12 1/4 inches) without projection	250 x 210 x 425 mm (9 7/8 x 8 3/8 x 16 3/4 inches) without projection
Power requirements	DC 12V	
Power consumption	Approx. 12.5 W (while recording, EVF On, LCD monitor Off)	Approx. 13.5 W (while recording, LCD viewfinder On)
Operating temperature	0 °C to +40 °C (+32 °F to +104 °F)	
Storage temperature	-20 °C to +60 °C (-4 °F to +104 °F)	
Battery operating time	Approx. 240 min with BP-U60 battery Approx. 120 min with BP-U30 battery	Approx. 210 min with BP-U60 battery Approx. 100 min with BP-U30 battery
Recording format	Video: MPEG-2 Long GOP HD HQ mode: VBR, maximum bit rate: 35 Mb/s, MPEG-2 MP@HL HD SP mode: CBR, 25 Mb/s, MPEG-2 MP@H-14 SD mode: DVCAM  Audio: Linear PCM (2ch, 16-bit, 48-kHz)	Video: MPEG-2 Long GOP HQ mode: VBR, maximum bit rate: 35 Mb/s, MPEG-2 MP@HL SP mode: CBR, 25 Mb/s, MPEG-2 MP@H-14  Audio: Linear PCM (2ch, 16-bit, 48-kHz)
Recording frame rate	NTSC area: HD HQ mode: 1920 x 1080/59.94i, 29.97p, 23.98p, 1440 x 1080/59.94i, 29.97p, 23.98p, 1280 x 720/59.94p, 29.97p, 23.98p HD SP mode: 1440 x 1080/59.94i, 23.98p (pull down) SD mode: 720 x 480/59.94i, 29.97PsF  PAL area: HD HQ mode: 1920 x 1080/50i, 25p, 1440 x 1080/50i, 25p, 1280 x 720/50p, 25p HD SP mode: 1440 x 1080/50i SD mode: 720 x 576/50i, 25PsF	NTSC area: HD HQ mode: 1920 x 1080/59.94i, 29.97p, 23.98p, 1280 x 720/59.94p, 29.97p, 23.98p HD SP mode: 1440 x 1080/59.94i, 23.98p (pull down)  PAL area: HD HQ mode: 1920 x 1080/50i, 25p, 1280 x 720/50p, 25p HD SP mode: 1440 x 1080/50i
Recording/Playback time	HQ Mode: Approx. 100 min with SBP-32 (32 GB) memory card** Approx. 50 min with SBP-16 (16 GB) memory card Approx. 25 min with SBP-8 (8 GB) memory card  SP/SD Mode: Approx. 140 min with SBP-32 (32 GB) memory card** Approx. 70 min with SBP-16 (16 GB) memory card Approx. 35 min with SBP-8 (8 GB) memory card	HQ Mode: Approx. 100 min with SBP-32 (32 GB) memory card** Approx. 50 min with SBP-16 (16 GB) memory card Approx. 25 min with SBP-8 (8 GB) memory card  SP Mode: Approx. 140 min with SBP-32 (32 GB) memory card** Approx. 70 min with SBP-16 (16 GB) memory card Approx. 35 min with SBP-8 (8 GB) memory card
Lens		
Lens mount	-	1/2-inch type EX mount
Zoom ratio	-	14x (optical), servo/manual
Focal length	-	f = 5.8 mm to 81.2 mm (equivalent to 31.4 mm to 439 mm to on 35 mm lens)
Iris	-	F1.9 to F16 and Close, auto/manual selectable
Focus	-	AF/MF/Full MF selectable, 800 mm to ∞ (MACRO OFF), 50 mm to ∞ (MACRO ON, Wide), 735 mm to ∞ (MACRO ON, Tele)
Image stabiliser	-	ON/OFF selectable, shift lens
Filter diameter	-	M77 mm, pitch 0.75 mm (on lens)
Camera Section		
Imaging device	-	3-chip 1/2-inch type "Exmor" Full HD CMOS
Effective picture elements	-	1920 (H) x 1080 (V)
Optical system	-	F1.6 prism system
Built-in optical filters	-	OFF: Clear, 1: 1/8ND, 2: 1/64ND
Sensitivity (2000 lx, 89.9% reflectance)	-	F1.0 (typical) (1920 x 1080/59.94i mode)
Minimum illumination	-	0.141 lx (typical) (1920 x 1080/59.94i mode, F1.9, +18 dB gain, with 64-frame accumulation)
S/N ratio	-	54 dB (V) (typical)
Horizontal resolution	-	1,000 TV lines or more (1920 x 1080i mode)
Shutter speed	-	1/60 sec to 1/2,000 sec + ECS
Slow Shutter (SLS)	-	2, 3, 4, 5, 6, 7, 8, 16, 32, and 64-frame accumulation
Slow & Quick Motion function	-	720p: Selectable from 1 fps to 60 fps as recording frame rate 1080p: Selectable from 1 fps to 30 fps as recording frame rate
White balance	-	Preset (3,200 K), Memory A, Memory B/ATW
Gain	-	-3, 0, 3, 6, 9, 12, 18, dB, AGC
Inputs/Outputs		
Audio input	-	XLR-type 3-pin (female) (x2), line/mic/mic +48 V selectable
Composite output	Phono jack (x1) via A/V multi connector, NTSC or PAL	BNC (x1), NTSC or PAL
S-Video output	-	Mini DIN 4-pin (x1)
Audio output	Phono jack (CH-1, CH-2) via A/V multi connector	Phono jack (CH-1, CH-2)
Component output	-	Mini D (x1) via A/V multi connector
SDI output	-	BNC (x1), HD-SDI/SD-SDI selectable
i.LINK	IEEE1394, 4-pin (x1), HDV (HDV 1080i) / DVCAM stream input/output, S400	IEEE1394, 4-pin (x1), HDV stream (HDV 1080i) input/output, S400
Timecode input	-	BNC (x1)
Timecode output	-	BNC (x1)
Genlock input	-	BNC (x1)
USB	-	USB device, Mini-B (x1)
Headphone output	-	Stereo mini-jack (x1)
Speaker output	-	Monaural
DC input	-	DC jack
DC output	-	-
Remote	-	8-pin
Lens remote	-	12-pin
MIC	-	-
HDMI output	A Type (x1)	-
VF	-	-
Wireless receiver IN	-	-
Monitoring		
Viewfinder	0.45-inch*** type color LCD: 852 (H) x 480 (V), 16:9	3.5-inch*** type color LCD monitor: approx. 921,000 effective pixels, 640 (H) x (RGB) x 480 (V), 16:9, hybrid type
Built-in LCD monitor	3.5-inch*** type color LCD monitor: approx. 921,000 effective pixels, 640 (H) x 3 (RGB) x 480 (V), 16:9, hybrid type	-
Built-in Microphone		
	Omni-directional stereo electret condenser microphone	
Media		
Type	ExpressCard/34 slot (x2)	
Supplied Accessories		
	Lens hood (1), Large eye cup (1), IR remote commander unit (1), USB cable (1), A/V connecting cable (1), Component video cable (1), Shoulder strap (1), Operation Manual (1), XDCAM EX Clip Broing software (1), SxS device driver software (1), BP-U30 battery (1), BC-U1 charger (1), Cold Shoe Kit (1)	14x zoom lens (1), Lens hood (1), LO-3830 1/2-inch lens adaptor (1), IR remote commander unit (1), USB cable (1), Component video cable (1), Shoulder strap (1), Operation Manual (1), Cheek pad, XDCAM EX Clip Browsing software (1), SxS device driver software (1), BP-U30 battery (1), BC-U1 charaer (1)

\*1. The specifications are measured with supplied lens. \*2. Recording /Playback time may vary the according to the encoding or memory. \*3. Viewable area measured diagonally.

\*4. When recording in HQ (35 Mbps) mode, actual recording times may vary according to the bit rate adopted during VBR encoding.

	PMW-350K, PMW-350L*1	PMW-320K, PMW-320L*1
<b>General</b>		
Mass	3.2 kg (7 lb 1 oz) (without lens), 6.3 kg (13 lb 14 oz) (with LCD VF, AF lens, Mic, BP-GL95 battery, one SxS PRO memory card)	
Dimension (W x H x D)	124 x 269 x 332 mm (5 x 10 5/8 x 13 1/8 inches) without projection (body)	
Power requirements	DC 12V	
Power consumption	Approx. 18 W (with supplied viewfinder, lens, and microphone while recording), Approx. 15 W (body while recording)	
Operating temperature	0 °C to +40 °C (+32 °F to +104 °F)	
Storage temperature	-20 °C to +60 °C (-4 °F to +104 °F)	
Battery operating time	Approx. 310 min with BP-GL95 battery	
Recording format	Video: MPEG-2 Long GOP HQ mode: VBR, maximum bit rate: 35 Mbps, MPEG-2 MP@HL SP mode: CBR, 25 Mbps, MPEG-2 MP@H-14 SD mode (option): DVCAM  Audio: HD mode: Linear PCM (4 ch, 16-bit, 48-kHz), SD mode (option): Linear PCM (2 ch, 16-bit, 48-kHz)	Video: MPEG-2 Long GOP HQ mode: VBR, maximum bit rate: 35 Mbps, MPEG-2 MP@HL SP mode: CBR, 25 Mbps, MPEG-2 MP@H-14 SD mode: DVCAM  Audio: HD mode: Linear PCM (4 ch, 16-bit, 48-kHz), SD mode: Linear PCM (2 ch, 16-bit, 48-kHz)
Recording frame rate	NTSC area: HQ mode: 1920 x 1080/59.94i, 29.97p, 23.98p, 1440 x 1080/59.94i, 29.97p, 23.98p, 1280 x 720/59.94p, 29.97p, 23.98p SP mode: 1440 x 1080/59.94i, 23.98p (pull down) SD mode (option): 720 x 480/59.94i, 29.97pPsf  PAL area: HQ mode: 1920 x 1080/50i, 25p, 1440 x 1080/50i, 25p, 1280 x 720/50p, 25p SP mode: 1440 x 1080/50i, SD mode (Option): 720 x 576/50i, 25pPsF	NTSC area: HQ mode: 1920 x 1080/59.94i, 29.97p, 23.98p, 1440 x 1080/59.94i, 29.97p, 23.98p, 1280 x 720/59.94p, 29.97p, 23.98p SP mode: 1440 x 1080/59.94i, 23.98p (pull down) SD mode: 720 x 480/59.94i, 29.97pPsf  PAL area: HQ mode: 1920 x 1080/50i, 25p, 1440 x 1080/50i, 25p, 1280 x 720/50p, 25p SP mode: 1440 x 1080/50i, SD mode: 720 x 576/50i, 25pPsF
Recording/Playback time	HQ Mode: Approx. 100 min with SBP-32 (32 GB) memory card Approx. 50 min with SBP-16 (16 GB) memory card Approx. 25 min with SBP-8 (8 GB) memory card  SP / SD Mode (SD : option): Approx. 140 min with SBP-32 (32 GB) memory card Approx. 70 min with SBP-16 (16 GB) memory card Approx. 35 min with SBP-8 (8 GB) memory card	HQ Mode: Approx. 100 min with SBP-32 (32 GB) memory card Approx. 50 min with SBP-16 (16 GB) memory card Approx. 25 min with SBP-8 (8 GB) memory card  SP / SD Mode: Approx. 140 min with SBP-32 (32 GB) memory card Approx. 70 min with SBP-16 (16 GB) memory card Approx. 35 min with SBP-8 (8 GB) memory card
<b>Lens</b>		
Lens mount	2/3-type SONY bayonet	1/2-type SONY bayonet
Zoom ratio	16x (optical), servo/manual (AF lens for PMW-350K)	16x (optical), servo/manual (AF lens for PMW-320K)
Focal length	f = 8 mm to 128 mm (equivalent to 31.5 mm to 503 mm on 35 mm lens)	f = 5.8 mm to 93 mm (equivalent to 31.4 mm to 503 mm on 35 mm lens)
Iris	F1.9 to F1.6 and Close, auto/manual selectable	F1.9 to F1.6 and Close, auto/manual selectable
Focus	AF/MF/Full MF selectable, 800 mm to ∞ (MACRO OFF), 50 mm to ∞ (MACRO ON, Wide), 732 mm to ∞ (MACRO ON, Tele)	AF/MF/Full MF selectable, 800 mm to ∞ (MACRO OFF), 50 mm to ∞ (MACRO ON, Wide), 782 mm to ∞ (MACRO ON, Tele)
Image stabiliser	ON/OFF selectable, shift lens	
Filter diameter	M82 mm, pitch 0.75 mm (on lens)	
<b>Camera Section</b>		
Imaging device	3-chip 2/3-inch type "Exmor" Full HD CMOS	3-chip 1/2-inch type "Exmor" Full HD CMOS
Effective picture elements	1920 (H) x 1080 (V)	1920 (H) x 1080 (V)
Optical system	F1.4 prism system	F1.6 prism system
Built-in optical filters	1: Clear, 2: 1/4ND, 3: 1/16ND, 4: 1/64ND	1: Clear, 2: 1/4ND, 3: 1/16ND, 4: 1/64ND
Sensitivity (2000 lx, 89.9% reflectance)	F12 (typical) (1920 x 1080/59.94i mode), F13 (typical) (1920 x 1080/50i mode)	F10 (typical) (1920 x 1080/59.94i mode), F11 (typical) (1920 x 1080/50i mode)
Minimum illumination	0.003 lx (typical) (1920 x 1080/59.94i mode, F1.4, +42 dB gain, with 64-frame accumulation)	0.05 lx (typical) (1920 x 1080/59.94i mode, F1.6, +24 dB gain, with 64-frame accumulation)
S/N ratio	59 dB (Y) (typical)	54 dB (Y) (typical)
Horizontal resolution	1,000 TV lines or more (1920 x 1080i mode)	1,000 TV lines or more (1920 x 1080i mode)
Shutter speed	1/60 sec to 1/2,000 sec + ECS	1/60 sec to 1/2,000 sec + ECS
Slow Shutter (SLS)	2, 3, 4, 5, 6, 7, 8, 16, 32, and 64-frame accumulation	2, 3, 4, 5, 6, 7, 8, 16, 32, and 64-frame accumulation
Slow & Quick Motion function	720p: Selectable from 1 fps to 60 fps as recording frame rate 1080p: Selectable from 1 fps to 30 fps as recording frame rate	720p: Selectable from 1 fps to 60 fps as recording frame rate 1080p: Selectable from 1 fps to 30 fps as recording frame rate
White balance	Preset (3,200 K), Memory A, Memory B/ATW	Preset (3,200 K), Memory A, Memory B/ATW
Gain	-3, 0, 3, 6, 9, 12, 18, 24, 30, 36, 42 dB	-3, 0, 3, 6, 9, 12, 18, 24 dB
<b>Inputs/Outputs</b>		
Audio input	XLR-type 3-pin (female) (x2), line/mic/mic +48 V selectable	
Composite output	BNC (x1), NTSC or PAL, COMPONENT Y	
S-Video output		
Audio output	XLR-type 5-pin	
Component output	Mini D (x1) via A/V multi connector	
SDI output	BNC (x1), HD-SDI/SD-SDI selectable	
i.LINK	IEEE 1394, 4-pin (x1), HDV™ (HDV 1080i)/DVCAM stream input/output, S400	
Timecode input	BNC (x1)	
Timecode output	BNC (x1)	
Genlock input	BNC (x1)	
USB	USB device, Mini-B (x1)	
Headphone output	Stereo mini-jack (x1)	
Speaker output	Monaural	
DC input	XLR-type 4-pin	
DC output	4-pin	
Remote	8-pin	
Lens remote	8-pin	
MIC	XLR-type 5-pin	
HDMI output	A type (x1)	
VF		
Wireless receiver IN		
<b>Monitoring</b>		
Viewfinder	3.5-inch*3 type color LCD monitor: approx. 921,000 effective pixels, 640 (H) x 3 (RGB) x 480 (V), 16:9, hybrid type	
Built-in LCD monitor	Black & White LCD (Audio level, TC, battery and media remaining capacity)	
<b>Built-in Microphone</b>		
	Omni-directional stereo electret condenser microphone	
<b>Media</b>		
Type	ExpressCard/34 slot (x2)	
<b>Supplied Accessories</b>		

# User Experiences

## Adam Sèbire - Camera - Director - Editor, SBS Radio & Television Youth Orchestra

The PMW-EX1R has completely transformed the way we do our overseas shoots - as I write I am shooting two projects in the German Alps with it. No more lugging kilos of tapes - I can travel with a MacBook Pro laptop and a couple of SxS cards. During breaks in shooting, I slot the card into the computer's ExpressCard slot and ingest shots straight into Final Cut Pro with the free Log & Transfer plug-in - an hour of HQ material takes less than 10 mins to digitise this way, and is ready to be dropped into the timeline immediately. Nightly I back up the media folder to a portable Firewire drive at the hotel. The advantages of this workflow cannot be overstated.

A recent project in the West Bank of Palestine required stills to be emailed to web designers and PR people in Holland each night. The beauty of this camera, especially with Sony's beautiful wide angle lens, is that progressive scan stills from the camera\* were sufficiently high resolution to satisfy even the print editions of major European daily newspapers ... and shooting 25p usually allowed us to choose the exact moment in the action that told the story. I barely took my SLR stills camera out of its pouch in over four weeks of shooting.



*Ramallah, a city in the central West Bank*



*Ramallah is located 10 km north of Jerusalem*

After much research we also decided to use PMW-EX1R on one of the darkest shoots I've ever encountered. For the Sydney Biennale, the concert hall of the Opera House was transformed into a living forest with over 1000 trees, mist, and lighting suggestive of the first moments of daybreak. Even with 0dB of gain, the camera's 360° shutter and brilliant low-light response surpassed that of similar cameras at 6dB. The PMW-EX1R was light enough to be mounted on a Steadicam Flyer, making it sufficiently nimble to traverse the forest (auditorium) floor.

The finished product will be shown on BluRay DVD in European galleries. You can't go wrong with one of these cameras.

*Note: The above images were progressive scan stills from footage shot on Adam's PMW-EX1R.*



## **Discovery Channel Asia's Storm Surfers documentary delivers almost true-to-life TV viewing through Sony HD Technology**

Awesome wave power surfing captured and delivered to viewers using special waterproof housings.

Screening on Discovery Channel Asia and entirely captured with Sony HD camera technology, the two Storm Surfers documentaries produced to date feature two-time world champion Tom Carroll, and big wave pioneer Ross Clarke-Jones. Both are Australian surfing legends who teamed up to track, chase down and then surf the most isolated, rugged and colossal waves the ocean can produce.

David Maguire has been Director of Photography (DOP) on both films, leading a team of cameramen who shot with Sony HD camera technology and used specialised mounts and waterproof housings.

### **Equipment Versatility and Quality Images**

Over the past year, Maguire has been shooting with Sony's excellent range of XDCAM and XDCAM EX cameras. His favourite is the Sony PMW-EX3 camera and his team's experience with this model surprised him. As he says, "The Sony PMW-EX3 camera has impressed me with its versatility and the quality of the images produced despite being priced at the lower end of the professional market."

Whilst shooting Storm Surfers, the crew originally took on the PMW-EX3 for capturing material for online micro-doc information segments. Using it extensively for that purpose, Maguire's team quickly discovered that the camera was also perfectly suited to match their main XDCAM PDW-700 camera.

"This was so convenient as it enabled us to use two cameras simultaneously in situations where a scene could only be captured once," lauds the DOP.

### **Never Worrying About Running out of Recording Space is a Huge Plus**

"Hence the PMW-EX3 was used in all the group dialogue sequences and was very suitable for the boat-to-big-waves shooting. The lens stabiliser helped take out some of the hard knocks that the chop was throwing at us and gave the operator an easier chance to anchor onto something with one hand, while operating at ease with the other because of the camera's light weight."

He explains that as almost four hours of recording time can be obtained on two 32GB SxS cards, the operator never has to worry about running out of recording space. The PMW-EX3 is easier to navigate when customising your personal settings and more efficient when adjusting modes within the menu.

Perfectly suited to productions filming in remote locations, the camera can be easily carried by hand and used where electricity sources are not available. Days of shooting can be completed with a supply of batteries, cards and PMW-EX3 camera all in one backpack!

This camera has given Maguire an air of confidence: "It is a camera I can rely on and as I said, for the quality at such a price, the PMW-EX3 can't be beaten. Happy shooting!"

Further Storm Surfers productions are in the pipeline. Visit the following websites and watch unreleased Storm Surfers footage:

- [www.stormsurfers.tv](http://www.stormsurfers.tv)
- <http://stormsurfers.tv/2010/05/shooting-storm-surfers>



## ■ Helping Indonesia's multimedia industry's access new technology for production

Leading multimedia equipment rental company Indika chooses Sony to meet local demands.

Creativity in the multimedia industry can only be enhanced with new technology with industry practitioners demanding for the best in equipment to help them express themselves fully in their productions.

No one knows this better than Indika Rental Equipment, a specialist in the rental of multimedia equipment to clients like media agencies, production houses and independent film-makers in Indonesia.

The company's latest acquisition is the new Sony XDCAM EX PMW-350, combining cutting-edge technology, durability and flexibility for indoor and outdoor shoots.

### Effortless and Ease of Use

Indika's Director of Photography, Arief Setiarso, said "With its tapeless camera technology and three 2/3 inch-type Exmor™ full HD CMOS sensors, the PMW-350 gives film makers the means to fully express their creativity. Our clients are also pleased with the light weight, durability and ease of use of this camcorder. "This is Indika's contribution to enhance our national movie industry and fulfills our promise of providing excellent professional support at competitive rates," he added.

The PMW-350 is Sony's first memory shoulder-mount camcorder. Its ergonomic and compact design ensures a high degree of mobility and comfort even for extended periods of shooting. Besides the hardware features, the PMW-350 matrix setup also allows for easy control of camcorder settings. Its wide latitude lens gives high-quality image capture even with low lighting. Like all the XDCAM EX series of camcorders, the PMW-350 uses the SxS memory card storage system—allowing instant preview and on-location editing, saving both post-production time and cost.



### Savings in Equipment and Manpower

Setiarso attests to the PMW-350 camcorder's prowess in action. "We were required to shoot footages in dense rainforests for a project. Given the high level of humidity and low-light exposure of the natural environment, I was initially skeptical of the PMW-350. But the camcorder really surprised me with its reliability and ease of use. The highly-sensitive image sensors and wide latitude lens means that we don't need to compromise on image quality even under poor light conditions. This coupled with the compact design of the body allowed us to travel light over rough terrains without the need to use extra manpower to bring extra lighting equipment along for our shoots."

Setiarso continues: "While some cameras may be prone to technical glitches under such demanding environment, the PMW-350 delivers in HD every time, even under long periods of shooting. I'm now truly convinced of the camcorder's capabilities."

With such glowing reviews from professionals in the industry, it is little wonder that the PMW-350 camcorders are constantly in high demand ever since Indika Rental Equipment invested in the series.

"The PMW series comes with a full range of top-notch accessories that really answered to all of our clients' needs and wants," Setiarso remarked. "With such sophisticated technology and excellent after sales services from Sony, Indika Rental Equipment is confident that we have chosen the right partner in Sony to bring in the best technology for our clients."



## ■ Asia's Leading Movie Production House Chooses Sony Technology To Meet New-Age Demands

### **Kantana Movie Town chief says superior technology, competitive pricing and value add were Sony's plus points in clinching the deal**

In the realm of movie and television production, the key to delivering that super quality vision on silver or LED screens is the reality of cost! Escalating camera equipment values brought about by the impact of new technology in movie and television production can make or break any movie studio or production house.

When Thailand's oldest and largest film studio, and also one of Asia's major film and processing hubs, Kantana Movie Town, was looking towards enhancing its capabilities with the latest in camcorder and studio production technology, they were aware that cost and quality were the two deciding factors as to what equipment to buy.

Sony Thailand took on the challenge to meet Kantana's stringent equipment road testing schedule with its XDCAM EX camcorder and Letus Lens adapter, P+S Technik Lens adapter, with fix lens, pitting itself against other leading brands in the camcorder range market. After one month of robust testing under varying conditions such as indoor studio, outside location broadcast, studio and natural lighting, and even low-light conditions, Kantana decided to go with Sony's XDCAM EX as its camcorder of choice.

Nirattisai Kaljaruek, Managing Director of Kantana Movie Town, said: "It was the value-added price tag and the high quality of the Sony camcorder that was the deciding factor. The full HD quality made our investment into Sony equipment a profitable one!"

### **Testing of camcorders & equipment showed off Sony's benefits**

The robust testing, out in the field and in studios, called for the use of Sony equipment to good effect, primarily in the area of Electronic Field Production (EFP), where the PMW-EX3 proved highly useful. Kantana used the HD Switcher and recorded to PDW-HD1500 by HD 50Mbps 4:2:2. The camcorder was tested for use with numerous lens types for different shooting angles, including fixed lens of 24, 32, 64, & 85mm. According to Kaljaruek, the testing period with Sony's latest equipment showed up many benefits to Kantana's production efforts. "The efficient production processes with Sony's equipment showed up many areas in time reduction which translated into cost savings, especially when our daily operations stretch from 7am to 10pm! The increased storage capacity also meant that less back-up equipment was needed.

### **Clear reduction in manpower & equipment costs**

"It was clear to us after the testing period that the adoption of Sony's equipment in our studios meant reduction in extra equipment, storage, and manpower, and this is a direct correlation to our bottom line results in the long term," he added.

Sony Thailand's Business & Professional Country Manager, Mr Piyathat Sombatsiri, said that Sony's technology allowed filming in low light, cutting down the number of Kantana crew deployed at each shoot. Previously, the lighting crew comprised 10 persons. But with the PMW-EX3's low light capabilities, Kantana now needs only five for the lighting crew. Sony's equipment was even 3D tested as the popularity of 3D films increases and Kantana making great progress in attracting a greater volume of work in this area. Kantana's decision to use Sony equipment for camera and production work came after neutral and fair comparisons with other similar brands. After weighing the various options, cost benefits and value-adds, the superiority of Sony's products shone above the rest.

"Kantana believes that Sony, being a leader in cutting edge video camcorder and production technology, is the ideal partner for us in our aim of exceeding the expectations of the 21st century film enthusiast," says Kaljaruek.



PMW-350 Series, PMW-320 Series, PMW-EX3  
and PMW-EX1R are produced at Sony EMCS  
Kosai Tec, which has received the ISO14001  
Environmental Management Certification.



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