

**SONY**<sup>®</sup>

**MSW-2000 Series**

**MPEG IMX**<sup>™</sup>

**MPEG**

MPEG IMX VTRs



# Migration path to the MPEG World



MPEG IMX Camcorder



Betacam SX Camcorders



Digital Betacam Camcorders

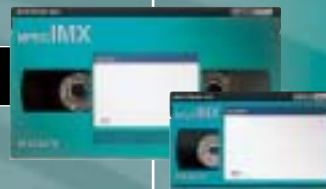


Betacam SP Camcorders



DVCAM Camcorders

MPEG IMX  
Small and Large Cassette



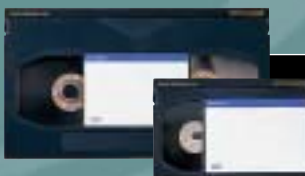
Betacam SX  
Small and Large Cassette



Digital Betacam  
Small and Large Cassette



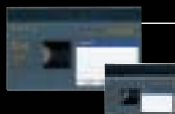
Betacam SP  
Small and Large Cassette



Betacam  
Small and Large Cassette



DVCAM  
Mini and Standard Cassette





## Realize an end-to-end MPEG environment with Sony's MSW-2000 Series MPEG IMX™ Studio Editing VTRs

As the industry heads toward a digital networked broadcasting environment, broadcasters are becoming increasingly aware of the significant benefits of consistent MPEG compression throughout the entire production process. MPEG-2, an ideal standard for DTV distribution because of its quality, cost-effectiveness, and efficiency in transmission, is the strategic choice among the various compression schemes. It offers bit-rate flexibility and upward/downward scalability with a variety of profiles and levels and, as broadcasters have identified the need for systems based on open compression, open interface standards and migration paths to mixed AV and IT environments, MPEG-2 is an ideal choice for the future.

Sony's response to this is the MSW-2000 Series of MPEG IMX VTRs, operating on MPEG-2 4:2:2 P@ML at 50 Mb/s, I-frame-only compression. This family of VTRs offers three studio recorders and one player, each optimized for environments where picture quality and operability are prime concerns.

A distinct advantage of these VTRs is the powerful legacy playback capabilities of Sony standard-definition 1/2-inch tape formats\*. This not only protects vast quantities of archive material but also allows continued use of those all-important acquisition tools, for a smooth migration path to an open MPEG environment.

Equally important, the MSW-2000 Series is built around industry-common, open interfaces that pave the way into an interoperable, networked world. The SDTI-CP interface standard, agreed to by many different prominent manufacturers, broadens the choice of how to migrate to the end-to-end MPEG environment. A network interface option brings linear tape assets into a file-based, networked domain by combining current AV and future IT worlds into one.

With MPEG IMX VTRs, Sony provides powerful tools to migrate into an open MPEG environment for the digital AV and IT of the future, while protecting past investments.

\*Playback-compatible formats vary by product.

# MPEG

# MPEG World



MSW-M2000



MSW-M2100

*SDTI-CP*

## MSW-2000 Series VTRs

	Model Name	REC		PLAY			
		MPEG IMX	MPEG IMX	Digital BETACAM	BETACAM SX	BETACAM SP	BETACAM
Recorder	MSW-M2000/M2000P	●	●	●	●	●	●
	MSW-A2000/A2000P	●	●	—	●	●	●
	MSW-2000	●	●	—	●	—	—
Player	MSW-M2100/M2100P	—	●	●	●	●	●

*MXF File  
Ether*



DNW-A75

**Betacam SX Studio Editing VTRs**  
(DNW-A75/A75P, A65/A65P, 75/75P, 65/65P)  
With the optional BKNW-124 SDTI-CP Output Board, SDTI-CP output is available for the following:



Betacam SX  
(A75/A75P, A65/A65P, 75/75P, 65/65P)



Betacam SP  
(A75/A75P, A65/A65P)



Betacam  
(A75/A75P, A65/A65P)



DVCAM



Consumer DV  
(SP & LP mode)



DVCPRD  
(25 Mb/s)



DSR-2000

**DSR-2000/2000P DVCAM Studio Editing Recorder**  
With the optional DSBK-210 SDTI-CP Output Board, SDTI-CP output is available for the following:



With Netu  
B

Id

### SDTI-CP Equipped Devices



**MAV-555A**  
Multi Access Video Disk Recorder



**MAV-2000**  
Multi Access Video and Audio Server



**MAV-70XGI**  
Transmission Server



**DNE-2000**  
Nonlinear Editor



**DMW-501NL**  
SDTV Nonlinear Production System



Other manufacturers' NLE with SDTI-CP I/O



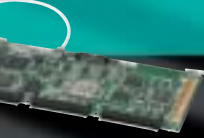
**MSB-2000**  
Multi-format Stream Bridge



**BDX-N1000**  
Network Interface Unit



Other manufacturers' servers with SDTI-CP I/O



**e-VTR**

With Network interface Board  
BKMW-E2000



Media Asset Management System



Non-linear Editor



Server



PC

### MXF-Compatible Devices

# Main Features

## ■ MPEG-2 4:2:2P@ML 50 Mb/s, I-frame Compression

MSW-2000 Series VTRs employ 8-bit 4:2:2P@ML component video sampling and MPEG-2 4:2:2 P@ML data compression at 50 Mb/s, I-frame only, thus offering superb picture quality and editing performance.

## ■ MPEG Bit Stream Data Over SDTI-CP

SDTI-CP (Serial Digital Transport Interface-Content Packages) is an industry-standard interface that is defined by SMPTE 326M. With SDTI-CP, an MPEG elementary stream output can be openly interfaced to compatible products without signal deterioration. There are a number of SDTI-CP equipped nonlinear editors and servers available from leading manufacturers as well as Sony, giving the widest possible choice.

## ■ Powerful Legacy Playback Capability

One significant feature of MPEG IMX VTRs is the legacy playback capability to replay all of Sony's Digital Betacam and Betacam SX to analog Betacam SP and Betacam 1/2-inch SD formats. This not only protects legacy analog libraries, but also protects ongoing analog acquisition. This feature makes these VTRs an ideal solution for migrating from analog to a digital, MPEG-based environment.

## ■ High-Speed Data Transfer

As a standard feature, MSW-2000 Series VTRs\* enable the MPEG elementary stream to be transferred at twice-normal playback speed\*\*. This is an effective feature when integrating an MSW-2000 Series VTRs into a production system using the SDTI-CP interface - for example, the Sony XPRI™ nonlinear editor or Sony MAV-555A server - since material can be digitized at twice-normal playback speed and virtually without signal degradation.

*\*Only the MSW-2000 model requires an optional part. Please contact your nearest Sony office.*

*\*\*Transfer at twice-normal playback speed is available only when playing back an MPEG IMX cassette.*

## ■ IP-Network Interface

Installing the optional plug-in board BKMW-E2000 allows the MSW-2000 Series VTRs to send and receive video and audio material as files, via a common network interface.

## ■ High-Definition Up-Conversion Output

Another interface option, the BKMW-104 up-conversion board, allows 1080/59.94i and 720/59.94P output from the playback (off-tape) signals of standard-definition 1/2-inch formats\*, including Betacam, Betacam SP, Betacam SX, and Digital Betacam as well as MPEG IMX cassettes. This option enables smooth migration to future HDTV operations.

*\*Playback-compatible formats vary by product.*

## ■ Compact Body Design

MSW-2000 Series VTRs feature a compact 4U design\* and weigh only 23 kg (50 lb 11 oz) – 12 kg (approx. 26 lb) lighter than the DVW-A500 Digital Betacam VTR.

*\*427 x 174 x 544 mm (16 7/8 x 6 7/8 x 21 1/2 inches)*

## ■ Elegant Front-Panel Design

These VTRs offer two major front-panel design innovations, while keeping knobs and buttons in their familiar positions. A clear, multi-function display provides comprehensive information, allowing quick access and easy control of a variety of functions. Additionally, dedicated control knobs are included for each of the eight, independently editable audio channels.

## ■ High-Quality Digital Audio

MSW-2000 Series VTRs provide eight channels of independently editable, 16-bit audio as standard. They can also be switched to provide four channels of 24-bit digital audio.

## ■ Long Recording and Playback Times

These VTRs provide long recording and playback times.

■ 184 (525)/220 (625) minutes using an L cassette

■ 60 (525)/71 (625) minutes using an S cassette

## ■ 525/60, 625/50 Switchable Operation

MSW-2000 Series VTRs offer 525/625 switchable operation for all playback-compatible 1/2-inch formats.

*\*For playback of 625-line Betacam and Betacam SP tapes in 525 machines and vice versa, the video outputs are for monitoring purpose only.*

## ■ Versatile Interfaces

These VTRs are equipped with a wide range of interfaces including SDI, SDTI-CP, analog component/composite, and analog/digital audio. This versatility allows the MSW-2000 Series VTRs to be easily integrated into a variety of systems. By adding the optional BKMW-104 board, HD-SDI output is also available. The optional BKMW-E2000 board further adds an IP-network interface.

*\*Either the BKMW-104 or BKMW-E2000 can be installed in the VTR.*

### Standard

- Analog composite I/O\*
- Analog component I/O\*
- SDI I/O\*
- SDTI-CP I/O\*
- Analog audio I/O\* (4 ch)
- AES/EBU audio I/O\* (16-bit – 8 ch/24-bit – 4 ch)
- Audio monitor output (2 ch)
- Time code I/O\*
- RS-422A (Sony 9-pin Remote)
- RS-232C
- Parallel 50-pin (standard)

*\*The MSW-M2100/M2100P player provides outputs only.*

### Option

- HD-SDI output (requires the optional BKMW-104)
- Ethernet (requires the optional BKMW-E2000)

# Operational Features

## ■ Frame-Accurate Insert/Assemble Editing (Recorders Only)

MSW-2000 Series recorders enable insert and assemble editing with  $\pm 0$  frame accuracy. This allows precise editing on MPEG IMX tape in machine-to-machine or A/B-roll configurations.

## ■ Pre-read Editing Capability (Recorders Only)

These recorders are equipped with advanced playback heads to enable pre-read editing. This function allows applications that require titling with a single VTR or A/B-roll with two VTRs, as well as audio mixing and channel swapping.

## ■ Variable Speed Control

- Digital Betacam tape: -1 to +3 times
- MPEG IMX tape: -1 to +3 times
- Betacam SX tape: -1 to +2 times
- Betacam SP tape: -1 to +3 times
- Betacam tape: -1 to +3 times

*With noiseless image and digital jog sound. Figures are relative to normal play speed.*

## ■ High-Speed Picture Search

- Digital Betacam tape:  $\pm 50$  times
- MPEG IMX tape:  $\pm 78$  times
- Betacam SX tape:  $\pm 78$  times
- Betacam SP tape:  $\pm 35(525)/\pm 42(625)$  times
- Betacam tape:  $\pm 35(525)/\pm 42(625)$  times

*Figures are relative to normal play speed.*

## ■ DMC Capability

Equipped with Dynamic Motion Control, this VTR provides slow-motion playback from its control panel or from external controllers such as Sony BVE Series Editors or the DTR-3000 Slow Motion Controller.

## ■ Audio Jog Sound

Complete reproduction of eight channels (four channels when playing back Digital Betacam and Betacam SX cassettes) of digital audio is maintained, from normal play speed forward to normal play speed in reverse, in Jog mode. This feature is helpful in quickly and precisely establishing an editing point while monitoring the digital audio signals, which remain in absolute sync with the pictures.

## ■ Optional Remote Control Panel

Using the optional control panel BKMW-101, these VTRs can be controlled simultaneously from the same control panel.

## MPEG IMX Format

General	Tape width Tape material Recording/Playback time Tape speed Track pitch Tracks per frame Longitudinal tracks	12.65 mm (1/2-inch) Metal particle tape Max. 184 (525)/220 (625) min with L-cassette 64.467 (525)/53.776 (625) mm/s 21.7 $\mu$ m 8 tracks/frame Time code/Control
Video	Compression Video bit rate Active lines per frame Sampling frequency Quantization Error correction	MPEG-2 4:2:2P@ML, Intra frame coding (ISO/IEC 13818-2000) 50 Mb/s 512 (525)/608 (625) Y: 13.5 MHz, R-Y/B-Y: 6.75 MHz 8 bits/sample Reed-Solomon
Audio	Compression Sampling frequency Quantization  Data recording capability Error correction	None 48 kHz Selectable, 16 bits/sample (8 channels) or 24 bits/sample (4 channels) Yes Reed-Solomon



# e-VTR Features

## e-VTR: Network-Enabled VTR



The e-VTR consists of an MSW-2000 Series VTR and optional BKMW-E2000 plug-in network board, enabling integration into a common Ethernet network environment.

The e-VTR can send and receive video and audio signals as files through any IP network.

The MXF file format, a proposed SMPTE standard, is used for the exchange of video, audio and metadata across the network.

The e-VTR provides the following features:

### ■ MXF Output from All 1/2-Inch Tape SD Formats

Material in any format replayable on the e-VTR can be converted to an MXF file and transferred to other MXF-based equipment through the network.

### ■ Asynchronous File Transfer over a Network

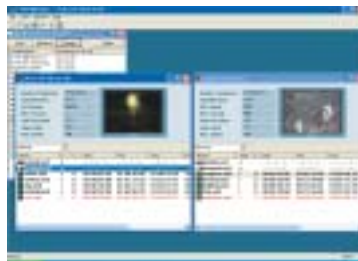
The e-VTR uses TCP/IP and FTP protocols to transfer MXF files over the network. And with its synchronous transfer speed, the e-VTR can transfer files at up to twice-normal playback speed.

### ■ Industry-Standard Network Interfaces and Protocols

The e-VTR is equipped with a wide range of computer protocols and interfaces including TCP/IP, FTP, UDP, HTTP, SNMP, and 1000/100/10-Base Ethernet interfaces.

### ■ Simple e-VTR Control Using Supplied e-VTR Manager Software

Supplied e-VTR Manager software allows the user to easily operate e-VTRs on the network. Easy-to-use GUI screens enable straightforward operation, whether the e-VTR is used in a simple peer-to-peer configuration or in a large-scale client/server network environment.



### ■ Content-Browsing Function

Operators can browse materials of any recording format played from any e-VTR on the network as low-rate data via the GUI.



### ■ Remote Monitoring of VTR Status

The e-VTR automatically generates HTML files that indicate VTR status and file attributes, allowing operators to view VTR status via a standard web browser running on a PC. The e-VTR also supports SNMP, allowing remote VTR maintenance.

### ■ Transfer of Metadata

The e-VTR can transfer metadata together with the video and audio essence by wrapping this information in the MXF file.

### ■ Use of Existing Networks

Connecting just a few e-VTRs together via an existing network can bring many new benefits to operational workflow.

# Optional Accessories



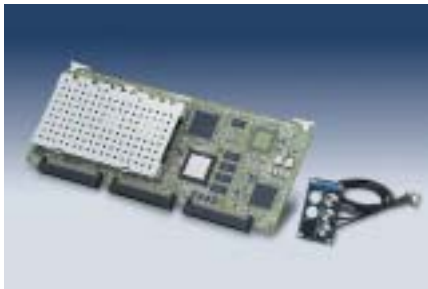
**BKMW-101**  
Remote Control Panel



**BKMW-102**  
Remote Control Unit



**BKMW-103**  
Control Panel Expansion Kit



**BKMW-104**  
HD Upconverter Board



**BKMW-E2000**  
Network Interface Board (for e-VTR)



**RCC-5G**  
Remote Cable



**RMM-131**  
Rack Mount Kit



**MLB-1M-100**  
Memory Label for Tele-File System



**JZ-1**  
Videocassette Logging Software for  
Tele-File System



**BZMW-5000/1000 Series**  
MMStation™/ISR™ Proxy  
Remote Monitoring and Maintenance  
Software



**BCT-6MX/12MX/22MX/32MX/60MX (Small)**  
**BCT-64MXL/94MXL/124MXL/184MXL (Large)**  
MPEG IMX Videocassettes

# Specifications

		MSW-M2000/M2000P, MSW-A2000/A2000P, MSW-2000 MPEG IMX Recorders	MSW-M2100/M2100P MPEG IMX Players
<b>General</b>			
Power requirements		AC 100 V to 240 V, 50/60 Hz	
Power consumption		2A (200 W)/AC 240 V	
Operating temperature		+41 °F to +104 °F (+5 °C to +40 °C)	
Storage temperature		-4 °F to +140 °F (-20 °C to +60 °C)	
Humidity		20% to 90% (relative humidity)	
Weight		50 lb 11 oz (23.0 kg)	
Dimensions (W x H x D)		16 7/8 x 6 7/8 x 21 1/2 inches(427 x 174 x 544 mm)	
Tape speed	MPEG IMX	64.467(625)/53.776(625) mm/s	
	Digital BETACAM	96.7 mm/s (MSW-M2000/M2000P/M2100/M2100P)	
	BETACAM SX	59.515 (525)/59.575 (625) mm/s	
	BETACAM/BETACAM SP	118.6 (525)/101.51 (625) mm/s (except MSW-2000)	
Playback time (MPEG IMX)		Max. 184 (525)/220 (625) min with BCT-184MXL cassette	
Fast forward/rewind time		Approx. 3.5 min with BCT-184MXL cassette	
Search speed range	MPEG IMX	±78 times normal playback speed	
	Digital BETACAM	±50 times normal playback speed (MSW-M2000/M2000P/M2100/M2100P)	
	BETACAM SX	±78 times normal playback speed	
	BETACAM/BETACAM SP	±35 (525)/±42 (625) times normal playback speed (except MSW-2000)	
Servo lock time		0.5 (525)/0.7 (625) s or less (from standby on)	
Load/unload time		6 sec or less	
<b>Output signals</b>			
Analog composite input		BNC (x2, including one loop through output), 1.0 Vp-p, 75 Ω, sync negative	—
Analog composite output		BNC (x3, including one character out), 1.0 Vp-p, 75 Ω, sync negative	
Analog component input		BNC (x3, for 1 set, Y/R-Y/B-Y): 1.0 Vp-p, 75 Ω, sync negative, R-Y/B-Y: 0.7 Vp-p, 75 Ω	—
Analog component output		BNC (x3, for 1 set, Y/R-Y/B-Y): 1.0 Vp-p, 75 Ω, sync negative, R-Y/B-Y: 0.7 Vp-p, 75 Ω	
SDI input		BNC (x2, including one active through out), SMPTE 259M (ITU-R BT.656-3), 270 Mb/s	—
SDI output		BNC (x3, including one character out), SMPTE 259M (ITU-R BT.656-3), 270 Mb/s	
SDTI-CP input		BNC (x1), SMPTE 326M (SDTI-CP)	
SDTI-CP output		BNC (x2), SMPTE 326M (SDTI-CP)	
HD-SDI output (option)		BNC (x3)	
Analog audio input		XLR (x4) (4CH: channel selectable)	
Analog audio output		XLR (x4) (4CH: channel selectable)	
Cue audio output		XLR (x1, only Digital Betacam playback) (MSW-M2000/M2000P/M2100/M2100P)	
Digital audio input (CH 1/2, 3/4, 5/6, 7/8), AES/EBU		BNC (x4), default 48 kHz (32 to 48 kHz with Sample Rate converter), Complies with AES-3id-1995	—
Digital audio output (CH 1/2, 3/4, 5/6, 7/8), AES/EBU		BNC (x4), 48 kHz fixed, Complies with AES-3id-1995	
Remote control	Remote (RS-422A)	D-sub 9-pin (x2), Sony 9-pin remote interface	
	RS-232C (ISR*)	D-sub 9-pin (x1), RS-232C interface	
	Parallel Remote	D-sub 50-pin (x1)	
	Video control (1)	D-sub 50-pin (x1)	
	Control Panel	Circular connector 10-pin	
Time code input		XLR (x1)	—
Time code output		XLR (x1)	
Memory card insertion slot		"Memory Stick" <sup>™</sup> (x1), PCMCIA (x1)	
Monitor output L/R		XLR (x2) (channel selectable)	
Phones		JM-60 Stereo phone jack	
<b>Processor adjustment range</b>			
Video level		±3 dB/ -∞ to 3 dB selectable	
Chroma level		±3 dB/ -∞ to 3 dB selectable	
Set up/Black level		±30 IRE/±210 mV	
Chroma phase/hue		±30°	
System sync phase		±15 μs	
System SC phase		±200 ns	
Y/C delay		±100 ns (BETACAM/BETACAM SP playback only)	
Composite input level		±3 dB	—
<b>Digital video performance</b>			
Sampling frequency		Y: 13.5 MHz, R-Y/B-Y: 6.75 MHz	
Quantization	MPEG IMX/BETACAM SX: 8 bits/sample	Digital BETACAM: 10 bits/sample (MSW-M2000/M2000P/M2100/M2100P)	
Error correction		Reed-Solomon code	
Digital input to analog component output		D/A quantization: 10 bits/sample Bandwidth: 0 to 5.75 MHz ±0.5 dB S/N ratio: 56 dB or more K-factor (2T pulse): 1% or less	
Analog component input to analog component output (MPEG IMX record/playback)		A/D and D/A quantization: 10 bits/sample Bandwidth: Y: 0 to 5.75 MHz +0.5/-2.0 dB, R-Y/B-Y: 0 to 2.75 MHz +0.5/-2.0 dB S/N ratio: 56 dB or more K-factor (2T pulse): 1% or less LF non-linearity: 3.0% or less	
Analog composite input to analog composite output (MPEG IMX record/playback)		A/D and D/A quantization: 10 bits/sample Bandwidth: 0 to 5.75 MHz +0.5/-2.0 dB S/N ratio: 53 dB or more Differential gain: 2% or less Differential phase: 2° or less Y/C delay: 20 ns or less K-factor (2T pulse): 1% or less	
<b>Digital audio performance</b>			
Sampling frequency		48 kHz (synchronized with video)	
Quantization		MPEG IMX: 16 or 24 bits/sample (selectable)	
		Betacam SX: 16 bits/sample	
		Digital Betacam: 20 bits/sample (MSW-M2000/M2000P/M2100/M2100P)	
Analog input to analog output (MPEG IMX record/playback)		A/D and D/A quantization: 24 bits/sample Frequency response (0 dB at 1kHz): 20 Hz to 20 kHz +0.5/-1.0 dB Dynamic range (at 1 kHz, emphasis ON): More than 90 dB (16-bit mode), More than 95 dB (24-bit mode) Distortion (at 1 kHz, emphasis ON, reference level): Less than 0.05% Cross talk (at 1 kHz, between any two channels): Less than -80 dB Wow & flutter: Below measurable level	
Head room		20 dB (18 dB selectable)	
Emphasis (ON/OFF selectable in REC mode)		T1=50 μs, T2=15 μs	
<b>Supplied accessories</b>			
		PSW 4x16 Rack Mount Screw (x4), Operation manual (x1), Installation manual (x1)	

\*ISR: Interactive Status Reporting

# SONY

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**SONY**

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