

SONY®

NTSC

BETACAM SX™

Betacam SX Camcorder

DNW-9WS

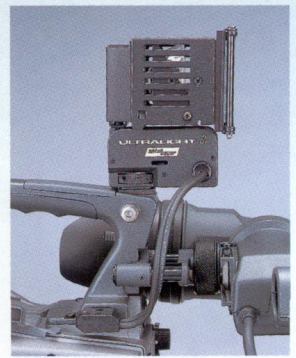


Lightweight and compact, the DNW-9WS is a professional camcorder designed for broadcast and professional video production. It features a 16.9/4.3 PowerHAD (Progressive High Definition) video system, which provides high resolution and sharp images. The camcorder also includes a built-in 1.8" LCD monitor, a 1/2" CCD sensor, and a 1000-line resolution. It is compatible with Betacam SX and Betacam SX Hi-Fi video formats. The DNW-9WS is a versatile and reliable camcorder for professional video production.

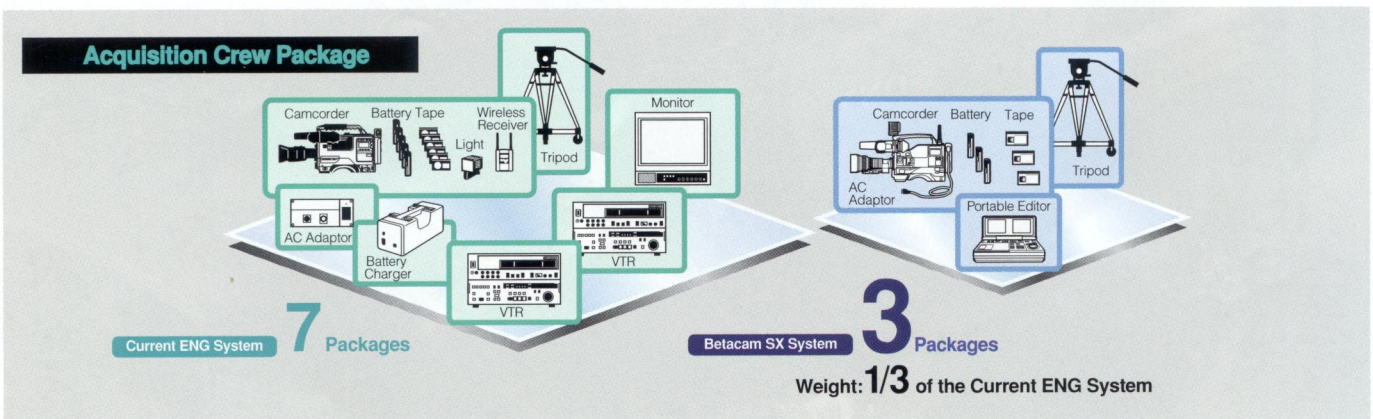
Features

The DNW-9WS is the newest member of the line-up of Betacam SX™ camcorders, equipped with 2/3-inch 520K switchable 16:9/4:3 Widescreen Power HAD™ 1000 IT CCDs. It incorporates 10-bit/36MHz full digital signal processing in the camera section and the superb picture quality of Betacam SX digital recording format in the VTR section. The DNW-9WS makes it easy and cost-effective to bridge the transition from the 4:3 world to the growing world of widescreen 16:9.

It is designed to bring both superior performance and high mobility into the field: the DNW-9WS weighs less than 6kg (13 lb 3oz) including battery, tape, viewfinder and lens. The DNW-9WS is not only shorter in overall length, it has a lower center of gravity for excellent balance—even better than the conventional Analog Betacam SP® camcorders. It also provides an integrated slot for an optional Wireless Microphone Receiver (Sony WRR-855A) and provides an internal driver for an automatic ENG Light System (Anton/Bauer Ultralight). So fewer pieces of equipment need to be carried into the field.



*Anton/Bauer Products may not be available in some countries.



16:9/4:3 Switchable

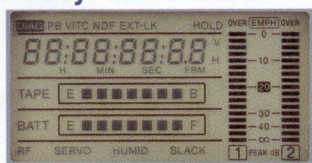
The DNW-9WS is equipped with 2/3-inch 520K Widescreen Power Had 1000 IT CCDs. It gives superior quality digital recording in both aspect ratios.

Low Acoustic Noise

A sophisticated noise barrier is incorporated in the VTR section to make camcorder operators more comfortable, and to prevent transport noise pickup by the onboard microphone during shooting.

Diagnostic Information for Easy Maintenance

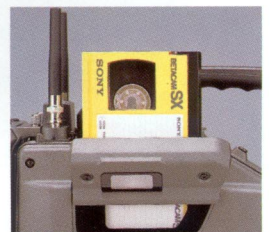
The DNW-9WS incorporates a sophisticated diagnostic system to detect malfunctions within the camcorder. Digital signal processing improves the ability to specify the precise location and



nature of a fault: camera faults are indicated by warning lights in the viewfinder, and VTR faults are indicated on the camcorder LCD display.

Redesigned Cassette Compartment

The cassette compartment does not pop up during cassette loading or ejecting, which helps to prevent damage to the cassette compartment mechanism. Cassettes are loaded vertically through a narrower entry that helps to keep out dust particles. The window on the cassette case has been repositioned, so it is easier for the operator to see how much tape is remaining.



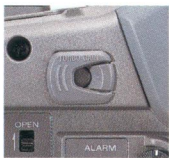
New Betacam SX Tape or Current Metal Particle Tape Can Be Used

Conventional Betacam SP metal particle tape (type BCT-MA or UVWT) can be used in the DNW-9WS, so tape is always readily available and, with the DNW-9WS, recording time is double the stated duration of the type BCT-MA and UVWT tapes. To achieve even higher performance and cost efficiency, a new Betacam SX tape has also been developed.



Turbo Gain: High Sensitivity

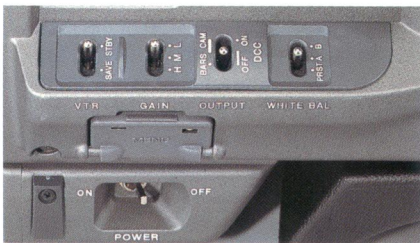
The Turbo Gain function of the DNW-9WS instantly raises the gain of the camera to +42dB at the touch of a button on the side of the camcorder, allowing immediate adaptation to extremely low light shooting conditions. By combining DPR Plus (Dual Pixel Readout Plus) technology with a conventional electronic gain-up function, a high signal-to-noise ratio is obtained with only a small loss of resolution in the Turbo Gain mode. The maximum gain level of the Turbo Gain mode is +36dB/+42dB selectable.



*DPR Plus: The technology which can gain four times normal sensitivity by reading out an electric charge of four adjoining CCD pixels.

Auto Tracing White Balance (ATW)

The DNW-9WS camcorder is equipped with Auto Tracing White Balance (ATW) capability which enables automatic adjustment of white balance according to the overall scene lighting conditions.



When lighting conditions change quickly—for example, moving from indoors to outdoors—white balance is quickly and automatically readjusted with this ATW function.

TruEye™ Process

In conventional RGB analog digital processing, some non-linear signal processing occurs after gamma correction, such as knee and white clip, and this can result in hue errors—a phenomenon that is particularly obvious in extreme highlight conditions. This significant problem is virtually eliminated by the TruEye process which manages video signal data according to three factors: brightness, hue, and saturation, so that color reproduction even with a very wide dynamic range approaches the faithfulness of the human eye. With this TruEye processing active, the factory preset value of the knee point (in the case of DCC OFF mode) is shifted from 98% to 85% for more faithful reproduction.

DynaLatitude™

Based on the TruEye system, the DNW-9WS further offers a unique new feature called DynaLatitude Function which adaptively manages the contrast of each pixel according to a histogram of video signal level distribution. DynaLatitude brings a new dimension to the technologies, such as Dynamic Contrast Control (DCC), that control the dynamic range of video signals. DynaLatitude optimizes the video level distribution to expand the limited dynamic range of the normal video signal. DynaLatitude is switchable in four steps: LOW, MID, HIGH, and OFF—via a menu control system and a graphic display in the viewfinder.

Optional Color Viewfinder

The DNW-9WS is equipped with a lightweight 2-inch monochrome viewfinder, the BVF-V20W, as a supplied accessory. It allows easy focusing even in 16:9 widescreen mode. There is also an optional 1.35-inch color viewfinder available, the BVF-VC10W, which allows color playback through the camcorder viewfinder without using an external adaptor. And when shooting, with the BVF-VC10W, objects are more clearly identifiable by their color.



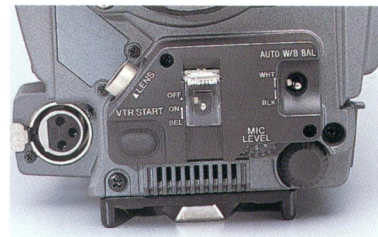
BVF-VC10W

Color Playback without an External Adaptor

The DNW-9WS allows color playback together with two audio channels without an external adaptor, making it easy to verify recording results and send recordings to the studio via microwave transmission. Recordings can also be reviewed in the camcorder viewfinder while monitoring audio via an earphone or the speaker built in to the side of the camcorder.

Variable Speed Electronic Shutter

In order to capture clear images of high-speed moving subjects without motion blur, the DNW-9WS has several shutter speeds available: 1/100, 1/125, 1/250, 1/500, 1/1000 and 1/2000 of a second.



Comprehensive Menu Control

Setup parameters are well organized in a two-layer menu system, categorized as User Menu and Engineer Menu. User Menus allow access to only the standard setup functions needed by operators. Engineer Menus allow access to all camcorder setup functions. Menu pages are visible in the camcorder viewfinder and may also be displayed on a monitor screen through video outputs. The setup control system is easily operated using a rotary encoder on the camcorder.



Setup Card for Uniform Camcorder Settings

The Betacam SX camcorder family allows all of the setup parameters for one complete camera setup to be stored on a removable Setup Card. These setup cards allow operators to set up this camcorder quickly, easily and accurately in the field. Several different camcorder settings can be stored and instantly recreated using separate Setup Cards prepared in the studio.



Setup Cards also aid in matching the setup of multiple camcorders, when shooting in several remote locations, or when there is a break between shooting assignments on a single story or production.

Features

Comprehensive LCD Display

The extensive LCD display on the DNW-9WS provides critical information on VTR operating status. Time Code, CTL and User-bit data, Tape Remaining and Battery Capacity are displayed via a bargraph meter. A digital audio peak meter allows precise adjustment of audio recording level.



Superimposed Camera ID on Color Bars

For easy confirmation of which camcorder was used for an individual recording, a camera ID can also be superimposed on color bars. The camera ID is set using the system control menu.

Fail-Safe Audio Recording

Through the VTR menu, four channels of audio can be assigned according to the user's needs. When Parallel mode is selected, the same signals are recorded by CH-1/CH-3 and CH-2/CH-4. In Separate mode, CH-3 automatically records the front microphone and CH-4 records the wireless microphone. This function ensures the microphone will not accidentally miss the audio recording; even when the external microphone is not connected, audio from the front microphone and the output of the wireless microphone will still be captured on audio channels 3 and 4.

Precision Audio Level Adjustment

The audio level of the front microphone can be easily and precisely adjusted by using the rotary switch located under the lens converter of the camcorder. Positioning the rotary switch in this location helps to prevent an operator's hands from accidentally touching the lens or entering the frame.

Stereo Audio Line Output (5-pin XLR)

The 5-pin XLR connector on the DNW-9WS carries two audio output channels. Either CH-1/2 or CH-3/4 can be selected through the VTR menu.



User-Friendly Controls

The DNW-9WS is carefully designed for simple operation. Switches are located in similar positions on both Betacam SX and Betacam SP camcorders, so operators accustomed to using Sony analog equipment will immediately find these new digital camcorders to be familiar and easy to use.

Lithium-Ion Battery

Lithium-ion batteries provide higher capacity in a smaller, lighter size than the previously available battery technologies. The DNW-9WS will operate for more than 165 minutes using a fully charged BP-L90 Lithium-ion Battery. If the smaller BP-L60 Lithium-ion Batteries are used, 110 minutes of recording can be achieved. (For improved balance especially when larger lenses are used, use of the BP-L90 is recommended). Lithium-ion batteries can be attached directly to the camcorder using the V-shoe attachment which facilitates quick, easy battery changes.



With optional adaptors, current NP-1B and BP-90A Ni-Cd batteries can also be used, allowing users to take advantage of existing battery and charging equipment for greater system flexibility.

New AC Adaptor

The optional new AC-DN1 AC Adaptor attaches directly to the DNW-9WS to provide uninterrupted power to shoot special events or extended conference sessions. The AC-DN1 can also be used to slow charge the lithium-ion batteries in an emergency.



Test Output

The DNW-9WS incorporates a test output port, providing composite video, red, green or blue signals for camera testing.



Shot Data and Shot Markers

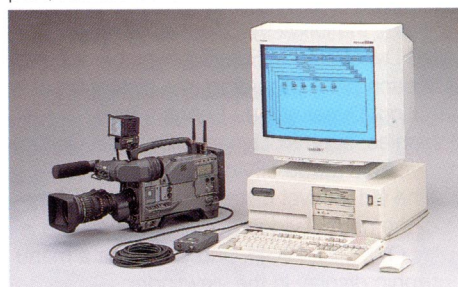
The DNW-9WS allows the operator to record shooting data on tape. Data such as Date, Time, Camera ID, Cassette Number and Shot Number can all be recorded during the shooting process. Shot Data can be used to quickly retrieve materials during editing. Furthermore, the DNW-9WS provides an innovative function to speed up the editing process: the ability to identify good takes while shooting in the field. A REC. Start Marker is automatically placed on the tape each time the VTR Start button is pressed while the VTR is in standby mode. A Good-Shot Marker can be added at any time by pressing the RETURN button on the side of the lens while in recording mode. When tapes are played back using the DNW-A100/A50/A45 Hybrid Recorders, these markers will appear highlighted as picture stamps on the GUI of the Sony Non-linear Editors. Using picture stamps helps to eliminate tedious searching through recorded material, and saves hard disk space by downloading only the scenes selected by editors. Picture stamp data recorded by the DNW-9WS can be used effectively throughout the broadcast newsroom operation from acquisition to archiving.

Multiple Tally Functions

In addition to tally functions on the front and back of the camcorder, the DNW-9WS has a camera tally on the viewfinder at the side of the eyepad, so the operator can see if the tally is on even when looking into the viewfinder from a distance.

PC Setup and Remote Control

For GUI-based remote control of camcorder setup, the BZP-100 Camera Setup Unit can be connected to the DNW-9WS via the 6-pin remote interface. The Sony Interactive Status Reporting (ISR) feature is also incorporated into the BZP-100. Furthermore, by connecting a RM-P9 Remote Control Unit via the 6-pin remote port, remote control of the basic function and adjustments of the DNW-9WS can be accomplished.



New

CA-702 Camcorder Adaptor

External Input and Analog Component/SDI Output Capability

The optional CA-702 Camcorder Adaptor can be attached to the DNW-9WS (as well as the other Betacam SX Camcorders) via a camcorder's built-in 40-pin connector. With this adaptor fitted, the Betacam SX camcorders can record an external analog composite or SDI input signal. The CA-702 also has 26-pin output connector to feed an analog component signal and BNC output connector to feed a SDI signal to an external VTR. Through this connector, the camera signal can be recorded with a BVW-50 Betacam SP portable VTR or DVW-250 Digital Betacam™ portable VTR. This feature has many application in the field acquisition.

General	Power consumption:	MAX. 5.5W
	Mass:	Approx. 0.9kg(2 lb)
	Dimensions (W/H/D):	165x195x65mm(6 ¹ / ₂ x7 ³ / ₄ x2 ⁵ / ₁₆ inches)
Connectors	DC IN:	XLR 4-pin
	DC OUT:	4-pin
	SDI/Composite IN:	BNC (x1)
	SDI OUT:	BNC (x1)
	EARPHONE:	Mini-jack
	VTR:	CCZ 26-pin
Supplied accessories	Operation manual (1)	
	Maintenance manual (1)	



CA-701 Camcorder Adaptor

4-Channel Audio Input and SDI Output Capability

The optional CA-701 Camcorder Adaptor can be attached to the DNW-9WS via the camcorder's built-in 40-pin connector, enabling simultaneous 4-channel audio recording by providing access to audio channels 3 and 4. In addition, two SDI outputs are provided, allowing direct connection to the other digital equipment via a single coaxial cable. Full component digital signals to standard CCIR-601 are available.

General	Power requirements:	Approx. DC 12V +5.0V/-1.0V
	Power consumption:	Approx. 7W
	Operating temperature:	0°C to +40°C (+32°F to +104°F)
	Storage temperature:	-20°C to +60°C (-4°F to +140°F)
	Humidity:	25% to 85% (relative humidity)
	Mass:	Approx. 1.0kg (2 lb 3 oz)
	Dimensions (W/H/D):	157x195x65mm(6 ¹ / ₈ x7 ³ / ₄ x2 ⁵ / ₁₆ inches)
Connectors	AUDIO IN:	XLR-3-31 type (x2)
	AUDIO OUT:	XLR 5-pin male (stereo)
	DC IN:	XLR 4-pin male, 11 to 17V
	DC OUT:	4-pin, 11 to 17V, max. 0.1A
	HEADPHONE:	Stereo standard phone jack
	SDI OUT:	BNC (x2), 0.8Vp-p, 75Ω
	CAMERA:	40-pin (DNW-7/9WS/90/90WS)
Supplied accessories	Operation manual (1)	
	Maintenance manual (1)	

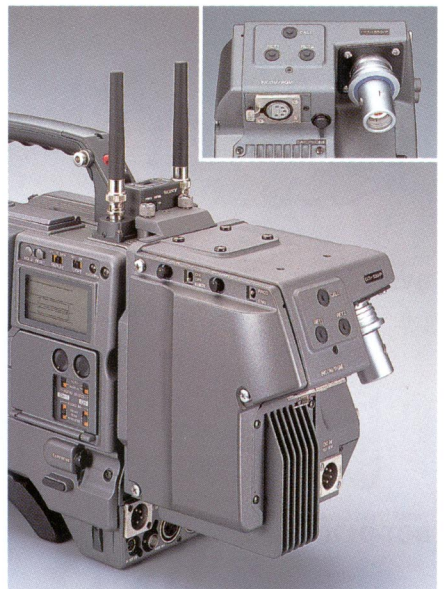


CA-755 Camcorder Adaptor

Studio Camera Integration with Triax System

The DNW-9WS Betacam SX camcorder can be easily integrated into a studio setup with other portable cameras using a Triax system. The optional CA-755 Camera Adaptor can be directly attached via the built-in 40-pin connector; precise camera setup parameters such as gamma, detail, iris control, electronic shutter on/off, shutter speed, etc., can then be remotely controlled from the CCU-550 Camera Control Unit or from a Remote Control Panel attached to the CCU-550.

General	Power consumption:	Approx. 13W
	Mass:	Approx. 1.9kg (4 lb 3 oz)
	Dimensions (W/H/D):	145X185.3X167mm(5 ⁷ / ₁₆ x7 ³ / ₈ x6 ⁷ / ₁₆ inches)
Connectors	DC IN:	XLR 4-pin, 11.5V to 17V
	RET OUT:	BNC (x1), 1.0Vp-p, 75Ω
	RETURN CONTROL:	6-pin
	EARPHONE:	Mini-jack, 8Ω
	CAMERA:	40-pin (DNW-7/9WS/90/90WS)
	CCU:	KINGS type
	INCOM/PGM:	Headset XLR 5-pin
Supplied accessories	Operation manual (1)	
	Maintenance manual (1)	
	Cable clamp (1)	
	M3/M4 screws for cable clamp (2x2)	
Optional accessories	Extention board EX-454	



Optional Accessories



Setup Card
(Package of four Setup Cards and a soft case)
BSC-1-Pack



Rechargeable Lithium-ion Battery
BP-L90A



Rechargeable Lithium-ion Battery
BP-L60A



Battery Case for an optional BP-90A NiCd Battery
DC-L90



Battery Case for an optional NP-1B NiCd Battery
DC-L1



Battery Charger for four BP-L60 and BP-L90 Batteries
BC-L100



Battery Charger for four BP-90A and four NP-1B Batteries
BC-410



Battery Charger for four NP-1B Batteries
BC-1WD



AC Adapter
AC-DN1



AC Adapter
AC-550



Slot-in Wireless Microphone Receiver
WRR-855A



Interface Box
VA-DN1



Remote Control Unit
RM-P9



Camera Control Unit
CCU-550



5-inch Viewfinder
BVF-55



Return Video Selector
CAC-6



Tripod Adapter
VCT-14



Viewfinder Rotation Bracket
BKW-401



Viewfinder Eye-piece
High magnification : **A-8262-537-A**
Low magnification : **A-8262-538-A**
Standard magnification with special
compensation for aberrations : **A-8267-737-A**



Viewfinder Eye-piece
(High performance (x3)): **A-8314-798-A**



1.35-inch 16:9 Color Viewfinder
BVF-VC10W



1.5-inch 4:3 B/W Viewfinder
BVF-V10
(supplied with DNW-9WS/90WS)



2.0-inch 16:9 B/W Viewfinder
BVF-V20W
(supplied with DNW-9WS/90WS)



Carrying Case
LC-DN7



Video Head Cleaning Cassette
BCT-D12CL



Video Head Cleaning Cassette
BCT-5CLN



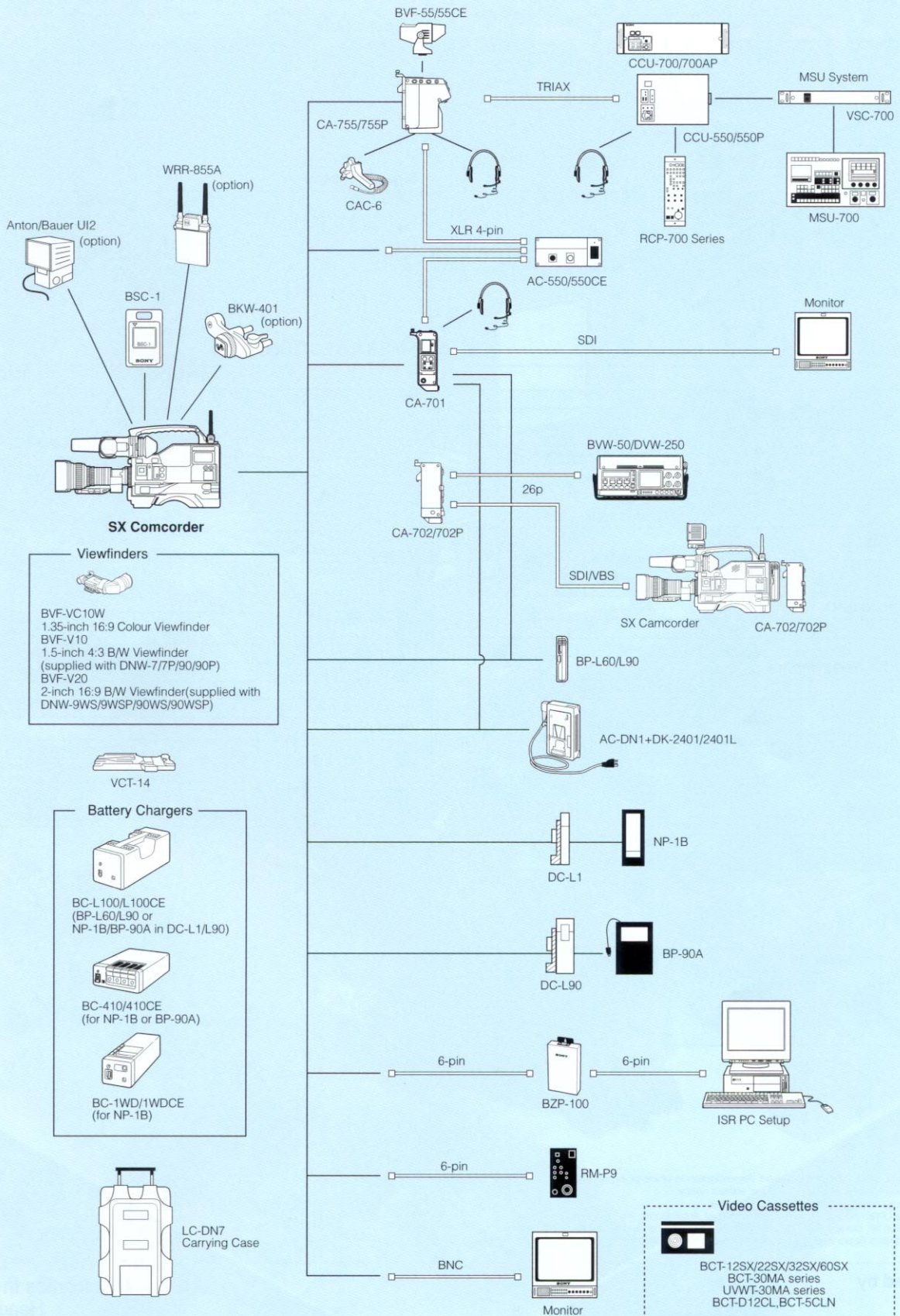
Betacam SX Video Cassette
BCT-12SX/22SX/32SX/60SX

Rain Cover
3-191-064-01

WRR Attachment Adapter
A-8278-057-A

Sony Audio Cable
CCXA-53M

System Configuration



Specifications

DNW-9WS

General		Signal inputs	
Mass	Approx. 4.0Kg (8 lb 13 oz)	Genlock video	BNC (x1), 1.0Vp-p, 75Ω
Operating weight	Approx. 6.0Kg (13 lb 3 oz)	Time code input	BNC (x1), 0.5 to 18Vp-p, 10kΩ
Power requirements	DC 12V +5.0V/-1.0V	Audio (CH-1/2)	XLR-3-pin female (x2), -60dBu/+4dBu selectable, high impedance, balanced
Power consumption	31.5W	Mic	XLR-3-pin female (x1), -60dBu with an external power supply system
Operating temperature	0°C to +40°C (+32°F to +104°F)		
Storage temperature	-20°C to +60°C (-4°F to +140°F)		
Humidity	25% to 85% (relative humidity)		
Continuous operating time	Approx. 110 min. (with BP-L60) Approx. 165 min. (with BP-L90)		
Others		Signal outputs	
Lens	12-pin	Video output	BNC (x1), 1.0Vp-p, 75Ω, sync negative
Remote	6-pin	Video test output	BNC (x1), 1.0Vp-p, 75Ω, sync negative
Light	2-pin, DC 12V, max. 30W	Time code output	BNC (x1), 1.0Vp-p, 75Ω
DC input	XLR 4-pin (for the optional AC-550)	Earphone	Mini-jack
DC output	4-pin (for wireless microphone receiver), DC 12V	Audio output	XLR 5-pin male (stereo)

VTR SECTION

General	
Recording format	Betacam SX
Tape speed	59.575mm/s
Playback/Recording time	Max. 60 min. with BCT-60SX cassette
Fast forward time	Approx. 5.5 min. with BCT-60SX
Rewind time	Approx. 5 min. with BCT-60SX
Recommended tape	Sony Betacam SX cassette (BCT-60SX series) Sony Betacam SP cassette (BCT-30MA series/UWV-30MA series)
Sampling frequency	Y : 13.5MHz R-Y/B-Y : 6.75MHz
Quantization	8bits/sample
Error correction	Reed-solomon code
Video performance	
K-factor (2T pulse)	1% or less
Y/R-Y/B-Y delay	15ns or less
Digital audio performance	
Sampling frequency	48kHz (synchronized with video)
Quantization	16bits/sample
Frequency response	20Hz to 20kHz +0.5dB/-1.0dB
Dynamic range (emphasis ON)	More than 85dB
Distortion (at 1kHz, emphasis ON, reference level)	Less than 0.08%
Cross talk (at 1kHz, reference level)	Less than -70dB
Wow & flutter	Below measurable limit
Head room	20dB
Emphasis (ON/OFF selectable)	T1=50μS, T2=15μS

*The specifications given above were measured by CA-701.

CAMERA SECTION

	16:9MODE	4:3MODE
Pickup device	3-chip 2/3-inch Power HAD 1000 16:9 Widescreen IT CCD	
Picture elements	1038 (H) x 504 (V)	
Optical system	F1.4 prism system	
Built-in filters	1: CLEAR 2:5600K+1/8ND 3:5600K 4:5600K+1/64ND	
Shutter speed	1/100, 1/125, 1/250, 1/500, 1/1000, 1/2000 (s)	
Clear scan	CLS:60.1 to 7000Hz (260 steps)	
Lens mount	Special bayonet mount	
Sensitivity (2000lx, 89.9% reflective)	F9 (Typical)	
Minimum illumination	Approx. 0.35lx (F1.4 lens, +42dB Turbo Gain)	
Video S/N ratio (typical)	63dB	
Vertical resolution	(without EVS) 400 TV lines (with EVS) 450 TV lines	
Registration	0.05% (all zones, without lens)	
Geometric distortion	Below measurable level (without lens)	
Warm-up time	2 sec.	
Modulation depth at 5MHz	70% (Typical)	55% (Typical)
Viewfinder		
CRT	2-inch monochrome	
Controls	BRIGHT control, CONTRAST control, PEAKING control, TALLY, ZEBRA, DISPLAY switches	
Horizontal resolution	450 TV Lines	600 TV Lines
Microphone	Ultra-directional(detachable)	

Supplied accessories

Shoulder belt (1)
Microphone (1)
XLR cap (4)
Maintenance manual Part 1 (1)
Operation manual (1)

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Distributed by

Sony Electronics Inc. (USA)
Headquarters
1 Sony Drive
Park Ridge, NJ 07656
www.sony.com/professional
Printed in U.S.A.
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