

Colorimetric and Resolution requirements of cameras

Alan Roberts

ADDENDUM 28 : Sony XDCAM HD, PDW-700

This document is a report of the results of tests that are the precursor of those described in the EBU technical document Tech3335. It is not an endorsement of the product.

Data for this section is taken from the handbook and a brief examination of a Sony PDW-700. This is a 1080-line camcorder, physically smaller and lighter than the HDW750, with slightly lower power consumption (40W) and some useful enhancements to connectivity. However, it runs only at 50Hz or 59.94Hz interlaced (including 25Hz and 29.97Kz psf), but a firmware upgrade to enable psf operation had not been installed on the camera under test. It has 3 1920x1080 sensors and records full 1920x1080 images with 4:2:2 colour sub-sampling, onto Dual layer Professional Disks with MPEG2 long GoP compression at 50Mb/s. The compression system was not tested, all viewing was done on live pictures via HDSDI. Future upgrades are expected to include some interesting items from the HDW range, plus an HDSDI input to allow recording from external sources.

The camera is housed in a conventional camcorder shell, and consumes about 40 watts. It has many internal menus for setting the performance, such that it can then be used without external controls. It is not ideally suited to multi-camera operation, although it can be controlled remotely. A standard feature is a 30-second picture cache, but there is only one filter wheel (neutral density filters), colour temperature compensation is achieved by electronic gain-changing. There is a live down-converter to SD, so the camera can be used in mixed environments (future upgrades will provide 720p modes at 50 and 60Hz as well as SD in DVCAM and MPEG-IMEX formats) with digital outputs. The SD performance of the camera was not tested.

The menu settings result from one brief measurement session, attempting to get a good setting for one wildlife shoot, and the settings reflect that. Further tests on the camera, when upgrades are fitted, would be needed to get a fuller range of settings. In the reported settings, the camera captures up to 600% overexposure (about 2.5 stops, using the full video range 109%) and is mimicking a film camera and telecine, with “best light” transfer to tape (totalling about 11 stops of tonal range), albeit only in interlaced mode for smooth motion. The range of controls is similar to those in the HDW range of HDCAM camcorders, and so it should be possible to make it mimic negative or positive film, with resolution tailored to 35mm or 16mm, to taste. Assuming that a grading operation will be used in post-production, the settings give the colourist the same range of options as with film. Detail enhancement produced spatial aliasing, but the Aperture compensation produced a much smoother image with complete freedom from aliasing. For use in Sport or Light Entertainment, it would probably be beneficial to switch off the Black Gamma, and to set Detail On, with Detail Level to -19 (0, factory setting, causes visible aliasing).

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ADDENDUM 28 : settings for Sony XDCAM HD, PDW-700

Since the camera settings offer great flexibility, it should be possible to derive several “BBC settings” for it. But, the test session was set up specifically to satisfy a wildlife programme, mimicking the long-contrast performance of negative film. Further testing would be needed to get settings for other purposes.

Many of the menu items have little or no effect on image quality. Those that have significant effect are highlighted. The full set of menu items is given for completeness. In boxes with a range of numeric settings, e.g. -99~99, the values indicate the range, and zero means no alteration to factory setting, not zero effect, and no scales are given. For each item, the factory setting is given where known, and the range offered. “BBC” recommended settings are in the last column, where appropriate. Factory settings, where known, are underlined. Value ranges shown as -99 ~ 99 may differ in practice, as a result of settings in lower menus.

The data files are used in “layers”, Factory, Service, Preset, User. The effect of a numeric data value in the user menus is the sum of all values for that item in all these layers. Only those in the Factory layer are absolute, thus it is vital to have all layers correctly set when entering new values, if the setup is to be copied from camera to camera. To return to Standard Setup (i.e. factory condition), go to menu FILE02 USER FILE 2 and select CLEAR USR PRESET, or FILE03 ALL FILE and select CLEAR ALL PRESET, and press the rotary encoder. Then values can be entered via menus or Memory Stick to achieve a specific setup. The range of values available in some items may not be those quoted in the camera manual, this is due to settings in the Factory layer which must not be altered.

This listing of the menus and contents is complete, but this should not be used as an excuse for not reading the manuals.

TOP MENU

USER	Go to daily routine settings, pages that can be customised
USER MENU CUSTOMISE	Customise user menu pages
ALL	Go to all menu pages
OPERATION	Settings for the most common controls
PAINT	Settings that normally need lab facilities to control properly
MAINTENANCE	Camera maintenance, usually best avoided
FILE	Load/save reference files etc
DIAGNOSIS	Check status of hardware/software
SERVICE	Keep out of here if at all possible

USER MENUS as set up in CUSTOMISE pages, can contain anything from:-

OUTPUT SEL, FUNCTION1, VF DISP1, VF DISP2, “!” LED, MARKER1, GAIN SW, VF SETTINGS, AUTO IRIS, SHOT ID, SHOT DISP, SET STATUS, USER FILE, LENS FILE

OPERATION MENUS

OPERATION 01 OUTPUT 1

Setting output signals

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
SDI out 1 select	<u>Off</u> / HDSDI / SDDSI		
SDI out 2 select	<u>Off</u> / HDSDI / SDDSI		
SDI out 2 super	<u>Off</u> / On	Adds viewfinder stuff	
Test out select	<u>VBS</u> / Y / R / G / LCD	Reverts to Y at power up, if R G or B selected. VBS is composite SD.	Y
Test out super	<u>Off</u> / On	Adds viewfinder stuff, complicated	

OPERATION 02 OUTPUT 2

More on setting output signals

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Live & play	<u>Off</u> / On	Allows playback while shooting, for shot matching. See handbook, p 73	

Down con mode	<u>C</u> rop / <u>S</u> queeze	Crop takes central 4x3 portion	Squeeze
Wide ID	<u>T</u> hru / <u>A</u> uto	Changes how Squeeze mode works	

OPERATION 03 SUPER IMPOSE

Yet more on setting output signals

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Super (VFdisp)	<u>O</u> ff / <u>O</u> n	Control output of text and markers to SDI 2 or Test out	
Super (Menu)	<u>O</u> ff / <u>O</u> n		
Super (TC)	<u>O</u> ff / <u>O</u> n		
Super (Marker)	<u>O</u> ff / <u>O</u> n		

OPERATION 04 LCD

Control of the lcd side panel

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
LCD color	-99 ~ 99	Colour level (saturation), so you can't trust it for picture assessment	
LCD marker & zebra	<u>O</u> ff / <u>O</u> n	Adds viewfinder stuff to the side lcd	

OPERATION 05 REC FUNCTION

Control of the cache recorder

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Cache rec	<u>O</u> ff / <u>O</u> n	Allows recording before you press record. See page 75 of the operations manual for full details	
Cache rec time	<u>0</u> -2s / 2-4s / 4-6s / 6-8s / 8-10s / 18-20s / 28-30s		

OPERATION 06 ASSIGNABLE SW

Custom switches

<i>item</i>	<i>range</i>	<i>BBC</i>
Assign sw <1> (push)	Off / Front mic / Picture cache / Super / Marker / Retake / ATW / Return video / Lens ret / Rec switch / Turbo gain / Zebra / Color temp 3200K / Color temp 4300K / Color temp 5600K / Color temp 6500K / CC 5600K / Zoom tele (tele=3, wide=4) / Zoom wide (tele=4, wide=3) / Shot mark 1 / Shot mark 2 / AU01-10	
Assign sw <2> (slide)	Off / Front mic / Picture cache / A Super / Marker / Zebra / UA01-10	
Assign sw <3> (push)	Off / Front mic / Picture cache / Super / Marker / Retake / ATW / Return video / Lens ret / Rec switch / Turbo / Zebra / Color temp 3200K / Color temp 4300K / Color temp 5600K / Color temp 6500K / CC 5600K / Zoom tele (tele=3, wide=4) / Zoom wide (tele=4, wide=3) / Shot mark 1 / Shot mark 2 / AU01-10	
Assign sw <4> (push)		
Assign sw <ret>		
Color temp sw		
Zoom speed	<u>0</u> - <u>20</u> - <u>99</u>	
Return video	<u>O</u> ff / <u>O</u> n	

OPERATION 07 POWER SAVE

Turn off unused stuff

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Ethernet/USB	<u>D</u> isabl / <u>E</u> nabl		
iLink (FAM)	<u>D</u> isabl / <u>E</u> nabl	Camera power off/on needed to effect this change	
Rec audio out	<u>E</u> E / <u>S</u> ave		

OPERATION 08 VF DISP 1

Items in the viewfinder

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
VF disp	<u>O</u> ff / <u>O</u> n		
VF disp mode	<u>1</u> / <u>2</u> / <u>3</u>	1=least info, 3=most	
Disp extender	<u>O</u> ff / <u>O</u> n		
Disp filter	<u>O</u> ff / <u>O</u> n		
Disp white	<u>O</u> ff / <u>O</u> n		
Disp gain	<u>O</u> ff / <u>O</u> n		
Disp shutter	<u>O</u> ff / <u>O</u> n		
Disp audio	<u>O</u> ff / <u>O</u> n		
Disp disc	<u>O</u> ff / <u>O</u> n		
Disp iris	<u>O</u> ff / <u>O</u> n		

OPERATION 09 VF DISP 2

Items in the viewfinder

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Disp zoom	<u>O</u> ff / <u>O</u> n		
Disp color temp	<u>O</u> ff / <u>O</u> n		
Disp batt remain	<u>I</u> nt / <u>V</u> olt / <u>A</u> uto	For Anton Bauer or BPGL batteries, shows power as % remaining or continuous voltage	
Disp dc in	<u>O</u> ff / <u>O</u> n		
Disp wr level	<u>O</u> ff / <u>O</u> n		
Disp rec format	<u>O</u> ff / <u>O</u> n		
Disp clip no (pb)	<u>O</u> ff / <u>O</u> n		
Disp timecode	<u>O</u> ff / <u>O</u> n		

OPERATION 10 VF DISP 3

Items in the viewfinder

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Disp low light	<u>Off</u> / On		
Disp low light level	-99 ~ 99		
VF batt warning	10% / 20%		

OPERATION 11 !LED

Warnings in the viewfinder

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Gain	Off / <u>On</u>		
Shutter	Off / <u>On</u>		
Wht preset	Off / <u>On</u>		
ATW run	Off / <u>On</u>		
Extender	Off / <u>On</u>		
Filter	<u>Off</u> / On		
Override	Off / <u>On</u>		

OPERATION 12 MARKER 1

Warnings in the viewfinder

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Marker	Off / <u>On</u>	All markers	
Center	<u>Off</u> / On	Centre cross	
Center mark	1 / 2 / <u>3</u> / 4	Type of centre co	
Safety zone	<u>Off</u> / On		
Safety area	80% / <u>90%</u> / 92.5% / 95%		
Aspect	<u>Off</u> / On		
Aspect select	15:9 / 14:9 / 13:9 / 4:3 / 1.85 / 2.35		14:9
Aspect mask	Off / <u>On</u>		
Aspect mask lvl	0 ~ <u>12</u> ~ 15		
100% marker	<u>Off</u> / On		

OPERATION 13 MARKER2

viewfinder markers, also on side socket monitor output

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
User box	<u>Off</u> / On	User defined marker box	Off
User box width	3 ~ <u>240</u> ~ 479	In 4-pixel steps	
User box height	3 ~ <u>135</u> ~ 269	In 4-line steps	
User box H pos	-477 ~ <u>0</u> ~ 476	4-pixel/line steps. Limited by box size, not allowed to go off edge of screen	
User box V pos	-267 ~ <u>0</u> ~ 267		
Center H pos	-480 ~ <u>0</u> ~ 479		
Center V pos	-270 ~ <u>0</u> ~ 269		
Aspect safe zone	<u>Off</u> / On		
Aspect safe area	80% / <u>90%</u> / 92.5% / 95%		

OPERATION 14 GAIN SW

gain switch settings

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Gain low	-6 / -3 / 0 / 3 / 6 / 9 / 12 / 18 / 24 / 30 / 36 / 42	Usual gain settings ¹	0dB
Gain mid			3B
Gain high			9B
Gain turbo			12dB
Turbo sw ind	<u>Off</u> / On		
Shockless gain	<u>Off</u> / On	Disables shockless auto gain control	Off

OPERATION 15 VF SETTING

more on the viewfinder

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Zebra	<u>Off</u> / On		On
Zebra select	<u>1</u> / 2 / Both		
Zebra 1 det level	20% ~ <u>70%</u> ~ 107%	Set for skin tone	65
Zebra 1 apt level	1% ~ <u>10%</u> ~ 20%		
Zebra 2 det level	52% ~ <u>100%</u> ~ 109%	Set for the camera knee point	85
VF detail level	-99 ~ 99		

OPERATION 16 AUTO IRIS

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
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¹ Camera noise is visible at 12dB gain, but is probably acceptable at +9dB. Higher gain settings should be avoided wherever possible. Subjectively, noise performance is between that of the HDW750 and 790.

Iris override	<u>Off</u> / On	Allows aim point control, ± 1 stop	Off
Iris speed	-99 ~ 99	-99=slow, 99=fast	
Clip highlight window	<u>Off</u> / On	Ignores signal over 100%	
Iris window	<u>1</u> / 2 / 3 / 4 / 5 / 6 / Var	Detection box shape	
Iris window ind	<u>Off</u> / On	Checks iris window against box cursor	
Iris var width	20 ~ <u>240</u> ~ 479	Variable box, set in in 4-pixel/line steps, same as box cursor	
Iris var height	20 ~ <u>135</u> ~ 269		
Iris var H pos	-460 ~ <u>0</u> ~ 450	4-pixel/line steps. Limited by box size, not allowed to go off edge of screen	
Iris var V pos	-253 ~ <u>0</u> ~ 252		

OPERATION 17 SHOT ID

identifying shots for recording

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
ID-1		4 lines, each of 12 characters, alphanumeric, symbols, spaces allowed	
ID-2			
ID-3			
ID-4			

OPERATION 18 SHOT DISP

Stuff recorded over colour bars

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Shot data	<u>Off</u> / On		
Shot time	<u>Off</u> / On		
Shot model name	<u>Off</u> / On		
Shot serial no	<u>Off</u> / On		
Shot id sel	<u>Off</u> / ID-1 / ID-2 / ID-3 / ID-4		
Shot 16:9 chara	<u>Off</u> / On		
Shot blink chara	<u>Off</u> / On		

OPERATION 19 SET STATUS

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Status abnormal	Off / <u>On</u>		
Status system	Off / <u>On</u>		
Status function	Off / <u>On</u>		
Status audio	Off / <u>On</u>		

OPERATION 20 WHITE SETTING

White balance controls

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
White switch 	<u>Mem</u> / ATW	White balance switch position B can take preset or auto	
Shockless white	Off / <u>1</u> / 2 / 3	Transition time for change of white balance (1=fast)	
ATW speed	1 / 2 / 3 / 4 / 5	Transition speed for auto-tracking white (1=fast)	
AWB fixed area	<u>Off</u> / On	Auto white on only centre of screen	
Filter wht mem	<u>Off</u> / On	Store separate white balance for each filter position	

OPERATION 21 OFFSET WHT

White balance stores

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Offset white <A>	<u>Off</u> / On		
Warm-cool <A>	Temp K	Shows current value, coarse adjustment	
Warm-cool bal <A>	-99 ~ 99	Fine adjustment	
Offset white 	<u>Off</u> / On		
Warm-cool 	Temp K	Shows current value, coarse adjustment	
Warm-cool bal 	-99 ~ 99	Fine adjustment	

OPERATION 22 SHT ENABLE

Shutter control

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Shutter ECS	Off / <u>On</u>	Shutter speeds available in the switch list, precise values may change with system frequency	
Shutter 1/60	Off / <u>On</u>		
Shutter 1/100	Off / <u>On</u>		
Shutter 1/125	Off / <u>On</u>		
Shutter 1/250	Off / <u>On</u>		
Shutter 1/500	Off / <u>On</u>		
Shutter 1/1000	Off / <u>On</u>		
Shutter 1/2000	Off / <u>On</u>		

OPERATION 23 LENS FILE

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Lens file select	<u>1</u> ~ 32	32 lens files allowed	

F.ID	Display only	Name of current file	
L.ID	Display only	Lens name	
L.MF	Display only	Lens manufacturer name	

OPERATION 24 FORMAT

System speed

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
System frequency	Display only		
Rec format	Display only		
Country	NTSC(J) Area / NTSC area / PAL area		PAL area ²

OPERATION 25 SOURCE SEL

Input mode for front mic

<i>Item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Front mic select	Mono / <u>Streo</u>		

OPERATION 26 UMID SET

SMPTE330M-2003, Unique Material Identifier

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Country code		Refer to SMPTE330M for details of the codes permitted. Leave blank or enter 0 if in doubt.	
Organization			
User code			
Time zone	<u>00</u> ~ 3F		

OPERATION 27 CLIP TITLE

Naming of clips on disc

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Title	<u>Disabl</u> / <u>Enabl</u>	Clips are automatically named in sequence (C0001 ~ C0300) unless you enable this. Manual titles can span several discs, see the operations manual p77 for details.	
Select prefix	Exec		
Clear numeric	Exec		
Load prefix data	Exec		
Prefix			
Numeric	1 ~ 99,999		

OPERATION 28 FILE NAMING

Naming of clips on disc

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Naming form	<u>C*****</u> / Free	See ops manual p80 for details	
Auto naming	<u>C*****</u> / Title		

PAINT

PAINT 01 SW STATUS

main controls

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Gamma	Off / <u>On</u>		On
Black gamma	<u>Off</u> / On		On
Matrix	Off / <u>On</u>		On
Knee	Off / <u>On</u>		On
White clip	Off / <u>On</u>		Off
Detail	Off / <u>On</u>		Off
Aperture	Off / <u>On</u>		On
Flare	Off / <u>On</u>		
Test saw	<u>Off</u> / On	Analogue sawtooth	

PAINT 02 WHITE

colour temperatures stored by the WHITE A/.B switch

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Color temp <A>	Display temp K	Shows current white balance in A	
C temp bal <A>	-99 ~ 99	Fine control	
R gain <A>	-99 ~ 99	Tweaking these changes the colour temperature setting	
B gain <A>	-99 ~ 99		
Color temp 	Display temp K	Shows current white balance in B	
C temp bal 	-99 ~ 99	Fine control	
R gain 	-99 ~ 99	Tweaking these changes the colour temperature setting	
B gain 	-99 ~ 99		

PAINT 03 BLACK/FLARE

master black settings

² Sets the frame rate: NTSC areas are 29.97Hz, PAL areas are 25Hz.

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Master black	-99 ~ 99		
R black	-99 ~ 99		
B black	-99 ~ 99		
Master flare	-99 ~ 99		
R flare	-99 ~ 99		
G flare	-99 ~ 99		
B flare	-99 ~ 99		
Flare	Off / <u>On</u>		
Test out select	VBS / R / G / B / LCD	Duplicates setting in OPERATION01	

PAINT 04 GAMMA

main gamma controls

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Gamma	Off / <u>On</u>	All curve bending	On
Master gamma	0.35 ~ <u>0.45</u> ~ 0.9	These controls have huge range, use with care	0.45
R gamma	-99 ~ 99		0
G gamma	-99 ~ 99		0
B gamma	-99 ~ 99		0
Test out select	<u>VBS</u> / R / G / B / LCD	Duplicates setting in OPERATION01	
Gamma table	1 ~ <u>5</u> ~ 6	4=SMPTE240 (4x), 5=ITU709 (4.5x), 6=BBC (5x)	5

PAINT 05 BLACK GAMMA

independent slope at black

<i>Item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Black gamma	Off / <u>On</u>		On
Black gam range	Low / L.mid / H.mid / <u>High</u>		H.mid
Master blk gamma	-99 ~ 99	Raises slope to about 7.5x	28
R black gamma	-99 ~ 99		0
G black gamma	-99 ~ 99		0
B black gamma	-99 ~ 99		0
Test out select	<u>VBS</u> / R / G / B / LCD	Duplicates setting in OPERATION01	

PAINT 06 KNEE

highlight compression

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Knee	Off / <u>On</u>		On
Knee point	50% ~ <u>95%</u> ~ 109%	One soft bend	82.5%
Knee slope	-99 ~ 99	Affects segment slope, slightly curved	15 ³
Knee saturation	Off / <u>On</u>		On
Knee sat level	-99 ~ 99		0
White clip	Off / <u>On</u>		Off ⁴
White clip level	90% ~ 109.5%		

PAINT 07 DETAIL1

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Detail	Off / <u>On</u>	All DETAIL compensation	Off
Aperture	Off / <u>On</u>	Separate APERTURE correction	On
Detail level	-99 ~ 99	Overall level	-19 ⁵
Aperture level	-99 ~ 99	Overall level	87 ⁶
Detail H/V level	-99 ~ 99	Only changes vertical amount	
Crsipening	-99 ~ 99	Signal level range that gets crsipened	
Level depend	Off / <u>On</u>	Detail level dependency	
Level depend lvl	-99 ~ 99	Detail level range affected	
Detail frequency	-99 ~ 99	Frequency of detail compensation	

PAINT 08 DETAIL2

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Knee aperture	Off / <u>On</u>	Extra detail above knee point	Off
Knee apt level	-99 ~ 99		
Detail limit	-99 ~ 99		

³ Knee settings are designed to capture 600% overexposure (the limit of the camera performance under test) into 109% coding range, and assumes that a full colour grade will be used, with no clipping during capture. Other settings would be needed for other uses.

⁴ This allows video to go up to 109%, post-production operations must not clip this during ingest, the extra coding range is useful for capturing overexposure and allows grading to do better than otherwise.

⁵ This is a reasonable setting for Detail enhancement, but it causes spatial aliasing.

⁶ Aperture correction looked much more smooth and resulted in sharper pictures with fewer problems.

Detail wht limit	-99 ~ 99	Detail +ve excursion limit	
Detail blk limit	-99 ~ 99	Detail -ve excursion limit	
V dtl creation	NAM / G / R+G / Y	Source for edge detection	
H/V control mode	HV / V	HV affects horizontal and vertical, V only vertical	

PAINT 09 SD DETAIL

extra controls for downconverter, if fitted

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
SD detail	Off / <u>On</u>	All as for HD	Off
SD detail level	-99 ~ 99		
SD crispening	-99 ~ 99		
SD dtl wht limit	-99 ~ 99		
SD dtl blk limit	-99 ~ 99		
SD level depend	Off / <u>On</u>		
SD LV depend level	-99 ~ 99		
SD dtl frequency	-99 ~ 99		
SD dtl H/V ratio	-99 ~ 99		
SD cross color	-99 ~ 99	Only relevant in NTSC-land	

PAINT 10 SKIN DETAIL

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Skin detail all	<u>Off</u> / On	All skin detail on/off	Off
Skin detect		Press rotary encoder to detect skin colour	
Skin area ind	<u>Off</u> / On	Zebra display of target area	
Skin dtl select	<u>1</u> / 2 / 3	3 separate banks of skin detail controls	
Skin detail	<u>Off</u> / <u>On</u>	Separate controls for each bank	
Skin detail lvl	-99 ~ 99	Detail level	
Skin detail sat	-99 ~ 99	Saturation change	
Skin detail hue	<u>0</u> ~ 359	Hue change	
Skin detail width	0 ~ <u>40</u> ~ 359	Target hue angle width	

PAINT 11 MTX LINEAR

camera matrix

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Matrix	Off / <u>On</u>	All matrices	On
Matrix (user)	<u>Off</u> / On	Roll your own matrix	Off
Matrix (preset)	<u>Off</u> / <u>On</u>	Standard matrices	On
Matrix (prst) sel	1 ~ <u>2</u> ~ 6	1=SMPTE240, 2=ITU709, 3=SMPTE-WIDE, 4=NTSC, 5=EBU(i.e.PAL), 6=ITU601	2
Matrix (user) R-G	-99 ~ 99		
Matrix (user) R-B	-99 ~ 99		
Matrix (user) G-R	-99 ~ 99		
Matrix (user) G-B	-99 ~ 99		
Matrix (user) B-R	-99 ~ 99		
Matrix (user) B-G	Off / <u>On</u>		

PAINT 12 MTX MULTI

multi-linear matrix, for advanced knob twiddlers only

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Matrix	Off / <u>On</u>	All matrices	On
Matrix (multi)	<u>Off</u> / On	Roll your own multi-segment matrix	Off
Matrix area ind	<u>Off</u> / On	Use zebra to show active region	
Matrix color det	Exec	Press rotary encoder to select current area	
Mtx (multi) axis	<u>B</u> / B+ / Mg- / Mg / Mg+ / R / R+ / Y1- / Y1 / Y1+ / G- / G / G+ / Cy / Cy+ / B-	16 hue angle zones	
Mtx (multi) hue	-99 ~ 99	Adjustment	
Mtx (multi) sat	-99 ~ 99	Adjustment	

PAINT 13 V MODULATION

white V sawtooth lens shading correction

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Vmod	Off / <u>On</u>		
Master vmod	-99 ~ 99	Collective control	
R vmod	-99 ~ 99		
G vmod	-99 ~ 99		
B vmod	-99 ~ 99		
Test out select	<u>VBS</u> / R / G / B / LCD	Duplicates setting in OPERATION01	

PAINT 14 SATURATION

extra saturation control for dark bits

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Low key sat	Off / On		Off
L key sat level	-99 ~ 99	Collective control	
L key sat range	Low / L.mid / H.mid / High		
Y black gamma	Off / On	Keeps saturations right	Off
Y blk gam level	-99 ~ 99	Slope	
Y blk gam range	Low / L.mid / H.mid / High		

PAINT 15 NOISE SUPPRESSION

Reduces hf noise

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Noise suppress	Off / On		On

PAINT 16 SCENE FILE

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
1		Recall one of the 5 scene files stored in the camera	
2			
3			
4			
5			
Standard		Clear all settings and return to reference values	
Scene recall		Recall file from camera or memory stick	
Scene store		Save to camera or memory stick	
F id		16 character file ID	

MAINTENANCE**MAINTENANCE 01 WHT SHADING**

lens corrections

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Wht shad ch sel	R / G / B / Test	Select channel, lower items change	
Test out select	VBS / R / G / B / LCD	Duplicates setting in OPERATION01	
R/G/B wht H saw	-99 ~ 99		5
R/G/B wht H para	-99 ~ 99		
R/G/B wht V saw	-99 ~ 99		
R/G/B wht V para	-99 ~ 99		
White saw/para	Off / On	All on/off	On

MAINTENANCE 02 BLK SHADING

lens corrections

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Blk shad ch sel	R / G / B	Select channel, lower items change	
Test out select	VBS / R / G / B / LCD	Duplicates setting in OPERATION01	
R/G/B blk H saw	-99 ~ 99		
R/G/B blk H para	-99 ~ 99		
R/G/B blk V saw	-99 ~ 99		
R/G/B blk V para	-99 ~ 99		
Master black	Off / On	All on/off	On
Master gain	-6dB to 42dB	Gain changes, only for this operation	12dB

MAINTENANCE 03 LEVEL ADJUST

main output signal levels

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
VBS video level	-99 ~ 99		
HD-Y level	-99 ~ 99		
Test out select	VBS / R / G / B / LCD	Duplicates setting in OPERATION01	

MAINTENANCE 04 BATTERY1

voltage parameters, sets warning levels

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Info Before end	5% / 10% / 15% / ... / 95% / 100%	Change these only if you really know what you're doing	
Info End	0% / 1% / 2% / 3% / 4% / 5%		
Sony Before end	11.5V ~ 17.0V		
Sony End	11.0V ~ 11.5V		
Other Before end	11.5V ~ 11.8V ~ 17.0V		
Other End	11.0V ~ 14.0V		
DC in Before end	11.5V ~ 11.8V ~ 17.0V		

DC in End	<u>11.0</u> ~ 14.0V	
Detected battery	Display only	

MAINTENANCE 05 BATTERY2

voltage parameters, sets battery indicator scaling

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Type detection	<u>Auto</u> / Other	Auto allows auto detection of battery type	Auto
Segment no.7	<u>11.0V</u> ~ <u>17.0V</u>	These settings are for when "Other" is selected. Each voltage is the value at which the numbered segment turns off	
Segment no.6	11.0V ~ <u>16.0V</u> ~ 17.0V		
Segment no.5	11.0V ~ <u>15.0V</u> ~ 17.0V		
Segment no.4	11.0V ~ <u>14.0V</u> ~ 17.0V		
Segment no.3	11.0V ~ <u>13.0V</u> ~ 17.0V		
Segment no.2	11.0V ~ <u>12.0V</u> ~ 17.0V		
Segment no.1	<u>11.0V</u> ~ 17.0V		

MAINTENANCE 06 AUDIO-1

Boring stuff starts here

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Front mic select	Mono / <u>Streo</u>		
Audio ch3/4 mode	Ch1 / 2 / <u>SW</u>	Which source routes through to ch3 and 4	
Rear XLR auto	<u>Off</u> / On		
Front mic ref	-60dB / <u>-50dB</u> / -40dB		
Rear mic ref	<u>-60dB</u> / -50dB / -40dB	Ref level for rear xlr when set to mic	
Min alarm vol	<u>Off</u> / Set	Minimum volume for alarm, off=almost inaudible, set=just audible	
SP att level	<u>Off</u> / 3dB / 6dB / 9dB	Speaker volume control, doesn't affect headphones	
Headphone out	<u>Mono</u> / Streo		

MAINTENANCE 07 AUDIO-2

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Au ref level	<u>-20dB</u> / -18dB / -16dB / -12dB / EBUL	1kHz tone level	
Au ref out	<u>0dB</u> / +4dB / -3dB / EBUL	Output ref level	
Au ch12 agc mode	<u>Mono</u> / Streo	Channels 1/2 as monos or stereo	
Au ch34 agc mode	Mono / Streo / Off		
Au agc spec	<u>-6dB</u> / -9dB / -12dB / -15dB / -17dB	AGC saturation level	
Au limiter mode	<u>Off</u> / -6dB / -9dB / -12dB / -15dB / -17dB	Limiter level for manual control	
Au out limiter	Off / <u>On</u>		

MAINTENANCE 07 AUDIO-3

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Au sg (1kHz)	On / <u>Off</u> / Auto	On=1kHz on bars, Auto=1kHz when ch1 audio select switch (inside) is on Auto	
Mic ch1 level	Side1 / <u>Front</u> / F+S1		
Mic ch2 level	Side2 / <u>Front</u> / F+S2		
Rear1/WRR level	<u>Side1</u> / Front / F+S1		
Rear2/WRR level	<u>Side2</u> / Front / F+S2		
Audio ch3 level	Fix / Front	Front=controlled by mic level control on front of camera	
Audio ch4 level	Fix / Front		

MAINTENANCE 09 WRR SETTING

Wireless radio mic

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
WRR Valid ch sel	<u>All</u> / Ch1	Enables both channels or just ch1	
WRR ch select	<u>Tx1</u> / Tx2		
WRR delay comp	Off / <u>On</u>	On delays sound by about 8mS	
TX		Displays selected transmitter number	
TX audio peak		Displays whether signal is limiting	
TX in put level	Mic / Line	Displays whether channel is mic or line level	
TX att level			
TX lcf freq		Low cut filter	
TX system delay	<u>Auto</u> / 0~8ms		

MAINTENANCE 10 TIMECODE

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
TC out	<u>Auto</u> / Gene		
DF/NDF	<u>DF</u> / NDF	Drop frame, only in NTSC-land	
Ext-LK DF/NDF	<u>Int</u> / Ext		
Ext-LK UBIT	<u>Int</u> / Ext		

Ltc UBIT	<u>Fix</u> / Time	Fix=you set data, Time=records time	
Watch auto adj	Off / <u>On</u>		
UBIT group id	<u>000</u> / 101		

MAINTENANCE 11 ESSENCE MARK

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Ret shot mark 1	Off / <u>On</u>	Shot marking on disc, see operations manual p75 for details	
Ret shot mark 2	Off / <u>On</u>		
Index pic. pos	<u>0sec</u> ~10sec		

MAINTENANCE 12 CAM CONFIG 1

General stuff

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Rec tally blink	Off / <u>On</u>	Blinks tally at end of battery or disc	
Rec start beep	Off / <u>On</u>		
Sub lcd mode sel	<u>Timer</u> / Off / Cont	Cont=show TC on lcd even when off	
Sub lcd timer	<u>1h</u> / 3h / 8h	Shows tc on lcd for this time when in Timer mode	
HDSDI remote i/f	Off / Chara / G-ty / R-ly	Control of remote recorder via HDSDI	

MAINTENANCE 13 CAM CONFIG 2

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Test saw select	<u>Saw</u> / Rec		
Color bar select	<u>Arib</u> / 100% / 75% / SMPTE		SMPTE ⁷
User & All only	Off / <u>On</u>	Show only User menus in Top menu	
RM common memory	Off / <u>On</u>	Memory sharing for remote control box	
RM rec start	<u>RM</u> / Cam / Para	Record enable from remote control box	
Sht disp mode	<u>Sec</u> / Deg	Shutter display in degrees or seconds	

MAINTENANCE 14 PRESET WHITE

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Color temp <P>	Display		
C temp bal <P>	-99 ~ 99	Fine control of preset white	
R gain <P>	-99 ~ 99		
B gain <P>	-99 ~ 99		
Awb enable <P>	Off / <u>On</u>	Allows Preset to store an auto white balance	

MAINTENANCE 15 WHITE FILTER

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
ND filter c temp	Off / <u>On</u>	Allows a colour temperature setting for each ND filter position	
ND flt c temp <1>	<u>3200K</u> / 4300K / 5600K / 6300K		
ND flt c temp 2-4	3200K / 4300K / <u>5600K</u> / 6300K		

MAINTENANCE 16 DCC ADJUST

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
DCC function sel	<u>DCC</u> / Fix	DCC is auto knee, Fix uses values below	
DCC D range	400% / 450% / 500% / 550% / <u>600%</u>	Exposure value the curve reaches in DCC	
DCC point	-99 ~ 99	Minimum knee point	
DCC gain	-99 ~ 99		
DCC delay time	-99 ~ 99	Reaction speed	
DCC peak filter	-99 ~ 99	Sensitivity to peak exposure	

MAINTENANCE 17 AUTO IRIS 2

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Iris window	<u>1</u> / 2 / 3 / 4 / 5 / 6 / Var	Size of iris window, Var=variable below	
Iris window ind	Off / <u>On</u>	Frame marker for window	
Iris level	-99 ~ 99	Target value	
Iris apl ratio	-99 ~ 99	Ratio of peak to mean in detection	
Iris var width	20 ~ <u>240</u> ~ 479	Frame width in Variable	
Iris var height	20 ~ <u>135</u> ~ 269	Frame height in Variable	
Iris var H pos	-460 ~ <u>0</u> ~ 459	Centring	
Iris var V pos	-235 ~ 0 ~ 252		
Iris speed	-99 ~ 99		
Clip high light	Off / <u>On</u>	Ignores brightest areas	

⁷ SMPTE colour bars are the accepted standard form HDTV production.

MAINTENANCE 18 GENLOCK

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Genlock	Off / <u>On</u>		
GI HD H phase	-99 ~ 99	Horizontal phase, HD	
GI SD H phase	-99 ~ 99	Horizontal phase, SD	
Reference	Internal / Genlock		

MAINTENANCE 19 ND COMP

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
ND offset adjust	<u>Off</u> / On	Allows separate colour balance for each filter position	
Clear ND adjust	Exec		

MAINTENANCE 20 AUTO SHADING

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Auto blk shading	Exec	Start automatic black shading tweak	
Reset blk shad	Exec	Clear ND filter compensations	
Test out select	<u>VBS</u> / R / G / B / LCD	Duplicates setting in OPERATION01	
Master gain (tmp)	-6dB / ... / 42dB	Temporary gain for this adjustment	

MAINTENANCE 21 APR

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
APR	Exec	Perform automatic pixel noise reduction	

MAINTENANCE 22 NETWORK

Ethernet connection

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
DHCP	Enabl / <u>Disabl</u>	Allows automatic IP address acquisition via DHCP	
IP address	<u>192.168.1.10</u>	Enter what you like, but these values would normally work	
Subnet mask	<u>255.255.255.0</u>		
Def gateway	<u>0.0.0.0</u>		
Link speed	<u>Auto</u> / 10Mbps / 100Mbps		
Duplex	<u>Auto</u> / Full / Half		

FILE**FILE01 USER FILE**

None of this affects pictures or sound

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
User file load	Exec	load/save USER file from memory stick	
User file save	Exec		
F.ID		16 characters file name	
User preset	Exec	Resets USER menus to standard	

FILE02 USER FILE 2

customising, memory stick operations

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Store user preset	Exec	Save contents of User menus as a preset	
Clear usr preset	Exec	Return USER data to factory settings	
Customize preset	Exec	Reset customised menus to factory	
Load custom data	<u>Off</u> / On	Whether to load customization data on file load	
Load out of user	<u>Off</u> / On	Load user stuff not registered as User	
Before file page	<u>Off</u> / On	Whether to load stuff from beyond User pages	
User load white	<u>Off</u> / On	Whether to load white balances as well	

FILE03 ALL FILE

powerful customising, memory stick operations

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
All file load	Exec	Read all menu items from stick	
All file save	Exec	Save all menu items to stick	
F.ID		16 characters file name	
All preset	Exec	Reset all menu items to standard settings	
Store all preset	Exec	Save all menu items and in the Preset layer	
Clear all preset	Exec	Return all Preset menus to factory settings	
3sec clear preset	<u>Off</u> / On	Allows Preset layer to return to factory settings when Menu Cancel switch pressed for 3 seconds	
Network data	<u>Off</u> / On	Whether to read in network-related data	

FILE04 SCENE FILE

less dangerous memory stick stuff

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>

1		Up to 5 files in camera, 100 on a stick. Deals with Paint, shutter and white balance. Goes into sub-menu to do the load/save.	
2			
3			
4			
5			
Standard		Returns to standard setting	
Scene recall	Exec	Brings up secondary menus to save/load scene files	
Scene store	Exec		
F.ID			16 characters file name

FILE05 REFERENCE

less dangerous memory stick stuff

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Reference store	Exec	Save REF file in from memory stick into camera	
Reference clear	Exec	Reset REF file to factory settings	
Reference load	Exec	Read REF file from memory stick	
Reference save	Exec	Save Ref file to memory stick	
F.ID		16 characters file name	
Scene white data	Off / On	Allow/disallow white data in scene file	

FILE06 LENS FILE 1

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Lens file recall	Exec	Brings up secondary menus, load/save up to 5 files to camera or memory stick	
Lens file store	Exec		
F.ID		16 characters file name	
Source		Sows memory number of last loaded lens file	
Lens no offset	Exec	Clear the lens file	
Lens auto recall	Off / On / S.no	Enables auto loading of lens file, if lens can talk to the camera to identify itself	
L.ID	Exec	Name of connected lens, if it can talk to the camera	
L.MF	Exec	Manufacturer	

FILE07 LENS FILE 2

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Lens M Vmod	-99 ~ 99	Adjust lens file V saw shading	
Lens center H	-480 ~ 0 ~ 479	Compensates horizontal position of lens centre marker	
Lens center V	-270 ~ 0 ~ 269	And vertical	
Test out select	VBS / R / G / B / LCD	Duplicates setting in OPERATION01	
Lens R flare	-99 ~ 99		
Lens G flare	-99 ~ 99		
Lens B flare	-99 ~ 99		
Lens W-R ofst	-99 ~ 99	White balance compensation	
Lens W-B ofst	-99 ~ 99		

FILE08 LENS FILE 3

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Shading ch select	R / G / B / Test	Select channel, Test links to Test Out setting	
Test out select	VBS / R / G / B / LCD	Duplicates setting in OPERATION01	
Lens R/G/B H saw	-99 ~ 99		
Lens R/G/B H para	-99 ~ 99		
Lens R/G/B V saw	-99 ~ 99		
Lens R/G/B B para	-99 ~ 99		

FILE09 MEMORY STICK

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
M.S. format	Exec	Formats the stick, wipes all content	
M S. in > jump to	Off / User / All / Scene / Lens / Refer / User1	Sets which menu page is automatically loaded when a memory stick is inserted	

DIAGNOSIS**DIAGNOSIS01 HOURS METER**

vtr usage meters

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Operation		Displays total hours unit has been powered	
Laser		Total output for optical head	
Operation (rst)		Total hours (resettable)	

Spindle (rst)		Spindle rotation hours (resettable)	
Loading (rst)		Total number of disc loadings (resettable)	
Seek (rst)		Total head seek time (resettable)	

DIAGNOSIS02 TIME/DATE

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Adjust	Exec	Opens a sub-menu for setting values	
Hour			
Min			
Sec			
Year			
Month			
Day			

DIAGNOSIS03 ROM VERSION 1

software versions

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Package		Firmware versions, not recorded from test camera	
Sy1			
Sy2k			
Sy2u			
Drv			
At			
Fp			

DIAGNOSIS04 ROM VERSION 2

software versions

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Lvis		Firmware versions, not recorded from test camera	
Tsys			
Tmbp			
Fam			
Laby			
Brdg			
Pier			
Cava			

DIAGNOSIS05 ROM VERSION 3

software versions

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
Dsp0		Firmware versions, not recorded from test camera	
Dsp2			
Prxa			

DIAGNOSIS04 DEV STATUS

reports on hardware status checks

<i>item</i>	<i>range</i>	<i>comment</i>	<i>BBC</i>
I/O : MS,FP,CN,DCP,VF	OK=normal NG=Abnormal ---=state not defined		
D/A : Dcp1,Dcp2,Dcp3			
EEprom : Cn, Dcp, Dr			
Fram : At			
Fan : Mb			
Lsi : Dcp1, Dcp2, Dcp3, Dcp4, Tg			
Sci : Sy, Rm			

Further menus exist but are accessible only by setting internal switches. They are best left to qualified service personnel.