Colorimetric and Resolution requirements of cameras

Alan Roberts

ADDENDUM 28 : Sony XDCAM HD, PDW-700

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 35mmor 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).

Colorimetric and Resolution requirements of cameras

Alan Roberts

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
MAINENANCE	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
<div align="right">Setting output signals</div>

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

OPERATION 02 OUTPUT 2
<div align="right">More on setting output signals</div>

item	range	comment	BBC
Live & play	Off / On	Allows playback while shooting, for shot matching. See handbook, p 73	
Down con mode	Crop / Sqeze	Crop takes central 4x3 portion	Sqeze
Wide ID	Throu / Auto	Changes how Sqeze mode works	

OPERATION 03 SUPER IMPOSE
<div align="right">Yet more on setting output signals</div>

item	range	comment	BBC
Super (VFdisp)	Off / On		
Super (Menu)	Off / On	Control output of text and markers to SDI 2 or Test out	
Super (TC)	Off / On		
Super (Marker)	Off / On		

OPERATION 04 LCD
<div align="right">Control of the lcd side panel</div>

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

OPERATION 05 REC FUNCTION
<div align="right">Control of the cache recorder</div>

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

OPERATION 06 ASSIGNABLE SW
<div align="right">Custom switches</div>

item	range	BBC
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	0-20-99	
Return video	Off / On	

OPERATION 07 POWER SAVE
<div align="right">Turn off unused stuff</div>

item	range	comment	BBC
Ethernet/USB	Disabl /Enable		
iLink (FAM)	Disabl / Enabl	Camera power off/on needed to effect this change	
Rec audio out	EE / Save		

OPERATION 08 VF DISP 1
<div align="right">Items in the viewfinder</div>

item	range	comment	BBC
VF disp	Off / On		
VF disp mode	1 / 2 / 3	1=least info, 3=most	
Disp extender	Off / On		
Disp filter	Off / On		
Disp white	Off / On		
Disp gain	Off / On		
Disp shutter	Off / On		

Disp audio	Off / <u>On</u>		
Disp disc	Off / <u>On</u>		
Disp iris	Off / <u>On</u>		

OPERATION 09 VF DISP 2   Items in the viewfinder

item	range	comment	BBC
Disp zoom	Off / <u>On</u>		
Disp color temp	Off / <u>On</u>		
Disp batt remain	<u>Int</u> / Volt / Auto	For Anton Bauer or BPGL batteries, shows power as % remaining or continuous voltage	
Disp dc in	<u>Off</u> / On		
Disp wrr level	<u>Off</u> / On		
Disp rec format	<u>Off</u> / On		
Disp clip no (pb)	Off / <u>On</u>		
Disp timecode	<u>Off</u> / On		

OPERATION 10 VF DISP 3   Items in the viewfinder

item	range	comment	BBC
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

item	range	comment	BBC
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

item	range	comment	BBC
Marker	Off / <u>On</u>	All markers	
Center	<u>Off</u> / On	Centre cross	
Center mark	1 / 2 / <u>3</u> / 4	Tyoe 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 / <u>4:3</u> / 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

item	range	comment	BBC
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

item	range	comment	BBC
Gain low		Usual gain settings[1]	0dB
Gain mid	-6 / -3 / 0 / 3 / 6 / 9 / 12		3B
Gain high	/ 18 / 24 / 30 / 36 / 42		9B
Gain turbo			12dB

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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.

Turbo sw ind	Off / On		
Shockless gain	Off / On	Disables shockless auto gain control	Off

OPERATION 15 VF SETTING   more on the viewfinder

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

OPERATION 16 AUTO IRIS

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

OPERATION 17 SHOT ID   identifying shots for recording

item	range	comment	BBC
ID-1			
ID-2		4 lines, each of 12 characters, alphanumerics, symbols,	
ID-3		spaces allowed	
ID-4			

OPERATION 18 SHOT DISP   Stuff recorded over colour bars

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

OPERATION 19 SET STATUS

item	range	comment	BBC
Status abnormal	Off / On		
Status system	Off / On		
Status function	Off / On		
Status audio	Off / On		

OPERATION 20 WHITE SETTING   White balance controls

item	range	comment	BBC
White switch <B>	Mem / ATW	White balance switch position B can take preset or auto	
Shockless white	Off / 1 / 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	Off / On	Auto white on only centre of screen	
Filter wht mem	Off / On	Store separate white balance for each filter position	

OPERATION 21 OFFSET WHT   White balance stores

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

OPERATION 22 SHT ENABLE   Shutter control

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

item	range	comment	BBC
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

item	range	comment	BBC
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

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

OPERATION 26 UMID SET SMPTE330M-2003, Unique Material Identifier

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

OPERATION 27 CLIP TITLE Naming of clips on disc

item	range	comment	BBC
Title	<u>Disabl</u> / Enabl		
Select prefix	Exec		
Clear numeric	Exec	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.	
Load prefix data	Exec		
Prefix			
Numeric	1 ~ 99,999		

OPERATION 28 FILE NAMING Naming of clips on disc

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

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

PAINT

PAINT 01 SW STATUS   main controls

item	range	comment	BBC
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

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

PAINT 03 BLACK/FLARE   master black settings

item	range	comment	BBC
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

item	range	comment	BBC
Gamma	Off / <u>On</u>	All curve bending	On
Master gamma	0.35 ~ <u>0.45</u> ~ 0.9		0.45
R gamma	-99 ~ 99	These controls have huge range, use with care	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

Item	range	comment	BBC
Black gamma	<u>Off</u> / On		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

item	range	comment	BBC
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]

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[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.

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

item	range	comment	BBC
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 crispened	
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

item	range	comment	BBC
Knee aperture	<u>Off</u> / On	Extra detail above knee point	Off
Knee apt level	-99 ~ 99		
Detail limit	-99 ~ 99		
Detail wht limit	-99 ~ 99	Detail +ve excursion limit	
Detail blk limit	-99 ~ 99	Detail –ve excursion limit	
V dtl creation	NAM / G / <u>R+G</u> / 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

item	range	comment	BBC
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

item	range	comment	BBC
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	Off / <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

item	range	comment	BBC
Matrix	Off / <u>On</u>	All matrices	On
Matrix (user)	<u>Off</u> / On	Roll your own matrix	Off
Matrix (preset)	Off / <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		

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[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.

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

item	range	comment	BBC
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+ / Yl- / Yl / Yl+ / 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

item	range	comment	BBC
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

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

PAINT 15 NOISE SUPPRESSION   Reduces hf noise

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

PAINT 16 SCENE FILE

item	range	comment	BBC
1			
2			
3		Recall one of the 5 scene files stored in the camera	
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 <div align="right">lens corrections</div>

item	range	comment	BBC
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 <div align="right">lens corrections</div>

item	range	comment	BBC
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 <div align="right">main output signal levels</div>

item	range	comment	BBC
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 <div align="right">voltage parameters, sets warning levels</div>

item	range	comment	BBC
Info Before end	5% / 10% / 15% / … / 95% / 100%		
Info End	0% / 1% / 2% / 3% / 4% / 5%		
Sony Before end	11.5V ~ 17.0V		
Sony End	11.0V ~ 11.5V	Change these only if you really know what you're doing	
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	11.0 ~ 14.0V		
Detected battery	Display only		

MAINTENANCE 05 BATTERY2 <div align="right">voltage parameters, sets battery indicator scaling</div>

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

MAINTENANCE 06 AUDIO-1 <div align="right">Boring stuff starts here</div>

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

MAINTENANCE 07 AUDIO-2

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

MAINTENANCE 07 AUDIO-3

item	range	comment	BBC
Au sg (1kHz)	On / Off / Auto	On=1kHz on bars, Auto=1kHz when ch1 audio select switch (inside) is on Auto	
Mic ch1 level	Side1 / Front / F+S1		
Mic ch2 level	Side2 / Front / F+S2		
Rear1/WRR level	Side1 / Front / F+S1		
Rear2/WRR level	Side2 / 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

item	range	comment	BBC
WRR Valid ch sel	All / Ch1	Enables both channels or just ch1	
WRR ch select	Tx1 / Tx2		
WRR delay comp	Off / On	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	Auto / 0~8ms		

MAINTENANCE 10 TIMECODE

item	range	comment	BBC
TC out	Auto / Gene		
DF/NDF	DF / NDF	Drop frame, only in NTSC-land	
Ext-LK DF/NDF	Int / Ext		
Ext-LK UBIT	Int / Ext		
Ltc UBIT	Fix / Time	Fix=you set data, Time=records time	
Watch auto adj	Off / On		
UBIT group id	000 / 101		

MAINTENANCE 11 ESSENCE MARK

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

MAINTENANCE 12 CAM CONFIG 1   General stuff

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

MAINTENANCE 13 CAM CONFIG 2

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

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

MAINTENANCE 14 PRESET WHITE

item	range	comment	BBC
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 / On	Allows Preset to store an auto white balance	

MAINTENANCE 15 WHITE FILTER

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

MAINTENANCE 16 DCC ADJUST

item	range	comment	BBC
DCC function sel	DCC / Fix	DCC is auto knee, Fix uses values below	
DCC D range	400% / 450% / 500% / 550% / 600%	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

item	range	comment	BBC
Iris window	1 / 2 / 3 / 4 / 5 / 6 / Var	Size of iris window, Var=variable below	
Iris window ind	Off / On	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 ~ 240 ~ 479	Frame width in Variable	
Iris var height	20 ~ 135 ~ 269	Frame height in Variable	
Iris var H pos	-460 ~ 0 ~ 459	Centring	
Iris var V pos	-235 ~ 0 ~ 252		
Iris speed	-99 ~ 99		
Clip high light	Off / On	Ignores brightest areas	

MAINTENANCE 18 GENLOCK

item	range	comment	BBC
Genlock	Off / On		
Gl HD H phase	-99 ~ 99	Horizontal phase, HD	
Gl SD H phase	-99 ~ 99	Horizontal phase, SD	
Reference	Internal / Genlock		

MAINTENANCE 19 ND COMP

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

MAINTENANCE 20 AUTO SHADING

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

MAINTENANCE 21 APR

item	range	comment	BBC
APR	Exec	Perform automatic pixel noise reduction	

MAINTENANCE 22 NETWORK   Ethernet connection

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

| Duplex | Auto / Full / Half | | |

FILE

FILE01 USER FILE   None of this affects pictures or sound

item	range	comment	BBC
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

item	range	comment	BBC
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	Off / On	Whether to load customization data on file load	
Load out of user	Off / On	Load user stuff not registered as User	
Before file page	Off / On	Whether to load stuff from beyond User pages	
User load white	Off / On	Whether to load white balances as well	

FILE03 ALL FILE   powerful customising, memory stick operations

item	range	comment	BBC
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	Off / On	Allows Preset layer to return to factory settings when Menu Cancel switch pressed for 3 seconds	
Network data	Off / On	Whether to read in network-related data	

FILE04 SCENE FILE   less dangerous memory stick stuff

item	range	comment	BBC
1			
2		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.	
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

item	range	comment	BBC
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

item	range	comment	BBC
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

item	range	comment	BBC

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

item	range	comment	BBC
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

item	range	comment	BBC
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

item	range	comment	BBC
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

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

DIAGNOSIS03 ROM VERSION 1 software versions

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

DIAGNOSIS04 ROM VERSION 2 software versions

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

DIAGNOSIS05 ROM VERSION 3 software versions

item	range	comment	BBC
Dsp0		Firmware versions, not recorded from test camera	
Dsp2			
Prxa			

DIAGNOSIS04 DEV STATUS reports on hardware status checks

item	range	comment	BBC
I/O : MS,FP,CN,DCP,VF			
D/A : Dcp1,Dcp2,Dcp3	OK=normal		
EEprom : Cn, Dcp, Dr	NG=Abnormal		
Fram : At	---=state not		
Fan : Mb	defined		
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.