Colorimetric and Resolution requirements of cameras

Alan Roberts

ADDENDUM 6/rev 2 : Sony HDCAM, HDW750P

Data for this section is taken from the handbook and examination of a prototype of the Sony HDW750P. This model is a 1080-line camcorder, is physically smaller and lighter than the HDW900, has lower power consumption and some useful enhancements to connectivity. However, it runs only at 50Hz interlaced or 25Hz PsF, unlike the multi-speed HDW900. It records using the same HDCAM algorithm and data rate as the HDW900, tapes are interchangeable.

The camera is housed in an IMX camcorder shell. 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. The HD viewfinder can be replaced with an SD one, especially useful when the camera is to be genlocked to an SD source. A standard option is a live down-converter to SD, so the camera can be used in mixed environments. Video output is analogue or SDI, both at HD and SD. An 8-second buffer allows the camera to capture pictures before the record button is pressed, thus power can be saved by not keeping the tape transport in Stand By mode.

The menu settings result from several measurement and usage sessions, mostly attempting to get a good “film-look”, and the settings reflect that. It is useful to think of the camera, when used in this way, to be mimicing a film camera and telecine, with “best light” transfer to tape, with about 11 stops of tonal range. Due to the extraordinary flexibility of the controls, it is possible to make it mimic negative or positive film, and resolution can be 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. The values for Gamma, Black Gamma and Knee allow about 2.5 stops of over-exposure and one of under-exposure relative to normal operation. The “film” gamma mode has a built-in knee, combining this with the main knee function gives smooth reproduction of highlights. This setup approaches a film-look, enhanced by the separated Detail and Aperture controls (detail enhancement can be set negative, to reduce in-band sharpness, leaving aperture correction to work at high frequencies). With both Detail and Aperture off, images are generally sharper than even for 35mm film, this can be an issue for production. For use in Sport or Light Entertainment, it would probably be beneficial to switch off the Black Gamma, and to set Detail Level to zero (factory setting).

This revision corrects a few very minor errors in the previous version, none of which affected pictures.

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ADDENDUM 6/rev 2 : settings for Sony HDCAM, HDW750P

Since the camera settings offer great flexibility, it has been possible to derive several "BBC settings" for it. Setting values are given for:

- "Best-light" negative film {n}
- Reversal film {r}
- Super16mm resolution {16}
- 35mm resolution {35}

Where different values are needed for these settings, they are marked e.g. thus: ON{n}OFF{16}. Note that these settings are not intended to precisely reproduce the performance of any particular film stock, merely to give a "look" that is representative of a generic film type.

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, and the range offered by the camera under test. Values in parenthesis are relative and depend on other settings, the values shown were those in the camera under test. "BBC" settings are in the last column, where appropriate.

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 revision corrects a few very minor errors in the previous version, none of which affected pictures.

TOP MENU	
USER	Go to daily routine settings, 5 pages that can be customised
USER MENU CUSTOMISE	Customise user menu pages
ALL	Go to all menu pages
OPERATION	Settings for shot-by-shot control
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 (5 pages) 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

OPERATION01 OUTPUT SEL setting output signals

item	*factory*	*range*	*comment*	*BBC*
HD SDI OUT	ON	OFF/ON	Switch off to save power	ON
REAR BNC OUT SEL	OFF	OFF/VBS/SDI	Optional downconvert, vbs=PAL comp	SDI
TEST OUT SELECT	HD	HD/SD	Socket on camera side	HD
DOWN CON MODE	CROP	SQEZE/LETTR/CROP	Format of downconverter from 16:9	SQEZE

OPERATION02 FUNCTION1 switch functions

item	*factory*	*range*	*comment*	*BBC*
ASSIGN SW <1>	EZ-FC	OFF/F.MIC/LOOPR/CHARA/MARKR/EZ-FC /RTAKE/ATW/RET.V/RET/REC/TURBO	Set assignable switches, see	EZ-FC
ASSIGN SW <2>	F.MIC	OFF/F.MIC/LOOPR/CHARA/MARKR	handbooks	CHARA
FRONT MIC SELECT	STREO	MONO/STREO		
END SEARCH	OFF	OFF/ON	Search for end of recording	ON
LOOP/INTVAL REC	OFF	OFF/LOOP/A.INT/M.INT	Loop recording, see handbooks	OFF

OPERATION03 FUNCTION2 more switch functions

item	*factory*	*range*	*comment*	*BBC*
WHITE SWITCH <B>	MEM	MEM/ATW	White bal B, Auto Tracing/Memory	MEM
SHOCKLESS WHITE	1	OFF/1/2/3sec	Smooth transitions in auto white	OFF
LOW LIGHT	OFF	OFF/ON	Warning message, low light level	
LOW LIGHT LEVEL	0	(-99~99)	Threshold	
BATTERY WARNING	10%	10%/20%	Anton Bauer warnings, 0.67/1.33V	

OPERATION04 VF DISP1 viewfinder display options

item	*factory*	*range*	*comment*	*BBC*
VF DISP	ON	OFF/ON	All on or off except menus	
VF DISP MODE	3	1/2/3	1=least info, 3=most	
DISP EXTENDER	ON	OFF/ON	Lens range extender	
DISP FILTER	ON	OFF/ON	Filter wheels	
DISP WHITE	ON	OFF/ON	White balance setting	
DISP GAIN	ON	OFF/ON	Gain switch	
DISP SHUTTER	ON	OFF/ON	Shutter speed	
DISP AUDIO	ON	OFF/ON	Audio levels	
DISP TAPE	ON	OFF/ON	Tape left	
DISP IRIS	ON	OFF/ON	Iris setting	

OPERATION05 VF DISP2 viewfinder display options

item	*factory*	*range*	*comment*	*BBC*
DISP ZOOM	ON	OFF/ON	Lens zoom	
DISP COLOR (sic) TEMP	OFF	OFF/ON	Colour temperature	
DISP VOLT	OFF	OFF/ON	Battery (DC IN) voltage	ON
DISP WRR RF LVL	OFF	OFF/ON	Radio mic receiver rf level	
DISP TIME CODE	OFF	OFF/ON	Time code	

OPERATION06 ! LED viewfinder warnings options

item	*factory*	*range*	*comment*	*BBC*
GAIN	ON	OFF/ON	If gain<>0dB	
SHUTTER	ON	OFF/ON	If shutter is ON	
WHT PRESET	ON	OFF/ON	If WHITE BAL is PRST	
ATW RUN	ON	OFF/ON	If Auto White Tracing is ON	
EXTENDER	ON	OFF/ON	If extender is in	
FILTER	OFF	OFF/ON	If filter(s) not at position 1	
OVERRIDE	ON	OFF/ON	If auto-iris ref is not at standard value	

OPERATION07 MARKER1 viewfinder markers, also on side socket monitor output

item	*factory*	*range*	*comment*	*BBC*
MARKER	OFF	OFF/ON	All markers on/off	ON
CENTER (sic)	OFF	OFF/ON		
CENTER MARK	3	1/2/3/4	Variants of centre cross marker	
SAFETY ZONE	OFF	OFF/ON		ON
SAFETY AREA	90%	80/90/92.5/95%	Linear size of safety zone marker	90%
ASPECT	OFF	OFF/ON	Aspect ratio marker	ON
ASPECT SELECT	4:3	14:9/13:9/4:3/VISTA/C NSCO	Vistavision=1.85:1, Cinemascope=2.35:1	14:9
ASPECT MASK	OFF	OFF/ON	Darkens outside the mask in vf only	OFF
ASPECT MASK LVL	0	0~8	Degree of darkness	
100% MARKER	OFF	OFF/ON/SD	Edge of raster, smaller in SD mode*	OFF

* This marks the edge of the camera image. In “HD” mode it marks the edge pixels and lines, but is narrower in “SD” mode. This is to take account of the ITU Rec.601 image size of 702 (or perhaps 704) pixels width rather than 720. If an edge-of-raster box is required, use the “HD” mode, since there is no guarantee that downconversion will not use the full 1920 pixels width.

OPERATION08 MARKER2 viewfinder markers, also on side socket monitor output

item	*factory*	*range*	*comment*	*BBC*
USER BOX	OFF	OFF/ON	User defined marker box	OFF
USER BOX WIDTH	240	1~479	In 4-pixel steps	
USER BOX HEIGHT	135	1~269	In 4-line steps	
USER BOX H POS	0	-479~479	4-pixel/line steps. Limited by box size,	
USER BOX V POS	0	-268~268	not allowed to go off edge of screen	
CENTER H POS	0	-479~480	In 4-pixel/line steps, moves centre	0
CENTER V POS	0	-270~269	marker	0

OPERATION09 GAIN SW gain switch settings

item	*factory*	*range*	*comment*	*BBC*
GAIN LOW	0dB	-3dB / 0dB / 6dB / 9dB	Usual gain settings	0dB
GAIN MID	6dB	/ 12dB / 18dB / 24dB /		6dB
GAIN HIGH	12dB	30dB / 36dB / 42dB		12dB
GAIN TURBO	42dB			42dB
TURBO SW IND	OFF	OFF/ON	Disables L/M/H switch when in turbo	OFF

OPERATION10 VF SETTING more on the viewfinder

item	*factory*	*range*	*comment*	*BBC*
ZEBRA	OFF	OFF/ON		ON
ZEBRA SELECT	1	1/2/BOTH		BOTH
ZEBRA1 DET LEVEL	0	(0~199)	Set for skin, 50=85% on grey scale	50
ZEBRA2 DET LEVEL	0	(-49~149)	Set for white, 0=100% on grey scale	0
ASPECT	OFF	OFF/ON	Duplicates setting in OPERATION07	ON
VF DETAIL LEVEL	0	(-120~78)	Software detail enhancer, no affect on	0
VF DTL H LEVEL	0	(-99~99)	recording or output (vf also has	0
VF DTL V LEVEL	0	(-99~99)	peaking), helps with focus checks	0

OPERATION11 AUTO IRIS

item	*factory*	*range*	*comment*	*BBC*
IRIS OVERRIDE	OFF	OFF/ON	Allows aim point control, ± 1 stop	OFF
IRIS SPEED	2	1/2/3/4/5	1=fast, 5=slow	
CLIP HIGHLIGHT	OFF	OFF/ON	Ignores signal over 100%	
IRIS WINDOW	1	1/2/3/4/5/6/VAR	Detection box shape	
IRIS WINDOW IND	OFF	OFF/ON	Checks iris window against box cursor	
IRIS VAR WIDTH	240	1~479	VARiable box, set in in 4-pixel/line	
IRIS VAR HEIGHT	135	1~269	steps, same as box cursor	
IRIS VAR H POS	0	-479~479	4-pixel/line steps. Limited by box size,	
IRIS VAR V POS	0	-268~268	not allowed to go off edge of screen	

OPERATION12 SHOT ID identifying shots for tape

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

OPERATION13 SHOT DISP this goes over colour bars as a caption

item	*factory*	*range*	*comment*	*BBC*
SHOT DATE	OFF	OFF/ON		OFF
SHOT TIME	OFF	OFF/ON		OFF
SHOT MODEL NAME	OFF	OFF/ON	Camera model name	OFF
SHOT SERIAL NO	OFF	OFF/ON	Camera serial number	OFF
SHOT ID SEL	OFF	OFF/ID-1~4	Selection from OPERATION12	OFF
SHOT BLINK CHAR	OFF	OFF/ON	Characters can flash	OFF

OPERATION14 SET STATUS select what comes up when STATUS switch is ON

item	*factory*	*range*	*comment*	*BBC*
STATUS ABNORMAL	ON	OFF/ON	Enables the "!" warnings: shows GAIN, SHUTTER, WHT PRESET, ATW RUN, EXTENDER, FILTER, OVERRIDE	ON
SATUS FUNCTION	ON	OFF/ON	Enables function screen: shows ASSIGN SW1, ASSIGN SW2, LOOP REC, REAR BNC, TEST OUT, HD SDI	ON
STATUS AUDIO	ON	OFF/ON	Enables audio status screen: shows EMPHASYS, CH1/2/3/4 SOURCE, sound levels	ON

OPERATION15 TEST OUT what comes out of the side socket marked TEST

item	*factory*	*range*	*comment*	*BBC*
TEST OUT MARKER	OFF	OFF/ON	All vf markers	OFF
TEST OUT VF DISP	OFF	OFF/ON	All vf text	OFF
TEST OUT MENU	OFF	OFF/ON	All menus	OFF
TEST OUT ZEBRA	OFF	OFF/ON	Zebras as set for vf	OFF
OUTPUT SELECT	Y	Y/R/G/B	HD monitor, Y becomes VBS for SD	OFF

OPERATION16 OFFSET WHITE deliberate offsets from white balance

item	*factory*	*range*	*comment*	*BBC*
OFFSET WHITE <A>	OFF	OFF/ON	Settings work only if auto white is off	OFF
WARM COOL <A>	3200	1592~27585K	Coarse R/B balance	
COLOR FINE <A>	0	(-99~99)	Fine R/B balance	
OFFSET WHITE <B>	OFF	OFF/ON	Settings work only if auto white is off	OFF
WARM COOL <B>	3200	1592~27585K	Coarse R/B balance	
COLOR FINE <B>	0	(-99~99)	Fine R/B balance	

OPERATION17 SHT ENABLE shutter speeds/modes for the external shutter switch

item	*factory*	*range*	*comment*	*BBC*
SHUTTER ECS	ON	OFF/ON	Extended Clear Scan, dialable shutter	ON
SHUTTER 1/33	ON	OFF/ON		ON
SHUTTER 1/50	ON	OFF/ON		ON
SHUTTER 1/60	ON	OFF/ON		ON
SHUTTER 1/100	ON	OFF/ON		ON
SHUTTER 1/125	ON	OFF/ON		ON
SHUTTER 1/250	ON	OFF/ON		ON
SHUTTER 1/500	ON	OFF/ON		ON
SHUTTER 1/1000	ON	OFF/ON		ON
SHUTTER 1/2000	ON	OFF/ON		ON

OPERATION18 LENS FILE

item	*factory*	*range*	*comment*	*BBC*
LENS FILE SELECT	OFF	OFF/1~5	Select lens file	OFF
F.ID			Display file ID	
F.STOP			Display F stop in file	

PAINT

PAINT01 SW STATUS main controls

item	*factory*	*range*	*comment*	*BBC*
GAMMA	ON	OFF/ON		ON
BLACK GAMMA	OFF	OFF/ON		ON{n} OFF{r}
MATRIX	OFF	OFF/ON		ON
KNEE	ON	OFF/ON		ON
WHITE CLIP	ON	OFF/ON		ON
DETAIL	ON	OFF/ON		ON
APERTURE	ON	OFF/ON		ON
FLARE	ON	OFF/ON		ON
EVS	OFF	OFF/ON	Enhanced Vertical resolution System	OFF
TEST SAW	OFF	OFF/ANALOG/ DIGITAL	Analog replaces the ccd signal. works only if BARS are OFF.	OFF

PAINT02 WHITE colour temperatures stored by the WHITE A/.B switch

item	*factory*	*range*	*comment*	*BBC*
COLOR TEMP <A>	3200	(2088~19000K)	Tweaks R/B gains indirectly	
COLOR FINE <A>	0	(-99~99)	Fine control	
R GAIN <A>	0	(-99~99)	Tweaking these changes the colour	
B GAIN <A>	0	(-99~99)	temperature setting	
COLOR TEMP <B>	3200	(2088~19000K)	Tweaks R/B gains indirectly	
COLOR FINE <B>	0	(-99~99)	Fine control	
R GAIN <B>	0	(-99~99)	Tweaking these changes the colour	
B GAIN <B>	0	(-99~99)	temperature setting	

PAINT03 BLACK/FLARE master black settings

item	*factory*	*range*	*comment*	*BBC*
MASTER BLACK	0	(-101~97)		0
R BLACK	0	(-101~97)		0
B BLACK	0	(-101~97)		0
MASTER FLARE	0	(-99~99)		0
R FLARE	0	(-99~99)		0
G FLARE	0	(-99~99)		0
B FLARE	0	(-99~99)		0
FLARE	ON	OFF/ON		ON
OUTPUT SELECT	Y	Y/R/G/B	Duplicates setting in OPERATION15	Y

PAINT04 GAMMA main gamma controls

item	*factory*	*range*	*comment*	*BBC*
GAMMA	ON	OFF/ON	All curve bending	ON
MASTER GAMMA	0	(-160~88)std (-221~27)film		0
R GAMMA	0	(-99~99)std (-170~28)film	These controls have huge range, limits and centres depend on whether STD or FILM gamma is selected	0
G GAMMA	0	(-99~99)std (-170~28)film		0
B GAMMA	0	(-99~99)std (-170~28)film		0
OUTPUT SELECT	Y	Y/R/G/B	Duplicated in OPERATION15	Y
GAMMA SEL	STD	STD/FILM	FILM gamma has built-in soft knee	FILM{n} STD{r}
GAMMA SEL	3	1~4	1=”Digibeta” (3.5x), 2=SMPTE240 (4x), 3=ITU709 (4.5x), 4=BBC (5x)	4{n} 3{r}

PAINT05 BLK GAMMA independent slope at black

item	*factory*	*range*	*comment*	*BBC*
BLACK GAMMA	ON	OFF/ON		ON{n} OFF{r}
BLK GAMMA RANGE	HIGH	LOW/L.MID/H.MID/HIGH	3.6/7.2/14.4/28/8% of luma	H.MID
MASTER BLK GAMMA	0	(-101~97)	Raises slope to about 7.5x	60
R BLK GAMMA	0	(-101~97)		0
G BLK GAMMA	0	(-101~97)		0
B BLK GAMMA	0	(-101~97)		0
OUTPUT SELECT	Y	Y/R/G/B	Duplicates setting in OPERATION15	Y

PAINT06 KNEE highlight compression

item	*factory*	*range*	*comment*	*BBC*
KNEE	ON	OFF/ON		ON
KNEE POINT	95.0	50%~109%	Two soft bends, this sets the lower	100{n} 85{r}
KNEE SLOPE	0	(-136~62)	Affects both segment slopes (curved)	-116{n} -15{r}
KNEE SATURATION	ON	OFF/ON	Not needed, True Eye keeps colours	OFF
KNEE SAT LEVEL	0	(-99~99)	right	
WHITE CLIP	ON	OFF/ON		ON
WHITE CLIP LEVEL	108.0	100.0~109.5%		108%

PAINT07 DETAIL1

item	*factory*	*range*	*comment*	*BBC*
DETAIL	ON	OFF/ON	All DETAIL compensation	ON
APERTURE	ON	OFF/ON	Separate APERTURE correction	ON
DETAIL LEVEL	0	(-128~70)	Overall level	-70{35} -90{16}
APERTURE LEVEL	0	(-1~14)	Overall level	5{35} 4{16}
DETAIL H/V RATIO	0	(-145~53)	Only changes vertical amount	0
CRISPENING	0	(-77~121)	Signal level range that gets crispened	0
LEVEL DEPEND	ON	OFF/ON	Detail level dependency	ON
LEVEL DEPEND LVL	0	(-37~161)	Detail level range affected	0
DETAIL FREQ	0	(-99~99)	Frequency of detail compensation	99{35} 65{16}

PAINT08 DETAIL2

item	*factory*	*range*	*comment*	*BBC*
KNEE APERTURE	ON	OFF/ON	Extra detail above knee point	OFF
KNEE APT LEVEL	0	(0~199)		
DETAIL WHT LIMIT	0	(-175~23)	Detail +ve excursion limit	
DETAIL BLK LIMIT	0	(-157~41)	Detail –ve excursion limit	
DETAIL V-BLK LIMIT	0	(-61~137)	Vertical detail –ve excursion limit	

PAINT09 SD DETAIL extra controls for downconverter, if fitted

item	*factory*	*range*	*comment*	*BBC*
SD DETAIL	ON	OFF/ON	All as for HD	OFF
SD DETAIL LEVEL	0	(-50~148)		
SD CRISPENING	0	(0~15)		
SD DTL WHT LIMIT	0	(-101~97)		
SD DTL BLK LIMIT	0	(-101~97)		
SD LEVEL DEPEND	ON	OFF/ON		
SD LV DEPEND LVL	0	(-8~7)		
SD DTL FREQ	0	(-2~1)		
SD DTL H/V RATIO	0	(-3~4)		
SD CROSS COLOR	0	(0~15)		

PAINT10 SKIN DETAIL

item	*factory*	*range*	*comment*	*BBC*
SKIN DETAIL ALL	OFF	OFF/ON	All skin detail on/off	OFF
SKIN DETECT	EXEC		Press rotary encoder to detect skin colour	
SKIN AREA IND	OFF	OFF/ON	Zebra display of target area	
SKIN DTL SELECT	1	1/2/3	3 separate banks of skin detail controls	
SKIN DETAIL	ON	OFF/ON	Separate controls for each bank	
SKIN DETAIL LEVEL	1	(-81~117)	Detail level	
SKIN DTL SAT	0	(-24~174)	Saturation change	
SKIN DTL HUE	0	(0-359)	Hue change	
SKIN DTL WIDTH	40	(0~359)	Target hue angle width	

PAINT11 MTX LINEAR camera matrix

item	*factory*	*range*	*comment*	*BBC*
MATRIX	OFF	OFF/ON	All matrices	ON
MATRIX (USER)	OFF	OFF/ON	Roll your own matrix	OFF
MATRIX (PRESET)	OFF	OFF/ON	Standard matrices	ON
MATRIX (PRST) SEL	2	1~6	SMPTE240/ITU709/SMPTE-WIDE/ NTSC/EBU(i.e.PAL)/ITU601	2
MATRIX (USER) R-G	0	(-99~99)		
MATRIX (USER) R-B	0	(-99~99)		
MATRIX (USER) G-R	0	(-99~99)		
MATRIX (USER) G-B	0	(-99~99)		
MATRIX (USER) B-R	0	(-99~99)		
MATRIX (USER) B-G	0	(-99~99)		

PAINT12 MTX MULTI multi-linear matrix, for advanced knob twiddlers only

item	*factory*	*range*	*comment*	*BBC*
MATRIX	OFF	OFF/ON	All matrices	ON
MATRIX (MULTI)	OFF	OFF/ON	Roll your own multi-segment matrix	OFF
MTRIX AREA IND	OFF	OFF/ON	Use zebra to show active region	
MTRIX COLOR DET	EXEC		Press rotary encoder to select current area	
MTX (MULTI) AXIS	B	B/B+/MG-/MG+ /R/R+/YL-/YL+/G-/G/G+/CY/CY+/B-	14 hue angle zones	
MTX (MULTI) HUE	0	(-99~99)	Adjustment	
MTX (MULTI) SAT	0	(-99~99)	Adjustment	

PAINT13 V MODULATION temporary white V sawtooth lens shading correction

item	*factory*	*range*	*comment*	*BBC*
VMOD	OFF	OFF/ON		OFF
MASTER VMOD	0	(-99~99)	Collective control	
R VMOD	0	(-99~99)		
G VMOD	0	(-99~99)		
B VMOD	0	(-99~99)		
OUTPUT SETLECT	Y	Y/R/G/B	Duplicates setting in OPERATION15	

PAINT14 LOW KEY SAT extra saturation control for dark bits

item	*factory*	*range*	*comment*	*BBC*
LOW KEY SAT	OFF	OFF/ON		OFF
L KEY SAT LEVEL	0	(-175~23)	Collective control	
L KEY SAT RANGE	HIGH	LOW/LMID/HMID/HIGH	up to 3.6/7/2/14/4/28/8% of luma	
Y BLACK GAMMA	OFF	OFF/ON	Keeps saturations right	OFF{n} ON{r}
Y BLK GAM LEVEL	0	(-100~98)	Slope	-61
Y BLK GAM RANGE	HIGH	LOW/LMID/HMID/HIGH	up to 3.6/7.2/14.4/28.8% of luma	HMID

PAINT15 SCENE FILE

item	*factory*	*range*	*comment*	*BBC*
1		open/blot	Select scene file or factory STANDARD. Always load STANDARD first when setting up a camera. Open box indicator to read from camera, filled box indicator to read from memory stick.	
2		open/blot		
3		open/blot		
4		open/blot		
5		open/blot		
STANDARD		open/blot		
SCENE RECALL	EXEC		Press rotary encoder to read/recall it	
SCENE STORE	EXEC		Press rotary encoder to save it	
F ID			16 character file ID	

MAINTENANCE

MAINTENANCE01 WHT SHADING lens corrections

item	*factory*	*range*	*comment*	*BBC*
SHADING CH SELECT	R	R/G/B	Select channel, lower items change	
OUTPUT SELECT	Y	OFF/ON	Duplicates setting in OPERATION15	Y
R WHITE H SAW	0	(-110~88)		0
R WHITE H PARA	0	(-78~120)		0
R WHITE V SAW	0	(-109~89)		0
R WHITE V PARA	0	(-99~99)		0
WHITE SAW/PARA	ON	OFF/ON	All on/off	ON

MAINTENANCE02 BLK SHADING lens corrections

item	*factory*	*range*	*comment*	*BBC*
SHADING CH SELECT	R	R/G/B	Select channel, lower items change	
OUTPUT SELECT	Y	Y/R/G/B	Duplicates setting in OPERATION15	Y
R WHITE H SAW	0	(-88~110)		0
R WHITE H PARA	0	(-112~86)		0
R WHITE V SAW	0	(-95~103)		0
R WHITE V PARA	0	(-103~95)		0
WHITE SAW/PARA	ON	OFF/ON	All on/off	ON
MASTER BLACK	0	(-101~97)		
MASTER GAIN (TMP)	0dB	-3dB to 42dB	Gain changes only for this operation	12dB

MAINTENANCE03 LEVEL ADJ main output signal levels

item	*factory*	*range*	*comment*	*BBC*
Y LEVEL	0	(-129~69)		0
SYNC LEVEL	0	(-95~103)		0
Pr LEVEL	0	(-117~81)		0
Pb LEVEL	0	(-117~81)		0
TEST SAW	OFF	OFF/ANALOG/ DIGITAL		
OUTPUT SELECT	Y	Y/R/G/B	Duplicates setting in OPERATION15	

MAINTENANCE04 SD LEVEL ADJ downconverter output signal levels

item	*factory*	*range*	*comment*	*BBC*
SD VBS LEVEL	0	(-112~86)		0
SD VBS SETUP LVL	0	0/7.5%		0
SD VF Y LEVEL	0	(-86~112)		0
SD VF R-Y LEVEL	0	(-82~116)		0
SD VF B-Y LEVEL	Y	(-82~116)		0

MAINTENANCE05 BATTERY voltage parameters, sets warning levels

item	*factory*	*range*	*comment*	*BBC*
BEFORE END	11.3	11.0~13.0V		11.3
END	11.0	10.5~11.5V		11.0

MAINTENANCE06 VTR MODE-1 vtr signal routing

item	*factory*	*range*	*comment*	*BBC*
VIDEO OUT (F/R)	EE	EE/PB	Output during FF/REW	
AUDIO OUT (F/R)	CUE	CUE/EE	Output during FF/REW	
REC AUDIO OUT	EE	EE/SAVE	Output while recording	
CAMERA ADAPTER	ENBLE	ENBLE/DSABL		
AUDIO CH 3/4 MODE	CH1/2	CH1/2/SW		
REAR XLR AUTO	ON	OFF/ON	Rear XLR can detect audio itself	

MAINTENANCE07 VTR MODE-2 vtr audio controls

item	*factory*	*range*	*comment*	*BBC*
AU REC EMPHASIS	OFF	OFF/ON		ON
CUE REC	ON	OFF/ON		ON
AU REF LEVEL	-18dB	-18dB/-20dB		-20dB
AU REF OUT	0dB	0dB/+4dB/-3dB		0dB
AU SG (1kHz)	OFF	ON/OFF/AUTO	Tone with bars	AUTO
MIC CH1 LEVEL	FRONT	SIDE1/FRONT/F+S1	Selects knob to control front mic L	
MIC CH2 LEVEL	FRONT	SIDE2/FRONT/F+S2	Selects knob to control front mic R	
REAR1/WRR LEVEL	SIDE1	SIDE1/FRONT/F+S1	Selects knob to control radio mic L	
REAR2/WRR LEVEL	SIDE2	SIDE2/FRONT/F+S2	Selects knob to control radio mic R	

MAINTENANCE08 VTR MODE-3 vtr time-code and user bits

item	*factory*	*range*	*comment*	*BBC*
TC/OUT	AUTO	AUTO/GENE		AUTO
EXT-LK UBIT	INT	INT/EXT	LTC user bits lock to INT/EXT source	INT
LTC UBIT	FIX	FIX/TIME		FIX
VITC UBIT	FIX	FIX/TIME		FIX
WATCH AUTO ADJ	ON	OFF/ON	Auto time correction of built-in watch	ON
UBIT GROUP ID	000	000/101		000

MAINTENANCE09 VTR MODE-4 vtr odds & sods

item	*factory*	*range*	*comment*	*BBC*
REC TALLY BLINK	ON	OFF/ON	Tally blinks near end of tape or battery	ON
REC START/STOP	OFF	OFF/ON	Beep at tape start/stop	OFF
MODE SEL	SEL	SEL/OFF/CONT	TC display after switch off, SEL setting	OFF
TIMER SET	1H	1H/3H/8H	in hours after switch off	
STBY OFF TIMER	5MIN	OFF/5/10/30/60MIN		5MIN
STOP KEY FREEZE	OFF	OFF/FRAME/FIELD	Frame or field freeze when tape stops	FRAME

MAINTENANCE10 VTR MODE-5 vtr markers

item	*factory*	*range*	*comment*	*BBC*
LTC UB-MARKER	SET	SET/ALL/OFF	Controls whether to write into LTC	
REC START MARKER	OFF	OFF/ON		
SHOT MARKER 1	OFF	OFF/ON		
SHOT MARKER 2	OFF	OFF/ON		
SHOT TIME DISPLAY	MD:HM	MD:HM/DM:HM/ D:HMS	Time format	

MAINTENANCE11 PRESET WHT white balance tweaker

item	*factory*	*range*	*comment*	*BBC*
COLOR TEMP	3200	2088~very high	Coarse tweak of colour temperature	
COLOR FINE	0	(-99~99)	Fine control	
R GAIN	0	(-99~99)	These controls reflect into colour temp	
B GAIN	0	(-99~99)		
AWB ENABLE	OFF	OFF/ON	Sets auto white as preset	OFF

MAINTENANCE12 DCC auto knee

item	*factory*	*range*	*comment*	*BBC*
DCC FUNCTION SEL	DCC	DCC/ADP.K/FIX	FIX=600%, ADP.K tries to do the best	DCC
DCC POINT	500%	400/450/500/550/600%		600%
DCC D RANGE	0	(-99~99)		0
DCC GAIN	0	(-99~99)		0
DCC PEAK FILTER	0	0/1/2/3		0
DCC DELAY TIME	0	(-4~194)		0

MAINTENANCE13 IRIS2 auto iris

item	*factory*	*range*	*comment*	*BBC*
IRIS WINDOW	1	1/2/3/4/5/6/VAR	6 shapes and variable	
IRIS WINDOW IND	OFF	OFF/ON	Shows iris box in vf	
IRIS LEVEL	0	(-49~149)	Convergence level	
IRIS APL RATIO	0	(-79~119)	High=average, low=peak	
IRIS VAR WIDTH	240	-479~479	4-pixel/line steps. Limited by box size,	
IRIS VAR HEIGHT	135	-268~268	not allowed to go off edge of screen	
IRIS VAR H POS	0	-479~480	In 4-pixel/line steps, moves centre	
IRIS VAR V POS	0	-270~269	marker	
IRIS SPEED	2	1/2/3/4/5	1=fast, 5=slow	
CLIP HIGH LIGHT	OFF	OFF/ON	Limits detection level to 100%	

MAINTENANCE14 FUNCTION3 more odds & sods

item	*factory*	*range*	*comment*	*BBC*
WHT FILTER INH	OFF	OFF/ON	Inhibits separate white balance values being stored for each filter position	ON
COLOR BAR SEL	100%	SMPTE/100%/75%/ 4:3-1/4:3-2/4:3/3		SMPTE
RM COMMON MEMORY	OFF	OFF/ON	Remote control, ON keeps changes after disconnection, OFF loses them	OFF
VTR START/STOP	RM	RM/CAM/PARA	Remote control of vtr	
USER AND ALL ONLY	OFF	OFF/ON	Memory allocations	

MAINTENANCE15 GENLOCK

item	*factory*	*range*	*comment*	*BBC*
GENLOCK	ON	OFF/ON	Genlocks to HD trisync	ON
RETURN VIDEO	OFF	OFF/ON	Show HD return feed on press Lens Ret	ON
GL PHASE COARSE	0	(-99~99)		
GL PHASE FINE	0	(-99~99)		

MAINTENANCE16 ND COMP colour compensation for ND filters

item	*factory*	*range*	*comment*	*BBC*
ND OFFSET ADJ	OFF	OFF/ON		OFF
CLEAR ND OFFSET	EXEC		Press rotary encoder to do it	
ND ADJUST MODE	display1-4	OK/YET	OK=do this one, YET=not done yet	

MAINTENANCE17 FORMAT operating mode

item	*factory*	*range*	*comment*	*BBC*
CURRENT	display			
NEXT	50i	25psf/50i	Set this then power off/on to change	25psf for film

FILE

FILE01 USER FILE lens corrections

item	*factory*	*range*	*comment*	*BBC*
USER FILE LOAD	EXEC	Press rotary encoder	load/save USER file from memory stick	
USER FILE SAVE	EXEC			
F.ID		text	16 characters	
USER PRESET	EXEC		Resets USER menus to standard	

FILE02 USER FILE 2 customising, memory stick operations

item	*factory*	*range*	*comment*	*BBC*
STORE USR PRESET	EXEC	Press rotary encoder	Save USER data and use as PRESET	
CLEAR USR PRESET	EXEC		Return USER data to factory settings	
CUSTOMIZE PRESET	EXEC		Reset customised menus to factory	
LOAD CUSTOM DATA	OFF	OFF/ON	Load customised menus	
LOAD OUT OF USER	OFF	OFF/ON	Load items in USER categories as well	
BEFORE FILE PAGE	OFF	OFF/ON	Save only data from before USER page	
USER LOAD WHITE	OFF	OFF/ON	Read out WHITE data	

FILE03 ALL FILE powerful customising, memory stick operations

item	*factory*	*range*	*comment*	*BBC*
ALL FILE LOAD	EXEC	Press rotary encoder	Read all menu items from stick	
ALL FILE SAVE	EXEC		Save all menu items to stick	
F.ID			16 characters	
ALL PRESET	EXEC		Reset all menu items to standard settings. numeric ranges go back to e.g. –99~99	
STORE ALL PRESET	EXEC		Save all menu items and use in PRESET layer, changes numeric ranges.	
CLEAR ALL PRESET	EXEC		Return all menus to factory settings	
3SEC CLR PRESET	OFF		Allows PRESET layer to return to factory settings when CANCEL switch pressed for 3 seconds	

FILE04 SCENE FILE less dangerous memory stick stuff

item	*factory*	*range*	*comment*	*BBC*
1		open/blot		
2		open/blot	RECALL/CANCEL scene file, Open	
3		open/blot	box reads file from memory stick, filled	
4		open/blot	box cancels scene file	
5		open/blot		
STANDARD		open/blot	Returns to standard setting	
SCENE RECALL	EXEC	Press rotary encoder	Brings up secondary menus to	
SCENE STORE	EXEC		save/load scene files	
F.ID			16 characters	

FILE05 REFERENCE FILE less dangerous memory stick stuff

item	*factory*	*range*	*comment*	*BBC*
REFERENCE STORE	EXEC	Press rotary encoder	Save REF file in main unit	
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	
SCENE WHITE DATA	OFF	OFF/ON	Allow/disallow white data in scene file	

FILE06 LENS FILE 1

item	*factory*	*range*	*comment*	*BBC*
LENS FILE RECALL	EXEC	Press rotary encoder	Brings up secondary menus, load/save	
LENS FILE STORE	EXEC		up to 5 files to camera or memory stick	
F.ID			16 characters	
F.STOP	1.7	1.7~3.4		
LENS NO OFFSET	EXEC		Resets lens file data to factory settings	
SOURCE		display only	Displays lens file memory number	

FILE07 LENS FILE 2

item	*factory*	*range*	*comment*	*BBC*
LENS M VMOD	0	-99~99	Master V Mod correction	
LENS CENTER H	0	-480~479	Centre marker position in steps of 2	
LENS CENTER V	0	-270~269	pixels/lines	
OUTPUT SELECT	Y	Y/R/G/B	Duplicates setting in OPERATION15	
LENS R FLARE	0	-99~99		
LENS G FLARE	0	-99~99		
LENS B FLARE	0	-99~99		
LENS W-R OFST	0	-99~99	Red and Blue white gain offsets	
LENS W-B OFST	0	-99~99		

FILE08 LENS FILE 3

item	*factory*	*range*	*comment*	*BBC*
SHADING CH SELECT	0	Y/R/G/B/RGB	Master V Mod correction	
OUTPUT SELECT	Y	Y/R/G/B/RGB	Like setting in OPERATION15	
LENS R H SAW	0	-99~99		
LENS R H PARA	0	-99~99	Sawtooth and parabola settings for	
LENS R V SAW	0	-99~99	whichever channel(s) selected	
LENS R V PARA	0	-99~99		

FILE09 MEMORY STICK memory stick options

item	*factory*	*range*	*comment*	*BBC*
FORMAT	EXEC	Press rotary encoder	Wipes it clean	
MS IN JUMP TO	OFF	OFF/USER/ALL/SCENE / LENS/REF/USER1	Action on inserting memory stick, jump to a menu page	

FILE10 TELE FILE format stick

item	*factory*	*range*	*comment*	*BBC*
TELE FILE CLEAR	EXEC	Press rotary encoder		
ID			20 characters	
SIZE	0000KBYTE	display only	Memory label capacity	
REMAIN	00%		Memory label free space	
STATUS	STANDBY		STANDBY=write enabled, NO LABEL= not attached, WRITE PROTECT, UNKOWN FORMAT=write disabled, NO CASSETTE, UNFORMAT=not formatted, MEMORY FULL	

DIAGNOSIS

DIAGNOSIS01 HOURS METER vtr usage meters

item	*factory*	*range*	*comment*	*BBC*
RESET METER	EXEC	Press rotary encoder	Menu to reset any of lower four meters	
DRUM RUNNING			Drum rotation hours	
TAPE RUNNING			Tape running hours	
OPERATION			Power-on hours	
THREADING			Number of threadings	
DRUM RUNNING 2				
TAPE RUNNING 2			Resettable meters	
OPERATION 2				
THREADING 2				

DIAGNOSIS02 TIME/DATE

item	*factory*	*range*	*comment*	*BBC*
ADJUST	EXEC	Press rotary encoder		
HOUR	12			
MIN	55			
SEC	58			
YEAR	00			
MONTH	06			
DAY	24			

DIAGNOSIS03 ROM VERSION software versions

item	*factory*	*range*	*comment*	*BBC*
AT : Ver	1.36		IC38/AT-143 board	
SS : Ver	0.01		IC8/SS-92 board	
FP : Ver	0.40		IC801/FP-121 board	
EQ : Ver	1.31		IC1101/EQ-88 board	

DIAGNOSIS04 DEV STATUS reports on hardware status checks

item	*factory*	*range*	*comment*	*BBC*
I/O			Input/Ouput devices	
IFA			IC201, 204/IFA-11 board	
DR			IC33/DR-433 board	
VF1			IC inside vf	
VF2		OK=normal	IC inside vf	
FP1		NG=Abnormal	IC703/FP-121 board	
FP2		---=state not defined	IC704/FP-121 board	
RP1			IC10/RP-123 board	
RP2			IC17/RP-123 board	
EEPROM			EEPROM checks	
IFA			IC202/IFA-11 board	
DCP			IC611/DCP-28 board	
DR			IC31/DR-433 board	
LSI			LSI checks	
SCVP			IC109/DCP-28 board	
SG			IC614/DCP-28 board	
DCAON			IC23/DC-110 board	
SCI			SCI checks	
SS			Comms with SS microprocessor	
RM			Comms with remote control	

DIAGNOSIS05 OPTION BOARD reports on hardware option boards

item	*factory*	*range*	*comment*	*BBC*
DOWN CONVERTER		O/-	O=installed, -=not installed	
HD-SDI OUTPUT		O/-		
PIC CACHE		O/-	8 second looping video store	

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