

Colorimetric and Resolution requirements of cameras

Alan Roberts

ADDENDUM 12 : Menu settings for

Sony HD, HDC950 (and 930)

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 handbooks of a Sony HDC950 camera (serial number 10520). It closely resembles the 900, but is a studio/OB camera with base station and remote control panel. Camera connection is by fibre-optic cable, which is very flexible.

The menu settings result from one measurement and usage session, mostly exploring the menus to see how it differs from the 900. In many ways it is identical, but there are some minor differences which guarantee that using data for the 900 will not work. I have derived “video” and “film” settings for it, like the 900, and performance is very similar to the 900. The manual for the 950 also covers the 930 and indicates that there are only very minor differences, therefore the settings are almost certainly fine for the 930 as well as the 950.

The “video look” was the easiest to derive, but the “film look” needed lab equipment to define it. This setting mimics a film camera and neg-scan telecine, with “best light” transfer to tape. It’s performance should match the equivalent setting in an HDW900 camcorder. It is always assumed that a grading operation should be used in post-production, the settings give the colourist the same range of options as with film. The laboratory tests were made using a BTS LDK9000 as a reference camera, of the type used in the Eureka 1250-line system. 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, although the knee has two points of inflexion which could conceivably cause colour contouring (although this has not been observed in practice). This setup approaches a film-look, provided that Detail correction is either off or set to a low level. Images are generally sharper than even for 35mm film, this can be an issue for production, but can generally be dealt with by using filters or some post-production softening. For use in Sport or Light Entertainment, it would probably be beneficial to switch off the Black Gamma, and to increase Detail Level to zero (factory setting).

Many of the menu items have little or no effect on image quality. Those that do so are highlighted. The full set of menu items is given for completeness.

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ADDENDUM 12 rev 1: Sony HD, HDC 950 (and 930)

In boxes with numeric settings (e.g. -99~99), the values indicate the range, and zero means factory setting, not zero effect, and no scales are given. For each item, the set value is given (if set), then the range offered by the camera. Where two values are given, they are for film- or video-look, e.g. ON {f} OFF {v}. Only the operation manual was available, therefore information from the Maintenance, File, and Diagnosis menus relies on information from the 900, where items are different, I have not guessed.

OPERATION MENUS

OPERATION/1 VF DISPLAY

viewfinder indicators for switch settings

Item	Switch	description	BBC
EX	3S/ON/OFF		
ZOOM	3S/ON/OFF		
FOCUS	3S/ON/OFF		
ND	3S/ON/OFF		
CC	3S/ON/OFF		
IRIS	3S/ON/OFF	Each item can be set to be on or off, or on for 3 seconds each time its value changes	
WHITE	3S/ON/OFF		
D5600K	3S/ON/OFF		
GAIN	3S/ON/OFF		
SHUTT	3S/ON/OFF		
BATT	3S/ON/OFF		
RETURN	3S/ON/OFF		
MESSAG	ALL/WRN/AT/OFF		

OPERATION/2 !IND

warning indicators of abnormal settings

Item	Switch	Range	description	BBC	
ND	ON/OFF	1~4	Each item can be on or off. Any item not at the NORMAL setting (in the Range column) raises the ! indicator, but there's nothing to say which one caused it.		
CC	ON/OFF	A~D			
WHITE	ON/OFF	P/A/B			
D5600K	ON/OFF	ON/OFF			
GAIN	ON/OFF	L/M/H			
SHUTT	ON/OFF	ON/OFF			
FAN	ON/OFF	AUTO1/AUTO2/MIN/MAX			
EXT	ON/OFF	ON/OFF			
FORMAT	ON/OFF	23.98/24/25/29.97/30 (PsF) /50/59.97/60 (I)		Frame/field rate	24/25 for film

OPERATION/3 MARKER

viewfinder markers

Item	Switch	Range	description	BBC
MARKER	ON/OFF		type of centre marker	
CENTER	ON/OFF	1~4		
SAFETY ZONE	ON/OFF	80%/90%/92.5%/95%		Dim outside zone
EFFECT	ON/OFF			
ASPECT MODE		16:9/15:9/14:9/13:9/4:3/ VAR H /VAR V/ VISTA1/VISTA2/		
MASK	ON/OFF	0~100	Dim outside zone	
VAR WIDTH		0:1920 (VAR H) /0:1080 (VAR V)	User box in pixels./lines	

OPERATION/4 GAIN SW

video gain switch

Item	Range	description	BBC
LOW	-3/0/3/6/12		0dB
MIDDLE	-3/0/3/6/12		6dB
HIGH	-3/0/3/6/12		12dB

OPERATION/5 ZEBRA/View Finder DeTail

zebra and v/f detail enhancement

Item	Switch	Range	description	BBC
ZEBRA	ON/OFF	1/2/1&2		ON, 1&2
ZEBRA1		58%~82%	Set low for skin tone	65%
ZEBRA2		88%~112%		100%
VF DTL	ON/OFF	-99~99	this doesn't seem to work	OFF

OPERATION/6 AUTO IRIS

metering area

<i>Item</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
WINDOW	1~6	Six window shapes	
OVERRIDE	-99~99	Manual control on lens	

OPERATION/7 BATT ALARM

battery alarm levels

<i>Item</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
DC IN TYPE	LITHIUM/DIGITAL/OTHERS1/OTHERS2/AC ADP	Heading	AC ADP
BEFORE END		Reflects voltage settings in maintenance menu	
END			

OPERATION/8 OTHERS

sets user switch and colour rebalancer

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
D5600K	ON/OFF		Shifts P3200 to D56	OFF
ASSIGNABLE 1		OFF/D12dB/D24dB/VTR/	D12/24=extra gain in digital	OFF
ASSIGNABLE 2		LENS RET/RETURN	processing, VT=start/stop	OFF
MIC1 GAIN				
MIC2 GAIN				
CAM VTR S/S	-60,-50,-40,-30,20dB			
LENS VTR S/S				
ZOOM DISP	LEFT/RIGHT			

OPERATION/9 OPERATOR FILE

read/write camera settings

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
READ (MS to CAM)	Press rotary encoder to execute		Memory stick read	
WRITE (CAM to MS)			Memory stick write	
PRESET			Factory reset	
FILE ID			Text field, enter what you like	
CAM CODE			User set	
DATE				

OPERATION/10 LENS FILE

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
FILE		1~16	Select lens file number	
LENS			Text entered in maint menu	
APERTURE			Only stores max aperture data	

PAINT MENUS**PAINT/1 SW STATUS**

parallel with switches in other menus

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
FLARE	ON/OFF			ON
GAMMA	ON/OFF			ON
BLK GAM	ON/OFF			ON {f} OFF {v}
KNEE	ON/OFF			ON
WHT CLIP	ON/OFF			ON
DETAIL	ON/OFF			OFF {f} ON {v}
LVL DEP	ON/OFF			ON
SKIN DTL	ON/OFF			OFF
MATRIX	ON/OFF			ON

PAINT/2 VIDEO LEVEL

some parallel with controls in other menus

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
WHITE [R]		-99~99	White balance settings. Reports	
WHITE [G]		-99~99	values set by auto-white	
WHITE [B]		-99~99	balance, or enter values directly	
WHITE [M]		-99~99	Effectively master gain	
BLACK [R]		-99~99	Black balance settings. Reports	
BLACK [G]		-99~99	values set by auto-white	
BLACK [B]		-99~99	balance, or enter values directly	
BLACK [M]		-99~99	Effectively master black	
FLARE [R]		-99~99		
FLARE [G]		-99~99	Depends on lens used	
FLARE [B]		-99~99		
FLARE [M]		-99~99	Master flare correction	

GAMMA [R]		-99~99		0
GAMMA [G]		-99~99		0
GAMMA [B]		-99~99		0
GAMMA [M]		-99~99		0
V MOD [R]		-99~99		0
V MOD [G]		-99~99		0
V MOD [B]		-99~99		0
V MOD [M]		-99~99		0
FLARE	OFF/ON			OFF
V MOD	OFF/ON		Vertical shading modulation	ON
TEST	OFF/1/2		Sawtooth, 2=digital, 1=analogue	

PAINT/3 GAMMA

Item	Switch	Range	description	BBC
LEVEL [R]		-99~99		0
LEVEL [G]		-99~99		0
LEVEL [B]		-99~99		0
LEVEL [M]		-99~99		0
COARSE		0.40/0.45/0.50	Degree of curvature 1=ENG (3.5 slope), 2/3=EFP	0.45
TABLE		1~6	(4.0), 4=SMPTE240 (4.0), 5=ITU709 (4.5), 6=BBC (5.0)	5
GAMMA	ON/OFF			ON
TEST	OFF/1/2		Duplicate of PAINT/2 item	

PAINT/4 BLK GAMMA

black stretch

Item	Switch	Range	description	BBC
LEVEL [R]		-99~99		0
LEVEL [G]		-99~99		0
LEVEL [B]		-99~99		0
LEVEL [M]		-99~99		62
RANGE [RGB]	OFF/ON	1,2,3,4	Set for max slope about 7.2 Upper limit of stretch	ON3 {f} OFF {v}
LEVEL [Y]		-99~99		
RANGE [Y]	OFF/ON	1/2/3/4	Upper limit of stretch	OFF
TEST	OFF/1/2		Duplicate of PAINT/2 item	

PAINT/5 LOW KET SAT

saturation in black stretch area

Item	Switch	Range	description	BBC
LEVEL		-99~99	Saturation in stretched part	
BLK CLIP	ON/OFF	-99~99	Value in Y curve where it stops	OFF

PAINT/6 KNEE

Item	Switch	Range	description	BBC
POINT [R]		-99~99		0
POINT [G]		-99~99	Set for 2.5 stops overload. CCDs can just deliver 2.5 stops	0
POINT [B]		-99~99	before clipping at 100%, knee	0
POINT [M]		-99~99	starts at about 85%, so keep	10 {f}
SLOPE [R]		-99~99	skin tones low to avoid	0
SLOPE [G]		-99~99	unnatural faces. Crucial element	0
SLOPE [B]		-99~99	of film look.	0
SLOPE [M]		-99~99		16 {f}
WHT CLP [R]		-99~99		0
WHT CLP [G]		-99~99		0
WHT CLP [B]		-99~99		0
WHT CLP [M]		-99~99	About 103%, 25=100%	18 {f}
KNEE SAT LEVEL	ON/OFF	-99~99	saturation in compressed zone	OFF
KNEE	ON/OFF		Vital for film look	ON {f} OFF {v}
KNEE SAT	ON/OFF		Both not needed, pictures look	ON {f} OFF {v}
WHT CLIP	ON/OFF		better without	OFF {f} ON {v}
TEST	OFF/1/2		Duplicate of PAINT/2 item	

PAINT/7 DETAIL 1

Item	Switch	Range	description	BBC
LEVEL		-99~99		0 {f} -14 {v}
LIMITER [M]		-99~99		0
LIMITER [WHT]		-99~99		0

LIMITER [BLK]		-99~99		0
CRISP		-99~99		0
HV RATIO		-99~99		0
FREQ		-99~99		0
LVL DEP		-99~99		0
DETAIL	ON/OFF		default values are ok	OFF {f} ON {v}
LVL DEP	ON/OFF		default values are ok	ON

PAINT/8 DETAIL 2

Item	Switch	Range	description	BBC
FINE DTL	ON/OFF	-99~99	HF detail	OFF
KNEE APERTURE	ON/OFF	-99~99	Detail in knee compressed parts	ON42 {f} OFF {v}

PAINT/9 SKIN DETAIL

Item	Switch	Range	description	BBC
SKIN DTL	ON/OFF		if this is on, chan 1 can't be off	OFF
SKIN GATE	ON/OFF			
CHAN SW [1]	ON/OFF			
GATE [1]	ON/OFF			
PHASE [1]	AUTO	0~359		
WIDTH [1]		-99~99		
SAT [1]		-99~99		
LEVEL [1]		-99~99		
CHAN SW [2]	ON/OFF			
GATE [2]	ON/OFF			
PHASE [2]	AUTO	0~359		
WIDTH [2]		-99~99		
SAT [2]		-99~99		
LEVEL [2]		-99~99		
CHAN SW [3]	ON/OFF			
GATE [3]	ON/OFF			
PHASE [3]	AUTO	0~359		
WIDTH [3]		-99~99		
SAT [3]		-99~99		
LEVEL [3]		-99~99		

PAINT/10 USER MATRIX

main matrix page

Item	Switch	Range	description	BBC
USER R-G		-99~99		
USER R-B		-99~99	Hand-crafted matrix, no clues	
USER G-R		-99~99	given about the scale of	
USER G-B		-99~99	coefficients. This needs a lab to	
USER B-R		-99~99	set up sensibly	
USER B-G		-99~99		
MATRIX	ON/OFF		Main matrix switch	ON
PRESET	ON/OFF	SMPTE-240M/ITU-709/SMPTE-WIDE/NTSC/EBU/ITU-601	Standard matrices, only ITU709 makes sense	ON, ITU709
USER MATRIX	ON/OFF		Off unless DoP has strong views	OFF
MULTI MATRIX	ON/OFF		Avoid at all costs	OFF

PAINT/11 MULTI MATRIX

Item	Switch	Range	description	BBC
PHASE		0~338 (22.5° steps)	Adjust hue and saturation of	
HUE		-99~99	22.5° segments independently	
SAT		-99~99		
ALL CLEAR			Resets all hue/sat settings to 0	
MATRIX	ON/OFF			ON
PRESET	ON/OFF	SMPTE-240M/ITU-709/SMPTE-WIDE/NTSC/EBU/ITU-601	Same item as PAINT/10	ON, ITU-709
USER MATRIX	ON/OFF		Off unless DoP has strong views	OFF
MULTI MATRIX	ON/OFF		Avoid at all costs	OFF

PAINT/12 SHUTTER

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
SHUTTER	ON/OFF	see below		ON {f} OFF {v}
ECS FREQ		see below	Avoids light/monitor strobing	
S-EVS	ON/OFF	0~100%	Enhanced Vertical res for interlace, 50%=film shutter	OFF, 50%

Shutter speeds	60I	1/100,1/125,1/25,1/500,1/1000,1/2000		
	50I	1/60,1/125,1/250,1/500,1/1000,1/2000		
	30PsF/29.97PsF	1/40,1/60,1/125,1/250,1/500,1/1000	950 only	
	25PsF	1/33,1/50,1/100,1/250,1/500,1/1000	950 only	
	24PsF/23.98PsF	1/32,1/48,1/96,1/125,1/250,1/500,1/1000	950 only	
ECS frequencies	60i/59.94I	30~5600Hz	950	50~4700Hz 930
	50I	25~5600Hz	950	50~4700Hz 930
	30PsF/29.97PsF	30~2800Hz	950	
	25PsF	25~2300Hz	950	
	24PsF/23.98PsF	24~2300Hz	950	

PAINT/13 SCENE FILE

standard features

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
STORE		1~5		
STANDARD				
FILE ID				
CAM CODE				
DATE				

MAINTENANCE MENUS**MAINTENANCE/1 AUTO SETUP**

software action mimicing hardware switches

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
AUTO BLACK				
AUTO WHITE				
AUTO LEVEL				
TEST	OFF/1/2		Duplicate of PAINT/2 item	

MAINTENANCE/2 WHITE SHADING

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
V SAW [R]		-99~99		
V SAW [G]		-99~99		
V SAW [B]		-99~99		
V PARA [R]		-99~99		
V PARA [G]		-99~99		
V PARA [B]		-99~99		
H SAW [R]		-99~99		
H SAW [G]		-99~99		
H SAW [B]		-99~99		
H PARA [R]		-99~99		
H PARA [G]		-99~99		
H PARA [B]		-99~99		
WHITE [R]		-99~99		
WHITE [G]		-99~99		
WHITE [B]		-99~99		
V MOD [R]		-99~99		
V MOD [G]		-99~99		
V MOD [B]		-99~99		
V MOD [M]	ON/OFF	-99~99		

MAINTENANCE/3 BLACK SHADING

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
V SAW [R]		-99~99		
V SAW [G]		-99~99		
V SAW [B]		-99~99		
V PARA [R]		-99~99		
V PARA [G]		-99~99		
V PARA [B]		-99~99		
H SAW [R]		-99~99		
H SAW [G]		-99~99		

H SAW [B]		-99~99	
H PARA [R]		-99~99	
H PARA [G]		-99~99	
H PARA [B]		-99~99	
BLK SET [R]		-99~99	
BLK SET [G]		-99~99	
BLK SET [G]		-99~99	
BLACK [R]		-99~99	
BLACK [G]		-99~99	
BLACK [B]		-99~99	
BLACK [B]		-99~99	
MASTER GAIN		-3/0/3/6/12/18dB	

MAINTENANCE/4 OHB MATRIX

optical head block matrix

Item	Switch	Range	description	BBC
PHASE		0~338 (22.5° steps)	Adjust hue/sat in 22.5 degree wedges, for matching cameras together, AVOID this	
HUE		-99~99		
SAT		-99~99		
ALL CLEAR			Resets all hue/sat settings to 0	
MATRIX	ON/OFF		This controls all matrix settings	ON
OHB MATRIX	ON/OFF			OFF

MAINTENANCE/5 AUTO IRIS

Item	Switch	Range	description	BBC
AUTO IRIS	ON/OFF			OFF
WINDOW		1:6	Choice of window shape	
OVERRIDE		-99~99		
IRIS LEVEL		-99~99		
APL RATIO		-99~99		
IRIS GAIN		-99~99		
IRIS CLOSE	ON/OFF		Close iris to check black level	

MAINTENANCE/6 CAM ID/DATE

Item	Switch	Range	description	BBC
CAM ID			Text	
DATE/TIME			Date and time	

MAINTENANCE/7 MULT-FORMAT

scanning standard, field/frame rate

Item	Switch	Range	description	BBC
CURRENT		60/59.94/50 I /	Current frame/field rate	24/25PsF {f}
NEXT		30/29.97/25/24/23.98 PsF	Select then cycle powert	50I {v}

MAINTENANCE/8 SDI

Video outputs

Item	Switch	Range	description	BBC
PROMPTER	ON/OFF			
BNC SDI OUT			Reports CCU control, ON or OFF	

MAINTENANCE/9 VTR 26PIN

Relevant only if a VTR's connected at CCU

Item	Switch	Range	description	BBC
CABLE COMP	OFF/25m/50m		Cable equaliser	
VIDEO SELECT	MAIN(YpbPr)/MAIN(RGB) /RET(YpbPr)			
MAIN VIDEO ADJ		-30~30	Volume controls on RGBYPbPr	

MAINTENANCE/10 BATT ALARM

these settings appear in OPERATION/7

Item	Switch	Range	description	BBC
DC-IN TYPE		LITHIUM/DIGITAL/OTHER S1/OTHERS2/AC ADP		AC ADP
BEFORE END		11.0~17.0V		
END		11.0~17.0V		

MAINTENANCE/11 OTHERS 1

Item	Switch	Range	description	BBC
FAN MODE		AUTO1/AUTO2/MIN/MAX	fan speed	AUTO1
CHU BARS	OFF/ON		Colour bars in camera head	

MAINTENANCE/12 OTHERS 2

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
MENU RESUME		OPE MENU/OFF/ALL	How menus reopen. OPE=last used, OFF=operator menus only	
DATE TYPE		1:6	Usual choice of date formats	
WHITE MEMORY		2/8	How white balances are stored	
COLOUR BARS		FULL4:3/FULL16:9/SMP TE4:3/SMPTE16:9	Camera head bars, 4:3 are letter-boxed	

MAINTENANCE/13 T ADP ADJ

Pardon?

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
V SAW OFST RGB				
CABLE				
STORE DATA				

FILE MENUS**FILE/1 OPERATOR FILE**

as OPERATION/9

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
READ		MS to CAM	Memory stick read/write	
WRITE		CAM to MS		
PRESET				
STORE PRESET FILE				
FILE ID				
CAM CODE				
DATE				

FILE/2 SCENE FILE

as PAINT/13

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
STORE		1~5		
STANDARD				
FILE ID				
CAM CODE				
DATE				

FILE/3 REFERENCE

reference file

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
STORE FILE				
STANDARD				
FILE ID				
CAM CODE				
DATE				

FILE/4 LENS FILE

not the same as OPERATION/10

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
STORE FILE			Action to store lens data	
FILE				
NO		1~16	File number	
NAME		e.g. HJ18x7.8B	Enter lens name	
F NO		F1.0~F3.4	Enter max aperture	
CENT MRK H POS		-20~20		
CENT MRK V POS		-20~20	Move lens centre markers	
STORE CENTER			Action to store new values	

FILE/5 OHB FILE

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
STORE FILE			Action to store OHB matrix settings, crashes hardware	

FILE/6 FILE CLEAR

reset to factory settings, probably

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
PRESET OPERATOR			Operator settings to factory	
REFERENCE (ALL)	10 SEC CLEAR	ON/OFF	Reference settings to factory	
LENS (CURRENT)				
OHB WHITE SHAD				
OHB BLACK SHAD				
OHB ND OFFSET				

OHB MATRIX	
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DIAGNOSIS MENUS**DIAGNOSIS/1 SDI**

Report, presumably about the fibre

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
OPTICAL LEVEL : GREEN				

DIAGNOSIS/2 BOARD STATUS

pcb reports

<i>Item</i>	<i>Switch</i>	<i>Range</i>	<i>description</i>	<i>BBC</i>
ROM		V1.22	Software version	
OHB		OK/NG		
VA		OK/NG		
DPR		OK/NG		
VAD		OK/NG		
DAD		OK/NG		
SDI		OK/NG		
DAP		OK/NG		
SG		OK/NG		
AT		OK/NG		
AU		OK/NG		
RE		OK/NG		
PS		OK/NG		