

Colorimetric and Resolution requirements of cameras

Alan Roberts

ADDENDUM 21 rev 2: Menu settings for

Panasonic DVCPPro100 AJ-HDX900

Assessment was made on an engineering sample of the AJ-HDX900 (no serial number), a multi-standard HDTV cam-corder. It is very similar in form and function to the SDX900, sharing many features and having a very similar menu set, and seems to be a replacement for the HDX400. Production models may differ slightly from the pre-production model initially assessed for this addendum.

The camera is switchable between 1080-line and 720-line HDTV standards, and between the base-normal frame rates of 29.97 and 25Hz. It can also be switched, in 1080 mode, between interlace (50i, 59.94i) and progressive (25psf, 29.97psf, and 23.98psf in both 2:3 and 2:3:3:2 pull-down) modes. In 720 mode it can also be switched to half-frame rate, and thus can generate a "film look" in the camera at system speed. It has specific "film-look" gamma curves that incorporate many of the contrast handling features of earlier cameras, making it a great deal easier to set up. The camera has 3 2/3" ccds (1280x720, progressively scanned) and records using small-format conventional DVCPPro tape at 100Mb/s (in "long-play" mode).

There are two versions of the camera, suffixed P and E; as far as I can tell they are identical in every way, except that the E version is expected to be used mostly at 50Hz while the P version will be used mostly at 60Hz. This is apparent only from the factory default settings of some menu items.

It is significantly smaller and lighter than the familiar Beta camcorder and is useful mostly for portable, single-camera work. It has many internal menus for setting the performance, such that it can then be used without external controls. It is not well suited to multi-camera operation. Monitoring and connectivity have been improved over previous Panasonic models; it will genlock to either analogue HD Y or analogue composite (PAL or NTSC as appropriate); there are two video outputs, one switchable between HDSDI, SDI (appropriate down-conversion), and composite (PAL or NTSC), the other between HDSDI and HD analogue Y for monitoring; it has a IEEE1394 (Firewire) output that will feed and control an external recorder.

There is a 7-second video cache memory. Using this, it is possible to record to tape up to 7 seconds of events that occurred before pressing "Record". The same circuitry is also used to provide a "slow-shutter" in which adjacent frames are summed to produce smeared pictures and reduced noise (or extra gain).

Video compression is still DVCPProHD, 6.7:1 for all the NTSC-related standards, 6.3:1 for all the PAL-related standards. The camera section has 14-bit adcs that deliver better noise performance than in earlier models.

In this setup, the gamma correction and knee are adjusted to capture about 2.5 stops of overload, and 1 stop of underexposure, to mimic film performance.

Some typographical errors have been corrected in the first revision.

This second revision includes settings intended to match the camera to the BBC's 'docs' settings for the DSR450.

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Panasonic DVCPro AJ-HDX900

Many menu items have little or no effect on the image. Those that do so are highlighted. The full menus are given for completeness. Where two values are given {f} denotes film use, {v} video. The film mode uses the “Filmlike1” gamma curve, which very closely resembles the best that can be done with a conventional gamma curve and knee, but with a nice smooth join; there seems no point in ignoring this curve since Panasonic have clearly put much effort into its design, and it works well. The photographic speed of the camera is unchanged (about 640 ASA) using this curve (“Filmlike2” is a similar curve but copes with about a stop less of overload and reduces the photographic “speed” by about a stop, also the manual knee controls have no effect in this mode so it is not possible to customise it; “Filmlike3” further reduces the exposure range and lowers the photographic “speed” of the camera by about one stop more; both these modes should produce better noise performance and thus may well be the best option for film-like work). The video mode uses conventional gamma and knee settings to achieve similar results but with more contrast compression in highlights. Both modes can cope with about 2.5 stops of overexposure (about 500% measured); the video mode (with optimal knee settings) has a slightly more pronounced change of slope in the knee but the difference is marginal. Total exposure range has been measured as about 11 stops.

The shutter can be set to HALF (i.e. 180°), which avoids the problem of having to work out what it should be from the field/frame rate.

Line Mix mode (available as a User Switch setting) appears to be the equivalent of EVS in other cameras. Switched on in 25p mode reduces the vertical resolution to the same as 50i, thus minimising most interlace twitter artefacts although the effect is not great.

Digital Super Gain is implemented by reducing the frame rate. This gives “free” gain without noise, provided the smeared pictures and lowered frame rate is acceptable.

When shooting at 59.94 rates, drop-frame time code is always used. In this case, the film-like modes are at 29.97fps or 23.98fps. When using 23.98 (called 24 in the camera), you have the option of standard 2:3 pull-down or the recently adopted Advanced mode, 2:3:3:2 in which it is easier to extract original frames from the 59.94 output stream.

Viewfinder and monitoring outputs can both have markers, individually set.

The camera “Gain” switch stores many camera settings, allowing the user to set completely different conditions selectable by that switch. However, most users will want only different gain, the menu contents given here are appropriate for the range of gains quoted, it is for the user to decide which gain settings are appropriate and to set the other conditions accordingly. Beware that the recommended settings were derived during a short laboratory test of the camera, better settings may well be found once the camera goes into general use.

Factory settings are underlined.

This second revision includes settings intended to match the camera to the

In the table, BBC values are marked: {f} for film look; {v} for video look; {u} for shooting without subsequent grading (with headroom adjusted to 1.5 stops, and colour performance offset), intended to match the BBC’s ‘docs’ settings for the DSR450.

| SYSTEM SETTING | | | |
|-----------------------|---|--|---------------------------------------|
| System mode | | Main video standard setting | |
| Item | Range | description | BBC |
| System Mode | <u>1080-50i, 1080-59.94i, 720-50P, 720-59.94P</u> | Any change requires a power-off/on cycle to take effect. Different defaults for E/P models | 1080-50i |
| Camera Mode | (1080-50i) <u>50i, 25p, (1080-59.94p) 60i, 30P, 24P, 24PA, (720-50P) 50P, 25P, (720-59.94P) 60P, 30P, 24P</u> | Interlace/proscan. All 59.94-based rates should be these numbers/1.001, the camera will NOT shoot at 24fps. Different defaults for E/P models | 25p{fu}, 1080 50i{vu} or 720p 50 {vu} |

| Rec function | | Specialist recording functions | |
|---------------------|---|--|------------|
| Item | Range | description | BBC |
| Interval Rec Mode | On, One shot, <u>Off</u> | Single frame recording possible | |
| Interval Rec Hold | On, <u>Off</u> | On holds settings through power cycle | |
| Rec Time | (59.94) 00s01f~59s29f (50) 00s01f~59s24f | Frames to record each time | |
| Pause Time | (59.94) 01f~ <u>04m59s29f~23h59m59s24f</u> (50) 01f~ <u>04m29s24f~23h59m59s24f</u> | Interval between recordings | |
| Take Total Time | <u>None</u> ~5day | Session duration | |
| Total Rec Time | 01f~99m59s29f~ OVER100m, <u>None</u> | =REC+PAUSE+TOTAL TAKE | |
| Auto Rec | <u>Off, On</u> | | |
| Start Delay | <u>0sec</u> ~10sec | Delay to start full recording in interval mode | |
| Pre Rec Mode | <u>Off, On</u> | Pre-roll time | |
| Pre Rec Time | 0s~7s | Length of video cache | |
| Retake Mode | On, <u>Off</u> | Refer to manual | |

| Output sel | | Signals on the Video Output connectors | |
|-----------------------|-------------------------------|---|------------|
| Item | Range | description | BBC |
| Output Item | TC, Status, <u>Menu only</u> | Stuff on the Video Out | |
| Moni Out | <u>HDSDI, HD-Y</u> | Video monitoring output, on camera right | |
| Moni Out Chara | On, <u>Off</u> | Adds characters on monitoring output (HDSDI only) | |
| Moni Out Mode | Cam, <u>VTR</u> | VTR=EE, Cam always sets camera feed | |
| VF Mode | Cam, <u>VTR</u> | Same but in the viewfinder | |
| Video Out Centr Mark | <u>Off, 1, 2, 3, 4</u> | Cross-hairs on Video Output, various sizes | |
| Video Out Safety Mark | <u>Off, 1, 2</u> | 1=box, 2=corners | |
| Safety Area | 80%~ <u>90%</u> ~100% | Box size, retains aspect ratio | |
| Frm Sig | <u>4:3, 13:9, 14:9, Vista</u> | Frame outline marker, Vista=16:8.65 | |
| Video Out User Box | On, <u>Off</u> | User-set marker box, on Video Output | |
| User Box Width | 1~ <u>13</u> ~100 | % | |
| User Box Height | 1~ <u>13</u> ~100 | % | |
| User Box H Pos | -50~ <u>0</u> ~50 | % | |
| User Box V Pos | -50~ <u>0</u> ~50 | % | |

| Monitor Out Setting | | Signals on the Monitoring Output connector | |
|----------------------------|-------------------------------|--|------------|
| Item | Range | description | BBC |
| Moni Out Centr Mark | <u>Off, 1, 2, 3, 4</u> | Cross-hairs on Monitoring Output | |
| Moni Out Safety Mark | <u>Off, 1, 2</u> | 1=box, 2=corners | |
| Safety Area | 80%~ <u>90%</u> ~100% | Box size, retains aspect ratio | |
| Moni Out Frm Mark | On, <u>Off</u> | Frame outline | |
| Frm Sig | <u>4:3, 13:9, 14:9, Vista</u> | Frame outline marker, Vista=16:8.65 | |
| Moni Out User Box | On, <u>Off</u> | User-set marker box, on Monitoring Output | |

| | | | |
|-----------------|----------|--|---|
| User Box Width | 1~13~100 | | % |
| User Box Height | 1~13~100 | | % |
| User Box H Pos | -50~0~50 | | % |
| User Box V Pos | -50~0~50 | | % |

RC Out Setting

Signals on the Remote connector

| Item | Range | description | BBC |
|--------------------|-----------------------------|---|-----|
| RC Out Centr Mark | <u>Off</u> , 1,2,3,4 | Cross-hairs on Remote Output, various sizes | |
| RC Out Safety Mark | <u>Off</u> , 1,2 | 1=box, 2=corners | |
| Safety Area | 80%~ <u>90%</u> ~100% | Box size, retains aspect ratio | |
| RC Out Frm Mark | On, <u>Off</u> | Frame outline | |
| Frm Sig | <u>4:3</u> ,13:9,14:9,Vista | Frame outline marker, Vista=16:8.65 | |

Downcon Setting

Down-conversion settings, only for monitoring, not for editing

| Item | Range | description | BBC |
|--------------|-----------------------------|---------------------------------------|-----|
| Downcon Mode | <u>Sqeez</u> ,Lt-Box,S-Crop | Aspect ratio | |
| Detail | <u>On</u> ,Off | Extra sharpening | |
| H.Dtl Level | 0~ <u>8</u> ~31 | Horizontal detail | |
| V.Dtl Level | 0~ <u>4</u> ~31 | Vertical detail | |
| Dtl Coring | 0, <u>1</u> ,15 | High value avoids emphasising noise | |
| H.Dtl Freq | 1~ <u>3</u> ~5 | Hump centre (2.5,3,3.5,4,4.5MHz) | |
| 2D lpf | On, <u>Off</u> | Diagonal filter, reduces cross colour | |
| Setup | 0,7.5% | DC setup, 7.5% for NTSC (not Japan) | |

Genlock

| Item | Range | description | BBC |
|----------------|------------------------|---|-----|
| Genlock | <u>Int</u> ,Ext | Genlock source | |
| GL.Phase | <u>HDSDI</u> ,Composit | Which is locked, other has ~90 line delay | |
| H.Phase Coarse | -100~ <u>0</u> ~100 | Coarse H timing | |
| H.Phase Fine | -100~ <u>0</u> ~100 | Fine H timing | |

Option mode

General options

| Item | Range | description | BBC |
|----------------|--------------------------|--|-----|
| Rec Tally | <u>Red</u> , Green, Char | Record indicator, Char puts REC in the v/f | |
| P.Off GPS Data | Hold, <u>Clear</u> | Holds GPS data while power off | |
| 1394 Speed | S200, <u>S400</u> | Firewire speed, 200Mb/s or 400Mb/s | |
| 1394 In Ch | 0~63, <u>Auto</u> | Assign channel number | |
| 1394 Out Ch | 0~63, <u>Auto</u> | Assign channel number | |
| 1394 Control | Off, <u>Both</u> | External recorder, Both servos external to camera controls | |
| 1394 Cmd Sel | <u>Rec</u> , P, Stop | External recorder, Stop or hold on RecPause | |
| SDI Metadata | <u>On</u> ,Off | Embed UMID data into HDSDI | |
| SDI EDH | <u>On</u> ,Off | Embed error signals into HDSDI | |

PAINT MENUS

RB Gain Control

Colour balancing

| Item | Range | description | BBC |
|-------------------|---------------------|---|-----|
| R Gain AWB Pre | -200~ <u>0</u> ~200 | Red gain in switch Preset balance | |
| B Gain AWB Pre | -200~ <u>0</u> ~200 | Blue gain in switch Preset balance | |
| R Gain AWB A | -200~ <u>0</u> ~200 | Red gain in switch A balance | |
| B Gain AWB A | -200~ <u>0</u> ~200 | Red gain in switch A balance | |
| R Gain AWB B | -200~ <u>0</u> ~200 | Red gain in switch B balance | |
| B Gain AWB B | -200~ <u>0</u> ~200 | Red gain in switch B balance | |
| AWB A Gain Offset | On, <u>Off</u> | On adds A values above after rebalance in A | |
| AWB B Gain Offset | On, <u>Off</u> | On adds B values above after rebalance in B | |

RGB Black Control

More colour balancing

| Item | Range | description | BBC |
|------------|----------------------|--|---------------|
| Master Ped | -200~ <u>15</u> ~200 | Master black level, 15's a bit high, 6 is better | 6 {fv} 15 {u} |
| R Pedestal | -100~ <u>0</u> ~100 | Red ped, reports value from remote control | |

| | | | |
|-----------------|------------|-------------------------|--|
| G Pedestal | -100~0~100 | Green | |
| B Pedestal | -100~0~100 | Blue | |
| Pedestal Offset | On,Off | On enables these values | |
| R Flare | -100~0~100 | Red flare correction | |
| G Flare | -100~0~100 | Green | |
| B Flare | -100~0~100 | Blue | |

Matrix (User preset) A,B

Colour matrix, user settings

| Item | Range | description | BBC |
|----------------|----------|-----------------------------|----------------------|
| Matrix Table | A,B | Two user tweakable matrices | |
| Matrix R-G | -63~0~63 | Settings for matrix A or B | |
| Matrix R-B | -63~0~63 | | |
| Matrix G-R | -63~0~63 | | |
| Matrix G-B | -63~0~63 | | |
| Matrix B-R | -63~0~63 | | |
| Matrix B-G | -63~0~63 | | |
| L Matrix Table | Off,A,B | | Select matrix in Low |
| M Matrix Table | Off,A,B | Mid | |
| H Matrix Table | Off,A,B | High gain setting | |

Color Correction

rather dangerous territory

| Item | Range | description | BBC |
|------------------|--------|---|--|
| R (Sat/Phase) | -63~63 | Adjusts colour in 45 degree segments, tweaks saturation and hue. | 0/0 {fv} +22/0 {u} |
| R-Mg (Sat/Phase) | -63~63 | | 0/0 {fv} +22/0 {u} |
| Mg (Sat/Phase) | -63~63 | | 0/0 {fv} +22/0 {u} |
| Mg-B (Sat/Phase) | -63~63 | This is rather dangerous, but can be very useful for special effects, generally, you should avoid this unless you have good test kit, including comprehensive colour test charts. | 0/0 {fv} +22/0 {u} |
| B (Sat/Phase) | -63~63 | | 0/0 {fv} +22/0 {u} |
| B-Cy (Sat/Phase) | -63~63 | | 0/0 {fv} +22/0 {u} |
| Cy (Sat/Phase) | -63~63 | | 0/0 {fv} +22/0 {u} |
| Cy-G (Sat/Phase) | -63~63 | | 0/0 {fv} +22/0 {u} |
| G (Sat/Phase) | -63~63 | | 0/0 {fv} +22/0 {u} |
| G-Y1 (Sat/Phase) | -63~63 | | Beware, equivalent settings from the Varicam do NOT work here. |
| Y1 (Sat/Phase) | -63~63 | 0/0 {fv} +22/0 {u} | |
| Y1-R (Sat/Phase) | -63~63 | 0/0 {fv} +22/0 {u} | |

Low Setting

Low Level Gain switch position

| Item | Range | description | BBC ¹ |
|--------------|----------------|------------------------------|--------------------|
| Master Gain | -3,0~30dB | dB settings, 3dB steps | -3 ~ +3 |
| H Dtl Level | 0~10~63 | | 6 {f} 20{v} 12 {u} |
| V Dtl Level | 0~20~31 | | 4 {f} 14{v} 9 {u} |
| Dtl Coring | 0,1~15 | | 2 |
| H Dtl Freq | 0~18~31 | | 31 |
| Level Dep | 0,1~5 | Low luma zone, no correction | 1 |
| Gamma | 0.35~0.45~0.75 | 0.01 steps | 0.45 |
| Black Gamma | -3~Off~+3 | No other controls | 1 |
| Matrix Table | A,B,Off | User preset matrices | Off |
| Color Corr. | On,Off | 12 segment adjust, see above | Off |

Mid Setting

Mid Level Gain switch position

| Item | Range | description | BBC ² |
|-------------|----------------|------------------------------|-------------------|
| Master Gain | -3~6~30dB | dB settings, 3dB steps | +3 ~ +9 |
| H Dtl Lev | 0~8~63 | | 6 {f} 20{v} 12{u} |
| V Dtl Lev | 0~18~63 | | 4 {f} 14{v} 9 {u} |
| Dtl Coring | 0~2~15 | | 2 |
| H Dtl Freq | 0~18~31 | | 31 |
| Level Dep | 0,1~5 | Low luma zone, no correction | 2 |
| Gamma | 0.35~0.45~0.75 | 0.01 steps | 0.45 |
| Black Gamma | -3~Off~+3 | | 0 |

¹ These settings are suitable for gain values of between -3 and +3dB.

² These settings are suitable for gain values of between +3 and +9dB.

| | | | |
|---------------|-----------------|------------------------------|-----|
| Matrix Table | A,B, <u>Off</u> | User preset matrices | Off |
| Color Correct | On, <u>Off</u> | 12 segment adjust, see above | Off |

High Setting

High Level Gain switch position

| Item | Range | description | BBC ³ |
|---------------|-------------------------|------------------------------|------------------|
| Master Gain | -3~ <u>12</u> ~30dB | dB settings, 3dB steps | +12 and above |
| H Dtl Lev | 0~ <u>6</u> ~63 | | 0 {f} 6{v} 12{u} |
| V Dtl Lev | 0~ <u>16</u> ~63 | | 0 {f} 4{v} 9 {u} |
| Dtl Coring | 0~ <u>3</u> ~15 | | 8 |
| H Dtl Freq | 0~ <u>18</u> ~31 | | 31 |
| Level Dep | 0~ <u>3</u> ~5 | Low-luma zone, no correction | 4 |
| Gamma | 0.35~ <u>0.55</u> ~0.75 | 0.01 steps | 0.5 |
| Black Str | -3~ <u>Off</u> ~+3 | | Off |
| Matrix Table | A,B, <u>Off</u> | User preset matrices | Off |
| Color Correct | On, <u>Off</u> | 12 segment adjust, see above | Off |

Additional Dtl

Detail, extra controls

| Item | Range | description | BBC |
|----------------|---|--|---------|
| Knee Ape Lvl | Off,1, <u>2</u> ~5 | Correction in knee compressed zone | 3 |
| Dtl Gain + | -31~ <u>0</u> ~31 | correction, +ve going edges | 0 |
| Dtl Gain - | -31~ <u>0</u> ~31 | correction, -ve going edges | 8 |
| Dtl Clip | <u>0</u> ~63 | Clip level of detail correction | 47 |
| Dtl Source | (G+B)/2, (R+G)/2, (2G+R+B)/4, (3G+R)/4, R, G | Doesn't make much difference except when noise level is high | (R+G)/2 |
| V Dtl Freq | 360TV,450TV,540TV, <u>630TV</u> ,720TV | TV lines, hump of response, only in 720P | 720 |
| H Dtl Line Mix | <u>0H</u> ,1H,2H | Vertical size of H detection window | 0 |
| Master Dtl | -31~ <u>0</u> ~31 | Master control | 0 |

Skin Tone Dtl

| Item | Range | description | BBC |
|----------------------|---------------------|---|-----|
| Skin Tone Dtl | <u>Off</u> ,A,B,AB | Select skin tone table, reduces wrinkles | Off |
| Skin Tone Zebra VF | On, <u>Off</u> | Zebra on skin tone detector | |
| Skin Tone Zebra Vout | On, <u>Off</u> | Adds skin zebra on Video Output (not in SD) | |
| Skin Tone Zebra Moni | On, <u>Off</u> | Adds skin zebra on Monitoring Output | |
| Skin Tone Table | A,B | Separate tables of target tones | |
| Skin Tone Get | | Looks for skin tone | |
| Skin Dtl Coring | 0~ <u>5</u> ~7 | | |
| Y Max | 0~ <u>190</u> ~255 | Max luma level for skin | |
| Y Min | 0~ <u>10</u> ~255 | Min luma level for skin | |
| I Center | 0~ <u>35</u> ~255 | Saturation mean level for skin | |
| I Width | 0~ <u>55</u> ~255 | Saturation range for skin | |
| Q Width | 0~ <u>10</u> ~90 | Hue mean level for skin | |
| Q Phase | -180~ <u>0</u> ~179 | Hue range for skin | |

Cam Main Menu 1, Knee Level

Don't use Auto knee, manual is better

| Item | Range | description | BBC |
|-----------------|----------------------|---|--------------------|
| Master Ped | -200~ <u>15</u> ~200 | Duplicate entry for pedestal | 6 |
| Manual Knee | On, <u>Off</u> | Valid only if AUTO is off | On |
| Knee Point | 70%~ <u>93</u> ~107% | Manual break point | 85 {fv} 88 {u} |
| Knee Slope | 0~ <u>85</u> ~99 | Gain in knee zone, about 2.5 stops overload | 99 {fv} 35 {u} |
| White Clip | On, <u>Off</u> | | On |
| White Clip Lvl | 90%~ <u>109%</u> | | 109% {fv} 102% {u} |
| A. Knee Point | 80%~ <u>93</u> ~107% | Auto knee point | 85% |
| A Knee Level | 100~ <u>107</u> ~109 | | 105 |
| A.Knee Response | 1~ <u>4</u> ~8 | Auto knee response speed (low=fast) | 4 |

Gamma

Differentials and colour tweaking

³ These settings are suitable for gain values of +12dB and above.

| Item | Range | description | BBC |
|----------------|---|----------------------------------|--------------------------|
| Master Gamma | 0.35~0.45~0.75 | | 0.45 |
| R Gamma | -15~0~15 | Set R away from Master | 0 |
| B Gamma | -15~0~15 | Set B away from Master | 0 |
| Gamma Mode Sel | HD,SD,Filmlike1, Filmlike2,Filmlike3 | HD=709, SD=BBC0.4, approximately | Filmlike1 {f} HD {vu} |

Camera Settings

| Item | Range | description | BBC |
|------------|--------|---|-----------------|
| Detail | On,Off | | Off {f} On {vu} |
| High Color | On,Off | Hue/Saturation maintenance at high luma | On |
| Gamma | On,Off | | On |
| Test Saw | On,Off | | |
| Flare | On,Off | | |
| H-F Compe | On,Off | Wide-band detail enhancement | On |

VF Display

User controls (RC=remote control)

| Item | Range | description | BBC |
|-----------------|-------------|---|-------------------|
| Disp Condition | Normal/Hold | Show switch status: Normal=On, Hold when ModeCheck pressed | Normal |
| Disp Mode | 1,2,3 | 1=off, 2=some, 3=all | 3 |
| VF Out | Y,NAM,R,G,B | What you see, NAM=non-additive mix | Y |
| VF Dtl | 0~5 | 5 roughly doubles the HD detail in the v/f | |
| Zebra 1 detect | 0%~70~109% | Set for skin tone (BL-TR) | 65%{f} 70%{vu} |
| Zebra 2 detect | 0~85~109% | Set for white (TL-BR) | 100% |
| Zebra 2 | On,Spot,Off | SPOT works only if Zebra 2>1 | Spot |
| Low Light Lvl | Off,10%~35% | Warns at low light level | 35% |
| RC menu Disp | On,Off | Shows menus in v/f when RC is connected | Off |
| Marker/Char Lvl | 50%~100% | Marker/Character brightness | 100% |

VF Marker

Viewfinder stuff

| Item | Range | description | BBC |
|-------------|---------------------|---|------|
| Table | A,B | Switch between AB setups set below | |
| Centre Mark | Off,1~4 | Cross size/type | |
| Safety Mark | Off,1,2 | 1=box, 2=corners | |
| Safety Area | 80%~90~100% | Size of safety area | |
| Frame Mark | On,Off | Frame marker | OFF |
| Frame Sig | 4:3,13:9,14:9,Vista | Vista is 16:8.65 | 14:9 |
| Frame Lvl | 0~15 | Picture level outside frame mark, 15=same | 15 |

VF User Box

More viewfinder stuff

| Item | Range | description | BBC |
|-----------------|----------|--------------|-----|
| User Box | On,Off | Custom frame | |
| User Box Width | 1~13~100 | Width, % | |
| User Box Height | 1~13~100 | | |
| User Box H Pos | -50~0~50 | | |
| User Box V Pos | -50~0~50 | | |

VF Indicator

And yet more

| Item | Range | description | BBC |
|-------------|------------------------------|---|-----|
| Extender | On,Off | Lens extender | |
| Shutter | On,Off | Shutter speed display | On |
| Filter | On,Off | Filter position | On |
| White | On,Off | Show AWB or Preset A/B | |
| Gain | On,Off | | |
| Iris | Offs,S+Iris,S | Iris/Super Iris (aperture/auto) display | |
| Camera ID | Bar,Off | Show camera ID over bars onto tape | |
| ID Position | UpperR,UpperL, LowerR,LowerL | Placement | |
| Date/Time | On,Off | Show time/date with camera ID | Off |
| Zoom Lvl | On,Off | Focal length | |
| Color Temp | On,Off | | |

| | | | |
|-------------|----------------|-------------------------|--|
| System Mode | <u>On</u> ,Off | Camera system speed | |
| DRS | <u>On</u> ,Off | Dynamic range stretcher | |

VF Indicator 2

Still more

| Item | Range | description | BBC |
|-------------|------------------------------|----------------------------|--------|
| Tape | <u>On</u> ,Off | Tape remaining | |
| Battery | <u>On</u> ,Off | Voltage | |
| Audio Lvl | <u>On</u> ,Off | Level meters | |
| TC | TCG,TCR, TCG/TCR, <u>Off</u> | Time code | |
| VTR Warning | Always, <u>Normal</u> ,Off | Normal= show for 3 seconds | Normal |
| Compression | <u>On</u> ,Off | VTR indicator | |
| Save LED | Save&Tape, <u>Save</u> | Standby/Save warning | Save |

Mode Check Ind

What happens when you press Mode Check

| Item | Range | description | BBC |
|----------|----------------|----------------------------------|-----|
| Status | <u>On</u> ,Off | Get the status screen | On |
| !LED | <u>On</u> ,Off | Shows why !LED might be lit | On |
| Function | <u>On</u> ,Off | Function screen | On |
| Audio | <u>On</u> ,Off | Audio screen | On |
| P.On Ind | <u>On</u> ,Off | Get status screen up at power-on | On |

! LED

VF warnings

| Item | Range | description | BBC |
|---------------|----------------|-------------|-----|
| Gain (0dB) | <u>On</u> ,Off | | |
| Gain (-3dB) | <u>On</u> ,Off | | |
| DS Gain | <u>On</u> ,Off | | |
| Line Mix | <u>On</u> ,Off | | |
| Shutter | <u>On</u> ,Off | | |
| White Preset | <u>On</u> ,Off | | |
| Extender | <u>On</u> ,Off | | |
| Black Gamma | <u>On</u> ,Off | | |
| Matrix | <u>On</u> ,Off | | |
| Color Correct | <u>On</u> ,Off | | |
| Filter | <u>On</u> ,Off | | |

OPERATION

Camera ID

3 lines of text

| Item | Range | description | BBC |
|------|-------|-------------------|-----|
| ID1 | | Max 10 characters | |
| ID2 | | | |
| ID3 | | | |

Shutter Speed

Select which speeds go onto the switch list

| Item | Range | description | BBC |
|-------------|----------------|--|-----|
| Synrho Scan | <u>On</u> ,Off | Speed set by buttons near filter wheel, longest exposure depends on frame rate | |
| Position 1 | <u>On</u> ,Off | ON adds items to list of settings that can be cycled through using the little switch below the lens. | |
| Position 2 | <u>On</u> ,Off | | |
| Position 3 | <u>On</u> ,Off | | |
| Position 4 | <u>On</u> ,Off | | |
| Position 5 | <u>On</u> ,Off | | |
| Position 6 | <u>On</u> ,Off | | |

Shutter Select

| Item | Range | Factory 59.94 | Factory 50 | description | BBC |
|------------|--|---------------|------------|---|--------|
| Position 1 | (59.94) 1/100,1/120,1/250,1/500,1/1000,1/2000,HALF | 1/100 | 1/60 | HALF keeps exposure at 180° irrespective of field or frame rate | 1/60 |
| Position 2 | | 1/120 | 1/120 | | 1/120 |
| Position 3 | | 1/250 | 1/250 | | 1/250 |
| Position 4 | (50) 1/60,1/120,1/250,1/500,1/1000,1/2000,HALF | 1/500 | 1/500 | | 1/500 |
| Position 5 | | 1/1000 | 1/1000 | | 1/1000 |
| Position 6 | | 1/2000 | 1/2000 | | HALF |

User SW

Assign user switches

| Item | Range | Factory | description | BBC |
|--------------|--|---------|-------------|-----|
| User Main Sw | Inh,S.Gain,DS.Gain,LineMix,S.Iris,I.Over,S. Blk,B.Gamma,AudioCh1,AudioCh2, RecSw,Y get,RetSW,Pre.Rec,DRS | S.Gain | | |
| User 1 Sw | | Pre.Rec | | |
| User 2 Sw | | DS.Gain | | |

SW Mode

More general stuff

| Item | Range | description | BBC |
|----------------|-----------------------|--|----------|
| Ret Sw | R.Review,Cam Ret | Review last few seconds/check Genlock input | R.Review |
| S.Blk Lvl | -10,-20,-30 | Super black level, not a good idea | |
| Auto Knee Sw | On,Off | Disables Auto Knee switch | Off |
| Shd,Abb Sw Ctl | On,Off | Does black shading with black balance if pressed >8seconds | On |
| Color Bars | SMPTE,Full,Split,Arib | SMPTE default for P model, Full for E model, daft idea. Arib=multi-format bars | SMPTE |
| S.Gain Off | L/M/H,S.Gain | Which switch cancels Super Gain | |
| DS.Gain Off | L/M/H,DS.Gain | Which switch cancels Digital Super Gain | |

White Balance Mode

Presets

| Item | Range | description | BBC |
|----------------|---------------------------------------|--|-------|
| Filter Inh | On,Off | Off allows separate balance data to be stored for each filter wheel position | On |
| Shockless AWB | Off,Fast,Normal, Slow1,Slow2,Slow3 | Response speed to white change, 1~20 seconds | |
| AWB Area | 25%,50%,90% | Central screen target area | |
| Color Temp Pre | 2300K~3200K~8000K | AWB set in Preset | 3200K |
| AWB A Temp | 2300K~3200K~8000K | AWB set in A, reports result of rebalance | 3200K |
| AWB B Temp | 2300K~3200K~8000K | AWB set in B, reports result of rebalance | 3200K |

User Sw Gain

Gain trickery

| Item | Range | description | BBC |
|--------------|-------|---|-----|
| S.Gain 30dB | | * Allows Super Gain (analogue) gain setting to be included or excluded from the gain lists | |
| S.Gain 36dB | | | |
| DS.Gain 6dB | | | |
| DS.Gain 10dB | | * Allows Digital Super Gain (Slow Shutter), effectively free gain by summing adjacent frames. | |
| DS.Gain 12dB | | | |
| DS.Gain 15dB | | | |
| DS.Gain 20dB | | | |

Lens/Iris

| Item | Range | description | BBC |
|-----------------|---------------------|--|-----|
| A.Iris Level | 0~45~100 | Auto iris target level, luma | |
| A.Iris Peak/Ave | 0~30~100 | Ratio, 0=average, 100=peak | |
| A.Iris Mode | Norm1, Norm2, Centr | 1=full frame, 2=not top, centre=spot | |
| S.Iris Level | 0~80~100 | Super Iris target (backlight compensation) | |
| Iris Gain | Cam,Lens | Where the iris gain control is | |
| Iris Gain Value | 1~10~20 | Value used when set to Cam | |

FILE MENUS

Card Read/Write

| Item | Range | description | BBC |
|-------------|-------|-------------------------|-----|
| R.Select | 1~8 | File number to read | |
| Read | | load from file | |
| W.Select | 1~8 | File number to write | |
| Write | | write to file | |
| Card Config | | List titles on card | |
| Title Read | | load user data | |
| Title1-8 | | Title, max 8 characters | |

Cam Card R/W Select

Decide what gets saved on the card

| Item | Range | description | BBC |
|------|-------|-------------|-----|
|------|-------|-------------|-----|

| | | | |
|----------------------|--------|---|--|
| System Mode R/W | On,Off | System and Camera Modes | |
| ID Read/Write | On,Off | On=save cam ID to card | |
| User Menu Select R/W | On,Off | Load/save Menu items that are/aren't marked | |
| System Menu R/W | On,Off | | |
| Paint Menu level R/W | On,Off | | |
| Paint Menu Sw R/W | On,Off | | |
| VF Menu R/W | On,Off | | |
| Operation Menu R/W | On,Off | | |
| Mainte Menu R/W | On,Off | | |
| VTR Menu R/W | On,Off | | |

Lens File

| Item | Range | description | BBC |
|-----------|-------|----------------------|-----|
| File No. | 1~8 | Lens file number | |
| Read | | Read it | |
| Write | | Write it | |
| Reset All | | Reset lens file data | |
| Title1-8 | | Max 12 characters | |

Lens File Card R/W

| Item | Range | description | BBC |
|------------------|-------|----------------|-----|
| Card File Select | 1~8 | 8 lens files | |
| Read | | | |
| Write | | | |
| Title Read | | | |
| Title1-8 | | Create a title | |

Scene

| Item | Range | description | BBC |
|-----------------|-------|----------------------------------|-----|
| Read User Data. | | Reads data from User memory area | |
| Scene Sel | 1~4 | 4 scene files | |
| Read | | | |
| Write | | | |
| Reset | | | |
| Title1-4 | | Create a title | |

Initialise

| Item | Range | description | BBC |
|--------------------|-------|------------------------------|-----|
| Read Factory Data. | | Resets User/Scene data | |
| Write User Data | | Save User data in the camera | |

MAINTENANCE

System Check

| Item | Range | description | BBC |
|-------------|--------|---------------------|-----|
| Color Check | On,Off | Displays RGB levels | |

Diagnostic

card/software versions, values for engineering sample camera tested on 8.8.2006

| Item | Range | description | BBC |
|---------------|-------|---------------------------------|--------------|
| Camsoft (in) | | Internal flash software version | 1.01-00.0.00 |
| Camsoft (out) | | External flash software version | 1.12-00.0.00 |
| Cam Table | | Table version | 2.06-00.0.00 |
| Font Rom | | Font version | 1.01-00.0.00 |
| FPGA (Char) | | Characters | 1.05-00.0.00 |
| FPGA (FM) | | Frame memories | 1.05-00.0.00 |
| FPGE (D/C) | | Down-converters | 1.02-00.0.01 |
| FPGA (TG) | | CCD drive version | 1.02-00.0.00 |

Len Adj

| Item | Range | description | BBC |
|----------|--------|-------------|-----|
| F2.8 adj | On,Off | | |
| F16 adj | On,Off | | |

Black Shading

| Item | Range | description | BBC |
|-----------------|----------------|----------------------|-----|
| Correct | <u>On</u> ,Off | | On |
| Detection (Dig) | | This makes it happen | |

White Shading

| Item | Range | description | BBC |
|----------|---------------------|---------------------------------|-----|
| Correct | <u>On</u> ,Off | | On |
| Saw/Para | -255~ <u>0</u> ~255 | Values for R/G/B, H/V, Para/Saw | |

Lens File Ad

| Item | Range | description | BBC |
|--------------------|---------------------|-----------------------------------|-----|
| RB Gain Ctrl Reset | <u>On</u> ,Off | Use/Reset RB gain offsets | |
| Lens R Gain Offset | -200~ <u>0</u> ~200 | Compensate for lens R sensitivity | |
| Lens B Gain Offset | -200~ <u>0</u> ~200 | Compensate for lens B sensitivity | |
| Lens R Flare | <u>0</u> ~100 | | |
| Lens G Flare | <u>0</u> ~100 | | |
| Lens B Flare | <u>0</u> ~100 | | |

VTR MENU

VTR Function

Basic stuff

| Item | Range | description | BBC |
|------------------|----------------------------------|---------------------------------------|--------|
| Humid Ope | <u>On</u> ,Off | On=ignore humidity warning | Off |
| Rec Start | All, <u>Normal</u> | How recording start is to be accepted | Normal |
| Pause Timer | 10min,20min, <u>30min</u> ,60min | Time to power down | |
| RC Check Sw | <u>R</u> ,Review,Retake | What "Rec" on remote vtr does | |
| Compression Mode | <u>Normal</u> , Dark | Dark is "Black Compress" on tape | Normal |

Battery/Tape

Basic stuff

| Item | Range | description | BBC |
|----------------------|--|--|-----|
| Battery Select | Propac14,Trimpac14,Hytron50, Hytron120, <u>Dionic90</u> , Dionic120,NP-L7,Endura7,Endura10,EnduraD, PagL95,BP-GL65/95,Nicd14,TypeA,TypeB | Set your battery/power source type and all the warnings and meters will read correctly | |
| Ext DC In Select | <u>AC Adpt</u> ,Propac14,Trimpac14,Hytron50,Hytron120, Dionic90, Dionic120,NP-L7,Endura7,Endura10, EnduraD, PagL95,BP-GL65/95,Nicd14,TypeA,TypeB | | |
| Batt Near End Alarm | <u>On</u> ,Off | Beep warning | |
| Batt Near End Cancel | <u>On</u> ,Off | If warning is on, Mode Check cancels beep | |
| Batt End Alarm | <u>On</u> ,Off | End of battery | |
| Batt Remain Full | 100, <u>70%</u> | Sets lcd indicator level for full charge | |
| Tape Near End Alarm | <u>On</u> ,Off | Beep warning | |
| Tape Near End Time | 3min, <u>2min</u> | Bleep time before end | |
| Tape End Alarm | <u>On</u> ,Off | Warning bleep | |
| Tape Remain | 5min,3min | Pixel size on tape display | |

Battery Setting 1

Decide which batteries exist in the list

| Item | Range | description | BBC |
|-----------|---|--|-----|
| Propac14 | <u>Auto</u> ,Manual (11~ <u>13.8</u> ~15) | Select each battery with * Auto/Manual controls whether you can set the warning level voltage manually. Be sensible with this and you'll never have silly battery warnings | |
| Trimpac14 | <u>Auto</u> ,Manual (11~ <u>13.6</u> ~15) | | |
| Hytron50 | <u>Auto</u> ,Manual (11~ <u>13.2</u> ~15) | | |
| Hytron100 | <u>Auto</u> ,Manual (11~ <u>13.0</u> ~15) | | |
| Dionic90 | <u>Auto</u> ,Manual (11~ <u>13.6</u> ~15) | | |
| Dionic160 | <u>Auto</u> ,Manual (11~ <u>13.1</u> ~15) | | |
| NP-L7 | <u>Auto</u> ,Manual (11~ <u>12.9</u> ~15) | | |
| Endura7 | <u>Auto</u> ,Manual (11~ <u>13.2</u> ~15) | | |
| Endura10 | <u>Auto</u> ,Manual (11~ <u>13.2</u> ~15) | | |
| EnduraD | <u>Auto</u> ,Manual (11~ <u>13.2</u> ~15) | | |
| PagL95 | <u>Auto</u> ,Manual (11~ <u>13.5</u> ~15) | | |

| | | | |
|------------|--|--|--|
| BP-GL65/95 | <u>Auto,Manual</u> (11~ <u>13.6</u> ~15) | | |
|------------|--|--|--|

Battery Setting 2

Continued

| Item | Range | description | BBC |
|--------|--|-------------|-----|
| Nicd14 | <u>Auto,Manual</u> (11~ <u>13.2 end</u> ~ <u>13.8 near end</u> ~15) | | |
| TypeA | <u>Auto,Manual</u> (11~ <u>12.9 end</u> ~ <u>13.6 near end</u> ~ <u>14.6 full</u> ~17) | | |
| TypeB | <u>Auto,Manual</u> (11~ <u>12.4 end</u> ~ <u>13.0 near end</u> ~ <u>15.2 full</u> ~17) | | |

Mic/Audio 1

| Item | Range | description | BBC |
|-----------------|--------------------------------|---------------------------------|-----|
| Front VR Ch1 | Front,WL,Rear,All, <u>Off</u> | Where the audio control is, Ch1 | |
| Front VR Ch2 | Front,WL,Rear,All, <u>Off</u> | Audio control, Ch2 | |
| Mic Lowcut Ch1 | Front,Rear,WL, <u>Off</u> | Bass-cut filters, to 200Hz | |
| Mic Lowcut Ch2 | Front,Rear,WL, <u>Off</u> | | |
| Mic Lowcut Ch3 | Front,Rear,WL, <u>Off</u> | | |
| Mic Lowcut Ch4 | Front,Rear,WL, <u>Off</u> | | |
| Limiter 1 | <u>On/Off</u> | | |
| Limiter 2 | <u>On/Off</u> | | |
| Audio Level Ch3 | <u>On,Off</u> | | |
| Audio Level Ch3 | <u>On,Off</u> | | |
| Cue Rec Select | Ch1,Ch2,Ch3.Ch4,Ch1+2,Ch3+4 | What goes onto the Cue Track | |
| Test Tone | <u>Normal,Always,Off,ChSel</u> | Which channel(s) get test tone | |

Mic/Audio 2

| Item | Range | description | BBC |
|--------------------|-------------------|--|------|
| Front Mic Power | <u>On,Off</u> | Phantom power | |
| Rear Mic Power | <u>On,Off</u> | Phantom power | |
| Audio Out | <u>On,Off</u> | | |
| Monitor Select | <u>Stereo,Mix</u> | What's monitored | |
| Front Mic level | <u>-40,-50dB</u> | | |
| Rear Mic Ch1 Level | <u>-50,-60dB</u> | | |
| Rear Mic Ch2 Level | <u>-50,-60dB</u> | | |
| Rear Line In Level | <u>-3,0,+4dB</u> | | |
| Audio Out level | <u>-2,0,+4dB</u> | | |
| Headroom | 18,20dB | Ref level, Factory=(50) 18dB, (59.94) 20dB | 18dB |
| Wireless Warn | <u>On,Off</u> | Warns when radio mic level is poor | |

TC/UB

Time code and User Bits

| Item | Range | description | BBC |
|-------------------|---|---|-----|
| TC Mode | <u>DF,NDF</u> | Always NDF at 50 | NDF |
| UB Mode | <u>User,Time,Date,Ext,TCG,FrmRate,Regen</u> | User bits data | |
| VITC UB MODE | <u>User/Ext,Time,Date,TCG,FrmRate,Regen</u> | | |
| TCG Set Hold | <u>On,Off</u> | Store TC when powered down | |
| First Rec TC | <u>Regen,Preset</u> | How TC is started | |
| P.Off LCD Display | <u>On,Off</u> | TC display when power OFF | |
| TC Out | <u>TCG,TCG/TCR</u> | | |
| TC Disp Sel | <u>30F,24F</u> | Base for 59.94 frame count, always 25 at 50 | |
| TC Video Synchro | <u>0,1,2,3</u> | Correction for TC, refer to the manual | |
| Rec Review Regen | <u>On,Off</u> | On uses tape TC on replay | |

UMID Set/Info

| Item | Range | description | BBC |
|--------------|-------|---|-----|
| Country | | Input your data, displays "No-Info" until you do so | |
| Organization | | | |
| User | | | |
| Device Node | | ID number of the product | |

VTR Diag

Reports from the vtr

| Item | Range | description | BBC |
|----------------|-------|------------------------------|--------------|
| Operation | | Total time power has been on | |
| Drum Running | | Drum time | |
| Threading | | Number of tape loads | |
| Drum Running r | | Drum time since last reset | |
| Threading r | | Tape loads since last reset | |
| VTR Syscon | | Software versions | 4.13-00-0.00 |
| Servo | | | 2.04-00-0.00 |
| Front | | | 3.00-00-0.00 |
| Video FPGA | | | 1.05-00-0.00 |
| Pwr Pld | | | 1.00-00-0.00 |
| | | | |

OPTION MENU

Option

More miscellaneous stuff

| Item | Range | description | BBC |
|-------------------|------------------------|--|------|
| Eng Security | On, <u>Off</u> | On disables all menus, and it's a jolly trip back to the shop to open them again | Off |
| Total Chroma Gain | -40~ <u>0</u> ~40 | Gains for Pb,Pr outputs | 0 |
| Chroma Output | <u>On</u> ,Off | Makes the camera monochrome | On |
| Frame Rate UB | <u>FrameRate</u> ,Menu | 720P or 24 only; record FrameRate or data as in VITC UB Mode in TC/UB Menu | |
| 1394 Config | <u>Dflt</u> ,1~255 | Best left alone | Dflt |
| 1394 Gap Count | 0~ <u>40</u> ~63 | Set interval between packets | 40 |