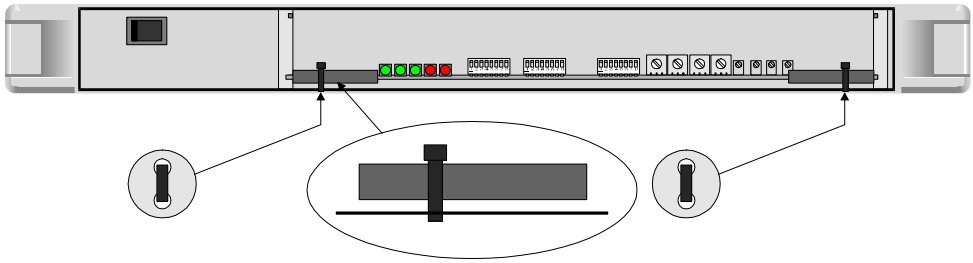
# CVR45/CVR45D

Standards Converter

## Transit Protection-Important Notice



**REMOVING THE TRANSIT TIE-WRAPS**

When supplied the PCB card will be secured by 2 tie-wraps, looped around the card ejectors and through 2 holes in the base plate. Before installing the rack both of the tie-wraps should be removed by cutting off the tie-wrap knot and completely removing the tie-wrap.

**REPLACING THE TRANSIT TIE-WRAPS**

Before shipping, the transit tie-wraps should be replaced with the spare tie-wraps supplied (part no. RMW610). With the unit free-standing ensure that the PCB card is pushed fully home using the card ejectors. From the inside of the unit, feed the tongue of the tie-wrap behind the card ejector and through the base plate using the rear of the 2 holes. From the outside, feed the tongue back through the base plate using the other hole, past the front of the card ejector, feed through the eye of the tie-wrap, pull tight and cut off the excess.

# Operator's Manual


Snell & Wilcox Ltd, Durford Mill, Petersfield, Hampshire, GU31 5AZ, United Kingdom.
Tel: +44(0) 1730 821188. Fax: +44(0) 1730 821199.

# Safety Warnings

**Always ensure that the unit is properly earthed and power connections correctly made.**

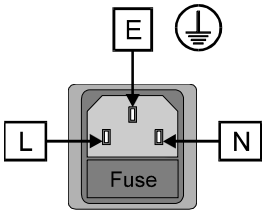
This equipment shall be supplied from a power system providing a **PROTECTIVE EARTH** ⏚ connection and having a neutral connection which can be reliably identified.

The power terminals of the IEC mains input connector on the rear panel are identified as shown below:

E = Protective Earth Conductor

N = Neutral Conductor

L = Live Conductor




## Power cable supplied for countries other than the USA

The equipment is normally shipped with a power cable with a standard IEC moulded free socket on one end and a standard IEC moulded plug on the other. If you are required to remove the moulded mains supply plug, dispose of the plug immediately in a safe manner. The colour code for the lead is as follows:

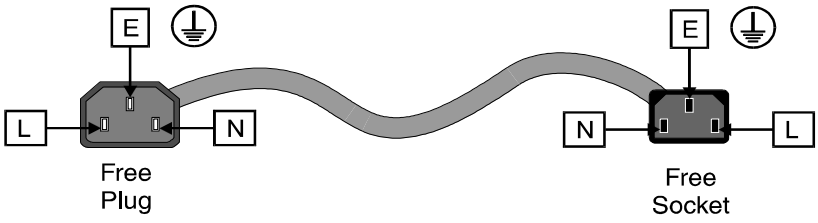
GREEN/YELLOW lead connected to E (Protective Earth Conductor)
BLUE lead connected to N (Neutral Conductor)
BROWN lead connected to L (Live Conductor)

## Power cable supplied for the USA

The equipment is shipped with a power cord with a standard IEC moulded free socket on one end and a standard 3-pin plug on the other. If you are required to remove the moulded mains supply plug, dispose of the plug immediately in a safe manner. The colour code for the lead is as follows:

GREEN lead connected to E (Protective Earth Conductor)
WHITE lead connected to N (Neutral Conductor)
BLACK lead connected to L (Live Conductor)

The terminals of the IEC mains supply lead are identified as shown opposite:




*Note that for equipment that is not fitted with a mains power switch, to comply with BS60950 Clauses 1.7.2 and 2.6.9, the power outlet supplying power to the unit should be close to the unit and easily accessible.*


## ⚠ Warnings ⚠

Voltages within this unit can be lethal under certain circumstances. Where power is required to be connected to the unit during servicing great care must be taken to avoid contact with these voltages.

Maintenance should only be carried out by suitably qualified personnel.

## EMC Standards

This unit conforms to the following standards:

Electromagnetic Compatibility-Generic Immunity Standard BS EN 50082-1:1992

*The European Standard EN 50082-1:1992 has the status of a British Standard and is related to European Council Directive 89/336/EEC dated 3rd May 1989.*

Electromagnetic Compatibility-Generic Emission Standard BS EN 50081-1:1992

*The European Standard EN 50081-1:1992 has the status of a British Standard and is related to European Council Directive 89/336/EEC dated 3rd May 1989.*

Federal Communications Commission Rules Part 15, Class A :1998

## Safety Standards

This unit conforms to EN60065:1992 as amended by amendment A1(May 1993) and amendment A2(March 1994). Specification for safety of technology equipment, including electrical business equipment.

## EMC Performance of Cables and Connectors

Snell & Wilcox products are designed to meet or exceed the requirements of the appropriate European EMC standards. In order to achieve this performance in real installations it is essential to use cables and connectors with good EMC characteristics.

All signal connections (including remote control connections) shall be made with screened cables terminated in connectors having a metal shell. The cable screen shall have a large-area contact with the metal shell.

COAXIAL CABLES

Coaxial cables connections (particularly serial digital video connections) shall be made with high-quality double-screened coaxial cables such as Belden 8281 or BBC type PSF1/2M.

D-TYPE CONNECTORS

D-type connectors shall have metal shells making good RF contact with the cable screen. Connectors having "dimples" which improve the contact between the plug and socket shells, are recommended.

## Packing List

The unit is supplied in a dedicated packing carton provided by the manufacturer and should not be accepted if delivered in inferior or unauthorised materials. Carefully unpack the carton and check for any shipping damage or shortages.

Any shortages or damage should be reported to the supplier immediately.

Enclosures:

- CVR45 Standards Converter Unit
- Power cable
- Operator's Handbook

# Table of Contents

**SECTION**

# *Manual Revision Record*

| Date | Version No. | Issue No. | Change | Comments |
|---|---|---|---|---|
| 230597 | 2 | 1 | Now for all versions of CVR45 | Complete new manual issued |
| 270597 | 2 | 2 | 0.3 New Safety Standard added<br>0.2 New warnings page added | New section 0 |
| 161199 | 2 | 3 | For new front panel artwork and N and M Options data added | Complete new manual issued |
| 130901 | 2 | 4 | -N, -M option notes removed section 1 to V2.4 | New sections 00, 01 issued |
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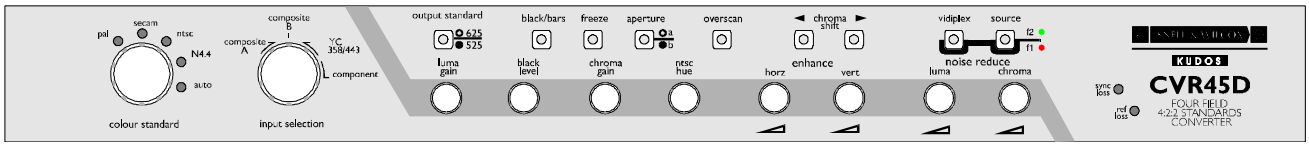
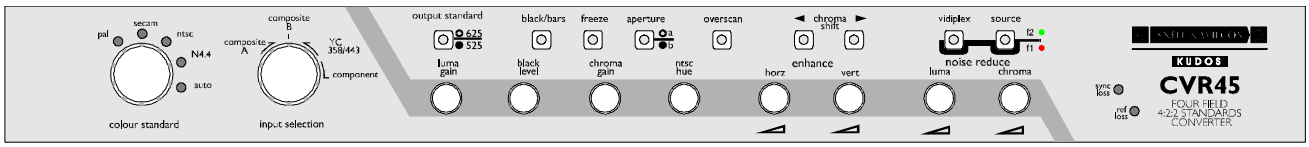
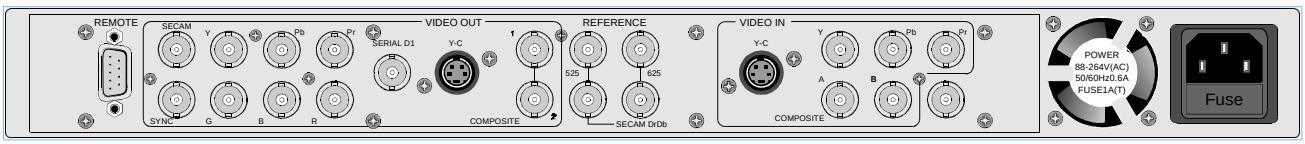
# Description

Since its introduction, the compact (1RU), cost effective Kudos CVR45/45D has established itself as the world's best selling broadcast quality standards converter and has transformed the way the world looks at standards conversion. Broadcasters, post-production facilities, corporations, universities and many other users have all realized that the Kudos CVR45/45D delivers quality, reliability and performance that was once available only from much larger and more expensive units. The innovative Kudos CVR45/45D provides rugged portability, high reliability and extremely low power consumption, together with high quality conversion, at an affordable price. The CVR45D adds an SDI output



# Features

- The world's most widely used broadcast standards converter
- 4-field, 4-line aperture conversion
- 8-bit 4:2:2 processing throughout
- Serial digital (SDI) output (CVR45D)
- Full 5.5 MHz composite and component bandwidth.
- Proprietary wideband gate decoding of PAL, NTSC and SECAM delivers sharp output pictures with minimum cross effects
- Rugged TBC performance enables reliable processing of poor quality input signals
- Powerful adaptive frame-based recursive noise reduction
- All-digital horizontal and vertical enhancement
- Choice of conversion apertures - including the classic ACE algorithm
- Simultaneous PAL and SECAM outputs (45D PAL only)
- Full range of adjustable proc. amp and enhancement controls
- Fully genlockable
- Built-in vidiplex decoding
- Proven high reliability: large world-wide installed base

# Specifications

## Features

### Signal Inputs

| | |
|---|---|
| Composite Video | 2 via BNC connectors |
| Separated Y/C | S-VHS/Hi-8 via 4-pin Mini DIN |
| Analogue Component | YPbPr EBU/SMPTE levels via BNC connectors |
| Genlock Reference | 625/525/DrDb via BNC connectors |

### Signal Outputs

| | |
|---|---|
| Composite Video | 2 programme via BNC connectors |
| Serial digital (CVR45D only) | 1 programme via BNC connector |
| SECAM | 1 programme via BNC connector |
| Separated Y/C | 1 programme via 4-pin Mini DIN |
| Analogue Component | 1 YPbPr EBU/SMPTE levels via BNC connectors |
| GBRS | 1 set (SOG selectable) via BNC connectors |

### Front Panel Controls

| | |
|---|---|
| Luminance Gain | +6 dB to -4 dB min |
| Black Level | ±100 mV |
| Chrominance Level | +6 dB to -4 dB min |
| NTSC Hue | More than 10° |
| Horizontal Enhance | Off, low, medium and high |
| Vertical Enhance | Off, low, medium and high |
| Input Standard Select | Auto or force PAL, SECAM, NTSC and NTSC 4.43 |
| Input Select | Composite A, B, Y/C and Component |
| Output Standard Select | 625 or 525 line |
| Test Signals (see aslo Presets) | Color Black or Color Bars |
| Freeze Frame | On/Off |
| Aperture Coefficient Set | Select A or B options |
| Overscan | Enable +2% vertical overscan to mask VCR head switch disturbances |
| Chroma Shift | ±1 µs in increments of 74 ns |
| Vidiplex | On/Off |
| Vidiplex Source | Select field 1 or 2 |
| Luminance Noise Reduction | Off, 3 dB, 6 dB or 9 dB |
| Chrominance Noise Reduction | Off, 4 dB, 8 dB or 12 dB |

## Features

### Preset Controls

| | |
|---|---|
| Horizontal Y/C Timing | -520 ns to +150 ns |
| Vertical Y/C Timing | -2 lines to +1 line |
| Test Signals | EBU Color Bars, Linear Ramp, Multiburst and Black |
| HAC Boost Frequency | 2.3 MHz or 3.4 MHz |
| Noise Reduction Threshold Level | Auto or set >30 dB, <30 dB, <25 dB |
| Genlock H-Phase (625 and 525) | ±2 µs |
| Genlock Subcarrier Phase | >360° |

## Specifications

| | |
|---|---|
| Input Standard | PAL/NTSC/SECAM/NTSC 4.43 |
| Input Line Frequency Range | ±5% from nominal |
| Output Standards | PAL/NTSC/SECAM |
| Separated Y/C Input | S-VHS/Hi-8 |
| Component Input | YPbPr at EBU/SMPTE levels |
| Reference Inputs | 625 and 525<br>Black Burst or Composite Video |
| SECAM Reference | Derives DrDb phasing from a SECAM signal at 525 ref. input |
| GBRS Outputs | 0.7 V pk to pk + Syncs at 2 V pk to pk<br>SOG at 0.3 V pk to pk selectable |
| Sampling | 4:2:2 (13.5 MHz) |
| Aperture Size | 4-field 4-line |
| Y Frequency Response | Better than 5.5 MHz -3 dB |
| 2T Pulse-Shape k-rating | Better than 2% K |
| Composite Frequency Response (PAL and NTSC) | Better than 5.5 MHz -3 dB |
| Signal to Noise Ratio | Better than 60 dB (Weighted) |
| Tilt | <1% |
| Residual Jitter | <25 ns |
| Video Delay | Synchronize Mode:<br>2 lines to 1 frame<br>Convert Mode:<br>1 Input frame (average) |
| Return Loss: Inputs | better than 35 dB to 5.0 MHz |
| Output Syncs | To CCIR specifications |
| Subcarrier Stability | Better than 10 ppm (0 to 40° C) |
| GPI Remote Control | Select Input A, B, Y/C or Analogue Component.<br>Enable Pattern/Black, Freeze, Vidiplex, Vidiplex field.<br>Select Output Standard 625/525 |

## Specifications

### Power

| | |
|---|---|
| Input Voltage Range | 90 V to 250 Vrms, 50/60 Hz |
| Consumption | 60 VA maximum |
| Mains Fuse Rating | 1 A |

### Mechanical

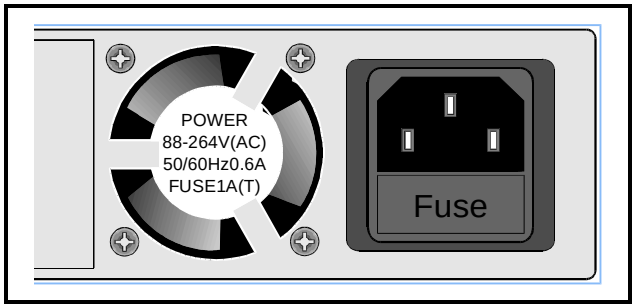
| | |
|---|---|
| Temperature Range | 0 to 40° C operating |

## Specifications

| | |
|---|---|
| Case Type | 1RU Rack Mounting |
| Dimensions | 483 mm x 456 mm x 44.4 mm (w,d,h) |
| Weight | 7 kg |

# Operation

POWER CONNECTIONS

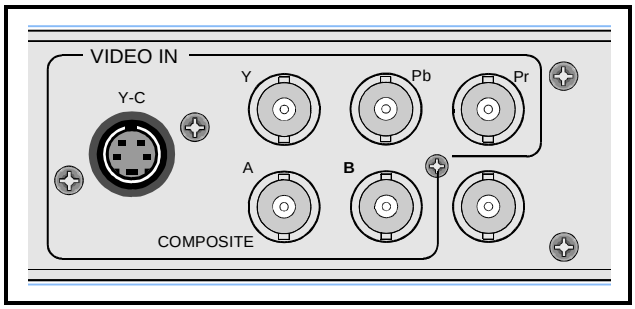



This is the mains power connector suitable for a standard IEC type power cable and contains a 1A(T) fuse. If a plug is fitted to the cable a fuse of 5A (Fast) should be installed.

The Power On/Off switch is located behind the drop down front panel in the left-hand corner.

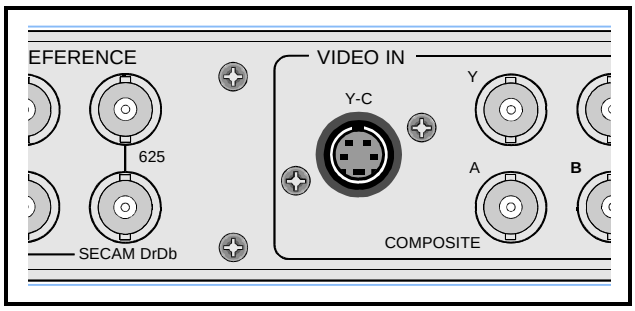
INPUT CONNECTIONS

COMPOSITE INPUTS A &B




These are the Composite video inputs to the unit via BNC connectors. Nominal input level is 1V p-p terminated in 75 Ohms. A or B input may be enabled by the front panel INPUT SELECT switch.

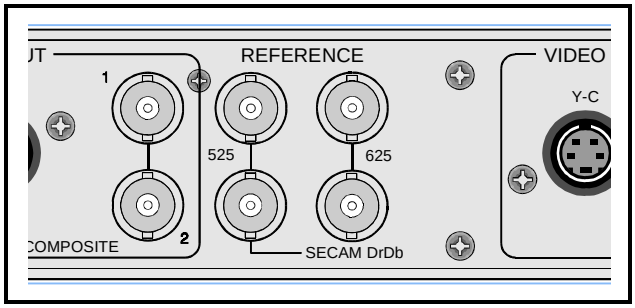
Y-C SEPARATED INPUT




The Y-C (S-VHS/Hi-8) input signal is connected to the unit via a 4 pin Mini DIN type connector.
Y input level is a nominal 1V p-p into 75 Ohms C input level is a nominal 0.3V p-p colour burst into 75 Ohms.

# Operation

REFERENCE INPUTS 625 AND 525
(SECAM Dr/Db)



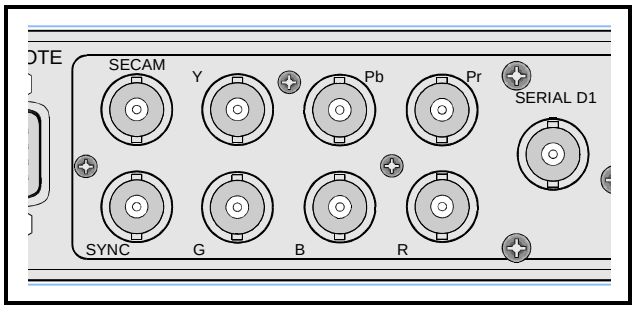

When suitable signals are connected to these inputs, the output of the unit will be fully synchronised to the relevant signal source. The 525/625 signal may be black burst or standard composite video and the BNC connector is terminated in 75 Ohms.
Note that by setting internal switches the 75 Ohm terminating resistor may be disconnected and the input impedance becomes high at >15K.

If no signal is present the unit will automatically revert to internal SPG operation and the red LED on the front panel will be illuminated indicating that the reference signal has been lost.

The SECAM Dr/Db reference signal should be connected to the '525' reference input socket.
The SECAM output signal will then follow the reference Dr/Db sequence, while the horizontal and vertical timing will follow the PAL reference signal connected to the '625' reference connector.

The SECAM DrDb reference must be horizontally timed close to this '625' reference (see specification). If only the SECAM output is to be used, then to reference to external Horizontal, Vertical and DrDb signals, a SECAM black signal must be connected to both the '525' and '625' reference inputs.

COMPONENT INPUT



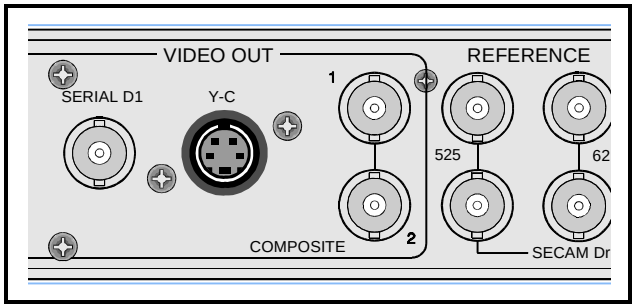

These BNC connectors accept standard EBU(625) or SMPTE(525) component signals and is enabled by setting the INPUT SELECT switch on the front panel to COMPONENT.

Nominal levels for 100% colour bars are as follows:-

| | |
|---|---|
| Y signal | 1V p-p (0.7V Video, 0.3V Sync) into 75 Ohms |
| Pb signal | 0.7V p-p |
| Pr signal | 0.7V p-p |

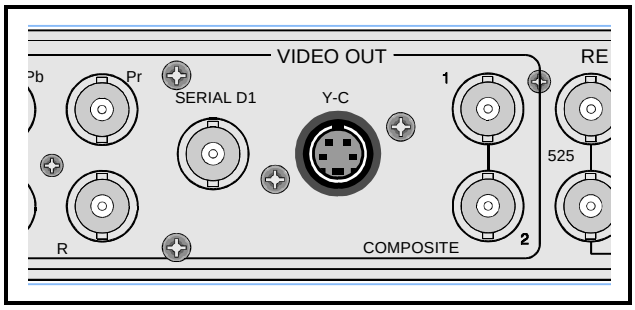
# Operation

MAIN OUTPUTS 1 & 2




Two isolated composite outputs are available from these BNC connectors.
Output level is standard 1V p-p into 75 Ohms.
When power to the unit is lost, or the unit is switched Off, the unit will automatically bypass the signal on Composite A input to Composite output 1

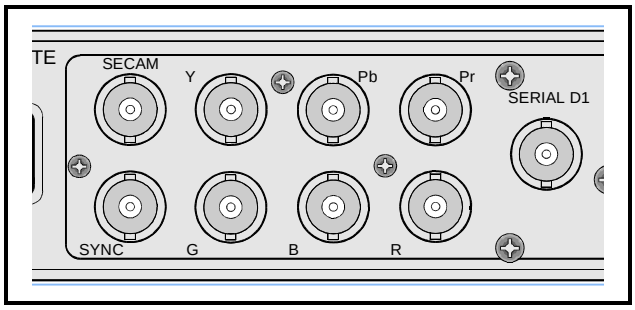
Y-C SEPARATED OUTPUT




A Y-C (S-VHS/Hi-8) output signal is available from a 4 pin Mini DIN type connector.

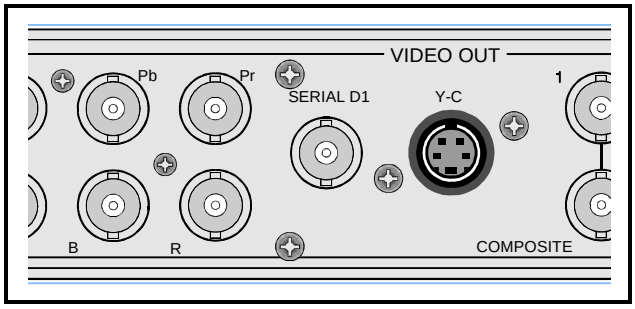
Y output level is a nominal 1V p-p into 75 Ohms
C output level is a nominal 0.3V p-p colour burst into 75 Ohms

COMPONENT OUTPUT




The three BNC connectors provide standard EBU(625) or SMPTE(525) component YPbPr output signals.

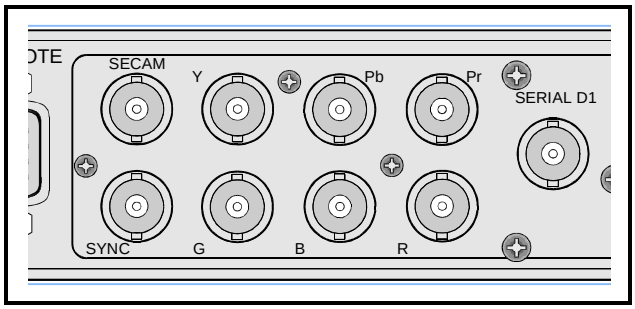
SERIAL D1 OUTPUT (CVR45D only)




An output of serial D1 is available from this BNC connector

# Operation

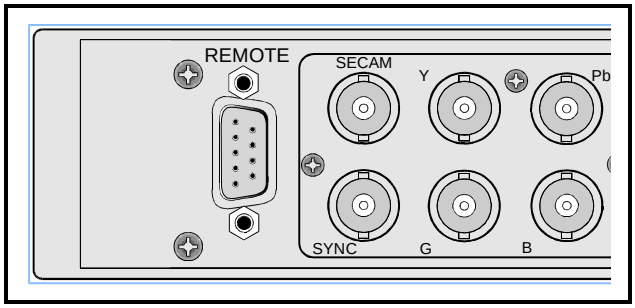
## GBRS OUTPUT




The three BNC connectors provide analogue non-composite outputs of separate Red, Green, and Blue signals at 0.7V p-p plus mixed sync at 2V p-p, all into 75 Ohms.
SOG (Sync on green) at 0.3V p-p may be enabled by an internal
link.

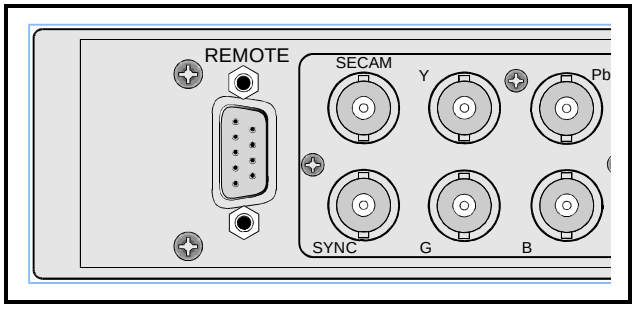
The complete PCB must be withdrawn from the unit (ensure power is turned off and PCB securing screws are removed) using the card ejectors and the ‘Sync on green’ link (LK 4) will be found to the rear of the lower main card.

## SECAM OUTPUT




This BNC connector provides a standard SECAM signal output of 1V p-p into 75 Ohms when the output standard is set to 625.
Note that when 525 output standard is selected this output becomes monochrome only.

## REMOTE




Remote control of certain functions is made available via this 9 pin female ‘D’ connector. Control signals are active when lines are taken to ground.
Control sources may be a mechanical switch, relay contact or open collector transistor.
Selection of input signals is by a 2-bit Binary code where 1 represents open and 0 represents low or grounded.

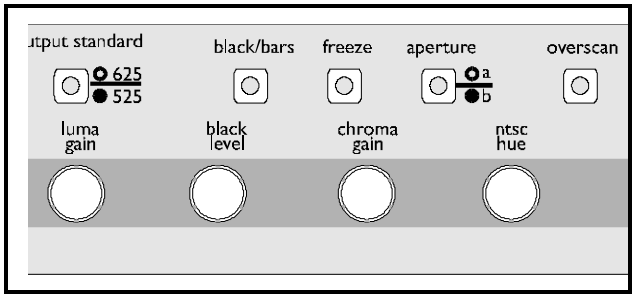
Connections are as follows:

| | | Composite | | | |
|---|---|---|---|---|---|
| Pin 1 | Ground | A | B | Y/C | YUV |
| 2 | Input Select 0 (low) | 1 | 0 | 0 | 1 |
| 3 | Input Select 1 (high) | 1 | 0 | 1 | 0 |
| 4 | Black/Pattern Enable | | | | |
| 5 | Not Connected | | | | |
| 6 | Freeze Enable | | | | |
| 7 | Vidiplex Enable | | | | |
| 8 | Vidiplex Field Select (high=field 1, low=field 2) | | | | |
| 9 | Not Used | | | | |

# Operation

## FRONT PANEL CONTROLS

*Note that clockwise rotation of these controls increases levels, anticlockwise rotation decreases levels.*




### LUMINANCE GAIN

This control allows the luminance level or contrast of the output signal to be adjusted.
The range of control is + 6 dB maximum to -4 dB minimum and 0 dB (Unity Gain) is set at the detent 12 o'clock position.

### BLACK LEVEL

The Black level or brightness of the output picture may be adjusted by +/-100mV with this control. The centre detent 12 o'clock position sets the black level at blanking level.

### CHROMA GAIN

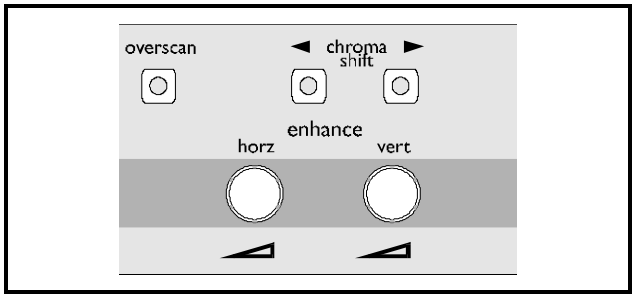
This control allows the Colour saturation of the output picture signal to adjusted.
The range of control is + 6 dB to -4 dB minimum and 0 dB (Unity Gain) is set at the detent 12 o'clock position.

### NTSC HUE

The colour Hue, or specific colour tint of the picture, can be changed using this control when processing NTSC signals.

The effect can be seen on a Vectorscope as a change in the vector angle between the Burst vector and the colour vectors.
The amount of adjustment available is greater than 10° and the centre detent position represents 0°

# Operation

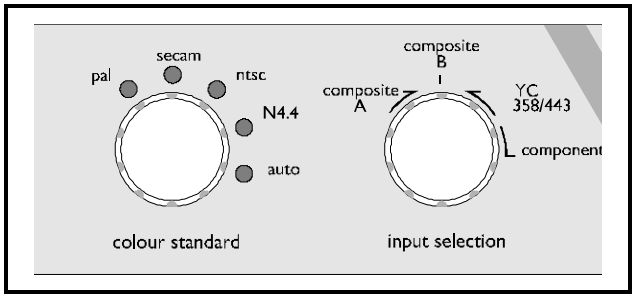



ENHANCE HORZ

This four-position switch allows various amounts of horizontal aperture correction to be applied to the signal being processed. The amount of correction that may be applied can be zero (off),
low, medium and high (max) and is cored against noise and residual subcarrier. Correction is only applied in the luminance channel.
The enhancement will be centred around the boost frequency set by SW2 position 2, to either 2.3MHz or 3.4MHz (See ‘Preset DIP Switches’)

ENHANCE VERT

This four-position switch allows various amounts of vertical aperture correction to be applied to the signal being processed. The amount of correction that may be applied can be zero (off),
low, medium and high (max).




COLOUR STANDARD

This switch selects the input standard of the signal connected to the appropriate input connector.

The colour standards that may be processed by the unit are
PAL, NTSC, SECAM and NTSC 4.4.
When the input colour standard is known the switch should be set to the relevant position (force input) and confirmation of the selection will be indicated by the illumination of red LED.
If the input standard is not known or may be variable, the AUTO position should be used.

The AUTO condition will be confirmed by the illumination of the green LED and the colour standard of the input signal will be indicated by the illumination of a red LED.

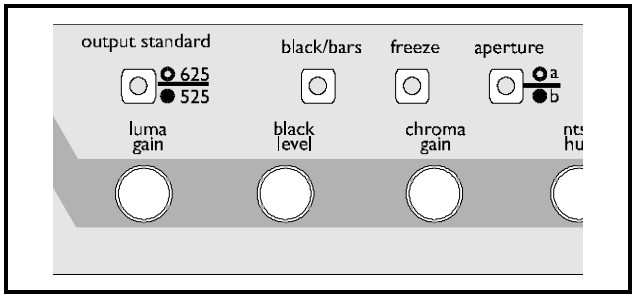
Note that the LED’s are disabled when a component input is selected and the 525 or 625 mode is automatically set.

INPUT SELECTION

This switch selects the input signal to be processed from the various input connectors on the rear panel of the unit.

Selection may be as follows:-
Composite Input A, Composite Input B, Y-C Separated (S-VHS/Hi-8) 358 or 443 and Component YPbPr.

# Operation




OUTPUT STANDARD

This illuminated toggle push button allows the line standard of the output signal to be selected.
The button will be illuminated green for 625 line PAL output standard and red for 525-line NTSC output standard.

BLACK/BARS

This illuminated toggle push button allows an internally generated test pattern (selected by card edge switch) to appear at all outputs of the unit.
If colour black is selected then it will enable the unit to cut to black.

FREEZE

When activated this button will be illuminated and the output picture will be frozen.
In synchronise mode the picture will be an interpolated frozen field giving correct interlace.
In convert mode the frozen field is interpolated from 4 input fields.

If vidiplex is ON the picture will be a freeze field 1 or 2, with the correct interlace sequence generated to prevent line flicker

APERTURE

Two conversion-aperture filter characteristics may be selected using this button.

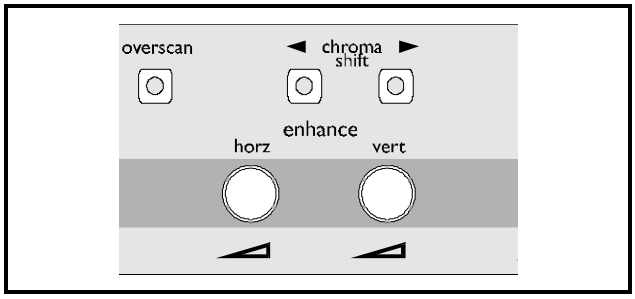
The A aperture (illuminated green LED) allows pictures with large amounts of fast motion to be displayed with minimum blurring effects and maximum sharpness.

The B aperture (illuminated red LED) is suited for pictures that contain limited amounts of fast motion and allows a picture to be displayed with a minimum amount of motion-induced aliasing effects.

In Vidiplex modes the A aperture acts purely vertically to create an interlaced output. Aperture B is a vertical/temporal filter intended to reduce ‘judder’ at the expense of a small amount of temporal lag.

# Operation

OVERSCAN




When this function is enabled (confirmed by an illuminated LED) the unit will expand the picture height by 2% so that the head switch disturbance from VCR's, that would normally be seen at the bottom of the picture, disappears.

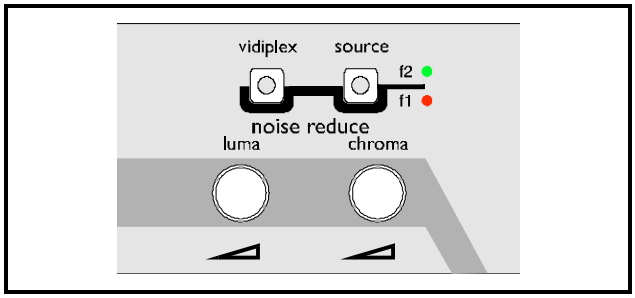
CHROMA SHIFT

These buttons allow the horizontal position of chrominance signal relative to the luminance signal to be changed.

This function is also known as Y/C delay adjustment. Each time the button is pressed a fixed amount of correction is applied. There are 16 steps in each direction.
The left-hand button moves chroma to the left (greater Chroma delay) and the right button moves chroma to the right (less Chroma delay) Overall range is 1 microsecond.

On power up the Chroma Shift will default to the amount set by the internal preset DIP switches (see Preset DIP switches SW1)

VIDIPLEX



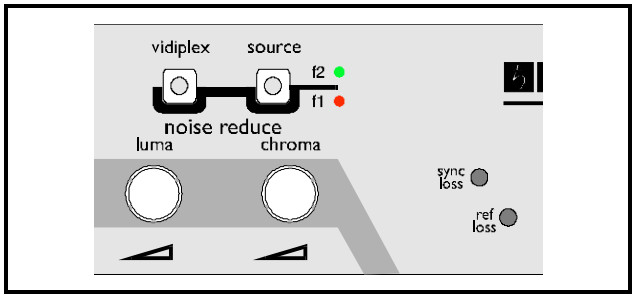

Vidiplex is a method of multiplexing two separate TV pictures onto one video signal line.
One picture is put onto one field of the picture frame and the other picture is put onto the next field of the frame using the odd/even field structure of the signal.

The Vidiplex function of the unit is enabled by pressing the Vidiplex ON button (operation confirmed by the LED illumination).

The unit will now decode the vidiplex signal and the individual field of the picture may be displayed by pressing the SOURCE button.

The LED in this button will glow red for field 1 and glow green for field 2.
The input fields are fully interpolated to produce a spatially correct interlaced output frame.

# Operation




NOISE REDUCE

These four position switches allow various amounts of Luminance and Chrominance Noise reduction to be applied to the signal being processed.
The amount of correction that may be applied can be zero (off), low, medium and high (max).

SYNC LOSS

In the event of input sync loss this red LED will be illuminated.

The output picture will field freeze on the last good field and, if desired, may be made to cut to black after approximately 0.5 seconds.
(Internal link selection LK7, located in the front right hand corner of the main PCB)

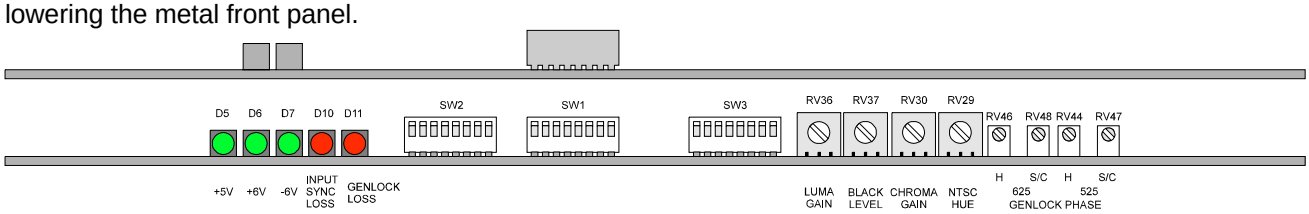
REF LOSS

If the reference signal related to the output (see above ‘Reference Inputs’) is lost, this red LED will become illuminated.

# Operation

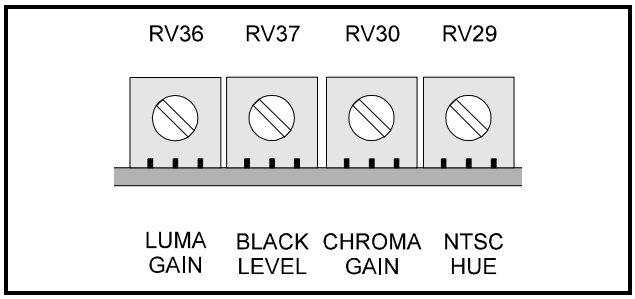
PRESET CONTROL FUNCTIONS

These presets are located on the front edge of the plug-in PCB and are accessible by pulling forward and lowering the metal front panel.




The preset controls for LUMA GAIN, BLACK LEVEL, CHROMA GAIN and HUE are used to calibrate the front panel controls centre detent position. e.g. The Video Gain Preset will allow the front panel Luminance Gain control centre detent position to be set for unity gain.
NOTE:- For accurate settings a Waveform Monitor and Vectorscope would be required.

LUMA GAIN




This control adjusts the overall Video gain of the module. The gain is factory preset to unity and can be adjusted from +6 dB to -4 dB using this control.
The preset position is factory set to correct the variation of Y level between NTSC and PAL systems.
Clockwise rotation increases the Gain, anticlockwise rotation reduces the gain.

BLACK LEVEL

The Black Level (pedestal) of the output signal is adjustable by +/-100mV with this control.

This control is factory set to remove the NTSC 7.5 IRE Units pedestal present on the input. True Black Level on the PAL output coincides with Blanking level.
Clockwise rotation increases the black level, anticlockwise rotation reduces the black level.

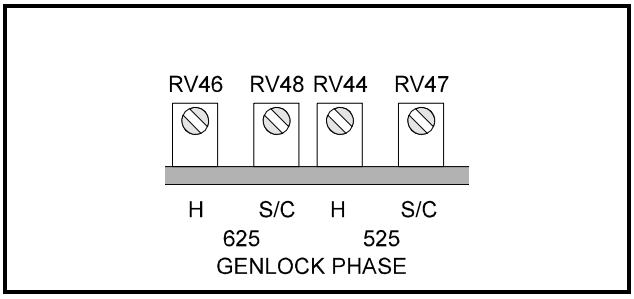
CHROMA GAIN

This control allows the colour saturation of the picture to be adjusted.
The range of adjustment is from +6 dB to -4 dB and is factory set to 0 dB. Clockwise rotation increases colour saturation, anticlockwise rotation reduces saturation.

NTSC HUE

The colour Hue, or specific colour tint of the picture, can be changed using this control. The effect can be seen on a Vectorscope as a change in the vector angle between the Burst vector and the colour vectors. The amount of adjustment available is 10° and is factory set to zero

# Operation




625 H PHASE

This control allows the timing between the 625 reference sync input and the output syncs to be adjusted. Adjustment requires the use of a dual channel oscilloscope so that coincidence occurs between the ref. syncs and output syncs. The range of control is +/-2 microseconds.

625 S/C PHASE

This control adjusts the relative phase of the Subcarrier at the video output to that of the Subcarrier of the 625 reference signal. To adjust correctly the ref. signal and the video output signal should be displayed on a dual channel vectorscope and burst vectors aligned for minimum overlap. Control range is greater than 360°

525 H PHASE

This control allows the timing between the 525 reference sync input and the output syncs to be adjusted. Adjustment requires the use of a dual channel oscilloscope so that coincidence occurs between the ref. syncs and output syncs. The range of control is +/-2 microseconds.

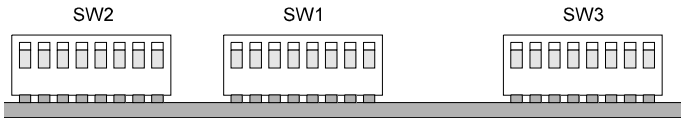
525 S/C PHASE

This control adjusts the relative phase of the Subcarrier at the video output to that of the Subcarrier of the 525 reference signal. To adjust correctly the ref. signal and the video output signal should be displayed on a dual channel vectorscope and burst vectors aligned for minimum overlap. Control range is greater than 360°

# Operation

PRESET DIP SWITCHES

These three banks of switches are provided to enable various modes and corrections to be preset. They may be used to operate the unit when supplied without a front control panel.




| FUNCTION SELECT | SW2 SETTINGS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Enable Black/Pattern* | ■ | | | | | | | |
| Pattern Black | ■ | | | | ■ | ■ | | |
| Pattern Colour Bars | ■ | | | | ■ | | | |
| Pattern Multiburst | ■ | | | | | ■ | | |
| Pattern Linear Ramp | ■ | | | | ■ | ■ | | |
| Enable HAC (Medium Level)* | | | ■ | | | | | |
| HAC Frequency Low | | ■ | | | | | | |
| HAC Frequency High | | ■ | | | | | | |
| Enable VAC (Medium Level)* | | | | ■ | | | | |
| Aperture A* | | | | | | | ■ | |
| Aperture B* | | | | | | | ■ | |
| Overscan Enable* | | | | | | | | ■ |

# Operation

| FUNCTION SELECT | | SW1 SETTINGS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Enable Vidiplex Field 1* | | | | | | | | | |
| Enable Vidiplex Field 2* | | | | | | | | | |
| Preset Horizontal Y/C Delay | 0 ns | | | | | | | | |
| | + 75 ns | | | | | | | | |
| | + 150 ns | | | | | | | | |
| | - 75 ns | | | | | | | | |
| | _ 150 ns | | | | | | | | |
| | - 300 ns | | | | | | | | |
| | - 370 ns | | | | | | | | |
| | - 520 ns | | | | | | | | |
| Preset Vertical Y/C Delay | 0 | | | | | | | | |
| | + 1 line | | | | | | | | |
| | - 1 line | | | | | | | | |
| | - 2 lines | | | | | | | | |
| Freeze Enable* | | | | | | | | | |

# Operation

| FUNCTION SELECT | SW3 SETTINGS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Select Input A* | ON | ON | OFF | OFF | OFF | OFF | OFF | OFF |
| Select Input B* | ON | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| Select Input Y/C* | ON | ON | OFF | OFF | OFF | OFF | OFF | OFF |
| Select Input YPbPr* | ON | ON | OFF | OFF | OFF | OFF | OFF | OFF |
| Output Standard 625* | OFF | OFF | ON | OFF | OFF | OFF | OFF | OFF |
| Output Standard 525** | OFF | OFF | ON | OFF | OFF | OFF | OFF | OFF |
| VITS Blanked | OFF | OFF | OFF | ON | OFF | OFF | OFF | OFF |
| VITS Pass | OFF | OFF | OFF | ON | OFF | OFF | OFF | OFF |
| Auto Select Input Standard* | OFF | OFF | OFF | OFF | ON | ON | ON | ON |
| Select Input Standard PAL* | OFF | OFF | OFF | OFF | ON | OFF | ON | ON |
| Select Input Standard SECAM* | OFF | OFF | OFF | OFF | ON | ON | OFF | ON |
| Select Input Standard NTSC* | OFF | OFF | OFF | OFF | ON | ON | ON | OFF |
| Select Input Standard N4.4* | OFF | OFF | OFF | OFF | ON | ON | ON | ON |

# Operation

## SECAM ENCODER

A composite SECAM output is available from this unit.

A major advantage of this encoder is the inclusion of a Carrier Dispersal System that prevents tilt on decoded highly saturated colour. This feature overcomes the familiar problem of hue errors following Chrominance transients exhibited by conventional SECAM encoders.

## PEAK LUMINANCE LEVEL ADJUSTMENT

This is set by means of a preset potentiometer RV2 on the Encoder daughter PCB.
Clockwise rotation reduces the peak luminance level at 4.28MHz.

## SECAM IDENTIFICATION SIGNAL

The Encoder may be configured to generate Dr/Db ident "bottles" and can be enabled or disabled by means of a link (LK 2) on the Encoder daughter PCB (upper PCB).
To change the configuration the main PCB retaining screws should be removed and the complete PCB withdrawn.
LK 2 is located at the rear of the daughter PCB.
To enable "bottles" the link should be fitted towards the Power Supply side of the unit and away from the Power Supply side to disable the "bottles".

## FEATURES

- Broadcast/Industrial specification
- High precision analogue encoding to SECAM
- Unique Luminance processing for maximum bandwidth
- Accurate 2T Pulse to Bar response
- Carrier Dispersal System
- External Dr/Db Phasing via SECAM reference Black Burst
- No external controls

## PERFORMANCE

Luminance Notch Peak Luminance level Set to 10% @ 4.28MHz
Adjustable 5-20% at 4.28MHz (see below)

| | |
|---|---|
| Tilt | <1% |
| K Rating | 1% Max. |
| Chrominance Bandwidth | 1MHz |
| Permissible Sync to DrDb reference Delay | ±4 µs |

# Operation

## NOISE REDUCTION

This is a powerful frame recursive noise reduction system with separate processing and controls for the Luminance and Chrominance channels.

The noise reduction system may be enabled and controlled by setting the card edge DIP switches or by the front panel rotary switches.
The level of noise reduction may be set to zero (off), low, medium and high.
This noise reducer incorporates a sophisticated noise measurement system that provides fully automatic adjustment of the threshold level at which noise reduction is enabled.

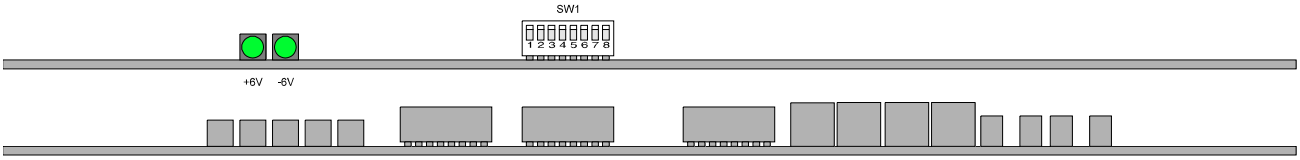
## DIP SWITCH SETTING

Manual adjustment of the threshold level is also possible.

Optimum performance is achieved when dealing with noise levels at -25 dB or better.

## FEATURES

- Frame Recursive Processing
- Separate control circuitry and motion detection for Y and C Signals
- Automatic Noise Energy Measurement
- Does not introduce any Additional time delay




| FUNCTION SELECT | | NOISE REDUCTION SETTINGS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Noise Reduction Threshold Level | Automatic | | | | | | | | |
| > 35 dB | Low | | | | | | | | |
| > 30 dB | Medium | | | | | | | | |
| > 25 dB | High | | | | | | | | |
| Luminance Noise Reduction Level | Off* | | | | | | | | |
| Low* | ~3 dB | | | | | | | | |
| Medium* | ~6 dB | | | | | | | | |
| High* | ~9 dB | | | | | | | | |
| Chrominance Noise Reduction Level | Off* | | | | | | | | |
| Low* | ~5 dB | | | | | | | | |
| Medium* | ~8 dB | | | | | | | | |
| High* | ~12 dB | | | | | | | | |

# Operation

**1st LINE MAINTENANCE**

In the unlikely event of this unit failing to operate correctly no attempt should be made to repair the unit unless all the necessary test equipment, service manuals and technical expertise is available and permission has been granted in writing by SNELL and WILCOX Ltd. or their official agents, for such repairs to be attempted.

Failure to comply with these conditions will void the warranty.

First line maintenance should be confined to the replacement of the plug-in card, the power supply module, the fan and the backplane assembly

**CLEANING**

It is important that the ventilation slots in the bottom of the front panel and the holes in the sides of the unit do not become obstructed or blocked in any way including the build-up of dust etc. as this will interfere with the ventilation and cooling of the unit.

A reduction of air flow through the unit may result in overheating and the power supply over-temperature cut-out may operate and shut down the unit.

The front panel slots, side panel holes and the cooling fan should be regularly inspected and cleaned if necessary.

**TO REMOVE THE PCB CARD**

***IMPORTANT WARNING***

***Before attempting to remove the PCB card the two PCB retaining screws located on the bottom panel of the unit must be removed . The card may then be safely removed by means of the card ejectors.***

**TO REMOVE THE POWER SUPPLY MODULE**

1. Disconnect power to the unit by removing the IEC power connector
2. Allow two minutes for capacitors to discharge
3. Remove the top cover of the unit (8 screws)
4. Pull off the insulating sheet covering the power supply module
5. Pull off the white plug-in connectors
6. Remove the four black M4 nuts securing the module
7. Withdraw the module

# Operation

**TO REMOVE THE COOLING FAN**

1. Remove the top cover of the unit
2. Remove the two PCB retaining screws located in the bottom panel
3. Remove the PCB using the card ejectors
4. Unplug the fan connector cable
5. Remove the four M4 nuts and bolts securing the fan
6. Withdraw the fan unit

NOTE:-

When refitting the fan ensure that it is fitted such that the airflow is from inside the unit to the outside. i.e. air is sucked out of the unit.

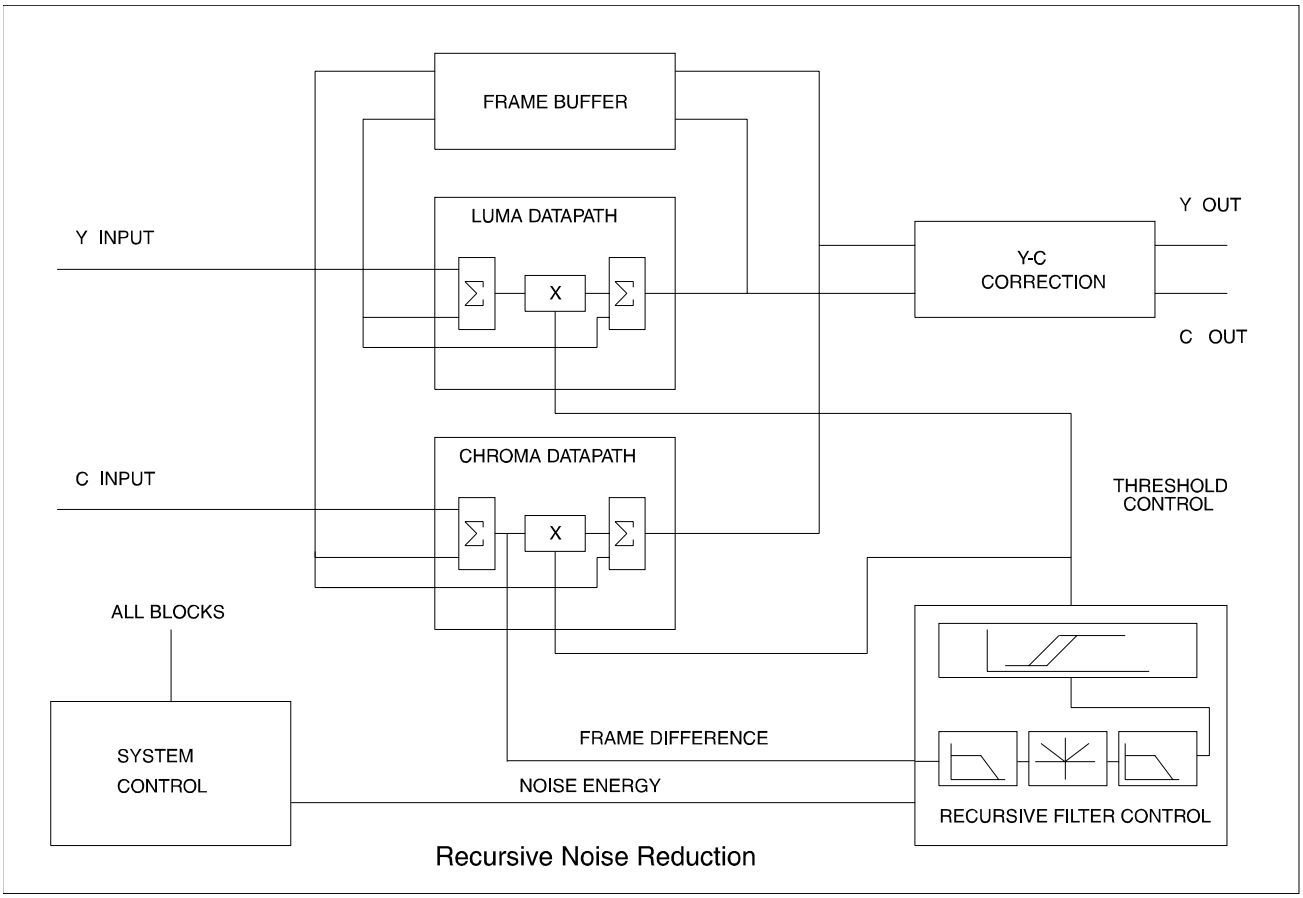
**TO REMOVE THE REAR BACKPLANE ASSEMBLY**

1. Remove the fan assembly as detailed above
2. Unplug the white Power Supply Module connector
3. Remove the external backplane fixing screws (5 pieces M2.5)
4. Remove the right-hand rear white plastic PCB runner. (Use a flat metal tool e.g. screwdriver, to lever off the runner. The runner is fixed to the metalwork by 2 lugs.)
5. The complete backplane assembly may now be withdrawn from the unit.

# System Overview-Noise Reducer

NOISE REDUCER SYSTEM

A detailed outline of the adaptive recursive noise reduction circuitry is shown below in Figure 1. The functionality of the system is implemented by the respective datapaths and the filter control algorithm described in the following sections.

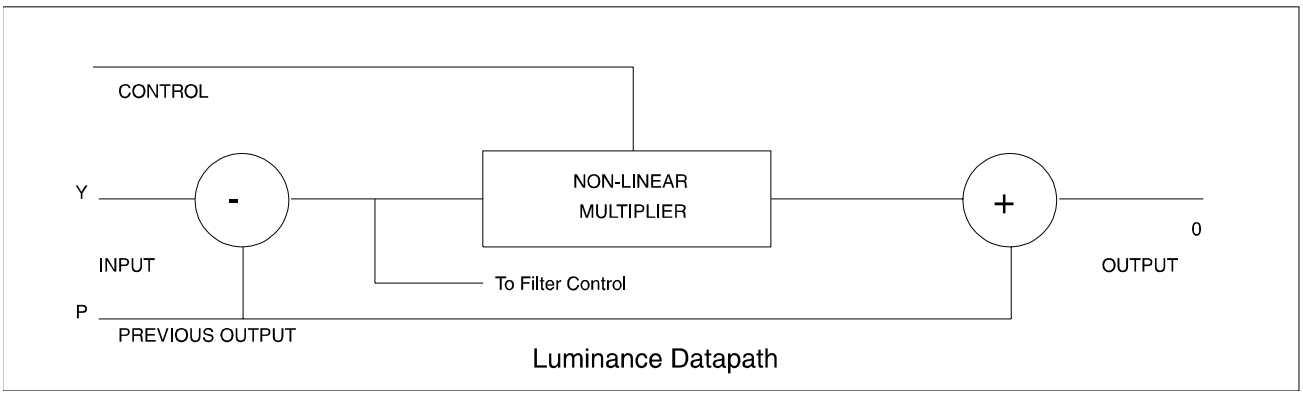



Recursive Noise Reduction

# System Overview-Noise Reducer

Luminance and Chrominance Datapaths

The architecture of each of the luminance and chrominance datapaths is essentially the same, but for clarity of some minor differences, each will be described separately. The luminance datapath incorporates a classical recursive implementation with additional non-linear features. An outline is given below in Figure 2.



Luminance Datapath

The initial subtractor provides a signal representing the difference between the current frame (Y) and the previous output from the previous frame (P). This signal is passed directly to the multiplier and to the filter control block; providing a reference for the filter control algorithm. Under external control the multiplier scales the input by a value (k), which may vary from 0.35 to 1.0. The output from the multiplier is then added to the previous output (P) to give the final output (O). The complete process may be defined thus:

$$O = P + k ( Y - P)$$

which may be rearranged:

$$O = k Y + (1 - k) P$$

The variable k therefore defines how much of the original signal is passed unaffected and how much is fed back from the previous output. The input is passed unaffected when k = 1.0 and the lowest value (k = 0.35) implies the highest level (9.1dB) of improvement possible for luminance signal to noise ratio using recursive filtering.

The multiplier also includes a non-linear mapping that allows high levels of difference to be passed directly. This difference information, which clearly represents motion, is therefore passed through the system unaffected. This provides an instantaneous response to high velocity motion. The transition region from multiplier coefficient to unity for high levels is continuous and smooth, so no visible transition is apparent. The chrominance datapath is identical in all but two respects to the luminance datapath. First, there is no direct coupling of the chrominance difference information to the control circuitry. Secondly, the depth of the highest noise reduction level is greater. The lowest value for k is 0.25, giving a highest level of signal to noise improvement of 12dB for chrominance.

# System Overview-Noise Reducer

The front panel controls marked 'Noise Reduce' - 'Luma' and 'Chroma' control the minimum value of k and therefore indicate the maximum applied noise reduction. The values of k and noise reduction corresponding to the switch settings are shown in Table 1 below. These options are also available as switch settings on the PCB which must be disabled for the front panel to operate.

| Switch Setting | Luminance Minimum k | Luminance Maximum Noise Reduction | Chrominance Minimum k | Chrominance Maximum Noise Reduction |
|---|---|---|---|---|
| OFF | 1 | 0dB | 1 | 0dB |
| LOW | 0.7 | -3dB | 0.6 | -4dB |
| MEDIUM | 0.5 | -6dB | 0.4 | -8dB |
| HIGH | 0.35 | -9dB | 0.25 | -12dB |

Table 1 Luminance and Chrominance Recursive Noise Reduction Settings

Recursive Filter Control

The non-linear mapping included in the multiplier circuitry is intended to differentiate between high velocity motion and noise. This task is relatively straightforward and is completed without external control. A more serious problem, however, is the differentiation between low velocity motion (like moving texture) and noise. Indeed, it is the failure to make this distinction which gives rise to the 'pasty' features common to classical recursive noise reduction systems.

The recursive filter control is designed to analyse the difference information and improve the distinction between moving texture and noise. To do this a threshold must be defined, upon which the system bases its analysis of the difference information. This threshold may be defined by the user or automatically by the adaptive noise level algorithm; this is described in the next section.

Within the recursive filter control, four main functions are implemented:

First, the input difference signal is low pass filtered. This reduces the effect of high frequency noise and thus makes it easier to detect motion. It is important that this filter contains no nulls; as this would allow certain spatial frequencies to pass without detection; for this reason an Infinite Impulse Response (IIR) digital filter is used at this stage.

Secondly, the filtered information is rectified. This converts the noise and motion amplitude to an energy level. The output of this stage is accumulated over a complete frame and passed to the adaptive noise level algorithm.

Next, the rectified signal is again low pass filtered. This process removes any harmonics introduced by the rectifier and provides a composite signal, representing motion added to a background noise. The effect of both filters and the rectifier is to provide an output representing background noise level plus motion.

Finally, a mapping is used to apply the predefined threshold to the signal. Ideally this threshold should be chosen to lie just above the level of the background noise, such that any motion of texture may be readily detected. As the noise level is not truly constant in the time domain, it is not generally possible to make a correct decision in all cases. For this reason a non-linear mapping is used in place of a fixed threshold; this provides a continuous function across the threshold, thereby giving a grey area of distinction between noise and moving texture. The result of this is a smooth transition between applied noise reduction and unaffected motion, improving performance by removing much of the 'pasty' effect typical of recursive noise reduction filters.

# System Overview-Noise Reducer

Adaptive Noise Level Algorithm

As described in the previous section, dynamic control of the recursive filter is dependent on the choice of a threshold region to allow differentiation between noise and moving texture. This level may be set by the user using the threshold control switch. Four settings are provided; settings two, three, and four provide thresholds in the region of -35dB, -30dB, and -25dB respectively. Clearly noise levels greater than -25dB will always be interpreted as motion and the system is not intended to operate in this region. The first setting, however, selects the automatic mode when the adaptive noise level algorithm is used to choose the ideal threshold for a given piece of material.

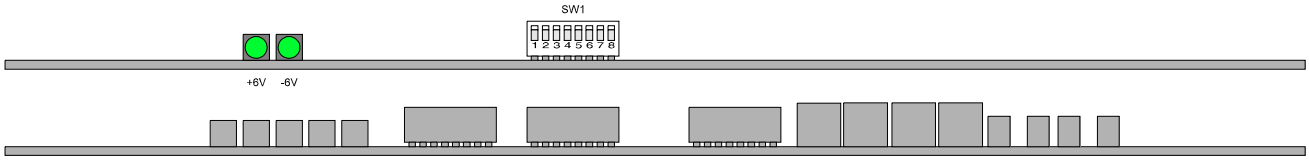
The algorithm operates on an accumulated measurement of the rectifier output over a complete frame, and is implemented within the on-board microsystem described earlier. This information is processed frame by frame providing a threshold level also calculated on a frame by frame basis. The algorithm uses a two stage non-linear filter to extract the background noise level (the noise floor) from the accumulated noise and motion energy. Two stages are required as the filter has different characteristics over long and short time intervals. This is necessary as typical material often contains very fast (short-term) motion such as cuts, and longer term motion due to panning or action.

# System Overview-Noise Reducer

APPENDIX

Switch settings (SW2) on upper PCB.

N.B. Note that switches 5,6,7 & 8 must all be OFF (0) for the front panel noise reducer controls to function correctly




| FUNCTION SELECT | | SW 2 SETTINGS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Recursive Luminance | OFF | | | | | | | | |
| | LOW | | | | | | | | |
| | MED | | | | | | | | |
| | HIGH | | | | | | | | |
| Recursive Chrominance | OFF | | | | | | | | |
| | LOW | | | | | | | | |
| | MED | | | | | | | | |
| | HIGH | | | | | | | | |
| Threshold Selection | AUTO | | | | | | | | |
| | LOW -35dB | | | | | | | | |
| | MED -30dB | | | | | | | | |
| | HIGH -25dB | | | | | | | | |