

# IQDDAC D to A Converter



### Module Description

The IQDDAC module converts serial D1 format 270Mbits/sec data to analogue component video, in either YPbPr or GBR format.

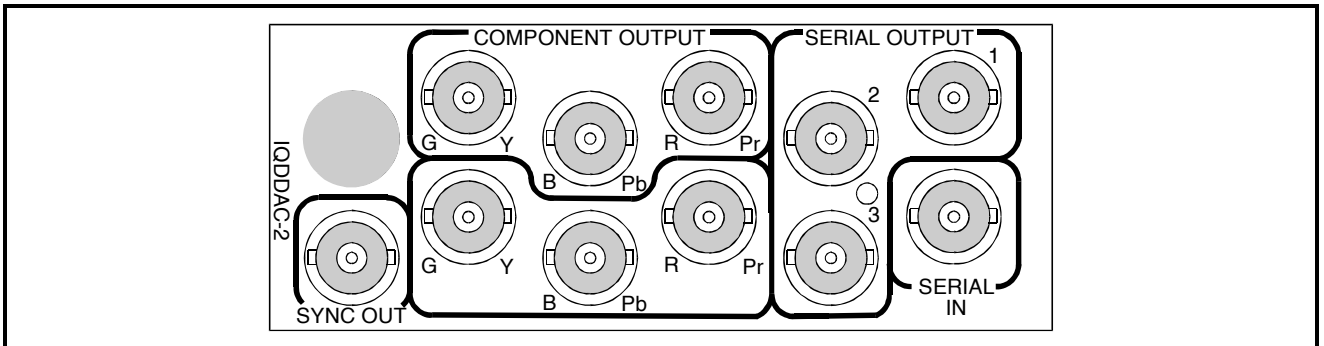
Programmable blanking is applied, and Y/C timing set. The signal is de-multiplexed to YPbPr format.

### Functional Description

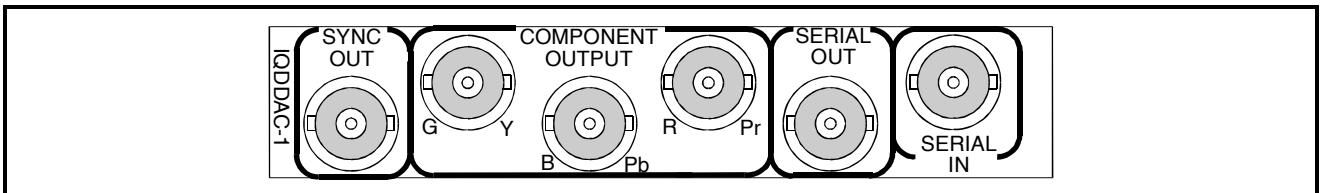
The incoming data is de-serialised after cable equalisation. The signal is analysed for 525 or 625 data, and optionally for EDH error data.

Each channel is oversampled and applied to three 10 bit DAC's (optionally 12 bit). These analogue signals are corrected for gain and offset, syncs added to the Y signal, and then low-pass filtered in accordance with the requirements for full '601' performance. These signals are then optionally matrixed to GBR and buffered for the final outputs.

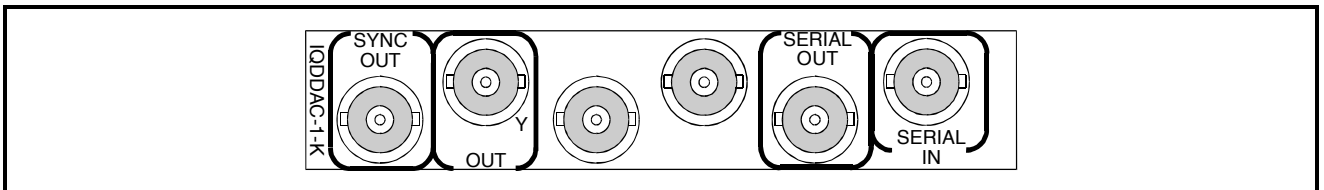
### REAR PANEL VIEWS



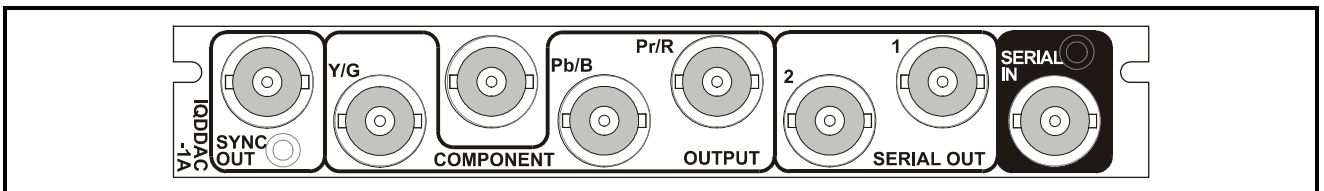
IQDDAC-2-0



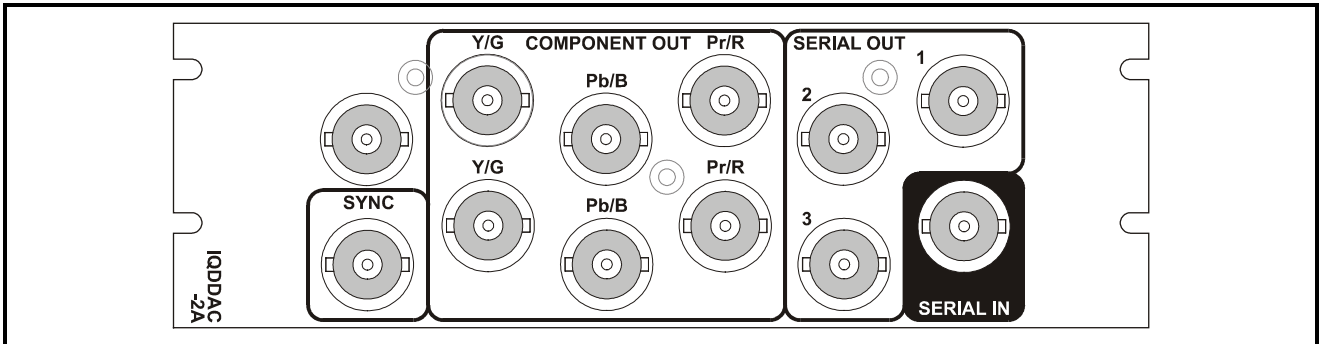
IQDDAC-1-0



IQDDAC-1-K



IQDDAC-1A



IQDDAC-2A

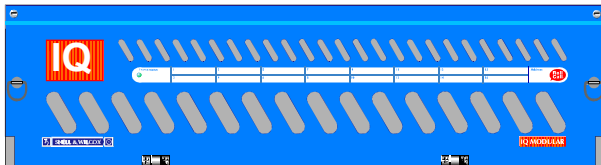
Versions of the module cards available are:

IQDDAC-1-0	Digital serial to YPbPr or RGB with 601 spec + 1 serial output
IQDDAC-2-0	Digital serial to YPbPr or RGB with 601 spec + 3 serial outputs
IQDDAC-1-K	Digital serial (4:0:0) to Y converter for key signals
IQDDAC-2A	Digital serial to YPbPr or RGB with 601 spec + 3 serial outputs
IQDDAC-1A	Digital serial to YPbPr or RGB with 601 spec + 2 serial output
IQDDAC-1A-K	Digital serial (4:0:0) to Y converter for key signals

**Note that there are two styles of rear panels available. They are not interchangeable between the two styles of enclosures. However, the cards may be fitted into any style of enclosure.**

**'A' Style Enclosure**

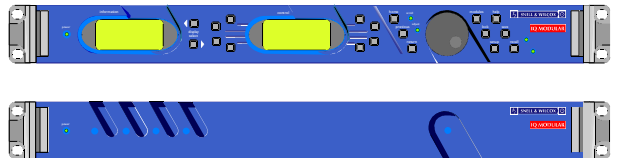
Rear panels **with** the suffix A may only be fitted into the 'A' style enclosure shown below.



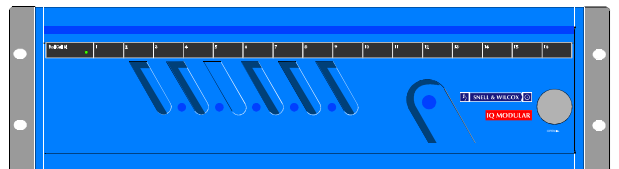
(Enclosure order codes IQH3A-E-O, IQH3A-E-P, IQH3A-N-O, IQH3A-N-P)

**'O' Style Enclosures**

Rear panels **without** the suffix A may only be fitted into the 'O' style enclosures shown below.

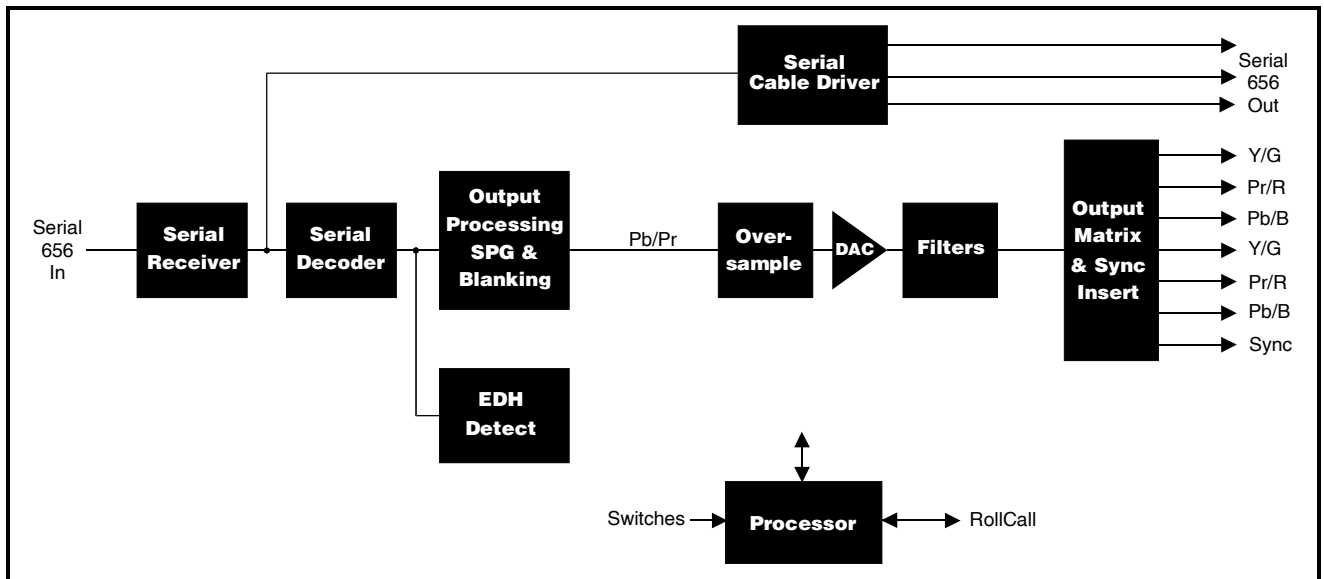


(Enclosure order codes IQH1S-RC-O, IQH1S-RC-AP, IQH1U-RC-O, IQH1U-RC-AP, Kudos Plus Products)



(Enclosure order codes IQH3N-O, IQH3N-P)

## BLOCK DIAGRAM



## Features

- SDI to analog YPrPbS or GBRS
- 10 bit oversampled DAC's
- Full CCIR601 filter performance
- 525 line YPbPr in Betacam or SMPTE levels
- auto-detects 625/525 line standards
- Separate 2V Sync output
- Control of blanking timing, picture position and Y to PbPr correction
- Two outputs for each component (-2)
- EDH monitoring and error checking
- User controlled Blanking shaping
- Digital bypass mode
- Selectable vertical blanking
- RollCall control, monitoring and logging

## Technical Profile

### Features

#### Signal Inputs

Serial ..... SDI 525 or 625 serial digital  
Standards ..... SMPTE 259M-C-1997

#### Signal Outputs

Component 525/625 ..... YPbPr to EBU/SMPTE/Betacam  
specification or GBR, Sync on Y,  
selectable on G, B/R

Serial ..... Up to 3 reclocked SDI  
Standards ..... SMPTE 259M-C-1997

Sync ..... Mixed Syncs at -2 v pk to pk

#### Card Edge Controls (also available via RollCall)

Picture Position ..... +518 to -592 ns in increments of  
74ns

Y to PbPr Timing ..... +222 to -148 ns in increments of  
74 ns

EDH clear ..... On/Off

Vertical Blanking ..... Pass/Blank

Syncs ..... On/Off

Digital Bypass ..... On/Off

Horizontal Blanking ..... D1 active (no shaping)  
D1 active (shaped)  
Composite (shaped)  
Minimum Legal (Composite  
shaped)

Output select ..... YPbPr or GBR

525 YPbPr Levels ..... SMPTE/Betacam

#### Functions Available via RollCall™ Only

EDH ..... Statistics

Picture Position ..... +3700 ns to -1332 ns in increments  
of 74 ns

### Specifications

Frequency Response ..... Within 601 specification

Output D.C. .... <±50 mV (YUV outputs)

Analog Output Return loss. Better than 35 dB DC to 5.0 MHz

Maximum input cable length  
>200m

Processing ..... 10 bit with oversampling

Serial input/ Output Return Loss

Better than -15 dB at 270 MHz

#### Power Consumption

Module Power Consumption  
7.5W max

INPUT SIGNALS

SD1 525 or 625 via a BNC socket terminated with a resistive 75 Ohm load.

The serial input should be of scrambled format following the polynomial  $(x^9 + x^4 + 1)(x + 1)$

This input contains an automatic equaliser allowing input lengths up to 200m when high quality coax is used.

OUTPUT SIGNALS

One set (-1 versions) or two sets (-2 versions) of component signals YPbPr or GBR, and 1 (-1 versions), 2 (-1A versions) or 3 (-2 versions) serial active loop-through outputs are available via BNC connectors for connection to 75 Ohms systems.

The output format may be either YPbPr or GBR at standard EBU/SMPTE/Betacam levels.

To change the output format use SW3 position 1 and 7.

*Note that to ensure reliable transmission of serial digital signals without causing unacceptable levels of radiated emissions, only high quality 75 Ohm coaxial cable should be used. The cable must also be terminated with a precision 75 Ohm load. Serial output via 75 Ohm BNC socket provides active loop through (re-clocked and regenerated) of serial input. Output sourced from 75 Ohm.*

OUTPUT SIGNALS

(Key Channel Version IQDDAC-1-K)

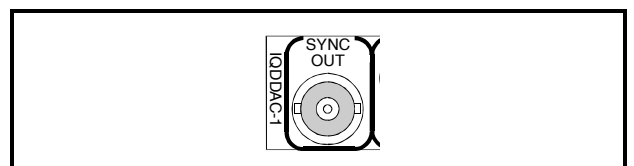
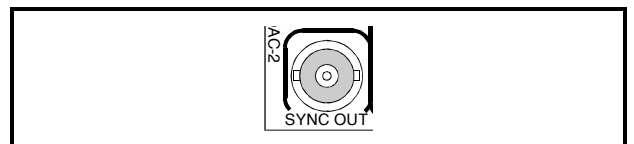
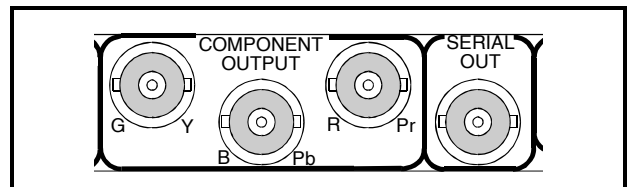
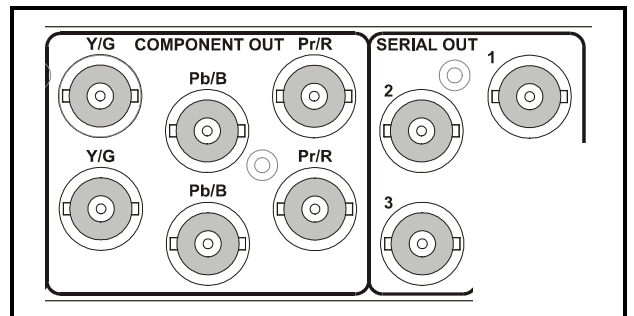
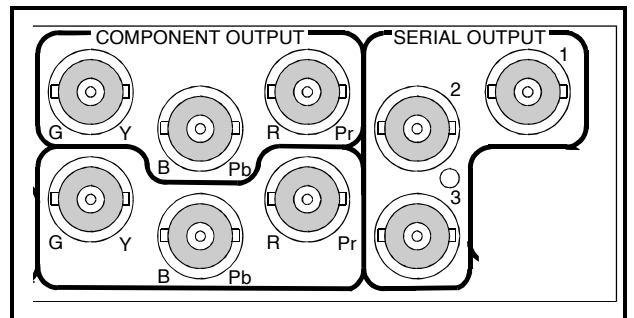
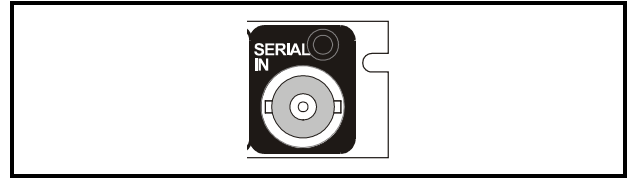
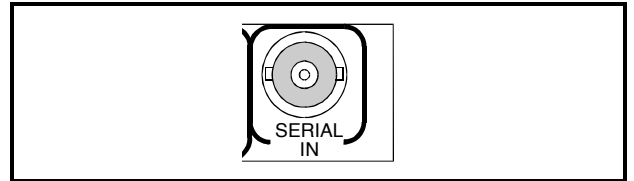
The key channel version provides Y (luminance) signal outputs only; there are no PbPr outputs.

It is only available as a single width module and does not have Y/C delay control, a Sync selection menu or output mode selection (RGB/YPbPr).

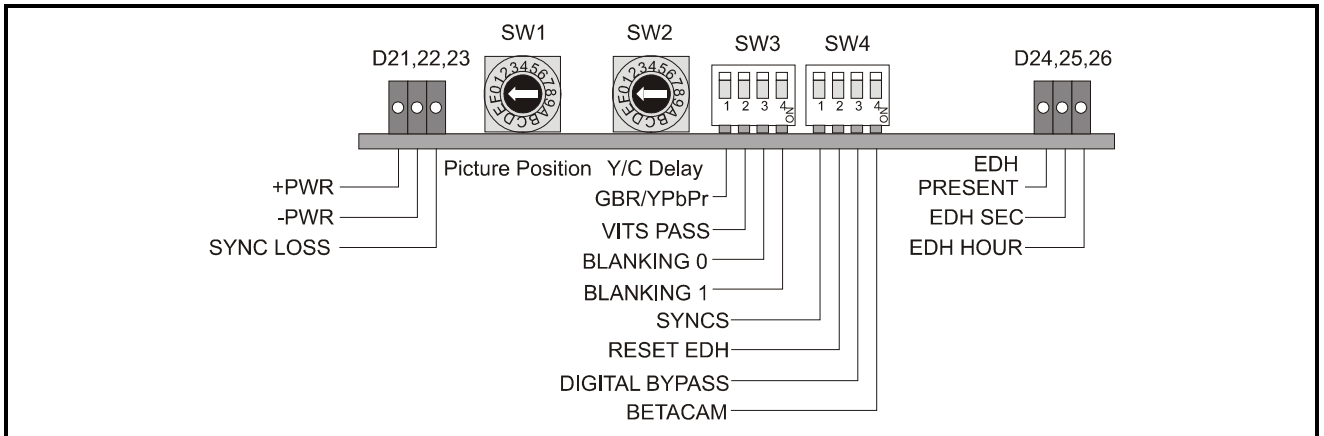
SYNC OUTPUT

This provides a composite sync output via a BNC connector for connection to 75 Ohm systems.

The output level is 2 V p-p into 75 Ohms.



CARD EDGE CONTROLS



Adjustment of the settings for the IQDDAC is available either via card edge controls and/or via a more comprehensive remote control system using RollCall™.

Note that in Main-frames where RollCall™ is not available the remote link, LK1, located at the front of the card, should be removed. This ensures that when the unit is powered-up the factory default settings are loaded. With LK1 fitted the card will power-up with the last settings sent by the remote control panel.

SWITCH SW3/4

These switches allow various functions to be enabled.

Note that for cards using the RollCall™ remote control system, activating these switches will override the remote control settings. The RollCall™ control panel will then follow these settings.

*Note that the unit will respond to both local and remote control, one system overriding the settings of the other. For cards using the RollCall™ remote control system, activating these switches will override the remote control settings. The RollCall™ control panel will then follow these settings.*

UP = OFF and DOWN = ON

SW3 position 1(GBR/YPbPr)  
(not used on -K version)

This switch allows the component output format to be set to either GBR or YPbPr. When the switch is in the OFF position the output is GBR. When the switch is in the ON position the output is YPbPr.

SW3 position 2 (VITS PASS)

When this switch is ON the unit will pass data (unblanked) present on vertical blanking lines. When the switch is OFF all data in the vertical interval will be blanked.

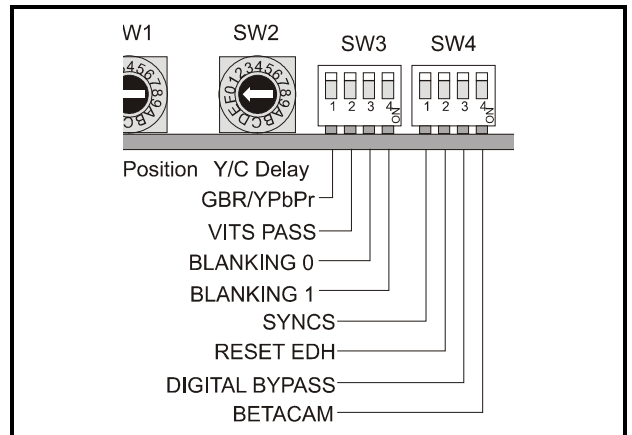
*Note that in the 525 standard blanking lines are from line 10 and 273 and in the 625 standard from line 6 and 319 inclusive.*

SW3 positions 3 & 4 (BLANKING)

These switches allow various widths of horizontal blanking to be applied to the signal.

A 2-bit code is used to enable the different widths as shown below:

HB1 (Pos 4)	HB0 (Pos 3)	Blanking Width
OFF	OFF	Analogue minimum
OFF	ON	Analogue normal
ON	OFF	Digital filtered
ON	ON	Digital normal

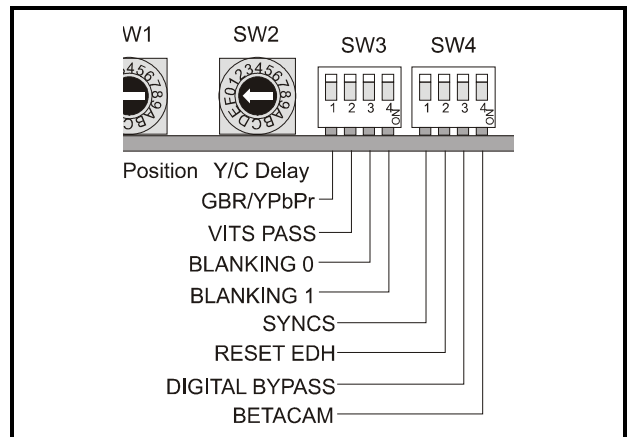


**SW4 position 1 (SYNC OFF)**  
*(not used on -K version)*

When this switch is in the OFF position syncs are added to all of the GBR signals.

When the switch is in the ON position syncs are removed from the GBR output signals.

*Note that by using the RollCall™ system syncs may also be added to either the green signal only or to the blue and red signals.*



**SW4 position 2 (RESET EDH)**

Setting this switch to the ON position resets the EDH statistics LED indicators D24, D25 and D26.

**SW4 position 3 (DIGITAL BYPASS)**

When this switch is set to the ON position the content of the D1 input (including D1 information, TRS codes and maximum picture width available) is passed through the unit.

**SW4 position 4 (BETACAM)**  
*(not used on -K version)*

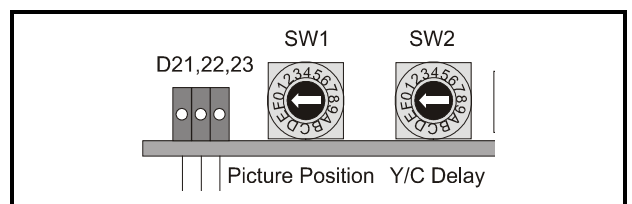
Setting this switch to the ON position adds a pedestal to the Y output and increases the chroma level in accordance with the Betacam standard (525 mode only)

**SW1 (Picture Position)**

This switch allows the picture position to be moved by +518ns to -592ns in increments of 74ns.

Position 8 is the default calibrated position.

*Note that under RollCall™ control this range is increased to +3700ns to -1332nsetc*



**SW2 (Y/C Delay) *(not used on -K version)***

This switch allows the timing between the Y signal and the PbPr signal to be adjusted by +222ns to -148ns in increments of 74ns.

Position 8 is the default calibrated position.



## LED INDICATORS

## D21 +PWR

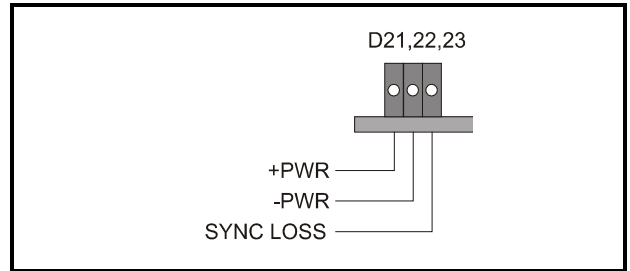
This green LED is illuminated when the positive power supply is present.

## D22 -PWR

This green LED is illuminated when the negative power supply is present.

## D23 SYNC LOSS

This red LED will become illuminated when no valid D1 signal is present at the serial input.



## D24 EDH PRESENT

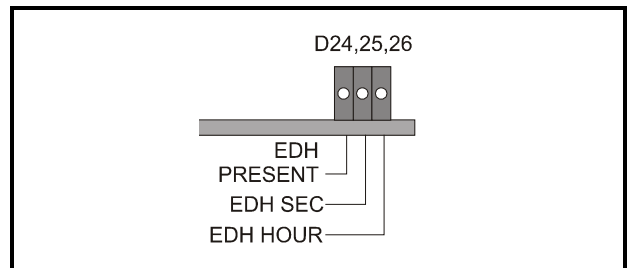
This yellow LED will become illuminated when EDH information is present in the incoming data stream. It will flash momentarily when ever an incoming data error is detected.

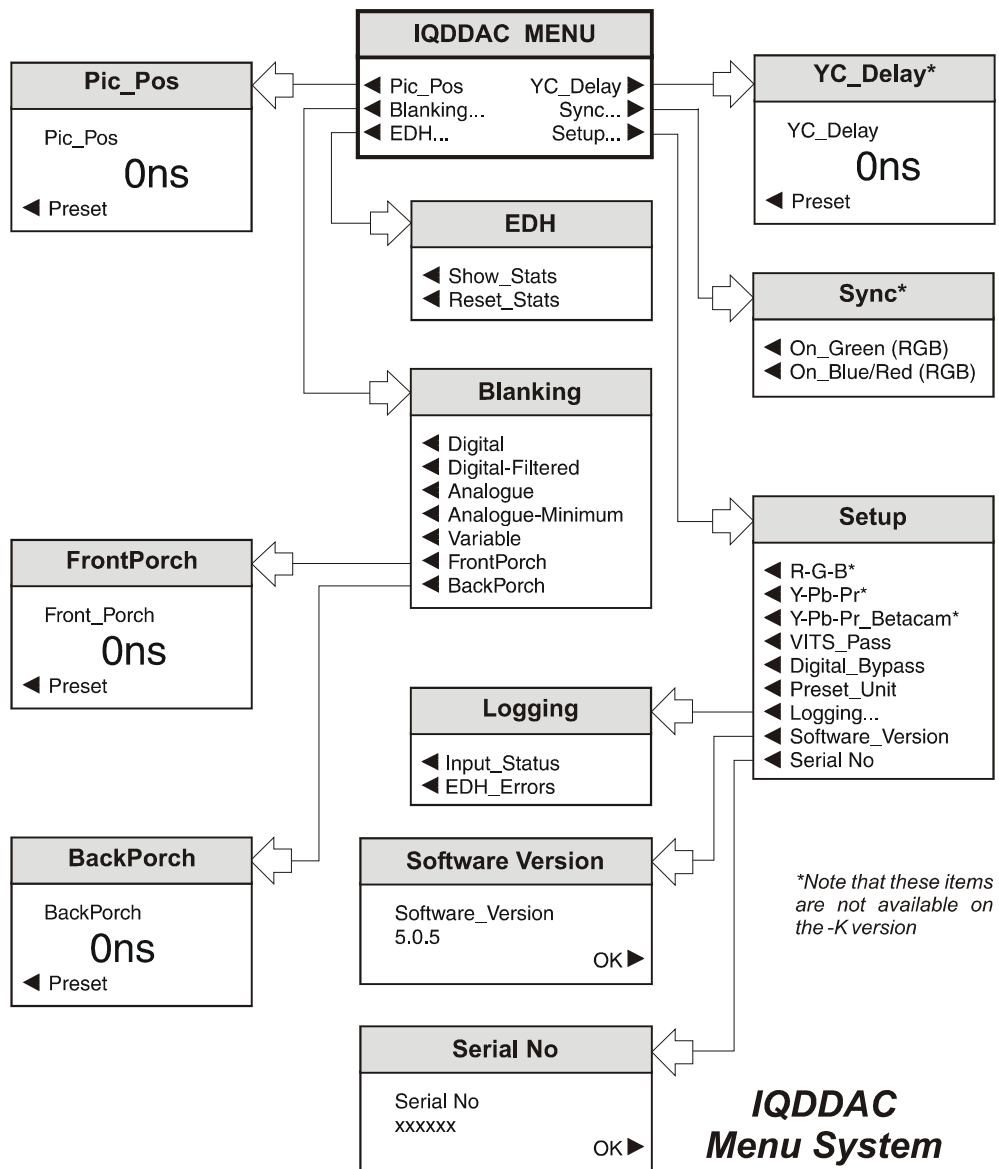
## D25 EDH SEC

This yellow LED becomes illuminated when an EDH error has occurred within the last second.

## D26 EDH HOUR

This yellow LED becomes illuminated when an EDH error has occurred within the last hour.





OPERATION FROM AN ACTIVE CONTROL PANEL

The card may be operated with an active control panel via the RollCall™ network. The menus available for this card are shown opposite and will appear in the Control display window.

Operational details for the remote control panel will be found in SECTION 1 of the Modular System Operator's Manual.

MENU DETAILS  
(see IQDDAC Menu System opposite)

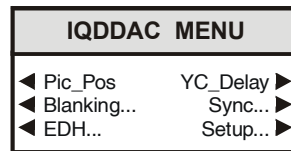
MAIN MENU

The main, or top level menu allows various sub-menus to be selected by pressing the button adjacent to the required text line.

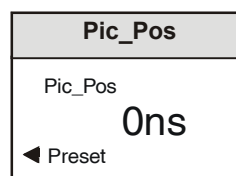
*Note that where a menu item is followed by three dots (...) this indicates that a further sub-menu may be selected.*

Whenever a menu item is selected the parameters of that selection will be displayed in the **Information** window of the front panel. Where the selection is purely a mode selection and does not enable a sub-menu, the text will become reversed (white-on-black) indicating that the mode is active. If the mode is not available for selection the text will remain normal.

**IQDDAC MAIN MENU**



◀ **Pic\_Pos**

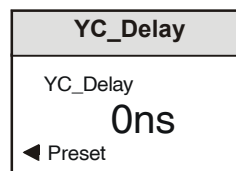


Selecting this item reveals a display showing the timing of the picture position relative to the normal value, in nanoseconds. Rotating the spin-wheel will adjust this value. Range is from +3700 ns to -1332 ns in 74 ns steps.

Selecting **Preset** returns the setting to the preset value of 0.

**YC\_Delay ▶**

(not used on -K version)



Selecting this item reveals a display showing the timing of the chrominance signal relative to the luminance signal, (i.e. Y to Cb/Cr timing) in nanoseconds. Rotating the spin-wheel will adjust this value. Range is from +222 ns to -148 ns in 74 ns steps.

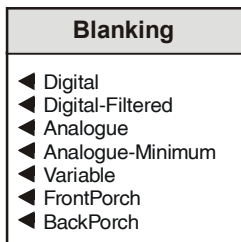
Selecting **Preset** returns the setting to the preset value of 0.

◀ **Blanking**

This selection reveals the Blanking sub-menu that allows picture blanking to be selected and adjusted.

Using both the Front Porch and Back Porch controls allows the blanking position and width to be adjusted by setting independent start and finish points.

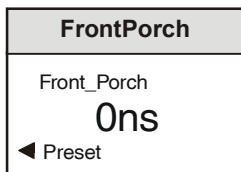
It should be noted that these controls will not allow blanking to exceed the limits for valid D1 signals.



These items allow various fixed widths of horizontal blanking to be applied to the signal.

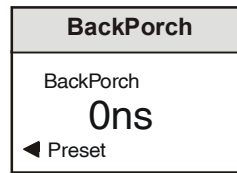
- ◀ Digital                      Normal unfiltered blanking
- ◀ Digital-Filtered            Filtered digital blanking
- ◀ Analogue                     Normal analogue blanking
- ◀ Analogue-Minimum        Minimum analogue blanking
- ◀ Variable                     Allows the front and back porch to be set, independently

◀ **FrontPorch**



The width of the front porch may be adjusted from 672ns to 1708ns in 525, 708ns to 1744ns in 625 in 74ns steps. Preset value is 1560ns in 525 and 1596 in 625.

◀ **BackPorch**



The width of the back porch may be adjusted from 3390ns to 5610ns in 525, 4616ns to 6836ns in 625 in 74ns steps. Preset value is 4722ns in 525 and 5726ns in 625.

**Sync...▶**

(not used on -K version)

Sync
◀ On_Green (RGB)
◀ On_Blue/Red (RGB)

This item allows syncs to be added to the component output signals. It will only operate when RGB output is selected; it will not operate if Y-PbPr output is selected.

*Note that mixed syncs will always be available at the **Sync Out** connector at a level of 2 V p-p, negative going.*

**◀ On\_Green (RGB)**

Selecting this item will add syncs to the green output signal. Sync level is 0.3 V p-p.

**◀ On\_Blue/Red (RGB)**

Selecting this item will add syncs to the Blue and Red output signals. Sync level is 0.3 V p-p.

*Note that by enabling both the above items sync will be added to the Red, Green and Blue signals.*

Preset is to Sync on All

**◀ EDH...**

This selection reveals a sub-menu that allows various Input or Output EDH parameters to be enabled.

EDH
◀ Show_Stats
◀ Reset_Stats

**◀ Show Stats (Statistics)**

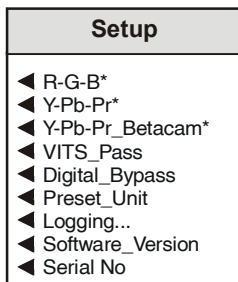
When this function is enabled (text reversed) the information window will display the number of errors from the time the function was enabled. The elapsed time in hours, minutes and seconds is also displayed.

**◀ Reset Stats (Statistics)**

Selecting this function will reset the EDH error count and the timer shown in the information window, to zero.

**Setup...▶**

This selection reveals the Setup Menu that allows various items to be selected.

**◀ R-G-B** (not used on –K version)

When this item is selected the output will be Red, Green and Blue.

**◀ Y-Pb-Pr** (not used on –K version)

When this item is selected the output will be Y, Pb, Pr.

**◀ Y-Pb-Pr Betacam** (not used on –K version)  
(available for 525 line standard only)

When this item is selected the output will be Y, Pb, Pr at Betacam levels.

A pedestal is added to the Y output and the chroma levels are increased in accordance with the Betacam standard (0.7 V for 75% color bars) (525 mode only)

**◀ VITS\_Pass**

When enabled the unit will pass data (unblanked) present on vertical blanking lines. When disabled all data in the vertical interval will be blanked.

*Note that in the 525 standard blanking lines are from line 10 and 273 and in the 625 standard from line 6 and 319 inclusive.*

**◀ Digital Bypass**

When enabled the content of the SDI input (including SDI HANC/VANC data, TRS codes and maximum picture width available) is passed through the unit.

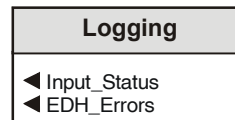
**◀ Preset Unit**

Selecting this item sets all adjustment functions that include a preset facility, to their preset values. Note that this is a momentary action and the text will not become reversed.

**◀ Logging**

If a logging device is attached to the RollCall™ network, information about various parameters can be made available to such a device.

Selecting this item reveals a display that allows information about two parameters to be made available for logging.

**◀ Input\_Status**

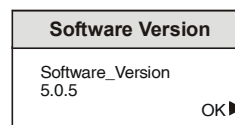
When activated, a change of input signal status will be available for the logging device.

**◀ EDH\_Errors**

When activated, EDH error reports will be available for the logging device.

**◀ Software Version**

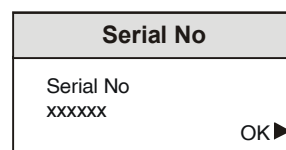
Selecting this item reveals a display showing the version of the software fitted in the module.



Select OK to return to the Setup Menu.

**◀ Serial No**

Selecting this item reveals a display showing the serial number of the module.



Select OK to return to the Setup Menu.

DISPLAY MESSAGES

Messages will be displayed on the left-hand (Information) display.

The **first line** will show the module name. This will be IQDDAC-0 or IQDDAC-K for the key channel version.

The **second line** will show the input status and the operating line standard.

**Input Status Abbreviations**

OK	Valid Input signal connected
**	No input signal detected

**Operating Line Standard Abbreviations**

525	Operating standard is 525 line
625	Operating standard is 625 line

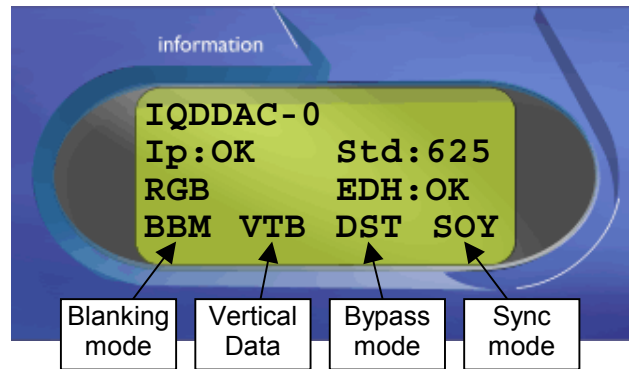
The **third line** will show the operating mode and the EDH status.

**Operating Mode Abbreviations**  
(not used on -K version)

RGB	Output is RGB format
YPbPr	Output is YPbPr format
Beta	Output is YPbPr at Betacam Levels

**EDH Status Abbreviations**

None	No EDH present on input
OK	EDH present and no detected errors
FAIL	EDH checksum errors detected on input



The **fourth line** will show Blanking mode, Vertical Data, Bypass Mode, and Sync Mode data using the following abbreviations:

**Blanking Mode Abbreviations**

BMM	Minimum Analogue blanking
BMA	Analogue blanking
BMD	Digital blanking
BMF	Digital filtered
BMV	Variable blanking

**Vertical Data Abbreviations**

VTB	Vertical data blanked
VTP	Vertical data passed

**Bypass Abbreviations**

DST	Normal operation of blanking
DBP	Digital bypass, no blanking, visible TRS words

**Sync Mode Abbreviations**  
(not used on -K version)

SOY	Sync on Y (Y-Pb-Pr mode)
SOG	Sync on Green (GBR mode)
SOA	Sync on all components (GBR mode)
SON	No sync inserted (GBR mode)
SBR	Sync on Blue/Red (GBR mode)

