IQD1ADC A to D Converter

Module Description

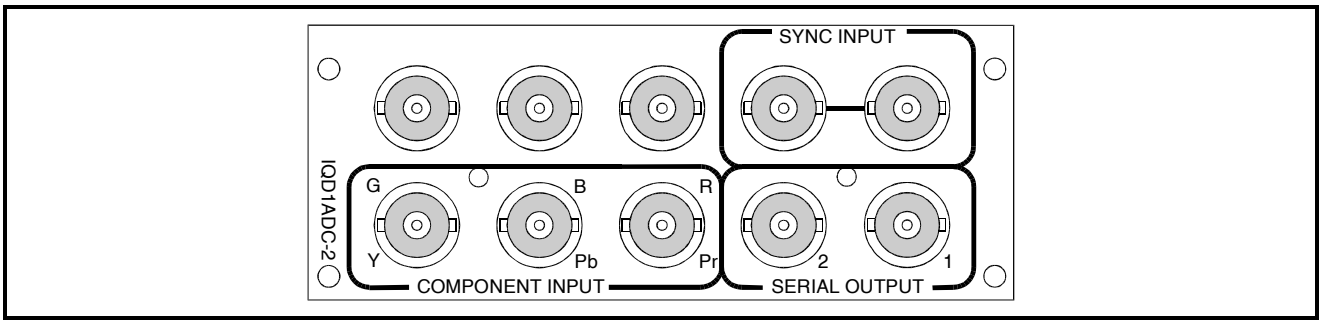
The IQD1ADC module converts an analog component video signal (in either YPbPr or GBRS formats) to serial component format at 270 M Bits/sec. Two outputs available.
Selection of input format is set by links on the circuit board. Synchronization is taken from the syncs on the Y/G signal or from the external sync input in the form of composite sync or black burst signal

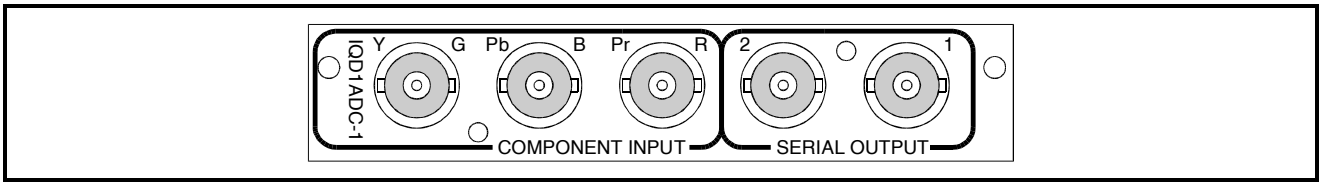
Functional Description

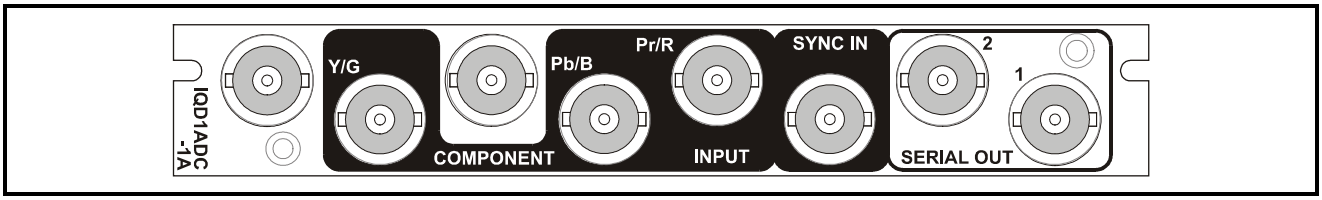
GBR inputs are matrixed to YPbPr, passed through anti-alias filters and then to the clamp amplifiers.
Digitally referenced clamps are employed on the Pb and Pr channels to ensure an accurate colour black.

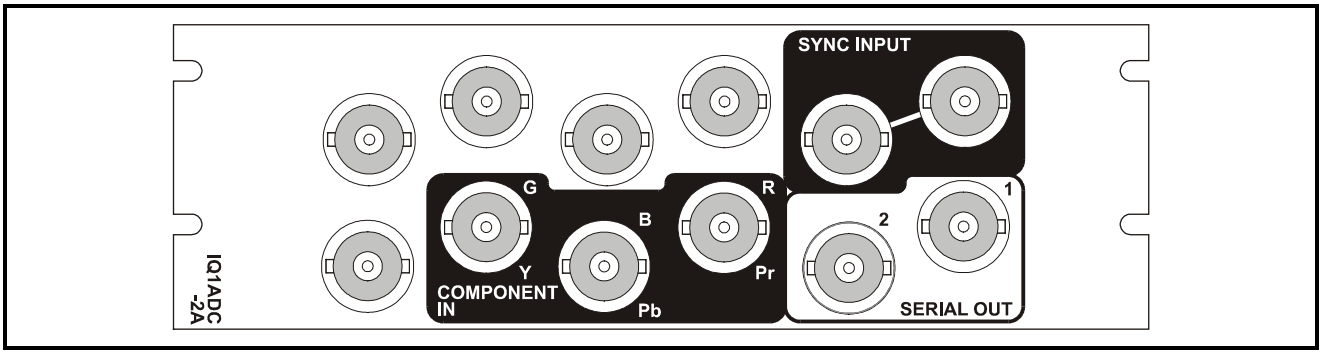
The Y clamp voltage is derived from a precision temperature compensated reference and adjustable via a card edge control (may also be remotely controlled) to allow for correction of black level errors. For 525 inputs, a SMPTE component format without pedestal is assumed.
For component 525 inputs with a pedestal, the pedestal will need to be removed manually with the black level control. The luminance gain will then also have to be adjusted for correct white level. The filtered YPbPr signals are then digitised and the data multiplexed into a parallel D1 data stream with all synchronisation codes added. For units with the EDH option fitted the checksums are calculated for each frame and inserted on line 6 (625 line signals) or line 10 (525 line signals)

REAR PANEL VIEWS

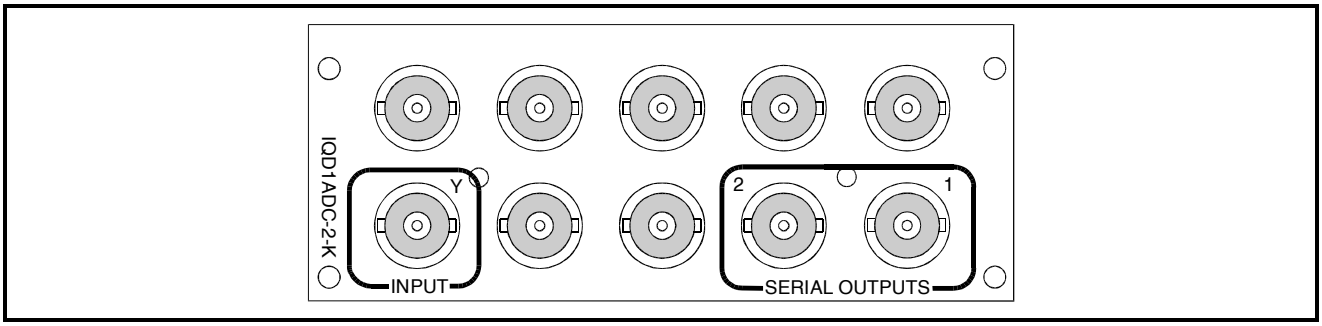


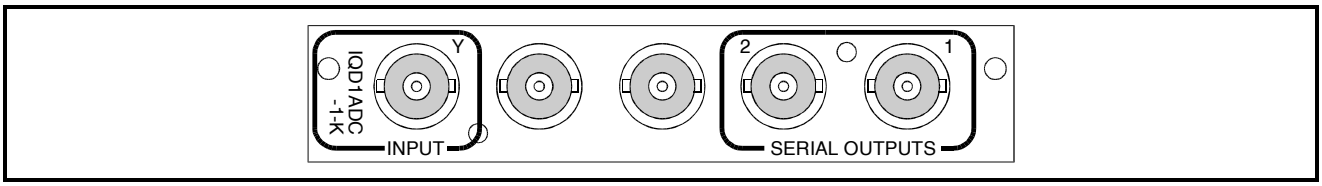


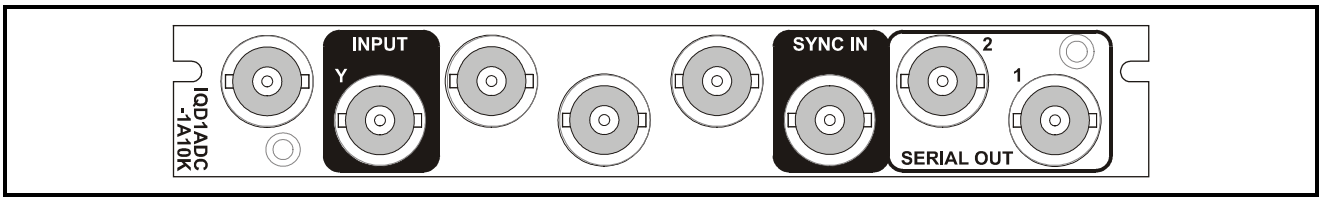




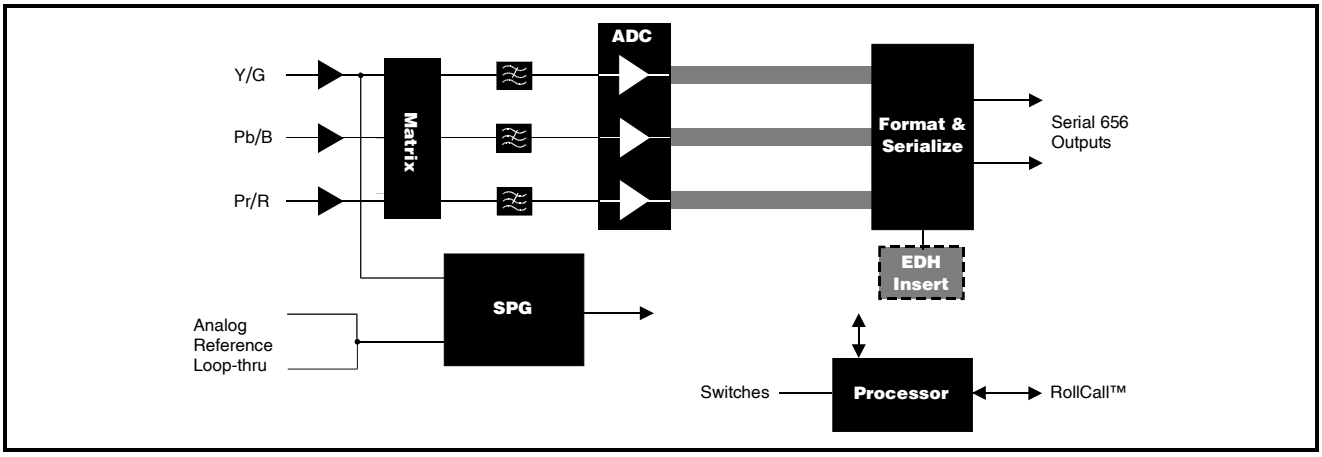
KEY CHANNEL VERSIONS







BLOCK DIAGRAM



Features

- Analog component YPbPrS or GBRS (selected by links) to 4:2:2 SDI
- Key channel versions Y to 4:0:0 SDI
- Set for SMPTE/EBU N10 levels
- 525 or 625 operation - automatic switching
- Digital clamping for accurate color black
- Full 10-bit conversion quality
- 'Near' 601 or full Rec 601 filtering
- EDH insertion as standard on SDI outputs
- Out of range indicators for YPbPr
- Levels and timing adjustment by remote control or card edge

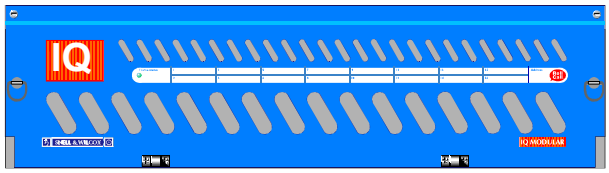
Versions of the module cards available are:

		Module Width
IQD1ADC-1-10-E	YPbPr or GBR to 4:2:2 serial 10-Bit 601 filters 2 output + EDH	Single
IQD1ADC-1-10-B	BetaCam levels to 4:2:2 serial 10-Bit 601 filters 2 output + EDH	Single
IQD1ADC-1-10-K	Y Key Channel to 4:0:0 serial 10-Bit 601 filters 2 output + EDH	Single
IQD1ADC-1-10F-0	YPbPr or GBR to 4:2:2 serial 10-Bit near 601 filters 2 output	Single
IQD1ADC-1A-10-E	YPbPr or GBR to 4:2:2 serial 10-Bit 601 filters 2 output + ref input + EDH	Single
IQD1ADC-1A-10-B	BetaCam levels to 4:2:2 serial 10-Bit 601 filters 2 output + ref input + EDH	Single
IQD1ADC-1A-10K	Y Key Channel to 4:0:0 serial 10-Bit 601 filters 2 output + EDH	Single
IQD1ADC-1A-10F-0	YPbPr or GBR to 4:2:2 serial 10-Bit near 601 filters 2 output + ref input	Single
IQD1ADC-2-10-E	YPbPr or GBR to 4:2:2 serial 10-Bit 601 filters 2 output + ref input + EDH	Double
IQD1ADC-2-10-B	BetaCam levels to 4:2:2 serial 10-Bit near 601 filters 2 output + EDH	Double
IQD1ADC-2-10F-0	YPbPr or GBR to 4:2:2 serial 10 Bit near 601 filters 2 output + ref input	Double
IQD1ADC-2A-10-E	YPbPr or GBR to 4:2:2 serial 10-Bit 601 filters 2 output + ref input + EDH	Double
IQD1ADC-2A-10-B	BetaCam levels to 4:2:2 serial 10-Bit near 601 filters 2 output + EDH	Double
IQD1ADC-2A-10F-0	YPbPr or GBR to 4:2:2 serial 10 Bit near 601 filters 2 output + ref input	Double

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

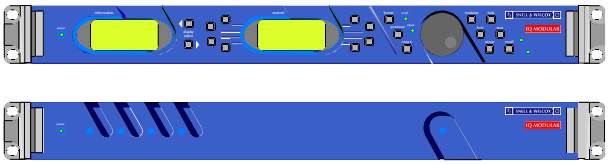
Rear panels ***with*** the suffix A may only be fitted into the 'A' style enclosure shown below.



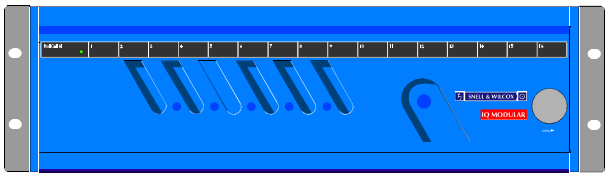
(Enclosure order codes IQH3A-E-O, IQH3A-E-P, IQH3A-N-O, IQH3A-N-P)

'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)

(Enclosure order codes IQH3U-RC-O, IQH3U-RC-P)

TECHNICAL PROFILE

Features

Signal Inputs

Component 525/625 ..... YPbPr to EBU/SMPTE specification or GBR

Y 525/625 (-K versions) ..... Y Key signal

Reference Sync ..... Composite Sync or Black Burst

Signal Outputs

Serial ..... 2 sets of 4:2:2 Serial or 4:0:0 for -K versions

Card Edge Controls (also available via RollCall)

Luminance Gain..... ±2dB

Black Level..... ±100 mV

PbPr Gain ..... ±2 dB (not on -K versions)

Sync Select ..... External or Signal Input

VITS Pass (Digital Y output) On/Off

Input Signal Standard..... 525/625

Force Standard ..... Auto or Force 525/625

Picture Position ..... -8 to +7 in increments of 74 ns

Functions Available via RollCall™ Only

Y-C Timing..... ±592 ns in increments of 74 ns (not on –K versions)

Specifications

Y Frequency Response..... 601 Filter:- 5.5 MHz ± 0.05dB
Near 601 Filter:- 5.5 MHz ± 0.1dB

PbPr Frequency Response 601 Filter:- 2.75 MHz ± 0.05dB
Near 601 Filter:- 2.2 MHz ± 0.1dB

GBR to YPbPr Matrix Error Better than 1%

Signal Input Return Loss.... Better than 40 dB to 6 MHz

Serial Output Level ..... 800 mV ±10%

Serial Output Return Loss.. Better than 15 dB to 270 MHz

Jitter..... < 500 ps

Composite Sync Input..... 2 V pk to pk ±6dB (loop-through)
525 or 625 line standard

Black Burst Input..... 0.3 V pk to pk ±6dB (loop-through)
525 or 625 line standard

Sync Input Return Loss..... Better than 40 dB to 6 MHz

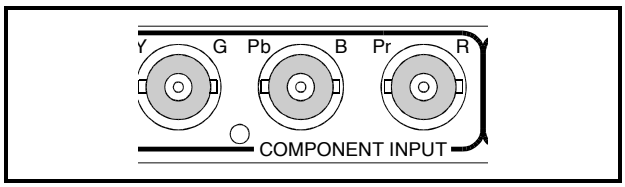
Power Consumption

Module Power Consumption 6.3W max

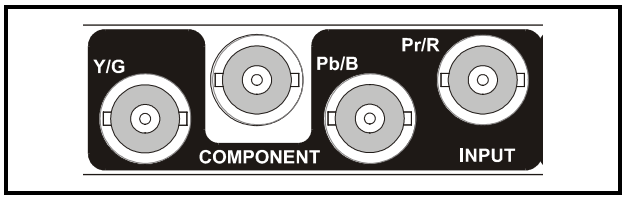
INPUTS AND OUTPUTS

SIGNAL INPUT

The component input (YPbPr or GBR) to the unit is made via these three BNC connectors which terminate in 75 Ohms.

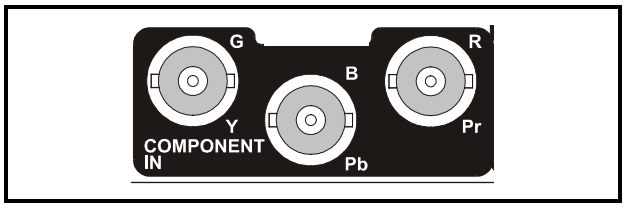


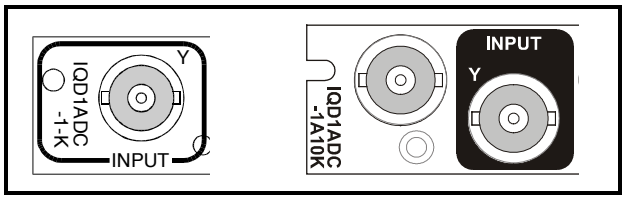
To accommodate the two different formats of input signals (GBR or YPbPr) the links LK12, LK13 and LK14 must be set to the position appropriate to the format of component input. These links are located towards the rear of the card.



Y INPUT (-K versions only)

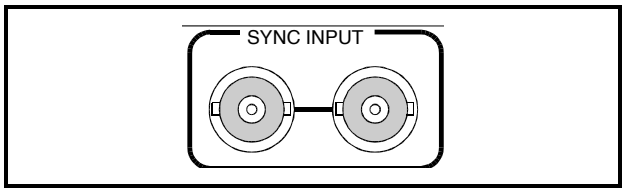
This connector will accept a Y or Key (luminance) signal at standard level.
Sync extraction from this Y signal.





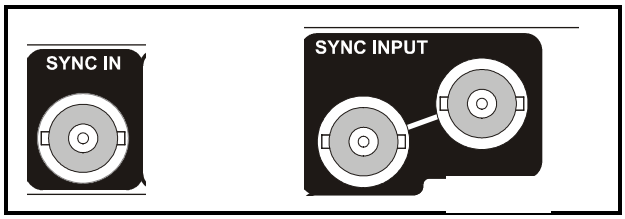
SYNC INPUT (-2 versions)

An external reference signal (composite sync or black burst) may be connected to one of these BNC connectors. (double width module only) If the loop-through facility in not used the unused connector must be fitted with a 75 Ohm terminator.



-A versions

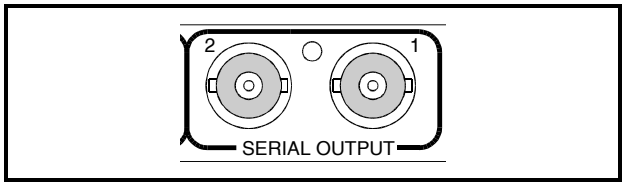
An external reference signal (composite sync or black burst) may be connected to this BNC connector that terminates in 75 Ohms.

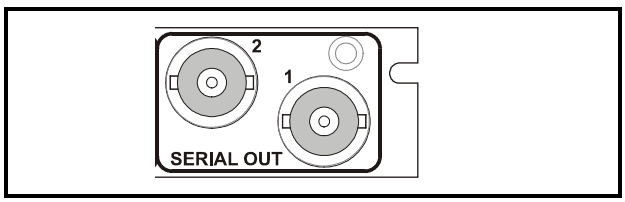


Note that LK15 (located towards the rear of the card) must be set to select 0.3 V or 2 V p-p syncs. The default sync selection is for sync extraction from the Y/G signal. The card edge switch SW1/1 (or remote control) is used to select this sync input.

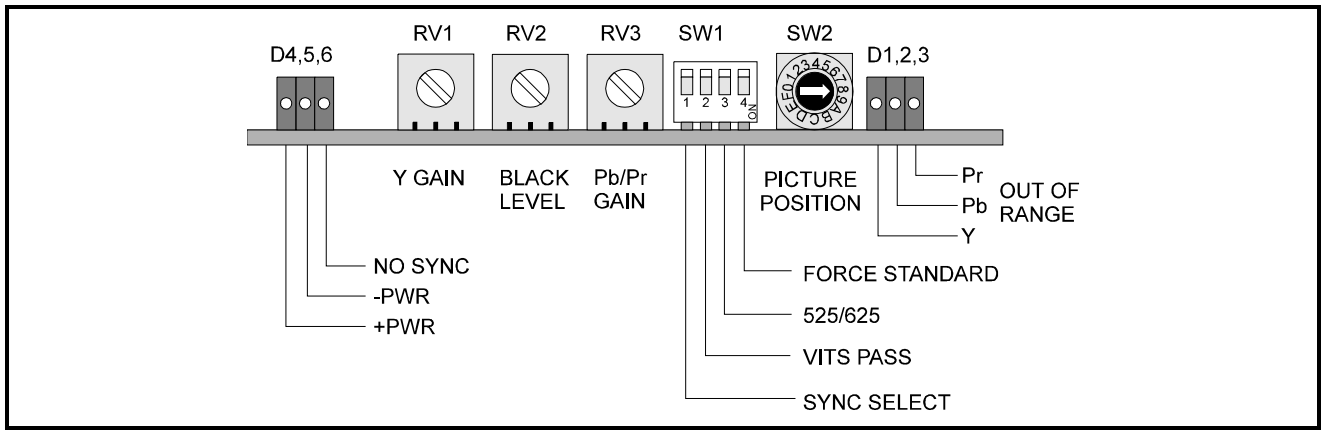
SERIAL OUTPUTS

These are the two isolated 4:2:2 Serial Digital outputs (4:0:0 for the –K versions) of the unit via BNC connectors for 75 Ohms.



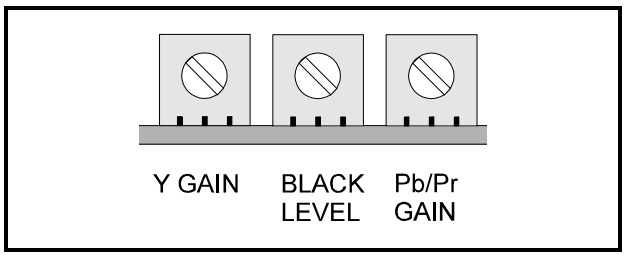


CARD EDGE CONTROLS



Adjustment of the settings for the IQD1ADC 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 (for Y Gain, Black Level, PbPr Gain, Y/C offset and picture position) sent by the remote control panel.



Y GAIN

This preset provides a small adjustment of luminance gain and is accurately factory set to give standard level outputs for standard input signal levels. *Note that if this control is adjusted the factory set calibration will be lost.*

BLACK LEVEL

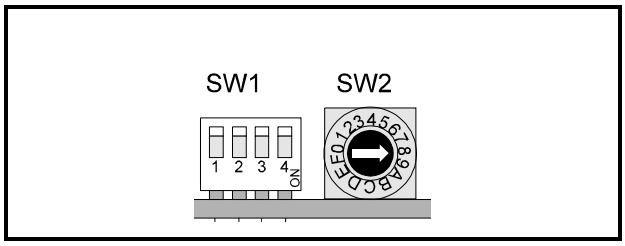
This preset sets the black level of the output signal and is accurately factory set to give a standard output black level for a standard input signal. *Note that if this control is adjusted the factory set calibration will be lost.*

PbPr GAIN (not available on –K versions)

This preset sets the chrominance gain of the unit by means of a tracked adjustment of the Pb and Pr channel gain and is accurately factory set to give standard level outputs for standard input signal levels. *Note that if this control is adjusted the factory set calibration will be lost.*

SWITCHES SW1 AND SW2

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.



SW1 Position 1 External Sync
(Function not available on –K versions)

This switch selects the sync source from either the external sync input (switch ON) or from the Y/G input signal (switch OFF)

SW1 Position 2 VITS Pass

When this switch is ON the unit will pass data (unblanked) present on VITS lines, to the digital Y output. The PbPr channels are always blanked during the vertical interval. When the switch is OFF all data in the vertical interval will be blanked.

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

SW1 Positions 3 & 4 Input Signal Standard

This switch allows the unit to automatically switch between 525 and 625 line standards according to the standard of the input syncs or force the unit to either 525 or 625 standard.

With SW1 position 4 set to OFF the unit will automatically switch between 525 and 625 line standards according to the standard of the input syncs. Detection of a new line standard will occur within 1 second. Note that under these conditions if there are no input syncs available the unit will produce a digital black signal in the last detected line standard.

With SW1 position 4 in the ON position the output standard will be forced to either 525 or 625 line standard determined by the setting of SW1 position 3. OFF forces the unit to 625 and ON forces the unit to 525 standard. Note that if the card is set to Forced 525 and a 625 line input signal is applied the unit will produce a 525 line digital black signal.

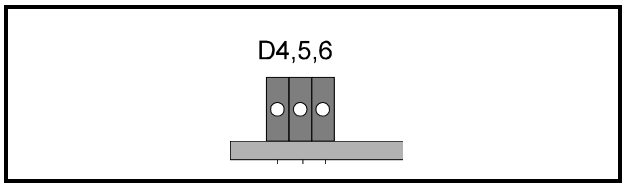
SW2 Picture Position

This switch allows the picture position to be moved within the digital line blanking area in 15 steps (-8 and +7) in increments of 74ns. Position 8 is the default calibrated position.

INDICATORS

D4 +PWR

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



D5 -PWR

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

D6 NO SYNC

This yellow LED becomes illuminated when no input sync signal is detected.

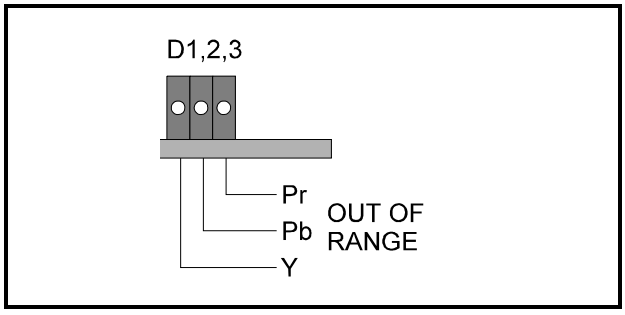
D1, D2 and D3

These LEDs will become illuminated if the particular signal is out of the legal amplitude range.

The error is detected when the digital signal exceeds standard levels.

i.e.if Y level exceeds 235_8 and if Pb or Pr exceeds 240_8 or is less than 16_8.

(PbPr indicators D2 and 3 are not fitted on –K versions)



EXTERNAL SYNC LEVEL SELECTION
(not available on –K versions)

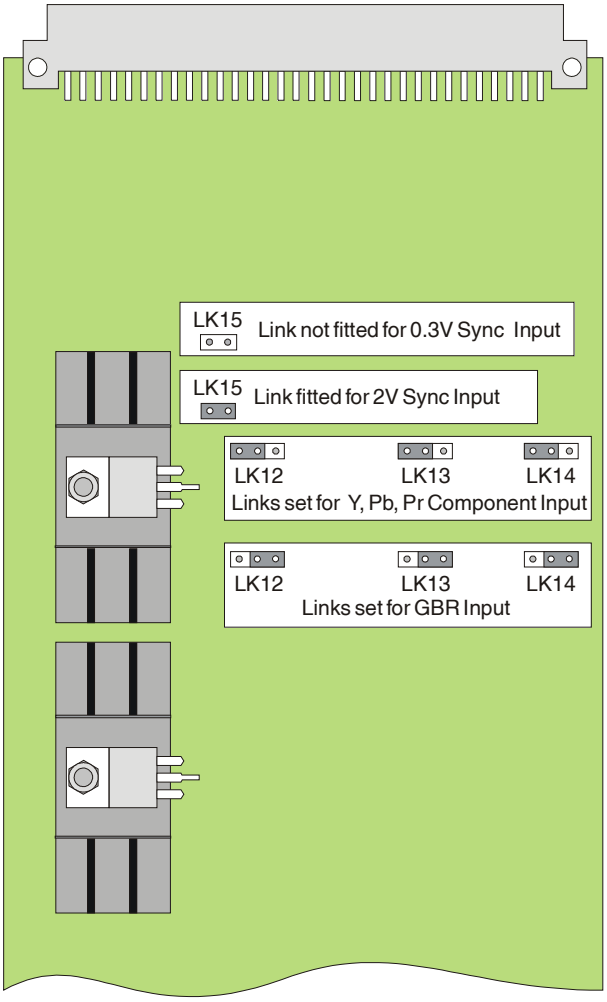
When external syncs are selected the unit may be configured to accept low level syncs (0.3 V p-p nominal) or high level syncs (2 V p-p nominal).

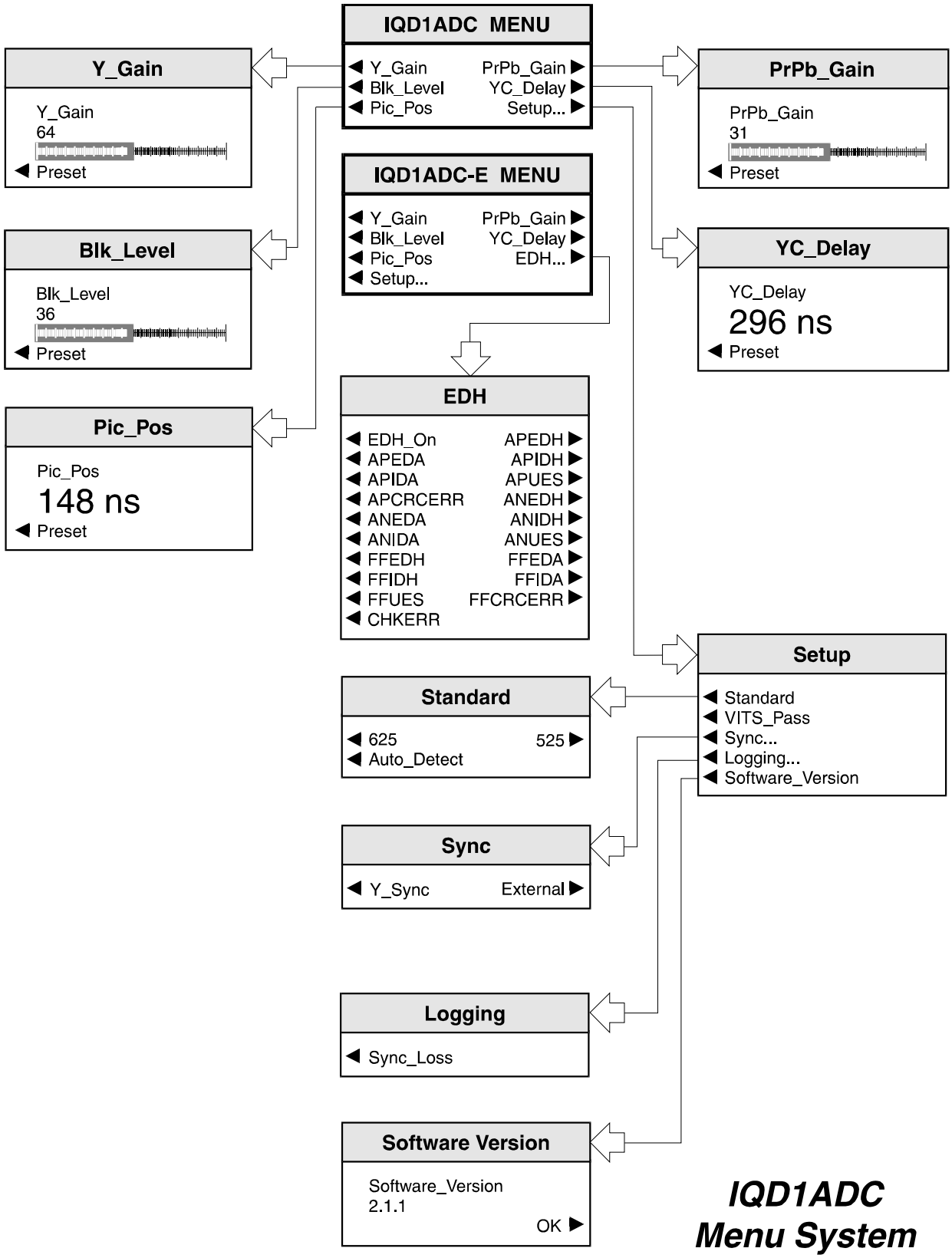
Link 15 should be fitted for a 2 V sync input and not fitted for 0.3 V sync input.

COMPONENT/GBR INPUT SELECTION
(not available on –K versions)

The unit may be configured to accept either a Y, Pb, Pr component input or a GBR input.

The three links (LK12, 13 and 14) should be fitted as shown in the diagram opposite to select the correct input signal.




IQD1ADC MENU
Y_Gain
Blk_Level
Pic_Pos
PrPb_Gain
YC_Delay
Setup...
IQD1ADC-E MENU
Y_Gain
Blk_Level
Pic_Pos
Setup...
PrPb_Gain
YC_Delay
EDH...
Y_Gain
Y_Gain
64
Preset
PrPb_Gain
PrPb_Gain
31
Preset
Blk_Level
Blk_Level
36
Preset
YC_Delay
YC_Delay
296 ns
Preset
Pic_Pos
Pic_Pos
148 ns
Preset
EDH
EDH_On
APEDA
APIDA
APCRCERR
ANEDA
ANIDA
FFEDH
FFIDH
FFUES
CHKERR
APEDH
APIDH
APUES
ANEDH
ANIDH
ANUES
FFEDA
FFIDA
FFCRCERR
Setup
Standard
VITS_Pass
Sync...
Logging...
Software_Version
Standard
625
Auto_Detect
525
Sync
Y_Sync
External
Logging
Sync_Loss
Software Version
Software_Version
2.1.1
OK
IQD1ADC
Menu System

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 on page 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 IQD1ADC 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.

◄ Y_GAIN

This selection reveals a sub-menu containing a bargraph display and a numerical readout (in arbitrary units) for the gain of the Y channel.By rotating the spinwheel the gain may be adjusted from its preset value of 64 to a maximum of 127 and a minimum of 0.

Selecting Preset returns the setting to the calibrated value of 64.

◄ BLK_LEVEL

This selection reveals a sub-menu containing a bargraph display and a numerical readout (in arbitrary units) for the black level of the output signal.By rotating the spinwheel the black level may be adjusted from its preset value of 36 to a maximum of 63 and a minimum of 0.

Selecting Preset returns the setting to the calibrated value of 36.

◄ PIC_POS

The horizontal picture position (active video position within line blanking) may be set using this function and rotating the spinwheel. The range is from -962 ns to +962 ns in steps of 74 ns.

When viewing a picture, the picture will move to the right for positive values and to the left for negative values of shift.

Selecting Preset returns the setting to 0.

PrPb_GAIN ►

(not available on –K versions)

This selection reveals a sub-menu containing a bargraph display and a numerical readout (in arbitrary units) for the gain of the both the Pr and Pb channels.By rotating the spinwheel the gain may be adjusted from its preset value of 31 to a maximum of 63 and a minimum of 0.

Selecting Preset returns the setting to the calibrated value of 31.

YC_Delay ►

(not available on –K versions)

The relative timing between the luminance and the chrominance signals may be set using this function and rotating the spinwheel. The range is from -592 ns to +592 ns in steps of 74 ns.

When viewing a picture, the chrominance will move to the right for positive values and to the left for negative values of shift.

Selecting Preset returns the setting to 0.

SETUP… ►

Selecting this item reveals a sub-menu that contains various system parameters that may be set.

◄ Standard

This selection reveals another sub-menu that allows the operating standard mode to be set.

When 625 is selected the output standard will be forced to 625; selecting 525 forces the output standard to 525.

When the AutoDetect mode is selected the unit will automatically switch between 525 and 625 line standards according to the standard of the input syncs. Detection of a new line standard will occur within 1 second.

◄ VITS_ Pass

When selected (text reversed) the unit will pass data (unblanked) present on VITS lines, to the digital Y output. The PbPr channels are always blanked during the vertical interval. When de-selected (text normal) all data in the vertical interval will be blanked.

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

◄ Sync (not available on –K versions)

This sub-menu allows the source of reference syncs, used to lock the unit, to be selected.

The Y-Sync selection will allow the unit to derive syncs from the Y or G input.

The External selection will allow the unit to derive syncs from the external Sync input.

◄ Logging

This sub-menu enables data to be sent to the logging device.

When Sync_Loss is enabled (appears in reversed text) sync loss errors will be reported to the logging device assigned in the Remote Control Interface system. (See Section 1, The RCIF Menu System)

◄ Software Version

This sub-menu will display the software version number fitted in the module. Press OK to quit and return to the previous menu.

EDH... ►

(-E Version only)

This selection reveals the EDH sub-menu which enables the generation of EDH checkwords and flags.

For more information please refer to SMPTE RP165 "Error Detection Checkwords and Status Flags for use in Bit-Serial Digital Interfaces for Television" or as reprinted in Appendix 2 of the IQD1MON (D1 EDH Inserter and D1 Monitor) operator's manual.

Error reporting provides the information necessary to allow system diagnostics. The error flags are used to identify specific error types and are contained in an error packet which can be read through a serial communication interface.

◄ EDH_On

Selecting this item (appears as reversed text) enables the error detection system. The following error flags are normally reset in equipment sourcing D1 data. However, they may be set in order to check the error handling and reporting of downstream D1 equipment.

◄ APEDA

Active Picture: Error Detected Already

◄ APIDA

Active Picture: Internal Error Detected Already

◄ APCRCERR

Active Picture: CRC (Cyclic Redundancy Check) code error

◄ ANEDA

Ancillary Data: Error Detected Already

◄ ANIDA

Ancillary Data: Internal Device Error Detected Already

◄ FFEDH

Full Field: Error Detected Here

◄ FFIDH

Full Field: Internal Device Error Detected Here

◄ FFUES

Full Field: Unknown Error Status

◄ CHKERR

Checksum Error

APEDH ►

Active Picture: Error Detected Here

APIDH ►

Active Picture: Internal Device Error Detected Here

APUES ►

Active Picture: Unknown Error Status

ANEDH ►

Ancillary Data: Error Detected Here

ANIDH ►

Ancillary Data: Internal Device Error Detected Here

ANUES ►

Ancillary Data: Unknown Error Status

FFEDA ►

Full Field: Error Detected Already

FFIDA ►

Full Field: Unknown Error Status

FFCRCERR ►

Full Field: CRC (Cyclic Redundancy Check) code error

Manual Revision Record

Date	Version No.	Issue No.	Change	Comments
210897	2	1	Word version created	New issue released
110298	2	2	Key versions added	New manual issued
091100	2	3	601 spec PbPr frequency response in tech spec corrected	New manual issued
080402	2	4	Now includes information for the 3A enclosure modules	New manual issued
080403	2	5	Power consumption added to techspec	New manual issued
180603	2	6	Link data added page 14.10	New manual issued