IQBADCDN 4-Channel Audio A to D Converter without Delay

CE

Module Description

The IQBADCDN converts two analog stereo pairs, or four analog mono channels into two AES/EBU digital audio streams. Each analog input is sampled at 48 kHz, 44.1 kHz or 32 kHz with 24-bit resolution. Sampling can be free-running, clock and audio frame locked to a reference AES/EBU digital input audio stream or video locked in accordance with AES11 recommended practice. Video standard is automatically determined. The analog input may be set to terminate at 600 R or >10k Ohms and is factory set to accept +24 dBu It has a variable range of +18 dBu to +24 dBu (+12 dBu to +18 dBu with links) for a full-scale digital output.

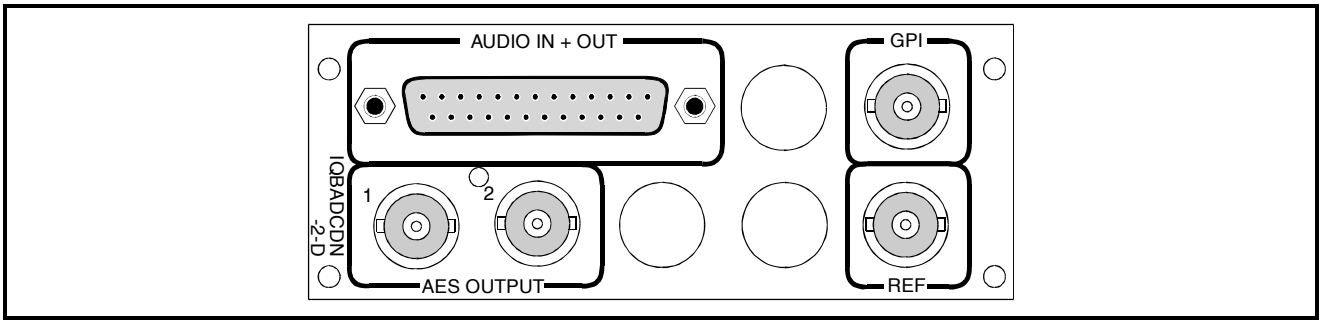
Full remote control and monitoring is available via RollCall.
Monitoring functions include reference presence indication, reference format and overflow warning.

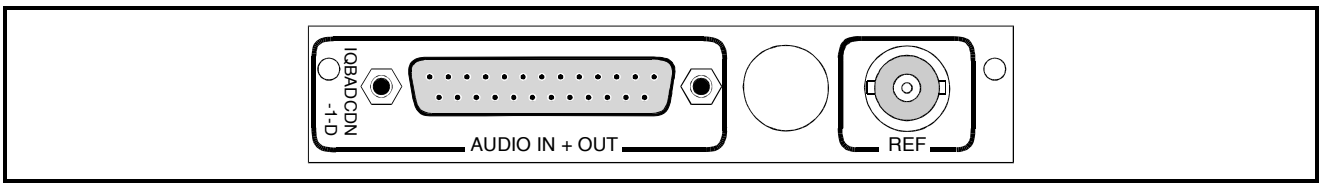
A GPI input may be attached to any control function.

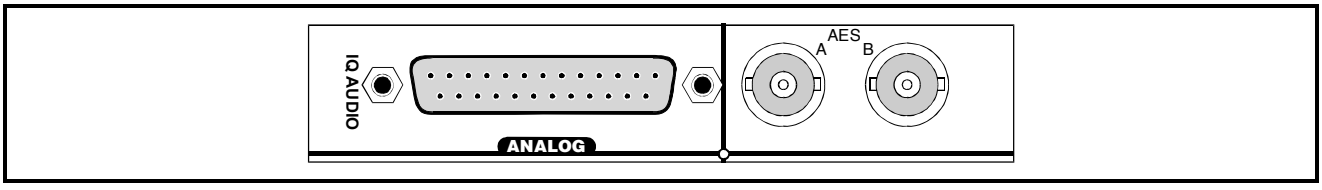
All analog audio connections are via a 25 D connector.

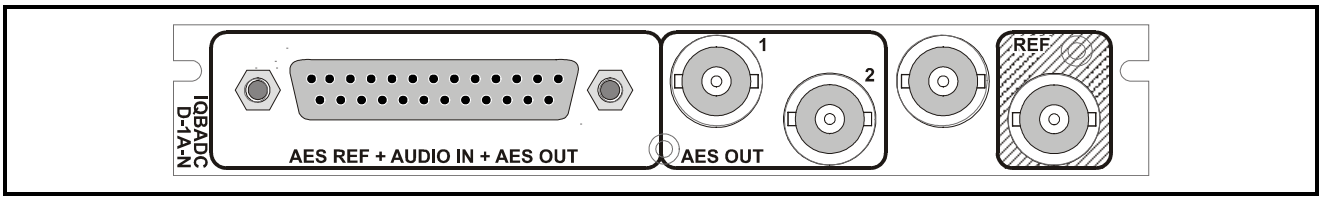
The AES/EBU outputs and reference are available in balanced and unbalanced format on the same card

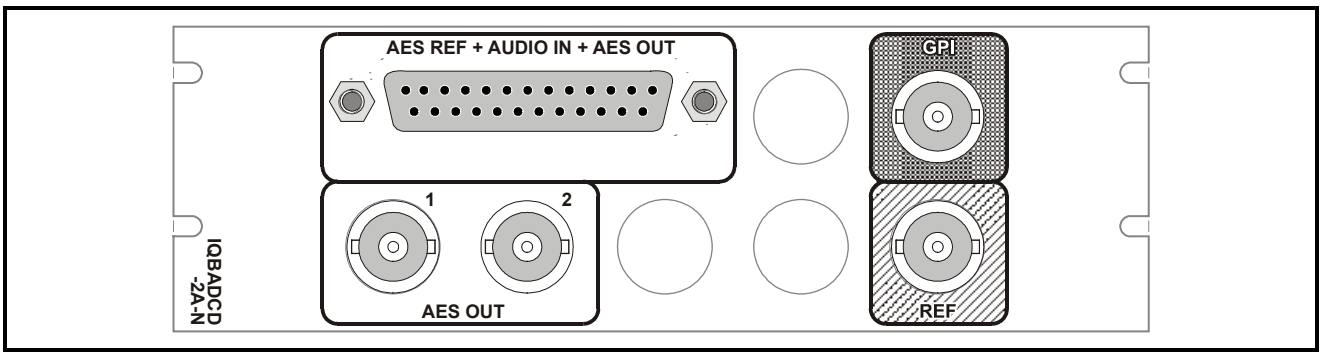
REAR PANEL VIEWS











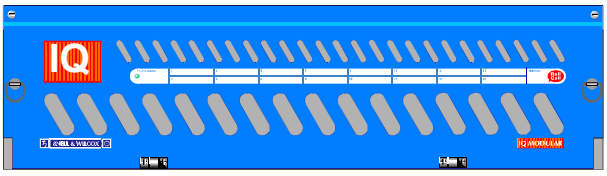
This manual covers the following versions of the IQBADCD-N:

IQBADCD-1-N Dual Audio ADC. Balanced (2) outputs.	Single width
IQBADCD-1A-N Dual Audio ADC. Balanced (2) & Unbalanced (2) AES/EBU outputs.	Single width
IQBADCD-1K-N Dual Audio ADC. Balanced (2) & Unbalanced (2) AES/EBU outputs	Single width
IQBADCD-2-N Dual Audio ADC. Balanced (2) & Unbalanced (2) AES/EBU outputs.	Double width
IQBADCD-2A-N Dual Audio ADC. Balanced (2) & Unbalanced (2) AES/EBU outputs.	Double width

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

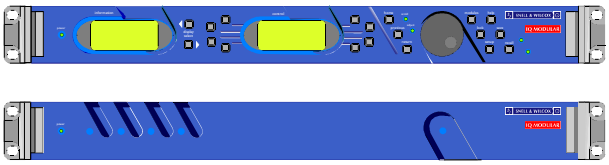
Rear panels ***with*** the suffix A may only be fitted into the 'A' style enclosure shown below.



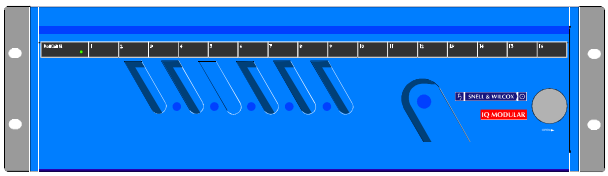
(Enclosure order codes IQH3A-E-0, IQH3A-E-P, IQH3A-0-0, IQH3A-0-P)

'O' Style Enclosures

Rear panels ***without*** the suffix A may only be fitted into the '0' style enclosures shown below.



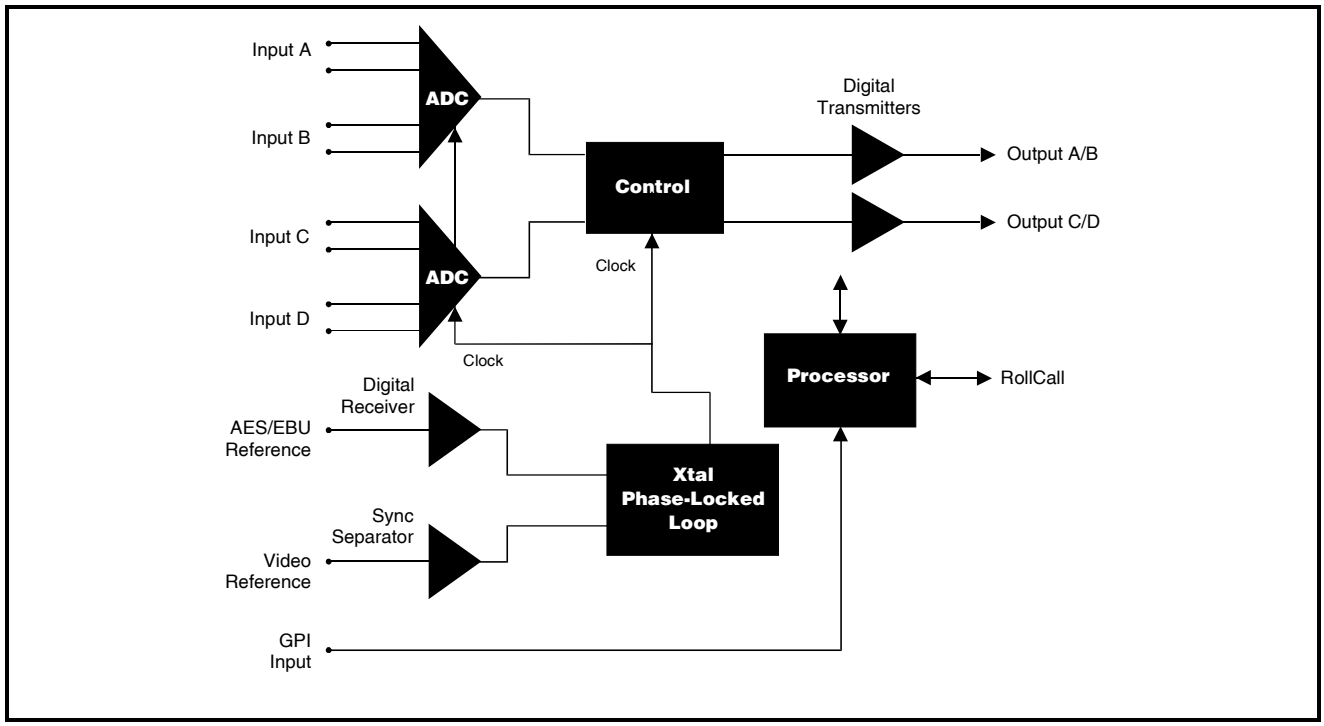
(Enclosure order codes IQH1S-RC-0, IQH1S-RC-AP, IQH1U-RC-0, IQH1U-RC-AP, Kudos Plus Products)



(Enclosure order codes IQH3N-0, IQH3N-P)

(Enclosure order codes IQH3U-RC-0, IQH3U-RC-P)

BLOCK DIAGRAM



Features

Converts four analog audio channels into two AES/EBU digital audio streams

- Output gain adjustable 0 to +12 dB
- Balanced and Unbalanced AES/EBU on the same card
- 24-bit sampling resolution
- Operates at 32, 44.1 and 48 kHz
- Sampling can be free-running, or locked to a video or an AES/EBU reference
- Input headroom adjustable +12 to +24 dBu
- Overflow indication
- GPI inputs programmable to any control function
- RollCall control and monitoring

TECHNICAL PROFILE

Features

Signal Inputs

Analog Input..... 4 Channels (2 Stereo Pairs)

Analog Video Reference .... Black Burst via BNC

Digital Audio Reference ..... 48 kHz, 44.1 kHz or 32 kHz
AES/ EBU Balanced via 25 way D

Digital Audio Reference ..... 48 kHz, 44.1 kHz or 32 kHz
AES/ EBU Unbalanced via BNC

GPI ..... TTL Signal via BNC (-2 Version)

Signal Outputs

Digital Audio 1..... 1 x AES/EBU output Balanced via 25 way D
1 x AES/EBU output Unbalanced via BNC (-2/-1A Versions)

Digital Audio 2..... 1 x AES/EBU output Balanced via 25 way D
1 x AES/EBU output Unbalanced via BNC (-2/-1A Versions)

Card Edge Controls (also available via RollCall)

Headroom ..... +24 dBu to +18 dBu or +18 dBu to +12 dBu by pot and link.

Gain..... 0, +3 dB, +6 dB, and +9 dB

Sample Rate..... Select 48 kHz, 44.1 kHz and 32 kHz

Reference Select ..... Free Run, AES/EBU or Video PAL/NTSC Auto Selected

Mute..... Mute either Output Pair On/Off

Control ..... Select Local or Remote

Indicators

Overflow..... 0.2 dB or greater than headroom setting
(Left, Right, Channels 1 & 2)

No Sync ..... Loss of Video Reference

Functions available via RollCall™ only

Gain ..... Adjustable from 0 to +12 dB in 0.25 dB steps

Reporting ..... Video Standard

Logging..... Reference Loss, Input Format

L/R Swap ..... On both channels 1 + 2

Phase Invert..... On both channels 1 + 2

Channel Status Editor ..... Channel Status origin and destination names can be edited. Channel Status bytes 0, 1, 2 and 4 are all editable or can be automatically generated

Specifications

Analog Input Level ..... 24 dBu (17.5 V pk to pk) Headroom

Analog Input Impedance .... >10 k ohms (Selectable 600 ohm termination)

Analog Reference Input Level
Black Burst at standard level ± 6 dB

Analog Reference Input Standard
625/525 line

Digital Reference Balanced Input Standard
AES/EBU (AES3-1992)

Digital Reference Balanced Input Level
0.2 V to 7 V pk to pk into 110 ohms via 25 way D
Maximum Cable Length 150 m

Digital Reference Unbalanced Input Standard
AES/EBU (AES3-1992)

Digital Reference Unbalanced Input Level
0.03 V to 5 V pk to pk into 75 ohms
Maximum Cable Length 1000 m

Digital Balanced Output Level
Typically 4 V pk to pk into 110 ohms

Digital Unbalanced Output Level
Typically 1 V pk to pk into 75 ohms

Digital Path ..... 32 kHz, 44.1 kHz and 48 kHz 20-bit

Total Harmonic Distortion + Noise
Better than 0.002% (-95 dB) at 700 Hz and -1 dBFs

Noise Floor ..... Better than -106 dBFs (20 Hz to 20 kHz)

Channel Separation ..... Better than -100 dBFs at 10 kHz

Frequency Flatness ..... Better than +0.1 dBu to -0.3 dBu (20 Hz to 20 kHz with reference to 1 kHz)

Output Level Accuracy..... better than –0.3 dB

Channel Amplitude Matching
better than ±0.05 dB

Digital Reference Input Frequency Pull-In Range
+2 Hz to –1 Hz

Sampling..... 48 kHz, 44.1 kHz or 32 kHz Free Running
48 kHz, 44.1 kHz or 32 kHz clock and frame locked to AES/EBU reference
48 kHz clock and frame locked to a PAL or NTSC video reference

Transport Delay ..... 0.9 ms

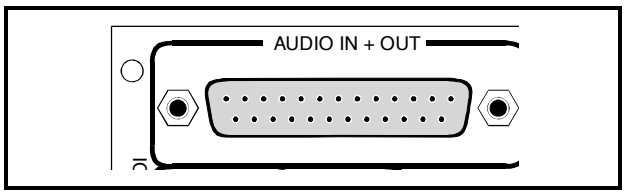
Power Consumption

Module Power Consumption
6 W max

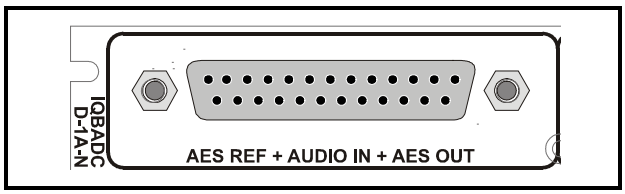
INPUTS AND OUTPUTS

Audio In + Out

All analogue input and output connections plus the AES reference are made via this 25 way female D-type connector

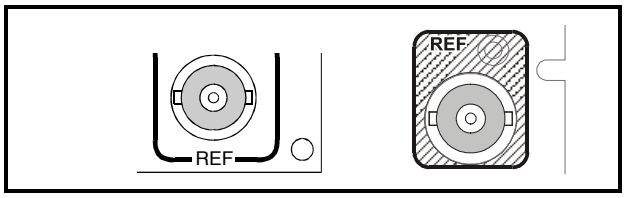


For connection data consult the tables on page 5.



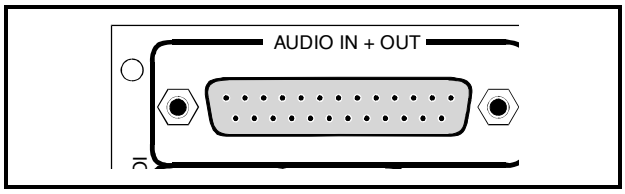
Reference Input

A standard analog video or black burst reference signal may be connected to this BNC connector. The signal is terminated internally at 75 Ohms.

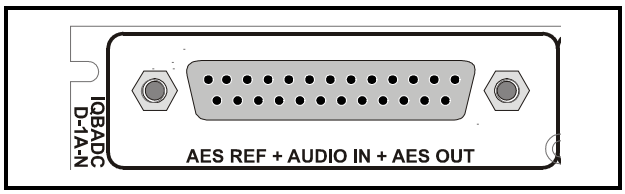


Digital Output

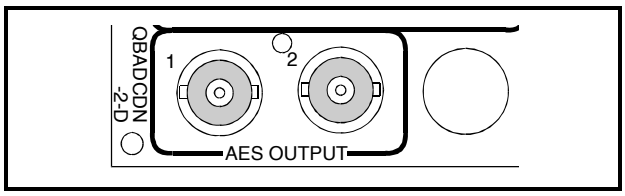
Balanced digital outputs are made via this 25 way female D-type connector.

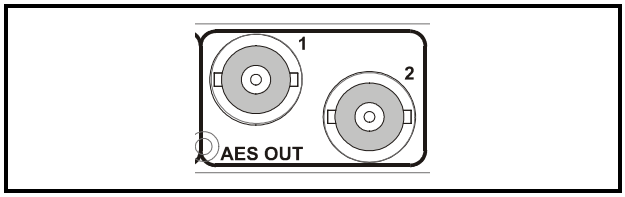


For connection data consult the tables on page 5.



Unbalanced outputs are available from these 2 BNC connectors.

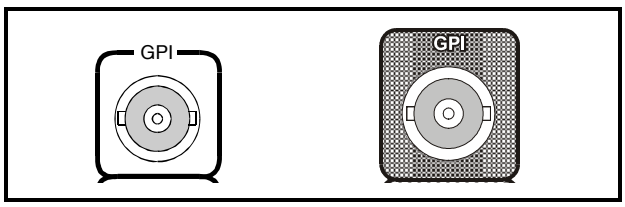




GPI Connection (-2 versions only)

This is used for accepting GPI information (from mechanical switch contacts, relay contacts etc.) The resulting action that the unit takes may be programmed via RollCall.

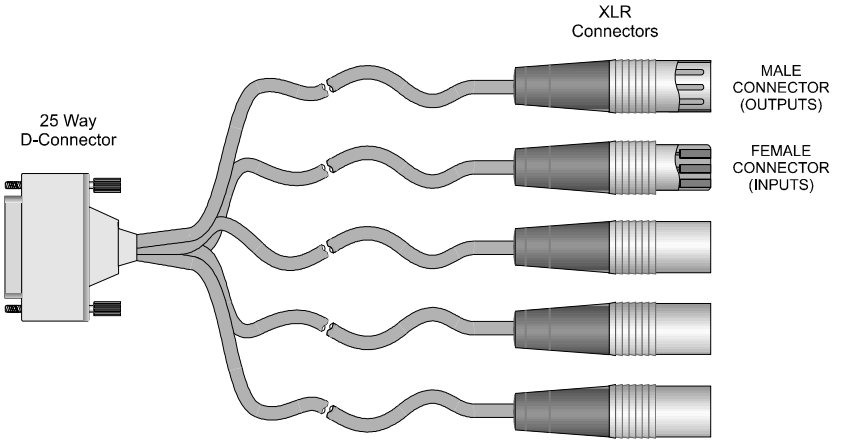
Operation is such that when the contact is closed the function is activated; when the contact is open, the function is de-activated.

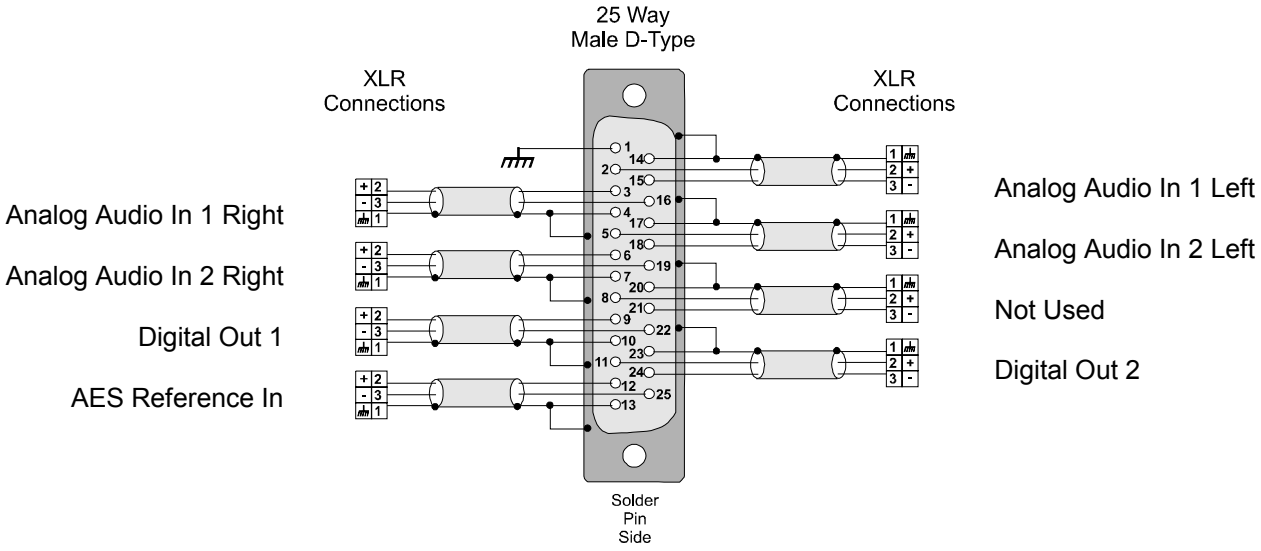


25 Way D Connection Details

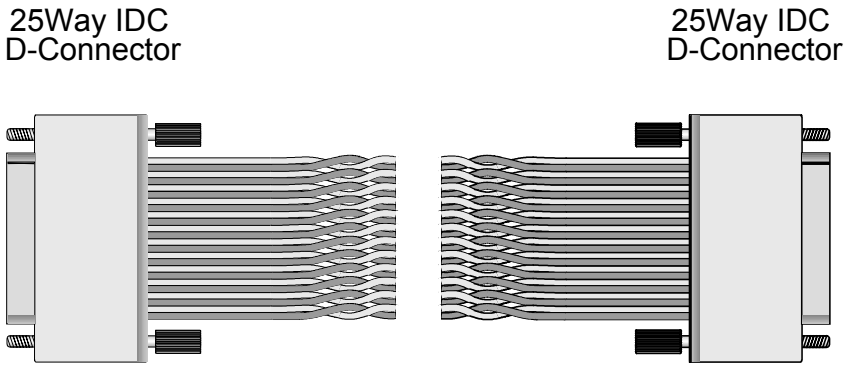
25 Way D Connector Pin Number	Description	Ribbon Cable Strand Number	Standard Pin Assignment
1		1	CHASSIS
14	ANALOG AUDIO IN 1 LEFT GND	2	GND1
2	ANALOG AUDIO IN 1+ LEFT	3	1+
15	ANALOG AUDIO IN 1- LEFT	4	1-
3	ANALOG AUDIO IN 1+RIGHT	5	2+
16	ANALOG AUDIO IN 1- RIGHT	6	2-
4	ANALOG AUDIO IN 1 RIGHT GND	7	GND2
17	ANALOG AUDIO IN 2 LEFT GND	8	GND3
5	ANALOG AUDIO IN 2+ LEFT	9	3+
18	ANALOG AUDIO IN 2- LEFT	10	3-
6	ANALOG AUDIO IN 2+ RIGHT	11	4+
19	ANALOG AUDIO IN 2- RIGHT	12	4-
7	ANALOG AUDIO IN 2 RIGHT GND	13	GND4 (CH)
20		14	GND5
8		15	5+
21		16	5-
9	AES AUDIO OUT 1 +	17	6+
22	AES AUDIO OUT 1 -	18	6-
10	AES AUDIO OUT 1 GND	19	GND6
23	AES AUDIO OUT 2 GND	20	GND7
11	AES AUDIO OUT 2 +	21	7+
24	AES AUDIO OUT 2 -	22	7-
12	AES AUDIO REF IN +	23	8+
25	AES AUDIO REF IN -	24	8-
13	AES AUDIO REF GND	25	GND8

Connection Details to XLR Connectors

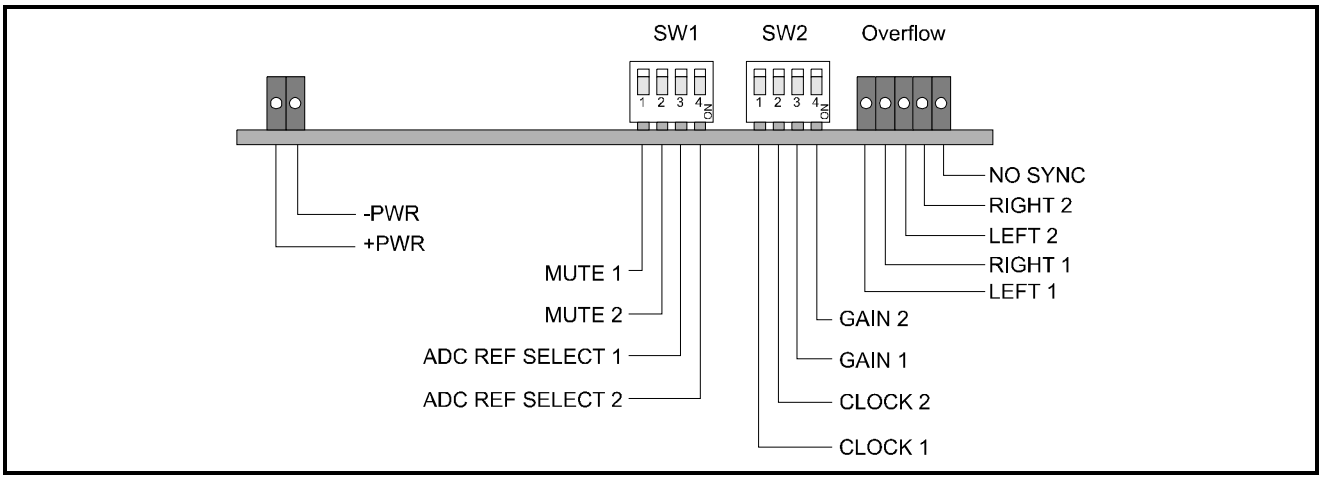




Connection Details via IDC connectors



CARD EDGE CONTROLS



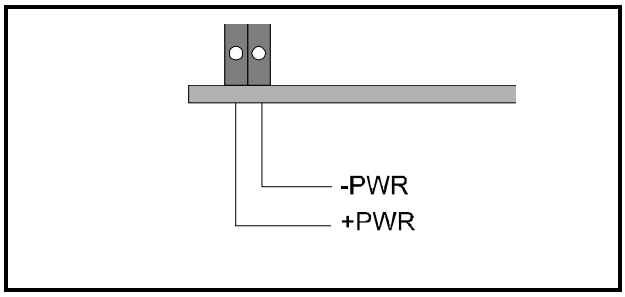
*Adjustment of the settings of the **IQBADCDN** is available either via card edge controls and/or via a more comprehensive remote control system using RollCall™*

Note that the availability of some of the card edge controls will depend on the card version; see feature table for variations.

LED INDICATORS

Power

These two indicators are illuminated when the positive and negative supplies are present.

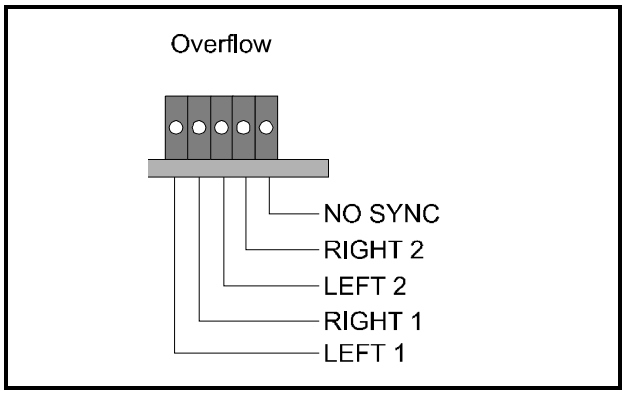


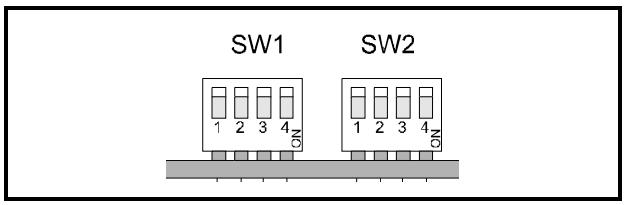
Overflow

These indicators will become illuminated when bit overflow is detected on channel 1 and channel 2 Right and Left channels.

No Sync

This indicator will become illuminated if no video reference is detected.
(Not applicable to AES reference)





SW1

Setting to the down (ON) position enables the function.

Position 1 Enables the Mute 1 function
Position 2 Enables the Mute 2 function
Positions 3 & 4 ADC Reference Select
(see below where 1 = ON)

ADC Reference	Pos 3	Pos 4
Internal	0	0
Video	1	0
AES/EBU	0	1
Internal	1	1

SW2

Setting to the down (ON) position enables the function.

Positions 1 & 2 Clock Rate Select
(see below where 1 = ON)

Clock Rate	Pos 1	Pos 2
48 kHz	0	0
44.1 kHz	1	0
32 kHz	0	1
48 kHz	1	1

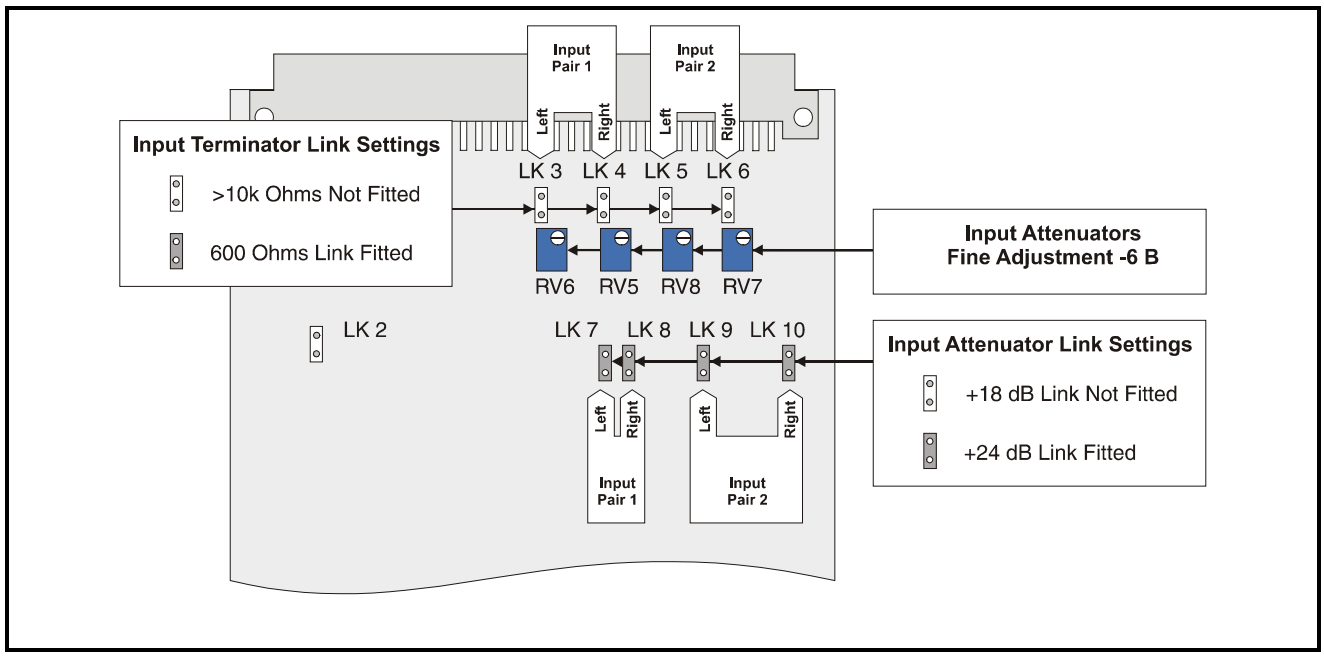
Positions 3 & 4 Gain Select
(see below where 1 = ON)

Gain	Pos 3	Pos 4
0 dBu	0	0
+3 dBu	1	0
+6 dBu	0	1
+9 dBu	1	1

Channel Status

Currently the AES "...standard implementation.." is adopted. Status bytes 0 to 2 are configured to AES specifications. The standard implementation provides a fundamental level of implementation that is sufficient for general applications in professional audio or broadcasting.

GAIN AND INPUT TERMINATION ADJUSTMENT



Gain Adjustment

The overall gain of a channel may be adjusted using links and a variable potentiometer.

The link provides a coarse adjustment of +18 dB (link not fitted) or +24 dB (link fitted).

The card is supplied with the link fitted as shown above, in the +24 dB position.

Adjusting the 10-turn potentiometer provides fine adjustment of -6 dB.

The card is supplied with the control set to the 0 dB position.

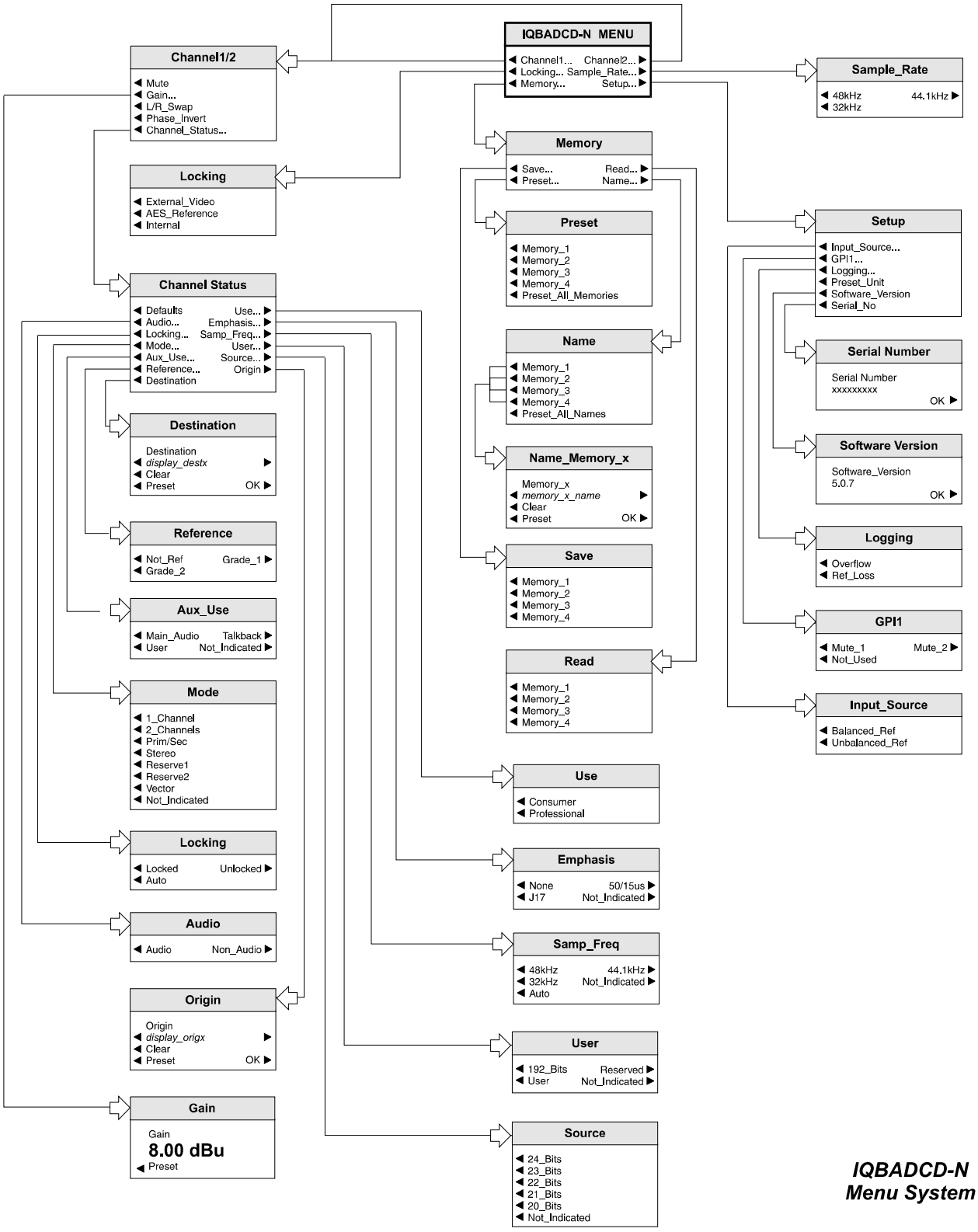
Input Termination Setting

The input impedance for the input channel may be set to HIGH (10,000 Ohms) or LOW (600 Ohms) by means of a link.

When the link is fitted the input impedance is 600 Ohms.

When the link is not fitted the input impedance is 10,000 Ohms.

The card is supplied in the HIGH (link not fitted) condition.



IQBADCD-N 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 the previous page 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 IQ 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.

◄ Channel1 & Channel2

These selections allow settings for channel 1 and channel 2 to be set up.

◄ Mute

When enabled this toggle function will mute the channel and the output will become silence.

◄ Gain

When selected a numerical display will appear and by operating the spinwheel the analogue gain may be adjusted. The range of adjustment is from 0 to 12 dBu in steps of 0.25 dB.
Preset is to 0 dB.

◄ L/R_Swap

This toggle function puts the left input signal data onto the right output and the right input signal data onto the left output.

◄ Phase_Invert

This toggle function reverses the polarity of the signal (phase inverted)

◄ Channel_Status

This function allows channel status information for both Channel 1 and Channel 2 to be modified using the following sub-menus.

Channel status for each audio channel carries information associated with that audio signal. The same channel status is inserted into both subframe 1 and 2.
Format follows that specified in the EBU document *"Specification of the Digital Audio Interface (The AES/EBU Interface) Tech. 3250-E, second edition August 1992.*

◄ Defaults
This item will return all settings for both channels to their default values.

Use ►

This sub-menu allows the level of use to be set.

◄ Consumer
The signal will be identified as for "consumer use" conforming to IEC 958

◄ Professional
The signal will be identified as for "professional use" conforming to IEC 958

Default is to Professional

◄ Audio

This sub-menu allows the mode to be set to either **Audio** or **Non-Audio**.
Default is to **Audio**.

Emphasis ►

This allows the audio emphasis characteristic to be set. Selections available are:

◄ None
No Emphasis applied

50/15µs ►
Emphasis characteristic set to 50/15µs

◄ J17
Emphasis set to CITT J.17 (with 6.5 dB insertion loss at 800 Hz)

Not_Indicated ►
Emphasis characteristic not indicated

Default is to Not_Indicated

◄ Locking

This allows the lock state of the sampling frequency to be set.

Selections are:

◄ Locked
Sampling frequency locked

Unlocked ►
Sampling frequency unlocked

◄ Auto
Automatic selection; i.e. the locking status of the IQBADCDN is inserted into the channel status.

Default is to Auto

Samp_Freq ►

This allows the sampling frequency to be set.

Selections are:

◄ 48 kHz 44.1 kHz ►
◄ 32 kHz Not_Indicated ►
◄ Auto

◄ Auto (Automatic Selection)
This inserts the actual sampling frequency of the IQBADCDN into the channel status.

Default is to Auto

◄ Mode

The encoded channel mode may be set with this sub-menu.

◄ 1_Channel
Single channel mode (monophonic)

◄ 2_Channels
Two channel mode

◄ Prim/Sec
Primary/ secondary mode (sub-frame 1 is primary)

◄ Stereo
Stereophonic mode (channel 1 is left channel)

◄ Reserve1
Reserved for user-defined applications

◄ Reserve2
Reserved for user-defined applications

◄ Vector
Vector to byte 3. Reserved for future applications

◄ Not_indicated
Mode not indicated

Default is to Stereo

User ►

This item defines the encoded user bits.

◄ 192_Bits
192-bit structure. Preamble “Z” indicates the start of a block

Reserved ►
User bits are reserved

◄ User
User defined

Not_Indicated ►
No user information indicated

Default is to Not_Indicated

◄ Aux_Use

This item defines the use of auxiliary sample bits.

◄ Main_Audio
Auxiliary bits used for main audio sample data. Maximum audio sample word length is 24 bits.

Talkback ►
Auxiliary bits used for talkback (a single co-ordination signal)
Maximum audio sample word length is 20 bits.

◄ User
Auxiliary bits are for user-defined applications.

Not_Indicated ►
Use of auxiliary sample bits not defined. Maximum audio sample word length is 20 bits.

Default is to Not_Indicated

Source ►

This item indicates the encoded audio sample word length of the transmitted (source) signal.

◄ 24_Bits
◄ 23_Bits
◄ 22_Bits
◄ 21_Bits
◄ 20_Bits
◄ Not_Indicated

Default is to 24_Bits

◄ Reference

This item indicates the source of sample frequency reference.

◄ Not_Ref
Sample frequency not referenced to a fixed source.

Grade_1 ►
Sample frequency is referenced to a grade 1 source.

◄ Grade_2
Sample frequency is referenced to a grade 2 source.

Default is to Not_Ref

Origin ►

This allows the originating channel status information to be changed.

The text may be edited by using the push buttons to select the position in the text and the spinwheel to select the new text character.
Select ◄ OK to save the text, ◄ Clear to clear the text or ◄ Preset to return to the default text.

◄ Destination

This allows the destination channel status information to be changed.

The text may be edited by using the push buttons to select the position in the text and the spinwheel to select the new text character.
Select ◄ OK to save the text, ◄ Clear to clear the text or ◄ Preset to return to the default text.

◄ Locking

This selection reveals a sub-menu that allows the the standard and mode of the locking source to be set.
Selections are:

- External Video (via Ref Video BNC input)
- AES Reference (via D connector)
- Internal (not locked to any external source)

Note that if locking to external video the sample rate will be set to 48 kHz.

Sample Rate ►

Sampling rates of 48 kHz, 44.1 kHz or 32 kHz may be selected from this menu.
Note that only 48 kHz can be selected if locking to external video.

◄ Memory

All settings of the unit may be stored in any of 4 non-volatile memory locations. These locations may be read, saved (write), given a name or cleared to the preset names by selecting this function and the sub-menus.

◄ Save

This will reveal a list of 4 memory locations. When a particular location is enabled, current settings will be saved in that memory location.

◄ Read

This will reveal a list of 4 memory locations. When a particular location is enabled, settings will be changed to the values contained in that memory location.

◄ Preset

This will reveal a list of 4 memory locations. When a particular location is enabled, the preset values of that memory location will be loaded. ◄ Preset_All_Memories will return all memory locations to their preset values.
Note that memory names will not be changed.

◄ Name

This will reveal a list of the 4 memory locations that may be given a specific name. Use the adjacent buttons to select the cursor position and the spinwheel to select the alphanumeric character. ◄ Preset_All_Names will return all names to their preset names.

Setup ►

This selection reveals a sub-menu that allows various functions to be set.

◄ Input_Source

The reference source may be selected from either the

◄ Balanced_Ref (via 25 way connector)
◄ Unbalanced_Ref (via BNC connector)

Default is to Balanced_Ref

◄ GPI 1

The GPI connector is used for accepting GPI information (from mechanical switch contacts, relay contacts etc.) The resulting action that the unit takes may be selected from this menu.

◄ Mute 1 & 2

The GPI signal will mute the selected channel; either Channel 1 or channel 2.

◄ Not_Used

When selected the GPI input connection will be disabled.

Default is to Not_Used

◄ Logging

If a logging device is attached to the RollCall™ network, information about various parameters will be reported to the logging device assigned in the Remote Control Interface system. (See Section 1, The RCIF Menu System)

The parameters that may be selected for logging are as follows:

◄ Overflow
◄ Ref (Reference) Loss

◄ 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.*

◄ Software Version

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

Select OK to return to the System Menu.

◄ Serial No.

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

Select OK to return to the Setup Menu.

Manual Revision Record

Date	Version No.	Issue No.	Change	Comments
170699	1	1		First Issue
180900	1	2	Corrections to links layout/text	New issue released
300401	1	3	Input Pot text to –6 dB range, link diagram now shows as shipped	New issue released
100402	1	4	Now includes information for the 3A enclosure modules	New manual issued
100303	1	5	Spec updated +I/O table	New manual issued
010403	1	6	Power consumption added to techspec	New manual issued
080704	1	7	Rear panel drawings corrected and updated	New manual released