CB Electronics
I-Mon
34 I/P 27 O/P
Analogue Monitor Control Unit

User Guide

Preliminary

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Introduction

The I-Mon analogue monitor control unit is housed in a 1U rack mount box. Designed for stereo, 5.1, 7.1 , 7.1.4, 9.1.4, 7.1.6 this versatile unit is designed to provide a cost effective solution to installing immersive monitoring in smaller studios.

- 1x 7.1.4 Input 1 x 7.1 input and 2 x Stereo Inputs
- Input Summing
- 3 outputs: 1 x7.1.4, and 2xStereo
- 3 x Stereo Cue inputs, also available as inputs
- 4 x Stereo Cue Outputs: Studio L/S, Headphones and cue 1, cue 2
- 2 x Talkback Mic Inputs, 2 x Listen Mic Inputs
- Metering selected input(s) or Left, Right, Centre, Studio L/S and Headphone
- Rear surround switching for 5.1 or 7.1
- LCR Bass Extension - to LFE via Low Pass Filter
- Surround Bass Extension - to LFE via Low Pass Filter

Three versions of the I-Mon are available with different input and output combinations as shown in the following table:

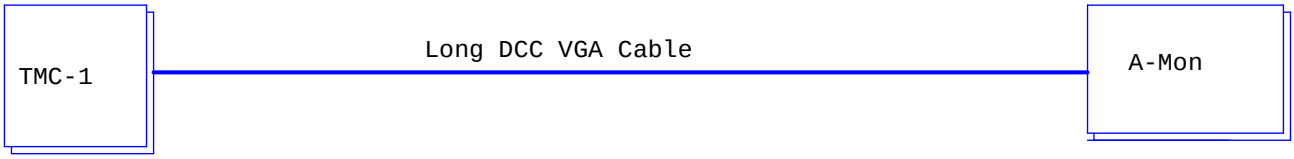
I-Mon Input and Output Table			
Input/Output	I-Mon-12a	I-Mon-12b	I-Mon-14
Main Input	12 Channel	12 Channel	14 Channel
Alt Input	8 Channel	8 Channel	8 Channel
Stereo I/P 1	Yes	Yes	Yes
Stereo I/P 2	Yes	Yes	Cue I/P 1
Stereo I/P 3	Cue I/P 1	Cue I/P 1	Cue I/P 2
Stereo I/P 4	Cue I/P 2	Cue I/P 2	Cue I/P 3
Cue I/P 1	Yes	Yes	Yes
Cue I/P 2	Yes	Yes	Yes
Cue I/P 3	Yes	No	Yes
Stereo AFL I/P	Yes	Yes	Yes
Listen 1 Mic I/P	Yes	Yes	Yes
Listen 2 Mic I/P	No	Yes	No
Internal Talk back	Yes	Yes	Yes
External Talk Back	No	Yes	No
Main Output	12 Channel	12 Channel	14 Channel
Alt Output	Stereo	Stereo	No
Mini Output	Stereo	Stereo	Stereo
Downmix O/P	Stereo	Stereo	Stereo
Studio O/P	Stereo	Stereo	Stereo
Cue 1 O/P	Stereo	Stereo	Stereo
Cue 1 O/P	Stereo	Stereo	Stereo
H/P O/P	Stereo	Stereo	Stereo
Slate O/P	Mono	Mono	Mono

Installation

The I-Mon is a 1U rack mounting, cooling is convection via the side vents, care should be taken that it is not mounted in a position where it will overheat. If possible leave a one unit rack spave above and below.

Connecting the TMC-1 to I-Mon

Connect the TMC-1 to I-Mon using a DDC VGA Cable, a 7.5 meter cable is supplied with the system. Where very long cables are used (>15m) we recommend using a separate Talkback Microphone cable to prevent cross talk between the Mic input and the digital signals resulting in noise on the Talkback feed. CB can supply breakout boxes allowing RJ45 cable to be used for the remote control.



All input and output connections to the I-Mon are made via 25 way 'D' connectors wired to the Tascam standard. All inputs and outputs are electronically balanced.

I/O Configuration

The I-Mon has 34 inputs and 27 outputs

The Main input and Main output are available in two standard configurations that can be specified when ordering or set later using internal links.

12 Channel for example Atmos 7.1.4, 9.1.2 or Auro 11.1

14 Channel for example Atmos 7.1.6, 9.1.4 or Auro 13.1

The I-Mon Talkback and cue inputs can be configured can be configured with either 1 Talk back and 1 Listen back channels or 2 Talk back and 2 Listen back channels.

The Tables below give a full specification of the channel layout

I-Mon Audio Input/Output

I-Mon 12a

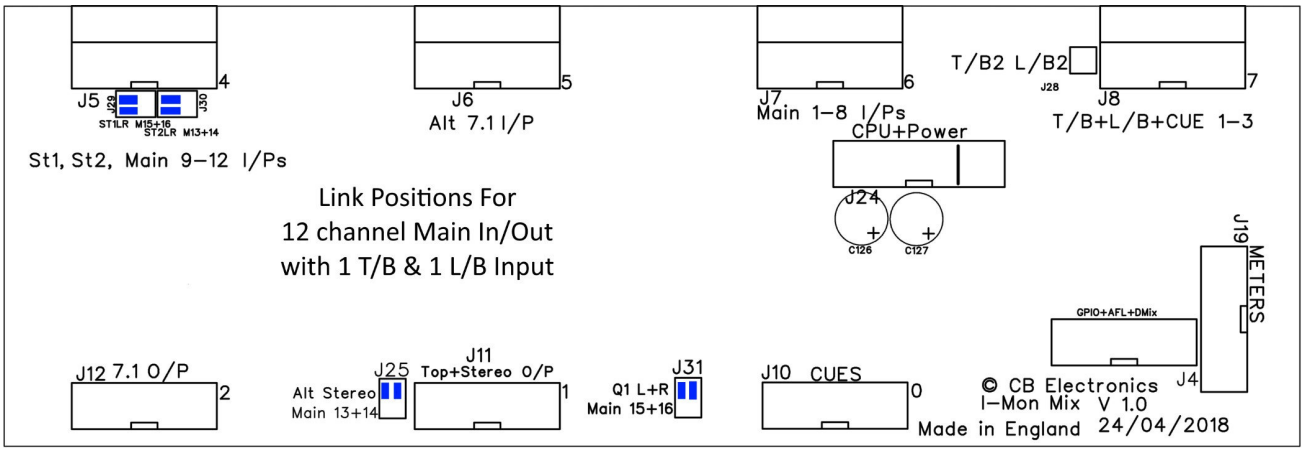
12 Channel Main Input with 1 T/B and 1 L/B input

Input Connections (25 'D')							
Channel No.	(+)	(-)	Gnd	Stereo I/P's 1-2 Main 9-12	Aux I/P, 7.1	Main I/P 1-8	T/B L/B Cue I/Ps
1	24	12	25	St-1 Left	Left	Left	T/B 1 (TMC-1)
2	10	23	11	St-1 Right	Right	Right	Listen 1
3	21	9	22	St-2 Left	Center	Center	Cue 3 Left
4	7	20	8	St-2 Right	LFE	LFE	Cue 3 right
5	18	6	19	Main Ch 9	L.side	L.side	St-3/Cue 1 Left
6	4	17	5	Main Ch 10	R.side	R.side	St-3/Cue 1 Right
7	15	3	16	Main Ch 11	L.back	L.back	St-4/Cue 2 Left
8	1	14	2	Main Ch12	R.back	R.back	St-4/Cue 2 Right
Gnd			13				

12 Channel Main Output

Output Connections (25 'D')							
Channel	(+)	(-)	Gnd	Cue O/Ps	Alt/Main/Mini O/P	Main O/P	GPIO AFL DMix
1	24	12	25	Cue 1 Left	Mini Left	Left	AFL Left I/P
2	10	23	11	Cue 1 Right	Mini Right	Right	AFL Right I/P
3	21	9	22	Cue 2 Left	Alt Left	Center	DMix Left O/P
4	7	20	8	Cue 2 Right	Alt Right	LFE	DMix Right O/P
5	18	6	19	SLS Left	Main Ch 9	L.side	T/B O/P(Slate)
6	4	17	5	SLS Right	Main Ch 10	R.side	See GPIO
7	15	3	16	H/P Left	Main Ch 11	L.back	See GPIO
8	1	14	2	H/P Right	Main Ch12	R.back	See GPIO
Gnd			13				

Fit 8 links as shown in drawing below



I-Mon 12b

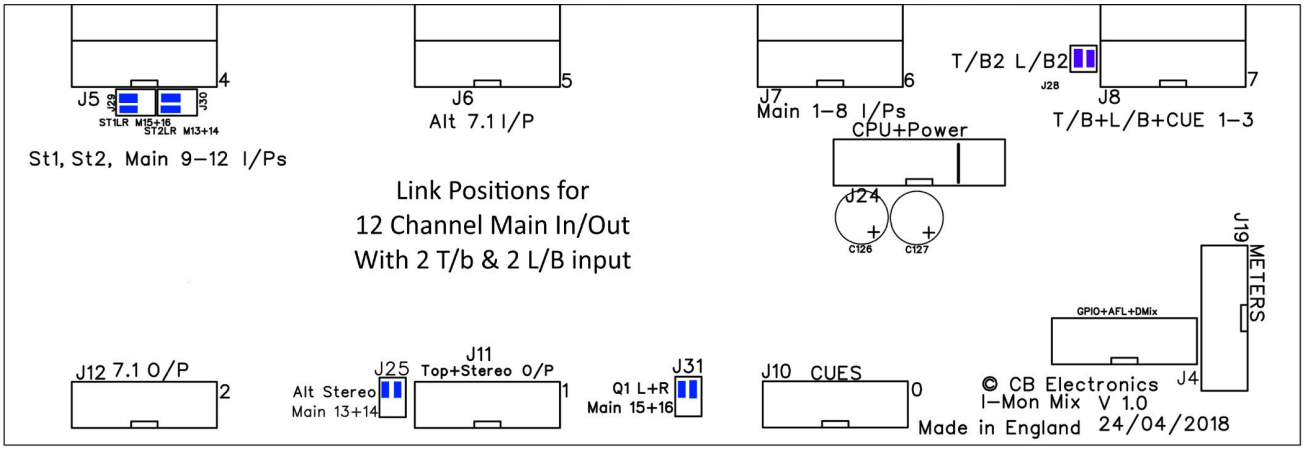
12 Channel Main Input with 2 T/B and 2 L/B inputs

Input Connections (25 'D')							
Channel No.	(+)	(-)	Gnd	Stereo I/P's 1-2 Main 9-12	Aux I/P, 7.1	Main I/P 1-8	T/B L/B Cue I/P's
1	24	12	25	St-1 Left	Left	Left	T/B 1 (TMC-1)
2	10	23	11	St-1 Right	Right	Right	Listen 1
3	21	9	22	St-2 Left	Center	Center	T/B2
4	7	20	8	St-2 Right	LFE	LFE	Listen 2
5	18	6	19	Main Ch 9	L.side	L.side	St-3/Cue 1 Left
6	4	17	5	Main Ch 10	R.side	R.side	St-3/Cue 1 Right
7	15	3	16	Main Ch 11	L.back	L.back	St-4/Cue 2 Left
8	1	14	2	Main Ch12	R.back	R.back	St-4/Cue 2 Right
Gnd			13				

12 Channel Main Output

Output Connections (25 'D')							
Channel	(+)	(-)	Gnd	Cue O/Ps	Alt/Main/Mini O/P	Main O/P	GPIO AFL DMix
1	24	12	25	Cue 1 Left	Mini Left	Left	AFL Left I/P
2	10	23	11	Cue 1 Right	Mini Right	Right	AFL Right I/P
3	21	9	22	Cue 2 Left	Alt Left	Center	DMix Left O/P
4	7	20	8	Cue 2 Right	Alt Right	LFE	DMix Right O/P
5	18	6	19	SLS Left	Main Ch 9	L.side	T/B O/P(Slate)
6	4	17	5	SLS Right	Main Ch 10	R.side	See GPIO
7	15	3	16	H/P Left	Main Ch 11	L.back	See GPIO
8	1	14	2	H/P Right	Main Ch12	R.back	See GPIO
Gnd			13				

Fit 10 links as shown in drawing below



I-Mon 14

14 Channel Main Input with 1 T/B and 1 L/B input

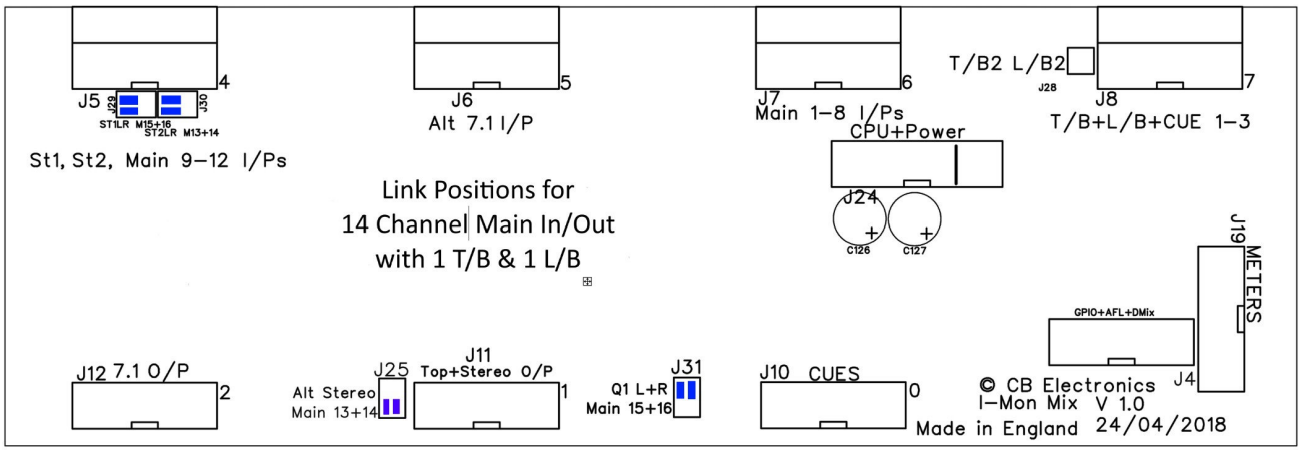
Input Connections (25 'D')							
Channel No.	(+)	(-)	Gnd	Stereo I/P Main 9-14	Aux I/P, 7.1	Main I/P 1-8	T/B L/B Cue I/P's
1	24	12	25	St-1 Left	Left	Left	T/B 1 (TMC-1)
2	10	23	11	St-1 Right	Right	Right	Listen 1
3	21	9	22	Main Ch 13	Center	Center	St-4/Cue3 Left
4	7	20	8	Main Ch 14	LFE	LFE	St-4/Cue3 Right
5	18	6	19	Main Ch 9	L.side	L.side	St-2/Cue 1 Left
6	4	17	5	Main Ch 10	R.side	R.side	St-2/Cue 1 Right
7	15	3	16	Main Ch 11	L.back	L.back	St-3/Cue 2 Left
8	1	14	2	Main Ch12	R.back	R.back	St-3/Cue 2 Right
Gnd			13				

14 Channel Main Output

Output Connections (25 'D')							
Channel	(+)	(-)	Gnd	Cue O/Ps	Main/Mini O/P	Main O/P	GPIO AFL DMix
1	24	12	25	Cue 1 Left	Mini Left	Left	AFL Left I/P
2	10	23	11	Cue 1 Right	Mini Right	Right	AFL Right I/P
3	21	9	22	Cue 2 Left	Main Ch 13	Center	DMix Left O/P
4	7	20	8	Cue 2 Right	Main Ch 14	LFE	DMix Right O/P
5	18	6	19	SLS Left	Main Ch 9	L.side	T/B O/P(Slate)
6	4	17	5	SLS Right	Main Ch 10	R.side	See GPIO
7	15	3	16	H/P Left	Main Ch 11	L.back	See GPIO
8	1	14	2	H/P Right	Main Ch12	R.back	See GPIO
Gnd			13				

DMix Left = L+C(-3dB)+Ls(-3dB)+Lb(-5dB), DMix Right = R+C(-3dB)+Rs(-3dB)+Rb(-5dB),
SLS = Studio Loudspeakers, H/P = Headphones

Fit 8 links as shown in drawing below



GPIO Connections

GPIO Connections (25 'D')				
Pin	**Type**	**Function**		
5	GPO 6			
17	GPI/GPO 5			
4	GPI/GPO 4			
16	GPI/GPO 3			
3	GPI/GPO 2			
15	GPI/GPO 1			
2	GPI/GPO 0			
14	GPI 6			
1	GPI 7			
13	Ground			

To Be updated

TMC-1 HD15 (VGA) Connector

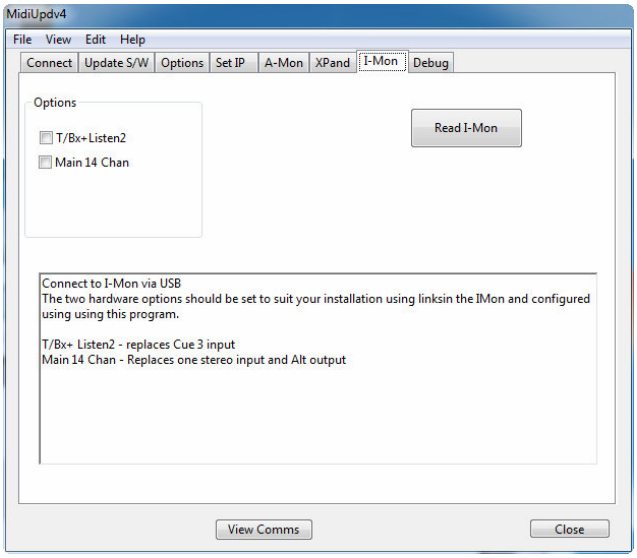
Pin No.	In/Out (TMC-1)	Function	Note
1	Output	TMC-1 T/B Mic +	
6	Unbalanced Ground	TMC-1 T/B Mic Gnd	Default Jumper J13 between pins 1 and 2
	Balanced Output	TMC-1 T/B Mic -	Option Jumper J13 between pins 2 and 3 – Use Pin 7 for Screen
11	Input	Midi Rx-	
2	Input	H/P Right I/P	
7	Ground	H/P Right Gnd	
12	Input	Midi Rx+	
3	Input	H/P left I/P	
8	Ground	H/P left Gnd	
13	Input	RS422 Rx+	Midi over RS422 or MIDI Optical See RS422/MIDI select in TMC-1 menu. XMon uses RS422 by default, Midi is used for software updates I-Mon uses RS422 only XPand uses RS422 only
4	Output	Midi Tx-	
9			
14	Output	RS422 Tx+	
5	Input	RS422 Rx-	
10	Output	RS422 Tx-	
15	Output	Midi Tx+	

System Setup

Monitoring Options

Normally the Configuration of the I-Mon is specified when ordered. However this can be changed in the field.

The different versions of the I-Mon are configured via Links on the Main Mix board. The Software must be informed of the settings using MidiUpdv4 or later.



T/Bx + Listen2: Cue input 3 may be used to provide Listen 2 and External Talkback Inputs.

Main 14 Chan: Main Input and output Width

Operation

The I-Mon powers up with hardware mutes activated, depressing the Mute key on the TMC-1 or the Mute key on the I-Mon will disable the Hardware mutes, to enable the Hardware mutes use Ctrl-Mute on the TMC-1 or the Mute key on the I-Mon.

The three LED's on the front of the I-Mon indicate the following

- Power: On when connected to power
- Mute: On when Hardware Mute is activated and ALL inputs and outputs are muted.
- Comms: Indicates communications received from TMC-1. When key is depressed or the knob is turned the LED will flash as the commands are received, otherwise the LED will flash about once a second.
- Mute Switch: Enable/Disable Hardware Mute, the Mute and Un-mute command from the TMC-1 remote will also disable the Hardware Mute.

Read the TMC-1 manual for information on controlling the I-Mon.

Stereo Down mix

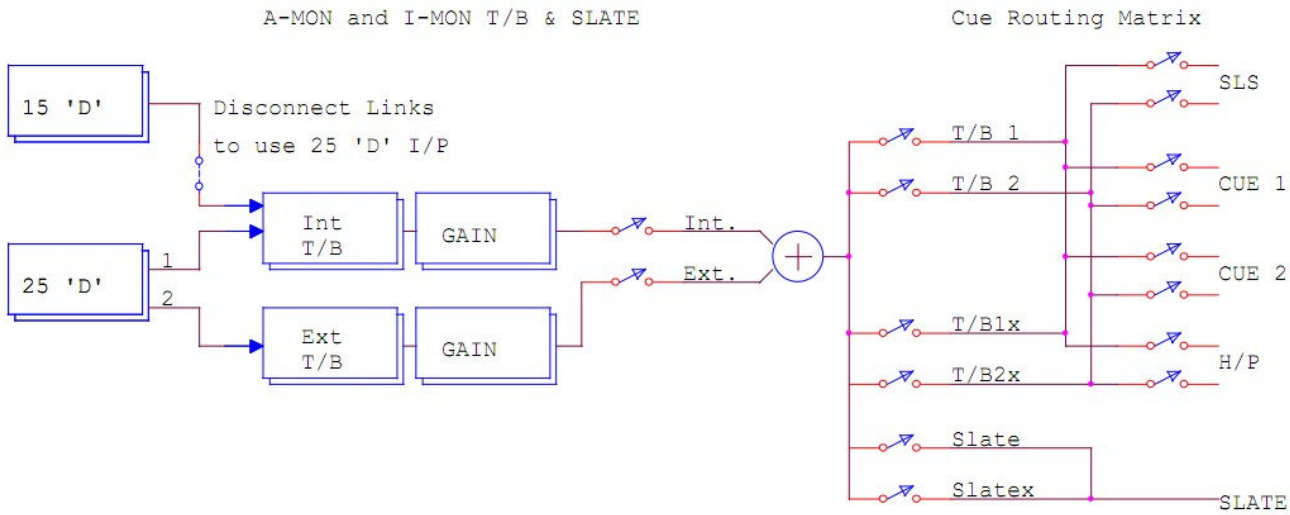
The I-Mon Stereo Down Mix feature is used to monitor 7.1 and 5.1 on a Stereo system or to check how a 7.1 or 5.1 mix will sound in stereo. The I-Mon design allows for variable ratios but they are currently fixed as follows:

Left Out		Left	Centre	Left Surround	Left Rear
	Ratio	0.69	0.47	0.47	0.39
	dB	-3.2	-6.56	-6.56	-8.14
Right Out		Right	Centre	Right Surround	Right Rear
	Ratio	0.69	0.47	0.47	0.39
	dB	-3.2	-6.56	-6.56	-8.14

Talkback

The I-Mon has one or two talkback inputs; by default the internal talkback input is connected to the TMC-1 talkback microphone via the HD15 remote connector. The two inputs have individual gain settings that can be adjusted from TMC-1.

The Talkback is enabled by the TMC-1 user keys [T/B 1], [T/B 2] or [T/B All](internal) and [T/B 1x], [T/B 2x], [T/B All] (external) which enable talkback microphones. GP Inputs may also be assigned via the menu to enable the internal and external talkback. The two Talkback GP Outputs may be used to drive relays that switch the talkback output destination. T/B 1 and T/B 2 are routed to the 4 cue sends using the TMC-1 cue send enable matrix.



I-Mon Talkback Block System

TMC-1 Talkback Microphone

Both talkback inputs are also connected to the rear panel 25 pin 'D' connector, if you want to replace the TMC-1 microphone with a different microphone connected via the rear panel 25 'D' connector you must disconnect the connection to the HD15 connector by unplugging the 10 way ribbon cable to the talkback input card. Alternatively if you are not using the External microphone input as the producers talkback input you could use the External talkback input.

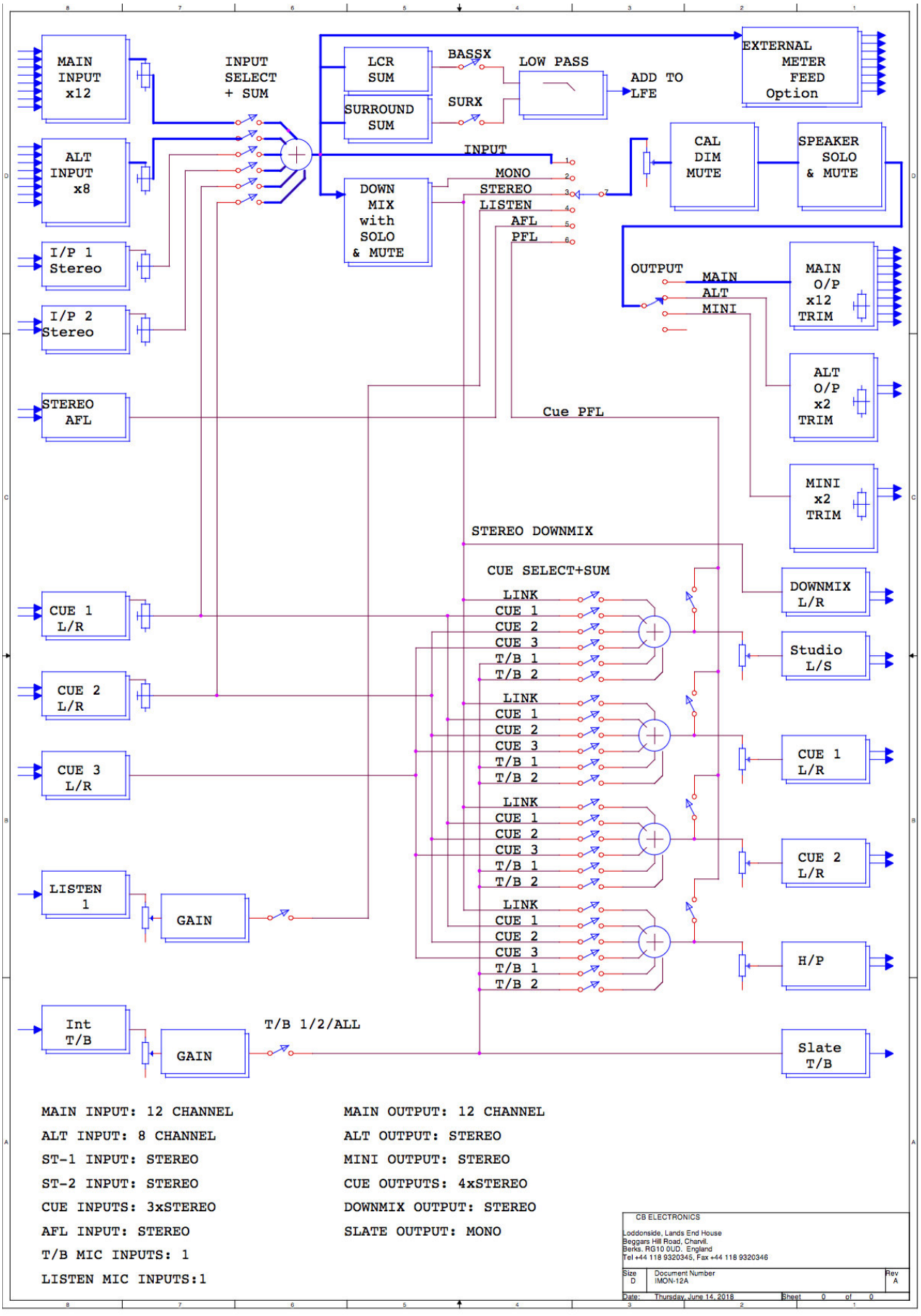
I-Mon Block Diagrams

See next 3 pages

I-Mon 12a:

I-Mon 12b:

I-Mon 14:



MAIN INPUT: 12 CHANNEL
ALT INPUT: 8 CHANNEL
ST-1 INPUT: STEREO
ST-2 INPUT: STEREO
CUE INPUTS: 3xSTEREO
AFL INPUT: STEREO
T/B MIC INPUTS: 1
LISTEN MIC INPUTS:1

MAIN OUTPUT: 12 CHANNEL
ALT OUTPUT: STEREO
MINI OUTPUT: STEREO
CUE OUTPUTS: 4xSTEREO
DOWNMIX OUTPUT: STEREO
SLATE OUTPUT: MONO

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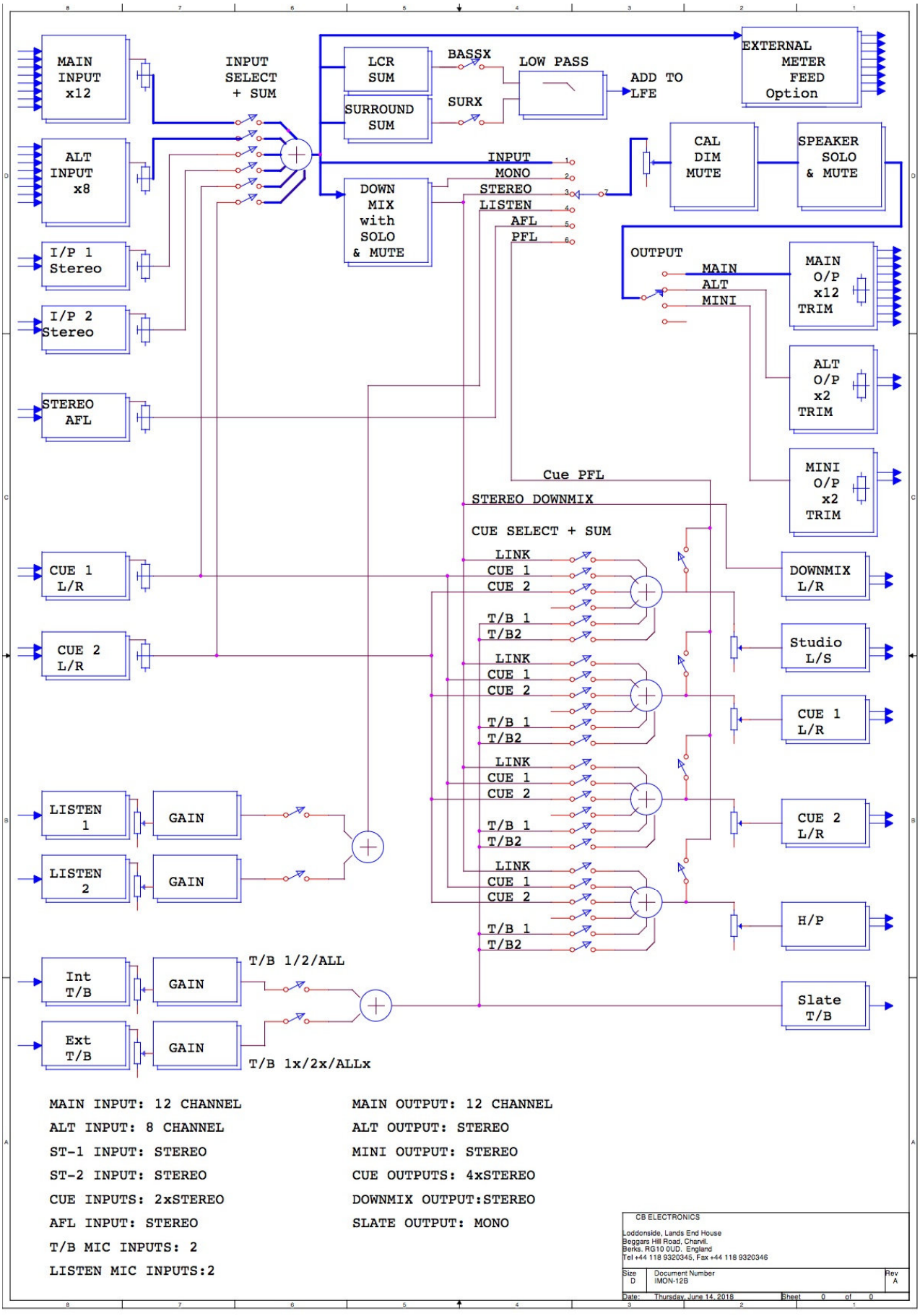
MAIN INPUT x12
ALT INPUT x8
I/P 1 Stereo
I/P 2 Stereo
STEREO AFL
CUE 1 L/R
CUE 2 L/R
LISTEN 1
LISTEN 2
Int T/B
Ext T/B
GAIN
INPUT SELECT + SUM
LCR SUM
SURROUND SUM
BASSX
SURX
LOW PASS
ADD TO LFE
EXTERNAL METER FEED Option
DOWN MIX with SOLO & MUTE
INPUT
MONO
STEREO
LISTEN
AFL
PFL
CAL DIM MUTE
SPEAKER SOLO & MUTE
OUTPUT
MAIN
ALT
MINI
MAIN O/P x12 TRIM
ALT O/P x2 TRIM
MINI O/P x2 TRIM
Cue PFL
STEREO DOWNMIX
CUE SELECT + SUM
LINK
CUE 1
CUE 2
T/B 1
T/B2
DOWNMIX L/R
Studio L/S
CUE 1 L/R
CUE 2 L/R
H/P
Slate T/B
T/B 1/2/ALL
T/B 1x/2x/ALLx
MAIN INPUT: 12 CHANNEL
ALT INPUT: 8 CHANNEL
ST-1 INPUT: STEREO
ST-2 INPUT: STEREO
CUE INPUTS: 2xSTEREO
AFL INPUT: STEREO
T/B MIC INPUTS: 2
LISTEN MIC INPUTS:2
MAIN OUTPUT: 12 CHANNEL
ALT OUTPUT: STEREO
MINI OUTPUT: STEREO
CUE OUTPUTS: 4xSTEREO
DOWNMIX OUTPUT:STEREO
SLATE OUTPUT: MONO
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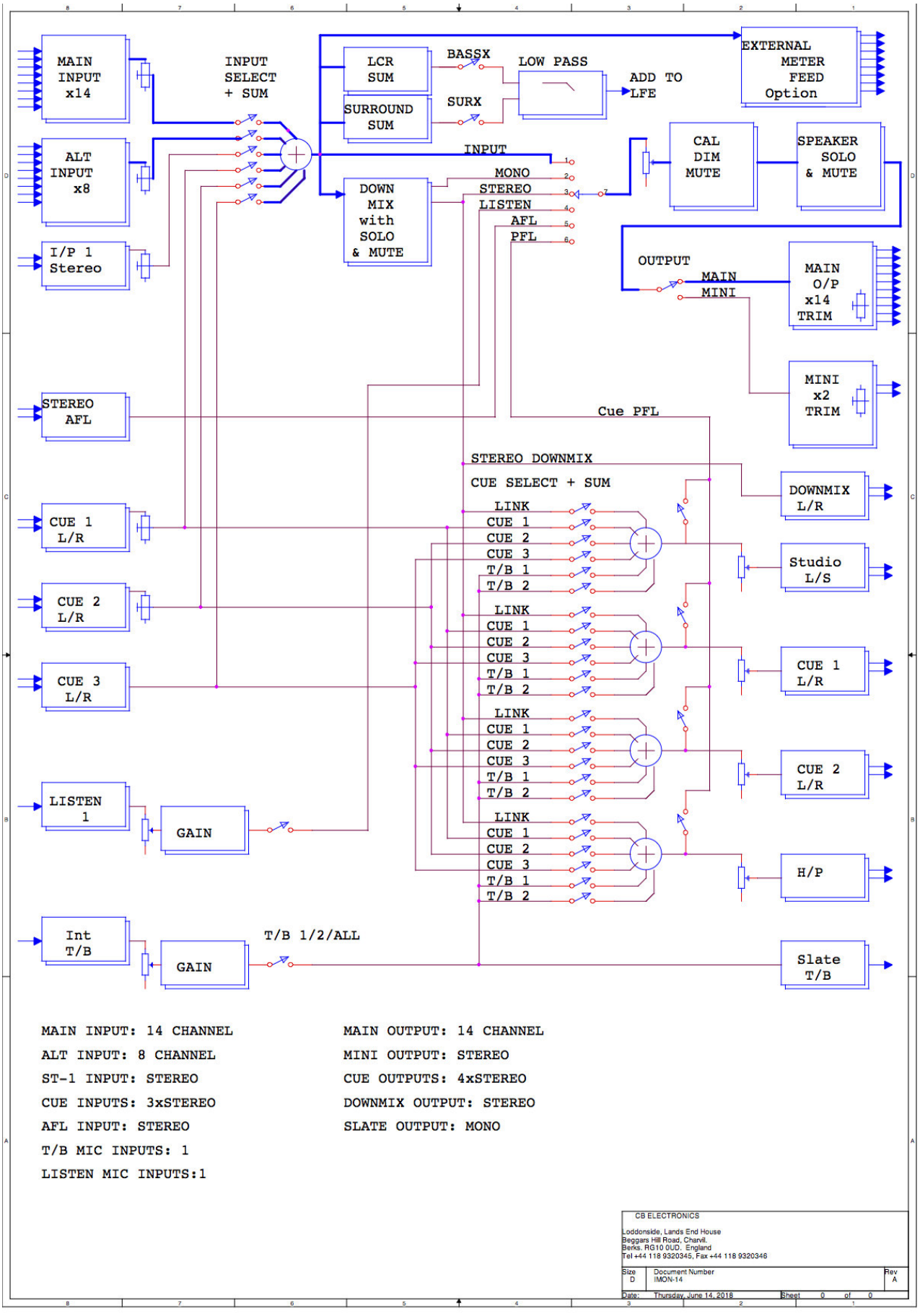

MAIN INPUT: 14 CHANNEL
ALT INPUT: 8 CHANNEL
ST-1 INPUT: STEREO
CUE INPUTS: 3xSTEREO
AFL INPUT: STEREO
T/B MIC INPUTS: 1
LISTEN MIC INPUTS:1

MAIN OUTPUT: 14 CHANNEL
MINI OUTPUT: STEREO
CUE OUTPUTS: 4xSTEREO
DOWNMIX OUTPUT: STEREO
SLATE OUTPUT: MONO

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D	IMON-14	A

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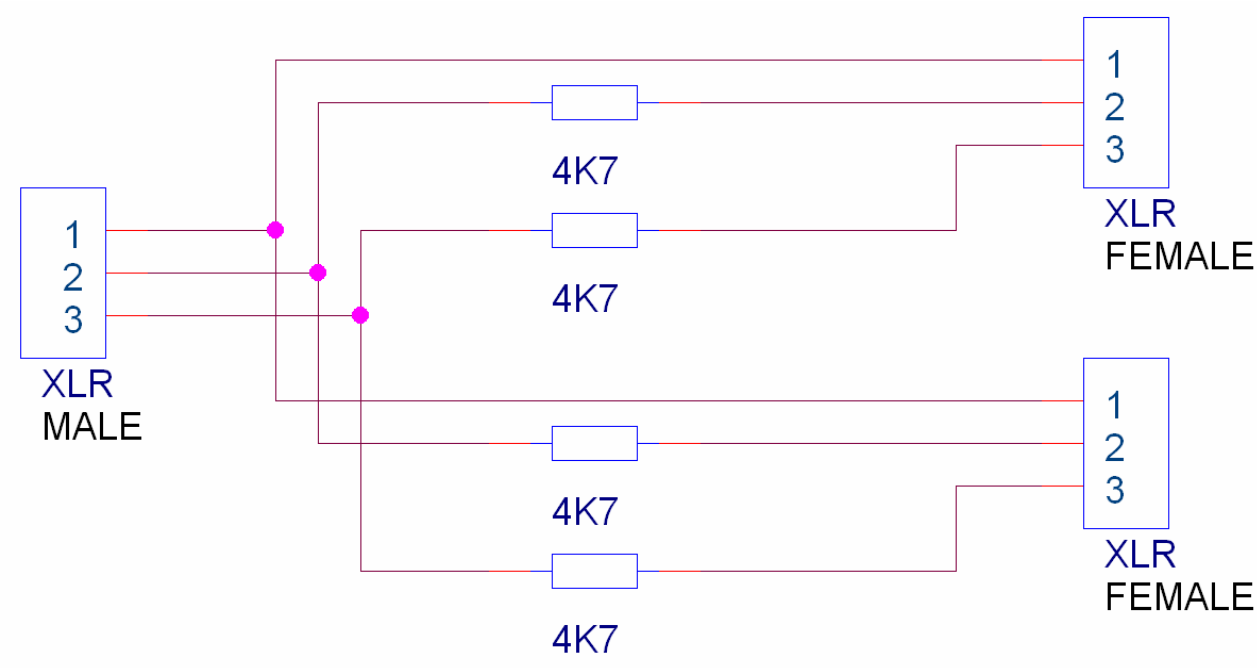
Case Studies

These modifications were made in actual installations

Mono Mini Output

There was only space for one speaker, although the Mono key can be used this does not work when using AFL or PFL.



USB Port

The USB port is used for the following functions

Configuration

Use the MidiUpd4-mac/win configuration software to set the system options.

Firmware Updates

The USB Port is also used to update the I-Mon firmware. Updates are posted on the I-Mon product page. See the I-Mon Reference and MidiUPD program for more information:

http://www.colinbroad.com/cbsoft/amon/amon.html

The Mute LED is used to indicate the Programming mode as follows

- Mute LED Flashing approximately once per second – Ready to program
- Mute LED Flashing approximately twice per second – Programming
- Mute LED Flashing approximately once per two seconds – Finished programming

Recovery Mode

If for any reason there is a problem when reprogramming (eg. Power Failure whist programming) a recovery mode is provided.

To enter recovery mode, disconnect the power for at least 5 seconds, then reconnect with the Mute key depressed. You will need to reselect the USB port used by MidiUpd.

The Mute LED will flash at approximately 1 second intervals to indicate that the device is ready to program.

Glossary

Listen 1, Listen 2

Listen back channels, microphones installed in the Studio, machine room or overdub booth which can be monitored on the control room speakers.

L/B1, L/B2, L/B 1+2

Listen back channels 1 and/or 2 are enabled

T/B 1, T/B 2, T/B 1+2

Talkback channels 1 and/or 2 are enabled,

Mono

Mono is enabled: The mono attenuator is enabled, user programmable attenuation from 0dB to 4dB in 0.5dB steps.

SLS-A, SLS-B

SLS = Studio Loudspeaker

There are two user keys associated with the Studio Loudspeakers SLS Mute and SLS A/B, SLS A/B allows you to switch quickly between two Studio Loudspeaker Selections

Fn-1, Fn-2, Fn-3

Keys 9, 10, 11 User assignable Function Keys

DMix

Stereo sum of L+R+C+Ls+Rs+Lb+Rb

H.Mute

Hardware Mute: the Hardware mute GPO is active to drive mute relays on the power amp inputs to protect your speakers and ears from digital noise and power on/off clicks

Default Input names

Main ip, Alt ip , St-1…St4

Default Speaker Set Names

Main, Alt, Mini

Specification

Design Rules

To avoid any low frequency phase errors and capacitor distortion almost all signal paths in the I-Mon are DC coupled. The only exceptions are the talk back and listen back microphone inputs.

Bass Extension Low pass filter uses Low distortion Polyphenylene Sulphide Film Capacitors

To avoid cross talk any unused inputs are muted at the input.

DC Coupled metering with precision rectifiers to provide approximately 60 dB of range.

The NJM2068 op amp was selected for its audio performance.

To minimise distortion audio switching via high voltage cmos (+/-14v) with a maximum signal level of +/-8v p to p.

Gain Control via CS3318 gain control chip with muting and zero crossing switching for click free input/output selection, mutes and gain control..

Inputs:

- 10 kOhm balanced or unbalanced
- Input trim: -10dB to +20dB 1dB steps
- Maximum Input Level: +24 dBu @ unity gain

Outputs:

- 100 Ohm balanced or 50 Ohm unbalanced
- Balanced:+4 dBu nominal, Unbalanced:6 dB below balanced line level
- Maximum Output Level:+24 dBu
- Output Trim : -4 to +4 dB in 0.5dB steps
- Frequency Response:10 Hz to 100 kHz (± 0.05 dB)
- THD+N:< 0.004% (unity gain)
- IMD:< 0.005% (unity gain)
- Noise below +4 dBu:< -90 dB (unity gain)
- Crosstalk: < -80 dB (unity gain +20dBu Input)
- Headroom: >20 dB (above +4 dBu)
- CMRR: > 55 dB (10 Hz to 20 kHz) <-60db(10Hz to 1kHz)

General

- Ambient Operating Environment:0° C to 55° C

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The information in this document is subject to change without notice.

The Information in the manual is updated as the I-Mon is improved, you can find the latest version of the software on the product web page.

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