
# MADDA 105 AND MADDA 111

## MADI (AES10) distribution amplifiers

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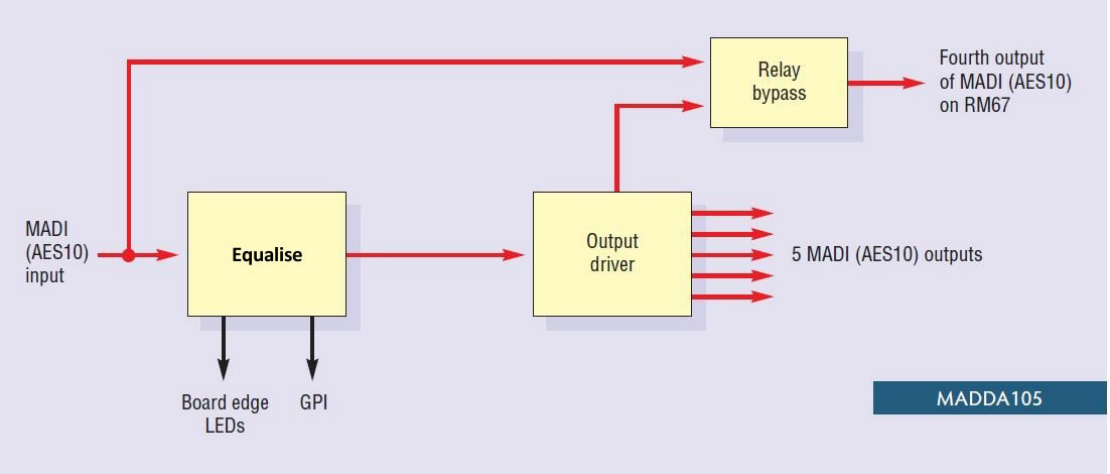
# Contents

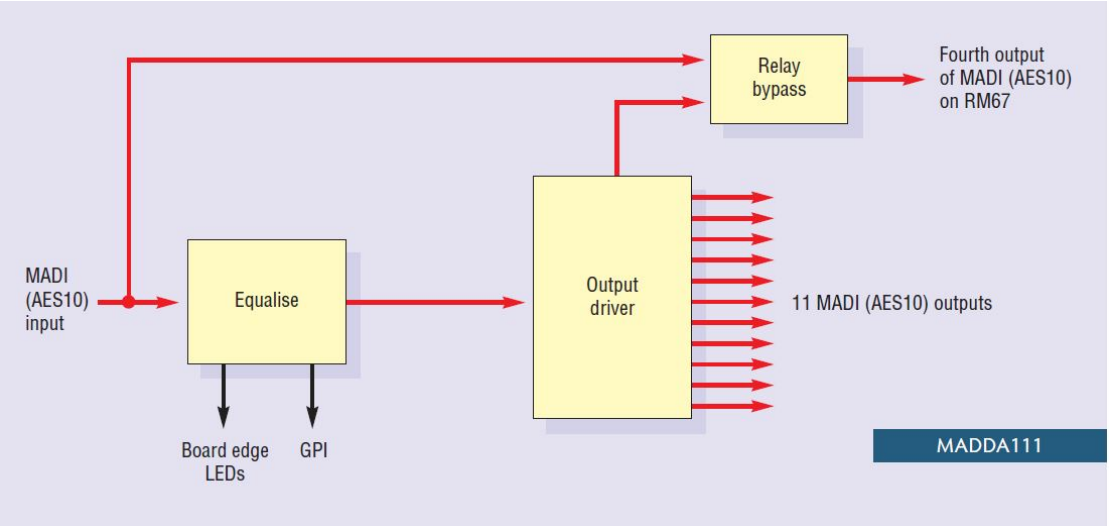
# 1 Introduction

Designed for transporting a large amount of audio as a block, MADI (AES10) is an audio signal format used for getting many channels of audio down a single coax cable, with these multiple AES streams packed together and sent with a higher data rate.

The MADDA105 and MADDA111 audio distribution amplifiers take in a MADI (AES10) data stream usually containing up to 64 mono audio channels and create multiple copies of this data stream which can then be sent to different places.

MADDA105 has five outputs and MADDA111 has 11 outputs to provide audio distribution to all audio areas.




MADDA105 and MADDA111 support the industry standard payload of 64 channels at a sampling rate of 48 kHz, with sampling rates up to 96 kHz also supported for those requiring fewer channels in return for the cleanest possible sound.

MADDA105 and MADDA111 include useful signal monitoring, providing both LED and GPI output indication of signal presence, as well as on-board power supplies fault.

The MADI distribution amplifiers fit in Crystal Vision's Indigo frames (available in 2U, 1U and desk top box sizes) alongside the other products and offer a choice of rear modules to suit your budget and application.

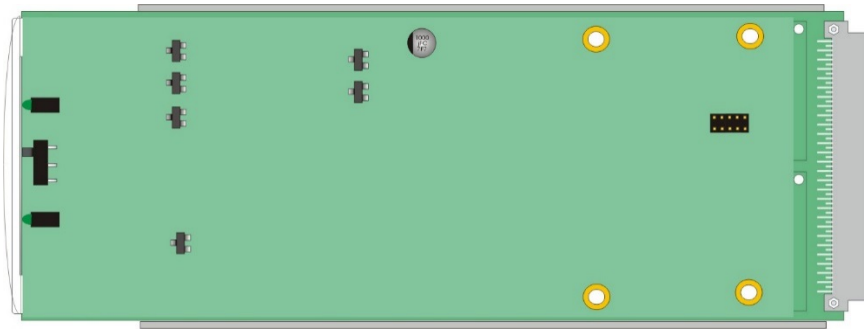
MADDA105 is a space-saving 100mm x 266mm module which sits in one frame slot allowing up to 12 MADI DAs in 2U. It uses the RM41 or RM67 frame rear modules to access the one MADI input and five MADI outputs.

MADDA111 is a 'double decker' 100mm x 266mm module which sits in two frame slots allowing up to six MADI DAs in 2U. It uses either the RM41 and RM34 frame rear modules together or the RM67 and RM34 rear modules together to access the one MADI input and eleven MADI outputs.

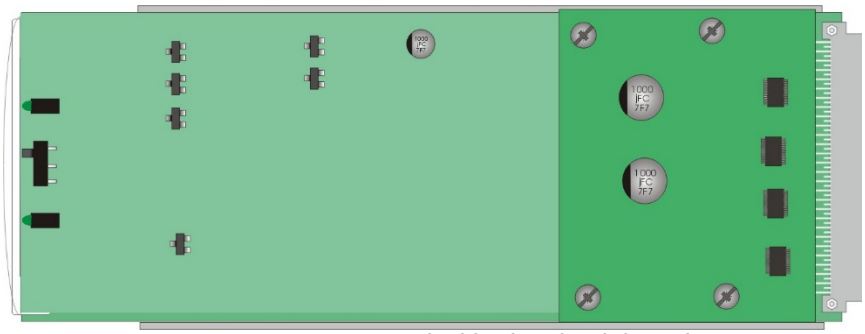
MADDA105 and MADDA111 meet the AES10-2008 specification and allow 56 channels at sample rates from 32 to 48 kHz with a tolerance of ±12.5%, a nominal 64 channels at sample rates from 32 to 48 kHz, and 28 channels at sample rates from 64 to 96 kHz with a tolerance of ±12.5%.

The universal connection system allows a mixture of Crystal Vision modules in the frame. The modules plug in the front and the rear connectors plug in the rear. Depending on frame design, a hinged or removable front panel reveals LED indications of input present and PSU status when opened.

# 2 Hardware installation



*MADDA105 card*



*MADDA111 card with piggyback board*

## 2.1 Card installation

The MADDA105 and MADDA111 distribution amplifiers fit into all Crystal Vision rack frames. All modules can be plugged in and removed while the frame is powered without damage.

Indigo frames have card retention brackets which must be unscrewed to allow access to the board carriers (see Indigo frame manual for more details). The brackets should be re-fitted, particularly so for mobile installations.

Make sure that the correct rear module for the card is fitted. Note that the MADDA111 has a piggyback board and two rear modules need to be fitted in the correct order – see section *Rear module connections.*

Ensure that the boards are correctly fitted into both card guides and press firmly home using the plastic card handle.

## 2.2 Rear module installation

Firstly, remove the EMC covers from the rear module slot position. Fit the rear module onto the frame rear connector and screw into position. Ensure the rear module is in the correct slot. When viewed from the rear, slots number from top to bottom and right to left. Slot one is the top right slot. See Indigo frame User Manual for more information.

## Link configuration

There are no user-settable links or controls on either the MADDA105 or the MADDA111.

# 3 Rear module connections

The 2U Indigo 2 frame will house up to 12 single height modules or six dual height modules and dual power supplies. The 1U Indigo 1 frame will house six single height modules or three dual height modules and a single or dual power supply. The Indigo DT desk top boxes have a built-in power supply and will house up to two single height modules or a single dual height module.

***Note:*** *For details of fitting rear connectors please refer to the appropriate frame manual.*

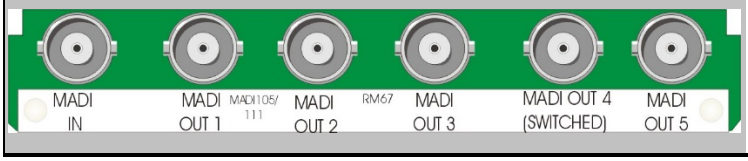
MADDA105 can support the following rear modules: RM41 and RM67. The RM41 has a single MADI input and five MADI outputs and the RM67 has the same number of inputs and outputs but includes relay bypass whereby the MADI input is automatically routed to one of the outputs in the event of power failure. Both rear modules are single height.

MADDA111 supports the RM41 and RM67 but in addition must use the RM34 rear module to accommodate the plug in card that provides the additional outputs. The combination of RM41 + RM34 or RM67 + RM34 make a combined double height rear module. **The RM34 rear module must always be fitted in the top position.**

## 3.1 MADDA105

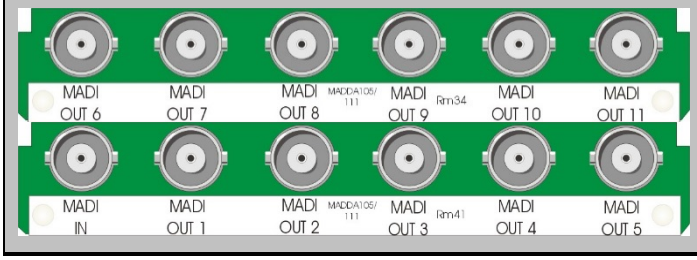
| RM41 fits in all frames | Description |
|---|---|
|  | **RM41**<br>• 12 modules in 2U<br>• Six in 1U<br>• Two in a DTB<br>• All slots can be used |

| BNC | RM41 I/O assignment |
|---|---|
| **MADI IN** | MADI (AES10) digital audio input |
| **MADI OUT 1** | MADI (AES10) digital audio output |
| **MADI OUT 2** | MADI (AES10) digital audio output |
| **MADI OUT 3** | MADI (AES10) digital audio output |
| **MADI OUT 4** | MADI (AES10) digital audio output |
| **MADI OUT 5** | MADI (AES10) digital audio output |

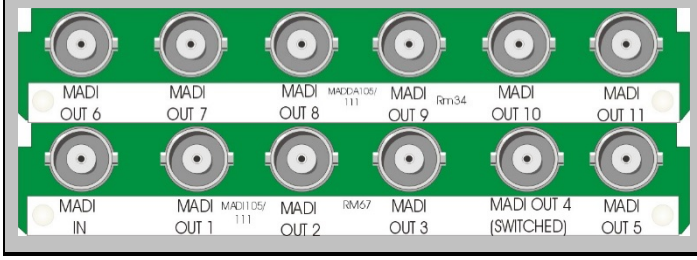
| RM67 fits in all frames | Description |
|---|---|
|  | **RM67**<br>• 12 modules in 2U<br>• Six in 1U<br>• Two in a DTB<br>• All slots can be used |

| BNC | RM67 I/O assignment |
|---|---|
| **MADI IN** | MADI (AES10) digital audio input |
| **MADI OUT 1** | MADI (AES10) digital audio output |
| **MADI OUT 2** | MADI (AES10) digital audio output |
| **MADI OUT 3** | MADI (AES10) digital audio output |
| **MADI OUT 4 (SWITCHED)** | Switched MADI (AES10) digital audio output |
| **MADI OUT 5** | MADI (AES10) digital audio output |

## 3.2 MADDA111

| RM41 + RM34 fits in all frames | Description |
|---|---|
|  | **RM41 + RM34**<br>• Six in 2U<br>• Three in 1U<br>• One in a DTB<br>• Two slots used for each card |

| BNC | RM41 + RM34 I/O assignment |
|---|---|
| **MADI IN** | MADI (AES10) digital audio input |
| **MADI OUT 1** | MADI (AES10) digital audio output 1 |
| **MADI OUT 2** | MADI (AES10) digital audio output 2 |
| **MADI OUT 3** | MADI (AES10) digital audio output 3 |
| **MADI OUT 4** | MADI (AES10) digital audio output 4 |
| **MADI OUT 5** | MADI (AES10) digital audio output 5 |
| **MADI OUT 6** | MADI (AES10) digital audio output 6 |
| **MADI OUT 7** | MADI (AES10) digital audio output 7 |
| **MADI OUT 8** | MADI (AES10) digital audio output 8 |
| **MADI OUT 9** | MADI (AES10) digital audio output 9 |
| **MADI OUT 10** | MADI (AES10) digital audio output 10 |
| **MADI OUT 11** | MADI (AES10) digital audio output 11 |

| RM67 + RM34 fits in all frames | Description |
|---|---|
|  | **RM67 + RM34**<br>• Six in 2U<br>• Three in 1U<br>• One in a DTB<br>• Two slots used for each card |

| BNC | RM67 + RM34 I/O assignment |
|---|---|
| **MADI IN** | MADI (AES10) digital audio input |
| **MADI OUT 1** | MADI (AES10) digital audio output 1 |
| **MADI OUT 2** | MADI (AES10) digital audio output 2 |
| **MADI OUT 3** | MADI (AES10) digital audio output 3 |
| **MADI OUT 4 (SWITCHED)** | Switched MADI (AES10) digital audio output 4 |
| **MADI OUT 5** | MADI (AES10) digital audio output 5 |
| **MADI OUT 6** | MADI (AES10) digital audio output 6 |
| **MADI OUT 7** | MADI (AES10) digital audio output 7 |
| **MADI OUT 8** | MADI (AES10) digital audio output 8 |
| **MADI OUT 9** | MADI (AES10) digital audio output 9 |
| **MADI OUT 10** | MADI (AES10) digital audio output 10 |
| **MADI OUT 11** | MADI (AES10) digital audio output 11 |

# 4 General Purpose Interface

The external GPI control lines 'a' to 'f' at the frame remote connectors are provided to allow remote control and/or remote status indication. Line 'a' is assigned as a GPI output to provide remote indication of input presence.

The GPI output is fitted with 6800 ohm pull-up to +5V and 270ohm series resistor so it can drive an LED directly. If the series resistor is shorted out, it can drive a bulb at +45V 500mA max.

## 4.1 GPI Connections

| | Not asserted (nominally 5Vdc) | Asserted (<0.5Vdc) |
|---|---|---|
| **'a'** | No input | Input present |
| **'b'** | PSU fault | PSU OK |
| **'c-f'** | Not assigned | Not assigned |

The following tables show the GPI pinout for each frame:

### 2U frame GPI Connections

GPI lines 'a' to 'f' of each card connect to one of four rear remote connectors as follows:

| Slot no | 'a' pin | 'b' pin | 'c' pin | 'd' pin | 'e' pin | 'f' pin |
|---|---|---|---|---|---|---|
| **1** | 8 (1) | 9 (1) | 18 (1) | 26 (1) | 19 (2) | 20 (2) |
| **2** | 7 (1) | 16 (1) | 17 (1) | 25 (1) | 10 (2) | 11 (2) |
| **3** | 8 (3) | 9 (3) | 18 (3) | 26 (3) | 19 (4) | 20 (4) |
| **4** | 7 (3) | 16 (3) | 17 (3) | 25 (3) | 10 (4) | 11 (4) |
| **5** | 5 (1) | 6 (1) | 15 (1) | 24 (1) | 1 (2) | 2 (2) |
| **6** | 4 (1) | 14 (1) | 13 (1) | 23 (1) | 3 (2) | 4 (2) |
| **7** | 5 (3) | 6 (3) | 15 (3) | 24 (3) | 1 (4) | 2 (4) |
| **8** | 4 (3) | 14 (3) | 13 (3) | 23 (3) | 3 (4) | 4 (4) |
| **9** | 3 (1) | 12 (1) | 22 (1) | 21 (1) | 12 (2) | 13 (2) |
| **10** | 10 (1) | 11 (1) | 19 (1) | 20 (1) | 21 (2) | 22 (2) |
| **11** | 3 (3) | 12 (3) | 22 (3) | 21 (3) | 12 (4) | 13 (4) |
| **12** | 10 (3) | 11 (3) | 19 (3) | 20 (3) | 21 (4) | 22 (4) |

*Table shows Pin number (Remote number)*

**Note:** Remote 1 and Remote 3 are 26 way high-density D-Type female sockets. Frame ground is pin 2 and +5V @500mA is pin 1 in each case.

Remote 2 and Remote 4 are 26 way high-density D-Type male plugs and frame ground is pin 6 in each case and +5V @500mA is pin 15 on Remote 2.

The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-4 to approximately 1A.

## 1U frame GPI connections

GPI lines ‘a’ to ‘f’ of each card connect to one of two rear remote connectors as follows:

| Slot no | ‘a’ pin | ‘b’ pin | ‘c’ pin | ‘d’ pin | ‘e’ pin | ‘f’ pin |
|---|---|---|---|---|---|---|
| **1** | 8 (1) | 9 (1) | 18 (1) | 26 (1) | 19 (2) | 20 (2) |
| **2** | 7 (1) | 16 (1) | 17 (1) | 25 (1) | 10 (2) | 11 (2) |
| **3** | 5 (1) | 6 (1) | 15 (1) | 24 (1) | 1 (2) | 2 (2) |
| **4** | 4 (1) | 14 (1) | 13 (1) | 23 (1) | 3 (2) | 4 (2) |
| **5** | 3 (1) | 12 (1) | 22 (1) | 21 (1) | 12 (2) | 13 (2) |
| **6** | 10 (1) | 11 (1) | 19 (1) | 20 (1) | 21 (2) | 22 (2) |

*Table shows Pin number (Remote number)*

**Note:**

Remote 1: 26 way high-density D-Type female socket. Frame ground is pin 2 and +5V @500mA is pin 1.

Remote 2: 26 way high-density D-Type male plugs and frame ground is pin 6 and +5V @500mA is pin 15

The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-2 to approximately 1A.

## Indigo DT desk top box GPI connections

GPI lines ‘a’ to ‘f’ of each card connect to the rear remote connector as follows:

| Slot no. | ‘a’ pin | ‘b’ pin | ‘c’ pin | ‘d’ pin | ‘e’ pin | ‘f’ pin |
|---|---|---|---|---|---|---|
| **1** | 8 (1) | 9 (1) | 18 (1) | 26 (1) | 19 (2) | 20 (2) |
| **2** | 7 (1) | 16 (1) | 17 (1) | 25 (1) | 10 (2) | 11 (2) |

*Table shows pin number (remote number)*

**Note:**

Remote 1: 26 way high-density D-Type female socket. Frame ground is pin 2 and +5V @500mA is pin 1.

Remote 2: 26 way high-density D-Type male plugs and frame ground is pin 6 and +5V @500mA is pin 15

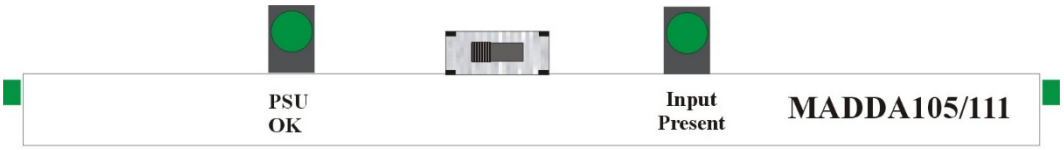
The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-2 to approximately 1A.

# 5 Card edge monitoring

## MADDA105 and MADDA111

The front card-edge of the MADDA105 and MADDA111 provides power rail monitoring and input signal presence.

***Note**: Slide switch has no function.*




*MADDA105/111 front edge view*

| LED | Location/colour | Meaning when lit |
|---|---|---|
| **Input Present** | Green | Valid input detected |
| **PSU OK** | Green | Power supply voltages present |

# 6 Troubleshooting

## Card edge monitoring

The card edge provides simple monitoring of the board status. This can be used as an initial aid to troubleshooting.

## Fault finding guide

**The Power OK LEDs are not illuminated**

Check that the frame PSU is functioning – refer to the appropriate frame manual for detailed information

Check that the card is seated correctly in the frame

**There is no MADI output**

Check that a valid MADI input is present (input present LED illuminated) and that any cabling is intact.

Ensure top piggyback card is correctly fitted for MADDA111.

Check that correct rear module is in place and in correct order for MADDA111.

**The MADI output is low quality**

Check that the maximum cable length has not been exceeded

# 7 Specification

## General

| | |
|---|---|
| Dimensions | 100mm x 266 mm module with DIN 41612 connector |
| Weight | |
| MADDA105 | 140g |
| MADDA111 | 200g |
| Power consumption | |
| MADDA105 | 2.8W |
| MADDA111 | 5.2W |

## Inputs

| | |
|---|---|
| Audio | MADI (AES10) >250 metres, Belden 8281 or equivalent<br>Sampling rates supported (as specified in AES10-2008): 32 kHz to 48 kHz +/- 12.5%, 56 channels; 32 kHz to 48 kHz nominal, 64 channels; 64 kHz to 96 kHz +/- 12.5%, 28 channels |

## Outputs

| | |
|---|---|
| MADDA105 | Five non-reclocked MADI (AES10) outputs using RM41 or RM67 frame rear modules. |
| MADDA111 | 11 non-reclocked MADI (AES10) outputs using RM41 + RM34 or RM67 + RM34 frame rear modules |

## Control and status

| | |
|---|---|
| Indicators | Board edge LEDs for PSU OK and signal present |
| GPI outputs | 2 off PSU OK and signal present. Open collector transistors 30V, 270 ohm current limit resistors. Pulled up to +5V through 6800 ohm |
| Controls | None |