m108 microphone preamplifier / ADC

Owner's Manual – Revision F / Jun 24, 2019

Firmware Version: 1.07

Grace Design, Lyons, CO / 1.303.823.8100

www.gracedesign.com / info@gracedesign.com

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<table>
<tr><td>1</td><td>Welcome</td></tr>
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1   Welcome

Thanks for purchasing the m108 mic preamplifier. It has been painstakingly designed and built to pro-vide you with a beautiful sounding, configurable and reliable mic preamp / ADC / interface. We worked very hard to ensure that anyone with modest audio production and engineering abilities can turn it on, plug in a microphone, connect it to a workstation and record. But of course, it also has a very deep and useful feature set of which all users should educate themselves. Not only will this enable you to operate the m108 more efficiently, but will free you up to focus on the music and the recording. So please famil-iarize yourself with the setup and operational details contained in this manual. And as always with this or any other Grace Design products, please don't hesitate to reach out if you have any questions. We are available by telephone Monday – Friday, 9AM to 5PM MST, or by email at info@gracedesign.com. Also, other information including technical documents and firmware can always be found on our website – www.gracedesign.com. Thanks for reading and enjoy your m108!

2   Important Safety Information

2.1   GENERAL

- Indoor use only

- Ordinary Protection: This equipment should not be exposed to dripping or splashing.

- Avoid placing objects filled with liquids, such as vases or glasses, on this equipment.

- Class I Equipment (grounded type)

- Electrical rating: 90-240V~ 50-60Hz 10W

- Mains supply voltage fluctuations are not to exceed ±10% of the nominal supply voltage.

- Pollution Degree 2

- Installation (Over voltage) Category II for transient overvoltages.

- Maximum Relative Humidity: <80%

- Operation temperature range: 10 °C to 40 °C

- Storage and transportation temperature range –40 °C to 70 °C

- Maximum altitude: 3000m (9843 ft)

- Equipment suitable for continuous operation

2.2   SAFETY MARKING SYMBOLS

This symbol, located on the equipment and in this manual, refers to important instructions. Read this manual thoroughly before operating this equipment.

This symbol, located on the equipment and in this manual, indicates the potential for electrical shock hazard.

2.3   SERVICE INFORMATION

The Grace Design m108 contains no user serviceable components. Contact Grace Design for repair and upgrade information. In the event that your Grace Design m108 needs to be returned to the factory, contact us for a return authorization number.

3   Overview and Features

3.1   Features

- 8 channels of transparent, musical mic preamplification

- Wide gain range: -6 to 69dB

- 8 channels of balanced analog preamp outputs

- Ribbon mic mode

- 8 channel digital outputs via AES, ADAT (SMUX), USB Class 2, and Dante™

- External Word clock in and out

- Reference DAC and headphone amplifier for low-latency monitoring of preamp channels, USB play-back from a computer, or Dante™ audio streams

- Channel 1 & 2 balanced HI-Z instrument inputs on front panel

- High contrast, wide viewing angle OLED display for all system parameters and setup menu

- Combination RS 485/422 serial / MIDI ports for control from existing m802 RCU or ProTools™

- m108 Controller App for Mac OS and Windows computers

- RJ45 Ethernet port with web server for network control using standard web browser

- Expansion slot for optional Audinate / Dante™ network audio card

- Cooling fan for reliable operation in the harshest environments

- Built in 100-240VAC universal AC power supply

- 5 year transferable warranty

- Made in the USA

3.2 Front Panel Connections and Controls
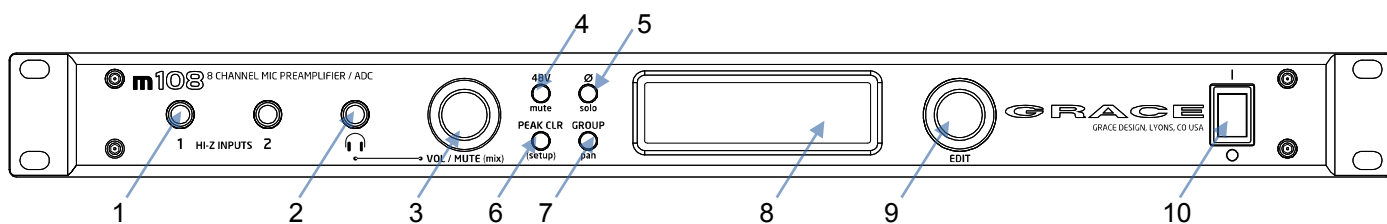
1. HI-Z balanced inputs, CH 1 and 2
2. 1/4" Headphone Jack
3. Encoder: headphone / Control Room output level control and MUTE, press and hold to enter mixer control, double click to toggle between headphone and control room output level control
4. 48V phantom power switch / mixer channel mute
5. Phase reverse switch / mixer channel solo / press and hold to enable ribbon mode
6. PEAK CLR / press and hold to enter setup menu
7. GROUP / mixer channel pan control
8. OLED display screen - all system parameters and setup menu
9. EDIT encoder, navigates and controls all system functions
10. Power switch

3.3 Rear Panel Connections
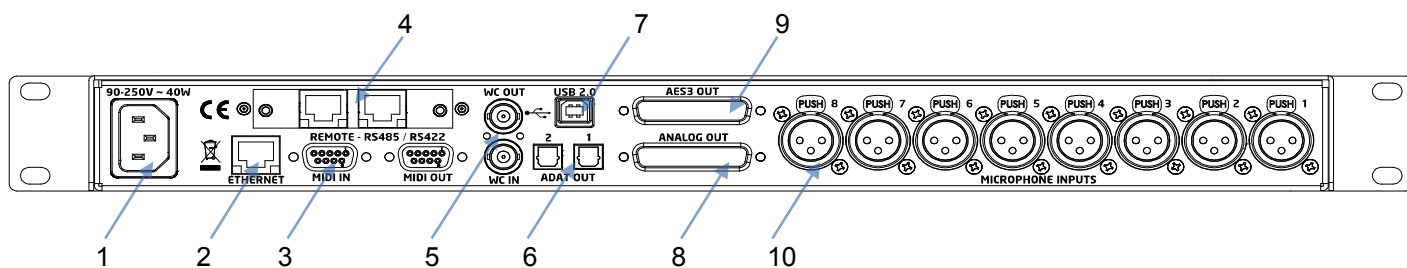
1. IEC 90 - 250VAC power input
2. Ethernet Control Port
3. Serial Control DB9: RS485 / RS 422 - MIDI IN / MIDI OUT
4. Option card slot (Dante or CR Output module)
5. Word Clock BNC IN / THROUGH / OUT
6. ADAT Lightpipe output
7. USB 2.0 audio interface
8. Analog Out DB25 (Tascam pinout)
9. AES3 Digital Out DB25 (Tascam pinout)

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10. Microphone Inputs XLR

4   Installation

4.1   Unboxing your m108

YOUR m108 BOX WILL CONTAIN
- The m108 preamp
- 6′ AC power cable which connects to the m108's universal power supply
- A bag with rubber feet and rack screws
- A USB type A to type B cable
- The owner's manual and warranty registration card

OPEN AND INSPECT YOUR BOX

Please take care when removing the m108 from its OEM packaging. Our packaging is designed with 'Korrvu©' suspension inserts, which provide the best protection from the dubious underworld of freight handling – so save your packaging material. Inner boxes will contain all the items listed above. If you think you are missing anything, give your dealer or us a call and we'll get you taken care of right away.

REGISTER YOUR UNIT

We strongly urge you to fill out your warranty registration card. The m108 is covered by a 5 year transferable warranty. Registering your unit will help us contact you if there are important updates and simplifies warranty service. So please take a few minutes to complete and send in the enclosed card, or simply fill out the warranty registration form on our website. We always keep your information private. Thank you!

4.2   Connecting the m108

POWER CONNECTIONS

The m108 has a built-in universal power supply which accepts line voltages of 90 to 240VAC. We include a power cable specified for the country where it was ordered, so it should be supplied correctly. If not, please contact your dealer or distributor for help. For safety, it is recommended that the AC power cable be connected to a grounded outlet.

AUDIO CONNECTIONS

Microphone Inputs: Female XLR, pin 2 positive, pin 3 negative and pin 1 ground. 48V phantom power is supplied on pins 2 and 3. With a gain range from -6dB to 69dB these inputs can be used for any type of microphone or as line level inputs.

Analog Balanced Line Outputs: DB25 Tascam pinout (See CABLE DIAGRAMS chapter 16). These outputs are always active. ADC full scale (0dBFS) is referenced to a signal level of +24dBu

AES3 Digital Outputs: DB25 Tascam pinout (See CABLE DIAGRAMS chapter 16) These outputs are active when the ADC is on.

ADAT Lightpipe Outputs: Optical Jacks provide 8 channels of audio data on each (at 44.1kHz and 48kHz). At 88.2kHz and 96kHz the ADAT S-MUX is enabled and channels 1-4 are transmitted on ADAT output 1, while channels 5-8 are transmitted on ADAT output 2. 176.4kHz and 192kHz sample rates are not supported over the ADAT interface. These outputs are active when the ADC is on.

USB Class 2 Audio Interface: USB Type B 8 channel audio output to host computer and 2 channel input from host computer. Use a standard USB type A -to- type B cable (included with your m108). The type A connector is to be plugged in to the HOST computer and the type B connector to the m108 input. PCM 44.1kHz – 192kHz/24 bit is supported. Please refer to USB audio setup in Chapter 11. This jack is also used for m108 firmware upgrades.

Option Card Dante™ Module: This option provides the m108 with a Dante interface. Two gigabit ethernet ports are provided for redundant Dante networks. The Dante interface provides 8 channels of outputs and inputs at sample rates up to 192kHz to other Dante enabled devices. Detailed instructions for operation are in chapter 9.

Option Card Control Room Output Module: 1/4" TRS Jacks. Tip positive, Ring negative, and Sleeve ground. Provides a single pair of balanced stereo analog speaker outputs, which connect to your stereo monitor system (power amp or powered speakers). Connections are made with standard balanced TRS cables. The output volume of this output is controlled by the Headphone volume control on the front panel.

WORDCLOCK IN: BNC 75Ω or 47kΩ (setup menu selected). The m108 can accept a standard 5V/75Ω word clock signal from an external clock generating unit. This might be a stand-alone clock source or via, for example, the word clock output from your digital audio workstation. The m108 locks to the incoming word clock with an ultra low jitter PLL. The PLL has a fast lock mode which rapidly acquires lock and then switches to a high jitter rejections mode with a loop bandwidth of 0.5Hz. This provides exceptional jitter rejection for the ADC and DAC sample clocks. In the event of a dropout or loss of incoming word clock signal, the intelligent PLL will remain at the last known valid frequency. When the signal is restored the PLL will smoothly re-acquire lock.

WORDCLOCK OUT: BNC 75Ω. The word clock output allows the user to synchronize other digital audio equipment to the m108. When the menu setting "clock output" is set to external, this connector output is a buffered copy of the signal on the word clock IN jack. This mode is useful for "daisy chaining" multiple m108s together in a system. When "clock output" is set to internal this connector outputs a buffered copy of the internal m108 word clock. The output is buffered and is designed to drive a 75Ω line.

REMOTE – RS485 / RS422: DB9. This is a galvanically isolated serial port for controlling the m108. With updated firmware, the m802RCU can control the m108 allowing m108 preamplifiers to be added to an existing m802 system. For wiring diagrams, see chapter 16.

MIDI IN – MIDI OUT: DB9. The m108 can be controlled directly from AVID ProTools® HD, via these jacks and compatible AVID I/O hardware. For wiring instructions, cable diagrams, chapter 13.

ETHERNET: RJ45. This is a standard 100 Base-T Ethernet interface and is used to connect the m108 to a TCP/IP network for the purpose of remote controlling the m108 via the standalone control app or the built-in web browser control.

4.3   Thermal Management

The m108 contains a large amount of circuitry in to a very compact 1U chassis. Under normal operating conditions the m108 will dissipate 20-25W of power depending on user settings. To protect the m108 from excessively high internal temperatures, and to ensure long term reliability, it is equipped with a 40mm variable speed fan. Whether or not this fan turns on is dependent on several variables. These are: ambient temperature, whether there is air movement around the m108, and if the m108 is mounted in contact with other heat generating equipment.

The variable speed fan to comes on to cool the internal circuits if the main circuit board temperature rises above 50ºC (122ºF). The fan has four speed ranges which are triggered by the following pcb temperature points:

1. 50ºC (122ºF)

2. 52ºC (125ºF)

3. 54ºC (129ºF)

4. 56ºC (132ºF)

If the m108 is mounted without space above and below and it is adjacent to heat generating devices then the internal temperature can rise above 50ºC and the fan will come on.

If the m108 is being used in an area where fan noise is undesirable it is recommended that the m108 be mounted such that is has space below and above the chassis and where the ambient temperature does not exceed 30ºC (86ºF). If multiple m108s are to be mounted in a rack enclosure it is best if there be a space between each unit.
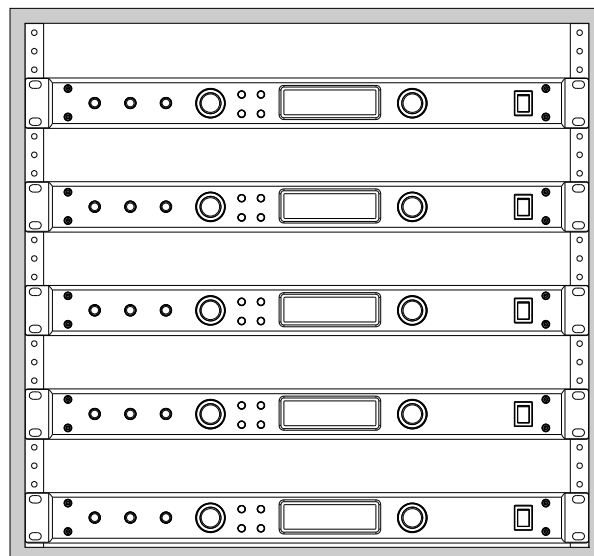
If rack space does not allow for this then the m108s can me mounted with a space in between every two units. In this configuration each preamplifier has one top or bottom surface exposed to ambient air.
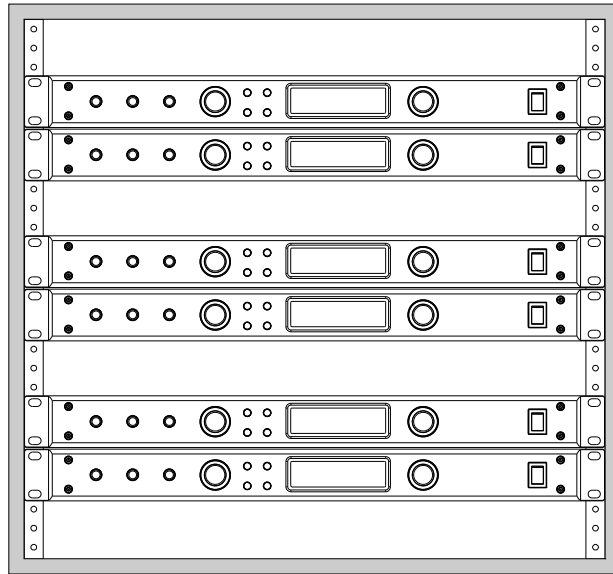
If it is necessary to mount multiple m108s in a rack without spaces in between them there should be forced air ventilation in the rack cabinet to ensure adequate cooling. This type of mounting is not recommenced unless the rack is located in a climate controlled environment, i.e. not outside in the hot sun.
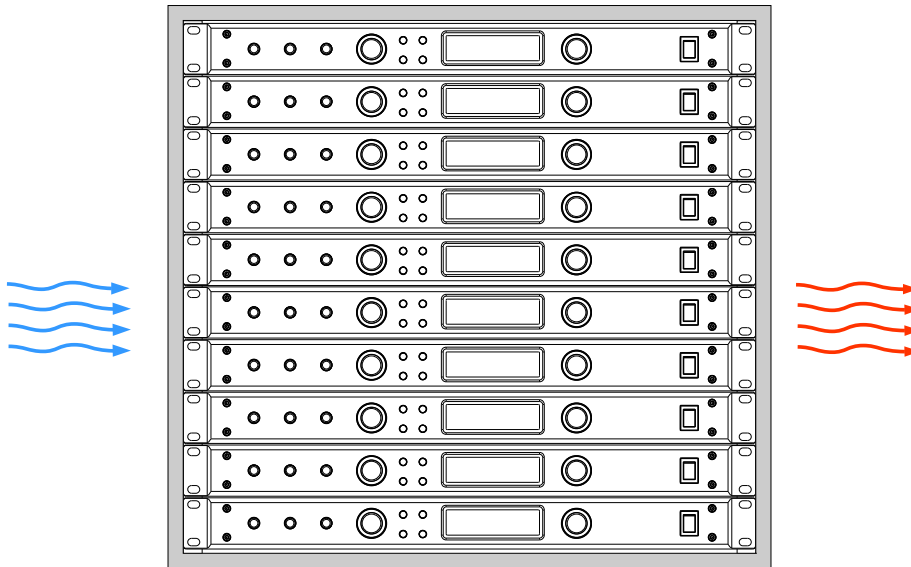
5   Basic Operation

5.1   The EDIT Encoder

This is a rotary push-button encoder which is used to navigate and control system parameters. In the main Preamplifier Control mode and Mixer Control mode it selects preamplifier channels and adjusts parameters. This encoder is also used for controlling the mixer functions and navigating the setup menu.

5.2   The VOL / MUTE (mix)

This push-button encoder is used to control the level of the headphone and control room outputs (if CR option card is installed). Turning the knob clockwise increases the level in 1dB steps. A single press will mute the outputs. Pressing it again will un-mute the outputs.

When the headphone or control room level change is enacted, a temporary pop-out window appears on the left side of the display (if the current display mode is set to display headphone status, this window will already be displayed). This window shows the headphone source and level. When level adjustment is complete, the fly-out window automatically disappears. Pressing and holding this knob will enter the m108 mixer. Double clicking this knob toggles between headphones and control room output (when enabled in the setup menu).

5.3   The Front Panel Hardware Switches
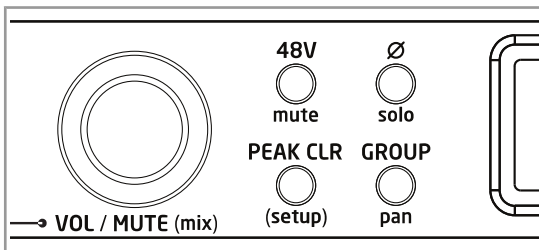
The labeling convention for these switches is as follows:

UPPERCASE - Preamplifier mode function

lowercase - Mixer mode function

(parenthesis) - Push-Hold function

The four hardware switches between the VOL / MUTE knob and the OLED display enact the following functions:

- 48V/mute: pressing this switch will turn on the phantom power supply for a selected mic preamp channel. In mixer mode this switch is used to mute the selected mixer channel.

- Ø (ribbon mode) / solo: pressing this switch will reverse the signal polarity of a selected mic preamp channel. Pressing and holding this switch will activate ribbon mic mode. In mixer mode this switch is used to solo the selected mixer channel.

- PEAK CLR / (setup): pressing this switch will clear all the peak status indicators across all 8 mic preamp channels, or pressing and holding this switch will enter the m108 into Setup Menu mode.

- GROUP / pan: pressing this switch will activate group mode. Pressing and holding this switch while turning the EDIT knob adds (or subtracts) sequential channels to a group. In mixer mode this switch is used to enter and exit pan control on the selected mixer channel.

5.4   The m108 OLED Display Screen

This screen has three main display modes:

- Preamplifier mode

- Mixer mode

- Setup mode

The default display mode at power up will be the Preamplifier Control Mode. This screen is user configurable via the 7 "display modes" in the setup menu, detailed in chapter 7. The factory default screen at power up (titled 'system' in the setup menu) will show the 8 mic preamp channels, and a system status window on the right which shows basic ADC and wordclock status.

The Mixer mode is activated by pushing and holding the VOL/MUTE (mix).

The Setup mode is activated by pushing and holding the PEAK CLR/(setup) button.

Mic Preamp Operating Screen
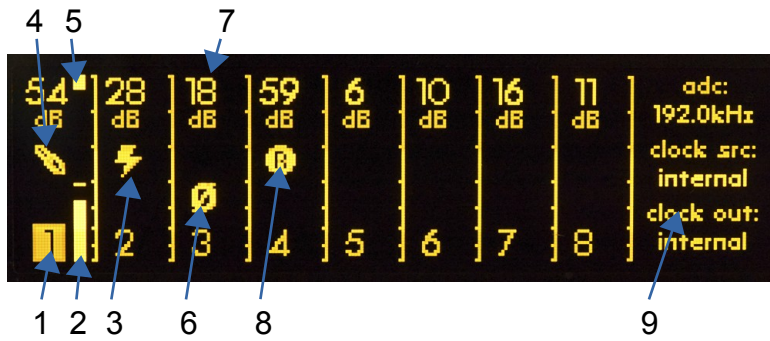
1. Channel number
2. Level meter
3. 48V icon
4. Hi-Z input icon
5. Over indicator
6. Phase reverse Icon
7. Gain level
8. Ribbon mode Icon
9. ADC status display

Mixer Operating Screen
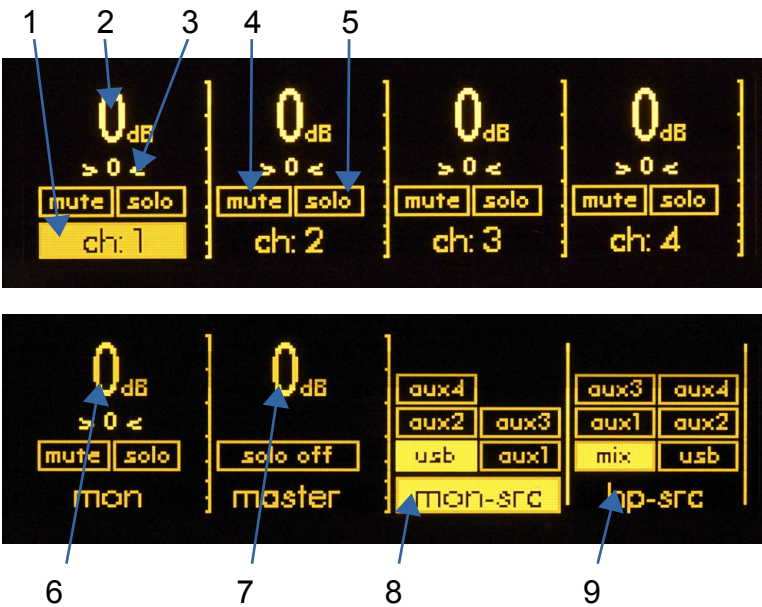
1. Channel number / name

2. Channel level display

3. Channel pan display

4. Mute

5. Solo

6. 2ch monitor input level

7. Master 2ch mix level

8. Monitor Source select

9. Headphone / Control Room Output Source select

Setup Menu Screen

```
15. remote              rs422
16. ethernet setup   press to config
 1. adc samplerate      off
 2. adc clocksource     internal
 3. clock output        internal
```

Setup menu items 1 – 16 (see chapter 7)

5.5   Setting Mic Preamplifier Gain

1. Use the rotary encoder to select a channel.

2. The current channel number becomes reversed (backlit in yellow) and the larger channel number will be displayed on the far right side of the screen.

3. A single press of the EDIT encoder now enters gain adjust mode, which is indicated by the backlit channel number becoming brighter.

4. Turn the EDIT encoder clockwise to increase the mic preamplifier gain, or counter-clockwise to decrease the mic preamplifier gain.

5. When the desired gain level is achieved, press the EDIT encoder again to exit gain adjust mode, which is indicated by the backlit channel dimming to its normal brightness.

6. The settings for a channel can be adjusted with the +48V, PHASE, or DATA controls. Pressing the +48V, PHASE or ribbon controls. Button toggles that function on or off for that channel. Press and hold the PHASE button to toggle RIBBON mode for the selected channel.

7. The bar graph meter at the right edge of each channel section is a dBFS level meter which indicates ADC output levels from –60 to 0dBFS.

Note: If you would like a larger view of the selected channel, press and hold the EDIT encoder. This will enter you into 'channel' view, which shows an exploded version of a single channel, with a large level meter, the full channel name and a large gain setting number. Press and hold the EDIT encoder again to return to the previous screen.

5.6   Activating 48V Phantom Power

To activate 48V phantom power on a preamp channel, use the EDIT knob to select the channel and press the 48V panel switch to the left of the screen. 48V power ON will be indicated by the lightning bolt power icon in the middle of the channel column. Pressing the 48V panel switch again with the channel selected will deactivate 48V phantom power.

5.7   Activating Phase Reverse

To reverse the signal polarity on a preamp channel, use the EDIT knob to select the channel and press the Ø panel switch to the left of the screen. Phase reverse will be indicated by the Ø icon in the middle of

the channel column. Pressing the Ø panel switch again with the channel selected will deactivate phase reversal.

5.8 Ribbon Mic Mode

To activate Ribbon Mic Mode on a preamp channel, use the EDIT knob to select the channel and press and hold the Ø panel switch to the left of the screen. Ribbon mic mode will be indicated by the 'R' icon in the middle of the channel column. Ribbon Mic Mode prevents 48V phantom power from being inadvertently applied to a mic input to which a ribbon microphone is connected.

5.9 Peak Clear

The m108 signal meters will display a small line to indicate the highest level (peak) a particular channel has achieved. There are 3 modes for displaying these peaks which can be selected in the setup menu (chapter 7) 'off, decay, and hold'. If either the decay or hold settings are chosen, then the peak indicator will remain lit until it is manually cleared with this switch or automatically after a period of time (decay).

As well as signal peaks, the signal level meter will display a bright square next to the gain level number to indicate an OVER at the ADC. If this is shown, a level adjustment should be made. OVER indicators will remain on until cleared with the peak clear switch.

5.10 Channel Group Mode

The Group mode allows between 2 to 8 adjacent mic preamp channels to be grouped together for gain change operations. To enter group mode, press the GROUP switch. Any defined channel groups will appear without vertical dividing lines.

To define a group, place the cursor on the left most channel of the channels to be grouped and turn the EDIT knob clockwise while pressing and holding the GROUP switch. You will notice that the vertical dividing lines between channels disappear as channels are added to a group.

Once in Group mode, gain changes are made in the same manner as in normal Channel select mode. To remove a group, place the cursor on the right most channel of the channels in the group and turn the EDIT knob counter clockwise while pressing and holding the GROUP switch. You will notice that the vertical dividing lines between channels reappear as channels are removed from a group.

Groups are limited to adjacent channels only and groups cannot span between preamplifier units. Also, only gain can be adjusted when in Group mode. To toggle the status of Phantom power or Phase on a channel, you must exit Group mode.
Using the HI-Z inputs

Channels 1 and 2 can be used as high impedance instrument inputs, for plugging an instrument or line level source directly into the front panel. These 1/4" inputs sense if a cable is plugged in and will automatically activate the HI-Z input. When active, the channel display on the OLED screen will show a 1/4" plug icon. This input has 10M Ohm input impedance.

6   Using the m108 Mixer

The m108 mixer is used to mix and monitor the 8 mic preamp channels as well as 2 incoming auxiliary

channels from the USB interface or an installed option module. Monitoring the mixer output is done with the headphone output or the optional stereo CR (control room) output module.

To enter the m108 mixer, press and hold the VOL / MUTE (mix) encoder knob. The mixer screen will appear. This screen has 3 pages which automatically change as the cursor travels across them from side to side. They are:
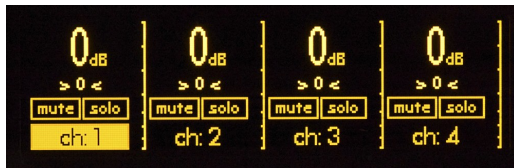
1. mixer channels 1-4
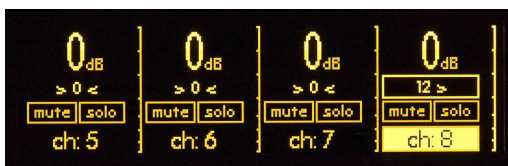
2. mixer channels 5-8

3. monitor channel, master, monitor source select, and headphone source select

6.1   To adjust the level of a mixer channel:

1. Use the EDIT knob to select a channel.

2. Press the EDIT knob to enter level adjust mode, which will be indicated by the numerical level display becoming outlined and the channel name / number becoming brighter.

3. Turning the EDIT knob to adjust the mixer channel level, from 0dB to OFF.

4. Press the EDIT knob again to exit level adjust mode.

6.2   To pan a mixer signal left or right in the stereo field:

1. Scroll to select the channel you wish to pan.

2. Press the pan switch to enter pan mode, which will be indicated by the pan display becoming outlined and channel name / number becoming brighter.

3. Turn the EDIT knob clockwise to pan the source to the right, or counter-clockwise to pan the source to the left. Note: the pan level increments expand progressively the further a signal is panned.

4. Press the pan switch or EDIT knob to exit pan mode.

6.3   To mute a mixer signal:

1. Scroll to select the channel you wish to mute.

2. Press the mute switch. The channel will be muted and mute status will be indicated by the mute icon being backlit yellow.

3. Press the mute switch again to un-mute the channel.

6.4   To Solo a mixer channel:

1. Scroll to select the channel you wish to solo.

2. Press the solo switch. The channel will be solo'd and solo status will be indicated by the solo indicator icon being backlit bright yellow.

3. Press the solo switch again to un-solo the channel.

6.5   The MON channel:

The MON (monitor) channel is a stereo channel that can be be sourced by any of the m108's available 2ch monitor inputs:

*   USB 2.0 interface

*   Aux pairs 1 – 4

The USB channels are whatever stereo audio source is being sent to your m108 from your computer's USB audio buss, either from the computer OS audio output or your from your DAW (see USB audio setup, chapter 11).

The aux pairs will only be available if there is an option card installed on the m108 which presents audio inputs. Currently this would only be from the Dante network audio option module (see Dante Module option, chapter 9).

6.6   Master Channel:

This channel sets the overall level of the mixer output, from 0dB to OFF. The output of the mixer will be sent to the headphones if the headphone source MIX is selected (see below). This channel has a 'solo off' switch which deactivates solo on all channels, allowing you to hear all mixer channels immediately without having to manually un-solo individual channels.

6.7   mon-src (Monitor Source):

This menu is used to select which 2ch source is present at the monitor channel. Options are: aux1-4 and USB. To select the input you wish to monitor:

1. Scroll the EDIT knob to the 'mon-src' menu, and press the knob to enter the source select mode.

2. Scroll the EDIT knob until your desired source is selected.

3. Press the EDIT knob to enter your selection.

4. To exit this select mode, you need to scroll the EDIT knob counter-clockwise until you reach 'mon-src', then press to exit.

6.8   hp-src (Headphone Source)

5. This menu is used to select which 2ch source feeds the headphone and control room outputs. Options are: aux pairs 1-4, USB and MIX. To select the source you wish to monitor with the headphones:

1. Scroll the EDIT knob to the 'hp-src' menu, and press the knob to enter the source select mode.

2. Scroll the EDIT knob until your desired source is selected.

3. Press the EDIT knob to enter you selection.

4. To exit this select mode, you need to scroll the EDIT knob counter-clockwise until you reach 'hp-src', press to exit.

7   Navigating and Using the Setup Menu

Because there are so many ways to use the m108, we have designed a very simple but powerful setup menu for controlling and adjusting all available setup parameters.

7.1   To enter and navigate the setup menu:

1. Press and hold the PEAK CLR (setup) hardware switch on the front panel. The display will change to show a vertical list of all available setup menu items.

2. Menu navigation mode - turning the EDIT encoder knob clockwise will scroll up the list numerically, counter-clockwise will scroll down the list numerically.

3. The selected list menu item will be in the vertical center of the screen, displayed between an underline and overline and its brightness intensified.

4. Once the desired menu item has been selected, pressing the EDIT knob enters edit mode, which is shown by the entire row of the menu item becoming back-lit by a background gradient bar.

From here, items in the setup will have 2 options for making adjustments

1. In edit mode, turn the EDIT knob to scroll through the list of available settings (all of which are described in detail below). When the setting you desire is displayed, press the EDIT knob to enter the section and exit edit mode. You will be returned to the setup menu navigation mode.

2. If the menu item you have selected reads 'press to config', then pressing the EDIT knob will open a new panel specific to that menu item with a separate array of editable items. These menu items will be explained in detail below.

3. The m108 responds to parameter changes in real time but the settings are not saved to non-volatile memory until you exit from the setup menu.

7.2   The 16 setup menu items (listed in order):

1 - adc samplerate

This setting adjusts the ADC sample rate. To set the sample rate you wish to use:

1. Press the EDIT encoder to enter edit mode
2. Turn the knob to select the desired sample rate
3. Press the EDIT knob again to enter your selection and exit edit mode

The available options are:

- off
- 44.1kHz
- 48kHz
- 88.2kHz
- 96kHz
- 176.4kHz
- 192kHz
- usb – select this to have the sample rate automatically set by the USB audio interface
- Dante - select this to enable the optional Dante interface. When Dante is enabled the sample rate is set in the device configuration tab for the m108 in Dante Controller.
- digilink - select this to enable the optional Digilink interface. When Digilink is enabled the sample rate is set by Pro Tools™

2 - adc clocksource

This setting sets which wordclock source the m108 ADC uses to operate. To set the clock source you wish to use:

1. Press the EDIT encoder to enter edit mode
2. Turn the knob to select the desired clock source
3. Press the EDIT knob again to enter your selection and exit edit mode

The available options are:

- internal: uses the m108's internal oscillator as the clock source
- word: uses incoming external wordclock source connected to the wordclock in BNC connector on the rear panel.
- word: 75Ω Same as above but with 75Ω termination
- Dante: uses incoming external wordclock source from the optional Dante Network Audio card

3 - Dante ext. syn

This setting selects the clock source for when the m108 is the Dante network clock master. If the "Allow Sync to External" check box is checked in Dante Controller, then the clock source for the m108 will switch to the clock source selected in the Dante ext. sync menu. To set your desired Dante ext. syn option:

1. Scroll to the setup menu item #4 'clock output'
2. Press the EDIT encoder to enter edit mode
3. Turn the knob to select your desired option
4. Press the EDIT knob again to enter your selection and exit edit mode

Note that there can only be one clock master on a Dante network. The available options are

- internal
- word
- word – 75 ohm

4 - clock output

This setting sets which wordclock source will be present at the WC OUT/THROUGH BNC connector on the m108 rear panel. To set your desired clock output setting:

1. Scroll to the setup menu item #4 'clock output'
2. Press the EDIT encoder to enter edit mode
3. Turn the knob to select your desired option
4. Press the EDIT knob again to enter your selection and exit edit mode

The available options are:

- internal
- external

5 - digital format

Sets the AES3 output format to indicate professional or consumer in the digital stream. To set your desired digital output format:

1. Scroll to the setup menu item #5 'digital format'
2. Press the EDIT encoder to enter edit mode
3. Then turn the knob to select your desired format
4. Press the EDIT knob again to enter your selection and exit edit mode

The available options are:

- professional
- consumer

6 - monitor setup

The monitor setup menu allows you to configure the headphone and control room monitor outputs. To make changes:

1. Scroll to the setup menu item #6 'monitor setup' and press the EDIT encoder to enter the monitor setup screen ('press to config')

2. A new menu will appear with several fields to navigate

3. Turn the EDIT knob to select the fields

4. The selected field will be displayed between an underline and overline and its brightness intensified

5. Press the EDIT knob to enter edit mode for the selected field, which will be indicated with a bright gradient background

6. Then turn the knob to select your desired option

7. Press the EDIT knob again to enter your selection and exit edit mode

8. Select 'done' to return to the setup menu or press the setup button to exit setup mode directly

The monitor setup fields are:

- monitor mode: There are three monitor configurations available in the m108. For systems without the control room output option module, 'phones only' should be selected.

    1. phones only: Standard operating mode that controls headphone output only. Use this mode exclusively if your m108 does not have the control room output option installed.

    2. phones or cntrl rm: In this mode, the headphone and control room outputs operate exclusively when phones are active, the control room output is muted and when the control room output is active the phones are dimmed. Each output has its own level control and mute settings. To toggle between phones and cntrl room, double click the VOL /MUTE encoder. The active output is indicated on the display below the level readout.

    3. phones and cntrl rm: In this mode, both the headphone and control room outputs are active simultaneously. This mode has a single level control and mute setting. The mode is indicated on the display below the level readout as 'phs+cr'.

- phones pwr-up lvl: This option allows you to store a specific level that the headphone output will return to every time the m108 is powered on. To set your desired phones power up level:

    1. Press the EDIT encoder to enter edit mode

    2. Turn the knob to select your desired operating level from 0-99

    3. Press the EDIT knob again to enter your selection and exit the edit mode

- cntrl rm pwr-up lvl: This option allows you to store a specific level that the control room output will return to every time the m108 is powered on. To set your desired control room power up level:

    1. Press the EDIT encoder to enter edit mode

    2. Turn the knob to select your desired operating level from 0-99

    3. Press the EDIT knob again to enter your selection and exit the edit mode

- phones gain: The m108 headphone amplifier features two hardware gain settings. For typical head-phones, the hardware gain should be set to 0dB for lowest noise operation. When using less effi-cient headphones, set the gain to +9.5dB if higher output level is required.

- done: Scroll to this area and push the EDIT knob to save your entry and return to the setup menu.

7 - meter peaks

The m108 signal meters will display a small line to indicate the highest level (peak) a particular channel has achieved. To set your desired meter peak setting:

1. Scroll to the setup menu item #7 'meter peaks'

2. Press the EDIT encoder to enter edit mode

3. Then turn the knob to select your desired option

4. Press the EDIT knob again to enter your selection and exit edit mode

You can set these peak indicators to do the following:

- off: signal peaks are not recorded or displayed

- decay: the peak signal indicator only remains for a short interval and then automatically disappears

- hold: the peak signal indicator is permanently displayed until a higher peak has been recorded or the peak clear switch is pressed

8 - display mode

The main mic preamp operating screen has 7 different display modes that you can choose between de-pending on how you are using the system and what display information you would like to see on the screen as default. To set your desired display mode:

1. Scroll to the setup menu item #8 'display mode'

2. Press the EDIT encoder to enter edit mode

3. Turn the knob to select your desired option

4. Press the EDIT knob again to enter your selection and exit edit mode

The display mode options are:

- system: in this mode, all 8 mic preamp channels are shown in a row, with the right side screen area displaying ADC sample rate, clock source and clock output.

- gain: in this mode, all 8 mic preamp channels are shown in a row, with the right side screen area dis-playing the channel name or number (if no name is entered), and the selected channel's gain level with large number.

- phones: in this mode, all 8 mic preamp channels are shown in a row, with the left side screen area displaying the selected headphone source and headphone output level with a large number.

- phones / sys: in this mode, all 8 mic preamp channels are shown in a row with slightly narrowed col-umns, with the left side screen area displaying the selected headphone source and headphone out-

put level with a large number; and the right side screen area displaying ADC sample rate, clock source and clock output.

- phones / gain: in this mode, all 8 mic preamp channels are shown in a row with slightly narrowed columns, with the left side screen area displaying the selected headphone source and headphone output level with a large number; and the right side screen area displaying the channel name or number (if no name is entered), and the selected channel's gain level with large number.

- channel: in this mode only a single channel is displayed at a time. There is a large horizontal dBFS meter across the top which includes scale numbers between -60 and 0dBFS. The full 11 character channel name is shown (if entered), as well as the +48V and phase reverse status, with a large channel gain number displayed in the right side screen area.

- phones / channel: in this mode only a single channel is displayed at a time. The left side screen area displays the selected headphone source and headphone output level with a large number. The middle of the screen has the large horizontal dBFS meter across the top which includes scale numbers between -60 and 0dBFS. The full 11 character channel name is shown (if entered), as well as the +48V and phase reverse status, and the large gain number is displayed in the right side screen area.

9 - display brightness

The high contrast OLED display can be set to 3 brightness settings. To set your desired screen brightness:

1. Scroll to the setup menu item #9 'display brightness'
2. Press the EDIT encoder to enter edit mode
3. Turn the knob to select your desired option
4. Press the EDIT knob again to enter your selection and exit edit mode

The display brightness options are:

- low
- norm
- high

10 - display auto dim

To help ensure a long service life, the m108 OLED display will automatically dim its intensity after a preset amount of time. Any front panel operation (switch press or knob turn) will restore the screen's default brightness level and reset the auto dim timer. To set the desired auto dim timer:

1. Scroll to the setup menu item #10 'display auto dim'
2. Press the EDIT encoder to enter edit mode
3. Then turn the knob to select your desired option
4. Press the EDIT knob again to enter your selection and exit edit mode

The auto dim timer settings are:

- 2min
- 5min

- 10min

- 15min

- 30min

- 45min

11 - channel name

The m108 allows you to enter a custom name up to 11 characters for individual channels. To enter a custom name:

1. Scroll to the setup menu item #11 and press the EDIT encoder to enter channel name edit mode ('press to config')

2. A new menu will appear, with 4 fields to navigate

3. Turn the EDIT knob to select the fields

4. The selected field will be displayed between an underline and overline and its brightness intensified

5. Press the EDIT knob to enter edit mode for the selected field, which will be indicated with a bright gradient background

The channel name edit fields are:

- channel number: turn the EDIT knob to select the channel number, press to enter the channel number select mode, then turn the encoder to select the number. When you have reached the number you want, press again to enter. You will be returned to the channel name menu.

- channel name: Push here to enter the individual characters of the name. An underline cursor will appear, which can be scrolled across the bottom of the individual character positions. Press the EDIT knob to input the desired character. Options are: lowercase letters a-z, uppercase letters A-Z, numbers 0-9, a space, and a dash. When you are done selecting a character, press the encoder to enter your character and advance to the next character you wish to edit. When you are done, scroll to and push the left side back arrow to enter the name.

- done: scroll here and push the EDIT encoder to save your entry and return to the setup menu.

- clear name: scroll here and push the EDIT encoder to clear all previously entered characters in the name field.

12 - preset recall

All of the m108 settings, including preamp level settings, ADC and wordclock settings, mixer settings, custom name settings etc.. can be stored into one of the 99 available presets and recalled. To recall a previously stored preset:

1. Press the EDIT encoder to enter preset recall mode ('press to config')

2. A new menu will appear, with 3 fields to navigate

3. Turn the EDIT knob to select the fields, the selected field will be displayed between an underline and overline and its brightness intensified

4. Press the EDIT knob to enter edit mode for the selected field, which will be indicated with a bright gradient background

The preset recall fields are:

select desired preset number 1 – 99: Turn the EDIT knob to select the preset name / number you wish to recall. When you have selected it, press the encoder to enter it and return to the menu.

recall: To recall the preset name / number you have selected, scroll here and press the EDIT knob. The preset will be recalled and you will be automatically returned to the setup menu.

cancel: To cancel your preset recall, scroll here and press the EDIT knob. The preset will not be recalled and you will be automatically returned to the setup menu.

Recalling preset 0 will restore all settings to factory defaults.

13 - preset save

All of the m108 settings, including preamp level settings, ADC and wordclock settings, mixer settings, custom name settings etc.. can be stored into one of the 99 available presets and recalled. To save the current m108 settings into a new preset:

1. Scroll to the setup menu item #13 'preset save' and press the EDIT encoder to enter preset save screen ('press to config')

2. A new menu will appear, with 5 fields to navigate

3. Turn the EDIT knob to select the fields

4. The selected field will be displayed between an underline and overline and its brightness intensified

5. Press the EDIT knob to enter edit mode for the selected field, which will be indicated with a bright gradient background

The preset save edit fields are:

• preset number: turn the EDIT knob to select the preset number, press to enter the channel preset select mode, then turn the encoder to select the number 1 - 99. When you have reached the number you want use, press again to enter. You will be returned to the preset save menu.

• name: Push here to enter the individual characters of the name. An underline cursor will appear, which can be scrolled across the bottom of the individual character positions. Press the EDIT knob to input the desired character. Options are: lowercase letters a-z, uppercase letters A-Z, numbers 0-9, a space, and a dash. When you are done selecting a character, press the encoder to enter the character and to return to the character select mode and advance to the next character you wish to edit. When you are done, scroll to and push the left side back arrow to enter the name. There is no auto correct.

• save: scroll to this area and push the EDIT encoder to save your entry and return to the setup menu.

• cancel: scroll to this area and push the EDIT encoder to cancel your preset save and return to the setup menu.

- reset name: scroll to this area and push the EDIT encoder to clear all previously entered characters in the name field.

14 - preamp id / name

m108 preamplifiers are able to be configured into large channel count, multi-unit systems. In a multi-unit system, each m108 preamp will require its own unique id number. Along with a unique id number, the preamp can have a custom name that will be displayed in the m108 Controller App and on the m108 web interface. To enter a custom name:

1. Scroll to the setup menu item #14 and press the EDIT encoder to enter preamp id / name edit mode ('press to config')

2. A new menu will appear, with 4 fields to navigate

3. Turn the EDIT knob to select the fields

4. The selected field will be displayed between an underline and overline and its brightness intensified.

5. Press the EDIT knob to enter edit mode for the selected field, which will be indicated with a bright gradient background.

The preamp id / name edit fields are:

- id number: Turn the EDIT knob to select the preamp id number, press to enter the preamp id number select mode, then turn the encoder to select the number, from 1 - 12. When you have reached the number you want, press again to enter. You will be returned to the channel name menu.

- preamp name: Push here to enter the individual characters of the preamp name. An underline cursor will appear, which can be scrolled across the bottom of the individual character positions. Press the EDIT knob to input the desired character. Options are: lowercase letters a-z, uppercase letters A-Z, numbers 0-9, a space, and a dash. When you are done selecting a character, press the encoder to enter your character and return to the character select mode to advance to the next character you wish to edit. When you are done, scroll to and push the left side back arrow to enter the name. There is no auto correct.

- done: Scroll here and push the EDIT encoder to save your entry and return to the setup menu.

- clear name: Scroll here and push the EDIT encoder to clear all previously entered characters in the name field.

15 - remote

The m108 can be controlled remotely via several different interfaces. Regardless of physical connections, the m108 will only respond to control commands from the remote source selected in this menu. To configure the desired remote control interface:

1. Scroll to the setup menu item #15 'remote'

2. Press the EDIT encoder to enter edit mode

3. Then turn the knob to select your desired option

4. Press the EDIT knob again to enter your selection and exit edit mode

The control protocol options are as follows:

- off: Disables all remote control functionality on the m108

- rs485: Enables the rs485 56k baud serial communication for interfacing with the m802 RCU.

- rs422: Enables the rs422 56k baud serial communication for interfacing with the m802 RCU.

- midi: Enables the Protools PRE compatible midi remote control interface

- ethernet: Enables the ethernet control port for remote control using the web browser control or standalone control application. Additional configuration may be required in the ethernet setup menu to correctly enable this feature.

16 - ethernet setup

Once you have set the remote control protocol to ethernet, the m108 TCP/IP settings should be configured in the ethernet setup menu:

1. Scroll to the setup menu item #16 'ethernet setup' and press the EDIT encoder to enter ethernet setup screen ('press to config')

2. A new menu will appear, with several fields to navigate (Note the available fields for editing change depending on the ethernet mode selection)

3. Turn the EDIT knob to select the fields

4. The selected field will be displayed between an underline and overline and its brightness intensified

5. Press the EDIT knob to enter edit mode for the selected field, which will be indicated with a bright gradient background

The ethernet edit fields are:

- mode: There are two modes of network operation available in the m108; auto (DHCP) and static. Press and turn the edit knob to select between the two options. Press again to return to the menu.

    - Auto or DHCP (Dynamic Host Configuration Protocol) mode can be used when the network is managed by a DHCP server. In this configuration, the m108 will automatically negotiate an IP address from the DHCP server and maintain the IP lease while the preamp is powered on with ethernet remote control enabled. Depending on the DHCP server and its configuration, the m108 may or may not be issued the same IP address each time. Most DHCP servers allow the user to configure assigned IP ranges as well as reserve specific IP addresses for unique MAC addresses. Refer to your DHCP server documentation for this configuration information. For reference, the m108 registers itself with the DHCP server with the Hostname "m108-DeviceID-DeviceName". The following shows an m108 with Device ID = 2. The device name was not set by the user, so "GraceDesign" is used as the default.

| IP address ▾	MAC address	Hostname	Start	End	Online	Lease Type
192.168.0.133	70:b3:d5:a3:bf:fe	m108-2-GraceDesign	2016/08/30 19:39:22	2016/08/30 21:39:22	online	active

- ○ The static setting allows the m108 user to define the unit's IP address manually. This option can be used on networks with or without a DHCP server. The static setting should be used when configuring a peer-to-peer network between your computer and the m108(s). When using a static IP, care should be taken to avoid IP conflicts on the network.

- ip (DHCP): When the ethernet mode has been set to auto, this field is read-only and displays the m108's IP address assigned by the DHCP server. If the IP address is 0.0.0.0, the m108 has not successfully acquired and IP address, or the connection has been lost.

- ip (static): If the ethernet mode has been set to static, use this field to manually enter the unique IP address for the preamp. Push to enter the individual numbers of the IP number. An underline / overline cursor will appear, which can be scrolled across the individual number fields. Press the EDIT knob to input the desired number from 0-255. When you are done selecting a number, press the encoder and return to the cursor mode. Advance to the next number to edit. When you are done, scroll to and push the left side back arrow to enter the IP address. The static IP address is stored in non-volatile memory and will be restored when switching from auto to static IP mode.   For a peer-to-peer network between your computer and the m108(s), manually set the IP address in your computer's network setup and configure the m108(s) with IP address(es) in the same subnet. For example, if you set your computer IP address to 192.168.0.1, the m108(s) IP address(es) should be 192.168.0.(2-255). The m108 subnet mask is fixed to 255.255.255.0. Confirm your computer's subnet mask is also set to 255.255.255.0 for proper connection.

- mac: the 'Media Access Control' address is a unique, specific hard-wired address assigned to every individual m108. This field is read-only. The MAC address is useful for integrating and troubleshooting an m108 on a network. For example, the MAC address can be used in your DHCP server configuration to allocate a specific IP address to each preamp.

- done: scroll to this area and push the EDIT knob to save your entry and return to the setup menu.

8   Remote Control

8.1   Web Browser Control

The m108 has a built-in web browser controller allowing remote control from most web enabled Mac, Windows, iOS and Android devices. This control has been optimized for Chrome, but will operate on most modern web browsers (excluding Internet Explorer).   This makes control of any m108 on an IP LAN as simple as entering the m108's IP address into the browser's navigation window, and the web browser control from that preamp will automatically load and connect (See above sections for selecting the ethernet remote control mode and ethernet setup).

The m108 web browser control provides access to mic preamp and ADC configuration and status. The available control and display features are as follows:
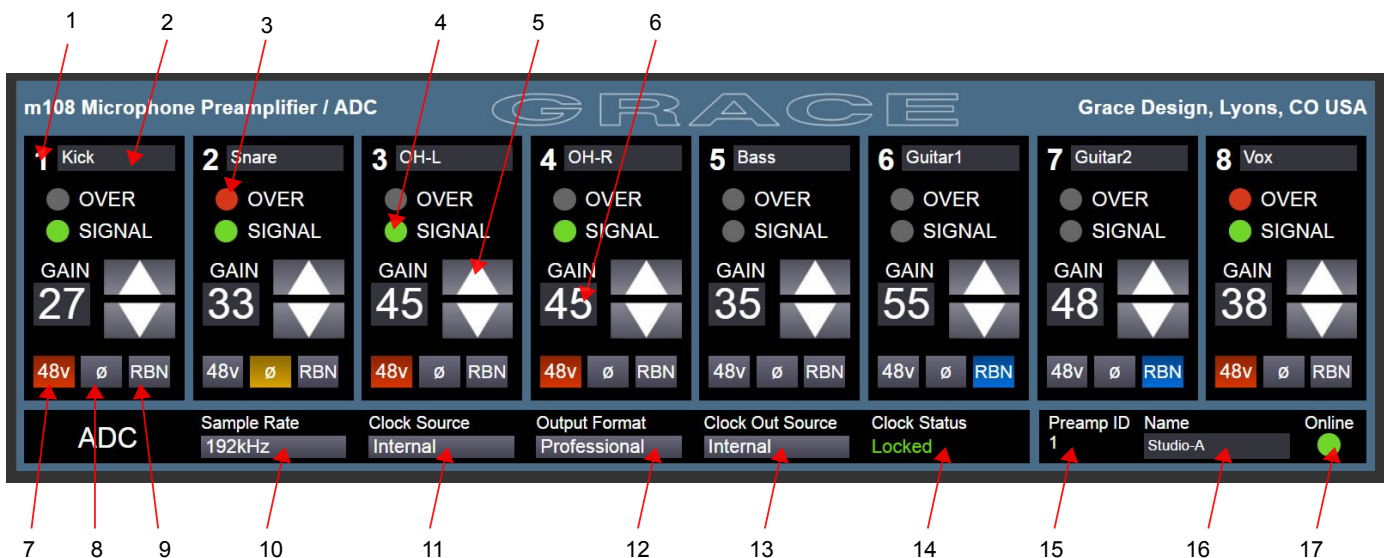
1. Channel number: the preamp channel number as determined by the preamp device ID

2. Channel name: the user defined name for each preamp channel. Names are limited to standard alpha-numeric characters and have a maximum length of 11 characters.

3. 0dBFS Over indicator: Illuminates red when the signal level has clipped on the channel. This indicator will remain on until it is cleared by clicking on it.

4. Signal present indicator: Illuminates green when signal level > -60dBFS is present on the channel.

5. Gain level adjustment via up/down buttons

6. Gain level adjustment via direct numerical entry

7. 48V phantom power switch: click to toggle phantom power on the channel

8. Phase Reverse switch: click to toggle the phase reverse on the channel

9.   Ribbon Mic Mode switch: click to toggle the ribbon mode on the channel

10. ADC Sample Rate select pulldown menu: select the ADC sample rate

11. ADC Clock Source select pulldown menu: select the ADC clocksource

12. ADC Output Format pulldown menu: select the digital output format

13. ADC Clock Output Source pulldown menu: select the clock output source

14. Clock Status display: shows the status of the current clock configuration

15. Preamp ID display: shows the device ID of this preamp

16. Preamp Name display: user defined name for this preamp. The names is limited to standard alpha-numeric characters and has a maximum length of 11 characters.

17.   Indicator display: Illuminates green while communication is good. Illuminates red if communication times out with the preamp. The web controller will attempt to re-establish communication with the preamp if it times out.

To connect your browser to the m108 simply type the preamp's IP address in the address bar. (refer to "ethernet setup" above for IP address information)

If there are multiple preamplifiers in your system you can open a new browser tab for each preamplifier.

8.2   MIDI Control

The m108 can be controlled directly from AVID ProTools® HD, via the MIDI combination DB9 connectors on the m108 and the AVID I/O. Using the m108 with ProTools® requires some setup in ProTools® and the host computer's MIDI configuration (MSS for windows, AMS for MAC). When connected to a ProTools® system, the m108 is designed to emulate the AVID®Pre. This means that configuring the m108 in the "I/O" and "Peripherals" settings in ProTools®, it is necessary to choose the exact same settings as the AVID®Pre.

For a detailed discussion of Pro Tools® Pre configuration, please read the AVID PRE user guide which can be found here: http://www.avid.com/~/media/avid/files/support-pdf/resources-pdf/pre_guide_v90_70448.pdf (file subject to relocation, google will help). Chapter 3 of this document includes operating system as well as Pro Tools® configuration information which will allow Pro Tools® to recognize the m108 as a AVID Pre.

A set of MIDI to DB9 breakout cables will be needed to connect MIDI in and MIDI out from the host computer MIDI interface. For systems with multiple m108s MIDI jumper cables will be needed to link the m108s together. See the wiring diagrams at the end of this manual. These cables can also be purchased through your Grace Design dealer.

WA190 MIDI -DB9 Breakout Cable

WA093 MIDI/I2C Jumper Cable

Since the AVID Pre and the m108 have differing features, there will be some m108 functions that are not available when in MIDI mode. As well, there are AVID Pre functions that do not exist on the m108.

Following is a summary of these limitations:

Gain Control

The m108 has a gain range of -6 to 69dB in 1dB steps. When in MIDI control mode the m108 switches to a gain range of -6 to 63db in 3db steps. If the m108 has channels set to gain values that are not available in MIDI control mode and the m108 receives MIDI activity, it will change these channels to the next lowest gain setting that is available in MIDI control mode. If the MIDI control mode times out and the m108 returns to its normal control mode, all of the channel gain settings will be unchanged. A gain setting of 0dB in ProTools will result in a gain setting of -6dB on the m108.

Pad

The m108 has an automatic pad circuit, so the PAD command will be ignored. When the ProTools gain setting is 0dB, the m108's pad is engaged and will displayed as 'on' in the ProTools control.

Input Impedance

The m108 does not have adjustable input impedance so Input Impedance commands will be ignored.

Mute

The m108 does not have a mute function so this command will be ignored.

8.3   m108 Controller Application

The m108 can be controlled by the m108 Controller Application. This program runs on Windows and Mac OS. This application uses the ethernet control port on the m108 so setup menu item 15-remote must be set to "ethernet".

The application allows for the simultaneous control of up to 12 m108 preamplifiers. It allows for channel gain grouping of any channels accross multiple preamplifiers. It also provides system level preset store and recall using configuration files that can be moved from computer to computer.

It can be downloaded from the Grace Design website:

http://www.gracedesign.com/support/support.htm

8.4   Serial Control

The m108 can be controlled via serial RS422 or RS485 by the m802RCU (the dedicated hardware remote control unit for m802 preamplifiers). However, the m802RCU must have RS485/RS422 I/O and firmware version 5.0 or higher. Contact Grace Design if you need upgrade instructions.

With the upgraded firmware the m802RCU can control m108s and m802s in the same system. There can be a total of 12 preamplifiers in a system. All preamplifiers must have unique ID numbers and m802 peamplifiers are limited to the highest ID# 8.

9   Dante Option Module

The Dante option provides the m108 with two gigabit ethernet ports for streaming 8 channels of audio at sample rates up to 192kHz to other Dante enabled devices. The heart of the Dante interface is the

Brooklyn II module. This is where the digital audio data is sent to and received from the Dante network "flows".

While most of the ADC configuration and setup is the same as the ADAT and AES3 interfaces, there are some clock architecture concepts that are unique to the Dante enabled m108.

We strongly recommend reading through the Dante Controller software user guide to become familiar with Dante networking basics.

The pdf can be downloaded at http://dev.audinate.com/GA/Dante-controller/userguide/pdf/latest/. The html version is http://dev.audinate.com/GA/Dante-controller/userguide/webhelp/

9.1   Connections

On the rear panel of the m108, the Dante interface module features two gigabit Ethernet ports. One labeled PRIMARY and one labeled SECONDARY. This allows the m108 to operate in full redundant mode if required. When operating on a single non-redundant network then the PRIMARY port should be used.

Refer to the Dante Controller user guide for more information on redundancy.

9.2   Signal Routing

The m108 Dante interface provides 8 channels of output from the ADC and 8 channels of input to the DAC. Since the m108 DAC is stereo only the user must select which channel pair to monitor. This is done in the monitor section of the m108 Mixer. mon-src and hp-src each can select AUX1-AUX4.

- AUX1 will be Dante inputs 1-2
- AUX2 will be Dante inputs 3-4
- AUX3 will be Dante inputs 5-6
- AUX4 will be Dante inputs 7-8

9.3   Dante Setup

There are menu items in the m108 setup menu for configuring Dante:
- Setup menu # 1: adc samplerate
- Setup menu # 2: adc clocksource
- Setup menu # 3: Dante ext. sync

To enable the Dante interface go to Setup menu # 1: adc samplerate and select "Dante".

This connects the Dante interface to the network and configures the ADC to the last used Dante sample rate. Sample rate changes must be made from the Dante Controller interface. Selecting any other option from the adc samplerate menu will turn the Dante interface off.

Setup menu # 2: adc clocksource menu item will automatically switch to "Dante" when Dante is enabled in the adc samplerate menu. The options "word", and "word - 75Ω" will be available but "internal" will not

be available as this would result in the m108 clock and the Dante clock being asynchronous. When Dante is disabled, the adc clocksource will automatically change to "internal".

Setup menu # 3: Dante ext. sync stores the clock source preference for when the m108 is the Dante network clock master. The options are internal, word, and word − 75Ω.

If the "Allow Sync to External" check box is checked in Dante Controller then the clock source for the m108 will switch to the clock source selected in the dante ext. sync menu. Note that there can only be one clock master on a Dante network.

9.4   Clocking

When Dante is enabled by selecting it in the sample rate menu, the adc clocksource menu item will automatically select "Dante" and the m108's sLock PLL will lock to the Dante clock.

This puts the m108 in Dante Clock Mode 1 (see below for clock mode descriptions). The sLock PLL in the m108 will then lock to the Dante network clock and audio will flow to the Dante network. When powered-off, the m108 will save the current configuration to non volatile memory. When powered back on, the m108 will restore the previous configuration and there will be an approximately 10 second delay while the Dante module is initialized.

9.5   Clock Modes

There are a total of 4 clocking modes for the m108 with Dante. Below is a description of each.

1. Brooklyn II card is Dante clock slave. adc clocksource is "Dante", ADC is clocked from Brooklyn II. Note: This is the most common and recommended configuration.
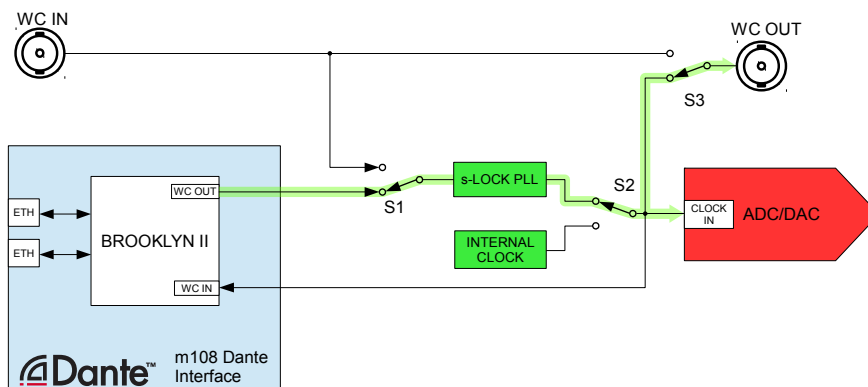
2. Brooklyn II card is Dante clock slave. adc clocksource is "word" or "word 75Ω", ADC is clocked from External Word Clock. Note: In this mode the external WC IN must be synchronous with the Dante Network Clock. If the external WC is not synchronous with the Dante clock then the Brooklyn II might mute the audio. If the two clocks are close in frequency but not synchronous, corrupt audio data will

be transmitted - (ticking, or dropped samples).
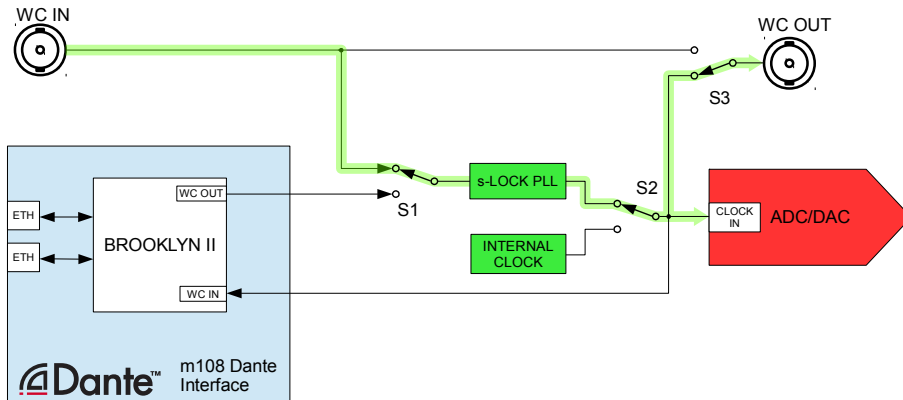
3. Brooklyn II is Dante clock master. Dante ext. sync is "internal" adc clocksource is "internal", m108 is System Master using Internal Clock. Note: Check boxes "Preferred Master" and "Enable Sync To External" for this m108 in the Dante Controller Clock Status Window.
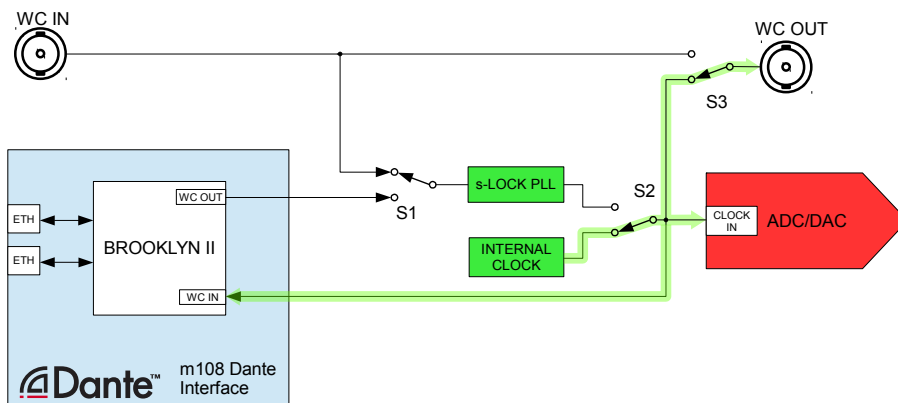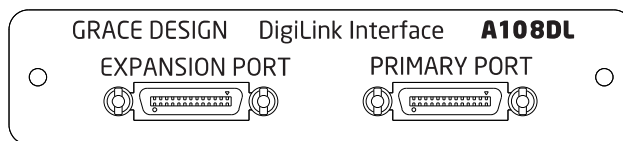
4. Brooklyn II is Dante Clock Master. Dante ext. sync is "word" of "word - 75Ω" adc clocksource is "word"
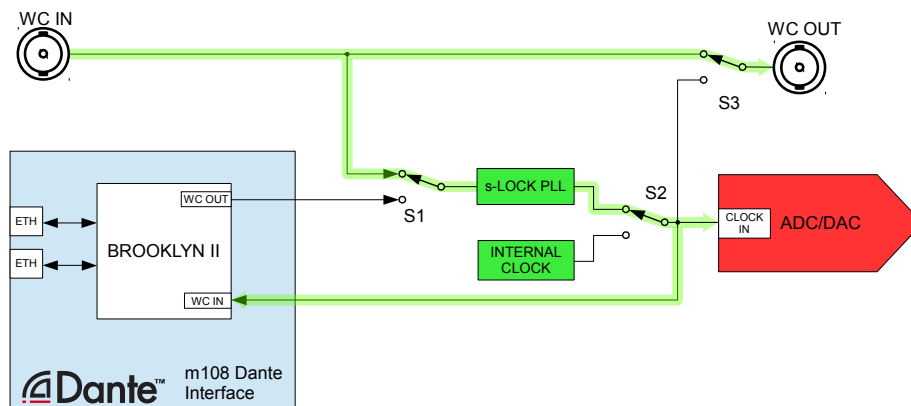
of "word - 75Ω", m108 is System Master using external WC IN. Note: Check boxes "Preferred Master" and "Enable Sync To External" in Dante Controller.

10   Digilink Option Module

The optional A108DL Digilink module allows the m108 to connect to Avid Pro Tools|HD Accel, Pro Tools|HDX, and Pro Tools|HD Native interfaces. The A108DL module emulates the Avid HD I/O interface and features two Mini-Digilink connectors. One is labeled "PRIMARY PORT" and one is labeled "EXPANSION" port. The concept of these ports is similar to those on an Avid HD interface. However, since the m108 is an 8 channel input and 2 channel output device, these ports allow two m108s to be connected together to emulate one Avid HD I/O with a standard configuration of 1 ADC card, 1 DAC card, and one Digital IO card.

The Digilink option module requires m108 firmware version 1.07 or higher.

For this to work properly the first m108 in the chain must have its preamp ID set to an ODD number and the second m108 in the chain must have it's preamp ID set to an EVEN number.

Common system connections are illustrated at the end of this section. Note that if only one m108 is being used it will look like an Avid HD I/O with 16 input channels and 8 output channels but input channels 9-16 will be silent. For this reason a single m108 should always be connected at the end of the chain.
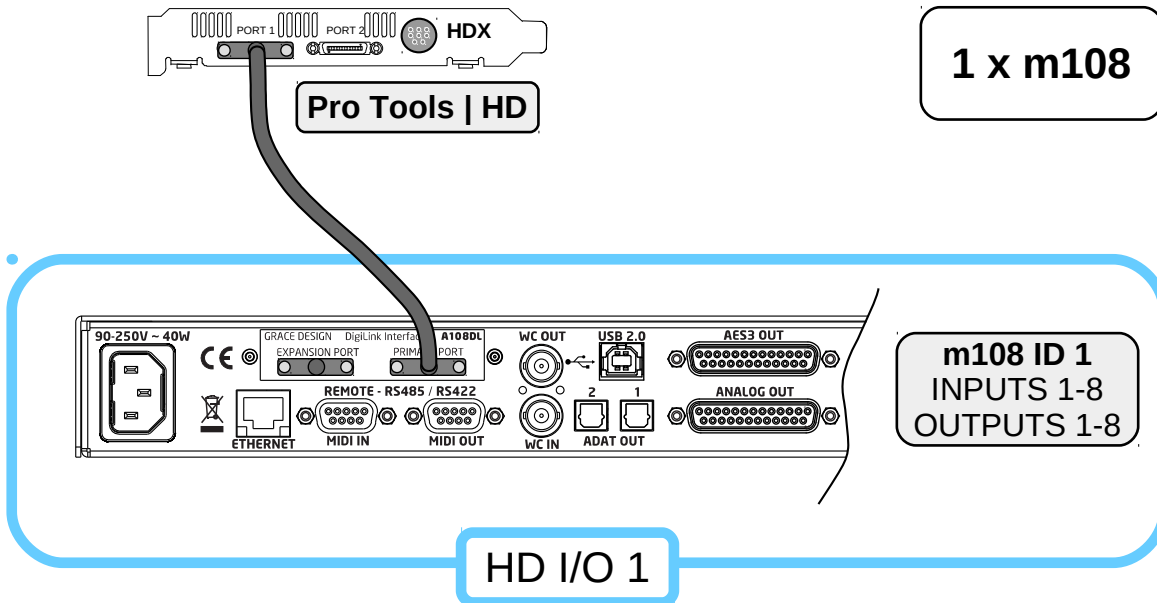
Since the m108 has only a stereo (2channel) DAC, the 8 output channels from Pro Tools™ can only be monitored in stereo pairs. See the <u>Using the mixer</u> section of this manual for details on selecting the Aux input channel pairs for monitoring If two m108s are connected together in the Digilink chain, the same outputs 1-8 will be present on each unit.

Pro Tools™ controls the sample rate of connected interfaces so the sample rate on the m108 should be set for "digilink". This will allow the Digilink interface to set the internal sample rate of the m108.

All systems using more than one interface (m108 or Avid HD) must have all the interfaces synchronized to a common word clock. If no external word clock generator is available then one of the m108s can be used as the clock master by setting it's clock source to "internal". Press and hold the PEAK CLR (setup)switch and then scroll to: **adc clocksource.** Select "internal". The Word Clock Output from the first m108 can be connected via daisy chain to downstream m108s. It is recommended to set the downstream m108s for 75 Ohm termination and **clock output** to "external".

Note: The m108 clock source is controlled within the m108 and does not respond to the Clock Source control in Pro Tools™ Setup>Hardware.
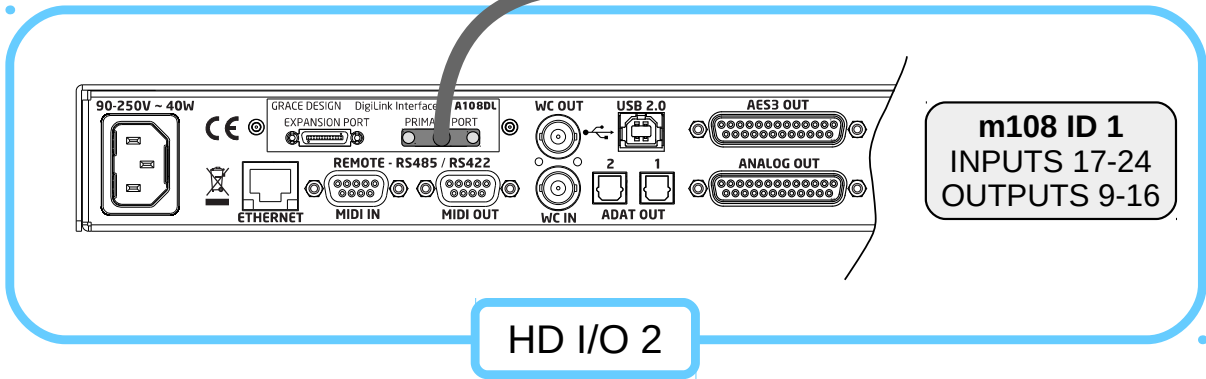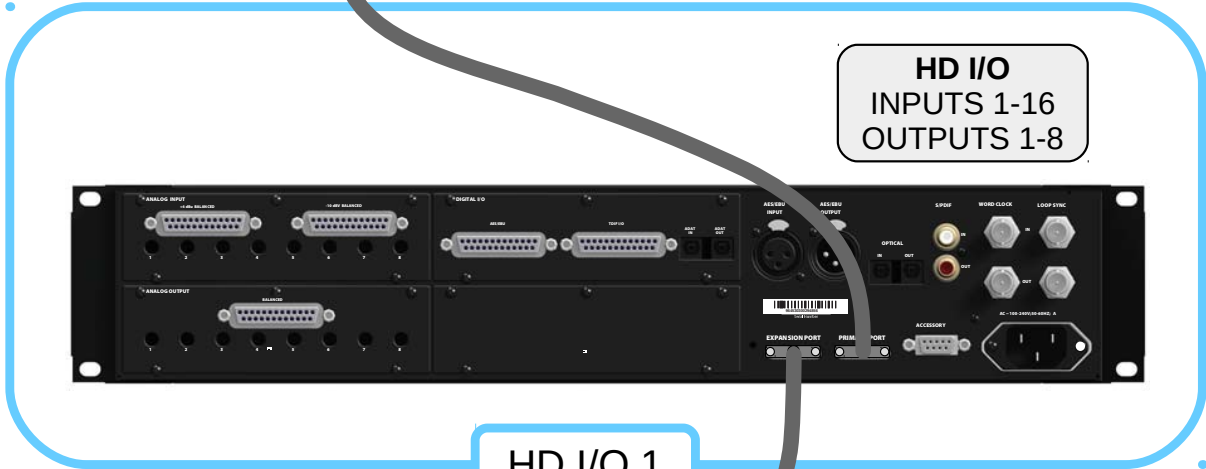

The system wiring diagrams below show various configurations of m108 and Avid HD interfaces. These diagrams do not show clocking connections. The labels show the m108s with ID numbers set to 1, 2, 3, and 4. However, the ID numbers can be arbitrary as long as the first m108 in the chain is set to an ODD number and the m108 following is set to an EVEN number.
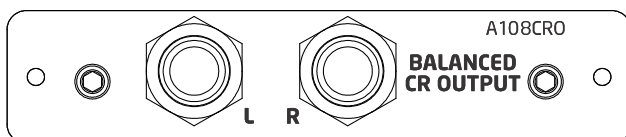
1 x m108

m108 ID 1
INPUTS 1-8
OUTPUTS 1-8

HD I/O 1

2 x m108

m108 ID 1
INPUTS 1-8
OUTPUTS 1-8

m108 ID 2
INPUTS 9-16
OUTPUTS 1-8

HD I/O 1

4 x m108

Pro Tools | HD

PORT 1 PORT 2 **HDX**

90-250V ~ 40W GRACE DESIGN DigiLink Interface **A108DL** WC OUT USB 2.0 AES3 OUT
EXPANSION PORT PRIMARY PORT ANALOG OUT
REMOTE - RS485 / RS422
ETHERNET MIDI IN MIDI OUT WC IN ADAT OUT

m108 ID 1
INPUTS 1-8
OUTPUTS 1-8

90-250V ~ 40W GRACE DESIGN DigiLink Interface **A108DL** WC OUT USB 2.0 AES3 OUT
EXPANSION PORT PRIMARY PORT ANALOG OUT
REMOTE - RS485 / RS422
ETHERNET MIDI IN MIDI OUT WC IN ADAT OUT

m108 ID 2
INPUTS 9-16
OUTPUTS 1-8

HD I/O 1

90-250V ~ 40W GRACE DESIGN DigiLink Interface **A108DL** WC OUT USB 2.0 AES3 OUT
EXPANSION PORT PRIMARY PORT ANALOG OUT
REMOTE - RS485 / RS422
ETHERNET MIDI IN MIDI OUT WC IN ADAT OUT

m108 ID 3
INPUTS 1-8
OUTPUTS 1-8

90-250V ~ 40W GRACE DESIGN DigiLink Interface **A108DL** WC OUT USB 2.0 AES3 OUT
EXPANSION PORT PRIMARY PORT ANALOG OUT
REMOTE - RS485 / RS422
ETHERNET MIDI IN MIDI OUT WC IN ADAT OUT

m108 ID 4
INPUTS 9-16
OUTPUTS 1-8

HD I/O 2

HDX

Pro Tools | HD

1 x m108
1 x HD I/O

HD I/O
INPUTS 1-16
OUTPUTS 1-8

HD I/O 1

m108 ID 1
INPUTS 17-24
OUTPUTS 9-16

HD I/O 2

11   Control Room Output Module

The CR (Control Room) Output Module provides an additional set of 1/4" TRS balanced outputs suitable for playing back via a stereo monitor system. These outputs are controlled by the front panel VOL/MUTE output level control. To facilitate interfacing with different amplifier / powered speakers systems, the CR Output Module features selectable output gain ranges. The CR Out module ships from the factory in Low Gain mode. This should be sufficient for most powered monitor systems. A volume setting in the range of 60-90 is normal. If more gain is needed, the CR Module can be configured for High Gain Mode.

For LOW gain, install jumpers J3, J4, J5 and J6. For HIGH gain, remove jumpers J3, J4, J5 and J6.
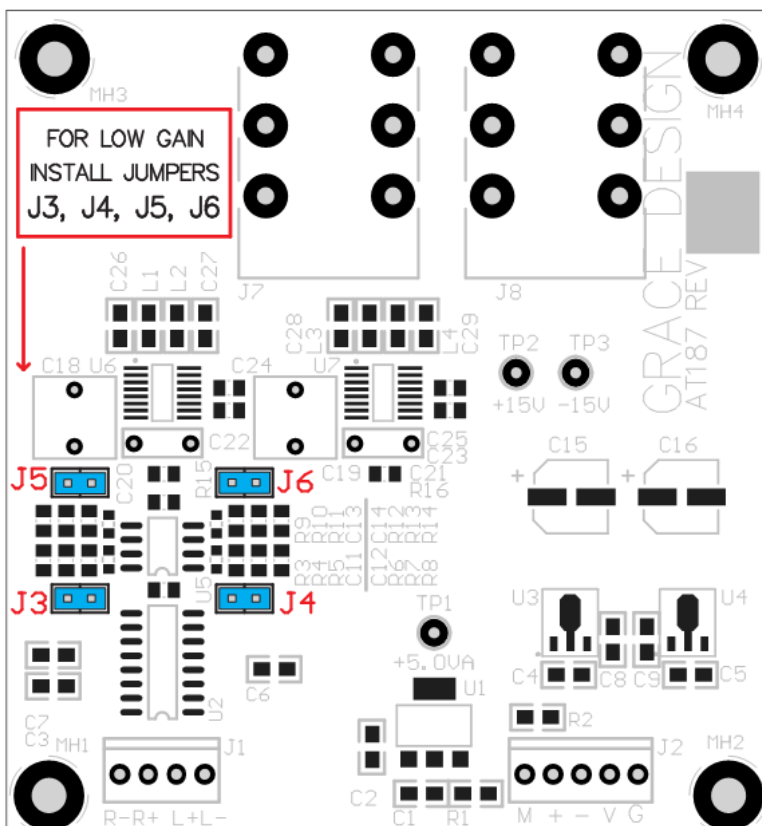
Control Room Output LOW gain jumper diagram

12   USB Setup

12.1 Computer Audio Requirements

The m108 ships with a standard USB type A to type B cable. The type A connector plugs in to the computer and the type B connector to the m108 USB jack.

The m108's asynchronous mode USB controller supports standard driverless operation on Mac OSX since version 10.8.5. Sample rates up to 192kHz are supported. For Windows 7, 8, 8.1, and 10 PC computers, users will need to download and install the Grace Design m108 USB ASIO driver on their computer. This driver can be found on our website:

http://www.gracedesign.com/support/support.htm

Installation and operation instructions can be found in the following chapter "Windows USB Driver Installation and Operation".

On Mac computers driverless operation basically means the m108 will automatically show up in your computer's list of supported audio devices as 'm108'. The m108 will provide 8 input channels and 2 output channels. In most cases, simply choose the m108 as your audio recording or playback device and the system will work.

In the event that you have any setup issues which aren't addressed by these resources, feel free to contact us directly at 303.823.8100, Monday through Friday 9 – 5, MST.

12.2 Using the m108 as a DAW Interface

With the extremely high quality audio recording and playback, the m108 can be a great option as a stand-alone I/O device with your digital audio workstation. However, using it in conjunction with other USB audio devices connected to your workstation computer's USB buss will require some adjustments to your computers audio settings.

For Mac OS X, this is achieved by setting up the m108 in an 'aggregate audio device' setup, with the m108 as the default input and playback` device.

With both of these setups, if you are using multiple I/O devices, you will need to pay careful attention to clocking. In Mac / Core audio aggregate setups, you are able to set which device is the clock master. However, this means that other devices may be sample rate converted, which we do not recommend.

13   Windows USB ASIO Driver Installation and Operation

13.1 Installation

The m108 USB ASIO driver is necessary for operating the m108 as an I/O device on a Windows computer. Install this driver before connecting the m108 to you computer. Download the installer .zip package from our website: http://www.gracedesign.com/support/support.htm

Extract the .zip file, and run the "Grace_Design_Multichannel_USB_Audio_Driver_v3.34.0.A_Driver-Setup_v3.34.0.exe" file to begin, then follow the steps illustrated below (It may take a few moments for

the user prompts to appear once the program is running). At the end of the install process you will con-
nect the m108 to complete the process.

The installer will guide you through the following steps:
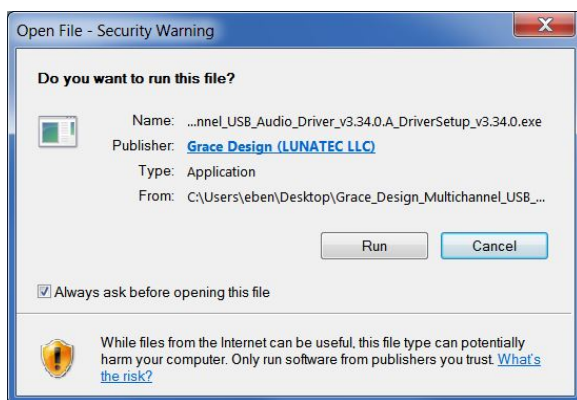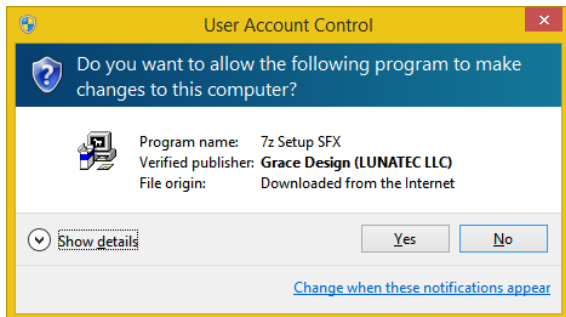
1. Depending on the version of Windows your computer is running you may see a security window
    similar to one of the images shown above. When prompted whether or not you want to allow the
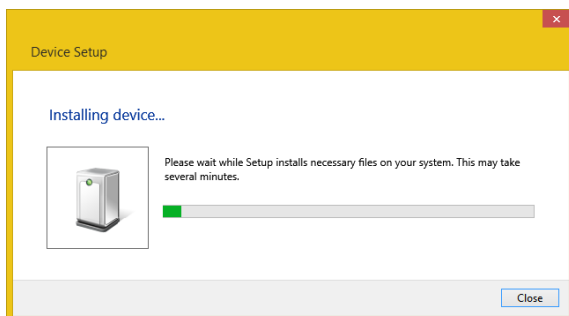   program to make changes or if you want to run this file - click "Yes" or "Run" to continue.

2. Next, begin the driver Install by clicking "Next" to continue.
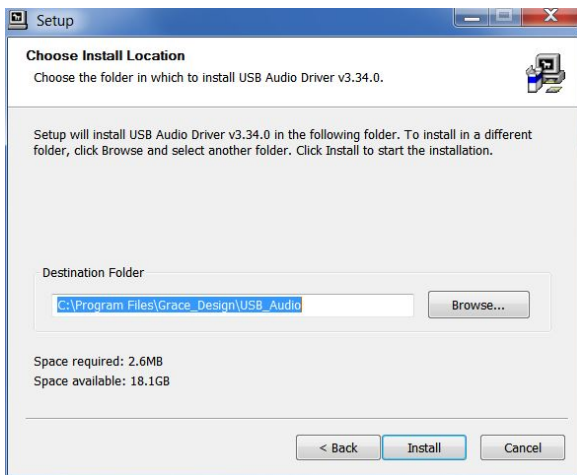
3. Choose the location you wish install the driver and click "Install" to proceed. It is recommended to use the default installation folder.
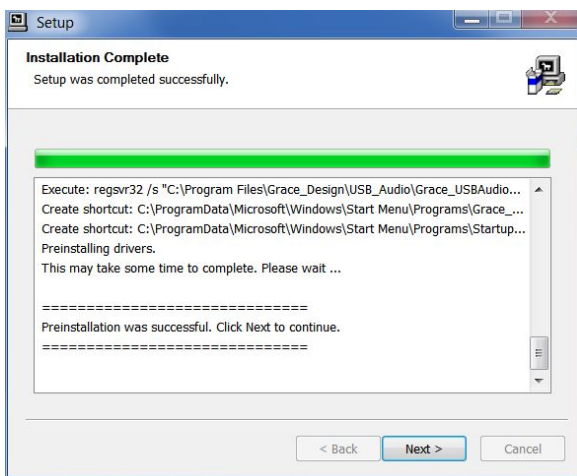
4. Once the install has completed, click "Next".
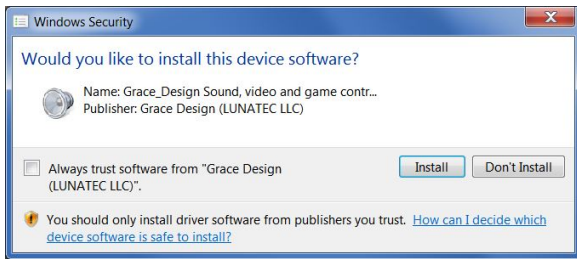
5. Connect your m108 to your computer via USB. At this point, the Windows OS driver should automatically install the m108 ASIO driver. Depending on your version of Windows you may or may not be prompted to complete this step. If asked, click 'Install".


6. Click finish to complete the installation and start using the driver.

1   Using the m108 ASIO driver

With the driver installed properly and the m108 connected to your computer, there will be a blue and white "G" icon in the system tray, or "Grace Design USB Audio Control Panel" in the start menu. Simply click this icon to open the driver control panel and show the following options:
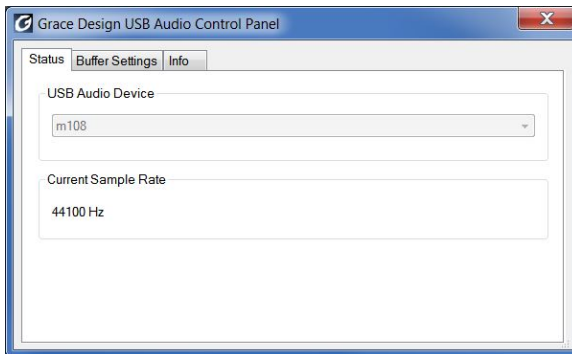
1. Status Window shows the connected device and the currently defined OS sample rate.
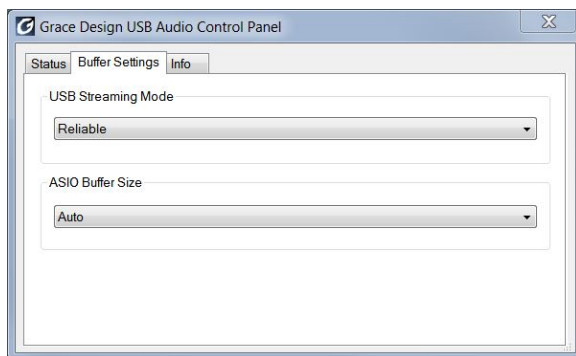
2. Buffer Settings displays the USB Streaming mode and the ASIO Buffer size.
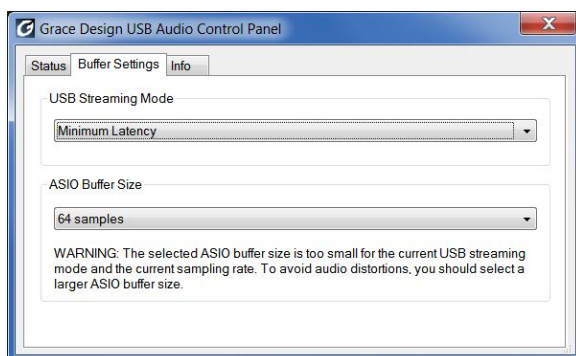
The USB Streaming Mode sets the computer's USB latency performance, ranging from very low to high latency. The lower the latency, the greater the load will be on your computer's resources, which may result in errors or distortion. The ASIO Buffer Size also affects latency, the smaller the buffer the lower the latency. This setting is interactive with the Streaming Mode. The panel will display a warning if the buffer size is too small for the selected streaming mode and sample rate. You will need to experiment with these

options to find a suitable setting for your computer.
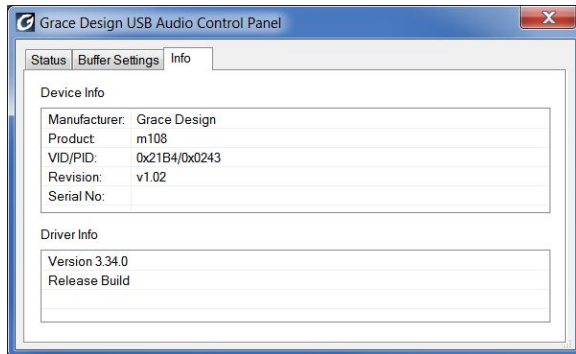
3. Info displays the Device and the Driver information.

14   Firmware Upgrades

The m108 features field upgradable control firmware. Over time firmware updates may become available to improve functionality or implement new features. These can be found and downloaded from the Grace Design website at http://www.gracedesign.com/support/support.htm. The current firmware version is displayed on the m108 screen at power-up. Currently, firmware upgrades require a Windows PC with the Grace Design m108 USB Driver installed. Mac OS upgrade software will be available at a future date.
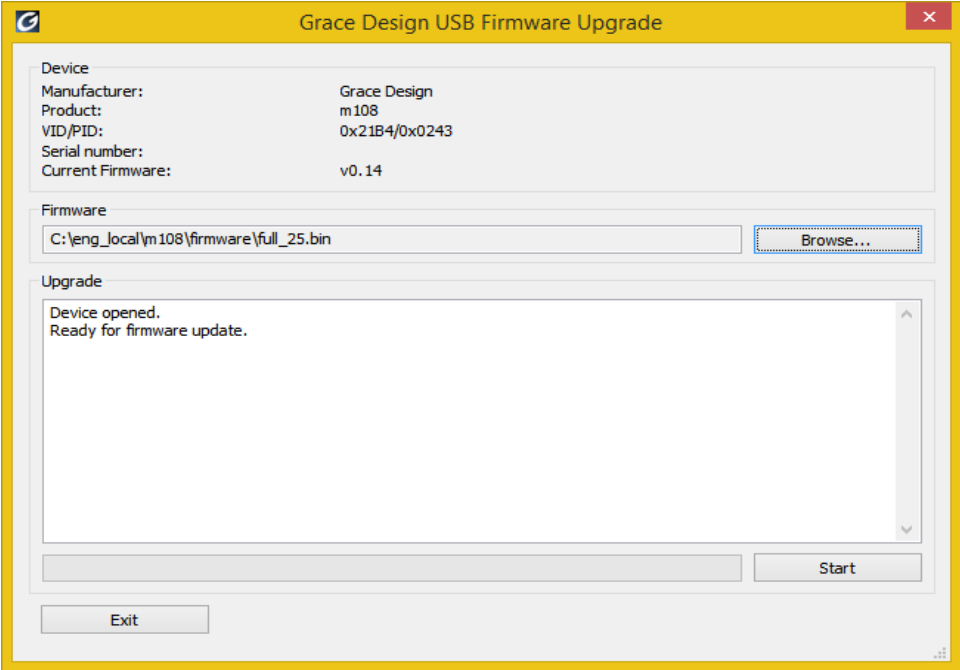
14.1 To update the firmware on the m108:

1. Download the m108 firmware package from the Grace Design Website and unzip it on your computer.

2. Turn off the m108 and connect your PC via USB to the USB 2 port on the m108.

3. Turn on the m108.

4. Open "GraceDesignAudioDfu.exe" application installed in the Grace Design USB Audio Driver Directory. The default path for this application is C:\Program Files\Grace_Design\USB_Audio

(continued)
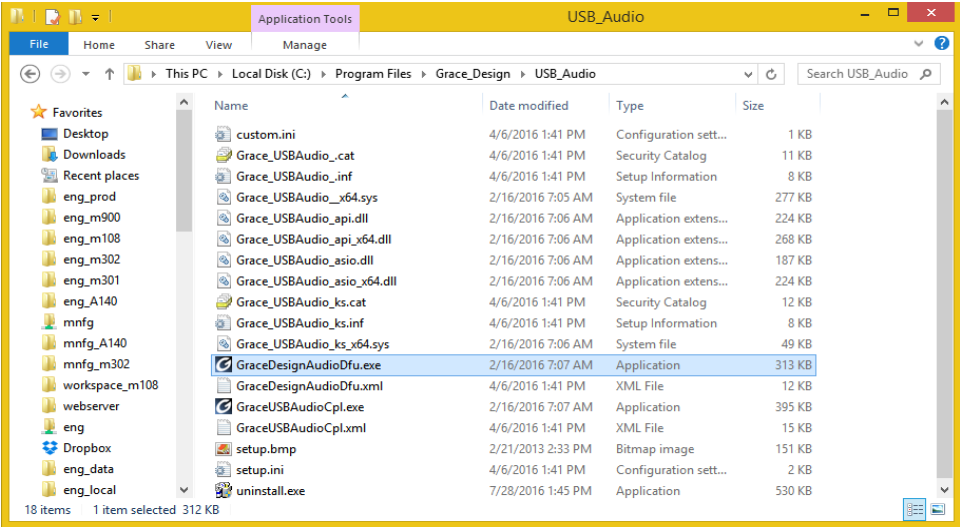
5. Once connected, the m108 will be recognized by the firmware upgrade application. The manufacturer, product and current firmware version fields will be updated with the m108's configuration.


6. Click the Browse button and locate the m108_upgrade_xxx.bin file that you downloaded and select it. The firmware upgrade application will indicate that it is ready for firmware update.
    (continued)

7. Click on Start Firmware Upgrade to begin the firmware upgrade process. The progress of the up grade will be indicated in a pop-up dialog box.
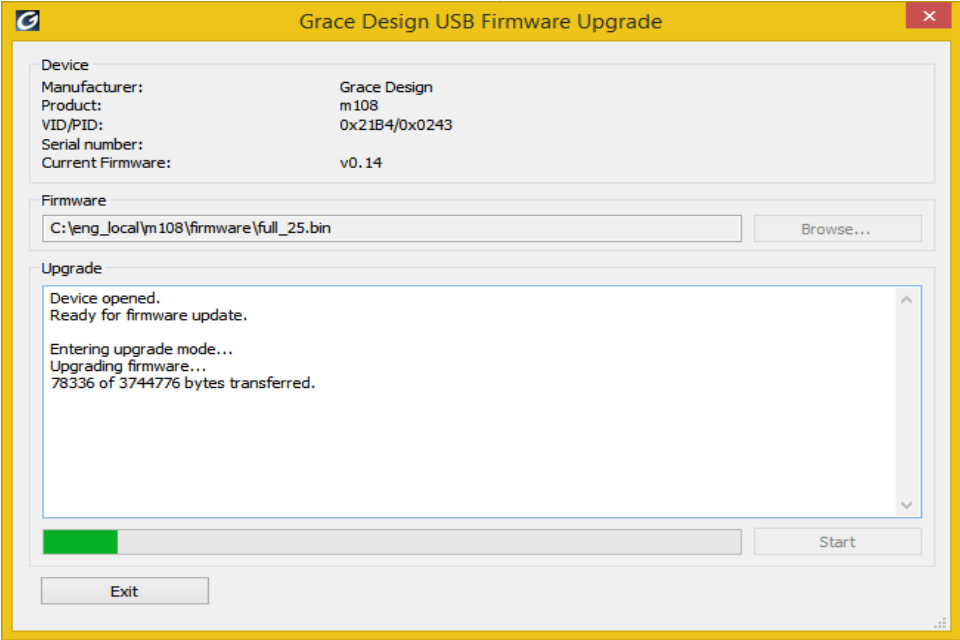

8. DO NOT DISCONNECT THE DEVICE OR INTERRUPT POWER TO THE m108 WHILE THIS IS IN PROCESS.

9. The upgrade application will indicate that the firmware upgrade finished successfully when it has completed the download.
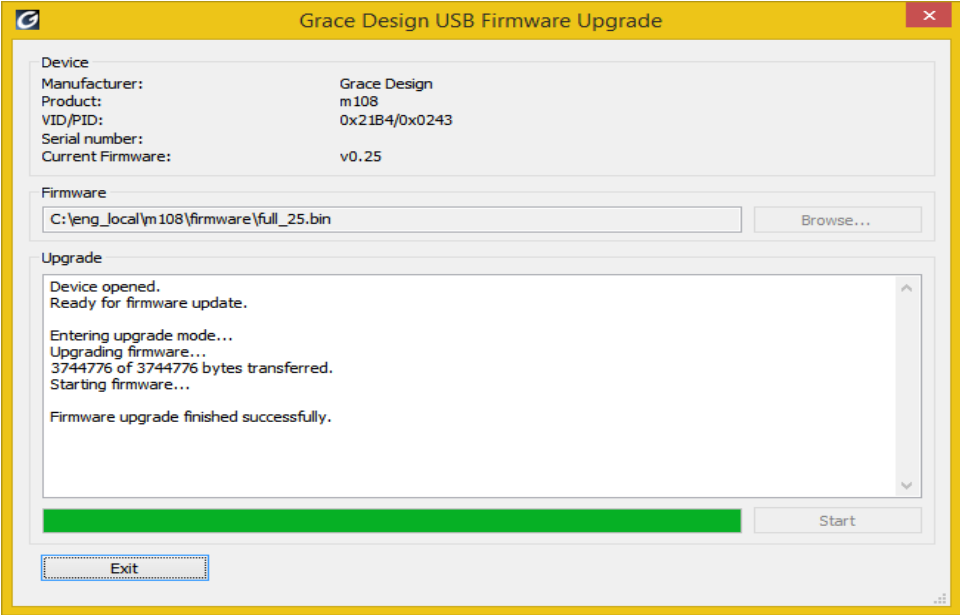

10. Click "EXIT" to close the firmware upgrade application.

(continued)

11. Power cycle the m108 and the m108 will update the system with the newly downloaded firmware. The front panel display shows the previous and new version numbers during this process. As long as the progress line is moving across the screen, the system is busy updating. This will take several minutes to complete. DO NOT DISCONNECT THE DEVICE OR INTERRUPT POWER TO THE m108 WHILE THIS IS IN PROCESS.

NEW FIRMWARE DOWNLOADED
UPDATING SYSTEM
v. 0.14   -->   v. 0.25
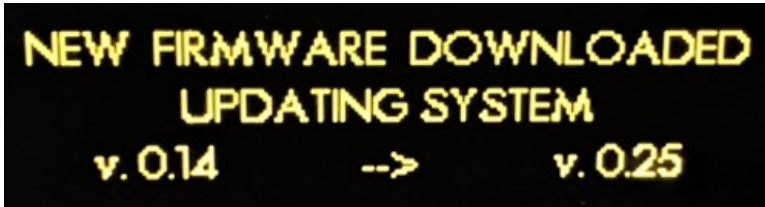
12. Once the system update is completed, the m108 will prompt you to restart the preamp.

SYSTEM UPDATE COMPLETE
PLEASE RESTART YOUR PREAMP
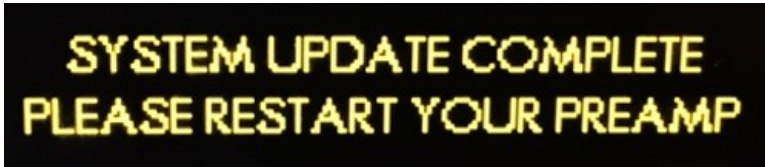
13. Should the firmware upgrade fail, start the process over again.

15   Specifications

MICROPHONE PREAMPLIFIER – Analog IN to Analog OUT		
Frequency Response		
@ 40dB gain ± 0.2dB (50Ω source)		15Hz-300kHz
@ 40dB gain ± 3dB (50Ω source)		4.5Hz-1.0MHz
THD+N		
@ 20dB gain +20dBu out, 1kHz		<.0003%
@ 40dB gain +20dBu out, 1kHz		<.0010%
@ 60dB gain +20dBu out, 1kHz		<.0080%
Intermodulation Distortion		
@ 40dB gain +20dBu out		
SMPTE/DIN 1:1 (50Hz, 7kHz)		<.001%
SMPTE/DIN 4:1 (50Hz, 7kHz)		<.0020%
Noise - Referred to Input		
@ 60dB gain, 50Ω source		-129dB
@ 60dB gain, 150Ω source		-127dB
@ 60dB gain, 600Ω source		-123dB
Phase Deviation		
40-20KHz @ 40dB gain		<5°
Crosstalk		
Any Channel @ 40dB gain 1kHz		-127dB
Any Channel @ 40dB gain 10kHz		-113dB
CMRR		
@ 60dB gain, +20dBu CM, 1kHz		>75dB
@ 60dB gain, +20dBu CM, 10kHz		>85dB
@ 60dB gain, +20dBu CM, 60Hz		>55dB
Maximum Output Level		
Balanced, 1kHz, 100kΩ Load		+27dBu
Balanced, 1kHz, 600Ω Load		+23dBu
Unbalanced, 1kHz, 100kΩ Load		+21dBu
Impedance		
Input	Ribbon Mode (+48V OFF)	19kΩ
Input	+48V ON	8kΩ

(continued)

A/D CONVERTER - All measurements at 15dB Gain, Fs=48kHz unless otherwise noted.		
Dynamic range		
22Hz-24kHz, 14dB Gain, 48kHz		>117dB
"A" weighted, 14dB Gain, 48kHz		>120dB
THD+N		
1kHz, -1dBFS, 15dB Gain 20Hz-22kHz		< 0.0004%
Intermodulation Distortion		
IMD SMPTE 4:1 60Hz, 7kHz, -3dBFS		<0.002%
Frequency response	+/-0.2dB	-3dB
44.1kHz Fs	15Hz-21kHz	6Hz-22kHz
48kHz Fs	15Hz-23kHz	6Hz-24kHz
88.2kHz Fs	15Hz-41kHz	6Hz-44kHz
96kHz Fs	15Hz-45kHz	6Hz-48kHz
176.4kHz Fs	15Hz-54kHz	6Hz-72.5kHz
192kHz Fs	15Hz-59kHz	6Hz-79kHz
Full scale input level, analog output @ 0dBFS		+24dBu
Crosstalk		
Interchannel crosstalk, 1kHz		< -140dB
Interchannel crosstalk, 10kHz		< -130dB
Group Delay , AES3 Out		<22/Fs
44.1kHz Fs		<0.5ms
48kHz Fs		<0.5ms
88.2kHz Fs		<0.25ms
96kHz Fs		<0.25ms
176.4kHz Fs		<0.13ms
192kHz Fs		<0.13ms

(continued)

DA CONVERTER/Headphone Amplifier - All measurements at Fs=48kHz unless otherwise noted.		
THD+N		
0dBFS In, Volume + 90, +8dBu Out, 22Hz-22kHz BW		<0.0006%
0dBFS In, 1.0V Out (31mW), 22Hz-22kHz BW, 32Ω load		<0.0025%
Intermodulation Distortion		
SMTPE/DIN 4:1 50Hz, 7kHz, 1.0V out, no load		<0.008%
SMTPE/DIN 4:1 50Hz, 7kHz, 1.0V out, 32Ω load		<0.008%
Frequency response		
Fs=96kHz , ±3dB		0.5-45.9kHz
Fs=96kHz , ±0.2dB		0.5-45.9kHz
Dynamic Range		
20-22kHz bandwidth		112dB
20-22kHz bandwidth and A weighting filter		115dB
Output Noise		
20-22kHz, volume=0-90		-104dBu
A weighting filter, volume = 0-90		-106dBu
20-22kHz, volume=90.5-99.5		-97dBu
A weighting filter, volume = 90.5-99.5		-100dBu
Crosstalk		
1kHz		<98dB
20kHz		<72dB
Attenuation Range		0 to -99dB, 0.5dB steps
Channel Tracking Accuracy		+/-0.05dB
Maximum Output Level		+18dBu
Impedance		
Headphone Output Impedance		0.5Ω
Control Room Output Module Line Output		47.5 Ohms

(continued)

Control Room Output Module

Frequency Response	
± 0.2dB	15Hz-300kHz
THD+N	
@ High gain +15dBu out, 1kHz	<0.0007%
@ Low gain +5dBu out, 1kHz	<0.0010%
Intermodulation Distortion SMTPE/DIN 4:1 (50Hz, 7kHz)	
@ High Gain, -10dBFS, +15dBu out	<0.0020%
@ Low Gain, -10dBFS, +2dBu out	<0.0020%
Output Noise 22-22kHz	
@ High Gain,	-90.0dB
@ Low Gain	-97.0dB
Crosstalk	
@ High gain, 1kHz, Bandpass response	-120dB
@ Low gain, 1kHz, Bandpass response	-120dB
Maximum Output Level	
High Gain Mode, Balanced, 1kHz, 100kΩ Load, 0dBFS	+23.5dBu
Low Gain Mode, Balanced, 1kHz, 100kΩ Load, 0dBFS	+14dBu

Clocking and general

|	
Supported Sample Rates kHz	44.1, 48, 88.2, 96, 176.4, 192
External Clock Lock Range	FS ± 1.5%
Intrinsic Jitter, 10Hz-20kHz BW	
Internal Clock	< 40ps RMS
External Clock	< 40ps RMS
Jitter Rejection Corner Frequency	500mHz
Weight and Dimensions	5.2lbs (2.3kg), 1U rack mount W16.75 x D10"
Power Consumption	
90-250V~ 50-60Hz	25 Watts

16   Block Diagram
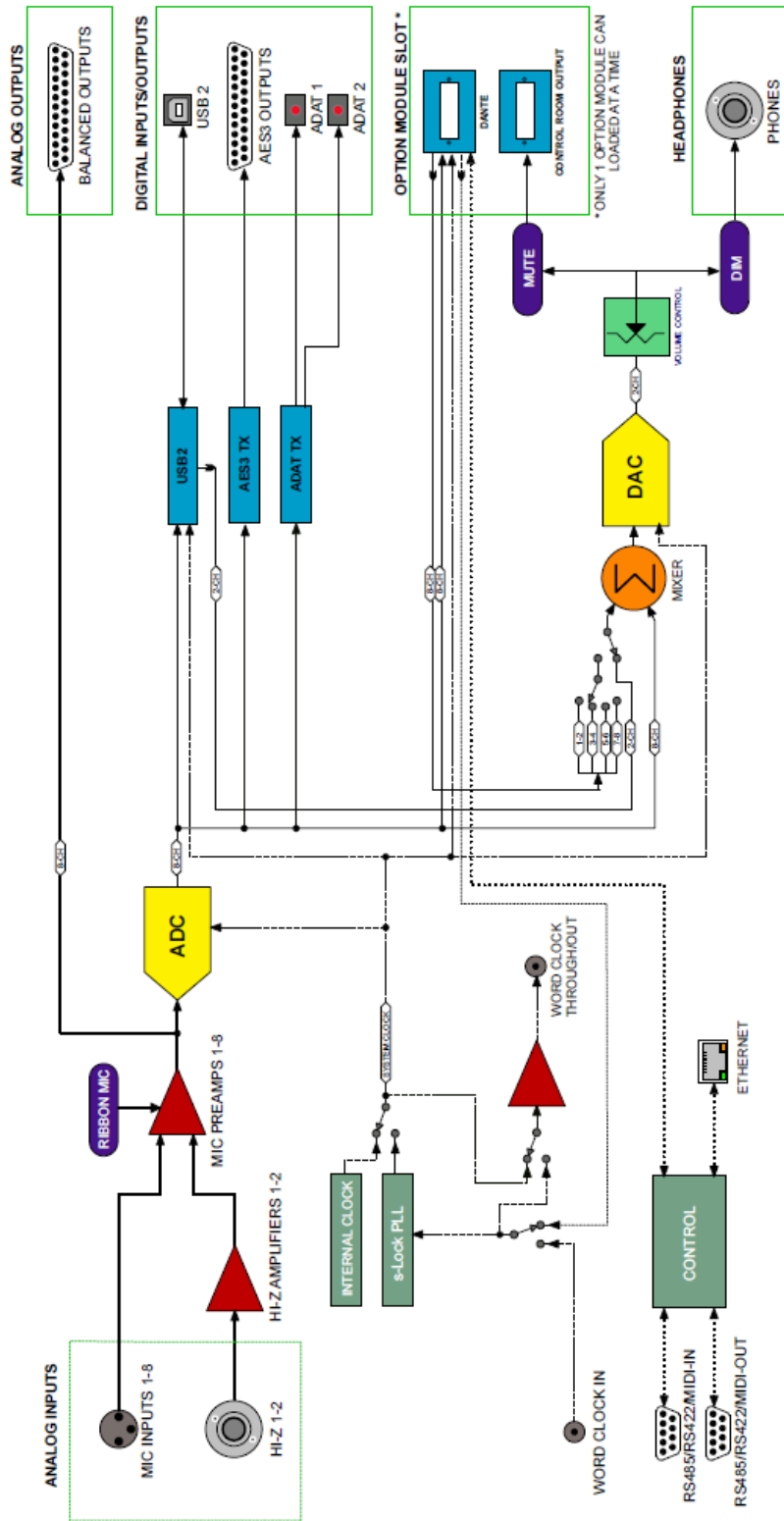
17   Cable Diagrams

17.1 Control Room Output

The Control Room Output option module utilizes a pair of balanced Tip-Ring-Sleeve (TRS) 1/4" jacks for the Left and Right outputs. For proper operation when connecting to an unbalanced input the Ring terminal should be connected to Ground as shown below. (Note: Connecting a Tip-Sleeve plug to the m108 also accomplishes this):
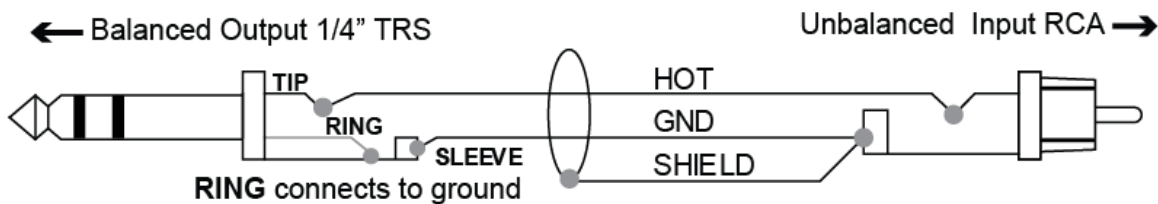
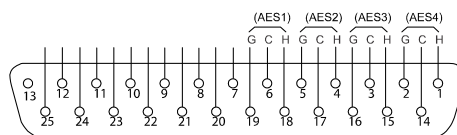Ground the Ring connection on m108 Control Room Output for unbalanced operation

17.2 DB25 pinouts

DB25 Analog Output Connector
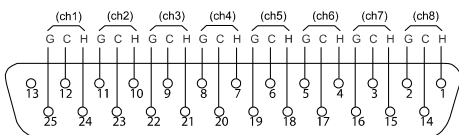
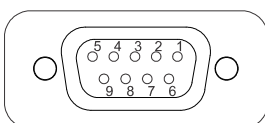H = HOT(+)   C = COLD(-)   G = GROUND

DB25 Digital Output Connector
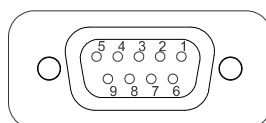
H = HOT(+)   C = COLD(-)   G = GROUND

17.3 DB9 pinouts

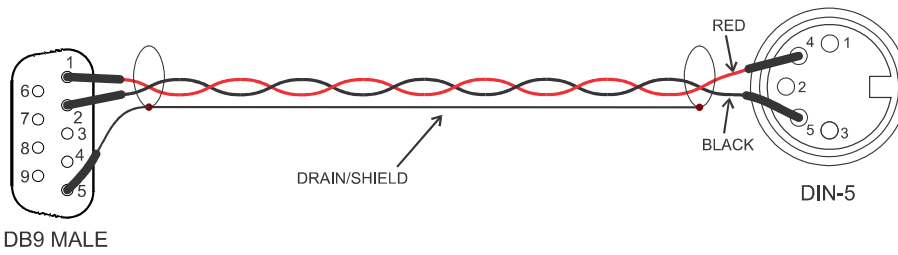m108 **preamplifier** DB9 pinout
REMOTE / MIDI IN

1 MIDI IN+
2 MIDI IN-
3 RS485 / RS422 TX-
4 RS422 RX-
5 Chassis GND
6 RS485 / RS422 TX+
7 RS485 / RS422 GND (GND-ISO)
8 RS422 RX

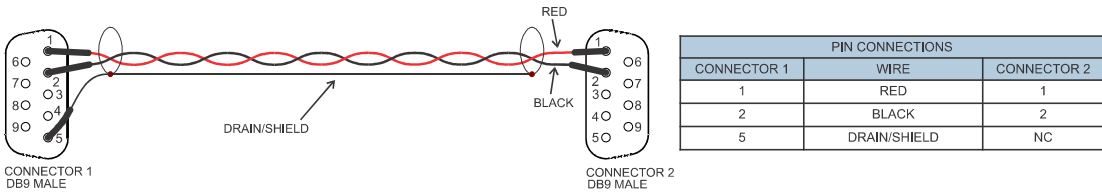m108 **preamplifier** DB9 pinout
REMOTE / MIDI OUT

1 MIDI OUT+
2 MIDI OUT-
3 RS485 / RS422 TX-
4 RS422 RX-
5 Chassis GND
6 RS485 / RS422 TX+
7 RS485 / RS422 GND (GND-ISO)
8 RS422 RX+
9 N/C

17.4 MIDI breakout cable

PIN CONNECTIONS		
DB9 MALE	WIRE	DIN-5
1	RED	4
2	BLACK	5
5	SHIELD	2

17.5 MIDI jumper

PIN CONNECTIONS		
CONNECTOR 1	WIRE	CONNECTOR 2
1	RED	1
2	BLACK	2
5	DRAIN/SHIELD	NC

18 Warranty Information

- Grace Design warrants this product to be free of defective parts and workmanship for a period of five years. This warranty period begins at the original date of purchase and is transferable to any person who may subsequently purchase the product during this time.

- This warranty excludes the following conditions: normal wear and tear, misuse, customer negligence, accidental damage, unauthorized repair or modification, cosmetic damage and damage incurred during shipment.

- During the time of this warranty, Grace Design will repair or replace, at its option, any defective parts or repair defective workmanship without charge, provided the customer has appropriate proof of purchase and that the product has its original factory serial number.

- In order for Grace Design to provide efficient and timely warranty service, it is important that you mail the completed warranty registration card enclosed with all of our products within 10 days of the original date of purchase. You may also register your product directly with Grace Design by telephone (303-823-8100 Monday-Friday 9:00am to 5:00pm MST), or you can register your product online at www.gracedesign.com.

- This warranty is in lieu of all other warranties whether written, expressed, or implied, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

- In no event will Grace Design be liable for lost profits or any other incidental, consequential or Exemplary damages, even if Grace Design is aware of the possibility of such damages. In no event will Grace Design's liability exceed the purchase price of the product.

- This warranty gives the customer specific legal rights. The customer may also have other rights, which vary from state to state. Some states do not allow limitations on implied warranties or consequential damages, so some of the limitations of the above may not apply to a particular customer.

19   Manual Revision History

Rev.	Description	Date	Initials
A	Initial release	07/25/16	EDG
B	Added Web Browser Control info, Added / Updated Ethernet Setup	08/31/16	JEK
B	Added Firmware Upgrade Instructions, Product Specifications, Thermal management	9/3/16	MBG
C	Add OSX version for USB operation	9/6/16	MBG
D	Added Control Room Output Module information Added Windows Driver information	11/22/16	EDG
E	Changed temperature ranges for fan operation	6/15/2017	EDG
F	Added Digilink option module information Added Firmware version 1.07 Added Table of Contents hyperlink to footer	5/22/2019	MBG