Grace Design m108

Eight-channel microphone preamplifier & A-D Converter

With remote control, USB audio interfacing and the sublime sonic performance for which Grace are known, the m108 doesn't disappoint!

HUGH ROBJOHNS

Regular readers of *SOS* will know that I've long been a fan of Grace Design; the company's products always seem to me to combine brilliant engineering with supreme technical specifications, thoughtful and pragmatic feature sets, and elegant, refined aesthetics. Such high-end design doesn't come cheap, of course, but these are the kinds of products that work so well they are never discarded, making the long-term cost-benefit ratio really very good.

Grace Design's new m108 is first and foremost an eight-channel mic preamp, but one which can be remote-controlled in a variety of ways. The design was apparently inspired by the company's flagship m801 eight-channel mic preamp and its remote-controlled sibling, the m802. However, the new m108 is also an eight-channel A-D converter, with AES and ADAT outputs, and includes a powerful reference-grade headphone amplifier with a built-in stereo monitor mixer. And if all that wasn't enough, it also boasts a class-compliant USB 2.0 interface as standard, allowing it to serve as a basic computer audio interface. Oh... and there's an expansion slot for additional I/O option cards as well, with the first being a Dante interface.

Overview

In physical terms, the m108 is a slim, 1U, rackmounting unit extending just 25cm (10 inches) behind the rack ears. It weighs a modest 2.3kg (5.2lbs) and has an internal switch-mode power supply which accepts any AC mains voltage from 90-250 Volts and consumes around 25W of power. The unit ships with a region-specific mains cable, a USB type-A to type-B cable, the manual and warranty card, a set of rubber feet (in case the unit is to be used free-standing), and a set of rack screws with insulated ferrules (to avoid ground loops).

The black front panel is very clean and elegant, with just two polished aluminium encoder knobs, labelled Volume and Edit, located either side of a crisp yellow OLED display. On the left of the front panel, two high-impedance instrument input sockets take over the first two input channels, and there is also a full-size stereo headphone socket. The reference grade headphone amplifier can be used to monitor the preamp outputs (and an external source) via a DSP-based stereo mixer.

Alongside the display are four black configuration buttons, while an illuminated rocker switch over on the right-hand side

Grace Design m108
£2995

PROS

- Excellent build quality and technical performance.
- Very clean, quiet and neutral sound, with generous headroom margins.
- Ribbon-mic mode.
- Two instrument inputs.
- Versatile analogue and digital interfacing facilities.
- Can serve as a USB audio interface.
- Optional interface modules, starting with Dante.
- High-performance multichannel A-D converter.
- Powerful reference-grade headphone amp.

CONS

- Products of this sublime calibre are never cheap!

SUMMARY

A very versatile multi-channel mic preamp with analogue and digital outputs, USB interfacing, option modules for additional formats (including Dante) and comprehensive remote-control facilities. The m108 also includes a reference headphone amplifier and built-in stereo monitor mixer, allowing it to serve as a complete computer interface system.

powers the unit. The configuration buttons are all dual-function, with their primary duties being to select phantom power, invert polarity, clear the meter peaks, and access the channel grouping (linking) functions. Their secondary functions are to mute or solo channels in the stereo monitor mixer, access the stereo mixer pan settings, or get into the unit's setup menus. Everything can be configured using the front-panel encoder knobs and buttons through a couple of simple menus on the screen, and it's all very logical and straightforward. In addition, the unit can be controlled remotely via the industry-standard serial RS485 and RS422 interfaces, or via MIDI, or Ethernet. For the last of these, there is a built-in web server which will work with any browser, although more comprehensive control is available via a dedicated (Windows/OS X) app. The MIDI implementation emulates Avid's Pro Tools HD Pre, allowing it to be controlled directly from a Pro Tools session, if desired, although other MIDI controllers can be used perfectly well, of course. The RS485/RS422 serial interfaces are compatible with Grace Design's m802 RCU controller (the latest firmware must be installed in the controller), and m108 units can be controlled alongside m802 preamps, if required.

The simplicity of the front panel belies the true power and sophistication of this product, but much more is revealed when the connectivity on the rear panel is examined. The right-hand side is much as would be expected, with eight XLR input sockets and balanced line-level analogue outputs presented on an AES59 (Tascam) format D-sub connector. All of the rest of the connectivity relates to the digital audio and remote control.

The internal A-D converter supports all the familiar base, double and quad sample rates up to 192kHz, and provides AES3-formatted outputs on a second D-sub (also conforming to the AES59 wiring standard). A pair of ADAT lightpipe sockets is also provided, and these deliver all eight channels in duplicate at base sample rates, reducing to four channels on each using S/MUX2 at double sample rates. Although the 176.4 and 192 kHz sample rates are not supported over ADAT, they are by the AES3 outputs. The internal A-D converter is aligned such that 0dBFS equates to +24dBu at the balanced analogue outputs. A pair of BNC sockets caters for word-clock in and out, and the input termination can be switched between 75Ω or a high-impedance (daisy-chain) mode.

The USB 2.0 socket allows for direct asynchronous Class-II connection to a computer or iOS tablet. In addition to the eight mic preamp outputs (at up to 24-bit/192kHz), the USB interface can return a stereo monitoring signal for auditioning at the headphone amplifier, and so the unit can serve as a basic, but very high-quality audio interface. This USB socket is also used for firmware upgrades, though only via a Windows PC at the time of writing.

Remote control connectivity is taken care of with a pair of nine-pin D-sub connectors and an RJ45 socket. The two D-subs both carry duplicated bi-directional RS485 and RS422 connections, allowing multiple units to be daisy-chained from one controller. The MIDI in and out connections are on separate D-subs and require custom break-out cables, but it is possible to link multiple units using MIDI if required. For TCP/IP network control the m108 can be set up for automatic (DHCP) or manual address allocation, and it uses a standard 100 Base-T connection.

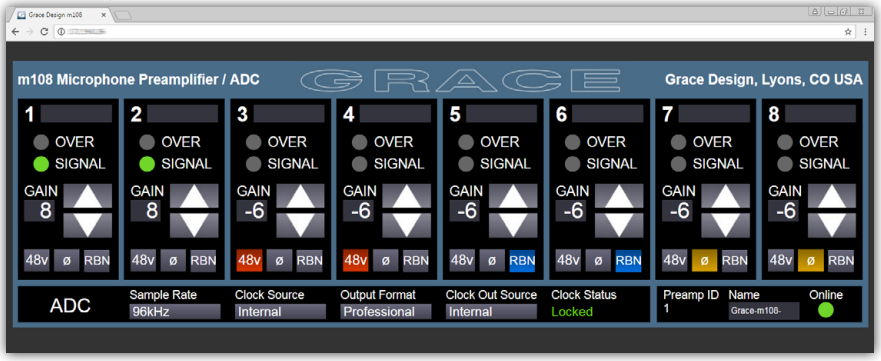
Directly above these RJ45 and nine-pin D-sub connectors is a removable plate which accesses the option slot. In the review model a Dante interface had been installed, with two RJ45 Gigabit Ethernet sockets providing redundant primary and secondary network connections. This Dante interface is apparently based around Audinate's Brooklyn II module, a popular off-the-shelf solution for several manufacturers.

In the latest version of the manual (Rev C) an alternative option module is described and this should be available by the time you read this review. It provides a pair of balanced line-level analogue outputs, intended for connection to a control-room monitoring system. When this module is installed the control room output level is determined by the headphone volume knob, but the updated firmware will apparently allow switching between the headphone and control room outputs, or enable both to be used simultaneously. This will make the m108 even more practical as a computer interface system.

Configuring For Use

When I unpacked the m108 I immediately noticed a small extraction fan built into the right-hand side panel, and my »

More than a preamp: alongside the usual XLR and D-sub analogue audio connectors there's extensive digital connectivity, including USB audio interfacing, a Dante card, word-clock in and out, and dual ADAT outputs.



The m108 can be controlled remotely via a Windows/OS X application or a web page.

» concerns rose further when I plugged the m108 in to the mains and the fan immediately ran at full speed for a few seconds, generating a lot of noise — clearly, there is a lot of heat-generating electronics in this box, but a noisy cooling fan wouldn't win it any friends! Thankfully, after the initial power-up sequence the fan stopped — the unit became blissfully quiet and it remained that way throughout the week or so I had to use this device. In fact, the fan only runs if the internal temperature exceeds 45C (113F), and even then it runs as slowly and as quietly as it can to keep the temperature within sensible limits (the fan controller has four speed modes, plus off). Provided there is good air circulation around the unit, I doubt the fan will trouble anyone — though a sensible precaution would be to avoid placing the m108 directly above other hot rack units.

After the power-up sequence, the display defaults to showing the status of the eight mic preamps (gain, phantom power, polarity, level meter and so on), with a side window on the right detailing the A-D status. A simple vertical bar-graph meter spanning a 60dB range is shown alongside the right-hand dividing line between channels, with peaks indicated by a thin horizontal bar and overloads by a larger persistent square at the top. However, in case this default layout doesn't suit, six alternative screen arrangements are available via a configuration menu (see below).

Configuring the individual preamps from the default channel screen involves turning the Edit knob to select a channel, and pressing the knob then accesses that channel's functions (the accessed channel display brightens compared with its neighbours). The Edit knob adjusts the gain (from -6 to +69 dB) in this mode, while the buttons to the left activate phantom power and polarity reverse, both being indicated with clear symbols under the numerical gain readout.

A really useful facility is provided by holding the Edit knob down for a couple of seconds, whereupon an enlarged display of the selected channel's facilities appears. The particular benefit here is a much larger horizontal bar-graph meter with proper scale markings, which makes life much easier when trying to set levels accurately. Another hidden function is accessed by holding the polarity button down for a couple of seconds — this engages a Ribbon mode, which disables the phantom power for the channel, raises the input impedance from the default 8kΩ to 19kΩ, and places an 'R' icon in the channel display.

For the first two channels, plugging an instrument cable into their front-panel sockets automatically selects the instrument input mode, with a jack-plug icon appearing in the display. The instrument input impedance is 10MΩ and the gain range is exactly the same as for the mic input (-6 to +69dB). The polarity-reversal option is still available in this mode, but phantom power is disabled.

When working with stereo or multichannel mic arrays it's very useful to be able to link the relevant channels so that their gains can be adjusted simultaneously. The m108 caters for that with a Group mode in which up to eight adjacent preamp channels can be linked using any of eight available link-groups. Logically enough, the Group mode is accessed by pressing the Group button, which then displays the selected group on the right where the A-D status is normally shown. The desired group is selected using the Edit knob, again, and then holding the Group button down allows further rotations of the Edit knob to add adjacent channels to the selected group. It's a very elegant and intuitive operation, and makes setting gains on stereo or multi-channel arrays a doddle. However, only the preamp gain settings are linked (pre-existing gain offsets between linked channels are retained); all the other facilities like phantom power and polarity must be accessed and configured individually via the channel display screen.

Stereo Monitoring

Accessing the internal stereo monitor mixer is achieved by holding the Volume knob down for a couple of seconds, at which point the display shows the first four monitor mixer channels. Again, the Edit knob scrolls across the mixer channels, calling up a display of channels 5-8 and going on to reveal dedicated Mon (return) and Master channels, as well as the monitor return and headphone source selector facilities.

Each channel's monitor mix fader setting is shown at the top of the display, accessed by pressing the Edit knob again when on the selected channel.

The fader level starts at 0dB by default (ie. no attenuation) and can be adjusted downwards all the way to off. The selected channel can also be muted or soloed using the buttons to the left of the screen, and pressing the Pan button allows the Edit knob to adjust the stereo pan instead of the fader level.

The Mon (return) source is an external input which can be selected either from the stereo USB signal being sent from the computer, or any of four stereo pairs of aux inputs which come from the option module. With the Dante module installed up to eight Dante return channels can be auditioned as four selectable stereo pairs. The Master channel controls the overall level of the monitor mixer, as might be expected, and pressing the Solo button when this master channel is selected acts to clear any solo buttons currently selected on any of the input channels. The signal feeding the headphone outputs (and control room outputs if the Control Room option module is installed) is selected in the HP-SRC section of the display, with the available source options being the stereo monitor mixer, the USB return, or any aux inputs available from the option card.

Again, this probably all sounds far more complicated than it actually is; I was happily navigating the system quite intuitively within a few minutes of turning it on, and the only facility I didn't find easily without consulting the manual was the expanded channel display mode. In general, the operating paradigm is obvious, familiar, and straightforward.

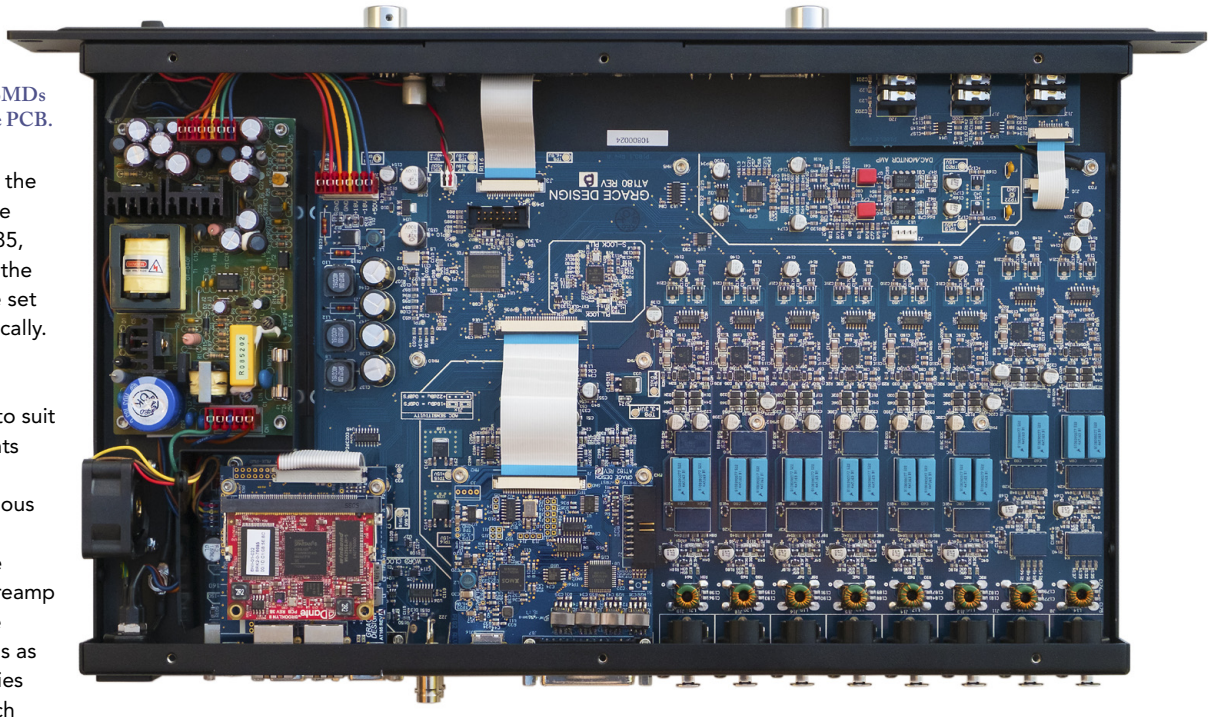
Setting the headphone listening level is the role of the Volume knob, of course, and whenever this is adjusted a 'fly-out' window pops out of the left-hand side of the display to indicate the current volume setting and headphone source selection. Pressing the knob briefly mutes or unmutes the headphone output.

Setup

To configure the m108's setup parameters, the Peak-Clr button is held down for a few seconds, revealing a new display which currently offers 16 menu options. These cover all the obvious requirements like the A-D sample rate and clock source (the A-D can also be disabled, if required), consumer or professional output format for the AES3 connection, clock output (internal or a buffered external clock), and Dante sync source (if the module is fitted). There's also a menu to set the start-up level for the headphone output (off, by default), the meter peak-hold mode (hold, decay, or off), the default display mode as well as its brightness and auto-dim duration. The individual channels can also be named, if required, as can the preamp unit itself (for multi-unit rigs), and all settings can be saved and recalled as presets. »

Alternatives

I'm not aware of any eight-channel mic preamps that exactly match the m108's features and facilities, though there are certainly parallels with **Focusrite**'s **RedNet MP8R** and **Millennia**'s **HV-3R**, both of which support networked audio and remote control. If all you need is a bank of preamps to hook up to your interface's ADAT connections, more affordable options include the **Audient ASP800**, **PreSonus Digimax DP88** and the **Focusrite Clarett Octopre**.



Lifting the lid: most of the circuitry comprises SMDs and lies on a large, single PCB.

» Further menus select the remote-control source (Ethernet, MIDI, RS485, or RS422), and allow the TCP/IP address to be set manually or automatically.

Clearly, there are a lot of options for customising the unit to suit particular requirements and preferences, but again it's all very obvious and straightforward. I particularly liked the ability to name the preamp channels, and to save specific configurations as presets — 99 memories are available, and each preset stores the preamp gain and modes, the A-D converter sample rate and clock, the monitor mixer setting, and any customised channel names. This is very useful if you have a number of frequently used configurations.

In Use

As I've already intimated, setting up and using the m108 from its front panel is straightforward, but I also tried using it as a remote-controlled unit via an Ethernet connection. Apparently the internal web server has been optimised for the Chrome browser, and after typing in the unit's IP address it all worked without any trouble, although the control functionality is a little limited. At present, for example, there's no metering beyond simple red and green lights for signal-present and overload, the instrument input mode is not indicated, and it appears to ignore any channel grouping options set up on the unit when adjusting the gains. On the other hand, the channel settings (phantom, polarity, and ribbon modes), converter sample rates, and clocking functions can all be controlled and are reported correctly.

A better network control option is available using Grace Design's dedicated OS X/Windows app. This is capable of controlling up to 12 separate m108 units (96 channels), and the most obvious difference from the built-in server option is the provision of real-time bar-graph metering, although the general layout is otherwise very similar. The instrument input mode is still not indicated, but the channel gains can be controlled in linked groups (the default offers just two groups, but more can be added via the setup tab). To save the effort of typing in the IP address each time the app is run, a complete setup configuration can be stored as a preset and recalled when the app is opened. That's useful, but it would be nice if the app reinstated its last operating setup automatically when started. However, this is the first iteration of the bespoke app and I'm sure it will be developed further in the months to come.

Apparently, there are no current plans to offer a remote control app for use via USB, presumably because the hardware isn't likely to be very remote from the user when connected that way! Although the USB 2.0 interface is class-compliant with OS X and iOS systems, a USB driver is needed for Windows, but I downloaded and installed that without any problems. The one 'trap' which caught me out for a while, though, in trying to getting audio from the mic preamp into the computer, is the need to set the sample rate to 'USB'. This is necessary to allow the computer's DAW (or other audio program) to control the unit's clocking, and no audio will reach the computer at all via the USB connection with any other sample-rate setting! This point isn't made very clear in the manual, and the function of the USB sample-rate setting is rather glossed over.

In all other respects, the m108's manual is well written and comprehensive. It also contains a very detailed set of exemplary technical specifications. I ran a few bench tests using an Audio Precision test system, just to check these figures, and in all cases I was able to achieve identical or better test measurements. For example, Grace Design's specs state an A-weighted dynamic range for the A-D converter of better than 120dB; I measured the AES17 dynamic range figure at 120.5dB (A-weighted and with 14dB of gain). This puts it slightly ahead of the Prism Lyra and Apogee Symphony, and fractionally below the Merging Hapi, Focusrite ISA card and Lynx Hilo — in other words, this is a very credible performance indeed. The unit's A-D converter is built around AKM's latest eight-channel AK5578 chip and an AK4101 handles the AES3 formatting.

Most of the electronics are contained on a large motherboard using SMD components, while smaller daughterboards are used for the front-panel controls and display, and the digital outputs. The build quality and attention to detail are excellent. The mic preamp circuitry appears to employ a trio of discrete transistors at the front end, with a THAT 1580 low-noise preamp chip delivering most of the gain, which is controlled by a THAT 5171 IC in its feedback path. The channel path also incorporates a Burr-Brown INA2137

Test Spec

Windows 7 64-bit Home Premium PC based around an Intel i7 CPU clocked at 3.1GHz, with 8GB RAM.

differential line receiver and a couple of beefy SMD transistors which I think are probably part of the monitor mixer. The balanced line outputs appear to employ Texas OPA1662 op-amps which have a high output drive capability, while the headphone section uses an AKM4490 D-A converter for its digital sources, with OPA1662 op-amps and NJM4556 high-current output drivers.

The preamp equivalent input noise (EIN) figure measured -127.3dB with a 150Ω source (20Hz-20kHz, 60dB gain), which is the same as both the m201 and m801 preamps, and on a par with most high-end preamps. The maximum signal level at the analogue line outputs is +27dBu (into a high-impedance load) and, since the digital output reaches 0dBFS with +24dBu at the line outputs there is still 3dB of headroom in the analogue circuitry when the digital side clips. Looking at the analogue path's signal bandwidth I measured the -3dB point at 5Hz and it was still ruler flat at 80kHz, the limit of my measuring system — the published specs claim the high end is -3dB at 1MHz and I don't doubt it. The high calibre of the circuit design is also demonstrated by the crosstalk figures; measured at 10kHz between adjacent channels I obtained a very impressive -131dB with 14dB of channel gain, and it still managed -108dB with 60dB of gain. The THD+N figure for the digital output was 0.003 percent (again with 60dB

"The build quality and attention to detail are excellent."

gain and with a -0.5dBFS output level). Converter latency measured around 0.4ms at 44.1kHz sample rate, and is proportionally lower at higher sample rates.

So much for the measurements; what does it actually sound like? Well, like its bigger siblings the m108 is fundamentally a very clean, quiet, and neutral-sounding preamp. It has a beautifully airy and detailed top end, complemented by a solid, extended low end, and it all sounds completely effortless and transparent. Stereo pairs delivered a very spacious and stable image and the superb analogue headroom margin combined with high-resolution converters really delivered the goods. I was at first slightly concerned that the absence of low-cut filters might lead to problems with unwanted subsonics causing intermodulation distortions, but this proved not to be the case — even when I deliberately provoked some severe LF vibrational energy! This is not a preamp for adding colour or character to a source but that doesn't mean it is bland at all; it is a reference tool that delivers precisely what the mics capture, with nothing added and nothing lost. For me that's a very big tick.

All in all, then, this is a very impressive mic preamp. It has a textbook technical performance and beautifully clean sonics, plentiful analogue and digital interfacing, multiple remote control options, an elegant operating paradigm, a solid build, and it looks very attractive, too. What more could you want or need? ■■■

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