# MICROMEGA
# M-100

## INTEGRATED AMPLIFIER/DAC/STREAMER

Micromega's M-100 Integrated Amplifier is very obviously not your ordinary integrated amplifier. This isn't only because it's not just an integrated amplifier, but also a DAC and a Streamer. It's also because it's the wrong size, the wrong shape and doesn't have the usual array of controls you'd expect to find on an integrated amplifier. So what was this famously French company thinking when it brain-stormed this design?

### THE EQUIPMENT

Whatever they were thinking, one thing is absolutely certain, and that's that the designers were thinking outside the square… a long, long way outside the square… thinking, maybe, of a flattened rectangle, or an activity aid at an aerobics step class. I suspect that when you see your first M-100, you'll either love the look, or hate it.

To help you love it, the M-100 is available in a myriad of finishes. The standard finishes are black or silver anodised aluminium (an obvious offering, as the M-100 is machined from a single block of the stuff, however Micromega has a 'Micromega Custom Finish' (MCF) program in place which allows you to specify any finish you want… you can even have it covered in leather if you like. In a conversation with Micromega's Adrien Hamdi, he revealed that at present, painted finishes are the most popular option (though, mind you, it's an option that adds $1,800 to the current RRP), with Micromega able to paint the M-100 any colour from the central European RAL colour chart. Reckoning that its French customers will own French loudspeakers, Micromega also offers to match Focal's Black Lacquer, Carrara White, Imperial Red, Electric Orange and Bleu Nogaro loudspeakers. (This isn't just a patriotic offer, it's also a commercial one, because Micromega now makes electronics for Focal, and in most countries in the world—not Australia—the two companies share distributors.) If you choose a Focal colour option, you'll save a few bucks, because Focal colours add only $1,490 to the retail price.

If you needed even more proof that Micromega was thinking outside the square when it designed the M-100, consider that it's designed to be wall-mounted. Yep, you can attach it to the wall, so if you have optioned in a bright colour, or a multi-hued finish, you'll be staring at a huge expanse of it… one that's 430mm wide and 350mm high. You will have to purchase a wall mount to do this though, and a Universal M-One wall mount costs $190 (RRP). Note that if you do mount the M-100 conventionally, watch out for the four tiny shallow-coned feet at the bottom of the amplifier, they're not actually sharp, but if you put the amplifier on a soft wooden surface, or push the amplifier over any surface, you could end up damaging and/or scratching that surface. Micromega does actually warn you about this in its manual, but it doesn't supply a manual with the M-100. You have to go on-line and download your own.

You can mount the M-100 in a conventional fashion on a shelf—though it would have to be a pretty deep shelf—or on an equipment rack. No matter which orientation you go for, you'll be able to see the information shown on the front-panel display because there are two displays, one at the 'top' of the amplifier (this being the 'top' if you're flat-mounting the M-100) and one on the thin edge of the amplifier, which would be the 'front' if you were mounting it conventionally. The 'top' display has two buttons either side of the display that are used to control all the functions on the amplifier. Because I had to send the M-100 back at the conclusion of this review I didn't wall mount it, sitting it horizontally on my equipment rack and one thing that annoyed me about the dual displays is that whenever I used the remote, the 'top' display turned off and simply showed the word 'Micromega', leaving only the 'front' display active. Maybe there's a way to stop this from happening… I certainly hope so!

How do four small buttons control all the M-100's functions?... and there are plenty of them! Once you have turned the amplifier on (top left button), the screen illuminates and the two buttons on the right become volume buttons (up/down), while the one at bottom left becomes an input source button. If you press the input source button, the screen changes, and then the functions of the four buttons also change, so you can cycle through inputs.

Other screens allow you to adjust the relative sensitivity of the inputs by up to 12dB, so the volume will stay the same when switching between components that have different output levels, adjust balance, and rename inputs (from a programmed list).

The 'front' display doesn't have any buttons. What looks like a button is actually a 3.5mm headphone jack. I would have preferred a larger, 6.35mm jack, but at least there is a headphone jack. What's more, the headphone circuitry has been implemented very cleverly, so that no matter what level you're playing your speakers, if you plug in your headphones, the volume will instantly revert to the one you last used when using your headphones, and the speakers themselves will be automatically muted. It's no ordinary headphone jack, either. In addition to using it conventionally, you can also switch between in three levels of binaural processing. If I can jump ahead of myself, I was impressed by the binaural headphone circuitry inside the M-100. It slightly softened the edges of the sound, and brought widely-panned elements into the central stage area, but was totally immersive… at least it was in the 'light' and 'strong' settings: The 'medium' setting was less so.

All the connections are made at the rear of the amplifier, and the rear panel is recessed, so that the top and sides of the aluminium extrusion extend beyond it by 60mm. This makes it more difficult to access all the connectors on the rear panel, but it makes it possible to hide all the cables from sight if you're wall-mounting the amplifier, or even if you're sitting it flat.

On the recessed rear panel you'll find an unbalanced line input (via RCA terminals) and a balanced line input (via XLR terminals). There's also a phono input whose gain is switchable for use with either moving-magnet or moving-coil cartridges. So that's three 'analogue' (more about this later) inputs in total. Then there are the digital inputs: one coaxial (RCA), one optical (Toslink), one AES/EBU (via XLR) and one USB (B-type). There's also an Ethernet port. (If you load the free Micromega app onto your smart phone—iOS or Android—you'll be able to play internet radio and networked files via UPnP/DLNA.)

The coaxial and AES/EBU digital inputs will do any sampling rate or bit configuration up to 32-bit/768kHz and the M-100 can handle PCM DSD and DSD over PCM (up to 11.2MHz DSD); the optical input is capable of up to 24-bit/192kHz. There are two USB-A slots on the rear panel. One is to allow firmware updates, plus can also be used to replay music stored on a stick or a drive (though a firmware update is required). The second USB-A slot is so you can plug in a USB 'dongle' associated with the 'M.A.R.S.' circuitry.

M.A.R.S. stands for Micromega Acoustic Room System and it's an equaliser that's designed to compensate for acoustic deficiencies in your room and in your loudspeakers. Unlike many programs, it doesn't offer much in the way of customisation: there are only two equalisation curves to choose between. One aims to eliminate room effects for you, and also make the frequency response of your speakers as flat as possible, while the other just aims to eliminate room effects, and leaves the frequency response of your speakers pretty-much as the designer of those speakers intended.

If you order the M.A.R.S. option, you'll not only get the essential USB key that activates the M.A.R.S. circuitry, but also a mini-tripod, a threaded microphone holder, a long high-quality cable and a Dayton Audio EMM-6 precision electret condenser measurement microphone. (Hence the reason for the provision of a microphone input above the ground terminal on the rear panel of the M-100, which I didn't mention earlier, because it wouldn't have made sense until you'd learned about the M.A.R.S. option. It's this that you plug the EMM-6 into, so the M-100 can then use it to measure your room. My review sample didn't come with the M.A.R.S. option fitted, but if you do order it, it will cost you an additional $1,490 if you order it pre-installed, and an additional $1,990 if you decide to add it afterwards.

The two sockets which look like they're HDMI sockets are reserved for future use with I2S data streams (as are already used internally prior to the DAC), and as a final digital bonus the M-100 offers Bluetooth streaming, with the aptX codec available for so-called 'near-CD' quality lossy compression if your sending device also supports aptX.

Also on the rear panel are balanced XLR pre-outputs, a subwoofer output, a pair of control triggers and a giant set of speaker terminals. I say 'giant' because they're larger than what I normally see—great huge blocks of gold-plated metal that can accommodate bare cable, banana plugs or spade connectors.

## INTERNAL CIRCUITRY

The M-100 is so narrow that I suspected the company might be using Class-D circuitry, but I was wrong. In fact, from the vehement anti-Class-D diatribe contained in the White Paper that's downloadable from Micromega's website, I don't imagine the company will be building an amplifier with a Class-D output stage anytime soon!

However, the power supply for the M-100 is not a conventional linear type, but a switch-mode power supply (SMPS) of a type Micromega calls a 'resonance power supply' or 'LLC' that has a switching frequency of between 90kHz and 120kHz which puts the rectified components up at around 200kHz and higher.

One thing Micromega's White Paper does not make clear is that although the output stage of the M-100 is analogue, the signal path *through* the amplifier is *not* analogue, because all internal processing is done in the digital domain: any signal you apply to any of the analogue inputs (XLR, RCA or Phono) will be converted to 24-bit/96kHz PCM at the input and only converted back to analogue just prior to the final amplifier stage.

As for the output of that analogue output stage, Micromega rates the output power of the M-100 at 100-watts per channel both channels driven into 8Ω loads and 200-watts per channel both channels driven into 4Ω loads. The heat from the Thermaltrak output transistors is dissipated by a tunnel and fan system that does not operate all the time, but is whisper-quiet when it is operating.

## LISTENING SESSIONS

Before you start listening I'd recommend you download Micomega's control App. When I loaded it onto my phone it found the M-100 immediately and offered easier access to various settings and adjustments you can make to the circuitry than I thought was possible using the front panel controls, plus it allows easy renaming of the inputs, rather than simply selecting from a preset list. For music operations it accesses internet radio, includes a good search option and accesses podcasts as well as live stations, and you can go to 'Audio Server' to play from UPnP and DLNA shares on your network.

If you'd rather not use your phone to control the system you can instead use the remote control Micromega supplies with the M-100. Micromega was also thinking outside the square when it designed this remote, because it's nothing like you'd expect a remote to be, not least because its size, shape and the location of the buttons on it make it very difficult (I won't say impossible, but I was tempted) to use the remote with just one hand—you have to hold onto it like you're controlling a drone.

My listening sessions started out with my favourite black vinyl spinners, and although I was acutely conscious of the fact that although I was playing vinyl, the music was being 'digitised' on-the-fly, what I was hearing through my loudspeakers was all analogue… and very beautiful-sounding analogue into the bargain. Playing my QRP re-mastered version of 'Tea for the Tillerman' (no, I haven't yet forgiven Yusuf Islam, but I've mellowed enough to play and perform his music after a two-decade hiatus), the very first moments of *Where do the Children Play* were enough to convince me of the sonic transparency of the M-100's digital and analogue circuitry.

It wasn't just the richness and depth of the bass, but the incredible level of detail—such as hearing the sound of the pick hitting the strings just before I heard the note of the string itself, not to mention the lovely high-frequency response: sweet, airy, extended… and more gorgeous than I've ever heard it sound on CD. After seriously surprising myself that I was so happy with the M-100's performance with black vinyl, I then slowly worked through listening to all its digital inputs, a process which necessarily including evaluating everything from various streaming services right up to the latest high-res formats, and found that the longer I listened to the M-100, and the more inputs I evaluated, the more impressed I became by its performance: This is one seriously cool component! (Well not *totally* cool, the case could become warm despite the fan… which I could hear up close when no music was playing, but not from my listening position, and never when the music was playing.) And speaking of streaming, that process seemed to continue even when I switched to listen to a different input, so make sure you stop it when you're not listening if you don't want to consume bandwidth.

Listening to Takatukas' 'Red Blood', which seemed appropriate given the M-100's heritage, the M-100 delivered the wild roller-coaster-ride of sound for which the band is famous, from the trademark machine-gun drumming of Bruno Mellier to the screaming, almost ear-piercing lead guitar shredding of Gerald Ozga. It kicks in from the opener *Paranoiaque/hypochondriaque* and keeps the excitement through all 15 tracks to *Ras Kouyon*. The slam and tone of Nicolas Vitry's bass is a constant delight as well.

I was able to confirm that the M-100's performance was totally consistent across all the inputs using my library of cuts that are identical except for format, many of which are sourced from Soundkeeper Recordings. The M-100 delivered consistently silent backgrounds, extraordinary dynamics and excelled at maintaining ruthlessly accurate tonality irrespective of music genre.

## CONCLUSION

As 'all in one' components become increasingly common, manufacturers are pulling out all the stops to make sure their products stand out. Micromega has pulled out so many stops building the M-100 that you have to peer upwards to see it (literally, if you wall-mount it). Brilliantly designed, lovely-sounding, able to be optioned-up and/or upgraded and, thanks to the MCF customisation on offer, it can be as beautiful as your heart's desire. *Magnifique*! *Jules Larkin*

Readers should note that the results mentioned in the report, tabulated in performance charts and displayed using graphs or photographs should be construed as applying only to the sample tested.

### CONTACT DETAILS

**Brand**: Micromega
**Model**: M-100
**RRP**: $6,490
**Warranty**: One Year
**Distributor**: Absolute Hi End
**Address**: PO Box 370
Ormond VIC 3204
**T**: (04) 8877 7999
**E**: info@ absolutehiend.com
**W**: www. absolutehiend.com

- Feature-packed
- Does everything
- Amazing sound

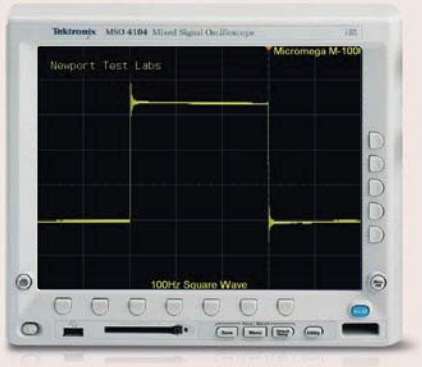
- No analog signal path
- Display switching
- Remote control

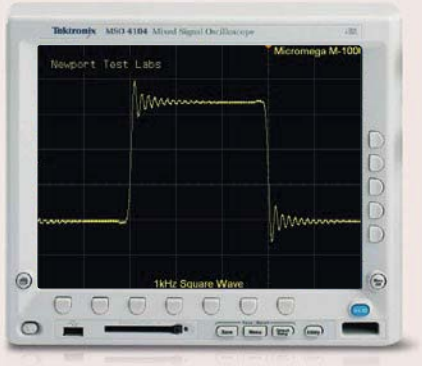
# LABORATORY TEST REPORT

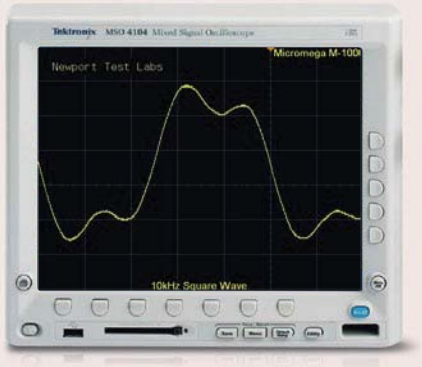
*Newport Test Labs* measured the power output of the Micromega M-100 as 108-watts per channel, both channels driven, at 1kHz and all frequencies up to 20kHz (the highest frequency measured in this test), and as 102 watts per channel both channels at 20Hz. All measurements are a little higher than Micromega's spec of 100-watts per channel into 8Ω. Measured into 4Ω loads, the Micromega M-100 only just exceeded its specification at 1kHz and 20kHz (201-watts per channel) but dropped just under specification when the test frequency was 20Hz, where it delivered 186-watts per channel, since this is just 0.3dB lower than specification, it's inconsequential. The M-100 delivered the same power output irrespective of whether a single channel was driven, or both channels, made possible in part because the amplifier uses dual power supplies, so one can't deplete the other. Good design. *Newport Test Labs* also tested the M-100 into 2Ω loads, for which it's not actually rated, but the Micromega rose to the challenge and delivered nearly 300-watts per channel, both channels driven, right across the audio band.

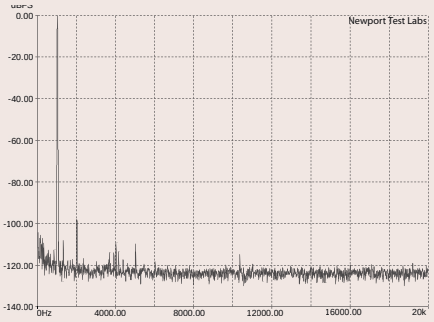
The frequency response of the Micromega M-100 is graphed in Graph 4 and tabulated in the accompanying Test Result table. Across the audio band (Graph 4) you can see the M-100's frequency response was ruler flat from 20Hz up to 2kHz. Below 20Hz it rolled off to be only 0.2dB down at 5Hz (and 1dB down at 2Hz, though this frequency was below the graphing limit) and above 2kHz it rolled off to be 0.5dB down at 20kHz and then 1dB down at 34kHz. The –3dB response extended from below 1Hz to 45kHz. Above 45kHz, the response essentially disappears, because the sampling frequency of the internal ADC is 96kHz, meaning response has to be completely rolled off by 48kHz in order to avoid aliasing.

Channel separation was excellent at

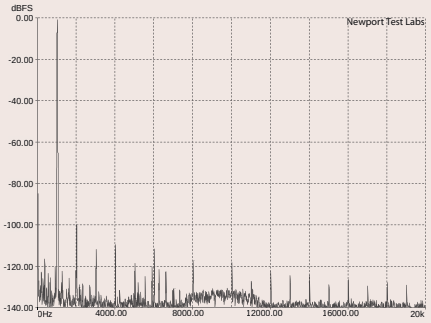


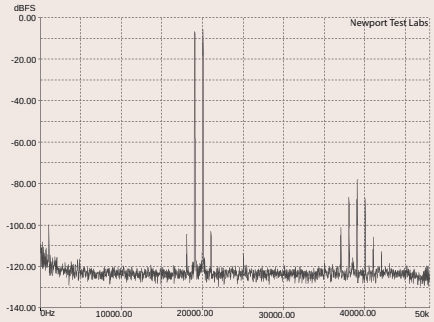





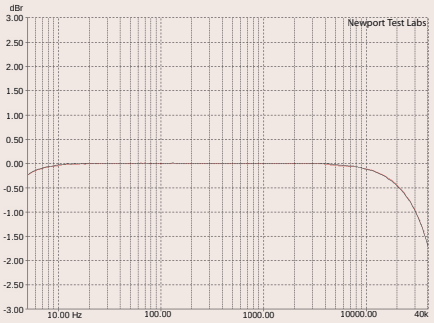

**Graph 1.** Total harmonic distortion (THD) at 1kHz at an output of 1-watt into an 8-ohm non-inductive load, referenced to 0dB.




**Graph 2.** Total harmonic distortion (THD) at 1kHz at rated output (100 watts) into an 8-ohm non-inductive load, referenced to 0dB.




**Graph 3.** Intermodulation distortion (CCIF-IMD) using test signals at 19kHz and 20kHz, at an output of 1-watt into an 8-ohm non-inductive load, referenced to 0dB.




**Graph 4.** Frequency response of line input at an output of 1-watt into an 8-ohm non-inductive load (black trace) and into a combination resistive/inductive/capacitive load representative of a typical two-way loudspeaker system (red trace).

low and midrange frequencies, as you can see from the tabulated results, but only 74dB at 20kHz, rather less than I am used to seeing from an integrated amplifier, but more than will be necessary to ensure perfect stereo imaging and channel separation. Channel phase errors were virtually non-existent, and even the largest of them (1.05° at 20kHz) would be completely inaudible. Channel balance was an excellent 0.035dB.

Distortion at an output of one watt into 8Ω (Graph 1) was very low, as you can see, with a second harmonic component at –98dB (0.0012% THD), a fourth harmonic at –110dB (0.0003% THD) and a fifth harmonic at –113dB (0.0002% THD). Note that in this case (and with all the other measurements *Newport Test Labs* made on the M-100), the results include not only the non-linearities of the analogue output stage, but also of the analogue-to-digital and digital-to-analogue converter stages. Performance into a 4Ω load (not shown) was similar but with slight increases in the levels of the 2nd and 4th harmonics, but only to –95dB (0.0017% THD) and –105dB (0.0005% THD) respectively, so hardly significant. Note the extremely low level of the noise floor over the audio band, down below 120dB referenced to 1-watt, which is outstanding performance.

Graph 2 shows distortion at rated output (100-watts) into 8Ω and you can see the M-100's performance was outstandingly good, with a second harmonic at –100dB (0.001% THD) and fourth and sixth harmonics down at around –110dB (0.0003% THD). Interestingly, a third harmonic component is obvious, so this is likely related to the output stage, but it's 113dB down (0.0002% THD) and so inaudible. Note that the noise floor across the audio band has dropped even lower, down close to –140dB. There is some low-frequency noise (the spike at the extreme left of the graph) but it's more than 80dB down. The slight anomalies in the noise floor are likely sampling-related.

Intermodulation distortion (CCIF), as measured by *Newport Test Labs*, is shown in Graph 3, and shows the two test signals (at 19kHz and 20kHz) just left of centre. The two sidebands at 18kHz and 21kHz are both around 110dB down (0.0003% THD), and the unwanted regenerated difference signal at 1kHz is 100dB down (0.001% THD). The signals up around 40kHz are likely to be a mixture of sampling artefacts and second harmonic distortion components, but are so high in frequency and so low in level that they can be discounted.

*Newport Test Labs* measured the signal-to-noise ratio of the Micromega M-100 as 81dB A-weighted referred to 1-watt and 97dB A-weighted referred to rated output. These are very good figures, that would have been even better if the lab had used a 20kHz low-pass filter, as the M-100 exhibited some ultrasonic noise that dragged down the measured figures somewhat, but is so high that it would be completely inaudible to the human ear.

The square wave performance of the Micromega M-100 is shown for three frequencies and are 'non-typical' of an amplifier because they show artefacts (ringing) caused by the internal A-D and D-A converters. The 10kHz wave is severely compromised because the essential internal filtering eliminates the higher-order harmonics necessary to create a high-frequency square wave, because only four components 10kHz, 20kHz, 30kHz and 40kHz are available, hence the almost-sinus shape of the waveform.

Considering that the measured performance of the M-100 takes into account A-D and D-A conversion as well as amplification to 100-watts (8Ω) and 200-watts (4Ω) per channel, my conclusion is that the M-100 delivered an outstanding level of performance on the test bench. *Steve Holding*

## Micromega M-100 Integrated Amplifier – Laboratory Test Results

| Test | Measured Result | Units/Comment |
|---|---|---|
| Frequency Response @ 1 watt o/p | 2Hz – 34kHz | –1dB |
| Frequency Response @ 1 watt o/p | <1Hz – 45kHz | –3dB |
| Channel Separation (dB) | 108dB / 101dB / 74dB | (20Hz / 1kHz / 20kHz) |
| Channel Balance | 0.035 | dB @ 1kHz |
| Interchannel Phase | 0.02 / 0.05 / 1.05 | degrees ( 20Hz / 1kHz / 20kHz) |
| THD+N | 0.01% / 0.0002% | @ 1-watt / @ rated output |
| Signal-to-Noise (unwghted/wghted) | 77dB / 81dB | dB referred to 1-watt output |
| Signal-to-Noise (unwghted/wghted) | 94dB / 97dB | dB referred to rated output |
| Input Sensitivity | 136mV / 1.36V | (1-watt / rated output) |
| Output Impedance | 0.02Ω | at 1kHz |
| Damping Factor | 400 | @1kHz |
| Power Consumption | 2.58 / 44.71 | watts (Standby / On) |
| Power Consumption | 62.83 / 337 | watts at 1-watt / at rated output |
| Mains Voltage Variation during Test | 235 – 253 | Minimum – Maximum |