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PERREAUX 200iX

INTEGRATED AMPLIFIER

Despite having one of the smallest populations in the world, New Zealand — or Aotearoa in its native Maori language — is renowned for punching well above its weight. So despite being the last country in the world to be inhabited by humans (c1320), it was the first country in the world to permit women to vote (1893). New Zealand's population is so small that it is outnumbered by its fleeced population, with almost nine times more sheep in the country than Kiwis. I mention this not only because it is a fact, but also because the video on Perreux's website that itemises the 200iX's many features has the sound of sheep baa-ing in the background as a reminder.

And anyone wondering about exactly what a Kiwi might be, it's a flightless bird that is the national symbol of New Zealand and is native to it, but the word is also used self-referentially by most people born in New Zealand, so they'll say 'I'm a Kiwi' rather than 'I'm a New Zealander'. This wasn't always the case. Apparently the descriptor only came into being after the First World War, during which Australian soldiers (called 'Diggers') started calling their New Zealand comrades 'Kiwis' and the name stuck.

New Zealand/Aotearoa (the literal meaning of the country's Maori name is 'land of the long white cloud') also punches well above its weight in the field of audio, being home to two of the most famous audiophile amplifier manufacturers in the world, the names of which co-incidentally begin with the same letter of the alphabet — Plinius and Perreux. However, whereas Plinius was named to honour Pliny the Elder, a Roman author, naturalist, and natural philosopher, as well as naval and army commander of the early Roman Empire, and a personal friend of the emperor Vespasian, Perreux was so-named because it was founded by Peter Perreux.

Perreux established his company in 1974 in Hawke's Bay, Napier, on the east coast of New Zealand's North Island, and he was one

of the first amplifier manufacturers in the world to use the then-new Hitachi MOSFETs in his output stages. His MOSFET-based amplifiers were so successful that he rapidly expanded from being a one-man operation into a multi-million dollar business that in 1987 was exporting integrated and power amplifiers to 17 countries.

Perreux sold his company to Martin Van Rooyen in 1995, who moved it down to Mosgiel on New Zealand's South Island before retiring. The company is still in Mosgiel but is now owned by electronics engineer Edwin Nieman, the founder of the award-winning Dunedin-based electronics design company Kamahi Electronics where he heads a team of nearly two dozen

New owner Nieman continues to champion the use of MOSFETs in Perreux amplifiers

electronics engineers. Nieman continues to champion the use of MOSFETs in Perreux amplifiers, though he admits that they are costly devices that make life difficult for audio amplifier designers. "They are more difficult to drive than simple transistors," he says, "so you need to master the art of controlling them. There's also the problem that the good ones are expensive, which is why you rarely see MOSFETs in cheaper amplifiers."

THE EQUIPMENT

You don't need me to tell you what's unique about Perreux's new 200iX. The lead photograph does that. There aren't a great many gloss white amplifiers in the world. There are even fewer gloss pink ones. Or gloss orange, or gloss red, or gloss lime green ones... and these are only some of the standard

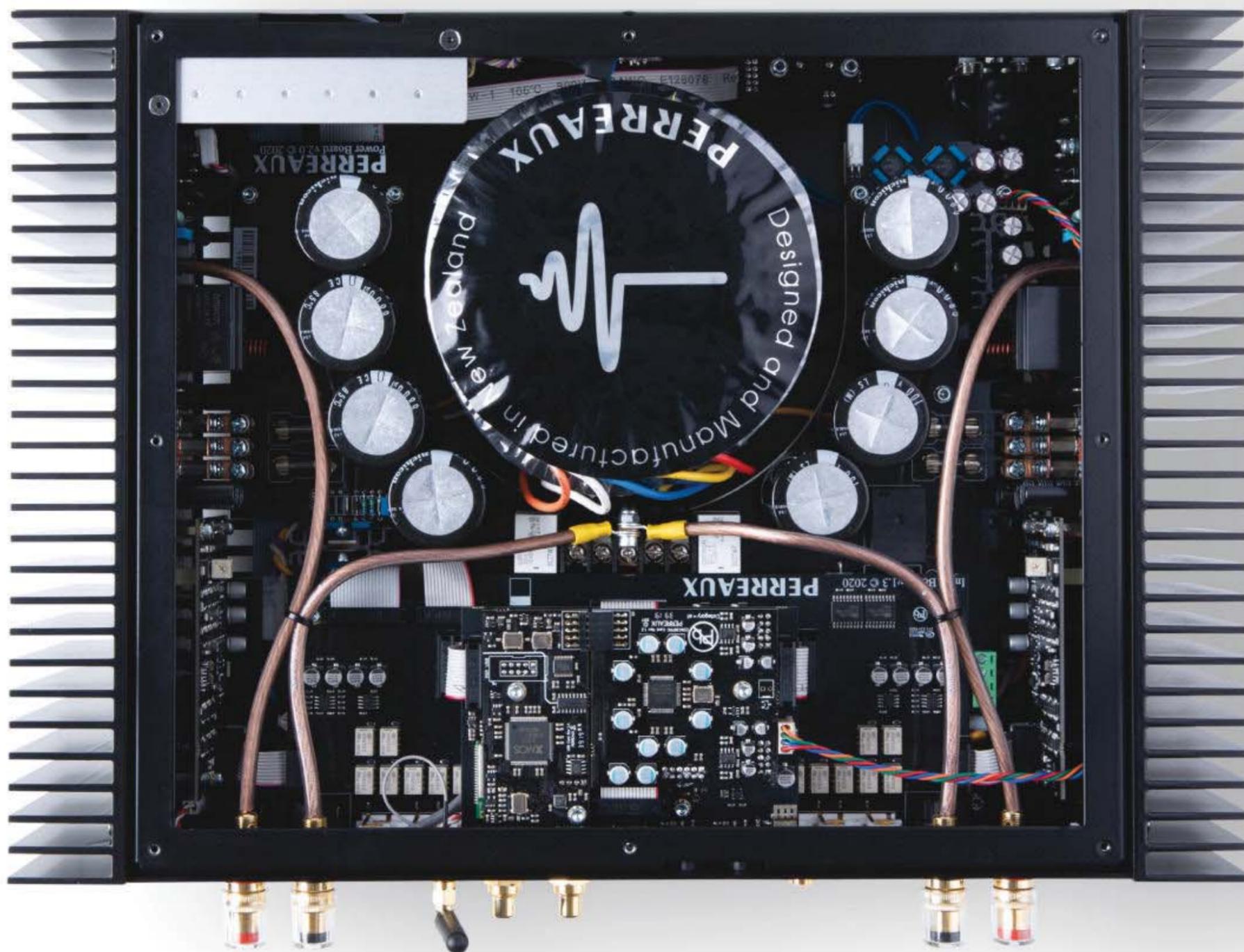
colours in which you can buy a 200iX. And if none of these colours suit, you can order one "in any colour of your heart's desire — or black," says the company's website.

However, whatever colour you decide on, you should note that the heat-sinking fins that run down the entire length of both sides of the amplifier will always be black, as will the rear panel. (And the underside, for that matter, though this is hardly relevant.) And do not be tempted to paint these yourself. Black is the most effective colour for dissipating heat, and the two sets of heatsinks on the 200iX have to dissipate a lot of it, because the 200iX has a rated output of 230-watts per channel into 8Ω and 400-Watts into 4Ω. Each heatsink is 300mm long, 85mm high and 40mm deep and has 29 'fins'.

You, like me, might be wondering why, since Perreux's model numbers usually reflect the amplifier's power output (the 80i delivers 80 watts per channel, and the 100p delivers 100-watts per channel) the 200iX is not called the 230iX to reflect the power output assigned to it in its specifications sheet. I have no idea why not, so this is a question you should ask of Paul M. Sammes, Perreux's Global Sales & Marketing Manager [paul@perreux.com]

It is, however, important to note that the Perreux 200iX will deliver these high power levels into 8Ω and 4Ω loads only if the amplifier is in its default 'High Impedance' mode. The 200iX is fitted with a user-selectable 'Low Impedance' mode which reduces the internal power supply rail voltage which in turn allows the amplifier to operate continuously into loudspeaker loads as low as 1Ω, though the reduced rail voltage means that the power output available when driving 2Ω will be reduced to around 100-watts per channel and to around 50-watts per channel when driving 4Ω loads.

Perreux says that the 200iX will drive speaker impedances of 2Ω or less even if it's in its default 'High Impedance' mode, but if operated at continuously at high listening volumes into such loads, the amplifier will "generate excess heat and may enter protect mode."



However, if you choose to use the 'Low Impedance' mode, the 200iX's power output into higher speaker impedances will also be affected, effectively limited to less than 40-watts per channel for impedances of 8Ω and higher.

You might initially imagine that, after spotting the amplifier because of its unusual colouring, visitors to your home might have no difficulty identifying the manufacturer of your amplifier due to the fact that the Perreaux name is engraved on the front panel in lettering that's 15mm high and 115mm long. There's also a huge Perreaux 'Impulse' logo engraved on the top surface of the amplifier that is 150mm high and 162mm long.

A very powerful, high-performance amplifier with very low distortion and also with very low noise levels

In fact, despite the size of the name and the logo, neither one of them is particularly obvious because there is no contrast between the engraved letters/logo and the background colour: At least there wasn't with my review sample, which was finished in gloss white. It may be more obvious in one or more of the other optional colours.

When you are considering which colour you'd like your amplifier, you should take into account that the 6.35mm (¼ inch) headphone socket on the front panel will always be black (I would have thought using a gold-plated socket would have been a better choice). This means that the headphone socket looks great on green and red models, would be invisible on black models, but is very obvious on white models (and likely on a few other colours as well). Also consider that the five small buttons underneath the front panel display will also be black, no matter what the colour of the amplifier.

Since I have mentioned the headphone socket, it's probably a good time to also mention that whenever you plug a headphone jack into it, the amplifier will automatically mute the loudspeakers and whatever volume level you were listening at will be reset to -50dB (at least it will if you're using the amplifier's default volume settings).

If you then pull out the headphone jack, the speakers will unmute and starting playing, but not at the level you were originally listening, but instead at whatever level you set the default volume 'turn-on' level to be.

All of which rather gives away the fact that the Perreaux 200iX not only allows you to set various different volume levels (Initial Volume, Maximum Volume, Mute Level and Bypass amongst them) but also allows you to specify whether you'd like the amplifier to 'ramp' the volume up (or down) to a particular level setting, or instead switch instantly from one level to another.

Regarding the Mute Level, you can set the degree of muting to be -10dB, -20dB, -30dB, -40dB or infinite, plus you can also set the mute ramping action to 'Off', 'Fast', 'Medium' or 'Slow'.

You can also specify volume offsets that are dependent on which input you are using, to ensure speaker volume remains the same when switching from one input to another, even if the components connected to those inputs are delivering different voltages.

Interestingly, 'maximum' volume is shown on the front panel display as +31.5dB (rather than 0dB, which I would have otherwise have expected it to be), while the

minimum is -96dB (whereas I would have expected -99.9dB).

As for the display (that shows volume level and other operational settings), it's not particularly large, (64mm wide by 32mm high) and the type on it shows as light blue against black, which is very readable despite the fairly small type (about 2.5mm high). My only complaint is that instead of using upper and lower case lettering, almost everything is in capital letters that are so 'blocky' so that the 'A's looked to me like 'R's. This means, for example, that I read 'HEADPHONE' as being 'HERDPHONE'.

The menuing system used for the display is very logical and straight-forward, which is good, because there are dozens of user-selectable options that can be selected. Choose 'Headphone' for example, and you will be shown a submenu of (top to bottom) INITIAL (start-up volume), VOLUME TRIM (default $+05.0\text{dB}$), BALANCE, IMPEDANCE ($8\text{--}250\Omega$ or $250\text{--}500\Omega$) and CLASS-A (On Demand or Always On).

There's also a 'System Info' screen that shows the Perreux 200iX's model number, serial number, build, firmware generation, and other relevant and not-so-relevant information. The DAC fitted is an ESS Sabre ES9038PRO that its maker claims is: "*the world's highest performance 32-bit solution designed for audiophile and studio equipment applications such as SACD players, Blu-ray players, digital preamplifiers, A/V receivers, studio consoles and digital audio workstations.*"

The display also shows which of the Perreux 200iX's ten inputs is selected. You can re-name any or all of these inputs, and program a volume trim and a balance trim for it. Labels can be up to 11 letters (alphanumeric) plus there's a selection of punctuation you can use including +, -, an apostrophe, three kinds of brackets — <, >, (), ., [] — an oblique/forward-slash and a full stop. Everything is UPPERCASE though, so try not to use too many As!

You can also optionally set any of the 200iX's inputs to bypass the internal volume control, and the amplifier's 'HT Loop' input is set to do this by default. However, you can disable the bypass on the HT loop so that it becomes just a standard input (in which case it becomes 'Input 4'), which essentially gives you an extra input if you're not integrating the Perreux into a multi-channel home theatre system. Very unusually, you can set the digital 'Coaxial 1' input to bypass the volume control, which will enable you to use your DAC to control the volume level in the digital domain. It may be unusual, but it is a great idea and a very welcome option!



So far as inputs are concerned, you get four line level inputs and one phono input. One of the line level inputs is balanced, the other unbalanced. There are six digital inputs (two coaxial, one USB, one AES/EBU, and two optical). You can also input signals wirelessly via Bluetooth, for which a small stub antenna is fitted to the rear panel.

Menu selection on the front panel can be selected by using the push-buttons under the display or by rotating and pressing the volume control or you can mix both control options, which makes things faster because you can use both hands, like if you were fast-texting.

You can also use the remote control that comes standard with the Perreux 200iX, rather than being an added-cost item. However, I think I would have happily paid extra for a remote if Perreux would improve the quality of the one it does supply, which is a very light-weight plastic affair that has sufficient buttons (42, shades of Douglas Adams!) to control not only the 200iX, but also other of Perreux's components.

However saving money on the remote control was likely a good choice, since I expect many audiophiles will prefer to control this amplifier with their mobile phone or tablet, which they'll be able to do thanks to Perreux's provision of apps for both iOS and Android.

The rear panel layout is initially confusing because of the way the analogue inputs are arranged. I would have put Inputs 1, 2 and 3 on the top row, and inputs 4 and 5 on the bottom row, rather than staggered them up and down, the way Perreux has done.

Perreux has got the left/right stuff correct though, because the left channel is on the right hand side of the rear panel (looking at it from the back) and *vice versa*, so your speaker cables will come out correctly and not 'cross over'. And once you get your head around where the inputs are located, you'll find that all the terminals are gold-plated (including the chassis ground screw!) and of very high quality — most especially the gold-plated speaker terminals which have clear knobs, are colour coded, and are capable of accepting bare wire, as well as bananas and spade connectors.

MOSFETS VS. BJTS

I had to make that heading a bit technical, because many people know that most amplifiers use 'transistors' in their output stages, so they usually ask the question: "Are MOSFETs better than transistors" without realising that a MOSFET *is* a transistor.

The initials stand for Metal Oxide Semiconductor Field Effect Transistor. The question they should have asked is: "Is a Metal Oxide Semiconductor Field Effect Transistor better than a Bipolar Junction Transistor?"

Unsurprisingly, the answer will depend on who they ask.

If they ask an audiophile, they'll likely get told that MOSFETs are better than BJTs because MOSFETs "sound better because they have sonic qualities that are very similar to those of the very best valve amplifiers, with none of the drawbacks of valve amplifiers."

If they ask an electronics engineer, they'll likely get told that MOSFETs are better because they have a negative temperature co-efficient, whereas BJTs have a positive temperature co-efficient, so MOSFETs are inherently stable. He (and it's usually a 'he') will also tell them that "MOSFETs are very fast, with a much higher slew rate than BJTs."

Said engineer might also mention that in the event of a transistor failure, BJTs tend to short-circuit, which connects the amplifier's d.c. supply rail directly to the output which not only shorts out all the devices in parallel with the failed transistor, but will also 'fry' the loudspeakers. MOSFETs, on the other hand, tend to fail 'open-circuit' so there are no down-stream effects.

If the question is asked of an accountant, they'll likely get told that BJTs are better, because they're not only much cheaper to buy than MOSFETs, but you generally need a much more complex (and thus much more expensive) power supply for a MOSFET amplifier than you do for an amp that uses BJTs.

If you asked me, I'd say that the circuit design and build quality of an amplifier is more important than the type of device that's used in its output stage if we're talking solely about sound quality. It is possible to build a superb-sounding amplifier no matter whether you use MOSFETs, BJTs... or even valves. Sure they will all sound 'different' but, if properly designed, they will all sound 'good'.

LISTENING SESSIONS

I have a little battery-powered oscillator that I often use to pre-condition amplifiers that I receive for review, so I used this to pre-condition the Perreux 200iX, but after a few hours the amplifier went into a protection mode in which a warning on the front panel display appeared with the words 'Protect! Please reset unit' in a box superimposed over the main screen.

When I reset the unit all was well for a while until it happened again. After another reset, the amplifier never went into its protection mode again over the many (eight) months I was using it, so maybe it was just a bit trigger-happy at the outset due to being brand new.

There is certainly plenty of protection built in, because the 200iX has microprocessor-controlled protection not only for the amplifier but also for your loudspeakers. This microprocessor circuitry includes protection against excessive current, over-temperature, d.c. offset and internal a.c. supply. There's also conventional fuse protection. According to Perreux, the protection circuitry is non-invasive and does not interfere with or degrade the audio signal path.

I discovered during the reset procedure that if you switch off the front panel's power button, the 200iX will come back on switched to the same source you were using, but not at the volume level it was when it was switched off, but at the volume level you've pre-programmed for switch on. I also discovered (but not in relation to this) that the balance control works in tiny 0.5dB increments all the way up to a monumental 40dB (either way) after which the display shows either LEFT or RIGHT to indicate that the other channel is effectively muted.

The amp can be handily operated in day-to-day use from the front panel, using the volume rotary, and the third and fourth of the pushbuttons in the row under the display to toggle through the inputs (the third for up and the fourth for down), while the furthest button to the right controls the Mute function. The first button brings up the Menu while the second is only used to control options in the sub-menus, and is not used at all in the main menu. However, as I said earlier, I suspect most owners will use the Perreux app to control the unit, even though it will likely be faster to use the front panel controls.

I rather liked that in addition to showing the volume as a digital display, volume level is also shown as a vertical bar (|) that slides across the screen from MIN at screen left to MAX at screen right.

That said, I have to say that you're not going to be seeing that vertical bar over towards the right hand side of the screen very much, because the Perreux 200iX is a veritable powerhouse that will easily be able to drive any loudspeakers you care to mention to volume levels far louder than your loudspeakers' designer would want you to drive them to. It's good, clean power too!

By way of example, I cranked up the volume of one of my favourite albums from last year, Turnstile's 'Glow On'. Right from the thrash start to *Mystery* (OK, pedants, it starts quietly, before the thrash kicks in) and the impact of the bass, guitars and drums is aurally startling. The speed of the 200iX is immediately apparent in the track that follows, *Blackout*. Listen to the way that when the sound stops, it stops. No overhang at all. And when it starts, it comes out of nowhere. And I just loved the fact that even though I had the volume at stun, the cleaner and more ethereal sounds were delicately reproduced. On *Don't Play* you can clearly hear that the drumming is syncopated, whereas lesser amps make it seem like a regular beat.

But if the Perreux 200iX is packed with power, it can also do delicate as I proved by listening to another of my favourites from last year, which is Yasmin Williams' delightful-sounding (and delightfully titled) album 'Urban Driftwood'. Once you get used to the sound of the string scrapes that are caused by the unusual way she plays her guitar (like a keyboard), you'll become totally captivated by the soundscapes she creates.

In opener *Sunshowers* she really does evoke an image of a sunny sky, with light rain pattering down through a rhythmic background. In *I Wonder (Song for Michael)* she separates out the melody from the



accompaniment so you can hear the singing of her strings. In *Juvenescence* the clarity of the harmonics is jaw-dropping. The delicacy and accuracy of the 200iX's delivery means not only that you're essentially hearing a live performance, but also that there's no aural effort required to listen, so you just find yourself sinking into the mood of the music so that you'll be relaxed, smiling and ready for anything by the time the closer *After The Storm* comes around. Listening to this via the Perreaux 200iX I often found myself simply sitting in silent reverie after the album finished, lost in my own thoughts, rather than moving on to play another album so I could get on with this review.

I'd never sign off on an amplifier review without listening to piano, and although I won't mention the many tried and true albums I auditioned using the Perreaux, one I would like to bring to your attention is 'Uneasy', a new 'free jazz' album by the Vijay Iyer Trio, which is pianist/composer Vijay Iyer, Linda May Han Oh (bass) and Tyshawn Sorey (percussion/multi). The 200iX delivered Iyer's stabbing, stumbling, syncopated pianistic style with unerring accuracy and a gloriously real piano sound. The ECM recording is fabulous too, not only with the piano sound, but also with the sound of Sorey's percussion and the recording acoustic (listen to those echoes!).

You may have noticed that I have not so far mentioned whether I used the Perreaux 200iX's 'Low Impedance' or 'High Impedance' mode for my listening sessions. Initially I had intended to use both modes and report on the differences, but during my sessions three of the speakers I used in conjunction with it had impedances that dipped down to 3.5Ω, 3.1Ω and 1.9Ω respectively and despite me pushing all three pairs of these speakers to very high volume levels for extended periods of time, the Perreaux drove them all brilliantly in its ordinary output mode, so I figured that if the 200iX could drive all these difficult loads in its 'High Impedance' mode, it could drive any speakers at all in this mode.

If I was impressed by the performance of the 200iX driving loudspeakers, I was absolutely blown away by its performance when it was driving headphones. So impressed was I that I hastened back to the company's website to find out what Perreaux had done to make the phono sound so impressive.

What the clever Kiwi company has done is actually build its famous SXH2 Class-A headphone amplifier into the 200iX. And not just the output stage of that device... it also built in a completely separate power supply to drive it.

It's such a massive power supply that there is a circuit inside the 200iX that puts it into a 'sleep' mode if you have not plugged in your 'phones.

What you'll hear from whatever 'phones you plug into the 200iX is tight, solid bass with not a hint of overhang, a midrange that's so ultra-smooth and linear you could be plugging your 'phones directly into the mixing desk and a deliciously sweet and refined treble. What you won't hear when you're listening is any background noise — no hiss, no hum, no noise at all, which means that combined with the power and drive of the circuit, you're getting completely unfettered dynamics.

CONCLUSION

The Perreaux 200iX is such a desirable amplifier on so many levels. It has more than sufficient power on tap to drive any loudspeakers, with plenty to spare. It's clean, distortionless sound too, with absolutely silent backgrounds. In short, it's a beautiful-sounding amplifier. But it's also an amplifier you can tailor to perfectly suit your requirements, by using the myriad control options built into it to allow you to perfectly match the 200iX to your various sources.

Then there are all the control options to consider — manual, custom remote, or from your phone or tablet. Plus, the multiple (myriad, even!) colour options mean that you can have all this high performance in an amplifier that will be uniquely yours — **there may be no other like it on the planet. Yes please!** *Colin Leith*



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- Sound quality
- Colour palette
- Flexibility



- None, really...

Readers interested in a full technical appraisal of the performance of the Perreaux 200iX should continue on and read the LABORATORY REPORT published on the following pages. Readers should note that the results mentioned in the report, tabulated in performance charts and/or displayed using graphs and/or photographs should be construed as applying only to the specific sample tested.

LABORATORY TEST REPORT

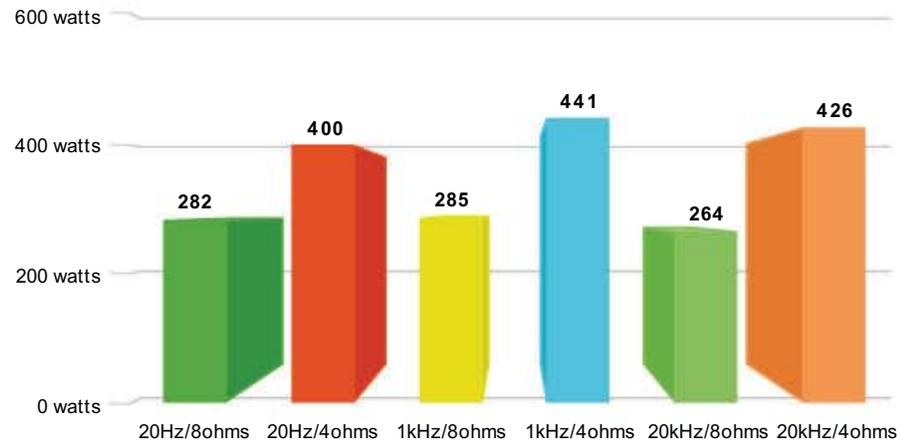
Newport Test Labs first measured the frequency response of the Perreaux 200iX and it proved to have an extraordinarily wide bandwidth, such that the lab measured it as being less than 1dB down at 1Hz and less than 1dB down at 120kHz. Using the more usual 3dB power down-points, the frequency response of the Perreaux 200iX extended from below 1Hz up to 239kHz. This is amazingly good. The frequency response across the audio bandwidth was extraordinarily linear into both laboratory test loads and into a simulated loudspeaker load, as we will discover in a moment.

Newport Test Labs then went on to measure the power output of the Perreaux 200iX, the results of which are shown in the tabulated results and in the accompanying 3D bar graphs. When just a single channel was driven into 8Ω loads, the Perreaux 200iX delivered 282-watts at 20Hz, 285-watts at 1kHz and 264-watts at 20kHz. Under the same test conditions, but with the load impedance halved to 4Ω, the Perreaux 200iX delivered 400-watts at 20Hz, 441-watts at 1kHz and 426-watts at 20kHz.

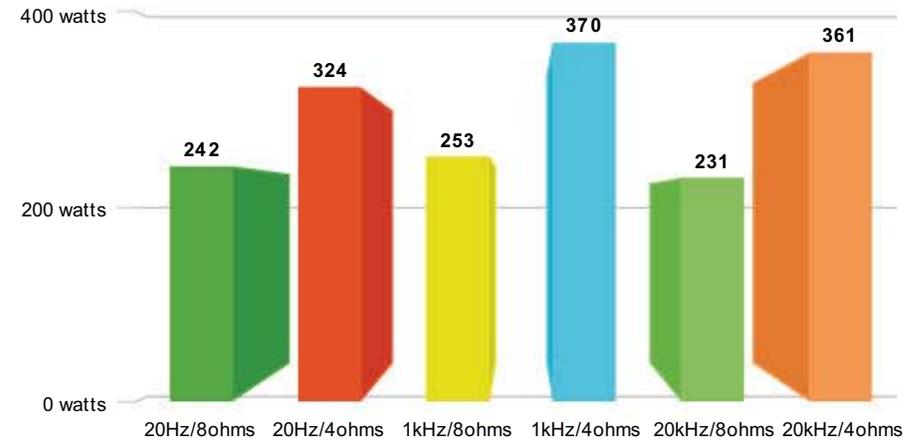
All the above results were obtained with the Perreaux in its high-impedance mode. When *Newport Test Labs* switched the 200iX to its low-impedance mode and repeated the test into three different test loads, using a 1kHz test signal, the amplifier delivered 32-watts into 8Ω, 56-watts into 4Ω and 100-watts into 2Ω. On this basis, I would have expected it to deliver at least 200-watts into 1Ω, but *Newport Test Labs* did not perform this particular test.

Power output dropped back a little when *Newport Test Labs* drove both left and right channels simultaneously, as one would expect, but the Perreaux 200iX still proved to be a powerhouse, delivering 242-watts at 20Hz, 253-watts at 1kHz and 231-watts at 20kHz into 8Ω loads, and 324-watts at 20Hz, 370-watts at 1kHz and 361-watts at 20kHz into 4Ω loads. Again, see the tabulated figures and the graphs on pages 41 and 42.

LAB REPORT



Poweroutput - Single Channel Driven



Poweroutput - Both Channels Driven

Channel separation was excellent at low and midrange frequencies (74dB at 20Hz and 77dB at 1kHz) but diminished at 20kHz to 58dB, which is still far higher than will ever be required to ensure perfect audible channel separation and imaging, but shows room for technical improvement nonetheless. Channel balance was excellent at 0.021dB, but even this tiny discrepancy could be corrected with the amplifier's built-in trim circuitry. You would never, however, perceive such a small imbalance when listening to music.

Signal-to-noise ratios were excellent, even allowing for the fact that the 200iX has both an inbuilt DAC — and DACs tend to be noisy — and an inbuilt phono amplifier and an in-built headphone amplifier.

Referenced to an output of one watt, *Newport Test Labs* measured the Perreux 200iX's signal to noise ratio at 75dB unweighted, a result that improved to 81dB with A-weighting. Referenced to rated output, the signal-to-noise ratios improved yet again, to 87dB unweighted and 96dB A-weighted. These are all excellent results.

Newport Test Labs measured the output impedance of the Perreux 200iX as being 0.016Ω at 1kHz, putting the amplifier's damping factor at 500, which is outstandingly good (about which more later when discussing the amplifier's audio-band frequency response).

Graph 1 shows the Perreux 200iX's distortion spectrum when driving an 8Ω load at an output of 1-watt with a 1kHz test signal.

The 1kHz test signal is the peak at the left of the graph referenced to 0dB. You can see that to the right of the test signal, there's essentially just a single harmonic distortion component at a level of -100dB (0.001% THD). The peaks to the left of the test signal comprise some 50Hz mains hum and harmonics and you can see they're all more than 85dB down. Overall, the noise floor is sitting down at -120dB which is excellent, of course, as it's referenced to just one-watt.

The result of using the same measurement set-up as for Graph 1, but reducing the output load impedance to 4Ω is shown in Graph 2. Distortion is still very, very low, with the second harmonic actually dropping a little in level, to -103dB (0.0007%), but the lower impedance has also resulted in the

appearance of some additional harmonic distortion components: a third harmonic at -101dB (0.0008%) a fourth at -112dB (0.0002%) and a fifth at -110dB (0.0003%). This is excellent performance.

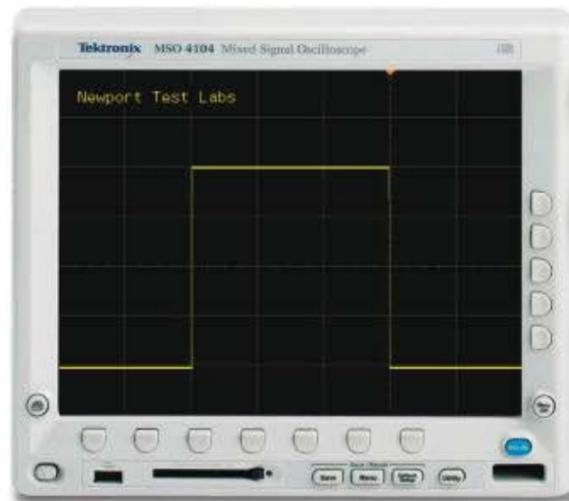
Graph 3 shows the distortion spectrum when the Perreaux is delivering 20-watts into an 8Ω load, which will be a worst-case scenario for an amplifier of its output power rating. You can see that all distortion components are more than 100dB down (0.001% THD) and most are more than 110dB down (0.0003% THD). There's a second harmonic at -103dB (0.0007%), a third harmonic at -108dB (0.0003%), a fourth at -110dB (0.0003%), a fifth at -111dB (0.0002%), a sixth at -115dB (0.0001%) and a sixth at -118dB (0.0001%).

Graph 4 shows the distortion spectrum when the Perreaux is delivering 20-watts into a 4Ω load which, if anything, is tougher than the test performed for Graph 3. You can see that the second harmonic distortion component has increased fractionally, to -98dB (0.00125%), after which there are third and fourth harmonics both down at around -110dB (0.00031%) followed by fifth and sixth harmonic distortion components down at around -115dB (0.00017%). There are some high-frequency signals present, but they're all around 120dB down (0.0001%). Note that due to the increased output power, the ratio of signal to noise has increased, so the noise floor has dropped down to average around -130dB across the audio band.

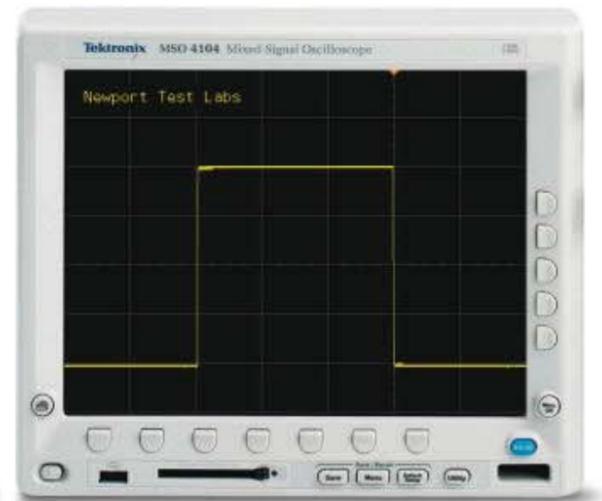
Intermodulation distortion (CCIF) at one watt is shown in Graph 5 and you don't need me to tell you that it's an outstandingly good result. The twin test signals (at 19kHz and 20kHz) are the two obvious signals on the graph. There are only two sidebands to these signals, both of which are 116dB (0.00015%) down. Fabulous! There appears to be a tiny regenerated difference signal down at 1kHz, but it's buried in the noise floor at -110dB.

Increasing output power for another worst-case CCIF-IMD test signal delivered the result shown in Graph 6. First, you can see the noise floor has dropped down as a result of the increased signal level. Interestingly, there are IMD sidebands either side of the two test signals, one at 17kHz and the other at 22kHz, but both are sitting at -120dB (0.0001%). The sidebands I'd have expected to see at 18kHz and 21kHz are buried in the noise floor down at -130dB (0.00003%). If there is a regenerated difference signal at 1kHz, it's buried in the noise floor which at low frequencies, is around -115dB.

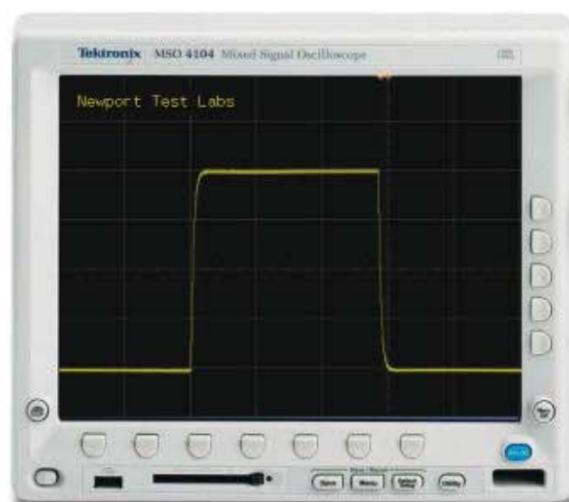
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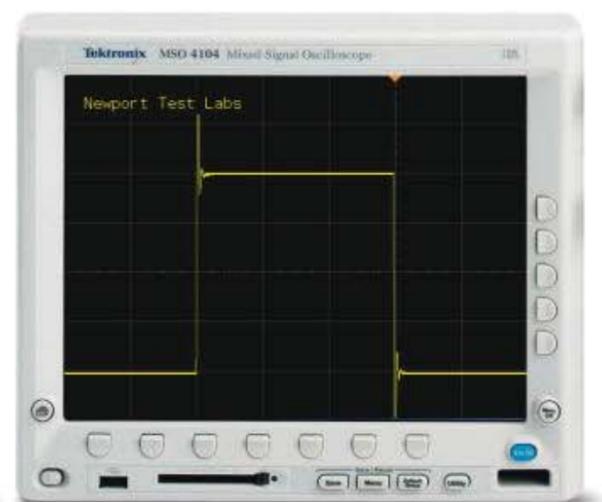
100Hz Square Wave (SQW1)



1kHz Square Wave (SQW2)



10kHz Square Wave (SQW3)



1kHz Square Wave cap load (SQW4)

Perreaux 200iX Int Amp/DAC- Test Results – Power Output

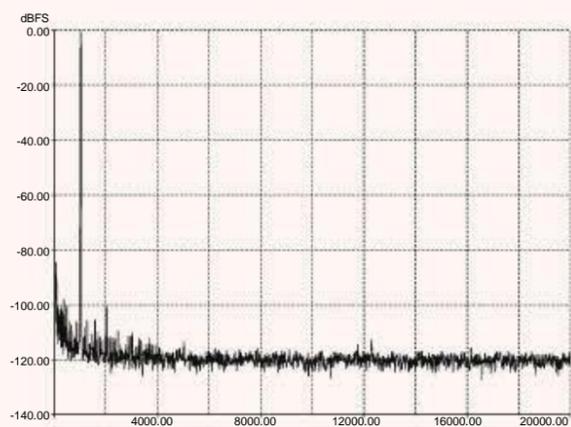
Channel	Load (Ω)	20Hz (watts)	20Hz (dBW)	1kHz (watts)	1kHz (dBW)	20kHz (watts)	20kHz (dBW)
1	8 Ω	282	24.5	285	24.5	264	24.2
2	8 Ω	242	23.8	253	24.0	231	23.7
1	4 Ω	400	26.0	441	26.4	426	26.3
2	4 Ω	324	25.1	370	25.7	361	25.6

Note: Figures in the dBW column represent output level in decibels referred to one watt output.

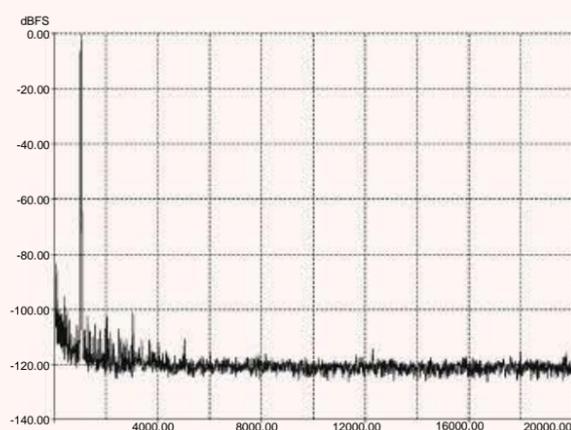
Perreaux 200iX Integrated Amplifier – Laboratory Test Results

Test	Measured Result	Units/Comment
Frequency Response @ 1 watt o/p	<1Hz – 120kHz	-1dB
Frequency Response @ 1 watt o/p	<1Hz – 239kHz	-3dB
Channel Separation (dB)	74dB / 77dB / 58dB	(20Hz / 1kHz / 20kHz)
Channel Balance (Direct/Tone)	0.021	dB @ 1kHz
Interchannel Phase (Direct)	0.01 / 0.03 / 1.30	degrees (20Hz / 1kHz / 20kHz)
THD+N	0.014% / 0.014%	@ 1-watt / @ rated output
Signal-to-Noise (unwghted/wghted)	75dB / 81dB	dB referred to 1-watt output
Signal-to-Noise (unwghted/wghted)	87dB / 96dB	dB referred to rated output
Input Sensitivity (Unbalanced)	mV / mV	(1-watt / rated output)
Output Impedance	0.016Ω	at 1kHz
Damping Factor	500	@1kHz
Power Consumption	N-A / 69.90	watts (Standby / On)
Power Consumption	77 / 1,221	watts at 1-watt / at rated output
Mains Voltage Variation during Test	239 – 245	Minimum – Maximum

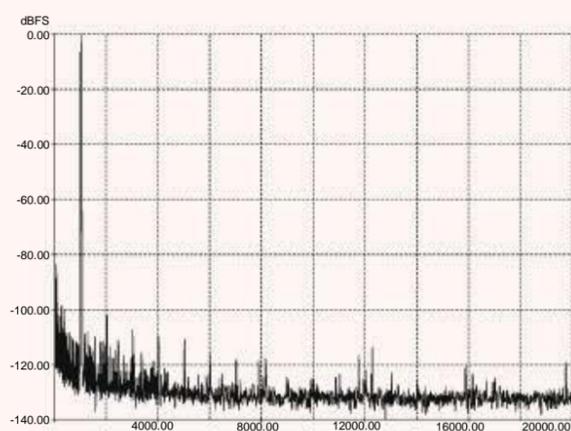
▶ CONTINUED FROM PAGE 41



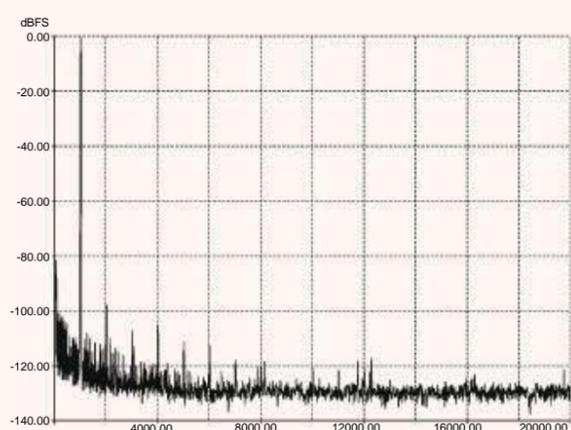
Graph 1: THD at 1kHz at 1-watt into 8 ohms.



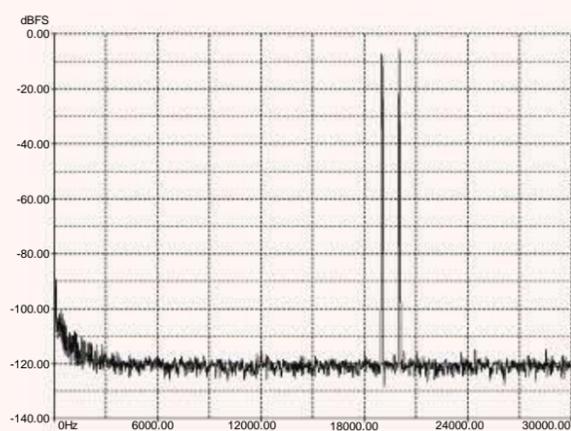
Graph 2: THD at 1kHz at 1-watt into 4 ohms.



Graph 3: THD at 1kHz at 20-watts into 8 ohms.



Graph 4: THD at 1kHz at 20-watt into 4 ohms.



Graph 5: CCIF-IMD at 1-watt into 8 ohms.

The audio-band frequency response is shown in Graph 7 for both when the Perreux 200iX is driving a standard non-inductive 8Ω load (black trace) and for when it's driving a load that simulates that of a typical 8Ω two-way bookshelf loudspeaker. The first thing to note here is the greatly exaggerated vertical scale used by *Newport Test Labs*, which means that the top of the graph represents +1dB and the bottom -1dB. So you can see that into a standard test load, the frequency response of the Perreux 200iX is literally ruler-flat from 10Hz up to 10kHz. Below 10kHz it rolls off to be just 0.05dB down at 5Hz (the graphing limit, not the low-frequency limit of the amplifier!) and above 10kHz, the frequency response rolls off to be about 0.05dB down at 40kHz. This puts the amplifier's normalised response across this frequency range as 5Hz to 40kHz ± 0.025 dB, self-evidently excellent.

The fact that the Perreux 200iX's frequency response into a simulated loudspeaker load (red trace) is almost identical to that into a non-inductive resistor shows not only that the amplifier has a very low output impedance (and thus a very high damping factor of 500, as mentioned previously) but also that the amplifier will 'sound' the same no matter which loudspeakers you use in conjunction with it, so if you change your speakers for any reason, you will have no need to also change your amplifier.

The Perreux 200iX's performance when reproducing a 100Hz square wave at 1-watt into an 8Ω load was jaw-droppingly good. As you can see for yourself, the horizontal is perfectly horizontal, tracking the oscilloscope's graticule exactly. The same is true for the horizontal — it also tracks the oscilloscope's graticule exactly. This is the perfect square wave response.

Increasing the frequency of the square wave to 1kHz (SWQ2) shows an identical result to that obtained at 100Hz.

The slight glitches in the response at the right angle 'joins' at the leading and trailing edges are actually caused by a slight mis-setting of the controls on the digital oscilloscope used to make the measurement. Essentially, you're looking at a duplicate of 100Hz test.

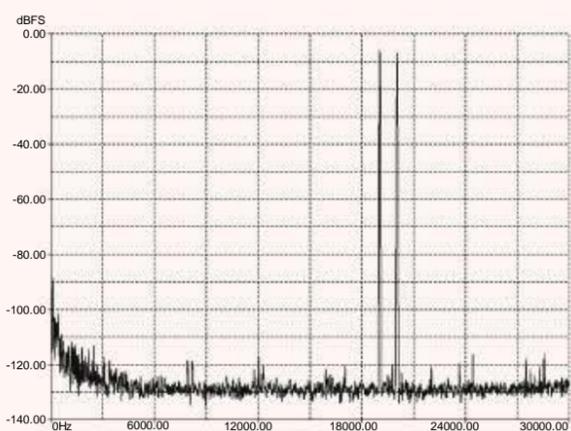
The extended bandwidth of the Perreux 200iX's output circuitry is immediately obvious in *Newport Test Labs'* photo showing performance with a 10kHz square wave at one watt into an 8Ω load (SQW3). There is a very slight rise-time limitation visible, but no other perturbations in the waveform at all.

Of course to be useful, an audio amplifier has to be capable of driving difficult loudspeaker loads, so in SQW4 you can see how well the Perreux 200iX drives a highly reactive load (an 8Ω resistor in parallel with a $2\mu\text{F}$ capacitor!) and you can see that the square wave is completely stable, with just a one quarter-height initial overshoot and with ringing damped within one and a half cycles. Yet again, amazingly good performance.

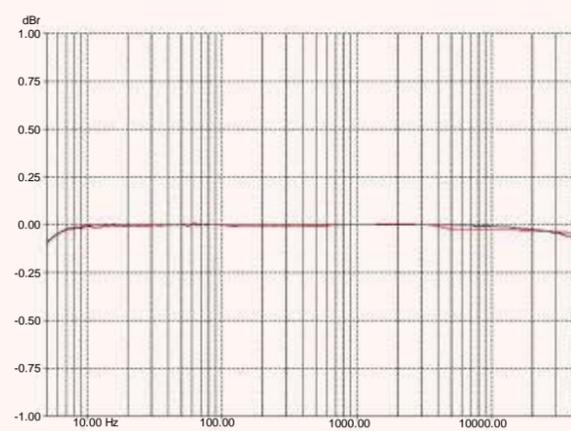
The Perreux 200iX proved to be quite power-hungry, I guess as you'd expect for a powerful amplifier with a linear power supply and a Class-AB output circuit to be, consuming nearly 70-watts when it was idling (no signal) and a little more when it was delivering an average output of one-watt, which would be around what would be delivered if you're listening at background listening levels.

At maximum output, the amplifier will pull 1,221-watts from your mains power point, a figure that's rather higher than I am used to seeing and means you should plug the Perreux 200iX either directly into a wall-mounted power point or, if you use a mains power conditioner for any reason, make sure its rating is such that it will handle the Perreux.

The Perreux 200iX is a very powerful, high-performance amplifier with very low distortion and very low noise. It delivered exemplary performance on *Newport Test Labs'* test bench. **— Steve Holding**



Graph 6: CCIF-IMD at 20-watts into 8 ohms.



Graph 7: Frequency responses (see copy).