

# PS Audio Stellar Power Plant 3

Don't look down your nose at PS Audio's cheapest mains regenerator. Used with low-power source components, pre and headphone amps, it can still be transformative  
 Review & Lab: **Keith Howard**

**B**ack in the late 1970s Bob Stuart of Meridian observed that an amplifier has more inputs than those labelled as such, others being 'output' and 'mains'. It was an idea to which lip-service was widely paid but, on the mains side, nobody really picked up the idea and ran with it until PS Audio introduced its first mains regenerator in 1998. Yes, we'd had mains filters and conditioners of various types before but this was the first device that said that if you want the cleanest mains supply you're going to have to synthesise it from scratch.

A mains regenerator is, in essence, a high voltage power amplifier with an integral sine wave oscillator at its input. Like all power amplifiers, regenerators have a rated output beyond which they run out of puff – in this instance current because the output voltage is fixed. So if you want to run a meaty power amplifier from it, you need a meaty regenerator too.

But that's costly, and there's something for saying that a regenerator's largest benefits accrue upstream when used to power signal sources, preamps, etc. In fact I've had experiences, reported before, where running certain power amplifiers from a regenerator has changed the sound, yes, but not necessarily for the better.

## CANNY CHOICE

So I don't look down on the Stellar Power Plant 3 just because, at £2310, it's the cheapest in PS Audio's latest range. On the contrary, I perceive it as a canny choice for buyers on a constrained budget looking to achieve the best bang for their buck.

At first glance you could mistake the Stellar PP3 for a minimalist preamp. It's slim at 83mm high and there are no external heatsinks making a statement of intent, just a narrow strip of perforations along the top panel which vent a front-to-back

**RIGHT:** PS Audio claims greater than 85 per cent efficiency for the internal amplifier at full output power, which allows the Stellar Power Plant 3 to trade a series of external heatsinks for a single and smaller internal one

heatsink tucked away internally. The SPP3 is pretty heavy for its size, though, at 14.2kg, due principally to its large toroidal mains transformer. Round the back it has no inputs other than mains power, just four outputs in the form of three-pin UK mains sockets. (There are, of course, different output options, and different output voltages, for other territories.)

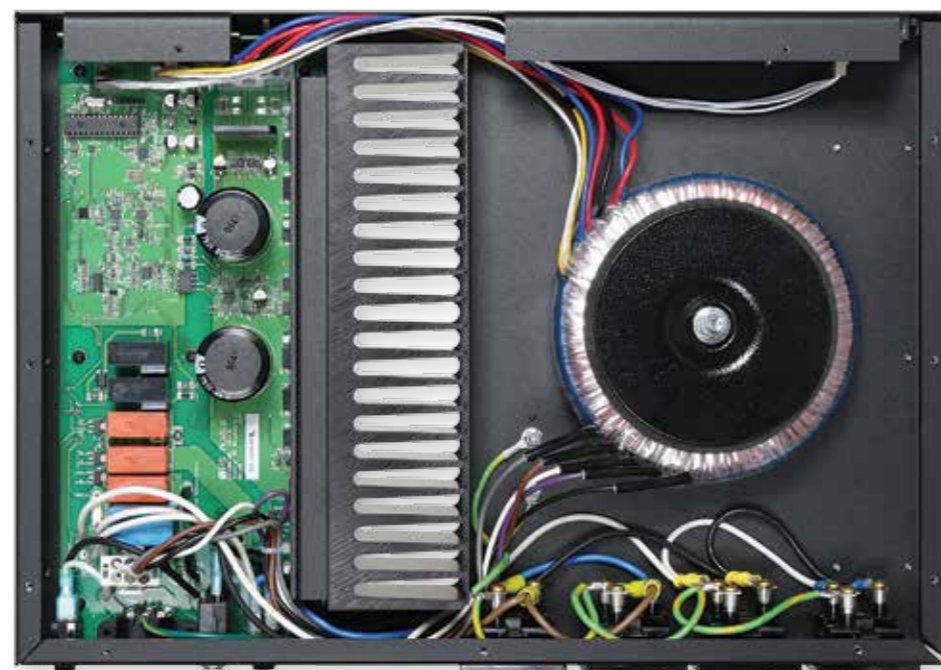
In the UK variant the four output sockets are divided into two groups of two. The pair mounted toward the middle of the rear panel is labelled 'Filtered High Current or Regenerated', with a switch off to one side that selects between HC (high current) and Regen (regenerated) operation. The other two outlets, labelled 'Regenerated', are not switchable. Importantly, PS Audio counsels against using a mains distribution lead to increase the number of outlets as this increases effective output impedance and can encourage overloading.

Via the HC outputs you can connect items of equipment, such as power amplifiers, that would draw more than the SPP3's 300W maximum rated output

while benefiting, potentially, from its inline filtering. PS Audio doesn't specify the series impedance for HC mode but, added to the impedance of the wall socket, total series impedance is sure to be greater than the less than 8 milliohms (or <0.008 ohm) output impedance specified for the regenerated output.

## REMOTE DRIVE

There are no controls on the SPP3's fascia, other than a standby switch in the top left corner, as it's intended to be driven via the supplied plastic IR remote control handset (lose this at your peril). But there are three LEDs indicating status on the front panel. Running left to right, the 'Output' LED shows green, yellow or red according to the power being pulled from the regenerated mains outlets. Green means that power draw is 270W or lower, ie, within 90% of maximum output; orange indicates 270-300W, close to maximum; and red means that 300W has been exceeded. If you exceed 330W for 30 seconds, the SPP3 will enter its fault mode.



The second LED indicates when 'MultiWave' is selected, and the third when 'CleanWave' is operating [see boxout, below]. MultiWave adds distortion to the regenerated output waveform, to positive effect, while CleanWave is a degaussing function intended to eliminate any permanent magnetisation of transformer cores in the attached equipment (which must be powered up for CleanWave to work). The indicator LEDs double as fault indicators if the SPP3 detects a problem and enters fault mode, disabling all outputs. Some fault modes can be corrected by the user, but more serious ones, like a fault with the internal amplifier, require service support.

*'Those who have long since left us, wove their magic'*

## FRESH EARS

Potentially you can use power amplifiers or integrated amplifiers with the SPP3 but you're limited to high-efficiency Class D or perhaps BASH designs. As no such thing is resident *chez moi*, I used the SPP3 in the way I suspect many buyers will, and which will probably deliver the best results: to power source items and a headphone amplifier. I used my regular signal chain

of a second-generation Mac mini running Windows XP and JRiver Media Center v22, a TC Electronic Impact Twin FireWire audio interface feeding S/PDIF to a Chord Qutest DAC [HFN Nov '18] – this feeding my resident Teac HA-501 [HFN Apr '14] and Matrix M-Stage HPA-3B headphone amplifiers. The Teac, Matrix, Chord and

TC – which have power consumptions of 22W, <25W, 3W and <14W, respectively – were all powered from the SPP3 (one per output socket, all operated in Regen mode), and I had a larger PS Audio P10 regenerator [HFN Apr '13] to hand for comparison. My old favourite Sony MDR-MA900 [HFN Oct '12] was chosen as the headphone.

I used this review as an opportunity to revisit tracks that I've chosen for reviews before but a long time ago, which gave me the opportunity to approach them – and the SPP3's effect on them – with fresh ears. I can summarise the experience by saying that the Stellar Power Plant 3 has the same powers, within its design envelope, to recast your listening experience as the DirectStream P20 did [HFN Apr '19] and the P10 still does in my listening room.

## MULTI AND CLEAN

**It may seem bizarre to design a low-distortion mains voltage supply and then stir distortion back into it but PS Audio has a long history of offering alternative output waveforms with its regenerators. The claim for 'MultiWave' – which adds third harmonic distortion at 150Hz to flat-top the output waveform – is that this increases power supply conduction time and thereby reduces voltage rail ripple in downstream equipment. Whatever the truth and extent of that (I've never seen it tested) it makes the point that low distortion in a regenerator's output may not be the prime requirement. Freedom from mains-borne interference and lowered source impedance may well be the more critical factors. Similarly, neither is PS Audio's 'CleanWave' function about waveform distortion but residual magnetisation of transformer cores, which can occur as a result of AC supply interruption (switching off not at a zero-crossing point). In mains grid transformers this is neutralised using alternating polarity DC of progressively decreasing amplitude; in CleanWave, a high frequency AC signal is added to the output waveform and reduced in amplitude over a five-second cycle.**

**ABOVE:** Lacking the display of larger Power Plant models, and because it is operated via IR remote, the Stellar PP3 has a simple front panel, with three indicator LEDs monitoring power output, plus operational and fault status

In the P20 review I wrote that, 'The effect of unplugging the Qutest from the P20 and plugging it directly into the mains was extraordinary – all the more so as I was using it with the iFi Audio's Micro iPower PSU that I'd found improved the sound of the Qutest when I reviewed it'. And so I found all over again with the SPP3.

## MARTINI ANYONE?

The first track I played to assess its effect on the Qutest/iFi Audio was Diana Krall's 'Narrow Daylight' from *The Girl In The Other Room* [Verve; 96kHz/24-bit download]. It's not Krall's clearest set but relies for its impact on the slightly cloudy piano sound being well resolved and her vocal being picked out quite separately, in as open a soundstage as possible. All these things suffered when the Qutest was plugged into the mains supply rather than the SPP3. The stereo image shrank and dynamic ease and variety were dialled back, both contributing to a 'closed in' sensation in which the thoughtful, wistful lyric had less emotional clout.

Pink Martini's stylish, tongue-in-cheek cha cha 'Où est ma tête?', about losing body parts in various locations in Paris [from *Splendor In The Grass*; Wrasse WRASS250], suffered in much the same way when deprived of SPP3 power: the soundstage contracted, dynamics were squashed, interest was diminished and the sprightly silliness of it all in large part lost. Where was that impish sense of fun?

Classical music suffered too without the SPP3 doing its thing. Listening to the Harmonia Mundi recording of George Gershwin's *Piano Concerto in F* [88.2kHz/24-bit conversion from the SACD, HMU 807441], initially with the Qutest connected to the mains, it was difficult to suppose that the Rochester

## MAINS REGENERATOR

## PS AUDIO STELLAR POWER PLANT 3



**ABOVE:** A total of four conditioned AC mains sockets are offered, two of which may be configured for a regenerated AC output or designated as 'high current' filtered-only outputs for the connection of high consumption power amplifiers

Orchestra could sound any more vigorous or expansive in the opening section of the first movement, or Jon Nakamatsu's piano any more sonorous when it enters. But with the SPP3 in place the stereo image became more obviously layered – I was now aware of the depth dimension – and the entire performance more solid, stable and engaging. I'd completely forgotten what a fabulous recording this is.

### ALL THAT JAZZ

I concluded in the P20 review that the effect of regenerated mains on the Teac HA-510 headphone amp was less than on the Qutest DAC, albeit still worth having. Maybe it's down to the music I chose but this time I felt the headphone amplifier benefited just as much from the SPP3 being in circuit. Despite, or perhaps because of, its age, Nat King Cole's *Welcome To The Club* [Audio Fidelity SACD, AFZ153] is an addictive introduction to the joys of easy listening jazz. That Nat Cole's voice is incomparable goes without saying, and the same is true of the Count Basie Orchestra (albeit

without its leader on this occasion). Stir in a fine Capitol recording and you have all the ingredients for a magical musical experience. But for the listening experience to match that potential, the HA-510 needed

**LEFT:** Plastic remote control is most useful for comparing Sine versus MultiWave modes from the listening positioning



the SPP3. With the Teac HA-510 receiving regenerated mains, I was put aboard the time machine that high-fidelity sound can be. Yes, the soundstage was more open and airy; yes, the sound was expanded dynamically as much as it was spatially. But the key difference was the sense of being present while masters of their craft, who have long since left us, wove their magic, seemingly without effort. There was a time when I played this track a lot; I'm sure I've never heard it sound as life-enhancingly special.

### A FINAL WAVE

I should have told you from the outset that I did all this listening with MultiWave engaged, having found it slightly but definitely preferable to a cleanly synthesised sine wave supply with the P20. Unsurprisingly, I experienced the same with the SPP3. As with the P20, MultiWave just gilded the lily, although it may not have the same positive effect with every system hardware. That's why PS Audio sensibly includes it as an option. But for me it added another small sprinkle of magic dust to what was already outrageously good sound. ☺

### HI-FI NEWS VERDICT

If you've never experienced mains regeneration, it's unlikely you'll ever be able to do so as painlessly to your wallet as with the Stellar Power Plant P3. It won't match its larger siblings in respect of accommodating power amplifiers, but I'm not convinced that's a major downside. What really matters is that it can transform – yes, transform – the sound from source components, DACs and headphone amplifiers. Wow.

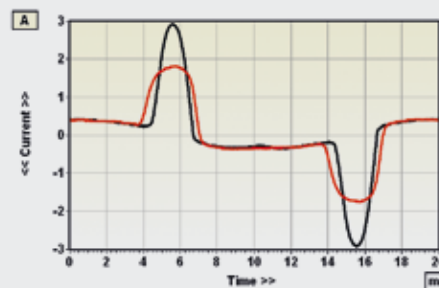
Sound Quality: 87%



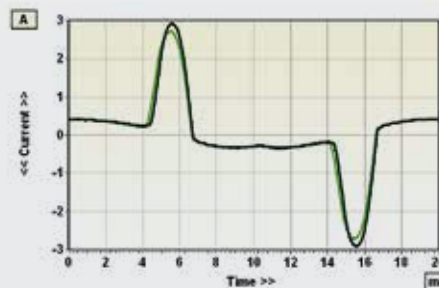
As the testing of mains regenerators isn't a standard procedure, I've built some special equipment to facilitate it. The first uses an inline Hall-effect current transducer from LEM Components that can record currents of up to 80A at slow rates >60A/μs over a bandwidth >100kHz, while adding a series resistance of only 0.18mohm. Built into a box with flying leads terminated in a mains plug at one side and a mains socket at the other, it can be inserted into any component's mains feed to measure charging current. Shown here are charging current waveforms from the wall socket and from the SPP3 [see Graph 1], and comparing sine with MultiWave output [Graph 2], using an old Exposure XVIII Mono power amp delivering 25W/4ohm. The SPP3's current pulses are almost textbook whereas those from the wall socket have a lower peak value and longer duration as a consequence of the mains waveform being flat-topped and from a higher source resistance. Note that MultiWave does increase the charging time slightly as claimed – but not, in this case, by a lot.

For measurement of regenerator distortion I've built a resistive attenuator that feeds a low-noise, low-distortion instrumentation amplifier. Together these give a voltage output one-hundredth that of the difference between the live and neutral lines, with much lower inherent distortion than a transformer-based solution. But a persistent mains tripping problem that occurred whenever this attenuator box was fitted to the SPP3 prevented waveform distortion being recorded and I was unable to resolve it before this issue went to press. Whether this occurred due to recent changes to the consumer unit and RCDs in my home or because of some characteristic of the SPP3 is unclear. It was not an issue when I measured the P20 [HFN Apr '19] and, importantly, did not also reoccur when I plugged the voltage attenuator into my legacy P10 [HFN Apr '13].

However, while investigating the cause, I discovered an issue with the P10 and SPP3 I haven't seen commented on previously: in UK form (at least) their live and neutral feeds are reversed. This was verified with both a multimeter and a Fluke SM100 socket tester. While this won't affect the operation of equipment connected to the regenerator it could constitute a safety hazard with older equipment having a single-pole on/off switch in the live feed should anyone delve inside assuming that dangerous voltages are not present as a result of the power switch being off. Always heed the standard advice: remove equipment entirely from the mains supply before ever venturing inside it. We have asked PS Audio to comment on this. KH



**ABOVE:** Distorted mains (charging) current waveform (red) versus significantly more linear sine waveform delivered by the PS Audio Stellar PP3 (black)



**ABOVE:** Comparing current waveforms from the PS Audio Stellar PP3 – default linear sine output (black) and MultiWave output (green)