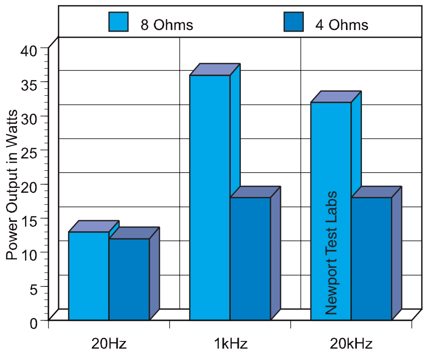
Unison Research

S6 VALVE INTEGRATED AMPLIFIER

Italian outfit Unison Research may be renowned for its quirky, unusual styling, but it's also renowned for its equally quirky and unusual methods of identifying its products. And with this new amplifier Unison Research has truly excelled itself, because it's called the 'S6'. '*What's the problem with this?*' I hear readers ask themselves. The problem is that this is a model number that Unison Research previously used for an earlier valve integrated amplifier, so now there are two completely different Unison Research S6 amplifiers in existence. I have absolutely no idea whose brilliant idea it was to re-use the same model number on a different model, but if the intent was to cause total confusion amongst the world's audiophile community, congratulations… you've succeeded. Indeed you'll find that everyone was apparently so confused thatUnison Research has now added the word 'New' in brackets after the S6 model number—on its website at least—in order to alleviate the confusion, though the model itself has only the letters 'S6' to identify it.

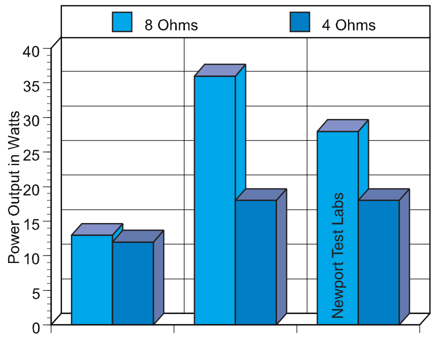
THE EQUIPMENT

So how different are the two versions of the S6 amplifier? Visually, there's absolutely no comparison, because the S6 (Old) was a fairly ugly, boxy-looking amp that looked like it was designed in the '40s, whereas the S6 (New) is a sleek, stylish beast—indeed I think that Unison Research's industrial designers have excelled themselves with the design of the exterior of the S6 (New), managing to deliver an amplifier that's visually out of the ordinary.



Power Output: Single channel driven into 8-ohm and 4-ohm non-inductive loads at 20Hz, 1kHz and 20kHz. [Unison S6]

It's a little more difficult to quantify the changes that have taken place under the hood. For example the thermionic part of the output stage is essentially unchanged, in that it's still a parallel single-ended Pure Class-A design using EL34/EL34B and ECC82/12AX7 valves. However the way the individual valves are biased is completely different. In the S6 (old) the bias was completely automatic. In the S6 (New) the bias is partially manual. When I say 'partially', this is because although most of the valve biasing process is automatic, the user has to 'fine tune' the final third of the process using a built-in needle-style bias meter and adjustable trim resistors. According to Unison Research, the fact that users now have to make final alignments allowed its engineers to reduce the levels of local feedback and thus increase the efficiency of the final output stage. They also claim that doing it this way has resulted in '*an appreciable improvement in sound.*' However there is a part of the output stage that is completely different, and that's the output transformer itself, which is now not only a new design, but also has a single fixed output impedance (it's fixed at 6Ω). Unison Research says (and this is a translation from the original Italian) that: '*the decision to standardise the output impedance at 6Ω was aimed at ensuring an optimal interface for all speakers, no matter*



Power Output: Both channels driven into 8-ohm and 4-ohm non-inductive loads at 20Hz, 1kHz and 20kHz. [Unison S6]

whether their nominal impedance is 4Ω or 8Ω.' I think this must be a mis-translation of the word 'optimal' but it's certainly a less expensive solution to implement. As for the reason for impedance matching, that is a little more complicated, as the following should reveal…

As everyone who's ever even glanced at a loudspeaker's impedance graph will already know, a loudspeaker's impedance depends entirely on the frequency you use to measure it, so that if you measure at 100Hz, the speaker's impedance could be 6Ω, but if you increase the test frequency to 500Hz, its impedance could be 15Ω. This is why the concept of a 'nominal' impedance was developed in the first place: it was supposed to be the 'average' impedance an amplifier would see over the audio band (20Hz to 20kHz). The only problem with this was that most speaker manufacturers just lied when stating their average impedance. (That's probably a bit harsh… let's say they simply looked at the impedance graph and took a guess based on the fact that if their guess wasn't close to 8Ω, they'd sell fewer loudspeakers!) Because of this, the International Electrotechnical Commission (IEC) in Europe introduced a rule that said a speaker's minimum impedance should never fall below 20 per cent of its claimed 'nominal' impedance. Mostly, unfortunately, speaker manufacturers that aren't based in Europe don't pay any attention to this ruling either! (A truth pushed home by the fact that Unison Research itself goes to great lengths to point out that the speakers it manufactures *do* conform with this particular IEC rule.)

The upshot of all this is that there were many valve amplifier manufacturers going to the considerable expense of providing two (8Ω and 4Ω), or sometimes even three (8Ω, 6Ω and 4Ω)! transformer taps to ensure correct speaker matching, but that because the speakers being connected to them were not even remotely close to their stated nominal impedance there was always a mismatch. It's because of this that Unison Research is offering only the single 6Ω output on the S6 (New). It will work best with speakers that really *are* 6Ω or 8Ω designs. If you connect a speaker that has a real nominal impedance of only 4Ω, for example, you'd need to make sure that it also has a high efficiency rating (90dBSPL or preferably more) to ensure adequate undistorted volume levels (that is, treat the S6 (New) like a SET amp!).

On a circuit level, whereas the S6 (Old) had just a single printed circuit board (PCB) that contained with all the tracks and components for both channels, the S6 (New) now has completely separate PCBs for each channel. Also, each of the preamp stages is now decoupled and filtered separately from the other. Obviously this improves channel separation, but Unison Research also claims that using two PCBs has allowed it to control the temperature in the various circuits in such a way as to improve amplifier stability, reliability and the MTBF of the various electronic components on the boards themselves. I personally think it more likely that the decision to use two PCBs was forced on them by the physical layout of the amplifier itself, as you can see from the photograph! (One guess where each PCB is located.)

UNISON RESEARCH S6
VALVE INTEGRATED AMPLIFIER

Brand: Unison Research
Model: S6 (New)
Category: Valve Amplifier
RRP: $6,299*
Warranty: Two Years (3 Months on Valves)
Distributor: Radiance AudioVisual
Address: Unit 33. 5 Gladstone Street
Castle Hill NSW 2154
☎ **(02) 9659 1117**
(02) 9659 1116
info@radianceav.com.au
www.radianceav.com.au

*Valve cover is an additional $299

- Valve biasing
- Remote control
- Low-cost valves

- Phono stage
- Headphone socket
- Valve covers

LAB REPORT

Readers interested in a full technical appraisal of the performance of the Unison Research S6 Valve Integrated Amplifier should continue on and read the LABORATORY REPORT published on page 86. 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.

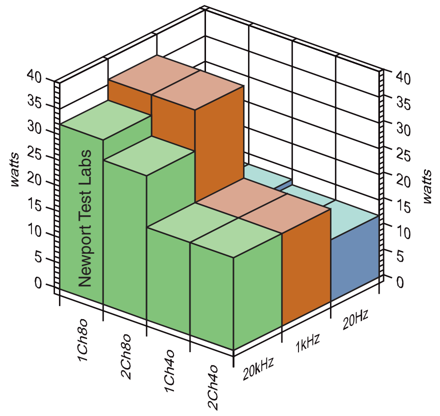
Lab Report on page 86

The rear panel has just the single set of output terminals (branded Unison Research, but they look just like WBTs) and five pairs of gold-plated RCA line-level inputs plus a gold-plated RCA record output pair (labelled 'Tape Out'). There's also a 240V IEC socket with an integrated mains fuse.

IN USE AND LISTENING SESSIONS

After installing the Unison Research S6 (New) I rummaged around in vain in the left-over cardboard packaging trying to locate the cover that would protect the valves from my curious cat and the even-more curious children from next door. No such luck. An email to the Australian importer revealed that the amplifier comes supplied without a cover. I thought the provision of a cover was mandatory in Australia for reasons of safety… perhaps I am wrong. There is a stainless steel cover available as an added-cost ($299) option. If you choose not to pay the extra for the protective cover you'll have to be extra-cautious about where you site the amplifier and who and what is allowed near it while it's operating. As for protection when it's not operating, you needn't worry because I would recommend always turning the S6 (New) off whenever you're not actually using it. You'll not only extend the life of the amplifier (particularly the valves), but also cut down on your electricity bills.

As for operation, you'll discover that the input selector, which has positions for five line level components (CD, Tuner, AV, Aux, and Tape) will move beautifully smoothly under your fingers, and has a lovely 'feel'… although there's a bit of a 'clunk' whenever you change sources. I am not sure why Unison Research uses 'Tape' as an identifying label… what audiophile in their right mind would use tape these days? The volume control's action is also beautifully smooth and has the same 'feel' under the fingers as the source selector. The power switch operates sideways, rather than the more usual up and down, which I guess neatly solves the usual dilemma of whether to have 'On' as the up position (as used in the USA) or the down position (as used in the UK/Australia). One other oddity about the power switch is that you need to push it by almost a centimetre to get it to move from one position to the other, which is further than usual. Biasing the valves is easy. The meters are easy to read and the pots are easy to adjust, with no backlash when they were released to upset the setting. Once properly aligned, the bias mostly remained at the set point, but the right channel on my sample tended to drift a little, requiring fairly regular resets. I expect this would settle down with a few more hours on the valves, but even if it didn't, the bias process is so quick and easy that it would not



Power Output: Single and both channels driven into 8-ohm and 4-ohm non-inductive loads at 20Hz, 1kHz and 20kHz. [S6]

be a chore even if you had to do it on a daily basis. Remember to let the amplifier warm up fully before you check valve bias. Because the automatic circuitry will get you in the bias ballpark even without the manual tweaking you can comfortably listen to music while you're waiting: you don't have to leave it until after the amplifier is fully warmed up and you've checked (and if necessary, adjusted) the various valve biases. Interestingly, I found that the central 'spine' of the amplifier gets amazingly hot… almost as hot as the valves.

The RC2 remote provided with the S6 (New) may surprise you because (1) it's quite nice and (2) the number of buttons on it, given that the S6 is just an integrated amplifier. However, despite the number of buttons, only two of them (volume up and volume down) can be used with the S6 (New). While I was not expecting the remote to switch between sources, I was originally hoping for at least a functional 'Mute' button… or perhaps even a stand-by circuit. (Evidently Unison Research expects you to invest in other of its components that make use of the other buttons on the remote.)

I started my listening sessions when the amplifier was 'cold' because I am sure this will be what most users end up doing (good intentions to the contrary!) and found the sound immediately accessible, with excellent delineation of music lines, an adequate sound-stage and a clear, transparent and eminently listenable treble. So yes, I'd be quite happy to listen to the S6 (New) straight from cold. But yes, since you ask, I did also think the sound improved for about 40 or 50 minutes, after which I thought that any other audible differences were so tiny that you'd need to A–B a coldie against a hottie to hear them. The improvements in sound revolved primarily around midrange lucidity—the mids definitely became more 'relaxed' and fluid, with more depth and richness, but I thought the bass also had a bit more impact with a fully warm amplifier. The only area where I noticed a huge difference was concerning the amplifier's dynamics in relation to playback volume level: when the amplifier is cold, the dynamics are fine at low listening levels, but if you turn the volume up, the sound doesn't open up, and the signal sounds quashed. It's only after the amplifier is fully hot that you can really ramp the volume up. However, how far you can ramp up the volume will depend on the size of your room, the way it's furnished, and the efficiency of your loudspeakers, because I also found that there's not a lot of power on tap, and the lack of it makes itself felt mostly in the low frequencies. For example, as I turned the volume level up beyond what I thought was a comfortable and realistic level, the bass first became a little soft and then as I turned the volume up even further, it became a little hard—at which point I suspected I was overdriving the amplifier. However at the right volume levels, I found the S6's bass to be rich, warm and truly 'likeable' in that it underpinned the music without emphasising or detracting any of the bass. The sound extending from the upper bass right across the midrange had that glorious 'valve' sound that's the clincher for thermionics over solid state. Listening to Barton Hollow's 'The Civil Wars' was a revelation, right from the first track (*20 Years*). The way the S6 rendered the harmonic interplay between Joy Williams' and John Paul White's voices is like listening to sounds made by heavenly choruses. Yet underpinning the voices you hear JPW's crisp acoustic guitar and the soft sympathetic percussion of Ken Lewis. It's almost as if the valves have a mind of their own, knowing to treat some of the music being amplified differently from other of the parts. The S6's ability to do this does discriminate: the recording needs to be good, and it's better with acoustic instruments and cleanly recorded voices. By way of example, I didn't find Grindhouse's *Rats in a Cage* had quite the same magical sound. The S6 rendered it more like I hear from a high-quality solid-state amplifier. But once I span up Gwyneth Herbert's *My Mini and Me* we were cookin' with gas again. Fantastic sound!

CONCLUSION

Like all valve amplifiers, you need to match your speakers very carefully in terms of impedance and sensitivity, as well as their sound quality, and also be aware that yes, there will be limits on how loud you'll be able to listen to your music, even under ideal circumstances. And yes, you will have to keep biasing the S6 (New) regularly in order that it performs at its best. But when the Unison Research S6 (New) is performing at its best, you'll discover that its best is very good indeed, and will change the way you think about music in your home. ***greg borrowman***

LAB REPORT ON PAGE 86

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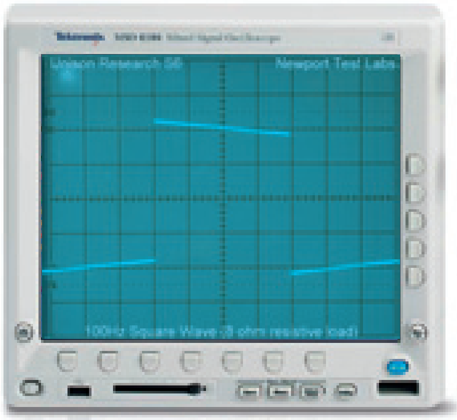
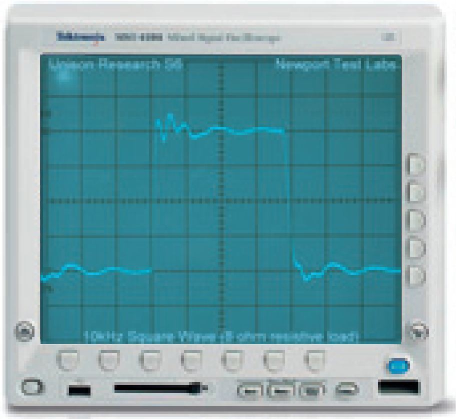
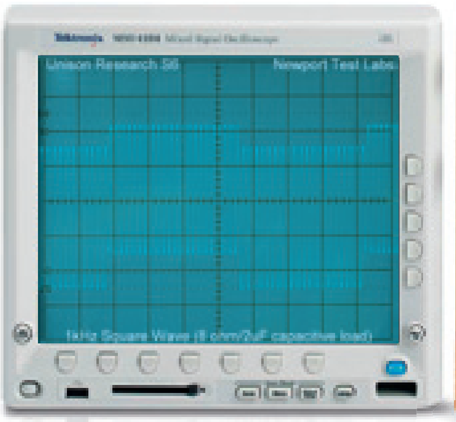
TEST RESULTS

Measuring the power output of a valve amplifier is always difficult because they have so much inherent distortion (most of it of the good-sounding even-order harmonic type, but the other distortions are usually low-order components, which also are less invasive than the high-order components typically generated by solid-state devices.) It is also further complicated by the fact that valve amplifiers don't go into 'hard' clipping in the same way as solid-state devices, so if you're simply looking for clipping on an oscilloscope, it's a difficult call, and one that depends to a great extent on the experience of the person doing the test. *Newport Test Labs* now uses a system whereby the output waveform is viewed on an oscilloscope while the distortion levels are simultaneously measured by a wideband distortion analyser. The power output is taken at the point where overall THD exceeds 3 per cent, or the shape of waveform moves away from being an exact sinus waveform. Under these conditions, the power output of the Unison Research S6 (New) at a frequency of 1kHz was measured as 36-watts continuous into 8Ω loads, with either one or both channels driven. However, under the Australian standard for power output, an amplifier must be able to produce its rated output at all frequencies between 20Hz and 20kHz, and at 20kHz, with both channels driven, the Unison Research S6 managed only 28-watts per channel, while at 20Hz, it delivered just 13-watts per channel, with either one or both channels driven. This puts the amplifier's maximum power output at 13-watts per channel. Driven into 4Ω loads, power output fell to a maximum of 18-watts at frequencies of 1kHz and higher, but maximum power output is dictated by the power output at low frequencies which, as you can see from the tabulated results, was 12-watts per channel into 4Ω. Although *Newport Test Labs* didn't test the amplifier into the 6Ω load specified by Unison Research, you can see from doing the maths on the results into 4Ω and 8Ω loads that it would deliver around 27-watts per channel at 1kHz, and 12.5-watts at 20Hz. You can also see that at lower impedances (less than 4Ω) power output would be reduced further, so I'd expect to see a result of around 9-watts at 1kHz when the amplifier is driving 2Ω loads.







Frequency response was extended, with the low-frequency response easily extending down to 1Hz, and the high-frequency response stretching up to 60kHz –1dB and to 180kHz –3dB. However, the low-frequency response was marred by an unusual and unwanted 3.2dB high-Q peak in the response at 6Hz, as you can see from Graph 6. Above this peak the response settles down to be very flat, so that from around 20Hz up to 20kHz the response is within 0.2dB. The second (red) trace on this graph shows the amplifier's frequency response into a reactive load, and you can see that it isn't as well-behaved as the response into a purely resistive load (black trace). Channel separation was not particularly great, as you can see from the tabulated results, returning a best figure of 68dB at 1kHz and reducing to 55dB at 20Hz and 45dB at 20kHz. These are, however, good results for a valve amplifier and also more than sufficient to ensure adequate channel separation and, by implication, excellent stereo imaging.

The high-frequency response stretched up to 60kHz –1dB and up to 180kHz –3dB, as well as down as low as 1Hz

Channel balance was excellent, at 0.04dB (at 1kHz), far better than I've seen on many high-end solid state amplifiers. Inter-channel phase errors were also low, which I thought was a particularly good result for a valve amplifier. Phase was essentially exact at mid-frequencies, and only 1.5° in error at 20Hz and only 1.1° at 20kHz.

Distortion levels are shown in Graphs 1 though 4. Common to all the graphs are the extended levels of 'grass' along the noise floor of the amplifier. In solid-state amplifiers, the appearance of this 'grass' is mostly related to power supply issues, but because it is apparent even in the 1-watt graphs for the Unison Research S6, it would appear that other factors are at work in this design. You can see that it's at its highest at around 70dB down at very low frequencies but quickly decreases in level with increasing frequency so that by 1kHz, it's 90dB down (0.003%) and above 6kHz more than 100dB down (0.001%). As for harmonically-related distortion, you can see that at one watt into 8Ω loads, there's a second harmonic at –65dB (0.056%) then a third at around –88dB (0.0039%). There are also components at –95dB and –100dB but these are hidden below the 'grass' and, in any case, would not be audible even if the noise floor was perfectly clean. (Ignore the signals up near 16kHz, they're spurious non-test-related signals that crept into the measurement set-up). When the amplifier is driving lower-impedance loads at one watt, (4Ω in the example of Graph 2) second harmonic distortion increases to –56dB (0.158%) and the third harmonic to –72dB (0.025%). As previously, there are other harmonic distortion components in the output, but they're hidden by the grass. Increasing the power output to 36-watts per channel into 8Ω you can see that the second harmonic increases further (but only slightly) to –52dB (0.251%) but more significantly, the third harmonic rises so far as to almost equal it, and fourth, fifth, sixth, seventh and eighth harmonic distortion components come up from out of the noise to play significant parts in the output.

Mains power consumption is very high, with the amplifier continuously drawing around 300 watts

This trend becomes even more pronounced when the amplifier is delivering its maximum output into 4Ω, with the second harmonic reaching –42dB (0.794%), the third touching –50dB (0.316%) and harmonics then significant but decreasing up to the 11th. Looking at the noise floor on both these graphs, you can see that despite there still being a 'grassy' appearance to the noise floor, it's mostly dropped to more than 100dB down, though there's still obviously some mains power supply noise at 50Hz at around –68dB (the single peak running up at the extreme left of both graphs).

Intermodulation distortion (CCID-IMD) was tested at a fairly low output level (1-watt) yet there was still an unwanted IMD component regenerated at 1kHz by the interaction between the two high-frequency test signals at 19kHz and 20kHz (the two peaks just to the right of the middle of the graph). The 1kHz component peaks at –55dB (0.177%). The two sidebands at 18kHz and 21kHz are more than 70dB down, and are so high in frequency and so low in level that they are of no consequence.

Signal-to-noise levels were slightly higher than average, but it's mainly low-frequency noise, which is less audible to the human ear. Unweighted, the amplifier returned figures of 63dB referred to 1-watt and 67dB referred to rated output. Weighting the results to account for insensitivities in human hearing saw results improve to 72dB and 82dB respectively. Square wave performance showed that this amplifier will not deliver its best performance into highly reactive loads, such as electrostatic loudspeakers, with the amplifier exhibiting oscillation when presented by such a load, as can be seen in the oscillogram

Unison Research S6 (New) Amplifier — Power Output

Channel	Load (Ω)	20Hz (watts)	20Hz (dBW)	1kHz (watts)	1kHz (dBW)	20kHz (watts)	20kHz (dBW)
1	8 Ω	13	11.1	36	15.5	32	15.0
2	8 Ω	13	11.1	36	15.5	28	14.5
1	4 Ω	12	10.8	18	12.5	18	12.5
2	4 Ω	12	10.8	18	12.5	18	12.5

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

Unison Research S6 (New) Amplifier — Test Results

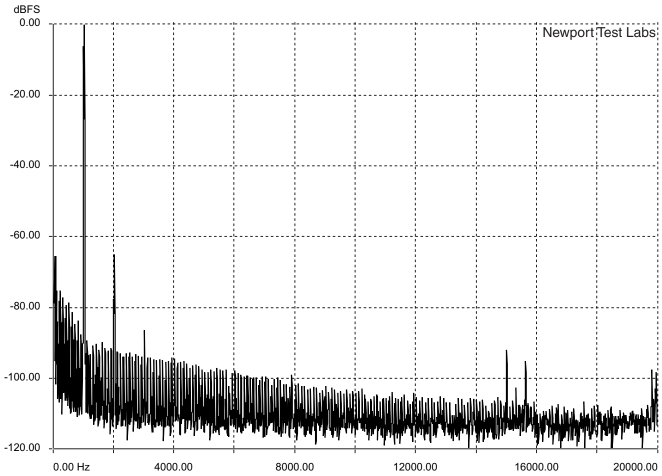
Test	Measured Result	Units/Comment
Frequency Response @ 1 watt o/p	1Hz – 60kHz	–1dB
Frequency Response @ 1 watt o/p	1Hz – 180kHz	–3dB
Channel Separation (dB)	55dB / 68dB / 45dB	(20Hz / 1kHz / 20kHz)
Channel Balance	0.04	dB @ 1kHz
Interchannel Phase	1.5 / 0.0 / 0.28	degrees (20Hz / 1kHz / 20kHz)
THD+N	0.08% / 0.28%	@ 1-watt / @ rated output
Signal-to-Noise (unwghted/wghted)	63dB / 72dB	dB referred to 1-watt output
Signal-to-Noise (unwghted/wghted)	67dB / 82dB	dB referred to rated output
Input Sensitivity (CD Input)	18mV / 100mV	(1-watt / rated output)
Output Impedance	1.4Ω	@1kHz
Damping Factor	5.7	@1kHz
Power Consumption	N/A / 294	watts (Standby / On)
Power Consumption	296 / 311	watts at 1-watt / at rated output
Mains Voltage Variation during Test	244 – 249	Minimum – Maximum

showing output when the amplifier is loaded with 2uF in parallel with 8Ω. However, with a more typical loudspeaker load the amplifier's output stage is mostly controlled… though with some ringing apparent.

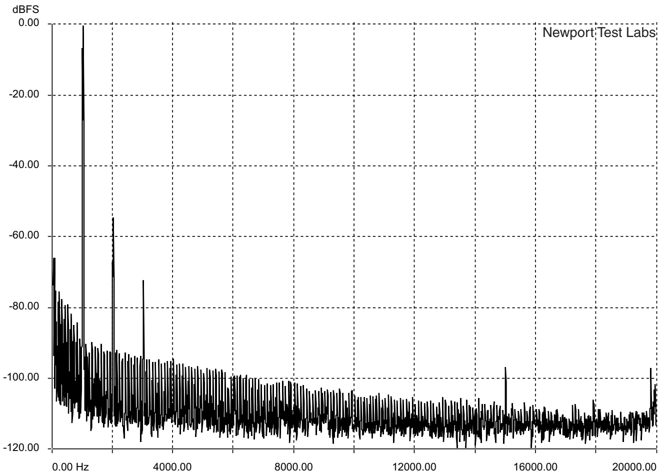
Output impedance was measured at 1.4Ω at 1kHz, which is typical for a valve amplifier, but means in turn a very low damping factor (5.7 at 1kHz) which, in turn, means that the amplifier will have little in hand to control the unwanted movement of loudspeakers connected to it. As such, I would not recommend using speakers with bass drivers with diameters larger than 203mm. At the same time, I'd also look to using high-efficiency speakers (preferably higher than 87dBSPL) that also have a relatively high nominal impedance (at least 8Ω).

Mains power consumption is very high, as you would expect, with the amplifier drawing around 300-watts whenever it's switched on, and pretty-much drawing the same power levels whenever you are using it, most of which will be converted directly into radiant heat. This is one amplifier that I would definitely leave switched off whenever you are not actually using it. You'll save on power bills and also greatly extend the life of the valves and other internal components.

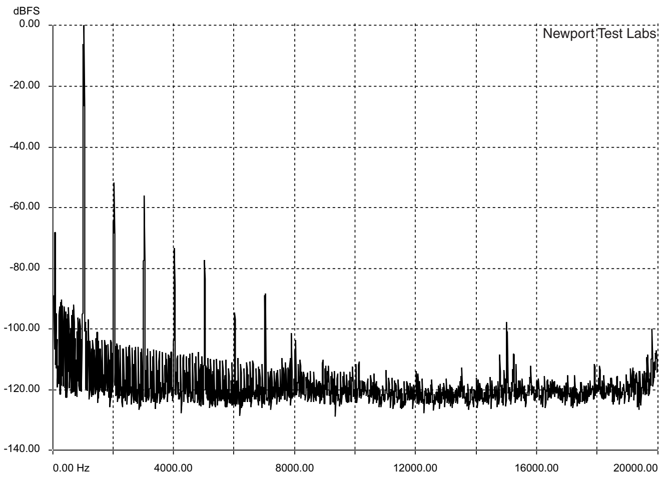
Steve Holding



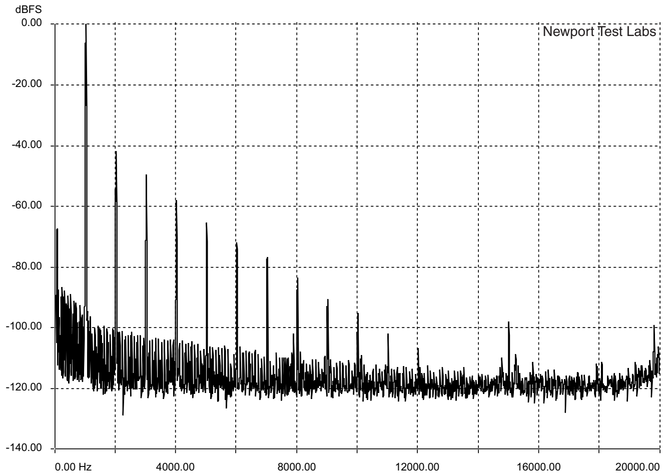
Graph 1: Total harmonic distortion (THD) at 1kHz at an output of 1-watt into an 8-ohm non-inductive load, referenced to 0dB. [Unison Research S6 (New) Valve Integrated Amplifier]



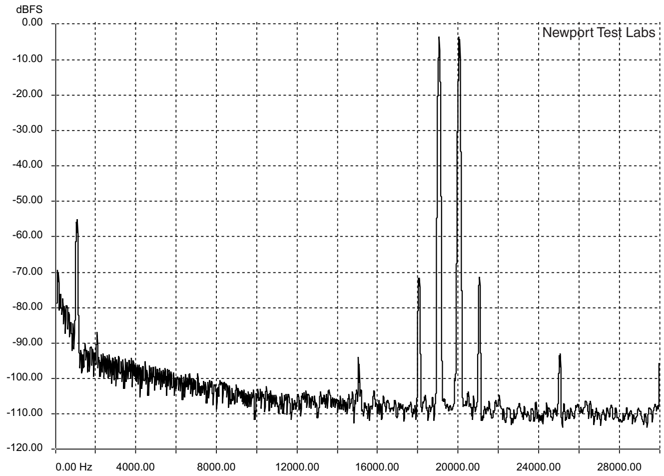
Graph 2: Total harmonic distortion (THD) at 1kHz at an output of 1-watt into a 4-ohm non-inductive load, referenced to 0dB. [Unison Research S6 (New) Valve Integrated Amplifier]



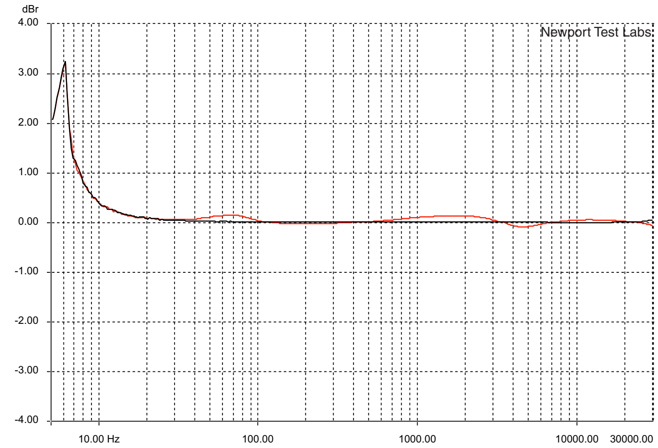
Graph 3: Total harmonic distortion (THD) at 1kHz at 21-watts into an 8-ohm non-inductive load, referenced to 0dB. [Unison Research S6 (New) Valve Integrated Amplifier]



Graph 4: Total harmonic distortion (THD) at 1kHz at 20-watts into a 4-ohm non-inductive load, referenced to 0dB. [Unison Research S6 (New) Valve Integrated Amplifier]



Graph 5: 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. [Unison Research S6 (New)]



Graph 6: 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). [Unison Research S6 (New) Valve Integrated Amplifier]