Peter Lau, the founder and chief designer of Audio Space, apparently once considered emigrating to Australia, but changed his mind, for which it would appear that Australia is the poorer, since a recent survey of Japanese audiophiles voted Lau one of the ten most influential living valve amplifier designers, and his company is reputed to be one of the three largest valve amplifier manufacturers in The People’s Republic of China.

In addition to manufacturing under the Audio Space brand name, Lau’s company manufactures amplifiers to which more than ten other companies attach their own brands. David Kan, of 6moons, says that Lau’s first two products, the Houston 7 and Houston 9, which kicked off his company (and one of which is still in Audio Space’s product line-up as the AS-9) were: ‘obviously based on the legendary Marantz 7 and 9.’ Although Peter Lau is based in Hong Kong, and Audio Space has offices and showrooms in Kowloon, manufacturing takes place on mainland China at Zhuhai, in Audio Space’s own wholly-owned factory, known as Corilex Technology Development.

The Audio Space Reference 3.1 (300B) reviewed here is available in two different models, the difference being the valves used in the output stage and the design of the output stage itself. The amplifier we were loaned for review was the lower-powered triode version of the amplifier, which uses 300B output valves. The higher-powered version uses KT-88 output valves.

**THE EQUIPMENT**

The Audio Space Reference 3.1 (300B) is a physically imposing amplifier. It’s big. It’s 475mm deep, 405mm wide and 215mm deep. It’s no lightweight either, at 28.7kg. It’s not for nothing that Audio Space warns in its manual that unpacking and installing the amplifier is ‘a job for two persons.’ It’s also as well to watch your fingers, because the Audio Space Reference 3.1 (300B) comes with its four very sharply-pointed feet already installed. The company supplies four protective chromed furniture cups to prevent these sharp spikes from damaging your furniture, but you need to be careful of your hands too: I accidentally pricked my finger during the install and drew blood. There’s no denying that the Audio Space Reference
Audio Space Reference 3.1 (300B) is also a very attractive amplifier. I don’t know if you can admire the shape of a valve, but I much prefer the curvy look of a 300B valve to the more stumpy, ‘businesslike’ look of a KT88. As you can see from our photographs (which show the Audio Space Reference 3.1 (300B) without the protective valve cover in place, though one comes standard with each amplifier) there are six valves visible: four 300Bs, and two more valves which could be either 6SN7s or 6N8Ps (about which more in a moment).

The other four valves (all 12AX7s) are hidden inside spring-loaded black-anodised aluminium tubes that cover them entirely, except for a small hole at the top, and have springs that both push down on the valves themselves, to ensure they can’t vibrate and simultaneously stop the casing itself from rattling. My sample, which came direct from another reviewer, was not fitted with the 6SN7s that are listed in Audio Space’s spec sheet, but instead with two of the Chinese versions of the same valve: 6N8Ps. Moreover, the two 6N8P valves were physically different, with one valve larger than the other. I can only assume that the reviewer before me was experimenting with different valve types and forgot to re-install the original matched pair before returning the amplifier. No problem, because I was able to quickly rectify this by replacing both 6N8Ps with vintage 6SN7s from my own NOS valve stock. (I know that many ‘tube-o-philes’ claim that the 6N8P is a superior valve to the 6SN7—and they’re interchangeable—but I wasn’t prepared to spend the time reviewing an amplifier with two apparently non-matched 6N8Ps when 6SN7s are also recommended for use in the amplifier and I had a matched pair on hand, so I used my own valves for this review, and replaced the ‘original’ valves before returning the Audio Space Reference 3.1 (300B) to the Australian distributor, Audio Space Australia.)

While I was installing my 6SN7s to replace the 6N8Ps, I noted that the 300B valve sockets are ‘floating’ rather than hard mounted. This type of valve mount helps with longevity, since there’s no chance of cracking any PCB links when you’re pushing a valve into a socket that’s hard-mounted. I was talking to the editor about this during the review process and he told me he’d recently had to return a non-working valve amplifier that had been sent in for review, and it had had hard-mounted valve sockets. He had noticed that the PC boards on which the sockets were fixed flexed alarmingly whenever a valve was inserted or removed, and suspected that a cracked PCB trace could have been the reason for the ‘dead on arrival’ review sample.

The front panel is a familiar design with a raised centre section and ‘shoulders’ at either end. The main power switch is rotary, which is a little unusual, but has obviously been done to make it visually ‘balance’ with the rotary volume at the opposite end of the front panel. Symmetry is also obvious with the other controls, with the rotary bias select switch on the left of the combination bias/output meter counterbalanced by the source selector switch to the right of the meter. The two front-panel switches are also symmetrical. The switch on the left allows you to adjust global feedback between ‘high’ and ‘low’, while the one at the right selects a ‘direct’ input that bypasses the input selector switch and the volume control, effectively converting the Reference 3.1 from an integrated amplifier into a power amplifier.

Why the feedback switch? Lau maintains that although negative feedback improves damping factor, resolution, soundstage width and depth, it ‘weakens’ harmonics. Because of this he says he fits most of his designs with negative feedback selectors so his customers get to choose the traits they prefer, rather than have him dictate the type of sound they should be listening to. He also says that having a choice can also help those with small speakers, because having minimal negative feedback will give small speaker a bit more ‘kick’ in the bass, whereas those who own large speakers might choose to have high negative feedback to ‘enable the greatest clarity.’

As you have no doubt already gathered from the previous paragraph, the centrally located circular meter does double duty, serving as both a valve biasing meter and a power output level meter. When operated as a power output level meter, it can monitor either the left channel output or the right channel output, but not both simultaneously. Again, this unusual implementation seems to have been done only for reasons of...
ON TEST

Audio Space Reference 3.1 (300B) Integrated Valve Amplifier

symmetry, so the selector knob would have an identical number of ‘steps’ on its left and right-hand sides. In theory you’d imagine it would be better for the meter to monitor both channels, and this would be technically correct, but in practice when you’re playing back pre-recorded music, monitoring a single channel will still give a fair indication of the actual ‘two-channel’ output level and, more importantly in this case, an excellent indication of whether you’re overdriving the Reference 3.1’s output stage.

The input selector switch has positions for (going clockwise) Phono, CD, Aux and Tuner. The phono stage is designed for a moving magnet cartridge with a nominal output of 3–5mV.

The rear of the amplifier reveals that Audio Space is offering a higher number of taps on its output transformers than usual, so you can elect to connect your loudspeakers via 4Ω, 8Ω or 16Ω taps. (In order to cut costs, many valve amplifier manufacturers now offer only a single 6Ω tap or just 4Ω and 8Ω taps.) I guess designer Peter Lau does this because with an output of 21-watts per channel, it’s essential to get maximum power transfer from the source into the load, and choosing the tap that best matches the real (rather than the ‘nominal’) impedance of your speakers is the best way to achieve this, and he might be figuring a large number of people will be using single cone wide-range loudspeakers, which generally have higher impedances than multi-way systems. This means it would be handy to know the real impedance of your speakers, so they will have had to have been tested and the results graphed.

If you don’t know the real impedance of your speakers, and wish to establish the correct tap to use, one good method is be to connect your speakers to the 8Ω tap and play music and, while the music is playing, make a mental note of the volume level. Then, without touching anything at all, switch the amplifier off, swap the speakers over so they’re being driven by the 4Ω terminals, then turn the amplifier on and play that same piece of music. If the volume is louder then keep your speakers on the 4Ω tap. If the music volume is lower, then switch back to the 8Ω tap (remembering to make connections only while the amplifier is switched off!). If you have a wide-range single-driver speaker design (Lowther, Fostex, E.J. Jordan, Bandor, Feastrex, Tangband et al) I’d recommend starting with the 16Ω tap, then trial the 8Ω and 4Ω taps in turn. (If you don’t own a wide-range single-driver speaker, the 16Ω taps will not be the best choice for your speakers, so there’s no need to include them in your trials.)

The speaker terminals themselves are very high-quality, gold-plated, multi-way insulated types. The input terminals are all high-quality gold-plated RCA types, long enough to accommodate Lemo connectors. Alongside the phono inputs is the mandatory screw-style ground terminal, which is nickel-plated. The 240V socket is a standard fused, IEC type. The ‘shiny’ bits on the chassis are said to be made from mirror-finished—and the rest of the chassis from coated—non-magnetic stainless steel. All three heavy-duty transformers are also said to be proprietary to Audio Space, and are claimed to have no magnetic leakage at all, to prevent hum being induced in the amplifier’s circuitry.

IN USE AND LISTENING SESSIONS

First, a big thank-you to Audio Space for delivering this amplifier with all the valves pre-installed. I have to wonder where the modern penchant for delivering valve amplifiers with the valves separately packed ever came from. After all, it’s not as though valves are intrinsically fragile. Just ask any lead guitarist who’s just plugged in his valve-equipped Fender Twin amplifier, after bumping it up the stairs to a nightclub for a gig, after first retrieving the amplifier from the boot of his car, in which it had been transported—valves still warm—from an earlier gig a few hours before. Valve amps are tough, and there’s absolutely no need to remove them in the event you have to move the amplifier for any reason, either from one room to another, or even to a new home. The fact the valves were pre-installed (and the amplifier already run-in not only by the good folk at Audio Space Australia, but by a previous reviewer), meant that all I had to do was warm the amplifier up, then adjust the bias before starting on the listening sessions.

It was when I went to adjust the bias that I realised that I didn’t have an insulated long-shanked, spade-headed screwdriver to adjust the bias screws. To my mind, you’ll need one because the fact that the bias screws are located between two very hot valves means that if you do what I resorted to doing, which was use a short-shanked screwdriver, you will end up burning your fingers… unless you’re very careful indeed. I later discovered that sourcing a long-shanked screwdriver with a sufficiently small head wasn’t all that easy, so it’d be nice if Audio Space had provided one with the amplifier. Once you have a suitable screwdriver, setting bias is easy and setting bias for one valve does not seem to affect any of the other valves, so there’s no need to set all four then go back and ‘tweak’ the settings all over again. And, once set, I found the bias doesn’t appear to need much resetting, I suspect a little fine-tuning every two or three weeks would be all that’s required, and even that might be gliding the lily. Once you have finished biasing the valves, switch the combo meter to either ‘L’ or ‘R’ so the meter is not in circuit with one or other of the valves while you are playing music. As for the reason for the manual bias, it appears that Lau doesn’t like auto-biasing, on the basis that it ‘compromises a power tube’s optimal performance.’ You’d imagine a valve amplifier would be quick to warm up, but the extremely ‘open’ nature of the Audio Space Reference 3.1 (300B) and the size of the chassis meant that that isn’t the case, and I found I needed a minimum of 14 minutes before the sound really ‘clicked’…
and that was using the valve cage, which tends to contain the heat. If you don’t use the cage, you’ll need to wait a little longer. Not that you can’t start listening after just a few minutes, but if you do, you’ll probably just say ‘Oh!’ about the sound quality of this amplifier, whereas after twenty minutes, it will be ‘Oooohoooooohhhhh’. And, just in case it isn’t obvious, you WILL need to select your partnering speakers carefully, because the 300B version of the Audio Space Reference 3.1 design is not overly powerful. I’d say that speakers that are 87dBsPL efficient would be the least I’d personally consider using and, if you like your music loud, I wouldn’t even be thinking of using speakers rated at less than 90dBsPL. (If you want more latitude in speaker selection, you could look at the KT-88 version of the Audio Space Reference 3.1, which can be switched between triode push-pull operation, in which mode it delivers 26-watts per channel and ultralinear push-pull, in which mode it’s rated at 48-watts per channel.)

If you’re listening while the amplifier warms up, you’ll love it when the sound ‘clicks’ because all of a sudden, notes will start to float through the room, rather than being propelled by the speakers, and there’s instantly a Zen-like sense of calmness to the sound, even if you’re listening to music that’s far from calm. The soundstage also opens out and becomes all-enveloping, so rather than just being able to hear where instruments are located, they become tangibly located at that position… almost visible. I found myself experiencing an over-arching feeling that the sound became suddenly totally fluid, yet all the strands were rendered clearly, and I could instantly zero-in on any melody—or countermelody or harmony—to bring its contribution forward, or zoom-out to hear the whole and even, wildly-enough, to hear both the micro and the macro at the same time. If you’ve never experienced this yourself, the closest I can get to explaining the moment is that it’s the aural equivalent of those 3D pictures where you look at a group of coloured dots and, if you relax your eyes, suddenly these dots will become a real 3D image that fills your entire visual cortex.

The bass surprised me by being far tighter than I usually hear with valve amplifiers, though I did find that this tightness was a moveable feast, because when I tried different loudspeakers with the Audio Space Reference 3.1 (300B), the degree of ‘tightness’ varied… though it always varied between and ‘tight’ and ‘less-tight’ without ever getting so far that I would describe it as ‘loose’ or flabby. The tonality was excellent… OK, perhaps it was ever-so-slightly warm, but that’s the way I like it. There was certainly none of that solid-state steeliness to the sound. Pitching at low frequencies was absolutely perfect. For example, when a bass guitar was playing the same note as another instrument (but a few octaves lower, of course) the interval between the two notes was perfect.

High frequencies—treble if you like—were gorgeous. Stunning. Lush. No, I’m not going to resort to a thesaurus and keep going. Instead, just think of the highest-pitched note you can, then imagine that note at its purest and most limpid, and you’ll have some inkling of the highs you’ll hear from the Audio Space Reference 3.1 (300B). And that’s with the standard-issue glass (well, except for my NOS 6SN7s). What if you swapped out those Chinese 12AX7s and replaced them with US or UK-made equivalents? And what of replacing the standard Audio Space 300Bs with Western Electric 300Bs? Or perhaps more modern 300Bs from JJ, or KR Audio, or Gold Lion? My mind is already racing…

‘Hey! What about that feedback switch? Which setting did you use when writing this review?’ If that’s you asking these questions, I fear that I have no easy ‘off-the-cuff’ answer for you. When I started my auditions, I thought I’d first work out which mode (high or low) gave the best sound quality, and then leave the switch in that position for the remainder of the review. (I’m a great believer in the KISS reviewing methodology.) Naturally, I tried several different pieces of music when doing this. Unfortunately, the sound quality was great in both feedback modes, and the decision of what I personally thought was the ‘best’ mode depended on what I was playing and (as I later discovered) even on my own particular mood when I was listening. If I had to make a rash generalisation, I’d say that I liked ‘high’ with classical music and ‘low’ with all other types. But equally, I discovered plenty of exceptions to this rule, where a particular classical piece sounded better in ‘low’ mode, or a rock track sounded better in ‘high’ than it did in ‘low’. One gripe I had with the switch is that it’s pretty difficult to properly evaluate the two modes, because whenever you switch from ‘High’ to ‘Low’ the volume level jumps up dramatically, so unless you compensate for this, by turning back the volume control at the same time, you will always judge the ‘Low’ feedback setting to sound better, just because it’s louder. As I think has been noted on these pages previously, this is a failing of the human ear/brain. If you hear two sounds that are identical except for one being louder than the other, you’ll always perceive the louder of the two as being the ‘better’ of the two.

**CONCLUSION**

I loved this amp. In fact I loved this Audio Space Reference 3.1 so much that I’m going to buy one. Just not this one. You see I couldn’t live with myself if I didn’t audition the KT-88 version first (and not least because it’s almost a grand cheaper, at $4,280). I am pretty sure that after I have A/B-auditioned the KT-88 version against the 300B version I will still end up buying the more-expensive 300B version, but I’m not going to spring the dough until I am absolutely certain. What I can tell you is that, either way, there is an Audio Space Reference 3.1 in my future. And if you take the time to listen to one (or the other) there may be one in yours, too.  

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**Chris Croft**
LABORATORY TEST RESULTS

I wasn’t surprised to see the power output figures that resulted from Newport Test Labs tests on the Audio Space Reference 3.1 (300B). What is surprising is that Audio Space has not been tempted to inflate the power output, like most other valve amplifier manufacturers. So, as you can see, Audio Space claims an output of 21-watts per channel, and that’s exactly the power output the test sample delivered… though only when a single channel was driven into an 8Ω load. However, unlike most valve amplifiers, the Audio Space could maintain this output level at the frequency extremes (20Hz and 20kHz). When both channels were driven, power output dropped to 15-watts at 20Hz, 16-watts at 1kHz and 17-watts at 20kHz, so to meet the Australian power output standard, this amplifier would have to be rated at 15-watts per channel. The figures into a 4Ω load (driven from the 8Ω tap) were almost identical to those for the 8Ω load, except for there being very slightly less power available at 20Hz.

Note that the power output figures are all a little imprecise, as they depend on the visual acuity of the person doing the test to detect waveform distortion on an oscilloscope because, in common with all valve amplifiers, the Audio Space does not go into ‘hard’ clipping when it reaches the upper limits of its output power. In practise, if the technician had allowed a little more waveform distortion, power output would be fractionally higher than shown in the tabulated listing and in the bar graphs.

During testing, Newport Test Labs did a quick check on the accuracy of the power output meter and reported that it is calibrated so that when the amplifier is delivering 1-watt into an 8Ω load, the needle will be at –10VU. When the amplifier is delivering 10-watts into an 8Ω load, the meter will show 0VU. Note, however, that because the meter needle’s action is damped, if the needle is hovering around the 0VU mark when you’re playing music, it’s likely that musical peaks will be slipping through that will be taxing the amplifier’s power output reserves.

This amplifier’s frequency response also varies depending on the setting of the feedback control (shown in Graph 4). With low feedback (red trace) the frequency

### Audio Space Reference 3.1 (300B) — Power Output Tests

<table>
<thead>
<tr>
<th>Channel</th>
<th>Load (Ω)</th>
<th>20Hz (watts)</th>
<th>20Hz (dBW)</th>
<th>1kHz (watts)</th>
<th>1kHz (dBW)</th>
<th>20kHz (watts)</th>
<th>20kHz (dBW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8 Ω</td>
<td>21</td>
<td>13.2</td>
<td>21</td>
<td>13.2</td>
<td>21</td>
<td>13.2</td>
</tr>
<tr>
<td>2</td>
<td>8 Ω</td>
<td>15</td>
<td>11.7</td>
<td>16</td>
<td>17</td>
<td>17</td>
<td>12.3</td>
</tr>
<tr>
<td>1</td>
<td>4 Ω</td>
<td>18</td>
<td>12.5</td>
<td>21</td>
<td>21</td>
<td>21</td>
<td>13.2</td>
</tr>
<tr>
<td>2</td>
<td>4 Ω</td>
<td>14</td>
<td>11.4</td>
<td>16</td>
<td>17</td>
<td>17</td>
<td>12.3</td>
</tr>
</tbody>
</table>

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

### Audio Space Reference 3.1 (300B) — Test Results

<table>
<thead>
<tr>
<th>Test</th>
<th>Measured Result</th>
<th>Units/Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Response @ 1 watt o/p</td>
<td>7.5Hz – 12kHz</td>
<td>–1dB</td>
</tr>
<tr>
<td>Frequency Response @ 1 watt o/p</td>
<td>3.5Hz – 22kHz</td>
<td>–3dB</td>
</tr>
<tr>
<td>Channel Separation (dB)</td>
<td>69dB / 70dB / 103dB</td>
<td>(20Hz / 1kHz / 20kHz)</td>
</tr>
<tr>
<td>Channel Balance</td>
<td>1.28</td>
<td>dB @ 1kHz</td>
</tr>
<tr>
<td>Interchannel Phase</td>
<td>4.47 / 0.44 / 4.96</td>
<td>degrees (20Hz / 1kHz / 20kHz)</td>
</tr>
<tr>
<td>THD+N</td>
<td>0.44% / 0.93%</td>
<td>@ 1-watt / @ rated output</td>
</tr>
<tr>
<td>Signal-to-Noise (unweighted/weighted)</td>
<td>71dB / 84dB</td>
<td>dB referred to 1-watt output</td>
</tr>
<tr>
<td>Signal-to-Noise (unweighted/weighted)</td>
<td>84dB / 92dB</td>
<td>dB referred to rated output</td>
</tr>
<tr>
<td>Input Sensitivity (CD Input)</td>
<td>27mV / 128mV</td>
<td>(1-watt / rated output)</td>
</tr>
<tr>
<td>Input Sensitivity (Direct Input)</td>
<td>101mV / 485mV</td>
<td>(1-watt / rated output)</td>
</tr>
<tr>
<td>Damping Factor</td>
<td>6</td>
<td>@1kHz</td>
</tr>
<tr>
<td>Power Consumption (N/A / 179)</td>
<td>wats (Standby / On)</td>
<td></td>
</tr>
<tr>
<td>Power Consumption (182 / 233)</td>
<td>wats at 1-watt / @ rated output</td>
<td></td>
</tr>
<tr>
<td>Mains Voltage Variation during Test</td>
<td>238 – 245</td>
<td>Minimum - Maximum</td>
</tr>
<tr>
<td>Heatsink Temperature (Degrees C)</td>
<td>52</td>
<td>@ 1-watt output on valve cage</td>
</tr>
</tbody>
</table>
response of the Audio Space Reference 3.1 (300B) is rather curtailed, being 1dB down at 9.5Hz and 7.5kHz and then 3dB down at 4.5Hz and 15kHz. With high feedback (black trace), the response is more extended, so it's just 1dB down at 7.5Hz and 12kHz, and 3dB down at 3.5Hz and 22kHz. According to Newport Test Labs’ tests, this puts the measured frequency response of the Audio Space Reference 3.1 (300B) at 3.5Hz to 22kHz ±1.5dB when driving a standard laboratory test load (8Ω non-inductive). This falls a tad short of the claimed response of 20Hz to 30kHz ±1dB. When driving a simulated loudspeaker load the high-frequency response was further curtailed (as shown in Graph 5). Into this load Newport Test Labs measured the frequency response (with the high setting of the feedback control) as 3.5Hz to 20kHz ±2.5dB. The degree of variation in the response means that this amplifier will sound substantially different depending on the speakers you connect to it—and the transformer tap you use—simply because of the way the speaker’s own impedance will affect the amplifier’s frequency response.

Channel separation was good, measuring around 70dB at low to midrange frequencies, and improving to more than 100dB at high frequencies, as you can see from the tabulated results. Channel balance was not so good, with a measured 1.28dB difference between the left and right channels. However, it’s unlikely that this would be perceivable and would in any case be swamped by the frequency response variations caused by the loudspeakers. Inter-channel phase was just 0.44° at 1kHz and a little more than 4° at the frequency extremes, which is excellent for a valve amplifier. As you’d surmise, distortion also varied considerably depending on the setting of the feedback switch, and the ‘lowest’ distortion levels were obtained using the ‘high’ switch setting, though irrespective of the setting, distortion was in all cases higher than I see from solid-state designs.

Graph 1 (high feedback) and Graph 1a (low feedback) of distortion into an 8Ω non-inductive test load serve nicely to illustrate. In Graph 1, the second harmonic is at –46dB (0.501%), the third at –52dB (0.251dB), the fourth at –73dB (0.022%) and the fifth and higher-order components all below –100dB (0.001%). In Graph 1a, both the second- and third-harmonic distortion components increase to –40dB (1.0%) and –45dB (0.562%) respectively. The fourth, fifth, sixth and seventh harmonics descend stair-case-like from –68dB (0.039%) down to just below –100dB (0.001%) after which there’s nothing much, save for a few harmonics that are more than 110dB (0.0001%) down. Overall THD, however, was 0.44%, which is a good result.

Increasing power output to 21-watts (Graphs 2 and 2a) saw all the higher-order harmonic distortion components rise considerably in level, but the second and third-harmonic components each stayed around at –40dB (1.0%).

Newport Test Labs also tested the distortion at rated output when the amplifier was driving 4Ω loads via the 8Ωtap for both high and low settings of the feedback switch (not shown). There were small differences between the performance into 8Ω and 4Ω loads, but nothing major. Overall THD was measured at 0.93%, just creeping in under Audio Space’s specification of 1.0%.
Newport Test Labs tested for intermodulation (IMD) effects using both SMPTE and CCIF test signals, of which only the results for the CCIF-IMD test are shown here (Graphs 3 and 3a). I was expecting to see quite a difference here, and there is, with the higher feedback resulting in less regenerated signal at 1kHz, but it’s only a 5dB difference, which I don’t think is significant. Perhaps more significant is the actual level of the regenerated signal, which at around 50dB (0.316%) is high, but typical of a valve amplifier.

Signal-to-noise ratios were good, again particularly for a valve amplifier, with Newport Test Labs measuring 71dB (unweighted) referred to a one watt output, increasing to 84dB with A-weighting. Referencing the noise to rated output (21-watts), the Audio Space returned S/N results of 84dB (unweighted) and 92dB (A-weighted). All these were measured through the standard CD input, so I’d expect them to improve further if the ‘Direct’ input had been used for testing.

The square wave oscillograms reflect the limited bandwidth of the Audio Space Reference 3.1 (300B), with the 100Hz wave showing the expected tilt, but no obvious phase shift, and the 10kHz square wave exhibiting considerable rounding on the leading edge—even the 1kHz square wave shows premature rounding on its leading edge. What was interesting was the amplifier’s performance into a highly capacitive load. Whereas most solid-state amplifiers would show considerable overshoot and extended ringing, the Audio Space Reference 3.1 (300B) overshoots only the tiniest amount when the high feedback mode is selected, and not at all when the low feedback mode is selected… and there’s absolutely no ringing visible in either mode. As I have noted

This type of performance is consistent with amplifiers that are subjectively assessed as having ‘good sound.’ on previous occasions, this type of performance is consistent with amplifiers that are subjectively assessed as having ‘good sound.’ On the technical side, it means the Audio Space Reference 3.1 (300B) will be completely stable when driving electrostatic loudspeakers, or other speaker designs that present a ‘difficult’ load to the driving amplifier.

Input sensitivity was measured at 27mV for one watt output, while 128mV is all that’s necessary for the amplifier to deliver its rated output. This is about par for the course for an integrated amplifier, so no concerns here. No concerns either if you use the Direct input, though if you do you’ll need 101mV at the input for the amplifier to deliver one watt, and 485mV for it to deliver rated output. Again these are fairly typical figures for any power amplifier.

As you’d expect from a valve power amplifier, the Audio Space will draw considerable energy from your household mains supply, pulling around 180-watts all the time, including when you’re playing music at low-ish levels, and more than 230-watts when being driven hard. Despite this, the amplifier doesn’t get overly hot, with the top of the central transformer getting hotter than the valve cage itself, with Newport Test Labs measuring both temperatures at about 51°C. So to save on energy bills and extend valve life, I’d recommend turning the Audio Space off whenever you’re not using it.

Steve Holding

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. Transformer tap: 8-ohms. Feedback: High. [Audio Space Reference 3.1 (300B) Integrated Amplifier]

Graph 3a: 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. Transformer tap: 8-ohms. Feedback: Low. [Audio Space Reference 3.1 (300B) Integrated Amplifier]

Graph 4: Frequency response of line input at an output of 1-watt output into an 8-ohm non-inductive load. Transformer tap: 8-ohms. Feedback High (Black Trace) vs. Feedback Low (Red Trace). [Audio Space Reference 3.1 (300B) Integrated Amplifier]

Graph 5: Frequency response of line input at an output of 1-watt into a combination resistive/inductive/capacitive load representative of a typical two-way loudspeaker system using high feedback setting (blue trace) and low feedback setting (red trace). Response into a non-inductive 8-ohm load also shown (black trace). Transformer tap: 8-ohms. [Audio Space Reference 3.1 (300B) Integrated Amplifier]