



- Exclusive, unique differential circuit topology
- Not Push Pull—not Single Ended
- Fully balanced operation throughout
- Zero negative feedback
- Beyond SE midrange microdynamics & '3D space'
- Better than Solid State bass control & tonality
- No typical valve amp or solid state colourations
- Extreme clarity and ambience accuracy

- Very fast, short, optimised signal path
- SuperRegulated input stage power supply
- Choke input filtered output stage power supply
- Non critical about speaker loading impedances
- Superbly musical on all speaker, inc. electrostatics
- Able to use any of the wide variety of 300B's
- Internally adjustable for power & sensitivity
- All signal wiring done with pure silver wire or foil



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Best of 2003 Awards—Amplification

"I first heard of Allen Wright, the designer, about six years ago when I was evaluating cables, and found his *Supercables Cookbook*, which espoused the use of very thin silver foil and minimal dielectric to allow minimal skin effect and maximize signal transfer purity.

...I had been using the *Electraprint DRD300B* amplifiers since I gave them "Best Product of the Year" award last year. They had the clearest cleanest mid-range production that I had heard, but the *Vacuum State dpa300B's* beat them out. The imaging became more 3-dimensional with greater depth and width and fullness to the soundstage, filling out even more the space between the instruments. They were actually letting more information through.

...the first piece I played was the first movement of Dvorak's Symphony #9... The bass was tight and strong, at least to the 50Hz range of the horn, and was the tightest I had ever heard from my system...Then the tympani kicked in and I heard the most authentic reproduction of tympani I'd ever witnessed. So they did do the bass better than any amplifier here.

I called...a local dealer and took Allen over for an evaluation. He was using the \$35,000 *Kondo NEIRO 2A3* PSE amplifiers on *Beauhorns*, with a *Kondo* IO-J cartridge and transformer to a *Kondo* pre-amplifier. Probably better than \$100,000 worth...and the sound was excellent with a liquid midrange to die for, and very good bass down to the *Beauhorn's* 40Hz. limit...

With the *Vacuum State* Differentials in the system, the *Beauhorn* bass tightened up giving more chest compression. There was as much micro-information hall space cues coming in as with the *NEIRO's*. Where the *NEIRO's* slightly beat out the *dpa300B's* was in the midrange that was somewhat more liquid and natural. Whether that was due to the amplifier circuitry difference or the *Nero's* 2A3 tubes verses the *Vacuum State* VV-32's

I have no idea, but it was very close. All in all I was ecstatic that the *dpa300B's* took on the mighty *Kondo* and, to my ears, won. There was even an apparent increase in the low frequency information such that we did not feel compelled to use the subwoofers...even though Steve threw some very bass heavy albums at them.

...my *Plinius SA-50* stereo amplifiers came back from their update and I had them running the woofers in Class A one channel per woofer, and the *Vacuum State* units the mid-tweeters. Believe it or not, my first impression, after balancing the system, was a loss of bass slam. The *dpa300B* tube amplifier putting out 18 watts had actually done tighter and deeper bass than four channels of 100 watts of "Class A" solid-state power. This amazed me.

I took the amplifiers down to...s house to see how they compared to his *Border Patrol 300B* amplifiers, and to the new *Tom Evans Soul 300B* amplifiers from England. All three present agreed that Allen's amplifier beat the others in information retrieval and deep bass tightness, with the *Evan's* coming close, but with the *Border Patrol* having that 300B lushness that some tubaholics prefer. Whether it is the VV-32's sound that does tend toward the sterile, or the amplifier's, I can't tell yet. For me, their retrieval of microdynamics and very low volume soundspace information make up for the slight loss of SET lushness.

The only problem with the setup now is that I miss the bass that the *dpa's* produced; so much so, that I am ordering two more from Allen using 300B tubes, which I will use on the mid tweeters and use the VV-32 iteration on the woofers. That is how much I like them! Plus, then I will be able to see if the difference in the sound we heard was due to the amplifiers or the tubes". BG.

All in all I was ecstatic that the dpa300Bs took on the mighty Kondo and, to my ears, won.

<http://www.enjoythemusic.com/magazine/equipment/0104/bestof2003.htm>

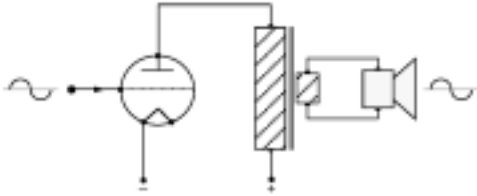
A New Type of Valve Power Amp?

In the hi-end valve amp business there is an almost religious jihad between the highly vocal advocates of single-ended (SE) amps and the equally vocal proponents of push-pull (P-P) amps—with both types also having seriously opinionated and very vocal detractors!

At *Vacuum State* we have built & extensively tested both types across more than twenty years (on the way to developing a third option) and offer the following explanation of the two concepts—and our experience of their strengths and weaknesses.

Single Ended:

In it's simplest form, the output stage of a SE amp uses a single output valve, often an archaic but very linear Directly Heated Triode such as a 300B, driving an output transformer containing a single primary winding:



This valve is run at a high current (Class A) and raises & lowers this current in response to the signal presented at it's control grid. Flowing in the transformer's primary winding, this changing current produces a lower voltage/higher current in the secondary to power the speaker system.

This SE topology has several technical disadvantages, one being it's very low efficiency (~25%) with much more power being expended as heat than turned into music. But of course this is of little concern to audiophiles chasing the best in music reproduction, to them the sound is all that matters! SE's big sonic upside is it's extremely good microdynamics. Described by writers as “midrange palpability” and other fluffy phrases, SE does this much better than conventional push-pull amps—and way better than anything I've heard from solid state, even specialist Class A designs. The naturalness created by this characteristic (whatever they call it) is the thing that makes many music lovers forgive the SE amp's weaknesses!

But along with these microdynamics comes some disturbing problems—at least to some ears:

1. Very high levels of harmonic and intermodulation distortion:

This can easily reach 5%, admittedly mostly low order, but this extreme amount makes the sonic signature thick (OK—rich if you're a fan) and adds this as a constant colouration to *all* music. Chocolate sauce on fresh strawberries may be a good or bad thing depending on your taste, but do you really want chocolate sauce on everything in the meal?

2. Asymmetrical output impedance:

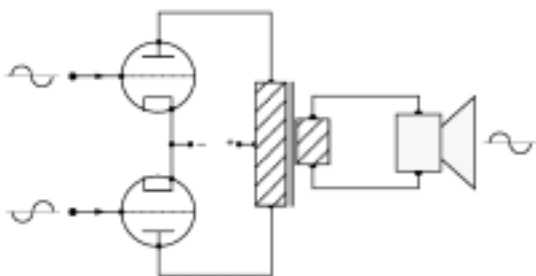
The output impedance (AKA damping factor) of a power amp has a big effect on the bass quality of your speakers, and this often determines if a speaker matches well with a given amp. But a typical SE amp displays a very different damping factor in one direction (i.e. speaker cone moving out) than the other (i.e. cone moving in) and this can create a very odd bass quality in many speakers. Not so important for tweeter use in a bi or tri-amped system—but it can be really weird in a full range system.

Favourable Metaphor: A skilled micro-surgeon performing an extremely critical operation under high optical magnification.

Unfavourable Metaphor: An old time timber cutter working single handed with a long saw, it smoothly and powerfully cutting when pulled towards him—but flexing & juddering with little useful cutting when pushed away.

Push-Pull:

In it's simplest form, the output stage of an P-P amp uses two output valves (often "modern" indirectly heated types such as EL34's or KT88's, although directly heated valves such as 300B's etc. are also used) and an output transformer with a center-tapped primary winding:



The valves can be run at high idling current (Class A) or low idling current (Class AB). The opposite phase signals at the grids raise this current in one valve while simultaneously lowering the current in the other by (ideally) the same amount. These changes are summed in the two primary windings and arrives (again ideally) coherently at the secondary to drive the speaker..

This P-P topology has higher efficiency (up to 50%) than SE amps, has no obvious *engineering* problems, and generally sounds musical.

Other P-P positives compared to SE are:

1. Generally much lower levels of harmonic and intermodulation distortion than SE—but often with more less pleasant higher order harmonics.
2. Symmetrical output impedance for good & accurate bass tonality.
3. Much higher output power for the same weight, size and cost.

The big P-P disadvantage is it's need to create those two opposite phase signals (to drive the output stages) with an often criticised phase-splitter—and then to re-combine these two (*at least slightly different*) signals to make a complete one. This re-combination is what causes P-P's often serious loss of microdynamics—certainly in comparison to a very good SE amp.

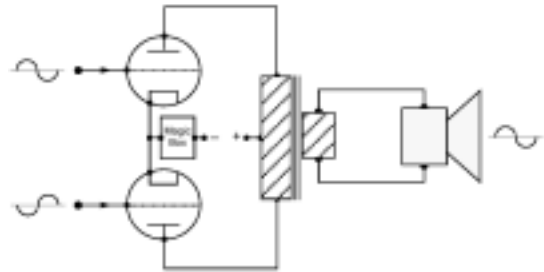
Favourable Metaphor: Two timber cutters, one on each end of a long saw, working smoothly and evenly, back and forward, in complete harmony.

Unfavourable Metaphor: Two surgeons, one on each side of the operating table—both holding & attempting to control the knife...

The Third Option

What if the best of both topologies, and none of their weaknesses, could be found in one design? Four years ago the lights came on, and we built up an experimental valve poweramp that did just that—and to the best of our knowledge this topology had never been used before as we had not been able to find any published schematics, or read between the lines in other manufacturer's promotion—even after extensive searching. But recently we heard that this exact *Third Option* concept had been used in some industrial valve amps used for the rather critical job of controlling the fuel rods in '60's German atomic power stations!

Using two output valves and a push-pull type of output transformer, at first glance the circuit looks to be that of yet another boring P-P amp, but it sure doesn't sound like that! Higher power, great bass and cost effectiveness come from it's apparent push-pull topology—but what about the musically vital micro-dynamics that SE does so well?



This is where it's far beyond anything P-P can do—and *at least* equal to the very best SE amps! The secret's in the *Magic Box* shown above: this addition turns the output stage into a differential amplifier—an advanced, theoretically ideal form of push-pull used extensively in high precision measuring instruments such as oscilloscopes. Our *Vacuum State Realtime* preamps have always been differential since the first one in 1980, as have the driver stages of all our poweramps. Many designers use differential stages somewhere within their designs—but this principle has never before (to the best of our knowledge) been applied to *all* stages of an audio power amp—especially the output stage!

This *Magic Box* ensures that the total current flowing through the two valves (and the output transformer) is ABSOLUTELY CONSTANT—if one valve's current goes up just one microamp from (say) 60.000 milliamps (mA) to 60.001mA, then the other one will come down by *exactly* the same amount, from 60.000 to 59.999mA. This completely solves the microdynamic losses in a conventional P-P amp where these currents are not in any way precisely controlled, and hence allow/cause the cancellation of subtle but vital musical information *within* the output transformer itself.

When used at every stage of a poweramp, this differential topology allows optimum micro-dynamics/resolution as well as surprisingly natural macro-dynamics—and with no inherent weaknesses. Listening tests prove that this principle has at least the same midrange naturalness and microdynamics of the worlds best SE amps without any added constant colourations—as well as wonderfully accurate bass tonality and overall musical naturalness!



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Bill Gaw's Audiolics Anonymous Chapter 63

Blue Note Best Of 2004 Award—Product Of The Year

Vacuum State dpa300B Power Amplifiers

"I'm enamored and will live happily ever after with them"

This is getting monotonous! This is the third year in a row I've given product of the year to an amplifier, and the second year in a row that title has gone to Allen Wright's Vacuum State dpa300B Fully Differential Amplifier. There's a good reason. If you review my previous article, AA Chapter 52, I had the original set built for Vaic VV-32 tubes, because I had multiple sets hanging around from my first adventure with SET amps. The amps were so good, I decided to have a set built for normal 300B's. Allen's circuit innovation is to design a magic box (his words, not mine) to turn a push-pull circuit into a full differential output stage. While other amps and preamps use a differential circuit for the input or driver stages, he claims that this is the first design to be able to do this with the output stage, except for a tube power amp used in German atomic power plants for accurate positioning control of the power rods...

The circuit works in spades. The units have the clarity and deep bass extension of solid state, the microdynamics and midrange of single ended tubes. Missing though for the SE guys is that luscious second order harmonic distortion that the SET crowd loves. In its place is a crystal clear soundstage. The VV-32 amps worked superbly for driving the mid-tweeters, but they didn't quite have that 300B or 2A3 luscious midrange when used with Plinius stereo 50 amps in balanced mode driving the woofers. I borrowed a set of 300B amps from a friend just to see how the VV-32 DPA amps would sound in the bass range. Wonder of wonders, the bass obtained was the tightest I'd heard yet in my system, far surpassing what the Plinius solid state amps would do for control of the woofers. In addition, the bass was more defined, giving that feeling of low frequency energy which completely permeates a concert hall that is felt more than heard.

This amazed me considering I was using one 18 watt monoblock tube amp driving 2 12" horn drivers instead of dual 50 watt solid state amps in Class A mode. I was so enamored of the results that I decided to have him build a new set so that I could bi-amplify using 300B tubes. I placed my order late last fall and finally was able to bring them home when I went over to the Munich High End Audio Show in May. The night I picked them up at Allen's workshop, I had trouble prying them out of his hands as these were the first of the 300B type produced, and he loved the sound compared to the KT-88 units he had been listening to. He was using them on a set of full range electrostats he had modified and the sound was superb.

The circuit has been designed such that it will take any 300B type of tube (300B, VV30, VV52 etc) with a simple resistor change for the self biasing circuit. My 300B amps are biased for 15 watts output and the 32's are set conservatively for 18 watts, but could be moved up to 25 watts if needed.

On to the build. The chassis is made of anodized aluminum, in a sort of retro-modern look. All wiring is point to point using his superb silver foil. Transformers are top of the line Lundahl, and caps and resistors are high quality. In other words, like his other products, Allen builds these to highest professional equipment standards.

Driver tubes are the 6H30pi "Super Tubes" from Russia. One can use any output tube one wishes in the 300B series just by changing a resistor to adjust for operating current balance. Bias is fully automatic thanks to the "magic box". There are inputs for single ended RCA's, but balanced input is preferred using either the XLR or Redel plugs. Output is either by two sets of gold plated banana plugs or Centronics computer plugs if you use his foil loudspeaker cables. An IEC plug allows use of any high end AC cord.

To me, these amps have all of the strengths of both solid state and tubes, single ended and push-pull, without any of the weaknesses. The VV-32 amps put a stranglehold on the woofers, giving tight, deep chest compression type bass, while the highs on the 300B amps extend out to beyond where my flat to 16kHz. tested ears can hear. The midrange is lush and full but without the bloating of second harmonic distortion single ended amps produce. The microdynamics give life to voices and instruments allowing one to hear inflections previously buried, while their quietness and lack of crossover distortion open up the soundstage to the low volume information that allows one to feel as if one is in the presence of live musicians with the right recordings. And don't be afraid of their relatively low wattage compared to the mega-amps. Remember, they beat my 50 watt "Class A" amps and were able to drive a difficult electrostatic load.

I feel these units are the closest I have heard to the proverbial "straight wire with gain." They could be put up against any amps at two to three times their price, which is rarefied atmosphere indeed. They have made my job of testing other products over the past six months far easier as they let all of the information through, warts and all. That's enough hyperbole, I think you get that I'm enamored and will live happily ever after with them. Bill.

'All the strengths of solid state & tubes, single ended & push-pull, without any of the weaknesses'

The full review can be found at: <http://www.enjoythemusic.com/magazine/archives/>

dpa300B differential monoblock amplifiers

This underside view clearly shows the hand wired, point to point, mirror image, monoblock construction:

- All sonically important connections (both signal and powersupply) are made with either *four nines silver wire*, or *four nines silver foil*. All other wiring is done with solid core copper. Stranded wire is not used at all.

- All primary signal path components are non inductive and non-magnetic.

- The two critical capacitors in the signal path are oil filled metal foil & polypropylene, choosen from over 50 types auditioned

- The main B+ choke input filter uses polypropylene filter capacitors— as normally used electrolytics are sonically unacceptable at this level.

The rear view shows the mirror image layout of the connectors:

- The centered IEC mains connector/fuse/power switch

- Three input connectors:

1 x unbalanced via RCA

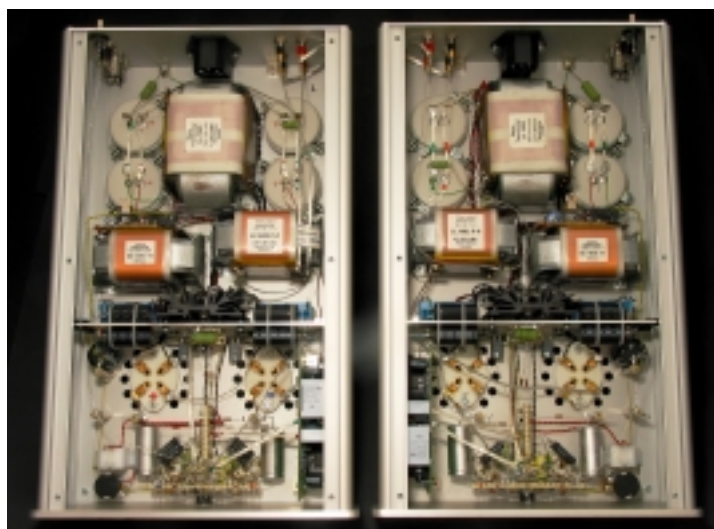
2 x balanced via XLR & REDEL

are on the opposite side to the outputs

- Three output sockets:

2 x paralleled via 4mm 'bananas'

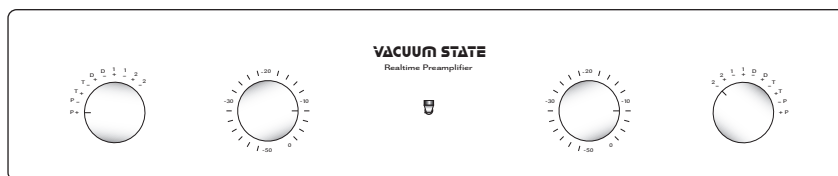
1 x Centronics for use with our 25mm *Vacuum State* silver foil speaker cables.



The *dpa300B* can use all types of 300B valves from the classic *Western Electric* 300B (and it's much lower priced Chinese & Russian clones) right up to the monster '52 variants from the Prague consortium of *Kron*, *Emission Labs* and *EAT*. Classic 300B's produce 18 watts of pure Class A1 output power, the biggest valves easily make 25 watts, and close to 40 watts with an optional higher voltage power transformer. Unless otherwise client specified, *dpa300B*'s are supplied set to use the classic 300B, but to gain the extra power available from the bigger valves all one needs to do is change one resistor internally per monoblock. This is easily done by your dealer, or yourself if reasonably competent with a soldering iron.

Extensive listening has proven that these amps are not restricted to working their sonic magic with just one type of speaker. Cones in box types—full range or complex multi way, planers—electrostatic or magnetic, and horns—large or small, all sing beautifully on all music types.

Our *Vacuum State RTP3C* is the perfect match for the *dpa300B*. Dual mono, mirror imaged & fully differential, with absolute phase selection on all inputs, it uses very similar circuit design concepts to the *dpa300B*.



Specifications

- Power output: 10 to 25 watts RMS (adjustable by one internal change) 40 watts with alternative transformer
 - Speaker load: from 2 to 15 ohms (design center is 6 ohms)
 - Gain: 20dB (adjustable +26dB to -10dB with one internal change)
 - Bandwidth: 5Hz to 100kHz @ -3dB (with no ultrasonic resonances)
 - Distortion: -60dB (with no harmonics beyond the 3rd)
 - Signal to noise: -80dB
 - Size: 412mm deep
260mm wide
220mm high
 - Weight: 9 kg per monoblock
 - Shipping weight: circa 20kg/pair
 - Valves: 2 x 6H30 input/driver triodes
2 x 300B (family) triodes
- NB: Please consult your agent or *Vacuum State* for a list of recommended 300B valves—most are fully usable.
- AC power: 115 or 230VAC—selected by a simple internal wiring change.
 - Input/driver stage supplied by a *Vacuum State* SuperRegulator
 - Top panel metering and adjustment for perfect output valve balancing

While perhaps not the first choice for disco level *techno*, they're superb on everything else: solo performer, small ensemble, full orchestra, vocal and/or instrumental, multi-tracked studio or acoustic live performance. Classic, jazz, rock, blues, country, new age—they will go a long way towards recreating the art, emotion & music of the *original performance* in your own space!

All *dpa300B*'s are 100% hand built in our new facility in Schaffhausen, Switzerland, and only by trained and qualified technicians. Kits are available to those who have competent electronic construction skills (or a *good* friend who does) and who are willing to follow the thorough instructions. A kit *dpa300B* will be optically and sonically identical to the factory units.

We are very excited about this amplifier, believing it is a major step forward in tube power amp design, and know it will bring exceptional musical results to those who are searching to recreate the beauty, excitement and realism of real music of all types in their homes.

Four line inputs & an *absolutely* state of the art MC phono stage, it makes the very well reviewed *Manley Steelhead* sound closed in, muddy and confused! More info on our site under the '2003 Preamp News' button.

Available from:

Completely hand made in Switzerland by skilled technicians

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