Subject: Initial review of ASUSA (Antique Sound USA) K2003 SET amp
Posted by akhilesh on Sun, 16 May 2004 19:11:53 GMT
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HI Everyone,As my earlier post indicates, I purchased an antique sound USA (a now defunct company) K2003 amplifier : it uses a 12ax7 with 2 EL84s, wired in SET mode. There is -5db feedback. I got it really cheap and my aim was to: a) compare it to my zen se84C and b) to try some upgrades and see if the sound could be improved. I received the amp in good condition, and plugged it in on a dummy load first. nothing blew up, so then i connected my homebrewed speakers to it. Here are some impressions:1. The bass is greater than the zen by a small amount. It is also a tiny bit looser than the zen. 2. The soundstage is a little bigger than the zen's. 3. The detail is about the same, except see 4:4. The zen emphasizes the midrange a bit more than this amp. 5. The zen has a slightly smoother sound (no negative feedback in the zen) and overall the music seems a tiny bit more "together" in the zen. 6. This amp is a lot better than my push-pull el84 amp: a lot smoother, and nicer sound stage. 7. The amp has no hum, unlike the zen which has a slight hum (the zen is tube rectified). 8. This amp gives out 4 watts of power, unlike the zen's 1.5. I suspect you can run 91-92 db speakers with this amp and get realy good sound, where the zen will be underpowered. I opened the amp and saw the following: MIT coupling caps, and diodes with the word FR on them. Whoever built this amp already upgraded the parts. I also noticed a solen cap, along with nichicon power caps and high quality resistors. The quality of soldering was average, with many parts soldered on with not a lot of mechanical support. In fact one grounded end of a cap popped loose and I resoldered it. Given this, as well as the small amount of room in the box, I will not be upgrading anything in this amp. The input tube is a GE 12ax7, and the outputs are sovtek. I may play around with a telefunken input tube. Overall, i am very satisfied with my purchase, given the money i paid. I would not pay $499 for this amp (the list price of the KIT alone), esp. since my speakers are fine with the 1.5 watts the zen has. However, if i has 91-92 db speakers, this amp would be much more preferable than the zen. The lack of negative feedback in the zen, along with tube rectification seems to make the music come together a little better, PROVIDED YOUR SPEAKERS CAN deal with 1.5 watts!At the next Tulsa audio meet, i'll bring this amp for others to listen. -akhilesh

Subject: Re: Initial review of ASUSA (Antique Sound USA) K2003 SET amp
Posted by Wayne Parham on Mon, 17 May 2004 02:31:55 GMT
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Cool, Akhilesh. Nice write up, thanks. I'm excited to hear this amp at the next get-together.

Subject: Addendum to review of ASUSA (Antique Sound USA) K2003 SET amp
Posted by akhilesh on Mon, 17 May 2004 23:34:19 GMT
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Hi Everyone,Couple of additional points:THe zen se84C (the amp i compared this one to in my review, made by www.decware.com) uses a 6922 input tube, along with sv83 outputs (same as el84 but plate voltages are a bit different, and sv83s are considered "more linear" by some). The asusa amp uses the standard 12ax7 input tube, along with the el84, a much more common setup than the zen. After some more listening, I was actually quite taken by the slam and punch of this amp versus the zen. Imaging was actually a bit better!Detail was as good. I think i was "looking for top end harshness" when i listened to it first, wen i wrote my initial review. After discovering that the components were ALREADY UPGRADED (according to earlier reviews of this amp, coupling caps really make it smoother and my piece has the upgraed caps already), when i listened to it again last evening, i actually found it quite smooth! Goes to show the "psychoacoustical impact" of many upgrades. The amp definiltey has more punch than the zen, and the midrange may be considered by some to be better balanced than the zen. Overall a nice amp that i am going to keep for sure! -akhilesh

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Subject: Re: Initial review of ASUSA (Antique Sound USA) K2003 SET amp
Posted by Thermionic on Wed, 19 May 2004 11:52:23 GMT
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Excellent review, Akilesh! It was very thorough, informative, and well written. Good job! At the risk of sounding too "know it all," I would like to offer a comment concerning one statement. You stated that the Zen hummed because it was tube rectified. A properly designed power supply using a tube rectifier will have zero hum. Hum can also be had from other sources like heater to cathode induced hum and a poor grounding scheme. Just my 2c.Hope you enjoy the new amp! Have fun with it!Thermionic

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Subject: Re: Initial review of ASUSA (Antique Sound USA) K2003 SET amp
Posted by Manualblock on Wed, 19 May 2004 12:29:59 GMT
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Excellent review AK. You know I too see differences in the sound quality of my stuff all the time without any change in variables except time of day, weather etc. I know that at certain times the line voltage is steadier and cleaner, I know it can be steadier because we have measured it. In summer during hot humid days my system sounds lousy compared to other times. Evenings around dinner is bad, someone suggested that all the microwave dinners are being cooked. I don't know and I prefer not to stray too far into middle earth with this stuff but I can't help but think it may have an effect on reviews of equipment. So maybe that could contribute to the rather radical change of perception you found with this amp. Small story; A friend lived about a mile from the sub-station for Lilco. He swore for years there was a low level, sub-sonic freq. apparent in his downstairs bedroom. They responded with numerous explanations and tests but refused to admit that it did in fact occur. However all of the panel nails holding his wallboard in, have vibrated out

upwards of an inch over the last 8 years. He claimed he could sense it while lying in bed at night and his lady freind claimed the same. It began to drive him nuts so he paid for an independent team to verify and sure enough they corroborated his story. Only after he threatened a lawsuit did the company apply some sort of filter, actually they never explained exactly what they did but the sound abated somewhat but he claimed it was still there. Finally sold the house for other reasons. He slept on a water bed, maybe the tides bothered him.

Subject: Thanx!
Posted by akhilesh on Thu, 20 May 2004 00:23:39 GMT
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Thanx for your post, John. I was mainly curious to see if the dreaded negative feedback is as bad asit iscrackedup to be by SETophiles, and i have to say, it is really a tradeoff, it has some good and some bad. Same thing with tube versus solid state rectifcation. I agree completely that so much of our impressions are internally driven (or subject to sonic interference even) that it is more like appreciating different paintings, rather than admiring engineering artifacts. -akhilesh

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Subject: Re: Initial review of ASUSA (Antique Sound USA) K2003 SET amp
Posted by akhilesh on Thu, 20 May 2004 00:25:47 GMT
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Thanx Thermionic. I didn;t realize that, learnt something new. I have read that solid state has mor edfined low end, do you know if that makes sense?-akhilesh

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Subject: Re: Initial review of ASUSA (Antique Sound USA) K2003 SET amp
Posted by Thermionic on Fri, 21 May 2004 03:26:57 GMT
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It depends on the power supply topology. In a capacitor-resistor-capacitor or capacitor-inductor-capacitor filter, SS diodes will exhibit less voltage and current "sag" under high load transients (such as sharp/loud bass notes) than tube rectifiers. Overall, the sand diodes yield a "harder" sound, and will also generally produce tighter bass definition in Class AB operation amps. Class A operation amps do not exhibit enough plate current draw increase on loud/bassy transients for them to make much of a difference. With Class AB operation push-pull amps, the increase in current draw may be quite dramatic. However, even modern high speed diodes do not produce DC that's as clean as a tube rectifier. Sand diodes produce a sharp high frequency spike with all sorts of harmonics as they switch. You can liken a FRED diode to a MOSFET. Better than the "Plain Jane" model, but it still ain't no tube. Vacuum tube diodes just switch softer, bar none.

Another problem is that the capacitor input topologies used on 99% of tube amps produce DC with a residual AC waveform component that is a sine wave on the top, and a triangle wave on the bottom. The triangle wave produces many harmonics at the sharp point of the waveform as it switches from descending to ascending voltage. SS diodes with a C-R-C filter not only can and may indeed may have very low residual ripple, but it's often as gunked up with hash as can be. Yes, the filter caps nuke a lot of it by forming a low pass filter, but aluminum electrolytic caps introduce trash of their own. Add an LED-based constant current source and you've got the electrical equivalent of a toxic waste dump. The common C-R-C filter also suffers from voltage drop on spikes in plate current draw more than any other supply topology. The voltage drop across the resistor increases with current draw according to Ohm's Law. The tubes get starved the most right at the spot where they need the most juice! A C-L-C filter also suffers from it but at a lesser degree, due to the often high DC resistance of the small chokes used as the L filter. When the power supply recovers after such a load passes, it "overshoots" the nominal intended voltage and "rings" with oscillations on the way back down to the nominal stable operating point. It creates all kinds of harmonics in addition to the voltage/current instability when this happens. It causes the sound to lose the intended sharp focus and definition. A tube rectifier with a choke input power supply and metallized polypropylene, Cerafine, or Black Gate caps is the ultimate power supply for a tube amp, especially a Class AB push-pull. A well designed choke input power supply has excellent regulation, far in excess of any other PS topology. The residual AC component is a pure sine wave, with no harmonics, and the above caps don't add their own say so to the mix, besides being much faster, less resistive, and more efficient than aluminum electrolytics. When bypassed with small value film and foil caps, they're unbeatable, IMO. The choke input supply also provides a constant current source for both your power and preamp tubes. It also reduces the necessary conduction angle of your power iron and rectifier tube, so both are stressed less and run cooler. Rectifier tube life is extended by a choke input. Also, a choke input supply greatly reduces overshoot and ringing. A choke input is not without drawbacks. Electrically, it's pretty awesome. In practice, it has it's physical problems. It requires a quite higher than normal power transformer secondary voltage, a low DC resistance choke capable of handling the current draw of the entire amplifier, and dealing with the enormous size, weight, and expense of such a choke. Most often, a choke input really done right requires a choke larger than the power transformer!Thermionic

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Subject: Paramour follies?
Posted by Wayne Parham on Fri, 21 May 2004 08:38:59 GMT
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Thanks for your comments and I'd like to hear what you have to say about mine. I've not really given this subject much thought, but it has crossed my mind.I assume your comments about semiconductor diodes and constant current sources are in reference to the Bottlehead Paramour amplifier and maybe others like it. I have a couple of Paramour amplifiers, and while they aren't entirely quiet, it seems to me that the problem is with rectified line cycle hum and a little bit of high frequency switching artifacts. Stock Paramours have a touch of hum and buzz.The Paramour is an entry level kit. As such, I suppose some cost-saving measures are in order. Personally, I would have liked to have an all-tube kit, but more for consistency than for performance reasons. It just seems cool to me to be all "old-school" running all tubes than to have a mix of tubes and solid

state in the circuit. But the Paramour saves maybe twenty bucks or more by using a couple of ten cent 1N400x rectifier diodes and inexpensive electrolytic caps for the DC supply. It was probably done to keep costs down, and it seems to work just fine.If anything, I think the biggest problem with this amp is that there is not enough power supply regulation. I'm not as concerned with what is used to regulate power supply voltage as the fact that it doesn't appear to have adequate regulation. But then again, it is an entry level kit.I think it's really cool to have an amplifier with no semiconductors at all. So I think it's cool to use tube rectifiers in the circuit, and to build a noise-free amplifier using them. I consider such an amplifier to be an impressive piece of hardware. But to tell the truth, I'm not sure I would expect to find any performance penalty when using semiconductor rectifiers or regulators. In these places, I would have expected using semiconductors would be an easy way to get the desired goal. Some might see it as kind of like "cheating" but I would have expected it to work well.Seems to me that shunt capacitance in the power supply should really knock down the ripple pretty well, and that caps across the diodes would help remove the switching noise. So I'm not sure I fault the diodes used as much as the lack of adequate filtering. Add a few more filter caps, and it probably would quiet down a lot.

Subject: Awesome discussion!
Posted by akhilesh on Sat, 22 May 2004 01:32:44 GMT
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What good posts, Thermionic & Wayne!I am learning a lot! One link i found http://www.geocities.com/SiliconValley/Pines/5440/supply.htmldescribes the effects of different types of filtering, especially filters that seem to work with the AC frequency in question (60 HZ in USA). Quick question for you gurus: Most circuits I have seen use a CLC filter, often cascaded filters. Do you all think a 2 stage CLC filter will remove audible effects of power grunge? (Key word here is audible). thanx-akhilesh

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Subject: Re: Awesome discussion!
Posted by Wayne Parham on Sat, 22 May 2004 09:55:16 GMT
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That's a good link, thanks. Right on target. You might make a note that half-wave rectifiers provides a line frequency (50Hz or 60Hz) pulse train before filtering but the full-wave rectifier "fills in the holes" and makes a 2X-line-frequency (100Hz or 120Hz) pulse train. The circuit flips conduction every half cycle to use both sides of the waveform. Bridge rectifiers are commonplace in solid state devices because four diodes don't cost that much. I'm not an expert on historical tube circuits by any means, but I don't think that bridge rectifiers were as common in tube systems, and I think single diode rectifiers and dual-diodes were most often used instead.As for power supply filters, it's very much like the situation found with loudspeaker crossovers. Higher-order filters suppress more in the stop band. Also, whatever slope is used (first-order, second-order, etc.), frequencies further into the stop band receive more attenuation. So the idea

is to make a filter that's low-pass, since all we want is DC, or 0Hz. Pretty much the larger the values, the better. A full-wave bridge presents a 2X (100Hz or 120Hz) pulse train instead of 50Hz or 60Hz, so the doubled frequency is further into the stop band, so more attenuation. And by using larger values and more filter poles, you increase attenuation of the primary ripple frequency as well.This is all pretty much just basic filter stuff. You make a basic low-pass filter for power supply, and possibly a series choke or resonator between the supply and load to reduce ripple further. You can visualize the circuit having perfect inductors and capacitors for this part. But one thing to consider is that the inductors have a series resistive component, and capacitors act like they have a resistance in series and in shunt. Large electrolytic capacitors, in particular, lose their effectiveness at high frequencies, so it sometimes makes sense to use a small value capacitor directly across large ones, or in strategic places in the circuit to counteract for some of the effects of real-world imperfections in parts.That's why I mentioned having some small capacitors across diodes. They'll shunt the switching spike. And small capacitors might also be employed across large electrolytics, to reduce the relatively high frequency components that pass through the power supply. Most of the noise coming out of a rectifier circuit is low frequency stuff. But there is some high frequency energy there too. It's attenuated, but if the filter components are ineffective at midrange frequencies, some noise might get through. Using smaller value bypass caps helps to reduce this.There are two things at issue here, one that is probably more important in small and medium power supply circuits like are used in home hi-fi systems. There is a time when a rectifier goes open, which introduces a small switching spike. This can be pretty significant on high-voltage, high-power systems and you'll see small caps across solid-state switching components in circuits like those. The spike from going open in a high-current circuit can be pretty large under certain load conditions. Even though the crossover voltage is low, at very high currents, the switching spike can be alarmingly large.All line-cycle rectifiers generate a series of pulses having sine curve half-cycles broken by sharp edges where rectification switching has occured. These transitions correspond to high frequency artifacts. So while the power supply filter is generally thought of as a very low-pass circuit, maybe with line-frequency or 2X notch filters, it still should have some ability to attenuate frequencies several times the line frequency. If the power supply filter becomes ineffective at high frequencies, there will be some noise at high frequency multiples of the line frequency. So that's why quality power supply capacitors are important, and if large electrolytics are used, smaller value bypass caps might be used as well.

Subject: Re: Awesome discussion!
Posted by Thermionic on Sat, 22 May 2004 13:46:53 GMT
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Sorry Wayne! I certainly didn't mean to make it look as if I was hurling a spear in yon Bottlehead direction! Or any other specific one. I was simply stating that the fact that the recovery spike will always be present to some degree, though much less in your Paramours' UF____ series diodes. I also agree with your solution of paralleled small value capacitors to remove a lot of the hash and harmonics. I was merely stating that nothing switches more softly than a tube, and that with a tube rectifier and a L-C filter, you get the smoothest, cleanest, and most regulated juice. As for LED-based CCS circuits, the switching hash is directly present at the tube. Also keep in mind that the cause of hum in an amp may be totally unrelated to B+ ripple. It can be caused by an improper grounding scheme causing ground loops, inductively produced eddy currents in a steel chassis

used as the circuit ground, very low level hum "piggybacked" on top of an ultrasonic oscillation and amplified, running signal lines too close and/or parallel to AC heater wires, and filament-to-cathode induced hum. I've built C-R-C filter amps with a modest amount of capacitive filtering that were dead silent, by using proper wire routing and a star point grounding system with the RCA jacks, volume pot, and negative speaker binding post all isolated from the chassis. Take a Dynaco FM3 tuner for example. FM3s always have a little hum. Their RCA outputs use the chassis as a ground. Running a jumper wire from the RCA jack to the ground buss on the multiplex board makes them dead silent. I know, I have one I'm repairing right now.Another cause of hum is what I'd bet the farm yours is....the filaments of directly heated triodes. The direct AC voltage present on the cathode is one cause. Signal modulation caused by the AC hum is another. The other is the fact that the filament minutely cools when the AC sine wave drops to zero and starts back up. I know that sounds nuts, but it's actually been proven! The minute thermal expansion and contraction causes a resonance in the filament (that perfectly coincides with the 60Hz hum to make matters worse) that makes it create more hum much the same way as the springs in a guitar amp's spring reverb unit produce reverb.Some megabuck DHT amps have proprietary filament hum reduction circuits. The AC filament voltage is tapped off, negative fullwave rectified (and purposely left unfiltered) and injected at the control grid, with an adjustment trimpot to adjust the phase so that the ripples in the DC will phase cancel the AC hum. Some other high dollar DHT amps may use a series of LC bandpass filters on the heater leads set at octaves of 60Hz to solve the problem by "filling in the gaps."Thermionic

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Subject: Re: Awesome discussion!
Posted by Wayne Parham on Sat, 22 May 2004 14:34:26 GMT
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No offense taken on the Paramours, none at all. I think the Bottlehead folks are real fine people and I think the kit is pretty good. It sounds real nice. But it is an entry level kit, and it does hum a bit.I agree with you completely about ground loops. That's the most common cause, and (ironically) it seems to affect expensive separates more than inexpensive integrated receivers and amps. The reason is obvious, there are more separate grounds to tie to a common point without developing a loop. Seems like cable TV is a common culprit too, so if the cable is hooked in to the home theater, it almost always is a good idea to run the 75 ohm coax in through an RF transformer. That will knock off the hum in lots of cases.I always thought that AC driven filaments would be a source of hum. I would have thought the cloud of electrons stays relatively constant but there certainly must be a small heatup/cooldown cycle from AC-driven heaters. I also would have thought the filament line would be a source of inductive coupling into the relatively high impedance signal lines right nearby. But I'm surely not an expert in tube circuits, and I'm really just kicking ideas around, sort of thinking out loud. I'm definitely soaking up the ideas around here, so thanks for your input.

Subject: Re: Awesome discussion!
Posted by akhilesh on Sat, 22 May 2004 14:58:05 GMT

Again, great posts from you gurus! This explains: a) why the power caps in the ASUSA amp i just bought (and which is sounding really good now btw, maybe the cheap sovtek el84 output tubes i got with it were new & needed to break in!) has small caps in parallel with the larger electrolytic caps. I thnk the person who built it really did try to get the most from this little amp, and it sounds good!Also, i built the cheap ($139) kit from antique sound a while back, and it uses a REALLY cheap full wave rectifier (all diodes in one small block, costs $3 or so at antiue sound) along with two really cheap power caps, and it's dead silent!My impression is that silence is not the only benefit of a good power supply: a clean DC will also lead to better sound? Or is dirt in the power supply ALWAYS translated as hum?Finally, from a pragmatic standpoint, what i have learnt is: Use a tube or a full wave FRED rectifier, along with a CLC filter, with fast caps in parallel with the electrolytic caps, or use blackgate/cerafine. Coorect me if i am mistaken! This knowledge itself is very useful for us newbie amp hobbyists.thanx-akhilesh

Subject: Re: Awesome discussion!
Posted by Thermionic on Sat, 22 May 2004 17:15:05 GMT

Hey, great discussion indeed guys! To me. this is what hi-fi forums are all about, expressing and learning from one another, great stuff, both of you. Wayne, I don't post much on this forum but I lurk closely by. Your knowledge is nothing short of amazing to me.Akhilesh, trash in the DC does not manifest itself as hum, only excessive ripple from the residual AC component. Trash manifests as a lack of focus or coherency,a graining or veiling, or other anomalies. Indeed, IMO, tube rectifiers or FREDs with a choke input (L-C) is the ultimate. Even if you have no choke, adding film/foil parallel caps to the aluminum electrolytics can make a difference. Fast Caps, Cerafines, or Black Gates, anything to ditch the aluminum electrolytics, will yield a blacker background, smoother presentation, and often better microdetail.Wayne, you probably have very little residual ripple. A bit of hum is just gonna happen with DHTs. I know, I'm a fellow 2A3 fanatic too!Thermionic