



By Bob Carver

Ghost Questions from the Past

“I love getting emails from interested audiophiles. Over the years, I’ve collected these. My ardent staff has insisted that we compile them for your reference, amusement and edification. Some are so old that they refer to my current amps as “new”. But I stick by all of my answers. Enjoy!”

Q: I have often read that an Ultra linear output tube connection is best for class AB amps. Your amps are not Ultra linear, what is your opinion on this and what is the difference? Thanks for your time.

A: Long ago when I first started designing tube amps I read the same literature promoting this same idea. However, an important series of converging experiments taught me that an Ultra-Linear output stage was not the best approach. I discussed this with the best and smartest tube amplifier designers in the industry. Each person felt that using an output stage with a regulated screen supply voltage yielded the very finest results. My conversation with Stu Hegeman (so long ago I was just a baby inventor), the designer of the Harman Kardon Citation amplifiers, confirmed my experimental results. He explained that when using an ultra-linear tap for the screen grids during full signal drive, the screen voltage is unavoidably pushed so low that the maximum output current suffers substantially. Stu Hegeman, a genius, was right! I hope this helps if I haven’t put you to sleep with my answer.

Q: Hello Mr. Carver. I own Apogee Scintilla loudspeakers. I am interested in your amplifiers and love the sound of vacuum tubes. Every tube amplifier that I have tried with these speakers has been unable to drive them to an adequate volume level without distortion. Can you reassure methat these will work and, if so, how do they do it? Thanks.

A: Driving the Apogees is a matter of raw power, as their impedance is about one ohm and their sensitivity is only about 72 dB SPL referred to one watt @ eight ohms. Pretty abysmal.

But so what? They are among the most fantastic sounding speakers of all time. I remember first hearing them years ago, and knew I was in the presence of greatness! They were clearly designed by a person who loved music and wanted his speakers to sound as good as he knew how. And never mind the impedance or the sensitivity! He was a true artist, and that approach

took courage because they were impossible to drive using normal amplifiers, and that fact alone limited his market tremendously. He was truly courageous. This amplifier has six powerful KT120 output tubes, and can easily deliver 30 peak amperes into a one-ohm Apogee load.

That's a peak power of over 900 watts! Not only that, but I own a pair of Apogees and have spent countless hours with this amp, together with the Apogees, optimizing the whole system. I speak from firsthand experience - fear not, these amps will drive your Apogees with aplomb. Good question, hope this helps, Bob Carver

Q: Bob: I notice you have said that these amps are the original prototypes after your (apparently) eventful meeting with Tim de Paravicini. However, you have sold other amplifiers here in the recent past. How do they differ from one another? Thanks a lot! Chris

A: I just knew someone would ask this! The only difference is the output power because of my new output transformers and the new KT120 tubes. They sound the same except for that. Cosmetic differences are a change from bright bottom screws to shiny black ones, a shorter roll-bar for the tubes, and the chassis is infinitesimally (3/16 inch) longer to better allow the small tubes and volume control to fit. That's it. Great question, and thanks for asking, Bob Carver

Q: How can the tubes last for 50 years when most manufacturers recommend changing the tubes in their amps in 3 or so years?

A: That is a very good question! The answer is the DC restorer. Here's how. Most amps idle the output tubes at an average of 32 watts or so. Now the DC restorer allows the tubes to idle at about 9.75 watts. Since tube longevity is roughly proportional to the plate dissipation raised to the 2.3 power, we have 32 divided by 9.75 raised to the power of 2.3 = 15.4. Finally, 15.4 X 3 years = 46 years. I have also noticed that many console amplifiers have 50-year-old tubes right here on eBay, and those tubes check out great. Great question, hope this helps, Bob Carver

Q: Hello Bob. Beautiful amplifiers. How do you get so much power from such a small amplifier? Am i missing something? Thanks.

A: Thank you, I think they are beautiful too. I spent a lot of time getting the color just right. I tried espresso brown, bright red, several other colors, and finally metallic burgundy cherry red. I liked that the best. As for the power, it was pretty easy actually - all we did was use a lot of output tubes, a transformer turns ratio of about 17:1, a robust high voltage power supply, and the Tung-Sol KT120 easily did the rest. And it's NOT so small - each one weighs almost 45 lbs.!

Q: Hey Mr. Carver — how do you have such a nice finish on the first amps? They look so nice and new.

A: New finish. Fresh paint, new champagne escutcheons on the front and new champagne trim medallions on the transformer covers. There are some minor paint imperfections and some build-up around some of the small screws, but they are not visible to the naked eye at one foot. Or when riding past on a horse at a slow trot.

Q: Dear Mr. Carver, I read something you wrote about bi-amping with a combination of tube [high end] and solid state [low end] amplification to be very illuminating. As a solid-state devotee for the past two decades — mainly Carver you will be pleased to learn but Bryston too!—I feel re-assured by your statement that tube amplification does not necessarily deliver a superior audio experience. Am I going too far with this statement? I always warmed to the idea, in a tube-like way, that Carver “TFM” was a real technology, that solid state amps could deliver the warmth of tubes and then some. Don’t get me wrong, I would dearly love to collect a pair of Reference Silver Seven Tube amps (as you will likely be aware, a pair recently sold on eBay for a shade under \$19k). It is refreshing to hear, however, that solid state amps should not be discounted. I agree that tube amps are super cool — I mean warm!

A: Absolutely! A great tube amp will sound wonderful, and a great solid-state amp can sound wonderful as well. But they WILL sound different. A tube amp generally will yield a more enveloping soundstage and a greater front-to-back depth of field with tight imaging within that soundstage - a very romantic presentation. A well designed solid-state amplifier will usually deliver a nice tight focus together with a greater up-front presentation. With these tube amps, a range of possibilities are possible, as the feedback switch and the bias adjustments allow the sound to be changed at will from very tube-like to almost solid state. This emerges naturally as a by-product of the DC restorer and the fact that the bias is “in the green” over a wide range of idling currents. Solid state amps are indeed not to be discounted - and thanks for your thoughtful and on the mark comments - they mean a lot to me.

Q: Bob. In a photo I saw, you sure have that “mad scientist” look on your face while winding that transformer! Thanks for sharing the pictures and your passion for audio excellence with us!

A: You think? Now that I look at it again, I see the only things missing are bugs in my teeth from the winding machine. The camera “stopped” the spokes — they are actually a blur.

Q: Hi Bob, huge fan! In a bi-amping configuration, would you use these mono blocks the upper or lower end? What are the pros and cons for this approach?

A: I would use these mono blocks for the high end and a solid-state amp for the low end, unless you had two sets of these amplifiers. A vacuum tube amp by its intrinsic nature will yield better bass because its output characteristic allows the signal to follow the impedance curve of the speaker system, delivering more voltage to the system within about an octave of its resonance frequency. This usually delivers a more satisfying low-end response. However, what normally happens in the real world is that vacuum tube amplifiers lack the raw power to effectively accomplish this; typically a solid-state amp is more able to deliver the power needed and therefore works better. But NOT if we have four of these very powerful tube amps. Good question, Bob Carver

Q: Is the RMS power pentode or triode?

A: This is one of those simple questions with a very complex and extended answer. The answer here is pentode, but that’s only the beginning of the story. Long, long ago, in the ‘30s and ‘40s, the only way to build an amplifier without notch distortion was to build it class A. Many talented amplifier designers worked and worked on this problem until at last a genius by the name of Williamson arrived and taught the world how to build a class AB output stage that was completely devoid of notch distortion.

This was late ‘40s - a breakthrough and the hi-fidelity industry took off. However, to work right, triodes were required which limited power efficiency. Still, the leap in efficiency from class A to class AB was huge, completely overshadowing the fact that triodes were not as power efficient as pentodes.

Triodes were still needed to make notch distortion go away as the art of output transformers had not yet been developed to their fullest. This was because triodes had a characteristic known as “low output impedance” and could easily overcome the problems of leakage inductance in the output transformer.

It took the genius Gordon Gow, a founder of McIntosh, to teach us how to build a high efficiency class AB output stage WITHOUT notch distortion. Others followed suit at Marantz, Citation, Scott, Fisher, and on and on. Today it is not difficult to build a class AB amplifier without notch distortion, thanks to the amazing pioneering work of those early guys. So - we see we went from triode class A to triode Class AB, and finally to pentode Class AB as the years trolled by. Often old ideas die hard, and to this day a false belief sometimes exists that triodes are still preferred in class A.

It IS easier to design with triodes, but a superbly designed pentode stage will easily outperform even a well-designed triode stage. Any difference in sound is associated with the circuit itself, not the choice of pentode or triode. Thanks for the question, Bob Carver

Q: I own a Sunfire amp and the Current Source outputs are 1 ohm (I think). Curious to what the output impedance is for your new tube amps?

A: That is a very deep and important question — more than you might imagine. Let me explain. It is the details of the output impedance that convey so much of the musical romance we hear when listening to great amplifiers. The non-zero output impedance and its variation with frequency give rise to a large romantic and beautiful soundstage. It helps deliver deep front-to-back depth of field, together with sweet imaging within that extensive sound-field. It allows the amplifier to “listen” to what the room is doing acoustically; this room—amplifier interaction provides a sense of believable ambiance and acoustic space that is thoroughly realistic and quite enjoyable. All this for a number of technical reasons beyond the scope of my missive here. My latest thinking on source impedance is 1.50 ohms, my very most favorite number, and sure enough, 20“, = 1.50 ohms for these amplifiers! One more thing, it may be changed from much lower than that to much higher by changing the idle current, and is read on the front meter. Great question, hope this helps and that I did not put you to sleep with my long answer. Thanks for asking, Bob Carver

Q: Wow two of the world’s best tube amp designers, one amp - must be AMAZING! I will bid for my Stax F81’s, that need limitless juice to open up. I use a Luxman M6000 right now, but the promise of tubes like this on the Stax, I have to bid!

A: Hey, I have only stood on the shoulders of the truly greats - Sid Smith, Frank McIntosh, Stu Hegeman, and foremost Tim de Paravicini. I’m lucky to be living now, and was able to rub shoulders with Tim and some of the other great amplifier designers. These amps DO have almost limitless juice to get any speaker to show its true self! Bid away, and if you should win and live within driving distance I’ll deliver them myself. Bid away, happy bidding!

Q: Your amplifiers are beautiful. I love the dark red color, very classy. I have a pair of Apogeos and I have been using a solid-state amp and would like to switch to tubes. A friend of mine brought his tube amp over and it sounded great, but it couldn’t drive them well. Do you think your amps would be able to drive them? Also, how is it possible that the tubes in your amps could last 50 years? I believe you, but it just seems too good to be true.

A: My mother taught me that if something seems too good to be true, it probably is. Forget everything your mother taught you about moderation - the tubes WILL last 50 years — here’s why. First of all a good output tube that is operated well below its maximum dissipation (heat) level will last a long time, substantially longer than three or four years. They have been designed by our forefathers to do that. Take a look at all the vintage stereo

amps listed on eBay — the ones from consoles - their output tubes are about 50 years old and usually check out fine. As for the small tubes, my own experience as a T.V. fixing man in my youth taught me that video pentodes and sync splitters seemed to last forever. They were not quite 50 years old of course, but close. It's the D.C. restorer that allows this extreme longevity, as it reduces the dissipation to about one fourth or one fifth normal practice. Longevity is calculated as related to the 2nd power of the dissipation ratio; $4^2 \sim 16$. Finally, $16 \times 3 = 48$ years.

I think the color is nice as well; it's a dark burgundy strawberry with a touch of metallic. Looks better in real life than in the pictures, if I may say so myself! As for driving your Apogeos: If you have one-ohm Apogeos, no problem - these amps can deliver over three hundred watts into one ohm. If you have four or eight-ohm Apogeos, driving them becomes super easy and a walk in the park for these mighty KT120's and powerful output transformers. I specifically designed them to be able to deliver lots of current by having a separate high current supply voltage source for the screen grids. Stu Hegeman (my hero) taught me how to do this long ago. Good questions.

Q: Hi Bob, Great amps you have there. May I ask, (if it isn't an old family secret), what ingredient(s) you use to make the output transformers, that you are winding for these amps, that you are selling now, superior to the originals that you used to use? They certainly are beauties!!!

A: No secrets at all. I'm using oxygen free (well, almost oxygen-free) copper wire, the hardest steel known to man, nonflammable nitrate transformer varnish, and lots of love with tons of attention to winding geometry detail.

Q: Thank you so very much Bob! I am in awe of you as an amp designer and even more as a human being. I am star-struck by you. You are a real star in the audio world. I even keep these emails so I can show my friends, like an autograph! My buddies won't believe I actually conversed with THE Bob Carver! You are the best and I am so appreciative. I am going to enjoy building this amp more than any other. I look forward to our future correspondence. Please don't ever stop doing what you do. I grew up with your name on amps and I remember how big it was. Then in the 80's tubes lost a lot of appeal. My dad had some really big collections of tubes and old tube radios and tube test gear, and I look back today and wish I would have known then what I know now. I try to spread the word about tube gear to everyone I can because I feel

like tubes almost became extinct. I would be so lost without them. They are what keeps me straight in the mind and gives me so much joy, after 3 tours in Iraq.

A: As I mentioned earlier, you have made my day. It is you who deserve the hi-five.

Q: Hi Mr. Carver. What's your conclusion about using output tubes in parallel? It seems to me very difficult that two or more tubes in parallel (or push-pull with tubes in parallel) will going getting old synchronously even considering that they were absolutely equal when new. The developed lazy, unequal, or non-linear tube will cause overloads in the other tube/s increasing their aging, this also affects the effective load impedance of the output transformer and distortion will be present. Have you experienced this issue? In my opi ion, if this occurs, the hi-end performance collapses and the result is a guitar amplifier! Thanks in advance and sorry formy poor English.

A: You know, that is a very good question — I don't know the answer. I never even thought about it. I must have figured it couldn't be a big deal and never gave it a second thought. But I can do an experiment whose results will teach us the answer. I have a big quantity (27) of old Sylvania 6550's in my tube stash that I've been buying on eBay (for my audio museum) these past two years. They are good vintage tubes, varying in age from 30 to 50 years old, and they are quite used, but still test well into the green. It will take me about 45 minutes to do the experiment, so I'm going to get up from my computer, go perform the experiment, and return as soon as I have some results. Stand by. Okay, I'm back. It took longer than 45 minutes. What I did was I removed all six output tubes from the amp and installed six randomly chosen Sylvania tubes in their place. I adjusted the bias after theywarmed up about 30 minutes and then measured the power output, frequency response, damping factor and power bandwidth. Here are the results (compared to brand new NOS GE 6550's, also from my museum stock): The output power was down by four watts, the frequency response was unchanged, and the damping factor was changed a tiny amount, so small I had trouble measuring it, even with all my cool lab equipment. The power bandwidth was changed by exactly the same relative amount as was the output power. Guess what? The amp still

sounded great! Now I know the answer to your question; my conclusion is that it's nothing to worry about. Clearly and with no ambiguity! Super question! Bob Carver

Q: Hello, Bob !! Beautiful amplifiers !!!! I live in Europe. Is it possible to switch the power to 220-240 volts? Best Regards

A: Thank you, and absolutely! These amps have split windings on the power transformer, so it's easy to do. I'll do it for you if you win my auction (if you wish). Otherwise it is a standard operation for a technician who is skilled in the art of working on electronics that has 120/240 volt capability. Move some wires, install a new fuse, and 'Voila! 10 minutes per amp. Thanks for joining my auction. Warmest and best, Bob Carver

Q: Are these amps built with love? My wife used to say the meals she made me were made with love. Hey ummm I got a job with some guy named Tom and he has this shop called Vintage Hi-Fi Pittsburgh. I'm the repair/modify guy and there's a guy gushing about my mods to a C-19. We have both sets of these amps bi-wired on your ribbon speakers. Hard to believe how loud and clean they play.

A: You are making my day! Yes, these amplifiers are built with gobs of obsessive love. However you can tell your wife you can't eat them.

Q: Hey Bob, I am having some difficulty finding information on using adamantine steel for output transformer use. It seems like you're the only one to use it. Why adamantine steel? What are the advantages?

A: The first time I ever heard of Adamantine steel was as a young child when I watched the classic science fiction movie, "Forbidden Planet", the screen adaptation of William Shakespeare's "The Tempest". William Shakespeare loved Adamantine steel. It appeared in several of his plays, most notably "A Midsummer Night's Dream" in which a sword of Adamantine steel was forged. In recent times, Adamantine steel was used by the minor wizard Xolotan (sp?) in the Marvel comic book Conan the Barbarian. Although I can't remember what Xolotan used it for, it was likely to try and best Conan and his broadsword. He failed. The most enduring image I have of Adamantine steel is when the Krell "Monster from the Id." in "Forbidden Planet" broke through an impenetrable steel door crafted of Adamantine steel. It seems that more than one audiophile has used the Krell of Shakespeare's forbidden planet to define amplifiers. In truth, Adamantine steel is an actual steel developed early in our century (I think in the 1930's or 1940's) to define the hardest steel known to man. And it still is. At least as early as 1952, U.S. Steel had a catalog including Adamantine steel with a hardness rating at the top of the list of all the steels they produced. As far as me being the only designer to use Adamantine steel in the output transformer, as far as I know, I guess I am! I chose Adamantine

steel for my output transformers because to this day it is the hardest steel known to humankind. And the harder the steel, the lower the induced eddy currents and the better the transformer. Good question, Bob Carver



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