Subject: PS Transformers
Posted by Manualblock on Fri, 28 Jul 2006 13:55:11 GMT
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Do we want a very high DCR on the secondary? And how to implement tube voltage regulation in the circuit? Is that a good thing?

Subject: Re: PS Transformers
Posted by Damir on Fri, 28 Jul 2006 19:32:45 GMT
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No offence, but if you ask those questions on the forum, then your "designer" skills are rudimentary, both for "designing" PT and PS, especially active, tube type.You can read various opinions, anecdotal and empirical "evidences", one-parameter "wonders", heating debates...May I suggest a different approach? Start with the quality PT, from the people who know what they are doing (I have a good experiences with Plitron/Amplimo and AE-Europe), add a good chokes, rectifiers and caps with a little help from PSUDII, breadbord it and listen...
http://audioroundtable.com/GroupBuild/messages/1959.html

Subject: Re: PS Transformers
Posted by Manualblock on Fri, 28 Jul 2006 21:12:41 GMT
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Well that would be the obvious and proper way to go about designing except how would I listen to it? I would have to build a amplifier and driver circuit then plug the PS into it and hope for the best I guess. A good learning experience except if it doesn't sound good; then a very expensive learning experience. Yet right here we have knowledgable designers who could pave the way so to speak. Yes; of course my design skills are rudimentary; but why then do some people say use low DCR and some say High DCR on the secondaries? And one designer says you must find the off-load voltage to properly utilise the transformer. So each unit must be tested. I have a couple PT's on hand; but not the ability to test each one for it's parameters.So I expose my lack of design skills; can you surf? Or play golf and shoot in the low nineties? I'll play you one on one half-court, no blood no foul .

Subject: Re: PS Transformers
Posted by Damir on Fri, 28 Jul 2006 22:05:39 GMT
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"I have a couple PT's on hand; but not the ability to test each one for it's parameters."What you need more? You can measure primary and secondary DCR, and with formula Rt = Rs +(Ns/Np)^2 * Rp you can find the "equivalent" PT resistance, where Rs is a DCR from CT to the one end of the secondary (from 0-350V). For example - you measured Rp=5 Ohms, Rs=20 Ohms. Then you can measure unloaded sec. voltage, say 350-0-350 V.Ns/Np is PT turns ratio, equal to voltage ratio (sec/prim.), say 350/117 = 3. Then our Rt = 20 + 3^2 * 5 = 65 Ohms. This Rt rectifier tube on the secondary "sees". If you don`t know current rating of your PT, then you can guess by its size, and if it is salvaged from some equipment (preamp/power amp).You now have all you need for PSUDII - Rt, Utr - choose your rectifier and a first filter (LC or CLC), put the CCS as a load (estimated current of your amp) - and start playing with the program with various values, rectifiers, etc. For example, you need 375V/100mA DC and you tried 10µ/10H-100R/100µ with 5R4GYB rectifier you have in your junkbox...yes, that`s about it!Breadbording proves that you are quite close, and you liked the sound - happy end...

Subject: Re: PS Transformers
Posted by Manualblock on Fri, 28 Jul 2006 23:16:24 GMT
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I'll give it a shot; I am also following Bas DIY Mag where he has a thorough explanation of the transformer part of PSUD; similar to what you wrote; although he sounds a little less confident of the results.He claims you must have the off-load voltage but doesn't say how to get that. He uses off-load voltage /wall voltage to get the turns ratio. You use Ns/Np; is there a difference?

Subject: Re: PS Transformers
Posted by Damir on Sat, 29 Jul 2006 04:45:48 GMT
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Huh, MB...you didn`t pay attention - turns ratio (Ns/Np) is equal to the voltage ratio (Us/Up)...you must measure both voltages (117V i 350V in our example).Be VERY carefull with those voltages - potentially lethal, better leave this over to the qualified person if you are not sure about measuring and building with HV...
http://www.plyrics.com/lyrics/ramones/gimmegimmeshocktreatment.html

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Subject: Re: PS Transformers
Posted by Manualblock on Sat, 29 Jul 2006 11:58:25 GMT
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Sorry; I assumed you were using the rated spec of the transformer and wall voltage. To measure off-load voltage you connect the primaries to the AC line input then use a voltmeter on the two legs of the secondaries right?

Subject: Re: PS Transformers
Posted by Manualblock on Sat, 29 Jul 2006 11:59:54 GMT
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Sorry; I assumed you were using the rated spec of the transformer and wall voltage. To measure off-load voltage you connect the primaries to the AC line input then use a voltmeter on the two legs of the secondaries right? But if you measure the voltages then why do you need the turns ratio? Thats already given by the primary and secondary voltage measurements.

Subject: Re: PS Transformers
Posted by Damir on Sat, 29 Jul 2006 14:52:16 GMT
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Well, the formulae is expressed with turns ratio - the number of turns (Np and Ns) are unchanging constant, both in ideal and real transformer.In ideal PT, turns ratio (Ns/Np) is equal to the voltage ratio (Us/Up); the real transformer is a little more complicated. But, for our purposes (usually we don`t know Np and Ns), measured "off-load" voltages and their ratio (Us/Up) is equal to the turns ratio.Note that "step-up" transformation "adds" Rp to the secondary multiplied with square of the turns ratio - with higher Us (and higher voltage/turns ratio) Rt is purely dominated by Rp and not with Rs! For example, we have 550-0-550V PT needed for LC supply (and "targeted" 430V DC)... say, our Rs is only 5 Ohms...but we must add (Us/Up)^2 * Rp, and (550/117)^2*Rp = 22*Rp.It means that every Ohm of the primary DCR is 22 Ohms "transformed" to the secondary side.

Subject: Re: PS Transformers
Posted by Manualblock on Sun, 30 Jul 2006 23:06:36 GMT
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Thanks D; you are doing good work here. Now I have a question; what is source impedance? I know it has something to do with the fact that Kirchners Law says that a loop must equalise at all points; but can you explain it in simpler terms? I know the words; it's the reactance looking back into the source; but I don't grasp it intuitively.

Subject: Re: PS Transformers
Posted by Forty2wo on Mon, 31 Jul 2006 01:44:43 GMT
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It seems to me that you are falling down the wokie hole. "Building the very best amp on the green earth on the first try"This is the road to madness, or at least inaction. I, and… can I get a show of hands here, been there.Let's say for the 6AH4 amp we were discussing a while back. At a guess you need

Subject: Re: PS Transformers
Posted by Damir on Mon, 31 Jul 2006 11:08:18 GMT
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Simplest - we have two devices "chained" together, 2nd "sees" output (or source) impedance of the 1st device on its input. For example, if 2nd device is a preamp, and 1st is a pot, then preamp "sees" output resistance of the pot in series on its input. We can describe the pot as a one resistor in series, and one resistor in parallel to the source. Then output resistance of the pot is the parallel combination of those two resistors. If our pot is half-opened 10k device, then its output (or series, or source) resistance (that preamp "sees" in series with its input) is 5k//5k = 2k5.Power suplies filters are more complicated - they have resistors, but also capacitors and inductors - they have impedance (say, frequency-dependent resistance to AC).Formulas for output impedances of various filters (Pi-type,CLC, for example) you can find elsevere, RDH comes to my mind...But, fortunately, large knowledge of network theory isn`t necessary for building a PS...

Subject: Re: PS Transformers
Posted by Manualblock on Mon, 31 Jul 2006 22:43:22 GMT
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Can you relate this explanation to the "Source Impedance" of the secondary of the transformer to the input of the first filter element? Thanks. Or the primary of the OPT to the plate of the power tube? That would be helpfull.I have a very comprehensive library of electronics reference books as well as explanations on the net from Rod Elliott and Bas and others. But you are building a data bank of explanations that can pull all this info together in a simple line of responnses that reflects well on ART. Thats why I persue this with you. If it becomes tiresome then I of course will cease and desist.Anyone can learn but few can teach.Wayne is a good example of speaker explanations; you do electronics.

Subject: Re: PS Transformers
Posted by Damir on Tue, 01 Aug 2006 10:45:33 GMT

Huh, thanks - but frankly, I`d be more happy with "normal" forum talk about DIY, exchange of ideas and experiences - then some "teacher role"... Source impedance in PS to the first capacitor - this is our Rt (secondary resistance + primary resistance "transformed" to the secondary side); plus impedance of vacuum tube recifier in series. It isn`t linear resistor, but for our purposes (with known current draw and voltage "drop" through the tube) we can simplified it with series resistor of typical value, say 100-300 Ohms (depends of the diode).About tube/OPT loading I wrote many times, for example:http://audioroundtable.com/GroupBuild/messages/1111.htmlhttp://audioroundtable.com/GroupBuild/messages/1113.htmlhttp://audioroundtable.com/Tubes/messages/665.html

Subject: Re: PS Transformers
Posted by Manualblock on Tue, 01 Aug 2006 13:50:33 GMT

Thats good. You cleared that up for me and thanks. I hope we get some DIY talk on here soon.

Subject: Re: PS Transformers
Posted by Manualblock on Tue, 01 Aug 2006 14:23:24 GMT

Very true; the project that gets built is more beautifull and sounds better than the perfect amp that doesn't. I fully appreciate what you're saying; but let me shplain a little. I have lots of projects going; I just finished my tube rec. EL 84 amp and re-built my Eico ST 40 which I happen to love the sound of. So you know I am not just pulling the chain here. But I decided on the 6Ah4 just as an example of a SE amp so I could use that as a platform for attempting to understand proper design and parts use. So just to get it built would'nt really do that for me. I know it is not going to be a slam dunk amp; if it helps me to understand some things then it did it's job.You know you and Damir and Doug do good work here as I am sure you all could migrate over to the Joelist or some other forum where they know their shit and it would probably be a lot more interesting for you all. So as a heads up; this beginners stuff is a lot of help to ....me at least; I don't know if others use it. But here's my thanks.You have brought up a good point regarding why most amps look alike. I have wondered and asked that in the past. What is the point of all this deep thinking then if the work has already been done?

Subject: Re: PS Transformers
Posted by Forty2wo on Thu, 03 Aug 2006 03:22:26 GMT

When I composed that message, I meant to change the title to "On hand is good". I forgot. Without it, it changes the tone of the post. It was meant as a "use what you got" rather than "Just get on with it" Over at AA there was a long discussion on the merits of low DSR chokes, that moved on to power transformers. At first I thought the thread had promise. Well silly me. Also it has been very hot here and with little or no AC. Perhaps I am a bit cranky.(No miserable little smile face)So. After your very considered reply, I reread the thread. To go back to your original question, low verses high DSR. I can not think of a reason that you would want a high DSR secondary in a SE amp. Does this mean that that the transformer with the lowest possible DSR is always the best? Good question. I have not looked at it in those terms, Two points. First, remember, a transformer can be drawn ‘as a black box that is full of compromises’ (I rather like that one;) Second, if you go and order ten different EI transformers with the same spec. you will end up with a collection that weighs in at say, 5lb to maybe 12lb or more and cost < $50 to maybe several hundred. Can the "goodness" be measured in DSR alone? Probably not but it may well be an indicator. Make a good green belt project for someone. .There is much more to say on this. Such as OK John get to the point and how do you choose a power transformer.(Hint I look in my junk box first).But it still much too hot and I am starting to fade away. More later…John

Subject: Re: PS Transformers
Posted by Manualblock on Thu, 03 Aug 2006 14:51:54 GMT

Please; I understood where you are coming from in the post and appreciate it. I saw nothing to indicate anything but a helpfull tone. And as I said you are right on the money regarding that advice. In fact I believe I might have indicated I had a used trans I was considering so your point is well taken.So; I must forget the effect DSR has on the filter and concentrate on measuring what I have and computing what I can do with that? Is that a good way to put it?Yes it is hot here too; 99 deg. We had a brownout last night and I had to spend a few hours in the bar with the wife and AC. I don't normally do that during the week much; but I should.

Subject: Re: PS Transformers
Posted by Forty2wo on Fri, 04 Aug 2006 02:10:34 GMT

Oh No, don’t dismiss the question. The DSR of the transformer you end up with and how that DSR will interact with your filter are very separate questions. My point is I do not choose a transformer on it’s DSR I find that if I choose a good transformer, low DSR usually happens. For example, take two transformers from Hammond the 270fx Vs the 370fx. Now the 370 is set up for multiple input voltages but that is beside the point. They are rated very close 139VA for the

270 Vs 142VA for the 370. The 370 is a much beefier transformer and cost twice as much. So what's up with that? Want to guess witch has the lower DSR? That aside If you are trying to get close to the "rated" 150ma, which do think will run reasonably cool and not buzz like a… well you get the idea. Now if you only ask for 75-100ma the 270 may work just fine. So were dose that leave us with the DSR?Your mission should you chose to accept it…Please let us know.;)As to how to whatever DSR we end up with works into the filter. I need to research as well. First thoughts, model a simple filter. Say 10uf -5mh-50uf to a stepped load. vary the transformer DSR and take good notes. Maybe replace the choke with a resistor. When in doubt use 1k. I think there something on the VT52 site.What do you say, we work this for a week or so and compare notes?…John

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Subject: Re: PS Transformers
Posted by Forty2wo on Fri, 04 Aug 2006 02:10:44 GMT
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Oh No, don't dismiss the question. The DSR of the transformer you end up with and how that DSR will interact with your filter are very separate questions. My point is I do not choose a transformer on it's DSR I find that if I choose a good transformer, low DSR usually happens. For example, take two transformers from Hammond the 270fx Vs the 370fx. Now the 370 is set up for multiple input voltages but that is beside the point. They are rated very close 139VA for the 270 Vs 142VA for the 370. The 370 is a much beefier transformer and cost twice as much. So what's up with that? Want to guess witch has the lower DSR? That aside If you are trying to get close to the "rated" 150ma, which do think will run reasonably cool and not buzz like a… well you get the idea. Now if you only ask for 75-100ma the 270 may work just fine. So were dose that leave us with the DSR?Your mission should you chose to accept it…Please let us know.;)As to how to whatever DSR we end up with works into the filter. I need to research as well. First thoughts, model a simple filter. Say 10uf -5mh-50uf to a stepped load. vary the transformer DSR and take good notes. Maybe replace the choke with a resistor. When in doubt use 1k. I think there something on the VT52 site.What do you say, we work this for a week or so and compare notes?…John

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Subject: Re: PS Transformers
Posted by Manualblock on Fri, 04 Aug 2006 12:38:59 GMT
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I say great. Onward and upward; to infinity and beyond! (You mention the Hammond 272hx which I have on handBTW.)
