
Subject: 4 x 1 Ohm = 16 Ohms (sometimes)
Posted by [Damir](#) on Mon, 25 Jul 2005 20:01:05 GMT
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Reading the specs for some "Partridge" SE OPTs, I found something that can be interesting (if you like OPTs and math and have nothing better to do). The specs say: "Primary impedance $R_{pr}=3500$ Ohms, and four secondaries of 1 Ohms - for 4, 8 & 16 Ohms connection." How? We have turns ratio between the primary, N_{pr} (number of turns of the primary winding), and four identical secondaries $N_{s1}=N_{s2}=N_{s3}=N_{s4}$ $n = N_{pr} / N_{s1-4}$ We don't have those numbers, but we know impedance ratio(s): $z = R_{pr}/R_{sec1-4} = 3500/1 = 3500$ And from imp. ratio, our turns ratio is: $n = z^{0.5} = 3500^{0.5} = 59,16$ Note that $z^{0.5}$ is the square root of z . Simplified, we can "assume" that $N_{pr}=5916$ turns, and $N_{s1-4}=100$ turns. a) We can connect all four 1-Ohm secondaries in series: Then we have $n1=N_{pr}/(N_{s1}+N_{s2}+N_{s3}+N_{s4})= 5916/400 = 14,79$ And $R_{s-a} = R_{pr}/n1^2 = 3500/14,79^2 = 16$ Ohms b) We can connect only three secondaries in series, then we have $n2=N_{pr}/(N_{s1}+N_{s2}+N_{s3})=5916/300 = 19,72$ $R_{s-b} = R_{pr}/n2^2 = 3500/19,72^2 = 9$ Ohms ("close enough" to nominal 8 Ohms) c) We can connect only two secondaries in series (but probably, better to connect N_{s1} & N_{s2} in series, then N_{s3} & N_{s4} in series too, then both series "combinations" in parallel) $n3=N_{pr}/(N_{s1}+N_{s2}) = 5916/200 = 29,58$ $R_{s-c} = R_{pr}/n3 = 3500/29,58^2 = 4$ Ohms Simple enough, when we know what is impedance ratio (z), and what is turns ratio (n). Turns ratio is equal to voltage ratio, and if we measure, say, 100Vrms across the primary, and say, 5Vrms on 4-Ohms winding, we have voltage/turns ratio= $100/5 = 20$, and our impedance ratio is $z=n^2 = 20^2 = 400$. Then our primary impedance is $R_{pr} = z * R_{sec} = 400 * 4 = 1600$ Ohms.
