Subject: 4 x 1 Ohm = 16 Ohms (sometimes)
Posted by Damir on Mon, 25 Jul 2005 20:01:05 GMT
View Forum Message <> Reply to Message

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 Rpr=3500 Ohms, and four secondaries of 1 Ohms - for 4, 8 & 16 Ohms connection." How?We have turns ratio between the primary, Npr (number of turns of the primary winding), and four identical secondaries Ns1=Ns2=Ns3=Ns4n = Npr / Ns1-4We don`t have those numbers, but we know impedance ratio(s):z = Rpr/Rsec1-4 = 3500/1 = 3500And from imp. ratio, our turns ratio is: n = z^0.5 = 3500^0.5 = 59,16Note that z^0.5 is the square root of z.Simplified, we can "assume" that Npr=5916 turns, and Ns1-4=100 turns.a)We can connect all four 1-Ohm secondaries in series:Then we have n1=Npr/(Ns1+Ns2+Ns3+Ns4)= 5916/400 = 14,79And Rs-a = Rpr/n1^2 = 3500/14,79^2 = 16 Ohmsb)We can connect only three secondaries in series, then we haven2=Npr/(Ns1+Ns2+Ns3)=5916/300 = 19,72Rs-b = Rpr/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 Ns1 & Ns2 in series, then Ns3 & Ns4 in series too, then both series "combinations" in parallel)n3=Npr/(Ns1+Ns2) = 5916/200 = 29,58Rs-c = Rpr/n3 = 3500/29,58^2 = 4 OhmsSimple 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 ration=100/5 = 20, and our impedance ratio is z=n^2 = 20^2 = 400. Then our primary impedance is Rpr = z * Rsec = 400 * 4 = 1600 Ohms.