DESIGNING A PA Chnyz

ELCOM BOOK

Output transformer for 12V

(1) - Determine desired power output Eg - 15W

(2) Assume transformer efficiency = 80%

∴ transistor O/P power required = $\frac{P}{.8}$ Eg = 18.8W = P_2

(3) - Calculate transistor dissipation per transistor = $\frac{P_2}{4}$ Eg = $\frac{18.8W}{4}$ = 4.7W

(4) Calculate heat sink by °C/W TOTAL = $\frac{T_{max} - T_{amb}}{P}$

(5) Calculate primary Z by Vcc^2/P_2 CT. Eg = $\frac{144}{18.8}$ = 7.8Ω CT

(6) For core area calculation double P_2 Eg → 18.8×2 = 37.6W = P6

AL-SEPT 70

(7) Calculate core area by $\frac{\sqrt{P6}}{5.58}$ Eg = $\frac{\sqrt{37.6}}{5.58}$ = 1.1 sq"

(8) Calculate turns ratio Zs/Zp 4Ω = $\sqrt{4/Zp}$ Eg: $\sqrt{\frac{4}{7.8}}$ = .715

(9) Calculate turns ratio Zs/Zp by $\sqrt{\frac{8}{Zp}}$ Eg = $\sqrt{\frac{8}{7.8}}$ = 1.01

(10) Calculate for 16Ω if desired by $\sqrt{\frac{16}{Zp}}$ Eg - $\sqrt{16/7.8}$ = 1.43

(11) Take supply voltage and double Eg 12V = 24V

(12) Determine primary current by $\frac{P2}{V11}$ Eg = $\frac{18.8W}{24V}$ = 780mA

- This is the current per section - total current draw would be 1560mA. for our example.

(13) Determine secondary currents by $I_s = \frac{I_p}{\text{Turns ratio}}$.

Eg - 4Ω = $\frac{1560}{.715}$ = 2.2A 8Ω = $\frac{1560}{1.01}$ = 1.55A 16Ω = $\frac{1560}{1.43}$ = 1.09A

(14) Choose wire size by the rate of 700 to 1000 circular mils / ampere though 600 is permissible with very neat winding.

AWG	AREA (C/M)	AWG	AREA (C/M)	AWG	AREA (C/M)
14	4107	25	320	36	25
15	3257	26	254	37	20
16	2583	27	201	38	15
17	2048	28	160	39	12
18	1624	29	126	40	10
19	1288	30	100		
20	1022	31	79		
21	810	32	63		
22	642	33	50		
23	509	34	39		
24	404	35	31		

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By ~~this~~ we find we need ~~1.5~~ .178A × 700 = ~~1045~~ 543 cm showing we need number 22 wire for the primary.

- 4Ω sec = 2.2 × 700 = #18 wire
- 8Ω = 1.55 × 700 = #19 wire.
- 16Ω = 1.09 × 700 = #21 wire

- use largest size possible though to prevent DC losses in the primary.

(15) Determine primary turns

by $PT's = \frac{2Vcc \times 10^8}{4.44(A)(f)(BM)}$

Eg $\frac{24 \times 10^8}{4.44 \times 1.1 \times 100 \times 70{,}000} = 70$ turns CT.

A = core area.
f = -3db frequency (low-end).
BM = flux density, 40000 to 100,000 (gauss/sq in) (70,000 is a good number)

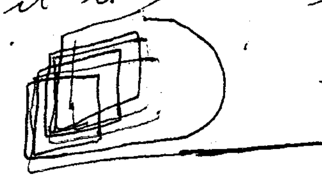
70 turns means 35 bifilar double turns

(16) determine secondary turns by Primary turns × turns ratio

Eg
- 4Ω = 70 × .715 = 50 turns
- 8Ω = 70 × 1.01 = 71 turns
- 16Ω = 70 × 1.43 = 100 turns

This completes calculation of the O/P trans

- A bifilar wind is where 2 separate winds are made at the same time - side by side, interwrapped - Then, the two windings are put in series to get a center tapped winding - This is done by taking one end and connecting it to the opposite end of the other winding. - They could also be left seperate if desired.



ELCOM - Driver trans for a CE - Push Pull ampr.

(1) - $Rin = 4(hie + (RE)(h_{FE}))$ Eg - Let hie = 200Ω & hFE = 40 & RE = 1Ω.

∴ sec Z = 4(240) = 960Ω CT

MY OWN

(2) Find Pin = 2Ic/B × Vcc ~~4hie Ipp / (hfe) Ipp~~   Ic = Ic per transistor

Eg = ~~4 × 200 × 18.8 / 1600 × 1.8~~ ~~= 1.2w~~   2 × .78A / 40 × 12 = .235w × 2 = .47w

With Tx eff of 75% say 1.5w is needed.

If a darlington is used - Let B = 400 - Pin = [illegible] = 120mw

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Find pri Z by $\frac{Vcc^2}{2Pin}$ Eg = $\frac{144}{.94}$ = ~~[illegible]~~ = 154Ω