



PAT 4141-00 Application: 6550 400 W  
This design is similar to the 300 Watt Bass guitar output transformer design (above), but only pentode configuration is possible, and the secondary impedances are 4 Ohms and 8 Ohms.  
The primary impedance is 1250 Ohms. The power bandwidth starts at 14 Hz. The transformer can handle 400 Watts. This will enable eight 6550 or KT88 or equivalent tubes to be used with an anode voltage of 560 Volts. The frequency range extends up to 117 kHz without feedback. This full range transformer provides clear bass guitar sounds like attacks, slaps and other modern sounds.

## Toroidal Output Transformer for Tube Amplifiers

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PAT-4141-00

## Ratings

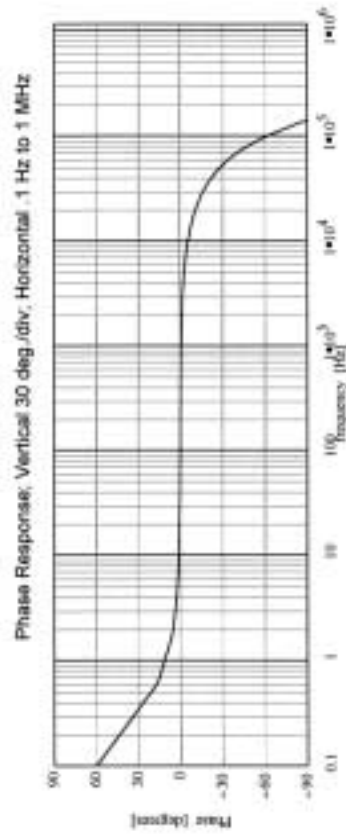
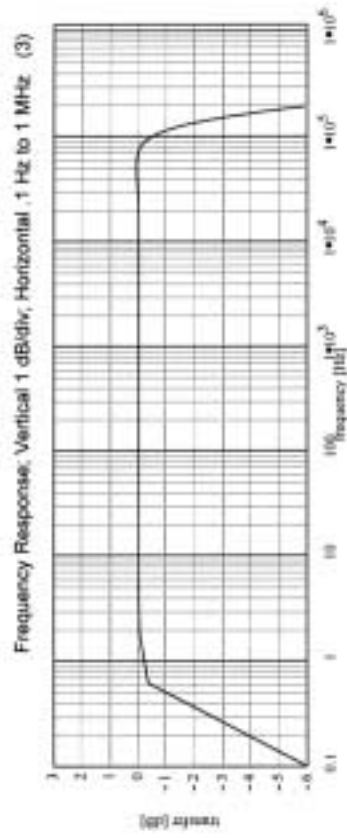
Type & Application	:	2 OHM	4 OHM	8 OHM	
Primary Impedance	:	Raa = 1.25	Raa = 1.253	Raa = 1.25	[k $\Omega$ ]
Secondary Impedance	:	Rls = 2	Rls = 4	Rls = 8	[ $\Omega$ ]
Turns Ratio Np/Ns	:	Ratio = 25	Ratio = 17.699	Ratio = 12.5	[ ]
Ultra Linear Tapping at	:	tap = 0	tap = 0	tap = 0	[%]
-1 dB Frequency Range [Hz to KHz] <sup>(3)</sup>	:	f1f = 0.794	f1f = 0.791	f1f = 71.189	f1f = 67.865
-1 dB Frequency Range [Hz to KHz] <sup>(3)</sup>	:	f11 = 0.339	f11 = 0.338	f1f = 100.638	f1f = 88.009
-3 dB Frequency Range [Hz to KHz] <sup>(3)</sup>	:	f13 = 0.172	f13 = 0.172	f1f = 137.556	f1f = 115.944
Nominal Power <sup>(1)</sup>	:	Ph = 400	Ph = 400	Ph = 400	[W]
-3 dB Power Bandwidth starting at	:	fu = 14	fu = 14	fu = 14	[Hz]
Total Primary Inductance <sup>(2)</sup>	:	Lp = 736.8	Lp = 736.8	Lp = 736.8	[H]
Primary Leakage Inductance	:	lsp = 2.109	lsp = 1.681	lsp = 2.371	[mH]
Effective Primary Capacitance	:	cip = 1.296	cip = 1.406	cip = 1.518	[nF]
Total Primary DC Resistance	:	Rip = 51.8	Rip = 51.8	Rip = 51.8	[ $\Omega$ ]
Total Secondary DC Resistance	:	Ris = 0.089	Ris = 0.145	Ris = 0.319	[ $\Omega$ ]
Tubes Plate Resistance per section	:	ri = 1	ri = 1	ri = 1	[k $\Omega$ ]
Insertion Loss	:	lloss = 0.358	lloss = 0.325	lloss = 0.34	[dB]
Q-factor 2nd order HF roll-off <sup>(5)</sup>	:	Q = 0.761	Q = 0.726	Q = 0.759	[ ]
HF roll-off Specific Frequency <sup>(5)</sup>	:	Fo = 124.73	Fo = 133.989	Fo = 108.601	[kHz]
Quality Factor <sup>(5)</sup>	:	QF = 3.494•10 <sup>5</sup>	QF = 4.383•10 <sup>5</sup>	QF = 3.108•10 <sup>5</sup>	[ ]
Quality Decade Factor = log(QF) <sup>(5)</sup>	:	QDF = 5.543	QDF = 5.642	QDF = 5.492	[ ]
Tuning Factor <sup>(5)</sup>	:	TF = 2.218	TF = 1.827	TF = 2.171	[ ]
Tuning Decade Factor = log(TF) <sup>(5)</sup>	:	TDF = 0.346	TDF = 0.262	TDF = 0.337	[ ]
Frequency Decade Factor <sup>(4,5)</sup>	:	FDF = 5.889	FDF = 5.904	FDF = 5.829	[ ]

- (1): calculated under the conditions of balancing the DC-currents and the AC-anode voltages of the power tubes driving the transformer  
(2): maximum value, measured over secondary, transferred to primary  
(3): calculation at 1 mWatt in Rls; ri and Rls are pure Ohmic  
(4): defined as FDF = log(fh3/f13) = number of frequency decades transferred  
(5): ir: Menno van der Veen; Theory and Practise of Wide Bandwidth Toroidal Output Transformers; preprint 3887, 97th AES Convention San Francisco  
(C): Copyright 1994 Vanderveen; Version 1.7; design date October 17, 1996

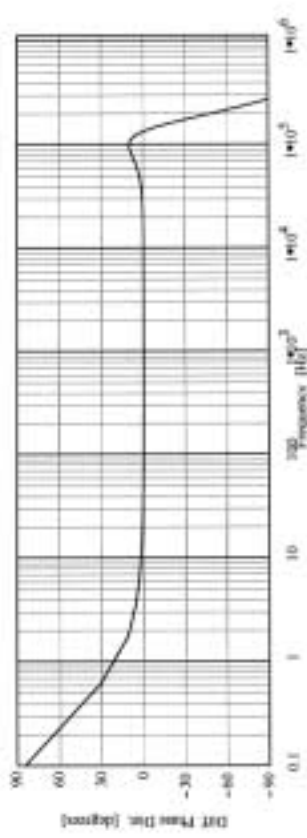
## Special Toroidal Output Transformer Designs

## Response Curves

20HM

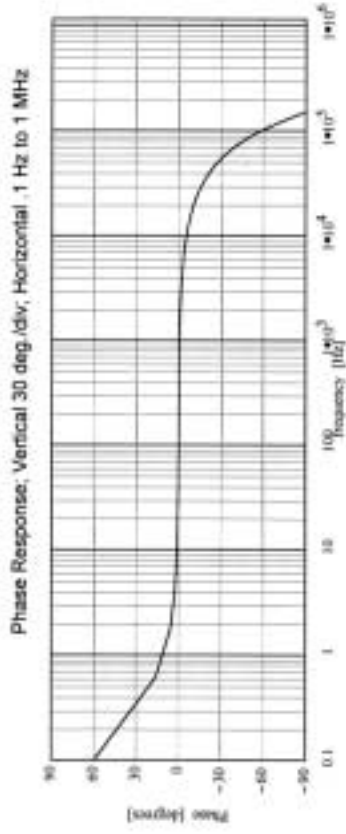
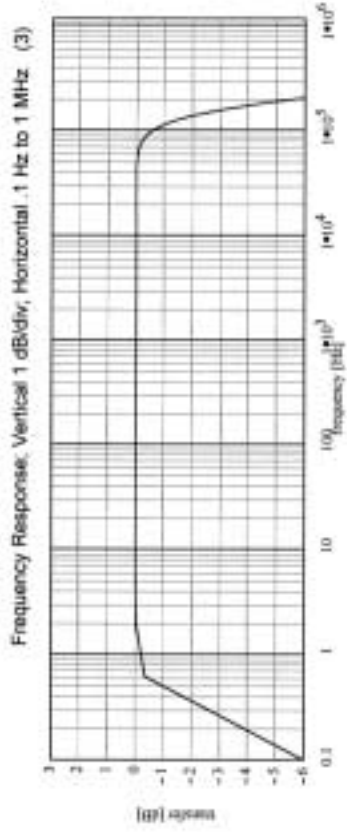


Differential Phase Distortion, vert. 30 deg./div, hor. 1 Hz to 1 MHz  
See: W.M. Leach, Differential Time Delay ... JAES sept. 89 pp. 709-715

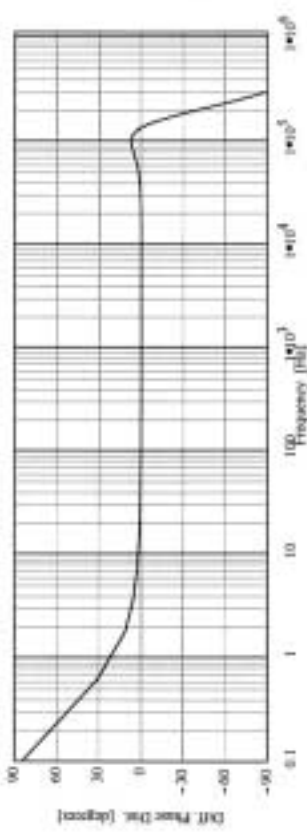


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40HM



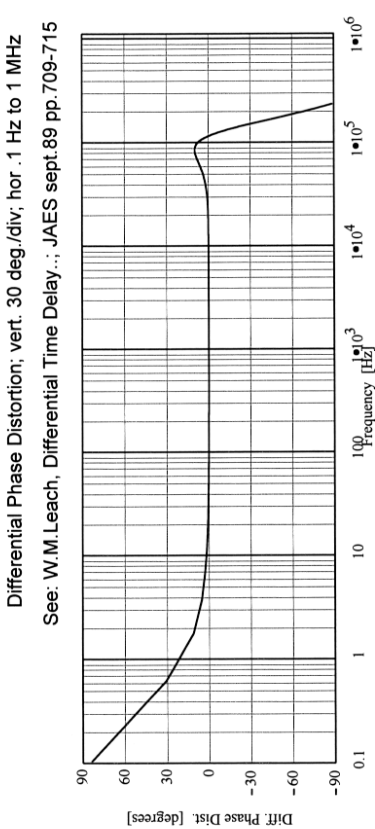
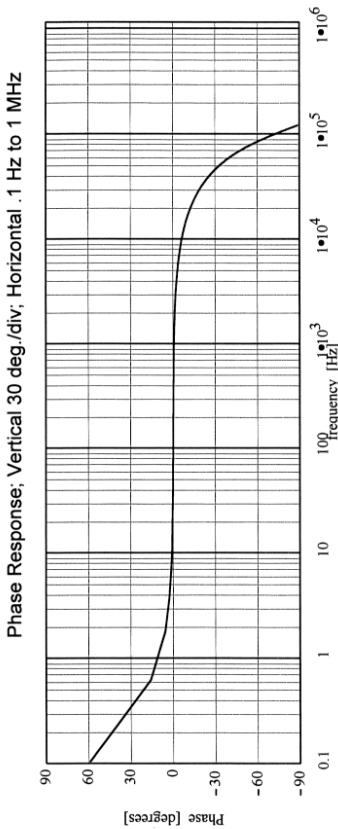
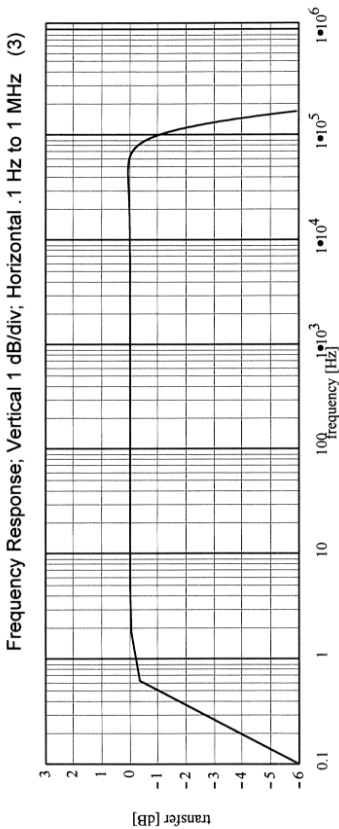
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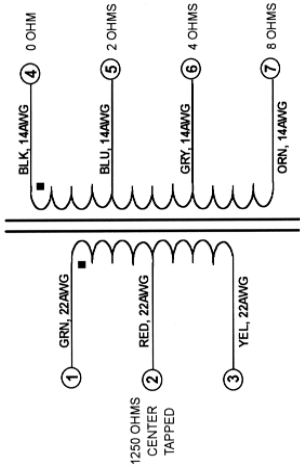
# PAT-4141-00 Response Curves

8 OHM

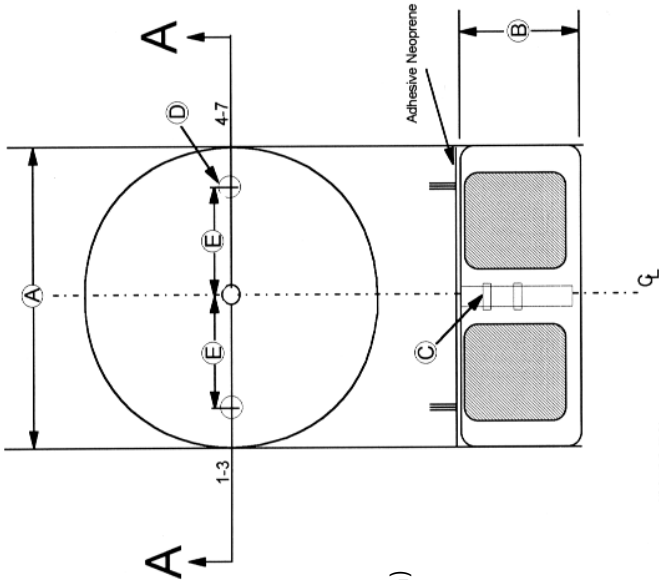


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## Schematic



## Mechanical



REF	Dimension, in mm
A	203.2 nominal
B	107.95 nominal
C	(2) 5/16-18 T-NUT
D	20 +/- 5 (2 places)
E	85 +/- 5 (2 places)

Weight: 10.65kg  
Lead Length: 200mm (+/- 10mm)

