



PAT 4149-00 Tube Application: 211 150 W Two 211 or Svetlana SV572 triodes in Push Pull configuration, connected to this output transformer, grid driven into the positive cathode-grid voltage region, can deliver up to 150 Watts of output power. This transformer is specially designed for this application, with a primary impedance of 8 kOhm. The anode voltage should be at 1200 Volt. This specialist transformer can handle 150 Watts, with a power bandwidth starting at 14 Hz and a -3dB (1W) frequency range up to 41 kHz, all without applying negative local or overall feedback. Secondary impedances of 4 Ohms, 8 Ohms or 16 Ohms are available as well as a separate center tapped 64 Ohm feedback winding.

## Toroidal Output Transformer for Tube Amplifiers

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## Special Toroidal Output Transformer Designs

### PAT-4149-00 Ratings

Type & Application	4 OHM	8 OHM	16 OHM	
Primary Impedance	Raa = 8.033	Raa = 7.971	Raa = 8.033	[kΩ]
Secondary Impedance	Rls = 4	Rls = 8	Rls = 16	[Ω]
Turns Ratio Np/Ns	Ratio = 44.815	Ratio = 31.565	Ratio = 22.407	[ ]
Ultra Linear Tapping at	tap = 0	tap = 0	tap = 0	[%]
-1 dB Frequency Range [Hz to KHz] <sup>(3)</sup>	flf = 1.028 fhf = 10.735	flf = 1.031 fhf = 9.453	flf = 1.029 fhf = 10.024	
-1 dB Frequency Range [Hz to KHz] <sup>(3)</sup>	fl1 = 0.438 fh1 = 23.48	fl1 = 0.44 fhf = 15.58	fl1 = 0.439 fhf = 22.025	
-3 dB Frequency Range [Hz to KHz] <sup>(3)</sup>	fl3 = 0.223 fh3 = 41.93	fl3 = 0.224 fhf = 22.614	fl3 = 0.223 fhf = 39.649	
Nominal Power <sup>(1)</sup>	Pn = 150	Pn = 150	Pn = 150	[W]
-3 dB Power Bandwidth starting at	fu = 14.14	fu = 14.14	fu = 14.14	[Hz]
Total Primary Inductance <sup>(2)</sup>	Lp = 3.058·10 <sup>3</sup>	Lp = 3.058·10 <sup>3</sup>	Lp = 3.058·10 <sup>3</sup>	[H]
Primary Leakage Inductance	lsp = 15.4	lsp = 103.8	lsp = 15.6	[mH]
Effective Primary Capacitance	cip = 0.963	cip = 0.909	cip = 1.019	[nF]
Total Primary DC Resistance	Rip = 417	Rip = 417	Rip = 417	[Ω]
Total Secondary DC Resistance	Ris = 0.154	Ris = 0.419	Ris = 0.659	[Ω]
Tubes Plate Resistance per section	ri = 4.2	ri = 4.2	ri = 4.2	[kΩ]
Insertion Loss	lloss = 0.376	lloss = 0.432	lloss = 0.387	[dB]
Q-factor 2nd order HF roll-off <sup>(5)</sup>	Q = 0.536	Q = 0.683	Q = 0.528	[ ]
HF roll-off Specific Frequency <sup>(5)</sup>	Fo = 59.069	Fo = 23.449	Fo = 57.09	[kHz]
Quality Factor <sup>(5)</sup>	QF = 1.986·10 <sup>5</sup>	QF = 2.946·10 <sup>4</sup>	QF = 1.96·10 <sup>5</sup>	[ ]
Quality Decade Factor = log(QF) <sup>(5)</sup>	QDF = 5.298	QDF = 4.469	QDF = 5.292	[ ]
Tuning Factor <sup>(5)</sup>	TF = 0.946	TF = 3.431	TF = 0.905	[ ]
Tuning Decade Factor = log(TF) <sup>(5)</sup>	TDF = -0.024	TDF = 0.535	TDF = -0.043	[ ]
Frequency Decade Factor <sup>(4,5)</sup>	FDF = 5.274	FDF = 5.005	FDF = 5.249	[ ]

(1): calculated under the conditions of balancing the DC-currents and the AC-anode voltages of the powertubes 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/fl3) = number of frequency decades transferred

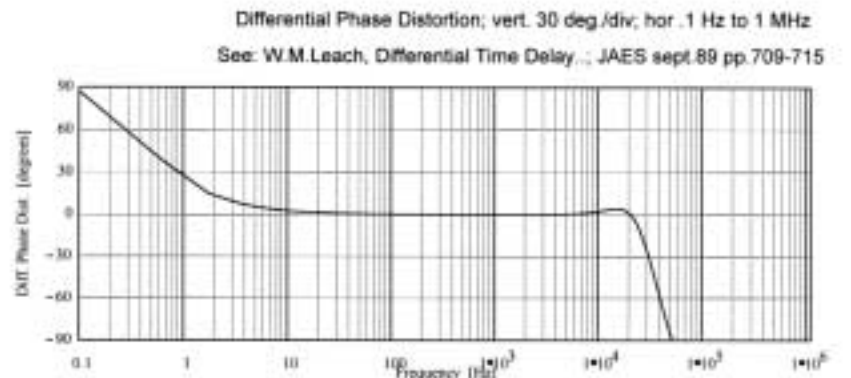
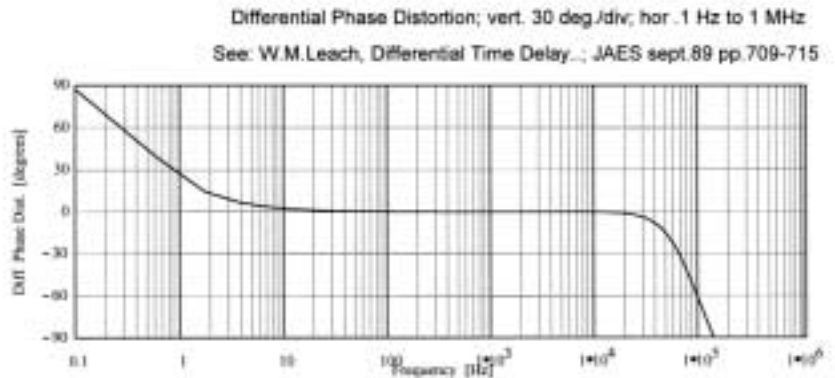
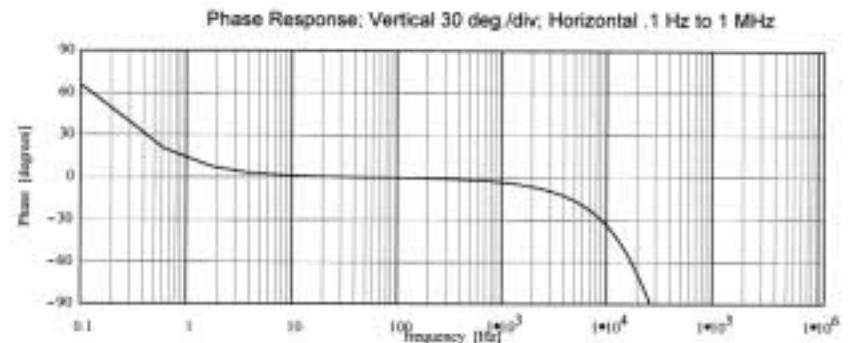
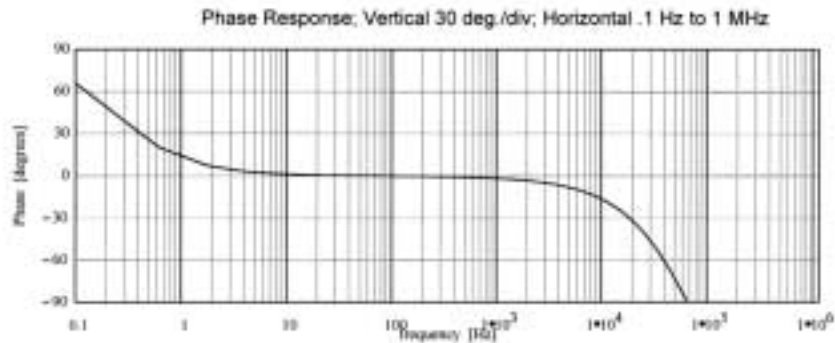
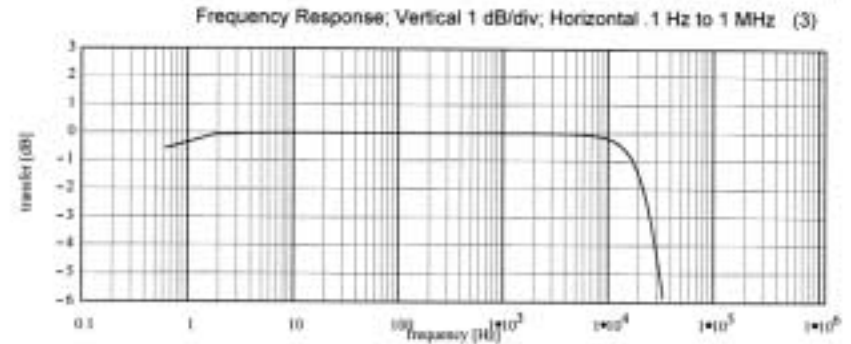
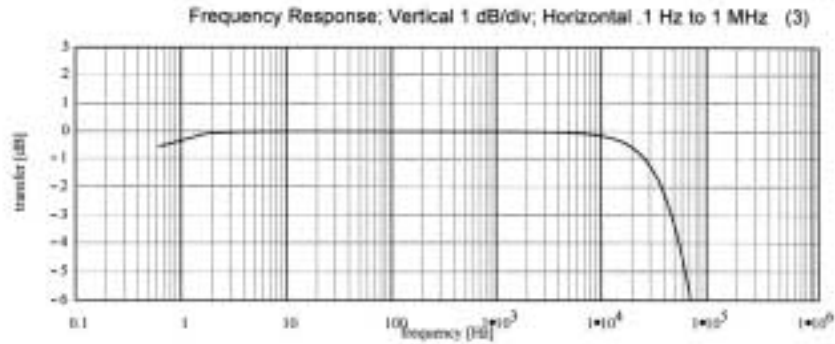
(5): ir. Menno van der Veen; Theory and Practise of Wide Bandwidth Toroidal Output Transformers; preprint 3887, 97th AES Convention San Fransico

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# PAT-4149-00 Response Curves

4 OHM

8 OHM



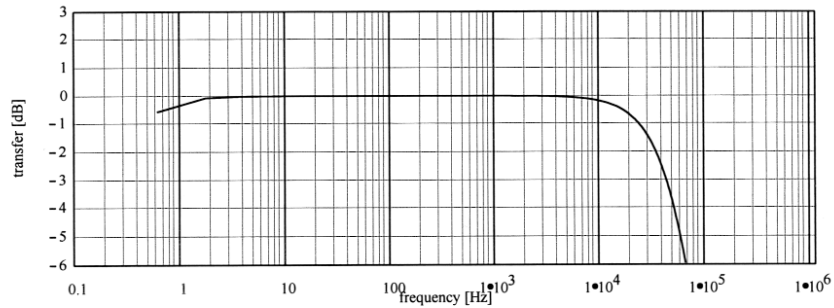
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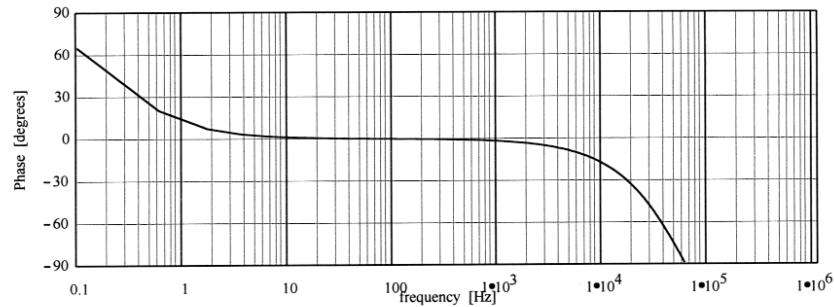
# PAT-4149-00 Response Curves

160HM

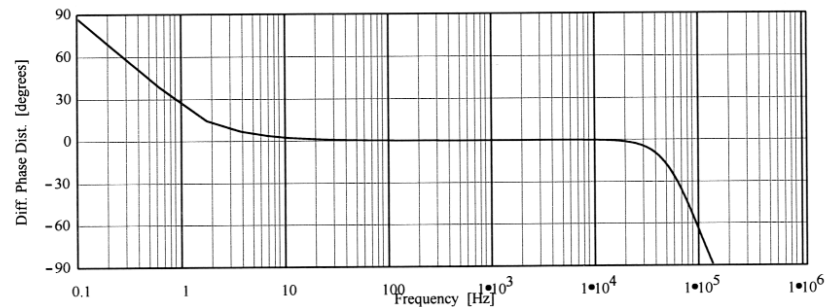
Frequency Response; Vertical 1 dB/div; Horizontal .1 Hz to 1 MHz (3)



Phase Response; Vertical 30 deg./div; Horizontal .1 Hz to 1 MHz

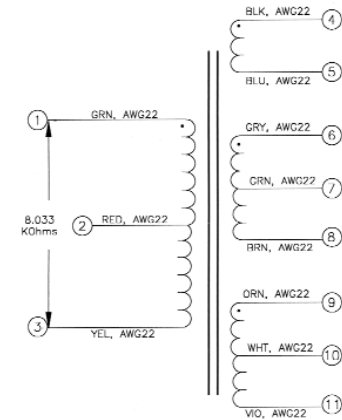


Differential Phase Distortion; vert. 30 deg./div; hor. .1 Hz to 1 MHz  
See: W.M.Leach, Differential Time Delay.; JAES sept.89 pp.709-715



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## Schematic



## Mechanical

REF	Dimension, in mm
A	152.4 nominal
B	88.9 nominal
C	5/16-18 T-NUT
D	20 +/- 5 (3 places)
E	70 +/- 5 (3 places)

Weight: 5.9kg  
Lead Length: 200mm (+/- 10mm)

