



**PAT 4150-00 Application: 300B 30W**  
 300Bs are often used in Single Ended configuration, however this transformer offers the possibility of Push Pull application with this famous power triode. The primary impedance is 3500 Ohms. The secondary impedance is 4 Ohms, 6 Ohms or 8 Ohms, ensuring that even low speaker impedances can be driven without difficulty. The transformer can handle 30 Watts in standard Push Pull design without entering the positive grid-cathode region. The frequency range extends up to 162 kHz. For strong bass reproduction the power bandwidth starts at 14 Hz. Special attention has been paid to the differential phase distortion, being below 2 degrees up to 100 kHz. This is an audio purist transformer for the special 300B triode where more output power is available than in the standard single ended configuration.

## Toroidal Output Transformer for Tube Amplifiers

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## Special Toroidal Output Transformer Designs

### PAT-4150-00 Ratings

| Type & Application                               | 4 OHM                        | 6 OHM                        | 8 OHM                        |       |
|--|------------------------------|------------------------------|------------------------------|-------|
| Primary Impedance                                | Raa = 3.453                  | Raa = 3.395                  | Raa = 3.394                  | [kΩ]  |
| Secondary Impedance                              | Rls = 4                      | Rls = 6                      | Rls = 8                      | [Ω]   |
| Turns Ratio Np/Ns                                | Ratio = 29.382               | Ratio = 23.786               | Ratio = 20.598               | [ ]   |
| Ultra Linear Tapping at                          | tap = 0                      | tap = 0                      | tap = 0                      | [%]   |
| -1 dB Frequency Range [Hz to KHz] <sup>(3)</sup> | flf = 1.235    fhf = 65.123  | flf = 1.227    fhf = 78.414  | flf = 1.226    fhf = 76.102  |       |
| -1 dB Frequency Range [Hz to KHz] <sup>(3)</sup> | fl1 = 0.527    fh1 = 139.755 | fl1 = 0.523    fhf = 164.698 | fl1 = 0.523    fhf = 159.634 |       |
| -3 dB Frequency Range [Hz to KHz] <sup>(3)</sup> | fl3 = 0.268    fh3 = 242.389 | fl3 = 0.266    fhf = 278.101 | fl3 = 0.266    fhf = 269.159 |       |
| Nominal Power <sup>(1)</sup>                     | Pn = 30                      | Pn = 30                      | Pn = 30                      | [W]   |
| -3 dB Power Bandwidth starting at                | fu = 14                      | fu = 14                      | fu = 14                      | [Hz]  |
| Total Primary Inductance <sup>(2)</sup>          | Lp = 649.6                   | Lp = 649.6                   | Lp = 649.6                   | [H]   |
| Primary Leakage Inductance                       | lsp = 2.927                  | lsp = 2.223                  | lsp = 2.267                  | [mH]  |
| Effective Primary Capacitance                    | cip = 0.313                  | cip = 0.34                   | cip = 0.357                  | [nF]  |
| Total Primary DC Resistance                      | Rip = 173.3                  | Rip = 173.3                  | Rip = 173.3                  | [Ω]   |
| Total Secondary DC Resistance                    | Ris = 0.165                  | Ris = 0.213                  | Ris = 0.263                  | [Ω]   |
| Tubes Plate Resistance per section               | ri = 0.7                     | ri = 0.7                     | ri = 0.7                     | [kΩ]  |
| Insertion Loss                                   | lloss = 0.38                 | lloss = 0.361                | lloss = 0.35                 | [dB]  |
| Q-factor 2nd order HF roll-off <sup>(5)</sup>    | Q = 0.562                    | Q = 0.583                    | Q = 0.584                    | [ ]   |
| HF roll-off Specific Frequency <sup>(5)</sup>    | Fo = 319.505                 | Fo = 349.009                 | Fo = 336.968                 | [kHz] |
| Quality Factor <sup>(5)</sup>                    | QF = 2.219·10 <sup>5</sup>   | QF = 2.922·10 <sup>5</sup>   | QF = 2.865·10 <sup>5</sup>   | [ ]   |
| Quality Decade Factor = log(QF) <sup>(5)</sup>   | QDF = 5.346                  | QDF = 5.466                  | QDF = 5.457                  | [ ]   |
| Tuning Factor <sup>(5)</sup>                     | TF = 4.073                   | TF = 3.574                   | TF = 3.53                    | [ ]   |
| Tuning Decade Factor = log(TF) <sup>(5)</sup>    | TDF = 0.61                   | TDF = 0.553                  | TDF = 0.548                  | [ ]   |
| Frequency Decade Factor <sup>(4,5)</sup>         | FDF = 5.956                  | FDF = 6.019                  | FDF = 6.005                  | [ ]   |

(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

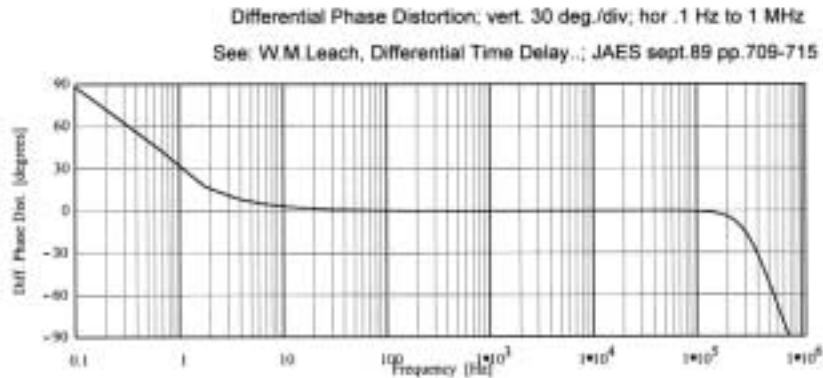
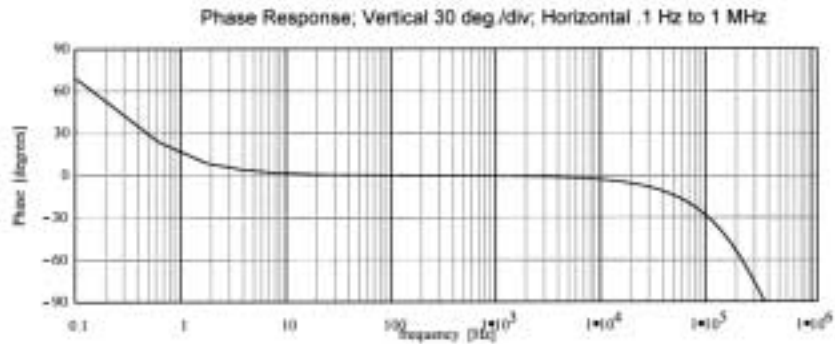
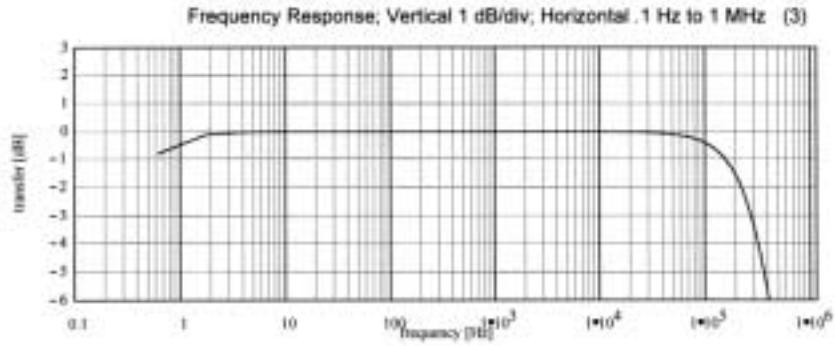
(5): ir. Menno van der Veen; Theory and Practise of Wide Bandwidth Toroidal Output Transformers; preprint 3887, 97th AES Convention San Fransico

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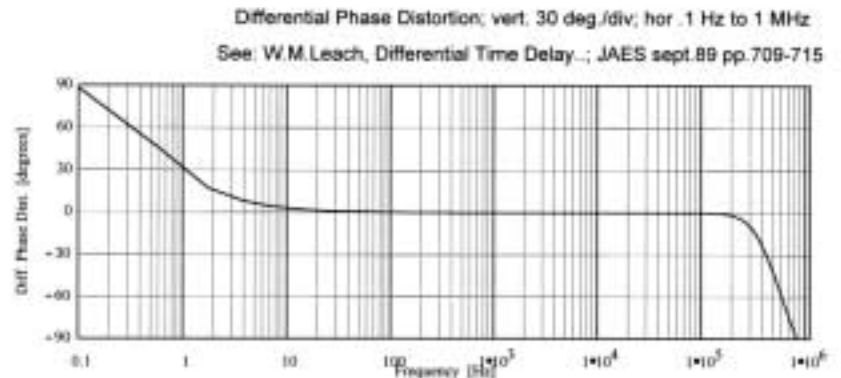
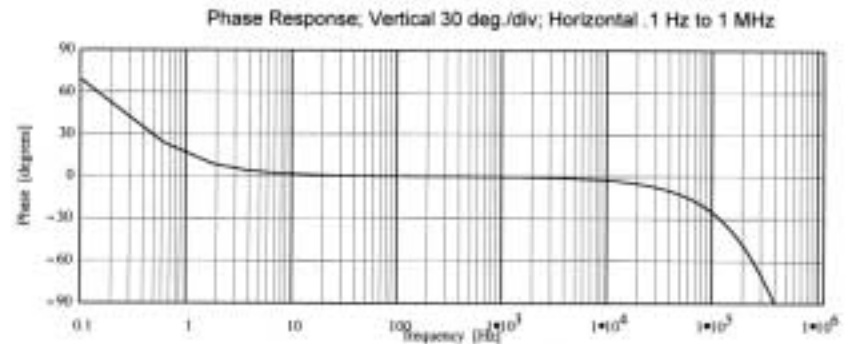
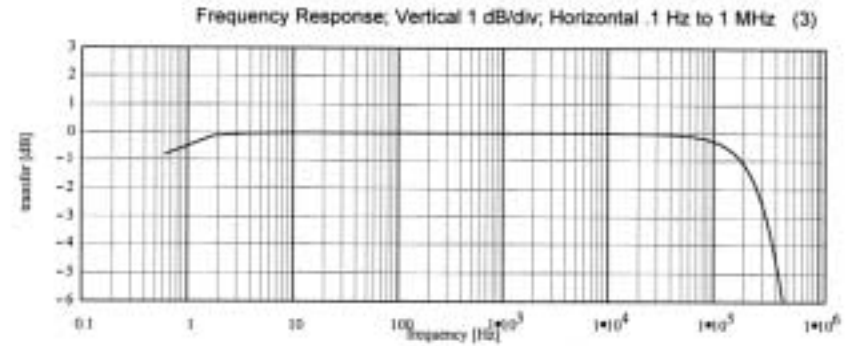
# PAT-4150-00 Response Curves

4 OHM

6 OHM



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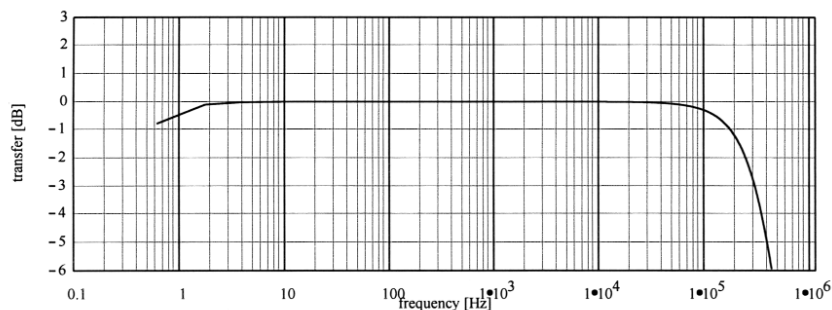


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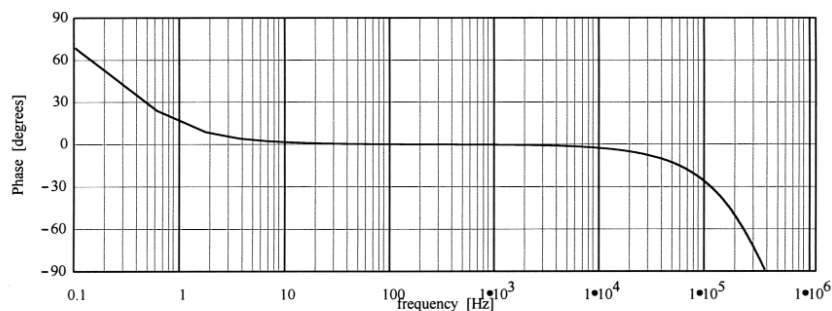
# PAT-4150-00 Schematic

8 OHM

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

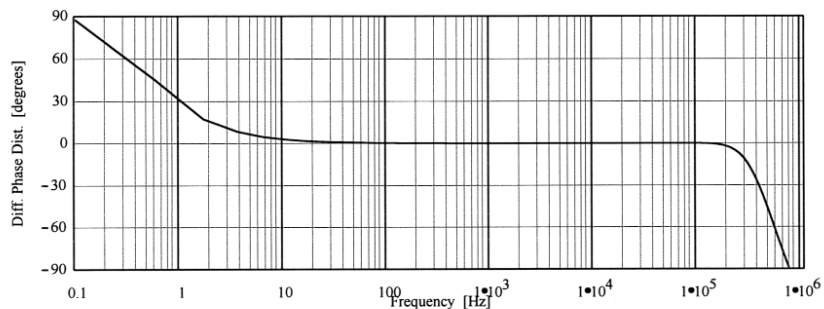


Phase Response; Vertical 30 deg./div; Horizontal .1 Hz to 1 MHz



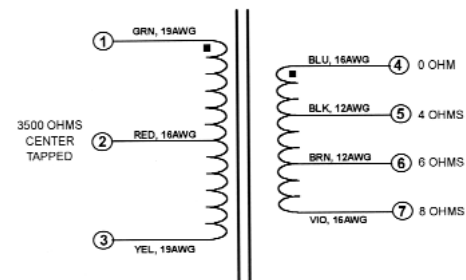
Differential Phase Distortion; vert. 30 deg./div; hor. .1 Hz to 1 MHz

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 (2 places) |
| E   | 70 +/- 5 (2 places) |

Weight: 5.3kg

Lead Length: 200mm (+/- 10mm)

