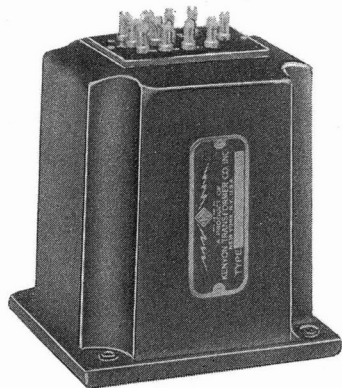


# K E N Y O N

## TYPE K-407

### GENERAL APPLICATIONS

Transformer K-407 has been designed to couple push pull plates requiring a plate to plate load of 5000 ohms or 3000 ohms to a transmission line or voice coil line. The 5000 ohm primary is intended to operate from push pull type 2A3, 6A3, or 45 tubes operated class AB self biased or from push pull type 45 or 6L6 tubes operated class A. The 3000 ohm primary will work out of 2A3, 6A3, or 45 tubes operated class AB fixed bias.



Top Mounting

Two separate sets of secondary windings are provided. The main secondary is supplied with the Kenyon Multiple Line which permits terminations of 50 to 500 ohms. The frequency response using any impedance of this combination will be linear within plus or minus  $\frac{1}{2}$  DB from 30 to 15,000 cycles. This is illustrated by the solid curve below. The second secondary is provided with the Kenyon Multiple Voice Coil Line which permits terminations of

1.8 to 15 ohms. This was primarily designed as an auxiliary winding for monitoring applications. The frequency response using any one combination of voice coil loads will be maintained as shown by the dotted curve below. Only one secondary should be loaded at one time with the rated load if the harmonic distortion generated by the associated tubes is to be kept within commercial limits. This precaution must be observed in the application of transformer K-407 unless the voice coil secondary is required for monitoring purposes. In this case the Multiple Line may be terminated with any rated load and the voice coil secondary terminated with a load equivalent to at least (ten) 10 times the rated load, e.g., if the 500 ohm winding of the Multiple Line secondary is worked into a 500 ohm line the 15 ohm secondary can be shunted with a 200 ohm line working into a monitor speaker.

### ELECTROSTATIC AND ELECTROMAGNETIC SHIELDING

Electrostatic shielding between windings is not necessary in an output transformer operating at a high audio level. Longitudinal interference pickup is amplified but little in a unit of this type. Interstage coupling—cross-talk—between the output transformer and any of the other audio transformers in the amplifier is eliminated by cast high permeability

## LABORATORY STANDARD » » » Output Transformer

List Price . . . \$21.00

housing. Electromagnetic shielding of 18 DB is provided by this case.

### DESIGN CONSIDERATIONS

Efficiency is one of the most important considerations in the design of a unit such as K-407. It is primarily controlled by copper loss and core-loss. Copper-loss is the combined heating effects of A.C. and D.C. currents in the windings. The secondary wire size must be chosen to provide low winding resistance and therefore low copper-loss. Core-loss affects transformer efficiency at low frequencies. Suppose the primary input is 12 watts and the flux density in the core is such that the core-loss is 2 watts. The effective power output is then 10 watts, signifying an efficiency of approximately 83%, or an insertion loss of approximately 1 DB. K-407 has a large high permeability low-loss silicon steel core. The total insertion loss due to copper and steel losses is less than 1 DB. Sufficient primary inductance is usually obtained when the A.C. flux density is kept to such a point that the core-loss is small.

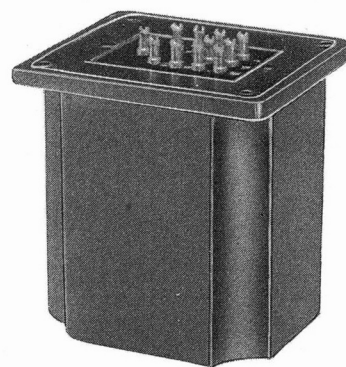
The high frequency response in a transformer of this type is controlled by the leakage reactance. Leakage reactance appears like a small reactor in series between primary and secondary. Leakage reactance therefore increases with frequency. The voltage appearing across this reactance also increases with frequency. This means that part of the voltage applied to the primary of the transformer is wasted internally, and the other part appears across the secondary load. Through proper coil design, the leakage reactance in this unit has been kept to such a point that the frequency response up to 15,000 cycles is impaired by only  $\frac{1}{2}$  DB.

The high frequency response in a transformer of this type is controlled by the leakage reactance. Leakage reactance appears like a small reactor in series between primary and secondary. Leakage reactance therefore increases with frequency. The voltage appearing across this reactance also increases with frequency. This means that part of the voltage applied to the primary of the transformer is wasted internally, and the other part appears across the secondary load. Through proper coil design, the leakage reactance in this unit has been kept to such a point that the frequency response up to 15,000 cycles is impaired by only  $\frac{1}{2}$  DB.

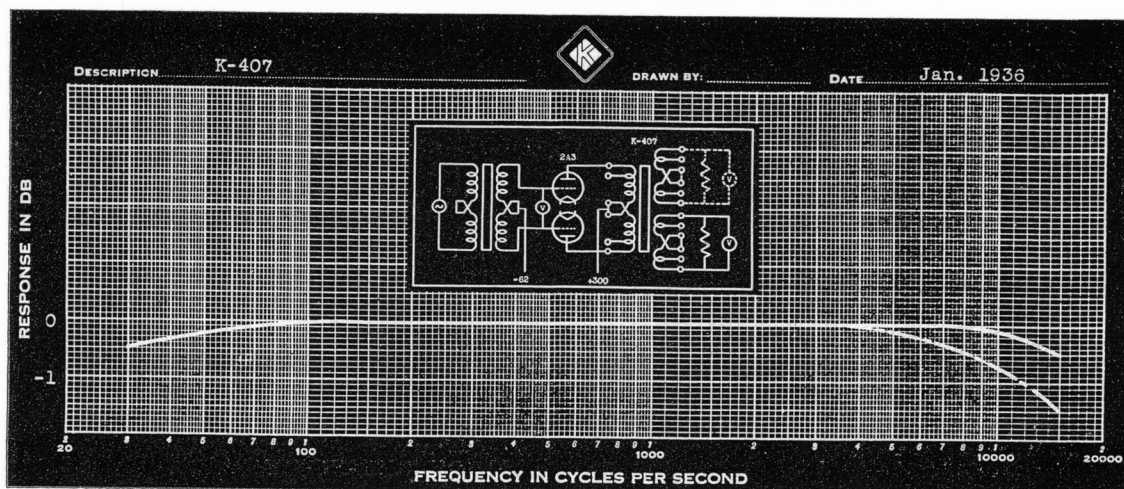
### SPECIAL APPLICATIONS

The following information is provided for the guidance of the audio engineer who has occasion to use this transformer in a circuit not covered by the rated applications.

Suppose it is necessary to couple push pull class AB 45's to a 1,000 ohm load. The 1,000 ohm load would be connected to the terminals rated for 500 ohms. The reflected primary load is doubled when the secondary load is doubled. This will result in a sacrifice in power output and a slight reduction in harmonic distortion. The primary reactance of this transformer is sufficient to insure low frequency response



Bottom Mounting



within  $\frac{1}{2}$  DB at 30 cycles when working out of a 5000 or 3000 ohm generator. If the secondary load is doubled the shunting effect of primary reactance is also doubled. This causes the low frequency response to be impaired. The loss at 30 cycles will be approximately 1 DB. The ratio of leakage reactance to the combined impedance of generator and load has been decreased in this application. The voltage drop across leakage reactance will be, in this case, a smaller percentage of the total generated voltage. The high frequency response will consequently be improved.

Suppose it is found necessary to couple push pull class AB 45's to a 25 ohm line. The 25 ohm load would be connected to the terminals rated for 50 ohms. This reflects a primary load of one half the rated value. The power output would be decreased and harmonic content would be increased. This increase in harmonic content may be serious. The only possible way to keep the harmonic distortion down would be to limit the amount of grid excitation. The frequency response at the low end will be improved. When secondary load is cut in half the shunting effect of primary reactance is approximately one half as great. This would indicate a good low frequency response extending to 15 cycles. The high frequency response on the contrary will be impaired. Since the ratio of leakage reactance to load impedance has been doubled the loss in voltage across the leakage reactance at higher frequencies will be twice as great. This indicates that the loss at 7500 cycles will be down approximately  $\frac{1}{2}$  DB or 1 DB at 15,000 cycles.

## ELECTRICAL SPECIFICATIONS

The detailed electrical characteristics provided below are supplied for the assistance of the audio engineer in the application of this transformer in practical audio frequency circuits.

### Frequency Response — $\pm \frac{1}{2}$ DB 30 to 15,000 cycles

This tolerance is maintained only on the Multiple Line secondaries. The frequency response characteristics of the Multiple Voice Coil Line secondaries are illustrated. The specified performance on either set of secondary windings is dependent on maintaining a set of operating conditions within the limits set forth in these data.

### Primary Impedance — 5000 or 3000 ohms (pl. to pl.)

### Secondary Impedance —

MULTIPLE LINE — 50, 125, 200 (balanced), 250, 333, or 500 (balanced) ohms

MULTIPLE VOICE COIL LINE — 1.8, 3.75, 6.8, 7.5 (balanced) 11, or 15 (balanced) ohms

Max. Pri. D.C. Balanced/Leg — 65 MA (static)  
70 MA (peak)

Max. Pri. D.C. Unbalanced/Leg — 5 MA

Maximum Level — 35 DB

### Pri. Inductance —

26 hy — 30 cycles — 10 volts applied  
50 hy — 30 cycles — 150 volts applied  
62 hy — 30 cycles — 300 volts applied  
44 hy — 60 cycles — 100 volts applied

The inductance figures given above have been determined with no polarizing D.C. in the coil and with an A.C. voltage applied to the coil of the frequency and potential specified.

Although transformer K-407 was designed primarily for operation in a balanced push pull output circuit it can be used with fair results to couple from a single tube requiring a plate load of 3000 or 5000 ohms, e.g., working out of a single 43, pentode connected, the response at 60 cycles will be down 1 DB. The high frequency response will be the same as for the push pull application.

**Coil Structure** — Interleaved sections balanced for inductance capacity and resistance

**Primary D.C. Resistance** — 210 ohms (total)

**Secondary D.C. Resistance —**

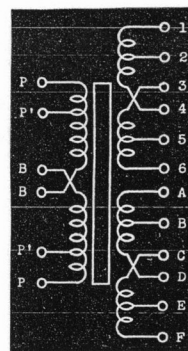
MULTIPLE LINE — 27 ohms (total)

MULTIPLE VOICE COIL LINE — .4 ohms (total)

**Core Material** — Low-loss high permeability silicon steel

**Electromagnetic Shielding** — High permeability cast case protects the transformer from the effects of pickup from stray electromagnetic and electrostatic fields.

## Terminal Arrangement



### PRIMARY TERMINALS

Plates (5000 ohm plate to plate load)

P — P

Plates (3000 ohm plate to plate load)

P' — P'

### SECONDARY TERMINALS —

#### MULTIPLE LINE

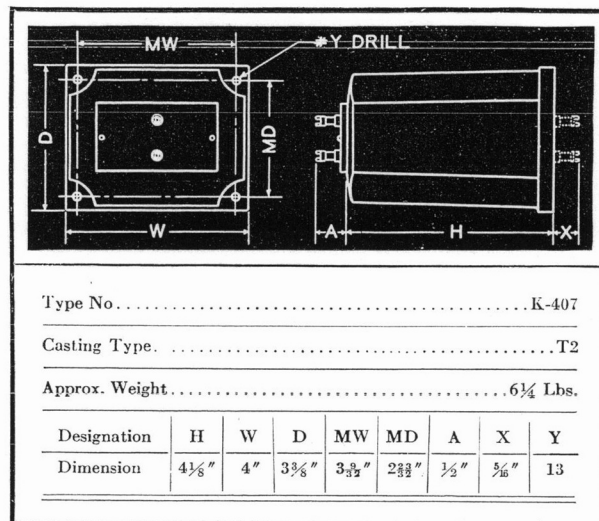
50 ohms — connect to 2 and 5,  
join 2 to 3 and 4 to 5  
125 ohms — connect to 1 and 6,  
join 1 to 3 and 4 to 6  
200 ohms — connect to 2 and 5,  
join 3 to 4  
250 ohms — connect to 1 and 6,  
join 2 to 3  
333 ohms — connect to 1 and 5,  
join 3 to 4  
500 ohms — connect to 1 and 6,  
join 3 to 4

### SECONDARY TERMINALS — MULTIPLE VOICE COIL LINE

15 ohms — connect to A and F, join C to D  
11 ohms — connect to A and E, join C to D  
7.5 ohms — connect to B and E, join C to D  
6.8 ohms — connect to A and F, join B to C  
3.75 ohms — connect to A and F, join A to C  
join D to F  
1.8 ohms — connect to B and E, join B to C  
join D to E

## MECHANICAL SPECIFICATIONS

Transformer K-407 can be supplied "top mounting" (with terminal lugs on top of case) or "bottom mounting" (with terminal lugs on bottom of case). TOP MOUNTING UNITS WILL BE SUPPLIED UNLESS OTHERWISE SPECIFIED.



## GUARANTY AND CONDITIONS

We have made every effort to make our operating instructions and performance characteristics clear, concise, and free of ambiguities. We unconditionally guarantee this unit to be exactly as we have represented it. Any unit not in accordance with our specifications, or defective due to material or manufacturing causes, will be repaired or replaced without charge. All material returned to this factory for inspection, repair or replacement must be shipped prepaid. This guaranty is effective for a period of five years from date of purchase.

Kenyon products are subject to continual laboratory test with resultant performance and production refinements. We accept your order with the understanding that we are authorized to furnish a revised type if the unit ordered has been discontinued.

**KENYON TRANSFORMER Co., Inc.**  
840 Barry Street :: :: New York City

Export Department:  
25 Warren Street  
New York, N. Y.

Cable Address:  
SIMONTRICE-NEW YORK





# K E N Y O N

## LABORATORY STANDARD » » » Output Transformer

TYPE K-408

List Price . . . \$18.00

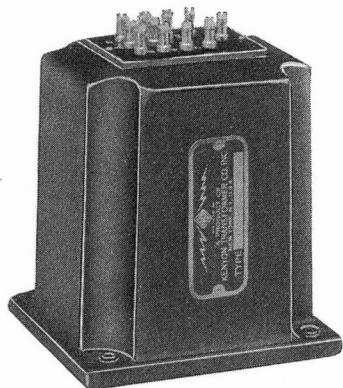
### GENERAL APPLICATIONS

Transformer K-408 has been designed to couple push pull plates requiring a plate to plate load of 5000 ohms or 3000 ohms to a transmission line. The 5000 ohm primary is intended to operate from push pull type 2A3, 6A3, or 45 tubes operated class AB self biased, or from push pull type 45 or 6L6 tubes operated class A. The 3000 ohm primary will work out of the 2A3, 6A3, or 45 tubes operated class AB fixed bias. The

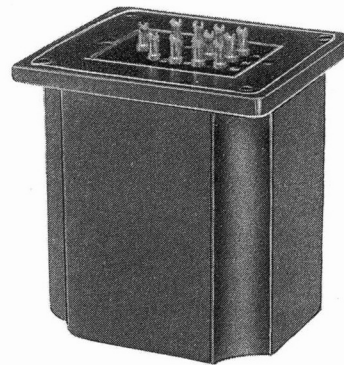
secondary is provided with the Kenyon Multiple Line which provides terminations ranging from 50 to 500 ohms.

### ELECTROSTATIC AND ELECTRO- MAGNETIC SHIELDING

Electrostatic shielding between windings is not necessary in an output transformer operating at a high audio level. Longitudinal interference pick-up is amplified but little in a unit of this type. Interstage coupling—cross talk—between the output transformer and any of the other audio transformers in the amplifier is eliminated by a cast high-permeability housing. Electromagnetic shielding of 18 DB is provided by this case.



Top Mounting

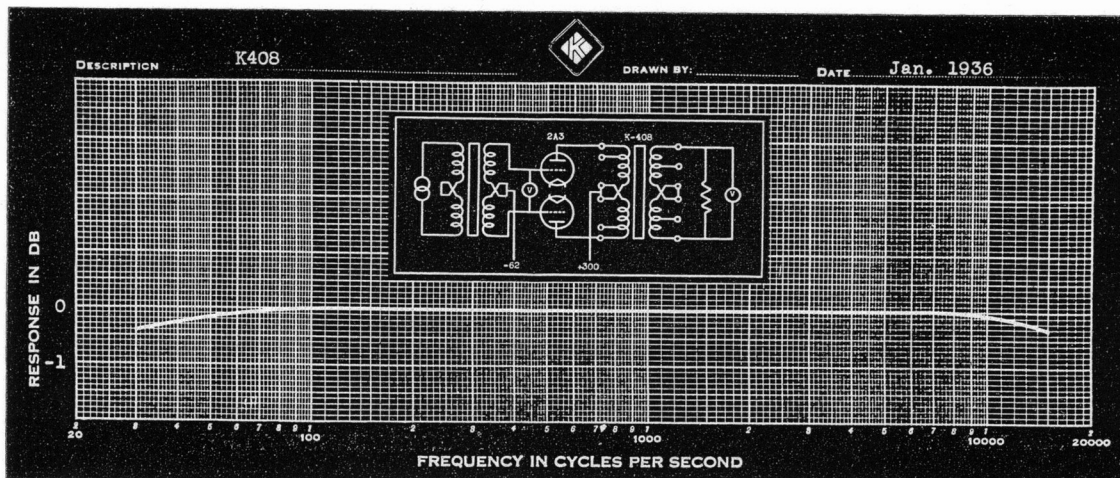


Bottom Mounting

### DESIGN CONSIDERATIONS

We believe that an understanding of the fundamental design considerations associated with all output transformers is necessary to the audio engineer who selects and uses them. We are therefore presenting the following data for his guidance and information: An understanding of what happens in an output transformer under actual operating conditions can be seen most clearly by drawing a simplified equivalent diagram of the transformer. We will now proceed with a word picture of the diagram. For the sake of simplicity let us consider the case of class A output tubes, 45's for example. The plate resistance of each tube is 1700 ohms, so the total is 3400 ohms. The turns ratio of the transformer is such that with any rated secondary load, the reflected primary load is 5000 ohms. This may be drawn as a generator with zero impedance having a resistor of 3400 ohms in series with it. Any drop occurring across this resistor is not available as output voltage. The transformer primary is then connected to one side of the zero impedance generator, and the other side to the 3400 ohms.

The primary of this transformer may be drawn as an inductance shunted across the line in parallel with a resistance shunted across the line. As the frequency decreases the reactance of this inductance decreases. When this reactance becomes of a value of the order of 5000 ohms, current flows through it (exciting current) which causes a drop in the generator impedance. As this condition exists only at the lower frequencies, it may be considered as a low frequency loss. The other low frequency loss is represented by the resistor which we placed in parallel with the primary inductance. This resistor represents the core loss of the transformer. As frequency decreases (applied voltage remaining constant) the A.C. flux density in the core of the transformer increases. As the flux density increases the core loss increases. Thus at the low frequencies the resistor shown on the schematic diagram will be decreased, drawing additional current from the generator and causing an additional power loss in the transformer which is not available for transfer to the secondary but which is dissipated as internal heat. Leakage reactance which controls high frequency response would appear as a small reactor in series between the secondary load impedance and the generator. The reactance of this branch of the circuit will increase directly as frequency increases. Any current flowing to the load will therefore cause a drop in voltage across this reactance. As the reactance becomes higher, the drop becomes greater, and so the loss in the transformer is greater. This signifies a high frequency loss. There is one other loss which must be carefully considered in the design of an output transformer. This is copper loss which is approximately the same at all audio frequencies. If the winding resistances are not kept to the proper value, the current flowing through them will cause a loss which is dissipated in internal heat. This loss which occurs at all frequencies is usually designated as the insertion loss of the transformer. In the design of K-408 a core with a large cross-sectional area has been provided. This core is high permeability, low loss, silicon steel, so that the maximum loss at 30 cycles will not exceed 1/2 DB under full power output conditions. The coil structure is such that the loss due to leakage reactance does not exceed 1/2 DB at 15,000 cycles. The winding resistances are kept to such a point that the total insertion loss of the unit is less than 1 DB.



## SPECIAL APPLICATIONS

It is often found necessary to use a transformer for some purpose other than for which it was designed. The following examples are given to assist the audio engineer in estimating the probable frequency response under these conditions.

Suppose that it is necessary to couple push pull class AB 45's to a 1000 ohm load. The 1000 ohm load should be connected to the terminals rated for 500 ohms. This connection reflects a plate to plate load to the primary of twice the rated value. This will decrease the power output and the harmonic distortion. The low frequency response is also effected since it is governed by the shunting effect of primary reactance. Under normal conditions K-408 has sufficient primary reactance to cause a loss of  $\frac{1}{2}$  DB or less at 30 cycles. When the secondary load is doubled this shunting effect is also approximately doubled. From these considerations, it will be seen that the low frequency loss of K-408 will be approximately double that obtained under normal operation conditions, i.e.,  $\frac{1}{2}$  DB at 60 cycles and 1 DB at 30 cycles. The high frequency response is governed by the ratio of leakage reactance to secondary load impedance and generator impedance. Since the secondary load is doubled the ratio of leakage reactance to secondary load is cut in half. This indicates a high frequency loss of slightly less than  $\frac{1}{2}$  DB at 15,000 cycles.

Assume a case in which it is necessary to couple class AB 45's to a 25 ohm load. The 25 ohm load will be connected to the terminals rated for 50 ohms. This reflects a primary plate to plate load of only one-half the correct value for the output tubes. The result of this mis-match may be serious since it will cause an additional amount of distortion as well as a sacrifice in power output. The distortion may be kept down by limiting grid excitation. Since the secondary load has been cut in half, the shunting effect of primary reactance has also been decreased. The loss at 20 cycles would be approximately  $\frac{1}{2}$  DB. The high frequency response, however, will be impaired. Since the secondary load is cut in half the ratio of leakage reactance to secondary load impedance is doubled. This indicates that the response at the higher frequencies will suffer approximately twice as much as in the rated applications. The expected frequency response under these conditions will show a loss of approximately  $\frac{1}{2}$  DB at 7500 cycles and approximately 1 DB at 15,000 cycles.

## ELECTRICAL SPECIFICATIONS

The detailed electrical specifications provided below are supplied for the assistance of the audio engineer in the application of this transformer to practical audio frequency circuits.

**Frequency Response** —  $\pm \frac{1}{2}$  DB 30 to 15,000 cycles

The frequency response specifications illustrated will be maintained at any set of operating conditions within the limits set forth in these data.

**Primary Impedance** — 5000 or 3000 ohms

**Secondary Impedance** — 50, 125, 200 (balanced), 250, 333 and 500 (balanced) ohms.

**Max. Pri. D.C. Balanced/Leg** — 65 MA (static)  
70 MA (peak)

**Max. Pri. D.C. Unbalanced/Leg** — 5 MA

**Maximum Level** — + 35 DB

**Pri. Inductance** —

26 hy — 30 cycles 10 volts applied  
50 hy — 30 cycles 150 volts applied  
62 hy — 30 cycles 300 volts applied  
44 hy — 60 cycles 100 volts applied

The inductance figures given above have been determined with no polarizing D.C. in the coil and with an A.C. voltage applied to the coil of the frequency and potential specified.

Although transformer K-408 was designed primarily for operation in a balanced push pull output circuit it can be used with fair results to couple from a single tube requiring a plate load of 3000 or 5000 ohms, e.g., working out of a single 43, pentode connected, the response at 60 cycles will be down 1 DB. The high frequency response will be the same as for the push pull application. The figures given below represent the inductance of the total primary of this transformer with various values of polarizing D.C. in the coil.

22 hy — 20 MA — 60 cycles — 100 volts applied  
18 hy — 30 MA — 60 cycles — 100 volts applied  
13 hy — 40 MA — 60 cycles — 100 volts applied

**Coil Structure** — Interleaved sections balanced for inductance, capacity and resistance

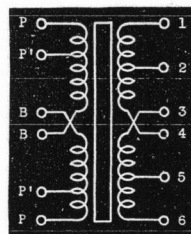
**Primary D.C. Resistance** — 200 ohms (total)

**Secondary D.C. Resistance** — 27 ohms (total)

**Core Material** — Low-loss high-permeability silicon steel

**Electromagnetic Shielding** — High permeability cast case protects the transformer from the effects of pickup from stray electromagnetic and electrostatic fields.

**Terminal Arrangement**



**PRIMARY TERMINALS:**

Plates (5000 ohms plate to plate load) — P — P'

Plates (3000 ohms plate to plate load) — P' — P'

B + — join B to B

**SECONDARY TERMINALS:**

50 ohms — connect to 2 and 5, join 2 to 3 and 4 to 5

125 ohms — connect to 1 and 6, join 1 to 3 and 4 to 6

200 ohms — connect to 2 and 5, join 3 to 4

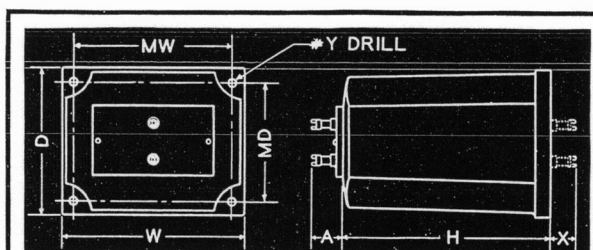
250 ohms — connect to 1 and 6, join 2 to 3

333 ohms — connect to 1 and 5, join 3 to 4

500 ohms — connect to 1 and 6, join 3 to 4

## MECHANICAL SPECIFICATIONS

Transformer K-408 can be supplied "top mounting" (with terminal lugs on top of case) or "bottom mounting" (with terminal lugs on bottom of case). **TOP MOUNTING UNITS WILL BE SUPPLIED UNLESS OTHERWISE SPECIFIED.**



Type No. .... K-408

Casting Type.....T2

Approx. Weight.....6 $\frac{1}{4}$  Lbs.

| Designation | H                 | W  | D                 | MW                | MD                | A               | X                | Y  |
|-------------|-------------------|----|-------------------|-------------------|-------------------|-----------------|------------------|----|
| Dimension   | 4 $\frac{1}{8}$ " | 4" | 3 $\frac{3}{8}$ " | 3 $\frac{1}{2}$ " | 2 $\frac{3}{8}$ " | $\frac{1}{2}$ " | $\frac{5}{16}$ " | 13 |

## GUARANTY AND CONDITIONS

We have made every effort to make our operating instructions and performance characteristics clear, concise and free of ambiguities. We unconditionally guarantee this unit to be exactly as we have represented it. Any unit not in accordance with our specifications, or defective due to material or manufacturing causes, will be repaired or replaced without charge. All material returned to this factory for inspection, repair, or replacement must be shipped prepaid. This guaranty is effective for a period of five years from date of purchase.

Kenyon products are subject to continual laboratory test with resultant performance and production refinements. We accept your order with the understanding that we are authorized to furnish a revised type if the unit ordered has been discontinued.

**KENYON TRANSFORMER Co., Inc.**  
840 Barry Street      ::      ::      New York City

Export Department:  
25 Warren Street  
New York, N. Y.

Cable Address:  
SIMONTRICE-NEW YORK



# KENYON

TYPE K-409

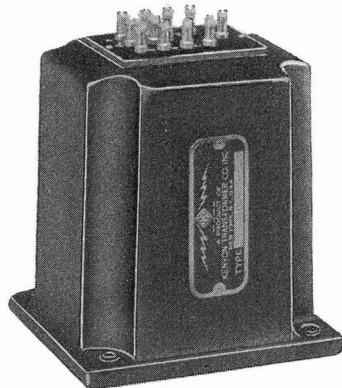
## GENERAL APPLICATIONS

Transformer K-409 has been designed to couple push-pull plates requiring a plate load of 5000 or 3000 ohms to a voice coil line. The 5000 ohm primary is intended to operate from push-pull type 2A3, 6A3, or 45 tubes operated class AB self biased or from push-pull type 45 or 6L6 tubes operated class A. The 3000 ohm primary is designed to work out of 2A3, 6A3 or 45 tubes operated class AB fixed bias. The

secondary is provided with the Kenyon Multiple Voice Coil Line which provides for terminations of 1.8 to 15 ohms.

## ELECTROSTATIC AND ELECTROMAGNETIC SHIELDING

Electrostatic shielding between windings is not necessary in an output transformer operating at a high audio level. Longitudinal interference pickup is amplified but little in a unit of this type. Interstage coupling—crosstalk—between the output transformer and any of the other audio transformers in the amplifier is eliminated by cast high-permeability housing. Electromagnetic shielding of 18 DB is provided by this case.



Top Mounting

Electromagnetic shielding of 18 DB is provided by this case.

## DESIGN CONSIDERATIONS

We believe that an understanding of the fundamental design considerations associated with all output transformers is necessary to the audio engineer who selects and uses them. We are therefore presenting the following data for his guidance and information: An understanding of what happens in an output transformer under actual operating conditions can be seen most clearly by drawing a simplified equivalent diagram of the transformer. We will now proceed with a word picture of the diagram. For the sake of simplicity let us consider the case of class A output tubes, 45's for example. The plate resistance of each tube is 1700 ohms, so the total is 3400 ohms. The turns ratio of the transformer is such that with any rated secondary load, the reflected primary load is 5000 ohms.

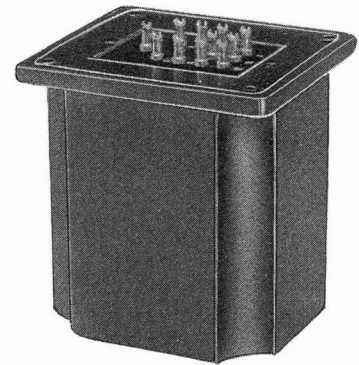
This may be drawn as a generator with zero impedance having a resistor of 3400 ohms in series with it. Any drop occurring across this resistor is not available as output voltage. The transformer primary is then connected to one side to the zero impedance generator, and the other side to the 3400 ohms. The primary of this transformer may be drawn as an induct-

## LABORATORY STANDARD » » » Output Transformer

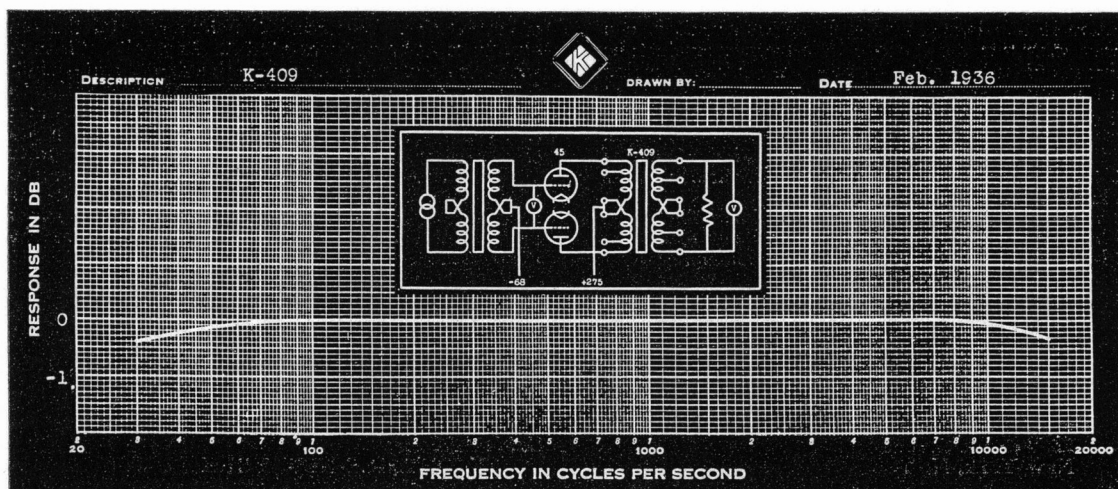
List Price . . . \$18.00

ance shunted across the line in parallel with a resistance shunted across the line. As the frequency decreases the reactance of this inductance decreases. When this reactance becomes of a value of the order of 5000 ohms, current flows through it (exciting current) which causes a drop in the generator impedance. As this condition exists only at the lower frequencies, it may be considered as a low frequency loss.

The other low frequency loss is represented by the resistor which we placed in parallel with the primary inductance. This resistor represents the core loss of the transformer. As frequency decreases (applied voltage remaining constant) the A.C. flux density in the core of the transformer increases. As the flux density increases the core loss increases. Thus at the low frequencies the resistor shown on the schematic diagram will be decreased, drawing additional current from the generator and causing an additional power loss in the transformer which is not available for transfer to the secondary but which is dissipated as internal heat. Leakage reactance which controls high frequency response would appear as a small reactor in series between the secondary load impedance and the generator. The reactance of this branch of the circuit will increase directly as frequency increases. Any current flowing to the load will therefore cause a drop in voltage across this reactance. As the reactance becomes higher, the drop becomes greater, and so the loss in the transformer is greater. This signifies a high frequency loss. There is one other loss which must be carefully considered in the design of an output transformer. This is copper loss which is approximately the same at all audio frequencies. If the winding resistances are not kept to the proper value, the current flowing through them will cause a loss which is dissipated in internal heat. This loss which occurs at all frequencies is usually designated as the insertion loss of the transformer. In the design of K-409 a core with a large cross-sectional area has been provided. This core is high permeability, low loss, silicon steel, so that the maximum loss at 30 cycles will not exceed 1/2 DB under full power output conditions. The coil structure is such that the loss due to leakage reactance does not exceed 1/2 DB at 15,000 cycles. The winding resistances are kept to such a point that the total insertion loss of the unit is less than 1 DB.



Bottom Mounting





## SPECIAL APPLICATIONS

The following examples of special applications are given for the assistance of the audio engineer in estimating the frequency response characteristics of this unit when used in circuits other than those listed.

Suppose it is necessary to couple push-pull class AB 45's to a 30 ohm load. The 30 ohm load should be connected to the terminals rated for 15 ohms. This connection reflects a plate to plate load of twice the load recommended for the tubes. This will result in a decrease in power output and harmonic content. The low frequency response is governed by the relation of transformer primary reactance to load impedance and generator impedance. If the primary reactance is low it acts as a shunt across the generator, thus decreasing the power output. Since in this case the secondary load has been doubled, the relative shunting effect of primary reactance will be increased. This indicates a low frequency loss of approximately  $\frac{1}{2}$  DB at 60 cycles and 1 DB at 30 cycles. Since the secondary load is doubled the ratio of leakage reactance to secondary load is cut in half. The voltage lost across the leakage reactance is therefore decreased — the high frequency response has been improved. The response at 15,000 cycles will suffer by slightly less than  $\frac{1}{2}$  DB.

Assume a case in which it is necessary to couple class AB 45's to a 1 ohm load. The one ohm load should be connected to the terminals rated for 1.8 ohms. This reflects a plate to plate load to the primary of only  $\frac{1}{2}$  the rated value for the output tubes. This mismatch will reduce the power output of the tubes and increase the distortion. The distortion may be kept down by limiting the grid excitation. Since the secondary load has been cut in half, the shunting effect of primary reactance will be decreased. This indicates an improved low frequency response with a loss of less than  $\frac{1}{2}$  DB at 30 cycles and a loss of approximately  $\frac{1}{2}$  DB at 15 cycles. On the other hand, the high frequency response will be impaired. Since the secondary load is cut in half, the ratio of leakage reactance to secondary load impedance is doubled. The voltage lost in leakage reactance will also be doubled. The frequency response under these conditions will be down approximately  $\frac{1}{2}$  DB at 7500 cycles and approximately 1 DB at 15,000 cycles.

## ELECTRICAL SPECIFICATIONS

The detailed electrical specifications provided below are supplied for the assistance of the audio engineer in the application of this transformer in practical audio frequency circuits.

**Frequency Response** —  $\pm \frac{1}{2}$  DB 30 to 15,000 cycles

The frequency response characteristics illustrated will be maintained at any set of operating conditions within the limits set forth in these data.

**Primary Impedance** — 5000 or 3000 ohms

**Secondary Impedance** — 1.8, 3.75, 6.8, 7.5 (balanced), 11 or 15 (balanced) ohms

**Max. Pri. D.C. Balance/Leg** — 65 MA (static)  
70 MA (peak)

**Max. Pri. D.C. Unbalance/Leg** — 5 MA

**Maximum Level** — + 35 DB

**Pri. Inductance** —

26 hy — 30 cycles — 10 volts applied  
50 hy — 30 cycles — 150 volts applied  
62 hy — 30 cycles — 300 volts applied  
44 hy — 60 cycles — 100 volts applied

All inductance figures given above have been determined with no polarizing D.C. in the coil and with an A.C. voltage applied to the coil of the frequency and potential specified.

Although transformer K-409 was designed primarily for operation in a balanced push-pull output circuit it can be used with fair results to couple from a single tube requiring a plate load of 3000 or 5000 ohms, e.g., working out of a single 43 pentode connected the response at 60 cycles will be down 1 DB. The high frequency response will be the same as for the push-pull application. The figures given below represent the inductance of the total primary of this transformer with various values of polarizing D.C. in the coil.

22 hy — 20 MA — 60 cycles — 100 volts applied  
18 hy — 30 MA — 60 cycles — 100 volts applied  
13 hy — 40 MA — 60 cycles — 100 volts applied

**Coil Structure** — Interleaved sections balanced for inductance, capacity and resistance

**Primary D.C. Resistance** — 210 ohms (total)

**Secondary D.C. Resistance** — .35 ohms (total)

**Core Material** — Low-loss high-permeability silicon-steel

**Electromagnetic Shielding** — High-permeability cast case protects the transformer from the effects of pickup from stray electromagnetic and electrostatic fields

## Terminal Arrangement

### PRIMARY TERMINALS:

Plates (5000 pl. to pl. load) —  
P — P

Plates (3000 pl. to pl. load) —  
P' — P'

B + — Join B and B

### SECONDARY TERMINALS:

15 ohms — connect to A and F,  
join C to D

11 ohms — connect to A and E,  
join C to D

7.5 ohms — connect to B and E,  
join C to D

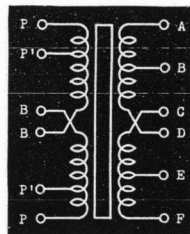
6.8 ohms — connect to A and F,  
join B to C

3.75 ohms — connect to A and F,  
join A to C

1.8 ohms — connect to B and E,  
join D to F

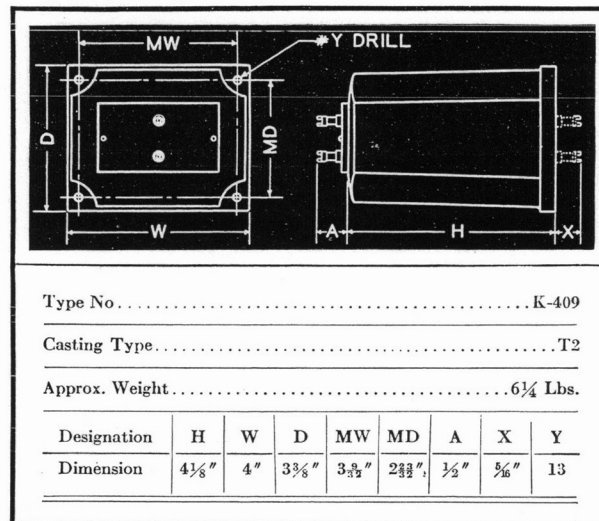
1.8 ohms — connect to B and E,  
join B to C

1.8 ohms — connect to B and E,  
join D to E



## MECHANICAL SPECIFICATIONS

Transformer K-409 can be supplied "top mounting" (with terminal lugs on top of case) or "bottom mounting" (with terminal lugs on bottom of case). TOP MOUNTING UNITS WILL BE SUPPLIED UNLESS OTHERWISE SPECIFIED.



## GUARANTY AND CONDITIONS

We have made every effort to make our operating instructions and performance characteristics clear, concise, and free of ambiguities. We unconditionally guarantee this unit to be exactly as we have represented it. Any unit not in accordance with our specifications, or defective due to material or manufacturing causes, will be repaired or replaced without charge. All material returned to this factory for inspection, repair, or replacement must be shipped prepaid. This guaranty is effective for a period of five years from date of purchase.

Kenyon products are subject to continual laboratory test with resultant performance and production refinements. We accept your order with the understanding that we are authorized to furnish a revised type if the unit ordered has been discontinued.

**KENYON TRANSFORMER Co., Inc.**

**840 Barry Street**

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**New York City**

**Export Department:**

**25 Warren Street**

**New York, N. Y.**

**Cable Address:**

**SIMONTRICE-NEW YORK**



# K E N Y O N

## TYPE K-414

### GENERAL APPLICATIONS

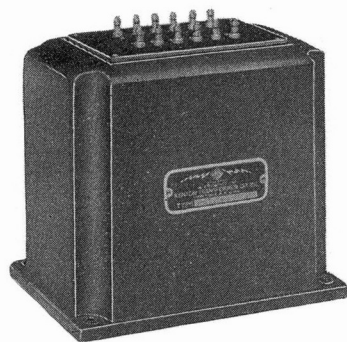
Transformer K-414 was designed to work out of push pull 6L6 tubes operated under the following conditions:

The total winding is a match for the 26.5 watt class AB (no grid current) condition that requires an 8500 ohm plate to plate load. There are two taps so arranged as to give a balanced winding for the 20 watt class AB (no grid current) condition that requires a 6000 ohm plate to plate load. The

secondary is the Kenyon Multiple Line which offers a range of impedance terminations from 50 to 500 ohms.

### ELECTROSTATIC AND ELECTROMAGNETIC SHIELDING

The amount of gain succeeding a unit of this type is never very great. For this reason it has been deemed unnecessary to provide electrostatic shielding between primary and



Top Mounting

secondary. Electromagnetic pickup or cross talk might prove serious in a unit operating at this level. To eliminate any such effects the unit is encased in a high permeability casting which reduces electromagnetic pickup by 18 DB.

### DESIGN CONSIDERATIONS

One of the greatest advantages of the new 6L6 tube is the low distortion content of the power output. In order to realize this advantage, the output transformer must be designed to present the exact plate to plate load recommended for the various operating conditions. Impedance terminations to match any one of the various output conditions will be found in this group of transformers presented by Kenyon.

One of the primary considerations in the design of an output transformer to handle levels as high as 26.5 watts is the provision of ample copper area for full power output. While the maximum primary current of this unit will not exceed 80 or 90 milliamperes the current flowing in the lowest impedance tap of the secondary may be many times this. If sufficiently large wire is not used in the secondary, the losses occurring in the windings will impair the efficiency of the unit to a great extent. Copper loss impairs efficiency at all frequencies.

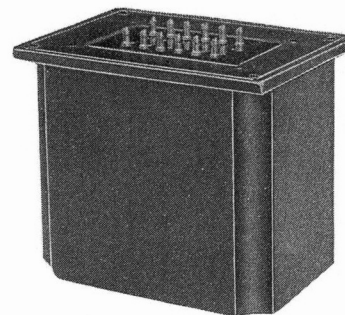
Low frequency response in an output transformer is determined by core loss and primary inductance. As an illustration of the effect of core loss let us look at an output transformer whose core weighs 8 lbs. with a flux density of such a value that the core loss is 1 watt per lb. Under these conditions if the input power to the transformer were 26½ watts, the output would be only 18½ watts. This shows an efficiency of 70%

## LABORATORY STANDARD » » » Output Transformer

List Price . . . \$25.00

or a low frequency loss of 1½ DB. To eliminate any such losses as this, the cross sectional area of the core has been kept large, and high permeability low loss silicon steel is used as the core material. In a properly designed output transformer if A.C. flux densities are kept to a point where core loss is not excessive, there is always sufficient primary inductance to insure good low frequency response. For this reason silicon steel instead of high permeability alloy steel is used as the core material. The losses in high permeability steels are not greatly less than those in high grade silicon steels; the great advantage of the former being high permeability. Since the additional primary inductance obtainable with this high permeability is not necessary, the use of the more expensive alloy is not justified.

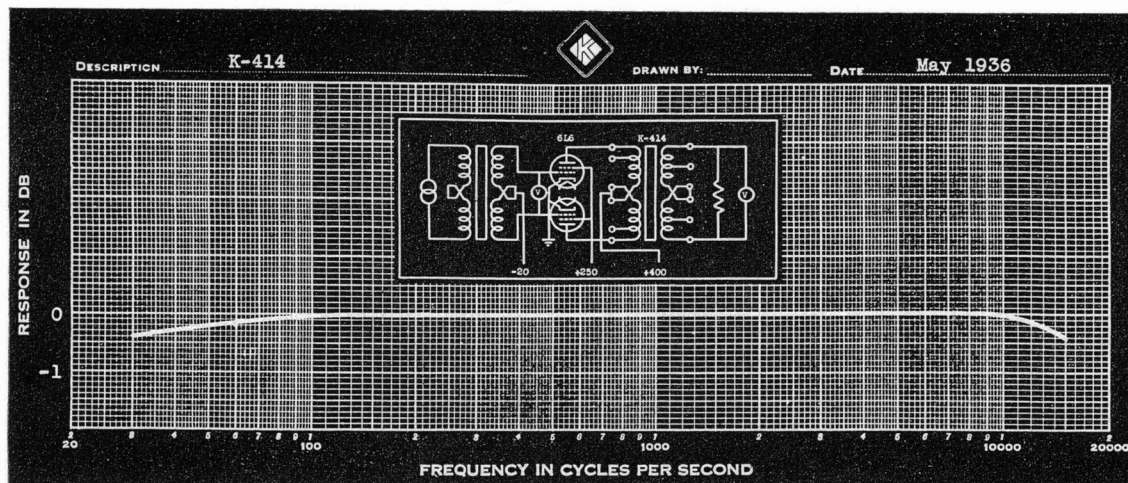
The governing factor of high frequency response is leakage reactance. Leakage reactance acts like a small choke coil in series between primary and secondary. The impedance of this choke coil increases directly with frequency. At the higher frequencies the voltage loss across it will be greatest. The ratio of the impedance of this choke coil to generator impedance and load impedance determines the amount of loss. By proper coil design this value has been kept to such a point that the maximum high frequency loss in K-414 is ½ DB at 15,000 cycles.



Bottom Mounting

### SPECIAL APPLICATIONS

It is often necessary to use a transformer for some application other than that for which it was designed. To assist the audio engineer in estimating the probable frequency response under these conditions the following examples are given: Let us suppose it is necessary to couple push pull 6L6 tubes to a 1000 ohm load. If the secondary load is doubled in impedance, the impedance of the reflected primary load is also doubled. This means that the 6L6 tubes would be working into a load twice as great as recommended. The result of this will be an increase in harmonic content. The only way to keep this harmonic content to a point where it is not objectionable, is to limit the amount of grid excitation. When the secondary load is doubled, we must consider the shunting effect of primary inductance to determine what the low frequency response will be. When the primary inductance of a transformer is too low, it acts like a shunting load on the generator. This causes current to flow through the primary of the transformer which cannot be utilized for power transfer to the secondary. The degree to which this effect occurs is governed



by the ratio of primary reactance (that is  $2\pi \times f \times L_p$ ) to generator impedance and load impedance. In this case generator impedance remains the same but load impedance has been doubled so we must consider that the shunting effect of primary reactance has been doubled also. This primary reactance as may be seen from the preceding formula is directly proportional to frequency. Since the reactance is only  $\frac{1}{2}$  as great as necessary to insure rated frequency response at 30 cycles, it will be of the correct value to insure  $\frac{1}{2}$  DB loss at 60 cycles. The probable loss at 30 cycles would be 1 DB.

As previously stated, high frequency response is governed by the ratio of leakage reactance to generator impedance and secondary load impedance. Since the secondary load has been doubled the ratio of leakage reactance to secondary load has been cut in half. This indicates that the frequency response will be better than rated at 15,000 cycles, the loss being slightly under  $\frac{1}{2}$  DB.

Now let us look at the case where it is desired to couple push pull 6L6 tubes to a 25 ohm load. The 25 ohm load would be connected to the terminals rated for 50 ohms. This connection reflects a primary load of  $\frac{1}{2}$  the recommended value. When this occurs the power output will be decreased and harmonic content will be decreased also. Since generator impedance remains the same and secondary load is cut in half, the ratio of primary reactance to generator impedance and secondary load is increased. This indicates that low frequency response will be improved. The loss at 30 cycles will be less than  $\frac{1}{2}$  DB and the response characteristic will continue flat on down to about 20 cycles. Since the load impedance has been cut in half the ratio of leakage reactance to load impedance has been doubled. This indicates that the effect of leakage reactance on the high frequencies will be increased. The probable loss will be  $\frac{1}{2}$  DB at 7500 cycles and 1 DB at 15000 cycles.

## ELECTRICAL SPECIFICATIONS

The detailed electrical specifications provided below are supplied for the assistance of the audio engineer in the application of this transformer in practical audio frequency circuits.

**Frequency Response** —  $\pm \frac{1}{2}$  DB 30 to 15,000 cycles

The frequency response characteristic illustrated will be maintained at any set of operating conditions within the limits set forth in these data.

**Primary Impedance** — 6000 or 8500 ohms (pl. to pl.)

**Secondary Impedance** — 50, 125, 200 (balanced)  
250, 333 or 500 (balanced) ohms

**Max. Pri. D.C. Balanced/Leg** — 70 MA (peak)  
55 MA (static)

**Max. Pri. D.C. Unbalanced/Leg** — 7 MA

**Max. Level** — + 36.5

**Pri. Inductance** —  
60 hy — 10 V 60 cycles applied  
130 hy — 100 V 60 cycles applied  
200 hy — 250 V 60 cycles applied

The inductance figures given above are based on no polarizing D.C. in the coil and with an A.C. voltage applied to the coil of the frequency and potential specified.

**Coil Structure** — Interleaved sections balanced for inductance, capacity and resistance

**Primary D.C. Resistance** — 360 ohms (total)

**Secondary D.C. Resistance** — 30 ohms (total)

**Core Material** — Low-loss high-permeability silicon steel

**Electromagnetic Shielding** — High-permeability casting protects transformers from the effect of pickup from stray electromagnetic and electrostatic fields

## Terminal Arrangement —

### PRIMARY TERMINALS

Plates — (8500 ohm pl. to pl. load) —

P — P

Plates — (6000 ohm pl. to pl. load) —

P' — P'

B + — Join B — B

### SECONDARY TERMINALS

50 ohms — connect to 2 and 5,

join 2 to 3 and 4 to 5

125 ohms — connect to 1 and 6,

join 1 to 3 and 4 to 6

200 ohms — connect to 2 and 5,

join 3 to 4

250 ohms — connect to 1 and 6,

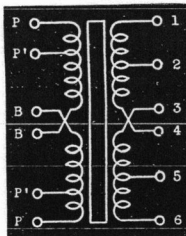
join 2 to 3

333 ohms — connect to 1 and 5,

join 3 to 4

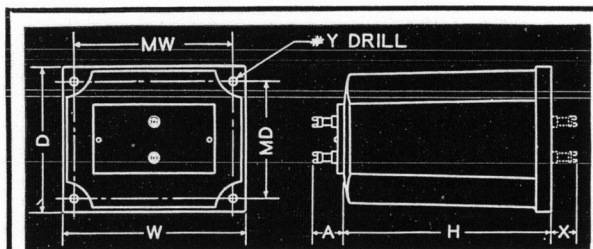
500 ohms — connect to 1 and 6,

join 3 to 4



## MECHANICAL SPECIFICATIONS

Transformer K-414 can be supplied "top mounting" (with terminal lugs on top of case) or "bottom mounting" (with terminal lugs on bottom of case). TOP MOUNTING UNITS WILL BE SUPPLIED UNLESS OTHERWISE SPECIFIED.



Type No. .... K-414

Casting Type. .... T3

Net Weight ..... 12 Lbs.

| Designation | H                 | W                 | D  | MW                | MD                | A                 | X                | Y  |
|-------------|-------------------|-------------------|----|-------------------|-------------------|-------------------|------------------|----|
| Dimension   | 4 $\frac{5}{8}$ " | 5 $\frac{3}{8}$ " | 4" | 4 $\frac{1}{2}$ " | 3 $\frac{3}{8}$ " | 1 $\frac{1}{2}$ " | $\frac{5}{16}$ " | 13 |

## GUARANTY AND CONDITIONS

We have made every effort to make our operating instructions and performance characteristics clear, concise, and free of ambiguities. We unconditionally guarantee this unit to be exactly as we have represented it. Any unit not in accordance with our specifications, or defective due to material or manufacturing causes, will be repaired or replaced without charge. All material returned to this factory for inspection, repair or replacement must be shipped prepaid. This guaranty is effective for a period of five years from date of purchase.

Kenyon products are subject to continual laboratory test with resultant performance and production refinements. We accept your order with the understanding that we are authorized to furnish a revised type if the unit ordered has been discontinued.

**KENYON TRANSFORMER Co., Inc.**

**840 Barry Street**

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**New York City**

**Export Department:**  
25 Warren Street  
New York, N. Y.

**Cable Address:**  
SIMONTRICE-NEW YORK





# K E N Y O N

## TYPE K-415

### GENERAL APPLICATIONS

Transformer K-415 was designed to work out of push pull 6L6 tubes operated under the following conditions:

The total winding is a match for the 26.5 watt Class AB (no grid current) condition that requires an 8500 ohm plate to plate load. There are two taps so arranged as to give a balanced winding for the 20 watt class AB (no grid current) condition that requires a 6000 ohm plate to plate load. The

secondary is a Multiple Voice Coil Line which provides a range of impedance terminations from 1.8 to 15 ohms.

### ELECTROSTATIC AND ELECTROMAGNETIC SHIELDING

The amount of gain succeeding a unit of this type is never very great. For this reason it has been deemed unnecessary to provide electrostatic shielding between primary and

secondary. Electromagnetic pickup or cross talk might prove serious in a unit operating at this level. To eliminate any such effects the unit is encased in a high permeability casting which reduces electromagnetic pickup by 18 DB.

### DESIGN CONSIDERATIONS

One of the greatest advantages of the new 6L6 tube is the low distortion content of the power output. In order to realize this full advantage, the output transformer must be designed to present the exact plate to plate load recommended for the various operating conditions. Impedance terminations to match exactly any one of the various output conditions will be found in this group of transformers presented by Kenyon.

One of the primary considerations in the design of an output transformer to handle levels as high as 26.5 watts is the provision of ample copper area for full power output. While the maximum primary current of this unit will not exceed 80 or 90 milliamperes the current flowing in the lowest impedance tap of the secondary may be many times this. If sufficiently large wire is not used in both primary and secondary, the losses occurring in the windings will impair the efficiency of the unit to a great extent. Copper loss impairs efficiency at all frequencies.

Low frequency response in an output transformer is determined by core loss and primary inductance. As an illustration of the effect of core loss let us look at an output transformer whose core weighs 8 lbs. with a flux density of such a value that the core loss is 1 watt per lb. Under these conditions if

## LABORATORY STANDARD » » » Output Transformer

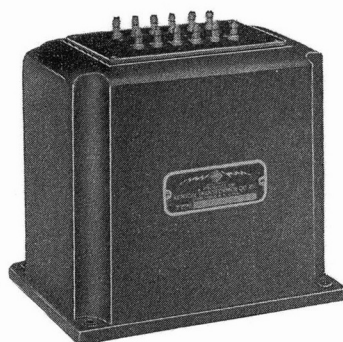
List Price . . . \$25.00

the input power to the transformer were 26.5 watts, the output would be only 18.5 watts. This shows an efficiency of 70% or a low frequency loss of 1½ DB. To eliminate any such losses as this, the cross sectional area of the core has been kept large, and high permeability low loss silicon steel is used as the core material. In a properly designed output transformer if A.C. flux densities are kept to a point where core loss is not excessive, there is always sufficient primary inductance to insure good low frequency response. For this reason silicon steel instead of high permeability alloy steel is used as the core material. The losses in high permeability steels are not greatly less than those in high grade silicon steels; the great advantage of the former being high permeability. Since the additional primary inductance obtainable with this high permeability is not necessary, the use of the more expensive alloy is not justified.

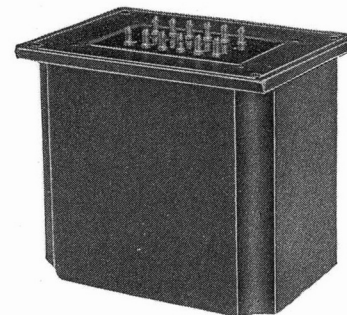
The governing factor of high frequency response is leakage reactance. Leakage reactance acts like a small choke coil in series between primary and secondary. The impedance of this choke coil increases directly with frequency. At the higher frequencies the voltage loss across it will be greatest. The ratio of the impedance of this choke coil to generator impedance and load impedance determines the amount of loss. By proper coil design this value has been kept to such a point that the maximum high frequency loss in K-415 is ½ DB at 15,000 cycles.

### SPECIAL APPLICATIONS

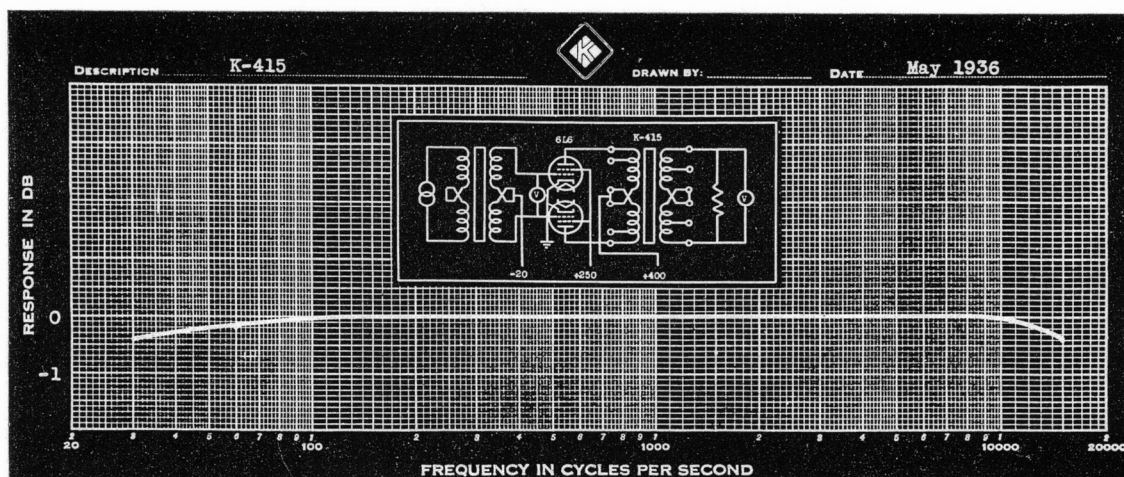
It is often necessary to use a transformer for some application other than that for which it was designed. To assist the audio engineer in estimating the probable frequency response under these conditions the following examples are given: Let us suppose it is necessary to couple push pull 6L6 tubes to a 30 ohm load. If the secondary load is doubled in impedance, the impedance of the reflected primary load is doubled also. This means that the 6L6 tubes would be working into a load twice as great as recommended. The result of this will be an increase in harmonic content. The only way to keep this harmonic content to a point where it is not objectionable, is to limit the amount of grid excitation. When the secondary load is doubled, we must consider the shunting effect of primary inductance to determine what the low frequency response will be. When the primary inductance of a transformer is too low, it acts like a shunt load on the generator. This causes current to flow through the primary



Top Mounting



Bottom Mounting



of the transformer which cannot be utilized for power transfer to the secondary. The degree to which this effect occurs is governed by the ratio of primary reactance (that is  $2\pi \times f \times L_p$ ) to generator impedance and load impedance. In this case generator impedance remains the same but load impedance has been doubled so we must consider that the shunting effect of primary reactance has been doubled also. This primary reactance as may be seen from the preceding formula is directly proportional to frequency. Since the reactance is only  $\frac{1}{2}$  as great as necessary to insure rated frequency response at 30 cycles, it will be of the correct value to insure  $\frac{1}{2}$  DB loss at 60 cycles. The probable loss at 30 cycles would be 1 DB.

As previously stated, high frequency response is governed by the ratio of leakage reactance to generator impedance and secondary load impedance. Since secondary load has been doubled the ratio of leakage reactance to secondary load has been cut in half. This indicates that the frequency response will be better than rated at 15,000 cycles the loss being slightly under  $\frac{1}{2}$  DB.

Now let us look at the case where it is desired to couple push pull 6L6 tubes to a 1 ohm load. The 1 ohm load would be connected to the terminals rated for 1.8 ohms. This connection reflects a primary load of  $\frac{1}{2}$  the recommended value. When this occurs the power output will be decreased and harmonic content will be decreased also. Since generator impedance remains the same and secondary load is cut in half, the ratio of primary reactance to generator impedance and secondary load is increased. This indicates that low frequency response will be greatly improved. The loss at 30 cycles will be less than  $\frac{1}{2}$  DB and the response characteristic will continue flat on down to about 20 cycles. Since the load impedance has been cut in half the ratio of leakage reactance to load impedance has been doubled. This indicates that the effect of leakage reactance on the high frequencies will be increased. The probable loss will be  $\frac{1}{2}$  DB at 7500 cycles and 1 DB at 15000 cycles.

## ELECTRICAL SPECIFICATIONS

The detailed electrical specifications provided below are supplied for the assistance of the audio engineer in the application of this transformer in practical audio frequency circuits.

**Frequency Response** —  $\pm \frac{1}{2}$  DB 30 to 15,000 cycles

The frequency response characteristic illustrated will be maintained at any set of operating conditions within the limits set forth in these data.

**Primary Impedance** — 6000 or 8500 ohms  
(Pl. to Pl.)

**Secondary Impedance** — 1.8, 3.75, 6.8, 7.5 (balanced)  
11 or 15 (balanced) ohms

**Max. Pri. D.C. Balanced/Leg** — 70 MA (peak)  
55 MA (static)

**Max. Pri. D.C. Unbalanced/Leg** — 7 MA

**Max. Level** — + 36.5 D.B.

**Pri. Inductance** —

60 hy — 10 V 60 cycles applied  
130 hy — 100 V 60 cycles applied  
200 hy — 250 V 60 cycles applied

The inductance figures given above are based on no polarizing D.C. in the coil and an A.C. voltage applied to the coil of the frequency and potential specified.

**Coil Structure** — Interleaved sections balanced for inductance, capacity and resistance.

**Primary D.C. Resistance** — 360 ohms (total)

**Secondary D.C. Resistance** — .9 ohms (total)

**Core Material** — Low-loss high-permeability silicon steel

**Electromagnetic Shielding** — High-permeability cast case protects transformer from the effects of pickup from stray electromagnetic and electrostatic fields.

## Terminal Arrangement —

### PRIMARY TERMINALS

Plates — (8500 ohm pl. to pl. load) —

P — P

Plates — (6000 ohm pl. to pl. load) —

P' — P'

B + — B — B

### SECONDARY TERMINALS

15 ohms — connect to A and F,  
join C to D

11 ohms — connect to A and E,  
join C to D

7.5 ohms — connect to B and E,  
join C to D

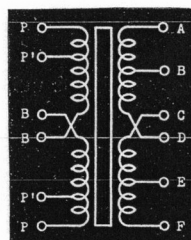
6.8 ohms — connect to A and F,  
join B to C

3.75 ohms — connect to A and F,  
join A to C

1.8 ohms — connect to B and E,  
join D to F

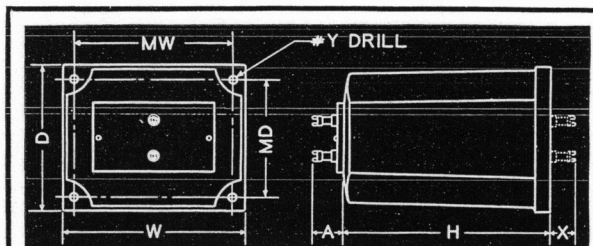
1.8 ohms — connect to B and E,  
join B to C

1.8 ohms — connect to B and E,  
join D to E



## MECHANICAL SPECIFICATIONS

Transformer K-415 can be supplied "top mounting" (with terminal lugs on top of case) or "bottom mounting" (with terminal lugs on bottom of case). TOP MOUNTING UNITS WILL BE SUPPLIED UNLESS OTHERWISE SPECIFIED.



Type No. .... K-415

Casting Type. .... T3

Net Weight ..... 12 Lbs.

| Designation | H                 | W                 | D  | MW                | MD                | A                 | X                 | Y  |
|-------------|-------------------|-------------------|----|-------------------|-------------------|-------------------|-------------------|----|
| Dimension   | 4 $\frac{5}{8}$ " | 5 $\frac{3}{8}$ " | 4" | 4 $\frac{1}{2}$ " | 3 $\frac{3}{8}$ " | 1 $\frac{1}{2}$ " | 5 $\frac{1}{8}$ " | 13 |

## GUARANTY AND CONDITIONS

We have made every effort to make our operating instructions and performance characteristics clear, concise, and free of ambiguities. We unconditionally guarantee this unit to be exactly as we have represented it. Any unit not in accordance with our specifications, or defective due to material or manufacturing causes, will be repaired or replaced without charge. All material returned to this factory for inspection, repair or replacement must be shipped prepaid. This guaranty is effective for a period of five years from date of purchase.

Kenyon products are subject to continual laboratory test with resultant performance and production refinements. We accept your order with the understanding that we are authorized to furnish a revised type if the unit ordered has been discontinued.

**KENYON TRANSFORMER Co., Inc.**  
840 Barry Street :: :: New York City

Export Department:  
25 Warren Street  
New York, N. Y.

Cable Address:  
SIMONTRICE-NEW YORK



# KENYON

## TYPE K-416

### GENERAL APPLICATIONS

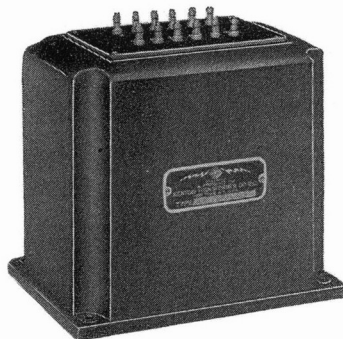
Transformer K-416 was designed to work out of push pull 6L6 tubes operated under the following conditions:

The total winding is a match for the 34 watt class AB (no grid current) condition that requires a 6600 ohm plate to plate load. There are two taps so arranged as to give a balanced winding for the 23 watt class AB (no grid current) condition that requires a 3800 ohm plate to plate load. The

secondary is the Kenyon Multiple Line which provides a range of impedance terminations from 50 to 500 ohms.

### ELECTROSTATIC AND ELECTROMAGNETIC SHIELDING

The amount of gain succeeding a unit of this type is never very great. For this reason it has been deemed unnecessary to provide electrostatic shielding between primary and



Top Mounting

secondary. Electromagnetic pickup or cross talk might prove serious in a unit operating at this level. To eliminate any such effects the unit is encased in a high permeability casting which reduces electromagnetic pickup by 18 DB.

### DESIGN CONSIDERATIONS

One of the greatest advantages of the new 6L6 tube is the low distortion content of the power output. In order to realize this full advantage, the output transformer must be designed to present the exact plate to plate load recommended for the various operating conditions. Impedance terminations to match exactly any one of the various output conditions will be found in this group of transformers presented by Kenyon.

One of the primary considerations in the design of an output transformer to handle levels as high as this is the provision of ample copper area for full power output. While the maximum primary current of this unit will not exceed 85 milliamperes the current flowing in the lowest impedance tap of the secondary may be many times this. If sufficiently large wire is not used in both primary and secondary, the losses occurring in the windings will impair the efficiency of the unit to a great extent. Copper loss impairs efficiency at all frequencies.

Low frequency response in an output transformer is determined by core loss and primary inductance. As an illustration of the effect of core loss let us look at an output transformer whose core weighs 8 lbs. with a flux density of such a value that the core loss is 1 watt per lb. Under these conditions if the input power to the transformer were 34 watts, the output would be only 26 watts. This shows an efficiency of 75%

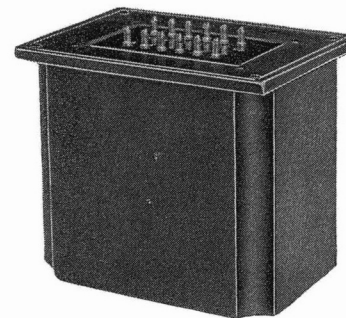
## LABORATORY STANDARD

## » » » Output Transformer

List Price . . . \$25.00

or a low frequency loss of  $1\frac{1}{2}$  DB. To eliminate any such losses as this, the cross sectional area of the core has been kept large, and high permeability low loss silicon steel is used as the core material. In a properly designed output transformer if A.C. flux densities are kept to a point where core loss is not excessive, there is always sufficient primary inductance to insure good low frequency response. For this reason silicon steel instead of high permeability alloy steel is used as the core material. The losses in high permeability steels are not greatly less than those in high grade silicon steels; the great advantage of the former being high permeability. Since the additional primary inductance obtainable with this high permeability is not necessary, the use of the more expensive alloy is not justified.

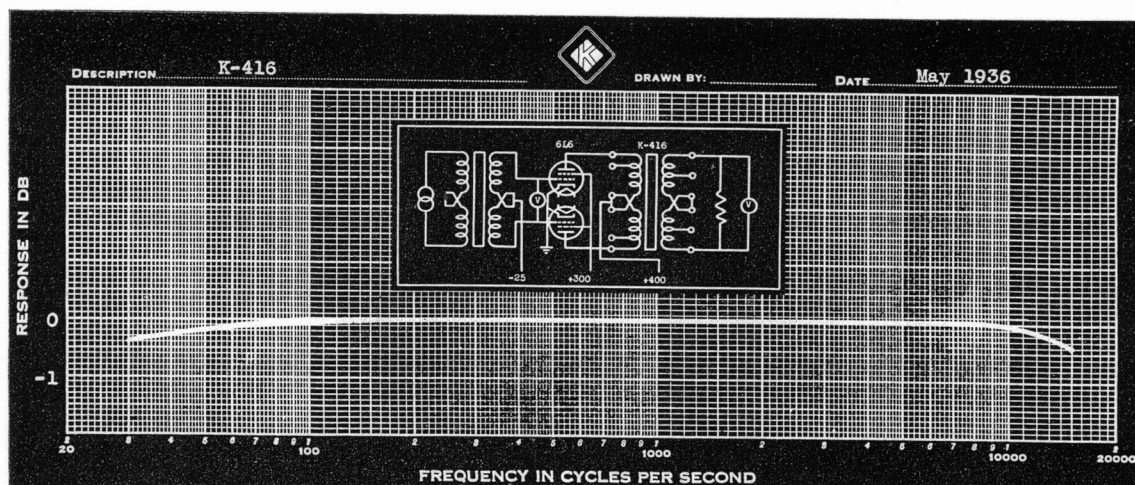
The governing factor of high frequency response is leakage reactance. Leakage reactance acts like a small choke coil in series between primary and secondary. The impedance of this choke coil increases directly with frequency. At the higher frequencies the voltage loss across it will be greatest. The ratio of the impedance of this choke coil to generator impedance and load impedance determines the amount of loss. By proper coil design this value has been kept to such a point that the maximum high frequency loss in K-416 is  $\frac{1}{2}$  DB at 15,000 cycles.



Bottom Mounting

### SPECIAL APPLICATIONS

It is often necessary to use a transformer for some application other than that for which it was designed. To assist the audio engineer in estimating the probable frequency response under these conditions the following examples are given: Let us suppose it is necessary to couple push pull 6L6 tubes to a 1000-ohm load. If the secondary load is doubled in impedance, the impedance of the reflected primary load is also doubled. This means that the 6L6 tubes would be working into a load twice as great as recommended. The result of this will be an increase in harmonic content. The only way to keep this harmonic content to a point where it is not objectionable, is to limit the amount of grid excitation. When the secondary load is doubled, we must consider the shunting effect of primary inductance to determine what the low frequency response will be. When the primary inductance of a transformer is too low, it acts like a shunting load on the generator. This causes current to flow through the primary of the transformer which cannot be utilized for power transfer to the secondary. The degree to which this effect occurs is governed





by the ratio of primary reactance (that is  $2\pi \times f \times L_p$ ) to generator impedance and load impedance. In this case generator impedance remains the same but load impedance has been doubled so we must consider that the shunting effect of primary reactance has been doubled also. This primary reactance as may be seen from the preceding formula is directly proportional to frequency. Since the reactance is only  $\frac{1}{2}$  as great as necessary to insure rated frequency response at 30 cycles, it will be of the correct value to insure  $\frac{1}{2}$  DB loss at 60 cycles. The probable loss at 15,000 cycles would be 1 DB.

As previously stated, high frequency response is governed by the ratio of leakage reactance to generator impedance and secondary load impedance. Since secondary load has been doubled the ratio of leakage reactance to secondary load has been cut in half. This indicates that the frequency response will be better than rated at 15,000 cycles the loss being slightly under  $\frac{1}{2}$  DB.

Now let us look at the case where it is desired to couple push pull 6L6 tubes to a 25 ohm load. The 25-ohm load would be connected to the terminals rated for 50-ohms. This connection reflects a primary load of  $\frac{1}{2}$  the recommended value. When this occurs the power output will be decreased and harmonic content will be decreased also. Since generator impedance remains the same and secondary load is cut in half, the ratio of primary reactance to generator impedance and secondary load is increased. This indicates that low frequency response will be greatly improved. The loss at 30 cycles will be less than  $\frac{1}{2}$  DB and the response characteristic will continue flat on down to about 20 cycles. Since the load impedance has been cut in half the ratio of leakage reactance to load impedance has been doubled. This indicates that the effect of leakage reactance on the high frequencies will be increased. The probable loss will be  $\frac{1}{2}$  DB at 7500 cycles and 1 DB at 15,000 cycles.

## ELECTRICAL SPECIFICATIONS

The detailed electrical specifications provided below are supplied for the assistance of the audio engineer in the application of this transformer in practical audio frequency circuits.

### Frequency Response — $\pm \frac{1}{2}$ DB 30 to 15,000 cycles

The frequency response characteristic illustrated will be maintained at any set of operating conditions within the limits set forth in these data.

**Primary Impedance** — 6600 or 3800 ohms

**Secondary Impedance** — 50, 125, 200 (balanced)  
250, 333, or 500 (balanced) ohms

**Max. Pri. D.C. Balanced/Leg** — 85 MA (peak)  
65 MA (static)

**Max. Pri. D.C. Unbalanced/Leg** — 8 MA

**Max. Level** — + 37.6 DB

**Pri. Inductance** —

63 hy — 10 V 60 cycles applied  
150 hy — 100 V 60 cycles applied  
230 hy — 250 V 60 cycles applied

The inductance figures given above are based on no polarizing D.C. in the coil and an A.C. voltage applied to the coil of the frequency and potential specified.

**Coil Structure** — Interleaved sections balanced for inductance, capacity and resistance

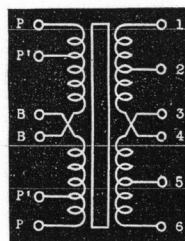
**Primary D.C. Resistance** — 370 ohms (total)

**Secondary D.C. Resistance** — 33 ohms (total)

**Core Material** — Low-loss high-permeability silicon steel

**Electromagnetic Shielding** — High-permeability cast case protects transformer from the effects of pickup from stray electromagnetic and electrostatic fields.

## Terminal Arrangement



### PRIMARY TERMINALS

Plates — (6600 ohm pl. to pl. load) —

P — P

Plates — (3800 ohm pl. to pl. load) —

P' — P'

B + — Join B — B

### SECONDARY TERMINALS

50 ohms — connect to 2 and 5,  
join 2 to 3 and 4 to 5

125 ohms — connect to 1 and 6,  
join 1 to 3 and 4 to 6

200 ohms — connect to 2 and 5,  
join 3 to 4

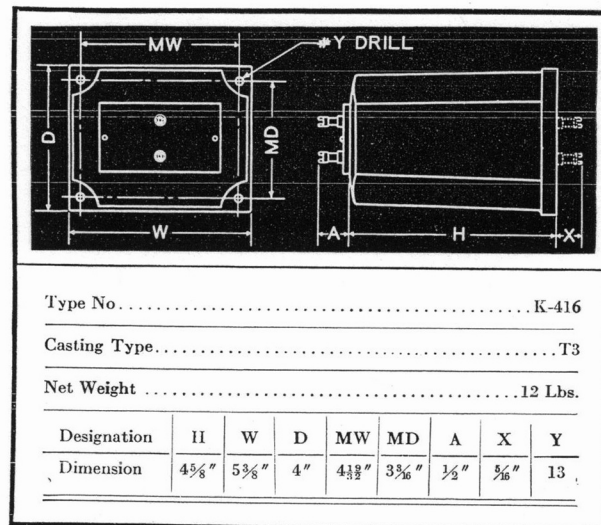
250 ohms — connect to 1 and 6,  
join 2 to 3

333 ohms — connect to 1 and 5,  
join 3 to 4

500 ohms — connect to 1 and 6,  
join 3 to 4

## MECHANICAL APPLICATIONS

Transformer K-416 can be supplied "top mounting" (with terminal lugs on top of case) or "bottom mounting" (with terminal lugs on bottom of case). TOP MOUNTING UNITS WILL BE SUPPLIED UNLESS OTHERWISE SPECIFIED.



## GUARANTY AND CONDITIONS

We have made every effort to make our operating instructions and performance characteristics clear, concise, and free of ambiguities. We unconditionally guarantee this unit to be exactly as we have represented it. Any unit not in accordance with our specifications, or defective due to material or manufacturing causes, will be repaired or replaced without charge. All material returned to this factory for inspection, repair or replacement must be shipped prepaid. This guaranty is effective for a period of five years from date of purchase.

Kenyon products are subject to continual laboratory test with resultant performance and production refinements. We accept your order with the understanding that we are authorized to furnish a revised type if the unit ordered has been discontinued.

**KENYON TRANSFORMER Co., Inc.**  
840 Barry Street :: :: New York City

Export Department:  
25 Warren Street  
New York, N. Y.

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# K E N Y O N

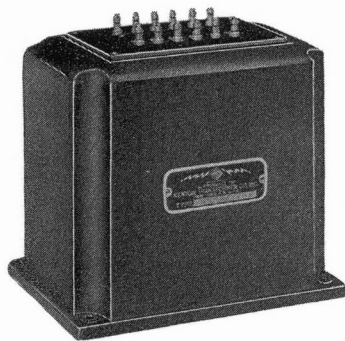
TYPE K-417

## GENERAL APPLICATIONS

Transformer K-417 was designed to work out of push pull 6L6 tubes operated under the following conditions:

The total winding is a match for the 34 watt class AB (no grid current) condition that requires a 6600 ohm plate to plate load. There are two taps so arranged as to give a balanced winding for the 23 watt class AB (no grid current) condition that requires a 3800 ohm plate to plate load. The

secondary is the Kenyon Multiple Voice Coil Line which provides for a range of impedance terminations from 1.8 to 15 ohms.



Top Mounting

## ELECTROSTATIC AND ELECTROMAGNETIC SHIELDING

The amount of gain succeeding a unit of this type is never very great. For this reason it has been deemed unnecessary to provide electrostatic shielding

between primary and secondary. Electromagnetic pickup or cross talk might prove serious in a unit operating at this level. To eliminate any such effects the unit is encased in a high permeability casting which reduces electromagnetic pickup by 18 DB.

## DESIGN CONSIDERATIONS

One of the greatest advantages of the new 6L6 tube is the low distortion content of the power output. In order to realize this advantage, the output transformer must be designed to present the exact plate to plate load recommended for the various operating conditions. Impedance terminations to match exactly any one of the various output conditions will be found in this group of transformers presented by Kenyon.

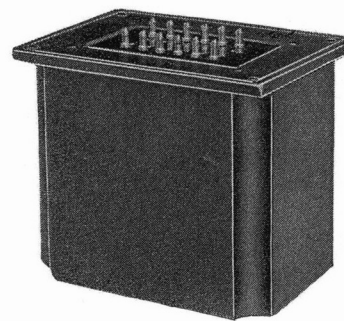
One of the primary considerations in the design of an output transformer to handle levels as high as this is the provision of ample copper area for full power output. While the maximum primary current of this unit will not exceed 85 milliamperes, the current flowing in the lowest impedance tap of the secondary may be many times this. If sufficiently large wire is not used in both primary and secondary, the losses occurring in the windings will impair the efficiency of the unit to a great extent. Copper loss impairs efficiency at all frequencies.

Low frequency response in an output transformer is determined by core loss and primary inductance. As an illustration of the effect of core loss let us look at an output transformer whose core weighs 8 lbs. with a flux density of such a value that the core loss is 1 watt per lb. Under these conditions if

## LABORATORY STANDARD » » » Output Transformer

List Price . . . \$25.00

the input power to the transformer were 34 watts, the output would be only 26 watts. This shows an efficiency of 75% or a low frequency loss of 1½ DB. To eliminate any such losses as this, the cross sectional area of the core has been kept large, and high permeability low loss silicon steel is used as the core material. In a properly designed output transformer if A.C. flux densities are kept to a point where core loss is not excessive, there is always sufficient primary inductance to insure good low frequency response. For this reason silicon steel instead of high permeability alloy steel is used as the core material. The losses in high permeability steels are not greatly less than those in high grade silicon steels; the great advantage of the former being high permeability. Since the additional primary inductance obtainable with this high permeability is not necessary, the use of the more expensive alloy is not justified.

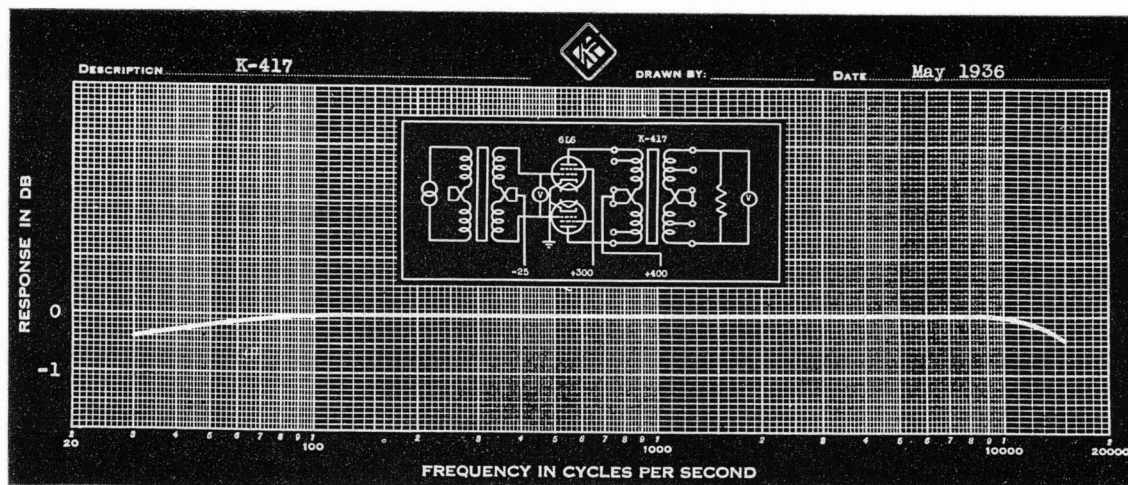


Bottom Mounting

The governing factor of high frequency response is leakage reactance. Leakage reactance acts like a small choke coil in series between primary and secondary. The impedance of this choke coil increases directly with frequency, thus at the higher frequencies the voltage loss across it will be greatest. The ratio of the impedance of this choke coil to generator impedance and load impedance determines the amount of loss. By proper coil design this value has been kept to such a point that the maximum high frequency loss in K-417 is ½ DB at 15,000 cycles.

## SPECIAL APPLICATIONS

It is often necessary to use a transformer for some application other than that for which it was designed. To assist the audio engineer in estimating the probable frequency response under these conditions the following examples are given: Let us suppose it is necessary to couple push pull 6L6 tubes to a 30 ohm load. If the secondary load is doubled in impedance, the impedance of the reflected primary load is also doubled. This means that the 6L6 tubes will be working into a load twice as great as recommended. The result of this will be an increase in harmonic content. The only way to keep this harmonic content to a point where it is not objectionable, is to limit the amount of grid excitation. When the secondary load is doubled, we must consider the shunting effect of primary inductance to determine what the low frequency response will be. When the primary inductance of a transformer is too low, it acts like a shunt load on the generator. This causes current to flow through the primary of the trans-



former which cannot be utilized for power transfer to the secondary. The degree to which this effect occurs is governed by the ratio of primary reactance (that is  $2\pi \times f \times L_p$ ) to generator impedance and load impedance. In this case generator impedance remains the same but load impedance has been doubled so we must consider that the shunting effect of primary reactance has been doubled also. This primary reactance as may be seen from the preceding formula is directly proportional to frequency. Since the reactance is only  $\frac{1}{2}$  as great as necessary to insure rated frequency response at 30 cycles, it will be of the correct value to insure  $\frac{1}{2}$  DB loss at 60 cycles. The probable loss at 30 cycles would be 1 DB.

As previously stated, high frequency response is governed by the ratio of leakage reactance to generator impedance and secondary load impedance. Since the secondary load has been doubled the ratio of leakage reactance to secondary load has been cut in half. This indicates that the frequency response will be better than rated at 15,000 cycles, the loss being slightly under  $\frac{1}{2}$  DB.

Now let us look at the case where it is desired to couple push pull 6L6 tubes to a 1 ohm load. The 1 ohm load would be connected to the terminals rated for 1.8 ohms. This connection reflects a primary load of  $\frac{1}{2}$  the recommended value. When this occurs the power output will be decreased and harmonic content will be decreased also. Since generator impedance remains the same and secondary load is cut in half, the ratio of primary reactance to generator impedance and secondary load is increased. This indicates that low frequency response will be improved. The loss at 30 cycles will be less than  $\frac{1}{2}$  DB and the response characteristic will continue flat on down to about 20 cycles. Since the load impedance has been cut in half the ratio of leakage reactance to load impedance has been doubled. This indicates that the effect of leakage reactance on the high frequencies will be increased. The probable loss will be  $\frac{1}{2}$  DB at 7500 cycles and 1 DB at 15,000 cycles.

## ELECTRICAL SPECIFICATIONS

The detailed electrical specifications provided below are supplied for the assistance of the audio engineer in the application of this transformer in practical audio frequency circuits.

**Frequency Response** —  $\pm \frac{1}{2}$  DB 30 to 15,000 cycles

The frequency response characteristic illustrated will be maintained at any set of operating conditions within the limits set forth in these data.

**Primary Impedance** — 6600 or 3800 ohms

**Secondary Impedance** — 1.8, 3.75, 6.8, 7.5 (balanced)  
11 or 15 (balanced) ohms

**Max. Pri. D.C. Balanced/Leg** — 85 MA (peak)  
65 MA (static)

**Max. Pri. D.C. Unbalanced/Leg** — 8 MA

**Max. Level** — + 37.6 DB

**Pri. Inductance** —  
63 hy — 10 V 60 cycles applied  
150 hy — 100 V 60 cycles applied  
230 hy — 250 V 60 cycles applied

The inductance figures given above are based on no polarizing D.C. in the coil and with an A.C. voltage applied to the coil of the frequency and potential specified.

**Coil Structure** — Interleaved sections balanced for inductance, capacity, and resistance.

**Primary D.C. Resistance** — 370 ohms (total)

**Secondary D.C. Resistance** — 1 ohm (total)

**Core Material** — Low-loss high-permeability silicon steel

**Electromagnetic Shielding** — High-permeability cast case protects transformer from the effects of pickup from stray electromagnetic and electrostatic fields.

## Terminal Arrangement

### PRIMARY TERMINALS

Plates — (6600 ohm pl. to pl. load) —

P — P

Plates — (3800 ohm pl. to pl. load) —

P' — P'

B + — Join B — B

### SECONDARY TERMINALS

15 ohms — connect to A and F,  
join C to D

11 ohms — connect to A and E,  
join C to D

7.5 ohms — connect to B and E,  
join C to D

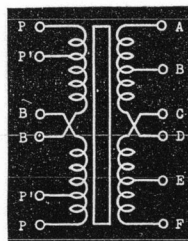
6.8 ohms — connect to A and F,  
join B to C

3.75 ohms — connect to A and F,  
join A to C

1.8 ohms — connect to B and E,  
join D to F

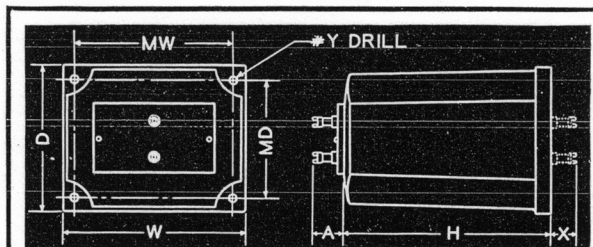
1.8 ohms — connect to B and E,  
join B to C

1.8 ohms — connect to B and E,  
join D to E



## MECHANICAL SPECIFICATIONS

Transformer K-417 can be supplied "top mounting" (with terminal lugs on top of case) or "bottom mounting" (with terminal lugs on bottom of case). TOP MOUNTING UNITS WILL BE SUPPLIED UNLESS OTHERWISE SPECIFIED.



Type No. .... K-417

Casting Type. .... T3

Net Weight ..... 12 Lbs.

| Designation | H                 | W                 | D  | MW                | MD                | A                 | X               | Y  |
|-------------|-------------------|-------------------|----|-------------------|-------------------|-------------------|-----------------|----|
| Dimension   | 4 $\frac{5}{8}$ " | 5 $\frac{3}{8}$ " | 4" | 4 $\frac{1}{2}$ " | 3 $\frac{1}{2}$ " | 1 $\frac{1}{2}$ " | $\frac{5}{8}$ " | 13 |

## GUARANTY AND CONDITIONS

We have made every effort to make our operating instructions and performance characteristics clear, concise, and free of ambiguities. We unconditionally guarantee this unit to be exactly as we have represented it. Any unit not in accordance with our specifications, or defective due to material or manufacturing causes, will be repaired or replaced without charge. All material returned to this factory for inspection, repair or replacement must be shipped prepaid. This guaranty is effective for a period of five years from date of purchase.

Kenyon products are subject to continual laboratory test with resultant performance and production refinements. We accept your order with the understanding that we are authorized to furnish a revised type if the unit ordered has been discontinued.

**KENYON TRANSFORMER Co., Inc.**

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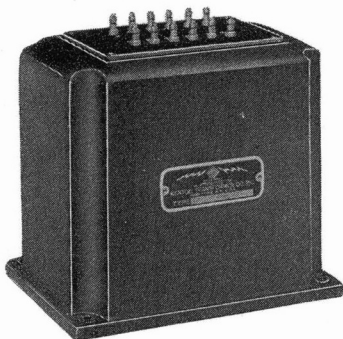
# K E N Y O N

## TYPE K-418

### GENERAL APPLICATIONS

Transformer K-418 was designed to work out of push pull 6L6 tubes operated under the following conditions:

The total winding is a match for the 40 watt class AB (grid current) condition that requires a 6000 ohm plate to plate load. There are two taps so arranged as to give a balanced winding for the 60 watt class AB (grid current) condition that requires a 3800 ohm plate to plate load. The secondary is provided with a Kenyon Multiple Line which provides a range of impedance terminations from 50 to 500 ohms.



Top Mounting

secondary. Electromagnetic pickup or cross talk might prove serious in a unit operating at this level. To eliminate any such effects the unit is encased in a high permeability casting which reduces electromagnetic pickup by 18 DB.

### ELECTROSTATIC AND ELECTROMAGNETIC SHIELDING

The amount of gain succeeding a unit of this type is never very great. For this reason it has been deemed unnecessary to provide electrostatic shielding between primary and

### DESIGN CONSIDERATIONS

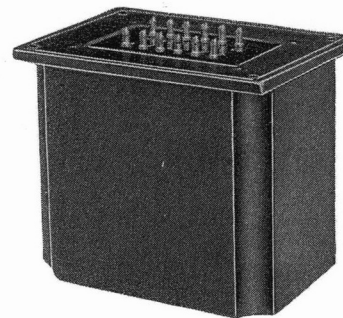
One of the greatest advantages of the new 6L6 tube is the low distortion content of the power output. In order to realize this full advantage, the output transformer must be designed to present the exact plate to plate load recommended for the various operating conditions. In this group of transformers, presented by Kenyon, impedance terminations to match exactly any one of the various output conditions will be found. One of the primary considerations in the design of an output transformer to handle levels as high as this is the provision of ample copper area for full power output. While the maximum primary current of this unit will not exceed 120 milliamperes, the current flowing in the lowest impedance tap of the secondary may be many times this. If sufficiently large wire is not used in both primary and secondary, the losses occurring in the windings will impair the efficiency of the unit to a great extent. Copper loss impairs efficiency at all frequencies.

Low frequency response in an output transformer is determined by core loss and primary inductance. As an illustration of the effect of core loss let us look at an output transformer whose core weighs 10 lbs. with a flux density of such a value that the core loss is 1 watt per lb. Under these conditions if

## LABORATORY STANDARD » » » Output Transformer

List Price . . . \$30.00

the input power of the transformer were 40 watts, the output would be only 30 watts. This shows an efficiency of 75% or a low frequency loss of  $1\frac{1}{2}$  DB. To eliminate any such losses as this, the cross sectional area of the core has been kept large, and high permeability low loss silicon steel is used as the core material. In a properly designed output transformer, if A.C. flux densities are kept to a point where core loss is not excessive, there is always sufficient primary inductance to insure good low frequency response. For this reason silicon steel instead of high permeability alloy steel is used as the core material. The losses in high permeability steels are not greatly less than those in high grade silicon steels; the great advantage of the former being high permeability. Since the additional primary inductance supplied by this high permeability is not necessary, the use of the more expensive alloy is not justified.



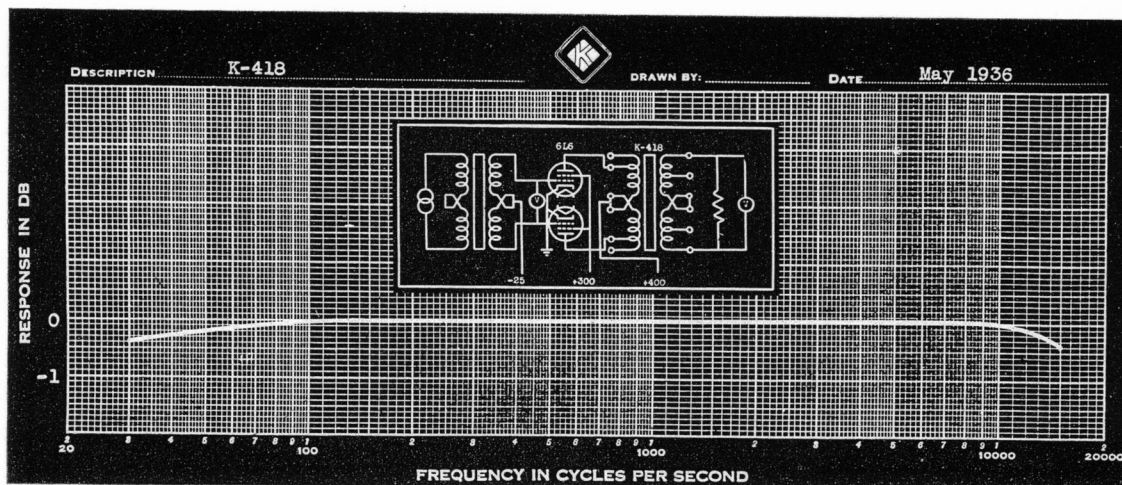
Bottom Mounting

The governing factor of high frequency response is leakage reactance. Leakage reactance acts like a small choke coil in series between primary and secondary. The impedance of this choke coil increases directly with frequency, thus at the higher frequencies the voltage loss across it will be greatest. The ratio of the impedance of this choke coil to generator impedance and load impedance determines the amount of loss. By proper coil design this value has been kept to such a point that the maximum high frequency loss in K-418 is  $\frac{1}{2}$  DB at 15,000 cycles.

### SPECIAL APPLICATIONS

It is often necessary to use a transformer for some application other than that for which it was designed. To assist the audio engineer in estimating the probable frequency response under these conditions the following examples are given: Let us suppose it is necessary to couple push pull 6L6 tubes to a 1000-ohm load. If the secondary load is doubled in impedance, the impedance of the reflected primary load is doubled also. This means that the 6L6 tubes would be working into a load twice as great as recommended.

The result of this will be an increase in harmonic content. The only way to keep this harmonic content to a point where it is not objectionable, is to limit the amount of grid excitation. When the secondary load is doubled, we must consider the shunting effect of primary inductance to determine what the low frequency response will be. When the primary inductance of a transformer is too low, it acts like a shunting



load on the generator. This causes current to flow through the primary of the transformer which cannot be utilized for power transfer to the secondary. The degree to which this effect occurs is governed by the ratio of primary reactance (that is  $2\pi \times f \times L_p$ ) to generator impedance and load impedance. In this case generator impedance remains the same but load impedance has been doubled so we must consider that the shunting effect of primary reactance has been doubled also. This primary reactance as may be seen from the preceding formula is directly proportional to frequency. Since the reactance is only  $\frac{1}{2}$  as great as necessary to insure rated frequency response at 30 cycles, it will be of the correct value to insure  $\frac{1}{2}$  DB loss at 60 cycles. The probable loss at 30 cycles would be 1 DB.

As previously stated, high frequency response is governed by the ratio of leakage reactance to generator impedance and secondary load impedance. Since the secondary load has been doubled the ratio of leakage reactance to secondary load has been cut in half. This indicates that the frequency response will be better than rated at 15,000 cycles, the loss being slightly under  $\frac{1}{2}$  DB.

Now let us look at the case where it is desired to couple push pull 6L6 tubes to a 25 ohm load. The 25 ohm load would be connected to the terminals rated for 50 ohms. This connection reflects a primary load of  $\frac{1}{2}$  the recommended value. When this occurs the power output will be decreased and harmonic content will be decreased also. Since generator impedance remains the same and secondary load is cut in half, the ratio of primary reactance to generator impedance and secondary load is increased. This indicates that low frequency response will be improved. The loss at 30 cycles will be less than  $\frac{1}{2}$  DB and the response characteristic will continue flat on down to about 20 cycles. Since the load impedance has been cut in half the ratio of leakage reactance to load impedance has been doubled. This indicates that the effect of leakage reactance on the high frequencies will be increased. The probable loss will be  $\frac{1}{2}$  DB at 7500 cycles and 1 DB at 15,000 cycles.

## ELECTRICAL SPECIFICATIONS

The detailed electrical specifications provided below are supplied for the assistance of the audio engineer in the application of this transformer in practical audio frequency circuits.

**Frequency Response** —  $\pm \frac{1}{2}$  DB 30 to 15,000 cycles

The frequency response characteristic illustrated will be maintained at any set of operating conditions within the limits set forth in these data.

**Primary Impedance** — 6000 or 3800 ohms

**Secondary Impedance** — 50, 125, 200 (balanced)  
250, 333, or 500 (balanced) ohms

**Max. Pri. D.C. Balanced/Leg** — 125 MA (peak)  
60 MA (static)

**Max. Pri. D.C. Unbalanced/Leg** — 10 MA

**Max. Level** — + 40 DB

**Pri. Inductance** —  
65 hy — 10 V 60 cycles applied  
152 hy — 100 V 60 cycles applied  
235 hy — 250 V 60 cycles applied

The inductance figures given above are based on no polarizing D.C. in the coil and an A.C. voltage applied to the coil of the frequency and potential specified.

**Coil Structure** — Interleaved sections balanced for inductance, capacity, and resistance.

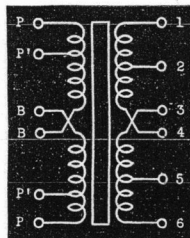
**Primary D.C. Resistance** — 225 ohms (total)

**Secondary D.C. Resistance** — 28 ohms (total)

**Core Material** — Low-loss high-permeability silicon steel

**Electromagnetic Shielding** — High-permeability cast case protects transformer from the effects of pickup from stray electromagnetic and electrostatic fields.

## Terminal Arrangement



### PRIMARY TERMINALS

Plates — (6000 ohm pl. to pl. load) —

P — P

Plates — (3800 ohm pl. to pl. load) —

P' — P'

B + — Join B — B

### SECONDARY TERMINALS

50 ohms — connect to 2 and 5,  
join 2 to 3 and 4 to 5

125 ohms — connect to 1 and 6,  
join 1 to 3 and 4 to 6

200 ohms — connect to 2 and 5,  
join 3 to 4

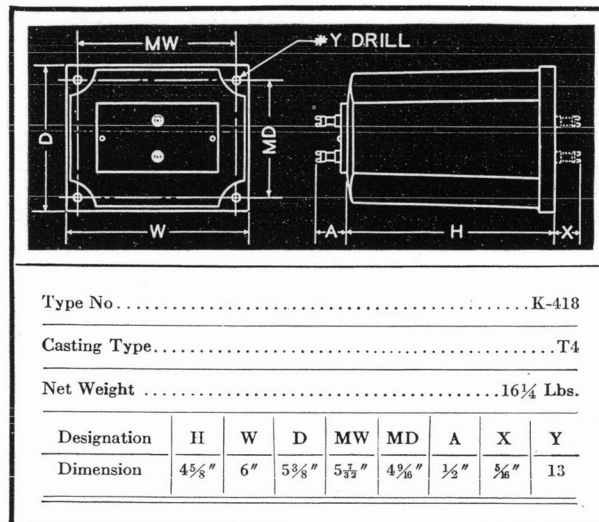
250 ohms — connect to 1 and 6,  
join 2 to 3

333 ohms — connect to 1 and 5,  
join 3 to 4

500 ohms — connect to 1 and 6,  
join 3 to 4

## MECHANICAL SPECIFICATIONS

Transformer K-418 can be supplied "top mounting" (with terminal lugs on top of case) or "bottom mounting" (with terminal lugs on bottom of case). TOP MOUNTING UNITS WILL BE SUPPLIED UNLESS OTHERWISE SPECIFIED.



## GUARANTY AND CONDITIONS

We have made every effort to make our operating instructions and performance characteristics clear, concise, and free of ambiguities. We unconditionally guarantee this unit to be exactly as we have represented it. Any unit not in accordance with our specifications, or defective due to material or manufacturing causes, will be repaired or replaced without charge. All material returned to this factory for inspection, repair or replacement must be shipped prepaid. This guaranty is effective for a period of five years from date of purchase.

Kenyon products are subject to continual laboratory test with resultant performance and production refinements. We accept your order with the understanding that we are authorized to furnish a revised type if the unit ordered has been discontinued.

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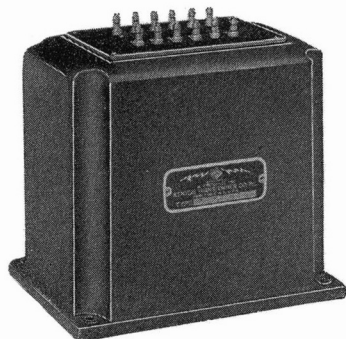
# K E N Y O N

TYPE K-419

## GENERAL APPLICATIONS

Transformer K-419 was designed to work out of push pull 6L6 tubes operated under the following conditions:

The total winding is a match for the 40 watt class AB (grid current) condition that requires a 6000 ohm plate to plate load. There are two taps so arranged as to give a balanced winding for the 60 watt class AB (grid current) condition that requires a 3800 ohm plate to plate load. The secondary is a Multiple Voice Coil Line which provides a range of impedance terminations from 1.8 to 15 ohms.



Top Mounting

## ELECTROSTATIC AND ELECTROMAGNETIC SHIELDING

The amount of gain succeeding a unit of this type is never very great. For this reason it has been deemed unnecessary to provide electrostatic shielding between primary and

secondary. Electromagnetic pickup or cross talk might prove serious in a unit operating at this level. To eliminate any such effects the unit is encased in a high permeability casting which reduces electromagnetic pickup by 18 DB.

## DESIGN CONSIDERATIONS

One of the greatest advantages of the new 6L6 tube is the low distortion content of the power output. In order to take full advantage of this, the output transformer must be designed to present the exact plate to plate load recommended for the various operating conditions. Impedance terminations to match exactly any one of the various output conditions will be found in this group of transformers presented by Kenyon.

One of the primary considerations in the design of an output transformer to handle levels as high as this is the provision of ample copper area for full power output. While the maximum primary current of this unit will not exceed 120 milliamperes the current flowing in the lowest impedance tap of the secondary may be many times this. If sufficiently large wire is not used in both primary and secondary, the losses occurring in the windings will impair the efficiency of the unit to a great extent. Copper loss impairs efficiency at all frequencies.

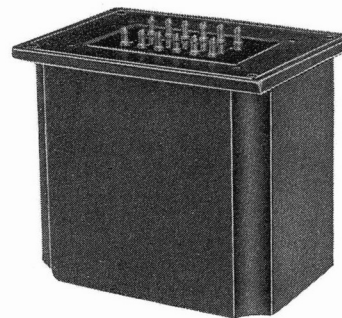
Low frequency response in an output transformer is determined by core loss and primary inductance. As an illustration of the effect of core loss let us look at an output transformer whose core weighs 10 lbs. with a flux density of such a value that the core loss is 1 watt per lb. Under these conditions if the input power of the transformer were 40 watts, the output

## LABORATORY STANDARD » » » Output Transformer

List Price . . . \$30.00

would be only 30 watts. This shows an efficiency of 75% or a low frequency loss of 1½ DB. To eliminate any such losses as this, the cross sectional area of the core has been kept large, and high permeability low loss silicon steel is used as the core material. In a properly designed output transformer if A.C. flux densities are kept to a point where core loss is not excessive, there is always sufficient primary inductance to insure good low frequency response. For this reason silicon steel instead of high permeability alloy steel is used as the core material. The losses in high permeability steels are not greatly less than those in high grade silicon steels; the great advantage of the former being high permeability. Since the additional primary inductance supplied by this high permeability is not necessary, the use of the more expensive alloy is not justified.

The governing factor of high frequency response is leakage reactance. Leakage reactance acts like a small choke coil in series between primary and secondary. The impedance of this choke coil increases directly with frequency, thus at the higher frequencies the voltage loss across it will be greatest. The ratio of the impedance of this choke coil to generator impedance and load impedance determines the amount of loss. By proper coil design this value has been kept to such a point that the maximum high frequency loss in K-419 is ½ DB at 15,000 cycles.

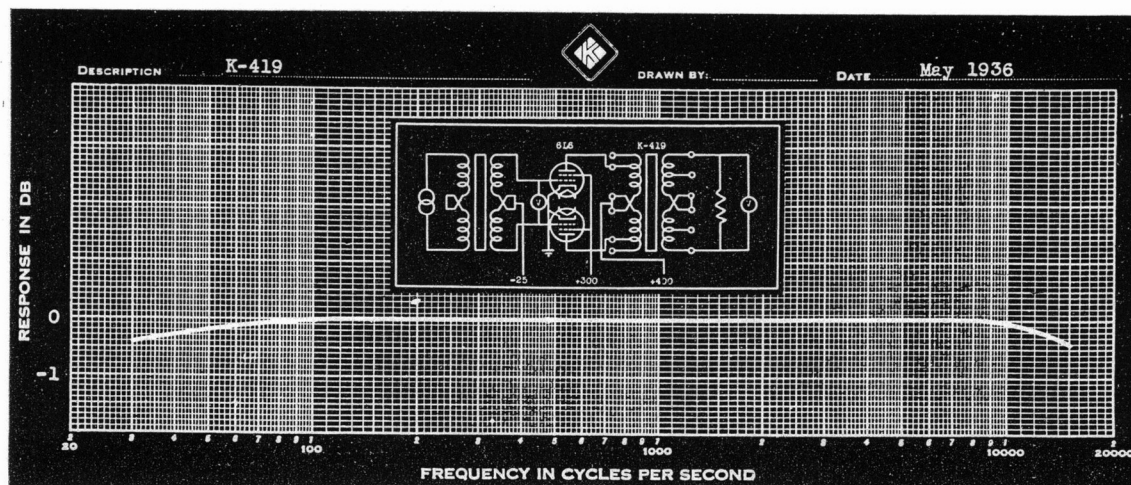


Bottom Mounting

## SPECIAL APPLICATIONS

It is often necessary to use a transformer for some application other than that for which it was designed. To assist the audio engineer in estimating the probable frequency response under these conditions the following examples are given: Let us suppose it is necessary to couple push pull 6L6 tubes to a 30 ohm load. If the secondary load is doubled in impedance, the impedance of the reflected primary load is doubled also. This means that the 6L6 tubes will be working into a load twice as great as recommended.

The result of this will be an increase in harmonic content. The only way to keep this harmonic content to a point where it is not objectionable, is to limit the amount of grid excitation. When the secondary load is doubled, we must consider the shunting effect of primary inductance to determine what the low frequency response will be. When the primary inductance of a transformer is too low, it acts like a shunting load on the generator. This causes current to flow through the primary of the transformer which cannot be utilized for power transfer





to the secondary. The degree to which this effect occurs is governed by the ratio of primary reactance (that is  $2\pi \times f \times L_p$ ) to generator impedance and load impedance. In this case generator impedance remains the same but load impedance has been doubled so we must consider that the shunting effect of primary reactance has been doubled also. This primary reactance as may be seen from the preceding formula is directly proportional to frequency. Since the reactance is only  $\frac{1}{2}$  as great as necessary to insure rated frequency response at 30 cycles, it will be of the correct value to insure  $\frac{1}{2}$  DB loss at 60 cycles. The probable loss at 30 cycles would be 1 DB. As previously stated, high frequency response is governed by the ratio of leakage reactance to generator impedance and secondary load impedance. Since the secondary load has been doubled the ratio of leakage reactance to secondary load has been cut in half. This indicates that the frequency response will be better than rated at 15,000 cycles, the loss being slightly under  $\frac{1}{2}$  DB.

Now let us look at the case where it is desired to couple push pull 6L6 tubes to a 1 ohm load. The 1 ohm load would be connected to the terminals rated for 1.8 ohms. This connection reflects a primary load of  $\frac{1}{2}$  the recommended value. When this occurs the power output will be decreased and harmonic content will be decreased also. Since generator impedance remains the same and secondary load is cut in half, the ratio of primary reactance to generator impedance and secondary load is increased. This indicates that low frequency response will be improved. The loss at 30 cycles will be less than  $\frac{1}{2}$  DB and the response characteristic will continue flat on down to about 20 cycles. The load impedance has been cut in half, so the ratio of leakage reactance to load impedance has been doubled. This indicates that the effect of leakage reactance on the high frequencies will be increased. The probable loss will be  $\frac{1}{2}$  DB at 7500 cycles and 1 DB at 15,000 cycles.

## ELECTRICAL SPECIFICATIONS

The detailed electrical specifications provided below are supplied for the assistance of the audio engineer in the application of this transformer in practical audio frequency circuits.

### Frequency Response — $\pm \frac{1}{2}$ DB 30 to 15,000 cycles

The frequency response characteristic illustrated will be maintained at any set of operating conditions within the limits set forth in these data.

**Primary Impedance** — 6000 or 3800 ohms

**Secondary Impedance** — 1.8, 3.75, 6.8, 7.5 (balanced)  
11 or 15 (balanced) ohms

**Max. Pri. D.C. Balanced/Leg** — 125 MA (peak)  
60 MA (static)

**Max. Pri. D.C. Unbalanced/Leg** — 10 MA

**Max. Level** — + 40 DB

**Pri. Inductance** —  
65 hy — 10 V 60 cycles applied  
152 hy — 100 V 60 cycles applied  
235 hy — 250 V 60 cycles applied

The inductance figures given above are based on no polarizing D.C. in the coil and an A.C. voltage applied to the coil of the frequency and potential specified.

**Coil Structure** — Interleaved sections balanced for inductance, capacity and resistance

**Primary D.C. Resistance** — 225 ohms (total)

**Secondary D.C. Resistance** — .85 ohms (total)

**Core Material** — Low-loss high-permeability silicon steel

**Electromagnetic Shielding** — High-permeability cast case protects transformer from the effects of pickup from stray electromagnetic and electrostatic fields

## Terminal Arrangement

### PRIMARY TERMINALS

Plates—(6000 ohm pl. to pl. load)

P — P

(3800 ohm pl. to pl. load) —  
P' — P'

B + — Join B — B

### SECONDARY TERMINALS

15 ohms — connect to A and F,  
join C to D

11 ohms — connect to A and E,  
join C to D

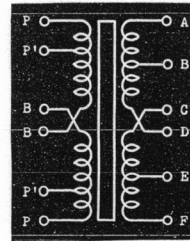
7.5 ohms — connect to B and E,  
join C to D

6.8 ohms — connect to A and F,  
join B to C

3.75 ohms — connect to A and F,  
join A to C

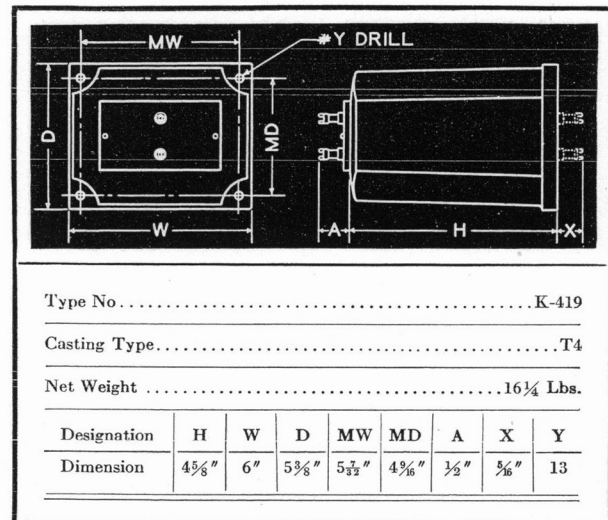
1.8 ohms — connect to B and E,  
join D to F

join B to C  
join D to E



## MECHANICAL SPECIFICATIONS

Transformer K-419 can be supplied "top mounting" (with terminal lugs on top of case) or "bottom mounting" (with terminal lugs on bottom of case). TOP MOUNTING UNITS WILL BE SUPPLIED UNLESS OTHERWISE SPECIFIED.



## GUARANTY AND CONDITIONS

We have made every effort to make our operating instructions and performance characteristics clear, concise, and free of ambiguities. We unconditionally guarantee this unit to be exactly as we have represented it. Any unit not in accordance with our specifications, or defective due to material or manufacturing causes, will be repaired or replaced without charge. All material returned to this factory for inspection, repair or replacement must be shipped prepaid. This guaranty is effective for a period of five years from date of purchase.

Kenyon products are subject to continual laboratory test with resultant performance and production refinements. We accept your order with the understanding that we are authorized to furnish a revised type if the unit ordered has been discontinued.

**KENYON TRANSFORMER Co., Inc.**  
840 Barry Street :: :: New York City

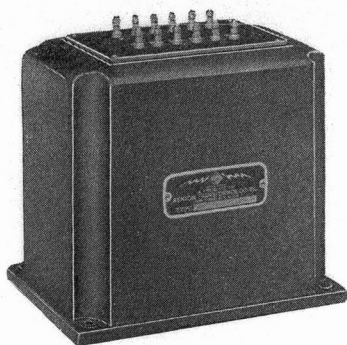
Export Department:  
25 Warren Street  
New York, N. Y.

Cable Address:  
SIMONTRICE-NEW YORK



# KENYON LABORATORY STANDARD

## Inductors and Power Transformers



Top Mounting

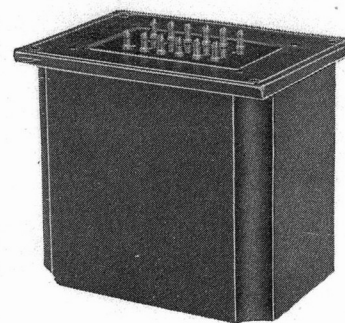
plate voltage for the driver tubes with a minimum number of units, and at the same time have sufficiently good voltage regulation, has been satisfactorily met with the rectifier circuits shown. For all operating conditions, the regulation of the plate, screen and bias supplies is within the limits recommended by the tube manufacturer.

The chart on which the transformers are listed includes, in addition to the electrical characteristics, the application for which the units are designed together with the recommended filter system components. This provides an easy method of determining the power equipment necessary for any amplifier. All units have been designed for continuous operation under the conditions specified on the chart, with a reasonable temperature rise.

Laboratory Standard Line power components are enclosed in a cast iron case for complete electromagnetic shielding, thus reducing hum pick up from this source to a minimum. An electrostatic shield is placed between primary and secondaries of all transformers to prevent feed-back of r.f. disturbances. All coils receive a double vacuum impregnation under varnish and this, together with the fact that the complete units are poured with a humidity proof insulating compound, provides the power components with excellent protection against adverse climatic conditions.

The Kenyon Laboratory Standard Line amplifier power equipment presented on the following pages is composed of units of new and improved design. With the increased popularity of class AB amplifiers, good regulation has become increasingly important. This factor has received primary consideration in the design of transformers and inductors. The transformers designed for class AB applications have tapped high voltage secondaries for fixed or self-bias operation as well as a tap to provide a low voltage for the fixed bias supply. Filament windings have been provided on the transformers for 2.5 volt and 6.3 volt tubes, extending the application of the units to all glass and metal tubes.

Particular care has been given to the design of the power supplies for the 6L6's—the new beam power amplifier tubes. The problem of providing the plate and screen voltages for the 6L6's and



Bottom Mounting

### INDUCTORS

| Type  | Inductance at Rated D.C. | D.C. Current | D.C. Resistance | Case | Wt.      | List Price |
|-------|--------------------------|--------------|-----------------|------|----------|------------|
| K-500 | 15 Hys.                  | 120 MA       | 220 ohms        | T-2  | 6½ Lbs.  | \$ 8.00    |
| K-501 | 15 Hys.                  | 180 MA       | 90 ohms         | T-3  | 12½ Lbs. | 11.50      |
| K-502 | 20 Hys.                  | 200 MA       | 125 ohms        | T-4  | 21 Lbs.  | 20.00      |
| K-503 | 40 Hys.                  | 60 MA        | 500 ohms        | T-2  | 6½ Lbs.  | 8.00       |
| K-504 | 15 Hys.                  | 100 MA       | 350 ohms        | T-1  | 3½ Lbs.  | 6.00       |
| K-521 | 300 Hys.                 | 3 MA         | 5,500 ohms      | T-1  | 3½ Lbs.  | 9.25       |
| K-522 | 400 Hys.                 | 5 MA         | 3,000 ohms      | T-2  | 5¾ Lbs.  | 13.00      |
| K-523 | 600 Hys.                 | 5 MA         | 3,000 ohms      | T-2  | 5¾ Lbs.  | 20.00      |

### POWER TRANSFORMERS

| Type No. | Secondary Volts         | D.C. MA | S <sub>1</sub> | S <sub>2</sub>  | S <sub>3</sub>  | S <sub>4</sub> | S <sub>5</sub> | Case | Wt.     | List Price |
|----------|-------------------------|---------|----------------|-----------------|-----------------|----------------|----------------|------|---------|------------|
| K-600    | 370-0-370               | 90      | 5 V-2 A CT     | 2.5 V-3 A CT    | 2.5 V-5 A CT    |                |                | T-3  | 13 Lbs. | \$22.00    |
| #K-601   | 420/360-0-360/420       | 165     | 5 V-3 A CT     | 2.5 V-3 A CT    | 2.5 V-5 A CT    | 2.5 V-7 A CT   | 6.3 V-4 A CT   | T-4  | 20 Lbs. | 25.00      |
| #K-602   | 440/370-0-370/440       | 270     | 5 V-3 A CT     | 2.5 V-3 A CT    | 2.5 V-10 A CT   | 2.5 V-10 A CT  | 6.3 V-5 A CT   | T-4  | 20 Lbs. | 32.00      |
| K-603    | 600-0-600               | 150     | 7.5 V-2.5 A CT | 7.5 V-1.25 A CT | 7.5 V-1.25 A CT | 2.5 V-6 A CT   |                | T-4  | 20 Lbs. | 30.00      |
| *K-604   | 470/370-0-370/470       | 230     | 5 V-3 A CT     | 2.5 V-3 A CT    | 2.5 V-3 A CT    | 6.3 V-3 A CT   |                | T-4  | 20 Lbs. | 28.00      |
| *K-605   | 475/370-0-370/475       | 300     | 5 V-3 A CT     | 2.5 V-3 A CT    | 2.5 V-3 A CT    | 6.3 V-3.5 A CT |                | T-4  | 22 Lbs. | 32.00      |
| K-620    | 235-0-235               | 20      | 6.3 V-.5 A CT  | 6.3 V-1.2 A CT  |                 |                |                | T-1  | 3½ Lbs. | 10.00      |
| K-621    | Bias Supply. See Chart. |         |                |                 |                 |                |                |      |         |            |

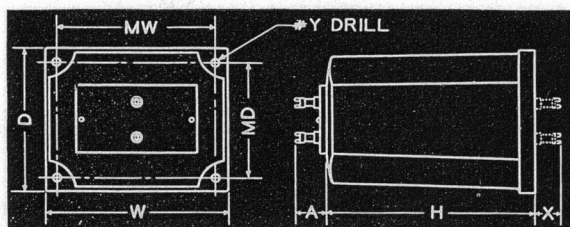
All primaries are tapped for 100/110/115/125 V—60 cycle operation

\* Bias tap at 75 V on High Voltage Secondary

# Bias tap at 125 V on High Voltage Secondary

### FILAMENT TRANSFORMERS

| Type No. | Secondary Volts | Amps | Case | Wt.     | List Price | Type No. | Secondary Volts | Amps | Case | Wt.     | List Price |
|----------|-----------------|------|------|---------|------------|----------|-----------------|------|------|---------|------------|
| K-650    | 2.5 CT          | 14   | T-2  | 6½ Lbs. | \$7.00     | K-651    | 6.3 CT          | 4    | T-2  | 6½ Lbs. | \$7.00     |



### MECHANICAL SPECIFICATIONS

| Casting Type | H  | W  | D  | MW | MD | A  | X    | Y      |
|--------------|----|----|----|----|----|----|------|--------|
| T1           | 3¾ | 3½ | 3⅛ | 2⅝ | 2⅞ | 1½ | 5/16 | No. 13 |
| T2           | 4⅞ | 4  | 3⅞ | 3⅝ | 2⅝ | 1½ | 5/16 | No. 13 |
| T3           | 4⅞ | 5⅞ | 4  | 4⅞ | 3⅞ | 1½ | 5/16 | No. 13 |
| T4           | 4⅞ | 6  | 5⅞ | 5⅞ | 4⅞ | 1½ | 5/16 | No. 13 |

# LABORATORY STANDARD POWER TRANSFORMERS

All Primaries are Tapped for 100/110/115/125 Volts—60 Cycle Operation

|                              | K-600                                    | K-601                                     | K-602                                                                                             | K-603                                                       | K-604                         | K-605                                                | K-620                                        | K-621                  |                                    |
|------------------------------|------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------|------------------------------------------------------|----------------------------------------------|------------------------|------------------------------------|
| TRANSFORMER APPLICATION      | Class A<br>PP-45's<br>—89's<br>Self Bias | Class AB<br>PP-45's<br>2A3's<br>Self Bias | Class AB<br>PP-45's<br>2A3's<br>Fixed Bias<br>6L6's<br>Class A <sub>1</sub><br>Self/Fixed<br>Bias | Class AB<br>PP Parallel<br>45's—2A3's<br>Self/Fixed<br>Bias | Class A<br>—50's<br>Self Bias | Class AB <sub>1</sub><br>6L6's<br>Self/Fixed<br>Bias | Class AB <sub>2</sub><br>6L6's<br>Fixed Bias | Preamplifier<br>Supply | Bias<br>Supply<br>45-2A3<br>50-6D5 |
| Rectifier Circuit No.        | No. 2 <sup>#</sup>                       | No. 2*                                    | No. 2 * <sup>⊙</sup> *                                                                            | No. 2*                                                      | No. 2 <sup>□</sup>            | No. 4                                                | No. 4                                        | No. 3                  | No. 1                              |
| CHARACTERISTICS              |                                          |                                           |                                                                                                   |                                                             |                               |                                                      |                                              |                        |                                    |
| E <sub>ac1</sub> .....       | 370                                      | 420                                       |                                                                                                   | 440                                                         | 600                           | 470                                                  | 475                                          | 235                    | 120                                |
| E <sub>ac2</sub> .....       |                                          |                                           | 360                                                                                               | 370                                                         |                               | 370                                                  | 370                                          |                        | 86                                 |
| E <sub>ac3</sub> .....       |                                          |                                           | 125                                                                                               | 125                                                         |                               | 75                                                   | 75                                           |                        |                                    |
| S1.....                      | 5V-2a                                    | 5V-3a                                     |                                                                                                   | 5V-3a                                                       | 7.5V-2.5a                     | 5V-3a                                                | 5V-3a                                        | 6.3V-.5a               | 2.5V-3a                            |
| S2.....                      | 2.5V-3a                                  | 2.5V-3a                                   |                                                                                                   | 2.5V-3a                                                     |                               | 2.5V-3a                                              | 2.5V-3a                                      | 6.3V-1.2a              |                                    |
| S3.....                      | 2.5V-5a                                  | 2.5V-5a                                   |                                                                                                   | 2.5V-10a                                                    | 7.5V-1.25a                    | 2.5V-3a                                              | 2.5V-3a                                      |                        |                                    |
| S4.....                      |                                          | 2.5V-7a                                   |                                                                                                   | 2.5V-10a                                                    | 7.5V-1.25a                    | 6.3V-3a                                              | 6.3V-3.5a                                    |                        |                                    |
| S5.....                      |                                          | 6.3V-4a                                   |                                                                                                   | 6.3V-5a                                                     | 2.5V-6a                       |                                                      |                                              |                        |                                    |
| V1.....                      | 80                                       | 83                                        | 83/5Z3                                                                                            | 83                                                          | 2-81's                        | 83                                                   | 83                                           | 84                     | 82                                 |
| V2.....                      |                                          |                                           | 82                                                                                                | 82                                                          |                               | 82                                                   | 82                                           |                        |                                    |
| V3.....                      |                                          |                                           |                                                                                                   |                                                             |                               | 82                                                   | 82                                           |                        |                                    |
| L1.....                      | K-500                                    | K-500                                     | K-501                                                                                             | K-502                                                       | K-500                         | K-501                                                | K-501                                        | K-520                  | Self-contained                     |
| L2.....                      | K-503                                    | K-503                                     | K-503                                                                                             | K-503                                                       | K-503                         | K-500                                                | K-500/K-501                                  | K-520                  |                                    |
| L3.....                      |                                          |                                           | K-504                                                                                             | K-504                                                       |                               | K-503                                                | K-503/K-500                                  |                        |                                    |
| L4.....                      |                                          |                                           |                                                                                                   |                                                             |                               | K-504                                                | K-504                                        |                        |                                    |
| C1A.....                     | 1 mfd                                    |                                           |                                                                                                   |                                                             | 1 mfd                         |                                                      |                                              |                        |                                    |
| C1.....                      | 1 mfd                                    | 1 mfd                                     | 1 mfd                                                                                             | 1 mfd                                                       | 1 mfd                         | 16 mfd                                               | 16 mfd                                       | 8 mfd                  | 1 mfd                              |
| C2.....                      | 4 mfd                                    |                                           |                                                                                                   |                                                             | 4 mfd                         | 16 mfd                                               | 16 mfd                                       |                        |                                    |
| C3.....                      | 8 mfd                                    | 16 mfd                                    | 16 mfd                                                                                            | 16 mfd                                                      | 8 mfd                         | 8 mfd                                                | 8 mfd                                        |                        | 8 mfd                              |
| C4.....                      |                                          |                                           | 1 mfd                                                                                             | 1 mfd                                                       |                               | 5 mfd                                                | 5 mfd                                        |                        |                                    |
| C5.....                      |                                          |                                           | 2/1 mfd                                                                                           | 2 mfd                                                       |                               | 16 mfd                                               | 16 mfd                                       |                        |                                    |
| C6.....                      |                                          |                                           | 16 mfd                                                                                            | 16 mfd                                                      |                               |                                                      |                                              |                        |                                    |
| R1.....                      | 15000                                    | 15000                                     | 15000                                                                                             | 20000                                                       | 25000                         | 20000                                                | 20000                                        | 25000                  | 2500                               |
| R2.....                      |                                          |                                           | 2500                                                                                              | 2500                                                        |                               | 10000                                                | 10000                                        |                        |                                    |
| R3.....                      |                                          |                                           |                                                                                                   |                                                             |                               | 1000                                                 | 1000                                         |                        |                                    |
| OUTPUT:                      |                                          |                                           |                                                                                                   |                                                             |                               |                                                      |                                              |                        |                                    |
| E <sub>dc1</sub> volts ..... | 300/230                                  | 325                                       | 270/230                                                                                           | 325/260                                                     | 500                           | -19 to -25                                           | -20 to -25                                   | 250                    | -62 to -68<br>-38 -50              |
| I <sub>dc1</sub> amps .....  | .020                                     | .035                                      | .035                                                                                              | .050                                                        | .035                          |                                                      |                                              | .020                   |                                    |
| E <sub>dc2</sub> volts ..... | 330/260                                  | 360                                       | 300/250                                                                                           | 362/290                                                     | 535                           | 265                                                  | 265/280                                      |                        |                                    |
| I <sub>dc2</sub> amps .....  | .072                                     | .130 avg                                  | .130 avg                                                                                          | .220 avg                                                    | .110                          | .075                                                 | .075/.125                                    |                        |                                    |
| E <sub>dc3</sub> volts ..... |                                          |                                           | -62 or -68                                                                                        | -62 or -68                                                  |                               | 300                                                  | 300                                          |                        |                                    |
| I <sub>dc3</sub> amps .....  |                                          |                                           |                                                                                                   |                                                             |                               | .017 peak                                            | .020 peak                                    |                        |                                    |
| E <sub>dc4</sub> volts ..... |                                          |                                           |                                                                                                   |                                                             |                               | 400                                                  | 400                                          |                        |                                    |
| I <sub>dc4</sub> amps .....  |                                          |                                           |                                                                                                   |                                                             |                               | .156 peak                                            | .230 peak                                    |                        |                                    |
| Case.....                    | T-3                                      | T-4                                       |                                                                                                   | T-4                                                         | T-4                           | T-4                                                  | T-4                                          | T-1                    | T-3                                |
| Wt.....                      | 13 lb.                                   | 20 lb.                                    |                                                                                                   | 20 lb.                                                      | 20 lb.                        | 20 lb.                                               | 22 lb.                                       | 3½ lb.                 | 13 lb.                             |
| List price.....              | \$22.00                                  | \$25.00                                   |                                                                                                   | \$32.00                                                     | \$30.00                       | \$28.00                                              | \$32.00                                      | \$10.00                | \$16.00                            |

#—For Class A 45's operate circuit No. 2—condenser input self bias. E<sub>dc1</sub>=300. Connect A to C.

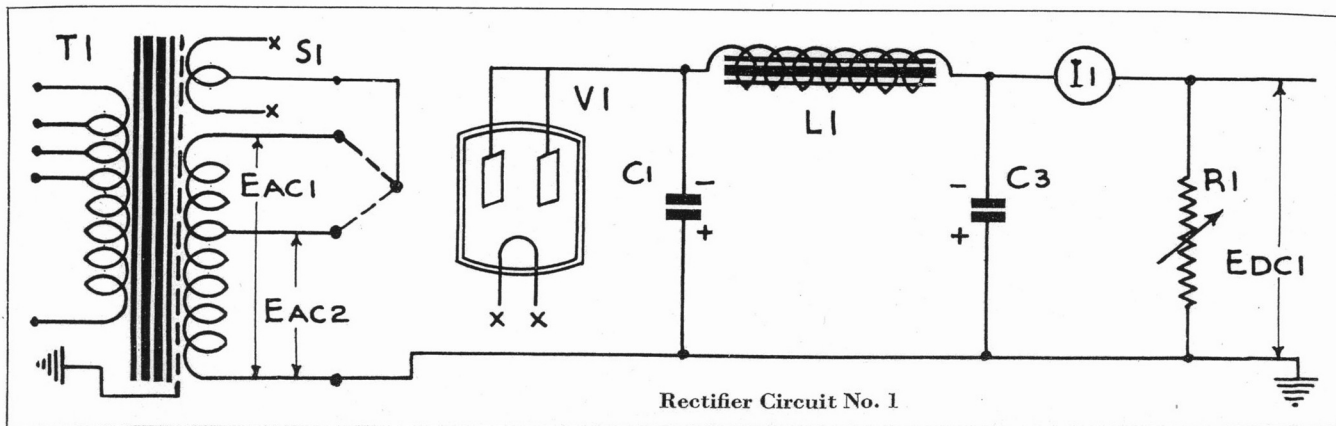
For Class A 89's operate circuit No. 2—choke input self bias. E<sub>dc2</sub>=260. Connect A to B—omit CIA.

□—For Class A, 6L6's, use 5Z3 rectifier for fixed or self bias operation. E<sub>ac2</sub>=365V, C<sub>4</sub>=1 mfd

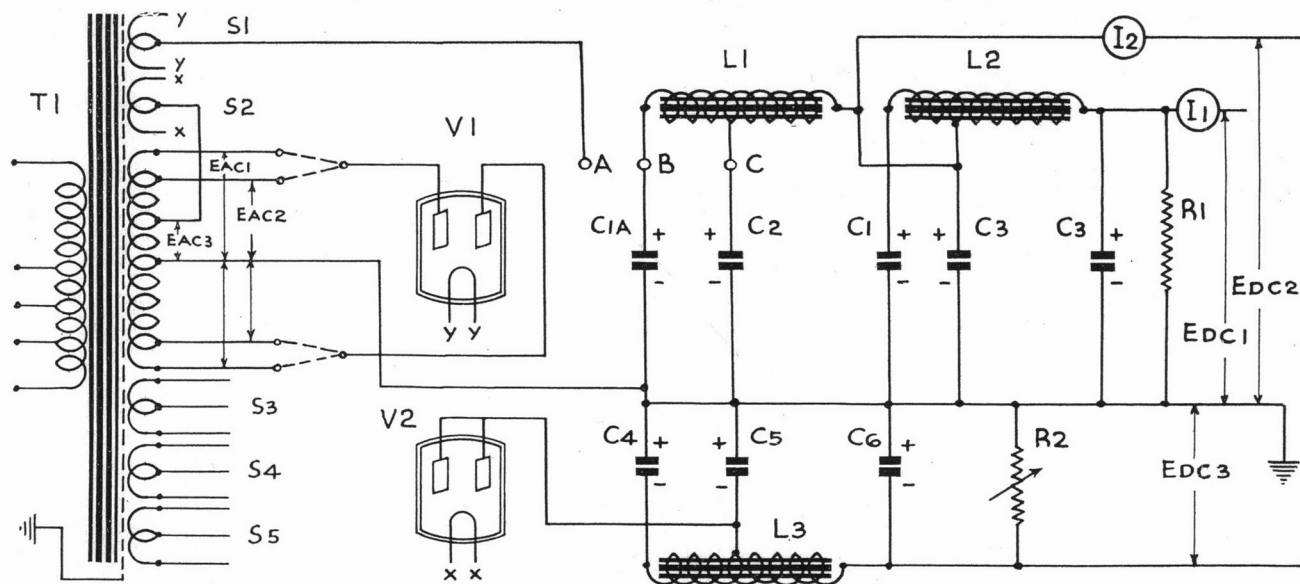
\*—Power Transformers with tapped high voltage secondary windings are designed for fixed or self bias operation. For self bias, connect plates of rectifier tube to E<sub>ac1</sub>. For fixed bias, connect plates of rectifier tube to E<sub>ac2</sub> and fixed bias rectifier to E<sub>ac3</sub>. See Circuit No. 2.

\*—Choke Input.

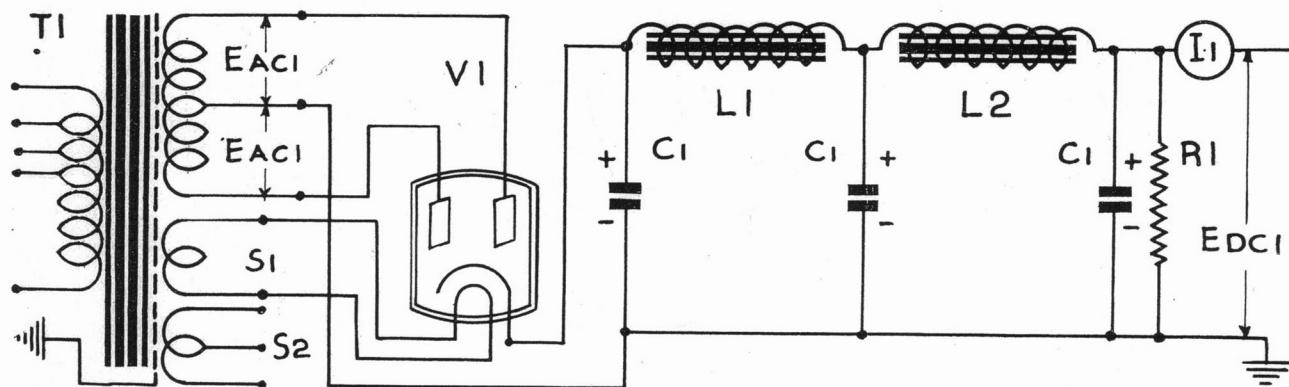
□—Condenser Input.



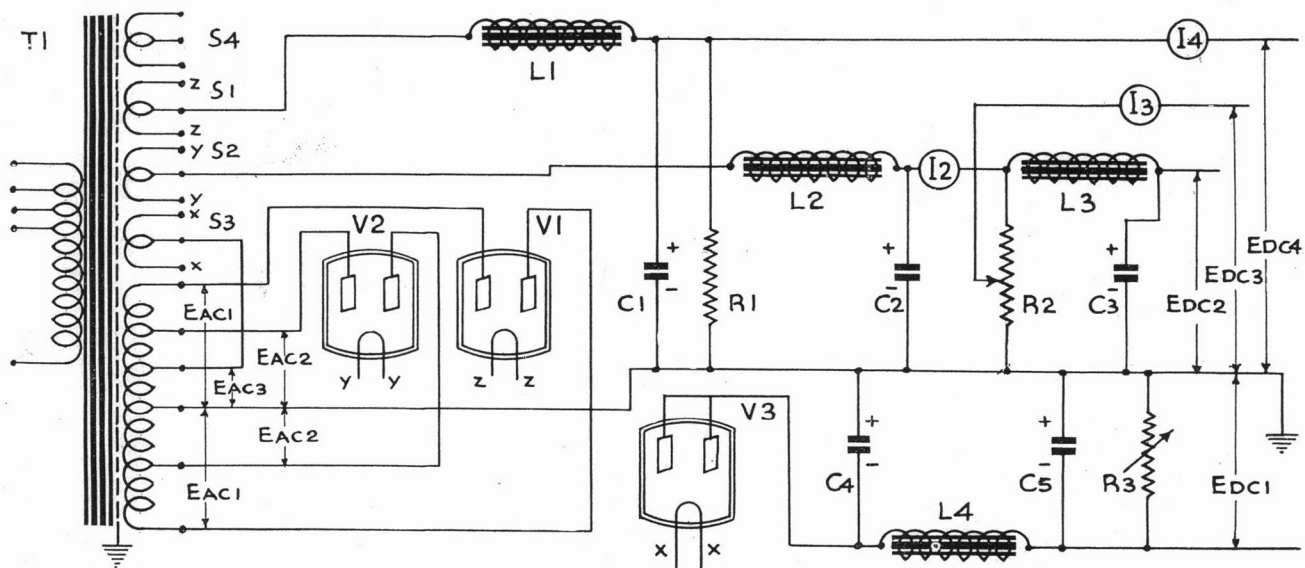




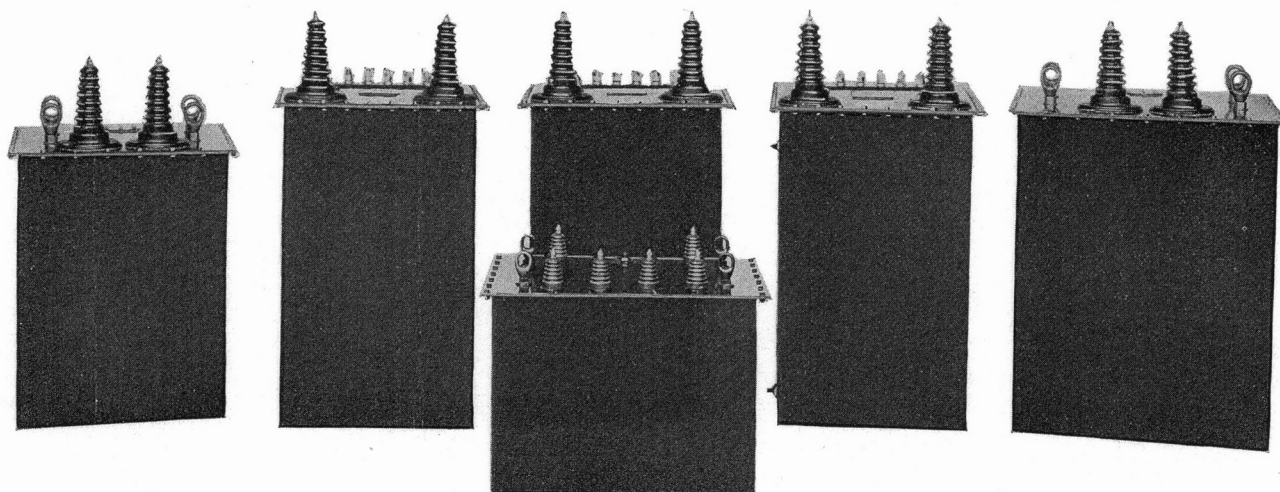
Rectifier Circuit No. 2



Rectifier Circuit No. 3



Rectifier Circuit No. 4



In addition to our standard equipment shown in this and other catalogs, the KENYON TRANSFORMER CO., Inc., is fully equipped to manufacture transformers and reactors up to 50 KVA.

If interested in special broadcast or power apparatus you are cordially invited to consult our technical and research staff.

**KENYON TRANSFORMER Co., Inc.**  
**840 Barry Street            ::            ::            New York City**

*Export Department:*  
25 Warren Street  
New York, N. Y.

*Cable Address:*  
SIMONTRICE-NEW YORK



# K E N Y O N

## PORTABLE BROADCAST Transformers and Inductors

THE KENYON TRANSFORMER CO., Inc., has for some time seen the need of a small, light, compact unit for use in portable remote pick-up equipment and similar applications. This line has been designed to fill this demand. The average weight of any one of the units is twenty ounces.

This line includes parallel feed chokes, line to line, input, interstage, and output transformers which are designed for use with the different tubes more commonly used in portable equipment.

All units are electromagnetically shielded by ANNEALED high permeability alloy steel cases.

The following are the salient features:

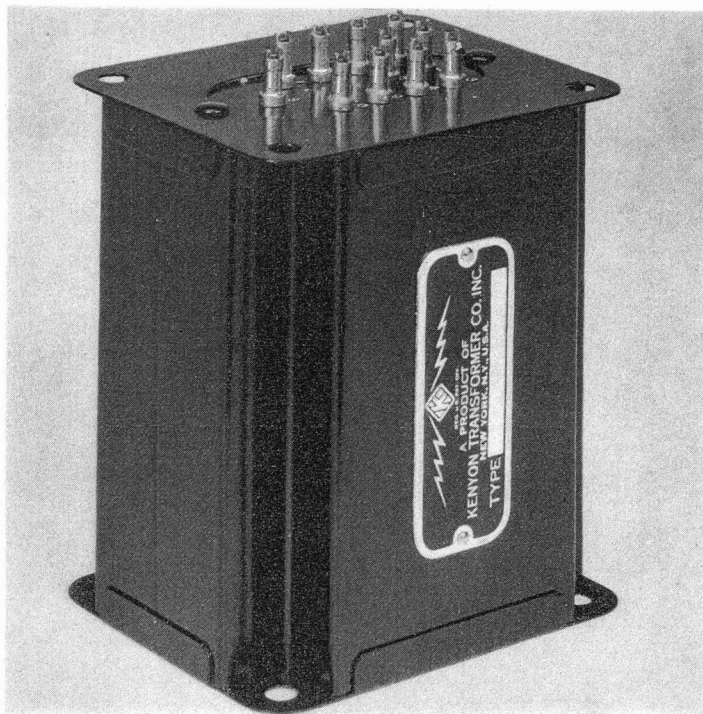
FREQUENCY RANGE:  $\pm 1$  DB—40 to 12,000 cycles

MECHANICAL: T1 Can  
Universal mounting  
The base size is  $2\frac{1}{16}$ " x  $2\frac{1}{2}$ "  
Height of can  $2\frac{7}{8}$ "  
Height over terminals  $3\frac{1}{4}$ "  
Mounting dimensions  $1\frac{19}{32}$ " x  $2\frac{1}{32}$ "

ELECTRICAL: Electrostatic shield between primary and secondary of all input, output, line, and microphone transformers. Shield and connection to core brought out on terminal board. Core insulated from case. Balanced windings are tested for resistance, inductance, and capacity balance. Interstage transformers are designed to carry the D.C. currents specified below. The frequency limit ( $\pm 1$  DB, 40-12,000) is maintained up to and including D.C. current value given. If extremely low frequency is desired, the use of a parallel feed choke is recommended.

The MULTIPLE line impedance arrangement is a coil structure conceived, designed and developed by the KENYON TRANSFORMER CO., Inc. All transformers in which this winding is incorporated offer balanced 200 and 500 windings with taps at 50, 125, 250 and 333 ohms.

Use is made of the latest alloys for core material, different alloys being used for the different transformers depending on their intended use. These transformers have a new type of impregnation and sealing which makes them proof against failure due to adverse climatic conditions.





## LINE TO LINE TRANSFORMERS

| Type  | Use                                                | Frequency Response<br>±1 DB | Impedance Ratio                       | Level<br>DB | List<br>Price |
|-------|----------------------------------------------------|-----------------------------|---------------------------------------|-------------|---------------|
| P-100 | Line to line                                       | 40-12,000                   | MULTIPLE line to MULTIPLE line        | +20         | \$10.00       |
| P-101 | Dynamic microphone or low impedance pickup to line | 40-12,000                   | 10-20 or 30 ohm line to MULTIPLE line | +20         | 10.00         |

## LINE TO GRID TRANSFORMERS

| Type  | Use                                                | Frequency Response<br>±1 DB | Impedance Ratio                         | Level<br>DB | List<br>Price |
|-------|----------------------------------------------------|-----------------------------|-----------------------------------------|-------------|---------------|
| P-200 | Line to grid                                       | 40-12,000                   | MULTIPLE line to 80,000 ohms (a)        | +20         | \$10.00       |
| P-201 | Dynamic microphone or low impedance pickup to grid | 40-12,000                   | 10-20 or 30 ohm line to 80,000 ohms (a) | +20         | 10.00         |

## INTERMEDIATE COUPLING TRANSFORMERS

| Type  | Use                             | Frequency Response<br>±1 DB | Turns Ratio          | Maximum D.C. | List<br>Price |
|-------|---------------------------------|-----------------------------|----------------------|--------------|---------------|
| P-300 | Single plate to single grid     | 40-12,000                   | 2 : 1                | 6 MA         | \$ 8.00       |
| P-301 | Single plate to push pull grids | 40-12,000                   | 1 : 1<br>(each side) | 6 MA         | 10.00         |

## OUTPUT TRANSFORMERS

| Type  | Use                      | Frequency Response<br>±1 DB | Impedance Ratio             | Level | List<br>Price |
|-------|--------------------------|-----------------------------|-----------------------------|-------|---------------|
| P-400 | Single plate to line     | 40-12,000                   | Plate (c) to MULTIPLE line  | +20   | \$10.00       |
| P-401 | Push pull plates to line | 40-12,000                   | Plates (c) to MULTIPLE line | +20   | 10.00         |

## AUDIO CHOKES

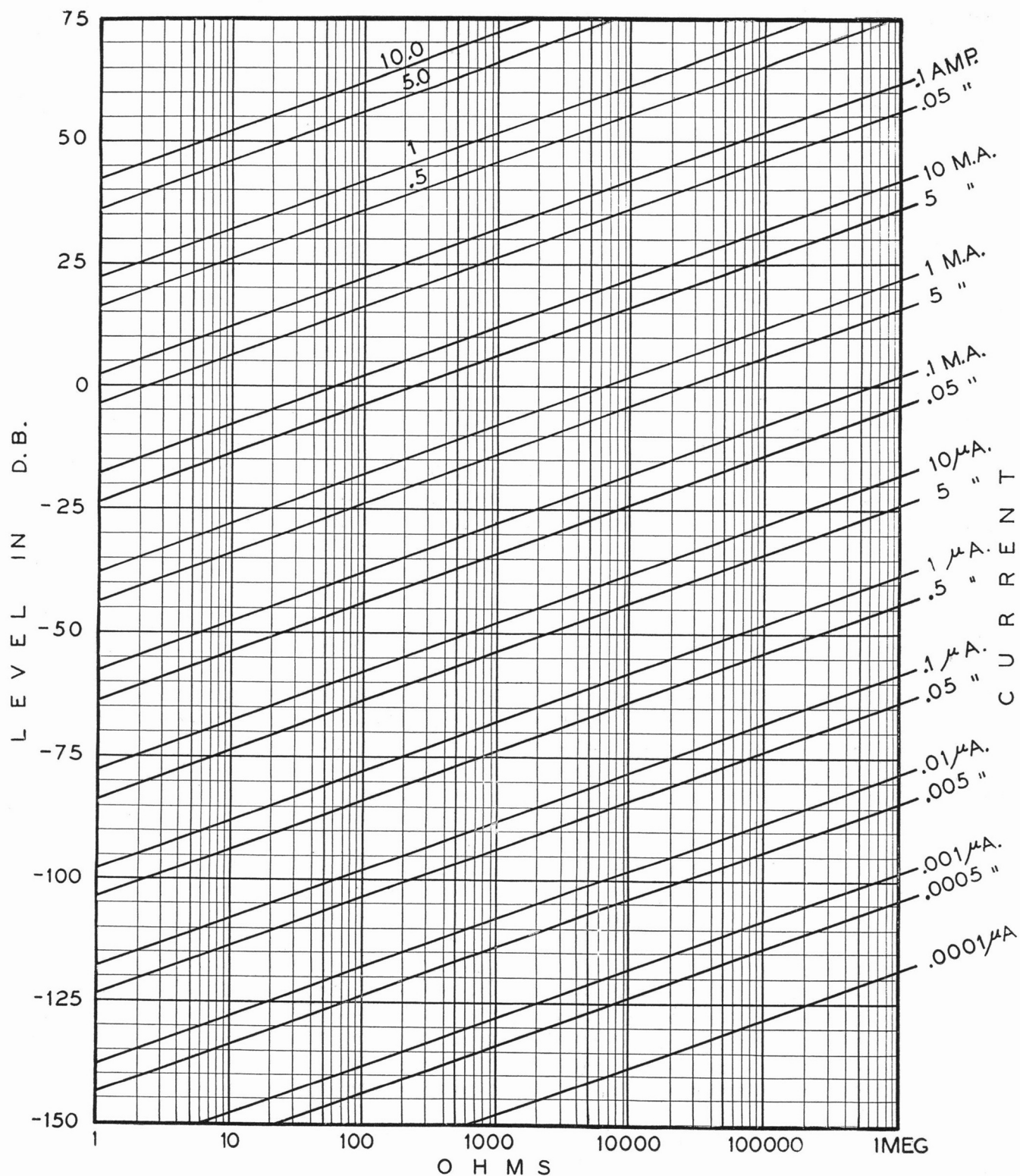
| Type  | Use                                                 | Maximum D.C. | Inductance at rated<br>D.C. (Henries) | D.C. Resistance | List<br>Price |
|-------|-----------------------------------------------------|--------------|---------------------------------------|-----------------|---------------|
| P-500 | Parallel feed audio choke (split winding)           | 3 MA         | 300                                   | 6000            | \$8.00        |
| P-501 | Parallel feed or output audio choke (split winding) | 10 MA        | 40                                    | 800             | 8.00          |

(a) Split winding—impedance refers to entire secondary.

(c) "Plate" refers to such tubes as 6C5, 56, 30, 846, etc., having an A.C. plate resistance of the order of 10,000 ohms.

# KEN-O-GRAF

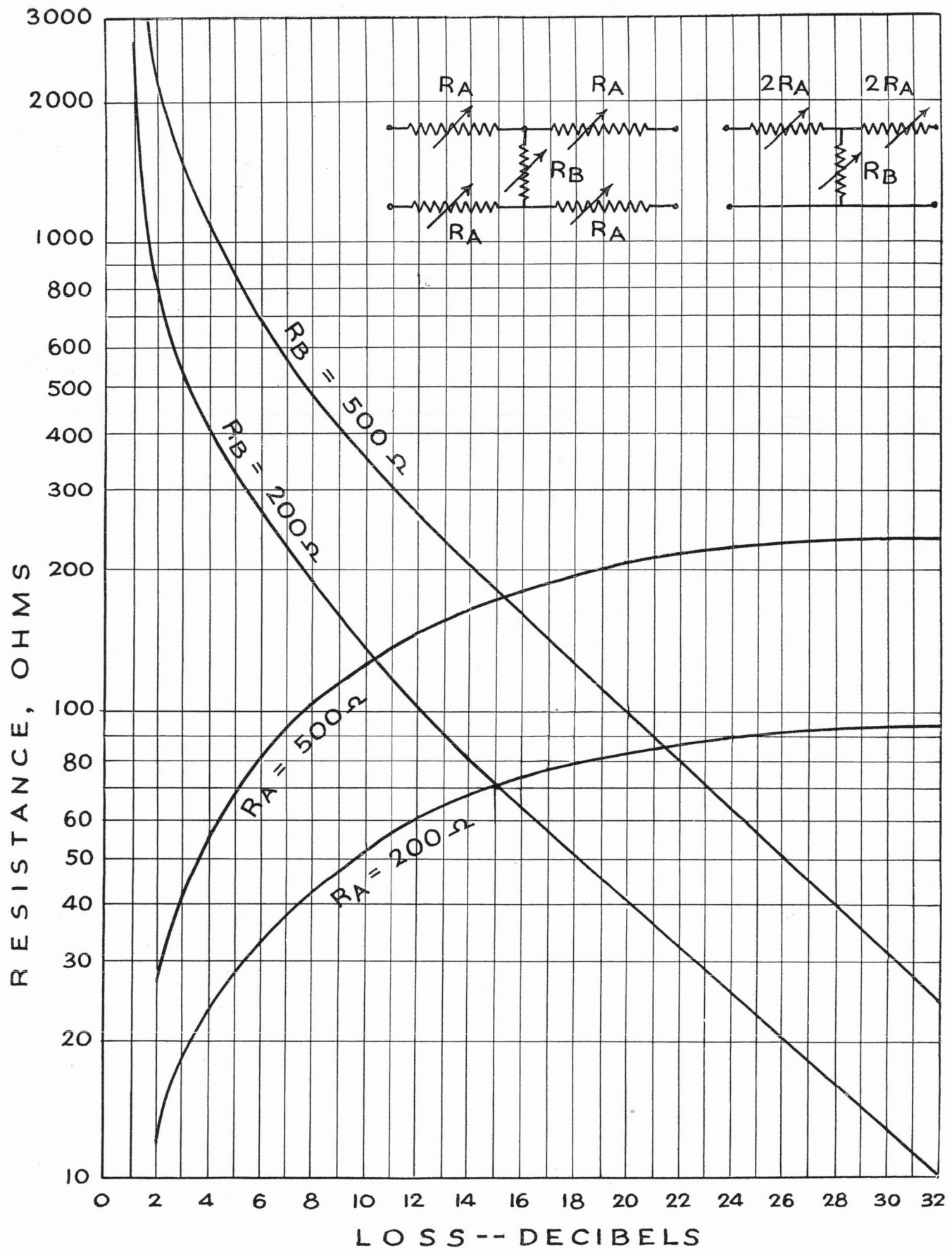
## OHMS-CURRENT-DECIBELS CONVERSION GRAPH



This graph may be used to find ohms, current and level in decibels, e.g.: What is the level in decibels at 600 ohms at a current of 10 M.A.? Enter the graph at the bottom (ohms) at 600 ohms and read up to where the slanting 10 M.A. line intersects. From this point, project horizontally to the left, and read + 10 db

Based on .006 watts at zero level.

# KEN-O-GRAF

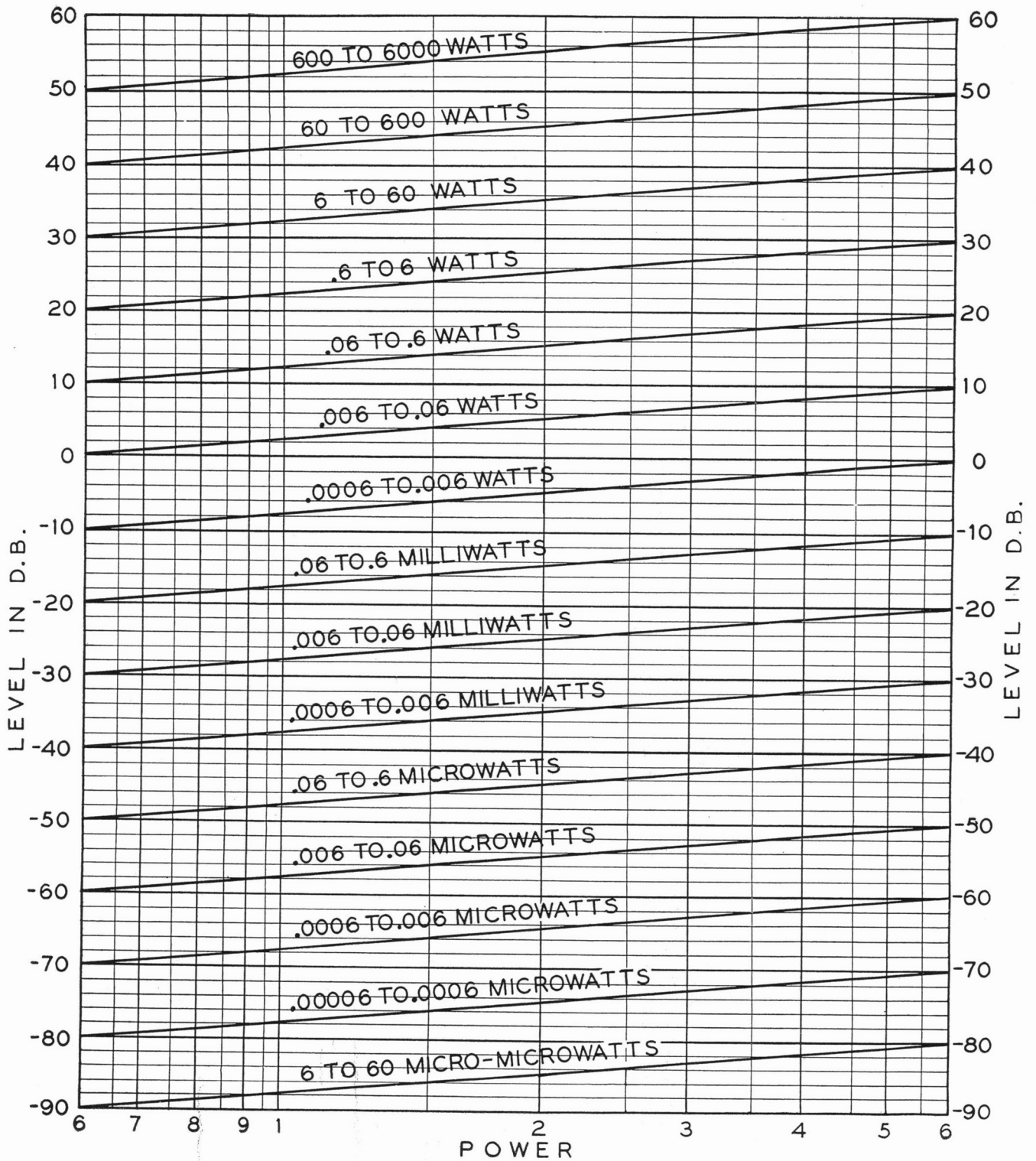


Proper attenuation of audio frequencies without introducing distortion is usually accomplished with "T" or "H" pads. The above graph gives resistance values of the branches of an "H" pad for channels having an impedance of 200 or 500 ohms. The range of attenuation is from 2 to 30 db.



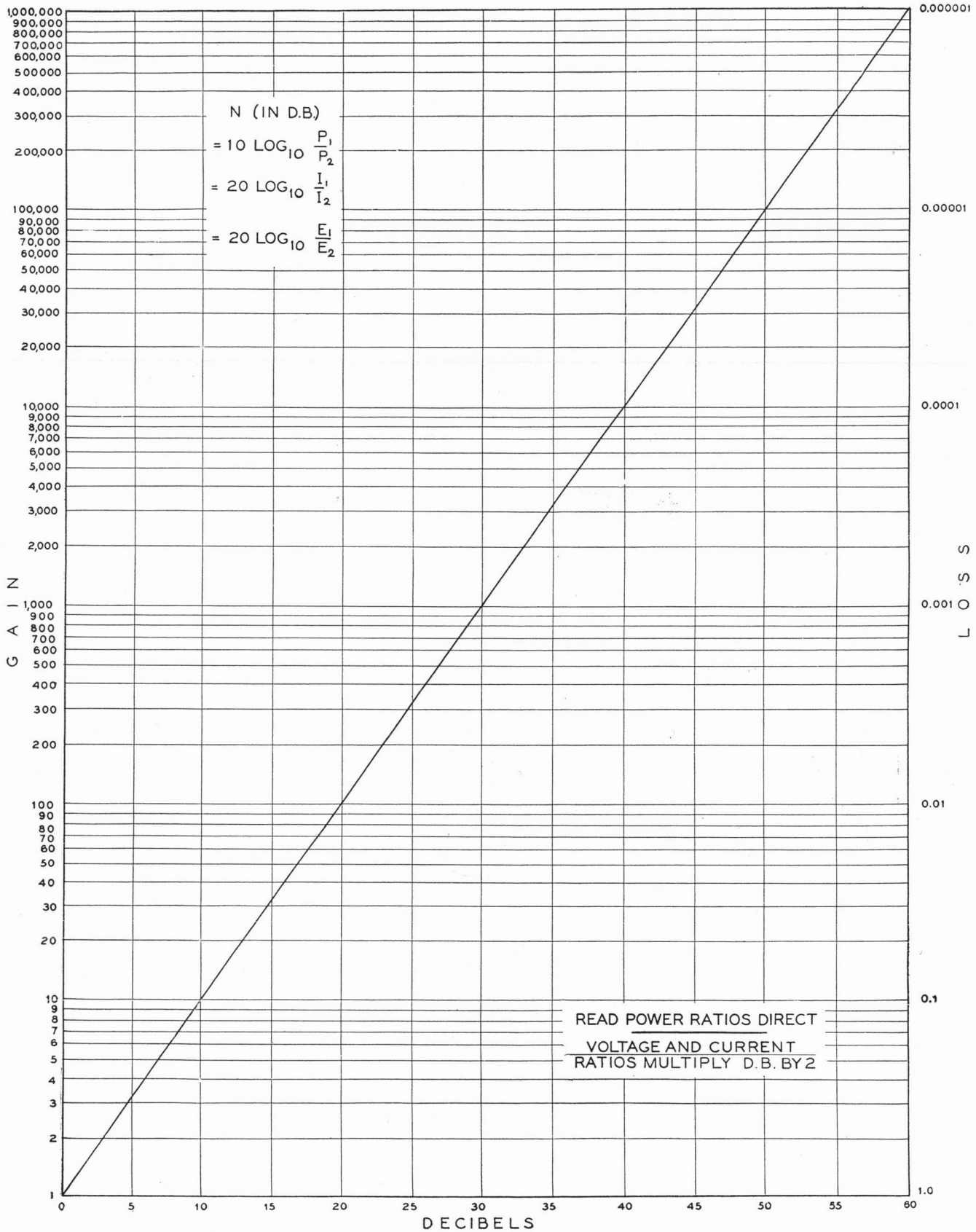
# KEN-O-GRAF

## WATTS - VS - DECIBELS



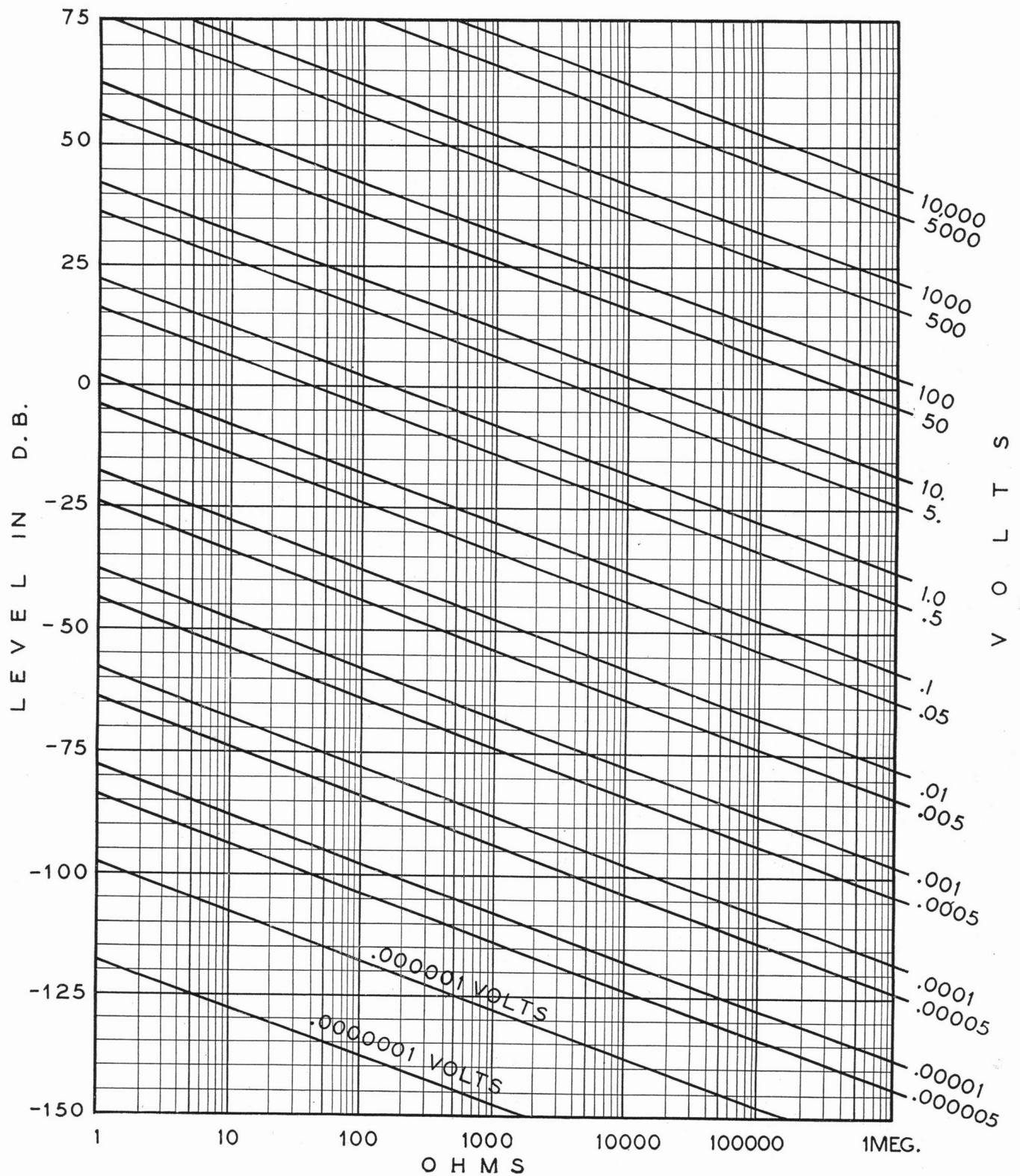
# KEN-O-GRAF

CONVERTING LOSS OR GAIN INTO DECIBELS



# KEN-O-GRAF

## OHMS-VOLTAGE — DECIBELS CONVERSION GRAPH

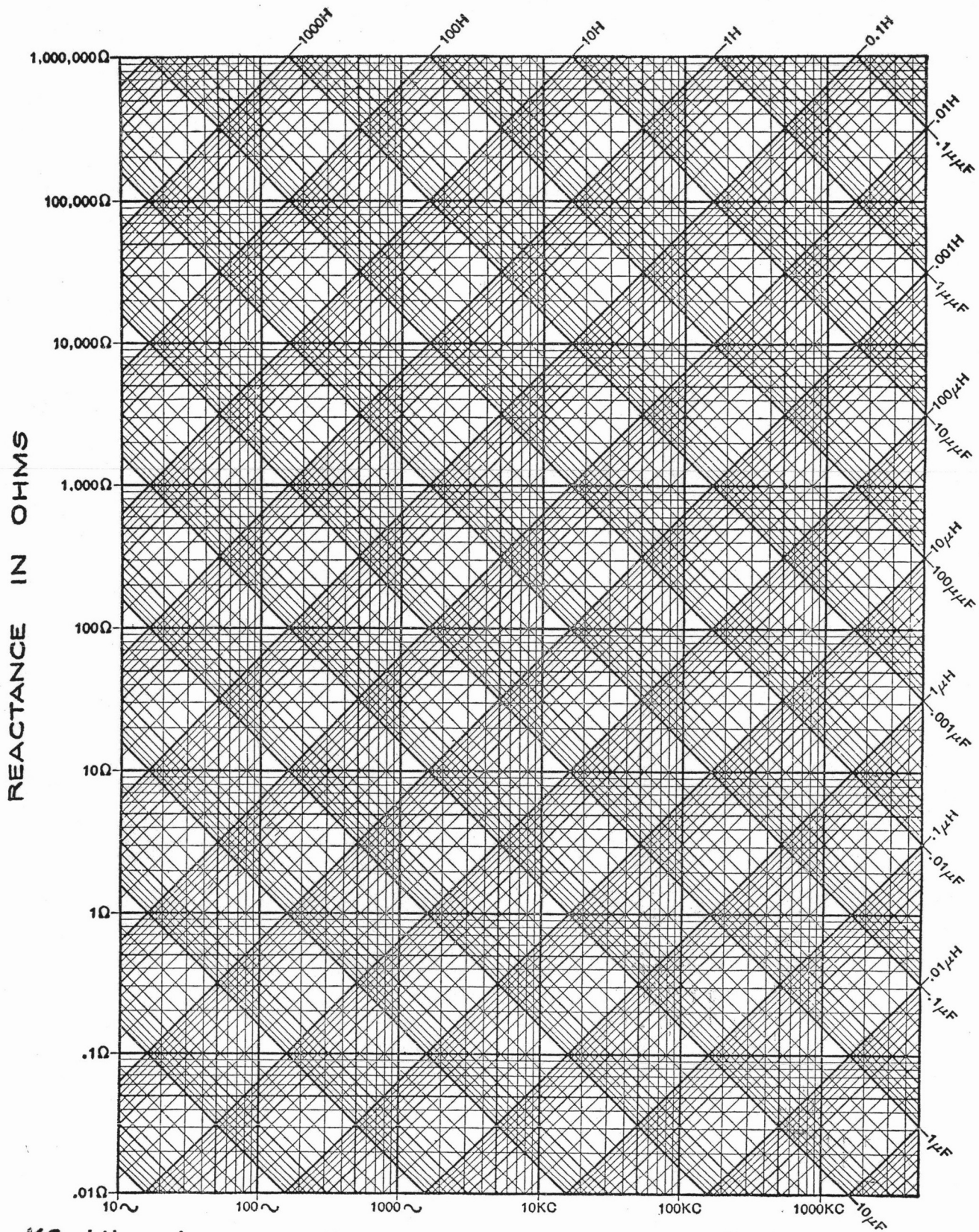


This graph may be used to find ohms, volts and level in decibels, e.g.: What is the level in decibels at 500 ohms at a voltage of 1 volt? Enter the graph at the bottom (ohms) at 500 ohms and read up to where the slanting 1 volt line intersects. From this point, project horizontally to the left, and read - 5 db

Based on .006 watts at zero level.



# KEN-O-GRAF



KC = kilocycles  
Ω = ohms

μF = microfarads  
μμF = micromicrofarads

H = henries  
μH = microhenries

This graph gives the reactance of capacity or inductance values at a given frequency. It also gives the resonant frequency of any given capacity and inductance.  
To find the reactance of 1 mfd. at 1000 cycles follow the 1 mfd. line (slanting UP from right to left) until it intersects the vertical line marked 1000 cycles; project horizontally to the left and read 160 ohms.  
To find the reactance of 1 henry at 1000 cycles follow the 1 henry line (slanting DOWN from right to left) until it intersects the vertical line marked 1000 cycles; project horizontally to the left and read 6300 ohms.  
To find the resonant frequency of 1 mfd. and 1 henry follow these lines to their intersection and project vertically to the bottom scale to read 160 cycles.

Courtesy Bell Laboratories.