jensen transformers

By REICHENBACH ENGINEERING

Data Sheet

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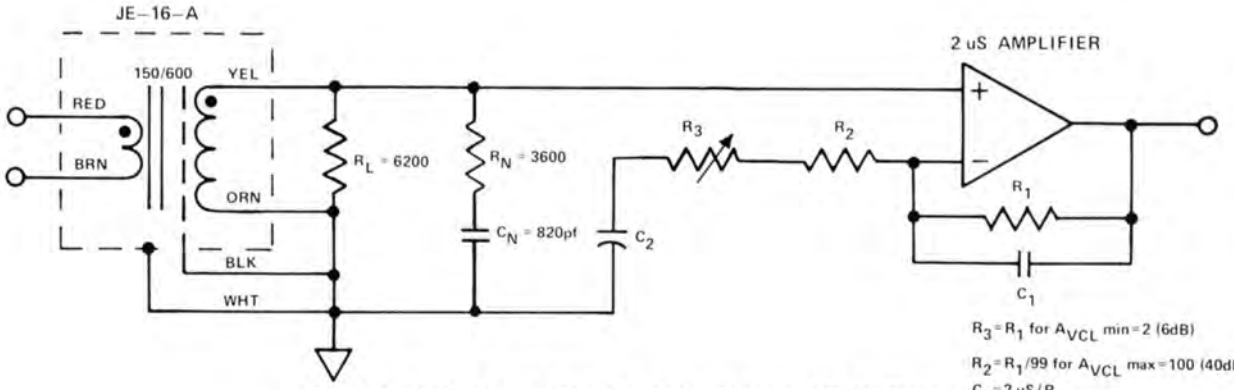
JE-16-A
MICROPHONE INPUT TRANSFORMER

The JE-16-A is a 1:2 turns ratio (150/600 ohm) microphone input transformer for use with European type input circuits or the 990 operational amplifier. It handles levels to +8dBv Re: 0.775v @ 20Hz (1% THD). Below saturation, the 20Hz THD is less than 0.1%. The bandwidth is 170kHz with no overshoot independent of the amplifier bandwidth. The JE-16-A has a multiple interleaved layer winding, similar to the JE-115K-E, for low leakage inductance. This yields wide bandwidth quite insensitive to load, low losses which affect noise in the upper spectrum, and very high frequency low Q resonance. A series RC network of 3600 ohms and 820pf should be connected across the 6200 ohm secondary load resistor for minimum transient distortion.

The series loss ratio referred to the secondary for 20kHz bandwidth is 1.45 ohm/ohm. This results in the transformer related noise figure of only 1.9dB. The 10kHz secondary source impedance is only 5% higher than that at 1kHz, so the noise spectrum is very close to a pure resistance. The 20kHz equivalent input noise is −128.8dBv Re: 0.775v when used with the 990 operational amplifier (0.8 nv/rt Hz per xstr & 1.0 pa/rt Hz).

The input impedance is higher and flatter than the higher ratio types, yielding good regulation of frequency response characteristics with various source impedances.



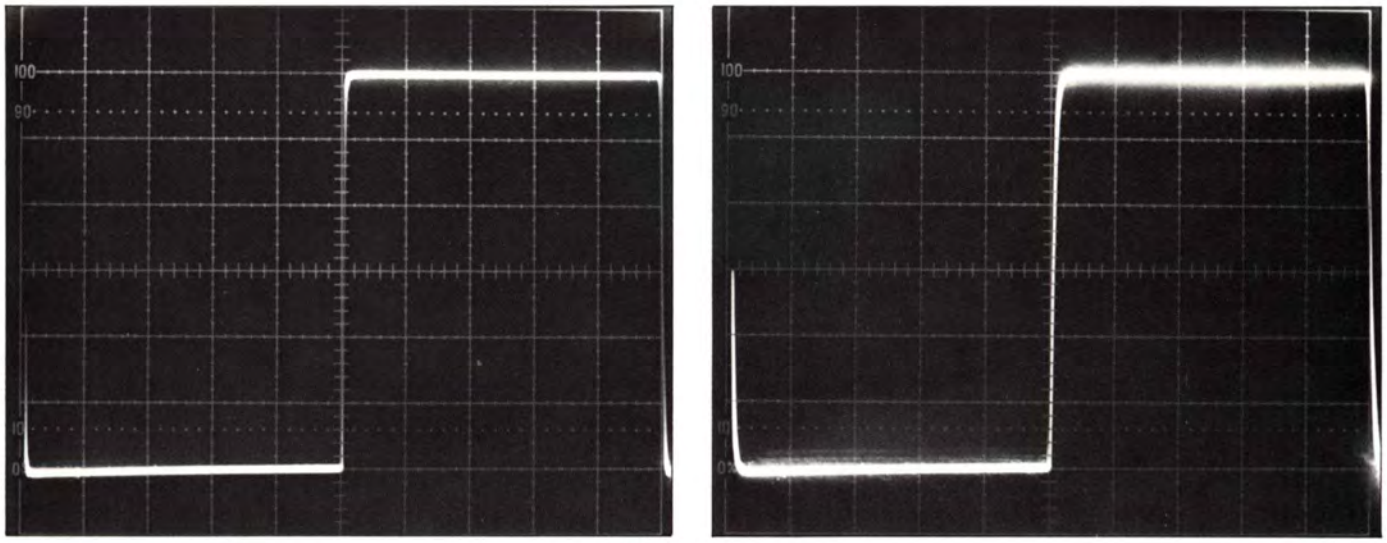
SCHEMATIC DIAGRAM OF TYPICAL TRANSFORMER APPLICATION

$R_3 = R_1$ for A_{VCL} min = 2 (6dB)
$R_2 = R_1/99$ for A_{VCL} max = 100 (40dB)
$C_1 = 2\ uS/R_1$
$C_2 = 64mS/R_2$

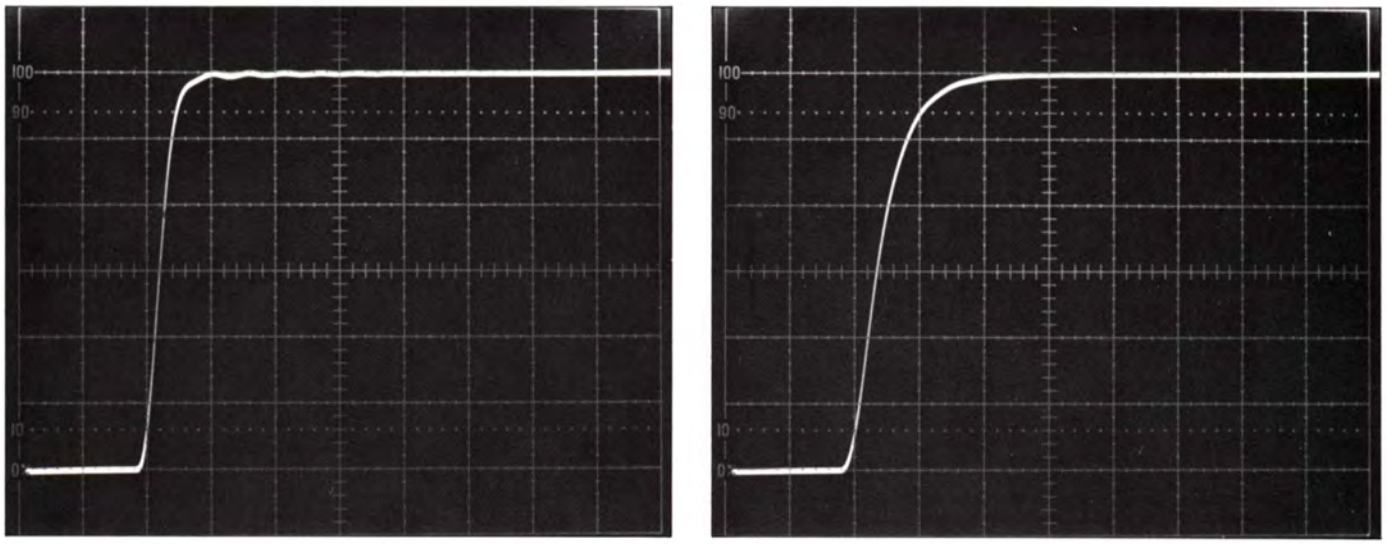
REGARDING THE OSCILLOSCOPE PHOTOS

Actual oscilloscope photos were made from a Tektronix Model 453A (certified calibration). Left column is transformer with secondary termination network and right column includes a 2 microsecond amplifier.

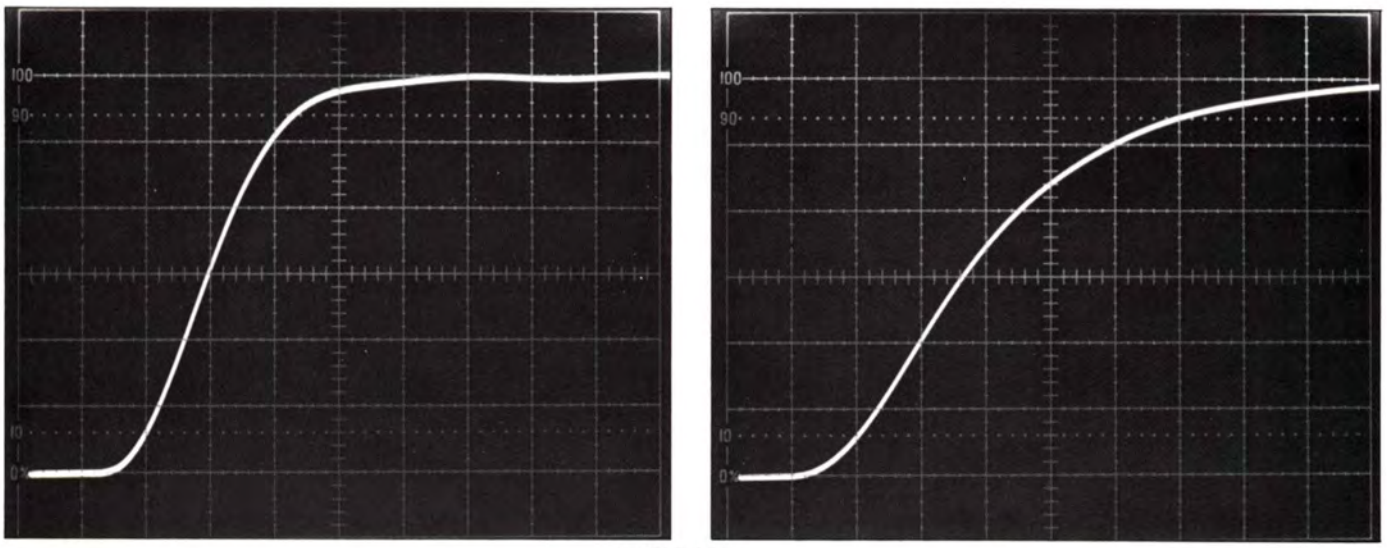
2kHz Square Wave



50μS/division



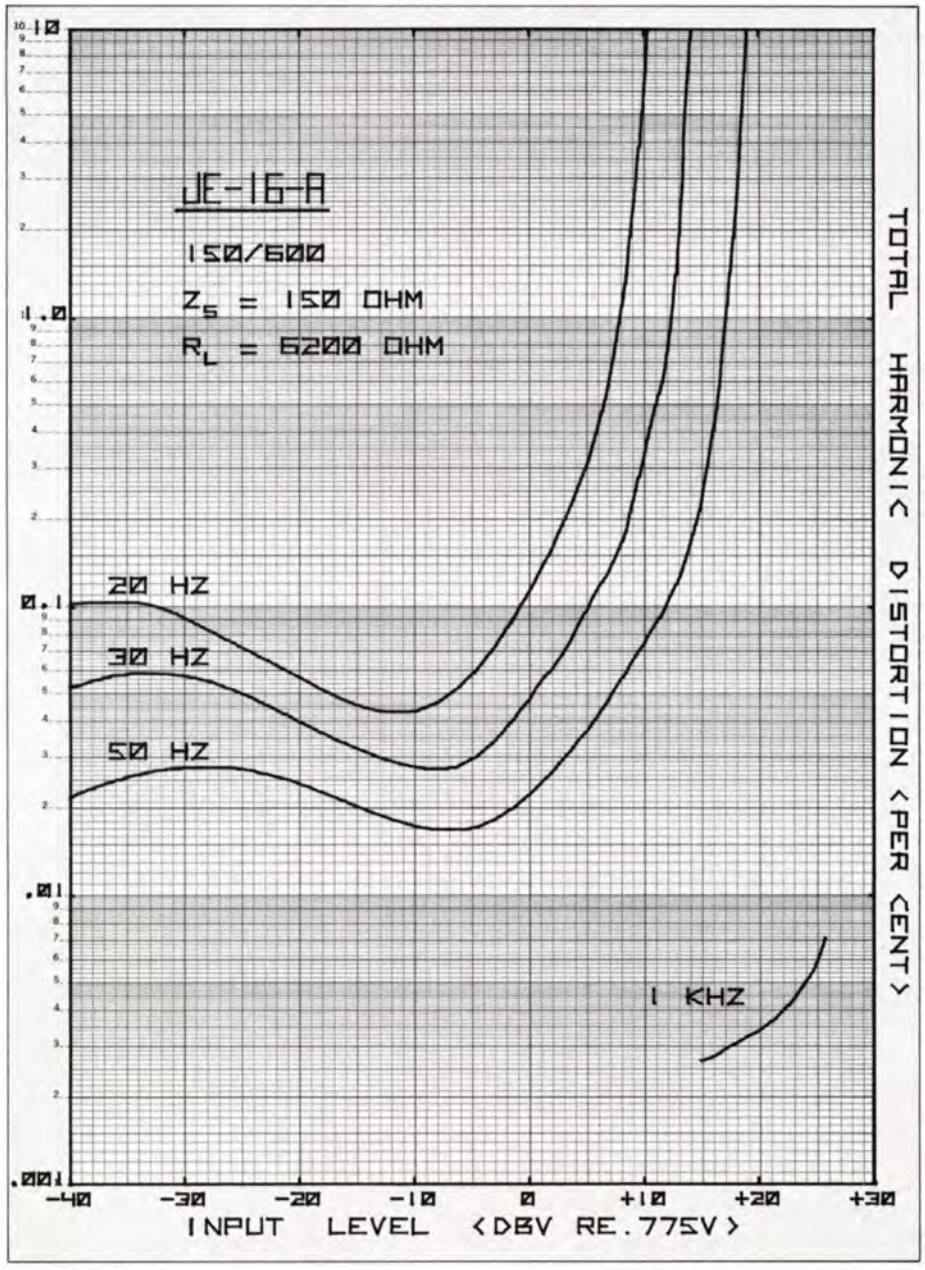
5μS/division



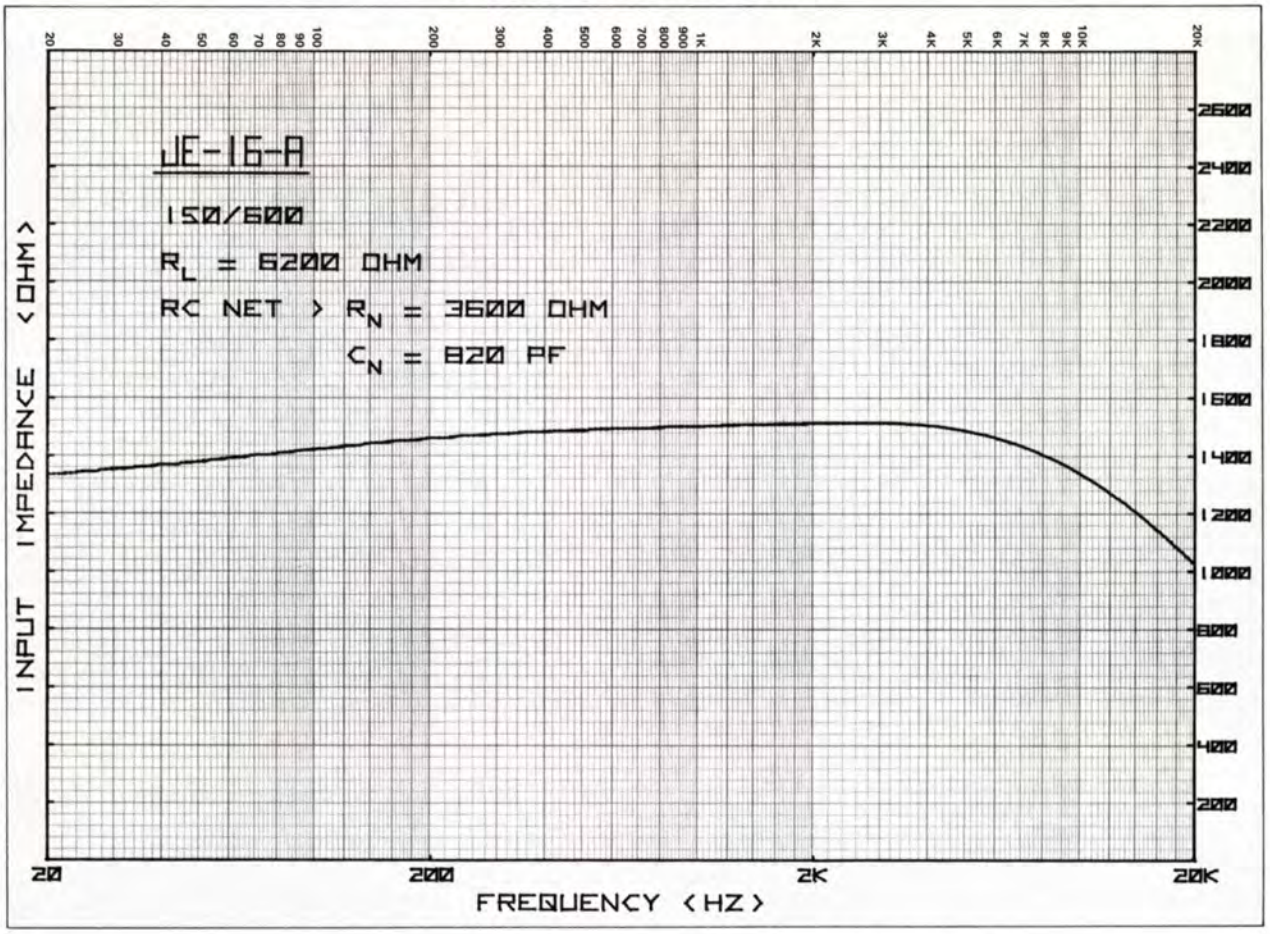
1μS/division

All curves were generated by a Hewlett-Packard 9815A/9862A programmable calculator/plotter. All calculations were either derived from or verified by actual measurements. Verified accuracies are on the order of one pen-line width.

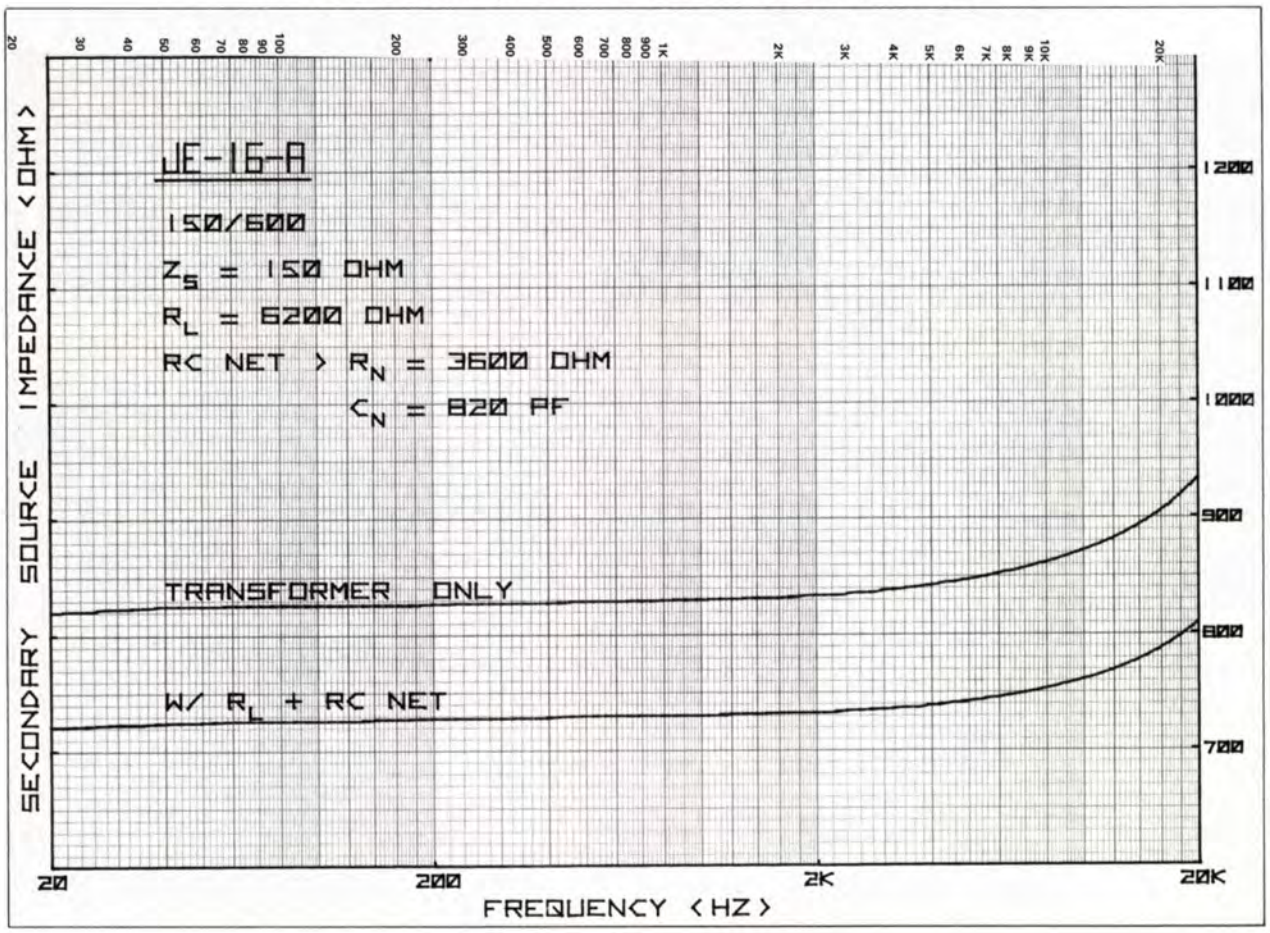
DISTORTION



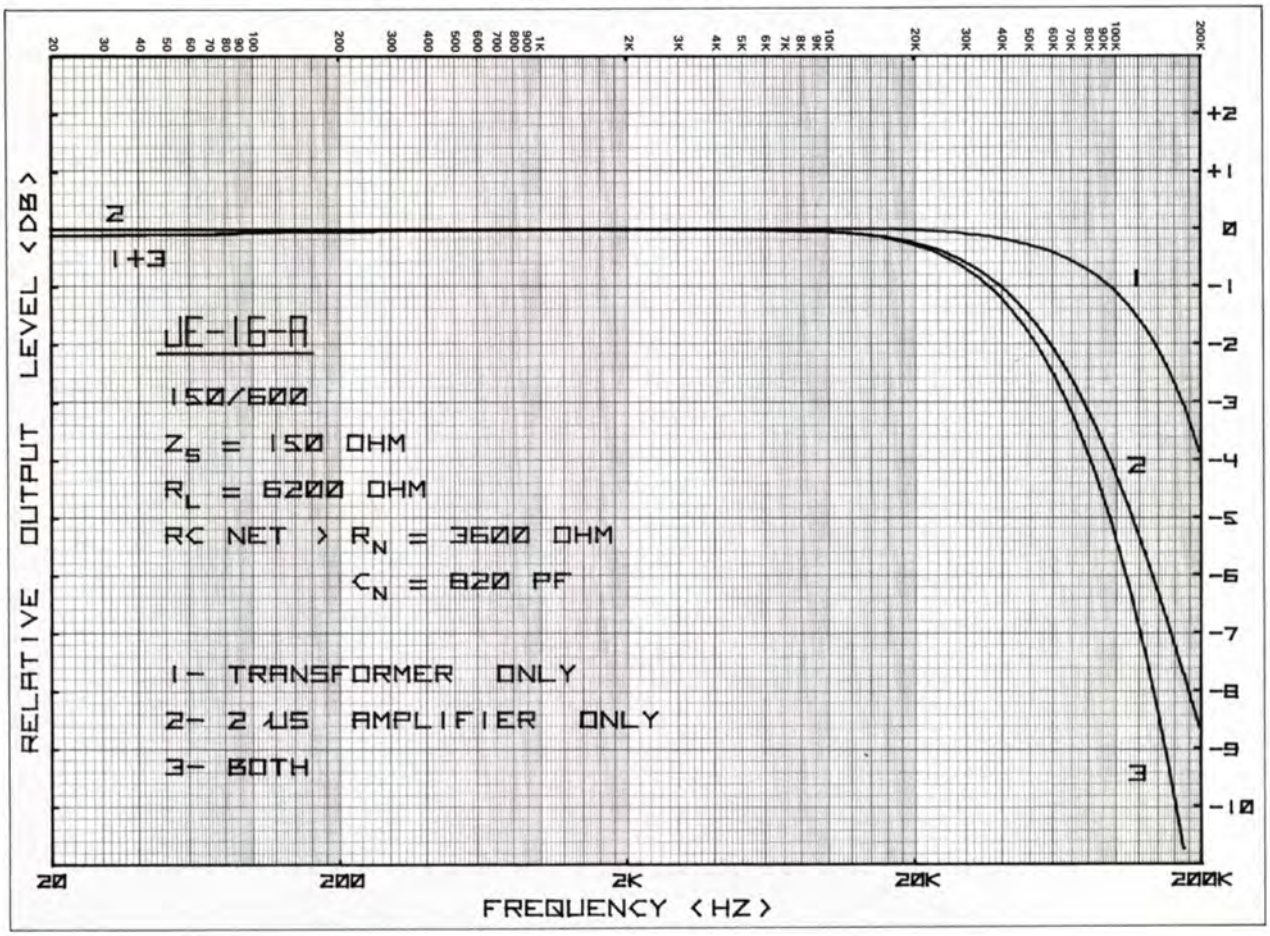
INPUT IMPEDANCE



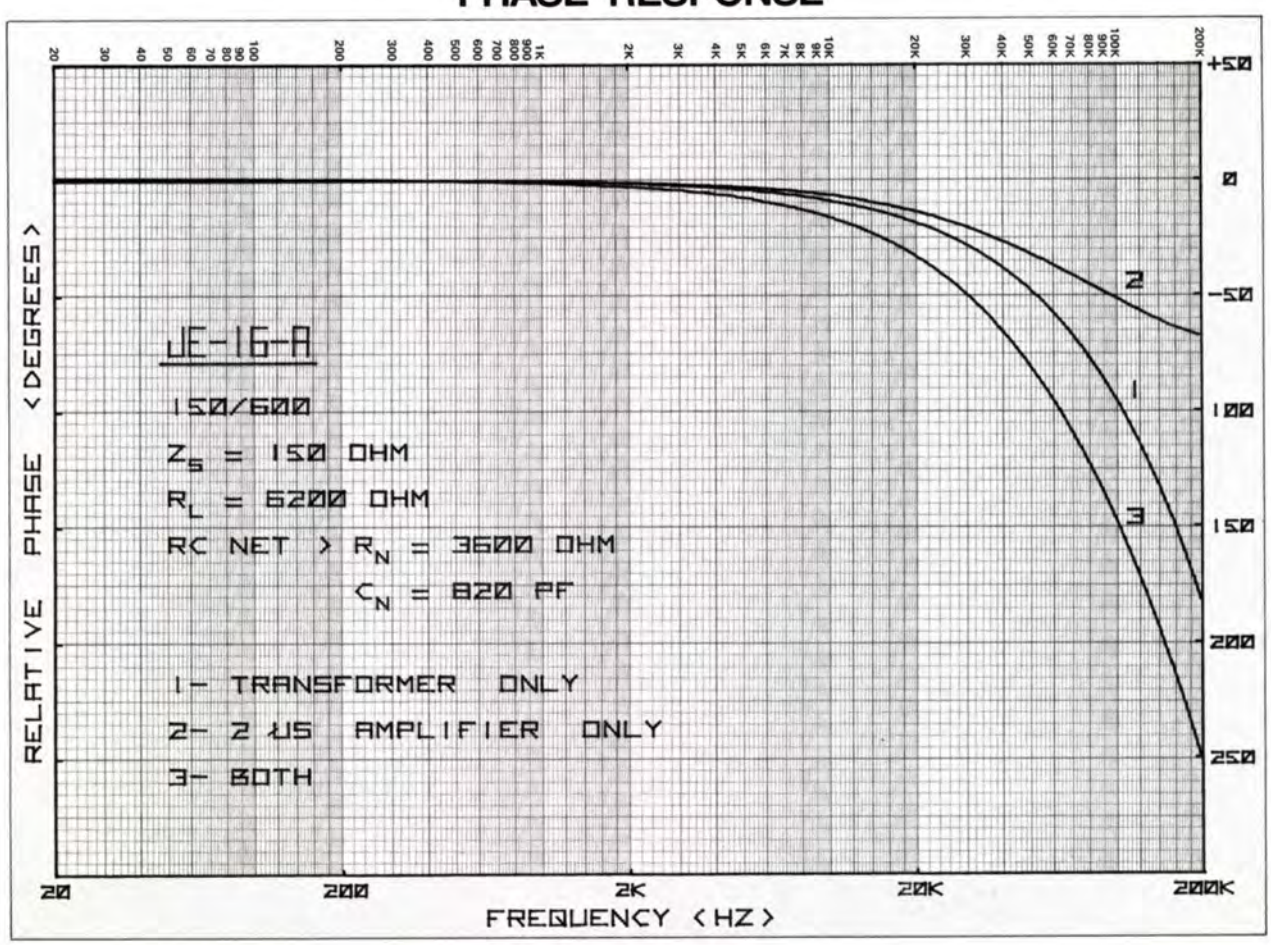
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



GENERAL CHARACTERISTICS

Turns Ratio
1:2
Impedance Ratio
150/600
Primary Source Impedance
150 ohms
Secondary Load Resistor
6200 ohms
Secondary RC Network
R_N = 3600 ohms C_N = 820pf
Faraday Shield
Separate lead
Magnetic Shield
30dB, separate case lead
Maximum Input Level at 20Hz
+9dBv (Re: 0.775v)

PHYSICAL CHARACTERISTICS

Package
Mu-metal can
Termination
Wire leads
Dimensions
1-5/16" diameter, 1-9/16" high
Mounting
2 holes, 0.7" center-to-center, self-tapping screws or clamp

TYPICAL PERFORMANCE

Voltage Gain
5.6dB
Input Impedance
1500 ohms @ 1kHz
1340 ohms @ 10kHz
Secondary Source Impedance
830 ohms @ 1kHz
872 ohms @ 10kHz
Total Harmonic Distortion (Below Saturation)
0.10% maximum @ 20Hz
0.06% maximum @ 30Hz
0.028% maximum @ 50Hz
0.003% @ 1kHz
Input Level @ 1% Saturation (dBv Re: 0.775v)
+8dBv @ 20Hz
+12dBv @ 30Hz
+17dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>85dB @ 1kHz
>65dB @ 10Khz,
Transformer Noise Figure*
1.9dB Re: 134.9 ohms**

(TRANSFORMER WITH SECONDARY TERMINATION ONLY)

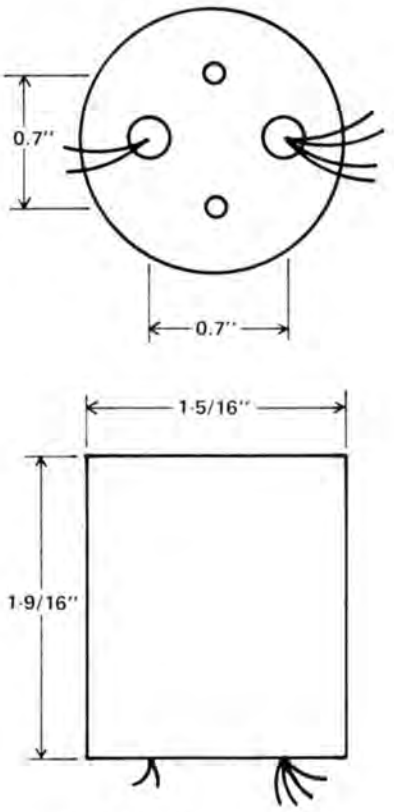
Frequency Response (Re: 1kHz)
−0.1dB @ 20Hz
−0.03dB @ 20kHz
(No resonance peak)
Bandwidth
170kHz @ −3dB
Phase Response
−19° @ 20kHz
Rise Time
2.2μS (10%-90%)
Overshoot
<1%

(INCLUDING 2μS AMPLIFIER)

Frequency Response (Re: 1kHz)
−0.1dB @ 20Hz
−0.3dB @ 20kHz
(No resonance peak)
Bandwidth
75kHz @ −3dB
Phase Response
−33° @ 20kHz
Rise Time
4.9μS (10%-90%)
Overshoot
<1%

Add to amplifier NF referred to impedance of 760 ohms. (Parallel value of secondary source impedance and load)

**Parallel value of source impedance and input impedance.*



Mounting Holes
Clearance for #4 screw
Lead Holes
Use 0.35" hole to clear grommet

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1617 NORTH FULLER AVENUE
HOLLYWOOD, CALIFORNIA 90046
PHONE: (213) 876-0059

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Data Sheet

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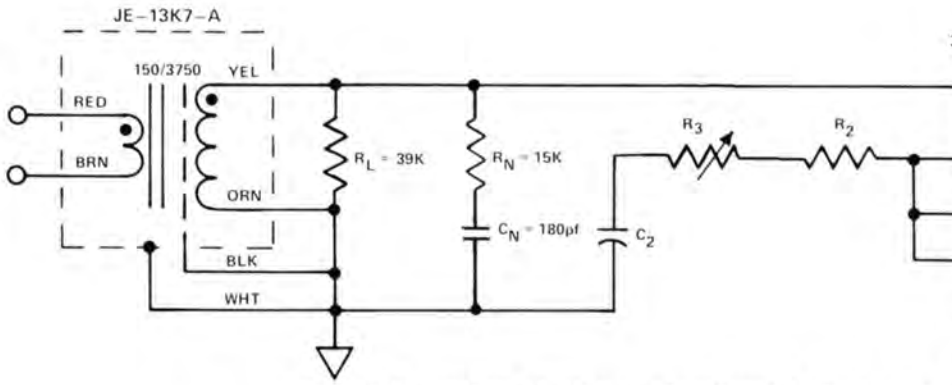
By REICHENBACH ENGINEERING

JE-13K7-A
MICROPHONE INPUT TRANSFORMER

The JE-13K7-A is a 1:5 turns ratio (150/3750 ohm) microphone input transformer for use with European type input circuits. It handles levels to +8dBv Re: 0.775v @ 20Hz (1% THD). Below saturation, the 20Hz THD is less than 0.1%. The bandwidth is 100kHz with no overshoot independent of the amplifier bandwidth. The JE-13K7-A has a multiple interleaved layer winding, similar to the JE-115K-E, for low leakage inductance. This yields wide bandwidth quite insensitive to load, low losses which affect noise in the upper spectrum, and very high frequency low Q resonance. A series RC network of 15K ohms and 180pf should be connected across the 39K ohm secondary load resistor for minimum transient distortion.

The series loss ratio referred to the secondary for 20kHz bandwidth is 1.55 ohm/ohm. This results in the transformer related noise figure of only 2.3dB. The 10kHz secondary source impedance is only 4.9% higher than that at 1kHz, so the noise spectrum is very close to a pure resistance. The 20kHz equivalent input noise is −128.0dBv Re: 0.775v when used with the NE5534A or the 918 operational amplifier (3.0 nv/rt Hz per xstr & 0.3 pa/rt Hz).



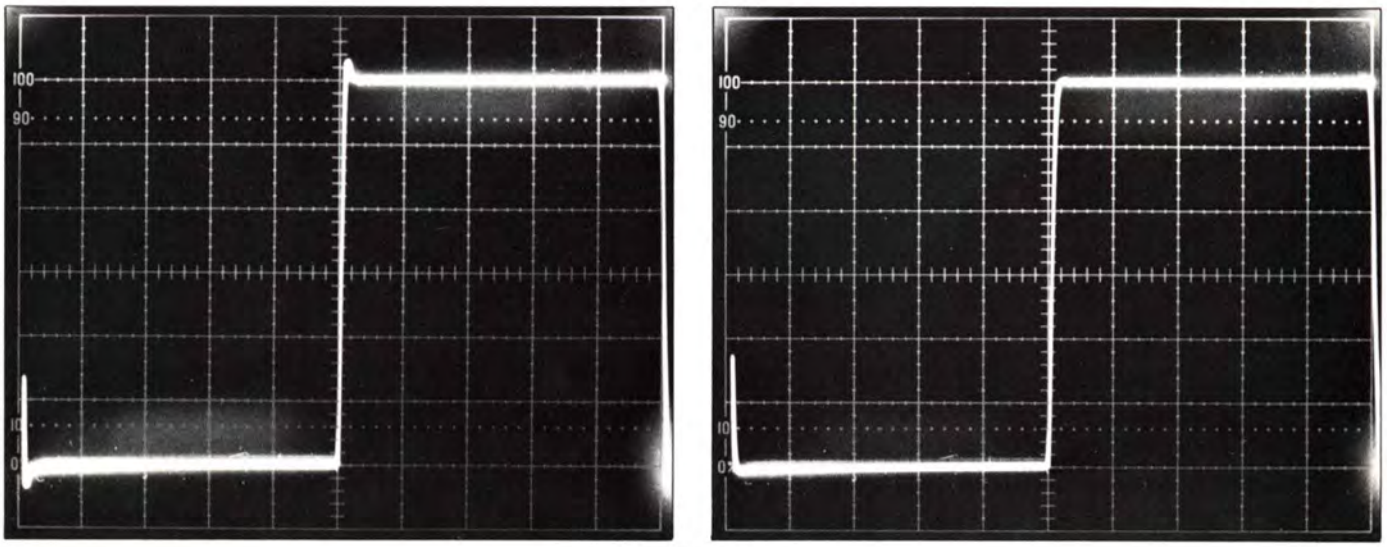
SCHEMATIC DIAGRAM OF TYPICAL TRANSFORMER APPLICATION

$R_3 = R_1$ for A_{VCL} min = 2 (6dB)
$R_2 = R_1/99$ for A_{VCL} max = 100 (40dB)
$C_1 = 2\ uS/R_1$
$C_2 = 64mS/R_2$

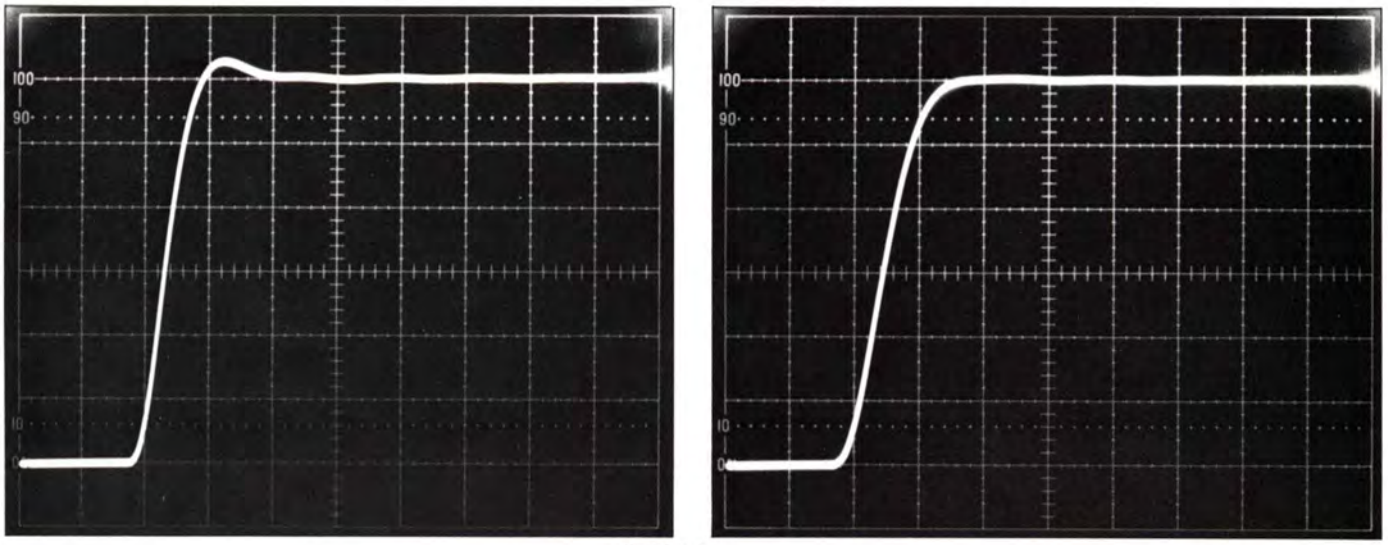
REGARDING THE OSCILLOSCOPE PHOTOS

Actual oscilloscope photos were made from a Tektronix Model 453A (certified calibration). Left column is transformer with secondary termination network and right column includes a 2 microsecond amplifier.

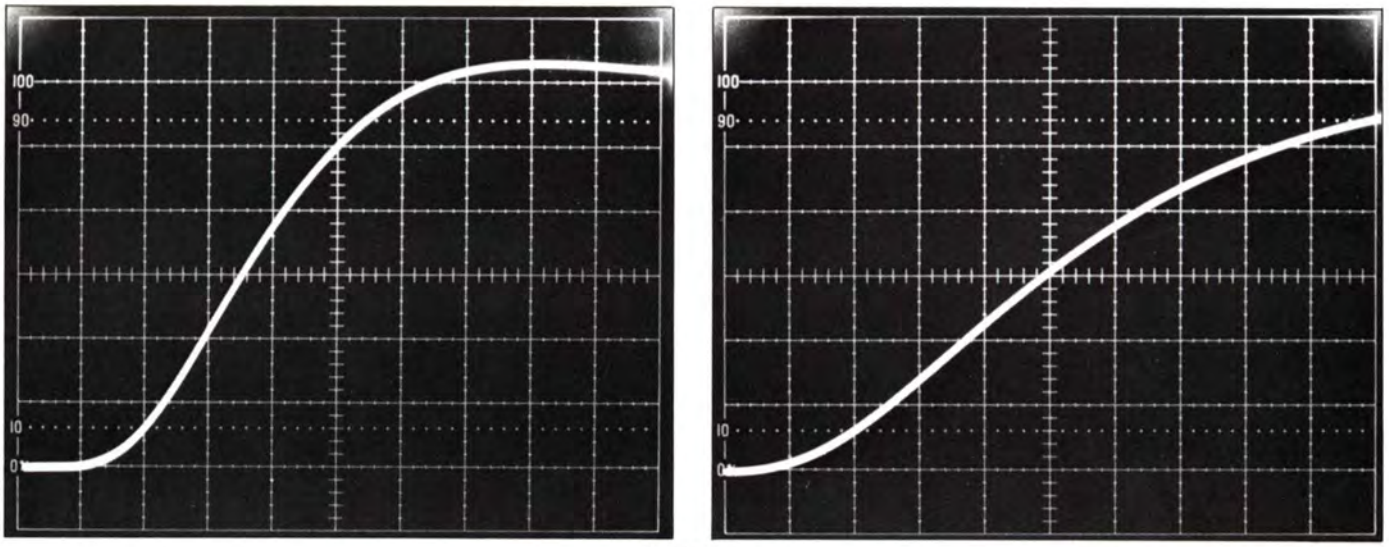
2kHz Square Wave



50μS/division



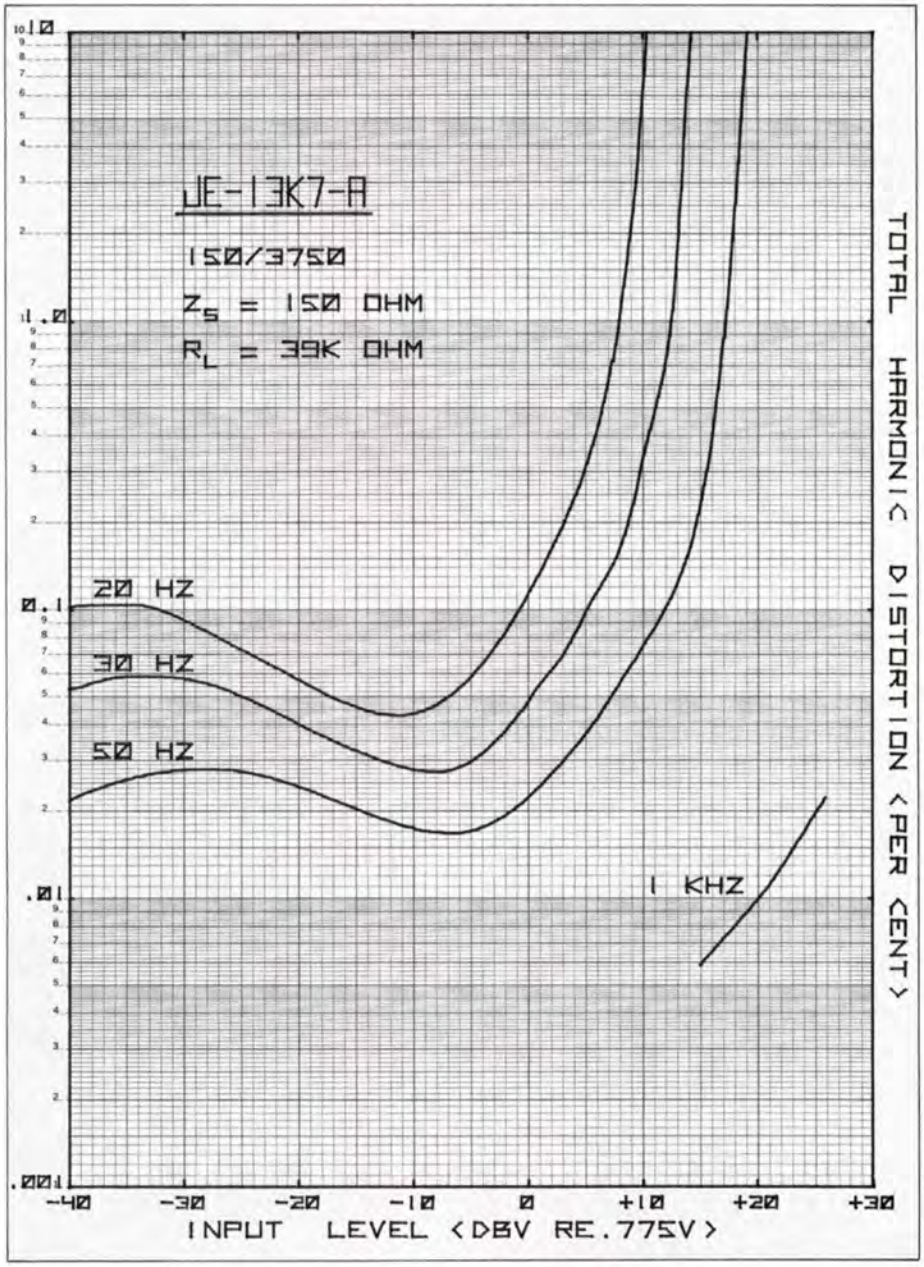
5μS/division



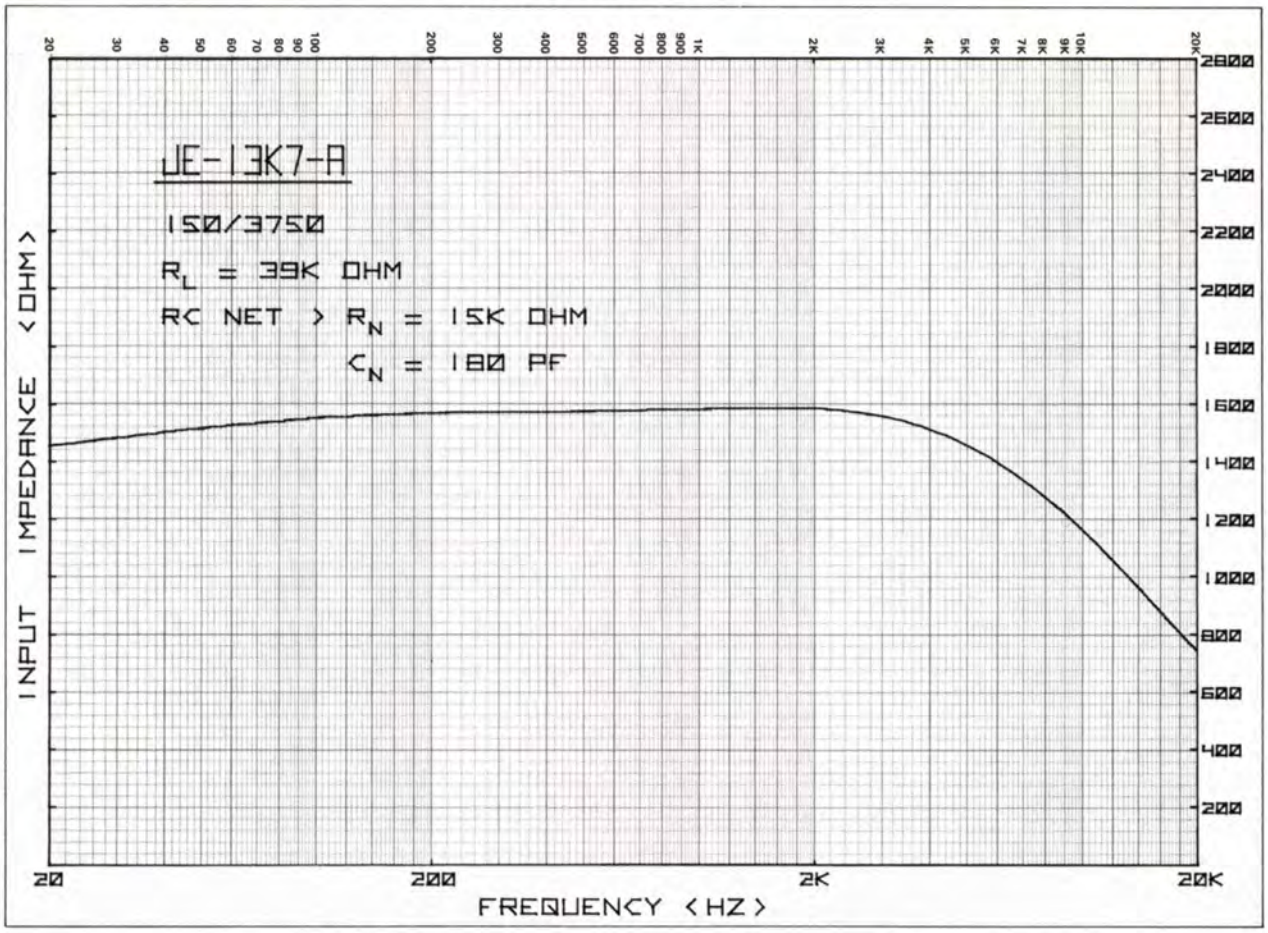
1μS/division

All curves were generated by a Hewlett-Packard 9815A/9862A programmable calculator/plotter. All calculations were either derived from or verified by actual measurements. Verified accuracies are on the order of one pen-line width.

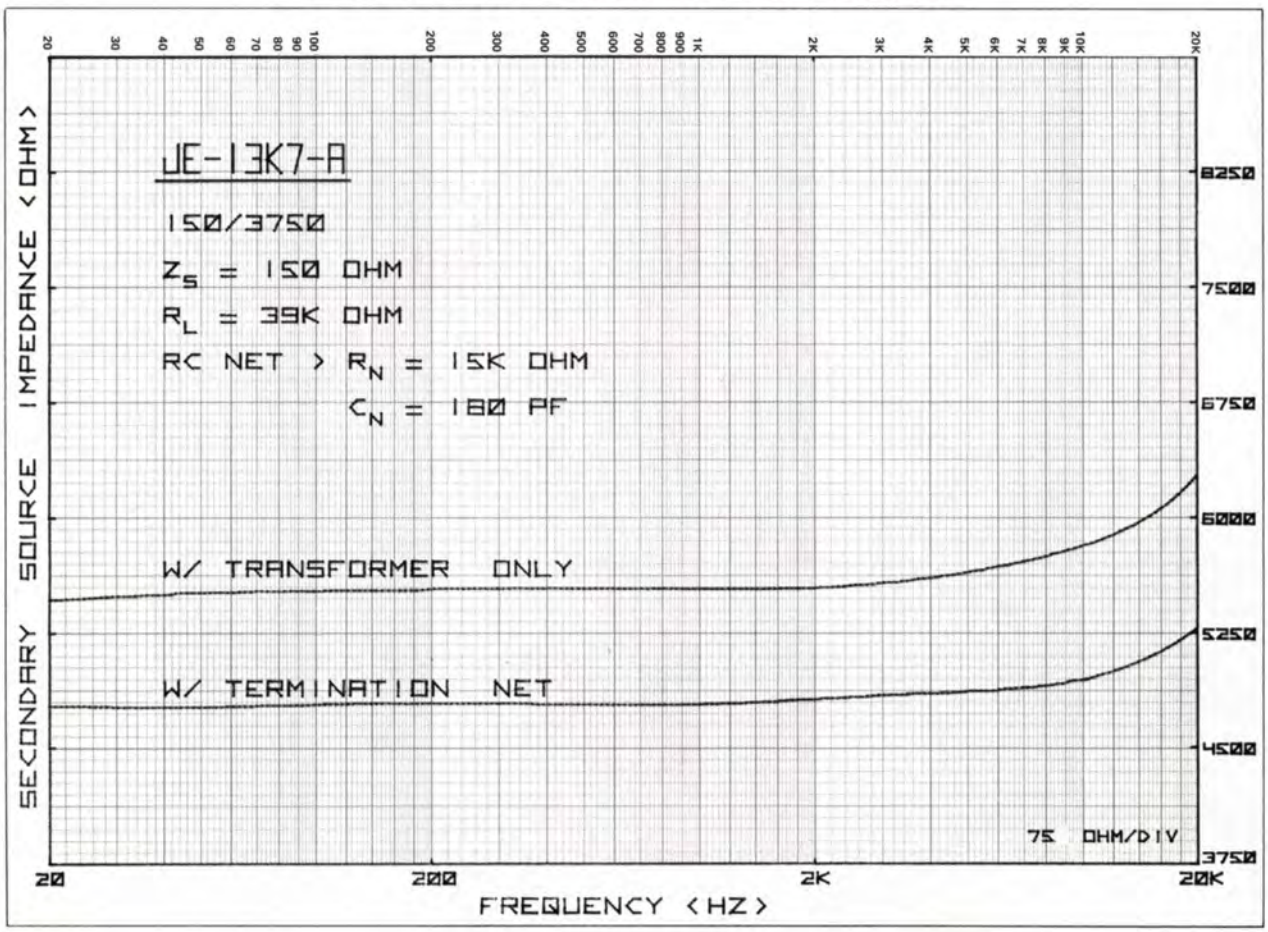
DISTORTION



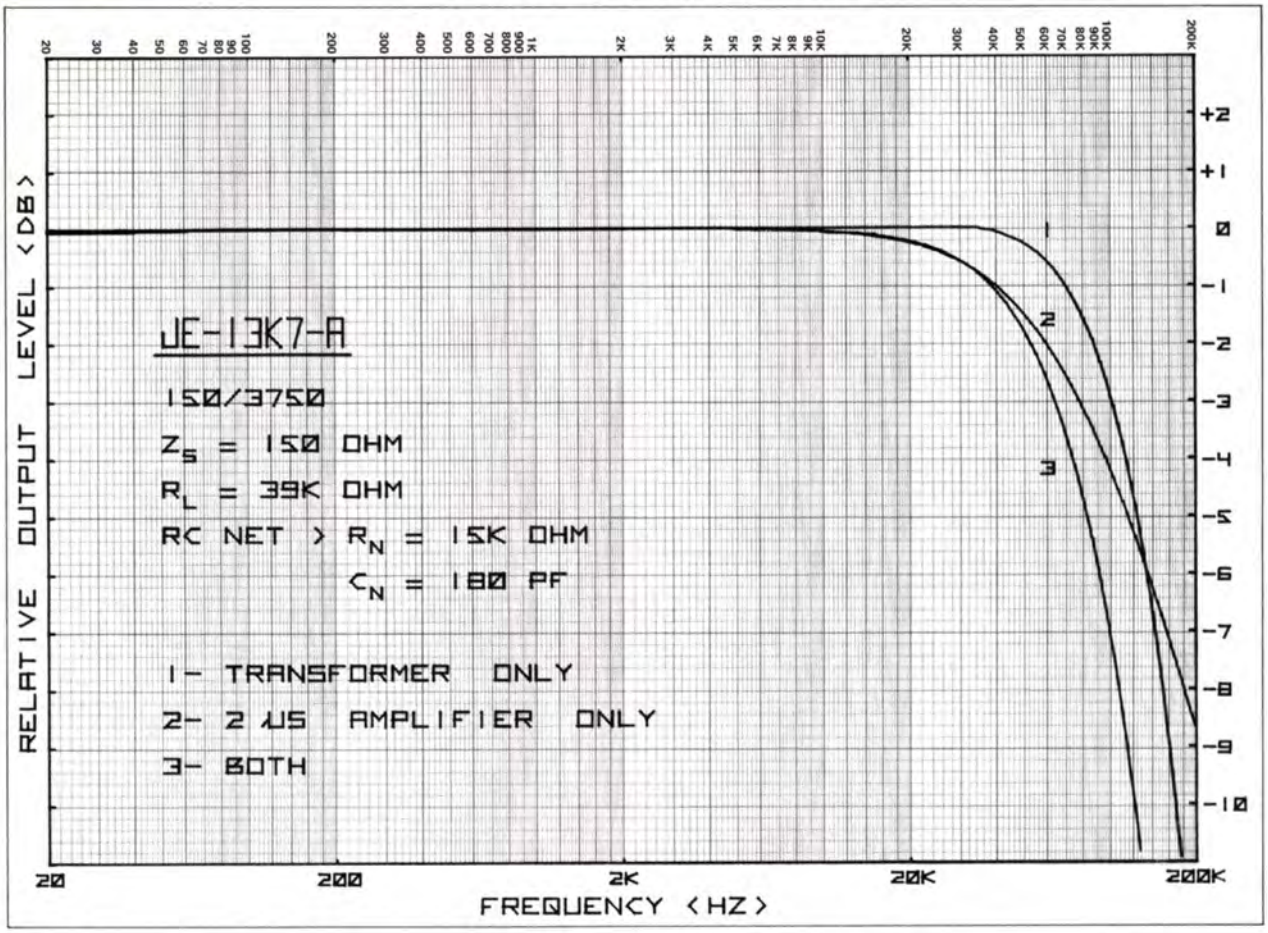
INPUT IMPEDANCE



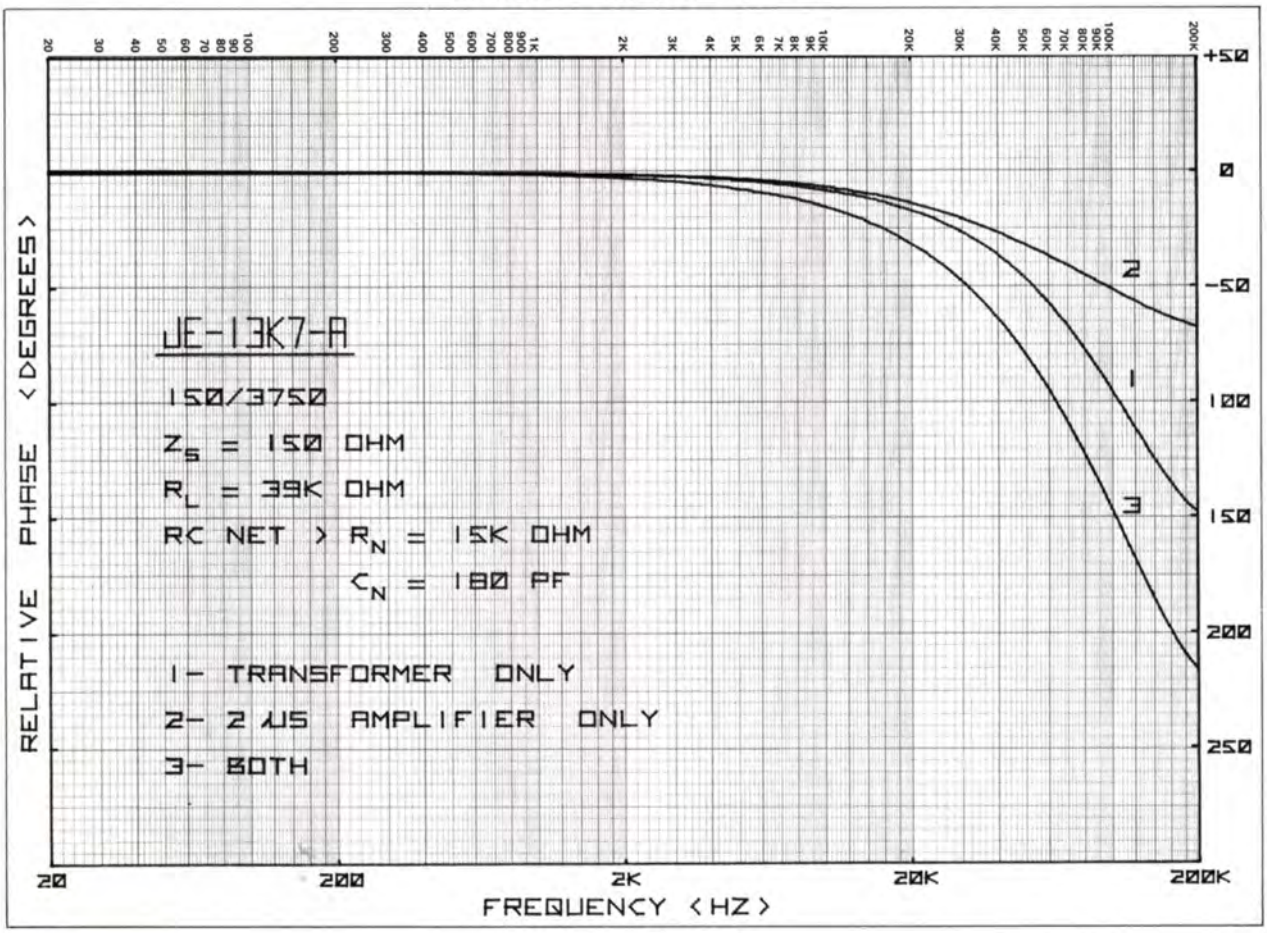
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



GENERAL CHARACTERISTICS

Turns Ratio
1:5
Impedance Ratio
150/3750
Primary Source Impedance
150 ohms
Secondary Load Resistor
39K ohms
Secondary RC Network
R_N = 15K ohms C_N = 180pf
Faraday Shield
Separate lead
Magnetic Shield
30dB, separate case lead
Maximum Input Level at 20Hz
+9dBv (Re: 0.775v)

PHYSICAL CHARACTERISTICS

Package
Mu-metal can
Termination
Wire leads
Dimensions
1-5/16" diameter, 1-9/16" high
Mounting
2 holes, 0.7" center-to-center, self-tapping screws or clamp

TYPICAL PERFORMANCE

Voltage Gain
13.5dB
Input Impedance
1580 ohms @ 1kHz
1160 ohms @ 10kHz
Secondary Source Impedance
5550 ohms @ 1kHz
5820 ohms @ 10kHz
Total Harmonic Distortion (Below Saturation)
0.10% maximum @ 20Hz
0.06% maximum @ 30Hz
0.028% maximum @ 50Hz
0.006% @ 1kHz
Input Level @ 1% Saturation (dBv Re: 0.775v)
+8dBv @ 20Hz
+12dBv @ 30Hz
+17dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>85dB @ 1kHz
>65dB @ 10kHz
Transformer Noise Figure*
2.3dB Re: 132.8 ohms**

(TRANSFORMER WITH SECONDARY TERMINATION ONLY)

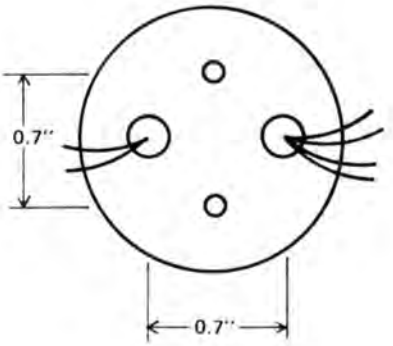
Frequency Response (Re: 1kHz)
−0.1dB @ 20Hz
+0.02dB @ 20kHz
(No resonance peak)
Bandwidth
100kHz @ −3dB
Phase Response
−18° @ 20kHz
Rise Time
3.4μS (10%-90%)
Overshoot
5%

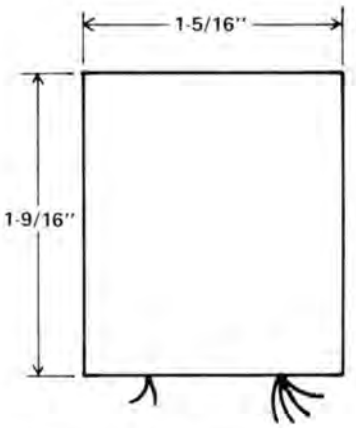
(INCLUDING 2μS AMPLIFIER)

Frequency Response (Re: 1kHz)
−0.1dB @ 20Hz
−0.25dB @ 20kHz
(No resonance peak)
Bandwidth
68kHz @ −3dB
Phase Response
−32° @ 20kHz
Rise Time
8μS (10%-90%)
Overshoot
<1%

Add to amplifier NF referred to impedance of 4950 ohms. (Parallel value of secondary source impedance and load)

***Parallel value of source impedance and input impedance.*





Mounting Holes
Clearance for #4 screw
Lead Holes
Use 0.35" hole to clear grommet

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JE-115K-E
MICROPHONE INPUT TRANSFORMER

The JE-115K-E is a microphone input transformer with extremely low leakage inductance. The step response exhibits less than 1% overshoot with the secondary loaded in 10 times its characteristic impedance requiring no RC resonance damping network when used with an amplifier which incorporates 2μS phase lead compensation in its feedback circuit.

2μS AMPLIFIER

The response characteristic of the JE-115K-E is a specific underdamped 2 pole low pass which, when combined with a 2μS single pole low pass amplifier, results very close to a critically damped 3 pole. This response shape defines zero transient distortion. The 2μS figure is determined from the Bode plot of an amplifier with a gain bandwidth product of 10MHz operated at a closed loop gain of 100 (40dB). The 10MHz figure is determined from popular amplifier types used in audio microphone preamplifiers. The closed loop gain is derived from the usual application of a variable feedback gain control over a range of 6-36dB. The 2μS figure determines a −3dB point at 80kHz to maintain a finite amount of feedback at all frequencies extending to the frequency of unity gain (open loop) for stability. The high frequency bandwidth of the transformer is 140kHz and with the 80kHz amplifier, the result is a 76kHz bandwidth without overshoot.

LOW FREQUENCY SATURATION

The rate of increase in distortion versus input level is specifically low; it could be stated as 10dB per decade THD. This results in a noticeably more gradual overload characteristic. The maximum input level capability at 20Hz is −1dBv (Re: 0.775v) for 4% THD (visable saturation) and −7dBv (Re: 0.775v) for 1% THD.

INPUT IMPEDANCE

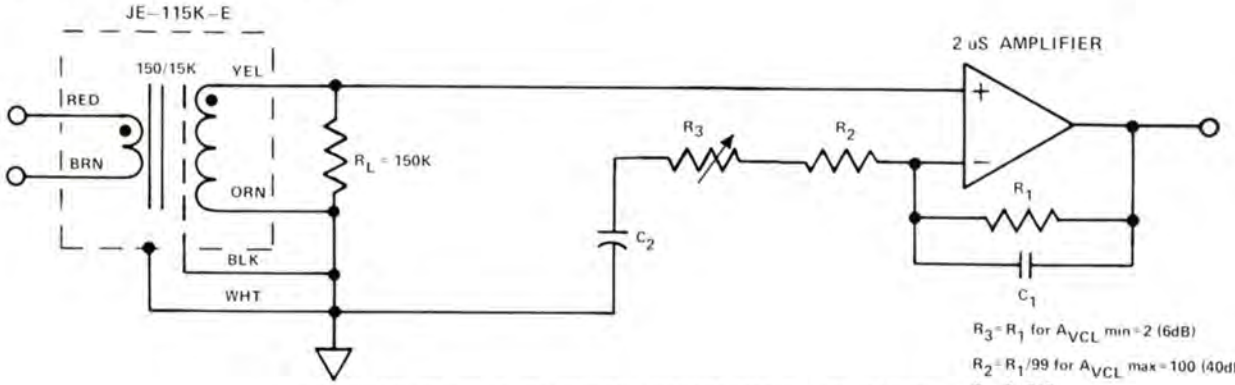
The input impedance, with the secondary terminated in 150K ohms, is 1400 ohms at mid-band frequencies, maintaining above 1000 ohms in the range of 26Hz to 14kHz.

LOSSES AFFECTING NOISE

The series loss ratio referred to the secondary for 20kHz bandwidth is 1.33 ohm/ohm. This results in the transformer related noise figure of only 1.5dB. The 10kHz secondary source impedance is only 2.1% higher than that at 1kHz, so the noise spectrum is very close to a pure resistance. The 20kHz equivalent input noise is −129.1dBv Re: 0.775v when used with the NE5534A or the 918 operational amplifier (3.0 nv/rt Hz per xstr & 0.3 pa/rt Hz).

PHASE SHIFT

The phase response at 20kHz is typically on the order of −5° (the 2μS amplifier exhibits −14° @ 20kHz).



SCHEMATIC DIAGRAM OF TYPICAL TRANSFORMER APPLICATION

$R_3 = R_1$ for A_{VCL} min = 2 (6dB)
$R_2 = R_1/99$ for A_{VCL} max = 100 (40dB)
$C_1 = 2\,uS/R_1$
$C_2 = 64mS/R_2$

REGARDING THE OSCILLOSCOPE PHOTOS

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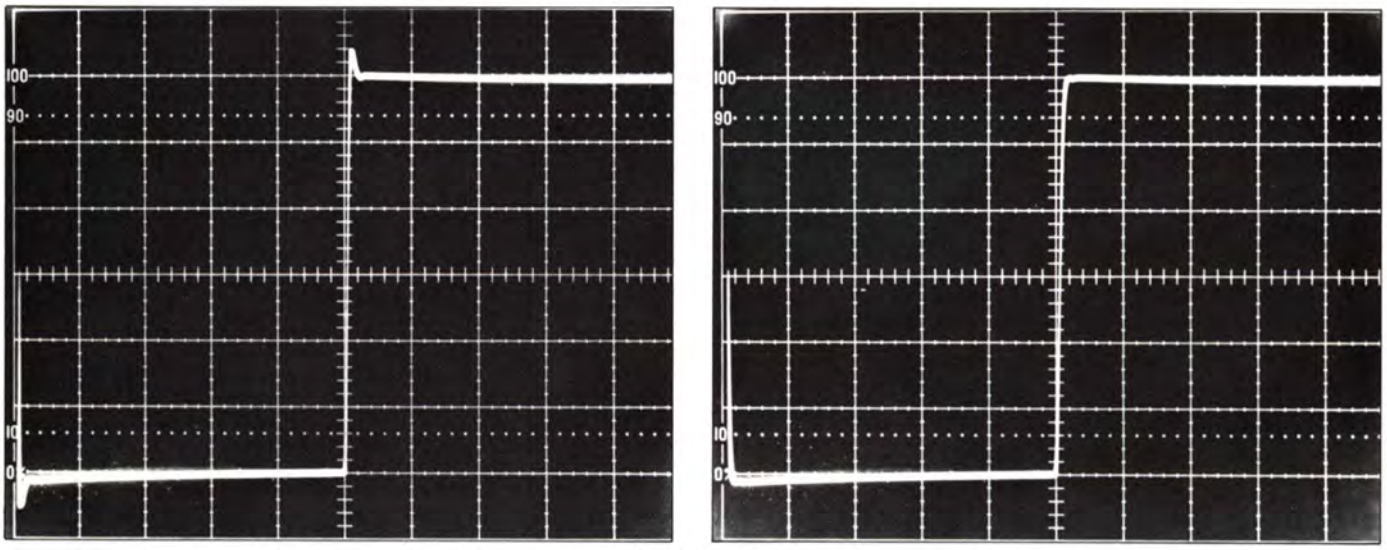
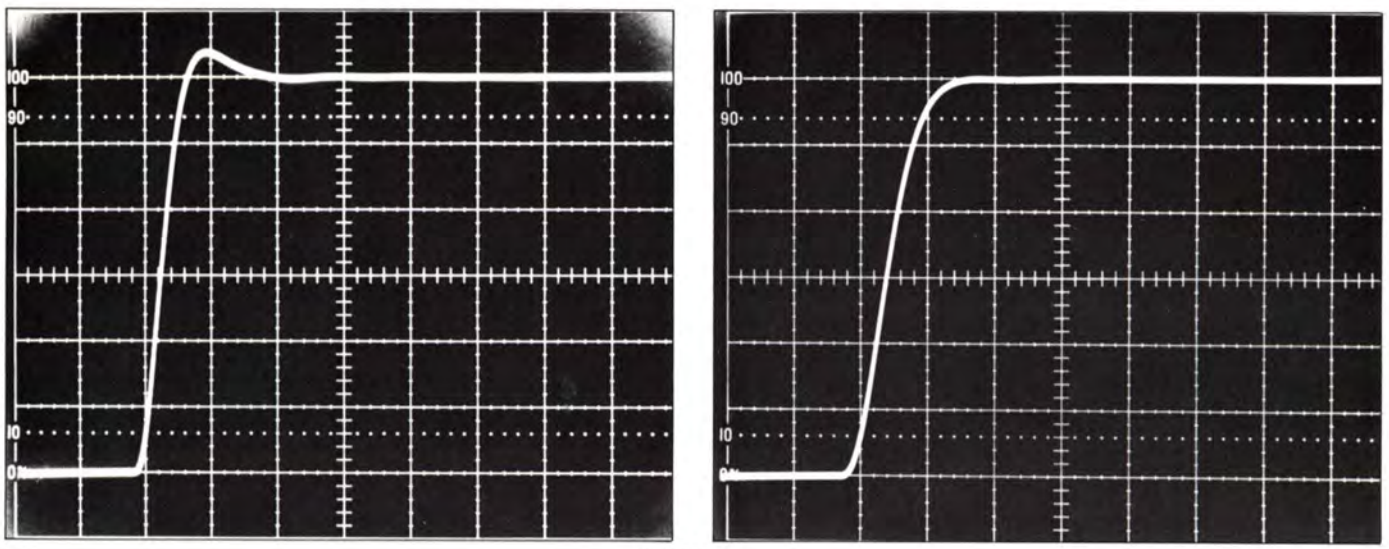
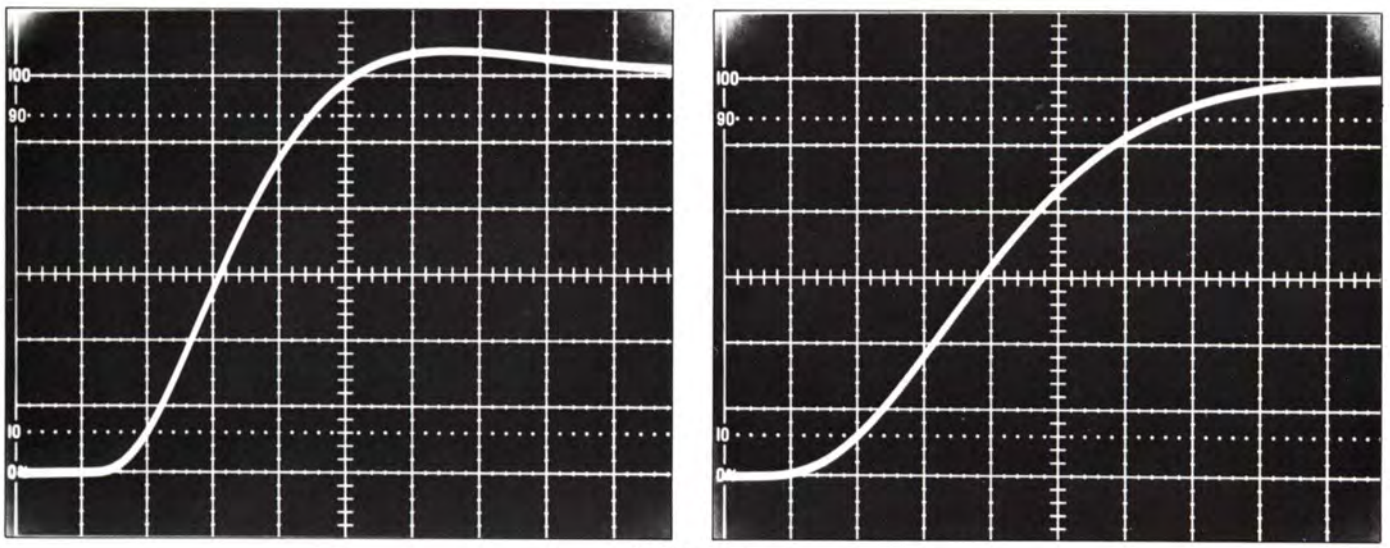
2kHz Square Wave



50μS/division



5μS/division



1μS/division

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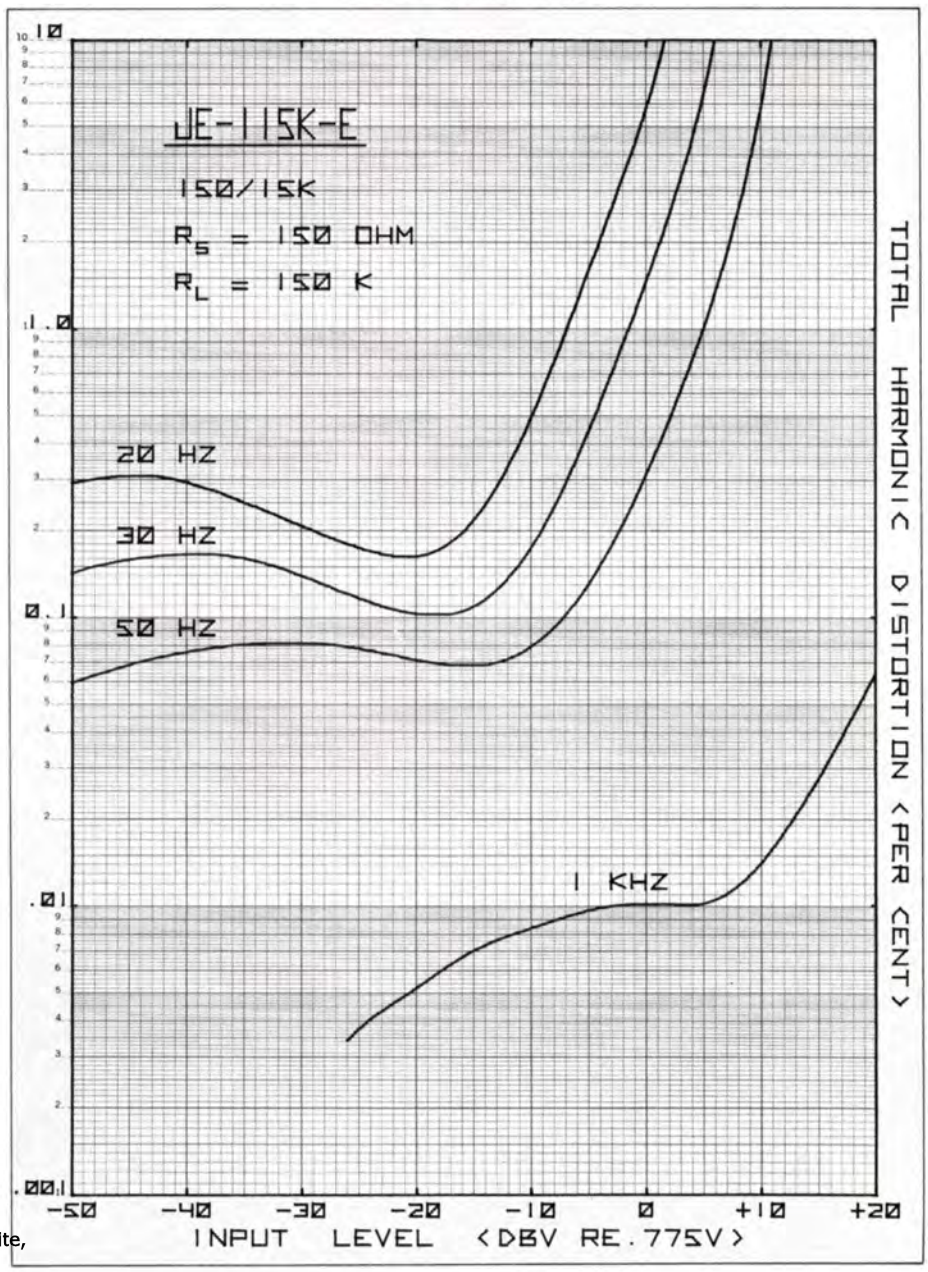
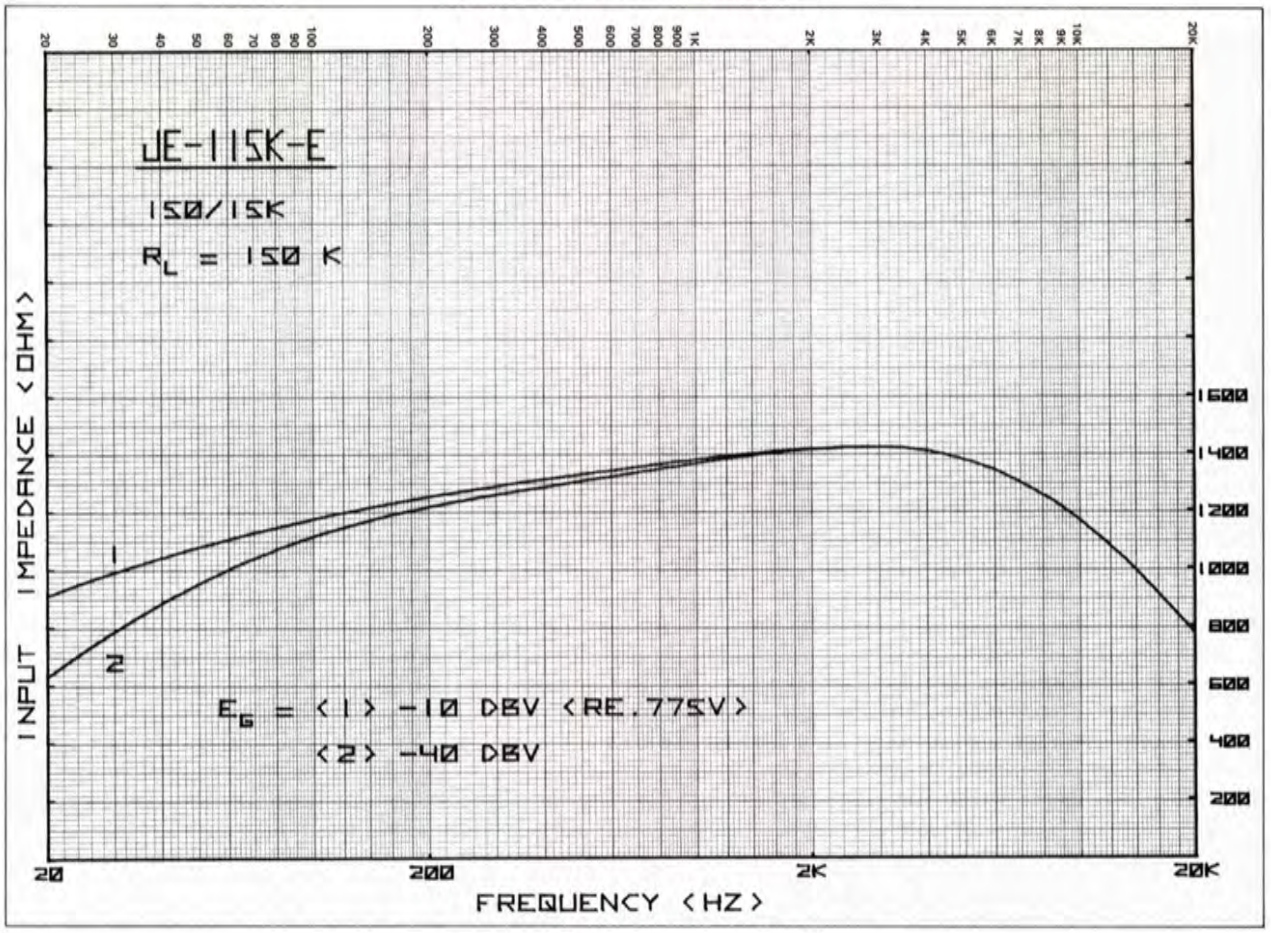
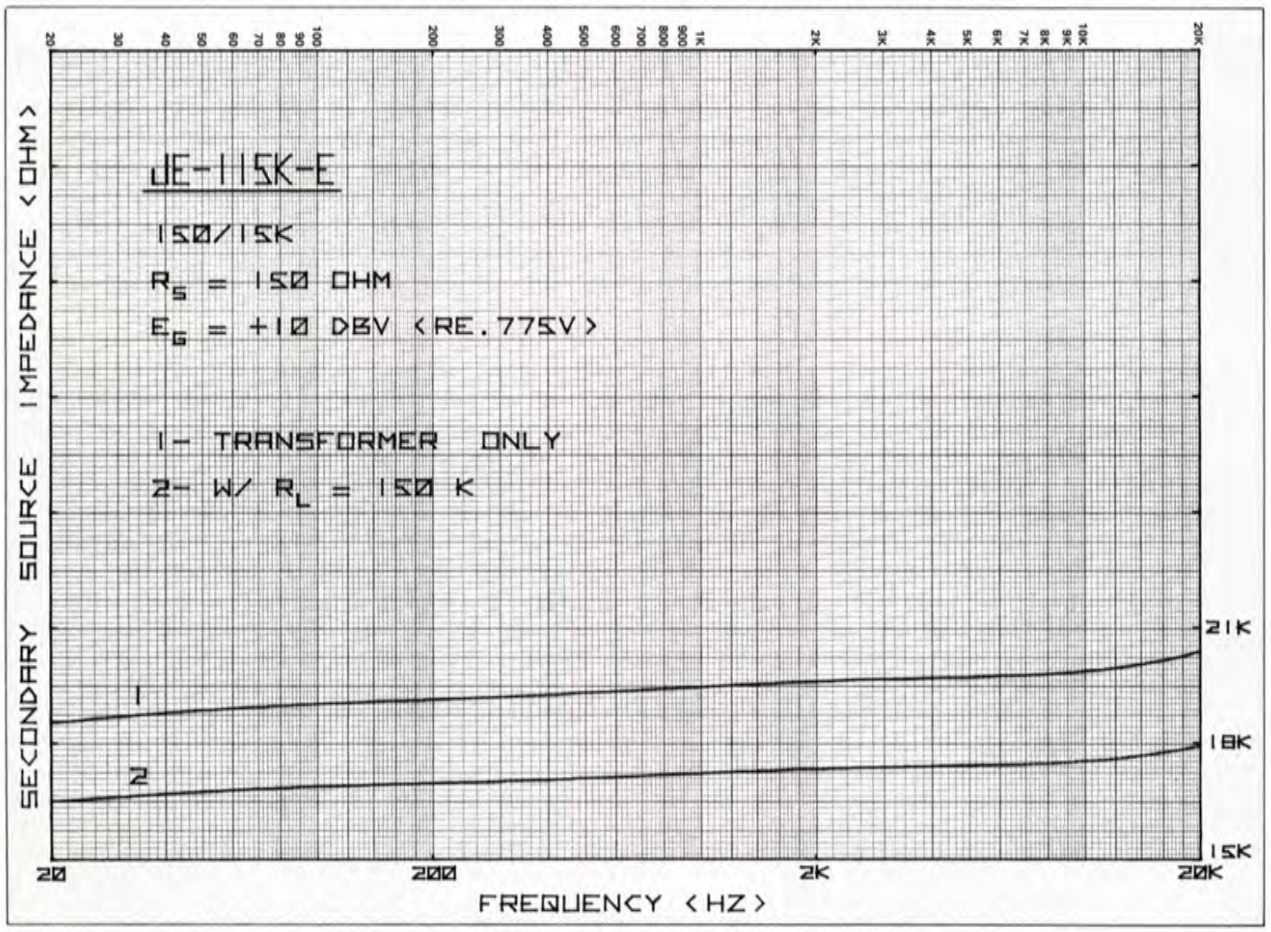
DISTORTION



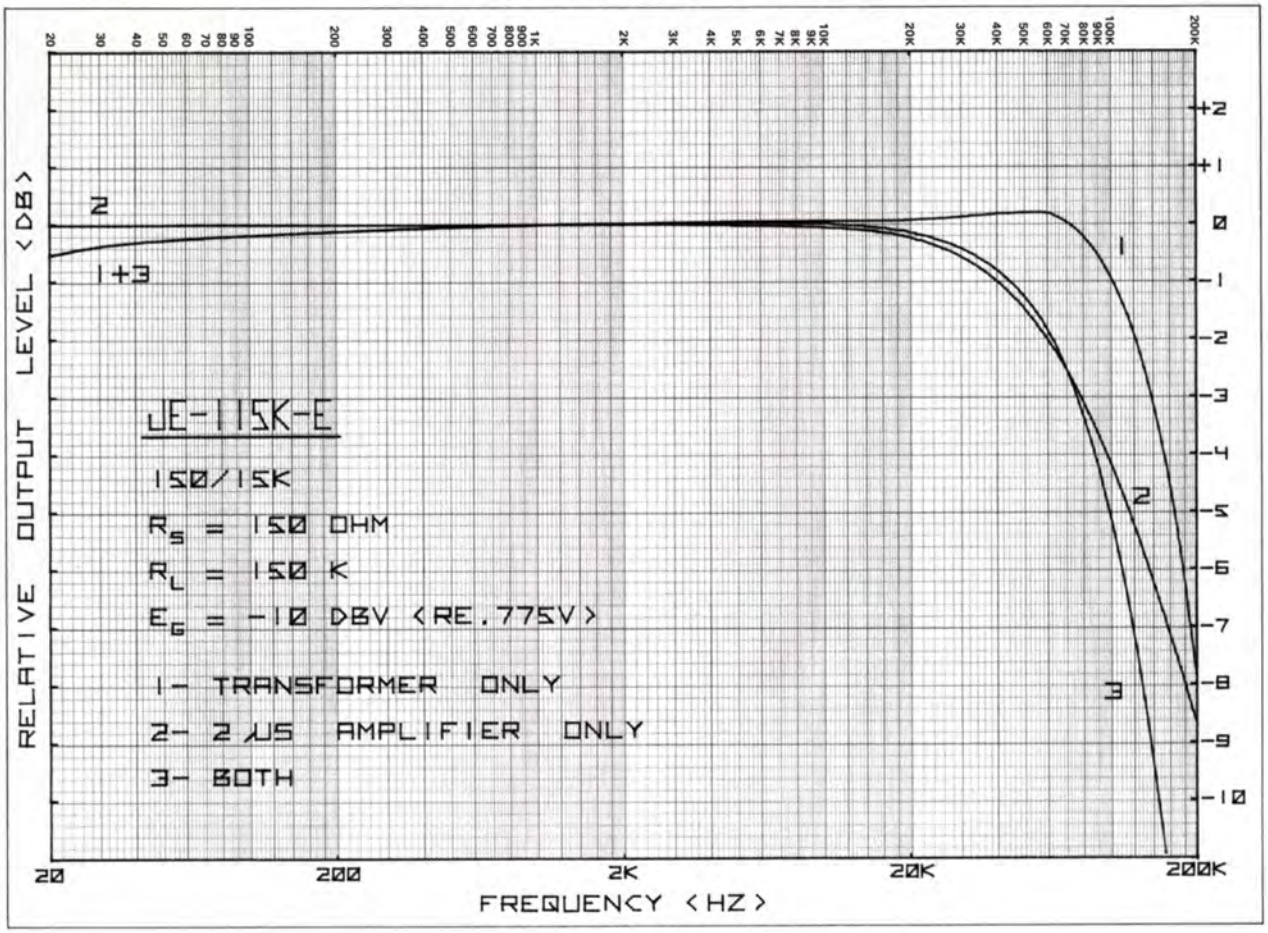
INPUT IMPEDANCE



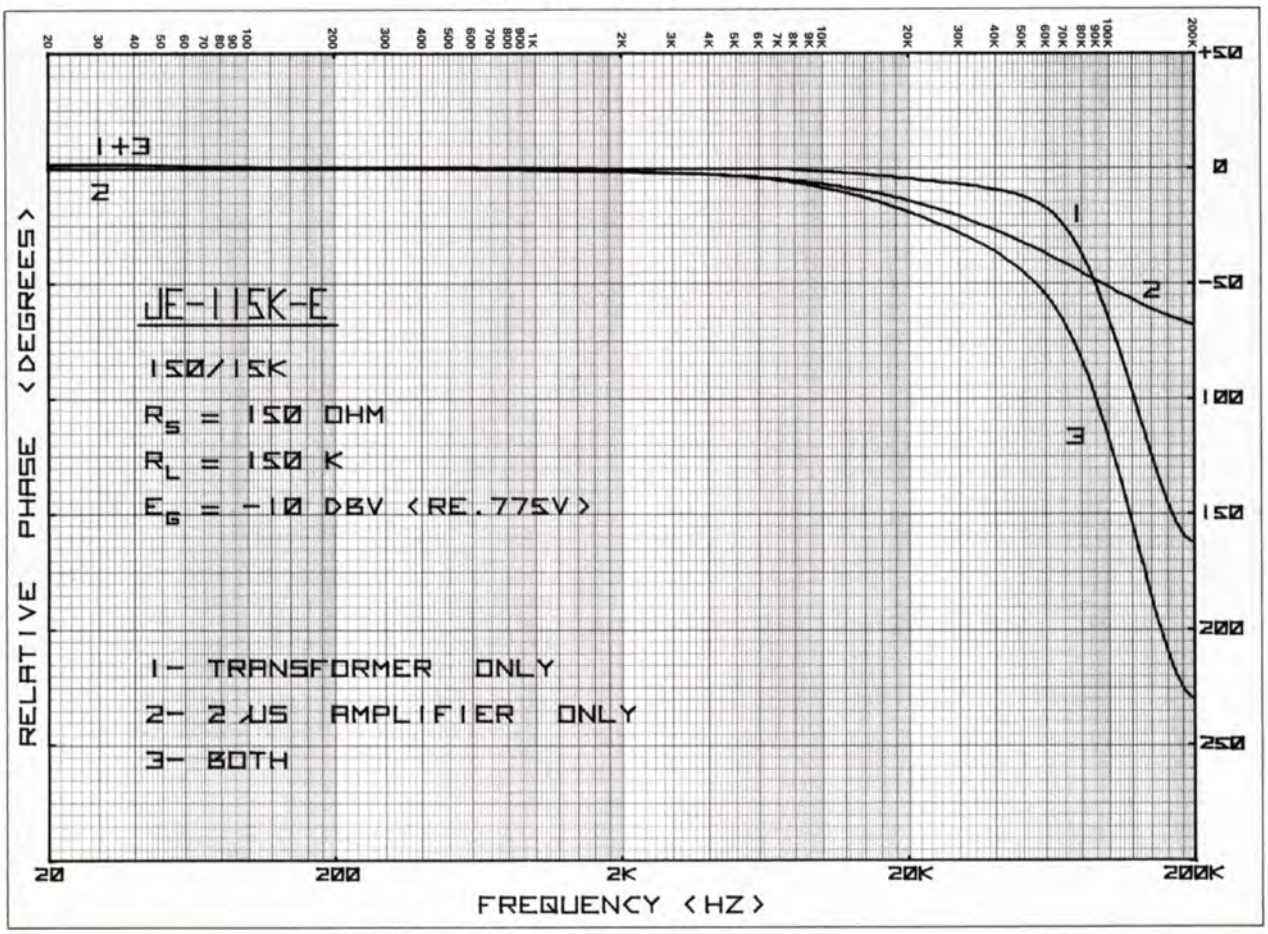
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



GENERAL CHARACTERISTICS

Turns Ratio
1:10
Impedance Ratio
150/15K
Primary Source Impedance
150 ohms
Secondary Load Resistor
150K ohms
Secondary RC Network
None Required
Faraday Shield
Separate lead
Magnetic Shield
30dB, separate case lead
Maximum Input Level at 20Hz
−1dBv (Re: 0.775v)

PHYSICAL CHARACTERISTICS

Package
Mu-metal can
Termination
Wire leads
Dimensions
1-1/8" diameter, 1-1/16" high
Mounting
2 holes, 0.7" center-to-center, self-tapping screws supplied

TYPICAL PERFORMANCE

Voltage Gain
19.7dB
Input Impedance
1350 ohms @ 1kHz
1150 ohms @ 10kHz
Secondary Source Impedance
19.5K ohms @ 1kHz
19.9K ohms @ 10kHz
Total Harmonic Distortion (Below Saturation)
0.31% maximum @ 20Hz
0.17% maximum @ 30Hz
0.082% maximum @ 50Hz
0.01% @ 1kHz
Input Level @ 1% Saturation (dBv Re: 0.775v)
−7dBv @ 20Hz
−1.5dBv @ 30Hz
+5dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>85dB @ 1kHz
>65dB @ 10kHz
Transformer Noise Figure*
1.5dB Re: 133 ohms**

(TRANSFORMER WITH SECONDARY TERMINATION ONLY)

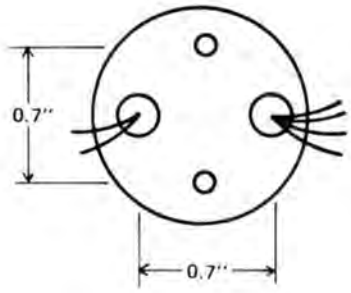
Frequency Response (Re: 1kHz)
−0.5dB @ 20Hz
+0.1dB @ 20kHz
+0.2dB @ 55kHz (peak)
Bandwidth
140kHz @ −3dB
Phase Response
−5° @ 20kHz
Rise Time
2.5μS (10%-90%)
Overshoot
6.6%

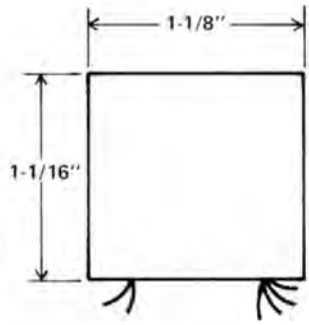
(INCLUDING 2μS AMPLIFIER)

Frequency Response (Re: 1kHz)
−0.5dB @ 20Hz
−0.2dB @ 20kHz
(No resonance peak)
Bandwidth
76kHz @ −3dB
Phase Response
−19° @ 20kHz
Rise Time
4.5μS (10%-90%)
Overshoot
<1%

Add to amplifier NF referred to impedance of 17.6K ohms. (Parallel value of secondary source impedance and load)

***Parallel value of source impedance and input impedance.*





Mounting Holes
Clearance for #4 screw
Lead Holes
Use 0.35" hole to clear grommet

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Data Sheet

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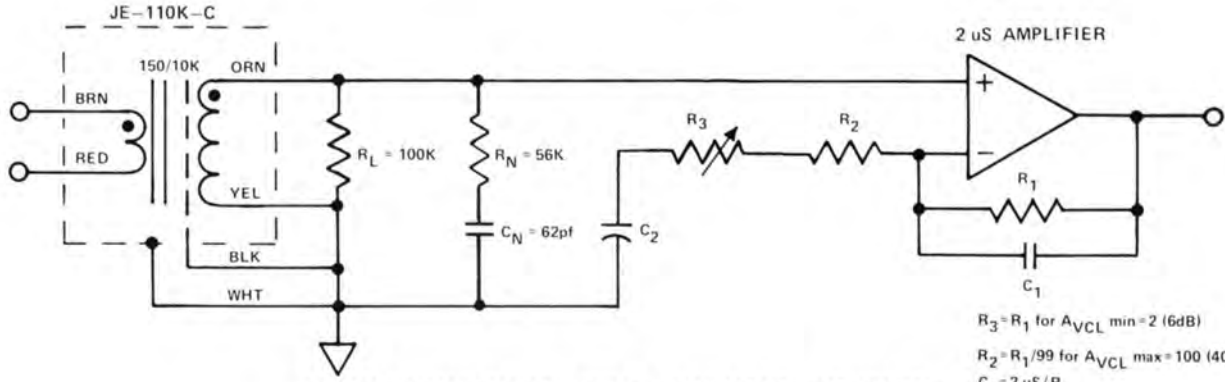
JE-110K-C
MICROPHONE INPUT TRANSFORMER

The JE-110K-C is a wire lead type 150/10K of earlier design than the JE-115K-E. The winding is a less complex configuration of interleaved layers exhibiting higher leakage inductance, so a series RC network of 56K ohms and 62pf should be connected across the 100K ohm secondary load resistor for minimum transient distortion. The resulting high frequency performance of this type is close to the more complex winding but at lower cost. The total turns and core size are similar to the JE-115K-E yielding similar low frequency maximum level capability and distortion. The higher series leakage inductance yields a 2.0dB noise figure compared to the 1.5dB noise figure of the JE-115K-E.



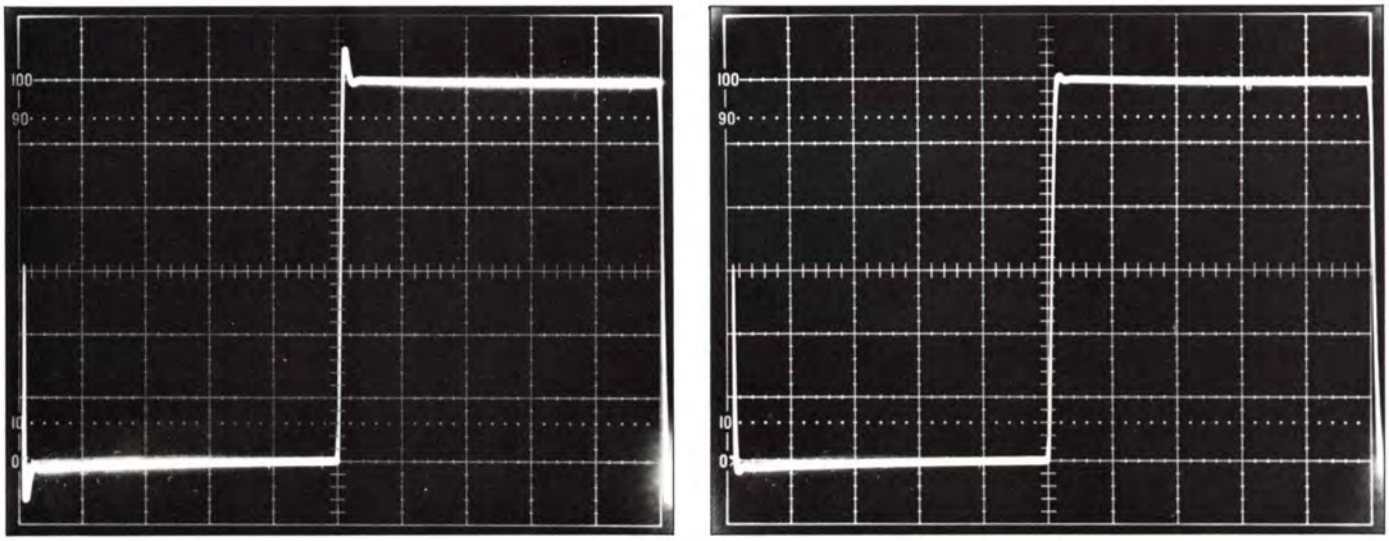
SCHEMATIC DIAGRAM OF TYPICAL TRANSFORMER APPLICATION

$R_3 = R_1$ for A_{VCL} min = 2 (6dB)
$R_2 = R_1/99$ for A_{VCL} max = 100 (40dB)
$C_1 = 2\ uS/R_1$
$C_2 = 64mS/R_2$

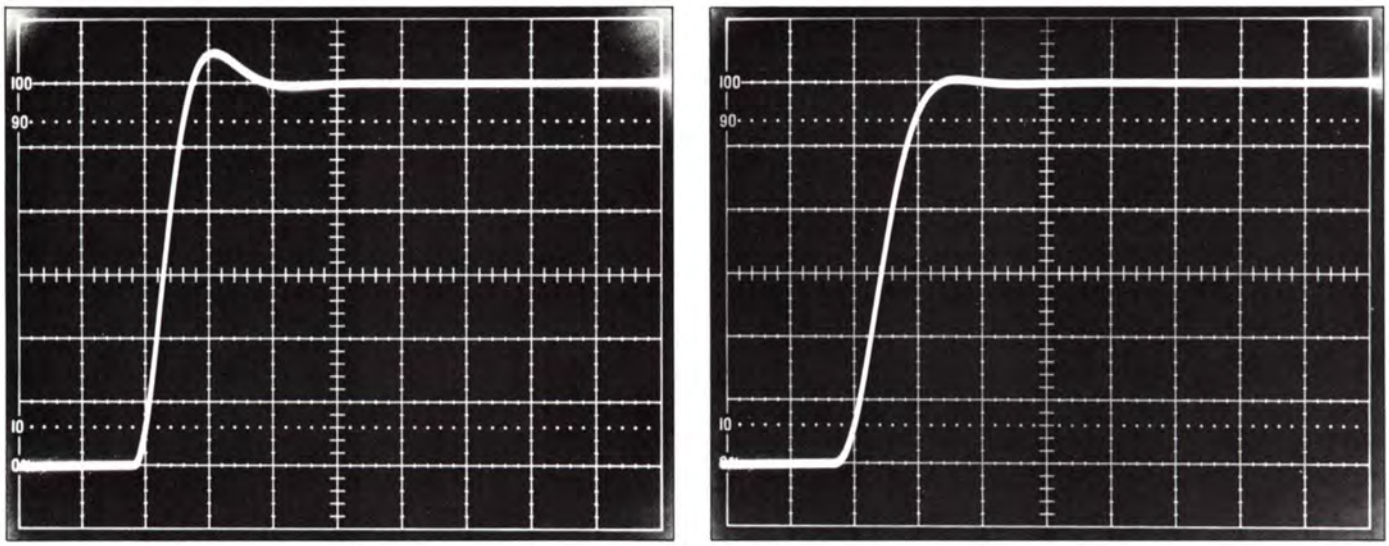
REGARDING THE OSCILLOSCOPE PHOTOS

Actual oscilloscope photos were made from a Tektronix Model 453A (certified calibration). Left column is transformer with secondary termination network and right column includes a 2 microsecond amplifier.

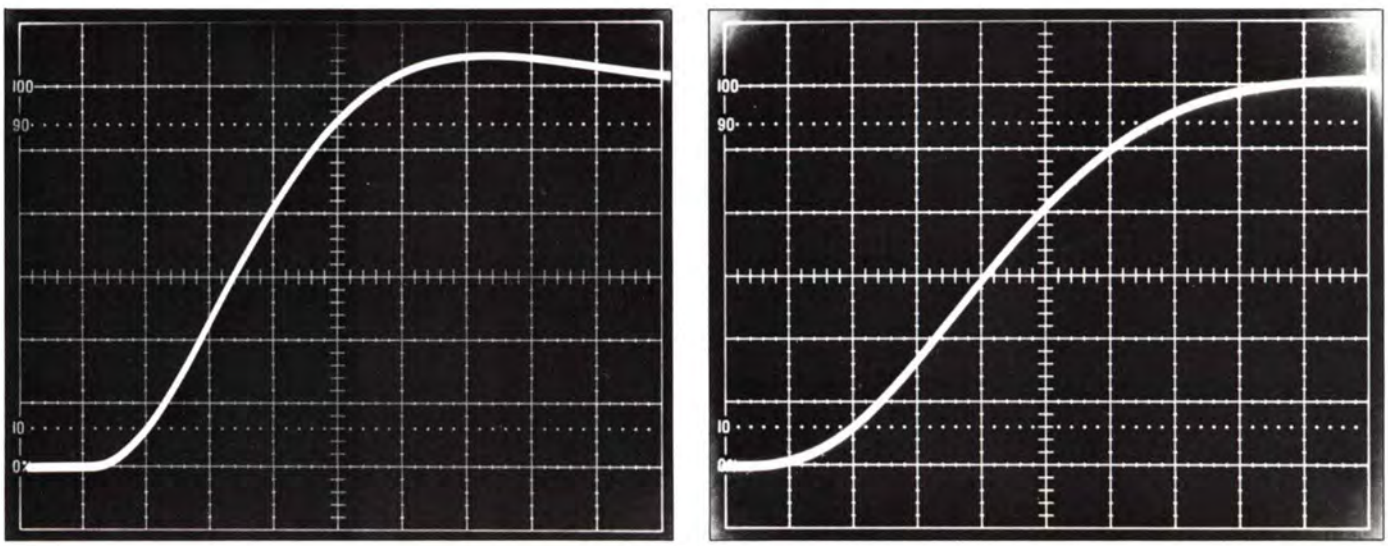
2kHz Square Wave



50μS/division



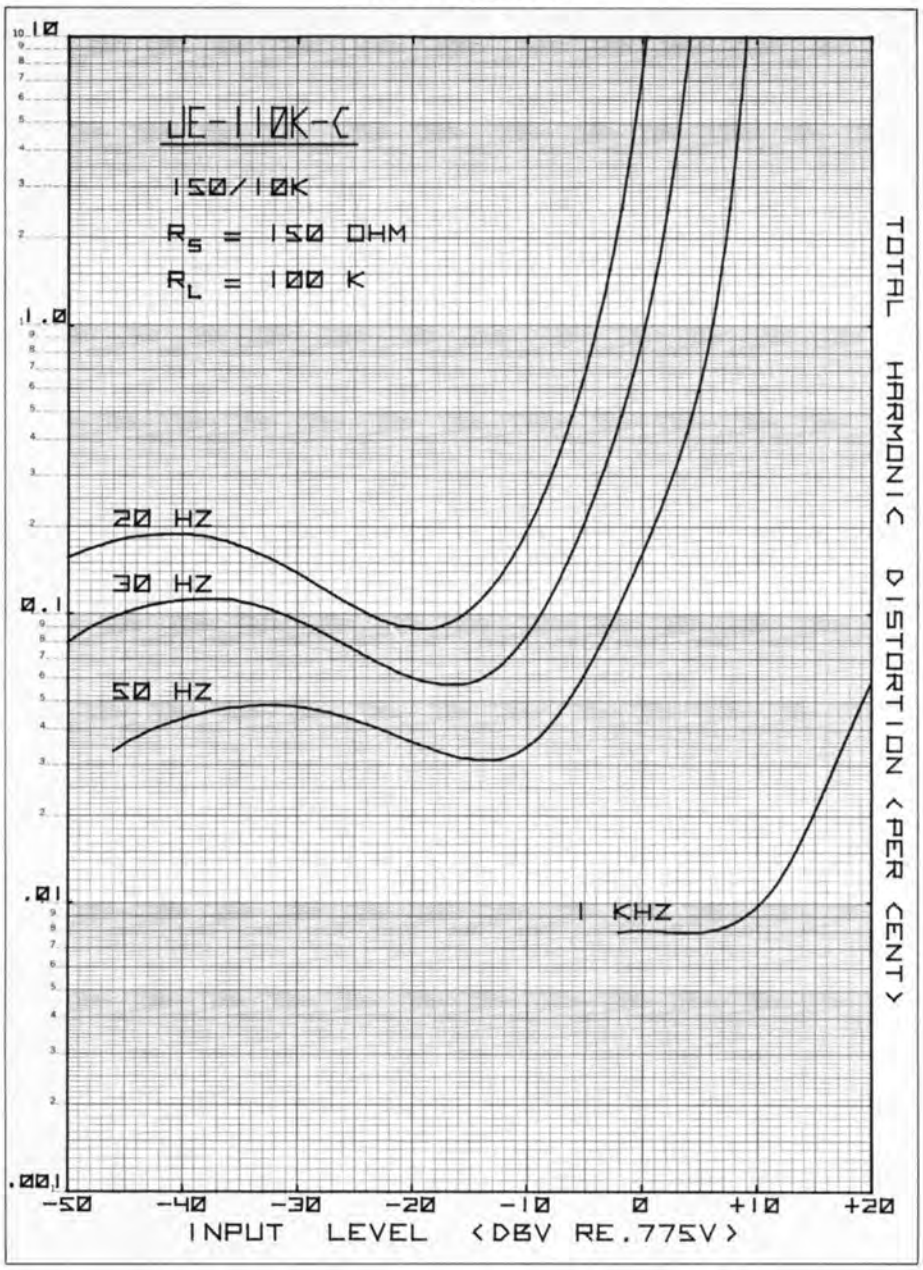
5μS/division



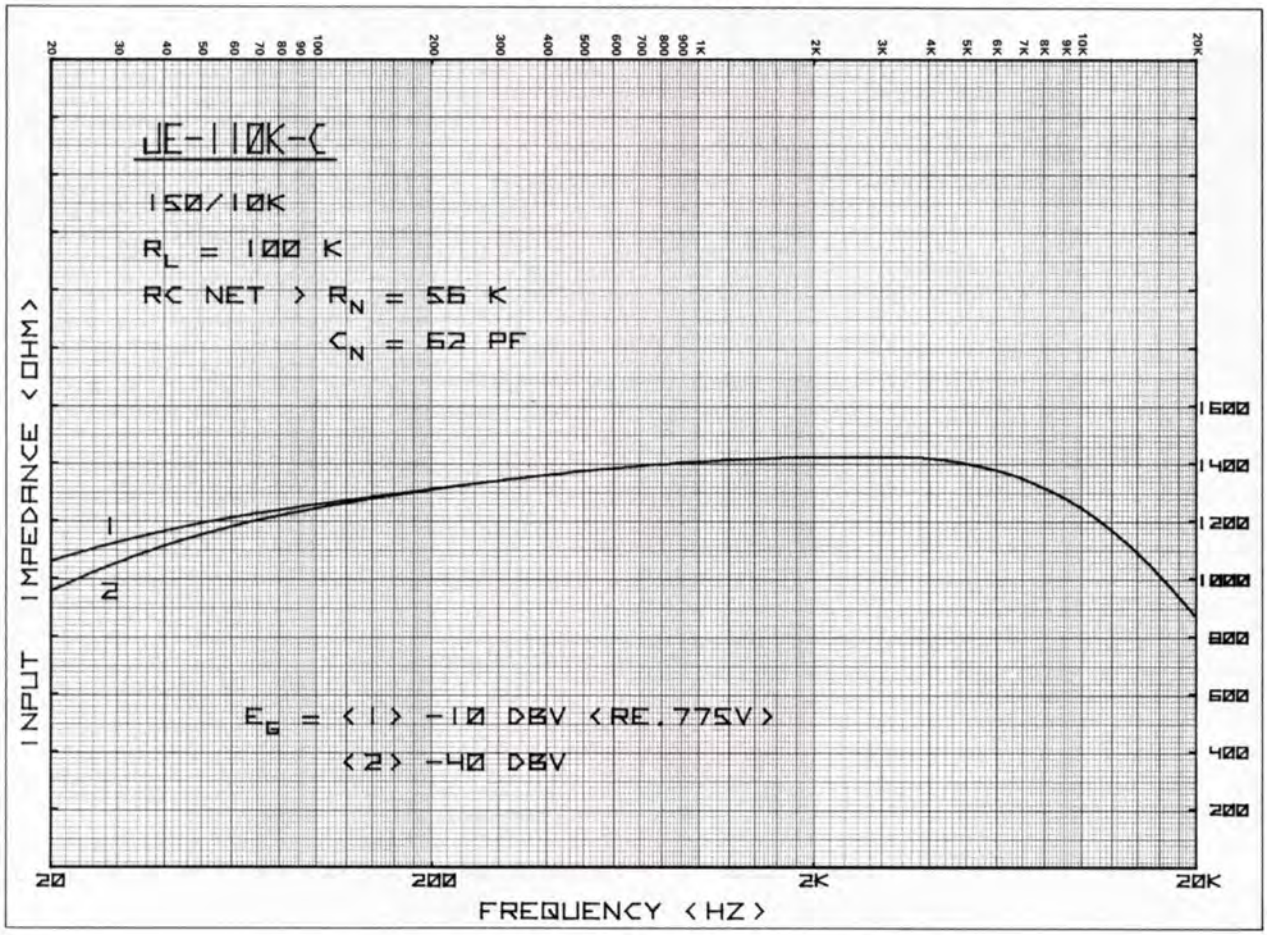
1μS/division

All curves were generated by a Hewlett-Packard 9815A/9862A programmable calculator/plotter. All calculations were either derived from or verified by actual measurements. Verified accuracies are on the order of one pen-line width.

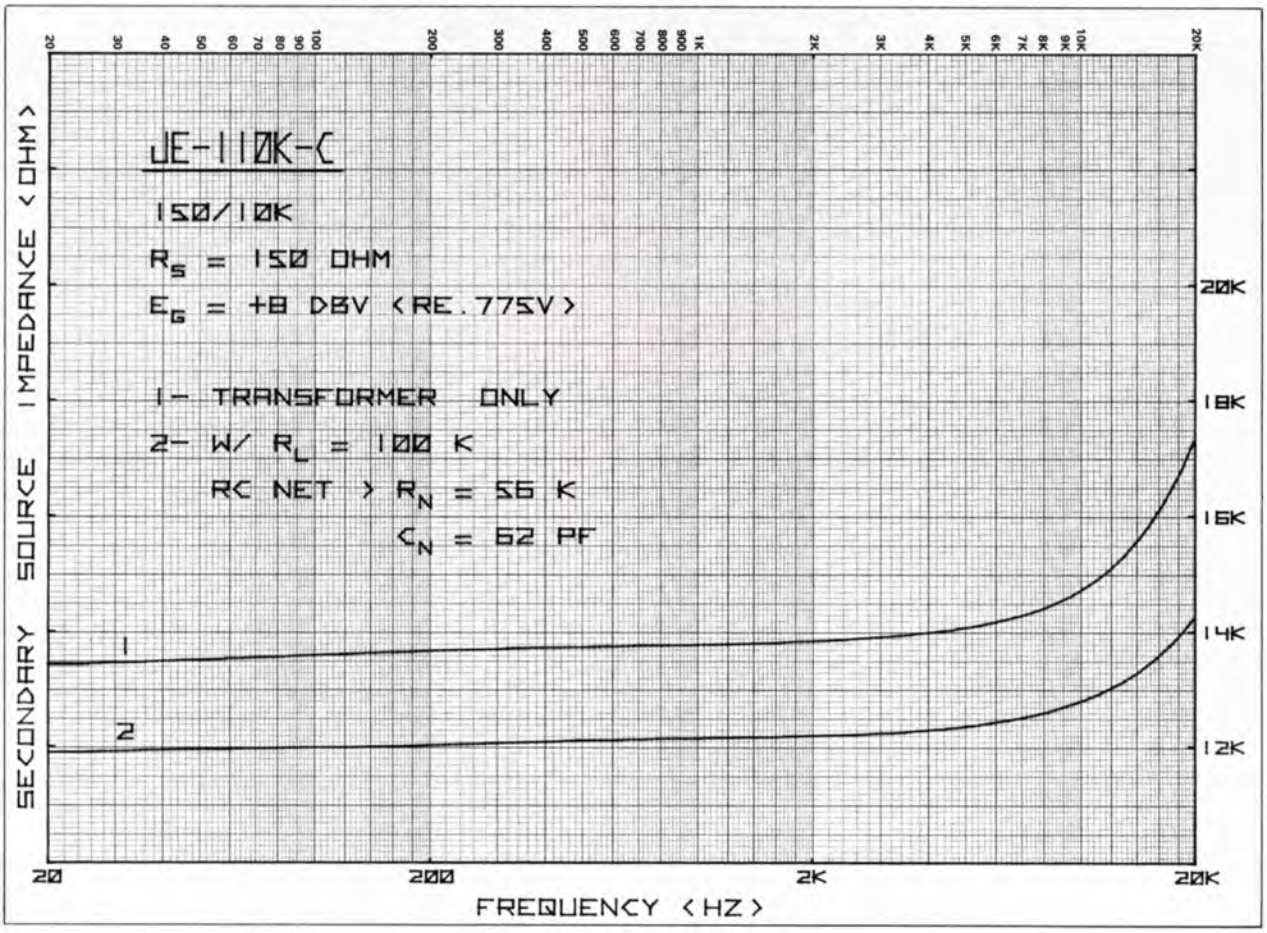
DISTORTION



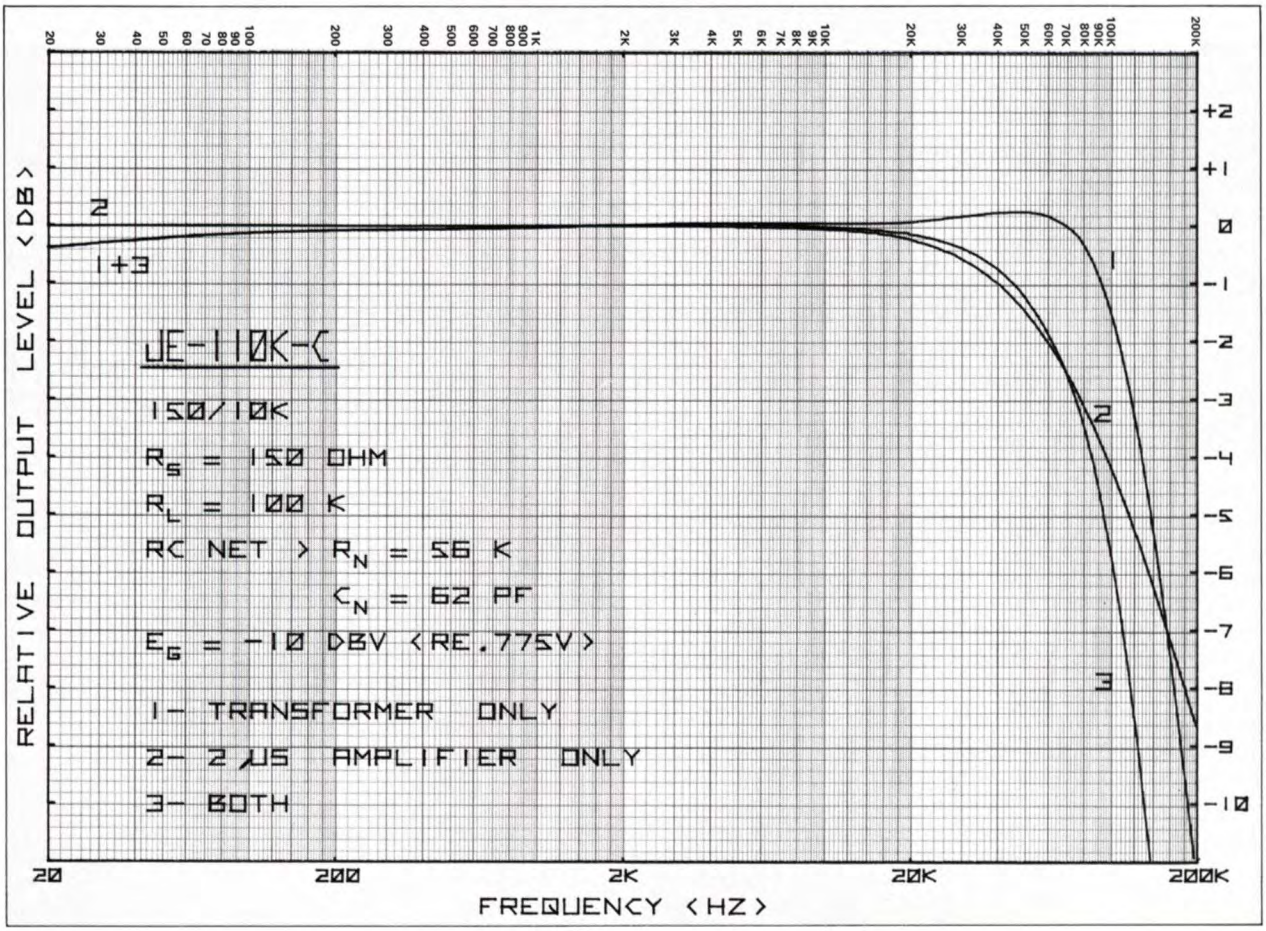
INPUT IMPEDANCE



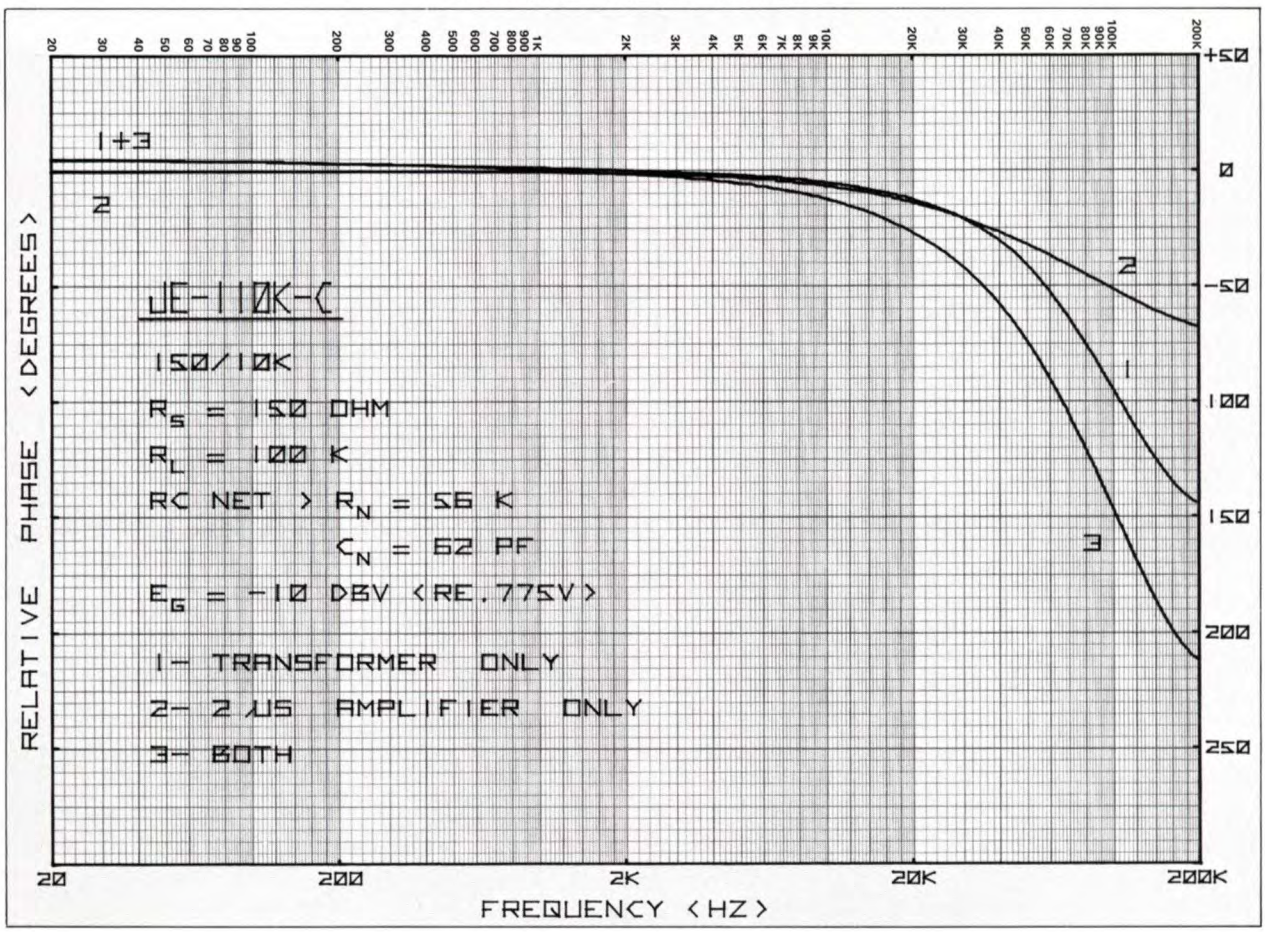
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



GENERAL CHARACTERISTICS

Turns Ratio
1:8.16
Impedance Ratio
150/10K
Primary Source Impedance
150 ohms
Secondary Load Resistor
100K ohms
Secondary RC Network
R_N = 56K ohms C_N = 62pf
Faraday Shield
Separate lead
Magnetic Shield
30dB, separate case lead
Maximum Input Level at 20Hz
−1dBv (Re: 0.775v)

PHYSICAL CHARACTERISTICS

Package
Mu-metal can
Termination
Wire leads
Dimensions
1-1/8" diameter, 1-1/16" high
Mounting
2 holes, 0.7" center-to-center, self-tapping screws supplied

TYPICAL PERFORMANCE

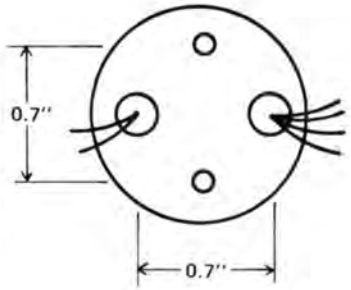
Voltage Gain
17.9dB
Input Impedance
1400 ohms @ 1kHz
1250 ohms @ 10kHz
Secondary Source Impedance
13.8K ohms @ 1kHz
14.7K ohms @ 10kHz
Total Harmonic Distortion (Below Saturation)
0.19% maximum @ 20Hz
0.11% maximum @ 30Hz
0.048% maximum @ 50Hz
0.008% @ 1kHz
Input Level @ 1% Saturation (dBv Re: 0.775v)
−4dBv @ 20Hz
0dBv @ 30Hz
+6dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>85dB @ 1kHz
>65dB @ 10kHz
Transformer Noise Figure*
2.0dB Re: 134.9 ohms**

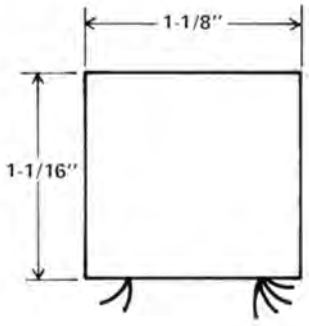
(TRANSFORMER WITH SECONDARY TERMINATION ONLY)

Frequency Response (Re: 1kHz)
−0.4dB @ 20Hz
+0.1dB @ 20kHz
+0.25dB @ 50kHz (peak)
Bandwidth
118kHz @ −3dB
Phase Response
−13° @ 20kHz
Rise Time
3μS (10%-90%)
Overshoot
8%

(INCLUDING 2μS AMPLIFIER)

Frequency Response (Re: 1kHz)
−0.4dB @ 20Hz
−0.2dB @ 20kHz
(No resonance peak)
Bandwidth
75kHz @ −3dB
Phase Response
−27° @ 20kHz
Rise Time
4.7μS (10%-90%)
Overshoot
<2%





Add to amplifier NF referred to impedance of 12.8K ohms. (Parallel value of secondary source impedance and load)

***Parallel value of source impedance and input impedance.*

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Data Sheet

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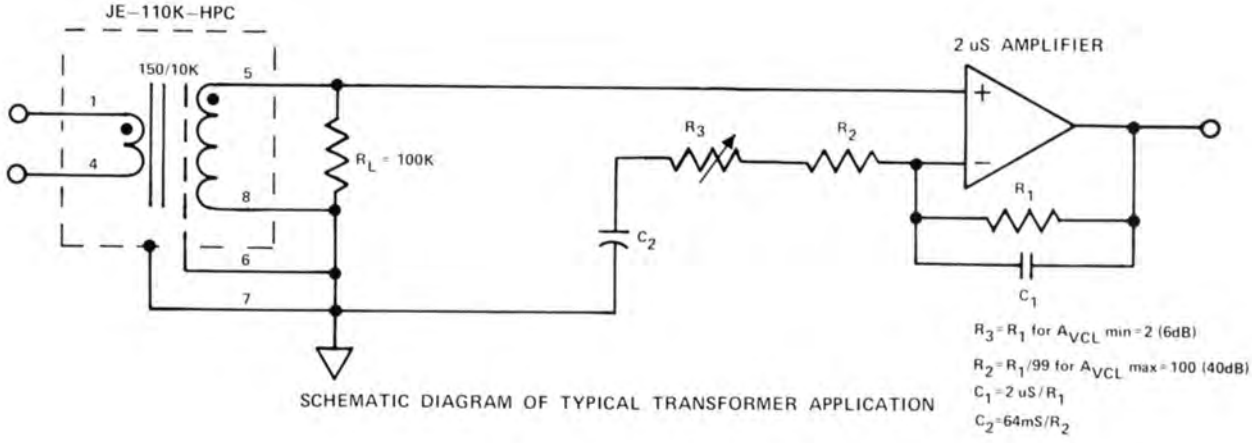
JE-110K-HPC
MICROPHONE INPUT TRANSFORMER

The JE-110K-HPC is a printed circuit type 150/10K with a winding similar to the JE-115K-E. The multiple interleaved layer winding exhibits very low leakage inductance requiring no series RC network across the 100K ohm secondary load resistor when used with an amplifier incorporating 2μS phase lead compensation in the feedback circuit. Since the PC bobbin contains a smaller stack of laminations than the wire lead JE-115K-E, the JE-110K-HPC uses more total turns of smaller wire. The result is higher maximum level capability at low frequencies and the distortion is the lowest of all types in this size (0.11% @ 20Hz), but the higher series losses increase the noise by 0.9dB, compared to the wire lead version JE-115K-E.

The pin pattern is compatible with the JE-6110K-APC.

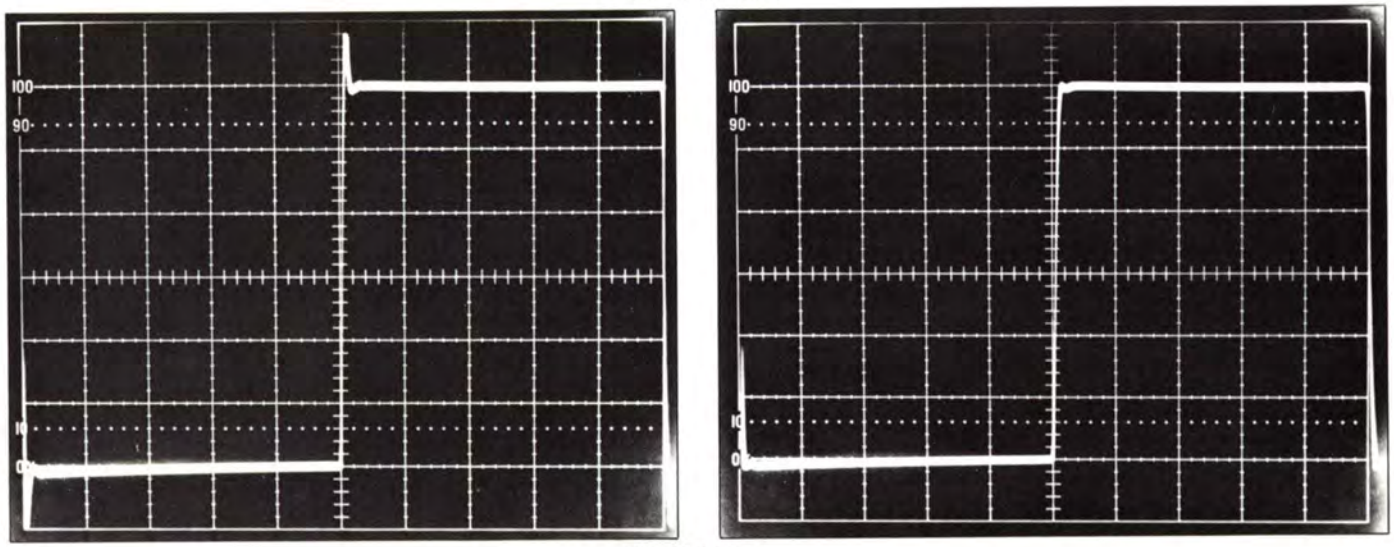


SCHEMATIC DIAGRAM OF TYPICAL TRANSFORMER APPLICATION

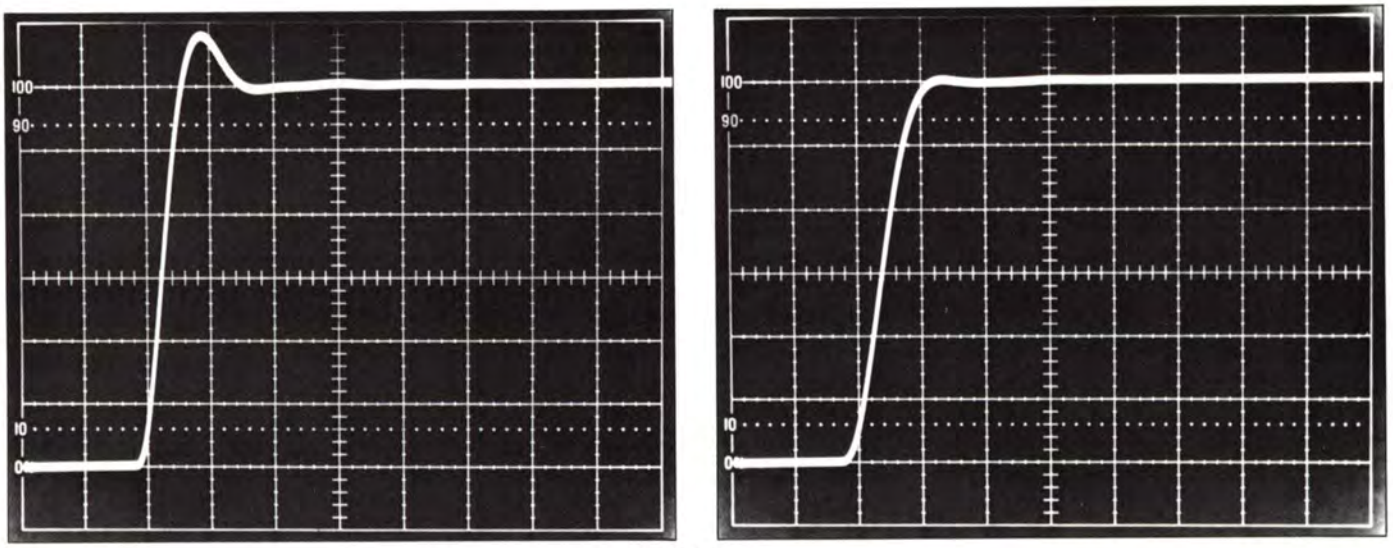
REGARDING THE OSCILLOSCOPE PHOTOS

Actual oscilloscope photos were made from a Tektronix Model 453A (certified calibration). Left column is transformer with secondary termination network and right column includes a 2 microsecond amplifier.

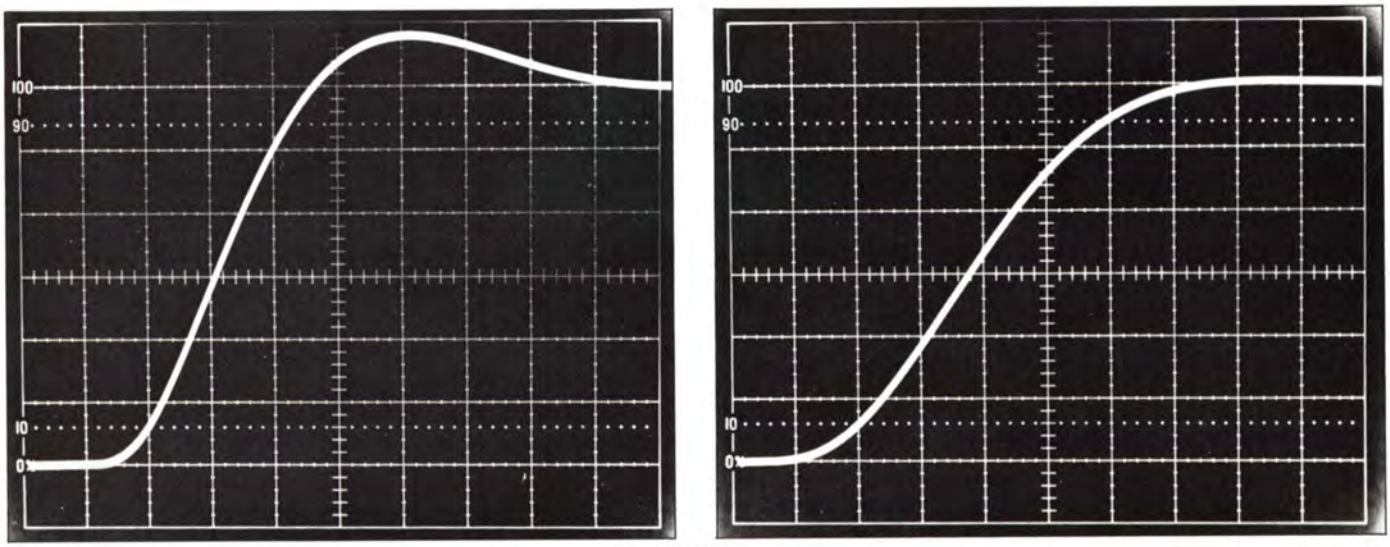
2kHz Square Wave



50μS/division



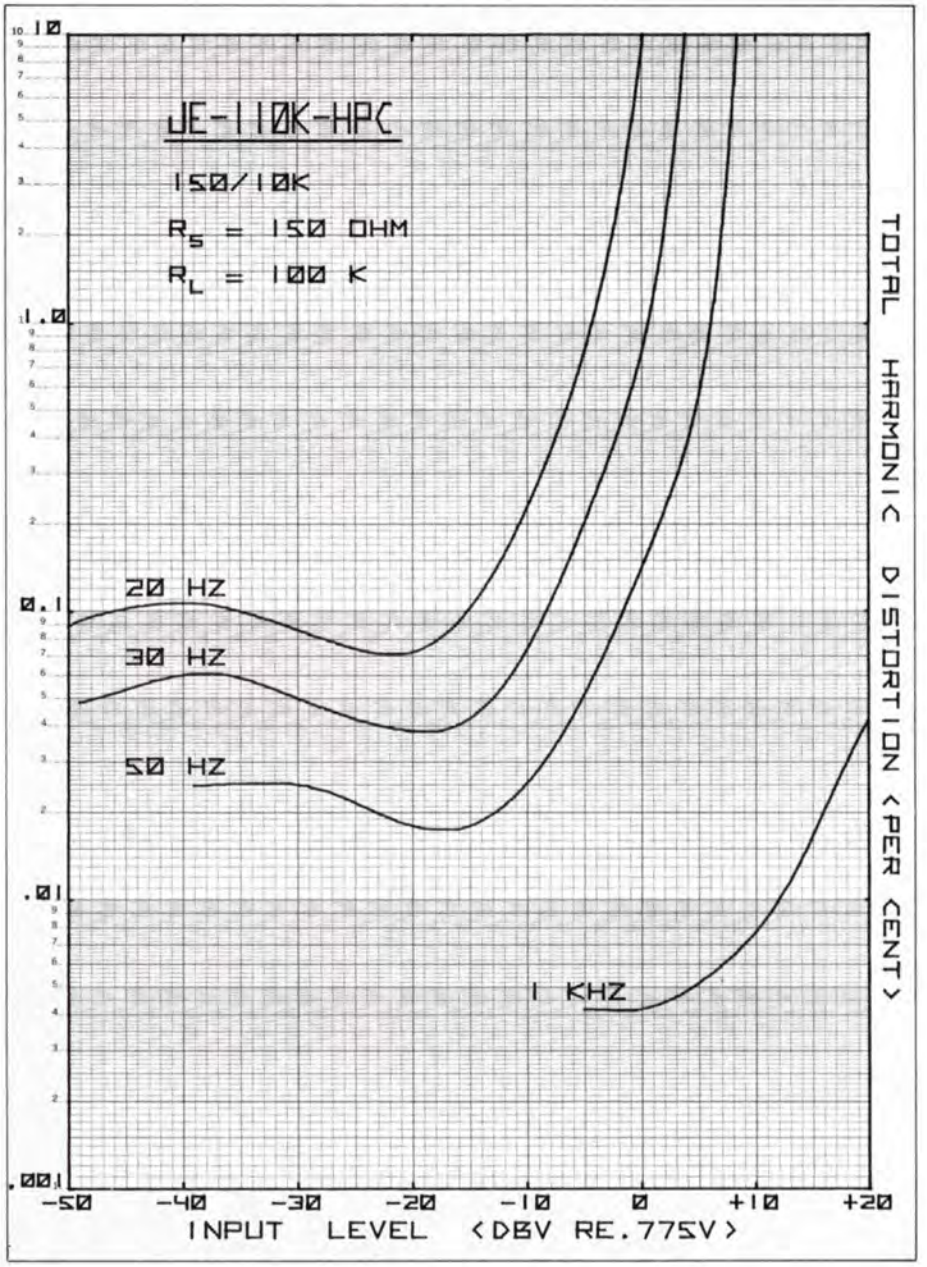
5μS/division



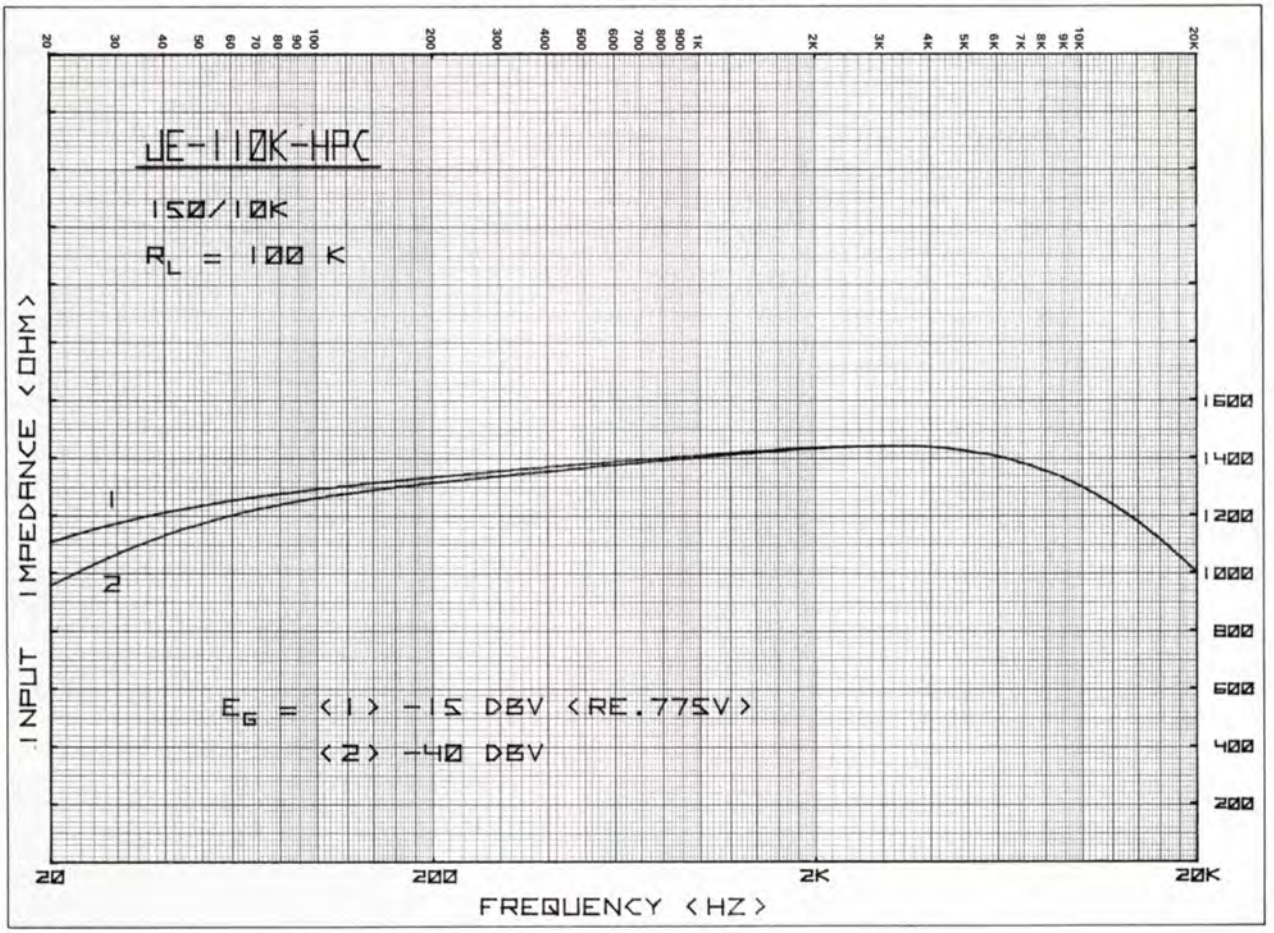
1μS/division

All curves were generated by a Hewlett-Packard 9815A/9862A programmable calculator/plotter. All calculations were either derived from or verified by actual measurements. Verified accuracies are on the order of one pen-line width.

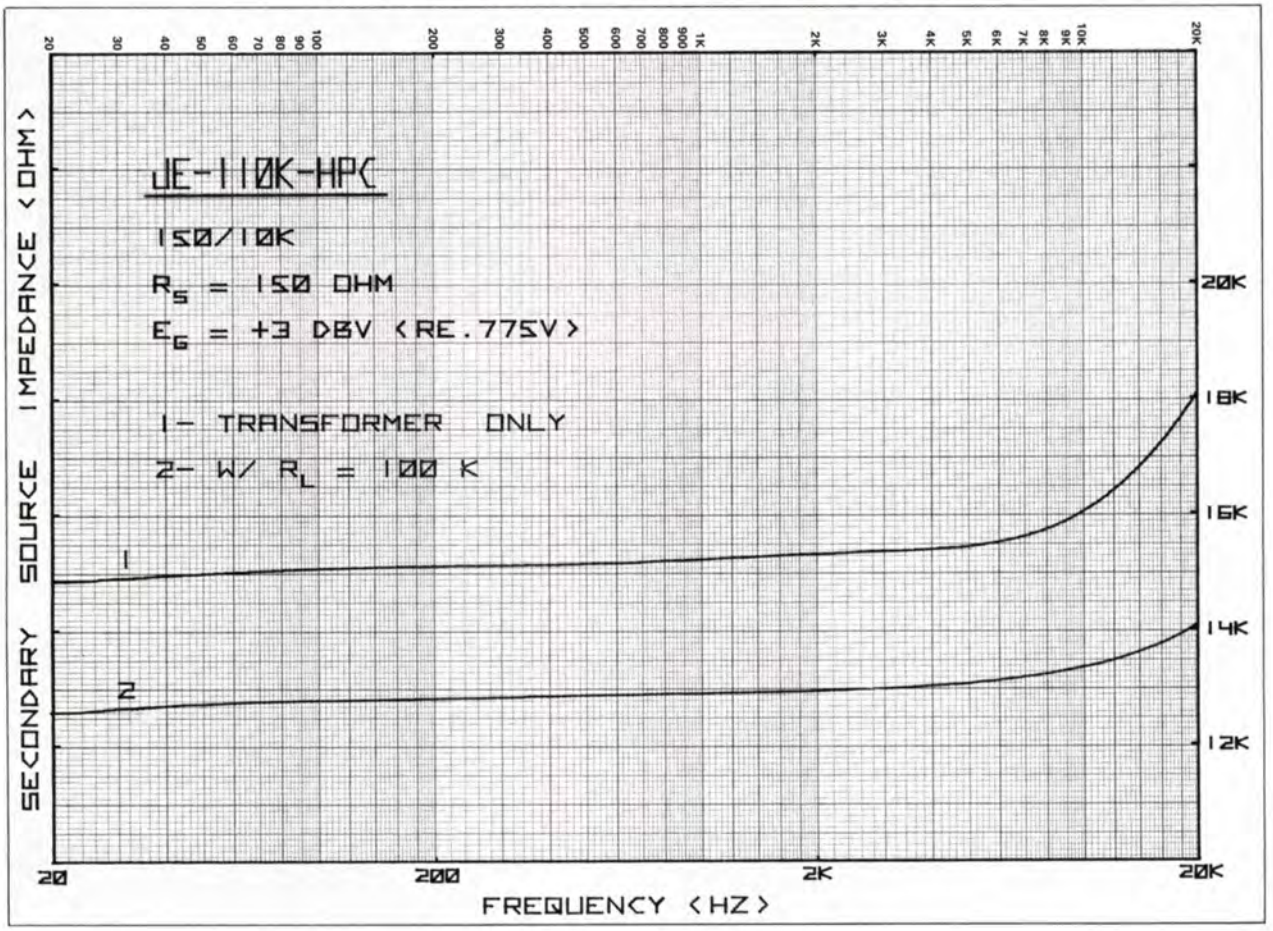
DISTORTION



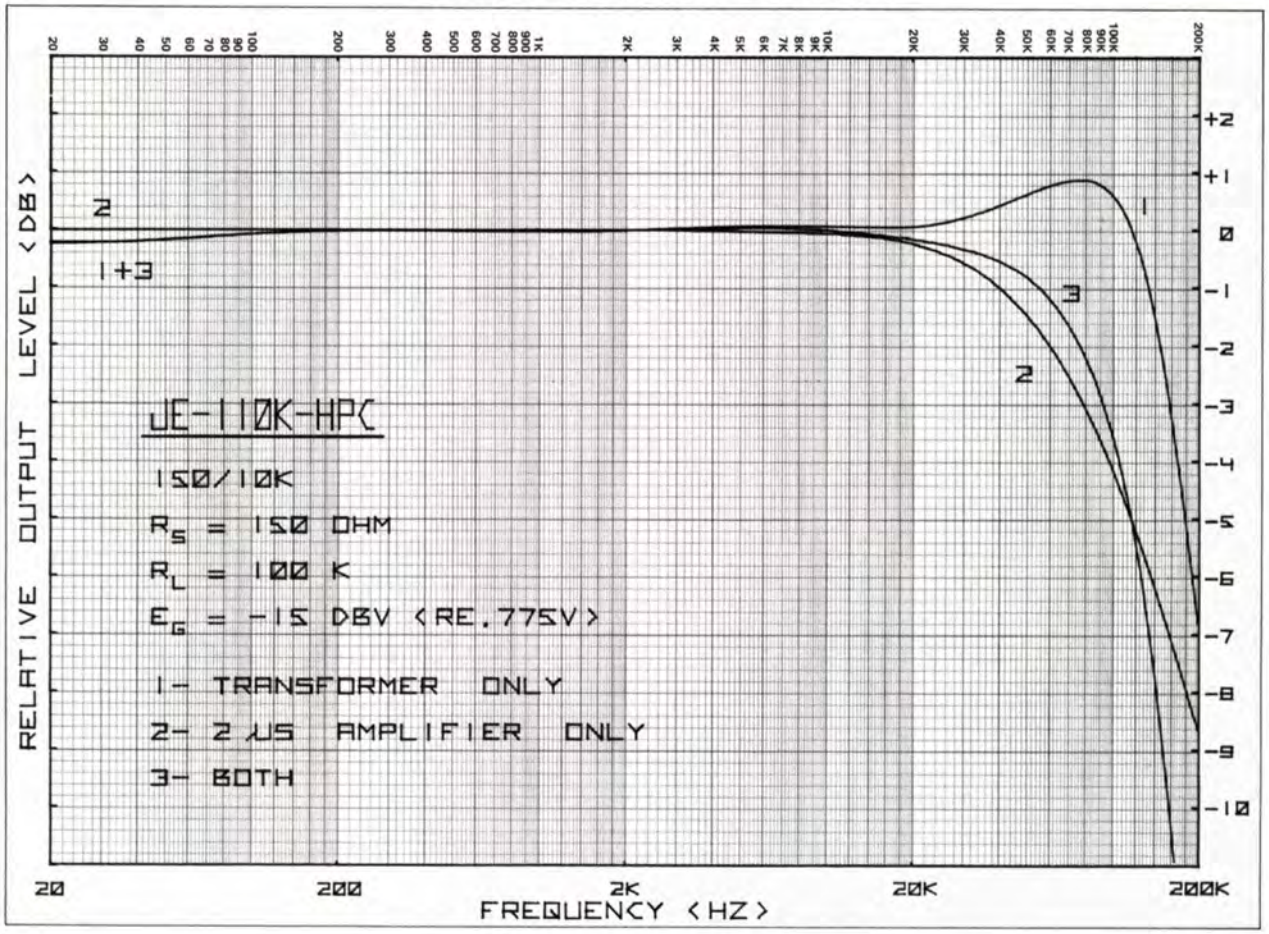
INPUT IMPEDANCE



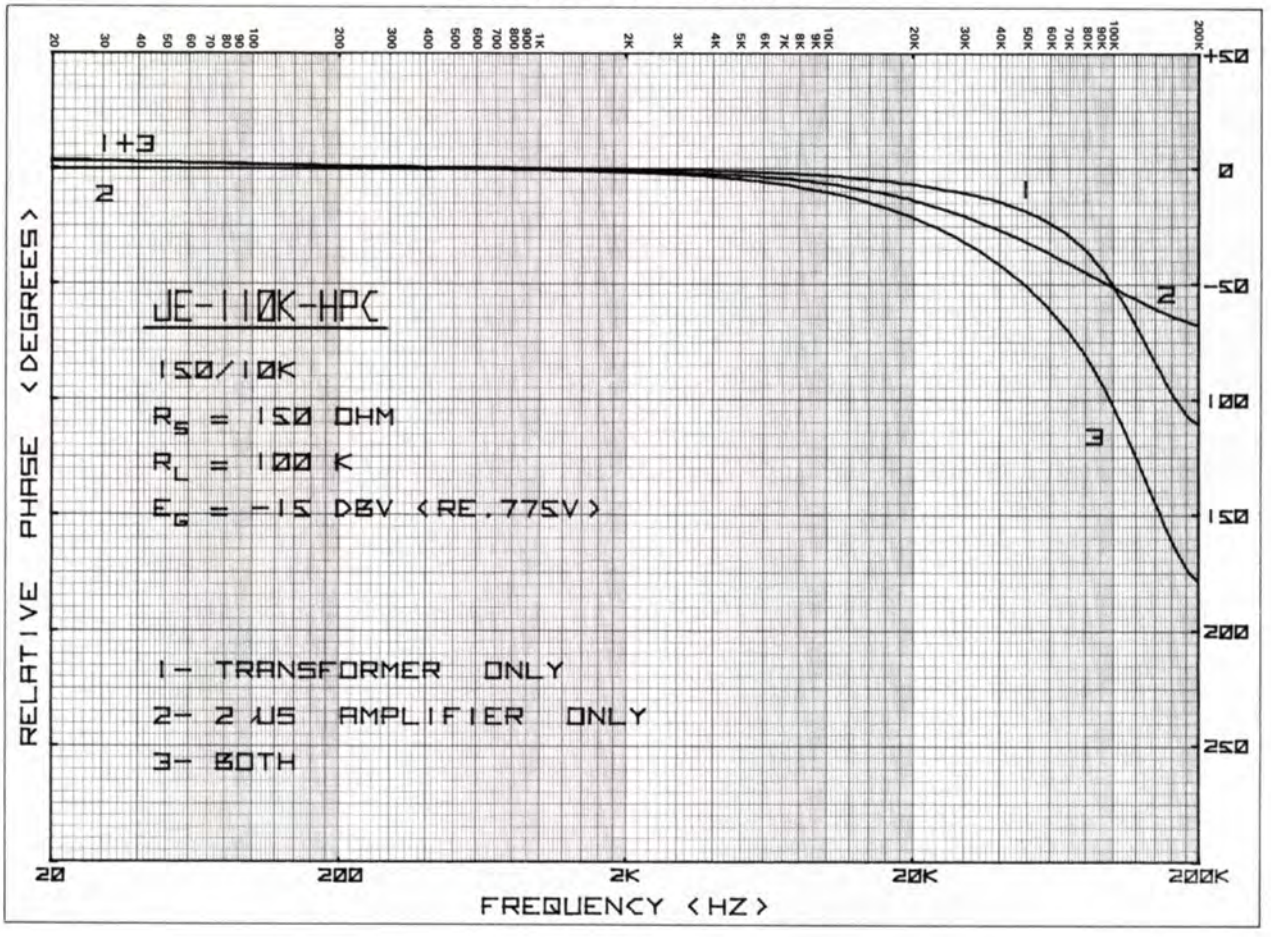
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



GENERAL CHARACTERISTICS

Turns Ratio
1:8.16
Impedance Ratio
150/10K
Primary Source Impedance
150 ohms
Secondary Load Resistor
100K ohms
Secondary RC Network
None required
Faraday Shield
Separate pin
Magnetic Shield
30dB, separate case pin
Maximum Input Level at 20Hz
−1dBv (Re: 0.775v)

PHYSICAL CHARACTERISTICS

Package
Mu-metal can
Termination
PC pins
Dimensions
1-1/8" diameter, 1-1/16" high

TYPICAL PERFORMANCE

Voltage Gain
17.8dB
Input Impedance
1400 ohms @ 1kHz
1300 ohms @ 10kHz
Secondary Source Impedance
15.2K ohms @ 1kHz
16.1K ohms @ 10kHz
Total Harmonic Distortion (Below Saturation)
0.11% maximum @ 20Hz
0.06% maximum @ 30Hz
0.025% maximum @ 50Hz
0.0042% @ 1kHz
Input Level @ 1% Saturation (dBv Re: 0.775v)
−4dBv @ 20Hz
+0.5dBv @ 30Hz
+6dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>85dB @ 1kHz
>65dB @ 10kHz
Transformer Noise Figure*
2.4dB Re: 134.5 ohms**

(TRANSFORMER WITH SECONDARY TERMINATION ONLY)

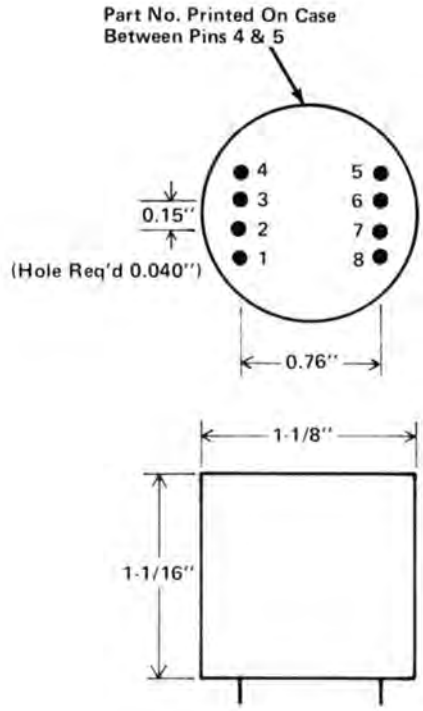
Frequency Response (Re: 1kHz)
−0.2dB @ 20Hz
+0.1dB @ 20kHz
+0.9dB @ 80kHz (peak)
Bandwidth
158kHz @ −3dB
Phase Response
−7.5° @ 20kHz
Rise Time
2.2μS (10%-90%)
Overshoot
13.3%

(INCLUDING 2μS AMPLIFIER)

Frequency Response (Re: 1kHz
−0.2dB @ 20Hz
−0.2dB @ 20kHz
(No resonance peak)
Bandwidth
92kHz @ −3dB
Phase Response
−21.5° @ 20kHz
Rise Time
3.9μS (10%-90%)
Overshoot
<1%

Add to amplifier NF referred to impedance of 13.8K ohms. (Parallel value of secondary source impedance and load)

**Parallel value of source impedance and input impedance.*



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Data Sheet JE-6110K-APC

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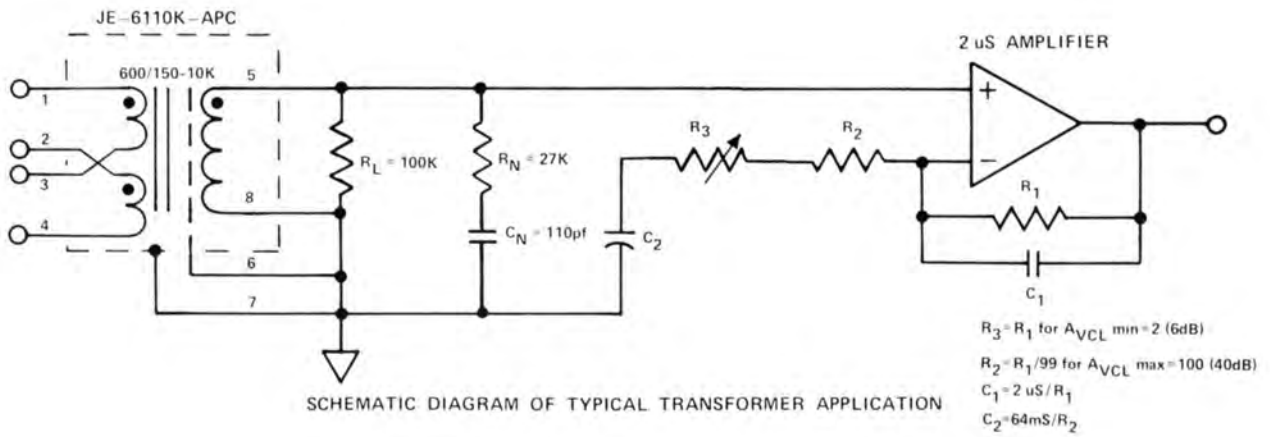
MICROPHONE INPUT TRANSFORMER

The JE-6110K-APC is a printed circuit type 600/150-10K of earlier design than the JE-110K-HPC. The winding is a less complex configuration of interleaved layers exhibiting higher leakage inductance, so a series RC network of 27K ohms and 110pf should be connected across the 100K ohm secondary load resistor for minimum transient distortion. The resulting high frequency performance of this type is close to the more complex winding but at lower cost. Also the total turns is lower than the JE-110K-HPC. This means the low frequency maximum level capability is less and the distortion is higher, but the lower series losses yield the same 1.5dB noise figure as the wire lead version JE-115K-E.

The pin pattern is compatible with the JE-110K-HPC.

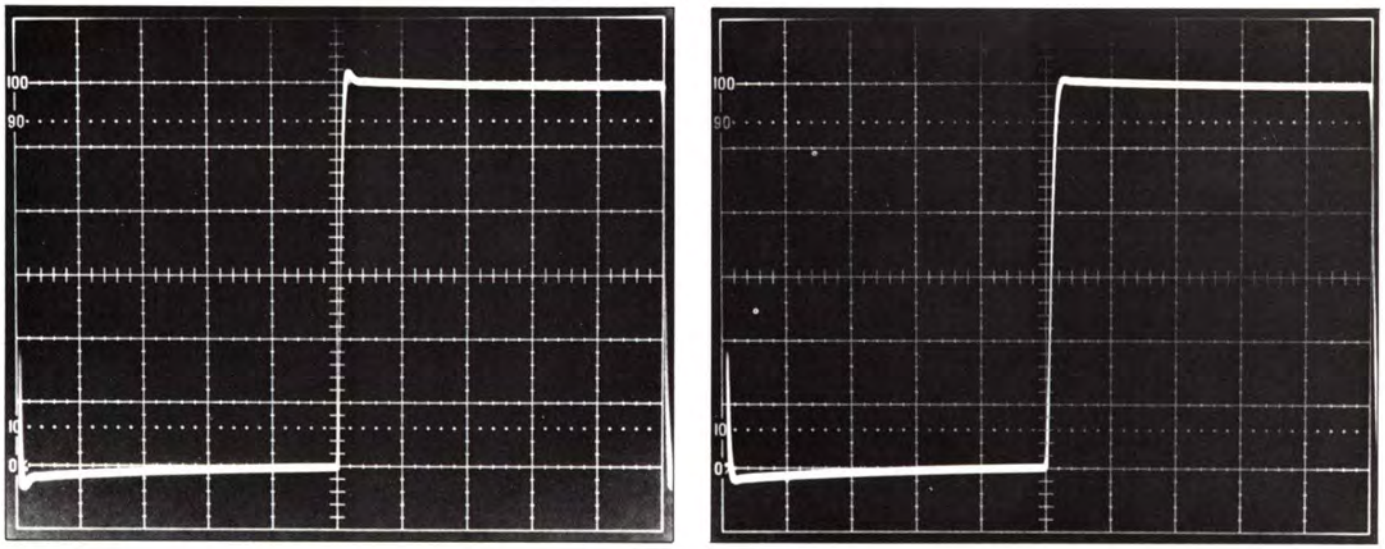


SCHEMATIC DIAGRAM OF TYPICAL TRANSFORMER APPLICATION

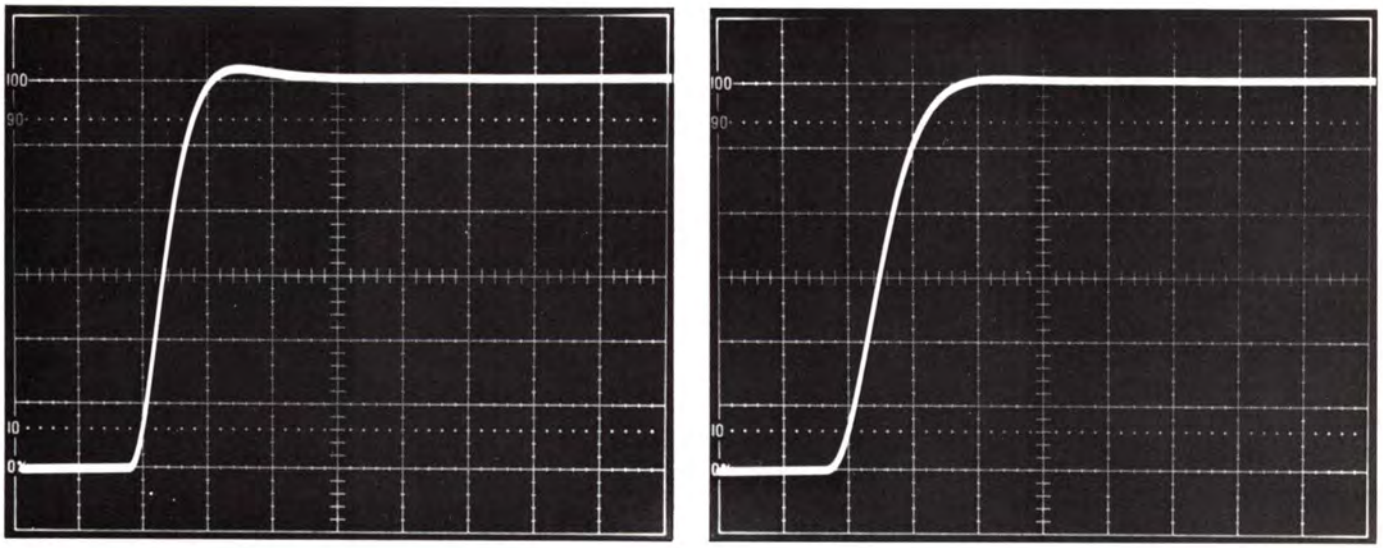
REGARDING THE OSCILLOSCOPE PHOTOS

Actual oscilloscope photos were made from a Tektronix Model 453A (certified calibration). Left column is transformer with secondary termination network and right column includes a 2 microsecond amplifier.

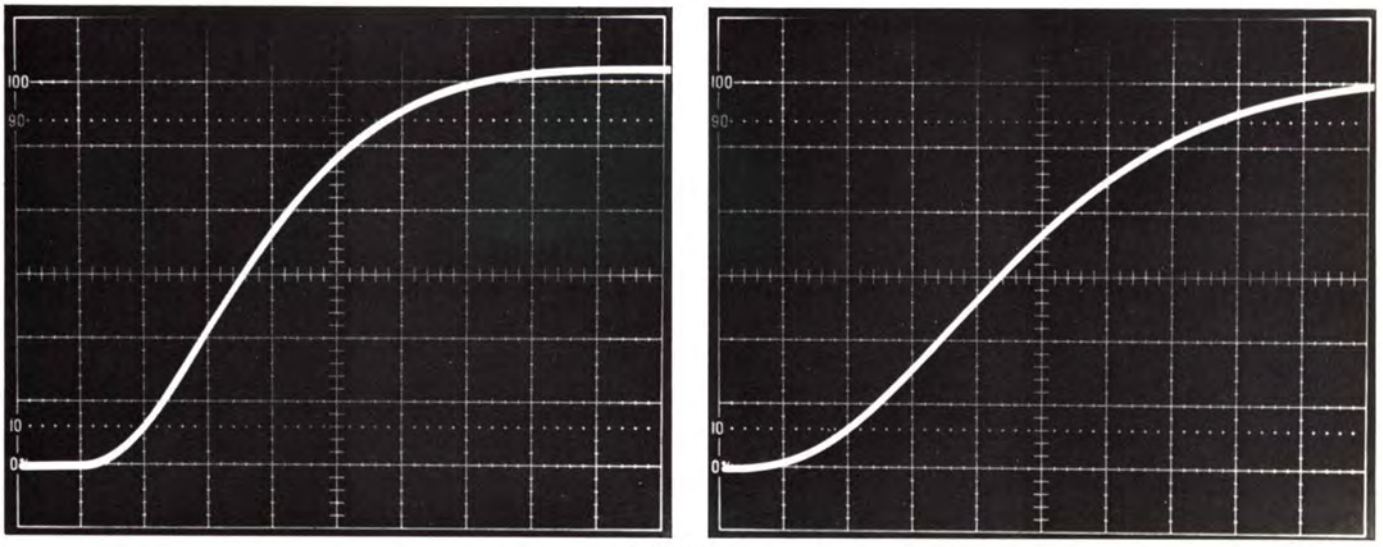
2kHz Square Wave



50μS/division



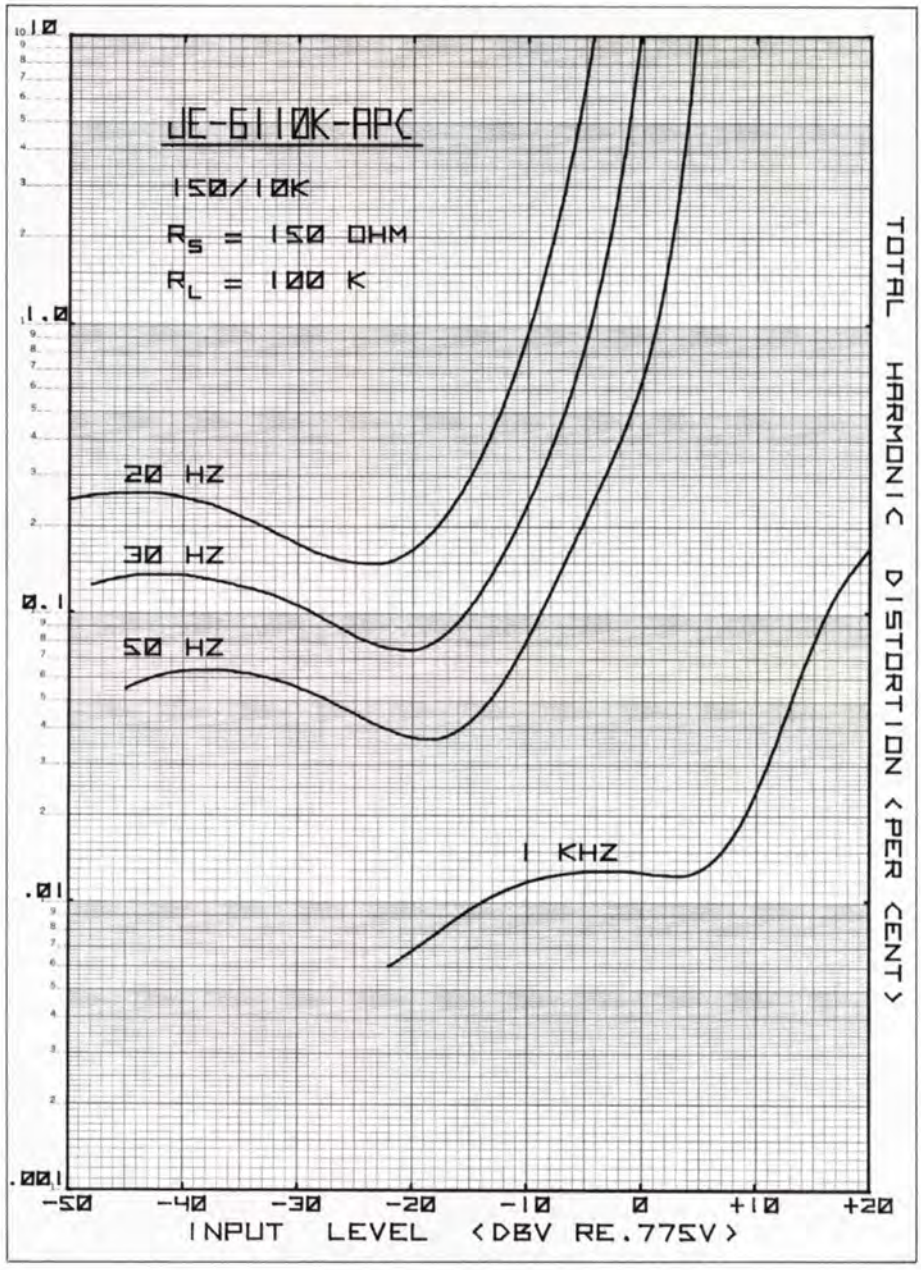
5μS/division



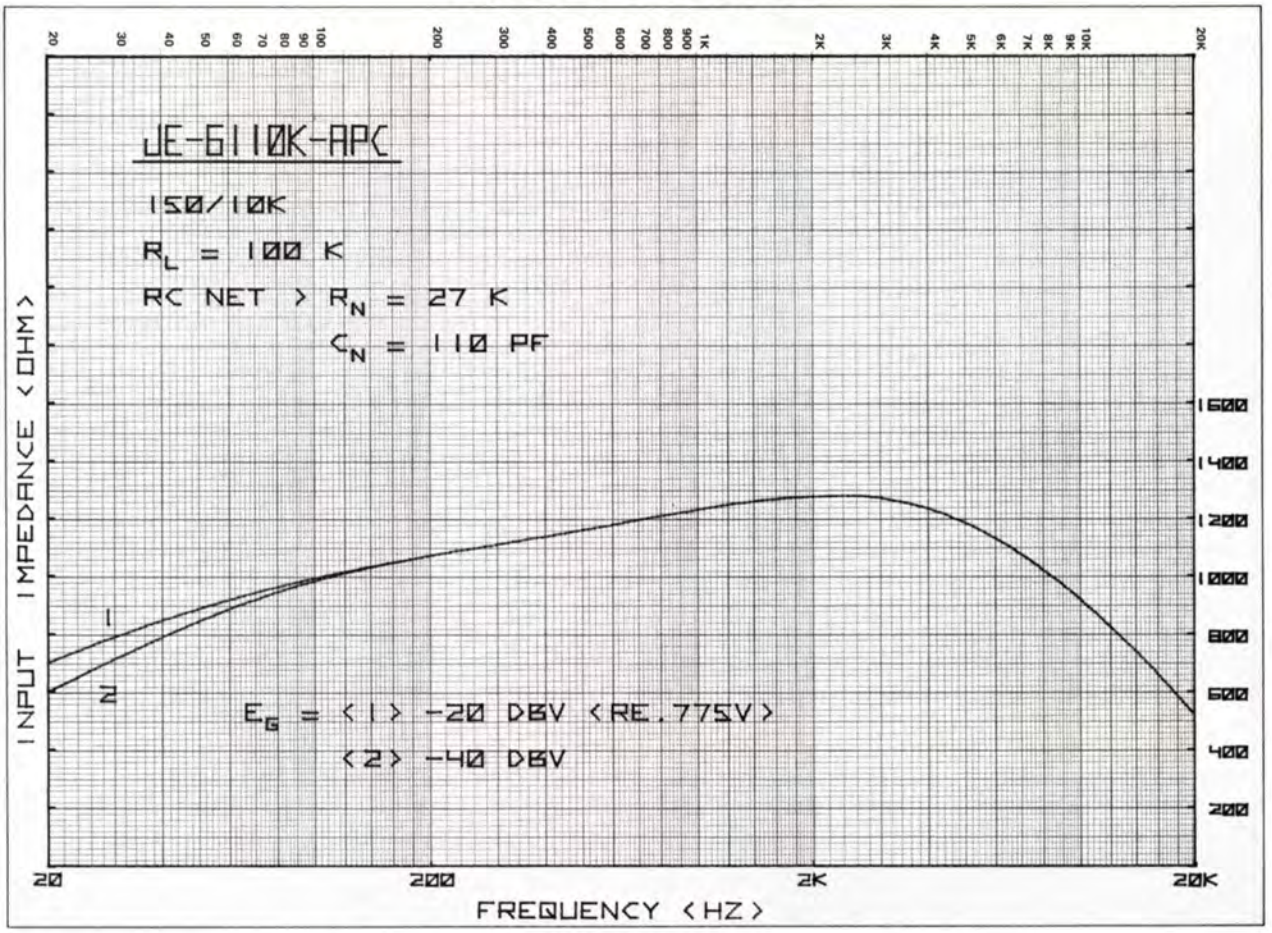
1μS/division

All curves were generated by a Hewlett-Packard 9815A/9862A programmable calculator/plotter. All calculations were either derived from or verified by actual measurements. Verified accuracies are on the order of one pen-line width.

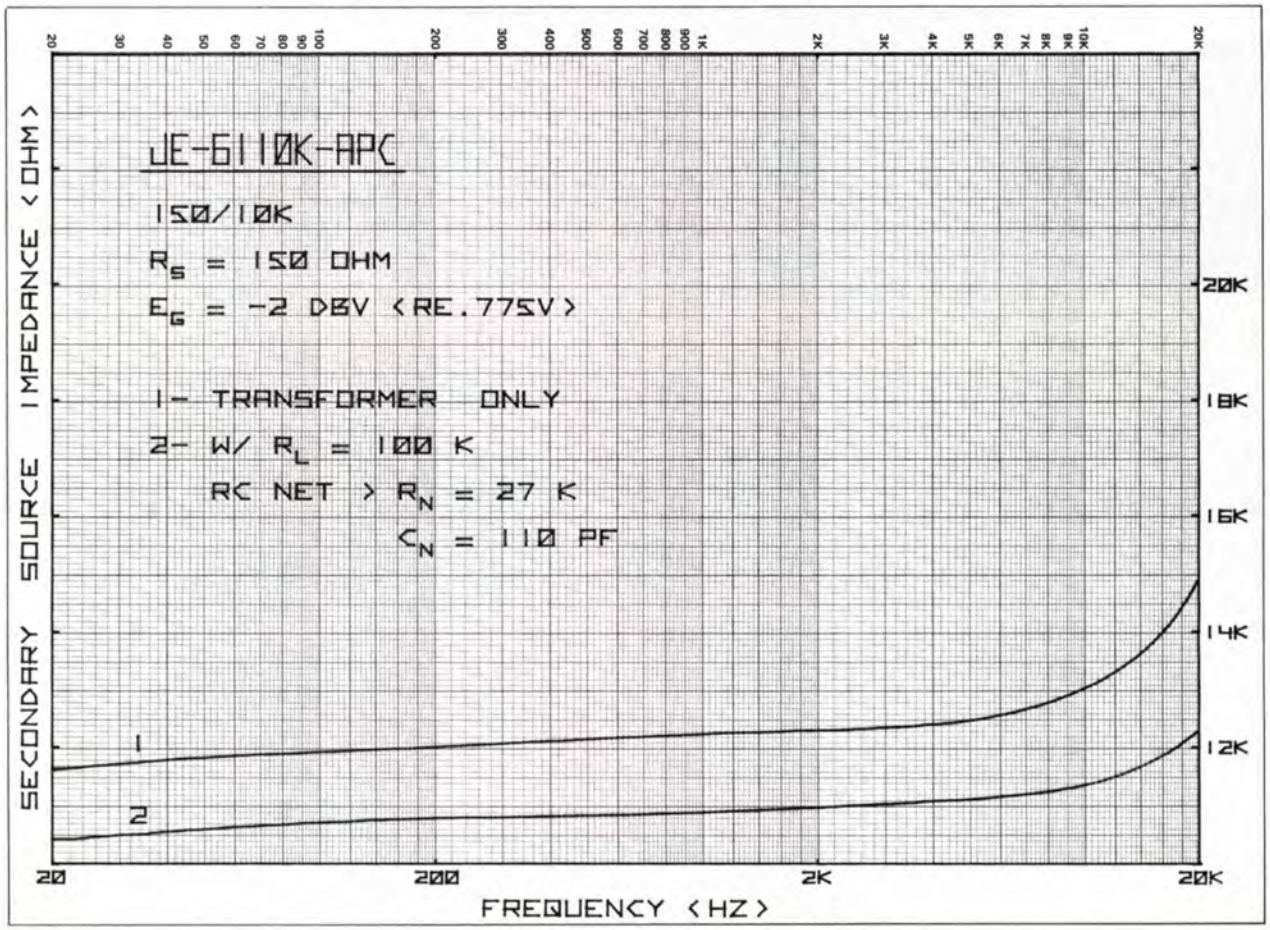
DISTORTION



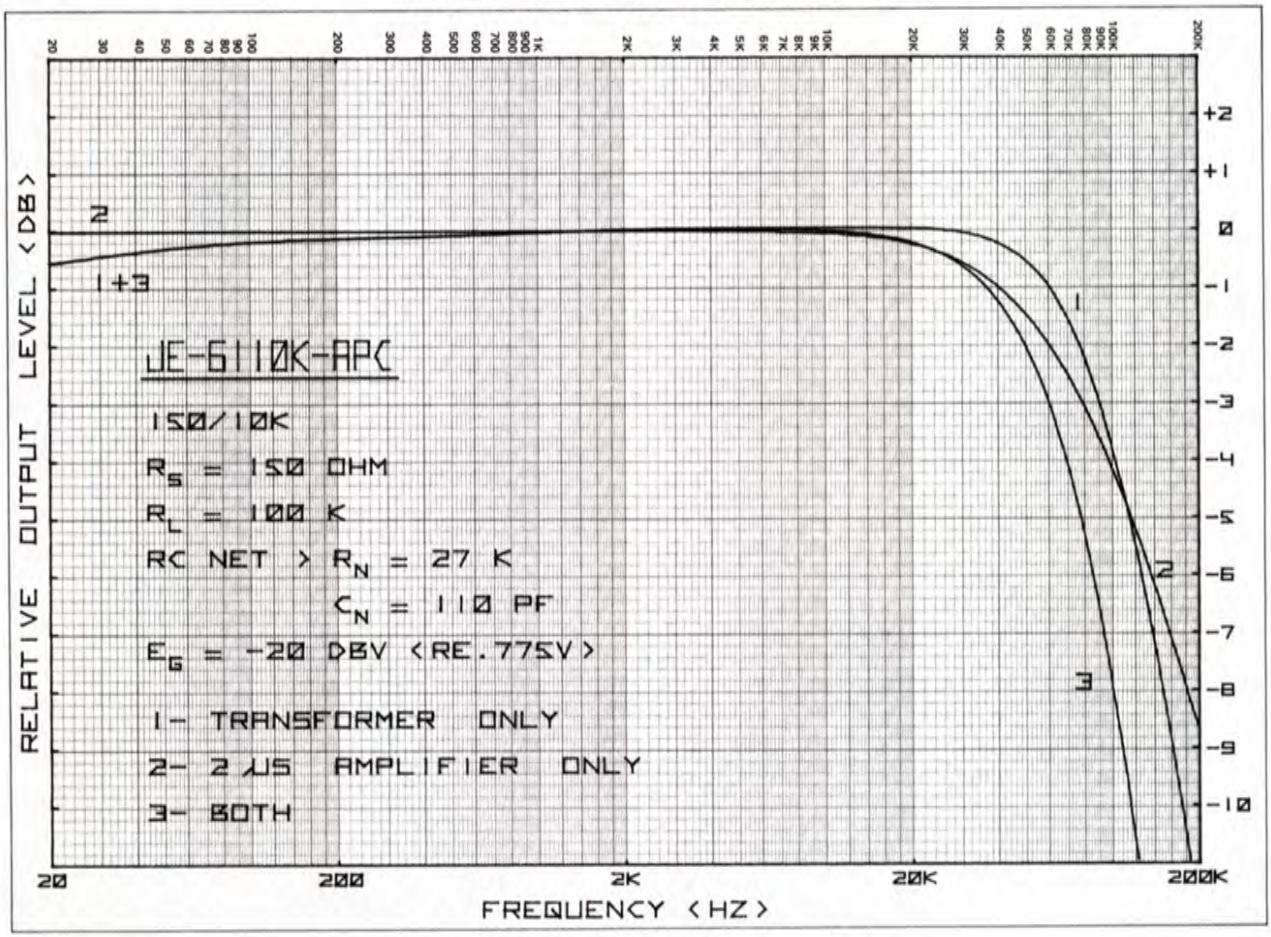
INPUT IMPEDANCE



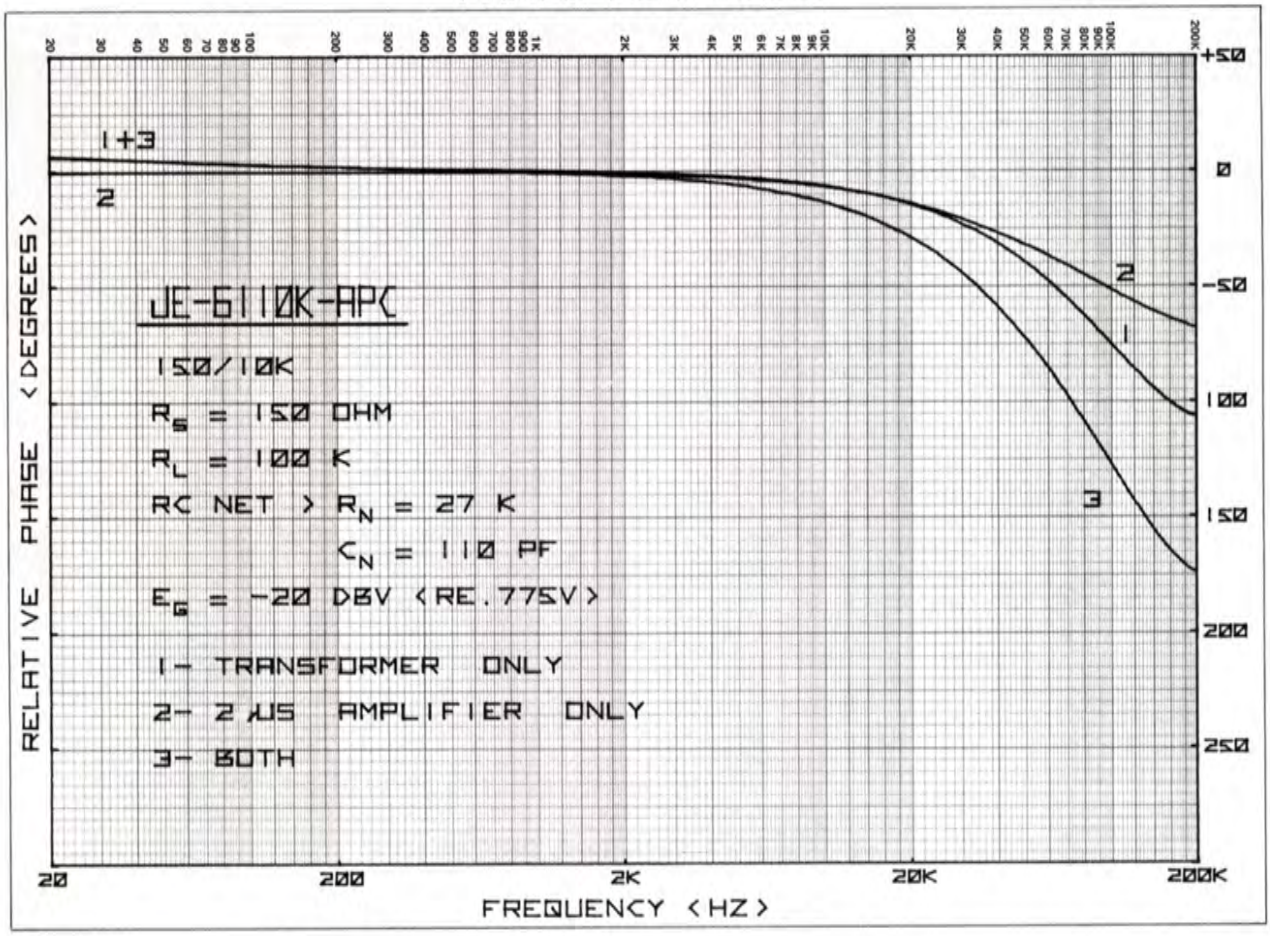
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



GENERAL CHARACTERISTICS

Turns Ratio
2/1:8.16
Impedance Ratio
600/150:10K
Primary Source Impedance
150 ohms (parallel primaries)
Secondary Load Resistor
100K ohms
Secondary RC Network
R_N = 27K ohms C_N = 110pf
Faraday Shield
Separate pin
Magnetic Shield
30dB, separate case pin
Maximum Input Level at 20Hz
−6dBv (Re: 0.775v)

PHYSICAL CHARACTERISTICS

Package
Mu-metal can
Termination
PC pins
Dimensions
1-1/8" diameter, 1-1/16" high

TYPICAL PERFORMANCE (150/10K)

Voltage Gain
18dB
Input Impedance
1240 ohms @ 1kHz
920 ohms @ 10kHz
Secondary Source Impedance
12.3K ohms @ 1kHz
13K ohms @ 10kHz
Total Harmonic Distortion (Below Saturation)
0.26% maximum @ 20Hz
0.14% maximum @ 30Hz
0.065% maximum @ 50Hz
0.013% @ 1kHz
Input Level @ 1% Saturation (dBv Re: 0.775v)
−10dBv @ 20Hz
−4.5dBv @ 30Hz
+1dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>85dB @ 1kHz
>65dB @ 10kHz
Transformer Noise Figure*
1.5dB Re: 129.5 ohms**

(TRANSFORMER WITH SECONDARY TERMINATION ONLY)

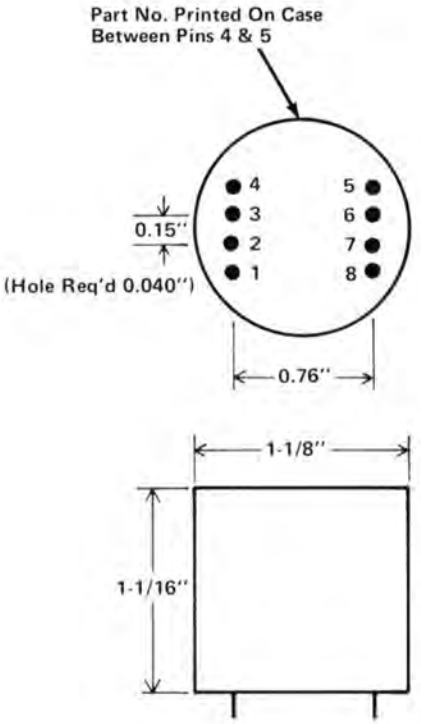
Frequency Response (Re: 1kHz)
−0.6dB @ 20Hz
+0.05dB @ 20kHz
(No Resonance peak)
Bandwidth
90kHz @ −3dB
Phase Response
−15° @ 20kHz
Rise Time
3.8μS (10%-90%)
Overshoot
3%

(INCLUDING 2μS AMPLIFIER)

Frequency Response (Re: 1kHz)
−0.6dB @ 20Hz
−0.25dB @ 20kHz
(No resonance peak)
Bandwidth
60kHz @ −3dB
Phase Response
−29° @ 20kHz
Rise Time
5.6μS (10%-90%)
Overshoot
<1%

Add to amplifier NF referred to impedance of 11.3K ohms. (Parallel value of secondary source impedance and load)

***Parallel value of source impedance and input impedance.*



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PHONE (213) 876-0059

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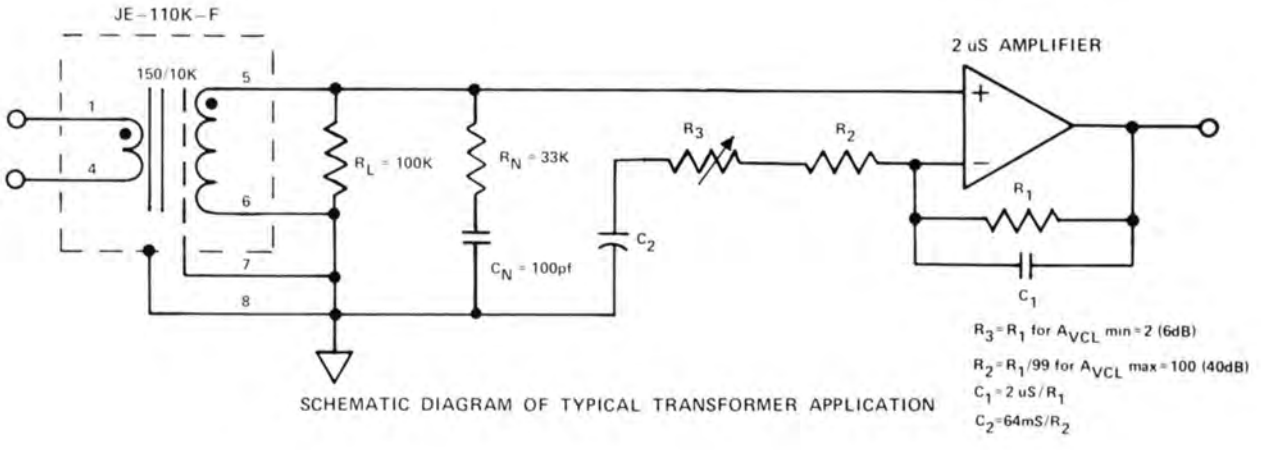
Data Sheet

jensen transformers
By REICHENBACH ENGINEERING

JE-110K-F
MICROPHONE INPUT TRANSFORMER

The JE-110K-F is a very miniature printed circuit board type 150/10K. The size is 0.73" square by 1.1" high with 8 PC pins and a mu-metal case. The package is a unique Reichenbach design which maximizes core area for package volume. This yields very good performance including high level capability for its size. However, the additional hand craftsmanship required for the small size, increases the cost of the JE-110K-F above his bigger brothers.

The pin pattern is unique, necessitated by the space occupied by the core.

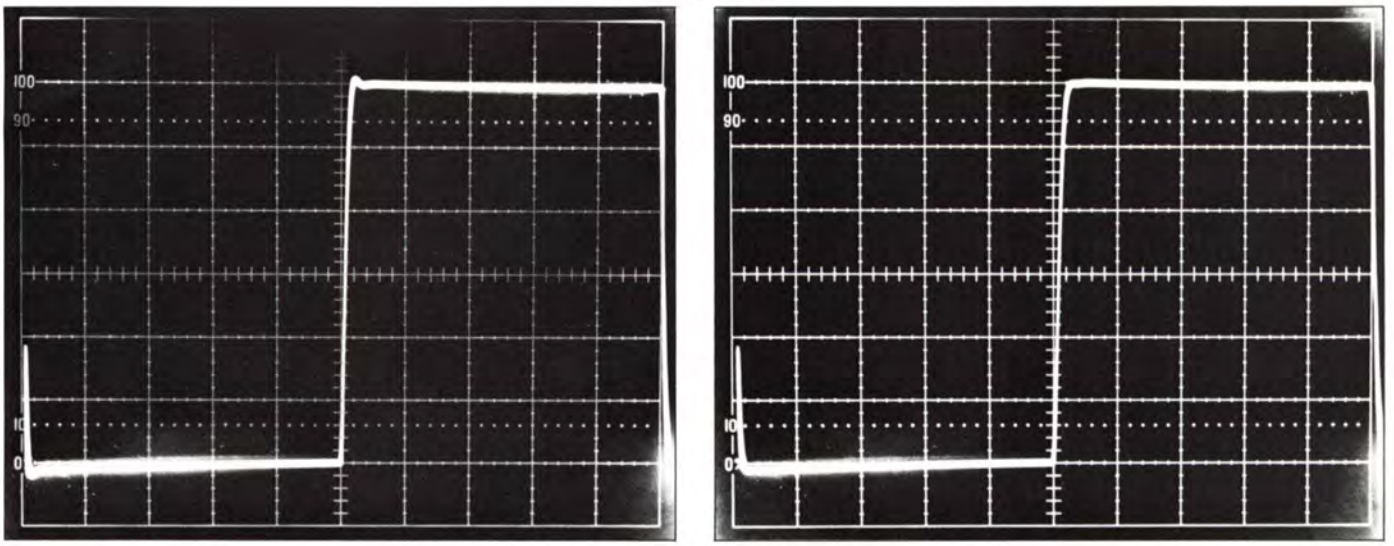


SCHEMATIC DIAGRAM OF TYPICAL TRANSFORMER APPLICATION

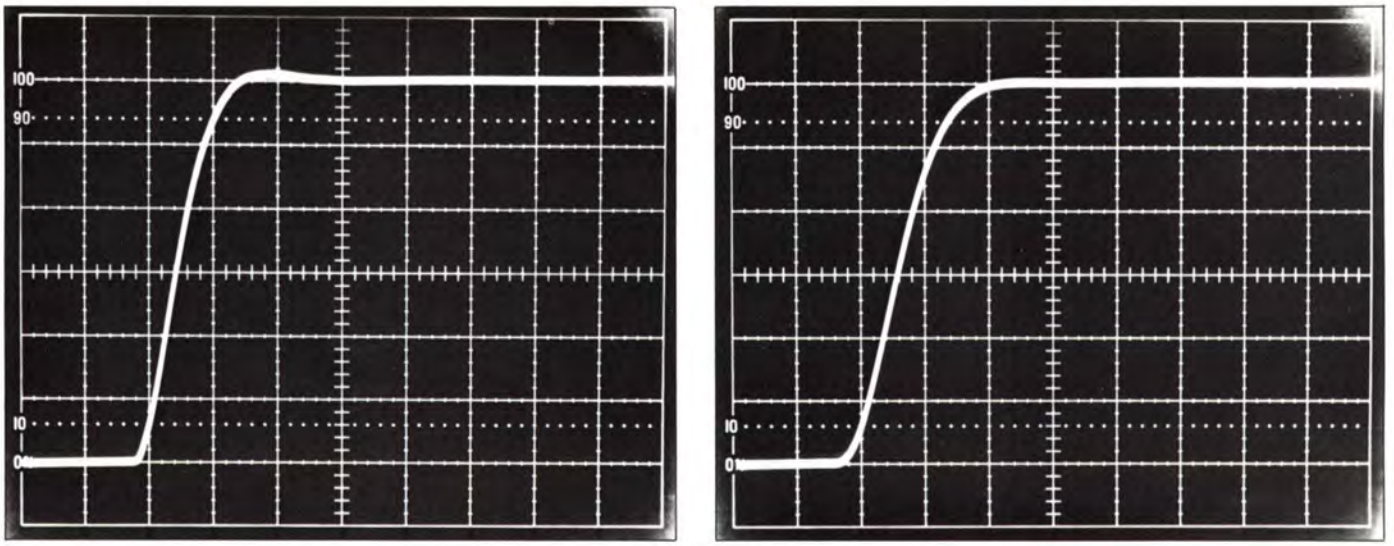
REGARDING THE OSCILLOSCOPE PHOTOS

Actual oscilloscope photos were made from a Tektronix Model 453A (certified calibration). Left column is transformer with secondary termination network and right column includes a 2 microsecond amplifier.

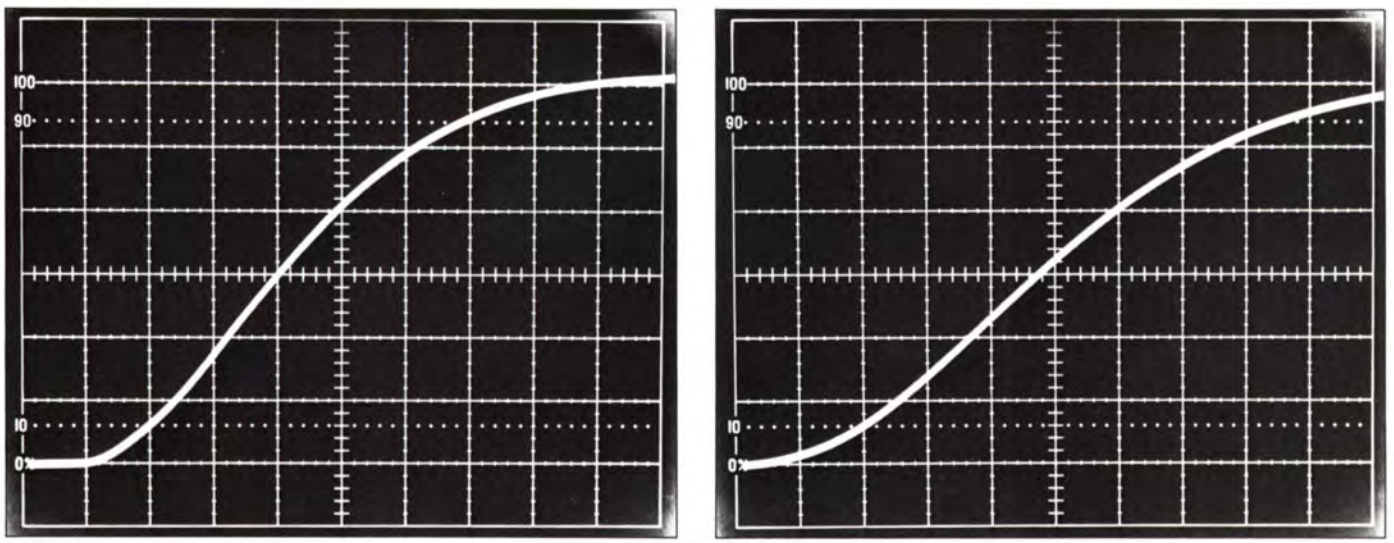
2kHz Square Wave



50μS/division



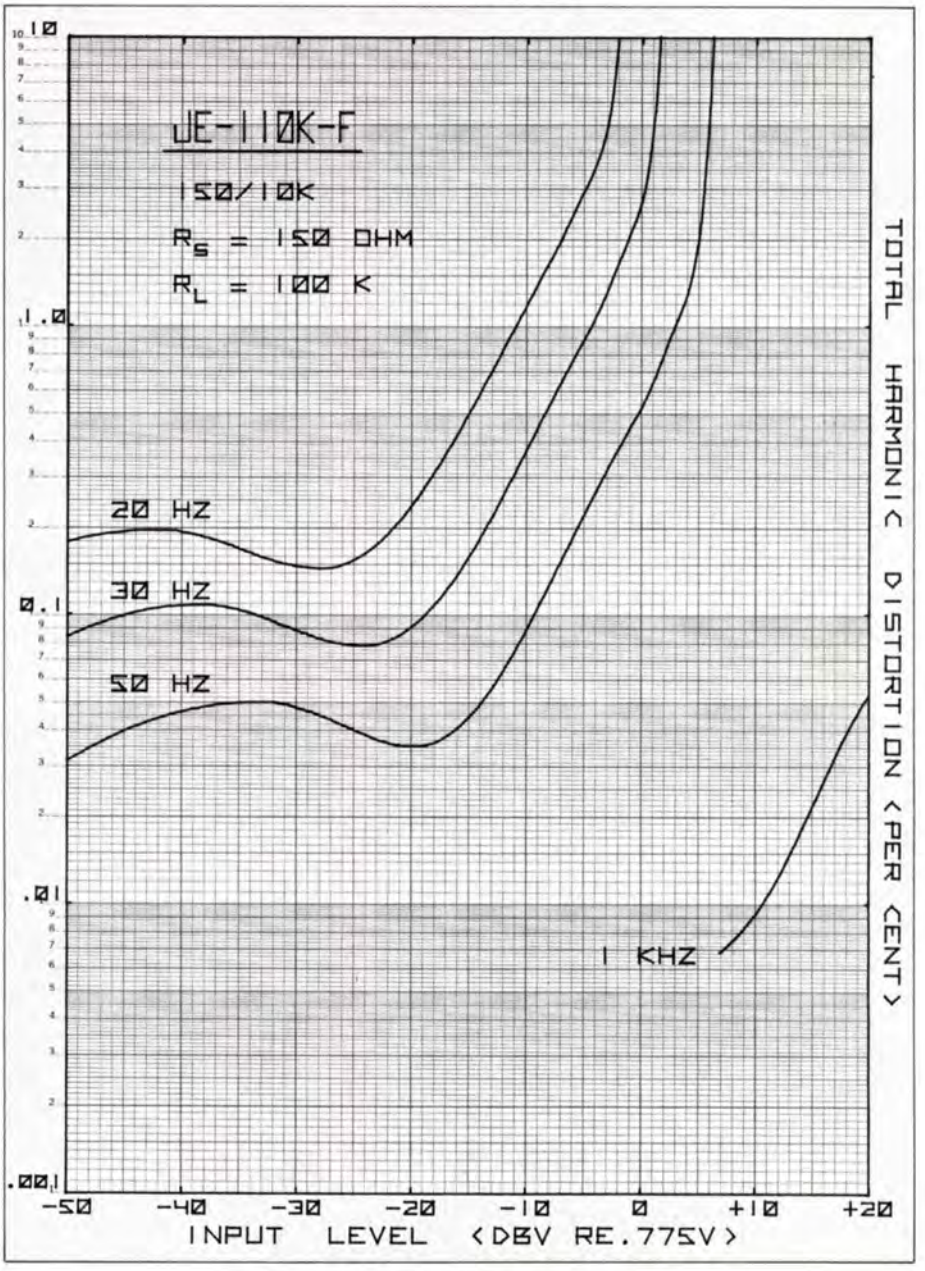
5μS/division



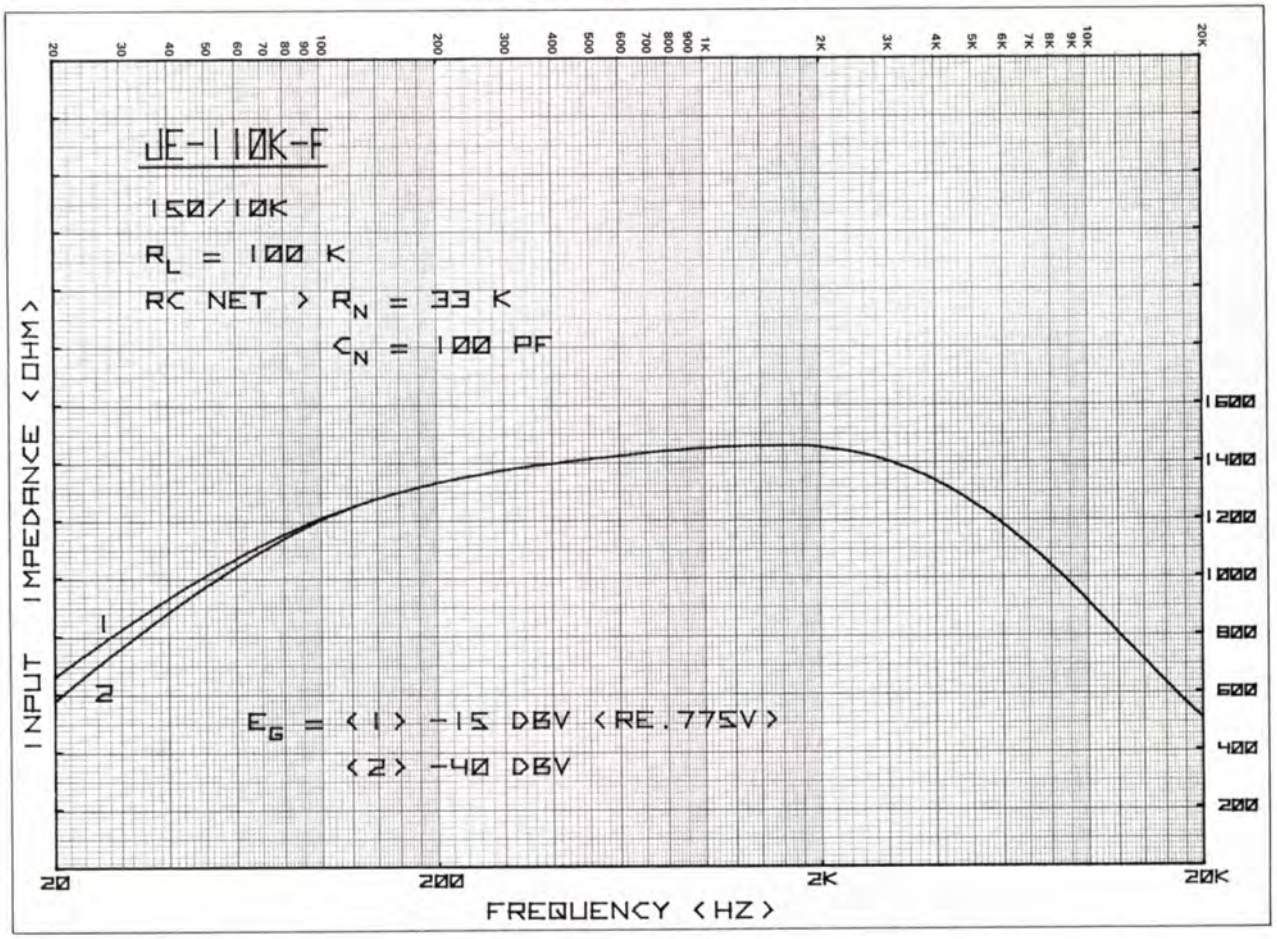
1μS/division

All curves were generated by a Hewlett-Packard 9815A/9862A programmable calculator/plotter. All calculations were either derived from or verified by actual measurements. Verified accuracies are on the order of one pen-line width.

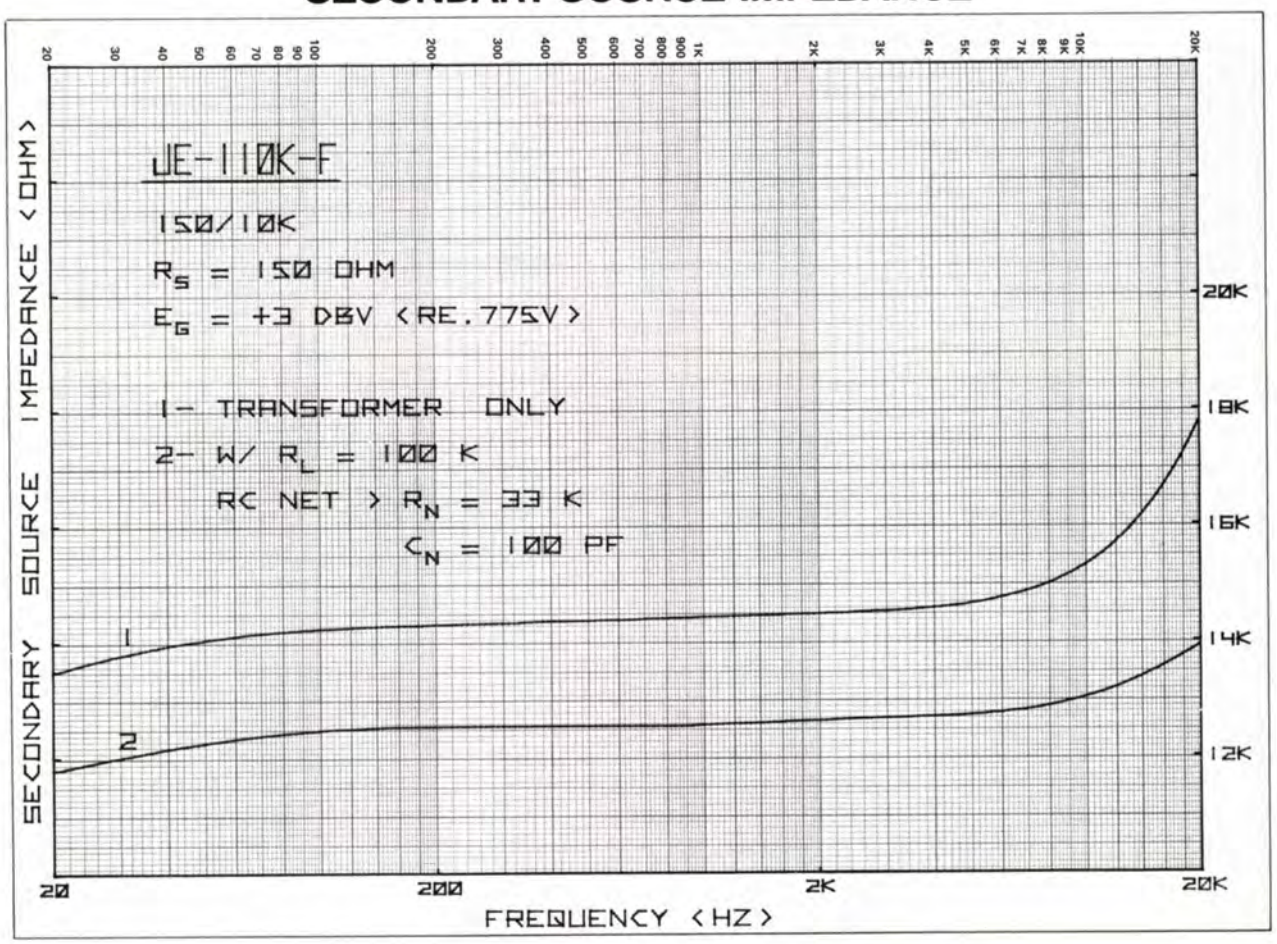
DISTORTION



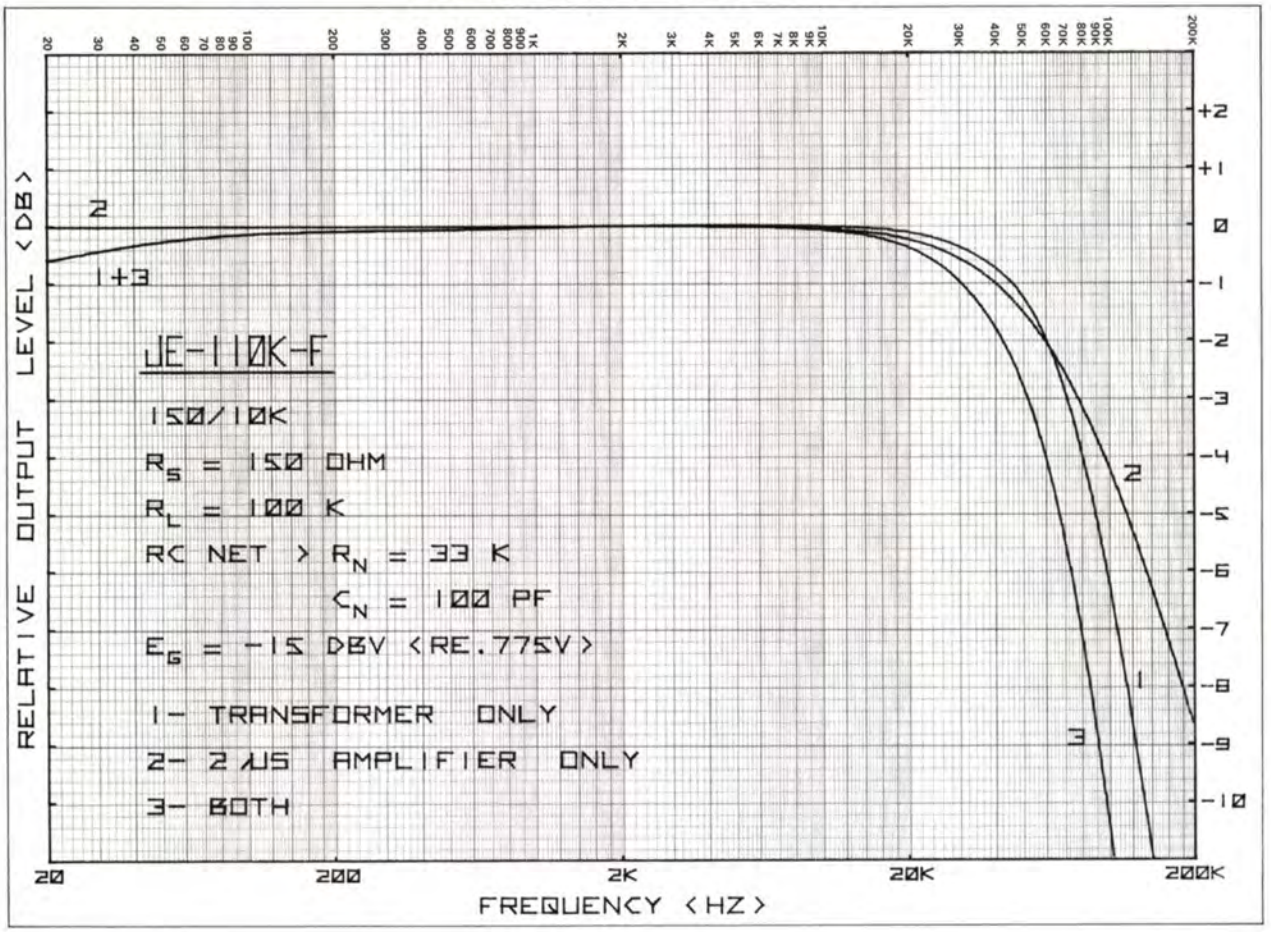
INPUT IMPEDANCE



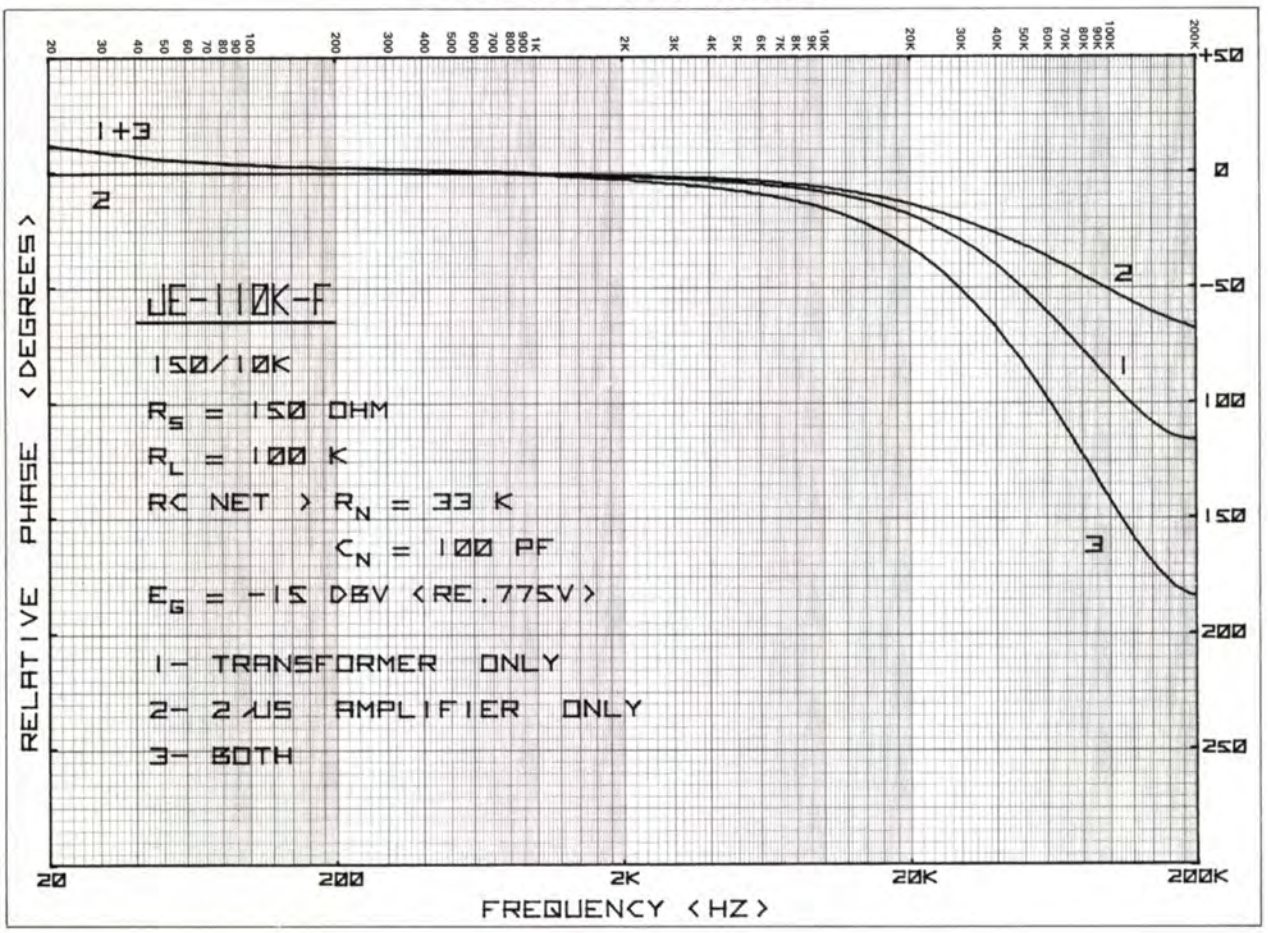
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



GENERAL CHARACTERISTICS

Turns Ratio
1:8.16
Impedance Ratio
150/10K
Primary Source Impedance
150 ohms
Secondary Load Resistor
100K ohms
Secondary RC Network
R_N = 33K ohms C_N = 100pf
Faraday Shield
Separate pin
Magnetic Shield
30dB, separate case pin
Maximum Input Level at 20Hz
−3.5dBv (Re: 0.775v)

PHYSICAL CHARACTERISTICS

Package
Miniature mu-metal can
Termination
PC pins
Dimensions
0.73" x 0.73" x 1.1" high

TYPICAL PERFORMANCE

Voltage Gain
17.9dB
Input Impedance
1450 ohms @ 1kHz
910 ohms @ 10kHz
Secondary Source Impedance
14.5K ohms @ 1kHz
15.3K ohms @ 10kHz
Total Harmonic Distortion (Below Saturation)
0.2% maximum @ 20Hz
0.11% maximum @ 30Hz
0.05% maximum @ 50Hz
0.007% @1kHz
Input Level @ 1% Saturation (dBv Re: 0.775v)
−11dBv @ 20Hz
−4.5dBv @ 30Hz
+3.0dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>75dB @ 1kHz
>55dB @ 10kHz
Transformer Noise Figure*
2.3dB Re: 128.6 ohms**

(TRANSFORMER WITH SECONDARY TERMINATION ONLY)

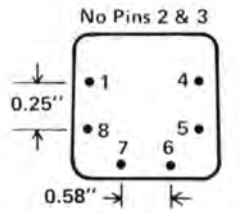
Frequency Response (Re: 1kHz)
−0.6dB @ 20Hz
−0.15dB @ 20kHz
(No resonance peak)
Bandwidth
77kHz @ −3dB
Phase Response
−20° @ 20kHz
Rise Time
4.8μS (10%-90%)
Overshoot
<3%

(INCLUDING 2μS AMPLIFIER)

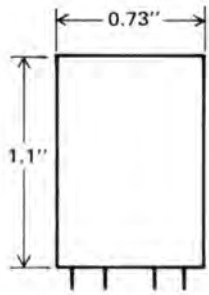
Frequency Response (Re: 1kHz)
−0.6dB @ 20Hz
−0.4dB @ 20kHz
(No resonance peak)
Bandwidth
52kHz @ −3dB
Phase Response
−34° @ 20kHz
Rise Time
6.6μS (10%-90%)
Overshoot
<1%

Add to amplifier NF referred to impedance of 12.9K ohms. (Parallel value of secondary source impedance and load)

**Parallel value of source impedance and input impedance.*



(Hole Req'd 0.040")



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By REICHENBACH ENGINEERING

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PHONE (213) 876-0059

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HIGH LEVEL IN

Data Sheet

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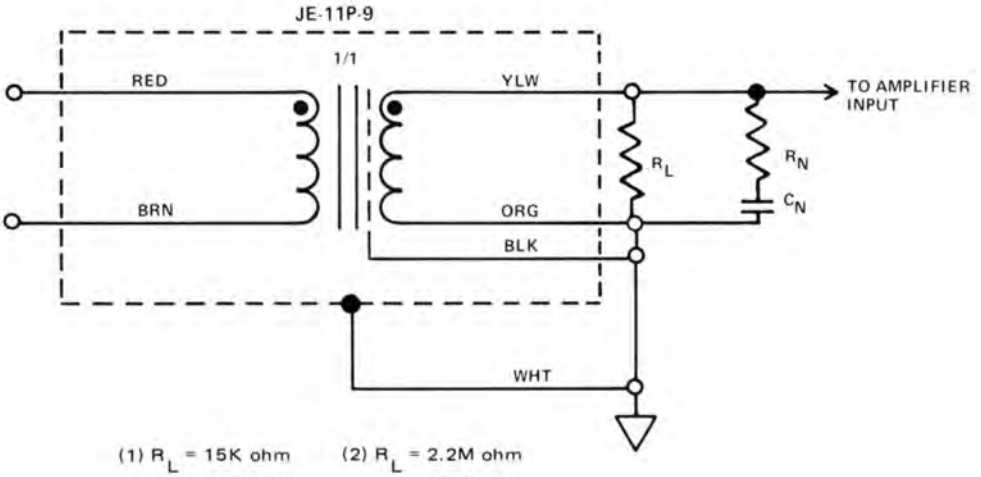
JE-11P-9
LINE INPUT TRANSFORMER

The JE-11P-9 is a 1:1 turns ratio line input transformer for high input impedance circuits (5K ohms and higher). It handles levels to +27dBv. Re: 0.775v @ 20Hz. Below saturation, the 20Hz THD is less than 0.025%. The high grade Nickel alloy core yields very low distortion even with source impedances up to several thousand ohms.

The bandwidth is 52kHz with <3% overshoot. The series losses are equivalent to 1470 ohms, so the level loss will be the same as a voltage divider made with a 1470 ohm series resistor and a shunt resistor equal to the load connected to the secondary. For 15K ohm load, an RC network of 7500 ohms and 1000pF is required to damp the resonance. If the load is 100K or higher, an RC network of 5600 ohms and 1500pF is required. For other loads such as input circuits with shunt capacitance, our computer can derive optimum RC network values to minimize transient distortion and maximize bandwidth and generate revised response and impedance results.

The standard package has wire leads. Octal plug versions are available for all popular pin connections with or without the RC network built-in.



(1) R_L = 15K ohm
R_N = 7500 ohm
C_N = 1000pf

(2) R_L = 2.2M ohm
R_N = 5600 ohm
C_N = 1500pf

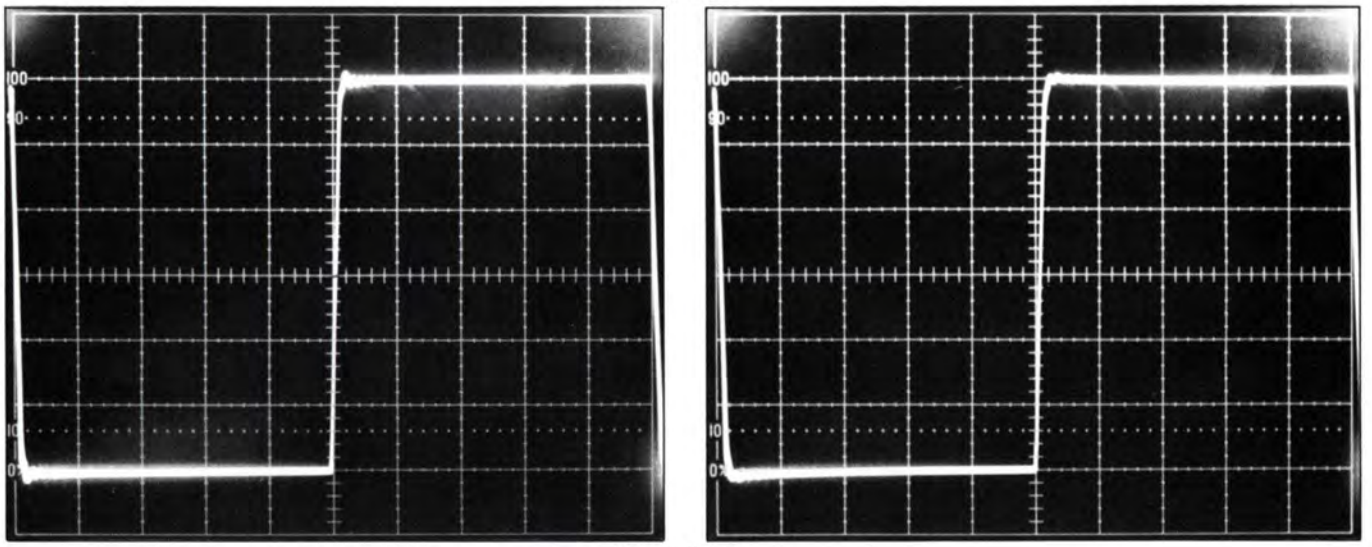
REGARDING THE OSCILLOSCOPE PHOTOS

Actual oscilloscope photos were made from a Tektronix Model 453A (certified calibration).

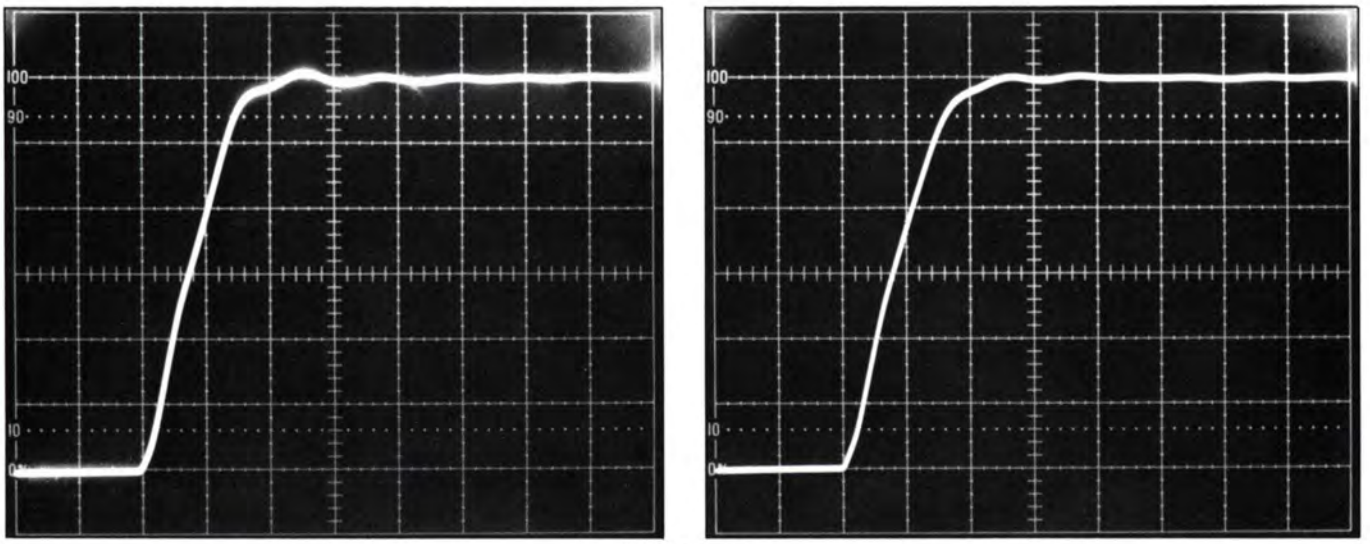
This column with 15kΩ load.

This column with no load.

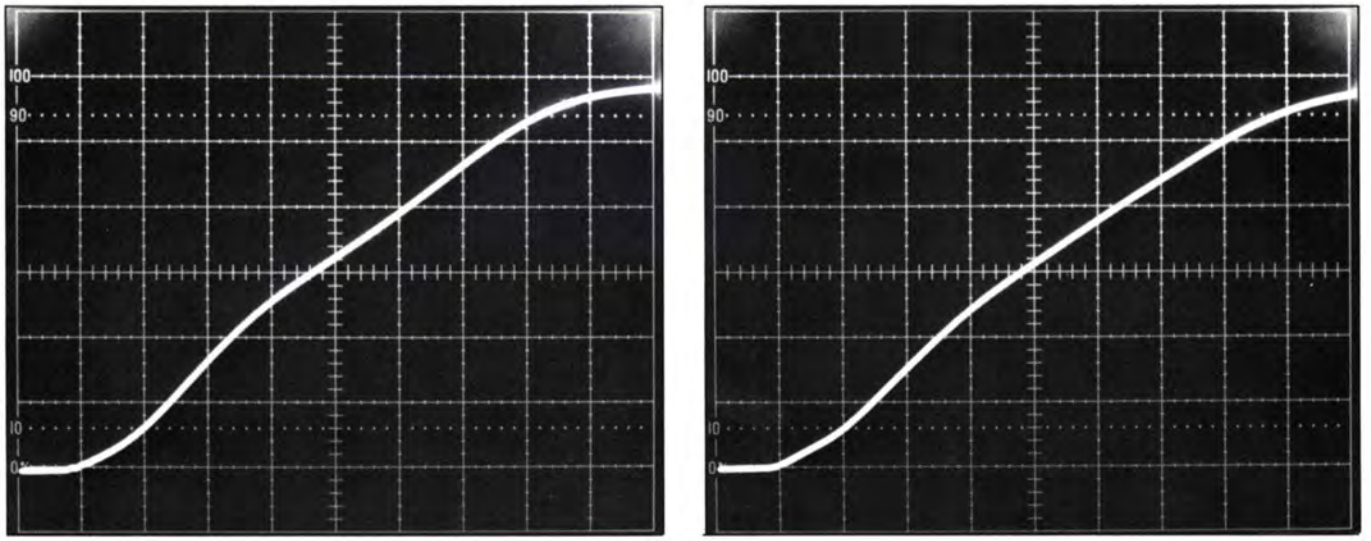
2kHz Square Wave



50μS/division



5μS/division

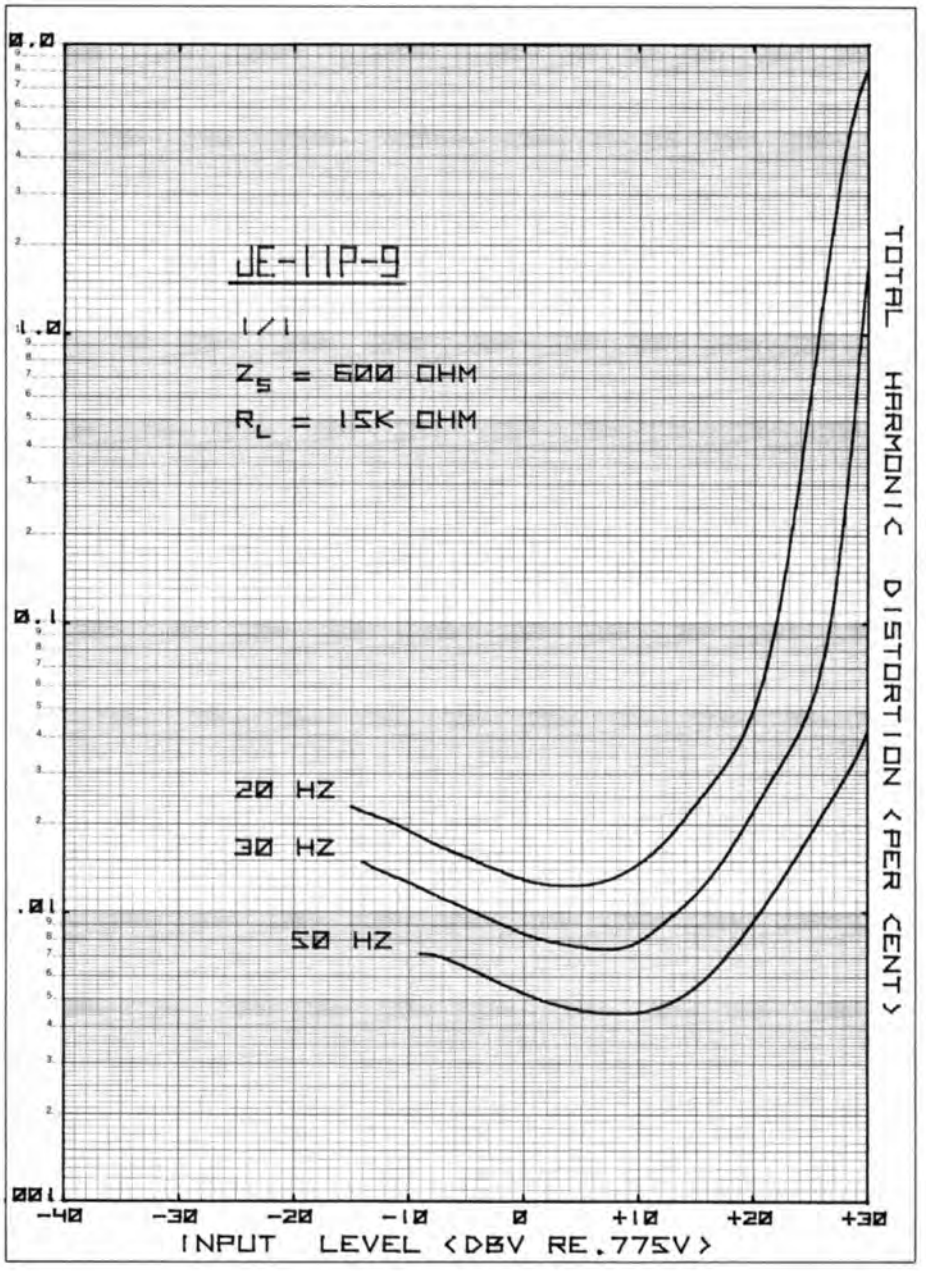


1μS/division

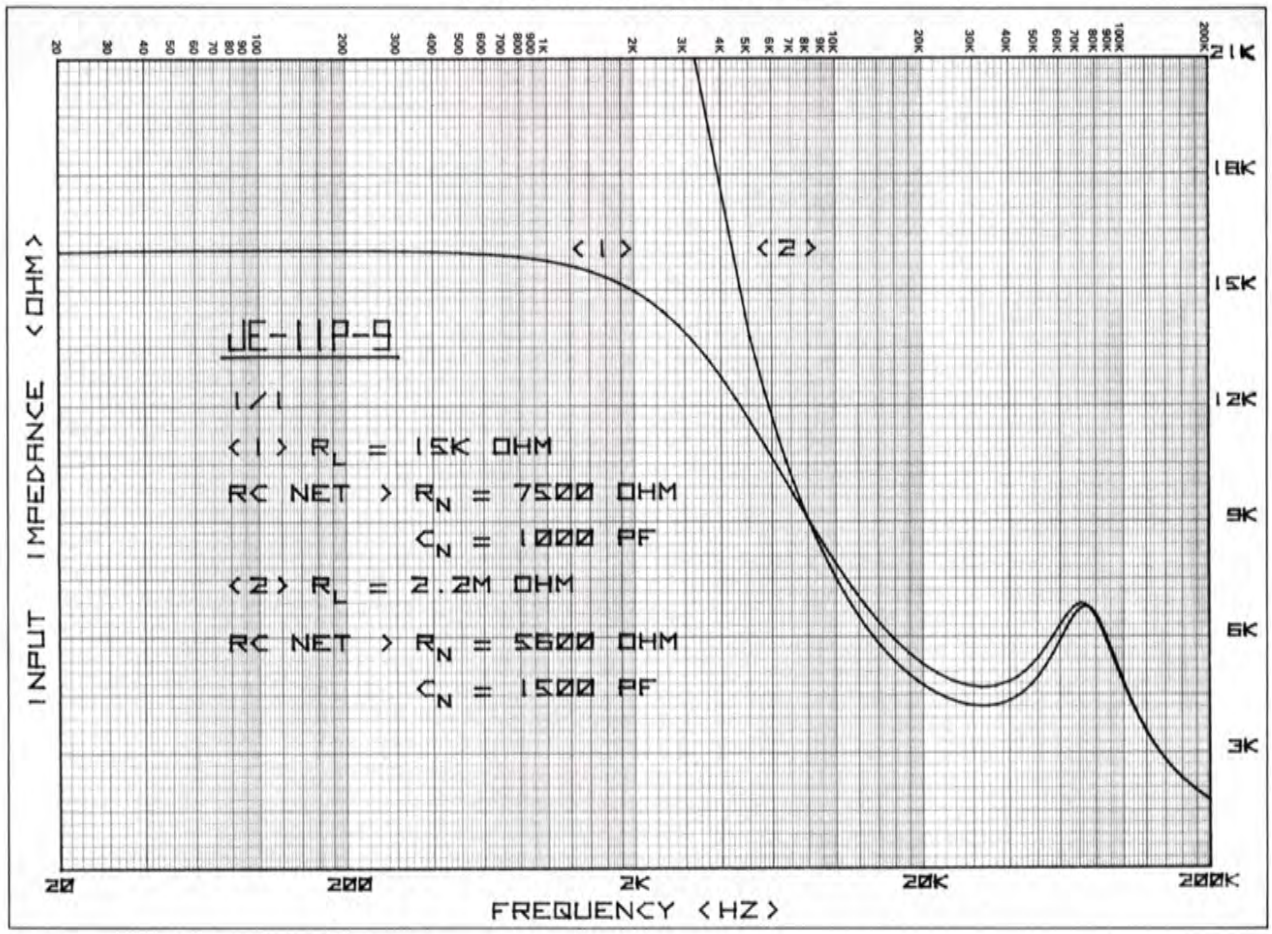
The response and impedance curves were generated by a Hewlett/Packard System 45 Desktop Computer and a 9872A Plotter. The curves are the calculated results from an equivalent circuit model using the H/P AC Circuit Analysis program. This method has made it possible to display the impedance curves up to 200kHz showing the secondary resonance and RC network damping effect. Measured data from many prototypes were used to derive the model to represent the average performance.

The distortion curves were generated by a Hewlett/Packard 9815A/9862A programmable calculator/plotter with a polynominal curve fit program. The distortion measurements employed a Sound Technology 1710A Analyzer. Verified accuracies are on the order of one pen line width.

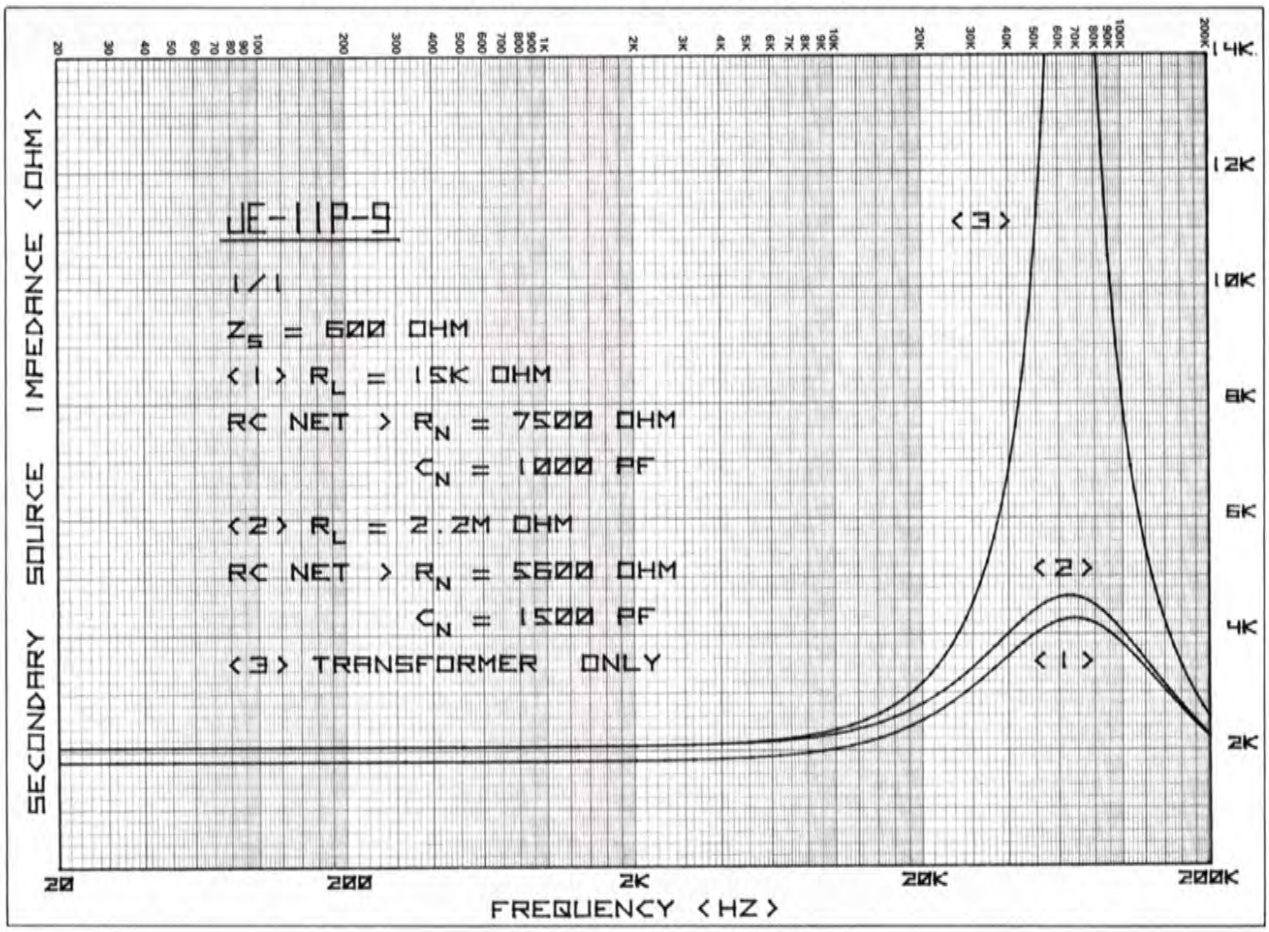
DISTORTION



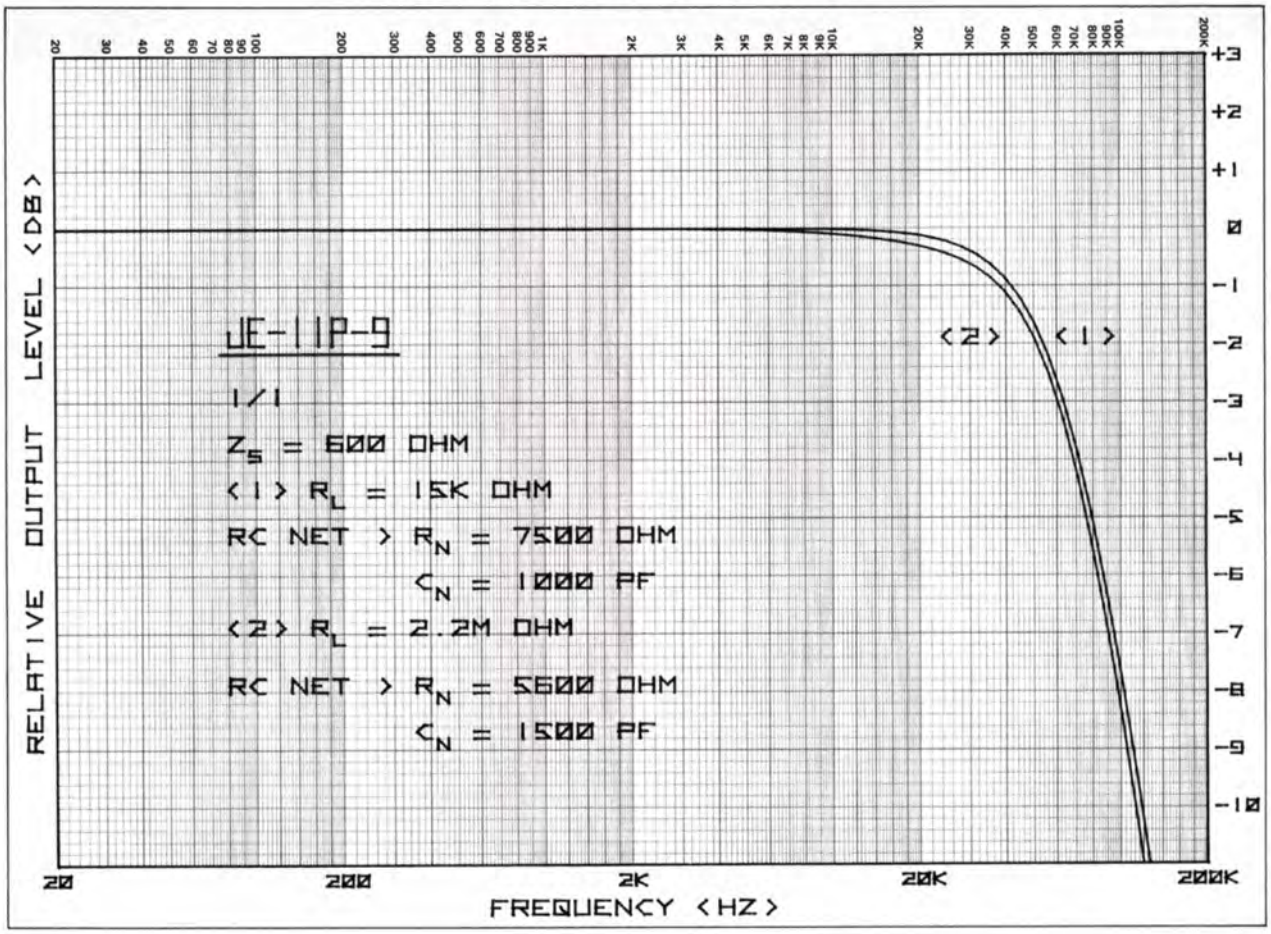
INPUT IMPEDANCE



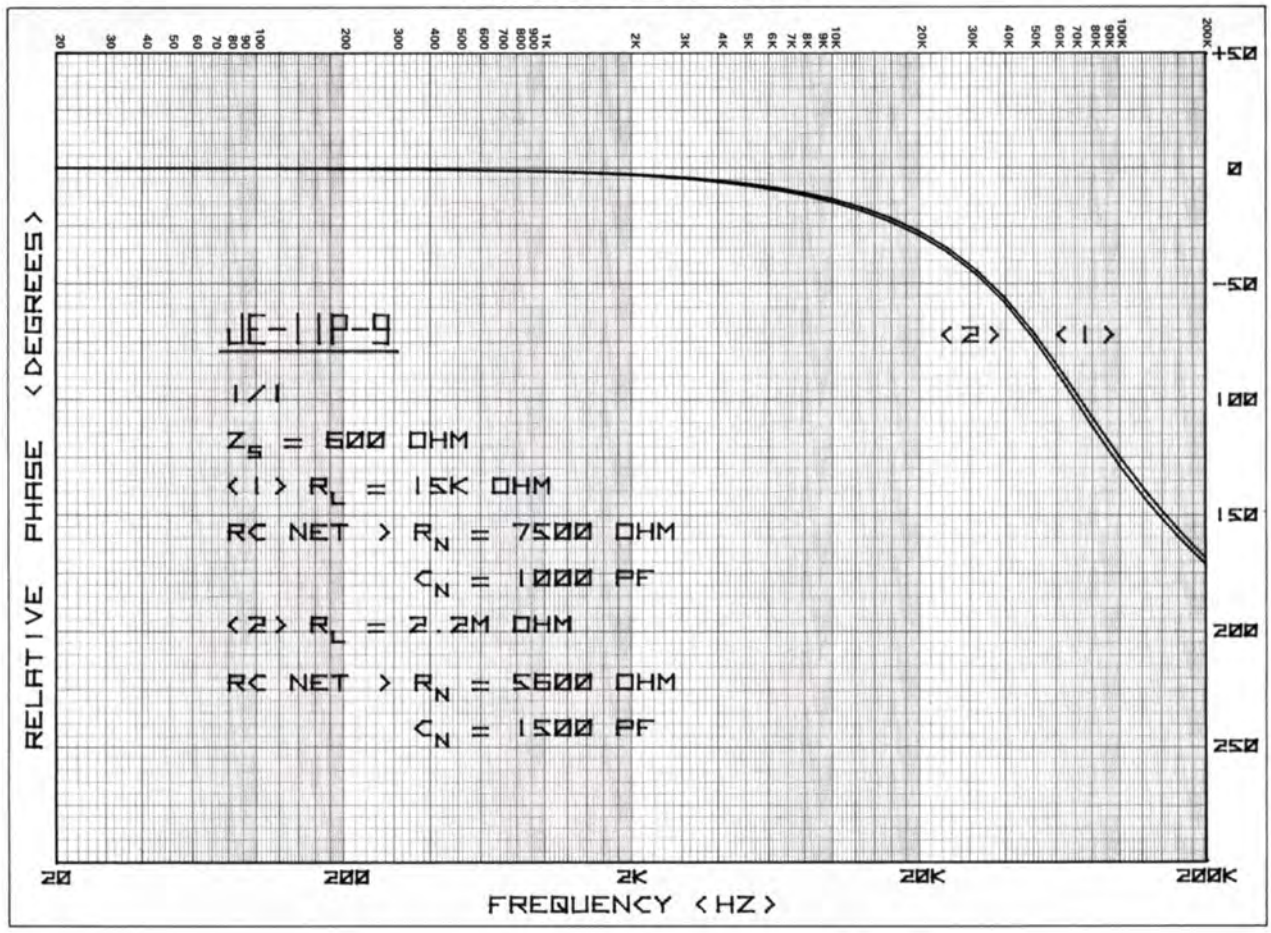
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



JE-11P-9 GENERAL CHARACTERISTICS

Turns Ratio
1:1
Impedance Ratio
(15K/15K)
Primary Source Impedance
600 ohms or less

Secondary Load Resistor	15K ohms	2.2Meg ohms
Secondary RC Network	7500 ohms, 1000pF	5600 ohms, 1500pF
	(most plug-in types have RC net built-in)	

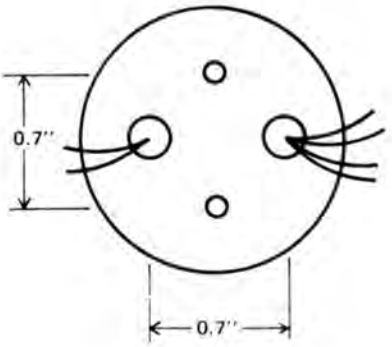
Faraday Shield
Separate Lead
Magnetic Shield
30dB, separate case lead
Maximum Input Level at 20Hz
+27dBv (Re: 0.775v)

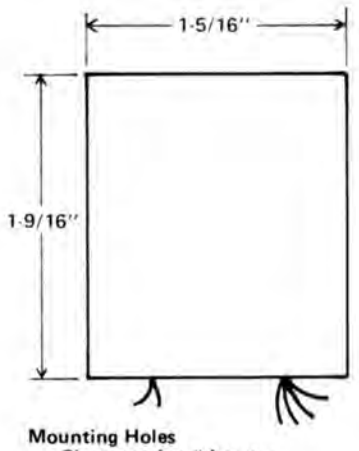
PHYSICAL CHARACTERISTICS

Package
Mu-metal can (standard) or octal plug
Termination
Wire Leads (standard)
Octal plug types also available
Dimensions
1-5/16" diameter, 1-9/16" high (standard)
1-5/16" diameter, 2" high (octal plug)
Mounting (standard)
2 holes, 0.7" center-to-center/self-trapping screws or clamp

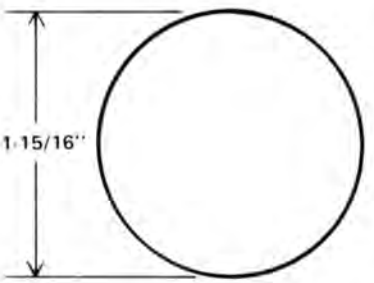
TYPICAL PERFORMANCE		With 15K load	With 2.2Meg load
Voltage Gain		−0.82dB	−0.03dB
Input Impedance	**@ 1kHz**	15.8K ohm	67K ohm
	@ 10kHz	7850 ohms	7470 ohms
Frequency Response (Re: 1kHz)	**@ 20Hz**	−0.03dB	−0.03dB
	@ 20kHz	−0.3dB	−0.6dB
Bandwidth	**@ −3dB**	52kHz	58kHz
Phase Response	**@ 20kHz**	−27.5 deg	−29 deg
Rise Time	**(10%-90%)**	6.2μS	6.6μS
Overshoot		<3%	<1%

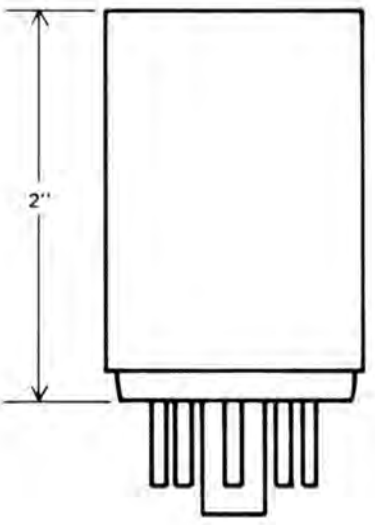
Secondary Source Impedance
2070 ohms @ 1kHz
2360 ohms @ 10kHz
Total Harmonic Distortion (Below Saturation)
0.025% @ 20Hz
0.015% @ 30Hz
0.008% @ 50Hz
Input Level @ 1% Saturation (dBv Re: 0.775v)
+26dBv @ 20Hz
+29dBv @ 30Hz
+35dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>75dB @ 1kHz
>55dB @ 10kHz





Mounting Holes
Clearance for #4 screw
Lead Holes
Use 0.35" hole to clear grommet





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Data Sheet

JE-11SSP-8M

LINE INPUT TRANSFORMER

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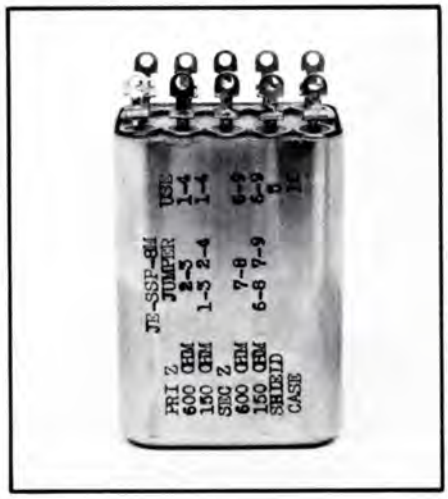
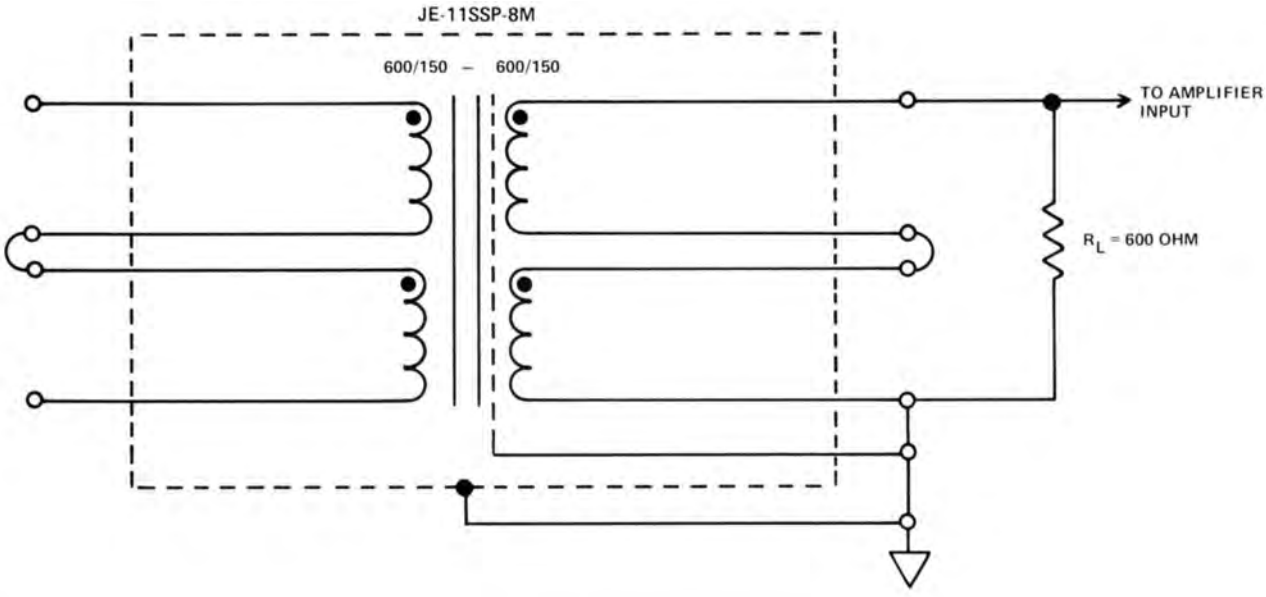
The JE-11SSP-8M is a 600/150 – 600/150 ohm (split winding) line input transformer for low input impedance circuits. It handles levels to +23dBv. Re: 0.775v @ 20Hz. Below saturation, the 20Hz THD is less than 0.035%. The high grade Nickel alloy core yields very low distortion even with source impedances up to several hundred ohms. The bandwidth is 120kHz with <3% overshoot.

The standard package has solder terminals. An 11 pin octal-type plug version is available.

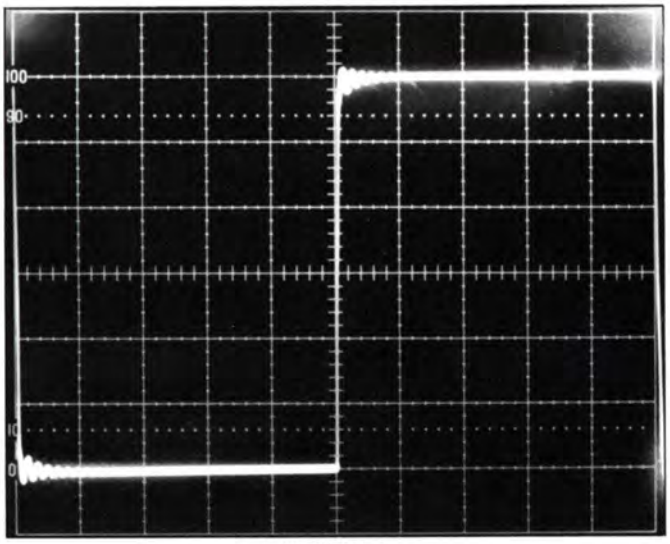




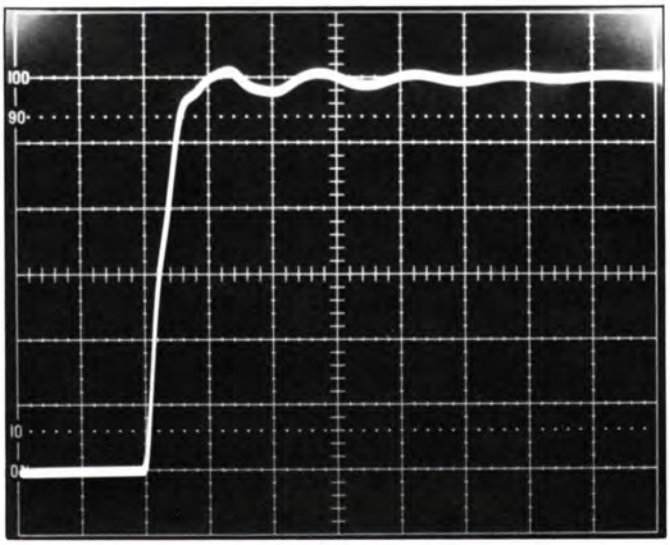
REGARDING THE OSCILLOSCOPE PHOTOS

Actual oscilloscope photos were made from a Tektronix Model 453A (certified calibration).

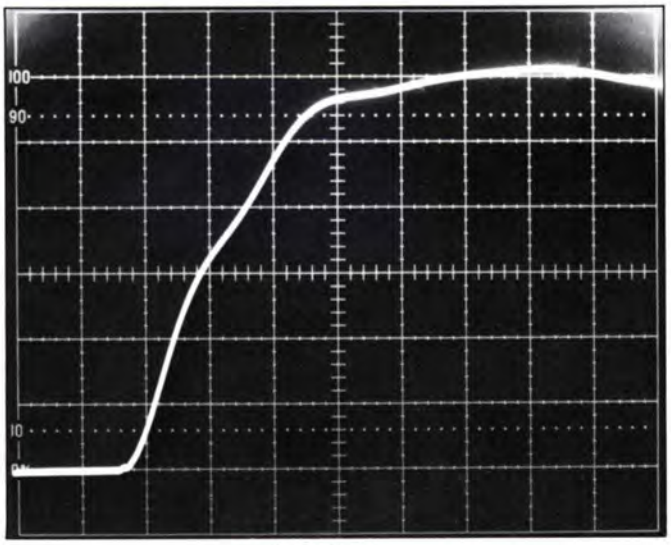
2kHz Square Wave



50μS/division



5μS/division

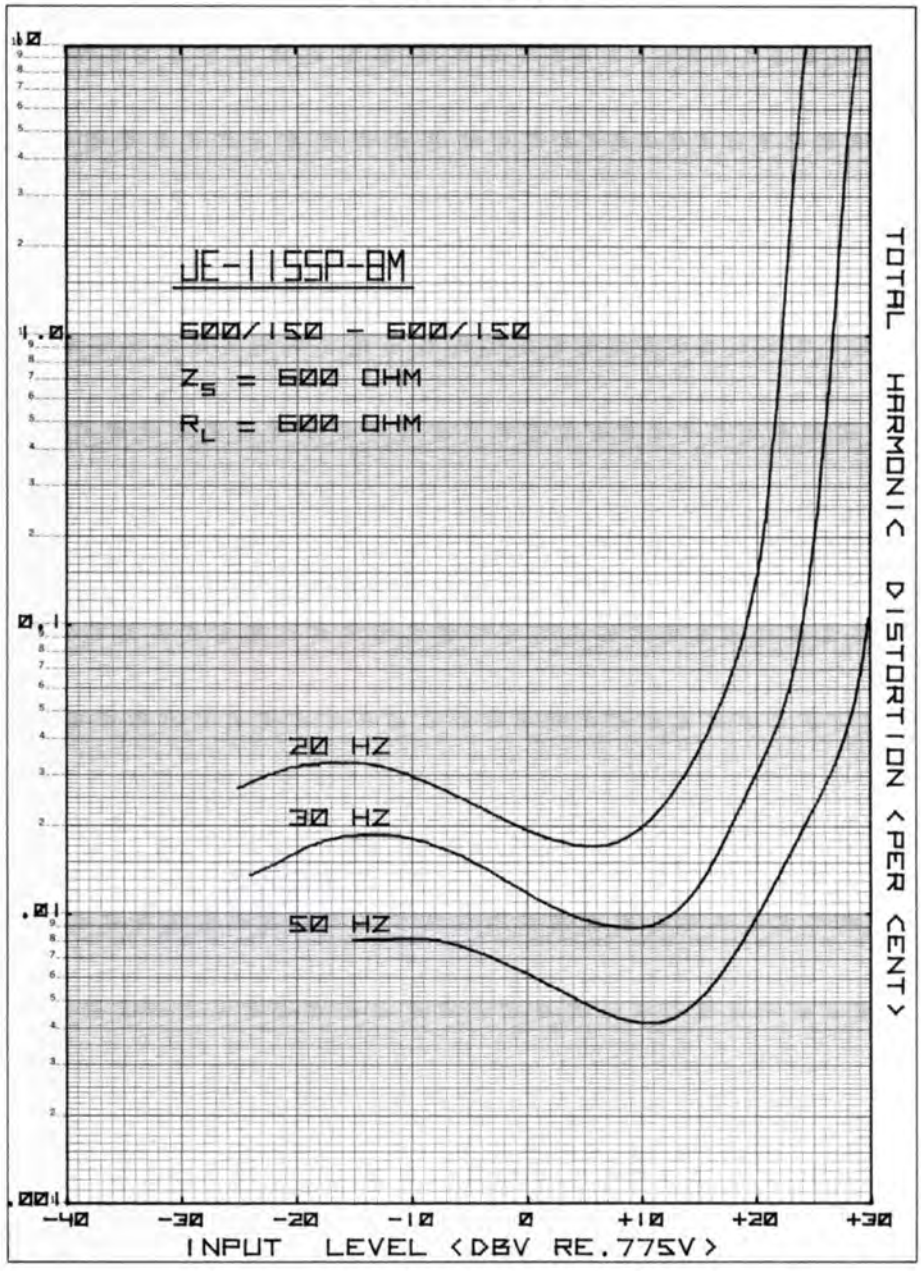


1μS/division

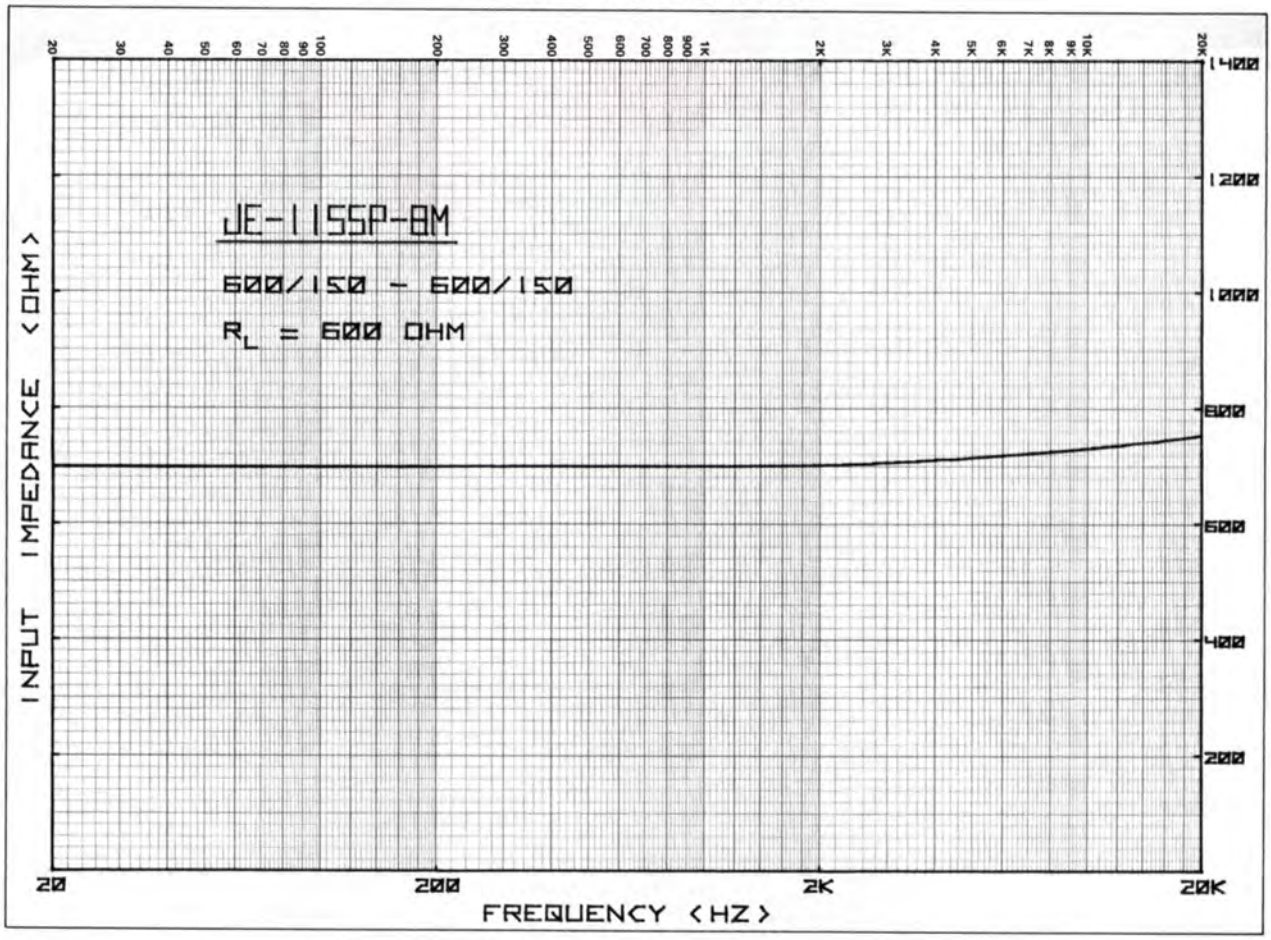
All curves were generated by a Hewlett-Packard 9815A/9862A programmable calculator/ plotter.

All calculations were either derived from or verified by actual measurements. The distortion curves were generated by a polynominal curve fit program using measurements by a Sound Technology 1710A analyzer. Verified accuracies are on the order of one pen line width.

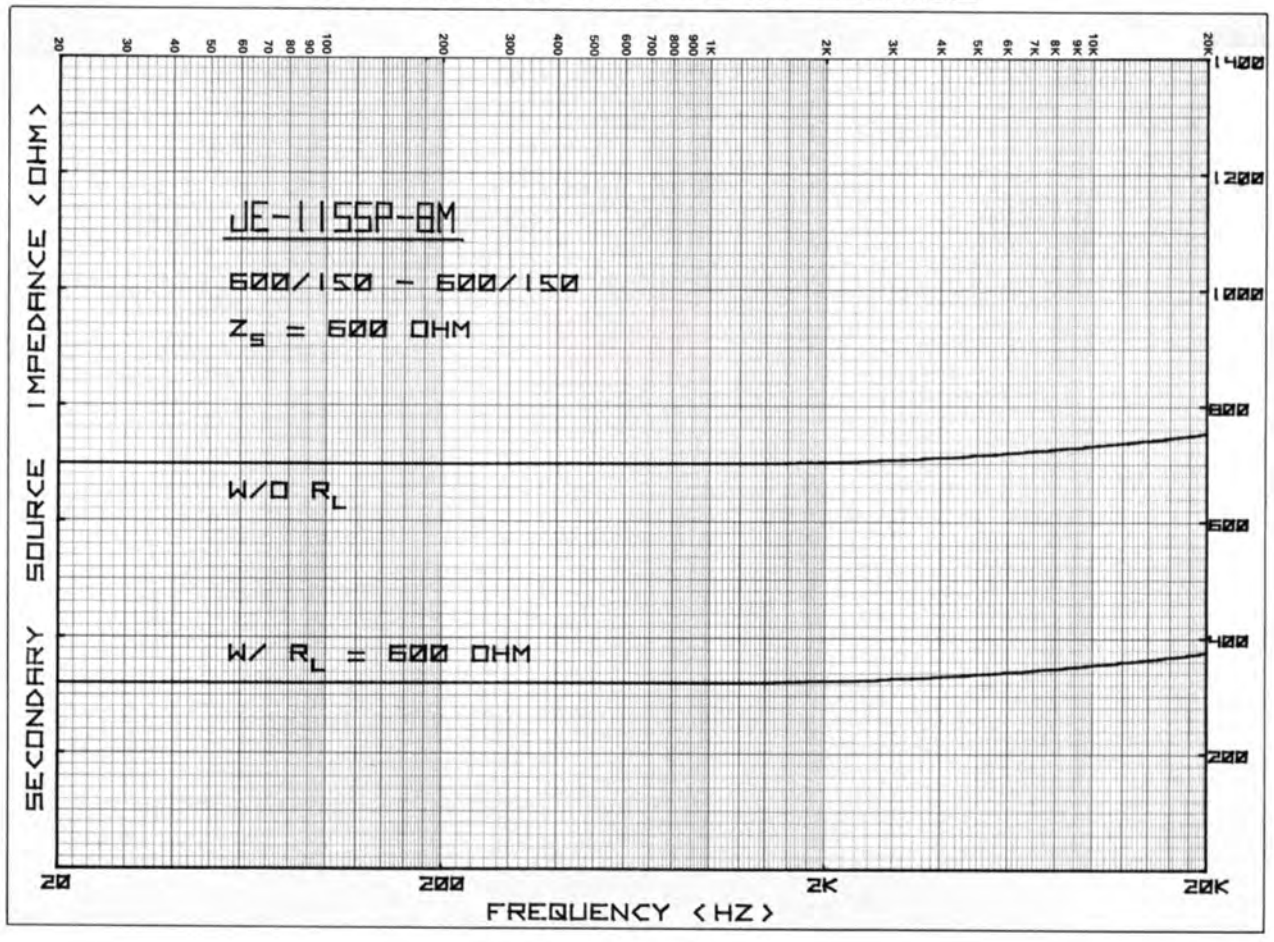
DISTORTION



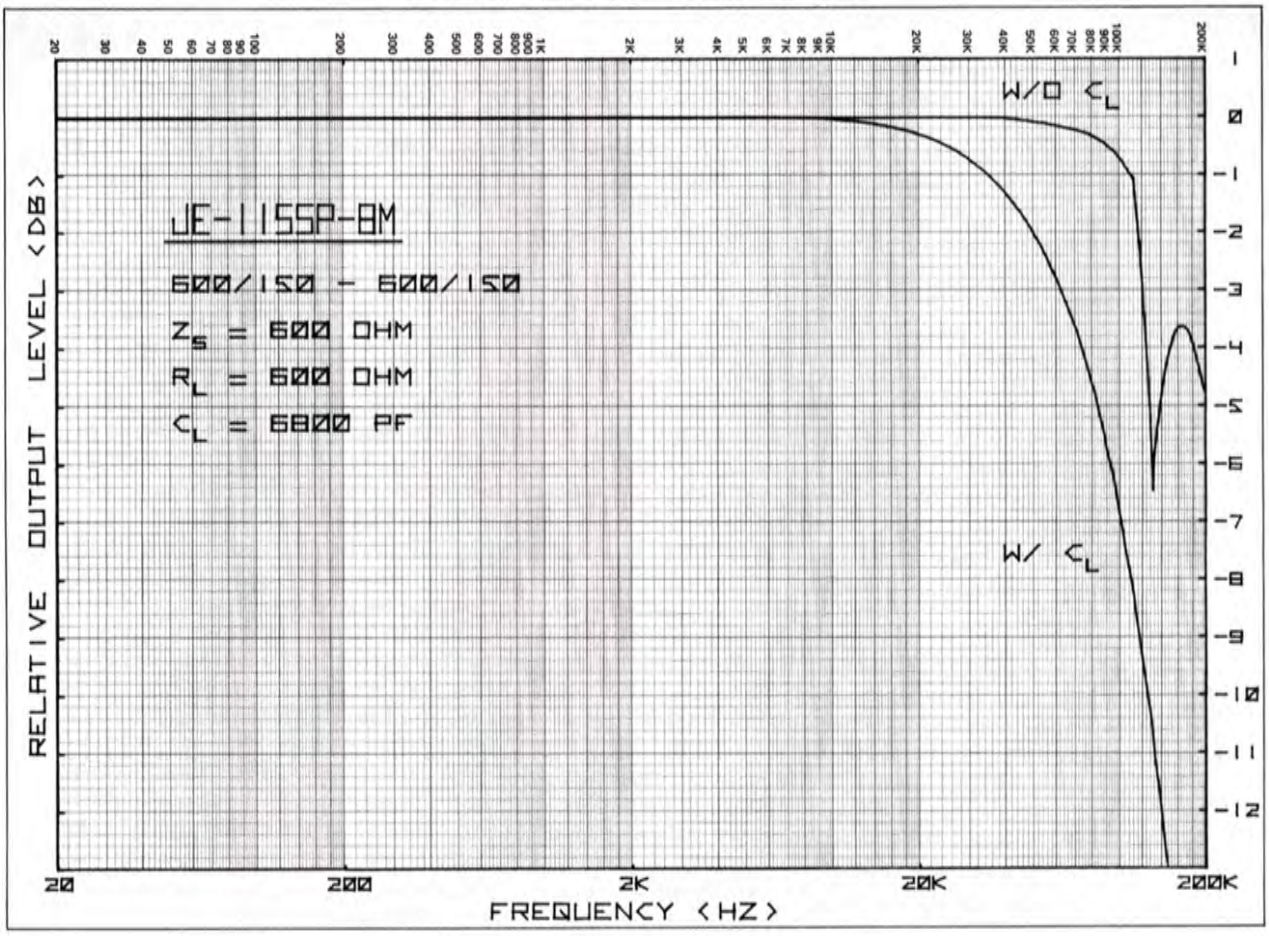
INPUT IMPEDANCE



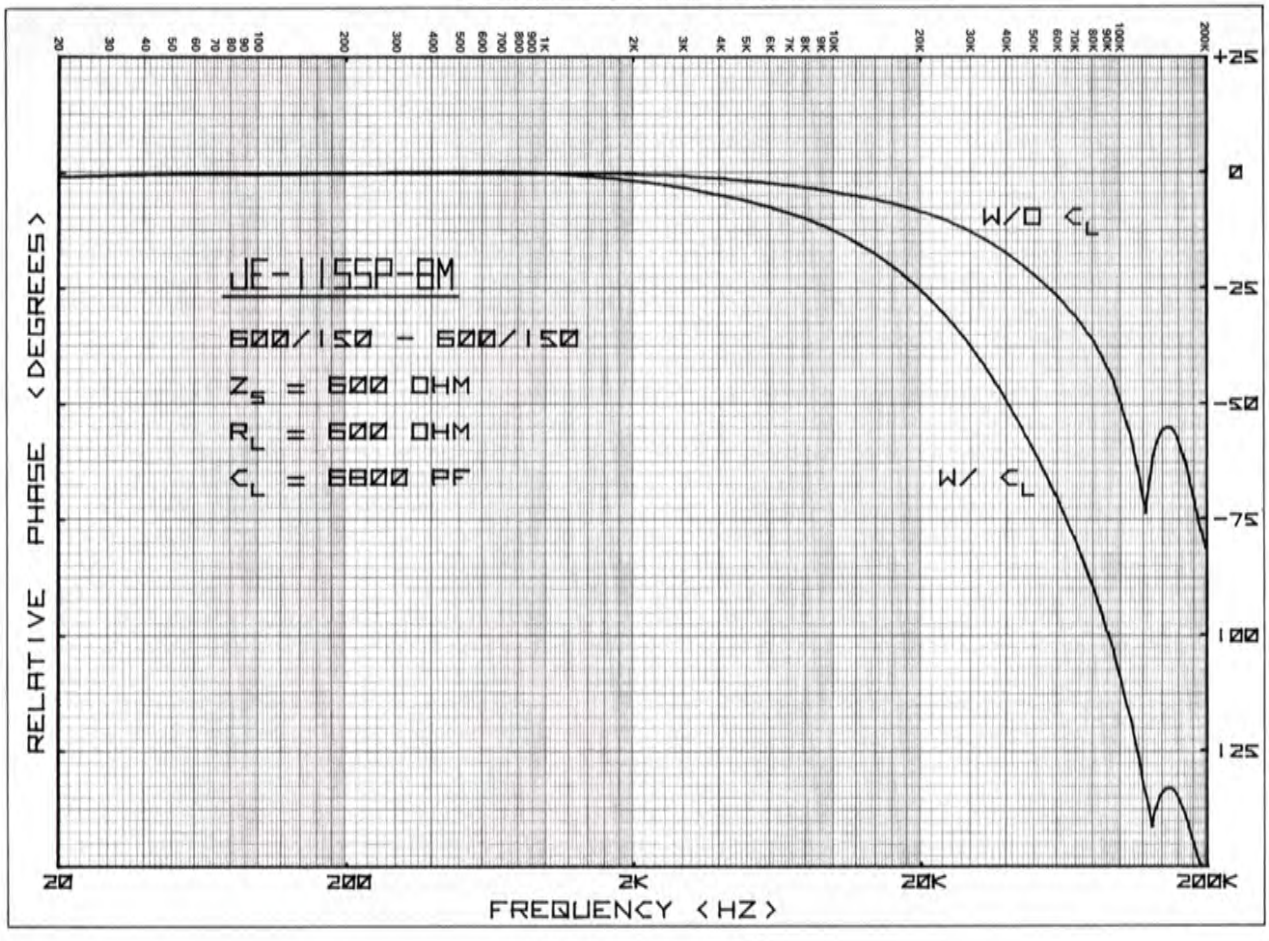
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



JE-11SSP-8M GENERAL CHARACTERISTICS

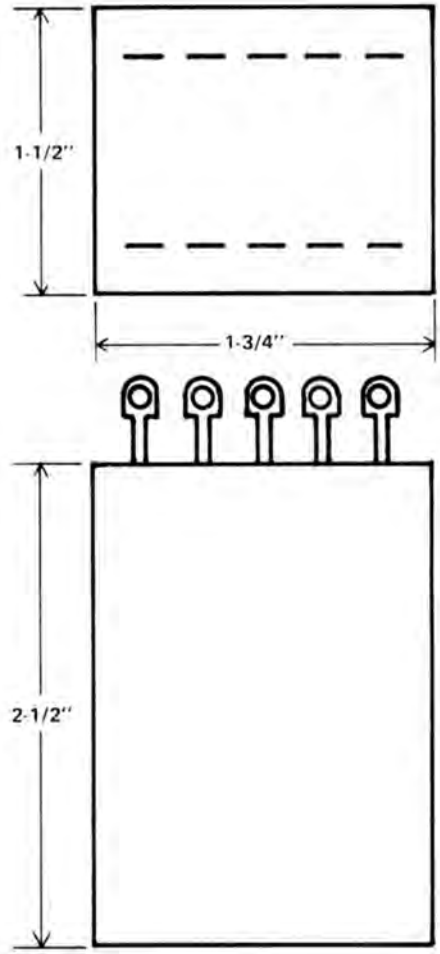
Turns Ratio
1:1
Impedance Ratio
600/150 – 600/150
Primary Source Impedance
600 ohms or less
Secondary Load Resistor
600 ohms
Faraday Shield
Separate connection
Magnetic Shield
30dB, separate case connection
Maximum Input Level @ 20Hz
+23dBv (Re: 0.775v)

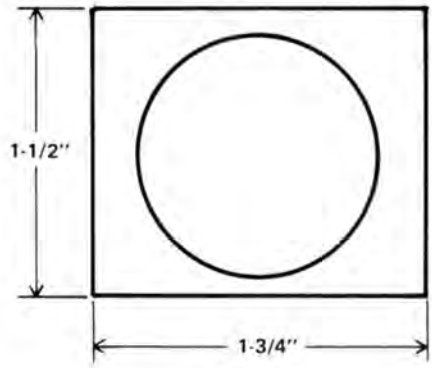
PHYSICAL CHARACTERISTICS

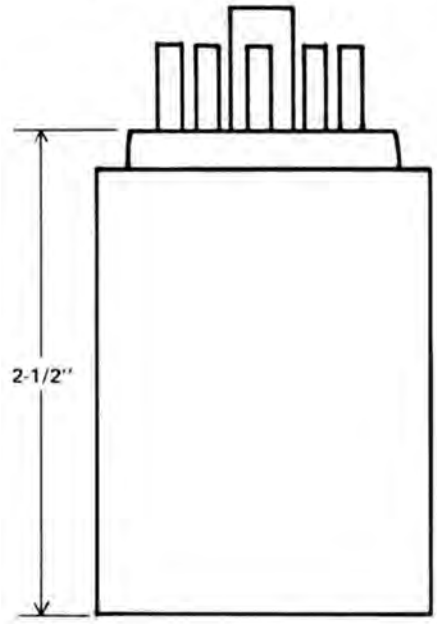
Package
Mu-metal can (standard) or octal type plug
Termination
Terminals or 11 pin plug (octal type)
Dimensions
1.5" x 1.75" x 2.5" high
Mounting
Threaded inserts

TYPICAL PERFORMANCE

Insertion Loss
–0.7dB
Input Impedance
@ 1kHz 701 ohms
@ 10kHz 732 ohms
Secondary Source Impedance
@ 1kHz 701 ohms
@ 10kHz 732 ohms
Frequency Response (Re: 1kHz)
@ 20Hz –0.03dB
@ 20kHz 0dB (ref.)
Bandwidth
@ –3dB 120kHz
Phase Response
@ 20kHz –9 deg
Rise Time
(10%-90%) 2.5μS
Overshoot
<3%
Total Harmonic Distortion (Below Saturation)
0.035% @ 20Hz
0.018% @ 30Hz
0.008% @ 50Hz
Input Level @ 1% Saturation (dBv Re: 0.775v)
+22dBv @ 20Hz
+26dBv @ 30Hz
+31dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>85dB @ 1kHz
>65dB @ 10kHz







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jensen transformers
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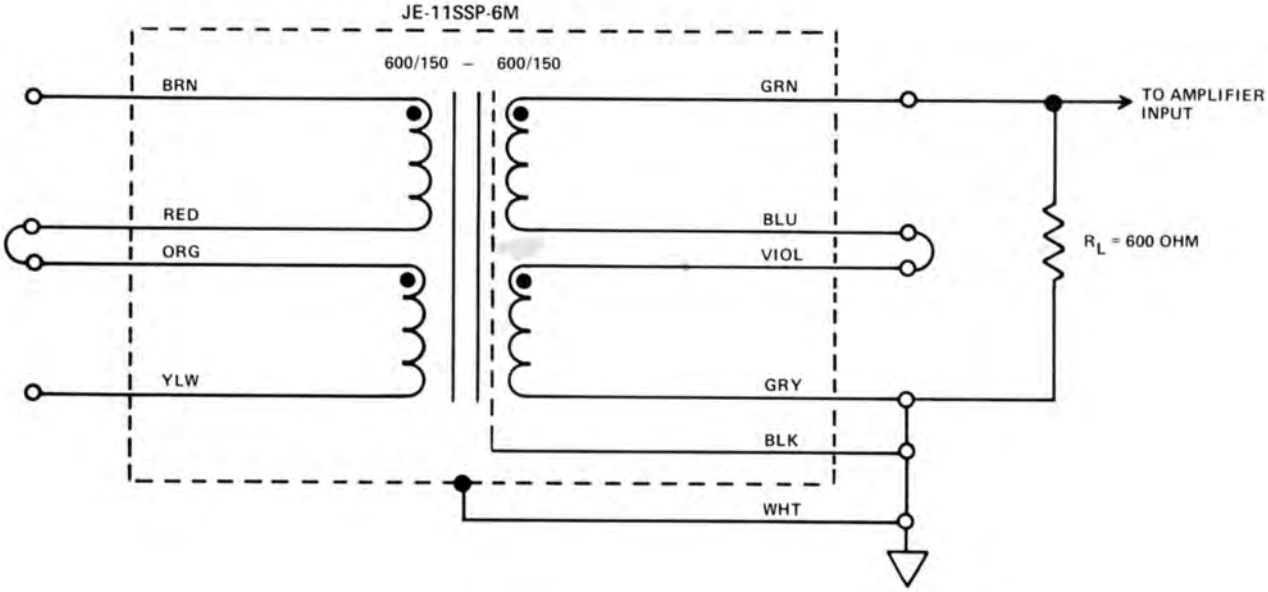
JE-11SSP-6M
LINE INPUT TRANSFORMER

The JE-11SSP-6M is a 600/150 – 600/150 ohm (split winding) line input transformer for low input impedance circuits. It handles levels to +18dBv. Re: 0.775v @ 20Hz. Below saturation, the 20Hz THD is less than 0.035%. The high grade Nickel alloy core yields very low distortion even with source impedances up to several hundred ohms. The bandwidth is 160kHz with <3.5% overshoot.

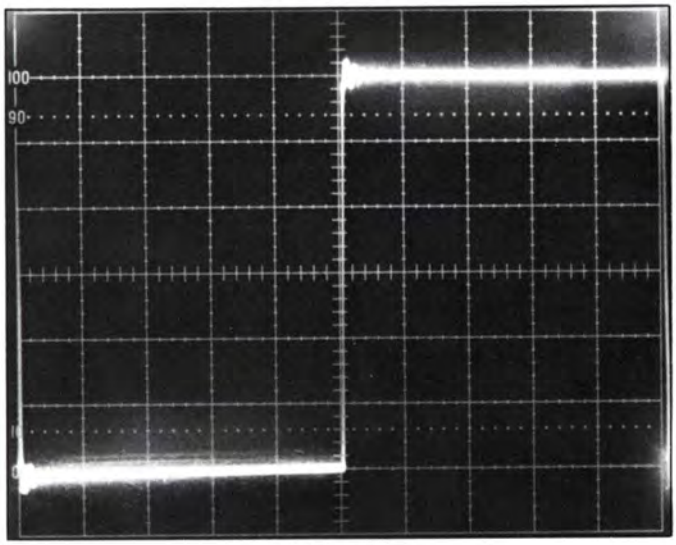
The standard package has wire leads. An 11 pin octal-type plug version is available. A terminal package version is planned, but was not yet released at the time of this printing. The same design is also available with a lower permeability Nickel core by omitting the suffix "M". This material yields 6dB more maximum level, but must be used with source impedances of 100 ohms or less to maintain low distortion at low levels.



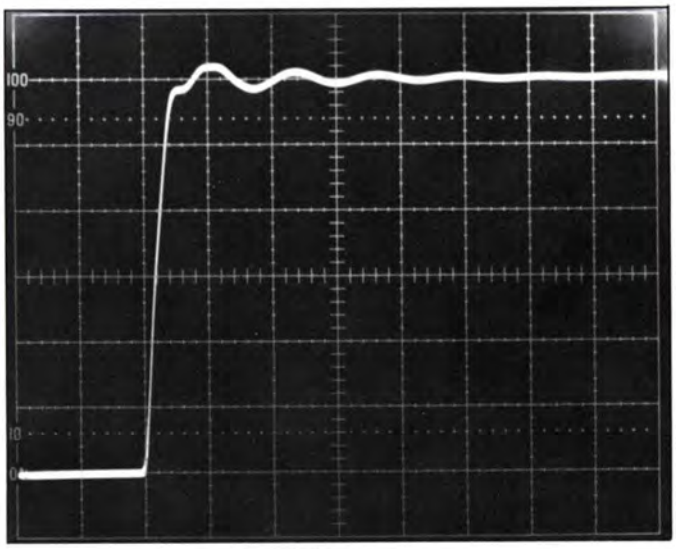
REGARDING THE OSCILLOSCOPE PHOTOS

Actual oscilloscope photos were made with a Tektronix Model 453A (certified calibration).

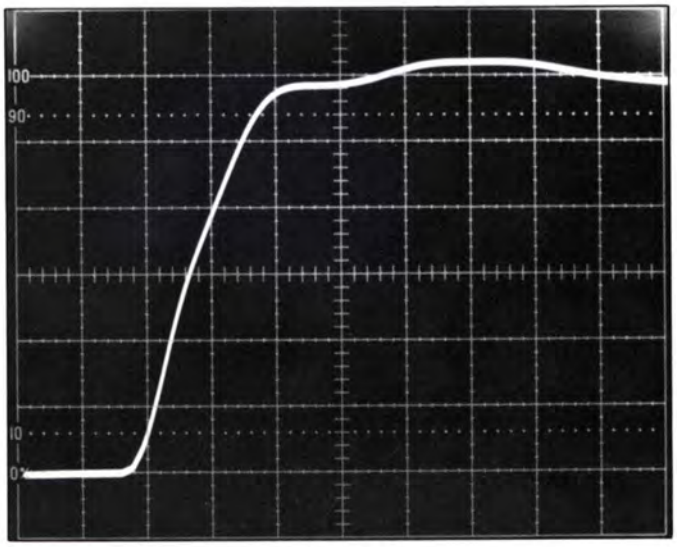
2kHz Square Wave



50μS/division



5μS/division

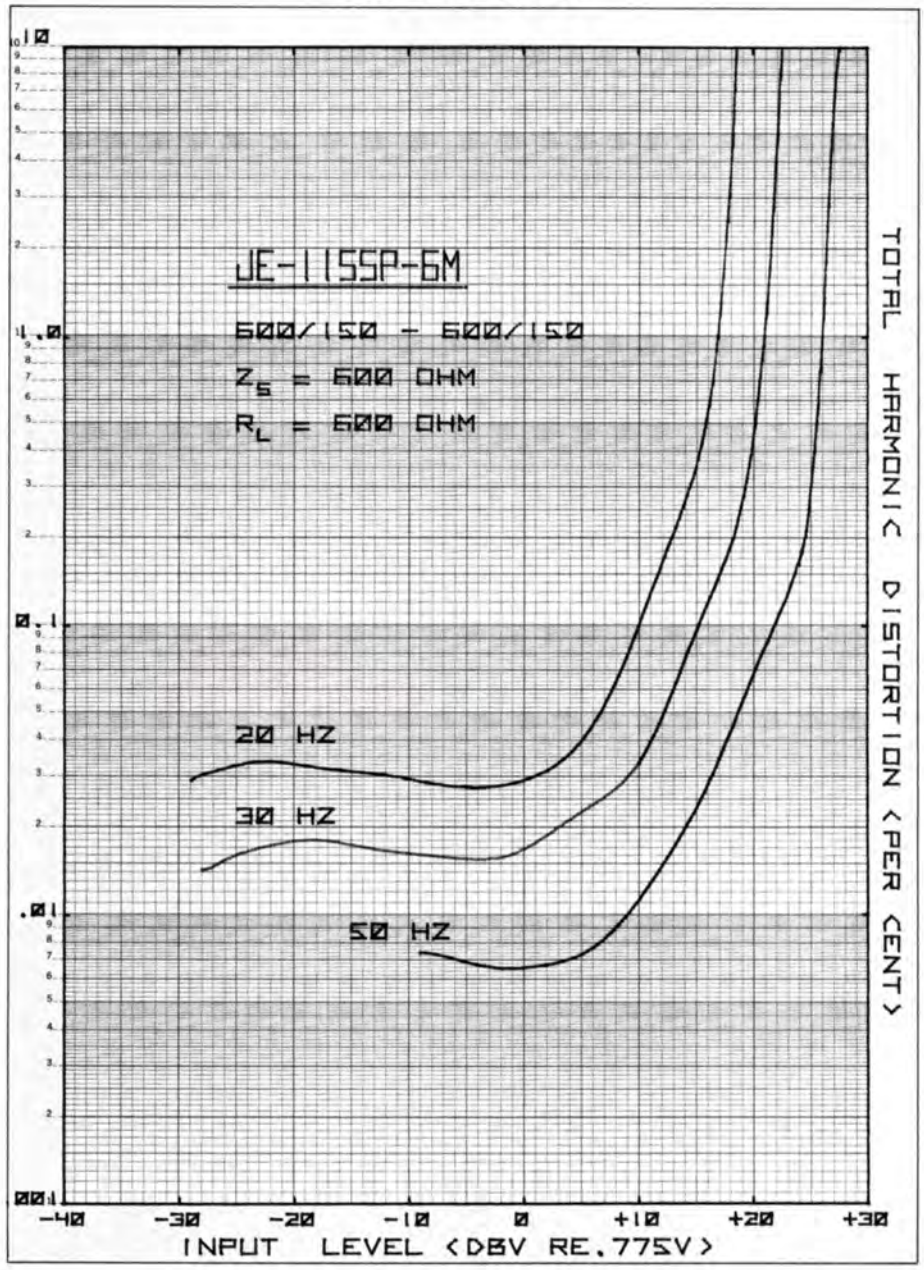


1μS/division

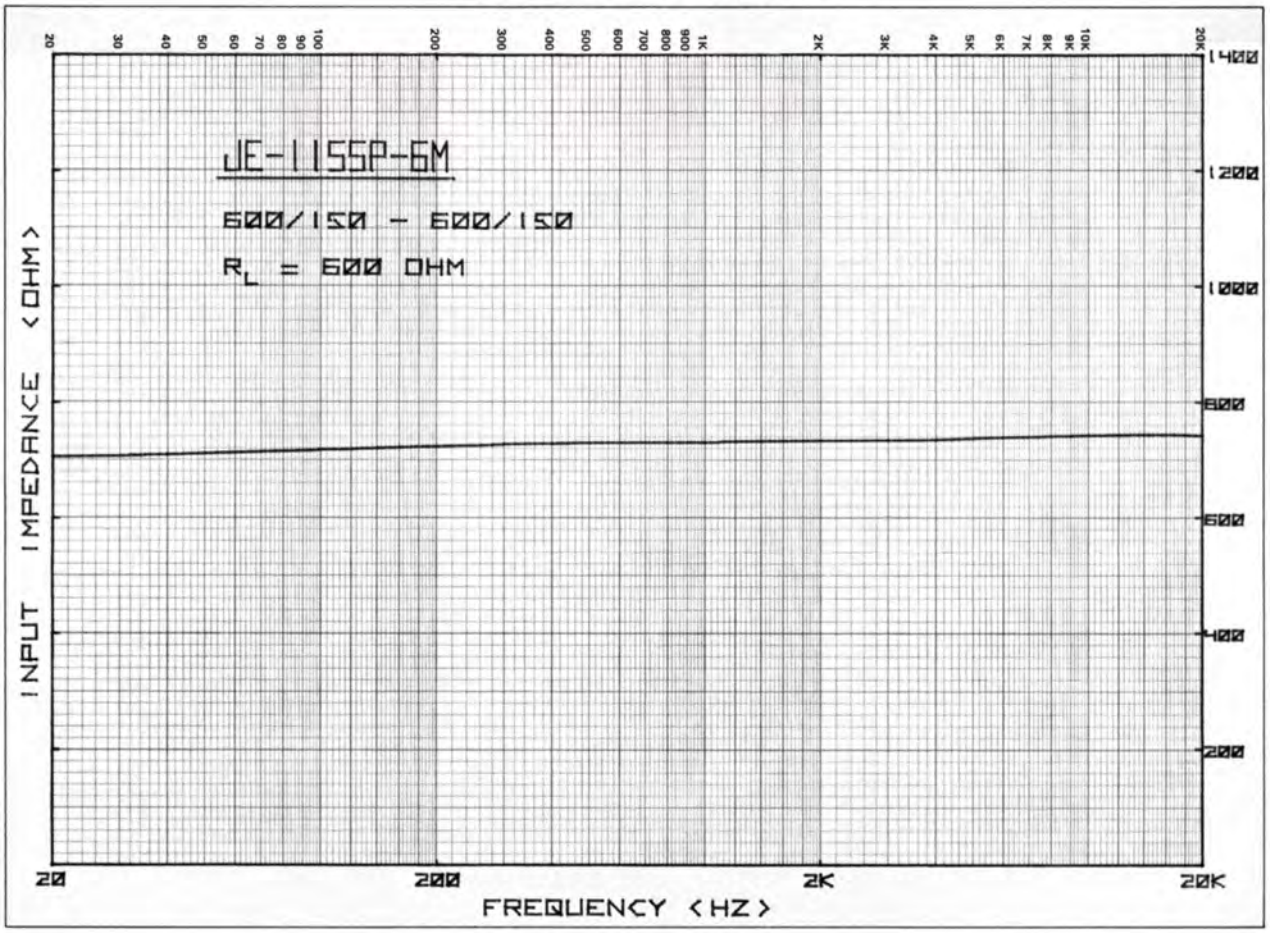
All curves were generated by a Hewlett-Packard 9815A/9862A programmable calculator/ plotter.

All calculations were either derived from or verified by actual measurements. The distortion curves were generated by a polynominal curve fit program using measurements by a Sound Technology 1710A analyzer. Verified accuracies are on the order of one pen line width.

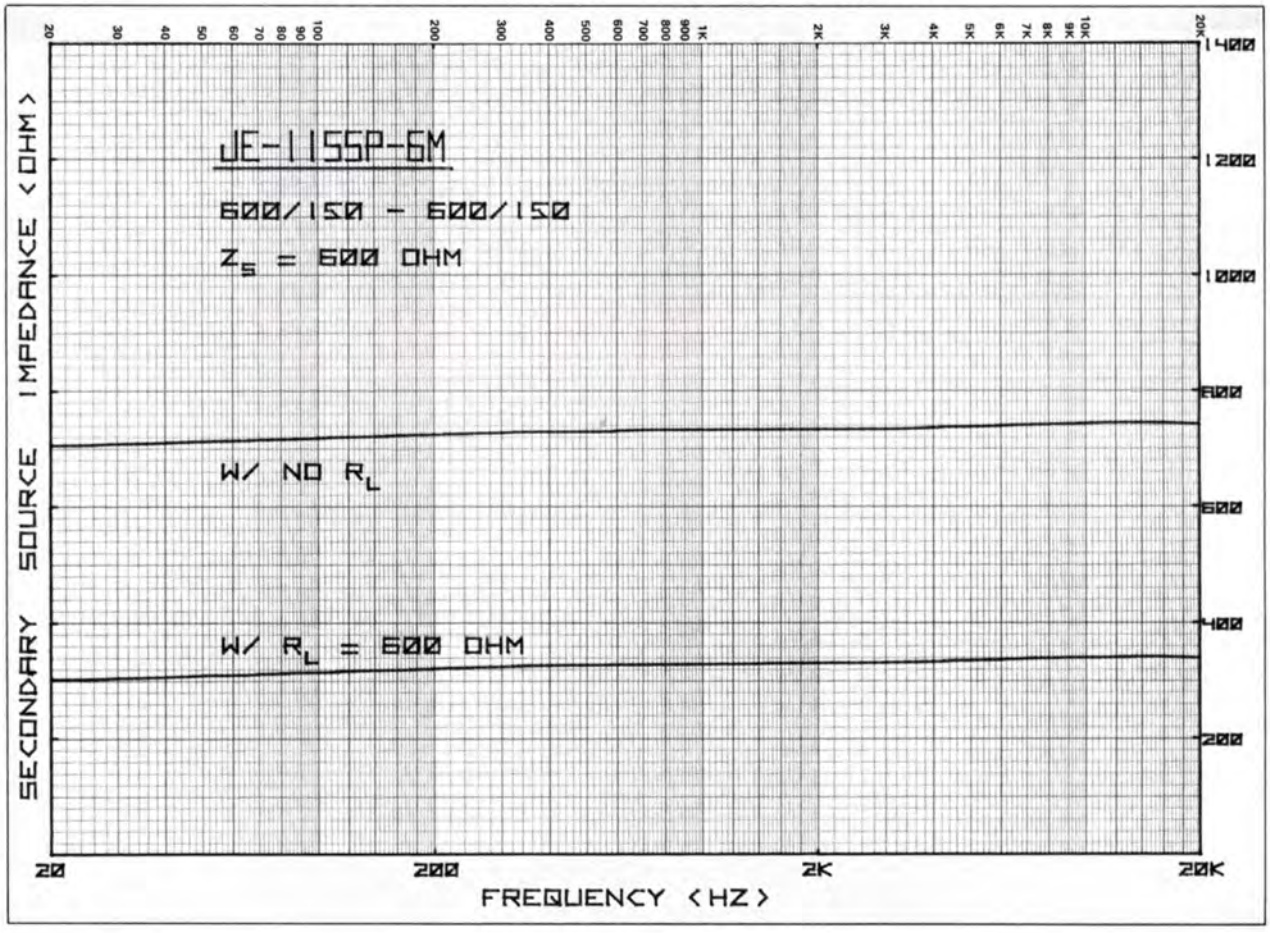
DISTORTION



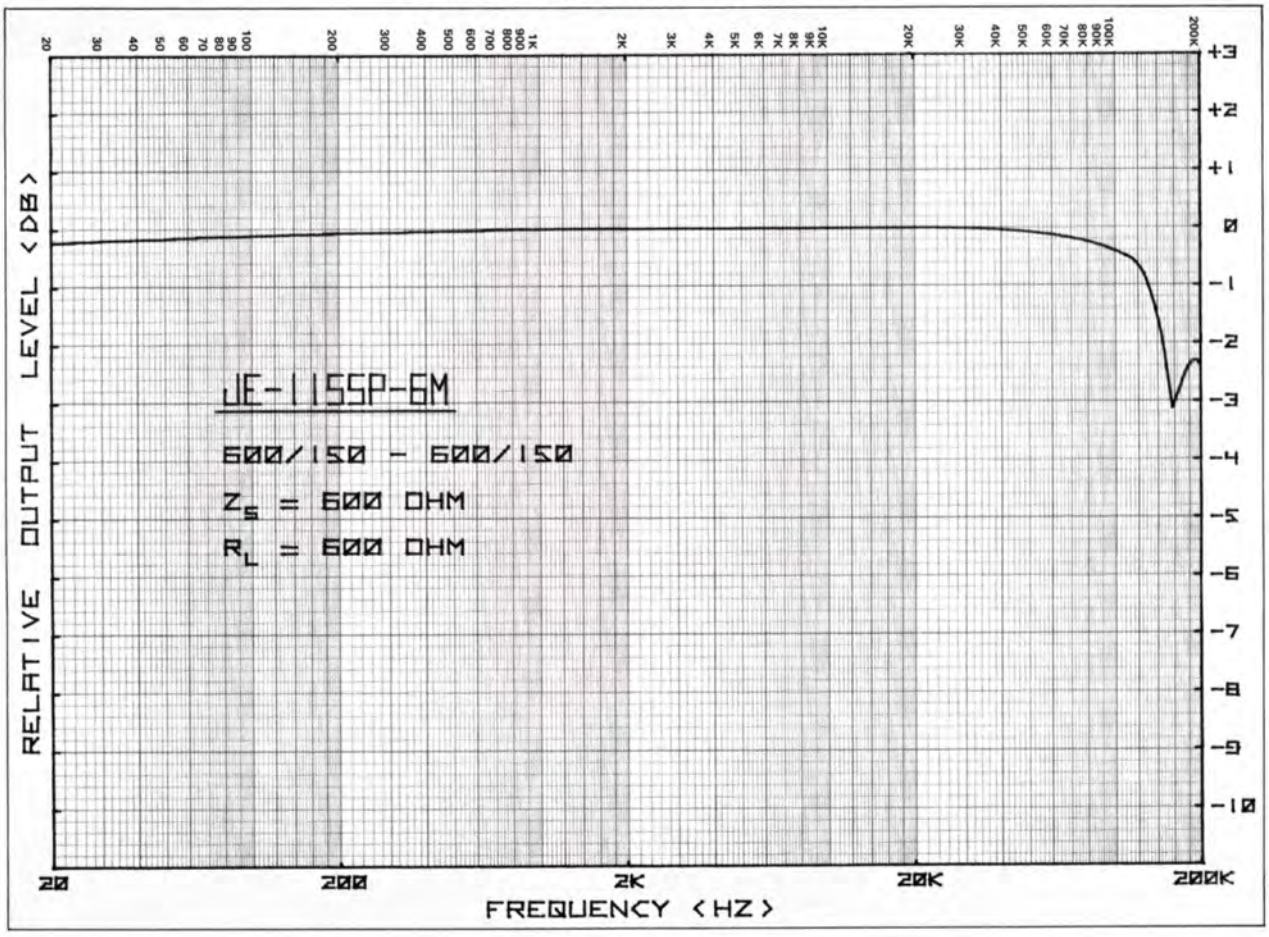
INPUT IMPEDANCE



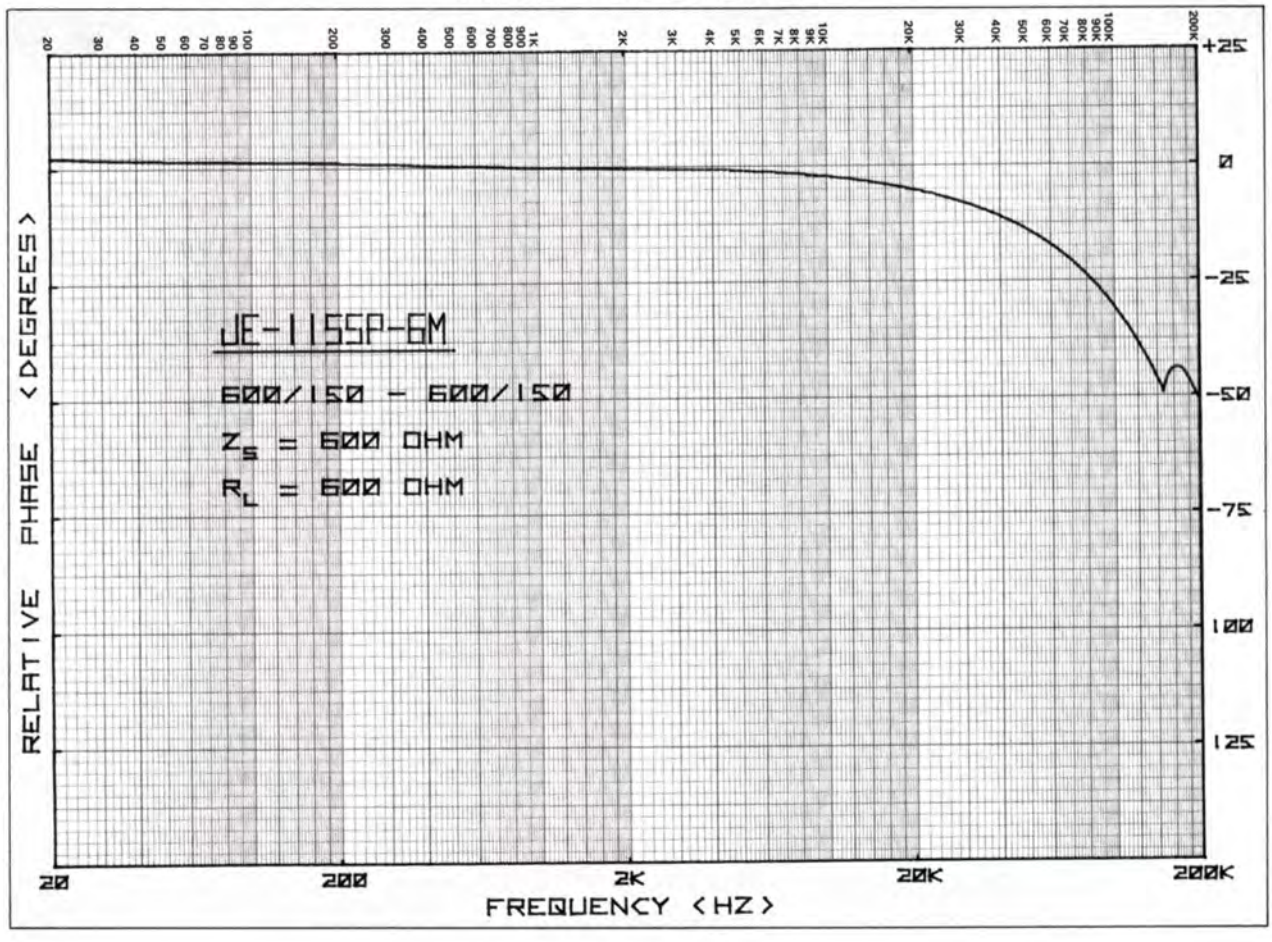
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



JE-11SSP-6M GENERAL CHARACTERISTICS

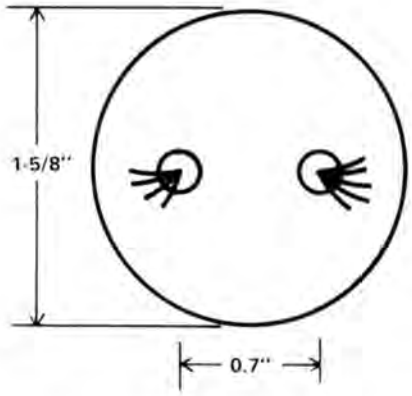
Turns Ratio
1:1
Impedance Ratio
600/150 – 600/150
Primary Source Impedance
600 ohms or less
Secondary Load Resistor
600 ohms
Faraday Shield
Separate Lead
Magnetic Shield
30dB, separate case lead
Maximum Input Level at 20Hz
+18dBv (Re: 0.775v)

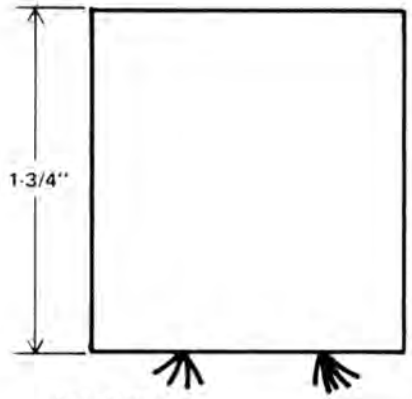
PHYSICAL CHARACTERISTICS

Package
Mu-metal can (standard) or octal type plug
Termination
Wire leads or 11 pin plug (octal type)
Dimensions
1-5/8" diameter, 1-3/4" high (standard)
1-5/8" diameter, 2.5" high (octal plug)
Mounting (standard)
Capacitor clamp supplied

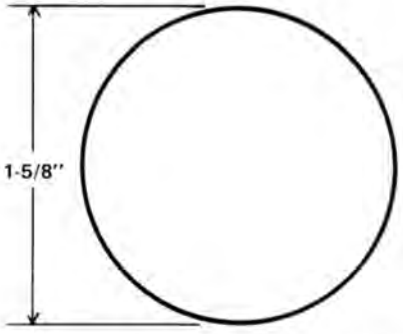
TYPICAL PERFORMANCE

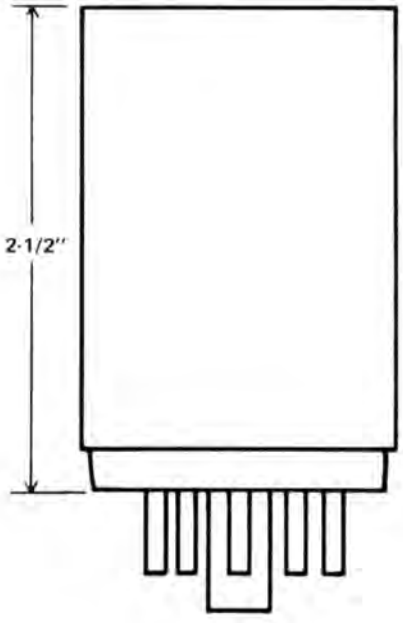
Insertion Loss
–1.0dB
Input Impedance
@ 1kHz 734 ohms
@ 10kHz 745 ohms
Secondary Source Impedance
@ 1kHz 734 ohms
@ 10kHz 745 ohms
Frequency Response (Re: 1kHz)
@ 20Hz –0.25dB
@ 20kHz 0dB (ref.)
Bandwidth
@ –3dB 160kHz
Phase Response
@ 20kHz –5 deg
Rise Time
(10%-90%) 1.7μS
Overshoot
<3.5%
Total Harmonic Distortion (Below Saturation)
0.035% @ 20Hz
0.018% @ 30Hz
0.008% @ 50Hz
Input Level @ 1% Saturation (dBv Re: 0.775v)
+17dBv @ 20Hz
+21dBv @ 30Hz
+26dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>90dB @ 1kHz
>70dB @ 10kHz





Lead Holes
Use 0.35" hole to clear grommet





jensen transformers
By REICHENBACH ENGINEERING

1617 NORTH FULLER AVENUE
HOLLYWOOD, CALIFORNIA 90046
PHONE (213) 876-0059

(Visitors by Appointment Only)

Data Sheet

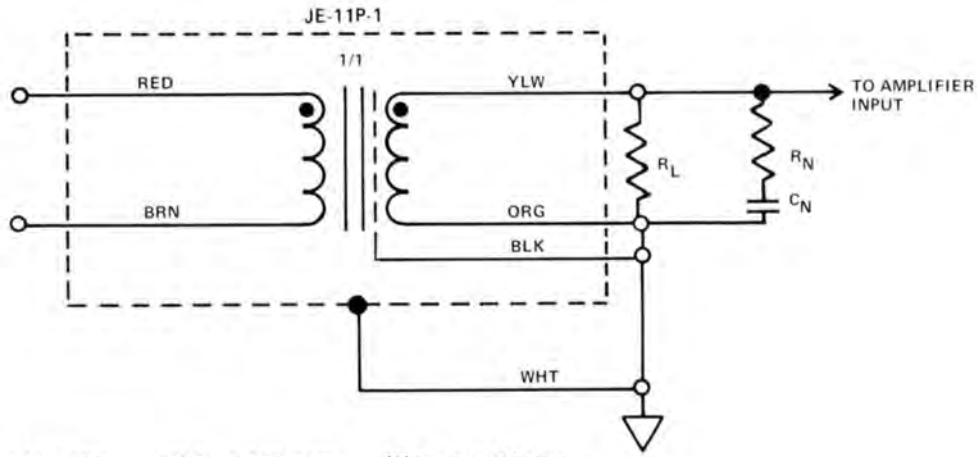
jensen transformers
By REICHENBACH ENGINEERING

JE-11P-1
LINE INPUT TRANSFORMER

The JE-11P-1 is a 1:1 turns ratio line input transformer for high input impedance circuits (10K ohms and higher). It handles levels to +18dBv. Re: 0.775v @ 20Hz. Below saturation, the 20Hz THD is less than 0.045%. The high grade Nickel alloy core yields very low distortion even with source impedances up to several thousand ohms.

The bandwidth is 69kHz with <2% overshoot. The series losses are equivalent to 3700 ohms, so the level loss will be the same as a voltage divider made with a 3700 ohm series resistor and a shunt resistor equal to the load connected to the secondary. If the load is 10K ohms, no RC network is required across the secondary. For 15K ohm load, an RC network of 30K ohms and 270pF is required to damp the resonance. If the load is 100K or higher, an RC network of 13K ohms and 620pF is required. For other loads such as input circuits with shunt capacitance, our computer can derive optimum RC network values to minimize transient distortion and maximize bandwidth and generate revised response and impedance results.

The standard package has wire leads. Octal plug versions are available for all popular pin connections with or without the RC network built-in.



(1) R_L = 10K ohm
R_N not required
C_N not required

(2) R_L = 15K ohm
R_N = 30K ohm
C_N = 270pf

(3) R_L = 2.2M ohm
R_N = 13K ohm
C_N = 620pf

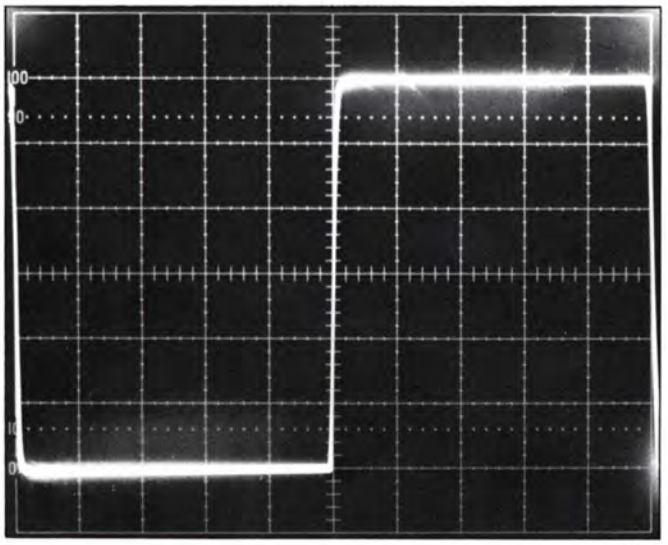
REGARDING THE OSCILLOSCOPE PHOTOS

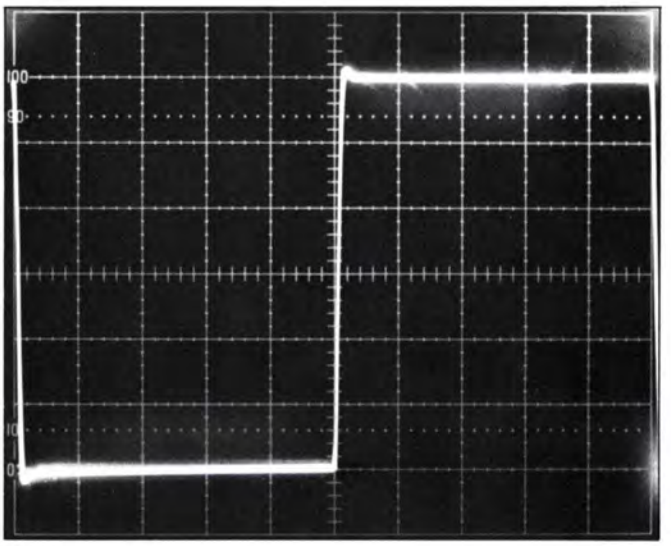
Actual oscilloscope photos were made from a Tektronix Model 453A (certified calibration).

This column with 15kΩ load.

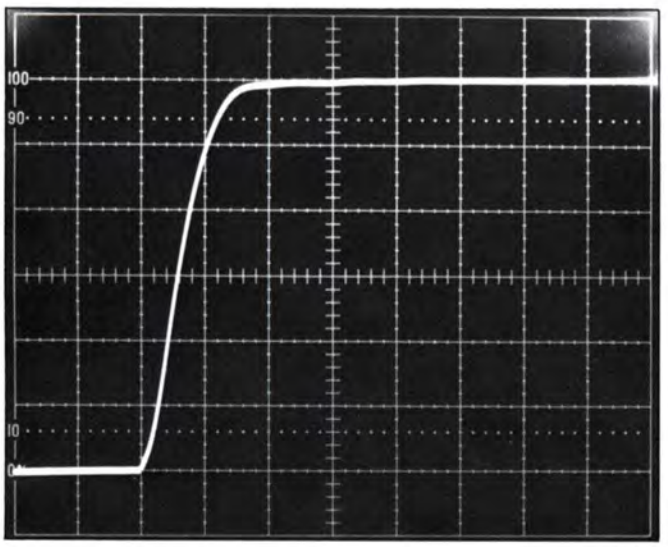
This column with no load.

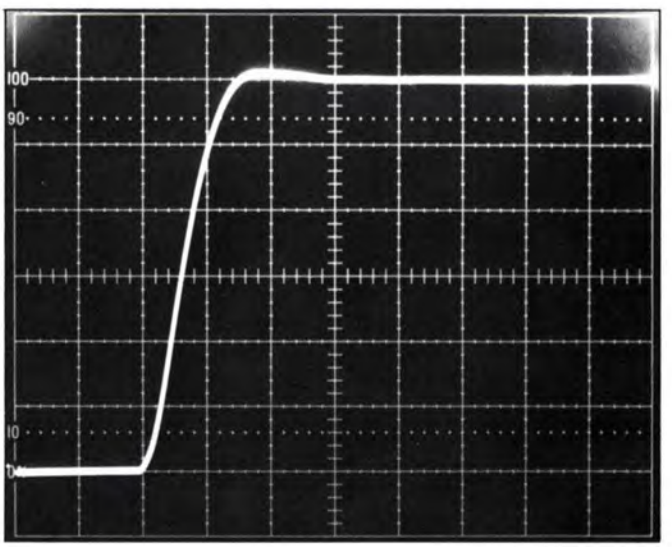
2kHz Square Wave



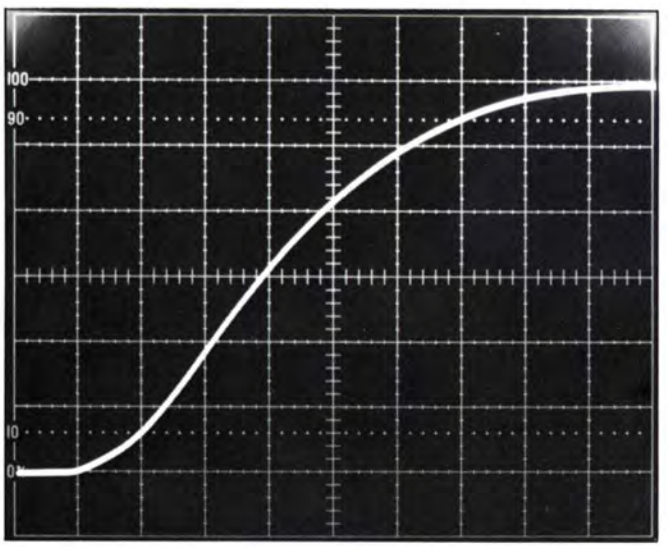


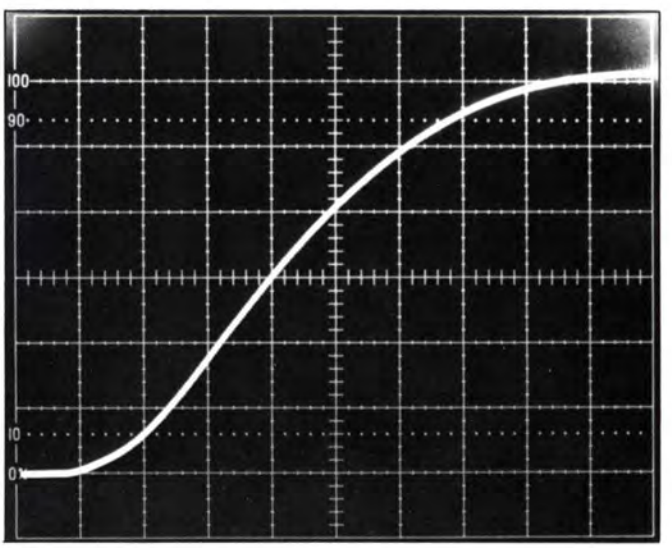
50μS/division





5μS/division



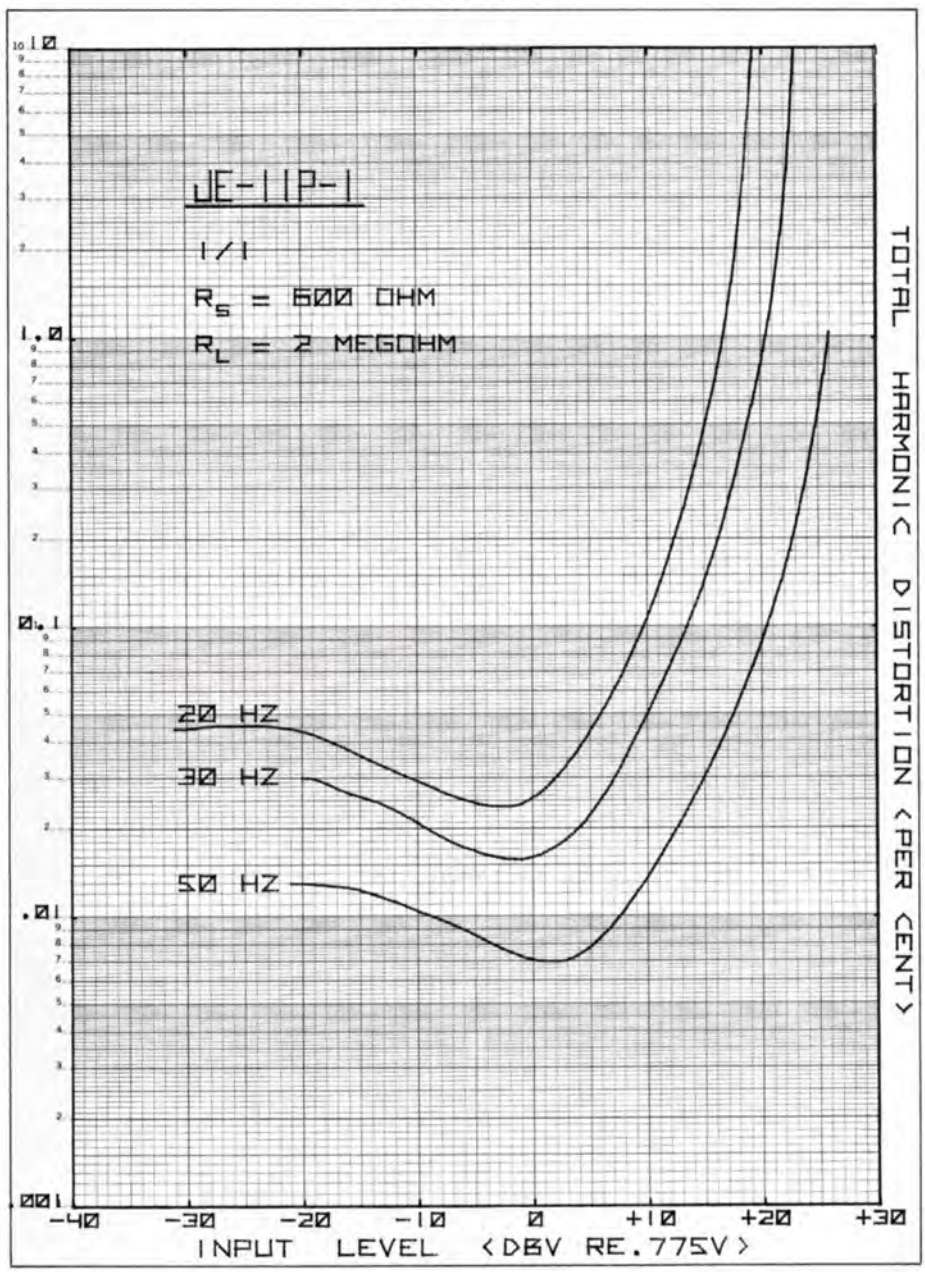


1μS/division

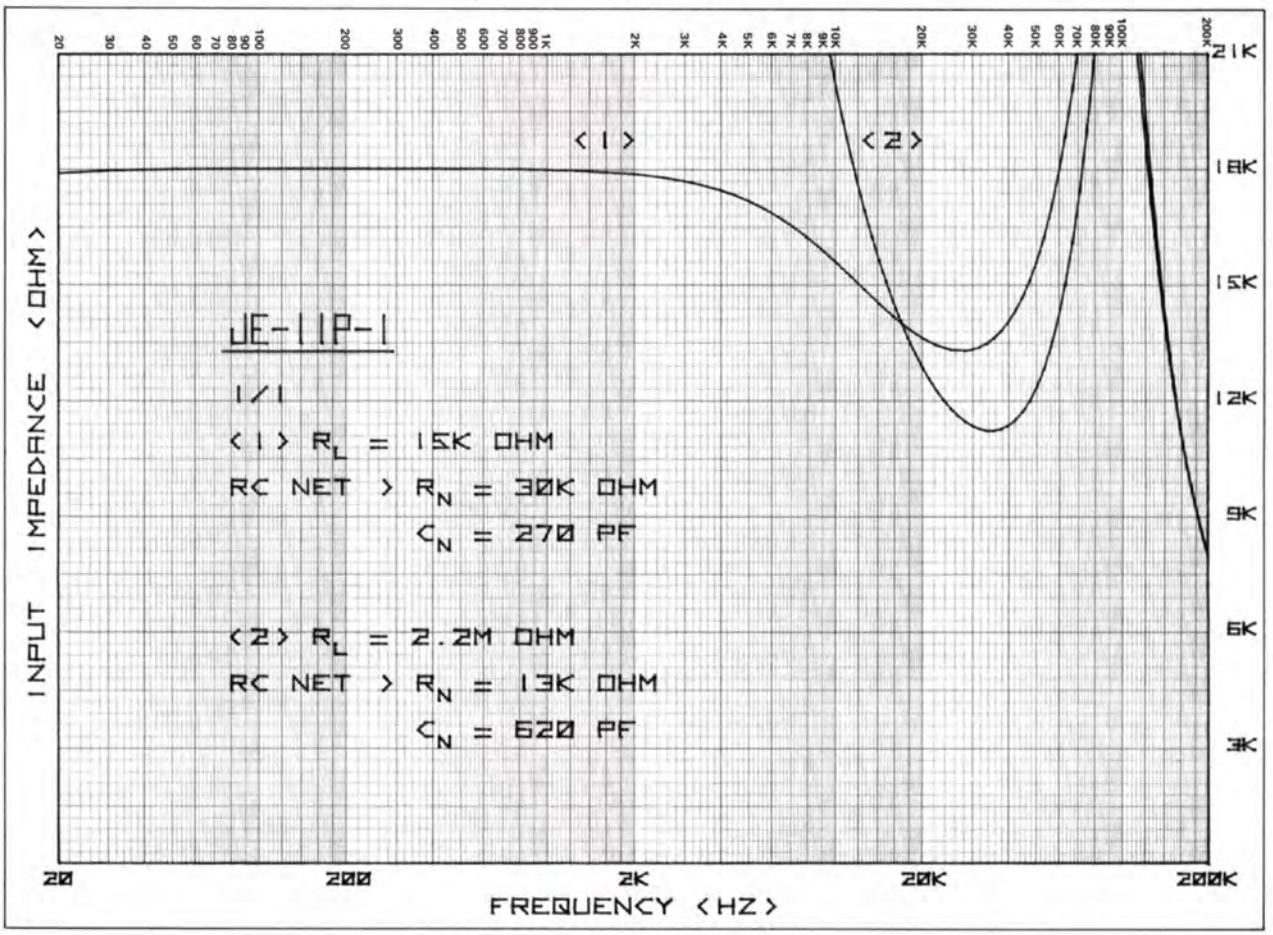
The response and impedance curves were generated by a Hewlett/Packard System 45 Desktop Computer and a 9872A Plotter. The curves are the calculated results from an equivalent circuit model using the H/P AC Circuit Analysis program. This method has made it possible to display the impedance curves up to 200kHz showing the secondary resonance and RC network damping effect. Measured data from many prototypes were used to derive the model to represent the average performance.

The distortion curves were generated by a Hewlett/Packard 9815A/9862A programmable calculator/plotter with a polynominal curve fit program. The distortion measurements employed a Sound Technology 1710A Analyzer. Verified accuracies are on the order of one pen line width.

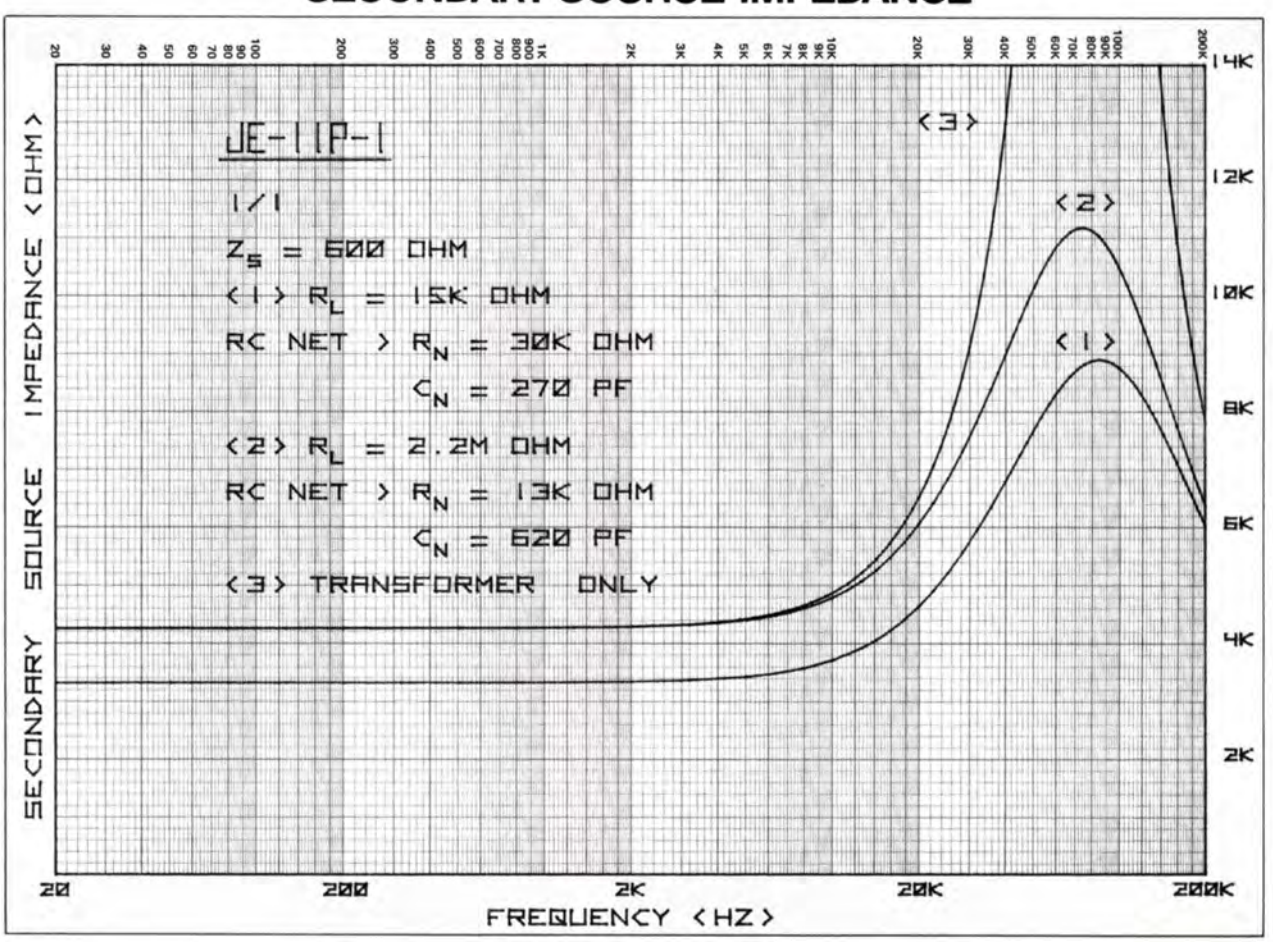
DISTORTION



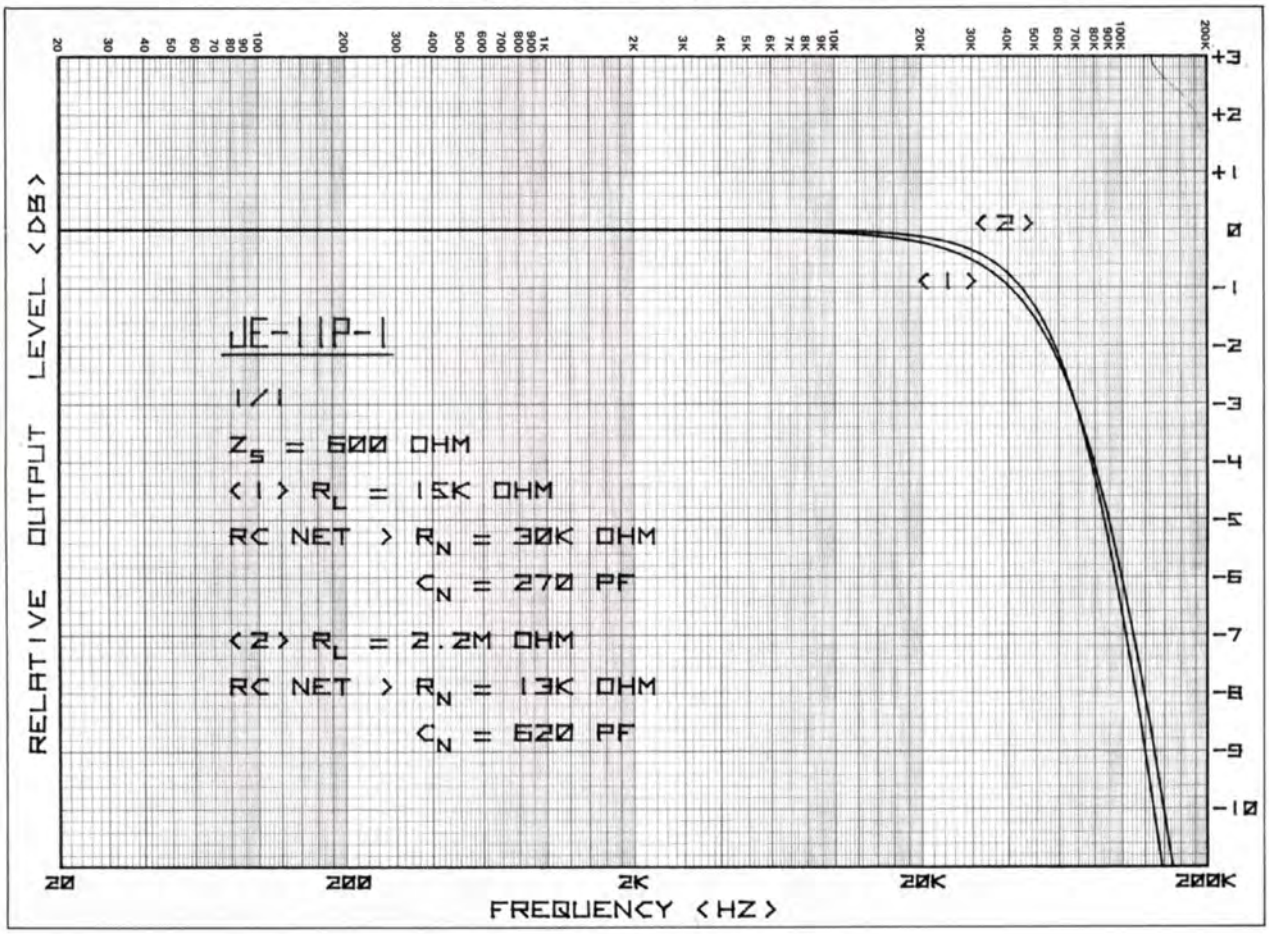
INPUT IMPEDANCE



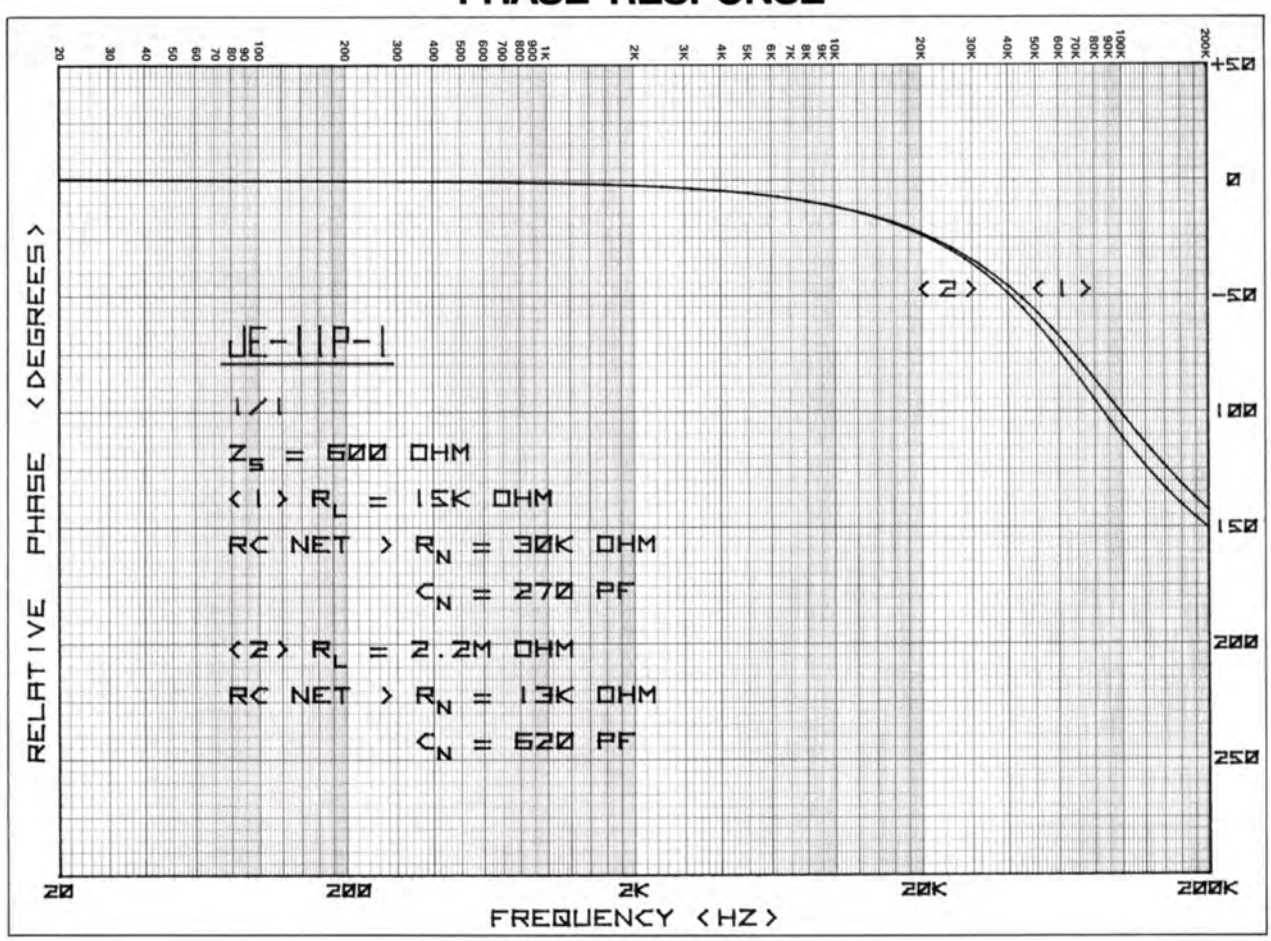
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



JE-11P-1 GENERAL CHARACTERISTICS

Turns Ratio
1:1
Impedance Ratio
(15K/15K)
Primary Source Impedance
600 ohms or less

Secondary Load Resistor	15K ohms	2.2Meg ohms
Secondary RC Network	30K ohms, 270pF	13K ohms, 620pF
	(most plug-in types have RC net built-in)	

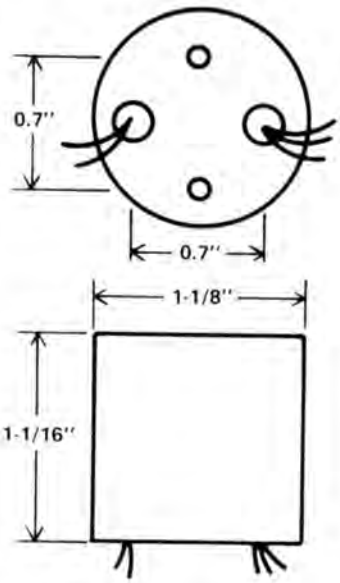
Faraday Shield
Separate Lead
Magnetic Shield
30dB, separate case lead (standard)
60dB, (octal plug-in types)
Maximum Input Level at 20Hz
+18dBv (Re: 0.775v)

PHYSICAL CHARACTERISTICS

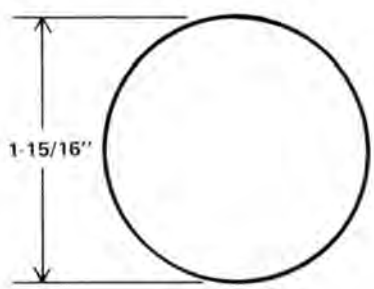
Package
Mu-metal can (standard) or octal plug
Termination
Wire Leads (standard)
Octal plug types also available
Dimensions
1-1/8" diameter, 1-1/16" high (standard)
1-5/16" diameter, 2" high (octal plug)
Mounting (standard)
2 holes, 0.7" center-to-center/self-tapping screws supplied

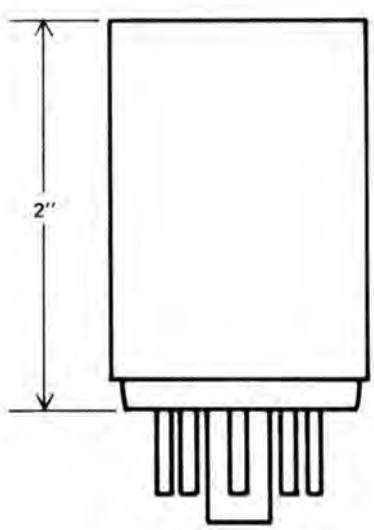
TYPICAL PERFORMANCE		With 15K load	With 2.2Meg load
Voltage Gain		−2dB	−0.05dB
Input Impedance	**@ 1kHz**	18K ohms	166K ohm
	@ 10kHz	15.6K ohms	20K ohms
Frequency Response (Re: 1kHz)	**@ 20Hz**	−0.03dB	−0.03dB
	@ 20kHz	−0.25dB	−0.12dB
Bandwidth	**@ −3dB**	69kHz	69kHz
Phase Response	**@ 20kHz**	−23 deg	−24 deg
Rise Time	**(10%-90%)**	5μS	4.8μS
Overshoot		<1%	<2%

Secondary Source Impedance
4300 ohms @ 1kHz
4900 ohms @ 10kHz
Total Harmonic Distortion (Below Saturation)
0.045% @ 20Hz
0.03% @ 30Hz
0.013% @ 50Hz
Input Level @ 1% Saturation (dBv Re: 0.775v)
+17dBv @ 20Hz
+20dBv @ 30Hz
+26dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>75dB @ 1kHz
>55dB @ 10kHz



Mounting Holes
Clearance for #4 screw
Lead Holes
Use 0.35" hole to clear grommet





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HOLLYWOOD, CALIFORNIA 90046
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OUTPUT

Data Sheet

jensen transformers
By REICHENBACH ENGINEERING

JE-44K-DX

40 OHM MOVING COIL CARTRIDGE INPUT TRANSFORMER

The JE-44K-DX is a step-up transformer for matching a 40 ohm moving coil cartridge to the 47K ohm input of a standard phono pre-amplifier. The transformer steps up the cartridge output level by 19.7dB and bridges the cartridge with about 400 ohms input impedance.

The JE-44K-DX has a multiple interleaved layer winding for low leakage inductance. This yields wide bandwidth quite insensitive to load, low losses which affect noise in the upper spectrum, and very high frequency low Q resonance. A series RC network of 13K ohms and 130pf should be connected across the secondary for minimum transient distortion. The high frequency bandwidth is 170kHz with only -10° of phase shift at 20kHz. The rise time is 2.3μS with less than 1% overshoot.

The input circuit of the phono pre-amp loads the transformer in 47K ohms. If there is a capacitor across the input, it should be removed. Also any cable used on the secondary of the transformer should be a special low capacitance type and no longer than necessary for minimum capacitance.

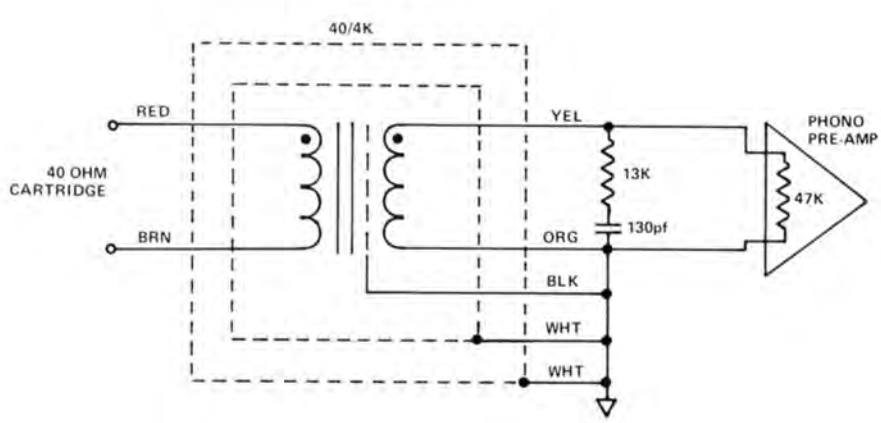
The series loss ratio referred to the secondary for 20kHz bandwidth is 1.4 ohm/ohm. This results in the transformer related noise figure of only 1.7dB. The 10kHz secondary source impedance is only 2.4% higher than at 1kHz, so the noise spectrum is very close to a pure resistance.

The distortion at 20Hz is on the order of 0.1% for all levels up to 30mv at the input. At 30Hz, 0.06% and at 50Hz, 0.03%.

Faraday type electrostatic shields are used between the primary and secondary sections. Combined with balanced capacitance in the primary winding, this eliminates capacitive coupling through the transformer of high frequency environmental noise which is common to the two input leads. The Faraday shield (black lead) should be connected to the same ground as the low side of the secondary (orange lead).

The transformers are cased separately (not paired), with dual mu-metal cans for greater than 60dB of magnetic shielding. They can be mounted with two self-tapping sheet metal screws (supplied) or ring type capacitor clamps (supplied) which allow custom orientation for minimum hum pickup for each channel. The two mu-metal cans can be grounded with the two white lead wires.

JE-44K-DX



REGARDING THE OSCILLOSCOPE PHOTOS

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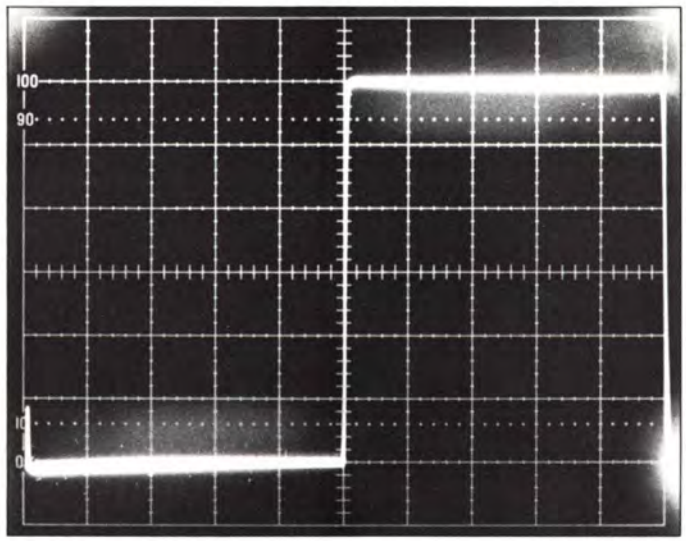
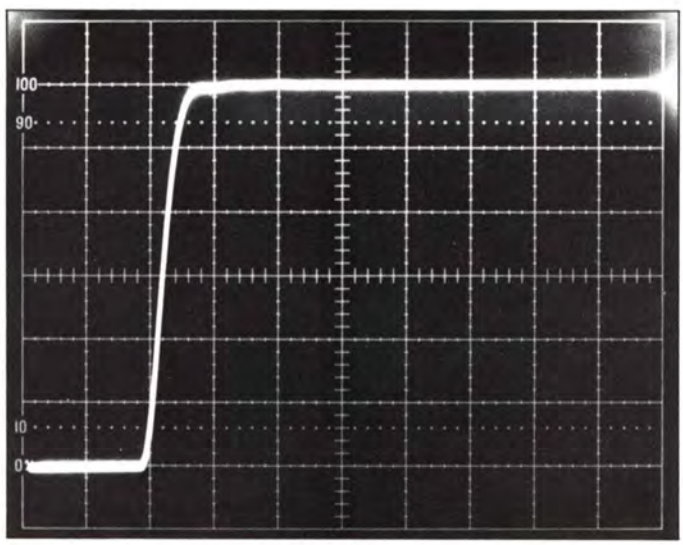
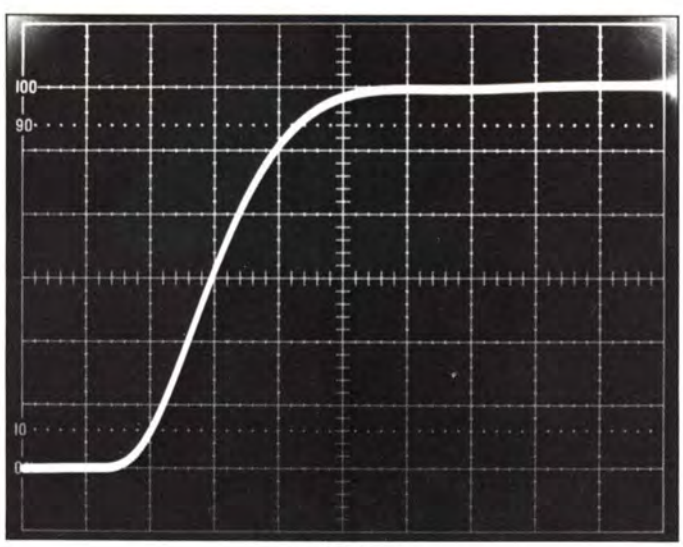
2kHz Square Wave



50μS/division



5μS/division



1μS/division

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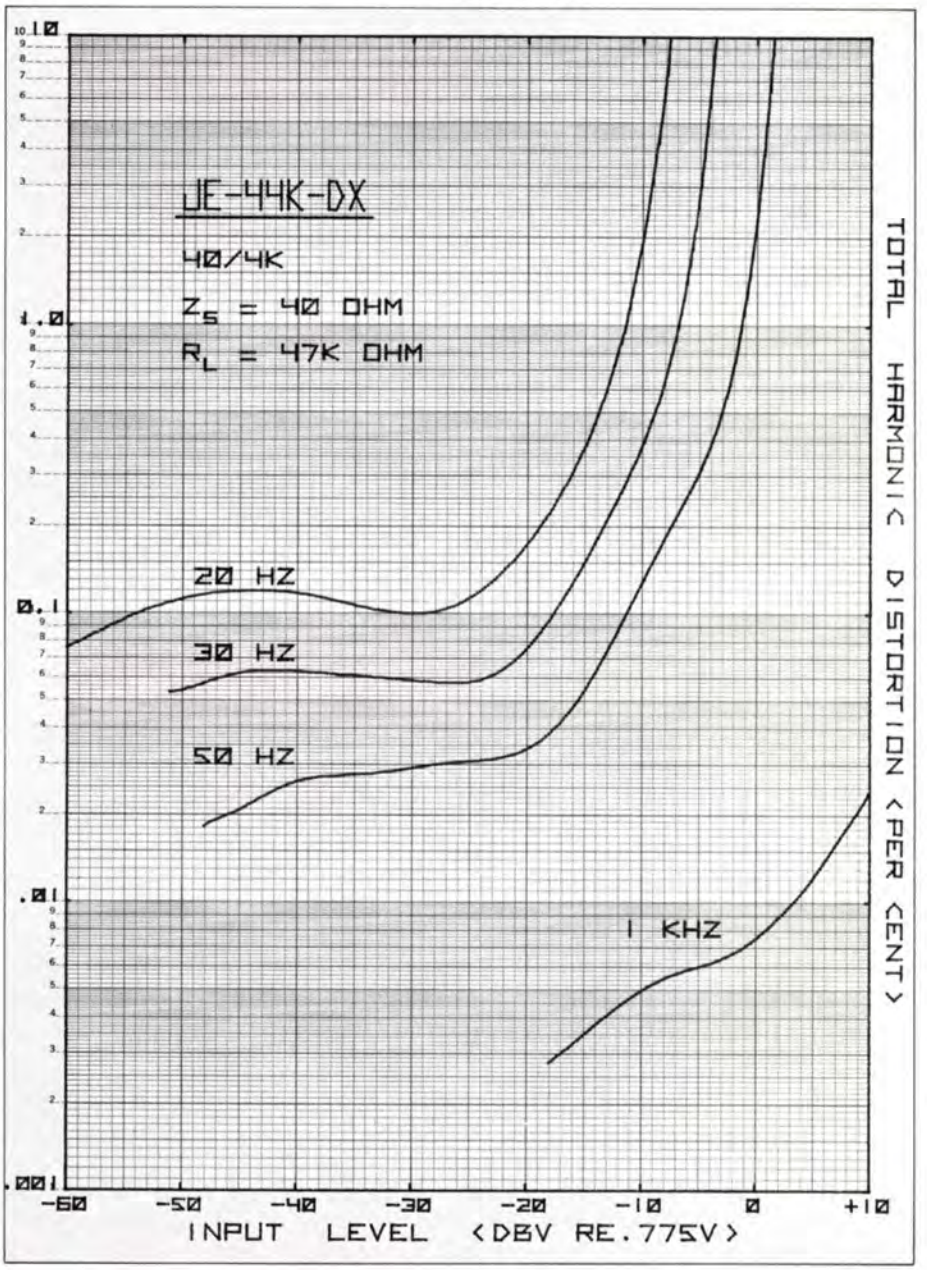
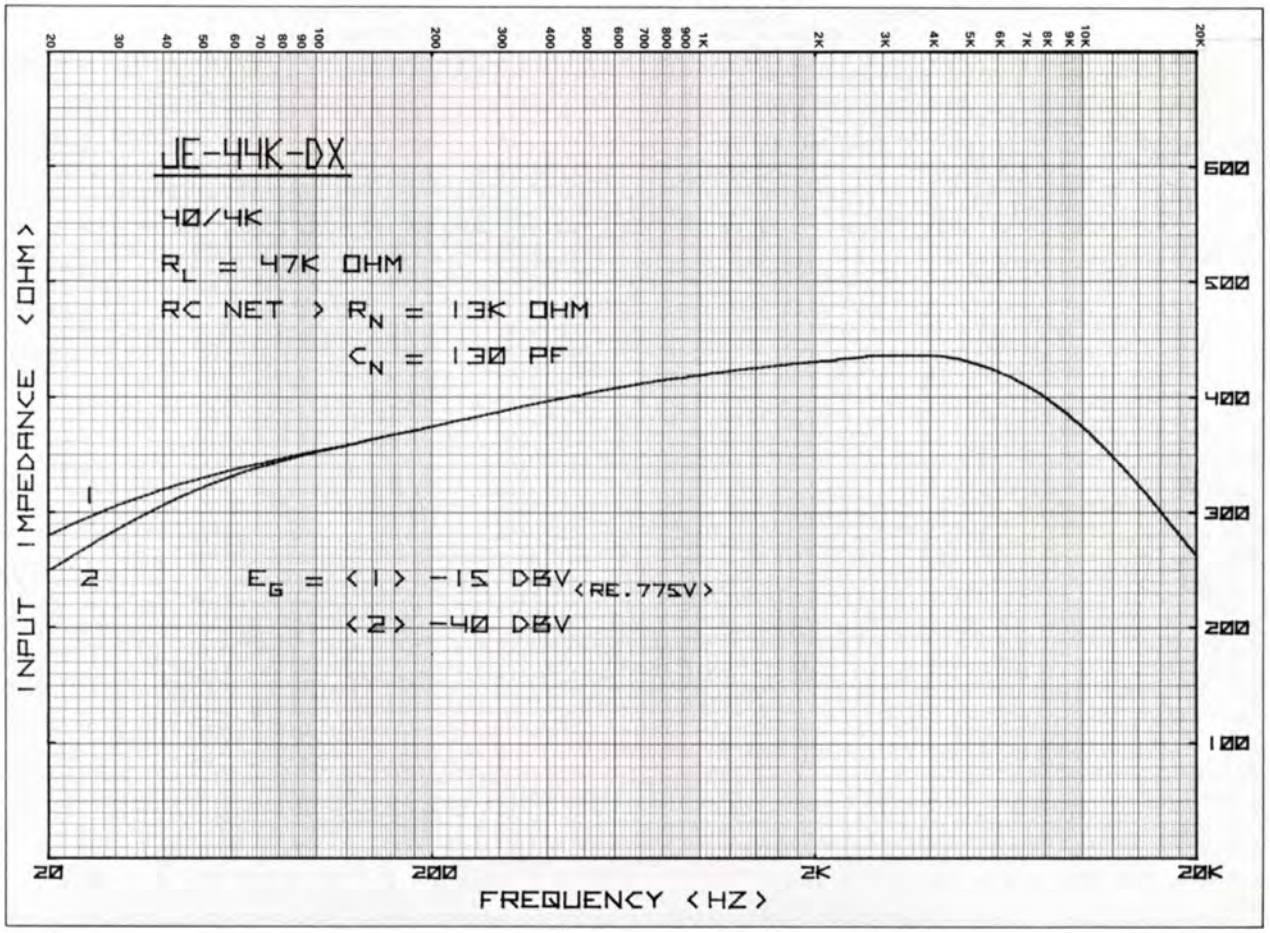
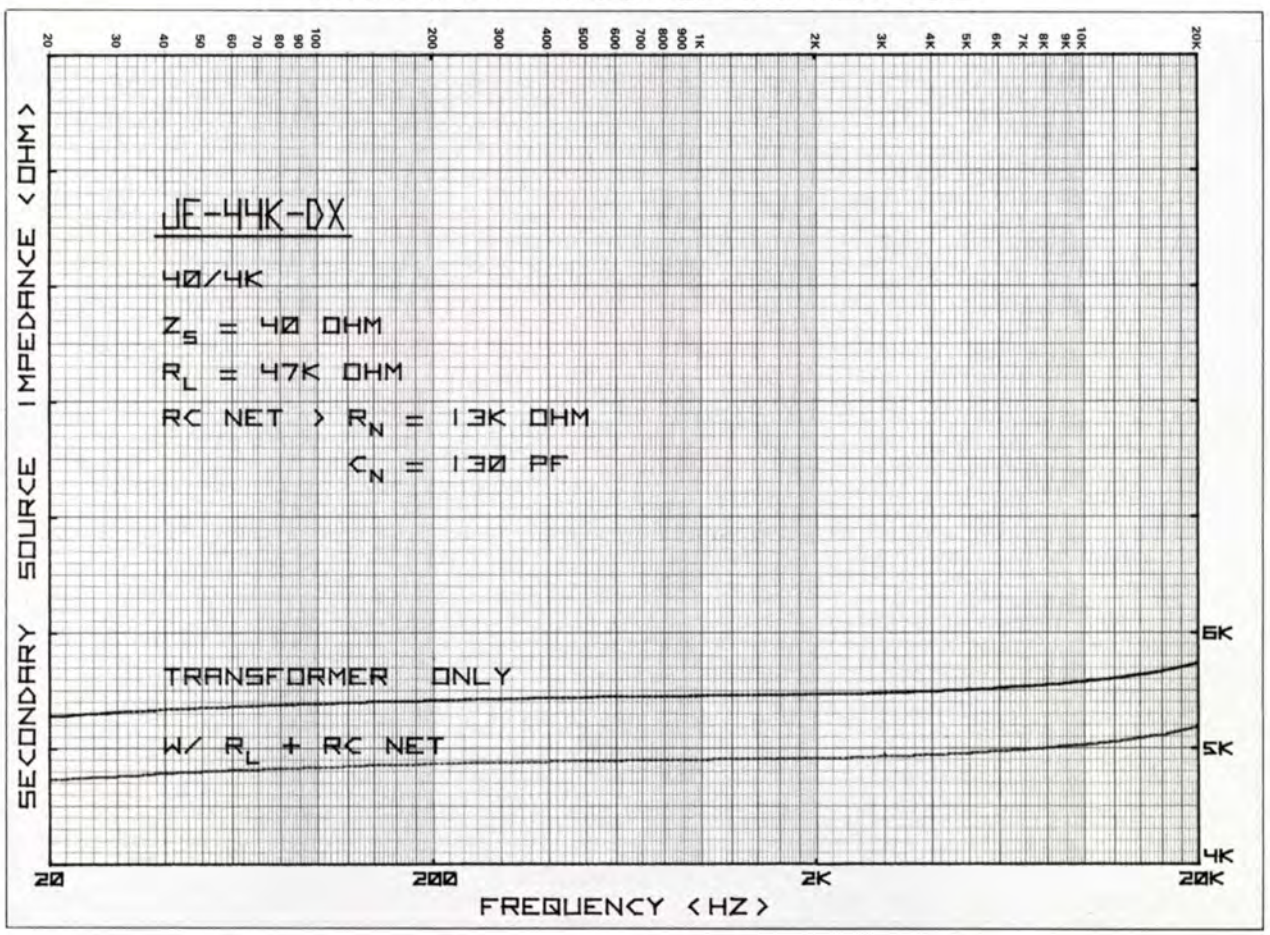
DISTORTION



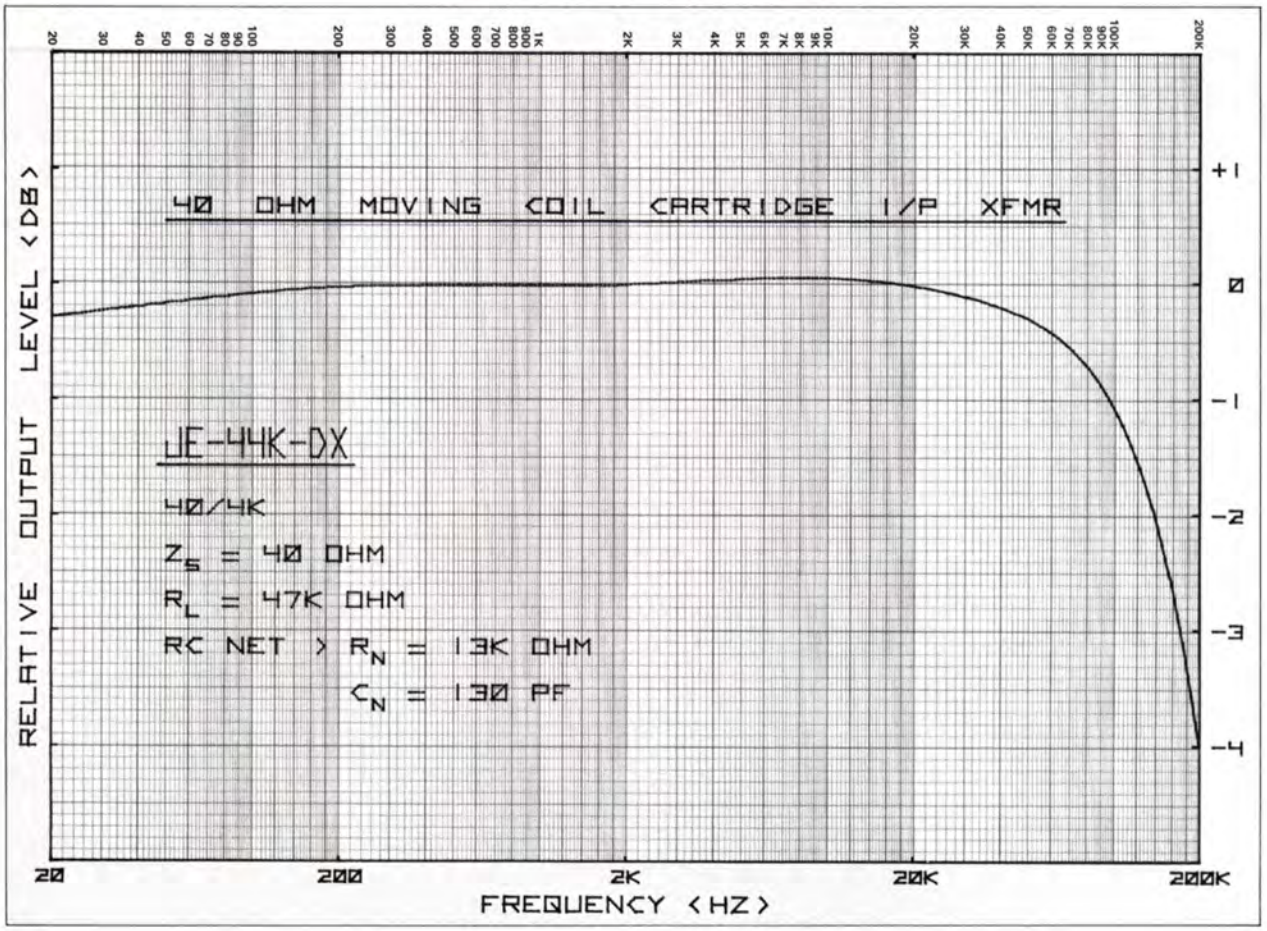
INPUT IMPEDANCE



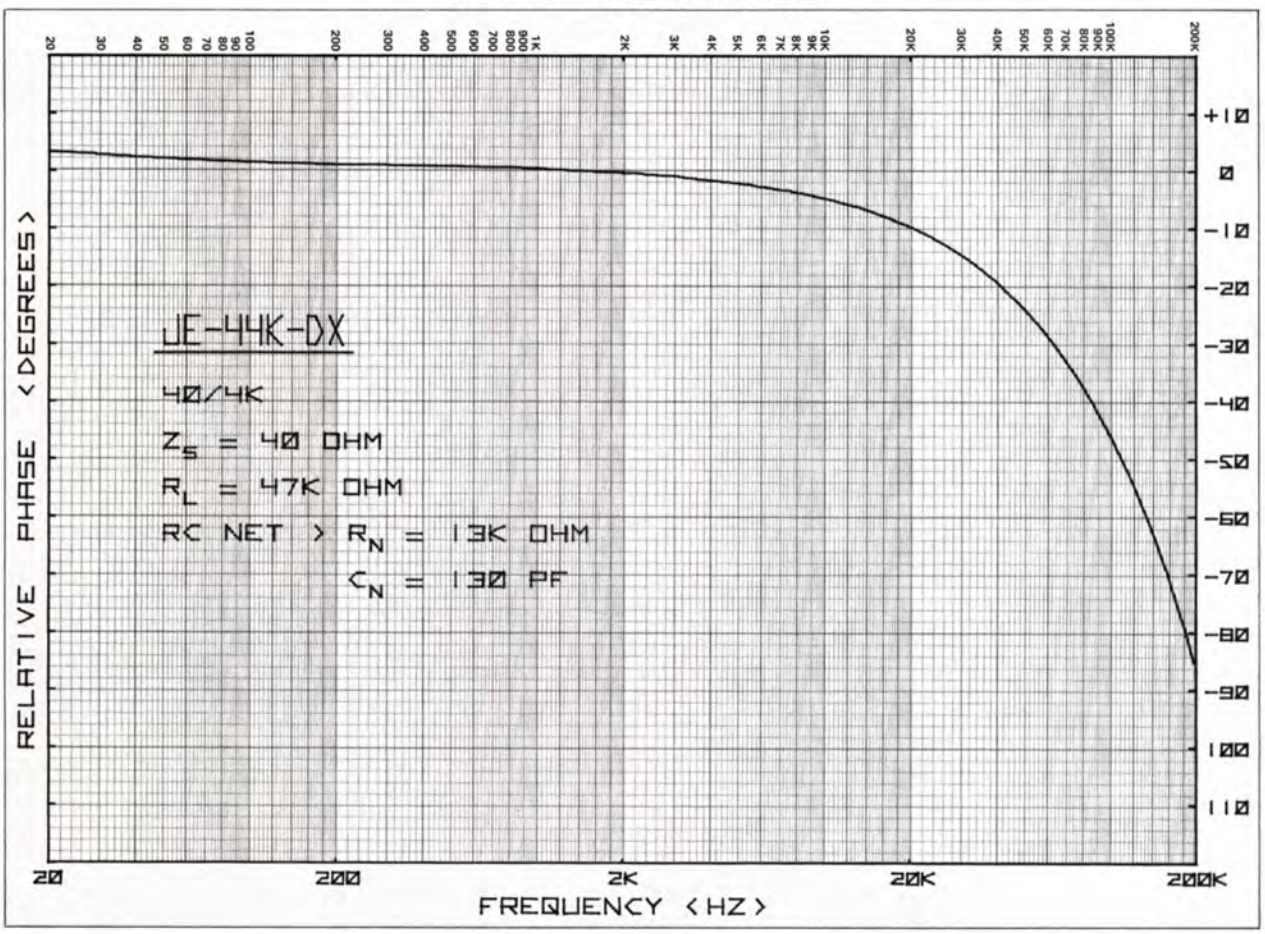
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



GENERAL CHARACTERISTICS

Turns Ratio
1:10
Impedance Ratio
40/4K
Primary Source Impedance
40 ohms
Secondary Load Impedance
47K ohms (Phono pre-amp)
Secondary Load Resistor
None required
Secondary RC Network
R_N = 13K ohms C_N = 130pf
Faraday Shield
Separate lead
Magnetic Shield
60dB, separate case leads
Maximum Input Level at 20Hz
−12dBv (Re: 0.775v)

PHYSICAL CHARACTERISTICS

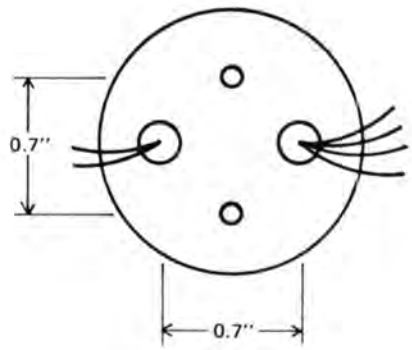
Package
Dual Mu-metal can
Termination
Wire leads
Dimensions
1-5/16" diameter, 1-1/4" high
Mounting
2 holes, 0.7" center-to-center, self-tapping screws or clamp

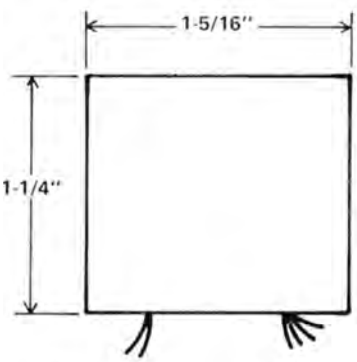
TYPICAL PERFORMANCE

Voltage Gain
19.7dB
Input Impedance
420 ohms @ 1kHz
375 ohms @ 10kHz
Secondary Source Impedance
5450 ohms @ 1kHz
5580 ohms @ 10kHz
Frequency Response (Re: 1kHz)
−0.3dB @ 20Hz
−0.02dB @ 20kHz
(No resonance peak)
Bandwidth
170kHz @ −3dB
Phase Response
−10° @ 20kHz
Rise Time
2.3μS (10%-90%)
Overshoot
<1%
Total Harmonic Distortion (Below Saturation)
0.12% maximum @ 20Hz
0.065% maximum @ 30Hz
0.03% maximum @ 50Hz
0.006% @ 1kHz
Input Level @ 1% Saturation (dBv Re: 0.775v)
−12dBv @ 20Hz
−7dBv @ 30Hz
0dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>85dB @ 1kHz
>65dB @ 10kHz
Transformer Noise Figure*
1.7dB Re: 36.1 ohms**

*Add to amplifier NF referred to impedance of 4935 ohms. (Parallel value of secondary source impedance and load)

**Parallel value of source impedance and input impedance.





Mounting Holes
Clearance for #4 screw.
Lead Holes
Use 0.35" hole to clear grommet.

jensen transformers
By REICHENBACH ENGINEERING

1617 NORTH FULLER AVENUE
HOLLYWOOD, CALIFORNIA 90046
PHONE (213) 876-0059

(Visitors by Appointment Only)

Data Sheet

jensen transformers
By REICHENBACH ENGINEERING

JE-34K-DX

3 OHM MOVING COIL CARTRIDGE INPUT TRANSFORMER

The JE-34K-DX is a step-up transformer for matching a 3 ohm moving coil cartridge to the 47K ohm input of a standard phono pre-amplifier. The transformer steps up the cartridge output level by 31dB and bridges the cartridge with about 30 ohms input impedance.

The JE-34K-DX has a multiple interleaved layer winding for low leakage inductance. This yields wide bandwidth quite insensitive to load, low losses which affect noise in the upper spectrum, and very high frequency low Q resonance. A series RC network of 13K ohms and 120pf should be connected across the secondary for minimum transient distortion. The high frequency bandwidth is 148kHz with only -11° of phase shift at 20kHz. The rise time is 2.0μS with less than 1% overshoot.

The input circuit of the phono pre-amp loads the transformer in 47K ohms. If there is a capacitor across the input, it should be removed. Also any cable used on the secondary of the transformer should be a special low capacitance type and no longer than necessary for minimum capacitance.

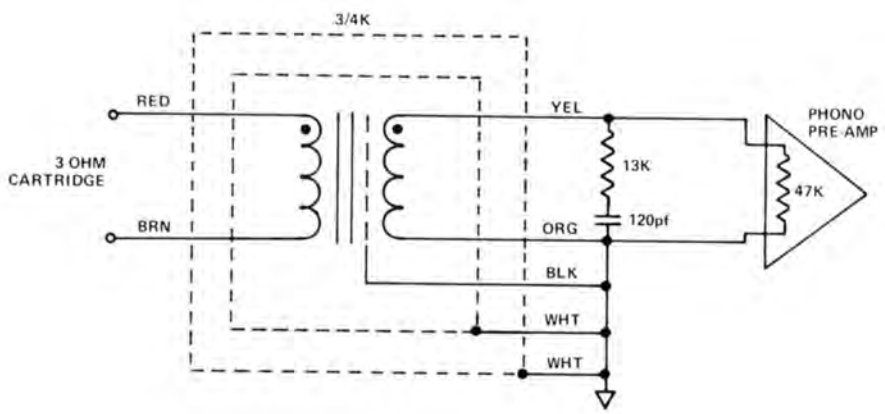
The series loss ratio referred to the secondary for 20kHz bandwidth is 1.33 ohm/ohm. This results in the transformer related noise figure of only 1.4dB. The 10kHz secondary source impedance is only 1.9% higher than that at 1kHz, so the noise spectrum is very close to a pure resistance.

The distortion at 20Hz is on the order of 0.1% for all levels up to 10mv at the input. At 30Hz, 0.06% and at 50Hz, 0.03%.

Faraday type electrostatic shields are used between the primary and secondary sections. Combined with balanced capacitance in the primary winding, this eliminates capacitive coupling through the transformer of high frequency environmental noise which is common to the two input leads. The Faraday shield (black lead) should be connected to the same ground as the low side of the secondary (orange lead).

The transformers are cased separately (not paired), with dual mu-metal cans for greater than 60dB of magnetic shielding. They can be mounted with two self-tapping sheet metal screws (supplied) or ring type capacitor clamps (supplied) which allow custom orientation for minimum hum pickup for each channel. The two mu-metal cans can be grounded with the two white lead wires.

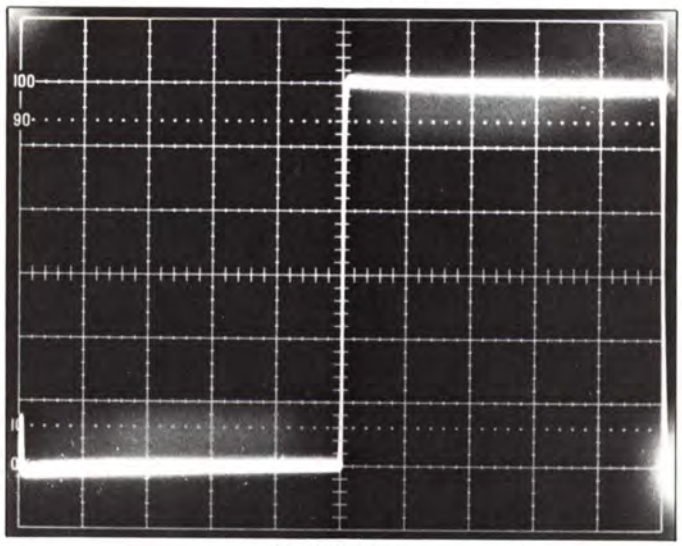
JE-34K-DX



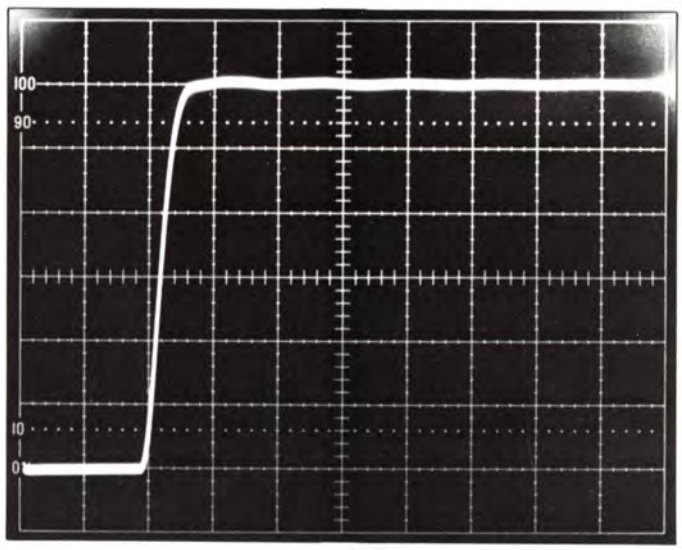
REGARDING THE OSCILLOSCOPE PHOTOS

Actual oscilloscope photos were made from a Tektronix Model 453A (certified calibration).

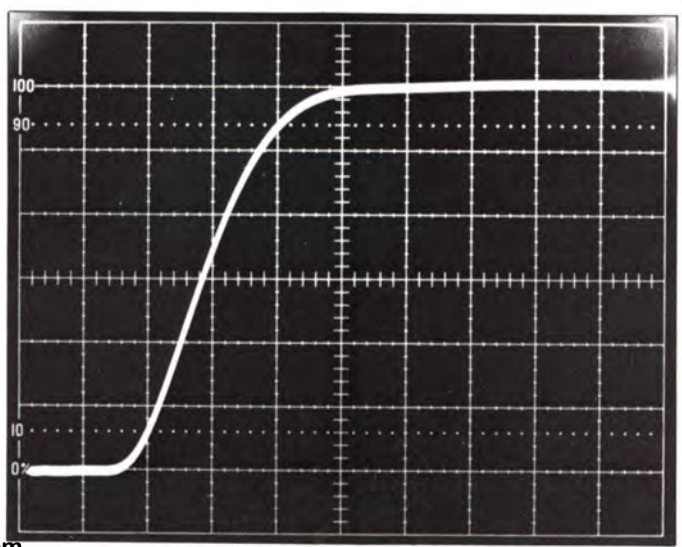
2kHz Square Wave



50μS/division



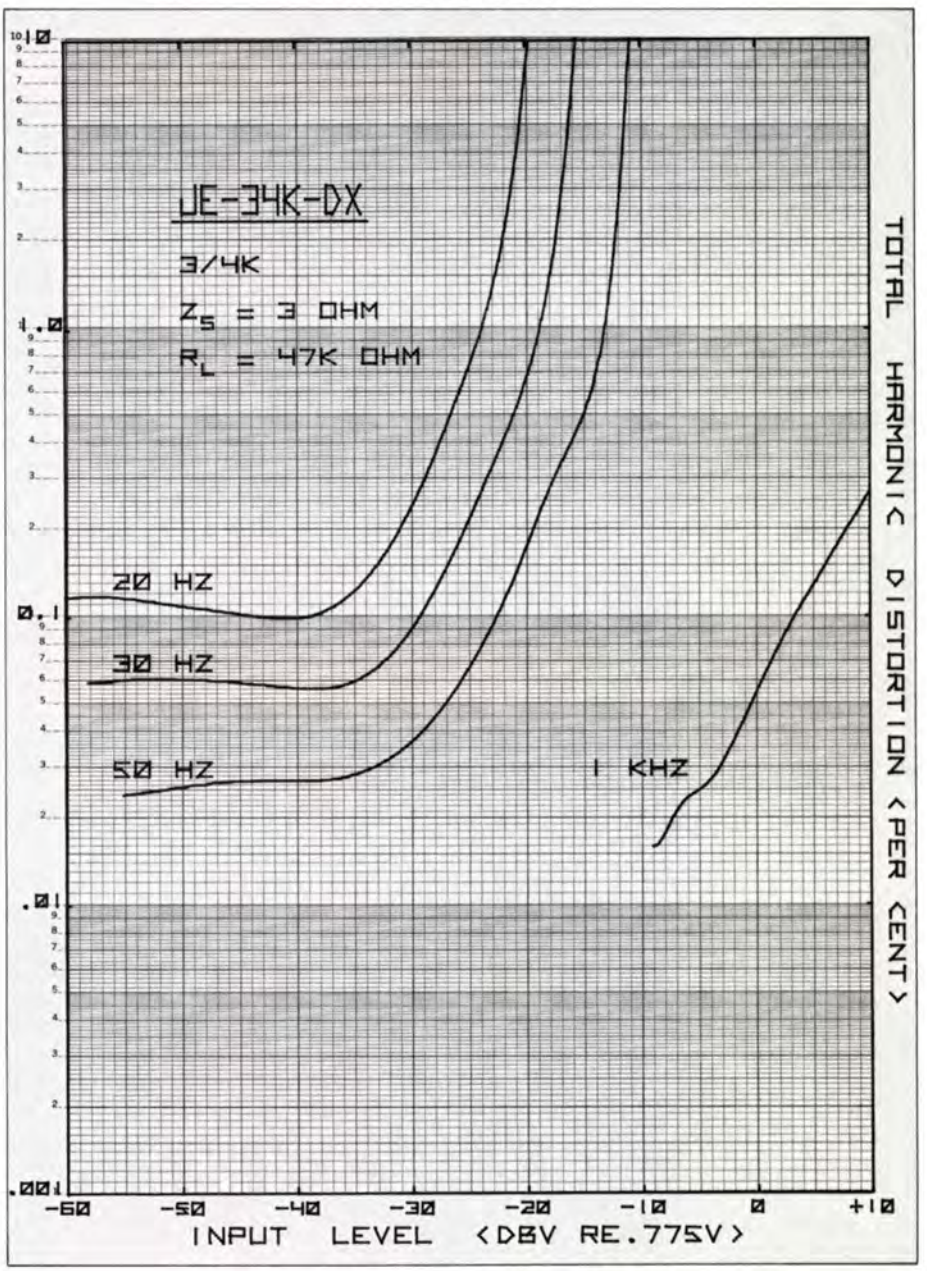
5μS/division



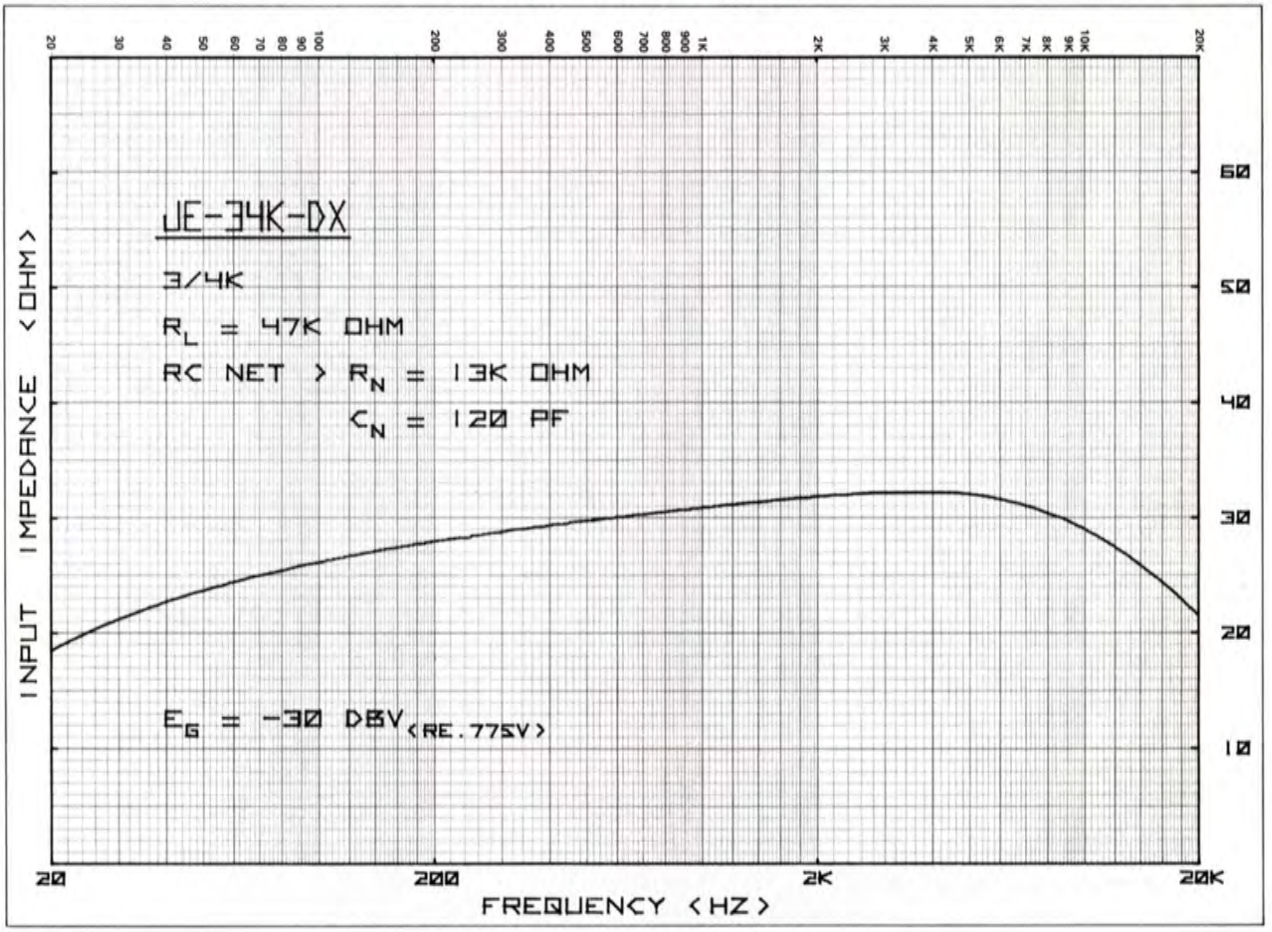
1μS/division

All curves were generated by a Hewlett-Packard 9815A/9862A programmable calculator/plotter. All calculations were either derived from or verified by actual measurements. Verified accuracies are on the order of one pen-line width.

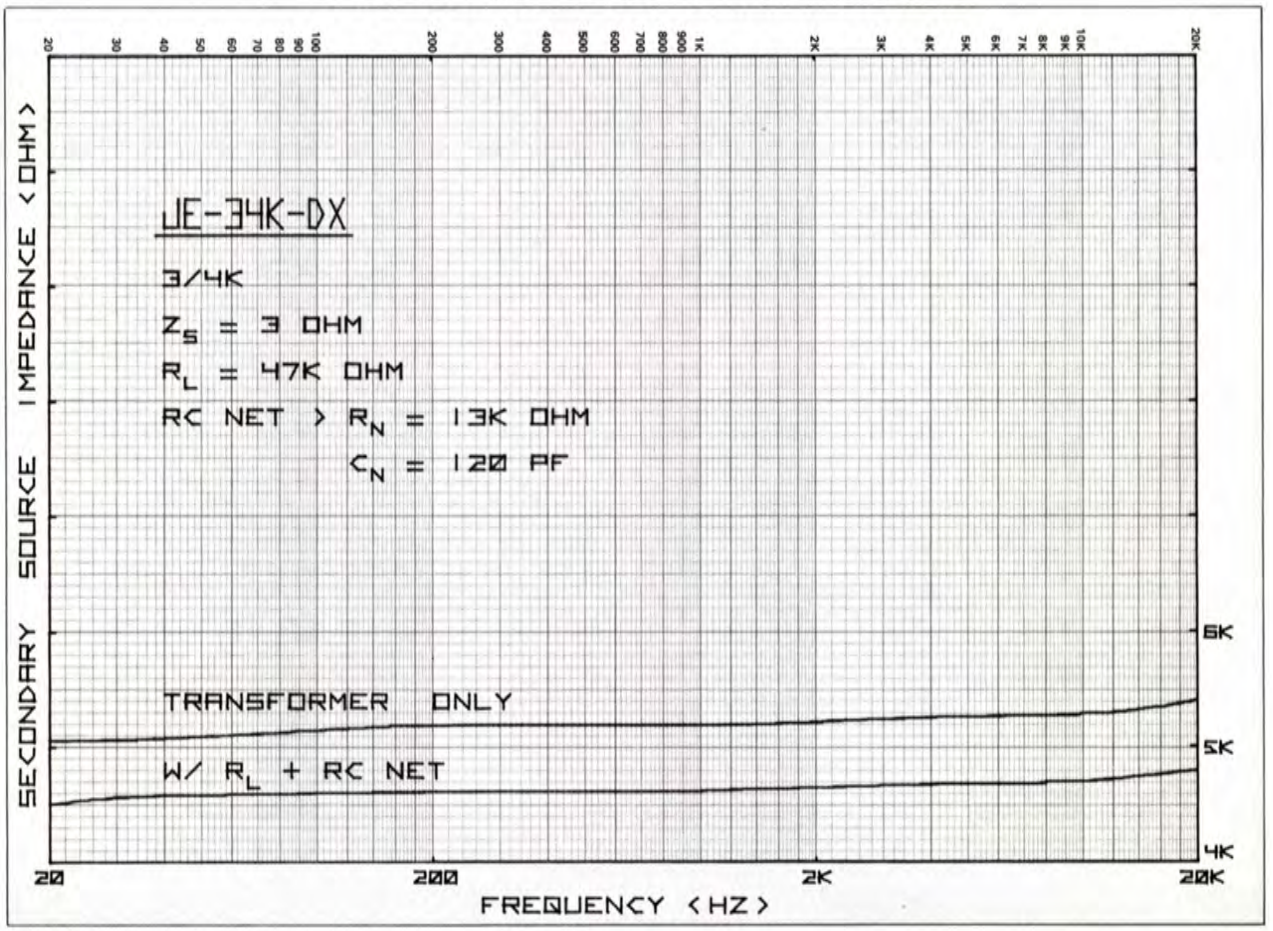
DISTORTION



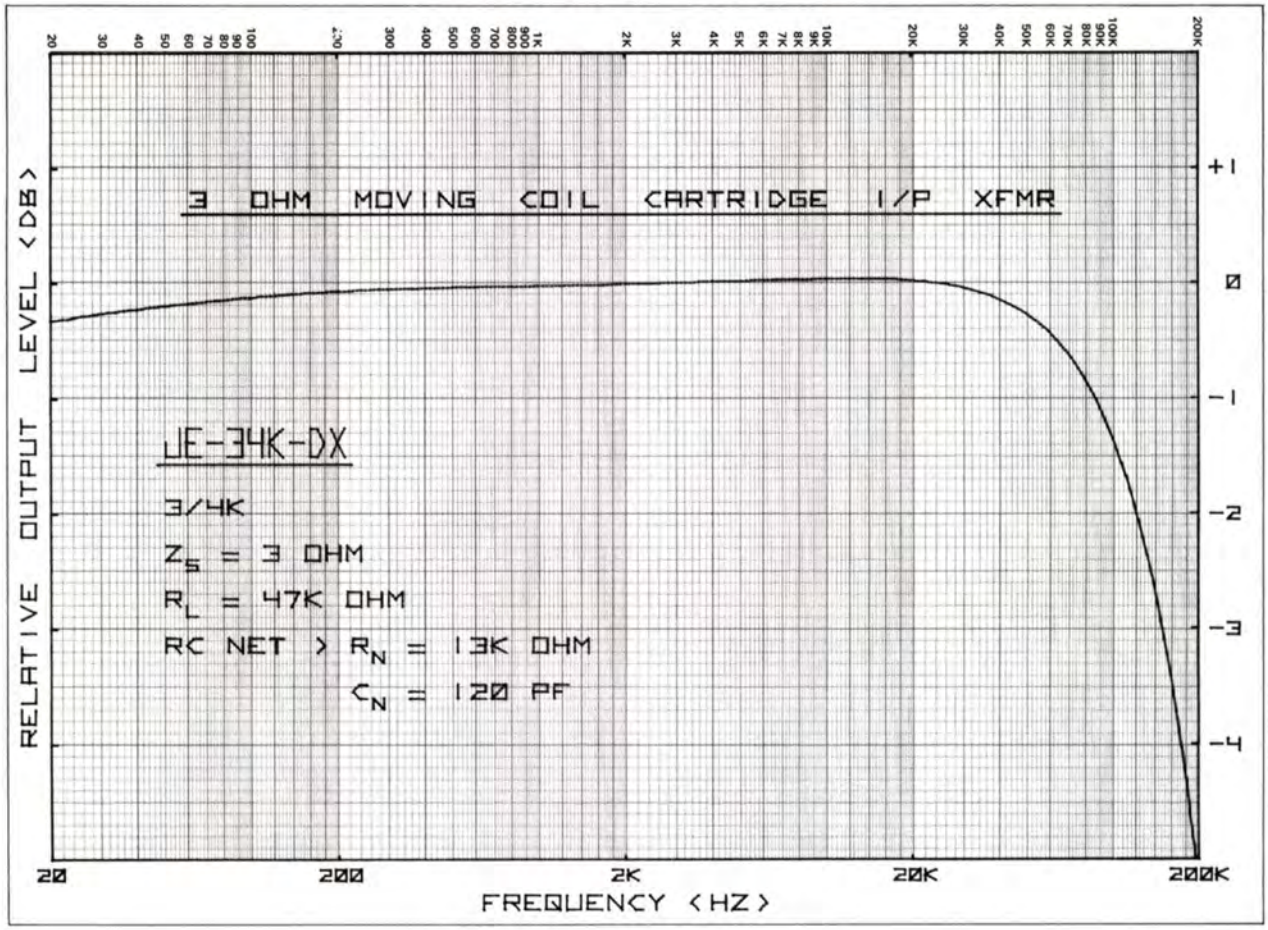
INPUT IMPEDANCE



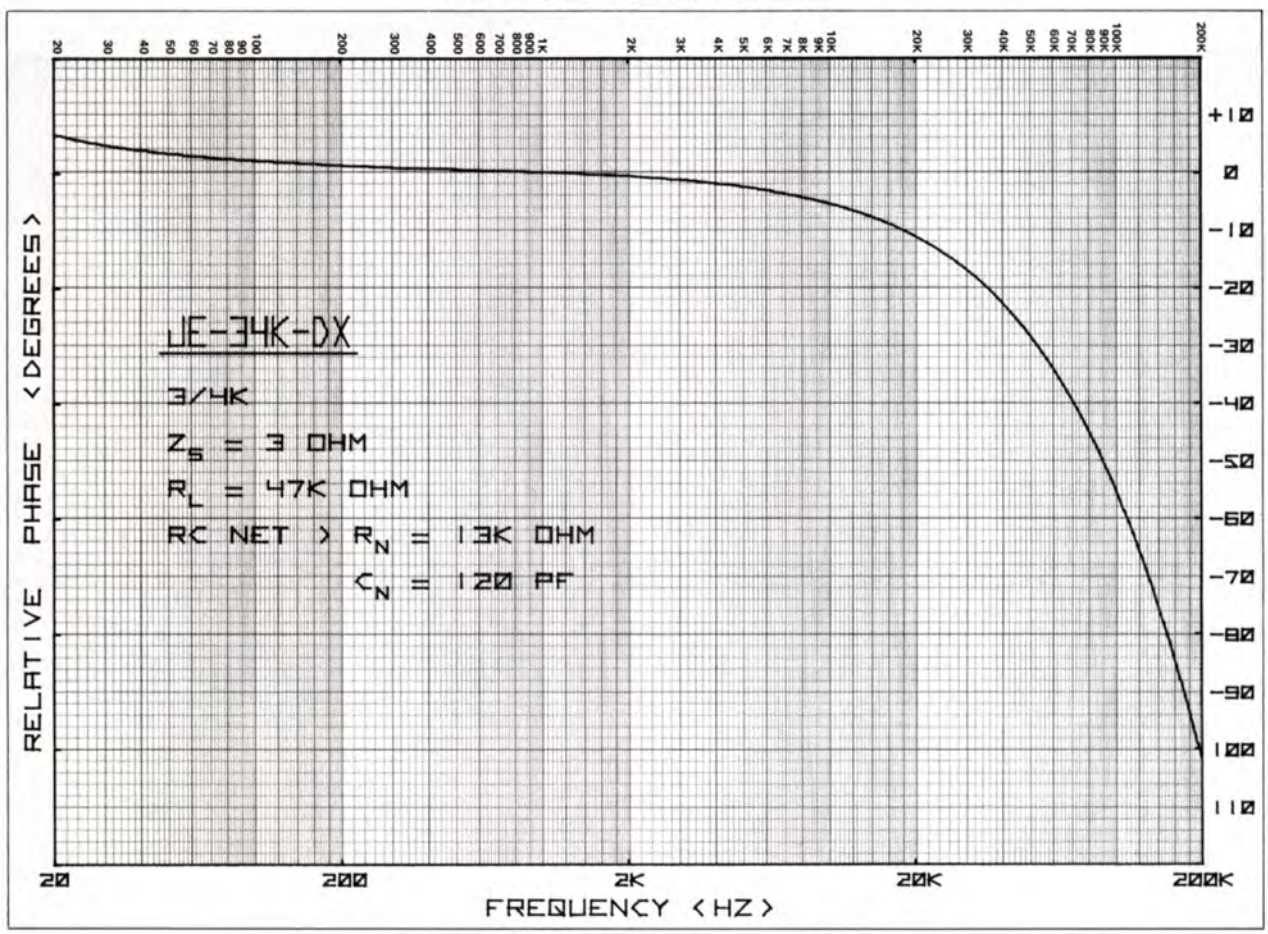
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



GENERAL CHARACTERISTICS

Turns Ratio
1:36.5
Impedance Ratio
3/4K
Primary Source Impedance
3 ohms
Secondary Load Impedance
47K ohms (Phono pre-amp)
Secondary Load Resistor
None required
Secondary RC Network
R_N = 13K ohms C_N = 120pf
Faraday Shield
Separate lead
Magnetic Shield
60dB, separate case leads
Maximum Input Level at 20Hz
−21dBv (Re: 0.775v)

PHYSICAL CHARACTERISTICS

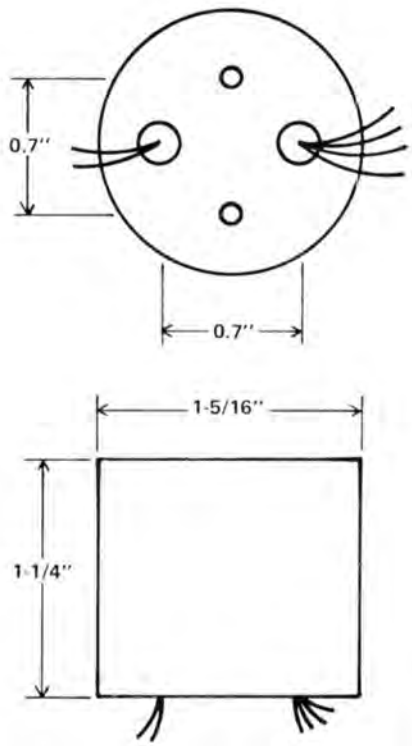
Package
Dual Mu-metal can
Termination
Wire leads
Dimensions
1-5/16" diameter, 1-1/4" high
Mounting
2 holes, 0.7" center-to-center, self-tapping screws or clamp

TYPICAL PERFORMANCE

Voltage Gain
31dB
Input Impedance
31 ohms @ 1kHz
29 ohms @ 10kHz
Secondary Source Impedance
5200 ohms @ 1kHz
5300 ohms @ 10kHz
Frequency Response (Re: 1kHz)
−0.35dB @ 20Hz
+0.02dB @ 20kHz
(No resonance peak)
Bandwidth
148kHz @ −3dB
Phase Response
−11° @ 20kHz
Rise Time
2μS (10%-90%)
Overshoot
<1%
Total Harmonic Distortion (Below Saturation)
0.12% maximum @ 20Hz
0.06% maximum @ 30Hz
0.027% maximum @ 50Hz
0.025% @ 1kHz
Input Level @ 1% Saturation (dBv Re: 0.775v)
−24dBv @ 20Hz
−19dBv @ 30Hz
−13dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>85dB @ 1kHz
>65dB @ 10kHz
Transformer Noise Figure*
1.4dB Re: 2.7 ohms**

Add to amplifier NF referred to impedance of 4720 ohms. (Parallel value of secondary source impedance and load)

***Parallel value of source impedance and input impedance.*



Mounting Holes
Clearance for #4 screw
Lead Holes
Use 0.35" hole to clear grommet

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1617 NORTH FULLER AVENUE
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Data Sheet

jensen transformers
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JE-MB-C
MICROPHONE BRIDGING TRANSFORMER

The JE-MB-C is a 1:1 turns ratio microphone bridging transformer with a single primary and a single secondary winding, each surrounded with its separate Faraday shield.

The JE-MB-C can be used to isolate and balance an unbalanced preamplifier input or to bridge a balanced microphone line, which is terminated with a balanced preamplifier input, to feed a second balanced preamplifier input.

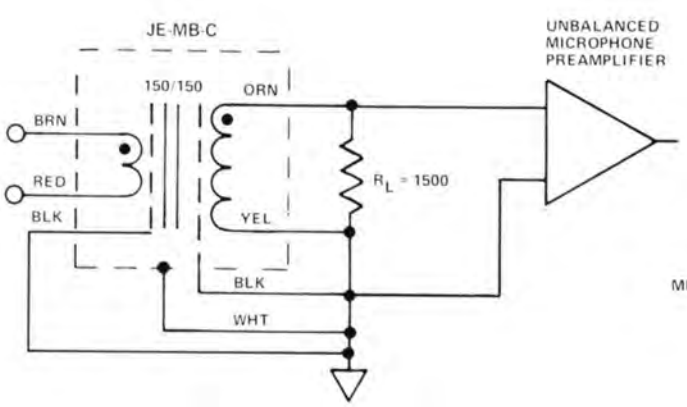
The transformer, with separate Faraday shields for each winding, isolates and rejects the common-mode noise caused by the noise voltage difference between the chassis of the two mixers. With this type of isolation, the microphone shield can be connected through to the chassis of one mixer but need not be connected through to the second mixer chassis. Instead, the chassis (shield) of the second mixer connects only to the Faraday shield of the secondary. This eliminates the ground loop which would be caused if the microphone shield were connected through to both mixers.

Phantom power can be provided by the mixer which terminates the microphone directly.

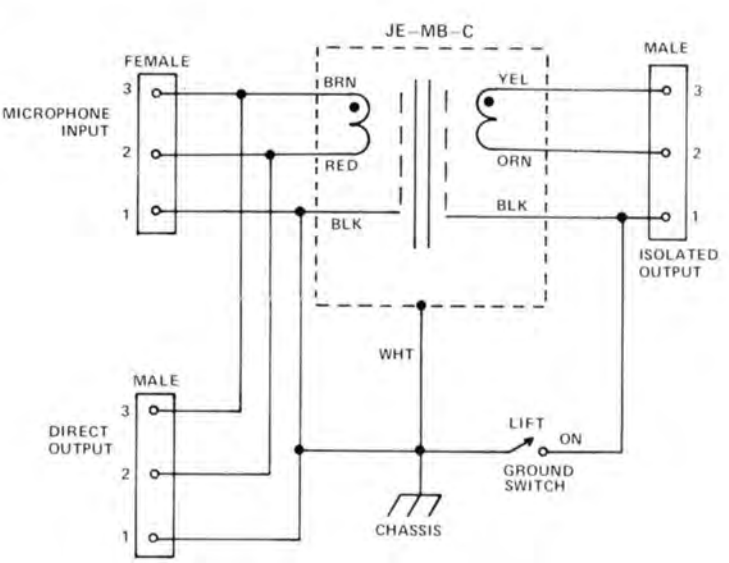
If cables with the shell connected to pin 1 (shield) are used in the system, insulated mounting will be required for the connectors.

The design is optimized for a source impedance at the primary of 150 ohms (microphone) and a secondary load of 1000 ohms (typical microphone preamplifier input impedance). No resistors are used in the usual application of a "mic-split box."

If the transformer is used to balance an unbalanced preamplifier input, a secondary termination resistor may be necessary to result in a load of 1000 to 2000 ohms. A higher secondary load impedance may result in a ringing response.



MICROPHONE INPUT ISOLATION TRANSFORMER

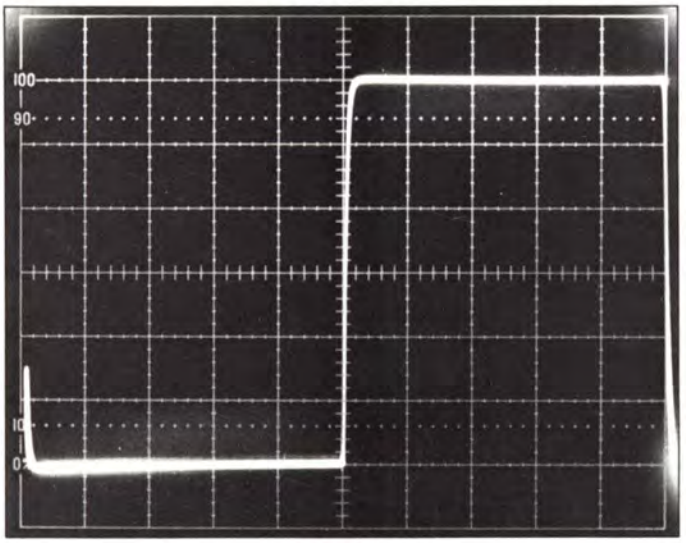


MIC SPLIT BOX SCHEMATIC

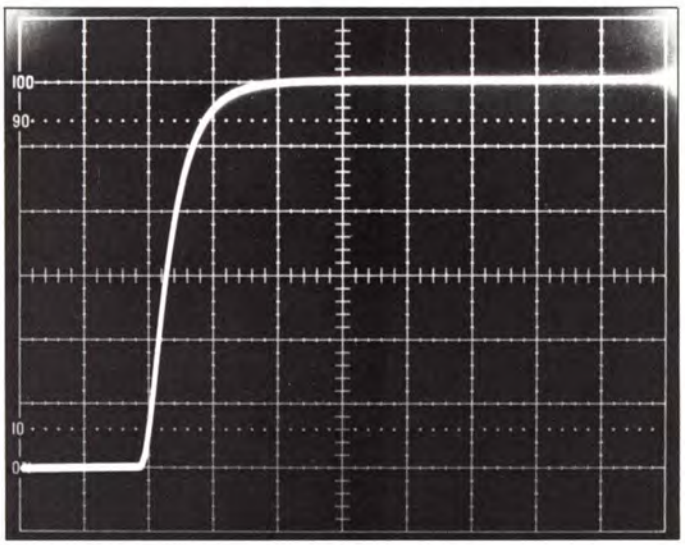
REGARDING THE OSCILLOSCOPE PHOTOS

Actual oscilloscope photos were made from a Tektronix Model 453A (certified calibration).

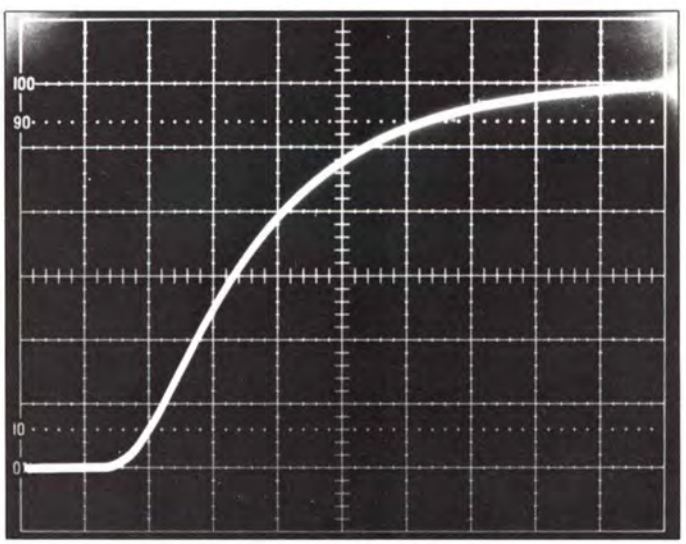
2kHz Square Wave



50μS/division



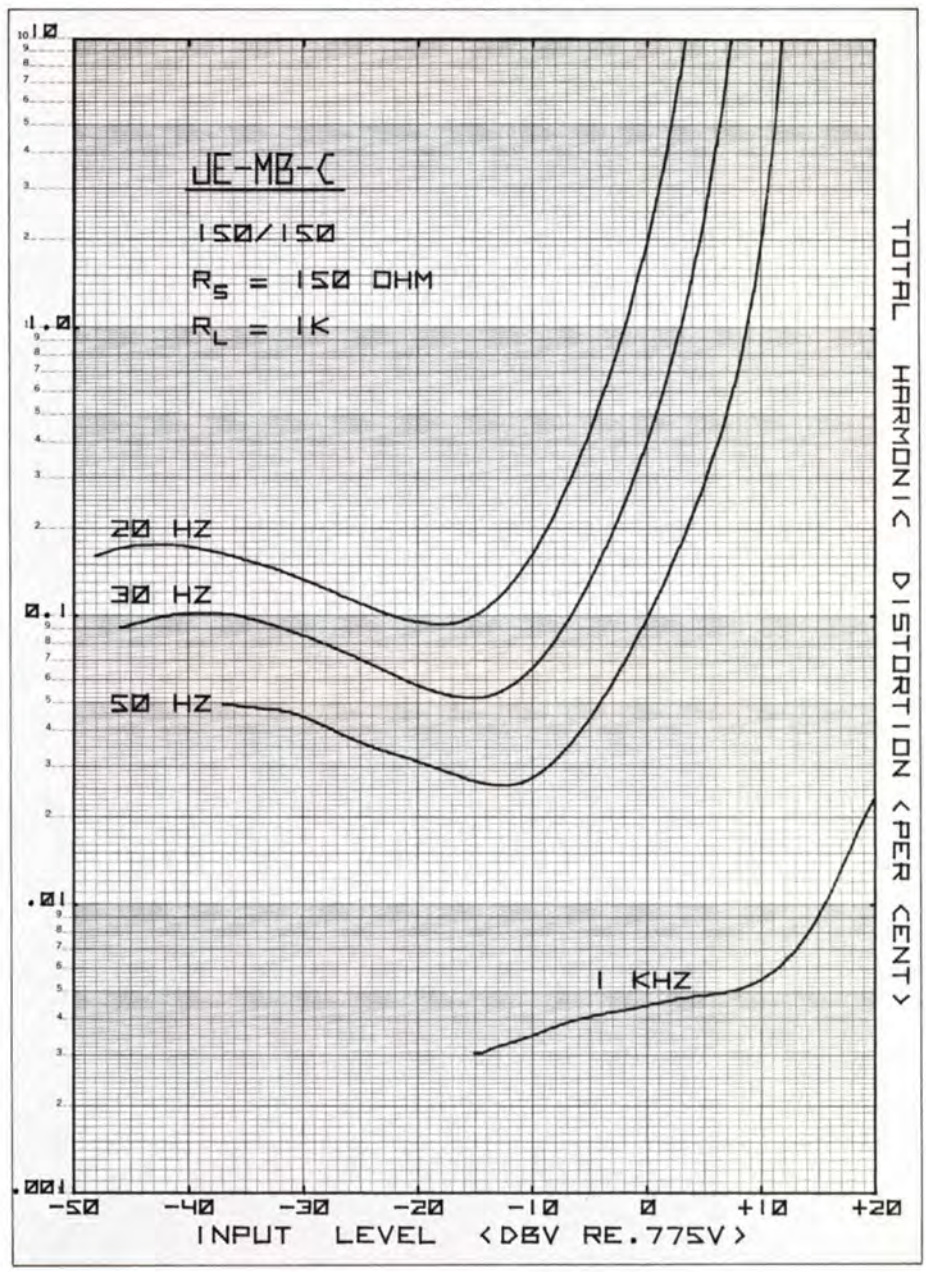
5μS/division



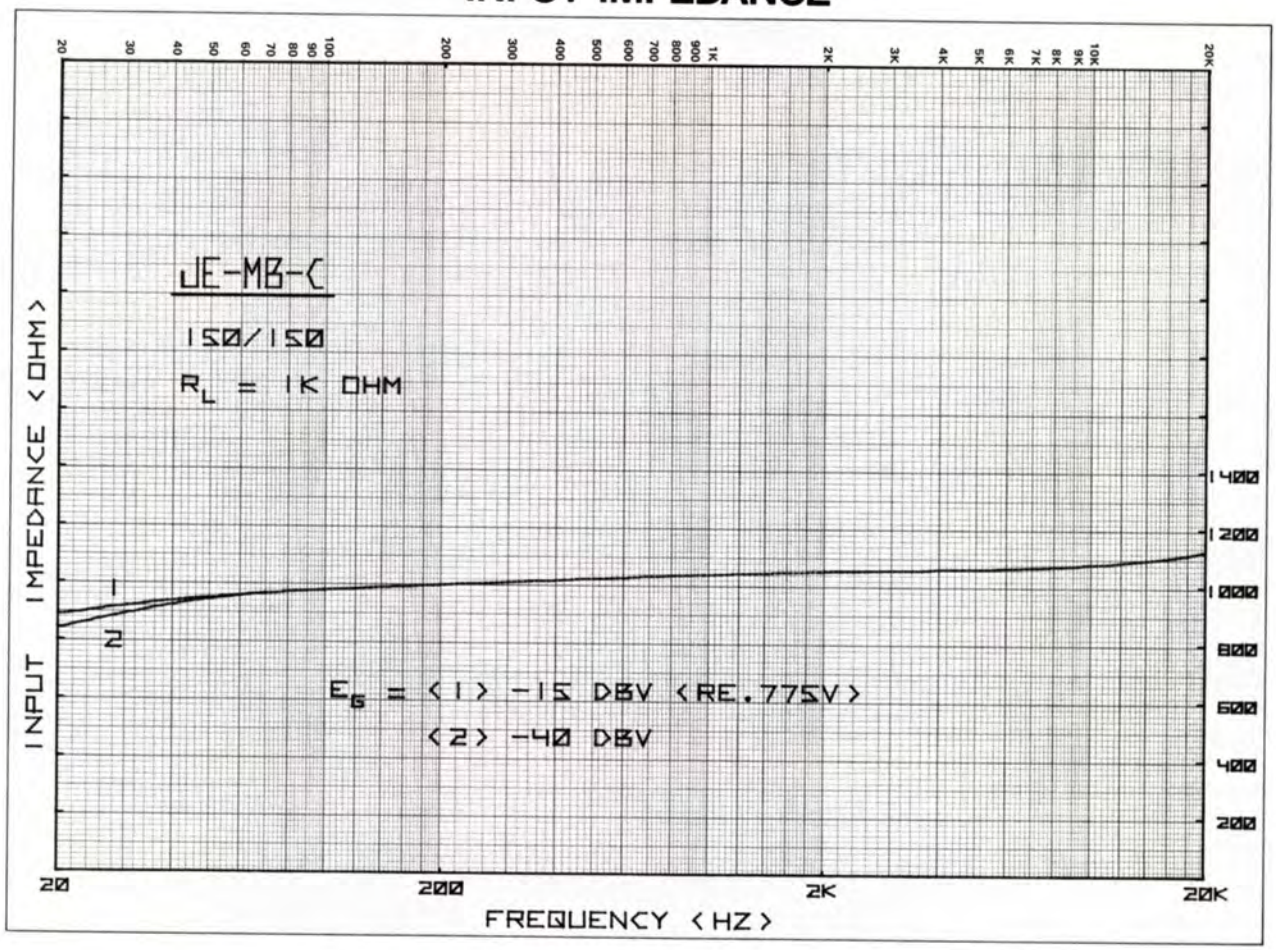
1μS/division

All curves were generated by a Hewlett-Packard 9815A/9862A programmable calculator/plotter. All calculations were either derived from or verified by actual measurements. Verified accuracies are on the order of one pen-line width.

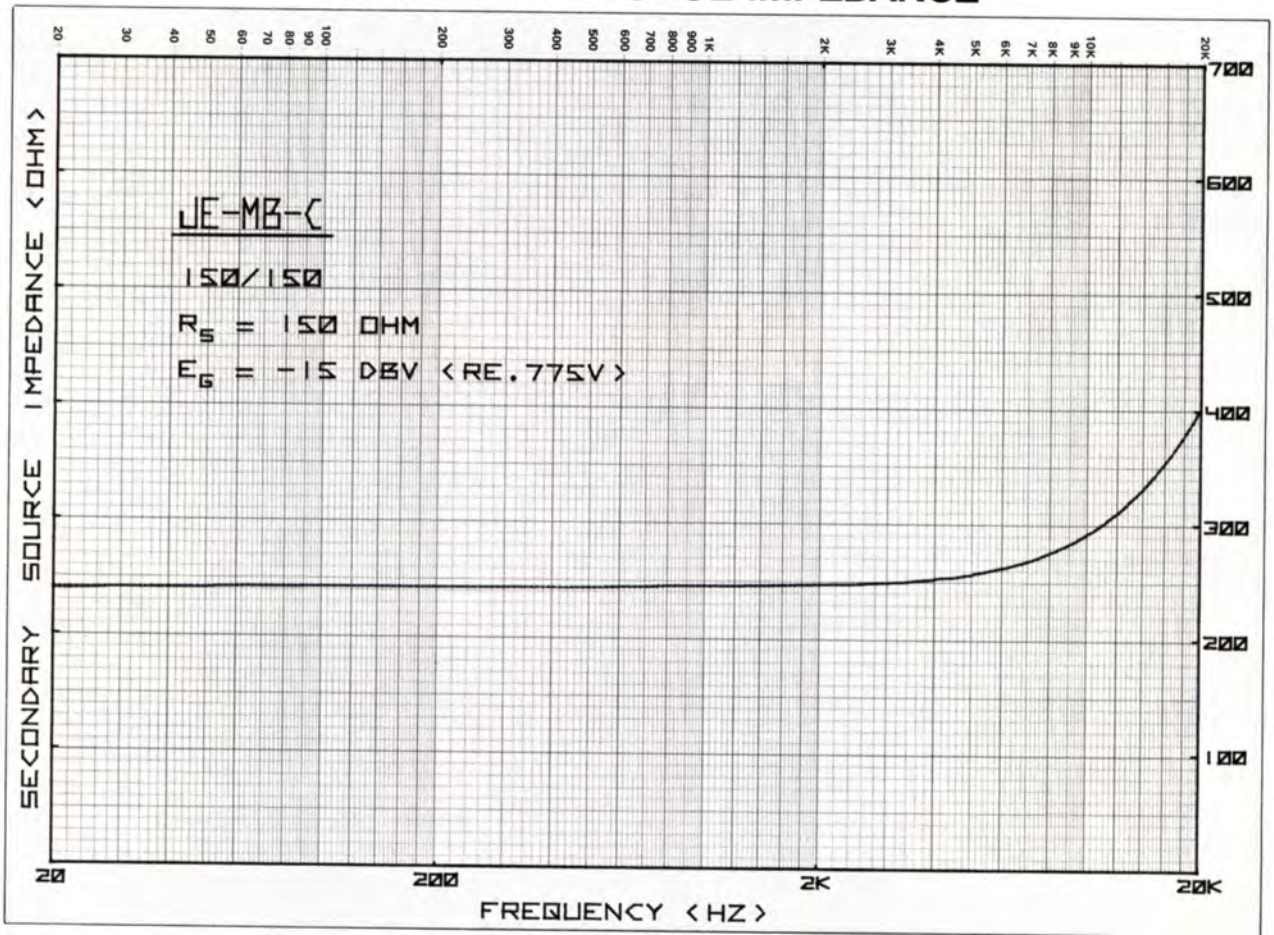
DISTORTION



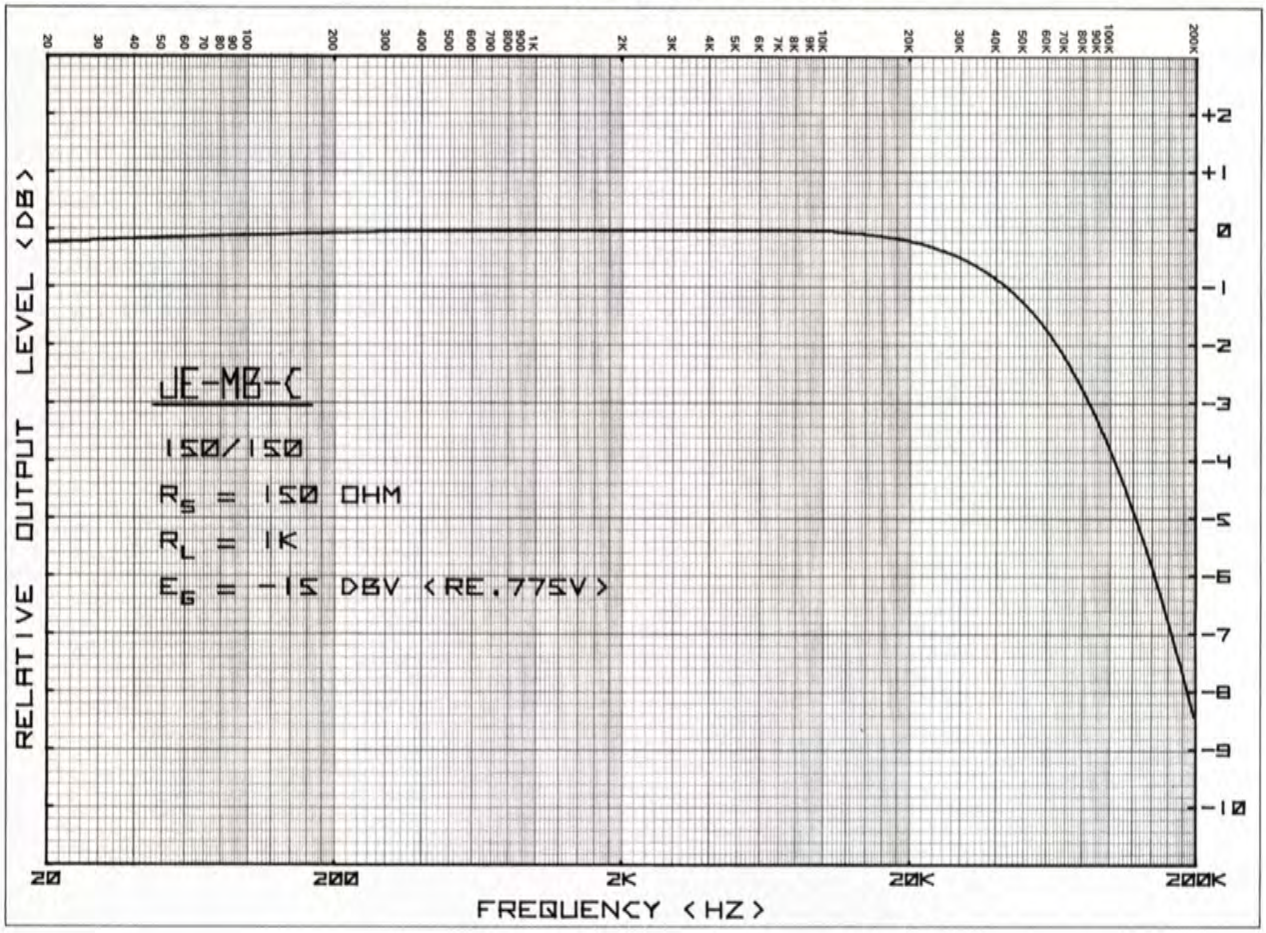
INPUT IMPEDANCE



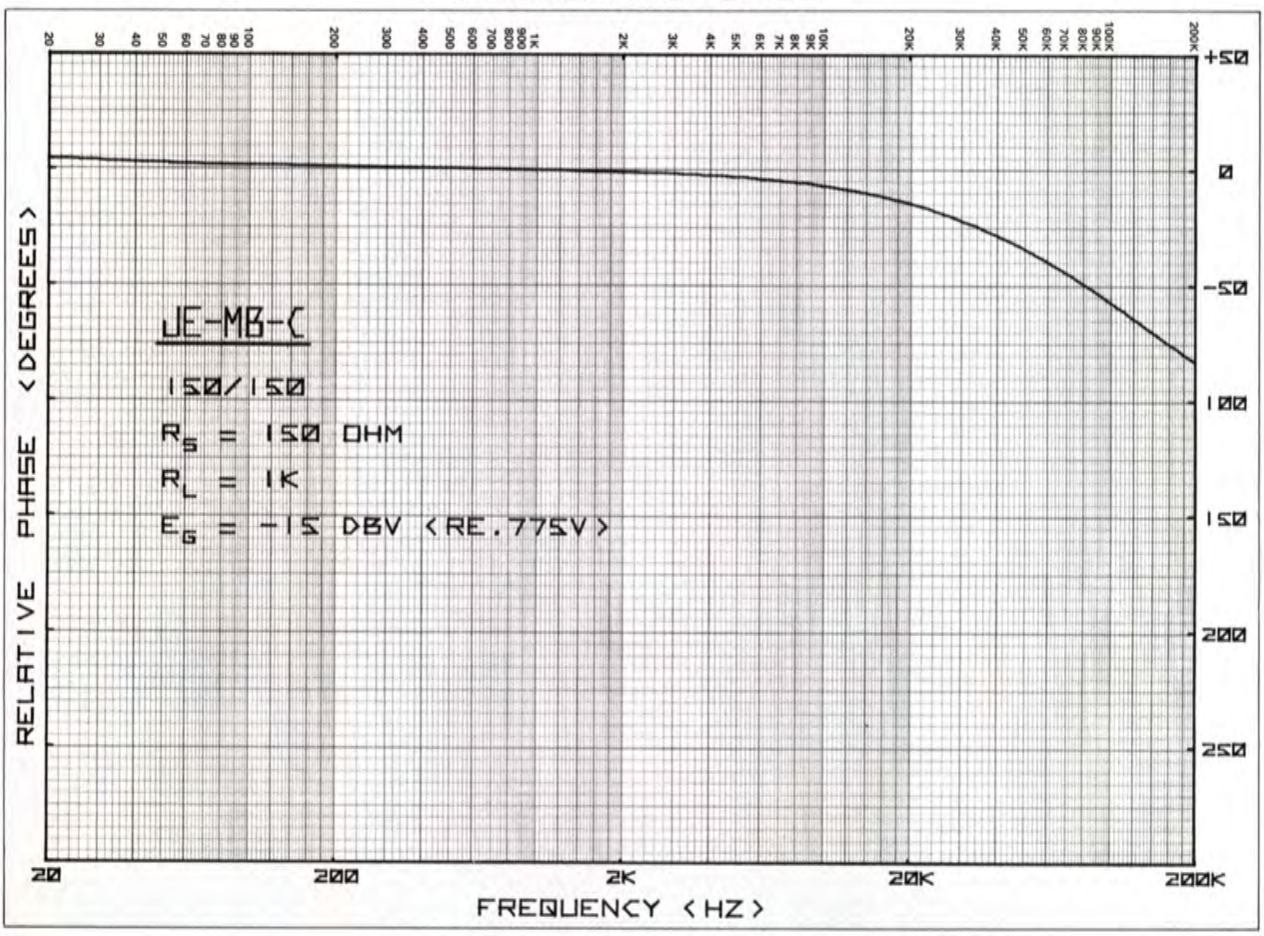
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



GENERAL CHARACTERISTICS

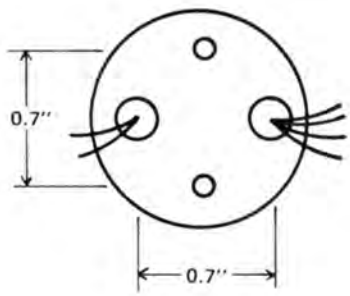
Turns Ratio
1:1
Impedance Ratio
150/150
Primary Source Impedance
150 ohms
Secondary Load Impedance
1K ohms (mic pre-amp)
Secondary Load Resistor
None required
Secondary RC Network
None required
Two Faraday Shields
Separate leads
Magnetic Shield
30dB, separate case lead
Maximum Input Level at 20Hz
+2dBv (Re: 0.775v)

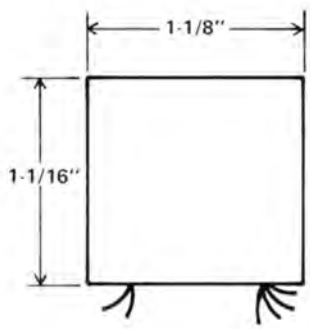
PHYSICAL CHARACTERISTICS

Package
Mu-metal can
Termination
Wire leads
Dimensions
1-1/8" diameter, 1-1/16" high
Mounting
2 holes, 0.7" center-to-center, self-tapping screws supplied

TYPICAL PERFORMANCE

Voltage Gain
−0.8dB
Input Impedance
1040 ohms @ 1kHz
1080 ohms @ 10kHz
Secondary Source Impedance
245 ohms @ 1kHz
290 ohms @ 10kHz
Frequency Response (Re: 1kHz)
−0.25dB @ 20Hz
−0.20dB @ 20kHz
(No resonance peak)
Bandwidth
88kHz @ −3dB
Phase Response
−15° @ 20kHz
Rise Time
4.3μS (10%-90%)
Overshoot
<1%
Total Harmonic Distortion (Below Saturation)
0.18% maximum @ 20Hz
0.10% maximum @ 30Hz
0.05% maximum @ 50Hz
0.005% @ 1kHz
Input Level @ 1% Saturation (dBv Re: 0.775v)
−2dBv @ 20Hz
+3dBv @ 30Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>85dB @ 1kHz
>65dB @ 10kHz





Mounting Holes
Clearance for #4 screw
Lead Holes
Use 0.35" hole to clear grommet

jensen transformers
By REICHENBACH ENGINEERING

1617 NORTH FULLER AVENUE
HOLLYWOOD, CALIFORNIA 90046
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Data Sheet

jensen transformers
By REICHENBACH ENGINEERING

JE-MB-D
MICROPHONE BRIDGING TRANSFORMER

The JE-MB-D is a 1:1:1 turns ratio microphone bridging transformer with a single primary and two secondary windings, each surrounded with its separate Faraday shield.

The JE-MB-D can be used to bridge a balanced microphone line, which is terminated with a balanced preamplifier input, to feed second and third balanced preamplifier inputs.

The transformer, with separate Faraday shields for each winding, isolates and rejects the common-mode noise caused by the noise voltage difference between the chassis of the multiple mixers. With this type of isolation, the microphone shield can be connected through to the chassis of one mixer but need not be connected through to the second or third mixer chassis. Instead, the chassis (shields) of the second and third mixers connect only to the Faraday shield of the appropriate secondary. This eliminates the ground loops which would be caused if the microphone shield were connected through to multiple mixers.

Phantom power can be provided by the mixer which terminates the microphone directly.

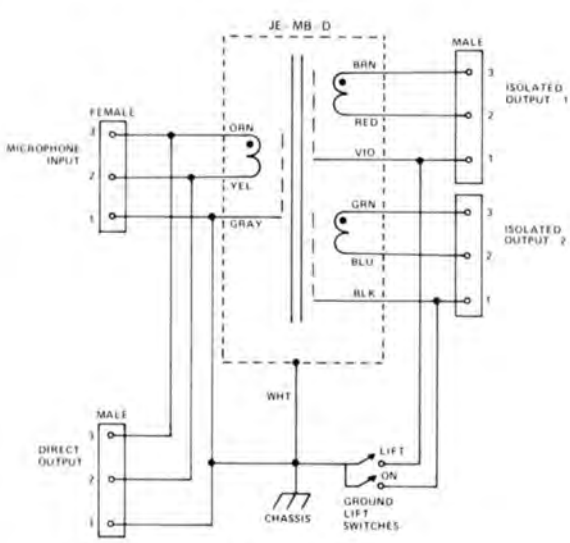
The design is optimized for a source impedance at the primary of 150 ohms (microphone) and secondary loads of 1000 ohms (typical microphone preamplifier input impedance). No resistors are used in the usual application of a "mic-split box."

The primary winding is interleaved equally with both secondary windings for matched transfer characteristics to both secondaries and to minimize variations in response with an unloaded secondary.

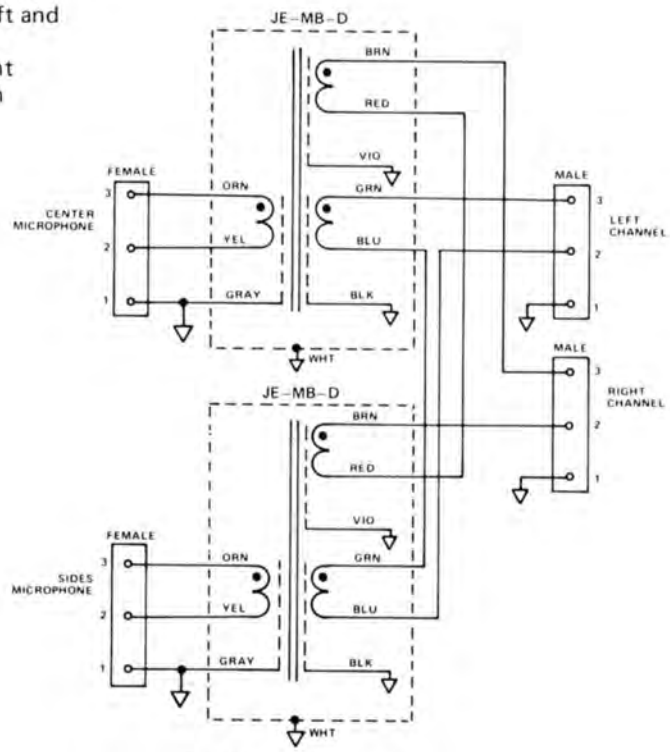
If cables with the shell connected to pin 1 (shield) are used in the system, insulated mounting will be required for the connectors.

STEREO MIC MATRIX

A pair of these 3 winding 1:1:1 transformers can be used to matrix the Sum and Difference signals of a stereo microphone to the Left and Right format. Connect each microphone to a primary, and cross-connect the secondaries in series and anti-series for Left and Right outputs. The Faraday shields can be connected together as one in applications not requiring separate shields.



MIC SPLIT BOX SCHEMATIC

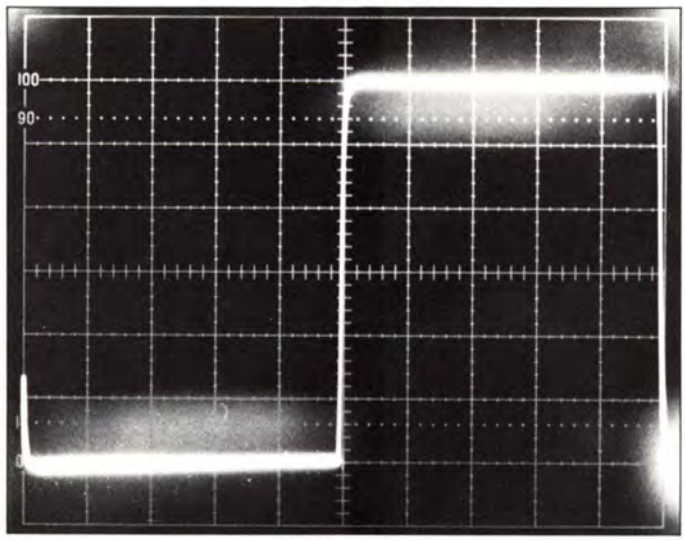


STEREO MICROPHONE MATRIX SCHEMATIC

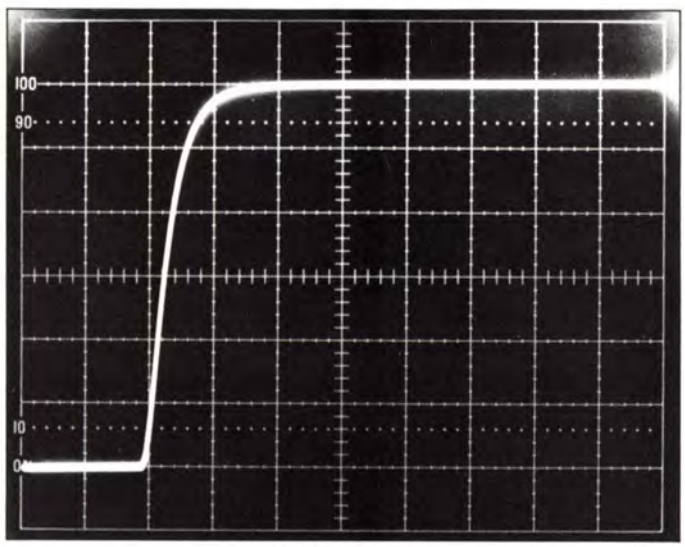
REGARDING THE OSCILLOSCOPE PHOTOS

Actual oscilloscope photos were made from a Tektronix Model 453A (certified calibration).

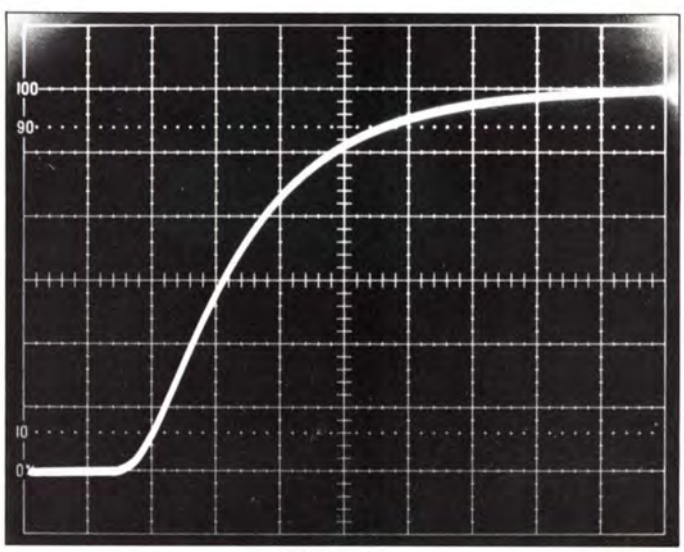
2kHz Square Wave



50μS/division



5μS/division



1μS/division

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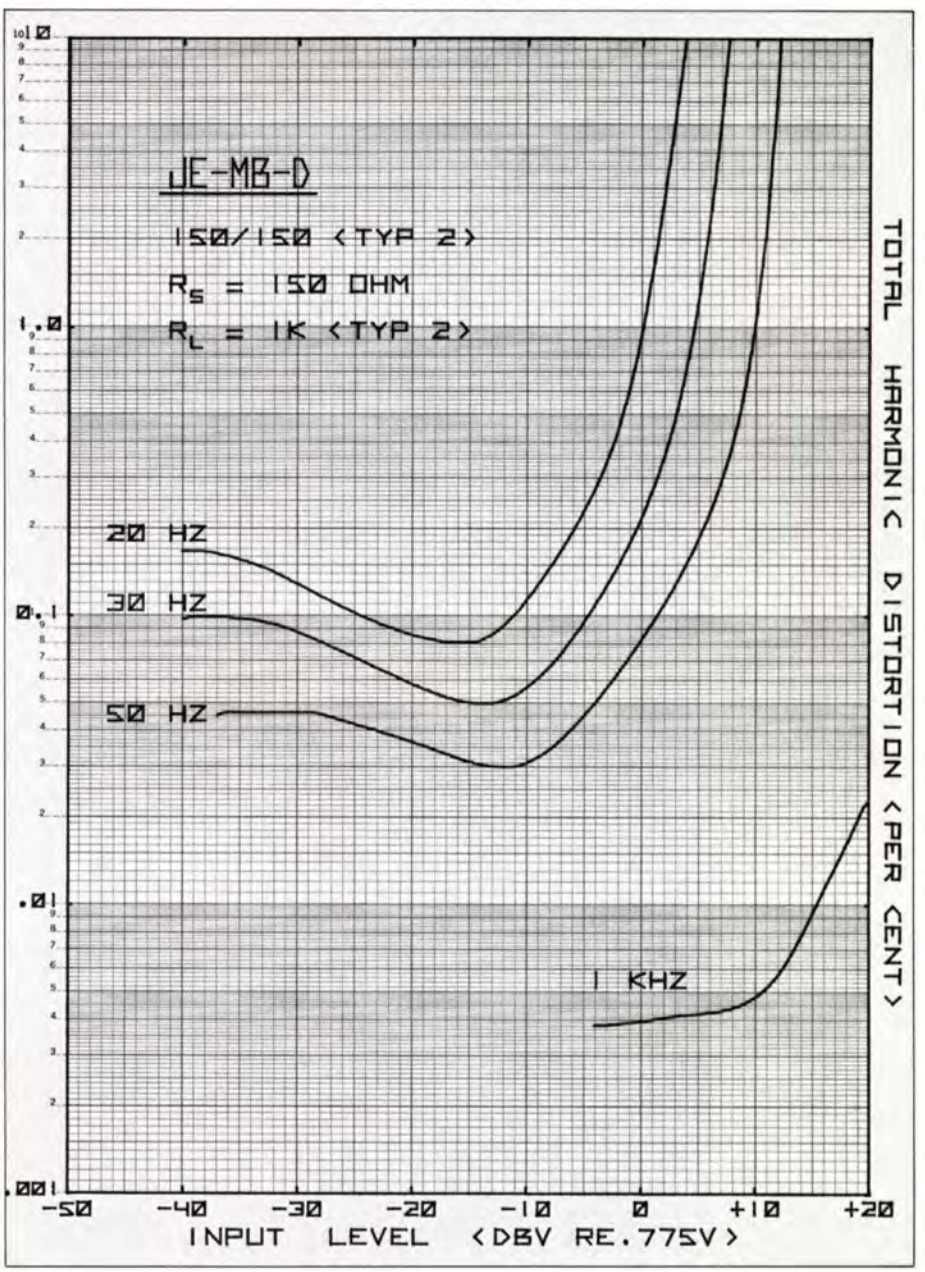
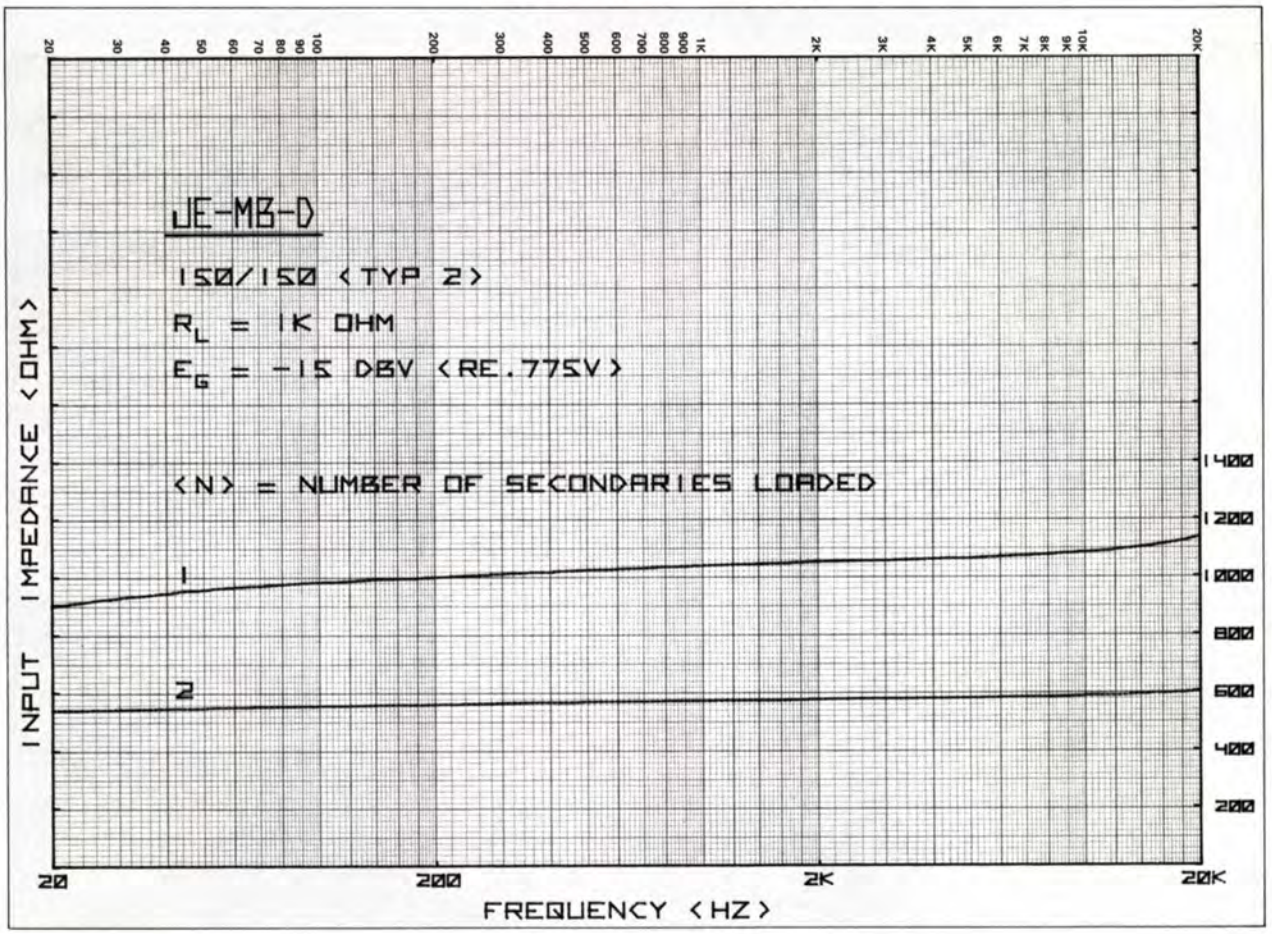
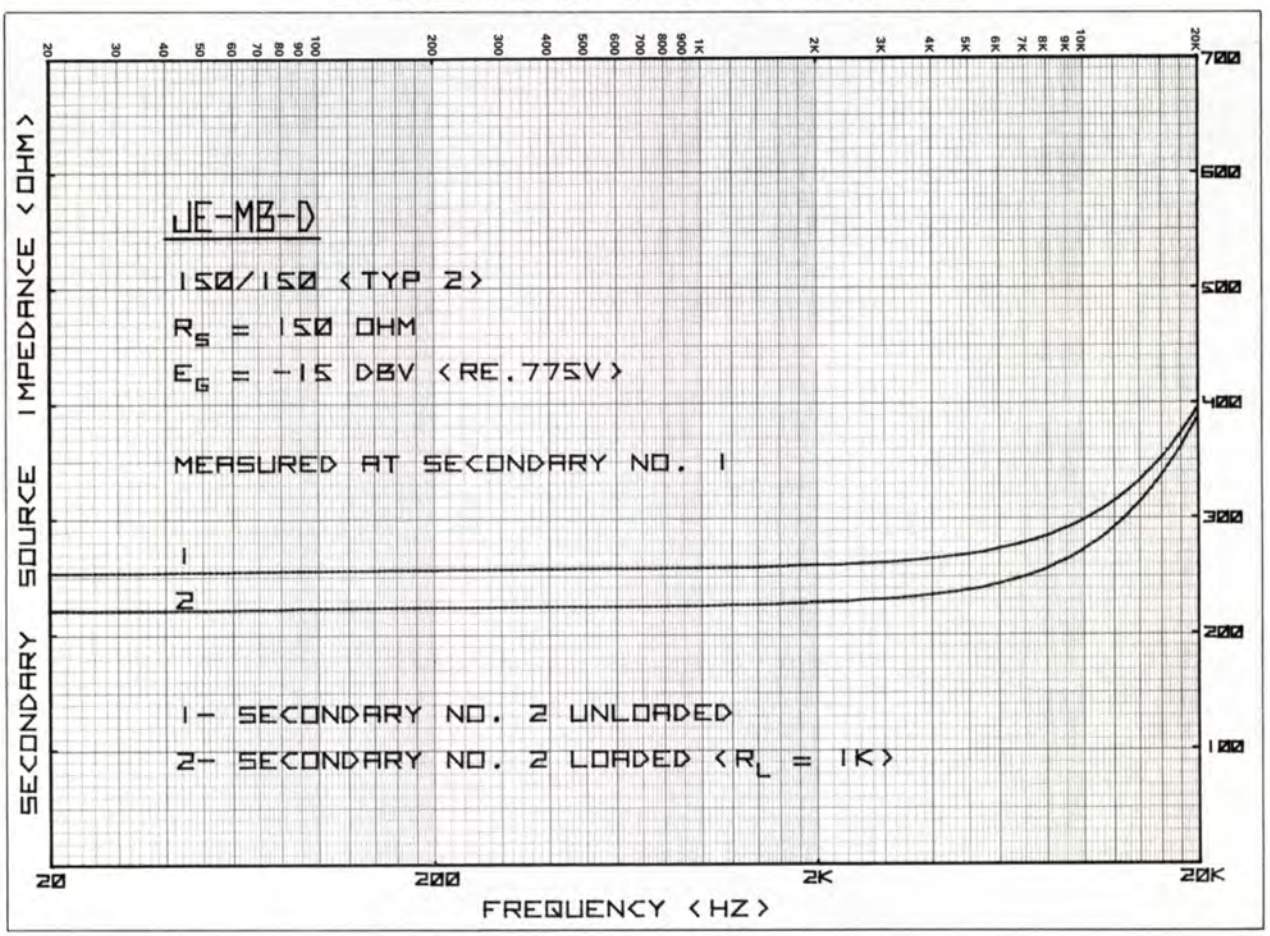
DISTORTION



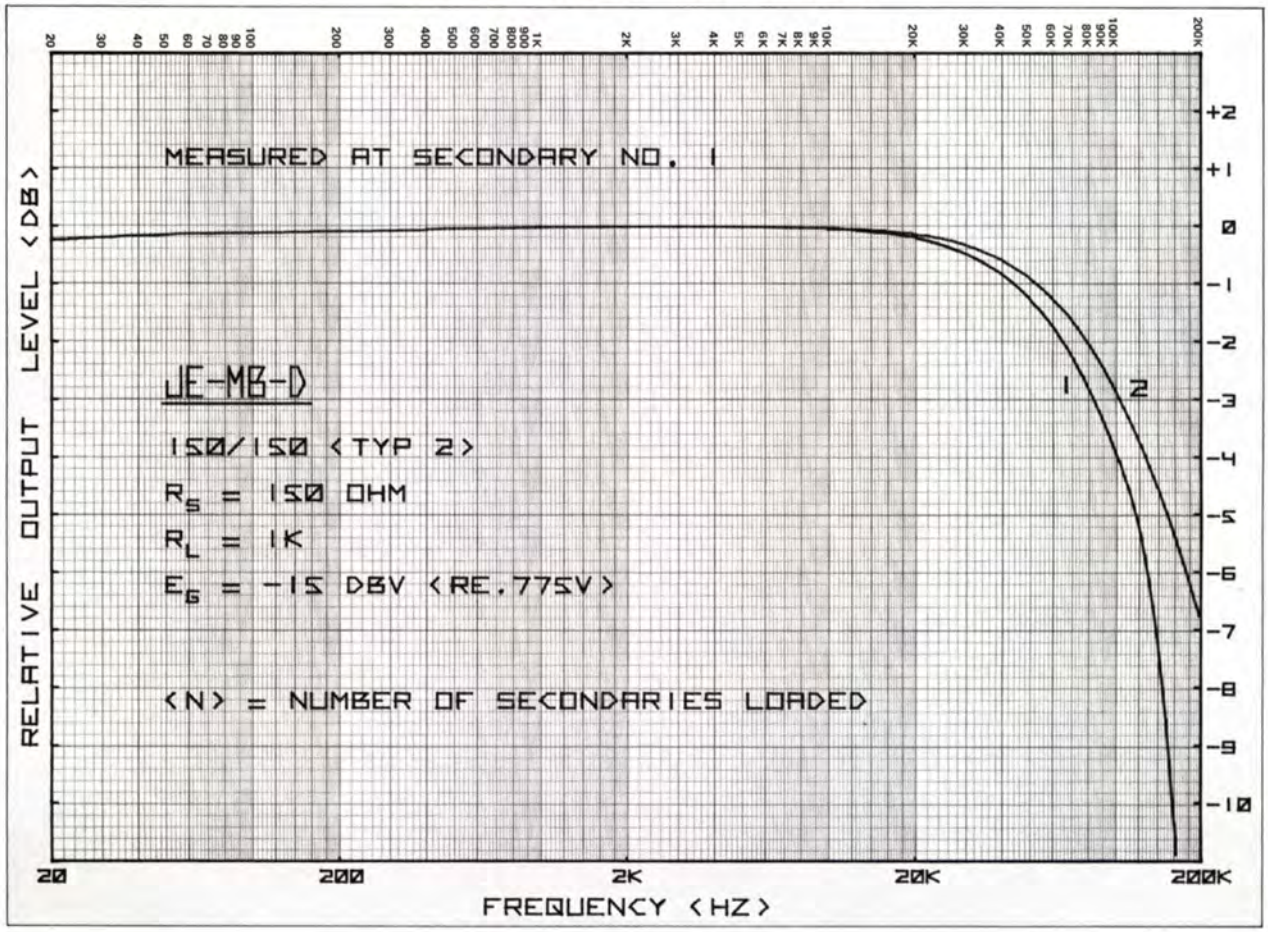
INPUT IMPEDANCE



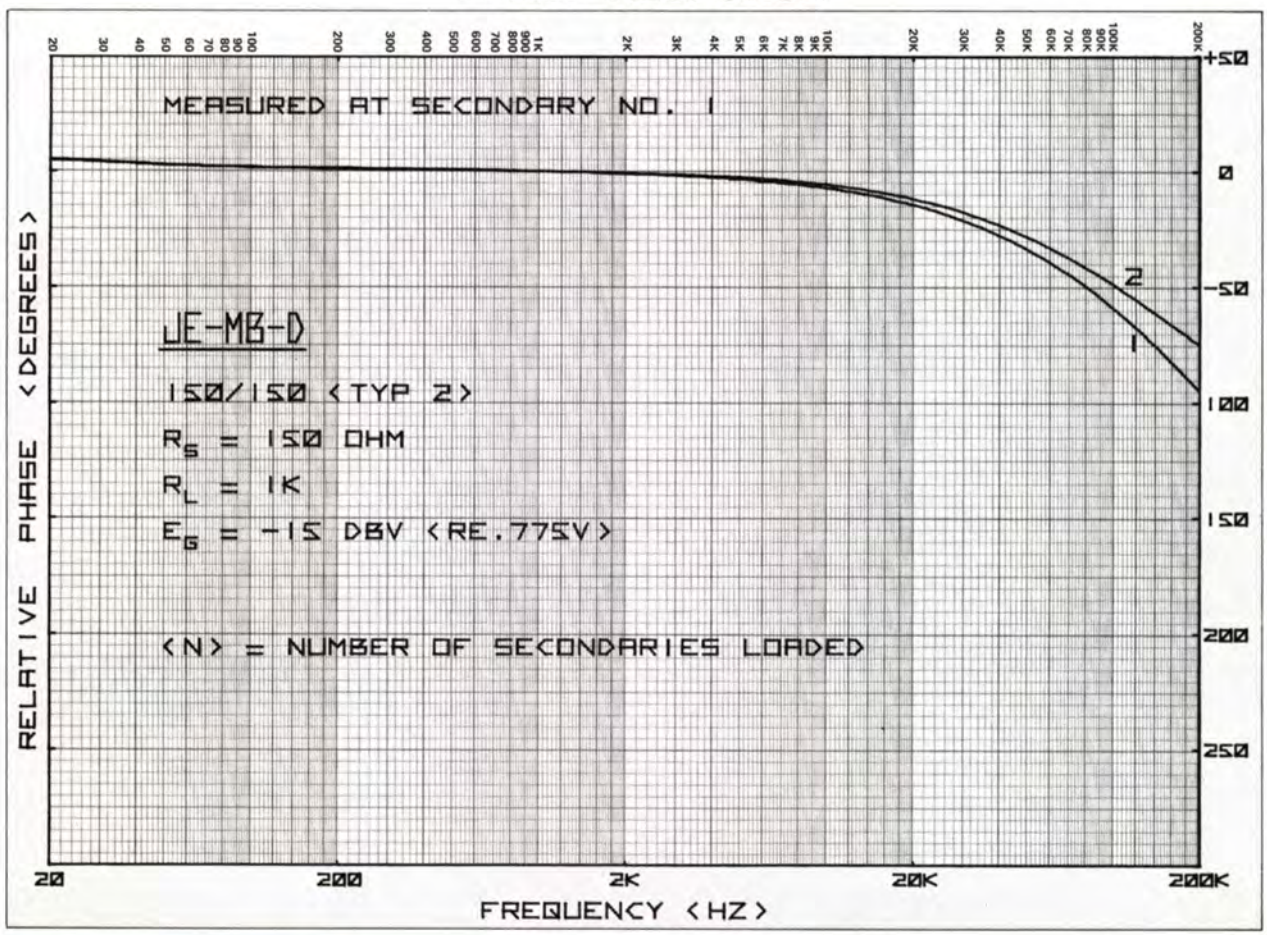
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



GENERAL CHARACTERISTICS

Turns Ratio
1:1:1 (2 secondaries)
Impedance Ratio
150/150/150
Primary Source Impedance
150 ohms
Secondary Load Impedances
1K ohms (mic pre-amps)
Secondary Load Resistors
None required
Secondary RC Networks
None required
Three Faraday Shields
Separate leads
Magnetic Shield
30dB, separate case lead
Maximum Input Level at 20Hz
+2dBv (Re: 0.775v)

PHYSICAL CHARACTERISTICS

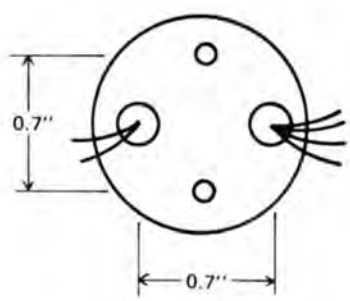
Package
Mu-metal can
Termination
Wire leads
Dimensions
1-1/8" diameter, 1-1/16" high
Mounting
2 holes, 0.7" center-to-center, self-tapping screws supplied

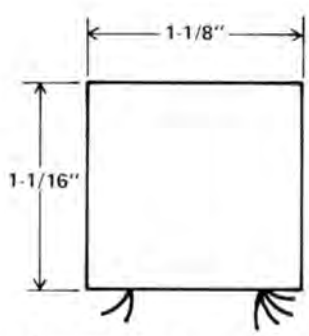
TYPICAL PERFORMANCE

Total Harmonic Distortion (Below Saturation)
0.18% maximum @ 20Hz
0.10% maximum @ 30Hz
0.05% maximum @ 50Hz
0.005% @ 1kHz
Input Level @ 1% Saturation (dBv Re: 0.775v)
0dBv @ 20Hz
+4dBv @ 30Hz
+10dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>85dB @ 1kHz
>65dB @ 10kHz

TYPICAL PERFORMANCE

		Secondary Loads	
		One	Two
Voltage Gain		−0.9dB	−1.4dB
Input Impedance	@ 1kHz	1040 ohms	575 ohms
	@ 10kHz	1080 ohms	590 ohms
Secondary Source Impedance	@ 1kHz	260 ohms	225 ohms
	@ 10kHz	300 ohms	270 ohms
Frequency Response (Re: 1kHz)	@ 20Hz	−0.25dB	−0.25dB
	@ 20kHz	−0.20dB (No resonance peak)	−0.16dB
Bandwidth	@ −3dB	88kHz	100kHz
Phase Response	@ 20kHz	−15°	−12°
Rise Time	(10%-90%)	4.0μS	3.6μS
Overshoot		<1%	<1%





Mounting Holes
Clearance for #4 screw
Lead Holes
Use 0.35" hole to clear grommet

jensen transformers
By REICHENBACH ENGINEERING

1617 NORTH FULLER AVENUE
HOLLYWOOD, CALIFORNIA 90046
PHONE (213) 876-0059

(Visitors by Appointment Only)

Data Sheet

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JE-MB-E
MICROPHONE BRIDGING TRANSFORMER

The JE-MB-E is a 1:1:1:1 turns ratio microphone bridging transformer with a single primary and three secondary windings, each surrounded with its separate Faraday shield.

The JE-MB-E can be used to bridge a balanced microphone line, which is terminated with a balanced preamplifier input, to feed three additional balanced preamplifier inputs.

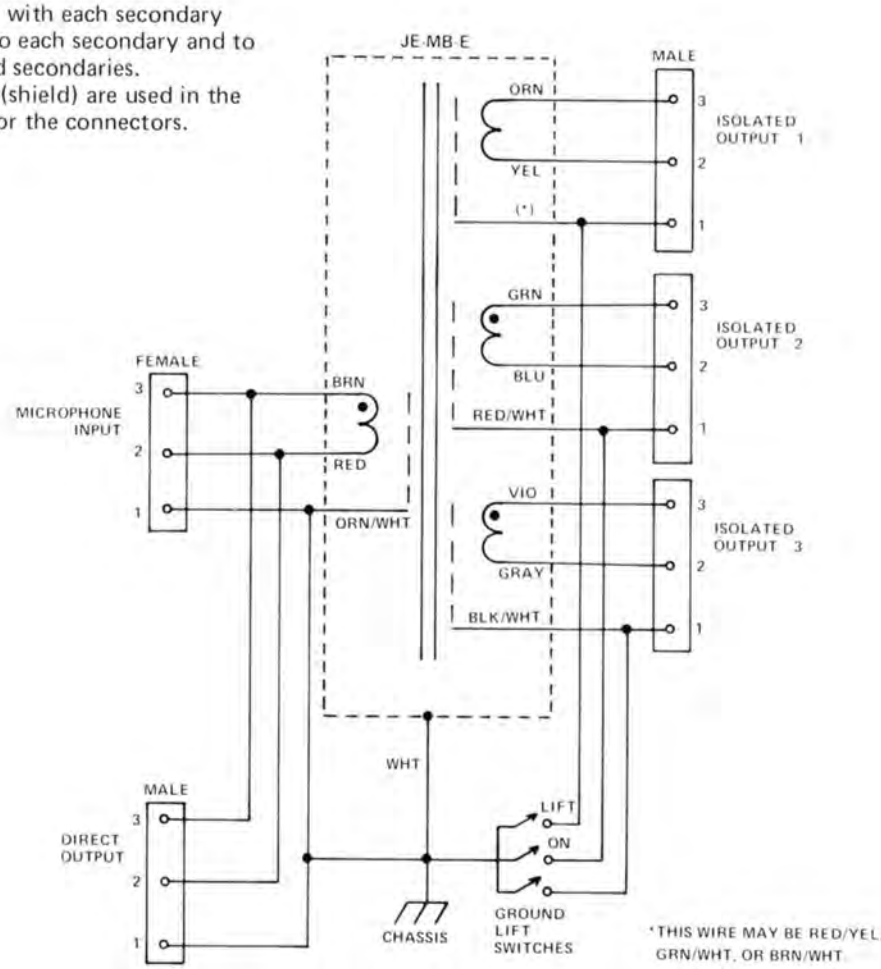
The transformer, with separate Faraday shields for each winding, isolates and rejects the common-mode noise caused by the noise voltage difference between the chassis of the multiple mixers. With this type of isolation, the microphone shield can be connected through to the chassis of one mixer but need not be connected through to the additional mixer chassis. Instead, the chassis (shields) of the additional mixers connect only to the Faraday shield of the appropriate secondary. This eliminates the ground loops which would be caused if the microphone shield were connected through to multiple mixers.

Phantom power can be provided by the mixer which terminates the microphone directly.

The design is optimized for a source impedance at the primary of 150 ohms (microphone) and secondary loads of 1000 ohms (typical microphone preamplifier input impedance). No resistors are used in the usual application of a "mic-split box."

The primary winding is interleaved equally with each secondary winding for matched transfer characteristics to each secondary and to minimize variations in response with unloaded secondaries.

If cables with the shell connected to pin 1 (shield) are used in the system, insulated mounting will be required for the connectors.

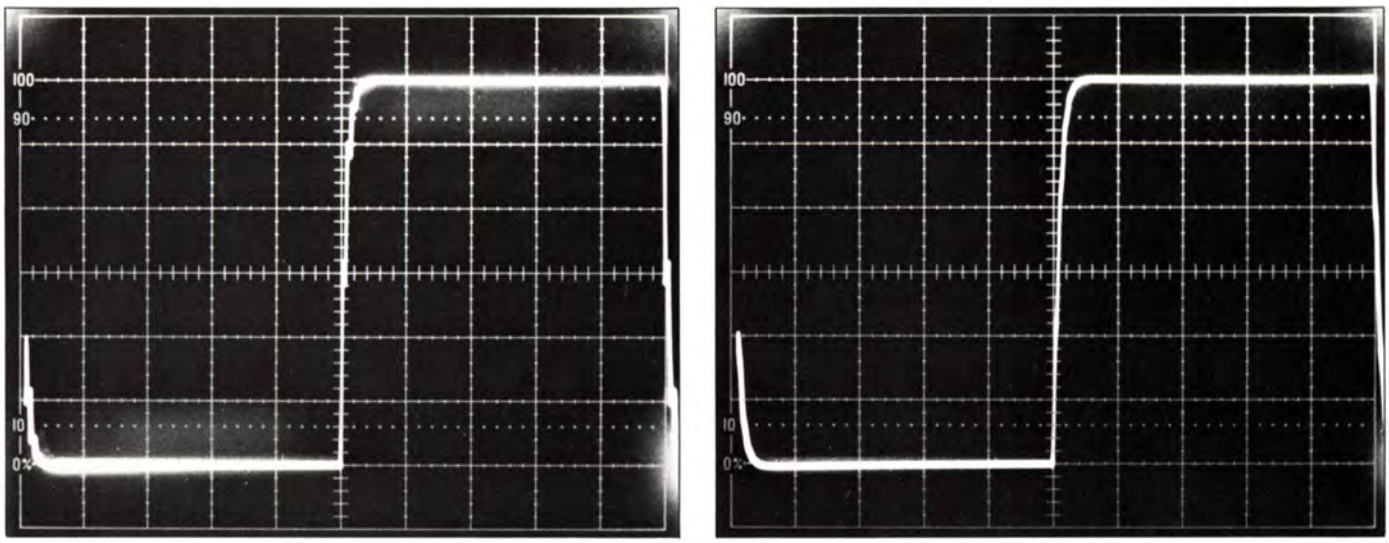


MIC SPLIT BOX SCHEMATIC

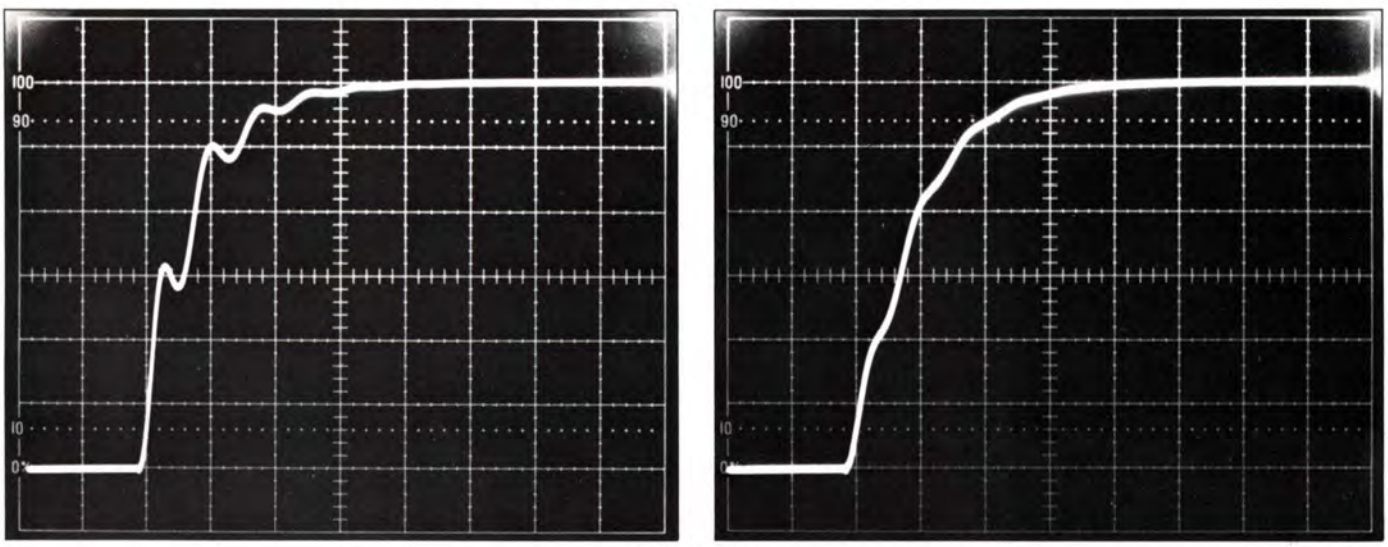
REGARDING THE OSCILLOSCOPE PHOTOS

Actual oscilloscope photos were made from a Tektronix Model 453A (certified calibration). Left column is transformer with secondary termination network and right column includes a 2 microsecond amplifier.

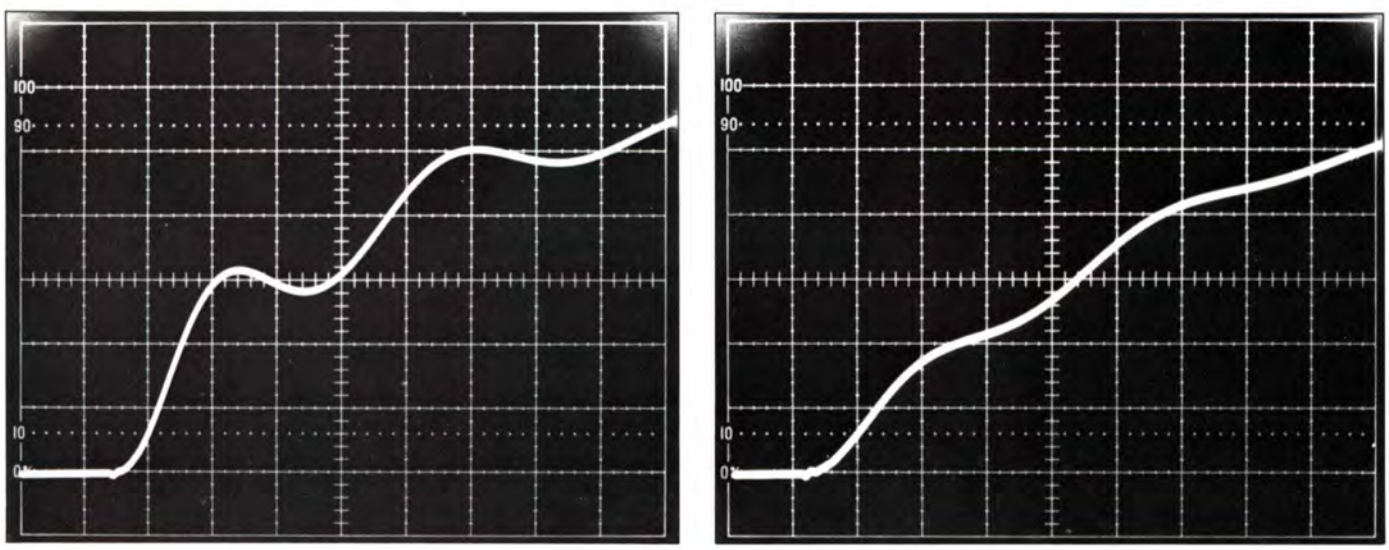
2kHz Square Wave



50μS/division



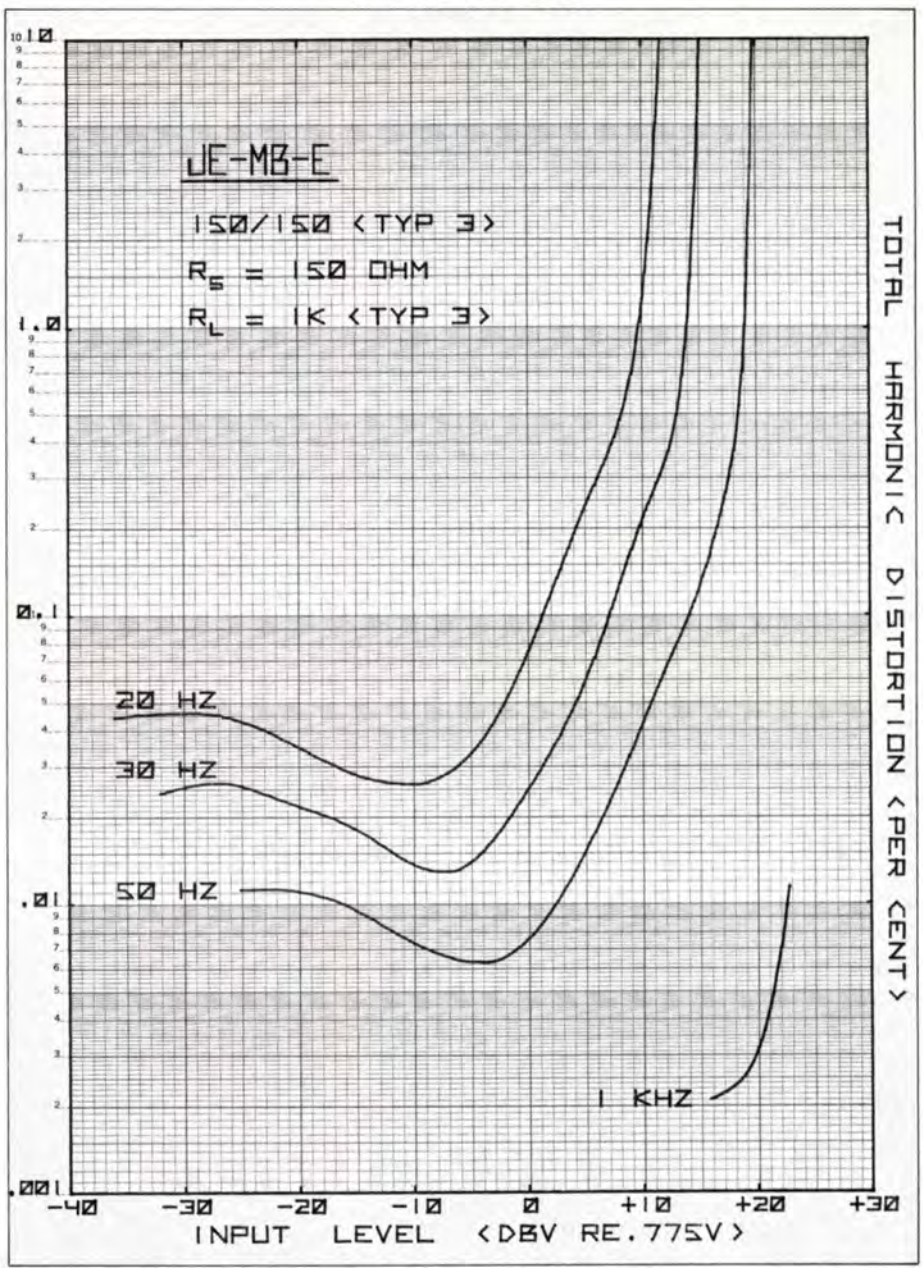
5μS/division



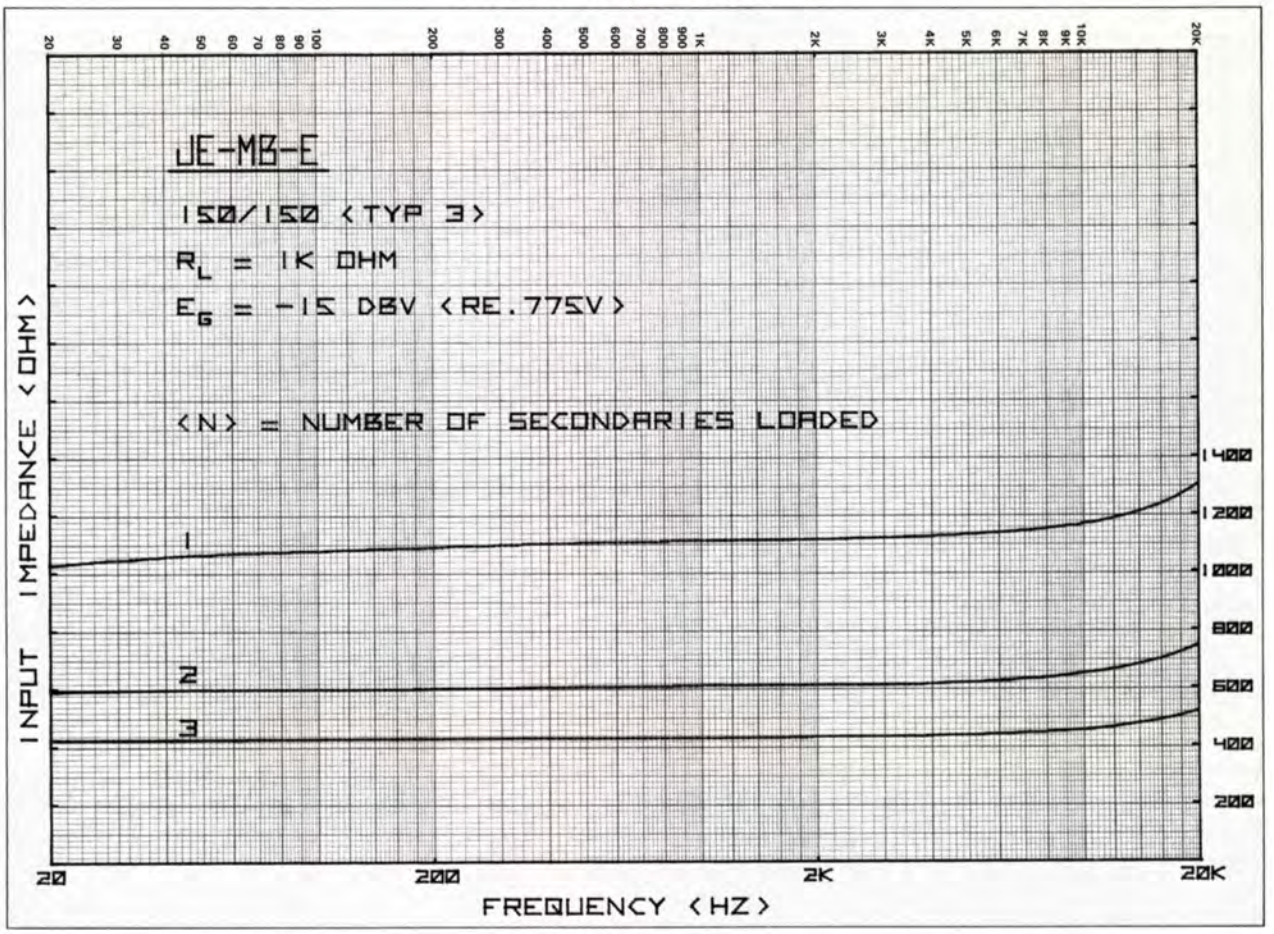
1μS/division

All curves were generated by a Hewlett-Packard 9815A/9862A programmable calculator/plotter. All calculations were either derived from or verified by actual measurements. Verified accuracies are on the order of one pen-line width.

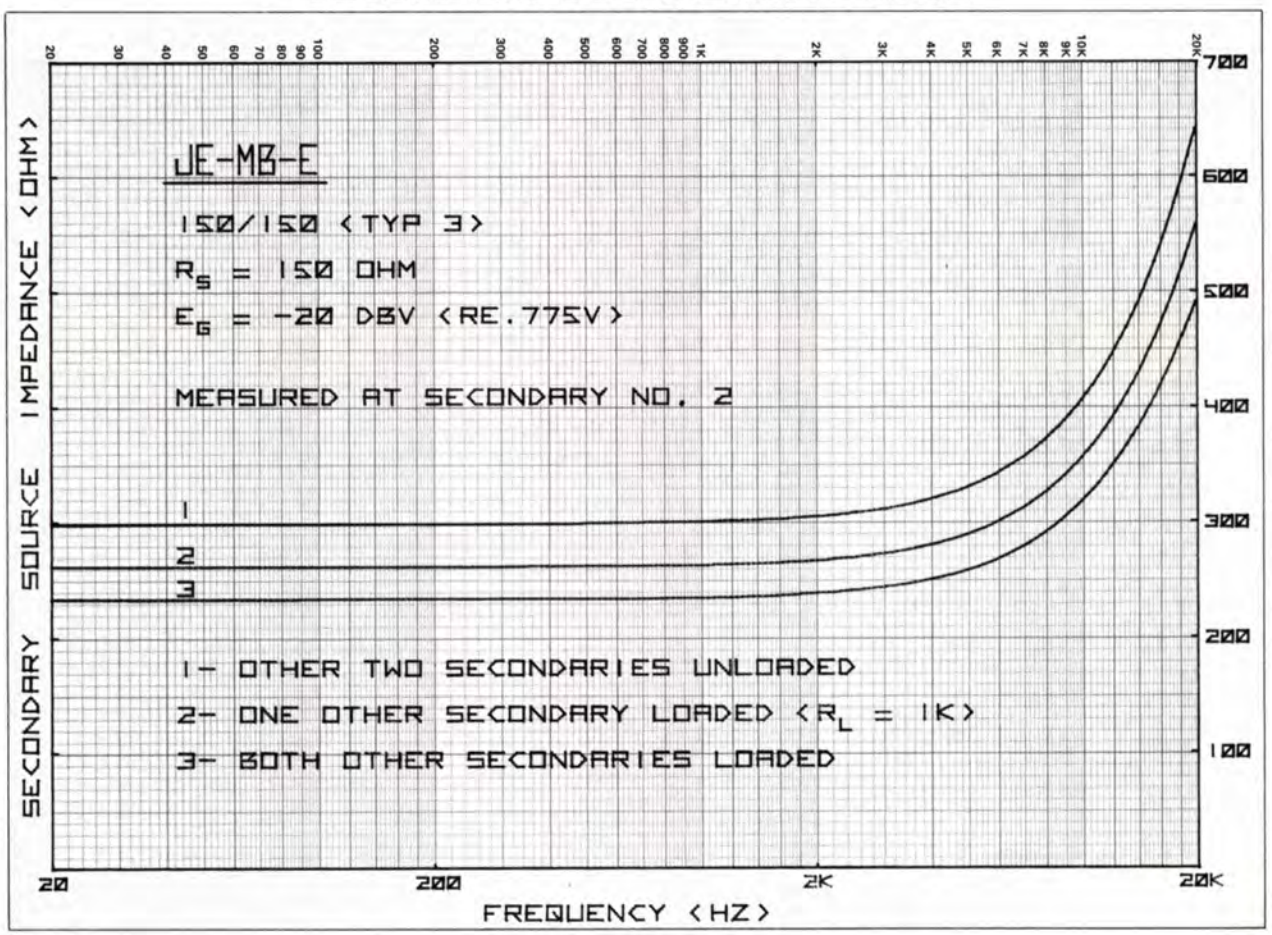
DISTORTION



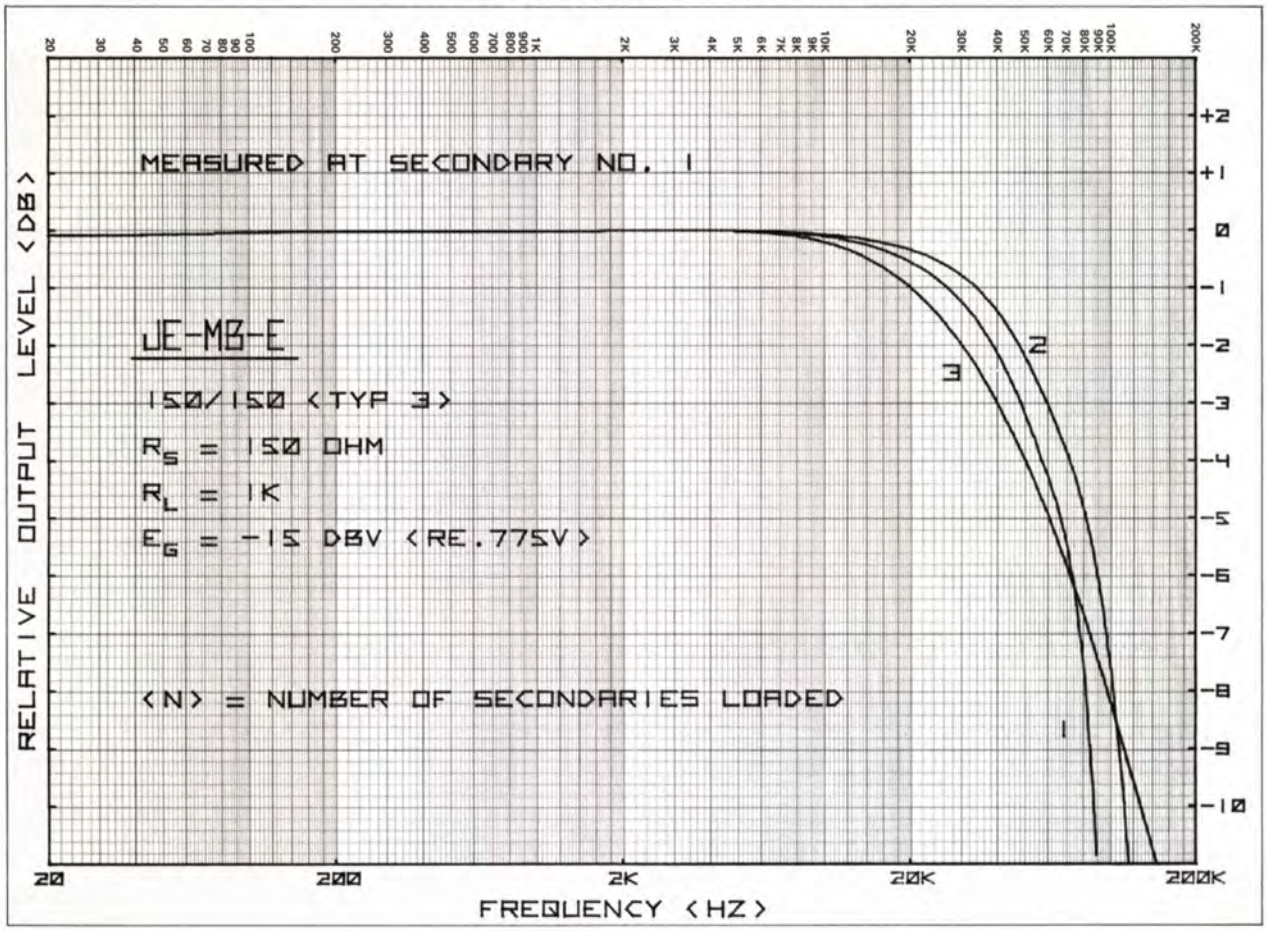
INPUT IMPEDANCE



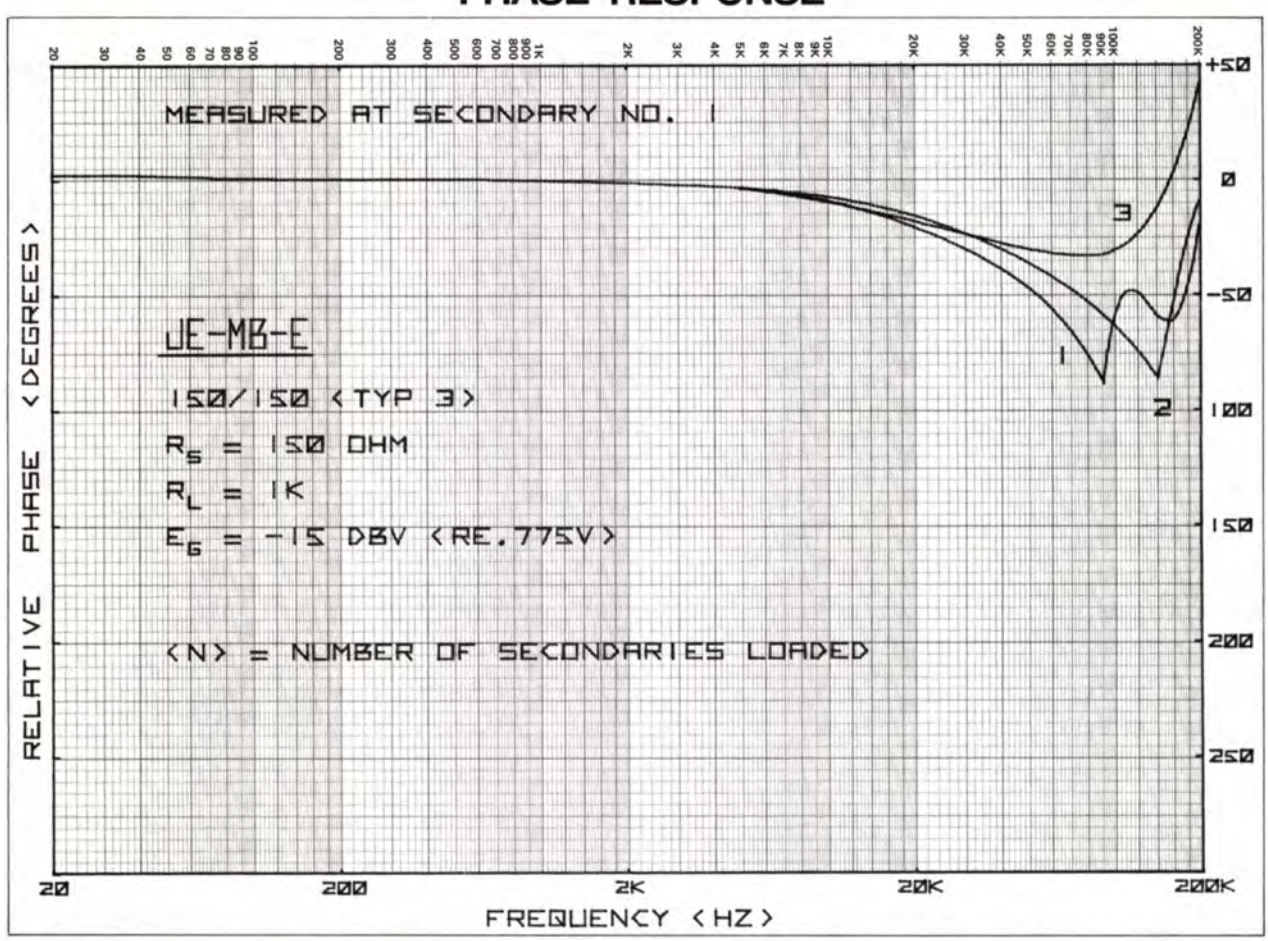
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



GENERAL CHARACTERISTICS

Turns Ratio
1:1:1:1 (3 secondaries)
Impedance Ratio
150/150/150/150
Primary Source Impedance
150 ohms
Secondary Load Impedances
1K ohms (mic pre-amps)
Secondary Load Resistors
None required
Secondary RC Networks
None required
Four Faraday Shields
Separate leads
Magnetic Shield
30dB, separate case lead
Maximum Input Level at 20Hz
+11dBv (Re: 0.775v)

PHYSICAL CHARACTERISTICS

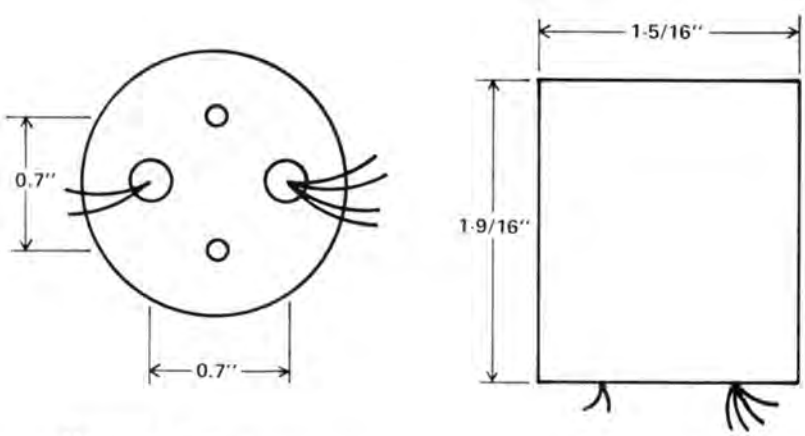
Package
Mu-metal can
Termination
Wire leads
Dimensions
1-5/16" diameter, 1-9/16" high
Mounting
2 holes, 0.7" center-to-center, self-tapping screws or clamp

TYPICAL PERFORMANCE

Total Harmonic Distortion (Below Saturation)
0.05% maximum @ 20Hz
0.03% maximum @ 30Hz
0.015% maximum @ 50Hz
0.002% @ 1kHz
Input Level @ 1% Saturation (dBv Re: 0.775v)
+10dBv @ 20Hz
+14dBv @ 30Hz
+19dBv @ 50Hz
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>85dB @ 1kHz
>65dB @ 10kHz

TYPICAL PERFORMANCE

		Secondary Loads		
		One	Two	Three
Voltage Gain		−1.2dB	−1.8dB	−2.3dB
Input Impedance	@ 1kHz	1100 ohms	610 ohms	430 ohms
	@ 10kHz	1170 ohms	640 ohms	460 ohms
Secondary Source Impedance	@ 1kHz	300 ohms	265 ohms	235 ohms
	@ 10kHz	410 ohms	360 ohms	320 ohms
Frequency Response (Re: 1kHz)	@ 20Hz	−0.1dB	−0.1dB	−0.1dB
	@ 20kHz	−0.6dB	−0.4dB	−1.0dB
		(some resonance @ 300kHz)		
Bandwidth	@ −3dB	48kHz	60kHz	40kHz
Phase Response	@ 20kHz	−21°	−16°	−18°
Rise Time	(10%-90%)	6.7μS	5.3μS	8.0μS
Overshoot		<1%	<1%	<1%
Ringing	>300kHz	<9%	<11%	<7%



Mounting Holes
Clearance for #4 screw
Lead Holes
Use 0.35" hole to clear grommet

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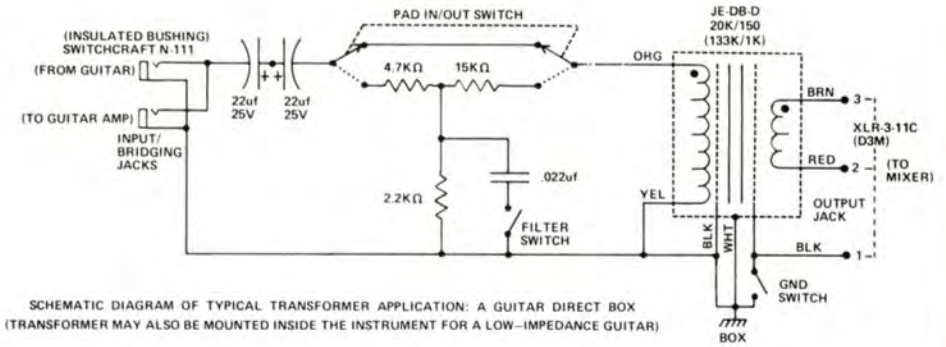
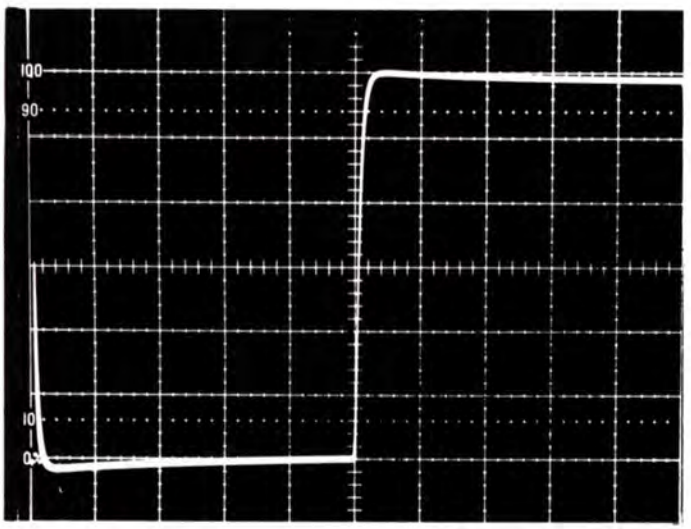
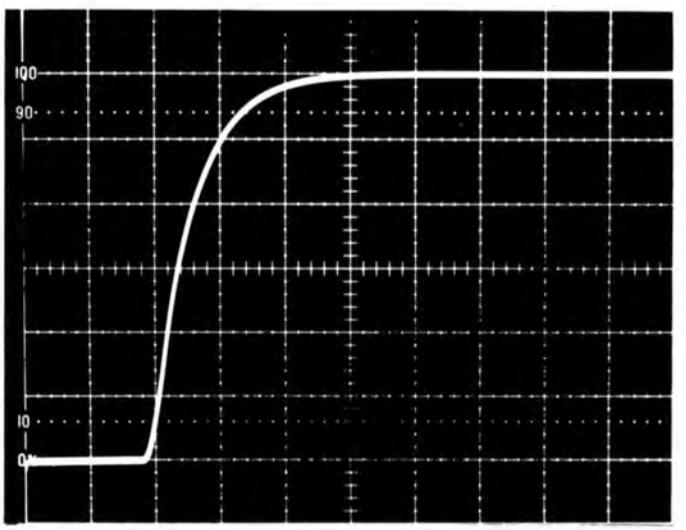
JE-DB-D
DIRECT BOX TRANSFORMER



SCHEMATIC DIAGRAM OF TYPICAL TRANSFORMER APPLICATION: A GUITAR DIRECT BOX
(TRANSFORMER MAY ALSO BE MOUNTED INSIDE THE INSTRUMENT FOR A LOW-IMPEDANCE GUITAR)



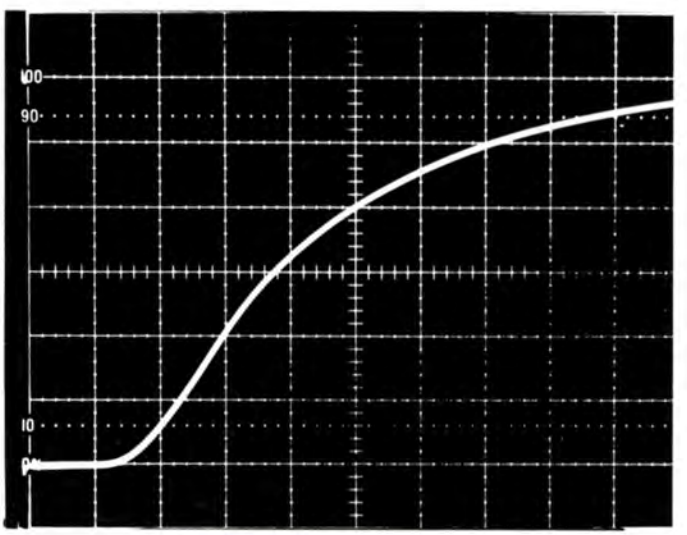
50µS/division 2kHz square wave



5µS/division

REGARDING THE OSCILLISCOPE PHOTOS

Actual oscilliscope photos were made from a Tektronix Model 453A (certified calibration). The transformer was fed with source impedance of 20K ohms (representing a typical pickup) and had a load impedance of 1K ohm (representing a typical mic preamplifier input).



1µS/division →

APPLICATIONS NOTES

IMPEDANCE MATCHING CHARACTERISTICS

The impedance matching requirements of the direct-box transformer are bi-directional.

(a) The high impedance guitar pickup must be transformed to a low impedance in the range of 150-200 ohms (the same as a low impedance microphone) to match the source impedance requirements for the input of a low impedance microphone preamplifier.

(b) At the same time, the primary of the direct-box transformer must present a load to the guitar pickup of not less than 50K ohms, and preferably higher, such as 100K ohms.

Synthesis of (a):

Measurements of the actual source impedances of many guitar pickups indicate some variation centering around 20K ohms. The impedance ratio of 20K/150 was chosen to match the average guitar pickup to a low impedance in the range of 150-200 ohms to satisfy requirement (a).

It is important to match the input of a low impedance microphone preamplifier with a source impedance of 150-200 ohms because most microphone preamplifiers utilize an essentially unterminated, high-ratio input transformer exhibiting a somewhat reactive input impedance (not a pure resistance). Therefore the frequency response of the transformer will be dependent upon the source impedance. More specifically, higher source impedances will cause a loss of high frequencies, and lower source impedances will cause a high frequency peak or resonance. This resonance creates transient distortion, which can be heard as a rough or raspy high-frequency distortion, sometimes refered to as an "edgy" sound. It is often described as a "lack of transparency". This resonance can be evaluated in the laboratory by observing the overshoot and ringing of a square wave on an osilloscope. To avoid this potential source of transient distortion, or frequency response error, created by operating the microphone preamplifier's input transformer from a source impedance outside it's optimum range, the source impedance must be on the order of 150-200 ohms. Of course, the transformer used in the direct-box must also be free from resonances as is the JE-DB-D.

Synthesis of (b):

The actual input impedance of a low impedance microphone preamplifier is not 150 ohms. The 150 ohm specification refers to the required source impedance to be connected to the input. The load impedance which the preamplifier presents to the microphone is usually on the order of 1000 ohms or higher.

This is done for two reasons:

(1) The higher load impedance results in improved high-frequency performance of many microphones. In the case of condenser microphones with built-in amplifier circuits, the headroom may be improved, resulting in lower distortion.

(2) The higher load impedance also results in 4 to 5 dB higher output level from the microphone, which yields improved signal-to-noise ratio.

The impedance ratio of the direct-box transformer has been determined by the synthesis of (a), which concerned the impedance transformation of the source impedance of the guitar pickup to a new source impedance at the secondary. Of course, the transformer also transforms impedance in the other direction by the same ratio, or more properly, by the reciprocal of that ratio. The 20K/150 ratio determined in (a) reduced (divided) the source impedance by a factor of 133. Likewise the input impedance of the microphone preamplifier will be increased (multiplied) by 133 to a new input or load impedance at the primary. The resulting load impedance which the primary presents to the guitar pickup is 133K ohms, satisfying requirement (b).

SPECIAL CONSIDERATIONS

Note that the direct-box transformer must operate as a 20K/150 ohm transformer in one direction, and as a 1K/133K transformer in the other direction. This requires some special design attention to response characteristics and losses. For example, the primary must exhibit high inductance and low capacitance in order to avoid loading the guitar pickup at the extremes of the frequency range. If these reactive loading effects were not considered, both high and low frequency response losses would result due to the high actual source impedance of the guitar pickup. The JE-DB-D direct box transformer exhibits reactive loading, equivalent to about 600K ohms across the primary, which does reduce the 133K figure to about 110K ohm load across the guitar pickup...still within acceptable limits to satisfy requirement (b).

Operation of a transformer from a high actual source impedance also results in low frequency distortion if the primary inductance is too low or if the magnetic material used exhibits excesive hysteresis losses. For these reasons, special attention has been given to both the magnetic material characteristics and the winding configuation.

To evaluate any of the performance parameters of a transformer in the laboratory, always simulate the actual source and load impedances which will be encountered during operation. In this case, a 20K ohm resistor is required in series with the test oscillator, and a 1K ohm load resistor should be connected across the secondary.

GROUNDING CONSIDERATIONS

The direct-box is used to interface the input of a low impedance microphone preamplifier to:

(1) a guitar pickup alone.

(2) a guitar pickup which is also connected to the input of a guitar amplifier.

(3) the output of an electronic instrument.

(4) the output of the guitar amplifier.

In case (1), the ground of the guitar must be connected through to the ground of the recording equipment by closing the ground switch (refer to schematic diagram).

In all the other cases, which involve electronic equipment, the ground of the signal source may need to be isolated from the ground of the recording equipment for lowest hum and buzz. The decision to operate with the ground switch open or closed is always made "on the spot".

Refering to the schematic diagram, note that the box itself is connected to the input ground, rather than the ground pin #1 of the 3 pin output connector. This decision results in lower buzz in the guitar amplifier in case (2). If the box were connected to the output ground, the capacitance between the box and the internal wiring to the guitar amplifier input could cause hum or buzz into the guitar amplifier with the ground switch open. However, with the box connected to the input ground, as shown, caution must be taken to avoid any connection between the outer shell of the output connector and pin #1, which would short across the ground switch. This would occur if the cable connector used at the output had an internal strap between the shell and pin #1. The safest solution is to use a mounting for the 3 pin output connector which insulates it from the box.

The schematic diagram shows the input connectors as insulated bushing types to avoid ground currents from flowing in the metal of the box itself. Actually a non-insulated type connector would not cause any ground currents if the only connection to the box is at the connector.

With the ground switch open, a voltage potential could exist between the direct-box and the microphones or stands. If the direct box is allowed to make contact to a mic stand, the resulting ground current could cause hum or buzz. Caution should be exercised to avoid personal contact with any two of these metal objects simultaneously to avoid shock hazard.

DUAL FARADAY SHIELD

A Faraday shield is a copper foil shield inserted between the primary and secondary windings. Sometimes called an electrostatic shield, it's purpose is to significantly reduce the capacitive coupling from the primary to the secondary. This type of shielding gives the transformer it's common-mode rejection characteristics usually refered to as isolation.

Refering to the schematic diagram, note that the JE-DB-D has two Faraday shields, as indicated by the two vertical dashed lines between the windings. One surrounds the prmimary winding, the other surrounds the secondary. The use of two Faraday shields yields excellent isolation in both directions. The secondary shield significantly reduces hum and buzz in the microphone preamplifier (recording equipment). The primary shield prevents hum and buzz in the guitar amplifier in case (2). Without the primary shield, capacitive coupling from the secondary shield to the high side of the primary would cause hum or buzz in the guitar amplifier. The leads for each winding and its respective shield are brought out through seperate holes in the case to maintain even lower capacitance between primary and secondary circuits (improved isolation). Note that, in the direct box shown, each Faraday shield is connected to its respective ground circuit. The ground switch connects the two ground circuits together when it is closed.

The mu-metal case of the transformer provides 30 dB of magnetic shielding to prevent hum pickup in the transformer itself. The case has a separate white lead and is connected to the box.

PAD CIRCUIT

For cases (1) & (2), the pad is switched out of the circuit when the signal source is a guitar pickup. For cases (3) & (4), the 10 dB pad is switched in to prevent overload of the transformer from higher output levels, i.e., from electronic instruments or guitar amplifier speaker outputs.

The pad presents a load to the output of the electronic instrument of about 6800 ohms and a source impedance to the direct-box transformer of about 16K ohms (approximating the guitar pickup). The latter is required to prevent transient distortion in the microphone preamplifier as described in requirement (a) under "impedance matching characteristics".

Electronic instruments may have some DC voltage present at the output which would cause low frequency losses and distortion in the direct-box transformer. The two electrolytic capacitors in series with the input signal block this DC voltage to maintain optimum low frequency performance.

FILTER CIRCUIT

The output signal of a guitar amplifier may exhibit severe clipping from amplifier overload. However, the high frequency roll-off characteristic of the typical guitar speaker attenuates the resulting distortion products which are upper harmonics of the fundamental notes.

Since the direct-box transformer does not roll-off these upper harmonics, the clipping or distortion will be heard in the recording. The filter circuit can be switched in to simulate the high frequency roll-off characteristic of the guitar speaker, more closely approximating the speaker's sound. The filter response is 6 dB per octave starting at about 4 kHz to 5 kHz. The value of the filter capacitor can be changed for more or less high frequency attenuation.

GUITAR CABLE LOSSES

The capacitance of a coiled guitar cable can be in the range of 1000 pF or greater. If the source impedance of the guitar pickup is in the range of 20K ohms, the resulting high frequency roll-off starts at about 8 kHz. There will be even more high frequency losses if the cord is longer or if the pickup impedance is higher.

This loss of the upper end of the frequency spectrum will affect the "brilliance" of the instrument. All of this suggests that the shorter the cable length between the high impedance pickup and the direct-box, the better the sound.

LOW IMPEDANCE GUITAR CONVERSION

Given enough space, the direct-box transformer can be installed in the guitar to significantly reduce the capacitive load on the high impedance pickup. A connector on the secondary would then be a low impedance output which could drive a very long cable without high frequency losses (the same as a low impedance microphone). Since the low impedance conversion of the guitar also creates a step-down 20 dB voltage loss, a reciprocal conversion would be required at the guitar amplifier input. A microphone input transformer (step-up) installed in the guitar amplifier input curcuit will complete the conversion. Then the cable would be connected from the secondary of the direct-box transfoemer to the now low impedance input of the guitar amplifier. The result will be a considerable improvement in high frequency response or brilliance, even with long cables.

GENERAL CHARACTERISTICS

Turns Ratio
11.55:1
Impedance Ratio
20K/150
Primary Source Impedance
20K ohms (typical guitar pickup)
Secondary Load Impedance
1K ohms (typical mic pre input)
Faraday Shield
Two shields, separate leads
Magnetic Shield
30dB, separate lead
Maxinum Input Level at 20Hz
+14.5dBv (Re: 0.775v)

PHYSICAL CHARACTERISTICS

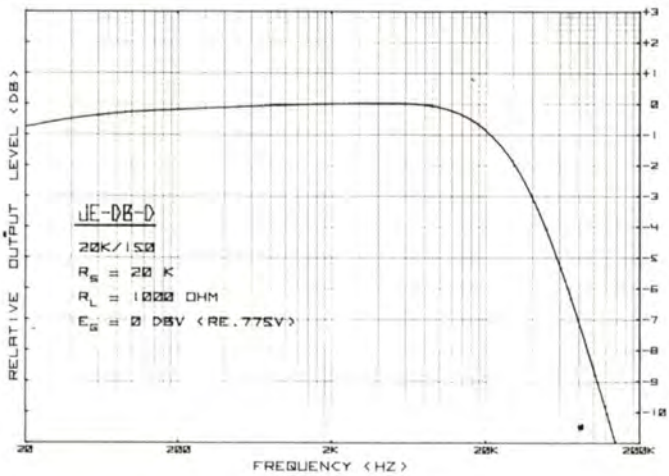
Package
Mu-metal can
Termination
Wire leads
Dimensions
1-1/8" diameter, 1-1/16" high
Mounting
2 holes, 0.7" center-to-center, self-tapping screws supplied

TYPICAL PERFORMANCE

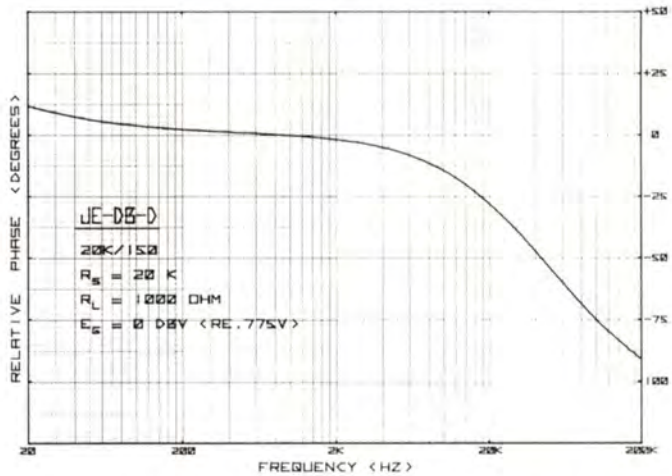
Voltage Loss
21.3dB
Input Impedance
108K ohms @ 1kHz
80K ohms @ 10kHz
Secondary Source Impedance
181 ohms @ 1kHz
186 ohms @ 10kHz
Total Harmonic Distortion (Below Saturation)
0.45% maximum @ 20Hz
0.28% maximum @ 30Hz
0.14% maximum @ 50Hz
0.017% @ 1kHz
Input Level @ 1% Saturation (dBv Re: 0.775v)
+9dBv @ 20Hz
+14dBv @ 30Hz
+20dBv @ 50Hz
Frequency Response (Re: 1kHz)
−0.75dB @ 20Hz
−0.9dB @ 20kHz
(No resonance peak)
−3dB @ 40kHz
Phase Response
−28° @ 20kHz
Rise Time
6.6μS (10%-90%)
Overshoot
<1%
Common-Mode Voltage (maximum)
>200v peak
Common-Mode Rejection Ratio
>85dB @ 1kHz
>65dB @ 10kHz

Also available for PC mounting.

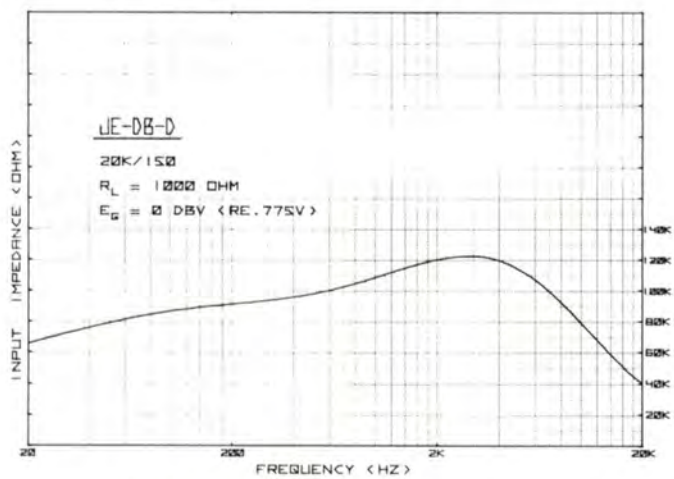
FREQUENCY RESPONSE



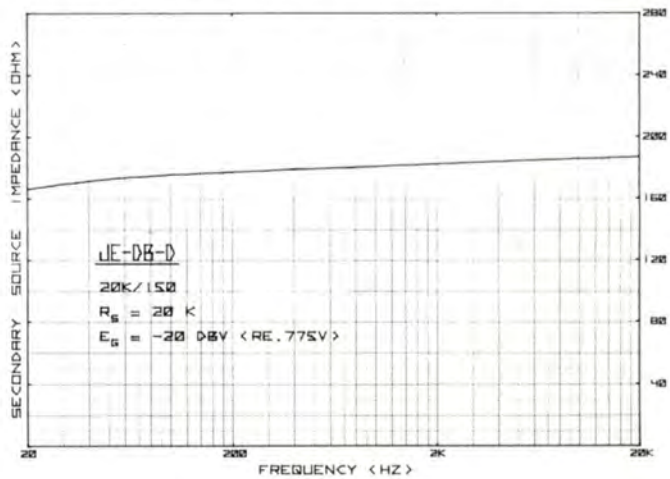
PHASE RESPONSE



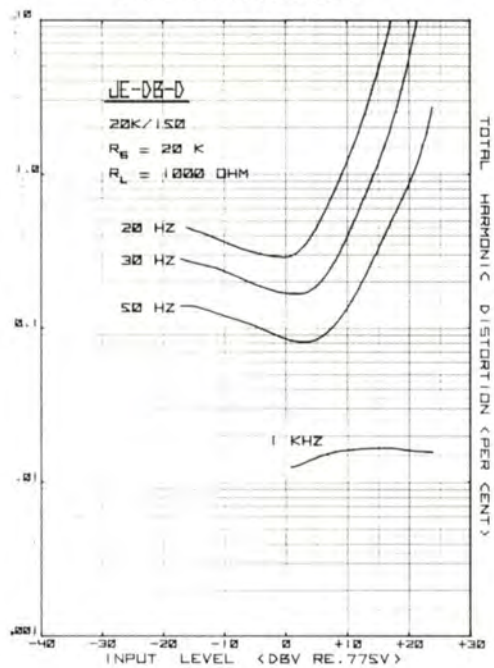
INPUT IMPEDANCE



SECONDARY SOURCE IMPEDANCE



DISTORTION



All curves were generated by a Hewlett-Packard 9815A/9862A programmable calculator/plotter. All calculations were either derived from or verified by actual measurements. Verified accuracies are on the order of one pen-line width.

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Price List

Part Number	Description	20Hz Max Level In	Term	Pkg	Magnetic Shield	Faraday Shield	Unit Price	Price * Schedule
MICROPHONE INPUT TRANSFORMERS								
	- - PC Type - Pkg #1 - -							
JE-6110K-APC	600/150	10K -6	2	1	1	1	26.34	2
JE-110K-HPC	150	10K -1	2	1	1	1	30.55	8
	- - PC Miniature - Pkg #12 - -							
JE-653	150 C.T.	3600 -6	2	12	1	1	34.47	22
JE-110K-F	150	10K -4	2	12	1	1	34.47	22
	- - Wire leads - Pkg #1 - -							
JE-6110K-A	600/150	10K -6	1	1	1	1	25.40	1
JE-13K6-C	150	3600 -1	1	1	1	1	24.90	6
JE-110K-C	150	10K -1	1	1	1	1	24.90	6
JE-115K-E	150	15K -1	1	1	1	1	30.55	8
JE-135K-D	150	35K -6	1	1	1	1	30.55	8
JE-150K-A	150	50K -10	1	1	1	1	26.34	2
	- - Wire leads - Pkg #2 - -							
JE-16-A	150	600 +8	1	2	1	1	41.37	26
JE-13K7-A	150	3750 +8	1	2	1	1	41.37	26
MICROPHONE BRIDGING TRANSFORMERS								
JE-MB-C	2 windings	+2	1	1	1	2	25.09	20
JE-MB-D	3 "	+2	1	1	1	3	43.85	21
JE-MB-E	4 "	+11	1	2	1	4	62.63	24
JE-MB-EPC	4 "	+11	1	14	1	4	65.69	29
DIRECT BOX TRANSFORMERS								
JE-DB-D	20K	150 +13	1	1	1	2	26.65	7
JE-DB-DPC	20K	150 +13	2	1	1	2	28.22	28
ELECTRET MICROPHONE OUTPUT TRANSFORMER								
JE-7552	4K	150 +4	1	11	0	0	15.69	18
MAGNETIC HEAD INPUT TRANSFORMER								
JE-642	1:9 turns ratio		2	12	1	1	34.47	22

*See last page for price schedules.

Part Number	Description	20Hz Max Level In	Term	Pkg	Magnetic Shield	Faraday Shield	Unit Price	Price * Schedule
LINE INPUT TRANSFORMERS								
- - For low source impedance applications (< 100 ohms) - -								
JE-10KB-B	600/150	10K	+18	1	2	1	1	39.47	9
JE-15P-1	600/150	15K	+18	1	2	1	1	39.47	9
JE-11P-5	10K	10K	+18	1	2	1	1	43.54	11
JE-11SP-5	10K/2500	10K	+18	1	2	1	1	45.46	23
JE-11P-5D	10K	10K	+18	1	2	1	2	45.56	12
JE-11P-6	600	600	+24	1	3	1	1	48.23	13
JE-11SSP-6	600/150-600/150		+24	1	3	1	1	49.24	14
JE-11P-6D	600	600	+24	1	3	1	2	63.67	15
JE-11-A	10K	10K	+18	1	1	1	0	21.94	16
JE-11P-7	600	600	+18	1	2	1	1	38.24	10
- - For higher source impedance applications (< 600 ohms) - -								
JE-6110K-B	600/150	10K	+12	1	2	1	1	43.13	5
JE-11P-1	10K	10K	+18	1	1	1	1	29.11	32
JE-11P-5M	10K	10K	+14	1	2	1	1	47.19	34
JE-11SP-5M	10K/2500	10K	+14	1	2	1	1	33.22	42
JE-11P-6M	600	600	+18	1	3	1	1	51.14	35
JE-11SSP-6M	600/150-600/150		+18	1	3	1	1	52.17	36
JE-11P-7M	600	600	+12	1	2	1	1	41.18	37
JE-11SSP-8M	600/150-600/150		+23	4	20	1	1	98.80	27
JE-11P-9	10K	10K	+27	1	2	1	1	66.91	43
- - Octal Plug-in Types - -								
JE-11P-1PN	10K/10K		+18	3	15	2	1	40.87	33
JE-11P-9PN	10K/10K		+27	3	15	2	1	74.97	44
BRIDGING TRANSFORMERS								
JE-10KB-A	10K	600	+16	1	1	1	1	26.65	7
JE-10KB-B	25K	-1500/375	+28	1	2	1	1	39.47	9
JE-15P-1	37.5K	-1500/375	+28	1	2	1	1	39.47	9
OUTPUT TRANSFORMERS - Steel Core - for zero ohm source impedance applications								
- -PC Type - -		Level Out						
JE-112-PC	1:1, 1:2		+24	2	9	0	0	15.69	18
JE-DBX	1:2		+24	2	9	0	0	15.69	18
JE-7103	1:2		+24	2	17	0	0	15.69	18
JE-112-SPC	1:1, 1:2		+27	2	16	0	0	18.79	38
JE-123-SPC	1:1, 1:2		+27	2	10	0	0	18.84	19
- - Wire leads - -								
JE-112-CF	1:1, 1:2		+24	1	18	0	0	15.30	39
JE-123-S	1:1, 1:2		+27	1	4	0	0	17.71	17
JE-123-SCF	1:1, 1:2		+27	1	5	0	0	17.71	17
JE-123-SS	1:1, 1:2		+27	1	3	1	0	31.25	25
JE-123-A	1:1, 1:2, 1:3		+30	1	6	0	0	21.94	16
JE-123-ACF	1:1, 1:2, 1:3		+30	1	7	0	0	21.94	16
JE-14S-T	1:4 split		+30	1	8	0	0	21.94	16

*See last page for price schedules.

Part Number	Description	20Hz Max Level Out	Term	Pkg	Magnetic Shield	Faraday Shield	Unit Price	Price * Schedule
OUTPUT TRANSFORMERS - Nickel Core - for higher source impedance applications (600 ohms)								
- - Wire leads - -								
JE-123-SL	1:1, 1:2	+22	1	4	0	0	21.77	41
JE-123-AL	1:1, 1:2, 1:3	+24	1	7	0	0	27.42	40
JE-11S-L	1:1, 1:2	+26	1	7	0	0	27.42	40
JE-11-T	1:1	+22	1	19	0	0	33.22	42
LOW FREQUENCY CROSSOVER TAPPED INDUCTORS								
JE-LX-600	600 ohm ckt		1	3	1	0	78.24	30
JE-LX-2K	2 K ohm ckt		1	3	1	0	78.24	30
JE-682	7 Hy CT		1	3	1	0	72.15	31

TERMINATION

1 - Wire leads
2 - Printed circuit pins
3 - Octal Plug-in
4 - Solder Terminals

PACKAGE	L	W	H
1 - Mu-metal can	1-1/8"	diam.	1-1/16"
2 - Mu-metal can	1-5/16"	diam.	1-9/16"
3 - Mu-metal can	1-5/8"	diam.	1-3/4"
4 - Uncased	1-5/8"	1-5/16"	1-1/8"
5 - Channel frame	1-11/16"	1-3/8"	1-1/8"
6 - Uncased	1-7/8"	1-9/16"	1-1/4"
7 - Channel frame	1-31/32"	1-21/32"	1-1/4"
8 - Uncased	2-5/8"	2-3/16"	1-1/4"
9 - Printed circuit channel frame - upright	1-7/16"	1-1/4"	1"
10 - Printed circuit bobbin - low profile	1-5/8"	1-5/16"	1-3/16"
11 - Miniature uncased	1/2"	7/16"	3/8"
12 - Miniature mu-metal can with PC pins	0.73"	0.73"	1.1"
13 - Dual nested mu-metal cans	1-5/16"	diam.	1-1/4"
14 - Printed circuit - mu-metal can	1.9"	1.6"	1.26"
15 - Octal Plug-in w/ mu-metal can	1-5/8"	diam.	2"
16 - Printed circuit bobbin - upright	1.7"	1.3"	1.4"
17 - Printed circuit bobbin - low profile	1.6"	1.3"	1.2"
18 - Channel frame	2.1"	1.15"	1.2"
19 - Uncased	1.75"	1.1"	0.76"
20 - Rectangular mu-metal can	1.5"	1.75"	2.5"

MAGNETIC SHIELDING

0 - No magnetic shield
1 - 30 dB mu-metal can
2 - 60 dB mu-metal can

FARADAY SHIELDING

0 - No Faraday shield
1 - 1 Faraday shield
2 - 2 Faraday shields
3 - 3 Faraday shields
4 - 4 Faraday shields

*See last page for price schedules.

PRICE SCHEDULES

Sched. No.	Quantity 1-19	20-39	40-59	60-79	80-99	100-249	250-499	500-999	1000-
1	$ 25.40	23.63	21.97	20.44	19.21	18.06	16.97	15.96	15.00
2	26.34	24.50	22.79	21.19	19.92	18.73	17.60	16.55	15.55
3	24.78	23.05	21.44	19.94	18.74	17.62	16.56	15.57	14.63
4	30.24	28.13	26.16	24.33	22.87	21.50	20.21	19.00	17.86
5	43.13	40.12	37.31	34.70	32.62	30.66	28.82	27.09	25.47
6	24.90	23.16	21.54	20.03	18.83	17.70	16.64	15.64	14.70
7	26.65	24.79	23.05	21.44	20.15	18.95	17.81	16.74	15.74
8	30.55	28.42	26.43	24.58	23.10	21.72	20.42	19.19	18.04
9	39.47	36.71	34.14	31.75	29.85	28.06	26.37	24.79	23.30
10	38.24	35.57	33.08	30.76	28.92	27.18	25.55	24.02	22.58
11	43.54	40.50	37.66	35.03	32.93	30.95	29.09	27.35	25.71
12	45.56	42.38	39.41	36.65	34.45	32.39	30.44	28.62	26.90
13	48.23	44.86	41.72	38.80	36.47	34.28	32.23	30.29	28.48
14	49.24	45.80	42.59	39.61	37.24	35.00	32.90	30.93	29.07
15	63.67	59.22	55.07	51.22	48.15	45.26	42.54	39.99	37.59
16	21.94	20.41	18.98	17.65	16.59	15.60	14.66	13.78	12.96
17	17.71	16.48	15.32	14.25	13.40	12.59	11.84	11.13	10.46
18	15.69	14.60	13.58	12.63	11.87	11.16	10.49	9.86	9.27
19	18.84	17.53	16.30	15.16	14.25	13.40	12.59	11.84	11.13
20	25.09	23.34	21.71	20.19	18.98	17.84	16.77	15.76	14.82
21	43.85	40.79	37.93	35.28	33.16	31.17	29.30	27.54	25.89
22	34.47	32.06	29.82	27.73	26.07	24.50	23.03	21.65	20.35
23	45.46	42.28	39.32	36.57	34.38	32.31	30.38	28.55	26.84
24	62.63	58.25	54.17	50.38	47.36	44.52	41.85	39.34	36.98
25	31.25	29.07	27.03	25.14	23.63	22.22	20.88	19.63	18.45
26	41.37	38.48	35.79	33.28	31.28	29.41	27.64	25.99	24.43
27	98.80	91.89	85.46	79.48	74.71	70.23	66.01	62.05	58.33
28	28.22	26.25	24.41	22.70	21.34	20.06	18.86	17.73	16.66
29	65.69	61.10	56.82	52.84	49.67	46.69	43.89	41.26	38.78
30	78.24	72.77	67.67	62.94	59.16	55.61	52.28	49.14	46.19
31	72.15	67.10	62.41	58.04	54.56	51.28	48.21	45.32	42.60
32	29.11	27.08	25.18	23.42	22.01	20.69	19.45	18.29	17.19
33	40.87	38.01	35.35	32.88	30.91	29.05	27.31	25.67	24.13
34	47.19	43.89	40.82	37.96	35.69	33.54	31.53	29.64	27.86
35	51.14	47.57	44.24	41.14	38.67	36.35	34.17	32.12	30.19
36	52.17	48.52	45.13	41.97	39.45	37.08	34.86	32.77	30.80
37	41.18	38.30	35.62	33.13	31.14	29.27	27.52	25.87	24.31
38	18.79	17.48	16.26	15.12	14.21	13.36	12.56	11.81	11.10
39	15.30	14.23	13.24	12.31	11.57	10.88	10.23	9.61	9.04
40	27.42	25.51	23.72	22.06	20.74	19.49	18.32	17.22	16.19
41	21.77	20.25	18.83	17.52	16.47	15.48	14.55	13.68	12.86
42	33.22	30.90	28.74	26.73	25.12	23.62	22.20	20.87	19.62
43	66.91	62.23	57.88	53.82	50.60	47.56	44.71	42.02	39.50
44	74.97	69.73	64.85	60.31	56.69	53.29	50.09	47.09	44.26

April 1, 1979 Prices subject to change without notice.

Orders not binding until accepted by seller.

jensen transformers
By REICHENBACH ENGINEERING

1617 NORTH FULLER AVENUE • HOLLYWOOD, CALIFORNIA 90046 • PHONE (213) 876-0059

jensen transformers
By REICHENBACH ENGINEERING

Price List

Part Number	Description	20Hz Max Level In	Term	Pkg	Magnetic Shield	Faraday Shield	Unit Price	Price * Schedule
MICROPHONE INPUT TRANSFORMERS								
	- - PC Type - Pkg #1 - -							
JE-6110K-APC	600/150	10K -6	2	1	1	1	24.61	2
JE-110K-HPC	150	10K -1	2	1	1	1	28.53	8
	- - PC Miniature - Pkg #12 - -							
JE-653	150 C.T.	3600 -6	2	12	1	1	32.21	22
JE-110K-F	150	10K -4	2	12	1	1	32.21	22
	- - Wire leads - Pkg #1 - -							
JE-6110K-A	600/150	10K -6	1	1	1	1	23.72	1
JE-13K6-C	150	3600 -1	1	1	1	1	23.26	6
JE-110K-C	150	10K -1	1	1	1	1	23.26	6
JE-115K-E	150	15K -1	1	1	1	1	28.53	8
JE-135K-D	150	35K -6	1	1	1	1	28.53	8
JE-150K-A	150	50K -10	1	1	1	1	24.61	2
	- - Wire leads - Pkg #2 - -							
JE-16-A	150	600 +8	1	2	1	1	38.65	26
JE-13K7-A	150	3750 +8	1	2	1	1	38.65	26
MOVING COIL CARTRIDGE INPUT TRANSFORMERS								
JE-34K-DX	3	4K -21	1	13	2	1	34.66	27
JE-44K-DX	40	4K -12	1	13	2	1	34.66	27
MICROPHONE BRIDGING TRANSFORMERS								
JE-MB-C	2 windings	+2	1	1	1	2	23.43	20
JE-MB-D	3 "	+2	1	1	1	3	40.96	21
JE-MB-E	4 "	+11	1	2	1	4	58.52	24
JE-MB-EPC	4 "	+11	1	14	1	4	61.38	29
DIRECT BOX TRANSFORMERS								
JE-DB-D	20K	150 +13	1	1	1	2	24.90	7
JE-DB-DPC	20K	150 +13	2	1	1	2	26.36	28
ELECTRET MICROPHONE OUTPUT TRANSFORMER								
JE-7552	4K	150 +4	1	11	0	0	14.65	18
MAGNETIC HEAD INPUT TRANSFORMER								
JE-642	1:9 turns ratio		2	12	1	1	32.21	22

*See last page for price schedules.

Part Number	Description	20Hz Max Level In	Term	Pkg	Magnetic Shield	Faraday Shield	Unit Price	Price * Schedule
LINE INPUT TRANSFORMERS								
- - For low source impedance applications (< 100 ohms) - -								
JE-10KB-B	600/150	+18	1	2	1	1	36.87	9
JE-15P-1	600/150	+18	1	2	1	1	36.87	9
JE-11P-5	10K	+18	1	2	1	1	40.67	11
JE-11SP-5	10K/2500	+18	1	2	1	1	42.48	23
JE-11P-5D	10K	+18	1	2	1	2	42.57	12
JE-11P-6	600	+24	1	3	1	1	45.05	13
JE-11SSP-6	600/150-600/150	+24	1	3	1	1	46.01	14
JE-11P-6D	600	+24	1	3	1	2	59.48	15
JE-11-A	10K	+18	1	1	1	0	20.50	16
JE-11P-7	600	+18	1	2	1	1	35.72	10
- - For higher source impedance applications (< 600 ohms) - -								
JE-6110K-B	600/150	+12	1	2	1	1	40.29	5
JE-11P-1	10K	+18	1	1	1	1	27.18	32
JE-11P-5M	10K	+14	1	2	1	1	44.09	34
JE-11SP-5M	10K/2500	+14	1	2	1	1	45.89	42
JE-11P-6M	600	+18	1	3	1	1	47.79	35
JE-11SSP-6M	600/150-600/150	+18	1	3	1	1	48.75	36
JE-11P-7M	600	+14	1	2	1	1	38.46	37
JE-11SSP-8M	600/150-600/150	+22	X	X	1	1	XX.XX	XX
- - Octal Plug-in Type Retrofit pinouts - -								
JE-11P-1A	10K/10K (Ampex)	+18	3	15	2	1	35.41	33
JE-11P-1B	10K/10K (Altec)	+18	3	15	2	1	35.41	33
BRIDGING TRANSFORMERS								
JE-10KB-A	10K 600	+16	1	1	1	1	24.90	7
JE-10KB-B	25K -1500/375	+28	1	2	1	1	36.87	9
JE-15P-1	37.5K -1500/375	+28	1	2	1	1	36.87	9
OUTPUT TRANSFORMERS - Steel Core - for zero ohm source impedance applications								
- -PC Type - -		Level Out						
JE-112-PC	1:1, 1:2	+24	2	9	0	0	14.65	18
JE-DBX	1:2	+24	2	9	0	0	14.65	18
JE-7103	1:2	+24	2	17	0	0	14.65	18
JE-112-SPC	1:1, 1:2	+27	2	16	0	0	17.56	38
JE-123-SPC	1:1, 1:2	+27	2	10	0	0	17.59	19
- - Wire leads - -								
JE-112-CF	1:1, 1:2	+24	1	18	0	0	14.29	39
JE-123-S	1:1, 1:2	+27	1	4	0	0	16.55	17
JE-123-SCF	1:1, 1:2	+27	1	5	0	0	16.55	17
JE-123-SS	1:1, 1:2	+27	1	3	1	0	29.20	25
JE-123-A	1:1, 1:2, 1:3	+30	1	6	0	0	20.50	16
JE-123-ACF	1:1, 1:2, 1:3	+30	1	7	0	0	20.50	16
JE-14S-T	1:4 split	+30	1	8	0	0	20.50	16

*See last page for price schedules.

Part Number	Description	20Hz Max Level Out	Term	Pkg	Magnetic Shield	Faraday Shield	Unit Price	Price * Schedule

OUTPUT TRANSFORMERS - Nickel Core - for higher source impedance applications (600 ohms)

- - Wire leads - -								
JE-123-SL	1:1, 1:2	+22	1	4	0	0	20.33	41
JE-123-AL	1:1, 1:2, 1:3	+24	1	7	0	0	25.62	40
JE-11S-L	1:1, 1:2	+26	1	7	0	0	25.62	40
JE-11-T	1:1	+22	1	19	0	0	31.03	42

LOW FREQUENCY CROSSOVER TAPPED INDUCTORS

JE-LX-600	600 ohm ckt		1	3	1	0	73.12	30
JE-LX-2K	2 K ohm ckt		1	3	1	0	73.12	30
JE-682	7 Hy CT		1	3	1	0	67.42	31

- -

TERMINATION

1 - Wire leads
2 - Printed circuit pins
3 - Octal Plug-in

PACKAGE	L	W	H
1 - Mu-metal can	1-1/8"	diam.	1-1/16"
2 - Mu-metal can	1-5/16"	diam.	1-9/16"
3 - Mu-metal can	1-5/8"	diam.	1-3/4"
4 - Uncased	1-5/8"	1-5/16"	1-1/8"
5 - Channel frame	1-11/16"	1-3/8"	1-1/8"
6 - Uncased	1-7/8"	1-9/16"	1-1/4"
7 - Channel frame	1-31/32"	1-21/32"	1-1/4"
8 - Uncased	2-5/8"	2-3/16"	1-1/4"
9 - Printed circuit channel frame - upright	1-7/16"	1-1/4"	1"
10 - Printed circuit bobbin - low profile	1-5/8"	1-5/16"	1-3/16"
11 - Miniature uncased	1/2"	7/16"	3/8"
12 - Miniature mu-metal can with PC pins	0.73"	0.73"	1.1"
13 - Dual nested mu-metal cans	1-5/16"	diam.	1-1/4"
14 - Printed circuit - mu-metal can	1.9"	1.6"	1.26"
15 - Octal Plug-in w/ mu-metal can	1.4"	daim.	1.65"
16 - Printed circuit bobbin - upright	1.7"	1.3"	1.4"
17 - Printed circuit bobbin - low profile	1.6"	1.3"	1.2"
18 - Channel frame	2.1"	1.15"	1.2"
19 - Uncased	1.75"	1.1"	0.76"

MAGNETIC SHIELDING

0 - No magnetic shield
1 - 30 dB mu-metal can
2 - 60 dB mu-metal can

FARADAY SHIELDING

0 - No Faraday shield
1 - 1 Faraday shield
2 - 2 Faraday shields
3 - 3 Faraday shields
4 - 4 Faraday shields

*See last page for price schedules.

PRICE SCHEDULES

Sched. No.	Quantity 1-19	20-39	40-59	60-79	80-99	100-249	250-499	500-999	1000-
1	$ 23.72	22.06	20.52	19.08	17.94	16.86	15.85	14.90	14.01
2	24.61	22.89	21.29	19.80	18.61	17.50	16.45	15.46	14.53
3	23.14	21.53	20.02	18.62	17.50	16.45	15.46	14.54	13.67
4	28.24	26.27	24.43	22.72	21.36	20.08	18.87	17.74	16.68
5	40.29	37.47	34.85	32.41	30.47	28.64	26.92	25.31	23.79
6	23.26	21.64	20.12	18.71	17.59	16.54	15.54	14.61	13.74
7	24.90	23.16	21.54	20.03	18.83	17.70	16.64	15.64	14.70
8	28.53	26.54	24.68	22.95	21.58	20.28	19.07	17.92	16.85
9	36.87	34.29	31.89	29.66	27.88	26.21	24.64	23.16	21.77
10	35.72	33.22	30.90	28.74	27.01	25.39	23.87	22.44	21.09
11	40.67	37.83	35.18	32.72	30.76	28.91	27.18	25.55	24.01
12	42.57	39.60	36.82	34.25	32.19	30.26	28.45	26.74	25.13
13	45.05	41.90	38.97	36.24	34.07	32.02	30.10	28.30	26.60
14	46.01	42.79	39.80	37.01	34.79	32.71	30.74	28.90	27.17
15	59.48	55.32	51.45	47.85	44.98	42.28	39.74	37.36	35.12
16	20.50	19.07	17.74	16.49	15.50	14.57	13.70	12.88	12.11
17	16.55	15.40	14.32	13.32	12.52	11.77	11.06	10.40	9.77
18	14.65	13.63	12.68	11.79	11.08	10.42	9.79	9.21	8.65
19	17.59	16.36	15.22	14.15	13.30	12.51	11.76	11.05	10.39
20	23.43	21.79	20.27	18.85	17.72	16.66	15.66	14.72	13.84
21	40.96	38.10	35.43	32.95	30.97	29.12	27.37	25.73	24.18
22	32.21	29.96	27.86	25.91	24.36	22.90	21.52	20.23	19.02
23	42.48	39.51	36.75	34.17	32.12	30.20	28.39	26.68	25.08
24	58.52	54.43	50.62	47.08	44.25	41.60	39.10	36.76	34.55
25	29.20	27.16	25.26	23.49	22.08	20.76	19.51	18.34	17.24
26	38.65	35.95	33.43	31.09	29.23	27.47	25.83	24.28	22.82
27	34.66	32.24	29.98	27.88	26.21	24.64	23.16	21.77	20.47
28	26.36	24.52	22.80	21.21	19.94	18.74	17.62	16.56	15.57
29	61.38	57.09	53.09	49.38	46.41	43.63	41.01	38.55	36.24
30	73.12	68.01	63.25	58.82	55.29	51.97	48.86	45.92	43.17
31	67.42	62.71	58.32	54.23	50.98	47.92	45.05	42.34	39.80
32	27.18	25.28	23.51	21.87	20.56	19.32	18.16	17.07	16.05
33	35.41	32.94	30.63	28.49	26.78	25.17	23.66	22.24	20.91
34	44.09	41.01	38.14	35.47	33.34	31.34	29.46	27.69	26.03
35	47.79	44.45	41.34	38.45	36.14	33.97	31.93	30.02	28.22
36	48.75	45.34	42.17	39.22	36.86	34.65	32.57	30.62	28.78
37	38.46	35.77	33.27	30.94	29.08	27.34	25.70	24.16	22.71
38	17.56	16.34	15.19	14.13	13.28	12.49	11.74	11.03	10.37
39	14.29	13.29	12.36	11.50	10.81	10.16	9.55	8.98	8.44
40	25.62	23.83	22.16	20.61	19.38	18.21	17.12	16.09	15.13
41	20.33	18.91	17.59	16.36	15.38	14.45	13.59	12.77	12.01
42	31.03	28.86	26.84	24.96	23.47	22.06	20.74	19.49	18.32

January 1, 1978 Subject to change without notice.

jensen transformers
By REICHENBACH ENGINEERING

1617 NORTH FULLER AVENUE • HOLLYWOOD, CALIFORNIA 90046 • PHONE (213) 876-0059