Data Sheet

jensen transformers
By REICHENBACH ENGINEERING

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

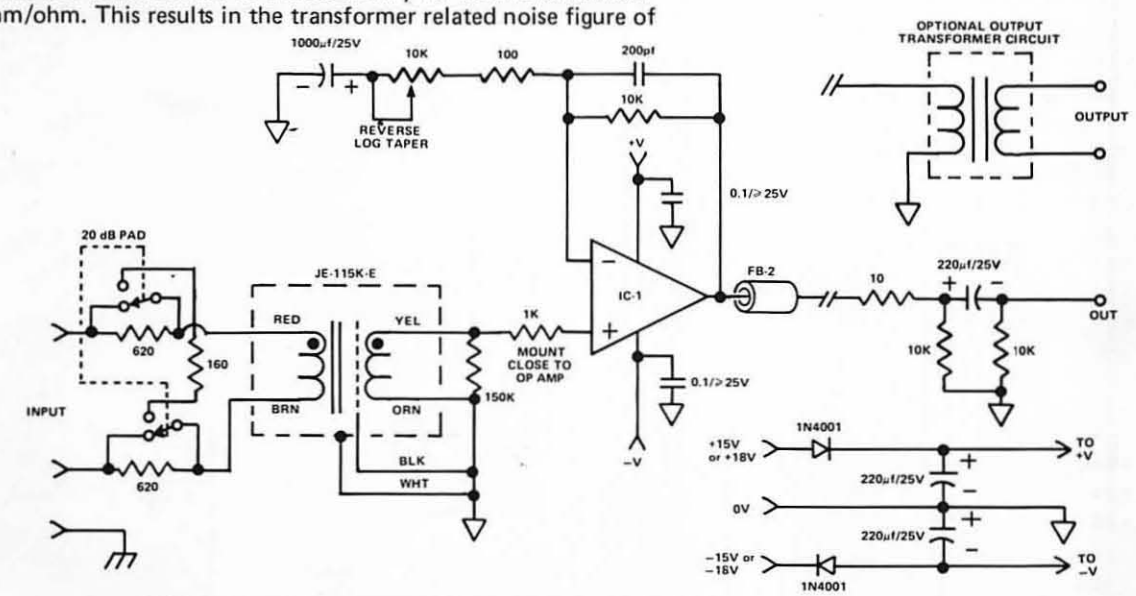
The input impedance, with the secondary terminated in 150K ohms, is 1400 ohms at mid-band frequencies, maintaining above 1000 ohms in the range of 26Hz to 14kHz.

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 MICROPHONE PREAMPLIFIER UTILIZING JE-115K-E

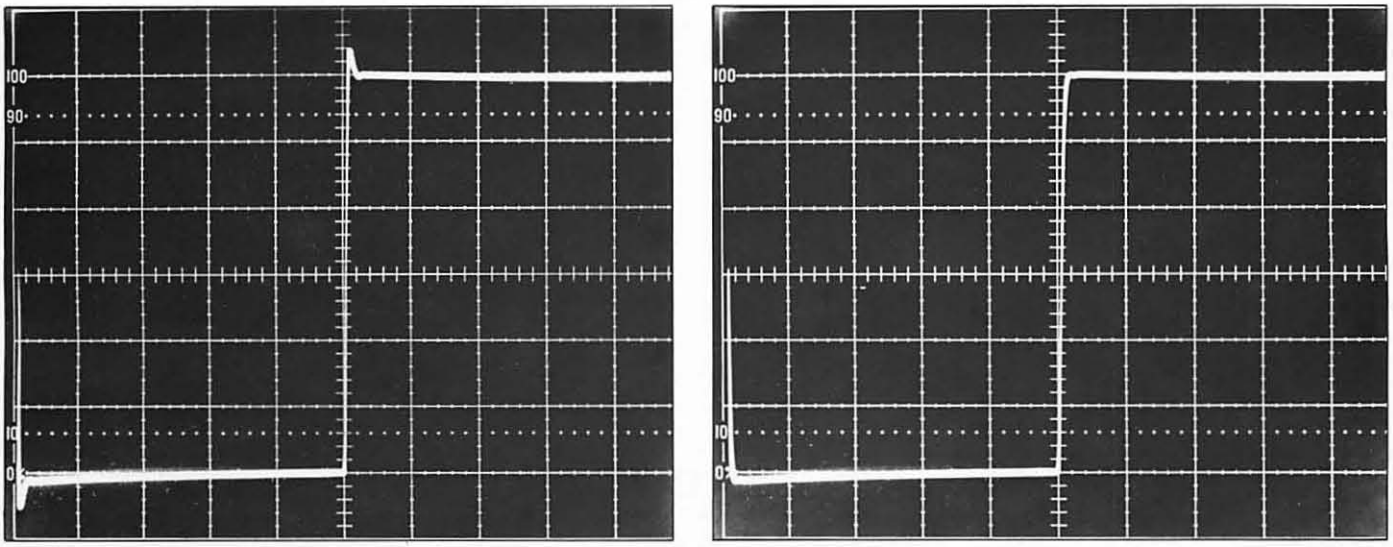
NOTES:

1. Integrated circuit OP amp such as NE-5534, NE-5532, LF-351, LF-356.
2. Gain Range: +26dB → +60dB.
3. Keep leads short between transformer and opamp.
4. All resistors=5%, 1/4 watt carbon film.
5. 200pf cap in feedback = 2μ sec compensation.
6. FB-2 = ferrite bead available from Jensen.

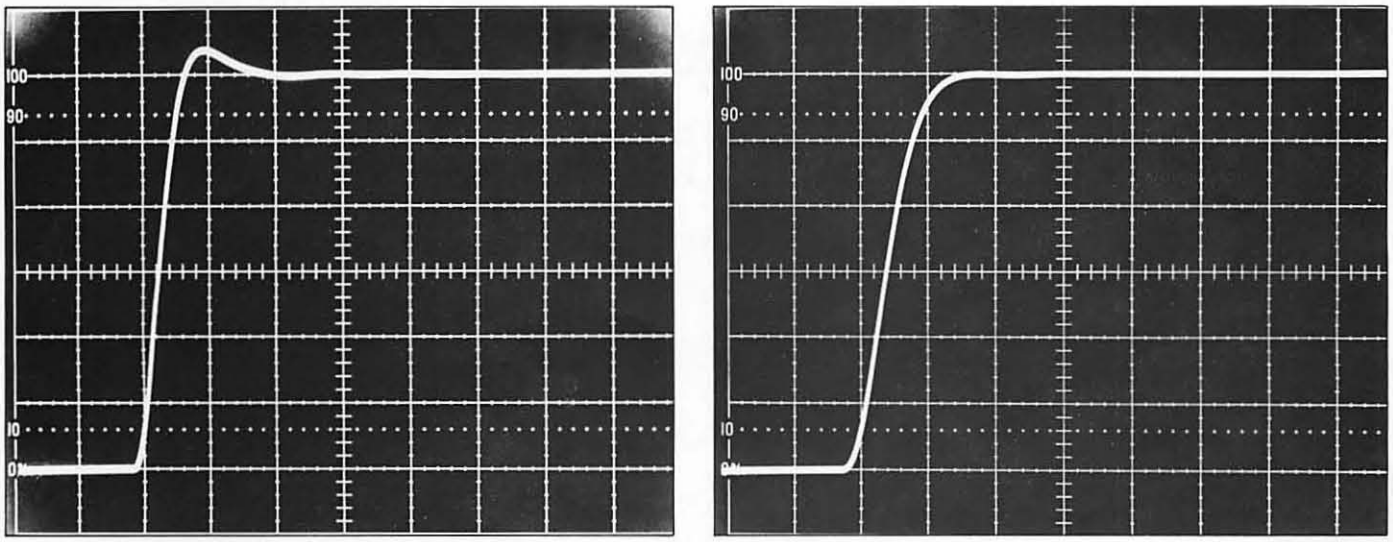
REGARDING THE OSCILLOSCOPE PHOTOS

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.

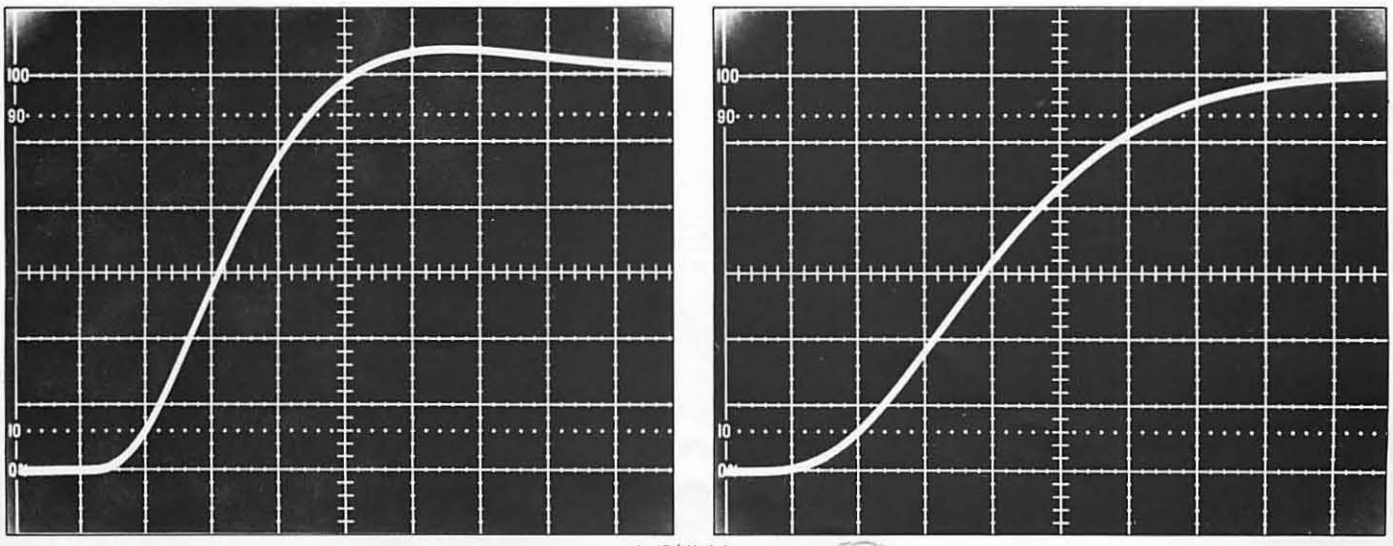
2kHz Square Wave



50μS/division



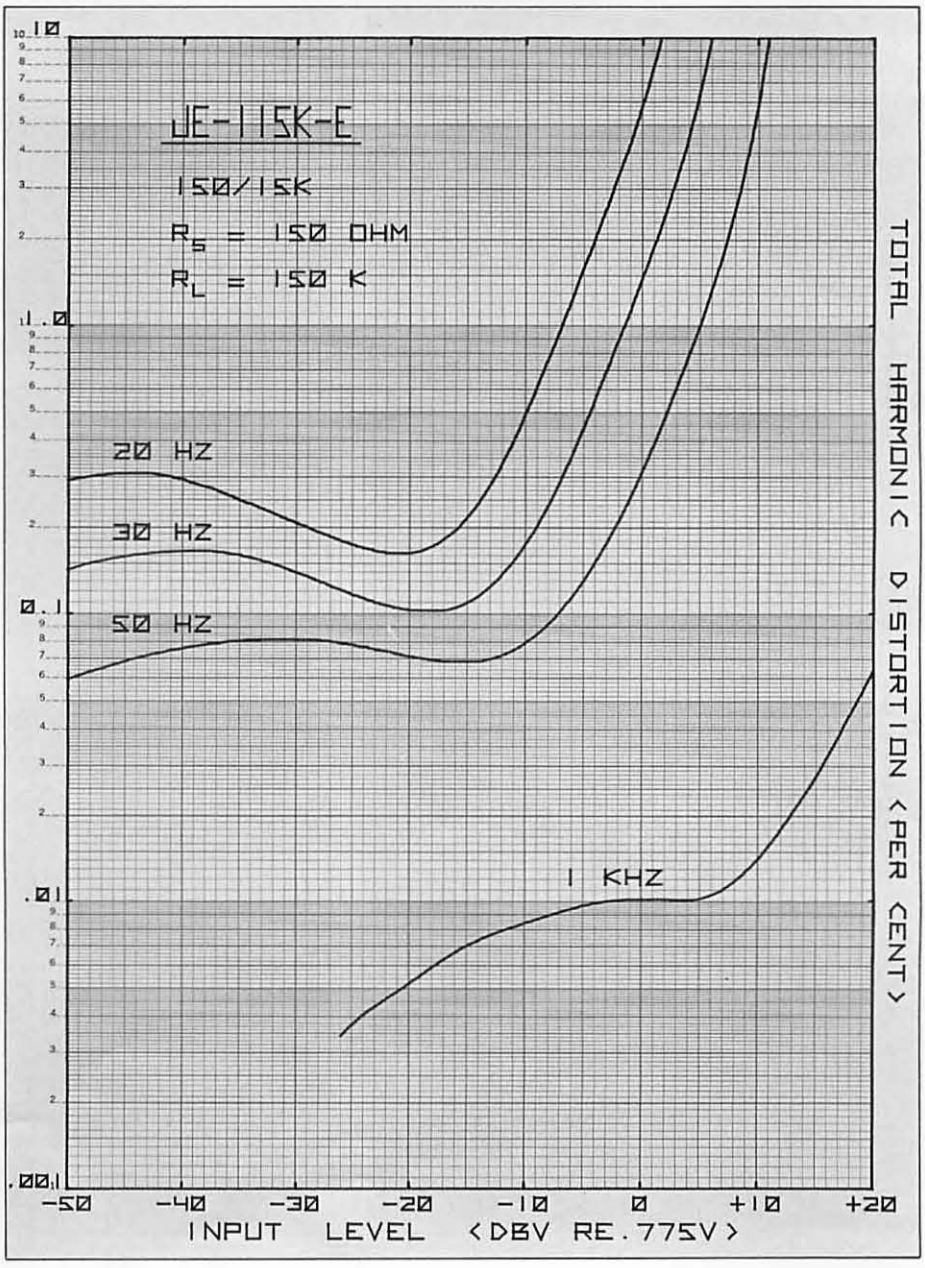
5μS/division



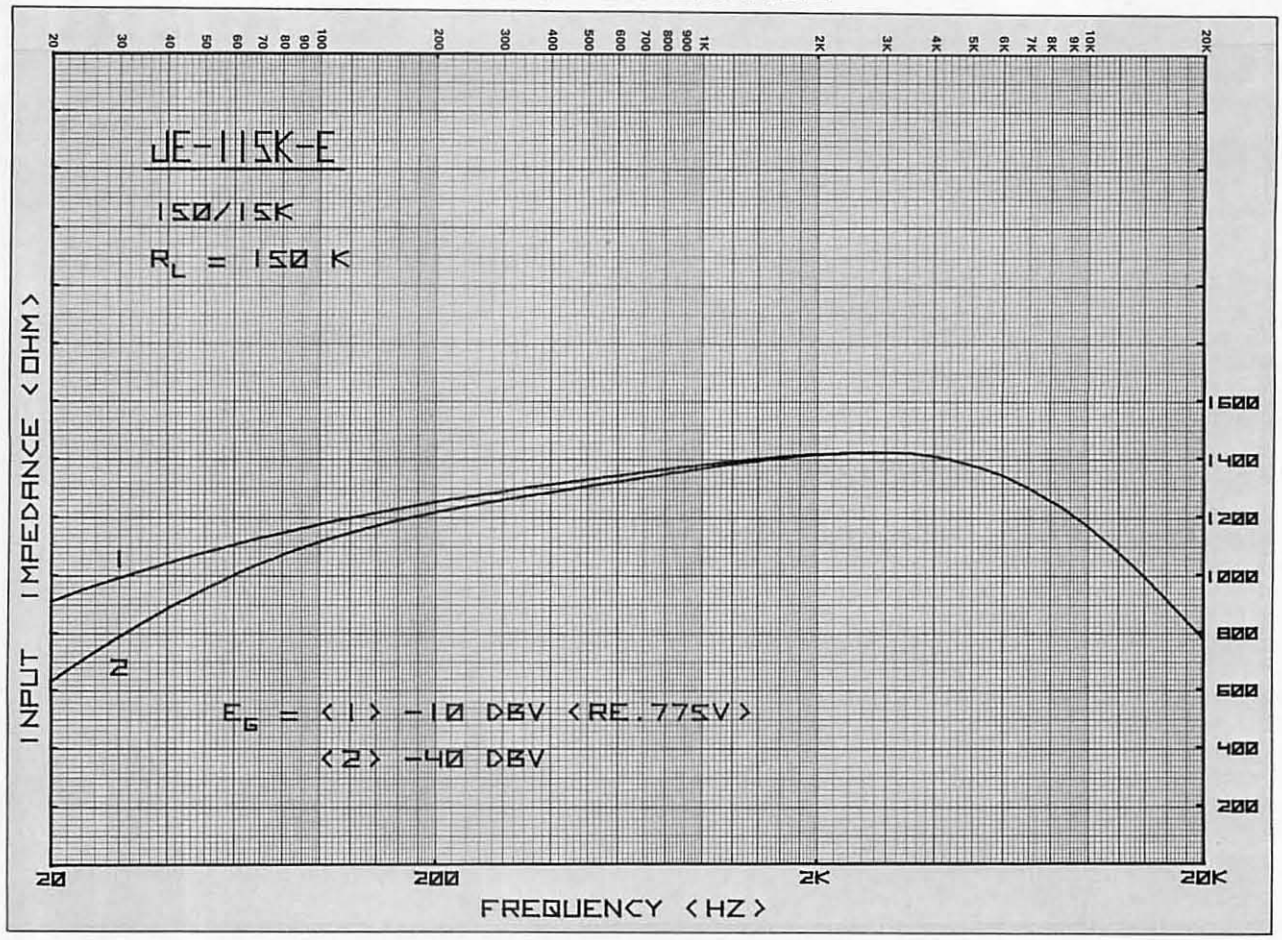
1μS/division

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.

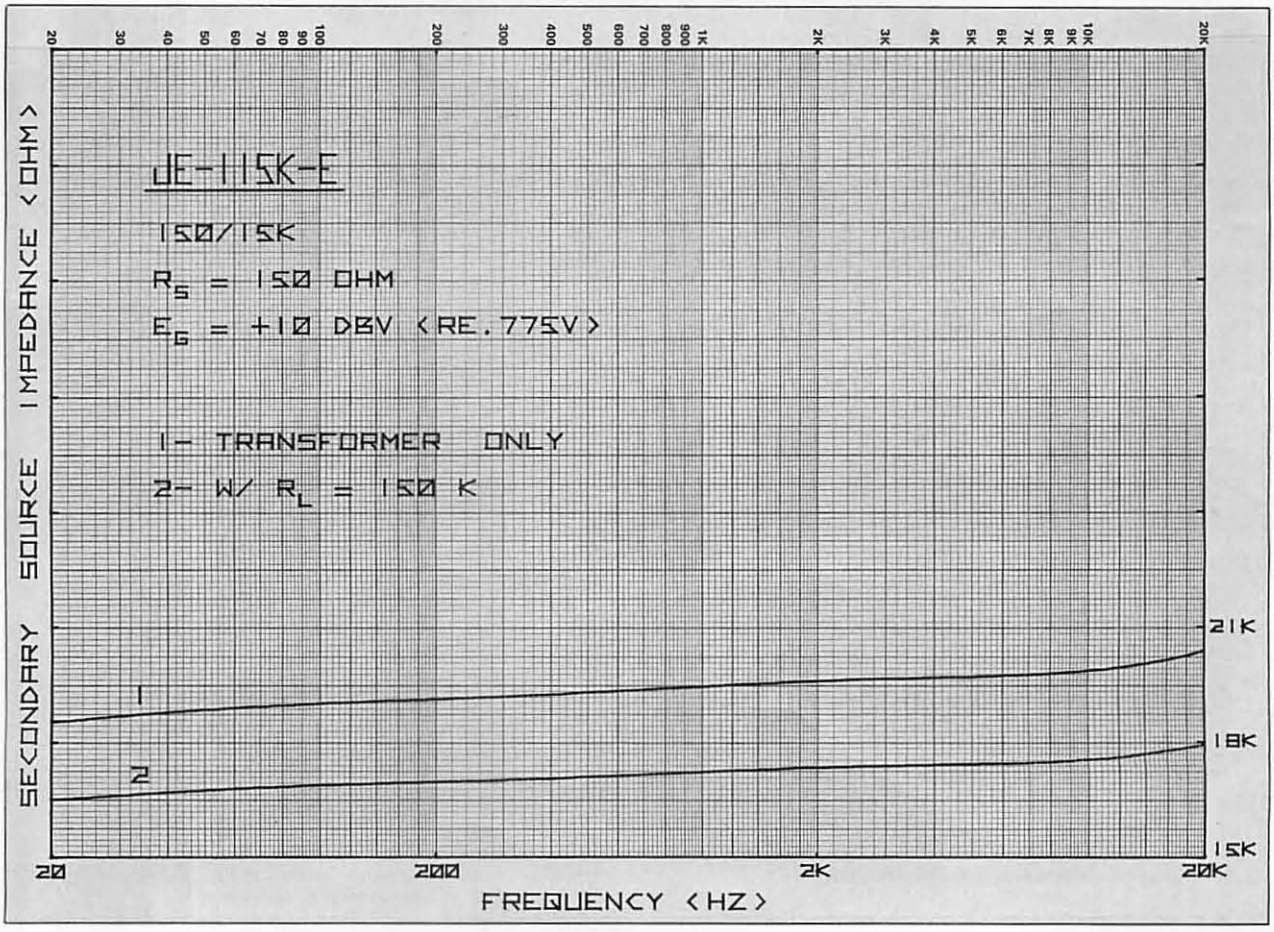
DISTORTION



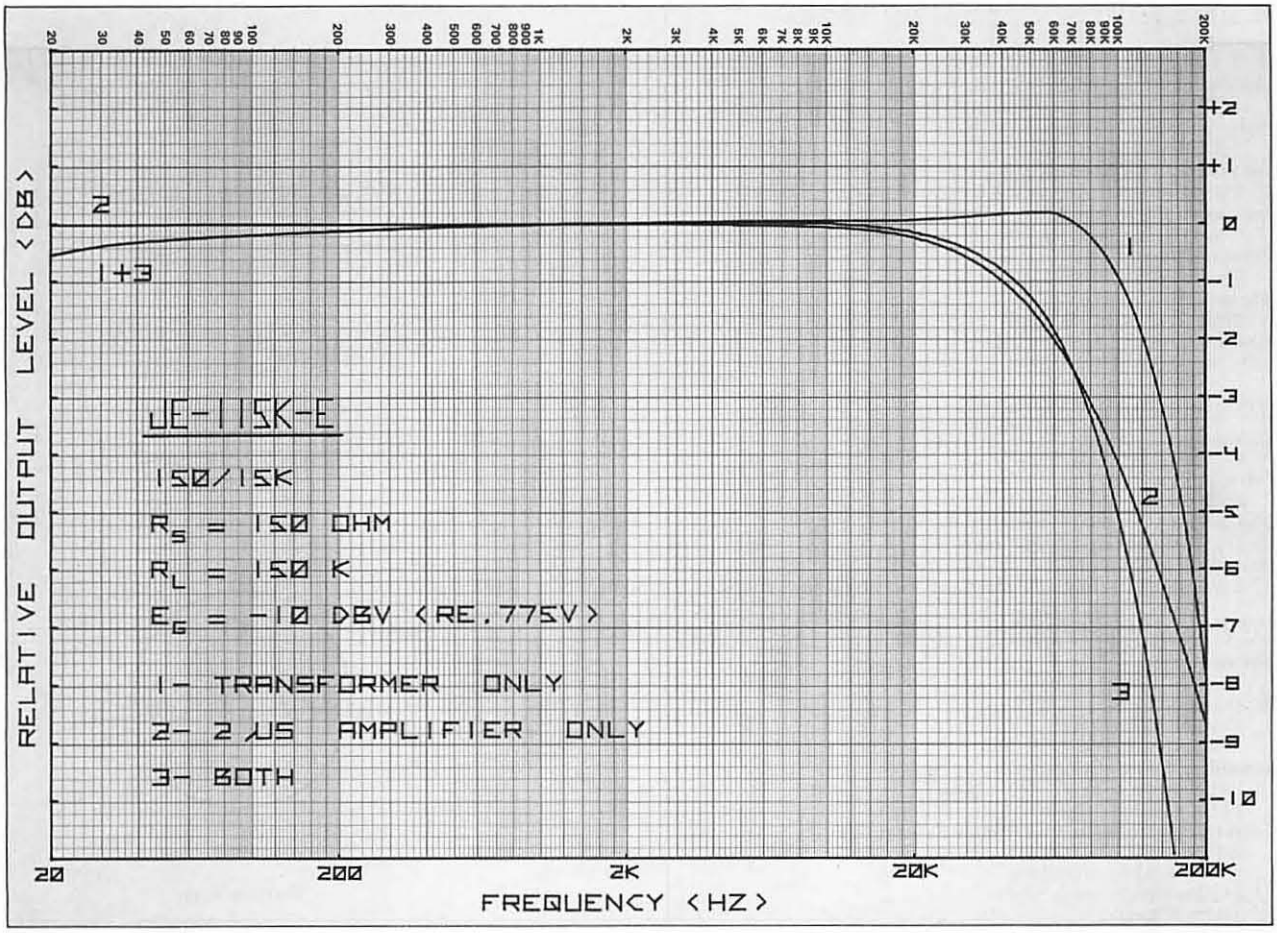
INPUT IMPEDANCE



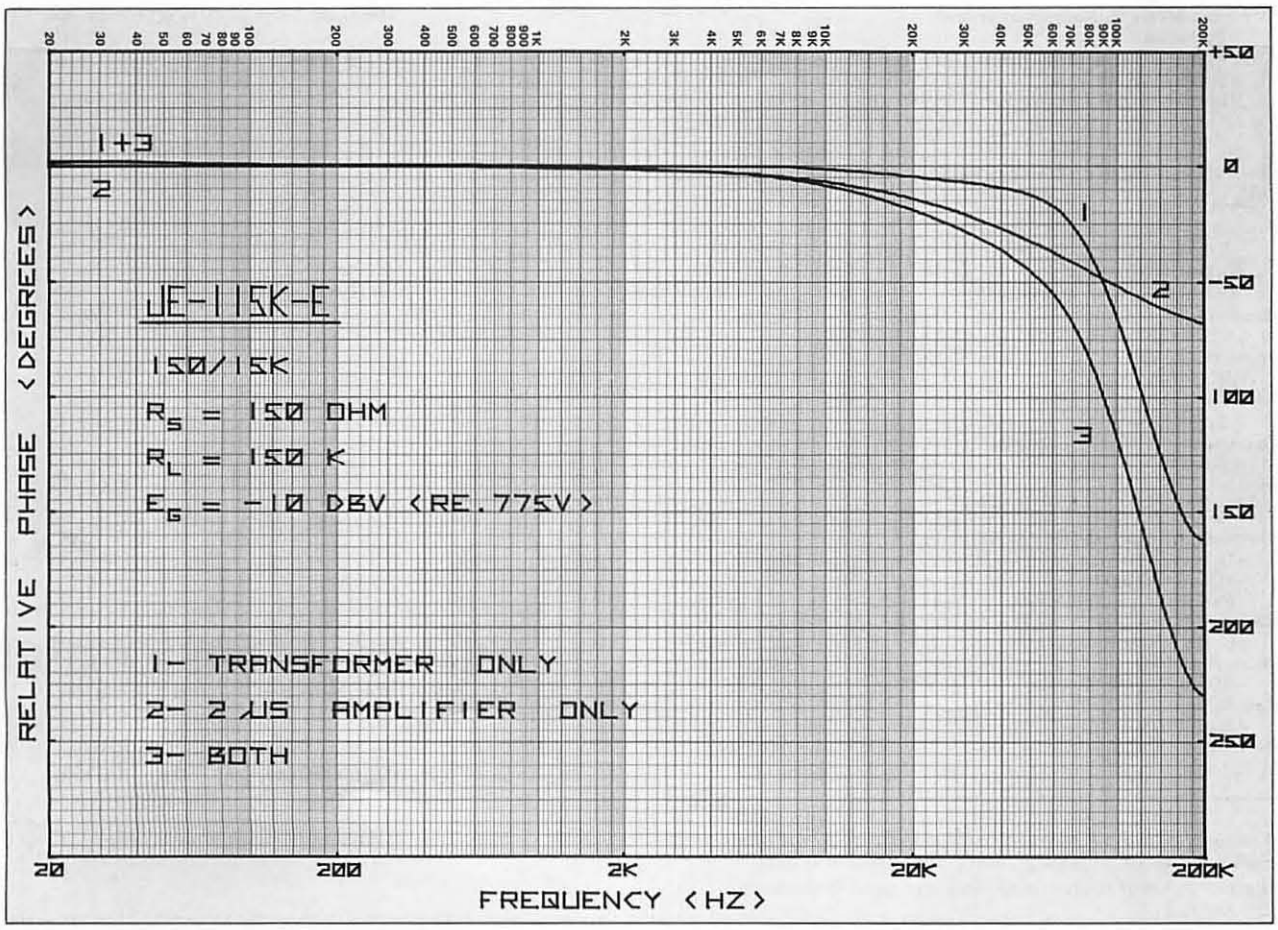
SECONDARY SOURCE IMPEDANCE



FREQUENCY RESPONSE



PHASE RESPONSE



JE-115K-E 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)

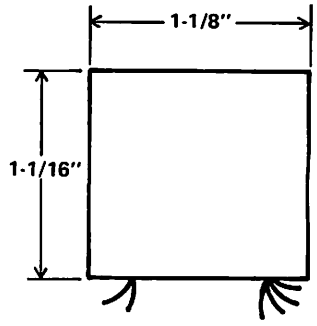
Frequency Response (Re: 1kHz)
−0.5dB @ 20Hz
+0.1dB @ 20kHz
+0.2dB @ 55kHz (peak)
Bandwidth
140kHz @ −3dB
Phase Response
−5° @ 20kHz
Rise Time
2.5μS (10%-90%)
Overshoot
6.6%

(INCLUDING 2μS AMPLIFIER)

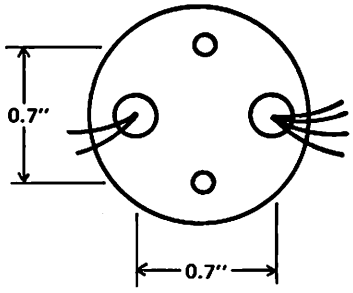
Frequency Response (Re: 1kHz)
−0.5dB @ 20Hz
−0.2dB @ 20kHz
(No resonance peak)
Bandwidth
76kHz @ −3dB
Phase Response
−19° @ 20kHz
Rise Time
4.5μS (10%-90%)
Overshoot
<1%

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.*



Side View



Bottom View

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

jensen transformers
By REICHENBACH ENGINEERING

10735 BURBANK BOULEVARD
N. HOLLYWOOD, CALIFORNIA 91601
PHONE (213) 876-0059

(Visitors by Appointment Only)