

# Data Sheet

**jensen transformers**  
INCORPORATED

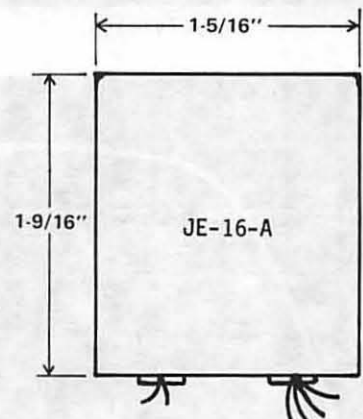
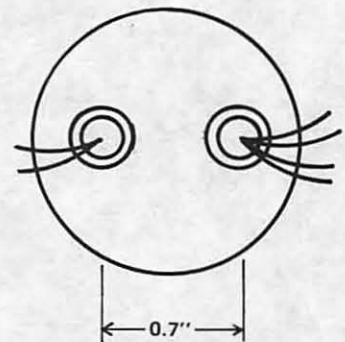
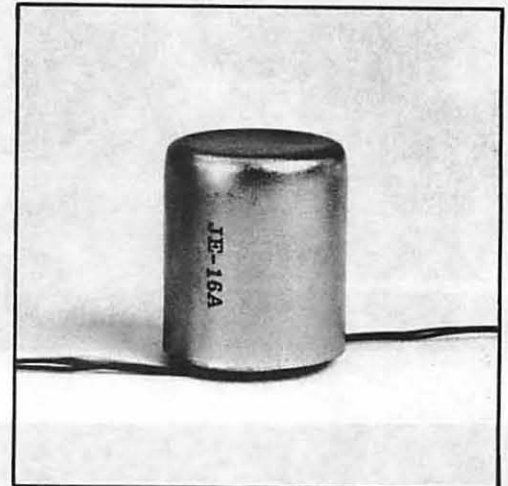
## JE-16-A/B MICROPHONE INPUT TRANSFORMER

The JE-16-A is a 1:2 turns ratio (150/600 Ohm) microphone input transformer for use with the JE-990 operational amplifier. It handles levels to +8 dBv re: 0.775 v @ 20 Hz (1% THD). Below saturation, the 20 Hz THD is less than 0.04%. The bandwidth is 200 kHz. Including the amplifier response, the overshoot is less than 1%. 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 4.32 K and 680 pF polystyrene or polypropylene is connected across the 6200 Ohm secondary load resistor for minimum transient distortion.

The series loss ratio referred to the secondary for 20 kHz bandwidth is 1.44 Ohm/Ohm. This results in the transformer related noise figure of only 1.7 dB. The 10 kHz secondary source impedance is only 2.5% higher than that at 1 kHz, so the noise spectrum is very close to a pure resistance. The 20 kHz equivalent input noise is -128.7 dBv re: 0.775 v when used with the JE-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 magnitude response characteristics with various source impedances. The response and impedance graphs were generated from an equivalent circuit model using a Hewlett/Packard 9845T Desktop Computer with a 9872A Graphic Plotter. The accuracy of the model has been carefully verified by multiple measurements to within the order of one pen-line width. The computer program "High Speed AC Circuit Analysis with Optimization" (AC-CAP) uses iterative admittance matrix analysis to "tweak" the model to match the measured data. The program can be licensed from Jensen Transformers for most Hewlett/Packard Desktop Computers, including the 9845, 9836, 9816, (model 200 series), and HP-9020.

The distortion curves were generated by direct measurements using a Hewlett/Packard 8903A Audio Analyzer controlled via HP-IB with a 9845T which plotted the graph on the 9872A Plotter. The 8903A was preceded by a JE-990 operational amplifier to extend the low level measurement capability down to a lower noise floor. The graphs stop at low levels where noise interferes with the reading.



Lead Holes  
Use 0.35" hole to clear grommet

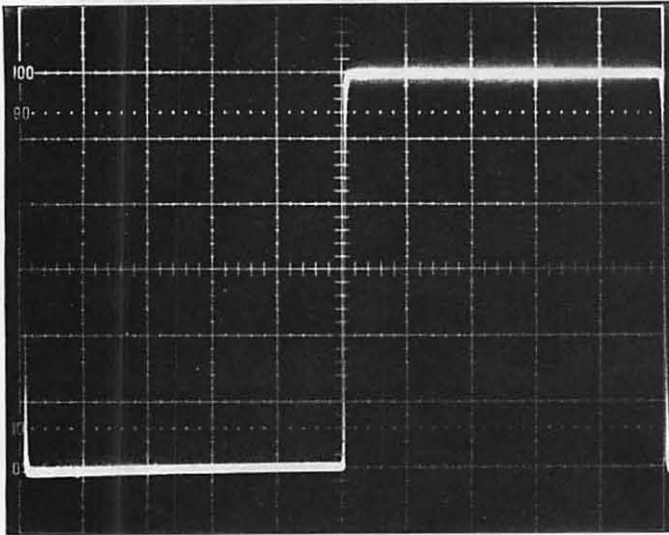
10735 BURBANK BOULEVARD  
N. HOLLYWOOD, CALIFORNIA 91601  
PHONE (213) 876-0059

*(Visitors by Appointment Only)*

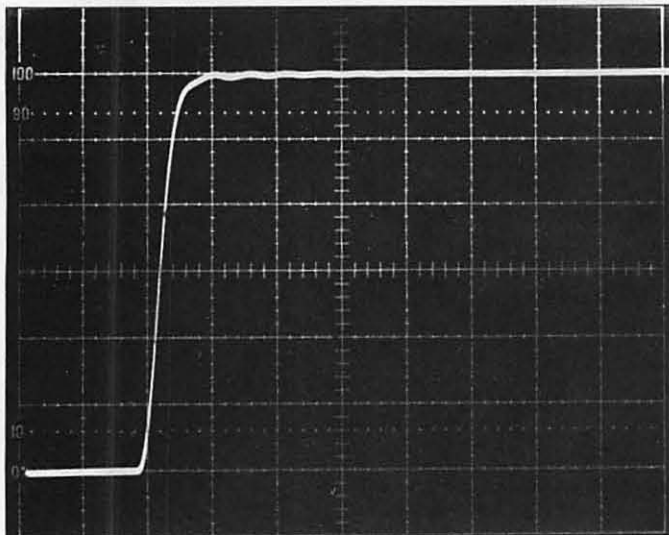
## REGARDING THE OSCILLOSCOPE PHOTOS

Actual oscilloscope photos were made from a Tektronix Model 453A  
Left column is transformer with secondary termination network

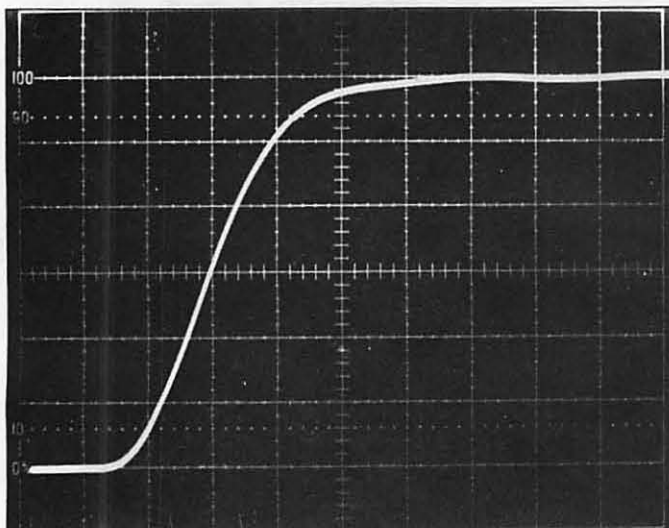
2 kHz Square Wave



50 μs/division



5 μs/division



1 μs/division

PLEASE NOTE: Previous data sheets recommended an RC network of 3600 Ohm + 820 pF. The following specifications refer to the currently recommended network, which yields improved performance. Note that some graphs and the scope photos in this preliminary data sheet indicate performance with the old network.

### GENERAL CHARACTERISTICS

Turns Ratio

1:2

Impedance Ratio

150/600

Primary Source Impedance

150 Ohm

Secondary Load Resistor

6200 Ohm

Secondary RC Network

R<sub>n</sub> = 4.32 K 1%

C<sub>n</sub> = 680 pF 2.5%

Faraday Shield

Separate lead

Magnetic Shield

30 dB, separate case lead

Maximum Input Level at 20 Hz (3% T.H.D)

+9 dBv (re: 0.775 v)

### PHYSICAL CHARACTERISTICS

Package

Mu-metal can

Termination

Wire leads

Dimensions

JE-16-A: 1-5/16" diameter x 1-9/16" high

JE-16-B: 1-3/16" square x 1-5/8" high

Mounting

JE-16-A: clamp supplied

JE-16-B: your bracket

### TYPICAL PERFORMANCE

Voltage Step-Up

5.6 dB

Input Impedance

1500 Ohm @ 1 kHz

1310 Ohm @ 10 kHz

Secondary Source Impedance

841 Ohm @ 1 kHz

862 Ohm @ 10 kHz

Total Harmonic Distortion (Below Saturation)

0.036% maximum @ 20 Hz

0.022% maximum @ 30 Hz

0.010% maximum @ 50 Hz

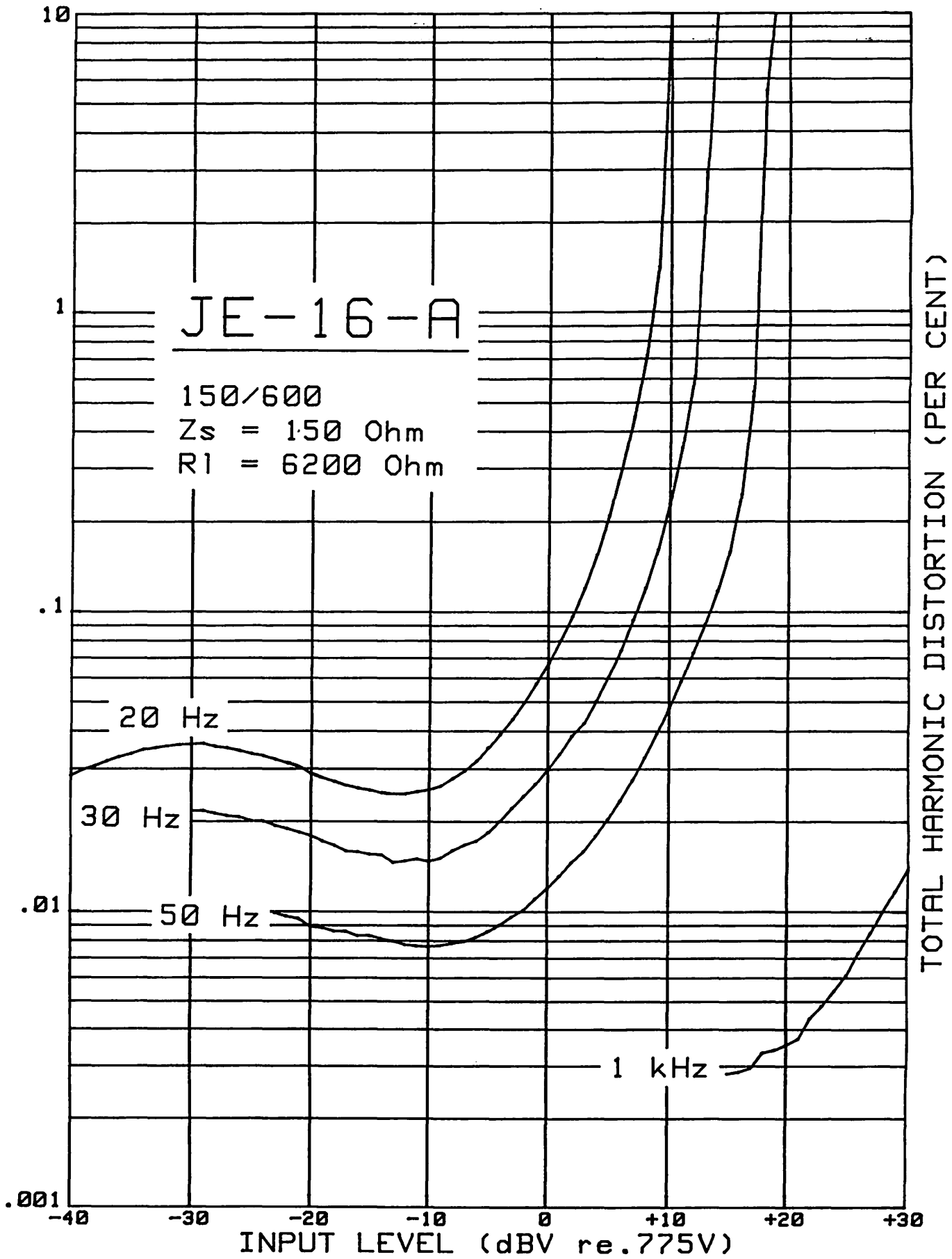
0.003% maximum @ 1 kHz

Input Level @ 1% T.H.D. Saturation (dBv re: 0.775 v)

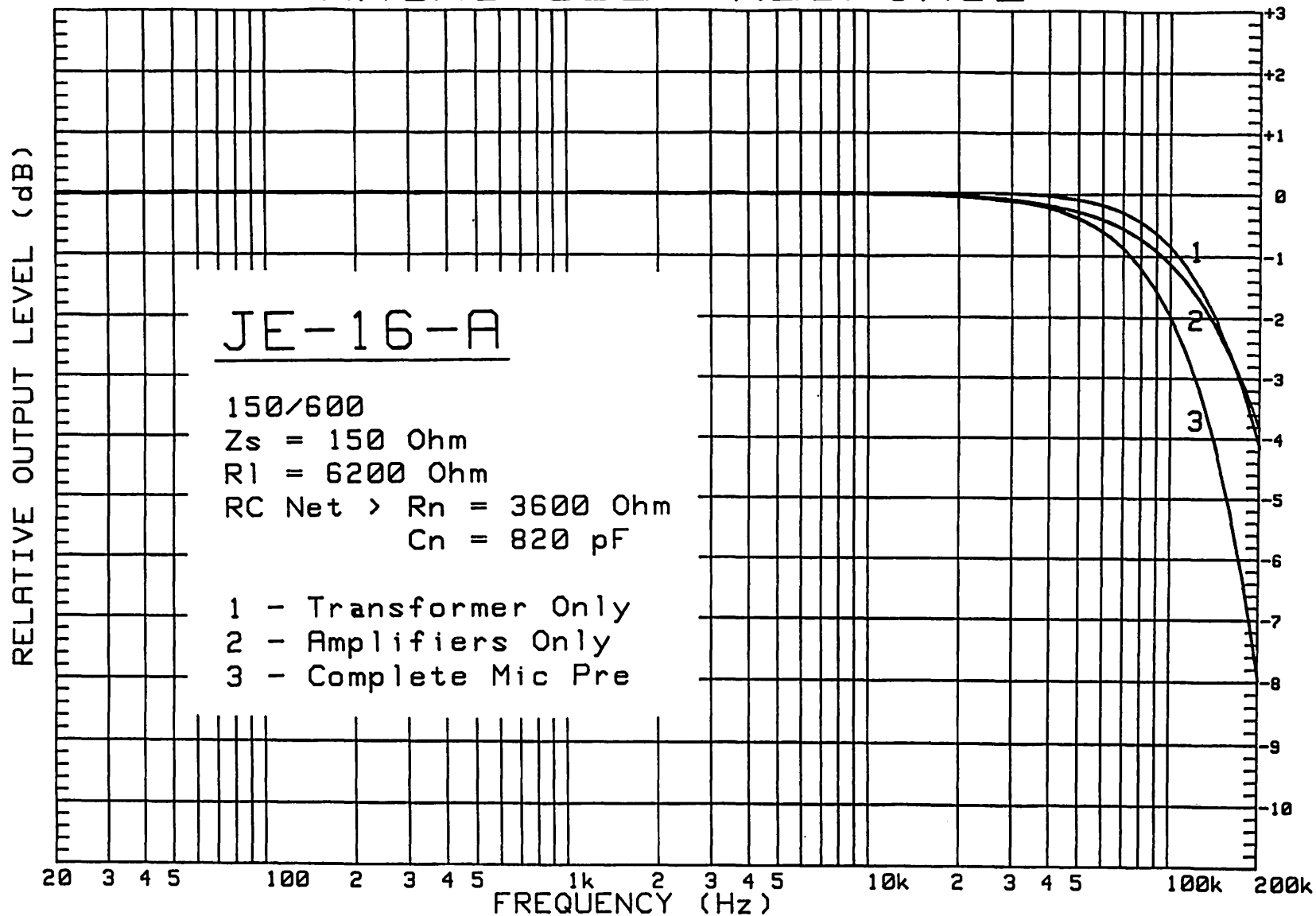
+8 dBv @ 20 Hz

+12 dBv @ 30 Hz

+17 dBv @ 50 Hz

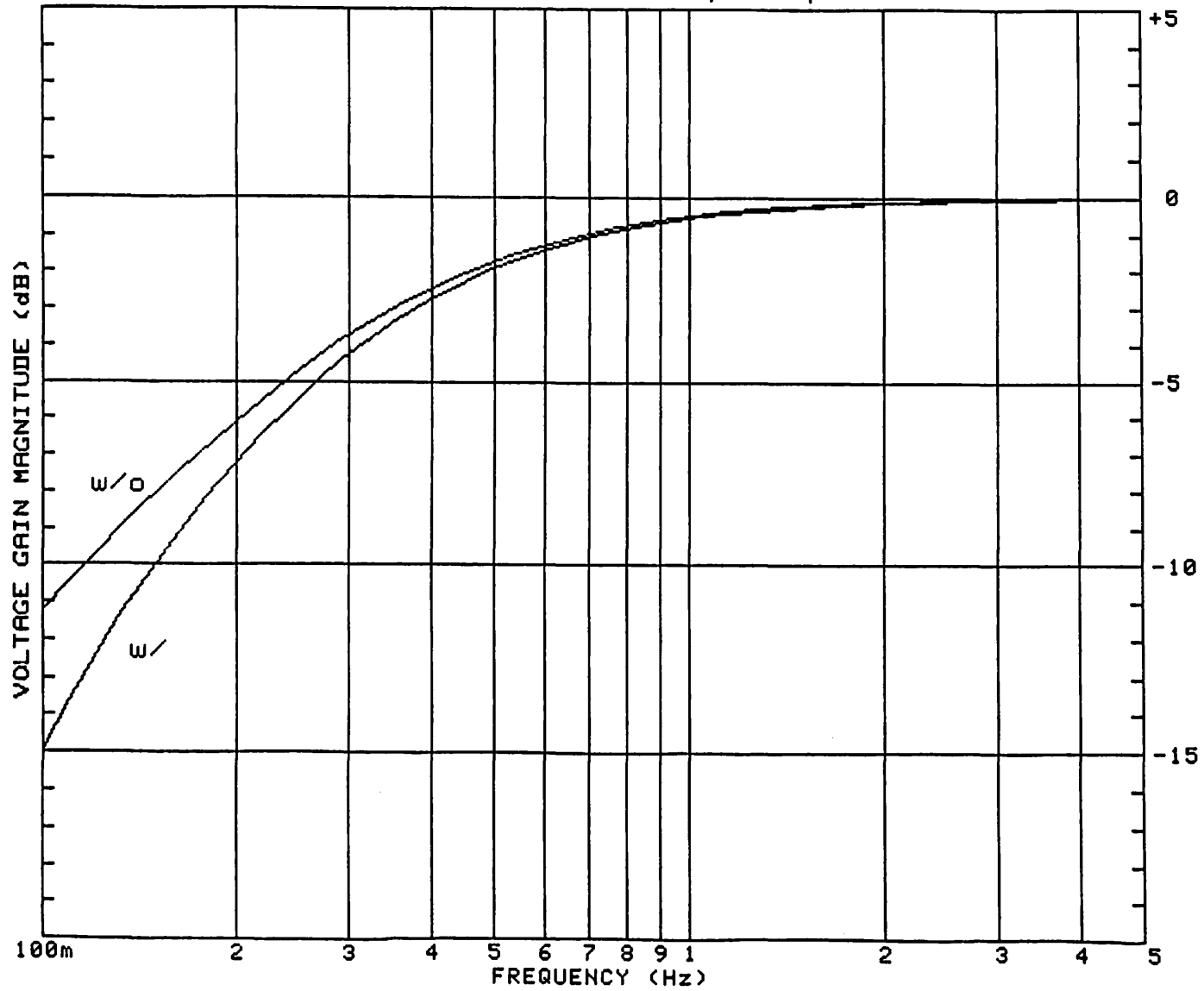


# MAGNITUDE RESPONSE

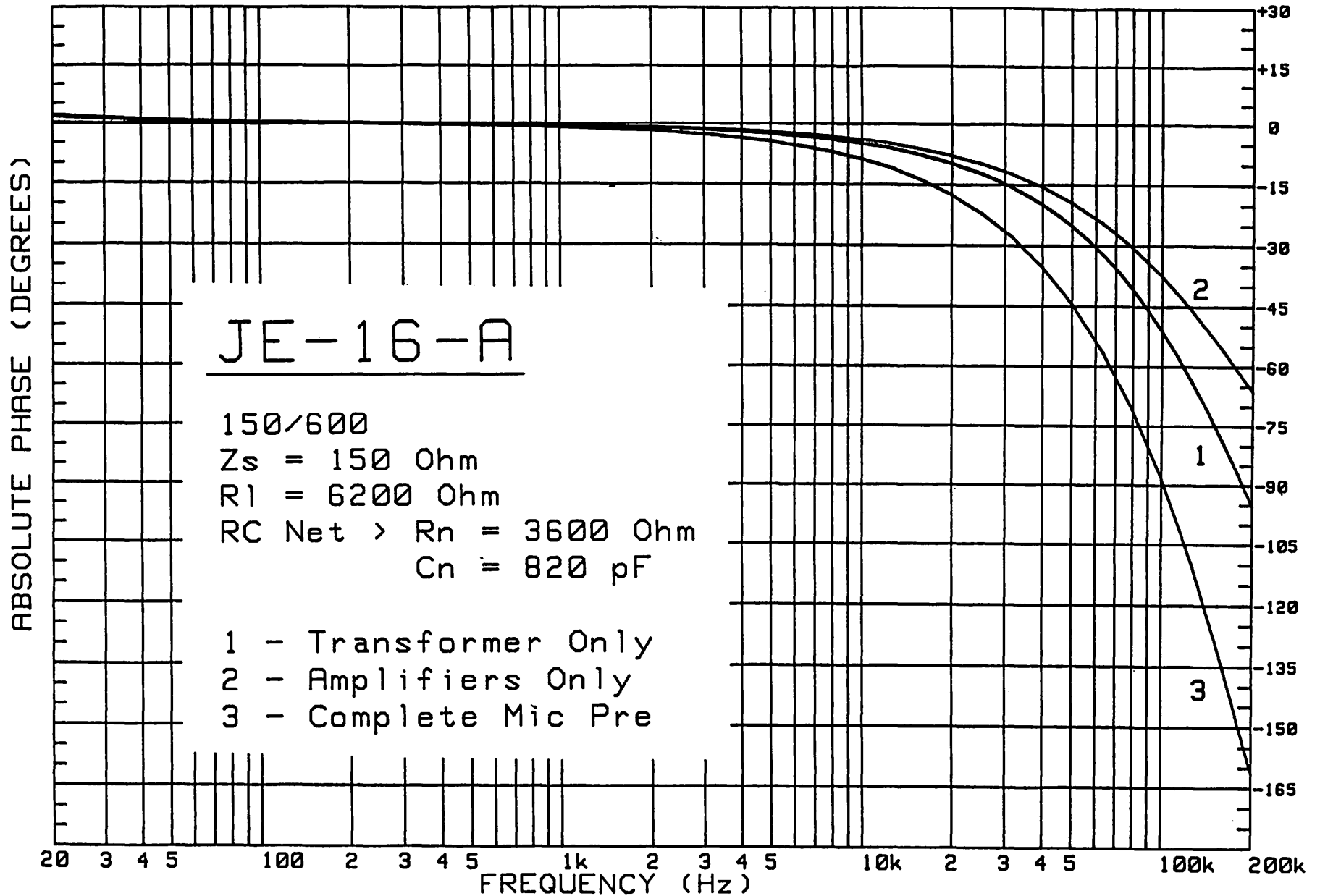


# MAGNITUDE RESPONSE

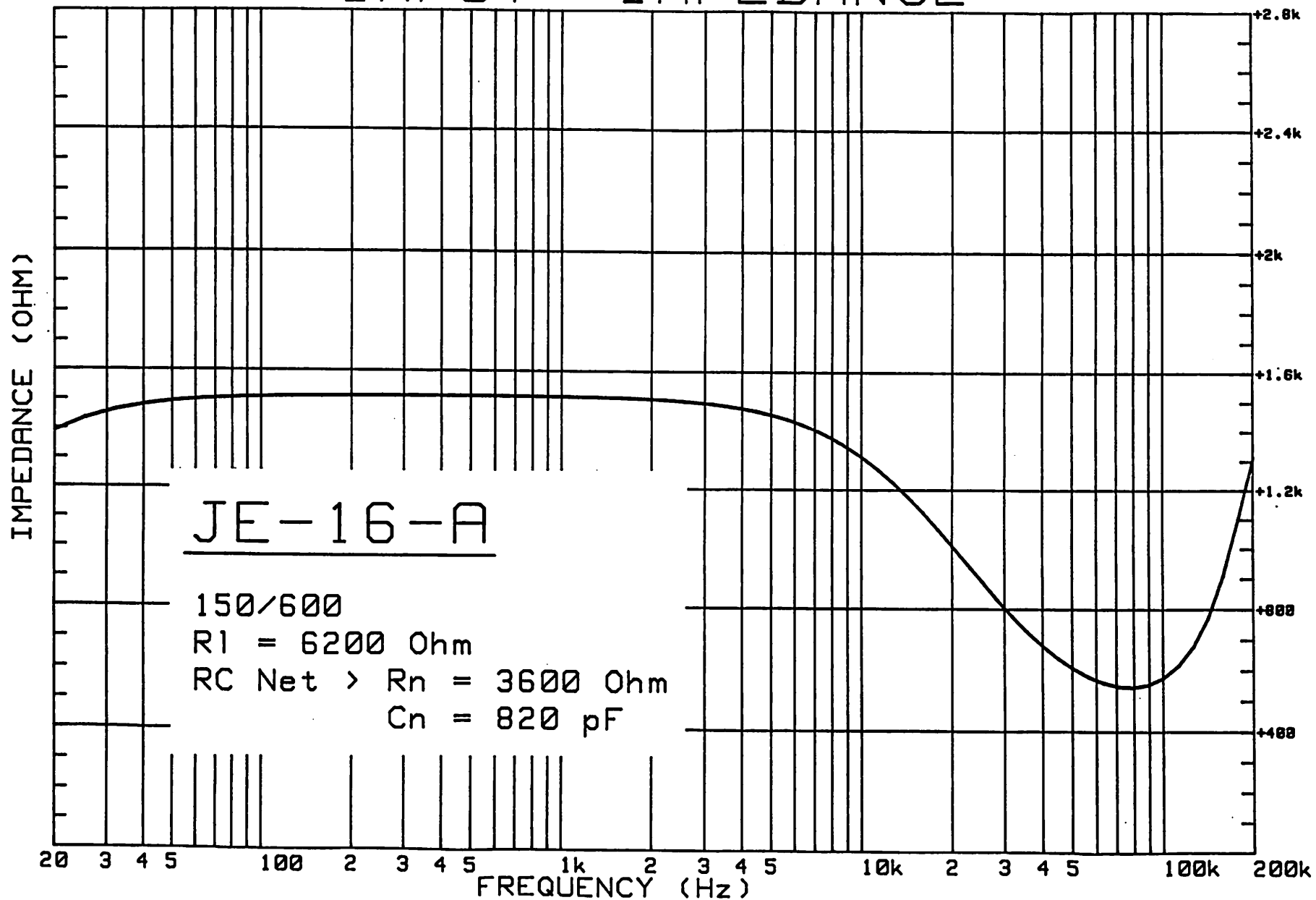
JE-16-A xfmr w/ & w/o DUAL 990 preamp w/ SERVO



# PHASE RESPONSE



# INPUT IMPEDANCE



# SECONDARY SOURCE IMPEDANCE

JE-16-A

150/600

$Z_s = 150 \text{ Ohm}$

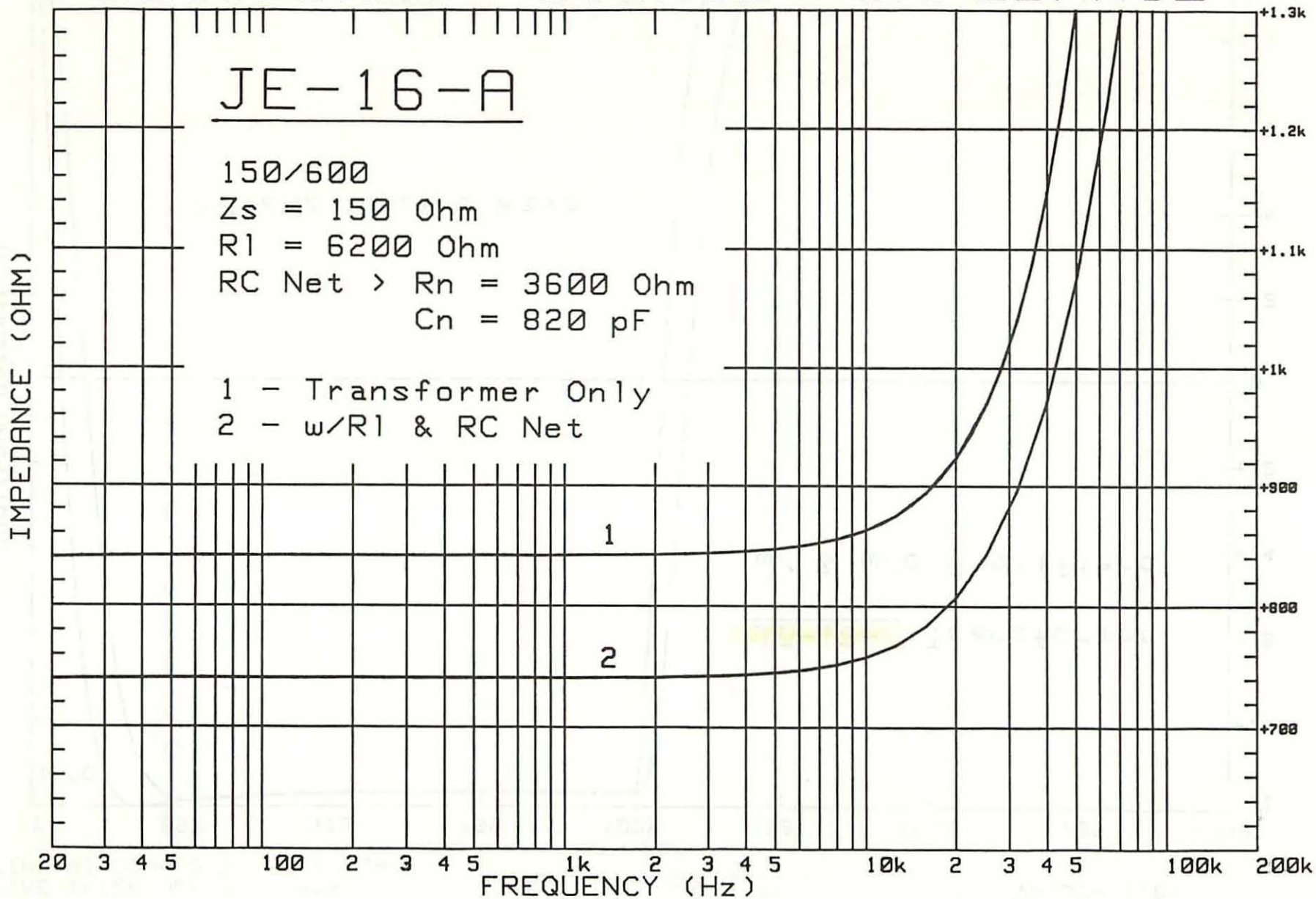
$R_1 = 6200 \text{ Ohm}$

RC Net >  $R_n = 3600 \text{ Ohm}$

$C_n = 820 \text{ pF}$

1 - Transformer Only

2 - w/ $R_1$  & RC Net



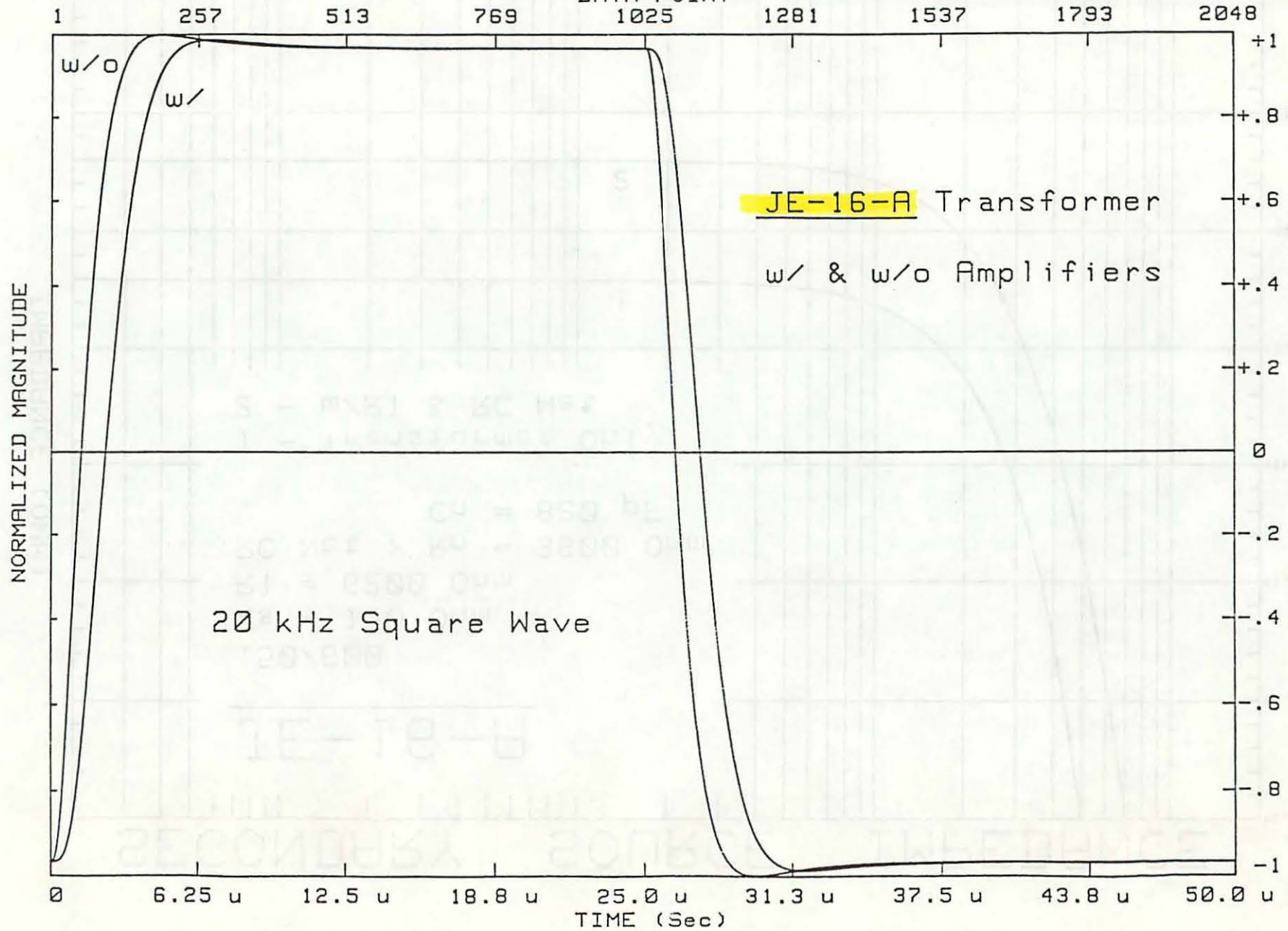


TIME INTERVAL= 24.4 nSec  
TIME WINDOW= 0 TO 50.0 uSec

TIME DOMAIN WAVEFORM

|MAX| VALUE= 1.04

DATA POINT

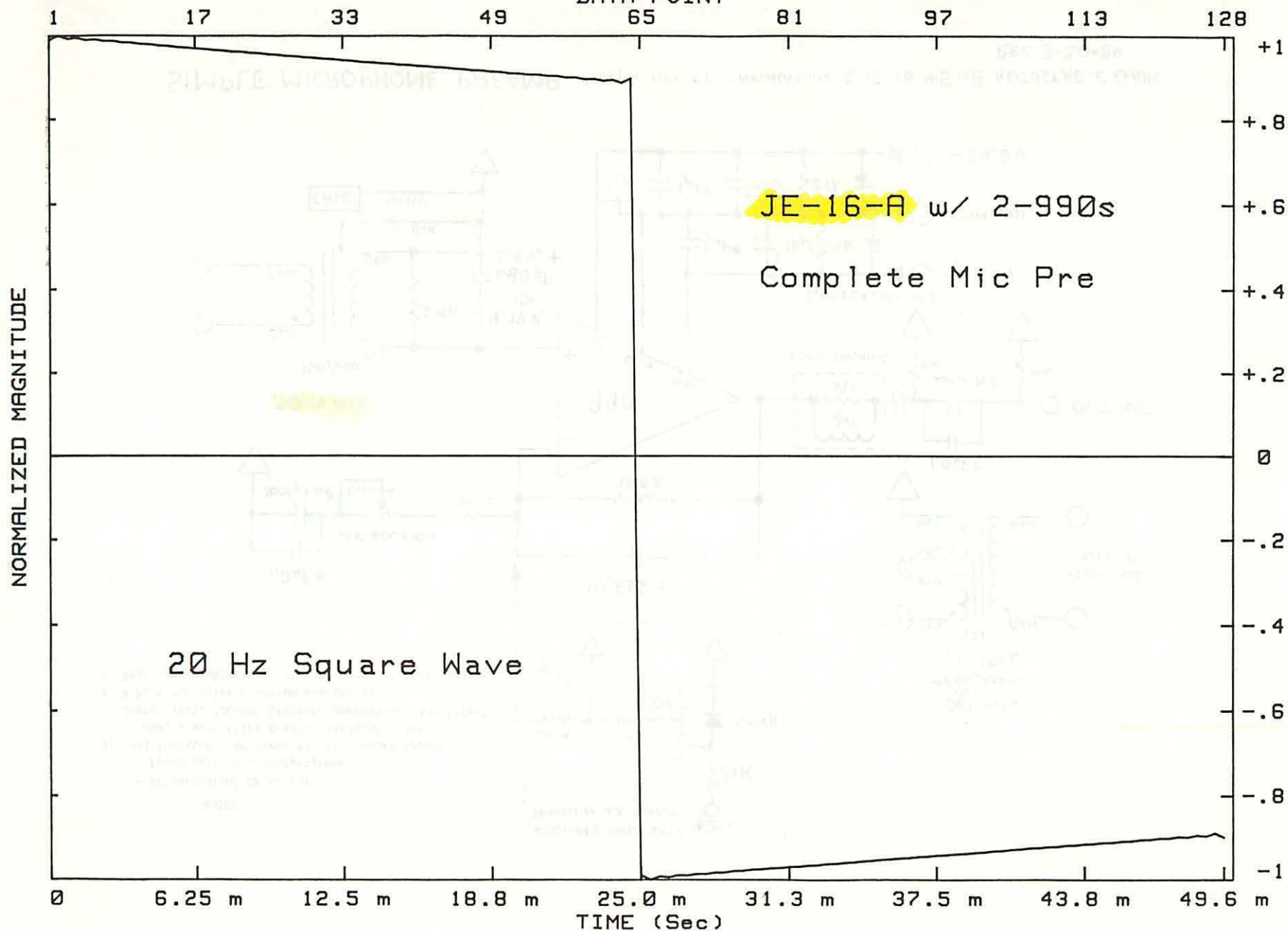


TIME INTERVAL= 391  $\mu$ Sec  
TIME WINDOW= 0 TO 50.0 mSec

TIME DOMAIN WAVEFORM

|MAX| VALUE= 1.06

DATA POINT



Common-Mode Voltage (Maximum)  
>1000 V peak  
Common-Mode Rejection Ratio  
>100 dB @ 1 kHz  
> 80 dB @ 10 kHz

Transformer Noise Figure\*  
1.7 dB re: 134.6 Ohm\*\*

(TRANSFORMER WITH SECONDARY TERMINATION ONLY)

Magnitude Response (re: 1 kHz)

-0.08 dB @ 20 Hz  
-0.05 dB @ 20 kHz  
(no resonance peak)

Bandwidth

-3 dB @ 0.35 Hz  
-3 dB @ 200 kHz

Phase Response

+2° @ 20 Hz  
-8° @ 20 kHz

Rise Time

1.7  $\mu$ s (10%-90%)

Overshoot

<1%

(INCLUDING 2-STAGE AMPLIFIER)

Magnitude Response

-0.08 dB @ 20 Hz  
-0.05 dB @ 20 kHz  
(no resonance peak)

Bandwidth

-3 dB @ 0.375 Hz  
-3 dB @ 150 kHz

Phase Response

+2° @ 20 Hz  
-12° @ 20 kHz

Rise Time

2.25  $\mu$ s (10%-90%)

Overshoot

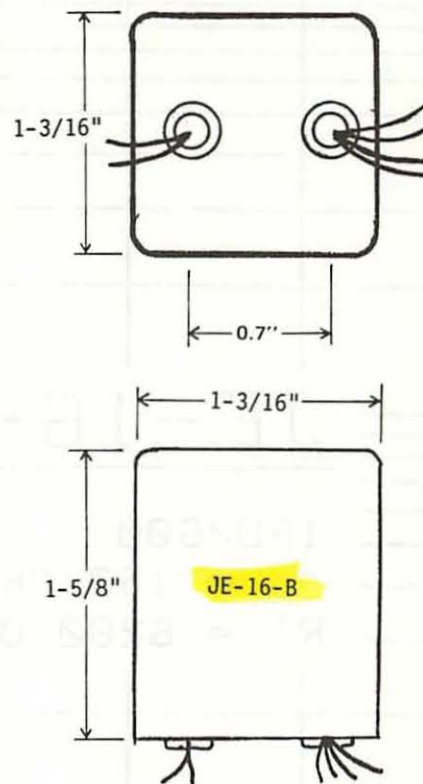
<1%

DC Offset

<1 mV

\*Add to amplifier NF referred to a.c. resistance of 641 Ohm. (Parallel value of secondary source a.c. resistance and load)

\*\*Parallel value of source a.c. resistance and input a.c. resistance.



Lead Holes  
Use 0.35" hole to clear grommet

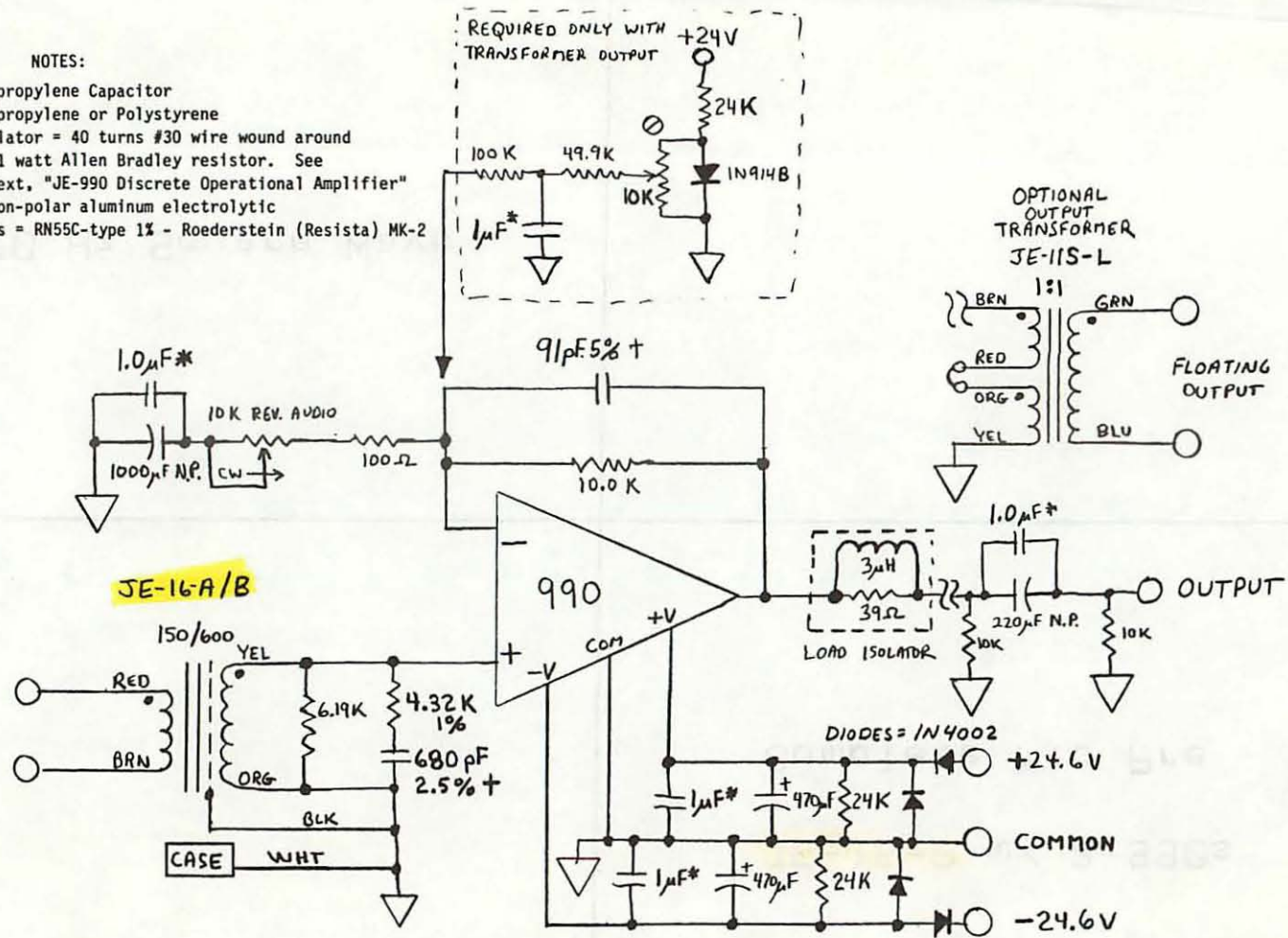
MECHANICAL DESIGNERS: Dimensions are approximate. It is recommended that you have an actual transformer in hand for design purposes.

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- NOTES:
- \* = Polypropylene Capacitor
  - + = Polypropylene or Polystyrene
  - Load Isolator = 40 turns #30 wire wound around 39 Ohm, 1 watt Allen Bradley resistor. See Jensen Text, "JE-990 Discrete Operational Amplifier"
  - N.P. = Non-polar aluminum electrolytic
  - Resistors = RN55C-type 1% - Roederstein (Resista) MK-2



SIMPLE MICROPHONE PREAMP WITH OFFSET COMPENSATION & 12 TO 45 dB ADJUSTABLE GAIN  
REV. 3-20-84