RCA RADIOTRON COMPANY, INC.
HARRISON NEW JERSEY

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UNIFIED SALES--ENGINEERING SERVICE
TO
EQUIPMENT MANUFACTURERS

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HARRISON, NEW JERSEY

APPLICATION NOTE No.32
January 17, 1934

This note supersedes
Application Note No.15

APPLICATION NOTE
ON
REVISION OF CHARACTERISTICS FOR THE TYPE 48 TUBE

The 48 is a tetrode designed for use as a power amplifier in receivers operated from d-c power lines. New ratings for this tube are given on the basis of control-grid-voltage values of -19 and -20 volts for plate-supply voltages of 96 and 125 volts, respectively. The characteristics for these conditions are:

Heater voltage	30		volts
Heater current	0.4		ampere
Plate voltage	96	125 max.	volts
Screen voltage	96	100 max.	volts
Control grid voltage	-19	-20	volts
Plate current	52	56	milliamperes
Screen current	9	9.5	milliamperes
Mutual conductance	3800	3900	micromhos
Power output	2.0	2.5	watts
Harmonic distortion	9.0	9.0	per cent
Load resistance	1500	1500	ohms

From the above tabulation, it will be noted, in comparison with the former values, that the mutual conductance has been increased to 3800 and 3900 micromhos, that there has been a slight increase in plate current, and that the power output has been increased to 2 watts. The new recommended value of load resistance is 1500 ohms. Type 48's with the new ratings are interchangeable with those having the former ratings.

In addition to its use as a tetrode, the 48 offers advantages as a triode in push-pull circuits. Average plate characteristics as a tetrode are shown in Figure 1, and as a triode (with the screen tied to the plate), in Figure 2. The advantages of one type of operation over the other depend on requirements for power output and distortion. To illustrate this, values for each method of operation using two 48's in a push-pull Class A amplifier follow:

Operated As	Plate Volts	Control Grid Volts	Power Output Watts	Maximum Distortion Per Cent
Triodes	125	-32.5	3	3
Tetrodes	125	-20.0	5	9

When it is desired to use the maximum available line-supply voltage on the plate of the 48, grid-bias voltage may be supplied by means of a "C-bias" battery. A battery for this purpose need be replaced only at very infrequent intervals. Its use makes available considerably larger audio output. When the use of a bias battery is not feasible, a self-bias or fixed-bias method may be utilized.

Figure 3 shows output and distortion for different plate-to-plate loads.

Figure 4 shows curves of mutual conductance, plate current, and screen current vs. control-grid bias for a single 48 with the tetrode connection.

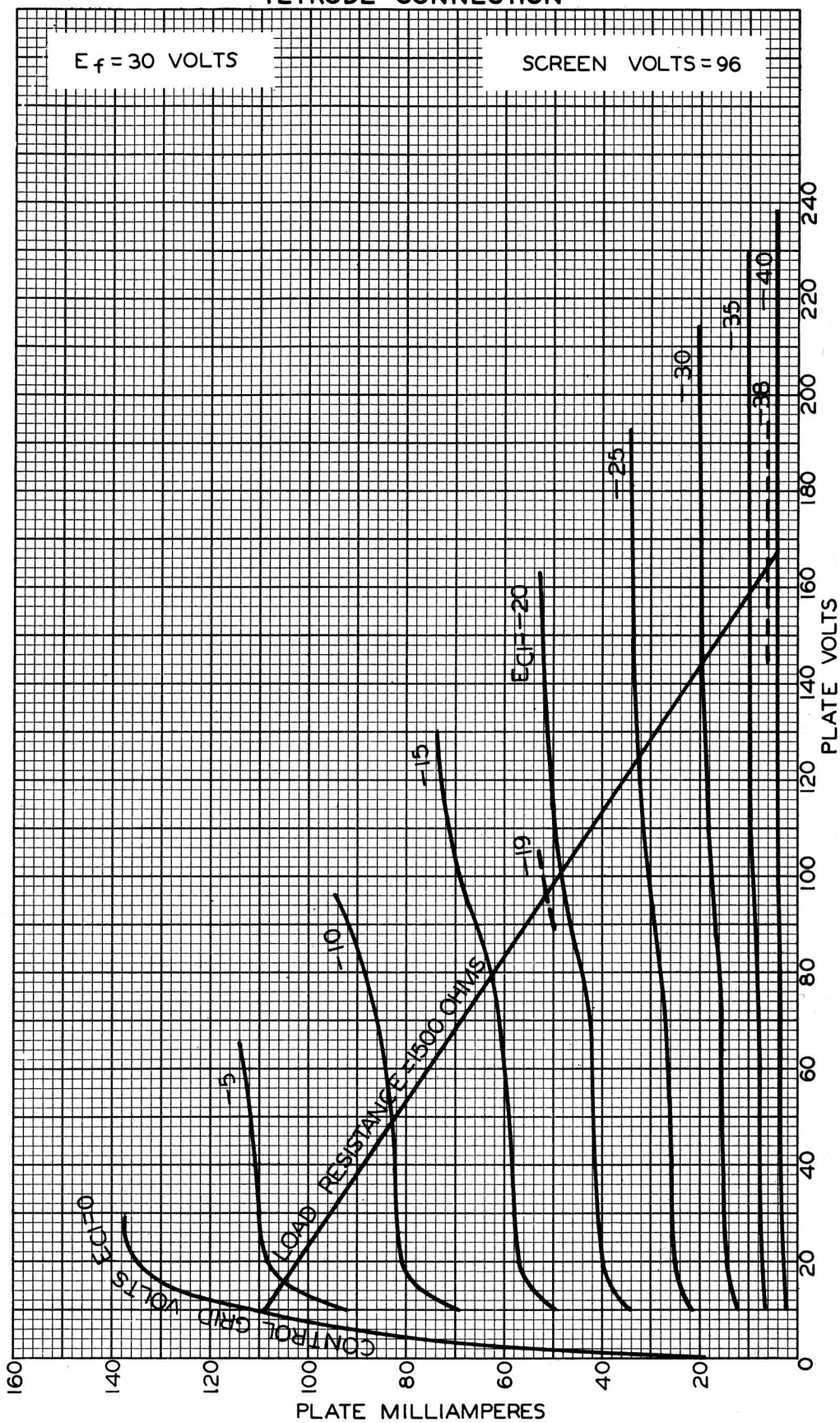
The 48 has a high-emission cathode which can be used to supply more plate and screen current than is generally demanded of the tube as an amplifier. It, therefore, finds application for use with current-operated devices such as relays. The recommended maximum power which may be dissipated by the plate and screen for the tetrode connection is eight watts. This same value is also the recommended plate dissipation for the triode connection.

RCA Radiotron RCA-48

Cunningham RADIO TUBES C-48

AVERAGE PLATE CHARACTERISTICS

TETRODE CONNECTION



DEC. 13, 1933

FIG. 1

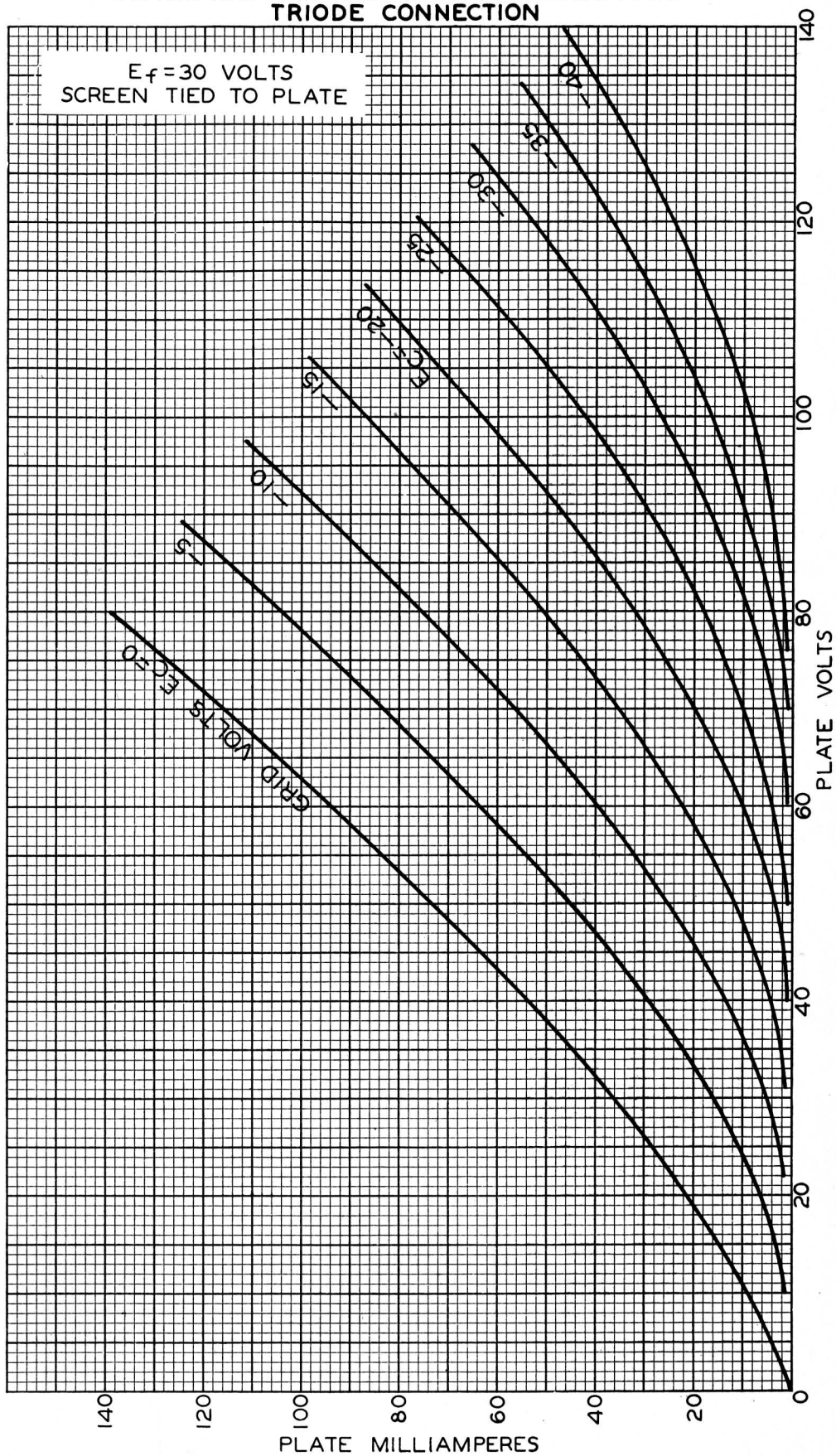
925-4228R1

RCA Radiotron RCA-48

Cunningham RADIO TUBES C-48

AVERAGE PLATE CHARACTERISTICS

TRIODE CONNECTION



DEC. 14, 1933

FIG. 2

925-5325RI

RCA Radiotron RCA-48 | Cunningham RADIO TUBES C-48

OPERATION CHARACTERISTICS
PUSH-PULL CLASS A-TRIODE CONNECTION

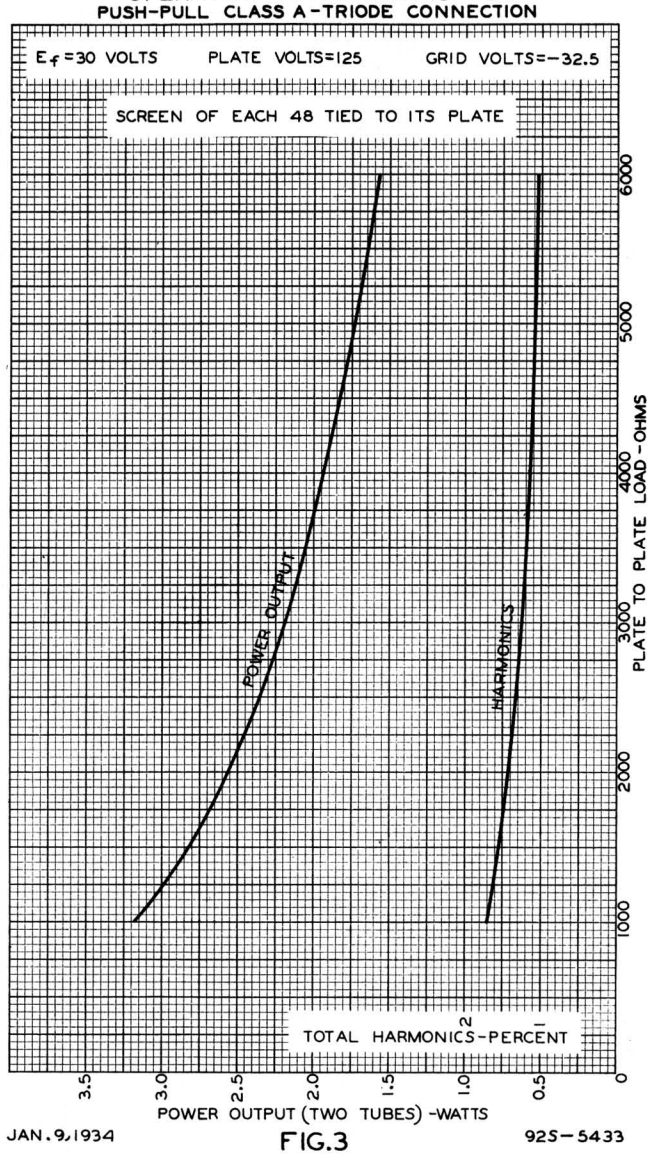


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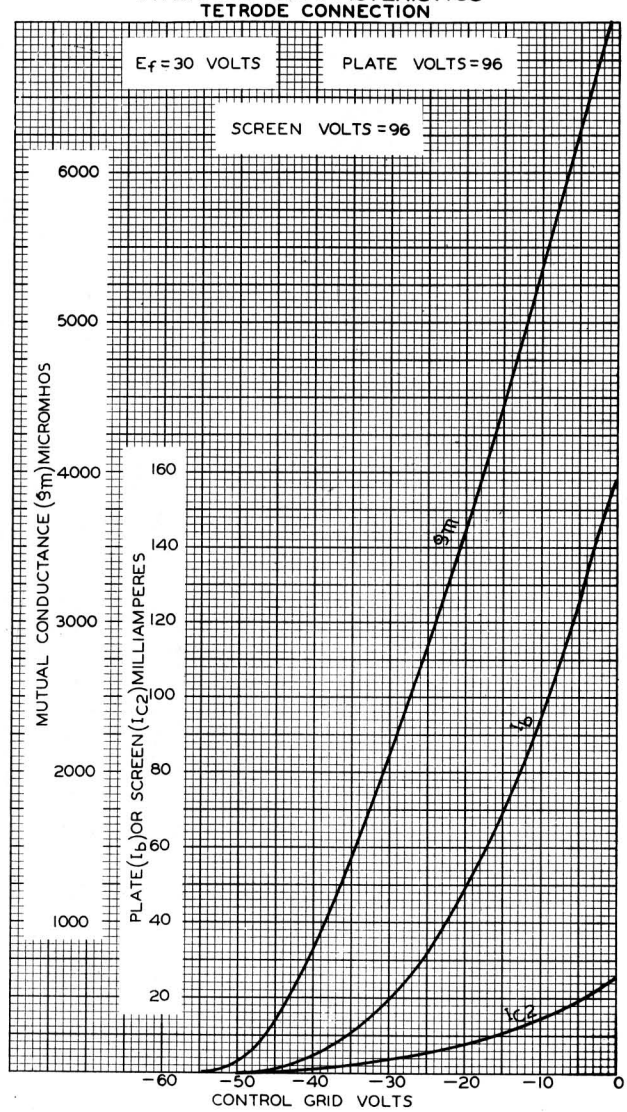
FIG. 3

925-5433

RCA Radiotron RCA-48

Cunningham RADIO TUBES C-48

AVERAGE CHARACTERISTICS
TETRODE CONNECTION



DEC. 12, 1933

FIG. 4

925-4229RI