

12AX7 Vacuum Tubes

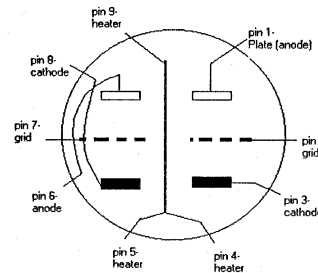
Does the brand name of a vacuum tube (i.e. materials and manufacturing processes) have an effect on the tube's ability to amplify an input signal?

Why are we looking at 12AX7 tubes?

Several 12AX7 tubes are connected in series in the preamp section of guitar amplifiers to amplify the output voltage from the guitar enough to run the power tubes in the main part of the amplifier.

What is a 12AX7 tube?

A 12AX7 is a dual triode vacuum tube. They typically have high μ values (<100) and low microphony. There are nine pins on a 12AX7 tube. Pins 4, 5, and 9 are connected to the filament heater; pins 1, 2, and 3 connect to the first triode (stage 1); and pins 6, 7, and 8 connect to the second triode (stage 2).



What does the TrioPar program do?

The program allows you to obtain the plate family of curves and the grid family of curves for any 12A*7 vacuum tube. The plate family of curves plots the plate current versus the plate voltage. The program holds the grid voltage at a constant value, and measures the plate current while scanning the plate voltage. The entire family is obtained by scanning at different values for the grid voltage. The grid family of curves plots the plate current versus grid voltage. The program holds the plate voltage at a constant value and measure the plate current while scanning the grid voltage. The family of curves is obtained by varying the value of the plate voltage. The current is actually measured at the cathode because it is equal to the current at the plate and much safer.

What will the data allow us to find?

AC Resistance (r_p) - obtained from the plate family of curves

$$r_p = \frac{\Delta e_p}{\Delta i_p} \quad \text{where } e_p \text{ is plate voltage and } i_p \text{ is plate current}$$

Transconductance (g_m) - obtained from the grid family of curves

$$g_m = \frac{\Delta i_p}{\Delta e_g} \quad \text{where } e_g \text{ is the grid voltage and } i_p \text{ is the plate current}$$

Amplification factor (μ) - must be obtained from both families of curves

$$\mu = \frac{\Delta e_p}{\Delta e_g} = g_m * r_p$$

By: Amanda Leonard
Maricela Tellez

General Electric
Tube 1
Grid Family

Grid voltage vs Cathode Current

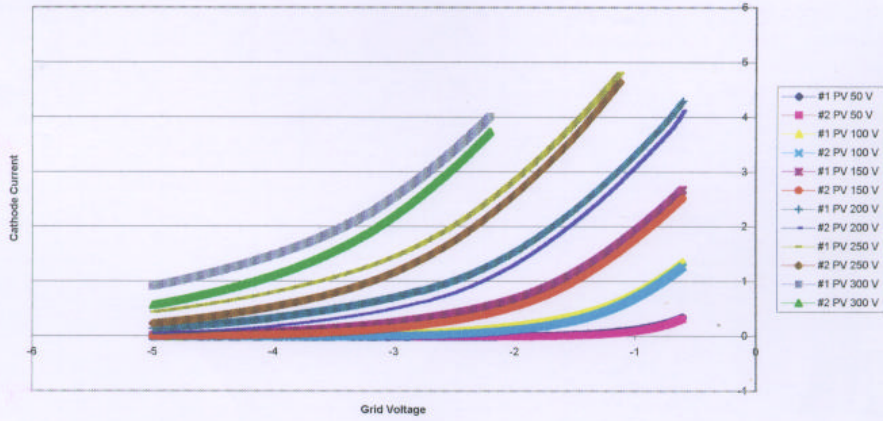
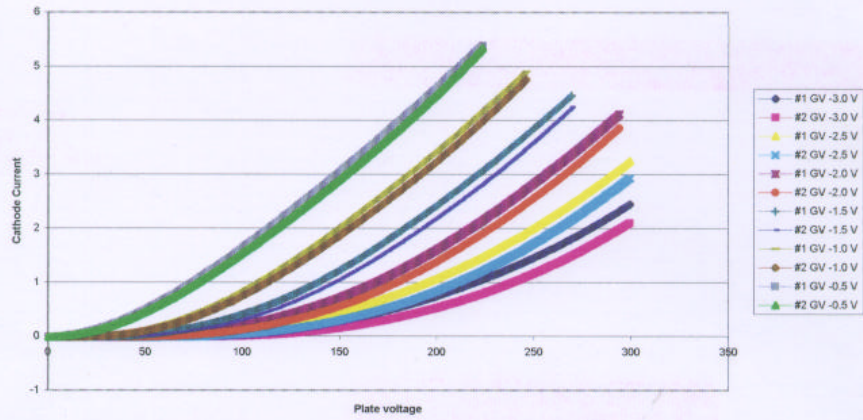


Plate Family

Plate voltage vs Cathode Current



General Electric
Tube 2
Grid Family

Grid voltage vs Cathode Current

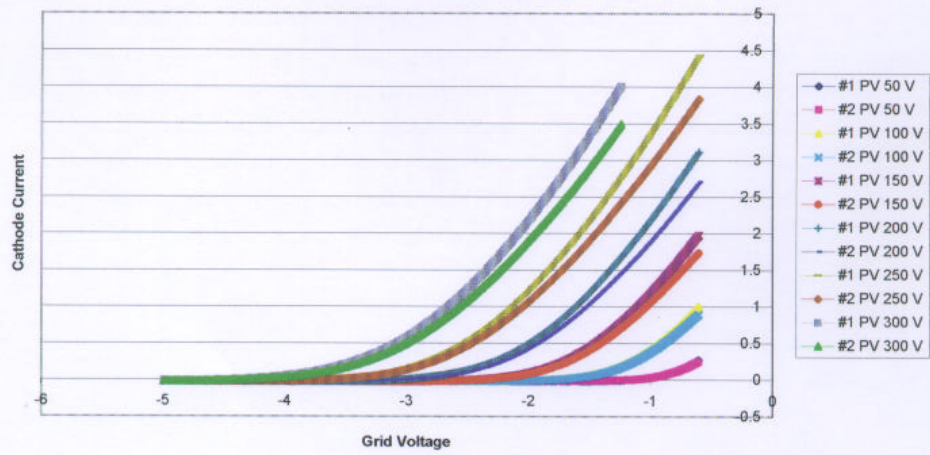
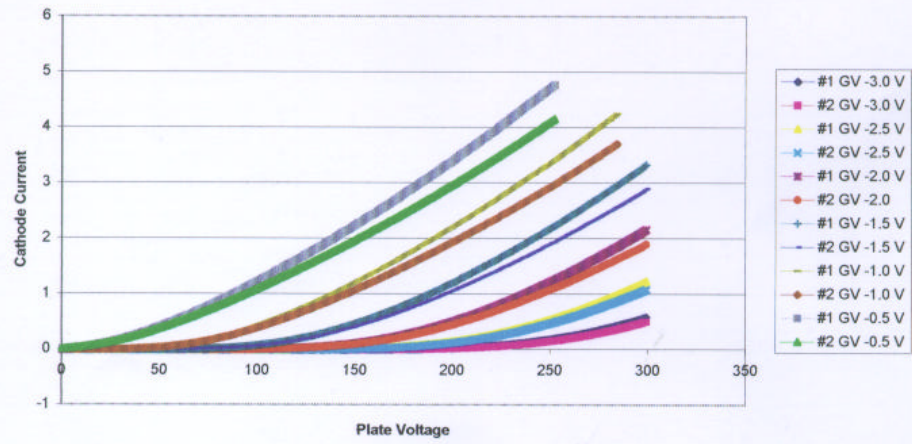


Plate Family

Plate voltage vs Cathode Current



General Electric Tube 3 Grid Family

Grid voltage vs Cathode Current

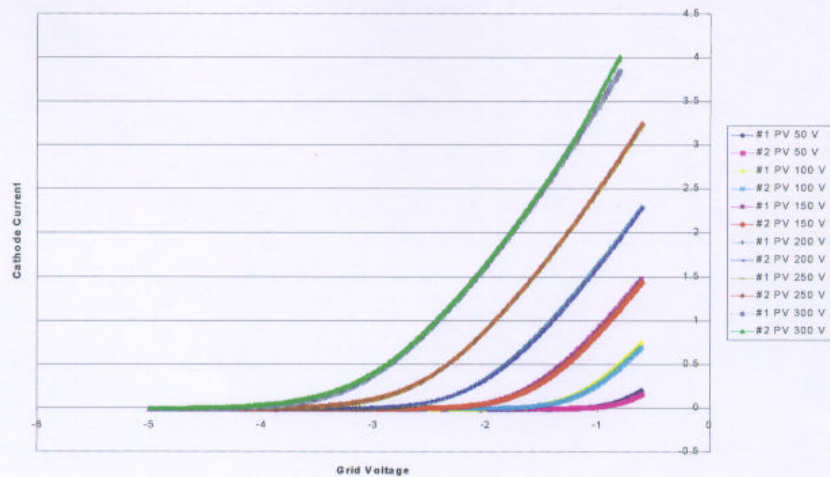
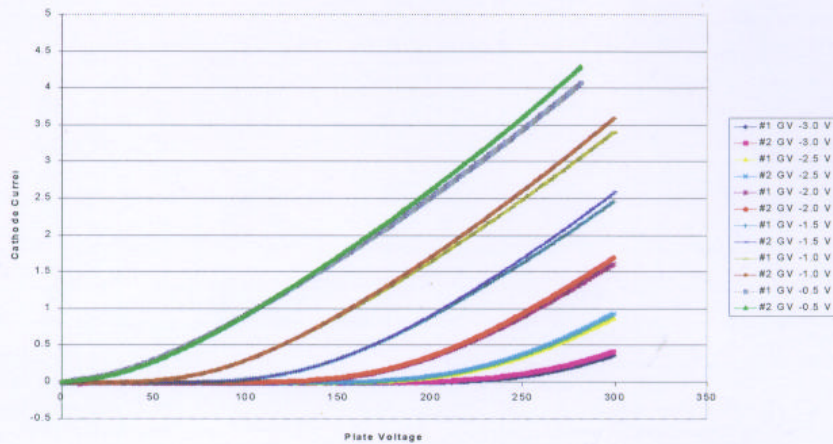


Plate Family

Plate voltage vs Cathode Current



General Electric
Tube 4
Grid Family

Grid voltage vs Cathode Current

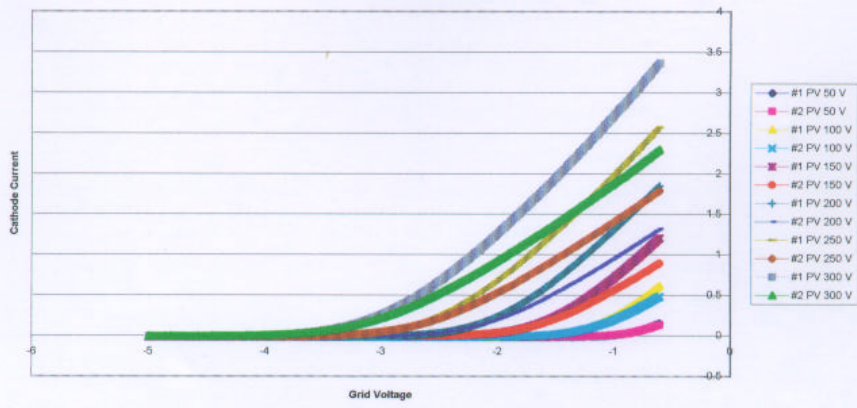
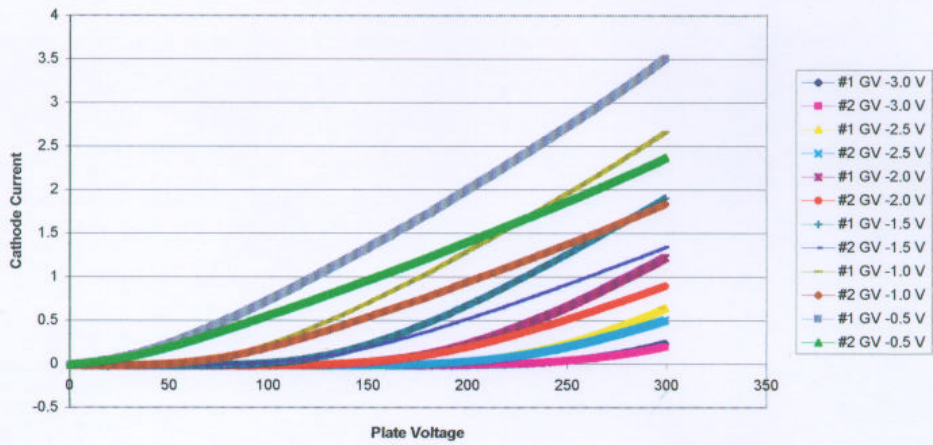


Plate Family

Plate voltage vs Cathode Current



Groove Tube
 Tube 1
 Grid Family
 Grid voltage vs Cathode Current

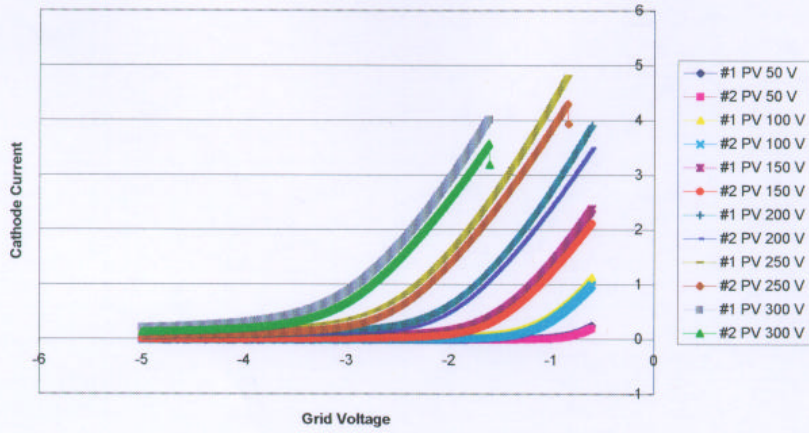
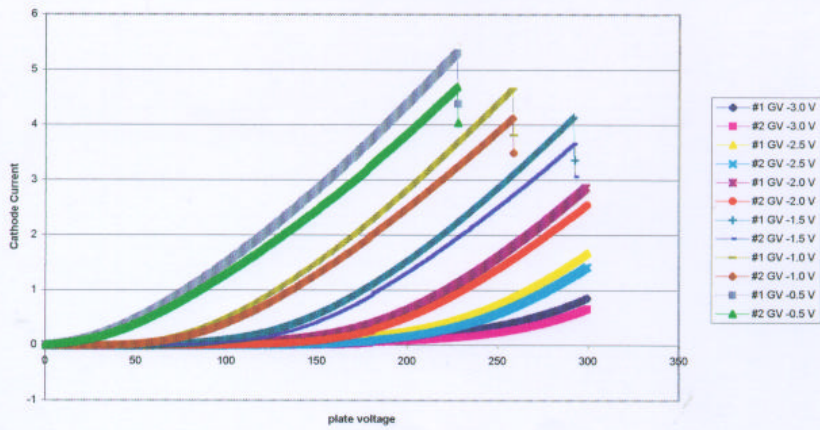


Plate Family
 plate voltage vs Cathode Current



Groove Tube
Tube 3

Grid Family

Grid voltage vs Cathode Current

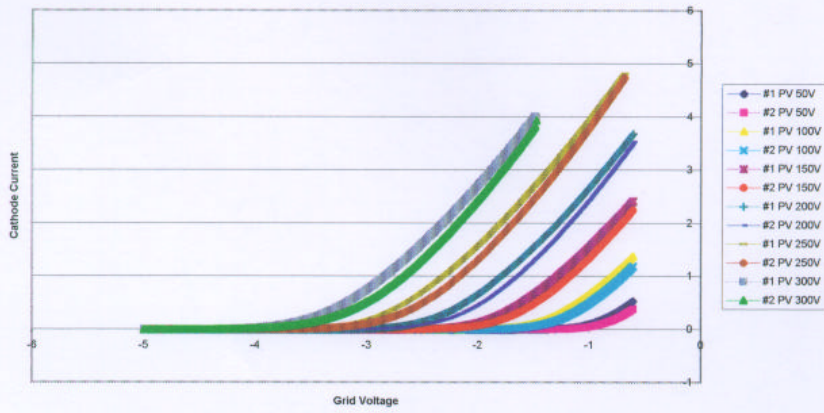
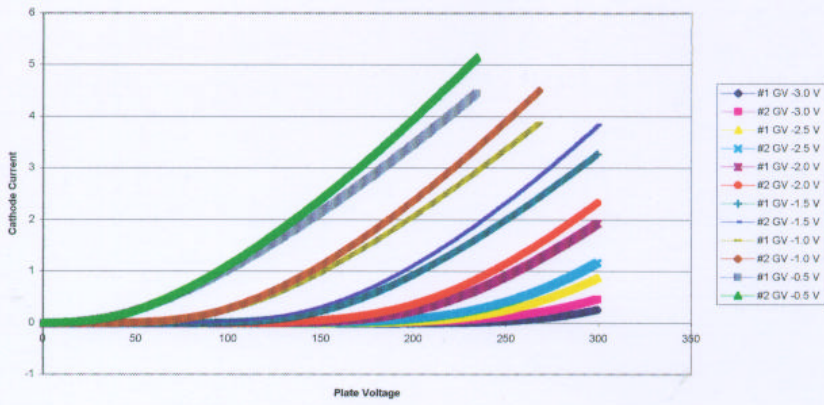


Plate Family

Plate voltage vs Cathode Current



Groove Tube
Tube 4
Grid Family

Grid voltage vs Cathode Current

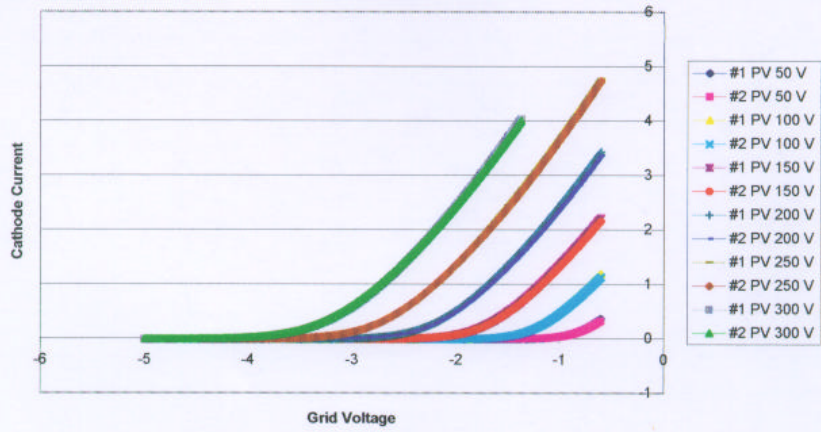
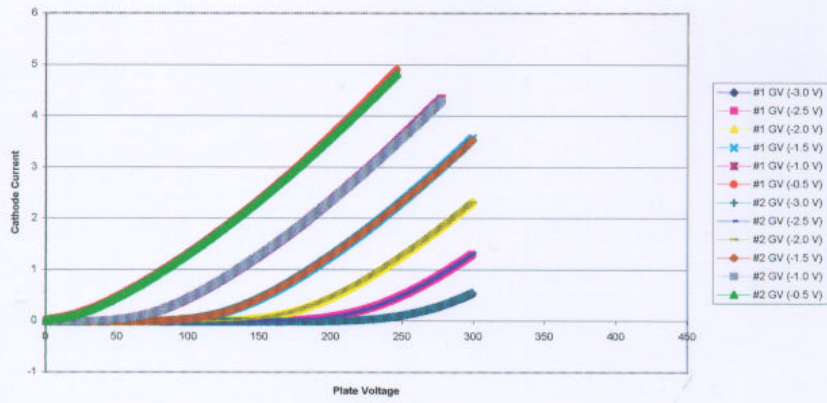


Plate Family

Plate voltage vs Cathode Current



Groove Tube
Tube 5
Grid Family

Grid voltage vs Cathode Current

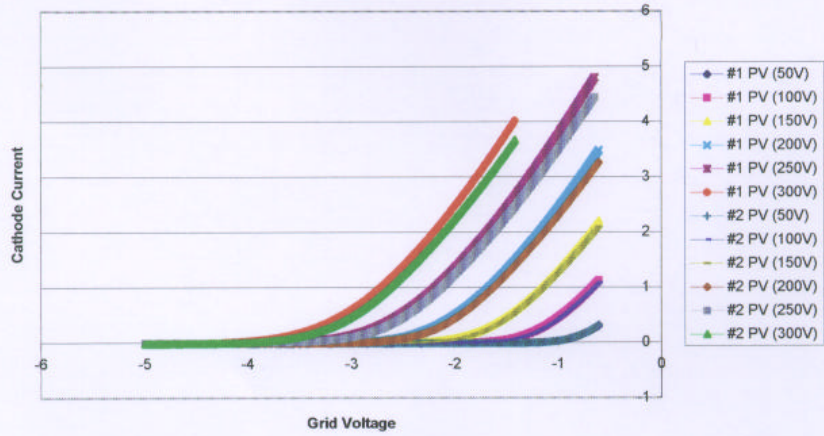
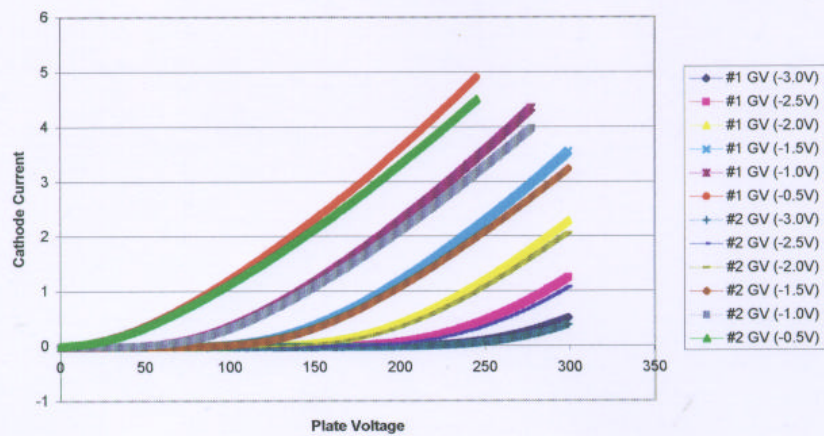


Plate Family

Plate voltage vs Cathode Current



New RCA
Tube 1
Grid Family

Grid voltage vs Cathode Current

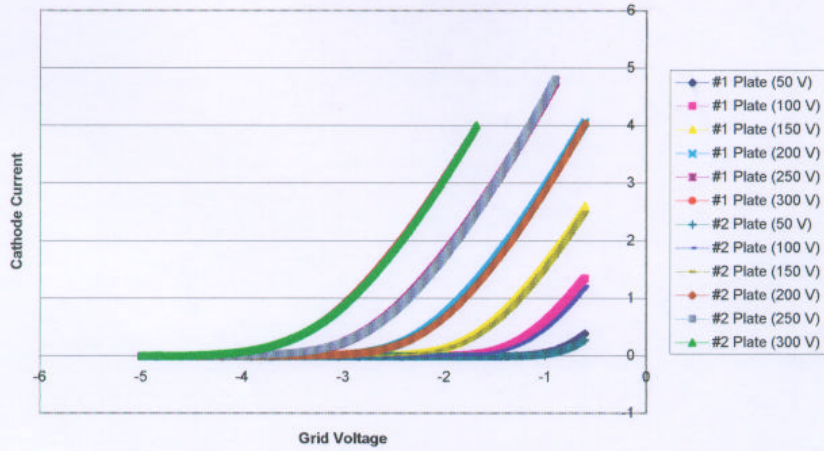
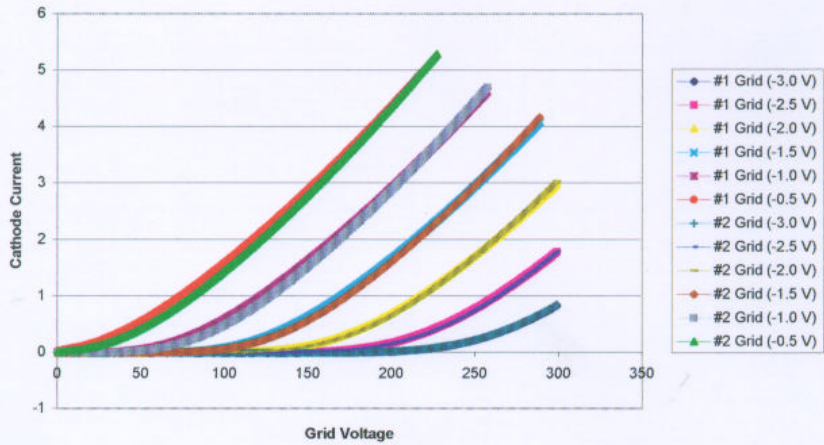


Plate Family

Plate voltage vs Cathode Current



New RCA
Tube 2
Grid Family

Grid voltage vs Cathode Current

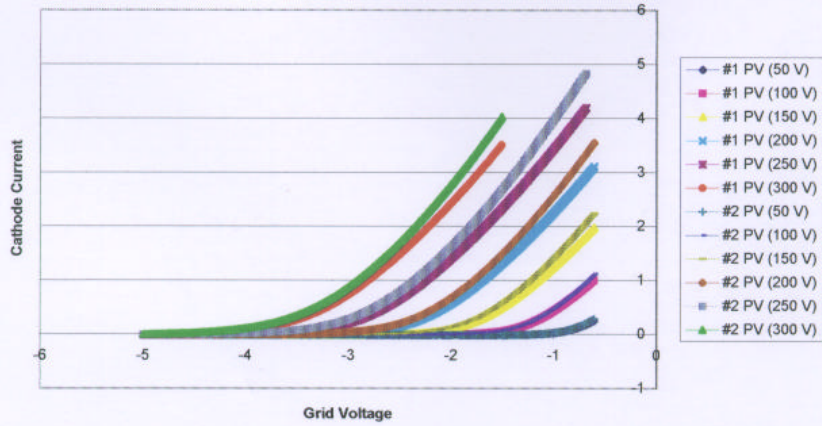
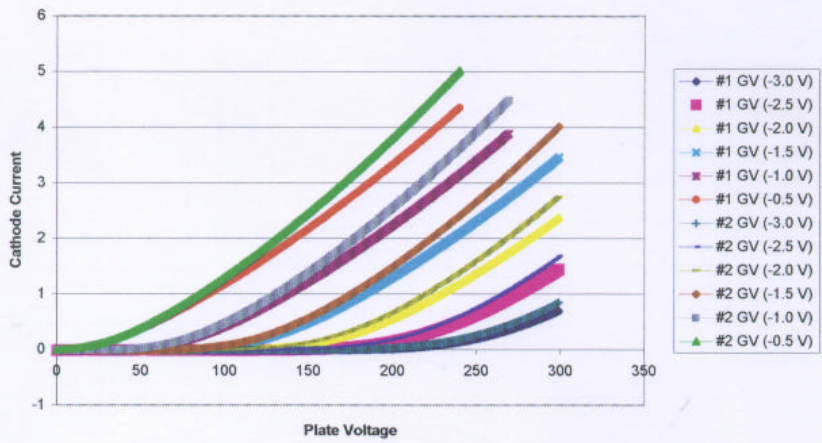


Plate Family

Plate voltage vs Cathode Current



New RCA
Tube 3
Grid Family

Grid voltage vs Cathode Current

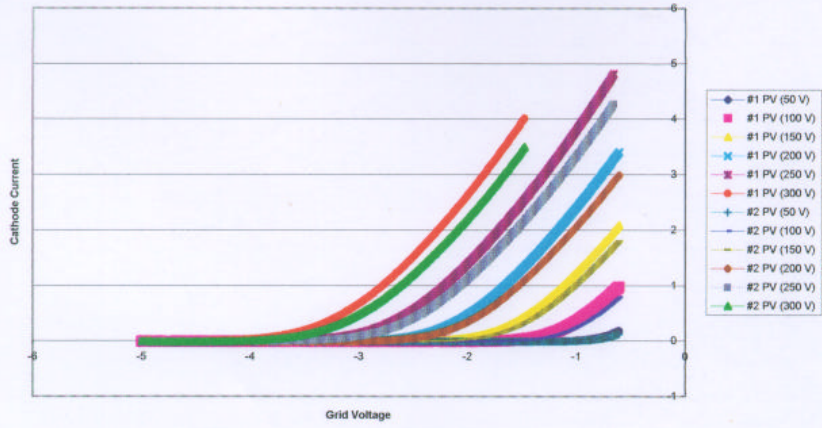
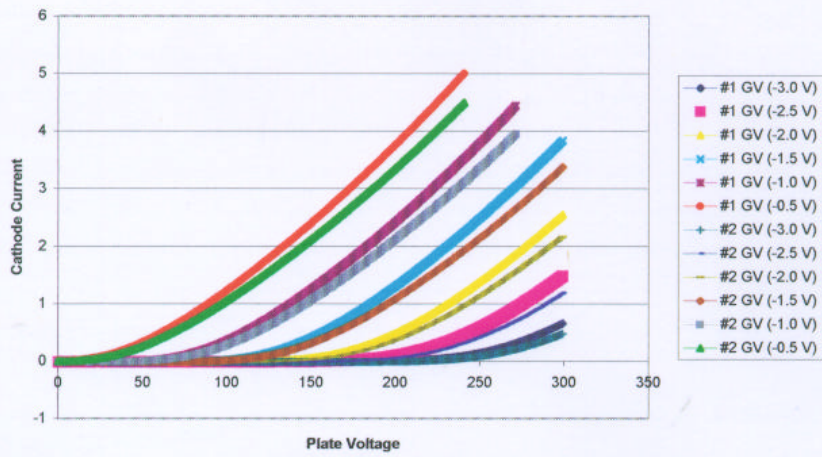


Plate Family

Plate voltage vs Cathode Current



New RCA
Tube 4
Grid Family

Grid voltage vs Cathode Current

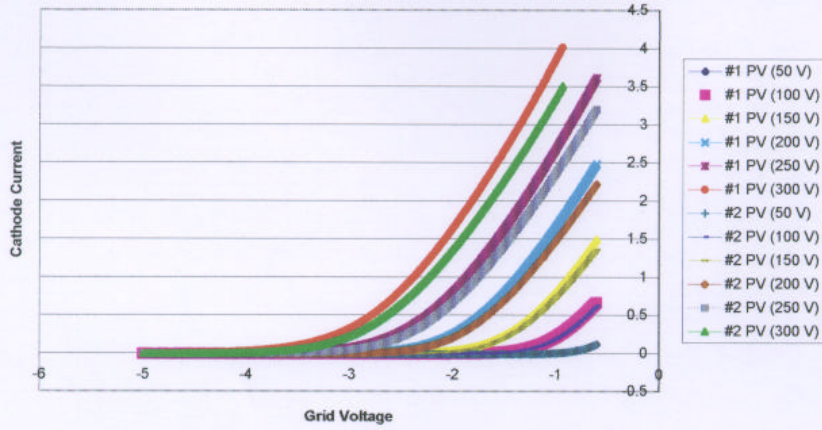
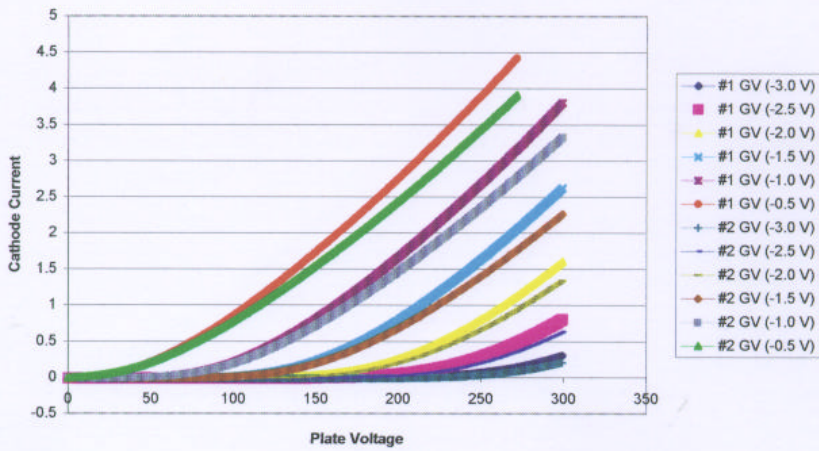


Plate Family

Plate voltage vs Cathode Current



New RCA
Tube 5
Grid Family

Grid voltage vs Cathode Current

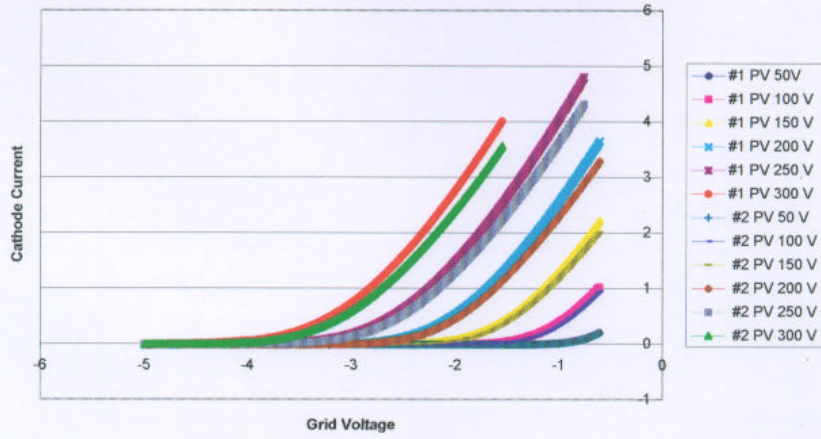
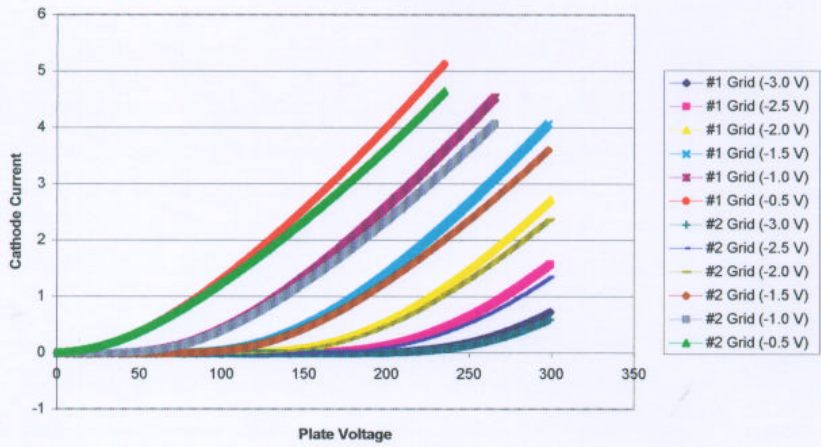


Plate Family

Plate voltage vs Cathode Current



Old RCA
Tube 1

Grid Family

Grid voltage vs Cathode Current

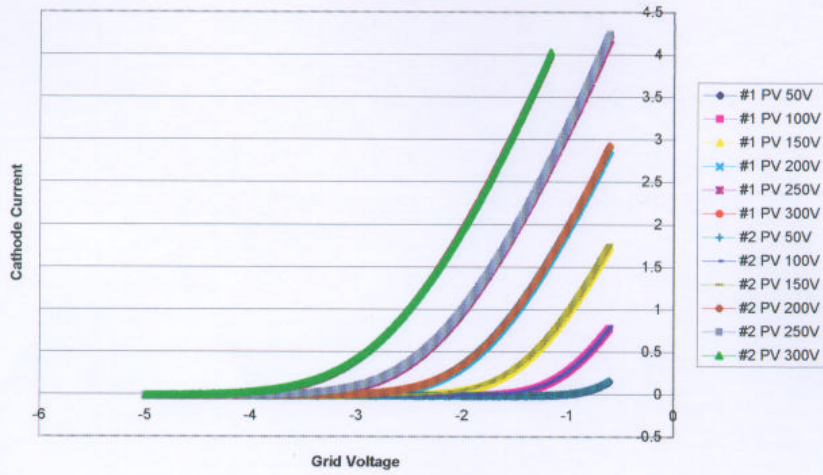
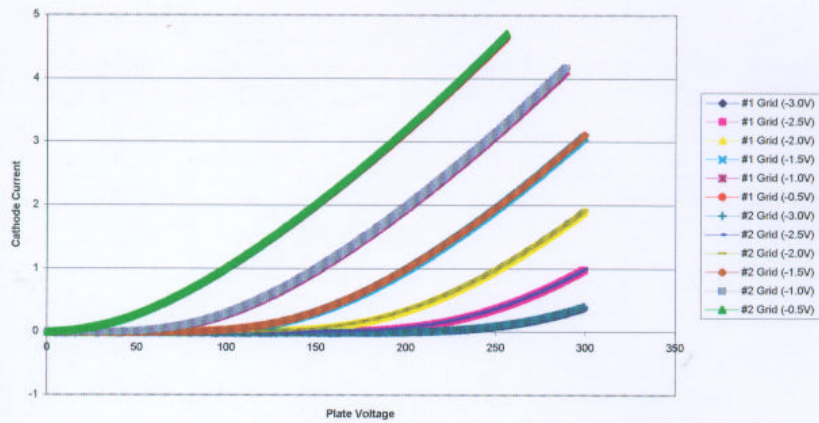


Plate Family

Plate voltage vs Cathode Current



Old RCA
Tube 2
Grid Family

Grid voltage vs Cathode Current

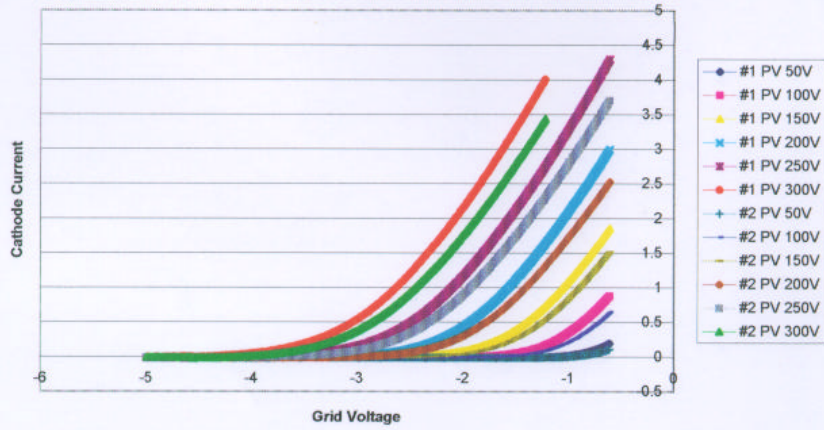
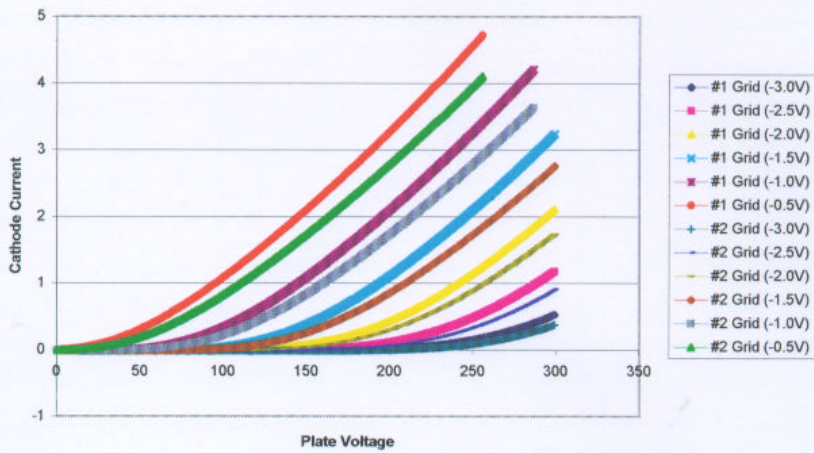


Plate Family

Plate voltage vs Cathode Current



Old RCA
Tube 3
Grid Family

Grid voltage vs Cathode Current

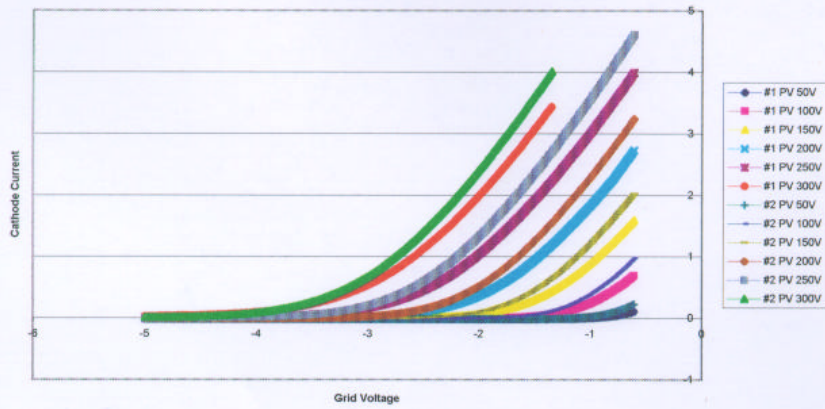
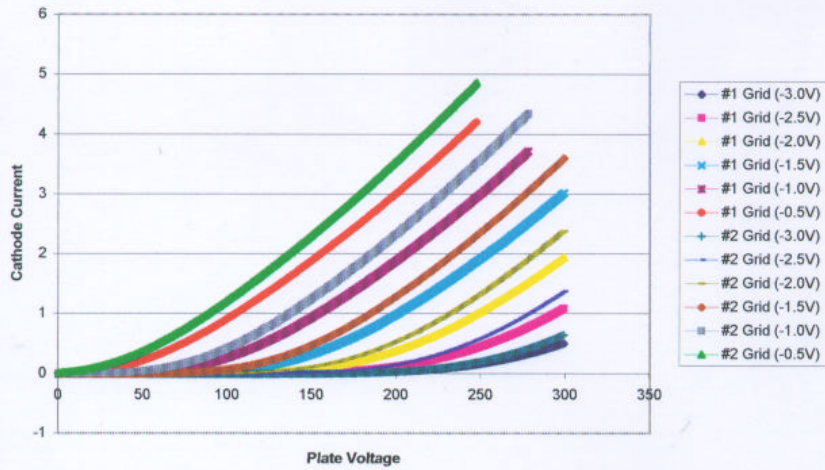


Plate Family

Plate voltage vs Cathode Current



Old RCA
Tube 4
Grid Family

Grid voltage vs Cathode Current

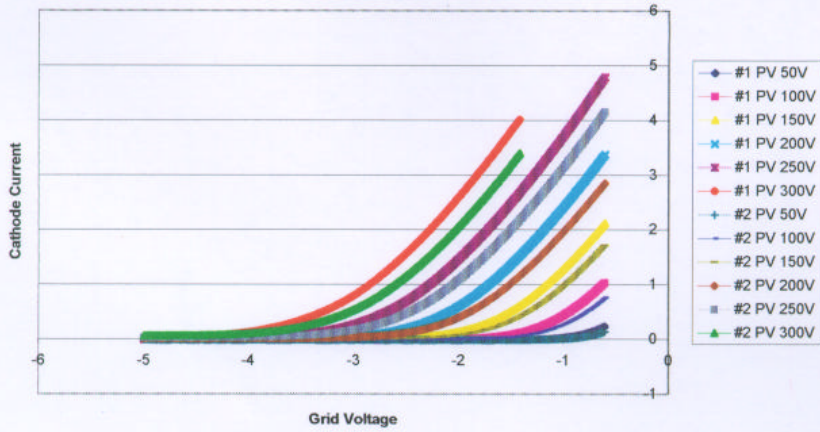
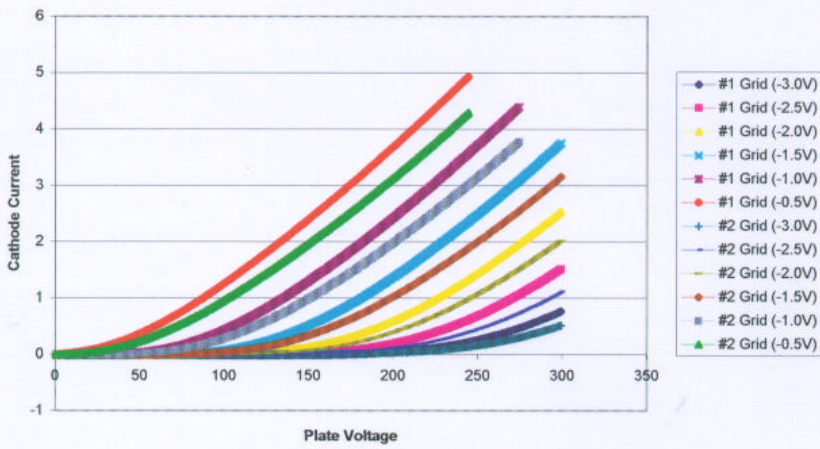


Plate Family

Plate voltage vs Cathode Current



Old RCA
Tube 5
Grid Family

Grid voltage vs Cathode Current

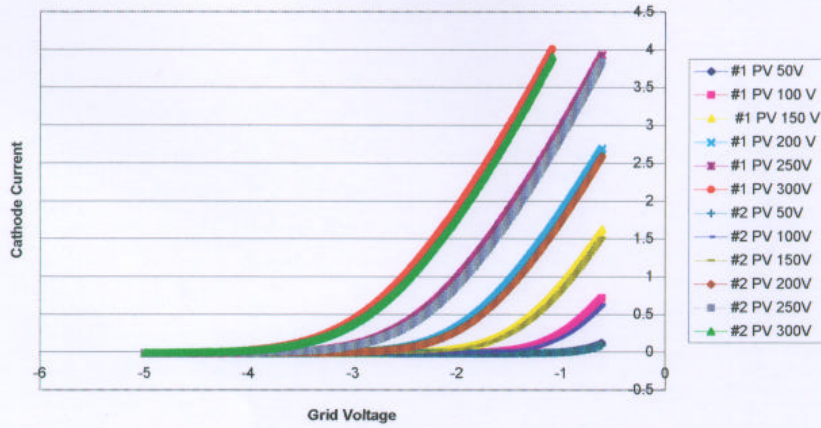
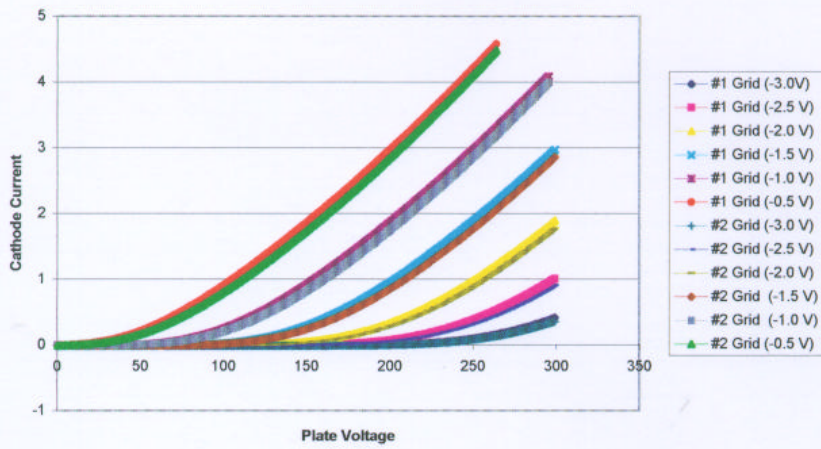


Plate Family

Plate voltage vs Cathode Current



Telefunken
Tube 1

Grid Family

Grid voltage vs Cathode Current

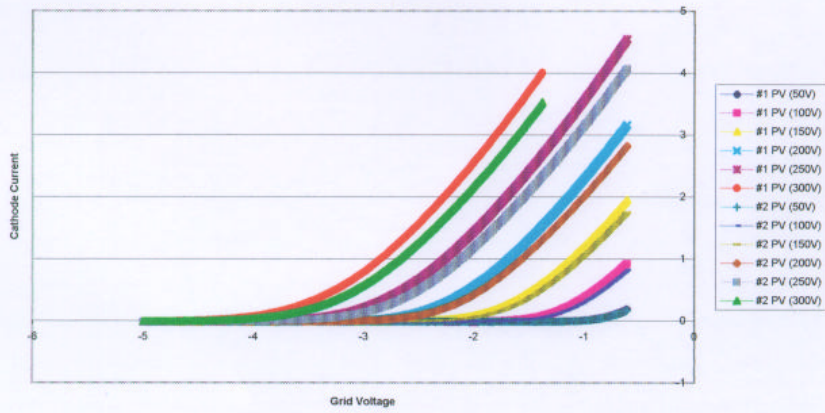
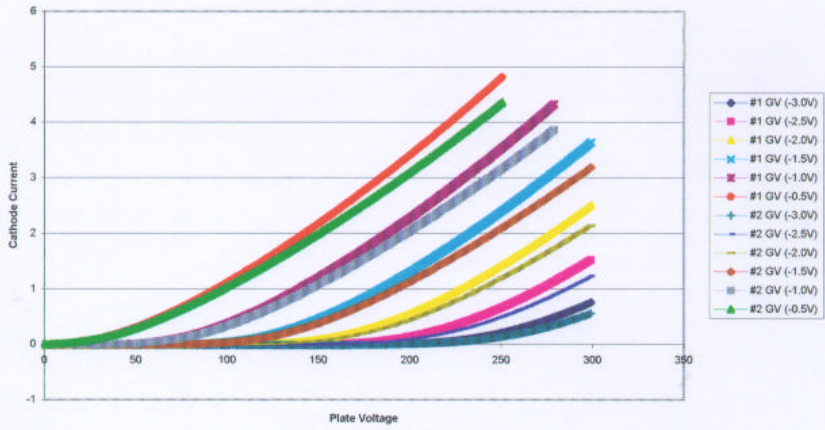


Plate Family

Plate voltage vs Cathode Current



Telefunken
Tube 2
Grid Family

Grid voltage vs Cathode Current

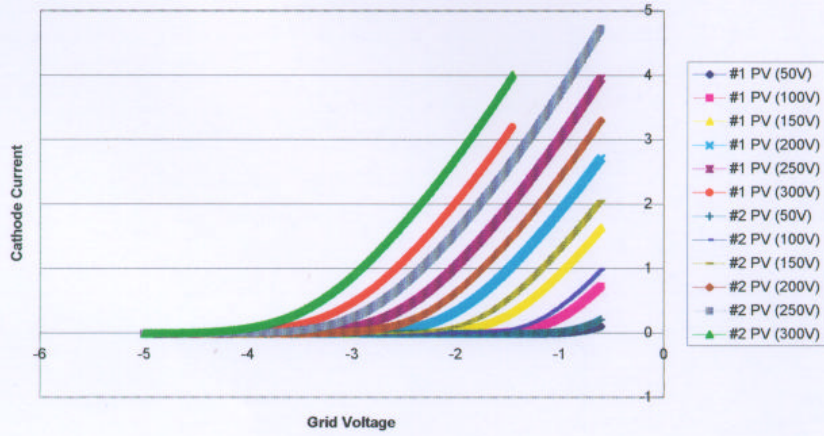
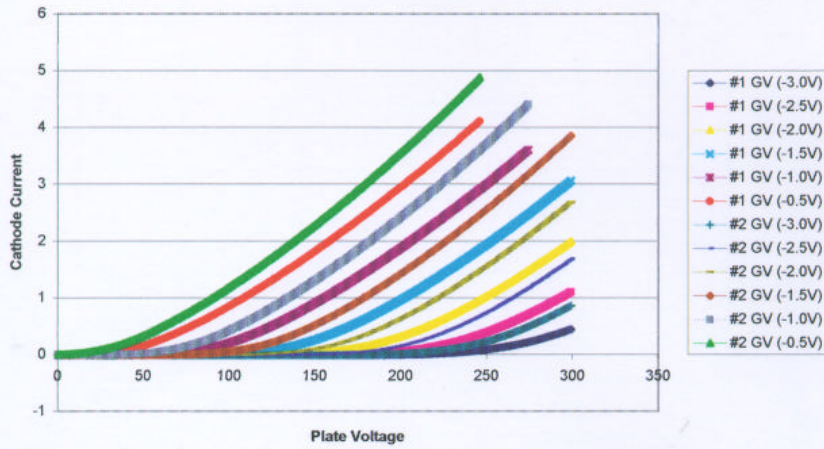


Plate Family
Plate voltage vs Cathode Current



Telefunken
Tube 3
Grid Family

Grid voltage vs Cathode Current

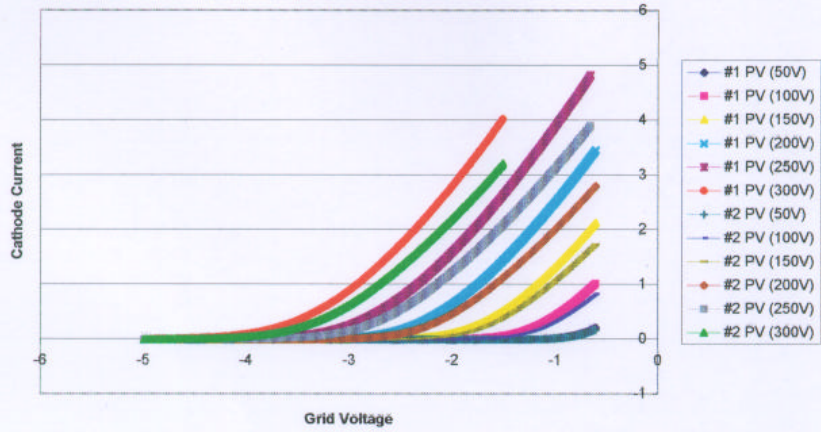
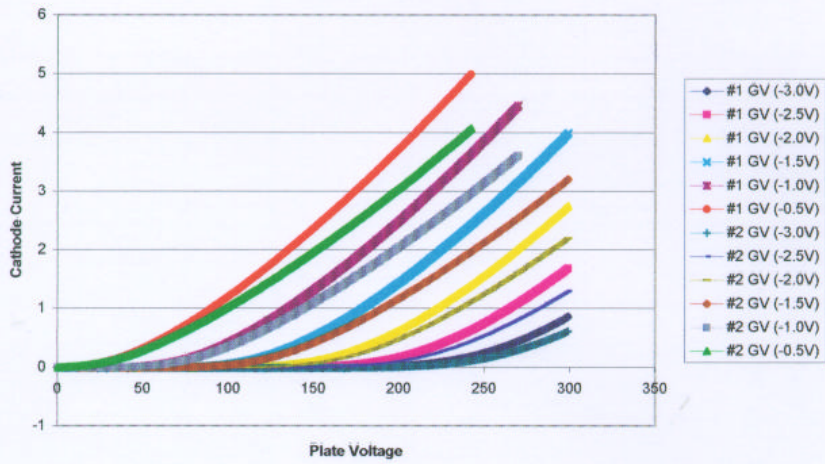


Plate Family

Plate voltage vs Cathode Current



Telefunken
Tube 4
Grid Family

Grid voltage vs Cathode Current

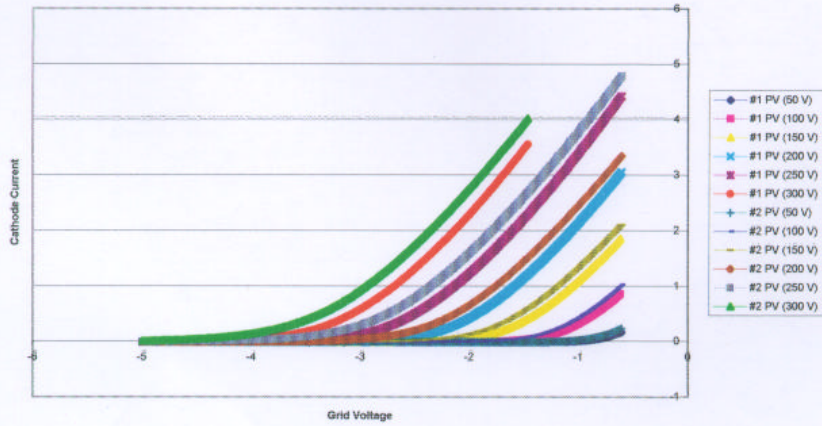
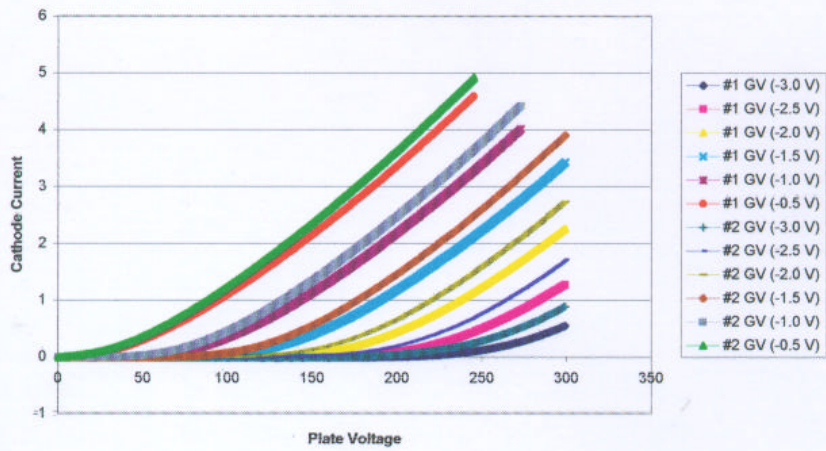


Plate Family

Plate voltage vs Cathode Current



Telefunken
Tube 5
Grid Family

Grid voltage vs Cathode Current

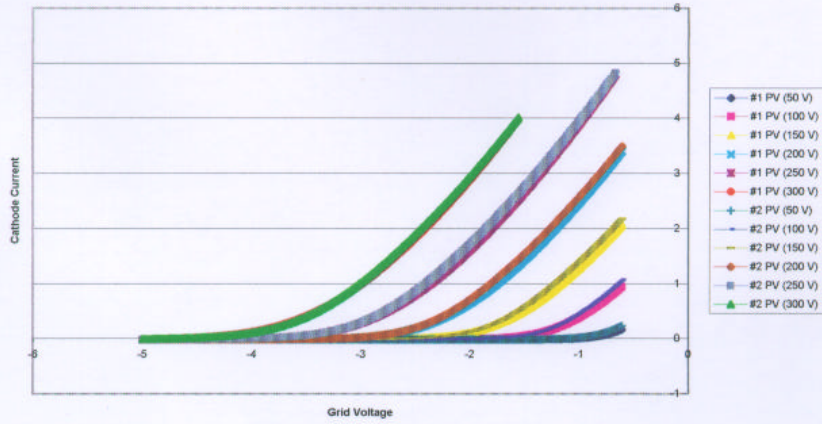


Plate Family

Plate voltage vs Cathode Current

