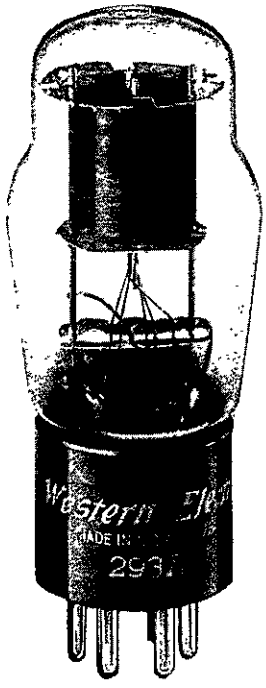


PENTODE
POWER AMPLIFIER

Western Electric

DESCRIPTION

The 293A is a suppressor grid, power pentode having an indirectly heated cathode. It is designed for use as an audio-frequency power amplifier in Class A_1 service.

CHARACTERISTICS

Heater Voltage		10.0 volts
Plate Current	$E_b = E_{c2} = 180$ volts; $E_{c1} = -18$ volts; $E_{c3} = 0$	15.8 milliamperes
Transconductance		1175 micromhos
Power Output		1.2 watts

GENERAL CHARACTERISTICS

ELECTRICAL DATA

Heater Voltage, A-C or D-C	10.0	volts
Heater Current	320	milliamperes
Direct Interelectrode Capacitances (without external shield)		
Grid to Plate	0.66	uuf
Input	6.2	uuf
Output	6.5	uuf

MECHANICAL DATA

Cathode	Coated Unipotential
Bulb	ST14
Base	Medium 6-pin
Mounting Position	Any

Dimensions and pin connections shown in outline drawing on Page 6

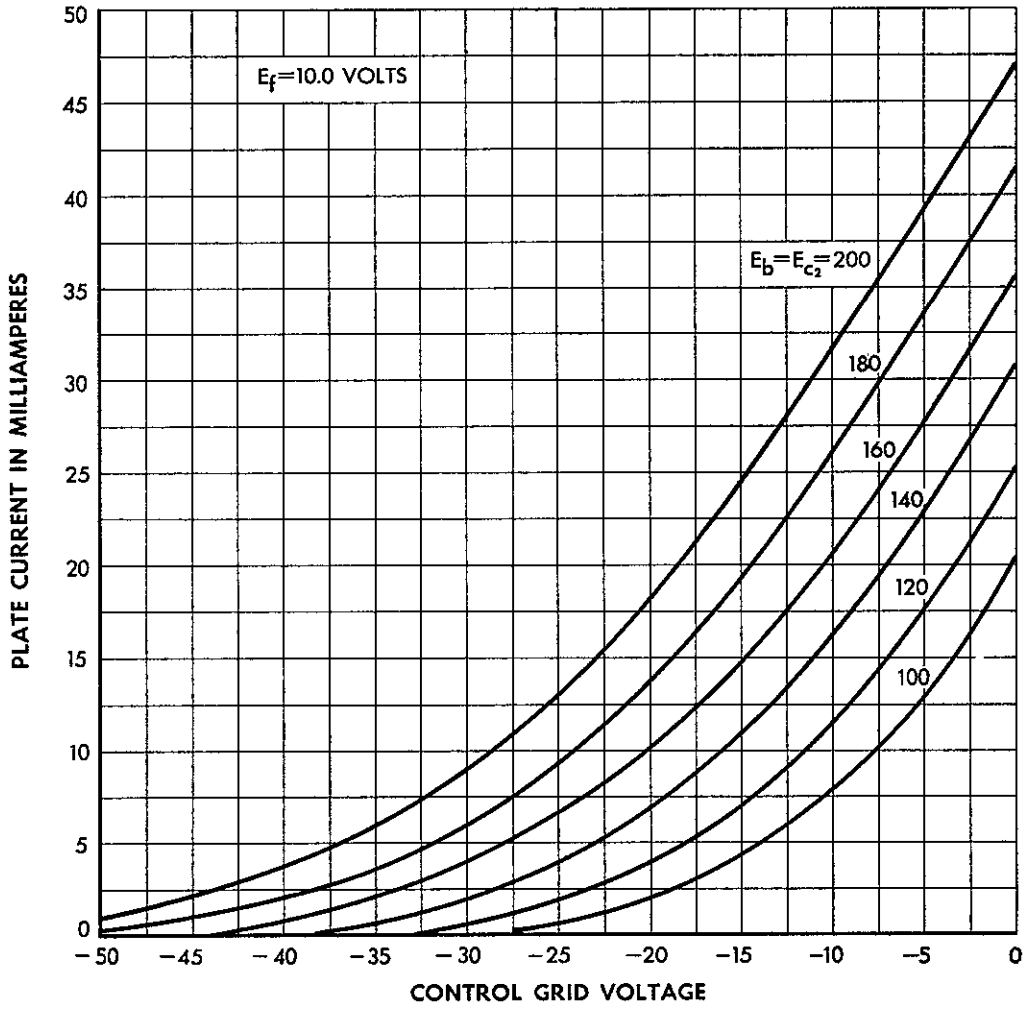
MAXIMUM RATINGS, Design-Center Values

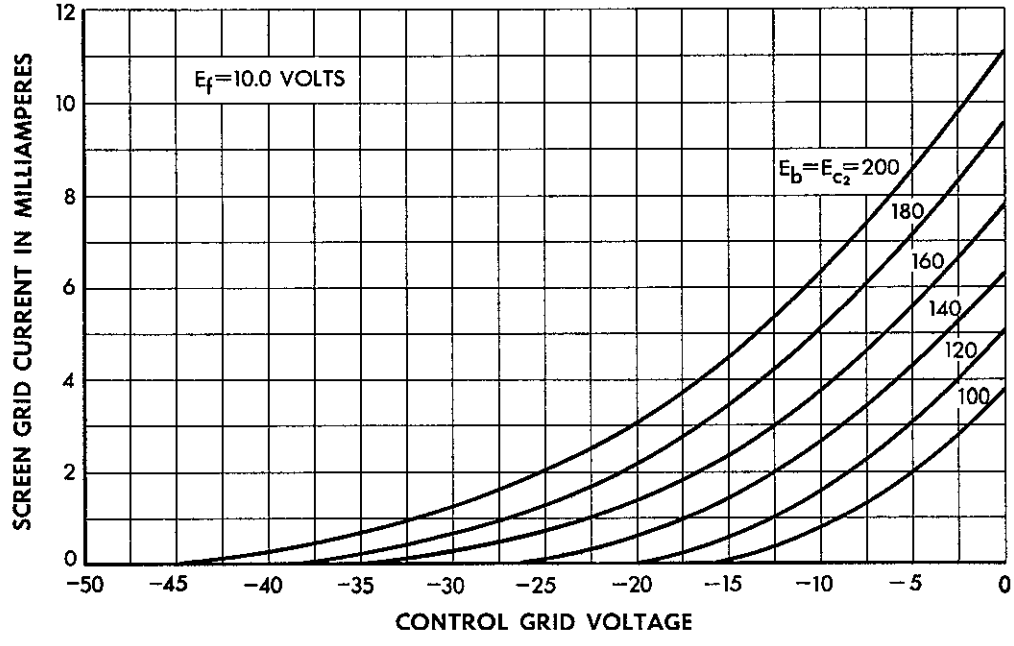
Plate Voltage	250	volts
Screen Grid Voltage	200	volts
Plate Dissipation	5	watts
Screen Grid Dissipation	1	watt
Cathode Current	30	milliamperes
Heater-Cathode Voltage	150	volts

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

SINGLE TUBE AMPLIFIER – CLASS A_1

Plate Voltage	135	180	250	volts
Screen Grid Voltage	135	180	200	volts
Control Grid Voltage	−12	−18	−18	volts
Peak A-F Grid Voltage	12	18	18	volts
Zero Signal Plate Current	12.5	15.8	21.5	milliamperes
Maximum Signal Plate Current	13.5	17.0	23.5	milliamperes
Zero Signal Screen Grid Current	1.9	2.7	3.5	milliamperes
Maximum Signal Screen Grid Current	3.2	5.2	5.6	milliamperes
Transconductance	1140	1175	1340	micromhos
Plate Resistance	95000	100000	100000	ohms
Load Resistance	11000	11500	12000	ohms
Maximum Signal Power Output	0.6	1.3	2.1	watts
Total Harmonic Distortion	9.7	11	10	per cent


Ef=10.0 VOLTS
Eb=Ec2=200
180
160
140
120
100
PLATE CURRENT IN MILLIAMPERES
CONTROL GRID VOLTAGE
50
45
40
35
30
25
20
15
10
5
0
−50
−45
−40
−35
−30
−25
−20
−15
−10
−5
0


Ef=10.0 VOLTS
Eb=Ec2=200
180
160
140
120
100
SCREEN GRID CURRENT IN MILLIAMPERES
CONTROL GRID VOLTAGE
12
10
8
6
4
2
0
−50
−45
−40
−35
−30
−25
−20
−15
−10
−5
0

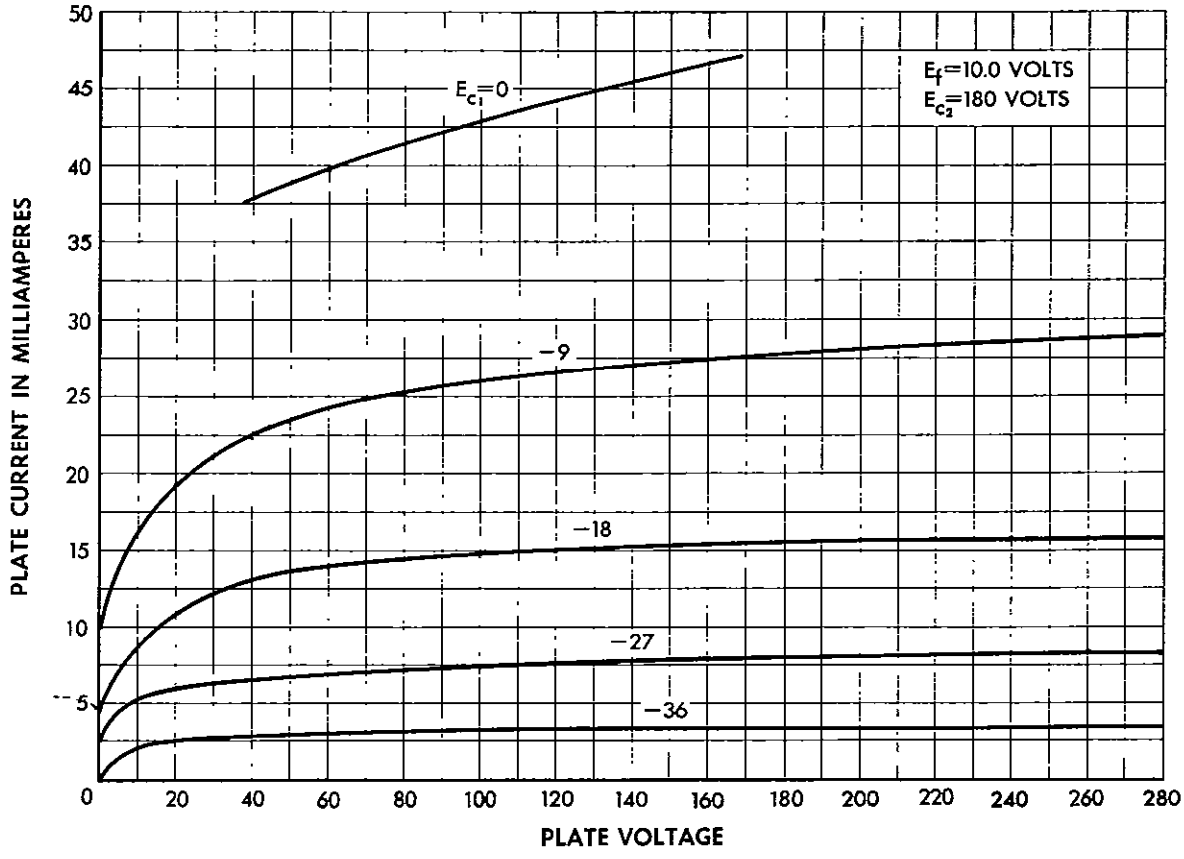
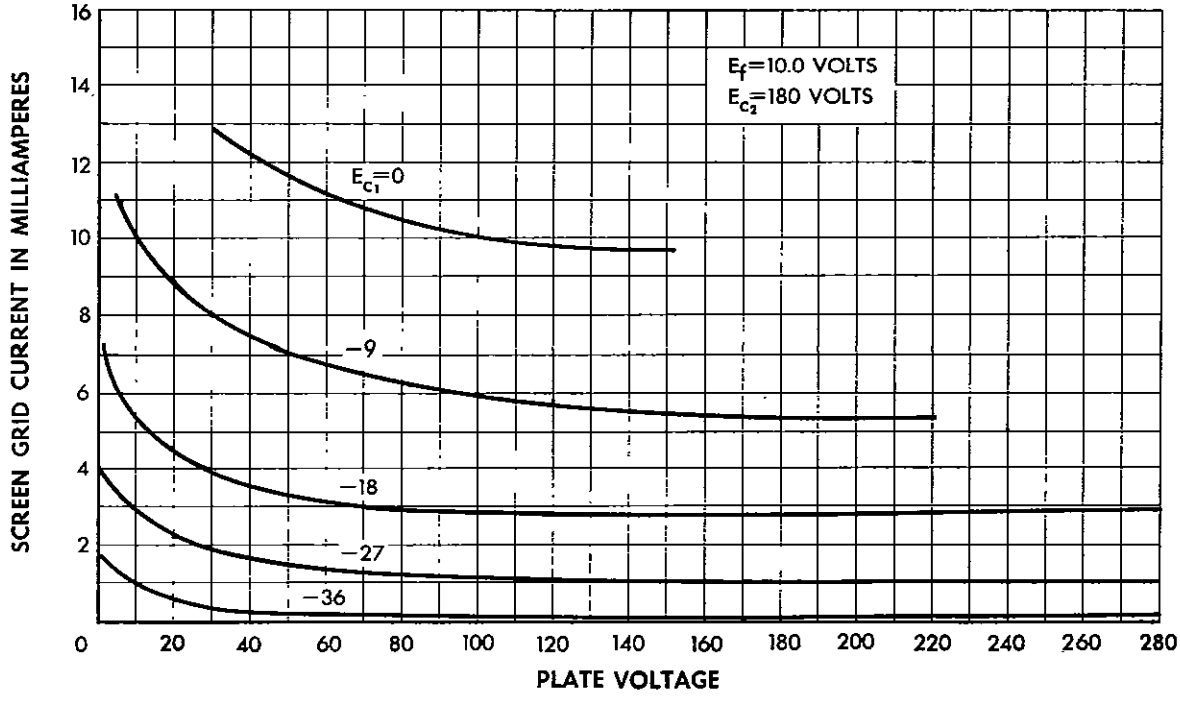
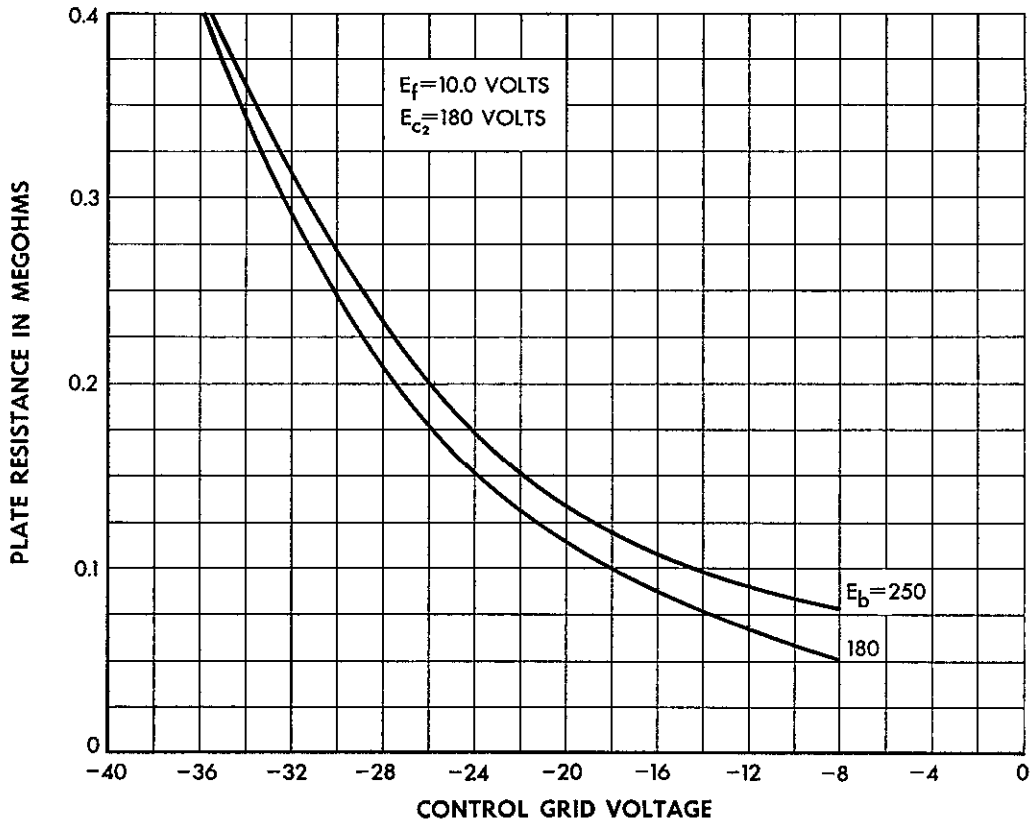
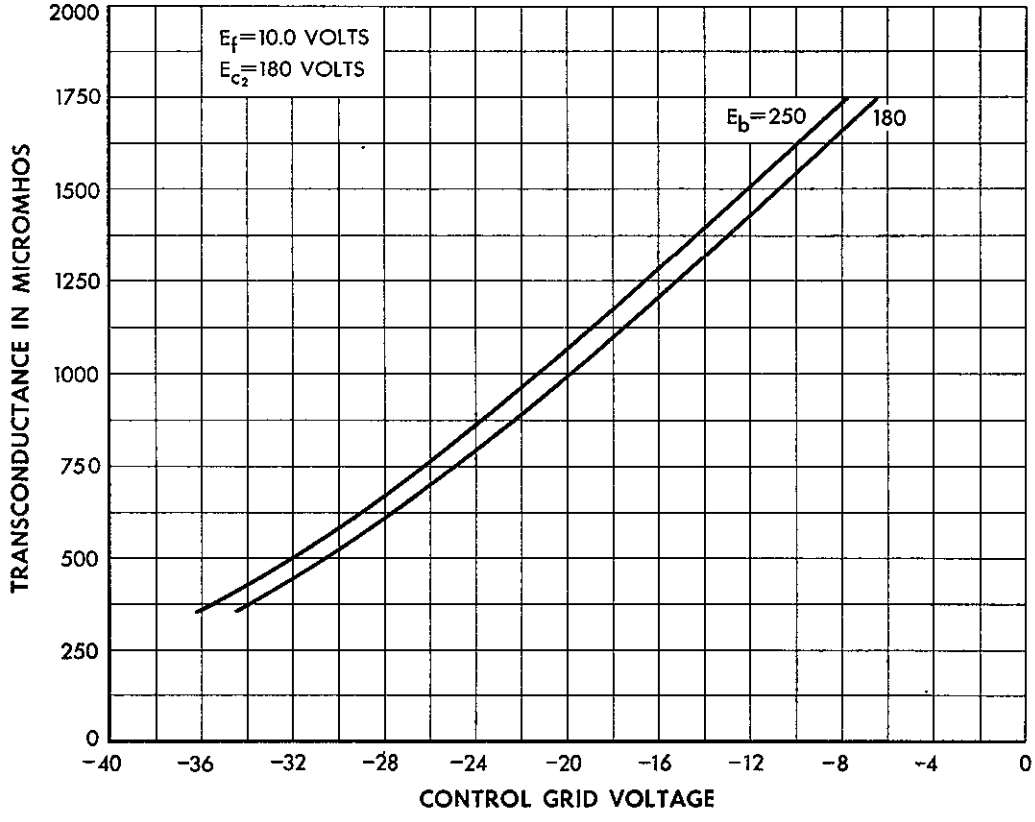
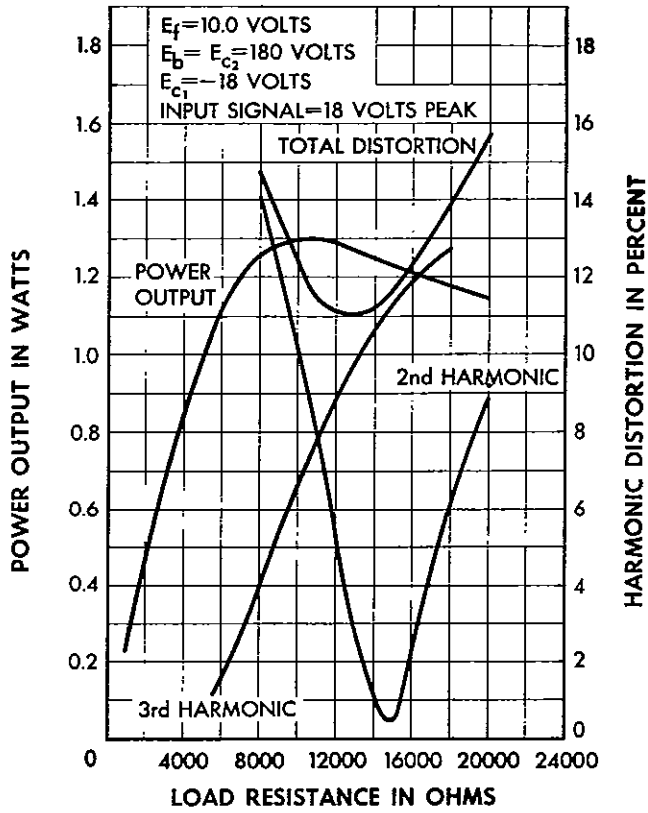


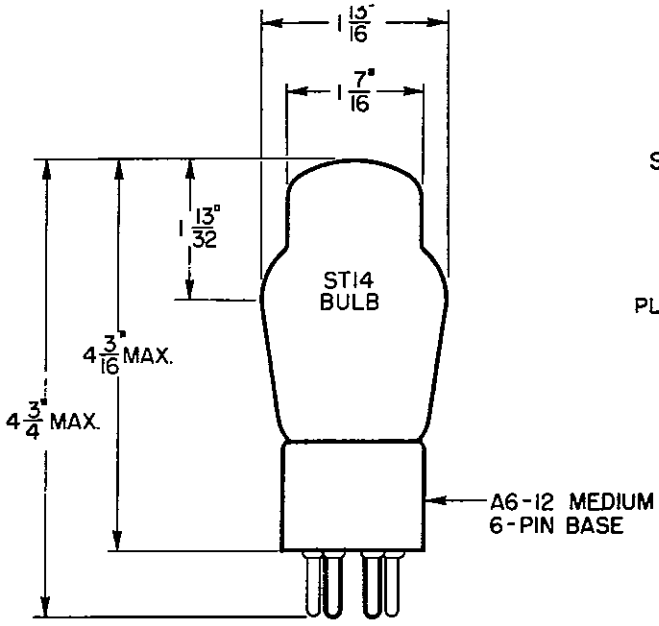
PLATE CURRENT IN MILLIAMPERES
PLATE VOLTAGE
E_f=10.0 VOLTS
E_{c_2}=180 VOLTS
E_{c_1}=0
−9
−18
−27
−36
0
5
10
15
20
25
30
35
40
45
50
20
40
60
80
100
120
140
160
180
200
220
240
260
280

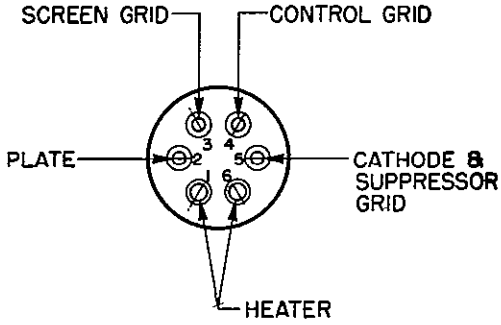

SCREEN GRID CURRENT IN MILLIAMPERES
PLATE VOLTAGE
E_f=10.0 VOLTS
E_{c_2}=180 VOLTS
E_{c_1}=0
−9
−18
−27
−36
0
2
4
6
8
10
12
14
16
20
40
60
80
100
120
140
160
180
200
220
240
260
280


E_f=10.0 VOLTS
E_{c_2}=180 VOLTS
E_b=250
180
PLATE RESISTANCE IN MEGOHMS
0.4
0.3
0.2
0.1
0
−40
−36
−32
−28
−24
−20
−16
−12
−8
−4
0
CONTROL GRID VOLTAGE


E_f=10.0 VOLTS
E_{c_2}=180 VOLTS
E_b=250
180
TRANSCONDUCTANCE IN MICROMHOS
2000
1750
1500
1250
1000
750
500
250
0
−40
−36
−32
−28
−24
−20
−16
−12
−8
−4
0
CONTROL GRID VOLTAGE







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A development of Bell Telephone Laboratories, the research laboratories of the American Telephone and Telegraph Company and the Western Electric Company.