



Excellence in Electronics

The 6BN6 is a heater-cathode type beam tube of miniature construction designed primarily to perform the combined operations of the limiter, discriminator and audio-voltage amplifier in FM and intercarrier television receivers. The 6BN6 may be used as a limiter or sync-clipper.

Except for heater characteristics, the 3BN6 is identical to the 6BN6. The 3BN6 has a 600-milli-ampere heater rating and a controlled heater warm-up characteristic.

The 4BN6 with a 450-milliampere heater rating and controlled heater warm-up is otherwise identical to the 6BN6.

The 12BN6 is identical to the 6BN6 except for heater characteristics and is especially useful in AC/DC radio receivers.

MECHANICAL DATA

ENVELOPE: T-5 1/2 Glass

BASE: Miniature Button 7-Pin

TERMINAL CONNECTIONS:

- Pin 1 Cathode, Focus Electrode and Internal Shields
- Pin 2 Grid #1 (Signal or Limiter)
- Pin 3 Heater

- Pin 4 Heater
- Pin 5 Grid #2 (Accelerator)
- Pin 6 Grid #3 (Quadrature)
- Pin 7 Plate

MOUNTING POSITION: Any

ELECTRICAL DATA

HEATER CHARACTERISTICS:

	<u>3BN6</u>	<u>4BN6</u>	<u>6BN6</u>	<u>12BN6</u>
Heater Voltage (ac or dc)	3.15	4.2	6.3	12.6 volts
Heater Current	0.6	0.45	0.3	0.15 amp.
Maximum Heater-Cathode Voltage:				
Heater Positive with Respect to Cathode				
DC Component	100	100	----	----
Total DC and Peak	200	200	90	90 volts
Heater Negative with Respect to Cathode				
Total DC and Peak	200	200	90	90 volts
Heater Warm-up Time *	11	11	----	----

DIRECT INTERELECTRODE CAPACITANCES: (μfds.)

Grid #1 to All	4.2
Grid #3 to All	3.3
Grid #1 to Grid #3	0.004 max.

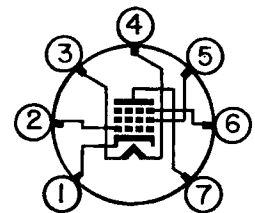
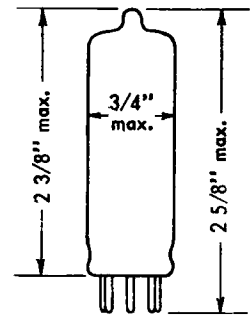
DESIGN CENTER MAXIMUM RATINGS:

Plate Supply Voltage	300 volts
Grid #2 (Accelerator) Voltage	100 volts
Peak Positive Grid #1 (Limiter-Grid) Voltage	55 volts
Total Cathode Current	11.5 ma.

CHARACTERISTICS AND TYPICAL OPERATION - LIMITER-DISCRIMINATOR SERVICE:

Input - Signal Center Frequency	10.7	10.7	4.5 Mc
Frequency Deviation	± 75	± 75	± 25 Kc
Plate Supply Voltage	85	285	270 volts
Plate Voltage	63	122	121 volts
Accelerator Voltage	55	100	100 volts
Cathode - Bias Resistor (Variables) ▲	200-400	200-400	200-400 ohms
Plate Load Resistor	85,000	330,000	330,000 ohms
Plate Linearity Resistor	470	1500	1000 ohms
Integrating Capacitor	.002	.001	.001 μfd.
Coupling Capacitor	.25	.01	.25 μfd.
Minimum Signal Voltage for Limiting Action ● (RMS)	1.25	1.25	1.25 volts
Average DC Plate Current	0.25	0.49	0.44 ma.
Accelerator Current	4.1	9.8	10.0 ma.
Input Signal Level for AM Rejection Adjustment ▲	1.25	2.0	2.0 volts

**TYPE
6BN6
3BN6
4BN6
12BN6**



BOTTOM VIEW

7DF

Tentative Data

RECEIVING TUBE DIVISION

RAYTHEON MANUFACTURING COMPANY

TYPE 6BN6
3BN6
4BN6
12BN6



GATED BEAM DISCRIMINATOR

CHARACTERISTICS AND TYPICAL OPERATION - LIMITER -DISCRIMINATOR SERVICE : (Cont'd)

AM Rejection at $E_{sig}=2.0$ Volts (RMS)	31	20	25 db
AM Rejection at $E_{sig}=3.0$ Volts (RMS)	30	29	30 db
Total Harmonic Distortion	2.0	1.6	1.8 percent
Peak Audio Output Voltage (For an input signal of 1.25 volts RMS.)	6.0	16.6	16.8 volts

▲ The cathode resistor should be adjusted for maximum AM rejection in the output of the limiter-discriminator stage of the specified signal level. AM rejection is measured with an applied signal containing 30% AM and 30% FM.

● At signal levels above specified value, limiting is within ± 2 decibels.

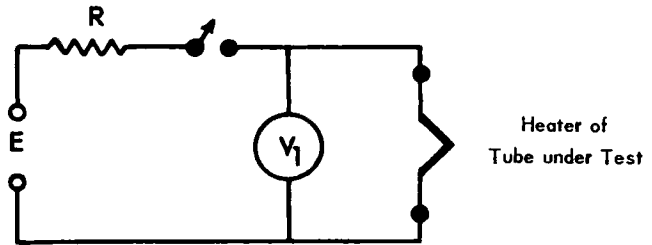
Adequate shielding between components of the limiter grid and the quadrature grid must be used to insure proper phasing of the voltage developed on the quadrature grid.

Standard deemphasis requirements for FM are included.

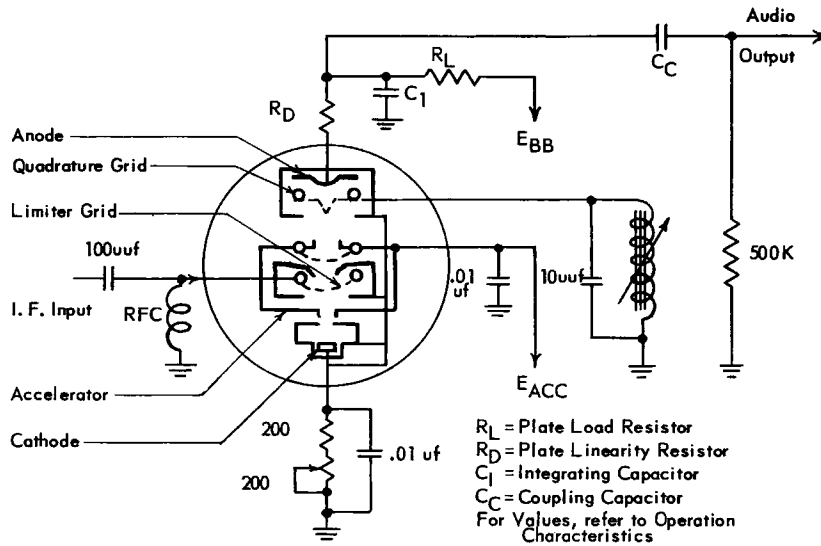
The Q of the quadrature grid circuit should be high enough to develop a minimum of 4 volts (RMS) signal with 2 volts (RMS) of the center-frequency signal applied to the limiter grid. It is recommended that the coil be shunted by a minimum of 10 μf . The capacitance may be composed of the tube input capacitance, stray capacitance and distributed capacitance, as well as physical capacitance.

* Heater warm-up time is defined as the time required in the circuit shown for the voltage across the heater terminals to increase from zero to the heater test voltage (V_1).

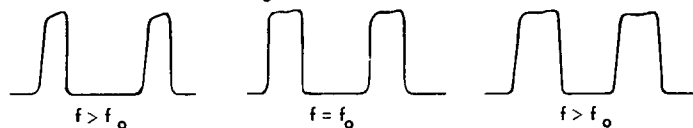
For Type	3BN6	4BN6
E=	12.6	16.8 volts (RMS or DC)
V_1 =	2.5	3.4 volts (RMS or DC)
R=	15.8	28 ohms



SCHEMATIC DIAGRAM SHOWING TYPICAL CIRCUIT AND INTERNAL CONSTRUCTION OF THE 6BN6



WAVEFORMS OF PLATE CURRENT
 f = frequency of applied signal
 f_0 = center-frequency of applied signal



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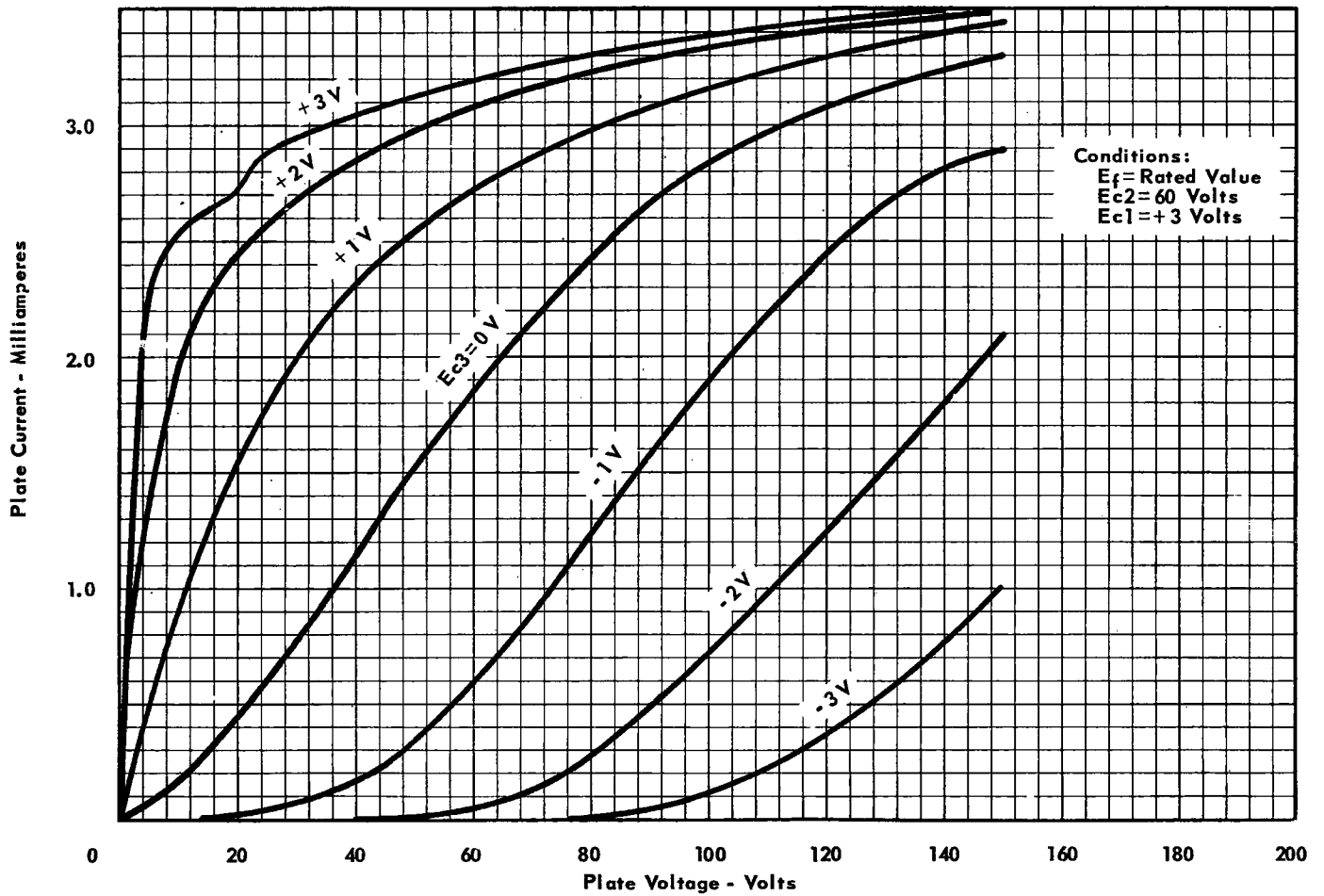
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TYPE 6BN6
3BN6
4BN6
12BN6

GATED BEAM DISCRIMINATOR

AVERAGE PLATE CHARACTERISTICS



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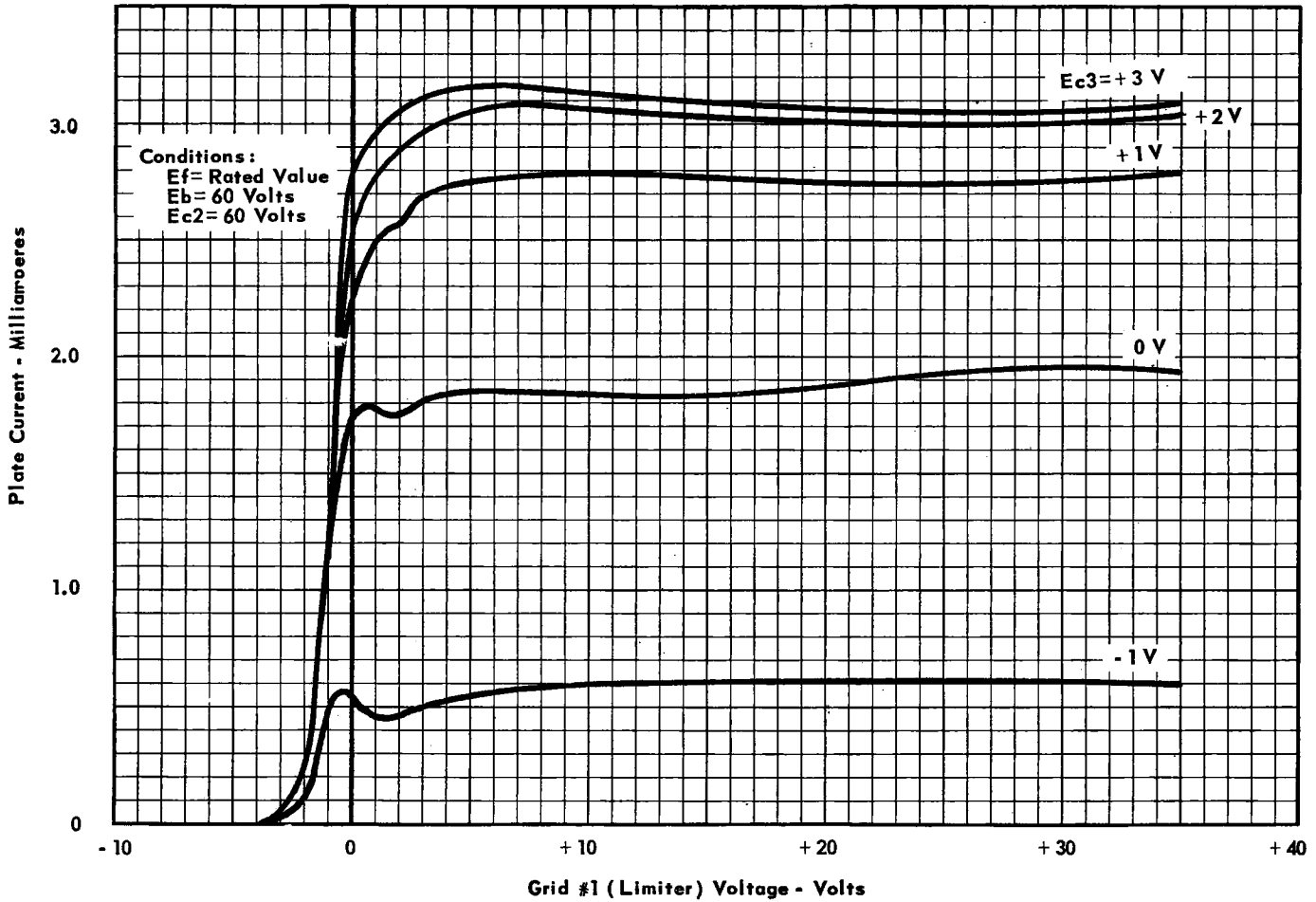
RECEIVING TUBE AND SEMICONDUCTOR OPERATIONS

TYPE 6BN6
3BN6
4BN6
12BN6



GATED BEAM DISCRIMINATOR

AVERAGE CHARACTERISTICS



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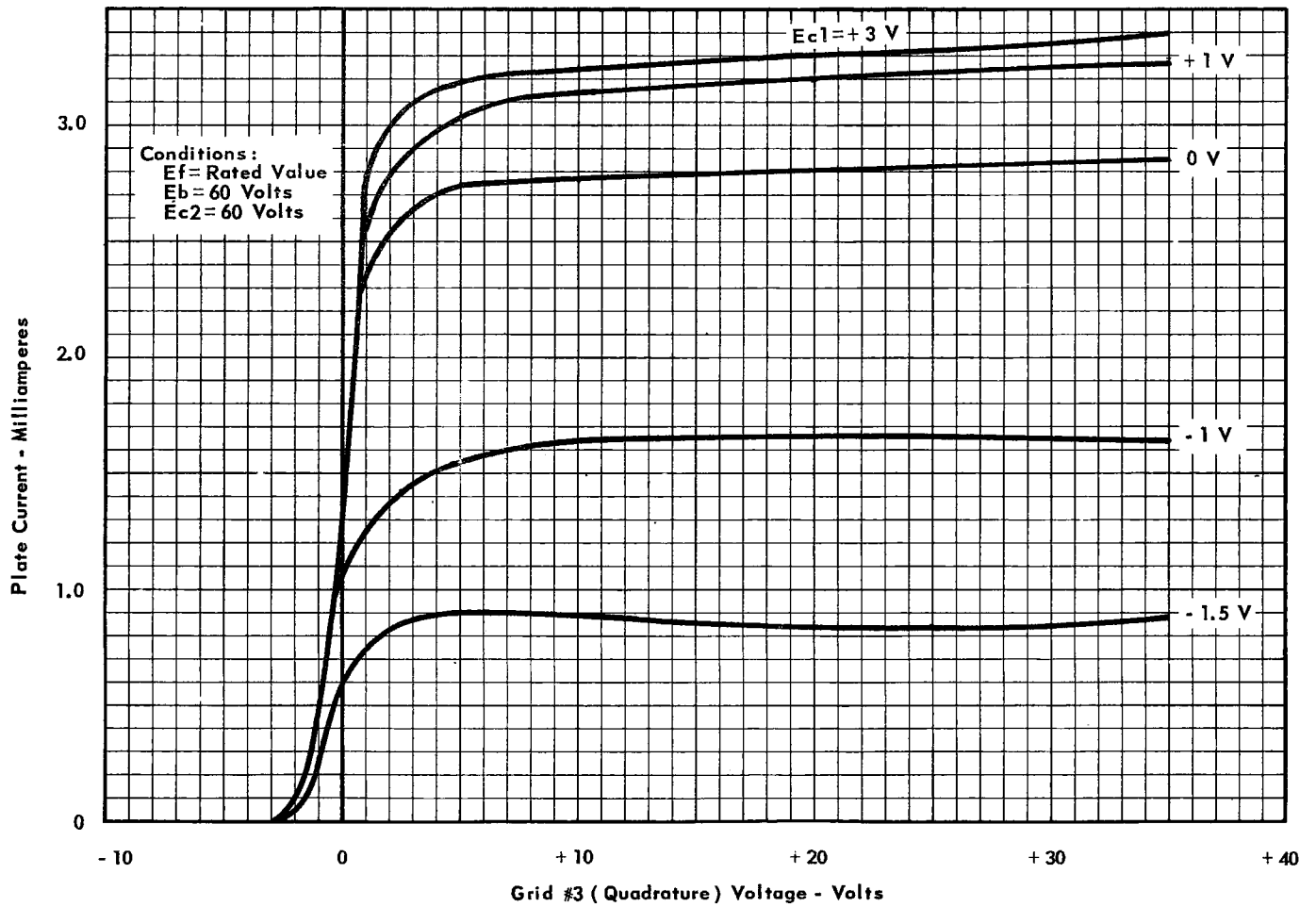
RECEIVING TUBE AND SEMICONDUCTOR OPERATIONS



TYPE 6BN6
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GATED BEAM DISCRIMINATOR

AVERAGE CHARACTERISTICS



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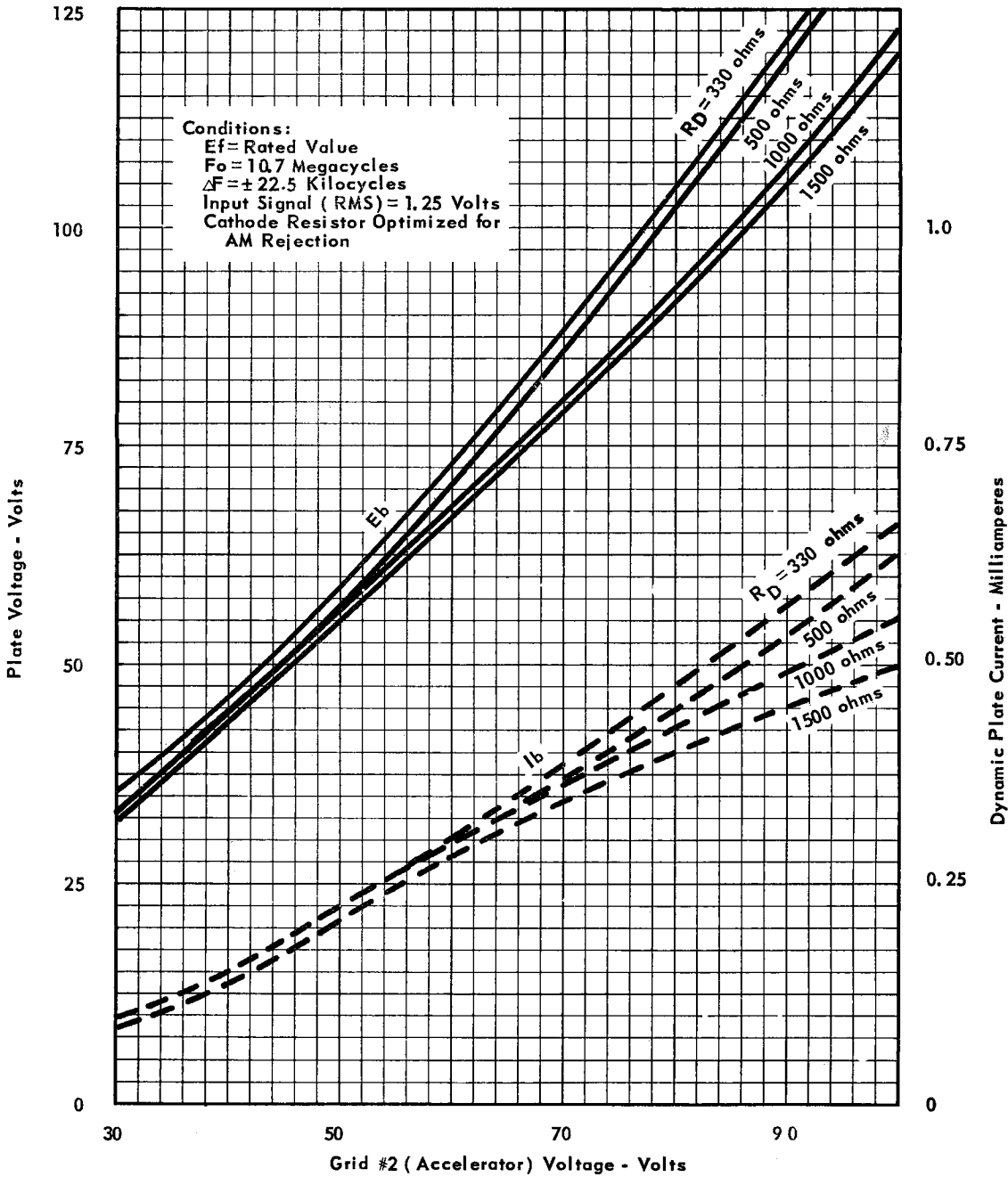
RECEIVING TUBE AND SEMICONDUCTOR OPERATIONS

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GATED BEAM DISCRIMINATOR

OPERATION CHARACTERISTICS



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RECEIVING TUBE AND SEMICONDUCTOR OPERATIONS