

# 6BN6

## Beam Tube

### 7-PIN MINIATURE TYPE

For Use in FM and TV Receivers As Combined Limiter,  
Discriminator, and Audio-Voltage-Amplifier Tube

#### GENERAL DATA

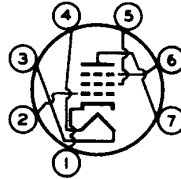
##### Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC) . . . . .	6.3 ± 10%	volts ←
Current at 6.3 volts . . . . .	0.3	amp
Direct Interelectrode Capacitances:▲		
Grid No.1 to cathode & internal shields, plate, grid No.3, grid No.2, and heater . . . . .	4.2	μf
Grid No.3 to cathode & internal shields, plate, grid No.2, grid No.1, and heater . . . . .	3.3	μf
Grid No.1 to grid No.3. . . . .	0.004 max.	μf

##### Mechanical:

Operating Position . . . . .	Any
Maximum Overall Length . . . . .	2-5/8"
Maximum Seated Length . . . . .	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip) . . . . .	2" ± 3/32" ←
Maximum Diameter . . . . .	0.650" to 0.750" ←
Dimensional Outline . . . . .	See <i>General Section</i>
Bulb . . . . .	.T5-1/2
Base . . . . .	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW . . . . .	7DF

Pin 1 - Cathode,  
Internal  
Shields  
Pin 2 - Grid No.1  
Pin 3 - Heater



Pin 4 - Heater  
Pin 5 - Grid No.2  
Pin 6 - Grid No.3  
Pin 7 - Plate

#### LIMITER & DISCRIMINATOR SERVICE ←

##### Maximum Ratings, Design-Maximum Values:

PLATE SUPPLY VOLTAGE . . . . .	330 max.	volts
GRID-No.3 (QUADRATURE-GRID) VOLTAGE . . . . .	•	
GRID-No.2 (ACCELERATOR-GRID) VOLTAGE . . . . .	110 max.	volts
GRID-No.1 (LIMITER-GRID) VOLTAGE:		
Positive-peak value . . . . .	60 max.	volts
CATHODE CURRENT . . . . .	13 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	200 max.	volts
Heater positive with respect to cathode . . . . .	200 max.	volts

← Indicates a change.



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## Typical Operation:

*In accompanying typical quadrature-grid-fm-detector circuit*

<i>Input-Signal</i>	<i>4.5</i>	<i>10.7</i>	<i>10.7</i>	<i>Mc</i>
Center Frequency				
Plate Supply Voltage.	270	85	285	volts
Plate Voltage . . . .	121	63	122	volts
Grid-No.3 Voltage . .	•	•	•	
Grid-No.2 Voltage . .	100	55	100	volts
Cathode-Circuit				
Resistance* . . . .	200 to 400	200 to 400	200 to 400	ohms
Peak AF Output Voltage	16.8	6	16.6	volts
Minimum Grid-No.1				
Signal Voltage (RMS)				
for AM rejection* .	2	1.25	2	volts
Minimum Grid-No.1				
Signal Voltage (RMS)				
for limiting action♦	1.25	1.25	1.25	volts
Plate Current . . . .	0.44	0.25	0.49	ma
Grid-No.2 Current . .	10	4.1	9.8	ma
Plate Load Resistor .	0.33	0.085	0.33	megohm
Linearity Resistor. .	1000	470	1500	ohms
Integrating				
Capacitor . . . . .	0.001	0.002	0.001	μf
Coupling Capacitor. .	0.25	0.25	0.01	μf
Frequency Deviation .	±25	±75	±75	kc
AM Rejection:				
For grid-No.1 signal				
volts (RMS) = 2 .	25	31	20	db
For grid-No.1 signal				
volts (RMS) = 3 .	30	30	29	db
Total Harmonic				
Distortion. . . . .	1.8	2	1.6	%

▲ Without external shield.

● For proper operation of this electron tube in the accompanying Typical Quadrature-Grid-FM Detector Circuit, the Q of the quadrature-grid tuned circuit (L<sub>1</sub>, C<sub>6</sub>) should be sufficiently high to assure that a 4-volt rms signal is developed at the quadrature grid when a 2-volt rms signal at the center frequency is applied to grid No.1.

It is recommended that L<sub>1</sub> be shunted by a capacitance of at least 10 μmf. This capacitance may be composed of tube capacitance, stray capacitance, the distributed capacitance of L<sub>1</sub>, and a fixed capacitor.

■ The dc component must not exceed 100 volts.

★ The cathode-circuit resistance should be adjusted for maximum AM rejection at the AF output of the circuit at the specified grid-No.1 signal voltage. AM rejection is measured with an applied signal containing 30 per cent amplitude modulation and 30 per cent frequency modulation.

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

## OPERATING CONSIDERATIONS

To insure proper phasing of the signal voltage developed at the quadrature grid, the components of the quadrature-grid circuit should be shielded from those of the control-grid circuit.

To obtain a symmetrical discriminator-response curve, the plate currents for no input signal and for unmodulated

→ Indicates a change.

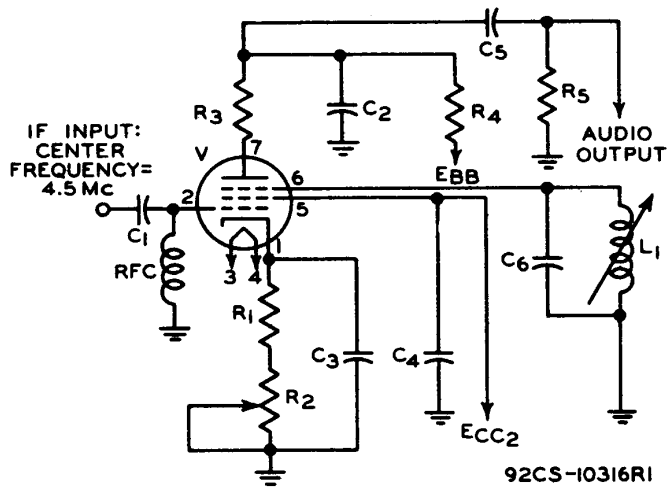


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input signal should be equal. To assure this equality, it is necessary that the plate voltage and grid-No.2 voltage have the proper values.

The proper plate voltage for any grid-No.2 voltage may be determined from the accompanying *Operation Characteristics* curve. This curve may also be used to determine the average dynamic plate current for any combination of grid-No.2 voltage and plate voltage.

## TYPICAL QUADRATURE-GRID-FM-DETECTOR CIRCUIT



- C<sub>1</sub>: 100 μf
- C<sub>2</sub>: Integrating capacitor, 0.001 μf
- C<sub>3</sub> C<sub>4</sub>: 0.01 μf
- C<sub>5</sub>: 0.25 μf
- C<sub>6</sub>: 10 μf
- L<sub>1</sub>: •
- R<sub>1</sub>: 200 ohms
- R<sub>2</sub>: Cathode-bias potentiometer, 200 ohms
- R<sub>3</sub>: Linearity resistor, 1000 ohms
- R<sub>4</sub>: Plate-load resistor, 0.33 megohm
- R<sub>5</sub>: 0.47 megohm
- V: Electron-tube-type 6BN6

- For proper operation of this electron tube in the accompanying Typical Quadrature-Grid-FM Detector Circuit, the Q of the quadrature-grid tuned circuit (L<sub>1</sub>, C<sub>6</sub>) should be sufficiently high to assure that a 4-volt rms signal is developed at the quadrature grid when a 2-volt rms signal at the center frequency is applied to grid No.1.

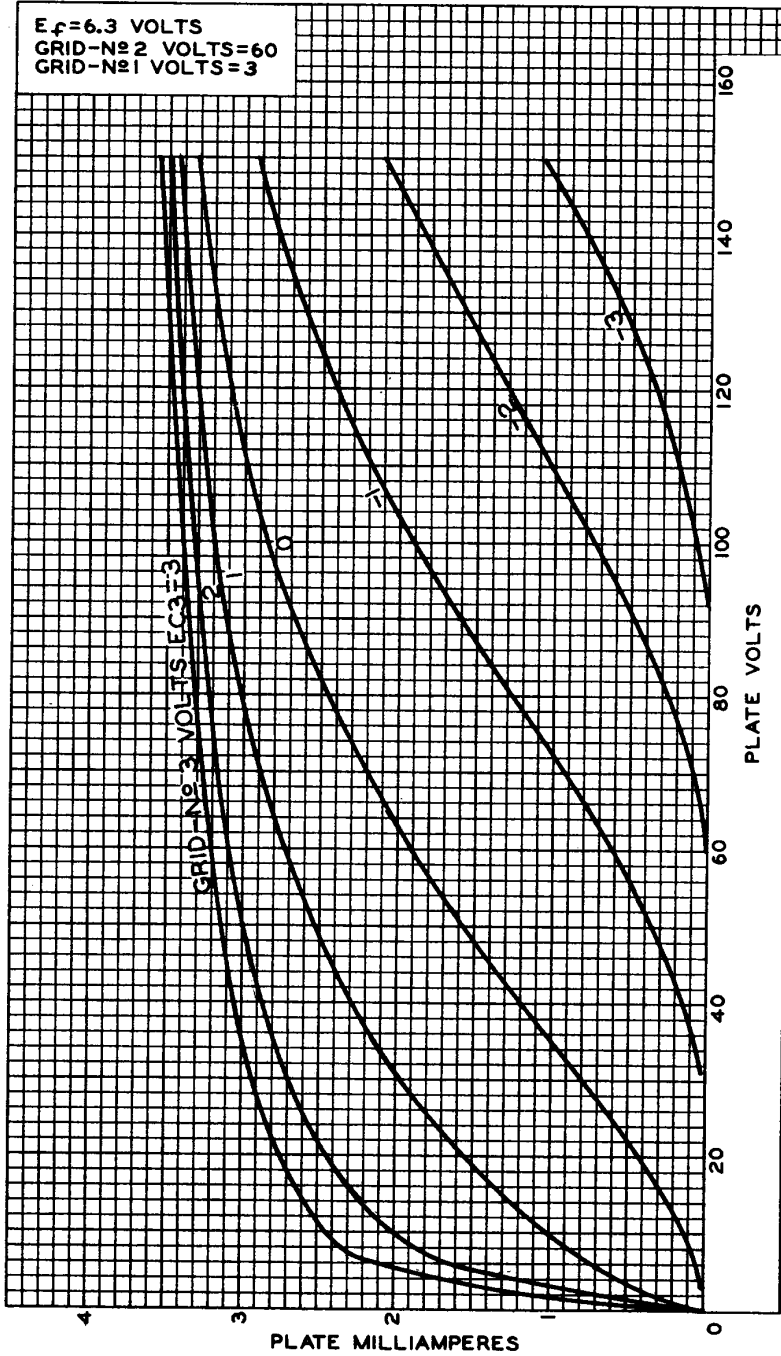
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## AVERAGE PLATE CHARACTERISTICS



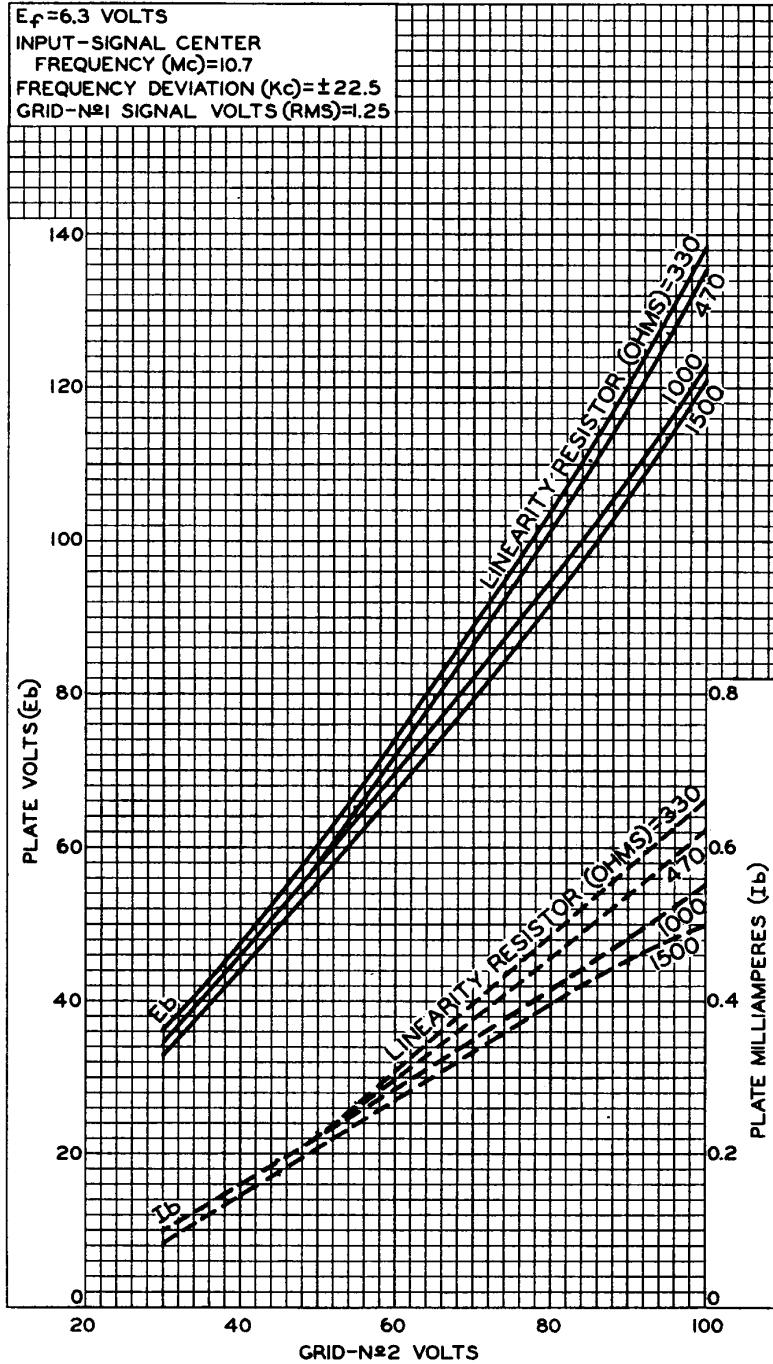
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## OPERATION CHARACTERISTICS



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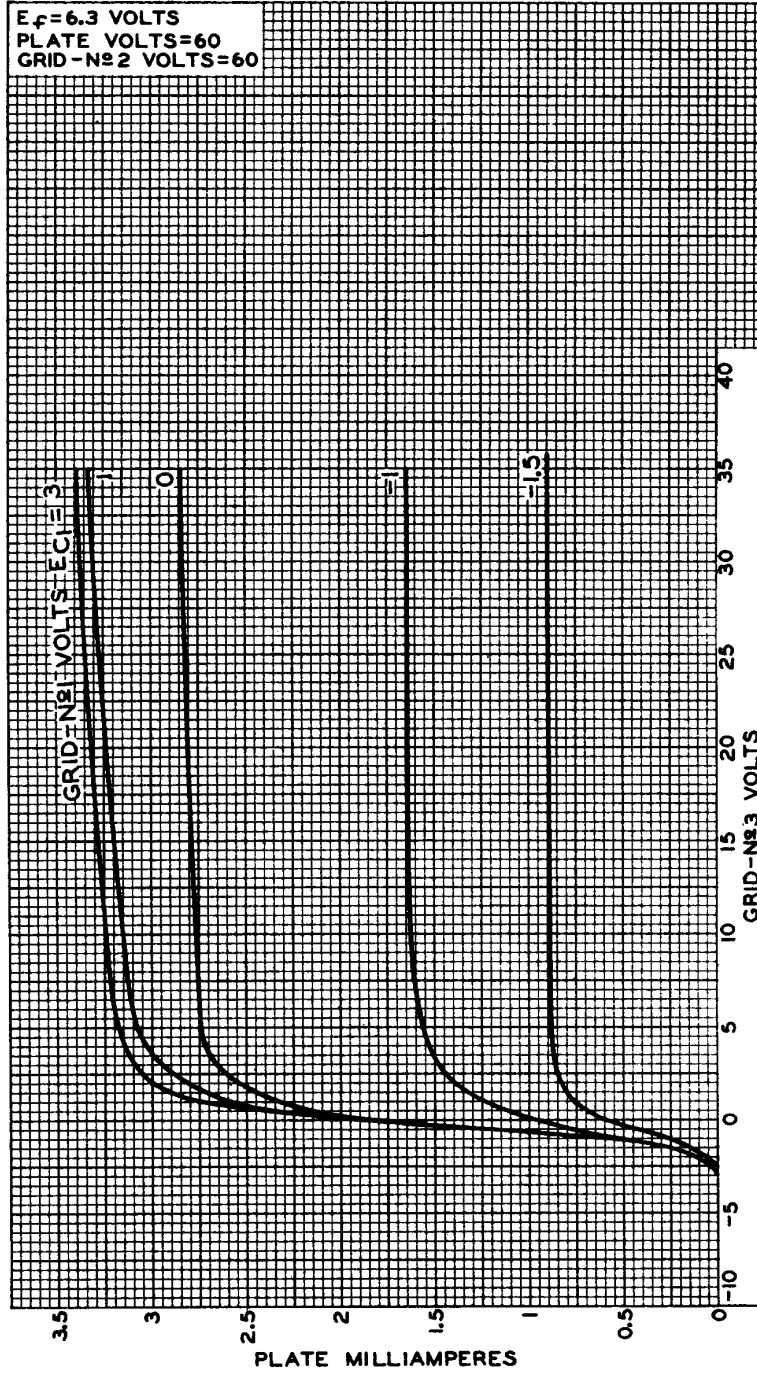


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DATA 3  
8-60

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## AVERAGE CHARACTERISTICS



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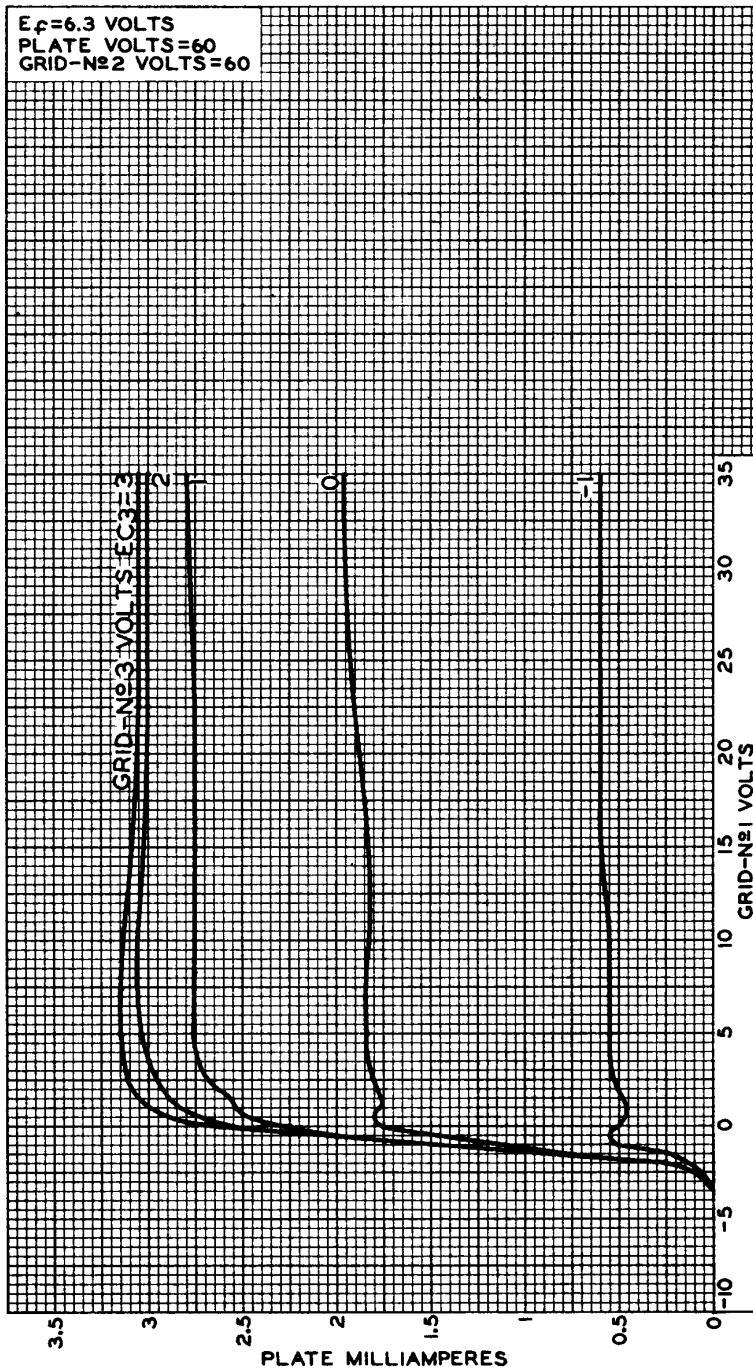
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## AVERAGE CHARACTERISTICS



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DATA 4  
8-60