

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) $6.3 \pm 10\%$ 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" $\pm 3/32$ "

Maximum Diameter. 0.650" to 0.750" ←

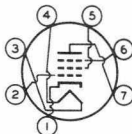
Dimensional Outline See *General Section*

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 . . . 110 max. volts

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.



Typical Operation:

In accompanying typical quadrature-grid-fm-detector circuit

Input-Signal

Center Frequency	4.5	10.7	10.7	Mc
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 (L₁, C₆) 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 L₁ be shunted by a capacitance of at least 10 μf. This capacitance may be composed of tube capacitance, stray capacitance, the distributed capacitance of L₁, 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.

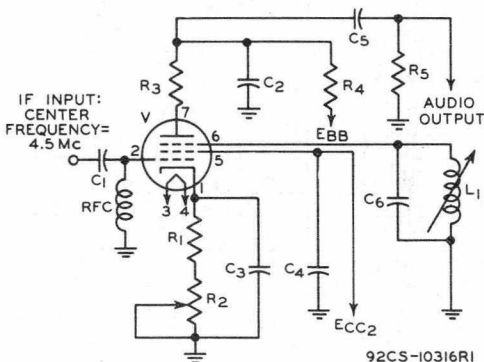
To obtain a symmetrical discriminator-response curve, the plate currents for no input signal and for unmodulated

→ Indicates a change.

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_1 : 100 μf
- C_2 : Integrating capacitor, 0.001 μf
- C_3 C_4 : 0.01 μf
- C_5 : 0.25 μf
- C_6 : 10 μf
- L_1 : •
- R_1 : 200 ohms
- R_2 : Cathode-bias potentiometer, 200 ohms
- R_3 : Linearity resistor, 1000 ohms
- R_4 : Plate-load resistor, 0.33 megohm
- R_5 : 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_1 , C_6) 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.

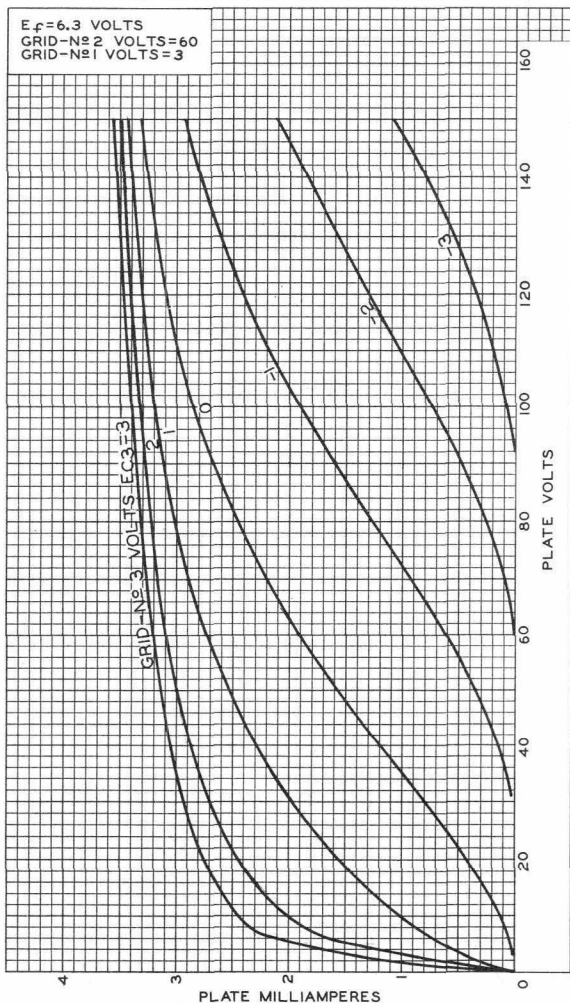
It is recommended that L_1 be shunted by a capacitance of at least 10 μf . This capacitance may be composed of tube capacitance, stray capacitance, the distributed capacitance of L_1 , and a fixed capacitor.

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AVERAGE PLATE CHARACTERISTICS

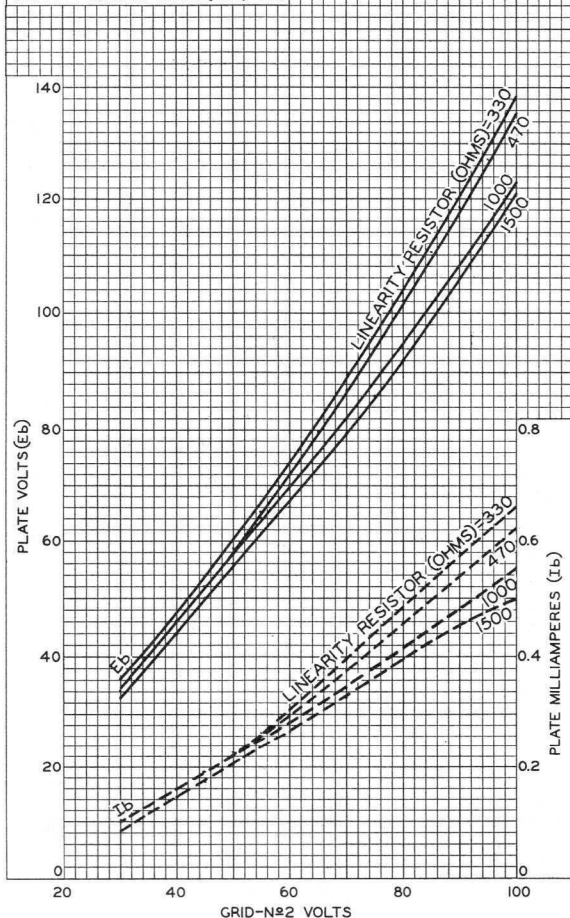


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OPERATION CHARACTERISTICS

$E_p = 6.3$ VOLTS
 INPUT-SIGNAL CENTER
 FREQUENCY (Mc)=10.7
 FREQUENCY DEVIATION (Kc)= ± 22.5
 GRID-N ϕ 1 SIGNAL VOLTS (RMS)=1.25

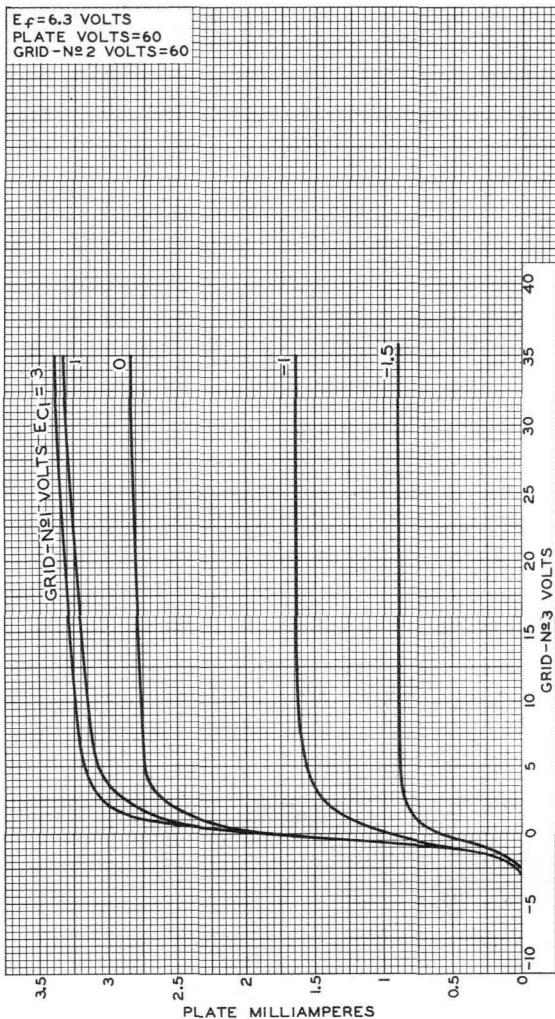


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6BN6

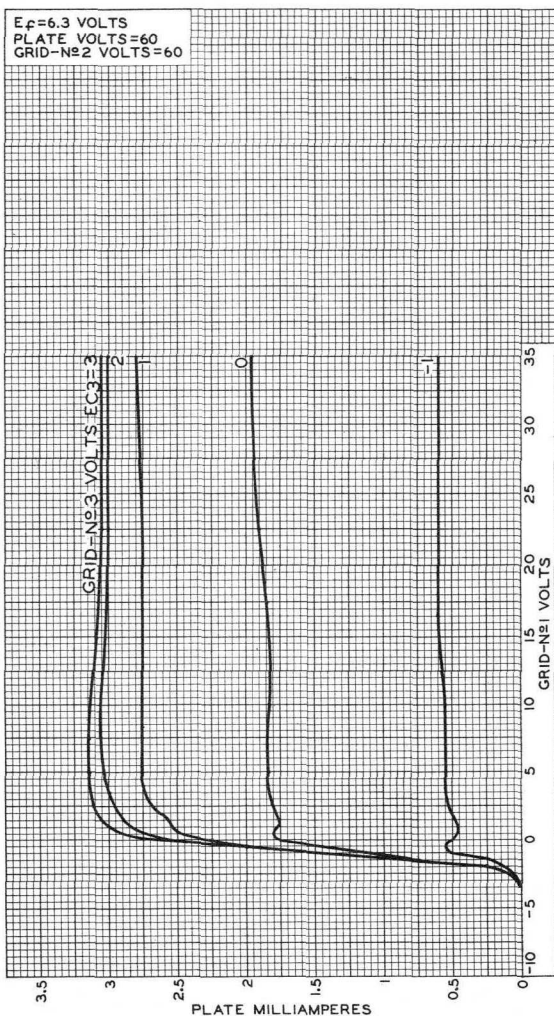
AVERAGE CHARACTERISTICS



92CM-10320



AVERAGE CHARACTERISTICS



92CM-10322



