



# 12BF6

## TWIN DIODE--MEDIUM-MU TRIODE

Miniature Type  
TENTATIVE DATA

RCA-12BF6 is a multi-unit miniature tube of the heater-cathode type containing two diodes and a medium-mu triode in one envelope. It is intended primarily for use as a combined detector, amplifier, and AVC tube in automobile radio receivers operating from a 12-volt storage battery.

Characteristics of the 12BF6 are such that it can be impedance-coupled or transformer-coupled to the output stage. In either case, the triode unit can supply more than ample output with low distortion to drive a pair of 12V6-GT's operating at maximum plate voltage in the output stage of automobile receivers. In performance, the 12BF6 is the equivalent of the larger metal type 12SR7.

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathode:  
Voltage (AC or DC) . . . . . 12.6 volts  
Current . . . . . 0.150 ampere  
Direct Inter-electrode Capacitances (Approx.):

	With External Shield <sup>▲</sup>	Without External Shield	
Triode Unit:			
Grid to Plate . . . . .	2.0	2.0	$\mu\mu\text{f}$
Grid to Cathode . . . . .	1.8	1.8	$\mu\mu\text{f}$
Plate to Cathode . . . . .	1.1	0.8	$\mu\mu\text{f}$
Plate of Diode Unit No. 1 to Cathode . . . . .	1.4	0.7	$\mu\mu\text{f}$
Plate of Diode Unit No. 2 to Cathode . . . . .	1.5	0.1	$\mu\mu\text{f}$
Plate of Diode Unit No. 1 to Triode Grid . . . . .	0.06 max.	0.07 max.	$\mu\mu\text{f}$
Plate of Diode Unit No. 2 to Triode Grid . . . . .	0.05 max.	0.06 max.	$\mu\mu\text{f}$

#### Mechanical:

Mounting Position . . . . . Any  
Maximum Overall Length . . . . . 2-1/8"  
Maximum Seated Length . . . . . 1-7/8"

Length from Base to Bulb Top (Excluding tip) . . . . . 1-1/2"  $\pm$  3/32"  
Maximum Diameter . . . . . 3/4"  
Bulb . . . . . T-5-1/2  
Base . . . . . Small-Button Miniature 7-Pin (JETEC No. E7-1)

### TRIODE UNIT AS CLASS A<sub>1</sub> AMPLIFIER

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

PLATE VOLTAGE . . . . . 300 max. volts  
PLATE DISSIPATION . . . . . 2.5 max. watts  
PEAK HEATER-CATHODE VOLTAGE:  
Heater negative with respect to cathode . . . . . 90 max. volts  
Heater positive with respect to cathode . . . . . 90 max. volts

#### Typical Operation with Transformer Coupling:

Plate Voltage . . . . . 250 volts  
Grid Voltage . . . . . -9 volts  
Amplification Factor . . . . . 16  
Plate Resistance (Approx.) . . . . . 8500 ohms  
Transconductance . . . . . 1900 umhos  
Plate Current . . . . . 9.5 ma  
Load Resistance . . . . . 10000 ohms  
Total Harmonic Distortion . . . . . 6.5 per cent  
Power Output . . . . . 300 milliwatts

#### Typical Operation as Resistance-Coupled Amplifier:

See Chart Below

### DIODE UNITS

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

PLATE CURRENT (For each diode) . . . . . 1.0 max. ma

#### Diode Considerations:

Diode units No. 1 and No. 2 and the triode unit have a common cathode.  
Diode biasing of the triode unit of the 12BF6 is not recommended.

<sup>▲</sup> According to RTMA Standard ET-109A with External Shield No. 315 tied to cathode.

### Operating Conditions as Resistance-Coupled Amplifier

	90			180			300			
	0.047	0.1	0.22	0.047	0.1	0.22	0.047	0.1	0.22	
Plate-Supply Voltage										
Plate Load Resistor	0.047	0.1	0.22	0.047	0.1	0.22	0.047	0.1	0.22	Megohm
Grid Resistor (of following stage)	0.1	0.22	0.47	0.1	0.22	0.47	0.1	0.22	0.47	Megohm
Cathode Resistor	2800	5400	12000	2500	5100	11000	2400	5000	11000	Ohms
Cathode Bypass Capacitor	2.0	1.0	0.5	2.2	1.1	0.5	2.4	1.2	0.5	$\mu\text{f}$
Blocking Capacitor	0.033	0.013	0.0065	0.033	0.015	0.007	0.033	0.015	0.007	$\mu\text{f}$
Peak Output Voltage <sup>□</sup>	18	20	23	42	47	54	74	85	95	Volts
Voltage Gain <sup>▲</sup>	10	11	11	10	11	12	11	12	12	

<sup>●</sup> The cathode bypass capacitors and blocking capacitors have been chosen to give output voltages at 100 cps ( $f_1$ ) which are equal to 0.8 of the mid-frequency value. For any other value of ( $f_1$ ), multiply the values of cathode bypass and blocking capacitors by 100/ $f_1$ .

<sup>▲</sup> At an output voltage of 5 volts rms.

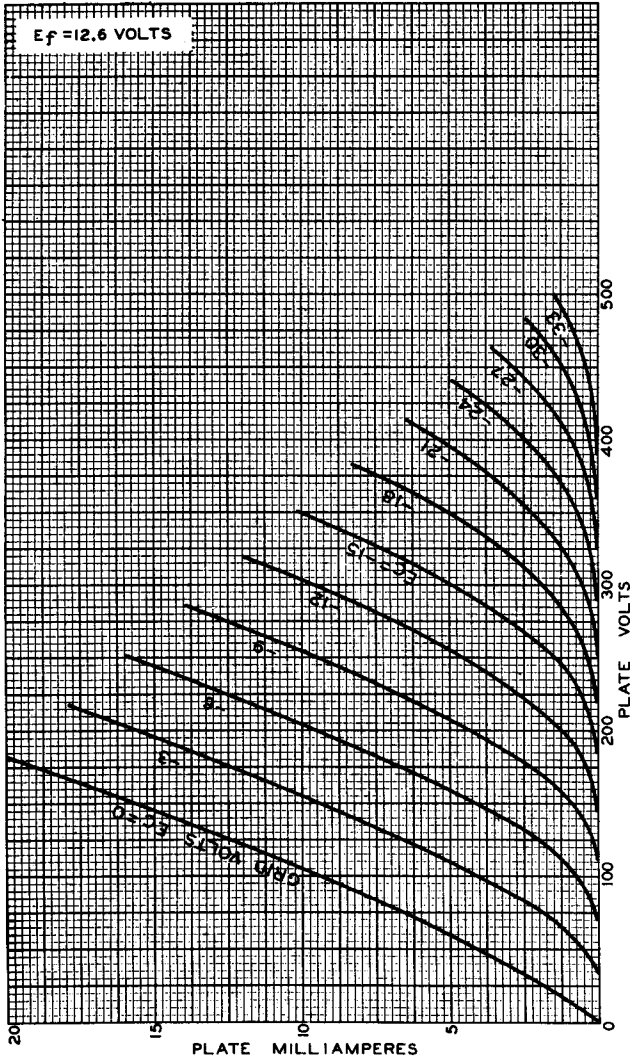
<sup>□</sup> This peak output voltage is obtained across the grid resistor of the following stage at any frequency within the flat region of the output vs frequency curve, and is for the condition where the signal level is adequate to swing the grid of the resistance-coupled amplifier tube itself to the point where its grid starts to draw current.



### OPERATING CONSIDERATIONS

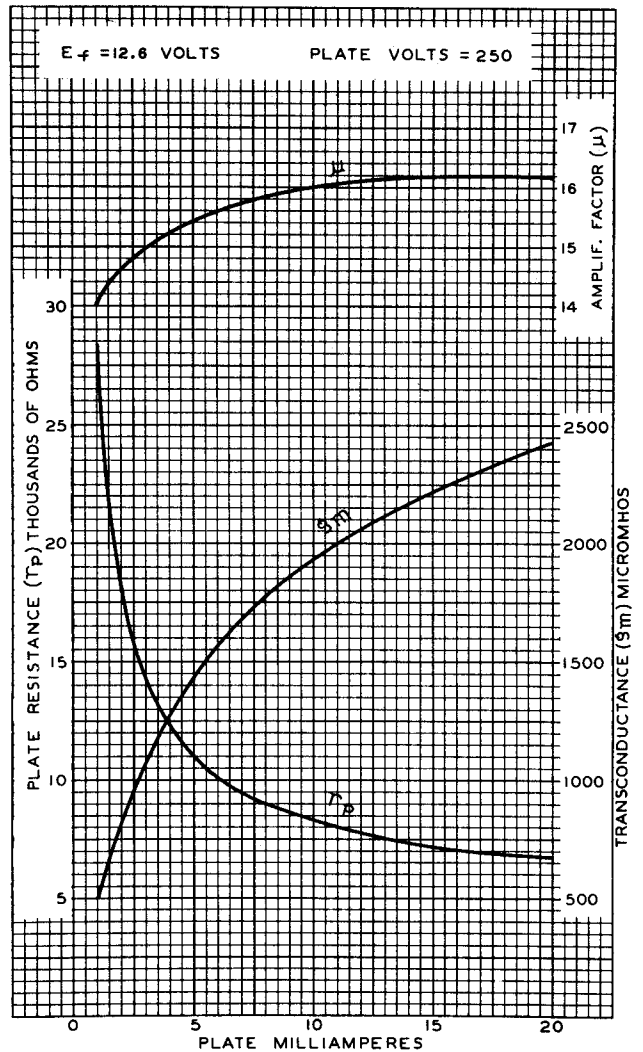
The *maximum ratings* in the tabulated data for the 12BF6 are working design-center maximums established according to the standard design-center system of rating electron tubes. Tubes so rated will give satisfactory performance in storage-battery-operated equipment provided the following stipulations are observed: When storage-battery equipment is operated without a

charger, it should be designed so that the published maximum values of plate voltages, grid-No.2 supply voltages, dissipations, and rectified output currents are never exceeded for a terminal potential at the battery source of 2.0 volts per cell. When storage-battery equipment is operated with a charger, it should be designed so that 90 per cent of the same maximum values is never exceeded for a terminal potential at the battery source of 2.2 volts.



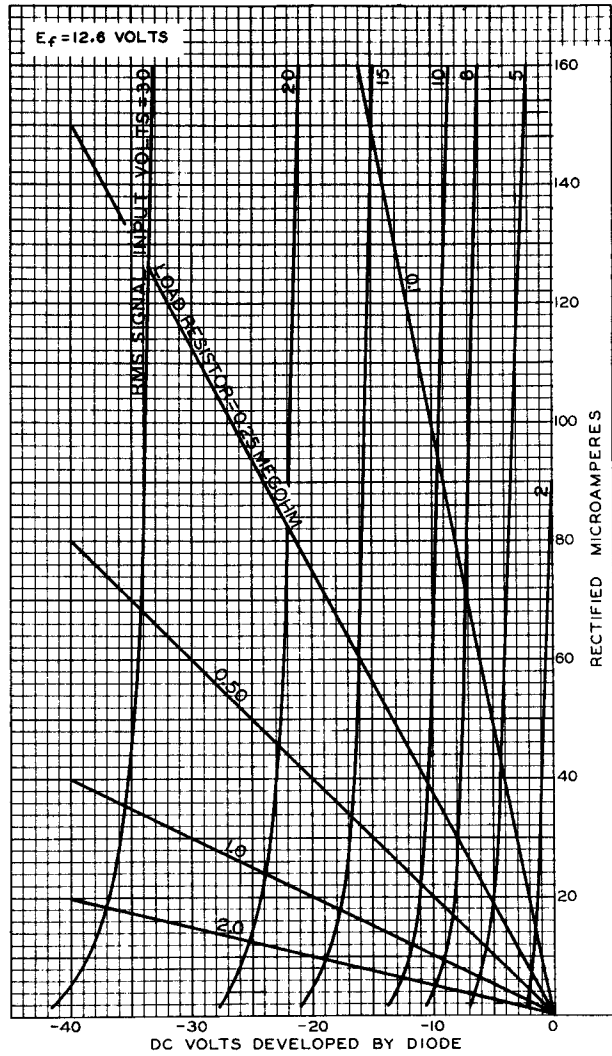
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Fig. 1 - Average Plate Characteristics for Triode Unit of Type 12BF6.



92CM-7830

Fig. 2 - Average Characteristics for Triode Unit of Type 12BF6.

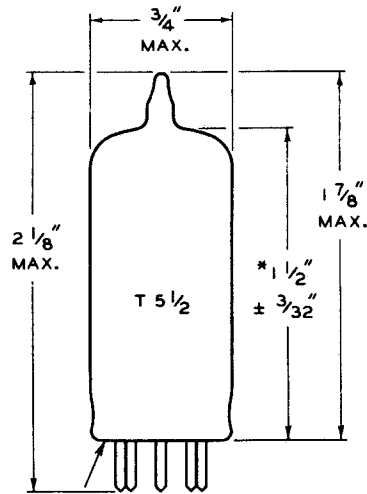


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Fig. 3 - Half-Wave Rectification Characteristics for Single Diode of Type 12BF6.

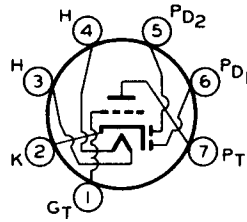


### DIMENSIONAL OUTLINE



SMALL-BUTTON MINIATURE  
7-PIN BASE  
JETEC No. E7-1

### SOCKET CONNECTIONS Bottom View



7BT

- PIN 1: TRIODE GRID
- PIN 2: CATHODE
- PIN 3: HEATER
- PIN 4: HEATER
- PIN 5: DIODE PLATE No. 2
- PIN 6: DIODE PLATE No. 1
- PIN 7: TRIODE PLATE