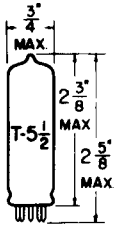
TUNG-SOL

PENTODE

MINIATURE TYPE

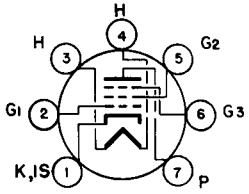


GLASS BULB
MINIATURE BUTTON
7 PIN BASE E7-1
OUTLINE DRAWING
JEDEC 5-3

COATED UNIPOTENTIAL CATHODE

GATED-BEAM DISCRIMINATOR
FOR FM AND INTERCARRIER
TELEVISION RECEIVERS

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM
JEDEC 7DF

THE 4BN6 IS A GATED-BEAM DISCRIMINATOR TUBE USING THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED TO PERFORM THE COMBINED OPERATION OF DETECTOR AND AUDIO-VOLTAGE AMPLIFIER IN 450 MA. SERIES HEATER OPERATED TELEVISION RECEIVERS. A UNIQUE DESIGN, MAKING USE OF THE ELECTROSTATIC BEAM DEFLECTION PRINCIPLE, RESULTS IN VERY EFFICIENT LIMITING AS WELL AS PROVIDING FOR FM DETECTION AND AMPLIFICATION. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. WITH THE EXCEPTION OF HEATER RATINGS, ITS CHARACTERISTICS ARE IDENTICAL TO THE 6BN6.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID #1 TO ALL	4.2	pf
GRID #3 TO ALL	3.3	pf
GRID #1 TO GRID #3 (MAX.)	0.004	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	4.2 VOLTS	450	MA.
HEATER SUPPLY LIMITS:			
CURRENT OPERATION		450±45	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS
HEATER WARM-UP TIME (APPROX.)*		11	SECONDS

*HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

CONTINUED ON FOLLOWING PAGE

TUNG-SOL

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS ←

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PLATE SUPPLY VOLTAGE	330	VOLTS
GRID VOLTAGE	110	VOLTS
PEAK POSITIVE LIMITER-GRID VOLTAGE	60	VOLTS
DC CATHODE CURRENT	13	MA.

TYPICAL OPERATING CHARACTERISTICS ←

LIMITER-DISCRIMINATOR SERVICE

INPUT-SIGNAL CENTER FREQUENCY	10.7	10.7	4.5	MEGACYCLES
FREQUENCY DEVIATION	±75	±75	±25	KCYCLES
PLATE-SUPPLY VOLTAGE	85	285	270	VOLTS
PLATE VOLTAGE	63	122	121	VOLTS
ACCELERATOR VOLTAGE	55	100	100	VOLTS
CATHODE-BIAS RESISTOR (VARIABLE) [A]	200-400	200-400	200-400	OHMS
PLATE LOAD RESISTOR	85000	330000	330000	OHMS
PLATE LINEARITY RESISTOR	470	1500	1000	OHMS
INTEGRATING CAPACITOR	0.002	0.001	0.001	μf
COUPLING CAPACITOR	0.25	0.01	0.25	μf
MINIMUM SIGNAL VOLTAGE FOR LIMITING ACTION, RMS [B]	1.25	1.25	1.25	VOLTS
DC PLATE CURRENT	0.25	0.49	0.44	MA.
ACCELERATOR CURRENT	4.1	9.8	10	MA.
INPUT SIGNAL LEVEL FOR AM REJECTION ADJUSTMENT [A]	1.25	2.0	2.0	VOLTS
AM REJECTION AT Esig=2.0V., RMS	31	20	25	DECIBELS
AM REJECTION AT Esig=3.0V., RMS	30	29	30	DECIBELS
TOTAL HARMONIC DISTORTION	2.0	1.6	1.8	PERCENT
PEAK AUDIO OUTPUT VOLTAGE	6.0	16.6	16.8	VOLTS

[A] THE CATHODE RESISTOR SHOULD BE ADJUSTED FOR MAXIMUM AM REJECTION IN THE OUTPUT OF LIMITER-DISCRIMINATOR STAGE AT THE SPECIFIED SIGNAL LEVEL. AM REJECTION IS MEASURED WITH AN APPLIED SIGNAL CONTAINING 30-PERCENT AMPLITUDE MODULATION AND 30-PERCENT FREQUENCY MODULATION.

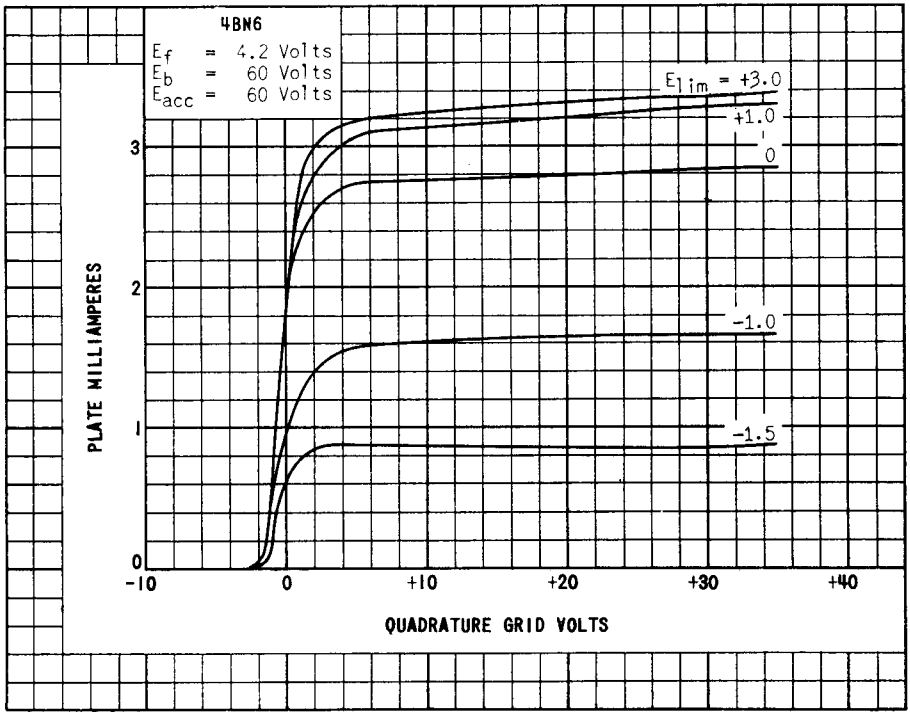
[B] AT SIGNAL LEVELS ABOVE SPECIFIED VALUE, LIMITING IS WITHIN ±2 DECIBELS.

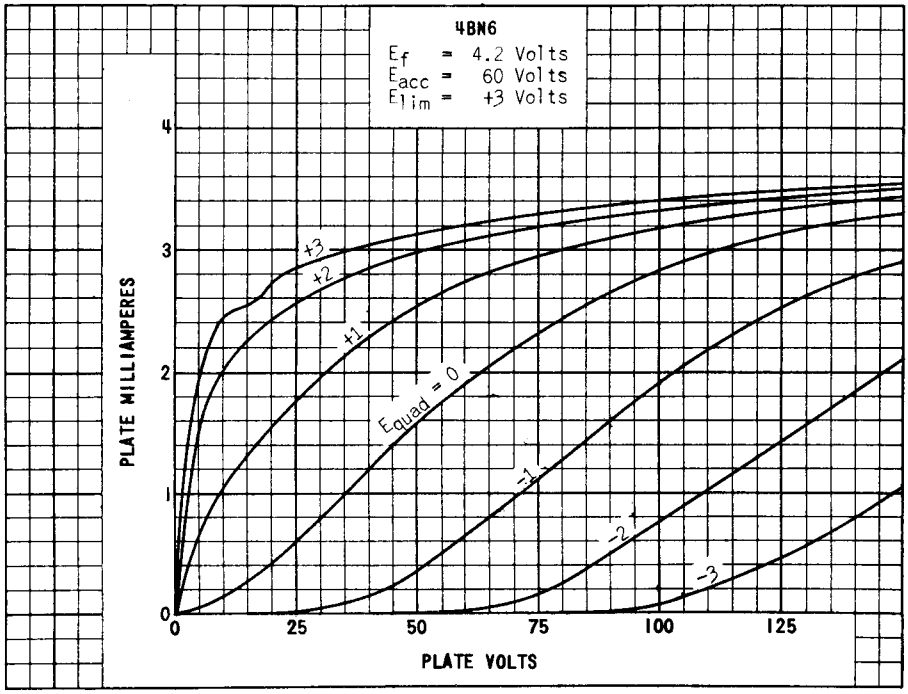
ADEQUATE SHIELDING BETWEEN COMPONENTS OF THE LIMITER GRID AND THE QUADRATURE GRID MUST BE USED TO INSURE PROPER PHASING OF THE VOLTAGE DEVELOPED ON THE QUADRATURE GRID.

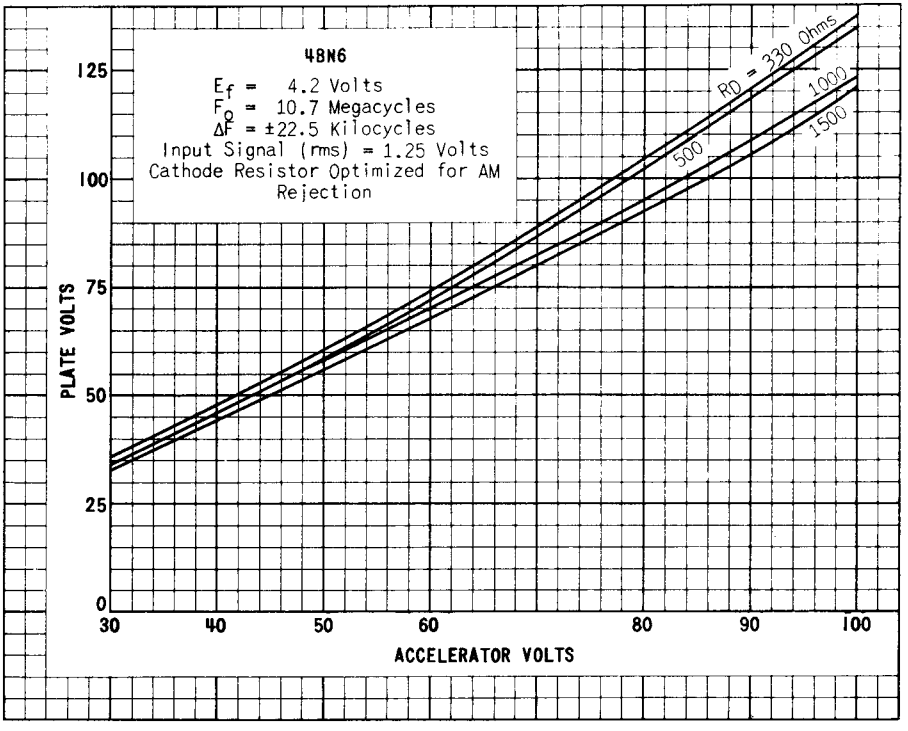
STANDARD DE-EMPHASEIS REQUIREMENTS FOR FM ARE INCLUDED.

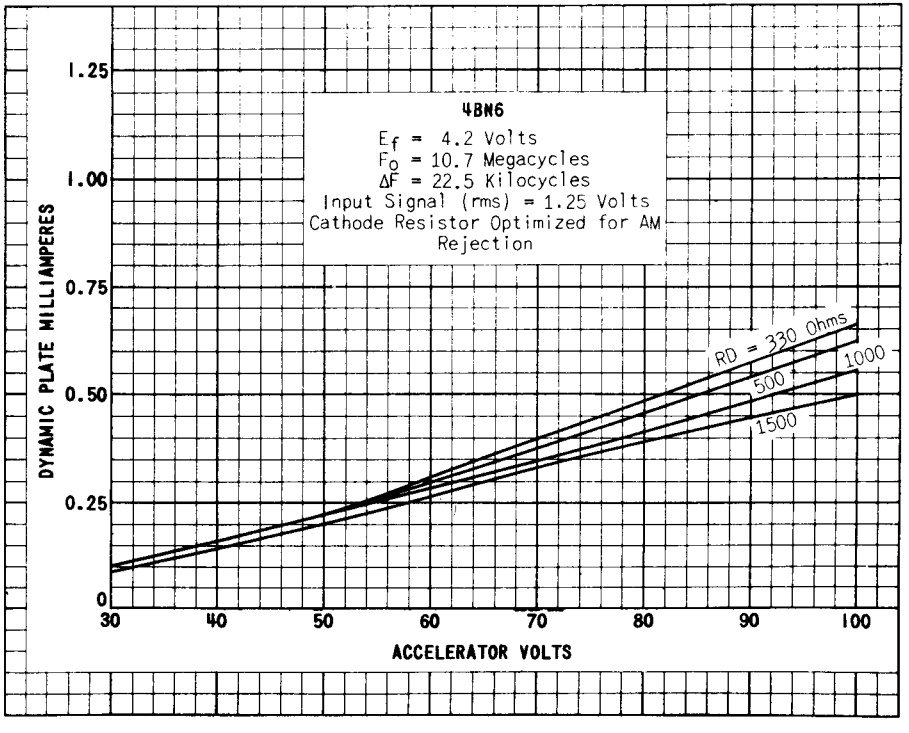
THE Q OF THE QUADRATURE GRID CIRCUIT SHOULD BE HIGH ENOUGH TO DEVELOP A MINIMUM OF 4 VOLTS (RMS) SIGNAL WITH 2 VOLTS (RMS) OF THE CENTER-FREQUENCY SIGNAL APPLIED TO THE LIMITER GRID. IT IS RECOMMENDED THAT THE COIL BE SHUNTED BY A MINIMUM OF 10 μμf. THE CAPACITANCE MAY BE COMPOSED OF TUBE INPUT CAPACITANCE, STRAY CAPACITANCE, AND DISTRIBUTED CAPACITANCE, AS WELL AS PHYSICAL CAPACITANCE.

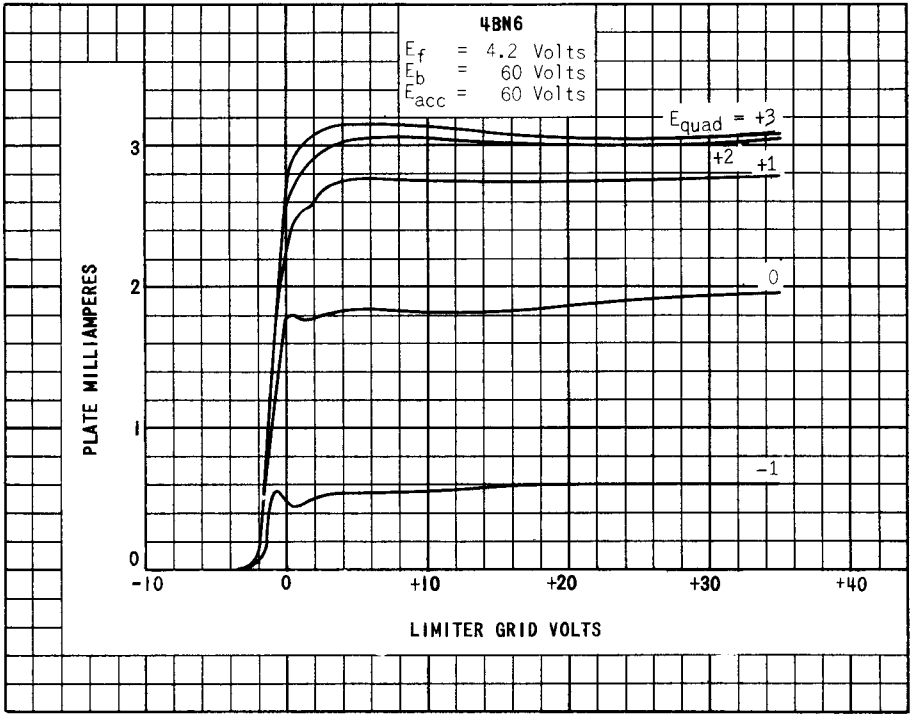
→ INDICATES A CHANGE.


4BN6
E_f = 4.2 Volts
E_b = 60 Volts
E_{acc} = 60 Volts
E_{lim} = +3.0
+1.0
0
-1.0
-1.5
PLATE MILLIAMPERES
0
1
2
3
-10
0
+10
+20
+30
+40
QUADRATURE GRID VOLTS


4BN6
E_f = 4.2 Volts
E_{acc} = 60 Volts
E_{lim} = +3 Volts
+3
+2
+1
E_{quad} = 0
-1
-2
-3
PLATE MILLIAMPERES
0
1
2
3
4
0
25
50
75
100
125
PLATE VOLTS


4BN6
E_f = 4.2 Volts
F_o = 10.7 Megacycles
ΔF = ±22.5 Kilocycles
Input Signal (rms) = 1.25 Volts
Cathode Resistor Optimized for AM Rejection
RD = 330 Ohms
500
1000
1500
PLATE VOLTS
0
25
50
75
100
125
30
40
50
60
80
90
100
ACCELERATOR VOLTS


4BN6
E_f = 4.2 Volts
F_o = 10.7 Megacycles
ΔF = 22.5 Kilocycles
Input Signal (rms) = 1.25 Volts
Cathode Resistor Optimized for AM Rejection
RD = 330 Ohms
500
1000
1500
DYNAMIC PLATE MILLIAMPERES
0
0.25
0.50
0.75
1.00
1.25
30
40
50
60
70
80
90
100
ACCELERATOR VOLTS



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