TUNG-SOL

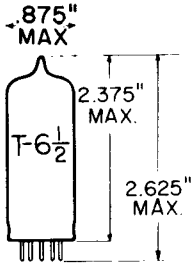
TWIN PENTODE

MINIATURE TYPE

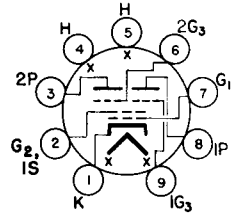
COATED UNIPOTENTIAL CATHODE

HEATER
4.2 VOLTS 450 MA.
AC OR DC

ANY MOUNTING POSITION



GLASS BULB
SMALL BUTTON
9 PIN BASE E9-1
OUTLINE DRAWING
JEDEC 6-3



BOTTOM VIEW
BASING DIAGRAM
JEDEC 9FG

THE 4BU8 IS A MINIATURE MULTISECTION TUBE WHICH INCORPORATES SEPARATE PLATES AND NUMBER 3 GRIDS FOR THE TWO SECTIONS TOGETHER WITH A COMMON SCREEN, NUMBER 1 GRID, AND CATHODE. THE TUBE IS INTENDED FOR USE AS A COMBINED SYNC-AGC TUBE IN TELEVISION RECEIVERS. IN THIS SERVICE, WHEN USED IN CONJUNCTION WITH SUITABLE CIRCUITRY, ONE SECTION OF THE 4BU8 FUNCTIONS AS SYNC SEPARATOR AND SYNC CLIPPER, WHILE THE OTHER SECTION IS USED TO GENERATE THE AUTOMATIC-GAIN-CONTROL VOLTAGE. IN ADDITION, BY UTILIZING THE COMMON, #1 GRID, NOISE PULSES CAN BE SUPPRESSED FROM BOTH SYNCHRONIZING AND AUTOMATIC-GAIN-CONTROL CIRCUITS. 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. EXCEPT FOR HEATER RATINGS THE 4BU8 IS IDENTICAL TO THE 6BU8.

DIRECT INTERELECTRODE CAPACITANCES — APPROX.

WITHOUT EXTERNAL SHIELD

GRID #3 TO PLATE, (EACH SECTION)	1.9	pf
GRID #1 TO ALL	6.0	pf
GRID #3 TO ALL (EACH SECTION)	3.6	pf
PLATE TO ALL (EACH SECTION)	3.0	pf
GRID #3 (SECTION 1) TO GRID #3 (SECTION 2) MAX.	0.015	pf

RATINGS

→ DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

MAXIMUM PLATE VOLTAGE (EACH SECTION)	300	VOLTS
MAXIMUM SCREEN VOLTAGE	150	VOLTS
MAXIMUM POSITIVE DC GRID #3 VOLTAGE (EACH SECTION)	3.0	VOLTS
MAXIMUM NEGATIVE DC GRID #3 VOLTAGE (EACH SECTION)	50	VOLTS
MAXIMUM PEAK POSITIVE GRID #3 VOLTAGE (EACH SECTION)	50	VOLTS
MAXIMUM NEGATIVE DC GRID #1 VOLTAGE	50	VOLTS
MAXIMUM PLATE DISSIPATION (EACH SECTION)	1.1	WATTS
MAXIMUM SCREEN DISSIPATION	0.75	WATTS
MAXIMUM DC CATHODE CURRENT	12	MA.

CONTINUED ON FOLLOWING PAGE

→ INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

RATINGS – CONT'D

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

MAXIMUM HEATER–CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE	0.5	MEGOHMS
MAXIMUM GRID #3 CIRCUIT RESISTANCE (EACH SECTION)	0.5	MEGOHMS
HEATER WARM–UP TIME*	11.0	SECONDS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

BOTH SECTIONS OPERATING

PLATE VOLTAGE (EACH SECTION)	100	100	VOLTS
SCREEN VOLTAGE	67.5	67.5	VOLTS
GRID #3 VOLTAGE (EACH SECTION)	-10	0	VOLTS
GRID #1 VOLTAGE	**	**	
PLATE CURRENT (EACH SECTION)		2.2	MA.
SCREEN CURRENT	6.5	3.3	MA.
CATHODE CURRENT	6.6	7.8	MA.

EACH SECTION SEPARATELY [A]

PLATE VOLTAGE	100	100	VOLTS
SCREEN VOLTAGE	67.5	67.5	VOLTS
GRID #3 VOLTAGE	0	0	VOLTS
GRID #1 VOLTAGE	0	**	VOLTS
GRID #3 TRANSCONDUCTANCE	---	180	μMHOS
GRID #1 TRANSCONDUCTANCE	1 500	---	μMHOS
PLATE CURRENT	---	2.2	MA.
GRID #3 VOLTAGE (APPROX.) I_b=100μAMPS	---	-4.5	VOLTS
GRID #1 VOLTAGE (APPROX.) I_b=100μAMPS	---	2.3	VOLTS

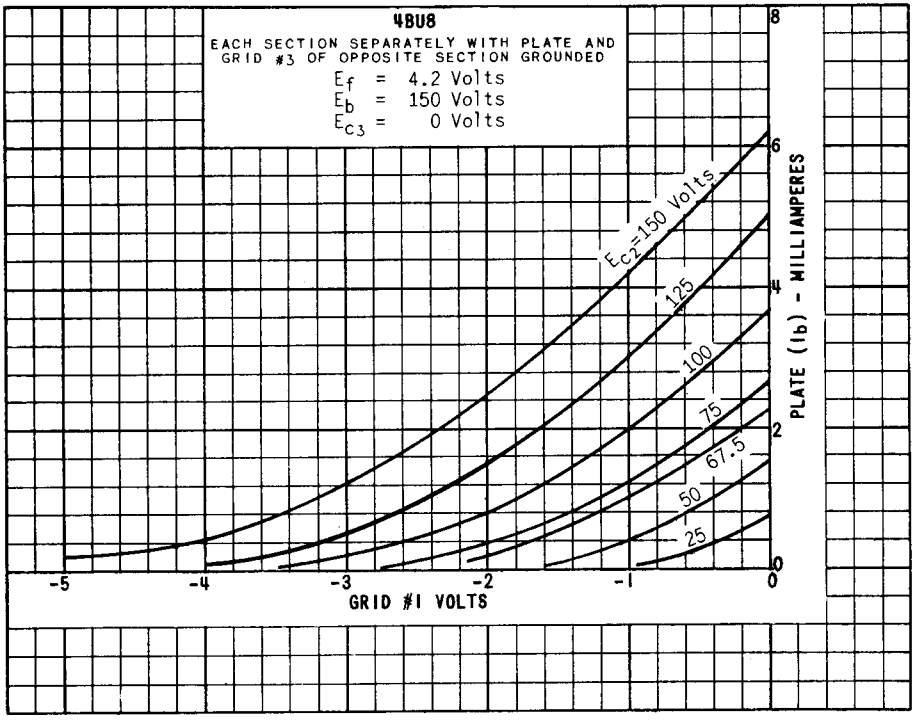
*HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

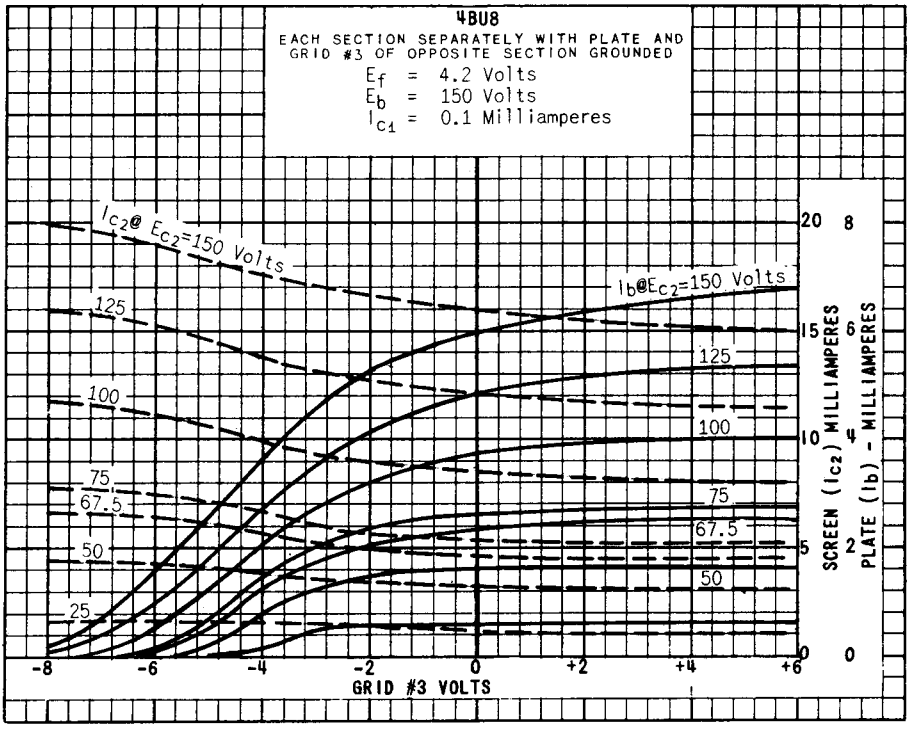
**WITH GRID CURRENT ADJUSTED FOR 100 μAMPS D-C.

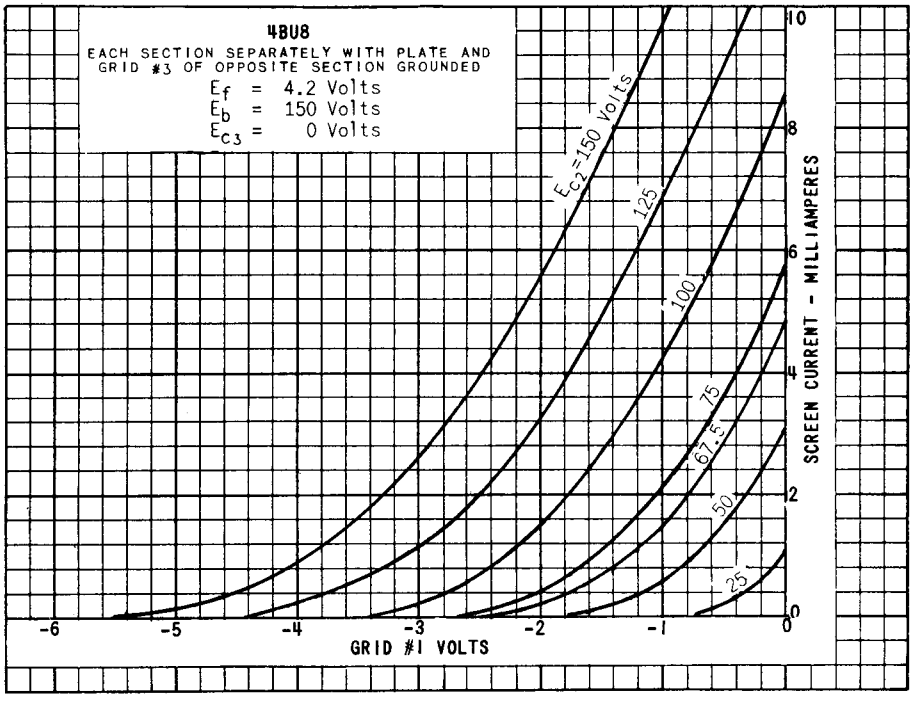
[A]WITH PLATE AND GRID #3 OF OPPOSITE SECTION GROUNDED.

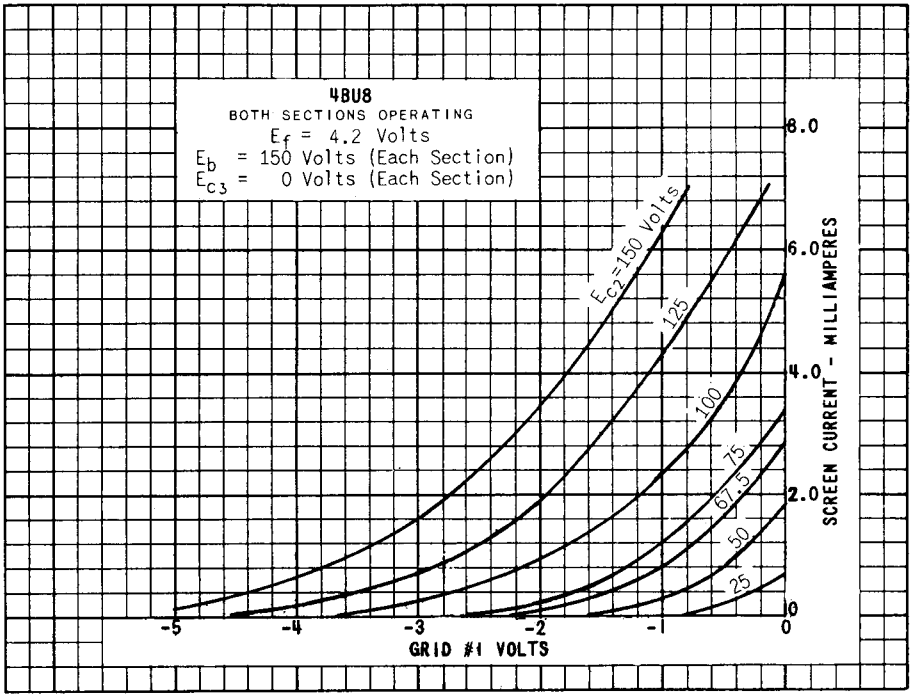
DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

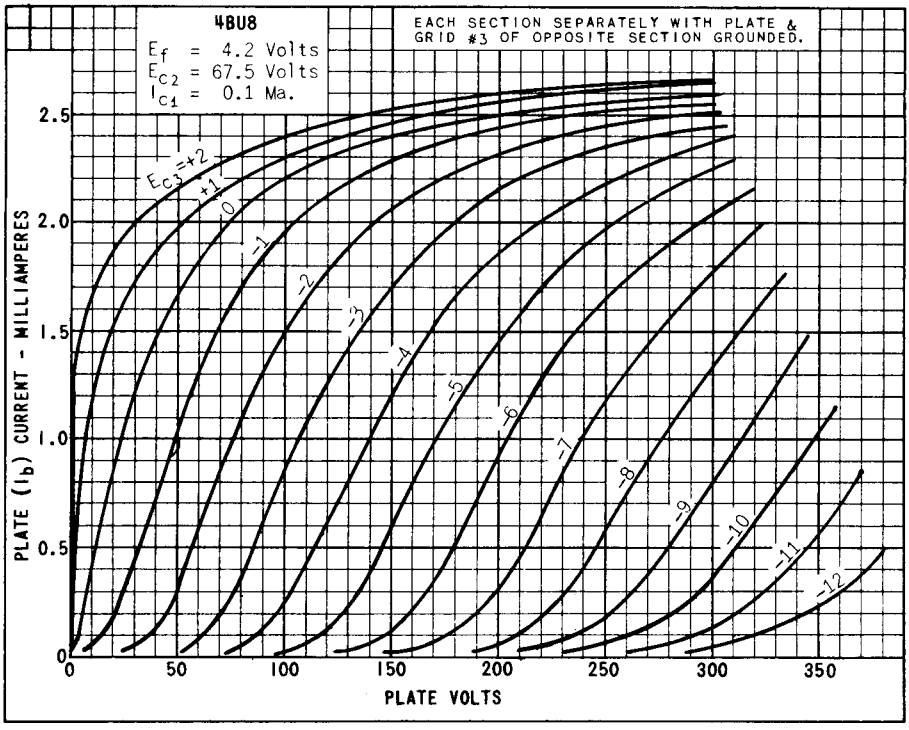
SIMILAR TYPE REFERENCE: Except for heater ratings the 4BU8 is identical to the 6BU8.

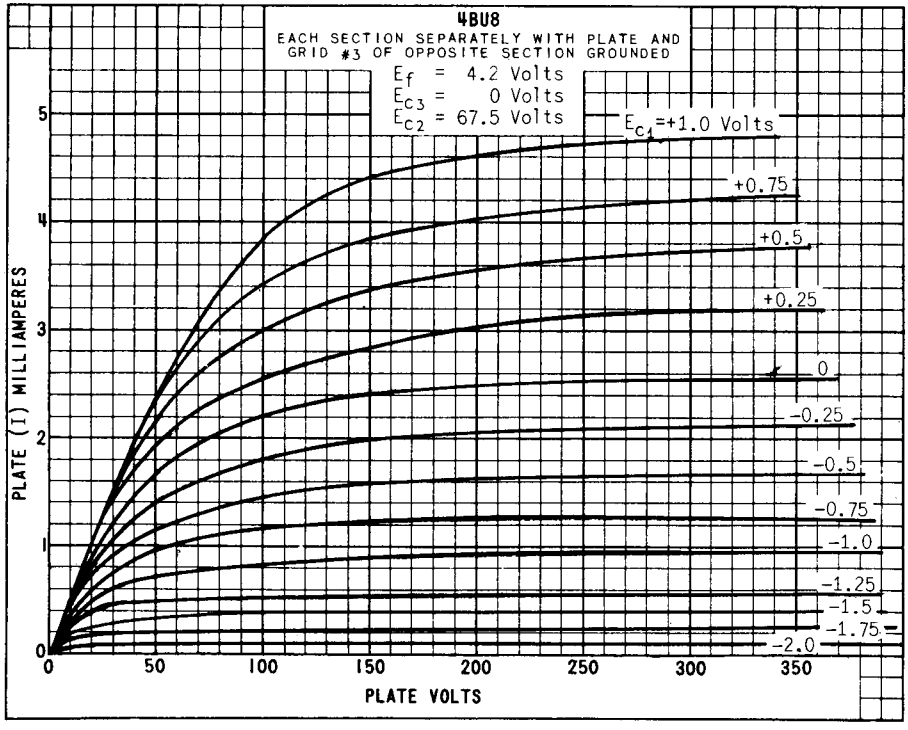

4BU8
EACH SECTION SEPARATELY WITH PLATE AND GRID #3 OF OPPOSITE SECTION GROUNDED
E_f = 4.2 Volts
E_b = 150 Volts
E_{c3} = 0 Volts
E_{c2}=150 Volts
125
100
75
67.5
50
25
PLATE (I_b) - MILLIAMPERES
GRID #1 VOLTS
-5
-4
-3
-2
-1
0
2
4
6
8

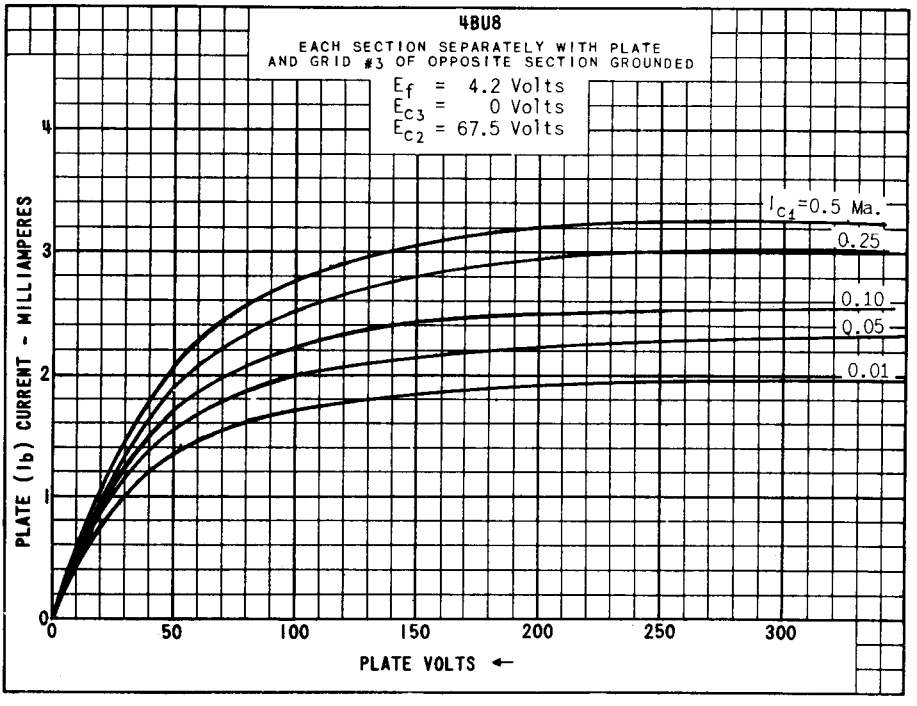

4BU8
EACH SECTION SEPARATELY WITH PLATE AND GRID #3 OF OPPOSITE SECTION GROUNDED
E_f = 4.2 Volts
E_b = 150 Volts
I_{c1} = 0.1 Milliamperes
I_{c2}@ E_{c2}=150 Volts
I_b@E_{c2}=150 Volts
125
100
75
67.5
50
25
SCREEN (I_{c2}) MILLIAMPERES
PLATE (I_b) - MILLIAMPERES
GRID #3 VOLTS
-8
-6
-4
-2
0
+2
+4
+6
0
5
10
15
20
2
4
6
8

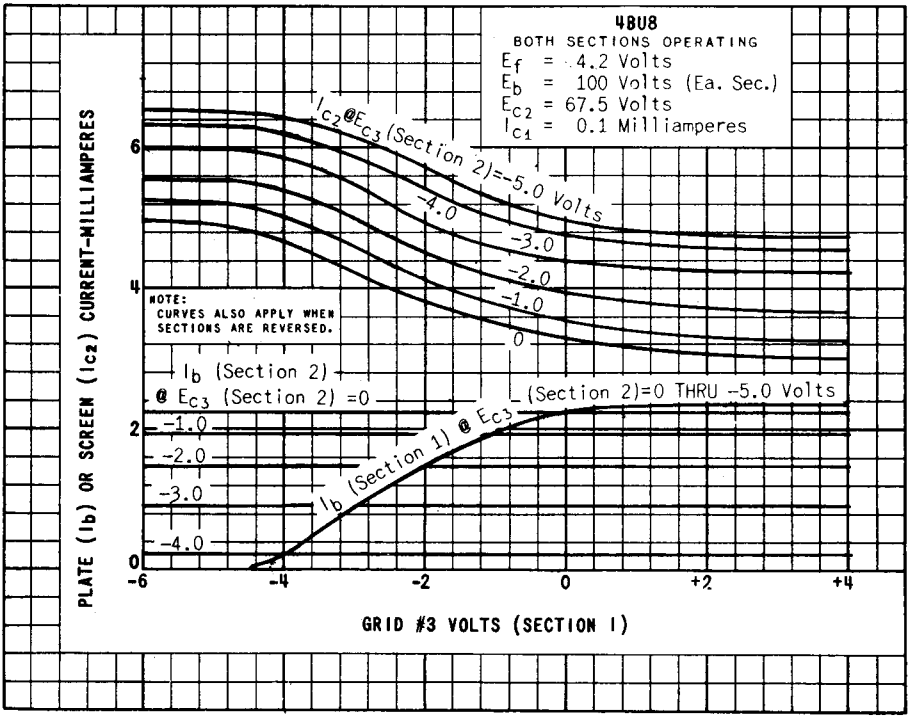

4BU8
EACH SECTION SEPARATELY WITH PLATE AND GRID #3 OF OPPOSITE SECTION GROUNDED
E_f = 4.2 Volts
E_b = 150 Volts
E_{c3} = 0 Volts
E_{c2}=150 Volts
125
100
75
67.5
50
25
SCREEN CURRENT - MILLIAMPERES
GRID #1 VOLTS
-6
-5
-4
-3
-2
-1
0
2
4
6
8
10

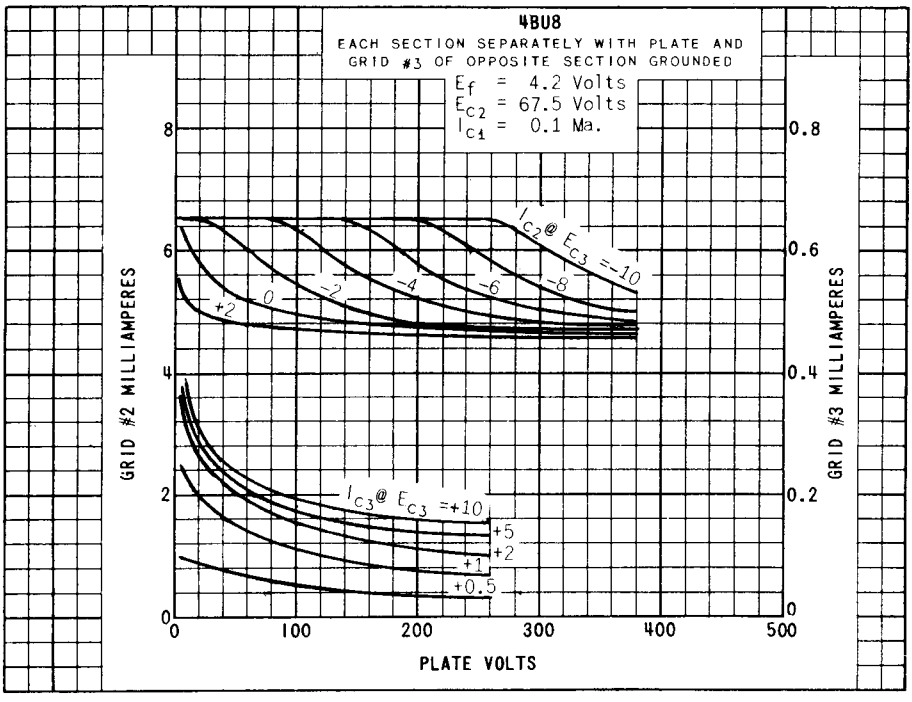

4BU8
BOTH SECTIONS OPERATING
E_f = 4.2 Volts
E_b = 150 Volts (Each Section)
E_{c3} = 0 Volts (Each Section)
E_{c2}=150 Volts
125
100
75
67.5
50
25
SCREEN CURRENT - MILLIAMPERES
GRID #1 VOLTS
-5
-4
-3
-2
-1
0
2.0
4.0
6.0
8.0

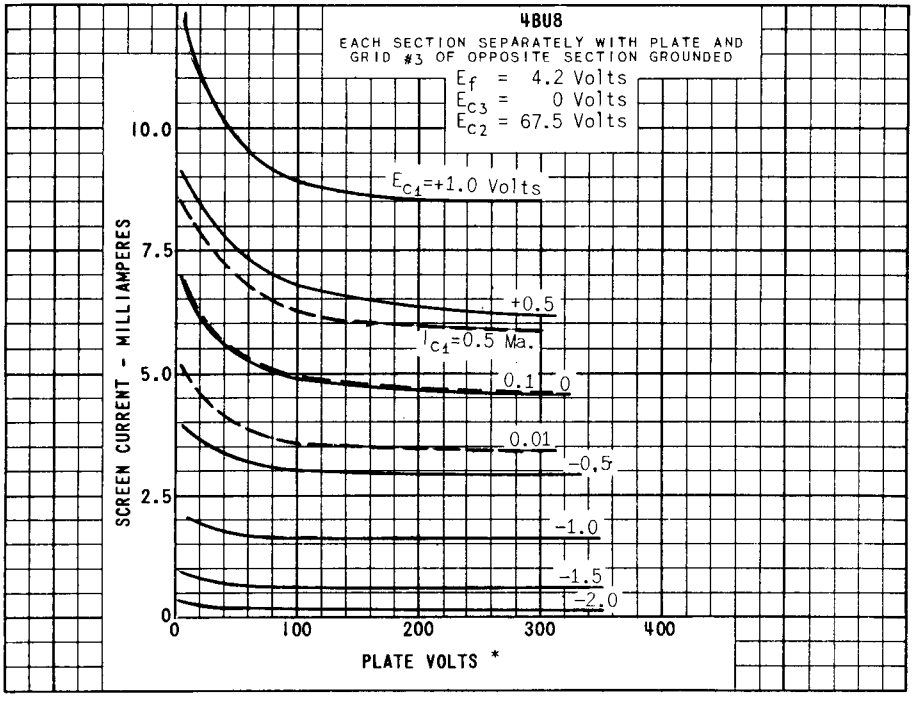


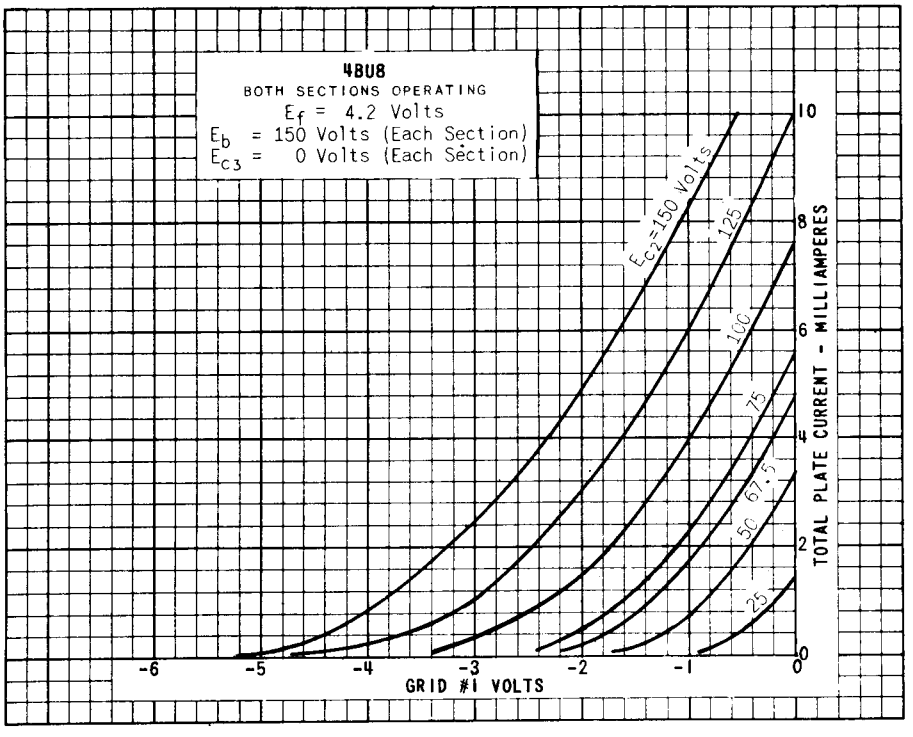


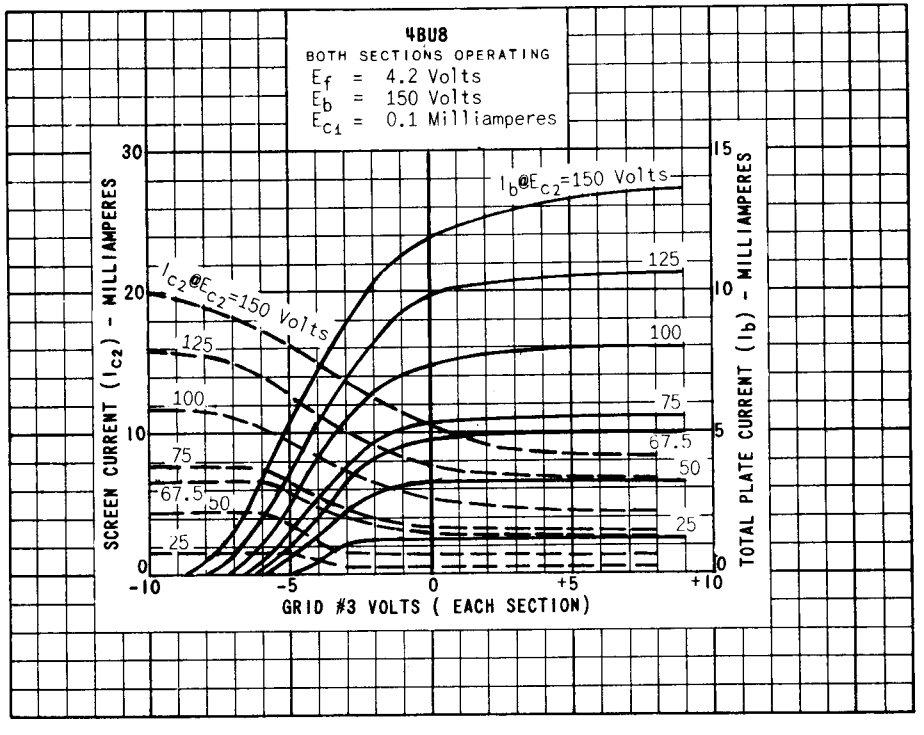

4BU8
EACH SECTION SEPARATELY WITH PLATE AND GRID #3 OF OPPOSITE SECTION GROUNDED
E_f = 4.2 Volts
E_{c3} = 0 Volts
E_{c2} = 67.5 Volts
I_{c1}=0.5 Ma.
0.25
0.10
0.05
0.01
PLATE (I_b) CURRENT - MILLIAMPERES
PLATE VOLTS ←
0
50
100
150
200
250
300
1
2
3
4


4BU8
BOTH SECTIONS OPERATING
E_f = 4.2 Volts
E_b = 100 Volts (Ea. Sec.)
E_{c2} = 67.5 Volts
I_{c1} = 0.1 Milliamperes
I_{c2}@E_{c3} (Section 2)=-5.0 Volts
-4.0
-3.0
-2.0
-1.0
0
NOTE:
CURVES ALSO APPLY WHEN SECTIONS ARE REVERSED.
I_b (Section 2) @ E_{c3} (Section 2) =0
I_b (Section 1) @ E_{c3} (Section 2)=0 THRU -5.0 Volts
-1.0
-2.0
-3.0
-4.0
PLATE (I_b) OR SCREEN (I_{c2}) CURRENT-MILLIAMPERES
GRID #3 VOLTS (SECTION 1)
-6
-4
-2
0
+2
+4
2
4
6






4BU8
BOTH SECTIONS OPERATING
E_f = 4.2 Volts
E_b = 150 Volts (Each Section)
E_{c3} = 0 Volts (Each Section)
E_{c_2}=150 Volts
125
100
75
67.5
50
25
TOTAL PLATE CURRENT - MILLIAMPERES
GRID #1 VOLTS
-6
-5
-4
-3
-2
-1
0
2
4
6
8
10


4BU8
BOTH SECTIONS OPERATING
E_f = 4.2 Volts
E_b = 150 Volts
E_{c_1} = 0.1 Milliamperes
$I_b@E_{c_2}$=150 Volts
125
100
75
67.5
50
25
$I_{c_2}@E_{c_2}$=150 Volts
125
100
75
67.5
50
25
SCREEN CURRENT (I_{c_2}) - MILLIAMPERES
TOTAL PLATE CURRENT (I_b) - MILLIAMPERES
GRID #3 VOLTS (EACH SECTION)
-10
-5
0
+5
+10
0
10
20
30
0
5
10
15