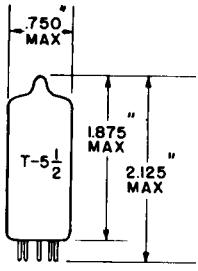
TUNG-SOL

HEPTODE

MINIATURE TYPE



GLASS BULB
SMALL-BUTTON MINIATURE
7 PIN BASE E7-1
OUTLINE DRAWING
JEDEC 5-2

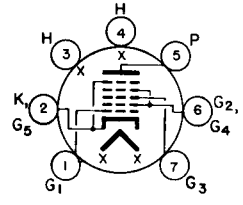
COATED UNIPOTENTIAL CATHODE

FOR USE

AS A GATED AMPLIFIER IN

TELEVISION RECEIVERS

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM
JEDEC 7CH

THE 3BY6 IS A PENTAGRID AMPLIFIER USING THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED EXPECIALLY FOR USE AS A GATED AMPLIFIER IN 600 MA. SERIES HEATER OPERATED TV RECEIVERS. IN SUCH SERVICE, IT MAY BE USED AS A COMBINED SYNC SEPARATOR AND SYNC CLIPPER. 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 6BY6.

DIRECT INTERELECTRODE CAPACITANCES

WITH NO EXTERNAL SHIELD

GRID #1 TO PLATE (MAX.)	0.08	pf
GRID #3 TO PLATE (MAX.)	0.35	pf
GRID #1 TO GRID #3 (MAX.)	0.22	pf
GRID #1 TO ALL OTHER ELECTRODES AND HEATER	5.4	pf
GRID #3 TO ALL OTHER ELECTRODES AND HEATER	6.9	pf
PLATE TO ALL OTHER ELECTRODES AND HEATER	7.6	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	3.15 VOLTS	600	MA.
HEATER SUPPLY LIMITS: CURRENT OPERATION		600±40	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE		200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		200[B]	VOLTS
HEATER WARM-UP TIME[A]		11	SECONDS

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

GATED AMPLIFIER SERVICE

PLATE VOLTAGE	→ 330	VOLTS
GRID #2 & #4 VOLTAGE	SEE RATING CHART	
GRID #2 & #4 SUPPLY VOLTAGE	→ 330	VOLTS
GRID #3 VOLTAGE:		
NEGATIVE BIAS VALUE	→ 55	VOLTS
POSITIVE BIAS VALUE	0	VOLTS
POSITIVE PEAK VALUE	→ 27	VOLTS

CONTINUED ON FOLLOWING PAGE

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS - CONT'D.

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

GATED AMPLIFIER SERVICE

GRID #1 VOLTAGE:		
NEGATIVE BIAS VALUE	→110	VOLTS
PLATE DISSIPATION	→2.3	WATTS
GRID #3 INPUT	0.1	WATT
GRIDS #2 & #4 INPUT:*		
FOR GRIDS #2 & #4 VOLTAGES UP TO 165 VOLTS	1.1	WATTS
FOR GRIDS #2 & #4 VOLTAGES BETWEEN 165 VOLTS AND 330 VOLTS	SEE RATING CHART	
GRID #1 INPUT	0.1	WATT
GRID #1 OR GRID #3 CIRCUIT RESISTANCE:		
FIXED BIAS OPERATION	0.5	MEGOHM
CATHODE BIAS OPERATION	1.0	MEGOHM

TYPICAL OPERATING CHARACTERISTICS

CLASS A_1 AMPLIFIER

PLATE VOLTAGE	250	VOLTS
GRIDS #2 & #4 VOLTAGE	100	VOLTS
GRID #3 VOLTAGE	-2.5	VOLTS
GRID #1 VOLTAGE	-2.5	VOLTS
GRID #3 TO PLATE TRANSCONDUCTANCE	500	µMHOS
GRID #1 TO PLATE TRANSCONDUCTANCE	1 900	µMHOS
PLATE CURRENT	6.5	MA.
GRID #2 & #4 CURRENT	9	MA.
GRID #3 VOLTS (APPROX.) FOR I_b = 35 µAMP. AND GRID #1 VOLTS = -4	-15	VOLTS
GRID #1 VOLTS (APPROX.) FOR I_b = 35 µAMP. AND GRID #3 VOLTS = 0	-12	VOLTS

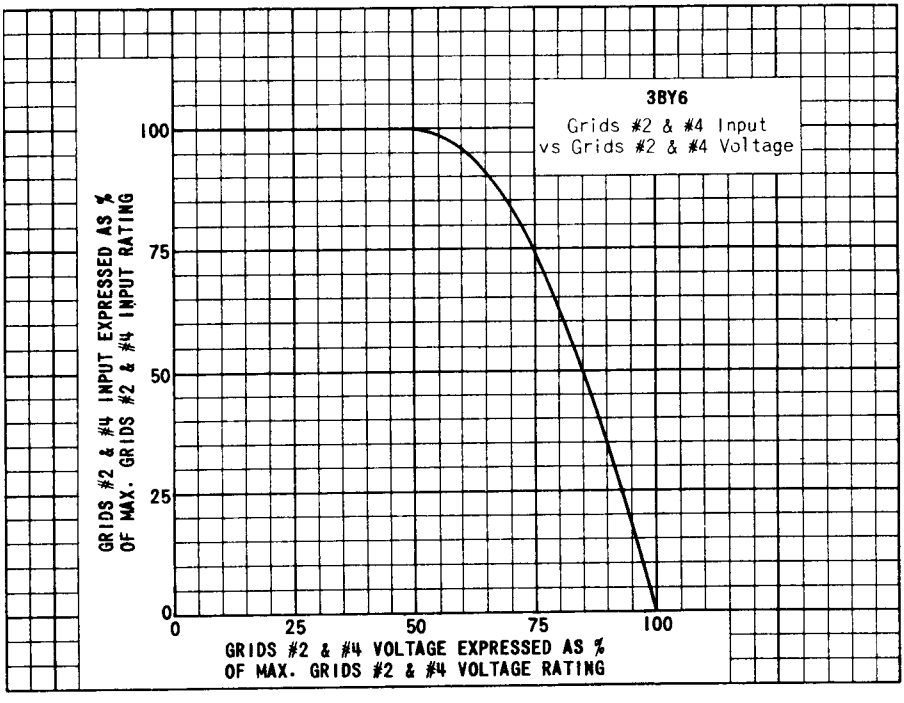
SYNC SEPARATOR AND SYNC CLIPPER

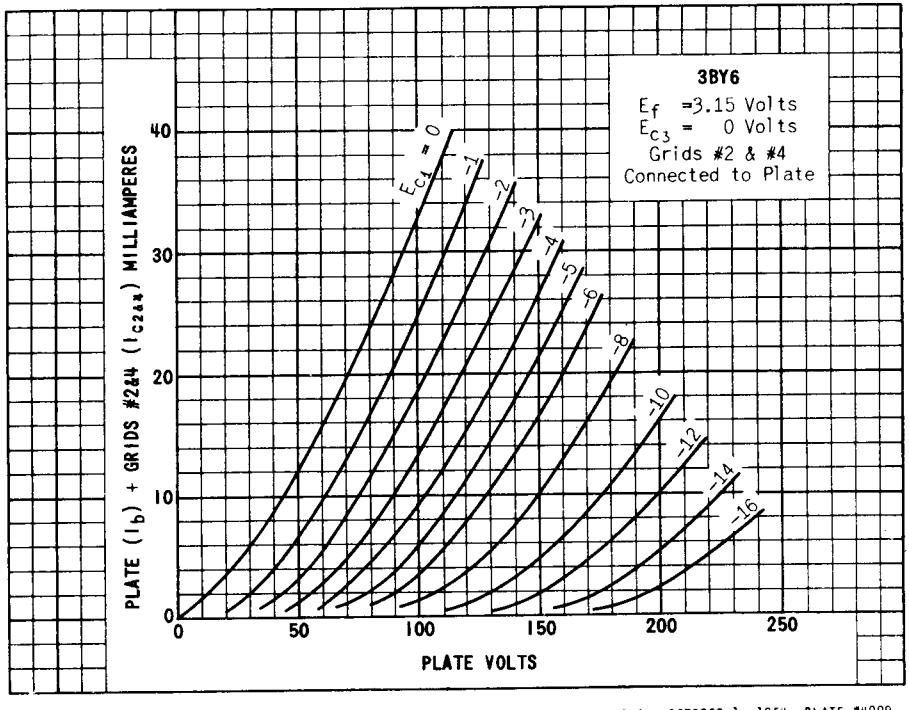
PLATE VOLTAGE	10	VOLTS
GRID #3 VOLTAGE	0	VOLTS
GRID #2 & #4 VOLTAGE	25	VOLTS
GRID #1 VOLTAGE	0	VOLTS
PLATE CURRENT	1.4	MA.
GRIDS #2 & #4 CURRENT	3.5	MA.
GRID #3 BIAS VOLTS (APPROX.) FOR PLATE VOLTAGE OF 25 VOLTS, GRIDS #2 & #4 VOLTAGE OF 25 VOLTS, GRID #1 VOLTAGE OF 0 VOLTS AND PLATE CURRENT OF 50 µAMP.	-2.5	VOLTS
GRID #1 BIAS VOLTAGE (APPROX.) FOR PLATE VOLTAGE OF 25 VOLTS, GRIDS #2 & #4 VOLTAGE OF 25 VOLTS, GRID #3 VOLTAGE OF 0 VOLTS AND PLATE CURRENT OF 50 µAMP.	-2.3	VOLTS

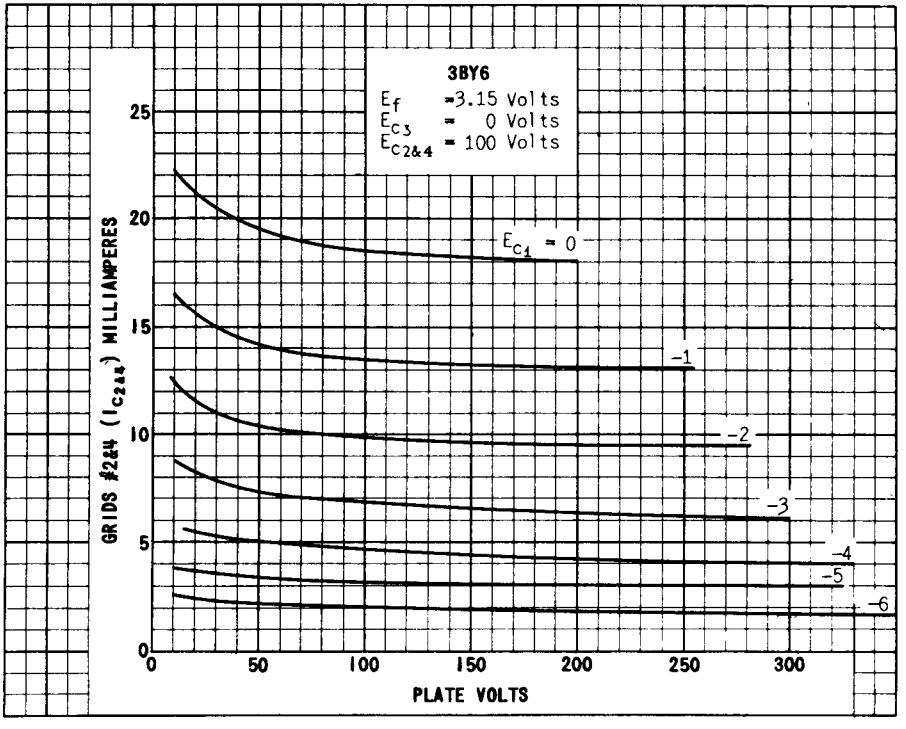
HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

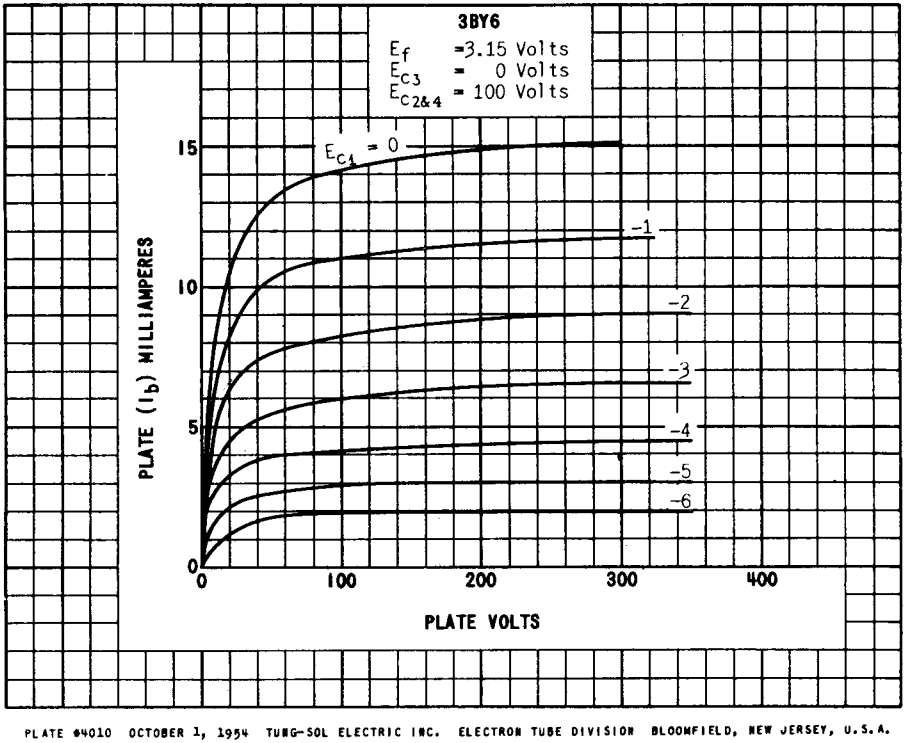
[B] THE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

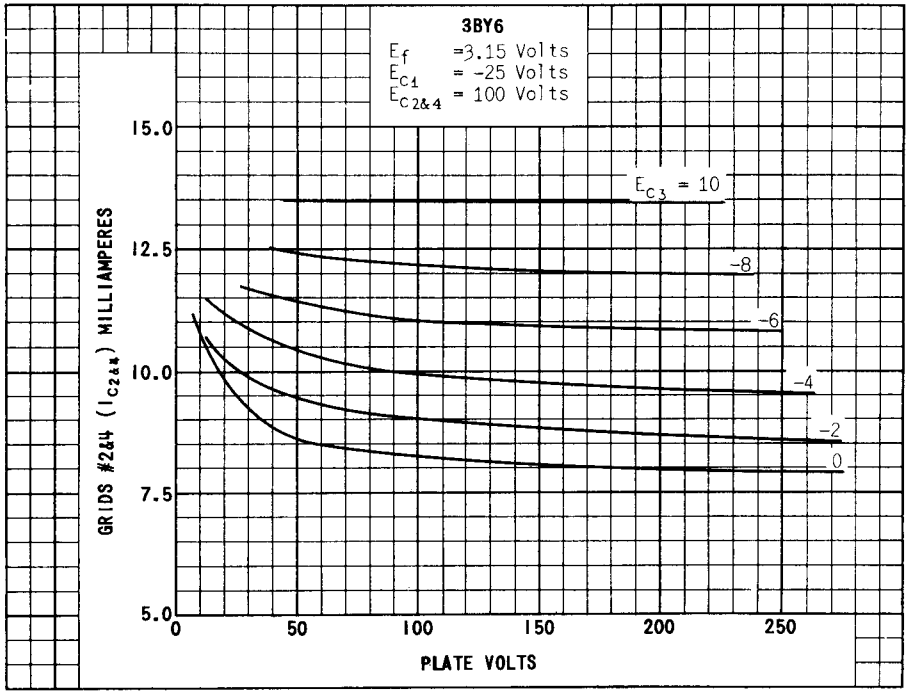
→ INDICATES A CHANGE. * INDICATES AN ADDITION.

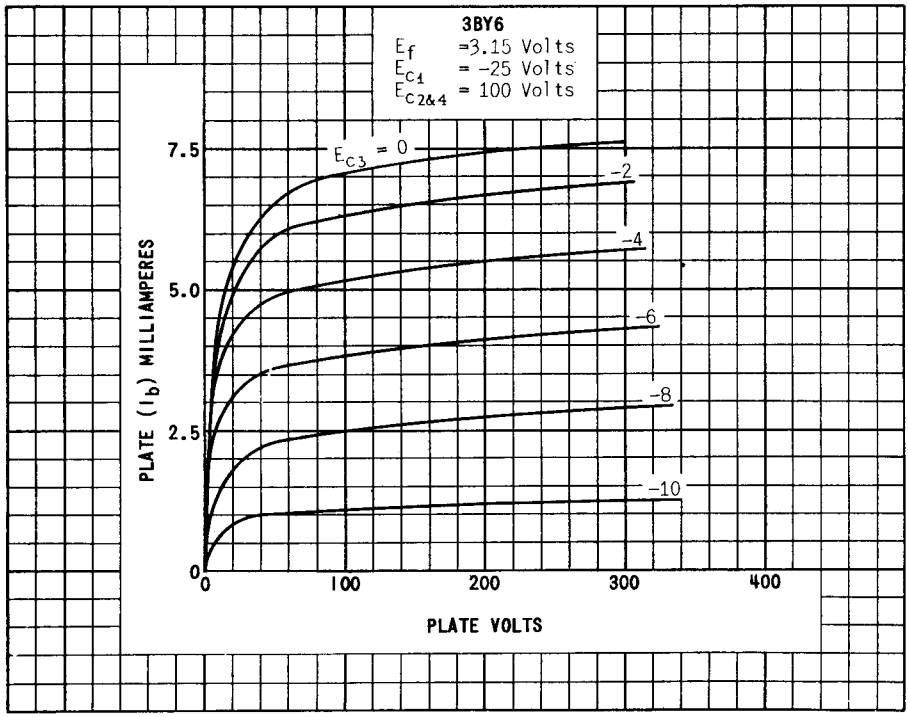

3BY6
Grids #2 & #4 Input
vs Grids #2 & #4 Voltage
GRIDS #2 & #4 INPUT EXPRESSED AS %
OF MAX. GRIDS #2 & #4 INPUT RATING
100
75
50
25
0
0
25
50
75
100
GRIDS #2 & #4 VOLTAGE EXPRESSED AS %
OF MAX. GRIDS #2 & #4 VOLTAGE RATING


3BY6
E_f =3.15 Volts
E_{c3} = 0 Volts
Grids #2 & #4
Connected to Plate
PLATE (I_b) + GRIDS #2&4 ($I_{c2\&4}$) MILLIAMPERES
40
30
20
10
0
E_{c1} = 0
-1
-2
-3
-4
-5
-6
-8
-10
-12
-14
-16
0
50
100
150
200
250
PLATE VOLTS


3BY6
E_f =3.15 Volts
E_{c3} = 0 Volts
$E_{c2\&4}$ = 100 Volts
GRIDS #2&4 ($I_{c2\&4}$) MILLIAMPERES
PLATE VOLTS
E_{c1} = 0
-1
-2
-3
-4
-5
-6
0
5
10
15
20
25
0
50
100
150
200
250
300


3BY6
E_f =3.15 Volts
E_{c3} = 0 Volts
$E_{c2\&4}$ = 100 Volts
PLATE (I_b) MILLIAMPERES
PLATE VOLTS
E_{c1} = 0
-1
-2
-3
-4
-5
-6
0
5
10
15
0
100
200
300
400


3BY6
E_f =3.15 Volts
E_{c1} = -25 Volts
$E_{c2\&4}$ = 100 Volts
GRIDS #2&4 ($I_{c2\&4}$) MILLIAMPERES
15.0
12.5
10.0
7.5
5.0
0
50
100
150
200
250
PLATE VOLTS
E_{c3} = 10
-8
-6
-4
-2
0


3BY6
E_f =3.15 Volts
E_{c1} = -25 Volts
$E_{c2\&4}$ = 100 Volts
PLATE (I_b) MILLIAMPERES
7.5
5.0
2.5
0
100
200
300
400
PLATE VOLTS
E_{c3} = 0
-2
-4
-6
-8
-10