



3E29

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TWIN-UNIT BEAM POWER AMPLIFIER

Similar to Type 829-B, but
intended particularly for pulse modulator service.
Unless otherwise specified, values are for both units

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Heater Arrangement	Series	Parallel	
Voltage.	12.6*	6.3*	ac or dc volts
Current.	1.125	2.25	amp

Transconductance, per Unit (Approx.):

for plate current of 60 ma. 8500 μ hos

Grid-Screen Mu-factor,

per unit. 9

Direct Interelectrode Capacitances (Each Unit):

Grid No.1 to Plate⁰. 0.12 max. μ fInput. 14.5 μ fOutput 7.0 μ f

Grid-No.2 to Cathode Capacitance,

(Including internal grid-No.2

by-pass capacitor). 65 μ f

* Should not deviate more than +10% or -5% from value shown.

0 With external shield.

Mechanical:

Mounting Position. Vertical, base up or down

Horizontal, plane of each plate vertical

Overall Length 4-1/8" $\pm$ 3/16"Seated Length. 3-11/16" $\pm$ 3/16"

Maximum Diameter See Outline Drawing

Bulb T-16

Bulb Terminals (Two) See Outline Drawing

Base Medium Molded-Flare Septar 7-Pin

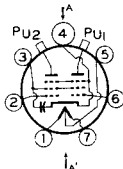
Basing Designation for BOTTOM VIEW 7BP

Pin 1-Heater Pin 6-Grid No.1 of Unit No.1

Pin 2-Grid No.1 of Unit No.2 Pin 7-Heater

Pin 3-Grid No.2 of Both Units

Pin 4-Cathode, Grid No.3 Both Units

Pin 5-Heater P_{U1} -Plate Terminal of Unit No.1Center-Tap P_{U2} -Plate Terminal of Unit No.2

PLANE OF ELECTRODES OF EACH UNIT
IS PARALLEL TO PLANE THROUGH AXIS
OF TUBE AND AA'

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TWIN-UNIT BEAM POWER AMPLIFIER

MODULATOR - Rectangular-Wave Modulation

Maximum CCS* Ratings, Absolute Values:

(Values for both units in parallel)

For Pulse Length of	7 max.	1.2 max.	μsec
DC PLATE-SUPPLY VOLTAGE [▲]	5000 max.	5000 max.	volts
INSTANTANEOUS PLATE VOLTAGE. . .	5750 max.	5750 max.	volts
DC GRID-No.2 (SCREEN) SUPPLY VOLT. [▲]	850 max.	850 max.	volts
DC GRID-No.1 (CONTROL GRID) SUPPLY VOLTAGE	-200 max.	-200 max.	volts
INSTANTANEOUS GRID-No.1 VOLT. . .	-600 max.	-600 max.	volts
PEAK POSITIVE GRID-No.1 VOLT. . .	250 max.	250 max.	volts
PEAK PLATE CURRENT	1.5 max.	10 max.	amp
PEAK GRID-No.2 CURRENT	0.5 max.	0.5 max.	amp
PEAK GRID-No.1 CURRENT	0.6 max.	4 max.	amp
PLATE INPUT.	85 max.	60 max.	watts
GRID-No.2 INPUT.	3 max.	3 max.	watts
GRID-No.1 INPUT.	1 max.	1 max.	watt
PLATE DISSIPATION.	15 max.	15 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	100 max.	100 max.	volts
Heater positive with respect to cathode	100 max.	100 max.	volts

Typical Operation with Rectangular-Wave Shapes:

(In accompanying test circuit)

With duty factor# of	2×10^{-3}	10^{-3}	
DC Plate-Supply Voltage.	2000 . .	5000 . .	volts
DC Grid-No.2 Supply Volt.	650 . .	850 . .	volts
DC Grid-No.1 Supply Volt.	-175 . .	-200 . .	volts
Peak Positive Grid-No.1 Volt.	50 . .	150 . .	volts
Peak Plate Current	5 . .	10 . .	amp
DC Plate Current	10 . .	10 . .	ma.
DC Grid-No.2 Current	1.1 . .	1.7 . .	ma.
DC Grid-No.1 Current	1.0 . .	1.5 . .	ma.
Load Resistance.	300 . .	300 . .	ohms

* Continuous Commercial Service.

▲ For tube protection, it is essential that the dc resistance of the plate supply and of the screen supply be sufficiently large to limit the short-circuit current to 0.5 ampere in either circuit.

Duty factor = pulse length multiplied by repetition rate.

OUTLINE DIMENSIONS for the 3E29 are the same as those shown for Type 829-8

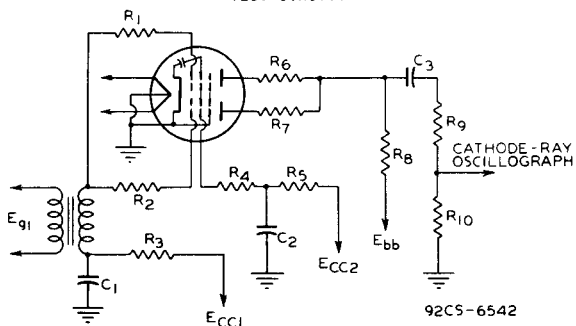


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TWIN-UNIT BEAM POWER AMPLIFIER

TEST CIRCUIT



R1 R2: 20 Ohms, non-inductive

R3: 1500 Ohms

R4: 25 Ohms, non-inductive

R5: 1500 Ohms

R6 R7: 10 Ohms, non-inductive

R8: 10000 Ohms

R9: 400 Ohms

R10: 10 Ohms

C1: 0.1 μ f, 600 V., DCC2: 0.1 μ f, 1000 V., DCC3: 0.1 μ f, 5000 V., DC

E_cc1: Grid-Supply Voltage

E_cc2: Screen-Supply Voltage

E_bb: Plate-Supply Voltage

E_q1: Signal Voltage

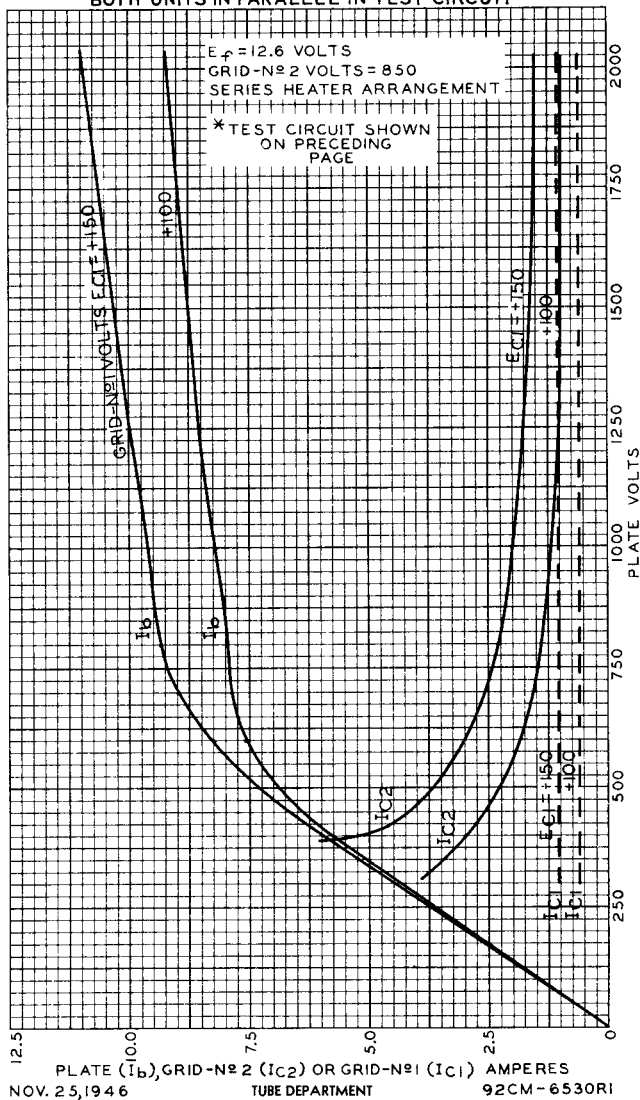
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AVERAGE CHARACTERISTICS BOTH UNITS IN PARALLEL IN TEST CIRCUIT *





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TWIN-UNIT BEAM POWER TUBE

Unless Otherwise Specified, Values are on a Per Tube Basis

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Arrangement	Parallel	Series	
Voltage (AC or DC)	6.3 $\begin{smallmatrix} +10\% \\ -5\% \end{smallmatrix}$	12.6 $\begin{smallmatrix} +10\% \\ -5\% \end{smallmatrix}$	volts
Current at 6.3 volts	2.25	—	amp
Current at 12.6 volts	—	1.125	amp

Transconductance (Each Unit):

With plate volts = 250, grid-			
No.2 volts = 175, and plate			
ma. = 60	8500		μ hos

Mu-Factor, Grid No.2 to Grid No.1
(Each Unit):

With plate volts = 225, grid-			
No.2 volts = 225, and plate			
ma. = 60	9		

Direct Interelectrode Capacitances (Each Unit):

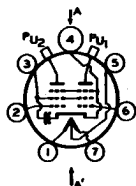
Grid No.1 to plate (with			
external shield $\square$)	0.12 max.		μ f
Input	14		μ f
Output	7		μ f

Mechanical:

Mounting Position	Vertical, base up or down; Horizontal, plane of each plate vertical
Overall Length	4-1/8" $\pm$ 3/16"
Seated Length	3-11/16" $\pm$ 3/16"
Maximum Diameter	2-3/8"
Bulb	T-16
Bulb Terminals (Two)	See Dimensional Outline
Weight (Approx.)	3.5 oz.
Base	Medium Molded-Flare Septar 7-Pin (JETEC No.E7-2)

BOTTOM VIEW

- Pin 1 - Heater
Pin 2 - Grid No.1 of
Unit No.2
Pin 3 - Grid No.2 of
Both Units
Pin 4 - Cathode,
Grid No.3 of
Both Units
Pin 5 - Heater
Center-Tap



- Pin 6 - Grid No.1 of
Unit No.1
Pin 7 - Heater

- P_{U1} - Plate Terminal
of Unit No.1
P_{U2} - Plate Terminal
of Unit No.2

PLANE OF ELECTRODES OF EACH UNIT
IS PARALLEL TO PLANE THROUGH AXIS
OF TUBE AND AA'

 $\square$: See next page.

← Indicates a change

MAY 3, 1954

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

DATA 1



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TWIN-UNIT BEAM POWER TUBE

MODULATOR—Rectangular-Wave Modulation

Values are for Units in Parallel

Maximum CCS* Ratings, Absolute Values:

For Duty Factor* between 0.0001 and 1.0

and Maximum Averaging Time of 1200 μ sec in Any Interval

DC PLATE SUPPLY VOLTAGE [▲]	5000 max.	volts
INSTANTANEOUS PLATE VOLTAGE	5750 max.	volts
DC GRID-No.2 (SCREEN) SUPPLY VOLTAGE [▲]	850 max.	volts
DC GRID-No.1 (CONTROL-GRID) SUPPLY VOLTAGE [▲]	-225 max.	volts
INSTANTANEOUS GRID-No.1 VOLTAGE	-600 max.	volts
PEAK POSITIVE GRID-No.1 VOLTAGE	250 max.	volts
PEAK PLATE CURRENT	See Rating Chart	
PEAK GRID-No.2 CURRENT	3.5 max.	amp
PEAK GRID-No.1 CURRENT	4 max.	amp
PLATE INPUT	85 max.	watts
GRID-No.2 INPUT	3 max.	watts
GRID-No.1 INPUT	1 max.	watt
PLATE DISSIPATION [#]	15 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Typical Operation with Rectangular-Wave Shapes in
Accompanying Test Circuit:

	With Duty Factor* of	0.002	0.001	
DC Plate Supply Voltage		2000	5000	volts
DC Grid-No.2 Supply Voltage		650	850	volts
DC Grid-No.1 Supply Voltage		-175	-200	volts
Peak Positive Grid-No.1 Voltage		50	150	volts

□ Having length of 3/4" and inside diameter of 2-3/8". Shield is placed around base end of tube and is connected to cathode.

● Continuous Commercial Service.

▲ For tube protection, it is essential that sufficient dc resistance be used in the plate supply circuit, the grid-No.2 supply circuit, and the grid-No.1 supply circuit so that the short-circuit current is limited to 0.5 ampere in each circuit.

* Duty Factor for the 3E29 is defined as the "on" time in microseconds divided by 1200 microseconds.

"On" Time is defined as the sum of the durations of all the individual pulses which occur during any 1200-microsecond interval.

Pulse Duration is defined as the time interval between the two points on the pulse at which the instantaneous value is 70% of the peak value. The peak value is defined as the maximum value of a smooth curve through the average of the fluctuations over the top portion of the pulse.

Averaged over any interval not exceeding 1200 microseconds. Care should be used in determining the plate dissipation. A calculated value based on rectangular pulses can be considerably in error when the actual pulses have a finite rise and fall time. Plate dissipation should preferably be determined by measuring the bulb temperature under actual operating conditions; then, with the tube in the same socket and under the same ambient-temperature conditions, apply to the tube sufficient dc input to obtain the same bulb temperature. This value of dc input is a measure of the plate dissipation.

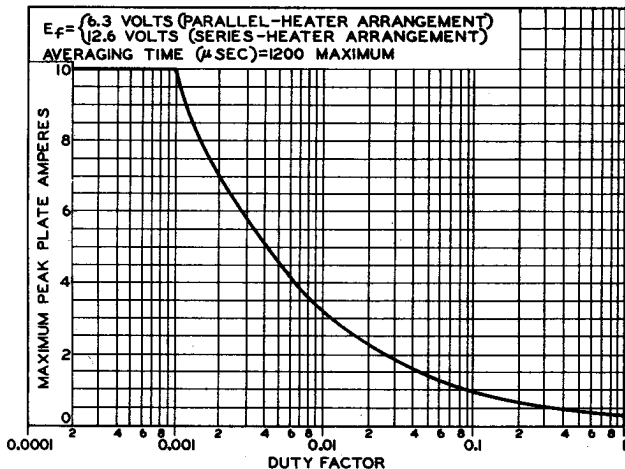
→ Indicates a change



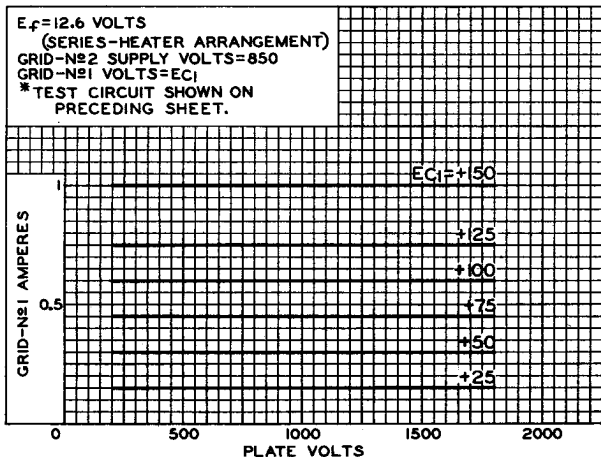
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RATING CHART



92CS-7927RI

 AVERAGE CHARACTERISTICS
 UNITS IN PARALLEL IN TEST CIRCUIT *


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AVERAGE CHARACTERISTICS UNITS IN PARALLEL IN TEST CIRCUIT*

$E_f = 12.6$ VOLTS (SERIES-HEATER ARRANGEMENT)

GRID-Nº2 SUPPLY VOLTS = 850

GRID-Nº1 VOLTS = E_{c1}

* TEST CIRCUIT SHOWN ON PRECEDING SHEET.

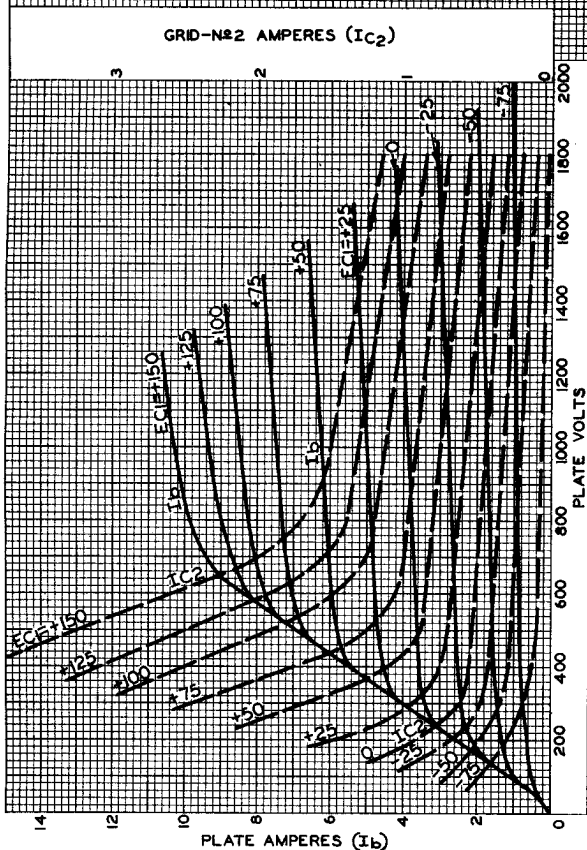


Plate Current:

Peak.	5	10	amp
DC.	0.010	0.010	amp
DC Grid-No.2 Current.	0.0011	0.002	amp
DC Grid-No.1 Current.	0.001	0.001	amp
Load Resistance	300	400	ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current (Parallel connection)	1	2.00	2.50	amp
Heater Current (Series connection)	2	1.00	1.25	amp
Grid-No.1-to-Plate Capacitance (Each unit)	3	-	0.12	μ f
Input Capacitance (Each unit)	-	12.8	16.2	μ f
Output Capacitance (Each unit).	-	5.25	8.75	μ f
Plate Current (Each unit)	1,4	38	82	ma
Grid-No.1 Voltage	1,5	-	-55	volts
Grid-No.2 Current (Each unit)	1,4	-	10	ma
Peak Plate Current.	1,6	9	-	amp

Note 1: With 6.3 volts on heater.

Note 2: With 12.6 volts on heater.

Note 3: With external shield having length of 3/4" and inside diameter of 2-3/8". Shield is placed around base end of tube and is connected to cathode.

Note 4: With dc plate voltage of 250 volts, dc grid-No.2 voltage of 175 volts, and dc grid-No.1 voltage of -11 volts. Grid No.1 of unit not under test is biased -100 volts with respect to its cathode.

Note 5: With units in parallel, dc plate voltage of 400 volts, dc grid-No.2 voltage of 225 volts, and dc grid-No.1 voltage adjusted to give dc plate current of 200 microamperes.

Note 6: With the units in parallel in the accompanying test circuit under the following conditions: rectangular-wave modulation applied to grid No.1; pulse duration of 1 microsecond approx; pulse repetition rate of 1500 cps approx; dc plate-supply voltage of 5000 volts; dc grid-No.2 voltage of 850 volts; dc grid-No.1 volts of -225 volts; peak positive grid-No.1 swing of 150 volts; and dc plate current of 15 ma. minimum obtained by adjusting the pulse repetition rate. ←

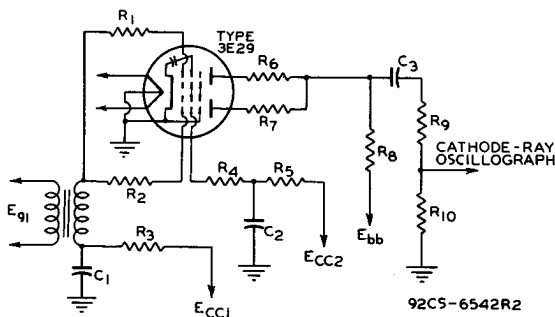
DIMENSIONAL OUTLINE

shown under Type 829B also applies to the 3E29

← Indicates a change.



TEST CIRCUIT



R_1 R_2 : 20 ohms, 1 watt non-inductive
 R_3 : 15000 ohms, 1 watt
 R_4 : 25 ohms, 1 watt, non-inductive
 R_5 : 10000 ohms, 1 watt
 R_6 R_7 : 10 ohms, 5 watts, non-inductive
 R_8 : 10000 ohms, 50 watts
 R_9 : $400 \pm 5\%$ ohms, 50 watts non-inductive

R_{10} : $10 \pm 1\%$ ohms, 5 watts
 C_1 : $0.1 \mu f$, 600 v dc
 C_2 : $0.1 \mu f$, 1000 v dc
 C_3 : $0.1 \mu f$, 5000 v dc
 E_{cc1} : Grid-No.1 Supply Voltage
 E_{cc2} : Grid-No.2 Supply Voltage
 E_{bb} : Plate Supply Voltage
 E_{g1} : Signal Voltage

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