

# RCA TUBE HANDBOOK

HR-3

70 L 3-6



GENERAL ELECTRIC COMPANY

TUBE DEPARTMENT

4830 ROCKAWAY AVENUE

HARTFORD, CONNECTICUT



5FP4-A

# 5FP4-A VIEW-FINDER KINESCOPE

MAGNETIC FOCUS

MAGNETIC DEFLECTION

## DATA

## General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts

Current . . . . . 0.6 . . . . . amp

Direct Interelectrode Capacitances:

Grid No.1 to All Other Electrodes. . . . . 8  $\mu\text{mf}$  ←Cathode to All Other Electrodes. . . . . 5  $\mu\text{mf}$ 

Phosphor (For Curves, see front of this Section). P4—Sulfide Type

Fluorescence and Phosphorescence . . . . . White

Persistence of Phosphorescence . . . . . Short

Focusing Method. . . . . Magnetic

Deflection Method. . . . . Magnetic

Deflection Angle (Approx.) . . . . .  $53^\circ$ Overall Length . . . . .  $11\text{-}1/8" \pm 3/8"$ Greatest Diameter of Bulb. . . . .  $4\text{-}15/16" \pm 3/32"$ Min. Useful Screen Diameter. . . . .  $4\text{-}1/4"$ 

Mounting Position. . . . . Any

Cap. . . . . Recessed Small Ball (JETEC No. J1-22)

Base . . . . . Long Medium-Shell Octal 8-Pin

## BOTTOM VIEW

Pin 1—No  
Connection  
Pin 2—Heater  
Pin 3—Grid No. 2  
Pin 4—No  
Connection



Pin 5—Grid No. 1  
Pin 6—No  
Connection  
Pin 7—Cathode  
Pin 8—Heater  
Cap—Anode

## Maximum Ratings, Design-Center Values:

ANODE VOLTAGE\* . . . . . 8000 max. volts

GRID-NO. 2 VOLTAGE. . . . . 410 max. volts

GRID-NO. 1 VOLTAGE:

Negative bias value. . . . . 125 max. volts

Positive bias value. . . . . 0 max. volts

Positive peak value. . . . . 2 max. volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode. 150 max. volts

Heater positive with respect to cathode. 150 max. volts

## Typical Operation:

Anode Voltage\*\* . . . . . 6000 volts

Grid-NO. 2 Voltage. . . . . 250 volts

Grid-NO. 1 Voltage for Visual Extinction  
of Undelected Focused Spot . . . . -25 to -70 volts

\* The product of anode voltage and average anode current should be limited to 6 watts.

\*\* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 4000 volts.

← Indicates a change.

AUG. 1, 1951

TUBE DEPARTMENT

DATA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

SFP4-A



SFP4-A

# VIEW-FINDER KINESCOPE

→ Focusing-Coil Current (DC, approx.)<sup>•</sup> . . . 120 ± 15% ma

**Maximum Circuit Values:**

Grid-No.1-Circuit Resistance. . . . . 1.5 max. megohms

• For specimen focusing coil similar to JETEC Focusing Coil No. 106 positioned with air gap toward kinescope screen, and center line of air gap 3-1/4" from Reference Line (see Outline Drawing). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 10 foot-lamberts on a 3-7/8" x 2-7/8" picture area sharply focused at center of screen.

→ Indicates a change.

AUG. 1, 1951

DATA



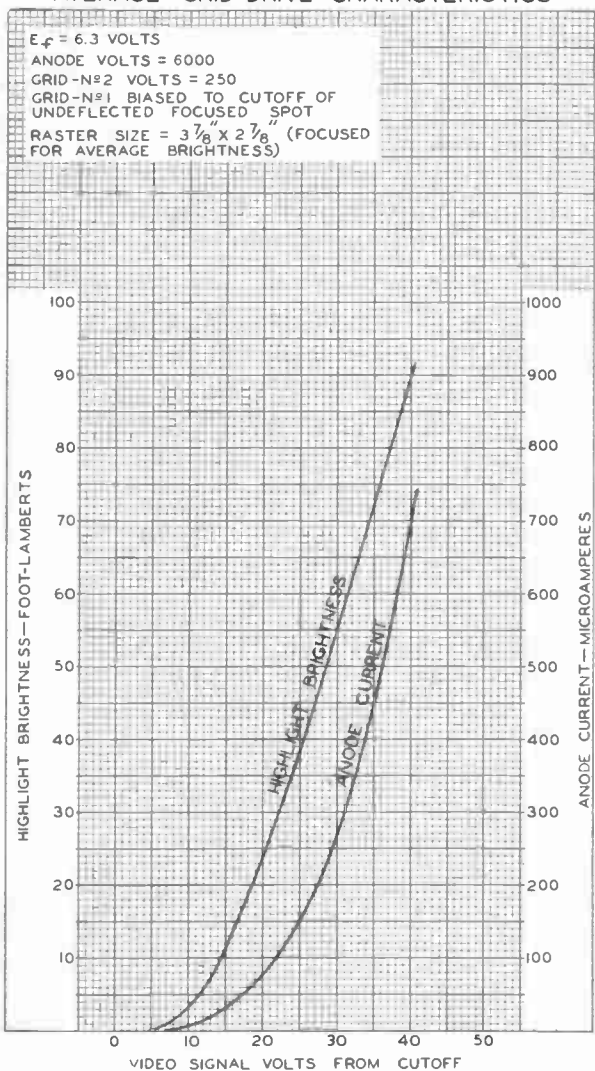
5FP4-A



5FP4-A

AVERAGE GRID-DRIVE CHARACTERISTICS

$E_f = 6.3$  VOLTS  
 ANODE VOLTS = 6000  
 GRID-N<sup>o</sup>2 VOLTS = 250  
 GRID-N<sup>o</sup>1 BIASED TO CUTOFF OF UNDEFLECTED FOCUSED SPOT  
 RASTER SIZE =  $3\frac{7}{8}$ " X  $2\frac{7}{8}$ " (FOCUSED FOR AVERAGE BRIGHTNESS)



DEC. 5, 1950

TUBE DEPARTMENT  
 RADIO CORPORATION OF AMERICA, HARTFORD, NEW JERSEY

92CM - 6683RI



10KP7

10KP7

# OSCILLOGRAPH TUBE

MAGNETIC FOCUS

MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts

Current . . . . . 0.6 ± 10% . . . . . amp

Direct Interelectrode Capacitances (Approx.):

Grid No.1 to all other electrodes . . . . . 6  $\mu$ mf

Cathode to all other electrodes . . . . . 5  $\mu$ mf

Faceplate . . . . . Filterglass

Light transmission (Approx.) . . . . . 16%

Phosphor (For curves, see front of this section). . . . . P7

Fluorescence . . . . . Blue

Phosphorescence . . . . . Greenish-Yellow

Persistence . . . . . Long

Focusing Method . . . . . Magnetic

Deflection Method . . . . . Magnetic

Deflection Angle (Approx.) . . . . . 50°

Tube Dimensions:

Overall length . . . . . 17-5/8" ± 3/8"

Diameter:

At faceplate . . . . . 10-1/2" ± 1/16"

Maximum, at faceplate seal . . . . . 10-5/8"

Minimum Useful Screen Diameter . . . . . 9"

Weight (Approx.) . . . . . 10 lbs

Operating Position . . . . . Any

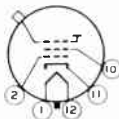
Cap . . . . . Recessed Small Cavity (JETEC No. J1-21)

Bulb . . . . . J-84

Base . . . . . Small-Shell Duodecal 5-Pin (JETEC No. B5-57)

Basing Designation for BOTTOM VIEW . . . . . 12D

Pin 1 - Heater  
 Pin 2 - Grid No.1  
 Pin 10 - Grid No.2  
 Pin 11 - Cathode



Pin 12 - Heater  
 Cap - Ultor  
 (Grid No.3,  
 Collector)

### Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE . . . . . 10000 max. volts

GRID-NO.2 VOLTAGE:

Positive value (DC or Peak AC) . . . . . 700 max. volts

Negative value\* (DC or Peak AC) . . . . . 180 max. volts

GRID-NO.1 VOLTAGE:

Negative bias value . . . . . 180 max. volts

Positive bias value<sup>▲</sup> . . . . . 0 max. volts

Positive peak value . . . . . 2 max. volts

PEAK GRID-NO.1 DRIVE FROM CUTOFF . . . . . 65 max. volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . . . . . 125 max. volts

Heater positive with respect to cathode . . . . . 125 max. volts

\* ▲: See next page.

← Indicates a change.



10KP7

## OSCILLOGRAPH TUBE

## Equipment Design Ranges:

For any ultor voltage ( $E_{c3}$ ) between 7000\* and 10000 volts  
and grid-No.2 voltage ( $E_{c2}$ ) between 150 and 700 volts

Grid-No.1 voltage for Visual

Extinction of Undelected

Focused Spot . . . . . -10.8% to -25.2% of  $E_{c2}$  voltsGrid-No.2 Current . . . . . -10 to +15  $\mu$ aFocusing-Coil Current (DC)<sup>oo</sup>.  $\left[ \sqrt{\frac{E_{c3}}{7000}} \times 99 \right] \pm 15\%$  ma

Spot Position . . . . . \*\*

## Examples of Use of Design Ranges:

For ultor voltage of	7000	9000	volts
and grid-No.2 voltage of	250	250	volts

Grid-No.1 Voltage for Visual

Extinction of Undelected

Focused Spot . . . . . -27 to -63 -27 to -63 volts

Focusing-Coil Current (DC). . . . . 99  $\pm$  15% 112  $\pm$  15% ma

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 1.5 max. megohms

# This value has been specified to take care of applications where grid No.2 is modulated.

▲ At or near this rating, the effective resistance of the ultor supply should be adequate to limit the ultor input power to 6 watts.

\* Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 7000 volts.

<sup>oo</sup> For specimen focusing coil similar to JETEC Focusing Coil No.106 positioned with air gap toward faceplate and center line of air gap 3-1/4" from Reference Line (See Dimensional Outline) and ultor current of 200 microamperes.

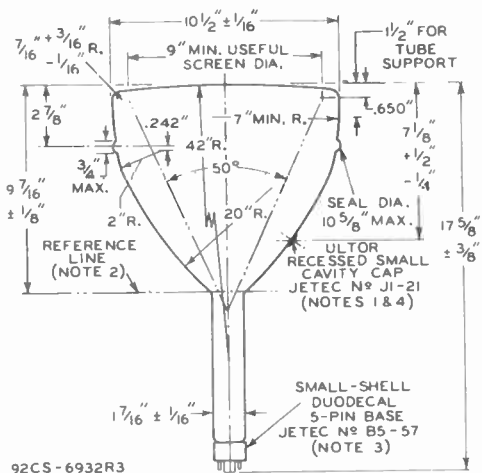
\*\* The center of the undeflected, unfocused spot will fall within a circle having an 18-mm radius concentric with the center of the tube face.



10KP7

10KP7

## OSCILLOGRAPH TUBE



92CS-6932R3

**NOTE 1:** THE FLARE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No. 7 MAY VARY FROM THE FLARE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 10^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No. 3.

**NOTE 2:** REFERENCE LINE IS DETERMINED BY POSITION WHERE REFERENCE-LINE GAUGE (JETEC No. 112) 1.500"  $\pm$  .003" - .000" I.D. AND 2" LONG WILL REST ON BULB CONE.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING DIAMETER OF 1-7/8".

**NOTE 4:** TUBE SUPPORT MUST BE KEPT AT LEAST 2" AWAY FROM ULTOR CAP.



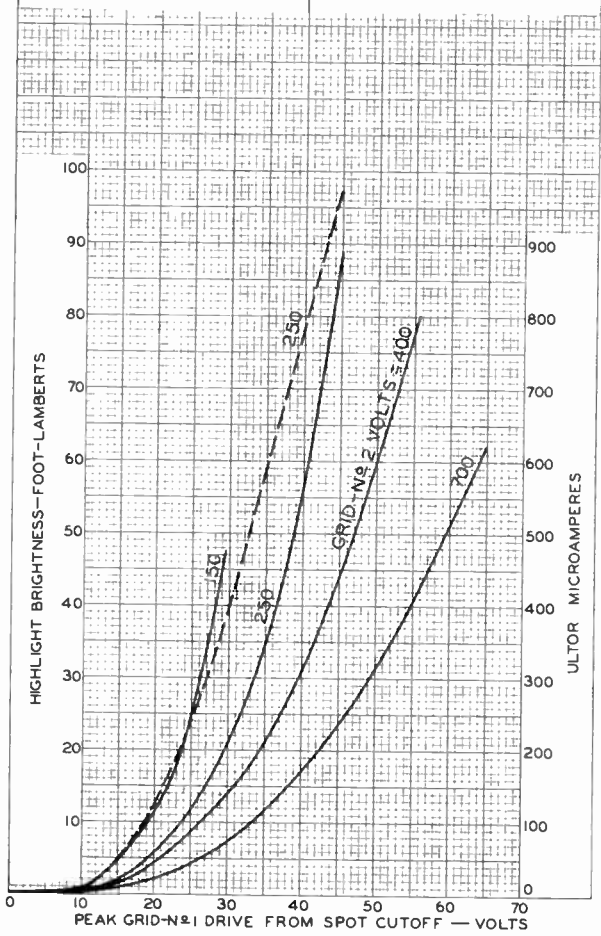
10KP7



10KP7

AVERAGE GRID-DRIVE CHARACTERISTICS

<p>—— ULTOR CURRENT</p> <p><math>E_f = 6.3</math> VOLTS</p> <p>ULTOR VOLTS = 7000-10000</p> <p>GRID No. 1 BIASED TO CUTOFF OF UNDEFLECTED FOCUSED SPOT.</p>	<p>--- HIGHLIGHT BRIGHTNESS</p> <p><math>E_f = 6.3</math> VOLTS</p> <p>ULTOR VOLTS = 9000</p> <p>GRID No. 1 BIASED TO CUTOFF OF UNDEFLECTED FOCUSED SPOT.</p> <p>RASTER SIZE = 14 CM x 14 CM</p>
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12DP7-A

# 12DP7-A OSCILLOGRAPH TUBE

MAGNETIC FOCUS

MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts  
Current . . . . .  $0.6 \pm 10\%$  . . . . . amp

Direct Inter-electrode Capacitances (Approx.):

Grid No.1 to all other electrodes . . . . . 9  $\mu\text{f}$   
Cathode to all other electrodes . . . . . 6  $\mu\text{f}$

Facelate, Spherical . . . . . Filterglass  
Light transmission (Approx.) . . . . . 76%

Phosphor (For Curves, see front of this section) . . . . . P7  
Fluorescence . . . . . Blue

Persistence . . . . . Short

Phosphorescence . . . . . Greenish-Yellow  
Persistence . . . . . Long

Focusing Method . . . . . Magnetic

Deflection Method . . . . . Magnetic

Deflection Angle (Approx.) . . . . . 50°

Overall Length . . . . . 19-5/8"  $\pm$  1/2"

Greatest Diameter of Bulb . . . . . 12"  $\pm$  3/16"

Minimum Useful Screen Diameter . . . . . 10"

Weight (Approx.) . . . . . 8 lbs

Mounting Position . . . . . Any

Cap. . . . . Medium (JETEC No. C1-5)

Bulb . . . . . J96

Base . . . . . Long Medium-Shell Octal 8-Pin (Etec No. B8-5),  
or Long Medium-Shell Octal 5-Pin (JETEC No. B5-80)

Basing Designation for BOTTOM VIEW . . . . . 4 2 1

- Pin 1 - No Connection
- Pin 2 - Heater
- Pin 3 - Grid No. 2
- Pin 4 - No Connection
- Pin 5 - Grid No. 1



- Pin 6 - No Connection
- Pin 7 - Cathode
- Pin 8 - Heater
- Cap - Ultor (Grid No. 3, Collector)

### Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE . . . . . 10000 max. volts

GRID-NO. 2 VOLTAGE:

Positive value (DC or Peak AC) . . . . . 700 max. volts

Negative value (DC or Peak AC) . . . . . 180 max. volts

GRID-NO. 1 VOLTAGE:

Negative bias value . . . . . 180 max. volts

Positive bias value<sup>▲</sup> . . . . . 0 max. volts

Positive peak value . . . . . 2 max. volts

<sup>▲</sup> At or near this rating, the effective resistance of the ultor supply should be adequate to limit the ultor input power to 6 watts.

← Indicates a change.



12DP7-A

## OSCILLOGRAPH TUBE

PEAK GRID-No.1 DRIVE FROM CUTOFF . . . . .	65 max. volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode . . . . .	125 max. volts
Heater positive with respect to cathode . . . . .	125 max. volts

**Equipment Design Ranges:**

For any ultor voltage ( $E_{c3}$ ) between 4000\* and 10000 volts  
and grid-No.2 voltage ( $E_{c2}$ ) between 150 and 750 volts

Grid-No.1 Voltage for Visual

Extinction of Undelected

Focused Spot\* . . . . . -10% to -28% of  $E_{c2}$  voltsGrid-No.2 Current . . . . . -15 to +15  $\mu$ ampFocusing-Coil Current (DC)<sup>OO</sup> . . . . .  $\left[ \sqrt{\frac{E_{c2}}{4000}} > 86.5 \right] \pm 15\%$  ma

Spot Position . . . . . \*\*

**Examples of Use of Design Ranges:**

For ultor voltage of	4000	7000	volts
and grid-No.2 voltage of	250	250	volts

Grid-No.1 Voltage for Visual

Extinction of Undelected

Focused Spot . . . . . -25 to -70 -25 to -70 volts

Focusing-Coil Current (DC) . . . . . 75 to 102 99 to 135 ma

**Maximum Circuit Values:**

Grid-No.1-Circuit Resistance . . . . . 1.5 max. megohms

\* Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 4000 volts.

<sup>OO</sup> For specimen focusing coil similar to JEDEC Focusing Coil No.166 positioned with air gap toward faceplate and center line of air gap  $4\frac{1}{8}$ " from Reference Line (See Dimensional Outline) and ultor current of 200 microamperes.

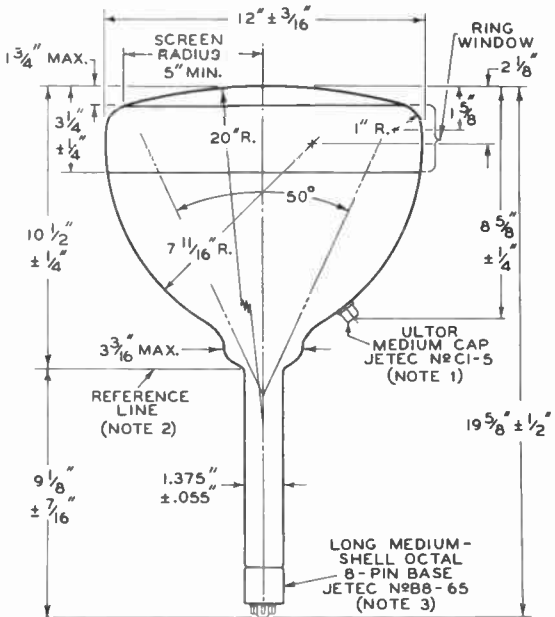
\*\* The center of the undeflected, unfocused spot will fall within a circle having a 20-mm radius concentric with the center of the tube face.



12DP7-A

## OSCILLOGRAPH TUBE

12DP7-A



92CM-6375R6

**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN No.5 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTROR TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 10^\circ$ . ULTROR TERMINAL IS ON SAME SIDE OF TUBE AS PIN No.5.

**NOTE 2:** REFERENCE LINE IS DETERMINED BY POSITION WHERE GAUGE  $1.430'' + .003'' - .000''$  I.D. and 2" LONG WILL REST ON BULB CONE.

**NOTE 3:**  $\angle$  OF BULB WILL NOT DEVIATE MORE THAN  $2^\circ$  IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

NOV. 1, 1955

TUBE DIVISION

CE-6375R6

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

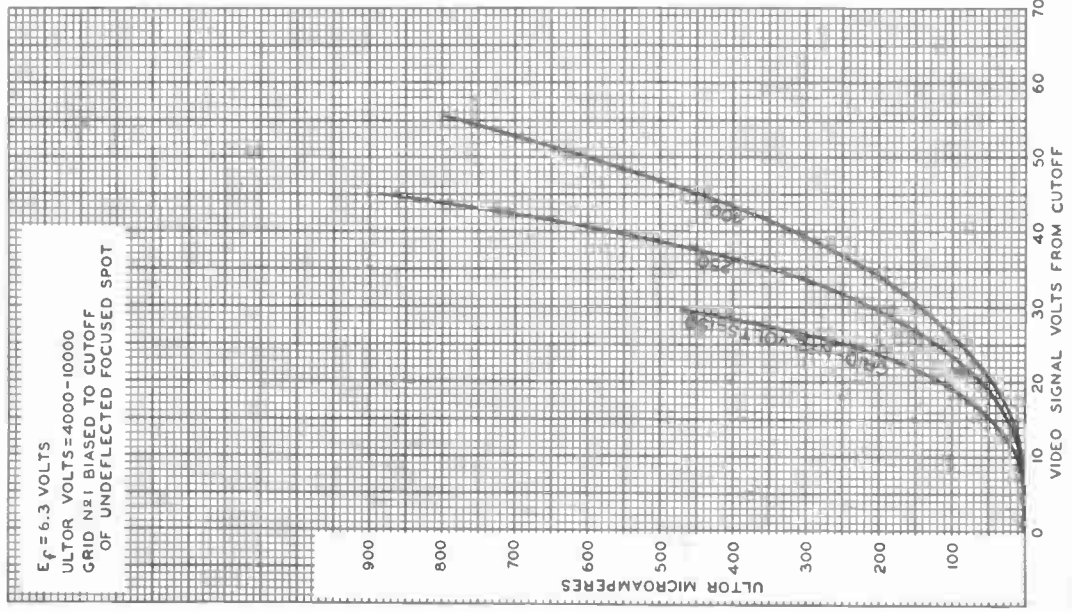
12DP7-A



12DP7-A

# AVERAGE GRID-DRIVE CHARACTERISTICS

$E_f = 6.3$  VOLTS  
 ULTOR VOLTS = 4000 - 10000  
 GRID N#1 BIASED TO CUTOFF  
 OF UNDEFLECTED FOCUSED SPOT



World Precision

APRIL 9, 1952

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6943RI



14EP4

# 14EP4/14CP4/14BP4 PICTURE TUBE

RECTANGULAR GLASS TYPE

MAGNETIC FOCUS

MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . .	6.3 . . . . .	ac or dc volts
Current . . . . .	0.6 + 10% . . . . .	amp

Capacitance between external Conductive Coating and Ultron . . . . .

	{ 2000 max. . . . .	$\mu\mu\text{f}$
	{ 750 min. . . . .	$\mu\mu\text{f}$

Faceplate, Spherical . . . . . Filterglass

Phosphor (For Curves, see front of this section) . P4—Sulfide Type

Deflector Angles (Approx.):

Diagonal . . . . .	70°
Horizontal . . . . .	65°
Vertical . . . . .	50°

Electron Gun . . . . . Ion-Trap Type Requiring External Single-Field Magnet

### Tube Dimensions:

Overall length . . . . .	12-5/8" $\pm$ 1/4"
Greatest width . . . . .	12-17/32" $\pm$ 1/8"
Greatest height . . . . .	9-23/32" $\pm$ 1/8"
Diagonal . . . . .	13-11/16" $\pm$ 1/8"
Neck length . . . . .	7-5/16" $\pm$ 1/8"
Radius of curvature of faceplate (External surface) . . . . .	27"

### Screen Dimensions (Minimum):

Greatest width . . . . .	11-1/2"
Greatest height . . . . .	8-5/8"
Diagonal . . . . .	12-3/4"
Projected area . . . . .	96 sq. in.

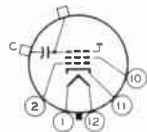
Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Base . . Small-Shell Duodecal 5-Pin (JETEC Group 4, No. B5-57)

Basing Designation for BOTTOM VIEW . . . . . 12N

- Pin 1—Heater
- Pin 2—Grid No.1
- Pin 10—Grid No.2
- Pin 11—Cathode
- Pin 12—Heater



- Cap—Ultron
- (Grid No.3, Collector)
- C—External Conductive Coating

### Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE . . . . .	14000 max.	volts
GRID-NO.2 VOLTAGE . . . . .	410 max.	volts
GRID-NO.1 VOLTAGE:		
Negative-bias value . . . . .	125 max.	volts
Positive-bias value . . . . .	0 max.	volts
Positive-peak value . . . . .	2 max.	volts

← Indicates a change.

14EP4



# 14EP4/14CP4/14BP4 PICTURE TUBE

## PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:

During equipment warm-up period not

exceeding 15 seconds . . . . . 410 max. volts

After equipment warm-up period . . . . . 150 max. volts

Heater positive with respect to cathode. 150 max. volts

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 1.5 max. megohms



14HP4

PICTURE TUBE

RECTANGULAR GLASS TYPE

14HP4

LOW-VOLTAGE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts

Current . . . . . 0.6 ± 10% . . . . . amp

Capacitance between External Conduc-

tive Coating and Ultor . . . . . { 2000 max. μmf  
750 min. μmf

Faceplate, Spherical . . . . . Filterglass

Phosphor (For curves, see front of this Section) . P4—Sulfide Type

Deflection Angles (Approx.):

Diagonal . . . . . 70°

Horizontal . . . . . 65°

Vertical . . . . . 50°

Electron Gun . . . . . Ion-Trap Type Requiring  
External Single-Field Magnet

Tube Dimensions:

Overall length . . . . . 16-25/32" ± 3/8"

Greatest width . . . . . 12-17/32" ± 1/8"

Greatest height . . . . . 9-23/32" ± 1/8"

Diagonal . . . . . 13-11/16" ± 1/8"

Neck length . . . . . 7-1/2" ± 3/16"

Radius of curvature of  
faceplate (External surface) . . . . . 27"

Screen Dimensions (Minimum):

Greatest width . . . . . 11-1/2"

Greatest height . . . . . 8-5/8"

Diagonal . . . . . 12-3/4"

Projected area . . . . . 96 sq. in.

Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Base . . . . . Small-Shell Duodecal 6-Pin (JETEC Group 4, No. B6-63)

Basing Designation for BOTTOM VIEW . . . . . 12L

Pin 1—Heater

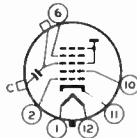
Pin 2—Grid No.1

Pin 6—Grid No.4

Pin 10—Grid No.2

Pin 11—Cathode

Pin 12—Heater



Cap—Ultor  
(Grid No.3,  
Grid No.5,  
Collector)

C—External  
Conductive  
Coating

Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE . . . . . 14000 max. volts

GRID-No.4 (FDCUSING) VOLTAGE:

Positive value . . . . . 500 max. volts

Negative value . . . . . 500 max. volts

GRID-No.2 VOLTAGE . . . . . 500 max. volts

← Indicates a change.



14HP4



14HP4

PICTURE TUBE

GRID-No.1 VOLTAGE:

Negative-bias value. . . . .	125 max.	volts
Positive-bias value. . . . .	0 max.	volts
Positive-peak value. . . . .	2 max.	volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . . . .	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
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14RP4

PICTURE TUBE

SHORT RECTANGULAR GLASS TYPE

LOW-VOLTAGE ELECTROSTATIC FOCUS      MAGNETIC DEFLECTION

The 14RP4 is the same as the 14RP4-A except that it utilizes a *non-aluminized phosphor*.

14RP4



14RP4-A

# 14RP4-A PICTURE TUBE

SHORT RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS

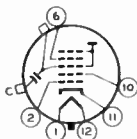
ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Bipotential Cathode:	
Voltage . . . . .	6.3 . . . . . ac or dc volts
Current . . . . .	0.6 ± 10% . . . . . amp
Direct Interelectrode Capacitances:	
Grid No.1 to all other electrodes. . . . .	6 μmf
Cathode to all other electrodes. . . . .	5 μmf
External conductive coating to ultor . . . . .	{ 1200 max. μmf ←
	{ 800 min. μmf ←
Faceplate, Spherical . . . . .	Filterglass
Light transmission (Approx.) . . . . .	.78%
Phosphor (For curves, see front of this section) . . . . .	P4—Sulfide Type
	Aluminized
Fluorescence . . . . .	White
Phosphorescence. . . . .	White
Persistence. . . . .	Short
Focusing Method. . . . .	Electrostatic
Deflection Method. . . . .	Magnetic
Deflection Angles (Approx.):	
Diagonal . . . . .	90°
Horizontal . . . . .	85°
Vertical . . . . .	68°
Electron Gun . . . . .	Ion-Trap Type Requiring External Single-Field Magnet
Tube Dimensions:	
Overall length . . . . .	14-3/16" ± 5/16" ←
Greatest width . . . . .	13-1/16" ± 1/8" ←
Greatest height. . . . .	10-9/16" ± 1/8" ←
Diagonal . . . . .	14" ± 1/8" ←
Neck length. . . . .	6-1/2" ± 3/16" ←
Screen Dimensions (Minimum):	
Greatest width . . . . .	12-1/16" ←
Greatest height. . . . .	9-1/2" ←
Diagonal . . . . .	13" ←
Projected area . . . . .	104 sq. in.
Weight (Approx.) . . . . .	8.5 lbs
Operating Position . . . . .	Any
Cap. . . . .	Recessed Small Cavity (JETEC No. J1 21)
Bulb . . . . .	J112
Base . . . . .	Small-Shell Duodecal 6-Pin (JETEC Group 4, No. B6-63)
Basing Designation for BOTTOM VIEW . . . . .	.12L

- Pin 1—Heater
- Pin 2—Grid No.1
- Pin 6—Grid No.4
- Pin 10—Grid No.2
- Pin 11—Cathode
- Pin 12—Heater



- Cap—Ultor  
(Grid No.3,  
Grid No.5,  
Collector)
- C—External  
Conductive  
Coating

← Indicates a change.



# 14RP4-A

## PICTURE TUBE

### GRID-DRIVE<sup>▲</sup> SERVICE

Unless otherwise specified, voltage values are positive with respect to cathode

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

ULTOR VOLTAGE. . . . .	14000 max.	volts
GRID-No.4 VOLTAGE:		
Positive value . . . . .	500 max.	volts
Negative value . . . . .	500 max.	volts
GRID-No.2 VOLTAGE. . . . .	400 max.	volts
GRID-No.1 VOLTAGE:		
Negative-peak value. . . . .	160 max.	volts
Negative-bias value. . . . .	110 max.	volts
Positive-bias value. . . . .	0 max.	volts
Positive-peak value. . . . .	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

#### Equipment Design Ranges:

With any ultor voltage ( $E_{C5k}$ ) between 8000\* and 14000 volts and grid-No.2 voltage ( $E_{C2k}$ ) between 200 and 400 volts

Grid-No.4 Voltage required for focus:

Changes directly with  $E_{C5k}$  at the rate of approximately 30 volts for each 1000-volt change in  $E_{C5k}$ .

Changes inversely with  $E_{C5k}$  at the rate of approximately 10 volts for each 100-volt change in  $E_{C2k}$ .

Changes inversely with ultor current at the rate of approximately 25 volts for each 50- $\mu$ a change in ultor current.

For typical values, see *Examples of Use of Design Ranges.*

Grid-No.1 Voltage ( $E_{C1k}$ ) for

visual extinction of

focused raster . . . . . See *Raster-Cutoff-Range Chart for Grid-Drive Service*

Grid-No.1 Video Drive from

Raster Cutoff

(Black Level):

White-level value

(Peak positive). . . . . Same value as determined for  $E_{C1k}$  except video drive is positive voltage

Grid-No.4 Current. . . . . -25 to +25  $\mu$ a

Grid-No.2 Current. . . . . -15 to +15  $\mu$ a

Ion-Trap Magnet Current

(Average)\*\* . . . . .  $\sqrt{E_{C5k}/14000} \times 38$  ma

Minimum Field Strength of

PM Ion-Trap Magnet§. . . . .  $\sqrt{E_{C5k}/14000} \times 43$  gauss

Field Strength of Adjustable Centering Magnet. . . . . 0 to 8 gauss

▲, #, \*\*, §: See next page.



14RP4-A

# 14RP4-A

## PICTURE TUBE

### Examples of Use of Design Ranges:

With ultor voltage of	10000	14000	volts
and grid-No.2 voltage of	300	300	volts
Grid-No.4 Voltage for focus with ultor current of 100 $\mu$ a . . . . .	-50 to +350	+70 to +470	volts
Grid-No.1 Voltage for visual extinction of focused raster . . . . .	-26 to -70	-26 to -70	volts
Grid-No.1 Video Drive from Faster Cutoff (Black Level): White-level value (Peak positive). . . . .	26 to 70	26 to 70	volts
Minimum Field Strength of PM Ion-Trap Magnet . . . . .	36	43	gausses

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
--	----------	---------

### CATHODE-DRIVE<sup>■</sup> SERVICE

*Unless otherwise specified, voltage values are positive with respect to grid No. 1*

### Maximum Ratings, Design-Center Values:

ULTOR-TO-GRID-No.1 VOLTAGE . . . . .	14000 max.	volts
GRID-No.4-TO-GRID-No.1 VOLTAGE:		
Positive value . . . . .	500 max.	volts
Negative value . . . . .	500 max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAGE . . . . .	510 max.	volts
CATHODE-TO-GRID-No.1 VOLTAGE:		
Positive-peak value . . . . .	160 max.	volts
Positive-bias value . . . . .	110 max.	volts
Negative-bias value . . . . .	0 max.	volts
Negative-peak value . . . . .	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

### Equipment Design Ranges:

*With any ultor-to-grid-No.1 voltage ( $E_{c5g1}$ ) between 8000\* and 14000 volts and grid-No.2-to-grid-No.1 voltage ( $E_{c2g1}$ ) between 225 and 510 volts*

### Grid-No.4-to-Grid-No.1

Voltage required for focus:

Changes directly with  $E_{c5g1}$  at the rate of approximately 30 volts for each 1000-volt change in  $E_{c5g1}$ .

Changes inversely with  $E_{c2g1}$  at the rate of approximately 10 volts for each 100-volt change in  $E_{c2g1}$ .

▲, #, \*\*, §, ■: See next page.

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# 14RP4-A PICTURE TUBE

Changes inversely with ultor current at the rate of approximately 25 volts for each 50- $\mu$ a change in ultor current.

For typical values, see *Examples of Use of Design Ranges*.

### Cathode-to-Grid-No.1

Voltage ( $E_{k_{g1}}$ ) for visual extinction of

focused raster . . . . . See *Raster-Cutoff-Range Chart for Cathode-Drive Service*

### Cathode-to-Grid-No.1

Video Drive from

Raster Cutoff

(Black Level):

White-level value

(Peak negative). . . . . Same value as determined for  $E_{k_{g1}}$

Grid-No.4 Current. . . . . -25 to +25  $\mu$ a

Grid-No.2 Current. . . . . -15 to +15  $\mu$ a

### Ion-Trap Magnet Current

(Average)\*\* . . . . .  $\sqrt{E_{c5g1}/14000} \times 38$  ma

### Minimum Field Strength of

PM Ion-Trap Magnet§. . . . .  $\sqrt{E_{c5g1}/14000} \times 43$  gaussess

### Field Strength of Adjust-

able Centering Magnet. . . . . 0 to 8 gaussess

### Examples of Use of Design Ranges:

With ultor-to-grid-

No.1 voltage of . . . . . 10000 . . . . . 14000 volts

and grid-No.2-to-grid-

No.1 voltage of . . . . . 300 . . . . . 300 volts

### Grid-No.4-to-Grid-No.1

Voltage for focus

with ultor current

of 100  $\mu$ a. . . . . -50 to +350 +70 to +470 volts

### Cathode-to-Grid-No.1

Voltage for visual

extinction of fo-

cused raster . . . . . 26 to 59 . . . . . 26 to 59 volts

### Cathode-to-Grid-No.1

Video Drive from

Raster Cutoff

(Black Level):

White-level value

(Peak negative). . . . . 26 to 59 . . . . . 26 to 59 volts

### Minimum Field Strength

of PM Ion-Trap Magnet. . . . . 36 . . . . . 43 gaussess

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 1.5 max. megohms

▲, #, \*\*, §, ■: See next page.



# I4RP4-A PICTURE TUBE

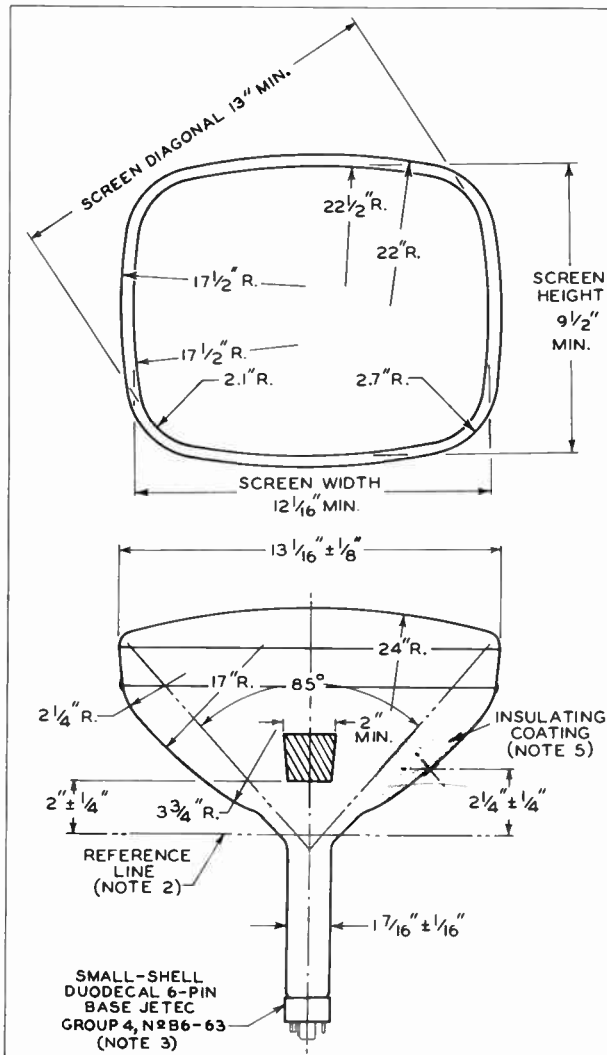
I4RP4-A

- ▲ Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.
- \* Brilliance and definition decrease with decreasing ultor voltage or ultor-to-grid-No.1 voltage. In general, the ultor voltage or ultor-to-grid-No.1 voltage should not be less than 8,000 volts.
- \*\* For JETEC Ion-Trap Magnet No.117, or equivalent, located with the trailing edge of the pole pieces located over the gap between grid No.1 and grid No.2 and rotated to give maximum brightness.
- § For specimen PM ion-trap magnet, such as Heppner Model No.E437 or equivalent, located in optimum position and rotated to give maximum brightness. For a given equipment application, the tolerance range for the strength of the PM ion-trap magnet should be added to the minimum value. The maximum strength of this magnet should not exceed the specified minimum value by more than 6 gaussess. This procedure will insure use of a PM ion-trap magnet allowing adequate adjustment to permit satisfactory performance without loss of highlight brightness.
- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.

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# 14RP4-A PICTURE TUBE



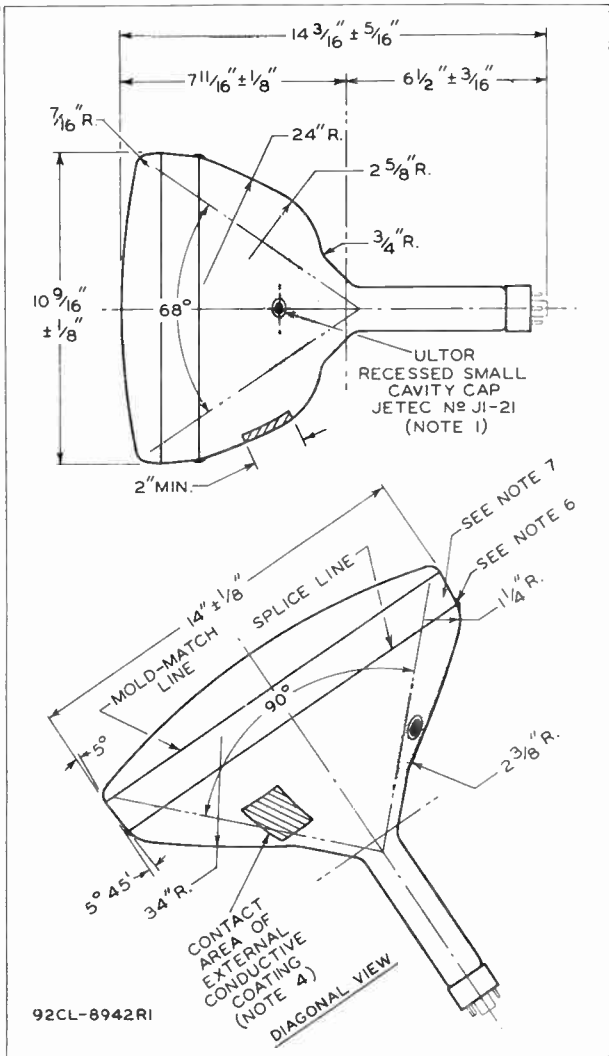




14RP4-A

14RP4-A

PICTURE TUBE



92CL-8942RI

14RP4-A



## 14RP4-A PICTURE TUBE

**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS PIN 6.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No. G-116 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

**NOTE 4:** THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT AREA OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THE CONTACT AREA SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDING.

**NOTE 5:** TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

**NOTE 6:** BULGE AT SPLICE-LINE SEAL WILL NOT PROTRUDE BEYOND THE MAXIMUM INDICATED VALUE FOR ENVELOPE WIDTH, DIAGONAL OR HEIGHT.

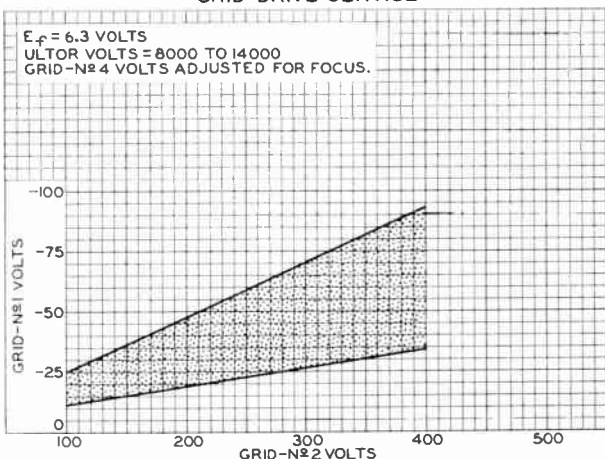
**NOTE 7:** UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/4" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND.



# 14RP4-A

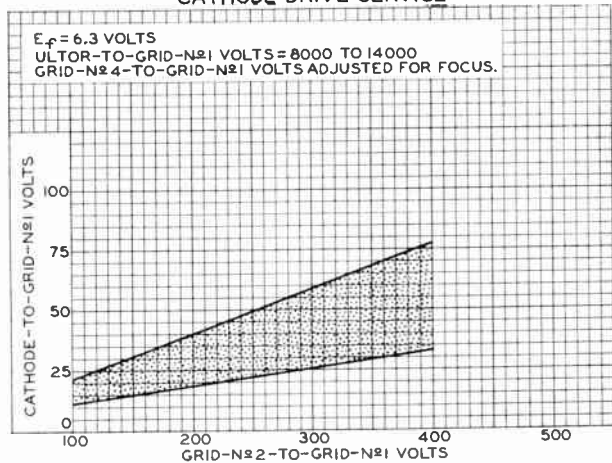
## RASTER-CUTOFF-RANGE CHARTS GRID-DRIVE SERVICE

14RP4-A



92CS-8972R1

## CATHODE-DRIVE SERVICE



92CS-8973R1



14RP4-A

## AVERAGE DRIVE CHARACTERISTICS

## CATHODE-DRIVE SERVICE

 $E_f = 6.3$  VOLTS

ULTRATOR-TO-GRID-N<sub>2</sub>1 VOLTS = 10000  
 CATHODE BIASED POSITIVE WITH  
 RESPECT TO GRID N<sub>2</sub>1 TO GIVE  
 FOCUSED RASTER CUTOFF.

RASTER FOCUSED

AT AVERAGE BRIGHTNESS.

RASTER SIZE = 11" x 8 1/4"

## GRID-DRIVE SERVICE

 $E_f = 6.3$  VOLTS

ULTRATOR VOLTS = 10000

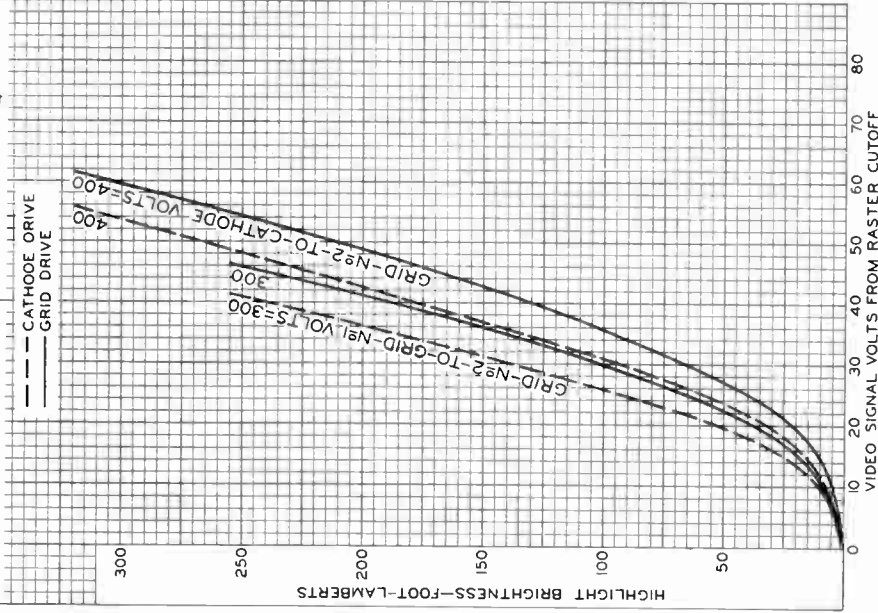
GRID N<sub>2</sub>1 BIASED NEGATIVE WITH  
 RESPECT TO CATHODE TO GIVE  
 FOCUSED RASTER CUTOFF.

RASTER FOCUSED

AT AVERAGE BRIGHTNESS.

RASTER SIZE = 11" x 8 1/4"

--- CATHODE DRIVE  
 --- GRID DRIVE



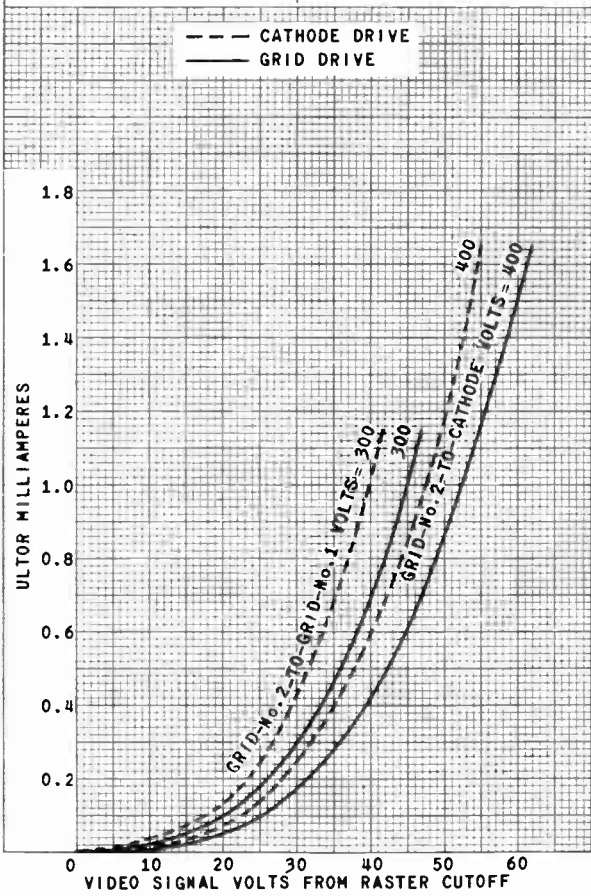


14RP4-A

14RP4-A

AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE	GRID-DRIVE SERVICE
$E_f = 6.3$ VOLTS	$E_f = 6.3$ VOLTS
ULTOR-TO-GRID-No.1 VOLTS = 8000 TO 14000	ULTOR VOLTS = 8000 TO 14000
CATHODE BIASED POSITIVE WITH RESPECT TO GRID No.1 TO GIVE FOCUSED RASTER CUTOFF.	GRID No.1 BIASED NEGATIVE WITH RESPECT TO CATHODE TO GIVE FOCUSED RASTER CUTOFF.







14WP4

# 14WP4/14ZP4 PICTURE TUBE

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN  
LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

*Intended for use in equipment having  
series heater-string arrangement*

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts  
Current . . . . . 0.6 ± 5% . . . . . amp  
Warm-up time (Average) . . . . . 11 . . . . . sec

*For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of Receiving Tube Section.*

Direct Interelectrode Capacitances:

Grid No.1 to all other electrodes . . . . . 6  $\mu\text{f}$   
Cathode to all other electrodes . . . . . 5  $\mu\text{f}$   
External conductive coating to ultron . . . . .  $\left\{ \begin{array}{l} 1200 \text{ max.} \\ 800 \text{ min.} \end{array} \right. \mu\text{f}$

Faceplate, Spherical . . . . . Filterglass

Light transmission (Approx.) . . . . . 78%

Phosphor (For curves, see front of this section) . P4—Sulfide Type  
Aluminized

Fluorescence . . . . . White

Phosphorescence . . . . . White

Persistence . . . . . Short

Focusing Method . . . . . Electrostatic

Deflection Method . . . . . Magnetic

Deflection Angles (Approx.):

Diagonal . . . . . 90°

Horizontal . . . . . 85°

Vertical . . . . . 58°

Electron Gun . . . . . Type Requiring No Ion-Frap Magnet

Tube Dimensions:

Overall length . . . . . 13-3/16" ± 5/16"

Greatest width . . . . . 13-1/16" ± 1/8"

Greatest height . . . . . 10-9/16" ± 1/8"

Diagonal . . . . . 14" ± 1/8"

Neck length . . . . . 5-1/2" ± 3/16"

Screen Dimensions (Minimum):

Greatest width . . . . . 12-1/16"

Greatest height . . . . . 9-1/2"

Diagonal . . . . . 13"

Projected area . . . . . 104 sq. in.

Weight (Approx.) . . . . . 8.5 lbs

Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Bulb . . . . . J112A1/B1

Base . . Small-Shell Duodecal 6-Pin (JETEC Group 4, No. B6-63)

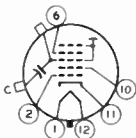
14WP4



# 14WP4/14ZP4 PICTURE TUBE

Basing Designation for BOTTOM VIEW. . . . . 12L

Pin 1 - Heater  
Pin 2 - Grid No.1  
Pin 6 - Grid No.4  
Pin 10 - Grid No.2  
Pin 11 - Cathode  
Pin 12 - Heater



Cap - Ultor  
(Grid No.3,  
Grid No.5,  
Collector)  
C - External  
Conductive  
Coating

## GRID-DRIVE<sup>▲</sup> SERVICE

Unless otherwise specified, voltage values are positive with respect to cathode

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

ULTOR VOLTAGE . . . . .	{ 14000 max. volts 9000* min. volts
GRID-No.4 (FOCUSING) VOLTAGE:	
Positive value. . . . .	1000 max. volts
Negative value. . . . .	500 max. volts
GRID-No.2 VOLTAGE . . . . .	500 max. volts
GRID-No.1 VOLTAGE:	
Negative-peak value . . . . .	200 max. volts
Negative-bias value . . . . .	140 max. volts
Positive-bias value . . . . .	0 max. volts
Positive-peak value . . . . .	2 max. volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode:	
During equipment warm-up period not exceeding 15 seconds. . . . .	410 max. volts
After equipment warm-up period. . . . .	180 max. volts
Heater positive with respect to cathode. . . . .	180 max. volts

### Equipment Design Ranges:

With any ultor voltage ( $E_{c5k}$ ) between 9000 and 14000 volts and grid-No.2 voltage ( $E_{c2k}$ ) between 200 and 500 volts

Grid-No.4 Voltage for focus <sup>§</sup> . . . . .	0 to +350 volts
Grid-No.1 Voltage ( $E_{c1k}$ ) for visual extinction of focused raster . . . . .	See Raster-Cutoff-Range Chart for Grid-Drive Service
Grid-No.1 Video Drive from Raster Cutoff (Black Level):	
White-level value (Peak positive) . . . . .	Same value as determined for $E_{c1k}$ except video drive is a positive voltage

▲, ♦, §: See next page.





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# 14WP4/14ZP4 PICTURE TUBE

Grid-No.4 Current . . . . .	-25 to +25	$\mu$ a
Grid-No.2 Current . . . . .	-15 to +15	$\mu$ a
Field Strength of Adjustable Centering Magnet . . . . .	0 to 8	gausses

### Examples of Use of Design Ranges:

<i>With ultor voltage of</i>	12000	volts
<i>and grid-No.2 voltage of</i>	300	volts
Grid-No.4 Voltage for focus . . . . .	0 to 1350	volts
Grid-No.1 Voltage for visual extinction of focused raster . . . . .	-28 to -72	volts
Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value . . . . .	28 to 72	volts

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
--	----------	---------

### CATHODE-DRIVE<sup>■</sup> SERVICE

*Unless otherwise specified, voltage values are positive with respect to grid No. 1*

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

ULTOR-TO-GRID-No.1 VOLTAGE . . . . .	{ 14000 max. volts 9000* min. volts
GRID-No.4-TO-GRID-No.1 VOLTAGE:	
Positive value . . . . .	1000 max. volts
Negative value . . . . .	500 max. volts
GRID-No.2-TO-GRID-No.1 VOLTAGE . . . . .	640 max. volts
GRID-No.2-TO-CATHODE VOLTAGE . . . . .	500 max. volts
CATHODE-TO-GRID-No.1 VOLTAGE:	
Positive-peak value . . . . .	200 max. volts
Positive-bias value . . . . .	140 max. volts
Negative-bias value . . . . .	0 max. volts
Negative-peak value . . . . .	2 max. volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode:	
During equipment warm-up period not exceeding 15 seconds . . . . .	410 max. volts
After equipment warm-up period . . . . .	180 max. volts
Heater positive with respect to cathode.	180 max. volts

▲, ◆, §, ■: See next page.

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# 14WP4/14ZP4 PICTURE TUBE

## Equipment Design Ranges:

With any ultor-to-grid-No.1 voltage ( $E_{c5g_1}$ ) between 9000 and 14000 volts and grid-No.2-to-grid-No.1 voltage ( $E_{c2g_1}$ ) between 225 and 640 volts

Grid-No.4-to-Grid-No.1 Voltage for focus $\phi$ . . . . .	0 to +350	volts
Cathode-to-Grid-No.1 Voltage ( $E_{k_1}$ ) for visual extinction of focused raster . . . . .	See Raster-Cutoff-Range Chart for Cathode-Drive Service	
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak negative) . . . . .	Same value as determined for $E_{k_1}$ except video drive is a negative voltage	
Grid-No.4 Current . . . . .	-25 to +25	$\mu\text{a}$
Grid-No.2 Current . . . . .	-15 to +15	$\mu\text{a}$
Field Strength of Adjustable Centering Magnet* . . . . .	0 to 8	gausses

## Examples of Use of Design Ranges:

With ultor-to-grid- No.1 voltage of . . . . .	12000	volts
and grid-No.2-to-grid- No.1 voltage of . . . . .	300	volts
Grid-No.4-to-Grid- No.1 voltage for focus . . . . .	0 to +350	volts
Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster. . . . .	25 to 58	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value . . . . .	-25 to -58	volts

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance. . . . . 1.5 max. megohms

- ▲ Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.
- ◆ Brilliance and definition decrease with decreasing ultor voltage or ultor-to-grid-No.1 voltage. In general, the ultor voltage or ultor-to-grid-No.1 voltage should not be less than 8,000 volts.

$\phi$ , \* , ■: See next page.



# 14WP4/14ZP4 PICTURE TUBE

14WP4

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The grid-No.4 voltage or grid-No.4-to-grid-No.1 voltage required for focus of any individual tube is independent of ultron current and will remain essentially constant for values of ultron voltage (or ultron-to-grid-No.1 voltage) or grid-No.2 voltage (or grid-No.2-to-grid-No.1 voltage) within design ranges shown for these items.

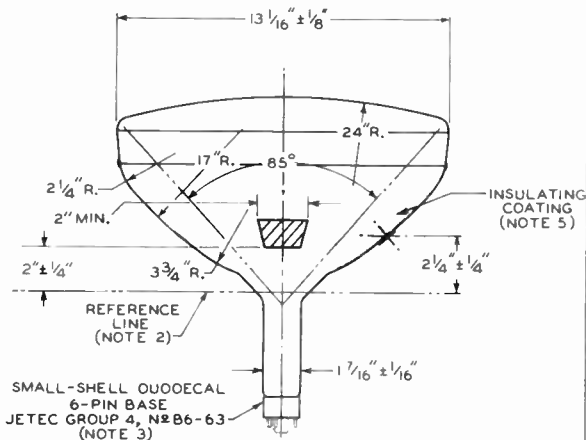
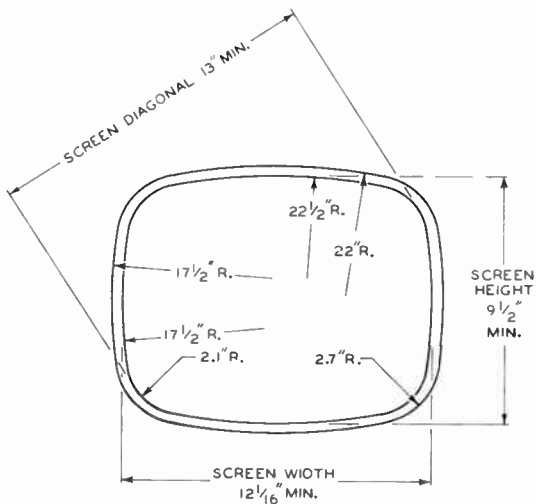
- Distance from Reference Line for suitable PM centering; magnet should not exceed  $2-1/4"$ . Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having  $1/4$ -inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as  $1/4$ -inch deflection of the spot from the center of the tube face.
- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*

14WP4



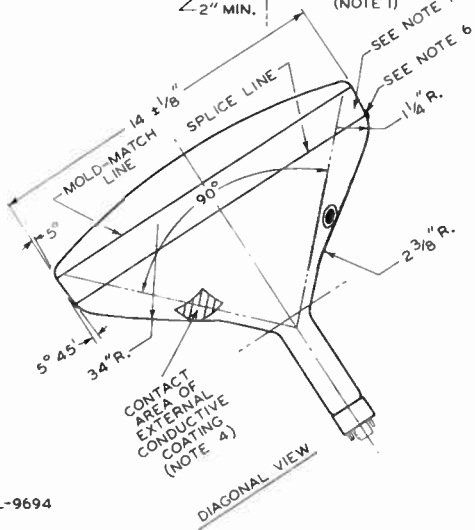
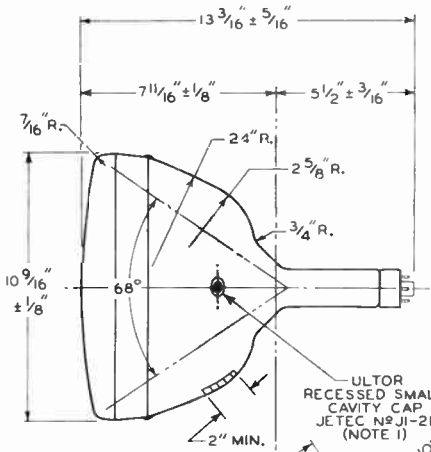
# 14WP4/14ZP4 PICTURE TUBE





14WP4

# 14WP4/14ZP4 PICTURE TUBE



92CL-9694

14WP4



# 14WP4/14ZP4 PICTURE TUBE

**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND BULB TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . BULB TERMINAL IS ON SAME SIDE AS PIN 6.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JFTEL No. 3-116 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CO' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

**NOTE 4:** THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT AREA OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THE CONTACT AREA SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

**NOTE 5:** TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

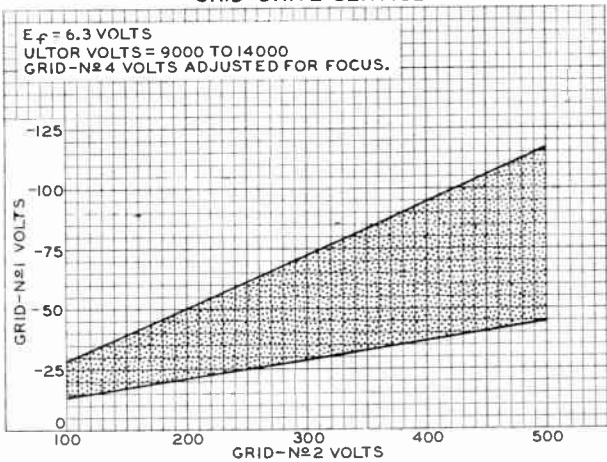
**NOTE 6:** BULGE AT SPLICE-LINE SEAL WILL NOT PROTRUDE BEYOND THE MAXIMUM INDICATED VALUE FOR ENVELOPE WIDTH, DIAGONAL, OR HEIGHT.

**NOTE 7:** UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/4" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND.



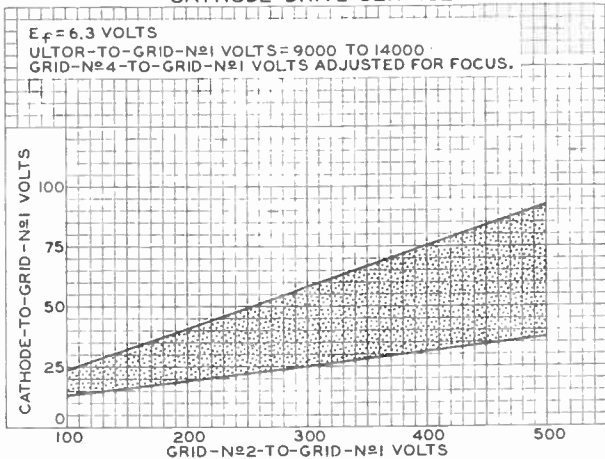
14WP4

# 14WP4/14ZP4 RASTER-CUTOFF-RANGE CHARTS GRID-DRIVE SERVICE



92CS-9699

## CATHODE-DRIVE SERVICE



92CS-9700

## AVERAGE DRIVE CHARACTERISTICS

## CATHODE-DRIVE SERVICE

E<sub>f</sub> = 6.3 VOLTS

ULTOR-TO-GRID-N<sub>81</sub> VOLTS = 14000  
 CATHODE BIASED POSITIVE WITH  
 RESPECT TO GRID N<sub>81</sub> TO GIVE  
 FOCUSED RASTER CUTOFF.

RASTER FOCUSED

AT AVERAGE BRIGHTNESS.

RASTER SIZE = 11" x 8 1/4"

## GRID-DRIVE SERVICE

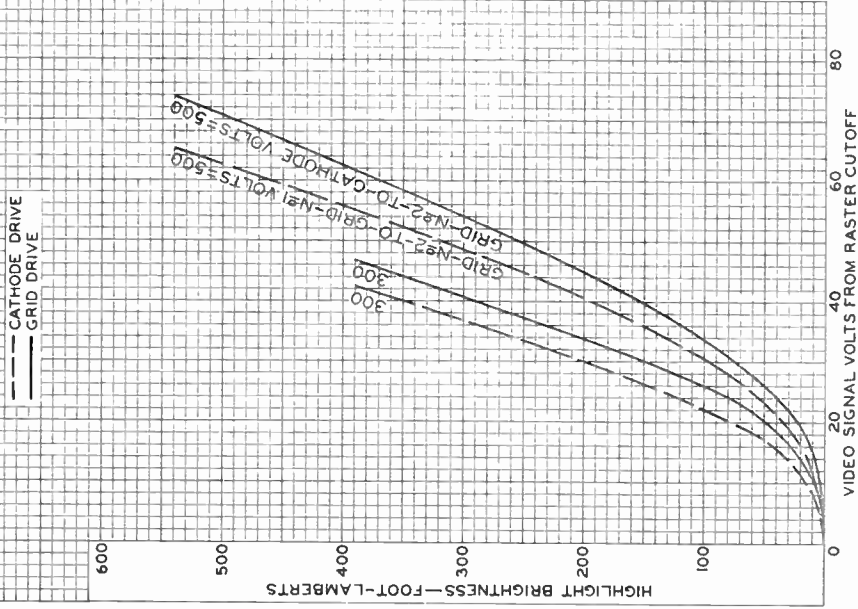
E<sub>f</sub> = 6.3 VOLTS

ULTOR VOLTS = 14000  
 GRID N<sub>81</sub> BIASED NEGATIVE WITH  
 RESPECT TO CATHODE TO GIVE  
 FOCUSED RASTER CUTOFF.

RASTER FOCUSED

AT AVERAGE BRIGHTNESS.

RASTER SIZE = 11" x 8 1/4"







14WP4/14ZP4

14WP4

### AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE

$E_f = 6.3$  VOLTS

ULTOR-TO-GRID-№1 VOLTS =

9000 TO 14000

CATHODE BIASED POSITIVE WITH

RESPECT TO GRID №1 TO GIVE

FOCUSED RASTER CUTOFF.

GRID-DRIVE SERVICE

$E_f = 6.3$  VOLTS

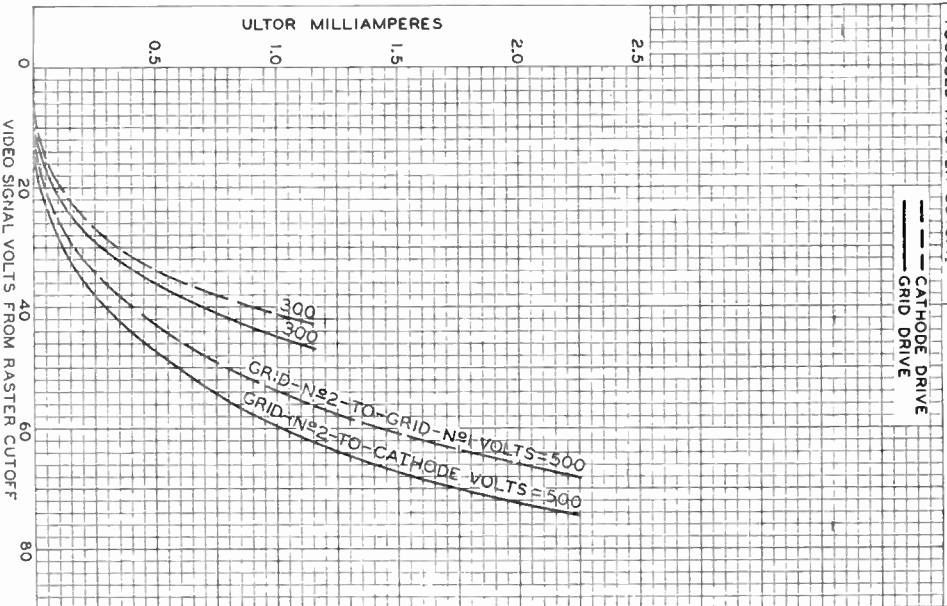
ULTOR VOLTS = 9000 TO 14000

GRID №1 BIASED NEGATIVE WITH

RESPECT TO CATHODE TO GIVE

FOCUSED RASTER CUTOFF.

--- CATHODE DRIVE  
— GRID DRIVE







16RP4  
16RP4-A

# 16RP4/16KP4, 16RP4-A/16KP4-A

## PICTURE TUBES

RECTANGULAR GLASS TYPES

MAGNETIC FOCUS

MAGNETIC DEFLECTION

### DATA

#### General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts

Current . . . . . 0.6 ± 10% . . . . . amp

Capacitance between External Conductive Coating and Ultor . . . . . { 1500 max. μμf  
750 min. μμf

Faceplate, Spherical . . . . . Filterglass

Phosphor (For Curves, see front of this Section). . . . . Type 16RP4 P4—Sulfide Type Type 16RP4-A P4—Sulfide Type Aluminized

Deflection Angles (Approx.):

Diagonal . . . . . 70°

Horizontal . . . . . 65°

Vertical . . . . . 50°

Electron Gun . . . . . Ion-Trap Type Requiring External Single-Field Magnet

Tube Dimensions:

Overall length . . . . . 18-3/4" ± 3/8"

Greatest width . . . . . 14-3/4" ± 1/8"

Greatest height . . . . . 11-1/2" ± 1/8"

Diagonal . . . . . 16-1/8" ± 1/8"

Neck length . . . . . 7-1/2" ± 3/16"

Radius of curvature of faceplate (External surface) . . 27"

Screen Dimensions (Minimum):

Greatest width . . . . . 13-1/2"

Greatest height . . . . . 10-1/8"

Diagonal . . . . . 14-7/8"

Projected area . . . . . 131 sq. in.

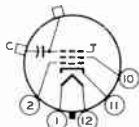
Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Base . . Small-Shell Duodecal 5-Pin (JETEC Group 4, No. B5-57)

Basing Designation for BOTTOM VIEW . . . . . 12N

- Pin 1—Heater
- Pin 2—Grid No.1
- Pin 10—Grid No.2
- Pin 11—Cathode
- Pin 12—Heater



- Cap—Ultor (Grid No.3, Collector)
- C—External Conductive Coating

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

ULTOR VOLTAGE . . . . . 16000 max. volts

GRID-NO.2 VOLTAGE . . . . . 410 max. volts

← Indicates a change.

16RP4  
16RP4-A



# 16RP4/16KP4, 16RP4-A/16KP4-A PICTURE TUBES

## GRID-No.1 VOLTAGE:

Negative-bias value. . . . .	125 max.	volts
Positive-bias value. . . . .	0 max.	volts
Positive-peak value. . . . .	2 max.	volts

## PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . . .	150 max.	volts
Heater positive with respect to cathode.	150 max.	volts

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
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*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*



# 17AVP4/17ATP4 PICTURE TUBE

RECTANGULAR GLASS TYPE

LOW-VOLTAGE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

The 17AVP4/17ATP4 is the same as the 17AVP4-A/17ATP4-A except that it utilizes a *non-aluminized phosphor*.

17AVP4





17AVP4-A

# 17AVP4-A/17ATP4-A PICTURE TUBE

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

### DATA

#### General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts  
Current . . . . . 0.6 ± 10% . . . . . amp

Direct Interelectrode Capacitances:

Grid No.1 to all other electrodes . . . . . 6 μμf  
Cathode to all other electrodes . . . . . 5 μμf  
External conductive coating to ultor . . . . . { 1500 max. μμf  
1000 min. μμf ←

Faceplate, Spherical . . . . . Filterglass  
Light transmission (Approx.) . . . . . 74%

Phosphor (For curves, see front of this section) . . P4—Sulfide Type  
Aluminized

Fluorescence . . . . . White  
Phosphorescence . . . . . White  
Persistence . . . . . Short

Focusing Method . . . . . Electrostatic  
Deflection Method . . . . . Magnetic

Deflection Angles (Approx.):  
Diagonal . . . . . 90°  
Horizontal . . . . . 85°  
Vertical . . . . . 68°

Electron Gun . . . . . Ion-Trap Type Requiring  
External Single-Field Magnet

Tube Dimensions:  
Overall length . . . . . 15-5/8" ± 3/8"  
Greatest width . . . . . 15-25/64" ± 1/8"  
Greatest height . . . . . 12-9/32" ± 1/8"  
Diagonal . . . . . 16-5/8" ± 1/8"  
Neck length . . . . . 6-1/2" ± 3/16"

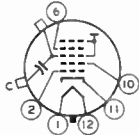
Screen Dimensions (Minimum):  
Greatest width . . . . . 14-5/16"  
Greatest height . . . . . 11-1/8"  
Diagonal . . . . . 15-9/16"  
Projected area . . . . . 149 sq. in.

Weight (Approx.) . . . . . 15 lbs  
Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)  
Bulb . . . . . J133 F1/G1 ←

Base . . Small-Shell Duodecal 6-Pin (JETEC Group 4, No. B6-63) ←  
Basing Designation for BOTTOM VIEW . . . . . 12L

Pin 1-Heater  
Pin 2-Grid No.1  
Pin 6-Grid No.4  
Pin 10-Grid No.2  
Pin 11-Cathode  
Pin 12-Heater  
Cap-Ultor  
(Grid No.3,  
Grid No.5,  
Collector)  
C-External  
Conductive  
Coating



← Indicates a change.

17AVP4-A



# 17AVP4-A/17ATP4-A PICTURE TUBE

## GRID-DRIVE<sup>▲</sup> SERVICE

Unless otherwise specified, voltage values are positive with respect to cathode

### Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE . . . . .	16000 max.	volts
GRID-No.4 (FOCUSING) VOLTAGE:		
Positive value . . . . .	1000 max.	volts
Negative value . . . . .	500 max.	volts
GRID-No.2 VOLTAGE . . . . .	500 max.	volts
GRID-No.1 VOLTAGE:		
Negative-peak value . . . . .	200 max.	volts
Negative-bias value . . . . .	140 max.	volts
Positive-bias value . . . . .	0 max.	volts
Positive-peak value . . . . .	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . . . .	180 max.	volts
Heater positive with respect to cathode . . . . .	180 max.	volts

### Equipment Design Ranges:

With any ultor voltage ( $E_{C5k}$ ) between 12000<sup>#</sup> and 16000 volts and grid-No.2 voltage ( $E_{C2k}$ ) between 200 and 500 volts

Grid-No.4 Voltage for focus with ultor current of 100 $\mu$ a . . . . .	-0.4% to +2.2% of $E_{C5k}$	volts
Grid-No.1 Voltage for visual extinction of focused raster . . . . .	-9.3% to -24% of $E_{C2k}$	volts
Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak positive) . . . . .	9.3% to 24% of $E_{C2k}$	volts
Grid-No.4 Current . . . . .	-25 to +25	$\mu$ a
Grid-No.2 Current . . . . .	-15 to +15	$\mu$ a
Ion-Trap Magnet Current (Average) <sup>**</sup> . . . . .	$\sqrt{\frac{E_{C5k}}{16000}} \times 30$	ma
Minimum Field Strength of PM Ion-Trap Magnet <sup>§</sup> . . . . .	$\sqrt{\frac{E_{C5k}}{16000}} \times 33$	gausses
Field Strength of Adjustable Centering Magnet . . . . .	0 to 8	gausses

<sup>▲</sup>, <sup>\*</sup>, <sup>\*\*</sup>, <sup>§</sup>: See next page.





17AVP4-A

# 17AVP4-A/17ATP4-A

## PICTURE TUBE

### Examples of Use of Design Ranges:

With ultor voltage of	14000	16000	volts
and grid-No.2 voltage of	300	300	volts
Grid-No.4 Voltage for focus with ultor current of 100 $\mu$ a . . . . .	-55 to +310	-65 to +350	volts
Grid-No.1 Voltage for visual extinction of focused raster. . . . .	-28 to -72	-28 to -72	volts
Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak positive) . . . . .	28 to 72	28 to 72	volts
Minimum Field Strength of PM Ion-Trap Magnet. . . . .	31	33	gausses

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance. . . . .	1.5 max.	megohms
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### CATHODE-DRIVE<sup>■</sup> SERVICE

*Unless otherwise specified, voltage values are positive with respect to grid No.1*

### Maximum Ratings, Design-Center Values:

ULTOR-TO-GRID-No.1 VOLTAGE. . . . .	16000 max.	volts
GRID-No.4-TO-GRID-No.1 VOLTAGE:		
Positive value. . . . .	1000 max.	volts
Negative value. . . . .	500 max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAGE. . . . .	640 max.	volts
GRID-No.2-TO-CATHODE VOLTAGE. . . . .	500 max.	volts
CATHODE-TO-GRID-No.1 VOLTAGE:		
Positive-peak value . . . . .	200 max.	volts
Positive-bias value . . . . .	140 max.	volts
Negative-bias value . . . . .	0 max.	volts
Negative-peak value . . . . .	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds. . . . .	410 max.	volts
After equipment warm-up period. . . . .	180 max.	volts
Heater positive with respect to cathode . . . . .	180 max.	volts

### Equipment Design Ranges:

*With any ultor-to-grid-No.1 voltage ( $E_{c5g1}$ ) between 12000\* and 16000 volts and grid-No.2-to-grid-No.1 voltage ( $E_{c2g1}$ ) between 220 and 640 volts*

Grid-No.4-to-Grid-No.1 Voltage for focus with ultor current of 100 $\mu$ a . . . . .	0% to 2.6% of $E_{c5g1}$	volts
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▲, #, \*\*, §, ■: See next page.



# 17AVP4-A/17ATP4-A

## PICTURE TUBE

Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster . . . . .	8.5% to 19.4% of $E_{c291}$	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak negative) . . . . .	8.5% to 19.4% of $E_{c291}$	volts
Grid-No.4 Current . . . . .	-25 to +25	$\mu$ a
Grid-No.2 Current . . . . .	-15 to +15	$\mu$ a
Ion-Trap Magnet Current (Average)** . . . . .	$\sqrt{\frac{E_{c591}}{16000}} \times 30$	ma
Minimum Field Strength of PM Ion-Trap Magnet§ . . . . .	$\sqrt{\frac{E_{c591}}{16000}} \times 33$	gausses
Field Strength of Adjustable Centering Magnet. . . . .	0 to 8	gausses

### Examples of Use of Design Ranges:

<i>With ultor-to-grid-No.1 voltage of</i>	14000	16000	volts
<i>and grid-No.2-to-grid No.1 voltage of</i>	300	300	volts
Grid-No.4-to Grid-No.1 Voltage for focus with ultor current of 100 $\mu$ a . . . . .	0 to 365	0 to 415	volts
Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster . . . . .	25 to 58	25 to 58	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak negative) . . . . .	25 to 58	25 to 58	volts
Minimum Field Strength of PM Ion-Trap Magnet. . . . .	31	33	gausses

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance. . . . .	1.5 max.	megohms
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▲ Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.

\* Brilliance and definition decrease with decreasing ultor voltage or ultor-to-grid-No.1 voltage. In general, the ultor voltage or ultor-to-grid-No.1 voltage should not be less than 12,000 volts.

\*\* For JETEC Ion-Trap Magnet No.117, or equivalent, located with the trailing edge of the pole pieces located over the gap between grid No.1 and grid No.2 and rotated to give maximum brightness.

§: ■: See next page.



17AVP4-A

# 17AVP4-A/17ATP4-A

## PICTURE TUBE

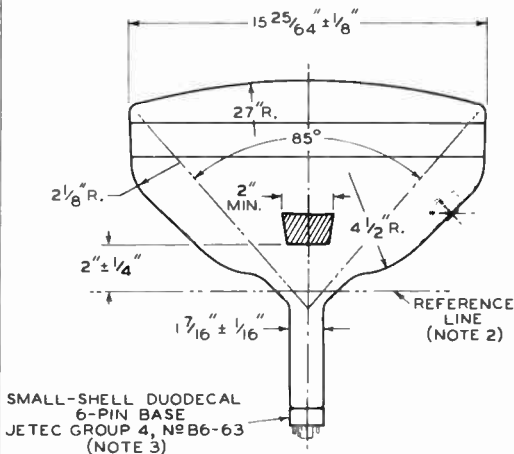
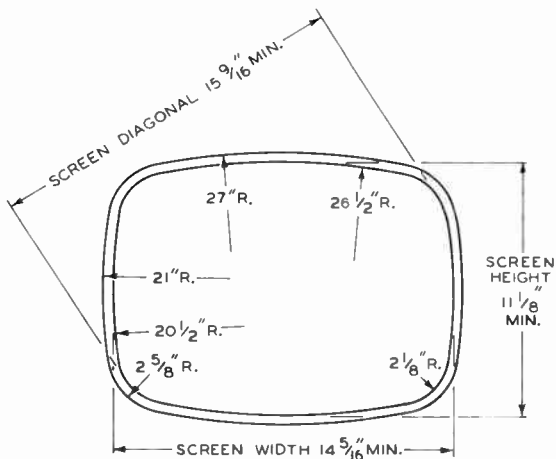
- § For specimen PM ion-trap magnet, such as Heppner Model No. E437, or equivalent, located in optimum position and rotated to give maximum brightness. For a given equipment application, the tolerance range for the strength of the PM ion-trap magnet should be added to the minimum value. The maximum strength of this magnet should not exceed the specified minimum value by more than 6 gauss. This procedure will insure use of a PM ion-trap magnet allowing adequate adjustment to permit satisfactory performance without loss of highlight brightness.
- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No. 1 and the other electrodes.

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*

17AVP4-A



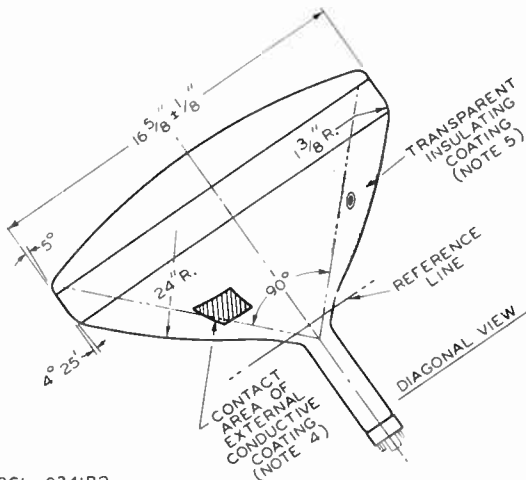
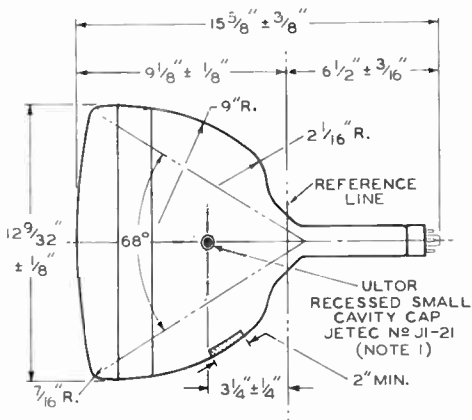
# 17AVP4-A/17ATP4-A PICTURE TUBE





17AVP4-A

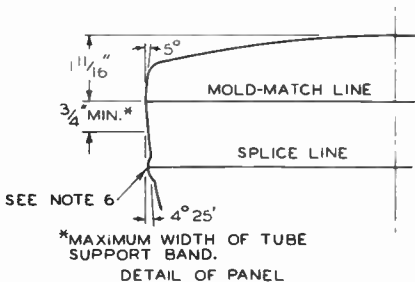
# 17AVP4-A/17ATP4-A PICTURE TUBE



92CL-8341R2



# 17AVP4-A/17ATP4-A PICTURE TUBE



**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS PIN 6.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No. G-116 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

**NOTE 4:** THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT AREA OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THE CONTACT AREA SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDING.

**NOTE 5:** TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

**NOTE 6:** BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

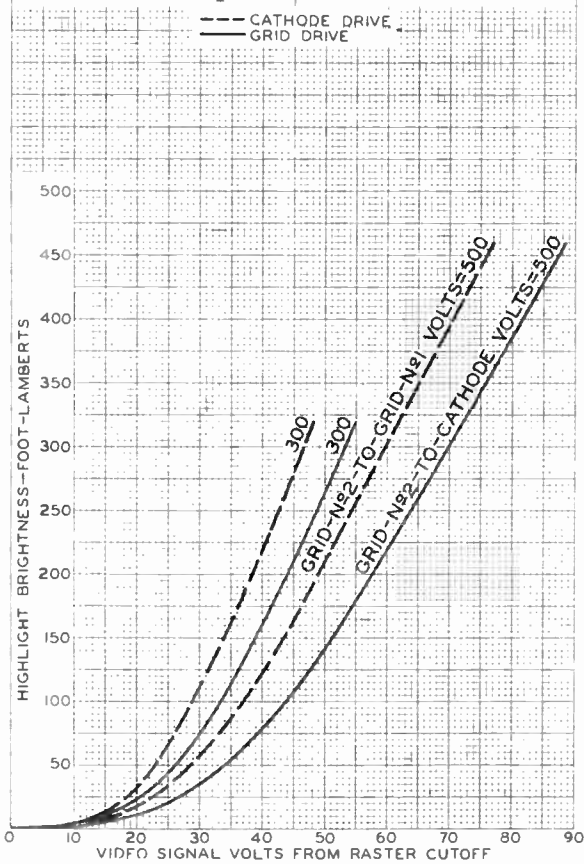


17AVP4-A

17AVP4-A/17ATP4-A

### AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE	GRID-DRIVE SERVICE
$E_f = 6.3$ VOLTS	$E_f = 6.3$ VOLTS
ULTOR-TO-GRID- $N_{g1}$ VOLTS=16000	ULTOR VOLTS=16000
CATHODE BIASED POSITIVE WITH RESPECT TO GRID $N_{g1}$ TO GIVE FOCUSED RASTER CUTOFF.	GRID $N_{g1}$ BIASED NEGATIVE WITH RESPECT TO CATHODE TO GIVE FOCUSED RASTER CUTOFF.
RASTER FOCUSED AT AVERAGE BRIGHTNESS.	RASTER FOCUSED AT AVERAGE BRIGHTNESS.
RASTER SIZE=14" x 10 1/2"	RASTER SIZE=14" x 10 1/2"



## 17AVP4-A/17ATP4-A

## AVERAGE DRIVE CHARACTERISTICS

## CATHODE-DRIVE SERVICE

 $E_f = 6.3$  VOLTS

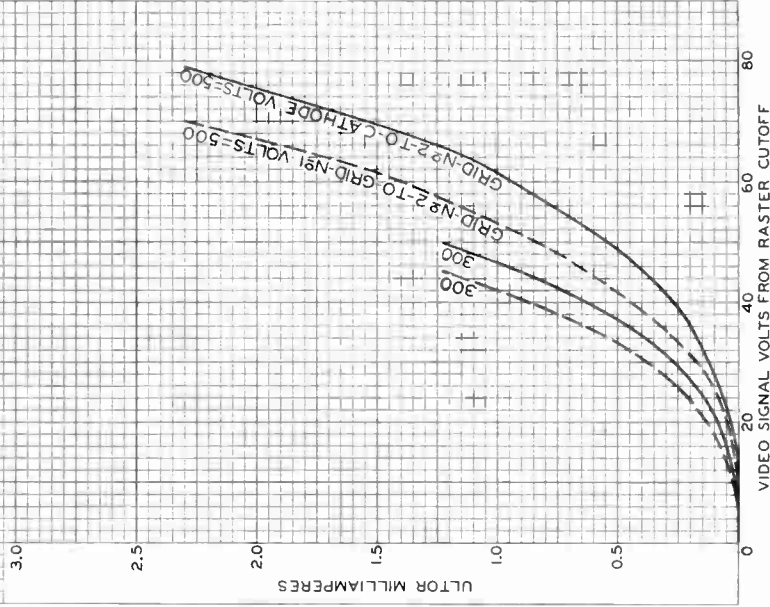
 ULTOR - TO - GRID - N $\&$ 1 VOLTS =  
12000 TO 16000

 CATHODE BIASED POSITIVE WITH  
RESPECT TO GRID N $\&$ 1 TO GIVE  
FOCUSED RASTER CUTOFF.

## GRID-DRIVE SERVICE

 $E_f = 6.3$  VOLTS

 ULTOR VOLTS = 12000 TO 16000  
GRID N $\&$ 1 BIASED NEGATIVE WITH  
RESPECT TO CATHODE TO GIVE  
FOCUSED RASTER CUTOFF.

 --- CATHODE DRIVE  
 ——— GRID DRIVE






17BJP4

# 17BJP4 PICTURE TUBE

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts  
Current . . . . . 0.6 . . . . . amp

Direct Interelectrode Capacitances:

Grid No.1 to all other electrodes . . . . . 6  $\mu\text{f}$   
Cathode to all other electrodes . . . . . 5  $\mu\text{f}$   
External conductive coating to ultor. . . . .  $\left\{ \begin{array}{l} 1500 \text{ max.} \\ 1000 \text{ min.} \end{array} \right. \mu\text{f}$

Faceplate, Spherical. . . . . Filterglass  
Light transmission (Approx.). . . . . 74%

Phosphor (For curves, see front of this section). . . . . P4—Sulfide Type

Fluorescence. . . . . Aluminized  
White  
Phosphorescence . . . . . White  
Persistence . . . . . Short

Focusing Method . . . . . Electrostatic

Deflection Method . . . . . Magnetic

Deflection Angles (Approx.):

Diagonal. . . . . 90°  
Horizontal. . . . . 85°  
Vertical. . . . . 68°

Electron Gun. . . . . Type Requiring No Ion-Trap Magnet

Tube Dimensions:

Overall length. . . . . 14-5/8"  $\pm$  3/8"  
Greatest width. . . . . 15-3/8"  $\pm$  1/8"  
Greatest height . . . . . 12-9/32"  $\pm$  1/8"  
Diagonal. . . . . 16-5/8"  $\pm$  1/8"  
Neck length . . . . . 5-1/2"  $\pm$  3/16"

Screen Dimensions (Minimum):

Greatest width. . . . . 14-5/16"  
Greatest height . . . . . 11-1/8"  
Diagonal. . . . . 15-9/16"  
Projected area. . . . . 149 sq. in.

Weight (Approx.). . . . . 15 lbs

Operating Position. . . . . Any

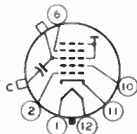
Cap . . . . . Recessed Small Cavity (JETEC No. J1-21)

B:lb. . . . . J133

Base. . . . . Small-Shell Duodecal 6-Pin (JETEC No. 86-63)

Basing Designation for BOTTOM VIEW. . . . . 12L

Pin 1—Heater  
Pin 2—Grid No.1  
Pin 6—Grid No.4  
Pin 10—Grid No.2  
Pin 11—Cathode  
Pin 12—Heater



Cap—Ultor  
(Grid No.3,  
Grid No.5,  
Collector)  
C—External  
Conductive  
Coating



# 17BJP4 PICTURE TUBE

## GRID-DRIVE<sup>▲</sup> SERVICE

Unless otherwise specified, voltage values are positive with respect to cathode

### Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE . . . . .	16000 max.	volts
GRID-No.4 VOLTAGE:		
Positive value . . . . .	1000 max.	volts
Negative value . . . . .	500 max.	volts
GRID-No.2 VOLTAGE . . . . .	500 max.	volts
GRID-No.1 VOLTAGE:		
Negative peak value . . . . .	200 max.	volts
Negative bias value . . . . .	140 max.	volts
Positive bias value . . . . .	0 max.	volts
Positive peak value . . . . .	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . . . .	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

### Equipment Design Ranges:

With any ultor voltage ( $E_{c5k}$ ) between 12000<sup>#</sup> and 16000 volts and grid-No.2 voltage ( $E_{c2k}$ ) between 200 and 500 volts

Grid-No.4 Voltage for focus . . . . .	-0.4% to +2.2% of $E_{c5k}$	volts
Grid-No.1 Voltage ( $E_{c1k}$ ) for visual extinction of focused raster . . . . .	See Raster-Cutoff-Range Chart for Grid-Drive Service	
Grid-No.1 Video Drive from Raster Cutoff (Black Level):		
White-level value (Peak positive) . . . . .	Same value as determined for $E_{c1k}$ except video drive is a positive voltage	
Grid-No.4 Current . . . . .	-25 to +25	$\mu$ a
Grid-No.2 Current . . . . .	-15 to +15	$\mu$ a
Field Strength of Adjustable Centering Magnet <sup>*</sup> . . . . .	0 to 8	gausses

### Examples of Use of Design Ranges:

With ultor voltage of	14000	16000	volts
and grid-No.2 voltage of	300	300	volts
Grid-No.4 Voltage for focus . . . . .	-55 to +300	-65 to +350	volts
Grid-No.1 Voltage for visual extinction of focused raster . . . . .	-28 to -72	-28 to -72	volts

<sup>▲</sup>, <sup>#</sup>, <sup>\*</sup>: See next page.



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# 17BJP4

## PICTURE TUBE

Grid-No.1 Video Drive  
 from Raster Cutoff  
 (Black Level):  
 White-level value . . . . . 28 to 72 28 to 72 volts

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance. . . . . 1.5 max. megohms

### CATHODE-DRIVE<sup>■</sup> SERVICE

*Unless otherwise specified, voltage values are positive  
 with respect to grid No.1*

### Maximum Ratings, Design-Center Values:

ULTOR-TO-GRID-No.1 VOLTAGE. . . . . 16000 max. volts

GRID-No.4-TO-GRID-No.1 VOLTAGE:

Positive value. . . . . 1000 max. volts

Negative value. . . . . 500 max. volts

GRID-No.2-TO-GRID-No.1 VOLTAGE. . . . . 640 max. volts

GRID-No.2-TO-CATHODE VOLTAGE. . . . . 500 max. volts

CATHODE-TO-GRID-No.1 VOLTAGE:

Positive peak value . . . . . 200 max. volts

Positive bias value . . . . . 140 max. volts

Negative bias value . . . . . 0 max. volts

Negative peak value . . . . . 2 max. volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:

During equipment warm-up period

not exceeding 15 seconds. . . . . 410 max. volts

After equipment warm-up period. . . . . 180 max. volts

Heater positive with respect to cathode. . . . . 180 max. volts

### Equipment Design Ranges:

*With any ultor-to-grid-No.1 voltage ( $E_{c5g1}$ ) between 12000<sup>#</sup>  
 and 16000 volts and grid-No.2-to-grid-No.1 voltage ( $E_{c2g1}$ )  
 between 220 and 640 volts*

Grid-No.4-to-Grid-No.1

Voltage for focus . . . . . 0% to 2.6% of  $E_{c5g1}$  volts

Cathode-to-Grid-No.1 Voltage

( $E_{kg1}$ ) for visual extinction

of focused raster . . . . . See Raster-Cutoff-Range Chart  
 for Cathode-Drive Service

Cathode-to-Grid-No.1 Video

Drive from Raster Cutoff

(Black Level):

White-level value

(Peak negative) . . . . . Same value as determined for  
 $E_{kg1}$  except video drive is a  
 negative voltage

Grid-No.4 Current . . . . . -25 to +25  $\mu$ a

▲, #, \*, ■: See next page.

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## PICTURE TUBE

Grid-No.2 Current. . . . .	-15 to +15	$\mu$ a
Field Strength of Adjustable Centering Magnet*. . . . .	0 to 8	gausses

**Examples of Use of Design Ranges:**

<i>With ultor-to-grid-</i>		
<i>No.1 voltage of</i>	14000	16000 volts
<i>and grid-No.2-to-grid-</i>		
<i>No.1 voltage of</i>	300	300 volts
Grid-No.4-to-Grid-No.1 Voltage for focus. . . . .	0 to 365	0 to 415 volts
Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster. . . . .	28 to 60	28 to 60 volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level):		
White-level value. . . . .	-28 to -60	-28 to -60 volts

**Maximum Circuit Values:**

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
--	----------	---------

- ▲ Grid drive is the operating condition in which the video signal varies the grid-no.1 potential with respect to cathode.
- # Brilliance and definition decrease with decreasing ultor voltage or ultor-to-grid-no.1 voltage. In general, the ultor voltage or ultor-to-grid-no.1 voltage should not be less than 12000 volts.
- \* Distance from *Reference Line* for suitable PM centering magnet should not exceed 2-1/2". Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 5/16-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as 1/2-inch deflection of the spot from the center of the tube face.
- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid no.1 and the other electrodes.

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*

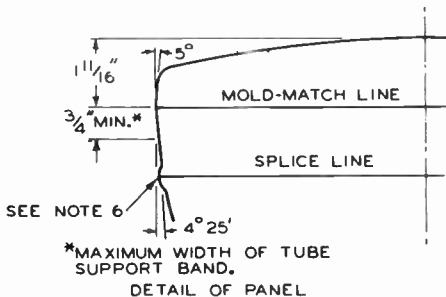
Curves and Charts shown under Type 17BZP4  
also apply to the 17BJP4



17BJP4

PICTURE TUBE

17BJP4



**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS PIN 6.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No. 116 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

**NOTE 4:** THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT AREA OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THE CONTACT AREA SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

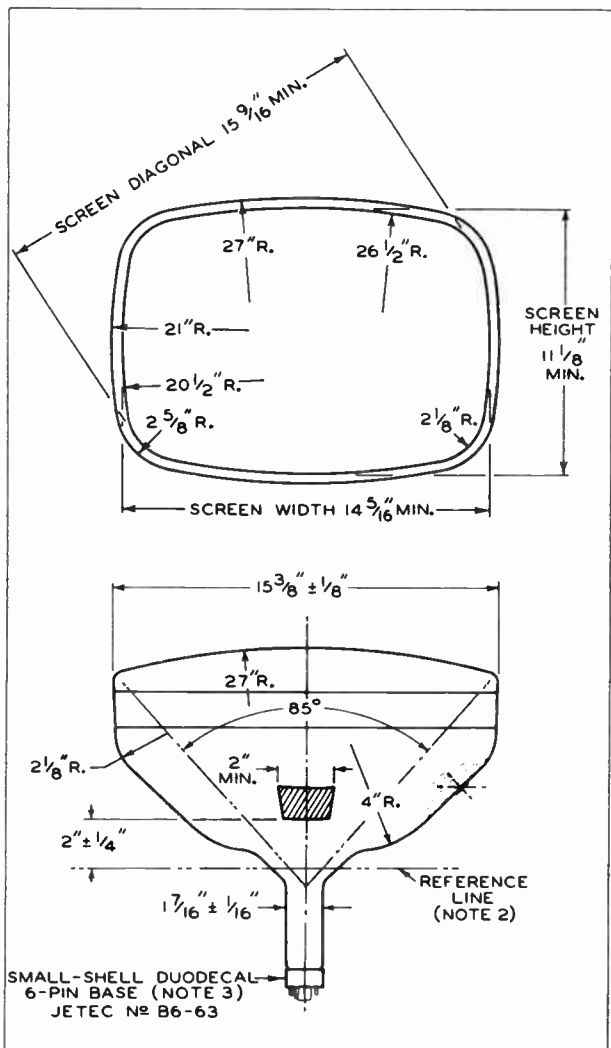
**NOTE 5:** TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

**NOTE 6:** BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

17BJP4



# 17BJP4 PICTURE TUBE

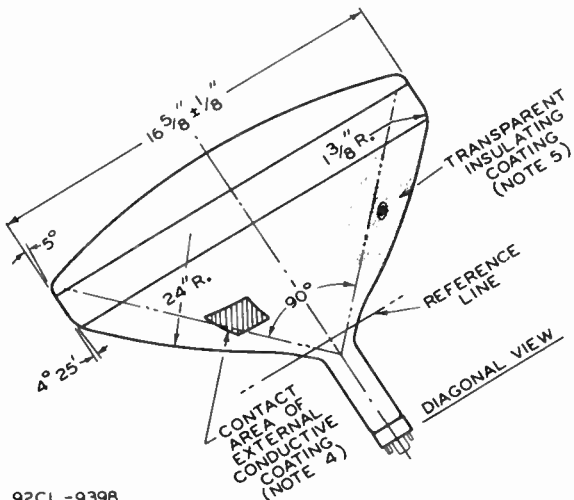
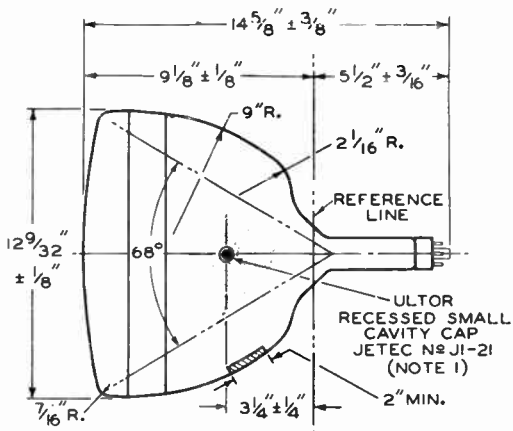




17BJP4

PICTURE TUBE

17BJP4



92CL-9398







17BP4-A  
17BP4-B

# 17BP4-A, 17BP4-B PICTURE TUBES

RECTANGULAR GLASS TYPES

MAGNETIC FOCUS

MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

voltage. . . . . 6.3 . . . . . ac or dc volts

Current. . . . . 0.6 ± 10% . . . . . amp

Capacitance between External Conduc-

tive Coatings: 1 Ulter . . . . . { 1500 max. μμf  
150 min. μμf

Faceplate, Spherical . . . . . Filterglass

Phosphor (for curves,  
see front of this  
Section). . . . .

Type 17BP4-A  
P4—Sulfide Type

Type 17BP4-B  
P4—Sulfide Type  
Aluminized

Deflection Angles (Approx.):

Diagonal . . . . . 70°

Horizontal . . . . . 65°

Vertical . . . . . 50°

Electron Gun . . . . . Ion-Trap Type Requiring  
External Single-Field Magnet

Tube Dimensions:

Overall length . . . . . 19-3/16" ± 3/8"

Greatest width . . . . . 15-25/64" ± 1/8"

Greatest height. . . . . 12-9/32" ± 1/8"

Diagonal . . . . . 16-5/8" ± 1/8"

Neck length. . . . . 7-1/2" ± 3/16"

Radius of curvature of faceplate (External Surface). . . . . 27"

Screen Dimensions (Minimum):

Greatest width . . . . . 14-5/16" ←

Greatest height. . . . . 11-1/8"

Diagonal . . . . . 15-9/16"

Projected area . . . . . 149 sq. in.

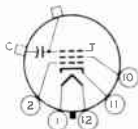
Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Base . . . . . Small-Shell Duodecal 5-Pin (JETEC Group 4, No. B5-57) ←

Basing Designation for BOTTOM VIEW . . . . . 12M

- Pin 1—Heater
- Pin 2—Grid No.1
- Pin 10—Grid No.2
- Pin 11—Cathode
- Pin 12—Heater



- Cap—Ultror  
(Grid No.3,  
Collector)
- C—External  
Conductive  
Coating

### Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE. . . . . 16000 max. volts ←

GRID-No.2 VOLTAGE. . . . . 500 max. volts ←

← Indicates a change.

17BP4-A  
17BP4-B



# 17BP4-A, 17BP4-B PICTURE TUBES

## GRID-No.1 VOLTAGE:

→ Negative-peak value. . . . .	200 max.	volts
→ Negative-bias value. . . . .	140 max.	volts
Positive-bias value. . . . .	0 max.	volts
Positive-peak value. . . . .	2 max.	volts

## PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:

During equipment warm-up period not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . . . .	150 max.	volts

Heater positive with respect to cathode 150 max. volts

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
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*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*

→ Indicates a change.



# 17BVP4

## PICTURE TUBE

17BVP4

RECTANGULAR GLASS TYPE

ALUMINIZED SCREEN

LOW-VOLTAGE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

*With heater having controlled warm-up time*

### DATA

#### General:

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . .	6.3	volts
Current . . . . .	0.6 ± 5%	amp
Warm-up time (Average) . . . . .	11	sec

Capacitance Between External Conductive Coating and Ultor . . . . .

{ 1500 max.	μμf
{ 1000 min.	μμf

Faceplate, Spherical . . . . . Filterglass

Phosphor (For curves, see front of this section) . . P4—Sulfide Type  
Aluminized

Deflection Angles (Approx.):

Diagonal . . . . .	110°
Horizontal . . . . .	105°
Vertical . . . . .	87°

Electron Gun . . . . . Ion-Trap Type Requiring  
External Single-Field Magnet

Tube Dimensions:

Overall length . . . . .	13-1/4" ± 5/16"
Greatest width . . . . .	15-5/8" ± 1/8"
Greatest height . . . . .	12-3/4" ± 1/8"
Diagonal . . . . .	16-9/16" ± 1/8"
Neck length . . . . .	6-1/8" ± 3/16"
Radius of curvature of faceplate (External surface) . . . . .	20-3/4"

Screen Dimensions (Minimum):

Greatest width . . . . .	14-3/4"
Greatest height . . . . .	11-11/16"
Diagonal . . . . .	15-3/4"
Projected area . . . . .	155 sq. in.

Operating Position . . . . . Any

Cap . . . . . Recessed Small Cavity (JEDEC No. J1-21)

Base . . . . . Special (JEDEC No. B6-185)

Basing Designation for BOTTOM VIEW . . . . . 7FA

- Pin 2—Cathode
- Pin 3—Heater
- Pin 4—Heater
- Pin 5—Grid No.1
- Pin 6—Grid No.4
- Pin 7—Grid No.2



- Cap—Ultor
- (Grid No.3, Grid No.5, Collector)
- C—External Conductive Coating

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

ULTOR VOLTAGE . . . . .	16000 max.	volts
GRID-No.4 (FOCUSING) VOLTAGE:		
Positive value . . . . .	1000 max.	volts
Negative value . . . . .	500 max.	volts
GRID-No.2 VOLTAGE . . . . .	500 max.	volts

17BVP4



17BVP4

PICTURE TUBE

GRID-NO.1 VOLTAGE:

Negative-peak value. . . . .	200 max.	volts
Negative-bias value. . . . .	140 max.	volts
Positive-bias value. . . . .	0 max.	volts
Positive-peak value. . . . .	2 max.	volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . .	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
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*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*



# 17BWP4

## PICTURE TUBE

17BWP4

RECTANGULAR GLASS TYPE

ALUMINIZED SCREEN

LOW-VOLTAGE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

*Intended for use in equipment having series heater-string arrangement*

### DATA

#### General:

Heater, for Unipotential Cathode:

- Voltage . . . . . 6.3 . . . . . ac or dc volts
- Current . . . . . 0.6 ± 5% . . . . . amp
- Warm-up time (Average) . . . . . 11 . . . . . sec

*For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of Receiving Tube Section.*

Capacitance between External Conductive Coating and Ultor . . . . . { 1500 max. μμf  
 { 1000 min. μμf

Faceplate, Spherical . . . . . Filterglass  
 Phosphor (For Curves, see front of this Section) . P4—Sulfide Type  
 Aluminized

#### Deflection Angles (Approx.):

- Diagonal . . . . . 110°
- Horizontal . . . . . 105°
- Vertical . . . . . 87°

Electron Gun . . . . . Type Requiring No Ion-Trap Magnet

#### Tube Dimensions:

- Overall length . . . . . 12-5/16" ± 5/16"
- Greatest width . . . . . 15-5/8" ± 1/8"
- Greatest height . . . . . 12-3/4" ± 1/8"
- Diagonal . . . . . 16-9/16" ± 1/8"
- Neck length . . . . . 5-3/16" ± 3/16"
- Radius of curvature of faceplate (External surface) . . . . . 20-3/4"

#### Screen Dimensions (Minimum):

- Greatest width . . . . . 14-3/4"
- Greatest height . . . . . 11-11/16"
- Diagonal . . . . . 15-3/4"
- Projected area . . . . . 155 sq. in.

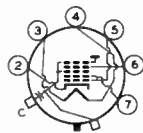
Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Base . . . . . Special (JETEC No. B6-185)

Basing Designation for BOTTOM VIEW . . . . . 7FA

- Pin 2 - Cathode
- Pin 3 - Heater
- Pin 4 - Heater
- Pin 5 - Grid No. 1
- Pin 6 - Grid No. 4
- Pin 7 - Grid No. 2



- Cap - Ultor (Grid No. 3, Grid No. 5, Collector)
- C - External Conductive Coating



## 17BWP4

## PICTURE TUBE

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

ULTOR VOLTAGE. . . . .	16000 max.	volts
GRID-No.4 (FOCUSING) VOLTAGE:		
Positive value . . . . .	1000 max.	volts
Negative value . . . . .	500 max.	volts
GRID-No.2 VOLTAGE. . . . .	500 max.	volts
GRID-No.1 VOLTAGE:		
Negative-peak value. . . . .	200 max.	volts
Negative-bias value. . . . .	140 max.	volts
Positive-bias value. . . . .	0 max.	volts
Positive-peak value. . . . .	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . . . .	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

**Maximum Circuit values:**

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
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*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*



17BZP4

# 17BZP4 PICTURE TUBE

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN  
LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:			
Voltage (AC or DC) . . . . .	6.3	volts	
Current . . . . .	0.6	amp	
Direct Interelectrode Capacitances:			
Grid No.1 to all other electrodes . . . . .	6	$\mu\mu\text{f}$	
Cathode to all other electrodes . . . . .	5	$\mu\mu\text{f}$	
External conductive coating to ultor. . . . .	{ 1500 max.	$\mu\mu\text{f}$	
	{ 1000 min.	$\mu\mu\text{f}$	←
Faceplate, Spherical . . . . .	Filterglass		
Light transmission (Approx.) . . . . .	78%		
Phosphor (For curves, see front of this section) . . . . .	P4—Sulfide Type		
	Aluminized		
Fluorescence . . . . .	White		
Phosphorescence . . . . .	White		
Persistence . . . . .	Medium-Short		←
Focusing Method . . . . .	Electrostatic		
Deflection Method . . . . .	Magnetic		
Deflection Angles (Approx.):			
Diagonal . . . . .		110°	
Horizontal . . . . .		105°	
Vertical . . . . .		87°	
Tube Dimensions:			
Overall length . . . . .	12-9/16" ± 1/4"		
Greatest width . . . . .	15-5/8" ± 1/8"		
Greatest height . . . . .	12-3/4" ± 1/8"		
Diagonal . . . . .	16-9/16" ± 1/8"		
Neck length . . . . .	5-7/16" ± 1/8"		
Radius of curvature of faceplate (External surface) . . . . .	20-3/4"		←
Screen Dimensions (Minimum):			
Greatest width . . . . .	14-3/4"		
Greatest height . . . . .	11-11/16"		
Diagonal . . . . .	15-3/4"		
Projected area . . . . .	155 sq. in.		
Weight (Approx.) . . . . .	.10 lbs		
Operating Position . . . . .	Any		
Cap . . . . .	Recessed Small Cavity (JEDEC No. J1-21)		
Bulb . . . . .	J132-1/2 A1/B1		←
Socket . . . . .	Ucinite Part No. 115446, or equivalent		
Base . . . . .	Small-Button Eightar 7-Pin, Arrangement 2, (JEDEC No. B7-183)		

← Indicates a change.

17BZP4

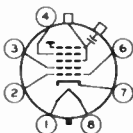


17BZP4

## PICTURE TUBE

Basing Designation for BOTTOM VIEW. . . . . 8HR

Pin 1- Heater  
 Pin 2- Grid No.1  
 Pin 3- Grid No.2  
 Pin 4- Grid No.4  
 Pin 6- Grid No.1  
 Pin 7- Cathode  
 Pin 8- Heater



Cap- Ultor  
 (Grid No.3,  
 Grid No.5,  
 Collector)  
 C- External  
 Conductive  
 Coating

GRID-DRIVE<sup>A</sup> SERVICE

*Unless otherwise specified, voltage values  
 are positive with respect to cathode*

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

ULTOR VOLTAGE. . . . .	{ 16000 max. volts 12000 min. volts
GRID-No.4 (FOCUSING) VOLTAGE:	
Positive value . . . . .	1000 max. volts
Negative value . . . . .	500 max. volts
GRID-No.2 VOLTAGE. . . . .	500 max. volts
GRID-No.1 VOLTAGE:	
Negative-peak value. . . . .	200 max. volts
Negative-bias value. . . . .	140 max. volts
Positive-bias value. . . . .	0 max. volts
Positive-peak value. . . . .	2 max. volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode.	180 max. volts
Heater positive with respect to cathode.	180 max. volts

## Equipment Design Ranges:

*With any ultor voltage ( $E_{c5k}$ ) between 12000 and 16000 volts  
 and grid-No.2 voltage ( $E_{c2k}$ ) between 200 and 500 volts*

Grid-No.4 Voltage for focus <sup>§</sup> . . . . .	0 to 400	volts
Grid-No.1 Voltage ( $E_{c1k}$ ) for visual extinction of focused raster. . . . .	<i>See Raster-Cutoff-Range Chart for Grid-Drive Service</i>	
Grid-No.1 Video Drive from Raster Cutoff (Black level):		
White-level value (Peak positive) . . . . .	Same value as determined for $E_{c1k}$ except video drive is a positive voltage	
Grid-No.4 Current . . . . .	-25 to +25	$\mu$ a
Grid-No.2 Current . . . . .	-15 to +15	$\mu$ a
Field Strength of Adjustable Centering Magnet*. . . . .	0 to 8	gausses





17BZP4

17BZP4

PICTURE TUBE

Examples of Use of Design Ranges:

With ultor voltage of	14000	16000	volts
and grid-No. 2 voltage of	300	400	volts
Grid-No. 4 Voltage for focus. . . . .	0 to 400	0 to 400	volts
Grid-No. 1 Voltage for visual extinction of focused raster . . . . .	-28 to -72	-36 to -94	volts
Grid-No. 1 Video Drive from Raster Cutoff (Black level):			
White-level value. . . . .	28 to 72	36 to 94	volts

Maximum Circuit Values:

Grid-No. 1-Circuit Resistance. . . . .	1.5 max.	megohms
--	----------	---------

CATHODE-DRIVE SERVICE

Unless otherwise specified, voltage values are positive with respect to grid No. 1

Maximum and Minimum Ratings, Design-Center Values:

ULTOR-TO-GRID-NO. 1 VOLTAGE. . . . .	{ 16000 max. volts
	{ 12000 min. volts
GRID-NO. 4-TO-GRID-NO. 1 VOLTAGE:	
Positive value. . . . .	1000 max. volts
Negative value. . . . .	500 max. volts
GRID-NO. 2-TO-GRID-NO. 1 VOLTAGE. . . . .	640 max. volts
GRID-NO. 2-TO-CATHODE VOLTAGE. . . . .	500 max. volts
CATHODE-TO-GRID-NO. 1 VOLTAGE:	
Positive-peak value . . . . .	200 max. volts
Positive-bias value . . . . .	140 max. volts
Negative-bias value . . . . .	0 max. volts
Negative-peak value . . . . .	2 max. volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode. . . . .	180 max. volts
Heater positive with respect to cathode. . . . .	180 max. volts

Equipment Design Ranges:

With any ultor-to-grid-No. 1 voltage ( $E_{c5g1}$ ) between 12000 and 16000 volts and grid-No. 2-to-grid-No. 1 voltage ( $E_{c2g1}$ ) between 225 and 640 volts

Grid-No. 4-to-Grid-No. 1 Voltage for focus. . . . .	0 to 400	volts
Cathode-to-Grid-No. 1 Voltage ( $E_{kg1}$ ) for visual extinction of focused raster . . . . .	See Raster-Cutoff-Range Chart for Cathode-Drive Service	

17BZP4



17BZP4

## PICTURE TUBE

Cathode-to-Grid-No. 1 Video Drive from Raster Cutoff (Black level): White-level value. . . .	Same value as determined for $E_{kg_1}$ except video drive is a negative voltage
Grid-No. 4 Current. . . . .	-25 to +25 $\mu$ a
Grid-No. 2 Current. . . . .	-15 to +15 $\mu$ a
Field Strength of Adjust- able Centering Magnet* .	0 to 8 gauss

**Examples of Use of Design Ranges:**

With ultor-to-grid-No. 1 voltage of	14000	16000	volts
and grid-No. 2-to-grid-No. 1 voltage of	300	400	volts
Grid-No. 4-to-Grid-No. 1 Voltage for focus. . . . .	0 to 400	0 to 400	volts
Cathode-to-Grid-No. 1 Voltage for visual extinction of focused raster . . . . .	28 to 60	36 to 78	volts
Cathode-to-Grid-No. 1 Video Drive from Raster Cutoff (Black level): White-level value. . . . .	-28 to -60	-36 to -78	volts

**Maximum Circuit Values:**

Grid-No. 1-Circuit Resistance. . . . . 1.5 max. megohms

- ▲ Grid drive is the operating condition in which the video signal varies the grid-no. 1 potential with respect to cathode.
- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid no. 1 and the other electrodes.
- § The grid-no. 4 voltage or grid-no. 4-to-grid-no. 1 voltage required for focus of any individual tube is independent of ultor current and will remain essentially constant for values of ultor voltage (or ultor-to-grid-no. 1 voltage) or grid-no. 2 voltage (or grid-no. 2-to-grid-no. 1 voltage) within design ranges shown for these items.
- \* Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4". Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 5/16-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as 1/2-inch deflection of the spot from the center of the tube face.

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*

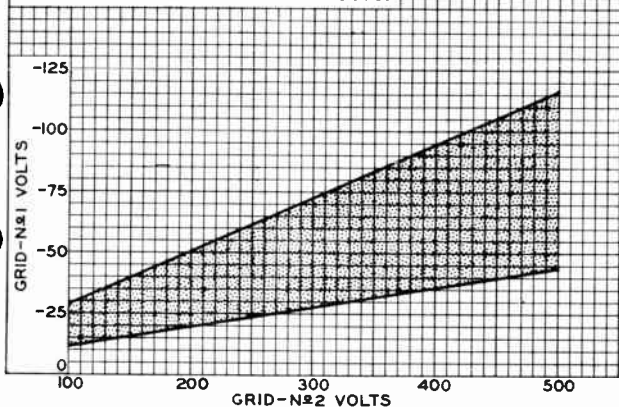


17BZP4

17BZP4

### RASTER-CUTOFF-RANGE CHARTS GRID-DRIVE SERVICE

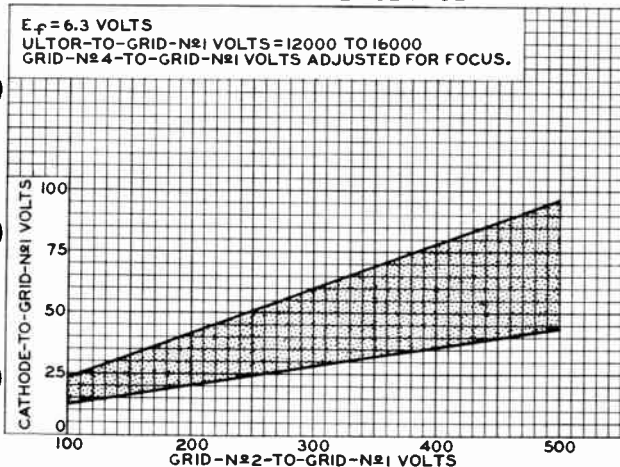
$E_f = 6.3$  VOLTS  
ULTOR VOLTS = 12000 TO 16000  
GRID-N $\neq$ 4 VOLTS ADJUSTED FOR FOCUS.



92CS-9245

### CATHODE-DRIVE SERVICE

$E_f = 6.3$  VOLTS  
ULTOR-TO-GRID-N#1 VOLTS = 12000 TO 16000  
GRID-N#4-TO-GRID-N#1 VOLTS ADJUSTED FOR FOCUS.



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

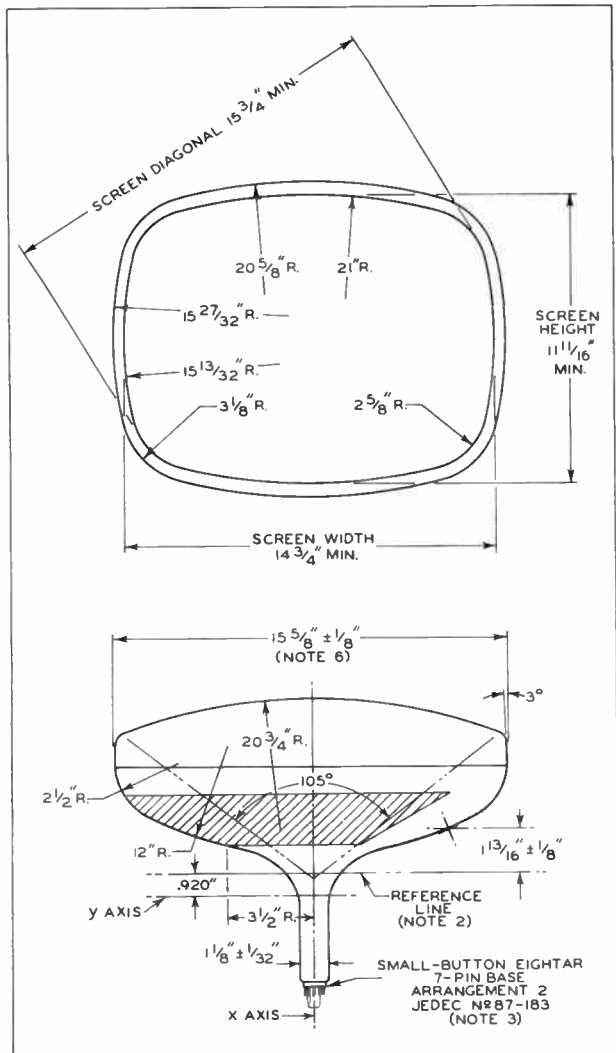
World Radio History

92CS-9244

17BZP4



# 17BZP4 PICTURE TUBE

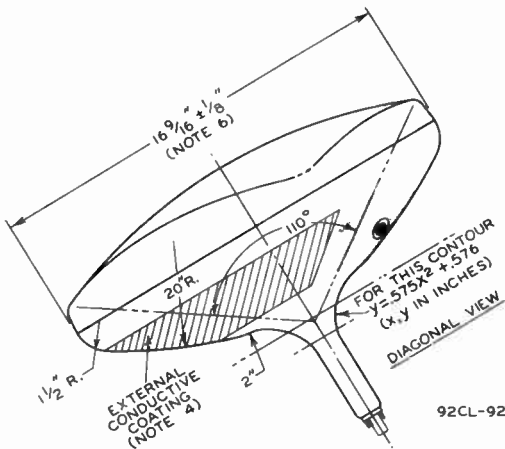
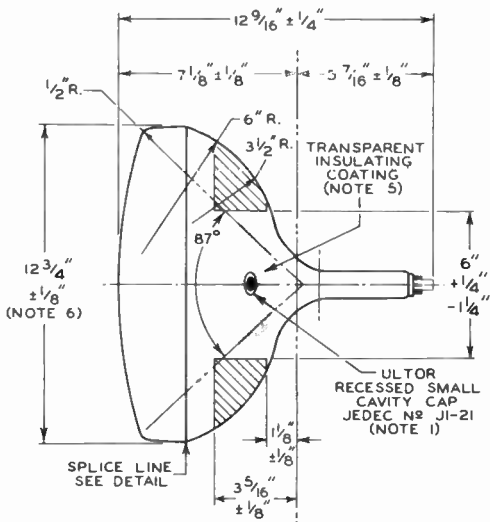




17BZP4

PICTURE TUBE

17BZP4

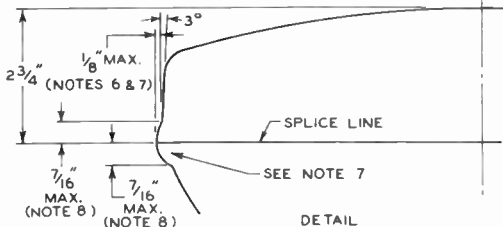


92CL-9237R2

17BZP4



# 17BZP4 PICTURE TUBE



**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC No. G-126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. THE DESIGN OF THE SOCKET SHOULD BE SUCH THAT THE CIRCUITRY CANNOT IMPRESS LATERAL STRAINS THROUGH THE SOCKET CONTACTS ON THE BASE PINS. BOTTOM CIRCUMFERENCE OF BASE WAFER WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 1-3/4".

**NOTE 4:** EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

**NOTE 5:** TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

**NOTE 6:** MEASURED  $2-9/32" \pm 1/32"$  FROM THE PLANE TANGENT TO THE SURFACE OF THE FACEPLATE AT THE TUBE AXIS.

**NOTE 7:** BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/4", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/8" BEYOND THE ENVELOPE SURFACE AT THE LOCATION SPECIFIED FOR DIMENSIONING THE ENVELOPE WIDTH, DIAGONAL, AND HEIGHT.

**NOTE 8:** THE TUBE SHOULD BE SUPPORTED ON BOTH SIDES OF THE BULGE. THE MECHANISM USED SHOULD PROVIDE CLEARANCE FOR THE MAXIMUM DIMENSIONS OF THE BULGE.



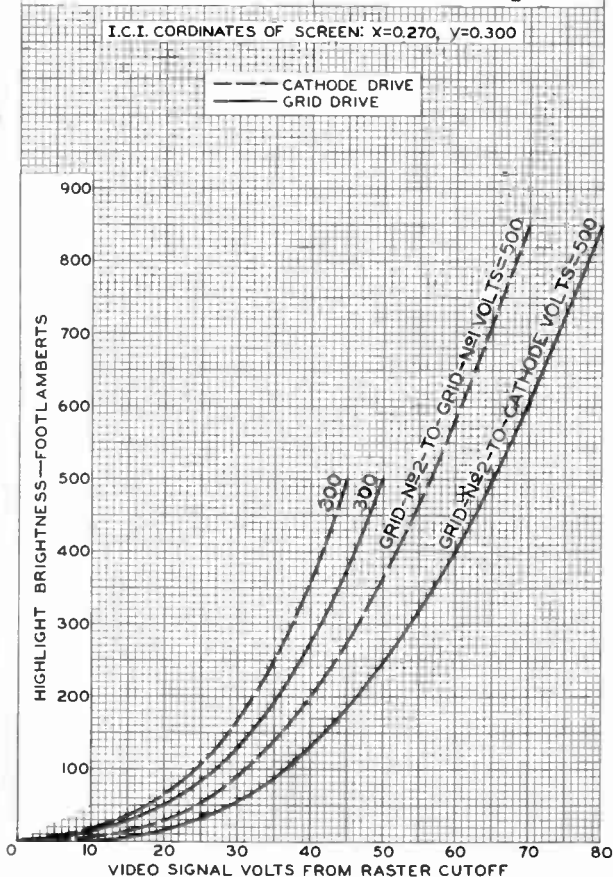
17BZP4

17BZP4

## AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE  
 $E_f = 6.3$  VOLTS  
 ULTOR-TO-GRID-№1 VOLTS = 16000  
 CATHODE BIASED POSITIVE WITH  
 RESPECT TO GRID №1 TO GIVE  
 FOCUSED RASTER CUTOFF.  
 RASTER FOCUSED  
 AT AVERAGE BRIGHTNESS.  
 RASTER SIZE =  $14" \times 10\frac{1}{2}"$

GRID-DRIVE SERVICE  
 $E_f = 6.3$  VOLTS  
 ULTOR VOLTS = 16000  
 GRID №1 BIASED NEGATIVE WITH  
 RESPECT TO CATHODE TO GIVE  
 FOCUSED RASTER CUTOFF.  
 RASTER FOCUSED  
 AT AVERAGE BRIGHTNESS.  
 RASTER SIZE =  $14" \times 10\frac{1}{2}"$



17BZP4



17BZP4

## AVERAGE DRIVE CHARACTERISTICS

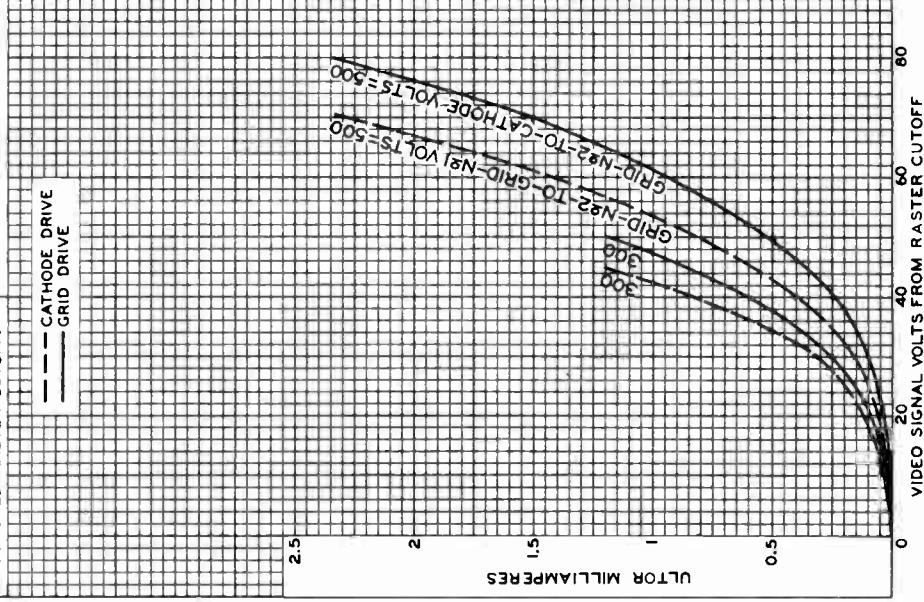
## CATHODE-DRIVE SERVICE

$E_f = 6.3$  VOLTS  
 ULTOR-TO-GRID-N<sub>2</sub>  
 VOLTS=12000 TO 16000  
 CATHODE BIASED POSITIVE WITH  
 RESPECT TO GRID N<sub>1</sub> TO GIVE  
 FOCUSED RASTER CUTOFF.

## GRID-DRIVE SERVICE

$E_f = 6.3$  VOLTS  
 ULTOR VOLTS=12000 TO 16000  
 GRID N<sub>2</sub> BIASED NEGATIVE WITH  
 RESPECT TO CATHODE TO GIVE  
 FOCUSED RASTER CUTOFF.

--- CATHODE DRIVE  
 --- GRID DRIVE







17BZP4

# 17BZP4/17CAP4/17CKP4/17BRP4 PICTURE TUBE

RECTANGULAR GLASS TYPE

ALUMINIZED SCREEN

LOW-VOLTAGE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

*The 17BZP4/17CAP4/17CKP4/17BRP4 is the same as the 17BZP4.*





17CDP4

# 17CDP4 KINESCOPE

RECTANGULAR CLASS TYPE      ALUMINIZED SCREEN  
LOW-VOLTAGE FOCUS      110° MAGNETIC DEFLECTION  
*Intended for use in equipment having  
series heater-string arrangement*

*The 17CDP4 is the same as the 17BZP4 except for the following items:*

Heater, for Unipotential Cathode:

Voltage. . . . . 8.4 . . . . . ac or dc volts  
Current. . . . . 0.45 . . . . . amp  
Warm-up time (Average) . . . . . 11 . . . . . sec

*For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of Receiving Tube Section.*



## Picture Tube

SHORT RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

## DATA

## General:

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . . 6.3 volts  
Current at 6.3 volts . . . . .  $0.6 \pm 5\%$  amp

Direct Interelectrode Capacitances:

Grid No.1 to all other electrodes . . . . . 6  $\mu\text{f}$   
Cathode to all other electrodes . . . . . 5  $\mu\text{f}$   
External conductive coating to ultor. . . . .  $\begin{cases} 1500 \text{ max.} \\ 1000 \text{ min.} \end{cases}$   $\mu\text{f}$

Faceplate, Spherical . . . . . Filterglass

Light transmission (Approx.) . . . . . 78%

Phosphor (For Curves, see front of this Section) . . . . . P4—Sulfide Type  
Aluminized

Fluorescence . . . . . White

Phosphorescence . . . . . White

Persistence . . . . . Medium Short

Focusing Method . . . . . Electrostatic

Deflection Method . . . . . Magnetic

Deflection Angles (Approx.):

Diagonal . . . . .  $110^\circ$

Horizontal . . . . .  $105^\circ$

Vertical . . . . .  $87^\circ$

Electron Gun . . . . . Type Requiring No Ion-Trap Magnet

Tube Dimensions:

Overall length . . . . .  $10\text{-}3/4" \pm 1/4"$

Greatest width . . . . .  $15\text{-}5/8" \pm 1/8"$

Greatest height . . . . .  $12\text{-}3/4" \pm 1/8"$

Diagonal . . . . .  $16\text{-}9/16" \pm 1/8"$

Neck length . . . . .  $3\text{-}5/8" \pm 1/8"$

Radius of curvature of faceplate

(External surface) . . . . .  $20\text{-}3/4"$

Screen Dimensions (Minimum):

Greatest width . . . . .  $14\text{-}3/4"$

Greatest height . . . . .  $11\text{-}11/16"$

Diagonal . . . . .  $15\text{-}3/4"$

Projected area . . . . . 151 sq. in.

Weight (Approx.) . . . . . 10 lbs

Operating Position . . . . . Any

Cap . . . . . Recessed Small Cavity (JEDEC No. J1-21)

Bulb . . . . . J132-1/2 A1/81

Socket . . . . . Ucinite Part No. 115446, or equivalent

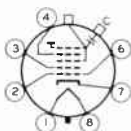
Base . . . . . Small-Button Neoeightar 7-Pin,  
Arrangement 1, (JEDEC No. 87-208)



# 17DTP4

Basing Designation for BOTTOM VIEW. . . . . 8HR

- Pin 1—Heater
- Pin 2—Grid No.1
- Pin 3—Grid No.2
- Pin 4—Grid No.4
- Pin 6—Grid No.1
- Pin 7—Cathode
- Pin 8—Heater



Cap—Ultror  
(Grid No.3,  
Grid No.5,  
Collector)  
C—External  
Conductive  
Coating

## GRID-DRIVE<sup>A</sup> SERVICE

*Unless otherwise specified, voltage values are positive with respect to cathode*

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

ULTOR VOLTAGE . . . . .	{	16000 max. volts
	}	12000* min. volts
GRID—No.4 (FOCUSING) VOLTAGE:		
Positive value. . . . .	1000 max. volts	
Negative value. . . . .	500 max. volts	
GRID—No.2 VOLTAGE . . . . .	500 max. volts	
GRID—No.1 VOLTAGE:		
Negative—peak value . . . . .	200 max. volts	
Negative—bias value . . . . .	140 max. volts	
Positive—bias value . . . . .	0 max. volts	
Positive—peak value . . . . .	2 max. volts	
PEAK HEATER—CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds. . . . .	410 max. volts	
After equipment warm-up period. . . .	180 max. volts	
Heater positive with respect to cathode.	180 max. volts	

### Equipment Design Ranges:

*With any ultor voltage ( $E_{C5k}$ ) between 12000\* and 16000 volts and grid—No.2 voltage ( $E_{C2k}$ ) between 200 and 500 volts*

Grid—No.4 Voltage for focus <sup>S</sup> . . . . .	0 to 400 volts
Grid—No.1 Voltage ( $E_{C1k}$ ) for visual extinction of focused raster. See <i>Raster-Cutoff-Range Chart for Grid-Drive Service</i>	
Grid—No.1 Video Drive from Raster Cutoff (Black level):	
White-level value (Peak positive) . . . . .	Same value as determined for $E_{C1k}$ except video drive is a positive voltage
Grid—No.4 Current . . . . .	-25 to +25 $\mu$ a
Grid—No.2 Current . . . . .	-15 to +15 $\mu$ a
Field Strength of Adjustable Centering Magnet* . . . . .	0 to 12 gauss



## Examples of Use of Design Ranges:

With ultor voltage of	14000	volts
and grid-No.2 voltage of	300	volts
Grid-No.4 Voltage for focus . . . . .	0 to 400	volts
Grid-No.1 Voltage for visual extinction of focused raster. . . . .	-28 to -72	volts
Grid-No.1 Video Drive from Raster Cutoff (Black level):		
White-level value . . . . .	28 to 72	volts

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance. . . . .	1.5 max.	megohms
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## CATHODE-DRIVE<sup>■</sup> SERVICE

*Unless otherwise specified, voltage values are positive with respect to grid No.1*

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

ULTOR-TO-GRID-No.1 VOLTAGE. . . . .	{ 16000 max.	volts
	{ 12000* min.	volts
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:		
Positive value. . . . .	1000 max.	volts
Negative value. . . . .	500 max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAGE. . . . .	640 max.	volts
GRID-No.2-TO-CATHODE VOLTAGE. . . . .	500 max.	volts
CATHODE-TO-GRID-No.1 VOLTAGE:		
Positive-peak value . . . . .	200 max.	volts
Positive-bias value . . . . .	140 max.	volts
Negative-bias value . . . . .	0 max.	volts
Negative-peak value . . . . .	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds. . . . .	410 max.	volts
After equipment warm-up period. . . . .	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

### Equipment Design Ranges:

*With any ultor-to-grid-No.1 voltage ( $E_{c5g1}$ ) between 12000\* and 16000 volts and grid-No.2-to-grid-No.1 voltage ( $E_{c2g1}$ ) between 225 and 640 volts*

Grid-No.4-to-Grid-No.1 Voltage for focus <sup>§</sup> . . . . .	0 to 400	volts
Cathode-to-Grid-No.1 Voltage ( $E_{kg1}$ ) for visual extinction of focused raster. . . . .	See <i>Raster-Cutoff-Range Chart for Cathode-Drive Service</i>	
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level):		
White-level value		
(Peak negative) . . . . .	Same value as determined for $E_{kg1}$ except video drive is a negative voltage	



# 17DTP4

Grid-No.4 Current . . . . .	-25 to +25	$\mu$ a
Grid-No.2 Current . . . . .	-15 to +15	$\mu$ a
Field Strength of Adjustable Centering Magnet* . . . . .	0 to 12	gausses

## Examples of Use of Design Ranges:

<i>With ultor-to-grid-No. 1 voltage of</i>	16000	volts
<i>and grid-No. 2-to-grid-No. 1 voltage of</i>	300	volts
Grid-No.4-to-Grid-No.1 Voltage for focus.	0 to 400	volts
Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster. . . . .	28 to 60	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value . . . . .	-28 to -60	volts

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance. . . . .	1.5 max.	megohms
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▲ Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.

◆ This value is a working design-center minimum. The equivalent absolute-minimum ultor (or ultor-to-grid-No.1) voltage is 11,000 volts, below which the serviceability of the 17DTP4 will be impaired. The equipment designer has the responsibility of determining a minimum design value such that under the worst probable operating conditions involving supply-voltage variation and equipment variation the absolute minimum ultor (or ultor-to-grid-No.1) voltage is never less than 11,000 volts.

§ The grid-No.4 (or grid-No.4-to-grid-No.1) voltage required for focus of any individual tube is independent of ultor current and will remain essentially constant for values of ultor (or ultor-to-grid-No.1) voltage or grid-No.2 (or grid-No.2-to-grid-No.1) voltage within design ranges shown for these items.

■ Distance from Reference Line for suitable PM centering magnet should not exceed  $2-1/4"$ . Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a  $5/16$ -inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as  $1/2$ -inch deflection of the spot from the center of the tube face.

■ Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.

## OPERATING CONSIDERATIONS

*Shatter-Proof Cover Over the Tube Face.* Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 17DTP4 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide X-ray protection when required.

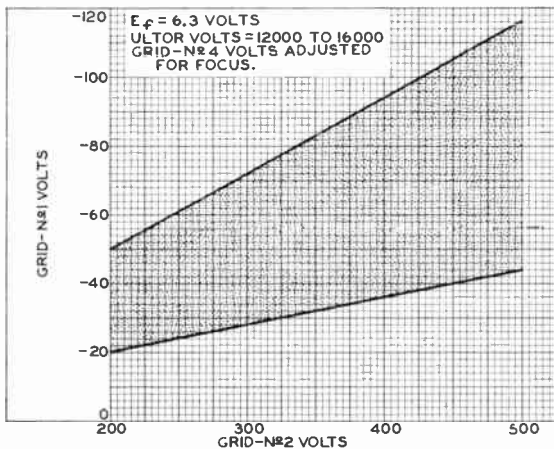
*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*





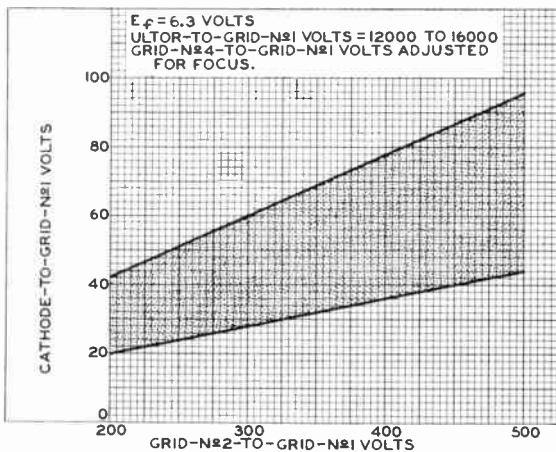
## RASTER-CUTOFF-RANGE CHARTS

### Grid-Drive Service



92CS-10246

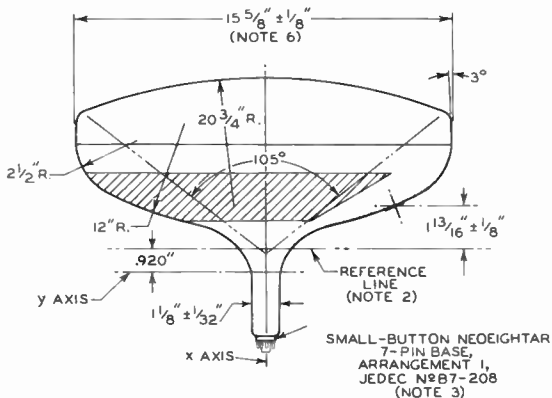
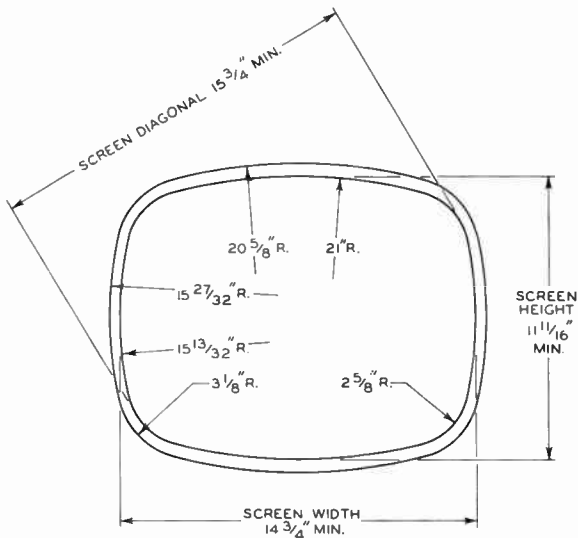
### Cathode-Drive Service

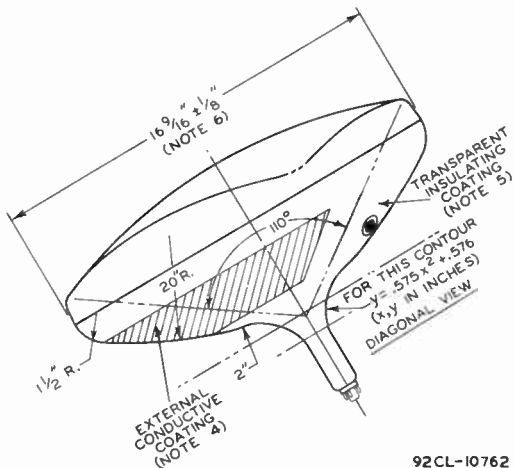
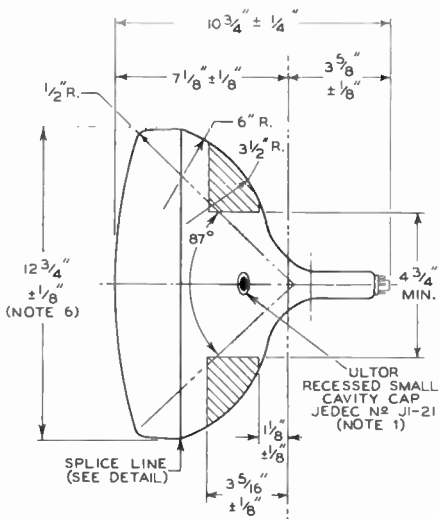


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# 17DTP4

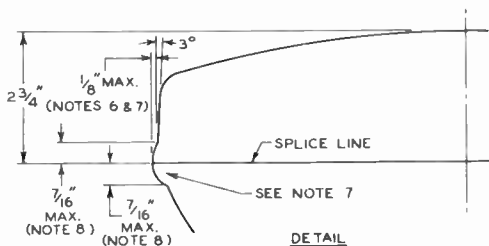




92CL-10762



# 17DTP4



**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC No. G-126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. THE DESIGN OF THE SOCKET SHOULD BE SUCH THAT THE CIRCUIT WIRING CANNOT IMPRESS LATERAL STRAINS THROUGH THE SOCKET CONTACTS ON THE BASE PINS. BOTTOM CIRCUMFERENCE OF BASE WAFER WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF  $1\text{-}\frac{3}{4}$ ".

**NOTE 4:** EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

**NOTE 5:** TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

**NOTE 6:** MEASURED  $2\text{-}\frac{9}{32}$ "  $\pm$   $\frac{1}{32}$ " FROM THE PLANE TANGENT TO THE SURFACE OF THE FACEPLATE AT THE TUBE AXIS.

**NOTE 7:** BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN  $\frac{1}{4}$ ", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN  $\frac{1}{8}$ " BEYOND THE ENVELOPE SURFACE AT THE LOCATION SPECIFIED FOR DIMENSIONING THE ENVELOPE WIDTH, DIAGONAL, AND HEIGHT.

**NOTE 8:** THE TUBE SHOULD BE SUPPORTED ON BOTH SIDES OF THE BULGE. THE MECHANISM USED SHOULD PROVIDE CLEARANCE FOR THE MAXIMUM DIMENSIONS OF THE BULGE. SUPPORTS MUST BE SPACED FROM THE TUBE BY THE USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

**NOTE 9:** NECK DIAMETER IS MAINTAINED TO AT LEAST  $2\text{-}\frac{7}{16}$ " FROM REFERENCE LINE.



17HP4

# 17HP4/17RP4 PICTURE TUBE

RECTANGULAR GLASS TYPE

LOW-VOLTAGE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

The 17HP4/17RP4 is the same as the 17HP4-B/17RP4-C except that it utilizes a *non-aluminized phosphor*.





17HP4-B

# 17HP4-B/17RP4-C PICTURE TUBE

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts  
Current . . . . .  $0.6 \pm 10\%$  . . . . . amp

Capacitance between External Conductive Coating and Ultor . . . . .  $\begin{cases} 1500 \text{ max. } \mu\text{mf} \\ 750 \text{ min. } \mu\text{mf} \end{cases}$

Faceplate, Spherical . . . . . Filterglass

Phosphor (For Curves, see front of this Section). . . . . P4—Sulfide Type  
Aluminized

Deflection Angles (Approx.):

Diagonal . . . . .  $70^\circ$   
Horizontal . . . . .  $65^\circ$   
Vertical . . . . .  $50^\circ$

Electron Gun . . . . . Ion-Trap Type Requiring  
External Single-Field Magnet

Tube Dimensions:

Overall length . . . . .  $19\text{-}3/16" \pm 3/8"$   
Greatest width . . . . .  $15\text{-}25/64" \pm 1/8"$   
Greatest height . . . . .  $12\text{-}9/32" \pm 1/8"$   
Diagonal . . . . .  $16\text{-}5/8" \pm 1/8"$   
Neck length . . . . .  $7\text{-}1/2" \pm 3/16"$   
Radius of curvature of faceplate (External surface). . . . . 27"

Screen Dimensions (Minimum):

Greatest width . . . . .  $14\text{-}5/16"$   
Greatest height . . . . .  $11\text{-}1/8"$   
Diagonal . . . . .  $15\text{-}9/16"$   
Projected area . . . . . 149 sq. in.

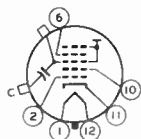
Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Base . . . . . Small-Shell Duodecal 6-Pin (JETEC Group 4, No. B6-63)

Basing Designation for BOTTOM VIEW . . . . . 12L

- Pin 1—Heater
- Pin 2—Grid No.1
- Pin 6—Grid No.2
- Pin 10—Grid No.4
- Pin 11—Cathode
- Pin 12—Heater



- Cap—Ultor (Grid No.3, Grid No.5, Collector)
- C—External Conductive Coating

### Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE . . . . . 16000 max. volts  
GRID-No.4 (FOCUSING) VOLTAGE:  
Positive value . . . . . 1000 max. volts  
Negative value . . . . . 500 max. volts  
GRID-No.2 VOLTAGE . . . . . 500 max. volts

← Indicates a change.

17HP4-B



17HP4-B / 17RP4-C

PICTURE TUBE

GRID-No.1 VOLTAGE:

Negative-peak value. . . . .	200 max.	volts
Negative-bias value. . . . .	140 max.	volts
Positive-bias value. . . . .	0 max.	volts
Positive-peak value. . . . .	2 max.	volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . . . .	180 max.	volts
Heater positive with respect to cathode. 180 max. volts		

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
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*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*





# 17JP4 KINESCOPE

RECTANGULAR GLASS TYPE

17JP4

MAGNETIC FOCUS

MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . .	6.3	ac or dc volts
Current . . . . .	0.6	amp

Direct Interelectrode Capacitances:

Grid No.1 to All Other Electrodes . . . . .	6	$\mu\text{mf}$
Cathode to All Other Electrodes . . . . .	5	$\mu\text{mf}$

External Conductive Coating to Ultor*	$\left\{ \begin{array}{l} 750 \text{ max.} \\ 500 \text{ min.} \end{array} \right.$	$\mu\text{mf}$
		$\mu\text{mf}$

Faceplate, Spherical . . . . .	Filterglass
Light Transmission (Approx.) . . . . .	66%

Phosphor (For Curves, see front of this Section).	P4—Sulfide Type
Fluorescence and Phosphorescence . . . . .	White
Persistence of Phosphorescence . . . . .	Short

Focusing Method . . . . .	Magnetic
Deflection Method . . . . .	Magnetic

Deflection Angles (Approx.):

Diagonal . . . . .	70°
Horizontal . . . . .	65°
Vertical . . . . .	50°

Ion-Trap Gun . . . . . Requires External, Single-Field Magnet

Tube Dimensions:

Overall Length . . . . .	19-3/16" $\pm$ 3/8"
Greatest Diagonal . . . . .	16-5/8" $\pm$ 1/8"
Greatest Width . . . . .	15-3/8" $\pm$ 1/8"
Greatest Height . . . . .	12-9/32" + 1/8" -7/32"

Minimum Screen Dimensions:

Greatest Width . . . . .	14-1/4"
Greatest Height . . . . .	10-3/4"
Diagonal . . . . .	15-1/4"

Weight (Approx.) . . . . . 18 lbs

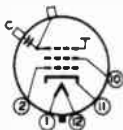
Mounting Position . . . . . Any

Cap . . . . . Recessed Small Cavity (JETEC No. J1-21)

Base . . . . . Small-Shell Duodecal 5-Pin (JETEC No. 85-57)

### BOTTOM VIEW

- Pin 1—Heater
- Pin 2—Grid No.1
- Pin 10—Grid No.2
- Pin 11—Cathode
- Pin 12—Heater



- Cap—Ultor (Grid No.3, Collector)
- C—External Conductive Coating

### Maximum Ratings, Design-Center Values:

ULTOR® VOLTAGE . . . . . 18000 max. volts

\* In the 17JP4, grid No.3 which has the ultor function and collector are connected together within the tube and are conveniently referred to collectively as "ultor". The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

17JP4



17JP4

## KINESCOPE

GRID-No.2 VOLTAGE . . . . .	410 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value . . . . .	125 max.	volts
Positive bias value . . . . .	0 max.	volts
Positive peak value . . . . .	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period. . . . .	150 max.	volts
Heater positive with respect to cathode . . . . .	150 max.	volts

**Equipment Design Ranges:**

For any ultor voltage ( $E_u$ ) between 12000# and 18000 volts and grid-No.2 voltage ( $E_{c2}$ ) between 150 and 410 volts.

Grid-No.1 Voltage for Visual Extinction of Undelected Focused Spot . . . . .	11% to 25.7% of $E_{c2}$	volts
Grid-No.2 Current . . . . .	-15 to +15	$\mu$ amp
Focusing-Coil Current (DC) <sup>oo</sup> . . . . .	$\left[ \sqrt{\frac{E_u}{12000}} \times 96 \right] \pm 10\%$	ma
Field Strength of Single-Field Ion-Trap Magnet (Approx.) <sup>**</sup> . . . . .	$\sqrt{\frac{E_u}{12000}} \times 42$	gausses
Field Strength of Adjustable Centering Magnet . . . . .	0 to 8	gausses

**Examples of Use of Design Ranges:**

For ultor voltage of	14000	16000	volts.
and grid-No.2 voltage of	300	300	volts.

Grid-No.1 Voltage for Visual Extinction of Undelected Focused Spot. . . . .	-33 to -77	-33 to -77	volts
Focusing-Coil Current (DC). . . . .	104 $\pm$ 10%	110 $\pm$ 10%	ma
Ion-Trap Magnet (Rated Strength). . . . .	45	50	gausses

**Maximum Circuit Values:**

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
--	----------	---------

# Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 12000 volts.

<sup>oo</sup> For specimen focusing coil similar to JETEC Focusing Coil No.109 positioned with air gap toward kinescope screen, and center line of air gap 3 inches from Reference Line (see Outline Drawing). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 30 foot-lamberts on a 14-1/4" x 10-3/4" picture area sharply focused at center of screen.

\*\* with a specimen ion-trap magnet similar to JETEC Ion-Trap Magnet No. 111 located in optimum position and rotated to give maximum brightness, the ion-trap magnet current is 82 milliamperes dc when the ultor voltage is 14000 volts and grid-No.2 voltage is 300 volts.

For x-ray shielding considerations, see sheet X-RAY  
PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section

JULY 1, 1952

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA

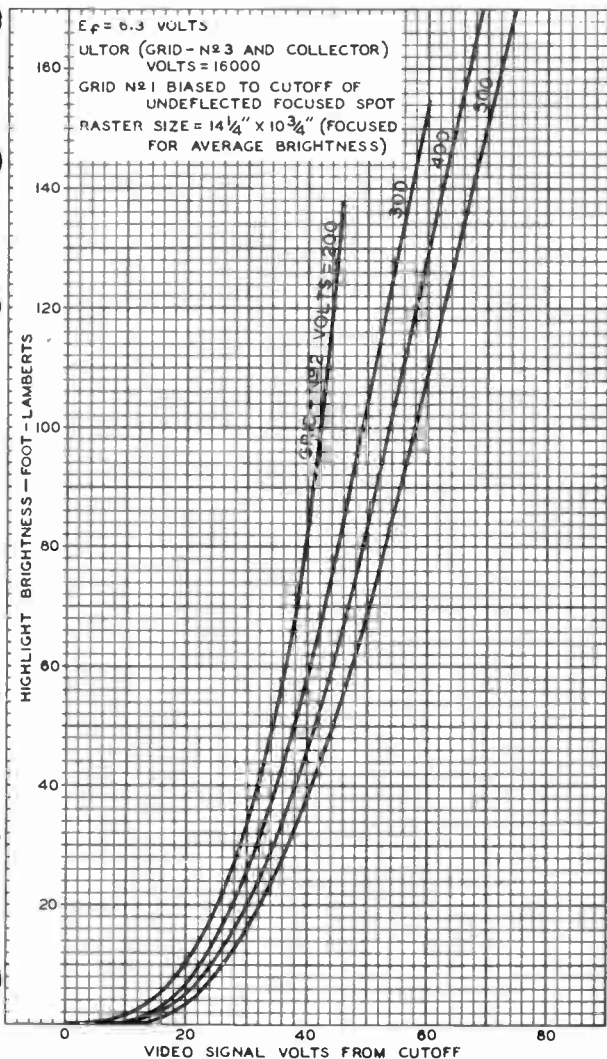
World Radio History



17JP4

17JP4

### AVERAGE GRID-DRIVE CHARACTERISTICS



FEB. 13, 1952

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

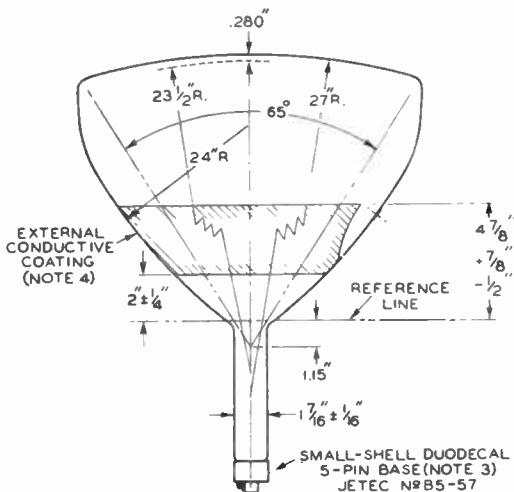
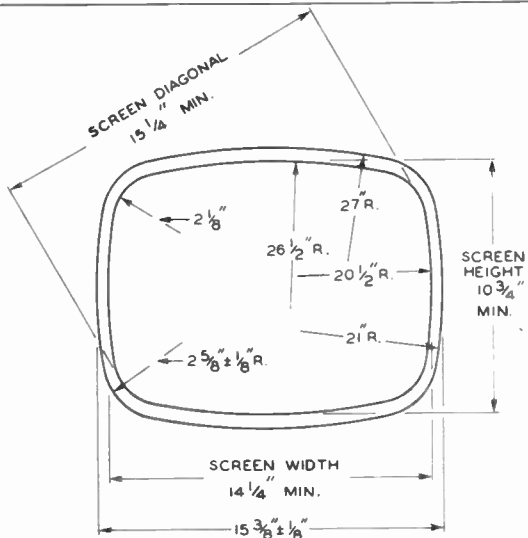
92CM - 7753

17JP4



17JP4

## KINESCOPE



JULY 1, 1952

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

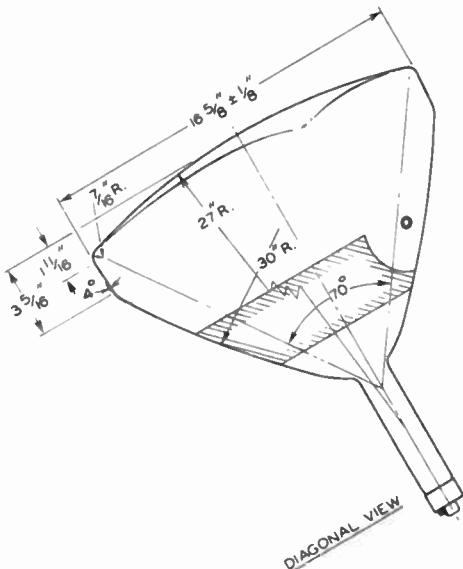
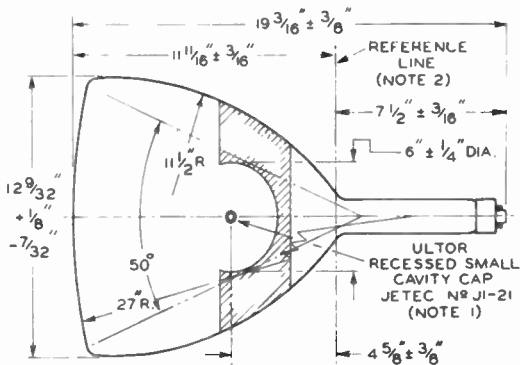
CE-7745R2A



17JP4

KINESCOPE

17JP4



92CL-7745R2

JULY 1, 1952

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CE-7745R2B

17JP4



17JP4

## KINESCOPE

**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.6.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No.110 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

**NOTE 4:** EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

JULY 1, 1952

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CE-7745R2C

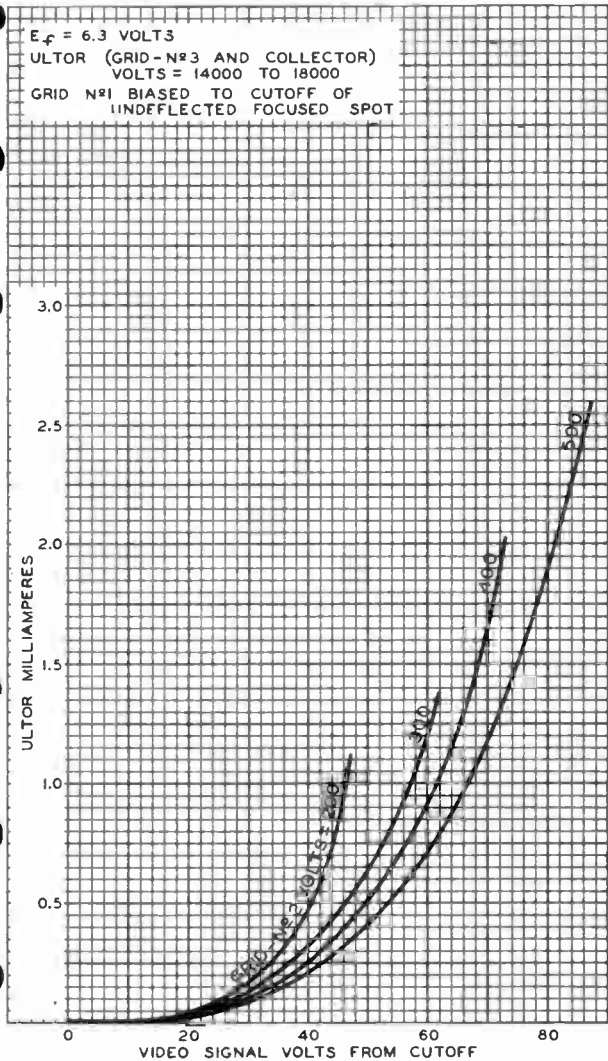
World Radio History



17JP4

17JP4

### AVERAGE GRID-DRIVE CHARACTERISTICS



NOV. 14, 1951

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7652R1







# 17LP4 / 17VP4 PICTURE TUBE

RECTANGULAR GLASS TYPE

LOW-VOLTAGE ELECTROSTATIC FOCUS      MAGNETIC DEFLECTION

The 17LP4/17VP4 is the same as the 17LP4-A/17VP4-B except that it utilizes a *non-aluminized phosphor*.

17LP4





17LP4-A

# 17LP4-A/17VP4-B PICTURE TUBE

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts  
Current . . . . . 0.6 ± 10% . . . . . amp

Capacitance between External Conduc-  
tive Coating and Ultor . . . . . { 1500 max. μmf  
750 min. μmf

Faceplate, Cylindrical . . . . . Filterglass  
Phosphor (For Curves, see front of this Section) . P4—Sulfide Type  
Aluminized

Deflection Angles (Approx.):

Diagonal . . . . . 70°  
Horizontal . . . . . 65°  
Vertical . . . . . 50°

Electron Gun . . . . . Ion-Trap Type Requiring  
External Single-Field Magnet

Tube Dimensions:

Overall length . . . . . 19-3/16" ± 3/8"  
Greatest width . . . . . 15-25/64" ± 1/8"  
Greatest height . . . . . 12-9/32" ± 1/8"  
Diagonal . . . . . 16-5/8" ± 1/8"  
Neck length . . . . . 7-1/2" ± 3/16"  
Radius of curvature of  
faceplate (External horizontal surface) . . . . . 27"

Screen Dimensions (Minimum):

Greatest width . . . . . 14-1/4"  
Greatest height . . . . . 10-3/4"  
Diagonal . . . . . 15-5/16"  
Projected area . . . . . 140 sq. in.

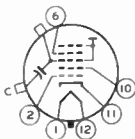
Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Base . . Small-Shell Duodecal 6-Pin (JETEC Group 4, No. B6-63)

Basing Designation for BOTTOM VIEW . . . . . 12L

- Pin 1 - Heater
- Pin 2 - Grid No. 1
- Pin 6 - Grid No. 4
- Pin 10 - Grid No. 2
- Pin 11 - Cathode
- Pin 12 - Heater



- Cap - Ultor  
(Grid No. 3,  
Grid No. 5,  
Collector)
- C - External  
Conductive  
Coating

### Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE . . . . . 16000 max. volts  
GRID-No. 4 (FOCUSING) VOLTAGE:  
Positive value . . . . . 1000 max. volts  
Negative value . . . . . 500 max. volts

→ Indicates a change.

17LP4-A



17LP4-A/17VP4-B

PICTURE TUBE

GRID-No.2 VOLTAGE. . . . .	500 max.	volts
GRID-No.1 VOLTAGE:		
Negative-peak value. . . . .	200 max.	volts
Negative-bias value. . . . .	140 max.	volts
Positive-bias value. . . . .	0 max.	volts
Positive-peak value. . . . .	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . . . .	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts
<b>Maximum Circuit Values:</b>		
Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*



17QP4

PICTURE TUBE

RECTANGULAR GLASS TYPE

MAGNETIC FOCUS

MAGNETIC DEFLECTION

The 17QP4 is the same as the 17QP4-A except that it utilizes a non-aluminized phosphor and has a maximum ultor-voltage rating of 16,000 volts together with a maximum grid-No.2-voltage rating of 410 volts.

17QP4





20DP4-A  
20CP4-A  
20DP4-C

# 20DP4-A/20CP4-A, 20DP4-C/20CP4-D PICTURE TUBES

RECTANGULAR GLASS TYPES

MAGNETIC FOCUS

MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3 . . . . . ac or dc volts

Current. . . . . 0.6 ± 10% . . . . . amp

Capacitance between External Conduc-

tive Coating and Ultor . . . . . { 1500 max. μf  
500 min. μf

Faceplate, Spherical . . . . . Filterglass

Phosphor (For Curves, see front of this Section). . . . . Type 20DP4-A P4-Sulfide Type Type 20DP4-C P4-Sulfide Type Aluminized

Deflection Angles (Approx.):

Diagonal . . . . . 70°

Horizontal . . . . . 66°

Vertical . . . . . 50°

Electron Gun . . . . . Ion-Trap Type Requiring External Single-Field Magnet

Tube Dimensions:

Overall length . . . . . 21-9/16" ± 5/16"

Greatest width . . . . . 18-11/16" ± 1/8"

Greatest height . . . . . 14-15/16" ± 1/8"

Diagonal . . . . . 20-3/32" ± 1/8"

Neck length . . . . . 7-5/16" ± 1/8"

Radius of curvature of faceplate (External surface). . . . . 40"

Screen Dimensions (Minimum):

Greatest width . . . . . 17"

Greatest height . . . . . 12-3/4"

Diagonal . . . . . 18-3/8"

Projected area . . . . . 199 sq. in.

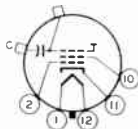
Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Base . . . . . Small-Shell Duodecal 5-Pin (JETEC Group 4, No. B5-57)

Basing Designation for BOTTOM VIEW . . . . . 12N

- Pin 1 - Heater
- Pin 2 - Grid No.1
- Pin 10 - Grid No.2
- Pin 11 - Cathode
- Pin 12 - Heater



- Cap - Ultor (Grid No.3, Collector)
- C - External Conductive Coating

### Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE. . . . . 18000 max. volts

GRID-No.2 VOLTAGE. . . . . 410 max. volts

← Indicates a change.

20DP4-A  
20DP4-C



20DP4-A/20CP4-A,  
20DP4-C/20CP4-D  
PICTURE TUBES

GRID-No.1 VOLTAGE:

Negative-bias value. . . . .	125 max.	volts
Positive-bias value. . . . .	0 max.	volts
Positive-peak value. . . . .	2 max.	volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . .	180 max.	volts
Heater positive with respect to cathode.		
	180 max.	volts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
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*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*





# 20HP4-A/20MP4, 20HP4-D PICTURE TUBES

RECTANGULAR GLASS TYPES

LOW-VOLTAGE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

20HP4-A  
20HP4-D

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts  
Current . . . . . 0.6 ± 10% . . . . . amp

Capacitance between External Conduc-  
tive Coating and Ultor . . . . . { 1500 max. μf  
500 min. μf ←

Faceplate, Spherical . . . . . Filterglass

Phosphor (for curves,  
see front of this  
section) . . . . . Type 20HP4-A Type 20HP4-D  
P4—Sulfide Type P4—Sulfide Type  
Aluminized

Deflection Angles (Approx.):

Diagonal . . . . . 70°  
Horizontal . . . . . 66°  
Vertical . . . . . 50°

Electron Gun . . . . . Ion-Trap Type Requiring  
External Single-Field Magnet

Tube Dimensions:

Overall length . . . . . 21-3/4" ± 3/8"  
Greatest width . . . . . 18-11/16" ± 1/8"  
Greatest height . . . . . 14-15/16" ± 1/8"  
Diagonal . . . . . 20-3/32" ± 1/8"  
Neck length . . . . . 7-1/2" ± 3/16"  
Radius of curvature of faceplate (External surface) . . . . . 40"

Screen Dimensions (Minimum):

Greatest width . . . . . 17"  
Greatest height . . . . . 12-3/4"  
Diagonal . . . . . 18-3/8"  
Projected area . . . . . 199 sq. in.

Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JEDEC No. J1-21)

Base . . . . . Small-Shell Duodecal 6-Pin (JEDEC Group 4, No. B6-63)

Basing Designation for BOTTOM VIEW . . . . . 12L

Pin 1—Heater

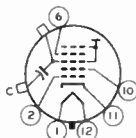
Pin 2—Grid No.1

Pin 6—Grid No.4

Pin 10—Grid No.2

Pin 11—Cathode

Pin 12—Heater



Cap—Ultor

(Grid No.3,

Grid No.5,

Collector)

C—External  
Conductive  
Coating

Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE . . . . . 16000 max. volts

GRID—No.4 (FOCUSING) VOLTAGE:

Positive value . . . . . 1000 max. volts

Negative value . . . . . 500 max. volts

GRID—No.2 VOLTAGE . . . . . 500 max. volts

← Indicates a change.

20HP4-A  
20HP4-D



20HP4-A/20MP4,  
20HP4-D

PICTURE TUBES

GRID-No.1 VOLTAGE:

Negative-bias value. . . . .	125 max.	volts
Positive-bias value. . . . .	0 max.	volts
Positive-peak value. . . . .	2 max.	volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:

During equipment warm-up period not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . . .	180 max.	volts

Heater positive with respect to cathode. 180 max. volts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 1.5 max. megohms

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*



2IACP4-A

# 2IACP4-A/2IBSP4/2IAMP4-A PICTURE TUBE

RECTANGULAR GLASS TYPE  
MAGNETIC FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . .	6.3 . . . . .	ac or dc volts
Current . . . . .	0.6 ± 10% . . . . .	amp

Capacitance between External Conduc-	} 2500 max. . . . .	μuf
tive Coating and Ultor . . . . .		

Faceplate, Spherical . . . . . Filterglass  
 Phosphor (For Curves, see front of this Section) . P4—Sulfide Type  
 Aluminized

### Deflection Angles (Approx.):

Diagonal . . . . .	90°
Horizontal . . . . .	85°
Vertical . . . . .	68°

Electron Gun . . . . . Ion-Trap Type Requiring  
External Single-Field Magnet

### Tube Dimensions:

Overall length . . . . .	20" ± 3/8"
Greatest width . . . . .	20-1/4" ± 1/8"
Greatest height . . . . .	16-3/8" ± 1/8"
Diagonal . . . . .	21-3/8" ± 1/8"
Neck length . . . . .	7-1/2" ± 3/16"
Radius of curvature of faceplate (External surface) . .	33"

### Screen Dimensions (Minimum):

Greatest width . . . . .	19-1/16"
Greatest height . . . . .	15-1/16"
Diagonal . . . . .	20-1/4"
Projected area . . . . .	262 sq. in.

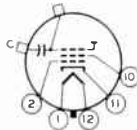
Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Base . . Small-Shell Duodecal 5-Pin (JETEC Group 4, No. B5-57)

Basing Designation for BOTTOM VIEW . . . . . 12N

- Pin 1 - Heater
- Pin 2 - Grid No. 1
- Pin 10 - Grid No. 2
- Pin 11 - Cathode
- Pin 12 - Heater



- Cap - Ultor  
(Grid No. 3,  
Collector)
- C - External  
Conductive  
Coating

### Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE . . . . .	20000 max.	volts
GRID-No. 2 VOLTAGE . . . . .	500 max.	volts
GRID-No. 1 VOLTAGE:		
Negative-peak value . . . . .	200 max.	volts
Negative-bias value . . . . .	140 max.	volts
Positive-bias value . . . . .	0 max.	volts
Positive-peak value . . . . .	2 max.	volts

← Indicates a change.

2IACP4-A



# 2IACP4-A/2IBSP4/2IAMP4-A PICTURE TUBE

### PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:

During equipment warm-up period

not exceeding 15 seconds . . . . . 410 max. volts

After equipment warm-up period . . . . . 180 max. volts

Heater positive with respect to cathode. . . . . 180 max. volts

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 1.5 max. megohms

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*



21ALP4

PICTURE TUBE

RECTANGULAR GLASS TYPE

LOW-VOLTAGE ELECTROSTATIC FOCUS      MAGNETIC DEFLECTION

The 21ALP4 is the same as the 21ALP4-B/21ALP4-A except that it utilizes a non-aluminized phosphor and has a maximum ultimate voltage rating of 18,000 volts.

21ALP4





21ALP4-B

# 21ALP4-B/21ALP4-A PICTURE TUBE

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN  
LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . . 6.3 volts

Current at 6.3 volts . . . . . 0.6 ± 10% volts

Capacitance between External Conductive

Coating and Ultor . . . . . { 750 max. μμf  
500 min. μμf

Faceplate, Spherical . . . . . Filterglass

Phosphor (For Curves, see front of this Section). P4—Sulfide Type  
Aluminized

Deflection Angles (Approx.):

Diagonal . . . . . 90°

Horizontal . . . . . 85°

Vertical . . . . . 68°

Electron Gun . . . . . Ion-Trap Type Requiring External  
Single-Field Magnet

Tube Dimensions:

Overall length . . . . . 20" ± 3/8"

Greatest width . . . . . 20-1/4" ± 1/8"

Greatest height . . . . . 16-3/8" ± 1/8"

Diagonal . . . . . 21-3/8" ± 1/8"

Neck length . . . . . 7-1/2" ± 3/16"

Radius of curvature of faceplate (External  
surface) . . . . . 33"

Screen Dimensions (Minimum):

Greatest width . . . . . 19-1/16"

Greatest height . . . . . 15-1/16"

Diagonal . . . . . 20-1/4"

Projected area . . . . . 262 sq. in.

Operating Position . . . . . Any

Cap . . . . . Recessed Small Cavity (JEDEC No. J1-21)

Base . . . . . Small-Shell Duodecal 6-Pin,  
Arrangement 1, (JEDEC Group 4,  
No. B6-63)

Basing Designation for BOTTOM VIEW . . . . . 12L

Pin 1—Heater

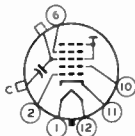
Pin 2—Grid No.1

Pin 6—Grid No.4

Pin 10—Grid No.2

Pin 11—Cathode

Pin 12—Heater



Cap—Ultor

(Grid No.3,

Grid No.5,

Collector)

C—External

Conductive

Coating

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

ULTOR VOLTAGE . . . . . { 20000 max. volts  
14000 min. volts

GRID—No.4 (FOCUSING) VOLTAGE:

Positive value . . . . . 1000 max. volts

Negative value . . . . . 500 max. volts

21ALP4-B



# 21ALP4-B/21ALP4-A

## PICTURE TUBE

GRID-No.2 VOLTAGE. . . . .	500 max.	volts		
GRID-No.1 VOLTAGE:				
Negative-peak value. . . . .	200 max.	volts		
Negative-bias value. . . . .	140 max.	volts		
Positive-bias value. . . . .	0 max.	volts		
Positive-peak value. . . . .	2 max.	volts		
PEAK HEATER-CATHODE VOLTAGE:				
Heater negative with respect to cathode:				
During equipment warm-up period not exceeding 15 seconds . . . . .	410 max.	volts		
After equipment warm-up period . . . . .	180 max.	volts		
Heater positive with respect to cathode . . . . .			180 max.	volts
<b>Maximum Circuit Values:</b>				
Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms		

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*





# 21ATP4-A/21ATP4 PICTURE TUBE

21ATP4-A

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

The 21ATP4-A/21ATP4 is the same as the 21ALP4-B/21ALP4-A except for the following item:

Capacitance between External Conductive Coating and Ultor. . . . .	{	1500 max.	$\mu\mu\text{f}$
		1200 min.	$\mu\mu\text{f}$





# 21AVP4/21AUP4 PICTURE TUBE

RECTANGULAR GLASS TYPE

LOW-VOLTAGE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

The 21AVP4/21AUP4 is the same as the 21AVP4-B/21AUP4-B/  
21AVP4-A/21AUP4-A except that it utilizes a *non-aluminized phosphor*  
and has a *maximum ultor-voltage rating of 18,000 volts.*

21AVP4





21AVP4-A

## 21AVP4-A/21AUP4-A

### KINESCOPE

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

*The 21AVP4-A/21AUP4-A is the same as the 21AVP4/21AUP4 except for the following item:*

Phosphor (for curves, see front of this section) . . . P4—Sulfide Type  
Aluminized

#### CURVES

for Type 21AVP4-A/21AUP4-A are the same as those shown for Type 21ALP4-A





21AVP4-B

# 21AVP4-B/21AUP4-B/21AVP4-A/21AUP4-A

## PICTURE TUBE

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

### DATA

#### General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts  
Current . . . . .  $0.6 \pm 10\%$  . . . . . amp

Capacitance between External Conduc-  
tive Coating and Ultor . . . . . { 2500 max.  $\mu\mu\text{f}$   
2000 min.  $\mu\mu\text{f}$

Faceplate, Spherical . . . . . Filterglass  
Phosphor (For Curves, see front of this Section) . P4—Sulfide Type  
Aluminized

Deflection Angles (Approx.):

Diagonal . . . . .  $72^\circ$   
Horizontal . . . . .  $67^\circ$   
Vertical . . . . .  $53^\circ$

Electron Gun . . . . . Ion-Trap Type Requiring  
External Single-Field Magnet

Tube Dimensions:

Overall length . . . . .  $23\text{-}1\text{/}32'' \pm 3\text{/}8''$   
Greatest width . . . . .  $20\text{-}1\text{/}4'' \pm 1\text{/}8''$   
Greatest height . . . . .  $16\text{-}3\text{/}8'' \pm 1\text{/}8''$   
Diagonal . . . . .  $21\text{-}3\text{/}8'' \pm 1\text{/}8''$   
Neck length . . . . .  $7\text{-}1\text{/}2'' \pm 3\text{/}16''$   
Radius of curvature of faceplate (External surface) . .  $33''$

Screen Dimensions (Minimum):

Greatest width . . . . .  $19\text{-}1\text{/}16''$   
Greatest height . . . . .  $15\text{-}1\text{/}16''$   
Diagonal . . . . .  $20\text{-}1\text{/}4''$   
Projected area . . . . . 262 sq. in.

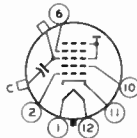
Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Base . . Small-Shell Duodecal 6-Pin (JETEC Group 4, No. B6-63)

Basing Designation for BOTTOM VIEW . . . . . 12L

- Pin 1 - Heater
- Pin 2 - Grid No. 1
- Pin 6 - Grid No. 4
- Pin 10 - Grid No. 2
- Pin 11 - Cathode
- Pin 12 - Heater



- Cap - Ultor  
(Grid No. 3,  
Grid No. 5,  
Collector)
- C - External  
Conductive  
Coating

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

ULTOR VOLTAGE . . . . . 20000 max. volts  
GRID-NO. 4 (FOCUSING) VOLTAGE:  
Positive value . . . . . 1000 max. volts  
Negative value . . . . . 500 max. volts  
GRID-NO. 2 VOLTAGE . . . . . 500 max. volts

← Indicates a change.

2IAVP4-B



2IAVP4-B/2IAUP4-B/2IAVP4-A/2IAUP4-A

### PICTURE TUBE

**GRID-NO. 1 VOLTAGE:**

Negative-peak value. . . . .	200 max.	volts
Negative-bias value. . . . .	140 max.	volts
Positive-bias value. . . . .	0 max.	volts
Positive-peak value. . . . .	2 max.	volts

**PEAK HEATER-CATHODE VOLTAGE:**

Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . .	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

**Maximum Circuit Values:**

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
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*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*





21BTP4

# 21BTP4 PICTURE TUBE

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN  
LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION  
*With heater having controlled warm-up time*

### DATA

#### General:

Heater, for Unipotential Cathode:  
 Voltage (AC or DC) . . . . . 6.3 volts  
 Current at 6.3 volts . . . . . 0.6 ± 5% amp  
 Warm-up time (Average) . . . . . 11 sec  
 Capacitance between External Conductive  
 Coating and Ultor . . . . . { 2500 max. μf  
 { 2000 min. μf  
 Faceplate, Spherical . . . . . Filterglass  
 Phosphor (For Curves, see front of this Section) . . . . . P4—Sulfide Type  
 Aluminized

Deflection Angles (Approx.):  
 Diagonal . . . . . 90°  
 Horizontal . . . . . 85°  
 Vertical . . . . . 68°

Electron Gun . . . . . Ion-Trap Type Requiring External Single-Field Magnet

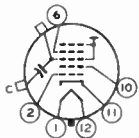
Tube Dimensions:  
 Overall length . . . . . 20" ± 3/8"  
 Greatest width . . . . . 20-1/4" ± 1/8"  
 Greatest height . . . . . 16-3/8" ± 1/8"  
 Diagonal . . . . . 21-3/8" ± 1/8"  
 Neck length . . . . . 7-1/2" ± 3/16"  
 Radius of curvature of faceplate  
 (External surface) . . . . . 33"

Screen Dimensions (Minimum):  
 Greatest width . . . . . 19-1/16"  
 Greatest height . . . . . 15-1/16"  
 Diagonal . . . . . 20-1/4"  
 Projected area . . . . . 262 sq. in.

Operating Position . . . . . Any  
 Cap . . . . . Recessed Small Cavity (JEDEC No. J1-21)  
 Base . . . . . Small-Shell Duodecal 6-Pin,  
 Arrangement 1, (JEDEC Group 4,  
 No. B6-63)

Basing Designation for BOTTOM VIEW . . . . . 12L

Pin 1 - Heater  
 Pin 2 - Grid No. 1  
 Pin 6 - Grid No. 4  
 Pin 10 - Grid No. 2  
 Pin 11 - Cathode  
 Pin 12 - Heater



Cap - Ultor  
 (Grid No. 3,  
 Grid No. 5,  
 Collector)  
 C - External  
 Conductive  
 Coating

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

ULTOR VOLTAGE . . . . . { 20000 max. volts  
 { 16000 min. volts

21BTP4



21BTP4

## PICTURE TUBE

GRID-No.4 (FOCUSING) VOLTAGE:		
Positive value . . . . .	1000 max.	volts
Negative value . . . . .	500 max.	volts
GRID-No.2 VOLTAGE . . . . .	500 max.	volts
GRID-No.1 VOLTAGE:		
Negative-peak value . . . . .	200 max.	volts
Negative-bias value . . . . .	140 max.	volts
Positive-bias value . . . . .	0 max.	volts
Positive-peak value . . . . .	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . . . .	180 max.	volts
Heater positive with respect to cathode . . . . .		
	180 max.	volts
<b>Maximum Circuit Values:</b>		
Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*



21CBP4-A

# 21CBP4-A PICTURE TUBE

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . .	6.3	ac or dc volts
Current . . . . .	0.6 ± 10%	amp

Direct Interelectrode Capacitances:

Grid No.1 to all other electrodes . . . . .	6	μf
Cathode to all other electrodes . . . . .	5	μf
External conductive coating to ultor . . . . .	{ 2500 max. 2000 min.	μf
		μf

Faceplate, Spherical . . . . . Filterglass

Light transmission (Approx.) . . . . . 74%

Phosphor (For curves, see front of this section) . P4—Sulfide Type  
Aluminized

Fluorescence . . . . . White

Phosphorescence . . . . . White

Persistence . . . . . Short

Focusing Method . . . . . Electrostatic

Deflection Method . . . . . Magnetic

Deflection Angles (Approx.):

Diagonal . . . . . 90°

Horizontal . . . . . 85°

Vertical . . . . . 68°

Electron Gun . . . . . Type Requiring No Ion-Trap Magnet

Tube Dimensions:

Overall length . . . . . 18" ± 3/8"

Greatest width . . . . . 20-1/4" ± 1/8"

Greatest height . . . . . 16-3/8" ± 1/8"

Diagonal . . . . . 21-3/8" ± 1/8"

Screen Dimensions (Minimum):

Greatest width . . . . . 19-1/16"

Greatest height . . . . . 15-1/16"

Diagonal . . . . . 20-1/4"

Neck length . . . . . 5-1/2" ± 3/16"

Projected area . . . . . 262 sq. in.

Weight (Approx.) . . . . . 24 lbs

Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Bulb . . . . . J171 (90°)

Base . . . . . Small-Shell Duodecal 6-Pin (JETEC No. B6-63)

Basing Designation for BOTTOM VIEW . . . . . 12L

Pin 1—Heater

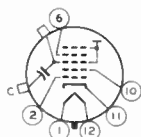
Pin 2—Grid No.1

Pin 6—Grid No.4

Pin 10—Grid No.2

Pin 11—Cathode

Pin 12—Heater



Cap—Ultor

(Grid No.3,

Grid No.5,

Collector)

C—External

Conductive

Coating



## 21CBP4-A PICTURE TUBE

### GRID-DRIVE<sup>▲</sup> SERVICE

*Unless otherwise specified, voltage values are positive with respect to cathode*

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

ULTOR VOLTAGE . . . . .	20000 max.	volts
GRID-No.4 VOLTAGE:		
Positive value . . . . .	1000 max.	volts
Negative value . . . . .	500 max.	volts
GRID-No.2 VOLTAGE . . . . .	500 max.	volts
GRID-No.1 VOLTAGE:		
Negative peak value . . . . .	200 max.	volts
Negative bias value . . . . .	140 max.	volts
Positive bias value . . . . .	0 max.	volts
Positive peak value . . . . .	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . . . .	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

#### Equipment Design Ranges:

*With any ultor voltage ( $E_{C5k}$ ) between 12000<sup>#</sup> and 20000 volts and grid-No.2 voltage ( $E_{C2k}$ ) between 200 and 500 volts*

Grid-No.4 Voltage for focus <sup>§</sup> . . . . .	0 to 450	volts
Grid-No.1 Voltage ( $E_{C1k}$ ) for visual extinction of focused raster . . . . .	<i>See Raster-Cutoff-Range Chart for Grid-Drive Service</i>	
Grid-No.1 Video Drive from Raster Cutoff (Black Level):		
White-level value (Peak positive) . . . . .	Same value as determined for $E_{C1k}$ except video drive is a positive voltage	
Grid-No.4 Current . . . . .	-25 to +25	$\mu$ a
Grid-No.2 Current . . . . .	-15 to +15	$\mu$ a
Field Strength of Adjustable Centering Magnet <sup>*</sup> . . . . .	0 to 8	gausses

#### Examples of Use of Design Ranges:

With ultor voltage of	16000	18000	volts
and grid-No.2 voltage of	300	400	volts
Grid-No.4 Voltage for focus . . . . .	0 to 450	0 to 450	volts

▲, \*, #, §: See next page.



21CBP4-A

# 21CBP4-A PICTURE TUBE

Grid-No.1 Voltage for visual extinction of focused raster . . . . .	-28 to -72	-35 to -94	volts
Grid-No.1 Video Drive from Raster Cutoff (Black Level):			
White-level value. . . . .	28 to 72	35 to 94	volts

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
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### CATHODE-DRIVE<sup>■</sup> SERVICE

*Unless otherwise specified, voltage values are positive with respect to grid No. 1*

### Maximum Ratings, Design-Center Values:

ULTOR-TO-GRID-No.1 VOLTAGE . . . . .	20000 max.	volts
GRID-No.4-TO-GRID-No.1 VOLTAGE:		
Positive value . . . . .	1000 max.	volts
Negative value . . . . .	500 max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAGE . . . . .	640 max.	volts
GRID-No.2-TO-CATHODE VOLTAGE . . . . .	500 max.	volts
CATHODE-TO-GRID-No.1 VOLTAGE:		
Positive peak value. . . . .	200 max.	volts
Positive bias value. . . . .	140 max.	volts
Negative bias value. . . . .	0 max.	volts
Negative peak value. . . . .	2 max.	volts

### PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . . . .	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

### Equipment Design Ranges:

*With any ultor-to-grid-No.1 voltage ( $E_{c5g_1}$ ) between 12000<sup>#</sup> and 20000 volts and grid-No.2-to-grid-No.1 voltage ( $E_{c2g_1}$ ) between 220 and 640 volts*

Grid-No.4-to-Grid-No.1 Voltage for focus <sup>§</sup> . . . . .	0 to 450	volts
Cathode-to-Grid-No.1 Voltage ( $E_{kg_1}$ ) for visual extinction of focused raster. . . . .	<i>See Raster-Cutoff-Range Chart for Cathode-Drive Service</i>	

▲, \*, #, §, ■: See next page.



## 21CBP4-A PICTURE TUBE

Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level):		
White-level value (Peak negative) . . . . .	Same value as determined for $E_{kg1}$ except video drive is a negative voltage	
Grid-No.4 Current . . . . .	-25 to +25	$\mu\text{a}$
Grid-No.2 Current . . . . .	-15 to +15	$\mu\text{a}$
Field Strength of Adjustable Centering Magnet* . . . . .	0 to 8	gausses

### Examples of Use of Design Ranges:

<i>With ultor-to-grid-No.1 voltage of</i>	16000	18000	volts
<i>and grid-No.2-to-grid-No.1 voltage of</i>	300	400	volts
Grid-No.4-to-Grid-No.1 Voltage for focus . . . . .	0 to 450	0 to 450	volts
Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster . . . . .	28 to 60	36 to 78	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level):			
White-level value . . . . .	-28 to -60	-36 to -78	volts

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 1.5 max. megohms

▲ Grid drive is the operating condition in which the video signal varies the grid-no.1 potential with respect to cathode.

\* Distance from *Reference Line* for suitable PM centering magnet should not exceed 2-1/2". Excluding extraneous fields, the center of the un-deflected focused spot will fall within a circle having a 3/8-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as 1/2-inch deflection of the spot from the center of the tube face.

# operation below this value is not recommended.

§ The grid-no.4 voltage or grid-no.4-to-grid-no.1 voltage required for focus of any individual tube is independent of ultor current and will remain essentially constant for values of ultor voltage (or ultor-to-grid-no.1 voltage) or grid-no.2 voltage (or grid-no.2-to-grid-no.1 voltage) within design ranges shown for these items.

■ Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid no.1 and the other electrodes.

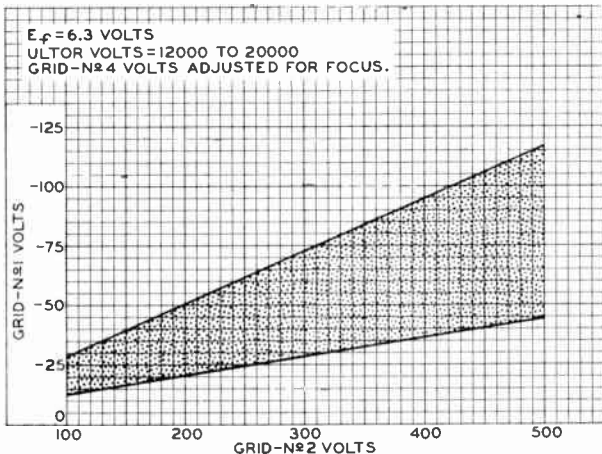
*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*



21C8P4-A

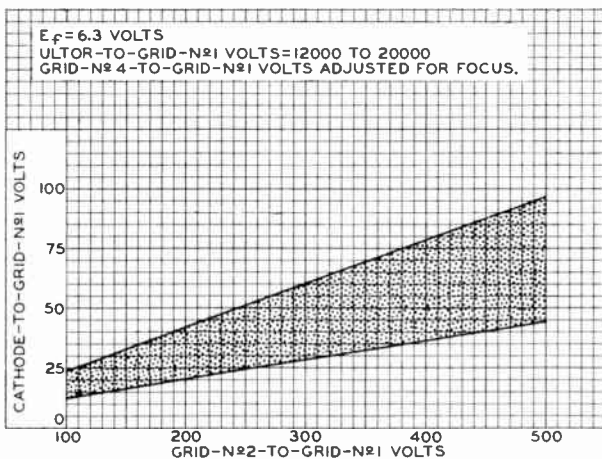
## 21C8P4-A

### RASTER-CUTOFF-RANGE CHARTS GRID-DRIVE SERVICE



92CS-9349V

### CATHODE-DRIVE SERVICE

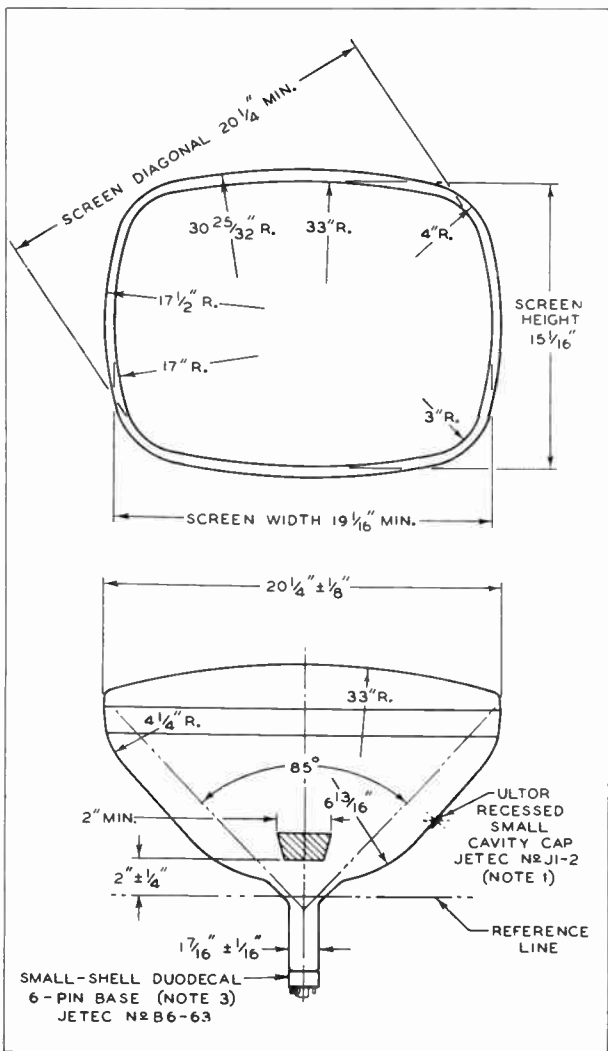


92CS-9350V

2ICBP4-A



# 2ICBP4-A PICTURE TUBE

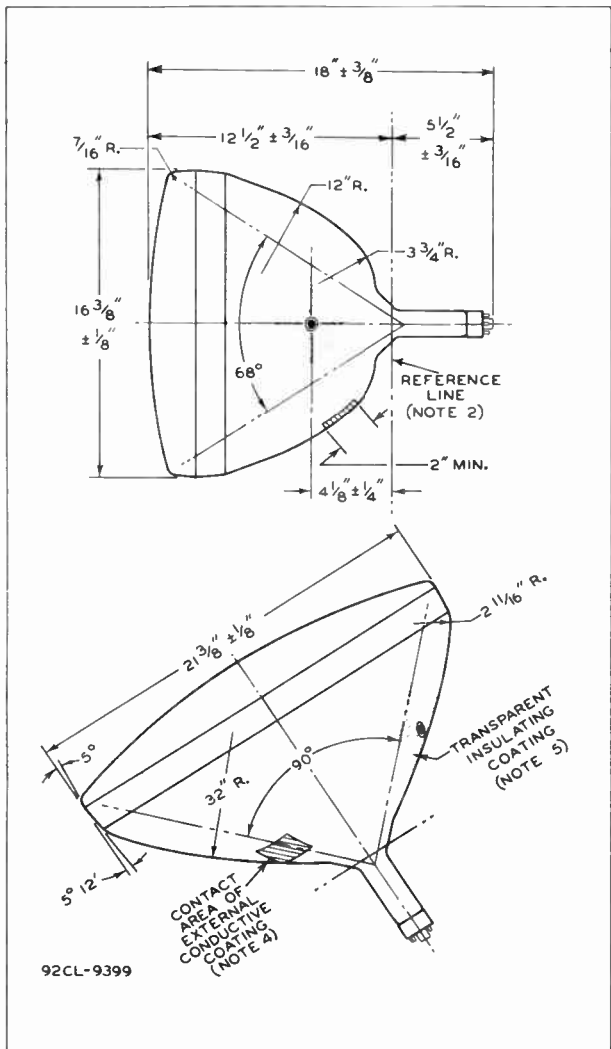






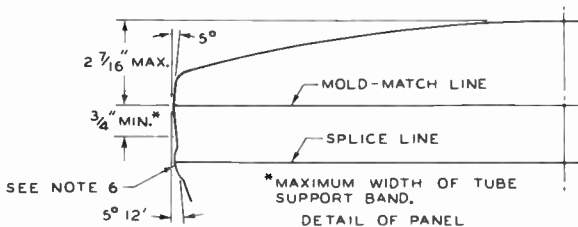
21CBP4-A

# 21CBP4-A PICTURE TUBE





## 2ICBP4-A PICTURE TUBE



**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS PIN 6.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No. 116 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 3".

**NOTE 4:** THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT AREA OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THE CONTACT AREA SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

**NOTE 5:** TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

**NOTE 6:** BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

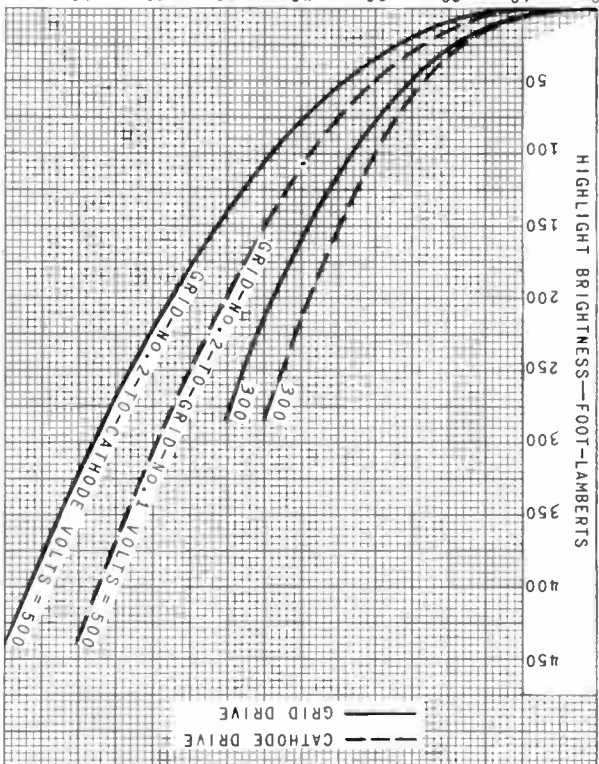


# AVERAGE DRIVE CHARACTERISTICS

## 21CBP4-A

21CBP4-A

<p>GRID-DRIVE SERVICE</p> <p><math>E_f = 6.3</math> VOLTS</p> <p>ULTOR VOLTS = 16000</p> <p>GRID-NO.1 BIASED NEGATIVE WITH RESPECT TO CATHODE TO GIVE FOCUSED RASTER CUTOFF.</p> <p>RASTER FOCUSED AT AVERAGE BRIGHTNESS.</p> <p>RASTER SIZE = <math>18" \times 13-1/2"</math></p>	<p>CATHODE-DRIVE SERVICE</p> <p><math>E_f = 6.3</math> VOLTS</p> <p>ULTOR-TO-GRID-NO.1 VOLTS = 16000</p> <p>CATHODE BIASED POSITIVE WITH RESPECT TO GRID NO.1 TO GIVE FOCUSED RASTER CUTOFF.</p> <p>RASTER FOCUSED AT AVERAGE BRIGHTNESS.</p> <p>RASTER SIZE = <math>18" \times 13-1/2"</math></p>
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21CBP4-A



21CBP4-A

## AVERAGE DRIVE CHARACTERISTICS

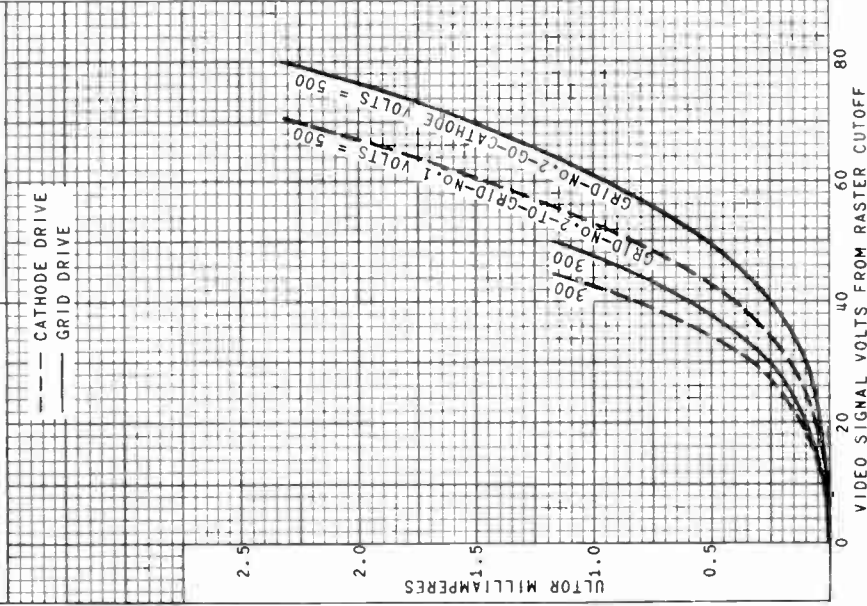
### CATHODE-DRIVE SERVICE

$E_f = 6.3$  VOLTS  
 ULTOR-TO-GRID-NO.1  
 VOLTS = 12000 TO 20000  
 CATHODE BIASED POSITIVE  
 WITH RESPECT TO GRID NO.1  
 TO GIVE FOCUSED RASTER  
 CUTOFF.

### GRID-DRIVE SERVICE

$E_f = 6.3$  VOLTS  
 ULTOR VOLTS =  
 12000 TO 20000  
 GRID NO.1 BIASED NEGATIVE  
 WITH RESPECT TO CATHODE  
 TO GIVE FOCUSED RASTER  
 CUTOFF.

--- CATHODE DRIVE  
 ——— GRID DRIVE





# 2ICEP4 PICTURE TUBE

2ICEP4

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts  
Current . . . . . 0.6 . . . . . amp

Direct Interelectrode Capacitances:

Grid No.1 to all other electrodes . . . . . 6  $\mu\mu\text{f}$   
Cathode to all other electrodes . . . . . 5  $\mu\mu\text{f}$   
External conductive coating to ultor . . . . .  $\left\{ \begin{array}{l} 2500 \text{ max. } \mu\mu\text{f} \\ 2000 \text{ min. } \mu\mu\text{f} \end{array} \right.$

Faceplate, Spherical . . . . . Filterglass

Light transmission (Approx.) . . . . . 73%

Phosphor (For curves, see front of this section) . P4—Sulfide Type  
Aluminized

Fluorescence . . . . . White

Phosphorescence . . . . . White

Persistence . . . . . Short

Focusing Method . . . . . Electrostatic

Deflection Method . . . . . Magnetic

Deflection Angles (Approx.):

Diagonal . . . . . 110°

Horizontal . . . . . 105°

Vertical . . . . . 87°

Electron Gun . . . . . Type Requiring No Ion-Trap Magnet

Tube Dimensions:

Overall length . . . . . 14-7/16"  $\pm$  5/16"

Greatest width . . . . . 20-1/4"  $\pm$  1/8"

Greatest height . . . . . 16-3/8"  $\pm$  1/8"

Diagonal . . . . . 21-3/8"  $\pm$  1/8"

Neck length . . . . . 5-7/16"  $\pm$  1/8"

Screen Dimensions (Minimum):

Greatest width . . . . . 19-1/16"

Greatest height . . . . . 15-1/16"

Diagonal . . . . . 20-1/4"

Projected area . . . . . 262 sq. in.

Weight (Approx.) . . . . . 23 lbs

Mounting Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Bulb . . . . . J171 (110°)

Socket . . . . . Ucinite Part No. 115446, or equivalent

Base . . . . . Small-Button Eightar 7-Pin,  
Arrangement 2, (JETEC No. B7-183)

Basing Designation for BOTTOM VIEW . . . . . 8HR

Pin 1 - Heater

Pin 2 - Grid No.1

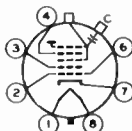
Pin 3 - Grid No.2

Pin 4 - Grid No.4

Pin 6 - Grid No.1

Pin 7 - Cathode

Pin 8 - Heater



Cap - Ultor  
(Grid No.3,  
Grid No.5,  
Collector)  
C - External  
Conductive  
Coating

2ICEP4



## 2ICEP4 PICTURE TUBE

### GRID-DRIVE<sup>▲</sup> SERVICE

*Unless otherwise specified, voltage values are positive with respect to cathode*

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

ULTOR VOLTAGE. . . . .	{ 18000 max. volts	
	{ 12000* min. volts	
GRID-No.4 VOLTAGE:		
Positive value . . . . .	1000 max. volts	
Negative value . . . . .	500 max. volts	
GRID-No.2 VOLTAGE. . . . .	500 max. volts	
GRID-No.1 VOLTAGE:		
Negative peak value. . . . .	200 max. volts	
Negative bias value. . . . .	140 max. volts	
Positive bias value. . . . .	0 max. volts	
Positive peak value. . . . .	2 max. volts	
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. . . . .	180 max. volts	
Heater positive with respect to cathode. . . . .	180 max. volts	

#### Equipment Design Ranges:

*With any ultor voltage ( $E_{c5k}$ ) between 12000 and 18000 volts and grid-No.2 voltage ( $E_{c2k}$ ) between 200 and 500 volts*

Grid-No.4 Voltage for Focus <sup>§</sup> . . . . .	0 to 400	volts
Grid-No.1 Voltage ( $E_{c1k}$ ) for Visual Extinction of Focused Raster . . . . .	<i>See Raster-Cutoff-Range Chart for Grid-Drive Service</i>	

Grid-No.1 Video Drive from Raster Cutoff (Black Level):		
White-level value (Peak positive). . . . .	Same value as determined for $E_{c1k}$ except video drive is a positive voltage	

Grid-No.4 Current. . . . .	-25 to +25	$\mu$ a
Grid-No.2 Current. . . . .	-15 to +15	$\mu$ a
Field Strength of Adjustable Centering Magnet* . . . . .	0 to 8	gausses

#### Examples of Use of Design Ranges:

With ultor voltage of	14000	16000	volts
and grid-No.2 voltage of	300	400	volts
Grid-No.4 Voltage for Focus. . . . .	0 to 400	0 to 400	volts
Grid-No.1 Voltage for Visual Extinction of Focused Raster . . . . .	-28 to -72	-36 to -94	volts

<sup>▲</sup> Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.

\*, §, .: See next page.



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2ICEP4

## PICTURE TUBE

With ultor voltage of	14000	16000	volts
and grid-No.2 voltage of	300	400	volts
Grid-No.1 Video Drive from Raster Cutoff (Black Level):			
White-level value. . . .	28 to 72	36 to 94	volts

**Maximum Circuit Values:**

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
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**CATHODE-DRIVE<sup>■</sup>SERVICE**

*Unless otherwise specified, voltage values are positive with respect to grid No.1*

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

ULTOR-TO-GRID-No.1 VOLTAGE . . . . .	{ 18000 max.	volts
GRID-No.4-TO-GRID-No.1 VOLTAGE:	{ 12000* min.	volts
Positive value . . . . .	1000 max.	volts
Negative value . . . . .	500 max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAGE . . . . .	640 max.	volts
GRID-No.2-TO-CATHODE VOLTAGE . . . . .	500 max.	volts
CATHODE-TO-GRID-No.1 VOLTAGE:		
Positive peak value . . . . .	200 max.	volts
Positive bias value . . . . .	140 max.	volts
Negative bias value . . . . .	0 max.	volts
Negative peak value . . . . .	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

**Equipment Design Ranges:**

With any ultor-to-grid-No.1 voltage ( $E_{c5g_1}$ ) between 12000 and 18000 volts  
and grid-No.2-to-grid-No.1 voltage ( $E_{c2g_1}$ ) between 225 and 640 volts

Grid-No.4-to-Grid-No.1 Voltage for Focus <sup>§</sup> . . . . .	0 to 400	volts
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Cathode-to-Grid-No.1 Voltage ( $E_{kg_1}$ ) for Visual Extinction of Focused Raster. . . . .	.See Raster-Cutoff-Range Chart for Cathode-Drive Service	
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■ Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid no.1 and the other electrodes.

§ The grid-No.4 voltage or grid-No.4-to-grid-No.1 voltage required for focus of any individual tube is independent of ultor current and will remain essentially constant for values of ultor voltage (or ultor-to-grid-No.1 voltage) or grid-No.2 voltage (or grid-No.2-to-grid-No.1 voltage) within design ranges shown for these items.

\* , \* : See next page.



2ICEP4

## PICTURE TUBE

Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value. . . .		Same value as determined for $E_{kg_1}$ except video drive is a negative voltage
Grid-No.4 Current. . . . .	-25 to +25	$\mu a$
Grid-No.2 Current. . . . .	-15 to +15	$\mu a$
Field Strength of Adjust- able Centering Magnet* .	0 to 8	gausses

**Examples of Use of Design Ranges:**

<i>With ultor-to-grid-No.1 voltage of</i>	14000	16000	volts
<i>and grid-No.2-to-grid-No.1 voltage of</i>	300	400	volts
Grid-No.4-to-Grid- No.1 Voltage for Focus . .	0 to 400	0 to 400	volts
Cathode-to-Grid-No.1 Voltage for Visual Extinction of Focused Raster . . . . .	28 to 60	36 to 78	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value. . . . .	-28 to -60	-36 to -78	volts

**Maximum Circuit Values:**

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
--	----------	---------

\* This value is a working design-center minimum. The equivalent absolute minimum ultor- or ultor-to-grid-No.1 voltage is 11000 volts, below which the serviceability of the 2ICEP4 will be impaired. The equipment designer has the responsibility of determining a minimum design value such that under the worst probable operating conditions involving supply-voltage variation and equipment variation the absolute minimum ultor- or ultor-to-grid-No.1 voltage is never less than 11000 volts.

\* Distance from Reference Line for suitable PM centering magnet should not exceed  $2\frac{1}{4}$ ". Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a  $\frac{3}{8}$ -inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as  $\frac{1}{2}$ -inch deflection of the spot from the center of the tube face.

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*





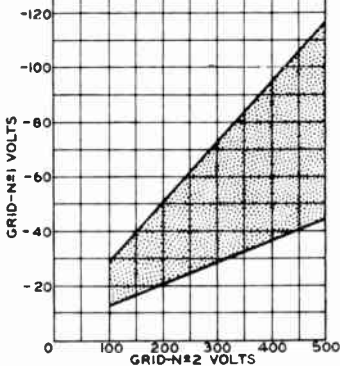
2ICEP4

2ICEP4

## RASTER-CUTOFF-RANGE CHARTS

## GRID-DRIVE SERVICE

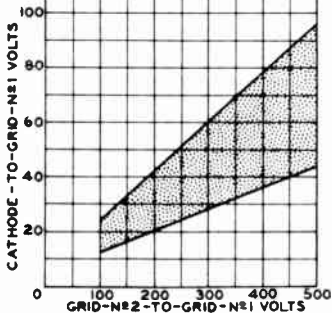
$E_f = 6.3$  VOLTS  
 ULTOR VOLTS = 12000 TO 18000  
 GRID-N#4 VOLTS ADJUSTED FOR FOCUS.



92CS-9139T

## CATHODE-DRIVE SERVICE

$E_f = 6.3$  VOLTS  
 ULTOR - TO-GRID-N#1 VOLTS =  
 12000 TO 18000  
 GRID-N#4 - TO-GRID-N#1 VOLTS  
 ADJUSTED FOR FOCUS.



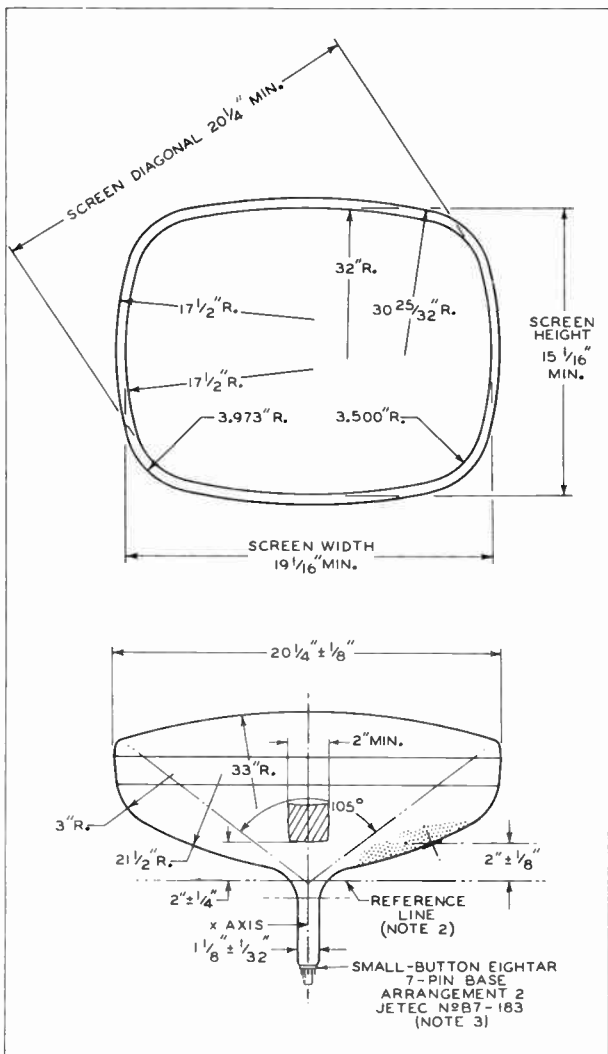
92CS-9140T1

2ICEP4



2ICEP4

## PICTURE TUBE



7-57

ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

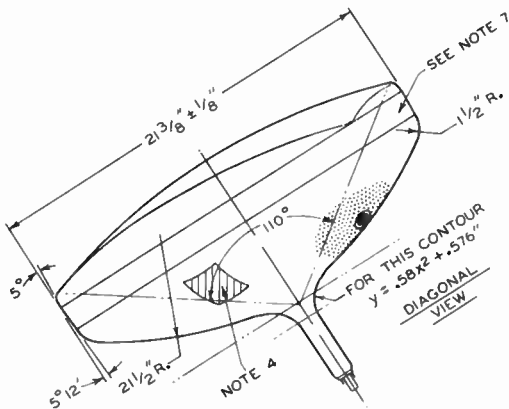
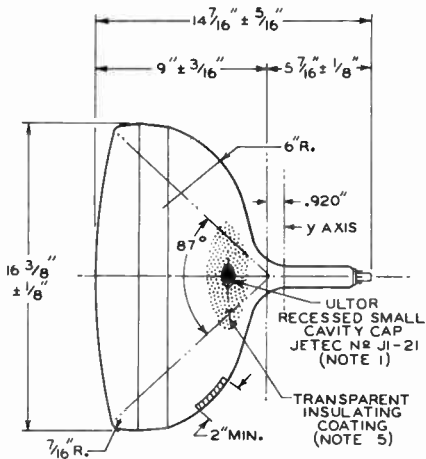
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2ICEP4

PICTURE TUBE

2ICEP4

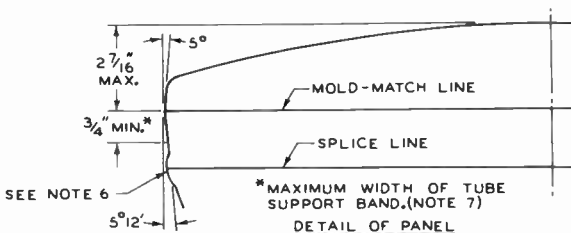


92CL-9138RI



2ICEP4

## PICTURE TUBE



**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No. 126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. THE DESIGN OF THE SOCKET SHOULD BE SUCH THAT THE CIRCUITRY CANNOT IMPRESS LATERAL STRAINS THROUGH THE SOCKET CONTACTS ON THE BASE PINS. BOTTOM CIRCUMFERENCE OF BASE WAFER WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF  $1\text{-}3/4$ ".

**NOTE 4:** THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT AREA OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THE CONTACT AREA SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

**NOTE 5:** TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

**NOTE 6:** BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN  $1/8$ ", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN  $1/16$ " BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

**NOTE 7:** UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS  $3/4$ " MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND.

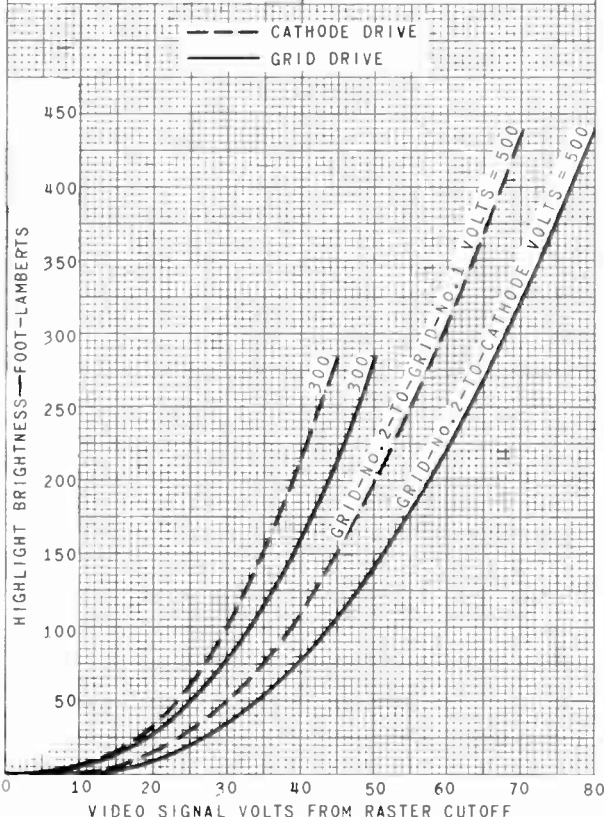


21CEP4

21CEP4

# AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE	GRID-DRIVE SERVICE
$E_f = 6.3$ VOLTS	$E_f = 6.3$ VOLTS
ULTOR-TO-GRID-No.1 VOLTS = 16000	ULTOR VOLTS = 16000 GRID NO.1 BIASED NEGATIVE WITH RESPECT TO CATH- ODE TO GIVE FOCUSED RASTER CUTOFF.
CATHODE BIASED POSITIVE WITH RESPECT TO GRID NO.1 TO GIVE FOCUSED RASTER CUTOFF.	RASTER FOCUSED AT AVERAGE BRIGHTNESS.
RASTER FOCUSED AT AVERAGE BRIGHTNESS.	RASTER SIZE = 18"x13-1/2"
RASTER SIZE = 18"x13-1/2"	



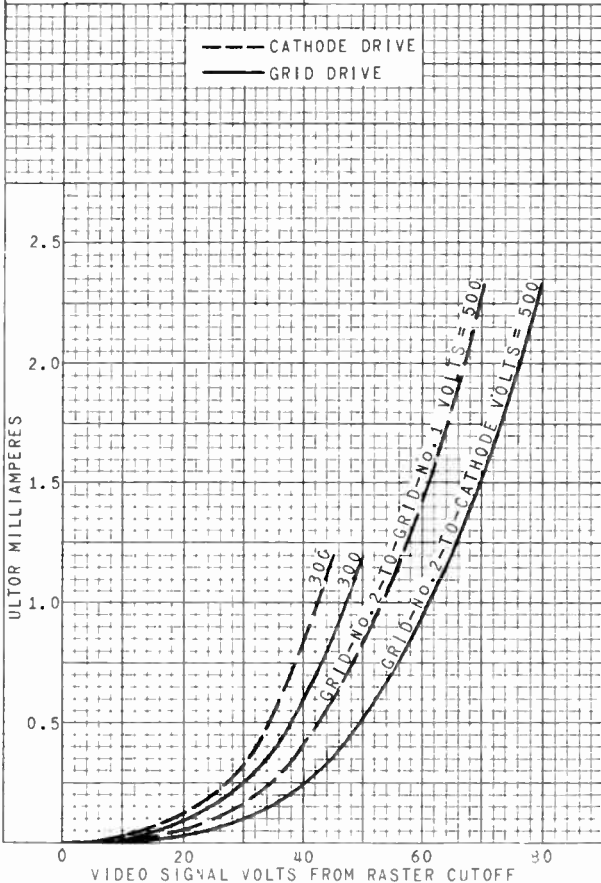
21CEP4



21CEP4

## AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE	GRID-DRIVE SERVICE
$E_f = 6.3$ VOLTS	$E_f = 6.3$ VOLTS
ULTOR-TO-GRID-NO.1 VOLTS = 12000 TO 18000	ULTOR VOLTS = 12000 TO 18000
CATHODE BIASED POSITIVE WITH RESPECT TO GRID NO.1 TO GIVE FOCUSED RASTER CUTOFF.	GRID NO.1 BIASED NEGATIVE WITH RESPECT TO CATHODE TO GIVE FOCUSED RASTER CUTOFF.



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

92CS-9142



# 2ICXP4 PICTURE TUBE

2ICXP4

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS  
LOW GRID-No.2 VOLTAGE  
ALUMINIZED SCREEN  
MAGNETIC DEFLECTION  
CATHODE-DRIVE TYPE  
*With heater having controlled warm-up time*

## DATA

### General:

Heater, for Unipotential Cathode:  
Voltage . . . . . 6.3 . . . . . ac or dc volts  
Current . . . . .  $0.6 \pm 10\%$  . . . . . amp  
Warm-up time (Average) . . . . . 11 . . . . . sec  
*For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of Receiving Tube Section.*

Direct Interelectrode Capacitances:  
Grid No.1 to all other electrodes . . . . . 6  $\mu\text{f}$   
Cathode to all other electrodes . . . . . 5  $\mu\text{f}$   
External conductive coating to ultr . . . . . { 2500 max.  $\mu\text{f}$   
2000 min.  $\mu\text{f}$   
Faceplate, Spherical . . . . . Filterglass  
Light transmission (Approx.) . . . . . 74%  
Phosphor (For curves, see front of this section) . . . . . P4—Sulfide Type  
Aluminized

Fluorescence . . . . . White  
Phosphorescence . . . . . White  
Persistence . . . . . Short

Focusing Method . . . . . Electrostatic  
Deflection Method . . . . . Magnetic

Deflection Angles (Approx.):  
Diagonal . . . . .  $90^\circ$   
Horizontal . . . . .  $85^\circ$   
Vertical . . . . .  $68^\circ$

Electron Gun . . . . . Type Requiring No Ion-Trap Magnet  
Tube Dimensions:  
Overall length . . . . .  $18" \pm 3/8"$   
Greatest width . . . . .  $20-1/4" \pm 1/8"$   
Greatest height . . . . .  $16-3/8" \pm 1/8"$   
Diagonal . . . . .  $21-3/8" \pm 1/8"$   
Neck length . . . . .  $5-1/2" \pm 3/16"$   
Radius of curvature of faceplate (External surface) . . . . . 33"

Screen Dimensions (Minimum):  
Greatest width . . . . .  $19-1/16"$   
Greatest height . . . . .  $15-1/16"$   
Diagonal . . . . .  $20-1/4"$   
Projected area . . . . . 262 sq. in.

Weight (Approx.) . . . . . 24 lbs  
Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JEDEC No.J1-21)  
Bulb . . . . . J171D2/E1  
Base . . . . . :Small-Shell Duodecal 6-Pin, Arrangement 1  
(JEDEC Group 4, No.B6-63), or  
Short Small-Shell Duodecal 6-Pin  
(JEDEC Group 4, No.B6-203)

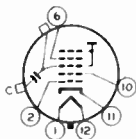
21CXP4



## 21CXP4 PICTURE TUBE

Basing Designation for BOTTOM VIEW . . . . .12L

Pin 1-Heater  
Pin 2-Grid No.1  
Pin 6-Grid No.4  
Pin 10-Grid No.2  
Pin 11-Cathode  
Pin 12-Heater



Cap-Ultor  
(Grid No.3,  
Grid No.5,  
Collector)  
C-External  
Conductive  
Coating

### CATHODE-DRIVE<sup>■</sup> SERVICE

*Unless otherwise specified, voltage values are positive with respect to grid No.1*

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

ULTOR-TO-GRID-No.1 VOLTAGE . . . . .	{	20000 max.	volts
	}	12000* min.	volts
GRID-No.4-TO-GRID-No.1 VOLTAGE:			
Positive value . . . . .	1000	max.	volts
Negative value . . . . .	500	max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAGE . . . . .	64	max.	volts
CATHODE-TO-GRID-No.1 VOLTAGE:			
Positive-peak value . . . . .	200	max.	volts
Positive-bias value . . . . .	140	max.	volts
Negative-bias value . . . . .	0	max.	volts
Negative-peak value . . . . .	2	max.	volts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode:			
During equipment warm-up period not exceeding 15 seconds . . . . .	410	max.	volts
After equipment warm-up period . . . . .	180	max.	volts
Heater positive with respect to cathode . . . . .	180	max.	volts

#### Equipment Design Ranges:

*With any ultor-to-grid-No.1 voltage ( $E_{C5g1}$ ) between 12000 and 20000 volts and grid-No.2-to-grid-No.1 voltage ( $E_{C2g1}$ ) between 40 and 64 volts*

Grid-No.4-to-Grid-No.1 Voltage for focus <sup>§</sup> . . . . .	0 to 350	volts
Cathode-to-Grid-No.1 Voltage ( $E_{kg1}$ ) for visual extinction of focused raster <sup>▲</sup> . . . . .	See Raster-Cutoff-Range Chart	
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level):		
White-level value		
(Peak negative) . . . . .	Same value as determined for $E_{kg1}$ except video drive is a negative voltage	

■, ◆, §, ▲: See next page.





21CXP4

PICTURE TUBE

21CXP4

Grid-No.4 Current. . . . .	-25 to +25	μa
Grid-No.2 Current. . . . .	15 to +15	μa
Field Strength of Adjust- able Centering Magnet* . . . . .	0 to 8	gausses

Examples of Use of Design Ranges:

<i>With ultor-to-grid- No.1 voltage of</i>	18000	volts
<i>and grid-No.2-to-grid- No.1 voltage of</i>	50	volts
Grid-No.4-to-Grid-No.1 Voltage for focus. . . . .	0 to 350	volts
Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster. . . . .	32 to 47	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value. . . . .	-32 to -47	volts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
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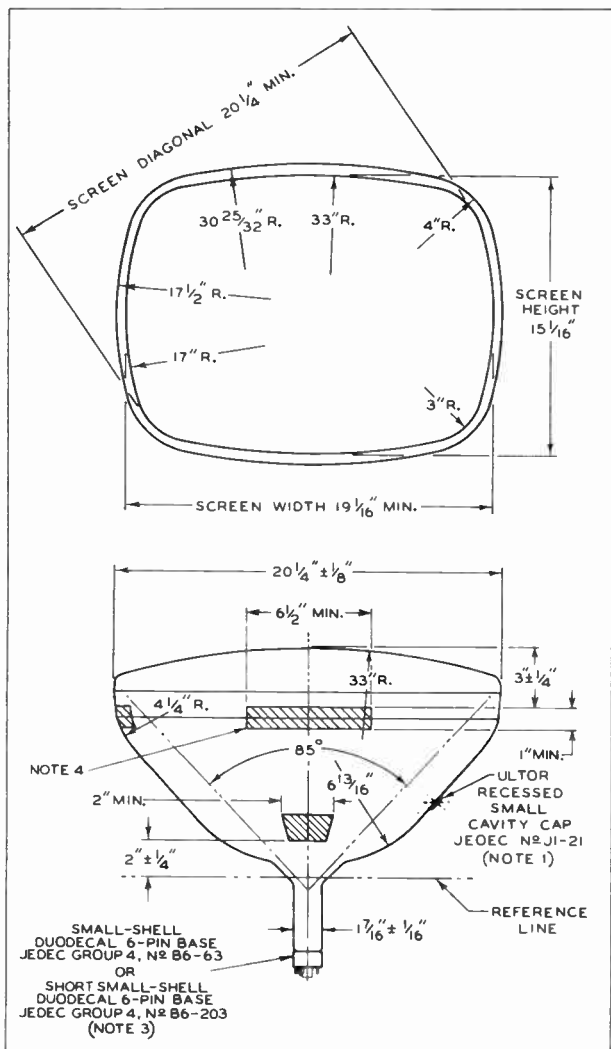
- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.
- This value is a working design-center minimum. The equivalent absolute minimum ultor-to-grid-No.1 voltage is 11,000 volts, below which the serviceability of the 21CXP4 will be impaired. The equipment designer has the responsibility of determining a minimum design value such that under the worst probable operating conditions involving supply-voltage variation and equipment variation the absolute minimum ultor-to-grid-No.1 voltage is never less than 11,000 volts.
- § The grid-No.4-to-grid-No.1 voltage required for focus of any individual tube is independent of ultor current and will remain essentially constant for values of ultor-to-grid-No.1 voltage or grid-No.2-to-grid-No.1 voltage within design ranges shown for these items.
- ▲ The cathode-to-grid-No.1 voltage ( $E_{k_1}$ ) will increase by approximately 2 per cent for every 1000-volt increase in ultor-to-grid-No.1 voltage and will decrease by approximately 2 per cent for every 1000-volt decrease in ultor-to-grid-No.1 voltage.
- Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/2". Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 3/8-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as 1/2-inch deflection of the spot from the center of the tube face.

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*

21CXP4



# 21CXP4 PICTURE TUBE

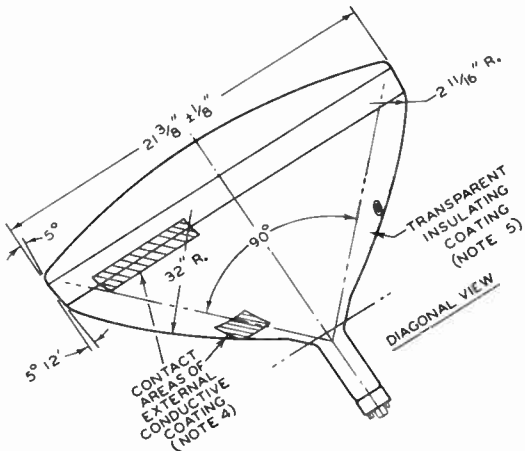
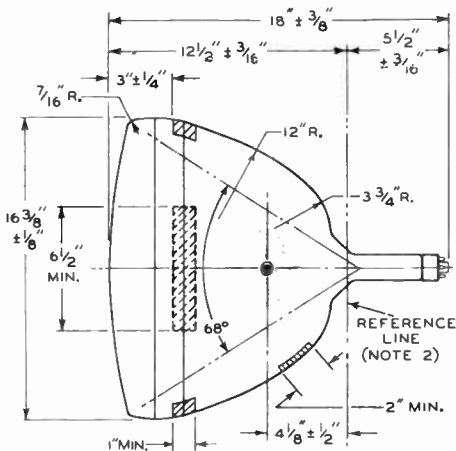




21CXP4

PICTURE TUBE

21CXP4



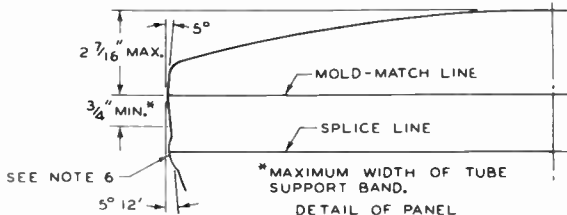
92CL-9910

21CXP4



21CXP4

## PICTURE TUBE



**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS PIN 6.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC No. G-116 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

**NOTE 4:** THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THREE OF FOUR CONTACT AREAS OF THE EXTERNAL CONDUCTIVE COATING. IN ADDITION TO THE 2" x 2" MIN. CONTACT AREA SHOWN, A 6-1/2" x 1" MIN. CONTACT AREA IS PROVIDED IN THE VICINITY OF THE SPLICE LINE ON EACH LONG SIDE OF THE BULB AND ON AT LEAST ONE SHORT SIDE OF THE BULB AS SHOWN. THE ACTUAL AREA OF EXTERNAL CONDUCTIVE COATING WHICH CONNECTS ALL THE CONTACT AREAS WILL BE GREATER THAN THE CONTACT AREAS SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

**NOTE 5:** TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

**NOTE 6:** BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.



21CXP4

21CXP4

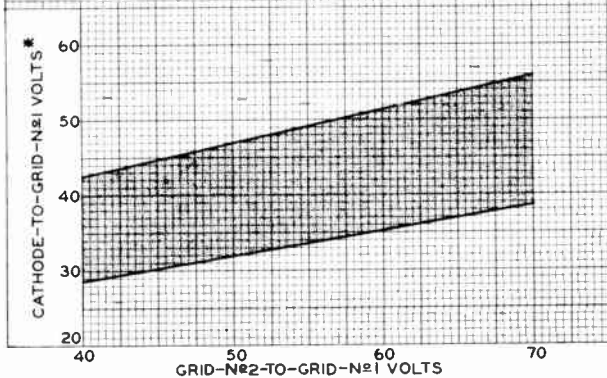
### RASTER-CUTOFF-RANGE CHART

$E_f = 6.3$  VOLTS

ULTOR-TO-GRID-N<sup>o</sup>1 VOLTS = 18000

GRID-N<sup>o</sup>4-TO-GRID-N<sup>o</sup>1 VOLTAGE ADJUSTED FOR FOCUS.

\* INCREASES OR DECREASES DIRECTLY BY APPROX. 2%  
FOR EVERY 1000-VOLT CHANGE IN ULTOR-TO-GRID-N<sup>o</sup>1  
VOLTAGE.



92CS-9911

ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA HARRISON NEW JERSEY

21CXP4



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### CATHODE-DRIVE CHARACTERISTICS

$E_f = 6.3$  VOLTS

ULTOR-TO-GRID-N<sub>2</sub>1 VOLTS = 18000

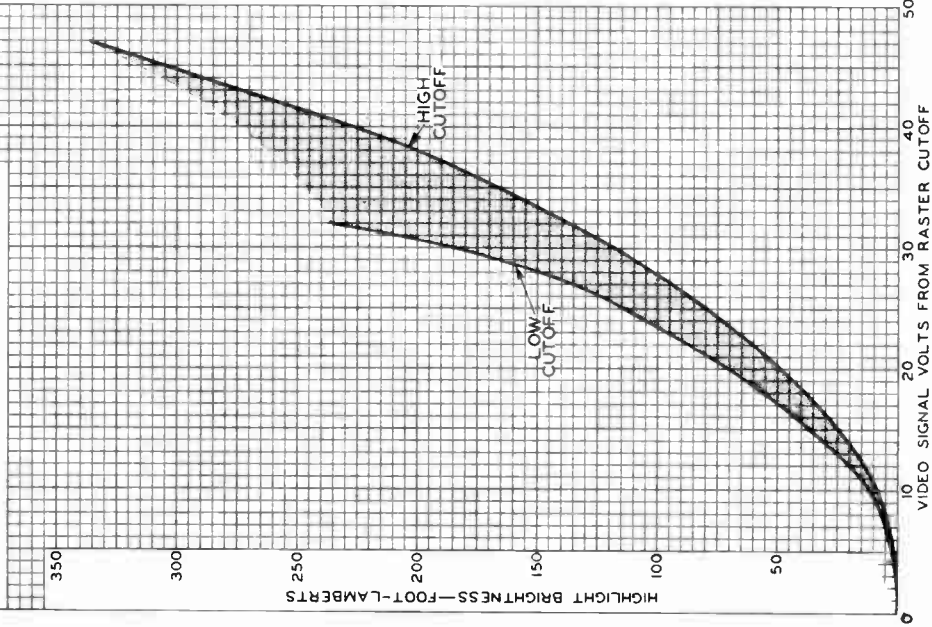
GRID-N<sub>2</sub>2 - TO-GRID-N<sub>2</sub>1 VOLTS = 50

CATHODE BIASED POSITIVE WITH RESPECT TO

GRID N<sub>2</sub>1 TO GIVE FOCUSED RASTER CUTOFF.

RASTER FOCUSED, AT AVERAGE BRIGHTNESS.

RASTER SIZE = 18" x 13-1/2"





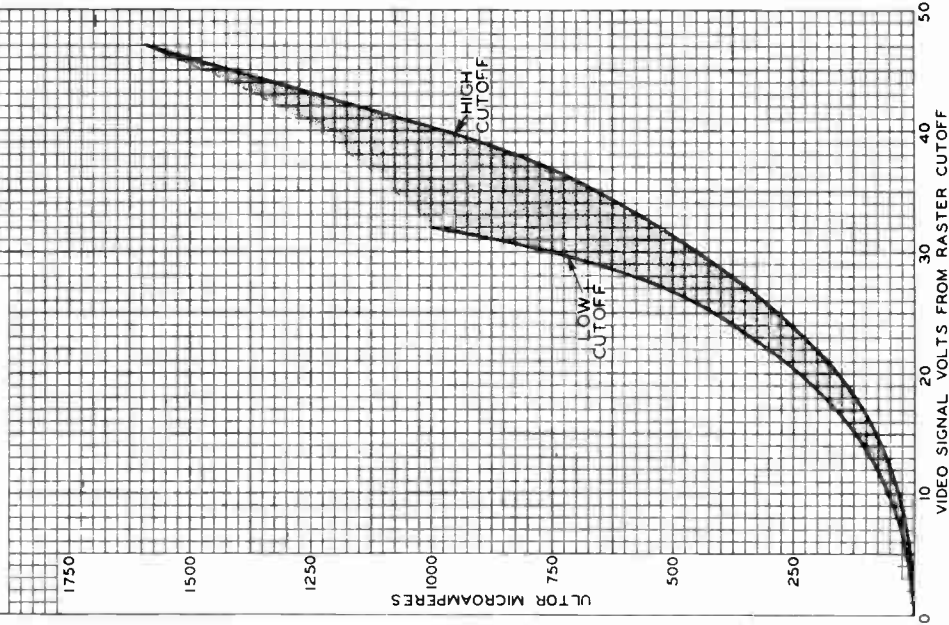
21CXP4

21CXP4

### CATHODE-DRIVE CHARACTERISTICS

$E_f = 6.3$  VOLTS

ULTOR - TO - GRID -  $N_{\#1}$  VOLTS = 18000  
GRID -  $N_{\#2}$  - TO - GRID -  $N_{\#1}$  VOLTS = 50  
CATHODE BIASED POSITIVE WITH  
RESPECT TO GRID  $N_{\#1}$  TO GIVE  
FOCUSED RASTER CUTOFF.









21DAP4

# 21DAP4

## PICTURE TUBE

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

*Intended for use in equipment having  
series heater-string arrangement*

### DATA

#### General:

Heater, for Unipotential Cathode:

Voltage . . . . .	6.3	. . . . .	ac or dc volts
Current . . . . .	0.0	. . . . .	amp
Warm-up time (Average). . . . .	11	. . . . .	sec

*For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of Receiving Tube Section.*

Direct Interelectrode Capacitances:

Grid No.1 to all other electrodes . . . . .	6		$\mu\text{f}$
Cathode to all other electrodes . . . . .	5		$\mu\text{f}$
External conductive coating to ultor. . . . .	2500 max. 2000 min.		$\mu\text{f}$
			$\mu\text{f}$

Faceplate, Spherical. . . . . Filterglass

Light transmission (Approx.). . . . . 74%

Phosphor (for Curves, see front of this section). .P4—Sulfide Type  
Aluminized

Fluorescence. . . . . White

Phosphorescence . . . . . White

Persistence . . . . . Short

Focusing Method . . . . . Electrostatic

Deflection Method . . . . . Magnetic

Deflection Angles (Approx.):

Diagonal. . . . . 110°

Horizontal. . . . . 105°

Vertical. . . . . 87°

Electron Gun. . . . . Type Requiring No Ion-Trap Magnet

Tube Dimensions:

Overall length. . . . . 14-11/16"  $\pm$  5/16"

Greatest width. . . . . 20-1/4"  $\pm$  1/8"

Greatest height . . . . . 16-3/8"  $\pm$  1/8"

Diagonal. . . . . 21-3/8"  $\pm$  1/8"

Neck length . . . . . 5-7/16"  $\pm$  1/8"

Screen Dimensions (Minimum):

Greatest width. . . . . 19-1/16"

Greatest height . . . . . 15-1/16"

Diagonal. . . . . 20-1/4"

Projected area. . . . . 262 sq. in.

Weight (Approx.). . . . . 20 lbs

Operating Position. . . . . Any

Cap . . . . . Recessed Small Cavity (JEDEC No. 1-21)

Bulb. . . . . J171G1/K1

2IDAP4

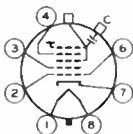


## 2IDAP4 PICTURE TUBE

Base. . . . . Small-Button Eightar 7-Pin,  
Arrangement 2, (JETEC No. B7-183)

Basing Designation for BOTTOM VIEW. . . . . 8HR

Pin 1 - Heater  
Pin 2 - Grid No. 1  
Pin 3 - Grid No. 2  
Pin 4 - Grid No. 4  
Pin 6 - Grid No. 1  
Pin 7 - Cathode  
Pin 8 - Heater



Cap - Ultor  
(Grid No. 3,  
Grid No. 5,  
Collector)  
C - External  
Conductive  
Coating

### GRID-DRIVE<sup>▲</sup> SERVICE

*Unless otherwise specified, voltage values are positive with respect to cathode*

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

ULTOR VOLTAGE . . . . . { 18000 max. volts  
12000\* min. volts

#### GRID-No. 4 (FOCUSING) VOLTAGE:

Positive value. . . . . 1000 max. volts  
Negative value. . . . . 500 max. volts

GRID-No. 2 VOLTAGE . . . . . 500 max. volts

#### GRID-No. 1 VOLTAGE:

Negative-peak value . . . . . 200 max. volts  
Negative-bias value . . . . . 140 max. volts  
Positive-bias value . . . . . 0 max. volts  
Positive-peak value . . . . . 2 max. volts

#### PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:

During equipment warm-up period  
not exceeding 15 seconds. . . . . 410 max. volts

After equipment warm-up period. . . . . 180 max. volts

Heater positive with respect to cathode. . . . . 180 max. volts

### Equipment Design Ranges:

*With any ultor voltage ( $E_{C3k}$ ) between 12000<sup>‡</sup> and 18000 volts  
and grid-No. 2 voltage ( $E_{C2k}$ ) between 200 and 500 volts*

Grid-No. 4 Voltage for focus<sup>§</sup>. . . . . 0 to 400 volts

Grid-No. 1 Voltage ( $E_{C1k}$ )

for visual extinction of focused raster. . . . . See Raster-Cutoff-Range Chart  
for Grid-Drive Service

Grid No. 1 Video Drive

From Raster Cutoff

(Black Level):

White-level value

(Peak positive) . . . . . Same value as determined for  
 $E_{C1k}$  except video drive is a  
positive voltage

<sup>▲</sup>, <sup>‡</sup>, <sup>§</sup>: See next page.



# 2IDAP4

## PICTURE TUBE

2IDAP4

Grid-No.4 Current . . . . .	-25 to +25	$\mu$ A
Grid-No.2 Current . . . . .	-15 to +15	$\mu$ B
Field Strength of Adjustable Centering Magnet* . . . . .	0 to 8	gausses

### Examples of Use of Design Ranges:

With ultor voltage of . . . . .	16000	volts
and grid-No.2 voltage of . . . . .	400	volts
Grid-No.4 Voltage for focus . . . . .	0 to 400	volts
Grid-No.1 Voltage for visual extinction of focused raster . . . . .	-36 to -94	volts
Grid-No.1 Video Drive from Raster Cutoff (Black Level):		
White-level value . . . . .	36 to 94	volts

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
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### CATHODE-DRIVE<sup>■</sup> SERVICE

*Unless otherwise specified, voltage values are positive with respect to grid No.1*

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

ULTOR-TO-GRID-No.1 VOLTAGE . . . . .	{ 18000 max. volts 12000* min. volts
GRID-No.4-TO-GRID-No.1 VOLTAGE:	
Positive value . . . . .	1000 $\mu$ A. volts
Negative value . . . . .	500 max. volts
GRID-No.2-TO-GRID-No.1 VOLTAGE . . . . .	640 max. volts
GRID-No.2-TO-CATHODE VOLTAGE . . . . .	500 max. volts
CATHODE-TO-GRID-No.1 VOLTAGE:	
Positive-peak value . . . . .	200 max. volts
Positive-bias value . . . . .	140 max. volts
Negative-bias value . . . . .	0 max. volts
Negative-peak value . . . . .	2 max. volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode:	
During equipment warm-up period not exceeding 15 seconds . . . . .	410 max. volts
After equipment warm-up period . . . . .	180 max. volts
Heater positive with respect to cathode.	180 max. volts

\*, †, §, ■: See next page.

21DAP4



## 21DAP4 PICTURE TUBE

### Equipment Design Ranges:

With any ultor-to-grid-No.1 voltage ( $E_{c5g_1}$ ) between 12000 and 18000 volts and grid-No.2-to-grid-No.1 voltage ( $E_{c2g_1}$ ) between 225 and 640 volts

Grid-No.4-to-Grid-No.1 Voltage for focus . . . . .	0 to 400	volts
Cathode-to-Grid-No.1 Voltage ( $E_{kq_1}$ ) for visual extinction of focused raster . . . . .	See Raster-Cutoff-Range Chart for Cathode-Drive Service	
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak negative) . . . . .	Same value as determined for $E_{kg_1}$ except video drive is a negative voltage	
Grid-No.4 Current . . . . .	-25 to +25	$\mu a$
Grid-No.2 Current . . . . .	-15 to +15	$\mu a$
Field Strength of Adjust- able Centering Magnet* . . . . .	0 to 8	gausses

### Examples of Use of Design Ranges:

With ultor-to-grid- No.1 voltage of	16000	volts
and grid-No.2-to-grid- No.1 voltage of	400	volts
Grid-No.4-to-Grid-No.1 Voltage for focus . . . . .	0 to 400	volts
Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster. . . . .	36 to 78	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value . . . . .	-36 to -78	volts

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance. . . . .	1.5 max.	megohms
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▲ Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.

◆ This value is a working design-center minimum. The equivalent absolute minimum ultor- or ultor-to-grid-No.1 voltage is 11,000 volts, below which the serviceability of the 21DAP4 will be impaired. The equipment designer has the responsibility of determining a minimum design value such that under the worst probable operating conditions involving supply-voltage variation and equipment variation the absolute minimum ultor- or ultor-to-grid-No.1 voltage is never less than 11,000 volts.

§ . . . : See next page.



2IDAP4

## PICTURE TUBE

2IDAP4

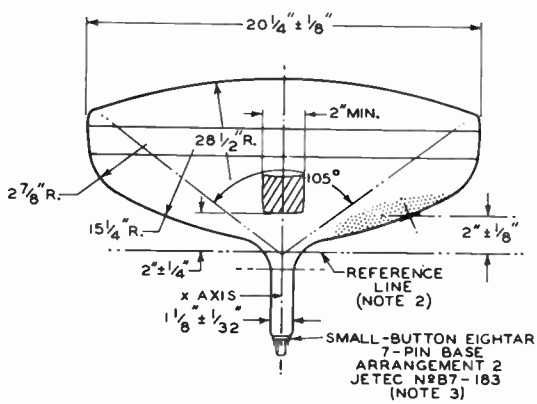
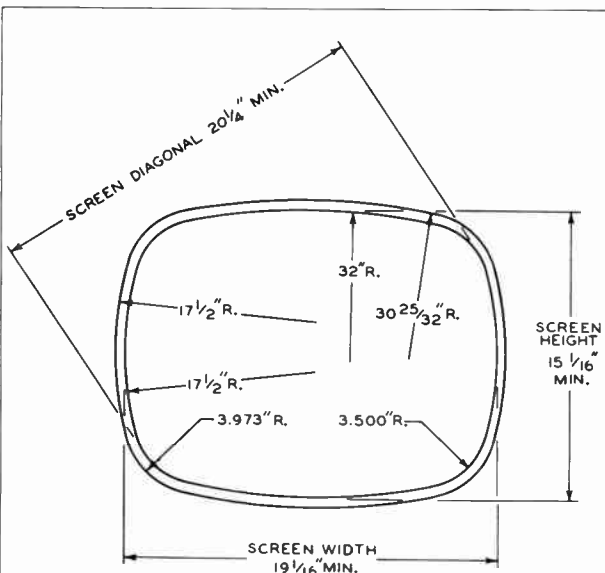
- § The grid-No.4 voltage or grid-No.4-to-grid-No.1 voltage required for focus of any individual tube is independent of ulior current and will remain essentially constant for values of ulior voltage (or ulior-to-grid-No.1 voltage) or grid-No.2 voltage (or grid-No.2-to-grid-No.1 voltage) within design ranges shown for these items.
- Distance from *Reference Line* for suitable PM centering magnet should not exceed 2-1/4". Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 7/16-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as 1/2-inch deflection of the spot from the center of the tube face.
  - Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*

2IDAP4



2IDAP4  
PICTURE TUBE

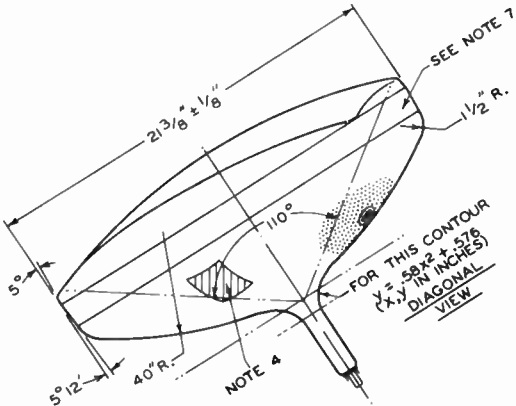
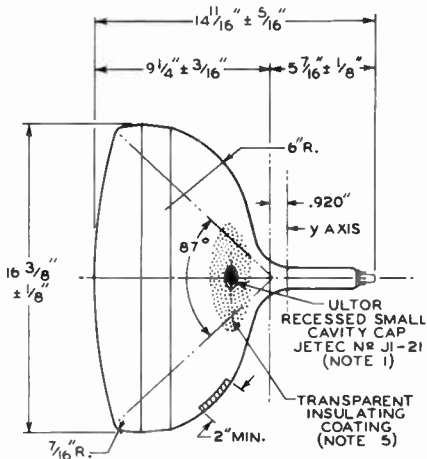




21DAP4

PICTURE TUBE

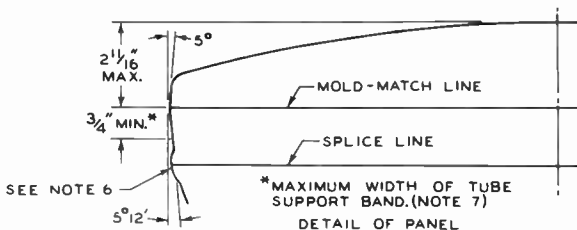
21DAP4



92CL-9645



## 2IDAP4 PICTURE TUBE



**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTORTERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No. G-126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. THE DESIGN OF THE SOCKET SHOULD BE SUCH THAT THE CIRCUITRY CANNOT IMPRESS LATERAL STRAINS THROUGH THE SOCKET CONTACTS ON THE BASE PINS. BOTTOM CIRCUMFERENCE OF BASE WAFER WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 1-3/4".

**NOTE 4:** THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT AREA OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THE CONTACT AREA SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

**NOTE 5:** TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

**NOTE 6:** BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

**NOTE 7:** UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/4" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND.

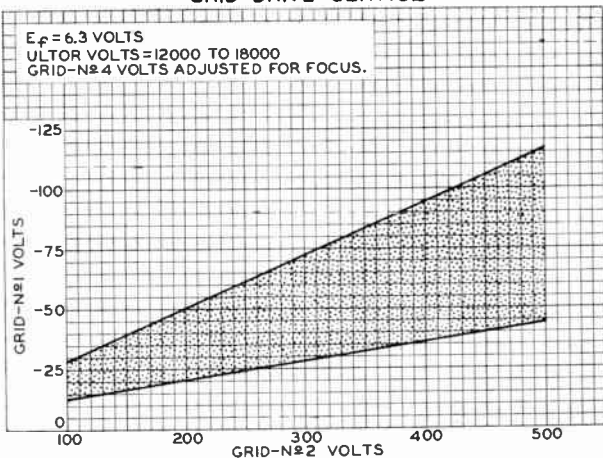




2IDAP4

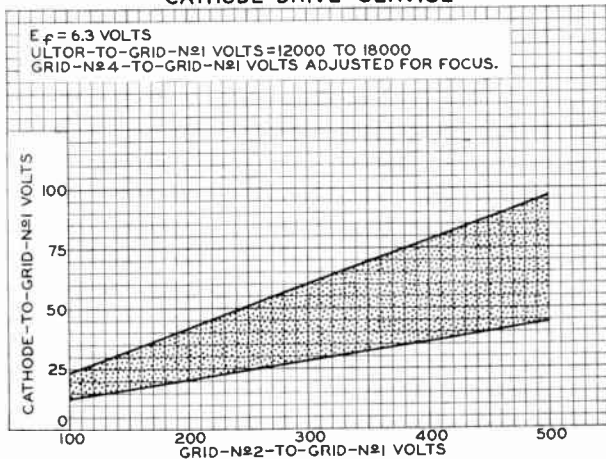
RASTER-CUTOFF-RANGE CHARTS  
GRID-DRIVE SERVICE

2IDAP4



92CS-9651

CATHODE-DRIVE SERVICE



92CS-9652

21DAP4



21DAP4

## AVERAGE DRIVE CHARACTERISTICS

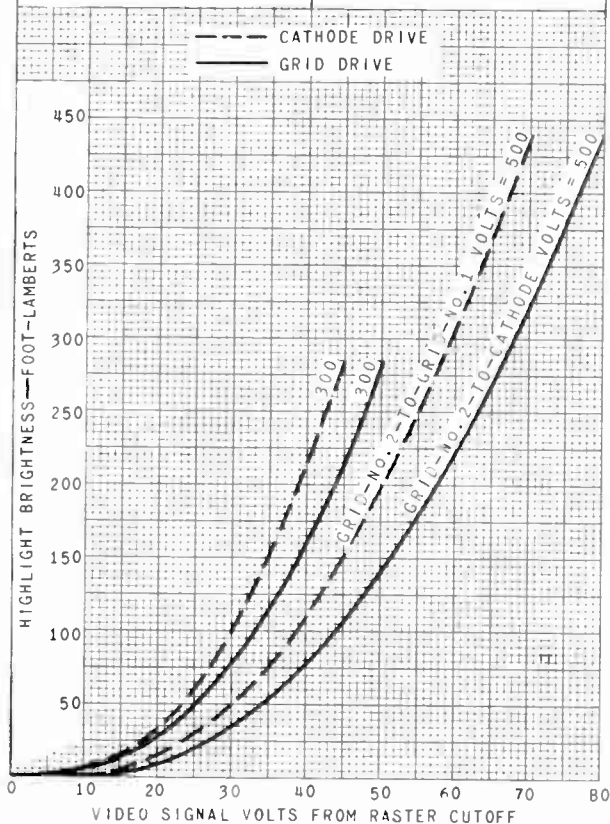
## CATHODE-DRIVE SERVICE

$E_f = 6.3$  VOLTS  
 ULTOR-TO-GRID-NO.1  
 VOLTS = 16000  
 CATHODE BIASED POSITIVE  
 WITH RESPECT TO GRID  
 NO.1 TO GIVE FOCUSED  
 RASTER CUTOFF.  
 RASTER FOCUSED AT AVERAGE  
 BRIGHTNESS.  
 RASTER SIZE = 18"x13-1/2"

## GRID-DRIVE SERVICE

$E_f = 6.3$  VOLTS  
 ULTOR VOLTS = 16000  
 GRID NO.1 BIASED NEGATIVE  
 WITH RESPECT TO CATH-  
 ODE TO GIVE FOCUSED  
 RASTER CUTOFF.  
 RASTER FOCUSED AT  
 AVERAGE BRIGHTNESS.  
 RASTER SIZE = 18"x13-1/2"

- - - CATHODE DRIVE  
 ——— GRID DRIVE



ELECTRON TUBE DIVISION

92CS-9143R1

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

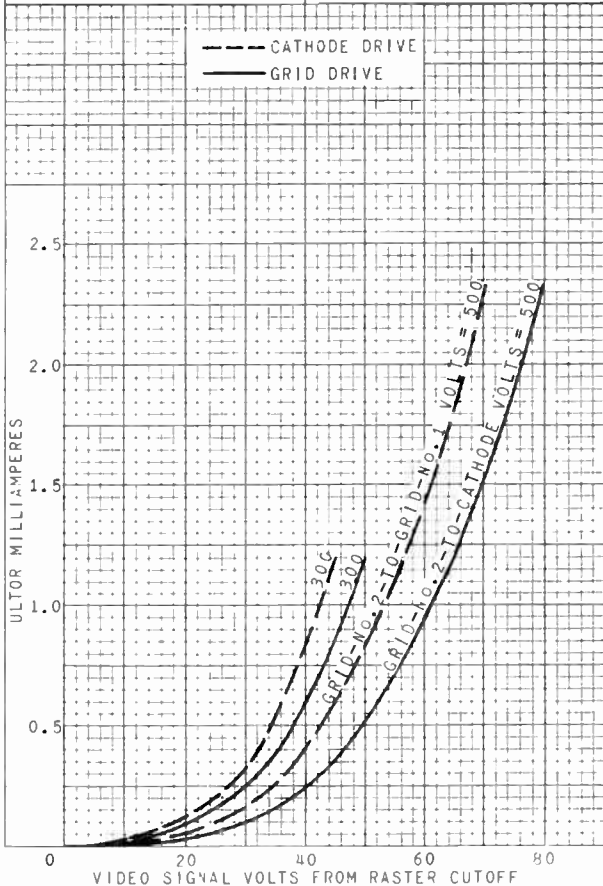


21DAP4

21DAP4

# AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE	GRID-DRIVE SERVICE
$E_f = 6.3$ VOLTS	$E_f = 6.3$ VOLTS
ULTOR-TO-GRID-No.1 VOLTS = 12000 TO 18000	ULTOR VOLTS = 12000 TO 18000
CATHODE BIASED POSITIVE WITH RESPECT TO GRID No.1 TO GIVE FOCUSED RASTER CUTOFF.	GRID No.1 BIASED NEGATIVE WITH RESPECT TO CATHODE TO GIVE FOCUSED RASTER CUTOFF.



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CS-9142





21DEP4-A

## 21DEP4-A/21DEP4/21CZP4 PICTURE TUBE

RECTANGULAR GLASS TYPE

ALUMINIZED SCREEN

LOW-VOLTAGE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

*With heater having controlled warm-up time*

*The 21DEP4-A/21DEP4/21CZP4 is the same as the 21DEP4-A.*





21EAP4

# 21EAP4 PICTURE TUBE

SHORT RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

*With heater having controlled warm-up time*

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . .	2.35 ± 10%	volts
Current at 2.35 volts . . . . .	0.6	amp
Warm-up time (Average) . . . . .	11	sec

Capacitance between External Conductive

Coating and Ultor . . . . .	} 2000 max. 1500 min.	μmf
		μmf

Faceplate, Spherical. . . . . Filterglass

Phosphor (For curves, see front of this section). . . P4—Sulfide Type  
Aluminized

Deflection Angles (Approx.):

Diagonal . . . . .	110°
Horizontal . . . . .	105°
Vertical . . . . .	87°

Electron Gun. . . . . Type Requiring No Ion-Trap Magnet

Tube Dimensions:

Overall length . . . . .	12-15/16" ± 1/4"
Greatest width . . . . .	20-1/4" ± 1/8"
Greatest height . . . . .	16-3/8" ± 1/8"
Diagonal . . . . .	21-3/8" ± 1/8"
Neck length . . . . .	3-11/16" ± 1/16"
Radius of curvature of faceplate (External surface) . . . . .	28-1/2"

Screen Dimensions (Minimum):

Greatest width . . . . .	19-1/16"
Greatest height . . . . .	15-1/16"
Diagonal . . . . .	20-1/4"
Projected area . . . . .	262 sq. in.

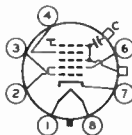
Operating Position. . . . . Any

Cap . . . . . Recessed Small Cavity (JEDEC No. J1-21)

Base . . . . . Small-Button Noveightar 7-Pin,  
Arrangement 1 (JEDEC No. B7-208)

Basing Designation for BOTTOM VIEW. . . . . 8JK

- Pin 1—Heater
- Pin 2—Grid No.2
- Pin 3—Grid No.1
- Pin 4—Grid No.4
- Pin 6—Grid No.2
- Pin 7—Cathode
- Pin 8—Heater



- Cap—Ultor  
(Grid No.3,  
Grid No.5,  
Collector)
- C—External  
Conductive  
Coating

### Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE . . . . .	18000 max.	volts
GRID-No.4 (FOCUSING) VOLTAGE:		
Positive value . . . . .	850 max.	volts
Negative value . . . . .	630 max.	volts
GRID-No.2 VOLTAGE . . . . .	500 max.	volts

21EAP4



21EAP4

PICTURE TUBE

GRID-No.1 VOLTAGE:

Negative-peak value . . . . .	360 max.	volts
Negative-bias value . . . . .	140 max.	volts
Positive-bias value . . . . .	0 max.	volts
Positive-peak value . . . . .	2 max.	volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds. . . . .		
	410 max.	volts
After equipment warm-up period. . . . .		
	180 max.	volts
Heater positive with respect to cathode. . . . .		
	180 max.	volts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance. . . . .	1.5 max.	megohms
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*For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section*



## Picture Tube

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

## DATA

## General:

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . . 6.3 volts  
Current at 6.3 volts . . . . . 0.6 amp

Direct Interelectrode Capacitances:

Grid No.1 to all other electrodes . . . . . 6  $\mu\text{f}$   
Cathode to all other electrodes . . . . . 5  $\mu\text{f}$   
External conductive coating to ultor. . . . . {2500 max.  $\mu\text{f}$   
2000 min.  $\mu\text{f}$

Faceplate, Spherical . . . . . Filterglass

Light transmission (Approx.) . . . . . 74%

Phosphor (For curves, see front of this section) . . . . . P4—Sulfide Type  
Aluminized

Fluorescence . . . . . White

Phosphorescence . . . . . White

Persistence . . . . . Medium Short

Focusing Method . . . . . Electrostatic

Deflection Method . . . . . Magnetic

Deflection Angles (Approx.):

Diagonal . . . . .  $110^\circ$

Horizontal . . . . .  $105^\circ$

Vertical . . . . .  $87^\circ$

Electron Gun . . . . . Type Requiring No Ion-Trap Magnet

Tube Dimensions:

Overall length . . . . .  $13\text{-}3/8" \pm 5/16"$

Greatest width . . . . .  $20\text{-}1/4" \pm 1/8"$

Greatest height . . . . .  $16\text{-}3/8" \pm 1/8"$

Diagonal . . . . .  $21\text{-}3/8" \pm 1/8"$

Neck length . . . . .  $4\text{-}3/8" \pm 1/8"$

Radius of curvature of faceplate

(External surface) . . . . . 33"

Screen Dimensions (Minimum):

Greatest width . . . . .  $19\text{-}1/16"$

Greatest height . . . . .  $15\text{-}1/16"$

Diagonal . . . . .  $20\text{-}1/4"$

Projected area . . . . . 262 sq. in.

Weight (Approx.) . . . . . 23 lbs

Operating Position . . . . . Any

Cap . . . . . Recessed Small Cavity (JFDEC No. 31-21)

Bulb . . . . . 5171 H1/J1

Socket . . . . . Ucinite Part No. 115446, or equivalent

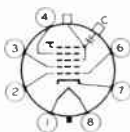
Base . . . . . Small-Button Neopentane 7-Pin, Arrangement 1,  
(JFDEC No. R7-208)



# 21EMP4

Basing Designation for BOTTOM VIEW. . . . . 8HR

- Pin 1—Heater
- Pin 2—Grid No.1
- Pin 3—Grid No.2
- Pin 4—Grid No.4
- Pin 6—Grid No.1
- Pin 7—Cathode
- Pin 8—Heater



- Cap—Ultor  
(Grid No.3,  
Grid No.5,  
Collector)
- C—External  
Conductive  
Coating

## GRID-DRIVE<sup>▲</sup> SERVICE

*Unless otherwise specified, voltage values are positive with respect to cathode*

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

ULTOR VOLTAGE . . . . .	{	18000 max.	volts
	}	12000* min.	volts
GRID-No.4 (FOCUSING) VOLTAGE:			
Positive value. . . . .		1000 max.	volts
Negative value. . . . .		500 max.	volts
GRID-No.2 VOLTAGE . . . . .		500 max.	volts
GRID-No.1 VOLTAGE:			
Negative-peak value . . . . .		200 max.	volts
Negative-bias value . . . . .		140 max.	volts
Positive-bias value . . . . .		0 max.	volts
Positive-peak value . . . . .		2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode:			
During equipment warm-up period			
not exceeding 15 seconds. . . . .		410 max.	volts
After equipment warm-up period. . . . .		180 max.	volts
Heater positive with respect to cathode . . . . . 180 max. volts			

### Equipment Design Ranges:

*With any ultor voltage ( $E_{c5k}$ ) between 12000\* and 18000 volts and grid-No.2 voltage ( $E_{c2k}$ ) between 200 and 500 volts*

Grid-No.4 Voltage for focus§. . . . .	0 to 400	volts
Grid-No.1 Voltage ( $E_{c1k}$ ) for visual extinction of focused raster . . . . .	See Raster-Cutoff-Range Chart for Grid-Drive Service	
Grid-No.1 Video Drive from Raster Cutoff (Black level):		
White-level value (Peak positive) . . . . .	Same value as determined for $E_{c1k}$ except video drive is a positive voltage	
Grid-No.4 Current . . . . .	-25 to +25	$\mu$ a
Grid-No.2 Current . . . . .	-15 to +15	$\mu$ a
Field Strength of Adjustable Centering Magnet* . . . . . 0 to 8 gauss		



## Examples of Use of Design Ranges:

With ultor voltage of	16000	volts
and grid-No.2 voltage of	300	volts
Grid-No.4 Voltage for focus. . . . .	0 to 400	volts
Grid-No.1 Voltage for visual extinction of focused raster . . . . .	-35 to -75	volts
Grid-No.1 Video Drive from Raster Cutoff (Black level):		
White-level value. . . . .	35 to 75	volts

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
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## CATHODE-DRIVE<sup>®</sup> SERVICE

*Unless otherwise specified, voltage values are positive with respect to grid No. 1*

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

ULTOR-TO-GRID-No.1 VOLTAGE . . . . .	{ 18000 max.	volts
	{ 12000* min.	volts
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:		
Positive value . . . . .	1000 max.	volts
Negative value . . . . .	500 max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAGE . . . . .	640 max.	volts
GRID-No.2-TO-CATHODE VOLTAGE . . . . .	500 max.	volts
CATHODE-TO-GRID-No.1 VOLTAGE:		
Positive-peak value. . . . .	200 max.	volts
Positive-bias value. . . . .	140 max.	volts
Negative-bias value. . . . .	0 max.	volts
Negative-peak value. . . . .	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . . . .	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

## Equipment Design Ranges:

*With any ultor-to-grid-No.1 voltage ( $E_{c5g1}$ ) between 12000\* and 18000 volts and grid-No.2-to-grid-No.1 voltage ( $E_{c2g1}$ ) between 225 and 640 volts*

Grid-No.4-to-Grid-No.1 Voltage for focus§ . . . . .	0 to 400	volts
Cathode-to-Grid-No.1 Voltage ( $E_{kq1}$ ) for visual extinction of focused raster. . . . .	.See <i>Raster-Cutoff-Range Chart for Cathode-Drive Service</i>	



# 21EMP4

## Cathode-to-Grid-No.1

Video Drive from  
 Raster Cutoff  
 (Black level):  
 White-level value  
 (Peak negative). . . . . Same value as determined for  
 $E_{kg1}$  except video drive is a  
 negative voltage

Grid-No.4 Current. . . . . -25 to +25  $\mu A$   
 Grid-No.2 Current. . . . . -15 to +15  $\mu A$   
 Field Strength of Adjustable  
 Centering Magnet\*. . . . . 0 to 8 GAUSS

## Examples of Use of Design Ranges:

With ultor-to-grid-  
 No.1 voltage of . . . . . 16000 volts  
 and grid-No.2-to-grid-  
 No.1 voltage of . . . . . 300 volts

Grid-No.4-to-Grid-  
 No.1 Voltage for focus . . . . . 0 to 400 volts

Cathode-to-Grid-No.1  
 Voltage for visual  
 extinction of focused  
 raster . . . . . 34 to 63 volts

Cathode-to-Grid-No.1  
 Video Drive from  
 Raster Cutoff  
 (Black level):  
 White-level value. . . . . -34 to -63 volts

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 1.5 max. megohms

- ▲ Grid drive is the operating condition in which the video signal varies the grid-no.1 potential with respect to cathode.
- ◆ This value is a working design-center minimum. The equivalent absolute-minimum ultor (or ultor-to-grid-no.1) voltage is 11,000 volts, below which the serviceability of the 21EMP4 will be impaired. The equipment designer has the responsibility of determining a minimum design value such that under the worst probable operating conditions involving supply-voltage variation and equipment variation the absolute minimum ultor (or ultor-to-grid-no.1) voltage is never less than 11,000 volts.
- § The grid-no.4 (or grid-no.4-to-grid-no.1) voltage required for optimum focus of any individual tube will have a value between 0 and 400 volts independent of ultor current and will remain essentially constant for values of ultor (or ultor-to-grid-no.1) voltage or grid-no.2 (or grid-no.2-to-grid-no.1) voltage within design ranges shown for these items.
- \* Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/8". Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 3/8-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as 1/2-inch deflection of the spot from the center of the tube face.
- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid no.1 and the other electrodes.



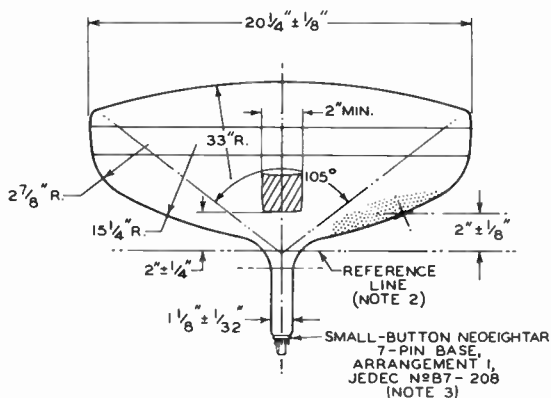
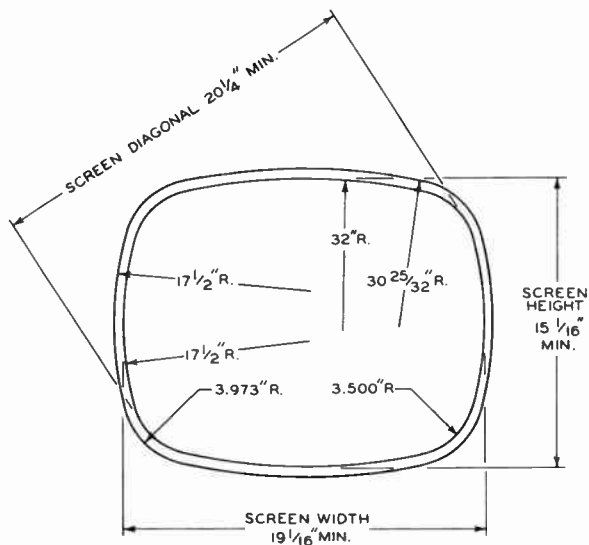
## OPERATING CONSIDERATIONS

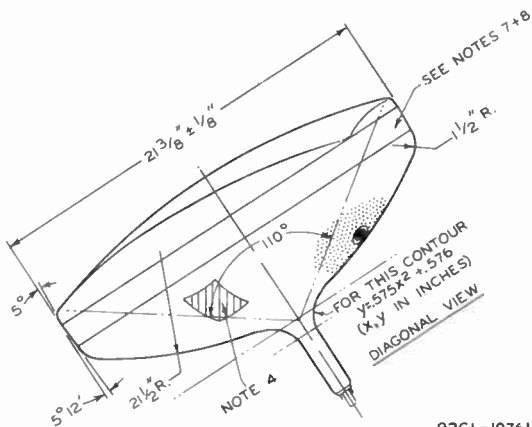
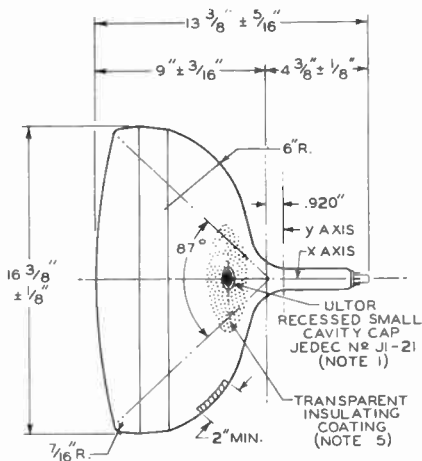
*Shatter-Proof Cover Over the Tube Face.* Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 21EMP4 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide X-ray protection when required.

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*



# 21EMP4

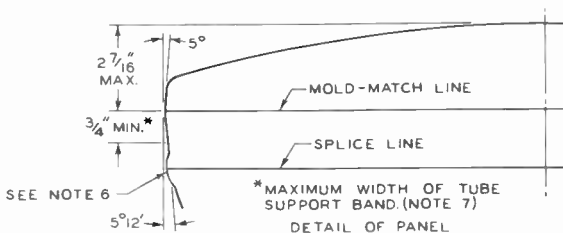




92CL-10761



# 21EMP4



**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC No. G-126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. THE DESIGN OF THE SOCKET SHOULD BE SUCH THAT THE CIRCUIT WIRING CANNOT IMPRESS LATERAL STRAINS THROUGH THE SOCKET CONTACTS ON THE BASE PINS. BOTTOM CIRCUMFERENCE OF BASE WAFER WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 1-3/4".

**NOTE 4:** EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

**NOTE 5:** TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

**NOTE 6:** BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE OF ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

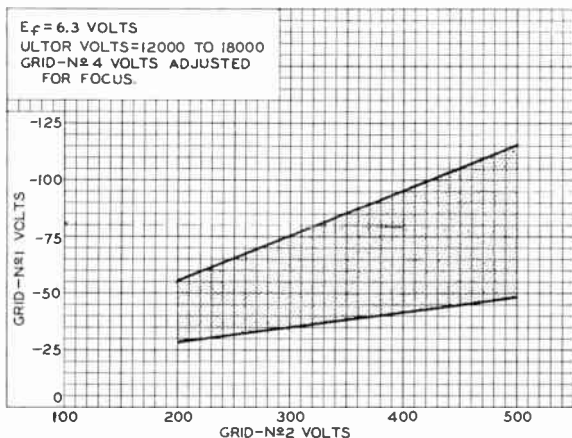
**NOTE 7:** WIDTH OF UNDISTURBED REGION BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/4" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND.

**NOTE 8:** TUBE MOUNTING OR YOKE SUPPORT CLAMPS MUST BE SPACED FROM TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.



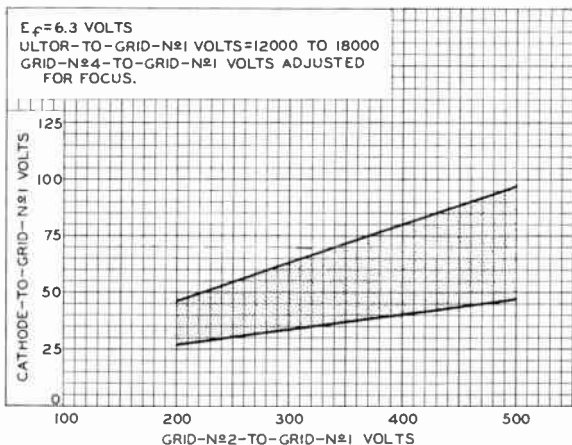
## RASTER-CUTOFF-RANGE CHARTS

### Grid-Drive Service



92CS-10759

### Cathode-Drive Service



92CS-10760







24ADP4

# 24ADP4/24VP4-A/24CP4-A/24TP4

## PICTURE TUBE

RECTANGULAR GLASS TYPE  
MAGNETIC FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

### DATA

#### General:

Heater, for Unipotential Cathode:  
 Voltage . . . . . 6.3 . . . . . ac or dc volts  
 Current . . . . . 0.6 ± 10% . . . . . amp  
 Capacitance between External Conductive Coating and Ultor . . . . .  $\left. \begin{array}{l} 2500 \text{ max. } \mu\text{mf} \\ 2000 \text{ min. } \mu\text{mf} \end{array} \right\}$   
 Faceplate, Spherical . . . . . Filterglass  
 Phosphor (For Curves, see front of this section) . P4—Sulfide Type  
 Aluminized

#### Deflection Angles (Approx.):

Diagonal . . . . . 90°  
 Horizontal . . . . . 85°  
 Vertical . . . . . 68°

Electron Gun . . . . . Ion-Trap Type Requiring External Single-Field Magnet

#### Tube Dimensions:

Overall length . . . . . 21-1/8" ± 3/8"  
 Greatest width . . . . . 22-11/16" ± 1/8"  
 Greatest height . . . . . 18-7/16" ± 1/8"  
 Diagonal . . . . . 24" ± 1/8"  
 Neck length . . . . . 7-1/2" ± 3/16"  
 Radius of curvature of faceplate (External surface) . . 40"

#### Screen Dimensions (Minimum):

Greatest width . . . . . 21-7/16"  
 Greatest height . . . . . 16-7/8"  
 Diagonal . . . . . 22-13/16"  
 Projected area . . . . . 332 sq. in.

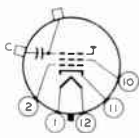
Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Base . . Small-Shell Duodecal 5-Pin (JETEC Group 4, No. B5-57)

Basing Designation for BOTTOM VIEW . . . . . 12N

- Pin 1 - Heater
- Pin 2 - Grid No. 1
- Pin 10 - Grid No. 2
- Pin 11 - Cathode
- Pin 12 - Heater



- Cap - Ultor (Grid No. 3, Collector)
- C - External Conductive Coating

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

ULTOR VOLTAGE . . . . . 22000 max. volts  
 GRID No. 2 VOLTAGE . . . . . 500 max. volts  
 GRID-No. 1 VOLTAGE:  
 Negative-peak value . . . . . 200 max. volts  
 Negative-bias value . . . . . 140 max. volts  
 Positive-bias value . . . . . 0 max. volts  
 Positive-peak value . . . . . 2 max. volts

← Indicates a change.

24ADP4



# 24ADP4/24VP4-A/24CP4-A/24TP4 PICTURE TUBE

## PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:

During equipment warm-up period

not exceeding 15 seconds . . . . . 410 max. volts

After equipment warm-up period . . . . . 180 max. volts

Heater positive with respect to cathode. . . . . 180 max. volts

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 1.5 max. megohms

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*



24DP4-A

# 24DP4-A/24YP4 PICTURE TUBE

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts

Current . . . . .  $0.6 \pm 10\%$  . . . . . amp

Capacitance between External Conductive Coating and Ultor . . . . .

{ 2500 max.  $\mu\text{f}$   
2000 min.  $\mu\text{f}$

Faceplate, Spherical . . . . . Filterglass

Phosphor (for Curves, see front of this Section). . . P4—Sulfide Type  
Aluminized

Deflection Angles (Approx.):

Diagonal . . . . .  $90^\circ$

Horizontal . . . . .  $85^\circ$

Vertical . . . . .  $68^\circ$

Electron Gun . . . . . Ion-Trap Type Requiring  
External Single-Field Magnet

Tube Dimensions:

Overall length . . . . .  $21-1/8" \pm 3/8"$

Greatest width . . . . .  $22-11/16" \pm 1/8"$

Greatest height . . . . .  $18-7/16" \pm 1/8"$

Diagonal . . . . .  $24" \pm 1/8"$

Neck length . . . . .  $7-1/2" \pm 3/16"$

Radius of curvature of faceplate (External surface). . .  $40"$

Screen Dimensions (Minimum):

Greatest width . . . . .  $21-7/16"$

Greatest height . . . . .  $16-7/8"$

Diagonal . . . . .  $22-13/16"$

Projected area . . . . . 332 sq. in.

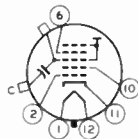
Operating Position . . . . . Any

Cap. . . . . Recessed Small Cavity (JETEC No. J1-21)

Base . . Small-Shell Duorectal 6-Pin (JETEC Group 4, No. B6-63)

Basing Designation for BOTTOM VIEW . . . . . 12L

- Pin 1—Heater
- Pin 2—Grid No.1
- Pin 6—Grid No.4
- Pin 10—Grid No.2
- Pin 11—Cathode
- Pin 12—Heater



- Cap—Ultor  
(Grid No.3,  
Grid No.5,  
Collector)
- C—External  
Conductive  
Coating

### Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE . . . . . 20000 max. volts

GRID-NO.4 (FOCUSING) VOLTAGE:

Positive value . . . . . 1000 max. volts

Negative value . . . . . 500 max. volts

GRID-NO.2 VOLTAGE . . . . . 500 max. volts

← Indicates a change.

24DP4-A



24DP4-A/24YP4

PICTURE TUBE

GRID-No.1 VOLTAGE:

Negative-peak value. . . . .	200 max.	volts
Negative-bias value. . . . .	140 max.	volts
Positive-bias value. . . . .	0 max.	volts
Positive-peak value. . . . .	2 max.	volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds . . . . .	410 max.	volts
After equipment warm-up period . . . . .	180 max.	volts
Heater positive with respect to cathode. 180 max. volts		

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
--	----------	---------

*For X-Ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*



27EP4

PICTURE TUBE

27EP4

RECTANGULAR GLASS TYPE  
MAGNETIC FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . . 6.3 volts  
Current . . . . . 0.6 ± 10% amp

Faceplate, Spherical. . . . . Filterglass

Phosphor (For Curves, see front of this section). . . . . P4—Sulfide Type  
Aluminized

Deflection Angles (Approx.):

Diagonal. . . . . 90°  
Horizontal. . . . . 85°  
Vertical. . . . . 69°

Electron Gun. . . . . Ion-Trap Type Requiring  
External Single-Field Magnet

Tube Dimensions:

Overall length. . . . . 23-1/16" ± 3/8"  
Greatest width. . . . . 25-9/32" ± 3/16"  
Greatest height . . . . . 20-7/32" ± 3/16"  
Diagonal. . . . . 26-13/16" ± 3/16"  
Neck length . . . . . 7-1/2" ± 3/16"

Radius of curvature of faceplate  
(External surface). . . . . 40"

Screen Dimensions (Minimum):

Greatest width. . . . . 24-1/4"  
Greatest height . . . . . 18-5/8"  
Diagonal. . . . . 25-3/4"  
Projected area. . . . . 425 sq. in.

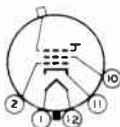
Operating Position. . . . . Any

Cap . . . . . Recessed Small Cavity (JEDEC No. J1-21)

Base. . . . . Small-Shell Duodecal 5-Pin  
(JEDEC Group 4, No. B5-57)

Basing Designation for BOTTOM VIEW. . . . . 12D

Pin 1- Heater  
Pin 2- Grid No.1  
Pin 10- Grid No.2  
Pin 11- Cathode



Pin 12- Heater  
Cap- Ultor  
(Grid No.3,  
Collector)

Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE . . . . . 20000 max. volts  
GRID-NO.2 VOLTAGE . . . . . 500 max. volts

GRID-NO.1 VOLTAGE:

Negative-peak value . . . . . 200 max. volts  
Negative-bias value . . . . . 140 max. volts  
Positive-bias value . . . . . 0 max. volts  
Positive-peak value . . . . . 2 max. volts

27EP4



27EP4

# PICTURE TUBE

## PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:

During equipment warm-up period  
not exceeding 15 seconds. . . . . 410 max. volts

After equipment warm-up period. . . . . 180 max. volts

Heater positive with respect to cathode. . . . . 180 max. volts

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance. . . . . 1.5 max. megohms

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*





## PHOTOSENSITIVE-DEVICE CLASSIFICATION CHART

*When choosing tube types, the equipment designer should refer to the RCA PREFERRED TYPES LIST and its companion list—TYPES NOT RECOMMENDED FOR NEW-EQUIPMENT DESIGN—both of which appear in the General Section*

### PHOTOTUBES

Response	Single-Unit		Twin-Unit		Multiplier
	Vacuum	Gas	Vacuum	Gas	
S-1	917	1P40		920	7102
	919	1P41			
	922	868			
	925	918			
	6570	921			
		923			
		927			
		928			
		930			
		6405/ 1640 6953			
S-3	926	1P29			
S-4	1P39	1P37	5652	5584	1P21
	929	5581			931-A
	934	5582			6328
	5653	5583			6472
	7043				7117
S-5	935				1P28
S-8					1P22
S-9	1P42				
S-10					6217
S-11					2020
					5819
					6199
					6342-A
					6655-A
				6810-A	
				7264	
Extended S-11					7046
S-13					6903
S-17					7029
S-19					7200
S-20					7265
					7326



# PHOTOSENSITIVE-DEVICE CLASSIFICATION CHART

## PHOTOCELLS

Response	Photoconductive Types	Photojunction Types
S-12	6694-A	
S-14		7223 7224 7467
S-15	6957 7163 7412 7536	

## CAMERA TUBES

Image Orthicons	Vidicons	Iconoscopes
5820 6474 6849 7198 7513	6198  6326 7038 7262 7263	1850-A

## IMAGE-CONVERTER TUBES

Response	Infrared-Sensitive Types	Ultraviolet-Sensitive Types
S-1	6032 6032-A 6914 6914-A 6929	
S-21		7404



1850-A

1850-A

# ICONOSCOPE

FOR PICKUP FROM MOTION-PICTURE FILM OR SLIDES

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . . 5.3 ± 10% . . . . . ac or dc volts

Current . . . . . 0.6 . . . . . amp

Direct Interelectrode Capacitances (Approx.):

Grid No.1 to All Other Electrodes . . . . . 6.5 μμf

Signal Electrode to Grid No.4<sup>o</sup> . . . . . 10 μμf

Mosaic, Photosensitive:

Response . . . . . See Curve

Useful Size of Rectangular Image

(4 x 3 Aspect Ratio) . . . . . 5.75" max. diagonal ←

Focusing Method . . . . . Electrostatic

Deflection Method . . . . . Magnetic

Deflection Angle (Approx.) . . . . . 55° ←

Max. Width of Mounted Tube . . . . . 8-1/8"

Height of Mounted Tube . . . . . 10-3/16" ± 3/4"

Depth of Mounted Tube . . . . . 12-13/16" ± 3/4"

Mounting Position . . . . . Mosaic in vertical plane

Minimum Deflecting-Coil Inside Diameter . . . . . 1-1/2" ←

Maximum Deflecting-Coil Length . . . . . 2-1/4" ←

Caps (Two) . . . . . Medium (JETEC No.C1-5)

Base . . . . . Long Medium-Shell Small 6-Pin

### BOTTOM VIEW

- Pin 1 - Heater
- Pin 2 - Grid No.2
- Pin 3 - Grid No.3
- Pin 4 - Grid No.1
- Pin 5 - Cathode
- Pin 6 - Heater



- Caps { See Outline Drawing
- Sj - Signal Electrode
- G4 - Grid No.4 (Collector)

DIRECTION OF LIGHT IS NORMAL TO MOSAIC

### Maximum Ratings, Absolute Values:

AVERAGE MOSAIC ILLUMINATION\* . . . . . 50 max. ft-c ←

OPERATING TEMPERATURE OF BULB

AT LARGE END OF TUBE . . . . . 40 max. °C ←

SIGNAL-ELECTRODE VOLTAGE . . . . . 1200 max. volts

GRID-No.4 (COLLECTOR) VOLTAGE . . . . . 1200 max. volts

GRID-No.3 VOLTAGE . . . . . 450 max. volts

GRID-No.2 VOLTAGE . . . . . 1200 max. volts

GRID-No.1 VOLTAGE:

Negative bias value . . . . . 125 max. volts

Positive bias value . . . . . 0 max. volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . . . . . 125 max. volts

Heater positive with respect to cathode . . . . . 10 max. volts

GRID-No.4 CURRENT . . . . . 0.5 max. μamp

<sup>o</sup> With external shield.

\* Averaged over any interval of 1 sec. max.

← Indicates a change.

MAY 1, 1951

TUBE DEPARTMENT

DATA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

1850-A



# 1850-A ICONOSCOPE

## Typical Operation and Characteristics:

Signal-Electrode Voltage . . . . .	1000	volts
Grid-No.4 Voltage. . . . .	1000	volts
Grid-No.3 Voltage (Beam Focus)— 24% to 36% of Grid-No.4 Voltage. . . . .	240 to 360	volts
Grid-No.2 Voltage. . . . .	1000	volts
→ Max. Grid-No.1 Voltage for Pattern Cutoff— 7% of Grid-No.4 Voltage . . . . .	-70	volts
→ Grid-No.4 Current (With no illumination on mosaic)*. . . . .	0.1 to 0.2	μamp
External Load Resistance . . . . .	0.1	megohm
→ Illumination on Mosaic:		
Steady Highlight Value for Slides. . . . .	4 to 6	ft-c
Average Pulse Highlight Value for Motion-Picture Film. . . . .	10 to 20	ft-c
→ Ratio of Peak-to-Peak Highlight Video-Signal Current to RMS Noise Current (Approx.). . . . .	100	
→ Minimum Peak-to-Peak Blanking Voltage. . . . .	20	volts
→ Deflecting-Coil Current (Approx.):**		
Horizontal (Peak to peak). . . . .	600	ma
Vertical (Peak to peak). . . . .	140	ma

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.0 max.	megohm
--	----------	--------

\* Allowance should be made for leakage currents.

\*\* For RCA Deflecting yoke No.201076.

→ Indicates a change.

MAY 1, 1951

DATA

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

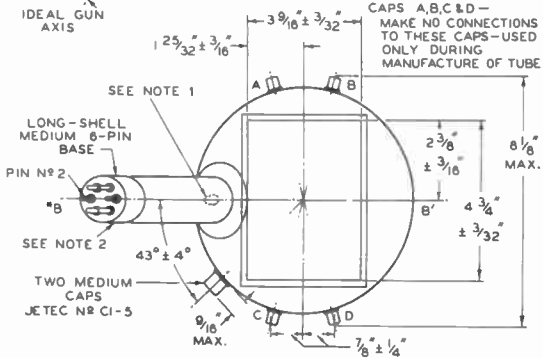
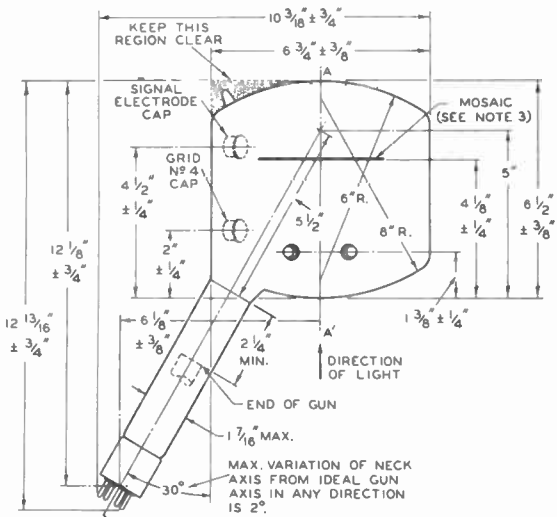
World Radio History



1850-A

# ICONOSCOPE

1850-A



92CM-4891R3

\* BB\* IS THE PLANE THROUGH THE BULB AXIS AA\* AND THE IDEAL GUN AXIS.

← Indicates a change.

MAY 1, 1951

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CE-4891F3A

1850-A



1850-A

## ICONOSCOPE

- NOTE 1:** VARIATION OF TIP CENTER FROM PLANE BB' IS 1/2".
- NOTE 2:** MAXIMUM ROTATION OF LINE THROUGH PINS 2 AND 5 ABOUT IDEAL GUN AXIS IS  $\pm 10^\circ$ , MEASURED FROM PLANE BB'.
- NOTE 3:** DEVIATION OF PLANE OF MOSAIC FROM PLANE PERPENDICULAR TO THE BULB AXIS AA' IS  $2.5^\circ$  MAX. ROTATION OF MOSAIC ABOUT THE BULB AXIS AA' WITH RESPECT TO A LINE OF INTERSECTION FORMED BY MOSAIC PLANE AND PLANE BB' IS  $2.5^\circ$  MAX.

MAY 1, 1951

CE-4891R3B

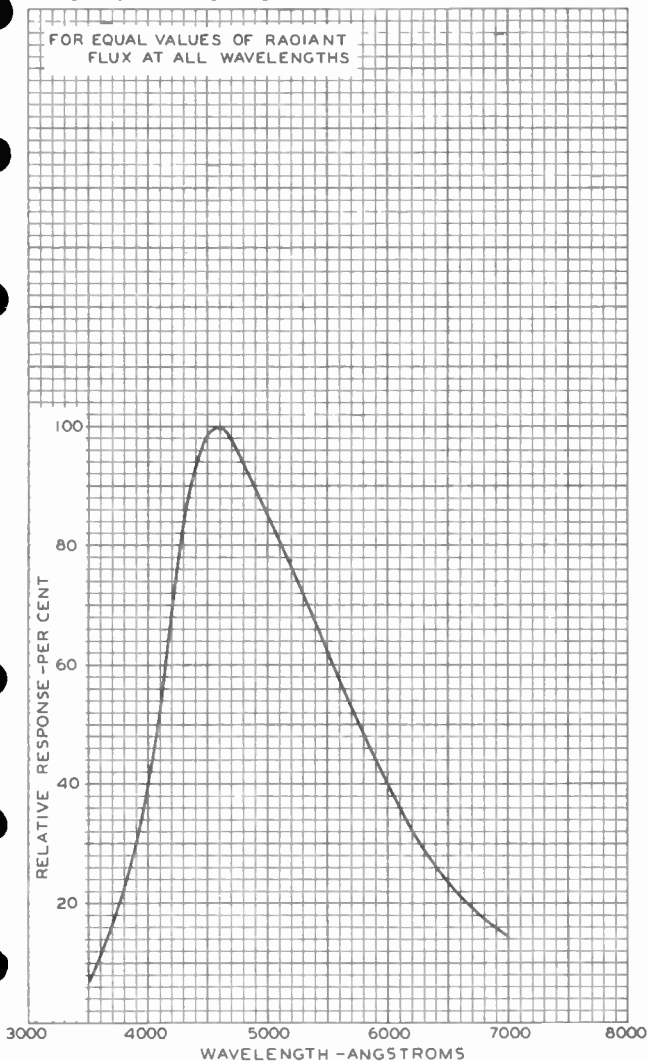


1850-A

1850-A

### SPECTRAL SENSITIVITY CHARACTERISTIC

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



JUNE 18, 1951

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

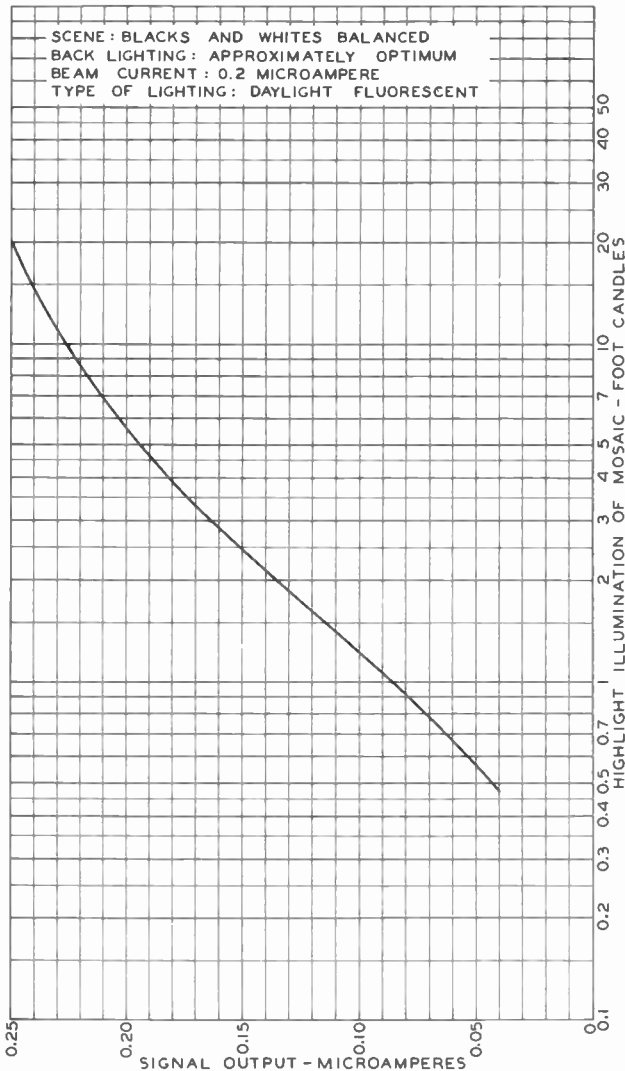
92CM-6404R1

1850-A



1850-A

## TYPICAL SIGNAL-OUTPUT CHARACTERISTIC



JAN. 2, 1951

SIGNAL OUTPUT - MICROAMPERES

TUBE DEPARTMENT

92CM-658IRI

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History



## Image Orthicon

## MAGNETIC FOCUS

## MAGNETIC DEFLECTION

For Low-Light-Level Color Pickup. The 4401 is Unilaterally Interchangeable with Types 5820, 6474, and 7513.

## DATA

## General:

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . . 6.3  $\pm$  10% volts  
Current at 6.3 volts. . . . . 0.6 amp

Direct Interelectrode Capacitance:

Anode to all other electrodes . . . . . 12  $\mu$ f

Spectral Response . . . . . .5-10

Wavelength of Maximum Response. . . . . 4500  $\pm$  300 angstroms

Photocathode, Semitransparent:

Rectangular image (4 x 3 aspect ratio):

Useful size of. . . . . 1.8" max. diagonal

Note: The size of the optical image focused on the photocathode should be adjusted so that its maximum diagonal does not exceed the specified value. The corresponding electron image on the target should have a size such that the corners of the rectangle just touch the target ring.

Orientation of. . . Proper orientation is obtained when the vertical scan is essentially parallel to the plane passing through center of face-plate and pin 7 of the shoulder base.

Focusing Method . . . . . Magnetic

Deflection Method . . . . . Magnetic

Overall Length. . . . . 15.20"  $\pm$  0.25"

Greatest Diameter of Bulb . . . . . 3.00"  $\pm$  0.06"

Minimum Deflecting-Coil Inside Diameter . . . . . 2-3/8"

Deflecting-Coil Length. . . . . 5"

Focusing-Coil Length. . . . . 10"

Alignment-Coil Length . . . . . 15/16"

Photocathode Distance Inside End of Focusing Coil . . . . . 1/2"

Operating Position. . . . . See *Operating Considerations*

Weight (Approx.). . . . . 1 lb 6 oz

Shoulder Base . . . . . Keyed Jumbo Annular 7-Pin

## BOTTOM VIEW

Pin 1 - Grid No.6

Pin 5 - Grid No.5

Pin 2 - Photocathode

Pin 6 - Target

Pin 3 - Internal Connection—Do Not Use

Pin 4 - Internal Connection—Do Not Use

Pin 7 - Internal Connection—Do Not Use

▲ See basing diagram on next page.

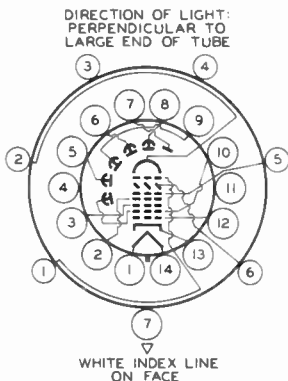


# 4401

End Base. . . . . Small-Shell Diheptal 14-Pin  
(JEDEC Group 5, No. B14-45)

## BOTTOM VIEW

- Pin 1 - Heater
- Pin 2 - Grid No. 4
- Pin 3 - Grid No. 3
- Pin 4 - Internal Connection—Do Not Use
- Pin 5 - Dynode No. 2
- Pin 6 - Dynode No. 4
- Pin 7 - Anode
- Pin 8 - Dynode No. 5
- Pin 9 - Dynode No. 3
- Pin 10 - Dynode No. 1, Grid No. 2
- Pin 11 - Internal Connection—Do Not Use
- Pin 12 - Grid No. 1
- Pin 13 - Cathode
- Pin 14 - Heater



### Maximum and Minimum Ratings, Absolute-Maximum Values:

#### PHOTOCATHODE:

Voltage . . . . .	-550 max.	volts
Illumination. . . . .	50 max.	fc

#### OPERATING TEMPERATURE:

Of any part of bulb . . . . .	50 max.	°C
Of bulb at large end of tube (target section). . . . .	35 min.	°C

#### TEMPERATURE DIFFERENCE:

Between target section and any part of bulb hotter than target section. . .	5 max.	°C
--	--------	----

GRID-No. 6 VOLTAGE . . . . .	-550 max.	volts
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#### TARGET VOLTAGE:

Positive value. . . . .	10 max.	volts
Negative value. . . . .	10 max.	volts

GRID-No. 5 VOLTAGE . . . . .	150 max.	volts
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GRID-No. 4 VOLTAGE . . . . .	300 max.	volts
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GRID-No. 3 VOLTAGE . . . . .	400 max.	volts
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GRID-No. 2 & DYNODE-No. 1 VOLTAGE . . . . .	350 max.	volts
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#### GRID-No. 1 VOLTAGE:

Negative-bias value . . . . .	125 max.	volts
Positive-bias value . . . . .	0 max.	volts

#### PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode .	125 max.	volts
Heater positive with respect to cathode .	10 max.	volts

ANODE SUPPLY VOLTAGE . . . . .	1500 max.	volts
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VOLTAGE PER MULTIPLIER STAGE. . . . .	500 max.	volts
---------------------------------------	----------	-------



**Typical Operation and Characteristics:**

Photocathode Voltage (Image Focus) . . .	-400 to -540	volts
Grid-No.6 Voltage (Accelerator)—		
Approx. 75% of photocathode voltage . . .	-300 to -405	volts
Target-Cutoff Voltage* . . . . .	-3 to +1	volts
Grid-No.5 Voltage (Decelerator) . . . . .	0 to 125	volts
Grid-No.4 Voltage (Beam Focus) . . . . .	140 to 180	volts
Grid-No.3 Voltage♦ . . . . .	225 to 330	volts
Grid-No.2 & Dynode-No.1 Voltage . . . . .	300	volts
Grid-No.1 Voltage for Picture Cutoff. . . . .	-45 to -115	volts
Dynode-No.2 Voltage . . . . .	600	volts
Dynode-No.3 Voltage . . . . .	800	volts
Dynode-No.4 Voltage . . . . .	1000	volts
Dynode-No.5 Voltage . . . . .	1200	volts
Anode Voltage . . . . .	1250	volts
Minimum Peak-to-Peak Blanking Voltage. . . . .	5	volts
Field Strength at enter		
of Focusing Coil . . . . .	75	gausses
Field Strength of Alignment Coil. . . . .	0 to 3	gausses

**Performance Data:**

*With conditions shown under Typical Operation and with picture highlights at the "knee" of the accompanying Basic-Light-Transfer-Characteristic Curve*

	Min.	Average	Max.	
Cathode Radiant Sensitivity				
at 4500 angstroms . . . . .	-	0.03	-	$\mu\text{a}/\mu\text{w}$
Anode Current (DC) . . . . .	-	40	-	$\mu\text{a}$
Signal-Output Current				
(Peak-to-peak) . . . . .	10.	25	50	$\mu\text{a}$
Ratio of Peak-to-Peak High-				
light Video-Signal Current				
to RMS Noise Current for				
Bandwidth of 4.5 Mc . . . . .	35:1	45:1	-	
Photocathode Illumination				
at 2870° K Required to				
Reach "Knee" of Light				
Transfer Characteristic . . . . .	-	0.007	0.01	fc
Peak-to-Peak Response to				
Square-Wave Test Pattern				
at 400 TV Lines per Picture				
Height (Per cent of large-				
area black to large-area				
white)♦ . . . . .	28	35	-	%

♦ Ratio of dynode voltages is shown under *Typical Operation*.

\* Normal setting of target voltage is +2 volts from target cutoff. The target supply voltage should be adjustable from -3 to +5 volts.

♦ Adjust to give the most uniformly shaded picture near maximum signal.

♦ Direction of current should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.

♦ Measured with amplifier having flat frequency response.

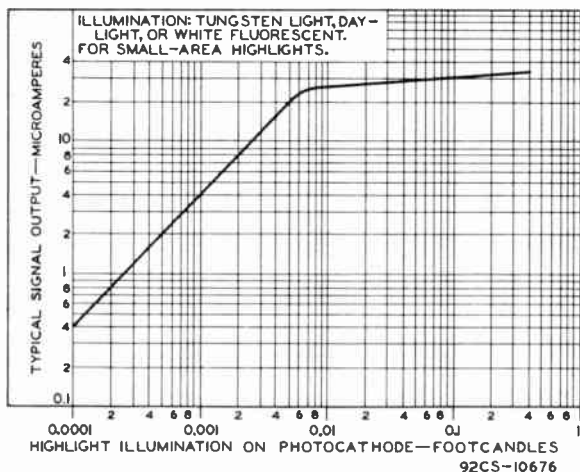


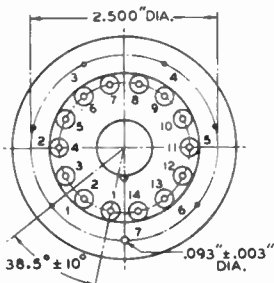
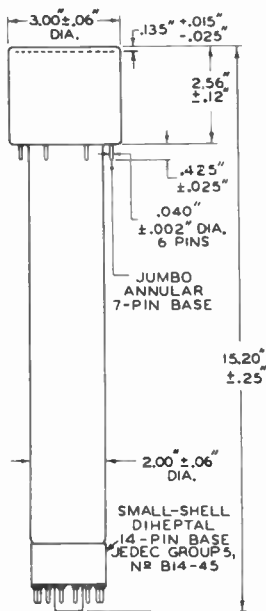
## OPERATING CONSIDERATIONS

The *operating position* of the 4401 should preferably be such that any loose particles in the neck of the tube will not fall down and strike or become lodged on the target. Therefore, it is recommended that the tube never be operated in a vertical position with the Diheptal-base end up nor in any other position where the axis of the tube with base up makes an angle of less than  $20^{\circ}$  with the vertical.

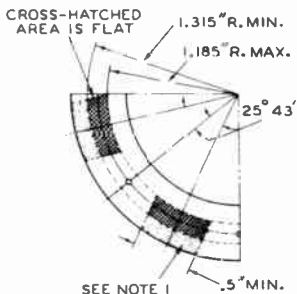
**SPECTRAL-SENSITIVITY CHARACTERISTIC**  
of Photosensitive Device having S-10 Response  
is shown at the front of this Section

## BASIC LIGHT-TRANSFER CHARACTERISTIC





#### DETAIL OF BOTTOM VIEW OF JUMBO ANNULAR BASE



NOTE 1: DOTTED AREA IS FLAT OR EXTENDS TOWARD DIHEPTAL-BASE END OF TUBE BY 0.060" MAX.

#### ANNULAR-BASE GAUGE

ANGULAR VARIATIONS BETWEEN PINS AS WELL AS ECCENTRICITY OF NECK CYLINDER WITH RESPECT TO PHOTOCATHODE CYLINDER ARE HELD TO TOLERANCES SUCH THAT PINS AND NECK CYLINDER WILL FIT FLAT-PLATE GAUGE WITH:

- SIX HOLES HAVING DIAMETER OF  $0.065" \pm 0.001"$  AND ONE HOLE HAVING DIAMETER OF  $0.150" \pm 0.001"$ . ALL HOLES HAVE DEPTH OF  $0.265" \pm 0.001"$ . THE SIX  $0.065"$  HOLES ARE ENLARGED BY  $45^\circ$  TAPER TO DEPTH OF  $0.047"$ . ALL HOLES ARE SPACED AT ANGLES OF  $51^\circ 26' \pm 5'$  ON CIRCLE DIAMETER OF  $2.500" \pm 0.001"$ .
- SEVEN STOPS HAVING HEIGHT OF  $0.187" \pm 0.001"$ , CENTERED BETWEEN PIN HOLES TO BEAR AGAINST FLAT AREAS OF BASE.
- RIM EXTENDING OUT A MINIMUM OF  $0.125"$  FROM  $2.812"$  DIAMETER AND HAVING HEIGHT OF  $0.126" \pm 0.001"$ .
- NECK-CYLINDER CLEARANCE HOLE HAVING DIAMETER OF  $2.200" \pm 0.001"$ .

92CM-8293R3



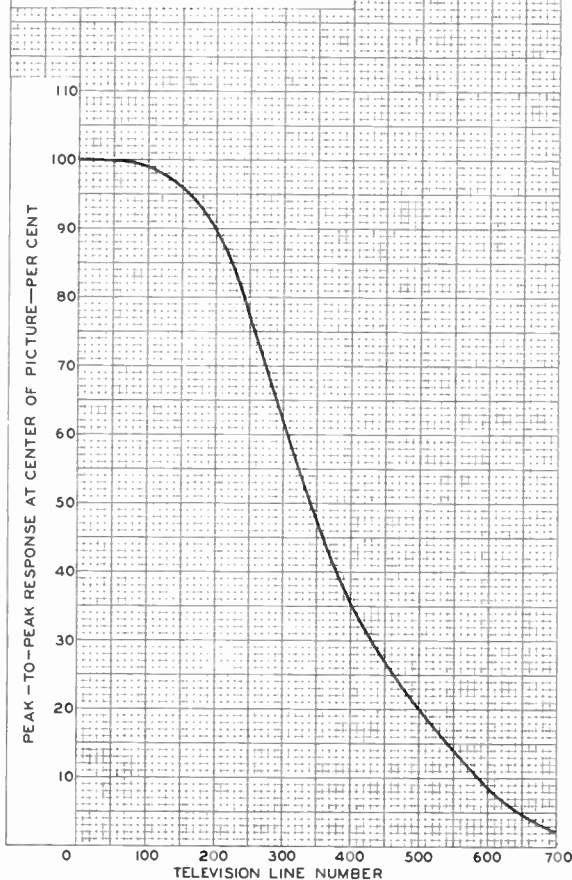
RADIO CORPORATION OF AMERICA  
Electron Tube Division

Harrison, N. J.

DATA 3  
10-60

## SQUARE-WAVE-RESPONSE CHARACTERISTIC

TEST PATTERN: SQUARE WAVE.  
 OPERATING TEMPERATURE OF BULB  
 ADJACENT TO TARGET: 35° C.  
 RESPONSE MEASURED IN SYSTEM  
 HAVING 10-Mc BANDWIDTH.  
 WITH HIGHLIGHTS AT KNEE OF  
 LIGHT TRANSFER CHARACTERISTIC.



92CM-10675





6474

6474/1854

## IMAGE ORTHICON

FOR SIMULTANEOUS COLOR PICKUP

MAGNETIC FOCUS

MAGNETIC DEFLECTION

## DATA

## General:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 ± 10% . . . . . ac or dc volts

Current . . . . . 0.6 . . . . . ampere

Direct Interelectrode Capacitance:

Anode to all other electrodes . . . . . 20  $\mu$ f

Photocathode, Semitransparent:

Response . . . See accompanying Spectral Sensitivity curve

Rectangular image (4 x 3 aspect ratio):

Useful size of . . . . . 1.6" max. Diagonal

Orientation of . . . Proper orientation is obtained when the vertical scan is essentially parallel to the plane passing through center of faceplate and pin No.7 of the shoulder base.

Focusing Method . . . . . Magnetic

Deflection Method . . . . . Magnetic

Overall Length . . . . . 15-3/16" ± 1/4"

Greatest Diameter of Bulb . . . . . 3" ± 1/16"

Minimum Deflecting-Coil Inside Diameter . . . . . 2-3/8"

Deflecting-Coil Length . . . . . 5"

Focusing-Coil Length . . . . . 10"

Alignment-Coil Length . . . . . 15/16"

Photocathode Distance Inside End of Focusing Coil . . . 1/2"

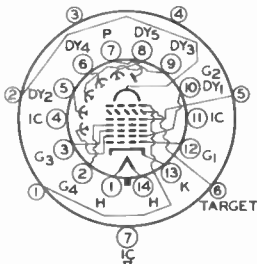
Operating Position: Any except with diheptal base up and tube axis at angle of less than 20° from vertical

Weight (Approx.) . . . . . 1 lb 6 oz

End Base . . . . . Small-Shell Diheptal 14-Pin Base (JETEC No. B14-45)

## BOTTOM VIEW

- Pin 1 - Heater
- Pin 2 - Grid No.4
- Pin 3 - Grid No.3
- Pin 4 - Internal Connection—Do Not Use
- Pin 5 - Dynode No.2
- Pin 6 - Dynode No.4
- Pin 7 - Anode
- Pin 8 - Dynode No.5
- Pin 9 - Dynode No.3
- Pin 10 - Dynode No.1, Grid No.2
- Pin 11 - Internal Connection—Do Not Use
- Pin 12 - Grid No.1
- Pin 13 - Cathode
- Pin 14 - Heater

DIRECTION OF LIGHT:  
PERPENDICULAR TO  
LARGE END OF TUBEWHITE INDEX LINE  
ON FACE

(Continued on next page)

JUNE 14, 1954

TUBE DIVISION

TENTATIVE DATA 1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6474



6474

## IMAGE ORTHICON

Shoulder Base . . . . .	Keyed Jumbo Annular 7-Pin
Pin 1 - Grid No.6	Pin 5 - Grid No.5
Pin 2 - Photocathode	
Pin 3 - Internal Connection—Do Not Use	Pin 6 - Target
Pin 4 - Internal Connection—Do Not Use	Pin 7 - Internal Connection—Do Not Use

**Maximum Ratings, Absolute Values:**

PHOTOCATHODE:		
Voltage . . . . .	-550 max.	volts
Illumination . . . . .	50 max.	ft-c
OPERATING TEMPERATURE:		
Of any part of bulb . . . . .	50 max.	°C
Of bulb at large end of tube (target section) . . . . .	35 min.	°C
TEMPERATURE DIFFERENCE:		
Between target section and any part of bulb hotter than target section . . . . .	5 max.	°C
GRID-No.6 VOLTAGE . . . . .	-550 max.	volts
TARGET VOLTAGE:		
Positive value . . . . .	10 max.	volts
Negative value . . . . .	10 max.	volts
GRID-No.5 VOLTAGE . . . . .	150 max.	volts
GRID-No.4 VOLTAGE . . . . .	300 max.	volts
GRID-No.3 VOLTAGE . . . . .	400 max.	volts
GRID-No.2 & DYNODE-No.1 VOLTAGE . . . . .	350 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value . . . . .	125 max.	volts
Positive bias value . . . . .	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	125 max.	volts
Heater positive with respect to cathode . . . . .	10 max.	volts
ANODE-SUPPLY VOLTAGE* . . . . .	1350 max.	volts
VOLTAGE PER MULTIPLIER STAGE . . . . .	350 max.	volts

**Typical Operation and Characteristics:**

Photocathode Voltage (Image Focus) . . . . .	-300 to -500	volts
Grid-No.6 Voltage (Accelerator)— 75% of photocathode voltage . . . . .	-225 to -375	volts
Target Voltage <sup>o</sup> . . . . .	0 to 3	volts
Grid-No.5 Voltage (Decelerator) . . . . .	0 to 125	volts
Grid-No.4 Voltage (Beam Focus) . . . . .	160 to 220	volts
Grid-No.3 Voltage# . . . . .	225 to 330	volts
Grid-No.2 & Dynode-No.1 Voltage . . . . .	300	volts
Grid-No.1 Voltage for Picture Cutoff . . . . .	-45 to -115	volts

\* Ratio of dynode voltages is shown under typical operation.

<sup>o</sup> Adjustable from -3 to +5 volts with blanking voltage off.

# Adjust to give the most uniformly shaded picture near maximum signal.

JUNE 14, 1954

TUBE DIVISION

TENTATIVE DATA 1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





6474

6474

## IMAGE ORTHICON

Dynode-No.2 Voltage . . . . .	600	volts
Dynode-No.3 Voltage . . . . .	800	volts
Dynode-No.4 Voltage . . . . .	1000	volts
Dynode-No.5 Voltage . . . . .	1200	volts
Anode Voltage . . . . .	1250	volts
Anode Current (IX) . . . . .	30	$\mu$ amp
Signal-Output Current (Peak to peak) . . . . .	3 to 20	$\mu$ amp
Target Temperature Range . . . . .	35 to 45	$^{\circ}$ C
Ratio of Peak-to-Peak Highlight Video-Signal Current to RMS Noise Current (Approx.) . . . . .	60	
Minimum Peak-to-Peak Blanking Voltage . . . . .	5	volts
Field Strength at Center of Focusing Coil <sup>▲</sup> . . . . .	75	gausses
Field Strength of Alignment Coil (Approx.) . . . . .	0 to 3	gausses

<sup>▲</sup> Direction of current should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.

## OPERATING CONSIDERATIONS

When the equipment design or operating conditions are such that the *maximum temperature rating* or *maximum temperature difference* as given under *Maximum Ratings* will be exceeded, provision should be made to direct a blast of cooling air from the diheptal-base end of the tube along the entire length of the bulb surface, i.e., through the space between the bulb surface and the surrounding deflecting-coil assembly and its extension. Any attempt to effect cooling of the tube by circulating even a large amount of air around the focusing coil will do little good, but a small amount of air directly in contact with the bulb surface will effectively drop the bulb temperature. For this purpose, a small blower is satisfactory, but it should be run at low speed to prevent vibration of the 6474 and the associated amplifier equipment. Unless vibration is prevented, distortion of the picture may occur.

To keep the operating temperature of the large end of the tube from falling below  $35^{\circ}$ C, some form of controlled heating should be employed. Ordinarily, adequate heat will be supplied by the focusing coil, deflecting coils, and associated amplifier tubes so that the temperature can be controlled by the amount of cooling air directed along the bulb surface. If, in special cases, a target heater is required, it should fit between the focusing coil and the bulb near the shoulder of the tube, and be non-inductively wound.

JUNE 14, 1954

TUBE DIVISION

TENTATIVE DATA 2

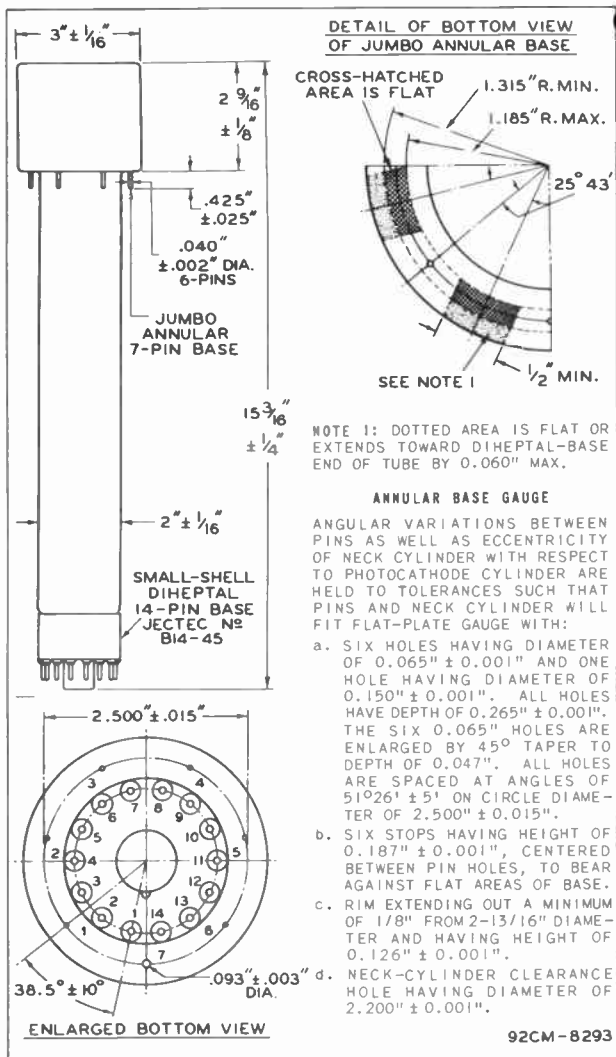
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6474



6474

## IMAGE ORTHICON



JUNE 14, 1954

TUBE DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CE-8293

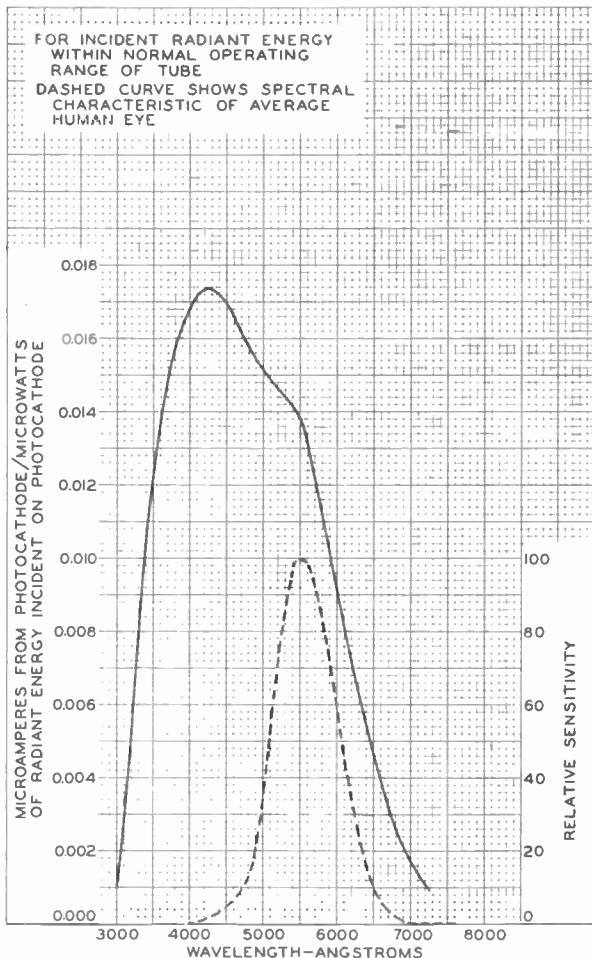


6474

6474

### SPECTRAL SENSITIVITY CHARACTERISTIC

FOR INCIDENT RADIANT ENERGY  
 WITHIN NORMAL OPERATING  
 RANGE OF TUBE  
 DASHED CURVE SHOWS SPECTRAL  
 CHARACTERISTIC OF AVERAGE  
 HUMAN EYE



MAR. 15, 1954

TUBE DIVISION

92CM-8274R1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

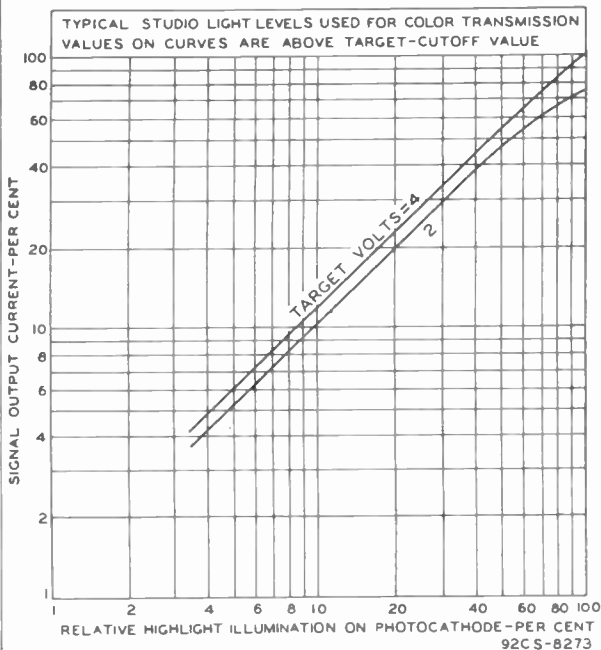
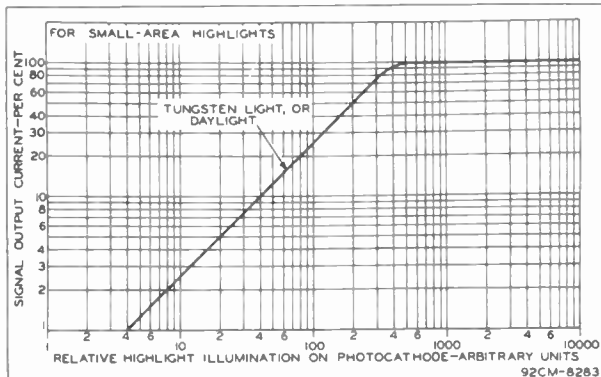
World Radio History

6474



6474

# LIGHT TRANSFER CHARACTERISTICS



JUNE 14, 1954

TUBE DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

CE-8283  
-8273



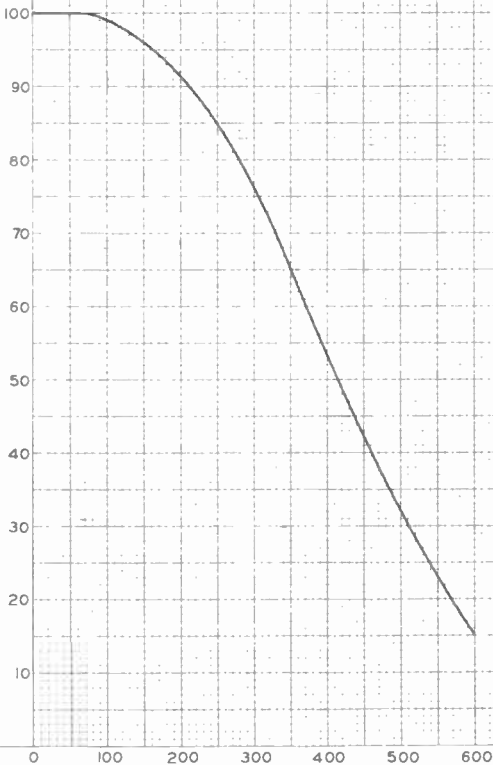
6474

6474

# AMPLITUDE RESPONSE CHARACTERISTIC

TEST PATTERN, SQUARE WAVE  
OPERATING TEMPERATURE OF BULB  
ADJACENT TO TARGET: 35°C  
RESPONSE MEASURED IN CHANNEL  
HAVING 10-Mc BANDWIDTH

RELATIVE CENTER AMPLITUDE RESPONSE—ARBITRARY UNITS



TELEVISION LINE NUMBER

MAR. 15, 1954

TUBE DIVISION

92CM-8271

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

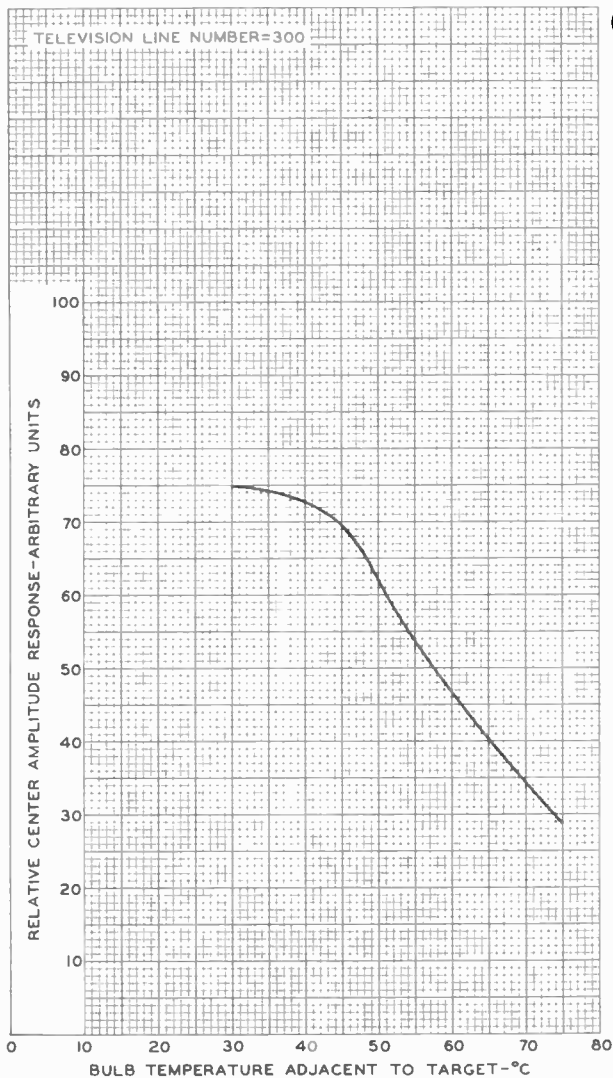
World Radio History

6474



6474

## TEMPERATURE EFFECT ON AMPLITUDE RESPONSE



MAR.15,1954

TUBE DIVISION

92CM-8272

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History



6849

6849

# IMAGE ORTHICON

for extremely low-light-level pickup  
in industrial and scientific-research applications

MAGNETIC FOCUS

MAGNETIC DEFLECTION

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage . . . . .  $6.3 \pm 10\%$  . . . . . ac or dc volts

Current . . . . . 0.6 . . . . . amp

Direct Interelectrode Capacitance (Approx.):

Anode to all other electrodes . . . . . 12  $\mu$ f

Photocathode, Semitransparent:

Response . . . . . See accompanying Spectral-Sensitivity-Characteristic curve

Rectangular image (4 x 3 aspect ratio):

Useful size of . . . . . 1.6" max. diagonal

Orientation of . . . . . Proper orientation is obtained when the vertical scan is essentially parallel to the plane passing through the center of the faceplate and pin 7 of the shoulder base.

Focusing Method . . . . . Magnetic

Deflection Method . . . . . Magnetic

Overall Length . . . . . 15-3/16"  $\pm$  1/4"

Greatest Diameter of Bulb . . . . . 3"  $\pm$  1/16"

Minimum Deflecting-Coil Inside Diameter . . . . . 2-3/8"

Deflecting-Coil Length . . . . . 5"

Focusing-Coil Length . . . . . 10"

Alignment-Coil Length . . . . . 15/16"

Photocathode Distance Inside End of Focusing Coil . . . . . 1/2"

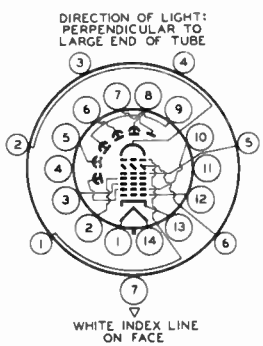
Operating Position: Any except with diheptal base up and tube axis at angle of less than 20° from vertical

Weight (Approx.) . . . . . 1 lb 6 oz

End Base . . . . . Small-Shell Diheptal 14-Pin (JETEC No.814-45)

### BOTTOM VIEW

- Pin 1 - Heater
- Pin 2 - Grid No.4
- Pin 3 - Grid No.3
- Pin 4 - Internal Connection—Do Not Use
- Pin 5 - Dynode No.2
- Pin 6 - Dynode No.4
- Pin 7 - Anode
- Pin 8 - Dyrode No.5
- Pin 9 - Dynode No.3
- Pin 10 - Dynode No.1, Grid No.2
- Pin 11 - Internal Connection—Do Not Use
- Pin 12 - Grid No.1
- Pin 13 - Cathode
- Pin 14 - Heater





## IMAGE ORTHICON

Shoulder Base . . . . .	Keyed Jumbo Annular 7-Pin
Pin 1 - Grid No.6	Pin 5 - Grid No.5
Pin 2 - Photocathode	
Pin 3 - Internal Connection—Do Not Use	Pin 6 - Target
Pin 4 - Internal Connection—Do Not Use	Pin 7 - Internal Connection—Do Not Use

**Maximum Ratings, Absolute Values:**

PHOTOCATHODE:		
voltage . . . . .	-550 max.	volts
illumination . . . . .	50 max.	ft-c
OPERATING TEMPERATURE:		
Of any part of bulb . . . . .	50 max.	°C
Of bulb at large end of tube (Target section). . . . .	35 min.	°C
TEMPERATURE DIFFERENCE:		
Between target section and any part of bulb hotter than target section. . . . .	5 max.	°C
GRID-No.6 VOLTAGE . . . . .	-550 max.	volts
TARGET VOLTAGE:		
Positive value. . . . .	10 max.	volts
Negative value. . . . .	10 max.	volts
GRID-No.5 VOLTAGE . . . . .	150 max.	volts
GRID-No.4 VOLTAGE . . . . .	300 max.	volts
GRID-No.3 VOLTAGE . . . . .	400 max.	volts
GRID-No.2 & DYNODE-No.1 VOLTAGE . . . . .	350 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value . . . . .	125 max.	volts
Positive bias value . . . . .	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	125 max.	volts
Heater positive with respect to cathode . . . . .	10 max.	volts
DYNODE-SUPPLY VOLTAGE* . . . . .	1350 max.	volts
VOLTAGE PER MULTIPLIER STAGE. . . . .	350 max.	volts

**Typical Operation and Characteristics:**

Photocathode Voltage (Image Focus). . . . .	-400 to -500	volts
Grid-No.6 Voltage (Accelerator)— 75% of photocathode voltage . . . . .	-300 to -405	volts
Target Voltage <sup>o</sup> . . . . .	0 to 3	volts
Grid-No.5 Voltage (Decelerator) . . . . .	0 to 125	volts
Grid-No.4 Voltage (Beam Focus). . . . .	130 to 180	volts
Grid-No.3 Voltage*. . . . .	225 to 330	volts
Grid-No.2 & Dynode-No.1 voltage . . . . .	300	volts
Grid-No.1 Voltage for Picture Cutoff. . . . .	-45 to -115	volts

\* Ratio of dynode voltages is shown under *Typical Operation*.

<sup>o</sup> Adjustable from -3 to +5 volts with blanking voltage off.

\* Adjust to give the most uniformly shaded picture near maximum signal.





6849

6849

## IMAGE ORTHICON

Dynode-No. 2 Voltage . . . . .	600	volts
Dynode-No. 3 Voltage . . . . .	800	volts
Dynode-No. 4 Voltage . . . . .	1000	volts
Dynode-No. 5 Voltage . . . . .	1200	volts
Anode Voltage . . . . .	1250	volts
Anode Current (DC) . . . . .	5	$\mu$ A
Signal-Output Current (Peak to peak) . . . . .	0.01 to 5	$\mu$ A
Target-Temperature Range . . . . .	35 to 45	$^{\circ}$ C
Minimum Peak-to-Peak Blanking Voltage . . . . .	5	volts
Field Strength at Center of Focusing Coil <sup>▲</sup> . . . . .	75	gausses
Field Strength of Alignment Coil (Approx.) . . . . .	0 to 3	gausses

<sup>▲</sup> Direction of current should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.

## OPERATING CONSIDERATIONS

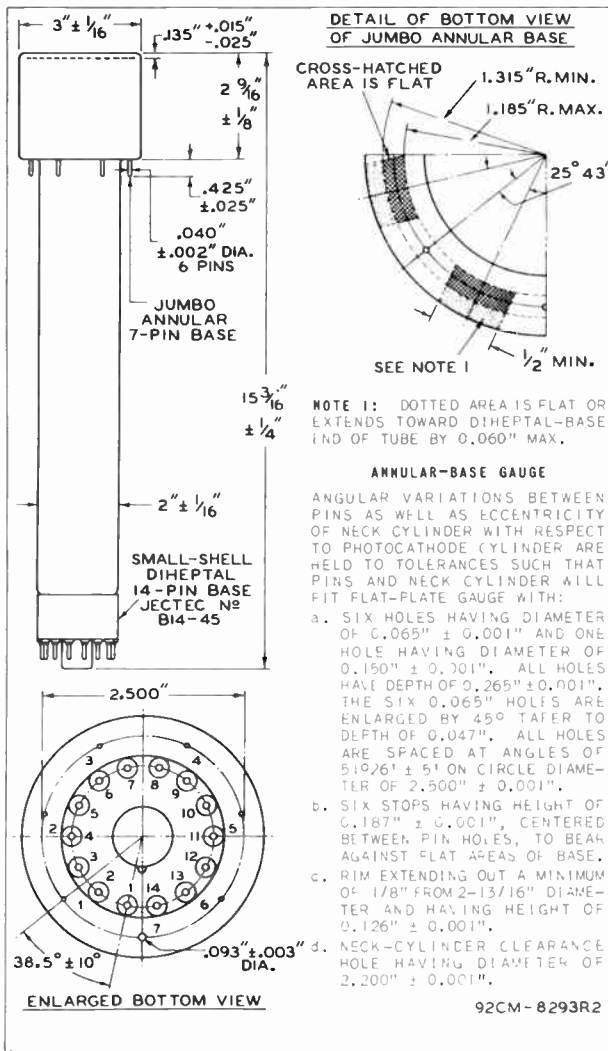
When the equipment design or operating conditions are such that the *maximum temperature rating* or *maximum temperature difference* as given under *Maximum Ratings* will be exceeded, provision should be made to direct a blast of cooling air from the diheptal-base end of the tube along the entire length of the bulb surface, i. e., through the space between the bulb surface and the surrounding deflecting-coil assembly and its extension. Any attempt to effect cooling of the tube by circulating even a large amount of air around the focusing coil will do little good, but a small amount of air directly in contact with the bulb surface will effectively drop the bulb temperature. For this purpose, a small blower is satisfactory, but it should be run at low speed to prevent vibration of the 6849 and the associated amplifier equipment. Unless vibration is prevented, distortion of the picture may occur.

To keep the operating temperature of the large end of the tube from falling below  $35^{\circ}$ C, some form of controlled heating should be employed. Ordinarily, adequate heat will be supplied by the focusing coil, deflecting coils, and associated amplifier tubes so that the temperature can be controlled by the amount of cooling air directed along the bulb surface. If, in special cases, a target heater is required, it should fit between the focusing coil and the bulb near the shoulder of the tube, and be non-inductively wound.

*Resolution* in excess of 450 lines at the center of the picture can be produced by the 6849 under the higher light-level conditions. With decreasing illumination levels, the resolution decreases. To utilize such resolution capability in the horizontal direction with the standard scanning rate of 525 lines, it is necessary to use a video amplifier having a bandwidth of at least 6 megacycles. The maximum resolution obtainable is limited by the mesh-screen portion of the target.



## IMAGE ORTHICON

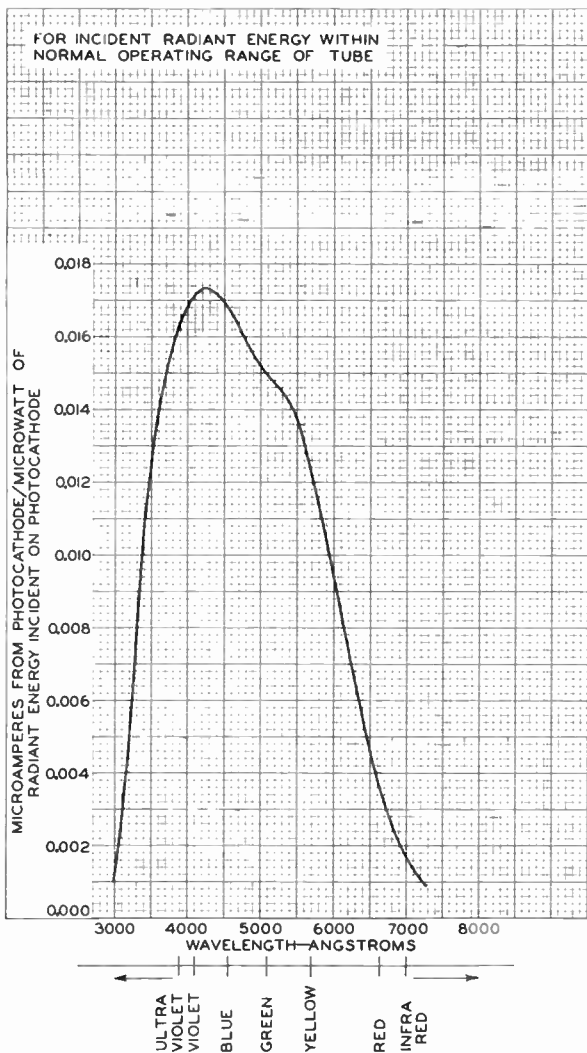




6849

6849

### SPECTRAL-SENSITIVITY CHARACTERISTIC



TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9199

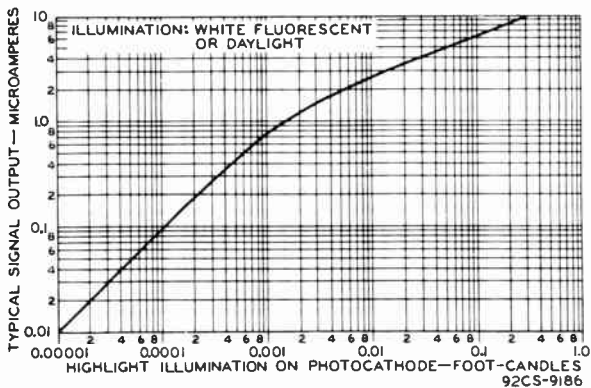
6849



6849

## IMAGE ORTHICON

## BASIC LIGHT-TRANSFER CHARACTERISTIC





7223

7223

# PHOTOJUNCTION CELL

GERMANIUM P-N ALLOY JUNCTION, HEAD-ON TYPE  
HAVING S-14 RESPONSE

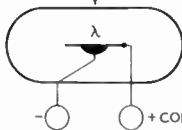
*For computer, punched-tape, punched-card,  
and sound pickup-from-film applications*

## DATA

### General:

Spectral Response . . . . .	S-14
Wavelength of Maximum Response . . . . .	15000 angstroms
Window . . . . .	Glass
Minimum diameter . . . . .	0.060"
Length (Excluding flexible leads) . . . . .	0.520" + 0.060" - 0.100"
Diameter . . . . .	0.080" ± 0.003"
Envelope Seals . . . . .	Hermetic
Operating Position . . . . .	Any
Weight (Approx., avoirdupois) . . . . .	3 grains
Leads, Flexible . . . . .	2
Minimum length . . . . .	1"
Diameter and polarity . . . . .	See Dimensional Outline

DIRECTION OF  
INCIDENT RADIATION:  
INTO END OF CELL



*λ indicates that the primary characteristic of the element within the envelope symbol is designed to vary under the influence of light.*

### Maximum Ratings, Absolute Values:

POLARIZING VOLTAGE . . . . .	50 max.	volts
POWER DISSIPATION . . . . .	0.025 max.	watt
AMBIENT TEMPERATURE . . . . .	50 max.	°C

### Characteristics:

*Under conditions with polarizing voltage of 2.5 volts and  
ambient temperature of 25° C, unless otherwise noted*

*Min. Median Max.*

#### Sensitivity:

Radiant intensity, at 15000 angstroms . . . . .	-	0.68	-	μA/watt, meter <sup>2</sup>
Illumination† . . . . .	0.1	0.2	0.5	μA/ft-c

#### Dark Current:

At polarizing volt- age of 2.5 volts . . . . .	-	-	14	μA
At polarizing volt- age of 50 volts . . . . .	-	-	35	μA

†, ▲: See next page.



7223

## PHOTOJUNCTION CELL

### Photocurrent:

Rise . . . . . See Curve  
Decay . . . . . See Curve

† For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K.

▲ The value of illumination incident on the window is 73 foot-candle.

### OPERATING CONSIDERATIONS

The *flexible leads* of the 7223 are usually soldered to the circuit elements. Soldering of the leads may be made close to the seals provided care is taken to conduct excessive heat away from the seals. Otherwise, the heat of soldering will open the seals and damage the cell.

A *clamp* around the metal shell of the cell may be used to hold the cell in position. However, care must be taken in clamping to avoid crushing or otherwise damaging the metal shell, the glass window, or the lead seals. *Do not solder or braze directly to the metal shell* of the cell.

The cell must be *polarized* by connecting the positive voltage to the copper-plated lead.

The use of an optical system to *focus the incident radiation* onto the window is suggested, especially when the level of incident radiation is low.

*Exposure of the 7223 to intense radiation*, such as focused sunlight, should be avoided under all conditions including the condition when no voltage is applied to the cell. Permanent damage to the cell may result if it is exposed to radiant energy so intense as to cause excessive heating of the cell.

With no radiation on the window of the cell, some *dark current* will flow across the junction. This current can be reduced, as shown in the accompanying curve, by operation of the cell at reduced ambient temperature.

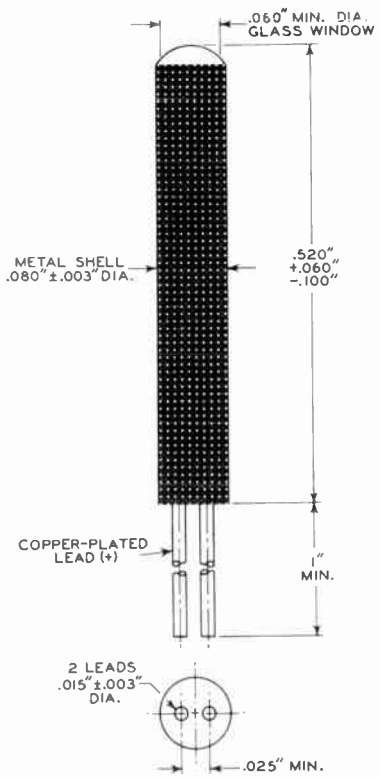
**SPECTRAL-SENSITIVITY CHARACTERISTIC**  
of Photojunction Cell having S-14 Response  
is shown at the front of this Section



7223

7223

# PHOTOJUNCTION CELL



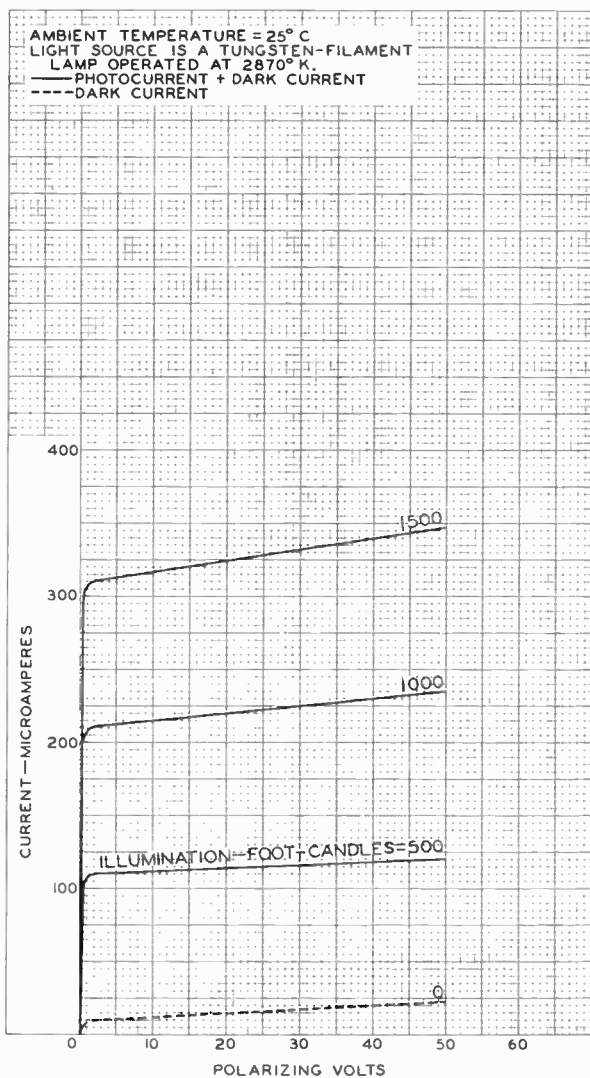
92CS-9644

7223



7223

## AVERAGE CHARACTERISTICS



ELECTRON TUBE DIVISION  
 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9648

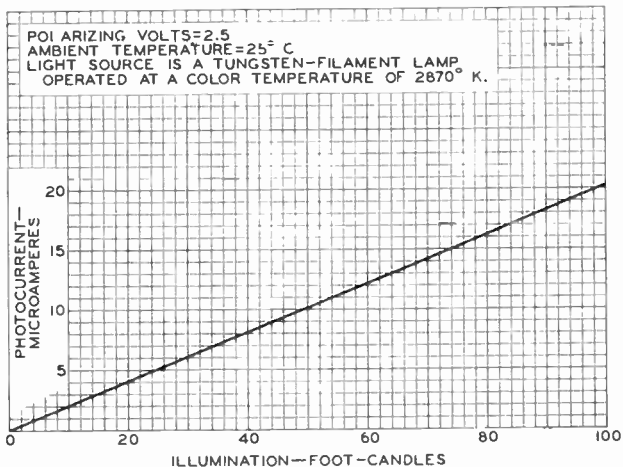




7223

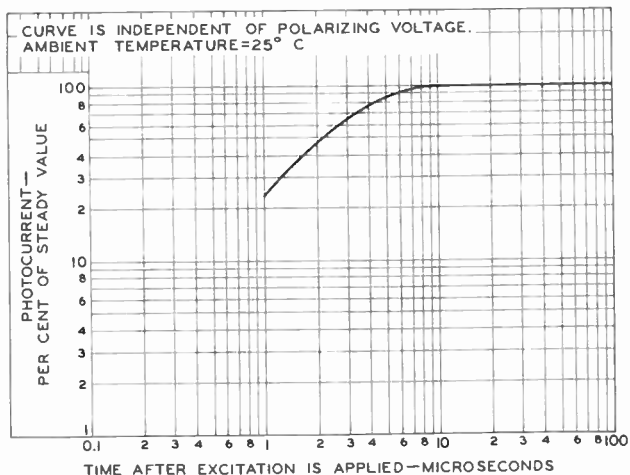
7223

## TYPICAL CHARACTERISTIC



92CS-9650

## TYPICAL RISE CHARACTERISTIC



92CS-9654

ELECTRON TUBE DIVISION

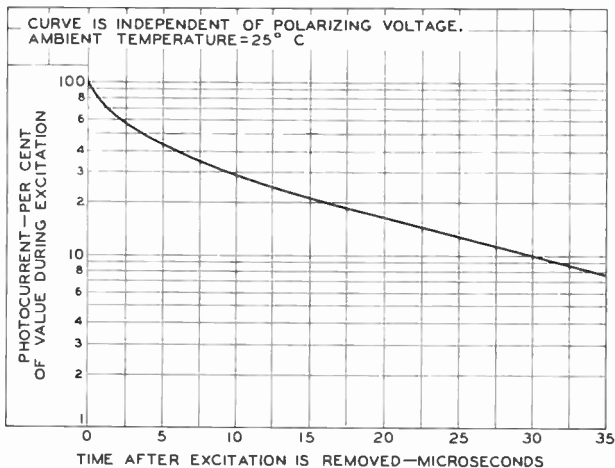
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

7223



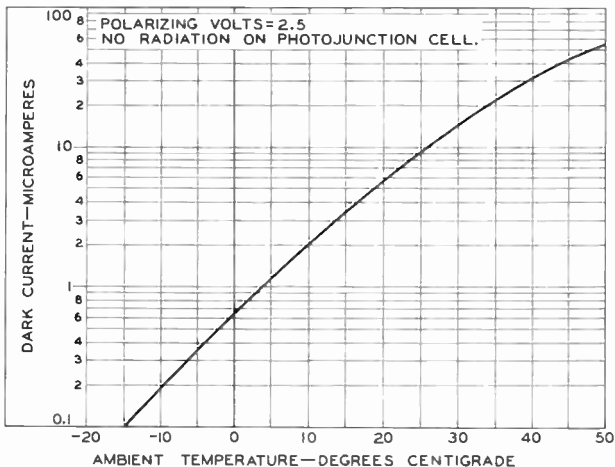
7223

### TYPICAL DECAY CHARACTERISTIC



92CS-9655

### TYPICAL CHARACTERISTIC



ELECTRON TUBE DIVISION

92CS-9656

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY



# 7262 VIDICON

7262

LOW-POWER (0.6-WATT) HEATER

600-LINE RESOLUTION

*For use in small, compact, transistorized TV cameras*

## DATA

### General:

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3 ± 10% . . . . . ac or dc volts

Current. . . . . 0.095 . . . . . amp

Direct Interelectrode Capacitance:

Target to all

other electrodes . . . . . 4.6  $\mu$ mf

Spectral Response. . . . . See Curves

Photoconductive Layer:

Maximum useful diagonal of  
rectangular image (4 x 3

aspect ratio). . . . . 0.62"

Orientation of quality rectangle—Proper orientation is obtained when the horizontal scan is essentially parallel to the straight sides of the masked portions of the face-plate. The straight sides are parallel to the plane passing through the tube axis and short index pin. The masking is for orientation only and does not define the proper scanned area of the photoconductive layer.

Focusing Method. . . . . Magnetic

Deflection Method. . . . . Magnetic

Overall Length . . . . . 5.12" ± 0.06"

Greatest Diameter. . . . . 1.125" ± 0.010"

Weight (Approx.) . . . . . 2 oz

Operating Position . . . . . Any

Bulb . . . . . T8

Base Connector . . . . . Cinch No.54A18088, or equivalent

Base . . . . . Small-Button Ditetrar 8-Pin (JEDEC No.E8-11)

Basing Designation for BOTTOM VIEW . . . . . 8HM

Pin 1 -Heater

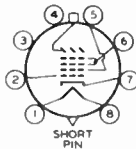
Pin 2 -Grid No.1

Pin 3 -Internal  
Connection—  
Do Not Use

Pin 4 -Same as Pin 3

Pin 5 -Grid No.2

Pin 6 -Grid No.4,  
Grid No.3



DIRECTION OF LIGHT:  
INTO FACE END OF TUBE

Pin 7 -Cathode

Pin 8 -Heater

Flange -Target

Short Index Pin -  
Same as  
Pin 3

### Maximum Ratings, Absolute Values:

*For scanned area of 1/2" x 3/8"*

GRID-No.3 & GRID-No.4 VOLTAGE. . . . . 350 max. volts

GRID-No.2 VOLTAGE. . . . . 350 max. volts

GRID-No.1 VOLTAGE:

Negative-bias value. . . . . 125 max. volts

Positive-bias value. . . . . 0 max. volts

See next page.

7262



7262

## VIDICON

## PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode.	125 max.	volts
Heater positive with respect to cathode.	10 max.	volts
DARK CURRENT . . . . .	0.25 max.	$\mu\text{a}$
PEAK TARGET CURRENT. . . . .	0.55 max.	$\mu\text{a}$

## FACEPLATE:

Illumination . . . . .	1000 max.	ft-c
Temperature. . . . .	60 max.	$^{\circ}\text{C}$

## Typical Operation:

For scanned area of  $1/2'' \times 3/8''$  and  
faceplate temperature of  $30^{\circ}$  to  $35^{\circ}\text{C}$

Grid-No.4 (Decelerator) & Grid-No.3 (Beam-focus electrode) Voltage. . . . .	250 <sup>D</sup> to 300	volts
Grid-No.2 (Accelerator) Voltage. . . . .	300	volts
Grid-No.1 Voltage for picture cutoff <sup>E</sup> . . . . .	-45 to -100	volts
Average "Gamma" of Transfer Characteristic for signal- output current between 0.02 $\mu\text{a}$ and 0.2 $\mu\text{a}$ . . . . .	0.65	
Visual Equivalent Signal-to- Noise Ratio (Approx.) <sup>*</sup> . . . . .	300:1	
Minimum Peak-to-Peak Blanking Voltage:		
When applied to grid No.1. . . . .	75	volts
When applied to cathode. . . . .	20	volts
Field Strength at Center of Focusing Coil (Approx.). . . . .	40	gausses
Field Strength of Adjustable Alignment Coil <sup>G</sup> . . . . .	0 to 4	gausses

## Maximum-Sensitivity Operation for Live-Scene Pickup

Faceplate Illumination (Highlight) . . . . .	2	ft-c
Maximum Target Voltage required to produce dark current of 0.2 $\mu\text{a}$ in any tube <sup>H</sup> . . . . .	110	volts
Target Voltage <sup>I</sup> . . . . .	60 to 100	volts
Dark Current <sup>A</sup> . . . . .	0.2	$\mu\text{a}$
Target Current (Highlight) <sup>J</sup> . . . . .	0.4 to 0.5	$\mu\text{a}$
Signal-Output Current: <sup>#</sup>		
Peak . . . . .	0.2 to 0.3	$\mu\text{a}$
Average. . . . .	0.08 to 0.1	$\mu\text{a}$

## Average-Sensitivity Operation for Live-Scene Pickup

Faceplate Illumination (Highlight) . . . . .	15	ft-c
Maximum Target Voltage required to produce dark current of 0.02 $\mu\text{a}$ in any tube <sup>H</sup> . . . . .	60	volts
Target Voltage <sup>I</sup> . . . . .	30 to 50	volts

• □ ● ★ ☆ † ‡ ▲ ■ # : See next page.



7262

7262

## VIDICON

Dark Current . . . . .	0.02	$\mu$ a
Target Current (Highlight) <sup>†</sup> . . . . .	0.3 to 0.4	$\mu$ a
Signal-Output Current:*		
Peak . . . . .	0.3 to 0.4	$\mu$ a
Average . . . . .	0.1 to 0.2	$\mu$ a

*Minimum-Lag Operation for Film Pickup*

Faceplate Illumination (Highlight) . .	100	ft-c
Maximum Target Voltage required to produce dark current of 0.004 $\mu$ a in any tube** . . . . .	30	volts
Target Voltage† . . . . .	15 to 25	volts
Dark Current . . . . .	0.004	$\mu$ a
Target Current (Highlight) <sup>†</sup> . . . . .	0.3 to 0.4	$\mu$ a
Signal-Output Current:*		
Peak . . . . .	0.3 to 0.4	$\mu$ a
Average . . . . .	0.1 to 0.2	$\mu$ a

↓ This capacitance, which effectively is the output impedance of the 7262, is increased when the tube is mounted in the deflecting-yoke and focusing-coil assembly. The resistive component of the output impedance is in the order of 100 megohms.

• Beam focus is obtained by combined effect of grid-No.3 voltage which should be adjustable over indicated range, and a focusing coil having an average field strength of 40 gaussess.

□ Definition, focus uniformity, and picture quality decrease with decreasing grid-No.4 and grid-No.3 voltage. In general, grid No.4 and grid No.3 should be operated above 250 volts.

• With no blanking voltage on grid No.1.

▲ Measured with high-gain, low-noise, cascode-input-type amplifier having bandwidth of 5 Mc. Because the noise in such a system is predominately of the high-frequency type, the visual equivalent signal-to-noise ratio is taken as the ratio of the highlight video-signal current to rms noise current, multiplied by a factor of 3.

⊙ The alignment coil should be located on the tube so that its center is at a distance of 3-11/16 inches from the face of the tube, and be positioned so that its axis is coincident with the axis of the tube, the deflecting yoke, and the focusing coil.

\*\* The target voltage for each 7262 must be adjusted to that value which gives the desired operating dark current.

† Indicated range for each type of service serves only to illustrate the operating target-voltage range normally encountered.

▲ The deflecting circuits must provide extremely linear scanning for good black-level reproduction. Dark-current signal is proportional to the scanning velocity. Any change in scanning velocity produces a black-level error in direct proportion to the change in scanning velocity.

• Video amplifiers must be designed properly to handle target currents of this magnitude to avoid amplifier overload or picture distortion.

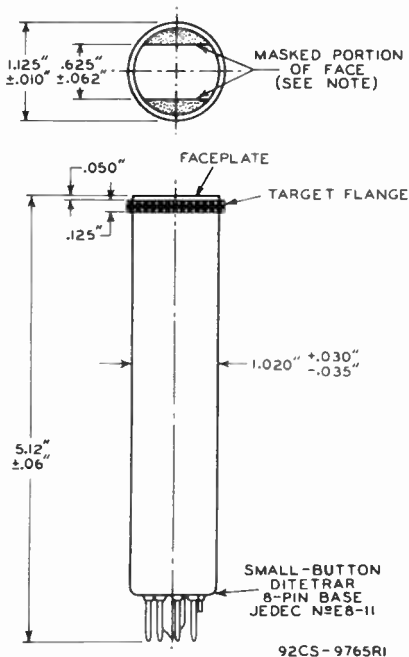
\* Defined as the component of the target current after the dark-current component has been subtracted.

7262



7262

VIDICON



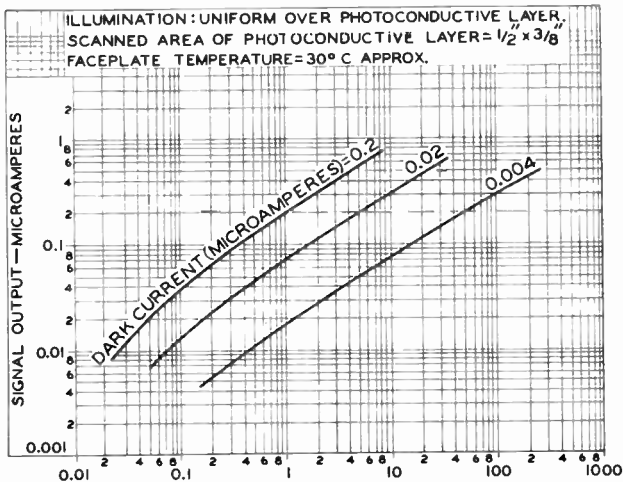
**NOTE:** STRAIGHT SIDES OF MASKED PORTIONS ARE PARALLEL TO THE PLANE PASSING THROUGH TUBE AXIS AND SHORT INDEX PIN.



7262

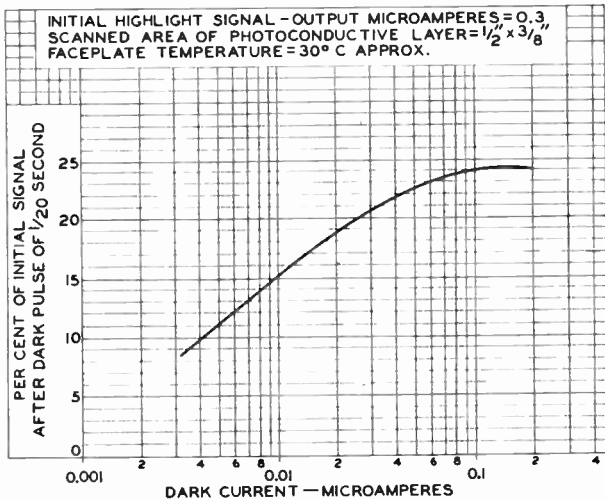
7262

### TYPICAL LIGHT-TRANSFER CHARACTERISTICS



2870° K TUNGSTEN ILLUMINATION ON TUBE FACE — FOOT-CANDLES  
92CS-9495

### TYPICAL PERSISTENCE CHARACTERISTIC



92CS-9504

ELECTRON TUBE DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

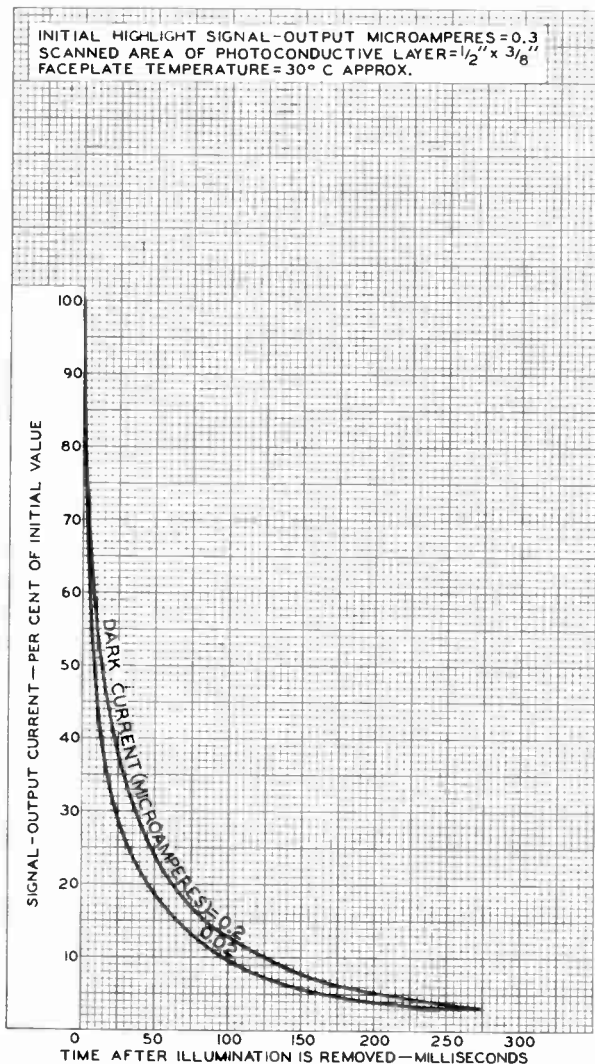
7262



7262

## TYPICAL PERSISTENCE CHARACTERISTICS

INITIAL HIGHLIGHT SIGNAL-OUTPUT MICROAMPERES = 0.3  
 SCANNED AREA OF PHOTOCONDUCTIVE LAYER =  $1/2'' \times 3/8''$   
 FACEPLATE TEMPERATURE = 30° C APPROX.







7262

7262

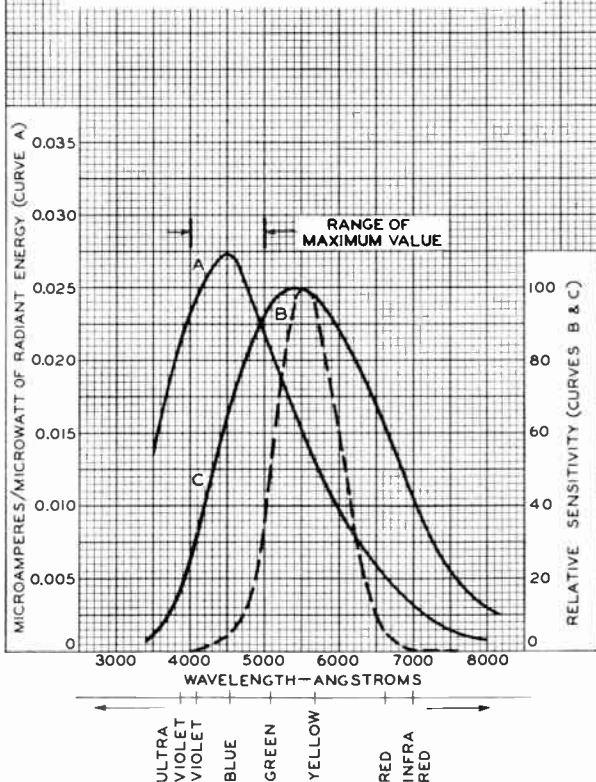
## SPECTRAL-SENSITIVITY CHARACTERISTICS

CURVE A: FOR EQUAL VALUES OF SIGNAL-  
OUTPUT CURRENT AT ALL WAVELENGTHS.

SIGNAL-OUTPUT MICROAMPERES FROM  
SCANNED AREA OF  $\frac{1}{2} \times \frac{3}{8} = 0.02$

CURVE B: SPECTRAL CHARACTERISTIC OF  
AVERAGE HUMAN EYE.

CURVE C: FOR EQUAL VALUES OF SIGNAL-  
OUTPUT CURRENT WITH RADIANT  
FLUX FROM TUNGSTEN SOURCE  
AT 2870° K.



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

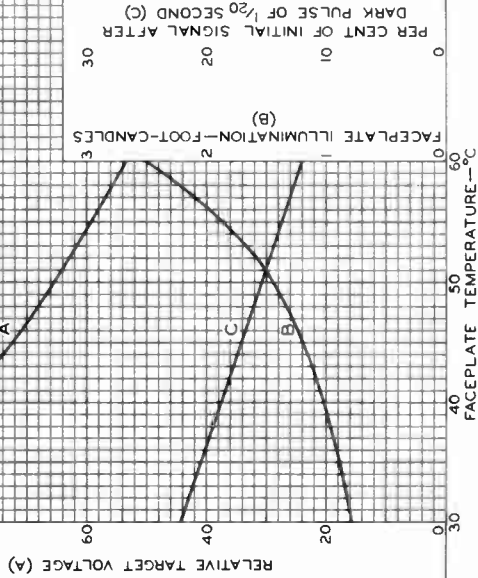
92CM-7783R2



7262

## TYPICAL CHARACTERISTICS

HIGHLIGHT SIGNAL - OUTPUT MICROAMPERES = 0.2  
 DARK CURRENT (MICROAMPERES) = 0.2  
 SCANNED AREA OF PHOTOCONDUCTIVE LAYER =  $\frac{1}{2} \times \frac{3}{8}$   
 CURVE A: RELATIVE TARGET VOLTAGE REQUIRED  
 TO MAINTAIN DARK CURRENT OF 0.2  $\mu$ A.  
 CURVE B: 2870° K INCANDESCENT ILLUMINATION  
 REQUIRED TO PRODUCE SIGNAL - OUTPUT  
 CURRENT OF 0.2  $\mu$ A.  
 CURVE C: PERSISTENCE (LAG) CHARACTERISTIC  
 FOR AN INITIAL SIGNAL-OUTPUT CURRENT  
 OF 0.2  $\mu$ A.



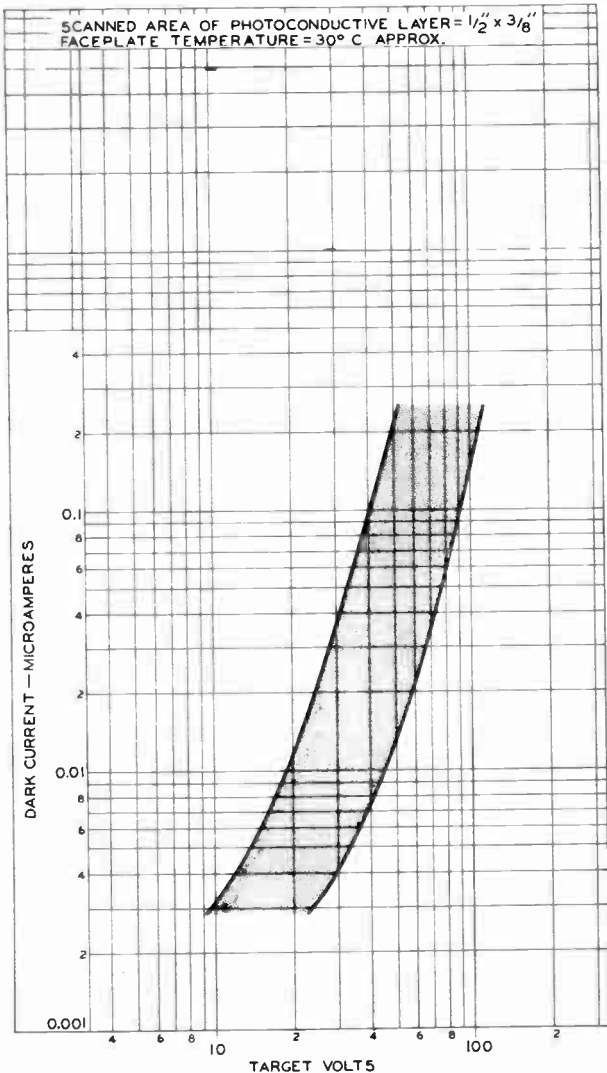


7262

7262

### DARK-CURRENT RANGE

SCANNED AREA OF PHOTOCONDUCTIVE LAYER =  $1/2 \times 3/8$ "  
FACEPLATE TEMPERATURE = 30° C APPROX.



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

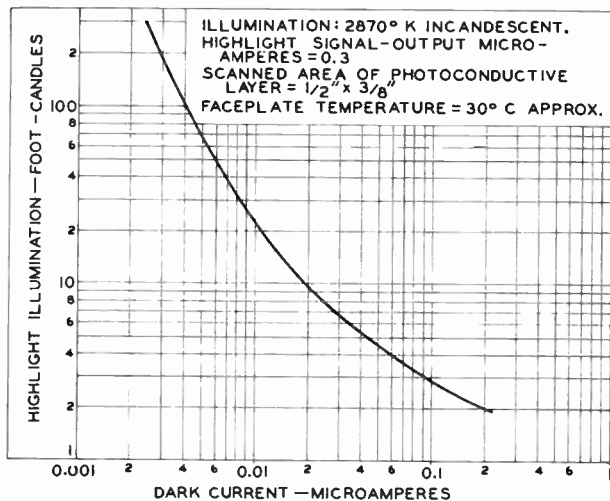
92CM-9497

7262



7262

## TYPICAL CHARACTERISTIC



92CS-9493

ELECTRON TUBE DIVISION  
 RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

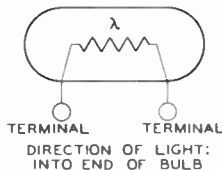
## Photoconductive Cell

## CADMIUM-SELENIDE, HEAD-ON TYPE

## DATA

## General:

Spectral Response . . . . .	See accompanying curve
Wavelength of Maximum Response . . . . .	7300 $\pm$ 500 angstroms
Sensitive Surface:	
Shape . . . . .	Rectangular
Length . . . . .	0.270" $\pm$ 0.015"
Width . . . . .	0.008" $\pm$ 0.003"
Area (Average) . . . . .	0.00178 sq. in.
Maximum Length (Excluding flexible leads) . . . . .	0.500"
Diameter . . . . .	0.29" $\pm$ 0.01"
Envelope . . . . .	Glass
Seals . . . . .	Hermetic
Leads, Flexible . . . . .	2
Minimum length . . . . .	1.5"
Diameter . . . . .	0.016" $\pm$ 0.003"
Operating Position . . . . .	Any
Weight (Approx.) . . . . .	0.04 oz.



$\lambda$  indicates that the primary characteristic of the element within the envelope symbol is designed to vary under the influence of light.

## Maximum Ratings, Absolute-Maximum Values:

VOLTAGE BETWEEN TERMINALS			
(DC or Peak AC) . . . . .	100 max.	volts	
PHOTOCURRENT . . . . .	1000 max.	$\mu$ a	
POWER DISSIPATION . . . . .	30 max.	mW	
AMBIENT TEMPERATURE . . . . .	50 max.	$^{\circ}$ C	

## Characteristics:

With DC voltage of 22.5 volts between terminals and an ambient temperature of 25 $^{\circ}$  C

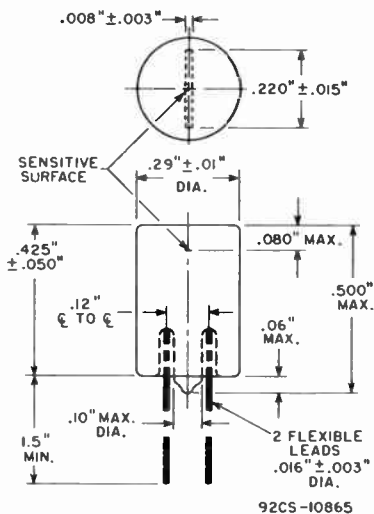
Min    Median    Max.

## Sensitivity:

Radiant $\blacktriangle$ at 7300				
angstroms . . . . .	-	6550	-	$\mu$ w
Luminous $\bullet$ $\blacktriangle$ . . . . .	-	41	-	a/lm
Illumination $\bullet$ $\blacktriangle$ . . . . .	-	500	-	$\mu$ a/fc
Photocurrent $\blacklozenge$ . . . . .	-	-	0.05	$\mu$ a



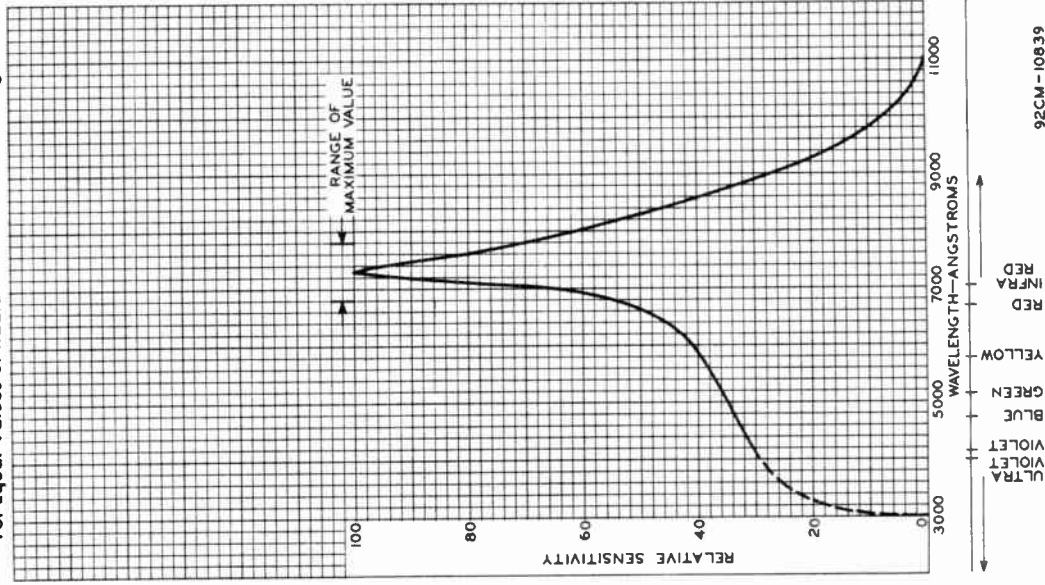
- ▲ For conditions where the incident power is  $7.65 \times 10^{-10}$  watts.
- For conditions where the light source is a tungsten-filament lamp operated at a color temperature of  $2870^{\circ}$  K.
- ★ Incident illumination on the sensitive surface is 0.01 footcandle.
- ◆ Measured 20 seconds after removal of incident-illumination level of 0.01 footcandle.



# 7846

## SPECTRAL-SENSITIVITY CHARACTERISTIC

For Equal Values of Radiant Flux at All Wavelengths



92CM-10839



RADIO CORPORATION OF AMERICA  
Electron Tube Division

DATA 2  
1-61







579-B

579-B

# HALF-WAVE HIGH-VACUUM RECTIFIER

## DATA

### Electrical:

#### Filament, Thoriated Tungsten:

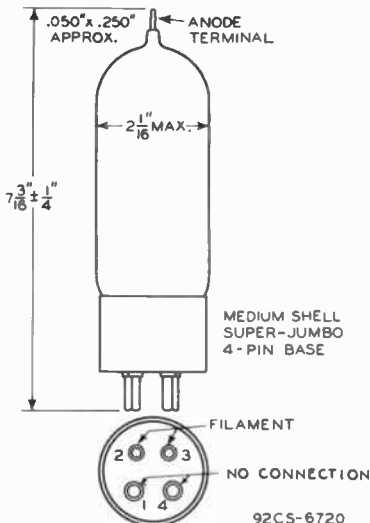
Voltage. . . . .	2.5 ± 5%	volts
Current. . . . .	6	amp

### Mechanical:

Mounting Position. . . . .	Vertical
Overall Length . . . . .	7-3/16" ± 1/4"
Maximum Diameter . . . . .	2-1/16"
Bulb . . . . .	T-16
Bulb Terminal. . . . .	See Outline Drawing
Base . . . . .	Medium Shell Super-Jumbo 4-Pin

### Maximum Ratings, Absolute Values:

PEAK INVERSE ANODE VOLTAGE . . . . .	20000 max.	volts
PEAK ANODE CURRENT . . . . .	270 max.	ma.
AVERAGE ANODE CURRENT. . . . .	25 max.	ma.
AMBIENT AIR TEMPERATURE. . . . .	50 max.	°C
BULB TEMPERATURE . . . . .	75 max.	°C



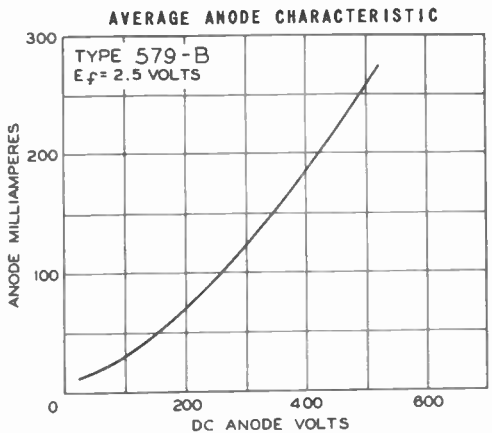
92CS-6720

579-B



579-B

# HALF-WAVE HIGH-VACUUM RECTIFIER



92CS-6719

MAY 1, 1946

TUBE DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

CE-6719



1950

1950

# VACUUM-GAUGE TUBE

SOFT-GLASS BULB, IONIZATION TYPE

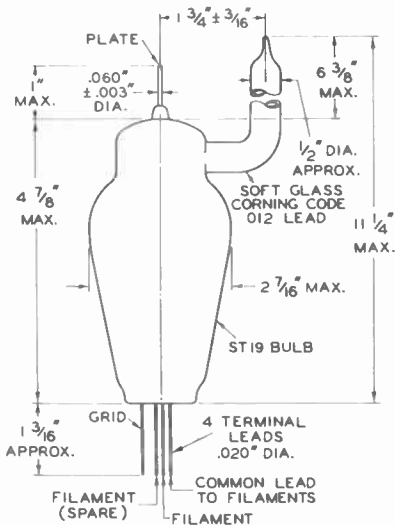
## DATA

### General:

Filament, Tungsten:	
Voltage (Approx.) . . . . .	5 . . . . . ac or dc volts
Current (Approx.) . . . . .	3.5 . . . . . amp
Maximum Tube Length (Including tubulation) . . . . .	11-1/4"
Maximum Tube Radius . . . . .	2-3/16"
Maximum Bulb Length . . . . .	4-7/8"
Maximum Bulb Diameter . . . . .	2-7/16"
Bulb . . . . .	ST-19
Tubulation . . . . .	1/2" Diameter Soft Glass, Corning Code 012 Lead
Operating Position . . . . .	Vertical, with tubulation up or down; Horizontal with stem press in vertical plane
Terminal Arrangement . . . . .	See Outline Drawing

\* The 1950 contains two filaments, one of which is a spare. Values shown are for either filament operated alone. The filament voltage should be kept as low as possible during degassing because use of a low filament voltage materially increases filament life.

Maximum Ratings, Typical Degassing Conditions, Typical Operation, Calibration and Terminal Lead Connections for the 1950 are the same as for the 1949.



92CS-6818





9004

9004

# U-H-F DIODE

ACORN TYPE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.15	amp.
Direct Interelectrode Capacitances: <sup>o</sup>		
Plate to Cathode	1.3	$\mu\mu\text{f}$
Plate to Heater	0.3 approx.	$\mu\mu\text{f}$
Heater to Cathode	2.2 approx.	$\mu\mu\text{f}$
Overall Length		1-7/32" $\pm$ 5/32"
Overall Diameter		1-3/32" $\pm$ 1/16"
Bulb		T-1 $\frac{1}{2}$
RCA Socket		Stock No. 9925
Mounting Position		Any

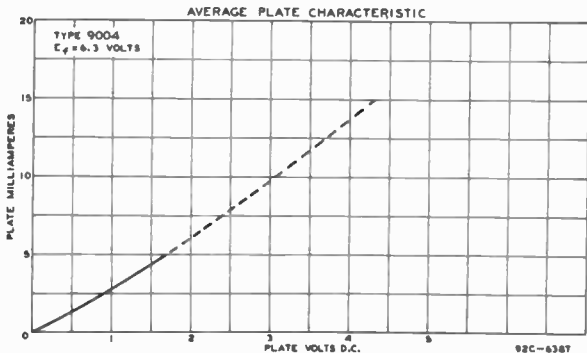
*Maximum Ratings Are Design-Center Values*

## RECTIFIER

A-C Plate Voltage (RMS)	117 max. volts
D-C Output Current	5 max. ma.

The resonant frequency of the 9004 is approximately 850 mc.

<sup>o</sup>With no external shield.

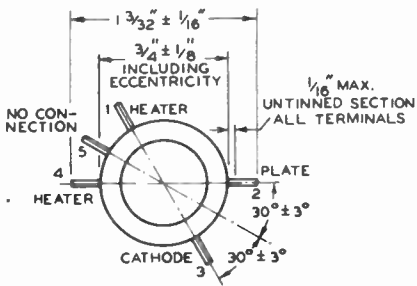
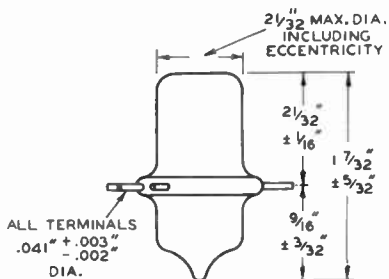


9004



9004

## U-H-F DIODE



BOTTOM VIEW

92C-6353R1

← Indicates a change.

Dec. 1, 1942

 RCA RADOTRON DIVISION  
 RCA MANUFACTURING COMPANY, INC.  
 World Radio History

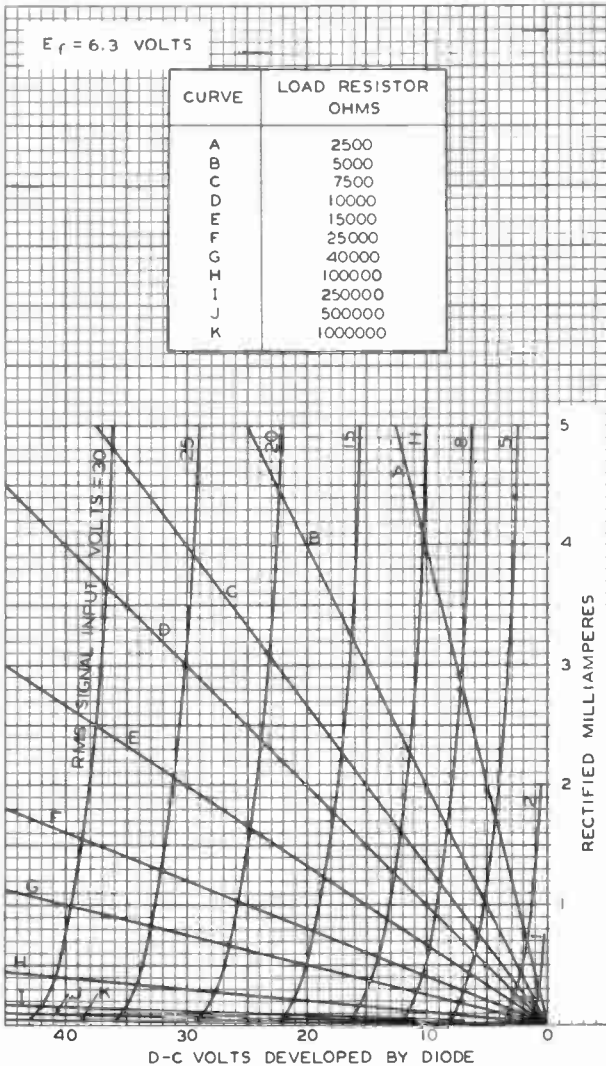
92C-6353R1



9004

9004

## AVERAGE CHARACTERISTICS



MARCH 18, 1942

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

92C-6383







2B7

2B7

# TWIN DIODE—REMOTE-CUTOFF PENTODE

Heater, for Unipotential Cathode:

Voltage. . . . .	2.5	. . . . .	ac or dc volts
Current. . . . .	0.8	. . . . .	amp

*The 2B7 is the same as the 6B7 except for heater rating.*

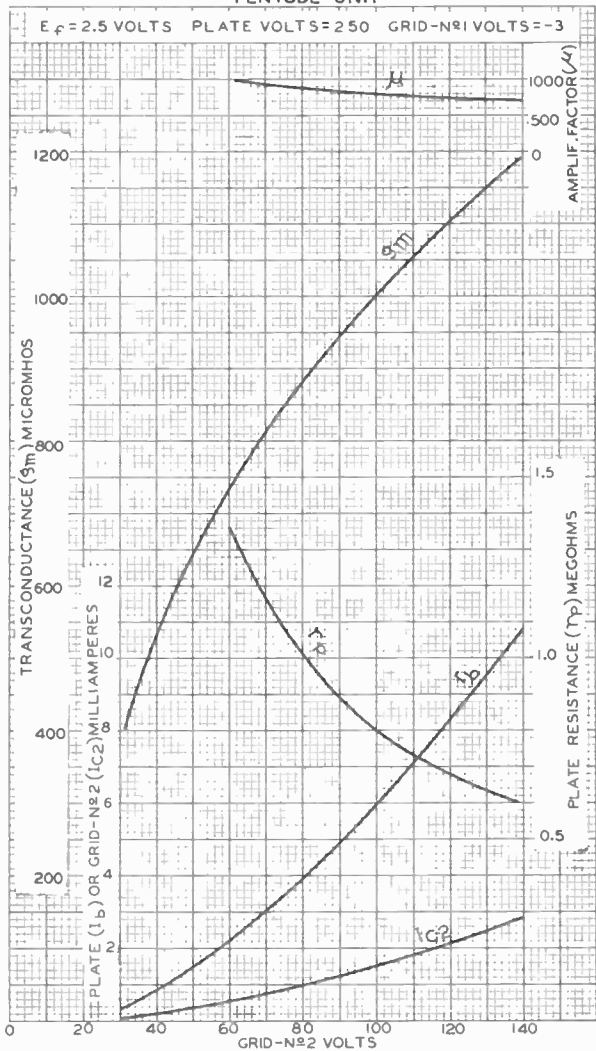
2B7



# 2B7

## AVERAGE CHARACTERISTICS

### PENTODE UNIT



FEB. 6, 1933

TUBE DEPARTMENT

92CM-5254

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

World Radio History



861

861

**SCREEN GRID R-F POWER AMPLIFIER**

Filament	Thoriated Tungsten	
Voltage	11	a-c or d-c volts
Current	10	amp.
Amplification Factor	300 approx.	
Transconductance for		
plate current of 130 ma.	2100	$\mu$ ms
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	0.10" maximum	$\mu$ f
Input	14.5	$\mu$ f
Output	10.5	$\mu$ f
Overall Length	17-3/32" $\pm$ 1/8"	
Maximum Radius	6-5/8"	
Bulb	GT-56 with arm	
Cap (opposite filament base)	No.3909	
Cap (on side of bulb)	No.3910	
Base	No.3503	
RCA End-Mountings	Types UT-10B5, UT-10B6 ←	

**MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS****R-F POWER AMPLIFIER - Class B Telephony***Carrier conditions per tube for use with a max. modulation factor of 1.0*

D-C Plate Voltage	3500 max.	volts
D-C Screen Voltage	750 max.	volts ←
D-C Plate Current	250 max.	ma.
Plate Input	600 max.	watts
Screen Input	35 max.	watts
Plate Dissipation	400 max.	watts

**Typical Operation:**

D-C Plate voltage	2500	3000	3500	volts
D-C Screen Voltage $\square$	500	500	500	volts
D-C Grid Voltage	-60	-60	-60	volts
Peak R-F Grid Voltage	250	245	215	volts
D-C Plate Current	190	175	150	ma.
D-C Grid Current $**$	4	4	4	approx.ma.
Driving Power $\square$ $**$	20	15	15	approx.watts
Power Output	140	160	175	approx.watts

 $\square$  Use of a series resistor is not recommended. $\circ$  At crest of a-f cycle with modulation factor of 1.0.**PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony***Carrier conditions per tube for use with a max. modulation factor of 1.0*

D-C Plate Voltage	3000 max.	volts
D-C Screen Voltage	750 max.	volts ←
D-C Grid Voltage	-1000 max.	volts
D-C Plate Current	300 max.	ma.
D-C Grid Current	75 max.	ma.
Plate Input	650 max.	watts
Screen Input	30 max.	watts
Plate Dissipation	270 max.	watts

 $\square$  with external shielding.  
 $**$  See next page.

← Indicates a change.

JULY 1, 1938

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY INC

DATA



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## SCREEN GRID R-F POWER AMPLIFIER

(continued from preceding page)

### Typical Operation:

D-C Plate Voltage	2000	2500	3000	volts
D-C Screen Voltage <sup>Δ</sup>	{ 30000	50000	70000	ohms
	{ 425	400	375	volts
D-C Grid Voltage ¶	{ 3900	3800	3600	ohms
	{ -250	-225	-200	volts
Peak R-F Grid Voltage	675	625	575	volts
D-C Plate Current	250	220	200	ma.
D-C Grid Current **	65	60	55	<u>approx.ma.</u>
Driving Power **	45	40	35	<u>approx.watts</u>
Power Output	285	340	400	<u>approx.watts</u>

<sup>Δ</sup> Obtained from modulated fixed supply or modulated plate-voltage supply through resistor.

¶ Obtained by grid-leak resistor or partial self-bias methods.

### R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

#### Key-down conditions per tube without modulation #

D-C Plate voltage	3500 max.	volts
D-C Screen Voltage	750 max.	volts
D-C Grid voltage	-1000 max.	volts
D-C Plate Current	350 max.	ma.
D-C Grid Current	75 max.	ma.
Plate Input	1200 max.	watts
Screen Input	35 max.	watts
Plate Dissipation	400 max.	watts

### Typical Operation:

D-C Plate Voltage	2000	3000	3500	volts
D-C Screen Voltage <sup>□</sup>	500	500	500	volts
D-C Grid Voltage •	{ 6300	6300	6300	ohms
	{ -250	-250	-250	volts
Peak R-F Grid Voltage	725	725	725	volts
D-C Plate Current	300	300	300	ma.
D-C Screen Current	50	50	40	ma.
D-C Grid Current **	40	40	40	<u>approx.ma.</u>
Driving Power **	30	30	30	<u>approx.watts</u>
Power Output	400	600	700	<u>approx.watts</u>

• Obtained by grid-leak resistor or other fixed- or self-bias method.

□ Use of series resistor is not recommended.

# Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

\*\* Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

For use of the 861 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

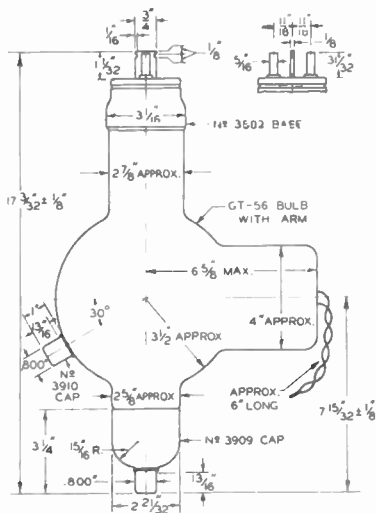
◁ Indicates a change.



861

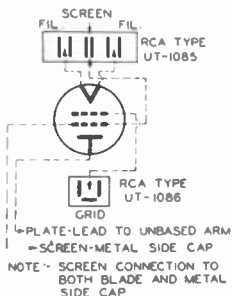
861

# SCREEN GRID R-F POWER AMPLIFIER



925-4324

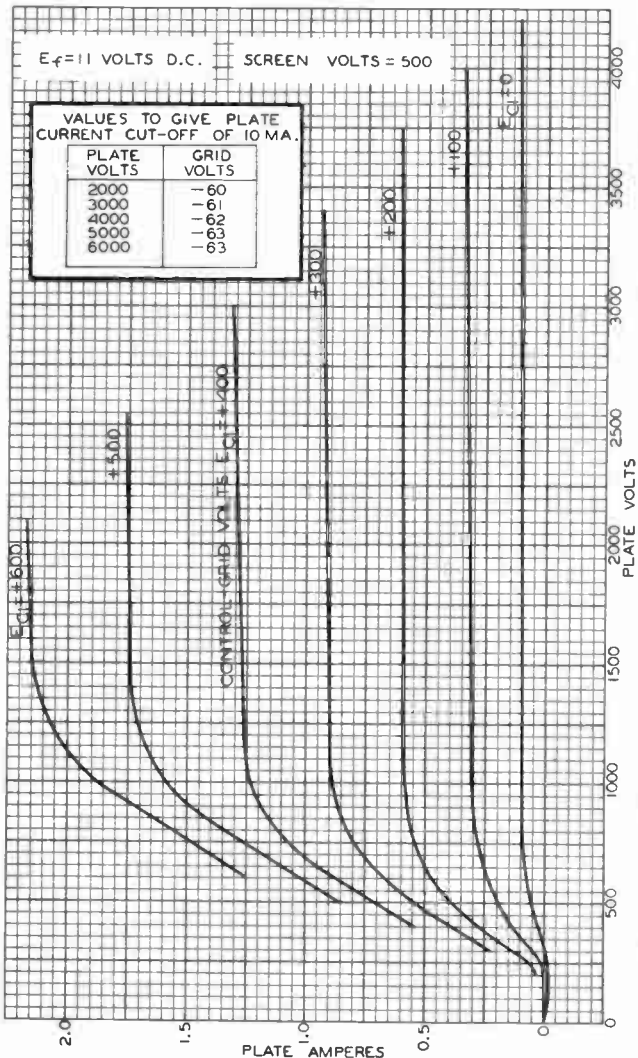
## TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS



APR. 18, 1933 (9-36)



## AVERAGE PLATE CHARACTERISTICS





862-A

862-A

## TRANSMITTING TRIODE

### WATER & FORCED-AIR COOLED

#### GENERAL DATA

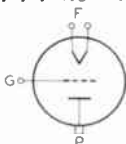
#### Electrical:

Filament: Tungsten  
 Voltage . . . . . 33 . . . . . a-c or d-c volts  
 Current . . . . . 207 . . . . . amp.  
 Starting - The current should never exceed 400 amperes, even momentarily.

Amplification Factor. . . . . 45  
 Direct Interelectrode Capacitances (Approx.):  
 Grid to Plate . . . . . 70 . . . . .  $\mu\text{f}$   
 Grid to Filament. . . . . 53 . . . . .  $\mu\text{f}$   
 Plate to Filament . . . . . 4.5 . . . . .  $\mu\text{f}$

#### Physical:

Terminal Legend:  
 F - Stranded Filament Terminal  
 G - Ribbon Grid Terminal



P - Water-cooled Plate Terminal

Mounting Position . . . . . Vertical only, glass end up  
 Maximum Overall Length. . . . . 60-3/8"  
 Greatest Radius . . . . . 10"  
 Base (with nozzle for air-cooling of filament seal) No. 3908  
 Water Jacket (with nozzle for air-cooling of bulb) Type UT-1289-A  
 Gasket. . . . . RCA Stock No. 17879

Cooling - Water flow of 15 to 25 gallons per minute must start before application of any voltages and continue for at least 10 minutes after removal of all voltages. Water temperature must not exceed 70°C at socket outlet under any conditions of operation. Air flow of 15 cubic feet per minute in bulb nozzle and 3 cubic feet per minute in filament-seal nozzle is required before the application of any voltages and must continue for at least 10 minutes after removal of voltages to limit the glass temperature to 150°C at the hottest part.

*This tube can often be operated at reduced filament voltage as explained on sheet TYPES OF CATHODES in General Section.*

#### A-F POWER AMPLIFIER & MODULATOR - Class B

#### Maximum Ratings, Absolute Values:

D-C PLATE VOLTAGE . . . . . 15000 max. . . volts  
 MAX.-SIGNAL D-C PLATE CURRENT\* . . . . . 7.5 max. . . amp.  
 MAX.-SIGNAL PLATE INPUT\* . . . . . 100 max. . . kw  
 PLATE DISSIPATION\* . . . . . 50 max. . . kw

#### Typical Operation:

*Unless otherwise specified, values are for 2 tubes*

D-C Plate Voltage . . . . . 12000 . . . volts  
 D-C Grid Voltage<sup>o</sup> . . . . . 0 . . . volts  
 Peak A-F Grid-to-Grid Voltage . . . . . 2000 . . . volts  
 Zero-Signal D-C Plate Current . . . . . 3 . . . amp.  
 Max.-Signal D-C Plate Current . . . . . 13 . . . amp.  
 Effective Load Res. (plate to plate). . . . . 1800 . . . ohms  
 Max.-Signal Driving Power . . . . . 450 approx. watts  
 Max.-Signal Power Output. . . . . 90 approx. kw

\* Averaged over any audio-frequency cycle of sine-wave form.  
<sup>o</sup> For a-c filament supply.

MAR. 30, 1945

RCA VICTOR DIVISION  
 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY  
 World Radio History

DATA 1

862-A



862-A

## TRANSMITTING TRIODE

(continued from preceding page)

### R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

#### Maximum Ratings, Absolute Values:

D-C PLATE VOLTAGE . . . . .	20000 max.	. volts
D-C PLATE CURRENT . . . . .	5 max.	. amp.
PLATE INPUT . . . . .	100 max.	. kw
PLATE DISSIPATION . . . . .	75 max.	. kw

#### Typical Operation:

D-C Plate Voltage . . . . .	12000	15000	18000	. . . volts
D-C Grid Voltage <sup>o</sup> . . . . .	-100	-150	-200	. . . volts
Peak R-F Grid Voltage . . . . .	500	625	750	. . . volts
D-C Plate Current . . . . .	2.8	3.5	4.2	. . . amp.
Driving Power # ** . . . . .	0.5	0.75	1.1	<u>approx. kw</u>
Power Output. . . . .	11	17.5	25	<u>approx. kw</u>

\*\* At crest of a-f cycle with modulation factor of 1.0.  
<sup>o</sup> For a-c filament supply.

### PLATE MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

#### Maximum Ratings, Absolute Values:

D-C PLATE VOLTAGE . . . . .	12000 max.	. volts
D-C GRID VOLTAGE. . . . .	-3000 max.	. volts
D-C PLATE CURRENT . . . . .	5 max.	. amp.
D-C GRID CURRENT. . . . .	1.25 max.	. amp.
PLATE INPUT . . . . .	60 max.	. kw
PLATE DISSIPATION . . . . .	50 max.	. kw

#### Typical Operation:

D-C Plate Voltage . . . . .	8000	10000	12000	. . . volts
D-C Grid Voltage. . . . .	-700	-750	-800	. . . volts
Peak R-F Grid Voltage . . . . .	1700	1850	2000	. . . volts
D-C Plate Current . . . . .	4	4.5	5	. . . amp.
D-C Grid Current # . . . . .	1	1	1	<u>approx. amp.</u>
Driving Power # . . . . .	1.7	1.85	2	<u>approx. kw</u>
Power Output. . . . .	24	34	45	<u>approx. kw</u>

### R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation\*\*

#### Maximum Ratings, Absolute Values:

D-C PLATE VOLTAGE . . . . .	20000 max.	. volts
D-C GRID VOLTAGE. . . . .	-3000 max.	. volts
D-C PLATE CURRENT . . . . .	10 max.	. amp.
D-C GRID CURRENT. . . . .	1 max.	. amp.
PLATE INPUT . . . . .	200 max.	. kw
PLATE DISSIPATION . . . . .	100 max.	. kw

#, ##: See next page.

MAR. 30, 1945

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

DATA 1





862-A

862-A

# TRANSMITTING TRIODE

(continued from preceding page)

## Typical Operation:

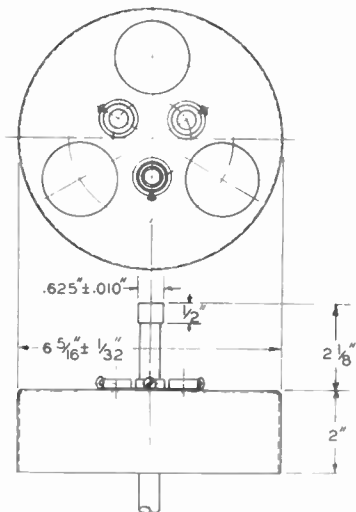
D-C Plate Voltage . . . . .	12000	15000	18000	
D-C Grid Voltage . . . . .	-800	-900	-1000	. . . volts
Peak R-F Grid Voltage . . . . .	2050	2300	2550	. . . volts
D-C Plate Current . . . . .	6.25	7.5	8.33	. . . volts
D-C Grid Current # . . . . .	0.8	0.85	0.9	approx. amp.
Driving Power # . . . . .	1.6	2	2.4	approx. kw
Power Output . . . . .	50	75	100	approx. kw

\* Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

\*\*Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

Data on operating frequencies for the 862-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

## № 3908 BASE OUTLINE



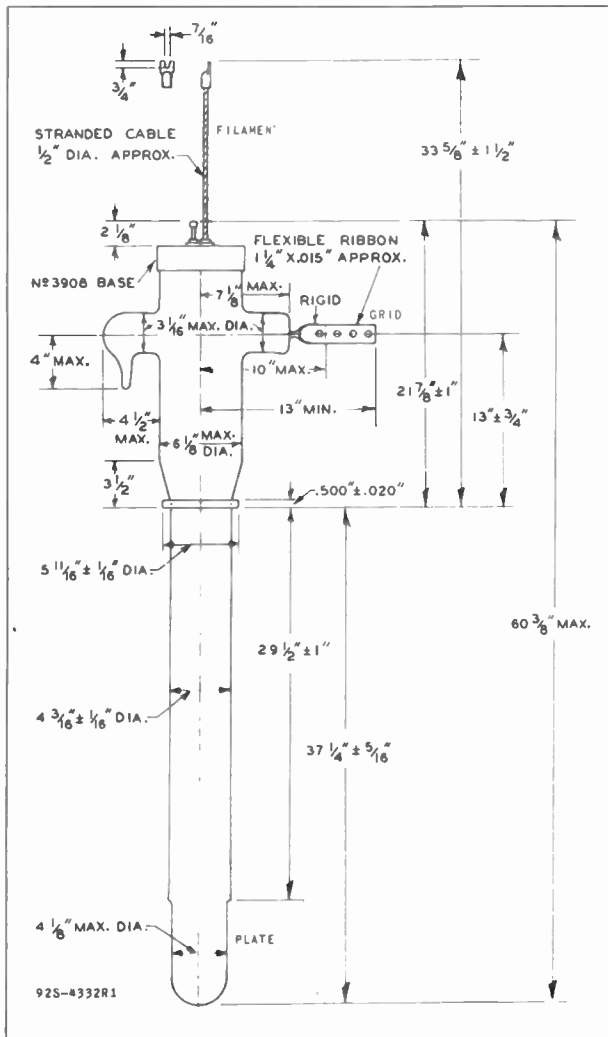
92CS-6577

862-A



862-A

## TRANSMITTING TRIODE



MAR. 30, 1945

 RCA VICTOR DIVISION  
 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

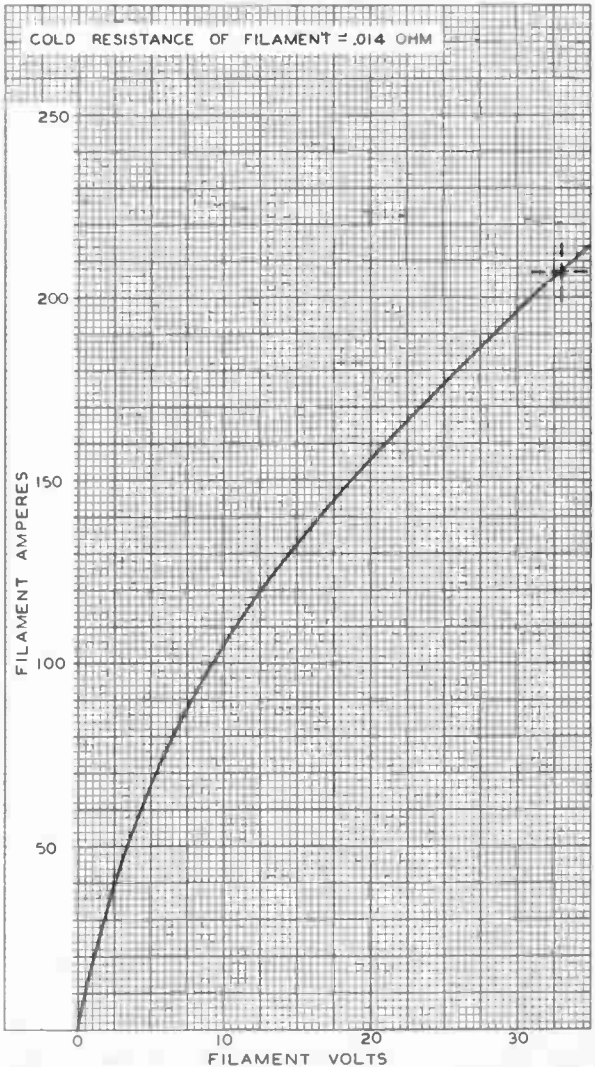
DATA 2



862-A

862-A

### AVERAGE FILAMENT CHARACTERISTIC



FEB. 1, 1945

RCA VICTOR DIVISION

92CM-4461R1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

862-A



862-A

## TRANSMITTING TRIODE

ADDITIONAL CURVES  
FOR THE 862-A ARE THE SAME AS  
THOSE FOR TYPE 898-A

MAR. 30, 1945

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

CURVES



865

865

**SCREEN GRID R-F POWER AMPLIFIER**

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	2.0	amp.
Amplification Factor	150 approx.	
Mutual Conductance for plate current of 18 ma.	750	μhos
Direct Interelectrode Capacitances:		
Grid to Plate	0.10*maximum	μf
Input	8.5	μf
Output	8.0	μf
Maximum Overall Length		5-3/4"
Maximum Diameter		2-1/16"
Bulb		ST-16
Cap		Small Metal
Base		Medium 4-Pin Bayonet

**MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS**R-F POWER AMPLIFIER—Class B (Telephony)*Carrier conditions per tube for use with a max. modulation fact. of 1.0*

D-C Plate Voltage	750 max.	volts
D-C Screen Voltage	175 max.	volts
D-C Plate Current	30 max.	ma.
R-F Grid Current	4 max.	amp.
Plate Input	22.5 max.	watts
Screen Input	3 max.	watts
Plate Dissipation	15 max.	watts

Typical Operation:

Filament Voltage	7.5	7.5	a-c volts
D-C Plate Voltage	500	750	volts
D-C Screen Voltage	125	125	volts
D-C Grid Voltage	-30	-30	volts
D-C Plate Current	30	22	ma.
D-C Grid Current	5	3	approx. ma.
Driving Power <sup>o</sup> **	2	1.5	approx. watts
Power Output	3	4.5	approx. watts

<sup>o</sup> At crest of a-f cycle with modulation factor of 1.0.PLATE-MODULATED R-F POWER AMPLIFIER—Class C Telephony*Carrier conditions per tube for use with a max. modulation fact. of 1.0*

D-C Plate Voltage	500 max.	volts
D-C Screen Voltage	175 max.	volts
D-C Grid Voltage	-200 max.	volts
D-C Plate Current	60 max.	ma.
D-C Grid Current	15 max.	ma.
R-F Grid Current	4 max.	amp.

\* With external shielding.

\*\* See next page.

(continued on next page)

SEPT. 30, 1936

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.  
World Radio History

DATA



## SCREEN GRID R-F POWER AMPLIFIER

(continued from preceding page)

Plate Input		30 max.	watts
Screen Input		2 max.	watts
Plate Dissipation		10 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5	a-c volts
D-C Plate Voltage	375	500	volts
D-C Screen Voltage	125	125	volts
D-C Grid Voltage	-120	-120	volts
D-C Plate Current	50	40	ma.
D-C Grid Current **	11	9	<u>approx.ma.</u>
Driving Power **	3	2.5	<u>approx.watts</u>
Power Output	8.5	10	<u>approx.watts</u>

### R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage		750 max.	volts		
D-C Screen Voltage		175 max.	volts		
D-C Grid Voltage		-200 max.	volts		
D-C Plate Current		60 max.	ma.		
D-C Grid Current		15 max.	ma.		
R-F Grid Current		5 max.	amp.		
Plate Input		45 max.	watts		
Screen Input		3 max.	watts		
Plate Dissipation		15 max.	watts		
Typical Operation:					
Filament Voltage	7.5	7.5	7.5	7.5	a-c volts
D-C Plate Voltage	375	500	625	750	volts
D-C Screen Voltage	125	125	125	125	volts
D-C Grid Voltage	-80	-80	-80	-80	volts
D-C Plate Current	55	50	45	40	ma.
D-C Grid Current **	11	9	6	5.5	<u>approx.ma.</u>
Driving Power **	2.5	2.0	1.2	1.0	<u>approx.watts</u>
Power Output	8.5	10	14	16	<u>approx.watts</u>

\*\* Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

# Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

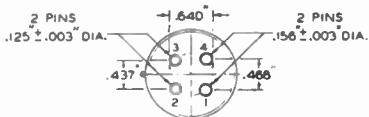
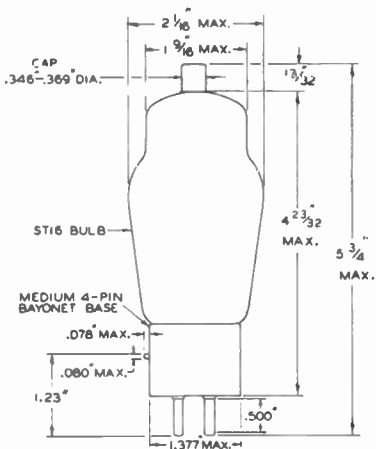
For use of the 865 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs. FREQUENCY.



865

865

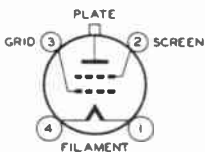
# SCREEN GRID R-F POWER AMPLIFIER



BOTTOM VIEW OF BASE

925-4272R3

TUBE SYMBOL & TOP VIEW  
OF  
SOCKET CONNECTIONS

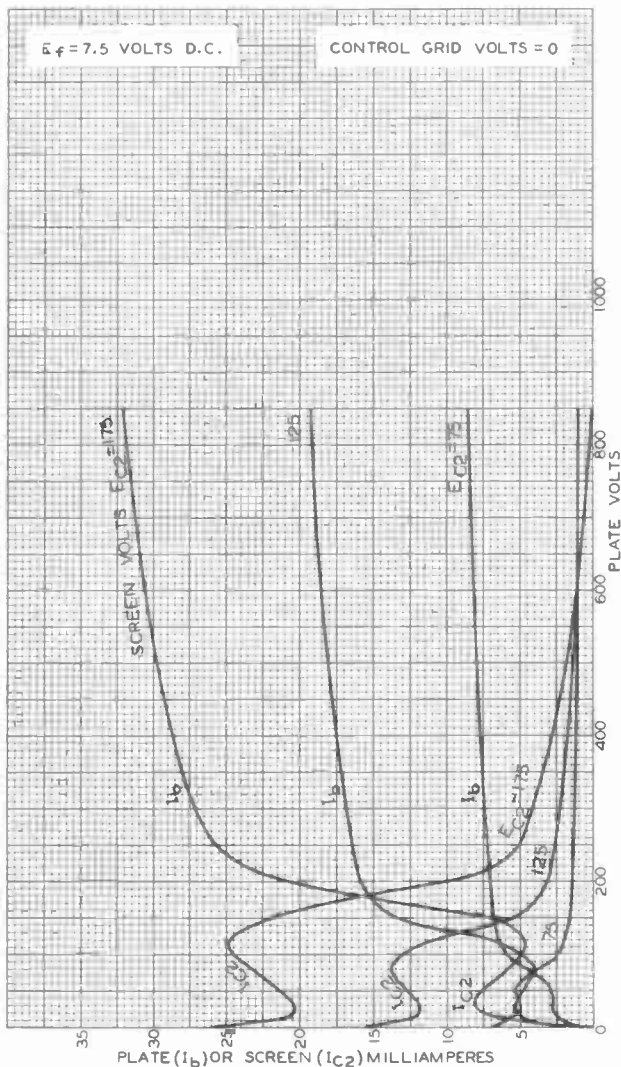


865



865

## AVERAGE PLATE CHARACTERISTICS



MAY 10, 1935

RCA RADIIOTRON DIVISION

925-5498RI

RCA MANUFACTURED BY Sylvania Electric Products, Inc.

World Radio History





8012-A

8012-A

# U-H-F TRANSMITTING TRIODE

The 8012-A supersedes the Type 8012.

## GENERAL DATA

### Electrical:

Filament, Thoriated Tungsten:\*\*

Voltage. . . . . 6.3 . . . . . ac or dc volts

Current. . . . . 1.92 . . . . . amp.

Amplification Factor . . . . . 18

Direct Interelectrode Capacitances:

Grid to Plate. . . . . 2.5 . . . . .  $\mu\text{mf}$

Grid to Filament . . . . . 2.7 . . . . .  $\mu\text{mf}$

Plate to Filament . . . . . 0.4 . . . . .  $\mu\text{mf}$

### Mechanical:

Mounting Position. . . . . Vertical Only

Cooling - *Forced-Air Cooling* is required when plate dissipation exceeds 75% of the rated value.

Maximum Overall Length (Excluding Flexible Leads). . . 3-15/16"

Greatest Radius. . . . . 1-1/8"  $\pm$  1/16"

Bulb . . . . . T-8

Terminal Connections . . . . . See Outline Drawing

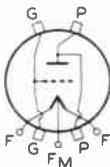
F - Filament

G - Grid

F<sub>M</sub> - Filament

P - Plate

Mid-Tap



G TERMINALS NEARER FILAMENT LEADS  
P TERMINALS NEARER BULB TIP

## GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

### Maximum Ratings, Absolute Values:

CCS<sup>■</sup>

D-C PLATE VOLTAGE. . . . . 1000 max. . . volts

D-C GRID VOLTAGE . . . . . -200 max. . . volts

D-C PLATE CURRENT. . . . . 65 max. . . ma.

PLATE INPUT. . . . . 50 max. . . watts

PLATE DISSIPATION. . . . . 40 max. . . watts

### Typical Operation:

D-C Plate Voltage. . . . . 1000 . . . . . volts

D-C Grid Voltage <sup>□</sup> . . . . . { -135 . . . . . volts

2500 . . . . . ohms

Peak R-F Grid Voltage. . . . . 155 . . . . . volts

Peak A-F Grid Voltage. . . . . 65 . . . . . volts

D-C Plate Current. . . . . 50 . . . . . ma.

D-C Grid Current \* . . . . . 4 approx. . ma.

Driving Power \*<sup>▲</sup> . . . . . 3.5 approx. watts

Power Output . . . . . 20 approx. watts

□, ▲: See next page. ■, \*, \*\*: See end of tabulation.

Nov. 15, 1945

RCA VICTOR DIVISION

DATA 1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History



## 8012-A

## U-H-F TRANSMITTING TRIODE

(continued from preceding page)

- Obtained from fixed supply or by cathode resistor of value shown.  
 ▲ At crest of audio-frequency cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, Absolute Values:	CCS <sup>■</sup>	
D-C PLATE VOLTAGE. . . . .	800 max.	. . . . volts
D-C GRID VOLTAGE . . . . .	-200 max.	. . . . volts
D-C PLATE CURRENT. . . . .	65 max.	. . . . ma.
D-C GRID CURRENT . . . . .	20 max.	. . . . ma.
PLATE INPUT. . . . .	33 max.	. . . . watts
PLATE DISSIPATION. . . . .	27 max.	. . . . watts

## Typical Operation:

D-C Plate Voltage. . . . .	800	. . . . volts
D-C Grid Voltage † . . . . .	-105	. . . . volts
		10000
Peak R-F Grid Voltage. . . . .	145	. . . . volts
D-C Plate Current. . . . .	40	. . . . ma.
D-C Grid Current*. . . . .	10.5	approx. . ma.
Driving Power* . . . . .	1.4	approx. watts
Power Output . . . . .	22	approx. watts

- † Obtained preferably from grid resistor of value shown, or combination of grid resistor with either fixed supply or suitably by-passed cathode resistor.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation †

Maximum Ratings, Absolute Values:	CCS <sup>■</sup>	
D-C PLATE VOLTAGE. . . . .	1000 max.	. . . . volts
D-C GRID VOLTAGE . . . . .	-200 max.	. . . . volts
D-C PLATE CURRENT. . . . .	80 max.	. . . . ma.
D-C GRID CURRENT . . . . .	20 max.	. . . . ma.
PLATE INPUT. . . . .	50 max.	. . . . watts
PLATE DISSIPATION. . . . .	40 max.	. . . . watts

## Typical Operation:

D-C Plate Voltage. . . . .	1000	. . . . volts	
D-C Grid Voltage <sup>○</sup> . . . . .	-90	. . . . volts	
		6400	. . . . ohms
		1400	. . . . ohms
Peak R-F Grid Voltage. . . . .	130	. . . . volts	
D-C Plate Current. . . . .	50	. . . . ma.	
D-C Grid Current* . . . . .	14	approx. . ma.	
Driving Power* . . . . .	1.6	approx. watts	
Power Output . . . . .	35	approx. watts	

†, ○, \*: See next page.

■ CCS = Continuous Commercial Service.



8012-A

# 8012-A

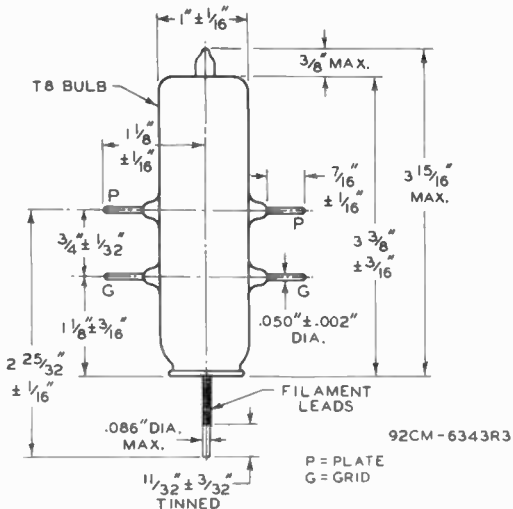
## U-H-F TRANSMITTING TRIODE

(continued from preceding page)

- O Obtained from fixed supply, or grid resistor (6400), or by cathode resistor (1400). When the 8012-A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 1000 volts a fixed bias of at least -40 volts should be used.
- \*\* The filament is center-tapped and the center lead is brought out of the tube. With this design, it is possible to minimize the effect of filament lead inductance by connecting all three filament leads in parallel through r-f by-pass capacitors. The center-lead of this parallel connection should not be returned directly to the center-tap of the filament-transformer winding or to ground, although it may be by-passed to either of these points if desired.
- \* Subject to wide variations as explained on sheet TUBE RATINGS in General Section.
- # Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

The 8012-A may be operated with maximum ratings at frequencies up to 500 megacycles but as the frequency is raised, the efficiency and power output fall off. At 600 megacycles an efficiency of about 35% can be expected. Since the efficiency at 600 megacycles is relatively low, the plate of the 8012-A has been designed to have an unusually high dissipation rating.

Data on operating frequencies for the 8012-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.



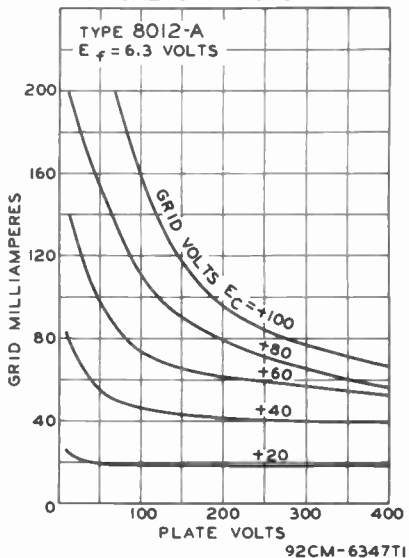
8012-A



8012-A

# U-H-F TRANSMITTING TRIODE

## TYPICAL CHARACTERISTICS

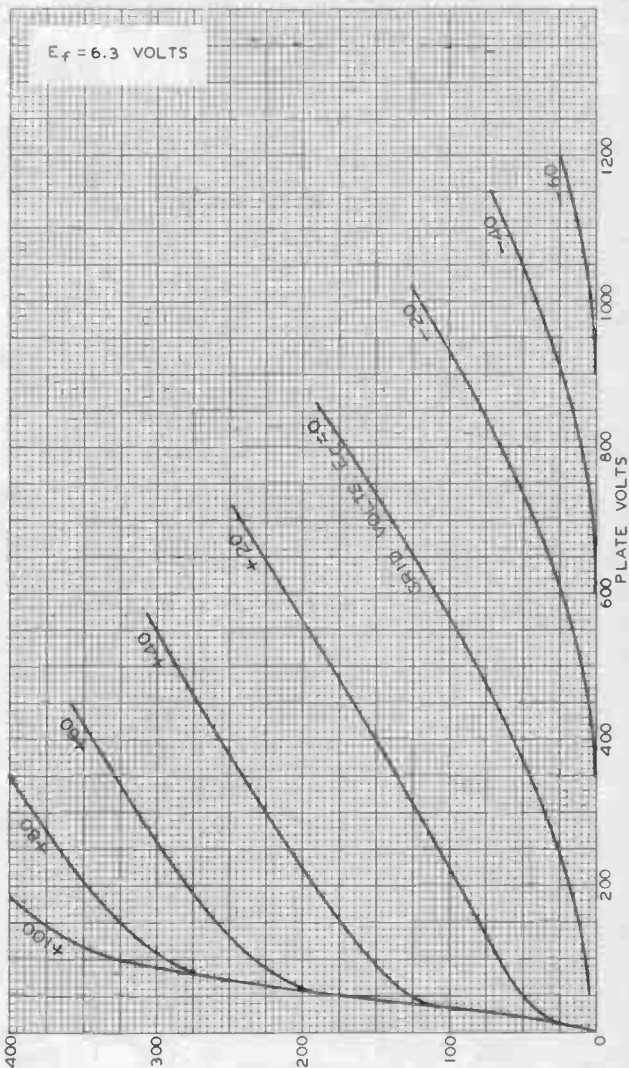




8012-A

8012-A

### AVERAGE PLATE CHARACTERISTICS



DEC. 1, 1943

PLATE MILLIAMPERES

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA HAZLETON, NEW JERSEY

92CM-6346





8014-A

8014-A

# TRANSMITTING TRIODE

FOPCFD-AIR COOLED

Intended especially for pulsed operation

## GENERAL DATA

### Electrical:

Filament, Thoriated Tungsten:

Voltage. . . . . 15.0 . . . . . ac volts

Current. . . . . 14.5 . . . . . amp

Starting Current: The filament current must never exceed, even momentarily, a value of 30 amperes

Peak Filament Emission . . . 50 (approx.) . . . . . amp

Amplification Factor . . . . . 30

Direct Interelectrode Capacitances (Approx.):

Grid to Plate. . . . . 4.4 . . . . .  $\mu\mu\text{f}$

Grid to Filament . . . . . 4:6 . . . . .  $\mu\mu\text{f}$

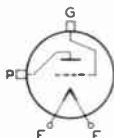
Plate to Filament. . . . . 3.2 . . . . .  $\mu\mu\text{f}$

### Mechanical:

Terminal Connections:

F - Filament

G - Grid Cap Terminal



P - Plate Terminal  
(Air-Cooled Radiator)

Mounting Position. . . Vertical only, Filament or Grid End Up

Overall Length . . . . . 8-17/32"  $\pm$  3/16"

Diameter . . . . . 1-7/8"  $\pm$  1/32"

Radiator . . . . . Integral Part of Tube

Cooling: Air should be delivered in sufficient quantity to the radiator to limit the temperature of the radiator to the rated maximum value. In addition, a small amount of cooling air is required on the filament. Air-flow must start before the application of any voltages.

### Maximum Ratings, Absolute Values:

DC PLATE VOLTAGE#. . . . . 13500 max. volts

DC GRID VOLTAGE. . . . . -3000 max. volts

PLATE DISSIPATION. . . . . 400 max. watts

RADIATOR TEMPERATURE<sup>▲</sup> . . . . . 180 max. °C

# The maximum value of filter capacitor permitted directly at the tube and its rf circuit is 1.0  $\mu\text{f}$ . A series resistance of at least 15000 ohms must be used between this capacitor and the high-voltage supply.

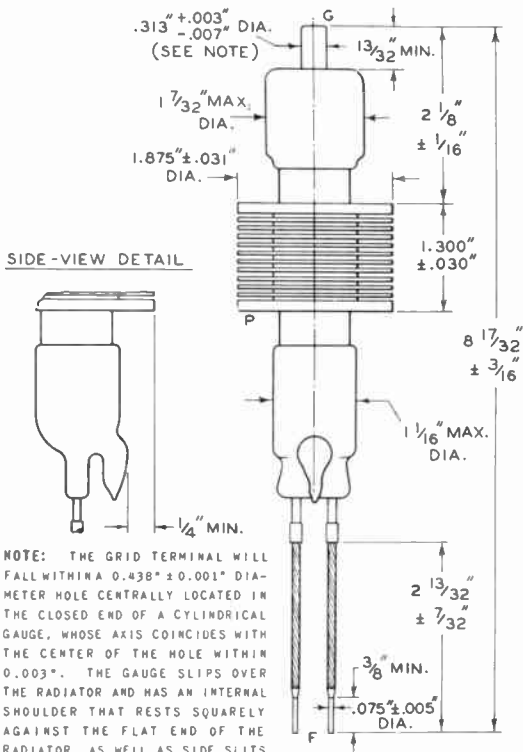
▲ Measured outside of air blast on outer fin of radiator near plate.

8014-A



8014-A

## TRANSMITTING TRIODE



**NOTE:** THE GRID TERMINAL WILL FALL WITHIN A  $0.438 \pm 0.001$ " DIAMETER HOLE CENTRALLY LOCATED IN THE CLOSED END OF A CYLINDRICAL GAUGE, WHOSE AXIS COINCIDES WITH THE CENTER OF THE HOLE WITHIN  $0.003$ ". THE GAUGE SLIPS OVER THE RADIATOR AND HAS AN INTERNAL SHOULDER THAT RESTS SQUARELY AGAINST THE FLAT END OF THE RADIATOR, AS WELL AS SIDE SLITS

EXTENDING APPROXIMATELY  $\frac{1}{2}$ " ABOVE THE INTERNAL SHOULDER TO INSURE SPRING FIT OVER THE RADIATOR. THE INNER SURFACE OF THE CLOSED END OF THE GAUGE IS  $1.812 + 0.010 - 0.000$ " FROM THE SHOULDER SURFACE WHICH RESTS AGAINST THE FLAT END OF THE RADIATOR. THE CLOSED END OF THE GAUGE IS  $0.438 \pm 0.010$ " THICK.

92CM-6363R1





8025-A

8025-A

# U-H-F TRANSMITTING TRIODE

The 8025-A supersedes the Type 8025.

## GENERAL DATA

### Electrical:

Filament, Thoriated Tungsten:\*\*

Voltage . . . . . 6.3 . . . . . ac or dc volts

Current . . . . . 1.92 . . . . . amp.

Amplification Factor . . . . . 18

Direct Interelectrode Capacitances:

Grid to Plate . . . . . 3.0 . . . . .  $\mu$ f

Grid to Filament . . . . . 2.7 . . . . .  $\mu$ f

Plate to Filament . . . . . 0.4 . . . . .  $\mu$ f

### Mechanical:

Mounting Position . . . . . Vertical Only: Base up or down

Cooling—Requirements are indicated under MAXIMUM RATINGS for each class of service. *Natural Cooling* means that adequate free circulation of air around the tube is necessary. When *Forced-Air Cooling* is required, an air flow from a fan should be directed on the bulb.

Maximum Overall Length . . . . . 4-15/16"

Maximum Seated Length . . . . . 4-5/15"

Greatest Radius . . . . . 1-1/64"  $\pm$  1/16"

Bulb . . . . . T-8

Caps (Four) . . . . . Saddle Skirted Miniature, with Nub

Base . . . . . Small 4-Pin, Micanol

Basing Designation for BOTTOM VIEW . . . . . 3M

Pin 1—Filament

Pin 2—No Con.

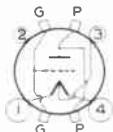
Pin 3—Filament

Mid-Tap

Pin 4—Filament

G—Grid

P—Plate



G CAPS NEARER BASE  
P CAPS NEARER BULB TIP

## GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

### Maximum Ratings, Absolute Values:

	Forced-Air Cooling CCS <sup>A</sup>	Natural Cooling ICAS <sup>A</sup>
D-C PLATE VOLTAGE . . . . .	1000 max.	1000 max. volts
D-C GRID VOLTAGE . . . . .	-200 max.	-200 max. volts
D-C PLATE CURRENT . . . . .	65 max.	65 max. ma.
PLATE INPUT . . . . .	60 max.	50 max. watts
PLATE DISSIPATION . . . . .	40 max.	30 max. watts

### Typical Operation:

D-C Plate Voltage . . . . .	1000	volts
D-C Grid Voltage <sup>□</sup> . . . . .	{ -135	volts
	{ 2500	ohms

<sup>□</sup>: See next page. <sup>A</sup>, <sup>\*\*</sup>: See end of tabulation.

8025-A



8025-A

# U-H-F TRANSMITTING TRIODE

(continued from preceding page)

Peak R-F Grid Voltage . . . . .	155 . . . . .	volts
Peak A-F Grid Voltage . . . . .	65 . . . . .	volts
D-C Plate Current . . . . .	50 . . . . .	ma.
D-C Grid Current* . . . . .	4 approx.	ma.
Driving Power ■ * . . . . .	3.5 approx.	watts
Power Output . . . . .	20 approx.	watts

- Obtained from fixed supply or by cathode resistor of value shown.
- At crest of audio-frequency cycle with modulation factor of 1.0.

## PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

### Maximum Ratings, Absolute Values:

	Forced-Air Cooling CCS <sup>▲</sup>	Natural Cooling ICAS <sup>▲</sup>
D-C PLATE VOLTAGE . . . . .	800 max.	800 max. volts
D-C GRID VOLTAGE . . . . .	-200 max.	-200 max. volts
D-C PLATE CURRENT . . . . .	65 max.	65 max. ma.
D-C GRID CURRENT . . . . .	20 max.	20 max. ma.
PLATE INPUT . . . . .	50 max.	33 max. watts
PLATE DISSIPATION . . . . .	27 max.	20 max. watts

### Typical Operation:

D-C Plate Voltage . . . . .	800 . . . . .	volts	
D-C Grid Voltage † . . . . .	{	-105 . . . . .	volts
		10000 . . . . .	ohms
Peak R-F Grid Voltage . . . . .	145 . . . . .	volts	
D-C Plate Current . . . . .	40 . . . . .	ma.	
D-C Grid Current* . . . . .	10.5 approx.	ma.	
Driving Power* . . . . .	1.4 approx.	watts	
Power Output . . . . .	22 approx.	watts	

† Obtained preferably from grid resistor of value shown, or combination of grid resistor with either fixed supply or suitably by-passed cathode resistor.

## R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation †

### Maximum Ratings, Absolute Values:

	Forced-Air Cooling CCS <sup>▲</sup>	Natural Cooling ICAS <sup>▲</sup>
D-C PLATE VOLTAGE . . . . .	1000 max.	1000 max. volts
D-C GRID VOLTAGE . . . . .	-200 max.	-200 max. volts
D-C PLATE CURRENT . . . . .	80 max.	80 max. ma.
D-C GRID CURRENT . . . . .	20 max.	20 max. ma.
PLATE INPUT . . . . .	75 max.	50 max. watts
PLATE DISSIPATION . . . . .	40 max.	30 max. watts

■, ▲, \*; See end of tabulation.



8025-A

8025-A

## U-H-F TRANSMITTING TRIODE

(continued from preceding page)

## Typical Operation:

D-C Plate Voltage. . . . .	1000	. . . . .	volts	
D-C Grid Voltage <sup>o</sup> . . . . .	{ -90 . . . . . volts 6400 . . . . . ohms 1400 . . . . . ohms           }			
Peak R-F Grid Voltage . . . . .		130	. . . . .	volts
D-C Plate Current. . . . .		50	. . . . .	ma.
D-C Grid Current* . . . . .	14 approx.	. . . . .	ma.	
Driving Power* . . . . .	1.6 approx.	. . . . .	watts	
Power Output . . . . .	35 approx.	. . . . .	watts	

\*\* The filament is center-tapped and the center lead is brought out to the No. 3 pin. With this design, it is possible to minimize the effect of filament lead inductance by connecting all three filament leads in parallel through r-f by-pass capacitors. The center-lead of this parallel connection should not be returned directly to the center-tap of the filament-transformer winding or to ground, although it may be by-passed to either of these points if desired.

▲ CCS = Continuous Commercial Service; ICAS = Intermittent Commercial and Amateur Service.

\* Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

<sup>o</sup> Obtained from fixed supply, or grid resistor (6400), or by cathode resistor (1400). When the 8025-A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 1000 volts a fixed bias of at least -40 volts should be used.

# Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

The 8025-A may be operated with maximum ratings at frequencies up to 500 megacycles, but as the frequency is raised, the efficiency and power output fall off. At 600 megacycles an efficiency of about 35% can be expected. Since the efficiency at 600 megacycles is relatively low, the plate of the 8025-A has been designed to have an unusually high dissipation rating.

Data on operating frequencies for the 8025-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

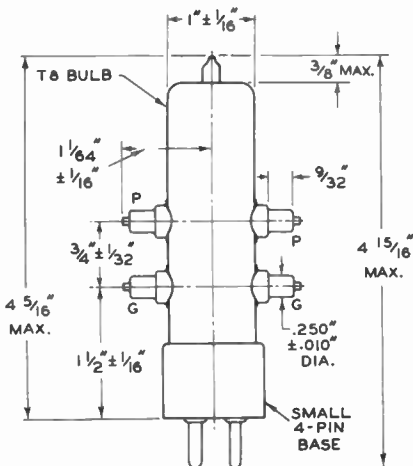
Curves for the 8025-A are the same as those for the 8012-A.

8025-A

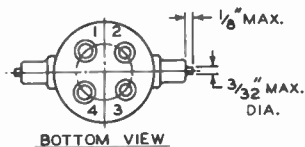


8025-A

## U-H-F TRANSMITTING TRIODE



92CM-6394R1



BOTTOM VIEW

∠ OF EACH CAP SHALL NOT DEVIATE MORE THAN  $3^{\circ}$  FROM PLANE NORMAL TO THE PLANE OF PINS NO. 1 & NO. 4 AND PASSING THROUGH CENTER OF BOTTOM OF BASE.

∠ OF BULB SHALL NOT DEVIATE MORE THAN  $2^{\circ}$  IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.



2J41

2J41

# MAGNETRON

FREQUENCY-STABILIZED TYPE  
Tunable: 9300-9320 Mc

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . .	5 ± 10%	ac or dc volts
Current . . . . .	0.36	amp
Minimum Cathode Heating Time . . . . .	1	minute
Frequency . . . . .	9310	Mc
Frequency Range . . . . .	{ 9320 max.	Mc
	{ 9300 min.	Mc

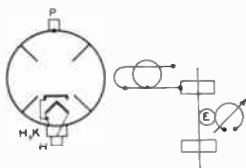
### Maximum Pulling Frequency:

At 9300 Mc . . . . .	2.5	Mc
At 9310 Mc . . . . .	1.5	Mc
At 9320 Mc . . . . .	2.5	Mc
Maximum Frequency Change with Anode Stud Temperature Change . . . . .	0.025	Mc/°C

### Mechanical:

Mounting Position . . . . .	Any
Dimensions . . . . .	See Dimensional Outline
Weight (Approx.) . . . . .	7-1/2 lbs
Mating Output RF Connector . . . . .	MIL Type UG-40/U
Base . . . . .	Short Skirted Miniature Double Bayonet
Terminal Connections (See Dimensional Outline):	

- H - Heater
- K - Cathode
- P - Anode



## PULSED OSCILLATOR SERVICE

### Maximum and Minimum Ratings, Absolute Values:

For Duty Cycle of 0.003 max.

PEAK ANODE VOLTAGE . . . . .	3000 max.	volts
PEAK ANODE CURRENT . . . . .	{ 1.2 max.	amp
	{ 0.8 min.	amp
PEAK POWER INPUT . . . . .	3.6 max.	kw
AVERAGE POWER INPUT . . . . .	10.8 max.	watts
PULSE DURATION . . . . .	0.6 max.	μsec
OPERATION TIME IN ANY 100- MICROSECOND INTERVAL . . . . .	3 max.	μsec
AMBIENT TEMPERATURE . . . . .	85 max.	°C
ABSOLUTE PRESSURE ON WAVEGUIDE WINDOW . . . . .	30 max.	psi
LOAD VOLTAGE STANDING-WAVE RATIO . . . . .	1.5 max.	
TIME OF RISE OF VOLTAGE PULSE . . . . .	0.2 max.	μsec

2J41



2J41

## MAGNETRON

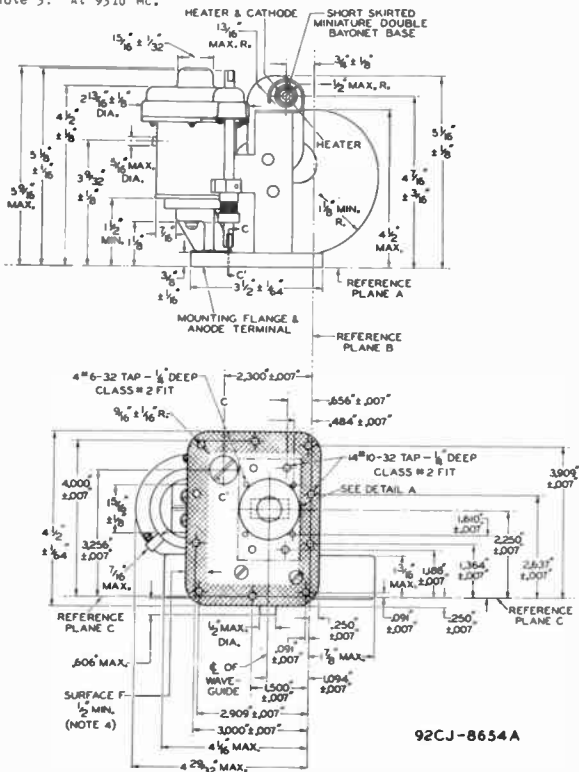
## CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current . . . . .	1	0.32	0.40	amp
Peak Anode Voltage . . . . .	1,2,3	2350	2650	volts
Peak Power Output:				
At 9300 Mc . . . . .	1,2	240	-	watts
At 9310 Mc . . . . .	1,2	300	-	watts
At 9320 Mc . . . . .	1,2	240	-	watts

Note 1: With 5 volts ac or dc on heater.

Note 2: With peak anode current of 1 ampere, duty cycle of 0.003, pulse duration of  $0.5 \mu\text{sec} \pm 10\%$ , load voltage standing-wave ratio, 1.1 max.

Note 3: At 9310 Mc.

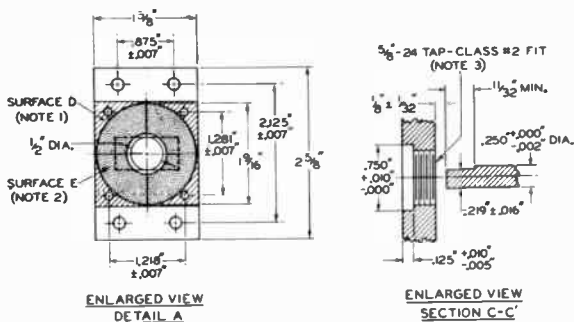




2J41

2J41

## MAGNETRON



Reference plane A is defined as the plane through a plane surface on which the mounting flange rests.

Reference plane B is defined as the plane which is perpendicular to the reference plane A and passes through the exact centers of the indicated mounting flange holes.

Reference plane C is defined as the plane which is mutually perpendicular to the reference planes A and B and passes through the exact center of the indicated mounting flange hole.

**NOTE 1:** When resting on a plane surface, surface D has a flatness such that a 0.010" thickness gauge, 1/8" wide will not enter between surface D and the plane surface by more than 0.020".

**NOTE 2:** Surface E recessed not more than 0.035" and not less than 0.010" and parallel to surface D within 0.010".

**NOTE 3:** Hole and shaft are concentric within 0.020".

**NOTE 4:** With the mounting flange resting on a plane surface, the flatness of surface F is such that a 0.010" thickness gauge, 1/8" wide will not enter more than 1/4".

92CJ-6654B







5822-A

# 5822-A IGNITRON

WATER-COOLED, STEEL-JACKETED, MERCURY-POOL-CATHODE  
TYPE HAVING MOUNTING PLATE FOR THERMOSTATIC CONTROL

*For intermittent rectifier and frequency-changer welder service*

## GENERAL DATA

### Electrical:

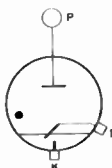
Cathode Excitation. . . . .			Cyclic
Cathode-Spot Starting. . . . .			By Ignitor
Minimum Requirements for Cathode Excitation:			
Peak ignitor voltage required to fire. . . . .	200	volts	
Peak ignitor current required to fire. . . . .	30	amp	
Starting time at required voltage or current. . . . .	100	μsec	
Tube Voltage Drop:			
At peak anode current of 1500 amperes. . . . .	25	volts	

### Mechanical:

Operating Position. . . . .	Vertical, flexible lead up
Maximum Overall Length (including flexible lead). . . . .	27-1/4"
Maximum Radius (including water connections). . . . .	3-5/8"
Weight. . . . .	8.25 lbs

Terminal Connections (See Dimensional Outline):

- P - Anode  
Terminal  
(flexible  
lead)
- K - Cathode  
Terminal  
(Bar oppo-  
site anode  
terminal)



- I - Ignitor  
Terminal  
(within  
jacket  
skirt at  
cathode  
end)

### Cooling:

Type. . . . .			Water
Minimum inlet water temperature. . . . .	10	°C	
Maximum outlet water temperature. . . . .	35	°C	
Minimum water flow. . . . .	1.5	gpm	
Maximum water-temperature rise. . . . .	6	°C	
Maximum pressure drop. . . . .	5	psi	

## INTERMITTENT RECTIFIER SERVICE and FREQUENCY-CHANGER WELDER SERVICE

Maximum Ratings, Absolute-Maximum Values:

*For zero phase-control angle and  
frequencies from 50 to 60 cps*

### RATING I

#### PEAK ANODE VOLTAGE:

Forward. . . . .	1200 max.	1200 max.	volts
Inverse. . . . .	1200 max.	1200 max.	volts

5822-A



## 5822-A IGNITRON

### ANODE CURRENT:

Peak . . . . .	420 max.	1500 max.	amp
Average (Averaged over any interval of 6.25 seconds maximum) . . . . .	70 max.	20 max.	amp
Average (Averaged over any interval of 0.2 second maximum) . . . . .	70 max.	250 max.	amp
Fault, for duration of 0.15 second maximum. . . . .	18750 max.	18750 max.	amp

### RATING II

#### PEAK ANODE VOLTAGE:

Forward . . . . .	1500 max.	1500 max.	volts
Inverse . . . . .	1500 max.	1500 max.	volts

#### ANODE CURRENT:

Peak . . . . .	336 max.	1200 max.	amp
Average (Averaged over any interval of 6.25 seconds maximum) . . . . .	56 max.	16 max.	amp
Average (Averaged over any interval of 0.2 second maximum) . . . . .	56 max.	200 max.	amp
Fault, for duration of 0.15 second maximum. . . . .	15000 max.	15000 max.	amp

### IGNITOR

#### Maximum Ratings, Absolute-Maximum Values:

#### PEAK IGNITOR VOLTAGE:

Positive . . . . .	Equal to anode	volts
Negative . . . . .	5 max.	volts

#### IGNITOR CURRENT:

Peak . . . . .	100 max.	amp
Average (Averaged over any interval of 5 seconds maximum) . . . . .	1 max.	amp
RMS . . . . .	10 max.	amp

### OPERATING CONSIDERATIONS

The 5822-A is equipped with a mounting plate for mounting a thermostatic control calibrated either for controlling the flow of cooling water through the water jacket, or for protection of the ignitron against overheating.

When the cooling water is circulated successively through the water jackets of two or more ignitrons, the water-saving thermostat, if used, should be mounted on the ignitron connected directly to the water supply.

The water-saving thermostat, which has normally open contacts, is calibrated to close a circuit energizing a solenoid valve in the water-supply line and thus permit water



5822-A

## IGNITRON

5822-A

flow to start when the temperature of the thermostat mounting plate exceeds approximately  $35^{\circ}$  C. Because of the lag between the heating of the ignitron envelope and the functioning of the water-saving thermostat to start water flow through the water jackets, the ignitron may overheat before the flow of cooling water starts.

Such overheating can be prevented by the use of an auxiliary contactor shunted across the contacts of the water-saving thermostat and actuated by the welding-control switch. The contactor causes the solenoid valve in the water-supply line to open as soon as welding current flows.

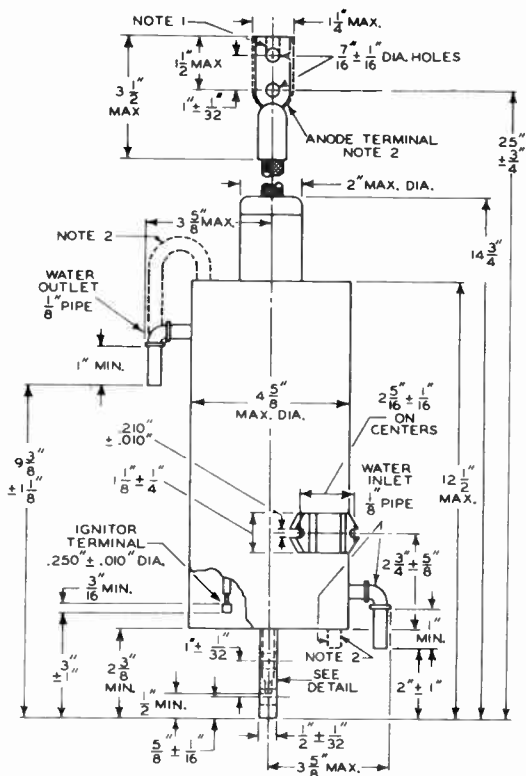
When a *protective thermostat* is used, it should be mounted on an ignitron from which the cooling water discharges into the drain. The protective thermostat is calibrated to open a set of normally closed contacts at a jacket temperature of approximately  $52^{\circ}$  C. The opening of these contacts causes a protective device to function. This device may be a relay opening the ignitor firing controls, or preferably, a circuit breaker which removes power from the ignitrons.

Care must be taken to insure that the water jacket of each ignitron is completely filled before power is applied. Tube operation with a partially filled water jacket may cause abnormal heating of the tube envelope with resultant arc-back which impairs tube life. It is also necessary to arrange the cooling system so as to prevent any draining of the water jackets when the flow of water ceases.

5822-A



# 5822-A IGNITRON



92CM-9772R1

ELECTRON TUBE DIVISION

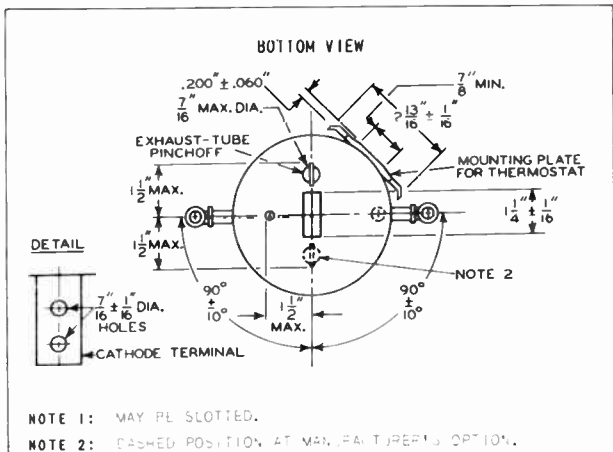
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

World Radio History



# 5822-A IGNITRON

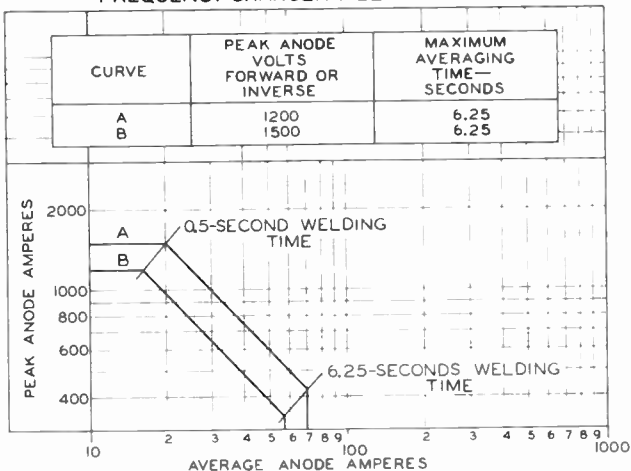
5822-A



4-59

E-977,418

## RATING CHART FREQUENCY-CHANGER WELDER SERVICE







# CLASSIFICATION CHART FOR TYPES IN MISCELLANEOUS TUBE SECTION

*When choosing tube types, the equipment designer should refer to the RCA PREFERRED TYPES LIST and its companion list - TYPES NOT RECOMMENDED FOR NEW EQUIPMENT DESIGN - both of which appear in the General Section.*

Description	TUBE TYPE
<b>TUBES FOR UHF APPLICATIONS</b>	
<b>Acorn Types</b>	
Oscillator Triode	2F4
Oscillator Triode	6L4
Sharp-Cutoff Pentode	954
Medium-Mu Triode	955
Remote-Cutoff Pentode	95C
Medium-Mu Triode	957
Medium-Mu Triode	958-A
Sharp-Cutoff Pentode	959
UHF Diode	9004
UHF Diode	9005
<b>"Pencil Types"</b>	
Medium-Mu Triode	5675
Fixed-Tuned Oscillator Triode	5794
High-Mu Triode	5876
Medium-Mu Triode	5893
UHF Diode	6173
Medium-Mu Triode	6223
Medium-Mu Triode	6254
Fixed-Tuned Oscillator Triode	5562
<b>Other Types for UHF Applications</b>	
Lighthouse Triode	2C40
Lighthouse Triode	2C43
Klystron	2K26
High-Mu Triode	6J4 <sup>□</sup>
Oscillator Triode	6026 <sup>■</sup>
Traveling-Wave Tube	5851
Sharp-Cutoff Pentode	9001 <sup>□</sup>
Medium-Mu Triode	9002 <sup>□</sup>
Remote-Cutoff Pentode	9003 <sup>□</sup>
UHF Diode	9006 <sup>□</sup>
<b>VACUUM-GAUGE TUBES</b>	
Thermocouple Type	194 <sup>□</sup>
Pirani Type	1947
Hard-Glass Bulb, Ionization Type	1949
Soft-Glass Bulb, Ionization Type	1950

□ Miniature type.

■ Subminiature type.



# CLASSIFICATION CHART FOR TYPES IN MISCELLANEOUS TUBE SECTION

Description	TUBE TYPE
<b>TUBES FOR SPECIAL APPLICATIONS</b>	
Mechano-Electronic Transducer	5734
Remote-Cutoff Beam Pentode (For use in Shunt Voltage-Regulator Service)	5890

<b>RECTIFIERS</b>					
Maximum Plate Ma. ♦		Maximum Peak Inverse Plate Volts ♦	Filament (F) or Heater (H)		TUBE TYPE
Average	Peak		Volts	Amperes	
<b>Half-Wave Vacuum Types</b>					
2	40	60000	1.6 F	1.25	5825
5	20	20000	2.5 F	5	876
7.5 ■	60 ■	12500 ■	2.5 H	1.75	2X2-A
20	150	40000 ▲	2.5 F	5	8013-A
25	270	20000	2.5 F	6	579-B
100	750	40000	5 F	6	8020

♦ Absolute values, except as noted.

▲ This value may be increased to 55,000 volts when the 8013-A is immersed in oil.

■ Design-center value.





6J8-G

6J8-G



## TRIODE-HEPTODE CONVERTER

Heater <sup>•</sup> Coated Unipotential Cathode  
 Voltage 6.3 a-c or d-c volts  
 Current 0.3 amp.

## Direct Interelectrode Capacitances:

Heptode Grid #1 to Heptode Plate*	0.01 max. $\mu\text{f}$
Heptode Grid #1 to Triode Plate*	0.015 max. $\mu\text{f}$
Heptode Grid #1 to Triode Grid & Heptode Grid #3	0.13 $\mu\text{f}$
Triode Grid to Triode Plate	2.2 $\mu\text{f}$
Heptode Grid #1 to All Other Electrodes (R-F Input)	4.4 $\mu\text{f}$
Triode Plate to All Other Electrodes (Osc. Output)	5.5 $\mu\text{f}$
Triode Grid & Heptode Grid #3 to All Other Electrodes (Osc. Input)	11.7 $\mu\text{f}$
Heptode Plate to All Other Electrodes (Mixer Output)	8.8 $\mu\text{f}$

Overall Length 4-7/32" to 4-15/32"

Seated Height 3-21/32" to 3-29/32"

Maximum Diameter 1-9/16"

Bulb ST-12

Cap Skirted Miniature

Base Small Shell Octal 8-Pin

- Pin 1 - No Connection
- Pin 2 - Heater
- Pin 3 - Heptode Plate
- Pin 4 - Heptode Grids #2 & #4



- Pin 5 - Triode Grid & Heptode Grid #3
- Pin 6 - Triode Plate
- Pin 7 - Heater
- Pin 8 - Cathode

Mounting Position BOTTOM VIEW (G-8H) Any

CONVERTER SERVICE

Heptode Plate Voltage 250 max. volts

Heptode Screen (Grids #2 &amp; #4) Voltage 100 max. volts

Triode Plate Supply Voltage\* 250 max. volts

Typical Operation and Characteristics:

Heptode Plate Voltage	100	250	volts
Heptode Screen Voltage	100	100	volts
Heptode Control-Grid Voltage (Grid #1)	-3	-3	volts
Triode Plate Voltage	100	-	volts
Triode Plate Supply Voltage*	-	250	volts
Triode Grid Resistor	50000	50000	ohms
Heptode Plate Resistance	0.9	4.0	approx. megohms
Conversion Transconductance	250	290	$\mu\text{mhos}$
Heptode Control-Grid Bias for Conversion Transcond. of 2 $\mu\text{mhos}$	-	-20	volts
Heptode Plate Current	1.4	1.3	ma.
Heptode Screen Current	3.0	2.9	ma.
Triode Plate Current	3.0	5.0	ma.
Triode Grid & Heptode Grid #3 Current	0.3	0.4	ma.

NOTE: The transconductance of the triode unit (not oscillating) is approximately 1600  $\mu\text{mhos}$  under the following conditions: triode plate volts, 150; triode grid volts, -3.

\* In circuits where the cathode is not connected directly to the heater, the potential difference between heater and cathode should be kept as low as possible.

• with shield-can connected to cathode.

• Applied through 20000-ohm dropping resistor.

July 1, 1941

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY INC.

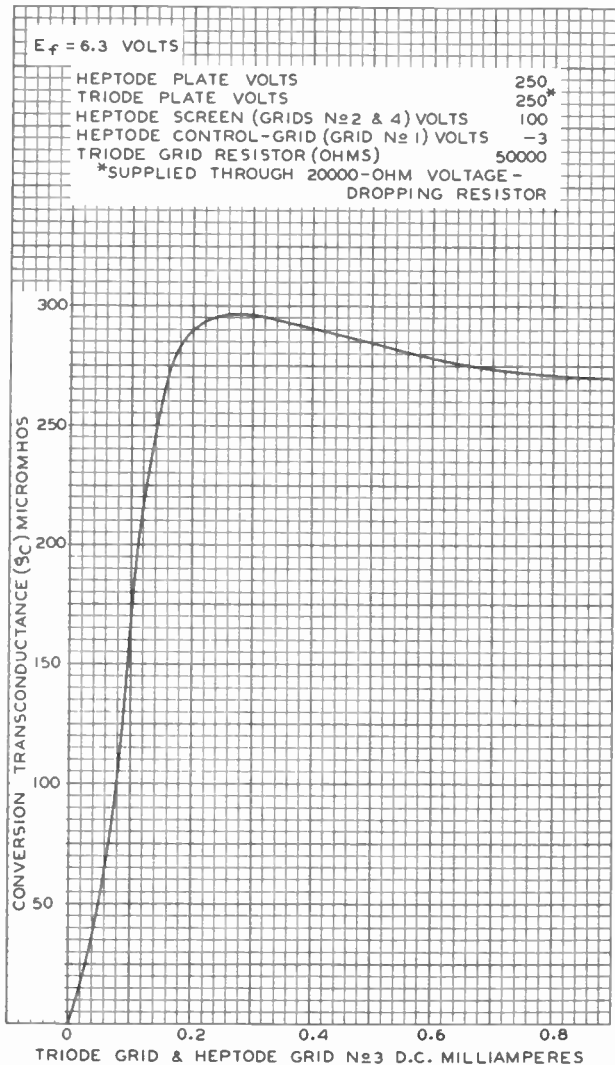
TENTATIVE DATA

6J8-G



6J8-G

## OPERATION CHARACTERISTIC



MAY 13, 1941

 RCA RADIOTRON DIVISION  
 RCA MANUFACTURING COMPANY, INC.

92C-6285

World Radio History



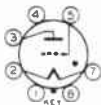
2A4-G

2A4-G

**GAS-TRIODE**

HOT-CATHODE CONTROL-GRID TYPE

Filament	Coated	
Voltage*	2.5	a-c or d-c volts
Current	2.5	amp.
Maximum Overall Length		4-1/8"
Maximum Seated Height		3-9/16"
Maximum Diameter		1-9/16"
Bulb		ST-12
Base		Small Shell Octal 7-Pin
Pin 1 - No Connection		Pin 5 - Grid
Pin 2 - Filament +		Pin 7 - Filament -
Pin 3 - Plate		Pin 8 - No Connection
Pin 4 - No Connection		
Mounting Position		Any



BOTTOM VIEW (G-5S7)

RELAY SERVICE

Peak Inverse Anode Voltage	200 max. volts
Peak Forward Anode Voltage	200 max. volts
Peak Voltage Between Any Two Electrodes	250 max. volts
Peak Anode Current	1.25 max. amp.
Average Anode Current (Averaged over Any Period of 45 Seconds)	0.10 max. amp.
Anode Drop	15 volts

\* Filament voltage should be applied for 2 seconds before current is drawn from the anode.

July 1, 1941

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC

TENTATIVE DATA





2C21/1642

2C21/1642

# TWIN-TRIODE AMPLIFIER

Heater <sup>■</sup> Coated Unipotential Cathodes  
 Voltage 5.5 a-c or d-c volts  
 Current 0.6 amp.

Direct Interelectrode Capacitances:<sup>○</sup>

	Triode Unit T <sub>1</sub>	Triode Unit T <sub>2</sub>	
Grid to Plate	2.4	1.8	μf
Grid to Cathode	2.6	1.6	μf
Plate to Cathode	1.4	2.0	μf
Overall Length	4-9/32" to 4-17/32"		
Seated Height	3-21/32" to 3-29/32"		
Maximum Diameter	1-9/16"		
Bulb	ST-12		
Cap	Small Metal		
Base	Small 7-Pin, Micanol		

- Pin 1 - Heater
- Pin 2 - Cathode T<sub>2</sub>
- Pin 3 - Plate T<sub>2</sub>
- Pin 4 - Grid T<sub>1</sub>
- RCA Socket
- Mounting Position



- Pin 5 - Plate T<sub>1</sub>
- Pin 6 - Cathode T<sub>1</sub>
- Pin 7 - Heater
- Cap - Grid T<sub>2</sub>
- Stock No. 9922
- Any

BOTTOM VIEW (7BH)

Maximum Ratings Are Design-Center Values

### AMPLIFIER - Each Unit

Plate Voltage	250 max. volts
Plate Dissipation	2.1 max. watts
<i>Characteristics - Class A<sub>1</sub> Amplifier:</i>	
Plate Voltage	250 volts
Grid Voltage	-16.5 volts
Amplification Factor	10.4
Plate Resistance	7600 ohms
Transconductance	1375 μmhos
Plate Current	8.3 ma.

- <sup>■</sup> In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.
- <sup>○</sup> with no external shield.

Mar. 20, 1943

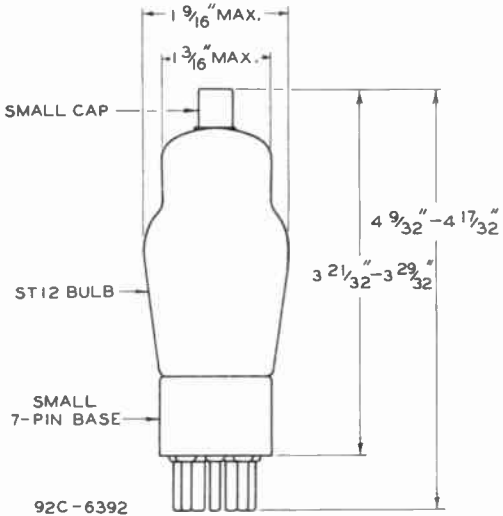
RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA



2C21

# TWIN-TRIODE AMPLIFIER



Mar. 20, 1943

TENTATIVE DATA

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World Radio History



2C21

# 2C21 AVERAGE PLATE CHARACTERISTICS EACH TRIODE UNIT

$E_f = 6.3$  VOLTS

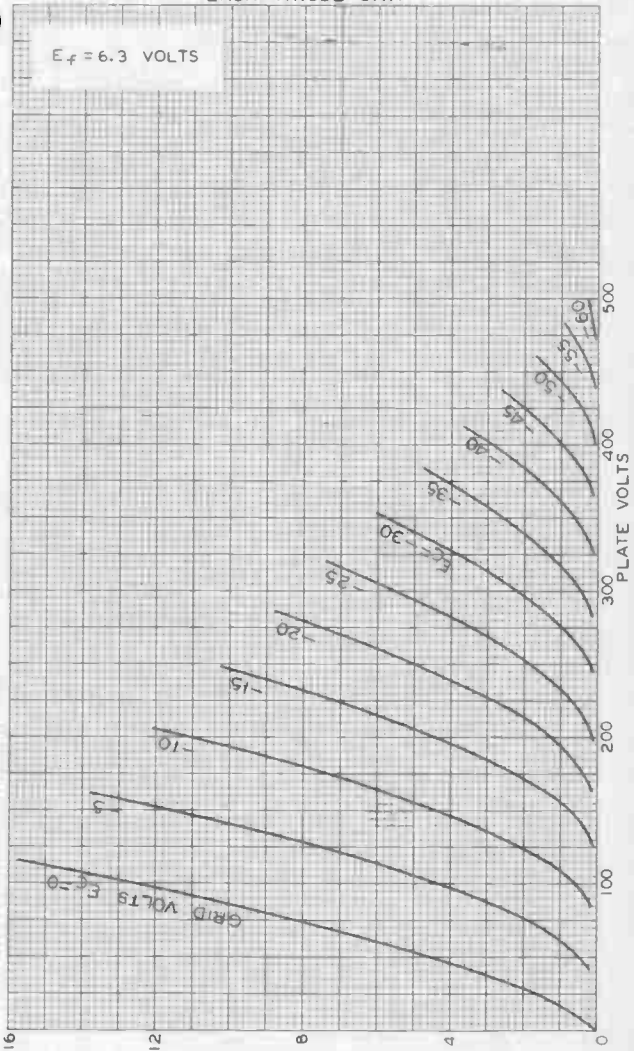


PLATE MILLIAMPERES

DEC. 1, 1943

RCA VICTOR DIVISION

92CM-6385R1

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

World Radio History







2C22

2C22

## AMPLIFIER TRIODE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.3	amp.
Direct Interelectrode Capacitances: <sup>o</sup>		
Grid to Plate	3.6	$\mu\text{f}$
Grid to Cathode	2.2	$\mu\text{f}$
Plate to Cathode	0.7	$\mu\text{f}$
Overall Length	3-1/8" $\pm$ 1/8"	
Seated Height	2-9/16" $\pm$ 1/8"	
Maximum Diameter	1-5/16"	
Bulb	T-9	
Caps (two RCA No. 3947)	Skirted Miniature	
Base	Intermediate Shell Octal 8-Pin	
Mounting Position	Any	

*Maximum Ratings Are Design-Center Values*AMPLIFIER

Plate Voltage	300 <sup>o</sup> max.	volts
Plate Dissipation	3.3 max.	watts
<i>Characteristics - Class A<sub>1</sub> Amplifier:</i>		
Plate Voltage	300	volts
Grid Voltage *	-10.5	volts
Amplification Factor	20	
Plate Resistance	6600	ohms
Transconductance	3000	$\mu\text{mhos}$
Plate Current	11	ma.

- In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.
- o With no external shield.
- This value is for Continuous Commercial Service (CCS). In Intermittent Commercial and Amateur Service (ICAS), the plate voltage may be as high as 500 volts maximum, but the maximum plate dissipation remains unchanged.
- \* Under maximum rated conditions, the resistance in the grid circuit should not exceed 1.0 megohm.

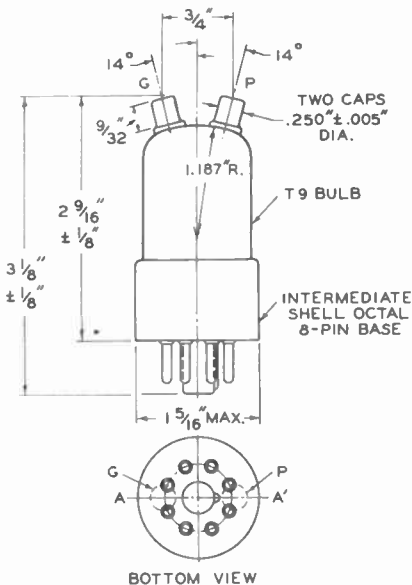
The approximate resonant frequency of the input (grid-cathode) circuit is 335 megacycles.

2C22



2C22

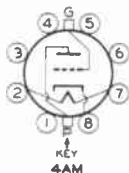
## AMPLIFIER TRIODE



## NOTE:

THE PLANE PASSING THROUGH THE CENTER OF EITHER CAP, PERPENDICULAR TO AND THROUGH THE CENTER OF THE BOTTOM OF THE BASE, SHALL NOT DEVIATE MORE THAN  $\pm 5^\circ$  FROM THE LINE A A' THROUGH BASE PLUG AXIS AND KEY CENTER.

92C-6427

BOTTOM VIEW OF SOCKET CONNECTIONS

Pin 1 - No Connection  
Pin 2 - Heater  
Pin 3 - No Connection  
Pin 4 - No Connection  
Pin 5 - No Connection  
Pin 6 - No Connection  
Pin 7 - Heater  
Pin 8 - Cathode  
Cap above Pins 1 & 8 - Plate  
Cap above Pins 4 & 5 - Grid

Mar. 20, 1943

RCA VICTOR DIVISION

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CE-6427

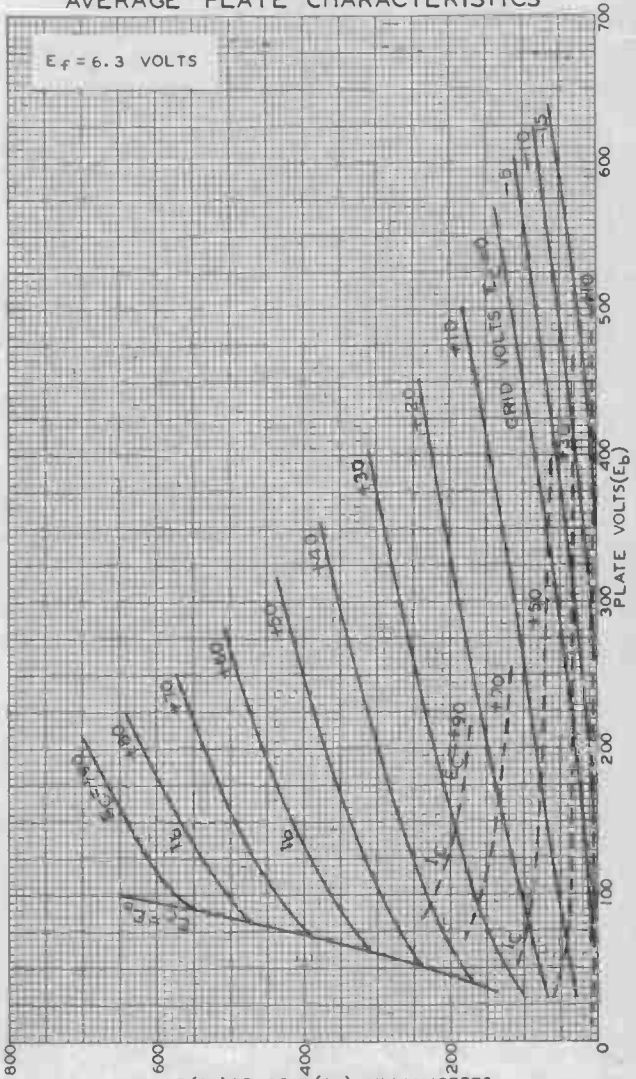
WorldRadioHistory



2C22

2C22

# AVERAGE PLATE CHARACTERISTICS



FEB. 23, 1943

PLATE ( $I_b$ ) OR GRID ( $I_c$ ) MILLIAMPERES

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA HARTFORD, NEW JERSEY

92C-6437

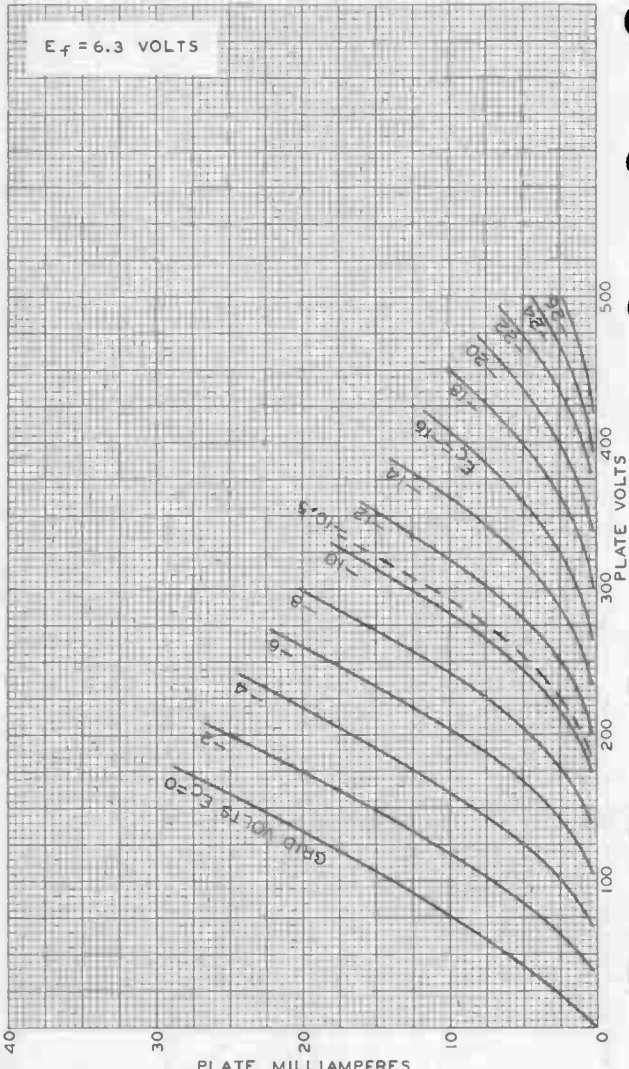
2C22



2C22

# AVERAGE PLATE CHARACTERISTICS

$E_f = 6.3$  VOLTS



FEB. 22, 1943

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA, HARTFORD, CONNECTICUT

92C-6436

World Radio History



2J50

2J50

# MAGNETRON

FORCED-AIR COOLED

Fixed Frequency: 8825 ± 75 Mc

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . .	6.3	ac or dc volts
Current . . . . .	1.0	amp
Minimum Cathode Heating Time . . . . .	2	minutes
Frequency . . . . .	8825 ± 75	Mc

Color Code (3 dots in row following type designation):

Orange, violet, green . . . . .	8750 to 8800	Mc
Orange, violet, blue . . . . .	8800 to 8850	Mc
Orange, violet, violet . . . . .	8850 to 8900	Mc

NOTE: The color code is given for the convenience of users and is not to be construed as furnishing a basis for ordering 2J50's with a specific color code.

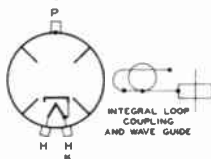
Maximum Frequency Pulling . . . . .	15	Mc
Maximum Frequency Change with Anode Temperature Change . . . . .	0.25	Mc/°C

### Mechanical:

Terminal Connections:

H - Heater

K - Cathode



P - Anode

Mounting Position . . . . .	Any
Dimensions . . . . .	See Outline Drawing
Air Flow to Fins:	

An air stream should be directed radially along the cooling fins toward the body of the tube. The stream may be obtained from a rectangular nozzle about 3-1/4" by 3/4" located so that the plane through the 3-1/4" side is parallel with the plane of a cooling fin and so that the nozzle is centered on the body of the tube. Adequate flow should be provided so that the temperature of the anode block does not exceed 150°C.

## PULSED OSCILLATOR SERVICE

Maximum Ratings, Absolute Values:

For Duty Cycle of 0.0007      0.0012 max.

PEAK ANODE VOLTAGE . . . . .	16 max.	16 max.	Kv
PEAK ANODE CURRENT . . . . .	16 max.	16 max.	amp
PEAK POWER INPUT . . . . .	260 max.	150 max.	Kw
AVERAGE POWER INPUT . . . . .	180 max.	180 max.	watts
PULSE DURATION . . . . .	2.5 max.	2.5 max.	μS
OPERATION TIME IN 100-MICROSECOND INTERVAL . . . . .	5 max.	5 max.	μS
ANODE-BLOCK TEMPERATURE . . . . .	150 max.	150 max.	°C

JAN. 1, 1951

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY  
World Radio History

TENTATIVE DATA

2J50



2J50

## MAGNETRON

## Typical Operation:

*With Duty Cycle of 0.001*

Heater Voltage . . . . .	See Operating Notes	
Applied Magnetic Field . . . . .	5400	gausses
Peak Anode Voltage . . . . .	12	Kv
Peak Anode Current . . . . .	12	amp
Pulse Repetition Rate. . . . .	1000	cps
Pulse Duration . . . . .	1	μs
Maximum RF Bandwidth . . . . .	3	Mc
Peak Power Output. . . . .	45	Kw

## OPERATING NOTES

The magnetic field required for operation of the 2J50 should be uniform to within 5 per cent over a cylindrical volume, 0.260" in diameter and 0.310" long, located centrally between the poles and coaxially with them. It is recommended that the pole faces of the magnet have a diameter of 3/4" and be spaced 0.635" + 0.005" - 0.000" from each other. The pole tips should taper back from the face for a distance of 0.430" at an included angle not exceeding 50° in order to clear parts of the tube.

Because of steel inserts in the end plates of the anode, the strength of the magnetic field inside the tube is greater than the strength of the external magnetic field into which the tube is inserted. The field strength shown in the tabulated data is the value at the center of the air gap before the tube is inserted in the field. The 2J50 may be operated without regard to polarity of the magnetic field.

Rated voltage should be applied to the heater for at least 2 minutes to allow the cathode to reach normal operating temperature before high-voltage pulses, negative with respect to the anode (ground), are applied to the cathode terminal. As soon as the 2J50 starts to oscillate, the heater voltage ( $E_f$ ) must be reduced approximately in accordance with the equation

$$E_f = 6.3 \sqrt{1 - \frac{P_i}{150}}$$

where  $P_i$  is the average power input to the tube. For power-input values of 150 watts or greater, the heater voltage should be turned off. When the tube is oscillating, the cathode is subjected to considerable electron bombardment which raises the temperature of the cathode. The magnitude of the heating is a function of the total dissipation and must be compensated by reduction of the heater voltage in order to prevent overheating of the cathode. The heater should be protected against input pulse power by a suitable filter. Failure to start the tube at rated heater voltage and to reduce the heater voltage as soon as oscillation starts may seriously affect tube life.

JAN. 1, 1951

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TENTATIVE DATA

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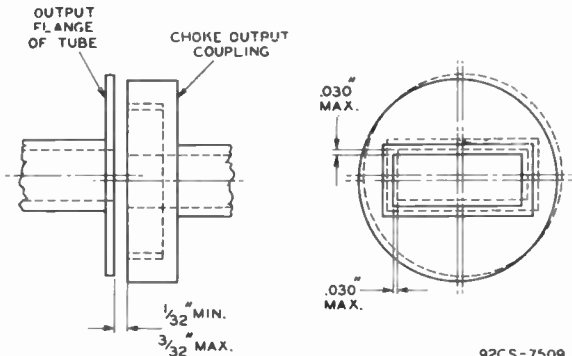


2J50

2J50

# MAGNETRON

Choke Output Coupling Required for Operation of the 2J50 with a Load Circuit of the Wave-Guide Type



92CS-7509

All points on the face of one component shall be between parallel planes which are  $1/32$ " and  $3/32$ " from and parallel to the face of the other component.

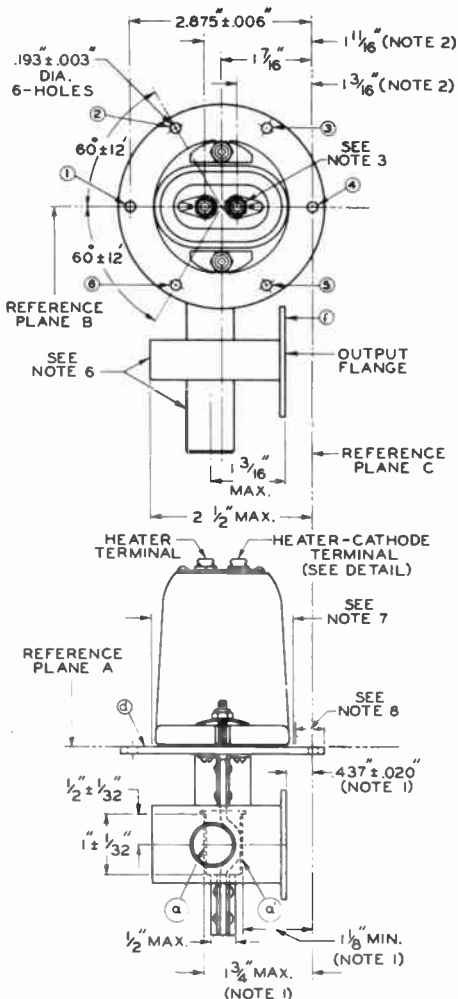
No point of the rectangular opening of one component shall fall outside a rectangle whose dimensions are 0.060" larger than, and whose sides are parallel to, the rectangular opening of the other component.

2J50



2J50

## MAGNETRON



JAN. 1, 1951

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CE-7507A

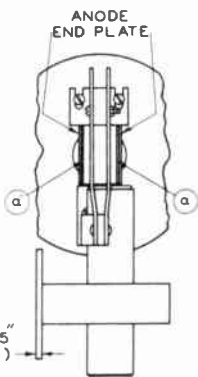
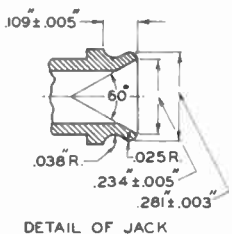
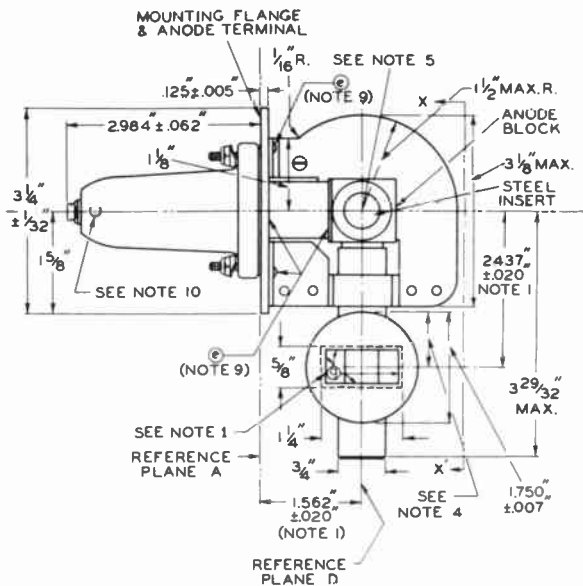




2J50

# MAGNETRON

2J50



92CL-7507

JAN. 1, 1951

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CE-7507B

2J50



2J50

## MAGNETRON

**NOTE 1:** WHEN THE SURFACE (d) IS MOUNTED ON SURFACE CORRESPONDING TO PLANE "A" BY MEANS OF SIX STUDS 0.176" DIA. LOCATED ON THE SPECIFIED CENTERS AND PROTRUDING THROUGH THE SIX HOLES. THE SURFACES (a - a') CAN BE INSERTED BETWEEN PARALLEL FACES WHICH (1) ARE 13/16" IN DIAMETER AND HAVE THEIR CENTERS ON THE ANODE AXIS (SEE NOTE 5). (2) ARE SPACED 0.625" APART. AND (3) ARE LOCATED EQUIDISTANT BETWEEN PLANES PERPENDICULAR TO PLANE "A" AND PASSING THROUGH THE SPECIFIED CENTERS OF HOLES 2 AND 6, AND HOLES 3 AND 5, RESPECTIVELY. WHEN THE 2J50 IS MOUNTED AS ABOVE SPECIFIED, THE WAVE GUIDE IS LOCATED AS FOLLOWS: SURFACE (f), INCLUDING ITS ANGULAR AND LATERAL DEVIATIONS, FITS BETWEEN PLANES PARALLEL WITH PLANE "C" AND SPACED 0.457" AND 0.457", RESPECTIVELY, FROM IT; CENTER LINE (AXIS) IS (1) BETWEEN PLANES PARALLEL WITH PLANE "A" AND SPACED 1.582" AND 1.542", RESPECTIVELY, FROM IT AND (2) BETWEEN PLANES PARALLEL WITH PLANE "B" AND SPACED 2.457" AND 2.417", RESPECTIVELY, FROM IT; AND SURFACES (g) ARE OUTSIDE OF A RIGHT PARALLELEPIPEDON HAVING A WIDTH OF 1.080", A HEIGHT OF 0.455", AND A DEPTH OF 1/2" AND WHOSE MAJOR AXIS IS IN PLANE "D" AND LOCATED PARALLEL TO AND 2.437" FROM PLANE "B." WITH THE WAVE GUIDE THUS LOCATED. THE SURFACES (a) AND (a') ARE NOT MORE THAN 1-3/4" AND NOT LESS THAN 1-1/8", RESPECTIVELY, FROM PLANE "C".

**NOTE 2:** THE CENTERS OF THE JACK HOLES ARE WITHIN CIRCULAR AREAS HAVING RADIUS OF 0.023" FROM THE IDEAL CENTERS, BUT ARE SPACED 0.500"  $\pm$  0.010" APART. THE AXES OF THE JACK HOLES ARE PERPENDICULAR TO PLANE "A" WITHIN 3°.

**NOTE 3:** HEX. HEAD BANANA-PIN SNAP-CATCH JACK HAVING LENGTH OF 19/32" AND HOLE WITH DIAMETER OF 0.169"  $\pm$  0.005".

**NOTE 4:** OUTPUT FLANGE IS CONCENTRIC WITH OPENING IN WAVE GUIDE WITHIN 0.010".

**NOTE 5:** LOCATION OF ANODE AXIS IS DETERMINED BY THE INTERSECTION OF PLANES "B" AND "D".

**NOTE 6:** ALL JOINTS IN WAVE-GUIDE ASSEMBLY ARE VACUUM TIGHT SO THAT THE WAVE-GUIDE FLANGE MAY BE USED TO PROVIDE A HERMETIC SEAL AT SURFACE (f).

**NOTE 7:** NO PART OF THE ASSEMBLY ABOVE THE SURFACE (d) EXTENDS BEYOND THE SURFACE OF A CYLINDER WHOSE AXIS IS PERPENDICULAR TO THE SURFACE (d) AT ITS TRUE CENTER AND WHOSE RADIUS IS 1-7/64".

**NOTE 8:** WHEN RESTING ON A PLANE SURFACE, THE ANNULAR AREA OF SURFACE (d) TO A DISTANCE 1/2" INWARD FROM ITS OUTER EDGE HAS A FLATNESS SUCH THAT A 0.010" THICKNESS GAUGE 1/8" WIDE WILL NOT ENTER ANY SPACE BETWEEN SURFACE (d) AND THE PLANE SURFACE MORE THAN 1/4".

**NOTE 9:** ALL JOINTS MARKED (e) ARE VACUUM TIGHT SO THAT MOUNTING FLANGE MAY BE USED TO PROVIDE A HERMETIC SEAL AT SURFACE (d).

**NOTE 10:** "C" INDICATES ADJACENT JACK IS THE COMMON HEATER-CATHODE TERMINAL.

**NOTE 11:** THIS DIMENSION IS GAUGED OVER THE ANNULAR AREA OUTSIDE OF A CONCENTRIC CIRCLE 1-25/64" MAX. DIAMETER.

JAN. 1, 1951

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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CE-7507C

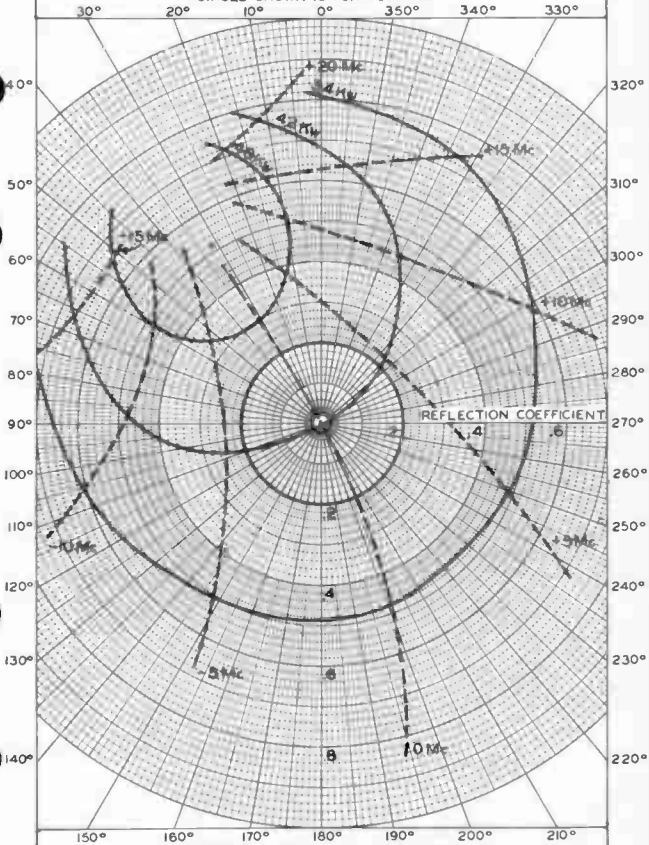


2J50

2J50

### RIEKE DIAGRAM

MAGNETIC FIELD (GAUSSSES) = 5500  
 PEAK INPUT AMPERES = 10  
 PULSE VOLTAGE VARIES ABOUT 12KV  
 CIRCLE SHOWN IS FOR VSWR = 1.5



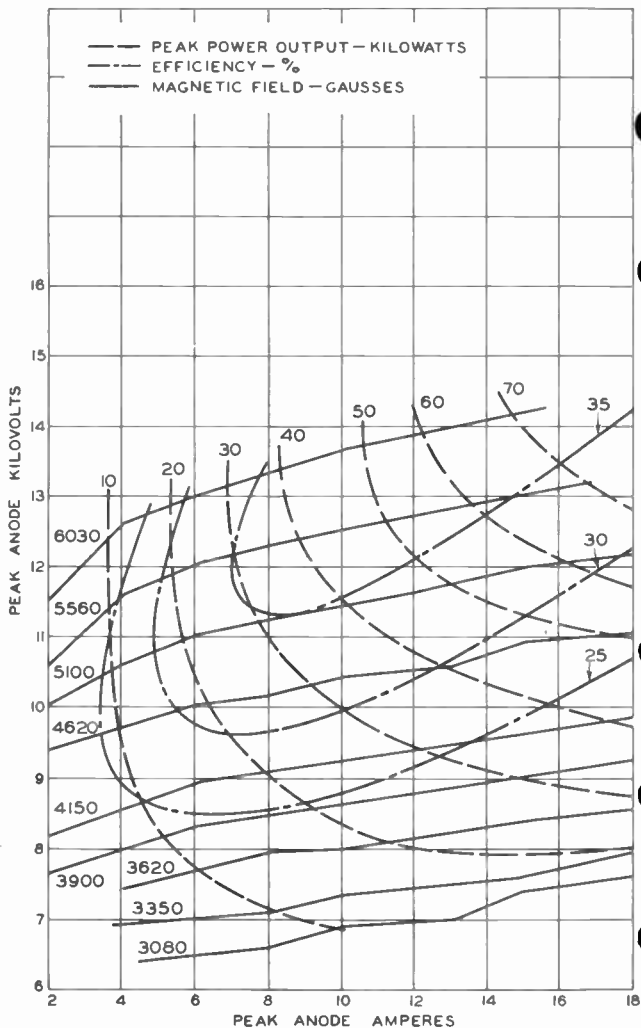
THE GENERAL ASPECT OF THE DIAGRAM  
 MAY BE CONSIDERED TYPICAL; ITS PHASE  
 WITH RESPECT TO A POINT ON THE TUBE  
 IS AT PRESENT VARIABLE.

2J50



2J50

## PERFORMANCE CHART



JULY 11, 1950

 TUBE DEPARTMENT  
 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7510

World Radio History



6957

6957

# PHOTOCONDUCTIVE CELL

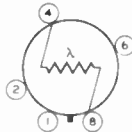
CADMIUM-SULFIDE, HEAD-ON TYPE

## DATA

### General:

Spectral Response . . . . .	S-15
Wavelength of Maximum Response . . . . .	5800 ± 500 angstroms
Sensitive Surface, Including Metallic Strips:	
Shape . . . . .	Rectangular
Length (Minimum) . . . . .	0.650"
Width (Minimum) . . . . .	0.540"
Area (Minimum) . . . . .	0.35 sq. in.
Maximum Overall Length . . . . .	2-7/32"
Maximum Seated Length . . . . .	1-11/16"
Seated Length to Plane of Sensitive Surface . . . . .	1" ± 3/32"
Maximum Diameter . . . . .	1-9/32"
Operating Position . . . . .	Any
Weight (Approx.) . . . . .	0.9 oz
Bulb . . . . .	T9
Base . . . . .	Intermediate-Shell Octal 5-Pin (JETEC No. B5-10)
Basing Designation for BOTTOM VIEW . . . . .	8HV

Pin 1 - No Connection  
 Pin 2 - No Connection



Pin 4 - Terminal  
 Pin 6 - No Connection  
 Pin 8 - Terminal

DIRECTION OF LIGHT:  
 INTO END OF BULB

### Maximum Ratings, Absolute Values:

POLARIZING VOLTAGE . . . . .	250 max.	volts
POWER DISSIPATION:		
Sensitive surface fully illuminated . . . . .	0.5 max.	watt
Sensitive surface partially illuminated . . . . .	1.4 max.	watts/sq. in.
PHOTOCURRENT . . . . .	50 max.	ma
AMBIENT-TEMPERATURE RANGE . . . . .	-75 to +60	°C

### Characteristics:

*Under conditions with polarizing voltage of 50 volts dc and at ambient temperature of 25° C*

Min. Median Max.

Sensitivity:					
Radiant <sup>#</sup> , at 5800 angstroms . . . . .	-	300	-	μa/μw	
Luminous <sup>*</sup> , at 0 cps . . . . .	-	0.85	-	amp/lumen	
Illumination <sup>Δ</sup> , at 0 cps . . . . .	2000	4000	8000	μa/ft-c	
Photocurrent <sup>Δ</sup> . . . . .	-	-	20	μa	
Rise . . . . .	See Curves				
Decay . . . . .	See Curves				

<sup>#</sup> For conditions where the incident power is 6.65 microwatts.

<sup>\*</sup>, <sup>Δ</sup>, <sup>Δ</sup>: See next page.

6957



6957

## PHOTOCONDUCTIVE CELL

- For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A light flux of about 2.5 millilumens is used.
- For conditions the same as shown under (\*) except that an incident illumination of 1.0 foot-candle is used.
- ▲ Measured approximately 10 seconds after removal of incident illumination of 1.0 foot-candle.

### DEFINITIONS

*Illumination Sensitivity.* The quotient of the output current by the incident illumination, at constant electrode voltages.

### OPERATING CONSIDERATIONS

The *polarizing voltage* for the 6957 may be applied without regard to polarity.

*Exposure of the 6957 to radiation so intense as to cause excessive heating* of the cell may permanently damage it.

The *angle of view* of the 6957 may be narrowed by the use of a hood of the desired length placed around the bulb end of the cell.

In some applications where the light source is several feet from the cell, a simple lens arrangement in which a suitable lens at the light source is used to collimate the light beam and another lens is used in front of the cell to converge the beam onto the sensitive area, will serve to utilize the available amount of light most effectively.

For a given illumination, the output current will have its highest value when the incident illumination is normal (angle of incidence is 90°) to the face of the cell. For smaller angles of incidence, the output current decreases. The decrease depends upon several factors including the angle of incidence of the illumination, the amount of illumination, and the area of sensitive surface illuminated.

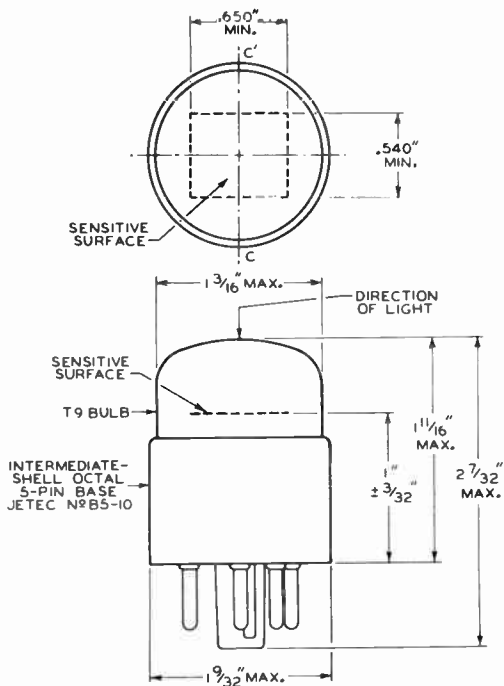
**SPECTRAL-SENSITIVITY CHARACTERISTIC**  
of Photoconductive Cell having S-15 Response  
is shown at the front of this Section



6957

6957

## PHOTOCONDUCTIVE CELL



92CM-9201

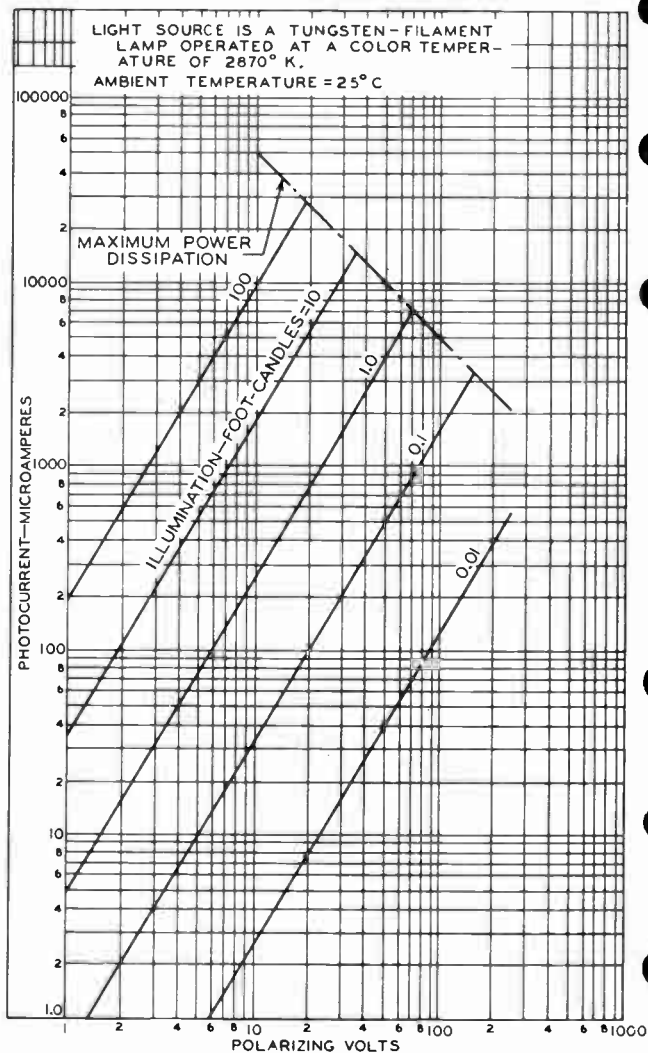
PLANE THROUGH MINOR AXIS (CC') OF SENSITIVE SURFACE AND CELL AXIS MAY VARY FROM PLANE THROUGH THE CELL AXIS AND PINS 4 AND 8 BY ANGULAR TOLERANCE (MEASURED ABOUT THE CELL AXIS) OF  $\pm 10^\circ$ .

6957



6957

## AVERAGE CHARACTERISTICS



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9209





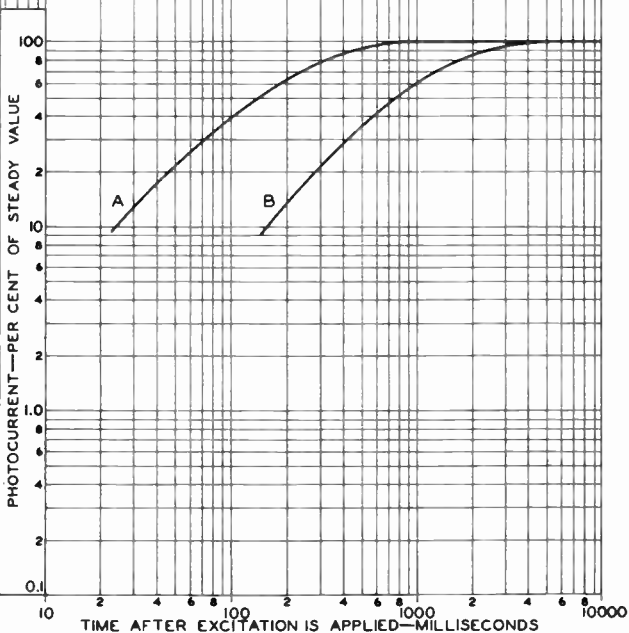
6957

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### TYPICAL RISE CHARACTERISTICS

CURVES ARE INDEPENDENT  
OF POLARIZING VOLTAGE.  
AMBIENT TEMPERATURE = 25° C

CURVE	ILLUMINATION— FOOT-CANDLES
A	1
B	0.1



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9205

6957



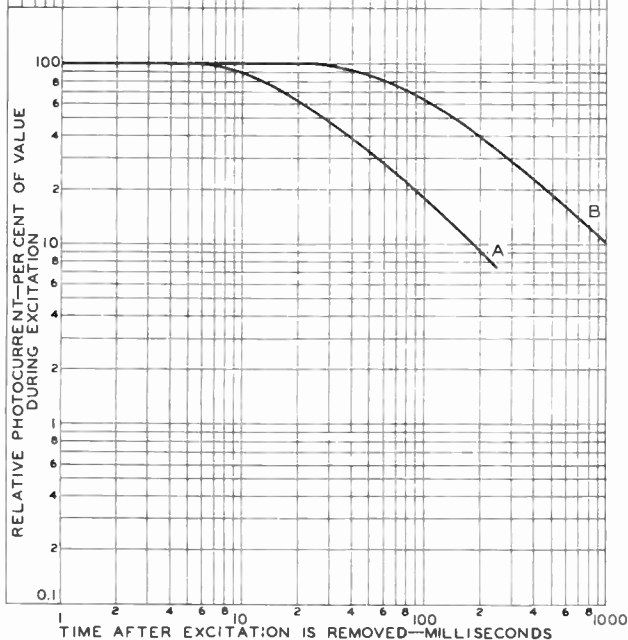
6957

## TYPICAL DECAY CHARACTERISTICS

CURVES ARE INDEPENDENT OF  
POLARIZING VOLTAGE.

AMBIENT TEMPERATURE = 25° C

CURVE	ILLUMINATION — FOOT-CANDLES
A	1
B	0.1

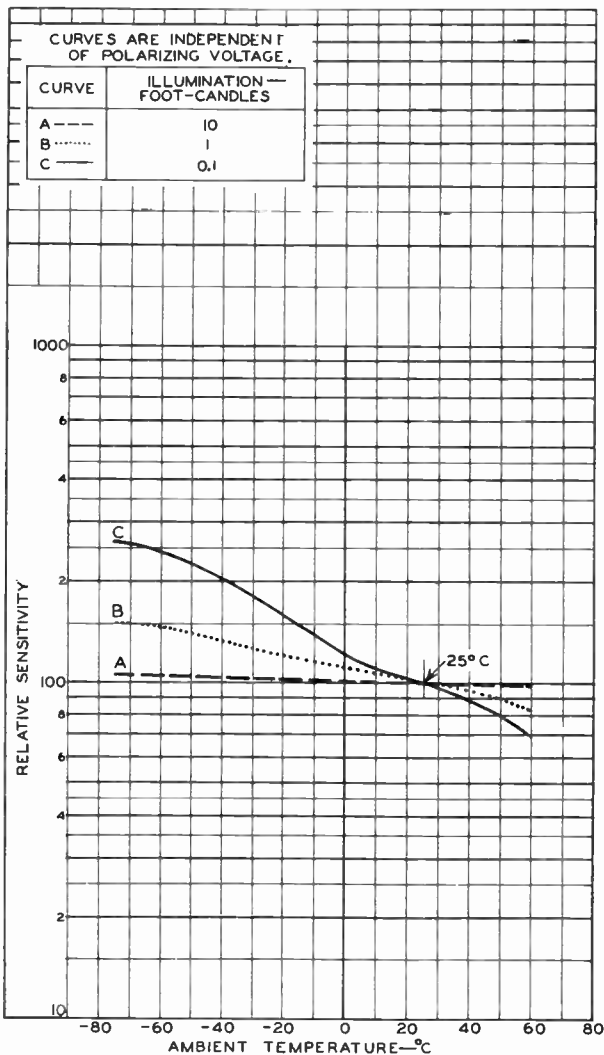




6957

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## TYPICAL CHARACTERISTICS



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9208



## Full-Wave Gas Rectifier

### METAL TYPE HAVING IONICALLY HEATED CATHODE

#### GENERAL DATA

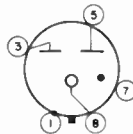
##### Electrical:

Cathode . . . . . Ionically Heated Type ←

##### Mechanical:

Operating Position . . . . . Any ←  
 Maximum Overall Length . . . . . 2-5/8"  
 Maximum Seated Length . . . . . 2-1/16"  
 Maximum Diameter . . . . . 1-5/16"  
 Dimensional Outline . . . . . See *General Section*  
 Envelope . . . . . Metal Shell MT8G  
 Base . . . . . Small-Wafer Octal 5-Pin (JEDEC Group 1, No. B5-215)  
 Basing Designation for BOTTOM VIEW . . . . . 4R

Pin 1 - Shell  
 Pin 3 - Plate No.2  
 Pin 5 - Plate No.1



Pin 7 - No Connection  
 Pin 8 - Cathode

#### FULL-WAVE RECTIFIER

Maximum and Minimum Ratings, *Design-Center Values Except as Noted:*

PEAK INVERSE PLATE VOLTAGE PER PLATE . . . . .	880 max.	volts
PEAK STARTING SUPPLY VOLTAGE PER PLATE . . . . .	300▲ min.	volts
PEAK PLATE CURRENT PER PLATE . . . . .	270 max.	ma
DC OUTPUT CURRENT . . . . .	{ 90 max. 30▲ min.	ma

##### Typical Operation:

*With vibrator-type power supply  
 and capacitor input to filter*

Peak Plate Supply Voltage Per Plate* . . . . .	380	volts
Filter-Input Capacitor . . . . .	8	μf
Total Effective Plate Supply Impedance Per Plate . . . . .	800	ohms
DC Output Voltage at input to filter . . . . .	275	volts
DC Output Current . . . . .	65	ma

##### Characteristics:

Tube Voltage Drop for plate ma. = 90 (Per plate). 24 volts

##### Minimum Circuit Value:

Total Effective Plate Supply Impedance Per Plate . . . . . 300 min. ohms

▲ Absolute value. Under no circumstances should the tube be operated with less than this value.

● Open-circuit voltage—flat portion of transformer voltage wave.

← Indicates a change







IA3

**H-F DIODE**  
MINIATURE TYPE

Heater	Coated Unipotential Cathode	
Voltage	1.4	a-c or d-c volts
Current	0.15	amp.
Direct Interelectrode Capacitances (Approx.):°		
Plate to Cathode	0.4	μf ←
Plate to Heater	0.8	μf
Heater to Cathode	0.6	μf
Maximum Overall Length		2-1/8"
Maximum Seated Height		1-7/8"
Length from Base Seat to Bulb Top (excluding tip)		1-1/2" ± 3/32" ←
Maximum Diameter		3/4"
Bulb		T-5-1/2
Base <sup>▲</sup>	Miniature Button 7-Pin	
Pin 1-Heater	Pin 5	{ Internal Con. ←
Pin 2-Plate		{ Do Not Use
Pin 3-Cathode	Pin 6-Plate	
Pin 4-No Connection	Pin 7-Heater	



RCA Socket Stock No. 9914  
 Mounting Position **BOTTOM VIEW (5AP<sub>2</sub>)** Any

*Maximum Ratings Are Design-Center Values*

RECTIFIER

Peak Inverse Plate Voltage	330 max. volts	←
Peak Plate Current	5 max. ma.	←
D-C Output Current	0.5 max. ma.	
D-C Heater-Cathode Potential	140 max. volts	←
<i>Typical Operation with Condenser-Input Filter:</i> ←		
A-C Plate Supply Voltage (RMS)	117	volts
Filter Input Condenser	2	μf
Min. Total Effective Plate-Supply Impedance	0	ohms

The resonant frequency of the IA3 is approximately 1000 Mc.  
 ° With no external shield.

▲ The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.

← Indicates a change.

AUG. 2, 1943

RCA VICTOR DIVISION  
 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

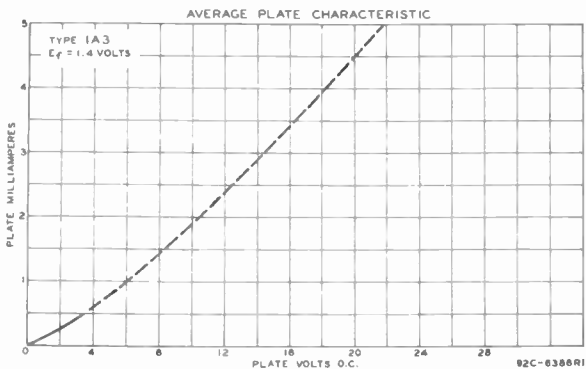
DATA

IA3



IA3

## H-F DIODE



AUG. 2, 1943

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY  
World Radio History

CE-6388R1





IA4-P



IA4-P

## SUPER-CONTROL R-F AMPLIFIER PENTODE

Filament	Coated	
Voltage	2.0	d-c volts
Current	0.060	amp.
Direct Interelectrode Capacitances:		
Grid to Plate (with shield-can)		0.007 max. $\mu\text{f}$
Input		5 $\mu\text{f}$
Output		11 $\mu\text{f}$
Overall Length		4-9/32" to 4-17/32"
Maximum Diameter		1-9/16"
Bulb		ST-12
Cap		Small Metal
Base		Small 4-Pin
Pin 1-Filament +		Pin 4-Filament -
Pin 2-Plate		Cap -Grid
Pin 3-Screen		



BOTTOM VIEW

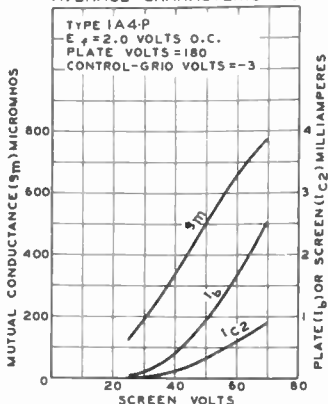
## AMPLIFIER - Class A

## Operating Conditions and Characteristics:

Filament	2.0	2.0	d-c volts
Plate	90	180 max.	volts
Screen	67.5	67.5 max.	volts
Grid	-3	-3	min. volts
Amp. Fac.	425	750	
Plate Res.	0.6	1.0	approx. megohm
Mut. Cond.	720	750	$\mu\text{mhos}$
Mut. Cond. *	15	15	$\mu\text{mhos}$
Plate Cur.	2.2	2.3	ma.
Screen Cur.	0.9	0.8	ma.

\* At -15 volts bias.

## AVERAGE CHARACTERISTICS



92C-4655

SEPT. 30, 1936

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

World Radio History

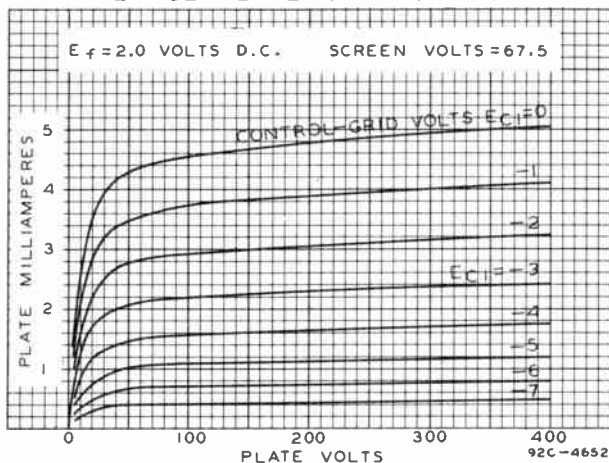
TENTATIVE DATA

1A4-P

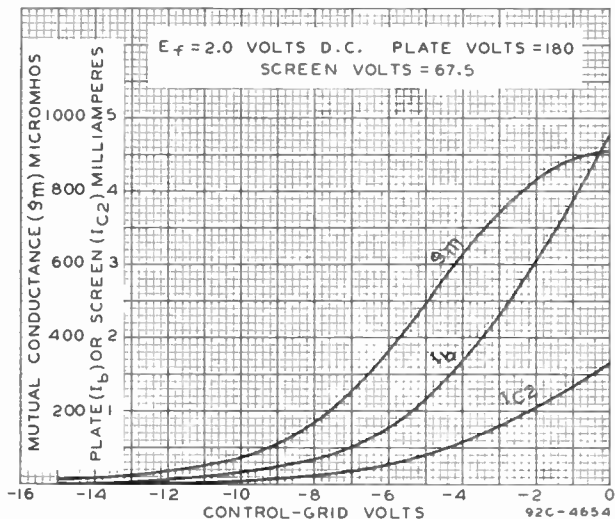


1A4-P

## AVERAGE PLATE CHARACTERISTICS



## AVERAGE CHARACTERISTICS



AUG. 21, 1936

RCA RADIONRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

World Radio History

92C-4665



1A5-GT



1A5-GT/1A5-G

## POWER AMPLIFIER PENTODE

Filament	Coated	
Voltage	1.4	d-c volts
Current	0.05	amp.
Maximum Overall Length		3-5/16"
Maximum Coated Height		2-3/4"
Maximum Diameter		1-5/16"
Bulb		T-9
Base		Intermediate Shell Octal 7-Pin
Pin 1 - No Connection		Pin 5 - Grid
Pin 2 - Filament +		Pin 7 - Filament -
Pin 3 - Plate		Pin 8 - No Connection
Pin 4 - Screen		
Mounting Position		Any



BOTTOM VIEW (G-6X)

AMPLIFIER

Plate Voltage	110 max.	volts
Screen Voltage	110 max.	volts
Total Zero-Sig. Cathode Current	6 max.	ma.

*Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:*

Plate	85	90	volts
Screen	85	90	volts
Grid	-4.5	-4.5	volts
Peak A-F Grid Volt:	4.5	4.5	volts
Zero-Sig. Plate Cur.	3.5	4.0	ma.
Max.-Sig. Plate Cur.	3.5	4.0	ma.
Zero-Sig. Screen Cur.	0.7	0.8	ma.
Max.-Sig. Screen Cur.	1.0	1.1	ma.
Plate Res.	0.3	0.3	<u>approx. ohms</u>
Transcond.	800	850	μmhos
Load Res.	25000	25000	ohms
Total Harmonic Dist.	10	7	%
Max.-Sig. Power Output	100	115	mw

\* Self-bias is recommended so that grid bias will be proportionately less as the B-supply voltage falls off during battery life.

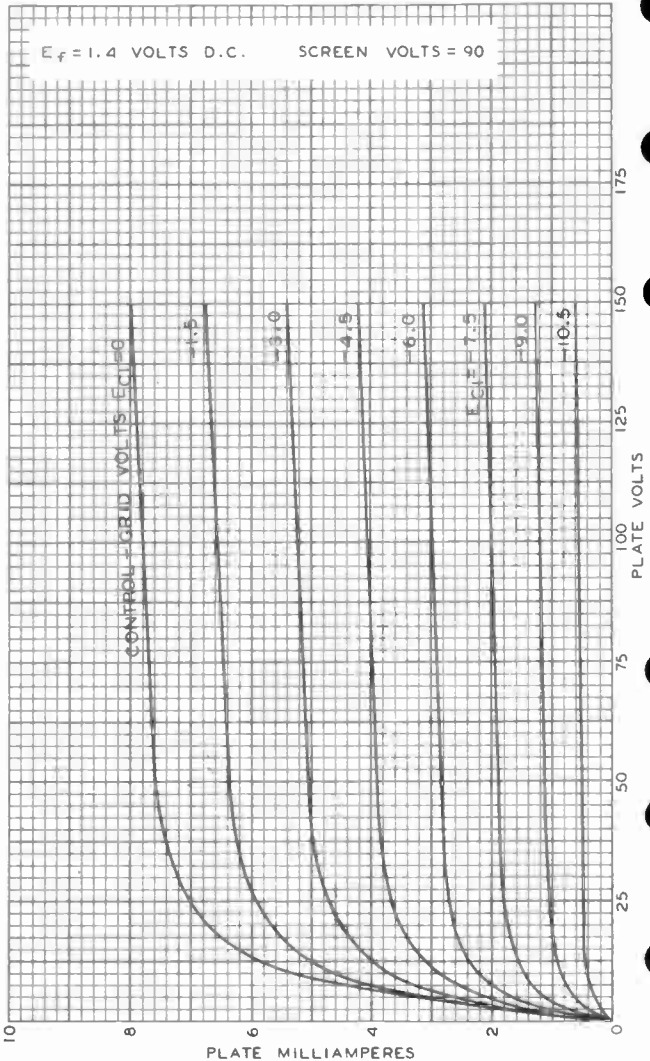
1A5-GT



1A5-GT

### AVERAGE PLATE CHARACTERISTICS

$E_f = 1.4$  VOLTS D.C.      SCREEN VOLTS = 90



NOV. 10, 1938

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.  
World Radio History

92C-4998

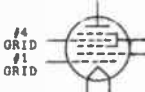
RCA-1A6

PENTAGRID CONVERTER

Filament Voltage	Coated 2.0	d-c volts
Current	0.060	amp.

Direct Interelectrode Capacitances (approx.):

$C_{g4F}$		0.25 <sup>⓪</sup> μf
$C_{g4g2}$		0.2 <sup>⓪</sup> μf
$C_{g4g1}$		0.1 <sup>⓪</sup> μf
$C_{g1g2}$		0.8 μf
$C_{g4(k+g1+g2+g3+g5+p)}$	= R-F Input	10.5 μf
$C_{g2(k+g1+g3+g4+g5+p)}$	= Osc. Output	6 μf
$C_{g1(k+g2+g3+g4+g5+p)}$	= Osc. Input	5 μf
$C_p(k+g1+g2+g3+g4+g5)$	= Mixer Output	9 μf

Overall Length	4-9/32" to 4-17/32"
Maximum Diameter	1-9/16"
Bulb	ST-12
Cap	Small Metal
Base	Small 6-Pin

Pin 1-Filament+	(3)	(4)	
Pin 2-Plate	(2)	(5)	
Pin 3-Grid #2	(1)	(6)	
Pin 4-Grid #1	BOTTOM VIEW		

CONVERTER SERVICE

Plate Voltage	180 max.	volts
Screen (Grids #3 & #5) Voltage	67.5 max.	volts
Anode-Grid (Grid #2) Voltage	135 max.	volts
Anode-Grid Voltage Supply*	180 max.	volts
Control-Grid (Grid #1) Voltage	-3 min.	volts
Total Cathode Current	9 max.	ma.

Typical Operation:

Filament	2.0	2.0	d-c volts
Plate	135	180	volts
Screen	67.5	67.5	volts
Anode-Grid	135	135	volts
Anode-Grid Supply	135	180 <sup>⓪</sup>	volts
Control-Grid	-3	-3	volts
Oscillator-Grid (Grid #1) Res.	50000	50000	ohms

Plate Resistance	0.4	0.5	megohm
Conversion Cond.	275	300	μmhos
Conversion Cond. at -22.5 volts on Grid #4	4	4	μmhos
Plate Current	1.7	1.3	ma.
Screen Current	2.5	2.4	ma.
Anode-Grid Current	2.3	2.3	ma.
Oscillator-Grid Cur.	0.2	0.2	ma.
Total Cathode Current	6.2	6.2	ma.

\* Applied through a 20000-ohm voltage-dropping resistor, by-passed by <math>0.1 \mu f</math> condenser.

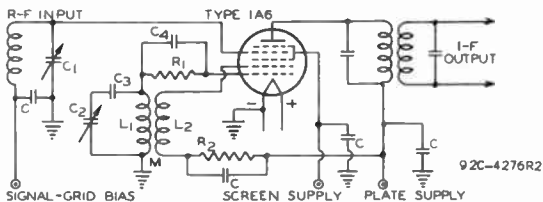
The mutual conductance of the oscillator portion (not oscillating) of the 1A6 is 425 micromhos under the following conditions: plate voltage, 135 to 180 volts; screen voltage, 67.5 volts; anode-grid voltage (no voltage-dropping resistor), 135 volts; and oscillator-grid voltage, 0 volts. Under these same conditions, the anode-grid current is 2.3 milliamperes.

⓪ With shield-can  
← Indicates a change

## PENTAGRID CONVERTER

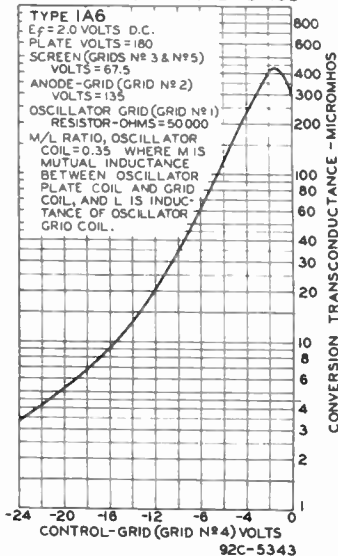
TYPICAL PENTAGRID CONVERTER CIRCUIT



- $C = 0.1 \mu f$   
 $C_1 = \text{GANGED VARIABLE CONDENSERS}$   
 $C_2 = \text{PADDING CONDENSER}$   
 $C_3 = \text{GRID CONDENSER OF } 200 \mu f$   
 $C_4 = \text{GRID CONDENSER OF } 20000 \text{ OHMS}$   
 $L_1 = \text{OSCILLATOR GRID INDUCTANCE}$   
 $L_2 = \text{OSCILLATOR PLATE INDUCTANCE}$
- $M = \text{MUTUAL INDUCTANCE OF } L_1 \text{ AND } L_2$   
 $R_1 = \text{OSCILLATOR GRID LEAK}$   
 $R_2 = \text{VOLTAGE DROPPING RESISTOR OF } 20000 \text{ OHMS}$
- GRID #2 VOLTS SHOULD BE HIGHER THAN SCREEN VOLTS
- COUPLED

The license extended to the purchaser of tubes appears in the license notice accompanying them. Information contained herein is furnished without assuming any obligations.

## OPERATION CHARACTERISTICS





1A7-GT/G

1A7-GT/G

## PENTAGRID CONVERTER

Filament	Coated	d-c volts
Voltage	1.4	
Current	0.05	amp.
Direct Interelectrode Capacitances: <sup>o</sup>		
Grid #4 to Plate	0.5 max.	μf
Grid #4 to Grid #2	0.4 max.	μf
Grid #4 to Grid #1	0.2 max.	μf
Grid #1 to Grid #2	0.9	μf
Grid #4 to All Other Electrodes (R-F Input)	7.0	μf
Grid #2 to All Other Electrodes Except		
Grid #1 (Osc. Output)	4.4	μf
Grid #1 to All Other Electrodes Except		
Grid #2 (Osc. Input)	3.4	μf
Plate to All Other Electrodes (Mixer Output)	10	μf
Maximum Overall Length		3-5/16"
Maximum Seated Height		2-3/4"
Maximum Diameter		1-5/16"
Bulb		T-9
Cap		Skirted Miniature
Base	Small Wafer Octal 8-Pin, Sleeve	
Pin 1 - Base Sleeve	Pin 6 - Grid #2	
Pin 2 - Filament +	Pin 7 - Filament -	
Pin 3 - Plate	Pin 8 - No Connection	
Pin 4 - Grids #3 & #5	Cap - Grid #4	
Pin 5 - Grid #1		
Mounting Position		Any



BOTTOM VIEW (GT-7Z)

Maximum Ratings Are Design-Center Values

## CONVERTER SERVICE

Plate Voltage	110 max.	volts
Screen (Grids #3 & #5) Voltage	60 max.	volts
Screen Supply Voltage	110 max.	volts
Anode-Grid (Grid #2) Voltage	110 max.	volts
Total Zero-Sig. Cathode Current	4 max.	ma.
Typical Operation:		
Plate	90	volts
Screen **	45	volts
Anode-Grid	90	volts
Control-Grid (Grid #4)*	0	volts
Oscillator-Grid (Grid #1) Resistor	200000	ohms
Plate Res.	0.6	megohm
Conversion Transcond.	250	μmhos
Conversion Transcond. with		
Grid #4 bias of -3 volts	5 approx.	μmhos
Plate Cur.	0.6	ma.
Screen Cur.	0.7	ma.
Anode-Grid Cur.	1.2	ma.
Oscillator-Grid Cur.	0.035	ma.
Total Cathode Cur.	2.5	ma.

NOTE: The transconductance of the oscillator portion (not oscillating) is 550 micromhos under the following conditions: plate volts, 90; screen volts, 45; control-grid volts, 0; anode-grid volts, 90; and oscillator-grid volts, 0.

<sup>o</sup> with external shield connected to negative filament terminal.

\*\* Obtained preferably by using a properly by-passed 45000- to 75000-ohm voltage-dropping resistor in series with the 90-volt supply.

\* A resistance of at least 1.0 megohm should be in the grid return to negative filament pin. ← Indicates a change.

Typical Pentagrid Converter Circuit is shown under Type 1A8.

Jan. 1, 1943

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

DATA



## OPERATION CHARACTERISTIC

$E_f = 1.4$  VOLTS D.C.  
 PLATE VOLTS = 90  
 GRIDS N<sup>o</sup> 3 & N<sup>o</sup> 5 (SCREEN) VOLTS = 45\*  
 GRID N<sup>o</sup> 4 (CONTROL GRID) VOLTS = 0  
 GRID N<sup>o</sup> 2 (ANODE GRID) VOLTS = 90  
 GRID N<sup>o</sup> 1 (OSCILLATOR GRID)  
 RESISTOR - OHMS = 200 000

\* OBTAINED THROUGH 70000-OHM  
 DROPPING RESISTOR FROM  
 90-VOLT SUPPLY







IAC5

IAC5

# POWER PENTODE

SUBMINIATURE TYPE

## GENERAL DATA

### Electrical:

Filament, Coated:

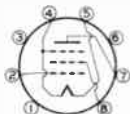
Voltage . . . . .	1.25 . . . . .	dc volts
Current . . . . .	U.04 . . . . .	amp

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall length . . . . .	1-3/4"
Maximum Seated Length . . . . .	1-1/2"
Length, Base Seat to Bulb Top (excluding tip) . . . . .	1.200" ± 0.060"
Maximum Diameter . . . . .	0.4"
Bulb . . . . .	T-3
Base . . . . .	Small-Button Sub-miniar 8-Pin

### BOTTOM VIEW

- Pin 1 - No Connection
- Pin 2 - Grid No.1
- Pin 3 - No Connection
- Pin 4 - Filament (-), Grid No.3



- Pin 5 - Filament (+)
- Pin 6 - No Connection
- Pin 7 - Plate
- Pin 8 - Grid No.2

### AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . .	67.5 max.	volts
GRID-No. 2 (SCREEN) VOLTAGE . . . . .	67.5 max.	volts
TOTAL CATHODE CURRENT . . . . .	4.0 max.	ma

### Typical Operation and Characteristics:

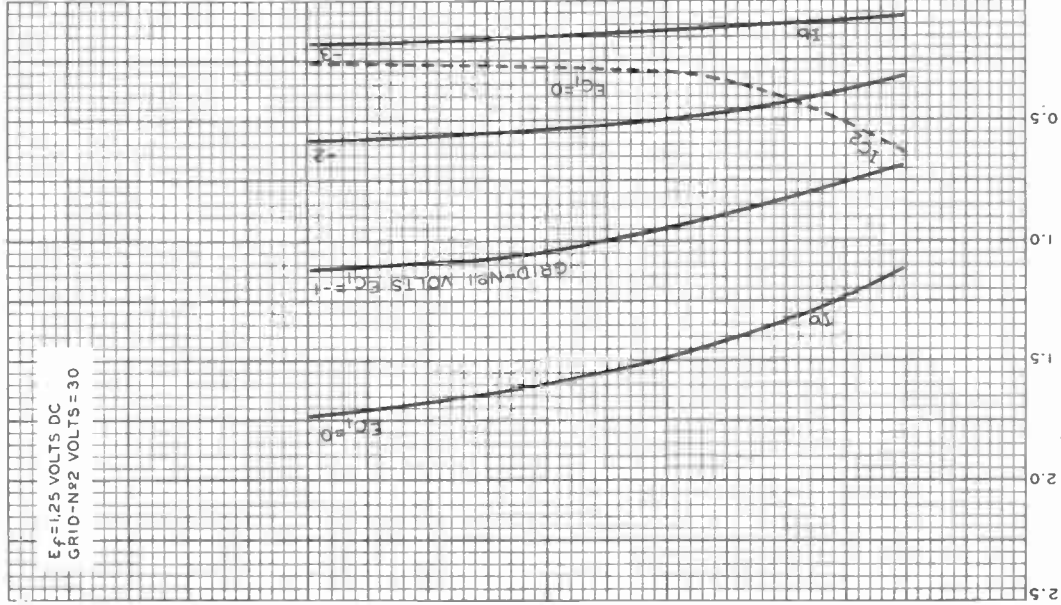
Plate Voltage . . . . .	30	45	67.5	volts
Grid-No.2 Voltage . . . . .	30	45	67.5	volts
Grid-No.1 (Control-Grid) Voltage . . . . .	-2	-3	-4.5	volts
Peak AF Grid-No.1 Voltage . . . . .	2	3	4.5	volts
Zero-Signal Plate Current . . . . .	0.5	1.0	2.0	ma
Zero-Signal Grid-No.2 Current . . . . .	0.1	0.2	0.4	ma
Plate Resistance . . . . .	0.2	0.17	0.15	megohm
Transconductance . . . . .	450	600	750	μmhos
Load Resistance . . . . .	50000	40000	25000	ohms
Total Harmonic Distortion . . . . .	10	10	10	%
Max.-Signal Power Output . . . . .	5	15	50	mW



1AC5

# AVERAGE PLATE CHARACTERISTICS

$E_f = 1.25$  VOLTS DC  
GRID-N $\times$ 2 VOLTS = 30



APRIL 12, 1949

PLATE ( $I_{b}$ ) OR GRID-N $\times$ 2 ( $I_{c2}$ ) MILLIAMPERES  
TUBE DEPARTMENT

RADCO CORPORATION OF AMERICA HARTFORD, NEW JERSEY

92CM-7245

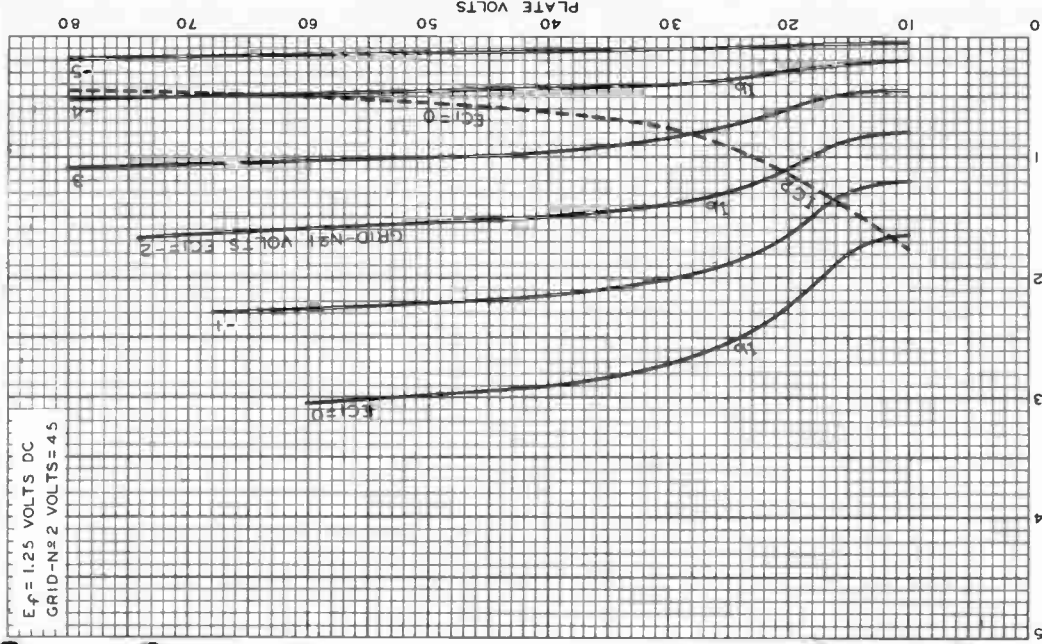


IAC5

IAC5

### AVERAGE PLATE CHARACTERISTICS

$E_f = 1.25$  VOLTS DC  
GRID-N $\pm$ 2 VOLTS = 45



APRIL 26, 1949

PLATE ( $I_b$ ) OR GRID-N $\pm$ 2 ( $I_c$ ) MILLIAMPERES

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

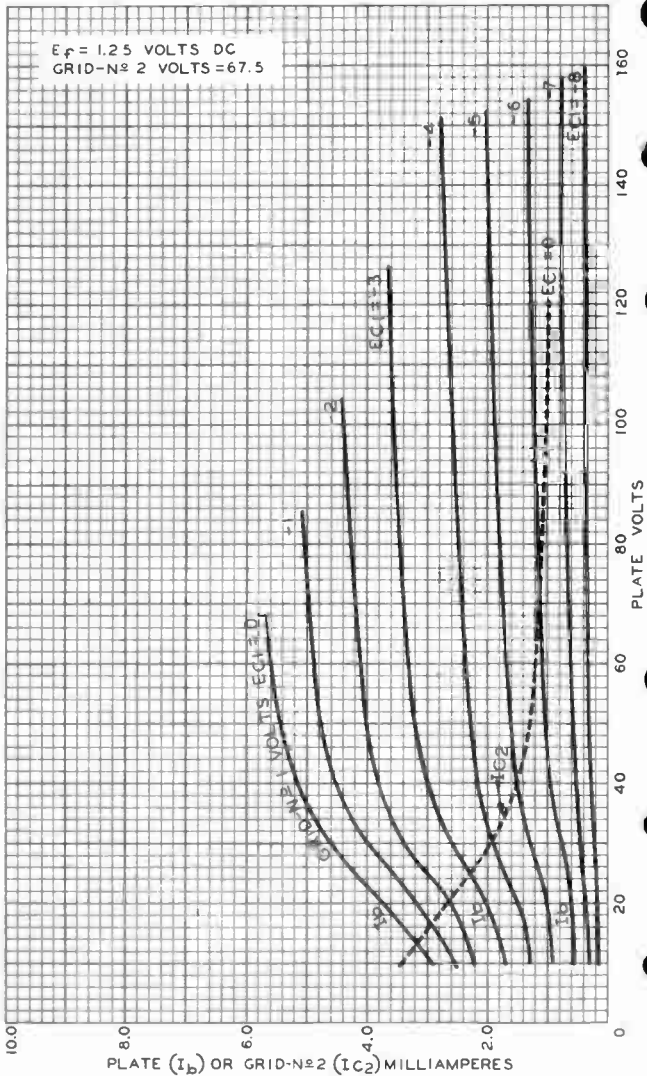
92CM-7261

IAC5



IAC5

### AVERAGE PLATE CHARACTERISTICS



APRIL 13, 1949

TUBE DEPARTMENT

92CM-7247

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY



IAD5

IAD5

## SHARP-CUTOFF PENTODE

SUBMINIATURE TYPE

## GENERAL DATA

## Electrical:

Filament, Coated:

Voltage . . . . .	1.25	dc volts
Current . . . . .	0.04	amp

Direct Interelectrode Capacitances:<sup>0</sup>

Grid No.1 to Plate . .	0.010 max.	$\mu\text{f}$
Input . . . . .	1.8	$\mu\text{f}$
Output . . . . .	2.8	$\mu\text{f}$

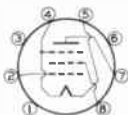
<sup>0</sup> with no external shield.

## Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	1-3/4"
Maximum Seated Length . . . . .	1-1/2"
Length, Base Seat to Bulb Top (excluding tip) . . . . .	1.200 $\pm$ 0.060"
Maximum Diameter . . . . .	0.4"
Bulb . . . . .	T-3
Base . . . . .	Small-Button Sub-minar 8-Pin

## BOTTOM VIEW

Pin 1 - No Connection  
 Pin 2 - Grid No.1  
 Pin 3 - No Connection  
 Pin 4 - Filament (-),  
 Grid No.3



Pin 5 - Filament (+)  
 Pin 6 - No Connection  
 Pin 7 - Plate  
 Pin 8 - Grid No.2

AMPLIFIER - Class A<sub>1</sub>

## Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . .	67.5	max.	volts
GRID-NO.2 (SCREEN) VOLTAGE . . . . .	67.5	max.	volts
TOTAL CATHODE CURRENT . . . . .	4.0	max.	ma

## Typical Operation and Characteristics:

Plate Voltage . . . . .	30	45	67.5	volts
Grid-No.2 Voltage . . . . .	30	45	67.5	volts
Grid-No.1 (Control-Grid) Voltage . . . . .	0	0	0	volts
Plate Resistance (Approx.) . . . . .	0.7	0.7	0.7	megohm
Transconductance . . . . .	430	580	735	$\mu\text{hos}$
Grid-No.1 Bias (Approx.) for plate current of 10 $\mu\text{amp}$ . . . . .	-3	-4	-6	volts
Plate Current . . . . .	0.45	0.9	1.85	ma
Grid-No.2 Current . . . . .	0.16	0.35	0.75	ma

SEPT. 15, 1949

TUBE DEPARTMENT

TENTATIVE DATA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

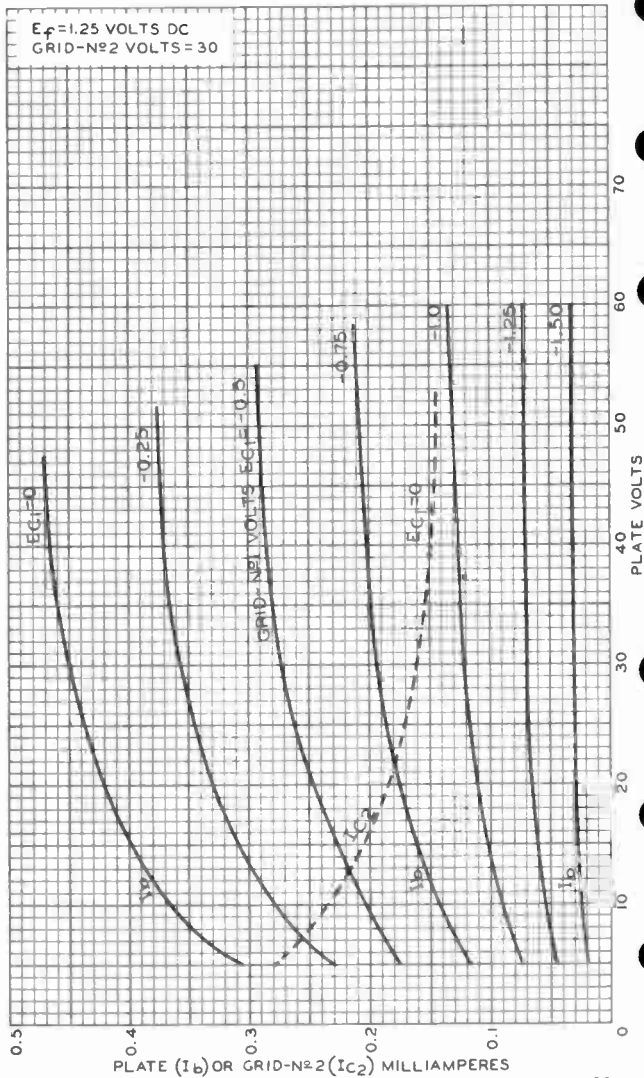
World Radio History

IAD5



IAD5

### AVERAGE PLATE CHARACTERISTICS



APRIL 19, 1949

TUBE DEPARTMENT

92CM-7253

RAD CO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

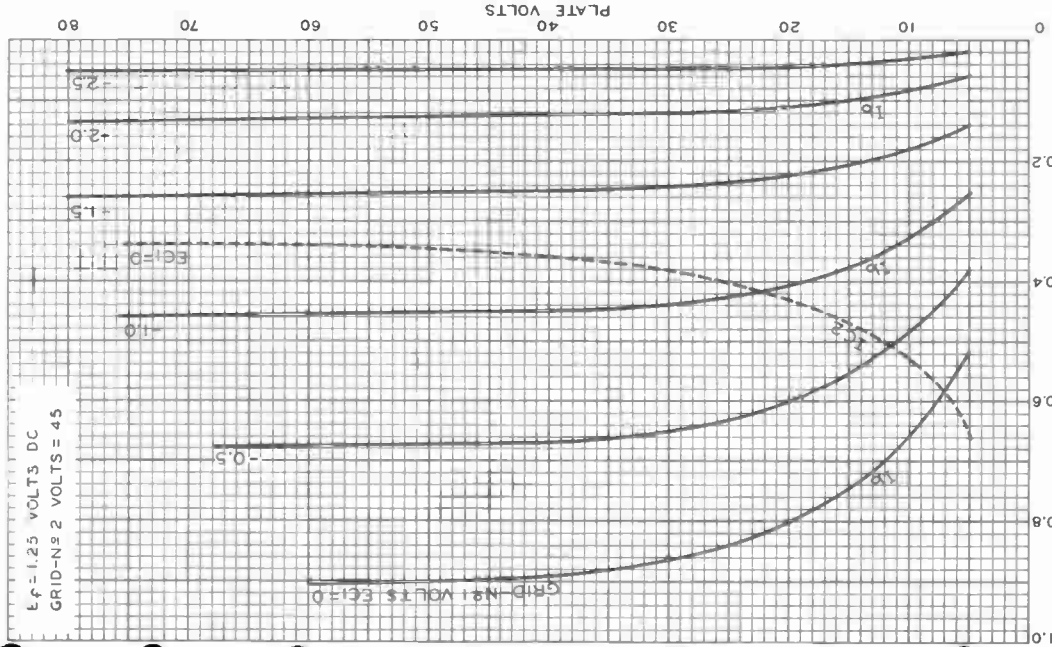


IAD5

IAD5

# AVERAGE PLATE CHARACTERISTICS

$E_f = 1.25$  VOLTS DC  
GRID-N<sup>o</sup> 2 VOLTS = 45



APRIL 19, 1949

TUBE DEPARTMENT

RADCO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

PLATE (I<sub>b</sub>) OR GRID-N<sup>o</sup> 2 (I<sub>c2</sub>) MILLIAMPERES

92CM-7251

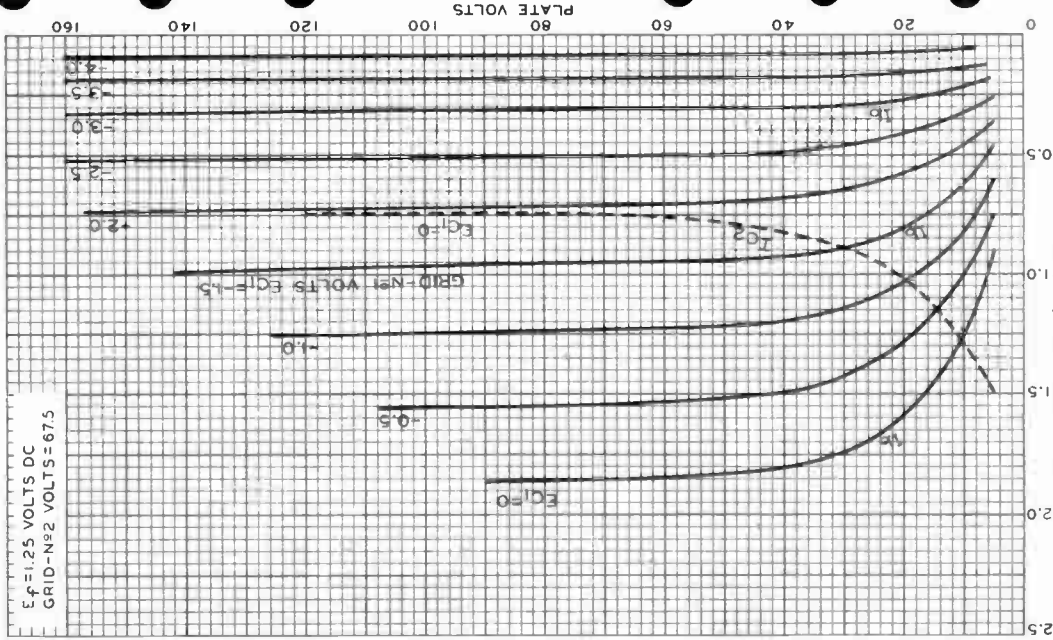
IAD5



IAD5

# AVERAGE PLATE CHARACTERISTICS

$E_f = 1.25$  VOLTS DC  
GRID-N<sup>o</sup>2 VOLTS = 67.5



World Precision

APRIL 19, 1949

TUBE DEPARTMENT

RADCO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

PLATE ( $I_b$ ) OR GRID-N<sup>o</sup>2 ( $I_{c2}$ ) MILLIAMPERES

92CM-7252





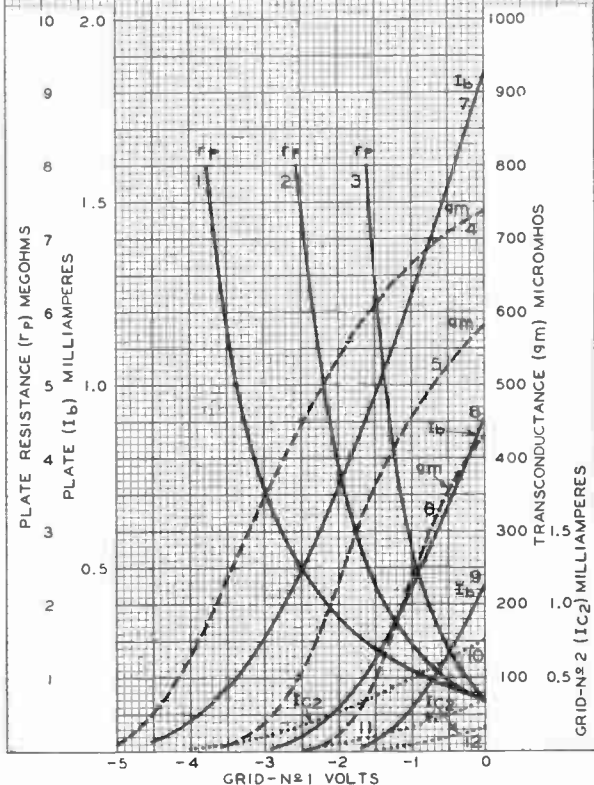
IAD5

IAD5

# AVERAGE CHARACTERISTICS

$E_p = 1.25$  VOLTS DC

CURVE	PLATE VOLTS	GRID-N <sup>o</sup> 2 VOLTS
1	67.5	67.5
2	45	45
3	30	30
4	67.5	67.5
5	45	45
6	30	30
7	67.5	67.5
8	45	45
9	30	30
10	67.5	67.5
11	45	45
12	30	30



APRIL 18, 1949

TUBE DEPARTMENT

92CM-7250

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History





IAX2

IAX2

# HALF-WAVE VACUUM RECTIFIER

9-PIN MINIATURE TYPE

## GENERAL DATA

### Electrical:

Filament, Coated:

Voltage . . . . .	1.4	ac volts
Current . . . . .	0.65	amp

Direct Interelectrode Capacitance:<sup>o</sup>

Plate to filament . . . . .	0.7 max.	$\mu\text{f}$
-----------------------------	----------	---------------

### Mechanical:

Mounting Position . . . . . Any

Maximum Overall Length . . . . . 2-27/32"

Seated Length . . . . . 2-7/16"  $\pm$  1/8"

Maximum Diameter . . . . . 7/8"

Dimensional Outline . . . . . See General Section

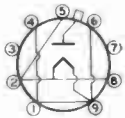
Bulb . . . . . T-6-1/2

Cap . . . . . Skirted Miniature (JETEC No. C1-2 or C1-33)

Base . . . . . Small-Button Noval 9-Pin (JETEC No. E9-1)

Basing Designation for BOTTOM VIEW . . . . . 9Y

- Pin 1 - Filament, Internal Shield
- Pin 2 - Filament
- Pin 3 - No Connection
- Pin 4 - Same as Pin 1



- Pin 5 - Same as Pin 2
- Pin 6 - Same as Pin 1
- Pin 7 - Same as Pin 3
- Pin 8 - Same as Pin 2
- Pin 9 - Same as Pin 1
- Cap - Plate

## PULSED-RECTIFIER SERVICE

Maximum Ratings, Design-Center Values Except as Noted:

For operation in a 525-line, 30-frame system<sup>o</sup>

### PEAK INVERSE PLATE VOLTAGE

(Absolute maximum) . . . . .	25000 <sup>■</sup> max.	volts
------------------------------	-------------------------	-------

PEAK PLATE CURRENT . . . . .	11 max.	ma
------------------------------	---------	----

AVERAGE PLATE CURRENT . . . . .	1 max.	ma
---------------------------------	--------	----

### Typical Operation:

Peak Plate Supply Voltage:

Positive pulse value . . . . .	20000	volts
--------------------------------	-------	-------

Negative pulse value . . . . .	5000	volts
--------------------------------	------	-------

DC Output Voltage (Approx.) . . . . .	20000	volts
---------------------------------------	-------	-------

DC Output Current (Approx.) . . . . .	300	$\mu\text{amp}$
---------------------------------------	-----	-----------------

<sup>o</sup> without external shield.

<sup>◆</sup> May be connected to one side of filament, or used as a tie point for filament dropping resistor; otherwise do not use.

<sup>□</sup> As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations", Federal Communications Commission.

<sup>■</sup> under no circumstances should this absolute value be exceeded.

IAX2



IAX2

## HALF-WAVE VACUUM RECTIFIER

### OPERATING CONSIDERATIONS

*Filament Voltage Adjustment.* When the filament is supplied from an rf source and is at a high dc potential above ground, adjustment of the filament voltage by direct measurement is impractical. To insure that the rated voltage is applied to the filament, a simple method utilizing a visual color match of two incandescent filaments in a darkened room may be used. In this method, the rf filament voltage, obtained from a pulse-power source, is adjusted until the color of this filament matches that of the filament of another IAX2 operated from a dc or low-frequency ac supply of 1.4 volts.

*X-rays.* The voltages employed in some television receivers and other high-voltage equipment are sufficiently high that high-voltage rectifier tubes may produce X-rays which can constitute a health hazard unless such tubes are adequately shielded. Relatively simple shielding should prove adequate, but the need for this precaution should be considered in equipment design.



IB4-P

IB4-P



## R-F AMPLIFIER PENTODE

Filament	Coated	
Voltage	2.0	d-c volts
Current	0.060	amp.
Direct Interelectrode Capacitances:		
Grid to Plate (with shield-can)		0.007 max. $\mu\text{f}$
Input		5 $\mu\text{f}$
Output		11 $\mu\text{f}$
Overall Length		4-9/32" to 4-17/32"
Maximum Diameter		1-9/16"
Bulb		ST-12
Cap		Small Metal
Base	(2) (3)	Small 4-Pin
Pin 1-Filament †	(1) (4)	Pin 4-Filament -
Pin 2-Plate		Cap -Grid
Pin 3-Screen		

BOTTOM VIEW

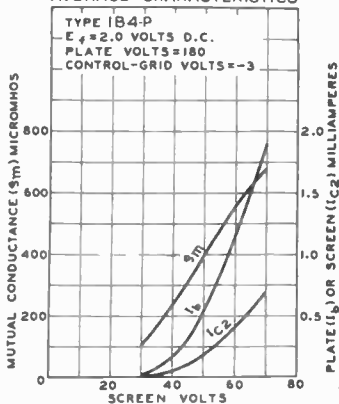
AMPLIFIER - Class A

## Operating Conditions and Characteristics:

Filament	2.0	2.0	d-c volts
Plate	90	180 max.	volts
Screen	67.5	67.5 max.	volts
Grid	-3	-3	volts
Amp. Fact.	550	1000	
Plate Res.	1.0	1.5	megohms
Mut. Cond.	600	650	$\mu\text{mhos}$
Grid Bias †	-8	-8	volts
Plate Cur.	1.6	1.7	ma.
Screen Cur.	0.7	0.6	ma.

† For plate current cut-off.

## AVERAGE CHARACTERISTICS



SEPT. 30, 1936

RCA RADITRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

TENTATIVE DATA

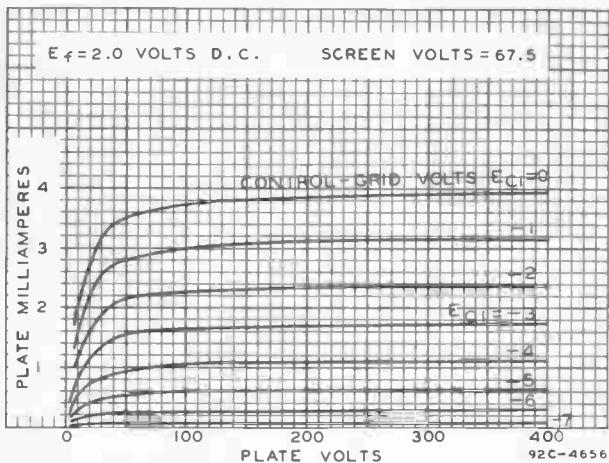
World Radio History

IB4-P

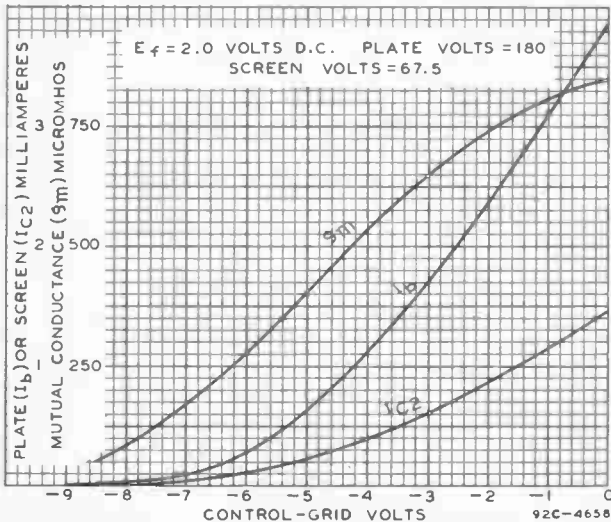


IB4-P

AVERAGE PLATE CHARACTERISTICS



AVERAGE CHARACTERISTICS






1B5/25S

1B5

DUPLEX-DIODE TRIODE

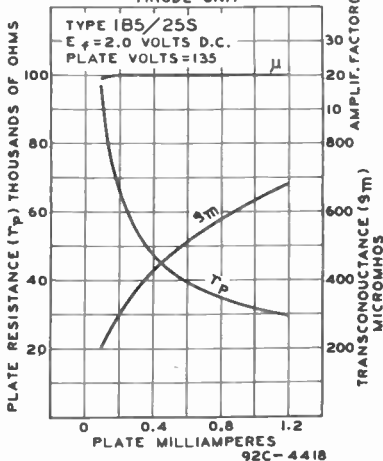
Filament	Coated	
Voltage	2.0	d-c volts
Current	0.06	amp.
Direct Interelectrode Capacitances - Triode Unit:		
Grid to Plate	3.6	$\mu\text{f}$
Grid to Filament	1.6	$\mu\text{f}$
Plate to Filament	1.9	$\mu\text{f}$
Maximum Overall Length		4-3/16" ←
Maximum Diameter		1-9/16" ←
Bulb		ST-12
Base		Small 6-Pin
Pin 1-Filament +		
Pin 2-Triode Plate		
Pin 3-Diode Plate #2*		
		
		Pin 4-Diode Plate #1*
		Pin 5-Triode Grid
		Pin 6-Filament -
Mounting Position	BOTTOM VIEW	Vertical, Base Down ◊ ←

\* Diode Plate #2 is at positive end of filament; Diode Plate #1 is at negative end of filament.

◊ Horizontal operation permitted if plane of filament is vertical.\*

For additional data and curves, refer to type 1B6-G. The 1B5/25S and the 1B6-G are identical electrically ←

AVERAGE CHARACTERISTICS TRIODE UNIT



← Indicates a change.

APRIL 20, 1938

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.  
World Radio History

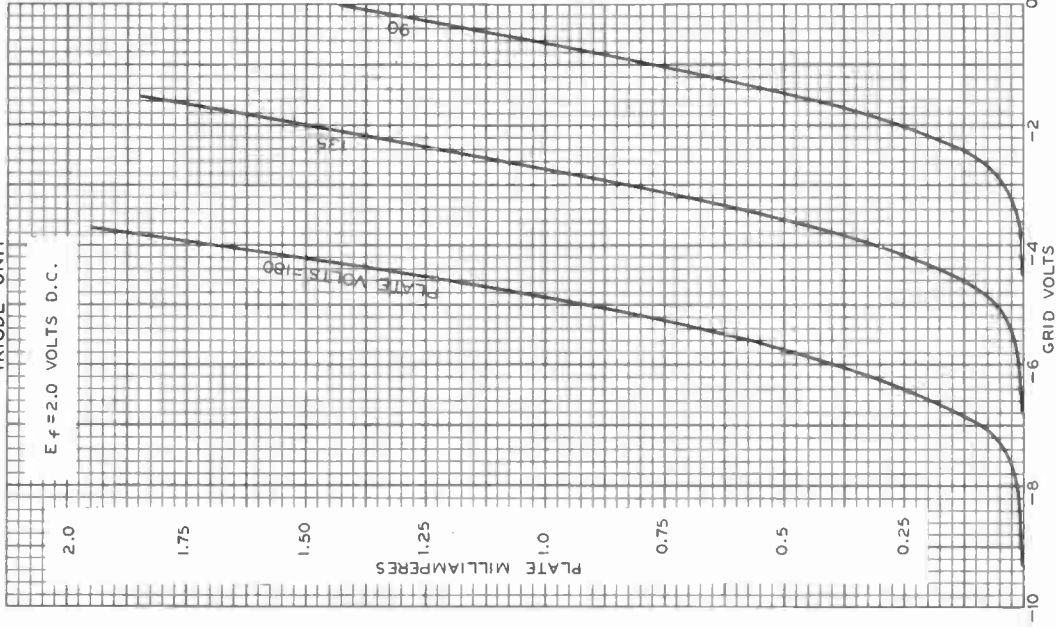
DATA



1B5

# AVERAGE CHARACTERISTICS TRIODE UNIT

$E_f = 2.0$  VOLTS D.C.



1B5

World Precision

MAY 21, 1935

RCA RADIODRON DIVISION  
RCA MANUFACTURING COMPANY INC

92C-4417





IC5-GT



IC5-GT/IC5-G

## POWER AMPLIFIER PENTODE

Filament	Coated	
Voltage	1.4	d-c volts
Current	0.10	amp.
Maximum Overall Length		3-5/16"
Maximum Seated Height		2-3/4"
Maximum Diameter		1-5/16"
Bulb		T-9
Base	Intermediate Shell Octal 7-Pin	
Pin 1 - No Connection		Pin 5 - Grid
Pin 2 - Filament +		Pin 7 - Filament -
Pin 3 - Plate		Pin 8 - No Connection
Pin 4 - Screen		
Mounting Position		Any



BOTTOM VIEW (G-6X)

## AMPLIFIER

Plate Voltage		110 max.	volts
Screen Voltage		110 max.	volts
Total Zero-Sig. Cathode Current		12 max.	ma.
<i>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</i>			
Plate	83	90	volts
Screen	83	90	volts
Grid *	-7.0	-7.5	volts
Peak A-F Grid Volt.	7.0	7.5	volts
Zero-Sig. Plate Cur.	7.0	7.5	ma.
Max.-Sig. Plate Cur.	7.3	7.8	ma.
Zero-Sig. Screen Cur.	1.6	1.6	ma.
Max.-Sig. Screen Cur.	3.5	3.5	ma.
Plate Res.	110000	115000	approx. ohms
Transcond.	1500	1550	μmhos
Load Res.	9000	8000	ohms
Total Harmonic Dist.	10	10	%
Max.-Sig. Power Output	200	240	mw

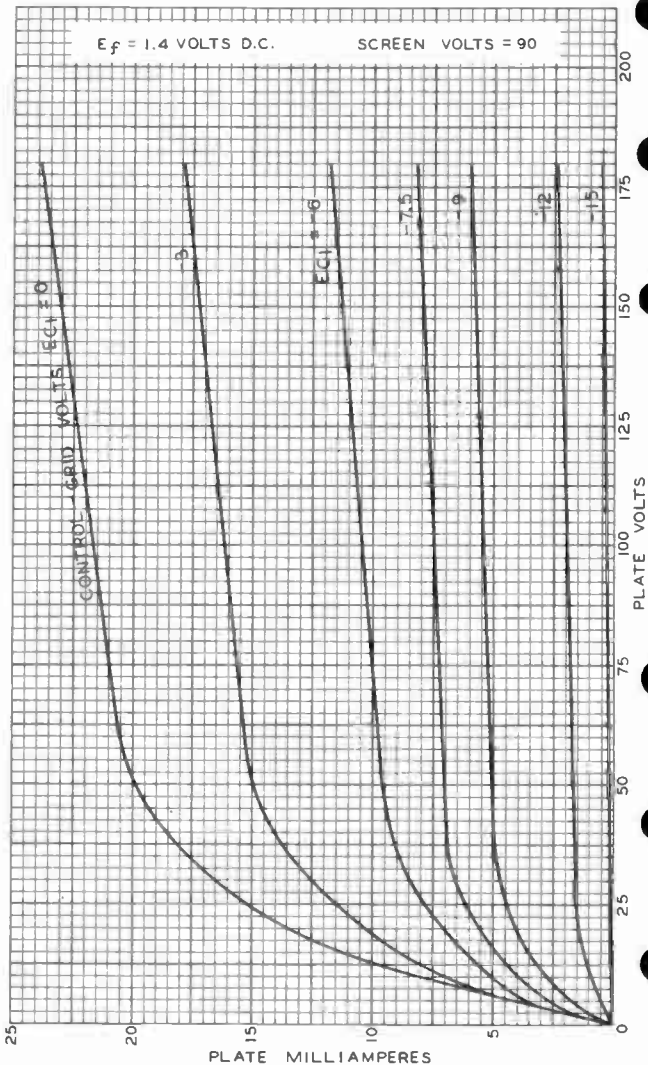
\* Self-bias is recommended so that grid bias will be proportionately less as the B-supply voltage falls off during battery life.

IC5-GT



IC5-GT

### AVERAGE PLATE CHARACTERISTICS



NOV. 10, 1938

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.  
World Radio History

92C-4997



IC6

IC6



## PENTAGRID CONVERTER

Filament	Coated	
Voltage	2.0	d-c volts
Current	0.12	amp.

## Direct Interelectrode Capacitances:

Grid #4 to Plate	0.30*	μμf
Grid #4 to Grid #2	0.30*	μμf
Grid #4 to Grid #1	0.15*	μμf
Grid #1 to Grid #2	1.5	μμf
Grid #4 to All Other Electrodes (R-F Input)	10	μμf
Grid #2 to All Other Electrodes (Osc. Output)	6	μμf
Grid #1 to All Other Electrodes (Osc. Input)	6	μμf
Plate to All Other Electrodes (Mixer Output)	10	μμf

Overall Length 4-9/32" to 4-17/32"

Maximum Diameter 1-9/16"

Bulb ST-12

Cap Small Metal

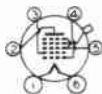
Base Small 6-Pin

Pin 1 - Filament +

Pin 2 - Plate

Pin 3 - Grid #2

Pin 4 - Grid #1



Pin 5 - Grids #3 &amp; #5

Pin 6 - Filament -

Cap - Grid #4

Mounting Position BOTTOM VIEW (6L) Vertical<sup>◇</sup>CONVERTER SERVICE

Plate Voltage	180 max. volts
Screen (Grids #3 & #5) Voltage	67.5 max. volts
Screen Supply Voltage	180 max. volts
Anode-Grid (Grid #2) Voltage	135 max. volts
Anode-Grid Supply Voltage	180 max. volts
Control-Grid (Grid #4) Voltage	0 min. volts
Plate Dissipation	0.3 max. watt
Screen Dissipation	0.2 max. watt
Anode-Grid Dissipation	0.4 max. watt
Total Cathode Current	9 max. ma.

## Typical Operation:

Filament	2.0	2.0	d-c volts
Plate	135	180	volts
Screen	67.5	67.5	volts
Anode-Grid Supply	135 <sup>▲</sup>	180 <sup>▲</sup>	volts
Control Grid	-3	-3	volts
Osc.-Grid (Grid #1) Resistor	50000	50000	ohms
Plate Res. (approx.)	0.6	0.7	megohm
Conversion Transcond.	300	325	μmhos
Conversion Transcond. (approx.) with grid #4 bias of -1a volts	a	a	μmhos
Plate Cur.	1.3	1.5	ma.
Screen Cur.	2.5	2.0	ma.
Anode-Grid Cur.	3.1	4.0	ma.
Oscillator-Grid Cur.	0.2	0.2	ma.
Total Cathode Cur.	7.1	7.7	ma.

NOTE: The transconductance of the oscillator portion (not oscillating) is 1050 micromhos under the following conditions: plate volts, 180; screen volts, 67.5; anode-grid volts, 135; and oscillator-grid volts, 0.

\* With shield-can connected to negative filament terminal.

◇ Horizontal operation permitted if pins 1 and 6 are in vertical plane.

▲ Applied through properly by-passed 20000-ohm voltage-dropping resistor.

A Typical Pentagrid Converter Circuit is shown under Type 1A6.

IC6



IC6

OPERATION CHARACTERISTICS

$E_f = 2.0$  VOLTS D.C.

SCREEN (GRIDS  $N_{\geq 3}$  &  $N_{\geq 5}$ ) VOLTS = 67.5

OSCILLATOR GRID (GRID  $N_{\geq 1}$ ) RESISTOR-OHMS = 50000

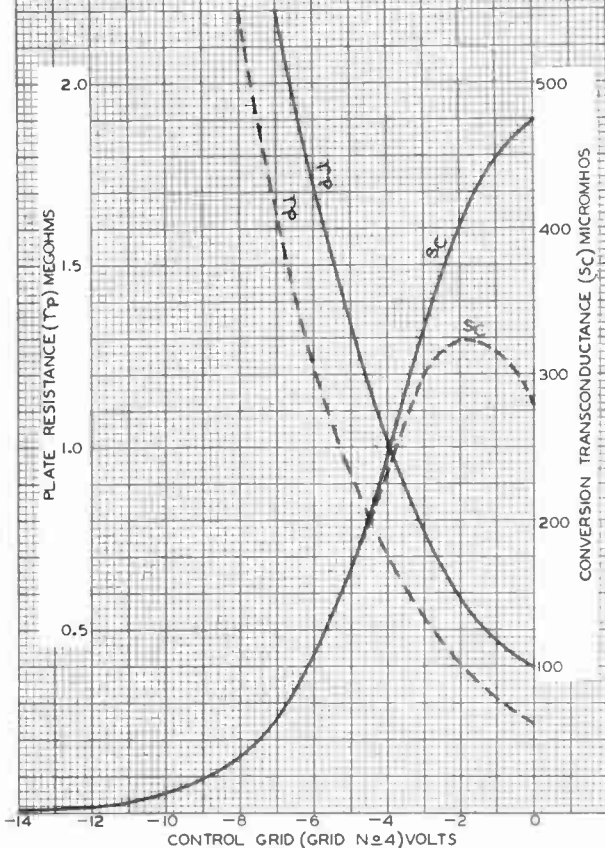
OSCILLATOR GRID CURRENT-MILLIAMPERES = 0.2

CURVE | PLATE VOLTS | ANODE-GRID (GRID  $N_{\geq 2}$ ) SUPPLY VOLTS\*

--- | 135 | 135

— | 180 | 180

\*APPLIED THROUGH 20000-OHM DROPPING RESISTOR



IC7-G  
ID5-GP

## IC7-G PENTAGRID CONVERTER

Filament	Coated	
Voltage	2.0	d-c volts
Current	0.120	amp.
Direct Interelectrode Capacitances: $\circ$		
Grid #4 to Plate		0.26 $\mu\text{f}$ ←
Grid #4 to Grid #2		0.32 $\mu\text{f}$
Grid #4 to Grid #1		0.11 $\mu\text{f}$
Grid #1 to Grid #2		1.2 $\mu\text{f}$
Grid #4 to All Other Electrodes (R-F Input)		10 $\mu\text{f}$
Grid #2 to All Other Electrodes Except Grid #1 (Osc. Output)		5.5 $\mu\text{f}$
Grid #1 to All Other Electrodes Except Grid #2 (Osc. Input)		4.8 $\mu\text{f}$
Plate to All Other Electrodes (Mixer Output)		18 $\mu\text{f}$
Overall Length	4-7/32" to 4-15/32"	
Seated Height	3-21/32" to 3-29/32"	←
Maximum Diameter	1-9/16"	
Bulb	ST-12	
Cap	Skirted Miniature	
Base	Small Shell Octal 8-Pin	
Pin 1 - No Connection		Pin 6 - Grid #2
Pin 2 - Filament +		Pin 7 - Filament -
Pin 3 - Plate		Pin 8 - No Connection
Pin 4 - Grids #3 & #5		Cap - Grid #4
Pin 5 - Grid #1		
Mounting Position	BOTTOM VIEW (G-7Z)	Vertical, Base Down $\circ$



$\circ$  Horizontal operation permitted if pins 2 and 7 are in vertical plane.  
 $\circ$  with close-fitting shield connected to negative filament terminal.  
 ← Indicates a change.

Maximum Ratings, Typical Operating Conditions and Curve for Type IC7-1 are the same as for Type IC6.

## ID5-GP

### SUPER-CONTROL R-F AMPLIFIER PENTODE

Filament	Coated	
Voltage	2.0	d-c volts
Current	0.060	amp.
Overall Length	4-7/32" to 4-15/32"	←
Seated Height	3-21/32" to 3-29/32"	
Maximum Diameter	1-9/16"	
Bulb	ST-12	
Cap	Skirted Miniature	
Base	Small Shell Octal 7-Pin	
Pin 1 - No Connection		Pin 5 - No Connection
Pin 2 - Filament +		Pin 7 - Filament -
Pin 3 - Plate		Pin 8 - No Connection
Pin 4 - Screen		Cap - Grid
Mounting Position	BOTTOM VIEW (G-5Y)	Vertical, Base Down $\circ$



$\circ$  Horizontal operation permitted if pins 2 and 7 are in vertical plane.  
 ← Indicates a change.

Operating Conditions and Curves for Type ID5-GP are the same as for Type 1A4-P.

ID5-GT  
ID7-G



## ID5-GT

### SUPER-CONTROL R-F AMPLIFIER TETRODE

Filament	Coated	
Voltage	2.0	d-c volts
Current	0.060	amp.
Overall Length		4-7/32" to 4-15/32"
Seated Height		3-21/32" to 3-29/32"
Maximum Diameter		1-9/16"
Bulb		ST-12
Cap		Skirted Miniature
Base		Small Shell Octal 7-Pin
Pin 1 - No Connection		Pin 5 - No Connection
Pin 2 - Filament +		Pin 7 - Filament -
Pin 3 - Plate		Pin 8 - No Connection
Pin 4 - Screen		Cap - Grid
Mounting Position	BOTTOM VIEW (G-5P)	Vertical $\diamond$



AMPLIFIER

*Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:*

Plate	135	180	volts
Screen	67.5	67.5	volts
Grid	-3	-3	volts
Plate Res.	0.35	0.6	approx. megohm
Transcond.	625	650	μmhos
Grid Bias for			
Transcond. = 15 μmhos	-15	-15	volts
Plate Cur.	2.2	2.2	ma.
Screen Cur.	0.7	0.7	ma.

$\diamond$  Horizontal operation permitted if pins 2 and 7 are in vertical plane.



## ID7-G

### PENTAGRID CONVERTER

Filament	Coated	
Voltage	2.0	d-c volts
Current	0.060	amp.
Overall Length		4-7/32" to 4-15/32"
Seated Height		3-21/32" to 3-29/32"
Maximum Diameter		1-9/16"
Bulb		ST-12
Cap		Skirted Miniature
Base		Small Shell Octal 8-Pin
Pin 1 - No Connection		Pin 6 - Grid #2
Pin 2 - Filament +		Pin 7 - Filament -
Pin 3 - Plate		Pin 8 - No Connection
Pin 4 - Grids #3 & #5		Cap - Grid #4
Pin 5 - Grid #1		
Mounting Position	BOTTOM VIEW (G-77)	Vertical, Base Down $\diamond$



For curve and additional data, refer to type 1A6. The ID7-G and the 1A6 are identical electrically.

$\diamond$  Horizontal operation permitted if pins 2 and 7 are in vertical plane.

$\leftarrow$  Indicates a charge.

May 1, 1941

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY INC

TENTATIVE DATA



ID8-GT



ID8-GT

**DIODE-TRIODE-POWER AMPLIFIER PENTODE**

Filament	Coated	
Voltage	1.4	d-c volts
Current	0.1	amp.
Maximum Overall Length		3-5/16"
Maximum Seated Height		2-3/4"
Maximum Diameter		1-5/16"
Bulb		T-9
Cap	Skirted Miniature - Style C	
Base	Intermediate Shell Octal 8-Pin	

- Pin 1 - No Connection
- Pin 2 - Filament +
- Pin 3 - Pentode Plate
- Pin 4 - Pentode Screen
- Pin 5 - Pentode Grid
- Pin 6 - Triode Plate
- Pin 7 - Filament -
- Pin 8 - Diode Plate
- Cap - Triode Grid



Mounting Position Any

BOTTOM VIEW (G-8AJ)

TRIODE UNIT

Plate Voltage		110 max.	volts
<i>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</i>			
Plate Voltage	45 67.5 90		volts
Grid Voltage	0 0 0		volts
Amplification Factor	25 25 25		
Plate Resistance	77000 55500 43500		approx. ohms
Transconductance	325 450 575		μmhos
Plate Current	0.3 0.6 1.1		ma.

PENTODE UNIT

Plate Voltage		110 max.	volts
Screen Voltage		110 max.	volts
Total Zero-Sig. Cathode Current		6 max.	ma.
<i>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</i>			
Plate Voltage	45 62.5 67.5 90		volts
Screen Voltage	45 62.5 67.5 90		volts
Grid Voltage	-4.5 -5 -6 -9		volts
Peak A-F Grid Volt.	4.5 5 6 9		volts
Plate Current	1.6 3.8 3.8 5		ma.
Screen Current	0.3 0.8 0.8 1.0		ma.
Plate Resistance	0.3 0.2 0.2 0.2		approx. megohm
Transconductance	650 875 875 925		μmhos
Load Resistance	20000 16000 16000 12000		ohms
Total Harmonic Dist.	10 10 10 10		%
Power Output	35 90 100 200		mw.

DIODE UNIT

The diode is located at the negative end of the filament, and is independent of the triode unit and of the pentode unit except for the common filament.

← Indicates a change.

Sept. 2, 1941

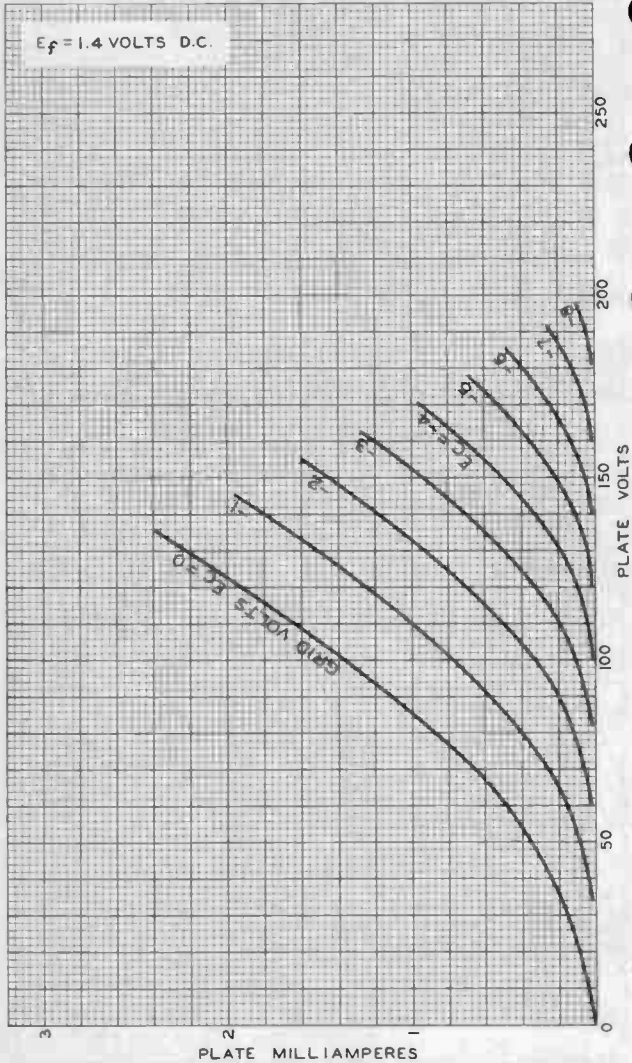
DATA

ID8-GT



ID8-GT

AVERAGE PLATE CHARACTERISTICS  
TRIODE UNIT



JUNE 9, 1939

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.  
World Radio History

92C-6058





IDN5

IDN5

# DIODE-REMOTE-CUTOFF PENTODE

7-PIN MINIATURE TYPE

## GENERAL DATA

### Electrical:

Filament, Coated:

Voltage. . . . .	1.4	dc volts
Current. . . . .	0.05	amp

Direct Interelectrode Capacitance (Approx.):<sup>0</sup>

Diode plate to pentode grid No.1 . . . . .	0.04	$\mu$ f
--	------	---------

### Characteristics, Class A<sub>1</sub> Amplifier (Pentode Unit):

Plate Voltage. . . . .	67.5	volts
Grid-No.2 (Screen-Grid) Voltage. . . . .	67.5	volts
Grid-No.1 (Control-Grid) Voltage. . . . .	0	volts
Plate Resistance (Approx.) . . . . .	0.6	megohm
Transconductance . . . . .	630	$\mu$ mhos
Plate Current. . . . .	2.1	ma
Grid-No.2 Current. . . . .	0.55	ma
Grid-No.1 Voltage (Approx.) for transconductance of 10 $\mu$ mhos . . . . .	-11.5	volts

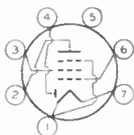
### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	2-1/8"
Maximum Seated Length. . . . .	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip). 1-1/2" $\pm$ 3/32"	
Maximum Diameter . . . . .	3/4"
Dimensional Outline. . . . .	See General Section
Bulb . . . . .	T5-1/2
Base . . . . .	Small-Button Miniature 7-Pin (JETEC No. E7-1)
Basing Designation for BOTTOM VIEW . . . . .	.6BW

Pin 1 - Filament (-),  
Pentode  
Grid No. 3

Pin 2 - Pentode  
Plate

Pin 3 - Pentode  
Grid No. 2



Pin 4 - Diode  
Plate

Pin 5 - No Con-  
nection

Pin 6 - Pentode  
Grid No. 1

Pin 7 - Filament (+)

## PENTODE UNIT - Class A<sub>1</sub> Amplifier

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	90 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE. . . . .	90 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative bias value. . . . .	50 max.	volts
Positive bias value. . . . .	0 max.	volts
CATHODE CURRENT. . . . .	3 max.	ma

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	3.3 max.	megohms
--	----------	---------

<sup>0</sup> without external shield.

IDN5



IDN5

# DIODE-REMOTE-CUTOFF PENTODE

## DIODE UNIT

### Maximum Ratings, Design-Center Values:

PLATE CURRENT. . . . . 0.25 max. ma

### Characteristics:

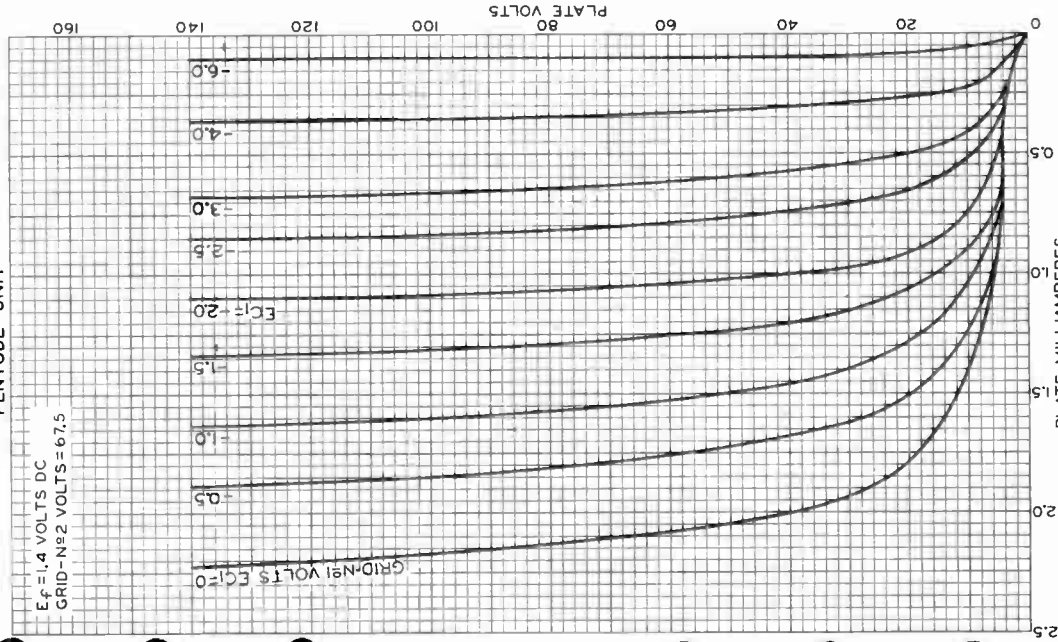
Average Plate Current with dc plate  
voltage of 10 volts. . . . . 1 ma



IDN5

# AVERAGE PLATE CHARACTERISTICS PENTODE UNIT

$E_f = 1.4$  VOLTS DC  
GRID-№2 VOLTS = 67.5



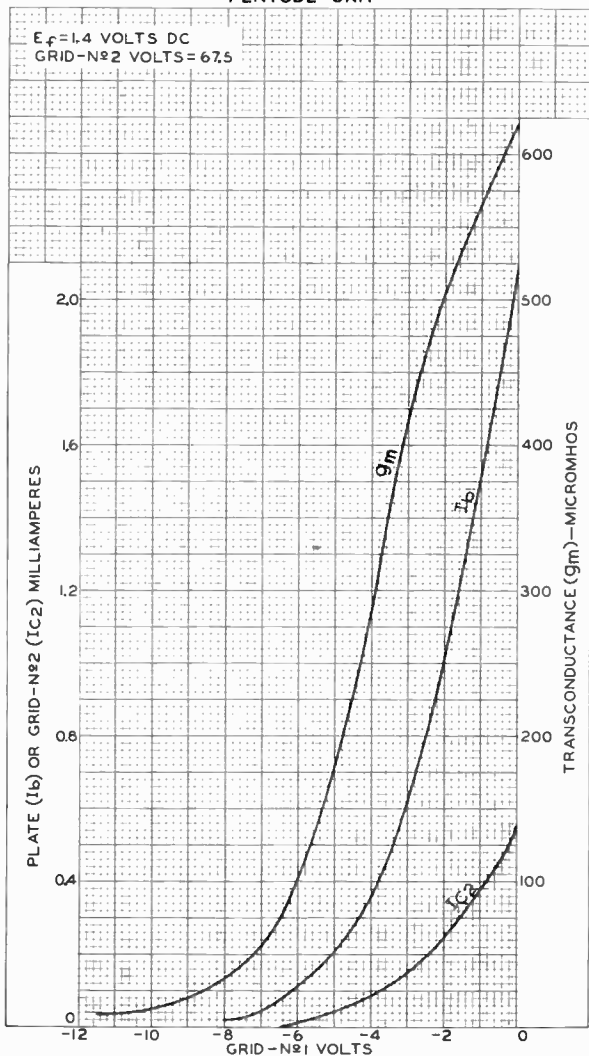
IDN5

IDN5



IDN5

AVERAGE CHARACTERISTICS  
PENTODE UNIT



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

92CM-9347




IE5-GP



IE5-GP

### R-F AMPLIFIER PENTODE

Filament	Coated	
Voltage	2.0	d-c volts
Current	0.060	amp.
Overall Length		4-7/32" to 4-15/32"
Maximum Diameter		1-9/16"
Bulb		ST-12
Cap		Skirted Miniature
Base		Small Shell Octal 7-Pin
Pin 1-No Connection		Pin 5-No Connection
Pin 2-Filament+		Pin 7-Filament-
Pin 3-Plate		Pin 8-No Connection
Pin 4-Screen		Cap -Grid

Mounting Position      BOTTOM VIEW (G-5Y)      Vertical<sup>◇</sup> ←

<sup>◇</sup> Horizontal operation permitted if pins 2 and 7 are in a vertical plane.  
← Indicates a change.

*For curves and additional data, refer to Type 1B4. The IE5-GT and the 1B4 are identical electrically.*





IE7-GT

IE7-GT

TWIN POWER PENTODE

GENERAL DATA

Electrical:

Filament, Coated:

Voltage . . . . . 2.0 . . . . . dc volts
Current . . . . . 0.24 . . . . . amp

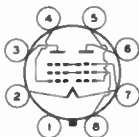
Mechanical:

Mounting Position . . . . . Vertical, or Horizontal with pins 2 and 7 in vertical plane
Maximum Overall Length . . . . . 3-5/16"
Maximum Seated Length . . . . . 2-3/4"
Maximum Diameter . . . . . 1-9/32"
Bulb . . . . . T-9
Base . . . . . Intermediate-Shell Octal 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 8C

For convenience, one Pentode unit is identified as P1; the other as P2.

- Pin 1 - No Connection
Pin 2 - Filament (+)
Pin 3 - Plate of Pentode No. 2
Pin 4 - Grid No. 1 of Pentode No. 2
Pin 5 - Grid No. 1 of Pentode No. 1



- Pin 6 - Plate of Pentode No. 1
Pin 7 - Filament (-), Grid No. 3 of Pentodes No. 1 & No. 2
Pin 8 - Grid No. 2 of Pentodes No. 1 & No. 2

AF POWER AMPLIFIER - Class A1

values are for one unit with grid No. 1 of other unit biased by -25 volts.

Maximum Ratings, Design-Center Values:

Table with 3 columns: Parameter, Value, Unit. Includes Plate Voltage (135 max. volts), Grid-No. 2 (SCREEN) Voltage (135 max. volts), Plate Dissipation (1.5 max. watts), and Grid-No. 2 Input (0.5 max. watt).

Typical Operation and Characteristics:

Table with 4 columns: Parameter, Value 1, Value 2, Unit. Includes Plate Voltage (90, 135 volts), Grid-No. 2 Voltage (90, 135 volts), Grid-No. 1 (Control-Grid) Voltage (-3.0, -4.5 volts), Peak AF Grid-No. 1 Voltage (3.0, 4.5 volts), Zero-Signal Plate Current (3.8, 7.5 ma), Zero-Signal Grid-No. 2 Current (1.1, 2.2 ma), Plate Resistance (Approx.) (0.34, 0.26 megohm), Transconductance (1150, 1425 umhos), Load Resistance (20000, 16000 ohms), Total Harmonic Distortion (Approx.) (5.5, 4.5 %), and Max.-Sig. Power Output (0.110, 0.290 watt).

IE7-GT



IE7-GT

## TWIN POWER PENTODE

PUSH-PULL AF POWER AMPLIFIER - Class A<sub>1</sub>**Maximum Ratings, Design-Center Values:**

PLATE VOLTAGE. . . . .	135 max.	volts
GRID-No.2 (SCREEN) VOLTAGE . . . . .	135 max.	volts
PLATE DISSIPATION (PER UNIT) . . . . .	1.5 max.	watts
GRID-No.2 INPUT (PER UNIT) . . . . .	0.5 max.	watt

**Typical Operation and Characteristics:***Values are for both units*

Plate Voltage. . . . .	135	volts
Grid-No.2 Voltage. . . . .	135	volts
Grid-No.1 (Control-Grid) Voltage . . . . .	-7.5	volts
Peak AF Grid-No.1 to Grid-No.1 Voltage . . . . .	15	volts
Zero-Signal Plate Current. . . . .	7	ma
Max.-Signal Plate Current. . . . .	10.5	ma
Zero-Signal Grid-No.2 Current. . . . .	2	ma
Max.-Signal Grid-No.2 Current. . . . .	3.5	ma
Effective Load Resistance (plate to plate)	24000	ohms
Total Harmonic Distortion (Approx.) . . . . .	5.5	%
Max.-Signal Power Output . . . . .	0.575	watt

**Maximum Circuit Values (for maximum rated conditions):**

## Grid-No.1-Circuit Resistance:

For fixed bias . . . . .	0.5	megohm
For cathode bias . . . . .	1	megohm

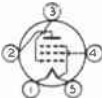




IF4

IF4  
IF5-G

## POWER AMPLIFIER PENTODE

Filament	Coated	
Voltage	2.0	d-c volts
Current	0.12	amp.
Maximum Overall Length		4-11/16"
Maximum Diameter		1-13/16"
Bulb		ST-14
Base		Medium 5-Pin
Pin 1 - Filament +		Pin 4 - Screen
Pin 2 - Plate		Pin 5 - Filament -
Pin 3 - Grid		
Mounting Position	BOTTOM VIEW (5K)	Vertical, Base Down ◊


Maximum Ratings, Typical Operating Conditions, and Curves are the same as for Type IF5-G.

◊ Horizontal operation is permissible if pins 1 and 5 are in vertical plane.

IF5-G



## POWER AMPLIFIER PENTODE

Filament	Coated	
Voltage	2.0	d-c volts
Current	0.12	amp.
Maximum Overall Length		4-5/8"
Maximum Diameter		1-13/16"
Bulb		ST-14
Base		Medium Shell Octal 7-Pin
Pin 1 - No Connection		Pin 5 - Grid
Pin 2 - Filament +		Pin 7 - Filament -
Pin 3 - Plate		Pin 8 - No Connection
Pin 4 - Screen		
Mounting Position	BOTTOM VIEW (G-6X)	Vertical, Base Down ◊

AMPLIFIER - Class A<sub>1</sub>

Plate Voltage		180 max. volts
Screen Voltage		180 max. volts
Plate Dissipation		1.75 max. watts
Screen Dissipation		0.75 max. watt
Typical Operation:		
Filament Voltage	2.0	2.0 d-c volts
Plate Voltage	90	135 volts
Screen Voltage	90	135 volts
Grid Voltage*	-3	-4.5 volts
Cathode Resistor	588	432 ohms
Peak A-F Grid Voltage	3	4.5 volts
Plate Resistance (approx.)	0.24	0.20 megohm
Transconductance	1400	1700 μmhos
Plate Current	4	8 ma.
Screen Current	1.1	2.4 ma.

◊ Horizontal operation is permissible if pins 2 and 7 are in a vertical plane.

\* See next page.

FEB. 2, 1940

RCA RADITRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

DATA

World Radio History



## POWER AMPLIFIER PENTODE

(continued from preceding page)

Load Resistance	20000	16000	ohms
Total Harmonic Distortion	6	5	%
Power Output	110	310	mw.

PUSH-PULL AMPLIFIER - Class AB<sub>1</sub>

Plate Voltage	180 max.	volts
Screen Voltage	180 max.	volts
Plate Dissipation	1.75 max.	watts
Screen Dissipation	0.75 max.	watt

## Typical Operation:

*Values are for two tubes*

Filament Voltage	2.0	a-c	volts
Plate Voltage	180		volts
Screen Voltage	180		volts
Grid Voltage*	-7.5		volts
Peak A-F Grid-to-Grid Voltage	15		volts
Zero-Sig. Plate Current	19		ma.
Max.-Sig. Plate Current	21		ma.
Zero-Sig. Screen Current	5.5		ma.
Max.-Sig. Screen Current	7		ma.
Load Resistance (plate to plate)	20000		ohms
Total Harmonic Distortion	4.5		%
Max.-Sig. Power Output	1.25		watts

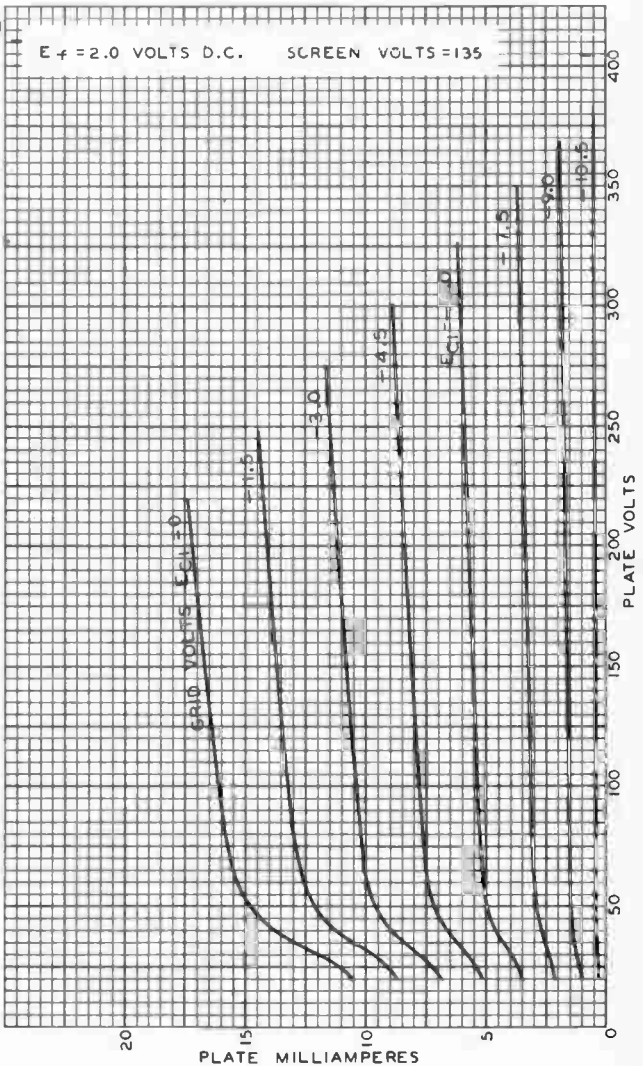
\* The d-c resistance in the grid circuit should be limited to 1.0 megohm with cathode bias, or 0.5 megohm with fixed bias.



IF5-G

IF5-G

### AVERAGE PLATE CHARACTERISTICS



AUG. 16, 1936

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

92C-4958

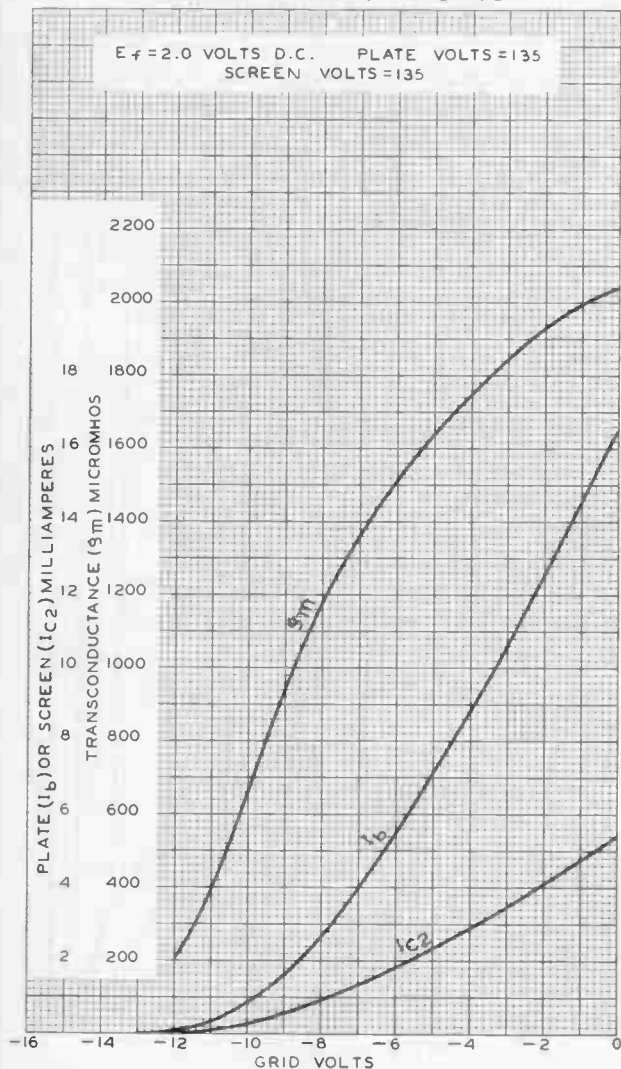
IF5-G



IF5-G

## AVERAGE CHARACTERISTICS

$E_f = 2.0$  VOLTS D.C. PLATE VOLTS = 135  
SCREEN VOLTS = 135



JAN. 8, 1940

RCA RADOTRON DIVISION

RCA MANUFACTURING COMPANY, INC.

World Radio History

92C-6125



IF6

IF6  
IF7-GV

## DUPLEX-DIODE PENTODE

Filament	Coated	
Voltage	2.0	d-c volts
Current	0.06	amp.

Direct Interelectrode Capacitances - Pentode Unit:

Grid to Plate (with shield-can)	0.007 max.	$\mu\text{f}$
Input	4	$\mu\text{f}$
Output	9	$\mu\text{f}$

Overall Length 4-9/32" to 4-17/32"

Maximum Diameter 1-9/16"

Bulb ST-12

Cap Small Metal

Base Small 6-Pin

Pin 1-Filament +

Pin 2-Plate

Pin 3-Screen

Pin 4-Diode Plate #2



Pin 5-Diode Plate #1

Pin C-Filament -

Cap -Grid

Mounting Position BOTTOM VIEW (6W) Vertical, Base Down<sup>◊</sup>

*Maximum Ratings, Typical Operating Conditions, and Curves are the same as for Type 1F7-GV.*

◊ Horizontal operation is permissible if pins 1 and 6 are in vertical plane.

IF7-GV

## DUPLEX-DIODE PENTODE



Filament	Coated	
Voltage	2.0	d-c volts
Current	0.06	amp.

Direct Interelectrode Capacitances - Pentode Unit:\*

Grid to Plate	0.01 max.	$\mu\text{f}$
Input	3.8	$\mu\text{f}$
Output	9.5	$\mu\text{f}$

Overall Length 4-7/32" to 4-15/32"

Maximum Diameter 1-9/16"

Bulb ST-12

Cap Skirted Miniature

Base Small Shell Octal 8-Pin

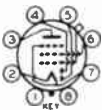
Pin 1-No Connection

Pin 2-Filament +

Pin 3-Pentode Plate

Pin 4-Diode Plate #2

Pin 5-Diode Plate #1



Pin 6-Pentode Grid #2

Pin 7-Filament -

Pin 8-No Connection

Cap - Pentode Grid #1

Mounting Position BOTTOM VIEW (7AD) Vertical, Base Down<sup>◊</sup>

\* With close-fitting shield connected to negative filament terminal.

◊ Horizontal operation permitted if pins 2 and 7 are in vertical plane.

(continued on next page)

FEB. 2, 1940

RCA RADIODRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

World Radio History

DATA



IF7-GV

## DUPLEX-DIODE PENTODE

(continued from preceding page)

### PENTODE UNIT - Class A<sub>1</sub> Amplifier

Plate Voltage 180 max. volts  
 Screen Voltage 67.5 max. volts

#### Typical Operation as R-F or I-F Amplifier:

Filament	2.0	d-c volts
Plate	180	volts
Screen	67.5	volts
Grid	-1.5	volts
Plate Res.	1 approx.	megohm
Transcond.	650	μmhos
Transcond. at -12 volts bias	20	μmhos
Plate Cur.	2.2	ma.
Screen Cur.	0.7	ma.

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

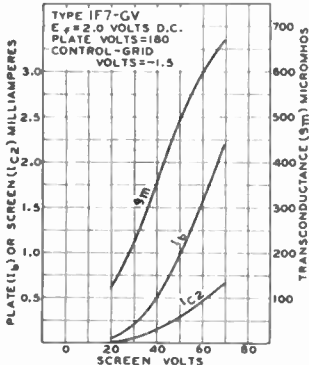
Filament	2.0	2.0	d-c volts		
Plate Supply <sup>o</sup>	135	135	volts		
Screen Supply <sup>o</sup>	135	135	volts		
Plate Resistor	0.25	0.25	megohm		
Screen Resistor	1	0.8	megohm		
Grid Voltage <sup>□</sup>	-1	-2	volts		
Peak A-F Grid Voltage	0.64	0.62	volts		
Zero-Sig. Plate Cur.	0.42	0.42	ma.		
Max.-Sig. Plate Cur.	0.34	0.34	ma.		
Load Resistance <sup>▲</sup>					
Grid Resistor <sup>▲</sup>	1.0	0.5	1.0	0.5	megohm
Voltage Output	30.8	28	28	25.2	peak volts
Tot. Harmonic Dist.	5	5	5	5	%
Voltage Amplification	48	43	46	41	

### DIODE UNITS - Two

The two diodes are located at the negative end of the filament. They are independent of each other and of the pentode unit except for the common filament. Diode curves under Type 687 apply to the IF7-GV.

- <sup>o</sup> Voltages at plate and screen will be Plate-Supply and Screen-Supply voltages minus voltage drops in plate and screen resistors, respectively.
- <sup>▲</sup> Load resistance, across which output voltage is developed, consists of plate resistor, blocking condenser, and grid resistor of following tube.
- <sup>□</sup> For following amplifier tube.
- <sup>□</sup> The d-c resistance in the grid circuit should not exceed 1.0 megohm.

### AVERAGE CHARACTERISTICS

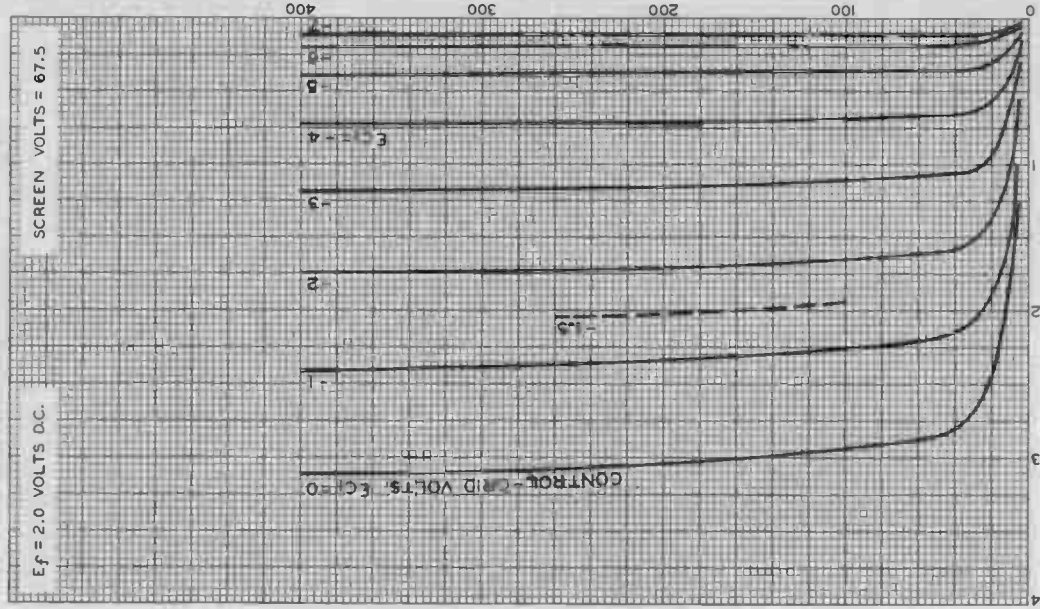




IF7-GV

IF7-GV

# AVERAGE PLATE CHARACTERISTICS



MARCH 2, 1938

RCA RADIIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

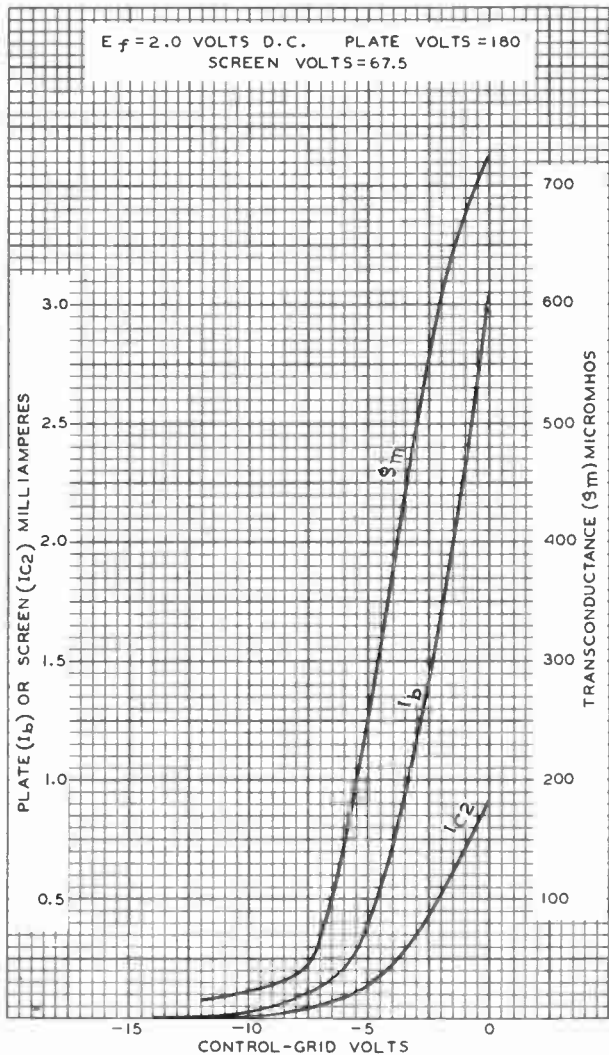
92C-4868

IF7-GV



IF7-GV

## AVERAGE CHARACTERISTICS



JAN. 5, 1940

 RCA RADIOTRON DIVISION  
 RCA MANUFACTURING COMPANY, INC.  
 World Radio History

92C-6124





IG5-G

IG5-G  
★

## POWER AMPLIFIER PENTODE

Filament	Coated	
Voltage	2.0	d-c volts
Current	0.12	amp.
Maximum Overall Length		4-5/8"
Maximum Diameter		1-13/16"
Bulb		ST-14
Base		Medium Shell Octal 7-Pin
Pin 1—No Connection		Pin 5—Grid
Pin 2—Filament +		Pin 7—Filament -
Pin 3—Plate		Pin 8—No Connection
Pin 4—Screen		

Mounting Position BOTTOM VIEW (G-6X) Vertical, Base Down<sup>□</sup>AMPLIFIER - Class A<sub>1</sub>

Plate Voltage	135 max. volts
Screen Voltage	135 max. volts
Plate Dissipation	1.25 max. watts
Screen Dissipation	0.6 max. watt

## Typical Operation:

Filament Voltage	2.0	2.0	2.0	d-c volts
Plate Voltage	90	124	135	volts
Screen Voltage	90	124	135	volts
Grid Voltage <sup>□</sup>	-6	-11	-13.5	volts
Peak A-F Grid Volt.	6	9.9	9.2	volts
Zero-Sig. Plate Cur.	8.5	10	8.7	ma.
Max.-Sig. Plate Cur.	8.7	10.7	9.7	ma.
Zero-Sig. Screen Cur.	2.5	3	2.5	ma.
Max.-Sig. Screen Cur.	3	4.3	3.6	ma.
Plate Res. (approx.)	0.133	0.145	0.160	megohm
Transconductance	1500	1500	1550	μmhos
Load Resistance	8500	8000	9000	ohms
Tot. Harmonic Dist.	6	10.5	11	%
Second Harmonic Dist.	3	7	8	%
Third Harmonic Dist.	5	7.5	7	%
Max.-Sig. Power Output	0.25	0.6*	0.55**	watt

<sup>□</sup> The d-c resistance in the grid circuit should be limited to 1.0 megohm with cathode bias, or 0.5 megohm with fixed bias.

\* With peak a-f grid voltage of 11 volts, a power output of 0.65 watt can be obtained with 13% total distortion (6% 2nd, 11% 3rd).

\*\* With peak a-f grid voltage of 13.5 volts, a power output of 0.75 watt can be obtained with 18% total distortion (9% 2nd, 15% 3rd).

<sup>◇</sup> Horizontal operation permitted if pins 2 and 7 are in vertical plane.

1G5-G

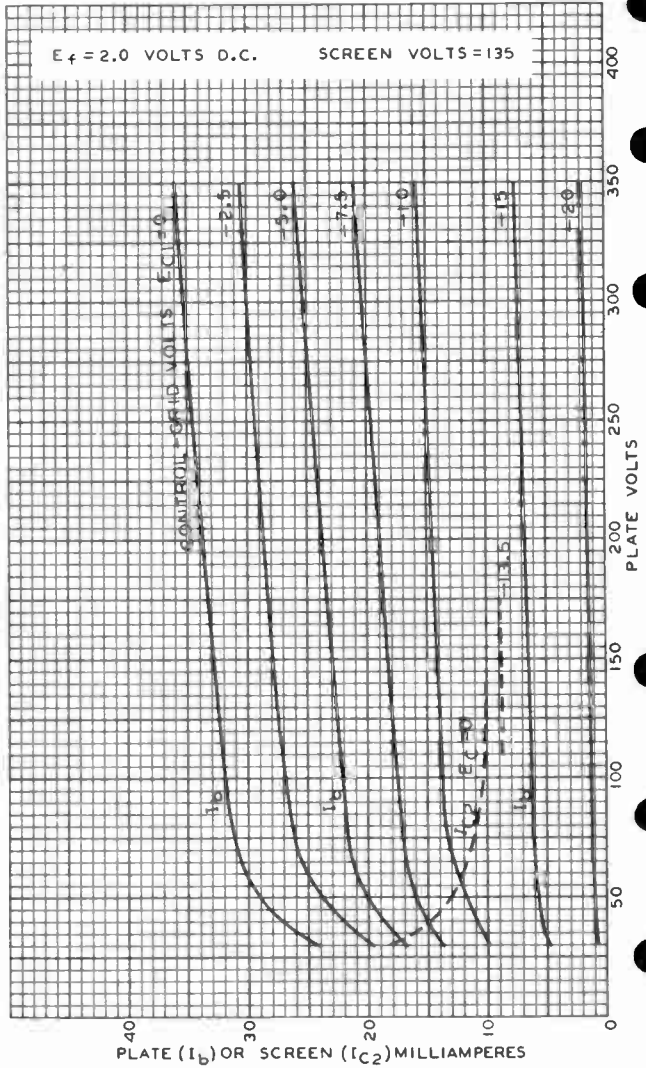


1G5-G

### AVERAGE PLATE CHARACTERISTICS

$E_f = 2.0$  VOLTS D.C.

SCREEN VOLTS = 135



JULY 29, 1938

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

92C-4951



IG6-GT/G

IG6-GT/G

**CLASS B TWIN AMPLIFIER**

Filament	Coated	
Voltage	1.4	d-c volts
Current	0.1	amp.
Maximum Overall Length		3-5/16" ←
Maximum Seated Height		2-3/4" ←
Maximum Diameter		1-5/16" ←
Bulb		T-9
Base		Intermed. Sh. Octal 8-Pin
Pin 1 - No Connection		Pin 5 - Grid (Triode T <sub>1</sub> )
Pin 2 - Filament +		Pin 6 - Plate (Triode T <sub>1</sub> )
Pin 3 - Plate (Triode T <sub>2</sub> )		Pin 7 - Filament -
Pin 4 - Grid (Triode T <sub>2</sub> )		Pin 8 - No Connection
Mounting Position	BOTTOM VIEW (G-7AB)	Any

For convenience, one triode unit is identified as F<sub>1</sub>; the other, F<sub>2</sub>.  
 Maximum Ratings Are Design-Center Values

CLASS B POWER AMPLIFIER

Plate Voltage		110 max.	volts
Peak Plate Current (per plate)		20 max.	ma.
<b>Typical Operation:</b>			
<i>Unless otherwise specified, values are for the two units</i>			
Plate-Supply Impedance	0	0*	ohms
Effective Grid-Circuit Impedance (per unit)	0	2530**	ohms
Plate Voltage	90	90	volts
D-C Grid Voltage	0	0	volts
Peak A-F Grid-to-Grid Voltage	42	48#	volts
Zero-Sig. D-C Plate Cur.	2	2	ma.
Max.-Sig. D-C Plate Cur.	14	11	ma.
Peak Grid Cur. (per unit)	5	5	ma.
Effective Load Res. (plate to plate)	12000	12000	ohms
Total Distortion	3	4	%
Power Output	675	350 approx.	mw

AMPLIFIER

Each Triode Unit

**Characteristics-Class A<sub>1</sub> Amplifier:**

Plate	90	volts
Grid	0	volts
Amp. Fact.	30	
Plate Res.	45000 approx.	ohms
Transcond.	675	μmhos
Plate Cur.	1	ma.

\* Battery supply.

\*\* At 400 cycles for class B stage in which the effective resistance per grid circuit is 2500 ohms, and the leakage reactance of the coupling transformer is 155 millihenrys. The driver stage should be capable of supplying the grids of the class B stage with the specified values at low distortion.

# Includes peak voltage drop through the grid circuit impedance.

← Indicates a change.

AUG. 1, 1942

RCA RADIOTRON DIVISION  
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 World Radio History

DATA

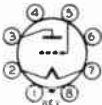




IH4-G

IH4-G

## DETECTOR AMPLIFIER TRIODE

Filament Voltage	Coated 2.0	d-c volts
Filament Current	0.06	amp.
Maximum Overall Length		4-1/8"
Maximum Diameter		1-9/16"
Bulb		ST-12
Base		Small Shell Octal 7-Pin
Pin 1-No Connection		Pin 5-Grid
Pin 2-Filament +		Pin 7-Filament -
Pin 3-Plate		Pin 8-No Connection
Pin 4-No Connection		
Mounting Position	BOTTOM VIEW	Vertical, Base Down <sup>o</sup> ←

## AMPLIFIER - Class A

## Operating Conditions and Characteristics:

Filament	2.0	2.0	2.0	d-c volts
Plate	90	135	180 max.	volts
Grid *	-4.5	-9	-13.5	volts
Amp. Fact.	9.3	9.3	9.3	
Plate Res.	11000	10300	10300	ohms
Transcond.	850	900	900	μmhos
Plate Cur.	2.5	3.0	3.1	ma.

\* The d-c resistance in the grid circuit should not exceed 2 megohms.

## AMPLIFIER - Class B

Plate Voltage	180 max. volts
Peak Plate Current	50 max. ma.
Zero-Signal Plate Current	1.5 max. ma.

## Typical Operating Conditions:

Unless otherwise specified, values are for 2 tubes.

Filament	2.0	d-c volts
Plate	157.5	volts
Grid	-15	volts
Zero-Signal D-C Plate Current	1.0	ma.
Load Resistance (per tube)	2000	ohms
Effective Load Res. (plate to plate)	8000	ohms
Maximum-Signal Driving Power	260	m.w.
Power Output †	2.1	watts

† With one Type IH4-G as driver operated at plate volts of 157.5, grid volts of -11.3, and with plate load of approximately 18000 ohms: input transformer ratio, primary to one-half secondary, is 1.165: total distortion is 6 to 7%.

## DETECTOR

Typical Operation:	Biased			Grid-Leak	
Filament	2.0	2.0	2.0	2.0	d-c volts
Plate	90	135	180 max.	45 max.	volts
Grid	-9 <sup>o</sup>	-13.5 <sup>o</sup>	-18 <sup>o</sup>	Return to (+) Fil.	volts
Plate Cur.	Adjusted to 0.2 ma. with no input signal. ‡			-	
Grid Leak	-	-	-	1 to 5	megohms
Grid Condenser	-	-	-	0.00025	μf

‡ Max.-signal d-c plate current should be limited to 2.0 ma.

<sup>o</sup> Approximate.<sup>o</sup> Horizontal operation permitted if plane of filament is vertical.

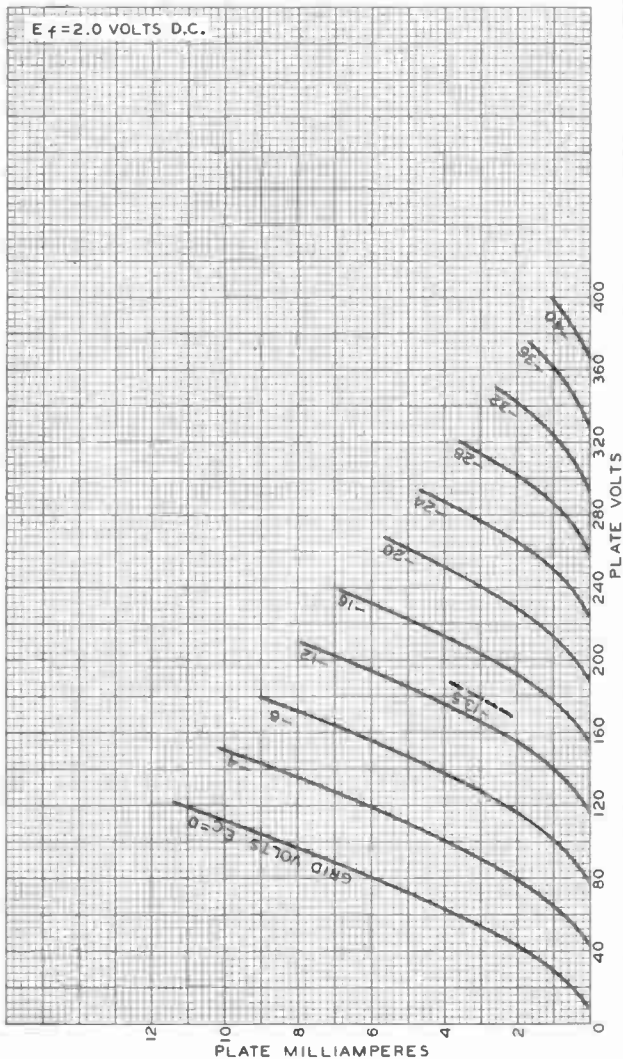
← Indicates a change.

IH4-G



IH4-G

### AVERAGE PLATE CHARACTERISTICS



MARCH 2, 1938

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.  
World Radio History

92C-4887

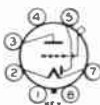


IH5-GT/G

IH5-GT/G

## DIODE HIGH-MU TRIODE

Filament	Coated	
Voltage	1.4	a-c or d-c volts
Current	0.05	amp.
Direct Interelectrode Capacitances (Approx.): <sup>0</sup>		
<i>Triode Unit</i>		
Grid to Plate	1.0	$\mu\text{f}$
Grid to Filament	1.1	$\mu\text{f}$
Plate to Filament	4.6	$\mu\text{f}$
Maximum Overall Length		3-5/16"
Maximum Seated Height		2-3/4"
Maximum Diameter		1-5/16"
Bulb		T-9
Cap		Skirted Miniature
Base		Sm. Wafer Octal 7-Pin, Sleeve
Pin 1 - Base Sleeve		Pin 7 - Filament -
Pin 2 - Filament +		Diode Shield
Pin 3 - Triode Plate		Pin 8 - No Connection
Pin 4 - No Connection		Cap - Triode Grid
Pin 5 - Diode Plate		
Mounting Position		Any



BOTTOM VIEW (GT-5Z)

Maximum Ratings Are Design-Center Values

## TRIODE UNIT

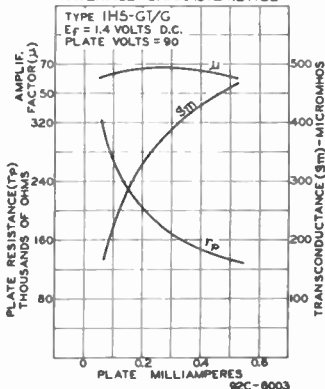
Plate Voltage		110 max. volts
Characteristics - Class A <sub>1</sub> Amplifier:		
Plate	90	volts
Grid	0	volts
Amp. Fact.	65	
Plate Res.	240000	ohms
Transcond.	275	$\mu\text{mhos}$
Plate Cur.	0.15	ma.

## DIODE UNIT

The diode is located at the negative end of the filament, and is independent of the triode unit except for the common filament.

<sup>0</sup> With external shield connected to negative filament terminal.

## AVERAGE CHARACTERISTICS



← Indicates a change.

Jan. 1, 1943

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

DATA

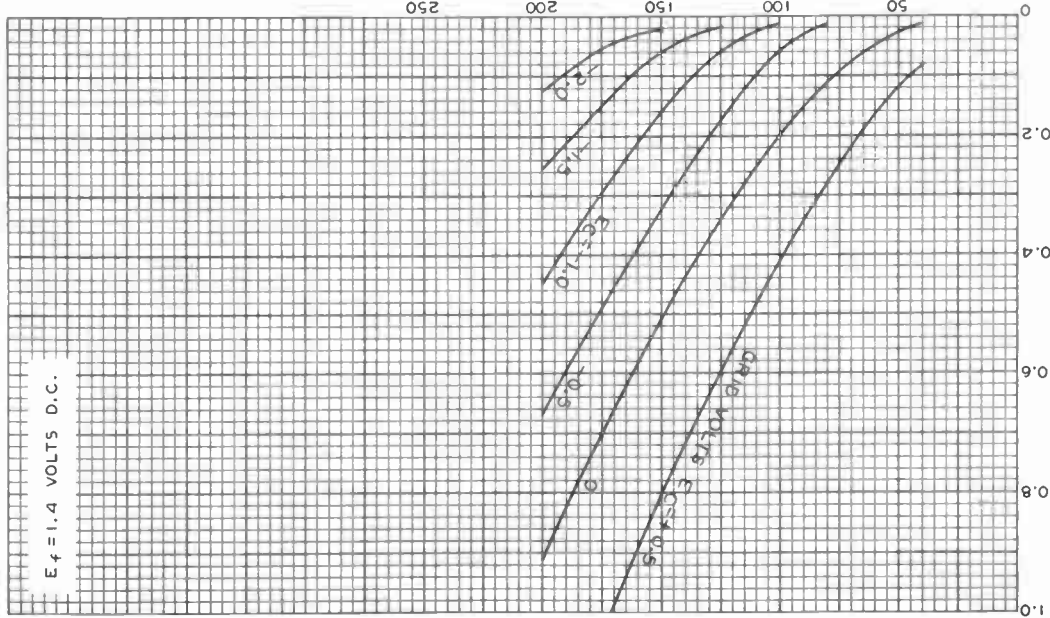
92C-8003



IH5-GT/G

AVERAGE PLATE CHARACTERISTICS

$E_f = 1.4$  VOLTS D.C.



DEC. 28, 1942

PLATE MILLIAMPERES  
RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA, HARTFORD, NEW JERSEY

92C-6001R1





1H6-G

1H6-G  
★**DUPLEX-DIODE TRIODE***For Diode Curves, refer to Type 6B7.*

Filament	Coated	
Voltage	2.0	d-c volts
Current	0.06	amp.
Maximum Overall Length		4-1/8"
Maximum Diameter		1-9/16"
Bulb		ST-12
Base		Small Shell Octal 8-Pin
Pin 1—No Connection		Pin 5—Diode Plate #1*
Pin 2—Filament +		Pin 6—Triode Grid
Pin 3—Triode Plate		Pin 7—Filament -
Pin 4—Diode Plate #2*		Pin 8—No Connection
Mounting Position		BOTTOM VIEW

\* Diode Plate #2 is at positive end of filament; Diode Plate #1 is at negative end of filament.

TRIODE UNIT - Class A Amplifier

## Operating Conditions and Characteristics:

Filament	2.0	d-c volts
Plate	135 maximum	volts
Grid	-3	volts
Amp. Fact.	20	
Plate Res.	35000	ohms
Transcond.	575	μmhos
Plate Cur.	0.8	ma.

DIODE UNITS - Two

One diode unit is located at each end of the filament. The two diodes are independent of each other and of the triode unit except for the common filament. When the diodes are used for separate applications, diode plate #1 should be used for detection to avoid signal-delay effects.

*For additional curves, refer to Type 1B5/25S. The 1H6-G and the 1B5/25S are identical electrically.*

← Indicates a change.

◊ Horizontal operation permitted if plane of filament is vertical.

APRIL 20, 1938

RCA RADION TRON DIVISION  
RCA MANUFACTURING COMPANY INC

DATA

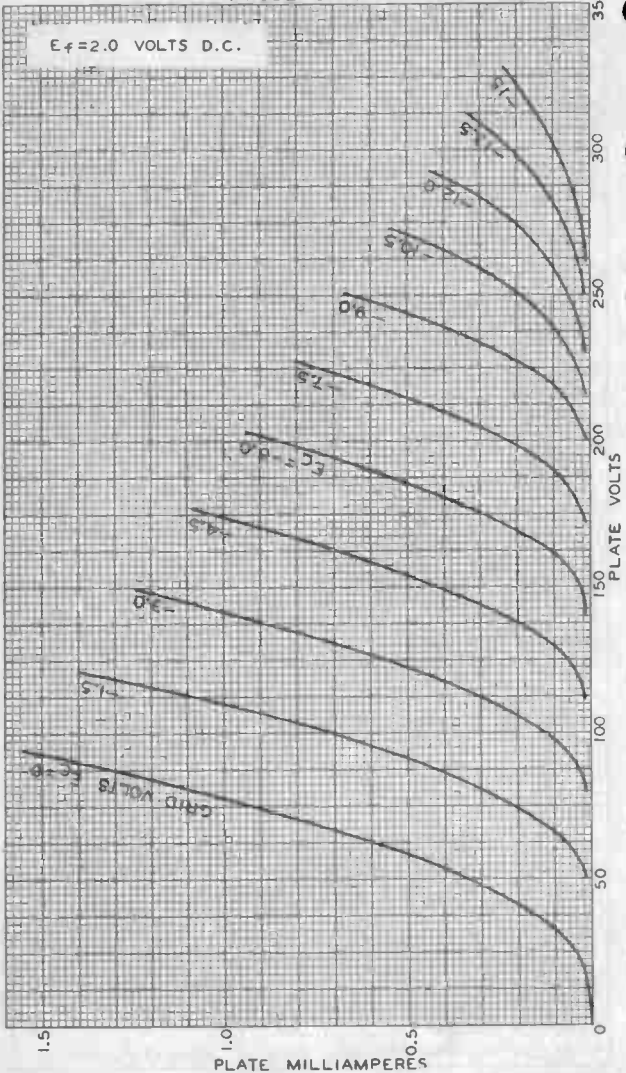
WorldRadioHistory

IH6-G



IH6-G

### AVERAGE PLATE CHARACTERISTICS TRIODE UNIT



MARCH 2, 1938

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY INC  
World Radio History

92C-4886



IJ6-GT

# IJ6-GT HIGH-MU TWIN POWER TRIODE

Supersedes type 1J6-A

## GENERAL DATA

### Electrical:

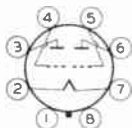
Filament, Coated:

Voltage. . . . .	2.0	dc volts
Current. . . . .	0.24	amp

### Mechanical:

Mounting Position. . . . .	Vertical; or Horizontal, with plane of pins 1 & 4 vertical
Maximum Overall Length . . . . .	3-7/16"
Maximum Seated Length. . . . .	2-7/8"
Maximum Diameter . . . . .	1-9/32"
Bulb . . . . .	T-9
Base . . . . .	Intermediate-Shell Octal 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	G-7AB

Pin 1 - No  
Connection  
Pin 2 - Filament (+)  
Pin 3 - Plate of  
Unit No.2  
Pin 4 - Grid of  
Unit No.2



Pin 5 - Grid of  
Unit No.1  
Pin 6 - Plate of  
Unit No.1  
Pin 7 - Filament (-)  
Pin 8 - No  
Connection

## AF POWER AMPLIFIER - Class B

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	135 max.	volts
PEAK PLATE CURRENT (per plate) . . . . .	50 max.	ma

### Typical Operation:

*Unless otherwise specified, values are for 2 units*

Plate Voltage. . . . .	135	135	135	volts
Grid Voltage . . . . .	-6	-3	0	volts
AF Grid-to-Grid Volt- age Supply (RMS) • . . . .	50	50	50	volts
Zero-Signal Plate Current. . . . .	0.2	3.4	10	ma
Max.-Signal Plate Current. . . . .	24	26	30	ma
Effective Load Resistance (plate-to-plate) . . . . .	10000	10000	10000	ohms
Effective Grid-Circuit Imped- ance (per unit). . . . .	1300	1300	1300	ohms
Driving Power. . . . .	110	135	170	mw
Total harmonic Distortion (Approx.) . . . . .	3	5	10	%
Max.-Signal Power Output . . . . .	1.6	2.0	2.2	watts

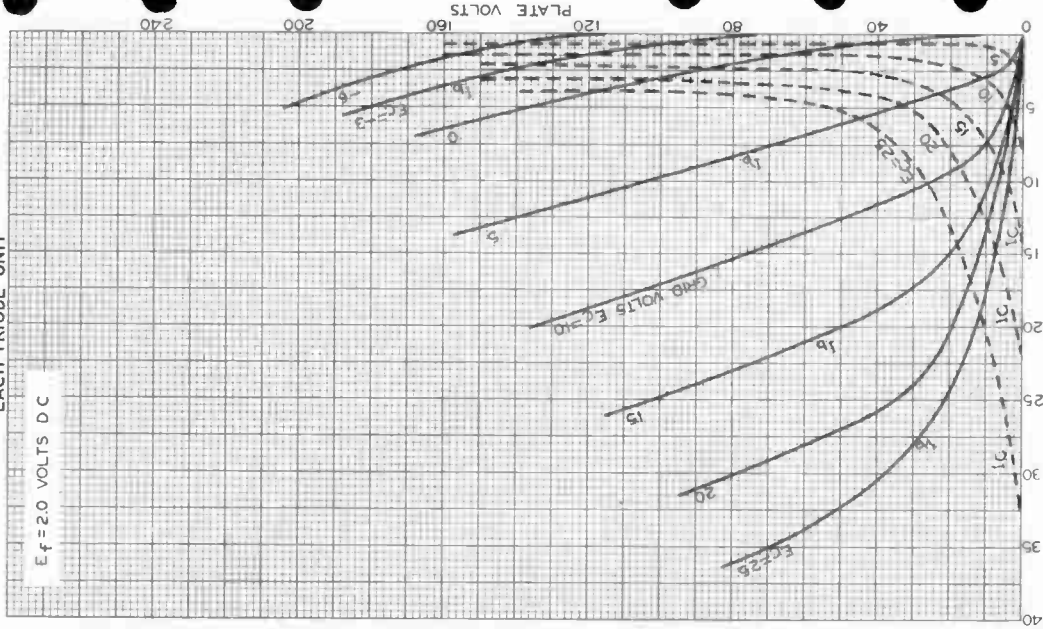
• Input to secondary of coupling transformer.



IJ6-GT

# AVERAGE PLATE CHARACTERISTICS EACH TRIODE UNIT

$E_f = 2.0$  VOLTS D C



IJ6-GT

MAR. 8, 1948

TUBE DEPARTMENT

92CM-4882R1



IL4

IL4

## R-F AMPLIFIER PENTODE

MINIATURE TYPE

Filament	Coated	
Voltage	1.4	d-c volts
Current	0.05	amp.
Direct Interelectrode Capacitances: <sup>o</sup>		
Grid to Plate	0.008 max.	$\mu\text{f}$
Input	3.6	$\mu\text{f}$
Output	7.5	$\mu\text{f}$
Maximum Overall Length		2-1/8"
Maximum Seated Height		1-7/8"
Maximum Diameter		3/4"
Bulb		T-5-1/2
Base <sup>▲</sup>		Miniature Button 7-Pin
Pin 1 - { Filament -, Internal Shield		Pin 5 - { Filament -, Internal Shield
Pin 2 - Plate		Pin 6 - Grid
Pin 3 - Screen		Pin 7 - Filament +
Pin 4 - No Connection		
RCA Socket		Stock No. 9914
Mounting Position		Any



BOTTOM VIEW (6AR)

Maximum And Minimum Ratings Are Design-Center Values

AMPLIFIER

Plate Voltage		110 max. volts
Screen Voltage		90 max. volts
Screen Supply Voltage		110 max. volts
Grid Voltage		0 min. volts
Total Cathode Current		6.5 max. ma.

*Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier*

Plate Voltage	90	90	volts
Screen Voltage	67.5	90	volts
Grid Voltage	0	0	volts
Plate Resistance	0.6	0.35	megohm
Transconductance	925	1025	$\mu\text{mhos}$
Grid Bias for			
Plate Current = 10 $\mu\text{amp}$ .	-6	-8	volts
Plate Current	2.9	4.5	ma.
Screen Current	1.2	2.0	ma.

<sup>o</sup> With no external shield.

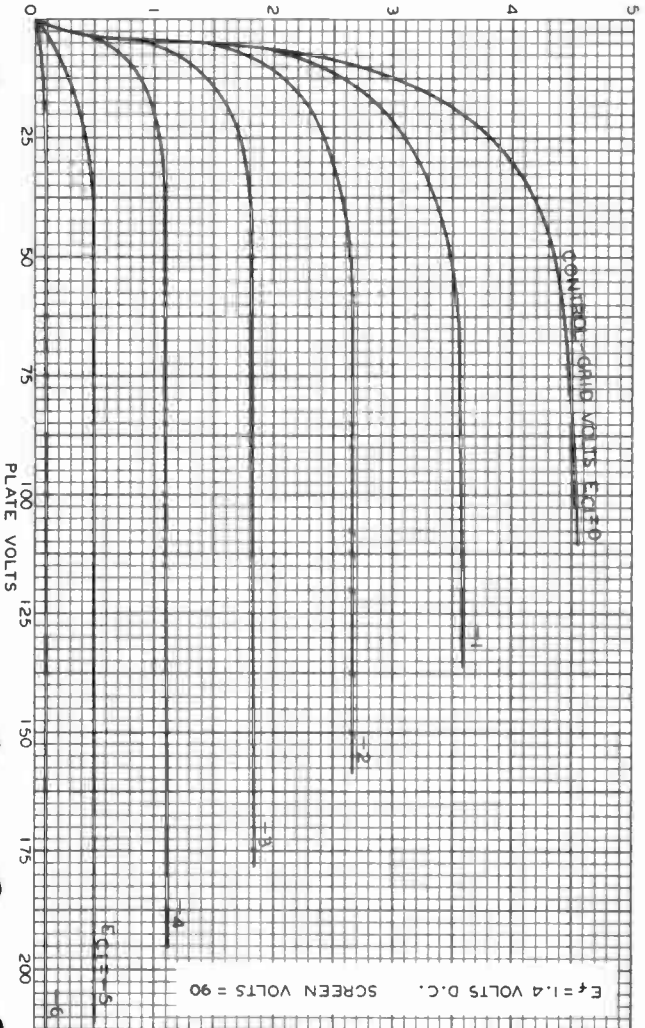
<sup>▲</sup> The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.

June 1, 1942

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.  
World Radio History

TENTATIVE DATA

PLATE MILLIAMPERES



AVERAGE PLATE CHARACTERISTICS

$E_f = 1.4$  VOLTS D.C. SCREEN VOLTS = 90



1L4



IL6

## PENTAGRID CONVERTER

MINIATURE TYPE

IL6

## GENERAL DATA

## Electrical:

Filament, Coated:

Voltage . . . . . 1.4 . . . . . dc volts

Current . . . . . 0.050 . . . . . amp

Direct Interelectrode Capacitances:

	With External Shield <sup>▲</sup>	Without External Shield	
Grid No.4 to All Other Electrodes (RF Input) . . .	7.5	7.5	$\mu\mu\text{f}$
Plate to All Other Electrodes (Mixer Output) .	12	7	$\mu\mu\text{f}$
Grid No.1 to All Other Electrodes Except Grid No.2 (Osc. Input) . . . . .	2.2	2.2	$\mu\mu\text{f}$
Grid No.2 to All Other Electrodes Except Grid No.1 (Osc. Output). . . . .	2.6	2.6	$\mu\mu\text{f}$
Grid No.4 to Plate . . . . .	0.36 max.	0.46 max.	$\mu\mu\text{f}$
Grid No.4 to Grid No.2 . . .	0.24	0.24	$\mu\mu\text{f}$
Grid No.4 to Grid No.1 . . .	0.19	0.19	$\mu\mu\text{f}$
Grid No.2 to Grid No.1 . . .	0.80	0.80	$\mu\mu\text{f}$
Grid No.1 to Plate . . . . .	0.10 max.	0.15 max.	$\mu\mu\text{f}$

## Mechanical:

Mounting Position . . . . . Any

Maximum Overall Length . . . . . 2-1/8"

Maximum Seated Length . . . . . 1-7/8"

Length from Base Seat 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)

Basing Designation for BOTTOM VIEW . . . . . 7DC

Pin 1 - Filament (-)

Pin 2 - Plate

Pin 3 - Grid No.2

Pin 4 - Grid No.1



Pin 5 - Grid No.3,

Grid No.5

Pin 6 - Grid No.4

Pin 7 - Filament (+)

## CONVERTER

Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . . 110 max. volts

GRIDS-No.3 &amp; No.5 (SCREEN) VOLTAGE . . . . . 65 max. volts

<sup>▲</sup> External shield #316 connected to pin 1.

AUG. 1, 1953

TUBE DEPARTMENT

TENTATIVE DATA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History



## PENTAGRID CONVERTER

GRIDS-No.3 & No.5 SUPPLY VOLTAGE . . . . .	110 max.	volts
GRID-No.2 (OSCILLATOR-PLATE) VOLTAGE . . . . .	110 max.	volts
TOTAL CATHODE CURRENT . . . . .	4 max.	ma

### Characteristics - Separate Excitation:\*

Plate Voltage . . . . .	90	volts
Grids-No.3-and-No.5 Voltage . . . . .	45	volts
Grid-No.2 (Oscillator-Plate) Voltage . . . . .	90	volts
Grid-No.4 (Mixer-Grid) Voltage . . . . .	0	volts
Grid-No.1 (Oscillator-Grid) Resistor . . . . .	0.2	megohm
Plate Resistance (Approx.) . . . . .	0.65	megohm
Conversion Transconductance . . . . .	300	$\mu$ mhos
Grid-No.4 Voltage for Conversion Transconductance of 10 $\mu$ mhos . . . . .	-3.5	volts
Grid-No.4 Voltage for Conversion Transconductance of 100 $\mu$ mhos . . . . .	-1.3	volts
Plate Current . . . . .	0.5	ma
Grids-No.3-and-No.5 Current . . . . .	0.6	ma
Grid-No.2 Current . . . . .	1.2	ma
Grid-No.1 Current . . . . .	0.035	ma
Total Cathode Current . . . . .	2.35	ma

### Maximum Circuit Values:

Grid-No.4-Circuit Resistance . . . . .	1.0 max.	megohm
--	----------	--------

NOTE: The transconductance between grid No.1 and grid No.2 connected to plate (not oscillating) is approximately 550  $\mu$ mhos under the following conditions: signal applied to grid No.1 at zero bias; grid No.2 and plate at 90 volts; grids No.3 and No.5 at 45 volts; grid No.4 grounded. Under the same conditions, the total cathode current is 5 milliamperes, and the amplification factor is 40.

\* The characteristics shown under separate excitation approximate those obtained in a self-excited oscillator operating with zero bias.



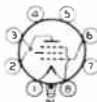


ILA4

ILA4  
ILA6

## POWER AMPLIFIER PENTODE

Filament	Coated	
Voltage	1.4	d-c volts
Current	0.05	amp.
Maximum Overall Length		2-25/32"
Maximum Seated Height		2-1/4"
Maximum Diameter		1-3/16"
Bulb		T-9
Base		Lock-in 8-Pin
Pin 1 - Filament +		Pin 5 - No Connection
Pin 2 - Plate		Pin 6 - Grid
Pin 3 - Screen		Pin 7 - No Connection
Pin 4 - No Connection		Pin 8 - Filament -
Mounting Position		Any

BOTTOM VIEW (5AD<sub>1</sub>)

For curve and additional data, refer to Type 1A5GT/1A5G. The 1LA4 and the 1A5GT/1A5G are identical electrically.

ILA6

## PENTAGRID CONVERTER



Filament	Coated	
Voltage	1.4	d-c volts
Current	0.05	amp.
Direct Interelectrode Capacitances: <sup>o</sup>		
Grid #4 to Plate		0.4 $\mu$ f
Grid #4 to Grid #2		0.3 $\mu$ f
Grid #4 to Grid #1		0.15 $\mu$ f
Grid #1 to Grid #2		0.6 $\mu$ f
Grid #4 to All Other Electrodes (R-F Input)		7.7 $\mu$ f
Grid #2 to All Other Electrodes Except Grid #1 (Osc. Output)		3.3 $\mu$ f
Grid #1 to All Other Electrodes Except Grid #2 (Osc. Input)		2.9 $\mu$ f
Plate to All Other Electrodes (Mixer Output)		8.0 $\mu$ f
Maximum Overall Length		2-25/32"
Maximum Seated Height		2-1/4"
Maximum Diameter		1-3/16"
Bulb		T-9
Base		Lock-in 8-Pin
Pin 1 - Filament +		Pin 5 - Grids #3 & #5
Pin 2 - Plate		Pin 6 - Grid #4
Pin 3 - Grid #2		Pin 7 - No Connection
Pin 4 - Grid #1		Pin 8 - Filament -
Mounting Position		Any



BOTTOM VIEW (7AK)

<sup>o</sup> with close-fitting shield connected to negative filament terminal.

(continued on next page)

May 1, 1941

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY INC  
World Radio History

TENTATIVE DATA



ILA6

## PENTAGRID CONVERTER

(continued from preceding page)

CONVERTER SERVICE

Plate Voltage	30 max.	volts
Screen (Grids #3 & #5) Voltage <sup>▲</sup>	55 max.	volts
Screen Supply Voltage	90 max.	volts
Anode-Grid (Grid #2) Voltage	90 max.	volts
Total Zero-Sig. Cathode Current	3 max.	ma.
<i>Typical Operation and Characteristics:</i>		
Plate	90	volts
Screen	45	volts
Anode-Grid	90	volts
Control-Grid (Grid #4) <sup>▲▲</sup>	0	volts
Oscillator-Grid (Grid #1) Resistor	200000	ohms
Plate Res.	0.75 approx.	ohms
Conversion Transcond.	250	μmhos
Conversion Transcond. with Grid #4		
Bias of -3 volts	10 approx.	μmhos
Plate Cur.	0.55	ma.
Screen Cur.	0.6	ma.
Anode-Grid Cur.	1.2	ma.
Oscillator-Grid Cur.	0.035	ma.
Total Cathode Cur.	2.4	ma.

NOTE: The transconductance of the oscillator portion (not oscillating) is approximately 550 μmhos, and the anode grid current 2.2 ma. under the following conditions: plate volts, 90; screen volts, 45; control-grid volts, 0; anode-grid volts, 90; and oscillator-grid volts, 0.

<sup>▲</sup> Obtained preferably by using a properly by-passed 45000 to 75000-ohm voltage-dropping resistor in series with a 90-volt supply.

<sup>▲▲</sup> A resistance of at least 1.0 megohm should be in the grid return to negative filament pin.

*A Typical Pentagrid Circuit is shown under Type 1A6.*



ILB4

# ILB4 POWER PENTODE

## GENERAL DATA

### Electrical:

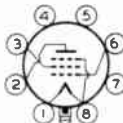
Filament, Coated:

Voltage. . . . .	1.4	dc volts
Current. . . . .	0.05	amp

### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	2-25/32"
Maximum Seated Length. . . . .	2-1/4"
Maximum Diameter . . . . .	1-3/16"
Bulb . . . . .	T-9
Base . . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	5AD2

Pin 1 - Filament (+)  
 Pin 2 - Plate  
 Pin 3 - Grid No. 2  
 Pin 4 - Internal  
 Connection  
 —Do Not Use



Pin 5 - No Connection  
 Pin 6 - Grid No. 1  
 Pin 7 - No Connection  
 Pin 8 - Filament (-),  
 Grid No. 3  
 Plug - Base Shell

*Maximum Ratings and Typical Operating Conditions for the ILB4 are the same as for the Pentode Unit of Type 1D8-GT.*

ILC5



ILC5

## SHARP-CUTOFF PENTODE

GENERAL DATA**Electrical:**

Filament, Coated:

Voltage. . . . . 1.4 . . . . . dc volts

Current. . . . . 0.05 . . . . . amp

Direct Interelectrode Capacitances:<sup>o</sup>Grid No.1 to Plate . . . 0.007 max. . . . .  $\mu\mu\text{f}$ Input. . . . . 3.2 . . . . .  $\mu\mu\text{f}$ Output . . . . . 7.0 . . . . .  $\mu\mu\text{f}$ <sup>o</sup> with external shield connected to negative filament terminal.**Mechanical:**

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 2-25/32"

Maximum Seated Length. . . . . 2-1/4"

Maximum Diameter . . . . . 1-3/16"

Bulb . . . . . T-9

Base . . . . . Lock-in 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 7A0

Pin 1 - Filament (+)

Pin 2 - Plate

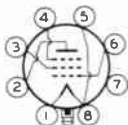
Pin 3 - Grid No.2

Pin 4 - Grid No.3

Pin 5 - Filament (-),

Internal

Shield



Pin 6 - Grid No.1

Pin 7 - No Connection

Pin 8 - Filament (-),

Internal

Shield

Plug - Base

Shell

AMPLIFIER - Class A<sub>1</sub>**Maximum Ratings, Design-Center Values:**

PLATE VOLTAGE. . . . . 110 max. volts

GRID-No.2 (SCREEN) VOLTAGE . . . . . 45 max. volts

**Typical Operation and Characteristics:**

Plate Voltage. . . . . 45 90 . . volts

Grid No.3. . . . . Connected to negative filament terminal at socket

Grid-No.2 Voltage. . . . . 45 45 . . volts

Grid-No.1 (Control-Grid)

Supply Voltage . . . . . 0 0 . . volts

Min. Grid-No.1 Resistor. . . . . 1 1 . . megohm

Plate Resistance (Approx.) . . . . . 0.7 1.5 . . megohms

Transconductance . . . . . 750 775 . .  $\mu\text{mhos}$ 

Plate Current. . . . . 1.1 1.15 . . ma

Grid-No.2 Current. . . . . 0.35 0.30 . . ma



ILC6

ILC6

# PENTAGRID CONVERTER

## GENERAL DATA

### Electrical:

Filament, Coated:

Voltage. . . . .	1.4	dc volts
Current. . . . .	0.05	amp

Direct Interelectrode Capacitances:<sup>o</sup>

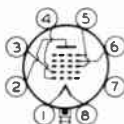
Grid No.4 to Plate . . . . .	0.28	$\mu\text{f}$
Mixer Input. . . . .	9.0	$\mu\text{f}$
Mixer Output . . . . .	5.5	$\mu\text{f}$
Oscillator Input . . . . .	2.4	$\mu\text{f}$
Oscillator Output. . . . .	4.8	$\mu\text{f}$

<sup>o</sup> with external shield connected to negative filament terminal.

### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	2-25/32"
Maximum Seated Length. . . . .	2-1/4"
Maximum Diameter . . . . .	1-3/16"
Bulb . . . . .	T-9
Base . . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	7AK

- Pin 1 - Filament (+)
- Pin 2 - Plate
- Pin 3 - Grid No. 2
- Pin 4 - Grid No. 1
- Pin 5 - Grid No. 3,  
Grid No. 5



- Pin 6 - Grid No. 4
- Pin 7 - No  
Connection
- Pin 8 - Filament (-)
- Plug - Base Shell

## CONVERTER

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	110 max.	volts
GRIDS-No. 3 & No. 5 (SCREEN) VOLTAGE . . . . .	45 max.	volts
GRIDS-No. 3 & No. 5 SUPPLY VOLTAGE . . . . .	110 max.	volts
GRID-No. 2 (ANODE-GRID) VOLTAGE . . . . .	50 max.	volts
GRID-No. 2 SUPPLY VOLTAGE . . . . .	110 max.	volts
TOTAL CATHODE CURRENT. . . . .	3.0 max.	ma

### Typical Operation:

Plate Voltage. . . . .	45	90	volts
Grids-No. 3 & No. 5 Voltage <sup>o</sup> . . . . .	35	35	volts
Grid-No. 2 Voltage. . . . .	45	45	volts
Grid-No. 4 (Control-Grid) Supply Voltage . . . . .	0	0	volts
Min. Grid-No. 4 Resistor. . . . .	1	1	megohm
Grid-No. 1 (Oscillator-Grid) Resistor . . . . .	0.2	0.2	megohm
Plate Resistance . . . . .	0.3	0.65	megohm
Conversion Transconductance. . . . .	250	275	$\mu\text{mhos}$
Conversion Transconductance (Approx.)# . . . . .	5	5	$\mu\text{mhos}$

<sup>o</sup>, #: See next page.

ILC6



ILC6

## PENTAGRID CONVERTER

Plate Current. . . . .	0.70	0.75	ma
Grids-No.3 & No.5 Current. . . . .	0.75	0.70	ma
Grid-No.2 Current. . . . .	1.4	1.4	ma
Grid-No.1 Current. . . . .	0.035	0.035	ma
Total Cathode Current. . . . .	2.9	2.9	ma

□ obtained preferably by using a properly bypassed voltage-dropping resistor in series with the plate voltage supply. To avoid oscillation difficulties, the voltage of grids No.3 & No.5 must be at least 10 volts lower than the grid-No.2 voltage.

# For grid-No.4 bias of -3 volts.

NOTE: The characteristics of the oscillator section (not oscillating) are: transconductance = approx. 550  $\mu$ mhos;  $\mu$  = 14; and grid-No.2 current = 2.7 ma. under the following conditions: plate volts = 90; grids No.3 & No.5 volts = 45; grid-No.4 volts = 0; grid-No.2 volts = 90; grid-No.1 volts = 0.



ILD5

ILD5

## DIODE—SHARP-CUTOFF PENTODE

GENERAL DATA**Electrical:**

Filament, Coated:

Voltage. . . . . 1.4 . . . . . dc volts

Current. . . . . 0.05 . . . . . amp

Direct Interelectrode Capacitances:<sup>o</sup>*Pentode Unit:*Grid No.1 to Plate . . . . . 0.18 . . . . .  $\mu\text{mf}$ Input. . . . . 3.2 . . . . .  $\mu\text{mf}$ Output . . . . . 6.0 . . . . .  $\mu\text{mf}$ <sup>o</sup> With external shield connected to negative filament terminal.**Mechanical:**

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 2-25/32"

Maximum Seated Length. . . . . 2-1/4"

Maximum Diameter . . . . . 1-3/16"

Bulb . . . . . T-9

Base . . . . . Lock-in 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 6AX

Pin 1 - Filament (+)

Pin 2 - Pentode

Plate

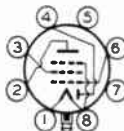
Pin 3 - Pentode

Grid No.2

Pin 4 - Diode Plate

Pin 5 - No

Connection



Pin 6 - Pentode

Grid No.1

Pin 7 - No

Connection

Pin 8 - Filament (-),

Pentode

Grid No.3

Plug - Base Shell

PENTODE UNITAMPLIFIER - Class A<sub>1</sub>**Maximum Ratings, Design-Center Values:**

PLATE VOLTAGE. . . . . 110 max. volts

GRID-No.2 (SCREEN) VOLTAGE . . . . . 50 max. volts

**Typical Operation and Characteristics:**

Plate Voltage. . . . . 45 90 . . volts

Grid-No.2 Voltage. . . . . 45 45 . . volts

Grid-No.1 Voltage. . . . . 0 0 . . volts

Plate Resistance (Approx.) . . . . . 0.9 0.75 . megohm

Transconductance . . . . . 550 575 .  $\mu\text{mhos}$ 

Plate Current. . . . . 0.55 0.6 . . ma

Grid-No.2 Current. . . . . 0.12 0.1 . . ma

DIODE UNIT

The diode is located at the negative end of the filament and is independent of the pentode unit except for the common filament.

ILE3



# ILE3 MEDIUM-MU TRIODE

## GENERAL DATA

### Electrical:

Filament, Coated:

Voltage . . . . . 1.4 . . . . . dc volts  
Current . . . . . 0.05 . . . . . amp

Direct Interelectrode Capacitances - Triode Unit:\*

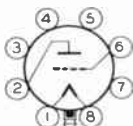
Grid to Plate . . . . . 1.7 . . . . .  $\mu\mu\text{f}$   
Grid to Cathode . . . . . 1.7 . . . . .  $\mu\mu\text{f}$   
Plate to Cathode . . . . . 3.0 . . . . .  $\mu\mu\text{f}$

\* with external shield connected to negative filament terminal.

### Mechanical:

Mounting Position . . . . . Any  
Maximum Overall Length . . . . . 2-25/32"  
Maximum Seated Length . . . . . 2-1/4"  
Maximum Diameter . . . . . 1-3/16"  
Bulb . . . . . T-9  
Base . . . . . Lock-in 8-Pin  
Basing Designation for BOTTOM VIEW . . . . . 4AA

Pin 1 - Filament (+)  
Pin 2 - Plate  
Pin 3 - No Connection  
Pin 4 - No Connection  
Pin 5 - Internal  
          Connection -  
          Do Not Use



Pin 6 - Grid  
Pin 7 - No  
          Connection  
Pin 8 - Filament (-)  
Plug - Base  
          Shell

## AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . . 110 max. volts

### Typical Operation and Characteristics:

Plate Voltage . . . . .	90	90	volts
Grid Voltage . . . . .	0	-3	volts
Amplification Factor . . . . .	14.5	14.5	
Plate Resistance . . . . .	11200	19000	ohms
Transconductance . . . . .	1300	760	$\mu\text{mhos}$
Plate Current . . . . .	4.5	1.4	ma





1LG5

1LG5

# REMOTE-CUTOFF PENTODE

## GENERAL DATA

### Electrical:

Filament, Coated:

Voltage . . . . .	1.4	dc volts
Current . . . . .	0.05	amp

Direct Interelectrode Capacitances:<sup>0</sup>

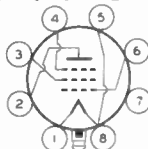
Grid No.1 to Plate. . . . .	0.007 max.	$\mu\text{f}$
Input . . . . .	3.2	$\mu\text{f}$
Output. . . . .	7.0	$\mu\text{f}$

<sup>0</sup> with external shield connected to negative filament terminal.

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length. . . . .	2-25/32"
Maximum Seated Length . . . . .	2-1/4"
Maximum Diameter. . . . .	1-3/16"
Bulb. . . . .	T-9
Base. . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW. . . . .	7A0

Pin 1 - Filament(+)  
 Pin 2 - Plate  
 Pin 3 - Grid No.2  
 Pin 4 - Grid No.3  
 Pin 5 - Filament(-)  
 Internal  
 Shield



Pin 6 - Grid No.1  
 Pin 7 - No Con-  
 nection  
 Pin 8 - Filament(-)  
 internal  
 Shield  
 Plug - Base Shell

## AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . .	110 max.	volts
GRID-No.2 (SCREEN) VOLTAGE. . . . .	110 max.	volts

### Typical Operation and Characteristics:

Plate Voltage . . . . .	90	90	volts
Grid-No.3 (Suppressor). . . . .	Connected to negative filament terminal at socket		
Grid-No.2 Voltage . . . . .	45	90	volts
Grid-No.1 (Control-Grid) Voltage. . . . .	0	-1.5	volts
Plate Resistance (Approx.). . . . .	1.0	0.5	megohm
Transconductance. . . . .	800	1150	$\mu\text{hos}$
Grid-No.1 Bias (Approx.) for transconductance of 10 $\mu\text{hos}$ . . . . .	-10	-19	volts
Plate Current . . . . .	1.7	3.7	ma
Grid-No.2 Current . . . . .	0.4	0.9	ma





1LH4

# 1LH4 DIODE-HIGH-MU TRIODE

## GENERAL DATA

### Electrical:

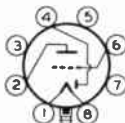
Filament, Coated:

Voltage. . . . .	1.4	dc volts
Current. . . . .	0.05	amp

### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	2-25/32"
Maximum Seated Length. . . . .	2-1/4"
Maximum Diameter . . . . .	1-3/16"
Bulb . . . . .	T-9
Base . . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	5AG

Pin 1 - Filament (+)  
 Pin 2 - Triode Plate  
 Pin 3 - No  
           Connection  
 Pin 4 - Diode Plate  
 Pin 5 - No  
           Connection



Pin 6 - Triode Grid  
 Pin 7 - No  
           Connection  
 Pin 8 - Filament (-)  
 Plug - Base  
        Shell

*Maximum Ratings and Characteristics for Type 1LH4  
 are the same as those shown for the 1H5-GT.*

ILN5



# ILN5 SHARP-CUTOFF PENTODE

## GENERAL DATA

### Electrical:

Filament, Coated:

Voltage . . . . .	1.4	dc volts
Current . . . . .	0.05	amp

Direct Interelectrode Capacitances:<sup>o</sup>

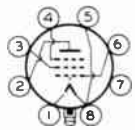
Grid No.1 to Plate . . . . .	0.007 max.	$\mu\mu\text{f}$
Input . . . . .	3.0	$\mu\mu\text{f}$
Output . . . . .	8.0	$\mu\mu\text{f}$

<sup>o</sup> With external shield connected to negative filament terminal.

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	2-25/32"
Maximum Seated Length . . . . .	2-1/4"
Maximum Diameter . . . . .	1-3/16"
Bulb . . . . .	T-9
Base . . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	7A0

- Pin 1 - Filament (+)
- Pin 2 - Plate
- Pin 3 - Grid No.2
- Pin 4 - Grid No.3
- Pin 5 - Filament (-)



- Pin 6 - Grid No.1
- Pin 7 - No Connection
- Pin 8 - Filament (-)
- Plug - Base Shell

## AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . .	110 max.	volts
GRID-No.2 (SCREEN) VOLTAGE . . . . .	110 max.	volts

### Typical Operation and Characteristics:

Plate Voltage . . . . .	90	volts
Grid-No.3 (Suppressor) . . . . .	Connected to cathode at socket	
Grid-No.2 Voltage . . . . .	90	volts
Grid-No.1 (Control-Grid) Voltage . . . . .	0	volts
Plate Resistance (Approx.) . . . . .	1.1	megohms
Transconductance . . . . .	800	$\mu\text{mhos}$
Grid-No.1 Bias (Approx.) for transconductance of 10 $\mu\text{mhos}$ . . . . .	-4.5	volts
Plate Current . . . . .	1.6	ma
Grid-No.2 Current . . . . .	0.35	ma



IN5-GT/G

IN5-GT/G

## R-F AMPLIFIER PENTODE

Filament	Coated	
Voltage	1.4	d-c volts
Current	0.05	amp.
Direct Interelectrode Capacitances: <sup>o</sup>		
Grid to Plate	0.007 max.	$\mu\mu\text{f}$
Input	3	$\mu\mu\text{f}$
Output	10	$\mu\mu\text{f}$
Maximum Overall Length		3-5/16"
Maximum Seated Height		2-3/4"
Maximum Diameter		1-5/16"
Bulb		T-9
Cap		Skirted Miniature
Base		Small Wafer Octal 7-Pin, Sleeve
Pin 1 - Base sleeve		Pin 5 - No Connection
Pin 2 - Filament +		Pin 7 - Filament -
Pin 3 - Plate		Pin 8 - No Connection
Pin 4 - Screen		Cap - Grid
Mounting Position		Any



BOTTOM VIEW (GT-5Y)

Maximum Ratings Are Design-Center Values

AMPLIFIER

Plate Voltage	110 max.	volts
Screen Voltage	110 max.	volts
<i>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</i>		
Plate	90	volts
Screen	90	volts
Grid	0	volts
Plate Res.	1.5 approx.	megohms
Transcond.	750	$\mu\text{mhos}$
Grid Bias for Transcond.		
of approx. 5 $\mu\text{mhos}$	-4	volts
Plate Cur.	1.2	ma.
Screen Cur.	0.3	ma.

<sup>o</sup> With shield connected to negative filament terminal.

Jan. 1, 1943

RCA VICTOR DIVISION  
 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

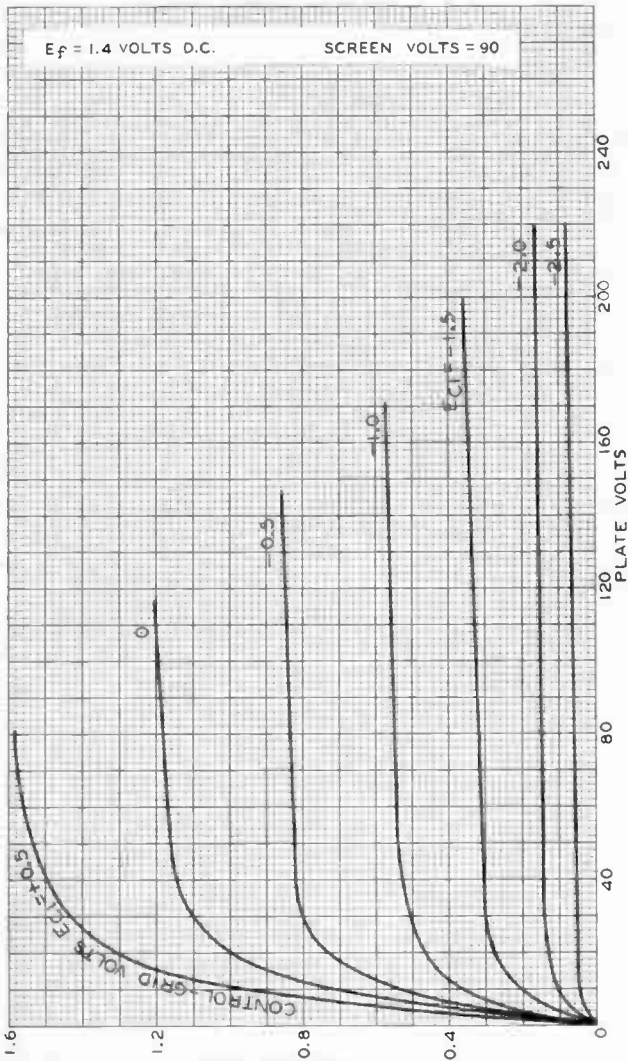
DATA

1N5-GT/G



1N5-GT/G

### AVERAGE PLATE CHARACTERISTICS



DEC. 29, 1942

PLATE MILLIAMPERES  
RCA VICTOR DIVISION

92C-6000R1

RADIO CORPORATION OF AMERICA, HARTFORD, NEW HAVEN, CT.

World Radio History



IP5-GT



IP5-GT

## SUPER-CONTROL R-F AMPLIFIER PENTODE

Filament	Coated	
Voltage	1.4	d-c volts
Current	0.05	amp.
Direct Interelectrode Capacitances: <sup>o</sup>		
Grid to Plate	0.007	max. $\mu\text{mf}$
Input	3.0	$\mu\text{mf}$
Output	10	$\mu\text{mf}$
Maximum Overall Length	3-5/16"	
Maximum Seated Height	2-3/4"	
Maximum Diameter	1-5/16"	
Bulb	T-9	
Cap	Skirted Miniature - Style C	
Base	Small Wafer Octal 7-Pin, Sleeve	
Pin 1 - Base Sleeve	Pin 5 - No Connection	
Pin 2 - Filament +	Pin 7 - Filament -	
Pin 3 - Plate	Pin 8 - No Connection	
Pin 4 - Screen	Cap - Grid	
Mounting Position		Any



BOTTOM VIEW (GT-5Y)

AMPLIFIER

Plate Voltage	110 max.	volts
Screen Voltage	110 max.	volts
<i>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</i>		
Plate	90	volts
Screen	90	volts
Grid	0	volts
Plate Res. (approx.)	0.8	megohm
Transcond.	750	$\mu\text{mhos}$
Grid Bias for		
Transcond. of 10 $\mu\text{mhos}$ (approx.)	-12	volts
Plate Cur.	2.3	ma.
Screen Cur.	0.7	ma.

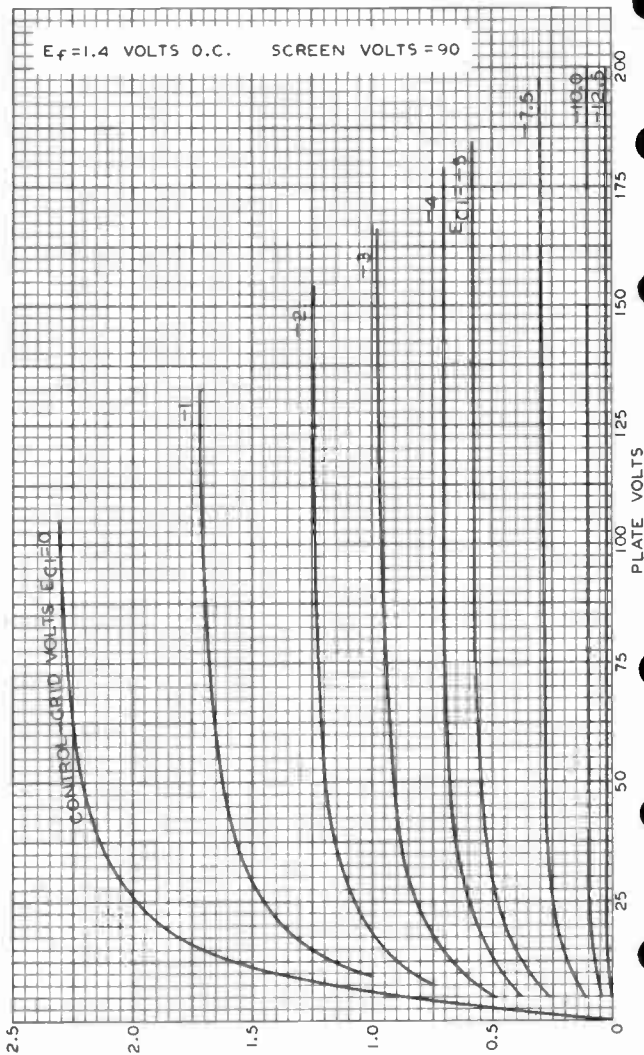
<sup>o</sup> With close-fitting shield connected to negative filament terminal.

IP5-GT



IP5-GT

## AVERAGE PLATE CHARACTERISTICS



APR. 24, 1941

PLATE MILLIAMPERES

RCA RADIONRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

92C-6276

World Radio History





IQ5-GT  
★

IQ5-GT/IQ5-G

**BEAM POWER AMPLIFIER**

Filament	Coated	
Voltage	1.4	d-c volts
Current	0.1	amp.
Maximum Overall Length		3-5/16" ←
Maximum Seated Height		2-3/4" ←
Maximum Diameter		1-5/16"
Bulb		T-9
Base	Intermediate Shell Octal	7-Pin
Pin 1 - No Connection		Pin 5 - Grid
Pin 2 - Filament +		Pin 7 - Filament -
Pin 3 - Plate		Pin 8 - No Connection
Pin 4 - Screen		
Mounting Position		Any



BOTTOM VIEW (G-6AF)

AMPLIFIER

Plate Voltage		110 max.	volts
Screen Voltage		110 max.	volts
Zero-Signal Cathode Current		12 max.	ma.
<i>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</i>			
Plate	85	90	volts
Screen	85	90	volts
Grid	-5	-4.5	volts
Peak A-F Grid Voltage	5	4.5	volts
Zero-Sig. Plate Cur.	7.0	9.5	ma.
Zero-Sig. Screen Cur.	0.8	1.3	<u>approx. ma.</u>
Plate Resistance	70000	75000	<u>approx. ohms</u>
Transconductance	1950	2200	μmhos
Load Resistance	9000	8000	ohms
Total Harmonic Dist.	5.5	6.0	%
Max.-Sig. Power Output	250	270	mw.

← Indicates a change.

July 1, 1941

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

World Radio History

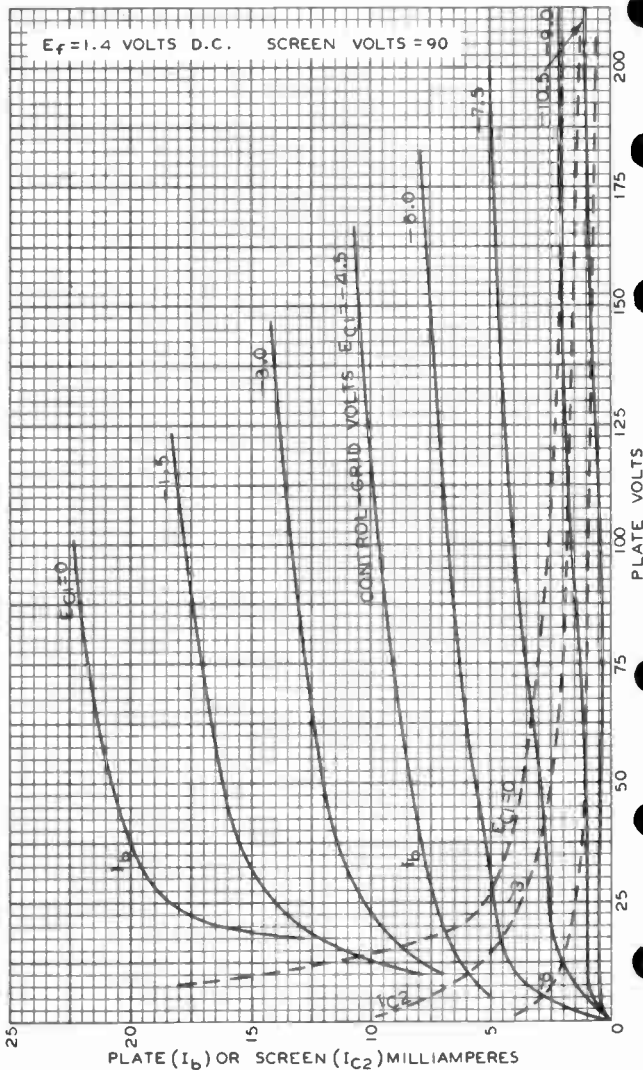
DATA

1Q5-GT



1Q5-GT

### AVERAGE PLATE CHARACTERISTICS



JUNE 3, 1941

RCA RADITRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

92C-6293

World Radio History



IR5

## PENTAGRID CONVERTER

MINIATURE TYPE

Filament	Coated	
Voltage	1.4	d-c volts
Current	0.05	amp.
Direct Interelectrode Capacitances: <sup>o</sup>		
Grid #3 to All Other Electrodes (R-F Input)	7.0	μf
Plate to All Other Electrodes (Mixer Output)	7.5	μf
Grid #1 to All Other Electrodes (Osc. Input)	3.8	μf
Grid #3 to Plate	0.4 max.	μf
Grid #3 to Grid #1	0.2 max.	μf
Grid #1 to Plate	0.1 max.	μf
Maximum Overall Length	2-1/8"	
Maximum Seated Height	1-7/8"	
Maximum Diameter	3/4"	
Bulb	T-5-1/2	
Base <sup>▲</sup>	Miniature Button 7- Pin	
Pin 1 - Filament -	Pin 5 - Filament -	
Pin 2 - Plate	Pin 6 - Grid #3	
Pin 3 - Grids #2 & #4	Pin 7 - Filament +	
Pin 4 - Grid #1		
Mounting Position	BOTTOM VIEW (7AT)	Any

*Maximum and Minimum Ratings Are Design-Center Values*CONVERTER SERVICE

Plate Voltage	90 max.	volts
Grids #2 & #4 Voltage	67.5 max.	volts
Grids #2 & #4 Supply Voltage	90 max.	volts
Grid #3 Voltage	0 min.	volts
Total Zero-Sig. Cathode Current	5.5 max.	ma.

*Typical Operation and Characteristics:*

Plate Voltage	45	67.5	90	90	volts
Grids #2 & #4 Voltage	45	67.5	45	67.5	volts
Grid #3 Voltage	0	0	0	0	volts
Grid #1 Resistor	0.1	0.1	0.1	0.1	megohm
Plate Resistance	0.6	0.5	0.8	0.6	approx. megohm
Conversion Transcond.	235	280	250	300	μmhos
Grid #3 Bias for Conver.					
Transcond. of approx.					
5 μmhos	-9	-14	-9	-14	volts
Plate Current	0.7	1.4	0.8	1.6	ma.
Grids #2 & #4 Current	1.9	3.2	1.9	3.2	ma.
Grid #1 Current	0.15	0.25	0.15	0.25	ma.
Total Cathode Current	2.75	5	2.75	5	ma.

NOTE: The transconductance between Grid #1 and Grids #2 & #4 tied to plate (not oscillating) is approximately 1800 μmhos under the following conditions: Grid #1 & #3 at 0 volts; Grids #2 & #4 and plate at 67.5 volts.

<sup>o</sup> With no external shield.

<sup>▲</sup> The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.

← Indicates a change.

May 1, 1942

RCA RADIODRUM DIVISION  
RCA MANUFACTURING COMPANY, INC.  
World Radio History

DATA

1R5

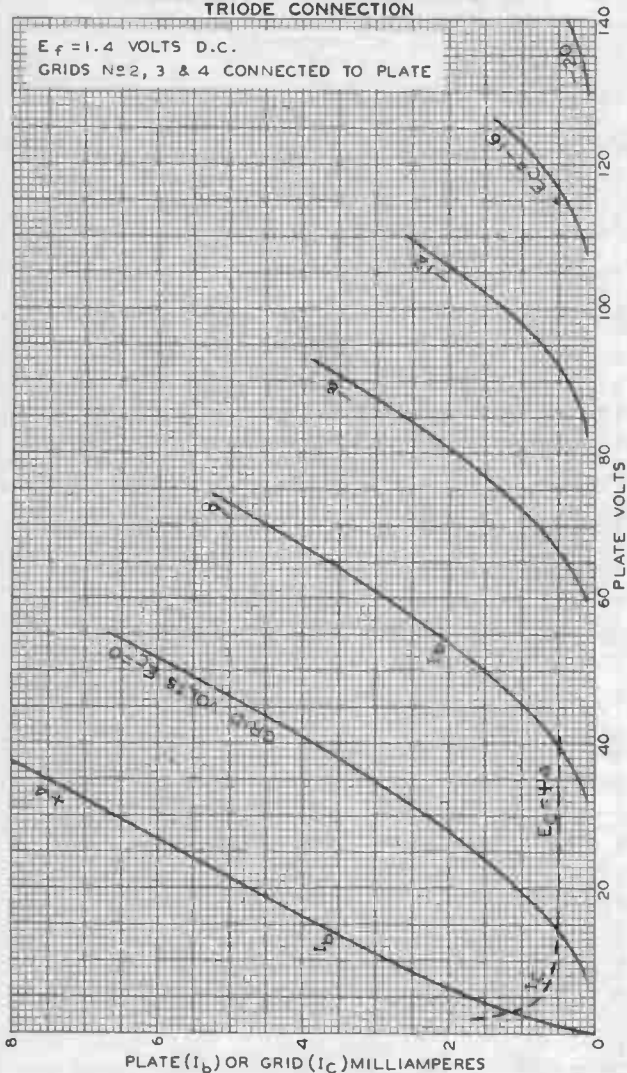


1R5

AVERAGE PLATE CHARACTERISTICS  
TRIODE CONNECTION

$E_f = 1.4$  VOLTS D.C.

GRIDS No 2, 3 & 4 CONNECTED TO PLATE



MAY 4, 1942

RCA RADIONRON DIVISION  
RCA MANUFACTURING COMPANY, INC.  
World Radio History

92C-6350RI

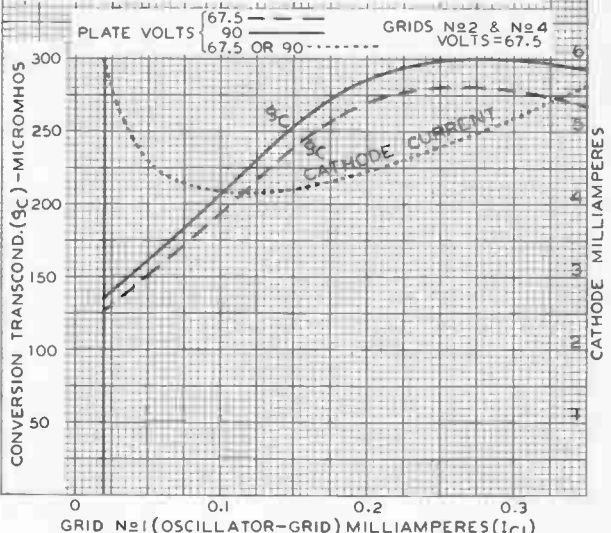
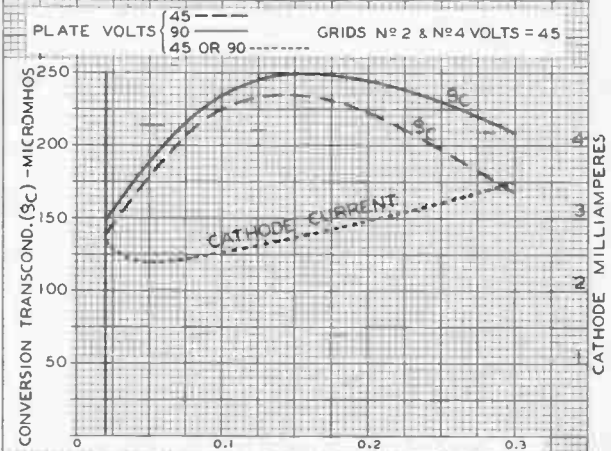


IR5

IR5

# OPERATION CHARACTERISTICS

$F_p = 1.4$  VOLTS D.C.      GRID No 3 VOLTS = 0  
 GRID No 1 RES. = 100 000 OHMS; RECOMMENDED MIN.  $I_{C1} = 0.02$  MA.  
 GRID No 1 CUR. VARIED BY ADJUSTMENT OF OSC. VOLTAGE  
 OSC. VOLTS ON GRIDS No 2 & No 4 & ON FILAMENT = 0



GRID No 1 (OSCILLATOR-GRID) MILLIAMPERES ( $I_{C1}$ )

MAY 30, 1940

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY INC

92C-6098R1

IR5



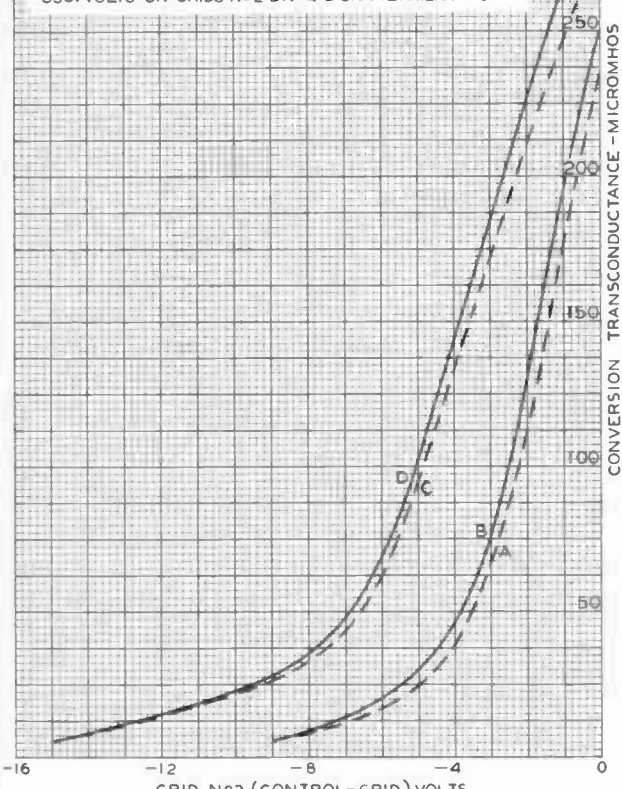
IR5

OPERATION CHARACTERISTICS

$E_f = 1.4$  VOLTS D.C.

CURVE	PLATE VOLTS	GRID No 2 & No 4 VOLTS	GRID No 1 RESISTOR OHMS	GRID No 1 CURRENT* $\mu A$
A	45	45	100000	150
B	90	45	100000	150
C	67.5	67.5	100000	250
D	90	67.5	100000	250

\*OBTAINED BY ADJUSTMENT OF OSC.-GRID (GRID No 1) VOLTS TO GIVE INDICATED VALUES  
 OSC. VOLTS ON GRIDS No 2 & No 4 & ON FILAMENT = 0





IS4

IS4

**POWER AMPLIFIER PENTODE**

MINIATURE TYPE

Filament	Coated	
Voltage	1.4	d-c volts
Current	0.1	amp.
Maximum Overall Length		2-1/8"
Maximum Seated Height		1-7/8"
Maximum Diameter		3/4"
Bulb		T-5-1/2
Base <sup>Δ</sup>		Miniature Button 7-Pin
Pin 1 - Filament -		Pin 5 - Filament -
Pin 2 - Plate		Pin 6 - Plate
Pin 3 - Grid		Pin 7 - Filament +
Pin 4 - Screen		
Mounting Position		Any



BOTTOM VIEW (7AV)

AMPLIFIER

Plate Voltage				90 max. volts
Screen Voltage				67.5 max. volts
Total Max.-Signal Cathode Current				11 max. ma.
Total Zero-Signal Cathode Current				9 max. ma.
<i>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</i>				
Filament	1.4	1.4	1.4	d-c volts
Plate	45	67.5	90	volts
Screen	45	67.5	67.5	volts
Grid	-4.5	-7	-7	volts
Peak A-F Grid Voltage	4.5	7	7	volts
Zero-Signal Plate Cur.	3.8	7.2	7.4	ma.
Zero-Signal Screen Cur.	0.8	1.5	1.4	ma.
Plate Res. (Approx.)	0.1	0.1	0.1	megohm
Transcond.	1250	1550	1575	μmhos
Load Res.	8000	5000	8000	ohms
Total Harmonic				
Distortion	12	10	12	%
Max.-Sig. Power Output	65	180	270	mW

<sup>Δ</sup> The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.

154

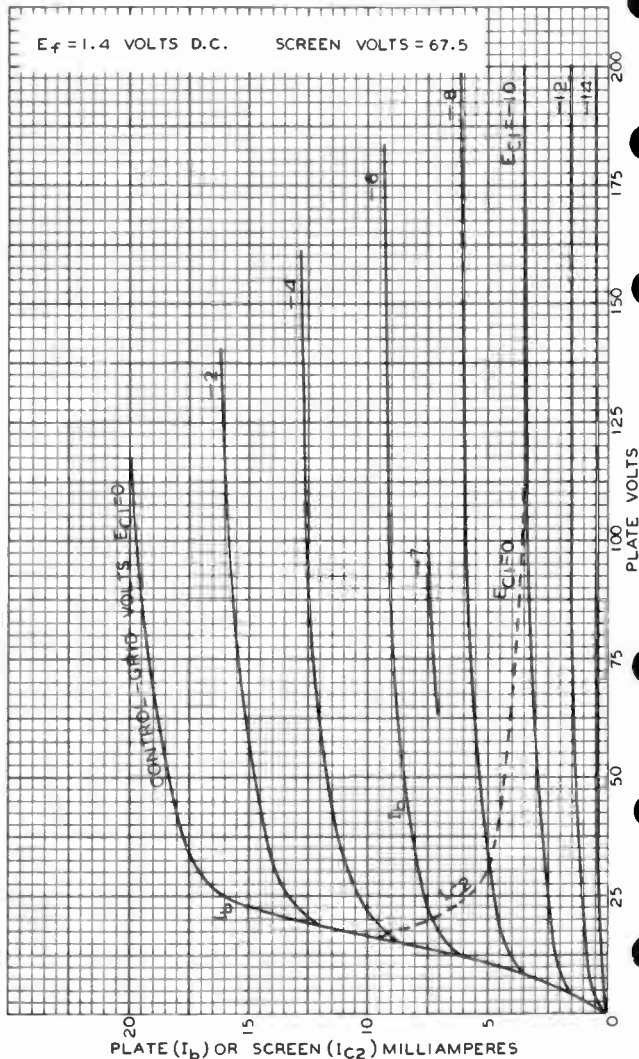


154

### AVERAGE PLATE CHARACTERISTICS

$E_f = 1.4$  VOLTS D.C.

SCREEN VOLTS = 67.5



JAN. 26, 1942

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

92C-6157RI

World Radio History





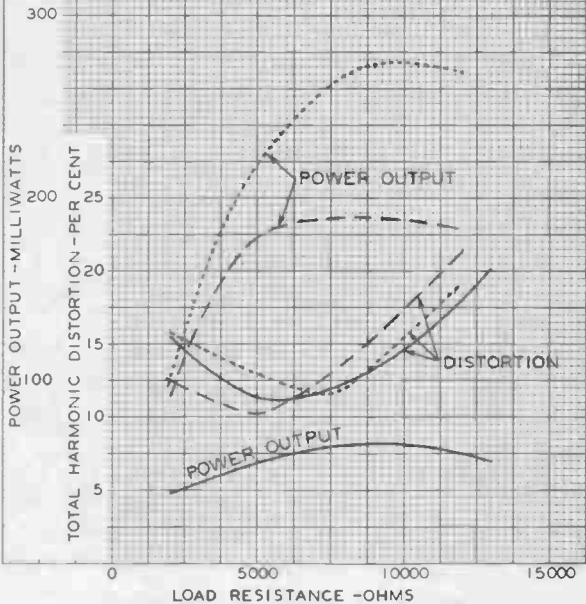
ISA

1S4

## OPERATION CHARACTERISTICS

 $E_f = 1.4$  VOLTS D.C.

CURVE	PLATE VOLTS	SCREEN VOLTS	GRID VOLTS	SIGNAL VOLTS RMS
—	45	45	-4.5	3.2
- - -	67.5	67.5	-7	4.95
⋯	90	67.5	-7	4.95



MAY 8, 1941

RCA RADOTRON DIVISION  
RCA ELECTRONIC COMPONENTS INC.

92C-6175R1

World Radio History

154



154

# AVERAGE PLATE CHARACTERISTICS TRIODE CONNECTION

$E_f = 1.4$  VOLTS

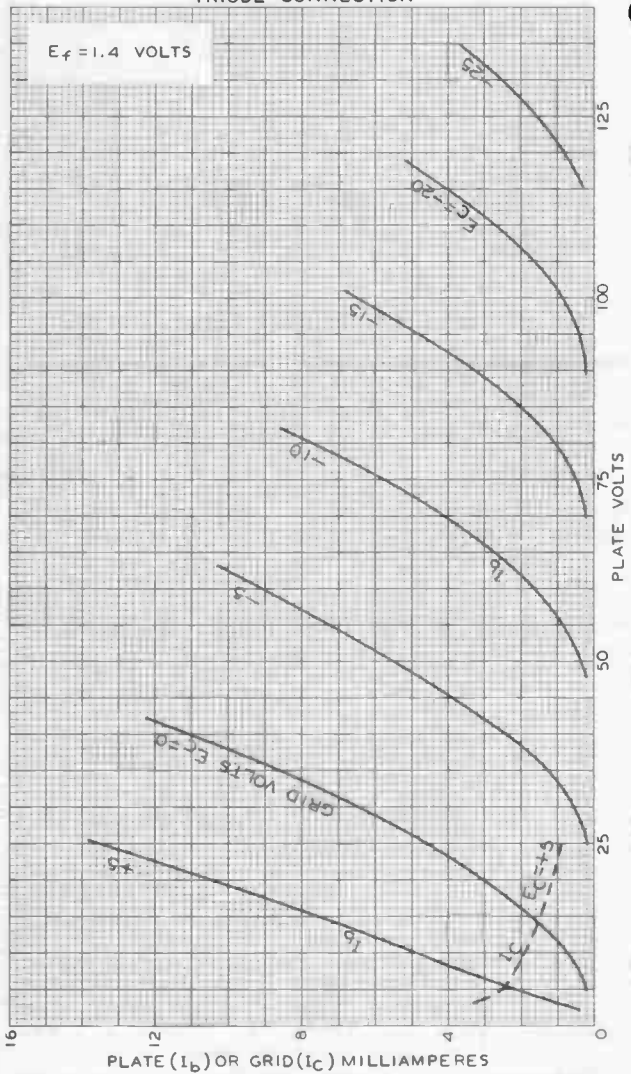


PLATE ( $I_b$ ) OR GRID ( $I_c$ ) MILLIAMPERES

PLATE VOLTS

DEC. 26, 1941

RCA RADITRON DIVISION  
RCA MANUFACTURING COMPANY INC.

92C-6348

World Radio History



1S5

# 1S5 DIODE-PENTODE

MINIATURE TYPE

## GENERAL DATA

### Electrical:

Filament, Coated:

Voltage. . . . . 1.4 . . . . . dc volts

Current. . . . . 0.05 . . . . . amp

### Mechanical:

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 2-1/8"

Maximum Seated Length. . . . . 1-7/8"

Length, Base Seat to Bulb Top (excluding tip). . . . . 1-1/2" ± 3/32"

Maximum Diameter . . . . . 3/4"

Bulb . . . . . T-5-1/2

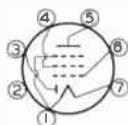
Base . . . . . Small-Button Miniature 7-Pin

Basing Designation for BOTTOM VIEW . . . . . 6AU

Pin 1 - Filament (-),  
Grid No.3

Pin 2 - No  
Connection

Pin 3 - Diode  
Plate



Pin 4 - Pentode  
Grid No.2

Pin 5 - Pentode  
Plate

Pin 6 - Pentode  
Grid No.1

Pin 7 - Filament (+)

*Maximum Ratings, Characteristics, and Typical Operating Conditions for Type 1S5 are the same as those shown for the 1U5.*

Curves shown under Type 1U5 also apply to the 1S5.

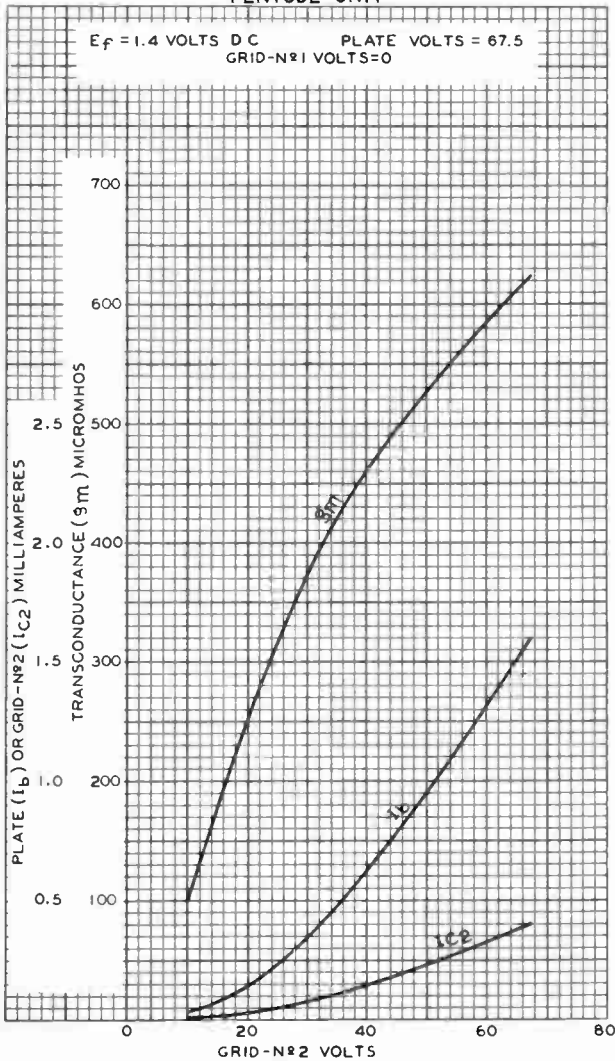


155

155

### AVERAGE CHARACTERISTICS PENTODE UNIT

$E_f = 1.4$  VOLTS D C      PLATE VOLTS = 67.5  
GRID-N#1 VOLTS=0



JUNE 12, 1941

TUBE DEPARTMENT

92CM-6297

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History



IT4

IT4

## REMOTE-CUTOFF PENTODE

MINIATURE TYPE

## GENERAL DATA

## Electrical:

Filament, Coated:

Voltage . . . . . 1.4 . . . . . dc volts  
 Current . . . . . 0.05 . . . . . amp

Direct Interelectrode Capacitances:<sup>0</sup>

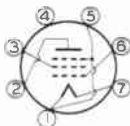
Grid No.1 to plate . . . . . 0.01 . . . . .  $\mu\text{f}$   
 Grid No.1 to filament (-) & grid No.3  
 & internal shield, and grid No.2 . . . . . 3.6 . . . . .  $\mu\text{f}$   
 Plate to filament (-) & grid No.3  
 & internal shield, and grid No.2 . . . . . 7.5 . . . . .  $\mu\text{f}$

## Mechanical:

Mounting Position . . . . . Any  
 Maximum Overall Length . . . . . 2-1/8"  
 Maximum Seated Length . . . . . 1-7/8"  
 Length, Base Seat to Bulb Top (Excluding tip) . . . . . 2"  $\pm$  3/32"  
 Maximum Diameter . . . . . 3/4"  
 Bulb . . . . . T-5-1/2  
 Base . . . . . Small-Button Miniature 7-Pin (JETEC No.E7-1)

Basing Designation for BOTTOM VIEW . . . . . 6AR

Pin 1 - Filament (-),  
 Grid No.3,  
 Int. Shield  
 Pin 2 - Plate  
 Pin 3 - Grid No.2  
 Pin 4 - No Connection-  
 Do Not Use



Pin 5 - Filament (-),  
 Grid No.3,  
 Int. Shield  
 Pin 6 - Grid No.1  
 Pin 7 - Filament (+)

AMPLIFIER - Class A<sub>1</sub>

## Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . . 90 max. volts  
 GRID-No.2 (SCREEN) SUPPLY VOLTAGE. . . . . 90 max. volts  
 GRID-No.2 VOLTAGE. . . . . 67.5 max. volts  
 GRID-No.1 (CONTROL-GRID) VOLTAGE:  
 Positive bias value. . . . . 0 max. volts  
 TOTAL CATHODE CURRENT. . . . . 5.5 max. ma

## Typical Operation and Characteristics:

Plate Voltage. . . . .	45	67.5	90	90	volts
Grid-No.2 Voltage. . . . .	45	67.5	45	67.5	volts
Grid-No.1 Voltage. . . . .	0	0	0	0	volts
Plate Resistance (Approx.). . . . .	0.35	0.25	0.8	0.5	megohm
Transconductance . . . . .	700	875	750	900	$\mu\text{mhos}$
Plate Current. . . . .	1.7	3.4	1.8	3.5	ma
Grid-No.2 Current. . . . .	0.7	1.5	0.65	1.4	ma
Grid-No.1 Voltage for transconductance of 10 $\mu\text{mhos}$	-10	-16	-10	-16	volts

<sup>0</sup>With or without external shield JETEC No.316 connected to pin No.1.

← Indicates a change.

JAN. 3, 1955

TUBE DIVISION

DATA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

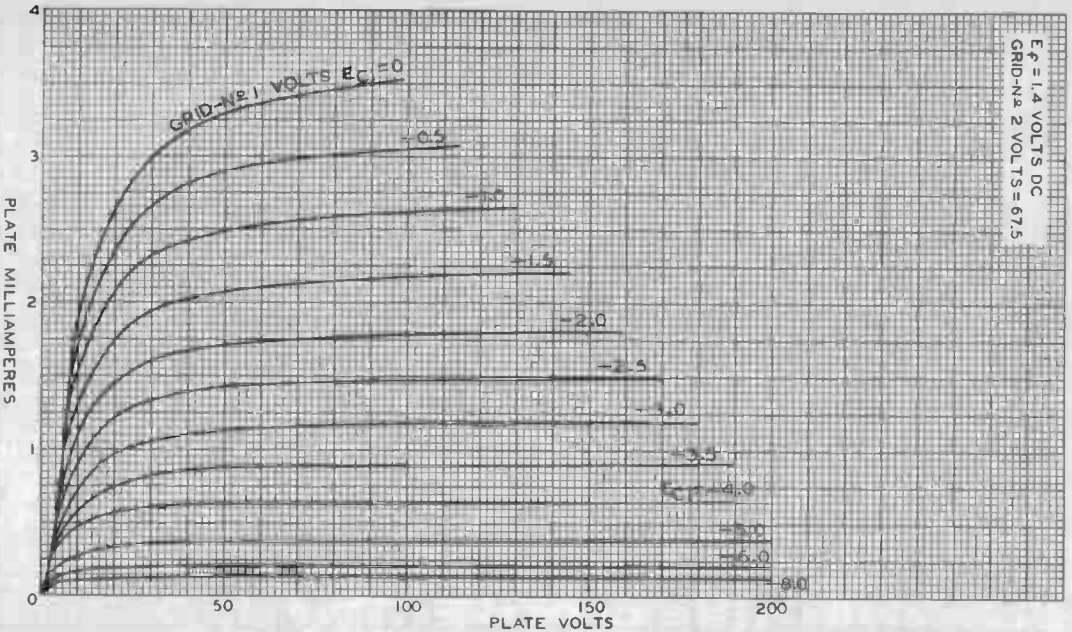
1T4



1T4

## AVERAGE PLATE CHARACTERISTICS

$E_f = 1.4$  VOLTS DC  
 GRID-No 2 VOLTS = 67.5



DEC. 27, 1954

PLATE MILLIAMPERES

TUBE DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM - 6101R2

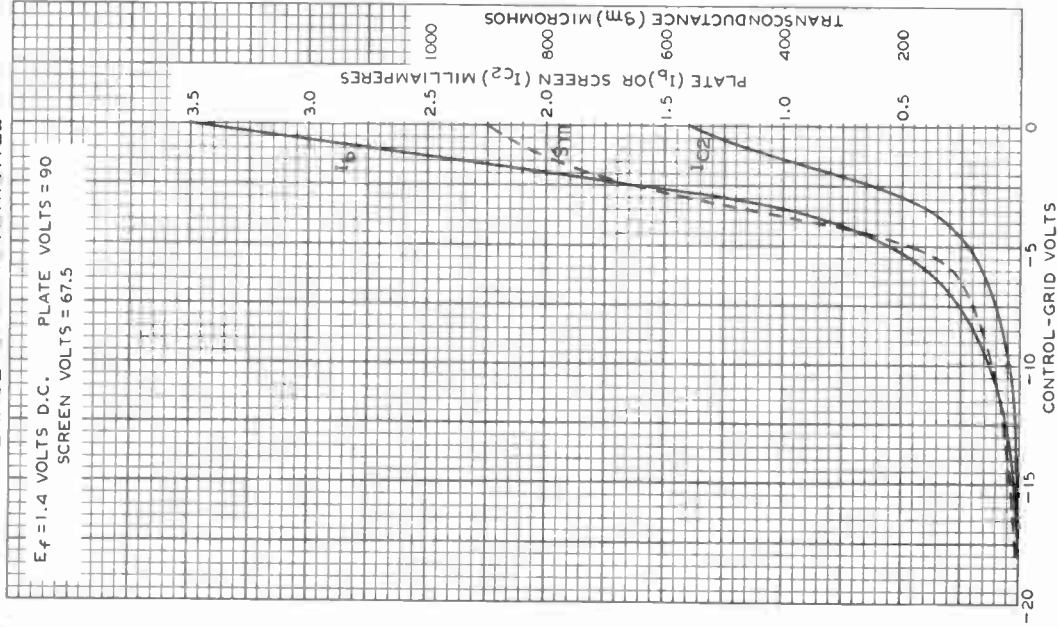


IT4

IT4

### AVERAGE CHARACTERISTICS

$E_f = 1.4$  VOLTS D.C.    PLATE VOLTS = 90  
SCREEN VOLTS = 67.5



JAN. 24, 1942

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C-6357

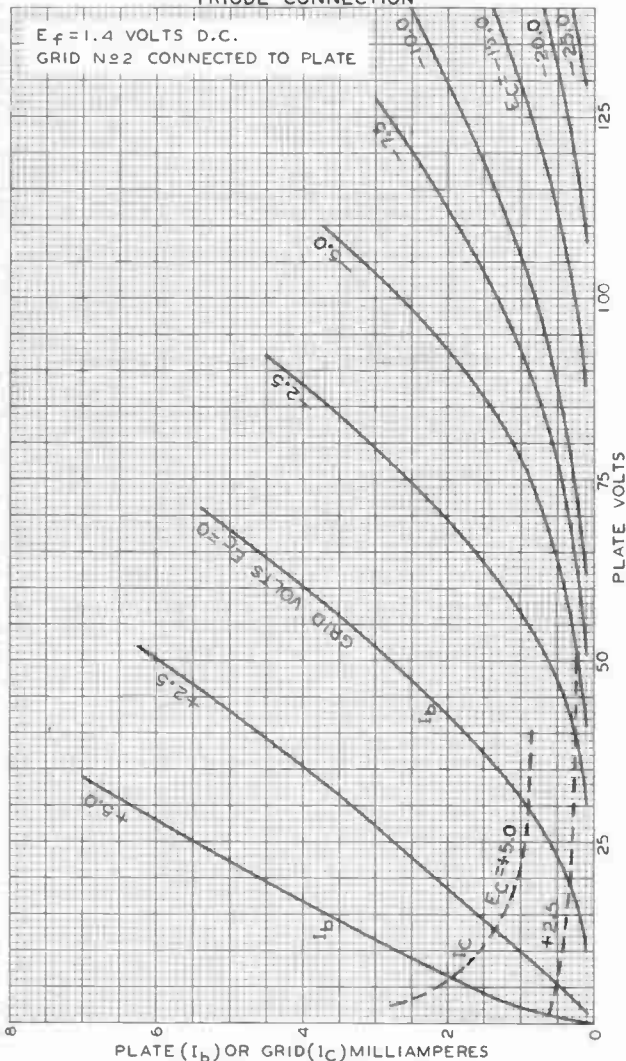
IT4



IT4

# AVERAGE PLATE CHARACTERISTICS TRIODE CONNECTION

$E_f = 1.4$  VOLTS D.C.  
GRID No2 CONNECTED TO PLATE



FEB. 16, 1943

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA HARTFORD, NEW JERSEY  
World Radio History

92C-6352R1





IT5-GT

IT5-GT

## BEAM POWER AMPLIFIER

Filament	Coated	
Voltage	1.4	d-c volts
Current	0.05	amp.
Direct Interelectrode Capacitances (Approx.): <sup>o</sup>		
Grid to Plate	0.5	μμf ←
Input	4.8	μμf
Output	8.0	μμf
Maximum Overall Length		3-5/16" ←
Maximum Seated Height		2-3/4" ←
Maximum Diameter		1-5/16"

Bulb T-9  
Base Intermediate Shell Octal 7-Pin

Pin 1 - No Connection

Pin 5 - Grid #1

Pin 2 - Filament +

Pin 7 - Filament -

Pin 3 - Plate

Pin 8 - No Connection

Pin 4 - Grid #2

Mounting Position Any



BOTTOM VIEW (G-6X)

*Maximum Ratings Are Design-Center Values*

## AMPLIFIER

Plate Voltage	110 max.	volts
Screen Voltage (Grid No.2)	110 max.	volts
Total Zero-Sig. Cathode Current	7.3 max.	ma.

*Typical Operation and Characteristics - Class A<sub>2</sub> Amplifier:*

	<u>Fixed Bias</u>	<u>Cathode Bias</u>	
Plate Voltage	90	84	volts
Screen Voltage	90	84	volts
Grid Voltage	-6	-6	volts
Peak A-F Grid Voltage	6	6	volts
Zero-Sig. Plate Current	6.5	5.4	ma.
Max.-Sig. Plate Current	6.5	5.5	ma.
Zero-Sig. Screen Current	0.8	0.6	<u>approx. ma.</u>
Max.-Sig. Screen Current	1.5	1.5	<u>approx. ma.</u>
Plate Resistance	250000	250000	<u>approx. ohms</u>
Transconductance	1150	1050	μmhos
Load Resistance	14000	14000	ohms
Total Harmonic Dist.	7.5	7.5	%
Power Output	170	145	mw

<sup>o</sup> with no external shield.

← Indicates a change.

AUG. 2, 1943

RCA VICTOR DIVISION

DATA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History





IT6

IT 6

# DIODE—SHARP-CUTOFF PENTODE

SUBMINIATURE TYPE

## GENERAL DATA

### Electrical:

Filament, Coated:

Voltage . . . . .	1.25	dc volts
Current . . . . .	0.04	amp

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	1-3/4"
Maximum Seated Length . . . . .	1-1/2"
Length, Base Seat to Bulb Top (excluding tip)	1.200 ± 0.060"
Maximum Diameter . . . . .	0.4"
Bulb . . . . .	T-3
Base . . . . .	Small-Button Sub-miniatur 8-Pin

### BOTTOM VIEW

Pin 1 - Pentode Plate  
 Pin 2 - No Connection  
 Pin 3 - Grid No.1  
 Pin 4 - Filament (-),  
 Grid No.3



Pin 5 - Filament (+)  
 Pin 6 - Diode Plate  
 Pin 7 - No Connection  
 Pin 8 - Grid No.2

### PENTODE UNIT AMPLIFIER - Class A<sub>1</sub>

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

PLATE VOLTAGE . . . . .	67.5 max.	volts
GRID-No.2 (SCREEN) VOLTAGE . . . . .	67.5 max.	volts
TOTAL CATHODE CURRENT . . . . .	2.0 max.	ma

#### Typical Operation and Characteristics:

Plate Voltage . . . . .	30	45	67.5	volts
Grid-No.2 Voltage . . . . .	30	45	67.5	volts
Grid-No.1 (Control-Grid) Voltage . . . . .	0	0	0	volts
Plate Resistance (Approx.) . . . . .	0.5	0.5	0.4	megohm
Transconductance . . . . .	330	475	600	μmhos
Plate Current . . . . .	0.33	0.75	1.6	ma
Grid-No.2 Current . . . . .	0.10	0.21	0.4	ma

### DIODE UNIT

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

PLATE CURRENT . . . . .	0.25 max.	ma
-------------------------	-----------	----

#### Diode Considerations:

The diode is located at the negative end of the filament and is independent of the pentode unit except for the common filament.

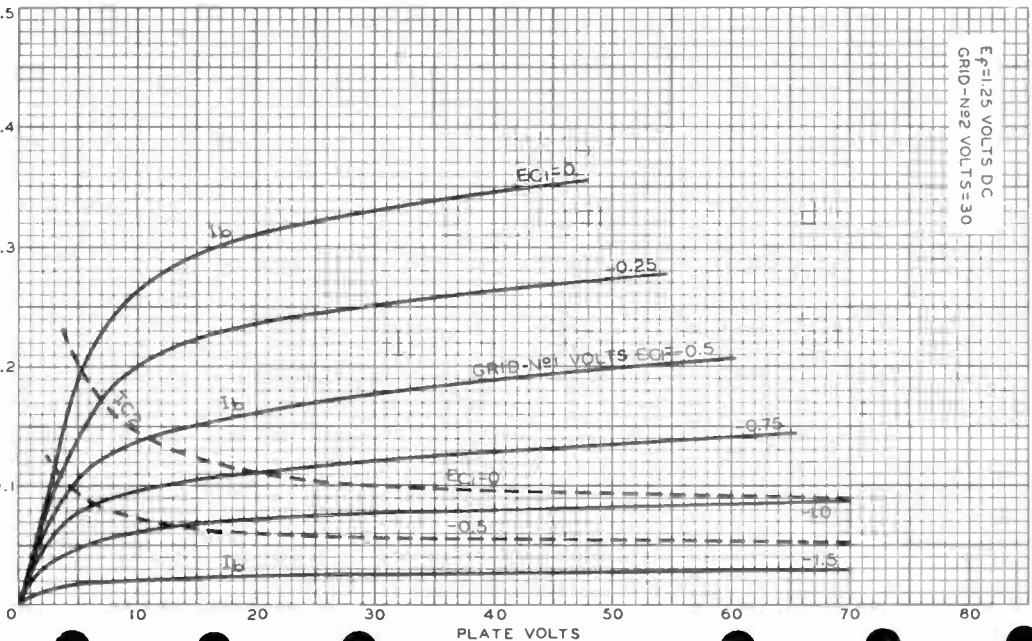
1T6



1T6

AVERAGE PLATE CHARACTERISTICS

$E_f = 1.25$  VOLTS DC  
 GRID - N<sub>2</sub> VOLTS = 30



APRIL 26, 1949  
 PLATE ( $I_b$ ) OR GRID-N<sub>2</sub> ( $I_{c2}$ ) MILLIAMPERES  
 TUBE DEPARTMENT  
 92CM-7260

RAD O CORPORATION OF AMERICA HARRISON NEW JERSEY

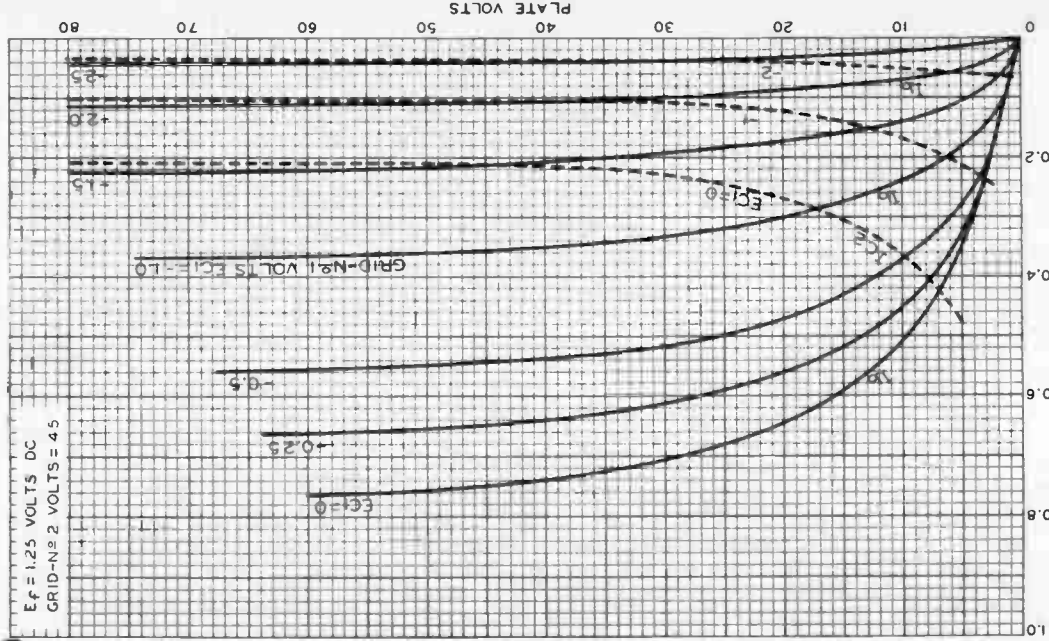


1T6

911

# AVERAGE PLATE CHARACTERISTICS

$E_f = 1.25$  VOLTS DC  
GRID-NO 2 VOLTS = 4.5



APRIL 21, 1949

PLATE ( $I_b$ ) OR GRID-NO 2 ( $I_{C2}$ ) MILLIAMPERES  
TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

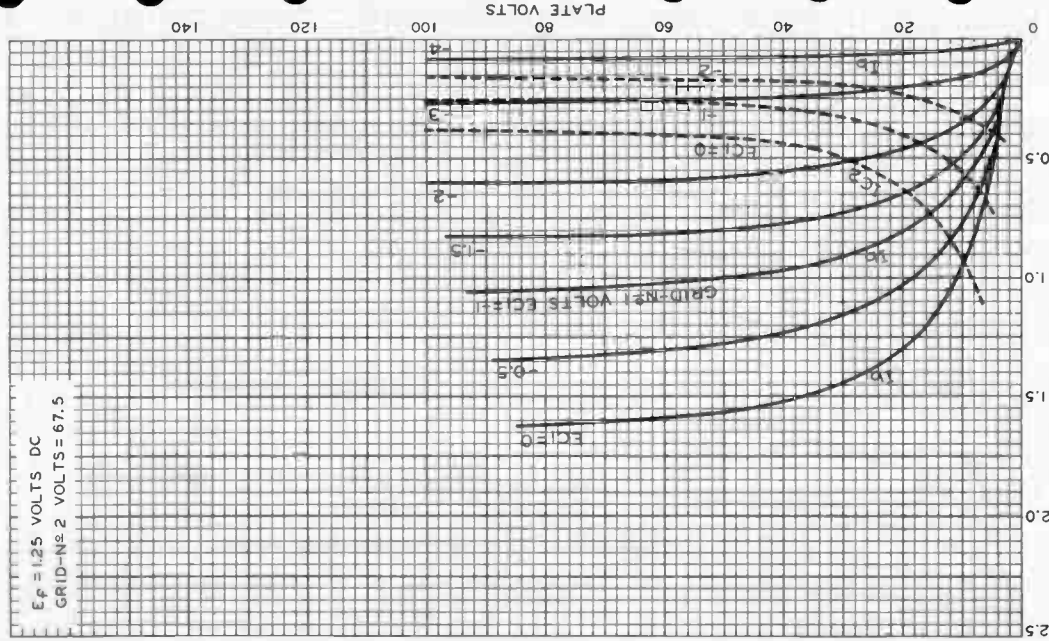
92CM-7257

1T6



1T6

## AVERAGE PLATE CHARACTERISTICS

 $E_f = 1.25$  VOLTS DCGRID-N<sub>2</sub> 2 VOLTS = 67.5

APRIL 20, 1949

PLATE (1b) OR GRID-N<sub>2</sub> 2 (1c2) MILLIAMPERES  
 TUBE DEPARTMENT  
 92CM-7256

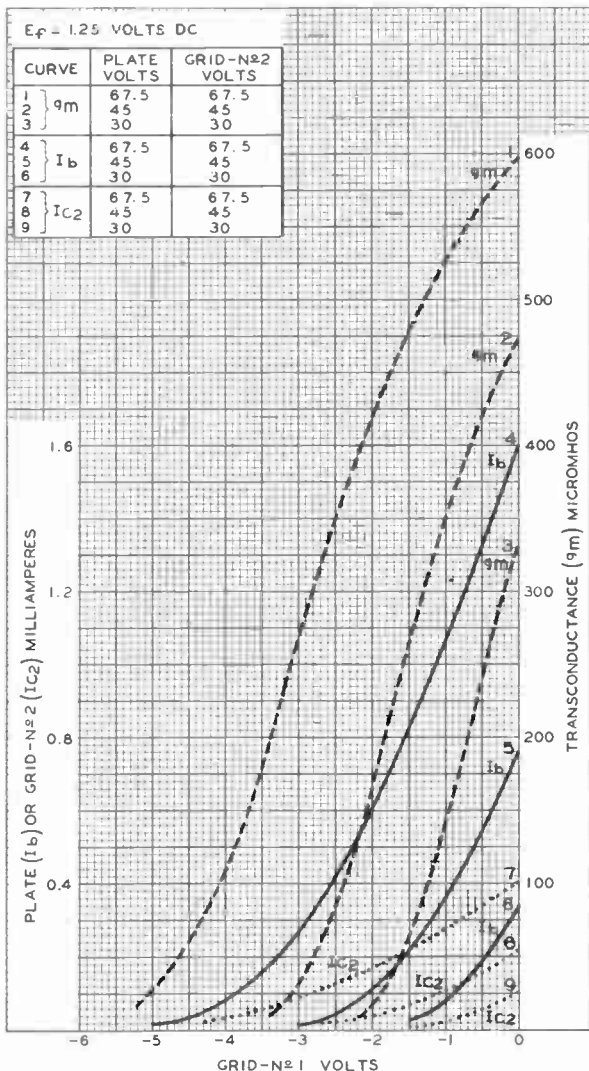
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



IT6

IT6

## AVERAGE CHARACTERISTICS



APRIL 25, 1949

TUBE DEPARTMENT

92CM-7259

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History







IU4

IU4

# SHARP-CUTOFF PENTODE

MINIATURE TYPE

## GENERAL DATA

### Electrical:

Filament, Coated:

Voltage . . . . .	1.4 . . . . .	dc volts
Current . . . . .	0.05 . . . . .	amp

Direct Interelectrode Capacitances:

Grid No.1 to plate <sup>o</sup> . . . . .	0.01 max.	$\mu\mu\text{f}$
Grid No.1 to filament (-) & grid No.3 & internal shield, and grid No.2 <sup>o</sup> . . . . .	3.6	$\mu\mu\text{f}$
Plate to filament (-) & grid No.3 & internal shield, and grid No.2 <sup>o</sup> . . . . .	7.5	$\mu\mu\text{f}$

### Characteristics, Class A<sub>1</sub> Amplifier:

Plate Voltage . . . . .	90	volts
Grid-No.2 Voltage . . . . .	90	volts
Grid-No.1 Voltage . . . . .	0	volts
Plate Resistance (Approx.) . . . . .	1	megohm
Transconductance . . . . .	900	$\mu\text{mhos}$
Plate Current . . . . .	1	ma
Grid-No.2 Current . . . . .	0.5	ma
Grid-No.1 Voltage (Approx.) for transconductance of 10 $\mu\text{mhos}$ . . . . .	-4	volts

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	2-1/8"
Maximum Seated Length . . . . .	1-7/8"
Length, Base Seat 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)

Basing Designation for BOTTOM VIEW . . . . . 6AR

Pin 1 - Filament (-), Grid No.3, Internal Shield		Pin 5 - Filament (-), Grid No.3, Internal Shield
Pin 2 - Plate		Pin 6 - Grid No.1
Pin 3 - Grid No.2		Pin 7 - Filament (+)
Pin 4 - No Connection		

### AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . .	110 max.	volts
GRID-No.2 (SCREEN) VOLTAGE . . . . .	110 max.	volts

<sup>o</sup> without external shield.

<sup>•</sup> with external shield JETEC No.316 connected to pin No.1 or pin No.5.

←Indicates a change.

IU4



IU4

# SHARP-CUTOFF PENTODE

GRID-No.1 (CONTROL-GRID) VOLTAGE:

Positive bias value . . . . . 0 max. volts

→ TOTAL CATHODE CURRENT . . . . . 6 max. ma

## Typical Operation as Resistance-Coupled Amplifier:

*See RESISTANCE-COUPLED AMPLIFIER CHART No. 3  
at front of this Section*

→ Indicates a change.

NOV. 5, 1954

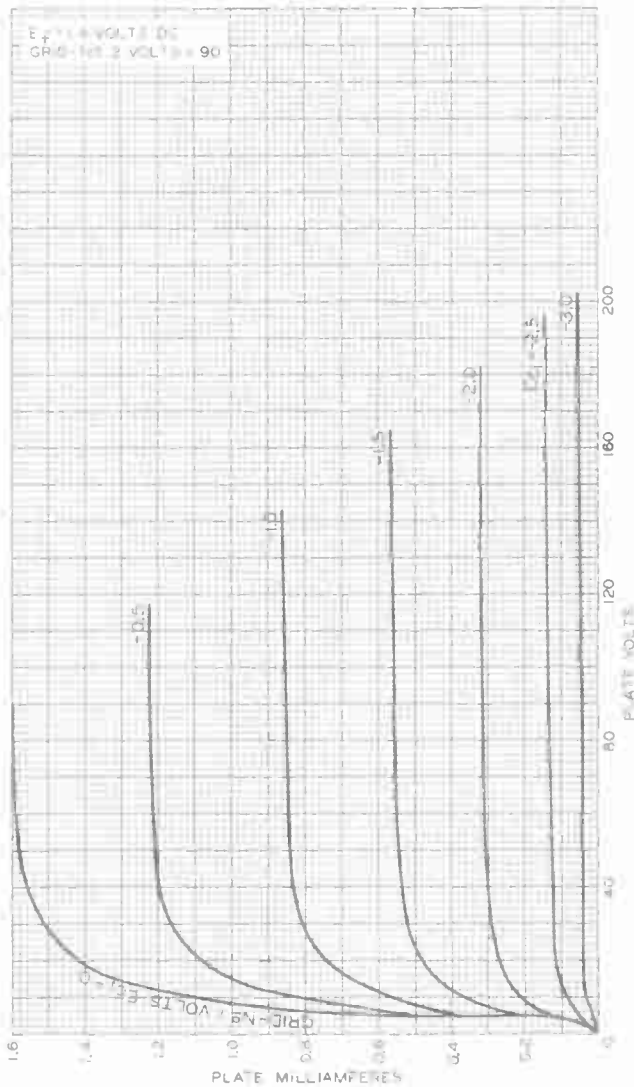
DATA



IU4

IU4

# AVERAGE PLATE CHARACTERISTICS



FEB. 6, 1942

TUBE DIVISION

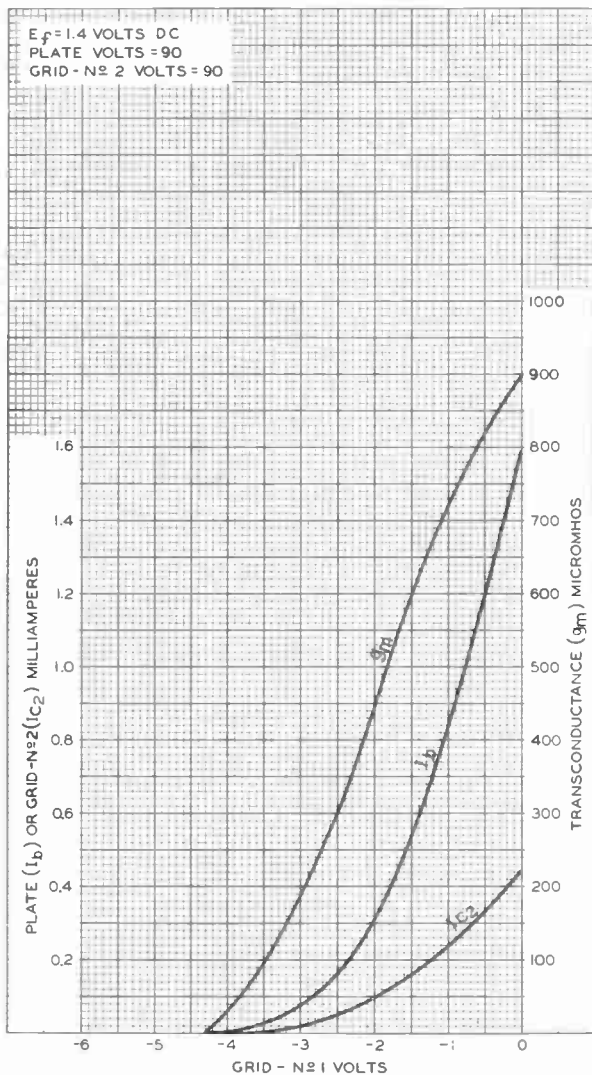
9269-286951

1U4



1U4

## AVERAGE CHARACTERISTICS



FEB. 6, 1946

 TUBE DIVISION  
 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6668R1

World Radio History



IU5

IU5

# DIODE-PENTODE

MINIATURE TYPE

## GENERAL DATA

### Electrical:

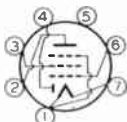
Filament, Coated:

Voltage. . . . .	1.4	dc volts
Current. . . . .	0.05	amp

### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	2-1/8"
Maximum Seated Length . . . . .	1-7/8"
Length, Base Seat to Bulb Top (excluding tip). . . . .	1-1/2" ± 3/32"
Maximum Diameter . . . . .	3/4"
Bulb . . . . .	T-5-1/2
Base . . . . .	Small-Button Miniature 7-Pin
Basing Designation for BOTTOM VIEW . . . . .	6BW

- Pin 1 - Filament (-),  
Pentode  
Grid No.3
- Pin 2 - Pentode  
Plate
- Pin 3 - Pentode  
Grid No.2



- Pin 4 - Diode Plate
- Pin 5 - No  
Connection
- Pin 6 - Pentode  
Grid No.1
- Pin 7 - Filament (+)

## PENTODE UNIT AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	90 max.	volts
GRID-No.2 (SCREEN) VOLTAGE . . . . .	90 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative bias value . . . . .	50 max.	volts
Positive bias value . . . . .	0 max.	volts
TOTAL MAX.-SIGNAL CATHODE CURRENT. . . . .	3 max.	ma.

### Characteristics:

Plate Voltage. . . . .	67.5	volts
Grid-No.2 Voltage . . . . .	67.5	volts
Grid-No.1 Voltage . . . . .	0	volts
Plate Resistance (Approx.) . . . . .	0.6	megohm
Transconductance . . . . .	625	μmhos
Plate Current. . . . .	1.6	ma.
Grid-No.2 Current. . . . .	0.4	ma.

### Typical Operation as Resistance-Coupled Amplifier:

See RESISTANCE-COUPLED AMPLIFIER CHART at front of this Section.

## DIODE UNIT

The diode is located at the negative end of the filament and is independent of the pentode unit except for the common filament.

Curve shown under Type 1S5 also applies to the IU5.

IU5

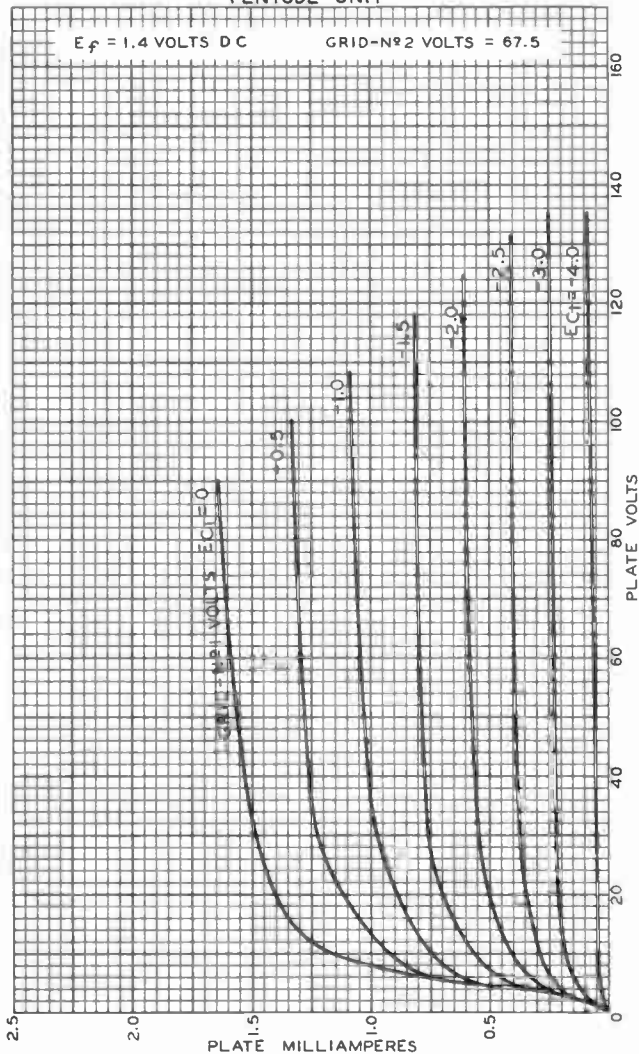


IU5

AVERAGE PLATE CHARACTERISTICS  
PENTODE UNIT

$E_f = 1.4$  VOLTS DC

GRID-Nº2 VOLTS = 67.5



JUNE 12, 1941

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6158RI



IU5

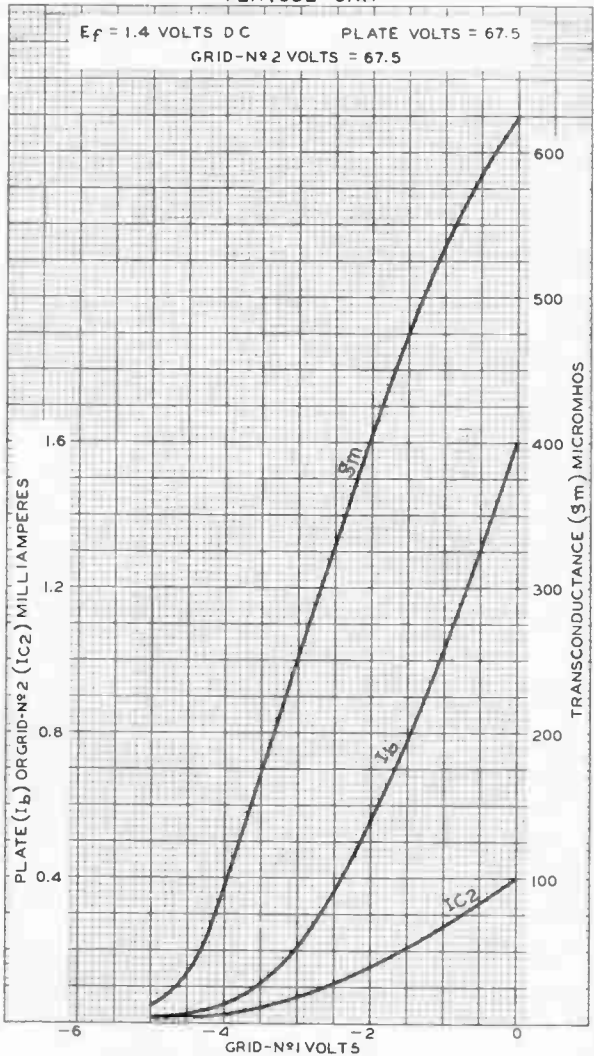
IU5

### AVERAGE CHARACTERISTICS PENTODE UNIT

$E_f = 1.4$  VOLTS DC

PLATE VOLTS = 67.5

GRID-Nº2 VOLTS = 67.5



JUNE 12, 1941

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6172R1

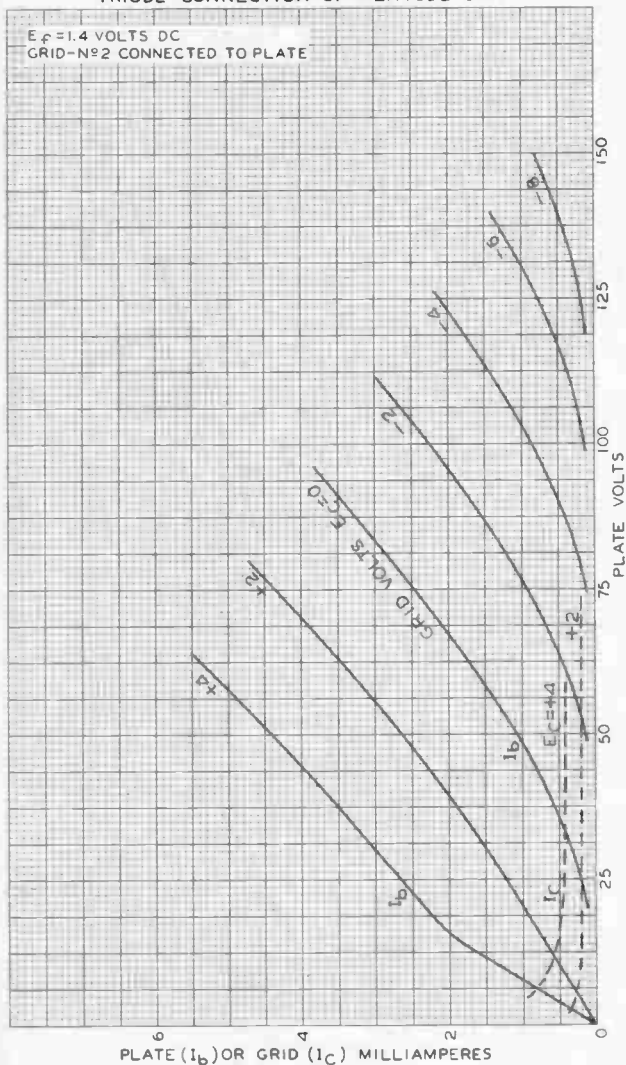
1U5



1U5

# AVERAGE PLATE CHARACTERISTICS

## TRIODE CONNECTION OF PENTODE UNIT



JAN. 2, 1942

 TUBE DEPARTMENT  
 RADIO CORPORATION OF AMERICA HASTON, NEW JERSEY

92CM - 6351R1





I-V



# HALF-WAVE HIGH-VACUUM RECTIFIER

The I-v supersedes the mercury-vapor type 1 and is interchangeable with it.

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.3	amp.
Maximum Overall Length		4-3/16"
Maximum Diameter		1-9/16"
Bulb		ST-12
Base		Small 4-Pin
Pin 1-Heater		Pin 3-Cathode
Pin 2-Plate		Pin 4-Heater
Mounting Position	BOTTOM VIEW (4G)	Any

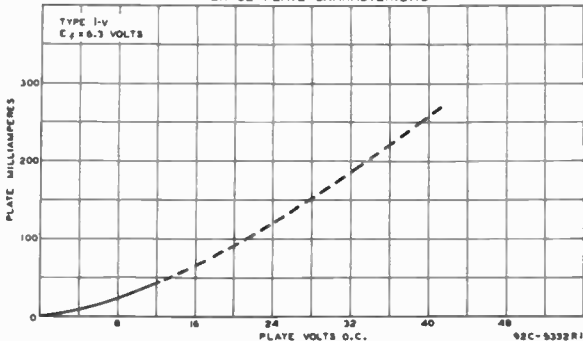


## HALF-WAVE RECTIFIER

Peak Inverse Voltage		1000 max. volts
Peak Plate Current		270 max. ma.
D-C Heater-Cathode Potential		500 max. volts
Typical Operation with Condenser-Input Filter:		
A-C Plate Voltage (RMS)	117	150
Total Effective Plate-Supply Impedance <sup>▲</sup>	0 min.	30 min.
D-C Output Current	45 max.	45 max.

■ Under no condition of operation should the normal operating heater voltage of 6.3 volts ever fluctuate to exceed a maximum of 7.5 volts.  
 ▲ When a filter-input condenser larger than 40  $\mu$ f is used, it may be necessary to use more plate-supply impedance than the minimum value shown to limit the peak plate current to the rated value.

AVERAGE PLATE CHARACTERISTIC



92C-5332R1

FEB. 2, 1940

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY INC.

DATA

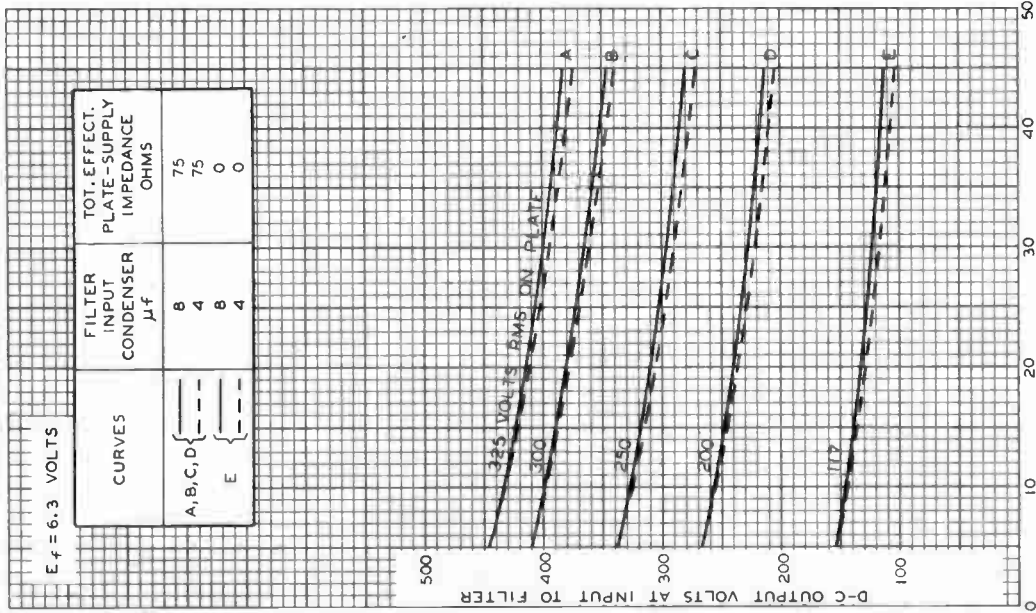


I-V

# OPERATION CHARACTERISTICS

$E_f = 6.3$  VOLTS

CURVES	FILTER INPUT CONDENSER $\mu f$	TOT. EFFECT. PLATE-SUPPLY IMPEDANCE OHMS
A, B, C, D {	8	75
{	4	75
E {	8	0
{	4	0





2A3

# 2A3 POWER TRIODE

## GENERAL DATA

### Electrical:

Filament, Coated:			
Voltage. . . . .	2.5	ac or dc volts	*
Current. . . . .	2.5	amp	
Direct Interelectrode Capacitances (Approx.):*			
Grid to Plate. . . . .	16.5	$\mu\text{f}$	
Grid to Cathode. . . . .	7.5	$\mu\text{f}$	
Plate to Cathode . . . . .	5.5	$\mu\text{f}$	

\* with no external shield.

### Mechanical:

Mounting Position. . . . .	Any	←
Maximum Overall Length . . . . .	5-3/8"	
Maximum Seated Length. . . . .	4-3/4"	
Maximum Diameter . . . . .	2-1/16"	
Bulb . . . . .	ST-16	
Base . . . . .	Medium-Shell Small 4-Pin	
Basing Designation for BOTTOM VIEW . . . . .	4D	

Pin 1 - Filament  
Pin 2 - Plate



Pin 3 - Grid  
Pin 4 - Filament

## AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	300 max.	volts
PLATE DISSIPATION. . . . .	15 max.	watts

### Typical Operation and Characteristics:

Plate Voltage. . . . .	250	volts
Grid Voltage* $\Delta$ . . . . .	-45	volts
Amplification Factor . . . . .	4.2	
Plate Resistance . . . . .	800	ohms
Transconductance . . . . .	5250	$\mu\text{mhos}$
Plate Current. . . . .	60	ma.
Load Resistance . . . . .	2500	ohms
Second Harmonic Distortion . . . . .	5	%
Power Output . . . . .	3.5	watts

### Maximum Circuit Values:<sup>□</sup>

Grid-Circuit Resistance. . . . .	{ fixed bias	0.05 max.	megohm
	{ cathode bias	0.5 max.	megohm

\*  $\Delta$ ,  $\square$ : See next page.  
Indicates a change.

2A3



## 2A3 POWER TRIODE

### PUSH-PULL AMPLIFIER - Class AB<sub>1</sub>

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

PLATE VOLTAGE. . . . .	300 max.	volts
PLATE DISSIPATION. . . . .	15 max.	watts

#### Typical Operation:

*Values are for 2 tubes*

	Fixed Bias	Cathode Bias	
Plate Voltage. . . . .	300	300 •	volts
Grid Voltage# . . . . .	-62	-	volts
Cathode-Bias Resistor. . . . .	-	780	ohms
→ Peak AF Grid-to-Grid Voltage . . . . .	124	156	volts
→ Zero-Signal Plate Current. . . . .	80	80	ma.
→ Max.-Signal Plate Current. . . . .	147	100	ma.
Effective Load Resistance (plate-to-plate) . . . . .	3000	5000	ohms
Total Harmonic Distortion. . . . .	2.5	5.0	%
Power Output . . . . .	15	10	watts

#### Maximum Circuit Values: □

Grid-Circuit Resistance. . . . .	{	fixed bias	0.05 max.	megohm
		cathode bias	0.5 max.	megohm

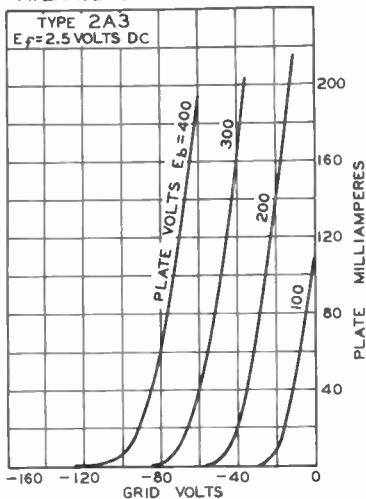
\* Grid voltage referred to mid-point of ac-operated filament.

▲ When a single 2A3 is operated cathode-biased, the cathode-biasing resistor value should be 750 ohms.

□ The type of coupling used should not introduce too much resistance in the grid circuit. Transformer or impedance-coupling devices are recommended.

• For zero-signal conditions.

### AVERAGE CHARACTERISTICS



→ Indicates a change.

OCTOBER 15, 1947

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

DATA

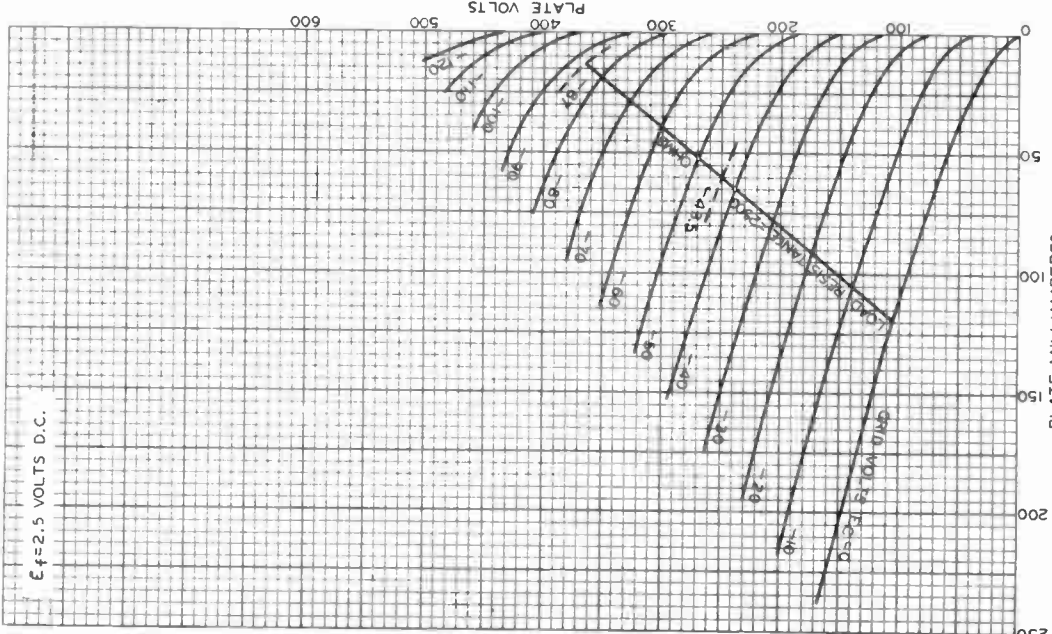


2A3

**Cunningham Radiotron**

RCA-2A3

### AVERAGE PLATE CHARACTERISTICS



MARCH 9, 1933

RCA RADIODIODE DIVISION  
RCA MANUFACTURING COMPANY, INC.

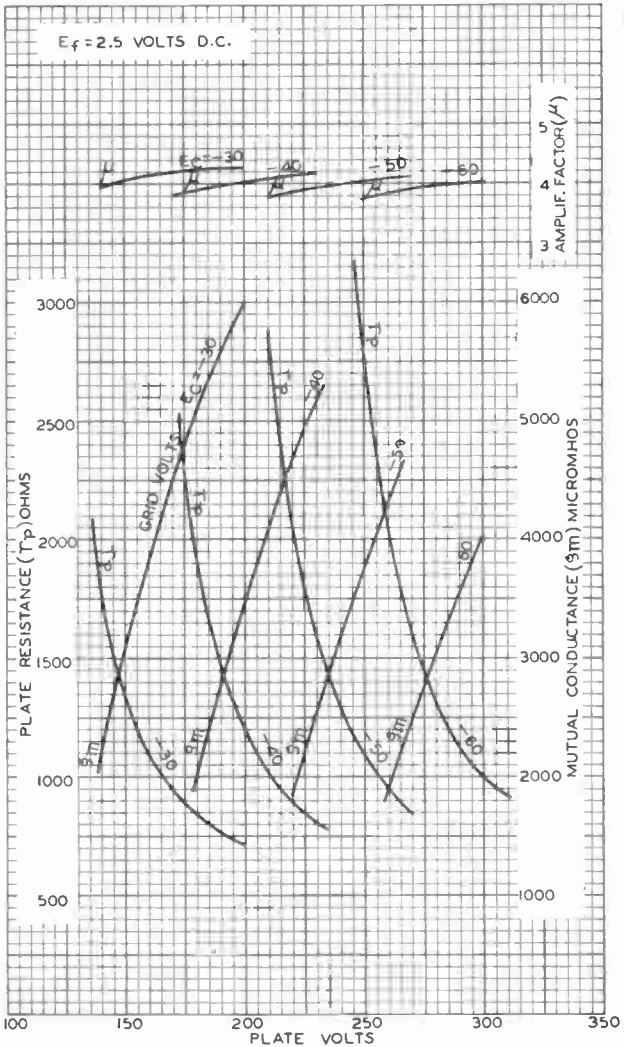
925-5233RI

2A3

# RCA Cunningham Radiotron RCA-2A3

## AVERAGE CHARACTERISTICS

$E_f = 2.5$  VOLTS D.C.



JUNE 12, 1933

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY INC.

925-5326R1



2A5



2A5

**POWER AMPLIFIER PENTODE**

Heater	Coated Inertial Cathode	
Voltage	2.5	a-c or d-c volts
Current	1.75	amp.
Maximum Overall Length		4-11/16"
Maximum Seated Height		4-1/16"
Maximum Diameter		1-13/16"
Bulb		ST-12
Base		Medium 9-Pin
Pin 1 - Heater		Pin 4 - Grid
Pin 2 - Plate		Pin 5 - Cathode
Pin 3 - Screen		Pin 8 - Heater
Mounting Position		Any



BOTTOM VIEW (6B)

*Maximum Ratings, Typical Operation, Characteristics and Curves are the same as for the 6PR.*

2A6



2A6

## DUPLEX-DIODE HIGH-MU TRIODE

Heater <sup>■</sup> Coated Unipotential Cathode  
 Voltage 2.5 a-c or d-c volts  
 Current 0.8 amp.

Direct Interelectrode Capacitances (Approx.):

*Triode Unit:*

Grid to Plate	1.7	$\mu\text{f}$
Grid to Cathode	1.7	$\mu\text{f}$
Plate to Cathode	3.8	$\mu\text{f}$

Overall Length 4-9/32" to 4-17/32"

Seated Height 3-21/32" to 3-29/32"

Maximum Diameter 1-9/16"

Bulb ST-12

Cap Small Metal

Base Small 6-Pin

Pin 1 - Heater

Pin 2 - Triode Plate

Pin 3 - Diode Plate #2

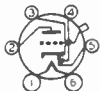
Pin 4 - Diode Plate #1

Pin 5 - Cathode

Pin 6 - Heater

Cap - Triode Grid

Mounting Position Any



BOTTOM VIEW (CS)

TRIODE UNIT

Plate Voltage 250 max. volts

*Characteristics and Curves are the same as for Type 6SQ7. Typical Operating Conditions are the same as for Type 75 in RESISTANCE-COUPLED AMPLIFIER CHART. The Curves under Type 75 also apply to the 2A6.*

<sup>■</sup> In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

← Indicates a change.

Sept. 2, 1941

RCA RADIOTRON DIVISION  
 RCA MANUFACTURING COMPANY INC

DATA

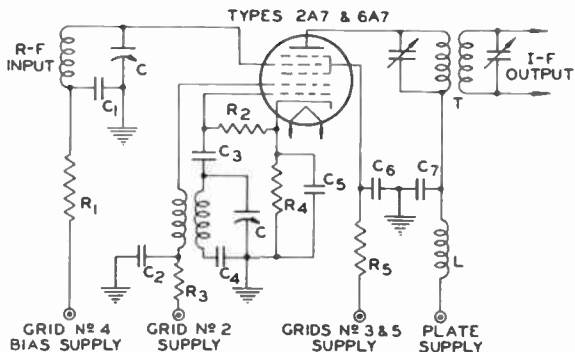


## PENTAGRID CONVERTER

Heater	Coated unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	0.8	amp.

For further data, see Type 6A7. The 6A7 and 2A7 are identical except for heater rating.

### TYPICAL PENTAGRID CONVERTER CIRCUIT



C = GANGED TUNING CONDENSER  
(40 TO 350  $\mu\mu\text{f}$ )

$C_1, C_2, C_5, C_6, C_7 = 0.1 \mu\text{f}$

$C_3 = 0.00025 \mu\text{f}$

$C_4 =$  SEE TABLE BELOW

$R_1 = 250\,000$  OHMS, 0.1 WATT

$R_2 = 10\,000 - 50\,000$  OHMS, 0.1 WATT

$R_3 =$  OSCILLATOR-ANODE (GRID No 2)  
VOLTAGE-DROPPING RESISTOR

$R_4 = 150 - 300$  OHMS, 0.1 WATT

$R_5 =$  SCREEN (GRIDS No 3 & 5) FILTER RESISTOR

L = 60-MILLIHENRY R-F CHOKE

T = 465-KC I-F TRANSFORMER

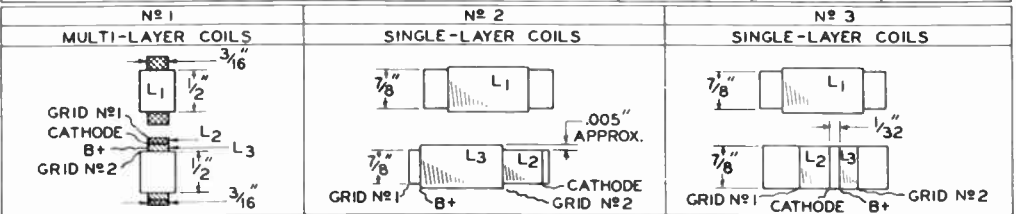
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TYPES 2A7 AND 6A7

TYPICAL PENTAGRID CONVERTER CIRCUIT  
COIL DESIGN DETAILS

(continued from preceding page)

FREQUENCY BAND MEGACYCLES	0.15 TO 0.40		0.55 TO 1.5				1.5 TO 4.0		4.0 TO 10		10 TO 25	
ASSEMBLY N <sup>o</sup>	1		1		2		2		3		3	
	TURNS	WIRE #	TURNS	WIRE #	TURNS	WIRE #	TURNS	WIRE #	TURNS	WIRE #	TURNS	WIRE #
R-F COIL (L <sub>1</sub> )	422	36 SSE	116	30 SSE	146	32 ENAM	36.2	30 ENAM	10.1	30 ENAM	4.4	20 ENAM
OSC. GRID COIL (L <sub>2</sub> )	198	36 SSE	80	30 SSE	92	32 ENAM	30.9	30 ENAM	9.7	30 ENAM	4.3	20 ENAM
OSC. PLATE COIL (L <sub>3</sub> )	60	36 SSE	30	30 SSE	20	32 ENAM	12	30 ENAM	12	36 ENAM	6	36 ENAM
OSC. TRACKING COND. (C <sub>4</sub> )	117 μμf		400 μμf				1070 μμf		2900 μμf		7300 μμf	





2EN5

# 2EN5 TWIN DIODE

7-PIN MINIATURE TYPE

*Intended for use in equipment having  
series heater-string arrangement*

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . .	2.1	volts
Current . . . . .	0.45 ± 6%	amp
Warm-up time (Average) . . . . .	11	sec

Direct Interelectrode Capacitances:

	Without External Shield	With External Shield <sup>0</sup>	
Plate to cathode, internal shield, and heater (Each unit) . . . . .	3.7	3.8	μμf
Plate to plate . . . . .	1.3 max.	3.8 max.	μμf

### Mechanical:

Operating Position . . . . .	Any
Maximum Overall Length . . . . .	2-1/8"
Maximum Seated Length . . . . .	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip) . . . . .	1-1/2" ± 3/32"
Diameter . . . . .	0.650" to 0.750"
Dimensional Outline . . . . .	See General Section
Bulb . . . . .	T5-1/2
Base . . . . .	Small-Button Miniature 7-Pin (JEDEC No. E7-1)
Basing Designation for BOTTOM VIEW . . . . .	7FL

- Pin 1 - No Connection
- Pin 2 - Diode-No. 2 Plate
- Pin 3 - Heater
- Pin 4 - Heater



- Pin 5 - Cathode
- Pin 6 - Internal Shield
- Pin 7 - Diode-No. 1 Plate

## HALF-WAVE RECTIFIER

### Maximum Ratings, Design-Maximum Values:

DC OUTPUT CURRENT PER PLATE . . . . .	5 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	200 max.	volts
Heater positive with respect to cathode . . . . .	200 max.	volts

### Characteristics:

*Values are for Each Unit*

Tube-Voltage Drop for plate ma. = 20 . . . . .	5	volts
---	---	-------

<sup>0</sup> with external shield JEDEC No. 316 connected to cathode.

<sup>▲</sup> The dc component must not exceed 100 volts.





3A2

3A2

# HALF-WAVE VACUUM RECTIFIER

9-PIN MINIATURE TYPE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . . 3.15 . . . . . ac volts

Current . . . . . 0.22 . . . . . amp

Direct Interelectrode Capacitance (Approx.):

Plate to heater, cathode, and  
internal shield . . . . . 1.0  $\mu\text{f}$

### Mechanical:

Mounting Position . . . . . Any

Maximum Overall Length . . . . . 2-13/16"

Seated Length . . . . . 2-7/16"  $\pm$  1/8"

Maximum Diameter . . . . . 7/8"

Bulb . . . . . T-6-1/2

Cap . . . . . Skirted Miniature (JETEC No. C1-33)

Base . . . . . Small-Button Noval 9-Pin (JETEC No. E9-1)

Basing Designation for BOTTOM VIEW . . . . . 9DT

Pin 1 - Heater,  
Cathode,  
Int. Shield

Pin 2 - Heater

Pin 3 - No  
Connection-  
Do Not Use

Pin 4 - Heater,  
Cathode,  
Int. Shield

Pin 5 - Heater



Pin 6 - Heater,  
Cathode,  
Int. Shield

Pin 7 - No  
Connection-  
Do Not Use

Pin 8 - Heater

Pin 9 - Heater,  
Cathode,  
Int. Shield

## PULSED-RECTIFIER SERVICE

Maximum Ratings, Design-Center Values:

*For operation in a 525-line, 30-frame system\*\**

PEAK INVERSE PLATE VOLTAGE . . . . . 18000 max. volts

PEAK PLATE CURRENT . . . . . 80 max. ma

AVERAGE PLATE CURRENT . . . . . 1.5 max. ma

with no external shield.

As described in "Standards of Good Engineering Practice Concerning Television Stations", Federal Communications Commission.

## OPERATING NOTES

*Measurement of Heater Voltage.* To measure the heater voltage when the heater is at a high dc potential with respect to ground, it is recommended that a voltmeter of the thermocouple type calibrated in rms volts be used. The meter and its leads must be insulated to withstand the dc output voltage. In some circuit designs, particularly in voltage-multiplier circuits where the heater

MAY 3, 1954

TUBE DIVISION

TENTATIVE DATA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

3A2

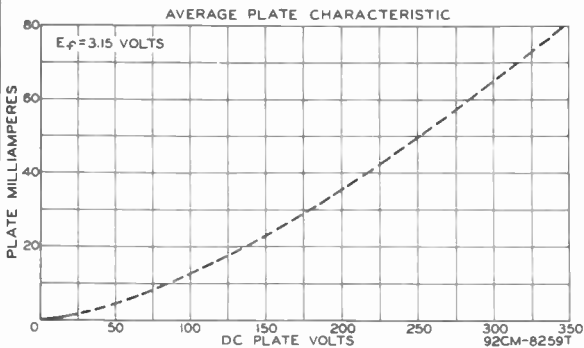


3A2

## HALF-WAVE VACUUM RECTIFIER

of a rectifier tube may be at a high ac potential with respect to ground, measurement of the heater voltage of this tube with a thermocouple meter is not practical because the capacitances of the meter and the meter leads will load the circuit and affect circuit operation. Therefore, a simple method utilizing visual comparison of heater temperatures can be used for adjustment of heater power. The color temperature of the heater operating from a pulse-operated power source may be checked visually by observing in a darkened room the reflection of the incandescent heater upon the surface of the internal shield. A visual comparison of this color temperature with that obtained when the heater of another 3A2 is operated from a dc or low-frequency ac supply of 3.15 volts, provides a convenient means for adjusting the heater voltage to the proper rms value.

The voltages employed in some television receivers and other high-voltage equipment are sufficiently high that high-voltage rectifier tubes may produce x-rays which can constitute a health hazard unless such tubes are adequately shielded. Relatively simple shielding should prove adequate, but the need for this precaution should be considered in equipment design.



MAY 3, 1954

TUBE DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA



3B2

3B2

# HALF-WAVE VACUUM RECTIFIER

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . . 3.15 . . . . . dc volts

Current . . . . . 0.22 . . . . . amp

Direct Inter-electrode Capacitance (Approx.):<sup>o</sup>

Plate to cathode & internal shield & heater . . . . . 1.8  $\mu$ mf

### Mechanical:

Mounting Position . . . . . Any

Maximum Overall Length . . . . . 5-7/32"

Seated Length . . . . . 4-1/2" ± 3/16"

Maximum Diameter . . . . . 1-23/32"

Bulb . . . . . T-12

Cap . . . . . Small (JETEC No. C1-1)

Base . . . . . Short Jumbo-Shell Octal 8-Pin with External Barrier (JETEC No. B8-71)

Basing Designation for BOTTOM VIEW . . . . . 8GH

Pin 1 - Internal Connection- Do Not Use

Pin 2 - Heater

Pin 3 - Same as Pin 1

Pin 4 - No Connection

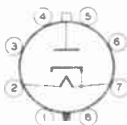
Pin 5 - Same as Pin 1

Pin 6 - Same as Pin 1

Pin 7 - Heater, Cathode, internal field

Pin 8 - Same as Pin 1

Cap - Plate



## PULSED-RECTIFIER SERVICE

Maximum Ratings, Design-Center Values except as Noted:

For operation in a 525-line, 3-frame system<sup>1)</sup>

### INVERSE PLATE VOLTAGE:

Total dc and peak (Absolute maximum) . . . . . 27000<sup>■</sup> max. volts

UC . . . . . 25000 max. volts

PEAK PLATE CURRENT . . . . . 80 max. ma

AVERAGE PLATE CURRENT . . . . . 1.1 max. ma

<sup>o</sup> without external field.

<sup>◆</sup> See Operating Considerations.

<sup>□</sup> As described in "Standards for 525-Line, 3-Frame System, Part 1: Concerning Television Broadcast Station", Federal Communication Commission.

<sup>■</sup> Under no circumstances should this absolute value be exceeded.

## OPERATING CONSIDERATIONS

Socket Connections. Low potential circuits should not be connected to any of the socket terminals. Any or all of the following socket terminal connections are permissible

## HALF-WAVE VACUUM RECTIFIER

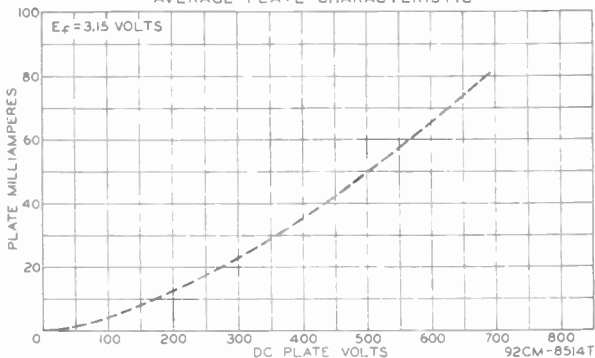
and may aid in corona reduction.

1. Pins 1, 2, and 3 may be connected together.
2. Pins 4, 6, and 8 may be connected together.
3. Pin 4 may be connected to either pin 1 or pin 2, or may be used as a tie point for a heater-voltage dropping resistor. Do not use pin 4 as a low-potential tie point.

**Measurement of heater voltage.** To measure the heater voltage when the heater is at a high potential with respect to ground, it is recommended that a simple method utilizing visual comparison of the cathode and heater temperatures be used. The color temperature of the cathode and heater, with the heater operating from a pulse-power source, may be checked visually by comparison in a darkened room this color temperature with that obtained when the heater of another 3B2 is operated from a dc or low-frequency ac supply of 5.1 volts.

**X-rays.** The voltages employed in some television receivers and other high voltage equipment are sufficiently high that high-voltage rectifier tubes may produce X-rays which can constitute a health hazard unless cathodes are adequately shielded. Relatively simple shielding could prove adequate, but the need for this precaution should be considered in equipment design.

AVERAGE PLATE CHARACTERISTIC







3LF4

BEAM POWER AMPLIFIER

3LF4

GENERAL DATA

Electrical:

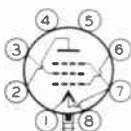
Filament, Coated:

Filament Arrangement	Series <sup>1</sup>	Parallel <sup>**</sup>	
Voltage. . . . .	2.8	1.4	.. dc volts
Current. . . . .	0.05	0.1	.. . . . amp

Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	2-25/32"
Maximum Seated Length . . . . .	2-1/4"
Maximum Diameter . . . . .	1-3/16"
Bulb . . . . .	T-9
Base . . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	6E5

Pin 1 - Filament	Pin 6 - Grid No. 1
Pin 2 - Plate	Pin 7 - Filament
Pin 3 - Grid No. 2	Mid-Tap,
Pin 4 - No	Grid No. 3
Connection	Pin 8 - Filament
Pin 5 - No	Plug - Base
Connection	Shell



AF POWER AMPLIFIER - Class A<sub>1</sub>

Maximum Ratings, Design-Center Values:

Filament Arrangement	Series <sup>*</sup>	Parallel <sup>**</sup>	
PLATE VOLTAGE. . . . .	110 max.	110 max.	volts
GRID-No.2 (SCREEN) VCLTAGE . . . . .	110 max.	110 max.	volts
TOTAL CATHODE CURRENT. . . . .	6 max.	12 max.	ma

Typical Operating Conditions and Characteristics are the same as those for Type 3Q5-GT.

Curves shown under Type 1Q5-GT also apply to the 3LF4 with filaments connected in parallel.

\* A resistor of 270 ohms must be used in parallel with the negative section of the filament (Pins 7 and 8) in order to insure that the value of 6.0 Ma. total cathode current for each 1.4-volt section of the filament is not exceeded. When other tubes in series filament circuits contribute to the filament current of the 3LF4, an additional shunt resistor between pins 1 and 8 will be required.

\*\* For parallel operation, connect pins 1 and 8 to the positive of the voltage supply and pin 7 to the negative.





3Q4

3Q4



## POWER AMPLIFIER PENTODE

A1, 1A1, 1F, 1P.

Filament	Coated		
	Series*	Parallel*	
Filament Arrangement			
Voltage	2.4	1.4	d-c volts
Current	0.07	0.1	amp.
Maximum Overall Length			2-1/8"
Maximum Seated Height			1-7/8"
Maximum Diameter			3/4"
Subst.			T-5-1/2
Base <sup>▲</sup>			Miniature Button 7-Pin
Pin 1 - Fil. (-series)			Pin 5 - Filament Mid-Tap
Pin 2 - Plate			(-parallel)
Pin 3 - Grid			Pin 6 - Plate
Pin 4 - Screen			Pin 7 - Filament+
Mounting Position			Any



BOTTOM VIEW (7-A)

## AMPLIFIER

Filament Arrangement	Series*		Parallel*		
Plate Voltage	90 max.	90 max.	90 max.	90 max.	volts
Screen Voltage	90 max.	90 max.	90 max.	90 max.	volts
Total Cathode Current	17 max.	12 max.	12 max.	12 max.	ma.
<b>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</b>					
Plate Voltage	90	85	90	90	volts
Screen Voltage	90	95	90	90	volts
Grid Voltage	-4.5	-5	-4.5	-4.5	volts
Peak A-F Grid Volt.	4.5	5	4.5	4.5	volts
Zero-Sig. Plate Cur.	7.7	6.9	9.5	9.5	ma.
Zero-Sig. Screen Cur.	1.7	1.5	2.1	2.1	ma.
Plate Res. (approx.)	0.12	0.12	0.1	0.1	megohm
Transconductance	2000	1975	2150	2150	μmhos
Load Resistance	10000	10000	10000	10000	ohms
Total Harmonic Dist.	7	10	7	7	%
Max.-Sig. Power Output	0.24	0.25	0.27	0.27	watt

\* For series filament arrangement, filament voltage is applied between pins No.1 and No.7. The grid voltage is referred to pin No.1.

For parallel filament arrangement, filament voltage is applied between pin No.5 and pins No.1 and No.7 connected together. The grid voltage is referred to pin No.5.

# For each 1.4-volt filament section. For series operation of the sections, a shunting resistor must be connected across the section between pins No.1 and No.5 to by-pass any cathode current in this section which is in excess of the rated maximum per section. When other tubes in a series-filament arrangement contribute to the filament current of the 3Q4, an additional shunting resistor may be required between pins No.1 and No.7.

▲ The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.

May 1, 1941

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY INC.

TENTATIVE DATA

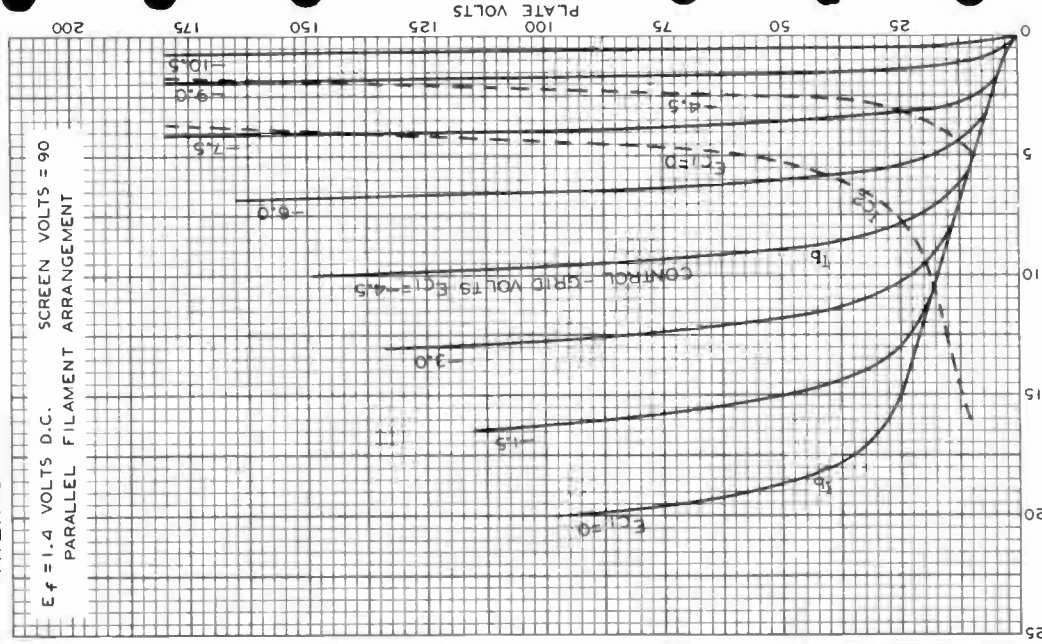


3Q4

3Q4

# AVERAGE PLATE CHARACTERISTICS

$E_f = 1.4$  VOLTS D.C. SCREEN VOLTS = 90  
PARALLEL FILAMENT ARRANGEMENT



APR. 22, 1941

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

PLATE ( $I_b$ ) OR SCREEN ( $I_{c2}$ ) MILLIAMPERES

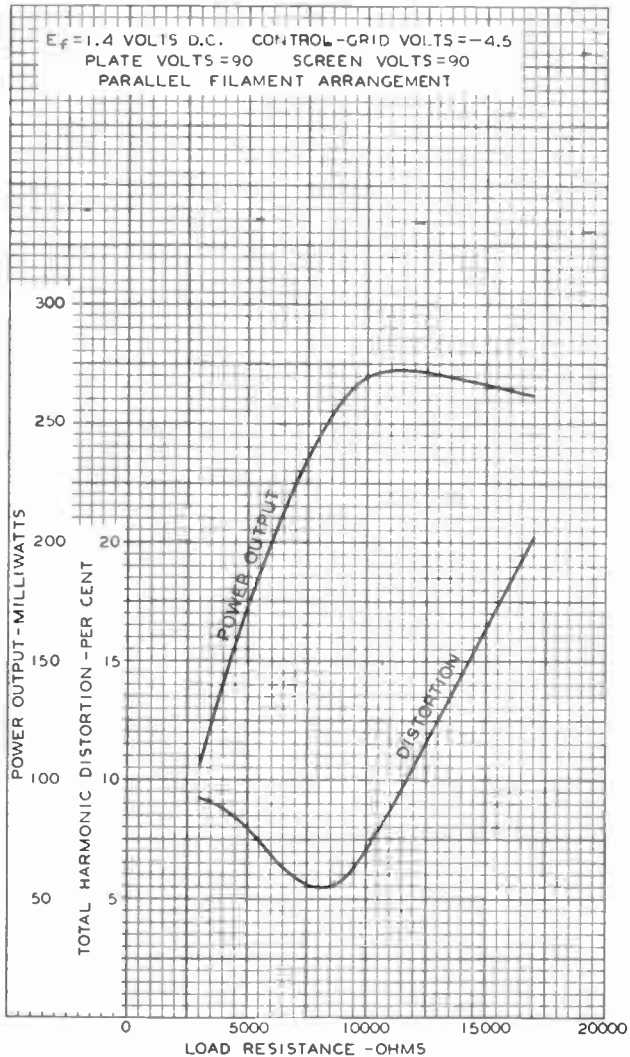
92C-6255 R 1



3Q4

3Q4

### OPERATION CHARACTERISTICS



MAY 7, 1941

TUBE DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C-6281

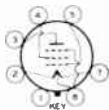
3Q5-GT/G



3Q5-GT/G

## BEAM POWER AMPLIFIER

Filament	Coated		
Filament Arrangement	Series*	Parallel**	
Voltage	2.8	1.4	d-c volts
Current	0.05	0.1	amp.
Direct Interelectrode Capacitances (Approx.): <sup>o</sup>			
Grid to Plate	0.6		μuf
Input	8.0		μuf
Output	6.5		μuf
Maximum Overall Leng			3-5/16"
Maximum Seated Height			2-3/8"
Maximum Diameter			1-5/16"
Bulb			T-9
Base			Intermediate Shell Octal 7-Pin
Pin 1 - No Connection			Pin 5 - Grid
Pin 2 - Filament			Pin 7 - Fil. (-, series)
Pin 3 - Plate			Pin 8 - Fil. (-, parallel)
Pin 4 - Screen			
Mounting Position			Any



BOTTOM VIEW (G-7AP)

Maximum Ratings Are Design-Center Values

## AMPLIFIER

Filament Arrangement	Series*	Parallel**	
Plate Voltage	110 max.	110 max.	volts
Screen Voltage	110 max.	110 max.	volts
Total Zero-Sig. Cath. Cur. 6#max.		12 max.	ma.

Typical Operation and Characteristics—Class A<sub>1</sub> Amplifier:

Plate	90	110	85	90	110	volts
Screen	90	110	85	90	110	volts
Grid <sup>▲</sup>	-4.5	-6.6	-5	-4.5	-6.6	volts
Peak A-F Grid Voltage	4.5	5.1	5	4.5	5.4	volts
Plate Cur.	8.0	8.5	7.0	9.5	10	ma.
Screen Cur. (approx.)	1.0	1.1	0.8	1.3	1.4	ma.
Plate Res. (approx.)	80000	110000	70000	90000	100000	ohms
Transcond.	2000	2000	1950	2200	2200	μmhos
Load Res.	8000	8000	9000	8000	8000	ohms
Tot. Harm. Dist.	8.5	8.5	5.5	6.0	6.0	%
Max. -Sig. Power Output	230	330	250	270	400	mw

\* Filament voltage applied across the two sections in series between pins No.2 and No.7. Grid voltage is referred to pin No.7.

\*\* Filament voltage applied across the two sections in parallel between pin No.8 and pins No.2 and No.7 connected together. Grid voltage is referred to pin No.8.

▲ For each 1.4-volt filament section. For series operation of the sections, a shunting resistor must be connected across the section between pins No.7 and No.8 to by-pass any cathode current in excess of the rated maximum per section. When other tubes in series-filament arrangement contribute to the filament current of the 3Q5-GT/G, an additional shunting resistor may be required between pins No.2 and No.7.

▲ The grid circuit resistance should not exceed 1.0 megohm for either cathode bias or fixed bias operation.

● with a peak a-f grid voltage equal to the grid bias, the power output for the 110-volt condition is: 500 mw at 10% total harmonic distortion for parallel filament operation; and 400 mw at 10% total harmonic distortion for series filament operation.

○ with no external shield.

Curves shown under Type 1Q5-GT/G also apply to the 3Q5-GT/G with the filaments connected in parallel.

← Indicates a change.

May 1, 1942

RCA RADITRON DIVISION  
RCA MANUFACTURING COMPANY INC

World Radio History

DATA



354

354

## POWER PENTODE

MINIATURE TYPE

## GENERAL DATA

## Electrical:

Filament, Coated:

Filament arrangement	Series*	Parallel**	
Voltage . . . . .	2.8	1.4	volts
Current . . . . .	0.05	0.1	amp

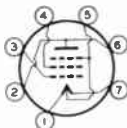
Direct Interelectrode Capacitances:<sup>0</sup>

Grid No.1 to plate . . . . .	0.3		$\mu\mu\text{f}$
Grid No.1 to filament (mid-tap) & grid No.3, and grid No.2. . . . .	4.8		$\mu\mu\text{f}$
Plate to filament (mid-tap) & grid No.3, and grid No.2. . . . .	4		$\mu\mu\text{f}$

## Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	2-1/8"
Maximum Seated Length . . . . .	1-7/8"
Length, Base Seat 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)
Basing Designation for BOTTOM VIEW . . . . .	7BA

Pin 1 - Filament  
(-series)  
Pin 2 - Plate  
Pin 3 - Grid No.1  
Pin 4 - Grid No.2



Pin 5 - Filament  
Mid-Tap  
(-parallel),  
Grid No.3  
Pin 6 - Plate  
Pin 7 - Filament (+)

AMPLIFIER - Class A<sub>1</sub>

## Maximum Ratings, Design-Center Values:

	Series*	Parallel**	
PLATE VOLTAGE . . . . .	90 max.	90 max.	volts
GRID-No.2 (SCREEN) VOLTAGE . . . . .	67.5 max.	67.5 max.	volts
TOTAL MAXIMUM-SIGNAL CATHODE CURRENT . . . . .	6# max.	12 max.	ma
TOTAL ZERO-SIGNAL CATHODE CURRENT . . . . .	4.5# max.	9 max.	ma

## Typical Operation and Characteristics:

	Series*		Parallel**		
Plate Voltage . . . . .	67.5	90	67.5	90	volts
Grid-No.2 Voltage . . . . .	67.5	67.5	67.5	67.5	volts

<sup>0</sup> Without external shield.

# For each 1.4-volt filament section. For series operation of the sections, a shunting resistor must be connected across the section between pins No.1 and No.5 to bypass any cathode current in excess of the rated maximum per section. When other tubes in series filament arrangement contribute to the filament current of the 354, an additional shunting resistor may be required between pins No.1 and No.7.

\*, \*\*: See next page.

← indicates a change.

JAN. 3, 1955

TUBE DIVISION

DATA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

354



354

## POWER PENTODE

	Series*		Parallel**		
Grid-No.1 (Control-Grid)					
Voltage . . . . .	-7	-7	-7	-7	volts
Peak AF Grid-No.1					
Voltage . . . . .	7	7	7	7	volts
Zero-Sig. Plate Current . .	6	6.1	7.2	7.4	ma
Zero-Sig. Grid-No.2 Current .	1.2	1.1	1.5	1.4	ma
Plate Resistance (Approx.) .	0.1	0.1	0.1	0.1	megohm
Transconductance . . . . .	1400	1425	1550	1575	$\mu$ hos
Load Resistance . . . . .	5000	8000	5000	8000	ohms
Total Harmonic Distortion .	12	13	10	12	%
Max.-Sig. Power Output . . .	160	235	180	270	mW

→ **Maximum Circuit Values (For maximum rated conditions):**

Grid-No.1-Circuit Resistance:

For fixed-bias operation . . . . .	2.2 max.	megohms
For cathode-bias operation . . . . .	2.2 max.	megohms

→ **Typical Operation with Single Filament Section:\***

Filament Voltage . . . . .	1.4	volts
Filament Current . . . . .	0.05	amp
Plate Voltage . . . . .	90	volts
Grid-No.2 Voltage . . . . .	67.5	volts
Grid-No.1 Voltage . . . . .	-7	volts
Peak AF Grid-No.1 Voltage . . . . .	7	volts
Zero-Signal Plate Current . . . . .	3.7	ma
Zero-Signal Grid-No.2 Current . . . . .	0.7	ma
Plate Resistance (Approx.) . . . . .	0.2	megohm
Transconductance . . . . .	800	$\mu$ hos
Load Resistance . . . . .	16000	ohms
Total Harmonic Distortion . . . . .	12	%
Maximum-Signal Power Output . . . . .	145	mW

→ **Maximum Circuit Values (For maximum rated conditions):**

Grid-No.1-Circuit Resistance:

For fixed-bias operation . . . . .	2.2 max.	megohms
For cathode-bias operation . . . . .	2.2 max.	megohms

\* Filament voltage applied across the two sections in series between pins No.1 and No.7. Grid-No.1 voltage is referred to pin No.1.

\*\* Filament voltage applied across the two sections in parallel between pin No.5 and pins No.1 and No.7 connected together. Grid-No.1 voltage is referred to pin No.5.

• Either filament section may be operated singly with the other section floating. It is to be noted, however, that such operation may impair the emission capabilities of the unused section. Although in subsequent operation the unused section may be operated in series with the used section, it should not be operated singly.

*Curves shown under Type 1S4 also apply to the 3S4 with the filaments connected in parallel*

→ Indicates a change.

JAN. 3, 1955

TUBE DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

DATA





3V4

# 3V4 POWER PENTODE

MINIATURE TYPE

## GENERAL DATA

### Electrical:

Filament, Coated:

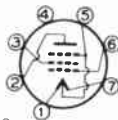
Filament arrangement	Series*	Parallel**	
Voltage . . . . .	2.8	1.4	volts
Current . . . . .	0.05	0.1	amp

Direct Interelectrode Capacitances (Approx.) <sup>0</sup>		
Grid No.1 to plate . . . . .	0.20	μf
Grid No.1 to filament (mid-tap) & grid No.3, and grid No.2 . . . . .	5.5	μf
Plate to filament (mid-tap) & grid No.3, and grid No.2 . . . . .	3.8	μf

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	2-1/8"
Maximum Seated Length . . . . .	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip). . . . .	1-1/2" ± 3/32"
Maximum Diameter . . . . .	3/4"
Bulb . . . . .	T-5-1/2
Base . . . . .	Small-Button Miniature 7-Pin (JETEC No.E7-1)
Basing Designation for BOTTOM VIEW . . . . .	6BX

Pin 1 - Filament (-series)	Pin 5 - Filament Mid-Tap (-parallel),
Pin 2 - Plate	Grid No.3
Pin 3 - Grid No.2	Pin 6 - Grid No.1
Pin 4 - No Connection-Do Not Use	Pin 7 - Filament (+)



## AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

	Series*	Parallel**	
PLATE VOLTAGE . . . . .	90 max.	90 max.	volts
GRID-NO.2 (SCREEN) VOLTAGE . . . . .	90 max.	90 max.	volts
TOTAL MAXIMUM-SIGNAL CATHODE CURRENT . . . . .	6*max.	12 max.	ma
TOTAL ZERO-SIGNAL CATHODE CURRENT . . . . .	6*max.	12 max.	ma

### Typical Operation and Characteristics:

	Series*	Parallel**	
Plate Voltage . . . . .	90	85 90	volts
Grid-No.2 Voltage . . . . .	90	85 90	volts

<sup>0</sup> Without external shield.

\* For each 1.4-volt filament section. For series operation of the sections, a shunting resistor must be connected across the section between pins No.1 and No.5 to bypass any cathode current in excess of the rated maximum per section. When other tubes in series filament arrangement contribute to the filament current of the 3V4, an additional shunting resistor may be required between pins No.1 and No.7.

\*, \*\*: See next page.

→ Indicates a change.

3V4



3V4

## POWER PENTODE

	Series*	Parallel**		
Grid-No.1 (Control-Grid)				
Voltage . . . . .	-4.5	-5	-4.5	volts
Peak AF Grid-No.1				
Voltage . . . . .	4.5	5	4.5	volts
Zero-Sig. Plate Current . . . . .	7.7	6.9	9.5	ma
Zero-Sig. Grid-No.2 Current . . . . .	1.7	1.5	2.1	ma
Plate Resistance (Approx.) . . . . .	0.12	0.12	0.1	megohm
Transconductance . . . . .	2000	1975	2150	μmhos
Load Resistance . . . . .	10000	10000	10000	ohms
Total Harmonic Distortion . . . . .	7	10	7	%
Max.-Signal Power Output . . . . .	240	250	270	mw

→ **Maximum Circuit Values (For maximum rated conditions):**

Grid-No.1-Circuit Resistance:

For fixed-bias operation . . . . .	2.2 max.	megohms
For cathode-bias operation . . . . .	2.2 max.	megohms

→ **Typical Operation with Single Filament Section:\***

Filament Voltage . . . . .	1.4	volts
Filament Current . . . . .	0.05	amp
Plate Voltage . . . . .	90	volts
Grid-No.2 Voltage . . . . .	90	volts
Grid-No.1 Voltage . . . . .	-4.5	volts
Peak AF Grid-No.1 Voltage . . . . .	4.5	volts
Zero-Signal Plate Current . . . . .	4.8	ma
Zero-Signal Grid-No.2 Current . . . . .	1.1	ma
Plate Resistance (Approx.) . . . . .	0.2	megohm
Transconductance . . . . .	1100	μmhos
Load Resistance . . . . .	20000	ohms
Total Harmonic Distortion . . . . .	7	%
Maximum-Signal Power Output . . . . .	135	mw

→ **Maximum Circuit Values (For maximum rated conditions):**

Grid-No.1-Circuit Resistance:

For fixed-bias operation . . . . .	2.2 max.	megohms
For cathode-bias operation . . . . .	2.2 max.	megohms

\* Filament voltage applied across the two sections in series between pins No.1 and No.7. Grid-No.1 voltage is referred to pin No.1.

\*\* Filament voltage applied across the two sections in parallel between pin No.5 and pins No.1 and No.7 connected together. Grid-No.1 voltage is referred to pin No.5.

• Either filament section may be operated singly with the other section floating. It is to be noted, however, that such operation may impair the emission capabilities of the unused section. Although in subsequent operation the unused section may be operated in series with the used section, it should not be operated singly.

Curves shown under Type 3Q4 also apply to the 3V4

→ Indicates a change.



5AZ4

5AZ4

# FULL-WAVE VACUUM RECTIFIER

## GENERAL DATA

### Electrical:

Filament, Coated:

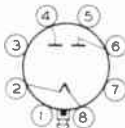
Voltage. . . . . 5 . . . . . ac or dc volts  
 Current. . . . . 2 . . . . . amp

### Mechanical:

Mounting Position. . . . . Vertical, or Horizontal with pins  
 2 and 8 in horizontal plane  
 Maximum Overall Length . . . . . 3-5/32"  
 Maximum Seated Length. . . . . 2-5/8"  
 Maximum Diameter . . . . . 1-3/16"  
 Bulb . . . . . T-9  
 Base . . . . . Lock-in 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 5T

Pin 1 - No  
 Connection  
 Pin 2 - Filament  
 Pin 3 - No  
 Connection  
 Pin 4 - Plate



Pin 5 - No  
 Connection  
 Pin 6 - Plate  
 Pin 7 - No  
 Connection  
 Pin 8 - Filament  
 Plug - Base Shell

## FULL-WAVE RECTIFIER

### Maximum Ratings, Design-Center Values:

PEAK INVERSE PLATE VOLTAGE . . . . . 1400 max. volts  
 PEAK PLATE CURRENT . . . . . 375 max. ma  
 DC OUTPUT CURRENT. . . . . 125 max. ma

### Typical Operation:

	Capacitor- Input to Filter	Choke- Input to Filter	
AC Plate-to-Plate Supply			
Voltage (RMS) . . . . .	700	1000	volts
Filter Input Capacitor . . . . .	4	-	μf
Min. Total Effective Plate-Supply Impedance per Plate* . . . . .	50	-	ohms
Min. Filter Input Choke . . . . .	-	5	henries
DC Output Current. . . . .	125	125	ma

\* when the input capacitor of the filter exceeds 40 μf, it may be necessary to increase the plate-supply impedance in order to limit the peak current to the rated value.






5T4



5T4

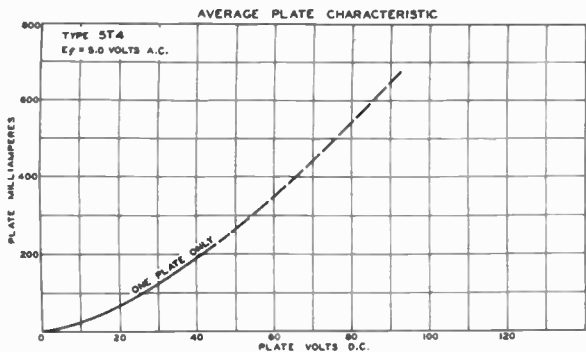
# FULL-WAVE HIGH-VACUUM RECTIFIER

Filament	Coated	
Voltage	5.0	a-c volts
Current	2.0	amp.
Maximum Overall Length		4-5/16"
Maximum Diameter		1-5/8"
Bulb		Metal Shell, MT-10
Base		Small Wafer Octal 5-Pin
Pin 1 - Shell		Pin 6 - Plate #1
Pin 2 - Filament		Pin 8 - Filament
Pin 4 - Plate #2		
Mounting Position	BOTTOM VIEW (5T)	Vertical <sup>◊</sup>

## FULL-WAVE RECTIFIER

Peak Inverse Voltage	1550 max. volts
Peak Plate Current per Plate	675 max. ma.
<i>Typical Operation with Condenser-Input Filter:</i>	
A-C Plate Voltage per Plate (RMS)	450 max. volts
Total Effective Plate-Supply Impedance per Plate <sup>▲</sup>	150 min. ohms
D-C Output Current	225 max. ma.
<i>Typical Operation with Choke-Input filter:</i>	
A-C Plate Voltage per Plate (RMS)	550 max. volts
Input-Choke Inductance	3 min. henries
D-C Output Current	225 max. ma.

◊ Horizontal operation permitted if pins 2 and 4 are in vertical plane.  
 ▲ When a filter-input condenser larger than 40  $\mu$ f is used, it may be necessary to use more plate-supply impedance than the minimum value shown to limit the peak plate current to the rated value.

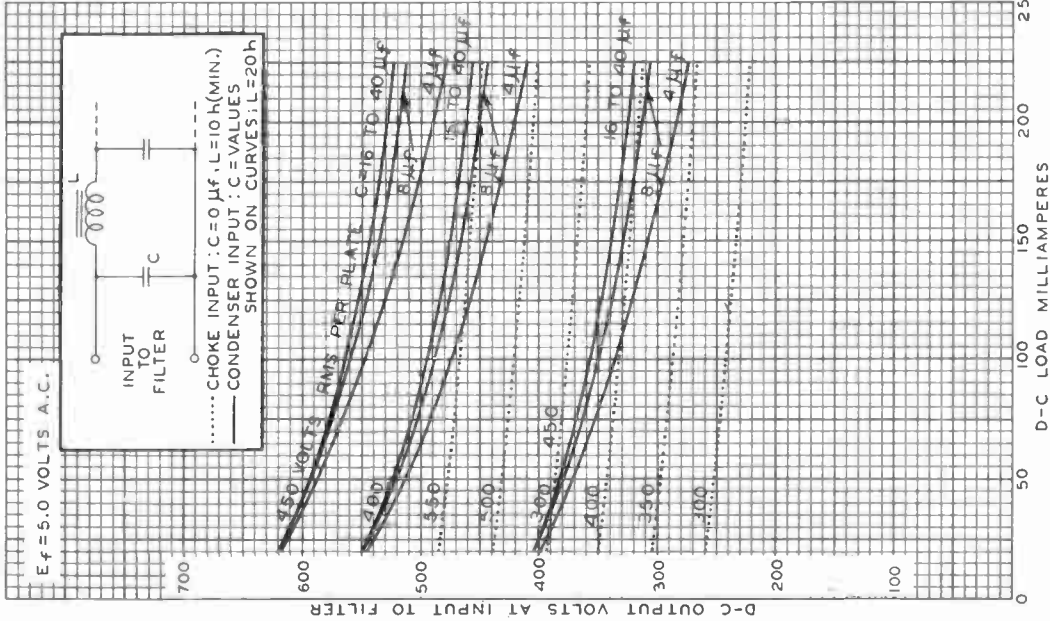


FEB. 2, 1940

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY INC

DATA

## OPERATION CHARACTERISTICS

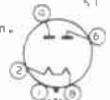


5W4  
5W4-GT/G

## 5W4, 5W4-GT/G

## FULL-WAVE HIGH-VACUUM RECTIFIER

	Coated		a-c volts amp.
	5W4	5W4-GT/G	
Filament voltage	5.0		
Filament current	1.5		
Maximum Overall Length	3-1/4"	3-3/8"	
Maximum Seated Height	2-11/16"	2-13/16"	
Maximum Diameter	1-5/16"	1-5/16"	
Bulb	Metal Shell, MT-8	T-9	
Base	{ Small wafer Octal 5-Pin	{ Intermed. Sh. Octal 5-Pin	
Basing Designation	5T	G-5T	
Pin 1 { 5W4, Shell		Pin 4 - Plate #2	
Pin 2 { 5W4-GT/G, No Con.		Pin 6 - Plate #1	
Pin 2 - Filament		Pin 8 - Filament	
Mounting Position		vertical	



BOTTOM VIEW

Maximum Ratings Are Design-Center Values

## FULL-WAVE RECTIFIER

Peak Inverse Plate Voltage	1400 max. volts
Peak Plate Current per Plate	300 max. ma.
D-C Output Current:	
With condenser input to filter	100 max. ma.
With choke input to filter	100* max. ma.

## Typical Operation:

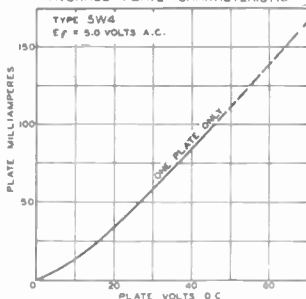
	Condenser- Input Filter	Choke- Input Filter	
A-C Plate-to-Plate Supply Voltage (RMS)	700	1000	volts
Filter Input Condenser	4	-	μf
Min. Total Effect. Plate-Supply Imped. per Plate	50	-	ohms
Filter Input Choke	-	6	henries
D-C Output Current	100	100	ma.
D-C Voltage (At input to filter):*			
At half-load current (50 ma.)	410	420	volts
At full-load current (100 ma.)	360	405	volts
Difference (Voltage Regulation)	50	15	volts
Percentage Regulation	12	3.5	%

◇ Horizontal operation of the 5W4 permitted if pins 2 and 8 are in a vertical plane. Horizontal operation of the 5W4-GT/G permitted if pins 2 and 8 are in a horizontal plane.

• For choke not less than 6 henries.

\* Approximate values.

## AVERAGE PLATE CHARACTERISTIC



◀ Indicates a change.

92C-6008R1

Mar. 20, 1943

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

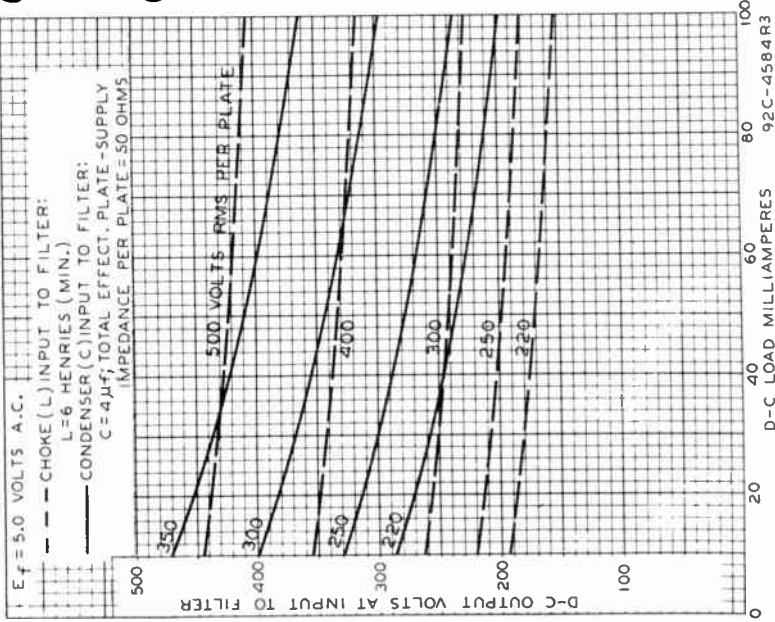
DATA

5X4-G



5W4

## OPERATION CHARACTERISTICS

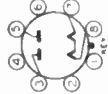


5X4-G

## FULL-WAVE HIGH-VACUUM RECTIFIER

Filament Voltage  
Coated 5.0  
3.0  
Maximum Overall Length  
Maximum Seated Height  
Maximum Diameter  
Bulb Base

Pin 1 - No Connection  
Pin 2 - No Connection  
Pin 3 - Plate #2  
Pin 4 - No Connection  
Mounting Position



BOTTOM VIEW (G-50)

a-c volts  
amp.  
5-5/16"  
3-3/8"  
2-1/16"  
ST-16  
8-Pin

Medium Shell Octal  
Pin 5 - Plate #1  
Pin 6 - No Connection  
Pin 7 - Filament  
Pin 8 - Filament  
Vertical  $\diamond$

$\diamond$  Horizontal operation permitted if pins 2 and 7 are in horizontal plane.  
Maximum Ratings, Operating Conditions, and Curves  
for the 5X4-G are the same as those for Type 5U4-G.

Mar. 20, 1943

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

DATA



RCA-6A6

## CLASS B TWIN AMPLIFIER

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.8	amp.
Maximum Overall Length		4-11/16"
Maximum Diameter		1-13/16"
Bulb		ST-14
Base		Medium 7-Pin
Pin 1-Heater	(3)	Pin 5-Grid (Triode $T_1$ )
Pin 2-Plate (Triode $T_2$ )	(2)	Pin 6-Plate (Triode $T_1$ )
Pin 3-Grid (Triode $T_2$ )	(1)	Pin 7-Heater
Pin 4-Cathode	(4) (5) (6) (7)	

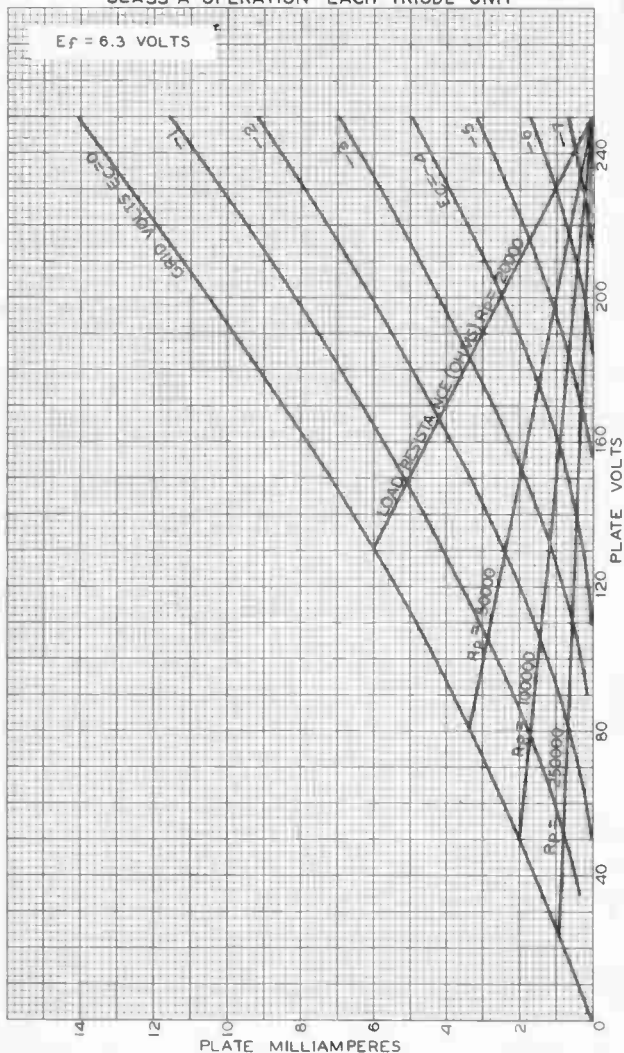
BOTTOM VIEW

For convenience, one triode unit is identified as  $T_1$ ; the other as  $T_2$ .  
 For additional curves and data, see Types 6N7 and 53, and the **RESISTANCE-COUPLED AMPLIFIER CHART**. The operating conditions and characteristics of the 6A6 are identical with those of the 6N7 and 53.

← indicates a change

6A6

**AVERAGE PLATE CHARACTERISTICS**  
CLASS A OPERATION - EACH TRIODE UNIT





6A7

6A7



## PENTAGRID CONVERTER

Heater <sup>■</sup>	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.3	amp.
Direct Interelectrode Capacitances:		
Grid #4 to Plate	0.3 <sup>o</sup>	$\mu\mu\text{f}$
Grid #4 to Grid #2	0.15 <sup>o</sup>	$\mu\mu\text{f}$
Grid #4 to Grid #1	0.15 <sup>o</sup>	$\mu\mu\text{f}$
Grid #1 to Grid #2	1.0	$\mu\mu\text{f}$
Grid #4 to All Other Electrodes (R-F Input)	8.5	$\mu\mu\text{f}$
Grid #2 to All Other Electrodes (Osc. Output)	5.5	$\mu\mu\text{f}$
Grid #1 to All Other Electrodes (Osc. Input)	7.0	$\mu\mu\text{f}$
Plate to All Other Electrodes (Mixer Output)	9.0	$\mu\mu\text{f}$
Overall Length	4-9/32" to 4-17/32"	
Seated Height	3-21/32" to 3-29/32" ←	
Maximum Diameter	1-9/16"	
Bulb	ST-12	
Cap	Small Metal	
Base	Small 7-Pin <sup>▲</sup>	
Pin 1 - Heater		Pin 5 - Grid #1
Pin 2 - Plate		Pin 6 - Cathode
Pin 3 - Grids #3 & #5		Pin 7 - Heater
Pin 4 - Grid #2		Cap - Grid #4
Mounting Position		Any

BOTTOM VIEW (7C)

Maximum Ratings, Typical Operating Conditions, and Curves are the same as for type 6A8.

- In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.
- o With shield-can connected to cathode.
- ▲ Requires different socket than medium 7-pin base.

← Indicates a change.

July 1, 1941

RCA RADIONRON DIVISION  
RCA MANUFACTURING COMPANY INC  
World Radio History

DATA





6A7S

6A7S  
6A8-G  
6A8-GT**PENTAGRID CONVERTER**

RENEWAL TYPE FOR MAJESTIC RECEIVERS

Heater <sup>■</sup>	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.3	amp.
Overall Length	4-9/32" to 4-17/32"	
Seated Height	3-21/32" to 3-29/32"	
Maximum Diameter (without shield)	1-9/16"	
Bulb (with form-fitting shield)	ST-12	
Cap	Small Metal	
Base <sup>▲</sup>	Small 7-Pin	

<sup>■</sup> In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

<sup>▲</sup> Requires a different socket than the medium 7-pin base.

<sup>\*</sup> Basing arrangement is the same as for the 6A7, except that the external shield on the 6A7S is connected to cathode.

Typical Operating Conditions and Curves for the 6A7S are the same as for Type 6A6.



6A8, 6A8-G, 6A8-GT

**PENTAGRID CONVERTER**

Heater <sup>■</sup>	Coated Unipotential Cathode		
Voltage	6.3	a-c or d-c volts	
Current	0.3	amp.	
Direct Interelectrode Cap. <sup>○</sup>	6A8	6A8-G	6A8-GT
Grid #4 to Plate	0.06	0.26	0.26 $\mu\mu\text{f}$
Grid #4 to Grid #2	0.1	0.19	0.19 $\mu\mu\text{f}$
Grid #4 to Grid #1	0.09	0.16	0.16 $\mu\mu\text{f}$
Grid #1 to Grid #2	0.8	1.1	1.1 $\mu\mu\text{f}$
Grid #4 to All Other Electrodes (R-F Input)	12	9.5	9.5 $\mu\mu\text{f}$
Grid #2 to All Other Electrodes Except Grid #1 (Osc. Output)	5	4.6	4.6 $\mu\mu\text{f}$
Grid #1 to All Other Electrodes Except Grid #2 (Osc. Input)	6.5	6	6 $\mu\mu\text{f}$
Plate to All Other Electrodes (Mixer Output)	12	12	12 $\mu\mu\text{f}$
Overall Length	{ 3-1/8" max.	{ 4-7/32" to 4-15/32"	{ 3-5/16" max.
Seated Height	{ 2-9/16" max.	{ 3-21/32" to 3-29/32"	{ 2-3/4" max.
Maximum Diameter	1-5/16"	1-9/16"	1-5/16"
Bulb	Metal Shell, MT-R	ST-12	T-9
Cap	Miniature	Skirted Min.	{ Skirted Min. Style C

<sup>■</sup> In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

<sup>○</sup> With shell of 6A8 connected to cathode, and with close-fitting shield on 6A8-G and 6A8-GT connected to cathode.

→ Indicates a change.

Dec. 1, 1941

RCA RADIONRON DIVISION

RCA MANUFACTURING COMPANY INC

World Radio History

DATA

6A8  
6A8-G  
6A8-GT



## 6A8, 6A8-G, 6A8-GT

### PENTAGRID CONVERTER

(continued from preceding page)

	6A8	6A8-G	6A8-GT
Base	{ Small Wafer Octal 8-Pin	{ Small Shell Octal 8-Pin	{ Small wafer Octal 8-Pin, Sleeve
Basing Designation	8A	G-8A	GT-8A
Pin 1			Pin 5 - Grid #1
Pin 2			Pin 6 - Grid #2
Pin 3			Pin 7 - Heater
Pin 4			Pin 8 - Cathode
Pin 5			Cap - Grid #4
Mounting Position	BOTTOM VIEW		Any

#### CONVERTER SERVICE

Plate Voltage			300 max. volts
Screen (Grids #3 & #5) Voltage			100 max. volts
Screen Supply Voltage			300 max. volts
Anode-Grid (Grid #2) Voltage			200 max. volts
Anode-Grid Supply Voltage			300 max. volts
Control-Grid (Grid #4) Voltage			0 min. volts
Plate Dissipation			1.0 max. watt
Screen Dissipation			0.3 max. watt
Anode-Grid Dissipation			0.75 max. watt
Total Cathode Current			14 max. ma.
Typical Operation:			
Plate Voltage	100	250	volts
Screen Voltage	50	100	volts
Anode-Grid Voltage	100	-	volts
Anode-Grid Supply Voltage	-	250*	volts
Control-Grid Voltage	-1.5	-3	volts
Osc.-Grid (Grid #1) Resistor	50000	50000	ohms
Plate Resistance	0.6	0.36	approx. ohms
Conversion Transconductance	360	550	μmhos
Conver. Transcond. (approx.) with Control-Grid Bias of -20 volts	3	-	μmhos
Conver. Transcond. (approx.) with Control-Grid Bias of -35 volts	-	6	μmhos
Plate Current	1.1	3.5	ma.
Screen Current	1.3	2.7	ma.
Anode-Grid Current	2	4	ma.
Oscillator-Grid Current	0.25	0.4	ma.
Total Cathode Current	4.6	10.6	ma.

NOTE: The transconductance of the oscillator portion (not oscillating) is 1150 micromhos under the following conditions: plate volts, 250; screen volts, 55; control-grid volts, -2; anode-grid volts, 100; and oscillator-grid volts, -1.

\* Anode-grid supply voltages in excess of 200 volts require use of 20000-ohm voltage-dropping resistor by-passed by 0.1 μf condenser.

*For Typical Circuit and Coil Design Details, refer to Type 2A7.*

← Indicates a change.

Dec. 1, 1941

RCA RADITRON DIVISION  
RCA MANUFACTURING COMPANY INC  
World Radio History

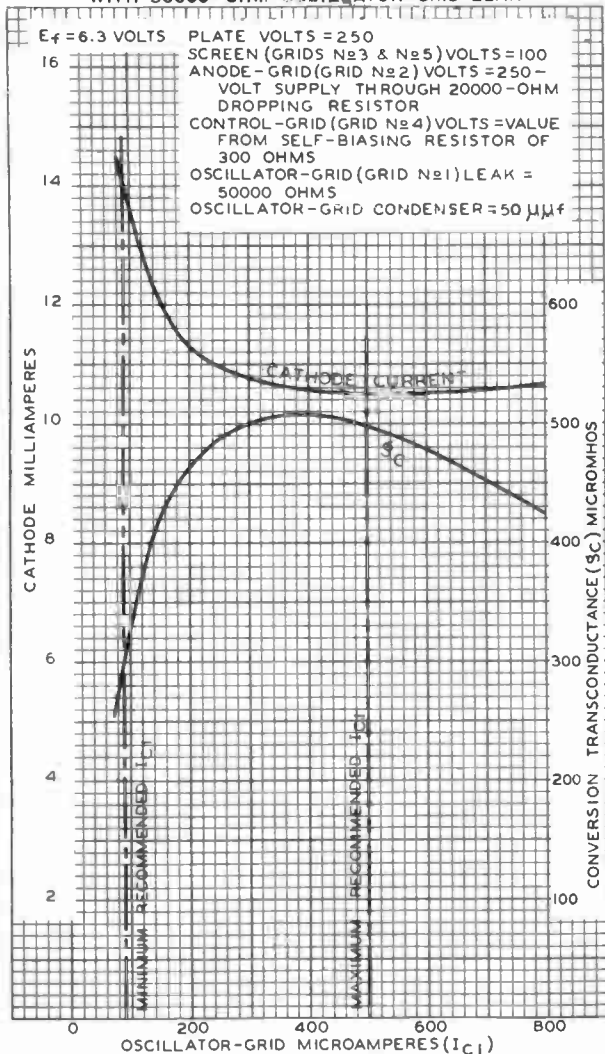
DATA



6A8

6A8

### OPERATION CHARACTERISTICS WITH 50000 OHM OSCILLATOR-GRID LEAK



}







6AB5



6AB5/6N5

## ELECTRON-RAY TUBE

INDICATOR TYPE WITH TRIODE UNIT

Heater <sup>■</sup>	Coated Unipotential Cathode	
Voltage	5.3	d-c or d-c volts
Current	0.15	amp.
Overall Length	3-13/16" to 4-3/16"	
Maximum Seated Height	3-9/16" ←	
Maximum Diameter	1-3/16" ←	
Bulb	T-9 ←	
Base	Small 6-Pin	
Pin 1 - Heater		Pin 4 - Target
Pin 2 - Plate		Pin 5 - Cathode
Pin 3 - Grid		Pin 6 - Heater
Mounting Position		BOTTOM VIEW (6R)

## MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Plate-Supply Voltage	120 max. volts		
Target Voltage	{ 120 max. volts 100 min. volts		
Typical Operation:			
Plate and Target Supply	135	135	volts
Series Triode-Plate Resistor <sup>□</sup>	0.25	1.0	megohm
Target Current † <sup>Δ</sup>	2	1.9	ma.
Triode-Plate Current <sup>Δ</sup>	0.5	0.13	ma.
Triode-Grid voltage (approx.)			
For shadow angle of 0°	-10	-15.5	volts ←
For shadow angle of 90°	0	0	volts

- In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.
- Designated as R in circuit diagram under Type 6E5.
- † Subject to wide variations.
- Δ For triode-grid bias of 0 volts.
- ← Indicates a change.

April 15, 1940

RCA RADIODRON DIVISION  
RCA MANUFACTURING COMPANY INC.

DATA

6AB5

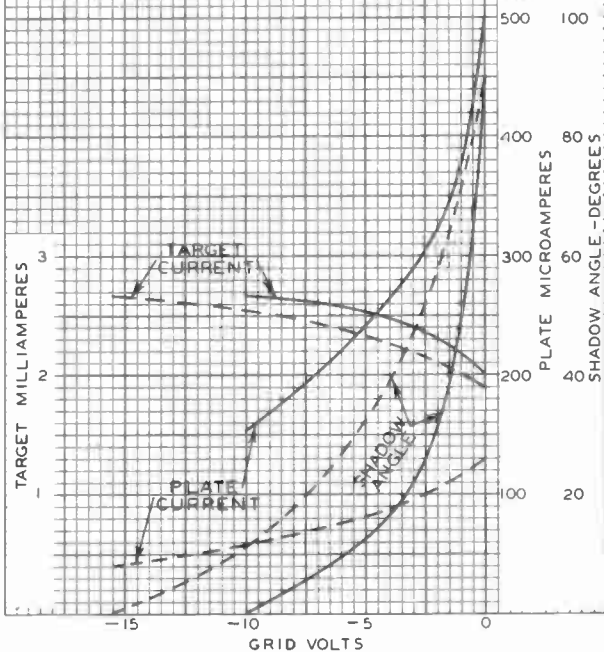
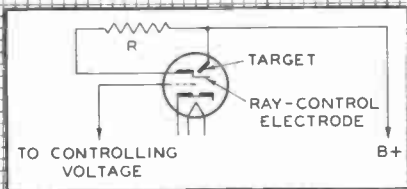


6AB5

## AVERAGE CONTROL CHARACTERISTICS

 $E_f = 6.3$  VOLTS

CURVE	PLATE-SUPPLY VOLTS (B+)	SERIES PLATE RESISTOR (R) -MEG.
—	135	0.25
- - -	135	1.0



MAY 7, 1940

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY INC

92C-4890RI

World Radio History



6AB7/1853

6AB7



## TELEVISION AMPLIFIER PENTODE

SINGLE-ENDED METAL TYPE

Heater $\star$	Coated Unipotential Cathode	
Voltage	6.3	e-c or d-c. volts
Current	0.45	amp.
Direct Interelectrode Capacitance: <sup>o</sup>		
Grid to Plate	0.015 max.	$\mu$ f
Input	8	$\mu$ f
Output	5	$\mu$ f
Maximum Overall Length		2-5/8"
Maximum Seated Height		2-1/16"
Maximum Diameter		1-5/16"
Bulb		Metal Shell, MT-8
Base		Small Wafer Octal 8-Pin
Pin 1 - Shell		Pin 5 - Cathode
Pin 2 - Heater		Pin 6 - Screen
Pin 3 - Suppressor		Pin 7 - Heater
Pin 4 - Grid		Pin 8 - Plate
Mounting Position	BOTTOM VIEW (BN)	Any



## AMPLIFIER

Plate Voltage	300 max.	volts
Screen Voltage	200 max.	volts
Screen-Supply Voltage	300 max.	volts
Plate Dissipation <sup>o</sup>	3.75 max.	watts
Screen Dissipation	0.65 max.	watt

Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:Condition I<sup>o</sup> Condition II<sup>oo</sup>

	Condition I <sup>o</sup>	Condition II <sup>oo</sup>	
Heater $\star$	6.3	6.3	volts
Plate	300	300	volts
Suppressor <sup>o</sup>	0	0	volts
Screen-Supply #	200	300	volts
Series Screen Resistor	-	30000	ohms
Grid ## <sup>•</sup>	-3	-3	min. volts
Plate Res.	0.7	0.7	approx. megohm
Transcond.	5000	5000	$\mu$ hos
Grid Bias for transcond. = 50 $\mu$ hos	-15	-22.5	volts
Plate Cur.	12.5	12.5	ma.
Screen Cur.	3.2	3.2	ma.

<sup>o</sup> With shell connected to cathode.<sup>•</sup> Condition I is with fixed screen supply.<sup>oo</sup> Condition II is with series screen resistor.<sup>#</sup> Screen-supply voltages in excess of 200 volts require the use of a series-dropping resistor to limit the voltage at the screen to 200 volts when the plate current is at its normal value of 12.5 milli-ampere.<sup>•</sup> May be obtained with cathode-bias resistor having a minimum value of 190 ohms.<sup>##</sup> The d-c resistance in the grid circuit should not exceed 0.25 megohm with fixed bias, or 0.5 megohm with full cathode bias and a series screen resistor.<sup>o</sup> Precautions should be taken to insure that dissipation rating is not exceeded with expected line-voltage fluctuations, especially in the case of fixed-bias operation.<sup>□</sup> The suppressor should be connected in r-f and i-f stages directly to ground to minimize feedback.<sup>\*</sup> The potential difference between heater and cathode should be kept as low as possible.**Note:** It is characteristic of a high gm tube to show appreciable changes of input capacitance and input conductance with plate current. In high-frequency circuits, it is necessary to take precautions to minimize this effect.

← Indicates a change.

Dec. 1, 1941

RCA RADIODRON DIVISION

RCA MANUFACTURING COMPANY INC

World Radio History

DATA

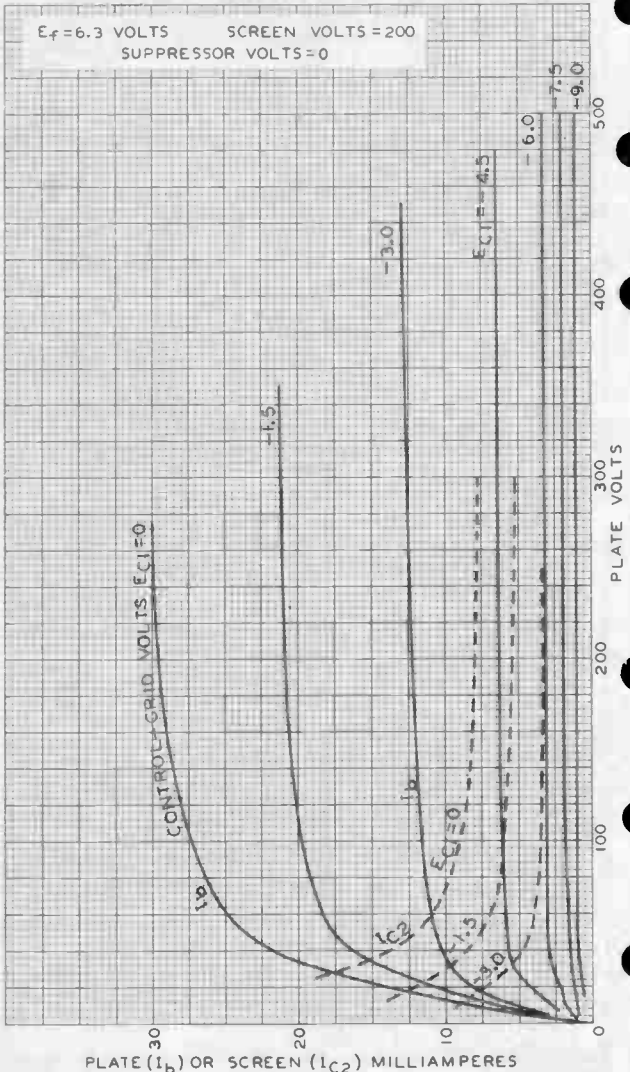
6AB7



6AB7

# AVERAGE PLATE CHARACTERISTICS

$E_f = 6.3$  VOLTS      SCREEN VOLTS = 200  
SUPPRESSOR VOLTS = 0



JUNE 21, 1938

RCA RADIOTRON DIVISION

92C-6140

World Radio History

6AC5-GT  
★

## 6AC5-GT/6AC5-G

## HIGH-MU POWER AMPLIFIER TRIODE

Heater Voltage	Coated unipotential Cathod	a-c or d-c volts
Current	6.3	amp.
Maximum Overall Length	0.11	3-5/16"
Maximum Seated Height		2-3/8"
Maximum Diameter		1-5/16"
Bulb Base		Intermed. Shell Octal 6-Pin
Pin 1 - No Connection		Pin 5 - Grid
Pin 2 - Heater		Pin 7 - Heater
Pin 3 - Plate		Pin 8 - Cathode
Mounting Position		Any



BOTTOM VIEW (6-40)

Characteristics

Plate Voltage	250 max.	volts
Grid Voltage	1-13	volts
Amplification Factor	125	
Plate Resistance	36700	ohms
Transconductance	3400	umhos
Plate Current	32	ma.
Grid Current	5	ma.

Amplifier

Plate Voltage	250 max.	volts
Peak Plate Current (per tube)	110 max.	ma.
Average Plate Dissipation	10 max.	watts

Typical Operation - Class B Power Amplifier:

Unless otherwise specified, values are for 2 tubes

Plate Voltage	250	volts
Grid Voltage	0	volts
Peak A-F Grid-to-Grid Voltage	70	volts
Zero-Signal D-C Plate Current	5	ma.
Effective Load Res. (plate to plate)	10000	ohms
Peak Power Input	950	mw
Power Output	8 approx.	watts

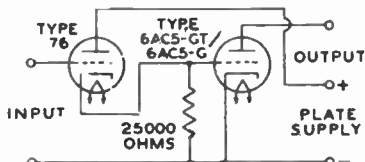
Dynamic-Coupled Class A<sub>1</sub> Amplifier - With Type 76 as Driver:

Plate-Supply Voltage	250	volts
Grid Voltage	4	volts
Average Plate Current	32	ma.
Average Plate Current of Driver	5.5	ma.
Input Signal to Driver (RMS)	16.5	volts
Driver Grid Resistor	1.0 max.	megohm
Load Resistance	7000	ohms
Harmonic Distortion	10	%
Power Output*	3.7	watts

□ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

▲ Bias voltage for both the 6AC5-GT/6AC5-G and the driver is developed by the Dynamic-Coupled connection shown in the circuit arrangement. The total d-c resistance in the grid circuit of the driver should not exceed 1.0 megohm. The main purpose of the 25000-ohm resistor is to prevent a current surge occurring while the tube is warming up.

• When driver is operated up to the grid-current point, it is possible to obtain a power output of 8.3 watts with approximately 14% distortion.

DYNAMIC-COUPLED CONNECTION

← Indicates a change.

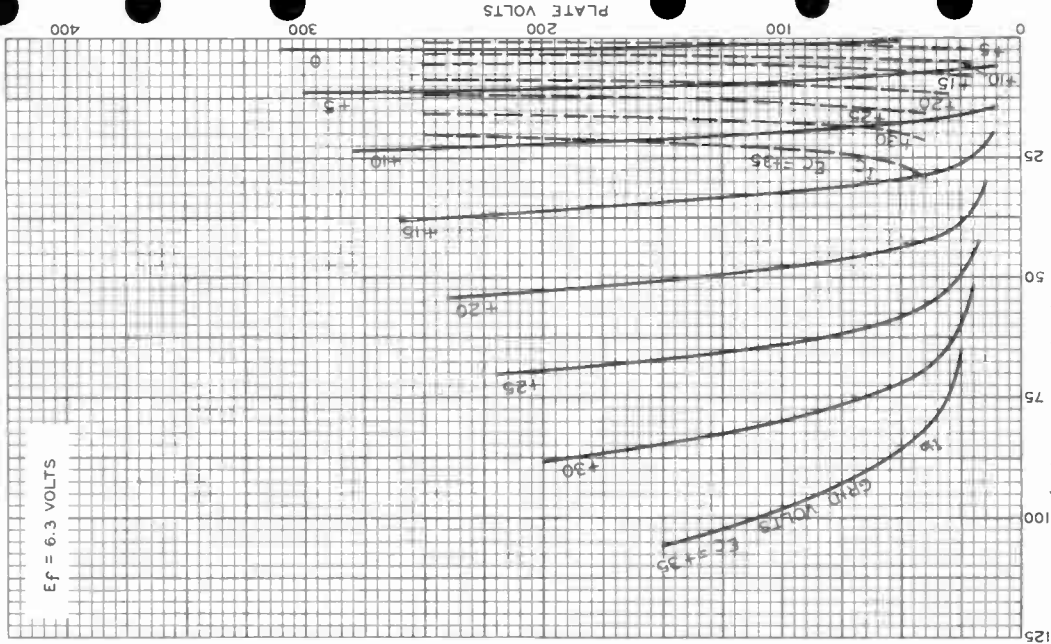
The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained therein is furnished without assuming any obligations.



6AC5-GT

6AC5-GT

# AVERAGE PLATE CHARACTERISTICS



OCT. 18, 1937

RCA RADIODIODE DIVISION  
RCA MANUFACTURING COMPANY, INC.

PLATE ( $I_b$ ) OR GRID ( $I_c$ ) MILLIAMPERES

92C-4840



6AC7/1852

6AC7



## TELEVISION AMPLIFIER PENTODE

SINGLE-ENDED METAL TYPE

Heater *	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.45	amp.
Direct Interelectrode Capacitances: <sup>0</sup>		
Grid to Plate	0.015 max.	μuf
Input	11	μuf
Output	5	μuf
Maximum Overall Length		2-5/8"
Maximum Seated Height		2-1/16"
Maximum Diameter		1-5/16"
Bulb		Metal Shell, MT-8
Base		Small Wafer Octal 8-Pin
Pin 1 - Shell		Pin 5 - Cathode
Pin 2 - Heater		Pin 6 - Screen
Pin 3 - Suppressor		Pin 7 - Heater
Pin 4 - Grid		Pin 8 - Plate
Mounting Position	BOTTOM VIEW (8N)	Any



## AMPLIFIER

Plate Voltage	300 max.	volts
Screen Voltage	150 max.	volts
Screen-Supply Voltage	300 max.	volts
Plate Dissipation	3.02 max.	watts
Screen Dissipation	0.38 max.	watt

Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:Condition I<sup>\*</sup> Condition II<sup>\*\*</sup>

Plate Voltage	300	300	volts
Suppressor <sup>0</sup>	0	0	volts
Screen-Supply #	150	300	volts
Screen Series Resistor	-	60000	ohms
Cathode-Bias Resistor ##	160	160	min.ohms
Plate Res.	1.0	1.0	approx. megohm
Transcond.	9000	9000	μmhos
Plate Cur.	10	10	ma.
Screen Cur.	2.5	2.5	ma.

<sup>0</sup> With shell connected to cathode.

# Screen-supply voltages in excess of 150 volts require the use of a series-dropping resistor to limit the voltage at the screen to 150 volts when the plate current is at its normal value of 10 milliamperes.

\* Condition I with fixed screen supply gives a sharp cut-off characteristic.

\*\* Condition II with series screen resistor gives an extended cut-off characteristic for applications where gain is controlled by variation of grid bias.

## Cathode-bias resistor should be adjusted to give a plate current of 10 ma. The d-c resistance in the grid circuit should not exceed 0.25 megohm when the screen voltage is obtained from a fixed source. When a series screen resistor is used with full cathode bias, the d-c resistance in the grid circuit may be as high as 0.5 megohm.

\* The potential difference between heater and cathode should be kept as low as possible.

□ The suppressor should be connected in r-f and i-f stages directly to ground to minimize feedback.

NOTE: It is characteristic of a high gm tube to show appreciable changes of input capacitance and input conductance with plate current. In high-frequency circuits, it will be necessary to take precautions to minimize this effect. The use of the 6AC7 as a high-gain audio amplifier is not recommended unless the heater is operated from a battery source.

← Indicates a change.

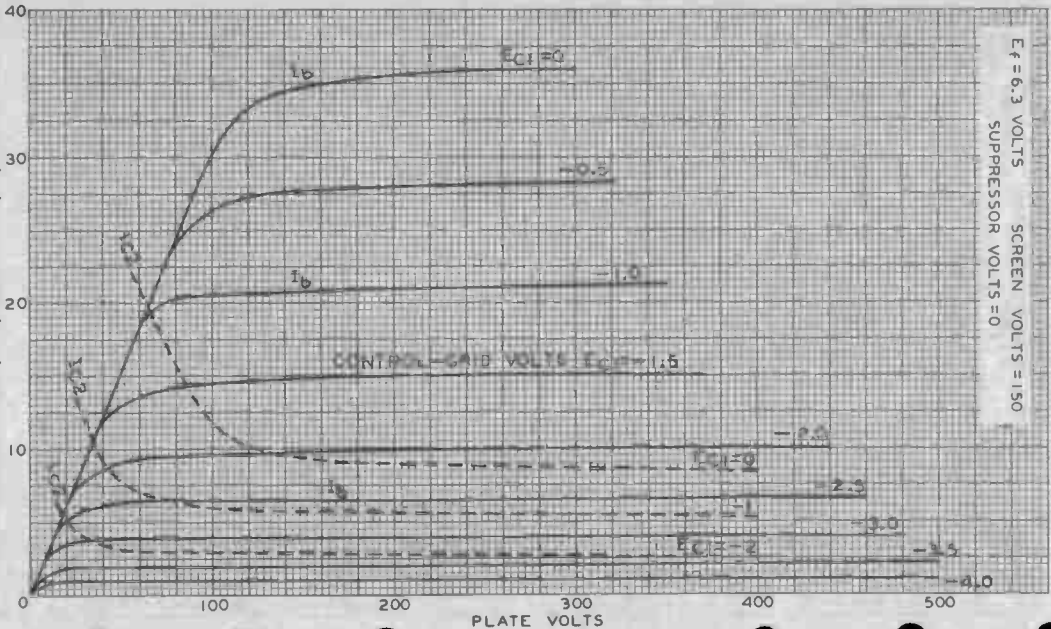
6AC7



6AC7

# AVERAGE PLATE CHARACTERISTICS

$E_f = 6.3$  VOLTS    SCREEN VOLTS = 150  
SUPPRESSOR VOLTS = 0



JUNE 17, 1938    PLATE ( $I_b$ ) OR SCREEN ( $I_{c2}$ ) MILLIAMPERES    92C-6139

RCA RADIODIODE DIVISION  
RCA MANUFACTURING COMPANY, INC.



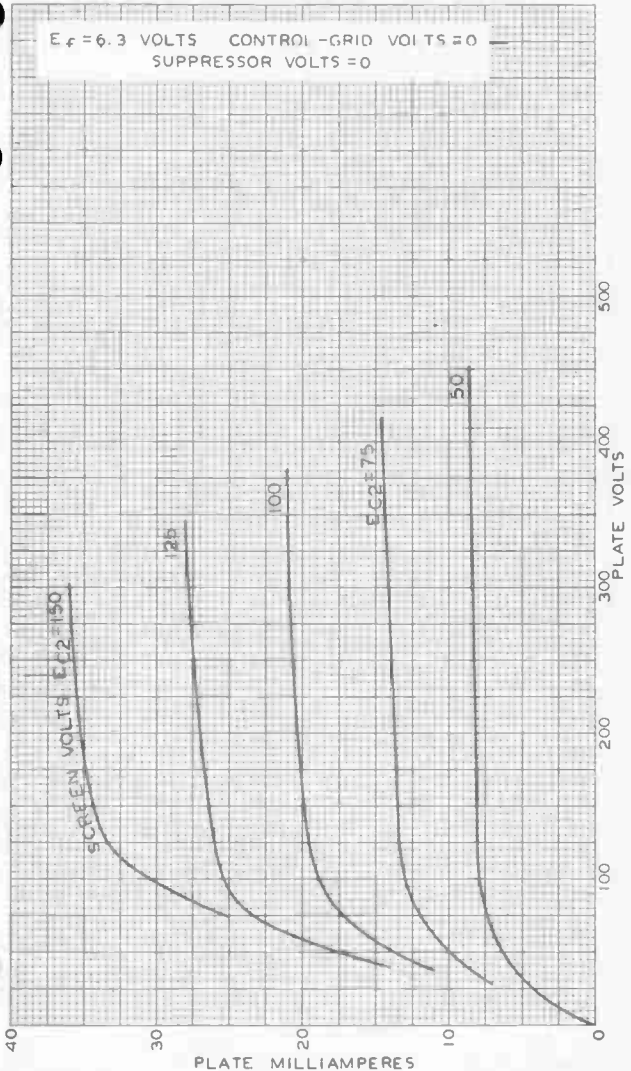


6AC7

6AC7

### AVERAGE PLATE CHARACTERISTICS

$E_f = 6.3$  VOLTS CONTROL - GRID VOLTS = 0  
SUPPRESSOR VOLTS = 0



DEC. 5 1942

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA HARRISON, N.J.

92C-6146R1

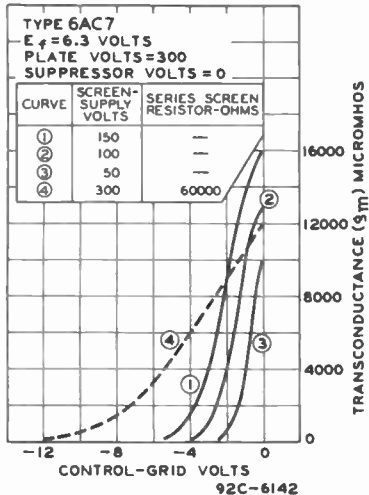
6AC7



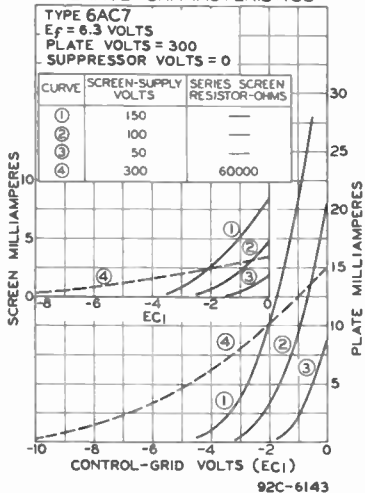
6AC7

## TELEVISION AMPLIFIER PENTODE

## AVERAGE CHARACTERISTICS



## AVERAGE CHARACTERISTICS



Jan. 1, 1943

RCA VICTOR DIVISION  
 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

92C-6142  
 92C-6143



6AD7-G

6AD7-G

**TRIODE - POWER AMPLIFIER PENTODE**

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.95	amp.
Maximum Overall Length		4-5/8"
Maximum Seated Height		4-1/16"
Maximum Diameter		1-13/16"
Bulb		ST-14
Base		Medium Shell Octal 8-Pin
Pin 1 - Triode Grid		Pin 5 - Pentode Grid
Pin 2 - Heater		Pin 6 - Triode Plate
Pin 3 - Pentode Plate		Pin 7 - Heater
Pin 4 - Pentode Screen		Pin 8 - Cathode
Mounting Position		Any

BOTTOM VIEW (8AY)

TRIODE UNIT

Plate Voltage	285 max.	volts
Plate Dissipation	1.0 max.	watt
<b>Characteristics - Class A<sub>2</sub> Amplifier:</b>		
Plate Voltage	250	volts
Grid Voltage	-25	volts
Amp. Factor	6	
Plate Res.	19000 approx.	ohms
Transcond.	325	μhos
Plate Current	4	ma.

PENTODE UNIT

Plate Voltage	375 max.	volts
Screen Voltage	285 max.	volts
Plate Dissipation	8.5 max.	watts
Screen Dissipation	2.7 max.	watts
<b>Typical Operation and Characteristics - Class A<sub>2</sub> Amplifier:</b>		
Plate Voltage	250	volts
Screen Voltage	250	volts
Grid Voltage	-16.5	volts
Peak A-F Grid Voltage	16.5	volts
Zero-Sig. Plate Current	34	ma.
Max.-Sig. Plate Current	36	ma.
Zero-Sig. Screen Current	6.5	ma.
Max.-Sig. Screen Current	10.5	ma.
Plate Resistance	80000 approx.	ohms
Transconductance	2500	μhos
Load Resistance	7000	ohms
Total Harmonic Distortion	8	%
Max.-Signal Power Output	3.2	watts

PUSH-PULL AMPLIFIER*Pentode Unit of 6AD7-G and a separate 6F6-G*

Plate Voltage	375 max.	volts
---------------	----------	-------

• In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

← Indicates a change.

Sept. 2, 1941

DATA



6AD7-G

## TRIODE-POWER AMPLIFIER PENTODE

(continued from preceding page)

Screen Voltage	285 max.	volts
Plate Dissipation	8.5 max.	watts
Screen Dissipation	2.7 max.	watts

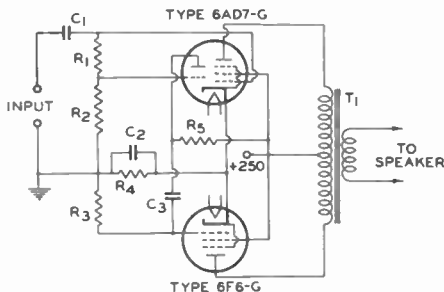
### → Typical Operation with Cathode Bias - Class $AB_1$ Amplifier:

Values are for pentode unit of 6AD7-G and 6F6-G together

Plate Voltage	250	285	375	volts
Screen Voltage	250	285	250	volts
Cathode Resistor	560	470	470	ohms
Peak A-F Grid to Grid Volt.	59	64	55	volts
Zero-Sig. Plate Current	36	47.5	41	ma.
Max.-Sig. Plate Current	41	54.5	50	ma.
Zero-Sig. Screen Current	6.7	8.2	6.7	ma.
Max.-Sig. Screen Current	11.7	13.7	9.2	ma.
Effec. Load Resistance (plate to plate)	14000	12000	16000	ohms
Total Harmonic Dist.	4	4	2	%
Max.-Sig. Power Output	6	8.5	9	watts

For curves of the pentode unit, refer to Type 6F6.

### TYPICAL PUSH-PULL CIRCUIT WITH PHASE INVERTER USING 6AD7-G AND 6F6-G



$R_1 = 330000$  OHMS  
 $R_2 = 120000$  OHMS  
 $R_3 = 470000$  OHMS  
 $R_4 = 560$  OHMS  
 $R_5 = 150000$  OHMS

$C_1 = 0.01$   $\mu$ f  
 $C_2 = 25$   $\mu$ f  
 $C_3 = 0.01$   $\mu$ f  
 $T_1 =$  OUTPUT TRANSFORMER:  
 PLATE-TO-PLATE LOAD, 14000 OHMS

← Indicates a change.

The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained herein is furnished without assuming any obligations.

Sept. 2, 1941

DATA



6AH4-GT

# 6AH4-GT

## MEDIUM-MU TRIODE

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . .	6.3 . . . . .	ac or dc volts
Current . . . . .	0.75 . . . . .	amp

Direct Interelectrode Capacitances (No external shield):

Grid to Plate . . . . .	4.4 . . . . .	$\mu\mu\text{f}$
Input . . . . .	7 . . . . .	$\mu\mu\text{f}$
Output . . . . .	1.7 . . . . .	$\mu\mu\text{f}$

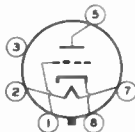
#### Characteristics, Amplifier Class A<sub>1</sub>:

Plate Voltage . . . . .	250	volts
Grid Voltage . . . . .	-23	volts
Amplification Factor . . . . .	8	
Plate Resistance . . . . .	1780	ohms
Transconductance . . . . .	4500	$\mu\text{mhos}$
Plate Current . . . . .	30	ma
Grid Volts (Approx.) for plate current of 0.5 ma . . . . .	-40	volts

#### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	3-5/16"
Maximum Seated Length . . . . .	2-3/4"
Maximum Diameter . . . . .	1-9/32"
Bulb . . . . .	T-9
Base . . . . .	Short Intermediate-Shell Octal 6-Pin (JETEC No. B6-60)
Basing Designation for BOTTOM VIEW . . . . .	8EL

Pin 1 - Grid  
Pin 2 - Heater  
Pin 3 - No  
Conn.



Pin 5 - Plate  
Pin 7 - Heater  
Pin 8 - Cathode

### VERTICAL DEFLECTION AMPLIFIER

Maximum Ratings, Design-Center Values Except As Noted:

For operation in a 525-line, 30-frame system<sup>□</sup>

DC PLATE VOLTAGE . . . . .	500 max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE* . . . . .	2000 <sup>Δ</sup> max.	volts
DC POSITIVE GRID VOLTAGE . . . . .	0 max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE. . . . .	-200 max.	volts

<sup>□</sup> As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations", Federal Communications Commission.

<sup>\*</sup> The duration of the voltage pulse must not exceed 15% of one vertical scanning cycle. In a 525-line, 30-frame system, 15% of one vertical scanning cycle is 2.5 milliseconds.

<sup>Δ</sup> Under no circumstances should this absolute value be exceeded.

6AH4-GT



# 6AH4-GT

## MEDIUM-MU TRIODE

### CATHODE CURRENT:

DC . . . . .	180 max.	ma
Peak . . . . .	60 max.	ma
PLATE DISSIPATION . . . . .	7.5 max.	watts

### PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode .	200 max.	volts
Heater positive with respect to cathode .	200 <sup>▲</sup> max.	volts

### Maximum Circuit Values:

Grid-Circuit Resistance . . . . .	2.2 max.	megohms
-----------------------------------	----------	---------

<sup>▲</sup> The dc component must not exceed 100 volts.

AUG. 1, 1953

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA



6AL7-GT

# 6AL7-GT ELECTRON-RAY TUBE

INDICATOR TYPE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . .	6.3	ac or dc volts
Current . . . . .	0.15	amp

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	3-1/16"
Maximum Seated Length . . . . .	2-1/2"
Maximum Diameter . . . . .	1-9/32"
Bulb . . . . .	T-9
Base . . . . .	Intermediate-Shell Octal 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	8CH

Pin 1-Grid  
 Pin 2-Heater  
 Pin 3-Target  
 Pin 4-Deflecting  
 Electrode  
 No.2



Pin 5-Deflecting  
 Electrode  
 No.3  
 Pin 6-Deflecting  
 Electrode  
 No.1  
 Pin 7-Heater  
 Pin 8-Cathode

## INDICATOR SERVICE

### Maximum Ratings, Design-Center Values:

TARGET VOLTAGE . . . . .	{ 365 max. volts 220 min. volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode	90 max. volts
Heater positive with respect to cathode	90 max. volts

### Typical Operation and Characteristics:

Target Voltage . . . . .	315	volts
Deflecting-Electrode-No.1 Voltage* . . . . .	0	volts
Deflecting-Electrode-No.2 Voltage* . . . . .	0	volts
Deflecting-Electrode-No.3 Voltage* . . . . .	0	volts
Grid Voltage . . . . .	0	volts
Cathode-Bias Resistor (Approx.) . . . . .	3300	ohms
Grid Voltage for Pattern cutoff (Approx.) . . . . .	-7	volts
Deflection Sensitivity (Approx.)# . . . . .	1	mm/volt

\* with tube mounted horizontally and pins #4 & #8 in vertical plane (Pin #4 on top), deflecting electrode No.1 controls top left-hand section of pattern, deflecting electrode No.2 controls top right-hand section of pattern, deflecting electrode No.3 controls bottom section of pattern.

# For first mm deflection (Deflecting Electrodes No.1 & No.2).

6AL7-GT



6AL7-GT

## ELECTRON-RAY TUBE

PATTERN SEQUENCE DURING TUNING

CONTROL VOLTAGE SOURCE	CIRCUIT (NEXT PAGE)	OFF CHANNEL (-)	ON CHANNEL OFF TUNE (-)	ON TUNE	ON CHANNEL OFF TUNE (+)	OFF CHANNEL (+)
DISCRIMINATOR (FM)	FIGS. 1 AND 2					
DISCRIMINATOR AND SQUELCH (FM)	FIG. 3					
DISCRIMINATOR AND LIMITER (FM)	FIG. 4					
AVC (FM)	FIG. 5					

FEB. 2, 1949

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CS-7171





6AL7-GT

# 6AL7-GT ELECTRON-RAY TUBE

## TYPICAL CIRCUITS

FIG. 1

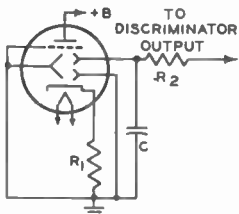


FIG. 2

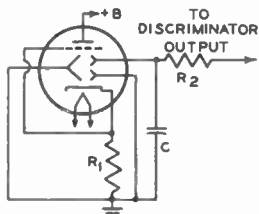


FIG. 3

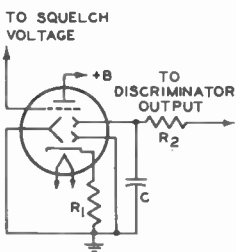


FIG. 4

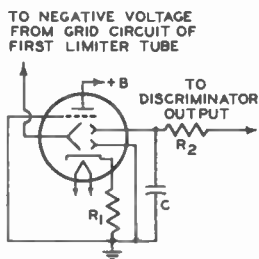
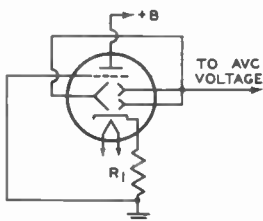


FIG. 5



+B = 315 VOLTS APPROX.  
C = 0.05  $\mu$ F

R<sub>1</sub> = 3300 OHMS  
R<sub>2</sub> = 1.0 MEGOHM

92CS-7169





6AQ6

6AQ6

**DUPLEX-DIODE HIGH-MU TRIODE**

MINIATURE TYPE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.15	amp.
Direct Interelectrode Capacitances - Triode Unit: <sup>o</sup>		
Grid to Plate	1.8	$\mu\mu\text{f}$
Grid to Cathode & Heater	1.7	$\mu\mu\text{f}$
Plate to Cathode & Heater	1.5	$\mu\mu\text{f}$
Maximum Overall Length		2-1/8"
Maximum Seated Height		1-7/8"
Length from Base Seat to Bulb Top (excluding tip)		1-1/2" $\pm$ 3/32"
Maximum Diameter		3/4"
Bulb		T-5 $\frac{1}{2}$
Base <sup>▲</sup>	Miniature Button 7-Pin	
Pin 1 - Triode Grid	Pin 5 - Diode Plate No. 2	
Pin 2 - Cathode	Pin 6 - Diode Plate No. 1	
Pin 3 - Heater	Pin 7 - Triode Plate	
Pin 4 - Heater		
RCA Socket		Stock No. 9914
Mounting Position		Any



BOTTOM VIEW (7BT)

*Maximum Ratings Are Design-Center Values*TRIODE UNIT

Plate Voltage		300 max. volts
D-C Heater-Cathode Potential		90 max. volts
<b>Characteristics - Class A<sub>1</sub> Amplifier:</b>		
Plate Voltage	100	250 volts
Grid Voltage	-1	-3 volts
Amplification Factor	70	70
Plate Resistance	61000	58000 ohms
Transconductance	1150	1200 $\mu\text{mhos}$
Plate Current	0.8	1.0 ma.

**Typical Operation with Resistance Coupling:**

Same as for Type 6T7-G in RESISTANCE-COUPLED AMPLIFIER CHART.

DIODE UNITS - Two

For consideration of these units, see Type 6S7.

<sup>o</sup> With close-fitting shield connected to cathode.

<sup>▲</sup> The center hole in sockets for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.

JUNE 30, 1944

RCA VICTOR DIVISION  
 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY  
 World Radio History

TENTATIVE DATA

6AQ6



6AQ6

AVERAGE PLATE CHARACTERISTICS  
TRIODE UNIT—PLATE CURRENTS UP TO 8 MA.

$E_f = 6.3$  VOLTS

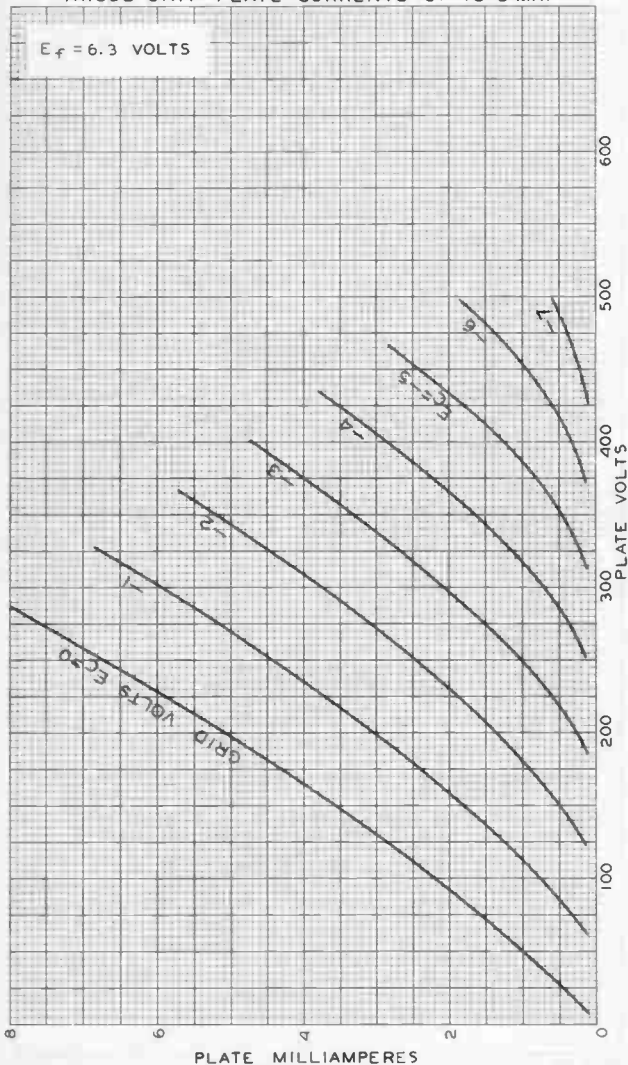


PLATE MILLIAMPERES

600  
500  
400  
300  
200  
100  
0  
PLATE VOLTS

APR. 7, 1944

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA NEW JERSEY

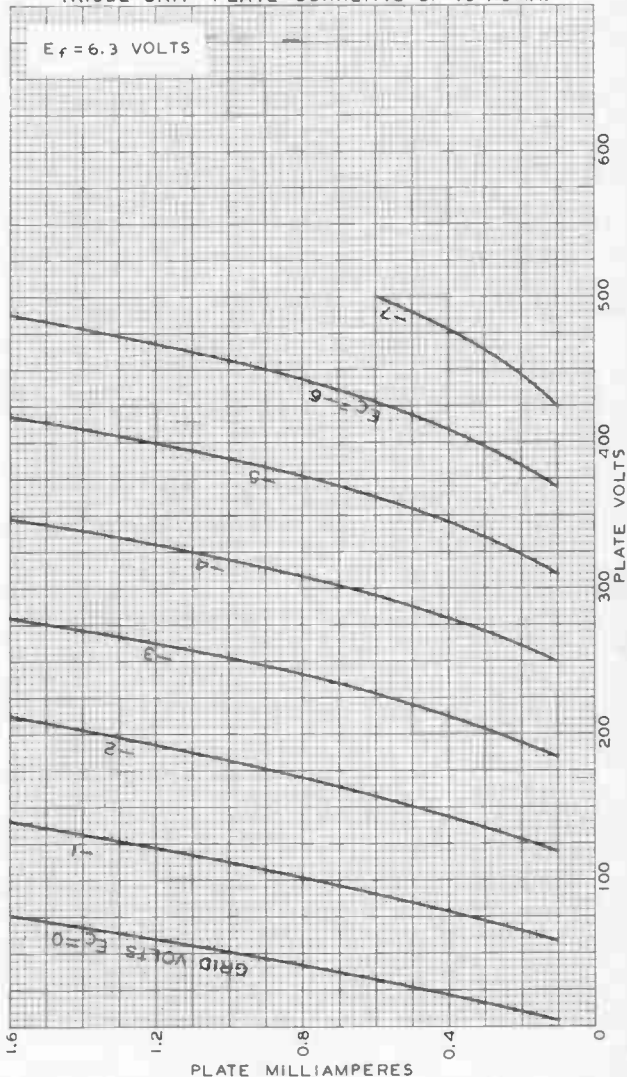
92CM-6551



6AQ6

6AQ6

# AVERAGE PLATE CHARACTERISTICS TRIODE UNIT—PLATE CURRENTS UP TO 1.6 MA.



APR. 8, 1944

PLATE MILLIAMPERES  
RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA HARTFORD, NEW JERSEY

92CM-6552





6AQ7-GT

# 6AQ7-GT TWIN DIODE-HIGH-MU TRIODE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathodes:

Voltage. . . . .	6.3	ac or dc volts
Current. . . . .	0.3	amp

Direct Interelectrode Capacitances:

Triode Unit:

Grid to Plate . . . .	3.0	$\mu\mu\text{f}$
Grid to Cathode. . . .	2.8	$\mu\mu\text{f}$
Plate to Cathode . . . .	3.2	$\mu\mu\text{f}$
Grid to Diode Cathode <sup>o</sup> .	0.25 max.	$\mu\mu\text{f}$

Diode-No.1 Plate to Diode Cathode* .	2:2	$\mu\mu\text{f}$
Diode-No.2 Plate to Diode Cathode* .	2.4	$\mu\mu\text{f}$
Diode-No.1 Plate to Diode-No.2 Plate*	0.5	$\mu\mu\text{f}$

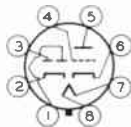
<sup>o</sup> with external shield No.308 connected to Pin No.6.

\* with external shield No.308 connected to Pin No.2.

### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	3-5/16"
Maximum Seated Length. . . . .	2-3/4"
Maximum Diameter . . . . .	1-9/32"
Bulb . . . . .	T-9
Base . . . . .	Intermediate-Shell Octal 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	8CK

- Pin 1 - Diode-No.2 Plate
- Pin 2 - Cathode of Diode Units
- Pin 3 - Diode-No.1 Plate



- Pin 4 - Triode Grid
- Pin 5 - Triode Plate
- Pin 6 - Cathode of Triode Unit
- Pin 7 - Heater
- Pin 8 - Heater

### TRIODE UNIT AMPLIFIER - Class A<sub>1</sub>

Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	250 max.	volts
GRID VOLTAGE:		
Positive bias value. . . . .	0 max.	volts
PLATE DISSIPATION. . . . .	1 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	90 max.	volts
Heater positive with respect to cathode.	90 max.	volts

Typical Operation and Characteristics:

Plate Voltage. . . . .	100	250	volts
Grid Voltage . . . . .	-1	-2	volts

6AQ7-GT



# 6AQ7-GT TWIN DIODE—HIGH-MU TRIODE

Amplification Factor . . . . .	79	70	
Plate Resistance (Approx.) . . .	64000	44000	.. ohms
Transconductance . . . . .	1250	1600	.. $\mu$ mhos
Plate Current . . . . .	1.1	2.3	.. ma

Typical Operation as Resistance-Coupled Amplifier:

See *RESISTANCE-COUPLED AMPLIFIER CHARTS*  
at front of this Section.

### DIODE UNITS - Two

Maximum Ratings, Design-Center Values:

PLATE CURRENT (For Each Diode) . . . . . 0.9 max. ma





6AR5

# POWER PENTODE

MINIATURE TYPE

6AR5

## GENERAL DATA

### Electrical:

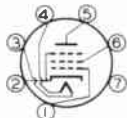
Heater, for Unipotential Cathode:

Voltage. . . . .	6.3	ac or dc volts
Current. . . . .	0.4	amp

### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	2-5/8"
Maximum Seated Length. . . . .	2-3/8"
Length, Base Seat to Bulb Top (excluding tip). . . . .	2" ± 3/32"
Maximum Diameter . . . . .	3/4"
Bulb . . . . .	T-5-1/2
Base . . . . .	Small-Button Miniature 7-Pin
Basing Designation for BOTTOM VIEW . . . . .	6CC

Pin 1 - Grid No.1  
 Pin 2 - Cathode,  
           Grid No.3  
 Pin 3 - Heater  
 Pin 4 - Heater



Pin 5 - Plate  
 Pin 6 - Grid No.2  
 Pin 7 - No  
           Connection

## AF POWER AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	250 max.	volts
GRID-No.2 (SCREEN) VOLTAGE . . . . .	250 max.	volts
PLATE DISSIPATION. . . . .	8.5 max.	watts
GRID-No.2 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 and Characteristics:

Plate Voltage. . . . .	250	250	volts
Grid-No.2 Voltage. . . . .	250	250	volts
Grid-No.1 (Control-Grid) Voltage . . . . .	-16.5	-18	volts
Peak AF Grid-No.1 Voltage. . . . .	16.5	18	volts
Zero-Signal Plate Current. . . . .	34	32	ma
Max.-Signal Plate Current. . . . .	35	33	ma
Zero-Signal Grid-No.2 Current. . . . .	5.7	5.5	ma
Max.-Signal Grid-No.2 Current. . . . .	10	10	ma
Plate Resistance (Approx.) . . . . .	65000	68000	ohms
Transconductance . . . . .	2400	2300	μmhos
Load Resistance. . . . .	7000	7600	ohms
Total Harmonic Distortion. . . . .	7	11	%
Max.-Sig. Power Output . . . . .	3.2	3.4	watts

(continued on next page)

6AR5



6AR5

# POWER PENTODE

## Maximum Circuit Values (for maximum rated conditions):

Grid-No.1-Circuit Resistance:

For fixed bias. . . . .	0.1 max.	megohm
For cathode bias. . . . .	0.5 max.	megohm

*Curves for the 6AR5 are the same as those shown for type 6K6-GT.*

## Half-Wave Vacuum Rectifier

NOVAR TYPE

For Television Damper Service

## GENERAL DATA

## Electrical:

Heater Characteristics and Ratings (*Design-Maximum Values*):

Voltage (AC or DC) . . . . .	6.3 ± 0.6	volts
Current at heater volts = 6.3 . . . . .	1.200	amp

Peak heater-cathode voltage:

Heater negative with respect to cathode <sup>a</sup> . . . . .	5000 <sup>b</sup> max.	volts
--	------------------------	-------

Heater positive with respect to cathode. . . . .	300 <sup>c</sup> max.	volts
--	-----------------------	-------

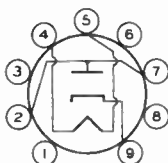
Direct Interelectrode Capacitances (Approx.):<sup>d</sup>

Plate to cathode and heater . . . . .	6.5	pf
Cathode to plate and heater . . . . .	9.0	pf
Heater to cathode . . . . .	2.8	pf

## Mechanical:

Operating Position. . . . .	Any
Type of Cathode . . . . .	Coated Unipotential
Maximum Overall Length. . . . .	3.54"
Maximum Seated Length . . . . .	3.16"
Length, Base Seat to Bulb Top (Excluding tip) . . . . .	2.60" ± 0.09"
Diameter. . . . .	1.062" to 1.188"
Bulb. . . . .	T9
Socket. . . . .	Novar 9-Contact
Base. . . . .	Small-Button Novar 9-Pin (JEDEC No. E9-75)
Basing Designation for BOTTOM VIEW. . . . .	9HP

Pin 1 - Do Not Use<sup>e</sup>  
 Pin 2 - Plate  
 Pin 3 - Do Not Use<sup>e</sup>  
 Pin 4 - Heater



Pin 5 - Heater  
 Pin 6 - Do Not Use<sup>e</sup>  
 Pin 7 - Plate  
 Pin 8 - Do Not Use<sup>e</sup>  
 Pin 9 - Cathode

## DAMPER SERVICE

Maximum Ratings, *Design-Maximum Values*:*For operation in a 525-line, 30-frame system<sup>f</sup>*

PEAK INVERSE PLATE VOLTAGE <sup>a</sup> . . . . .	5000 max.	volts
PEAK PLATE CURRENT. . . . .	1100 max.	ma
DC PLATE CURRENT. . . . .	175 max.	ma
PLATE DISSIPATION . . . . .	6.5 max.	watts

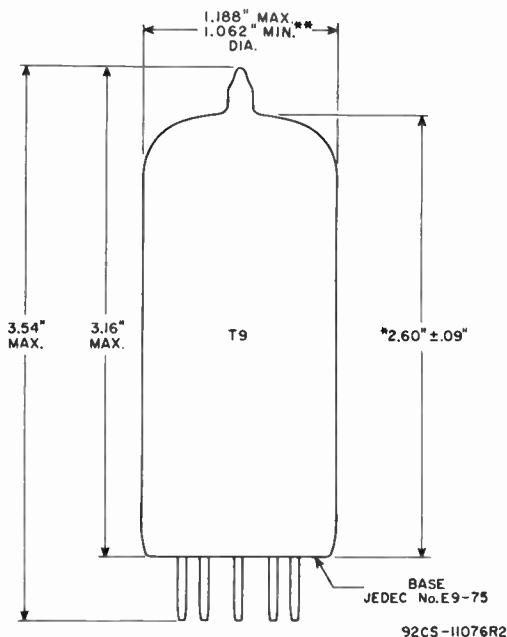
<sup>a</sup> This rating is applicable when the duration of the voltage pulse does not exceed 15 per cent of one horizontal scanning cycle. In a 525-line, 30-frame system, 15 per cent of one horizontal scanning cycle is 10 microseconds.

← Indicates a change.



# 6AY3

- b The dc component must not exceed 900 volts.
- c The dc component must not exceed 100 volts.
- d Without external shield.
- e Socket terminals 1, 3, 6, and 8 should not be used as tie points. It is recommended that the socket clips for these pins be removed to reduce the possibility of arc-over and to minimize leakage.
- f As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.



- \*\* APPLIES IN ZONE STARTING 0.375" FROM BASE SEAT.
- \* MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY A RING GAUGE OF 0.600" INSIDE DIAMETER.





6B8

6B8



## DUPLEX-DIODE PENTODE

Heater <sup>■</sup> Coated Unipotential Cathode  
 Voltage 6.3 a-c or d-c volts  
 Current 0.3 amp.

Direct Interelectrode Capacitances:<sup>o</sup>

*Pentode Unit:*

Grid to Plate 0.005 max.  $\mu\text{f}$   
 Input 6  $\mu\text{f}$   
 Output 9  $\mu\text{f}$

Maximum Overall Length 3-1/8"

Maximum Seated Height 2-9/16"

Maximum Diameter 1-5/16"

Bulb

Metal Shell, MT-8

Cap

Miniature

Base

Small Wafer Octal 8-Pin

Pin 1-Shell

Pin 6-Screen

Pin 2-Heater

Pin 7-Heater

Pin 3-Plate

Pin 8-Cathode

Pin 4-Diode Plate #2

Cap -Grid

Pin 5-Diode Plate #1



Mounting Position

BOTTOM VIEW (8E)

Any

### PENTODE UNIT

Plate Voltage 300 max. volts

Screen Voltage 125 max. volts

Screen Supply Voltage 300 max. volts

Grid Voltage 0 min. volts

Plate Dissipation 2.25 max. watts

Screen Dissipation 0.3 max. watt

*Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:*

Plate 250 volts

Screen 125 volts

Grid -3 volts

Plate Res. 0.6 approx. megohm

Transcond. 1325  $\mu\text{mhos}$

Grid Bias for

cathode-current cut-off -21 approx. volts

Plate Cur. 10 ma.

Screen Cur. 2.3 ma.

### DIODE UNITS - Two

Consideration of these units is given under Type 6B8-G. Circuits will be similar to those shown for Type 2B7.

<sup>■</sup> In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

<sup>o</sup> With shell connected to cathode.

For Diode Curves, see Type 6B7. For additional data, see RESISTANCE-COUPLED AMPLIFIER CHART.

← indicates a change.

Sept. 2, 1941

RCA RADOTRON DIVISION

RCA MANUFACTURING COMPANY, INC.

World Radio History

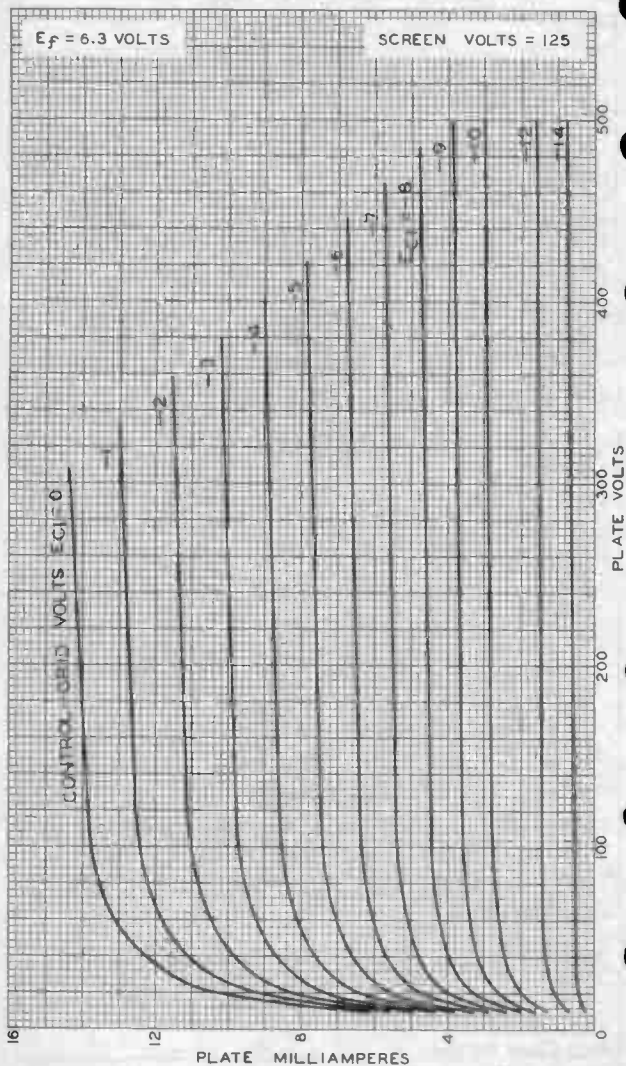
DATA

6B8



6B8

## AVERAGE PLATE CHARACTERISTICS



AUG. 14, 1936

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY

92C-4657



6BF5

6BF5

# BEAM POWER AMPLIFIER

MINIATURE TYPE

## GENERAL DATA

### Electrical:

Heater for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts

Current . . . . . 1.2 . . . . . amp

Direct Interelectrode Cap. (Approx.; no external shield):

As Beam Power Amplifier:

Grid No.1 to Plate . . 0.65 . . . . .  $\mu\mu\text{f}$

Input . . . . . 14 . . . . .  $\mu\mu\text{f}$

Output . . . . . 6 . . . . .  $\mu\mu\text{f}$

Characteristics as Beam Power Amplifier:

See AMPLIFIER--Class A<sub>1</sub>

Characteristics as Triode-Connected Amplifier--Class A<sub>1</sub>:

(Grid No.2 connected to plate)

Plate Voltage . . . . . 225 volts

Grid Voltage . . . . . -30 volts

Amplification Factor . . . . . 6.7

Plate Resistance . . . . . 2500 ohms

Transconductance . . . . . 2700  $\mu\text{mhos}$

Plate Current . . . . . 10 ma

Grid Voltage (Approx.) for plate

current of 0.5 ma . . . . . -40 volts

### Mechanical:

Mounting Position . . . . . Any

Maximum Overall Length . . . . . 2-5/8"

Maximum Seated Length . . . . . 2-3/8"

Length, Base Seat to Bulb Top (Excluding tip) . . 2"  $\pm$  3/32"

Maximum Diameter . . . . . 3/4"

Bulb . . . . . T-5-1/2

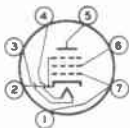
Base . . . . . Small-Button Miniature 7-Pin (JETEC No.E7-1)

Basing Designation for BOTTOM VIEW . . . . . 7BZ

Pin 1 - Grid No.1

Pin 2 - Cathode,  
Grid No.3

Pin 3 - Heater



Pin 4 - Heater

Pin 5 - Plate

Pin 6 - Grid No.2

Pin 7 - Grid No.1

## AMPLIFIER--Class A<sub>1</sub>

Maximum Ratings, Design - Center Values:

PLATE VOLTAGE . . . . . 250 max. volts

GRID-No.2 (SCREEN) VOLTAGE . . . . . 117 max. volts

PLATE DISSIPATION . . . . . 5.5 max. watts

GRID-No.2 INPUT . . . . . 1.25 max. watts

6BF5



6BF5

## BEAM POWER AMPLIFIER

### PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . . . . .	200 max.	volts
Heater positive with respect to cathode . . . . .	200 <sup>max.</sup>	volts

### Typical Operation and Characteristics:

Plate Voltage . . . . .	110	volts
Grid-No.2 (Screen) Voltage . . . . .	110	volts
Grid-No.1 (Control-Grid) Voltage . . . . .	-7.5	volts
Peak AF Grid-No.1 Voltage . . . . .	7.5	volts
Zero-Signal Plate Current . . . . .	36	ma
Maximum-Signal Plate Current . . . . .	39	ma
Zero-Signal Grid-No.2 Current . . . . .	4	ma
Maximum-Signal Grid-No.2 Current . . . . .	10.5	ma
Plate Resistance (Approx.) . . . . .	12000	ohms
Transconductance . . . . .	7500	μmhos
Plate Load Resistance . . . . .	2500	ohms
Total Harmonic Distortion . . . . .	10	per cent
Maximum-Signal Power Output . . . . .	1.9	watts

### VERTICAL DEFLECTION AMPLIFIER

*Triode Connected--Grid No.2 Connected to Plate*

### Maximum Ratings, Design-Center Values Except as Noted:

*For operation in a 525-line, 30 frame system<sup>o</sup>*

DC PLATE VOLTAGE . . . . .	250 max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE† . . . . .	900 <sup>o</sup> max.	volts
CATHODE CURRENT:		
DC . . . . .	40 max.	ma
Peak . . . . .	120 max.	ma
PLATE DISSIPATION†† . . . . .	5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	200 max.	volts
Heater positive with respect to cathode . . . . .	200 <sup>max.</sup>	volts

### Maximum Circuit Values:

Grid-No.1 Circuit Resistance:		
For cathode-bias operation . . . . .	2.2 max.	megohms

<sup>o</sup> The dc component must not exceed 100 volts.

<sup>\*</sup> As described in "Standards of Good Engineering Practice for Television Broadcast Stations", Federal Communications Commission.

† The duration of the voltage pulse must not exceed 7 per cent of one vertical scanning cycle. In a 525-line, 30-frame system, 7 per cent of one vertical scanning cycle is 1.2 milliseconds.

<sup>o</sup> under no circumstances should this absolute value be exceeded.

†† An adequate bias resistor or other means is required to protect the tube in the absence of excitation.

OCT. 1, 1953

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA

World Radio History





6BF6

6BF6

# TWIN DIODE—MEDIUM-MU TRIODE

MINIATURE TYPE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . .	6.3 . . . . .	ac or dc volts
Current. . . . .	0.3 . . . . .	amp

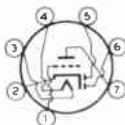
Direct Interelectrode Capacitances (Approx.):

	With External Shield <sup>▲</sup>	Without External Shield	
Triode Unit:			
Grid to Plate. . . . .	2.0	2.0	μf
Input. . . . .	1.8	1.8	μf
Output . . . . .	1.1	0.8	μf
Plate of Diode Unit			
No.1 to Cathode. . . .	1.4	0.7	μf
Plate of Diode Unit			
No.2 to Cathode. . . .	1.5	0.1	μf
Plate of Diode Unit			
No.1 to Triode Grid. .	0.06 max.	0.07 max.	μf
Plate of Diode Unit			
No.2 to Triode Grid. .	0.05 max.	0.06 max.	μf

### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	2-1/8"
Maximum Seated Length. . . . .	1-7/8"
Length from Base Seat to	
Bulb Top (excluding tip) . . . . .	1-1/2" ± 3/32"
Maximum Diameter . . . . .	3/4"
Bulb . . . . .	T-5-1/2
Base . . . . .	Small-Button Miniature 7-Pin (JETEC No. E7-1)
Basing Designation for 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

## TRIODE UNIT - 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

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

← indicates a change.

6BF6



6BF6

# TWIN DIODE—MEDIUM-MU TRIODE

## Typical Operation with Transformer Coupling:

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

## Typical Operation as Resistance-Coupled Amplifier:

See *RESISTANCE-COUPLED AMPLIFIER CHART*  
at front of this Section

### DIODE UNITS

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

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

#### Diode Considerations:

Consideration of these units, including typical circuits and diode curves, is given at the front of this section. Diode biasing of the triode unit of the 6BF6 is not suitable.

*Curves shown under Types 6R7 and 6SR7  
also apply to the triode unit of the 6BF6*



6BG6-G

# 6BG6-G

## BEAM POWER TUBE

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . .	6.3	ac or dc volts
Current . . . . .	0.9	amp

Direct Interelectrode Capacitances (Approx.):<sup>0</sup>

Grid No.1 to plate . . . . .	0.34	$\mu\mu\text{f}$
Grid No.1 to cathode & grid No.3, grid No.2, and heater. . . . .	12	$\mu\mu\text{f}$
Plate to cathode & grid No.3, grid No.2, and heater. . . . .	6.5	$\mu\mu\text{f}$

#### Characteristics, Class A<sub>1</sub> Amplifier:

Plate Voltage . . . . .	60	250	volts
Grid-No.2 (Screen) Voltage . . . . .	250	250	volts
Grid-No.1 (Control-Grid) Voltage . . . . .	0	-15	volts
$\mu$ -Factor, Grid No.2 to Grid No.1. . . . .	-	8	
Plate Resistance (Approx.) . . . . .	-	25000	ohms
Transconductance . . . . .	-	6000	$\mu\text{mhos}$
Plate Current . . . . .	180*	75	ma
Grid-No.2 Current . . . . .	18*	4	ma
Grid-No.1 Voltage (Approx.) for plate current of 1 ma. . . . .	-	-45	volts

#### Mechanical:

Mounting Position . . . . .	Vertical, base up or down, or Horizontal with pins 2 and 7 in vertical plane
Maximum Overall Length . . . . .	5-11/16"
Seated Length . . . . .	4-31/32" $\pm$ 5/32"
Maximum Diameter . . . . .	2-1/16"
Dimensional Outline . . . . .	See General Section
Bulb . . . . .	ST-16
Cap. . . . .	Small (JETEC No.C1-1)
Base . . . . .	Medium-Shell Octal 6-Pin (JETEC No.B6-13)
Basing Designation for BOTTOM VIEW. . . . .	5BT

- Pin 1 - No Connection
- Pin 2 - Heater
- Pin 3 - Cathode,  
Grid No.3



- Pin 5 - Grid No.1
- Pin 7 - Heater
- Pin 8 - Grid No.2
- Cap - Plate

<sup>0</sup> without external shield.

\* These values can be measured by a method involving a recurrent wave form such that the cathode current and grid-No.2 input will be kept within ratings in order to prevent damage to the tube.

← Indicates a change.

6BG6-G



6BG6-G

## BEAM POWER TUBE

## HORIZONTAL DEFLECTION AMPLIFIER

## → Maximum Ratings, Design-Center Values Except as Noted:

For operation in a 525-line, 30-frame system<sup>□</sup>

DC PLATE VOLTAGE . . . . .	700	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE (Absolute maximum) <sup>Ⓜ</sup> . . . . .	1000	max.	volts
PEAK NEGATIVE-PULSE PLATE VOLTAGE . . . . .	1000	max.	volts
DC GRID-No. 2 (SCREEN) VOLTAGE . . . . .	250	max.	volts
DC GRID-No. 1 (CONTROL-GRID) VOLTAGE . . . . .	-50	max.	volts
PEAK NEGATIVE-PULSE GRID-No. 1 VOLTAGE . . . . .	200	max.	volts
CATHODE CURRENT:			
Peak . . . . .	400	max.	ma
Average . . . . .	110	max.	ma
GRID-No. 2 INPUT . . . . .	2.2	max.	watts
PLATE DISSIPATION <sup>†</sup> . . . . .	20	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode . . . . .	200	max.	volts
Heater positive with respect to cathode . . . . .	200 <sup>▲</sup>	max.	volts
HEATER TEMPERATURE (At hottest point on tube surface) <sup>‡</sup> . . . . .	210	max.	°C

## → Maximum Circuit Values:

Grid-No. 1-Circuit Resistance:

For grid-resistor-bias operation<sup>†</sup> . . . . 0.47 max. megohm

<sup>□</sup> As described in "Standard of Good Engineering Practice Concerning Television Broadcast Stations", Federal Communication Commission.

<sup>Ⓜ</sup> Under no circumstances should this absolute value be exceeded.

<sup>Ⓜ</sup> The duration of the voltage pulse must not exceed 15 per cent of one horizontal scanning cycle. In a 525-line, 30-frame system, 15 per cent of one horizontal scanning cycle is 10 microsecond.

<sup>†</sup> It is essential that the plate dissipation be limited in the event of loss of grid signal. For this purpose, some protective means such as a cathode resistor of suitable value should be employed.

<sup>▲</sup> The dc component must not exceed 100 volts.

→ Indicates a change.

SEPT. 1, 1955

DATA

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History



6BK5

# 6BK5 BEAM POWER TUBE

9-PIN MINIATURE TYPE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . .	6.3	ac or dc volts
Current . . . . .	1.2	amp

Direct Interelectrode Capacitances:<sup>o</sup>

Grid No.1 to plate . . . . .	0.6	$\mu\text{f}$
Grid No.1 to cathode & grid No.3, grid No.2, and heater. . . . .	13	$\mu\text{f}$
Plate to cathode & grid No.3, grid No.2, and heater. . . . .	5	$\mu\text{f}$

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	2-5/8"
Maximum Seated Length . . . . .	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip). . . . .	2" $\pm$ 3/32"
Maximum Diameter . . . . .	7/8"
Bulb . . . . .	T-6-1/2
Base . . . . .	Small-Button Noval 9-Pin (JETEC No.E9-1)
Basing Designation for BOTTOM VIEW . . . . .	9BQ

- |                       |                               |
|-----------------------|-------------------------------|
| Pin 1 - Plate         | Pin 6 - Cathode,<br>Grid No.3 |
| Pin 2 - No Connection | Pin 7 - Grid No.1             |
| Pin 3 - Grid No.1     | Pin 8 - Grid No.2             |
| Pin 4 - Heater        | Pin 9 - No Connection         |
| Pin 5 - Heater        |                               |



## AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings. Design-Center Values:

PLATE VOLTAGE . . . . .	250 max.	volts
GRID-No.2 (SCREEN) VOLTAGE . . . . .	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive bias value . . . . .	0 max.	volts
GRID-No.2 INPUT . . . . .	2.5 max.	watts
PLATE DISSIPATION . . . . .	9 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 and Characteristics:

Plate Voltage . . . . .	250	volts
Grid-No.2 Voltage . . . . .	250	volts
Grid-No.1 Voltage . . . . .	-5	volts
Peak AF Grid-No.1 Voltage . . . . .	5	volts
Zero-Signal Plate Current . . . . .	35	ma
Max.-Signal Plate Current (Approx.) . . . . .	37	ma
Zero-Signal Grid-No.2 Current . . . . .	3.5	ma

<sup>o</sup> without external shield.

MAY 1, 1955

TENTATIVE DATA

6BK5



6BK5

## BEAM POWER TUBE

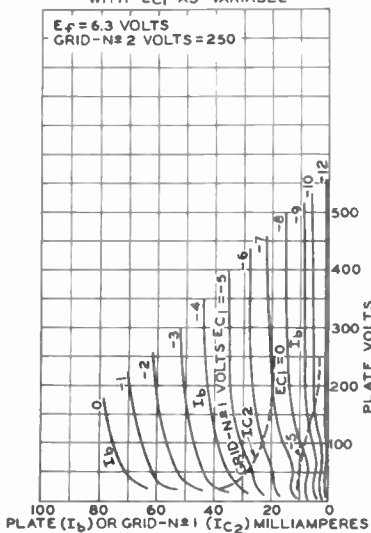
Max.-Signal Grid-No.2 Current (Approx.) . . . . .	10	ma
Plate Resistance (Approx.) . . . . .	0.1	megohm
Transconductance . . . . .	8500	$\mu$ mhos
Load Resistance . . . . .	6500	ohms
Total Harmonic Distortion (Approx.) . . . . .	7	%
Power Output . . . . .	3.5	watts

**Maximum Circuit Values:**

Grid-No.1-Circuit Resistance:

For fixed-bias operation . . . . .	0.1 max. megohm
For cathode-bias operation . . . . .	0.5 max. megohm

**AVERAGE PLATE CHARACTERISTICS  
WITH  $E_{C1}$  AS VARIABLE**



MAY 1, 1955

TUBE DIVISION

TENTATIVE DATA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



6BY5-GA

# 6BY5-GA FULL-WAVE VACUUM RECTIFIER

For Television Damper Service

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathodes:

Voltage . . . . . 6.3 . . . . . ac or dc volts  
Current . . . . . 1.6 . . . . . amp

### Mechanical:

Mounting Position . . . . . Any  
Maximum Overall Length . . . . . 3 7/8"  
Maximum Seated Length . . . . . 3-5/16"  
Maximum Diameter . . . . . 1-9/16"  
Bulb . . . . . T-12

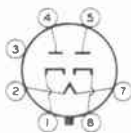
Base . . . . . Medium-Shell Octal 7-Pin (JETEC No. B7-12),  
or Short-Medium-Shell Octal 7-Pin  
with External Barriers (JETEC No. B7-119)

Basing Designation for BOTTOM VIEW . . . . . 6CN

Pin 1 - Cathode of  
Unit No. 2

Pin 2 - Heater

Pin 3 - No Connection - Do  
Not Use\*



Pin 4 - Plate of  
Unit No. 2

Pin 5 - Plate of  
Unit No. 1

Pin 7 - Heater

Pin 8 - Cathode of  
Unit No. 1

## DAMPER SERVICE

Values are for Each Unit

Maximum Ratings, Design-Center Values Except as Noted:

For operation in a 525-line, 30-frame system<sup>□</sup>

### PEAK INVERSE PLATE VOLTAGE

(Absolute maximum)<sup>#</sup> . . . . . 3000<sup>■</sup> max. volts

PEAK PLATE CURRENT . . . . . 525 max. ma

DC PLATE CURRENT . . . . . 175 max. ma

### PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . . . . . 450 max. volts

Heater positive with respect to cathode . . . . . 100 max. volts

\* Socket terminal no. 3 should not be used as tie point.

□ As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations", Federal Communications Commission.

<sup>#</sup> This rating is applicable where the duty cycle of the voltage pulse does not exceed 15 per cent of one horizontal scanning cycle. In a 525-line, 30-frame system, 15 per cent of one horizontal scanning cycle is 10 microseconds.

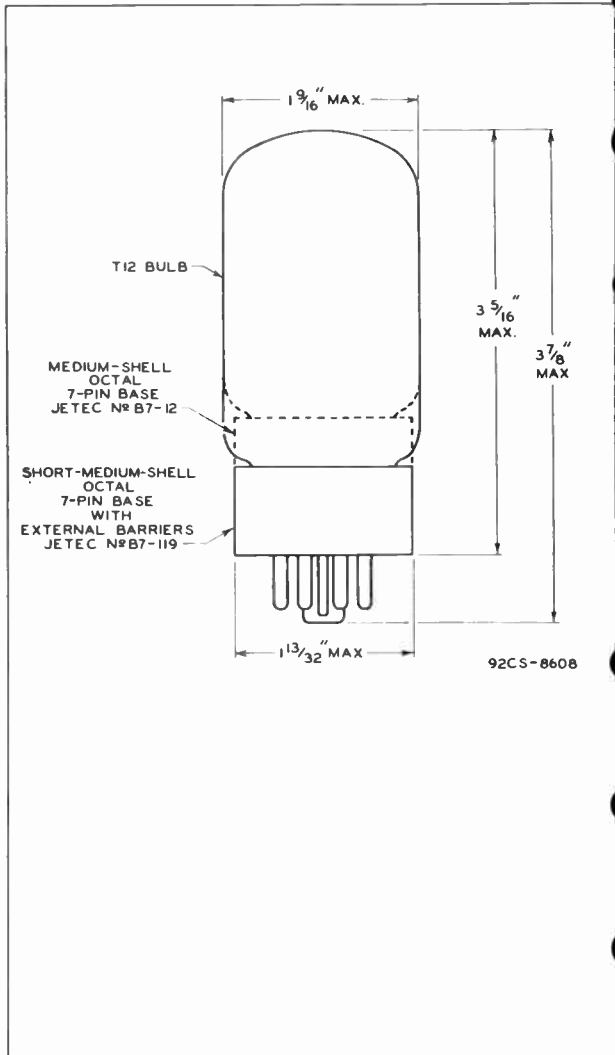
<sup>■</sup> Under no circumstances should this absolute value be exceeded.

6BY5-GA



6BY5-GA

# FULL-WAVE VACUUM RECTIFIER



MAY 1, 1955

TUBE DIVISION

CE-8608

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



6C5  
6C5-GT/G

## 6C5, 6C5-GT/G

## DETECTOR AMPLIFIER TRIODE

Heater		Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts	
Current	0.3	amp.	
	6C5	6C5-GT/G	
Direct Interelectrode Cap.	▲	▲▲	
Grid to Plate	2.0	2.2	μf
Grid to Cathode	3.0	4.4	μf
Plate to Cathode	11	12	μf
Maximum Overall Length	2-5/8"	3-5/16"	
Maximum Seated Height	2-1/16"	2-3/4"	
Maximum Diameter	1-5/16"	1-5/16"	
Bulb	Metal Shell, MT-8	T-9	
Base	{ Small Wafer { Octal 6-Pin	{ Small Wafer { Octal 6-Pin, Sleeve	
Basing Designation	60	GT-6Q	
Pin 1	{ 6C5, Shell { 6C5-GT/G, Sleeve	Pin 5 - Grid	
Pin 2 - Heater		Pin 7 - Heater	
Pin 3 - Plate		Pin 8 - Cathode	
Mounting Position		Any	



BOTTOM VIEW

Maximum And Minimum Ratings Are Design-Center Values

## AMPLIFIER

Plate Voltage	300 max. volts
Grid Voltage	0 min. volts
Plate Dissipation	2.5 max. watts

Characteristics - Class A<sub>2</sub> Amplifier:

Plate Voltage	250	volts
Grid Voltage *	-8	volts
Amplification Factor	20	
Plate Resistance	10000	ohms
Transconductance	2000	μmhos
Plate Current	8	ma.

## Typical Operation with Resistance Coupling:

See RESISTANCE-COUPLED AMPLIFIER CHART.

## DETECTOR

## Typical Operation:

	Biased	Grid Leak	
Plate Voltage	250	45 to 100	volts
Grid Voltage	-17 approx.	Return to cathode	volts
Plate Current	Adjusted to 0.2 ma. with no input signal	-	
Grid Leak	-	0.1 to 1.0	megohm
Grid Condenser	-	0.00005 to 0.0005	μf

■ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

▲▲ with shell of 6C5 connected to cathode. Values are approximate.

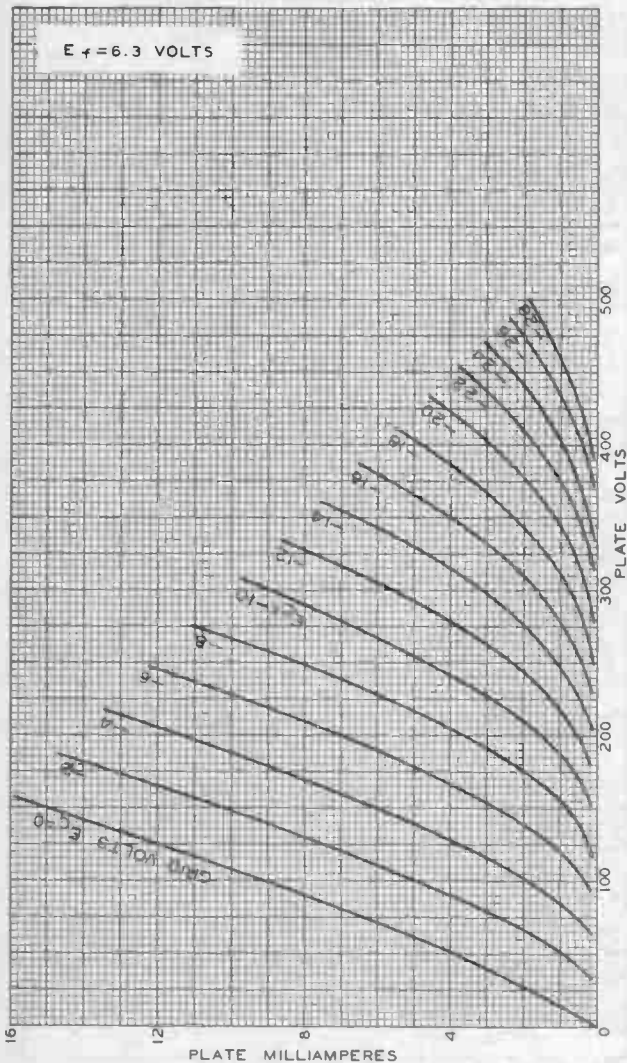
\* with external shield connected to cathode. Values are approximate, under maximum rated conditions, the resistance in the grid circuit should not exceed 1.0 megohm.

6C5



6C5

# AVERAGE PLATE CHARACTERISTICS

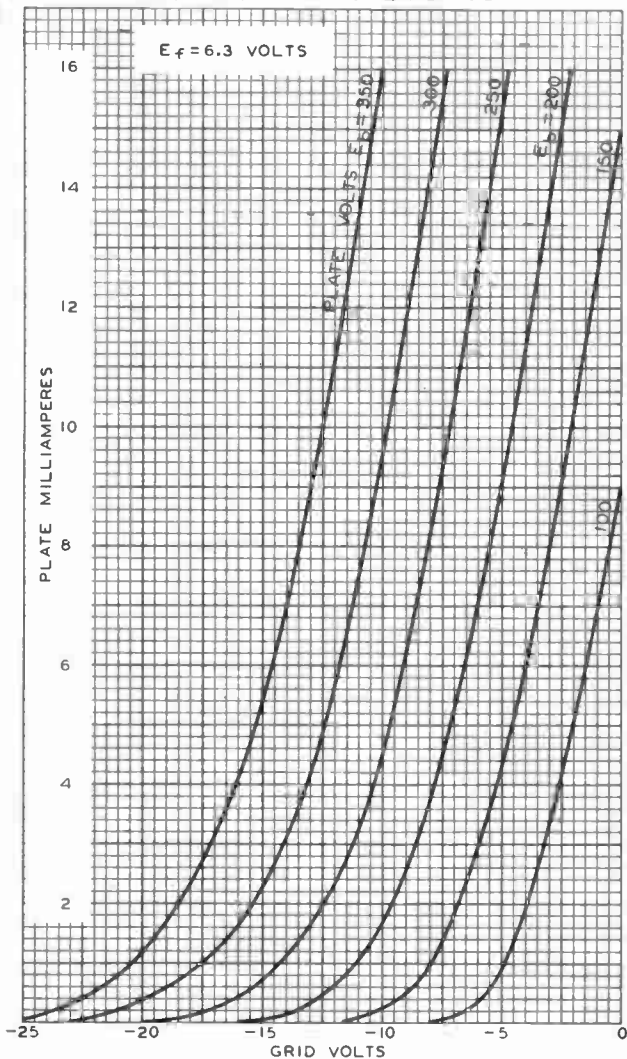


JULY 23, 1935

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY  
World Radio History

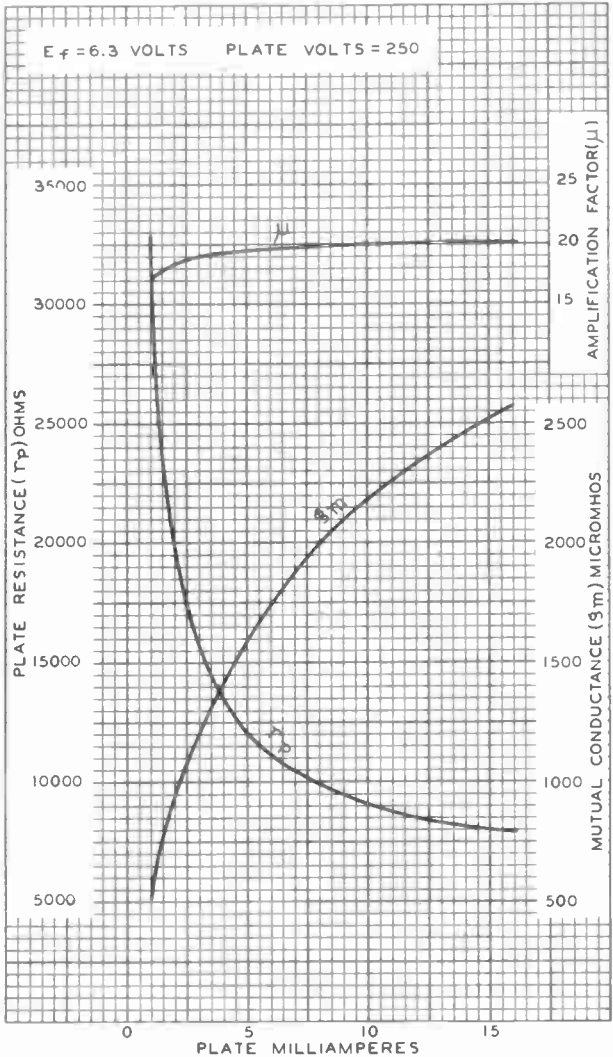
92C-4441

AVERAGE CHARACTERISTICS



6C5

AVERAGE CHARACTERISTICS





6C6

6C6

# SHARP-CUTOFF PENTODE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . .	6.3	. . . . .	ac or dc volts
Current. . . . .	0.3	. . . . .	amp

Direct Interelectrode Capacitances:

Pentode Connection:

Grid No.1 to Plate <sup>0</sup> .	0.007 max.	. . . . .	$\mu\mu\text{f}$
Input <sup>00</sup> .	5	. . . . .	$\mu\mu\text{f}$
Output <sup>00</sup> .	6.5	. . . . .	$\mu\mu\text{f}$

Triode Connection<sup>00</sup>:

Grid No.1 to Plate .	2	. . . . .	$\mu\mu\text{f}$
Grid No.1 to Cathode	3	. . . . .	$\mu\mu\text{f}$
Plate to Cathode . .	10.5	. . . . .	$\mu\mu\text{f}$

<sup>0</sup> with external shield connected to cathode.

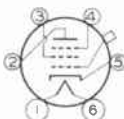
<sup>00</sup> with no external shield.

\* with grid No.2 and grid No.3 connected to plate.

### Mechanical:

Mounting Position. . . . .	. . . . .	Any
Maximum Overall Length . . . . .	. . . . .	4-15/16"
Seated Length. . . . .	. . . . .	4-3/16" $\pm$ 1/8"
Maximum Diameter . . . . .	. . . . .	1-9/16"
Bulb . . . . .	. . . . .	ST-12
Cap. . . . .	. . . . .	Small
Base . . . . .	Small-Shell	Small 6-Pin
Basing Designation for BOTTOM VIEW . . . . .	. . . . .	6F

Pin 1- Heater  
 Pin 2- Plate  
 Pin 3- Grid No.2  
 Pin 4- Grid No.3



Pin 5- Cathode,  
 Internal  
 Shield  
 Pin 6- Heater  
 Cap - Grid No.1

*Maximum Ratings, Characteristics, and Typical Operating Conditions are the same as for Type 6J7.*

*Curves for Type 6C6 are the same as those for Type 6J7.*

*For additional data, see RESISTANCE-COUPLED AMPLIFIER CHARTS at the front of this Section.*





6C8-G

6C8-G



## TWIN-TRIODE AMPLIFIER

Heater <sup>■</sup> Coated Unipotential Cathodes  
 Voltage 6.3 a-c or d-c volts  
 Current 0.3 amp.

Direct Interelectrode Capacitances (Approx.):

	Triode Unit $T_1$	Triode Unit $T_2$	
Grid to Plate	2.6	1.8	$\mu\text{f}$
Grid to Cathode	2.6	1.3	$\mu\text{f}$
Plate to Cathode	2.0	2.2	$\mu\text{f}$
Grid to Grid		0.1	$\mu\text{f}$
Plate to Plate		7.0	$\mu\text{f}$

Overall Length 4-7/32" to 4-15/32"

Seated Height 3-21/32" to 3-29/32"

Maximum Diameter 1-9/16"

Bulb ST-12

Cap Skirted Miniature, Style A

Base Small Shell Octal 8-Pin

Pin 1 - No Connection	Pin 6 - Plate (Triode $T_1$ )
Pin 2 - Heater	Pin 7 - Heater
Pin 3 - Plate (Triode $T_2$ )	Pin 8 - Cathode (Triode $T_1$ )
Pin 4 - Cathode (Triode $T_2$ )	Cap - Grid (Triode $T_2$ )
Pin 5 - Grid (Triode $T_1$ )	

Mounting Position Any

BOTTOM VIEW (G-8G)

EACH TRIODE UNIT

Plate Voltage 250 max. volts

Grid Voltage 0 min. volts

Plate Dissipation 1.0 max. watt

Characteristics - Class  $A_1$  Amplifier:

Plate	250	volts
Grid	-4.5	volts
Amp. Fact.	36	
Plate Res.	22500	ohms
Transcond.	1600	$\mu\text{mhos}$
Plate Cur.	3.2	ma.

Typical Operation - Resistance-Coupled Amplifier:

See RESISTANCE-COUPLED AMPLIFIER CHART.

<sup>■</sup> In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

← Indicates a change.

Dec. 1, 1941

RCA RADIONRON DIVISION  
RCA MANUFACTURING COMPANY INC.

World Radio History

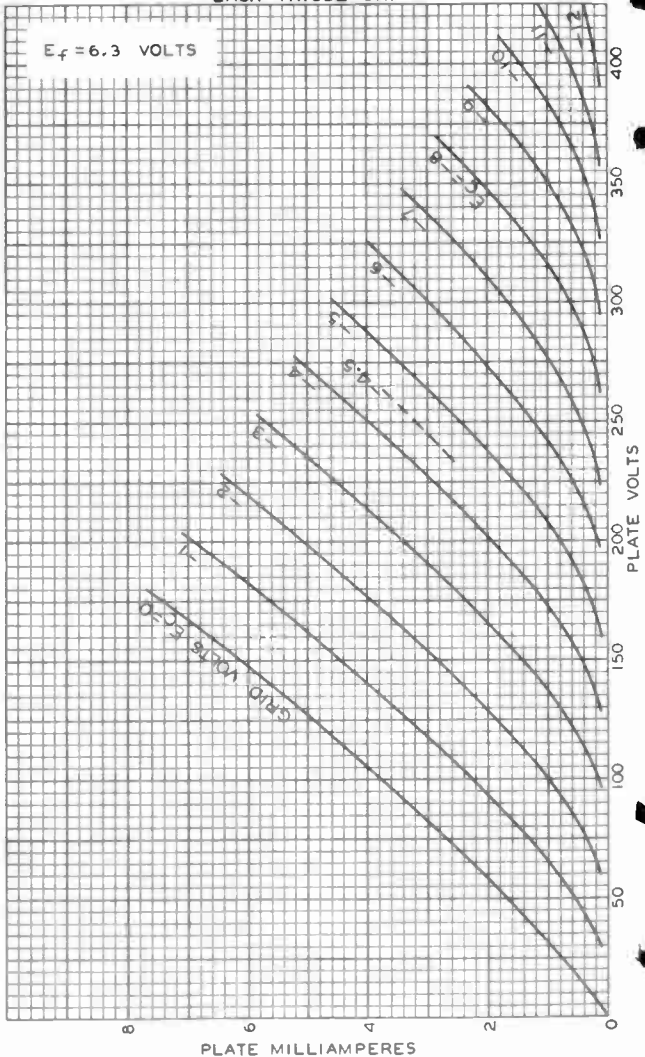
DATA

6C8-G



6C8-G

### AVERAGE PLATE CHARACTERISTICS EACH TRIODE UNIT



SEPT. 18, 1941

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.  
World Radio History

92C-4957RI





6D6

6D6



## TRIPLE-GRID SUPER-CONTROL AMPLIFIER

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.3	amp.
Direct Interelectrode Capacitances:		
Grid to Plate	0.007 max. <sup>o</sup>	$\mu\text{f}$
Input	4.7	$\mu\text{f}$
Output	6.5	$\mu\text{f}$
Overall Length		4-11/16" to 4-15/16"
Seated Height		4-1/16" to 4-5/16"
Maximum Diameter		1-9/16"
Bulb		ST-12
Cap		Small Metal
Base		Small 6-Pin
Pin 1 - Heater		Pin 5 - Cathode
Pin 2 - Plate		Pin 6 - Heater
Pin 3 - Screen		Cap - Grid
Pin 4 - Suppressor		
Mounting Position	BOTTOM VIEW (6F)	Any



- In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.
- With close-fitting shield connected to cathode.

Maximum Ratings, Typical Operating Conditions and Curves are the same as for Type 6U7-G.

— Indicates a change.

Sept. 2, 1941

RCA RADIODRON DIVISION  
RCA MANUFACTURING COMPANY INC.

World Radio History

DATA

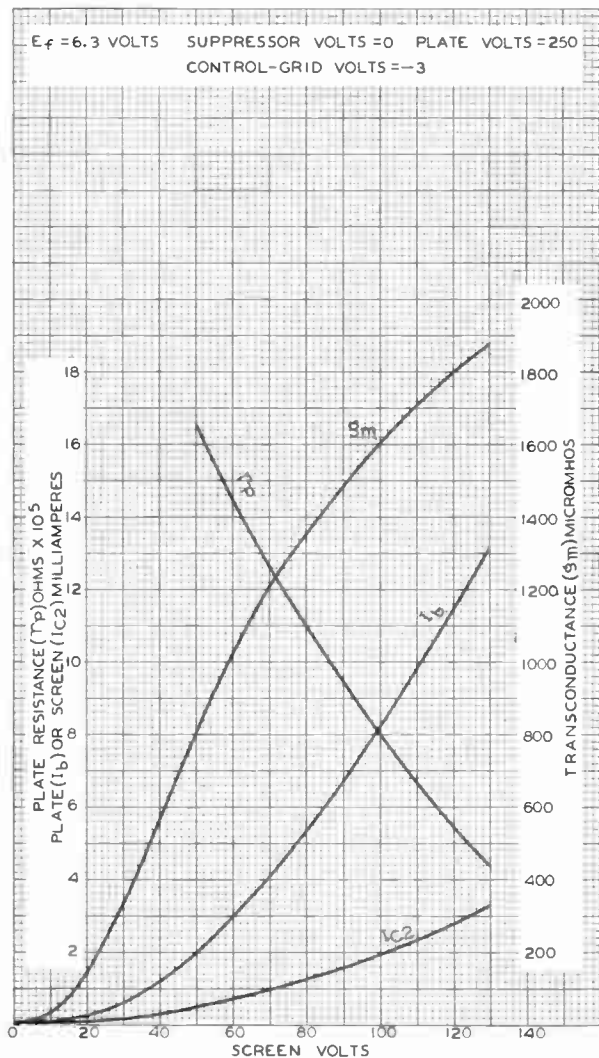
6D6



6D6

## AVERAGE CHARACTERISTICS

$E_f = 6.3$  VOLTS    SUPPRESSOR VOLTS = 0    PLATE VOLTS = 250  
 CONTROL-GRID VOLTS = -3



JULY 31, 1941

RCA RADIOTRON DIVISION  
 RCA MANUFACTURING COMPANY, INC.  
 World Radio History

92C - 4743RI



6F5  
6F5-GT

# 6F5, 6F5-GT HIGH-MU TRIODE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3 . . . . . ac or dc volts  
Current. . . . . 0.3 . . . . . amp

Direct Interelectrode Capacitances (Approx.):

	6F5 <sup>o</sup>	6F5-GT <sup>oo</sup>
Grid to Plate. . . . .	2.4	2.8 . . . μf
Grid to Cathode. . . . .	5.5	2.2 . . . μf
Plate to Cathode . . . . .	4.0	3.2 . . . μf

<sup>o</sup> with shell connected to cathode.

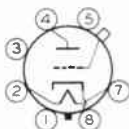
<sup>oo</sup> with no external shield.

### Mechanical:

Mounting Position. . .	Any	Any
Maximum Overall Length	3-1/8"	3-5/16"
Seated Length. . . . .	2-7/16" ± 1/8"	2-5/16"—2-3/4"
Maximum Diameter . . .	1-5/16"	1-5/16"
Bulb . . . . .	Metal Shell, MTT8A	T-9
Cap . . . . .	Miniature	Miniature
Base . . . . .	Small-Wafer Octal 7-Pin	Intermed. Shell Octal 7-Pin
Basing Designation .	5M <sub>1</sub>	G-5M <sub>1</sub>

### BOTTOM VIEW

Pin 1 { 6F5, Shell  
6F5-GT, No  
Connection  
Pin 2 - Heater  
Pin 3 - No  
Connection



Pin 4 - Plate  
Pin 5 - No  
Connection  
Pin 7 - Heater  
Pin 8 - Cathode  
Cap - Grid

*Maximum Ratings and Characteristics for the 6F5 and 6F5-GT are the same as shown for Type 6SF5. Typical Operating Conditions are shown in the RESISTANCE-COUPLED AMPLIFIER CHART at front of this Section.*

Curve under Type 6SF5 also applies to the 6F5 and 6F5-GT.

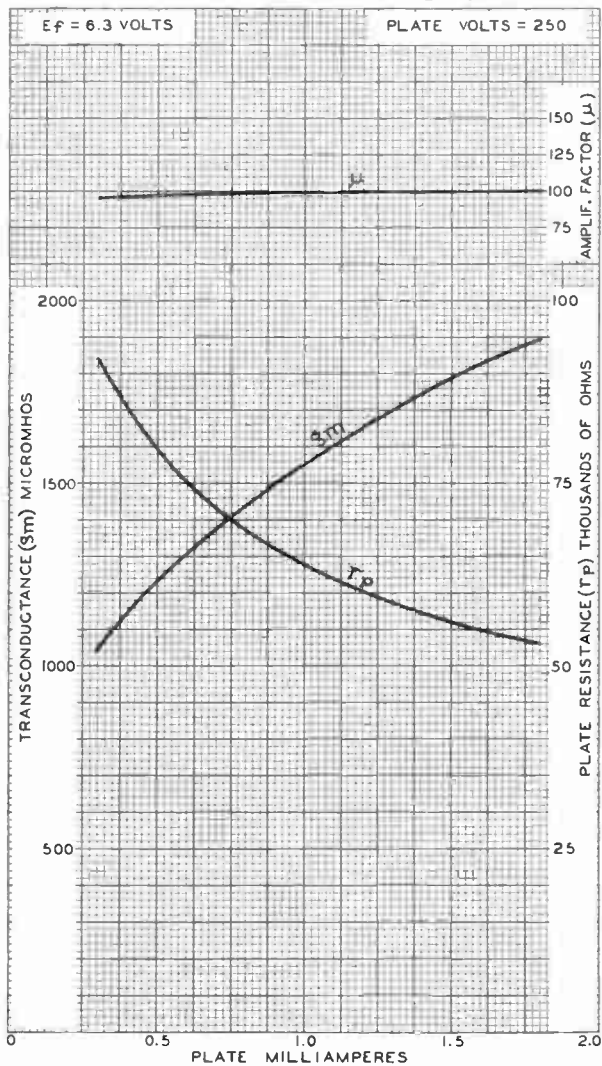
← Indicates a change.

6F5



6F5

## AVERAGE CHARACTERISTICS



SEPT. 4, 1935

TUBE DEPARTMENT

92CM-4470

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History



6F6-G

POWER PENTODE

6F6-G  
6F6-GT

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:	
Voltage . . . . .	6.3 . . . . . ac or dc volts
Current . . . . .	0.7 . . . . . amp
Direct Inter-Element Capacitances (Approx.):	
Grid No. 1 to plate . . . . .	0.1 $\mu$ f
Grid No. 2 to cathode & grid No. 3, grid No. 2, and heater . . . . .	5 $\mu$ f
Plate to cathode & grid No. 3, grid No. 2, and heater . . . . .	8.5 $\mu$ f

Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	4-5/8"
Maximum Seated Length . . . . .	4-1/16"
Maximum Diameter . . . . .	1-13/16"
Dimensional Outline . . . . .	See General Section
Style . . . . .	ST-14
Base . . . . .	Medium-Shell Octal 7-Pin (JEDEC No. 67-12)
Base Designation for BOTTOM VIEW . . . . .	7S

- Pin 1 - No connection
- Pin 2 - Heater
- Pin 3 - Plate
- Pin 4 - Grid No. 2



- Pin 5 - Grid No. 1
- Pin 7 - Heater
- Pin 8 - Cathode, Grid No. 3

Additional data and curves for the 6F6-G are the same as those shown under type 6F6

without external shield.

← indicates a change.

6F6-GT

POWER PENTODE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:	
Voltage . . . . .	6.3 . . . . . ac or dc volts
Current . . . . .	0.7 . . . . . amp

Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	3-7/16"
Maximum Seated Length . . . . .	2-7/8"
Maximum Diameter . . . . .	1-9/32"

6F6-GT



6F6-GT

POWER PENTODE

Dimensional Outline. . . . . See General Section

Bulb . . . . . T-9

Base . . . . . Intermediate-Shell Octal 7-Pin (JETEC No. B7-7),

Short Intermediate-Shell Octal 7-Pin (JETEC No. B7-47),

Intermediate-Shell Octal 6-Pin (JETEC No. B6-81),

or Short Intermediate-Shell Octal 6-Pin

with External Barriers (JETEC No. B6-84)

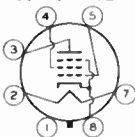
Basing Designation for BOTTOM VIEW . . . . . 75

Pin 1 ♦ - No Connection

Pin 2 - Heater

Pin 3 - Plate

Pin 4 - Grid No. 2



Pin 5 - Grid No. 1

Pin 7 - Heater

Pin 8 - Cathode,  
Grid No. 3

Additional data and curves for the 6F6-GT are the same as those shown under type 6F6

♦ Pin 1 as well as pin 6 is omitted on the 6-pin bases.

## RCA-6F7 TRIODE-PENTODE

Heater: Coated Uni-potential Cathode  
 Voltage 6.3 a-c or d-c volts  
 Current 0.3 amp.

**Direct Interelectrode Capacitances:**

<b>Triode Unit:</b>			
Grid to Plate	2.0		μf
Grid to Cathode	2.5		μf
Plate to Cathode	3.0		μf
<b>Pentode Unit:</b>			
Grid to Plate	0.008 max. <sup>o</sup>		μf
Input	3.2		μf
Output	12.5		μf

Overall Length 4-9/32" to 4-17/32"  
 Maximum Diameter 1-0/16"  
 Bulb ST-12  
 Cap Small Metal  
 Base Small 7-Pin <sup>Δ</sup>



Pin 5-Triode Grid  
 Pin 6-Cathode  
 Pin 7-Heater  
 Cap -Pentode Grid

BOTTOM VIEW

AMPLIFIER SERVICE

	<u>Triode Unit</u>	<u>Pentode Unit</u>		
Plate Voltage	100 max.	100	250 max.	volts
Screen Voltage	-	100	100 max.	volts
Grid Voltage	-3	-3	-3 min.	volts
Amp. Fact.	8	300	900	
Plate Res.	16000	290000	850000	ohms
Mut. Cond.	500	1050	1100	μmhos
Mut. Cond. at -35 volts bias	-	9	10	μmhos
Plate Cur.	3.5	6.3	6.5	ma.
Screen Cur.	-	1.6	1.5	ma.

CONVERTER SERVICE

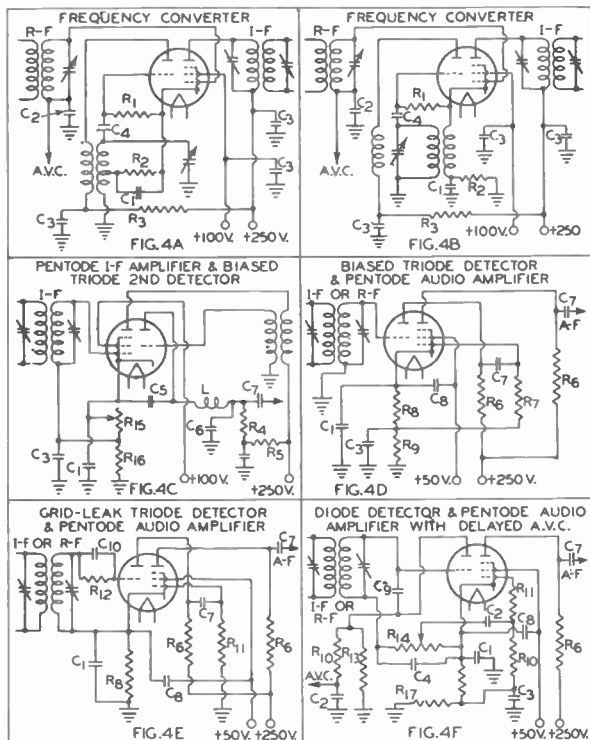
	<u>Triode Unit</u>	<u>Pentode Unit</u>		
Plate Voltage	100 max.	250 max.		volts
Screen Voltage	-	100 max.		volts
Grid Voltage	##	-3 min.*		volts
Oscillator Plate Cur. (av.)	4 max.	-		ma.
<b>Typical Operation:</b>				
Plate	100 <sup>o</sup>	250		volts
Screen	-	100 <sup>oo</sup>		volts
Grid Bias	##	-10 <sup>oo</sup>		volts
Plate Resistance	-	2		megohms
Conversion Conductance	-	300		μmhos
D-c Plate Current	2.4	2.8		ma.
D-c Grid Current	0.15	0		ma.
Screen Current	-	0.6		ma.
Oscillator Peak Voltage Input	-	7		volts

- ## Usually obtained by means of a grid leak.
- \*\* Grid bias should be at least .3 volts greater than the peak oscillator voltage applied to the pentode grid.
- <sup>o</sup> May be obtained from 250-volt source through 60000-ohm dropping resistor.
- <sup>oo</sup> Obtained by means of 1700-ohm self-biasing (cathode) resistor.
- \* In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.
- <sup>Δ</sup> Requires different socket than medium 7-pin base.
- <sup>•</sup> With shield-can.

6F7

RCA-6F7

## TYPICAL CIRCUITS



## APPROXIMATE VALUES

$C_1 = 5 \mu\text{f}$   
 $C_2 = 0.05 \mu\text{f}$   
 $C_3 = 0.1 \mu\text{f}$   
 $C_4 = 0.0002 \mu\text{f}$   
 $C_5 = 0.0024 \mu\text{f}$   
 $C_6 = 0.00016 \mu\text{f}$   
 $C_7 = 0.01 \mu\text{f}$   
 $C_8 = 0.5 \mu\text{f}$   
 $C_9 = 0.0005 \text{ TO } 0.001 \mu\text{f}$   
 $C_{10} = 0.00025 \mu\text{f}$   
 L = I-F CHOKE COIL  
 $R_1$  = OSCILLATOR GRID LEAK-0.1 MEGOHM

$R_2$  = PENTODE SELF-BIASING RESISTOR-1500 OHMS  
 $R_3$  = VOLTAGE DROPPING RESISTOR-50000 OHMS  
 $R_4$  = PLATE COUPLING RESISTOR-170000 OHMS  
 $R_5$  = FILTER RESISTOR-3000 OHMS  
 $R_6$  = PLATE COUPLING RESISTOR-300000 OHMS  
 $R_7$  = PENTODE GRID LEAK-0.5 MEGOHM  
 $R_8$  = PENTODE SELF-BIASING RESISTOR-5000 OHMS  
 $R_9$  = 10000 OHMS.  $R_9 + R_8$  = TRIODE BIASING RESISTOR  
 $R_{10}$  = FILTER RESISTOR-1.0 MEGOHM  
 $R_{11}$  = GRID RESISTOR-50000 OHMS  
 $R_{12}$  = TRIODE GRID LEAK-1.0 MEGOHM  
 $R_{13}$  = A.V.C. DIODE LOAD-1.0 MEGOHM  
 $R_{14}$  = A-F DIODE-LOAD POTENTIOMETER-0.5 MEGOHM  
 $R_{15}$  = PENTODE SELF-BIASING RES. 4000 OHMS VAR.  
 $R_{16}$  = 1500 OHMS.  $R_{16} + R_{15}$  = TRIODE BIASING RESISTOR

The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained herein is furnished without assuming any obligations.





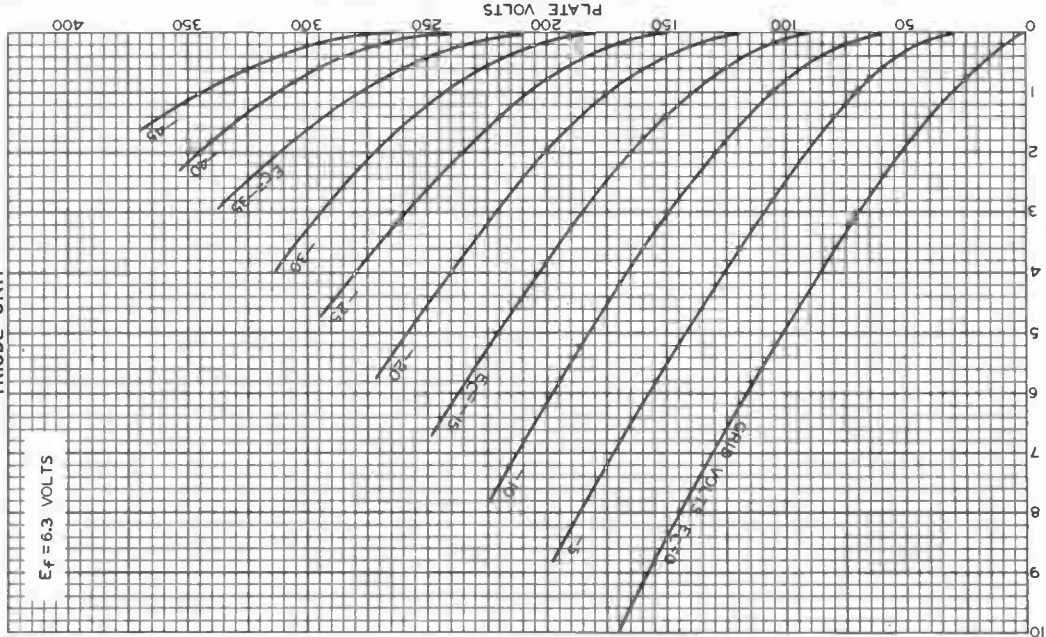
RCA-6F7



C-6F7

6F7

### AVERAGE PLATE CHARACTERISTICS TRIODE UNIT



**RCA** Radiotron

RCA-6F7

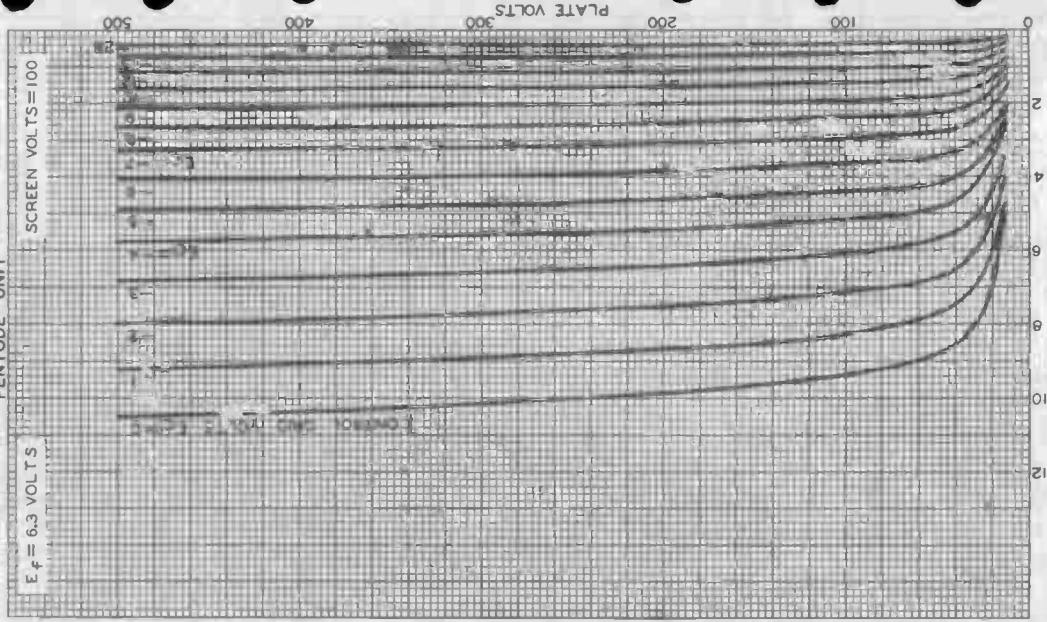
*Cunningham*  
RADIO TUBES  
C-6F7

6F7

AVERAGE PLATE CHARACTERISTICS  
PENTODE UNIT

$E_f = 6.3$  VOLTS

SCREEN VOLTS = 100



AUG. 18, 1933

925-5360



6F8-G

6F8-G

## TWIN-TRIODE AMPLIFIER

Heater <sup>Ⓜ</sup>      Coated Unipotential Cathodes  
 Voltage                      6.3                      a-c or d-c volts  
 Current                      0.6                      amp.

Direct Interelectrode Capacitances (Approx.):<sup>0</sup>

	Triode Unit $T_1$	Triode Unit $T_2$	
Grid to Plate	3.8	3.2	$\mu\text{f}$
Grid to Cathode	3.2	1.9	$\mu\text{f}$
Plate to Cathode	1.0	1.9	$\mu\text{f}$

Maximum Overall Length	4-15/32"
Maximum Seated Height	3-29/32"
Maximum Diameter	1-9/16"

Bulb                      ST-12  
 Cap                      Skirted Miniature  
 Base                      Small Shell Octal 8-Pin

Pin 1 - No Connection

Pin 2 - Heater

Pin 3 - Plate  $T_2$ Pin 4 - Cathode  $T_2$ Pin 5 - Grid  $T_1$ Pin 6 - Plate  $T_1$ 

Pin 7 - Heater

Pin 8 - Cathode  $T_1$ Cap - Grid  $T_2$ 

Mounting Position      BOTTOM VIEW (G-8G)      Any

For convenience, one triode unit is identified as  $T_1$ ; the other as  $T_2$

Maximum And Minimum Ratings Are Design-Center Values

## AMPLIFIER - Each Unit

Plate Voltage	300 max.	volts
Grid Voltage	0 min.	volts
Plate Dissipation	2.5 max.	watts

Characteristics - Class  $A_1$  Amplifier:

Plate	90	250	volts
Grid	0	-8	volts
Amp. Fact.	20	20	
Plate Res.	6700	7700	ohms
Transcond.	3000	2600	$\mu\text{mhos}$
Plate Cur.	10	9	ma.

Typical Operation with Resistance Coupling:

See RESISTANCE-COUPLED AMPLIFIER CHART.

- In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.
- with no external shield.

Curves under Type 6J5 apply to each unit of the 6F8-G.

← Indicates a change.

Jan. 1, 1943

RCA VICTOR DIVISION  
 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

DATA





6G6-G

6G6-G

**POWER AMPLIFIER PENTODE**

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.15	amp.
Direct Interelectrode Capacitances (Approx.): <sup>o</sup>		
Grid to Plate	0.5	$\mu$ f
Input	5.5	$\mu$ f
Output	7.0	$\mu$ f
Maximum Overall Length		4-1/8"
Maximum Seated Height		3-9/16"
Maximum Diameter		1-9/16"
Bulb		5T-12
Base	Small Shell Octal 7-Pin	
Pin 1—No Connection		Pin 5—Grid
Pin 2—Heater		Pin 7—Heater
Pin 3—Plate		Pin 8—Cathode
Pin 4—Screen		
Mounting Position	BOTTOM VIEW (IG-7S1)	Any

*Maximum Ratings Are Design-Center Values*AMPLIFIER - Pentode Connection

Plate Voltage	300 max. volts	
Screen Voltage	300 max. volts	←
Plate Dissipation	2.75 max. watts	
Screen Dissipation	0.75 max. watt	
D-C Heater-Cathode Potential	90 max. volts	←

Typical Operation and Characteristics— Class A<sub>1</sub> Amplifier:

Plate Voltage	135	180	volts
Screen Voltage	135	180	volts
Grid Voltage*	-6	-9	volts
Peak A-F Grid Voltage	6	9	volts
Zero-Sig. Plate Cur.	11.5	15	ma.
Zero-Sig. Screen Cur.	2	2.5	ma.
Plate Resistance	0.170	0.175	megohm
Transconductance	2100	2300	$\mu$ hos
Load Resistance	12000	10000	ohms
Total Harmonic Dist.	7.5	10	%
Max.-Sig. Power Output	0.6	1.1	watts

AMPLIFIER - Triode Connection<sup>▲</sup>

Plate Voltage	300 max. volts	←
Plate Dissipation	3.5 max. watts	←
D-C Heater-Cathode Potential	90 max. volts	←

Typical Operation and Characteristics — Class A<sub>1</sub> Amplifier:

Plate Voltage	180	volts
Grid Voltage*	-12	volts
Peak A-F Grid Voltage	12	volts
Amplification Factor	9.5	
Plate Resistance	4750	ohms
Transconductance	2000	$\mu$ hos
Plate Current	11	ma.

← Indicates a change.

<sup>o</sup>, <sup>▲</sup>, \* : See next page.

APRIL 1, 1944

RCA VICTOR DIVISION

DATA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

6G6-G



6G6-G

## POWER AMPLIFIER PENTODE

(continued from preceding page)

Load Resistance	12000	ohms
Total Harmonic Distortion	5	%
Max.-Sig. Power Output	0.25	watt

- with no external shield.
- Under maximum rated conditions, the d-c resistance in the grid circuit may be as high as 0.5 megohm with cathode bias or 0.1 megohm with fixed bias.
- ▲ With screen connected to plate.

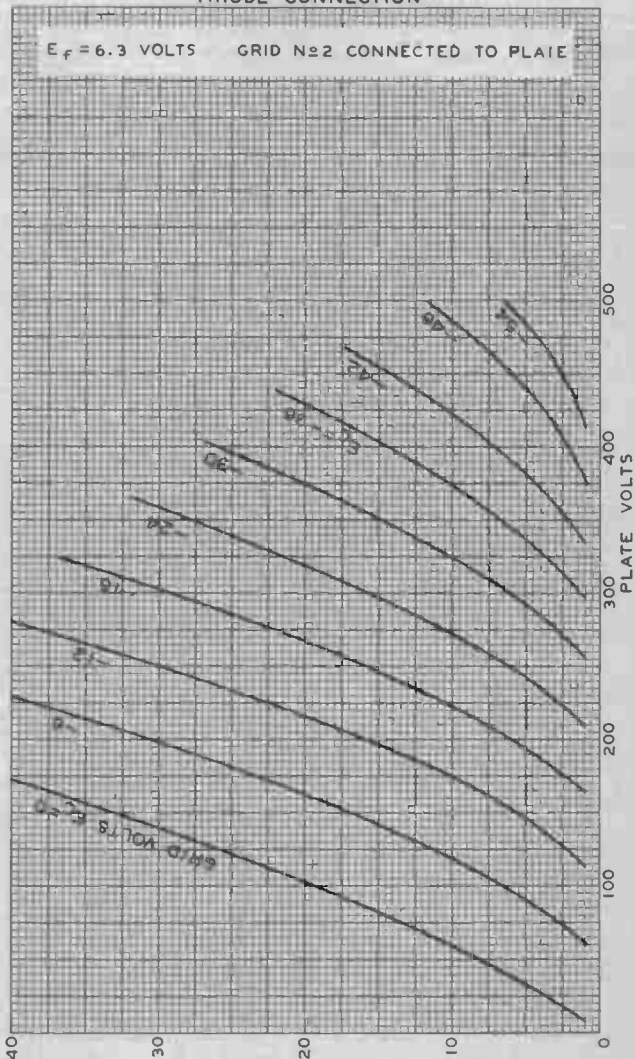


6G6-G

6G6-G

# AVERAGE PLATE CHARACTERISTICS TRIODE CONNECTION

$E_f = 6.3$  VOLTS      GRID N<sub>2</sub> CONNECTED TO PLATE



AUG. 12, 1943

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

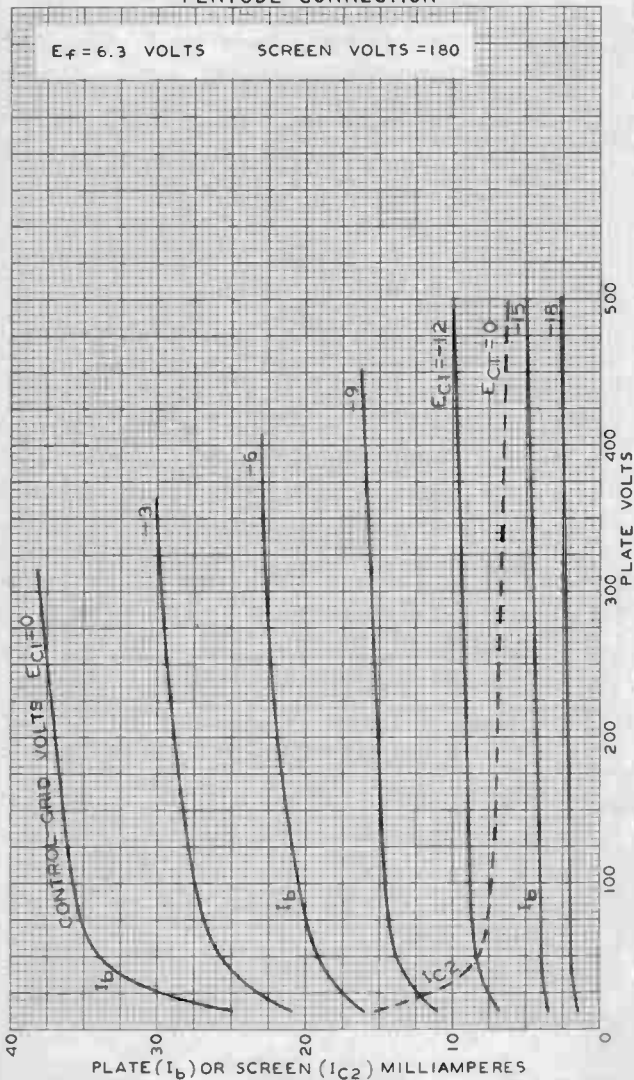
92CM-6122R1

6G6-G



# 6G6-G AVERAGE PLATE CHARACTERISTICS PENTODE CONNECTION

$E_f = 6.3$  VOLTS      SCREEN VOLTS = 180



AUG. 19, 1943

RCA VICTOR DIVISION

92CM-4956R1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History





6J5  
6J5-GT

# 6J5, 6J5-GT MEDIUM-MU TRIODE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . .	6.3	ac or dc volts
Current. . . . .	0.3	amp

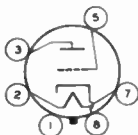
	6J5	6J5-GT	
Direct Interelectrode Cap. (Approx.):	-	▲▲	
Grid to Plate. . . . .	3.4	3.8	μμf
Grid to Cathode. . . . .	3.4	4.2	μμf
Plate to Cathode. . . . .	3.6	5.0	μμf

▲▲ with No. 308 shield connected to cathode.

### Mechanical:

Mounting Position. . . . .	Any	Any
Maximum Overall Length. . . . .	2-5/8"	3-5/16"
Maximum Seated Height. . . . .	2-1/16"	2-3/4"
Maximum Diameter. . . . .	1-5/16"	1-5/16"
Bulb . . . . .	Metal Shell, MT8G	T-9
Ease . . . . .	{ Small-Wafer Octal 6-Pin	{ Sm.-Wafer Octal 6-Pin, Sleeve GT-6Q
Basing Designation for BOTTOM VIEW	6Q	GT-6Q

- Pin 1 { 6J5, Shell  
6J5-GT, Base  
Sleeve
- Pin 2 - Heater



- Pin 3 - Plate
- Pin 5 - Grid
- Pin 7 - Heater
- Pin 8 - Cathode

## AMPLIFIER- Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	300 max.	volts
GRID VOLTAGE . . . . .	0 max.	volts
CATHODE CURRENT. . . . .	20 max.	ma
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 and Characteristics:

Plate Voltage. . . . .	90	250	volts
Grid Voltage . . . . .	0	-8	volts
Amplification Factor . . . . .	20	20	-
Plate Resistance . . . . .	6700	7700	ohms
Transconductance . . . . .	3000	2000	μmhos
Plate Current. . . . .	10	9	ma

6J5  
6J5-GT



# 6J5, 6J5-GT MEDIUM-MU TRIODE

**Maximum Circuit Values:**

Grid-Circuit Resistance. . . . . 1.0 max. megohm

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

*See RESISTANCE-COUPLED AMPLIFIER CHART  
at the front of this Section.*

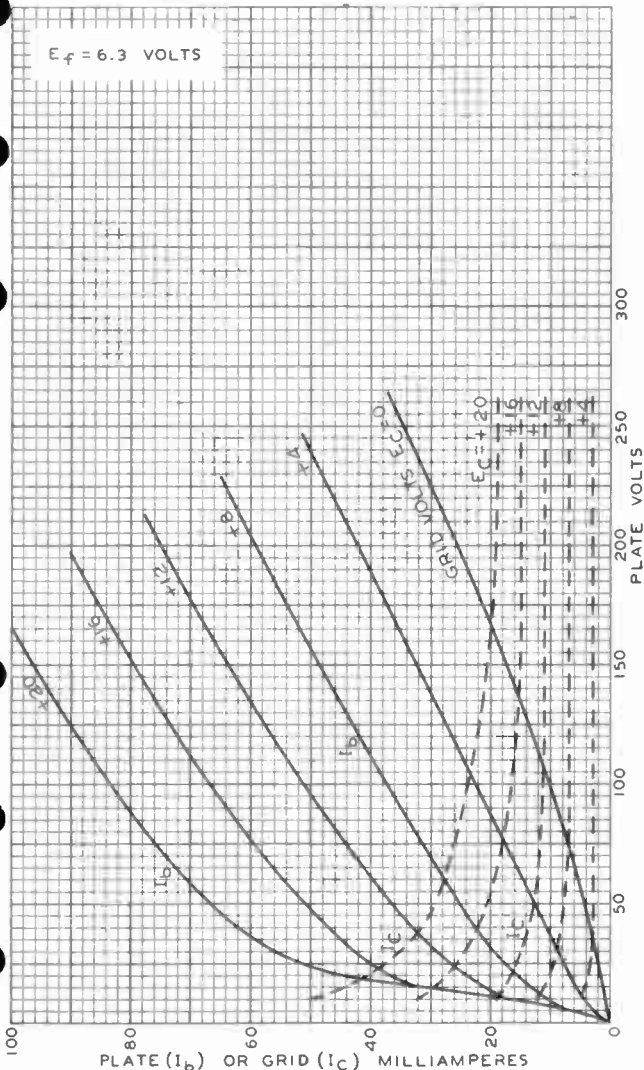


6J5

6J5

# AVERAGE PLATE CHARACTERISTICS

$E_f = 6.3$  VOLTS



AUG. 10, 1943

TUBE DEPARTMENT

92CM-6448

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

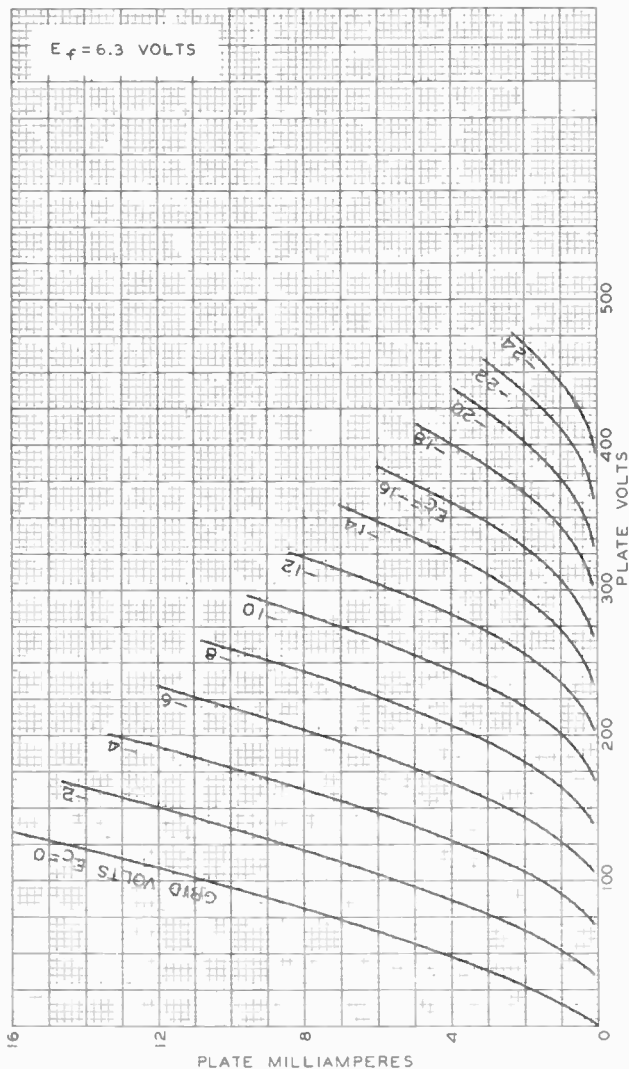
World Radio History

6J5



6J5

## AVERAGE PLATE CHARACTERISTICS



APRIL 27, 1943

TUBE DEPARTMENT

92CM-4771R1

RADIO CORPORATION OF AMERICA, HARTFORD, CONNECTICUT, U.S.A.

World Radio History



6J6

6J6

# MEDIUM-MU TWIN TRIODE

MINIATURE TYPE

## GENERAL DATA

### Electrical:

Heater for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts

Current . . . . . 0.45 . . . . . amp

Direct Interelectrode Capacitances:

	Without External Shield	With External Shield	
<i>Unit No. 1</i>			
Grid to plate . . . . .	1.6	1.5	$\mu\mu\text{f}$
Grid to cathode and heater . . . . .	2.2	2.6	$\mu\mu\text{f}$
Plate to cathode and heater . . . . .	0.4	1.6	$\mu\mu\text{f}$
<i>Unit No. 2</i>			
Grid to plate . . . . .	1.6	1.5	$\mu\mu\text{f}$
Grid to cathode and heater . . . . .	2.2	2.6	$\mu\mu\text{f}$
Plate to cathode and heater . . . . .	0.4	1.0	$\mu\mu\text{f}$

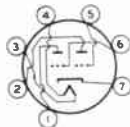
### Characteristics, Class A<sub>1</sub> Amplifier (Each Unit):

Plate Voltage . . . . .	100	volts
Cathode-Bias Resistor . . . . .	50 $\blacklozenge$	ohms
Amplification Factor . . . . .	38	
Plate Resistance . . . . .	7100	ohms
Transconductance . . . . .	5300	$\mu\text{mhos}$
Plate Current . . . . .	8.5	ma

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	2-1/8"
Maximum Seated Length . . . . .	1-7/8"
Length, Base Seat 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)
Basing Designation for BOTTOM VIEW . . . . .	7BF

- Pin 1 - Plate of Unit No. 2
- Pin 2 - Plate of Unit No. 1
- Pin 3 - Heater
- Pin 4 - Heater



- Pin 5 - Grid of Unit No. 1
- Pin 6 - Grid of Unit No. 2
- Pin 7 - Cathode

o with external shield JETEC No. 316 connected to cathode.  
 ■ Fixed-bias operation is not recommended.  
 ◆ value is for both units operating at the specified conditions.

← Indicates a change.

6J6



6J6

## MEDIUM-MU TWIN TRIODE

### AMPLIFIER - Class A<sub>1</sub>

Values are for Each Unit

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

PLATE VOLTAGE . . . . .	300 max.	volts
GRID VOLTAGE:		
Positive bias value . . . . .	0 max.	volts
PLATE DISSIPATION . . . . .	1.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . .	100 max.	volts
Heater positive with respect to cathode . .	100 max.	volts

#### Maximum Circuit Values (For maximum rated conditions):

Grid-Circuit Resistance:		
For cathode-bias operation . . . . .	0.5 max.	megohm

### RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation

Values are for Each Unit

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

DC PLATE VOLTAGE . . . . .	300 max.	volts
DC GRID VOLTAGE:		
Negative bias value . . . . .	-40 max.	volts
Positive bias value . . . . .	0 max.	volts
DC PLATE CURRENT . . . . .	15 max.	ma
DC GRID CURRENT . . . . .	8 max.	ma
DC PLATE INPUT . . . . .	4.5 max.	watts
PLATE DISSIPATION . . . . .	1.5 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 Push-Pull Operation at Frequencies up to 50 Mc:\*

Values are for Both Units

DC Plate Voltage . . . . .	150	volts
DC Grid Voltage:		
From a fixed supply of . . . . .	-10	volts
From a grid resistor of . . . . .	625	ohms
From a cathode resistor of . . . . .	220	ohms
DC Plate Current . . . . .	30	ma
DC Grid Current (Approx.) <sup>†</sup> . . . . .	16	ma
Driving Power (Approx.) <sup>†</sup> . . . . .	0.35	watt
Useful Power Output (Approx.) . . . . .	3.5	watts

\* Approximately 1.0 watt can be obtained when the 6J6 is used at 250 Mc as a push-pull oscillator with a plate voltage of 150 volts, with maximum rated plate dissipation, and with a grid resistor of 2000 ohms common to both units.

† For effect of load resistance on grid current and driving power, refer to TUBE RATINGS-Grid Current and Driving Power in the General Section.

→ Indicates a change.

MAR. 1, 1955

TUBE DIVISION

DATA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

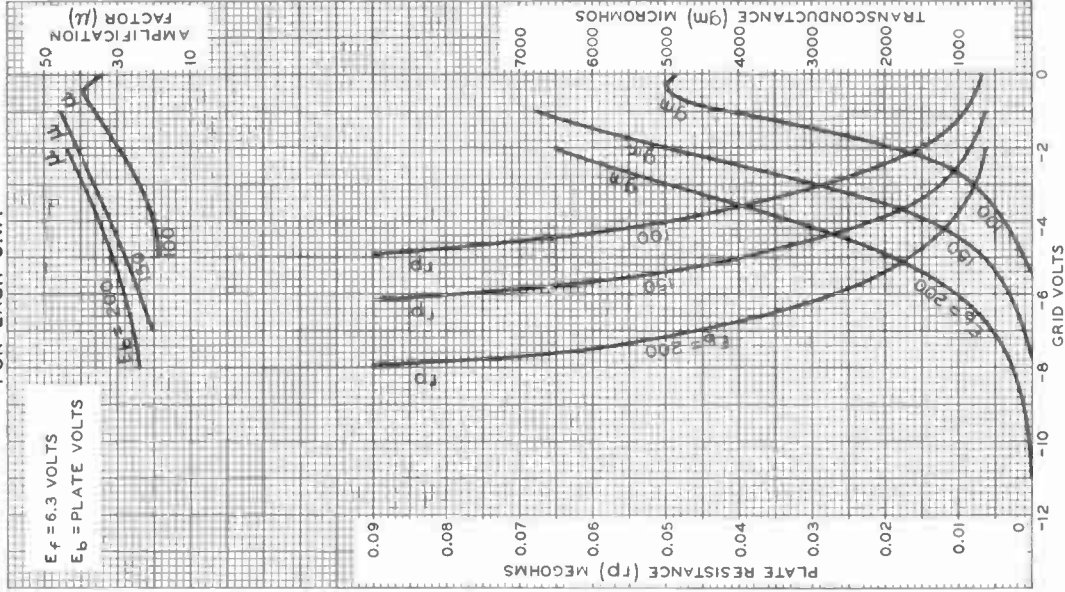


6J6

# AVERAGE CHARACTERISTICS FOR EACH UNIT

$E_f = 6.3$  VOLTS

$E_b =$  PLATE VOLTS



6J6

JUNE 28, 1951

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA HARTFORD, NEW JERSEY

92CM-7672



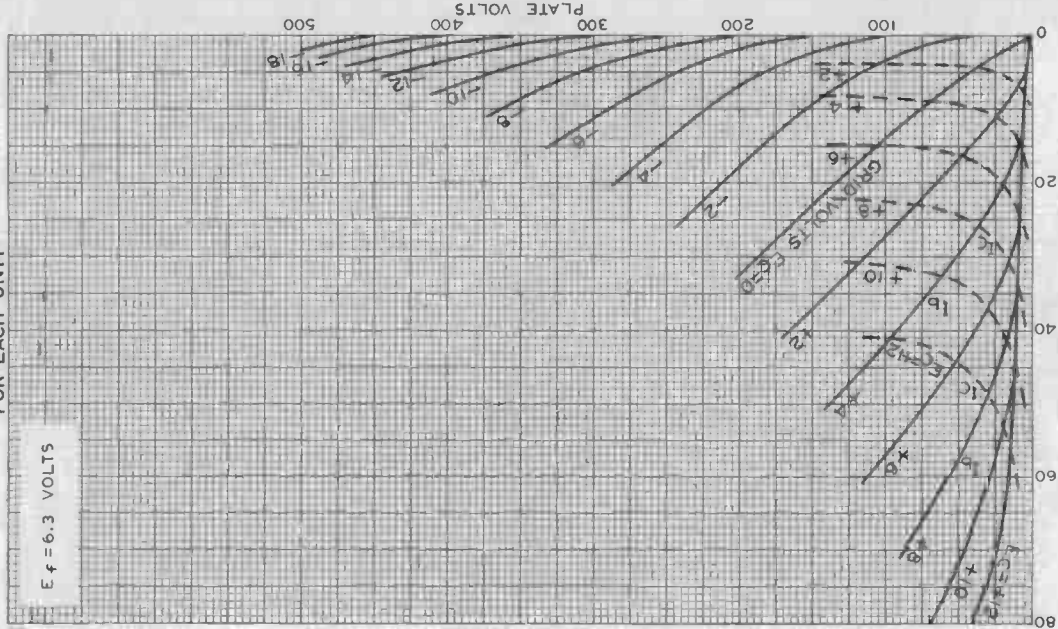




6J6

# AVERAGE PLATE CHARACTERISTICS FOR EACH UNIT

$E_f = 6.3$  VOLTS



9J6

OCT. 21, 1944

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

PLATE ( $I_b$ ) OR GRID ( $I_c$ ) MILLIAMPERES

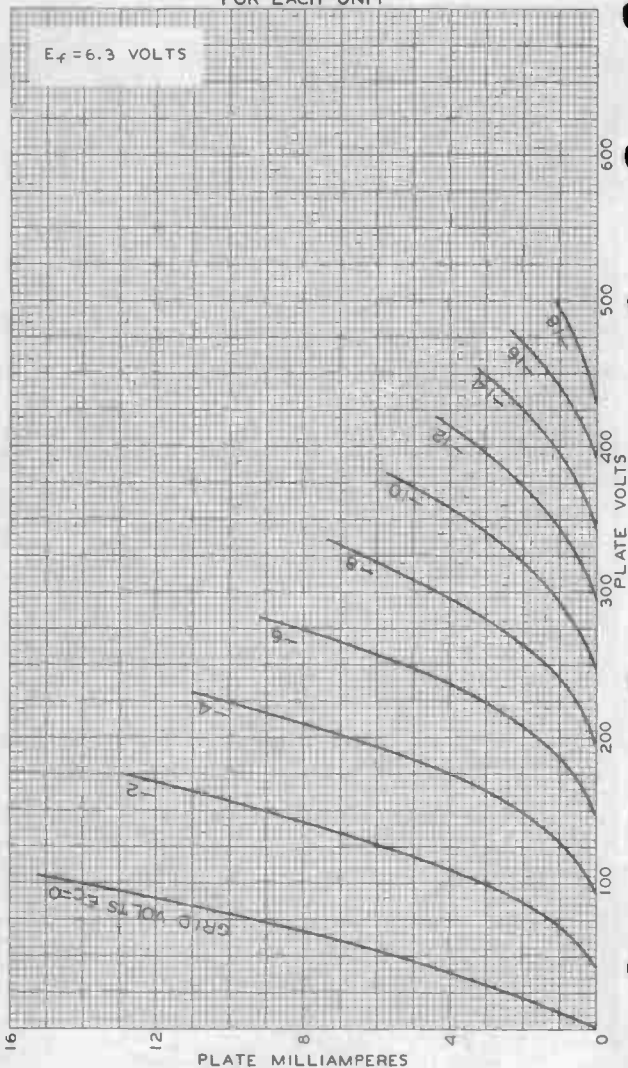
92CM-6403RI

6J6



6J6

# AVERAGE PLATE CHARACTERISTICS FOR EACH UNIT



SEPT. 20, 1944

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA HARTFORD, NEW BRITAIN  
World Radio History

92CM-6402RI



6J7  
6J7-G  
6J7-GT

# 6J7, 6J7-G, 6J7-GT SHARP-CUTOFF PENTODE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts  
Current . . . . . 0.3 . . . . . amp

Direct Interelectrode Capacitances:

	6J7 <sup>▲</sup>	6J7-G	6J7-GT	
<b>Pentode Connection:</b>				
Grid No. 1 to Plate	0.005 max.	0.007 max. ●	0.005 max. ●	μuf
Input . . . . .	7 . .	4.0 ● . .	4.6 ● . .	μuf
Output . . . . .	12 . .	12 ● . .	12 ● . .	μuf
<b>Triode Connection:*</b>				
Grid No. 1 to Plate	2 . .	1.8 <sup>□</sup> . .	1.8 <sup>□</sup> . .	μuf
Grid No. 1 to Cath.	5 . .	2.6 <sup>□</sup> . .	2.6 <sup>□</sup> . .	μuf
Plate to Cathode.	14 . .	17 <sup>□</sup> . .	17 <sup>□</sup> . .	μuf

### Mechanical:

	Any	Any	Any
Mounting Position . .	Any	Any	Any
Max. Overall Length .	3-1/8"	4-15/32"	3-5/16"
Seated Length . . .	2-7/16" ± 1/8"	3-3/4" ± 5/32"	{ 2-5/16" to 2-3/4" }
Maximum Diameter . .	1-5/16"	1-9/16"	1-5/16"
Bulb . . . . .	{ Metal Shell MTTBA }	ST-12	T-9
Cap . . . . .	Miniature	{ Skirted Miniature }	{ Skirted Miniature }
Base . . . . .	{ Small-Wafer Octal 7-Pin }	{ Small-Shell Octal 7-Pin }	{ Small-Wafer Octal 7-Pin, Sleeve }
Basing Designation	7R	G-7R	GT-7R

BOTTOM VIEW

Pin 1 { 6J7-Shell  
6J7-G-Internal  
Shield  
6J7-GT-Base  
Sleeve

Pin 2-Heater  
Pin 3-Plate



Pin 4-Grid No.2  
Pin 5-Grid No.3  
Pin 7-Heater  
Pin 8-Cathode

Cap - Grid No. 1

### AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . . 300 max. volts  
GRID-No.2 (SCREEN) VOLTAGE . . . . . 125 max. volts  
GRID-No.2 SUPPLY VOLTAGE . . . . . 300 max. volts  
PLATE DISSIPATION . . . . . 0.75 max. watt  
GRID-No.2 DISSIPATION . . . . . 0.1 max. watt

(continued on next page)

▲ with shell connected to cathode. □ without external shield.  
● with external shield connected to cathode.  
▪ with grid No.2 and grid No.3 connected to plate.

6J7  
6J7-G  
6J7-GT



## 6J7, 6J7-G, 6J7-GT SHARP-CUTOFF PENTODE

**GRID-No.1 (CONTROL-GRID) VOLTAGE:**  
 Positive bias value. . . . . 0 max. volts

**PEAK HEATER-CATHODE VOLTAGE:**  
 Heater negative with respect to cathode. . 90 max. volts  
 Heater positive with respect to cathode. . 90 max. volts

**Typical Operation and Characteristics:**

Plate Voltage. . . . .	100	250	..	volts
Grid No.3 (Suppressor) .	Connected to cathode at socket			
Grid-No.2 Voltage. . . . .	100	100	..	volts
Grid-No.1 Voltage. . . . .	-3	-3	..	volts
Plate Resistance (Approx.) . . . . .	1	#	..	megohm
Transconductance . . . . .	1185	1225	..	μmhos
Grid-No.1 Bias (Approx.) for cathode-current cutoff. . . . .	-7	-7	..	volts
Plate Current. . . . .	2	2	..	ma
Grid-No.2 Current. . . . .	0.5	0.5	..	ma

**Maximum Circuit Values:**  
 Grid-No.1-Circuit Resistance . . . . . 1 max. megohm

### AMPLIFIER - Class A<sub>1</sub>

*Triode Connection - Grids No.2 & No.3 Connected to Plate*

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

PLATE VOLTAGE. . . . .	250 max.	volts
PLATE DISSIPATION (Total). . . . .	1.75 max.	watts
<b>GRID-No.1 VOLTAGE:</b>		
Positive bias value. . . . .	0 max.	volts
<b>PEAK HEATER-CATHODE VOLTAGE:</b>		
Heater negative with respect to cathode. .	90 max.	volts
Heater positive with respect to cathode. .	90 max.	volts

**Typical Operation and Characteristics:**

Plate Voltage. . . . .	180	250	..	volts
Grid-No.1 Voltage. . . . .	-5.3	-8	..	volts
Amplification Factor . . . . .	20	20		
Plate Resistance (Approx.) . . . . .	11000	10500	..	ohms
Transconductance . . . . .	1800	1900	..	μmhos
Plate Current. . . . .	5.3	6.5	..	ma

**Maximum Circuit Values:**  
 Grid-No.1-Circuit Resistance . . . . . 1 max. megohm

### BIASED DETECTOR

**Typical Operation:**

Plate-Supply Voltage <sup>⊕</sup> . . . . .	100	100	250	250	volts
Grid No.3. . . . .	Connected to cathode at socket				
Grid-No.2 Voltage. . . . .	12	30	50	100	volts
RF Grid-No.1 Volts (RMS) <sup>⊕</sup>	1.05	1.6	1.18	1.37	volts

#, ⊕, ⊕: See next page.



# 6J7, 6J7-G, 6J7-GT SHARP-CUTOFF PENTODE

6J7  
6J7-G  
6J7-GT

Cathode-Bias Resistor.	18000	10000	3000	10000	ohms
Zero-Sig. Cathode Cur.	0.063	0.183	0.65	0.43	ma
Plate Resistor . . . .	1.0	0.25	0.25	0.5	megohm
Blocking Capacitor . .	0.01	0.01	0.3	0.3	$\mu$ f
Grid Resistor* . . . .	1.0	0.5	0.25	0.25	megohm

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 1 max. megohm

\* Greater than 1 megohm.

♦ Voltage at plate will be "Plate-Supply" voltage minus voltage drop in plate resistor caused by plate current.

▲ With these signal values modulated 20%, the voltage output under each set of conditions is 17 peak volts at the grid of the following amplifier. This value is sufficient to insure full audio output from a 6F6 (class A pentode) at 250 volts on plate.

● For the following amplifier tube.

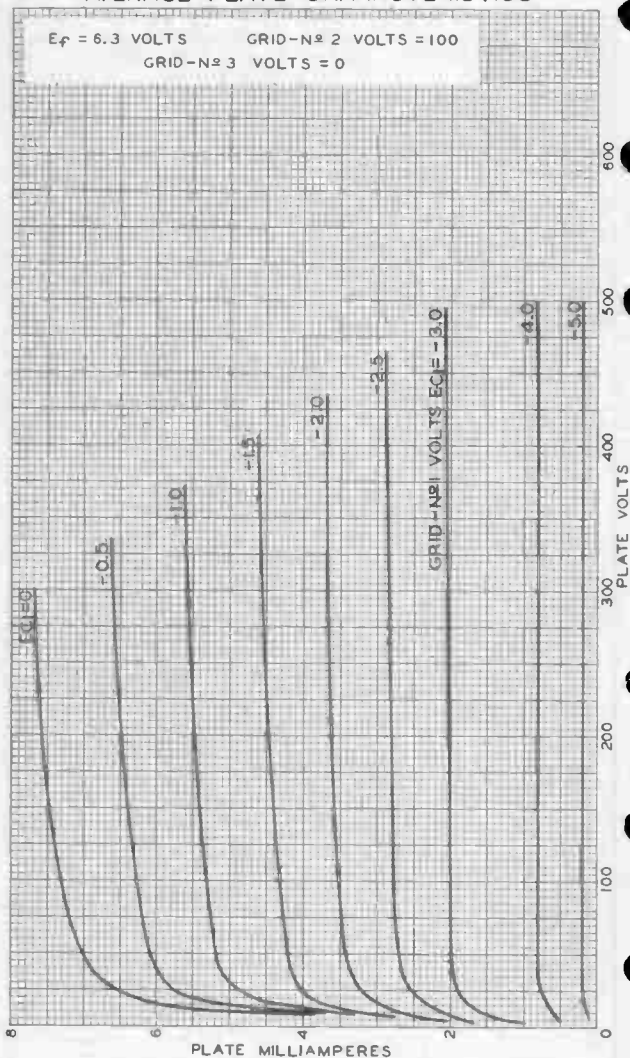
*For additional data, see RESISTANCE-COUPLED AMPLIFIER CHARTS at the front of this Section.*

6J7



6J7

## AVERAGE PLATE CHARACTERISTICS



MAY 12, 1948

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA HARTFORD, NEW JERSEY

92CM-4741R2

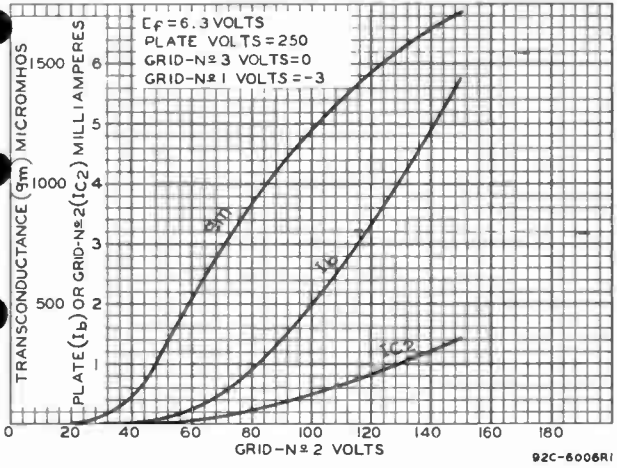
World Radio History



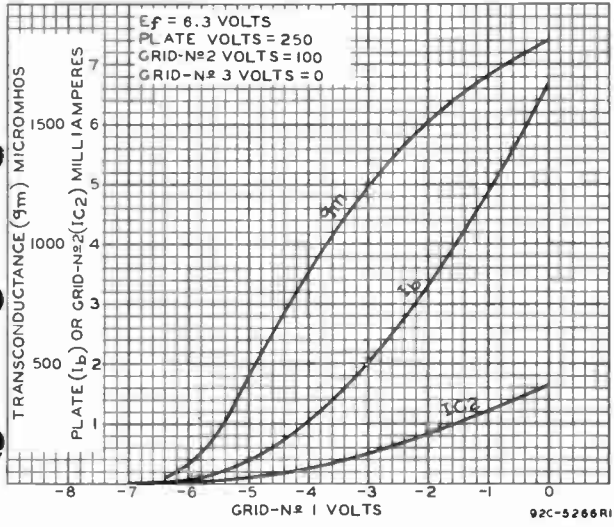
6J7

6J7

### AVERAGE CHARACTERISTICS



### AVERAGE CHARACTERISTICS



MAY 18, 1948

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-60D7R1

6J7

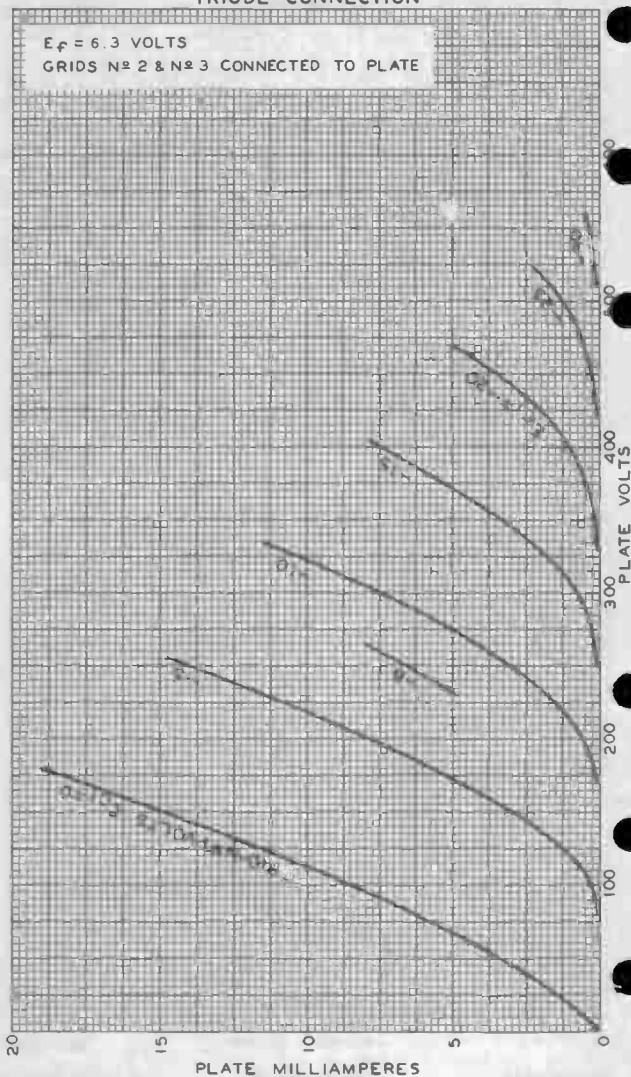


6J7

# AVERAGE PLATE CHARACTERISTICS TRIODE CONNECTION

$E_f = 6.3$  VOLTS

GRIDS N<sup>o</sup> 2 & N<sup>o</sup> 3 CONNECTED TO PLATE



MAY 11, 1948

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA HARTFORD, NEW JERSEY

92CM-4842R1





6K7  
6K7-G  
6K7-GT

# 6K7, 6K7-G, 6K7-GT

## TRIPLE-GRID SUPER-CONTROL AMPLIFIER

	Coated Unipotential Cathode		
	6K7	6K7-G	6K7-GT
Heater Voltage	6.3	a-c or d-c volts	
Heater Current	0.3	amp.	
Direct Interelectrode Cap.	▲	▲▲	▲▲
Grid to Plate	0.005	0.007	0.005 $\mu\text{f}$
Input	7	5	4.6 $\mu\text{f}$
Output	1E	1Z	1Z $\mu\text{f}$
Overall Length	{ 3-1/8" max.	{ 4-7/32" to 4-15/32" max.	3-5/16" max.
Seated Height	{ 2-9/16" max.	{ 3-21/32" to 3-29/32" max.	2-3/4" max.
Maximum Diameter	1-5/16"	1-9/16"	1-5/16"
Bulb	Metal Shell, MT-8	ST-12	T-9
Cap	Miniature	{ Skirted Min. Style C	{ Skirted Min. Style C
Base	{ Small Wafer Octal 7-Pin	{ Small Shell Octal 7-Pin	{ Sm. Wafer Octal 7-Pin, Sleeve
Basing Designation	7R	G-7R	GT-7R
Pin 1	{ 6K7, Shell 6K7-G, No Con. 6K7-GT, Base sleeve		Pin 4 - Screen
Pin 2 - Heater			Pin 5 - Suppressor
Pin 3 - Plate			Pin 7 - Heater
Mounting Position			Pin 8 - Cathode
			Cap - Grid



BOTTOM VIEW

### AMPLIFIER

Plate Voltage		300 max.	volts
Screen Voltage		125 max.	volts
Screen Supply Voltage		300 max.	volts
Grid Voltage		0 min.	volts
Plate Dissipation		2.75 max.	watts
Screen Dissipation		0.35 max.	watt
<b>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</b>			
Plate	100	250	250 volts
Screen	100	100	125 volts
Grid	-1	-3	-3 volts
Suppressor	Connected to cathode at socket		
Plate Res.	0.15	0.8	0.6 approx. megohm
Transcond.	1650	1450	1650 $\mu\text{mhos}$
Grid Bias for transcond.			
of approx. 2 $\mu\text{mhos}$	-38.5	-42.5	-52.5 volts
Plate Cur.	9.5	7.0	10.5 ma.
Screen Cur.	2.7	1.7	2.6 ma.

■ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

▲ With shell connected to cathode.

▲▲ With close-fitting shield connected to cathode. The internal shield in the dome is connected to cathode within 6K7-G and 6K7-GT.

Curves under Type 78 also apply to the 6K7, 6K7-G, and 6K7-GT.

~ Indicates a change.

6K7



6K7

## AVERAGE PLATE CHARACTERISTICS



FEB. 24, 1937

 RCA RADIOTRON DIVISION  
 RCA MANUFACTURING COMPANY INC  
 World Radio History

92C-4742

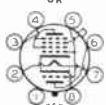


6K8  
6K8-G  
6K8-GT



# 6K8, 6K8-G, 6K8-GT TRIODE-HEXODE CONVERTER

Heater		Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts	
Current	0.3	amp.	
Direct Interelectrode Capacitances:			
	6K8 <sup>o</sup>	6K8-G <sup>A</sup>	6K8-GT <sup>A</sup>
Hexode Grid #3 to Hexode Plate	0.03	0.08	0.08 max. $\mu$ uf
Hexode Grid #3 to Triode Plate	0.02	0.05	0.05 max. $\mu$ uf
Hexode Grid #3 to Triode Grid & Hexode Grid #1	0.2	0.2	0.2 max. $\mu$ uf
Triode Grid & Hexode Grid #1 to Triode Plate	1.1	1.8	1.8 $\mu$ uf
Triode Grid & Hexode Grid #1 to Hexode Plate	0.1	0.15	0.15 max. $\mu$ uf
Hexode Grid #3 to All Other Electrodes (R-F Input)	6.4	4.6	4.6 $\mu$ uf
Triode Plate to All Other Electrodes Except Triode Grid & Hexode Grid #1 (Osc. Output)	3.2	3.4	3.4 $\mu$ uf
Triode Grid & Hexode Grid #1 to All Other Electrodes Except Triode Plate (Osc. Input)	6.0	6.5	6.5 $\mu$ uf
Hexode Plate to All Other Electrodes (Mixer Output)	3.5	4.8	4.8 $\mu$ uf
Overall Length	{ 3-1/8" max.	{ 4-7/32" to 4-15/32" max.	{ 3-9/16" 3" max.
Seated Height	{ 2-9/16" max.	{ 3-21/32" to 3-29/32" max.	{ 1-5/16" T-9
Maximum Diameter	1-5/16"	1-9/16"	1-5/16"
Bulb	Metal Shell, MT-8	ST-12	T-9
Cap	Miniature	{ Skirted min. Sm. Shell Oct. 8-Pin	{ Skirted min. Sm. Wafer Oct. 8-Pin, Sleeve GT-8K
Base	{ Small Wafer Octal 8-Pin	{ Skirted min. Sm. Shell Oct. 8-Pin	{ Skirted min. Sm. Wafer Oct. 8-Pin, Sleeve GT-8K
Basing	Designation 8K	G-8K	GT-8K
Pin 1	{ 6K8, Shell 6K8-G, No Con. 6K8-GT Sleeve	Pin 5 - Hexode Grid #1 & Triode Grid	Pin 6 - Triode Plate
Pin 2 - Heater		Pin 7 - Heater	Pin 8 - Cathode
Pin 3 - Hexode Plate		Cap - Hexode Grid #3	Any
Pin 4 - Hexode Grids #2 & #4			



BOTTOM VIEW

## CONVERTER SERVICE

Hexode Plate Voltage	300 max. volts
Hexode Screen (Grids #2 & #4) Voltage	150 max. volts
Hexode Screen Supply Voltage	300 max. volts
Hexode Control-Grid (Grid #3) Voltage	0 min. volts
Triode Plate Voltage	125 max. volts
Hexode Plate Dissipation	0.75 max. watt
Hexode Screen Dissipation	0.7 max. watt
Triode Plate Dissipation	0.75 max. watt
Total Cathode Current	16 max. ma.

Typical Operation:			
Hexode Plate Voltage	100	250	volts
Hexode Screen Voltage	100	100	volts
Hexode Control-Grid Voltage	-3	-3	volts
Triode Plate Voltage	100	100	volts
Triode Grid Resistor	50000	50000	ohms
Hexode Plate Resistance (approx.)	0.4	0.6	megohm
Conversion Transconductance	325	350	$\mu$ mos
Conversion Transcond. with Hexode Grid #3 Bias of -30 volts (approx.)	2	2	$\mu$ mos
Hexode Plate Current	2.3	2.5	ma.
Hexode Screen Current	6.2	6.0	ma.
Triode Plate Current	3.8	3.8	ma.
Triode Grid & Hexode Grid #1 Current	0.15	0.15	ma.
Total Cathode Current	12.5	12.5	ma.

NOTE: The transconductance of the triode section, not oscillating, is approximately 3000  $\mu$ mos when the triode plate volts = 100 and the triode grid volts = 0.

□ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

▲ With close-fitting shield connected to cathode.

○ With shell connected to cathode.

← Indicates a change.

6K8

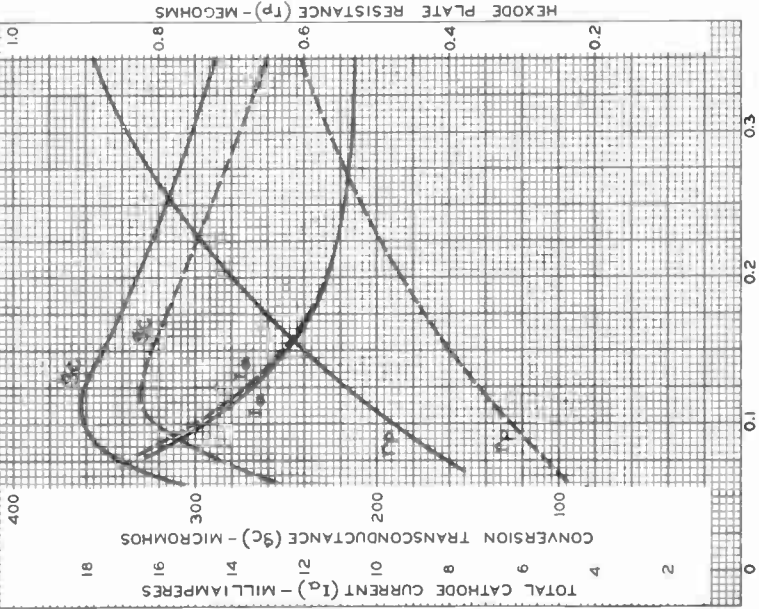


6K8

## OPERATION CHARACTERISTICS

 $E_f = 6.3$  VOLTS

CURVE	-----	-----
HEXODE PLATE VOLTS	100	250
TRIODE PLATE VOLTS	100	100
HEXODE SCREEN (GRIDS N <sup>o</sup> 2 & 4) VOLTS	100	100
HEXODE CONTROL - GRID (GRID N <sup>o</sup> 3) VOLTS	-3	-3
TRIODE GRID RESISTOR (OHMS)	50000	50000



APRIL 8, 1938

TRIODE GRID & HEXODE GRID N<sup>o</sup> 1 D-C MILLIAMPERESRCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY INC

92C-4866R1



6L6-GB

# 6L6-GB

## BEAM POWER TUBE

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 . . . . . ac or dc volts  
Current . . . . . 0.9 . . . . . amp

Direct Interelectrode Capacitances (Approx.):<sup>o</sup>

Grid No.1 to plate. . . . . 0.9  $\mu\mu\text{f}$   
Grid No.1 to cathode & grid No.2,  
grid No.2, and heater . . . . . 11.5  $\mu\mu\text{f}$   
Plate to cathode & grid No.3,  
grid No.2, and heater . . . . . 9.5  $\mu\mu\text{f}$

#### Mechanical:

Mounting Position . . . . . Any  
Maximum Overall Length . . . . . 4-1/4"  
Maximum Seated Length . . . . . 3-11/16"  
Maximum Diameter . . . . . 1-9/16"

Bulb . . . . . T12  
Base . . . . . Medium-Shell Octal 7-Pin (JETEC No. B7-12),  
Short Medium-Shell Octal 7-Pin

with External Barriers, Style A (JETEC No. B7-111),  
or Short Medium-Shell Octal 7-Pin  
with External Barriers, Style B (JETEC No. B7-119)

Basing Designation for BOTTOM VIEW . . . . . 7AC

Pin 1 - No Connection  
Pin 2 - Heater  
Pin 3 - Plate  
Pin 4 - Grid No. 2



Pin 5 - Grid No. 1  
Pin 7 - Heater  
Pin 8 - Cathode,  
Grid No. 3

### AF POWER AMPLIFIER - Class A<sub>1</sub>

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

PLATE VOLTAGE . . . . . 360 max. volts  
GRID-NO. 2 (SCREEN-GRID) VOLTAGE . . . . . 270 max. volts  
GRID-NO. 2 INPUT . . . . . 2.5 max. watts  
PLATE DISSIPATION . . . . . 19 max. watts

#### PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . . . . . 180 max. volts  
Heater positive with respect to cathode . . . . . 180 max. volts

#### Typical Operation and Characteristics:

##### Fixed-Bias Operation

Plate Voltage . . . . . 200 250 300 350 volts  
Grid-No. 2 Voltage . . . . . 200 250 200 250 volts  
Grid No. 1 (Control-Grid)  
Voltage . . . . . -11.5 -14 -12.5 -18 volts

<sup>o</sup> without external shield.

6L6-GB



6L6-GB

## BEAM POWER TUBE

Peak AF Grid-No.1 Voltage. . . . .	11.5	14	12.5	18	volts
Zero-Signal Plate Current. . . . .	52	72	48	54	ma
Max.-Signal Plate Current. . . . .	57	79	55	66	ma
Zero-Signal Grid-No.2 Current. . . . .	3.5	5	2.5	2.5	ma
Max.-Signal Grid-No.2 Current. . . . .	5.7	7.3	4.7	7	ma
Plate Resistance (Approx.) . . . . .	35000	22500	35000	33000	ohms
Transconductance . . . . .	5300	6000	5300	5200	μmhos
Load Resistance. . . . .	3000	2500	4500	4200	ohms
Total Harmonic Distortion. . . . .	9	10	11	15	%
Max.-Signal Power Output . . . . .	4	6.5	6.5	10.8	watts

*Cathode-Bias Operation*

Plate-Supply voltage . . . . .	200	250	300	volts
Grid-No.2 Supply Voltage . . . . .	200	250	200	volts
Cathode Resistor . . . . .	186	167	218	ohms
Peak AF Grid-No.1 voltage. . . . .	11.5	14	12.7	volts
Zero-Signal Plate Current. . . . .	55	75	51	ma
Max.-Signal Plate Current. . . . .	56	78	54.5	ma
Zero-Signal Grid-No.2 Current. . . . .	4.2	5.4	3	ma
Max.-Signal Grid-No.2 Current. . . . .	5.6	7.2	4.6	ma
Load Resistance. . . . .	3000	2500	4500	ohms
Total Harmonic Distortion. . . . .	9	10	11	%
Max.-Signal Power Output . . . . .	4	6.5	6.5	watts

**Maximum Circuit Values:**

Grid-No.1-Circuit Resistance:

For fixed-bias operation . . . . .	0.1 max. megohm
For cathode-bias operation . . . . .	0.5 max. megohm

**AF POWER AMPLIFIER - Class A<sub>1</sub>***Triode Connection - Grid No.2 Connected to Plate***Maximum Ratings, Design-Center Values:**

PLATE VOLTAGE. . . . .	275 max.	volts
PLATE DISSIPATION. . . . .	19 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

**Typical Operation and Characteristics:**

	<i>Fixed Bias</i>	<i>Cathode Bias</i>	
Plate-Supply Voltage . . . . .	250	250	volts
Grid-No.1 (Control-Grid) Voltage	-20	-	volts
Cathode Resistor . . . . .	-	490	ohms
Peak AF Grid-No.1 Voltage. . . . .	20	20	volts
Zero-Signal Plate Current. . . . .	40	40	ma
Max.-Signal Plate Current. . . . .	44	42	ma
Plate Resistance (Approx.) . . . . .	1700	-	ohms



6L6-GB

6L6-GB

BEAM POWER TUBE

	Fixed Bias	Cathode Bias	
Amplification Factor . . . . .	8	-	
Transconductance . . . . .	4700	-	μmhos
Load Resistance . . . . .	5000	6000	ohms
Total Harmonic Distortion . . . . .	5	6	%
Max.-Signal Power Output . . . . .	1.4	1.3	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:

For fixed-bias operation . . . . .	0.1 max. megohm
For cathode-bias operation . . . . .	0.5 max. megohm

PUSH-PULL AF POWER AMPLIFIER - Class A<sub>1</sub>

Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . .	360 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE . . . . .	270 max.	volts
GRID-No.2 INPUT . . . . .	2.5 max.	watts
PLATE DISSIPATION . . . . .	19 max.	watts
FLANK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	180 max.	volts
Heater positive with respect to cathode . . . . .	180 max.	volts

Typical Operation and Characteristics:

Unless otherwise specified, values are for 2 tubes

	Fixed Bias		Cathode Bias		
Plate voltage . . . . .	250	270	150	170	volts
Grid-No.2 voltage . . . . .	250	270	150	170	volts
Grid-No.1 voltage . . . . .	-16	-17.5	-	-	volts
Cathode Resistor . . . . .	-	-	110	120	ohms
Peak AF Grid-No.1-to-Grid-No.1 Voltage . . . . .	32	35	35.6	28.2	volts
Zero-Signal Plate Current . . . . .	120	134	120	134	ma
Max.-Signal Plate Current . . . . .	140	155	131	145	ma
Zero-Signal Grid-No.2 Current . . . . .	10	11	10	11	ma
Max.-Signal Grid-No.2 Current . . . . .	16	17	15	17	ma
Plate Resistance (Approx., per tube) . . . . .	14500	23500	-	-	ohms
Transconductance (Per tube) . . . . .	5500	5700	-	-	μmhos
Effective Load Resistance (Plate to plate) . . . . .	5000	5000	5000	5000	ohms
Total Harmonic Distortion . . . . .	2	2	2	2	%
Max.-Signal Power Output . . . . .	14.5	17.5	13.8	18.5	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:

For fixed-bias operation . . . . .	0.1 max. megohm
For cathode-bias operation . . . . .	0.5 max. megohm



## 6L6-GB BEAM POWER TUBE

### PUSH-PULL AF POWER AMPLIFIER - Class AB<sub>1</sub>

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

PLATE VOLTAGE . . . . .	360 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE . . . . .	270 max.	volts
GRID-No.2 INPUT . . . . .	2.5 max.	watts
PLATE DISSIPATION . . . . .	19 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	180 max.	volts
Heater positive with respect to cathode . . . . .	180 max.	volts

#### Typical Operation:

*Values are for 2 tubes*

	Fixed Bias		Cathode Bias	
Plate Voltage . . . . .	360	360	360	volts
Grid-No.2 Voltage . . . . .	270	270	270	volts
Grid-No.1 (Control-Grid) Voltage . . . . .	-22.5	-22.5	-	volts
Cathode Resistor . . . . .	-	-	248	ohms
Peak AF Grid-No.1-to-				
Grid-no.1 Voltage . . . . .	45	45	40.6	volts
Zero-Signal Plate Current . . . . .	88	88	88	ma
Max.-Signal Plate Current . . . . .	132	140	100	ma
Zero Signal Grid-No.2 Current . . . . .	5	5	5	ma
Max.-Signal Grid-No.2 Current . . . . .	15	11	17	ma
Effective Load Resistance (Plate to plate) . . . . .	6600	3800	9000	ohms
Total Harmonic Distortion . . . . .	2	2	4	%
Max.-Signal Power Output . . . . .	26.5	18	24.5	watts

#### Maximum Circuit Values:

Grid-No.1-Circuit Resistance: <sup>*</sup>	
For fixed-bias operation . . . . .	0.1 max. megohm
For cathode-bias operation . . . . .	0.5 max. megohm

### PUSH-PULL AF POWER AMPLIFIER - Class AB<sub>2</sub>

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

PLATE VOLTAGE . . . . .	360 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE . . . . .	270 max.	volts
GRID-No.2 INPUT . . . . .	2.5 max.	watts
PLATE DISSIPATION . . . . .	19 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	180 max.	volts
Heater positive with respect to cathode . . . . .	180 max.	volts

<sup>\*</sup> The type of input coupling used should not introduce too much resistance in the grid-no.1 circuit. Transformer- or impedance-coupling devices are recommended.





# 6L6-GB

6L6-GB

## BEAM POWER TUBE

### Typical Operation:

*Values are for 2 tubes*

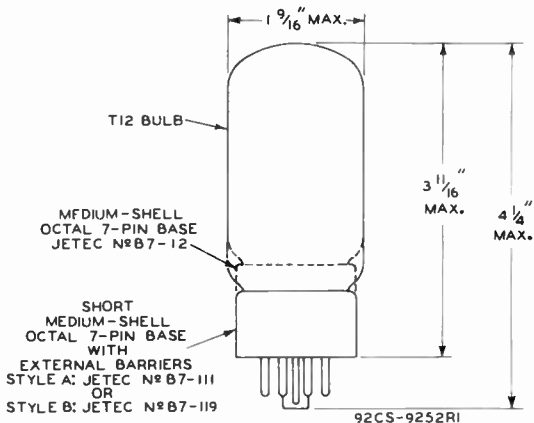
Plate Voltage. . . . .	360	360	volts
Grid-No.2 Voltage. . . . .	225	270	volts
Grid-No.1 (Control-Grid) Voltage . . . . .	-18	-22.5	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage. . . . .	52	72	volts
Zero-Signal Plate Current. . . . .	78	88	ma
Max.-Signal Plate Current. . . . .	147	205	ma
Zero-Signal Grid-No.2 Current. . . . .	3.5	5	ma
Max.-Signal Grid-No.2 Current. . . . .	11	16	ma
Effective Load Resistance (Plate to plate) . . . . .	6000	3800	ohms
Total Harmonic Distortion. . . . .	2	2	%
Max.-Signal Power Output . . . . .	31	47	watts

### Maximum Circuit Values:

#### Grid-No.1-Circuit Resistance: <sup>▲</sup>

- For fixed-bias operation . . . . . 0.1 max. megohm
- For cathode-bias operation . . . . . Not recommended

<sup>▲</sup> Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the AB<sub>2</sub> stage. To minimize distortion, the effective resistance per grid-No.1 circuit of the AB<sub>2</sub> stage should be held at a low value. For this purpose, the use of transformer coupling is recommended.



6L6-GB



6L6-GB

AVERAGE PLATE CHARACTERISTICS

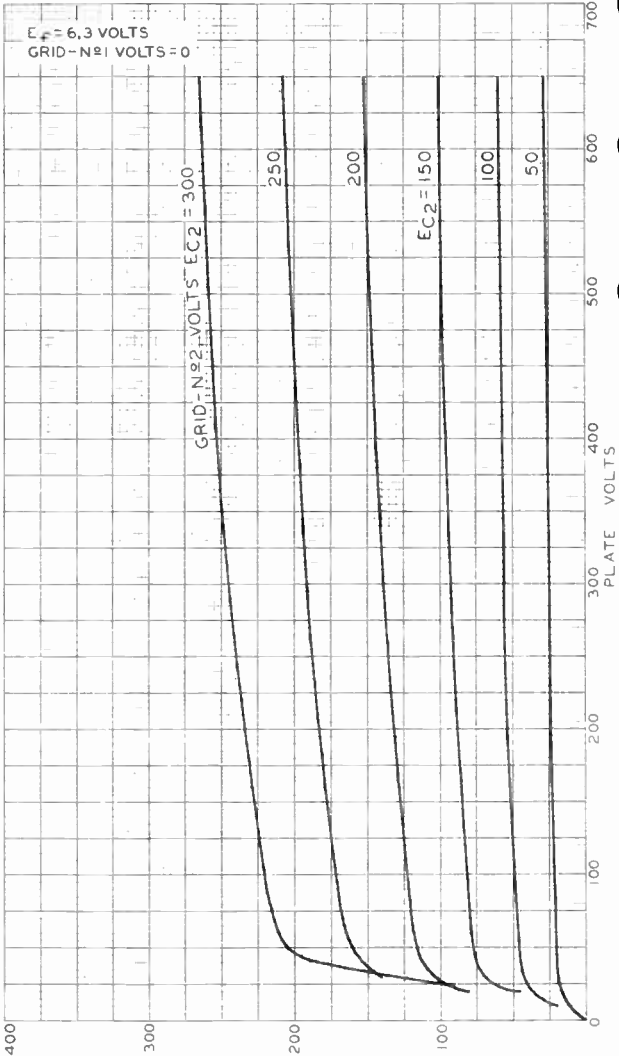


PLATE MILLIAMPERES  
TUBE DIVISION

92CM-4580R2

RADIO CORPORATION OF AMERICA HARTFORD, NEW JERSEY

World Radio History



6L6-GB

# 6L6-GB AVERAGE CHARACTERISTICS

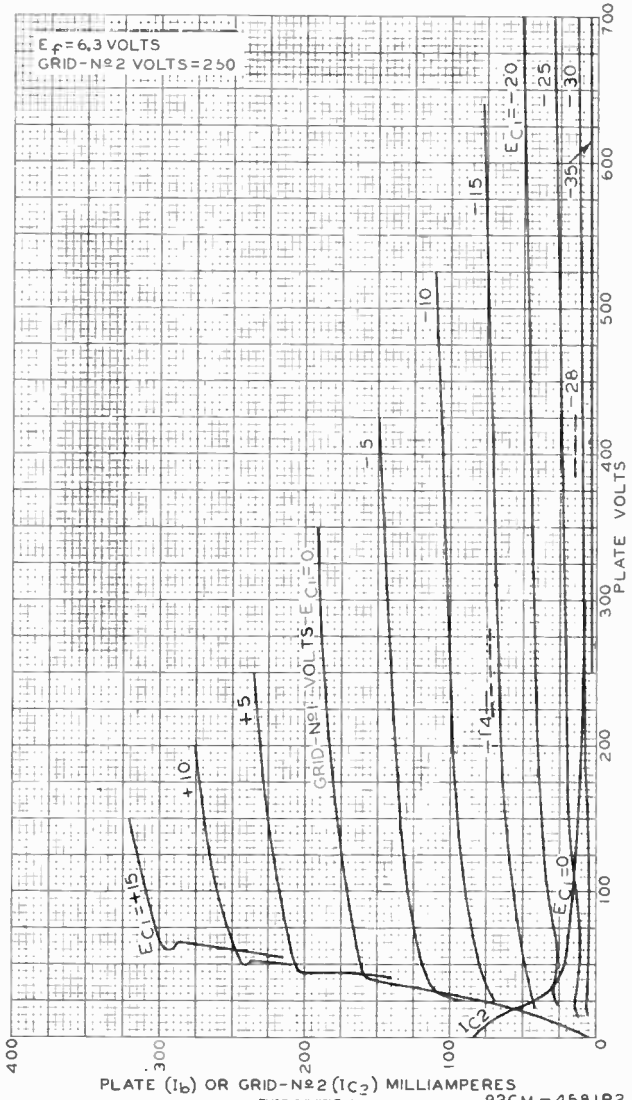


PLATE ( $I_b$ ) OR GRID-NO. 2 ( $I_{c2}$ ) MILLIAMPERES  
TUBE DIVISION 92CM-4581R2

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

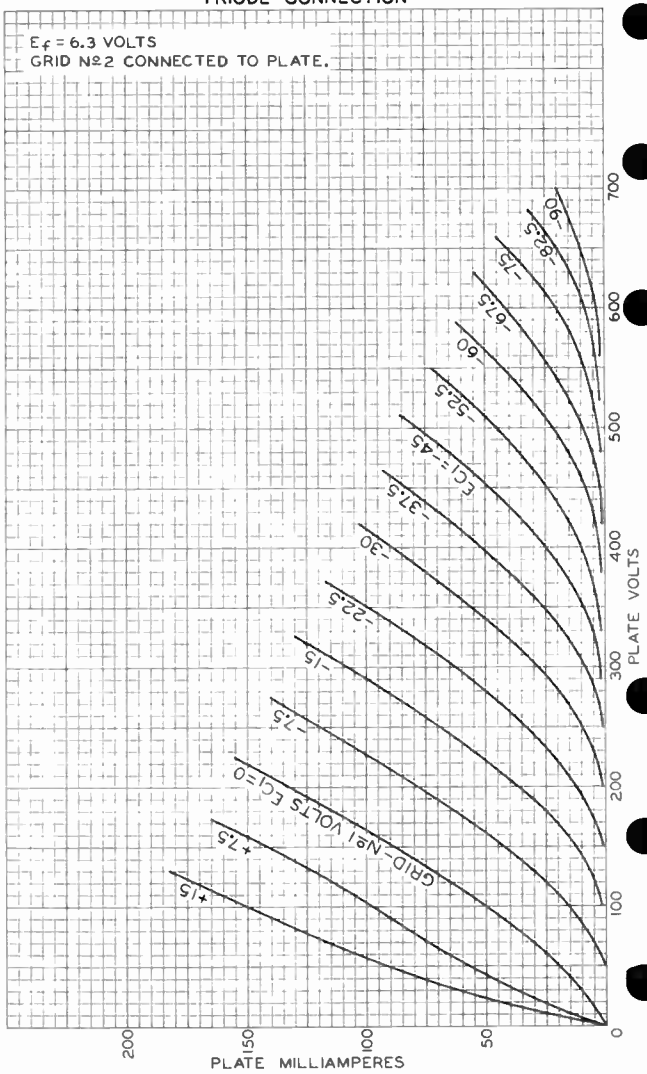
6L6-GB



6L6-GB

### AVERAGE PLATE CHARACTERISTICS TRIODE CONNECTION

$E_f = 6.3$  VOLTS  
GRID No 2 CONNECTED TO PLATE.



TUBE DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

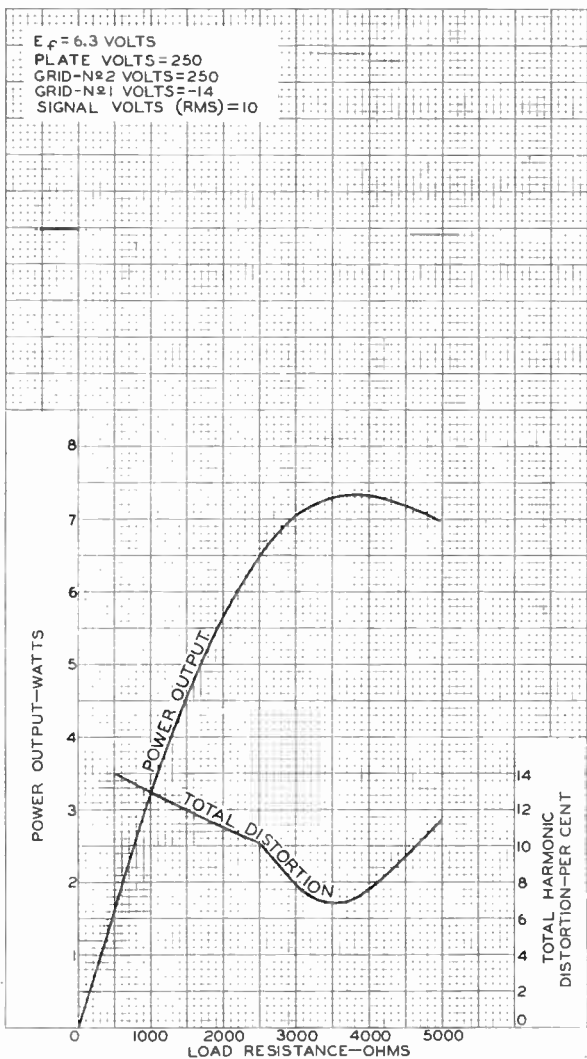
92CM-4966R2



6L6-GB

6L6-GB

## OPERATION CHARACTERISTICS







6L7, 6L7-G

6L7  
6L7-G

## PENTAGRID MIXER AMPLIFIER

Heater <sup>■</sup> Coated Unipotential Cathode  
 Voltage 6.3 a-c or d-c volts  
 Current 0.3 amp.

	6L7	6L7-G
Direct Interelectrode Cap.	▲	▲▲
Grid #1 to Grid #3	0.2 max.	0.2 max. μμf
Grid #1 to Plate	0.001 max.	0.005 max. μμf
Grid #3 to Plate	0.1	0.24 μμf
Grid #1 to All Other Electrodes	7.5	6 μμf
Grid #3 to All Other Electrodes	10	12 μμf
Plate to All Other Electrodes	11	10 μμf

Overall Length 3-1/8" max. { 4-7/32" to 4-15/32"  
 Maximum Diameter 1-5/16" 1-9/16"  
 Bulb Metal Shell, MT-8 ST-12  
 Cap Miniature Skirted Min.  
 Base { Small Wafer { Small Shell  
 { Octal 7-Pin { Octal 7-Pin  
 Basing Designation 7T G-7T

Pin 1 { 6L7, Shell  
 { 6L7-G, No Con.

Pin 2 - Heater

Pin 3 - Plate

Pin 4 - Grids #2 &amp; #4

Mounting Position



BOTTOM VIEW

Pin 5 - Grid #3

Pin 7 - Heater

Pin 8 - Cathode &amp; Grid #5

Cap - Grid #1

Any

AMPLIFIER - Class A<sub>1</sub>

Plate Voltage	300 max.	volts
Screen Voltage (Grids #2 & #5)	100 max.	volts
Plate Dissipation	1.5 max.	watts
Screen Dissipation	1.0 max.	watt
Typical Operation:		
Plate	250	volts
Screen	100	volts
Control Grid (Grid #1)	-3	volts
Control Grid (Grid #3)	-3	volts
Plate Res. (approx.)	0.6	megohm
Transcond., Grid #1 to Plate	1100	μmhos
Transcond., Grid #1 to Plate*	5 approx.	μmhos
Plate Cur.	5.3	ma.
Screen Cur.	6.5	ma.

## MIXER

Plate Voltage	300 max.	volts
Screen Voltage (Grids #2 & #4)	150 max.	volts
Plate Dissipation	1.0 max.	watt
Screen Dissipation	1.5 max.	watts

■ In circuits where the cathode is not connected directly to the heater, the potential difference between heater and cathode should be kept as low as possible.

▲ With shell connected to cathode.

▲▲ With close-fitting shield connected to cathode.

\* With grid #1 bias of -15 volts, and grid #3 bias of -15 volts.

FEB. 2, 1940

RCA RADIODRON DIVISION  
RCA MANUFACTURING COMPANY INC

DATA

6L7  
6L7-G

6L7,6L7-G

## PENTAGRID MIXER AMPLIFIER

(continued from preceding page)

## Typical Operation:

Plate	250	250#	volts
Screen	100	150#	volts
Signal-Grid (Grid #1)	-3 min.	-6# min.	volts
Oscillator Grid (Grid #3) **	-10	-15	volts
Peak Osc.-Grid Voltage Applied to Grid #3	12 min.	18 min.	volts
Plate Res.	Greater than 1		megohm
Conversion Transcond.	375	350	$\mu$ mhos
Conversion Transcond.	5 <sup>●</sup>	5 <sup>△</sup>	$\mu$ mhos
Plate Cur.	2.4	3.3	ma.
Screen Cur.	7.1	9.2	ma.

- \*\* The d-c resistance in grid #3 circuit should not exceed 50000 ohms.  
 ● With grid #1 bias of -30 volts.    △ With grid #1 bias of -45 volts.  
 # These conditions are recommended for multi-range receiver applications.

FEB. 2, 1940

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY INC

DATA





Sunningham  
Radiotron

RCA-6L7

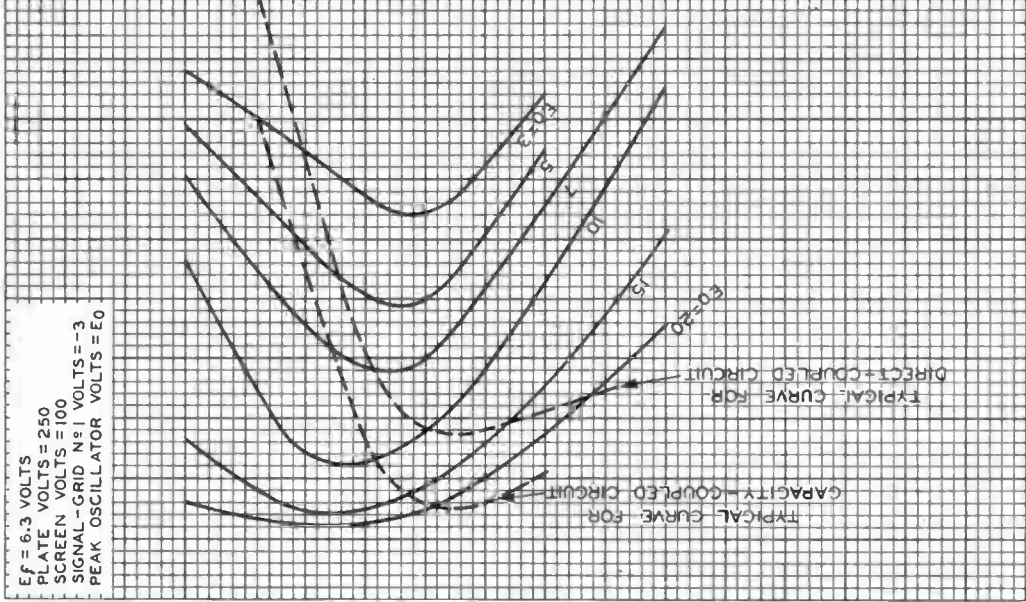
6L7

### OPERATION CHARACTERISTICS

$E_f = 6.3$  VOLTS  
PLATE VOLTS = 250  
SCREEN VOLTS = 100  
SIGNAL - GRID N<sup>o</sup> 1 VOLTS = -3  
PEAK OSCILLATOR VOLTS =  $E_0$

0  
-5  
-10  
-15  
-20  
-25  
-30

OSCILLATOR - GRID N<sup>o</sup> 3 VOLTS



TYPICAL CURVE FOR  
CAPACITY-COUPLED CIRCUIT

TYPICAL CURVE FOR  
DIRECT-COUPLED CIRCUIT

JULY 30, 1935

CONVERSION CONDUCTANCE (SC) MICROMHOS

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY INC.

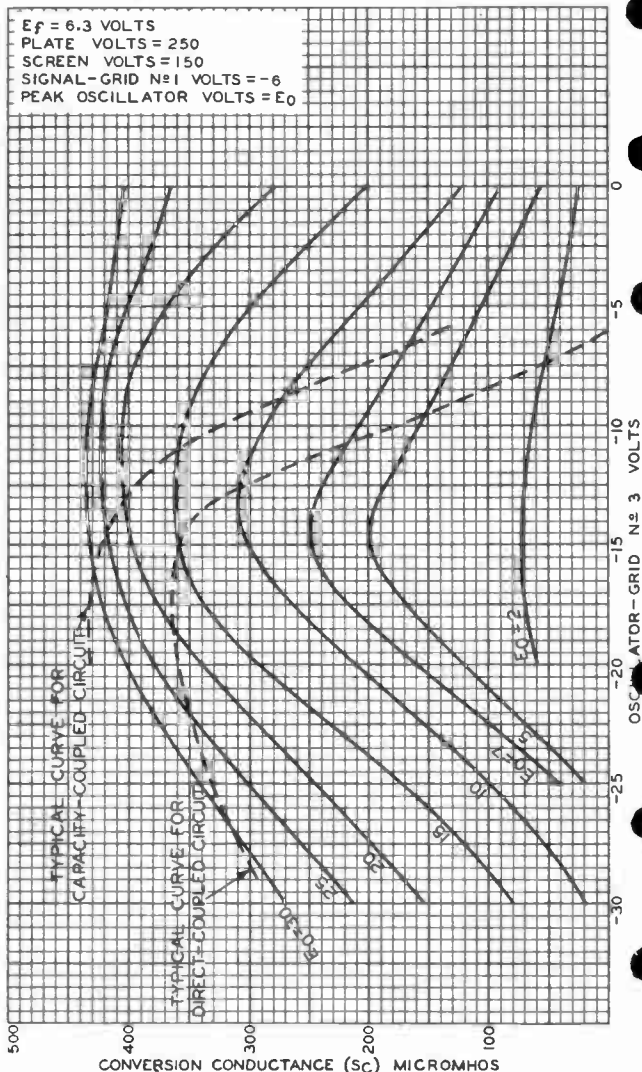
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6L7


**Cunningham  
Radiotron**


RCA-6L7

## OPERATION CHARACTERISTICS



JULY 26, 1935

 RCA RADIODRON DIVISION  
 RCA MANUFACTURING COMPANY, INC.

92C-4445

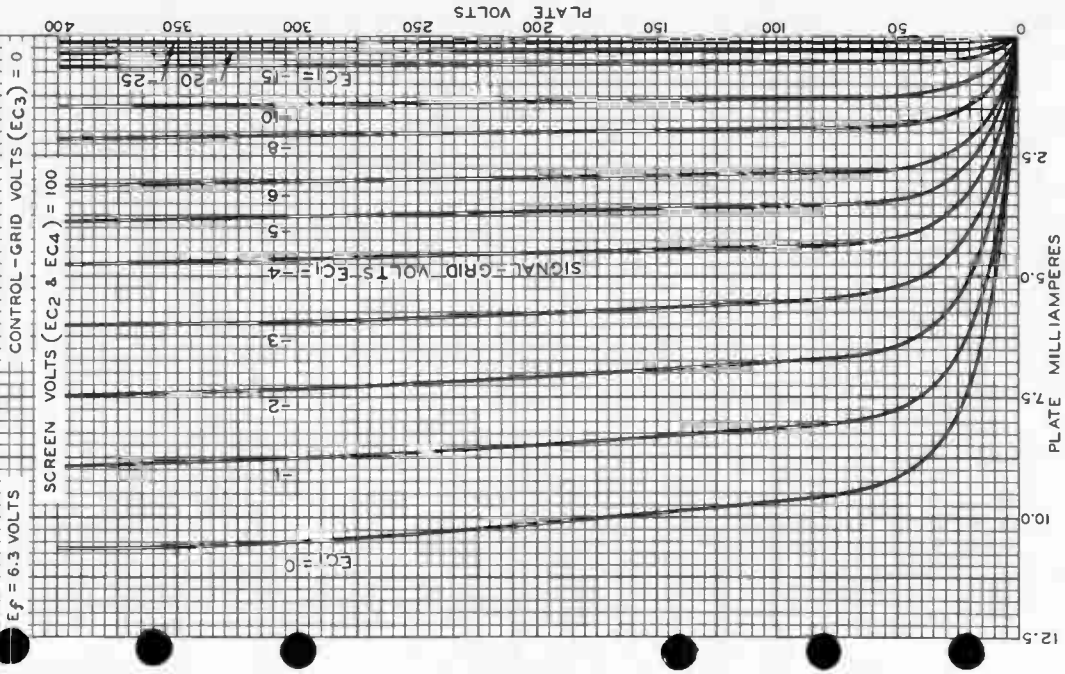
World Radio History



6L7

6L7

# AVERAGE PLATE CHARACTERISTICS WITH $E_{C1}$ AS VARIABLE



JAN. 3, 1936

RCA Radiotron Division  
RCA Manufacturing Company, Inc.

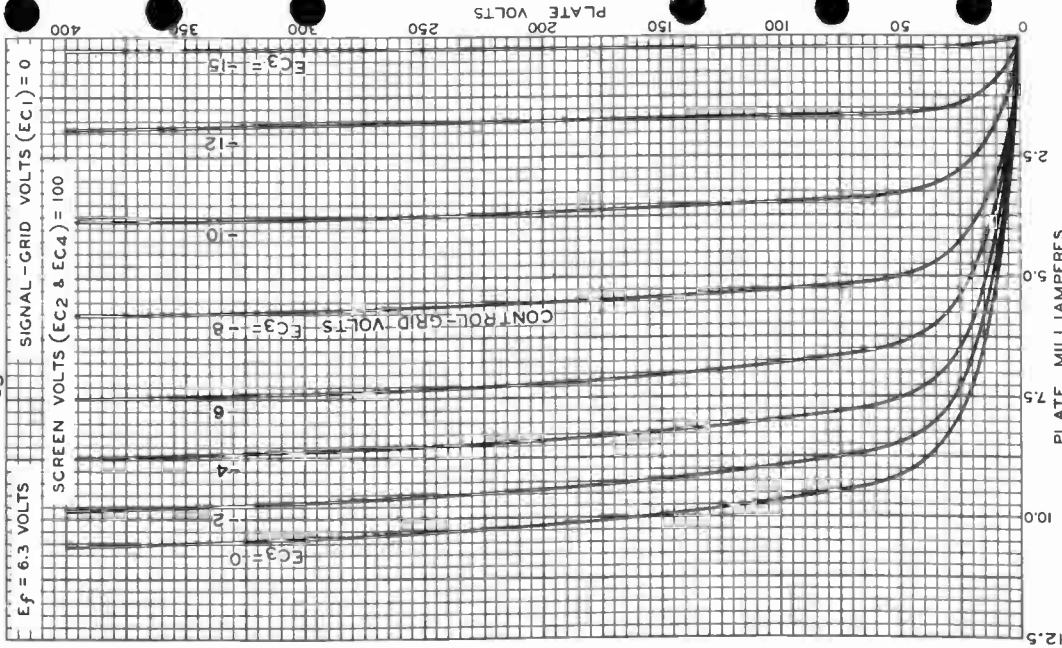
92C-4531

6L7



6L7

# AVERAGE PLATE CHARACTERISTICS WITH $E_{C3}$ AS VARIABLE



JAN. 7, 1936

PLATE MILLIAMPERES

RCA RADIONRON DIVISION  
RCA MANUFACTURING COMPANY INC

92C-4534

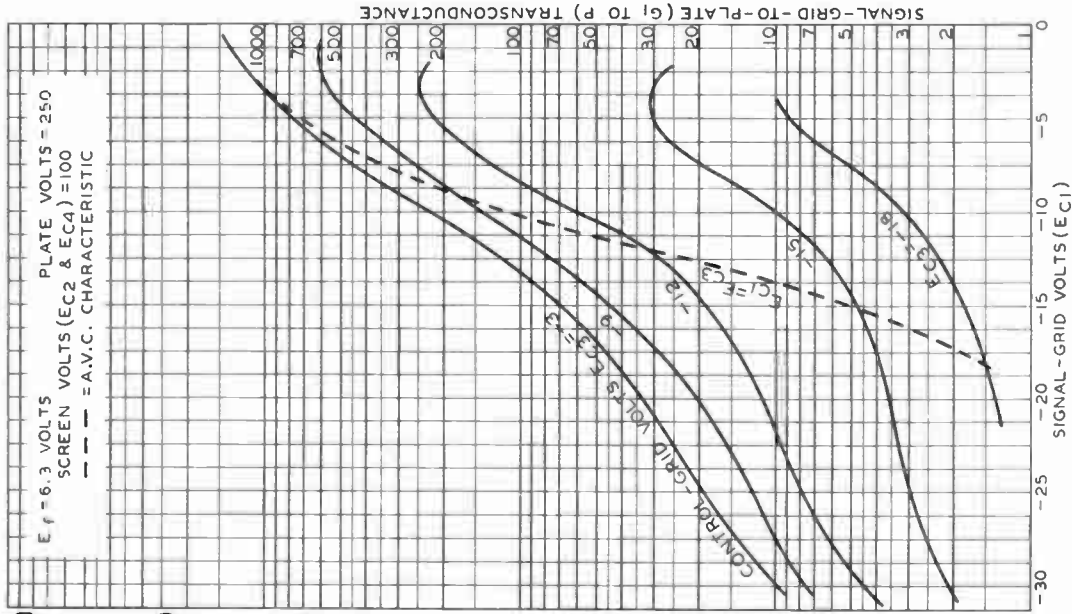


6L7

6L7

### AVERAGE CHARACTERISTICS

$E_f = 6.3$  VOLTS      PLATE VOLTS = 250  
SCREEN VOLTS ( $E_{C2}$  &  $E_{C4}$ ) = 100  
- - - = A.V.C. CHARACTERISTIC



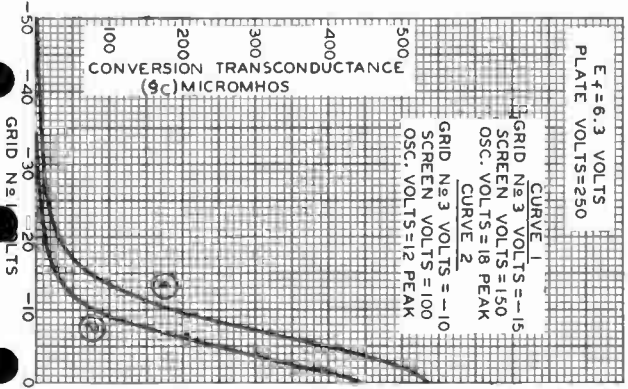
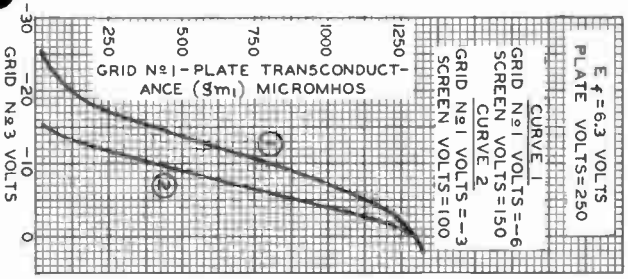
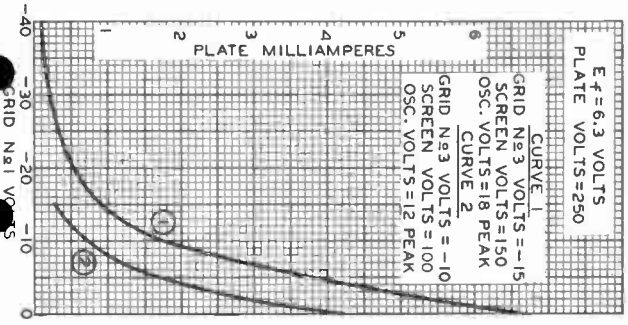
JAN. 8, 1936

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

92C-4536



AVERAGE CHARACTERISTICS





6N6-G

6N6-G

**DIRECT-COUPLED POWER AMPLIFIER**

Heater *	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.8	amp.
Maximum Overall Length		4-11/16"
Maximum Diameter		1-13/16"
Bulb		ST-14
Base		Medium Shell Octal 7-Pin
Pin 1 - No Connection		Pin 5 - Input-Triode Grid
Pin 2 - Heater		Pin 7 - Heater
Pin 3 - Output-Triode Plate		Pin 8 - Cathode
Pin 4 - Input-Triode Plate		



Mounting Position      BOTTOM VIEW (G-7AU)      Any

**AMPLIFIER - Class A<sub>1</sub>****Operating Conditions and Characteristics:**

Heater *	6.3	volts
Output-Triode Plate	300 max.	volts
Input-Triode Plate	300 max.	volts
Input-Triode Grid <sup>Δ</sup>	0	volts
Peak A-F Grid Voltage	21	volts
Amp. Fact.	58	
Plate Res.	24000	ohms
Transcond. <sup>‡</sup>	2400	μmhos
Output-Triode Plate Cur.	42	ma.
Input-Triode Plate Cur.	9	ma.
Load Res. <sup>□</sup>	7000	ohms
Total Harmonic Distortion	5	%
Power Output	4	watts

\* In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

<sup>‡</sup> Input grid to output plate.

The input triode serves as a driver for the output triode and is directly coupled to it. No external bias supply is required, but the input-triode grid does not draw grid current because a bias voltage is set up automatically in the tube.

<sup>□</sup> If two tubes are operated in push-pull, the plate-to-plate load resistance should be 10000 ohms.

DEC. 1, 1939

RCA RADIODRON DIVISION  
RCA MANUFACTURING COMPANY INC

TENTATIVE DATA







## 6N7, 6N7-GT/G

6N7  
6N7-GT/G

## CLASS B TWIN AMPLIFIER

	Coated Unipotential Cathode	
Heater Voltage	6.3	a-c or d-c volts
Heater Current	0.8	amp.
	6N7	6N7-GT/G
Maximum Overall Length	3-1/4"	3-5/16"
Maximum Seated Height	2-11/16"	2-2/4"
Maximum Diameter	1-5/16"	1-5/16"
Bulb	Metal Shell, MT-8 { Small Wafer { Octal 8-Pin	T-9 { Interm. Sh. { Octal 8-Pin
Base	8R	G-8R
Basing Designation		
Pin 1- { 6N7, Shell 6N7-GT/G, No Conn.		Pin 5-Grid (Triode T <sub>1</sub> )
Pin 2-Heater		Pin 6-Plate (Triode T <sub>1</sub> )
Pin 3-Plate (Triode T <sub>2</sub> )		Pin 7-Heater
Pin 4-Grid (Triode T <sub>2</sub> )		Pin 8-Cathode
Mounting Position	BOTTOM VIEW	



For convenience, one triode unit is identified as T<sub>1</sub>; the other as T<sub>2</sub>.

Maximum Ratings Are Design-Center Values

## CLASS B POWER AMPLIFIER

Plate Voltage	300 max. volts	
Peak Plate Current (per plate)	125 max. ma.	
Average Plate Dissipation (per plate)	5.5 max. watts	
Typical Operation:		
<i>Unless otherwise specified, values are for the two units</i>		
Plate-Supply Impedance	0	1000 <sup>□</sup> ohms
Effective Grid-Circuit Impedance (per unit)	0	516 <sup>□□</sup> ohms
Plate Voltage	300	300 volts
Grid Voltage	0	0 volts
Peak A-F Grid-to-Grid Voltage <sup>▲</sup>	58	82 volts
Zero-Sig. D-C Plate Cur.	35	35 ma.
Max.-Sig. D-C Plate Cur.	70	70 ma.
Peak Grid Cur. (per unit)	20	22 ma.
Effective Load Res. (plate to plate)	8000	8000 ohms
Total Harmonic Distortion	4	8 %
Third Harmonic Distortion	3.5	7.5 %
Fifth Harmonic Distortion	1.5	2.5 %
Max.-Sig. Power Output	10	10 watts

□ Practical design value.

□□ At 400 cycles for class B stage in which the effective resistance per grid circuit is 500 ohms, and the leakage reactance of the coupling transformer is 50 millihenries. The driver stage should be capable of supplying the grids of the class B stage with the specified values at low distortion.

• Includes peak voltage drop through the grid circuit impedance.

▲ For power output shown.

Two 6N7's or 6N7-G's can be operated in a class B output stage with the two triode units of each tube connected in parallel to give a power output of 20 watts (approx.) under conditions of 300 volts on the plates and a 5000-ohm plate-to-plate load.

• See next page.

← Indicates a change.

6N7  
6N7-GT/G



# 6N7, 6N7-GT/G

## CLASS B TWIN AMPLIFIER

(continued from preceding page)

### CLASS A<sub>1</sub> AMPLIFIER - As Driver

*Both grids connected together at socket; likewise, both plates.*

Plate Voltage	300 max. volts
Plate Dissipation (per plate)	1.0 max. watt

**Typical Operation:**

Plate	250	294	volts
Grid <sup>▲</sup>	-5	-6	volts
Amp. Fact.	35	35	
Plate Res.	11300	11000	ohms
Transcond.	3100	3200	μmhos
Plate Cur.	6	7	ma.

Plate Load—Depends largely on the design factors of the class B amplifier. In general, the load will be between 20000 and 40000 ohms.

Power Output—under max. voltage conditions, upwards of 400 mw. can be obtained.

- In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.
- ▲ The d-c resistance in the grid circuit of the 6N7 or 6N7-GT/G as a class A amplifier may be as high as 0.5 megohm with cathode bias. With fixed bias, the resistance should not exceed 0.1 megohm.

*For additional curves, see Types 6A6 and 53; for data, see RESISTANCE-COUPLED AMPLIFIER CHART.*

← Indicates a change.

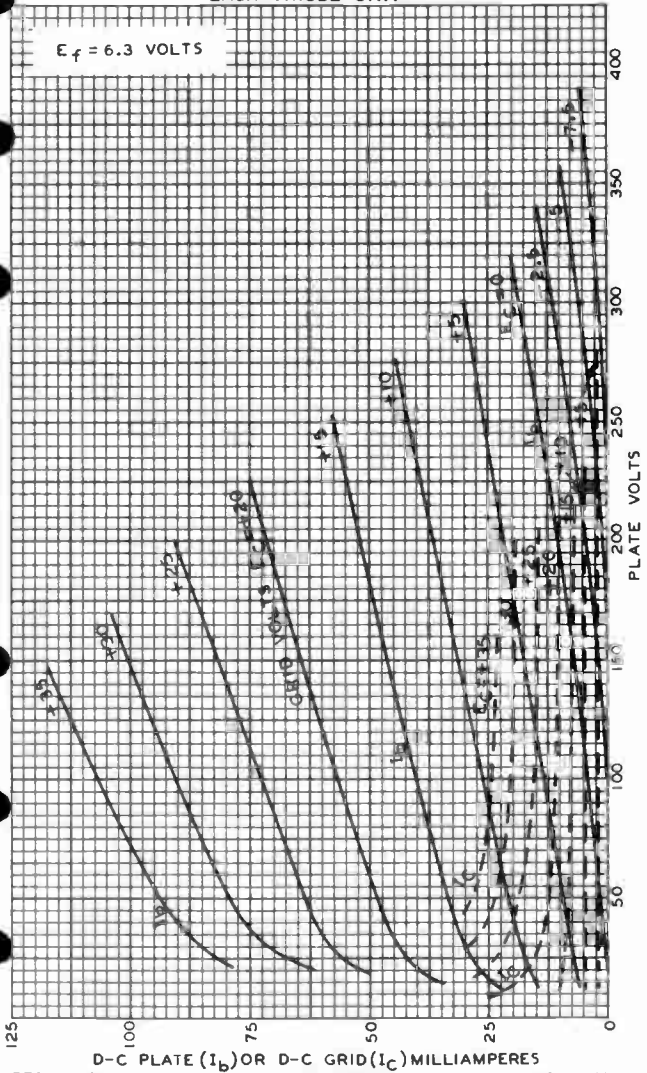


6N7

6N7

### AVERAGE PLATE CHARACTERISTICS EACH TRIODE UNIT

$E_f = 6.3$  VOLTS



D-C PLATE ( $I_b$ ) OR D-C GRID ( $I_c$ ) MILLIAMPERES

DEC. 18, 1939

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

92C-4611

6P5-GT/G



6P5-GT/G

**DETECTOR AMPLIFIER TRIODE**

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.3	amp.
Direct Interelectrode Capacitances: <sup>o</sup>		
Grid to Plate	2.6	μf
Grid to Cathode	3.4	μf
Plate to Cathode	5.5	μf
Maximum Overall Length		3-5/16"
Maximum Seated Height		2-3/4"
Maximum Diameter		1-5/16"
Bulb		T-9
Base	Intermediate Shell Octal 6-Pin	
Pin 1 - No Connection		Pin 5 - Grid
Pin 2 - Heater		Pin 7 - Heater
Pin 3 - Plate		Pin 8 - Cathode
Mounting Position		Any



BOTTOM VIEW (G-6Q)

Maximum Ratings Are Design-Center Values

AMPLIFIER

Plate Voltage	250 max. volts
Plate Dissipation	1.25 max. watts

*Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:*

Plate	100	250	volts
Grid #	-5	-13.5	volts
Amp. Fact.	13.8	13.8	
Plate Res.	12000	9500	ohms
Transcond.	1150	1450	μmhos
Plate Cur.	2.5	5	ma.

- In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.
- o With shield connected to cathode. Values are approximate.
- \* Under maximum rated conditions, the d-c resistance in the grid circuit should not exceed 1.0 megohm.

*Curves for the Type 6P5-GT/G are the same as for the 56 and the 76.*



6Q7, 6Q7-G, 6Q7-GT

6Q7-G  
6Q7-GT  
★

## DUPLEX-DIODE HIGH-MU TRIODE

Heater		Coated Unipotential Cathode		
Voltage		6.3	a-c or d-c volts	
Current		0.3	amp.	
		6Q7	6Q7-G	6Q7-GT
Direct Interelectrode Cap.		▲	▲▲	▲▲
Grid to Plate		1.4	1.5	1.6 μf
Grid to Cathode		5.0	3.2	2.2 μf
Plate to Cathode		3.8	5.0	5.0 μf
Overall Length		{ 3-1/8" max.	{ 4-7/32" to 4-16/32"	3-5/16" max.
Seated Height		{ 2-9/16" max.	{ 3-21/32" to 3-29/32"	2-3/4" max.
Maximum Diameter		1-5/16"	1-9/16"	1-5/16"
Bulb		Metal Shell, MT-8	ST-12	T-9
Cap		Miniature	{ Skirted Miniature	{ Skirted Min. Style C
Base		{ Small Wafer Octal 7-Pin	{ Small Shell Octal 7-Pin	{ Sm. Wafer Octal 7-Pin, Sleeve
Basing Designation		7V	G-7V	GT-7V
Pin 1	{ 6Q7, Shell 6Q7-G, No Con. 6Q7-GT, Base Sleeve		Pin 4 - Diode Plate #2	Pin 5 - Diode Plate #1
Pin 2 - Heater			Pin 7 - Heater	Pin 8 - Cathode
Pin 3 - Triode Plate			Cap - Triode Grid	
Mounting Position				Any
		BOTTOM VIEW TRIODE UNIT		
Plate Voltage			300 max.	volts
<b>Characteristics - Class A<sub>1</sub> Amplifier:</b>				
Plate		100	250	volts
Grid		-1	-3	volts
Amp. Fact.		70	70	
Plate Res.		58000	58000	ohms
Transcond.		1200	1200	μmhos
Plate Cur.		0.8	1.0	ma.
<b>Typical Operation - Resistance-Coupled Amplifier:</b>				
See RESISTANCE-COUPLED AMPLIFIER CHART.				
<u>DIODE UNITS - Two</u>				
Consideration of these units is given under Type 85. Circuits will be similar to those shown for Type 55 with fixed bias. Diode biasing of the triode unit of the 6Q7, 6Q7-G or 6Q7-GT is not suitable. Diode curves under Type 687 apply to the 6Q7, 6Q7-G, and 6Q7-GT.				
■ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible. ▲ With shell connected to cathode. Values are approximate. ▲▲ With close-fitting shield connected to cathode. Values are approximate.				

← Indicates a change.

Dec. 1, 1941

 RCA RADIOTRON DIVISION  
 RCA MANUFACTURING COMPANY, INC.  
 World Radio History

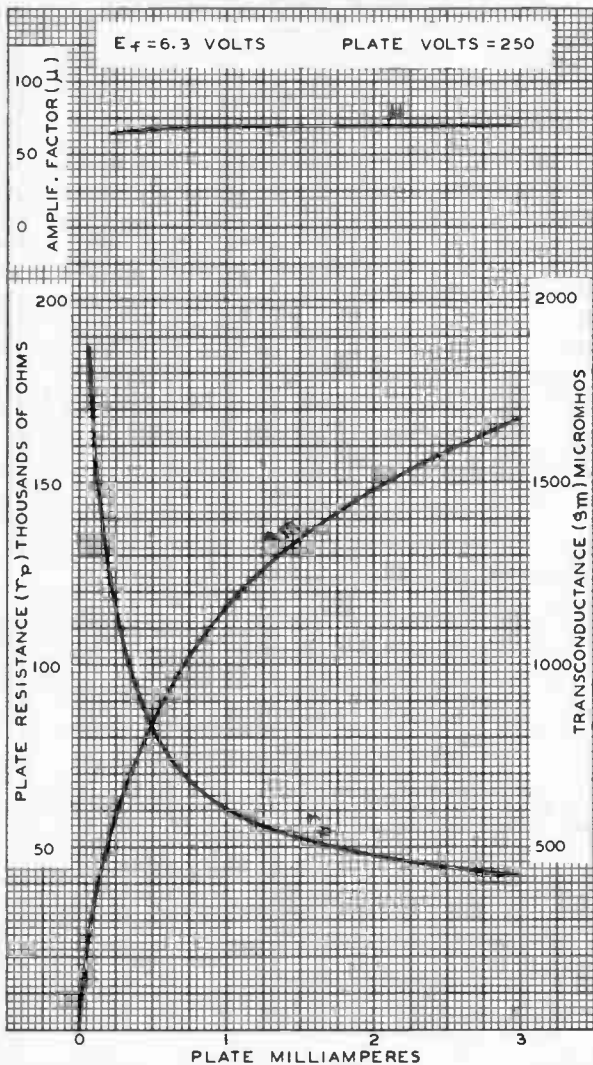
DATA

6Q7



6Q7

## AVERAGE CHARACTERISTICS



JUNE 29, 1936

RCA RADIONRON DIVISION

RCA MANUFACTURING COMPANY, INC.

World Radio History

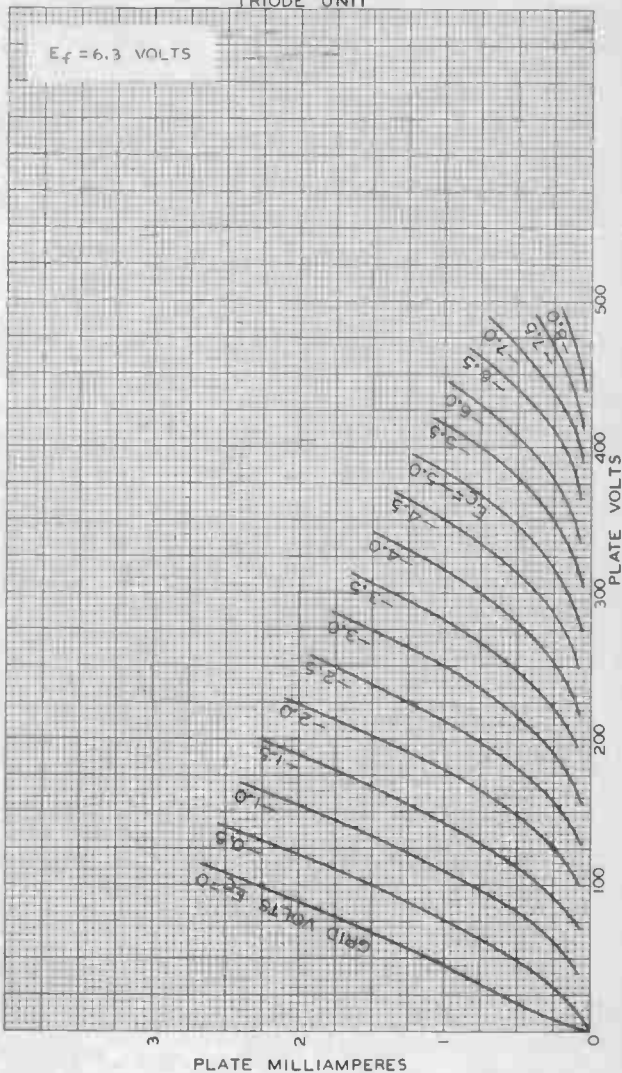
92C-4577



6Q7

6Q7

# AVERAGE PLATE CHARACTERISTICS TRIODE UNIT



SEPT. 10, 1941

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY INC.

92C-4522R2



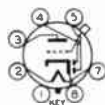


6R7  
6R7-GT/G

## 6R7, 6R7-GT/G

## DUPLEX-DIODE TRIODE

Heater		Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts	
Current	0.3	amp.	
	<u>6R7</u>	<u>6R7-GT/G</u>	
Direct Interelectrode Cap.	▲		
Grid to Plate	2.4	-	μf
Grid to Cathode	4.8	-	μf
Plate to Cathode	3.8	-	μf
Maximum Overall Length	3-1/8"	3-5/16"	
Maximum Seated Height	2-9/16"	2-3/4"	
Maximum Diameter	1-5/16"	1-5/16"	
Bulb	Metal Shell, MT-8	T-9	
Cap	Miniature	{ Skirted	
		{ Miniature	
Base	{ Small Wafer	{ Intermed. Shell	
	{ Octal 7-Pin	{ Octal 7-Pin	
Basing Designation	7V	G-7V	
Pin 1	{ 6R7, Shell	Pin 4 - Diode Plate #2	
	{ 6R7-GT/G, No	Pin 5 - Diode Plate #1	
	{ Connection	Pin 7 - Heater	
Pin 2 - Heater		Pin 8 - Cathode	
Pin 3 - Triode Plate		Cap - Triode Grid	
Mounting Position			Any



BOTTOM VIEW

Maximum Ratings Are Design-Center Values

## TRIODE UNIT

Plate Voltage	250 max. volts
Plate Dissipation	2.5 max. watts
D-C Heater-Cathode Potential	100 max. volts
<i>Typical Operation and Characteristics—Class A<sub>2</sub> Amplifier:</i>	
Plate	250 volts
Grid	-9 volts
Amp. Fact.	16
Plate Res.	8500 ohms
Transcond.	1900 μmhos
Plate Cur.	9.5 ma.

*Typical Operation—Resistance-Coupled Amplifier:*

See RESISTANCE-COUPLED AMPLIFIER CHART. Under maximum rated conditions, the d-c resistance in the grid circuit of the 6R7 and 6R7-GT/G should not exceed 1.0 megohm.

## DIODE UNITS - Two

For consideration of these units, see Type 85. Circuits will be similar to those shown for Type 55 with fixed bias. Diode biasing of the triode unit of the 6R7 and 6R7-GT/G is not suitable. Diode curves under Type 6R7 apply to the 6R7 and 6R7-GT/G.

▲ Triode unit with shell connected to cathode. values are approximate.

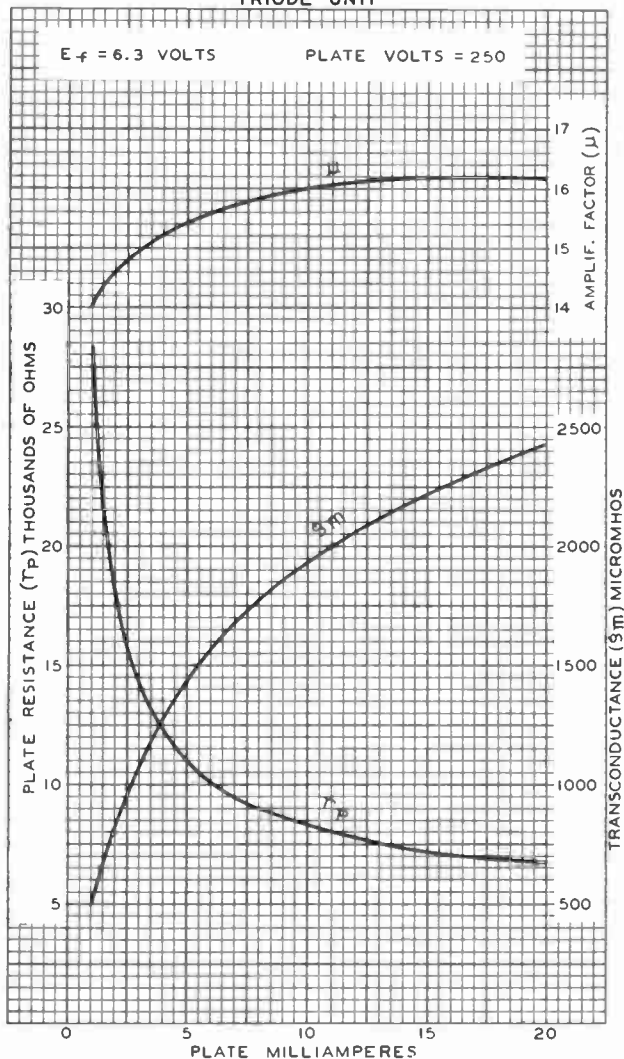
An additional curve applying to Types 6R7 and 6R7-GT/G is indicated by ← is shown under Type 6SR7.

6R7



6R7

### AVERAGE CHARACTERISTICS TRIODE UNIT



DEC. 14, 1943

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-4546R1

World Radio History



6S7, 6S7-G

6S7  
6S7-G

## TRIPLE-GRID SUPER-CONTROL AMPLIFIER

Heater <sup>■</sup>	Coated Unipotential Cathode		a-c or d-c volts amp.
	6S7	6S7-G	
Voltage	6.3		
Current	0.15		
Direct Interelectrode Cap.	▲	▲▲	
Grid to Plate	0.005 max.	0.008 max.	μf
Input	6.5	4.4	μf
Output	10.5	8	μf
Overall Length	3-1/8" max.	{ 4-7/32" to 4-15/32"	
Maximum Diameter	1-5/16"	1-9/16"	
Bulb	Metal Shell, MT-8	ST-12	
Cap	Miniature	Skirted Min.	
Base	{ Small Wafer Octal 7-Pin	{ Small Shell Octal 7-Pin	
Basing Designation	7R	G-7R	
Pin 1	{ 6S7, Shell 6S7-G, No Con.	Pin 5 - Suppressor	
Pin 2 - Heater		Pin 7 - Heater	
Pin 3 - Plate		Pin 8 - Cathode	
Pin 4 - Screen		Cap - Grid	
Mounting Position			Any



BOTTOM VIEW

AMPLIFIER - Class A<sub>1</sub>

Plate Voltage		300 max. volts
Screen Voltage		100 max. volts
Screen Supply Voltage		300 max. volts
Grid Voltage		0 min. volts
Plate Dissipation		2.25 max. watts
Screen Dissipation		0.25 max. watt
Typical Operation:		
Plate	135	250 volts
Screen	67.5	100 volts
Grid	-3	-3 volts
Suppressor	Connected to cathode at socket	
Plate Res. (approx.)	1	1 megohm
Transcond.	1250	1750 μmhos
Transcond.	10 <sup>●</sup>	10 <sup>▲</sup> μmhos
Plate Cur.	3.7	8.5 ma.
Screen Cur.	0.9	2 ma.

■ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

▲ With shell connected to cathode.

▲▲ With close-fitting shield connected to cathode.

● With grid bias of -25 volts.      ▲ With grid bias of -38.5 volts.

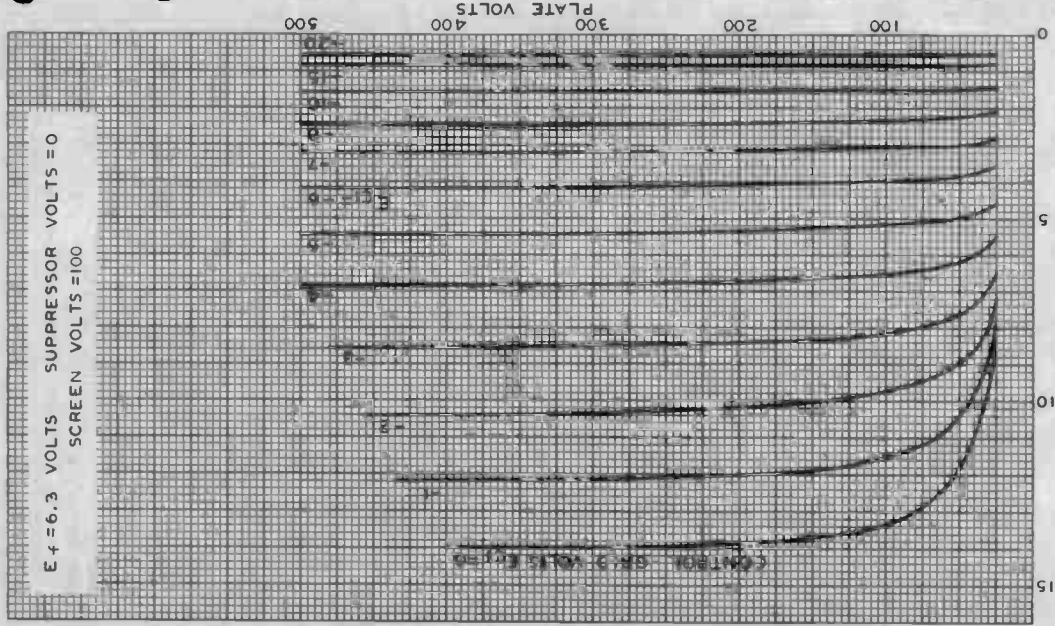
6S7



6S7

# AVERAGE PLATE CHARACTERISTICS

$E_f = 6.3$  VOLTS SUPPRESSOR VOLTS = 0  
SCREEN VOLTS = 100



JAN. 17, 1938

PLATE MILLIAMPERES

RCA RADIIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

92C-4868



6S8-GT

6S8-GT

# TRIPLE DIODE-HIGH-MU TRIODE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathodes:

Voltage . . . . . 6.3 . . . . . ac or dc volts

Current . . . . . 0.3 . . . . . amp

Direct Interelectrode Capacitances:

Triode Unit:

Grid to Plate . . . . . 1.2 . . . . .  $\mu\mu\text{f}$

Grid to Cathode . . . . . 2.0 . . . . .  $\mu\mu\text{f}$

Plate to Cathode . . . . . 3.8 . . . . .  $\mu\mu\text{f}$

Each Diode Unit:

Plate to Cathode (Approx.) . . . . . 1.0 . . . . .  $\mu\mu\text{f}$

\* With external shield.

### Mechanical:

Mounting Position . . . . . Any

Maximum Overall Length . . . . . 3-5/8"

Maximum Seated Length . . . . . 3-1/16"

Maximum Diameter . . . . . 1-9/32"

Bulb . . . . . T-9

Base . . . . . Intermediate-Shell Octal 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 8CB

Pin 1 - Diode  
Plate No. 3

Pin 2 - Cathode of  
Triode &  
Diodes  
Nos. 2 & 3

Pin 3 - Diode  
Plate No. 1



Pin 4 - Diode  
Plate No. 2

Pin 5 - Cathode of  
Diode No. 1

Pin 6 - Triode Plate

Pin 7 - Heater

Pin 8 - Heater

Cap - Triode Grid

### TRIODE UNIT AMPLIFIER - Class A<sub>1</sub>

Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . . 300 max. volts

PLATE DISSIPATION . . . . . 0.5 max. watt

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . . . . . 90 max. volts

Heater positive with respect to cathode . . . . . 90 max. volts

### Characteristics:

Plate Voltage . . . . . 50 100 250 . . volts

Grid Voltage . . . . . 0 -1 -2 . . volts

Grid Resistor . . . . . 10 0 0 . megohms

Amplification Factor . . . . . 85 100 100

Plate Resistance . . . . . 285000 110000 91000 . . ohms

Transconductance . . . . . 300 900 1100 . .  $\mu\text{mhos}$

Plate Current . . . . . 0.07 0.4 0.9 . . ma

6S8-GT



6S8-GT

TRIPLE DIODE—HIGH-MU TRIODE

DIODE UNITS

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

PLATE CURRENT (For Each Diode) . . . . . 1.0 max. ma

**Diode Considerations:**

Diode units No.2 & No.3 and the triode unit have a common cathode, and diode unit No.1 has a separate cathode. Diodes No.1 (pins 3 & 5) and No.3 (pins 1 & 2) are recommended for use in FM detector applications, while diode No.2 (pins 4 & 2) is recommended for use as an AM detector.

Further consideration of these units, including diode curves, is given at the front of this section. Diode biasing of the triode unit of the 6S8-GT is not suitable.

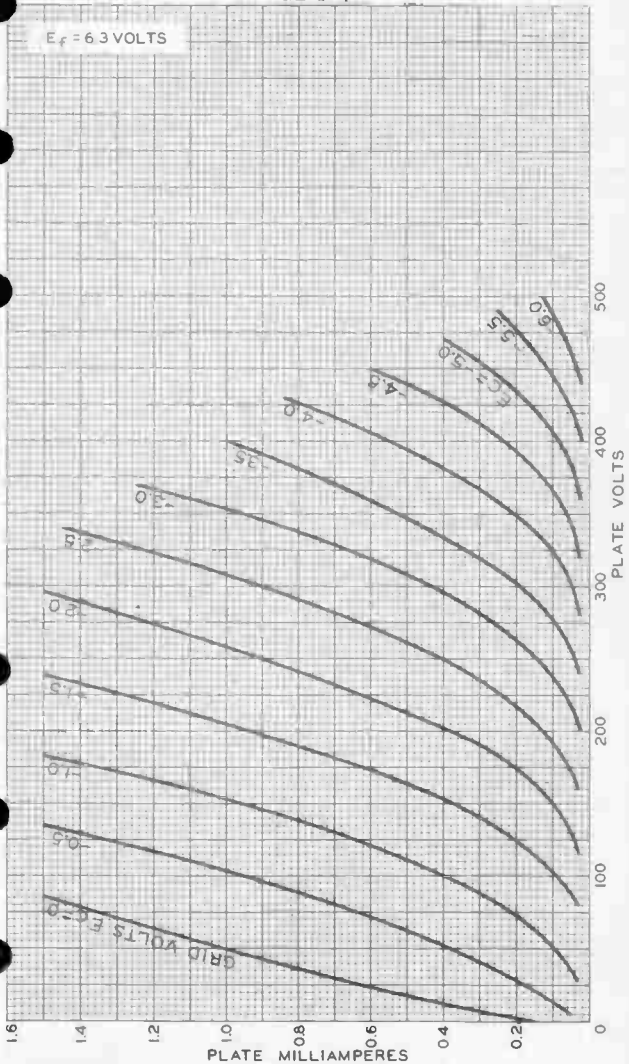


6S8-GT

# AVERAGE PLATE CHARACTERISTICS TRIODE UNIT

6S8-GT

$E_f = 6.3$  VOLTS



JULY 25, 1947

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA HARRISON NEW JERSEY  
World Radio History

92CM-6876







6SB7-Y

6SB7-Y

**PENTAGRID CONVERTER**

SINGLE-ENDED METAL TYPE

GENERAL DATA**Electrical:**

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3 . . . . . ac or dc volts

Current. . . . . 0.3 . . . . . amp.

Direct Interelectrode Capacitances:

Grid No.3 to All Other Electrodes  
(RF Input)<sup>▲</sup>. . . . . 9.6 . . . . . μfPlate to All Other Electrodes  
(Mixer Output)<sup>▲</sup>. . . . . 9.2 . . . . . μfGrid No.1 to All Other Electrodes  
(Osc. Input)<sup>▲</sup>. . . . . 7.3 . . . . . μfGrid No.3 to Plate<sup>▲</sup>. . . . . 0.13 max. μfGrid No.3 to Grid No.1<sup>▲</sup>. . . . . 0.16 max. μfGrid No.1 to Plate<sup>▲</sup>. . . . . 0.06 max. μfGrid No.1 to All Other Electrodes and  
Shell, Except Cathode . . . . . 3.8 . . . . . μf

Grid No.1 to Cathode . . . . . 3.4 . . . . . μf

Cathode to All Other Electrodes and  
Shell Except Grid No.1 . . . . . 4.5 . . . . . μf**Mechanical:**

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 2-5/8"

Maximum Seated Length. . . . . 2-1/16"

Maximum Diameter . . . . . 1-5/16"

Bulb . . . . . MT-BG

Base . . . . . Small Wafer Octal 8-Pin, Micanol

Basing Designation for BOTTOM VIEW . . . . . BR

Pin 1-Shell, . . . . . Pin 5-Grid No.1  
Grid No.5 . . . . . Pin 6-Cathode

Pin 2-Heater . . . . . Pin 7-Heater

Pin 3-Plate . . . . . Pin 8-Grid No.3

Pin 4-Grids . . . . .

No.2 &amp; No.4



KEY

CONVERTER SERVICE**Maximum Ratings, Design-Center Values:**

PLATE VOLTAGE. . . . . 300 max. volts

GRIDS-No.2 &amp; No.4 VOLTAGE . . . . . 100 max. volts

GRIDS-No.2 &amp; No.4 SUPPLY VOLTAGE. . . . . 300 max. volts

PLATE DISSIPATION. . . . . 2.0 max. watts

GRIDS-No.2 &amp; No.4 DISSIPATION . . . . . 1.5 max. watts

TOTAL CATHODE CURRENT. . . . . 22 max. ma.

GRID-No.3 VOLTAGE:

Negative Bias Voltage. . . . . 100 max. volts

Positive Bias Voltage. . . . . 0 max. volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . . . . . 90 max. volts

Heater positive with respect to cathode . . . . . 90 max. volts

<sup>▲</sup> with shell connected to cathode.

APRIL 1, 1946

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA 1

6SB7-Y



6SB7-Y

## PENTAGRID CONVERTER

## Characteristics - - Separate Excitation:\*

Plate Voltage. . . . .	100	250	. . volts
Grids-No.2 & No.4 (Screen) Voltage	100	100	. . volts
Grid-No.3 (Control Grid) Voltage	-1.0	-1.0	. . volt
Grid-No.1 (Oscillator Grid) Resistor	20000	20000	. . ohms
Plate Resistance (Approx.) . .	0.5	1.0	. . Megohm
Conversion Transconductance. .	900	950	. . $\mu$ mhos
Conversion Transconductance**	3.5	3.5	. . $\mu$ mhos
Plate Current. . . . .	3.6	3.8	. . ma.
Grids-No.2 & No.4 Current . . .	10.2	10	. . ma.
Grid-No.1 Current . . . . .	0.35	0.35	. . ma.
Total Cathode Current. . . . .	14.2	14.2	. . ma.

## Typical Operation in FM Band (88-108 Mc):

(See circuit on following page)

Plate Voltage. . . . .		250	. . volts
Grids-No.2 & No.4 (Screen) Supply Voltage		250	. . volts
Grids-No.2 & No.4 Resistor . . . .		12000	. . ohms
Grid-No.1 Resistor . . . . .		22000	. . ohms
Signal Frequency . . . . .	88	108	Mc
Oscillation Frequency. . . . .	98.7	118.7	Mc
Plate Current. . . . .	6.8	6.5	ma.
Grids-No.2 & No.4 Current. . . . .	12.6	12.5	ma.
Grid-No.1 Current . . . . .	0.130	0.140	ma.

NOTE: The transconductance between grid No.1 and grids No.2 & No.4 connected to plate (not oscillating) is approximately 8000 micromhos under the following conditions: signal applied to grid No.1 at zero-bias; grids-No.2 and No.4 and plate at 100 volts; grid No.3 grounded. Under the same conditions, the plate current is 32 milliamperes and the amplification factor is 16.5.

\* The characteristics shown with separate excitation correspond very closely with those obtained in a self-excited oscillator circuit operating with zero bias.

\*\* With grid-No.3 bias of -20 volts.



6SB7-Y

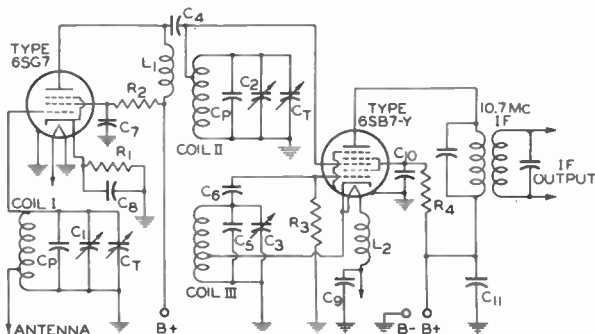
6SB7-Y

## PENTAGRID CONVERTER

TYPICAL SELF-EXCITED CONVERTER CIRCUIT  
FOR TYPE 6SB7-Y WITH RF STAGE

88-108Mc

(SEE TYPICAL OPERATION)



C1 C2 C3 = GANGED TUNING CONDENSERS: 7 - 23  $\mu$ f  
 C4 C5 C6 = 22  $\mu$ f  
 C7 C8 C9 C10 C11 = BY-PASS CONDENSERS  
 Cp = PADDING CONDENSERS  
 Ct = TRIMMER CONDENSERS

L1 L2 = RF CHOKES  
 R1 = 68 OHMS  
 R2 = 33000 OHMS  
 R3 = 22000 OHMS  
 R4 = 12000 OHMS

COIL I = ANTENNA COIL\*: 2 TURNS NO. 14 WIRE + 1-1/4" LEAD NO. 20 WIRE. COIL TAPPED AT 1 TURN.  
 COIL II = INTERSTAGE COIL\*: 2 TURNS NO. 14 WIRE + 1-1/4" LEAD NO. 20 WIRE. COIL TAPPED AT 1-1/4 TURN.  
 COIL III = OSCILLATOR COIL\*: 1-7/8 TURNS NO. 14 WIRE, NO ADDED LEAD. COIL TAPPED AT 5/8 TURN.

\* All coils 5/8" long, approx.

NOTE 1: All tap positions are approximate and should be adjusted to give stable operation.

NOTE 2: Insertion of a small non-inductive resistor of about 3 ohms in the circuit at grid-no. 3 terminal of the 6SB7-Y is helpful in preventing oscillation at the signal frequency.

92CM-6650

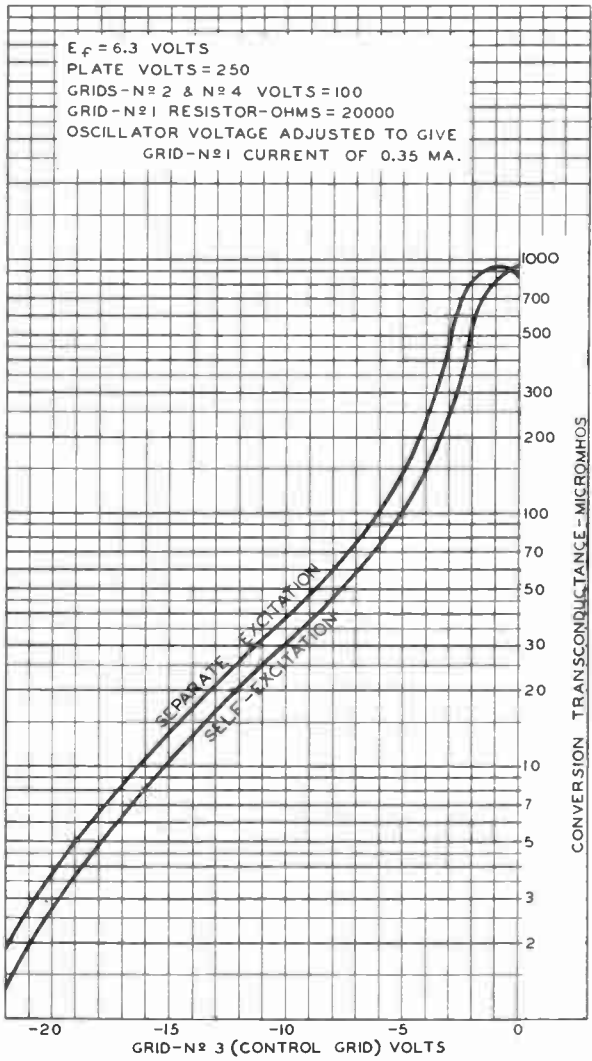
6SB7-Y



6SB7-Y

OPERATION CHARACTERISTICS

$E_f = 6.3$  VOLTS  
 PLATE VOLTS = 250  
 GRIDS-N<sup>o</sup> 2 & N<sup>o</sup> 4 VOLTS = 100  
 GRID-N<sup>o</sup> 1 RESISTOR-OHMS = 20000  
 OSCILLATOR VOLTAGE ADJUSTED TO GIVE  
 GRID-N<sup>o</sup> 1 CURRENT OF 0.35 MA.



NOV. 8, 1945

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6619



6SB7-Y

6SB7-Y

### OPERATION CHARACTERISTICS WITH SELF-EXCITATION

$E_f = 6.3$  VOLTS

PLATE VOLTS = 250

GRIDS-N<sup>o</sup> 2 & N<sup>o</sup> 4 VOLTS = 100

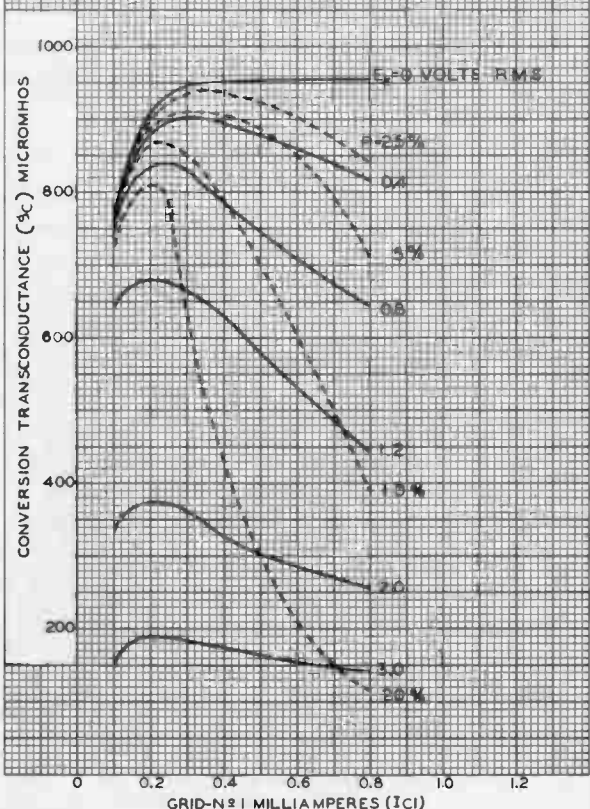
GRID-N<sup>o</sup> 3 (CONTROL GRID) VOLTS = -1

GRID-N<sup>o</sup> 1 RESISTOR - OHMS = 20000

P - PERCENTAGE RATIO OF  $E_k$  TO  $E_k + E_g$ , WHERE

$E_k$  = VOLTAGE ACROSS OSCILLATOR - COIL SECTION  
BETWEEN GROUND AND CATHODE, AND

$E_g$  = OSCILLATOR VOLTAGE BETWEEN CATHODE  
AND GRID



6SB7-Y



6SB7-Y

### OPERATION CHARACTERISTICS WITH SEPARATE OSCILLATOR EXCITATION

$E_f = 6.3$  VOLTS

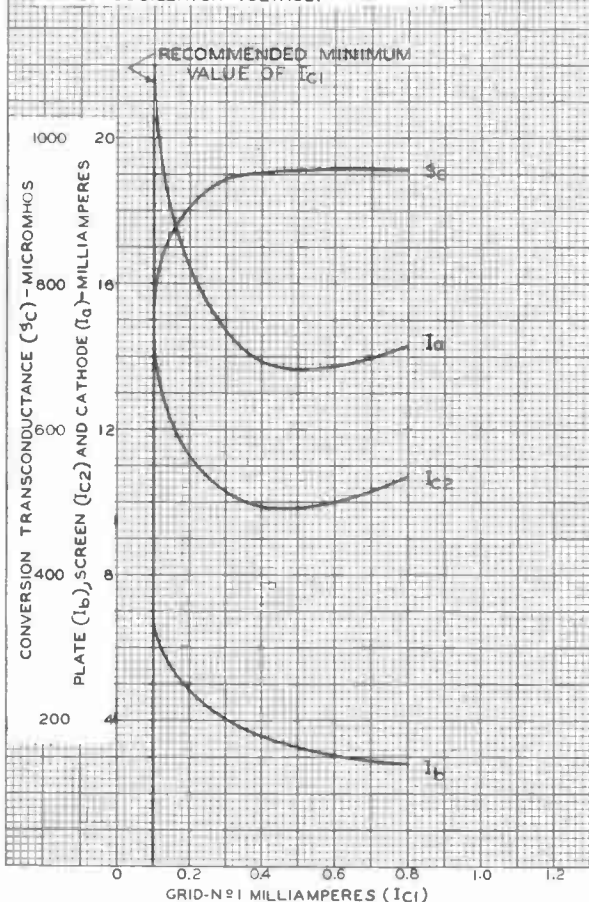
PLATE VOLTS = 250

GRIDS-N<sup>o</sup> 2 & N<sup>o</sup> 4 VOLTS = 100

GRID-N<sup>o</sup> 3 (CONTROL GRID) VOLTS = -1

GRID-N<sup>o</sup> 1 RESISTOR-OHMS = 20000

GRID-N<sup>o</sup> 1 CURRENT VARIED BY ADJUSTMENT  
OF OSCILLATOR VOLTAGE.



NOV. 20, 1945

RCA VICTOR DIVISION

92CM-6634

RADIO CORPORATION OF AMERICA, PHILADELPHIA, NEW JERSEY

World Radio History



6SC7

6SC7

# HIGH-MU TWIN TRIODE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . .	6.3 . . . . .	ac or dc volts
Current . . . . .	0.3 . . . . .	amp

Direct Interelectrode Capacitances (Approx.):\*

Grid to plate . . . . .	2	$\mu\mu\text{f}$
Grid to cathode, heater, and shell . . . . .	2	$\mu\mu\text{f}$
Plate to cathode, heater, and shell . . . . .	3	$\mu\mu\text{f}$

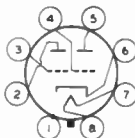
### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	2-5/8"
Maximum Seated Length . . . . .	2-1/16"
Maximum Diameter . . . . .	1-5/16"

Bulb . . . . . Metal Shell, MT-8  
Base . . . . . Small-Wafer Octal 8-Pin (JETEC No. B8-21)

Basing Designation for BOTTOM VIEW . . . . . 8S

- |                            |                            |
|----------------------------|----------------------------|
| Pin 1 - Shell              | Pin 5 - Plate of Unit No.1 |
| Pin 2 - Plate of Unit No.2 | Pin 6 - Cathode            |
| Pin 3 - Grid of Unit No.2  | Pin 7 - Heater             |
| Pin 4 - Grid of Unit No.1  | Pin 8 - Heater             |



### AMPLIFIER - Class A<sub>1</sub>

Values are for Each Unit

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . .	250 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	90 max.	volts
Heater positive with respect to cathode . . . . .	90 max.	volts

### Characteristics:

Plate Voltage . . . . .	250	volts
Grid Voltage . . . . .	-2	volts
Amplification Factor . . . . .	70	
Plate Resistance (Approx.) . . . . .	53000	ohms
Transconductance (Approx.) . . . . .	1325	$\mu\text{mhos}$
Plate Current . . . . .	2	ma

### Typical Operation as Resistance-Coupled Amplifier:

See RESISTANCE-COUPLED AMPLIFIER CHART No. 17 at front of this Section

\* values for each unit with pin 1 connected to pin 6.

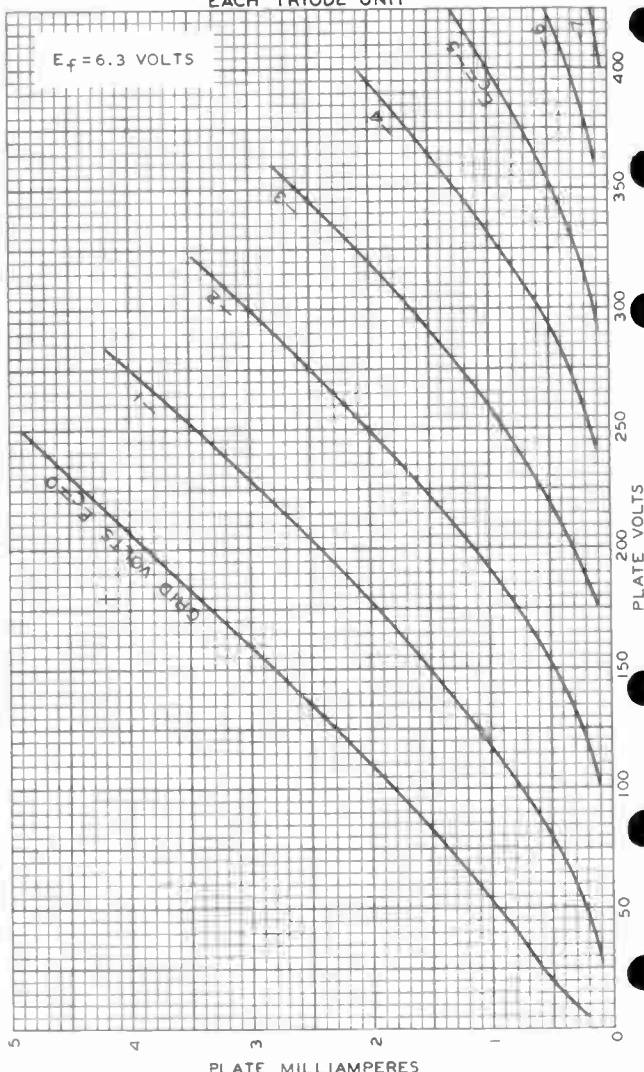
← indicates a change.

6SC7



6SC7

# AVERAGE PLATE CHARACTERISTICS EACH TRIODE UNIT



OCT. 16, 1940

TUBE DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6096R1



6SF5  
6SF5-GT

# 6SF5, 6SF5-GT HIGH-MU TRIODE

Heater <sup>■</sup> Coated Unipotential Cathode  
 Voltage 6.3 a-c or d-c volts  
 Current 0.3 amp.

Direct Interelectrode Cap.	6SP5 <sup>▲</sup>	6SP5-GT
Grid to Plate	2.4	- uuf
Grid to Cathode	4.0	- uuf
Plate to Cathode	3.6	- uuf

Maximum Overall Length 2-5/8" 3-5/16"  
 Maximum Seated Height 2-1/16" 2-3/4"  
 Maximum Diameter 1-5/16" 1-5/16"

Bulb Metal Shell MT-8 T-9

Base { Small Wafer { Intermed. Shell  
 { Octal 6-Pin { Octal 6-Pin

Basing Designation 6AB G-6AB

Pin 1 { 6SF5, Shell Pin 5 - Plate  
 { 6SF5-GT, No Con. Pin 7 - Heater

Pin 2 - Cathode Pin 8 - Heater

Pin 3 - Grid

Mounting Position Any



BOTTOM VIEW

AMPLIFIER

Plate Voltage 300 max. volts

Characteristics - Class A<sub>1</sub> Amplifier:

Plate	100	250	volts
Grid	-1	-2	volts
Amp. Fact.	100	100	
Plate Res.	85000	66000	ohms
Transcond.	1150	1500	umhos
Plate Cur.	0.4	0.9	ma.

Typical Operation - Resistance Coupled Amplifier:

Same as 6F5 in RESISTANCE-COUPLED AMPLIFIER CHART.

■ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

▲ with shell connected to cathode. Values are approximate.

The curve under Type 6F5 also applies to the 6SP5 and 6SP5-GT.

← Indicates a change.

May 1, 1941

RCA RADOTRON DIVISION  
 RCA MANUFACTURING COMPANY, INC.

World Radio History

DATA

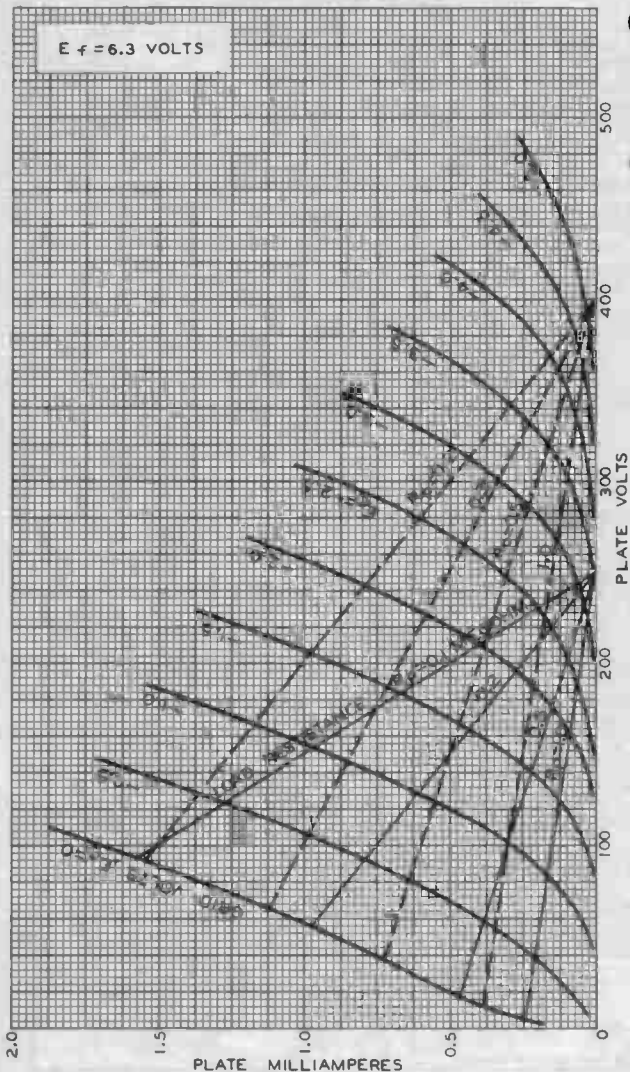
6SF5



6SF5

### AVERAGE PLATE CHARACTERISTICS

$E_f = 6.3$  VOLTS



SEPT. 23 1938

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY INC.

92C-4974

World Radio History



6SF7



6SF7

**DIODE - SUPER-CONTROL AMPLIFIER PENTODE**

SINGLE-ENDED METAL TYPE

Heater <sup>■</sup>	Coated Unipotential Cathode	
Voltage	6.3	a-c, or d-c volts
Current	0.3	amp.
Direct Interelectrode Capacitances: <sup>o</sup>		
<i>Pentode Unit</i>		
Grid to Plate	0.004 max.	μf
Input	5.5	μf
Output	6.0	μf
<i>Pentode Grid to Diode</i>		
	0.002 max.	μf
<i>Pentode Plate to Diode</i>		
	0.8	μf
Maximum Overall Length		2-5/8"
Maximum Seated Height		2-1/16"
Maximum Diameter		1-5/16"
Bulb		Metal Shell, MT-8
Base		Small Wafer Octal 8-Pin
Pin 1 - Shell		Pin 5 - Diode Plate
Pin 2 - Pentode Grid		Pin 6 - Pentode Plate
Pin 3 - Cathode		Pin 7 - Heater
Pin 4 - Screen		Pin 8 - Heater
Mounting Position		Any



BOTTOM VIEW (7A2)

PENTODE UNIT - AMPLIFIER

Plate Voltage		300 max. volts
Screen Voltage		100 max. volts
Screen-Supply Voltage		300 max. volts
Grid Voltage		0 min. volts
Plate Dissipation		3.5 max. watts
Screen Dissipation		0.5 max. watt
<i>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</i>		
Plate	100	250 volts
Screen	100	100 volts
Grid	-1	-1 volts
Plate Resistance (Approx.)	0.2	0.7 megohm
Transconductance	1975	2050 umhos
Grid Bias (Approx.) †	-35	-35 volts
Plate Current	12	12.4 ma.
Screen Current	3.4	3.3 ma.

DIODE UNIT - One

Consideration of this unit is similar to that given under Type 688-G with the exception that there is one diode in Type 6SF7. Diode curves shown under Type 6B7 apply to the 6SF7.

<sup>■</sup> In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

<sup>o</sup> With shell connected to cathode.

† For transconductance of 10 umhos.

← - Indicates a change.

Dec. 1, 1941

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

World Radio History

TENTATIVE DATA

6SF7



6SF7

# AVERAGE PLATE CHARACTERISTICS PENTODE UNIT

$E_f = 6.3$  VOLTS

SCREEN VOLTS = 100

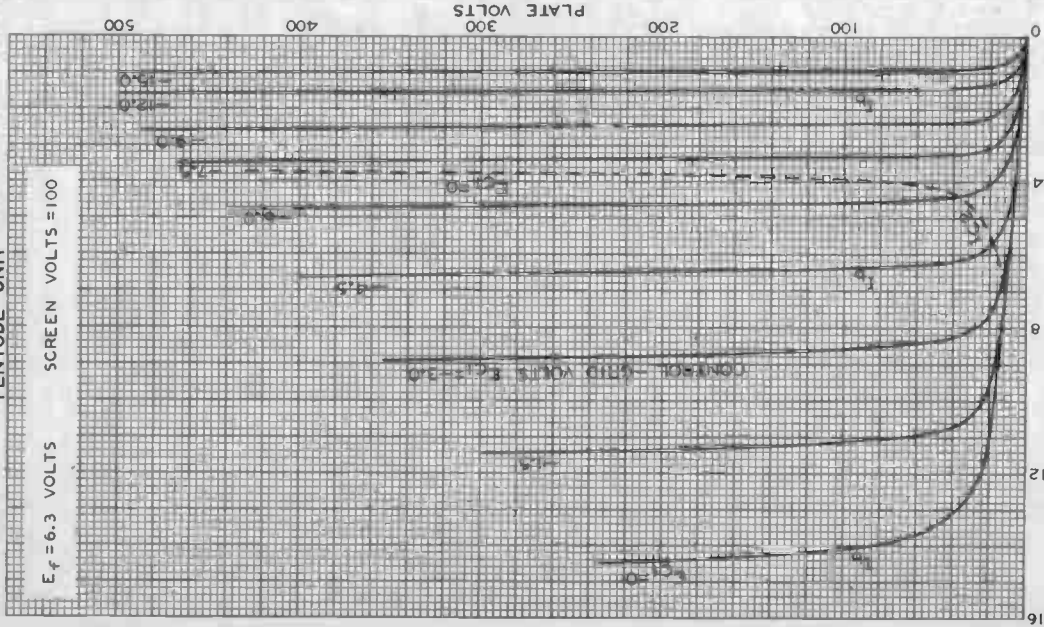


PLATE ( $I_b$ ) OR SCREEN ( $I_{cp}$ ) MILLIAMPERES

FEB. 20, 1941

ECA RADIOTRON DIVISION  
ECA MANUFACTURING COMPANY, INC.

92C-6254



6SG7

6SG7

**H-F AMPLIFIER PENTODE**

SINGLE-ENDED METAL TYPE WITH SEMI-REMOTE CUI-UFF

Heater <sup>■</sup>	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.3	amp.
Direct Interelectrode Capacitances: <sup>○</sup>		
Grid to Plate	0.003 max.	μf
Input	8.5	μf
Output	7.0	μf
Maximum Overall Length		2-5/8"
Maximum Seated Height		2-1/16"
Maximum Diameter		1-3/16"
Bulb		Metal Shell, MT-8
Base		Small Wafer Octal, 8-Pin
Pin 1 - Shell		Pin 5 - Cathode
Pin 2 - Heater		Pin 6 - Screen
Pin 3 - Cathode		Pin 7 - Heater
Pin 4 - Grid		Pin 8 - Plate
Mounting Position		Any



BOTTOM VIEW (8BK)

*Maximum And Minimum Ratings Are Design-Center Values***AMPLIFIER**

Plate Voltage	300 max. volts		
Screen Voltage	200 max. volts		
Screen Supply Voltage	300 max. volts		
Grid Voltage	0 min. volts		
Plate Dissipation	3 max. watts		
Screen Dissipation	0.6 max. watt		
<i>Typical Operation and Characteristics-Class A<sub>1</sub> Amplifier:</i>			
Plate Voltage	100	250	250 volts
Screen Voltage	100	125	150 volts
Grid Voltage	-1	-1	-2.5 volts
Suppressor	Connected to pin #3 internally		
Plate Resistance (Approx.)	0.25	0.9	# megohm
Transconductance	4100	4700	4000 μmhos
Grid Bias*	-11.5	-14	-17.5 volts
Plate Current	8.2	11.8	9.2 ma.
Screen Current	3.2	4.4	3.4 ma.

■ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

# Greater than 1 megohm.

\* Approximate, for transconductance of 40 micromhos.

○ with shell connected to cathode.

← Indicates a change.

May 1, 1942

**RCA RADOTRON DIVISION**  
 RCA MANUFACTURING COMPANY, INC.  
 World Radio History

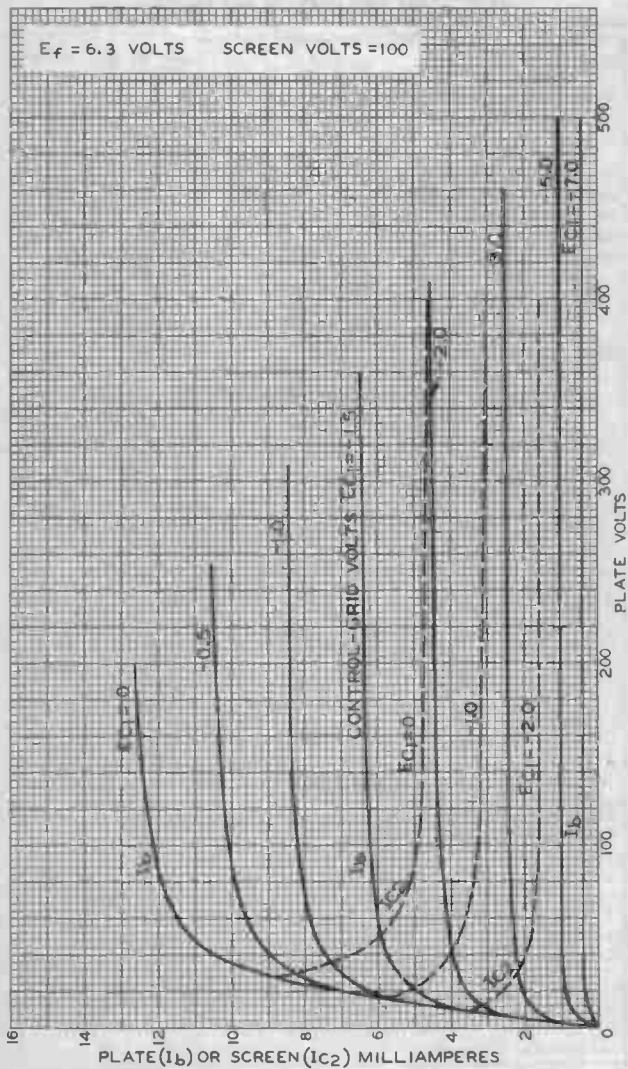
TENTATIVE DATA

6SG7



6SG7

## AVERAGE PLATE CHARACTERISTICS



APRIL 16, 1942

RCA RADITRON DIVISION  
RCA MANUFACTURING COMPANY

92C-6253R2

World Radio History



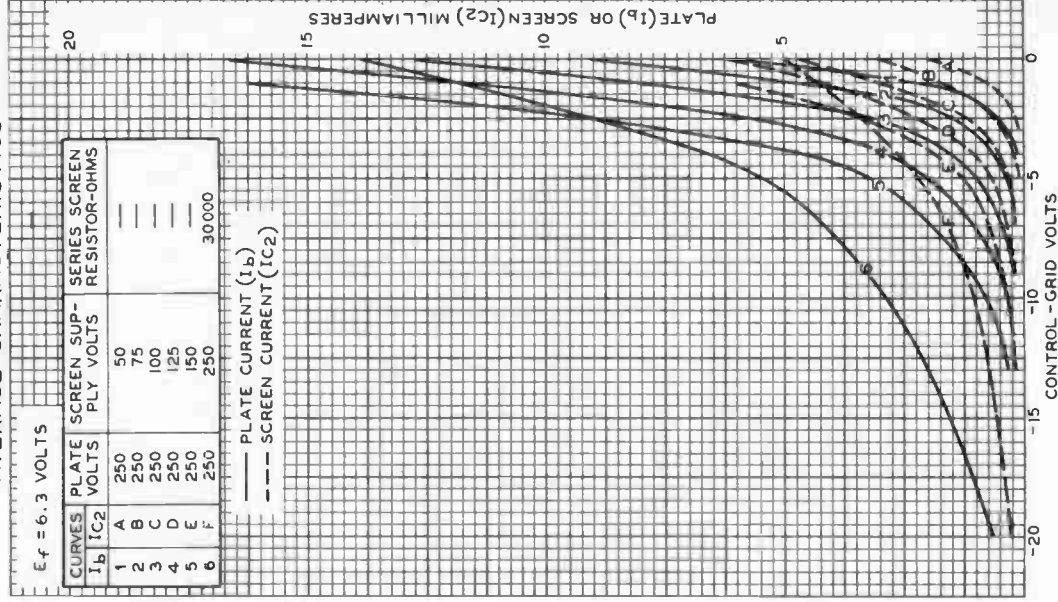
6SG7

6SG7

## AVERAGE CHARACTERISTICS

 $E_f = 6.3$  VOLTS

CURVES		PLATE VOLTS	SCREEN SUP- PLY VOLTS	SERIES SCREEN RESISTOR-OHMS
$I_b$	$I_{C2}$			
1	A	250	50	—
2	B	250	75	—
3	C	250	100	—
4	D	250	125	—
5	E	250	150	—
6	F	250	250	30000

— PLATE CURRENT ( $I_b$ )- - - SCREEN CURRENT ( $I_{C2}$ )

APRIL 16, 1942

RCA RADIIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

92C-6248R2

6SG7

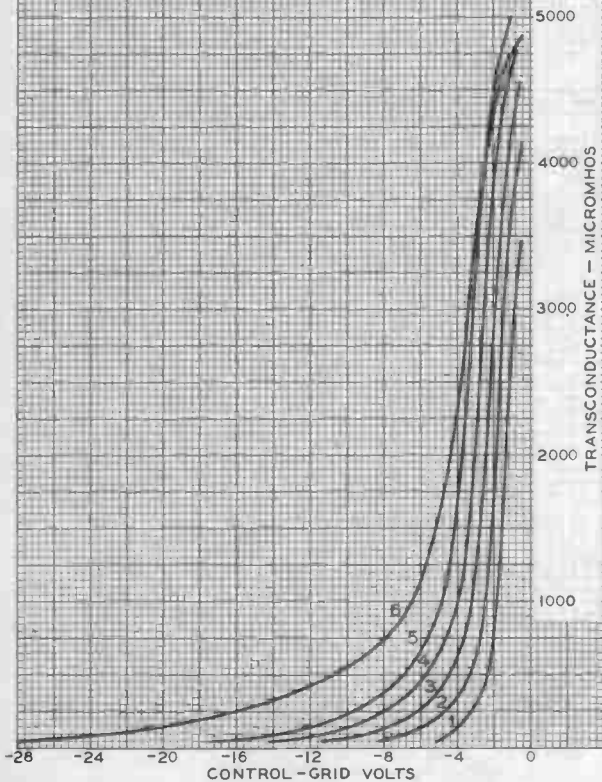


6SG7

## AVERAGE CHARACTERISTICS

 $E_f = 6.3$  VOLTS

CURVE	PLATE VOLTS	SCREEN SUPPLY VOLTS	SERIES SCREEN RESISTOR-OHMS
1	250	50	—
2	250	75	—
3	250	100	—
4	250	125	—
5	250	150	—
6	250	250	30000



APRIL 16, 1942

 RCA RADOTRON DIVISION  
 RCA MANUFACTURING COMPANY, INC.  
 World Radio History

92C-6245R2





6SH7

6SH7

**H-F AMPLIFIER PENTODE**

SINGLE-ENDED METAL TYPE WITH SHARP CUT-OFF

Heater	Coated Bipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.3	amp.
Direct Interelectrode Capacitances: <sup>o</sup>		
Grid to Plate	0.003 max.	μf
Input	8.5	μf
Output	7.0	μf
Maximum Overall Length		2-5/8"
Maximum Seated Height		2-1/16"
Maximum Diameter		1-5/16"
Bulb		Metal Shell, MT-8
Base		Small Wafer Octal, 8-Pin
Pin 1 - Shell		Pin 5 - Cathode
Pin 2 - Heater		Pin 6 - Screen
Pin 3 - Cathode		Pin 7 - Heater
Pin 4 - Grid		Pin 8 - Plate
Mounting Position	BOTTOM VIEW (8BK)	Any



Maximum And Minimum Ratings Are Design-Center Values

AMPLIFIER

Plate Voltage	300 max.	volts
Screen Voltage	150 max.	volts
Screen Supply Voltage	300 max.	volts
Grid Voltage	0 min.	volts
Plate Dissipation	3 max.	watts
Screen Dissipation	0.7 max.	watt

*Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:*

Plate Voltage	100	250	volts
Screen Voltage	100	150	volts
Grid Voltage	-1	-1	volts
Plate Resistance	0.35	0.9 approx.	megohm
Transconductance	4000	4900	μmhos
Grid Bias for			
Plate Current = 10 μamp.	-4	-5.5	volts
Plate Current	5.3	10.8	ma.
Screen Current	2.1	4.1	ma.

NOTE: This type is not recommended for high-gain audio amplifier applications because undesirable hum may be encountered.

- In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.
- with shell connected to cathode.

← Indicates a change.

June 1, 1942

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY INC

World Radio History

TENTATIVE DATA

6SH7

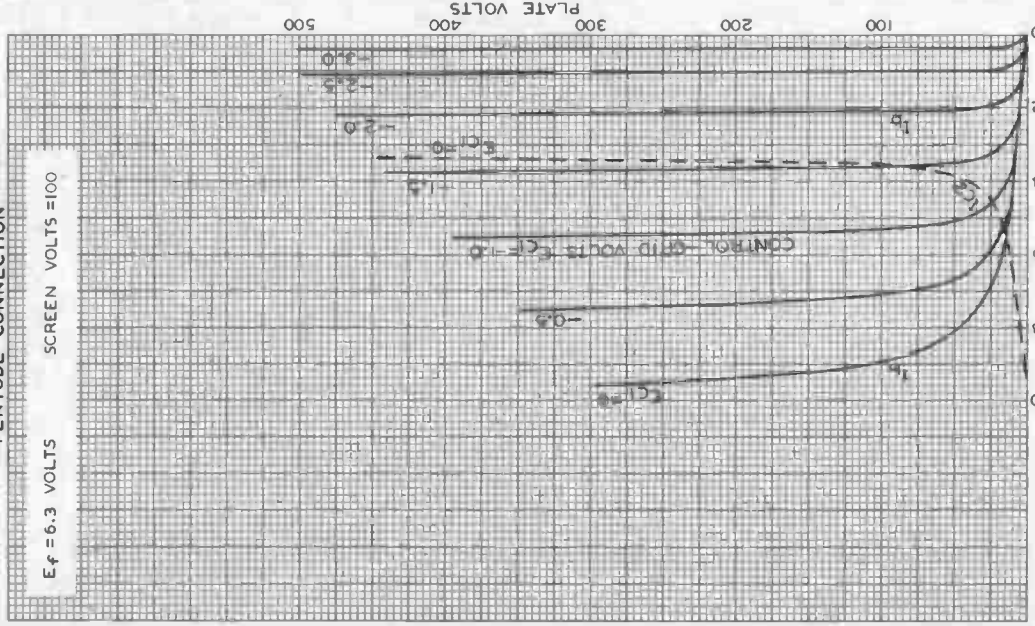


6SH7

# AVERAGE PLATE CHARACTERISTICS PENTODE CONNECTION

$E_f = 6.3$  VOLTS

SCREEN VOLTS = 100



JULY 24, 1941

RCA RADIODIODE DIVISION  
RCA MANUFACTURING COMPANY, INC.

PLATE ( $I_b$ ) OR SCREEN ( $I_{c2}$ ) MILLIAMPERES

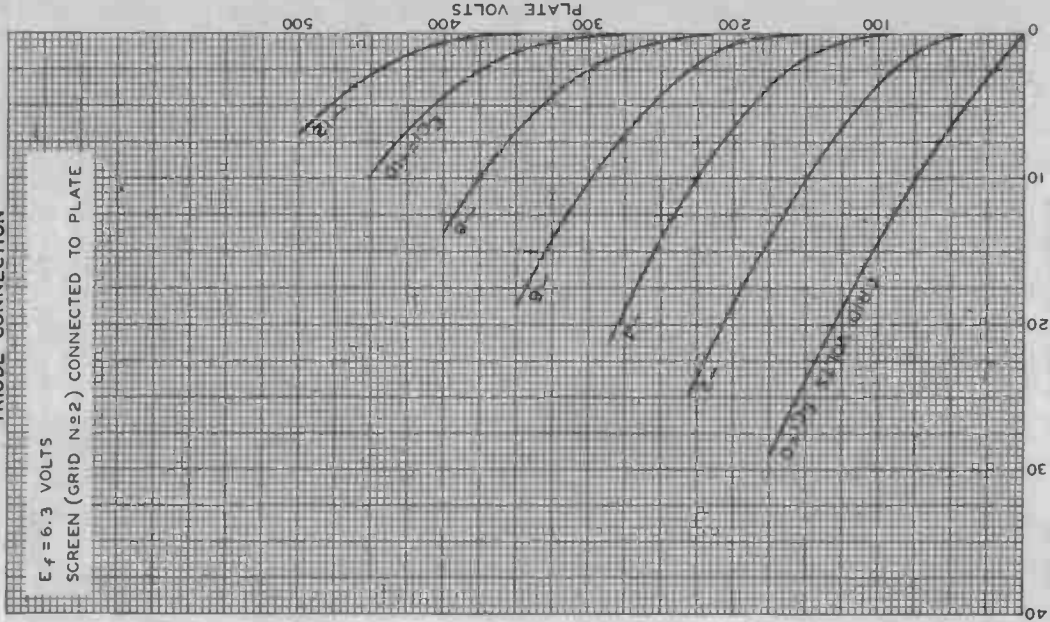
92C-6300



6SH7

6SH7

# AVERAGE PLATE CHARACTERISTICS TRIODE CONNECTION



MAY 11, 1942

PLATE MILLIAMPERES

RCA RADIODOTRON DIVISION  
RCA MANUFACTURING COMPANY INC.

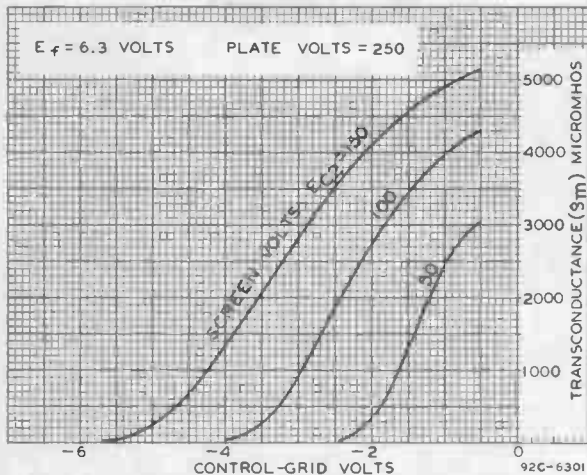
92C-6395

6SH7

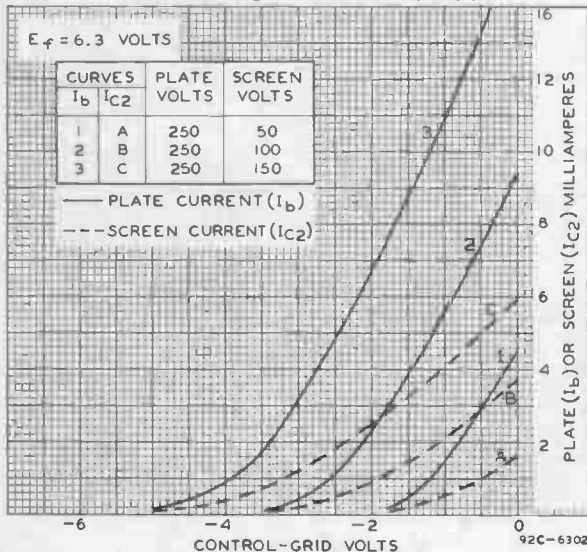


6SH7

## AVERAGE CHARACTERISTICS



## AVERAGE CHARACTERISTICS



MAY 14, 1942

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

92C-6401

World Radio History




6SR7

6SR7

**DUPLEX-DIODE TRIODE**

SINGLY-ENDED METAL TYPE

Heater <sup>■</sup>	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.3	amp.
Direct Interelectrode Capacitances—Triode Unit: <sup>°</sup>		
Grid to Plate	2.4	μf
Grid to Cathode	3.6	μf
Plate to Cathode	2.8	μf
Maximum Overall Length		2-5/8"
Maximum Seated Height		2-1/16"
Maximum Diameter		1-5/16"
Bulb		Metal Shell, MT-8
Base		Small Wafer Octal 8-Pin
Pin 1—Shell		Pin 5—Diode Plate #1
Pin 2—Triode Grid		Pin 6—Triode Plate
Pin 3—Cathode		Pin 7—Heater
Pin 4—Diode Plate #2		Pin 8—Heater
Mounting Position		Any

BOTTOM VIEW (8Q)

TRIODE UNIT - Class A<sub>1</sub> Amplifier

Plate Voltage	250 max.	volts
Plate Dissipation	2.5 max.	watts
<i>Typical Operation with Transformer Coupling:</i>		
Plate	250	volts
Grid	-9	volts
Amp. Fact.	16	
Plate Res.	8500	ohms
Transconductance	1900	μmhos
Plate Cur.	9.5	ma.
Load Res.	10000	ohms
Power Output	300	mw

*Typical Operation with Resistance Coupling:*

See RESISTANCE-COUPLED AMPLIFIER CHART, Type 6R7.

DIODE UNITS - Two

For consideration of these units, see Type 85. Circuits will be similar to those shown for Type 55 with fixed bias. Diode biasing of the triode unit of the 6SR7 is not suitable. Diode curves under Type 6B7 apply to the 6SR7.

<sup>■</sup> In circuits where the cathode is not connected directly to the heater, the potential difference between heater and cathode should be kept as low as possible.

<sup>°</sup> With shell connected to cathode. values are approximate.

An additional curve applying to the 6SR7 is shown under Type 6R7.

April 15, 1940

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

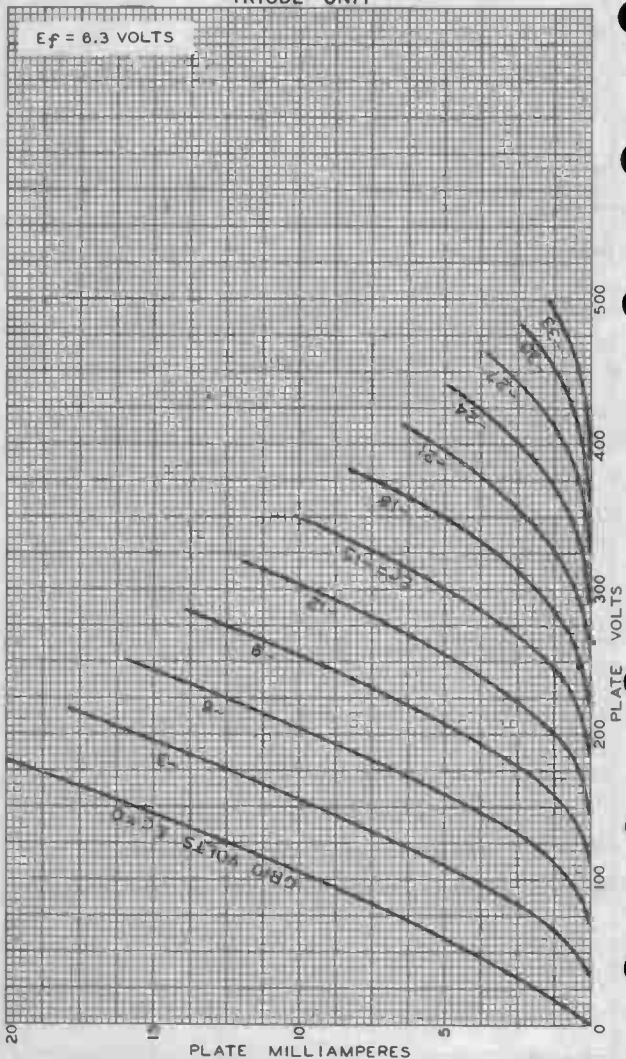
TENTATIVE DATA

6SR7



6SR7

# AVERAGE PLATE CHARACTERISTICS TRIODE UNIT





6SS7

6SS7

**TRIPLE-GRID SUPER-CONTROL AMPLIFIER**

SINGLE-ENDED METAL TYPE

Heater <sup>o</sup>	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.15	amp.
Direct Interelectrode Capacitances: <sup>o</sup>		
Grid to Plate	0.004 max.	μf
Input	5.5	μf
Output	7.0	μf
Maximum Overall Length	2-5/8"	
Maximum Seated Height	2-1/16"	
Maximum Diameter	1-5/16"	
Bulb	Metal Shell, MT-8	
Base	Small Wafer Octal, 8-Pin	
Pin 1 - Shell	Pin 5 - Cathode	
Pin 2 - Heater	Pin 6 - Screen	
Pin 3 - Suppressor	Pin 7 - Heater	
Pin 4 - Grid	Pin 8 - Plate	
Mounting Position	Any	



BOTTOM VIEW (8N)

AMPLIFIER

Plate Voltage	300 max.	volts
Screen Voltage	100 max.	volts
Screen Supply Voltage	300 max.	volts
Grid Voltage	0 min.	volts
Plate Dissipation	2.25 max.	watts
Screen Dissipation	0.35 max.	watt
<i>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</i>		
Plate Voltage	100	250 volts
Screen Voltage	100	100 volts
Grid Voltage	-1	-3 volts
Suppressor	Connected to cathode at socket	
Plate Res.	0.12	1.0 approx. megohm
Transcond.	1930	1850 μmhos
Grid Bias for Transcond.		
of 10 μmhos (approx.)	-35	-35 volts
Plate Cur.	12.2	9 ma.
Screen Cur.	3.1	2 ma.

<sup>■</sup> In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

<sup>o</sup> With shell connected to cathode.

May 1, 1941

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

World Radio History

TENTATIVE DATA

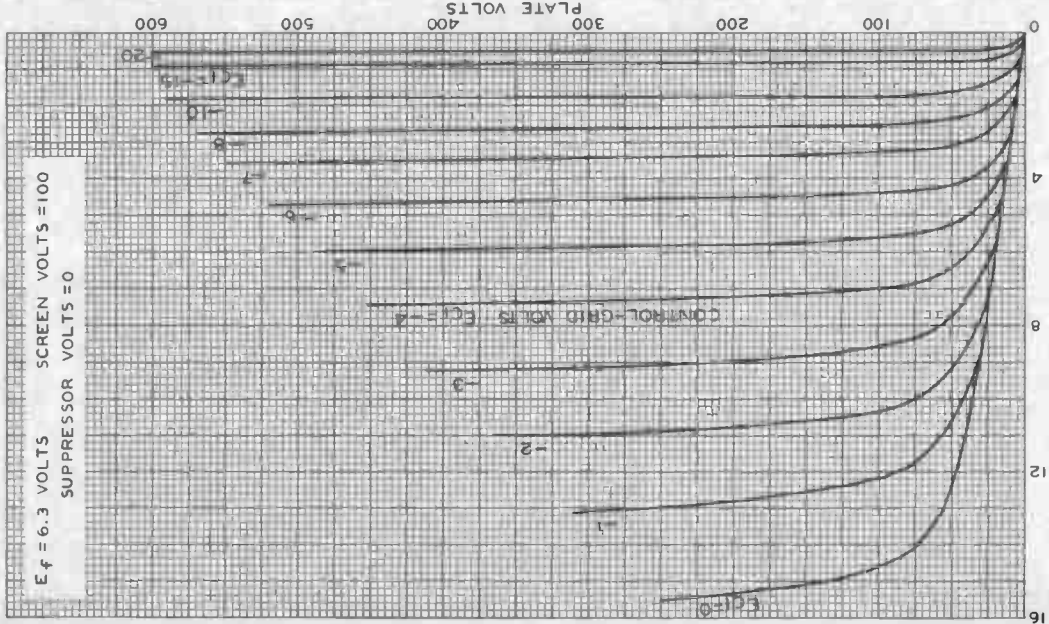
6557



6SS7

## AVERAGE PLATE CHARACTERISTICS

$E_f = 6.3$  VOLTS    SCREEN VOLTS = 100  
 SUPPRESSOR VOLTS = 0



APR. 3, 1941

PLATE MILLIAMPERES

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

92C-6270






7A4

7A4



## DETECTOR AMPLIFIER TRIODE

Heater	Coated Unipotential Cathode	
Voltage	6.3 <sup>□</sup>	a-c or d-c volts
Current	0.3 <sup>□□</sup>	amp.
Direct Interelectrode Capacitances: <sup>○</sup>		
Grid to Plate		4.0 uuf
Grid to Cathode		3.4 uuf
Plate to Cathode		3.0 uuf
Maximum Overall Length		2-25/32"
Maximum Seated Height		2-1/4"
Maximum Diameter		1-3/16"
Bulb		T-9
Base		Lock-in 8-Pin
Pin 1 - Heater		Pin 6 - Grid
Pin 2 - Plate		Pin 7 - Cathode
Pin 3 - No Connection		Pin 8 - Heater
Pin 4 - No Connection		Plug - Base Shell
Pin 5 { Internal Con. Do Not Use		
Mounting Position	BOTTOM VIEW (5A2)	Any

Maximum Ratings, Typical Operating Conditions, and Curves for Type 7A4 are the same as for Type 6J5.

- In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.
- Nominal voltage = 7.0 volts.
- Nominal current = 0.32 ampere.
- with close-fitting shield connected to cathode. Values are approximate.

May 1, 1941

RCA RADIONRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

TENTATIVE DATA

World Radio History



## BEAM POWER AMPLIFIER

Heater <sup>■</sup>	Coated Unipotential Cathode	
Voltage	6.3 <sup>□</sup>	a-c or d-c volts
Current	0.75 <sup>aa</sup>	amp.
Maximum Overall Length		3-5/32"
Maximum Seated Height		2-5/8"
Maximum Diameter		1-3/16"
Bulb		T-9
Base		Lock-in 8-Pin
Pin 1-Heater		Pin 6-Grid
Pin 2-Plate		Pin 7-Cathode
Pin 3-Screen		Pin 8-Heater
Pin 4-No Connection		Plug - Base Shell
Pin 5-No Connection		
Mounting Position		Any



BOTTOM VIEW (6AA)

### AMPLIFIER

Plate Voltage	125 max. volts
Screen Voltage	125 max. volts
Plate Dissipation	5.5 max. watts
Screen Dissipation	1.2 max. watts

#### Typical Operation and Characteristics-Class A<sub>1</sub> Amplifier:

Heater <sup>■</sup>	6.3 <sup>□</sup>	6.3 <sup>□</sup>	volts
Plate	110	125	volts
Screen	110	125	volts
Grid <sup>▲</sup>	-7.5	-9	volts
Peak A-F Grid Voltage	7.5	9	volts
Zero-Sig. Plate Cur.	40	44	ma.
Max.-Sig. Plate Cur.	41	45	ma.
Zero-Sig. Screen Cur. (Approx.)	3	3.3	ma.
Max.-Sig. Screen Cur. (Approx.)	7	9.5	ma.
Plate Res. (Approx.)	14000	17000	ohms
Transcond.	5800	6000	μmhos
Load Res.	2500	2700	ohms
Total Harmonic Dist.	10	10	%
Max.-Sig. Power Output	1.5	2.2	watts

<sup>■</sup> In circuits where the cathode is not connected directly to the heater, the potential difference between heater and cathode should be kept as low as possible.

<sup>□</sup> Nominal voltage = 7 volts.

<sup>aa</sup> Nominal current = 0.80 ampere.

<sup>▲</sup> The type of input coupling should not introduce too much resistance in the grid circuit. Transformer- or impedance-input coupling devices are recommended. When the grid circuit has a resistance not higher than 0.1 megohm, fixed bias may be used; for higher values, cathode bias is required. With cathode bias, the grid circuit may have a resistance not to exceed 0.5 megohm.



7A6

# 7A6 TWIN DIODE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathodes:

Voltage. . . . .  $6.3^{\square}$  . . . . . ac or dc volts

Current. . . . .  $0.15^{\square\square}$  . . . . . amp

Direct Interelectrode Capacitances (Approx.):<sup>o</sup>

Plate to Cathode

(Diode No.1) . . . . . 2.0 . . . . .  $\mu\text{mf}$

Plate to Cathode

(Diode No.2) . . . . . 2.6 . . . . .  $\mu\text{mf}$

Plate of Diode No.1 to

Plate of Diode No.2 . . . . . 0.1 max. . . . .  $\mu\text{mf}$

<sup>o</sup> With external shield connected to cathodes.

### Mechanical:

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 2-25/32"

Maximum Seated Length. . . . . 2-1/4"

Maximum Diameter . . . . . 1-3/16"

Bulb . . . . . T-9

Base . . . . . Lock-in 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 7AJ

Pin 1 - Heater

Pin 2 - Cathode of

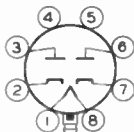
Diode No.2

Pin 3 - Plate of

Diode No.2

Pin 4 - No

Connection



Pin 5 - Internal

Shield

Pin 6 - Plate of

Diode No.1

Pin 7 - Cathode of

Diode No.1

Pin 8 - Heater

Plug - Base Shell

### Maximum Ratings, Design-Center Values (Each Diode):

RMS PLATE VOLTAGE. . . . . 150 max. volts

PEAK PLATE CURRENT . . . . . 45 max. ma.

DC OUTPUT CURRENT . . . . . 8 max. ma.

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode. 330 max. volts

Heater positive with respect to cathode. 330 max. volts

<sup>o</sup> Nominal voltage = 7.0 volts.

<sup>o</sup><sup>o</sup> Nominal current = 0.160 ampere.

7A7



7A7

# REMOTE-CUTOFF PENTODE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3<sup>□</sup> . . . . . ac or dc volts  
 Current. . . . . 0.3<sup>□□</sup> . . . . . amp

Direct Interelectrode Capacitances:<sup>○</sup>

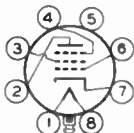
Grid No.1 to Plate . . . 0.005 max. . . . . μf  
 Input . . . . . 5.5 . . . . . μf  
 Output . . . . . 7.0 . . . . . μf

<sup>○</sup> With no external shield.

### Mechanical:

Mounting Position. . . . . Any  
 Maximum Overall Length . . . . . 2-25/32"  
 Maximum Seated Length . . . . . 2-1/4"  
 Maximum Diameter . . . . . 1-3/16"  
 Bulb . . . . . T-9  
 Base . . . . . Lock-in 8-Pin  
 Basing Designation for BOTTOM VIEW . . . . . 8V

Pin 1 - Heater  
 Pin 2 - Plate  
 Pin 3 - Grid No.2  
 Pin 4 - Grid No.3  
 Pin 5 - Internal  
 Shield



Pin 6 - Grid No.1  
 Pin 7 - Cathode  
 Pin 8 - Heater  
 Plug - Base  
 Shell

*Maximum Ratings, Characteristics, and Typical Operating Conditions are the same as those for Type 6SK7*

- nominal voltage = 7.0 volts.  
 □□ nominal current = 0.32 ampere.



7A8

7A8



## OCTODE CONVERTER

Heater	Controlled unipotential Cathode	
Voltage	6.3 $\square$	a-c or d-c volts
Current	0.15 $\square$	amp.
Direct Interelectrode Capacitances:		
Grid No. 4 to Plate	0.15	max. uuf
Grid No. 4 to Grid No. 2	0.15	uuf
Grid No. 4 to Grid No. 1	0.15	uuf
Grid No. 1 to Grid No. 2	0.60	uuf
Grid No. 4 to All Other Electrodes = R-F Input	7.5	uuf
Grid No. 2 to All Other Electrodes Except Grid No. 1 (Osc. Output)	3.4	uuf
Grid No. 1 to All Other Electrodes Except Grid No. 2 (Osc. Input)	3.8	uuf
Plate to All Other Electrodes	9	uuf
Maximum Overall Length	2-25/32"	
Maximum Seated Height	2-1/4"	
Maximum Diameter	1-3/16"	
Bulb	T-9	
Base	Lock-in 8-Pin	
Pin 1 - Heater	Pin 6 - Grid #4	
Pin 2 - Plate	Pin 7 - Cathode	
Pin 3 - Grid #2	Pin 8 - Heater	
Pin 4 - Grid #1	Plug - Base Shell	
Pin 5 - Grids #3 & #5		



Mounting Position BOTTOM VIEW (BU) Any

## CONVERTER SERVICE

Plate Voltage	300	max.	volts
Screen (Grids #3 & #5) Voltage	100	max.	volts
Screen Supply Voltage	300	max.	volts
Anode-Grid (Grid #2) Voltage	200	max.	volts
Anode-Grid Supply Voltage	300	max.	volts
Control-Grid (Grid #4) Voltage	0	min.	volts
Plate Dissipation	1.0	max.	watt
Screen Dissipation	0.3	max.	watt
Anode-Grid Dissipation	0.75	max.	watt
Total Cathode Current	13	max.	ma.
<b>Typical Operation and Characteristics:</b>			
Plate Voltage	100	250	volts
Screen Voltage	75	100	volts
Anode-Grid Voltage	100	-	volts
Anode-Grid Supply Voltage $\Delta$	-	250	volts
Control-Grid Voltage	-3	-3	volts
Oscillator-Grid (Grid #1) Res.	50000	50000	ohms
Plate Resistance	0.65	0.7	approx. megohm
Conversion Transconductance	375	550	$\mu$ mhos
Conversion Transconductance for Grid Bias of -30 volts	-	2	approx. $\mu$ mhos
Plate Current	1.8	3.0	ma.
Screen Current	2.7	3.2	ma.
Anode-Grid Current	2.8	4.2	ma.
Oscillator-Grid Current	0.2	0.4	ma.
Total Cathode Current	8.5	10.8	ma.

NOTE: The transconductance between Grid #1 and Grid #2 (not oscillating) is approximately 1600  $\mu$ mhos under the following conditions: plate volts, 250; screen volts, 100; anode-grid volts, 180; oscillator-grid volts, 0; and control-grid connected to cathode.

$\blacksquare$  In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

$\square$  With close-fitting shield connected to cathode.

$\square$  Nominal voltage 7.0 volts.

$\square$  Nominal current 0.15 ampere.

$\Delta$  Applied through a properly by-passed 20000-ohm voltage-dropping resistor.

$\leftarrow$  Indicates a change.

May 1, 1941

RCA RADIODRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

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7AF7

### MEDIUM-MU TWIN TRIODE

7AF7  
7AG7

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3<sup>□</sup> . . . . . ac or dc volts  
Current. . . . . 0.3<sup>□□</sup> . . . . . amp

*The 7AF7 is the same as the 14AF7 except for heater rating.*

□ Nominal voltage = 7.0 volts.      □□ Nominal current = 0.32 ampere.

7AG7

### SHARP-CUTOFF PENTODE

#### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3<sup>□</sup> . . . . . ac or dc volts  
Current. . . . . 0.15<sup>□□</sup> . . . . . amp

Direct Interelectrode Capacitances:<sup>○</sup>

Grid No.1 to Plate . . . . . 0.005 max. . . . . μf  
Input . . . . . 7 . . . . . μf  
Output . . . . . 6 . . . . . μf

○ with external shield connected to cathode.

#### Mechanical:

Mounting Position. . . . . Any  
Maximum Overall Length . . . . . 2-25/32"  
Maximum Seated Length. . . . . 2-1/4"  
Maximum Diameter . . . . . 1-3/16"  
Bulb . . . . . T-9  
Base . . . . . Lock-in 8-Pin  
Basing Designation for BOTTOM VIEW . . . . . 8V

Pin 1-Heater  
Pin 2-Plate  
Pin 3-Grid No.2  
Pin 4-Grid No.3  
Pin 5-Internal  
Shield



Pin 6-Grid No.1  
Pin 7-Cathode  
Pin 8-Heater

Plug - Base  
Shell

#### AMPLIFIER - Class A<sub>1</sub>

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

PLATE VOLTAGE. . . . . 300 max. volts  
GRID-No.2 (SCREEN) VOLTAGE . . . . . 300 max. volts  
PLATE DISSIPATION. . . . . 2 max. watts  
GRID-No.2 DISSIPATION. . . . . 0.75 max. watt  
GRID-No.1 (CONTROL-GRID) VOLTAGE:  
Negative bias value. . . . . 1 min. volt  
PEAK HEATER-CATHODE VOLTAGE:  
Heater negative with respect to cathode. 90 max. volts  
Heater positive with respect to cathode. 90 max. volts

□ nominal voltage = 7.0 volts.      □□ nominal current = 0.16 ampere.

JUNE 15, 1948

TUBE DEPARTMENT

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7AG7



7AG7

## SHARP-CUTOFF PENTODE

## Typical Operation and Characteristics:

Plate Voltage . . . . .	250 . . .	volts
Grid No.3 (Suppressor) . . . . .	Connected to cathode at socket	
Internal Shield . . . . .	Connected to cathode at socket	
Grid-No.2 Voltage . . . . .	250 . . .	volts
Cathode-Bias Resistor* . . . . .	250 . . .	ohms
Plate Resistance (Approx.) . . . . .	0.75 . . .	megohm
Transconductance . . . . .	4200 . . .	$\mu$ hos
Grid-No.1 Bias (Approx.) for plate current of 10 $\mu$ a . . . . .	-10 . . .	volts
Plate Current . . . . .	6 . . .	ma
Grid-No.2 Current . . . . .	2 . . .	ma

\* Fixed-bias operation is not recommended.





7AH7

7AH7

## REMOTE-CUTOFF PENTODE

## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3<sup>0</sup> . . . . . ac or dc voltsCurrent . . . . . 0.15<sup>00</sup> . . . . . ampDirect Interelectrode Capacitances:<sup>0</sup>

Grid No.1 to Plate . . . 0.005 max. . . . . μμf

Input . . . . . 7 . . . . . μμf

Output . . . . . 6.5 . . . . . μμf

<sup>0</sup> with external shield connected to cathode.

## Mechanical:

Mounting Position . . . . . Any

Maximum Overall Length . . . . . 2-25/32"

Maximum Seated Length . . . . . 2-1/4"

Maximum Diameter . . . . . 1-3/16"

Bulb . . . . . T-9

Base . . . . . Lock-in 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 8V

Pin 1 - Heater

Pin 2 - Plate

Pin 3 - Grid No.2

Pin 4 - Grid No.3

Pin 5 - Internal

Shield

Pin 6 - Grid No.1

Pin 7 - Cathode

Pin 8 - Heater

Plug - Base

Shell

AMPLIFIER - Class A<sub>1</sub>

## Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . . 300 max. volts

GRID-No.2 (SCREEN) VOLTAGE . . . . . 300 max. volts

PLATE DISSIPATION . . . . . 2 max. watts

GRID-No.2 DISSIPATION . . . . . 0.7 max. watt

GRID-No.1 (CONTROL-GRID) VOLTAGE:

Negative bias value . . . . . -1 min. volt

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . . . . . 90 max. volts

Heater positive with respect to cathode . . . . . 90 max. volts

## Typical Operation and Characteristics:

Plate Voltage . . . . . 250 volts

Grid No.3 (Suppressor) . . . . . Connected to cathode at socket

Internal Shield . . . . . Connected to cathode at socket

Grid-No.2 Voltage . . . . . 250 volts

Cathode-Bias Resistor \* . . . . . 250 ohms

Plate Resistance (Approx.) . . . . . 1 megohm

Transconductance . . . . . 3300 μμhos

Grid-No.1 Bias (Approx.) for  
transconductance of 35 μμhos . . . . . -20 volts

# Fixed bias not recommended.

□ Nominal voltage = 7.0 volts.

□□ Nominal current = 0.16 ampere.

FFB. 1, 1949

TUBE DEPARTMENT

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

7AH7



7AH7

# REMOTE-CUTOFF PENTODE

Plate Current. . . . .	6.8	ma
Grid-No.2 Current. . . . .	1.9	ma

FEB. 1, 1949

DATA



7B4

7B4

# HIGH-MU TRIODE

## GENERAL DATA

### Electrical:

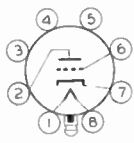
Heater, for Unipotential Cathode:

Voltage . . . . . 6.3<sup>□</sup> . . . . . ac or dc volts  
 Current . . . . . 0.3<sup>□□</sup> . . . . . amp

### Mechanical:

Mounting Position . . . . . Any  
 Maximum Overall Length . . . . . 2-25/32"  
 Maximum Seated Length . . . . . 2-1/4"  
 Maximum Diameter . . . . . 1-3/16"  
 Bulb . . . . . T-9  
 Base . . . . . Lock-in 8-Pin  
 Basing Designation for BOTTOM VIEW . . . . . 5AC

Pin 1 - Heater  
 Pin 2 - Plate  
 Pin 3 - No  
 Connection  
 Pin 4 - No  
 Connection



Pin 5 - No  
 Connection  
 Pin 6 - Grid  
 Pin 7 - Cathode  
 Pin 8 - Heater  
 Plug - Ease Shell

*Maximum Ratings, Characteristics, and Typical Operating Conditions are the same as those for type 6SF5*

□ Nominal voltage = 7.0 volts.  
 □□ Nominal current = 0.32 ampere.

7B5



7B5

## POWER PENTODE

GENERAL DATA**Electrical:**

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3<sup>□</sup> . . . . . ac or dc voltsCurrent. . . . . 0.4<sup>□□</sup> . . . . . amp**Mechanical:**

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 3-5/32"

Maximum Seated Length. . . . . 2-5/8"

Maximum Diameter . . . . . 1-3/16"

Bulb . . . . . T-9

Base . . . . . Lock-in 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 6AE

Pin 1 - Heater

Pin 2 - Plate

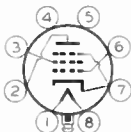
Pin 3 - Grid No.2

Pin 4 - No

Connection

Pin 5 - No

Connection



Pin 6 - Grid No.1

Pin 7 - Cathode,  
Grid No.3

Pin 8 - Heater

Plug - Base  
Shell

*Maximum Ratings, Characteristics, and Typical Operating Conditions are the same as those for Type 6K6-GT*

□ Nominal voltage = 7.0 volts.

□□ Nominal current = 0.43 ampere.



7B6

7B6

## TWIN DIODE—HIGH-MU TRIODE

## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3<sup>□</sup> . . . . . ac or dc volts  
 Current. . . . . 0.3<sup>□□</sup> . . . . . amp

Direct Interelectrode Capacitances — Triode Unit:<sup>0</sup>

Grid to Plate. . . . . 1.6 . . . . .  $\mu\text{mf}$   
 Grid to Cathode. . . . . 3.0 . . . . .  $\mu\text{mf}$   
 Plate to Cathode . . . . . 2.4 . . . . .  $\mu\text{mf}$

<sup>0</sup> with external shield connected to cathode.

## Mechanical:

Mounting Position . . . . . Any  
 Maximum Overall Length . . . . . 2-25/32"  
 Maximum Seated Length. . . . . 2-1/4"  
 Maximum Diameter . . . . . 1-3/16"  
 Bulb . . . . . T-9  
 Base . . . . . Lock-in 8-Pin  
 Basing Designation for BOTTOM VIEW . . . . . 8W

Pin 1 — Heater  
 Pin 2 — Triode Plate  
 Pin 3 — Triode Grid  
 Pin 4 — Internal  
           Connection  
 Pin 5 — Diode Plate  
           No.2



Pin 6 — Diode  
           Plate No.1  
 Pin 7 — Cathode,  
           Internal  
           Shield  
 Pin 8 — Heater  
 Plug — Base Shell

TRIODE UNIT  
 AMPLIFIER — Class A<sub>1</sub>

## Maximum Ratings, Design-Center Values:

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

## Typical Operation and Characteristics:

Plate Voltage. . . . . 100 250 . . . volts  
 Grid Voltage . . . . . -1 -2 . . . volts  
 Amplification Factor . . . . . 100 100  
 Plate Resistance . . . . . 110000 91000 . . ohms  
 Transconductance . . . . . 900 1100 . .  $\mu\text{mhos}$   
 Plate Current. . . . . 0.4 0.9 . . ma.

## DIODE UNITS — Two

Consideration of these units, including typical circuits and diode curves, is given at the front of this Section.

□ Nominal voltage = 7.0 volts.

□□ Nominal current = 0.32 amperes.

7B7



7B7

## REMOTE-CUTOFF PENTODE

## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3<sup>□</sup> . . . . . ac or dc voltsCurrent . . . . . 0.15<sup>□□</sup> . . . . . ampDirect Interelectrode Capacitances:<sup>c</sup>

Grid No.1 to Plate . . . . . 0.007 max. . . . . μf

Input . . . . . 5.0 . . . . . μf

Output . . . . . 6.0 . . . . . μf

<sup>□</sup> with external shield connected to cathode.

## Mechanical:

Mounting Position . . . . . Any

Maximum Overall Length . . . . . 2-25/32"

Maximum Seated Length . . . . . 2-1/4"

Maximum Diameter . . . . . 1-3/16"

Bulb . . . . . T-9

Base . . . . . Lock-in 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 8V

Pin 1 - Heater

Pin 2 - Plate

Pin 3 - Grid No.2

Pin 4 - Grid No.3

Pin 5 - Internal  
Shield

Pin 6 - Grid No.1

Pin 7 - Cathode

Pin 8 - Heater

Plug - Base  
ShellAMPLIFIER - Class A<sub>1</sub>

## Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . . 300 max. volts

GRID-No.2 (SCREEN) VOLTAGE . . . . . 100 max. volts

PLATE DISSIPATION . . . . . 2.25 max. watts

GRID-No.2 DISSIPATION . . . . . 0.25 max. watt

GRID-No.1 (CONTROL-GRID) VOLTAGE:

Positive bias value . . . . . 0 max. volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode. 90 max. volts

Heater positive with respect to cathode. 90 max. volts

## Typical Operation and Characteristics:

Plate Voltage . . . . . 100 250 . . volts

Grid-No.3 (Suppressor) . . . . . Connected to cathode at socket

Grid-No.2 Voltage . . . . . 100 100 . . volts

Grid-No.1 Voltage . . . . . -3 -3 . . volts

Plate Resistance (Approx.) . . . . . 0.3 0.75 . . megohm

Transconductance . . . . . 1675 1750 . . μmhos

Grid-No.1 Bias (Approx.) for  
transconductance of 10 μmhos . . . . . -40 -40 . . volts

Plate Current . . . . . 8.2 8.5 . . ma.

Grid-No.2 Current . . . . . 1.8 1.7 . . ma.

<sup>□</sup> Nominal voltage = 7.0 volts.<sup>□□</sup> Nominal current = 0.160 ampere.

JUNE 20, 1947

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY  
World Radio History

DATA



7B8

7B8

## PENTAGRID CONVERTER

## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3<sup>□</sup> . . . . . ac or dc voltsCurrent. . . . . 0.3<sup>□□</sup> . . . . . ampDirect Interelectrode Capacitances:<sup>○</sup>

Grid No.4 to All Other Electrodes (RF Input) 10.0 . . μf

Plate to All Other Electrodes (Mixer Output) 9.0 . . μf

Grid No.1 to All Other Electrodes except  
Grid No.2 (Osc. Input) . . . . . 5.0 . . μfGrid No.2 to All Other Electrodes except  
Grid No.1 (Osc. Output) . . . . . 3.4 . . μf

Grid No.4 to Plate . . . . . 0.2 max. μf

Grid No.4 to Grid No.2 . . . . . 0.2 max. μf

Grid No.4 to Grid No.1 . . . . . 0.2 max. μf

Grid No.1 to Grid No.2 . . . . . 0.9 . . μf

○ With external shield connected to cathode.

## Mechanical:

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 2-25/32"

Maximum Seated Length. . . . . 2-1/4"

Maximum Diameter . . . . . 1-3/16"

Bulb . . . . . T-9

Base . . . . . Lock-in 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 8X

Pin 1 - Heater

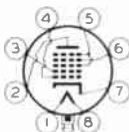
Pin 2 - Plate

Pin 3 - Grid No.2

Pin 4 - Grid No.1

Pin 5 - Grid No.3,

Grid No.5



Pin 6 - Grid No.4

Pin 7 - Cathode

Pin 8 - Heater

Plug - Base

Shell

Maximum Ratings and Typical Operating Conditions for the  
7B8 are the same as those for Type 6A8

□ Nominal voltage = 7.0 volts.

□□ Nominal current = 0.320 ampere.

7C5



7C5

# BEAM POWER AMPLIFIER

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3<sup>□</sup> . . . . . ac or dc volts

Current. . . . . 0.45<sup>□□</sup> . . . . . amp

Direct Interelectrode Capacitances (Approx.):<sup>○</sup>

Grid No.1 to Plate . . . . . 0.4 . . . . .  $\mu\text{f}$

Input. . . . . 9.5 . . . . .  $\mu\text{f}$

Output . . . . . 9.0 . . . . .  $\mu\text{f}$

<sup>○</sup> with no external shield.

### Mechanical:

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 3-5/32"

Maximum Seated Length. . . . . 2-5/8"

Maximum Diameter . . . . . 1-3/16"

Bulb . . . . . T-9

Base . . . . . Lock-in 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 6AA

Pin 1 - Heater

Pin 2 - Plate

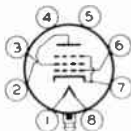
Pin 3 - Grid No.2

Pin 4 - No

Connection

Pin 5 - No

Connection



Pin 6 - Grid No.1

Pin 7 - Cathode,

Grid No.3

Pin 8 - Heater

Plug - Base

Shell

*Maximum Ratings and Typical Operating Conditions for the 7C5 are the same as those for Type 6V6*

<sup>□</sup> Nominal voltage = 7.0 volts.

<sup>□□</sup> Nominal current = 0.48 ampere.





7C6

7C6



## DUPLEX-DIODE HIGH-MU TRIODE

Heater*	Coated Unipotential Cathode	
Voltage	6.3 <sup>□</sup>	a-c or d-c volts
Current	0.15 <sup>□□</sup>	amp.
Direct Interelectrode Capacitances - Triode Unit:°		
Grid to Plate	1.4	μf
Grid to Cathode	2.4	μf
Plate to Cathode	3.0	μf
Maximum Overall Length		2-25/32"
Maximum Seated Height		2-1/4"
Maximum Diameter		1-3/16"
Bulb		T-0
Base		Lock-in 8-Pin
Pin 1 - Heater		Pin 6 - Diode Plate #1
Pin 2 - Triode Plate		Pin 7 - Cathode
Pin 3 - Triode Grid		Pin 8 - Heater
Pin 4 - Cathode		Plug - Base Shell
Pin 5 - Diode Plate #2		
Mounting Position	BOTTOM VIEW (8W)	Any

### TRIODE UNIT

Plate Voltage	250 max.	volts
<i>Characteristics - Class A<sub>2</sub> Amplifier:</i>		
Heater	6.3	volts
Plate	250	volts
Grid	-1	volt
Amp. Fact.	100	
Plate Res.	0.1	megohm
Transcond.	1000	μmhos
Plate Cur.	1.3	ma.
<i>Typical Operation - Resistance-Coupled Amplifier:</i>		
Plate Supply	250	volts
Load Resistance	0.25	megohm
Grid Resistor	10	megohms

### DIODE UNITS - Two

Consideration of these units is given under Type 85. Circuits will be similar to those shown for the 55 with fixed bias. Diode biasing of the triode unit of the 7C6 is not suitable. Diode curves under Type 6B7 apply to the 7C6.

□ Nominal voltage = 7.0 volts.

□□ Nominal current = 0.16 ampere.

\* In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

° Values are approximate.

← Indicates a change.

April 15, 1940

RCA RADIODRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

TENTATIVE DATA

7C7



7C7

# TRIPLE-GRID DETECTOR AMPLIFIER

Heater<sup>■</sup> Coated Unipotential Cathode  
 Voltage 6.3<sup>□</sup> a-c or d-c volts  
 Current 0.15<sup>□□</sup> amp.

Direct Interelectrode Capacitances:<sup>○</sup>

Grid to Plate 0.007 max.  $\mu\text{f}$   
 Input 5.5  $\mu\text{f}$   
 Output 6.5  $\mu\text{f}$

Maximum Overall Length 2-25/32"

Maximum Seated Height 2-1/4"

Maximum Diameter 1-3/16"

Bulb T-9

Base Lock-in 8-Pin

Pin 1 - Heater

Pin 2 - Plate

Pin 3 - Screen

Pin 4 - Suppressor

Pin 5 - Internal Shield

Pin 6 - Grid

Pin 7 - Cathode

Pin 8 - Heater

Plug - Base Shell



Mounting Position BOTTOM VIEW (8V) Any

## AMPLIFIER

Plate Voltage 300 max. volts

Screen Voltage 100 max. volts

Screen Supply Voltage 300 max. volts

Grid Voltage 0 min. volts

Plate Dissipation 1.0 max. watt

Screen Dissipation 0.1 max. watt

*Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:*

Plate 100 250 volts

Screen 100 100 volts

Grid -3 -3 volts

Suppressor Connected to cathode at socket

Internal Shield Connected to cathode at socket

Plate Res. (approx.) 1.2 2 megohms

Transconductance 1225 1300  $\mu\text{mhos}$

Plate Cur. 1.8 2 ma.

Screen Cur. 0.4 0.5 ma.

■ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

□ Nominal voltage = 7 volts.

□□ Nominal current = 0.16 ampere.

○ With close-fitting shell connected to cathode.

May 15, 1940

RCA RADIODRON DIVISION  
 RCA MANUFACTURING COMPANY, INC.

TENTATIVE DATA



7E6

7E6

# TWIN DIODE—MEDIUM-MU TRIODE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . .	6.3 <sup>□</sup>	ac or dc volts
Current . . . . .	0.3 <sup>□□</sup>	amp

Direct Interelectrode Capacitances:\*

Triode Unit:		
Grid to Plate . . . . .	1.5	μf
Grid to Cathode . . . . .	3.0	μf
Plate to Cathode . . . . .	2.4	μf
Diode-No.1 Plate to Grid. . . . .	0.01 max.	μf
Diode-No.2 Plate to Grid. . . . .	0.04 max.	μf

\* with external shield connected to cathode.

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length. . . . .	2-25/32"
Maximum Seated Length . . . . .	2-1/4"
Maximum Diameter. . . . .	1-3/16"
Bulb. . . . .	T-9
Base. . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	8W

Pin 1 - Heater  
 Pin 2 - Triode Plate  
 Pin 3 - Triode Grid  
 Pin 4 - Internal  
 Connection  
 —Do Not Use  
 Pin 5 - Diode-No. 2  
 Plate



Pin 6 - Diode-No. 1  
 Plate  
 Pin 7 - Cathode  
 Pin 8 - Heater

Plug - Base Shell

## TRIODE UNIT AMPLIFIER—Class A1

### 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 and Characteristics:

Plate Voltage . . . . .	100	250	volts
Cathode-Bias Resistor . . . . .	770	950	ohms
Amplification Factor. . . . .	16.5	16	
Plate Resistance. . . . .	11000	8500	ohms

(continued on next page)

□ Nominal Voltage = 7.0 volts.      □□ Nominal Current = 0.32 ampere.

←Indicates a change.

SEPT. 30, 1948

TUBE DEPARTMENT

DATA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7E6



7E6

# TWIN DIODE—MEDIUM-MU TRIODE

Transconductance. . . . .	1500	1900	. .	$\mu$ mhos
Plate Current . . . . .	3.9	9.5	. .	ma

**Maximum Circuit Values (for maximum circuit conditions):**

Grid-No.1—Circuit Resistance. . . . .	1 max.	megohm
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DIODE UNITS—Two

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

PLATE CURRENT (Each Diode). . . . .	1 max.	ma
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7E7

7E7

# TWIN DIODE-REMOTE-CUTOFF PENTODE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3<sup>□</sup> . . . . . ac or dc volts

Current . . . . . 0.3<sup>□□</sup> . . . . . amp

Direct Interelectrode Capacitances:<sup>○</sup>

Pentode Unit:

Grid No.1 to Plate . . . . . 0.005 max. . . . . μμf

Input . . . . . 4.6 . . . . . μμf

Output . . . . . 5.5 . . . . . μμf

Diode-No.1 Plate to Grid No.1 . . . . . 0.013 max. . . . . μμf

Diode-No.2 Plate to Grid No.1 . . . . . 0.003 max. . . . . μμf

<sup>○</sup> with external shield connected to cathode.

### Mechanical:

Mounting Position . . . . . Any

Maximum Overall Length . . . . . 2-25/32"

Maximum Seated Length . . . . . 2-1/4"

Maximum Diameter . . . . . 1-3/16"

Bulb . . . . . T-9

Base . . . . . Lock-In 8 Pin

Basing Designation for BOTTOM VIEW . . . . . 8AE

Pin 1 - Heater . . . . . Pin 6 - Pentode

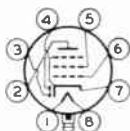
Pin 2 - Pentode Plate . . . . . Grid No.1

Pin 3 - Diode-No.2 Plate . . . . . Pin 7 - Cathode, Pentode

Pin 4 - Diode-No.1 Plate . . . . . Grid No.3

Pin 5 - Pentode Grid No.2 . . . . . Pin 8 - Heater

Plug - Base . . . . . Shell



## PENTODE UNIT AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . . 300 max. volts

GRID-No.2 (SCREEN) VOLTAGE . . . . . 100 max. volts

GRID-No.2 SUPPLY VOLTAGE . . . . . 300 max. volts

PLATE DISSIPATION . . . . . 2 max. watts

GRID-No.2 DISSIPATION . . . . . 0.3 max. watt

GRID-No.1 (CONTROL-GRID) VOLTAGE:

Positive bias value . . . . . 0 max. volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode. . . . . 90 max. volts

Heater positive with respect to cathode. . . . . 90 max. volts

(continued on next page)

<sup>□</sup> Nominal voltage = 7.0 volts.

<sup>□□</sup> Nominal current = 0.32 ampere.

← Indicates a change.

7E7



7E7

## TWIN DIODE—REMOTE-CUTOFF PENTODE

## Typical Operation and Characteristics:

Plate Voltage. . . . .	100	250	. .	volts
Grid-No.2 Voltage. . . . .	100	100	. .	volts
Cathode-Bias Resistor. . . . .	80	330	. .	ohms
Plate Resistance (Approx.) . . . . .	0.15	0.7	. .	megohm
Transconductance . . . . .	1600	1300	. .	$\mu$ mhos
Grid-No.1 Bias (Approx.) for transconductance of 2 $\mu$ mhos . . . . .	-36	-42.5	. .	volts
Plate Current. . . . .	10	7.5	. .	ma
Grid-No.2 Current. . . . .	2.7	1.6	. .	ma

DIODE UNITS - Two

## Maximum Ratings, Design-Center Values:

PLATE CURRENT (For Each Diode) . . . . .	1 max.	ma
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7F7

# HIGH-MU TWIN TRIODE

7F7

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathodes:

Voltage. . . . .	6.3 <sup>□</sup>	ac or dc volts
Current. . . . .	0.3 <sup>□□</sup>	amp

Direct Interelectrode Capacitances:\*

Each Unit:

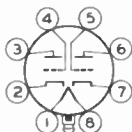
Grid to Plate. . . . .	1.6	μf
Grid to Cathode. . . . .	2.4	μf
Plate to Cathode. . . . .	2.0	μf
Grid to Grid. . . . .	0.2 max.	μf
Plate to Plate. . . . .	1.0 max.	μf

\* with external shield connected to cathode.

### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length. . . . .	2-25/32"
Maximum Seated Length. . . . .	2-1/4"
Maximum Diameter. . . . .	1-3/16"
Bulb. . . . .	T-9
Base. . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW. . . . .	8AC

Pin 1 - Heater  
 Pin 2 - Cathode of Unit No. 2  
 Pin 3 - Plate of Unit No. 2  
 Pin 4 - Grid of Unit No. 2  
 Pin 5 - Grid of Unit No. 1



Pin 6 - Plate of Unit No. 1  
 Pin 7 - Cathode of Unit No. 1  
 Pin 8 - Heater  
 Plug - Base Shell

## AMPLIFIER - Class A<sub>1</sub>

Values are for each unit

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	300 max.	volts
PLATE DISSIPATION. . . . .	1.0 max.	watt
GRID VOLTAGE:		
Positive bias value. . . . .	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. . . . .	90 max.	volts
Heater positive with respect to cathode. . . . .	90 max.	volts

### Characteristics:

Plate Voltage. . . . .	100	250	volts
Grid Voltage. . . . .	-1	-2	volts
Amplification Factor. . . . .	70	70	
Plate Resistance (Approx.) . . . . .	62000	44000	ohms
Transconductance. . . . .	1125	1600	μmhos
Plate Current. . . . .	0.65	2.3	ma

□ Nominal voltage = 7.0 volts.

□□ Nominal current = 0.32 ampere.

← indicates a change.

DEC. 30, 1947

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7F8

7F8

# MEDIUM-MU TWIN TRIODE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathodes:

Voltage . . . . .	6.3 <sup>□</sup>	ac or dc volts
Current . . . . .	0.3 <sup>□□</sup>	amp

Direct Interelectrode Capacitances:

Each Unit:

Grid to Plate . . . . .	1.2 <sup>*</sup>	μμf
Grid to Cathode . . . . .	2.8 <sup>*</sup>	μμf
Plate to Cathode . . . . .	1.4 <sup>*</sup>	μμf
Heater to Cathode . . . . .	2.8 <sup>**</sup>	μμf
Grid to Grid . . . . .	0.1 max. <sup>*</sup>	μμf
Plate to Plate . . . . .	0.5 max. <sup>*</sup>	μμf

\* with external shield connected to cathode.

\*\* with external shield connected to ground.

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	2-9/32"
Maximum Seated Length . . . . .	1-3/4"
Maximum Diameter . . . . .	1-3/16"
Bulb . . . . .	T-9
Base . . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	8BW

Pin 1 - Grid of Unit No.2  
 Pin 2 - Heater  
 Pin 3 - Plate of Unit No.2  
 Pin 4 - Cathode of Unit No.2  
 Pin 5 - Cathode of Unit No.1



Pin 6 - Plate of Unit No.1  
 Pin 7 - Heater  
 Pin 8 - Grid of Unit No.1  
 Plug - Base Shell

## AMPLIFIER - Class A<sub>1</sub>

Values are for each unit

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . .	300 max.	volts
PLATE DISSIPATION (Total for both units) . . . . .	3.5 max.	watts
GRID VOLTAGE:		
Positive bias value . . . . .	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	90 max.	volts
Heater positive with respect to cathode . . . . .	90 max.	volts

### Characteristics:

Plate Voltage . . . . .	250	volts
Cathode-Bias Resistor . . . . .	500	ohms
Amplification Factor . . . . .	48	

□ Nominal voltage = 7.0 volts.

□□ Nominal current = 0.32 ampere.

7F8



7F8

# MEDIUM-MU TWIN TRIODE

Plate Resistance (Approx.) . . . . .	14500	. .	ohms
Transconductance . . . . .	3300	. .	$\mu$ mhos
Plate Current. . . . .	6	. .	ma
Grid Bias for plate current of 10 $\mu$ a (Approx.). . . . .	-11	. .	volts

### Maximum Circuit Values (for maximum rated conditions):

Grid-Circuit Resistance:	
For cathode-bias operation . . . . .	0.5 max. megohm



7G7

7G7

## SHARP-CUTOFF PENTODE

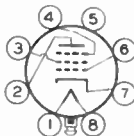
## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3<sup>□</sup> . . . . . ac or dc volts  
Current . . . . . 0.45<sup>□□</sup> . . . . . ampDirect Interelectrode Capacitances:<sup>○</sup>Grid No.1 to Plate . . . 0.007 max. . . . . μf  
Input . . . . . 9 . . . . . μf  
Output . . . . . 7 . . . . . μf<sup>○</sup> with external shield connected to cathode.

## Mechanical:

Mounting Position . . . . . Any  
Maximum Overall Length . . . . . 2-25/32"  
Maximum Seated Length . . . . . 2-1/4"  
Maximum Diameter . . . . . 1-3/16"  
Bulb . . . . . T-9  
Base . . . . . Lock-in 8-Pin  
Basing Designation for BOTTOM VIEW . . . . . 8VPin 1 - Heater  
Pin 2 - Plate  
Pin 3 - Grid No.2  
Pin 4 - Grid No.3  
Pin 5 - Internal  
ShieldPin 6 - Grid No.1  
Pin 7 - Cathode  
Pin 8 - Heater  
Plug - Base  
ShellAMPLIFIER - Class A<sub>1</sub>

## Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . . 300 max. volts ←  
GRID-No.2 (SCREEN) VOLTAGE . . . . . 100 max. volts ←  
GRID-No.2 SUPPLY VOLTAGE . . . . . 300 max. volts ←  
PLATE DISSIPATION . . . . . 1.5 max. watts ←  
GRID-No.2 DISSIPATION . . . . . 0.3 max. watt ←  
PEAK HEATER-CATHODE VOLTAGE:  
Heater negative with respect to cathode . . . 90 max. volts  
Heater positive with respect to cathode . . . 90 max. volts

## Typical Operation and Characteristics:

Plate Voltage . . . . . 250 . . volts  
Grid No.3 . . . . . Connected to cathode at socket  
Internal Shield . . . . . Connected to cathode at socket  
Grid-No.2 Voltage . . . . . 100 . . volts  
Grid-No.1 Voltage . . . . . -2 . . volts  
Cathode-Bias Resistor . . . . . 250 . . ohms  
Plate Resistance (Approx.) . . . . . 0.8 . . megohm  
Transconductance . . . . . 4500 . . μmhos

(continued on next page)

<sup>□</sup> Nominal voltage = 7.0 volts.<sup>□□</sup> Nominal current = 0.48 ampere.

← Indicates a change.

DEC. 30, 1947

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

DATA

7G7



7G7

## SHARP-CUTOFF PENTODE

→ Grid-No.1 Bias (Approx.) for			
Cathode Current Cutoff . . . . .	-7	..	volts
Plate Current. . . . .	6	..	ma
Grid-No.2 Current. . . . .	2	..	ma

→ Indicates a change.

DEC. 30, 1947

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7H7

7H7

## REMOTE-CUTOFF PENTODE

## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3<sup>o</sup> . . . . . ac or dc voltsCurrent. . . . . 0.3<sup>oo</sup> . . . . . ampDirect Interelectrode Capacitances:<sup>o</sup>Grid No.1 to Plate . . . . . 0.007 max. . . . .  $\mu$ fInput. . . . . 8 . . . . .  $\mu$ fOutput . . . . . 7 . . . . .  $\mu$ f<sup>o</sup> with external shield connected to cathode.

## Mechanical:

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 2-25/32"

Maximum Seated Length. . . . . 2-1/4"

Maximum Diameter . . . . . 1-3/16"

Bulb . . . . . T-9

Base . . . . . Lock-in 8-Pin

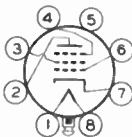
Basing Designation for BOTTOM VIEW . . . . . 8V

Pin 1 - Heater

Pin 2 - Plate

Pin 3 - Grid No.2

Pin 4 - Grid No.3

Pin 5 - Internal  
Shield

Pin 6 - Grid No.1

Pin 7 - Cathode

Pin 8 - Heater

Plug - Base

Shell

AMPLIFIER - Class A<sub>1</sub>

## Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . . 300 max. volts

GRID-No.2 (SCREEN) VOLTAGE . . . . . 150 max. volts

GRID-No.2 SUPPLY VOLTAGE . . . . . 300 max. volts

GRID-No.1 (CONTROL-GRID) VOLTAGE:

Positive bias value. . . . . 0 max. volts

PLATE DISSIPATION. . . . . 2.5 max. watts

GRID-No.2 DISSIPATION. . . . . 0.5 max. watt

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . . . . . 90 max. volts ←

Heater positive with respect to cathode . . . . . 90 max. volts ←

## Typical Operation and Characteristics:

Plate Voltage. . . . . 100 250 volts

Grid No.3 . . . . . Connected to cathode at socket

Internal Shield . . . . . Connected to cathode at socket

Grid-No.2 Voltage . . . . . 100 150 volts

Grid-No.1 Voltage . . . . . -1 - volt

Cathode-Bias Resistor. . . . . 80 180 ohms

(continued on next page)

□ Nominal voltage = 7.0 volts.

□□ Nominal current = 0.32 ampere.

← Indicates a change.

DEC. 30, 1947

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7H7



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## REMOTE-CUTOFF PENTODE

Plate Resistance (Approx.) . . . . .	0.25	0.8	megohm
Transconductance . . . . .	4800	4200	$\mu$ mhos
Grid-No.1 Bias (Approx.) for transconductance of 35 $\mu$ mhos . . .	-12	-19	volts
Plate Current. . . . .	8.2	10	ma
Grid-No.2 Current. . . . .	3.3	3.2	ma

DEC. 30, 1947

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7J7

7J7

# TRIODE-HEPTODE CONVERTER

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . .	6.3 <sup>□</sup>	ac or dc volts
Current. . . . .	0.3 <sup>□□</sup>	amp

Direct Interelectrode Capacitances:<sup>0</sup>

Heptode Grid No.1 to Heptode Plate . . .	0.03 max.	μf
Heptode Grid No.1 to Triode Plate . . .	0.1 max.	μf
Heptode Grid No.1 to Triode Grid & Heptode Grid No.3. . .	0.3 max.	μf
Triode Grid & Heptode Grid No.3 to Triode Plate . . . . .	0.9 . .	μf
Heptode Grid No.1 to All Other Electrodes (RF Input). . . . .	4.6 . .	μf
Heptode Plate to All Other Electrodes (Mixer Output) . . . . .	3.2 . .	μf
Triode Grid & Heptode Grid No.3 to All Other Electrodes Except Triode Plate (Oscillator Input) . . . . .	7.5 . .	μf
Triode Plate to All Other Electrodes Except Triode Grid & Heptode Grid No.3 (Oscillator Output). . . . .	7.5 . .	μf

<sup>0</sup> with external shield connected to cathode.

### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	2-25/32"
Maximum Seated Length. . . . .	2-1/4"
Maximum Diameter . . . . .	1-3/16"
Bulb . . . . .	T-9
Base . . . . .	Lock-in 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 8BL

Pin 1 - Heater	Pin 6 - Heptode Grid No.1
Pin 2 - Heptode Plate	Pin 7 - Cathode, Heptode Grid No.5, Internal Shield
Pin 3 - Triode Plate	Pin 8 - Heater Plug - Base Shell
Pin 4 - Triode Grid, Heptode Grid No.3	
Pin 5 - Heptode Grids No.2 & No.4	



## CONVERTER

### Maximum Ratings, Design-Center Values:

HEPTODE PLATE VOLTAGE. . . . .	300 max.	volts
HEPTODE GRIDS-No.2 & No.4 (SCREEN) VOLTAGE . . . . .	100 max.	volts

□ Nominal voltage = 7.0 volts.  
 □□ Nominal current = 0.32 ampere.  
 ← Indicates a change.

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# TRIODE-HEPTODE CONVERTER

HEPTODE GRIDS—No. 2 & No. 4			
SUPPLY VOLTAGE . . . . .	300 max.	volts	
HEPTODE GRID—No. 1 (CONTROL- GRID) VOLTAGE:			
Positive bias value. . . . .	0 max.	volts	
HEPTODE PLATE DISSIPATION. . . . .	0.5 max.	watt	
HEPTODE GRIDS—No. 2 & No. 4 DISSIPATION. . . . .	0.3 max.	watt	
TRIODE PLATE VOLTAGE . . . . .	150 max.	volts	
TRIODE PLATE-SUPPLY VOLTAGE. . . . .	300 max.	volts	
TRIODE PLATE DISSIPATION . . . . .	1.25 max.	watts	
TOTAL CATHODE CURRENT. . . . .	14 max.	ma	
→ PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode. . . . .	90 max.	volts	
Heater positive with respect to cathode. . . . .	90 max.	volts	
→ Typical Operation:			
Heptode Plate Voltage. . . . .	100	250	volts
Heptode Grids—No. 2 & No. 4 Voltage. . . . .	100	100	volts
Heptode Grid—No. 1 Voltage. . . . .	-3	-3	volts
Triode (Oscillator) Plate-Supply Volt. . . . .	100	250 <sup>†</sup>	volts
Triode Grid & Heptode			
Grid—No. 3 Resistor . . . . .	50000	50000	ohms
Heptode Plate Resistance . . . . .	0.5	1.5	megohms
Heptode Plate Current. . . . .	1.5	1.4	ma
Heptode Grids—No. 2 & No. 4 Current. . . . .	2.6	2.8	ma
Triode Plate Current . . . . .	3.2	5	ma
Triode Grid & Heptode			
Grid—No. 3 Current. . . . .	0.3	0.4	ma
Conversion Conductance . . . . .	280	290	μmhos
Conversion Conductance (Approx.) for heptode grid—No. 1 bias of -20 volts . . . . .			μmhos
Total Cathode Current. . . . .	7.7	9.6	ma

<sup>†</sup> Applied through a 20000-ohm dropping resistor, properly bypassed.

NOTE: The transconductance of the triode section, not oscillating, is approximately 1400 μmhos under the following conditions: triode plate voltage = 150; triode-grid & heptode grid—No. 3 volts = -3. Under the same conditions, triode plate current is 6.6 ma., triode plate resistance is 10700 ohms, and amplification factor is 15.

→ Indicates a change.

DEC. 30, 1947

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

DATA





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# TWIN DIODE—HIGH-MU TRIODE

## GENERAL DATA

### Electrical:

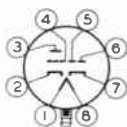
Heater, for Unipotential Cathodes:

Voltage . . . . .	6.3 <sup>□</sup>	ac or dc volts
Current . . . . .	0.3 <sup>□□</sup>	amp

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	2-25/32"
Maximum Seated Length . . . . .	2-1/4"
Maximum Diameter . . . . .	1-3/16"
Bulb . . . . .	T-9
Base . . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	8BF

- Pin 1 - Heater
- Pin 2 - Triode Cathode
- Pin 3 - Triode Plate
- Pin 4 - Triode Grid
- Pin 5 - Diode-No. 2 Plate



- Pin 6 - Diode-No. 1 Plate
- Pin 7 - Cathode of Diode-No. 1 & Diode-No. 2
- Pin 8 - Heater Plug - Base Shell

## TRIODE UNIT AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . .	250 max.	volts
-------------------------	----------	-------

### Typical Operation and Characteristics:

Plate Voltage . . . . .	250	volts
Grid Voltage . . . . .	-2	volts
Amplification Factor . . . . .	70	
Plate Resistance . . . . .	44000	ohms
Transconductance . . . . .	1600	μmhos
Plate Current . . . . .	2.3	ma

## DIODE UNITS - Two

The two diode units have a common cathode and are independent of the triode unit. Further consideration of the diode units including diode curves is given at the front of this Section.

□ Nominal voltage = 7.0 volts

□□ Nominal current = 0.32 amperes.





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## SHARP-CUTOFF PENTODE

## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3<sup>□</sup> . . . . . ac or dc volts  
 Current . . . . . 0.3<sup>□□</sup> . . . . . amp

Direct Interelectrode Capacitances:<sup>○</sup>

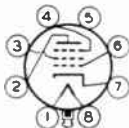
Grid No.1 to Plate . . . . . 0.01 max. . . . .  $\mu\mu\text{f}$   
 Input . . . . . 8.0 . . . . .  $\mu\mu\text{f}$   
 Output . . . . . 6.5 . . . . .  $\mu\mu\text{f}$

<sup>○</sup> with external shield connected to cathode and base shell.

## Mechanical:

Mounting Position . . . . . Any  
 Maximum Overall Length . . . . . 2-25/32"  
 Maximum Seated Length . . . . . 2-1/4"  
 Maximum Diameter . . . . . 1-3/16"  
 Bulb . . . . . T-9  
 Base . . . . . Lock-in 8-Pin  
 Basing Designation for BOTTOM VIEW . . . . . 8V

Pin 1-Heater  
 Pin 2-Plate  
 Pin 3-Grid No.2  
 Pin 4-Grid No.3  
 Pin 5-Internal  
 Shield



Pin 6-Grid No.1  
 Pin 7-Cathode  
 Pin 8-Heater  
 Plug - Base  
 Shell

AMPLIFIER - Class A<sub>1</sub>

## Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . . 300 max. volts  
 GRID-No.2 (SCREEN) VOLTAGE . . . . . 125 max. volts  
 GRID-No.2 SUPPLY VOLTAGE . . . . . 300 max. volts  
 PLATE DISSIPATION . . . . . 4.0 max. watts  
 GRID-No.2 DISSIPATION . . . . . 0.4 max. watt  
 GRID-No.1 (CONTROL-GRID) VOLTAGE:  
 Positive bias value . . . . . 0 max. volts  
 PEAK HEATER-CATHODE VOLTAGE:  
 Heater negative with respect to cathode . . . . . 90 max. volts  
 Heater positive with respect to cathode . . . . . 90 max. volts

## Typical Operation and Characteristics:

Plate Voltage . . . . . 100 250 volts  
 Grid No.3 & Internal Shield . . Connected to cathode at socket  
 Grid No.2 Voltage . . . . . 100 100 volts  
 Grid No.1 Voltage . . . . . -1 -1.5 volts  
 Cathode-Bias Resistor . . . . . 125 250 ohms  
 Plate Resistance (Approx.) . . . . . 0.1 1.0 megohm  
 Transconductance . . . . . 3000 3100  $\mu\text{mhos}$

□ Nominal voltage = 7.0 volts.

□□ Nominal current = 0.32 ampere.

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## SHARP-CUTOFF PENTODE

(continued from preceding page)

Grid-No.1 Bias (Approx.) for cathode-current cutoff . . . . .	-6	-6	volts
Plate Current. . . . .	5.5	4.5	ma
Grid-No.2 Current. . . . .	2.4	1.5	ma

7N7

## MEDIUM-MU TWIN TRIODE

## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathodes:

Voltage. . . . .	6.3 <sup>□</sup>	ac or dc volts
Current. . . . .	0.6 <sup>□□</sup>	amp

Direct Interelectrode Capacitances:<sup>○</sup>

	<u>Triode No. 1</u>	<u>Triode No. 2</u>	
Grid to Plate. . . . .	3.0	3.0	μf
Input. . . . .	3.4	2.9	μf
Output. . . . .	2.0	2.4	μf

<sup>○</sup> with external shield connected to cathode.

## Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length. . . . .	3-5/32"
Maximum Seated Length. . . . .	2-5/8"
Maximum Diameter. . . . .	1-3/16"
Bulb. . . . .	T-9
Base. . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW. . . . .	8AC

Pin 1 - Heater  
 Pin 2 - Cathode of  
           Triode No. 2  
 Pin 3 - Plate of  
           Triode No. 2  
 Pin 4 - Grid of  
           Triode No. 2



Pin 5 - Grid of  
           Triode No. 1  
 Pin 6 - Plate of  
           Triode No. 1  
 Pin 7 - Cathode of  
           Triode No. 1  
 Pin 8 - Heater  
 Plug - Base Shell

*Maximum Ratings, Characteristics, and Typical Operating  
 Conditions are the same as those for Type 6SN7-GT*

□ Nominal voltage = 7.0 volts.

□□ Nominal current = 0.64 ampere.

OCTOBER 15, 1947

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

DATA



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## PENTAGRID CONVERTER

Heater	Coated Unipotential Cathode	
Voltage	6.3 <sup>□</sup>	a-c or d-c volts
Current	0.3 <sup>□□</sup>	amp.
Direct Interelectrode Capacitances: 0		
Grid #3 to All Other Electrodes & Base Shell (R-F Input)	9.0	μf
Plate to All Other Electrodes & Base Shell (Mixer Output)	9.0	μf
Grid #1 to All Other Electrodes & Base Shell	7.0	μf
Grid #3 to Plate	0.20 max.	μf
Grid #1 to Grid #3	0.20 max.	μf
Grid #1 to Plate	0.15 max.	μf
Grid #1 to All Other Electrodes & Base Shell Except Cathode	5.0	μf
Grid #1 to Cathode	2.2	μf
Cathode to All Other Electrodes & Base Shell Except Grid #1	6.0	μf
Maximum Overall Length	2-25/32"	
Maximum Seated Height	2-1/4"	
Maximum Diameter	1-3/16"	
Bulb	T-9	
Base	Lock-in 8-Pin	
Pin 1 - Heater	Pin 5 - Grid #3	
Pin 2 - Plate	Pin 7 - Cathode	
Pin 3 - Grids #2 & #4	Pin 8 - Heater	
Pin 4 - Grid #1	Plug - Base Shell	
Pin 5 - Grid #5		
Mounting Position	BOTTOM VIEW (8AL)	Any
	<u>CONVERTER SERVICE</u>	
Plate Voltage	300 max.	volts
Grids #2 & #4 Voltage	100 max.	volts
Grids #2 & #4 Supply Voltage	300 max.	volts
Grid #3 Voltage	0 min.	volts
Plate & Grids #2 & #4 Dissipation (total)	2.0 max.	watts
Grids #2 & #4 Dissipation	1.0 max.	watt
Total Cathode Current	14 max.	ma.
Characteristics with Separate Excitation: *		
Plate Voltage	100	250 volts
Grids #2 & #4 Voltage	100	100 volts
Grid #3 (Control) Voltage	-2	-2 volts
Grid #5 Voltage	0	0 volts
Grid #1 Resistor	20000	20000 ohms
Plate Resistance	0.5	1 approx. megohm
Conversion Transcond.	525	550 μmhos
Conversion Transcond. with Grid #3 Bias of -35 volts	2	2 approx. μmhos
Plate Current	3.3	3.5 ma.
Grids #2 & #4 Current	8.5	8.5 ma.
Grid #1 Current	0.5	0.5 ma.
Total Cathode Current	12.3	12.5 ma.



□, □□, •, °, \* : See next page.

May 1, 1941

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY INC

TENTATIVE DATA

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## PENTAGRID CONVERTER

(continued from preceding page)

NOTE: The transconductance between Grid #1 and Grids #2 & #4 connected to plate (not oscillating) is approximately 4500  $\mu$ hos under the following conditions: Grids #1, #3, and #5 at 0 volts; Grids #2 & #4 and plate at 100 volts.

■ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

□ Nominal voltage = 7.0 volts.

□ Nominal current = 0.32 ampere.

○ with shield-can connected to cathode.

● with self-excited oscillator.

● These characteristics correspond very closely to those obtained with zero bias in a self-excited oscillator circuit.

*A typical self-excited converter circuit is shown under type 6SA7.*

May 1, 1941

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

TENTATIVE DATA



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# TWIN DIODE—REMOTE-CUTOFF PENTODE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . .	6.3 <sup>0</sup>	ac or dc volts
Current. . . . .	0.3 <sup>00</sup>	amp

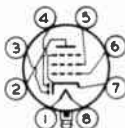
Direct Interelectrode Capacitances:\*

Grid No.1 to Plate . . . . .	0.004 max.	$\mu$ f
Input to Cathode . . . . .	5.6	$\mu$ f
Output to Cathode. . . . .	5.3	$\mu$ f
Plate of Diode No.1 to Pentode Grid No.1 . . . . .	0.005 max.	$\mu$ f
Plate of Diode No.2 to Pentode Grid No.1 . . . . .	0.002 max.	$\mu$ f

\* with external shield connected to cathode.

### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	2-25/32"
Maximum Seated Length. . . . .	2-1/4"
Maximum Diameter . . . . .	1-3/16"
Bulb . . . . .	T-9
Base . . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	8AE
Pin 1 - Heater	Pin 6 - Pentode
Pin 2 - Pentode	Grid No.1
Plate	Pin 7 - Cathode,
Pin 3 - Diode No.2	Pentode
Plate	Grid No.3
Pin 4 - Diode No.1	Pin 8 - Heater
Plate	
Pin 5 - Pentode	Plug - Base
Grid No.2	Shell



## AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	300 max.	volts
GRID-No.2 (SCREEN) VOLTAGE . . . . .	100 max.	volts
GRID-No.2 SUPPLY VOLTAGE . . . . .	300 max.	volts
PLATE DISSIPATION. . . . .	2.0 max.	watts
GRID-No.2 DISSIPATION. . . . .	0.25 max.	watt
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive bias value. . . . .	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

### Typical Operation and Characteristics:

Plate Voltage. . . . .	100	100	250	250	volts
Grid-No.2 Voltage. . . . .	10C	100	100	100	volts

<sup>0</sup>, <sup>00</sup>: See next page.

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## TWIN DIODE—REMOTE-CUTOFF PENTODE

Grid-No.1 Voltage. . . . .	-2.0	-1.0	-2.0	-1.0	volts
Cathode-Bias Resistor. . . . .	450	130	450	130	ohms
Plate Resistance (Approx.) . .	0.5	0.35	1.8	1	megohm
Transconductance . . . . .	2100	3000	2200	3400	$\mu$ mhos
Grid-No.1 Bias (Approx.) for transconductance of 2 $\mu$ mhos	-16	-16	-20	-20	volts
Plate Current. . . . .	3.4	5.5	3.5	6.2	ma
Grid-No.2 Current. . . . .	1.0	2.2	1.0	1.6	ma

□ nominal voltage = 7.0 volts.

□□ nominal current = 0.32 ampere.





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## TRIODE-HEPTODE CONVERTER

GENERAL DATA**Electrical:**

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3<sup>□</sup> . . . . . ac or dc voltsCurrent. . . . . 0.3<sup>□□</sup> . . . . . ampDirect Interelectrode Capacitances:<sup>○</sup>Heptode Grid No.1 to Heptode Plate . . . 0.03 max.  $\mu\mu\text{f}$ Heptode Grid No.1 to Triode Plate. . . . 0.1 max.  $\mu\mu\text{f}$ Heptode Grid No.1 to Triode Grid &  
Heptode Grid No.3 . . . 0.35 max.  $\mu\mu\text{f}$ Triode Grid & Heptode Grid No.3 to  
Triode Plate . . . . . 1 . .  $\mu\mu\text{f}$ Heptode Grid No.1 to All Other  
Electrodes (RF Input) . . . . . 5 . .  $\mu\mu\text{f}$ Heptode Plate to All Other  
Electrodes (Mixer Output) . . . . . 8 . .  $\mu\mu\text{f}$ Triode Grid & Heptode Grid No.3 to All  
Other Electrodes Except Triode  
Plate (Oscillator Input) . . . . . 7 . .  $\mu\mu\text{f}$ Triode Plate to All Other Electrodes  
Except Triode Grid & Heptode  
Grid No.3 (Oscillator Output). . . . . 3.5 . .  $\mu\mu\text{f}$ 

○ with external shield connected to cathode.

**Mechanical:**

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 2-25/32"

Maximum Seated Length . . . . . 2-1/4"

Maximum Diameter . . . . . 1-3/16"

Bulb . . . . . T-9

Base . . . . . Lock-in 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 8BL

Pin 1 - Heater

Pin 2 - Heptode Plate

Pin 3 - Triode Plate

Pin 4 - Triode Grid,

Heptode

Grid No.3

Pin 5 - Heptode

Grids No.2

&amp; No.4

Pin 6 - Heptode

Grid No.1

Pin 7 - Cathode,

Heptode

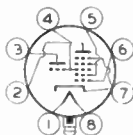
Grid No.5,

Internal

Shield

Pin 8 - Heater

Plug - Base Shell

CONVERTER**Maximum Ratings, Design-Center Values:**

HEPTODE PLATE VOLTAGE. . . . . 300 max. volts

HEPTODE GRIDS-No.2 & No.4  
(SCREEN) VOLTAGE . . . . . 100 max. voltsHEPTODE GRIDS-No.2 & No.4  
SUPPLY VOLTAGE . . . . . 300 max. volts

□ Nominal voltage = 7.0 volts.

□□ Nominal current = 0.32 ampere.

DEC. 30, 1947

TUBE DEPARTMENT

DATA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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## TRIODE-HEPTODE CONVERTER

### HEPTODE GRID-No.1 (CONTROL-

#### GRID) VOLTAGE:

Positive bias value. . . . .	0 max.	volts
HEPTODE PLATE DISSIPATION. . . . .	0.6 max.	watt
HEPTODE GRIDS-No.2 & No.4 DISSIPATION. . .	0.4 max.	watt
TRIODE PLATE VOLTAGE . . . . .	175 max.	volts
TRIODE PLATE-SUPPLY VOLTAGE. . . . .	300 max.	volts
TRIODE PLATE DISSIPATION . . . . .	1 max.	watt
TOTAL CATHODE CURRENT. . . . .	14 max.	ma
<b>PEAK HEATER-CATHODE VOLTAGE:</b>		
Heater negative with respect to cathode. .	90 max.	volts
Heater positive with respect to cathode. .	90 max.	volts

### Typical Operation:

Heptode Plate Voltage. . . . .	100	250	volts
Heptode Grids-No.2 & No.4 Voltage. . .	100	100	volts
Triode (Oscillator) Plate-Supply Volt.	100	250 <sup>†</sup>	volts
Heptode Grid-No.1 Voltage. . . . .	-2	-2	volts
Cathode-Bias Resistor. . . . .	240	195	ohms
Triode Grid & Heptode			
Grid-No.3 Resistor . . . . .	50000	50000	ohms
Heptode Plate Current. . . . .	1.9	1.8	ma
Heptode Grids-No.2 & No.4 Current. . .	3	3	ma
Triode Plate Current . . . . .	3	5	ma
Triode Grid & Heptode			
Grid-No.3 Current. . . . .	0.3	0.4	ma
Heptode Plate Resistance . . . . .	0.5	1.25	megohms
Conversion Conductance . . . . .	500	525	μmhos
Conversion Conductance (Approx.) for			
heptode grid-No.1 bias of -21 volts .	2	2	μmhos
Total Cathode Current. . . . .	8.2	10.2	ma

<sup>†</sup> Applied through a 20000-ohm dropping resistor, properly bypassed.

NOTE: The transconductance of the triode section, not oscillating, is approximately 1650 μmhos under the following conditions: triode plate volts = 100, triode grid and heptode grid No.3 volts = 0. Under the same conditions, triode plate current is 6.5 ma., triode plate resistance is 11000 ohms, and amplification factor is 18.



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# SHARP-CUTOFF PENTODE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . .	6.3 <sup>□</sup>	ac or dc volts
Current. . . . .	0.45 <sup>□□</sup>	amp

Direct Interelectrode Capacitances:<sup>○</sup>

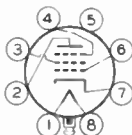
Grid No.1 to Plate . . . . .	0.004 max.	μμf
Input. . . . .	9.5	μμf
Output . . . . .	6.5	μμf

<sup>○</sup> with external shield connected to cathode.

### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	2-25/32"
Maximum Seated Length. . . . .	2-1/4"
Maximum Diameter . . . . .	1-3/16"
Bulb . . . . .	T-9
Base . . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	8V

Pin 1 - Heater  
 Pin 2 - Plate  
 Pin 3 - Grid No.2  
 Pin 4 - Grid No.3  
 Pin 5 - Internal  
 Shield



Pin 6 - Grid No.1  
 Pin 7 - Cathode  
 Pin 8 - Heater  
 Plug - Base  
 Shell

## AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	300 max.	volts
GRID-No.2 (SCREEN) VOLTAGE . . . . .	150 max.	volts
GRID-No.2 SUPPLY VOLTAGE . . . . .	300 max.	volts
PLATE DISSIPATION. . . . .	4 max.	watts
GRID-No.2 DISSIPATION. . . . .	0.8 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	90 max.	volts
Heater positive with respect to cathode . . . . .	90 max.	volts

### Typical Operation and Characteristics:

	Condition I*	Condition II**
Plate Voltage. . . . .	300	300 . . volts
Grid No.3 (Suppressor)	Connected to cathode at socket	
Internal Shield. . . . .	Connected to cathode at socket	
Grid-No.2 Supply -		
Voltage# . . . . .	150	300 . . volts
Grid-No.2 Resistor . . . . .	-	40000 . . ohms
Min. Cathode-Bias		
Resistor. . . . .	160	160 . . ohms

<sup>□</sup> Nominal voltage = 7.0 volts.

<sup>□□</sup> Nominal current = 0.48 ampere.

\*, \*\*, #: See next page.

7V7  
7W7



7V7

**SHARP-CUTOFF PENTODE**

Plate Current . . . . .	10	10	ma
Grid-No.2 Current . . .	3.9	3.9	ma
Plate Resistance . . . .	0.3	0.3	megohm
Transconductance . . . .	5800	5800	μmhos
Grid-No.1 Bias (Approx.) for plate current of			
10 μa . . . . .	-8	-16	volts

\* Condition I with fixed grid-No.2 supply gives a sharp-cutoff characteristic.

\*\* Condition II with series grid-No.2 resistor gives an extended-cutoff characteristic.

# When grid-No.2 supply voltage in excess of 150 volts is used, a series grid-No.2 resistor must be used to limit grid-No.2 voltage to 150 volts when the plate current is at its normal value of 10 ma.

7W7

**SHARP-CUTOFF PENTODE**

GENERAL DATA

**Electrical:**

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3<sup>□</sup> . . . . . ac or dc volts

Current . . . . . 0.45<sup>□□</sup> . . . . . amp

Direct Interelectrode Capacitances:<sup>○</sup>

Grid No.1 to Plate . . . 0.0025 max. . . . . μμf

Input . . . . . 9.5 . . . . . μμf

Output . . . . . 7 . . . . . μμf

<sup>○</sup> with external shield connected to cathode.

**Mechanical:**

Mounting Position . . . . . Any

Maximum Overall Length . . . . . 2-25/32"

Maximum Seated Length . . . . . 2-1/4"

Maximum Diameter . . . . . 1-3/16"

Bulb . . . . . T-9

Base . . . . . Lock-in 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 8B1

Pin 1- Heater

Pin 2- Plate

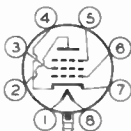
Pin 3- Grid No.2

Pin 4- Cathode

Pin 5- Grid No.3,

Internal

Shield



Pin 6- Grid No.1

Pin 7- Cathode

Pin 8- Heater

Plug - Base  
Shell

*Maximum Ratings, Typical Operation, and Characteristics are the same as for Type 7V7*

<sup>□</sup> nominal voltage = 7.0 volts.

<sup>□□</sup> nominal current = 0.48 ampere.

JUNE 15, 1948

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

DATA



7X7

7X7

# DOUBLE DIODE—HIGH-MU TRIODE

## GENERAL DATA

### Electrical:

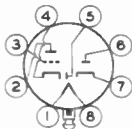
Heater, for Unipotential Cathodes:

Voltage . . . . .	6.3 <sup>□</sup>	ac or dc volts
Current . . . . .	0.3 <sup>□□</sup>	amp

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	2-25/32"
Maximum Seated Length . . . . .	2-1/4"
Maximum Diameter . . . . .	1-3/16"
Bulb . . . . .	T-9
Base . . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	8BZ

Pin 1 - Heater  
 Pin 2 - Triode Plate  
 Pin 3 - Triode Grid  
 Pin 4 - Cathode  
 (Triode &  
 Diode No. 1)  
 Internal  
 Shield



Pin 5 - Diode Plate  
 No. 1  
 Pin 6 - Diode Plate  
 No. 2  
 Pin 7 - Cathode  
 (Diode No. 2)  
 Pin 8 - Heater  
 Plug - Base Shell

## TRIODE UNIT AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

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

### Typical Operation and Characteristics:

Plate Voltage . . . . .	100	250	volts
Grid Voltage . . . . .	0	-1	volt
Amplification Factor . . . . .	85	100	
Plate Resistance . . . . .	85000	67000	ohms
Transconductance . . . . .	1000	1500	μmhos
Plate Current . . . . .	1.2	1.9	ma

## DIODE UNITS - Two

The 7X7 differs from the usual twin-diode-triode in that diode No. 2 has its own cathode, separate from that used for the triode and diode No. 1.

- Nominal voltage = 7.0 volts.
- Nominal current = 0.32 ampere.





7Y4

7Y4

**FULL-WAVE VACUUM RECTIFIER**GENERAL DATA**Electrical:**

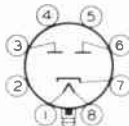
Heater, for Unipotential Cathode:

Voltage. . . . . 6.3<sup>□</sup> . . . . . ac or dc volts  
 Current. . . . . 0.5<sup>□□</sup> . . . . . amp

**Mechanical:**

Mounting Position. . . . . Any  
 Maximum Overall Length. . . . . 2-25/32"  
 Maximum Seated Length. . . . . 2-1/4"  
 Maximum Diameter. . . . . 1-3/16"  
 Bulb. . . . . T-9  
 Base. . . . . Lock-in 8-Pin  
 Basing Designation for BOTTOM VIEW. . . . . 5AB

Pin 1 - Heater  
 Pin 2 - No  
 Connection  
 Pin 3 - Plate No. 2  
 Pin 4 - No  
 Connection



Pin 5 - No  
 Connection  
 Pin 6 - Plate No. 1  
 Pin 7 - Cathode  
 Pin 8 - Heater  
 Plug - Base Shell

FULL-WAVE RECTIFIER**Maximum Ratings, Design-Center Values:**

PEAK INVERSE PLATE VOLTAGE. . . . . 1250 max. volts  
 PEAK PLATE CURRENT PER PLATE. . . . . 180 max. ma  
 DC OUTPUT CURRENT. . . . . 70 max. ma ←  
 PEAK HEATER-CATHODE VOLTAGE:  
 Heater negative with respect to cathode. . . . . 450 max. volts  
 Heater positive with respect to cathode. . . . . 450 max. volts ←

**Typical Operation:**

	<u>Capacitor- Input to Filter</u>	<u>Choke- Input to Filter</u>	
AC Plate-to-Plate Supply			
Voltage (RMS) . . . . .	650	900	volts
Filter-Input Capacitor . . . . .	4	-	μf
Min. Total Effective Plate- Supply Impedance per Plate* . . . . .	150	-	ohms
Min. Filter-Input Choke. . . . .	-	10	henries
DC Output Current. . . . .	70	70	ma
DC Output Voltage at			
Input to Filter (Approx.):			
At half-load (35 ma.). . . . .	390	385	volts
At full-load (70 ma.). . . . .	355	375	volts
Voltage Regulation (Approx.):			
Half-load to full load current	35	10	volts

\* Indicated value for conditions shown will limit peak plate current to maximum rated value. When a filter-input capacitor larger than 4μf is used, it may be necessary to use more plate-supply impedance than the value shown to limit the peak plate current to the rated value.

□ Nominal voltage = 7.0 volts.      □□ Nominal current = 0.53 ampere.

← Indicates a change.

7Z4



7Z4

# FULL-WAVE VACUUM RECTIFIER

## GENERAL DATA

### Electrical:

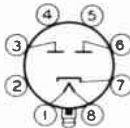
Heater, for Unipotential Cathode:

Voltage. . . . . 6.3<sup>□</sup> . . . . . ac or dc volts  
 Current. . . . . 0.9<sup>□□</sup> . . . . . amp

### Mechanical:

Mounting Position. . . . . Any  
 Maximum Overall Length . . . . . 3-5/32"  
 Maximum Seated Length. . . . . 2-5/8"  
 Maximum Diameter . . . . . 1-3/16"  
 Bulb . . . . . T-9  
 Base . . . . . Lock-in 8-Pin  
 Basing Designation for BOTTOM VIEW . . . . . 5AB

Pin 1 - Heater  
 Pin 2 - No  
           Connection  
 Pin 3 - Plate No.2  
 Pin 4 - No  
           Connection



Pin 5 - No  
           Connection  
 Pin 6 - Plate No.1  
 Pin 7 - Cathode  
 Pin 8 - Heater  
 Plug - Base Shell

## FULL-WAVE RECTIFIER

### Maximum Ratings, Design-Center Values:

PEAK INVERSE PLATE VOLTAGE . . . . . 1250 max. volts  
 PEAK PLATE CURRENT PER PLATE . . . . . 300 max. ma  
 DC OUTPUT CURRENT. . . . . 100 max. ma  
 PEAK HEATER-CATHODE VOLTAGE:  
   Heater negative with respect to cathode. 450 max. volts  
   Heater positive with respect to cathode. 450 max. volts

### Typical Operation:

	Capacitor- Input to Filter	Choke- Input to Filter	
AC Plate-to-Plate Supply Voltage (RMS) . . . . .	650	900	volts
Min. Total Effective Plate- Supply Impedance per Plate* . . . . .	75	-	ohms
Min. Filter-Input Choke. . . . .	-	6	henries
DC Output Current. . . . .	100	100	ma
DC Output Voltage at Input to Filter (Approx.):			
At half-load (50 ma.) . . . . .	400	365	volts
At full-load (100 ma.) . . . . .	365	350	volts
Voltage Regulation (Approx.):			
Half-load to full load current	35	15	volts

\* When a filter-input capacitor larger than 40  $\mu$ f is used, it may be necessary to use more plate-supply impedance than the minimum value shown to limit the peak plate current to the rated value.

□ Nominal voltage = 7.0 volts.

□□ Nominal current = 0.96 ampere.

DEC. 30, 1947

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

DATA





12A8-GT

# 12A8-GT

## PENTAGRID CONVERTER

*The 12A8-GT is the same as the 6A8-GT except for the following items:*

Heater, for Unipotential Cathode:

Voltage. . . . .	12.6	. . . . .	ac or dc volts
Current. . . . .	0.15	. . . . .	amp





# 12AC6

## REMOTE-CUTOFF PENTODE

7-PIN MINIATURE TYPE

For use in automobile radio receivers operating directly from 6-cell storage-battery systems

12AC6

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathode:

Voltage range (AC or DC) . . . . . 10 to 15.9 volts

*This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.)

at 12.6 volts . . . . . 0.15 amp

Direct Interelectrode Capacitances (Approx.):

	Without External Shield	With External Shield <sup>o</sup>	
Grid No.1 to plate . . . . .	0.005	0.004	$\mu\mu\text{f}$
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater. . . . .	4.3	4.3	$\mu\mu\text{f}$
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater. . . . .	5	5	$\mu\mu\text{f}$

#### Characteristics, Class A<sub>1</sub> Amplifier:

Heater Voltage . . . . .	12.6	volts
Plate Voltage . . . . .	12.6	volts
Grid No.3 . . . . .	Connected to cathode at socket	
Grid-No.2 Voltage . . . . .	12.6	volts
Grid-No.1 Voltage . . . . .	0	volts
Grid-No.1 Resistor (Bypassed) . . . . .	2.2	megohms
Plate Resistance (Approx.) . . . . .	0.5	megohm
Transconductance, Grid No.1 to Plate. . . . .	730	$\mu\text{mhos}$
Plate Current . . . . .	550	$\mu\text{a}$
Grid-No.2 Current . . . . .	200	$\mu\text{a}$
Grid-No.1 Voltage (Approx.) for transconductance ( $\mu\text{mhos}$ ) = 10 . . . . .	-5.2	volts
Grid-No.3 Voltage (Approx.) for transconductance ( $\mu\text{mhos}$ ) = 10 . . . . .	-3.7	volts

#### Mechanical:

Operating Position . . . . .	Any
Maximum Overall Length . . . . .	2-1/8"
Maximum Seated Length . . . . .	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip) . . . . .	1-1/2" $\pm$ 3/32"
Diameter . . . . .	0.650" to 0.750"
Dimensional Outline . . . . .	See General Section
Bulb . . . . .	T5-1/2
Base . . . . .	Small-Button Miniature 7-Pin (JEDEC No. E7-1)

<sup>o</sup> with external shield JEDEC No.316 connected to cathode.

12AC6

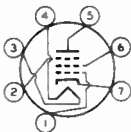


12AC6

# REMOTE-CUTOFF PENTODE

Basing Designation for BOTTOM VIEW. . . . . 7BK

- Pin 1 - Grid No.1
- Pin 2 - Grid No.3,  
Internal  
Shield
- Pin 3 - Heater



- Pin 4 - Heater
- Pin 5 - Plate
- Pin 6 - Grid No.2
- Pin 7 - Cathode

## AMPLIFIER — Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	30 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE. . . . .	30 max.	volts
CATHODE CURRENT. . . . .	20 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode .	30 max.	volts
Heater positive with respect to cathode .	30 max.	volts

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	10 max.	megohms
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## Pentagrid Converter

### 7-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating  
Directly from 6-Cell Storage Batteries

#### GENERAL DATA

##### Electrical:

Heater, for Unipotential Cathode:

Voltage range (DC) . . . . . 10 to 15.9 volts

*For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.) at 12.6 volts . . . . . 0.15 amp

Direct Interelectrode Capacitances:

	Without External Shield	With External Shield <sup>a</sup>	
Grid No.3 to all other electrodes (RF input) . . . . .	7	7	μf
Plate to all other electrodes (Mixer output) . . . . .	7	12	μf
Grid No.1 to cathode & grid No.5, plate, grid No.3, and heater (Oscillator input) . . . . .	3.2	3.2	μf
Grid No.3 to plate . . . . .	0.3 max.	0.26 max.	μf
Grid No.3 to grid No.1 . . . . .	0.15 max.	0.15 max.	μf
Grid No.1 to grid No.2 & grid No.4 . . . . .	2.2	2.2	μf
Grid No.2 & grid No.4 to all other electrodes except grid No.1 (Oscillator output) . . . . .	11	11	μf

##### Mechanical:

Operating Position . . . . . Any

Maximum Overall Length . . . . . 2-1/8"

Maximum Seated Length . . . . . 1-7/8"

Length, Base Seat to Bulb Top (Excluding tip) . . . . . 1-1/2" ± 3/32"

Diameter . . . . . 0.650" to 0.750"

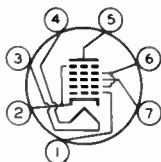
Dimensional Outline . . . . . See *General Section*

Bulb . . . . . T5-1/2

Base . . . . . Small-Button Miniature 7-Pin (JFDEC No.E7-1)

Basing Designation for BOTTOM VIEW . . . . . 7CH

- Pin 1 - Grid No.1
- Pin 2 - Cathode,  
Grid No.5
- Pin 3 - Heater
- Pin 4 - Heater



- Pin 5 - Plate
- Pin 6 - Grid No.2,  
Grid No.4
- Pin 7 - Grid No.3

← Indicates a change.



# 12AD6

## CONVERTER

### Maximum Ratings, Design-Maximum Values:

PLATE VOLTAGE . . . . .	16 max.	volts
GRID-No.3 (CONTROL-GRID) VOLTAGE:		
Negative-bias value . . . . .	16 max.	volts
Positive-bias value . . . . .	0 max.	volts
GRIDS-No.2 & No.4 (SCREEN-GRID) SUPPLY VOLTAGE . . . . .	16 max.	volts
GRIDS-No.2 & No.4 VOLTAGE . . . . .	16 max.	volts
TOTAL CATHODE CURRENT . . . . .	20 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	16 max.	volts
Heater positive with respect to cathode . . . . .	16 max.	volts

### Typical Operation and Characteristics:

With separate excitation<sup>b</sup> and with heater voltage of 12.6 volts

Plate Voltage . . . . .	10.6	12.6	14.6	volts
Grids-No.2 & No.4 voltage . . . . .	10.6	12.6	14.6	volts
Grid-No.3 Supply Voltage . . . . .	0	0	0	volts
Grid-No.3 Resistor . . . . .	2.2	2.2	2.2	megohms
Peak-to-Peak Grid-No.1 (Oscillator-Grid) Voltage . . . . .	4.5	4.5	4.5	volts
Grid-No.1 Resistor . . . . .	33000	33000	33000	ohms
Plate Resistance (Approx.) . . . . .	0.5	0.4	0.3	megohm
Conversion Transconductance . . . . .	-	320	-	μmhos
Grid-No.3 Voltage (Approx.) for conversion transconductance (μmhos) =				
5 . . . . .	-	-3	-	volts
0.5 . . . . .	-	-4	-	volts
Plate Current . . . . .	-	0.35	-	ma
Grid-No.1 Current . . . . .	-	0.05	-	ma
Total Cathode Current . . . . .	-	1.6	-	ma

### Oscillator Characteristics (Not Oscillating):

With grids No.2 & No.4 connected to plate  
and with heater voltage of 12.6 volts

Plate and Grids-No.2 & No.4 Voltage . . . . .	12.6	volts
Grid-No.3 Voltage . . . . .	0	volts
Grid-No.1 Voltage . . . . .	0	volts
Amplification Factor between grid No.1 and grids No.2 & No.4 connected to plate . . . . .	9.4	
Transconductance between grid No.1 and grids No.2 & No.4 connected to plate . . . . .	3600	μmhos
Cathode Current . . . . .	4.5	ma
Grid-No.1 voltage (Approx.) for plate $\mu_1 = 10$ . . . . .	-3.7	volts

### Maximum Circuit Values:

Grid-No.3-Circuit Resistance . . . . .	10 max.	megohms
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<sup>a</sup> with external shield JEDEC No.316 connected to cathode & grid No.5.

<sup>b</sup> The characteristics shown with separate excitation correspond very closely with those obtained in a self-excited oscillator circuit operating with zero bias.

→ Indicates a change.





12AE6-A

# 12AE6-A

## TWIN DIODE—MEDIUM-MU TRIODE

7-PIN MINIATURE TYPE

For use in automobile-radio receivers operating directly from 12-volt storage batteries

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathode:

Voltage range. . . . . 10 to 15.9 . . . . . dc volts

*This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.)

at 12.6 volts. . . . . 0.15 . . . . . amp

Direct Interelectrode Capacitances (Approx.):<sup>0</sup>

Triode grid to triode plate. . . . . 2  $\mu$ f

Triode grid to cathode and heater. . . . . 1.8  $\mu$ f

Triode plate to cathode and heater. . . . . 1.1  $\mu$ f

Plate of diode unit No.1 to plate of

diode unit No.2. . . . . 0.9  $\mu$ f

#### Characteristics, Class A<sub>1</sub> Amplifier (Triode Unit):

Heater Voltage . . . . . 12.6 12.6 volts

Plate Voltage. . . . . 12.6 12.6 volts

Grid Voltage . . . . . - 0 volts

Grid Resistor. . . . . 10 - megohms

Amplification Factor . . . . . 14.3 16.7

Plate Resistance (Approx.) . . . . . 20000 13000 ohms

Transconductance . . . . . 715 1300  $\mu$ mhos

Plate Current. . . . . 0.32 1 ma

#### Mechanical:

Operating Position . . . . . Any

Maximum Overall Length . . . . . 2-1/8"

Maximum Seated Length. . . . . 1-7/8"

Length, Base Seat to Bulb Top (Excluding tip). . . . . 1-1/2"  $\pm$  3/32"

Diameter . . . . . 0.650" to 0.750"

Dimensional Outline. . . . . See General Section

Bulb . . . . . T5-1/2

Base . . . . . Small-Button Miniature 7-Pin (JEDEC No. E7-1)

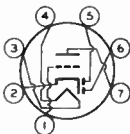
Basing Designation for BOTTOM VIEW . . . . . 7BT

Pin 1—Grid of Triode Unit

Pin 2—Cathode of Triode Unit and Diode Units No.1 and No.2

Pin 3—Heater

Pin 4—Heater



Pin 5—Plate of Diode Unit No.2

Pin 6—Plate of Diode Unit No.1

Pin 7—Plate of Triode Unit

<sup>0</sup>: without external shield.

12AE6-A



12AE6-A

## TWIN DIODE—MEDIUM-MU TRIODE

TRIODE UNIT — AMPLIFIER — Class A<sub>1</sub>

## Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	30 max.	volts
CATHODE CURRENT. . . . .	20 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	30 max.	volts
Heater positive with respect to cathode.	30 max.	volts

## Maximum Circuit Values:

Grid-Circuit Resistance. . . . .	10 max.	megohms
----------------------------------	---------	---------

## DIODE UNITS — Two

## Maximum Ratings, Design-Center Values:

Values are for Each Unit

PLATE CURRENT. . . . .	1 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	30 max.	volts
Heater positive with respect to cathode.	30 max.	volts

## Characteristics:

Heater Voltage . . . . .	12.6	volts
Plate Voltage. . . . .	10	volts
Plate Current. . . . .	2	ma



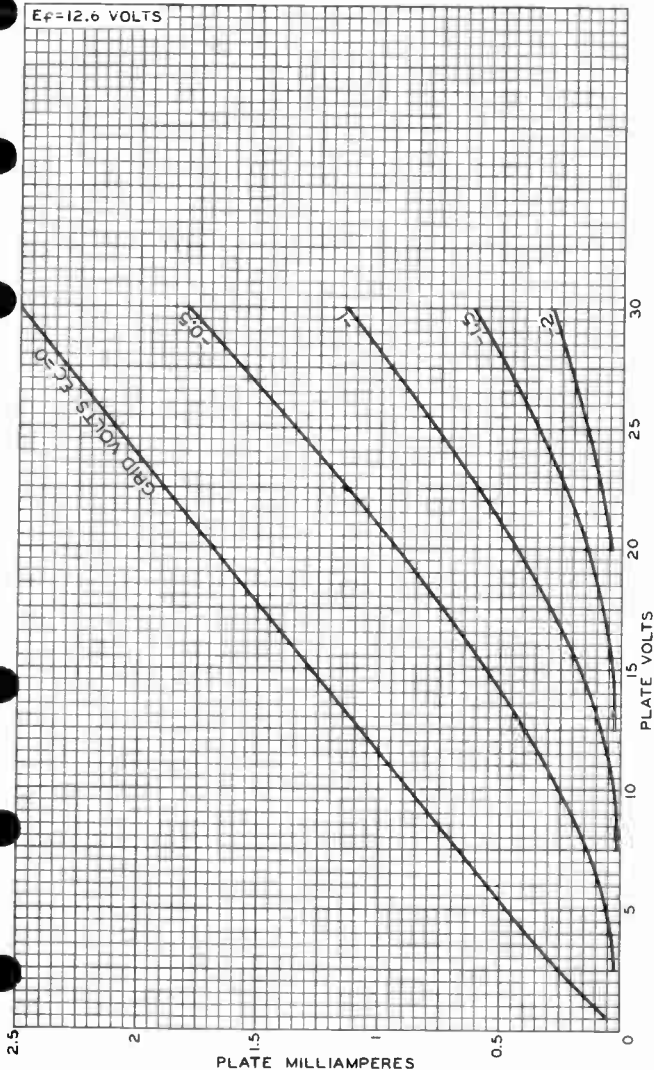


12AE6-A

12AE6-A

### AVERAGE PLATE CHARACTERISTICS TRIODE UNIT

$E_f = 12.6$  VOLTS



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9915

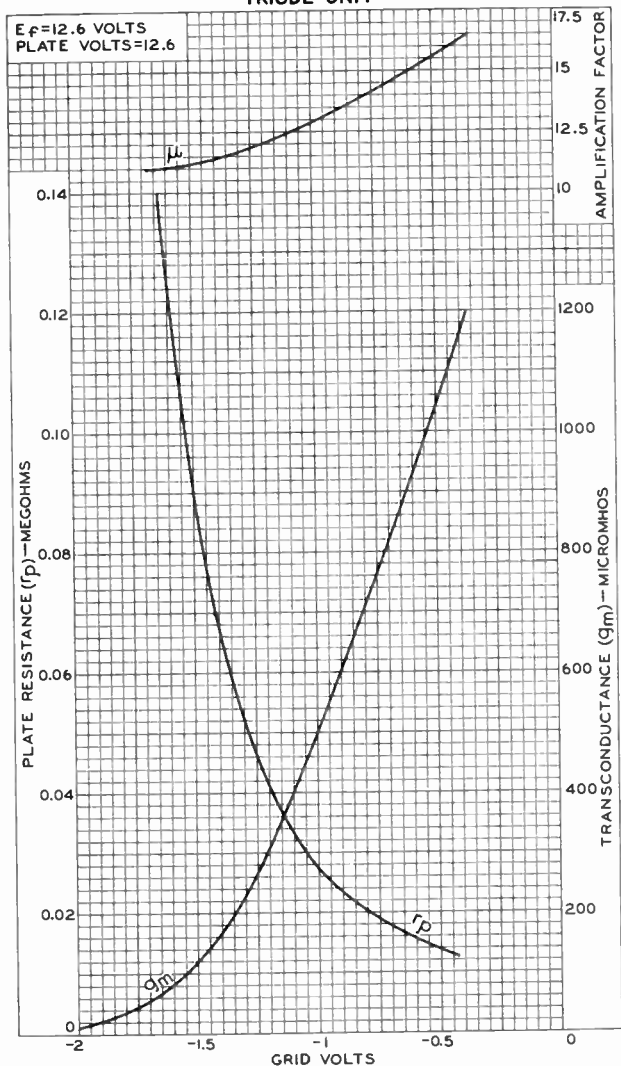
World Radio History

12AE6-A



12AE6-A

### AVERAGE CHARACTERISTICS TRIODE UNIT



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9916

World Radio History

## Dual Triode

### With Medium-Mu Unit and Low-Mu Unit

#### 9-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating  
Directly from 6-Cell Storage Batteries

#### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathodes:

Voltage range (DC) . . . . . 10 to 15.9 volts

*For longest life, it is recommended that the heater  
be operated within the voltage range of 11 to 14 volts.*

Current (Approx.) at 12.6 volts . . . . . 0.45 amp

Direct Interelectrode Capacitances (Approx.):

	Unit No. 1	Unit No. 2	
Grid to plate . . . . .	3.9	3.4	$\mu\mu\text{f}$
Grid to cathode and heater. . .	4.7	4.2	$\mu\mu\text{f}$
Plate to cathode and heater . .	0.75	0.85	$\mu\mu\text{f}$

#### Characteristics, Class A<sub>1</sub> Amplifier:

With heater voltage of 12.6 volts

	Unit No. 1	Unit No. 2	
Plate Voltage . . . . .	12.6	12.6	volts
Grid Resistor . . . . .	1.5	1	megohms
Amplification Factor. . . . .	13	6.4	
Plate Resistance (Approx.). . . .	3150	985	ohms
Transconductance. . . . .	4000	6500	$\mu\text{mhos}$
Plate Current . . . . .	1.9	7.5	ma

#### Mechanical:

Operating Position. . . . . Any

Maximum Overall Length. . . . . 2-3/16"

Maximum Seated Length. . . . . 1-15/16"

Length, Base Seat to Bulb Top (Excluding tip) . . . 1-9/16"  $\pm$  3/32"

Diameter. . . . . 0.750" to 0.875"

Dimensional Outline . . . . . See General Section

Bulb. . . . . T6-1/2

Base. . . . . Small-Button Noval 9-Pin (JEDEC No. E9-1)

Basing Designation for BOTTOM VIEW. . . . . 9A

Pin 1 - Plate of Unit No. 2      Pins 5 & 9 - Heater of Unit No. 1

Pin 2 - Grid of Unit No. 2      Pin 6 - Plate of Unit No. 1

Pin 3 - Cathode of Unit No. 2      Pin 7 - Grid of Unit No. 1

Pins 4 & 9 - Heater of Unit No. 2      Pin 8 - Cathode of Unit No. 1

Pin 9 - Heater Tap



# 12AE7

## AUDIO DRIVER

*Values are for Each Unit*

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . .	16 max.	volts
GRID VOLTAGE:		
Positive-bias value . . . . .	0 max.	volts
PLATE DISSIPATION . . . . .	1 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode .	16 max.	volts
Heater positive with respect to cathode .	16 max.	volts

### Maximum Circuit Values:

Grid-Circuit Resistance . . . . .	1.5 max.	megohms
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## Remote-Cutoff Pentode

## 7-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating  
Directly from 6-Cell Storage Batteries

## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathode:

Voltage range (DC) . . . . . 10 to 15.9 volts

*For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.) at 12.6 volts . . . . . 0.15 amp

Direct Interelectrode Capacitances:<sup>a</sup>

Grid No.1 to plate . . . . . 0.006 max.  $\mu\mu\text{f}$

Grid No.1 to cathode, grid No.3 &  
internal shield, grid No.2,  
and heater . . . . . 5.5  $\mu\mu\text{f}$

Plate to cathode, grid No.3 & internal  
shield, grid No.2, and heater . . . . . 4.8  $\mu\mu\text{f}$

Characteristics, Class A<sub>1</sub> Amplifier:

Heater Voltage . . . . . 12.6 volts

Plate Voltage . . . . . 12.6 volts

Grid No.3 . . . . . Connected to cathode at socket

Grid-No.2 Voltage . . . . . 12.6 volts

Grid-No.1 Supply Voltage . . . . . 0 volts

Grid-No.1 Resistor (Bypassed) . . . . . 2.2 megohms

Plate Resistance (Approx.) . . . . . 0.35 megohm

Transconductance . . . . . 1500  $\mu\text{mhos}$

Plate Current . . . . . 1.1 ma

Grid-No.2 Current . . . . . 0.45 ma

Grid-No.1 Voltage (Approx.) for  
transconductance ( $\mu\text{mhos}$ ) = 40 . . . . . -2.7 volts

Grid-No.1 Voltage (Approx.) for  
transconductance ( $\mu\text{mhos}$ ) = 10,  
grid-No.1 resistor = 0, and with  
grid No.1 connected to grid No.3 . . . . . -3.5 volts

## Mechanical:

Operating Position . . . . . Any

Maximum Overall Length . . . . . 2-1/8"

Maximum Seated Length . . . . . 1-7/8"

Length, Base Seat to Bulb Top (Excluding tip) . . . . . 1-1/2"  $\pm$  3/32"

Diameter . . . . . 0.650" to 0.750"

Dimensional Outline . . . . . See General Section

Bulb . . . . . T5-1/2

Base . . . . . Small-Button Miniature 7-Pin (JEDEC No. E7-1)

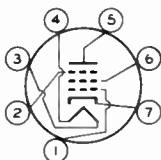
← Indicates a change.



# 12AF6

Basing Designation for BOTTOM VIEW. . . . . 7BK

Pin 1 - Grid No.1  
Pin 2 - Grid No.3,  
Internal  
Shield  
Pin 3 - Heater



Pin 4 - Heater  
Pin 5 - Plate  
Pin 6 - Grid No.2  
Pin 7 - Cathode

## AMPLIFIER — Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . . 16 max. volts  
GRID No.3 (SUPPRESSOR GRID) . . .Connect to cathode at socket  
GRID-No.2 (SCREEN-GRID) VOLTAGE . . . . . 16 max. volts  
GRID-No.1 (CONTROL-GRID) VOLTAGE:  
Positive-bias value . . . . . 0 max. volts  
PEAK HEATER-CATHODE VOLTAGE:  
Heater negative with respect to cathode . 16 max. volts  
Heater positive with respect to cathode . 16 max. volts

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance. . . . . 2.2 max. megohms

<sup>a</sup> without external shield.





12AH7-GT

# 12AH7-GT

## MEDIUM-MU TWIN TRIODE

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathodes:

Voltage . . . . .	12.6 . . . . .	ac or dc volts
Current . . . . .	0.15 . . . . .	amp

Direct Interelectrode Capacitances (Approx.):<sup>0</sup>

	Unit No. 1	Unit No. 2	
Grid to plate . . . . .	3	2.2	$\mu\text{f}$
Grid to cathode and heater . . . . .	2.0	3.2	$\mu\text{f}$
Plate to cathode and heater . . . . .	2.6	3	$\mu\text{f}$
Plate of unit No.1 to plate of unit No.2 . . . . .		0.4	$\mu\text{f}$
Grid of unit No.1 to grid of unit No.2 . . . . .		0.06	$\mu\text{f}$

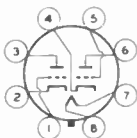
#### Characteristics, Class A<sub>1</sub> Amplifier (Each unit):

Plate Voltage . . . . .	100	180	volts
Grid Voltage . . . . .	-3.6	-6.5	volts
Amplification Factor . . . . .	16	16	
Plate Resistance (Approx.) . . . . .	10300	8400	ohms
Transconductance . . . . .	1550	1900	$\mu\text{mhos}$
Plate Current . . . . .	3.7	7.6	ma
Grid Voltage (Approx.) for plate current of 10 $\mu\text{amp}$ . . . . .	-8.5	-16	volts

#### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	3-1/16"
Maximum Seated Length . . . . .	2-1/2"
Maximum Diameter . . . . .	1-9/32" ←
Dimensional Outline . . . . .	See General Section ←
Bulb . . . . .	T-9
Base . . . . .	Intermediate-Shell Octal 8-Pin (JETEC No. B8-6) ←
Basing Designation for BOTTOM VIEW . . . . .	8BE

- Pin 1 - Grid of Unit No. 2
- Pin 2 - Cathode of Unit No. 2
- Pin 3 - Plate of Unit No. 2
- Pin 4 - Cathode of Unit No. 1



- Pin 5 - Grid of Unit No. 1
- Pin 6 - Plate of Unit No. 1
- Pin 7 - Heater
- Pin 8 - Heater

<sup>0</sup> with external shield JETEC No. 308 connected to cathode of unit under test.

← Indicates a change.

12AH7-GT



# 12AH7-GT MEDIUM-MU TWIN TRIODE

## AMPLIFIER - Class A<sub>1</sub>

*Values are for Each Unit*

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	180 max.	volts
PLATE-SUPPLY VOLTAGE . . . . .	300 max.	volts
PLATE DISSIPATION. . . . .	1.5 max.	watts
→ PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	200 max.	volts
Heater positive with respect to cathode.	200 <sup>▲</sup> max.	volts

▲ The dc component must not exceed 100 volts.

→ Indicates a change.





12AJ6

# 12AJ6

## TWIN DIODE—MEDIUM-MU TRIODE

7-PIN MINIATURE TYPE

For use in automobile radio receivers operating directly from 12-volt storage batteries

### GENERAL DATA

#### Electrical:

Heater<sup>•</sup>, for Unipotential Cathode:

Voltage range. . . . . 10.0 to 15.9 . . . . . dc volts

*This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.)

at 12.6 volts. . . . . 0.15 . . . . . amp

Direct Interelectrode Capacitances (Approx.):<sup>o</sup>

Triode grid to triode plate. . . . . 2  $\mu\mu\text{f}$

Triode grid to cathode and heater. . . . . 2.2  $\mu\mu\text{f}$

Triode plate to cathode and heater. . . . . 0.8  $\mu\mu\text{f}$

Plate of diode unit No.1 to plate of diode unit No.2. . . . . 0.9  $\mu\mu\text{f}$

#### Mechanical:

Operating Position . . . . . Any

Maximum Overall Length . . . . . 2-1/8"

Maximum Seated Length. . . . . 1-7/8"

Length, Base Seat to Bulb Top (Excluding tip). 1-1/2"  $\pm$  3/32"

Maximum Diameter . . . . . 3/4"

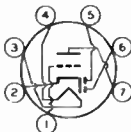
Dimensional Outline. . . . . See General Section

Bulb . . . . . T5-1/2

Base . . . . . Small-Button Miniature 7-Pin (JETEC No.E7-1)

Basing Designation for BOTTOM VIEW . . . . . 7BT

- Pin 1—Triode Grid
- Pin 2—Cathode
- Pin 3—Heater
- Pin 4—Heater
- Pin 5—Plate of Diode Unit No.2



- Pin 6—Plate of Diode Unit No.1
- Pin 7—Triode Plate

### TRIODE UNIT — AMPLIFIER — Class A<sub>1</sub>

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

PLATE VOLTAGE. . . . . 30 max. volts

CATHODE CURRENT. . . . . 20 max. ma

#### PEAK HEATER—CATHODE VOLTAGE:

Heater negative with respect to cathode. 30 max. volts

Heater positive with respect to cathode. 30 max. volts

#### Characteristics with 12.6 Volts on Heater:

Plate Voltage. . . . . 12.6 volts

Grid Voltage . . . . . 0 volts

Amplification Factor . . . . . 55

<sup>•</sup>, <sup>o</sup>: see next page.

12AJ6



12AJ6

## TWIN DIODE—MEDIUM-MU TRIODE

Plate Resistance (Approx.) . . . . .	45000	ohms
Transconductance . . . . .	1200	$\mu$ mhos
Plate Current . . . . .	750	$\mu$ a

**Typical Operation as Resistance-Coupled Amplifier  
with 12.6 Volts on Heater:**

Plate-Supply Voltage . . . . .	12.6	volts
Grid Voltage . . . . .	0	volts
Plate Load Resistor . . . . .	1	megohm
Grid Resistor . . . . .	1	megohm
Grid Resistor of Following Stage . . . . .	2	megohms
Input Capacitor . . . . .	0.02	$\mu$ f
Output Capacitor . . . . .	0.01	$\mu$ f
Voltage Gain at 400 cps with RMS output volts = 1 . . . . .	16	

**Maximum Circuit Values:**

Grid-Circuit Resistance . . . . .	10 max.	megohms
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**DIODE UNITS — Two**
**Maximum Ratings, Design-Center Values:**
*Values are for Each Unit*

PLATE CURRENT . . . . .	1 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	30 max.	volts
Heater positive with respect to cathode.	30 max.	volts

**Characteristics with 12.6 Volts on Heater:**

Plate Current for plate volts = 10 . . . . .	2	ma
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- Operation of heater in series with other heaters is not recommended.
- without external shield.

**OPERATING CONSIDERATIONS**

The maximum ratings in the tabulated data for the 12AJ6 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:

In the case of storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. This fluctuation imposes severe operating conditions on tubes. Under these conditions, the equipment should be designed so that 90 per cent of the design-center maximum value of plate voltage is never exceeded for a battery-terminal potential of 13.2 volts. Although the operating voltages of the 12AJ6 in this service will, at times, exceed the design-center maximum values, satisfactory performance with probable sacrifice in life will be obtained.



12AV7

MEDIUM-MU TWIN TRIODE

9-PIN MINIATURE TYPE

12AV7

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Heater Arrangement	Series	Parallel	
Voltage . . . . .	12.6	6.3	ac or dc volts
Current . . . . .	0.225	0.45	amp

Direct Interelectrode Capacitances:

Unit No. 1 Unit No. 2

Without external shield:

Grid to plate . . . . .	1.9	1.9	μf
Grid to cathode and heater.	3.1	3.1	μf
Plate to cathode. . . . .	0.24	0.24	μf
Plate to cathode and heater	0.5	0.4	μf
Plate to grid and heater. . .	2	2	μf
Cathode to grid and heater.	6.9	6.9	μf
Cathode to heater . . . . .	3.8	3.8	μf

With external shield, JETEC No.315, connected to cathode, except as noted:

Grid to plate . . . . .	1.9	1.9	μf
Grid to cathode and heater.	3.2	3.2	μf
Plate to cathode. . . . .	0.24	0.23	μf
Plate to cathode and heater	1.3	1.6	μf
Plate to grid, heater, and external shield . . . . .	2.8	3.2	μf
Cathode to grid, heater, and external shield . . . . .	7	7	μf
Heater to cathode . . . . .	4	4	μf

Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	2-3/16"
Maximum Seated Length . . . . .	1-15/16"
Maximum Diameter . . . . .	7/8"
Bulb . . . . .	T-6-1/2
Base . . . . .	Small-Button Noval 9-Pin (JETEC No.E9-1)

Basing Designation for BOTTOM VIEW . . . . . 9A

Pin 1 - Plate of Unit No.2	Pin 6 - Plate of Unit No.1
Pin 2 - Grid of Unit No.2	Pin 7 - Grid of Unit No.1
Pin 3 - Cathode of Unit No.2	Pin 8 - Cathode of Unit No.1
Pins 4,9 - Heater of Unit No.2	Pin 9 - Heater Mid-Tap
Pins 5,9 - Heater of Unit No.1	



12AV7



12AV7

## MEDIUM-MU TWIN TRIODE

### AMPLIFIER - Class A<sub>1</sub>

Values are for Each Unit

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

PLATE VOLTAGE . . . . .	300 max.	volts
GRID VOLTAGE:		
Negative bias value . . . . .	-50 max.	volts
PLATE DISSIPATION . . . . .	2.7 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 and Characteristics:

Plate Supply Voltage . . . . .	100	150	volts
Cathode-Bias Resistor . . . . .	120	56	ohms
Amplification Factor . . . . .	37	41	
Plate Resistance . . . . .	6100	4800	ohms
Transconductance . . . . .	6100	8500	$\mu$ mhos
Plate Current . . . . .	9	18	ma
Grid Voltage (Approx.) for plate current of 10 $\mu$ amp . . . . .	-9	-12	volts



12BL6

12BL6

# REMOTE-CUTOFF PENTODE

7-PIN MINIATURE TYPE

For use in automobile radio receivers operating directly from 12-volt storage batteries

## GENERAL DATA

### Electrical:

Heater<sup>o</sup>, for Unipotential Cathode:

Voltage range. . . . . 10.0 to 15.9 . . . . . dc volts

*This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.)

at 12.6 volts. . . . . 0.15 . . . . . amp

Direct Interelectrode Capacitances:<sup>o</sup>

Grid No.1 to plate . . . . . 0.006 max.  $\mu$ f

Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater. . . . . 5.5  $\mu$ f

Plate to cathode, grid No.3 & internal shield, grid No.2, and heater. . . . . 4.8  $\mu$ f

### Mechanical:

Operating Position . . . . . Any

Maximum Overall Length . . . . . 2-1/8"

Maximum Seated Length. . . . . 1-7/8"

Length, Base Seat to Bulb Top (Excluding tip). . . . . 1-1/2"  $\pm$  3/32"

Maximum Diameter . . . . . 3/4"

Dimensional Outline. . . . . See General Section

Bulb . . . . . T5-1/2

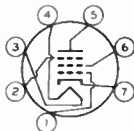
Base . . . . . Small-Button Miniature 7-Pin (JETEC No. E7-1)

Basing Designation for BOTTOM VIEW . . . . . 7BK

Pin 1-Grid No.1

Pin 2-Grid No.3,  
Internal  
Shield

Pin 3-Heater



Pin 4-Heater

Pin 5-Plate

Pin 6-Grid No.2

Pin 7-Cathode

## AMPLIFIER — Class A<sub>1</sub>

Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . . 30 max. volts

GRID-No.2 (SCREEN-GRID) VOLTAGE. . . . . 30 max. volts

GRID-No.1 (CONTROL-GRID) VOLTAGE:

Positive bias value. . . . . 0 max. volts

CATHODE CURRENT. . . . . 20 max. ma

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . . . . . 30 max. volts

Heater positive with respect to cathode . . . . . 30 max. volts

Characteristics with 12.6 Volts on Heater:

Plate Voltage. . . . . 12.6 volts

Grid-No.3 (Suppressor-Grid) Voltage. . . . . 0 volts

<sup>o</sup>, <sup>o</sup>: See next page.

12BL6



12BL6

## REMOTE-CUTOFF PENTODE

Grid-No.2 Voltage . . . . .	12.0	volts
Grid-No.1 Supply Voltage . . . . .	0	volts
Grid-No.1 Resistor (Bypassed) . . . . .	2.2	megohms
Plate Resistance (Approx.) . . . . .	0.5	megohm
Transconductance . . . . .	1750	μmhos
Plate Current . . . . .	1.35	ma
Grid-No.2 Current . . . . .	0.5	ma
Grid-No.1 Voltage (Approx.) for trans- conductance of 10 μmhos . . . . .	-6	volts
Grid-No.1 and Grid-No.2 Voltage (Approx.) for transconductance of 10 μmho . . . . .	-5	volts

**Maximum Circuit Values:**

Grid-No.1-Circuit Resistance . . . . . 10 max. megohms

- Operation of heater in series with other heaters is not recommended.
- With external shield JETEC No.316 connected to cathode.

**OPERATING CONSIDERATIONS**

The maximum ratings in the tabulated data for the 12BL6 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:

In the case of storage-battery-*with*-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. This fluctuation imposes severe operating conditions on tubes. Under these conditions, the equipment should be designed so that 90 per cent of the design-center maximum value of plate voltage and grid-No.2 voltage is never exceeded for a battery-terminal potential of 13.2 volts. Although the operating voltages of the 12BL6 in this service will, at times, exceed the design-center maximum values, satisfactory performance with probable sacrifice in life will be obtained.



12C8

12C8

## TWIN DIODE-REMOTE-CUTOFF PENTODE

Heater, for Unipotential Cathode:

Voltage . . . . . 12.6 . . . . . ac or dc volts

Current . . . . . 0.15 . . . . . amp

*The 12C8 is the same as the 6B8 except for heater rating.*







12CX6

12CX6

# SHARP-CUTOFF PENTODE

7-PIN MINIATURE TYPE

For use in automobile radio receivers operating directly from 12-volt storage batteries

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage range. . . . . 10 to 15.9 . . . . . dc volts  
*This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.)  
at 12.6 volts. . . . . 0.15 . . . . . amp

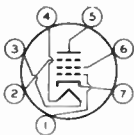
Direct Interelectrode Capacitances:<sup>o</sup>

Grid No.1 to plate . . . . . 0.05 max.  $\mu$ f  
Grid No.1 to cathode, grid No.3,  
grid No.2, and heater. . . . . 7.6  $\mu$ f  
Plate to cathode, grid No.3,  
grid No.2, and heater. . . . . 6.2  $\mu$ f

### Mechanical:

Operating Position . . . . . Any  
Maximum Overall Length . . . . . 2-1/8"  
Maximum Seated Length. . . . . 1-7/8"  
Length, Base Seat to Bulb Top (Excluding tip). . . 1-1/2"  $\pm$  3/32"  
Diameter . . . . . 0.650" to 0.750"  
Dimensional Outline. . . . . See General Section  
Bulb . . . . . T5-1/2  
Base . . . . . Small-Button Miniature 7-Pin (JEDEC No.E7-1)  
Basing Designation for BOTTOM VIEW . . . . . 7BK

Pin 1-Grid No.1  
Pin 2-Grid No.3  
Pin 3-Heater  
Pin 4-Heater



Pin 5-Plate  
Pin 6-Grid No.2  
Pin 7-Cathode

## AMPLIFIER — Class A<sub>1</sub>

### Maximum Ratings, Design-Maximum Values:

PLATE VOLTAGE. . . . . 33 max. volts  
GRID-No.2 (SCREEN-GRID) VOLTAGE. . . . . 33 max. volts  
GRID-No.1 (CONTROL-GRID) VOLTAGE:  
Positive-bias value. . . . . 0 max. volts  
PEAK HEATER-CATHODE VOLTAGE:  
Heater negative with respect to cathode. 30 max. volts  
Heater positive with respect to cathode. 30 max. volts

### Characteristics:

Heater Voltage . . . . . 12.6 volts  
Plate Voltage. . . . . 12.6 volts

<sup>o</sup> without external shield.

12CX6



12CX6

## SHARP-CUTOFF PENTODE

Grid-No.3 (Suppressor-Grid) Voltage . . .	0	volts
Grid-No.2 Voltage . . . . .	12.6	volts
Grid-No.1 Supply Voltage. . . . .	0	volts
Grid-No.1 Resistor (Bypassed) . . . . .	2.2	megohms
Plate Resistance (Approx.) . . . . .	40000	ohms
Transconductance. . . . .	3100	$\mu$ mhos
Plate Current . . . . .	3	ma
Grid-No.2 Current . . . . .	1.4	ma
Grid-No.1 Voltage (Approx.) for plate $\mu$ a = 10 . . . . .	-4.5	volts

**Maximum Circuit Values:**

Grid-No.1-Circuit Resistance. . . . .	10 max.	megohms
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# Diode—Remote-Cutoff Pentode

## 9-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating  
Directly from 6-Cell Storage Batteries

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathodes:

Voltage range . . . . . 10 to 15.9 volts

*For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.) at 12.6 volts . . . . . 0.2 amp

Direct Interelectrode Capacitances:▲

#### Pentode Unit:

Grid No.1 to plate . . . . . 0.006 max.  $\mu\mu\text{f}$

Grid No.1 to cathode, grid No.3  
& internal shield, grid No.2,  
and heater . . . . . 5.5  $\mu\mu\text{f}$

Plate to cathode, grid No.3  
& internal shield, grid No.2,  
and heater . . . . . 5.7  $\mu\mu\text{f}$

#### Diode Unit:

Plate to cathode, pentode grid No.3  
& internal shield, and heater . . . . . 3.7  $\mu\mu\text{f}$

Cathode to plate and heater . . . . . 5.7  $\mu\mu\text{f}$

Pentode grid No.1 to diode plate . . . . . 0.018 max.  $\mu\mu\text{f}$

Pentode plate to diode plate . . . . . 0.012 max.  $\mu\mu\text{f}$

Pentode grid No.1 to diode cathode . . . . . 0.13 max.  $\mu\mu\text{f}$

Pentode plate to diode cathode . . . . . 0.0016 max.  $\mu\mu\text{f}$

#### Characteristics, Class A<sub>1</sub> Amplifier (Pentode Unit):

Heater Voltage . . . . . 12.6 volts

Plate Voltage . . . . . 12.6 volts

Grid No.3 . . . . . Connected to cathode at socket

Grid-No.2 Voltage . . . . . 12.6 volts

Grid-No.1 Voltage:

Developed across a 2.2-megohm  
grid resistor . . . . . -0.8 volt

Plate Resistance (Approx.) . . . . . 0.3 megohm

Transconductance . . . . . 1500  $\mu\text{mhos}$

Plate Current . . . . . 1.3 ma

Grid-No.2 Current . . . . . 0.5 ma

Grid-No.1 Voltage (Approx.) for  
transconductance ( $\mu\text{mhos}$ ) = 10 . . . . . -6 volts

#### Mechanical:

Operating Position . . . . . Any

Maximum Overall Length . . . . . 2-3/16"

Maximum Seated Length . . . . . 1-15/16"

Length, Base Seat to Bulb Top (Excluding tip) . . . . . 1-9/16"  $\pm$  3/32"

Diameter . . . . . 0.750" to 0.875"

Dimensional Outline . . . . . See General Section



# 12DE8

Bulb. . . . . T6-1/2  
Base. . . . . Small-Button Noval 9-Pin (JEDEC No. E9-1)  
Basing Designation for BOTTOM VIFW. . . . . 9HG

Pin 1 - Pentode  
Grid No.1  
Pin 2 - Diode Cathode  
Pin 3 - Diode Plate  
Pin 4 - Heater  
Pin 5 - Heater  
Pin 6 - Pentode Plate



Pin 7 - Pentode  
Grid No.3,  
Internal  
Shield  
Pin 8 - Pentode  
Grid No.2  
Pin 9 - Pentode Cathode

## PENTODE UNIT — AMPLIFIER — Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . . 30 max. volts  
GRID No.3 (SUPPRESSOR GRID) . . . . . *Connect to cathode at socket*  
GRID-No.2 (SCREEN-GRID) VOLTAGE . . . . . 30 max. volts  
CATHODE CURRENT . . . . . 20 max. ma  
PEAK HEATER-CATHODE VOLTAGE:  
Heater negative with respect to cathode. 30 max. volts  
Heater positive with respect to cathode. 30 max. volts

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance. . . . . 10 max. megohms

## DIODE UNIT

### Maximum Ratings, Design-Center Values:

PLATE CURRENT . . . . . 5 max. ma

### Characteristics, Instantaneous Test Condition:

Plate Current for plate volts = 5 . . . . . 20 ma

▲ without external shield.



# Twin Diode—Power Tetrode

## 9-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating  
Directly from 6-Cell Storage Batteries

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathode:

Voltage range (DC) . . . . .	10 to 15.9	volts
<i>For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.</i>		
Current (Approx.) at 12.6 volts . . . . .	0.5	amp

#### Characteristics, Class A<sub>1</sub> Amplifier (Tetrode Unit):

Heater Voltage . . . . .	12.6	volts
Plate Voltage . . . . .	12.6	volts
Grid-No.2 Voltage . . . . .	12.6	volts
Grid-No.1 Resistor (Bypassed) . . . . .	2.2	megohms
Plate Resistance (Approx.) . . . . .	4000	ohms
Transconductance . . . . .	5000	μmhos
Plate Current . . . . .	6	ma
Grid-No.2 Current . . . . .	1	ma

#### Mechanical:

Operating Position . . . . .	Any
Maximum Overall Length . . . . .	2-5/8"
Maximum Seated Length . . . . .	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip) . . . . .	2" ± 3/32"
Diameter . . . . .	0.750" to 0.875"
Dimensional Outline . . . . .	See General Section
Bulb . . . . .	T6-1/2
Base . . . . .	Small-Button Noval 9-Pin (JEDEC No. E9-1)
Basing Designation for BOTTOM VIEW . . . . .	9HZ

Pin 1—Tetrode  
Grid No.1

Pin 2—Cathode

Pin 3—Tetrode  
Grid No.2

Pin 4—Heater

Pin 5—Heater



Pin 6—Diode-No.2  
Plate

Pin 7—Tetrode Plate

Pin 8—Internal Con-  
nection—  
Do Not Use

Pin 9—Diode-No.1  
Plate

### TETRODE UNIT — AMPLIFIER — Class A<sub>1</sub>

Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . .	30 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE . . . . .	30 max.	volts
PLATE CURRENT . . . . .	10 max.	ma
PLATE DISSIPATION . . . . .	0.5 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	30 max.	volts
Heater positive with respect to cathode.	30 max.	volts



# 12DK7

## Typical Operation:

Heater Voltage . . . . .	12.6	volts
Plate Voltage . . . . .	12.6	volts
Grid-No.2 Voltage . . . . .	12.6	volts
Grid-No.1 Voltage . . . . .	<i>Obtained by rectification through 15-megohm grid-No.1 resistor</i>	
Peak AF Grid-No.1 Voltage from 0.2-megohm signal source . . . . .	1.4	volts
Zero-Signal Plate Current . . . . .	6	ma
Max.-Signal Plate Current . . . . .	2.5	ma
Load Resistance . . . . .	3500	ohms
Total Harmonic Distortion . . . . .	10	%
Max.-Signal Power Output . . . . .	10	mw

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	15 max.	megohms
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## DIODE UNITS — Two

*Values are for Each Unit*

## Characteristics, Instantaneous Test Condition:

Heater Voltage . . . . .	12.6	volts
Plate Current for plate volts = 10. . . . .	1	ma





12DL8

# 12DL8 TWIN DIODE—POWER TETRODE

4-PIN MINI DUM LIFE  
For use in automobile radio receivers  
operating directly from 12-volt storage batteries

## GENERAL DATA

### Electrical:

Heater<sup>•</sup> for filament cathodes:  
 Voltage range . . . . . 10.0 to 15.9 . . . . . volts  
*This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*  
 Current (Approx.) at  
 12.6 volts . . . . . 0.45 . . . . . amp

### Direct Interelectrode Capacitances:<sup>†</sup>

#### Tetrode Unit:

Grid No.2 to plate . . . . .	14	μf
Grid No.2 to cathode, grid No.1, and heater . . . . .	12	μf
Plate to cathode, grid No.1, and heater . . . . .	1.3	μf

#### Diode Units:

Diode plate No.1 to diode cathode and heater . . . . .	1.6	μf
Diode plate No.2 to diode cathode and heater . . . . .	1.6	μf
Diode plate No.1 to diode plate No.2 . . . . .	0.03	μf
Tetrode grid No.2 to diode plate No.1 . .	0.02 max.	μf
Tetrode grid No.2 to diode plate No.2 . .	0.006 max.	μf

### Characteristics, Class A<sub>1</sub> Amplifier with 12.6 Volts on Heater (Tetrode Unit):

Plate Voltage . . . . .	12.6	volts
Grid-No.2 (Control-Grid) Voltage: Developed across a 2.2-megohm resistor . . . . .	-0.5	volt
Grid-No.1 (Space-Charge-Grid) Voltage . . . . .	12.6	volts
Plate Resistance (Approx.) . . . . .	480	ohms
Amplification Factor, Grid No.2 to Plate . . . . .	7.2	
Transconductance, Grid No.2 to Plate . .	15000	μmhos
Plate Current . . . . .	40	ma
Grid-No.1 Current . . . . .	75	ma

### Mechanical:

Operating Position . . . . .	Any
Maximum Overall Length . . . . .	2-5/8"
Maximum Seated Length . . . . .	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip) . . . . .	2" ± 3/32"
Maximum Diameter . . . . .	7/8"
Dimensional Outline . . . . .	See General Section
Bulb . . . . .	T6-1/2

<sup>•</sup>, <sup>†</sup>: See next page.

12DL8



12DL8

## TWIN DIODE—POWER TETRODE

Small-Button Novol 9 Pin (JETFEC No. F9-1)  
 Binding Designation for BOTTOM VIFA . . . . . 9HP

Pin 1—Plate of Diode Unit No. 2

Pin 2—Cathode of Tetrode Unit

Pin 3—Grid No. 1 of Tetrode Unit

Pin 4—Heater

Pin 5—Heater



Pin 6—Plate of Tetrode Unit

Pin 7—Grid No. 2 of Tetrode Unit

Pin 8—Cathode of Diode Units

Pin 9—Plate of Diode Unit No. 1

## TETRODE UNIT — AUDIO DRIVER

**Maximum Ratings, Design-Center Values Except as Noted:**

PLATE VOLTAGE . . . . .	30 max.	volts
GRID-NO. 2 (CONTROL GRID) VOLTAGE:		
Negative bias value . . . . .	-20 max.	volts
GRID-NO. 1 (SPACE-CHARGE-GRID) VOLTAGE		
(Absolute maximum) . . . . .	15 <sup>■</sup> max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	30 max.	volts
Heater positive with respect to cathode . . . . .	30 max.	volts

**Typical Operation with 12.6 Volts on Heater:**

Plate Voltage . . . . .	12.6	volts
Grid-No. 2 Voltage:		
Obtained by rectification through 2.2-megohm resistor . . . . .	-2	volts
Peak AF Grid No. 2 Voltage:		
Obtained from 100000-ohm source . . . . .	2.5	volts
Grid-No. 1 Voltage . . . . .	12.6	volts
Zero-Signal Plate Current (Approx.) . . . . .	40	ma
Max.-Signal Plate Current . . . . .	8	ma
Grid-No. 1 Current . . . . .	75	ma
Load Resistance . . . . .	800	ohms
Total Harmonic Distortion . . . . .	10	%
Max.-Signal Power Output . . . . .	40	mw

**Maximum Circuit Values:**

Grid No. 2—Circuit Resistance . . . . .	10 max.	megohms
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**DIODE UNITS — Two**

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

*Values are for Each Unit*

PLATE CURRENT . . . . .	5 max.	ma
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•, °, ■: See next page.





12DL8

12DL8

# TWIN DIODE—POWER TETRODE

## PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . . . . .	30 max.	volts
Heater positive with respect to cathode . . . . .	30 max.	volts

## Characteristics with 12.6 Volts on Heater:

Plate Current for plate volts = 10. . . . . 3 ma

- Operation of heater in series with other heaters is not recommended.
- Without external shield.
- Under no circumstances should this absolute value be exceeded.

### OPERATING CONSIDERATIONS

The *maximum ratings* in the tabulated data for the 12DL8, except the rating for grid-No.1 (space-charge-grid) voltage, 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:

In the case of storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. This fluctuation imposes severe operating conditions on tubes. Under these conditions, the equipment should be designed so that 90 per cent of the design-center maximum value of plate voltage is never exceeded for a battery terminal potential of 13.2 volts. Although the operating voltages of the 12DL8 in this service will, at times, exceed the design-center maximum values, satisfactory performance with probable sacrifice in life will be obtained.

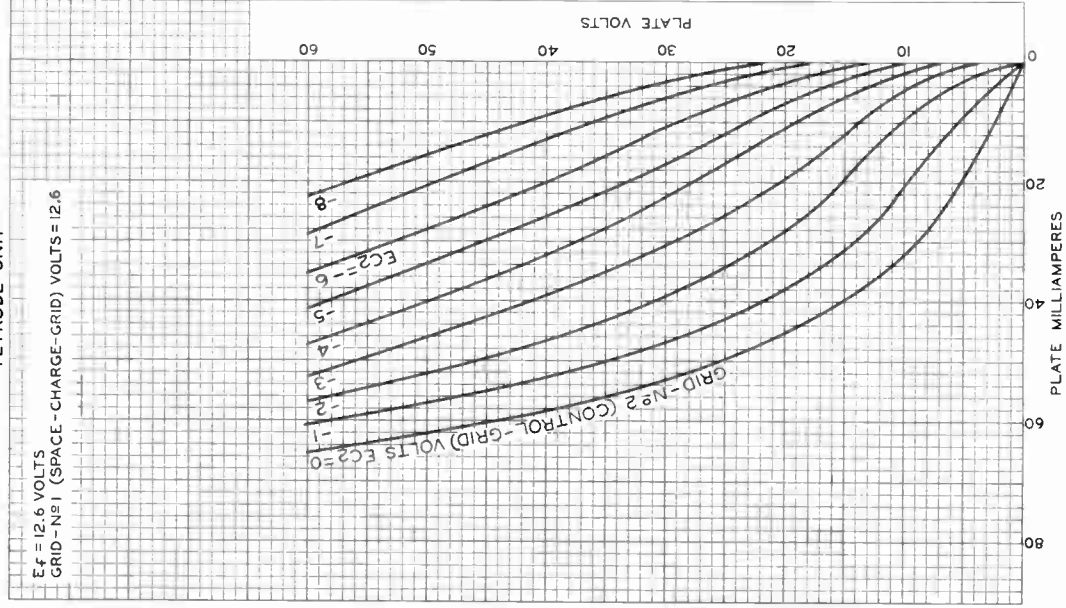
12DL8



12DL8

# AVERAGE PLATE CHARACTERISTICS TETRODE UNIT

$E_f = 12.6$  VOLTS  
 GRID - N<sup>o</sup> 1 (SPACE - CHARGE - GRID) VOLTS = 12.6



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92CM-9422



12DL8

# AVERAGE PLATE CHARACTERISTICS TETRODE UNIT

12DL8

$E_f = 12.6$  VOLTS  
GRID - No 2 (CONTROL-GRID) VOLTS = 0

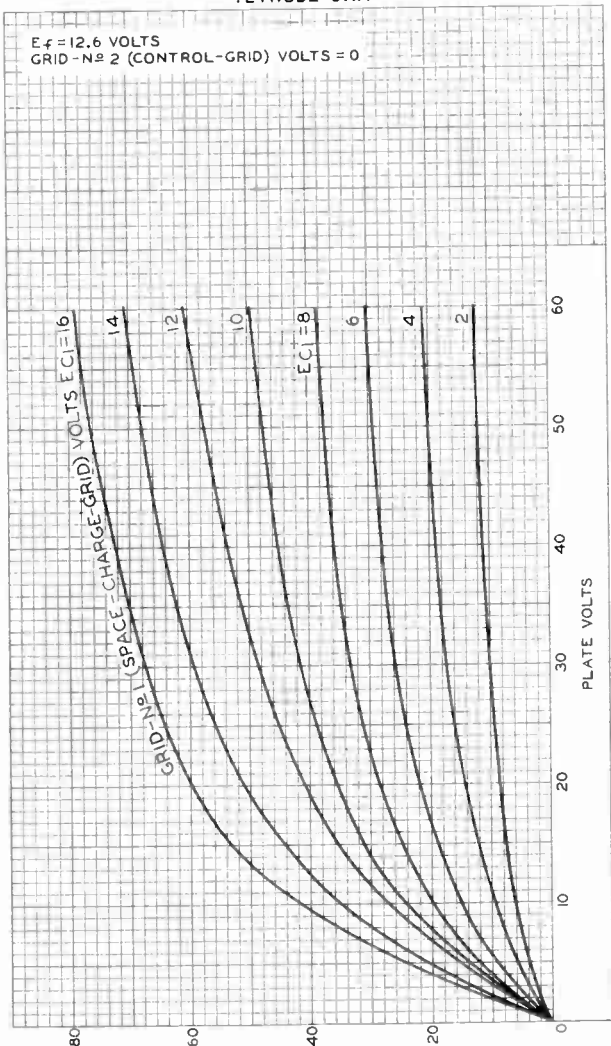


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World Radio History

92CM-9423





12DS7

# 12DS7

## TWIN DIODE-POWER TETRODE

9-PIN MINIATURE TYPE

For use in automobile radio receivers  
operating directly from 12-volt storage batteries

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathode:  
 Voltage range. . . . . 10 to 15.9 . . . . . dc volts  
*This voltage range is on an absolute basis. For long-est life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*  
 Current (Approx.) at  
 12.6 volts . . . . . 0.4 . . . . . amp

#### Direct Interelectrode Capacitances:<sup>0</sup>

##### Tetrode Unit:

Grid No.2 to plate . . . . .	12.5	$\mu\mu\text{f}$
Grid No.2 to cathode, grid No.1, and heater . . . . .	13	$\mu\mu\text{f}$
Plate to cathode, grid No.1, and heater.	2	$\mu\mu\text{f}$

##### Diode Units:

Diode plate No.1 to cathode and heater . . . . .	0.5	$\mu\mu\text{f}$
Diode plate No.2 to cathode and heater . . . . .	0.5	$\mu\mu\text{f}$
Diode plate No.1 to diode plate No.2 .	0.1	$\mu\mu\text{f}$
Tetrode grid No.2 to diode plate No.1. .	0.15 max.	$\mu\mu\text{f}$
Tetrode grid No.2 to diode plate No.2. .	0.15 max.	$\mu\mu\text{f}$

#### Characteristics, Class A<sub>1</sub> Amplifier (Tetrode Unit):

Heater Voltage . . . . .	12.6	volts
Plate Voltage. . . . .	12.6	volts
Grid-No.2 (Control-Grid) Voltage: Developed across a 2.2-megohm resistor .	-0.5	volt
Grid-No.1 (Space-Charge-Grid) Voltage. . .	12.6	volts
Plate Resistance (Approx.) . . . . .	480	ohms
Amplification Factor, Grid No.2 to Plate .	7.2	
Transconductance, Grid No.2 to Plate . . .	15000	$\mu\text{mhos}$
Plate Current. . . . .	40	ma
Grid-No.1 Current. . . . .	75	ma

#### Mechanical:

Operating Position . . . . .	. . . . .	Any
Maximum Overall Length . . . . .	. . . . .	2-5/8"
Maximum Seated Length. . . . .	. . . . .	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip). . . . .	. . . . .	2" $\pm$ 3/32"
Diameter . . . . .	. . . . .	0.750" to 0.875"
Dimensional Outline. . . . .	. . . . .	See General Section
Bulb . . . . .	. . . . .	T6-1/2

<sup>0</sup>: See next page.

12DS7



12DS7

## TWIN DIODE—POWER TETRODE

Base . . . . . Small-Button Noval 9-Pin (JETEC No. E9-1)  
 Basing Designation for BOTTOM VIEW. . . . . 9JU

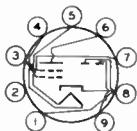
Pin 1—Plate of Diode  
 Unit No.2

Pin 2—No Connec-  
 tion

Pin 3—Grid No.1 of  
 Tetrode Unit

Pin 4—Heater

Pin 5—Heater



Pin 6—Plate of  
 Tetrode Unit

Pin 7—Grid No.2 of  
 Tetrode Unit

Pin 8—Cathode

Pin 9—Plate of Diode  
 Unit No.1

### TETRODE UNIT — AUDIO DRIVER

**Maximum Ratings, Design-Center Values Except as Noted:**

PLATE VOLTAGE . . . . .	16	max.	volts
GRID-No.2 (CONTROL-GRID) VOLTAGE: Negative-bias value . . . . .	-16	max.	volts
GRID-No.1 (SPACE-CHARGE-GRID) VOLTAGE (Absolute maximum). . . . .	16 <sup>o</sup>	max.	volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode . . . . .	16	max.	volts
Heater positive with respect to cathode . . . . .	16	max.	volts

### Typical Operation:

#### Cathode Bias

Heater Voltage. . . . .	12.6	volts
Plate-Supply Voltage. . . . .	12.6	volts
Plate Voltage . . . . .	Obtained from indicated plate supply through series 100-henry choke having dc resistance of 150 ohms	
Grid-No.1 Supply Voltage. . . . .	12.6	volts
Grid-No.2 Supply Voltage. . . . .	0	volts
Grid-No.2 Resistor. . . . .	1.8	megohms
Cathode Resistor. . . . .	18	ohms
Peak AF Grid-No.2 Supply Voltage (Approx.):		
From 3.3-megohm signal source. . . . .	2.85	volts
Zero-Signal Plate Current (Approx.) . . . . .	23	ma
Max.-Signal Plate Current . . . . .	13	ma
Grid-No.1 Current . . . . .	77	ma
Load Resistance . . . . .	1250	ohms
Total Harmonic Distortion . . . . .	8	%
Max.-Signal Power Output. . . . .	10	mw

#### Grid-No.2-Resistor Bias

Heater Voltage. . . . .	12.6	volts
Plate Voltage . . . . .	12.6	volts
Grid-No.1 Voltage . . . . .	12.6	volts

<sup>o</sup>, <sup>■</sup>: See next page.



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# TWIN DIODE-POWER TETRODE

## Grid-No.2 Voltage:

Obtained by rectification through a 2.2-megohm resistor. . . . .	-2	volts
Peak AF Grid-No.2 Voltage (Approx.): From 0.1-megohm signal source. . . . .	2.5	volts
Zero-Signal Plate Current (Approx.). . . . .	40	ma
Max.-Signal Plate Current. . . . .	8	ma
Grid-No.1 Current. . . . .	75	ma
Load Resistance. . . . .	800	ohms
Total Harmonic Distortion. . . . .	10	%
Max.-Signal Power Output . . . . .	40	mw

## Maximum Circuit Values:

Grid-No.2-Circuit Resistance . . . . .	10 max.	megohms
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## DIODE UNITS — Two

*Values are for Each Unit*

## Maximum Ratings, Design-Center Values:

PLATE CURRENT. . . . .	5 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. . . . .	16 max.	volts
Heater positive with respect to cathode. . . . .	16 max.	volts

## Characteristics:

Heater Voltage . . . . .	12.6	volts
Plate Current for plate volts = 10 . . . . .	3	ma

○ without external shield.

■ Under no circumstances should this absolute value be exceeded.

12DS7

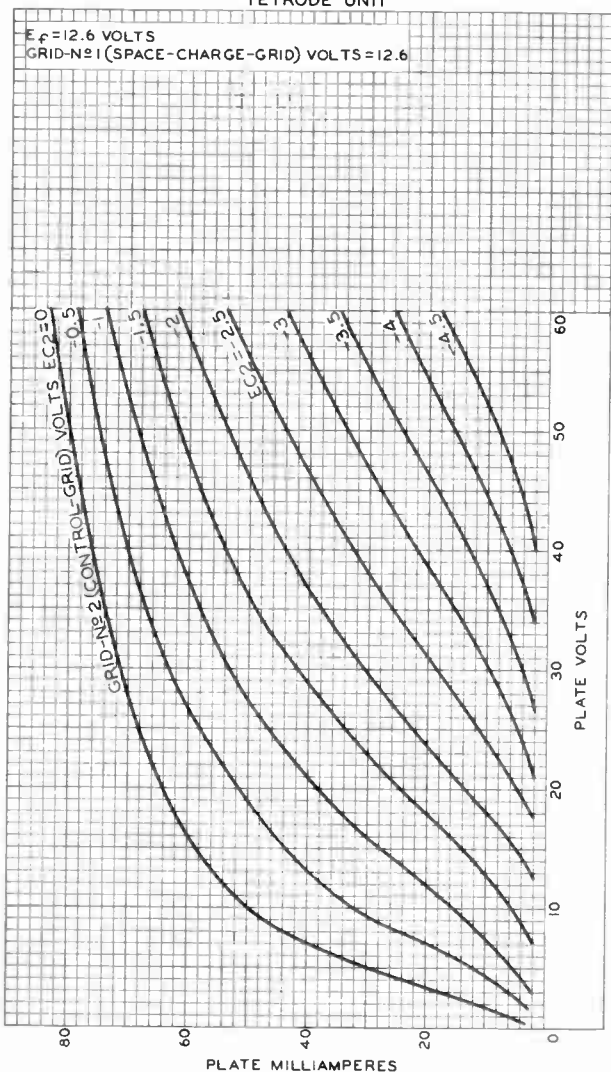


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# AVERAGE PLATE CHARACTERISTICS TETRODE UNIT

 $E_f = 12.6$  VOLTS

GRID-NO 1 (SPACE-CHARGE-GRID) VOLTS = 12.6



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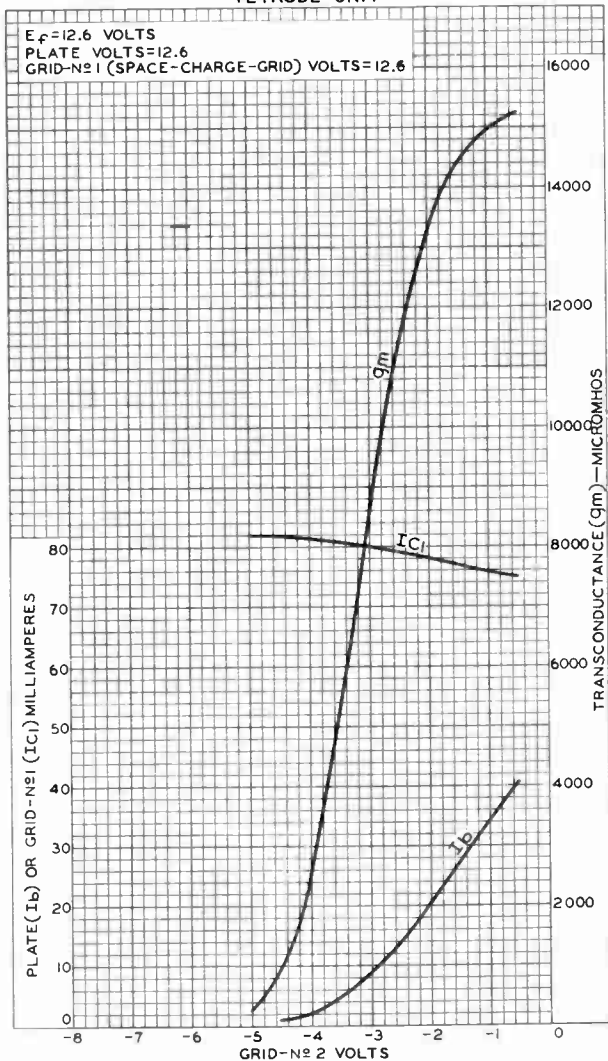




12DS7

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### AVERAGE CHARACTERISTICS TETRODE UNIT



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92CM-9671

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12DS7-A

# 12DS7-A TWIN DIODE-POWER TETRODE

9-PIN MINIATURE TYPE

For use in automobile radio receivers  
operating directly from 6-cell storage-battery systems

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage range (AC or DC) . . . . . 10 to 15.9 volts

*This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.) at 12.6 volts . . . . . 0.4 amp

Direct Interelectrode Capacitances:<sup>0</sup>

#### Tetrode Units:

Grid No.2 to plate. . . . . 13.8  $\mu$ f

Grid No.2 to grid No.1, cathode,  
and heater. . . . . 12.7  $\mu$ f

Plate to grid No.1, cathode,  
and heater. . . . . 2.2  $\mu$ f

#### Diode Units:

Diode plate No.1 to cathode  
and heater. . . . . 0.5  $\mu$ f

Diode plate No.2 to cathode  
and heater. . . . . 0.5  $\mu$ f

Diode plate No.1 to diode plate No.2 . . . . . 0.1  $\mu$ f

Tetrode grid No.2 to diode plate No.1 . . . . . 0.3  $\mu$ f

Tetrode grid No.2 to diode plate No.2 . . . . . 0.3  $\mu$ f

### Characteristics, Class A<sub>1</sub> Amplifier (Tetrode Unit):

Heater Voltage. . . . . 12.6 volts

Plate Voltage . . . . . 12.6 volts

Grid-No.2 Voltage:

Developed across a 2.2-megohm resistor. . . . . -0.5 volt

Grid-No.1 Voltage . . . . . 12.6 volts

Plate Resistance (Approx.) . . . . . 500 ohms

Amplification Factor, Grid No.2 to Plate. . . . . 9.1

Transconductance, Grid No.2 to Plate. . . . . 19000  $\mu$ mhos

Plate Current . . . . . 35 ma

Grid-No.1 Current . . . . . 75 ma

### Mechanical:

Operating Position. . . . . Any

Maximum Overall Length. . . . . 2-5/8"

Maximum Seated Length . . . . . 2-3/8"

Length, Base Seat to Bulb Top (Excluding tip) . . . . . 2"  $\pm$  3/32"

Diameter. . . . . 0.750" to 0.875"

Dimensional Outline . . . . . See General Section

Bulb. . . . . T6-1/2

Base. . . . . Small-Button Noval 9-Pin (JEDEC No.E9-1)



12DS7-A

## TWIN DIODE—POWER TETRODE

Basing Designation for BOTTOM VIEW. . . . . 9JU

Pin 1—Plate of Diode  
Unit No.2Pin 2—No Connec-  
tionPin 3—Grid No.1 of  
Tetrode Unit

Pin 4—Heater

Pin 5—Heater

Pin 6—Plate of  
Tetrode UnitPin 7—Grid No.2 of  
Tetrode Unit

Pin 8—Cathode

Pin 9—Plate of Diode  
Unit No.1

## TETRODE UNIT — AUDIO DRIVER

## Maximum Ratings, Design-Maximum Values:

PLATE VOLTAGE . . . . .	16 max.	volts
GRID-No.2 (CONTROL-GRID) VOLTAGE:		
Negative-bias value . . . . .	16 max.	volts
GRID-No.1 (SPACE-CHARGE-GRID) VOLTAGE . . . . .	16 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. . . . .	16 max.	volts
Heater positive with respect to cathode. . . . .	16 max.	volts

## Typical Operation:

## Cathode Bias

Heater Voltage. . . . .	12	volts
Plate Supply Voltage. . . . .	11.2	volts
Plate Voltage . . . . .	Obtained from indicated plate supply through series 100-henry choke having dc resistance of 150 ohms	
Grid-No.2 Supply Voltage. . . . .	0	volts
Grid-No.2 Resistor. . . . .	1.8	megohms
Grid-No.1 Supply Voltage. . . . .	11.2	volts
Cathode Resistor. . . . .	18	ohms
Peak AF Grid-No.2 Supply Voltage (Approx.):		
From 3.3-megohm signal source . . . . .	4.25	volts
Zero-Signal Plate Current (Approx.) . . . . .	20	ma
Indicated-Signal Plate Current. . . . .	7	ma
Grid-No.1 Current . . . . .	58	ma
Load Resistance . . . . .	1250	ohms
Total Harmonic Distortion at power output of 2.5 mw. . . . .	5	%
Indicated-Signal Power Output . . . . .	10	mw

## Grid-No.2-Resistor Bias

Heater Voltage. . . . .	12.6	volts
Plate Voltage . . . . .	12.6	volts
Grid-No.2 Voltage:		
Obtained by rectification through a 2.2-megohm resistor . . . . .	-2.5	volts



12DS7-A

12DS7-A

### TWIN DIODE-POWER TETRODE

Peak AF Grid-No.2 Voltage (Approx.):		
From 0.22-megohm signal source. . . . .	2.5	volts
Grid-No.1 Voltage . . . . .	12.6	volts
Zero-Signal Plate Current (Approx.) . . . . .	35	ma
Max.-Signal Plate Current . . . . .	11	ma
Grid-No.1 Current . . . . .	80	ma
Load Resistance . . . . .	700	ohms
Total Harmonic Distortion . . . . .	10	%
Max.-Signal Power Output. . . . .	45	mw

**Maximum Circuit Values:**

Grid-No.2-Circuit Resistance. . . . .	10 max.	megohms
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**DIODE UNITS — Two**

*Values are for Each Unit*

**Maximum Ratings, Design-Maximum Values:**

PLATE CURRENT . . . . .	5 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. . . . .	16 max.	volts
Heater positive with respect to cathode. . . . .	16 max.	volts

**Characteristics:**

Heater Voltage. . . . .	12.6	volts
Plate Current for plate volts = 10. . . . .	3	ma

<sup>o</sup> without external shield.

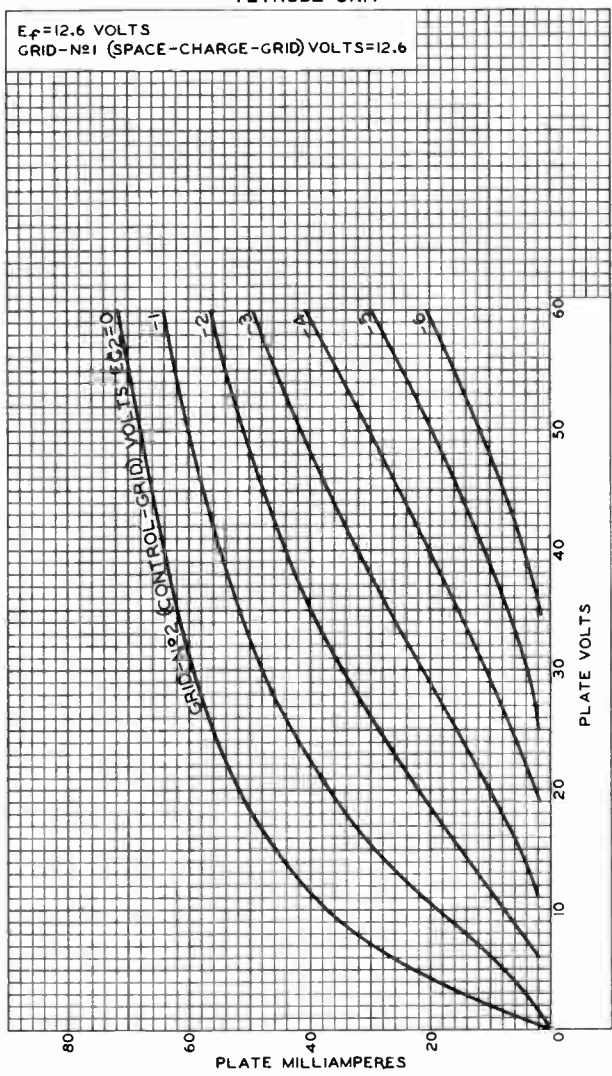
12DS7-A



12DS7-A

AVERAGE PLATE CHARACTERISTICS  
TETRODE UNIT

$E_f = 12.6$  VOLTS  
GRID-N $\circ$ 1 (SPACE-CHARGE-GRID) VOLTS = 12.6



ELECTRON TUBE DIVISION  
RADIO CORPORATION OF AMERICA, MARRISON, NEW JERSEY

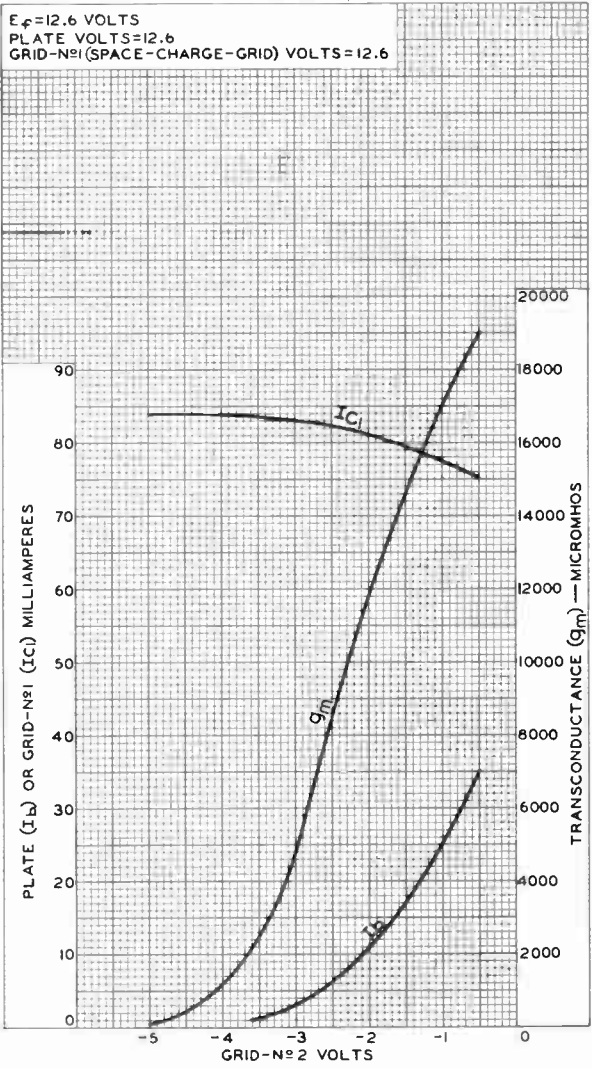
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12DS7-A

# 12DS7-A

## AVERAGE CHARACTERISTICS TETRODE UNIT



ELECTRON TUBE DIVISION

92CM-10134

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





## Twin Diode—Power Tetrode

## 9-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating  
Directly from 6-Cell Storage Batteries

## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathode:

Voltage range (DC) . . . . . 10 to 15.9 volts

*For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.) at 12.6 volts . . . . . 0.25 amp

Direct Interelectrode Capacitances.▲

*Tetrode Unit:*

Grid No.1 to plate . . . . . 0.6  $\mu\text{f}$

Grid No.1 to cathode, grid No.2,  
and heater . . . . . 11  $\mu\text{f}$

Plate to cathode, grid No.2,  
and heater . . . . . 3.6  $\mu\text{f}$

Tetrode grid No.1 to diode-No.1  
plate . . . . . 0.22 max.  $\mu\text{f}$

Tetrode grid No.1 to diode-No.2  
plate . . . . . 0.12 max.  $\mu\text{f}$

Characteristics, Class A<sub>1</sub> Amplifier (Tetrode Unit):

Heater Voltage . . . . . 12.6 volts

Plate Voltage . . . . . 12.6 volts

Grid-No.2 Voltage . . . . . 12.6 volts

Grid-No.1 Resistor (Bypassed) . . . . . 2.2 megohms

Plate Resistance (Approx.) . . . . . 6000 ohms

Transconductance . . . . . 6200  $\mu\text{mhos}$

Plate Current . . . . . 12 ma

Grid-No.2 Current . . . . . 1.5 ma

## Mechanical:

Operating Position . . . . . Any

Maximum Overall Length . . . . . 2-3/16"

Maximum Seated Length . . . . . 1-15/16"

Length, Base Seat to Bulb Top (Excluding tip) . . . . . 1-9/16"  $\pm$  3/32"

Diameter . . . . . 0.750" to 0.875"

Dimensional Outline . . . . . See *General Section*

Bulb . . . . . T6-1/2

Base . . . . . Small-Button Novair 9-Pin (JEDEC No.E9-1)

Basing Designation for BOTTOM VIEW . . . . . 9JX

Pin 1—Tetrode  
Grid No.1

Pin 2—Cathode

Pin 3—Tetrode  
Grid No.2

Pin 4—Heater

Pin 5—Heater

Pin 6—Tetrode Plate



Pin 7—Diode-No.2  
Plate

Pin 8—Internal Con-  
nection—  
Do Not Use

Pin 9—Diode-No.1  
Plate



# 12DU7

## TETRODE UNIT — AUDIO DRIVER

### Maximum Ratings, Design-Maximum Values:

PLATE VOLTAGE . . . . .	16 max.	volts
GRID-NO.2 (SCREEN-GRID) VOLTAGE . . . . .	16 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	16 max.	volts
Heater positive with respect to cathode . . . . .	16 max.	volts

### Typical Operation:

Heater Voltage . . . . .	12.6	volts
Plate Voltage . . . . .	12.6	volts
Grid-No.2 Voltage . . . . .	12.6	volts
Grid-No.1 Voltage . . . . .	<i>Obtained by rectification through 2.2-megohm grid-No.1 resistor</i>	
Peak AF Grid-No.1 Voltage . . . . .	2.2	volts
Load Resistance . . . . .	2700	ohms
Total Harmonic Distortion . . . . .	10	%
Max.-Signal Power Output . . . . .	25	mw

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	10 max.	megohms
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## DIODE UNITS — Two

*Values are for Each Unit*

### Maximum Ratings, Design-Maximum Values:

PLATE CURRENT . . . . .	1 max.	ma
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### Characteristics, Instantaneous Test Condition:

Heater Voltage . . . . .	12.6	volts
Plate Current for plate volts = 10. . . . .	1.3	ma

▲ without external shield.





12DV8

# 12DV8

## TWIN DIODE-POWER TETRODE

9-PIN MINIATURE TYPE

For use in automobile radio receivers operating directly from 6-cell storage-battery systems

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathodes:

Voltage range (DC) . . . . .	10 to 15.9	volts
<i>This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.</i>		

Current (Approx.) at 12.6 volts . . .	0.975	amp
---------------------------------------	-------	-----

Direct Interelectrode Capacitances:<sup>0</sup>

#### Tetrode Unit:

Grid No.2 to plate . . . . .	12	$\mu\mu\text{f}$
Grid No.2 to cathode, grid No.1, and heater . . . . .	9	$\mu\mu\text{f}$
Plate to cathode, grid No.1, and heater . . . . .	1	$\mu\mu\text{f}$

#### Diode Units:

Plate of unit No.1 to cathode & internal shield, and heater . . .	1.7	$\mu\mu\text{f}$
Plate of unit No.2 to cathode & internal shield, and heater . . .	1.6	$\mu\mu\text{f}$
Plate of unit No.1 to plate of unit No.2 . . . . .	0.1 max.	$\mu\mu\text{f}$
Tetrode grid No.2 to either diode plate . . . . .	0.015 max.	$\mu\mu\text{f}$

#### Characteristics, Class A<sub>1</sub> Amplifier (Tetrode Unit):

Heater Voltage . . . . .	12.6	volts
Plate Supply Voltage . . . . .	12.6	volts
Grid-No.2 (Control-grid) Resistor . . .	4.7	megohms
Grid-No.1 (Space-charge-grid) Supply Voltage . . . . .	12.6	volts
Cathode Resistor . . . . .	18	ohms
Plate Resistance (Approx.) . . . . .	900	ohms
Amplification Factor, Grid No.2 to Plate . . . . .	7.6	
Transconductance, Grid No.2 to Plate . .	8500	$\mu\text{mhos}$
Plate Current . . . . .	9	ma
Grid-No.1 Current . . . . .	53	ma

#### Mechanical:

Operating Position . . . . .	Any
Maximum Overall Length . . . . .	2-5/8"
Maximum Seated Length . . . . .	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip) . .	2" $\pm$ 3/32"
Diameter . . . . .	0.750" to 0.875"
Dimensional Outline . . . . .	See General Section
Bulb . . . . .	T6-1/2

<sup>0</sup> without external shield.

12DV8

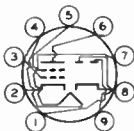


12DV8

## TWIN DIODE-POWER TETRODE

Base . . . . . Small-Button Noval 9-Pin (JEDEC No. E9-1)  
 Basing Designation for BOTTOM VIEW. . . . . 9HR

Pin 1 - Plate of Diode  
 Unit No.2  
 Pin 2 - Cathode of  
 Tetrode Unit  
 Pin 3 - Grid No.1 of  
 Tetrode Unit  
 Pin 4 - Heater  
 Pin 5 - Heater  
 Pin 6 - Plate of  
 Tetrode Unit



Pin 7 - Grid No.2 of  
 Tetrode Unit  
 Pin 8 - Cathode of  
 Diode Units  
 No.1 & No.2,  
 Internal  
 Shield  
 Pin 9 - Plate of Diode  
 Unit No.1

### TETRODE UNIT — AUDIO DRIVER

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

PLATE VOLTAGE . . . . .	16 max.	volts
GRID-No.2 (CONTROL-GRID) VOLTAGE:		
Negative-bias value . . . . .	16 max.	volts
GRID-No.1 (SPACE-CHARGE-GRID) VOLTAGE . . . . .	16 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. . . . .	16 max.	volts
Heater positive with respect to cathode. . . . .	16 max.	volts

#### Typical Operation:

Heater Voltage. . . . .	12.6	volts
Plate Supply Voltage. . . . .	12.6	volts
Grid-No.1 Supply Voltage. . . . .	12.6	volts
Grid-No.2 Resistor. . . . .	4.7	megohms
Cathode Resistor. . . . .	18	ohms
Peak AF Grid-No.2 Supply Voltage (Approx.):		
From 0.3-megohm signal source . . . . .	1.2	volts
Indicated-Signal Plate Current. . . . .	6.8	ma
Grid-No.1 Current . . . . .	54	ma
Load Resistance . . . . .	1250	ohms
Total Harmonic Distortion . . . . .	3	%
Indicated-Signal Power Output . . . . .	5	mW

#### Maximum Circuit Values:

Grid-No.2-Circuit Resistance. . . . .	10 max.	megohms
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### DIODE UNITS — Two

Values are for Each Unit

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

PLATE CURRENT . . . . .	5 max.	ma
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12DV8

12DV8

### TWIN DIODE-POWER TETRODE

**PEAK HEATER-CATHODE VOLTAGE:**

Heater negative with respect to cathode. . . . .	16 max.	volts
Heater positive with respect to cathode. . . . .	16 max.	volts

**Characteristics:**

Heater Voltage. . . . .	12.6	volts
Plate Current for plate volts = 10. . .	3	ma



## Medium-Mu Triode— Remote-Cutoff Tetrode

### 9-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating  
Directly from 6-Cell Storage Batteries

#### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathodes:

Voltage range (DC) . . . . . 10 to 15.9 volts

*For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.) at 12.6 volts . . . . . 0.35 amp

Direct Interelectrode Capacitances (Approx.):<sup>a</sup>

#### Triode Unit:

Grid to plate . . . . . 1.5  $\mu\text{f}$

Grid to cathode & internal shield,  
and heater. . . . . 2  $\mu\text{f}$

Plate to cathode & internal shield,  
and heater. . . . . 2  $\mu\text{f}$

#### Tetrode Unit:

Grid No.1 to plate. . . . . 0.74  $\mu\text{f}$

Grid No.1 to cathode, grid No.2,  
and heater. . . . . 11  $\mu\text{f}$

Plate to cathode, grid No.2,  
and heater. . . . . 3  $\mu\text{f}$

#### Characteristics, Class A<sub>1</sub> Amplifier:

*With heater voltage of 12.6 volts*

	Triode Unit	Tetrode Unit	
Plate Voltage . . . . .	12.6	12.6	volts
Grid-No.2 Voltage . . . . .	—	12.6	volts
Grid-No.1 Voltage . . . . .	0	—	volts
Grid-No.1 Resistor. . . . .	—	2.2	megohms
Amplification Factor. . . . .	20	—	
Plate Resistance (Approx.) . . . . .	10000	5000	ohms
Transconductance. . . . .	2000	6000	$\mu\text{mhos}$
Plate Current . . . . .	1.2	14	ma
Grid-No.2 Current . . . . .	—	2	ma
Grid Voltage (Approx.) for plate $\mu\text{a} = 10$ . . . . .	-2	—	volts
Grid-No.1 Voltage (Approx.) for plate $\mu\text{a} = 20$ . . . . .	—	-9	volts

#### Mechanical:

Operating Position. . . . . Any

Maximum Overall Length. . . . . 2-3/16"

Maximum Seated Length . . . . . 1-15/16"

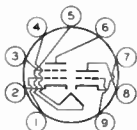
Length, Base Seat to Bulb Top (Excluding tip) . 1-9/16"  $\pm$  3/32"



# 12DY8

Diameter. . . . . 0.750" to 0.875"  
 Dimensional Outline . . . . . See *General Section*  
 Bulb. . . . . T6-1/2  
 Base. . . . . Small-Button Noval 9-Pin (JEDEC No. E9-1)  
 Basing Designation for BOTTOM VIEW. . . . . 9JD

Pin 1 - Tetrode  
 Grid No.1  
 Pin 2 - Tetrode  
 Cathode  
 Pin 3 - Tetrode  
 Grid No.2  
 Pin 4 - Heater  
 Pin 5 - Heater



Pin 6 - Tetrode  
 Plate  
 Pin 7 - Triode  
 Cathode,  
 Internal  
 Shield  
 Pin 8 - Triode  
 Plate  
 Pin 9 - Triode  
 Grid No.1

## TETRODE UNIT — RELAY-CONTROL SERVICE

### Maximum Ratings, Design-Maximum Values:

PLATE VOLTAGE . . . . . 16 max. volts  
 GRID-NO.2 (SCREEN-GRID) VOLTAGE . . . . . 16 max. volts  
 PEAK HEATER-CATHODE VOLTAGE:  
 Heater negative with respect to cathode . . 16 max. volts  
 Heater positive with respect to cathode . . 16 max. volts

### Typical Operation:

Heater Voltage. . . . . 10 15 volts  
 Plate Supply Voltage. . . . . 10 15 volts  
 Grid-No.2 Voltage . . . . . 10 15 volts  
 Grid-No.1 Voltage . . . . . - -6 volts  
 Grid-No.1 Resistor . . . . . 10 - megohms  
 Plate Load Resistor . . . . . 700 700 ohms  
 Plate Current . . . . . 5 min. 3 max. ma

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance. . . . . 10 max. megohms

## TRIODE UNIT — AMPLIFIER — Class A<sub>1</sub>

### Maximum Ratings, Design-Maximum Values:

PLATE VOLTAGE . . . . . 16 max. volts  
 PEAK HEATER-CATHODE VOLTAGE:  
 Heater negative with respect to cathode . . 16 max. volts  
 Heater positive with respect to cathode . . 16 max. volts

### Maximum Circuit Values:

Grid-Circuit Resistance . . . . . 10 max. megohms

<sup>a</sup> without external shield.







12EA6

# 12EA6

## SHARP-CUTOFF PENTODE

7-PIN MINIATURE TYPE

For use in automobile radio receivers operating directly from 6-cell storage-battery systems

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathode:

Voltage range (DC) . . . . .	10 to 15.9	volts
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*This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.) at 12.6 volts . . . . .	0.19	amp
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Direct Interelectrode Capacitances:<sup>0</sup>

Grid No.1 to plate. . . . .	0.04 max.	$\mu$ f
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater. . . . .	11	$\mu$ f
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater. . . . .	4	$\mu$ f

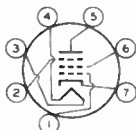
#### Characteristics, Class A<sub>1</sub> Amplifier:

Heater Voltage. . . . .	12.6	volts
Plate Voltage . . . . .	12.6	volts
Grid-No.3 Voltage . . . . .	0	volts
Grid-No.2 Voltage . . . . .	12.6	volts
Grid-No.1 Resistor (Bypassed) . . . . .	10	megohms
Plate Resistance (Approx.) . . . . .	32000	ohms
Transconductance. . . . .	3800	$\mu$ mhos
Plate Current . . . . .	3.2	ma
Grid-No.2 Current . . . . .	1.4	ma
Grid-No.1 Voltage (Approx.) for plate $\mu$ a = 10 . . . . .	-3.4	volts

#### Mechanical:

Operating Position. . . . .	Any
Maximum Overall Length. . . . .	2-1/8"
Maximum Seated Length. . . . .	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip). . . . .	1-1/2" $\pm$ 3/32"
Diameter. . . . .	0.650" to 0.750"
Dimensional Outline . . . . .	See General Section
Bulb. . . . .	T5-1/2
Base. . . . .	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW. . . . .	7BK

Pin 1 - Grid No.1  
 Pin 2 - Grid No.3,  
           Internal  
           Shield  
 Pin 3 - Heater



Pin 4 - Heater  
 Pin 5 - Plate  
 Pin 6 - Grid No.2  
 Pin 7 - Cathode

<sup>0</sup> without external shield.

12EA6



12EA6

## SHARP-CUTOFF PENTODE

AMPLIFIER — Class A<sub>1</sub>

## Maximum Ratings, Design-Maximum Values:

PLATE VOLTAGE . . . . .	16 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE . . . . .	16 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive-bias value . . . . .	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with		
respect to cathode. . . . .	16 max.	volts
Heater positive with		
respect to cathode. . . . .	16 max.	volts

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance. . . . .	12 max.	megohms
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# Medium-Mu Triode— Semiremote-Cutoff Pentode

## 9-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating  
Directly from 6-Cell Storage Batteries

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathodes:

Voltage range (DC) . . . . . 10 to 15.9 volts

*For longest life, it is recommended that the heater  
be operated within the voltage range of 11 to 14 volts.*

Current (Approx.) at 12.6 volts . . . . . 0.225 amp

Direct Interelectrode Capacitances:<sup>a</sup>

#### Triode Unit:

Grid to plate . . . . . 1.7  $\mu\text{f}$

Grid to cathode and heater . . . . . 2.6  $\mu\text{f}$

Plate to cathode and heater . . . . . 0.4  $\mu\text{f}$

#### Pentode Unit:

Grid No.1 to plate . . . . . 0.02 max.  $\mu\text{f}$

Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, and heater . . . . . 4.6  $\mu\text{f}$

Plate to cathode & grid No.3 & internal shield, grid No.2, and heater . . . . . 2.6  $\mu\text{f}$

Heater to cathode (Each unit) . . . . . 2.6  $\mu\text{f}$

#### Characteristics, Class A<sub>1</sub> Amplifier:

*With heater voltage of 12.6 volts*

	Triode Unit	Pentode Unit	
Plate Supply Voltage . . . . .	12.6	12.6	volts
Grid-No.2 Voltage . . . . .	—	12.6	volts
Grid-No.1 Supply Voltage . . . . .	0	0	volts
Grid-No.1 Resistor . . . . .	4700	33000	ohms
Amplification Factor . . . . .	25	—	
Plate Resistance (Approx.) . . . . .	6000	750000	ohms
Transconductance . . . . .	4700	2000	$\mu\text{mhos}$
Plate Current . . . . .	2.4	0.66	ma
Grid-No.2 Current . . . . .	—	0.28	ma
Grid-No.1 Voltage (Approx.) for plate $\mu\text{a} = 10$ . . . . .	-2.2	-1.6	volts

#### Mechanical:

Operating Position . . . . .	Any
Maximum Overall Length . . . . .	2-3/16"
Maximum Seated Length . . . . .	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip) . . . . .	1-9/16" $\pm$ 3/32"
Diameter . . . . .	0.750" to 0.875"
Dimensional Outline . . . . .	See <i>General Section</i>
Bulb . . . . .	T6-1/2
Base . . . . .	Small-Button Noval 9-Pin (JEDEC No. E9-1)



# 12EC8

Basing Designation for BOTTOM VIEW. . . . . 9FA

- Pin 1 - Triode Grid
- Pin 2 - Triode Plate
- Pin 3 - Triode Cathode
- Pin 4 - Heater
- Pin 5 - Heater
- Pin 6 - Pentode Plate
- Pin 7 - Pentode Grid No.2



- Pin 8 - Pentode Cathode, Grid No.3, Internal Shield
- Pin 9 - Pentode Grid No.1

## AMPLIFIER — Class A<sub>1</sub>

### Maximum Ratings, Design-Maximum Values:

	<i>Triode Unit</i>	<i>Pentode Unit</i>	
PLATE VOLTAGE. . . . .	16 max.	16 max.	volts
GRID-NO.2 (SCREEN-GRID) VOLTAGE. . . . .	—	16 max.	volts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode . . . . .	16 max.	16 max.	volts
Heater positive with respect to cathode . . . . .	16 max.	16 max.	volts

### Maximum Circuit Values:

	<i>Triode Unit</i>	<i>Pentode Unit</i>	
Grid-No.1-Circuit Resistance . . . . .	1 max.	1 max.	megohm

<sup>a</sup> without external shield.





12EG6

PENTAGRID AMPLIFIER

7-PIN MINIATURE TYPE

For use in automobile radio receivers operating directly from 12-volt storage batteries

12EG6

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage range. . . . . 10 to 15.9 . . . . . dc volts

This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.

Current (Approx.)

at 12.6 volts. . . . . 0.15 . . . . . amp

Direct Interelectrode Capacitances:<sup>0</sup>

Grid No.3 to all other electrodes

except plate . . . . . 6.5 μmf

Plate to all other electrodes. . . . .

12 μmf

Grid No.1 to all other electrodes

except plate . . . . . 5.7 μmf

Grid No.3 to plate . . . . . 0.25 max. μmf

Grid No.3 to grid No.1 . . . . . 0.15 max. μmf

Grid No.1 to plate . . . . . 0.04 max. μmf

Grid No.1 to cathode & grid No.5 . . . . . 3.2 μmf

Cathode & grid No.5 to all other electrodes except grid No.1. . . . . 23 μmf

Characteristics, Class A<sub>1</sub> Amplifier:

With grid No.3 connected to grid No.1 through 100,000-ohm resistor

Heater Voltage . . . . . 12.6 volts

Plate Voltage. . . . . 12.6 volts

Grids No.2 & 4 (Screen-Grids) Voltage. . . . . 12.6 volts

Grid-No.1 (Control-Grid) Voltage:

Developed across 2.2-megohm resistor . . . . . -0.6 volt

Plate Resistance (Approx.) . . . . . 0.15 megohm

Transconductance, Grid No.3 to Plate . . . . . 800 μmhos

Plate Current. . . . . 0.55 ma

Grids-No.2 & 4 Current . . . . . 2.8 ma

Grid-No.1 Voltage (Approx.) for grid-No.3-

to-plate transconductance of 20 μmhos. . . . . -3 volts

Mechanical:

Operating Position . . . . . Any

Maximum Overall Length . . . . . 2-1/8"

Maximum Seated Length. . . . . 1-7/8"

Length, Base Seat to Bulb Top (Excluding tip). . . . . 1-1/2" ± 3/32"

Diameter . . . . . 0.650" to 0.750"

Dimensional Outline. . . . . See General Section

Bulb . . . . . T5-1/2

<sup>0</sup>: See next page.

12EG6



12EG6

PENTAGRID AMPLIFIER

Base. . . . . Small-Button Miniature 7-Pin (JETEC No.E7-1)  
Basing Designation for BOTTOM VIEW. . . . . 7CH

- Pin 1 - Grid No.1
- Pin 2 - Cathode,  
Grid No.5
- Pin 3 - Heater
- Pin 4 - Heater



- Pin 5 - Plate
- Pin 6 - Grid No.2,  
Grid No.4
- Pin 7 - Grid No.3

AMPLIFIER — Class A<sub>1</sub>

Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . .	16 max.	volts
GRID-No.3 (CONTROL-GRID) VOLTAGE:		
Negative-bias value . . . . .	16 max.	volts
Positive-bias value . . . . .	0 max.	volts
GRIDS-No.2 & 4 (SCREEN-GRIDS)		
SUPPLY VOLTAGE. . . . .	16 max.	volts
GRIDS-No.2 & 4 VOLTAGE. . . . .	16 max.	volts
CATHODE CURRENT . . . . .	20 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode .	16 max.	volts
Heater positive with respect to cathode .	16 max.	volts

Maximum Circuit Values:

Grid-No.3-Circuit Resistance. . . . .	10 max.	megohms
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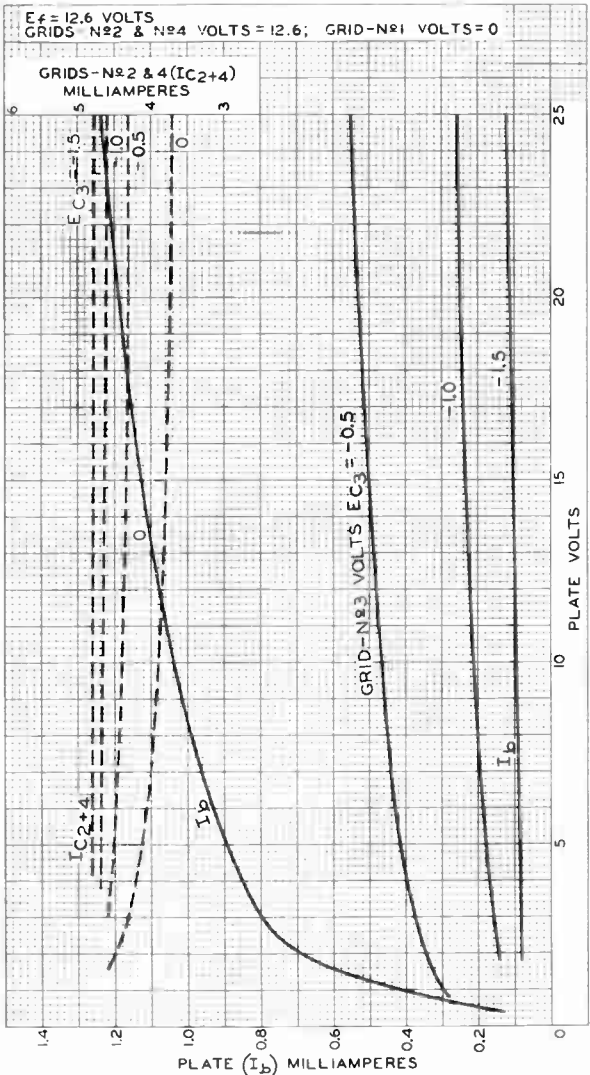
° With external shield JETEC No.316 connected to cathode.



12EG6

12EG6

### AVERAGE CHARACTERISTICS



92CM-9643

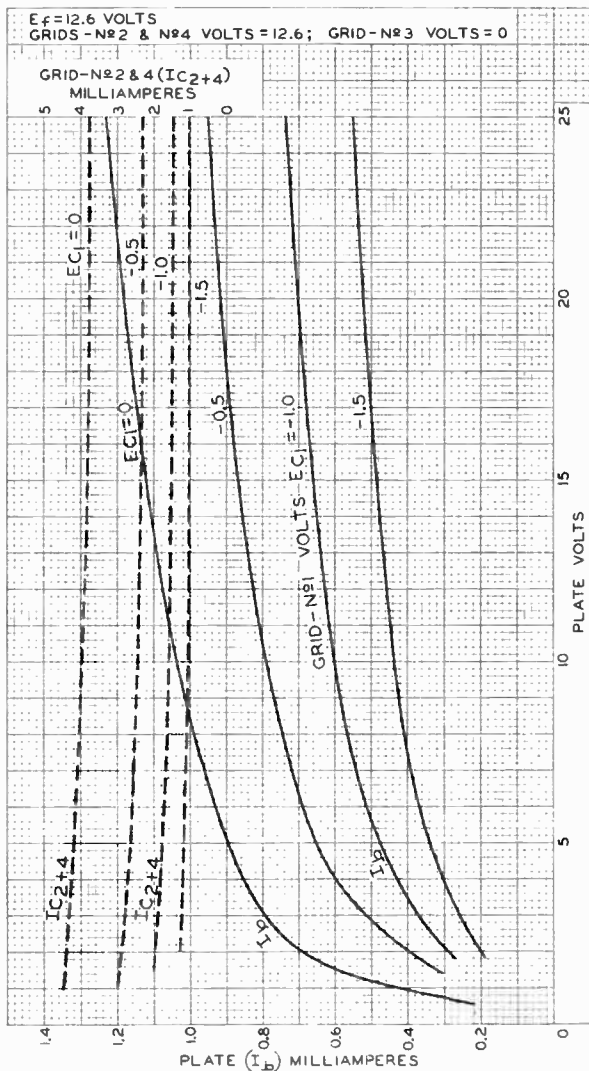
ELECTRON TUBE DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

12EG6



12EG6

## AVERAGE CHARACTERISTICS



ELECTRON TUBE DIVISION  
 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9642





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### AVERAGE CHARACTERISTICS

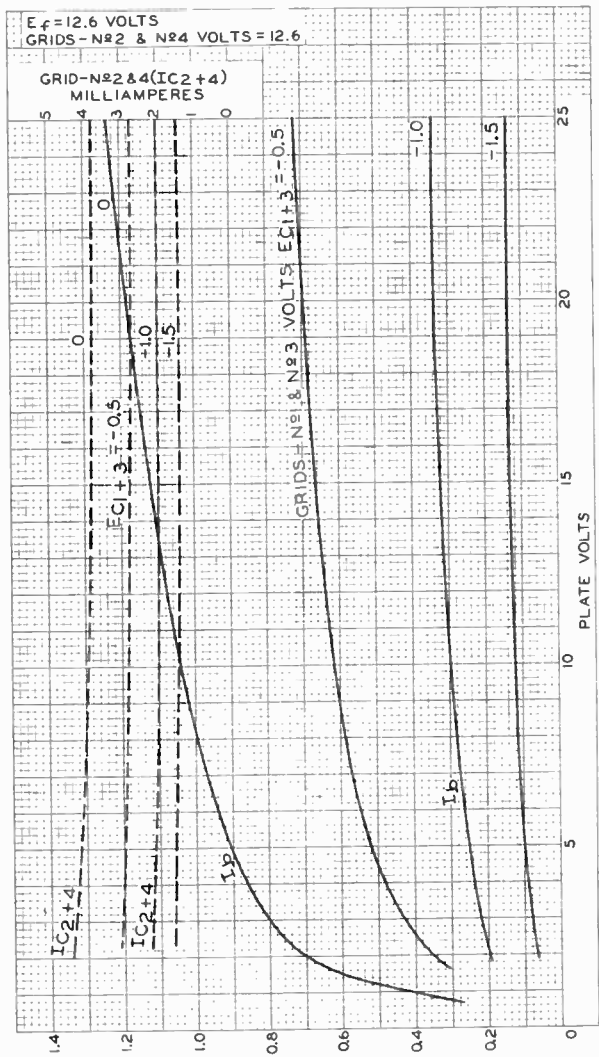


PLATE ( $I_b$ ) MILLIAMPERES

ELECTRON TUBE DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9641





12EK6

12EK6

# SHARP-CUTOFF PENTODE

7-PIN MINIATURE TYPE

For use in automobile radio receivers operating directly from 12-volt storage batteries

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage range. . . . . 10 to 15.9 . . . . . dc volts  
*This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.)

at 12.6 volts. . . . . 0.19 . . . . . amp

Direct Interelectrode Capacitances:<sup>0</sup>

Grid No.1 to plate . . . . . 0.032 max.  $\mu\text{f}$

Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater . . . . . 10  $\mu\text{f}$

Plate to cathode, grid No.3 & internal shield, grid No.2, and heater. . . . . 5.5  $\mu\text{f}$

### Characteristics, Class A<sub>1</sub> Amplifier:

Heater Voltage . . . . . 12.6 volts

Plate Voltage. . . . . 12.6 volts

Grid No.3. . . . . *Connected to cathode at socket*

Grid-No.2 Voltage. . . . . 12.6 volts

Grid-No.1 Supply Voltage . . . . . 0 volts

Grid-No.1 Resistor (Bypassed). . . . . 2.2 megohms

Plate Resistance (Approx.) . . . . . 40000 ohms

Transconductance . . . . . 4200  $\mu\text{mhos}$

Plate Current. . . . . 4.4 ma

Grid-No.2 Current. . . . . 2 ma

Grid-No.1 Voltage (Approx.) for plate  $\mu\text{a} = 10$ . . . . . -4 volts

### Mechanical:

Operating Position . . . . . Any

Maximum Overall Length . . . . . 2-1/8"

Maximum Seated Length. . . . . 1-7/8"

Length, Base Seat to Bulb Top (Excluding tip) . . . . . 1-1/2"  $\pm$  3/32"

Diameter . . . . . 0.650" to 0.750"

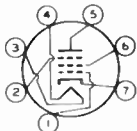
Dimensional Outline. . . . . *See General Section*

Bulb . . . . . T5-1/2

Base . . . . . Small-Button Miniature 7-Pin (JETEC No. E7-1)

Basing Designation for BOTTOM VIEW . . . . . 7BK

Pin 1 - Grid No.1  
Pin 2 - Grid No.3  
          internal  
          Shield  
Pin 3 - Heater



Pin 4 - Heater  
Pin 5 - Plate  
Pin 6 - Grid No.2  
Pin 7 - Cathode

<sup>0</sup>: See next page.

12EK6



12EK6

SHARP-CUTOFF PENTODE

AMPLIFIER — Class A<sub>1</sub>

Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	16 max.	volts
GRID-No.3 (SUPPRESSOR-GRID) VOLTAGE. . . . .	0 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE. . . . .	16 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive-bias value. . . . .	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	16 max.	volts
Heater positive with respect to cathode.	16 max.	volts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	10 max.	megohms
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<sup>o</sup> without external shield.



12EK6

12EK6

### AVERAGE CHARACTERISTICS

$E_f = 12.6$  VOLTS  
GRID N<sup>o</sup>3 CONNECTED TO CATHODE.  
GRID-N<sup>o</sup>2 VOLTS = 12.6

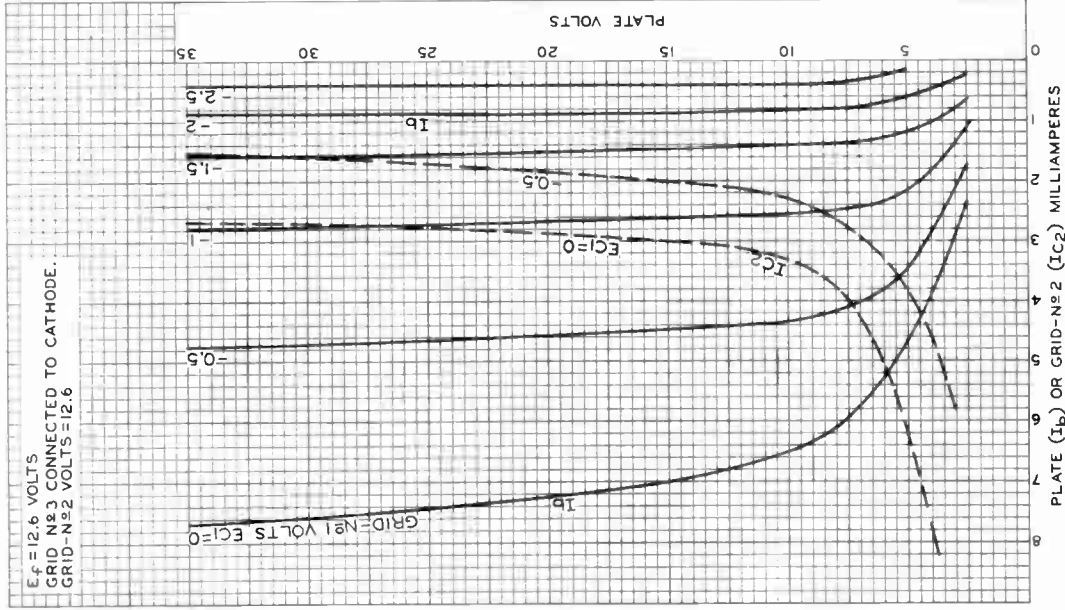


PLATE ( $I_b$ ) OR GRID-N<sup>o</sup>2 ( $I_{c2}$ ) MILLIAMPERES

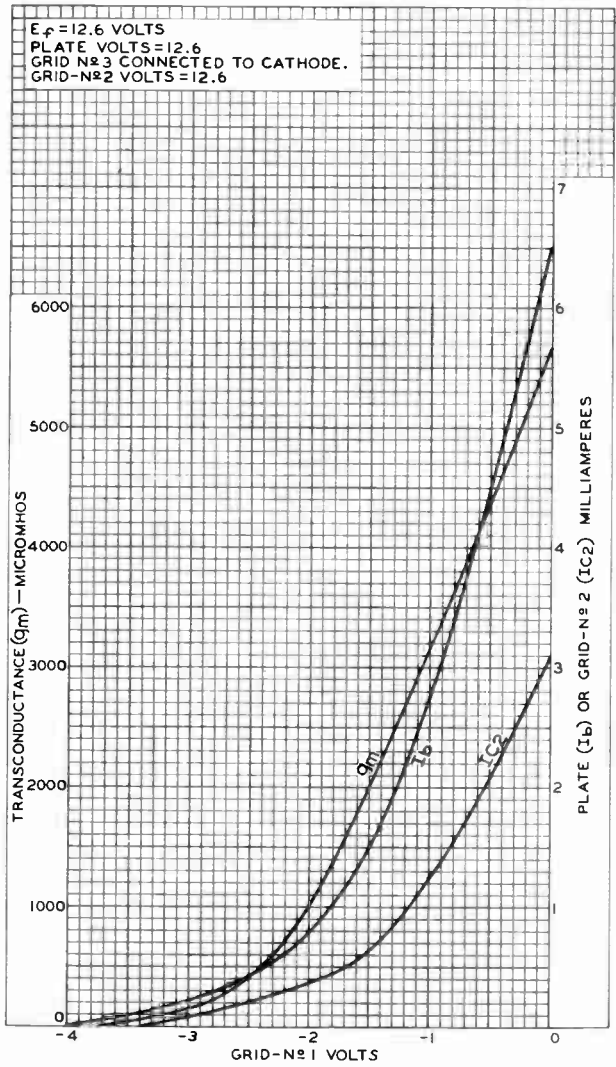
12EK6



12EK6

### AVERAGE CHARACTERISTICS

$E_f = 12.6$  VOLTS  
PLATE VOLTS = 12.6  
GRID-Nº3 CONNECTED TO CATHODE.  
GRID-Nº2 VOLTS = 12.6





12EL6

12EL6

# TWIN DIODE—HIGH-MU TRIODE

7-PIN MINIATURE TYPE

For use in automobile radio receivers operating directly from 6-cell storage-battery systems

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage range (DC) . . . . . 10 to 15.9 volts

*This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.)

at 12.6 volts . . . . . 0.15 amp

Direct Interelectrode Capacitances

(Approx.):<sup>o</sup>

Triode grid to triode plate . . . . . 1.8  $\mu\mu\text{f}$

Triode grid to cathode and heater . . . . . 2.2  $\mu\mu\text{f}$

Triode plate to cathode and heater . . . . . 1  $\mu\mu\text{f}$

Diode-No.1 plate to diode-No.2 plate. . . . . 1  $\mu\mu\text{f}$

### Characteristics, Class A<sub>1</sub> Amplifier (Triode Unit):

Heater Voltage . . . . . 12.6 volts

Plate Voltage . . . . . 12.6 volts

Grid Voltage . . . . . 0 volts

Amplification Factor . . . . . 55

Plate Resistance (Approx.) . . . . . 45000 ohms

Transconductance . . . . . 1200  $\mu\text{mhos}$

Plate Current . . . . . 750  $\mu\text{a}$

### Mechanical:

Operating Position . . . . . Any

Maximum Overall Length . . . . . 2-1/8"

Maximum Seated Length . . . . . 1-7/8"

Length, Base Seat to Bulb Top (Excluding tip) . . . . . 1-1/2"  $\pm$  3/32"

Diameter . . . . . 0.650" to 0.750"

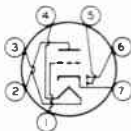
Dimensional Outline . . . . . See General Section

Bulb . . . . . T5-1/2

Base . . . . . Small-Button Miniature 7-Pin (JEDEC No. E7-1)

Basing Designation for BOTTOM VIEW . . . . . 7FB

- Pin 1 - Triode Grid
- Pin 2 - Triode Plate
- Pin 3 - Heater
- Pin 4 - Heater



- Pin 5 - Diode-No.2 Plate
- Pin 6 - Diode-No.1 Plate
- Pin 7 - Cathode

### TRIODE UNIT — AMPLIFIER — Class A<sub>1</sub>

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

PLATE VOLTAGE . . . . . 30 max. volts

CATHODE CURRENT . . . . . 20 max. ma

<sup>o</sup> without external shield.

12EL6



12EL6

## TWIN DIODE—HIGH-MU TRIODE

## PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode. . .	30 max.	volts
Heater positive with respect to cathode. . .	30 max.	volts

## Typical Operation:

*As resistance-coupled amplifier*

Heater Voltage . . . . .	12.6	volts
Plate Supply Voltage . . . . .	12.6	volts
Grid Voltage . . . . .	0	volts
Plate Load Resistor. . . . .	1	megohm
Grid Resistor. . . . .	1	megohm
Grid Resistor of Following Stage . . . . .	2	megohms
Input Capacitor. . . . .	0.02	$\mu$ f
Output Capacitor . . . . .	0.01	$\mu$ f
Voltage Gain at 400 cps with RMS output volts = 1. . . . .	16	

## Maximum Circuit Values:

Grid-Circuit Resistance. . . . .	10 max.	megohms
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## DIODE UNITS — Two

*Values are for Each Unit*

## Maximum Ratings, Design-Center Values:

PLATE CURRENT. . . . .	1 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. .	30 max.	volts
Heater positive with respect to cathode. .	30 max.	volts

## Characteristics:

Heater Voltage . . . . .	12.6	volts
Plate Current for plate volts = 10 . . . . .	2	ma





12F8

12F8

# TWIN DIODE-REMOTE-CUTOFF PENTODE

9-PIN MINIATURE TYPE

For use in automobile radio receivers operating directly from 12-volt storage batteries

## GENERAL DATA

### Electrical:

Heater<sup>•</sup>, for unipotential Cathode:

Voltage range . . . . . 10.0 to 15.9 . . . . . dc volts

*This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.)

at 12.6 volts . . . . . 0.15 . . . . . ma

Direct Interelectrode Capacitance (Approx.):<sup>o</sup>

Grid No. 1 to plate . . . . . 6.6  $\mu$ mf

Grid No. 1 to cathode, grid No. 3,

grid No. 2, and heater . . . . . 4.5  $\mu$ mf

Plate to cathode, grid No. 3,

grid No. 2, and heater . . . . . 3  $\mu$ mf

Plate of diode unit No. 1 to plate

of diode unit No. 2 . . . . . 0.3  $\mu$ mf

### Mechanical:

Operational Position . . . . . Any

Maximum Overall Length . . . . . 2-3/16"

Maximum Seated Length . . . . . 1-15/16"

Length, Base Seat to Built Top (Excluding Tip) . . . . . 1-9/16"  $\pm$  3/32"

Maximum Diameter . . . . . 7/8"

Dimensional Outline . . . . . See General Section

Bulb . . . . . T6-1/2

Base . . . . . Small-Button Novel-Base (ET-1, J-1)

Basing Designation for BOTTOM VIEW . . . . . 9F1

Pin 1 - Plate of Diode Unit No. 2

Pin 2 - Pentode Grid No. 2

Pin 3 - Pentode Plate

Pin 4 - Heater

Pin 5 - Heater

Pin 6 - Plate of Diode Unit No. 1



Pin 7 - Cathode of Pentode Unit and Diode Unit

Pin 8 - Pentode Grid No. 1

Pin 9 - Pentode Grid No. 3

## PENTODE UNIT — AMPLIFIER — Class A<sub>1</sub>

Maximum Ratings, Design Center Values:

PLATE VOLTAGE . . . . . 31 max. volts

GRID-No. 2 (SCREEN-GRID) VOLTAGE . . . . . 36 max. volts

GRID-No. 1 (CONTROL-GRID) VOLTAGE:

Positive bias value . . . . . 0 max. volts

<sup>•</sup>, <sup>o</sup>: See next page.

12F8



12F8

## TWIN DIODE—REMOTE-CUTOFF PENTODE

### PEAK HEATER—CATHODE VOLTAGE:

Heater negative with respect to cathode.	30 max.	volts
Heater positive with respect to cathode.	30 max.	volts

### Characteristics with 12.6 Volts on Heater:

Plate Voltage. . . . .	12.6	volts
Grid-No.3 (Suppressor-Grid) Voltage. . . . .	0	volts
Grid-No.2 Voltage. . . . .	12.6	volts
Grid-No.1 Voltage. . . . .	0	volts
Plate Resistance (Approx.) . . . . .	7.33	megohm
Transconductance . . . . .	1000	$\mu$ mhos
Plate Current. . . . .	1	ma
Grid-No.2 Current. . . . .	0.38	ma
Grid-No.1 Voltage (Approx.) for trans- conductance of 10 $\mu$ mhos. . . . .	-5	volt

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	10 max.	megohms
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### DIODE UNITS — Two

### Maximum Ratings, Design-Center Values:

*Values are for Each Unit*

PLATE CURRENT. . . . .	1 max.	ma
PEAK HEATER—CATHODE VOLTAGE:		
Heater negative with respect to cathode.	30 max.	volts
Heater positive with respect to cathode.	30 max.	volts

### Characteristics with 12.6 Volts on Heater:

Plate Current for plate volts = 10 . . . . .	2	ma
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- Operation of heater in series with other heaters is not recommended.
- Without external shield.

### OPERATING CONSIDERATIONS

The *maximum ratings* in the tabulated data for the 12F8 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:

In the case of storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. This fluctuation imposes severe operating conditions on tubes. Under these conditions, the equipment should be designed so that 90 per cent of the design-center maximum value of plate voltage and grid-No.2 voltage is never exceeded for a battery-terminal potential of 13.2 volts. Although the operating voltages of the 12F8 in this service will, at times, exceed the design-center maximum values, satisfactory performance with probable sacrifice in life will be obtained.



12FM6

12FM6

# TWIN DIODE-MEDIUM-MU TRIODE

7-PIN MINIATURE TYPE

For use in automobile radio receivers operating directly from 6-cell storage-battery systems

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage range (AC or DC) . . . . . 10 to 15.9 volts  
*This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.)  
at 12.6 volts . . . . . 0.15 amp

Direct Interelectrode Capacitances

(Approx.):<sup>o</sup>  
Triode grid to triode plate . . . . . 1.7  $\mu\mu\text{f}$   
Triode grid to cathode and heater . . . . . 2.7  $\mu\mu\text{f}$   
Triode plate to cathode and heater . . . . . 1.7  $\mu\mu\text{f}$   
Diode-No.1 plate to diode-No.2 plate . . . . . 1.1  $\mu\mu\text{f}$

### Characteristics, Class A<sub>1</sub> Amplifier (Triode Unit):

Heater Voltage . . . . .	12.6	12.6	volts
Plate Voltage . . . . .	12.6	12.6	volts
Grid Voltage . . . . .	0	-	volts
Grid Resistor (Bypassed) . . . . .	0	2.2	megohms
Amplification Factor . . . . .	13.5	10	
Plate Resistance (Approx.) . . . . .	5600	7700	ohms
Transconductance . . . . .	2400	1300	$\mu\text{mhos}$
Plate Current . . . . .	1.8	1	ma

### Mechanical:

Operating Position . . . . . Any  
Maximum Overall Length . . . . . 2-1/8"  
Maximum Seated Length . . . . . 1-7/8"  
Length, Base Seat to Bulb Top (Excluding tip) 1-1/2"  $\pm$  3/32"  
Diameter . . . . . 0.650" to 0.750"  
Dimensional Outline . . . . . See General Section  
Bulb . . . . . T5-1/2  
Base . . . . . Small-Button Miniature 7-Pin (JEDEC No.E7-1)  
Basing Designation for BOTTOM VIEW . . . . . 7BT

Pin 1 - Triode Grid  
Pin 2 - Cathode  
Pin 3 - Heater  
Pin 4 - Heater



Pin 5 - Diode-No.2 Plate  
Pin 6 - Diode-No.1 Plate  
Pin 7 - Triode Plate

<sup>o</sup> Without external shield.

12FM6



12FM6

## TWIN DIODE-MEDIUM-MU TRIODE

TRIODE UNIT — AMPLIFIER — Class A<sub>1</sub>

## Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	30 max.	volts
CATHODE CURRENT. . . . .	20 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	30 max.	volts
Heater positive with respect to cathode.	30 max.	volts

## Maximum Circuit Values:

Grid-Circuit Resistance. . . . .	10 max.	megohms
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## DIODE UNITS — Two

Values are for Each Unit

## Maximum Ratings, Design-Center Values:

PLATE CURRENT. . . . .	1 max.	ma
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## Characteristics:

Heater Voltage . . . . .	12.6	volts
Plate Current for plate volts = 10 . . . . .	2	ma

## Pentagrid Converter

### 7-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating  
Directly from 6-Cell Storage Batteries

#### GENERAL DATA

##### Electrical:

Heater, for Unipotential Cathode:

Voltage range (DC) . . . . . 10 to 15.9 volts

*For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.) at 12.6 volts . . . . . 0.15 amp

Direct Interelectrode Capacitances:

	Without External Shield	With External Shield <sup>a</sup>	
Grid No.3 to all other electrodes (RF input) . . . . .	8	8	$\mu\mu\text{f}$
Plate to all other electrodes (Mixer output) . . . . .	8	13	$\mu\mu\text{f}$
Grid No.1 to all other electrodes (Oscillator input) . . . . .	5	5	$\mu\mu\text{f}$
Grid No.3 to plate . . . . .	0.3 max.	0.25 max.	$\mu\mu\text{f}$
Grid No.3 to grid No.1 . . . . .	0.15 max.	0.15 max.	$\mu\mu\text{f}$
Grid No.1 to plate . . . . .	0.1 max.	0.05 max.	$\mu\mu\text{f}$
Grid No.1 to cathode & grid No.5 . . . . .	2.5	2.5	$\mu\mu\text{f}$
Cathode & grid No.5 to all other electrodes except grid No.1 . . . . .	15	20	$\mu\mu\text{f}$

##### Mechanical:

Operating Position . . . . . Any

Maximum Overall Length . . . . . 2-1/8"

Maximum Seated Length . . . . . 1-7/8"

Length, Base Seat to Bulb Top (Excluding tip) . . . . . 1-1/2"  $\pm$  3/32"

Diameter . . . . . 0.650" to 0.750"

Dimensional Outline . . . . . See *General Section*

Bulb . . . . . T5-1/2

Base . . . . . Small-Button Miniature 7-Pin (JEDEC No.E7-1)

Basing Designation for BOTTOM VIEW . . . . . 7CH

Pin 1 - Grid No.1  
Pin 2 - Cathode,  
Grid No.5  
Pin 3 - Heater  
Pin 4 - Heater



Pin 5 - Plate  
Pin 6 - Grid No.2,  
Grid No.4  
Pin 7 - Grid No.3

#### CONVERTER

Maximum Ratings, Design-Maximum Values:

PLATE VOLTAGE . . . . . 16 max. volts



# 12GA6

## GRID-No.3 (CONTROL-GRID) VOLTAGE:

Negative-bias value . . . . .	16 max.	volts
Positive-bias value . . . . .	0 max.	volts
GRIDS-No.2 & No.4 (SCREEN-GRID) VOLTAGE . . .	16 max.	volts

## PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . .	16 max.	volts
Heater positive with respect to cathode . .	16 max.	volts

## Typical Operation and Characteristics:

*With separate excitation<sup>b</sup> and with heater voltage of 12.6 volts*

Plate Voltage . . . . .	12.6	volts
Grids-No.2 & No.4 Voltage . . . . .	12.6	volts
Grid-No.3 Supply Voltage . . . . .	0	volts
Grid-No.3 Resistor (Bypassed) . . . . .	2.2	megohms
RMS Grid-No.1 (Oscillator-Grid) Voltage . . .	1.6	volts
Grid-No.1 Resistor . . . . .	33000	ohms
Plate Resistance (Approx.) . . . . .	1	megohm
Conversion Transconductance . . . . .	140	$\mu\text{mhos}$
Grid-No.3 Voltage (Approx.) for conversion transconductance ( $\mu\text{mhos}$ ) =		
5 . . . . .	-3	volts
20 . . . . .	-2.5	volts
Plate Current . . . . .	0.3	ma
Grids-No.2 & No.4 Current . . . . .	0.8	ma
Grid-No.1 Current . . . . .	0.06	ma

## Oscillator Characteristics (Not Oscillating):

*With grids No.2 & No.4 connected to plate  
and with heater voltage of 12.6 volts*

Plate and Grids-No.2 & No.4 Voltage . . . . .	12.6	volts
Grid-No.3 Voltage . . . . .	0	volts
Grid-No.1 Voltage . . . . .	0	volts
Amplification Factor between grid No.1 and grids No.2 & No.4 connected to plate. . . .	9	
Transconductance between grid No.1 and grids No.2 & No.4 connected to plate. . . .	2400	$\mu\text{mhos}$
Cathode Current . . . . .	3.6	ma
Grid-No.1 Voltage (Approx.) for plate $\mu\text{a} = 10$ . . . . .	-3.3	volts

## Maximum Circuit Values:

Grid-No.3-Circuit Resistance . . . . .	10 max.	megohms
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<sup>a</sup> With external shield JEDEC No.316 connected to cathode & grid No.5.

<sup>b</sup> The characteristics shown with separate excitation correspond very closely with those obtained in a self-excited oscillator circuit operating with zero bias.





12H6

TWIN DIODE

12H6  
TO  
12J7-GT

Heater, for Unipotential Cathode:

Voltage . . . . . 12.6 . . . . . ac or dc volts

Current . . . . . 0.15 . . . . . amp

*The 12H6 is the same as the 6H6 except for heater rating.*

12J5-GT

MEDIUM-MU TRIODE

Heater, for Unipotential Cathode:

Voltage . . . . . 12.6 . . . . . ac or dc volts

Current . . . . . 0.15 . . . . . amp

*The 12J5-GT is the same as the 6J5-GT except for heater rating and base. Base and connections for the 12J5-GT are the same as for the 6P5-GT.*

12J7-GT

SHARP-CUTOFF PENTODE

Heater, for Unipotential Cathode:

Voltage . . . . . 12.6 . . . . . ac or dc volts

Current . . . . . 0.15 . . . . . amp

*The 12J7-GT is the same as the 6J7-GT except for heater rating.*







12J8

12J8

# TWIN DIODE—POWER TETRODE

9-PIN MINIATURE TYPE

For use in automobile radio receivers  
operating directly from 12-volt storage batteries

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathodes:

Voltage range . . . . . 10 to 15.9 . . . . . dc volts

*This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts*

Current (Approx.) at

12.6 volts . . . . . 0.325 . . . . . amp

Direct Interelectrode Capacitances:<sup>0</sup>

*Tetrode Unit:*

Grid No.1 to plate . . . . . 0.7  $\mu\mu\text{f}$

Grid No.1 to cathode, grid No.2, and heater . . . . . 10.5  $\mu\mu\text{f}$

Plate to cathode, grid No.2, and heater . . . . . 4.4  $\mu\mu\text{f}$

Tetrode grid No.1 to plate of diode unit No.1. 0.04 max.  $\mu\mu\text{f}$

Tetrode grid No.1 to plate of diode unit No.2. 0.015 max.  $\mu\mu\text{f}$

### Mechanical:

Operating Position . . . . . Any

Maximum Overall Length . . . . . 2-3/16"

Maximum Seated Length . . . . . 1-15/16"

Length, Base Seat to Bulb Top (Excluding tip) 1-9/16"  $\pm$  3/32"

Diameter . . . . . 0.750" to 0.875"

Dimensional Outline . . . . . See General Section

Bulb . . . . . T6-1/2

Base . . . . . Small-Button Noval 9-Pin (JEDEC No.E9-1)

Basing Designation for BOTTOM VIEW . . . . . 9GC

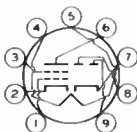
Pin 1—Grid No.1 of Tetrode Unit

Pin 2—Cathode of Tetrode Unit

Pin 3—Grid No.2 of Tetrode Unit

Pin 4—Heater

Pin 5—Heater



Pin 6—Plate of Tetrode Unit

Pin 7—Cathode of Diode Units No.1 & No.2

Pin 8—Plate of Diode Unit No.2

Pin 9—Plate of Diode Unit No.1

## TETRODE UNIT — AUDIO DRIVER

Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . . 30 max. volts

GRID-No.2 (SCREEN-GRID) VOLTAGE . . . . . 30 max. volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode. 30 max. volts

Heater positive with respect to cathode. 30 max. volts

<sup>0</sup> without external shield.

12J8



12J8

## TWIN DIODE—POWER TETRODE

### Typical Operation with 12.6 Volts on Heater:

Plate Voltage. . . . .	12.6	volts
Grid-No.2 Voltage. . . . .	12.6	volts
Grid-No.1 (Control-Grid) Voltage . . . . .	0	volts
AF Grid-No.1 Voltage (RMS) . . . . .	1.6	volts
Grid-No.1 Resistor . . . . .	2.2	megohms
Grid-No.1-Resistor Bypass Capacitor. . . . .	1	$\mu$ f
Zero-Signal Plate Current. . . . .	12	ma
Zero-Signal Grid-No.2 Current. . . . .	1.5	ma
Transconductance . . . . .	5500	$\mu$ mhos
Plate Resistance (Approx.) . . . . .	6000	ohms
Load Resistance. . . . .	2700	ohms
Total Harmonic Distortion. . . . .	5	%
Max.-Signal Power Output . . . . .	20	mw

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	10 max.	megohms
--	---------	---------

### DIODE UNITS — Two

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

*Values are for Each Unit*

PLATE CURRENT. . . . .	5 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. . . . .	30 max.	volts
Heater positive with respect to cathode. . . . .	30 max.	volts

#### Characteristics with 12.6 Volts on Heater:

	Diode Unit No.1	Diode Unit No.2	
Plate Current for plate volts = 5. . . . .	8.5	12	ma

## Beam Power Tube

## NOVAK TYPE

For TV Horizontal-Deflection Amplifier Applications  
With Heater Having Controlled Warm-Up Time

*The 12JB6 is the same as the 6JB6 except for the following items:*

Heater Characteristics and Ratings:

Voltage (AC or DC). . .	12.6 <sup>a</sup>	12.6 ± 1.3	volts
Current . . . . .	0.600 ± 0.040	0.600 <sup>b</sup>	amp
Warm-up time (Average).	11	-	sec

<sup>a</sup> At heater amperes = 0.600.

<sup>b</sup> At heater volts = 12.6.







12K5

12K5

# POWER TETRODE

7-PIN MINIATURE, SPACE-CHARGE-GRID TYPE

For use in automobile radio receivers operating directly from 12-volt storage batteries

## GENERAL DATA

### Electrical:

Heater\*, for Unipotential Cathode:

Voltage range. . . . . 10.0 to 15.9 . . . . . ac volts

*This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.*

Current (Approx.)

at 12.6 volts. . . . . 0.4 . . . . . amp

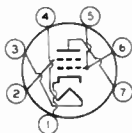
Characteristics, Class A<sub>1</sub> Amplifier with 12.6 Volts on Heater:

Plate Voltage. . . . .	12.6	volts
Grid-No.2 (Control-Grid) Voltage . . . . .	-0.5	volt
Grid-No.1 (Space-Charge-Grid) Voltage. . . . .	12.6	volts
Plate Resistance (Approx.) . . . . .	480	ohms
Amplification Factor, Grid No.2 to Plate. . . . .	7.2	
Transconductance, Grid No.2 to Plate . . . . .	15000	μmhos
Plate Current. . . . .	40	ma
Grid-No.1 Current. . . . .	75	ma

### Mechanical:

Operating Position . . . . .	Any
Maximum Overall Length . . . . .	2-5/8"
Maximum Seated Length. . . . .	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip) . . . . .	2" ± 3/32"
Maximum Diameter . . . . .	3/4"
Dimensional Outline. . . . .	See General Section
Bulb . . . . .	T5-1/2
Base . . . . .	Small-Button Miniature 7-Pin (JETEC No.E7-1)
Basing Designation for BOTTOM VIEW# . . . . .	7FD

- Pin 1 - Cathode
- Pin 2 - Grid No.2
- Pin 3 - Heater
- Pin 4 - Heater



- Pin 5 - Grid No.1
- Pin 6 - Grid No.1
- Pin 7 - Plate

## AUDIO-DRIVER SERVICE

Maximum Ratings, Design-Center Values Except as Noted:

PLATE VOLTAGE. . . . .	30 max.	volts
GRID-No.2 (CONTROL-GRID) VOLTAGE:		
Negative bias value. . . . .	-20 max.	volts
GRID-No.1 (SPACE-CHARGE-GRID) VOLTAGE		
(Absolute maximum) . . . . .	16 <sup>■</sup> max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. . . . .	30 max.	volts
Heater positive with respect to cathode. . . . .	30 max.	volts

\* ■: See next page.

12K5



12K5

## POWER TETRODE

## Typical Operation with 12.6 Volts on Heater:

Plate Voltage. . . . .	12.6	volts
Grid-No.2 voltage:		
Obtained by rectification through 2.2- megohm resistor. . . . .	-2	volts
Peak AF Grid-No.2 Voltage:		
Obtained from 100000-ohm source. . . . .	2.5	volts
Grid-No.1 Voltage. . . . .	12.6	volts
Zero-Signal Plate Current. . . . .	40	mA
Max.-Signal Plate Current. . . . .	8	mA
Grid-No.1 Current. . . . .	75	mA
Load Resistance. . . . .	800	ohms
Total Harmonic Distortion. . . . .	10	%
Max.-Signal Power Output . . . . .	40	mW

## Maximum Circuit Values:

Grid-No.2-Circuit Resistance . . . . . 10 max. megohms

- Operation of heater in series with other heaters is not recommended.
- Under no circumstances should this absolute value be exceeded.

## OPERATING CONSIDERATIONS

The *maximum ratings* in the tabulated data for the 12K5, except the rating for grid-no.1 (space-charge-grid) voltage, 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:

In the case of storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. This fluctuation imposes severe operating conditions on tubes. Under these conditions, the equipment should be designed so that 90 per cent of the design-center maximum values of plate voltage, grid-no.2 voltage, plate dissipation, and grid-no.2 input is never exceeded for a battery-terminal potential of 13.2 volts. Although the operating voltages of the 12K5 in this service will, at times, exceed the design-center maximum values, satisfactory performance with probable sacrifice in life will be obtained.

# 12K7GT

## Remote-Cutoff Pentode

The 12K7GT is the same as the 6K7GT except for the following items:

Heater Characteristics and Ratings (Design-Center Values):

Voltage (AC or DC)	12.6 ± 1.2	volts
Current at heater volts = 12.6	0.150	amp

# 12K8

## Triode-Hexode Converter

The 12K8 is the same as the 6K8 except for the following items:

Heater Characteristics and Ratings (Design-Center Values):

Voltage (AC or DC)	12.6 ± 1.2	volts
Current at heater volts = 12.6	0.150	amp

# 12KL8

## Diode—Sharp-Cutoff Pentode

### 9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 12KL8 is the same as the 6KL8 except for the following items:

Heater Characteristics and Ratings (Design-Maximum Values):

Voltage (AC or DC)	12.6 <sup>a</sup>	12.6 ± 1.2	volts
Current	0.150 ± 0.010	0.150 <sup>b</sup>	amp
Warm-up time (Average)	17	—	sec

<sup>a</sup> At heater amperes = 0.150.

<sup>b</sup> At heater volts = 12.6.



# 12L6GT

## Beam Power Tube

### With Heater Having Controlled Warm-Up Time

The 12L6GT is the same as the 25L6GT except for the following items:

Heater Characteristics and Ratings (Design-Center Values):

Voltage (AC or DC) . . . . .	12.6 <sup>a</sup>	12.6 ± 1.2	volts
Current . . . . .	0.600 ± 0.040	0.600 <sup>b</sup>	amp
Warm-up time (Average) . . . . .	11	-	sec
Peak heater-cathode voltage:			
Heater negative with respect to cathode . . . . .	300	max.	volts
Heater positive with respect to cathode . . . . .	200 <sup>c</sup>	max.	volts

# 12Q7GT

## Twin Diode—High-Mu Triode

The 12Q7GT is the same as the 6Q7GT except for the following items:

Heater Characteristics and Ratings (Design-Center Values):

Voltage (AC or DC) . . . . .	12.6 ± 1.2	volts
Current at heater volts = 12.6 . . . . .	0.150	amp

<sup>a</sup> At heater amperes = 0.600.

<sup>b</sup> At heater volts = 12.6.

<sup>c</sup> The dc component must not exceed 100 volts.







## 12S8-GT

### TRIPLE DIODE—HIGH-MU TRIODE

Heater, for Unipotential Cathodes:

Voltage . . . . .	12.6	. . . . .	ac or dc volts
Current . . . . .	0.15	. . . . .	amp

*The 12S8-GT is the same as the 6S8-GT except for heater rating.*

## 12SA7, 12SA7-GT

### PENTAGRID CONVERTER

Heater, for Unipotential Cathode:

Voltage . . . . .	12.6	. . . . .	ac or dc volts
Current . . . . .	0.15	. . . . .	amp

*The 12SA7 and 12SA7-GT are the same as the 6SA7 and 6SA7-GT, respectively, except for heater rating.*

## 12SC7

### HIGH-MU TWIN TRIODE

Heater, for Unipotential Cathode:

Voltage . . . . .	12.6	. . . . .	ac or dc volts
Current . . . . .	0.15	. . . . .	amp

*The 12SC7 is the same as the 6SC7 except for heater rating.*

## 12SF5, 12SF5-GT

### HIGH-MU TRIODE

Heater, for Unipotential Cathode:

Voltage . . . . .	12.6	. . . . .	ac or dc volts
Current . . . . .	0.15	. . . . .	amp

*The 12SF5 and 12SF5-GT are the same as the 6SF5 and 6SF5-GT, respectively, except for heater rating.*

12S8-GT  
12S8-GT  
12SF5-GT

12SF7  
TO  
12SJ7-GT



### 12SF7

## DIODE—REMOTE-CUTOFF PENTODE

Heater, for Unipotential Cathode:

Voltage . . . . .	12.6	. . . . .	ac or dc volts
Current . . . . .	0.15	. . . . .	amp

*The 12SF7 is the same as the 6SF7 except for heater rating.*

### 12SG7

## REMOTE-CUTOFF PENTODE

Heater, for Unipotential Cathode:

Voltage . . . . .	12.6	. . . . .	ac or dc volts
Current . . . . .	0.15	. . . . .	amp

*The 12SG7 is the same as the 6SG7 except for heater rating.*

### 12SH7

## SHARP-CUTOFF PENTODE

Heater, for Unipotential Cathode:

Voltage . . . . .	12.6	. . . . .	ac or dc volts
Current . . . . .	0.15	. . . . .	amp

*The 12SH7 is the same as the 6SH7 except for heater rating.*

### 12SJ7, 12SJ7-GT

## SHARP-CUTOFF PENTODE

Heater, for Unipotential Cathode:

Voltage . . . . .	12.6	. . . . .	ac or dc volts
Current . . . . .	0.15	. . . . .	amp

*The 12SJ7 and 12SJ7-GT are the same as the 6SJ7 and 6SJ7-GT, respectively, except for heater rating.*



## 12S8-GT

### TRIPLE DIODE—HIGH-MU TRIODE

Heater, for Unipotential Cathodes:

Voltage . . . . .	12.6	. . . . .	ac or dc volts
Current . . . . .	0.15	. . . . .	amp

*The 12S8-GT is the same as the 6S8-GT except for heater rating.*

## 12SA7, 12SA7-GT

### PENTAGRID CONVERTER

Heater, for Unipotential Cathode:

Voltage . . . . .	12.6	. . . . .	ac or dc volts
Current . . . . .	0.15	. . . . .	amp

*The 12SA7 and 12SA7-GT are the same as the 6SA7 and 6SA7-GT, respectively, except for heater rating.*

## 12SC7

### HIGH-MU TWIN TRIODE

Heater, for Unipotential Cathode:

Voltage . . . . .	12.6	. . . . .	ac or dc volts
Current . . . . .	0.15	. . . . .	amp

*The 12SC7 is the same as the 6SC7 except for heater rating.*

## 12SF5, 12SF5-GT

### HIGH-MU TRIODE

Heater, for Unipotential Cathode:

Voltage . . . . .	12.6	. . . . .	ac or dc volts
Current . . . . .	0.15	. . . . .	amp

*The 12SF5 and 12SF5-GT are the same as the 6SF5 and 6SF5-GT, respectively, except for heater rating.*

12S8-GT  
12SA7-GT  
12SF5-GT

12SF7  
TO  
12SJ7-GT



### 12SF7

## DIODE—REMOTE-CUTOFF PENTODE

Heater, for Unipotential Cathode:		
Voltage . . . . .	12.6 . . . . .	ac or dc volts
Current . . . . .	0.15 . . . . .	amp

*The 12SF7 is the same as the 6SF7 except for heater rating.*

### 12SG7

## REMOTE-CUTOFF PENTODE

Heater, for Unipotential Cathode:		
Voltage . . . . .	12.6 . . . . .	ac or dc volts
Current . . . . .	0.15 . . . . .	amp

*The 12SG7 is the same as the 6SG7 except for heater rating.*

### 12SH7

## SHARP-CUTOFF PENTODE

Heater, for Unipotential Cathode:		
Voltage . . . . .	12.6 . . . . .	ac or dc volts
Current . . . . .	0.15 . . . . .	amp

*The 12SH7 is the same as the 6SH7 except for heater rating.*

### 12SJ7, 12SJ7-GT

## SHARP-CUTOFF PENTODE

Heater, for Unipotential Cathode:		
Voltage . . . . .	12.6 . . . . .	ac or dc volts
Current . . . . .	0.15 . . . . .	amp

*The 12SJ7 and 12SJ7-GT are the same as the 6SJ7 and 6SJ7-GT, respectively, except for heater rating.*

# 12SK7

## Remote-Cutoff Pentode

*The 12SK7 is the same as the 6SK7 except for the following items:*

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . .	12.6	volts
Current . . . . .	0.15	amp

# 12SK7GT

## Remote-Cutoff Pentode

*The 12SK7GT is the same as the 6SK7GT except for the following items:*

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . .	12.6	volts
Current . . . . .	0.15	amp

# 12SL7GT

## High-Mu Twin Triode

*The 12SL7GT is the same as the 6SL7GT except for the following items:*

Heater, for Unipotential Cathodes:

Voltage (AC or DC) . . . . .	12.6	volts
Current . . . . .	0.15	amp

# 12SN7GT

## Medium-Mu Twin Triode

*The 12SN7GT is the same as the 6SN7GT except for the following items:*

Heater, for Unipotential Cathodes:

Voltage (AC or DC) . . . . .	12.6	volts
Current . . . . .	0.3	amp



# 12SN7GTA

## Medium-Mu Twin Triode

*The 12SN7GTA is the same as the 6SN7GTA except for the following items:*

Heater, for Unipotential Cathodes:

Voltage (AC or DC) . . . . .	12.6	volts
Current . . . . .	0.3	amp

# 12SQ7

## Twin Diode—High-Mu Triode

*The 12SQ7 is the same as the 6SQ7 except for the following items:*

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . .	12.6	volts
Current . . . . .	0.15	amp

# 12SQ7GT

## Twin Diode—High-Mu Triode

*The 12SQ7GT is the same as the 6SQ7GT except for the following items:*

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . .	12.6	volts
Current . . . . .	0.15	amp

# 12SR7

## Twin Diode—Medium-Mu Triode

*The 12SR7 is the same as the 6SR7 except for the following items:*

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . .	12.6	volts
Current . . . . .	0.15	amp





14A4

# MEDIUM-MU TRIODE

14A4  
14A5

Heater, for Unipotential Cathode:

Voltage. . . . .	12.6 <sup>□</sup>	. . . . .	ac or dc volts
Current. . . . .	0.15 <sup>□□</sup>	. . . . .	amp

The 14A4 is the same as the 7A4 except for heater rating.

□ Nominal voltage = 14.0 volts.      □□ Nominal current = 0.16 ampere.

14A5

# BEAM POWER AMPLIFIER

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . .	12.6 <sup>□</sup>	. . . . .	ac or dc volts
Current. . . . .	0.15 <sup>□□</sup>	. . . . .	amp

Direct Interelectrode Capacitances (Approx.):<sup>○</sup>

Grid No.1 to Plate . . . . .	0.4	. . . . .	μμf
Input. . . . .	6.8	. . . . .	μμf
Output . . . . .	7.0	. . . . .	μμf

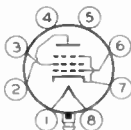
○ with external shield connected to cathode.

### Mechanical:

Mounting Position. . . . .	. . . . .	Any
Maximum Overall Length . . . . .	. . . . .	2-25/32"
Maximum Seated Length. . . . .	. . . . .	2-1/4"
Maximum Diameter . . . . .	. . . . .	1-3/16"
Bulb . . . . .	. . . . .	T-9
Base . . . . .	. . . . .	Lock-in 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 6AA

Pin 1 - Heater		Pin 6 - Grid No.1
Pin 2 - Plate		Pin 7 - Cathode,
Pin 3 - Grid No.2		Grid No.3
Pin 4 - No		Pin 8 - Heater
Connection		
Pin 5 - No		Plug - Base
Connection		Shell



## AF POWER AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	300 max.	volts
GRID-No.2 (SCREEN) VOLTAGE . . . . .	300 max.	volts
PLATE DISSIPATION. . . . .	7.5 max.	watts
GRID-No.2 DISSIPATION. . . . .	1.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

□ Nominal voltage = 14.0 volts.  
 □□ Nominal current = 0.16 ampere.

14A5  
14A7  
14B6



## 14A5

### BEAM POWER AMPLIFIER

(continued from preceding page)

#### Typical Operation and Characteristics:

Plate Voltage. . . . .	250	volts
Grid-No.2 Voltage. . . . .	250	volts
Grid-No.1 (Control-Grid) Voltage . . . . .	-12.5	volts
Cathode-Bias Resistor. . . . .	370	ohms
Peak AF Grid-No.1 Voltage. . . . .	12.5	volts
Zero-Signal Plate Current. . . . .	30	ma
Max.-Signal Plate Current. . . . .	32	ma
Zero-Signal Grid-No.2 Current. . . . .	3.5	ma
Max.-Signal Grid-No.2 Current. . . . .	5.5	ma
Plate Resistance (Approx.) . . . . .	70000	ohms
Transconductance . . . . .	3000	μmhos
Load Resistance. . . . .	7500	ohms
Total Harmonic Distortion. . . . .	7	%
Max.-Sig. Power Output . . . . .	2.8	watts

#### Maximum Circuit Values (for maximum rated conditions):

##### Grid-No.1-Circuit Resistance:

For fixed bias . . . . .	0.1	megohm
For cathode bias . . . . .	0.5	megohm

## 14A7

### REMOTE-CUTOFF PENTODE

#### Heater, for Unipotential Cathode:

Voltage. . . . .	12.6 <sup>□</sup>	ac or dc volts
Current. . . . .	0.15 <sup>□□</sup>	amp

*The 14A7 is the same as the 7A7 except for heater rating.*

<sup>□</sup> Nominal voltage = 14.0 volts.      <sup>□□</sup> Nominal current = 0.16 ampere.

## 14B6

### TWIN DIODE—HIGH-MU TRIODE

#### Heater, for Unipotential Cathode:

Voltage. . . . .	12.6 <sup>□</sup>	ac or dc volts
Current. . . . .	0.15 <sup>□□</sup>	amp

*The 14B6 is the same as the 7B6 except for heater rating.*

<sup>□</sup> Nominal voltage = 14.0 volts.      <sup>□□</sup> Nominal current = 0.16 ampere.





14AF7

# MEDIUM-MU TWIN TRIODE

14AF7

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathodes:

Voltage. . . . . 12.6<sup>□</sup> . . . . . ac or dc volts

Current. . . . . 0.15<sup>□□</sup> . . . . . amp

Direct Interelectrode Capacitances:<sup>○</sup>

Each Unit:

Grid to Plate. . . . . 2.3 . . . . .  $\mu$ f

Grid to Cathode . . . . . 2.2 . . . . .  $\mu$ f

Plate to Cathode . . . . . 1.6 . . . . .  $\mu$ f

Grid of Unit No.1 to Grid of Unit No.2 . . . . . 0.20 max. . . . .  $\mu$ f

Plate of Unit No.1 to Plate of Unit No.2. . . . . 0.60 max. . . . .  $\mu$ f

Grid of Unit No.1 to Plate of Unit No.2. . . . . 0.06 max. . . . .  $\mu$ f

Grid of Unit No.2 to Plate of Unit No.1. . . . . 0.10 max. . . . .  $\mu$ f

<sup>○</sup> Without external shield.

### Mechanical:

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 2-25/32"

Maximum Seated Length. . . . . 2-1/4"

Maximum Diameter . . . . . 1-3/16"

Bulb . . . . . T-9

Base . . . . . Lock-in 8-Pin

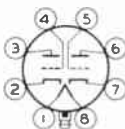
Basing Designation for BOTTOM VIEW . . . . . 8AC

Pin 1 - Heater

Pin 2 - Cathode of  
Triode No.2

Pin 3 - Plate of  
Triode No.2

Pin 4 - Grid of  
Triode No.2



Pin 5 - Grid of  
Triode No.1

Pin 6 - Plate of  
Triode No.1

Pin 7 - Cathode of  
Triode No.1

Pin 8 - Heater  
Plug - Base Shell

## AMPLIFIER - Class A<sub>1</sub>

Values are for each unit

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . . 300 max. volts

PLATE DISSIPATION. . . . . 2.5 max. watts

GRID VOLTAGE:

Positive bias value. . . . . 0 max. volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode. . . . . 90 max. volts

Heater positive with respect to cathode. . . . . 90 max. volts

### Typical Operation and Characteristics:

Plate Voltage. . . . . 100 100 250 volts

Grid Voltage . . . . . 0 - - volts

Cathode-Bias Resistor. . . . . - 600 1100 ohms

<sup>□</sup> nominal voltage = 14.0 volts.

<sup>□□</sup> Nominal current = 0.16 ampere.

14AF7  
TO  
14C5



14AF7

## MEDIUM-MU TWIN TRIODE

(continued from preceding page)

Amplification Factor . . . . .	17	16	16	
Plate Resistance . . . . .	6500	8400	7600	ohms
Transconductance . . . . .	2600	1900	2100	$\mu$ mhos
Plate Current. . . . .	10.8	5	9	ma

### 14B6

## TWIN DIODE—HIGH-MU TRIODE

Heater, for Unipotential Cathode:

Voltage. . . . . 12.6<sup>□</sup> . . . . . ac or dc volts  
Current. . . . . 0.15<sup>□□</sup> . . . . . amp

*The 14B6 is the same as the 7B6 except for heater rating.*

<sup>□</sup> Nominal voltage = 14.0 volts.      <sup>□□</sup> Nominal current = 0.16 ampere.

### 14B8

## PENTAGRID CONVERTER

Heater, for Unipotential Cathode:

Voltage. . . . . 12.6<sup>□</sup> . . . . . ac or dc volts  
Current. . . . . 0.15<sup>□□</sup> . . . . . amp

*The 14B8 is the same as the 7B8 except for heater rating.*

<sup>□</sup> Nominal voltage = 14.0 volts.      <sup>□□</sup> Nominal current = 0.16 ampere.

### 14C5

## BEAM POWER AMPLIFIER

Heater, for Unipotential Cathode:

Voltage. . . . . 12.6<sup>□</sup> . . . . . ac or dc volts  
Current. . . . . 0.225<sup>□□</sup> . . . . . amp

*The 14C5 is the same as the 7C5 except for heater rating.*

<sup>□</sup> Nominal voltage = 14.0 volts.      <sup>□□</sup> Nominal current = 0.240 ampere.

# Sharp-Cutoff Pentode

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . .	12.6 <sup>▲</sup>	volts
Current at 12.6 volts . . . . .	0.15 <sup>●</sup>	amp

Direct Interelectrode Capacitances:\*

Grid No.1 to plate . . . . .	0.007 max.	$\mu\text{f}$
Grid No.1 to cathode, grid No.3, grid No.2, internal shield, and heater . . . . .	6	$\mu\text{f}$
Plate to cathode, grid No.3, grid No.2, internal shield, and heater . . . . .	6.5	$\mu\text{f}$

### Characteristics, Class A<sub>1</sub> Amplifier:

Plate Supply Voltage . . . . .	100	250	volts
Grid No.3 . . . . .	Connected to cathode at socket		
Internal Shield . . . . .	Connected to cathode at socket		
Grid-No.2 Supply Voltage . . . . .	100	100	volts
Grid-No.1 Supply Voltage . . . . .	-1	-3	volts
Cathode Resistor . . . . .	130	100	ohms
Plate Resistance (Approx.) . . . . .	0.325	◆	megohm
Transconductance . . . . .	2275	1575	$\mu\text{mhos}$
Plate Current . . . . .	5.7	2.2	ma
Grid No.2 Current . . . . .	1.8	0.7	ma
Grid-No.1 Voltage (Approx.) for cathode-current cutoff . . . . .	-7	-7	volts

### Mechanical:

Operating Position . . . . .	Any
Maximum Overall Length . . . . .	2-25/32"
Maximum Seated Length . . . . .	2-1/4"
Maximum Diameter . . . . .	1-3/16"
Dimensional Outline . . . . .	See <i>General Section</i>
Bulb . . . . .	T9
Base . . . . .	Lock-in 8-Pin (JEDEC No.D8-1)
Basing Designation for BOTTOM VIEW . . . . .	.8V

Pin 1 - Heater  
Pin 2 - Plate  
Pin 3 - Grid No.2  
Pin 4 - Grid No.3  
Pin 5 - Internal  
Shield



Pin 6 - Grid No.1  
Pin 7 - Cathode  
Pin 8 - Heater  
Plug - Base  
Shell

### AMPLIFIER — Class A<sub>1</sub>

Maximum Ratings, Design-Center Values:

PLATE VOLTAGE . . . . .	300 max.	volts
GRID No.3 (SUPPRESSOR GRID) . . . . .	Connect to cathode at socket	
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE . . . . .	300 max.	volts



# 14C7

GRID-No.2 VOLTAGE. . . . .	100 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive-bias value. . . . .	0 max.	volts
GRID-No.2 INPUT. . . . .	0.1 max.	watt
PLATE DISSIPATION. . . . .	1 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. .	90 max.	volts
Heater positive with respect to cathode. .	90 max.	volts

- ▲ Nominal voltage = 14 volts.
- Nominal current = 0.16 ampere.
- \* with external shield JEDEC No. 308 connected to cathode.
- ◆ Greater than 1 megohm.

# 14F7

## High-Mu Twin Triode

*The 14F7 is the same as the 7F7 except for the following items:*

Heater, for Unipotential Cathodes:		
Voltage (AC or DC) . . . . .	12.6 <sup>▲</sup>	volts
Current at 12.6 volts. . . . .	0.15 <sup>●</sup>	amp

# 14F8

## Medium-Mu Twin Triode

*The 14F8 is the same as the 7F8 except for the following items:*

Heater, for Unipotential Cathodes:		
Voltage (AC or DC) . . . . .	12.6 <sup>▲</sup>	volts
Current at 12.6 volts. . . . .	0.15 <sup>●</sup>	amp

- ▲ Nominal voltage = 14 volts.
- Nominal current = 0.16 ampere.





14J7

14J7  
TO  
14R7

## TRIODE-HEPTODE CONVERTER

Heater, for Unipotential Cathode:

Voltage. . . . . 12.6<sup>□</sup> . . . . . ac or dc volts  
Current. . . . . 0.15<sup>□□</sup> . . . . . amp

*The 14J7 is the same as the 7J7 except for heater rating.*

□ Nominal voltage = 14.0 volts.

□□ Nominal current = 0.16 ampere.

14N7

## MEDIUM-MU TWIN TRIODE

Heater, for Unipotential Cathodes:

Voltage. . . . . 12.6<sup>□</sup> . . . . . ac or dc volts  
Current. . . . . 0.3<sup>□□</sup> . . . . . amp

*The 14N7 is the same as the 7N7 except for heater rating.*

□ Nominal voltage = 14.0 volts.

□□ Nominal current = 0.32 ampere.

14Q7

## PENTAGRID CONVERTER

Heater, for Unipotential Cathode:

Voltage. . . . . 12.6<sup>□</sup> . . . . . ac or dc volts  
Current. . . . . 0.15<sup>□□</sup> . . . . . amp

*The 14Q7 is the same as the 7Q7 except for heater rating.*

□ Nominal voltage = 14.0 volts.

□□ Nominal current = 0.16 ampere.

14R7

## TWIN DIODE-REMOTE-CUTOFF PENTODE

Heater, for Unipotential Cathode:

Voltage. . . . . 12.6<sup>□</sup> . . . . . ac or dc volts  
Current. . . . . 0.15<sup>□□</sup> . . . . . amp

*The 14R7 is the same as the 7R7 except for heater rating.*

□ Nominal voltage = 14.0 volts.

□□ Nominal current = 0.16 ampere.





19BG6-GA

# 19BG6-GA BEAM POWER TUBE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . . 18.9 . . . . . ac or dc volts

Current . . . . . 0.3 . . . . . amp

Direct Interelectrode Capacitances (Approx.):<sup>o</sup>

Grid No.1 to plate . . . . . 0.8  $\mu$ f

Grid No.1 to cathode & grid No.3,  
grid No.2, and heater. . . . . 11  $\mu$ f

Plate to cathode & grid No.3,  
grid No.2, and heater. . . . . 6  $\mu$ f

### Characteristics, Class A<sub>1</sub> Amplifier:

Plate Voltage . . . . . 60 250 volts

Grid-No.2 Voltage . . . . . 250 250 volts

Grid-No.1 Voltage . . . . . 0 -15 volts

Mu-Factor, Grid No.2 to Grid No.1 . . . . . - 8

Plate Resistance (Approx.) . . . . . - 25000 ohms

Transconductance . . . . . - 6000  $\mu$ mhos

Plate Current . . . . . 180\* 75 ma

Grid-No.2 Current . . . . . 18\* 4 ma

Grid-No.1 Voltage (Approx.) for  
plate current of 1 ma . . . . . - -45 volts

### Mechanical:

Mounting Position . . . . . Vertical, base up or down, or  
Horizontal with pins 2 and 7 in vertical plane

Maximum Overall Length . . . . . 5"

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

Maximum Diameter . . . . . 1-9/16"

Bulb . . . . . T-12

Cap. . . . . Small (JETEC No.C1-1)

Base . . . . . Short Medium-Shell Octal 8-Pin

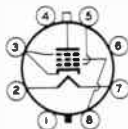
with External Barriers, Style A (JETEC No.B8-110),

or Short Medium-Shell Octal 8-Pin

with External Barriers, Style B (JETEC No.B8-118)

Basing Designation for BOTTOM VIEW . . . . . 5BT

- Pin 1 - No Connec-  
tion
- Pin 2 - Heater
- Pin 3 - Cathode,  
Grid No.3
- Pin 4 - Same as Pin 1



- Pin 5 - Grid No.1
- Pin 6 - Same as Pin 1
- Pin 7 - Heater
- Pin 8 - Grid No.2
- Cap - Plate

<sup>o</sup> Without external shield.

\* These values can be measured by a method involving a recurrent wave form such that the cathode current and grid-No.2 input will be kept within ratings in order to prevent damage to the tube.

19BG6-GA



# 19BG6-GA BEAM POWER TUBE

## HORIZONTAL DEFLECTION AMPLIFIER

**Maximum Ratings, Design-Center Values Except as Noted:**

*For operation in a 525-line, 30-frame system<sup>□</sup>*

DC PLATE VOLTAGE . . . . .	700	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE (Absolute maximum) <sup>•</sup> . . . . .	6600 <sup>■</sup>	max.	volts
PEAK NEGATIVE-PULSE PLATE VOLTAGE . . . . .	1500	max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE . . . . .	350	max.	volts
PEAK NEGATIVE-PULSE GRID-No.1 VOLTAGE . . . . .	300	max.	volts
<b>CATHODE CURRENT:</b>			
Peak . . . . .	400	max.	ma
Average . . . . .	110	max.	ma
GRID-No.2 INPUT . . . . .	3.2	max.	watts
PLATE DISSIPATION† . . . . .	20	max.	watts
<b>PEAK HEATER-CATHODE VOLTAGE:</b>			
Heater negative with respect to cathode . . . . .	200	max.	volts
Heater positive with respect to cathode . . . . .	200 <sup>▲</sup>	max.	volts
<b>BULB TEMPERATURE (At hottest point on bulb surface). . . . .</b>			
	210	max.	°C

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance:

For grid-resistor-bias operation† . . . . 0.47 max. megohm

<sup>□</sup> As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations", Federal Communications Commission.

<sup>■</sup> Under no circumstances should this absolute value be exceeded.

<sup>•</sup> The duration of the voltage pulse must not exceed 15 per cent of one horizontal scanning cycle. In a 525-line, 30-frame system, 15 per cent of one horizontal scanning cycle is 10 microseconds.

<sup>†</sup> It is essential that the plate dissipation be limited in the event of loss of grid signal. For this purpose, some protective means such as a cathode resistor of suitable value should be employed.

<sup>▲</sup> The dc component must not exceed 100 volts.

### CURVES

for Type 19BG6-GA are the same as those shown for  
Type 6BG6-G





19J6

# 19J6 MEDIUM-MU TWIN TRIODE

MINIATURE TYPE

GENERAL DATA**Electrical:**

Heater, for Unipotential Cathode:

Voltage. . . . . 18.9 . . . . . ac or dc volts

Current. . . . . 0.15 . . . . . amp

Direct Interelectrode Capacitances (Each unit, approx.):<sup>o</sup>Grid to Plate. . . . . 1.5 . . . . .  $\mu\text{mf}$ Grid to Cathode. . . . . 2.0 . . . . .  $\mu\text{mf}$ Plate to Cathode. . . . . 0.4 . . . . .  $\mu\text{mf}$ <sup>o</sup> with no external shield.**Mechanical:**

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 2-1/8"

Maximum Seated Length. . . . . 1-7/8"

Length, Base Seat to Bulb Top (excluding tip) . 1-1/2"  $\pm$  3/32"

Maximum Diameter . . . . . 3/4"

Bulb . . . . . T-5-1/2

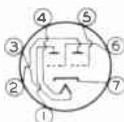
Base . . . . . Small-Button Miniature 7-Pin

Basing Designation for BOTTOM VIEW . . . . . 7BF

Pin 1 - Plate of  
Triode No. 2Pin 2 - Plate of  
Triode No. 1

Pin 3 - Heater

Pin 4 - Heater

Pin 5 - Grid of  
Triode No. 1Pin 6 - Grid of  
Triode No. 2

Pin 7 - Cathode

AMPLIFIER - Class A<sub>1</sub>

Values are for each unit

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

PLATE VOLTAGE. . . . . 300 max. volts

PLATE DISSIPATION. . . . . 1.5 max. watts

**PEAK HEATER-CATHODE VOLTAGE:**

Heater negative with respect to cathode . 90 max. volts

Heater positive with respect to cathode. 90 max. volts

**Characteristics:**

Plate Voltage. . . . . 100 . . . . . volts

Cathode-Bias Resistor<sup>▲</sup> . . . . . 50<sup>◆</sup> . . . . . ohms

Amplification Factor . . . . . 38

Plate Resistance . . . . . 7100 . . . . . ohms

Transconductance . . . . . 5300 . . . . .  $\mu\text{mhos}$ 

Plate Current. . . . . 8.5 . . . . . ma

**Maximum Circuit Values (for maximum rated conditions):**

Grid-Circuit Resistance:

For cathode-bias operation . . . . . 0.5 max. megohm

<sup>▲</sup>, <sup>◆</sup>: See next page.

NOV. 15, 1948

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY  
World Radio History

TENTATIVE DATA

19J6



19J6

## MEDIUM-MU TWIN TRIODE

MIXER SERVICE*Values are for each unit***Maximum Ratings, Design-Center Values:**

PLATE VOLTAGE . . . . .	300 max.	volts
PLATE DISSIPATION . . . . .	1.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. .	90 max.	volts
Heater negative with respect to cathode. .	90 max.	volts

**Characteristics:**

Plate Voltage. . . . .	150	volts
Cathode-Bias Resistor <sup>▲</sup> . . . . .	810 <sup>†</sup>	ohms
Oscillator Peak Voltage. . . . .	3	volts
Plate Resistance . . . . .	10200	ohms
Conversion Transconductance. . . . .	1900	μmhos
Short-Circuit Input Conductance		
at 100 Mc . . . . .	96	μmhos
Plate Current. . . . .	4.8	ma

**Maximum Circuit Values (for maximum rated conditions):****Grid-Circuit Resistance:**

For cathode-bias operation . . . . . 0.5 max. megohms

<sup>▲</sup> operation with fixed bias is not recommended.<sup>◆</sup> value is for both units operating at the specified conditions.<sup>†</sup> For one unit, with other unit not operating. When both units are operating, the value of cathode-bias resistor is determined by the total cathode current of both units.

NOV. 15, 1948

TUBE DEPARTMENT

TENTATIVE DATA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

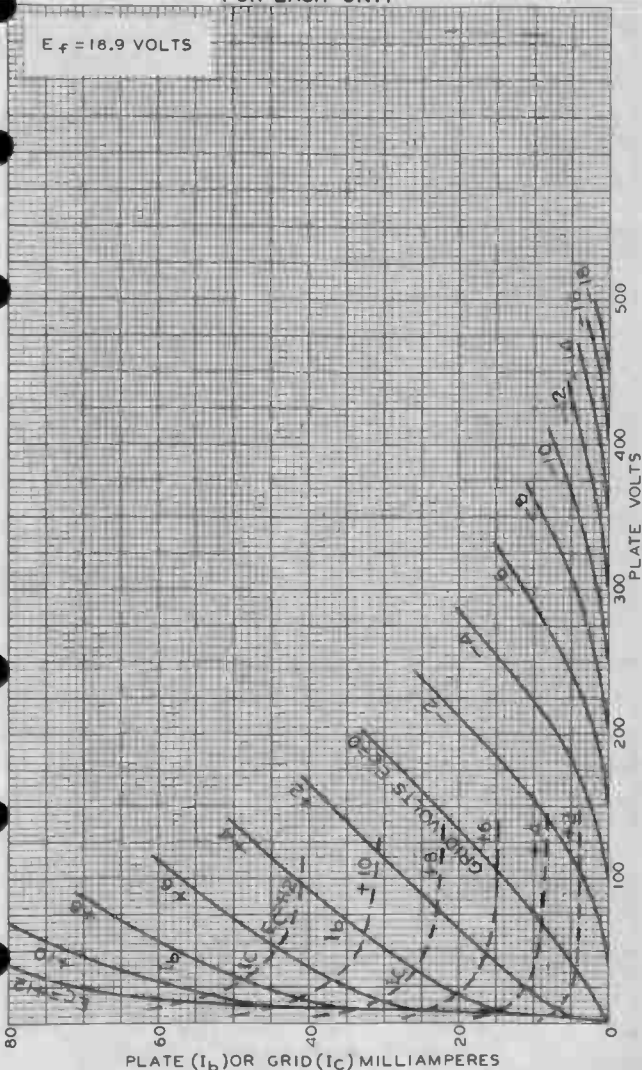


19J6

19J6

# AVERAGE PLATE CHARACTERISTICS FOR EACH UNIT

$E_f = 18.9$  VOLTS



AUG. 18, 1948

TUBE DEPARTMENT

92CM-7061

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

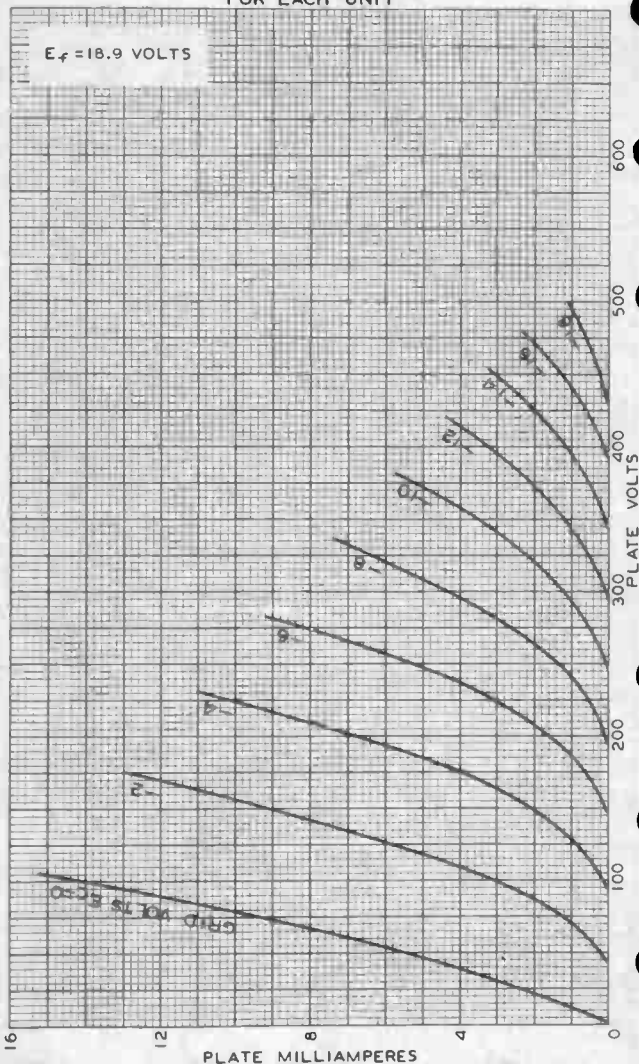
World Radio History

19J6



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### AVERAGE PLATE CHARACTERISTICS FOR EACH UNIT



AUG. 18, 1948

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92CM-7060

RADCO CORPORATION OF AMERICA, PHILADELPHIA, NEW JERSEY

World Radio History



24-A

24-A

## SCREEN GRID R-F AMPLIFIER

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	1.75	amp.
Direct Interelectrode Capacitances:		
Grid to Plate	0.007 max.	$\mu\text{pF}$
Input	5.3	$\mu\text{pF}$
Output	10.5	$\mu\text{pF}$
Overall Length	4-25/32" to 5-1/32"	
Maximum Diameter	1-13/16"	
Bulb	ST-14	
Cap	Small Metal	
Base	Medium 5-Pin	
Pin 1 - Heater	Pin 4 - Cathode	
Pin 2 - Plate	Pin 5 - Heater	
Pin 3 - Screen	Cap - Grid	
Mounting Position	BOTTOM VIEW	Any ←

AMPLIFIER - Class A<sub>1</sub>

## Operating Conditions and Characteristics:

Heater*	2.5	2.5	volts
Plate	180	250 <sup>o</sup>	volts
Screen	90	90	max. volts
Grid	-3	-3	volts
Amp. Fact.	400	630	
Plate Res.	400000	600000	ohms
Transcond.	1000	1050	$\mu\text{mhos}$
Plate Cur.	4	4	ma.
Screen Cur.	1.7	1.7	max. ma.

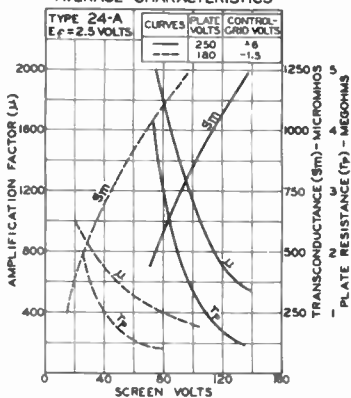
## DETECTOR

## Typical Operation:

	Biased	Grid-Leak	
Heater *	2.5	2.5	volts
Plate	250 <sup>o</sup>	180 max.	volts
Screen	20 to 45	20 to 45	volts
Grid	-5 approx.	Return to Cathode <sup>v</sup>	volts
Plate Load	0.25 <sup>Δ</sup>	0.25 <sup>Δ</sup>	megohm
Plate Cur.	Adjusted to 0.1 ma. with no input signal <sup>■</sup>		

- Max. plate volts = 275.
- ▼ Conventional grid leak and condenser.
- ▲ Or 500 h. choke shunted by 0.25 megohm. For resistance load, plate-supply voltage will be voltage at plate plus voltage drop in load caused by specified plate current.
- with shield-can.
- Average plate current with normal maximum signal should be limited to 4.0 ma., as measured with a d-c meter.
- \* In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.
- ← Indicates a change.

## AVERAGE CHARACTERISTICS



APRIL 3, 1939

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY INC

World Radio History

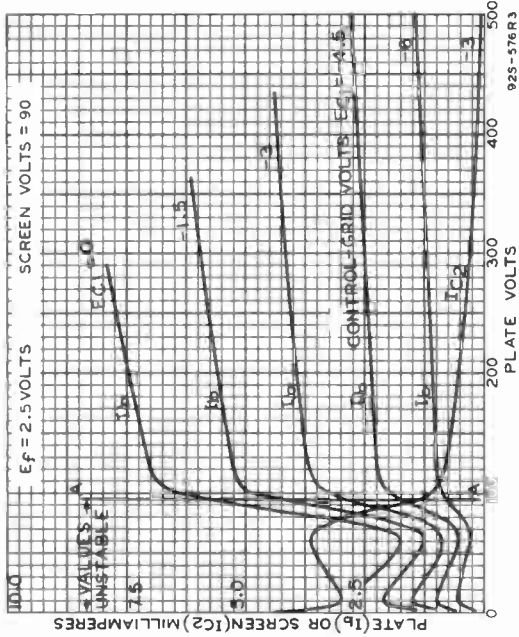
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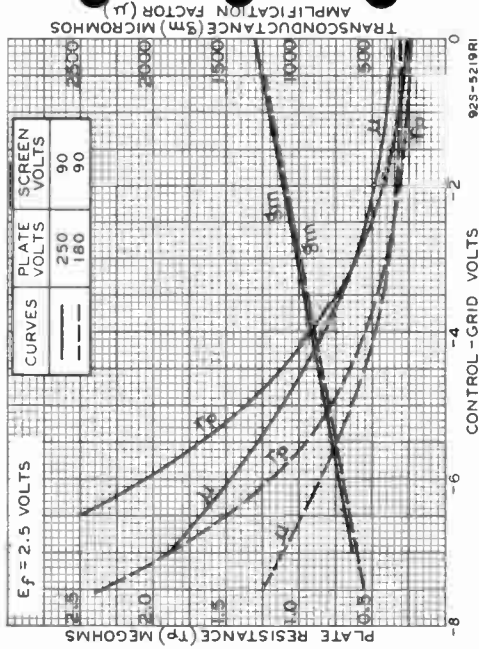
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## AVERAGE PLATE CHARACTERISTICS



World Archival

## AVERAGE CHARACTERISTICS



FEB. 14, 1939

RCA RADIORON DIVISION  
RCA MANUFACTURING COMPANY INC

92C-6027



25A6  
25A6-GT/G

# 25A6, 25A6-GT/G

## POWER AMPLIFIER PENTODE

Heater		Coated Unipotential Cathode	
Voltage	25	a-c or d-c volts	
Current	0.3	amp.	
	<u>25A6</u>	<u>25A6-GT/G</u>	
Direct Interelectrode Cap.	▲		
Grid to Plate	0.2	-	μf
Input	8.5	-	μf
Output	12.5	-	μf
Maximum Overall Length	3-1/4"	3-5/16"	
Maximum Seated Height	2-11/16"	7-3/4"	
Maximum Diameter	1-5/16"	1-5/16"	
Bulb	Metal Shell, MT-8	T-9	
Base	{ Small Wafer { Octal 7-Pin	{ Intermed. Sh. { Octal 7-Pin	
Basing Designation	7S	G-7S	
Pin 1 { 25A6, Shell { 25A6-GT/G, No Con.		Pin 5 - Grid	
Pin 2 - Heater		Pin 7 - Heater	
Pin 3 - Plate		Pin 8 - Cathode,	
Pin 4 - Screen		Grid #3	
Mounting Position			Any



BOTTOM VIEW

Maximum Ratings Are Design-Center Values  
AMPLIFIER

Plate Voltage	160 max. volts
Screen Voltage	135 max. volts
Plate Dissipation	5.3 max. watts
Screen Dissipation	1.9 max. watts

*Typical Operation and Characteristics— Class A<sub>1</sub> Amplifier:*

Plate Voltage	95	135	160	volts
Screen Voltage	95	135	120	volts
Grid Voltage *	-15	-20	-18	volts
Peak A-F Grid Voltage	15	20	18	volts
Zero-Sig. Plate Current	20	37	33	ma.
Max.-Sig. Plate Current	22	39	36	ma.
Zero-Sig. Screen Current	4	8	6.5	ma.
Max.-Sig. Screen Current	8	14	12	ma.
Plate Resistance	4500	3500	4200	ohms
Transconductance	2000	2450	2375	μmhos
Load Resistance	4500	4000	5000	ohms
Total Harmonic Distortion	11	9	10	%
Max.-Sig. Power Output	0.9	2	2.2	watts

■ Heater-cathode bias should not exceed 90 volts d.c. as measured between negative heater terminal and cathode.  
 ▲ with shell connected to cathode. Values are approximate.  
 \* The d-c resistance in the grid circuit should not exceed 0.5 megohm with cathode bias. With fixed bias, the d-c resistance may be as high as 0.5 megohm for the 95-volt condition, but should be limited to 0.1 megohm for the 135-volt and 160-volt conditions.

Curves under Type 43 also apply to the 25A6 and 25A6-GT/G.

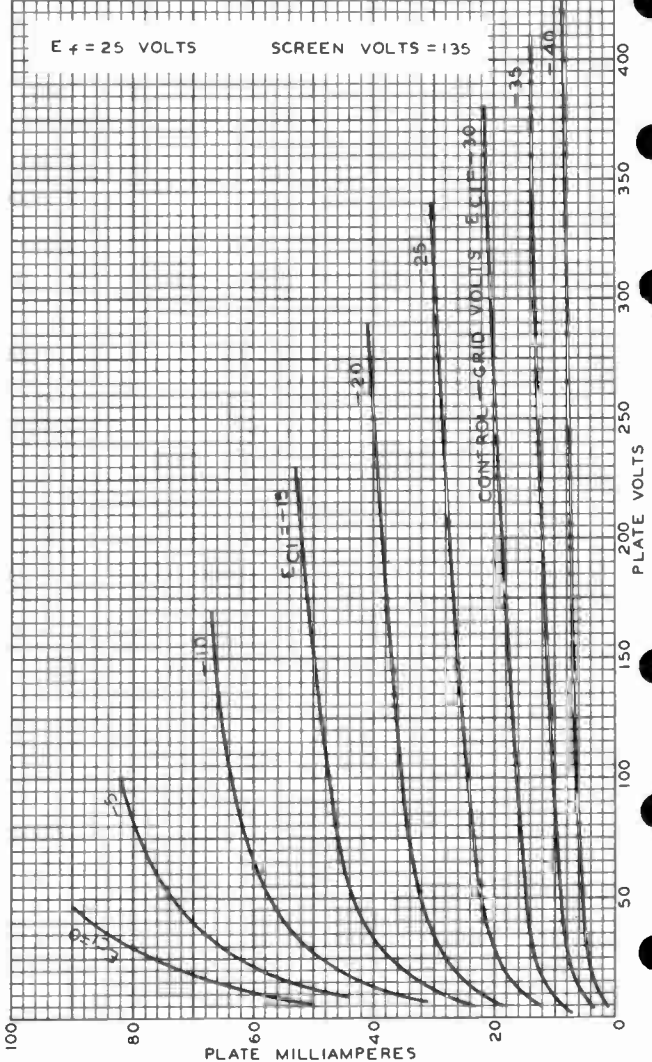
- Indicates a change.

25A6



25A6

### AVERAGE PLATE CHARACTERISTICS



JAN. 8, 1940

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY  
World Radio History

92C-4559RI





25L6

25L6

# BEAM POWER AMPLIFIER

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . .	25 . . . . .	ac or dc volts
Current. . . . .	0.3 . . . . .	amp

Direct Interelectrode Capacitances (Approx.):<sup>o</sup>

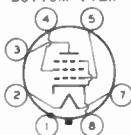
Grid No.1 to Plate . . . . .	0.3 . . . . .	$\mu$ f
Input. . . . .	10.0 . . . . .	$\mu$ f
Output . . . . .	13.5 . . . . .	$\mu$ f

<sup>o</sup> with shell connected to cathode.

### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	3-1/4"
Maximum Seated Length. . . . .	2-11/16"
Maximum Diameter . . . . .	1-5/16"
Bulb . . . . .	Metal Shell, MT-8
Base . . . . .	Small-Wafer Octal 7-Pin
Basing Designation for BOTTOM VIEW . . . . .	7AC

- Pin 1 - Shell
- Pin 2 - Heater
- Pin 3 - Plate
- Pin 4 - Grid No.2



- Pin 5 - Grid No.1
- Pin 7 - Heater
- Pin 8 - Cathode, Grid No.3

## AF POWER AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . .	200 max.	volts
GRID-No.2 (SCREEN) VOLTAGE . . . . .	117 max.	volts
PLATE DISSIPATION. . . . .	10 max.	watts
GRID-No.2 INPUT. . . . .	1.25 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 and Characteristics:

Plate Voltage. . . . .	110	200	volts	←
Grid-No.2 Voltage. . . . .	110	110	volts	
Grid-No.1 (Control-Grid) Voltage . . . . .	-7.5	-8	volts	
Peak AF Grid-No.1 Voltage. . . . .	7.5	8	volts	
Zero-Signal Plate Current. . . . .	49	50	ma	
Max.-Signal Plate Current. . . . .	50	55	ma	
Zero-Sig. Grid-No.2 Cur. (Approx.)	4	2	ma	
Max.-Sig. Grid-No.2 Cur. (Approx.)	11	7	ma	
Plate Resistance (Approx.) . . . . .	13000	30000	ohms	
Transconductance . . . . .	9000	9500	$\mu$ mos	
Load Resistance. . . . .	2000	3000	ohms	
Total Harmonic Distortion. . . . .	10	10	%	

← Indicates a change.

25L6



25L6

## BEAM POWER AMPLIFIER

Max.—Signal Power Output . . . . . 2.1 4.3 watts

### Maximum Circuit Values (for maximum rated conditions):

Grid—No.1—Circuit Resistance:

For fixed bias . . . . .	0.1	megohm
For cathode bias . . . . .	0.5	megohm

*Curves shown under Type 50L6-GT also apply to the 25L6.*



25Z5



25Z5

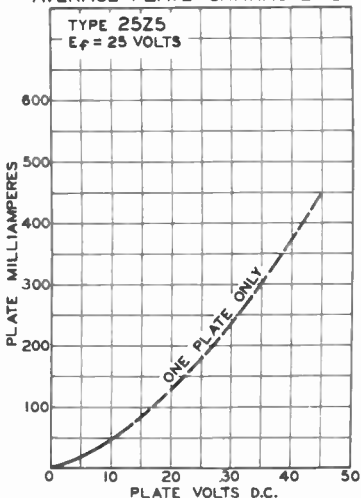
# HIGH-VACUUM RECTIFIER-DOUBLER

Heater	Coated Unipotential Cathodes	
Voltage	25	a-c or d-c volts
Current	0.3	amp.
Maximum Overall Length		4-3/16"
Maximum Seated Height		3-9/16"
Maximum Diameter		1-9/16"
Bulb		ST-12
Base		Small 6-Pin
Pin 1 - Heater		Pin 4 - Cathode #1
Pin 2 - Plate #2		Pin 5 - Plate #1
Pin 3 - Cathode #2		Pin 6 - Heater
Mounting Position		BOTTOM VIEW (6E)

Maximum Ratings, Typical Operating Conditions, and Curves are the same as those for Type 25B6.

In the design of "transformerless" receivers, a filter of condenser-input type is recommended for use with the 25Z5 in order to obtain a d-c output voltage as high as possible. A larger input capacitance, i.e., 16  $\mu$ f, is desirable for half-wave rectifier service, while a higher value is advantageous for voltage-doubler circuits. Since the peak voltage applied to the input condenser(s) is relatively low, it is possible to use condensers having moderate voltage rating (sufficient only for the line voltage). For rectifier and voltage-doubler circuits, see next page.

### AVERAGE PLATE CHARACTERISTIC



92C-4458R1

← Indicates a change.

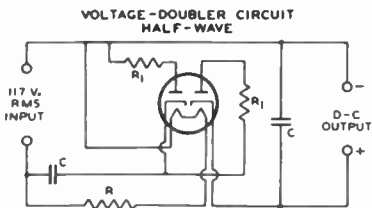
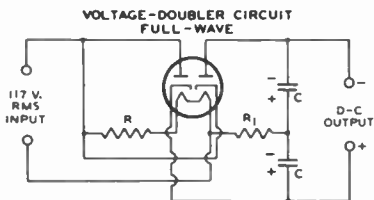
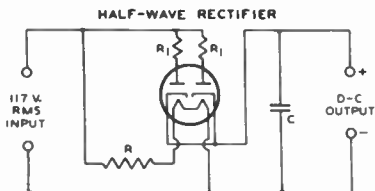
Sept. 2, 1941

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY INC  
World Radio History

DATA



## TYPICAL RECTIFIER-DOUBLER CIRCUITS



R = HEATERS OF OTHER TUBES IN SERIES  
WITH VOLTAGE-DROPPING RESISTOR

$R_1$  = PROTECTIVE RESISTOR

C = CONDENSERS

The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained herein is furnished without assuming any obligations.



2526  
2526-GT/G

## 2526, 2526-GT/G

### HIGH-VACUUM RECTIFIER-DOUBLER

Heater Voltage	25	a-c or d-c volts
Current	0.3	amp.
	2526	2526-GT/G
Maximum Overall Length	3-1/4"	3-5/16"
Maximum Seated Height	2-11/16"	2-3/4"
Maximum Diameter	1-5/16"	1-5/16"
Bulb	Metal Shell, MT-8	T-9
Base	{ Small Wafer Octal 7-Pin	{ Intermed. Sh. Octal 7-Pin
Basing Designation	70	G-70
Pin 1 { 2526, Shell		Pin 4 - Cathode #2
Pin 2 - Heater		Pin 5 - Plate #1
Pin 3 - Plate #2		Pin 7 - Heater
Mounting Position		Pin 6 - Cathode #1
		Any



BOTTOM VIEW

Maximum Ratings Are Design-Center Values  
RECTIFIER OR DOUBLER

Peak Inverse Plate Voltage	700 max. volts
Peak Plate Current per Plate	450 max. ma.
D-C Output Current per Plate	75 max. ma.
D-C Heater-Cathode Potential	350 max. volts

Typical Operation as Half-Wave Rectifier  
with Condenser-Input Filter:\*

Unless otherwise indicated, values are for both plates in parallel.

A-C Plate Supply Voltage per Plate (RMS)	117	150	235	volts
Filter Input Condenser	16	16	16	μf
Min. Total Effect. Plate-Supply Imped. per Plate	15	40	100	ohms
D-C Output Current per Plate	75	75	75	ma.
D-C Voltage (At input to filter):*				
At half-load current (75 ma.)	115	-	255	volts
At full-load current (150 ma.)	80	-	200	volts
Difference (Voltage Regulation)	35	-	55	volts
Percentage Regulation	30	-	22	%

Typical Operation as Voltage Doubler:

	Half-Wave	Full-Wave	
A-C Plate Supply Voltage per Plate (RMS)	117	117	volts
Filter Input Condenser (Each)	16	16	μf
Min. Total Effect. Plate-Supply Imped. per Plate	30	15	ohms
D-C Output Current	75	75	ma.
D-C Voltage (At input to filter):*			
At half-load current (37.5 ma.)	-	250	volts
At full-load current (75 ma.)	-	205	volts
Difference (Voltage Regulation)	-	45	volts
Percentage Regulation	-	18	%

\* In half-wave rectifier service, the two units may be used separately or in parallel.  
\* Approximate values.

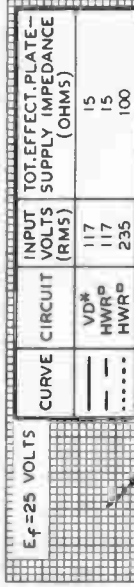
Circuits and Plate Characteristic Curve for the 2526 and 2526-GT/G are the same as for Type 2525.

2576

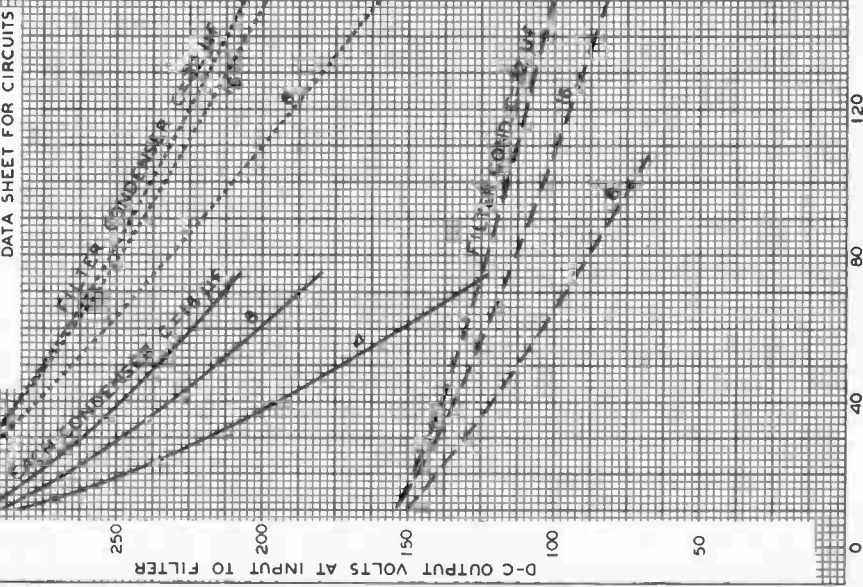


2576

## OPERATION CHARACTERISTICS



\* VD = VOLTAGE DOUBLER (FULL-WAVE)  
<sup>o</sup> HWR = HALF-WAVE RECTIFIER, SEE 2525  
 DATA SHEET FOR CIRCUITS



NOV. 27, 1939

D-C LOAD MILLIAMPERES

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARTISON, NEW JERSEY

92C-4603 R2

## RCA-26 AMPLIFIER A-C FILAMENT

Filament	Coated		
Voltage	1.5		a-c or d-c volts
Current	1.05		amp.
<b>Direct Interelectrode Capacitances:</b>			
Grid to Plate	8.1		$\mu\text{f}$
Grid to Filament	2.8		$\mu\text{f}$
Plate to Filament	2.5		$\mu\text{f}$
Maximum Overall Length			4-11/16"
Maximum Diameter			1-13/16"
Bulb	(2)	(3)	ST-14
Base			Medium 4-Pin
Pin 1-Filament	(1)		Pin 3-Grid
Pin 2-Plate		(4)	Pin 4-Filament

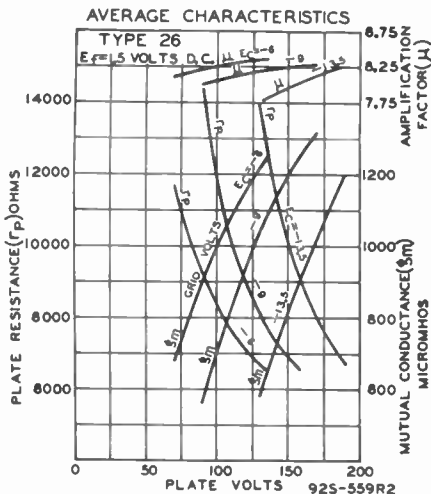
BOTTOM VIEW

### AMPLIFIER (Class A)

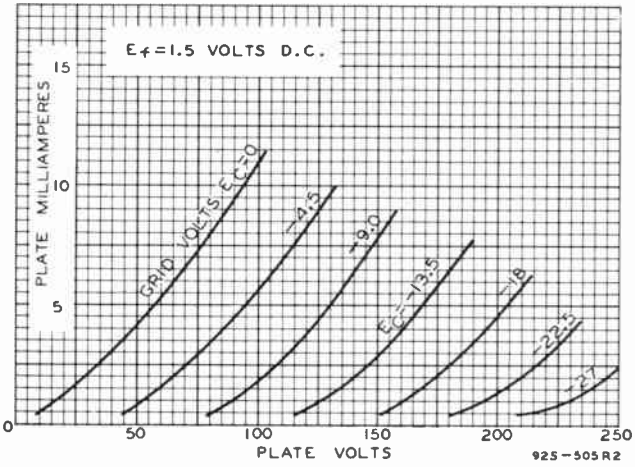
**Operating Conditions and Characteristics:**

Filament	1.5	1.5	1.5		a-c volts
Plate	90	135	180	max.	volts
Grid*	-7	-10	-14.5		volts
Amp. Fact.	8.3	8.3	8.3		
Plate Res.	8900	7600	7300		ohms
Mut. Cond.	935	1100	1150		$\mu\text{mhos}$
Plate Cur.	2.9	5.5	6.2		ma.

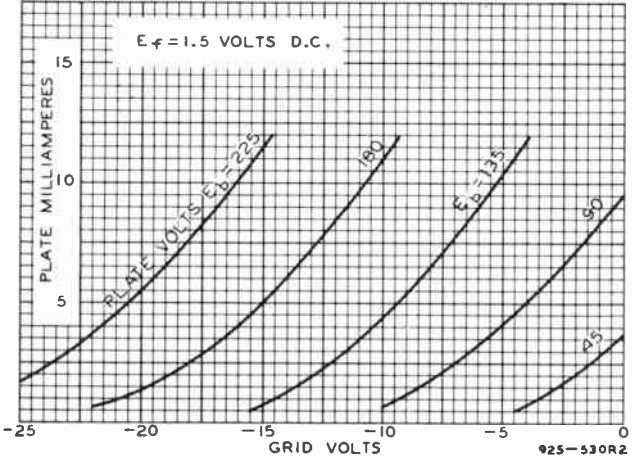
\* Grid volts measured from mid-point of a-c operated filament.



AVERAGE PLATE CHARACTERISTICS



AVERAGE CHARACTERISTICS





## RCA-27 DETECTOR, AMPLIFIER

Heater	Coated Uni-potential Cathode		
Voltage	2.5		a-c or d-c volts
Current	1.75		amp.
Direct Interelectrode Capacitances:			
Grid to Plate	3.3		μf
Grid to Cathode	3.1		μf
Plate to Cathode	2.3		μf
Maximum Overall Length	③		4-1/4"
Maximum Diameter			1-9/16"
Bulb			ST-12
Base	②	④	Medium 5-Fin
Pin 1-Heater			Pin 4-Cathode
Pin 2-Plate	①	⑤	Pin 5-Heater
Pin 3-Grid			

### BOTTOM VIEW AMPLIFIER (Class A)

Operating Conditions and Characteristics:					
Heater*	2.5	2.5	2.5	2.5	volts
Plate	90	135	180	250	275 max. volts
Grid	-6	-9	-13.5	-21	volts
Amp. Fact.	9	9	9	9	
Plate Res.	11000	9000	9000	9250	ohms
Mut. Cond.	820	1000	1000	975	μmhos
Plate Cur.	2.7	4.5	5.0	5.2	ma.

Grid-coupling resistor, if used, should not exceed 1.0 megohm.

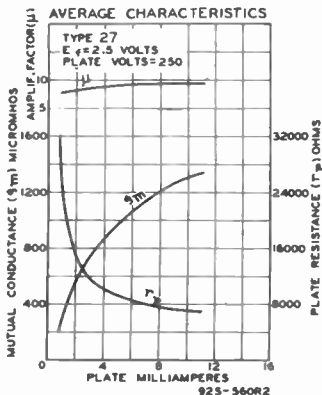
### DETECTOR

Typical Operation:	<u>Biased</u>	<u>Grid-Leak</u>	
Heater *	2.5	2.5	2.5 volts
Plate	250*	275 max.	45 volts
Grid	-30*	-33*	Return to Cathode volts
Plate Cur. <sup>o</sup>	Adjusted to 0.2 ma. with no input signal		-
Grid Leak	-	-	1 to 5 megohms
Grid Condenser	-	-	0.00025 μf

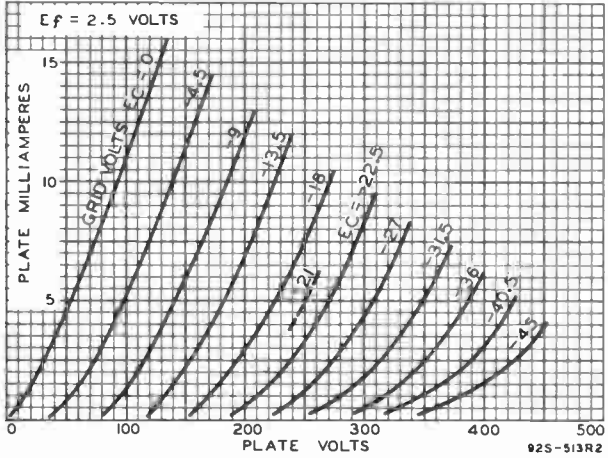
<sup>o</sup> Max-Signal d-c plate current should be limited to 5.0 ma.

\* Recommended practice is to connect the cathode directly to a mid-tap on the heater winding. If this practice is not followed, the potential difference between heater and cathode should be kept as low as possible.

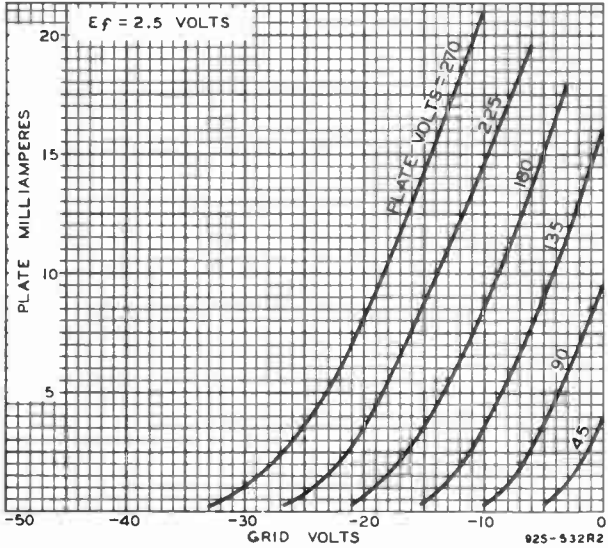
# Approximate.



AVERAGE PLATE CHARACTERISTICS



AVERAGE CHARACTERISTICS





35A5

35A5

# BEAM POWER AMPLIFIER

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . . 35.0 . . . . . ac or dc volts

Current. . . . . 0.15 . . . . . amp

### Mechanical:

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 3-5/32"

Maximum Seated Length. . . . . 2-5/8"

Maximum Diameter . . . . . 1-3/16"

Eulb . . . . . T-9

Base . . . . . Lock-in 8-Pin

Basing Designation for BOTTOM VIEW . . . . . 6AA

Pin 1 - Heater

Pin 2 - Plate

Pin 3 - Grid No.2

Pin 4 - No Connection

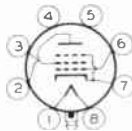
Pin 5 - No Connection

Pin 6 - Grid No.1

Pin 7 - Cathode, Grid No.3

Pin 8 - Heater

Plug - Base Shell



## AF POWER AMPLIFIER - Class A<sub>1</sub>

### Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . . 200 max. volts

GRID-No.2 (SCREEN) VOLTAGE . . . . . 125 max. volts

PLATE DISSIPATION. . . . . 8.5 max. watts

GRID-No.2 DISSIPATION. . . . . 1.0 max. watt

### PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode. 90 max. volts

Heater positive with respect to cathode. 90 max. volts

### Typical Operation and Characteristics:

Plate Voltage. . . . . 110 200 . . volts

Grid-No.2 Voltage . . . . . 110 110 . . volts

Grid-No.1 (Control-Grid) Voltage . -7.5 -8 . . volts

Zero-Signal Plate Current. . . . . 40 41 . . ma.

Max.-Signal Plate Current. . . . . 41 44 . . ma.

Zero-Signal Grid-No.2 Current. . . . 3.0 2.0 . . ma.

Max.-Signal Grid-No.2 Current. . . . 7.0 7.0 . . ma.

Plate Resistance (Approx.) . . . . . 16000 40000 . . ohms

Transconductance . . . . . 5800 5900 . .  $\mu$ mhos

Load Resistance. . . . . 2500 4500 . . ohms

Total Harmonic Distortion. . . . . 10 10 . . %

Max.-Sig. Power Output . . . . . 1.5 3.3 . . watts

### Maximum Circuit Values (for maximum rated conditions):

Grid-No.1-Circuit Resistance:

For fixed bias . . . . . 0.1 . . megohm

For cathode bias . . . . . 0.5 . . megohm





35Y4

35Y4

# HALF-WAVE VACUUM RECTIFIER

## GENERAL DATA

### Electrical:

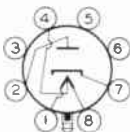
	Without Panel Lamp	With No.40 or No.47 Panel Lamp <sup>▲</sup>	
Heater, for Unipotential Cathode:			
Voltage (AC or DC):			
Entire Heater (pins 1 & 8) . . . . .	35	32	volts
Panel-Lamp Section (pins 1 & 4) . . . . .	7.5	5.5	volts
Current {	between pins 1 & 8 . . . . .	0.15	amp
	between pins 4 & 8 . . . . .	-	0.15 amp

▲ Under typical operating conditions shown below.

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	3-5/32"
Maximum Seated Length . . . . .	2-5/8"
Maximum Diameter . . . . .	1-3/16"
Bulb . . . . .	T-9
Base . . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	5AL

- Pin 1 - Heater
- Pin 2 - Plate
- Pin 3 - No Connection
- Pin 4 - Heater Tap
- Pin 5 - No Connection
- Pin 6 - No Connection



- Pin 7 - Cathode
- Pin 8 - Heater
- Plug - Base Shell
- Panel-Lamp Heater Section is between pins 1 & 4

## HALF-WAVE RECTIFIER

### Maximum Ratings, Design-Center Values:

PEAK INVERSE PLATE VOLTAGE . . . . .	700 max.	volts
PEAK PLATE CURRENT . . . . .	600 max.	ma
DC OUTPUT CURRENT:		
With Panel Lamp & { No Shunting Resistor . . . . .	60 max.	ma
{ Shunting Resistor . . . . .	90 max.	ma
Without Panel Lamp . . . . .	100 max.	ma
PANEL-LAMP-SECTION VOLTAGE (RMS):		
When panel lamp fails . . . . .	15 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	300 max.	volts
Heater positive with respect to cathode . . . . .	300 max.	volts

### Typical Operation With No.40 or No.47 Panel Lamp in Circuit Below with Capacitor-Input Filter:

AC Plate-Supply Volt. (RMS)	117	117	117	117	235	volts
Filter-Input Capacitor . . . . .	40	40	40	40	40	μf
Min. Total Effective Plate-Supply Impedance . . . . .	15	15	15	15	100	ohms
Panel-Lamp Shunting Res. . . . .	-	300	150	100	-	ohms
DC Output Current . . . . .	60	70	80	90	60	ma

35Y4



35Y4

## HALF-WAVE VACUUM RECTIFIER

### Typical Operation Without Panel Lamp in Conventional Half-Wave Circuit with Capacitor-Input Filter:

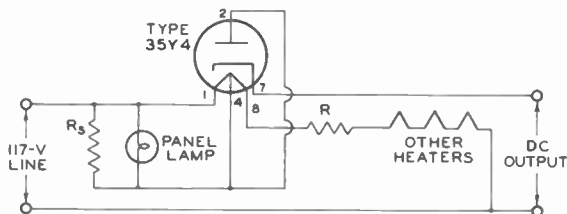
AC Plate-Supply Voltage (RMS) . . . . .	117	235	volts
Filter-Input Capacitor . . . . .	40	40	$\mu$ f
Min. Total Effective Plate-Supply Imped. . . . .	15	100	ohms
DC Output Current . . . . .	100	100	ma
DC Output Voltage at Input to Filter (Approx.):			
At half-load current (50 ma.) . . . . .	140	280	volts
At full-load current (100 ma.) . . . . .	120	235	volts
Voltage Regulation (Approx.):			
Half-load to full-load current . . . . .	20	45	volts

### Maximum Circuit Values:

Panel-Lamp Shunting Resistor:\*

For dc output current of	70 ma. . . .	800 max.	ohms
	80 ma. . . .	400 max.	ohms
	90 ma. . . .	250 max.	ohms

\* Required when dc output current is greater than 60 ma.



DROP ACROSS R AND ALL HEATERS (WITH PANEL LAMP) SHOULD EQUAL 117 VOLTS AT 0.15 AMPERE.  $R_s$  = SHUNTING RESISTOR REQUIRED WHEN DC OUTPUT CURRENT EXCEEDS 60 MILLIAMPERES

92C5-6626

Many of the devices and arrangements shown or described herein use inventions of patents owned by RCA or others. Information contained herein is furnished without assuming any responsibility for its use.



35Z3

# 35Z3 HALF-WAVE VACUUM RECTIFIER

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . .	35	. . . . .	ac or dc volts
Current. . . . .	0.15	. . . . .	amp

### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	3-5/32"
Maximum Seated Length. . . . .	2-5/8"
Maximum Diameter . . . . .	1-3/16"
Bulb . . . . .	T-9
Base . . . . .	Lock-in 8-Pin
Basing Designation for BOTTOM VIEW . . . . .	4Z

Pin 1 - Heater

Pin 2 - Plate

Pin 3 - No Connection

Pin 4 - No Connection

Pin 5 - No Connection

Pin 6 - No

Connection

Pin 7 - Cathode

Pin 8 - Heater

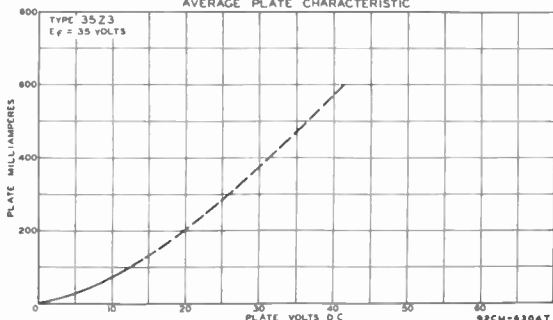
Plug - Base

Shell



*Maximum Ratings and Typical Operating Conditions for the 35Z3 are the same as for Type 35Z4-GT.*

AVERAGE PLATE CHARACTERISTIC



35Z4-GT



# 35Z4-GT HALF-WAVE VACUUM RECTIFIER

## GENERAL DATA

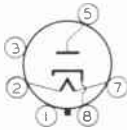
### Electrical:

Heater, for Unipotential Cathode:  
 Voltage . . . . . 35 . . . . . ac or dc volts  
 Current . . . . . 0.15 . . . . . amp

### Mechanical:

Mounting Position . . . . . Any  
 Maximum Overall Length . . . . . 3-5/16"  
 Maximum Seated Length . . . . . 2-3/4"  
 Maximum Diameter . . . . . 1-5/16"  
 Bulb . . . . . T-9  
 Base . . . . . Intermediate-Shell Octal 6-Pin  
 Basing Designation for BOTTOM VIEW . . . . . G-5AA

Pin 1 - No Connection  
 Pin 2 - Heater  
 Pin 3 - No Connection  
 Pin 5 - Plate  
 Pin 7 - Heater  
 Pin 8 - Cathode



## HALF-WAVE RECTIFIER.

### Maximum Ratings, Design-Center Values:

PEAK INVERSE PLATE VOLTAGE . . . . . 700 max. volts  
 PEAK PLATE CURRENT . . . . . 600 max. ma.  
 DC OUTPUT CURRENT . . . . . 100 max. ma.  
 PEAK HEATER-CATHODE VOLTAGE:  
 Heater negative with respect to cathode . . . . . 350 max. volts  
 Heater positive with respect to cathode . . . . . 350 max. volts

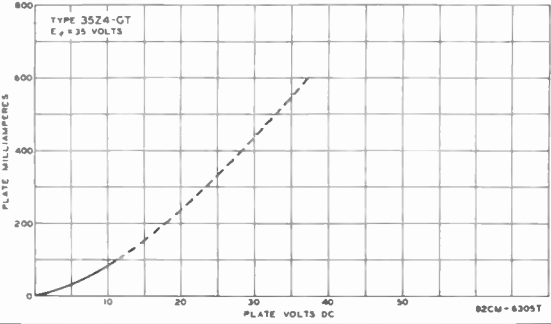
### Typical Operation with Capacitor-Input Filter:

AC Plate-Supply Voltage (RMS) . . . . . 117 235 volts  
 Min. Total Effective Plate-Supply Imped.<sup>▲</sup> . . . . . 15 100 ohms  
 DC Output Current . . . . . 100 100 ma.

▲ when a filter-input capacitor larger than 40  $\mu$ f is used, it may be necessary to use more plate-supply impedance than the minimum value shown to limit the peak plate current to the rated value.

Curves under Type 35Z5-GT also apply to the 35Z4-GT

AVERAGE PLATE CHARACTERISTIC







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## POWER PENTODE

Heater <sup>■</sup>	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.4	amp.
Direct Interelectrode Capacitances (Approx.): <sup>○</sup>		
Grid to Plate	0.6	$\mu\text{f}$
Input	6.0	$\mu\text{f}$
Output	7.5	$\mu\text{f}$
Maximum Overall Length		4-3/16"
Maximum Seated Height		3-9/16"
Maximum Diameter		1-9/16"
Bulb		ST-12
Base		Small-Shell Small 6-Pin
Pin 1 - Heater		Pin 4 - Grid
Pin 2 - Plate		Pin 5 - Cathode
Pin 3 - Screen		Pin 6 - Heater
Mounting Position		Any



BOTTOM VIEW (6B)

Maximum Ratings Are Design-Center Values

SINGLE-TUBE AMPLIFIER

Plate Voltage	315 max.	volts
Screen Voltage	285 max.	volts
Plate Dissipation	8.5 max.	watts
Screen Dissipation	2.8 max.	watts

*Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:*

Plate	100	250	315	volts
Screen	100	250	250	volts
Grid*	-7	-18	-21	volts
Peak A-F Grid Voltage	7	18	21	volts
Zero-Sig. Plate Cur.	9	32	25.5	ma.
Max.-Sig. Plate Cur.	9.5	33	28	ma.
Zero-Sig. Screen Cur.	1.6	5.5	4.0	ma.
Max.-Sig. Screen Cur.	3	10	9	ma.
Plate Resistance	104000	68000	75000	approx. ohms
Transconductance	1500	2300	2100	$\mu\text{mhos}$
Load Resistance	12000	7600	9000	ohms
Total Harmonic Dist.	11	11	15	%
Max.-Sig. Power Output	0.35	3.4	4.5	watts

PUSH-PULL AMPLIFIER

Plate Voltage	315 max.	volts
Screen Voltage	285 max.	volts
Plate Dissipation	8.5 max.	watts
Screen Dissipation	2.8 max.	watts

*Typical Operation - Class A<sub>1</sub> Amplifier:*

Unless otherwise specified, values are for 2 tubes

	<u>Fixed Bias</u>	<u>Cathode Bias</u>	
Plate Voltage	285	285	volts
Screen Voltage	285	285	volts

■ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

○ With no external shield.

\* See next page.

← Indicates a change.

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41

## POWER PENTODE

	<i>Fixed Bias</i>	<i>Cathode Bias</i>	
Grid*	-25.5	-	volts
Cathode Resistor	-	400	ohms
Peak A-F Grid to Grid Volt.	51	51	volts
Zero-Sig. Plate Cur.	55	55	ma.
Max.-Sig. Plate Cur.	72	61	ma.
Zero-Sig. Screen Cur.	9	9	ma.
Max.-Sig. Screen Cur.	17	13	ma.
Effective Load Resistance (plate to plate)	12000	12000	ohms
Total Harmonic Dist.	6	4	%
Max.-Sig. Power Output	10.5	9.8	watts

\* The type of input coupling should not introduce too much resistance in the grid circuit. Transformer- or impedance-coupling devices are recommended. When the grid circuit has a resistance not higher than 0.1 megohm, fixed bias may be used; for higher values, cathode bias is required. With cathode bias, the grid circuit may have a resistance not to exceed 0.5 megohm.

*Curves for Type 41 are the same as those shown for Type 6K6-GT.*



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**POWER AMPLIFIER PENTODE**

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.7	amp.
Maximum Overall Length		4-11/16"
Maximum Diameter		1-13/16"
Bulb		ST-14
Base		Medium 6-Pin
Pin 1-Heater		Pin 4-Grid
Pin 2-Plate		Pin 5-Cathode
Pin 3-Screen		Pin 6-Heater



BOTTOM VIEW

For additional data, refer to Type 6F6; and to Types 6F6 and 2A5 for additional curves. ←

← Indicates a change.



### OPERATION CHARACTERISTICS TRIODE CONNECTION-CLASS AB OPERATION

$E_f = 6.3$  VOLTS

INPUT STAGE : CLASS A DRIVER-ONE TYPE 42 AS TRIODE  
PLATE VOLTS = 250

SELF-BIAS RESISTOR = 650 OHMS

OUTPUT STAGE : CLASS AB-TWO TYPE 42'S AS TRIODES

ZERO-SIGNAL PLATE VOLTS = 350, FROM  
SUPPLY HAVING RESISTANCE ( $R_b$ )  
SHOWN IN TABLE

ZERO-SIGNAL BIAS VOLTS = VALUE FROM

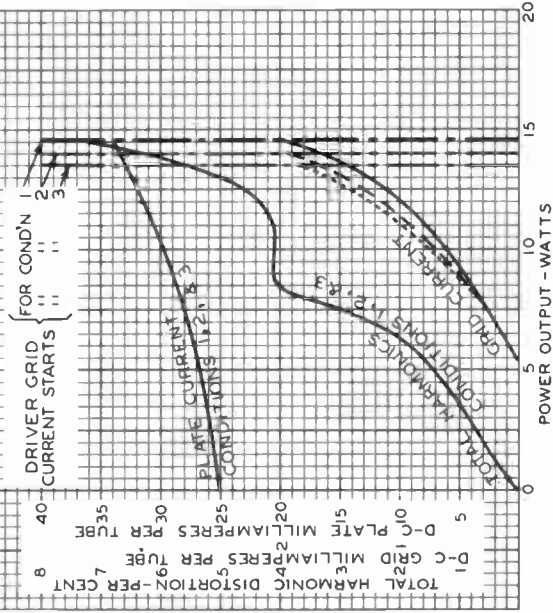
GRID-BIAS RESISTOR ( $R_c$ ) OF

730 OHMS

OUTPUT LOAD, PLATE TO PLATE = 10000 OHMS

CONDIT- TION	CURVE	$R_b$ Ohms	DRIVER STAGE		INTERSTAGE TRANSFORMER	
			Input-Signal Volts* (RMS)	Plate Load Ohms	Voltage Ratio Prim.:1/2 Sec.	Peak Power Efficiency - %
1	---	0	14	15000	1.23	75.7
2	---	500	14	17000	1.29	76.9
3	.....	1000	14	17000	1.29	76.7

\* For maximum output



## RCA-43

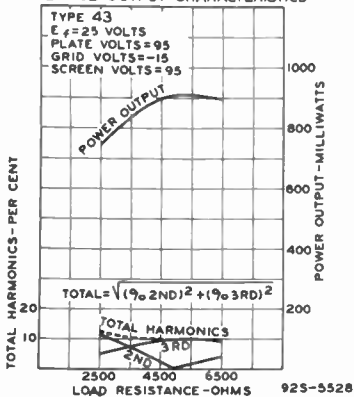
### POWER AMPLIFIER PENTODE

Heater	Coated Unipotential Cathode	
Voltage	25.0	a-c or d-c volts
Current	0.3	amp.
Maximum Overall Length		4-11/16"
Maximum Diameter		1-13/16"
Bulb		ST-14
Base		Medium 6-Pin
Pin 1-Heater	(2)	Pin 4-Grid
Pin 2-Plate	(1)	Pin 5-Cathode
Pin 3-Screen	(3) (4) (5) (6)	Pin 6-Heater

BOTTOM VIEW

*For data and additional curve, refer to Type 25A6. The 43 and 25A6 are identical electrically.*

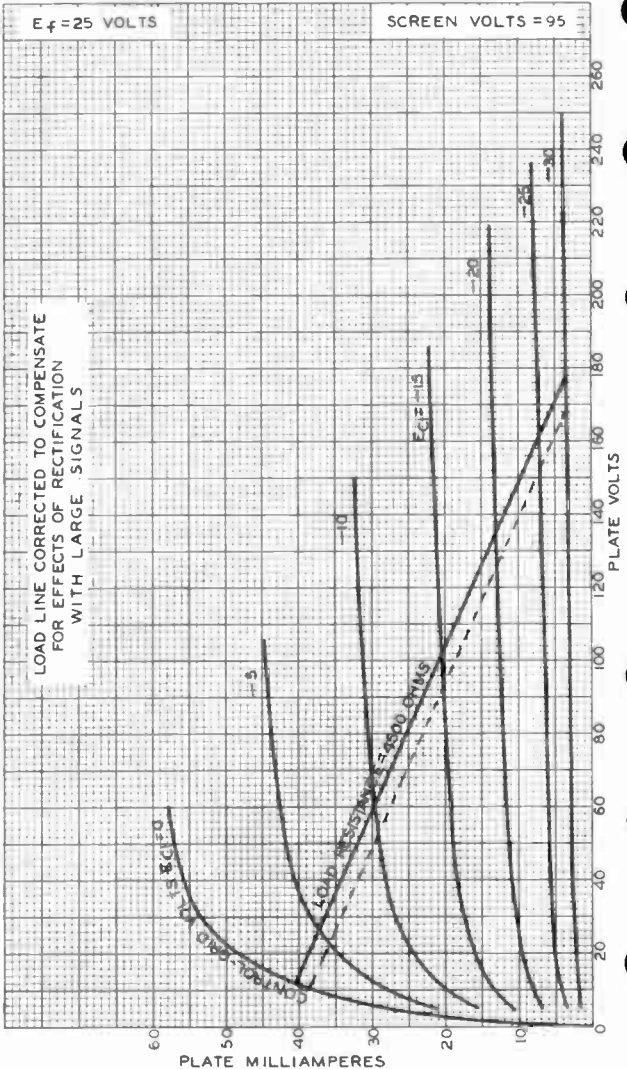
AVERAGE OUTPUT CHARACTERISTICS



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RCA-43

AVERAGE PLATE CHARACTERISTICS





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45

## POWER AMPLIFIER

Filament	Coated		
Voltage	2.5		a-c or d-c volts
Current	1.5		amp.
Direct interelectrode Capacitances:			
Grid to Plate		7	$\mu\text{f}$
Grid to Filament		4	$\mu\text{f}$
Plate to Filament		3	$\mu\text{f}$
Maximum Overall Length			4-11/16"
Maximum Diameter			1-13/16"
Bulb			ST-14
Base			Medium 4-Pin
Pin 1 - Filament			Pin 3 - Grid
Pin 2 - Plate			Pin 4 - Filament
Mounting Position	BOTTOM VIEW		vertical, Base Down



## CLASS A AMPLIFIER

Operating Conditions and Characteristics:				
Filament	2.5	2.5	2.5	a-c volts
Plate	180	250	275 max.	volts
Grid <sup>a</sup>	-31.5	-50	-56	volts
Amp. Fact.	3.5	3.5	3.5	
Plate Res.	1650	1610	1700	ohms
Transcond.	2125	2175	2050	$\mu\text{mhos}$
Plate Cur.	31	34	36	ma.
Load Res.	2700	3900	4600	ohms
U.P.O.	025	1600	2000	mw.

<sup>a</sup> Cathode-bias is advisable in all cases; required if grid-coupling resistor (max. value 1.0 megohm) is used.

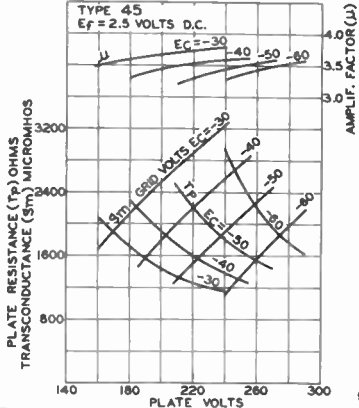
CLASS AB<sub>2</sub> AMPLIFIER

Values are for 2 tubes

Typical Operation:	Fixed Bias		Cathode Bias	
	2.5	2.5	2.5	a-c volts
Filament	275	275	275	max. volts
Plate	-68	-	-	volts
Grid <sup>a</sup>	-	775	-	ohms
Cathode Resistor	656	460	460	mw.
Average Driving Power (grid to grid)	28	36	36	ma.
Zero-Sig. Plate Current	138	90	90	ma.
Max.-Sig. Plate Current	800	1265	1265	ohms
Load Resistance (per tube)	3200	5060	5060	ohms
Effective Load Res. (plate to plate)	5	5	5	%
Total Harmonic Distortion	18	12	12	watts
Power Output				

<sup>a</sup> Grid volts measured from mid-point of a-c operated filament.  
 Horizontal operation permitted if plane of filament is vertical.

## AVERAGE CHARACTERISTICS



← Indicates a change.

82C-565R2

APRIL 20, 1938

DATA








4523

4523

**HALF-WAVE HIGH-VACUUM RECTIFIER**

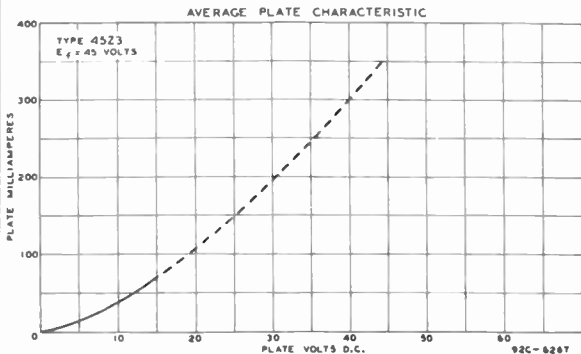
MINIATURE TYPE

Heater	Coated Inimotional Cathode	
Voltage	45	a-c or d-c volts
Current	0.075	amp.
Maximum Overall Length		2-1/8"
Maximum Seated Height		1-7/8"
Maximum Diameter		3/4"
Bulb		T-5-1/2
Base ▲		Miniature Button 7-Pin
Pin 1 - Heater		Pin 4 - Cathode
Pin 2 - Plate		Pin 5 - No Connection
Pin 3 - (Internal Con. Do Not Use)		Pin 6 - Plate
		Pin 7 - Heater

Mounting Position **BOTTOM VIEW (5AV)** AnyHalf-Wave Rectifier

Peak Inverse Voltage	350 max. volts
Peak Plate Current	390 max. ma.
D-C Heater-Cathode Potential	175 max. volts
<i>With Condenser-Input Filter:</i>	
A-C Plate Voltage (RMS)	117 max. volts
Total Effec. Plate-Supply Impedance	15 min. ohms
D-C Output Current	65 max. ma.

▲ The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.



May 1, 1941

RCA RADITRON DIVISION  
RCA MANUFACTURING COMPANY INC

TENTATIVE DATA

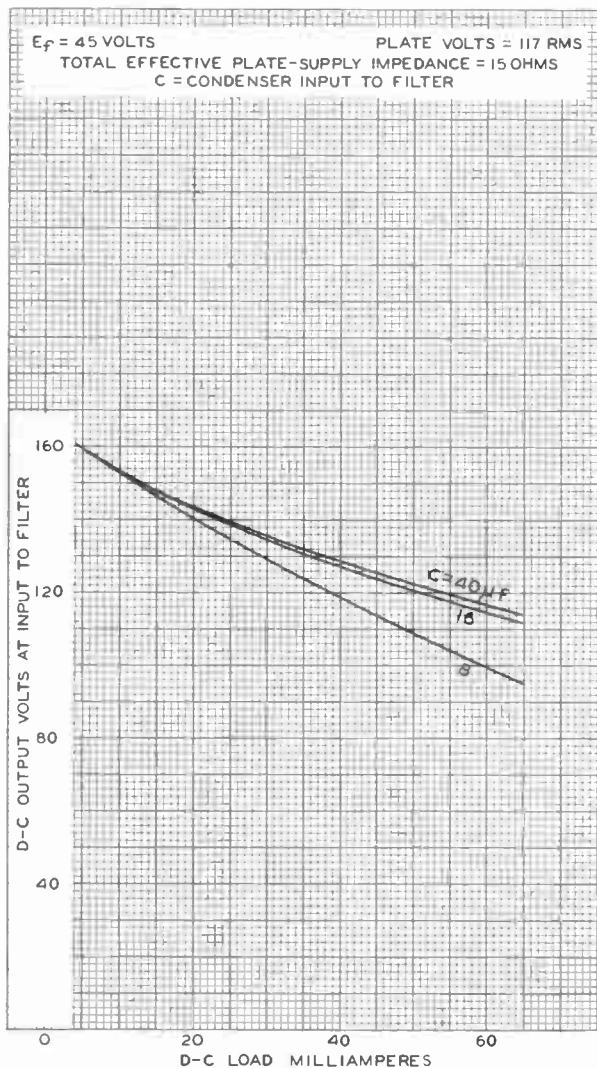
World Radio History

45Z3



45Z3

## OPERATION CHARACTERISTICS



APR. 23, 1941

 RCA RADIODIODE DIVISION  
 RCA MANUFACTURING COMPANY, INC.  
 World Radio History

92C-6266R1



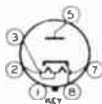
45Z5-GT

45Z5-GT



## HALF-WAVE HIGH-VACUUM RECTIFIER

Heater	Coated Unipotential Cathode	
Voltage:	Entire heater (pins 2 & 7)	45 a-c or d-c volts
	Panel Lamp Section (pins 2 & 3) with 0.15 amp. between pins 2 & 7	7.5 a-c or d-c volts
Current	0.15	amp.
Maximum Overall Length		3-5/16" ←
Maximum Seated Height		2-3/4" ←
Maximum Diameter		1-5/16" ←
Bulb		T-9
Base	Intermediate Shell Octal 6-Pin	
Pin 1 - No Connection	Pin 5 - Plate	
Pin 2 - Heater	Pin 7 - Heater	
Pin 3 - Heater Tap	Pin 8 - Cathode	
Mounting Position		Any



BOTTOM VIEW (G-6AD)

## HALF-WAVE RECTIFIER

A-C Plate Voltage		235 max. volts	←
Peak Inverse Voltage		700 max. volts	←
Peak Plate Current		600 max. ma.	
D-C Output Current:			
With Panel Lamp and	{ No Shunting Resistor Shunting Resistor	60 max. ma.	
Without Panel Lamp		90 max. ma.	←
Shunting Resistor:			
For D-C Output Current of 70 ma.		800 max. ohms	←
80 ma.		400 max. ohms	←
90 ma.		250 max. ohms	←
D-C Heater-Cathode Potential		350 max. volts	←
Panel-Lamp-Sect. Volt. (RMS) when panel lamp fails		15 max. volts	←
Typical Operation:			←

*With #40 or #47 Panel Lamp in Circuit Below with  
Condenser-Input Filter*

Heater Cur. between Pins 3 & 7	0.15	0.15	0.15	0.15	0.15	amp.
Heater Volt. between Pins 2 & 7	42	42	42	42	42	volts
Section Volt. between Pins 2 & 3	5.5	5.5	5.5	5.5	5.5	volts
A-C Plate Voltage (RMS)	117	117	117	117	235	volts
Tot. Eff. Plate-Supply Imped. <sup>Δ</sup>	15	15	15	15	100 min.	ohms
D-C Output Current	60	70	80	90	60	ma.
Shunting Resistance	-	300	150	100	-	ohms

*Without Panel Lamp - Conventional Half-Wave Circuit with  
Condenser-Input Filter*

Heater Cur. between Pins 3 & 7	0.15	0.15	amp.
Heater Volt. between Pins 2 & 7	45	45	volts
Section Volt. between Pins 2 & 3	7.5	7.5	volts
A-C Plate Voltage (RMS)	117	235	volts
Total Effective Plate-Supply Impedance <sup>Δ</sup>	15	100 min.	ohms
D-C Output Current	100	100	ma.

<sup>Δ</sup> When a filter-input condenser larger than 40 μf is used, it may be necessary to use more plate-supply impedance than the minimum value shown to limit the peak plate current to the rated value.

*The Circuit under type 35Z5-GT also applies to the 45Z5-GT.*

← Indicates a change.

Jan. 30, 1942

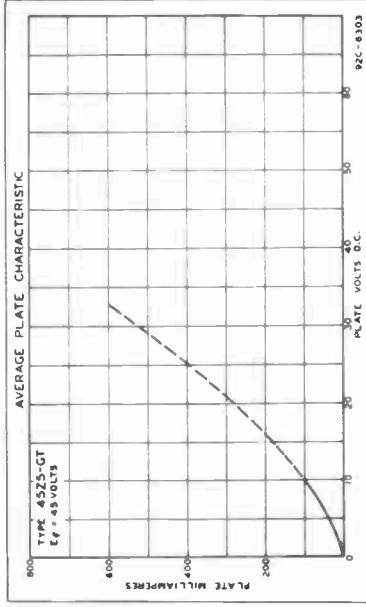
RCA RADIODIVISION  
RCA MANUFACTURING COMPANY, INC.

DATA



45Z5-GT

# HALF-WAVE HIGH-VACUUM RECTIFIER



## OPERATION CHARACTERISTICS HALF-WAVE RECTIFIER

$E_f = 45$  VOLTS BETWEEN PINS N<sup>o</sup>2 & N<sup>o</sup>7  
(NO TAP CONNECTION)

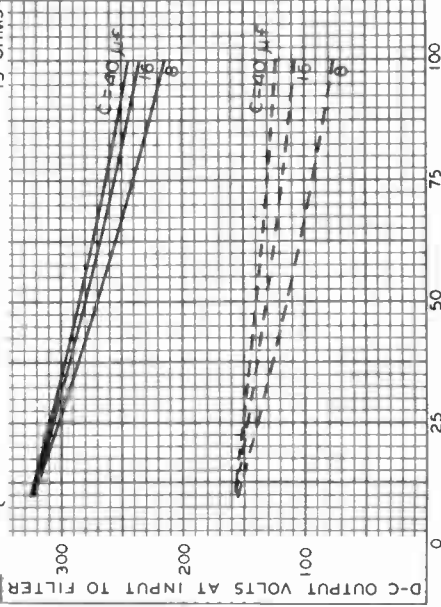
C = CONDENSER INPUT TO FILTER

— { PLATE VOLTS = 235 RMS

----- { TOTAL EFFECTIVE PLATE-SUPPLY IMPEDANCE =  
100 OHMS

— { PLATE VOLTS = 117 RMS

----- { TOTAL EFFECTIVE PLATE-SUPPLY IMPEDANCE =  
15 OHMS





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**DUAL-GRID POWER AMPLIFIER**

Filament	Coated	
Voltage	2.5	a-c or d-c volts
Current	1.75	amp.
Maximum Overall Length		5-3/8" ←
Maximum Diameter		2-1/16" ←
Bulb		ST-16
Base		Medium 5-Pin
Pin 1 - Filament		Pin 4 - Grid #2
Pin 2 - Plate		Pin 5 - Filament
Pin 3 - Grid #1		
Mounting Position		BOTTOM VIEW

**PUSH-PULL AMPLIFIER - Class B**

Grids #1 and #2 connected together at socket  
 Unless otherwise specified, values are for 2 tubes

Plate Voltage		400 max.	volts
Peak Plate Current		200 max.	ma.
Average Plate Dissipation		10 max.	watts
Typical Operation:			
Filament	2.5	2.5	a-c volts
Plate	300	400	volts
Grid (#1 & #2 tied together) *	0	0	volts
Peak A-F Grid-to-Grid Voltage	113	116	volts
Zero-Sig. D-C Plate Cur.	4	6	ma.
Load Resistance (per tube)	1300	1450	ohms
Effective Load Res. (plate to plate)	5200	5800	ohms
Power Output	16 <sup>□</sup>	20 <sup>□□</sup>	approx. watts

\* The grid- and the plate-return lead are connected to the mid-tap of the filament winding or to the center-tap of a 20-ohm resistor across the winding.

□ with average power input of 950 milliwatts applied between grids.

□□ with average power input of 650 milliwatts applied between grids.

**AMPLIFIER - Class A<sub>1</sub>**

Grid #2 connected to plate at socket

**Operating Conditions and Characteristics:**

Filament	2.5	a-c volts
Plate	250 max.	volts
Grid **	-33	volts
Amp. Fact.	5.6	
Plate Res.	2380	ohms
Transcond.	2350	μmhos
Plate Cur.	22	ma.
Load Res. ◊	6400	ohms
U.P.O.	1.25	watts

◊ Optimum for maximum U.P.O. Approximately twice this value is recommended for load of this tube when used as driver for class B stage.

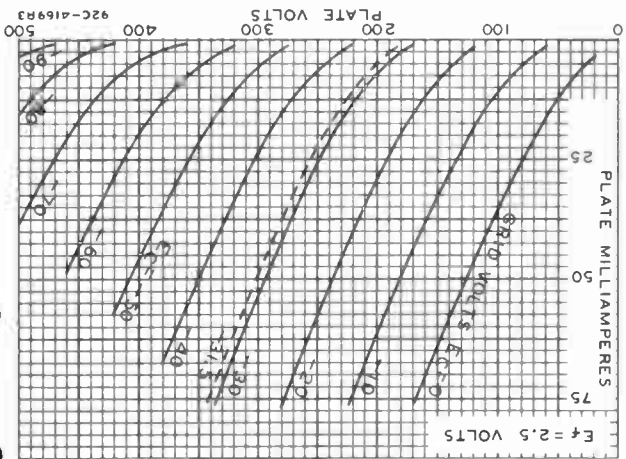
\*\* Grid volts measured from mid-point of a-c operated filament.

◊ Horizontal operation permitted if Pins No. 1 and No. 5 are in a vertical plane.

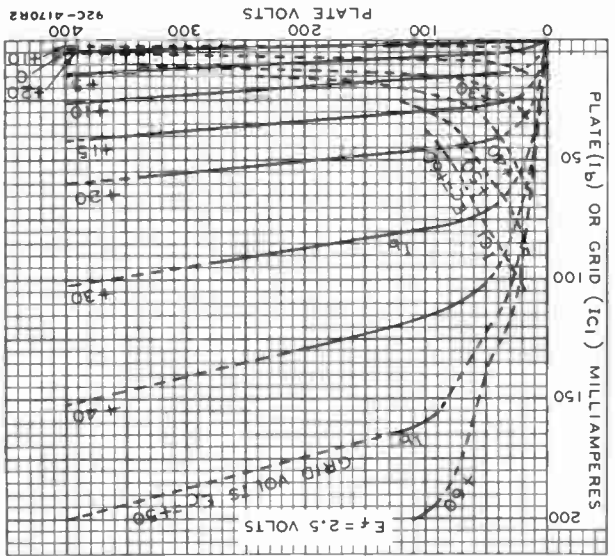
← Indicates a change.



AVERAGE PLATE CHARACTERISTICS  
CLASS A OPERATION-GRID N#2 TIED TO PLATE



AVERAGE PLATE CHARACTERISTICS  
CLASS B OPERATION-GRIDS TIED TOGETHER



## POWER AMPLIFIER PENTODE

Filament	Coated	
Voltage	2.5	a-c or d-c volts
Current	1.75	amp.
Direct Interelectrode Capacitances:		
Grid to Plate	1.2	$\mu\text{f}$
Input	8.6	$\mu\text{f}$
Output	13.0	$\mu\text{f}$
Maximum Overall Length	(3)	5-3/8"
Maximum Diameter		2-1/16"
Bulb		ST-16
Base	(1) (2) (3) (4) (5)	Medium 5-Pin
Pin 1-Filament	(1)	Pin 4-Screen
Pin 2-Plate	(5)	Pin 5-Filament
Pin 3-Grid		

BOTTOM VIEW

### AMPLIFIER - Class A

**Operating Conditions and Characteristics:**

Filament	2.5	a-c volts
Plate	250 maximum	volts
Screen	250 maximum	volts
Grid #	-16.5	volts
Amp. Fact.	150	
Plate Res.	60000	ohms
Transcond.	2500	$\mu\text{hos}$
Plate Cur.	31	ma.
Screen Cur.	6	ma.
Load Res.	7000 <sup>o</sup>	ohms
Power Output	2.7 <sup>o</sup>	watts

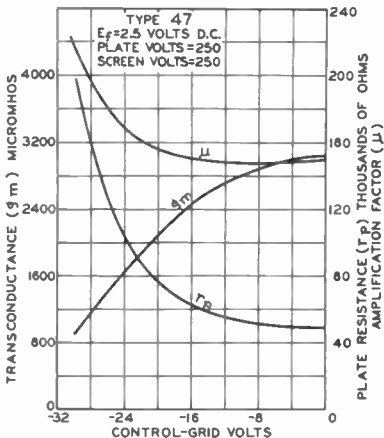
<sup>o</sup> 6% total harmonic distortion.

\* Grid volts measured from mid-point of a-c operated filament.

If a single 47 is self-biased, the self-biasing resistor (450 ohms) should be shunted by a suitable filter network to avoid degenerative effects at low audio frequencies. With two 47's in push-pull, the filter network may be omitted across the resistor (225 ohms).

Transformer or impedance input-coupling devices are recommended. If, however, resistance coupling is employed, a grid resistor limited to 0.5 megohm may be used under self-bias conditions. Without self-bias, the grid resistor should not exceed 50000 ohms.

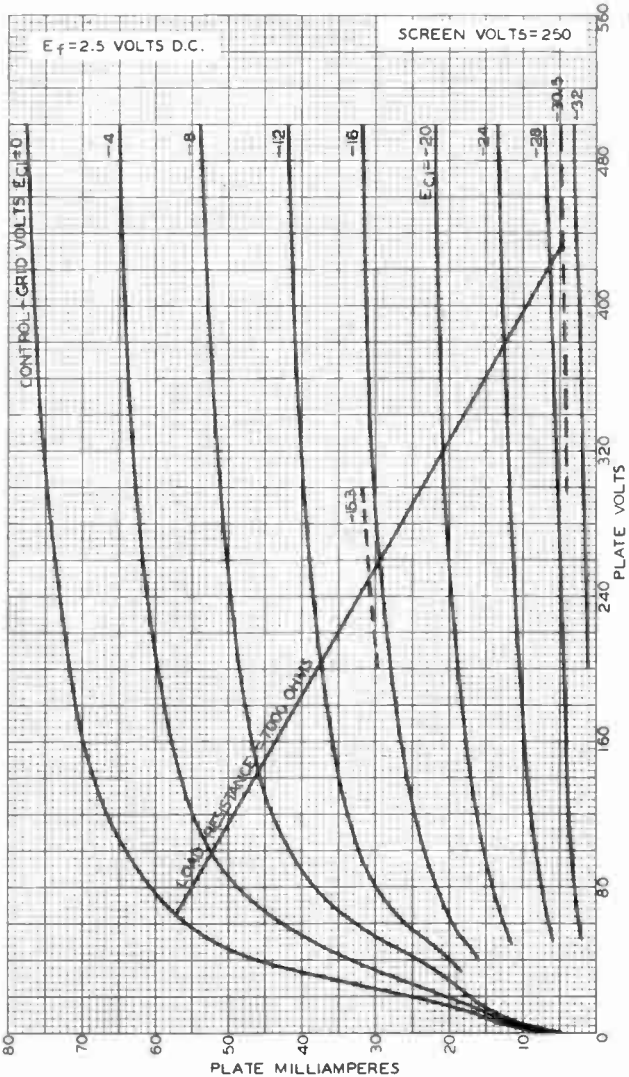
### AVERAGE CHARACTERISTICS



92C-513G

47

AVERAGE PLATE CHARACTERISTICS





## RCA-49

### DUAL-GRID POWER AMPLIFIER

Filament	Coated	
Voltage	2.0	d-c volts
Current	0.120	amp.
Maximum Overall Length		4-11/16"
Maximum Diameter		1-13/16"
Bulb		ST-14
Base		Medium 5-Pin

Pin 1-Filament+		Pin 4-Grid #2
Pin 2-Plate		Pin 5-Filament-
Pin 3-Grid #1		

BOTTOM VIEW

#### CLASS B POWER AMPLIFIER

*Grids #1 & #2 connected together at socket*

Plate Voltage	180 max.		volts
Peak Plate Current	50 max.		ma.
Typical Operation (2 tubes):			
Filament	2.0	2.0	volts
Plate	135	180	volts
Grid (#1 & #2 tied together)	0	0	volts
Zero-Sig. Plate Cur. (per tube)	1.3	2	ma.
Load Resistance (per tube)	2000	3000	ohms
Effective Load Resistance (plate to plate)	8000	12000	ohms
Power Output (2 tubes)	2.3	3.5	<u>approx.watts</u>

#### CLASS A AMPLIFIER

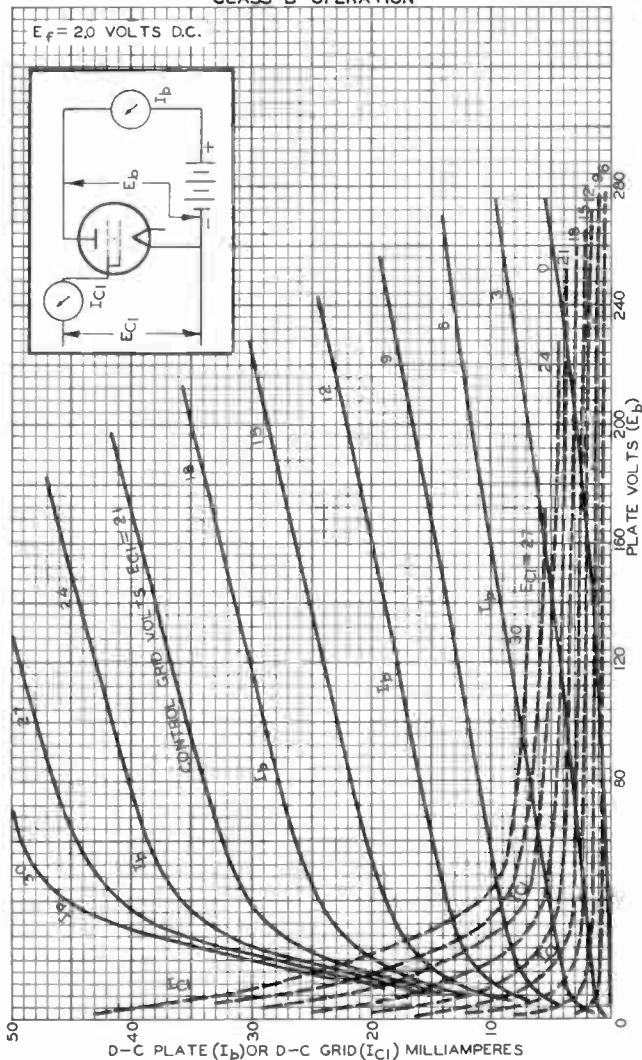
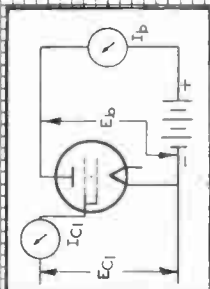
*Grid #2 connected to plate at socket*

Operating Conditions and Characteristics:			
Filament	2.0		volts
Plate	135 max.		volts
Grid (#1 only)	-20		volts
Amp. Fact.	4.7		
Plate Res.	4175		ohms
Mut. Cond.	1125		μmhos
Plate Cur.	6.0		ma.
Load Res.	11000*		ohms
Power Output	0.170		<u>approx.watts</u>

\* Approximately twice this value is recommended for load of this tube when used as driver for Class B stage.

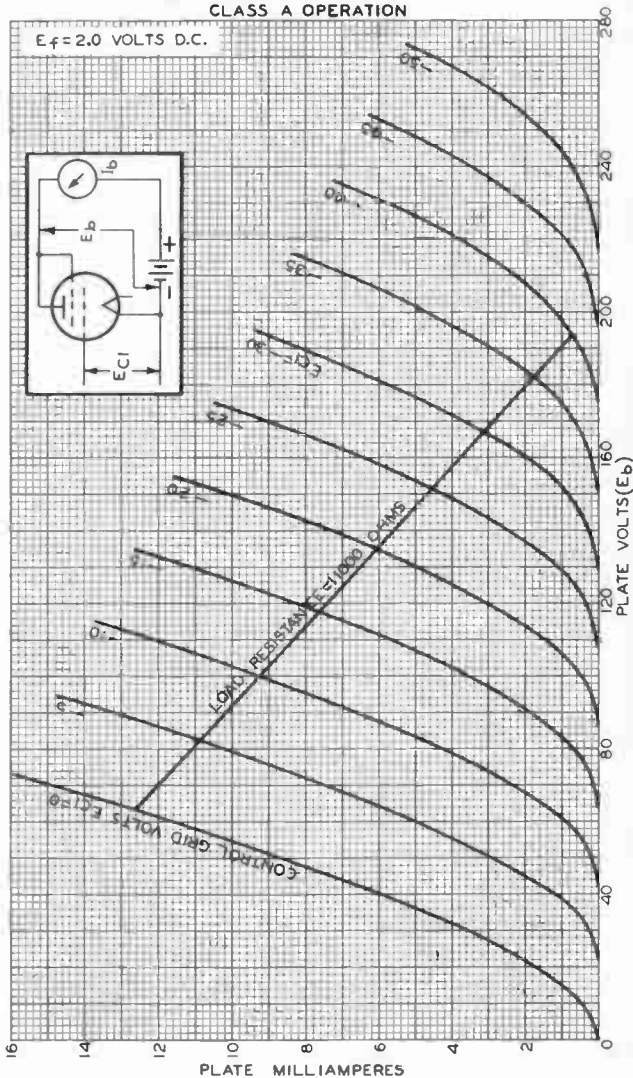
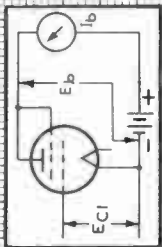
AVERAGE PLATE CHARACTERISTICS  
CLASS B OPERATION

$E_f = 2.0$  VOLTS D.C.



AVERAGE PLATE CHARACTERISTICS  
CLASS A OPERATION

$E_f = 2.0$  VOLTS D.C.





## RCA-50 POWER AMPLIFIER

Filament	Coated	
Voltage	7.5	a-c or d-c volts
Current	1.25	amp.
Direct Interelectrode Capacitances:		
Grid to Plate	7.1	μuf
Grid to Filament	4.2	μuf
Plate to Filament	3.4	μuf
Maximum Overall Length		6-1/4"
Maximum Diameter	(2) (3)	2-7/16"
Bulb		ST-19
Base		Med. 4-Pin Bay.
Pin 1-Filament	(1) (4)	Pin 3-Grid
Pin 2-Plate		Pin 4-Filament

BOTTOM VIEW

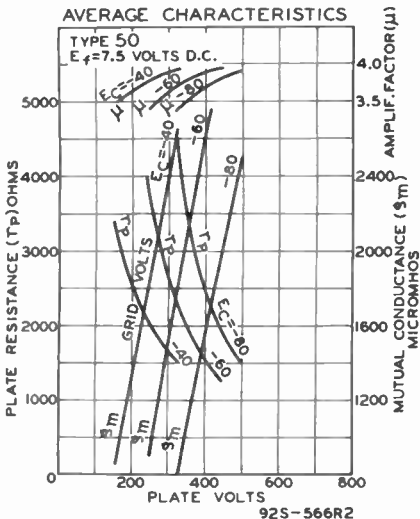
### AMPLIFIER (Class A)

**Operating Conditions and Characteristics:**

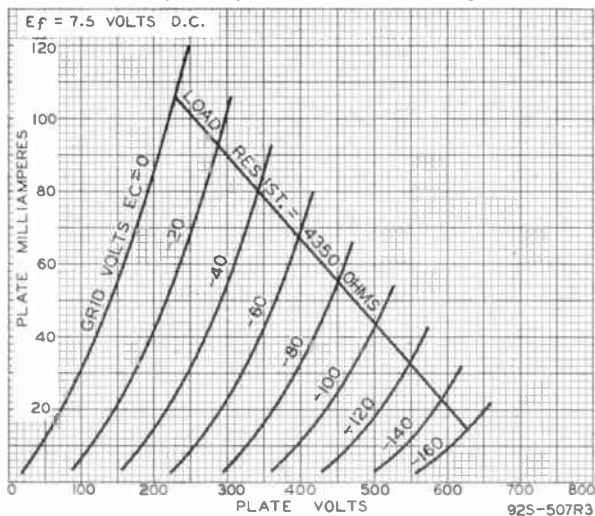
Filament	7.5	7.5	7.5	7.5	a-c volts
Plate	300	350	400	450 max.	volts
Grid*	-54	-63	-70	-84	volts
Amp. Fact.	3.8	3.8	3.8	3.8	
Plate Res.	2000	1900	1800	1800	ohms
Mut. Cond.	1900	2000	2100	2100	μmhos
Plate Cur.	35	45	55	55	ma.
Load Res.	4600	4100	3670	4350	ohms
U.P.O.	1.6	2.4	3.4	4.6	watts

Self-bias is advisable in all cases. The resistance in the grid-coupling circuit should not exceed 10000 ohms.

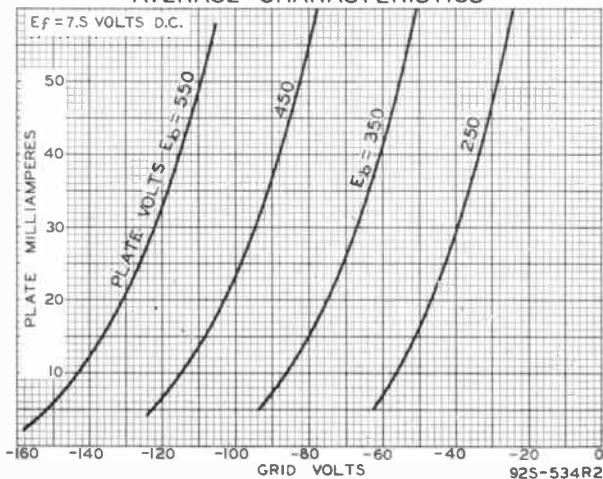
\* Grid volts measured from mid-point of a-c operated filament.



## AVERAGE PLATE CHARACTERISTICS



## AVERAGE CHARACTERISTICS





50A5

50A5

## BEAM POWER AMPLIFIER

## GENERAL DATA

## Electrical:

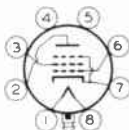
Heater, for Unipotential Cathode:

Voltage. . . . . 50 . . . . . ac or dc volts  
 Current. . . . . 0.15 . . . . . amp

## Mechanical:

Mounting Position. . . . . Any  
 Maximum Overall Length. . . . . 3-5/32"  
 Maximum Seated Length. . . . . 2-5/8"  
 Maximum Diameter. . . . . 1-3/16"  
 Bulb . . . . . T-9  
 Base . . . . . Lock-in 8-Pin  
 Basing Designation for BOTTOM VIEW . . . . . 6AA

Pin 1 - Heater  
 Pin 2 - Plate  
 Pin 3 - Grid No.2  
 Pin 4 - No  
 Connection  
 Pin 5 - No Connection



Pin 6 - Grid No.1  
 Pin 7 - Cathode,  
 Grid No.3  
 Pin 8 - Heater  
 Plug - Base  
 Shell

AMPLIFIER - Class A<sub>1</sub>

## Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . . 200 max. volts  
 GRID-No.2 (SCREEN) VOLTAGE . . . . . 117 max. volts  
 PLATE DISSIPATION. . . . . 10 max. watts  
 GRID-No.2 DISSIPATION. . . . . 1.25 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 and Characteristics:

Plate Voltage . . . . .	110	200	volts
Grid-No.2 Voltage. . . . .	110	110	volts
Grid-No.1 Voltage. . . . .	-7.5	-8	volts
Peak A-F Grid No.1 Voltage . . . . .	7.5	8	volts
Zero-Signal Plate Current. . . . .	49	50	ma
Max.-Signal Plate Current. . . . .	50	55	ma
Zero-Signal Grid-No.2 Current. . . . .	4	1.5	ma
Max.-Signal Grid-No.2 Current. . . . .	8.5	6.0	ma
Plate Resistance (Approx.) . . . . .	13000	35000	ohms
Transconductance . . . . .	8000	8250	μmhos
Load Resistance. . . . .	2000	3000	ohms
Total Harmonic Distortion. . . . .	10	10	%
Max.-Sig. Power Output . . . . .	2.1	4.3	watts

## Maximum Circuit Values (for maximum rated conditions):

Grid-No.1-Circuit Res. . . . . { fixed bias 0.1 . . . megohm  
 cathode bias 0.5 . . . megohm

DEC. 30, 1947

TUBE DEPARTMENT  
 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

DATA







50X6

50X6

# VACUUM RECTIFIER-DOUBLER

## GENERAL DATA

### Electrical:

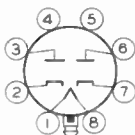
Heater, for Unipotential Cathodes:

Voltage. . . . .	50	ac or dc volts
Current. . . . .	0.150	amp

### Mechanical:

Mounting Position. . . . .	Any
Maximum Overall Length . . . . .	3-5/32"
Maximum Seated Length. . . . .	2-5/8"
Maximum Diameter . . . . .	1-3/16"
Bulb . . . . .	T-9
Base . . . . .	Lock-in 8-Pin
Base Designation for BOTTOM VIEW . . . . .	7AJ

Pin 1-Heater  
 Pin 2-Cathode of Unit No.2  
 Pin 3-Plate of Unit No.2  
 Pin 4-No Connection



Pin 5-No Connection  
 Pin 6-Plate of Unit No.1  
 Pin 7-Cathode of Unit No.1  
 Pin 8-Heater Plug - Base Shell

## RECTIFIER OR DOUBLER

### Maximum Ratings, Design-Center Values:

PEAK INVERSE PLATE VOLTAGE . . . . .	700 max.	volts
PEAK PLATE CURRENT PER PLATE . . . . .	450 max.	ma
DC OUTPUT CURRENT PER PLATE. . . . .	75 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. . .	350 max.	volts
Heater positive with respect to cathode. . .	350 max.	volts

### Typical Operation as Half-Wave Rectifier with Capacitor-Input to Filter:<sup>0</sup>

AC Plate-Supply Voltage				
per Plate (RMS) . . . . .	117	150	235	volts
Filter-Input Capacitor . . . . .	16	16	16	μf
Min. Total Effective Plate-Supply Impedance per Plate . . . . .	15	40	100	ohms
DC Output Current per Plate. . . . .	75	75	75	ma

### Typical Operation as Voltage Doubler:

	<u>Half-Wave</u>	<u>Full-Wave</u>	
AC Plate-Supply Voltage			
per Plate (RMS) . . . . .	117	117	volts
Filter-Input Capacitor			
per Plate . . . . .	16	16	μf
Min. Total Effective Plate-Supply Impedance per Plate . . . . .	30	15	ohms
DC Output Current. . . . .	75	75	ma

<sup>0</sup> In half-wave rectifier service, the two units may be used separately or in parallel.

50Y6-GT



50Y6-GT

VACUUM RECTIFIER-DOUBLER

Heater, for Unipotential Cathodes:

Voltage. . . . . 50 . . . . . ac or dc volts

Current. . . . . 0.15 . . . . . amp

*The 50Y6-GT is the same as the 25Z6-GT except for  
heater rating.*



50Y7-GT

50Y7-GT

## VACUUM RECTIFIER-DOUBLER

## GENERAL DATA

Electrical:	Without	With No. 40	
	Panel	or No. 47	
Heater, for Unipotential Cathode:	Lamp	Panel Lamp	
Voltage (AC or DC):			
Entire Heater (pins 2 & 7)	50	46	volts
Panel-Lamp Section (pins 6 & 7)	7.5	5.5	volts
Current	between pins 2 & 7	-	amp
	between pins 2 & 6	-	amp

## Mechanical:

Mounting Position	Any
Maximum Overall Length	3-5/16"
Maximum Seated Length	2-3/4"
Maximum Diameter	1-9/32"
Bulb	T-9
Base	Intermediate-Shell Octal 8-Pin
Basing Designation for BOTTOM VIEW	G-8AN

- Pin 1 - No Connection
- Pin 2 - Heater
- Pin 3 - Plate No. 2
- Pin 4 - Cathode No. 2



- Pin 5 - Plate No. 1
- Pin 6 - Heater Tap
- Pin 7 - Heater
- Pin 8 - Cathode No. 1

## RECTIFIER OR DOUBLER

## Maximum Ratings, Design-Center Values:

PEAK INVERSE PLATE VOLTAGE	700 max.	volts
PEAK PLATE CURRENT PER PLATE	450 max.	ma
DC OUTPUT CURRENT PER PLATE		
With Panel Lamp & { No Shunting Resistor	60 max.	ma
{ Shunting Resistor*	65 max.	ma
Without Panel Lamp	75 max.	ma
PANEL-LAMP-SECTION VOLTAGE (RMS):		
When panel lamp fails	15 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	350 max.	volts
Heater positive with respect to cathode	350 max.	volts

## Typical Operation with No. 40 or No. 47 Panel Lamp in Half-Wave Rectifier Circuit with Capacitor-Input Filter:

AC Plate-Supply Volt. per Plate (RMS)	117	150	235	volts
Filter-Input Capacitor	16	16	16	μf
Min. Total Effect. Plate-Supply Imped. per Plate	15	40	100	ohms
Panel Lamp Shunting Resistor	250	250	250	ohms
DC Output Current per Plate	65	65	65	ma

\* Max. value of this resistor is 250 ohms for dc output current of 65 ma.

50Y7-GT



50Y7-GT

VACUUM RECTIFIER-DOUBLER

Typical Operation with No.40 or No.47 Panel Lamp in Voltage-Doubler Circuit:

	Half-Wave	Full-Wave	
AC Plate Supply Voltage per Plate (RMS) . . . . .	117	117	volts
Filter-Input Capacitor . . . . .	16	16	μf
Min. Total Effect. Plate-Supply Imped. per Plate. . . . .	30	15	ohms
Panel Lamp Shunting Resistor . . . . .	250	250	ohms
DC Output Current per Plate. . . . .	65	65	ma

Typical Operation Without Panel Lamp in Half-Wave Rectifier Circuit with Capacitor-Input Filter:<sup>o</sup>  
*Values are for both units connected in parallel*

AC Plate Supply Voltage (RMS) . . . . .	117	150	235	volts
Filter-Input Capacitor . . . . .	16	16	16	μf
Min. Total Effect. Plate-Supply Imped. per Plate. . . . .	15	40	100	ohms
Total DC Output Current. . . . .	150	150	150	ma
DC Output Voltage at Input to Filter (Approx.):				
At half-load current (75 ma.) . . . . .	115	-	255	volts
At full-load current (150 ma.) . . . . .	80	-	200	volts
Voltage Regulation (Approx.):				
Half-load to full-load current . . . . .	35	-	55	volts

Typical Operation Without Panel Lamp in Full-Wave Voltage-Doubler Circuit:<sup>o</sup>

AC Plate Supply Voltage per Plate (RMS) . . . . .	117	volts
Filter-Input Capacitor . . . . .	16	μf
Min. Total Effective Plate-Supply Impedance per Plate . . . . .	15	ohms
DC Output Current. . . . .	75	ma
DC Output Voltage at Input to Filter (Approx.):		
At half-load current (37.5 ma.) . . . . .	250	volts
At full-load current (75 ma.) . . . . .	205	volts
Voltage Regulation (Approx.):		
Half-load to full-load . . . . .	45	volts

<sup>o</sup> Plate current must not flow through heater section between pins 6 and 7.



50Y6-GT/G

50Y6-GT/G  
50Z7-G**HIGH-VACUUM RECTIFIER-DOUBLER**

Heater	Coated Unipotential Cathodes	
Voltage	50	a-c or d-c volts
Current	0.15	amp.

The 50Y6-GT/G is the same as the 25Z6-GT/G except for heater rating.

50Z7-G

**HIGH-VACUUM RECTIFIER-DOUBLER**

Heater	Coated Unipotential Cathodes	
Voltage	{ Entire Heater (pins #2 & #7)	50 a-c or d-c volts
	{ Panel Lamp Section (pins #6 & #7) with 0.15 amp. between pins #2 & #7	2.0 a-c or d-c volts
Current	0.15	amp.

Maximum Overall Length	4-1/8"
Maximum Seated Height	3-9/16"
Maximum Diameter	1-9/16"
Bulb	ST-12

Base	Small Shell Octal 8-Pin
Pin 1 - No Connection	Pin 5 - Plate #1
Pin 2 - Heater	Pin 6 - Heater Tap
Pin 3 - Plate #2	Pin 7 - Heater
Pin 4 - Cathode #2	Pin 8 - Cathode #1
Mounting Position	Any



BOTTOM VIEW (G-8AN)

Maximum Ratings Are Design-Center Values

RECTIFIER OR DOUBLER

Peak Inverse Plate Voltage	700 max. volts
Peak Plate Current per Plate	400 max. ma.
D-C Output Current per Plate with Panel Lamp	65 max. ma.
D-C Heater-Cathode Potential	350 max. volts
Panel-Lamp Sect. Volt. (between pins #6 & #7)	2.5 max. volts

*Typical Operation as Half-Wave Rectifier-  
With #292 or #292A Panel Lamp:\**

Heater Cur. (between pins #2 & #6)	0.15	0.15	amp.
Heater Volt. (between pins #2 & #7) approx.	50	50	volts
A-C Plate Supply Voltage per Plate (RMS)	117	235	volts
Min. Total Effect. Plate-Supply Imped. per Plate	15	100	ohms
D-C Output Current per Plate	65	65	ma.

*Typical Operation as Voltage Doubler-  
With #292 or #292A Panel Lamp:*

Heater Cur. (between pins #2 & #6)	0.15	amp.
Heater Voltage (between pins #2 & #7) approx.	50	volts
A-C Plate Supply Voltage per Plate (RMS)	117	volts
Min. Total Effect. Plate-Supply Imped. per Plate	15	ohms
D-C Output Current	65	ma.

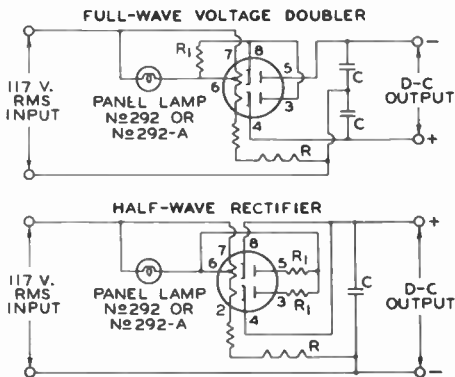
\* In half-wave rectifier service, the two units may be used separately or in parallel.

50Z7-G



50Z7-G

## HIGH-VACUUM RECTIFIER-DOUBLER



C = Filter Condenser.

R = Heaters of Other Tubes in Series with Voltage-Dropping Resistor.

 $R_1$  = Protective Resistor.

NOTE: Drop across R and all heaters (with panel lamp) should equal 117 volts at 0.15 amp.

The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained herein is furnished without assuming any obligations.

AUG. 2, 1943

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

DATA

World Radio History

## CLASS B TWIN AMPLIFIER

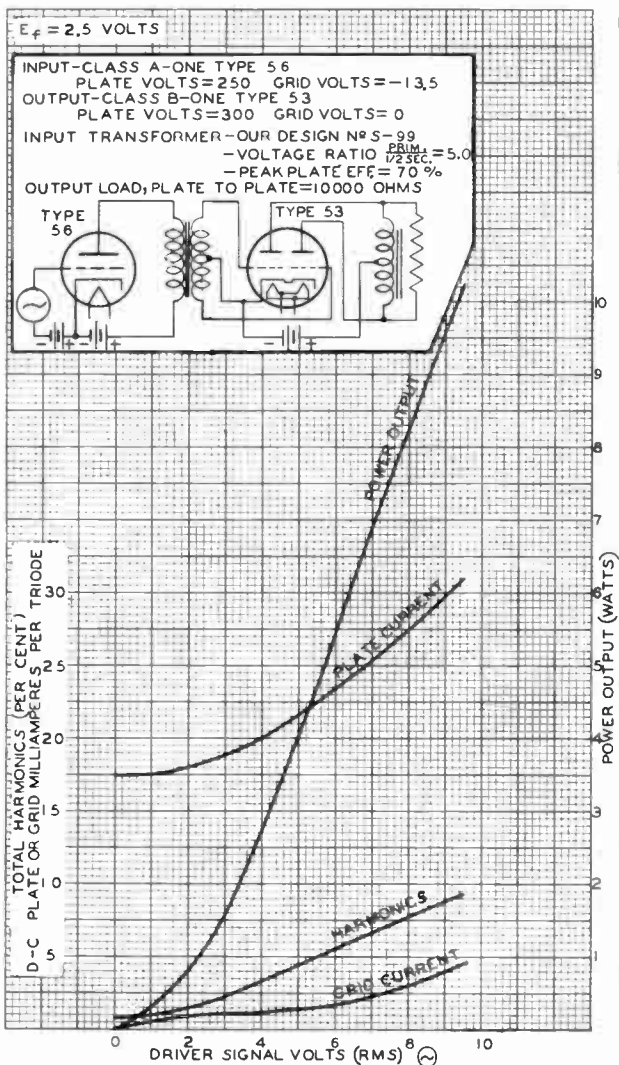
Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.0	amp.

For additional data and curves, see Types 6N7 and 6A6, and the RESISTANCE-COUPLED AMPLIFIER CHART. The operating conditions and characteristics of the 53 are identical with those of the 6N7 and 6A6 except for heater voltage and current. The physical characteristics of the 53 are the same as those of the 6A6.

◀ Indicates a change

RCA-53

## OPERATION CHARACTERISTICS







70L7-GT

70L7-GT



## RECTIFIER-BEAM POWER AMPLIFIER

Heater	Coated Unipotential Cathodes	
Voltage	70	a-c or d-c volts
Current	0.15	amp.
Maximum Overall Length		3-7/16"
Maximum Seated Height		2-7/8"
Maximum Diameter		1-5/16"
Bulb		T-9
Base		Intermed. Sh. Octal 8-Pin
Pin 1 - Rectifier Cath.		Pin 5 - Amplifier Grid
Pin 2 - Heater		Pin 6 - Amplifier Cath.
Pin 3 - Amplifier Plate		Pin 7 - Heater
Pin 4 - Amplifier Screen		Pin 8 - Rectifier Plate
Mounting Position	BOTTOM VIEW (8AA)	Any

AMPLIFIER UNIT

Plate Voltage	117 max.	volts
Screen Voltage	117 max.	volts
Plate Dissipation	5.0 max.	watts
Screen Dissipation	1.0 max.	watt
<i>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</i>		
Plate	110	volts
Screen	110	volts
Grid*	-7.5	volts
Peak A-F Grid Voltage	7.5	volts
Zero-Signal Plate Cur.	40	ma.
Max.-Signal Plate Cur.	43	ma.
Zero-Signal Screen Cur.	3 approx.	ma.
Max.-Signal Screen Cur.	6 approx.	ma.
Plate Resistance	15000	ohms
Transconductance	7500	μmhos
Load Resistance	2000	ohms
Total Harmonic Distortion	10	%
Max.-Signal Power Output	1.8	watts

RECTIFIER UNIT

Peak Inverse Voltage	350 max.	volts
Peak Plate Current	420 max.	ma.
D-C Heater-Cathode Potential	175 max.	volts
<i>With Condenser-Input Filter:</i>		
A-C Plate Voltage (RMS)	117 max.	volts
Total Effective Plate-Supply Impedance <sup>▲</sup>	15 min.	ohms
D-C Output Current	70 max.	ma.

■ It is recommended that the potential difference between heater and cathode of the amplifier unit be kept as low as possible by connecting pin #2 to the side of the line opposite that to which pins #7 & #8 are connected.

\* The type of input coupling used should not introduce too much resistance in the grid circuit. Transformer- or impedance-coupling devices are recommended. When the grid circuit has a resistance not higher than 0.1 megohm, fixed bias may be used; for higher values, cathode bias is required. With cathode bias, the grid circuit may have a resistance not higher than 0.5 megohm.

▲ When a filter-input condenser larger than 40 μf is used, it may be necessary to use more plate-supply impedance than the minimum value shown to limit the peak plate current to the rated value.

→ Indicates a change.

Dec. 1, 1941

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

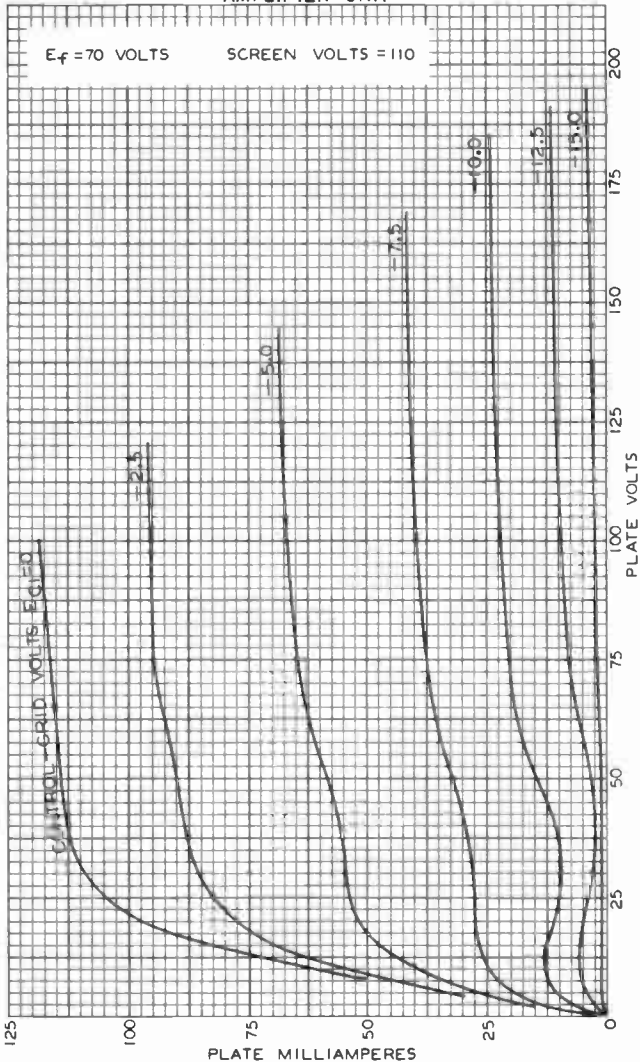
DATA

70L7-GT



70L7-GT

### AVERAGE PLATE CHARACTERISTICS AMPLIFIER UNIT



SEPT. 26, 1941

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

92C-6323

World Radio History

## RCA-71-A

### POWER AMPLIFIER

Filament	Coated	
Voltage	5.0	a-c or d-c volts
Current	0.25	amp.
Direct Interelectrode Capacitances:		
Grid to Plate	7.5	$\mu\text{f}$
Grid to Filament	3.2	$\mu\text{f}$
Plate to Filament	2.9	$\mu\text{f}$
Maximum Overall Length		4-11/16"
Maximum Diameter	(2) (3)	1-13/16"
Bulb		ST-14
Base		Medium 4-Pin Bay.
Pin 1-Filament+	(1) (4)	Pin 3-Grid
Pin 2-Plate		Pin 4-Filament-

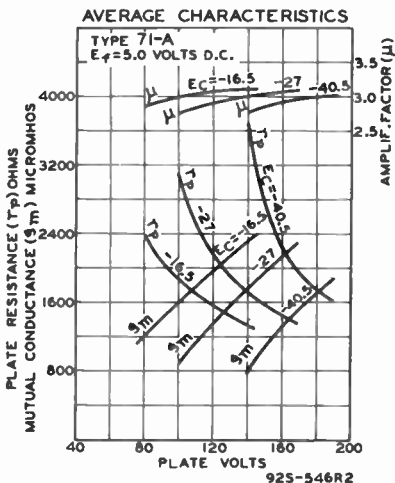
BOTTOM VIEW

#### AMPLIFIER (Class A)

#### Operating Conditions and Characteristics:

Filament	5.0	5.0	5.0	d-c volts
Plate	90	135	180 max.	volts
Grid	-16.5	-27	-40.5	volts
Amp. Fact.	3	3	3	
Plate Res.	2170	1820	1750	ohms
Mut. Cond.	1400	1650	1700	$\mu\text{mhos}$
Plate Cur.	10	17.3	20	ma.
Load Res.	3000	3000	4800	ohms
U.P.O.	125	400	790	mw.

A grid coupling resistor, if used, should not exceed 0.5 megohm.

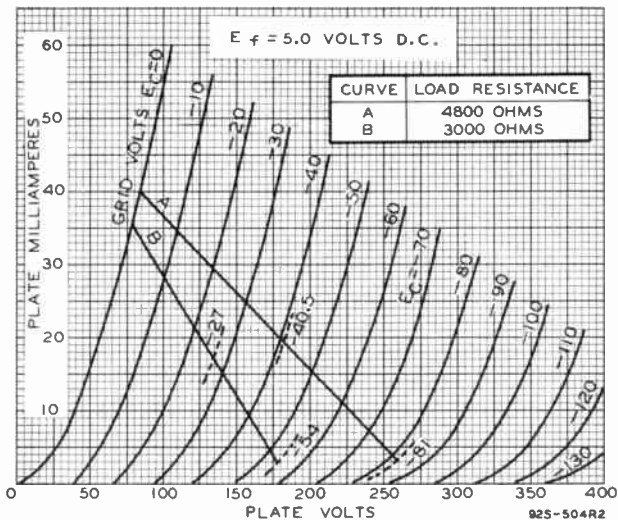


71-A

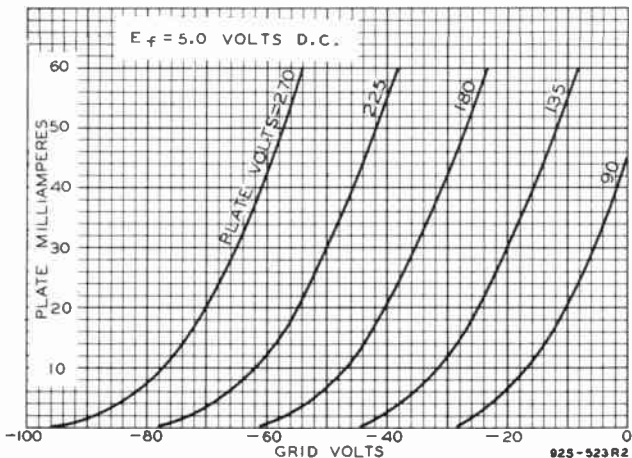

**Cunningham**  
**Radiotron**


RCA-71-A

## AVERAGE PLATE CHARACTERISTICS



## AVERAGE CHARACTERISTICS



SEPT. 13, 1935

 RCA RADIOTRON DIVISION  
 RCA MANUFACTURING COMPANY, INC.

92C-4477



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**DUPLEX-DIODE HIGH-MU TRIODE**

Heater	Coated Unipotential Cathode	
Voltage	0.3	a-c or d-c volts
Current	0.3	amp.
Direct Interelectrode Capacitances (approx.):		
<i>Triode Unit</i>		
Grid to Plate		1.7 $\mu$ f
Grid to Cathode		1.7 $\mu$ f
Plate to Cathode		3.8 $\mu$ f
Overall Length		4-9/32" to 4-17/32"
Seated Height		3-21/32" to 3-29/32" ←
Maximum Diameter		1-9/16"
Bulb		ST-12
Cap		Small Metal
Base		Small 6-Pin
Pin 1-Heater		Pin 5-Cathode
Pin 2-Triode Plate		Pin 6-Heater
Pin 3-Diode Plate #2		Cap -Triode Grid
Pin 4-Diode Plate #1		
Mounting Position		Any



BOTTOM VIEW (6G)

AMPLIFIER

Plate Voltage 250 max. volts

*Characteristics and Curves are the same as for Type 6SQ7. For Typical Operating Conditions see RESISTANCE-COUPLED AMPLIFIER CHART. Diode Curves under Type 6B7 also apply to the*

75-

■ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

← Indicates a change.

Sept. 2, 1941

RCA RADIONRON DIVISION  
RCA MANUFACTURING COMPANY INC

DATA

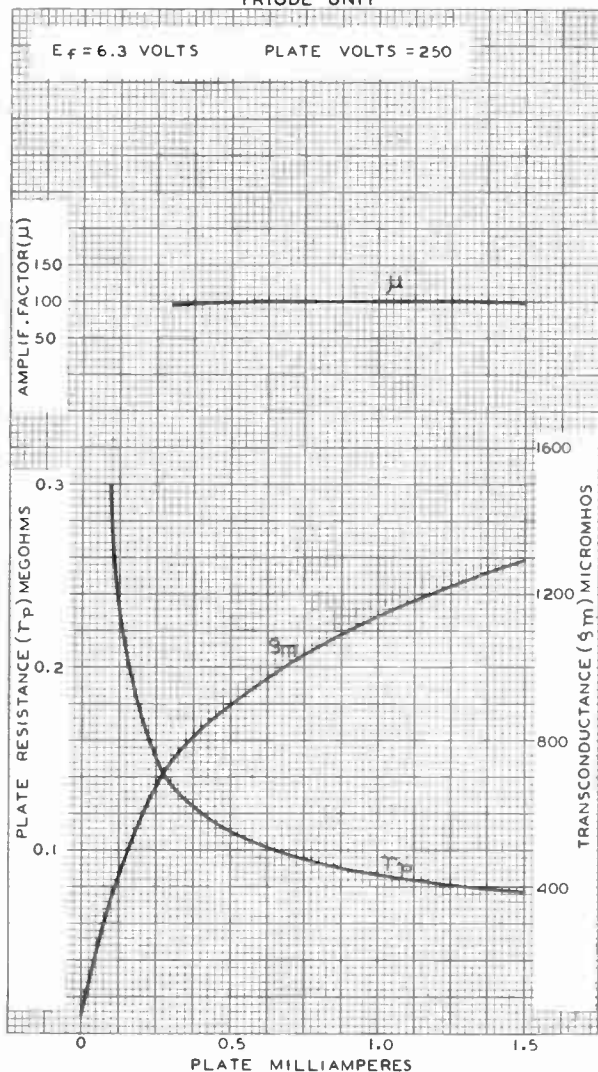


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# AVERAGE CHARACTERISTICS TRIODE UNIT

$E_f = 6.3$  VOLTS

PLATE VOLTS = 250



JULY 31, 1941

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.

92C-5284R1

World Radio history



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## MEDIUM-MU TRIODE

GENERAL DATA**Electrical:**

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3 . . . . . ac or dc volts

Current. . . . . 0.3 . . . . . amp

Direct Interelectrode Capacitances:<sup>0</sup>Grid to Plate. . . . . 2.8 . . . . .  $\mu\mu\text{f}$ Grid to Cathode. . . . . 3.5 . . . . .  $\mu\mu\text{f}$ Plate to Cathode . . . . . 2.5 . . . . .  $\mu\mu\text{f}$ <sup>0</sup> with no external shield.**Mechanical:**

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 4-3/16"

Seated Length. . . . . 3-3/8"  $\pm$  3/16"

Maximum Diameter . . . . . 1-9/16"

Bulb . . . . . ST-12

Base . . . . . Small-Shell Small 5-Pin

Basing Designation for BOTTOM VIEW . . . . . 5A

Pin 1 - Heater

Pin 2 - Plate

Pin 3 - Grid

Pin 4 - Cathode

Pin 5 - Heater

AMPLIFIER - Class A<sub>1</sub>**Maximum Ratings, Design-Center Values:**

PLATE VOLTAGE. . . . . 250 max. volts

PLATE DISSIPATION. . . . . 1.4 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 and Characteristics:**

Plate Voltage. . . . . 100 250 . . . volts

Grid Voltage . . . . . -5 -13.5 . . . volts

Amplification Factor . . . . . 13.8 13.8

Plate Resistance . . . . . 12000 9500 . . . ohms

Transconductance . . . . . 1150 1450 . . .  $\mu\text{mhos}$ 

Plate Current. . . . . 2.5 5 . . . ma

**Maximum Circuit Values:**

Grid-Circuit Resistance. . . . . 1 max. megohm

← Indicates a change.

JUNE 15, 1948

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

DATA



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## MEDIUM-MU TRIODE

### DETECTOR

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

PLATE VOLTAGE. . . . .	250 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	90 max.	volts
Heater positive with respect to cathode.	90 max.	volts

#### Typical Operation as Biased Detector:

Plate Voltage. . . . .	100	250	..	volts
Grid Voltage (Approx.) . . . . .	-8	-20	..	volts
Plate Current. . . . .	Adjust to 0.2 ma. with no input signal			
Cathode-Bias Resistor <sup>▲</sup> . . . . .	30000	30000	}	ohms
	to	to		
	150000	150000		

#### Typical Operation as Grid-Resistor Detector:

Plate Voltage. . . . .	45	..	volts
Grid . . . . .	Return to cathode		
Grid Resistor. . . . .	1 to 5	megohms	
Grid Capacitor . . . . .	250	..	$\mu$ mf

<sup>▲</sup> not critical.

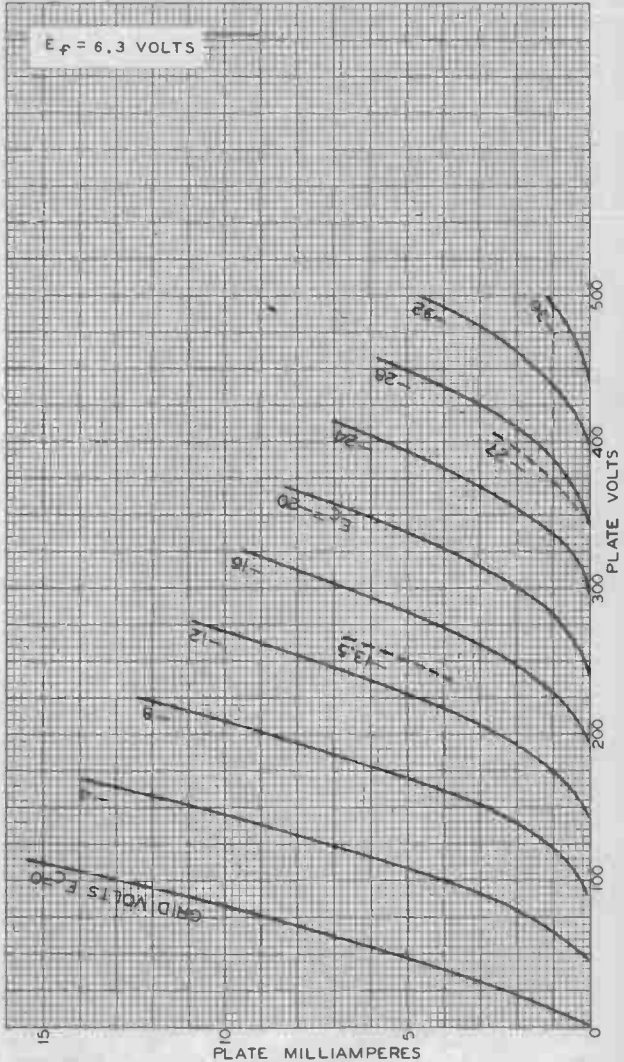




76

76

# AVERAGE PLATE CHARACTERISTICS



MAR. 5, 1934

TUBE DEPARTMENT

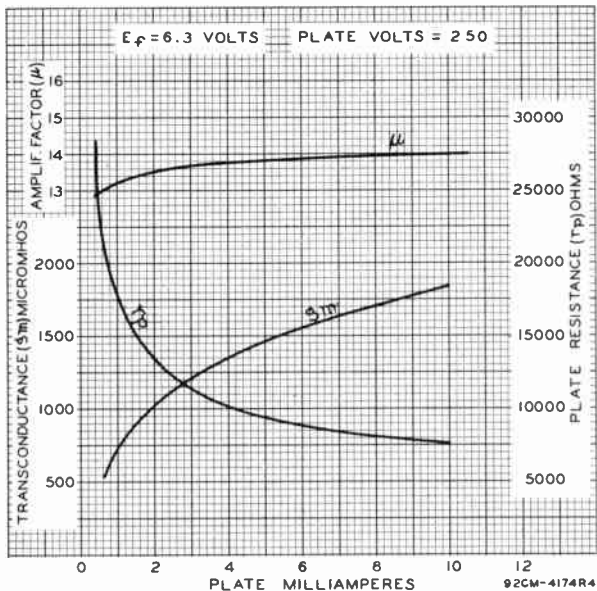
92CM-4175R2

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

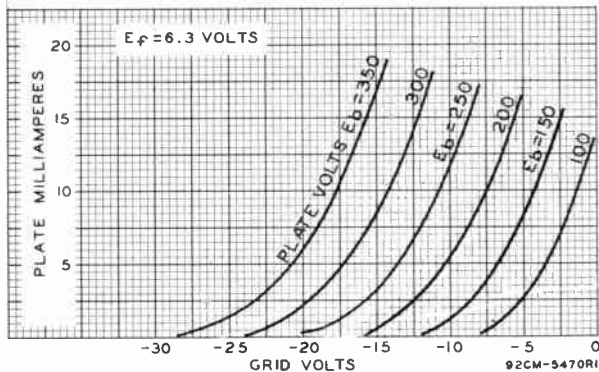
World Radio history



## AVERAGE CHARACTERISTICS



## AVERAGE CHARACTERISTICS





77

77



## TRIPLE-GRID DETECTOR AMPLIFIER

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.3	amp.
Direct Interelectrode Capacitances:		
Grid to Plate	0.007 max. <sup>o</sup>	$\mu$ f
Input	4.7	$\mu$ f
Output	11	$\mu$ f
Overall Length	4-9/32" to 4-17/32"	
Seated Height	3-21/32" to 3-29/32"	
Maximum Diameter	1-9/16"	
Bulb	ST-12	
Cap	Small Metal	
Base	Small 6-Pin	
Pin 1-Heater		Pin 5-Cathode
Pin 2-Plate		Pin 6-Heater
Pin 3-Screen		Cap -Grid
Pin 4-Suppressor		
Mounting Position	BOTTOM VIEW (6F)	Any



BOTTOM VIEW (6F)

## AMPLIFIER

Plate Voltage	300 max.	volts
Screen Voltage	100 max.	volts
Screen Supply Voltage	300 max.	volts
Grid Voltage	0 min.	volts
Plate Dissipation	0.75 max.	watt
Screen Dissipation	0.1 max.	watt

Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:

Plate	100	250	volts
Screen	60	100	volts
Grid*	-1.5	-3	volts
Suppressor	Connected to cathode at socket		
Plate Res. (approx.)	0.6	#	megohm
Transcond.	1100	1250	$\mu$ mhos
Grid Bias for cathode-current cut-off	-5.5	-7.5	volts
Plate Cur.	1.7	2.3	ma.
Screen Cur.	0.4	0.5	ma.

## DETECTOR

## Typical Operation as Biased Detector:

Plate Supply <sup>▲</sup>	100	250	250	volts
Screen	36	50	100 max.	volts
Grid	-1.95	-1.95	-4.3	volts
Cathode Resistor	12500	3000	10000	ohms
Suppressor	Connected to cathode at socket			
Cathode Cur. (no signal)	0.155	0.650	0.43	ma.
Plate Resistor	0.25	0.25	0.5	megohm
Blocking Condenser	0.01	0.03	0.03	$\mu$ f
Grid Resistor for following amplifier tube	0.25	0.25	0.25	megohm
R-F Signal (RMS) <sup>oo</sup>	1.88	1.18	1.37	volts

■ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

o with shield-can connected to cathode. The internal shield within the dome of the 77 is connected to the screen within the tube.

▲ The d-c resistance in the grid circuit should not exceed 1.0 megohm.

\* Voltage at plate will be Plate-Supply voltage minus voltage drop in plate resistor caused by plate current.

oo With these signal values modulated 20%, the voltage output for the 100-volt plate supply is 14 peak volts at the grid of the following amplifier; likewise, for the 250-volt conditions, 17 peak volts.

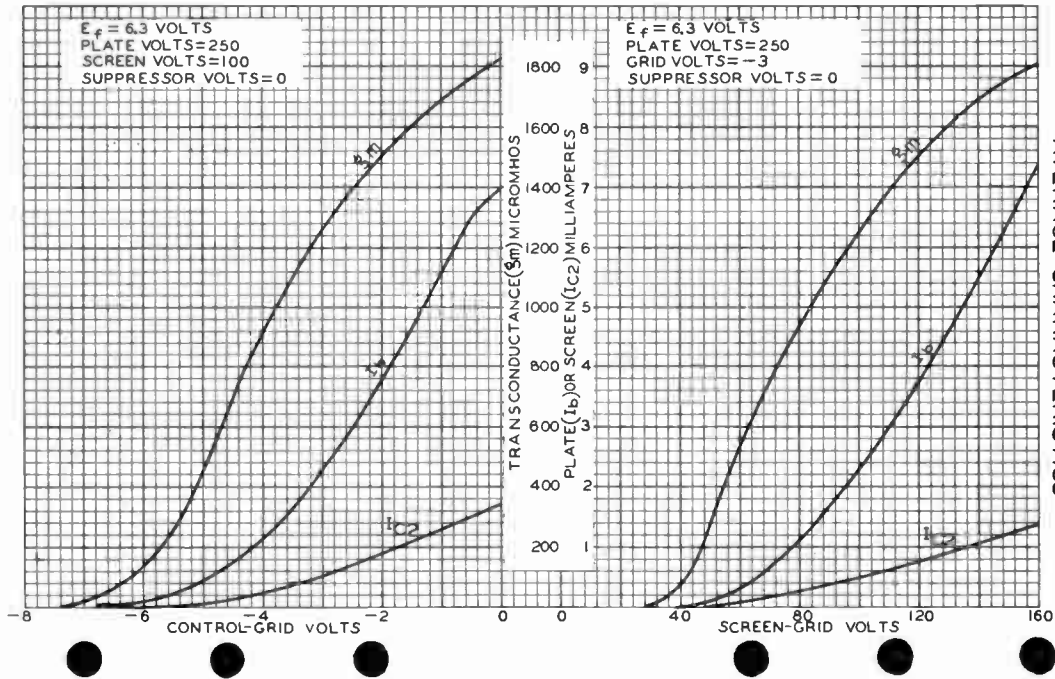
# Greater than 1.0 megohm.

← Indicates a change.

JULY 31, 1941

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RCA MANUFACTURING COMPANY INC.

CE-5280RI  
CE-5281RI



AVERAGE CHARACTERISTICS

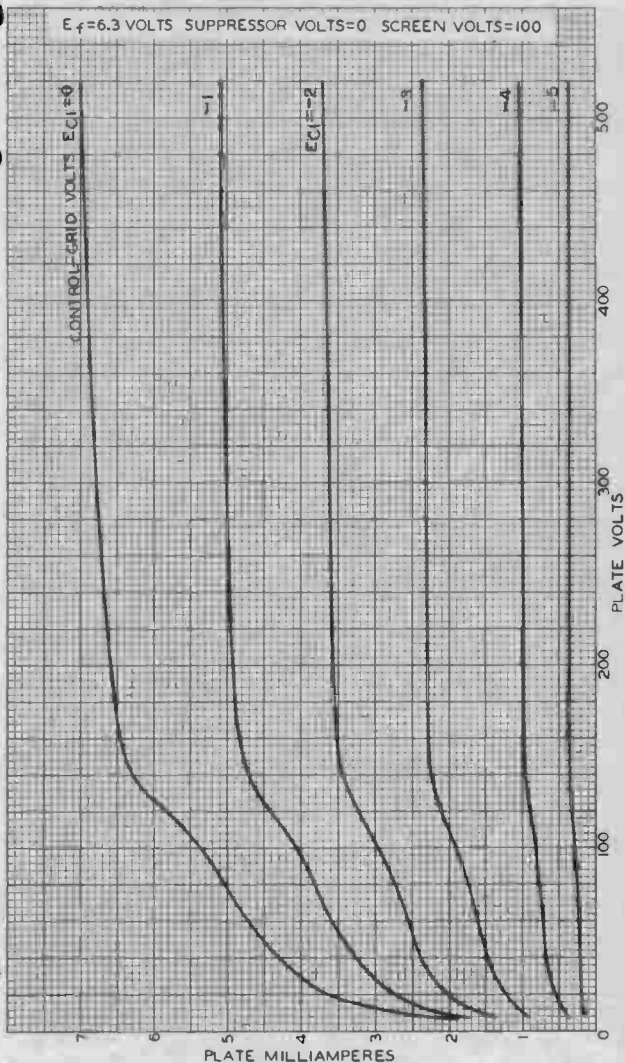


77

77

AVERAGE PLATE CHARACTERISTICS

$E_f = 6.3$  VOLTS SUPPRESSOR VOLTS = 0 SCREEN VOLTS = 100



77

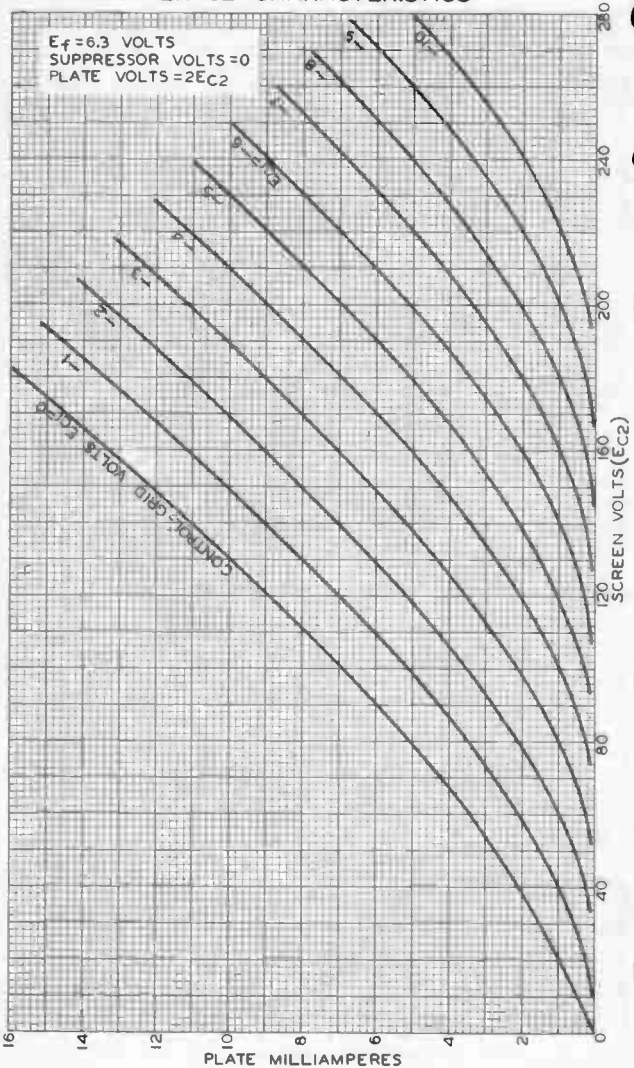


# Cunningham Radiotron

## RCA-77

### AVERAGE CHARACTERISTICS

$E_f = 6.3$  VOLTS  
SUPPRESSOR VOLTS = 0  
PLATE VOLTS =  $2E_{c2}$



JUNE 12, 1933

RCA RADIOTRON DIVISION  
RCA MANUFACTURING COMPANY INC  
World Radio History

925-5329

**RCA-78**

**TRIPLE-GRID SUPER-CONTROL AMPLIFIER**

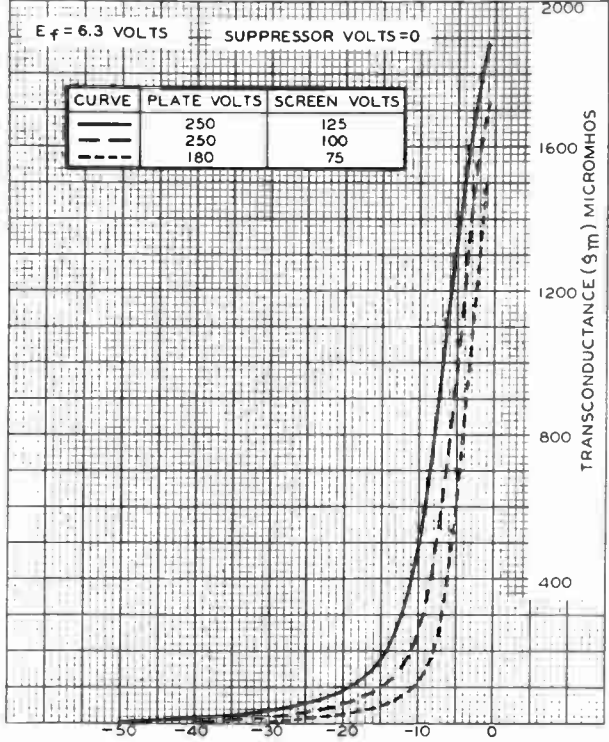
For additional data and curve, see Type 6K7. Except for capacitances, the characteristics of the 78 and 6K7 are identical. ←

Heater	Coated Unipotential Cathode		
Voltage	6.3		a-c or d-c volts
Current	0.3		amp.
Direct Interelectrode Capacitances: ⓪			
Grid to Plate	0.007 max.		μuf
Input	4.5		μuf
Output	11.0		μuf
Overall Length			4-9/32" to 4-17/32"
Maximum Diameter			1-9/16"
Bulb	③ ④		ST-12
Cap			Small Metal
Base			Small 6-Pin
Pin 1-Heater	②	⑤	Pin 5-Cathode
Pin 2-Plate			Pin 6-Heater
Pin 3-Screen	①	⑥	Cap -Grid
Pin 4-Suppressor			

BOTTOM VIEW

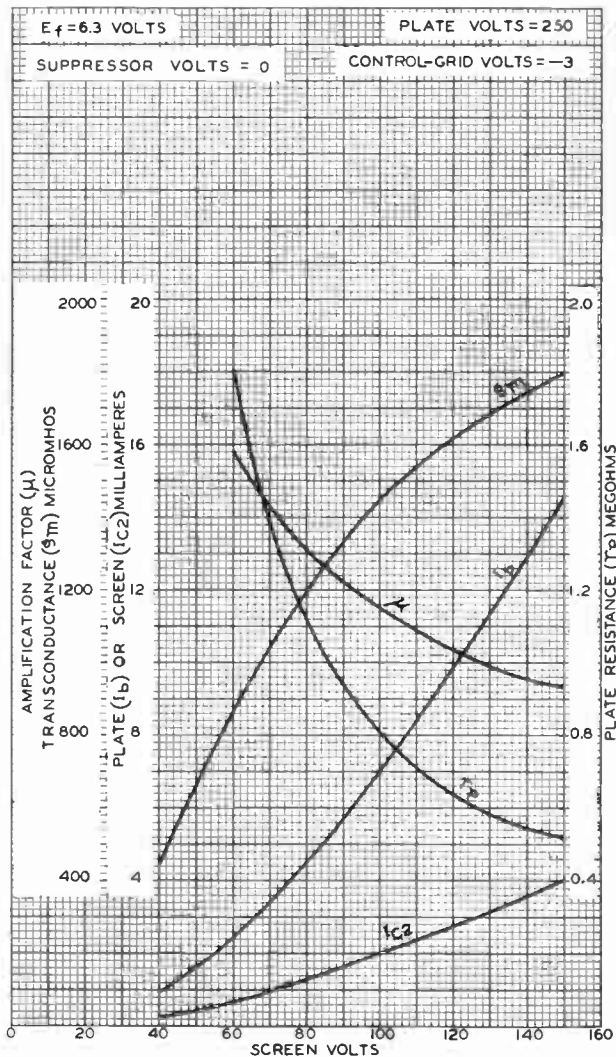
⓪ With shield can.  
← Indicates a change

**AVERAGE CHARACTERISTICS**



RCA-78

## AVERAGE CHARACTERISTICS





**RCA-79**

**CLASS B TWIN AMPLIFIER**

Heater	Coated Uni-potential Cathode		
Voltage	6.3		a-c or d-c volts
Current	0.6		amp.
Overall Length			4-9/32" to 4-17/32"
Maximum Diameter			1-9/16"
Bulb			ST-12
Cap	(3) (4)		Small Metal
Base			Small 6-Pin
Pin 1-Heater	(2)	(5)	Pin 5-Plate (Triode T <sub>1</sub> )
Pin 2-Plate (Triode T <sub>2</sub> )			Pin 6-Heater
Pin 3-Grid (Triode T <sub>2</sub> )	(1) (6)		Cap -Grid (Triode T <sub>1</sub> )
Pin 4-Cathode			

BOTTOM VIEW

*For convenience, one triode unit is identified as T<sub>1</sub>, the other as T<sub>2</sub>.*

CLASS "B" POWER AMPLIFIER

Plate Voltage	250 max.	volts
Peak Plate Current (per plate)	90 max.	ma.
Average Plate Dissipation	11.5 max.	watts

Typical Operation:

Heater	6.3	6.3	volts
Plate	180	250	volts
Grid	0	0	volts
Zero-Sig. Plate Current (per plate)	3.8	5.3	ma.
Load Res. (per plate)	1750	3500	ohms
Effective Load Res. (plate to plate)	7000	14000	ohms
Power Output <sup>o</sup>	5.5	8.0	approx. watts

\* In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

<sup>o</sup> With average power input of 360 milliwatts applied between grids.

RCA-79

## OPERATION CHARACTERISTICS

 $E_f = 6.3$  VOLTS

INPUT-CLASS A-ONE TYPE 37

PLATE VOLTS=185.5 GRID VOLTS=-14.5

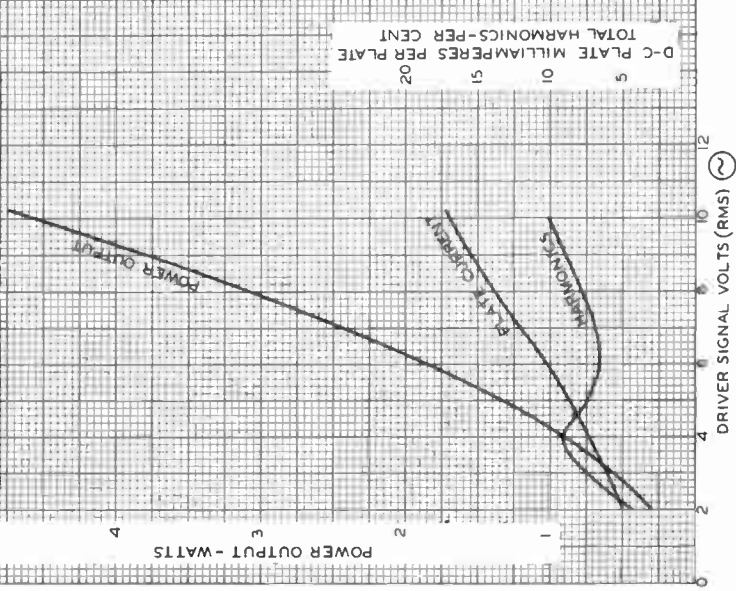
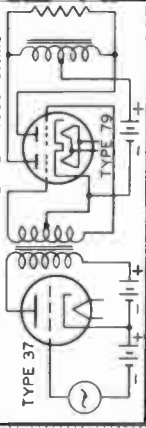
OUTPUT-CLASS B-ONE TYPE 79

PLATE VOLTS=200 GRID VOLTS=0

INPUT TRANSFORMER-VOLTAGE RATIO  $\frac{\text{PRIM.}}{1/2 \text{ SEC.}} = 2.6$ 

-PEAK POWER EFF. = 70%

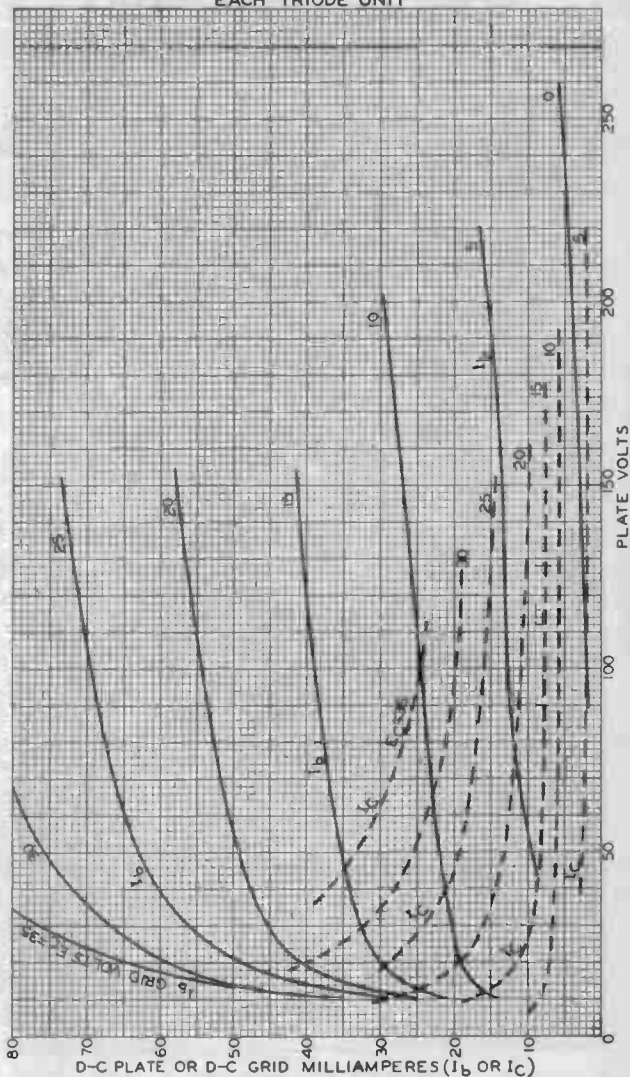
OUTPUT LOAD, PLATE TO PLATE=14000 OHMS



RCA-79

C-79

**AVERAGE PLATE CHARACTERISTICS  
EACH TRIODE UNIT**



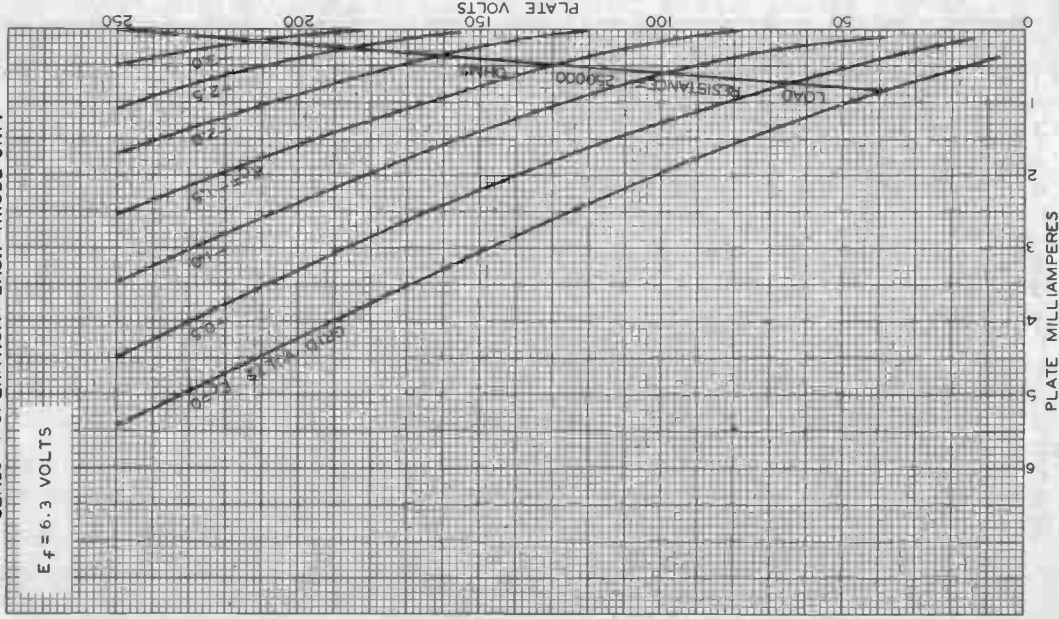
76

RCA Radiotron

Cunningham  
RADIO TUBES

RCA-79

C-79

AVERAGE PLATE CHARACTERISTICS  
CLASS A OPERATION - EACH TRIODE UNIT $E_f = 6.3$  VOLTS

NOV. 1, 1933

PLATE MILLIAMPERES

92S-5413



80

80, 81

**FULL-WAVE HIGH-VACUUM RECTIFIER**

Filament Voltage	Coated	
Current	5.0	a-c volts
Maximum Overall Length	2.0	amp.
Maximum Diameter		4-11/16"
Bulb		1-13/16"
Base		ST-14
Pin 1 - Filament		Medium $\mu$ -Pin
Pin 2 - Plate #2		Pin 3 - Plate #1
Mounting Position		Pin 4 - Filament
		Vertical $\diamond$



BOTTOM VIEW (4B)

 $\diamond$  Horizontal operation permitted if pins 1 and 4 are in horizontal plane.

*Maximum Ratings, Typical Operating Conditions, and Curves are the same as those for Type 5Y3-G.*

81

**HALF-WAVE HIGH-VACUUM RECTIFIER**

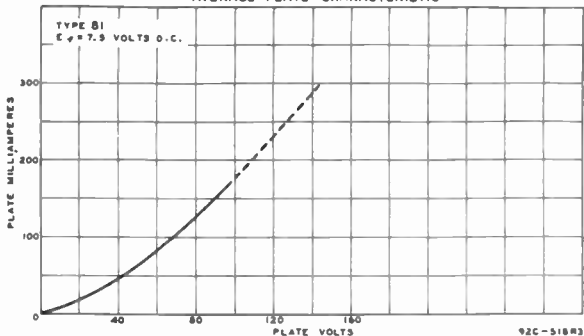
Filament Voltage	Coated	
Current	7.5	a-c volts
Maximum Overall Length	1.25	amp.
Maximum Diameter		6-1/4"
Bulb		2-7/16"
Base		ST-19
Pin 1 - Filament		Medium $\mu$ -Pin, Bay.
Pin 2 - Plate		Pin 3 - No Connection
Mounting Position		Pin 4 - Filament
		Vertical $\diamond$



BOTTOM VIEW (4B)

**HALF-WAVE RECTIFIER**

Peak Inverse Voltage	2000 max. volts
Peak Plate Current	500 max. ma.
Typical Operation with Condenser- or Choke-Input Filter:	
A-C Plate Voltage (RMS)	700 max. volts
D-C Output Current	85 max. ma.

 $\diamond$  Horizontal operation permitted if pins 1 and 4 are in vertical plane.**AVERAGE PLATE CHARACTERISTIC**

FEB. 2, 1940

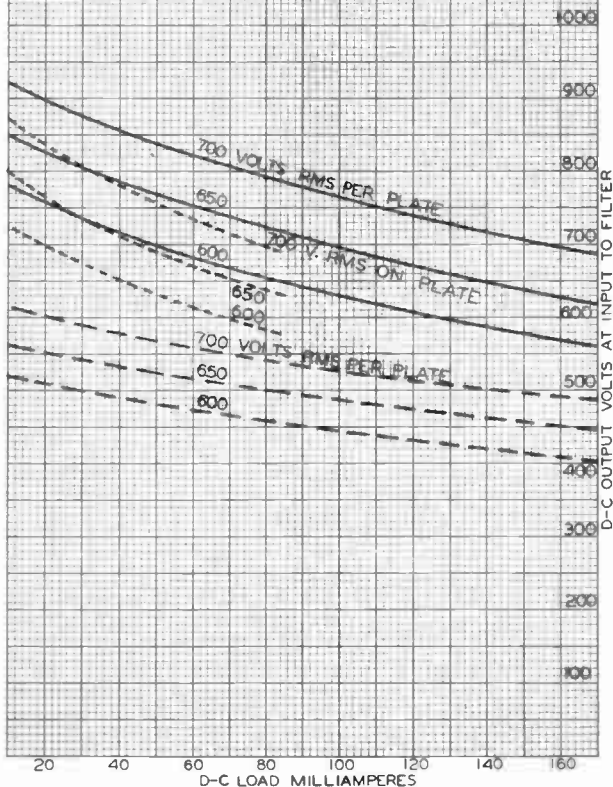
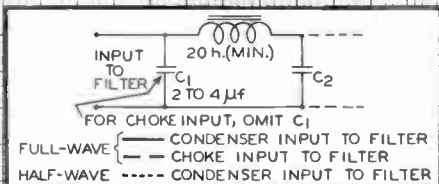
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RCA MANUFACTURING COMPANY, INC.

World Radio History

DATA



## OPERATION CHARACTERISTICS

 $E_f = 7.5$  VOLTS A.C.




82



82

**FULL-WAVE MERCURY-VAPOR RECTIFIER**

Filament	Coated	
Voltage	2.5	a-c volts
Current	3.0	amp.
Maximum Overall Length		4-11/16"
Maximum Seated Height		4-1/16"
Maximum Diameter		1-13/16"
Bulb		ST-14
Base		Medium 4-Pin
Pin 1 - Filament		Pin 3 - Plate #1
Pin 2 - Plate #2		Pin 4 - Filament
Mounting Position		Vertical, base down



BOTTOM VIEW (4C)

FULL-WAVE RECTIFIER

Peak Inverse Voltage	1550 max. volts
Peak Plate Current per Plate	600 max. ma.
Condenser Mercury Temperature Range	24° - 60°C
<i>With Condenser-Input Filter:</i>	
A-C Plate Voltage per Plate (RMS)	450 max. volts
Total Effective Plate-Supply Impedance per Plate <sup>▲</sup>	50 min. ohms
D-C Output Current	115 max. ma.
<i>With Choke-Input Filter:</i>	
A-C Plate Voltage per Plate (RMS)	550 max. volts
Input-Choke Inductance	6 min. henries
D-C Output Current	115 max. ma.
Tube Voltage Drop	15 approx. volts

HALF-WAVE RECTIFIER

As a half-wave rectifier, the 82 is operated with plates connected in parallel. Two 82's so connected in a full-wave circuit can supply twice the output current of a single tube. Both plates within the same tube should be connected to the same terminal of the plate transformer. To equalize the current distribution between plates, a resistor of not less than 100 ohms should be connected in series with each plate.

<sup>▲</sup> When a filter-input condenser larger than 40  $\mu$ f is used, it may be necessary to use more plate-supply impedance than the minimum value shown to limit the peak plate current to the rated value.

← Indicates a change.

Sept. 2, 1941

RCA RADIODRON DIVISION  
RCA MANUFACTURING COMPANY INC

DATA

83  
83-v

83

## FULL-WAVE MERCURY VAPOR RECTIFIER

Filament	Coated	
Voltage	5.0	a-c volts
Current	3.0	amp.
Maximum Overall Length		5-3/8"
Maximum Seated Height		4-3/4"
Maximum Diameter		2-1/16"
Bulb		ST-16
Base		Medium 4-Pin
Pin 1-Filament		Pin 3-Plate #1
Pin 2-Plate #2		Pin 4-Filament
Mounting Position		Vertical, base down



BOTTOM VIEW (4C)

### FULL-WAVE RECTIFIER

Peak Inverse Voltage	1550 max.	volts
Peak Plate Current per Plate	1.0 max.	amp.
Condensed Mercury Temperature Range	20° - 60°C	
<i>With Condenser-Input Filter:</i>		
A-C Plate Voltage per Plate (RMS)	450 max.	volts
Total Effective Plate-Supply Impedance per Plate*	50 min.	ohms
D-C Output Current	225 max.	ma.
<i>With Choke-Input Filter:</i>		
A-C Plate Voltage per Plate (RMS)	550 max.	volts
Input-Choke Inductance	3 min.	henries
D-C Output Current	225 max.	ma.
Tube Voltage Drop	15 approx.	volts

### HALF-WAVE RECTIFIER

As a half-wave rectifier, the 83 is operated with plates connected in parallel. Two 83's so connected in a full-wave circuit can supply twice the output current of a single tube. Both plates within the same tube should be connected to the same terminal of the plate transformer. To equalize the current distribution between plates, a resistor of not less than 50 ohms should be connected in series with each plate.

\* When a filter-input condenser larger than 40  $\mu\text{f}$  is used, it may be necessary to use more plate-supply impedance than the minimum value shown to limit the peak plate current to the rated value.

→ Indicates a change.

83-v

## FULL-WAVE HIGH-VACUUM RECTIFIER

Heater	Coated Unipotential Cathode*	
Voltage	5.0	a-c volts
Current	2.0	amp.
Maximum Overall Length		4-11/16"
Maximum Seated Height		4-1/16"
Maximum Diameter		1-13/16"
Bulb		ST-14
Base		Medium 4-Pin
Pin 1-Heater		Pin 3-Plate #1
Pin 2-Plate #2		Pin 4-Heater & Cathode
Mounting Position		Any



BOTTOM VIEW (4AD)

For Curves and additional data, see Type 574-G.

\* The cathode of the 83-v is connected to the heater within the tube.

→ Indicates a change.

Sept. 2, 1941

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RCA MANUFACTURING COMPANY INC

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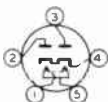
84/6Z4



84

## FULL-WAVE HIGH-VACUUM RECTIFIER

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.5	amp.
Maximum Overall Length		4-3/16"
Maximum Diameter		1-9/16"
Bulb		ST-12
Base		Small 5-Pin
Pin 1 - Heater		Pin 4 - Cathode
Pin 2 - Plate		Pin 5 - Heater
Pin 3 - Plate		
Mounting Position	BOTTOM VIEW (5D)	Any

FULL-WAVE RECTIFIER

Peak Inverse Voltage	1250 max. volts
Peak Plate Current per Plate	180 max. ma.
D-C Heater-Cathode Potential	450 max. volts

*Typical Operation with Condenser-Input Filter:*

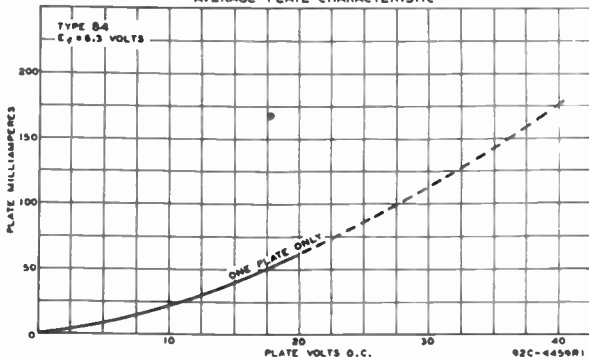
A-C Plate Voltage per Plate (RMS)	325 max. volts
Total Effective Plate-Supply Impedance per Plate <sup>▲</sup>	65 min. ohms
D-C Output Current	60 max. ma.

*Typical Operation with Choke-Input Filter:*

A-C Plate Voltage per Plate (RMS)	450 max. volts
Input-Choke Inductance	10 min. henries
D-C Output Current	60 max. ma.

- The heater voltage should never fluctuate to exceed 7.5 volts.  
 ▲ When a filter-input condenser larger than 40  $\mu$ f is used, it may be necessary to use more plate-supply impedance than the minimum value shown to limit the peak plate current to the rated value.

AVERAGE PLATE CHARACTERISTIC



FEB. 2, 1940

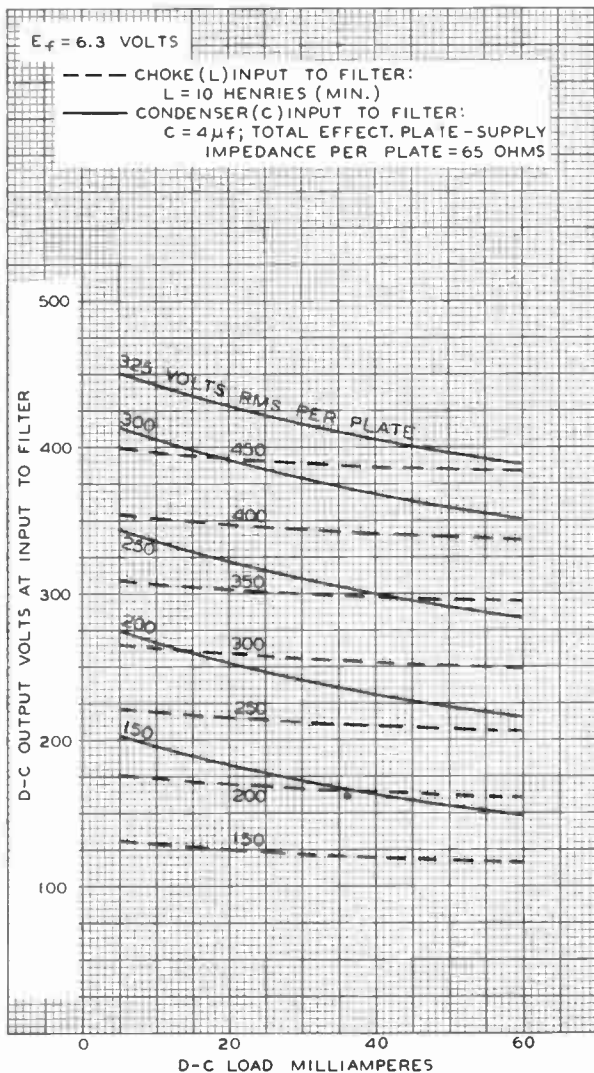
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## OPERATION CHARACTERISTICS





85

## TWIN DIODE—MEDIUM-MU TRIODE

## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3 . . . . . ac or dc volts

Current. . . . . 0.3 . . . . . amp

Direct Interelectrode Capacitances - Triode Unit:\*

Grid to Plate. . . . . 1.5 . . . . .  $\mu\text{f}$ Grid to Cathode. . . . . 1.5 . . . . .  $\mu\text{f}$ Plate to Cathode . . . . . 4.3 . . . . .  $\mu\text{f}$ 

\* With no external shield.

## Mechanical:

Mounting Position. . . . . Any

Maximum Overall Length . . . . . 4-17/32"

Seated Length. . . . . 3-25/32"  $\pm$  1/8"

Maximum Diameter . . . . . 1-9/16"

Eulb . . . . . ST-12

Cap. . . . . Small

Base . . . . . Small-Shell Small 6-Pin

Basing Designation for BOTTOM VIEW . . . . . 6G

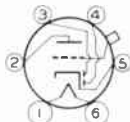
Pin 1 - Heater

Pin 2 - Triode

Plate

Pin 3 - Diode No. 2

Plate



Pin 4 - Diode No. 1

Plate

Pin 5 - Cathode

Pin 6 - Heater

Cap - Triode Grid

TRIODE UNIT  
AMPLIFIER - Class A<sub>1</sub>

## Maximum Ratings, Design-Center Values:

PLATE VOLTAGE. . . . . 250 max. volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode. . . 90 max. volts

Heater positive with respect to cathode. . . 90 max. volts

## Typical Operation and Characteristics:

Plate Voltage. . . . . 135 180 250 . . volts

Grid Voltage . . . . . -10.5 -13.5 -20 . . volts

Amplification Factor . . . . . 8.3 8.3 8.3

Plate Resistance . . . . . 11000 8500 7500 . . ohms

Transconductance . . . . . 750 975 1100 . .  $\mu\text{mhos}$ 

Plate Current. . . . . 3.7 6.0 8.0 . . ma

Load Resistance. . . . . 25000 20000 20000 . . ohms

Power Output . . . . . 75 160 350 . . mw

← Indicates a change.

(continued on next page)



85

## TWIN DIODE—MEDIUM-MU TRIODE

### DIODE UNITS - Two

Consideration of these units, including typical circuits and diode curves, is given at the front of this Section. Diode biasing of the triode unit of the 85 may be used only when at least 20000 ohms resistance is in the triode plate circuit.

*For additional data, see RESISTANCE-COUPLED AMPLIFIER CHARTS at the front of this Section.*

JUNE 15, 1948

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

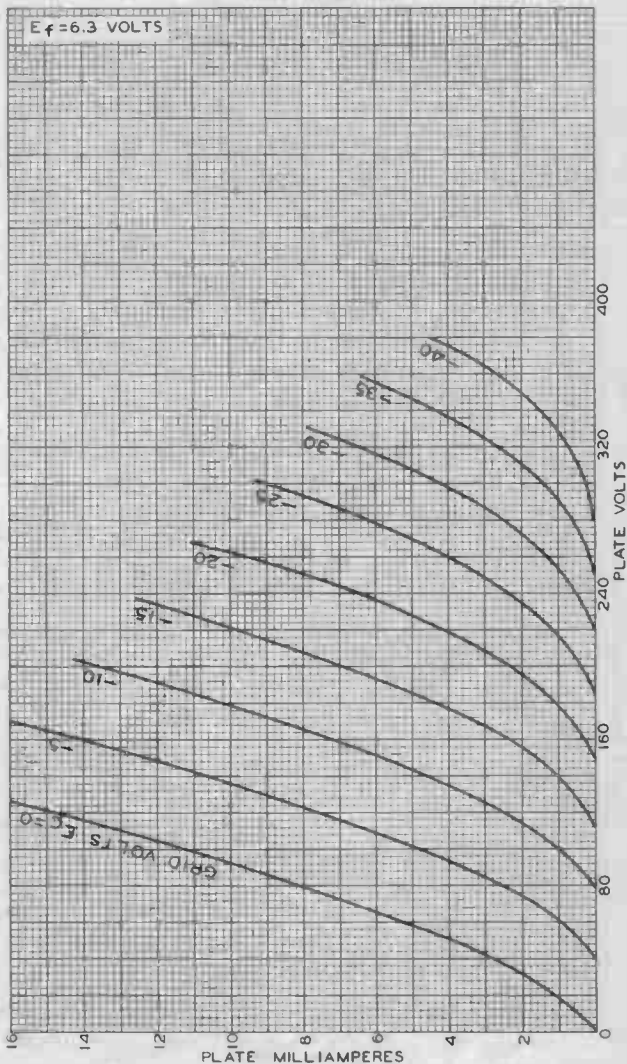
World Radio History

DATA



85

# AVERAGE PLATE CHARACTERISTICS TRIODE UNIT



MAY 13, 1948

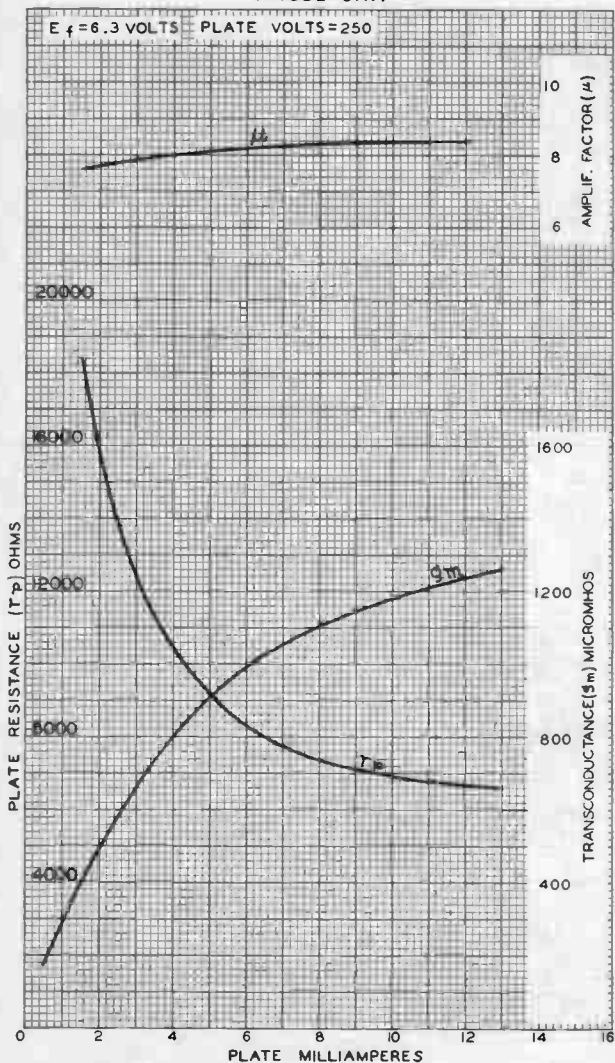
TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARTFORD, NEW JERSEY

92CM-5197R1



85

# AVERAGE CHARACTERISTICS TRIODE UNIT



MAY 14, 1948

TUBE DEPARTMENT

92CM-4746R1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



89

89

## TRIPLE-GRID POWER AMPLIFIER

Heater	Coated Unipotential Cathode		
Voltage	6.3		a-c or d-c volts
Current	0.4		amp.
Overall Length		4-9/32" to 4-17/32"	
Maximum Diameter		1-9/16"	
Bulb		ST-12	
Cap		Small Metal	
Base		Small 6-Pin	
Pin 1 - Heater		Pin 5 - Cathode	
Pin 2 - Plate		Pin 6 - Heater	
Pin 3 - Grid #2		Cap - Grid #1	
Pin 4 - Grid #3			



Mounting Position BOTTOM VIEW Any ←

## AMPLIFIER - Class A (Triode Connection)

(Grids #2 &amp; #3 tied to plate)

## Operating Conditions and Characteristics:

Heater	6.3	6.3	6.3	volts
Plate	160	180	250 max.	volts
Grid (#1)	-20	-22.5	-31	volts
Amp. Fact.	4.7	4.7	4.7	
Plate Res.	3300	3000	2600	ohms
Transcond.	1425	1550	1800	μmhos
Plate Cur.	17	20	32	ma.
Load Res. **	7000	6500	5500	ohms
U.P.O.	300	400	900	mw.

\*\* Optimum for maximum U.P.O. Approximately twice this value is recommended for load of tube when used as driver for class B stage.

## AMPLIFIER - Class A (Pentode Connection)

(Grid #3 tied to cathode)

## Operating Conditions and Characteristics:

Heater	6.3	6.3	6.3	6.3	volts
Plate	100	135	180	250 max.	volts
Screen (Grid #2)	100	135	180	250 max.	volts
Grid (#1)	-10	-13.5	-18	-25	volts
Amp. Fact.	125	125	125	125	
Plate Res.	104000	92500	80000	70000	ohms
Transcond.	1200	1350	1550	1800	μmhos
Plate Cur.	9.5	14	20	32	ma.
Screen Cur	1.6	2.2	3.0	5.5	ma.
Load Res.	10700	9200	8000	6750	ohms
P.O. <sup>0</sup>	0.33	0.75	1.5	3.4	watts

<sup>0</sup> 95 total harmonic distortion.

## AMPLIFIER - Class B (Triode Connection)

(Grid #3 tied to plate; Grids #1 &amp; #2 tied together)

Plate Voltage	250 max.	volts
Peak Plate Current	90 max.	ma.
Average Grid Dissipation (Grids #1 & #2)	0.35 max.	watts

## Typical Operation:

Unless otherwise specified, values are for 2 tubes

Heater *	6.3	6.3	volts
Plate (Plate & Grid #3)	180	180	volts
Grid (Grids #1 & #2)	0	0	volts
Peak A-F Grid-to-Grid voltage	45	68	volts
Zero-Sig. Plate Cur.	6	6	ma.
Load Res. (per tube)	3400	2350	ohms
Effective Load Res. (plate to plate)	13600	9400	ohms
Power Output	2.5	3.5	approx. watts

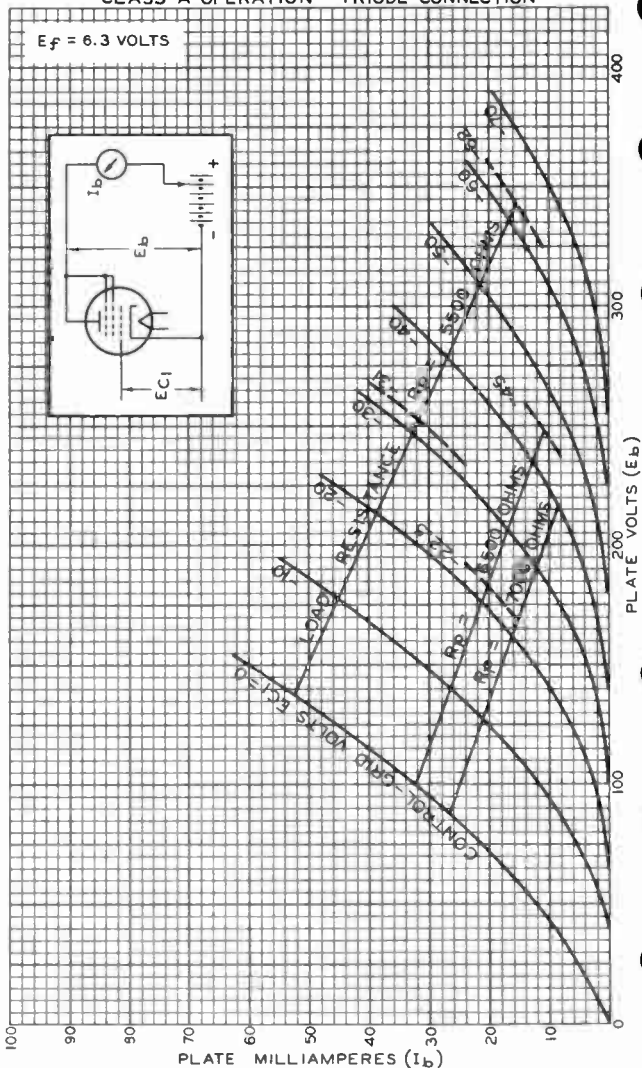
\* In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

When the 89 is operated as a Class A Amplifier (triode or pentode), transformer or impedance input-coupling devices are recommended. If, however, resistance coupling is used, a resistance of one megohm may be employed, provided the heater voltage does not rise more than 10% above rated value under any condition of operation.

← Indicates a change.



# AVERAGE PLATE CHARACTERISTICS CLASS A OPERATION - TRIODE CONNECTION







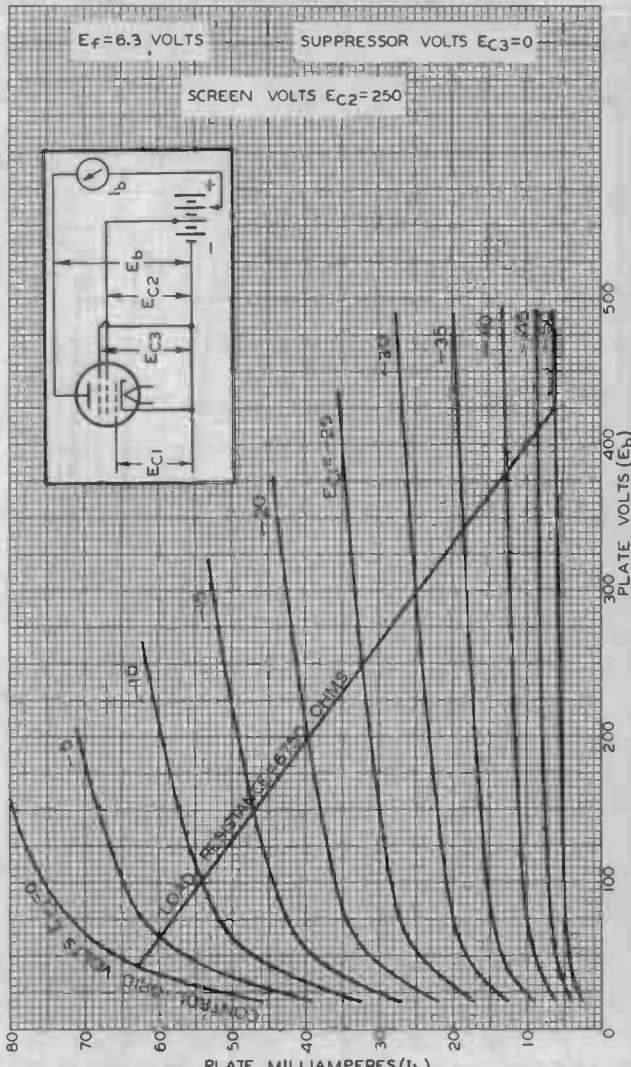
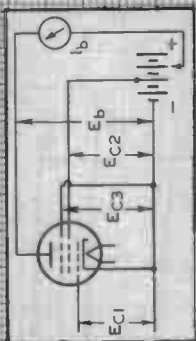
89

# AVERAGE PLATE CHARACTERISTICS CLASS A OPERATION - PENTODE CONNECTION

$E_f = 8.3$  VOLTS

SUPPRESSOR VOLTS  $E_{C3} = 0$

SCREEN VOLTS  $E_{C2} = 250$



FEB. 5, 1934

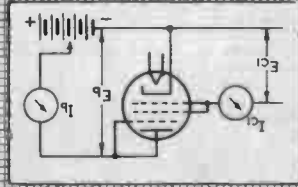
RCA RADIODEN DIVISION  
RCA MANUFACTURING COMPANY INC.  
World Radio History

925-5452



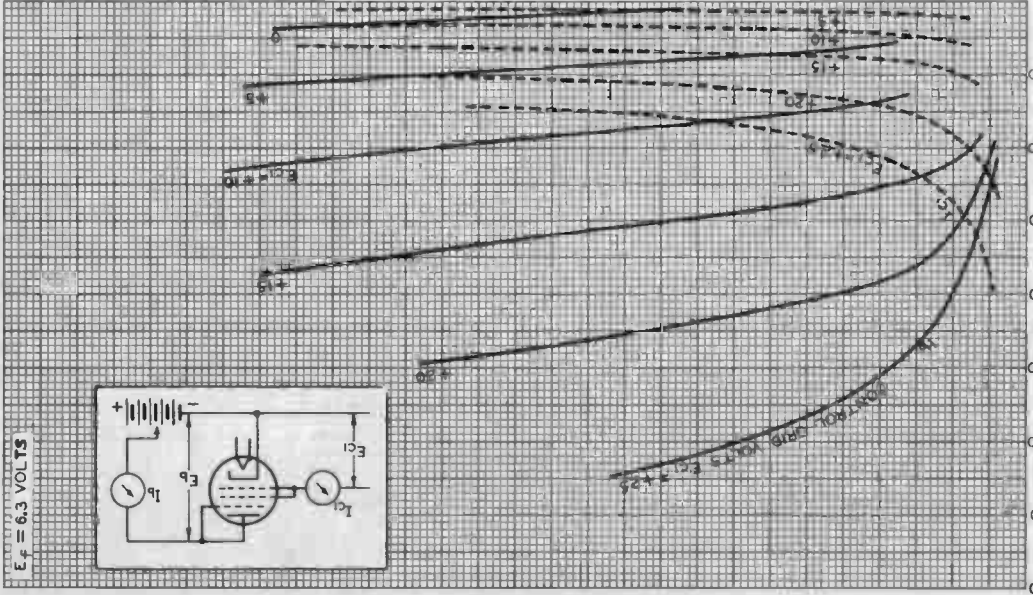
89

# AVERAGE PLATE CHARACTERISTICS CLASS B OPERATION

 $E_f = 6.3$  VOLTS

280 260 240 220 200 180 160 140 120 100 80 60 40 20 0

PLATE VOLTS ( $E_p$ )



JUNE 15, 1932.

D-C PLATE OR D-C GRID MILLIAMPERES ( $I_p$  OR  $I_{c1}$ )

RCA MANUFACTURING COMPANY, INC.

92S-4198



117L7-GT



117L7-GT/117M7-GT

## RECTIFIER-BEAM POWER AMPLIFIER

Heater <sup>a</sup>	Coated Unipotential Cathodes	
Voltage	117	a-c or d-c volts
Current	0.09	amp.
Maximum Overall Length		3-7/16"
Maximum Seated Height		2-7/8"
Maximum Diameter		1-5/16"
Bulb		T-9
Base	Intermediate Shell Octal 8-Pin	
Pin 1-Rectifier Cathode		Pin 5-Amplifier Screen
Pin 2-Heater		Pin 6-Rectifier Plate
Pin 3-Amplifier Plate		Pin 7-Heater
Pin 4-Amplifier Grid		Pin 8-Amplifier Cathode
Mounting Position		Any

BOTTOM VIEW (8A0)

RECTIFIER UNIT (Half-Wave)

Peak Inverse Voltage	350 max.	volts
Peak Plate Current	450 max.	volts
D-C Heater to Cathode Potential	175 max.	volts
<i>With Condenser-Input Filter:</i>		
A-C Plate Voltage (RMS)	117 max.	volts
Total Effective Plate Supply Impedance	15 min.	ohms
D-C Output Current	75 max.	ma.

AMPLIFIER UNIT

Plate Voltage	117 max.	volts
Screen Voltage	117 max.	volts
Plate Dissipation	6.0 max.	watts
Screen Dissipation	1.0 max.	watt
<i>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</i>		
Plate	105	volts
Screen	105	volts
Grid	-5.2	volts
Peak A-F Grid Voltage	5.2	volts
Zero-Sig. Plate Cur.	43	ma.
Max.-Sig. Plate Cur.	43	ma.
Zero-Sig. Screen Cur.	4	ma.
Max.-Sig. Screen Cur.	5.5	ma.
Plate Resistance	17000 approx.	ohms
Transconductance	5300	μmhos
Load Resistance	4000	ohms
Total Harmonic Distortion	5	%
Max.-Sig. Power Output	0.85	watt

It is recommended that the potential difference between heater and cathode of the amplifier unit be kept as low as possible by connecting pin #2 to the side of the line opposite that to which pins #6 & #7 are connected.

May 1, 1941

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY, INC.  
World Radio History

TENTATIVE DATA

117N7-GT



117N7-GT

## RECTIFIER-BEAM POWER AMPLIFIER

Heater	Coated Unipotential Cathodes	
Voltage	117	a-c or d-c volts
Current	0.09	amp.
Maximum Overall Length		3-7/16"
Maximum Seated Height		2-7/8"
Maximum Diameter		1-5/16"
Bulb		T-9
Base	Intermediate Shell Octal 8-Pin	
Pin 1 - No Connection		Pin 6 - Amplifier Cathode
Pin 2 - Heater		Pin 7 - Rectifier Plate, Heater
Pin 3 - Amplifier Plate		Pin 8 - Rectifier Cathode
Pin 4 - Amplifier Grid		
Pin 5 - Amplifier Screen		
Mounting Position	Any	

BOTTOM VIEW (8AV)

### RECTIFIER UNIT (Half-Wave)

Peak Inverse Voltage	350 max.	volts
Peak Plate Current	450 max.	ma.
D-C Heater-Cathode Potential	175 max.	volts
<i>With Condenser-Input Filter:</i>		
A-C Plate Voltage (RMS)	117 max.	volts
Total Effective Plate-Supply Impedance <sup>▲</sup>	15 min.	ohms
D-C Output Current	75 max.	ma.

### AMPLIFIER UNIT

Plate Voltage	117 max.	volts
Screen Voltage	117 max.	volts
Plate Dissipation	5.5 max.	watts
Screen Dissipation	1 max.	watt
<i>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</i>		
Plate Voltage	100	volts
Screen Voltage	100	volts
Grid Voltage <sup>○</sup>	-6	volts
Peak A-F Grid Voltage	6	volts
Zero-Signal Plate Current	51	ma.
Zero-Signal Screen Current	5	ma.
Plate Resistance	16000 approx.	ohms
Transconductance	7000	μmhos
Load Resistance	3000	ohms
Total Harmonic Distortion	6	%
Max.-Signal Power Output	1.2	watts

<sup>▲</sup> When a filter-input condenser larger than 40 μf is used, it may be necessary to use more plate-supply impedance than the minimum value shown to limit the peak plate current to the rated value.

<sup>○</sup> Type of input coupling used should not introduce too much resistance in the grid circuit. With fixed bias, the resistance should not exceed 0.25 megohm; with cathode bias, 1.0 megohm.



117P7-GT



117P7-GT

**RECTIFIER—BEAM POWER AMPLIFIER**

Heater	Coated Unipotential Cathodes	
Voltage	117	a-c or d-c volts
Current	0.090	amp.
Maximum Overall Length		3-7/16"
Maximum Seated Height		2-7/8"
Maximum Diameter		1-5/16"
Bulb		T-9
Base	Intermediate Shell Octal 8-Pin	
Pin 1—No Connection		Pin 6—Amplifier Cathode
Pin 2—Heater		Pin 7—Rectifier Plate, Heater
Pin 3—Amplifier Plate		Pin 8—Rectifier Cathode
Pin 4—Amplifier Grid		
Pin 5—Amplifier Screen		
Mounting Position		Any

BOTTOM VIEW (8AV)

RECTIFIER UNIT (Half-Wave)

Peak Inverse Voltage	350 max.	volts
Peak Plate Current	450 max.	ma.
D-C Heater to Cathode Potential	175 max.	volts
<i>With Condenser-Input Filter:</i>		
A-C Plate Voltage (RMS)	117 max.	volts
Total Effective Plate-Supply Impedance	15 min.	ohms
D-C Output Current	75 max.	ma.

AMPLIFIER UNIT

Plate Voltage	117 max.	volts
Screen Voltage	117 max.	volts
Plate Dissipation	6.0 max.	watts
Screen Dissipation	1.0 max.	watt
<i>Typical Operation and Characteristics - Class A<sub>1</sub> Amplifier:</i>		
Plate Voltage	105	volts
Screen Voltage	105	volts
Grid Voltage #	-5.2	volts
Peak A-F Grid Voltage	5.2	volts
Zero-Sig. Plate Current	43	ma.
Max.-Sig. Plate Current	43	ma.
Zero-Sig. Screen Current	4	ma.
Max.-Sig. Screen Current	5.5	ma.
Plate Resistance	17000 approx.	ohms
Transconductance	5300	μmhos
Load Resistance	4000	ohms
Total Harmonic Distortion	5.0	%
Max.-Sig. Power Output	0.85	watt

# The type of input coupling used should not introduce too much resistance in the grid circuit. With fixed bias, the resistance should not exceed 0.25 megohm; with cathode bias, 0.5 megohm.

Dec. 1, 1941

RCA RADOTRON DIVISION  
RCA MANUFACTURING COMPANY INC.

TENTATIVE DATA

World Radio History





117Z3

# HALF-WAVE VACUUM RECTIFIER

117Z3

MINIATURE TYPE

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . . 117 . . . . . ac or dc volts

Current . . . . . 0.04 . . . . . amp

### Mechanical:

Mounting Position . . . . . Any

Maximum Overall Length . . . . . 2-5/8"

Maximum Seated Length . . . . . 2-3/8"

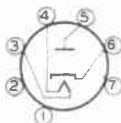
Maximum Diameter . . . . . 3-4"

Bulb . . . . . T-5-1/2

Base . . . . . Miniature Button 7-Pin

Basing Designation for BOTTOM VIEW . . . . . 4CB

- Pin 1 - Internal Con.-  
Do Not Use
- Pin 2 - No Connection
- Pin 3 - Heater



- Pin 4 - Heater
- Pin 5 - Plate
- Pin 6 - Cathode
- Pin 7 - No Con.-

## HALF-WAVE RECTIFIER

### Maximum Ratings, Design-Center Values:

PEAK INVERSE PLATE VOLTAGE . . . . . 330 max. volts ←

PEAK PLATE CURRENT . . . . . 540 max. ma

DC OUTPUT CURRENT . . . . . 90 max. ma

### HOT-SWITCHING TRANSIENT PLATE CURRENT

For duration of 0.2 second maximum . . . . . 2.5 max. amp

### PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode. . . 175 max. volts

Heater positive with respect to cathode. . . 100 max. volts

### Typical Operation with Capacitor-Input to Filter:

AC Plate-Supply Voltage (RMS) . . . . . 117 volts ←

Filter-Input Capacitor . . . . . 30 μf

Min. Total Effective Plate-Supply Impedance. . . . . 20 ohms

DC Output Current . . . . . 90 ma

### DC Output Voltage at Input to Filter (Approx.):

At half-load current (45 ma.) . . . . . 130 volts

At full-load current (90 ma.) . . . . . 110 volts

### Voltage Regulation (Approx.):

Half-load to full-load current . . . . . 20 volts ←

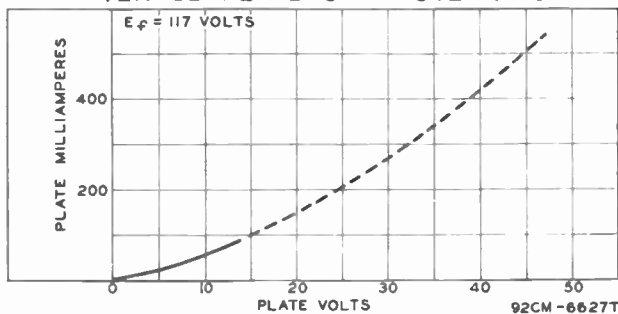
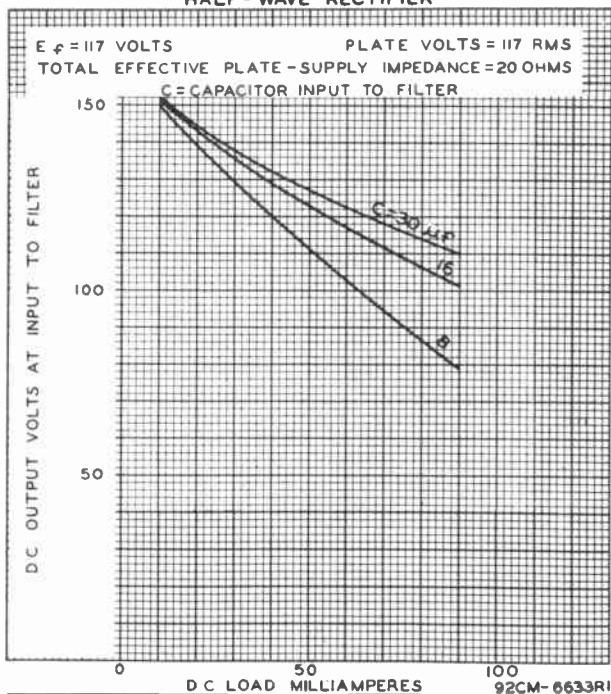
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117Z3



117Z3

## AVERAGE PLATE CHARACTERISTIC

OPERATION CHARACTERISTICS  
HALF-WAVE RECTIFIER

JULY 3, 1950

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CE-6627T-6633R1

World Radio History





117Z4-GT

117Z4-GT

# HALF-WAVE VACUUM RECTIFIER

## GENERAL DATA

### Electrical:

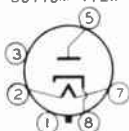
Heater, for Unipotential Cathode:

Voltage . . . . .	117	ac or dc volts
Current . . . . .	0.04	amp

### Mechanical:

Mounting Position . . . . .	Any
Maximum Overall Length . . . . .	3"
Maximum Seated Length . . . . .	2-7/16"
Maximum Diameter . . . . .	1-9/32"
Bulb . . . . .	T-9
Base . . . . .	Intermediate-Shell Octal 6-Pin
Basing Designation for BOTTOM VIEW . . . . .	5AA

- Pin 1 - No Connection
- Pin 2 - Heater
- Pin 3 - No Connection



- Pin 5 - Plate
- Pin 7 - Heater
- Pin 8 - Cathode

## HALF-WAVE RECTIFIER

### Maximum Ratings, Design-Center Values:

PEAK INVERSE PLATE VOLTAGE . . . . .	350 max.	volts
PEAK PLATE CURRENT . . . . .	540 max.	ma
DC OUTPUT CURRENT . . . . .	90 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	175 max.	volts
Heater positive with respect to cathode	175 max.	volts

### Typical Operation with Capacitor-Input to Filter:

AC Plate-Supply Voltage (RMS) . . . . .	117	volts
Filter-Input Capacitor . . . . .	40	μf
Min. Total Effective Plate-Supply Impedance*	30	ohms
DC Output Current . . . . .	90	ma

\* When a filter-input capacitor larger than 40μf is used, it may be necessary to use more plate-supply impedance than the minimum value shown to limit the peak plate current to the rated value.





117Z6-GT/G

# 117Z6-GT/G

## HIGH-VACUUM RECTIFIER-DOUBLER

Heater	Coated Unipotential Cathodes	
Voltage	117	a-c or d-c volts
Current	0.075	amp.
Maximum Overall Length	3-5/16"	
Maximum Seated Height	2-3/4"	
Maximum Diameter	1-5/16"	
Bulb	T-9	
Base	Intermediate Shell Octal 7-Pin	
Pin 1 - No Connection	Pin 5 - Plate #1	
Pin 2 - Heater	Pin 7 - Heater	
Pin 3 - Plate #2	Pin 8 - Cathode #1	
Pin 4 - Cathode #2		
Mounting Position		Any



BOTTOM VIEW (G-7Q)

Maximum Ratings Are Design-Center Values

### RECTIFIER OR DOUBLER

Peak Inverse Plate Voltage	700 max. volts
Peak Plate Current per Plate	360 max. ma.
D-C Output Current per Plate	60 max. ma.
D-C Heater-Cathode Potential	350 max. volts

Typical Operation As Half-Wave Rectifier with Condenser-Input Filter:<sup>0</sup>

A-C Plate Supply Voltage per Plate (RMS)	117	150	235	volts
Filter Input Condenser	40	40	40	μf
Min. Total Effect. Plate-Supply Imped. per Plate	15	40	100	ohms
D-C Output Current per Plate	60	60	60	ma.

Typical Operation As Voltage Doubler:

	Half-Wave	Pull-Wave	
A-C Plate Supply Voltage per Plate (RMS)	117	117	volts
Filter Input Condenser	40	40	μf
Min. Total Effect. Plate-Supply Imped. per Plate	30	15	ohms
D-C Output Current	60	60	ma.

<sup>0</sup> In half-wave rectifier service, the two units may be used separately or in parallel.

For Typical Rectifier-Doubler Circuits, see Type 25Z5.

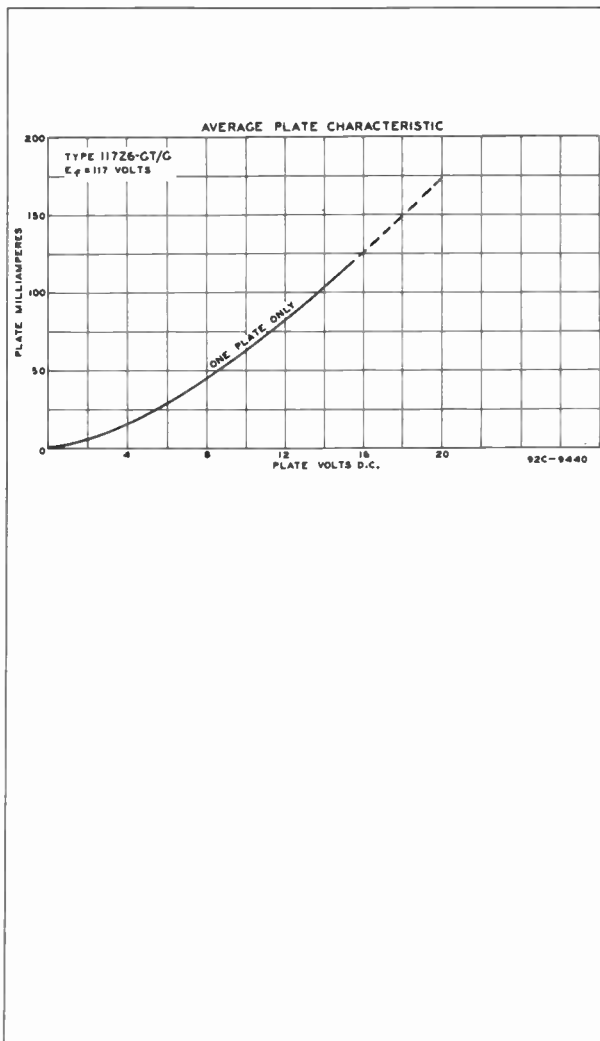
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117Z6-GT/G



117Z6-GT/G

# HIGH-VACUUM RECTIFIER-DOUBLER



AUG. 2, 1943

RCA VICTOR DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CF-6440



4-65A

# 4-65A

## BEAM POWER TUBE

Useful at maximum ratings with natural cooling at frequencies up to 50 Mc; at maximum ratings with forced-air cooling from 50 to 150 Mc; and with reduced ratings at higher frequencies

### GENERAL DATA

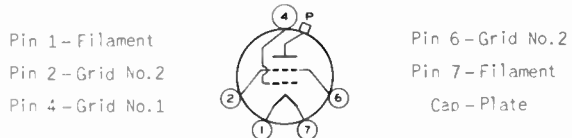
#### Electrical:

Filament, Thoriated Tungsten:			
Voltage . . . . .	6 ± 5%	. . . . .	ac or dc volts ←
Current . . . . .	3.5	. . . . .	amp
Transconductance, for plate volts =			
500, grid-No.2 volts = 250,			
and plate ma. = 125 . . . . .	4000		μmhos ←
Mu-Factor, Grid No.2 to Grid No.1 . .	5		
Direct Interelectrode Capacitances: <sup>o</sup>			
Grid No.1 to plate. . . . .	0.12 max.		μμf
Grid No.1 to filament			
and grid No.2 . . . . .	8		μμf
Plate to filament and			
grid No.2 . . . . .	2.1		μμf

#### Mechanical:

Operating Position. . . . .	Vertical, base down or up
Maximum Overall Length. . . . .	4-3/8"
Seated Length . . . . .	3-11/16" ± 3/16"
Maximum Diameter. . . . .	2-3/8"
Weight (Approx.). . . . .	3 oz ←
Cap . . . . .	Skirted Small (JETEC No.C1-22) ←
Heat-Radiating Plate Connector. . .	Eimac HR-6, or equivalent
Socket. . . . .	Johnson No.122-101, or equivalent
Base. . . . .	Special-Button Septar 5 Pin ←

#### BOTTOM VIEW



#### Bulb and Seal Temperatures:

Continuous Service. . . . .	225 max.	°C ←
Adequate ventilation around the tube must be provided to prevent the temperature of the bulb and seals from exceeding the specified maximum value.		

<sup>o</sup>: See next page.

← Indicates a change.

4-65A



4-65A

## BEAM POWER TUBE

Intermittent Service ("On" period does not exceed 5 minutes and is followed by "off" period of the same or

greater duration). . . . . 250 max. °C

When ambient temperature does not exceed 30° C and the operating frequency is below 50 Mc, it will not usually be necessary to provide forced-air cooling of the bulb and seals to prevent exceeding the specified maximum temperature value provided a heat-radiating plate connector is used and adequate ventilation is provided.

AF POWER AMPLIFIER & MODULATOR — Class AB<sub>1</sub>\*

## Maximum CCS\* Ratings, Absolute Values:

DC PLATE VOLTAGE . . . . .	3000 max.	volts
DC GRID-NO.2 (SCREEN-GRID) VOLTAGE . . .	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT** . . . . .	150 max.	ma
MAX.-SIGNAL GRID-NO.2 INPUT** . . . . .	10 max.	watts
PLATE DISSIPATION** . . . . .	65 max.	watts

## Typical Operation:

Values are for 2 tubes

DC Plate Voltage . . . . .	1000	1500	1750	volts
DC Grid-No.2 Voltage <sup>■</sup> . . . . .	500	500	500	volts
DC Grid-No.1 (Control-Grid) Voltage <sup>▲</sup> . . . . .	-85	-90	-90	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage . . . . .	170	180	180	volts
Zero-Signal DC Plate Current . . . . .	60	60	60	ma
Max.-Signal DC Plate Current . . . . .	170	180	170	ma
Zero-Signal DC Grid-No.2 Current. . . . .	0	0	0	ma
Max.-Signal DC Grid-No.2 Current. . . . .	30	20	23	ma
Effective Load Resistance (Plate to plate) . . . . .	9000	15000	20000	ohms
Max.-Signal Driving Power (Approx.) . . . . .	0	0	0	watts
Max.-Signal Power Output (Approx.) . . . . .	80	145	175	watts

## Maximum Circuit Values:

Effective Grid-No.1-Circuit Resistance . . . . . 0.25 max. megohms

AF POWER AMPLIFIER & MODULATOR — Class AB<sub>2</sub>†

## Maximum CCS\* Ratings, Absolute Values:

DC PLATE VOLTAGE . . . . .	3000 max.	volts
DC GRID-NO.2 (SCREEN-GRID) VOLTAGE . . .	600 max.	volts

○, ●, ■, ▲, †: see next page.

→ Indicates a change.



4-65A

4-65A

## BEAM POWER TUBE

MAX.-SIGNAL DC PLATE CURRENT**	150 max.	ma
MAX.-SIGNAL DC GRID-No.2 INPUT**	10 max.	watts
PLATE DISSIPATION**	65 max.	watts

## Typical Operation:

Values are for 2 tubes

DC Plate Voltage	600	1000	1500	1800	volts
DC Grid-No.2 Voltage	250	250	250	250	volts
DC Grid-No.1 (Control-Grid) Voltage:▲▲					
From fixed supply of	-40	-40	-45	-50	volts
Peak AF Grid-No.1-to- Grid-No.1 Voltage	240	210	200	180	volts
Zero-Signal DC Plate Current	60	60	60	50	ma
Max.-Signal DC Plate Current	300	300	250	220	ma
Zero-Signal DC Grid-No.2 Current	0	0	0	0	ma
Max.-Signal DC Grid-No.2 Current	80	60	40	30	ma
Effective Load Resistance (Plate to plate)	3600	6800	14000	20000	ohms
Max.-Signal Average Driving Power (Approx.)	3.7	3	1.9	1.3	watts
Max.-Signal Peak Driving Power (Approx.)§	7.4	6	3.8	2.6	watts
Max.-Signal Power Output (Approx.)	90	170	250	270	watts

## PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use  
with a maximum modulation factor of 1

## Maximum CCS\* Ratings, Absolute Values:

DC PLATE VOLTAGE	2500 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	120 max.	ma
GRID-No.1 INPUT	5 max.	watts
GRID-No.2 INPUT	10 max.	watts
PLATE DISSIPATION	45 max.	watts

## Typical Operation:

DC Plate Voltage	600	1000	1500	2000	2500	volts
DC Grid-No.2 Voltage <sup>oo</sup>	250	250	250	250	250	volts
DC Grid-No.1 Voltage <sup>o</sup>	-120	-125	-125	-130	-135	volts
Peak AF Grid-No.2 Voltage (For 100% modulation)	250	250	250	250	250	volts
Peak RF Grid-No.1 Voltage	215	220	220	225	215	volts
DC Plate Current	120	120	120	120	110	ma
DC Grid-No.2 Current	40	40	40	40	25	ma

o, ., •, ••, ■, ▲, †, ▲▲, §, oo, ⊕: See next page.

← Indicates a change.

4-65A



4-65A

BEAM POWER TUBE

DC Grid-No.1 Current (Approx.)	15	16	16	16	12	ma
Driving Power (Approx.)	3.2	3.5	3.5	3.6	2.6	watts
Power Output (Approx.)	45	90	140	195	230	watts

**RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy<sup>#</sup>**  
**and**  
**RF POWER AMPLIFIER — Class C FM Telephony**

**Maximum CCS<sup>o</sup> Ratings, Absolute Values:**

DC PLATE VOLTAGE		3000	max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE		400	max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE		-500	max.	volts
DC PLATE CURRENT		150	max.	ma
GRID-No.1 INPUT		5	max.	watts
GRID-No.2 INPUT		10	max.	watts
PLATE DISSIPATION		65	max.	watts

→ **Typical Operation:**

DC Plate Voltage	600	1000	1500	2000	3000	volts
DC Grid-No.2 Voltage	250	250	250	250	250	volts
DC Grid-No.1 Voltage	-75	-80	-85	-90	-100	volts
Peak RF Grid-No.1 Voltage	170	175	180	190	170	volts
DC Plate Current	150	150	150	140	115	ma
DC Grid-No.2 Current	40	40	40	40	22	ma
DC Grid-No.1 Current (Approx.)	18	17	18	11	10	ma
Driving Power (Approx.)	3.1	3	3.2	2.1	1.7	watts
Power Output (Approx.)	45	95	165	215	280	watts

→ **LINEAR RF POWER AMPLIFIER — Class AB<sub>1</sub>**  
**Single-Sideband Suppressed-Carrier Service**

**Maximum CCS<sup>o</sup> Ratings, Absolute Values:**

		<i>Up to 50 Mc</i>		
DC PLATE VOLTAGE		3000	max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE		600	max.	volts
MAX.-SIGNAL DC PLATE CURRENT		150	max.	ma
GRID-No.2 INPUT		10	max.	watts
PLATE DISSIPATION		65	max.	watts

**Typical Operation for "Single-Tone Modulation" and/or "Two-Tone Modulation":**

DC Plate Voltage	1000	1500	2000	2500	3000	volts
DC Grid-No.2 Voltage	510	480	450	405	360	volts
DC Grid-No.1 (Control-Grid) Voltage <sup>▲</sup>	-110	-105	-100	-90	-85	volts
Zero-Signal DC Plate Current	45	30	22	17	15	ma

o, s, ●, ■, ▲, †, ▲, §, ∞, ⊕, #: see next page.

→ Indicates a change.





4-65A

4-65A

## BEAM POWER TUBE

Effective RF Load						
Resistance . . . . .	3240	7500	12600	19000	24900	ohms
"Single-Tone Modulation": <sup>•</sup>						
Max.-Signal Peak RF						
Grid-No.1 Voltage	110	105	100	90	85	volts
Max.-Signal DC Plate						
Current . . . . .	100	90	80	70	65	ma
Max.-Signal DC Grid-						
No.2 Current . . . . .	17	13	11	8.5	6.5	ma
Max.-Signal DC Grid-						
No.1 Current . . . . .	0	0	0	0	0	ma
Max.-Signal Power						
Output . . . . .	40	75	100	115	130	watts
"Two-Tone Modulation": <sup>••</sup>						
Average DC Plate						
Current . . . . .	80	70	60	50	45	ma
Average DC Grid-						
No.2 Current . . . . .	6	4	3	2.5	1.5	ma

- without external shield.
- \* subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.
- continuous Commercial Service.
- \*\* averaged over any audio-frequency cycle of sine-wave form.
- Obtained from a source having good regulation.
- ▲ Adjusted to give indicated value of zero-signal plate current.
- † subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.
- ▲▲ adjusted to give indicated value of zero-signal plate current. The dc resistance of the bias source should not exceed 250 ohms.
- § The driver stage should be capable of supplying the No.1 grids of the class AB<sub>2</sub> stage with the specified driving power at low distortion. The effective resistance per grid-No.1 circuit of the class AB<sub>2</sub> stage should be held at a low value.
- OO Modulation voltage for grid No.2 is obtained by supplying the dc grid-No.2 voltage from the modulated plate supply through a series dropping resistor or an af reactor, or from a separate winding on the modulation transformer.
- ⊕ The use of bias obtained partially from a grid resistor is recommended.
- # Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions. When the 4-65A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation or oscillator keying, a small amount of fixed bias must be used to maintain the plate dissipation within the rated value. With 2000 volts on the plate, and 250 volts on grid No.2, a fixed bias of at least -40 volts should be used.
- "Single-Tone" operation refers to that class of amplifier service in which the grid-No.1 input consists of a monofrequency rf signal having constant amplitude. This signal is produced in a single-sideband suppressed-carrier system when a single audio frequency of constant amplitude is applied to the input of the system.
- "Two-Tone" operation refers to the simultaneous amplification of the two equal-amplitude, radio-frequency signals resulting from modulation of a single-sideband, suppressed-carrier transmitter by two audio-frequency signals of equal amplitude. The data shown for "Two-Tone" modulation refer to the case in which the peak amplitude of the resultant rf grid signal is equal to "Max.-Signal" Peak RF Grid-No.1 voltage as specified under "Single-Tone" modulation.

4-65A

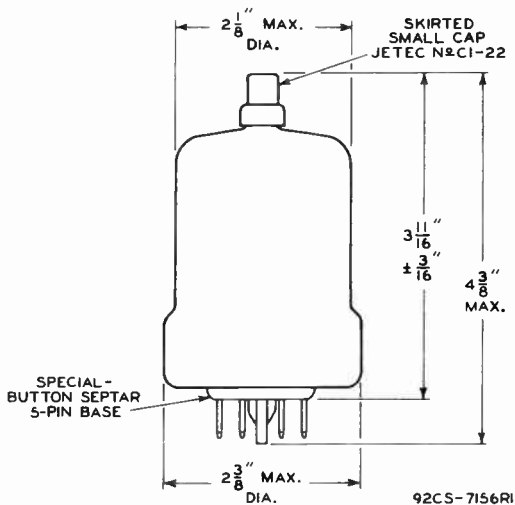


4-65A

## BEAM POWER TUBE

## MAXIMUM RATINGS vs OPERATING FREQUENCY

	FREQUENCY	50	Mc
MAXIMUM-PERMISSIBLE PERCENTAGE OF MAXIMUM-RATED PLATE VOLTAGE OR PLATE INPUT:			
	Class C plate-modulated telephony	100	%
	Class C telegraphy	100	%

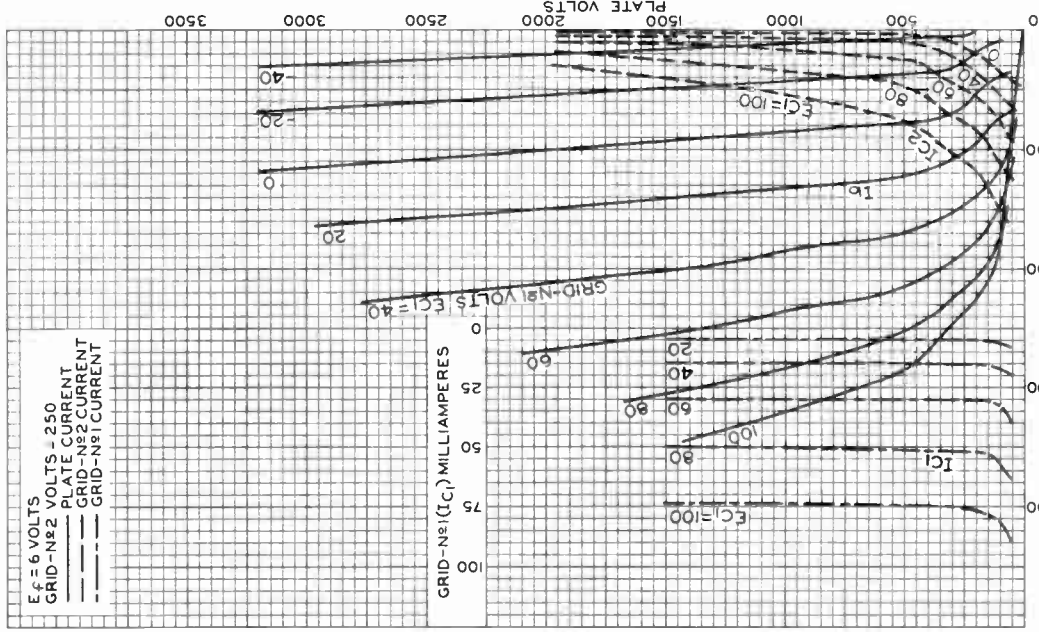




4-65A

# TYPICAL CHARACTERISTICS

$E_f = 6$  VOLTS  
 GRID-N<sub>2</sub> VOLTS = 250  
 PLATE CURRENT  
 GRID-N<sub>2</sub> CURRENT  
 GRID-N<sub>1</sub> CURRENT



4-65A

PLATE ( $I_b$ ) OR GRID-N<sub>2</sub> ( $I_{c2}$ ) MILLIAMPERES

ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON NEW JERSEY

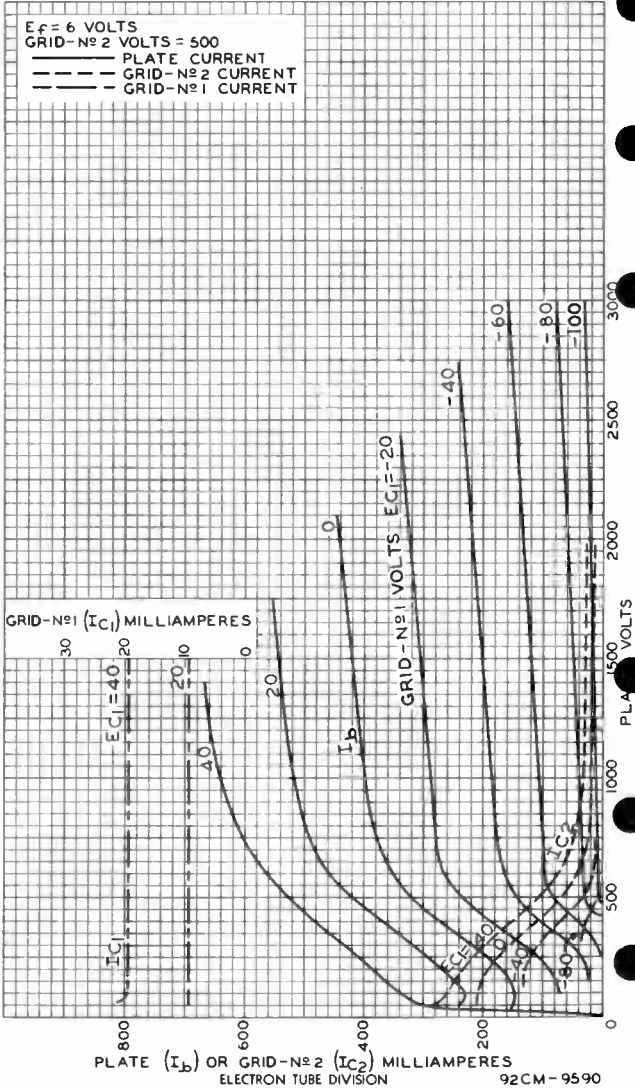
92CM-9591

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TYPICAL CHARACTERISTICS



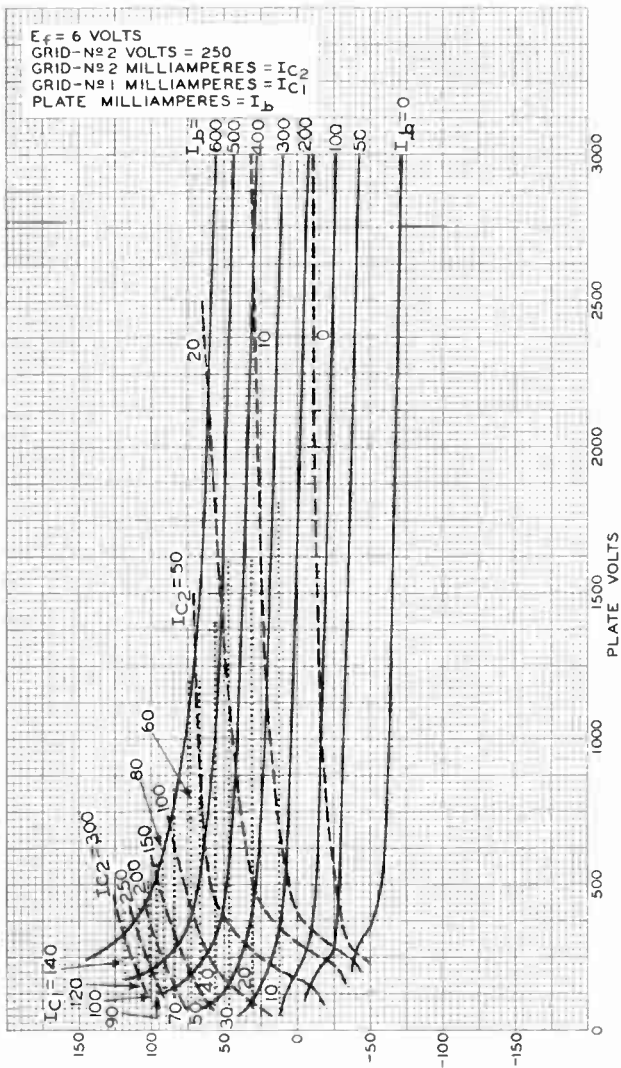
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### TYPICAL CONSTANT-CURRENT CHARACTERISTICS



ELECTRON TUBE DIVISION  
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92CM-7155R1





4-1000A

# 4-1000A BEAM POWER AMPLIFIER

FORCED-AIR COOLED

## GENERAL DATA

### Electrical:

Filament, Thoriated Tungsten:

Voltage . . . . . 7.5 ± 5% . . . . . ac or dc volts

Current . . . . . 21 . . . . . amp

Mu-Factor, Grid No.2 to

Grid No.1 . . . . . 7

Transconductance for plate

volts = 2500, grid-no.2 volts = 500, and plate ma. = 30n; 10000 . . . . . μmhos

Direct Interelectrode Capacitances:

Grid No.1 to Plate\* . . . . . 0.24 . . . . . μμf

Input . . . . . 27.2 . . . . . μμf

Output . . . . . 7.6 . . . . . μμf

### Mechanical:

Mounting Position . . . . . Vertical, base up or down

Overall Length . . . . . 9-1/4" ± 3/8"

Seated Length . . . . . 8-3/8" ± 3/8"

Maximum Diameter . . . . . 5-1/4"

Cap . . . . . Skirted Medium

Base . . . . . Special Ventilated Metal-Shell 5-Pin

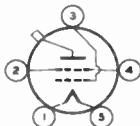
Socket . . . . . Eimac 4-1000A Air-System Socket, or equivalent

### BOTTOM VIEW

Pin 1 - Filament

Pin 2 - Grid No.2

Pin 3 - Grid No.1



Pin 4 - Grid No.2

Pin 5 - Filament

Cap - Plate

### Air Flow:

*Through Base*—A sufficient airflow should be provided to keep the base-seal temperature below its specified maximum value. The air should enter through the socket, cool the base pins, flow through the base, and then be directed along the bulb envelope.

*To Plate Seal*—Adequate air should be circulated around the envelope and plate seal to keep the temperature of the latter below its specified maximum value.

Base-Seal Temperature . . . . . 150 max. °C

Plate-Seal Temperature . . . . . 200 max. °C

Plate Heat-Dissipating Connector . . . . . Eimac HR-8, or equivalent

## AF POWER AMPLIFIER & MODULATOR--Class AB<sub>1</sub>†

Maximum CCS\* Ratings, Absolute Values:

DC PLATE VOLTAGE . . . . . 6000 max. volts

\* Without external shielding and with base sleeve grounded.

† Subscript 1 indicates that grid-no.1 current does not flow during any part of the input cycle.

•: See next page.

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TUBE DEPARTMENT

TENTATIVE DATA 1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

4-1000A



4-1000A

## POWER TETRODE

DC GRID-No.2 (SCREEN) VOLTAGE . . . . .	1000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT** . . . . .	700 max.	ma
PLATE DISSIPATION** . . . . .	1000 max.	watts
GRID-No.2 DISSIPATION** . . . . .	75 max.	watts

**Typical Operation:***Values are for 2 tubes*

DC Plate Voltage . . . . .	4000	5000	6000	volts
DC Grid-No.2 Voltage . . . . .	1000	1000	1000	volts
DC Grid-No.1 (Control-Grid) Voltage . . . . .	-115	-125	-135	volts
Peak AF Grid-No.1-to- Grid-No.1 Voltage . . . . .	230	250	270	volts
Zero-Sig. DC Plate Current . . . . .	300	240	200	ma
Max.-Sig. DC Plate Current . . . . .	1050	1000	950	ma
Zero-Sig. DC Grid-No.2 Cur. . . . .	0	0	0	ma
Max.-Sig. DC Grid-No.2 Cur. . . . .	60	60	64	ma
Effective Load Resistance (Plate to plate) . . . . .	7000	10000	14000	ohms
Max.-Signal Driving Power (Approx.) . . . . .	0	0	0	watts
Max.-Signal Power Output (Approx.) . . . . .	2340	3100	3840	watts

**Maximum Circuit Values:**

DC Resistance in Series with Grid No.1 of Each Tube . . . . .	0.25 max.	megohm
--	-----------	--------

**AF POWER AMPLIFIER & MODULATOR--Class AB<sub>2</sub>#****Maximum CCS<sup>o</sup> Ratings, Absolute Values:**

DC PLATE VOLTAGE . . . . .	6000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE . . . . .	1000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT** . . . . .	700 max.	ma
PLATE DISSIPATION** . . . . .	1000 max.	watts
GRID-No.2 DISSIPATION** . . . . .	75 max.	watts

**Typical Operation:***Values are for 2 tubes*

DC Plate Voltage . . . . .	4000	5000	6000	volts
DC Grid-No.2 Voltage . . . . .	500	500	500	volts
DC Grid-No.1 (Control-Grid) Voltage . . . . .	-60	-70	-75	volts
Peak AF Grid-No.1-to- Grid-No.1 Voltage . . . . .	280	290	260	volts
Zero-Sig. DC Plate Current . . . . .	300	200	150	ma
Max.-Sig. DC Plate Current . . . . .	1200	1100	950	ma

\*\* Averaged over any audio-frequency cycle of sine-wave form.

# Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

• See next page.

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TENTATIVE DATA 1

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## POWER TETRODE

Zero-Sig. DC Grid-No.2 Cur. . . . .	0	0	0	ma
Max.-Sig. DC Grid-No.2 Cur. . . . .	95	90	65	ma
Effective Load Resistance (Plate to plate) . . . . .	7000	11000	15000	ohms
Max.-Signal Driving Power (Approx.) . . . . .	11	11	9.4	watts
Max.-Signal Power Output (Approx.) . . . . .	3000	3800	3900	watts

## PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

## Maximum CCS\* Ratings, Absolute Values:

	Up to 30 Mc	From 30 to 110 Mc	
DC PLATE VOLTAGE . . . . .	5500 max.	5000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE . . . . .	1000 max.	1000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . . . .	-500 max.	-500 max.	volts
DC PLATE CURRENT . . . . .	600 max.	600 max.	ma
PLATE DISSIPATION . . . . .	670 max.	670 max.	watts
GRID-No.2 DISSIPATION . . . . .	75 max.	75 max.	watts
GRID-No.1 DISSIPATION . . . . .	25 max.	25 max.	watts

## Typical Operation up to 30 Mc:

DC Plate Voltage . . . . .	5500	volts
DC Grid-No.2 Voltage (Modulated 100%) . . . . .	500	volts
DC Grid-No.1 Voltage . . . . .	-200	volts
Peak AF Grid-No.2 Voltage (For 100% modulation) . . . . .	250	volts
Peak RF Grid-No.1 Voltage . . . . .	325	volts
DC Plate Current . . . . .	600	ma
DC Grid-No.2 Current . . . . .	105	ma
DC Grid-No.1 Current (Approx.) . . . . .	28	ma
Driving Power (Approx.) . . . . .	9	watts
Power Output (Approx.) . . . . .	2630	watts

## Typical Operation from 30 to 110 Mc:

DC Plate Voltage . . . . .	3000	4000	5000	volts
DC Grid-No.2 Voltage (Modulated 100%) . . . . .	500	500	500	volts
DC Grid-No.1 Voltage . . . . .	-200	-200	-200	volts
Peak AF Grid-No.2 Voltage (For 100% modulation) . . . . .	250	250	250	volts
Peak RF Grid-No.1 Voltage . . . . .	340	335	335	volts
DC Plate Current . . . . .	600	600	600	ma
DC Grid-No.2 Current . . . . .	145	132	130	ma
DC Grid-No.1 Current (Approx.) . . . . .	36	33	33	ma

\* See next page.

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TENTATIVE DATA 2

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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## POWER TETRODE

Driving Power (Approx.) <sup>•</sup> . . . . .	12	11	11	watts
Power Output (Approx.) . . . . .	1390	1910	2440	watts

**RF POWER AMPLIFIER & OSC.--Class C Telegraphy<sup>□</sup>**  
**and**  
**RF POWER AMPLIFIER--Class C FM Telephony**

Maximum CCS<sup>•</sup> Ratings, Absolute Values:

	<i>Up to</i>			
	<i>110 Mc</i>			
DC PLATE VOLTAGE . . . . .		6000	max.	volts
DC GRID--No.2 (SCREEN) VOLTAGE . . . . .		1000	max.	volts
DC GRID--No.1 (CONTROL--GRID) VOLTAGE . . . . .		-500	max.	volts
DC PLATE CURRENT . . . . .		700	max.	ma
DC PLATE DISSIPATION . . . . .		1000	max.	watts
DC GRID--No.2 DISSIPATION . . . . .		75	max.	watts
DC GRID--No.1 DISSIPATION . . . . .		25	max.	watts

## Typical Operation up to 110 Mc--Single Tube:

DC Plate Voltage . . . . .	3000	4000	5000	6000	volts
DC Grid--No.2 Voltage . . . . .	500	500	500	500	volts
DC Grid--No.1 Voltage . . . . .	-150	-150	-200	-200	volts
Peak RF Grid--No.1 Voltage . . . . .	290	290	355	350	volts
DC Plate Current . . . . .	700	700	700	700	ma
DC Grid--No.2 Current . . . . .	146	137	147	140	ma
DC Grid--No.1 Current (Approx.) . . . . .	38	39	45	42	ma
Driving Power (Approx.) <sup>•</sup> . . . . .	11	12	16	15	watts
Power Output (Approx.) . . . . .	1430	2100	2810	3400	watts

## Typical Operation at 110 Mc--Two Tubes in Push-Pull Circuit:

DC Plate Voltage . . . . .	4000	5000	6000	volts
DC Grid--No.2 Voltage . . . . .	450	500	500	volts
DC Grid--No.1 Voltage . . . . .	-150	-160	-180	volts
DC Plate Current . . . . .	1150	1250	1250	ma
DC Grid--No.2 Current . . . . .	280	240	250	ma
DC Grid--No.1 Current . . . . .	80	80	100	ma
Driver Power Output (Approx.) <sup>•</sup> . . . . .	350	400	400	watts
Useful Power Output (Approx.) <sup>••</sup> . . . . .	3000	4200	5200	watts

<sup>•</sup> Continuous Commercial Service.

<sup>•</sup> The values of required driving power increase above 30 Mc. At 110 Mc, the driver should be capable of providing 200 watts per tube to supply feed-through power, circuit losses and radiation losses.

<sup>□</sup> Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

<sup>•</sup> Indicated values include power required by a practical resonant circuit and by the tube.

<sup>••</sup> Indicated values of useful power are measured in load circuit.

DCT. 1, 1953

TUBE DEPARTMENT

TENTATIVE DATA 2

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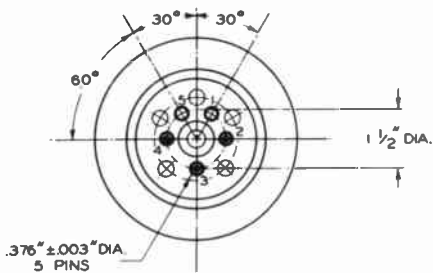
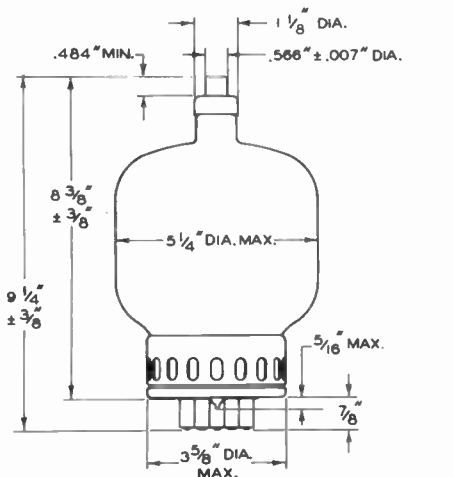
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4-1000A

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# POWER TETRODE



BOTTOM VIEW

92CM-7930

OCT. 1, 1953

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CE-7930

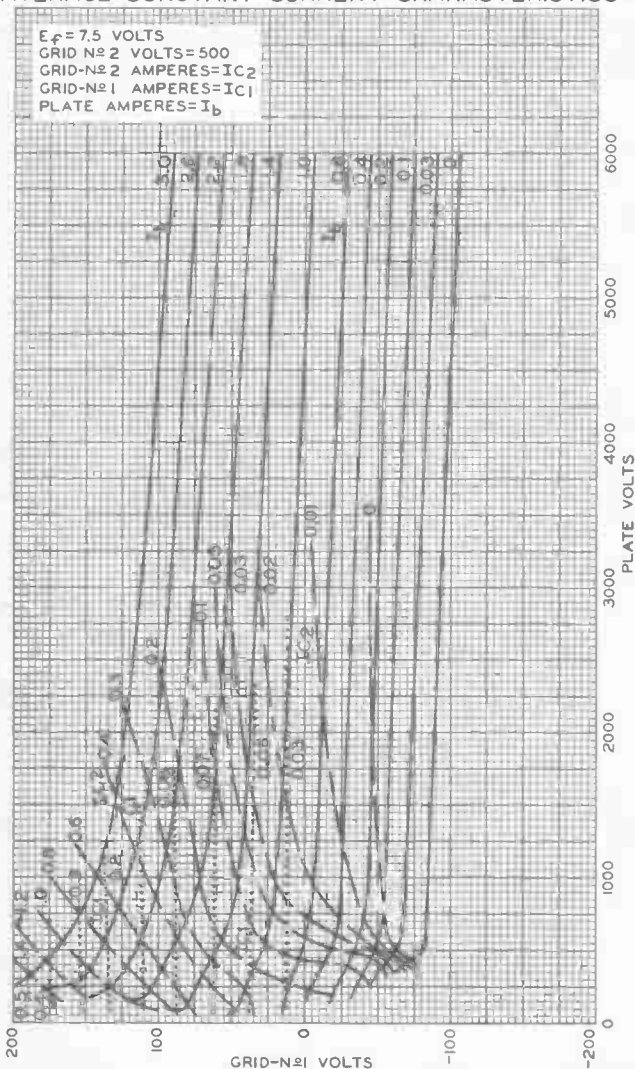
4-1000A



4-1000A

### AVERAGE CONSTANT-CURRENT CHARACTERISTICS

$E_f = 7.5$  VOLTS  
 GRID-N<sup>o</sup>2 VOLTS = 500  
 GRID-N<sup>o</sup>2 AMPERES =  $I_{C2}$   
 GRID-N<sup>o</sup>1 AMPERES =  $I_{C1}$   
 PLATE AMPERES =  $I_b$



FEB. 10, 1953

TUBE DEPARTMENT

92CM-7921

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

## Beam Power Tube

90 Watts CW Input (ICAS) up to 60 Mc  
 60 Watts CW Input (ICAS) up to 175 Mc  
 For Use under Severe Shock and Vibration

## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . .  $6.3 \pm 10\%$  volts  
 Current at heater volts = 6.3 . . . . . 1.25 amp

Transconductance, for plate volts

= 200, grid-No.2 volts = 200,  
 and plate ma. = 100 . . . . . 7000  $\mu$ hos

Mu-Factor, Grid No.2 to Grid No.1

for plate volts = 200, grid-No.2  
 volts = 200, and plate ma. = 100. . . . . 4.5

Direct Interelectrode Capacitances:

Grid No.1 to plate. . . . . 0.24 max.  $\mu$ f

Grid No.1 to cathode & grid No.3  
 & internal shield, grid No.2,  
 base sleeve, and heater . . . . . 13.0  $\mu$ f ←

Plate to cathode & grid No.3 &  
 internal shield, grid No.2,  
 base sleeve, and heater . . . . . 8.5  $\mu$ f

## Mechanical:

Operating Position. . . . . Any

Maximum Overall Length. . . . . 3-13/16"

Seated Length . . . . . 3-1/8"  $\pm$  1/8"

Maximum Diameter. . . . . 1-21/32"

Weight (Approx.). . . . . 2.07

Bulb. . . . . T12

Cap. . . . . Small (JEDEC No.C1-1)

Socket. . . . . Standard Octal 8-Contact

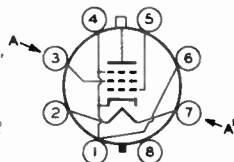
Base. . . . Small Micanol-Wafer Octal 8-Pin with "770" Sleeve

(JEDEC Group 1, No.B8-150)

Basing Designation for BOTTOM VIEW. . . . . 7CK ←

Pin 1 - Cathode,  
 Grid No.3,  
 Internal  
 Shield

Pin 2 - Heater  
 Pin 3 - Grid No.2  
 Pin 4 - Same as  
 Pin 1



AA' = PLANE OF ELECTRODES

Pin 5 - Grid No.1

Pin 6 - Same as  
Pin 1

Pin 7 - Heater

Pin 8 - Base  
Sleeve

Cap - Plate

\* See next page.

← Indicates a change.



## AF POWER AMPLIFIER & MODULATOR — Class AB<sub>1</sub>†

Maximum Ratings, Absolute-Maximum Values:

	CCS*	ICAS**	
DC PLATE VOLTAGE . . . . .	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE. . . . .	250 max.	250 max.	volts
MAX.-SIGNAL DC PLATE CURRENT** . . . . .	125 max.	135 max.	ma
MAX.-SIGNAL PLATE INPUT** . . .	60 max.	85 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT** . . . . .	3 max.	3 max.	watts
PLATE DISSIPATION** . . . . .	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode . . . . .	135 max.	135 max.	volts
Heater positive with respect to cathode . . . . .	135 max.	135 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface) . . . . .	220 max.	220 max.	°C

### Typical CCS Push-Pull Operation:

Values are for 2 tubes

DC Plate Voltage . . . . .	400	500	600	volts
DC Grid-No.2 Voltage▲. . . . .	190	185	180	volts
DC Grid-No.1 (Control-Grid) Voltage:				
With fixed-bias source . . . . .	-40	-40	-45	volts
Peak AF Grid-No.1-to- Grid-No.1 Voltage. . . . .	80	80	90	volts
Zero-Signal DC Plate Current . .	63	57	26	ma
Max.-Signal DC Plate Current . .	228	215	200	ma
Zero-Signal DC Grid-No.2 Current. . . . .	2.5	2	1	ma
Max.-Signal DC Grid-No.2 Current. . . . .	25	25	23	ma
Effective Load Resistance (Plate to plate) . . . . .	4000	5500	7000	ohms
Max.-Signal Driving Power (Approx.) . . . . .	0	0	0	watts
Max.-Signal Power Output (Approx.) . . . . .	55	70	82	watts

### Typical ICAS Push-Pull Operation:

Values are for 2 tubes

DC Plate Voltage . . . . .	600	750	volts
DC Grid-No.2 Voltage▲. . . . .	200	195	volts
DC Grid-No.1 (Control-Grid) Voltage:			
From fixed-bias source . . . . .	-50	-50	volts

\*, †, °, \*\*, \*\*, ▲: See next page.





7212

7212

## BEAM POWER TUBE

Peak AF Grid-No.1-to- Grid-No.1 Voltage . . . . .	100	100	volts
Zero-Signal DC Plate Current . . .	28	23	ma
Max.-Signal DC Plate Current . . .	229	220	ma
Zero-Signal DC Grid-No.2 Current .	1	1	ma
Max.-Signal DC Grid-No.2 Current .	27	26	ma
Effective Load Resistance (Plate to plate) . . . . .	6000	8000	ohms
Max.-Signal Driving Power (Approx.) . . . . .	0	0	watts
Max.-Signal Power Output (Approx.) . . . . .	95	120	watts

**Maximum Circuit Values (CCS or ICAS):**

Grid-No.1-Circuit Resistance under any condition: <sup>on</sup> *	
For fixed-bias operation . . . . .	0.1 max. megohm
For cathode-bias operation . . . . .	Not recommended

**AF POWER AMPLIFIER & MODULATOR — Class AB<sub>1</sub> †***Triode Connection* §CCS<sup>•</sup>ICAS<sup>••</sup>**Maximum Ratings, Absolute Values:**

DC PLATE VOLTAGE . . . . .	400 max.	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT** . . . . .	90 max.	90 max.	ma
MAX.-SIGNAL PLATE INPUT** . . . . .	35 max.	35 max.	watts
PLATE DISSIPATION** . . . . .	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode . . . . .	135 max.	135 max.	volts
Heater positive with respect to cathode . . . . .	135 max.	135 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface) . . . . .	220 max.	220 max.	°C

**Typical Push-Pull Operation:***Values are for 2 tubes*

DC Plate Voltage . . . . .	250	400	400	volts
DC Grid-No.1 Voltage . . . . .	-50	-100	-100	volts
Peak AF Grid-No.1-to- Grid-No.1 Voltage <sup>o</sup> . . . . .	100	200	200	volts
Zero-Signal DC Plate Current . . . . .	120	40	40	ma
Max.-Signal DC Plate Current . . . . .	125	100	100	ma
Effective Load Resistance (Plate to plate) . . . . .	5000	8000	8000	ohms

•, †, •, ••, •••, ▲, ∞, ‡, §, °: See next page.

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## BEAM POWER TUBE

	CCS*		ICAS**		
Max.-Signal Driving Power (Approx.) . . . . .	0	0	0	0	watts
Max.-Signal Power Output (Approx.) . . . . .	10	22	22	22	watts

**Maximum Circuit Values (CCS or ICAS):**

Grid-No.1-Circuit Resistance under any condition: <sup>no</sup> ⊕					
For fixed-bias operation . . . . .			0.1 max.		megohm
For cathode-bias operation . . . . .			0.5 max.		megohm

**AF POWER AMPLIFIER & MODULATOR — Class AB<sub>2</sub><sup>#</sup>****Maximum Ratings, Absolute Values:**

	CCS*		ICAS**		
DC PLATE VOLTAGE . . . . .	600 max.	600 max.	750 max.	750 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE . . . . .	250 max.	250 max.	250 max.	250 max.	volts
MAX.-SIGNAL DC PLATE CURRENT** . . . . .	125 max.	125 max.	135 max.	135 max.	ma
MAX.-SIGNAL PLATE INPUT** . . . . .	62.5 max.	62.5 max.	90 max.	90 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT** . . . . .	3 max.	3 max.	3 max.	3 max.	watts
PLATE DISSIPATION** . . . . .	20 max.	20 max.	25 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:					
Heater negative with respect to cathode . . . . .	135 max.	135 max.	135 max.	135 max.	volts
Heater positive with respect to cathode . . . . .	135 max.	135 max.	135 max.	135 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface). . . . .	220 max.	220 max.	220 max.	220 max.	°C

**Typical CCS Push-Pull Operation:***Values are for 2 tubes*

DC Plate Voltage . . . . .	400	500	600	volts
DC Grid-No.2 Voltage <sup>▲</sup> . . . . .	175	175	165	volts
DC Grid-No.1 (Control-Grid) Voltage:				
From fixed-bias source . . . . .	-41	-44	-44	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage. . . . .	95	102	97	volts
Zero-Signal DC Plate Current. . . . .	33	27	22	ma
Max.-Signal DC Plate Current. . . . .	232	242	207	ma
Zero-Signal DC Grid-No.2 Current. . . . .	1.1	0.7	0.6	ma

†, •, ••, •••, ▲, ∞, ✱, §, ○, ⊕, #: See next page.





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## BEAM POWER TUBE

Max.—Signal DC Grid—No.2 Current. . . . .	18	18	17	ma
Max.—Signal DC Grid—No.1 Current. . . . .	1.6	1.9	1.1	ma
Effective Load Resistance (Plate to plate) . . . . .	3700	4600	6800	ohms
Max.—Signal Driving Power (Approx.) ♦ . . . .	0.2	0.3	0.2	watt
Max.—Signal Power Output (Approx.) . . . . .	62	83	90	watts

## Typical ICAS Push-Pull Operation:

Values are for 2 tubes

DC Plate Voltage . . . . .	600	750	volts
DC Grid—No.2 Voltage▲. . . . .	190	165	volts
DC Grid—No.1 (Control-Grid) Voltage:			
From fixed-bias source . . . . .	-48	-46	volts
Peak AF Grid—No.1-to— Grid—No.1 Voltage. . . . .	109	108	volts
Zero-Signal DC Plate Current . . . . .	28	22	ma
Max.—Signal DC Plate Current . . . . .	270	240	ma
Zero-Signal DC Grid—No.2 Current. . . . .	1.2	0.3	ma
Max.—Signal DC Grid—No.2 Current. . . . .	20	20	ma
Max.—Signal DC Grid—No.1 Current. . . . .	2	2.6	ma
Effective Load Resistance (Plate to plate) . . . . .	5000	7400	ohms
Max.—Signal Driving Power (Approx.) ♦ . . . .	0.3	0.4	watt
Max.—Signal Power Output (Approx.) . . . . .	113	131	watts

## Maximum Circuit Values (CCS or ICAS):

Grid—No.1—Circuit Resistance: ♦			
For fixed-bias operation . . . . .	30000	max.	ohms
For cathode-bias operation . . . . .	Not recommended		

## PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with  
a maximum modulation factor of 1

CCS\* ICAS\*\*

## Maximum Ratings, Absolute Values:

DC PLATE VOLTAGE . . . . .	480 max.	600 max.	volts
DC GRID—No.2 (SCREEN-GRID) VOLTAGE. . . . .	250 max.	250 max.	volts

. † • •• •• ▲ ∞ \* \$ ◊ # ♦: See next page.

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## BEAM POWER TUBE

	CCS*	ICAS**
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . . . .	-150 max.	-150 max. volts
DC PLATE CURRENT . . . . .	117 max.	125 max. ma
DC GRID-No.1 CURRENT . . . . .	3.5 max.	4 max. ma
PLATE INPUT. . . . .	45 max.	67.5 max. watts
GRID-No.2 INPUT. . . . .	2 max.	2 max. watts
PLATE DISSIPATION. . . . .	13.3 max.	16.7 max. watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	135 max.	135 max. volts
Heater positive with respect to cathode . . . . .	135 max.	135 max. volts
BULB TEMPERATURE (At hottest point on bulb surface). . . . .	220 max.	220 max. °C

## Typical Operation:

At frequencies up to 60 Mc

DC Plate Voltage . . . . .	400	475	600	volts
DC Grid-No.2 Voltage . . . . .	150	135	150	volts
From a series resistor of. . . . .	33000	51000	56000	ohms
DC Grid-No.1 Voltage* . . . . .	-87	-77	-87	volts
From a grid-No.1 resistor of. . . . .	27000	27000	27000	ohms
Peak RF Grid-No.1 Voltage. . . . .	107	95	107	volts
DC Plate Current . . . . .	112	94	112	ma
DC Grid-No.2 Current . . . . .	7.8	6.4	7.8	ma
DC Grid-No.1 Current (Approx.). . . . .	3.4	2.8	3.4	ma
Driving Power (Approx.). . . . .	0.4	0.3	0.4	watt
Power Output (Approx.). . . . .	32	34	52	watts

## Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance†. . . . . 30000 max. ohms

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy<sup>■</sup>  
and  
RF POWER AMPLIFIER — Class C FM Telephony

CCS\*

ICAS\*\*

## Maximum Ratings, Absolute Values:

DC PLATE VOLTAGE . . . . .	600 max.	750 max. volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE. . . . .	250 max.	250 max. volts

†, •, ••, •••, ▲, ∞, †, §, ○, •, #, ♦, ♠, ★, †, ■: See next page.



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### BEAM POWER TUBE

	CCS*	ICAS**	
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . . . .	-150 max.	-150 max.	volts
DC PLATE CURRENT . . . . .	140 max.	150 max.	ma
DC GRID-No.1 CURRENT . . . . .	3.5 max.	4 max.	ma
PLATE INPUT . . . . .	67.5 max.	90 max.	watts
GRID-No.2 INPUT . . . . .	3 max.	3 max.	watts
PLATE DISSIPATION . . . . .	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode . . . . .	135 max.	135 max.	volts
Heater positive with respect to cathode . . . . .	135 max.	135 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface). . . . .	220 max.	220 max.	°C

#### Typical Operation:

*As amplifier at frequencies up to 60 Mc*

DC Plate Voltage . . . . .	500	600	600	750	volts
DC Grid-No.2 Voltage** . . . . .	170	150	180	160	volts
From a series resistor of . . . . .	36000	51000	43000	56000	ohms
DC Grid-No.1 Voltage* . . . . .	-66	-58	-71	-62	volts
From a grid-No.1 resistor of . . . . .	27000	20000	24000	20000	ohms
From a cathode resistor of . . . . .	470	470	430	470	ohms
Peak RF Grid-No.1 Voltage . . . . .	84	73	91	79	volts
DC Plate Current . . . . .	135	112	150	120	ma
DC Grid-No.2 Current . . . . .	9	9	10	11	ma
DC Grid-No.1 Current (Approx.) . . . . .	2.5	2.8	2.8	3.1	ma
Driving Power (Approx.) . . . . .	0.2	0.2	0.3	0.2	watt
Power Output (Approx.) . . . . .	48	52	66	70	watts

#### Typical Operation:

*As amplifier at frequency of 175 Mc*

DC Plate Voltage . . . . .	320	400	volts
DC Grid-No.2 Voltage** . . . . .	180	190	volts
From a series resistor of . . . . .	13000	20000	ohms
DC Grid-No.1 Voltage* . . . . .	-51	-54	volts
From a grid-No.1 resistor of . . . . .	27000	24000	ohms
From a cathode resistor of . . . . .	330	330	ohms

\* † • •• •• ▲ ○ ⊕ § ◊ # ♦ ↓ ★ † ■ •• •• See next page.

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## BEAM POWER TUBE

	CCS*	ICAS**	
Peak RF Grid-No.1 Voltage . . . . .	64	68	volts
DC Plate Current . . . . .	140	150	ma
DC Grid-No.2 Current . . . . .	10	10.4	ma
DC Grid-No.1 Current (Approx.) . . . . .	2	2.2	ma
Driving Power (Approx.) . . . . .	3	3	watts
Power Output (Approx.) . . . . .	25	35	watts

**Maximum Circuit Values (CCS or ICAS):**

Grid-No.1-Circuit Resistance†. . . . . 30000 max. ohms

\* Without external shield.

† Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

• Continuous Commercial Service.

•• Intermittent Commercial and Amateur Service.

\*\* Averaged over any audio-frequency cycle of sine-wave form.

▲ Preferably obtained from a separate source or from the plate-voltage supply with a voltage divider.

∞ The type of input coupling network used should not introduce too much resistance in the grid-No.1 circuit. Transformer- or impedance-coupling devices are recommended.

• When the 7212 is operated as a beam power tube in class AB<sub>1</sub> service, only fixed bias should be used, and the dc grid-No.1-circuit resistance should never exceed the specified value of 0.1 megohm.

§ with grid No.2 connected to plate.

○ The driver stage should be capable of supplying the No.1 grids of the class AB<sub>1</sub> stage with the specified driving voltage at low distortion.

• When the 7212 is connected as a triode and its grid No.1 is operated with fixed bias, the dc grid-No.1-circuit resistance should never exceed the specified value of 0.1 megohm. If higher values of grid-No.1-circuit resistance are desired, cathode bias must be employed. Under no circumstances should the dc grid-No.1-circuit resistance exceed the specified value of 0.5 megohm.

# Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

◆ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the AB<sub>2</sub> stage. To minimize distortion, the effective resistance per grid-No.1 circuit of the AB<sub>2</sub> stage should be held at a low value. For this purpose, the use of transformer coupling is recommended. In no case, however, should the total dc grid-No.1-circuit resistance exceed 30,000 ohms when the 7212 is operated at maximum ratings. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100,000 ohms.

• Obtained preferably from a separate source modulated along with the plate supply or from the modulated plate supply through a series resistor.

\* Obtained from grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

† When grid No.1 is driven positive and the 7212 is operated at maximum ratings, the total dc grid-No.1-circuit resistance should not exceed the specified value of 30,000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100,000 ohms.

••• : See next page.

- Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.
- ⊕ Obtained preferably from a separate source, or from the plate supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should be used only when the 7212 is used in a circuit which is not keyed. Grid-No.2 voltage must not exceed 400 volts under key-up conditions.
- Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

### CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current . . . . .	1	1.175	1.325	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate . . . . .	2	-	0.24	$\mu\text{f}$
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, base sleeve, and heater . .	2	12.0	15.0	$\mu\text{f}$
Plate to cathode & grid No.3 & internal shield, grid No.2, base sleeve, and heater . . . . .	2	7.3	9.5	$\mu\text{f}$
Plate Current . . . . .	3	46	94	ma
Grid-No.2 Current . . . . .	3	-	5.5	ma
Heater-Cathode Leakage Current:				
Heater 100 volts negative with respect to cathode . .	1	-	100	$\mu\text{a}$
Heater 100 volts positive with respect to cathode . .	1	-	100	$\mu\text{a}$
Useful Power Output . . . . .	4	47	-	watts
Mu-Factor, Grid No.1 to Grid No.2 . . . . .	5	3.6	5.4	←

Note 1: With 6.3 volts ac on heater.

Note 2: Without external shield.

Note 3: With 6.3 volts ac on heater, dc plate volts = 300, dc grid-No.2 volts = 200, and dc grid-No.1 volts = -33.

Note 4: In a single-tube, self-excited oscillator circuit, and with 6.3 volts ac on heater, dc plate volts = 600, dc grid-No.2 volts = 180, grid-No.1 resistor (ohms) = 30,000  $\pm$  10%, dc plate ma. = 100 to 112, dc grid-No.2 ma. = 23 maximum, dc grid-No.1 ma. = 2 to 2.5 and frequency (Mc) = 15.

Note 5: With 6.3 volts ac on heater, dc plate volts = 200, plate ma. = 100, and grid-No.2 volts = 200.

### SPECIAL RATINGS & PERFORMANCE DATA

#### 500-g Shock Rating:

This test is performed on a sample lot of tubes from each production run. Tubes are held rigid and are subjected in four different positions to an impact acceleration of 500 g. At the end of this test, tubes are required to meet the following limits:

← Indicates a change.



Useful RF Power Output . . . . . 42 min. watts  
 For conditions shown under *Characteristics Range Values*,  
*Note 4.*

Heater-Cathode

Leakage Current . . . . See *Characteristics Range Values*

The tubes must also meet the established limit for low-frequency vibration (See below).

#### Fatigue Rating:

This test is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected to 2.5-g vibrational acceleration at 25 cycles per second for 32 hours in each of three positions. At the end of this test, tubes are required to meet the following limits:

Useful RF Power Output . . . . . 42 min. watts  
 For conditions shown under *Characteristics Range Values*,  
*Note 4.*

Heater-Cathode

Leakage Current . . . . See *Characteristics Range Values*

The tubes must also meet the established limit for low-frequency vibration (See below).

#### Low-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run under the following conditions: Heater volts = 6.3, plate-supply volts = 250, grid-No.2 volts = 200, grid-No.1 voltage varied to give a plate current of 10 milliamperes, plate load resistor (ohms) = 2000, and vibrating frequency of 25 cycles per second with a fixed amplitude of 0.040 inch (total excursion 0.080 inch). The rms output voltage across the plate load resistor as a result of vibration of the tube must not exceed 500 millivolts.

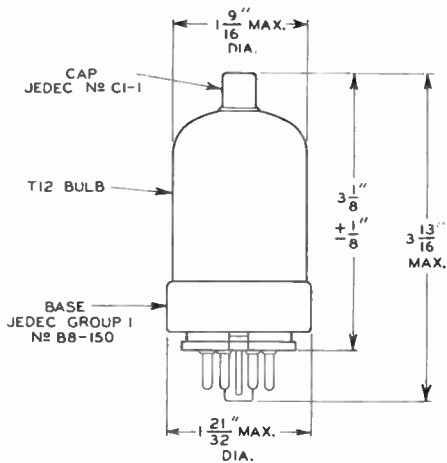
#### Variable-Frequency Vibration Performance (1):

This test is performed on a sample lot of tubes from each production run. Tubes are vibrated in each of 3 positions through frequency range of from 10 to 50 cycles per second and back to 10 cycles per second. The tubes are vibrated under the same conditions as specified for *Low-Frequency Vibration Performance*. During the test, the tubes will not show an rms output voltage across the plate load resistor in excess of 500 millivolts. At the end of this test, the tubes will not show tap or permanent interelectrode shorts or defects that cause the tubes to be inoperable.

#### Variable-Frequency Vibration Performance (2):

This test is performed on a sample lot of tubes from each production run. Tubes are vibrated in each of 3 positions, perpendicular and parallel to major axis of the tube, and parallel to longitudinal axis of the tube, through the frequency range from 50 to 120 cycles per second at a fixed acceleration of 10 g under the same voltage, current and load conditions as specified for *Low-Frequency Vibration Performance*. During this test, the tubes will not show an rms output voltage across the plate load resistor in excess of 500 millivolts.

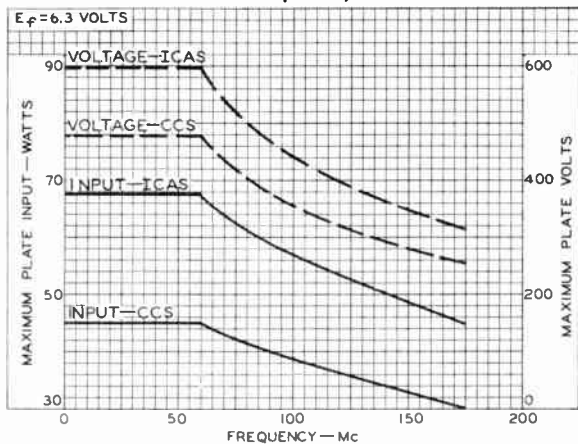




92CS-9625R4

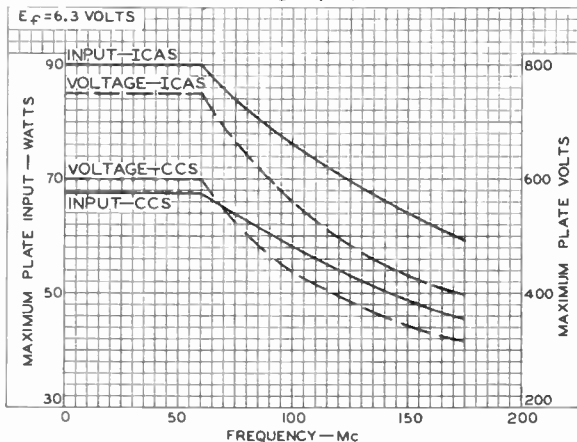


## RATING CHART I Class C Telephony Service



92CS-9614

## RATING CHART II Class C Telegraphy Service



92CS-9615







7212

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# AVERAGE PLATE CHARACTERISTICS

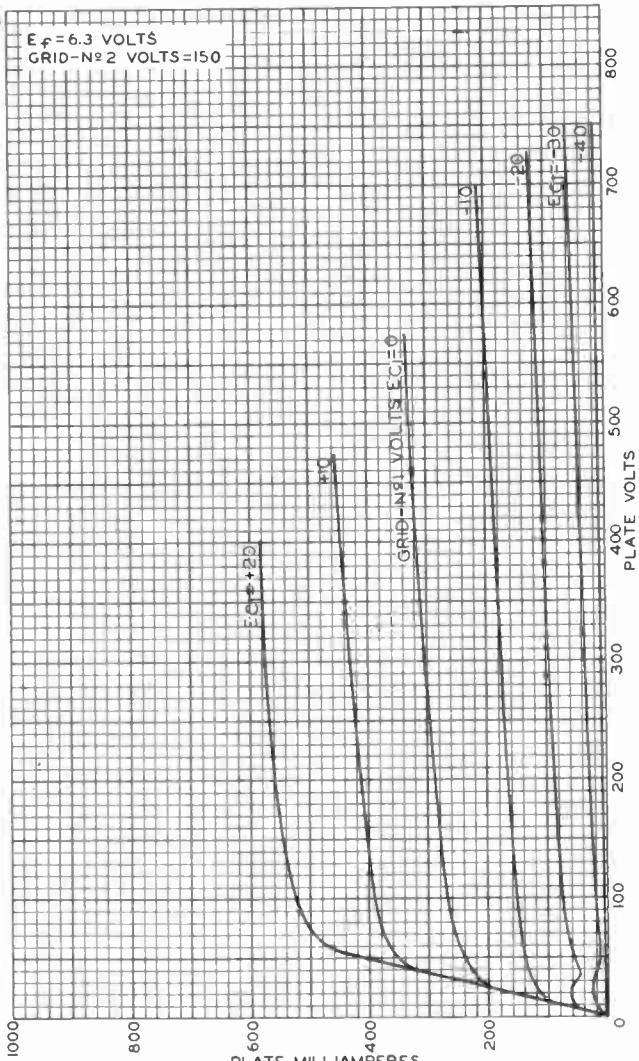


PLATE MILLIAMPERES  
ELECTRON TUBE DIVISION

92CM-8145

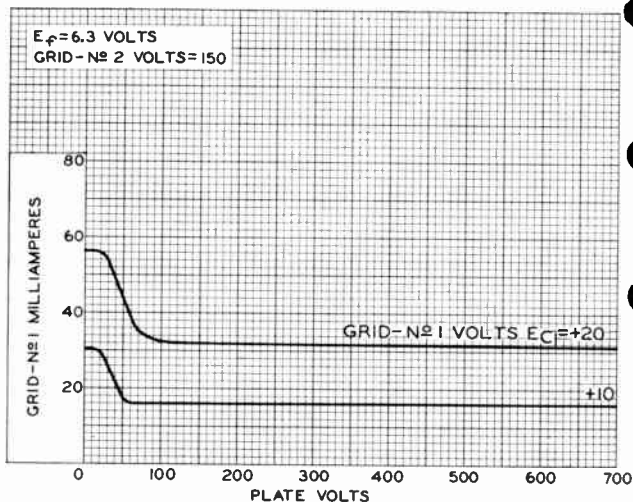
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7212

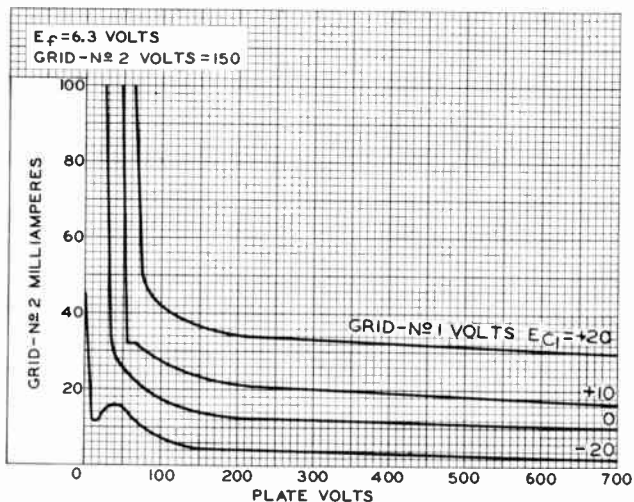


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## AVERAGE CHARACTERISTICS



92CS-9619



ELECTRON TUBE DIVISION  
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CS-9620



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# AVERAGE PLATE CHARACTERISTICS

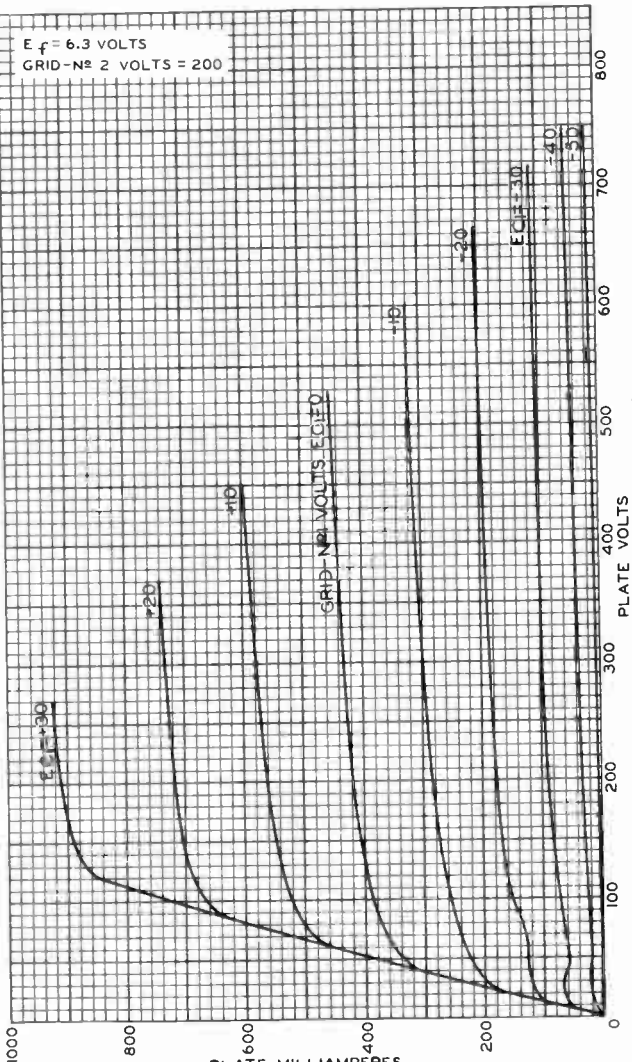


PLATE MILLIAMPERES  
ELECTRON TUBE DIVISION

92CM-7707R1

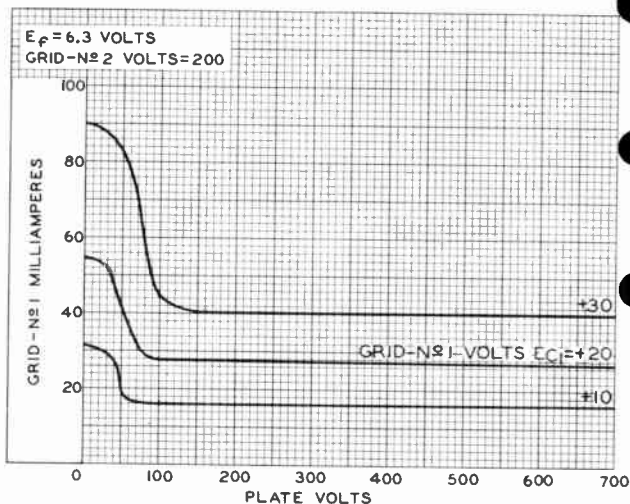
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7212

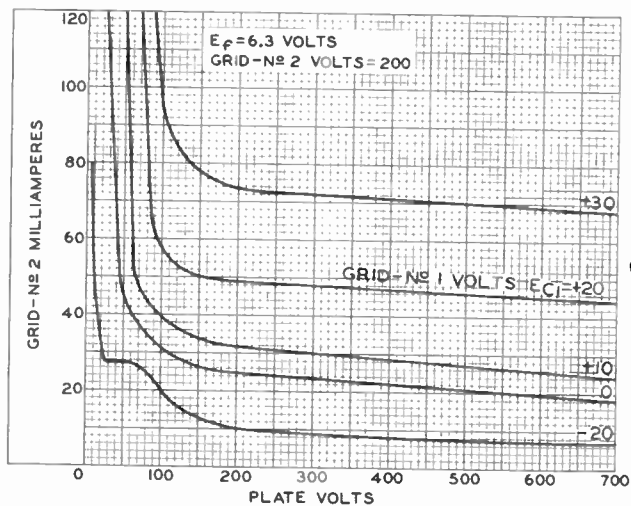


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## AVERAGE CHARACTERISTICS



92CS-9617



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

World Radio History

92CS-9618



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# AVERAGE CHARACTERISTICS TRIODE CONNECTION

$E_c = 6.3$  VOLTS  
GRID NO 2 CONNECTED TO PLATE.

GRID-NO 1 ( $T_c$ ) MILLIAMPERES

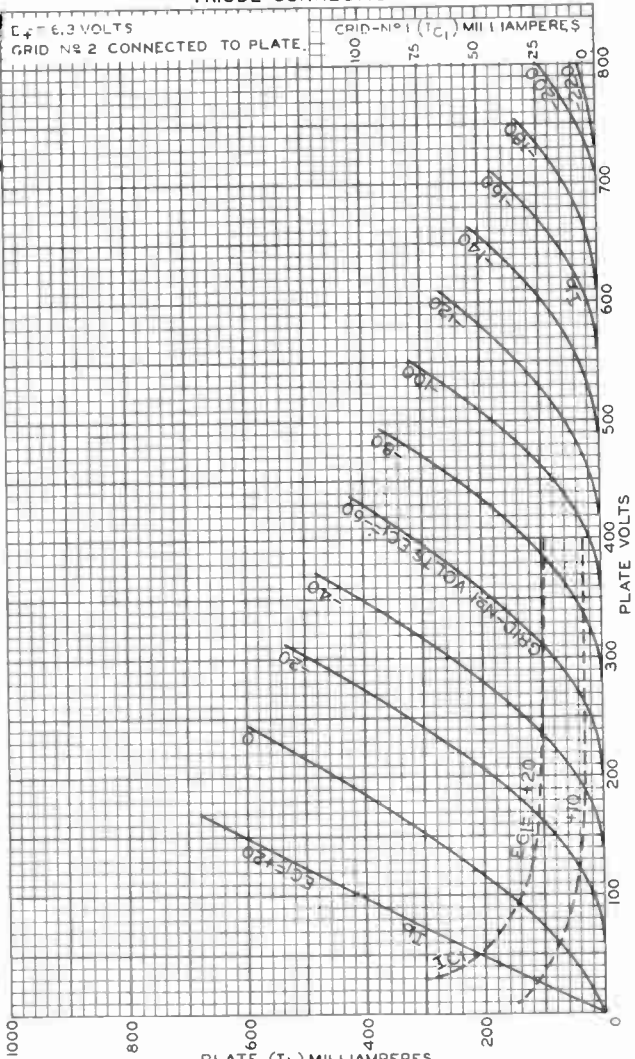


PLATE ( $I_b$ ) MILLIAMPERES  
ELECTRON TUBE DIVISION

92CM-7711R1

RADIO CORPORATION OF AMERICA, HARRISON NEW JERSEY





7357

7357

### BEAM POWER TUBE

90 Watts CW Input (ICAS) up to 60 Mc

60 Watts CW Input (ICAS) at 175 Mc

For use under severe shock and vibration

The 7357 is the same as the 7212 except for the following items:

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . .	26.5 ± 10%	volts
Current at 26.5 volts . . . . .	0.3	amp

#### CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current. . . . .	1	0.28	0.32	amp

Note 1: With 26.5 volts ac on heater.

