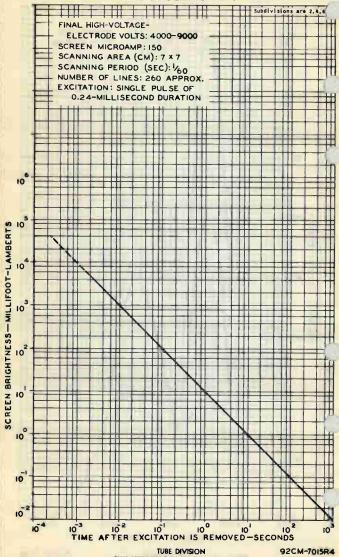


RADIO CORPORATION OF AMERICA, HARRISON, NEW JER



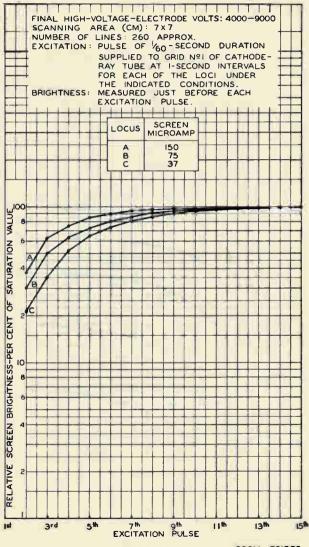
PERSISTENCE CHARACTERISTIC OF PHOSPHOR P7



BADIO CONFORATION OF AMERICA, HARRISON, NEW JEEST



BUILDUP CHARACTERISTICS OF PHOSPHOR P7

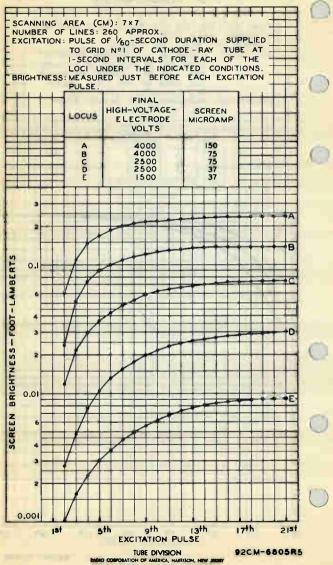


TUBE DIVISION

92CM - 7019R3



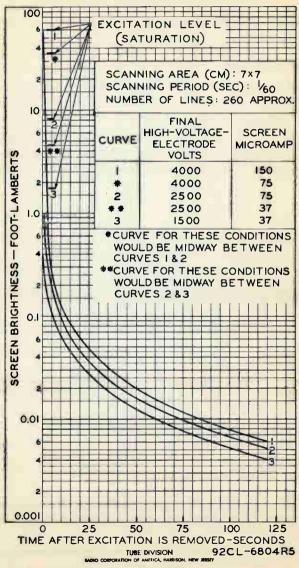
BUILDUP CHARACTERISTICS OF PHOSPHOR P7





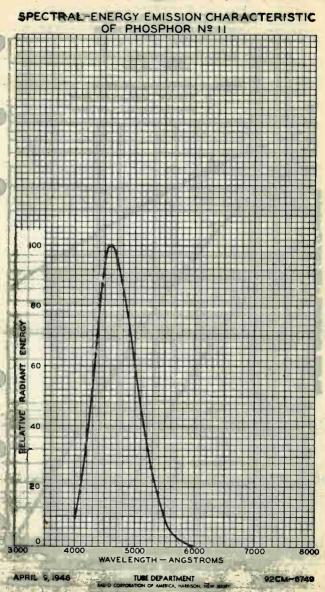
PERSISTENCE CHARACTERISTICS OF PHOSPHOR P7

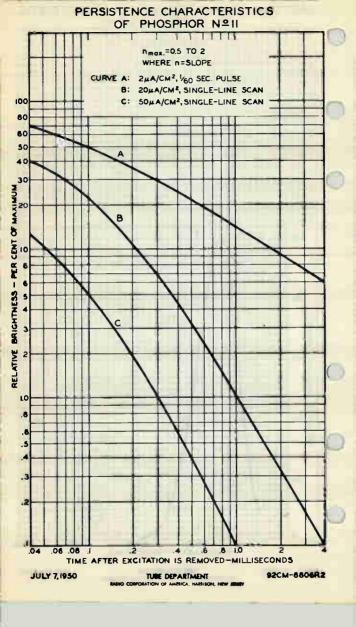
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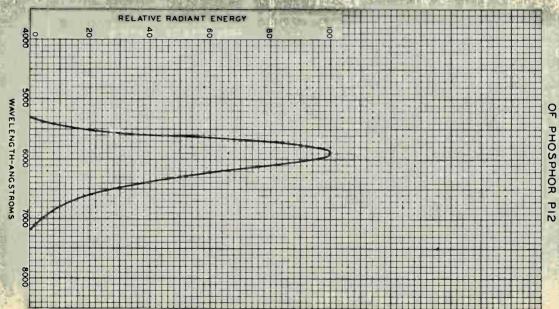












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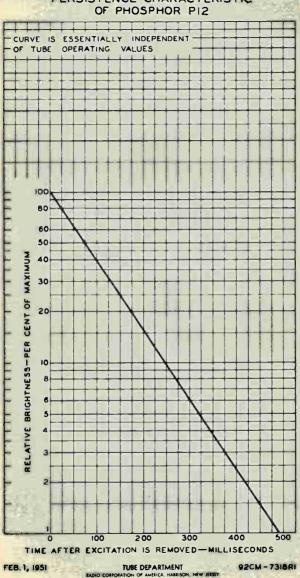
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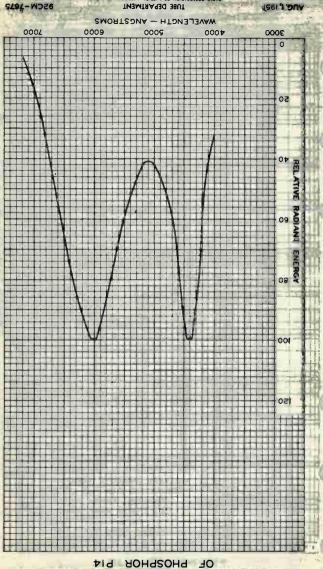
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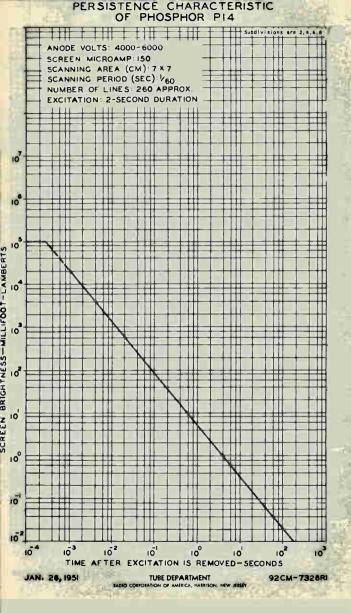
PERSISTENCE CHARACTERISTIC



SPECTRAL-ENERGY EMISSION CHARACTERISTIC



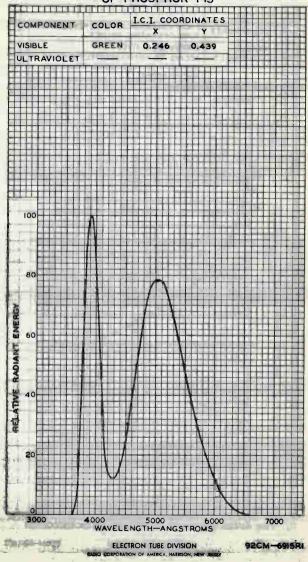
EVDIO CONORVION OF AMERICA, HARRISON, NEW JELET





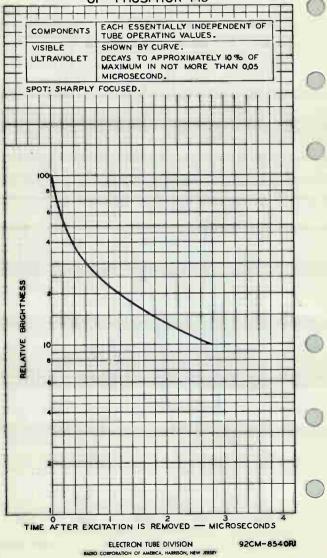
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SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR PIS



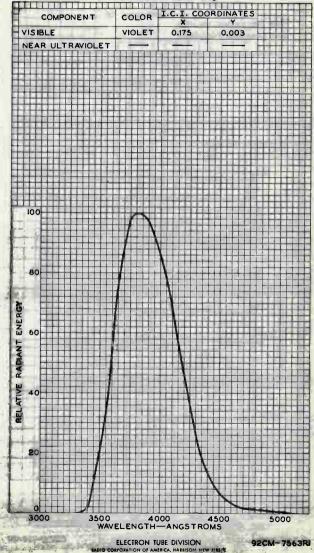


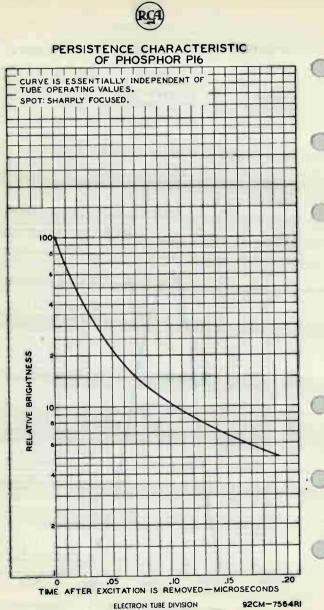
PERSISTENCE CHARACTERISTIC OF PHOSPHOR PIS



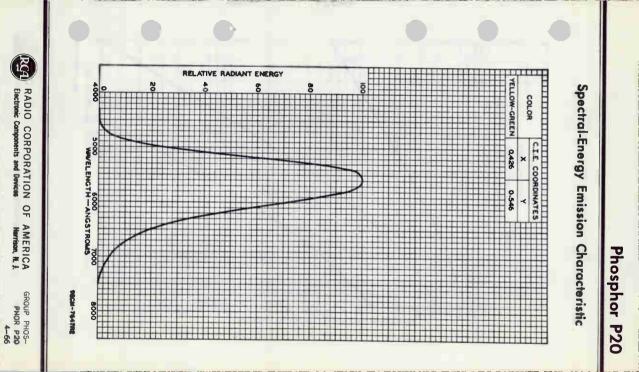


SPECTRAL-ENERGY EMISSION CHARACTERISTIC

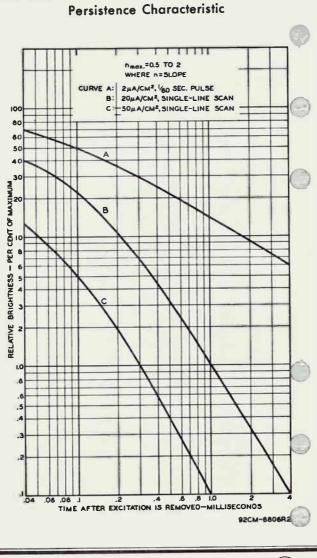




BADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY







DATA 2

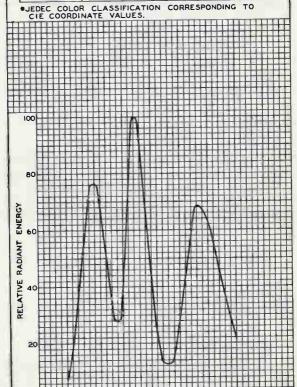
RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



SPECTRAL-ENERGY EMISSION CHARACTERISTIC

SIMULTANEOUS EXCITATION OF BLUE PHOSPHOR, GREEN PHOSPHOR, AND RED PHOSPHOR TO PRODUCE 8500° K + 27 M.P.C.D. WHITF (X=0.287,Y=0.316).

ONENT COLOR	CIE COORDINATES	
JEDEC DESIGNATION*	x	Y
PURPLISH-BLUE	0.146	0.052
YELLOWISH-GREEN	0,218	0.712
REDDISH-ORANGE	0.674	0.326
	JEDEC DESIGNATION* PURPLISH-BLUE YELLOWISH-GREEN	JEDEC DESIGNATION® X PURPLISH-BLUE 0.146 YELLOWISH-GREEN 0.218



4500 5500 6500 WAVELENGTH-ANGSTROMS 7500 92CM-7969R4



3500

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. GROUP PHOS-PHOR P22 10-60

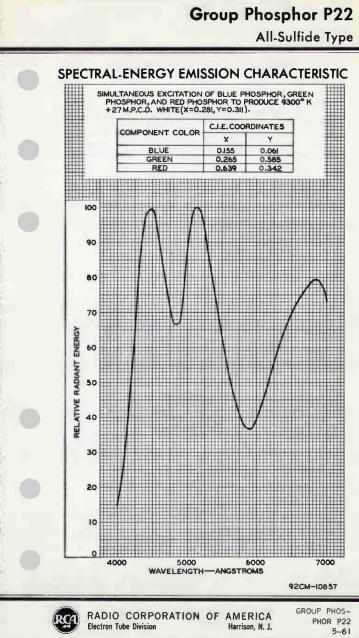
PERSISTENCE CHARACTERISTIC

The persistence of the group phosphorescence is such that its brightness does not exceed 7 per cent of the peak value in 33 milliseconds after excitation is removed.

5

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

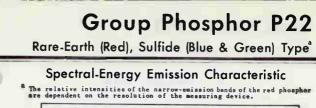




PERSISTENCE CHARACTERISTIC

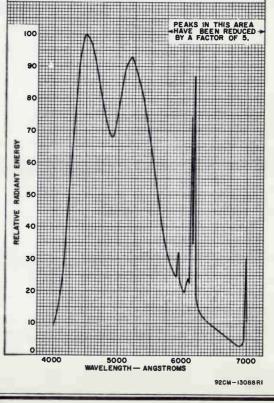
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.





SIMULTANEOUS EXCITATION OF REO PHOSPHOR, BLUE PHOSPHOR, AND GREEN PHOSPHOR TO PRODUCE 9300° K + 27 M.P.C.O. WHITE (X + 0.28), Y + 0.31).

COMPONENT COLOR	C.I.E. COOF	ONATES
COMPONENT COLON	X	Y
REO	0.676	0.324
BLUE	0,155	0,061
GREEN	0.290	0.590





RADIO CORPORATION OF AMERICA Electronic Components and Devices Herrison, N. & GROUP PHOS-PHOR P22 9-65

Group Phosphor P22

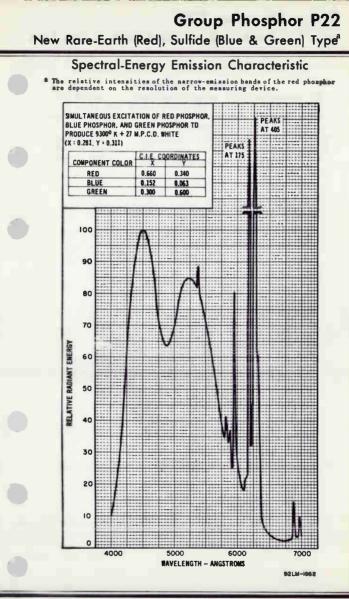
Rare-Earth Red), Sulfide Blue & Green) Type

PERSISTENCE CHARACTERISTIC

The persistence of the group phosphorescence is medium short. Persistence of the component phosphors is such that after excitation is removed, brightness decays to s level not exceeding 10 per cent of the initial value in:



GROUP PHOS-PHOR P22 RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.





RADIO CORPORATION OF AMERICA **Electronic Components and Devices**

Harrison, N. J.

GROUP PHOS-PHOR P22 4-67

Group Phosphor P22

New Rare-Earth (Red), Sulfide (Blue & Green) Type

PERSISTENCE CHARACTERISTIC

The persistence of the group phosphorescence is medium short. Persistence of the component phosphors is such that after excitation is removed, brightness decays to a level not exceeding 10 per cent of the initial value in:

. . .Blue phosphor 22 microseconds (Approx.). 60 microseconds (Approx.). Green phosphor 1 millisecond (Approx.). Red phosphor

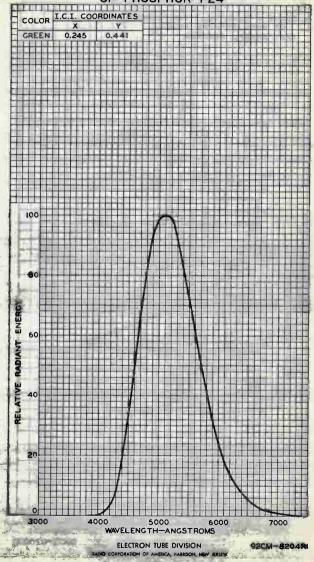
GROUP PHOS-PHOR P22

RADIO CORPORATION OF AMERICA **Electronic Components and Devices** Harrison, N. J.

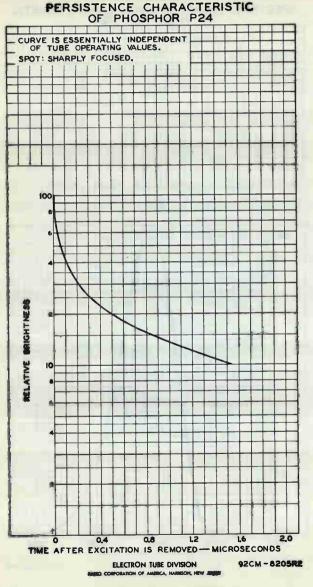




SPECTRAL-ENERGY EMISSION CHARACTERISTIC







Picture-Tube Dimensional Outlines

The Dimensional Outlines on the following pages provide the basic dimensions of PCA Picture Tubes. These Dimensional Outlines are classified by Bulb Designations in accordance with the designation system established by the American Standards Association. Tube neck length, tube overall length, base designation, and the configuration of the external conductive coating (when used) are not shown on these Dimensional Outlines. These items are covered on the data sheets for specific picture-tube types.

The terms used in the picture-tube data sheets to describe the Type of External Conductive Coating and the Contact Area for Grounding are defined below:

Type of External Conductive Coating

Regular Band. A band of external conductive coating of uniform height covering part of the bulb funnel. The band may entirely encompass the funnel except for an insulated area in the region of the anode (ultor) contact.

Modified Band. A coating configuration similar to a Regular Band except for special contouring of the upper and/or lower edges.

Special. A coating configuration not defined in the industry specification for the tube type.

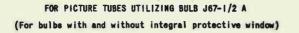
Contact Area for Grounding

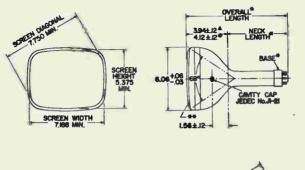
Near Reference Line. Refers to the position of the contact area usually employed for grounding a Regular or Modified Band of external conductive coating. A spring-finger contact mounted on the deflecting yoke or on the tube mounting assembly is normally employed for grounding the external conductive coating.

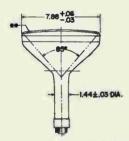
Special. Indicates that one or more contact areas for grounding the external conductive coating other than the area near the reference line are provided in the industry specification for the tube type.

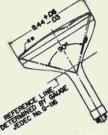


RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. CRT OUTLINES 1 4-65









DINERSIONS IN INCHES

See data for specific tube type.
 Integral protective window is indicated.
 A for bulb without protective window.
 For bulb with protective window.

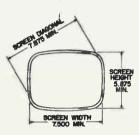
OUTLINES I

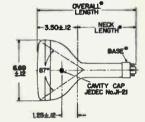
RADIO CORPORATION OF AMERICA Electronic Components and Devices Herrison, N. J.

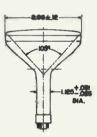


Dimensional Outline Bulb J67-1/2 B

FOR PICTURE TUDES UTILIZING BULB J67-1/2 B









BECL-18884

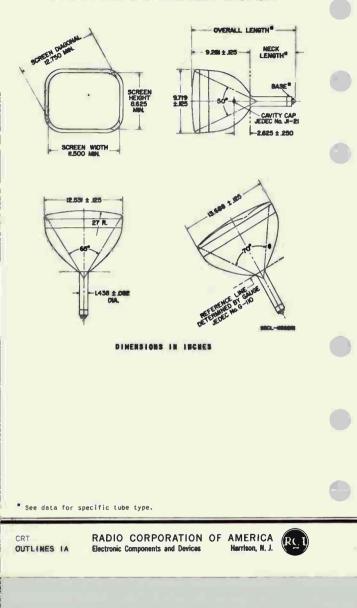
DINERSIONS IN INCHES

* See data for specific tube type.



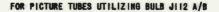
 OUTLINES IA

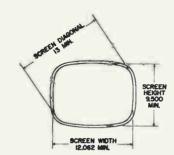
FOR PICTURE TUBES UTILIZING BULB J109-1/2 A/C

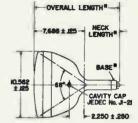


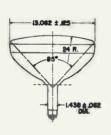
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Dimensional Outline Bulb J112 A/B











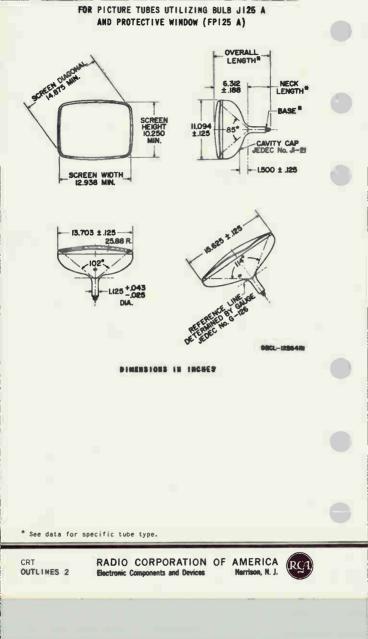
DIMENSIONS IN INCHES

* See data for specific tube type.

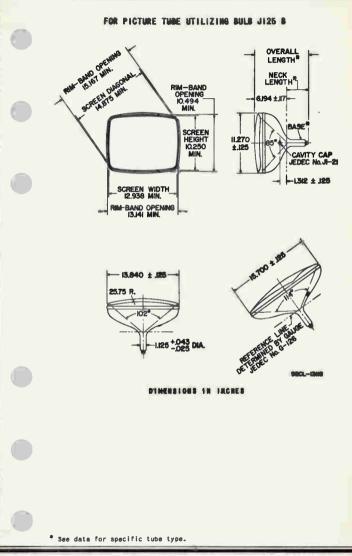


RADIO CORPORATION OF AMERICA Electronic Components and Devices _____ Harrison, N. J.

CRT OUTLINES 2 4-65



Dimensional Outline Bulb J125 B

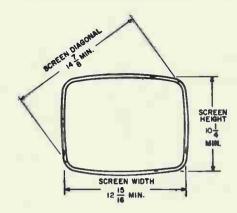


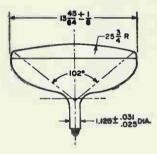


RADIO CORPORATION OF AMERICA Electronic Components and Devices

Harrison, N. J.

CRT OUTLINES 3 4-65 FOR PICTURE TUBES UTILIZING BULB J125 C2

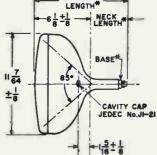


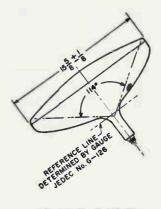


RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.









DIMENSIONS IN INCHES

92CL-12037

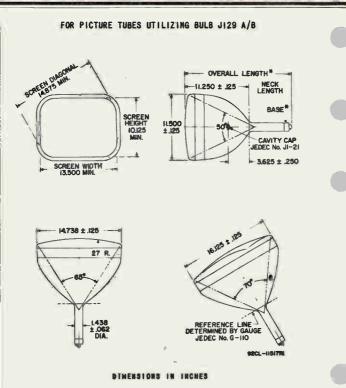
* See data for specific tube type.



BULB J125 C2

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. OUTLINES 4

Dimensional Outline Bulb J129 A/B



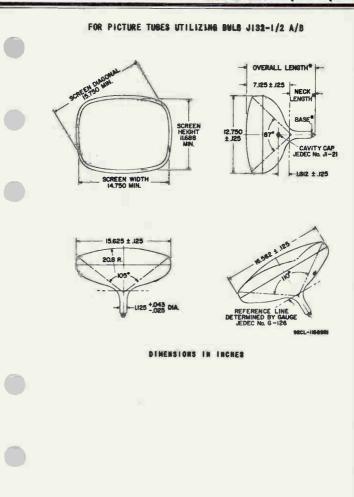
* See data for specific tube type.

CRT

RADIO CORPORATION OF AMERICA OUTLINES 4 **Electronic Components and Devices** Harrison, N. J.



Dimensional Outline Bulb J132-1/2 A/B

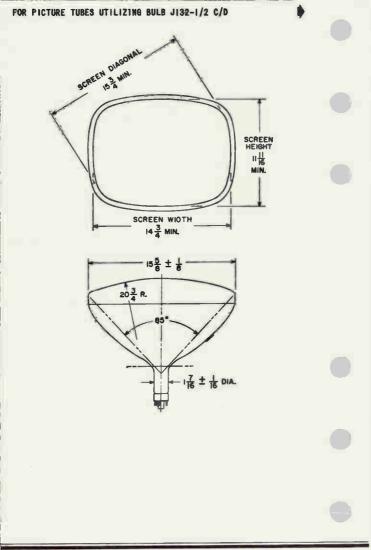


* See data for specific tube type.

RCA

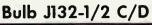
RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

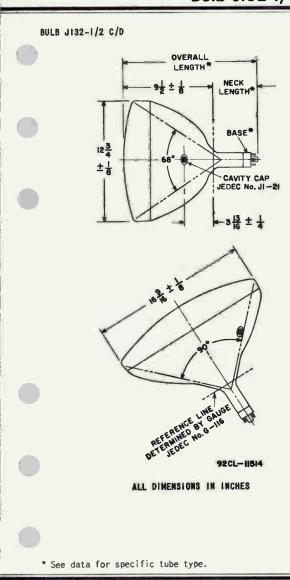
CRT OUTLINES 5 10-65



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



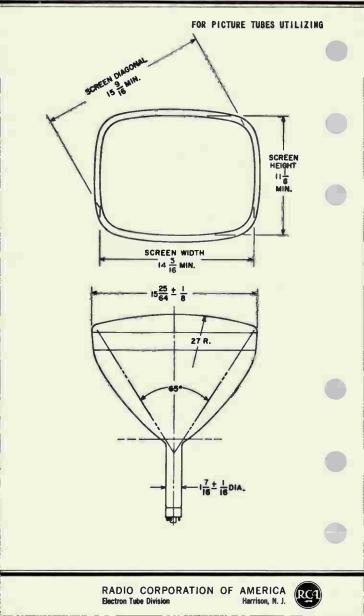


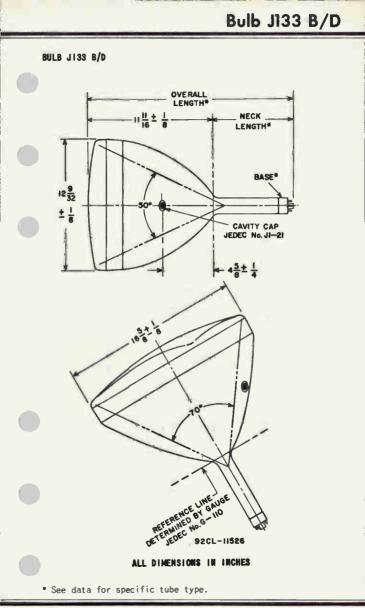


RCA

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

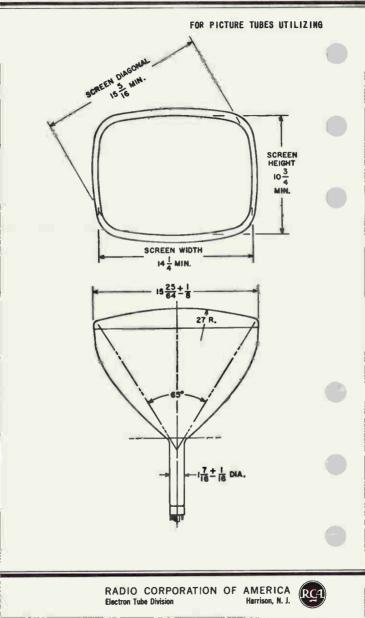
OUTLINES 6



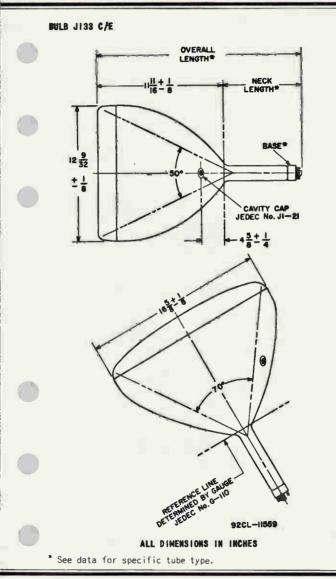




RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. 1. CRT OUTLINES 7 3-62

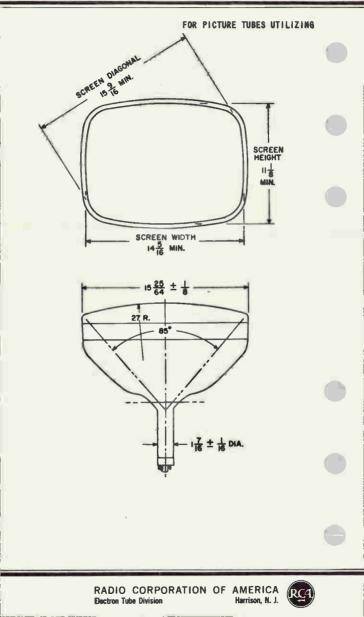


Bulb J133 C/E

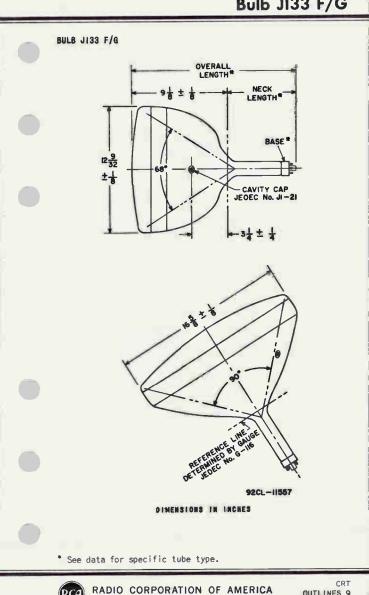




RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. 1. CRT OUTLINES 8 3-62



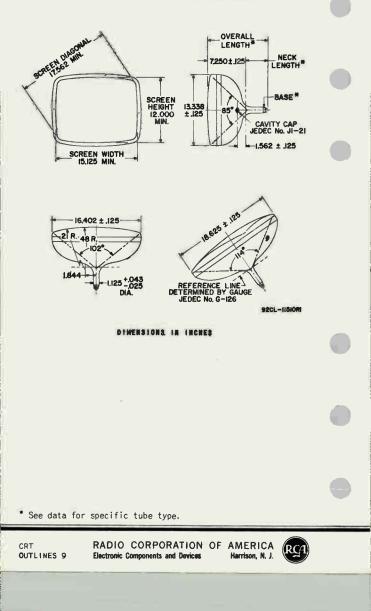
Bulb J133 F/G





Electronic Components and Devices Harrison, N. J. OUTLINES 9 10-65

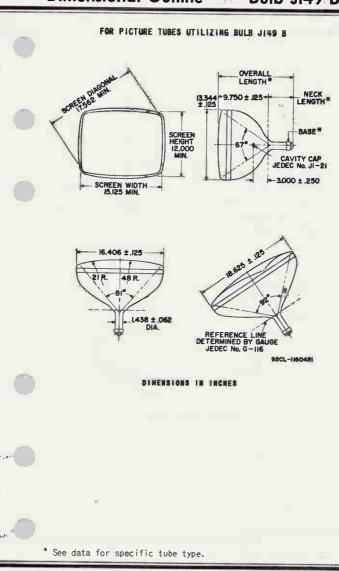
FOR PICTURE TUBES UTILIZING BULB J149 A



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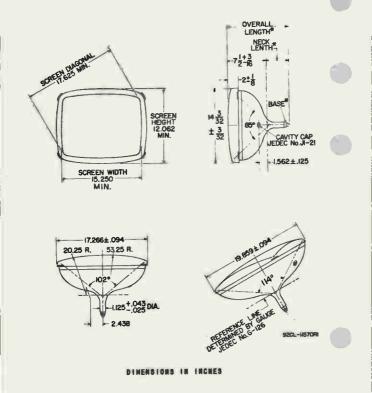
Bulb J149 B



RADIO CORPORATION OF AMERICA **Electronic Components and Devices**

Harrison, N. J.

CRT OUTLINES II 10-65 FOR PICTURE TUBES UTILIZING BULB J149 C AND PROTECTIVE PANEL



* See data for specific tube type.

CRT OUTLINES II

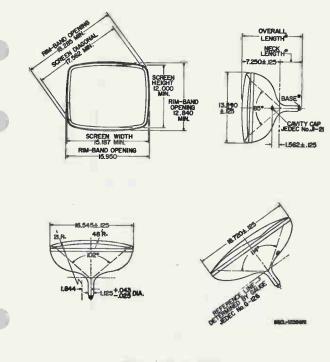
RADIO CORPORATION OF AMERICA Electronic Components and Devices

Harrison, N. J.



Dimensional Outline Bulb J149 F

FOR PICTURE TUBES UTILIZING BULB J149 F



DIMENSIONS IN INCHES

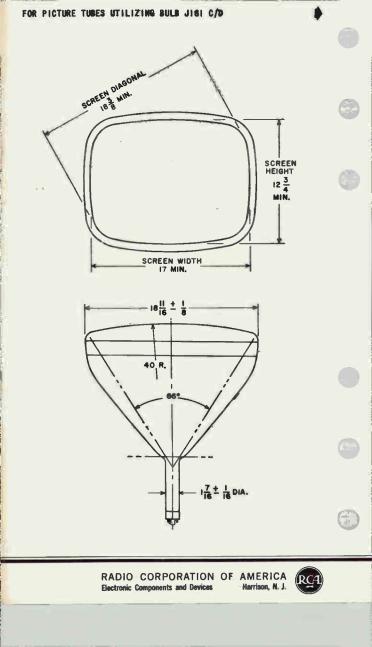
*See data for specific tube type.



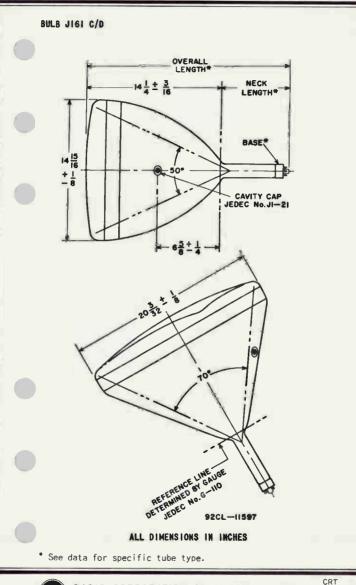
RADIO CORPORATION OF AMERICA **Electronic Components and Devices**

Harrison, N. J.

CRT OUTLINES 12 10-64

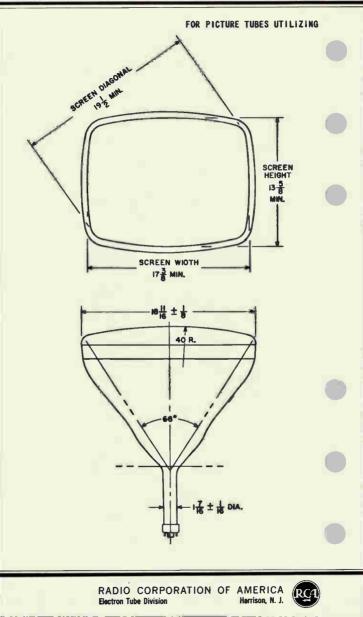


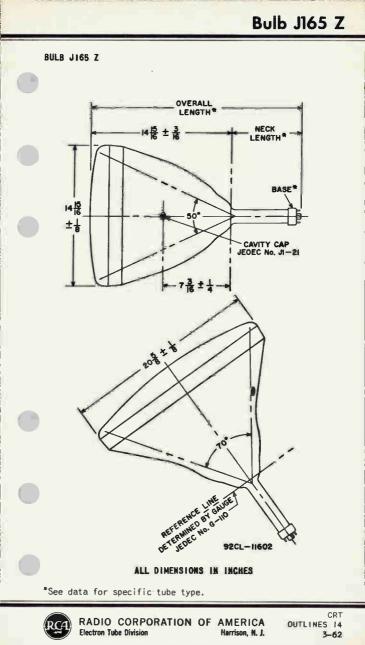
Bulb J161 C/D

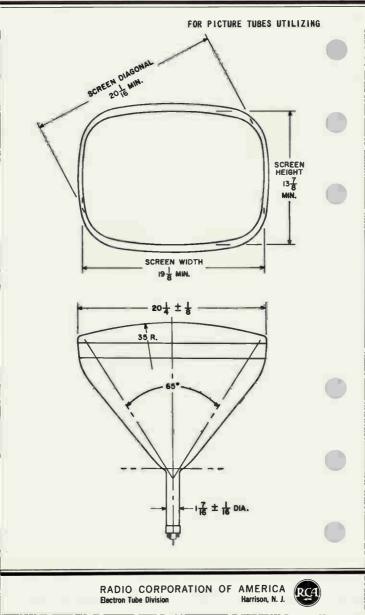




RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. OUTLINES 13 3-62





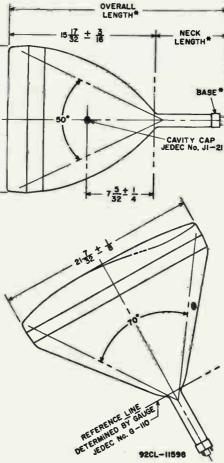






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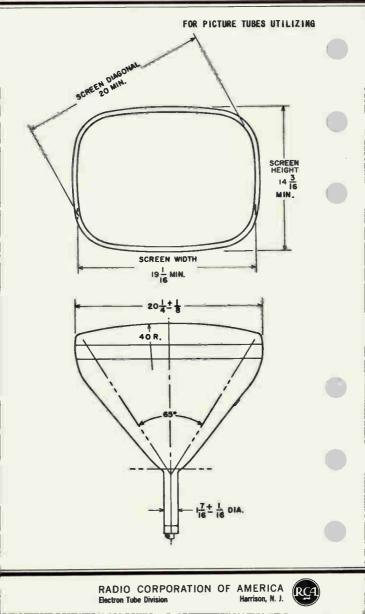
92CL-11598

* See data for specific tube type.



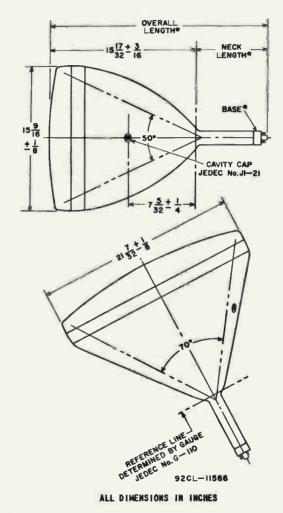
RADIO CORPORATION OF AMERICA **Electron Tube Division** Harrison, N. J.

CRT OUTLINES 15 3-62



Bulb J170 B/D

BULB JI70 B/D

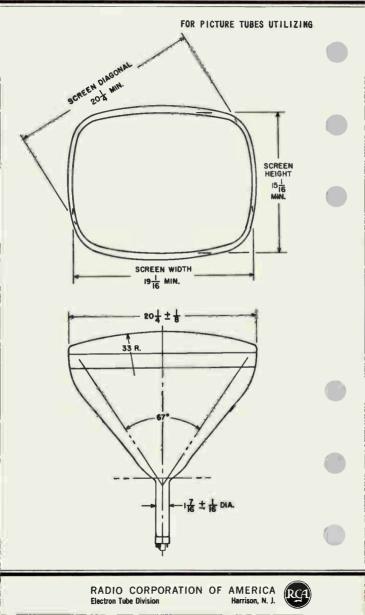


* See data for specific tube type.

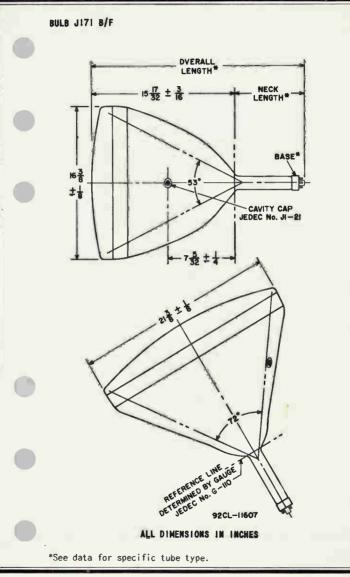


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

OUTLINES 16 3-62



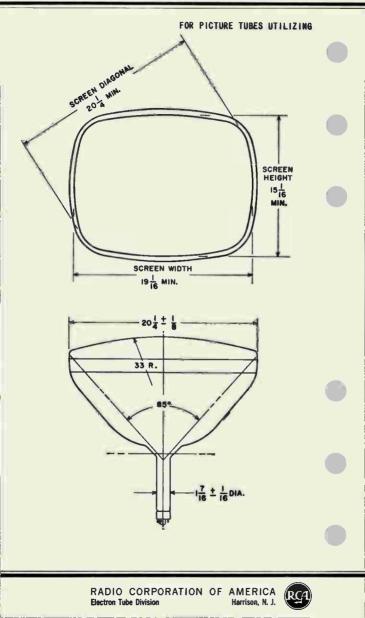
Bulb J171 B/F

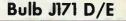




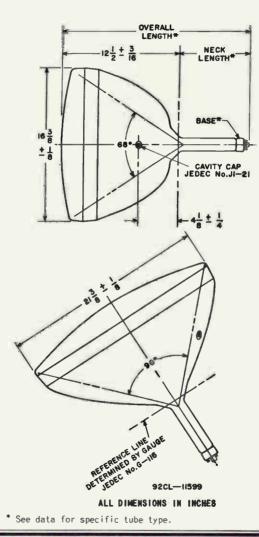
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

CRT OUTLINES 17 3-62





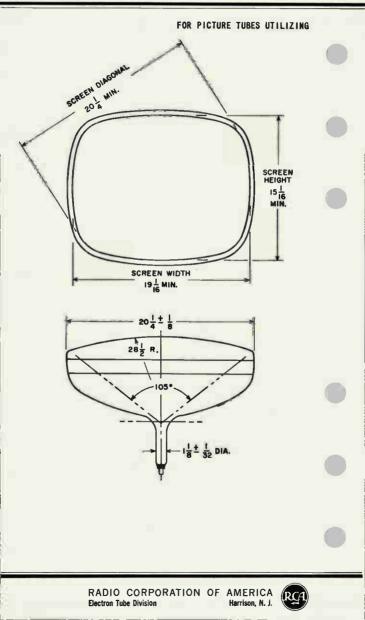


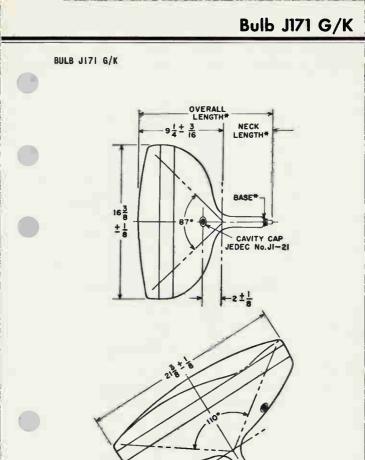




RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

OUTLINES 18 3-62





REFERENCE LINE USE DEFENITED DY 126 DEFENITE No. G 126 ALL DIMENSIONS IN INCHES

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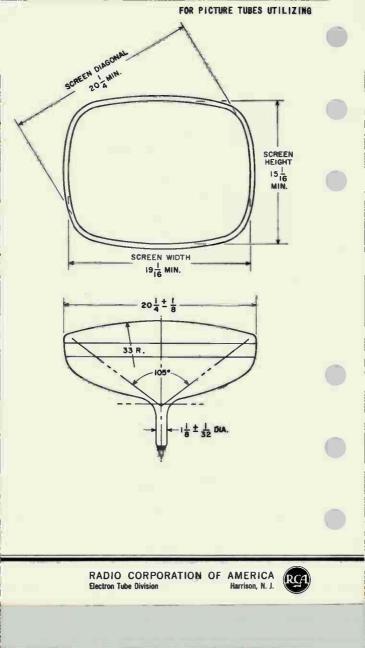
CRT

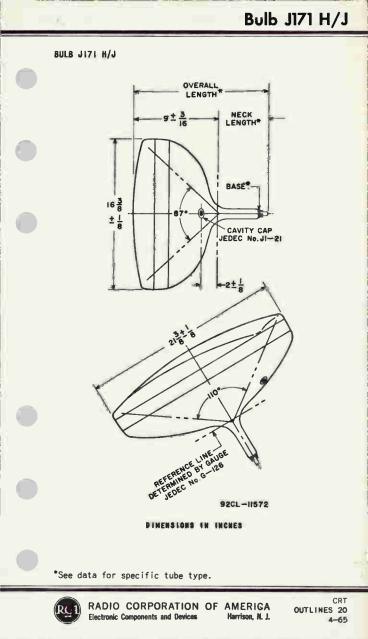
3-62

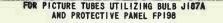
* See data for specific tube type.

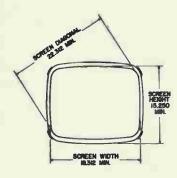


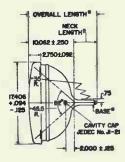
RADIO CORPORÁTION OF AMERICA OUTLINES 19 **Electron Tube Division** Harrison, N. J.

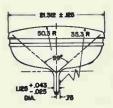


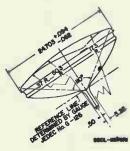












DINENSIONS IN INCHES

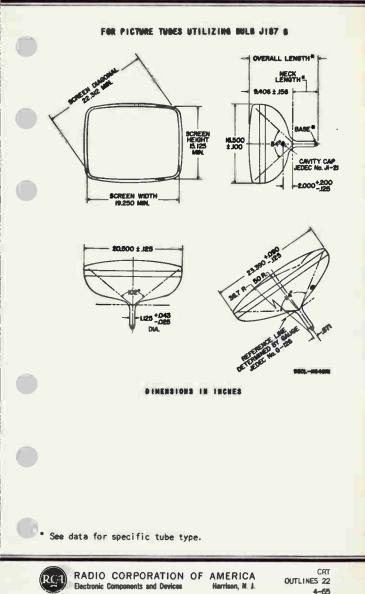
* See data for specific tube type.

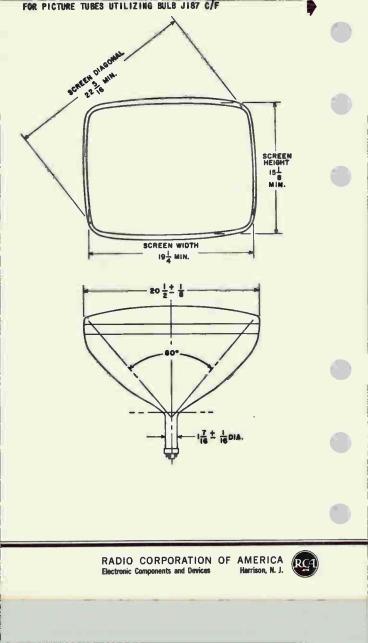
CRT OUTLINES 20 RADIO CORPORATION OF AMERICA Electronic Components and Devices

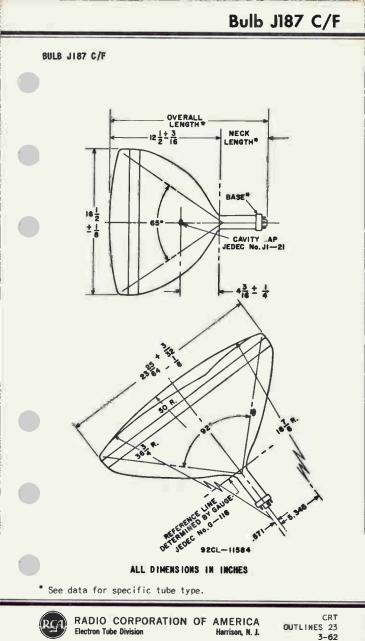


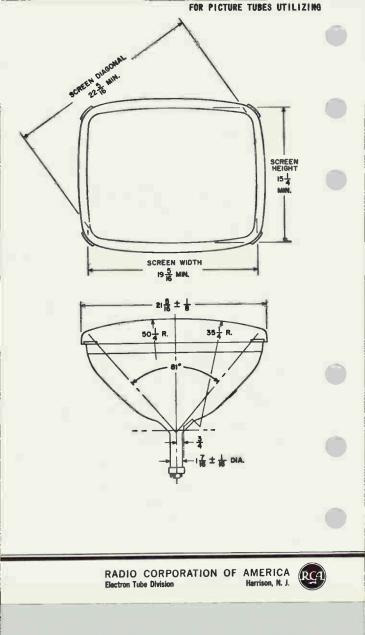
Harrison, N. J.

Dimensional Outline Bulb J187 B

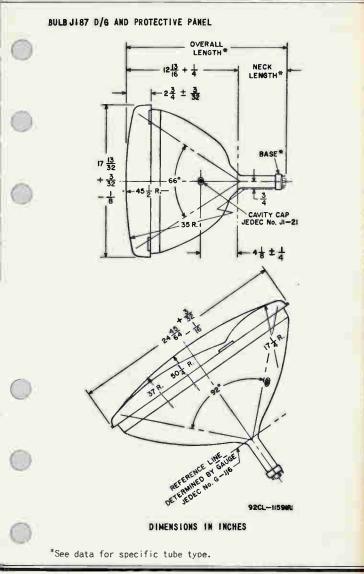








Bulb J187 D/G



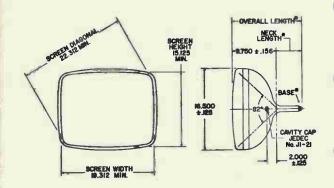


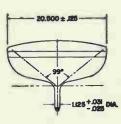
RADIO CORPORATION OF AMERICA **Electronic Components and Devices**

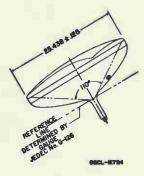
Harrison, N. J.

CRT OUTLINES 24 8-64

FOR PICTORE TUBES OTILIZING BULB JIST E







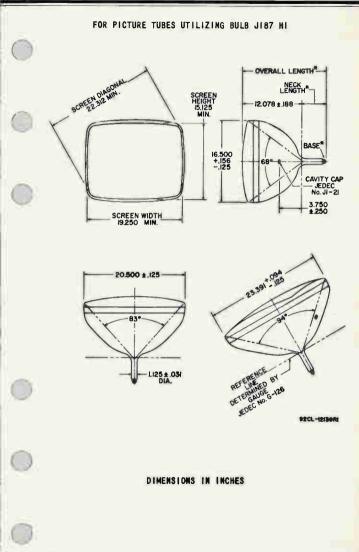


*See data for specific tube type.

RADIO CORPORATION OF AMERICA Electronic Components and Devices



Dimensional Outline Bulb J187 H1



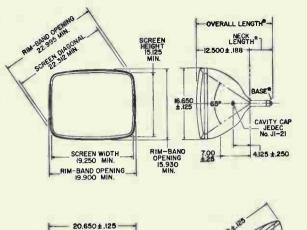
*See data for specific tube type.

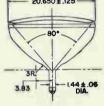
RADIO CORPORATION OF AMERICA Electronic Components and Devices

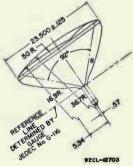
Harrison, N. J.

CRT OUTLINES 25 8-64

FOR PICTURE TUBES UITLIZING BULB JTB/ J





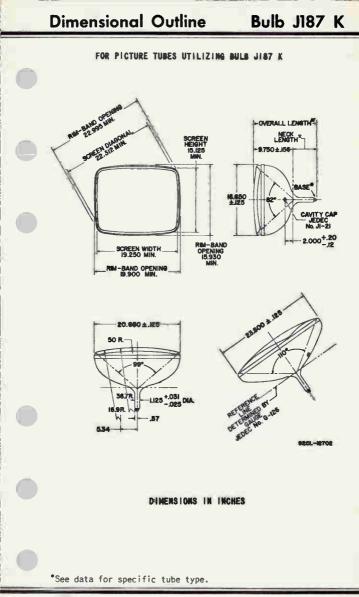


DIMENSIONS IN INCHES

"See data for specific tube type.

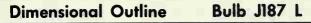
RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



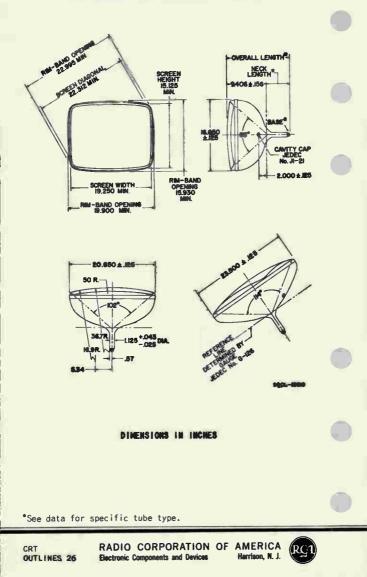


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RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. CRT OUTLINES 26 4-65



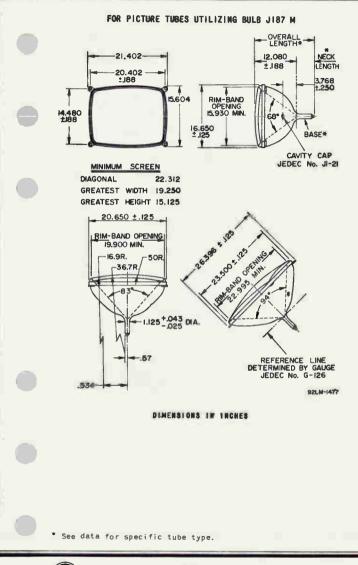
FOR PICTURE TUBES UTILIZING BULB JIST L





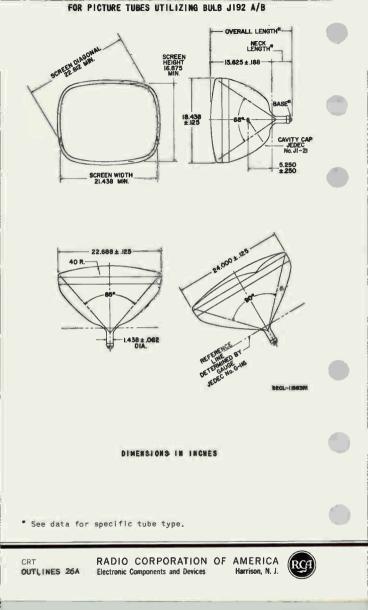


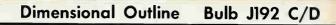
Dimensional Outline



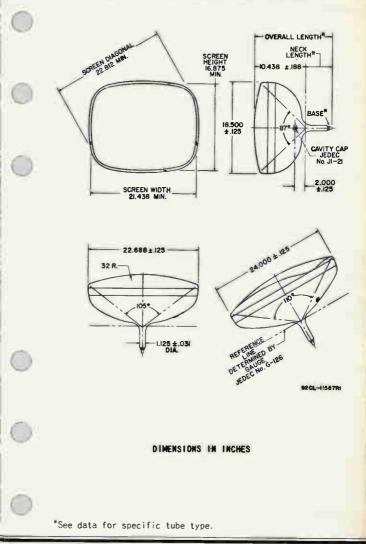
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RADIO CORPORATION OF AMERICA Electronic Components and Devices Narrison, N. J. CRT OUTLINES 26A





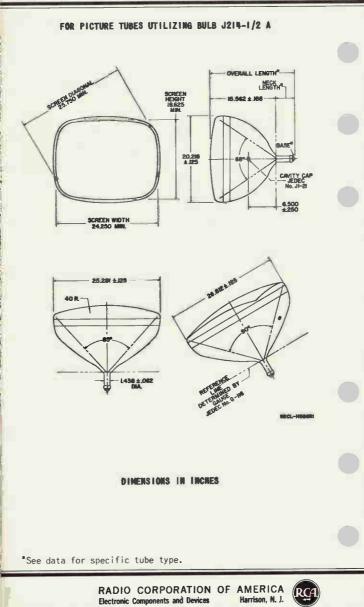




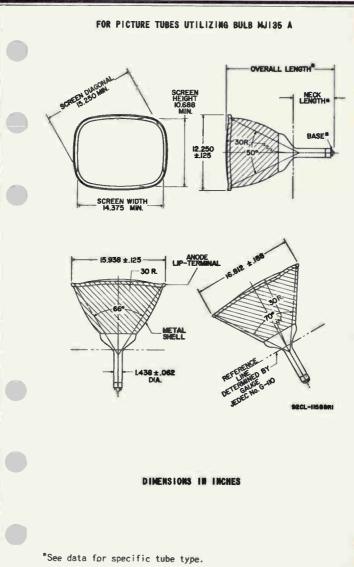
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RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. OUTLINES 27 8-64

Dimensional Outline Bulb J214-1/2 A



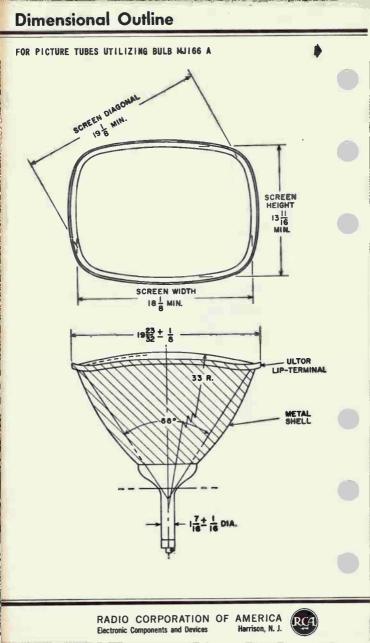
Dimensional Outline Bulb MJ135 A

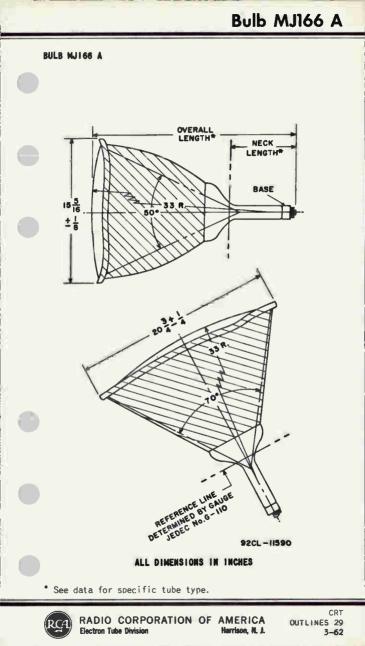




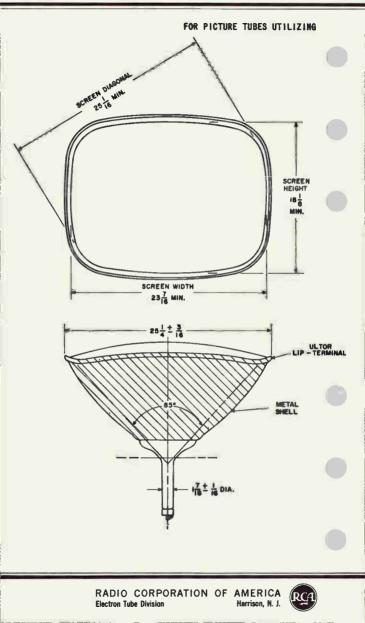
RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. CRT OUTLINES 28 8-64

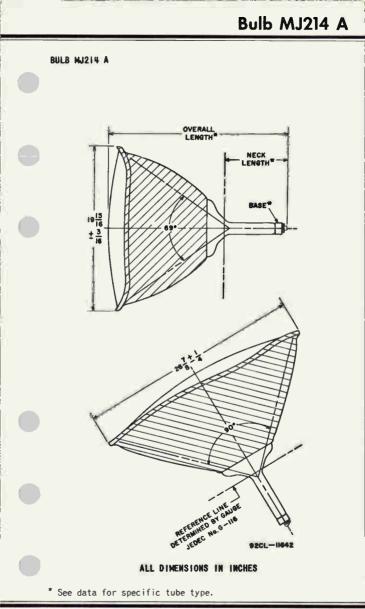
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Dimensional Outline

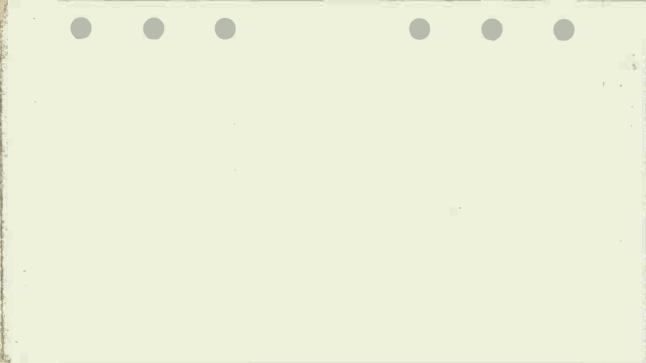


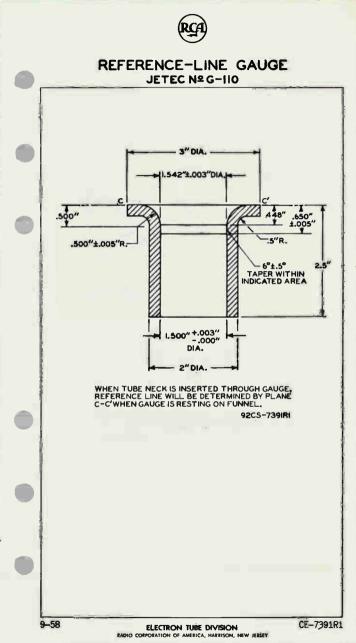


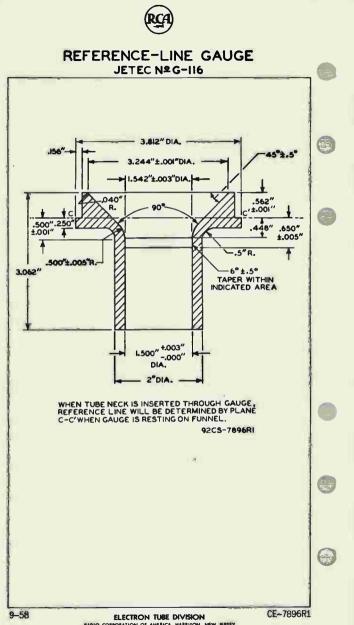
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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

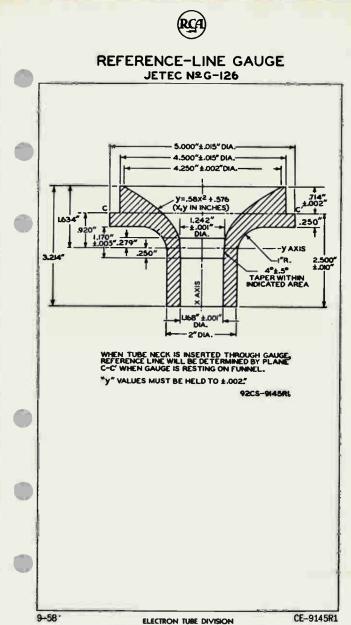
CRT OUTLINES 30 3-62







RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



X-Radiation Precautions

For Cathode-Ray Tubes

WARNING

All types of cathode-ray tubes may be operated at voltages (where ratings permit) up to 16 kilovolts without personal injury on prolonged exposure at close range.

Above 16 kilovolts, special shielding precautions for X radiation may be necessary.



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. X-RADIATION PRECAUTIONS 3-62

Definitions

Of Cathode-Ray-Tube Terms

Ultor. The "ultor" in a cathode-ray tube is the element to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

Post-Ultor. The "post-ultor" in a cathode-ray tube is the element to which is applied a dc voltage higher than the ultor voltage for accelerating the electrons in the beam after its deflection.

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.





OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

IE AI

DATA

	enin .
	General:
	Heater, for Unipotential Cathode:
	Voltage 6.3 ac or dc volts
0	Current 0.6 ± 10% amp
(\exists)	Direct Interelectrode Capacitances (Approx.):
\sim	Grid No.1 to all other electrodes 6.5 ##f
	Deflecting electrode DJ to
	deflecting electrode DJ2 1.7 ##f
5	Deflecting electrode DJ3 to
1	deflecting electrode D4 0.6 µµf
\sim	
()	
And and	DJ3 to all other electrodes 3.8 ##f DJ4 to all other electrodes 3.8 ##f
	Faceplate, Flat
	Phosphor (For Curves, see front of this Section)
	Fluorescence.
	Phosphorescence
	Persistence
	Focusing Method Electrostatic
	Deflection Method Electrostatic
	Maximum Overall Length
	Maximum Diameter
	Minimum Useful Screen Diameter 1-1/16"
	Mounting Position
	Weight (Approx.)
	Bulb
	Base. Small-Button Unidekar 11-Pin (JEIEC NO.E11-22)
	Basing Designation for BOTTOM VIEW
	Pin 1-Heater Pin 8-Ultor
\sim	Pin 2-Heater (Grid No.2,
\cup	Pin 3-Grid No.1 Grid No.4,
	Pin 4 - Cathode Collector)
	Pin 5-Grid No.3 Pin 9-Deflecting
	Pin 6-Deflecting Y Pin 6-Deflectrode
	Electrode Q
	DJ4 Pin 10 - Deflecting
0	Pin 7-Deflecting Electrode
	Electrode DJ
<u> </u>	DJ3 Pin 11 – Internal Connection-
	Do Not Use
	UU NOL USE
	DJ1 and DJ2 are nearer the screen
(3)	DJ ₃ and DJy are nearer the base
3	
	»"
	6-56 TENTATIVE DATA 1
	TUBE DIVISION
	RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



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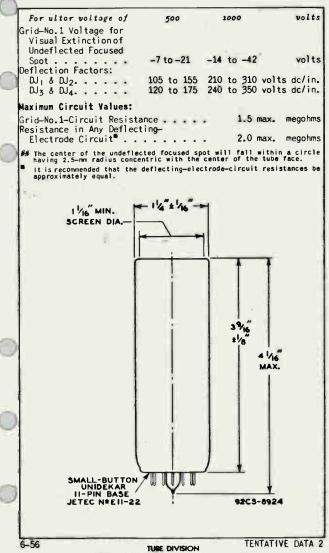
IE PI OSCILLOGRAPH TUBE

21		
pect to DJI, the	spot is de	flected
n pins 6 and /.	With DJ3 p	ositive
ot is deflected t	oward the m	idpoint
ce produced by D.	J3 and DJ4 a	and its
		ind the
d 10 does not exc	eed $\pm 10^{\circ}$.	
e produced by D.	Jz and DJ4 a	and the
U_2 is 90° ± 3°.	-	
Ann Walness		
		volts
• • • • • • • •	1200 max.	vorts
	200 may	volts
		volts
		volts
AND		
	500 max.	valts
E:		
ect to cathode.	125 max.	volta
	-	
OMMERIZED MERSON		
100 4. 200 .5		volts
10% 10 50% 01	CC4	APH CO
		_
-1.45 to -4.25	of Sea	volts
100 million 100		
-15 to +10		(aemt)
210 to 310	v dc/in./kv	of LCA
	v dc/ in./kv	OT LCA
##		1
langest		_
500	3800	volts
50 to 150	100 to 300	volts
ease with decreasing	g ultor voltag	e. Rec-
	10 300 10100	
be used under condi-	tions of low-v	elocity
in general service be used under condi- ight levels. For o that the ultor volt	tions of low-v peration betw age be applied	elocity een 300 before
in general service be used under condi- ight levels. For o that the ultor volt a, a screen charge i	tions of low-v peration betw age be applied may develop to	elocity een 300 before o block
ease with decreasing in general service be used under condi- ight levels. For o that the ultor volt a, a screen charge i ttern.	tions of low-v peration betw age be applied may develop to	elocity een 300 before o block
in general service be used under condi- ight levels. For o that the ultor volt a, a screen charge i ittern.	tions of low-v peration betw age be applied may develop t	elocity een 300 before o block
in general Service be used under condi ight levels. For o that the ultor volt , a screen charge ittern.	tions of low-v peration betw age be applied may develop to TENTATIVE	
	n pins 6 and 7. ot is deflected to ce produced by D. ane through the d 10 does not exc ce produced by D. DJ2 is 90° ± 3°. ater Values: 	ater Values: 1500 max. 1200 max. 1200 max. 1200 max. 0 max. 0 0 max. 2 10 max. 2 125 max. Sto cathode. 125 max. 10% to 30% of Ec. 125 max. -1.4% to -4.2% of Ec. -15 to 410 210 to 310 v dc/in./kv 240 to 350 v dc/in./kv 350 to 150 100 to 300

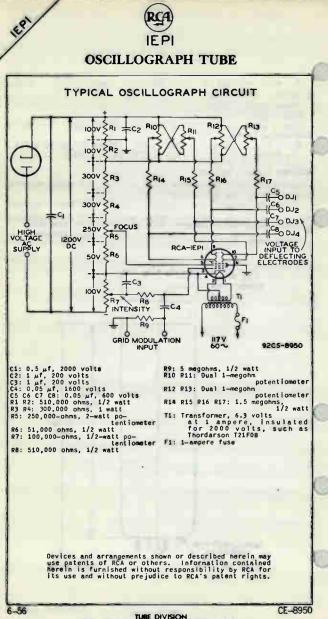


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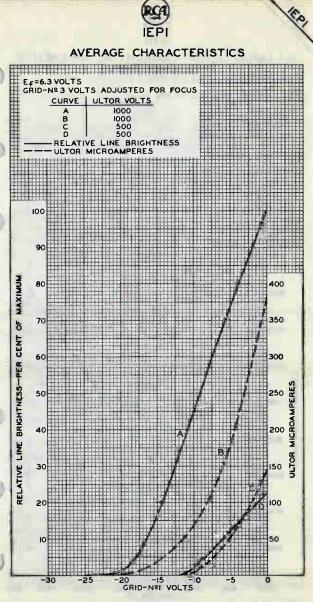
OSCILLOGRAPH TUBE



BADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

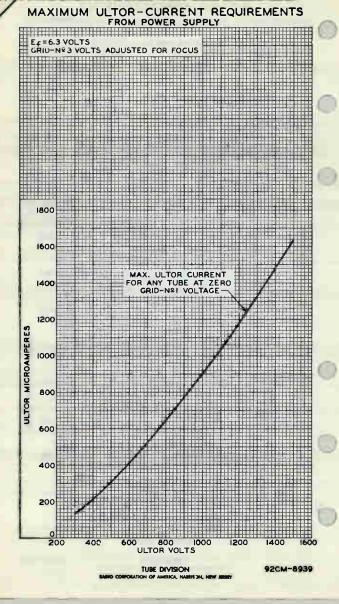


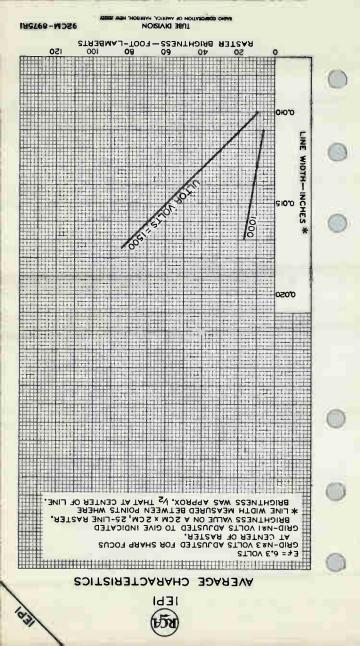
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

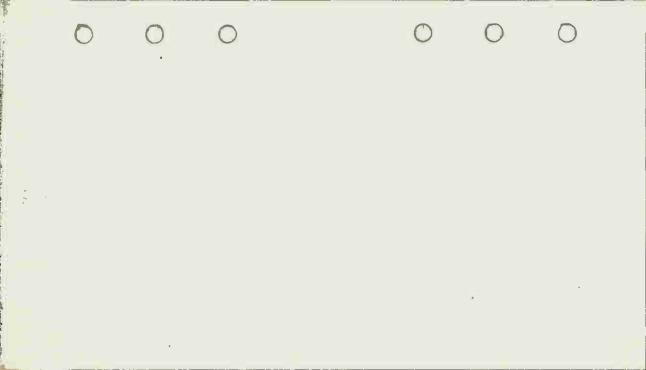


TUBE DIVISION

92CM-8938









OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

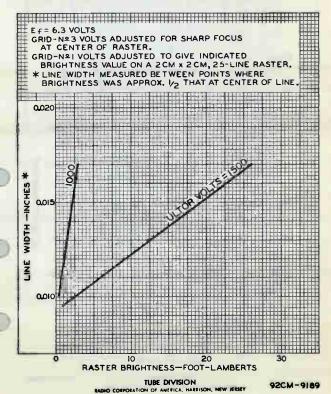
The 1EP2 is the same as the 1EP1 except for the following items:

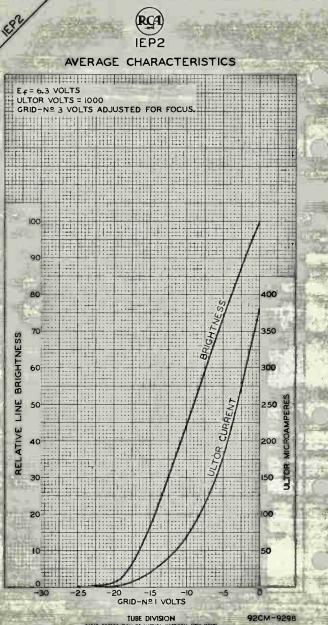
General:

Phosphor (For Curv															
Fluorescence										Gre	en	is	h—Y	elle	ow
Phosphorescence										Gre	en	is	h-)	ell	OW
Persistence .	•			•	•	•	•			• •		•		. Lo	ng

In general, operation of the 1EP2 at an ultor voltage less than 750 volts is not recommended.

AVERAGE CHARACTERISTICS



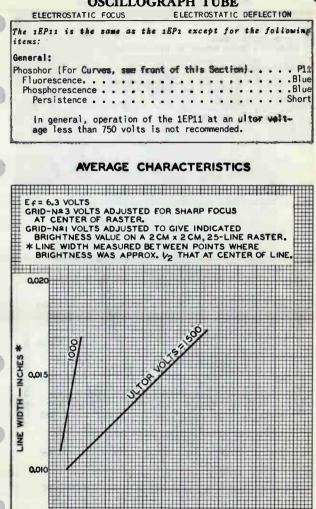


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OSCILLOGRAPH TUBE



6 RASTER BRIGHTNESS-FOOT-LAMBERTS TUBE DIVISION

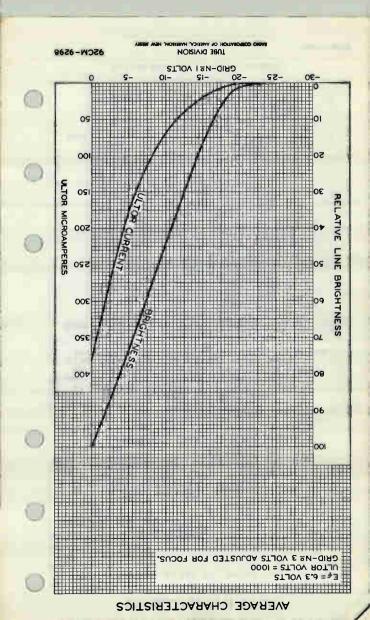
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O CORPORATION OF AMERICA, HARRISON, NEW S





24 SI-A HIGH-VACUUM CATHODE-RAY TUBE Supersedes Type 2AP1

General:

Heater, for Unipotential Cathode:
Voltage 6.3 ± 10% ac or dc volts
Current 0.6
Direct Interelectrode Capacitances (Approx.):
Grid No.1 to All Other Electrodes 8.0 µµf
Cathode to All Other Electrodes 5.5 µµf
DJ1 to DJ2 0.6 μμf
DJ3 to DJ4 1.1 μμf
DJ1 to All Other Electrodes 8.5 9.0
DJ3 to All Other Electrodes 9.0
DI2 to All Other Electrodes excent Dia 4.6 uuf
DJ3 to All Other Electrodes except DJ4 . 7.5 . uuf DJ4 to All Other Electrodes except DJ3 . 6.0 . uuf
DJ4 to All Other Electrodes except DJ3. 6.0
Phosphor (For Curves, see front of this Section) No.1
Fluorescence
Persistence
Focusing Method Electrostatic
Deflection Method Electrostatic
Overall Length
Minimum Useful Screen Diameter
Minimum Useful Screen Diameter
Base
Mounting Position. Any Base
Pin 1 - Heater C Pin 8 - Deflecting
Pin 2- Cathode Electrode
Pin 3-Deflecting
Electrode DJ1 3 Pin 9-Deflecting
Pin 4- Anode No.1 Pin 5- No Connection
Electrode DJA Pin 10- Grid No. 1
Pin 7- Anode No. 2,
Grid No.2
DJ1 and DJ2 are nearer the screen
Dig and Dig are nearer the base
With DJ positive with respect to DJ2, the spot is de-
flected toward pin 4. With DJ3 positive with respect to
DJ ₄ , the spot is deflected toward pin i.
The angle between the trace produced by DJ3 and DJ4 and
its intersection with the plane through the tube axis and
pin I does not exceed 10°.
The angle between the trace produced by DJ3 and DJ4 and
the trace produced by W_1 and W_2 is 90° ± 4°.

RCA VICTOR DIVISION ID CONFORATION OF AMERICA, HARRISON, MRW JI



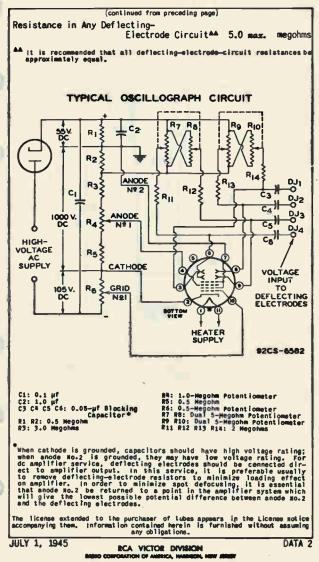
2APTA

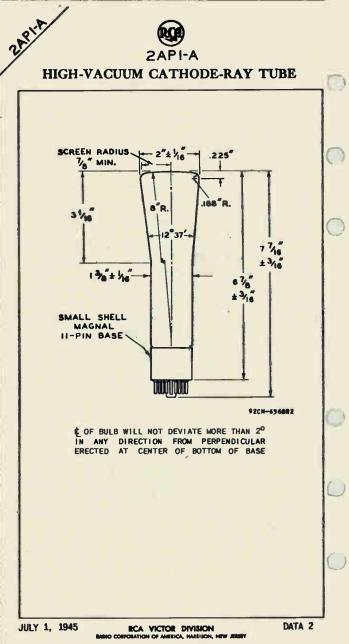
HIGH-VACUUM CATHODE-RAY TUBE

1		-
1	(continued from preceding page)	1
	Maximum Ratings, Absolute Values:	1.1
	ANODE-NO. 2 & GRID-NO. 2 VOLTAGE 1100 max.	volts
1	ANODE-No. 1 VOLTAGE	volts
l	GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:	- 14
1	Negative Value 125 max. Positive Value 0 max.	volts
I	POSITIVE Value	volts
	ANY DEFLECTING ELECTRODE 660 max.	volts
1	PEAK HEATER-CATHODE VOLTAGE:	vorta
	Heater negative with respect to cathode 125 max.	volts
	Heater positive with respect to cathode 10 max.	volts
	Typical Operation:	
ł		_
	Anode-No. 2 & Grid-No. 2 Voltage* 500 1000	volts
	Anode-No.1 Voltage for Focus	
	at 75% of Grid-No.1 Volt-	
1	age for Cutoff 125 250 Grid-No.1 Volt. for Visual Cutoff # -30 -60	voits
1	Max. Anode-No.1 Current Range ^A . Between -50 and +10	vorts
I	Deflection Sensitivity:	heavily.
	DJ1 and DJ2 0.220 0.110	m/v dc
	DJ3 and DJ4 0.260 0.130	m/v dc
	Deflection Factor: **	- 11
1	DJ1 and DJ2 115 230 v	dc/in.
	DJ3 and DJ4	dc/in.
l		
1	★ Brilliance and definition decrease with decreasing anode—No.2 v In general, anode—No.2 voltage should not be less than 500 volt	oltage. S.
1	 Individual tubes may require between +20% and -45% of the value with grid-No.1 voltages between zero and cutoff. 	s shown
	With grid-No.1 voltages between zero and cutoff.	
1	<pre>\$ visual extinction of stationary focused spot. Supply should be able to ± 50% of these values.</pre>	adjust-
1	See curve for average values.	
1	Individual tubes may vary from these values by ± 205.	
	Spot Position:	-
ł	The undeflected focused spot will fail within a 10-mm	
	centered at the geometric center of the tube face and one side parallel to the trace produced by DJ1 and DJ2.	
	able test conditions are: anode-No.2 voltage, 1000	
	anodě-No.l voltage, adjusted for focus; deflecting-ele	ct rode
	resistors, I megohm each, connected to anode No.2; th	e tube
	shielded from all extraneous fields. To avoid damage t	o the
	tube, grid-No.1 voltage should be near cutoff before ap	plica-
	tion of anode voltages.	
	Maximum Circuit Values:	-
	Grid-No.1-Circuit Resistance 1.5 max. m	egohms
ł	Impedance of Any Deflecting-Electrode	egonins
		negohm
	and were supply in equally and were	gonn
4	10 × 1 1045	DATA
	JULY 1, 1945 RCA VICTOR DIVISION	DATA 1



2 Port HIGH-VACUUM CATHODE-RAY TUBE







ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

ATA®,

General:	1
Heater, for Unipotential Cathode:	
Voltage 6.3	ac or dc volts
Current 0.6	amp
Direct Interelectrode Capacitances (Ap	
Grid No.1 to All Other Electrodes	
D_1 to D_2	
D_3 to D_4	. 2 <i>щ</i> иf
DJ1 to All Other Electrodes	· . 11 · . · μμf
DJ2 to All Other Electrodes	•• 8••• ##f
DJ3 to All Other Electrodes	7 µµuf
DJ4 to All Other Electrodes Phosphor (For Curves, see front of thi	••• 8•••• μμf «
	Green
Persistence	
	Electrostatic
Deflection Method	Electrostatic
Overall Length	7-5/8" ± 3/16" 2" ± 1/16"
Minimum Useful Screen Diameter	1-3/4"
Mounting Position	
Mounting Position	1-Shell Duodecal 12-Pin
Basing Designation for BOTTOM VIEW	••••••••••••••••••••••••••••••••••••••
Pin 1-Heater	Pin 8 - Anode No. 2.
Pin 2-Grid No.1	Grid No.2
Pin 3 - Cathode	Pin 9-Deflecting
Pin 4 - Anode No.1	Electrode
Pin 5 – Internal	DJ ₂
Connection-	Pin 10 - Deflecting
Do Not Use	Electrode
Pin 6-Deflecting	DJ1
Electrode	
DJ3	Pin 11 - Internal Connection-
Pin 7-Deflecting	Do Not Use
Electrode	
DJ4	Pin 12-Heater
DJ_2 and DJ_2 are nearer DJ_2 and DJ_4 are nearer	the screen
Ud3 and UJ4 are nearer	the base
With DJ1 positive with respect to DJ2,	the soot is deflected
toward nin 4 With D13 positive with	h respect to Did the
toward pin 4. With DJ3 positive with spot is deflected toward pin 1.	in respect to boy, the
The plane through the tube axis and p the trace produced by DJ1 and DJ2 by	
(measured about the tube axis) of 10°.	an angular toterance
The angle between DJ1 - DJ2 trace and	nd W3 - W4 trace is
90° ± 3°.	
	- Indicates a change.
SEPT 1 1050 THE DEBARTMENT	DATA

SEPT. 1, 1950

ral.

TURE DEPARTMENT

DATA

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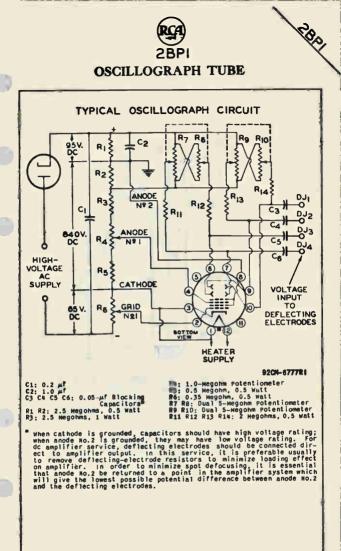


	Maximum Ratings, Design-Center Values:
1	ANODE-No.2 VOLIAGE 2500 max. volts
	ANODE-No.1 VOLTAGE 1000 max. volts
	GRID-No.1 VOLTAGE:
	Negative bias value 200 max. volts
1	Positive bias value
	Positive peak value
1	PEAK VOLTAGE BETWEEN ANODE NO.2 AND
ł	
ł	
1	PEAK HEATER-CATHODE VOLTAGE:
1	Heater negative with respect to cathode. 125 max. volts
1	Heater positive with respect to cathode. 125 max. volts
ļ	Equipment Design Ranges:
j	
-	For any anode-No.2 voltage (Eb2) between 500° and 2500 volts
	Anode-No.1 Voltage 15% to 28% of Eb2 volts
	Max. Grid-No.1 Voltage
1	for Visual Cutoff. 6.75% of Ebo volts
I	Max. Anode-No.1
1	Deflection Factors:
1	DJ1 & DJ2
U	Di3 & Di4
-	Spot Position
1	Examples of Use of Design Ranges:
U	For anode-No. 2 voltage of 1000 2000 volts
1	Anode-No.1 Voltage 150 - 280 300 - 560 volts
	Max. Grid-No.1 Voltage
IJ	for Visual Cutoff67.5 -135 volts
1	Deflection Factors:
i	DJ1 & DJ2 115-155 230-310 volts dc/in.
1	DJ3 & DJ4
l	ery - eret
1	Maximum Circuit Values:
	Grid-No.1-Circuit Resistance 1.5 max. megohms
l	Resistance in Any Deflecting-
	Electrode Circuito 5.0 max. megohms
1	
1	Brilliance and definition decrease with decreasing anode-No.2 voltage, A value as low as 500 volts is recommended only for low-velocity de- flection and low room-light levels.
1	A value as low as 500 volts is recommended only for low-velocity de-
1	o it is recommended that the deflecting-electrode-circuit resistances
l	be approximately equal.
l	Anode No.2 and grid No.2 which are connected together within tube, are referred to herein as anode No.2. The product of anode-No.2 voltage and average anode-No.2 current should be iinited to 6 watts.
l	referred to herein as anode No. 2. The product of anode-No. 2 voltage
l	and average anode-no. 2 current should be timited to b watto.
ļ	I The center of the undeflected, focused spot will fall within a circle having a 5.0-mm radius concentric with the center of the tube face.
	narrig a sto ind rasta onionite the
1	
1	
1	

SEPT. 1, 1950

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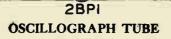
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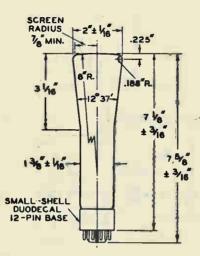


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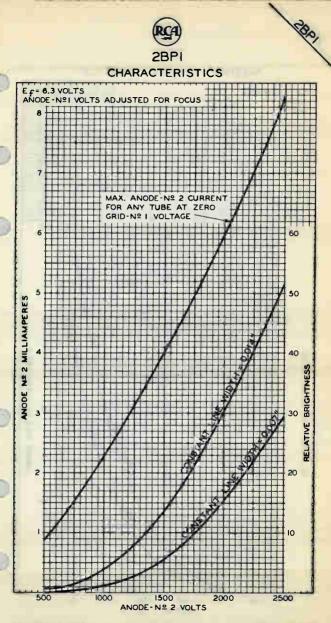
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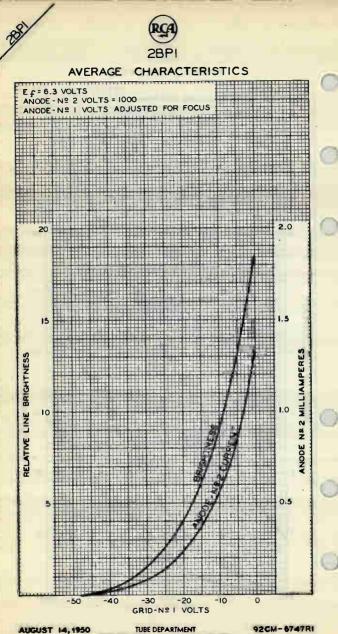
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TUBE DEPARTMENT



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92CM- 6747RI



ELECTROSTATIC FOCUS

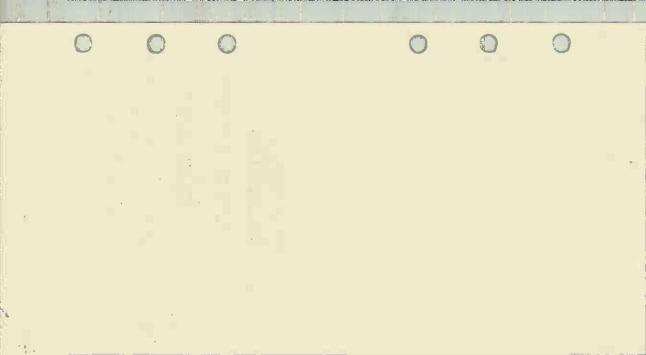
ELECTROSTATIC DEFLECTION

The 2BP11 is the same as the 2BP1 except that it has a phosphor of the short-persistence, blue-fluorescence type designated P11. The blue radiation of the P11 screen is highly actinic and has sufficiently short persistence to permit use of the 2BP11 in all moving film photographic applications without blurring except in those where film moves at a high speed. The 2BP11 is also quite satisfactory for visual observation of phenomena because its phosphor has unusually high brightness for a blue screen.

In general, operation of the 2BP11 at an anode-No.2 voltage less than 1000 volts is not recommended.

THE SPECTRAL-ENERGY EMISSION CHARACTERISTIC and the PERSISTENCE CHARACTERISTIC of the P11 Phosphor are shown at the front of this Section

SEPT. 1, 1950



2F2I MONOSCOPE 25.21

5-INCH	MAGNET	LIC-DEFL	ECTION	TYPE
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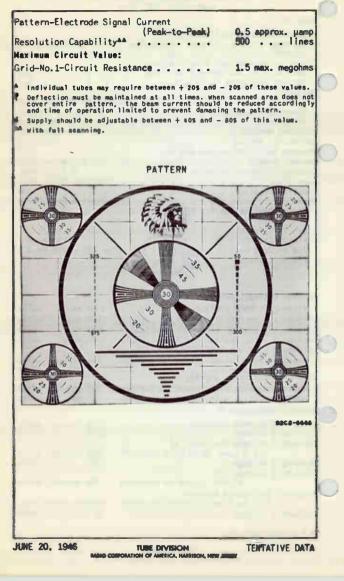
Supersedes Type 1899

Ge	ne	ra	1	:

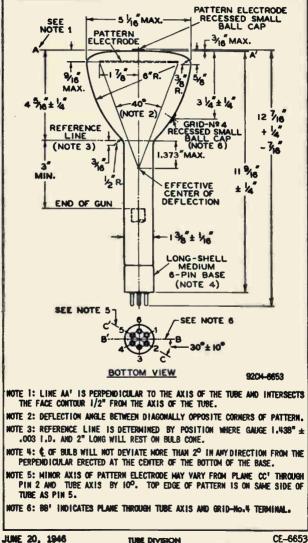
1	venci el.	I
	Heater, for Unipotential Cathode:	I
	Voltage	Į
	Current 0.6	ł
	Direct Interelectrode Capacitances:	1
-1	Grid No.1 to All Other Electrodes 7	1
	Pattern Electrode to Grid No.4 5 µµf	1
	Pattern:	I
	Type See illustration on next page	ł
	Dimensions (Approx.)	1
	Calibration Up to 500 lines	I.
Ξ	Focusing Method.	н
1	Deflection Method Magnetic	I
	Deflection Method	ł
e,	Overall Length	I
	Greatest Diameter of Bulb	I
	Cans (Two) Recessed Small Ball	L
l	Mounting Position Any	L
Ľ	Base Long-Shell Medium 6-Pin	L
		t
		ł
đ	Pin 2-Grid No 2 (3) (4) End Can - Pattern	1
2	Pin 1-Heater Pin 2-Grid No.2 Pin 3-Grid No.2	ł
I)	Pin 1 - Heater Pin 2 - Grid No. 2 Pin 3 - Grid No. 3 Pin 4 - Grid No. 1 Pin 4 - Grid No. 1 Pin 5 Pin 6 Pin 7 Pin 8 Pin 8	I
	Pin 5-Cathode	ł
1	Pin S=cathode	1
		ł
÷		I
	Maximum Ratings, Design-Center Values:	l
ľ		ł
ч		в.
		ł
	GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:	L
ł	inguerro brao rarbor r r r r r r r r	
Ц		L
	PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode 125 max. volts	ł
1	Heater positive with respect to cathode 125 max. volts	ł
	Typical Operation: 🕈	L
1	Pattern-Electrode Voltage 1000 volts	
	Grid-No.4 Voltage 1050 volts	ł
1	Grid-No.3 Voltage for Focus at	ł
	0.5 µamp Grid-No.4 Current ^A 300 approx. volts	ł
	Grid-No.2 Voltage 1000 volts	
	Grid-No.1 Voltage for	1
ł	Visual Cutoff on Monitor# -50 approx. volts	ł
-	Internal Resistance between	1
1	Grid No.4 and Pattern Electrode Greater than 1 meg.	1
	Grid-No.4 Current 0.5 µamp	1
		1
	₹, *, #: See next page.	J
	JUNE 20, 1946 TUBE DIVISION TENTATIVE DATA	L

BADIO CORPORATION OF AMERICA, HARRISON, NEW JENEY

MONOSCOPE



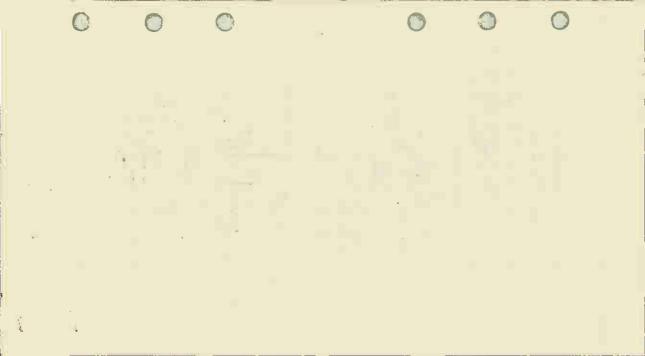
2F21 MONOSCOPE



PORATION OF AMERICA, HARRISON, NEW J

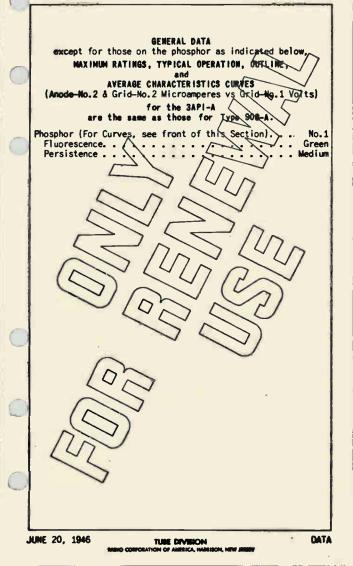
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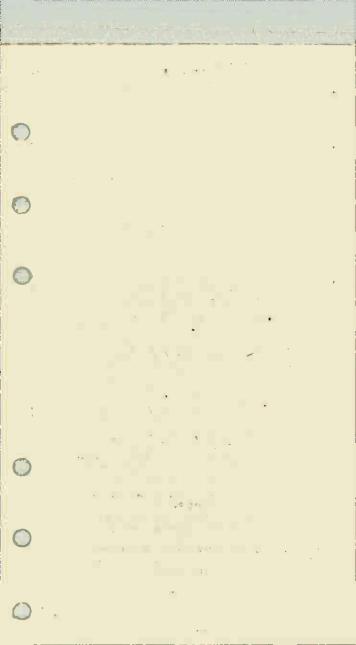
25-21





33.DI-A





3AQP1

Oscillograph Tube

ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

DATA

Gen	£.	ra	1	
	-		•	•

	Heater, for Unipotential Cathode:
	Voltage (AC or DC) 6.3 volts
	Current 0.6 ± 10% amp
h	Direct Interelectrode Capacitances (Approx.):
7	Grid No.1 to all other electrodes 7.5 Huf
	Cathode to all other electrodes 4.3 #
	Deflecting electrode DJ1 to deflecting
	electrode DJ2
	Deflecting electrode DJ3 to deflecting
	electrode DJ4
	DJ to all other electrodes 10.1 $\mu\mu$ f DJ to all other electrodes 7.5 $\mu\mu$ f
	DJ ₃ to all other electrodes 8.1 $\mu\mu$ f DJ ₄ to all other electrodes 9.2 $\mu\mu$ f
	Faceplate, Spherical.
	Phosphor (For Curves, see front of this Section)
	Fluorescence Yellowish-Green
	Phosphorescence Yellowish-Green
	Persistence
	Focusing Method Electrostatic
	Deflection Method Electrostatic
	Overall Length
	Greatest Diameter of Bulb
	Minimum Useful Screen Diameter
	Useful Scan (Centered with
	respect to tube face):
	By deflecting electrodes DJ ₁ & DJ ₂ 2-3/4"
	By deflecting electrodes DJ ₃ & DJ ₄ 2-1/4"
	Operating Position
	Bulb
N	Base Small-Shell Duodecal 12-Pin (JEDEC Group 4, No. B12-43)
	Basing Designation for BOTTOW VIEW
	Pin 1-Heater Pin 8-Ultor
	Pin 2-Grid No.1 (Grid No.2.
	Pin 3-Cathode Grid No.4,
	Pin 4-Grid No.3 Collector)
	Pin 5-Internal Con- 5 Pin 9-Deflecting
	nection— Electrode
	Do Not Use CAR DU2
	Pin 6-Deflecting
	Electrode Electrode
	Pin 7-Deflecting Pin 11-Internal Con-
	Electrode nection-
	DJ ₄ Do Not Use
	Pin 12-Heater
	DJ_1 and DJ_2 are nearer the screen
	DJ3 and DJ4 are nearer the base



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA

3AQPI

Maximum and Minimum Rat	Lings, Design-Cent	er Values:	
ULTOR VOLTAGE		∫2750 max.	volts
CETOR FOETAGET		* `\ 500 min.	volts
ULTOR INPUT (AVERAGE).			watts
GR1D-No.3 VOLTAGE	• • • • • • • • •	• • 1100 max.	volts
GRID-No.1 VOLTAGE:			
Negative-bias value.		200 max.	volts
Positive-bias value. Positive-peak value.			volts
PEAK VOLTAGE BETWEEN UL		• • 2 max.	vorts
ANY DEFLECTING ELECTR		550 may	unlte
PEAK HEATER-CATHODE VOL		· · 000 max.	AALT2
Heater negative with		e:	
During equipment wa			
	seconds	410 max.	volts
After equipment war	m-up period	125 max.	volts
Heater positive with	respect to cathod	e 125 max.	volts
Équipment Design Ranges			
For any ultor volta	ige (Ecy) between g	500 and 1750 vo	lts
Grid-No.3 Voltage			
for focus 16	6.5% to 31% of Esa		volts
Negative Grid-No.1			
Voltage for visual			
extinction of			
undeflected spot . 2. Grid-No.3 Current	to a. /s or Leg		volte
for any operating			
condition	-15 to +10		math
Deflection Factors:	-13 (0 +10		pa
DJ & DJ2	73 to 99	v dc/in./kv	of E.
DJ3 & DJ4	28 to 35	v dc/in./kv	of E
			C4

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.





SBRIA HIGH-VACUUM CATHODE-RAY TUBE Supersedes Type 38P1

General:

I	Heater, for Unipotential Cathode:
Į	Voltage 6.3 ± 10% ac or dc volts
	Current 0.6
l	Direct Interelectrode Capacitances (Approx.):
1	Grid No.1 to All Other Electrodes 8.5
4	Cathode to All Other Electrodes 8.0
1	DJ1 to DJ2 2.0 μμf
	DJ3 to DJ4
	DJ1 to All Other Electrodes 8.0 µµf
ł	DJ3 to All Other Electrodes 6.0 uuf
l	DJ1 to All Other Electrodes except DJ2 . 6.0 uuf
1	DJ2 to All Other Electrodes except DJ1 . 5.0 uuf
1	DJ3 to All Other Electrodes except DJ4 . 4.0
	DJ4 to All Other Electrodes except DJ3. 6.0
I	Phosphor IFor Curves, see front of this Section 1 No.1
I	Fluorescence Green
	Persistence
l	
ł	Overall Length
	Overall Length
	Minimum Useful Screen Diameter
	Mounting Position
I	Mounting Position
	Basing Designation for BOTTOW VIEW
ł	Pin 1-Heater (7) (8 Pin 9- Anode No. 2,
ł	Pin 2 - Cathode Grid No. 2
ł	Pin 3-Grid No.1 9 Pin 10-Deflecting
1	Pin 4 – Internal Con. 4 Electrode
	Do Not Use DJ2
N	Pin 5-Anode No.1 Pin 11-Deflecting
4	Pin 7 – Deflecting NEY Electrode
ł	Electrode DJ3 DJ1
	Pin 8-Deflecting Pin 12-No Conn.
-	Electrode DJ4 Pin 14-Heater
	DJ ₁ and DJ ₂ are nearer the screen
	DJ_3 and DJ_4 are nearer the base
1	With DJ positive with respect to DJ, the spot is de-
1	flected toward pin 5. With DJz positive with respect to
	DJ _A the spot is deflected toward pin 2.
J	The angle between the trace produced by DJ_1 and DJ_2 and
l	its intersection with the plane through the tube axis and
	pin 5 does not exceed 10°.
J	
1	The angle between the trace produced by DJ_3 and DJ_4 and the trace produced by DJ_1 and DJ_2 is $90^{\circ} \pm 3^{\circ}$.
1	the trace produced by 011 and 012 12 20 2 20.
	Maximum Ratings, Abolute Values:
	ANODE-No.2 & GRID-No.2 VOLTAGE
	ANODE-No.1 VOLTAGE
ĺ	NUN 1 1045 DATA 1
	JULT 1, 1945 RCA VICTOR DIVISION

JOTTA

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE;
Negative Value
Positive Value
PEAK VOLTAGE BETWEEN ANODE NO.2 AND
ANY DEFLECTING ELECTRODE 550 max. volts
PEAK HEATER-CATHODE VOLTAGE:
Heater negative with respect to cathode 125 max. volts
Heater positive with respect to cathode 10 max. volts
Typical Operation:
Typicar operation.
Anode-No.2 & Grid-No.2 Voltage 1500 2000 volts
Anode No.1 Voltage for Focus
at 75% of Grid-No.1 Volt-
age for Cutoff [®] . 430 575 volts
Grid-No.1 Volt. for Visual Cutoff# -45 -60 volts
Max. Anode—No.1 Current Range≜ Between —50 and +10 µamp. Deflection Sensitivity:
DJ1 and DJ2 0.169 0.127 mm/v dc
DJ3 and DJ4 0.229 0.172
Deflection Factor:**
DJ1 and DJ2 150 200 v dc/in.
DJ3 and DJ4
Brilliance and definition decrease with decreasing anode-No.2 voltage. In general, anode-No.2 voltage should not be less than 1500 volts.
in general, anoge-so.2 voltage should not be less than 1500 volta.

In general, another of the short of the short of the short of the short short with grid-Ho.1 voltages between zero and cutoff.

- \$ Visual extinction of stationary focused spot. Supply should be adjustable to \pm 50% of thuse values.
- See curve for average values.

Individual tubes may vary from these velues by 2 305.

Spot Position:

The undeflected focused spot will fall within a 15-mm square centered at the geometric center of the tube face and having one side parallel to the trace produced by DJ and DJ2. Suitable test conditions are: anode-No.2 voltage, 1500 volts; anode-No.1 voltage, adjusted for focus; deflecting-electrode resistors, I megohm each, connected to anode No.2; the tube shielded from all extraneous fields. To avoid damage to the tube, grid-No.1 voltage should be near cutoff before application of anode voltages.

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms
Impedance of Any Deflecting-Electrode		
Circuit at Heater-Supply Frequency	1.0 max.	megohm
Resistance in Any Deflecting-		
Electrode Circuit	5.0 mex.	megonins
A It is recommended that all deflecting-electro be approximately equal.	de-circuit r	esistances

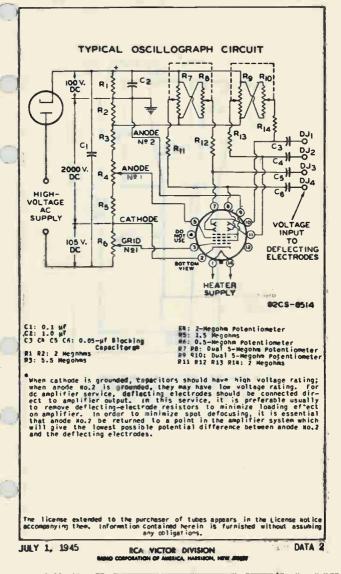
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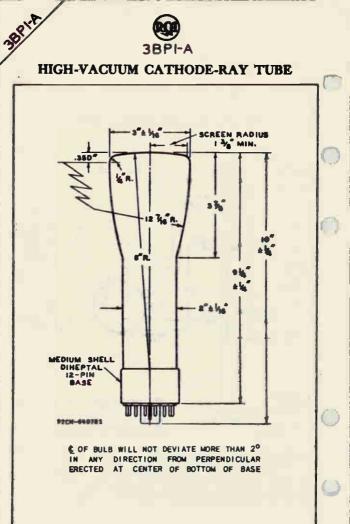
RCA VICTOR DIVISION

DATA 1



BOLA HIGH-VACUUM CATHODE-RAY TUBE





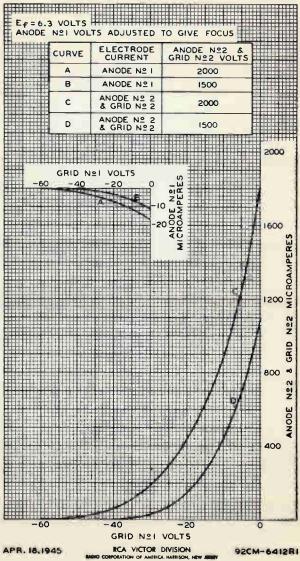
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RCA VICTOR DIVISION CONFOLATION OF AMERICA, MARRIDON, NEW JE DATA 2



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AVERAGE CHARACTERISTICS







POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

DATA

	Beneral:
	leater, for Unipotential Cathode:
	Voltage 6.3 ac or dc volts
	Current 0.6
1	Direct Interelectrode Capacitances (Approx.):
I	Grid No.1 to All Other Electrodes 8 muf
I	Cathode to All Other Electrodes 8 µµf
1	DJ1 to DJ2 2.5 μμf
	DJ3 to DJ4
Į	DJ1 to All Other Electrodes 8 ##f
1	DJ2 to All Other Electrodes
1	DJ3 to All Other Electrodes
1	DJ ₄ to All Other Electrodes
ł	Fluorescence and Phosphorescence
	Persistence of Phosphorescence Medium
	Focusing Method.
	Deflection Method.
	Overall Length
	Overal} Length
ł	Winimum Useful Screen Diameter
	Mounting Position
ŀ	Mounting Position
	Base Medium-Shell Diheptal 12-Pin (JETEC No.B12-37)
1	Basing Designation for BOTTOM VIEW
	Pin 1-Heater Pin 9-Anode No.2,
ł	Pin 2-Cathode Grid No.2
I	Pin 3-Grid No.1 Pin 10-Deflecting
ł	Pin 4 - Internal Electrode
	Connection- OX Connection- DJ2
1	Do Not Use Pin 11-Deflecting
1	Pin 5-Anode No.1 Electrode
1	Pin 7-Deflecting DJ1
1	Electrode OTO Pin 12 - No Dia Connection
н	
	Pin 8 - Deflecting Electrode DJ4 Pin 14 - Heater Cap - Anode No.3
H	
ł	DJ1 and DJ2 are nearer the screen
ł	DJ ₃ and DJ ₄ are nearer the base
1	With DJ1 positive with respect to DJ2, the spot is deflected
1	toward pin 5. With DJ positive with respect to DJ, the spot
	is deflected toward pin 2.
	The plane through the tube axis and each of the following items
	may vary from the trace produced by DJ1 and DJ2 by the following
	angular tolerances measured about the tube axis: Pin 5, 10°;
	Cap (on same side of tube as pin 5), 10 ⁰ .
L	The angle between $W_1 - W_2$ trace and $W_3 - W_4$ trace is $90^{\circ} \pm 3^{\circ}$.

AUG. 1, 1951

TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JENNEY DATA 1

3301



3JP1

3 JPI

OSCILLOGRAPH TUBE

Maximum Ratings, Design-Center Values:		
ANODE-No.3 VOLTAGE	4000 max.	volts
LUNDER V. SP. VALENCE	2000 max.	volts
ANODE-NO. 29 VOLTAGE	LOOD MARY	
ANODE-NO.2 VOLTAGE	23.1 may	-
	1000 max.	volts
ANODE-No.1 VOLTAGE	TOOD Max.	vorts
GRID-No.1 VOLTAGE:	200 max.	volts
Negative bias value	0 max.	volts
	2 max.	volts
Positive peak value.	2 1104.	Vorts
PEAK VOLTAGE BETWEEN ANODE No. 2	500 max.	volts
AND ANY DEFLECTING ELECTRODE	JUU HIRA.	VUITS
PEAK HEATER-CATHODE VOLTAGE:	125 max.	volts
Heater negative with respect to cathode.	125 max.	
Heater positive with respect to cathode.	125 max.	volts
Equipment Design Ranges:		
For any anode-No.3 voltage (Bb3) between 2	000" and 4000	volts
and any anode-No. 2 voltage (Eb ₂) between 15	00 ** and 2000	volts
Anode-No.1 Voltage 20% to 34.5% of	Lb2	volts
Grid-No.1 Voltaget 1.5% to 4.5% of	£b2	volts
Anode-No.1 Current for any		
Operating Condition50 to +10		μamp
Deflection Factors:		100
When Bbg = 2 x Ebg		
01 * 01- 95 to 115	v dc/in:/kv	of Eb2
$W_1 \& W_2 \\ W_3 \& W_4 \\ \dots \\ $		
When Eb3 = Eb2	1.1. 11	. C FL
DJ1 & DJ2 68 to 92	v dc/in./kv	
DJ3 & DJ4 50 to 68 Spot Position #	v dc/in./kv	OT CD2
Spot Position		
Anode No.2 and grid No.2, which are connected	together withi	n tube
Anode No.2 and grid No.2, which are connected and referred to herein as anode No.2.	eogeener wrent	
At or near this rating, the effective resistance should be adequate to limit the anode-Ho.2 input	of the anode	supply
" It is recommended that anode-No.3 voltage be not	less than 300	0 volts
for high-speed transients.		
** Recommended minimum value of anode-No.2 voltage	•	
with heater voltage of 6.3 volts, anode-No.3 voltage anode-No.2 voltage of 1.50 volts, anode-No.3 volt grid-No.1 voltage adjusted to give spot that deflecting electrode connected through 1-megohm and tube shielded from all extraneous fields, t apot will fall within a 15-mm square centered a of the tube face and having one side parallel to Dit and Die.	Itage of 3 000	volts,
anode-No.2 voltage of 1500 volts, anode-No.1 volta	is just visibl	e, each
deflecting electrode connected through 1-megohm	resistor to anod	e No. 2.
and tube shielded from all extraneous fields, t	t the geometric	center
of the tube face and having one side parallel to	the trace prod	uced by
DJ1 and DJ2.		
		1
		1
t: See next page,		
UC 1 1051		DATA 1
TURE DEPARTMENT		

TUBE DEPARTMENT



Examples of Use of Design Ranges: For anode-No. 2 voltage of 4000 volts 2000 9000 and anode-No. 2 volts voltage of 2000 1500 2000 volts Anode-No.1 Volt. 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Volt.+ -30 to -90 22.5 to -67.5 -30 to -90 Deflection Factors: DJ1 & DJ2.... 136 to 184 127 to 173 170 to 230 DJ3 & DJA. . . 100 to 136 94 to 128 125 to 170 Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max. megohms Resistance in Any Deflecting-Electrode Circuit 5.0 max, megohms I For visual extinction of undeflected focused spot.

volts dc/in.

It is recommended that the deflecting-electrode-circuit resistances be approximately equal.

OPERATING NOTES

The 3JPI utilizes a medium-persistence screen having green fluorescence and phosphorescence. The screen has high visual efficiency and exceptionally good brightness contrast between the scanned line and the background. Under conditions of high ambient light, contrast may be maintained by the use of a green filter, such as Wratten No.58.

For high-speed scanning, it is recommended that the anode-No.3 (post-deflection accelerator) voltage be not less than 3000 volts, but for low- and medium-speed'scanning, anode No.3 may be operated at a voltage as low as 2000 volts.

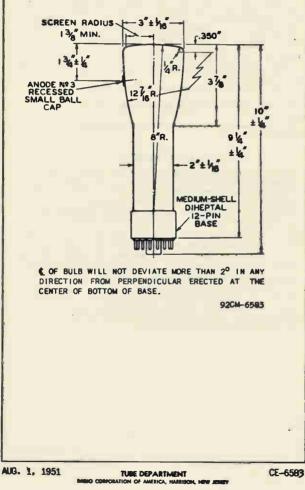
Because of its medium persistence, the 3JPI is particularly useful where either medium-speed non-recurring phenomena or medium- and high-speed recurring phenomena are to be observed. The persistence is such that the 3JPI can be operated with scanning frequencies as low as 20 cycles per second without excessive flicker.

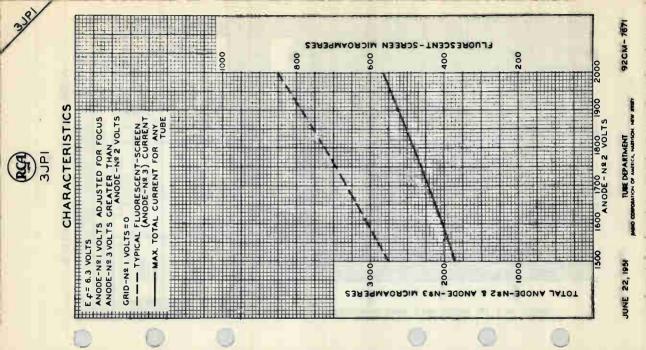
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DATA 2

JUS



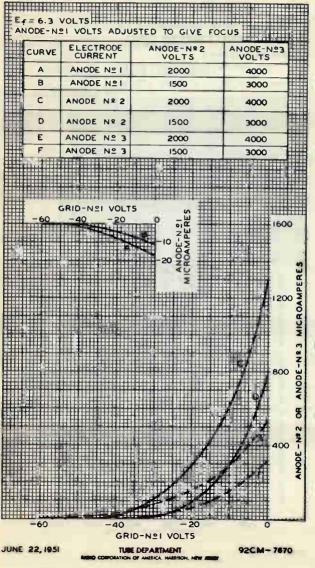






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AVERAGE CHARACTERISTICS





POST-DEFLECTION ACCELERATOR ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The 3JP7 is electrically and mechanically like the 3JP1 but utilizes a long-persistence, cascade (twolayer) screen which exhibits bluish fluorescence of short persistence and greenish-yellow phosphorescence which persists for several minutes under conditions of adequate excitation and low ambient light.

Because of its long persistence, the 3JP7 is particularly useful where either low-speed non-recurring phenomena or high-speed recurring phenomena are to be observed.

The persistence is such that the 3JP7 without filter can be operated with scanning frequencies as low as 30 cycles per second without excessive flicker. When used with a yellow filter, such as Wratten No.15 (G), the 3JP7 can be operated with much lower scanning frequencies.

GENERAL DATA, MAXIMUM RATINGS, AND EQUIPMENT Design ranges

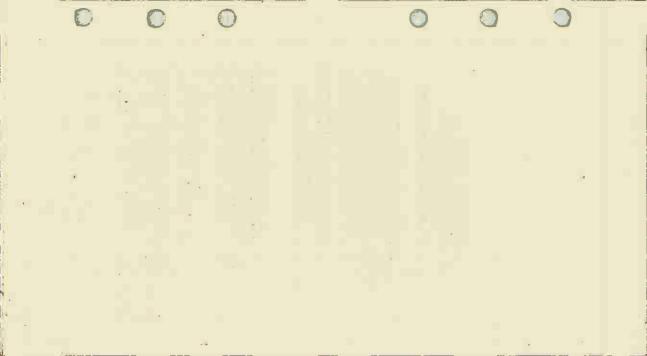
for the 3JP7 are identical with those for the 3JP1 except that Spot Position is defined as follows:

With heater voltage of 6.3 volts, anode-No.3 voltage of 4000 volts, anode-No.2 voltage of 2000 volts, anode-No.1 voltage adjusted for focus, grid-No.1 voltage adjusted to give spot that is just visible, each deflecting electrode connected through 1-megohm resistor to anode No.2, and tube shielded from all extraneous fields, the undeflected focused spot will fall within a 12-mm square centered at the geometric center of the tube face and having one side parallel to the trace produced by DJ1 and DJ2.

THE SPECTRAL-ENERGY EMISSION CHARACTERISTIC, BUILDUP CHARACTERISTICS, and PERSISTENCE CHARACTERISTICS of the P7 Phosphor are shown at the front of this Section.

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ELECTROSTATIC FOCUS	ELECTROSTATIC DEFLECTION
	DATA

General:

- 1		
	Heater, for Unipotential Cathode:	
	Voltage 6.3 ac or dc volts	
	Current 0.6 ± 10% amp	-
J.	Direct Interelectrode Capacitances (Approx.):	
)ł	Grid No.1 to all other electrodes	1
1		
	Deflecting electrode D1 to	
	deflecting electrode DJ2	
	Deflecting electrode DU3 to	
1	deflecting electrode DJ4	
	DJ1 to all other electrodes	
	DJ2 to all other electrodes 8 µµf	
	DJ3 to all other electrodes	
1	DJ4 to all other electrodes 8 µµf	
3	Faceplate	-
	Phosphor (For Curves, see front of this Section).	
	Thosphot (for curves, see from of child oberroute -	
ļ	Phosphorescence	-
1	Persistence Medium	
	Focusing Method Electrostatic	
	Deflection Method	1
	Overall Length	
P	Greatest Diameter of Eulb	
	Mimimum Useful Screen Diameter	
	Weight (Approx.)	-
	Mounting Position	
	J-24	-
	Bulb. J-24 Base	-
	Basing Designation for BOTTOM VIEW	
1	• - · ·	
	Pin 1-Heater Pin 8-Deflecting	
Ľ	Pin 2-Grid No.1 Electrode	
ł	Pin 3-Cathode DJ2	
I.	Pin 4-Grid No.3 Pin 9-Deflecting	
	Pin 5-Deflecting (3) (7) Electrode	
1	Electrode Quarter Dut	
	DJ3 Pin 10 - Internal	
	Pin 6 - Deflecting 3 Connection-	
Ì,	DJ4 ()=() Pin 11-Heater	
-	Pin 7-Ultor	
,	(Grid No.2,	
1	Grid No.4,	
	Collector)	
	DJ1 and DJ2 are nearer the screen	
	BIz and BIz are nearer the base	

4-56

-Indicates a change.

DATA 1

STA

TUBE DIVISION



34.91

OSCILLOGRAPH TUBE

	With DJ positive with respect to DJ2, the spot is deflected toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1.	
	The plane through the tube axis and pin 1 may vary from the trace produced by D(3 and D(4 by $\pm 10^{\circ}$ (measured about the tube axis).	
	The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°.	
	Maximum Ratings, Design-Center Values:	L
	ULTOR VOLTAGE	
•	ULTOR INPUT (AVERAGE) 6 max. watts	
	GRID-No.3 VOLTAGE 1000 max. volts GRID-No.1 VOLTAGE:	
	Negative bias value	1
	Positive bias value	
	Positive peak value	
	PEAK VOLTAGE BETWEEN ULTOR AND	1
	ANY DEFLECTING ELECTRODE	
	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_{C_d}) between	
	recommended minimum" and 2500 volts	
	Grid-No.3 Voltage for Focus 16% to 30% of Ec. volts	
	Grid-No.1 Voltage for * Visual Extinction of Undeflected Focused	
	Grid-No.3 Current for	
	Any Operating Condi-	Ю
	tion	
	Deflection Factors:	E
	DJ1 & DJ2 50 to 68 v dc/in./kv of E _{c.}	
	DJ3 & DJ4	Ł
	Spot Position ##	
	Examples of Use of Design Ranges:	Ę
	For ultor voltage of 1000 2000 wolts	
	Grid-No.3 Voltage for Focus 160 to 300 320 to 600 volts	
	Brilliance and definition decrease with decreasing ultorvoltage. Rec- ommended minimum for the 3KP1 in general service is 1000 volts but a value as low as 500 volts may be used under conditions of low-velocity deflection and low ambient-light levels.	5
	The center of the undeflected focused spot will fall within a circle having 7.5-mm radius concentric with the center of the tube face.	¢.
1	- Indicates a change.	
	4-56 DATA 1	

3

0

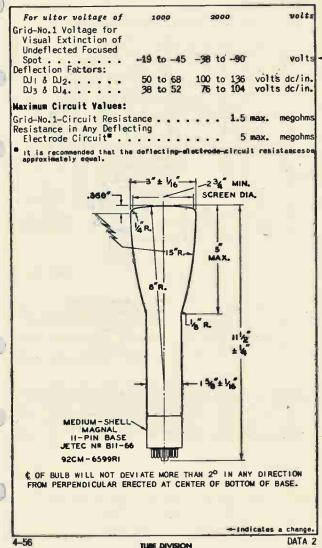
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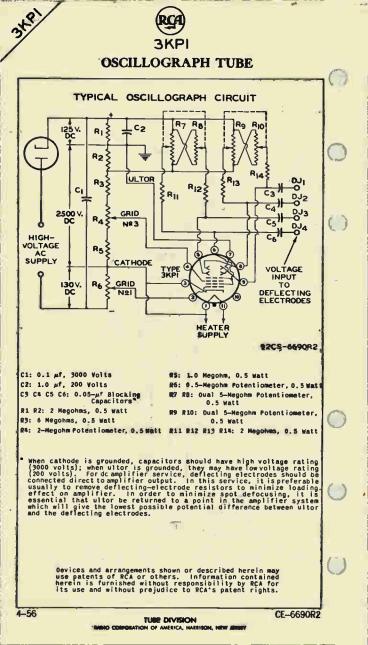


SHA

OSCILLOGRAPH TUBE



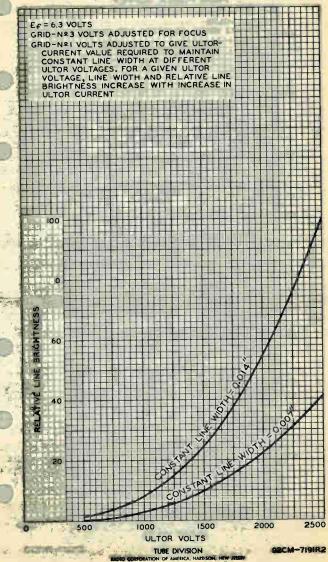
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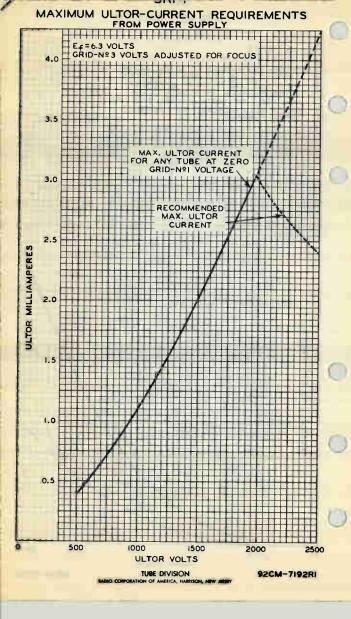


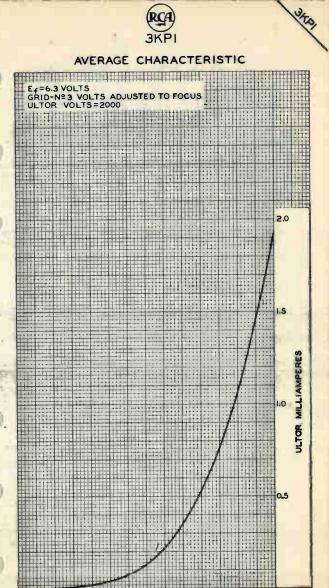


CHARACTERISTICS & MORICAM

STA







-60

GRID-NºI VOLTS

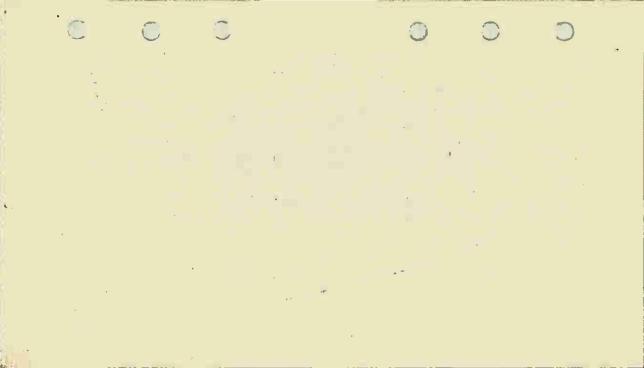
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PORATION OF AMERICA, HARRISON, NEW SENTER

-20

92CM-6658R2

0





ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

The 3KP4 is the same as the 3KP1 except for the following items:

General:

Phosphor (For curves,																				
Fluorescence																				
Phosphorescence .																				
Persistence	•	•	•	•	•	•	•	•	•	•	•	٠	•	•	•	Me	d	um	–Shoi	rt

In general, operation of the 3KP4 at an ultor voltage less than 1500 volts is not recommended.

The PERSISTENCE CHARACTERISTICS

of the P4-sulfide phosphor are the same as those shown for the P11 phosphor at the front of this Section

3KP7

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

The 3KP7 is the same as the 3KP1 except for the following stems:

General:

	Phosphor (For Cur																	
ļ	Fluorescence																	
1	Persistence .														•	 Medium 	⊢Short	-
1	Phosphorescence	•	•	•		•		*		•				*		Yellowish	-Green	+
10 - 10	Persistence .	•	•	•	•	•	•	•	•	•	٠	•	•	•	•	• • • Ver	y Long	+
1																		

In general, operation of the 3KP7 at an ultor voltage less than 1500 volts is not recommended.

3KPII

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

The 3KP11 is the same as the 3KP1 except for the following items:

General:

ļ	Phosphor (For Curves														
ļ	Fluorescence														
	Phosphorescence . Persistence														
i															۱.
	in general, operat	ion	of	the	31	KP1	1 at	an	u 11	or	V	olta	ge	less	L

than 1500 volts is not recommended.

- Indicates a change.

11-58

ELECTRON TUBE DIVISION

DATA



ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The allPi6 is the same as the allPi except for the following items: General: Phosphor (For Curves, see front of this Section)P16 Fluorescence~ . Violet Visible radiation. . . Near-Ultraviolet Invisible radiation. . . Phosphorescence-Persistence of visible radiation . Very Short Persistence of invisible radiation . , Very Short In general, operation of the 3KP16 at an ultor voltage less

than 1500 volts is not recommended.

11-58

3XPID

ELECTRON TUBE DIVISION

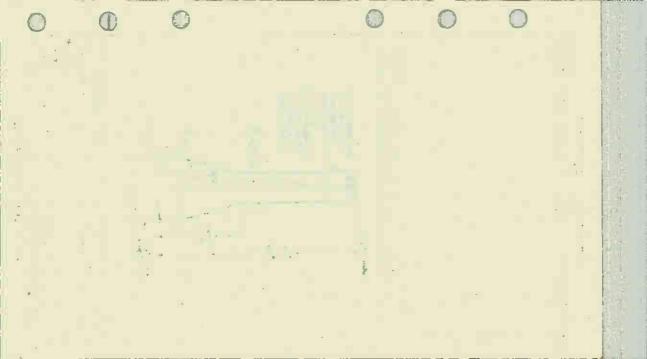
DATA



ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION The 3RP1 is the same as the 3RP1-A except for the following items: General: Faceplate. . Soherical Clear Glass Bulb . . J-24P1 Weight (Approx.) 7 oz . 3 + 12 SCREEN DIA. 0.350 2 3 MIN. 17 8: 4 1/16 MAX. őR. SMALL-SHELL DUODECAL IO-PIN BASE JETEC Nº BIO -75 OR SMALL-SHELL DUODECAL 12-PIN BASE JETEC Nº BI2-43 DINE NO. 92CM-7119R

CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN $2^{\rm O}$ in any direction from perpendicular erected at center of bottom of base.

SPA





ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The 3RP4 is the same as the gRP1 except for the following items:

General:

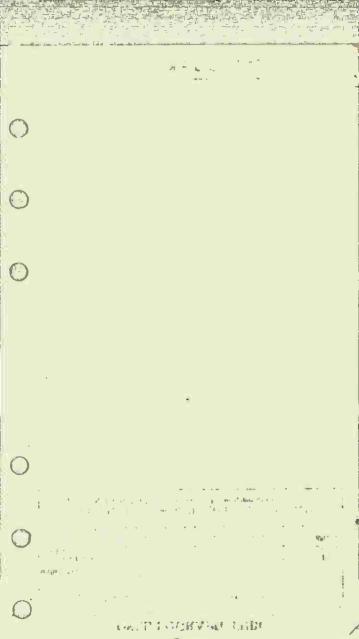
Phosphor (For Curves,			fr	'0 1	t	of	Eh.	is	50	ct.	i en)	•	P	4-	-5	iu I	fi	de Type
Fluorescence Phosphorescence	•	:	•	•	:	:	:	•	•	•	:	•	•	:	•	•	•	•	White
Persistence	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	Short

In general, operation of the 3RP4 at an ultor voltage less than 1500 volts is not recommended.



DATA

SADA





3RDI I

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

DATA

	General:
	Heater, for Unipotential Cathode:
	Voltage 6.3 ac or dc volts
	Current 0.6 ± 10%
	Direct Interelectrode Capacitances (Approx.):
	Grid No.1 to all other electrodes 8 µµf Deflecting electrode DJ1 to
i	Deflecting electrode DJ2
j	deflecting electrode DU4
	DJ1 to all other electrodes
	DJ2 to all other electrodes 8 µµf
	DJ3 to all other electrodes 7 µµf
	\mathbb{D}_4 to all other electrodes
	Faceplate
	Fluorescence
	Phosphorescence
1	Persistence
-	Focusing Method
1	Deflection Method
1	Overall Length 9-1/8" ± 1/4"
	Greatest Diameter of Bulb
1	Minimum Useful Screen Diameter
	Mounting Position
	Base
	or Small-Shell Duodecal 12-Pin (JETEC No.B12-43)
	Basing Designation for BOTTOM VIEW
	Pin 1 - Heater Pin 8 - Ultor
1	Pin 2 - Grid No.1 (Grid No.2,
J	Pin 3 - Cathode Grid No.4,
1	Pin 4 - Grid No.3 (1) (Collector)
1	Pin 54- Internal 3 Pin 9 - Deflecting
1	Connection-
1	Pin 6 - Deflecting
	Electrode 2 1 Electrode
1	N3 Ū™® N1
	Pin 7 - Deflecting Pin 11 - Internal
	Electrode Connection-
1	DJ4 Do Not Use
	Pîn 12 – Heater
	BJ1 and BJ2 are nearer the screen
	DJ_2 and DJ_4 are nearer the base
	3 7
I	Pins 5 and 11 are omitted from the 10-pin base.
1	
	JULY 1. 1955 THE DUMONT TENTATIVE DATA 1
	TUBE DIVISION

3RPI-A

OSCILLOGRAPH TUBE

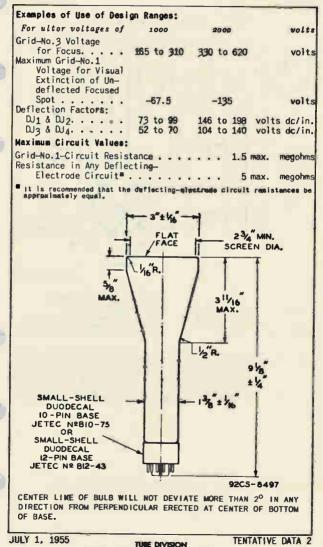
and the second se			
With DJ1 positive with toward pin 4. With DJ3	respect to DJ2	. the spot is	deflected
is deflected toward pir		respect to LU4	, the spot
The plane through the trace produced by DJ3 a axis).	tube axis and and D_4 by 10°	pin 1 may vary (measured abou	from the
The angle between D_1 $\pm 3^{\circ}$.	- DJ2 trace and	1 DJ3 - DJ4 tr	ace is 90 ⁰
Maximum Ratings, Design	n-Center Values		
ULTOR ^O VOLTAGE		2500 m	
ULTOR INPUT (AVERAGE).			
GRID-No.3 VOLTAGE GRID-No.1 VOLTAGE:		1000 m	ax. volts
Negative bias value.			
Positive bias value. Positive peak value.		··· 0 m	wax. volts wax. volts
PEAK VOLTAGE BETWEEN U		20	ax. voits
ANY DEFLECTING ELE	CTRODE	500 m	ax. volts
PEAK HEATER-CATHODE VO Heater negative with		hada 125 m	ax. volts
Heater positive with			
Equipment Design Range			
		a root and ore	a valte
For any ultor volta, Grid-No.3 Voltage	re ibe4 verween	500 GAG 250	0 00000
for Focus.	. 16.5% to 31	% of Eca	volts
Maximum Grid-No.1			
Voltage for Visual Extinction of Un-			
deflected Focused	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1		
Spot	· -6.75% of	Ec4	volts
Any Operating Con-			
dition		+10	µamp
Deflection Factor: DJ1 & DJ2	73 to	99 v dc/in.	No of For
$D_3 \& D_4 \dots \dots$. 52 to		/kv of Eca
DJ3 & DJ4	. **		
O The "ultor" in a cathod	e-ray tube is the e	lectrode to which	h is applied
O The "ultor" in a cathod the highest dc voltage to its deflection. In grid xo. 4. Since grid w gether within the 3RP1- "ultor" for convenience	for accelerating the 3RP1-A, the ul	tor function is	e beam prior performed by
grid No. 4. Since grid N gether within the 3RP1-	o.4, grid No.2, and A, they are collec	tively referred	to simply as
"Ultor" for convenience " Brilliance and definiti	on decrease with	a and curves. decreasing ultor	voltage.
Brilliance and definiti value as low as 500 vo flection and low ambien	Its is recommende t-light levels.	d only for low-v	elocity de-
## The center of the undef having 7.5-mm radius co	lected focused spe	t will fall with	in a circle
naving 7.5-mm Fadius co	icentric with the	center of the ti	toe race.
JULY 1. 1955		TENTAT	TIVE DATA 1
JOCI 1, 1900	TUBE DIVISION	IENTA	THE DATA 1

TUBE DIVISION

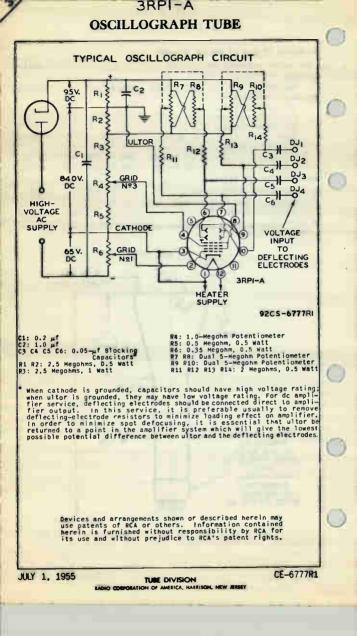


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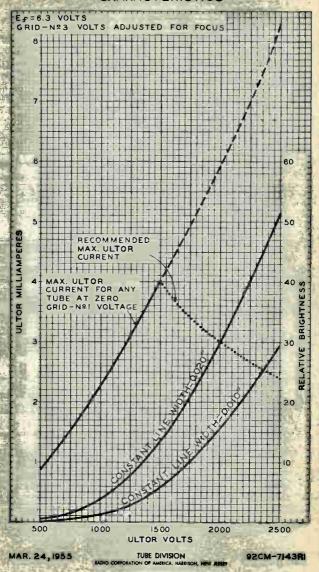
OSCILLOGRAPH TUBE

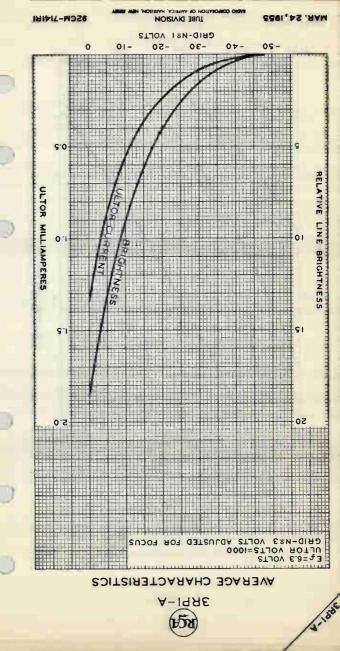


O CORFORATION OF AMERICA, HARRISON, NEW JERSEY











	(RCA) 34
	3WPI
	OSCILLOGRAPH TUBE
0	ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECT NON
()	DATA
	General:
	Heater, for Unipotential Cathode:
	Voltage 6.3
\bigcirc	Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 4.6 to 8.7 µµf
\bigcirc	Cathode to all other electrodes, 3 to 5.7 µµf
	Deflecting electrode DJ ₁ to deflecting electrode DJ ₂ 1.7 to 3.3 µµf
	Deflecting electrode DJ3 to
~	deflecting electrode $\overline{\mathbb{U}}_4$
()	Dia to all other electrodes. 5.5 to 10.5 wif
	DJ ₃ to all other electrodes 3.5 to 6.8 µµf DJ ₄ to all other electrodes
	Faceplate, Flat
	Fluorescence
	Phosphorescence
	Focusing Method
	Deflection Method Electrostatic Deflecting-electrode
	arrangement.
	Overall Length
	Minimum Useful Screen Diameter
	respect to tube face):
	By deflecting electrodes DJ & DJ
~	[Weight (Approx.)
U	Mounting Position
	Base Small-Shell Duodecal 10-Pin (JETEC No.B10-75), or Small-Shell Duodecal 12-Pin (JETEC No.B12-43)
	Basing Designation for BOTTOM VIEW
	Pin 1 - Heater Pin 8 - Ultor
\bigcirc	Pin 2 - Grid No.1 (Grid No.2, Pin 3 - Cathode ().7 Grid No.4,
\smile	Pin 4 - Grid No.3 Pin 6 - Deflecting () Pin 9 - Deflecting
	Electrode Electrode
	Pin 7 - Deflecting
0	Electrode U-12 Electrode
0	DJ2 DJ3 Pin 12 - Heater
	A PT TENTATIVE DATA 4

4-57

TENTATIVE DATA 1

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JELSEY



3HP1

OSCILLOGRAPH TUBE

Maximum Ratings, Design-Center Values;	0
ULTOR VOLTAGE	
ULTOR INPUT (AVERAGE)	
GRID-No.3 VOLTAGE 1000 max. volts	
GRID-No.1 VOLTAGE:	
Negative bias value	
Positive bias value	
Positive peak value	
PEAK VOLTAGE BETWEEN ULTOR AND ANY	
DEFLECTING ELECTRODE	
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode. 180 max. volts	
Heater positive with respect to cathode. 180 max. volts	
Faultanet Destas Dessa	10
Equipment Design Ranges:	V
For any ultor voltage (Ecu) between recommended	
minimum" and 2500 volts	1
Grid-No.3 Voltage	
for Focus 16.5% to 31% of Eca volts	9
Grid-No.1 Voltage for Visual Ex-	
tinction of Unde-	1
flected Focused	1
Spot	A
Grid-No.3 Current	1
for Any Operat-	
ing Condition	
Deflection Factors:	1
DJ & DJ2 41.5 to 50.5 v dc/in./kv of Ec.	
DJ3 & DJ4 28.5 to 35 v dc/in./kv of Ec.	
Spot Position ##	
Examples of Use of Design Ranges:	
For ultor voltage of 1000 1500 2000 Polt.	C
Grid-No.3 Volt-	10
age for Focus. 165 to 310 247 to 465 330 to 620 volts	5
Grid-No.1	1
Voltage for	1
Visual Ex-	1
tinction of	10
Indeflected	10
Focused Spot30 to -50 -45 to -75 -60 to -100 volt	s V
Deflection	
Factors:	1
DJ: & DJ2 41.5 to 50.5 62.3 to 75.8 83 to 101 v de/in	
DJ3 & DJ4 28.5 to 35 42.8 to 52.5 57 to 70 v dc/in	
Brilliance and definition decrease with decreasing ultor voltage. Recommended minimum for the 3MP1 in general service is 1000 volts but a value as low as 500 volts may be used under conditions of low- velocity deflection and low ambient-light levels.	
but a value as low as 500 volts may be used under conditions of low-	
veroursy democration and row ambrens-right revers.	
#: See next page.	
4-57 TENTATIVE DATA	1
TUBE DIVISION	-

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

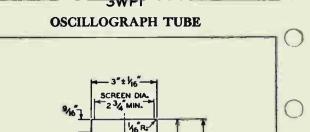


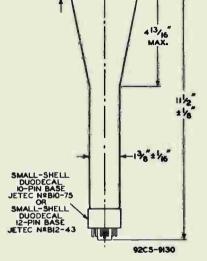
3MAI

OSCILLOGRAPH TUBE

0	
	Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max, megohms
	Resistance in Any Deflecting-
	Electrode Circuit 5 max. megohms
0	SPECIAL PERFORMANCE DATA
\cup	For ultor voltage of 1500 volts
	Line Width ⁴ inch Peak Grid-No.1 Drive from Spot
	Cutoff ⁴
\sim	Raster Shape
\bigcirc	## with grid-wo.1 voltage adjusted to give a spot that is just visible, and the tube shielded from all extraneous fields, the center of the
	undeflected focused spot will fall within a circle of 3/16-inch radius concentric with the center of the tube face.
	It is recommended that the deflecting-electrode-circuit resistances be
	Under the following conditions: heater voltage of 6.3 volts, brightness of 7 foot-lamberts measured on a 2° x 2°, 49-line raster with high-
	frequency scanning applied to deflecting electrodes 0J1 and 0J2. For line-width measurement, the high-frequency scanning is adjusted to
	give sharpest focus at center of tube face. Raster height is con- fracted until the individual scanning lines are just barely distin-
	approximately equal. under the following conditions: heater voltage of 6.3 volts, brightness of 7 foot-lamberts measured on a 2" x 2", 49-line raster with high-frequency scanning applied to deflecting electrodes DJ and DJ2. For line-width measurement, the high-frequency scanning is adjusted to give a raster width of 6.9 cm with the grid-No.3 voltage adjusted to give sharpest focus at center of tube face. Raster height is contracted until the individual scanning lines are just barely distinguishable. Line width is expressed as the quotient of the contracted raster height measurement the center line of the tube face divided by the number of scanning lines (#9).
	5 Under the following conditions: heater voltage of 6.3 volts, grid-No.3 voltage adjusted for focus, and grid-No.1 voltage adjusted to give visible raster. With 49-line raster centered with respect to the tube face and 1.688 in 30J4 direction, all points on the raster will lie within the area between the two rectangles also centered with respect to the tube face; the one, 1.920 in 10J2 direction and 1.646 in 30J4 direction; the other, 1.830° in 10J2 direction and 1.646° in 30J4
	visible raster. With #9-line raster centered with respect to the tube face and size adjusted to give mean dimensions of 1.875° in 10J2 direc-
	tion and 1.688° in 30J4 direction, all points on the rater with respect within the area between the two rectangles also centered with respect to the tube face: the one. 1.920° in 10J2 direction by 1.730° in 30J4
	direction; the other, 1.830° in 10J2 direction and 1.646° in 3DJ4 direction.
0	The deflection factor for either DJ1 and DJ2 electrodes or DJ3 and DJ8 electrodes for a deflection of less than 75 per cent of the respec- tive useful scan will not differ from the deflection factor for the corresponding deflecting electrodes at 25 per cent of the useful scan by more than 2 per cent.
V	corresponding deflecting electrodes at 25 per cent of the useful scan by more than 2 per cent.
\bigcirc	
0	
	1
	4-57 TENTATIVE DATA 2

BADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





 $\ensuremath{{\ensuremath{\xi}}}$ of bulb will not deviate more than 2° in any direction from perpendicular erected at center of bottom of base.

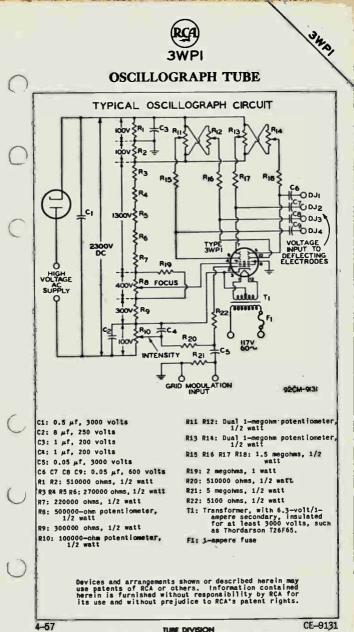
THE PLANE THROUGH THE TUBE AXIS AND PIN 3 MAY VARY FROM THE TRACE PRODUCED BY DJ₁ AND DJ₂ BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 10^{\circ}$. ANGLE BETWEEN DJ₁ - DJ₂ TRACE AND DJ₃ - DJ₄ TRACE IS 90° $\pm 10^{\circ}$.

DJ1 AND DJ2 ARE NEARER THE SCREEN: DJ3 AND DJ4 ARE NEARER THE BASE. WITH DJ1 POSITIVE WITH RESPECT TO DJ2, THE SPOT WILL BE DEFLECTED TOWARD PIN 3: LIKEWISE, WITH DJ3 POSITIVE WITH RESPECT TO DJ4, THE SPOT WILL BE DEFLECTED TOWARD PIN 12.

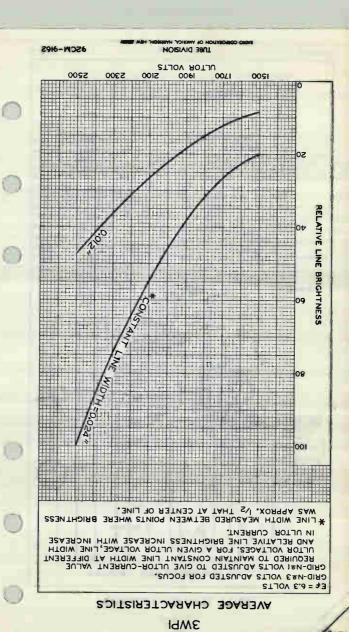
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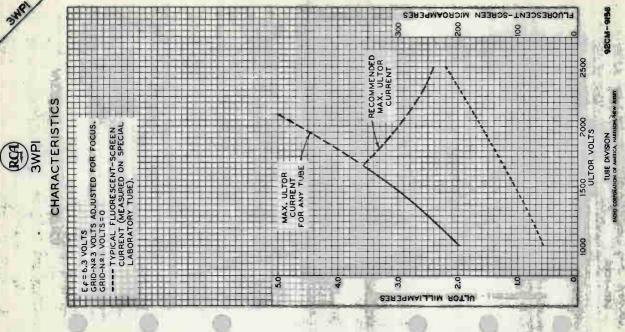
TUBE DIVISION

4-57



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

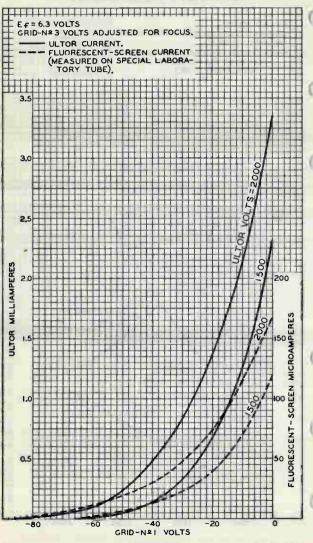






3MPI

AVERAGE CHARACTERISTICS



TUBE DIVISION

92CM-9159





ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

The 3NP2 is the same as the 3NP1 except for the following items:

General:

Phosphor (For Curves,	see	front	of this	Section)	P2
Fluorescence				Greenish-Ye	llow
Phosphorescence				Greenish-Ye	ellow
Persistence					. Long

Line width and drive values for the 3WP2 are the same as those shown for type 3WP1 under the heading SPECIAL PER-FORMANCE DATA and are based upon operation at brightness values calculated from 3WP1 performance.

3WPII OSCILLOGRAPH TUBE

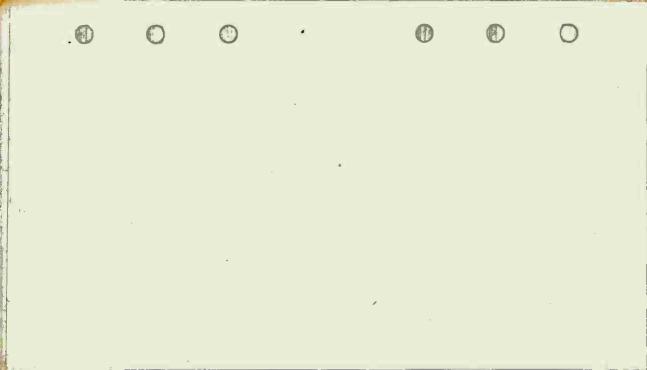
ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The 3WP11 is the same as the 3WP1 except for the following items:

General:

Phosphor (For Curv	es	5,	Se	e	fi	ron	at	of	1	thi	s	Se	ect	tie	on;				. P11
Fluorescence.																			.Blue
Phosphorescence	•	•	•	•	•	•	•	•	•		•	•	•		•	•	•	•	Blue
Persistence .	٠					•					٠	•	٠					٠	Snort

Line width and drive values for the 3WP11 are the same as those shown for type 3WP1 under the heading SPECIAL PER-FORMANCE DATA and are based upon operation at brightness values calculated from 3WP1 performance.





STOPI

OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

DATA

General:	
Heater, for Unipotential Cat	hode:
Voltage	
Current	0.6 amp
Direct Interelectrode Capaci	tances (Approx.):
Grid No.1 to All Other Ele	ctrodes
Cathode to All Other Elect	rodes
U_1 to U_2	
DJ3 to DJ4	1,3 µµf
Disto All Other Electrode	e àf
DJ2 to All Other Electrode	µµf s,, 9µµf s, 9µµf
DJ3 to All Other Electrode	s 5μμf
DJ4 to All Other Electrode	sμμf
Faceplate, Flat	Clear Glass
Phosphor (For Curves, see fr	s9μμ s5μμ s6μμf s6μμf Clear Glass ront of this Section}P1
Fluorescence and Phosphore	scence Green
Persistence of Phosphoreso	ence Medium
Focusing Method	Electrostatic
Deflection Method	Electrostatic
Overall Length	••••••••••••••••••••••••••••••••••••••
Greatest Diameter of Buib .	•••••• 5-1/4" ± 3/32"
Minimum Useful Screen Diamet	
Bulb	
Weight (Approx.)	
Can Postcion	essed Small Ball (JETEC No.J1-22)
Raco Madium-Shall	Diheptal 12-Pin (JETEC No.B12-37)
	TOM VIEW
Pin 1-Heater Pin 2-Cathode	Pin 9-Ultor (Grid No.2,
	(Grid No.2, Grid No.4)
Pin 3-Grid No.1 Pin 4-No Con-	
Pin 4 - No Con- nection-	Electrode DJ2
Do Not Use	Pin 11 - Deflecting
Pin 5-Grid No.3	Electrode DJ1
Pin 7-Deflecting	Pin 12-No. Conn.
Electrode DJ3	Pin 14 - Heater
Pin 8-Deflecting	Cap - Post-Ultor
Electrode DJ	(Grid No.5.
	Collector)
DI and DI an	a measure the screen
DI and DI a	e nearer the screen re nearer the base
With DJ1 positive with re	spect to DJ2, the spot is de- h DJ3 positive with respect to
flected toward pin 5. Wit	h DJ3 positive with respect to
DJ_4 , the spot is defiected	toward pin 2.
	axis and each of the following
	race produced by DJ1 and DJ2 by

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TENTATIVE DATA 1

5ABPI OSCILLOGRAPH TUBE

Contraction of the second second					
pin 5), 10°. Angle between DJ ₁ - DJ ₂ trace and DJ ₃ - DJ ₄ trace is 90° ± 1.5°. Maximum Ratings , Design-Center Values: POST-ULTOR VOLTAGE	the following an	gular tolerar	neas (measur	red about the	tube
trace is 90° ± 1.5°. Maximum Ratings , Design-Center Values: POST-ULTOR VOLTAGE	nin 51 100, An	ale between [hat (0) sat	race and Dia	- DIA
Maximum Ratings, Design-Center Values:POST-ULTOR* VOLTAGE6000 max. voltsRATIO OF POST-ULTOR VOLTAGE2.3:1 max.TO ULTOR VOLTAGE2.3:1 max.SRID-No.3 VOLTAGE:1000 max. voltsPositive bias value200 max. voltsPositive bias value2 max. voltsPositive bias value500 max. voltsPositive bias value2 max. voltsPositive with respect to cathode.125 max. voltsBeater positive with respect to cathode.125 max. voltsGrid-No.3 Voltage for Focus.20% to 34.5% of Ecg.Grid-No.3 Voltage for Focus.20% to 34.5% of Ecg.Coused Spot2 max26% to 4.3% of Ecg.Posting Condition-15 to +10µampDeflection Factors:#18 to 24When Ecg. = Ecg0.1 & D.2DJ & D.22.5 to 29v dc/in./kvof EcgSpot Position#4Examples of Use of Design Ranges:For post-ultor2000voltage of2000sood<	trace is $90^{\circ} \pm 1$	5°.	0 1 00 2 0		
POST-ULTOR VOLTAGE					
DUTOR* VOLTAGE		-			
RATIO OF POST-ULTOR VOLTAGE TO ULTOR VOLTAGE . 2.3:1 max. GRID-No.3 VOLTAGE . 1000 max. volts Regative bias value . 200 max. volts Positive bias value . 200 max. volts Positive bias value . 2 max. volts Positive peak value . 2 max. volts PEAK VOLTAGE BETWEEN ULTOR AND ANY DEFLECTING ELECTRODE . 500 max. volts PEAK HEATER-CATHODE VOLTAGE: Heater positive with respect to cathode. 125 max. volts Heater positive with respect to cathode. 125 max. volts Heater positive with respect to cathode. 125 max. volts Grid-No.3 Voltage for Focus . 20% to 34.5% of E_{C_4} . volts Grid-No.3 Voltage for Focus . 20% to 34.5% of E_{C_4} . volts Grid-No.3 Voltage for Visual Extinction of Undeflected Focused Spot 2.6% to 4.3% of E_{C_4} volts Grid-No.3 Current for Any Operating Condition					
To ULTOR VOLTAGE 2.3:1 max. GRID-No.3 VOLTAGE				2600 max.	VOITS
GRID-No.3 VOLTAGE	RATIO OF POST-ULIO	R VULTAGE		2 2.1	
BRID-No.1 VOLTAGE: Negative bias value	CRID No 2 VOLTACE	O ULIOR VULIA	4GE		volts
Negative bias value 200 max. volts Positive bias value				1000	
Positive bias value ⁰		lue		200 max.	volts
PEAK VOLTAGE BETWEEN ULTOR AND ANY DEFLECTING ELECTRODE 500 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 post-ultor voltage (E_{cg}) between 2000° and 6000 volts and any ultor voltage (E_{cg}) between 2000° and 6000 volts Grid-No.3 Voltage for Focus . 20% to 34.5% of E_{cg} volts Grid-No.3 Voltage for Focus . 20% to 34.5% of E_{cg} volts Grid-No.3 Voltage for Visual Extinction of Undeflected Focused Spot 2.6% to 4.3% of E_{cg} volts Grid-No.3 Current for Any Operating Condition15 to +10	Positive bias va	lue ⁰		· O max.	volts
ANY DEFLECTING ELECTRODE 500 max. volts PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode. 125 max. volts Heater positive with respect to cathode. 125 max. volts Heater positive with respect to cathode. 125 max. volts Equipment Design Ranges: For any post-ultor voltage (E_{C_d}) between 2000° and 6000 volts and any ultor voltage (E_{C_d}) between 1500° and 2000 volts Grid-No.3 Voltage for Focus . 20% to 34.5% of E_{C_d} volts Grid-No.3 Voltage for Visual Extinction of Undeflected Focused Spot 2.6% to 4.3% of E_{C_d} volts Grid-No.3 Current for Any Operating Condition15 to +10				2 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 post-ultor voltage (E_{C_d}) between 2000" and 6000 volts and any ultor voltage (E_{C_d}) between 1500"" and 2600 volts Grid-No.1 Voltage for Focus 20% to 34.5% of E_{C_d} volts Grid-No.1 Voltage for Focus 20% to 34.5% of E_{C_d} volts Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot 2.6% to 4.3% of E_{C_d} volts Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot 2.6% to 4.3% of E_{C_d} volts Grid-No.1 Voltage for Visual Extinction for Any Operating Condition15 to +10					
Heater negative with respect to cathode.125 max. voitsHeater positive with respect to cathode.125 max. voitsEquipment Design Ranges:For any post-ultor voltage (E_{c_d}) between 2000" and 6000 voltsand any ultor voltage (E_{c_d}) between 2000" and 2000 voltsGrid-No.3 Voltage for Focus 20% to 34.5% of E_{c_d} voltsGrid-No.1 Voltage for VisualExtinction of UndeflectedFor used Spot 2.6% to 4.3% of E_{c_d} voltsGrid-No.3 Current for Any Operating Condition15 to +10 µampDeflection Factors:#When $E_{c_g} = 2 \times E_{c_d}$ DJ1 & DJ2 226.5 to 36 v dc/in./kvof Ec_4DJ3 & DJ4			DDE • • • •	500 max.	VOITS
Heater positive with respect to cathode. 125 max. volts Equipment Design Ranges: For any post-ultor voltage (E_{C_d}) between 2000° and 6000 volts and any ultor voltage (E_{C_d}) between 200° and 6000 volts Grid-No.3 Voltage for Focus . 20% to 34.5% of E_{C_d} volts Grid-No.3 Voltage for Visual Extinction of Undeflected Focused Spot 22.6% to 4.3% of E_{C_d} volts Grid-No.3 Current for Any Operating Condition15 to +10			to cathode	125 may	volte
Equipment Design Ranges: For any post-ultor voltage (E_{C_q}) between 2000" and 6000 volts and any ultor voltage (E_{C_q}) between 2000" and 2000 volts Grid-No.3 Voltage for Focus. 20% to 34.5% of E_{C_q} . volts Grid-No.1 Voltage for Focus. 20% to 34.5% of E_{C_q} . volts Grid-No.1 Voltage for Focus. 20% to 34.5% of E_{C_q} . volts Grid-No.3 Current for Any Operating Condition . 2.6% to 4.3% of E_{C_q} volts $Focused Spot . 2.6\% to 4.3\% of E_{C_q}$ volts Fid-No.3 Current for Any Operating Condition15 to +10 μ amp Deflection Factors:# New E _{C_g} = 2 x E _{C_q} DJ & DJ ₂ . 2.6.5 to 36 v dc/in./kvof E _{C_q} DJ & DJ ₂ . 2.6.5 to 29 v dc/in./kvof E _{C_q} DJ & DJ ₂ . 2.6.5 to 29 v dc/in./kvof E _{C_q} DJ & DJ ₂ . 2.6.5 to 29 v dc/in./kvof E _{C_q} DJ & DJ ₂ . 2.6.5 to 29 v dc/in./kvof E _{C_q} DJ & DJ ₄ . 2.6.5 to 29 v dc/in./kvof E _{C_q} DJ & DJ ₄ . 2.6.5 to 29 v dc/in./kvof E _{C_q} DJ & DJ ₄ . 2.6.5 to 29 v dc/in./kvof E _{C_q} DJ & DJ ₄ . 2.6.5 to 29 v dc/in./kvof E _{C_q} DJ & DJ ₄ . 2.6.5 to 29 v dc/in./kvof E _{C_q} Spot Position ## Examples of Use of Design Ranges: For post-ultor voltage of 2000 good 4000 volts Grid-No.3 Volt. for Focus 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Volt. ⁰ -52 to -87 -39 to -65 -52 to -87 volts	Heater negative	with respect	to cathode.	125 max.	
For any post-ultor voltage (E_{C_g}) between 2000" and 6000 volts and any ultor voltage (E_{C_g}) between 2500" and 2600 volts Grid-No.3 Voltage for Focus . 20% to 34.5% of E_{C_4} volts Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot 2.6% to 4.3% of E_{C_4} volts Grid-No.3 Current for Any Operating Condition15 to +10 · · · µamp Deflection Factors:# $Hen E_{C_g} = 2 \times E_{C_4}$ DJ & DJ · · · · · 26.5 to 36 v dc/in./kvof E_{C_4} DJ & DJ · · · · · 21.5 to 29 v dc/in./kvof E_{C_4} DJ & DJ · · · · · 21.5 to 29 v dc/in./kvof E_{C_4} DJ & DJ · · · · · · · · · · · · · · · · · ·	neater pusitive	with respect	to cathode.	ILU MAAT	10110
Grid-No.3 Voltage for Focus . 20% to 34.5% of E_{C_4} volts Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot 2.6% to 4.3% of E_{C_4} volts Grid-No.3 Current for Any Operating Condition15 to +10					
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	For any post-ultor	voltage (Bc.) between ;	2000" and 600	o volts
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	and any ultor vo	Itage (Ec.) 1	etween 1500	o** and 2600	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot 2.6% to 4.3% of Ecg volts Grid-No.3 Current for Any Operating Condition15 to +10 · · · µamp Deflection Factors:# <i>Then Ecg = 2 x Ecg</i> DJ & DJ2 · · · · · 26.5 to 36 v dc/in./kvof Ecg DJ & DJ2 · · · · · 26.5 to 29 v dc/in./kvof Ecg DJ & DJ2 · · · · · 18 to 24 v dc/in./kvof Ecg DJ & DJ2 · · · · · 21.5 to 29 v dc/in./kvof Ecg DJ & DJ2 · · · · · 14.5 to 19.5 v dc/in./kvof Ecg DJ & DJ4 · · · · · 14.5 to 19.5 v dc/in./kvof Ecg Examples of Use of Design Ranges: For post-ultor voltage of 2000 gooo 4000 volts Grid-No.3 Volt. for Focus 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Volt. ⁰ -52 to -87 -39 to -65 -52 to -87 volts	Grid-No.3 Voltage	for Focus .	20% to 34.	5% of Eca	. volts
Focused Spot 2.6% to 4.3% of Ecg volts Grid-No.3 Current for Any Operating Condition15 to +10 · · µamp Deflection Factors:# Then $E_{cg} = 2 \times E_{cg}$ DJ1 & DJ2 · · · · 26.5 to 36 v dc/in./kvof Ecg DJ3 & DJ4 · · · · 18 to 24 v dc/in./kvof Ecg DJ1 & DJ2 · · · · 21.5 to 29 v dc/in./kvof Ecg DJ3 & DJ4 · · · · · 14.5 to 19.5 v dc/in./kvof Ecg Spot Position # Examples of Use of Design Ranges: For post-ultor voltage of 2000 3000 4000 volts Grid-No.3 Volt. for Focus 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Volt. ⁰ -52 to -87 -39 to -65 -52 to -87 volts	Grid-No.1 Voltage	tor Visual			
Grid-No.3 Current for Any Operating Condition15 to +10	Extinction of Un	deflected			
Deflection Factors:# When $E_{cg} = 2 \times E_{c_4}$ DJ_1 & DJ_2	Focused Spot		2.6% to 4.	3% of Ec4	. volts
Deflection Factors:# When $E_{cg} = 2 \times E_{c_4}$ DJ_1 & DJ_2	Grid-No.3 Current	tor Any	15.4-		
When $E_{cg} = 2 \times E_{c_d}$ DJ1 & DJ2 · · · · · 26.5 to 36 v dc/in./kvof Ec4 DJ3 & DJ4 · · · · · 18 to 24 v dc/in./kvof Ec4 When $E_{cg} = E_{c_d}$ DJ1 & DJ2 · · · · · · 21.5 to 29 v dc/in./kvof Ec4 DJ3 & DJ4 · · · · · · · · 14.5 to 19.5 v dc/in./kvof Ec4 DJ3 & DJ4 · · · · · · · · · · · · · · · · 14.5 to 19.5 v dc/in./kvof Ec4 Spot Position ## Examples of Use of Design Ranges: For post-ultor ## voltage of 2000 3000 4000 volts and ultor 2000 1500 \$000 volts Grid-No.3 Volt. 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Volt. -52 to -87 -39 to -65 -52 to -87 volts	Deflection Factors	lon	-15 (0	5+10	- pomp
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Derrection ractors				
When $E_{Cg} = E_{Cd}$ DJ1 & DJ2		WACK BC5	2 X BC4		
When $E_{Cg} = E_{Cd}$ DJ1 & DJ2	$DJ_1 \& DJ_2 \dots$. 26.5 to 3	6 v dc/in./k	VOT LC4
DJ1 & DJ2	W3 & W4			V dc/in./k	VOI CC4
DJ3 & DJ4 14.5 to 19.5 v dc/in./kvot Ec4 Spot Position ## Examples of Use of Design Ranges: For post-ultor voltage of 2000 3000 4000 volts and ultor voltage of 2000 1300 sooo volts Grid-No.3 Volt. for Focus 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Volt. ⁰ -52 to -87 -39 to -65 -52 to -87 volts		When Bog =	Ec.		
DJ3 & DJ4 14.5 to 19.5 v dC/in./kvor Ec4 Spot Position ## Examples of Use of Design Ranges: For post-ultor voltage of 2000 3000 4000 volts and ultor voltage of 2000 1300 volts Grid-No.3 Volt. for Focus 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Volt. ⁰ -52 to -87 -39 to -65 -52 to -87 volts	DJ1 & DJ2		. 21.5 to 2	9 v dc/in./k	vof Ec4
Examples of Use of Design Ranges: For post-ultor voltage of 2000 9000 volts and ultor 2000 1900 s000 volts Grid-No.3 Volt. 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Volt. -52 to -87 -39 to -65 -52 to -87 volts	DJ3 & DJ4		. 14.5 to 19	.5 v dc/in./k	vof Ec4
For post-ultor 2000 3000 4000 volts and ultor 2000 2000 2000 2000 volts Grid-No.3 Volt. 2000 300 to 515 400 to 690 volts volts Grid-No.1 Volt. -52 to -87 -39 to -65 -52 to -87 volts	Spot Position		##		
For post-ultor 2000 3000 4000 volts and ultor 2000 1500 2000 1500 volts Grid-No.3 Volt. 2000 300 to 515 400 to 690 volts volts Grid-No.1 Volt. -52 to -87 -39 to -65 -52 to -87 volts	Examples of Use of	Design Range			
voltage of 2000 9000 4000 volta and ultor voltage of 2000 1900 2000 volta Grid-No.3 Volt. for Focus 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Volt. ⁹ -52 to -87 -39 to -65 -52 to -87 volts					
and ultor voltage of 2000 1900 2000 volts Grid-No.3 Volt. for Focus 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Volt. ⁹ -52 to -87 -39 to -65 -52 to -87 volts		2000	3000	1000	volts
voltage of 2000 1500 2000 volts Grid-No.3 Volt. for Focus 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Volt. -52 to -87 -39 to -65 -52 to -87 volts					
Grid-No.3 Volt. for Focus 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Volt. –52 to –87 –39 to –65 –52 to –87 volts		2000	1500	2000	volts
for Focus 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Volt. ⁹ -52 to -87 -39 to -65 -52 to -87 volts					
	for Focus	400 to 690			
	Grid-No.1 Volt.ª	-52 to -87	-39 to -65	-52 to87	volts
A 0 * ** 4 # D	The second s				
a'''''''''''''''''''''''''''''''''''''	e,*,0,*,**,#,#,.D: See	e next page.			
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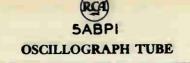
TUBE DEPARTMENT



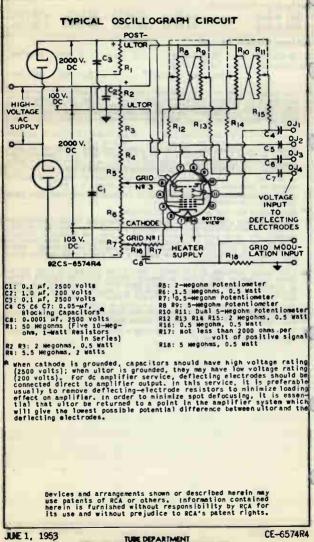
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OSCILLOGRAPH TUBE

								4		-										•3
	11	is	rec prox	omm	end	ed t	hat	the	e de	f lec	tin	9-0	lect	tro	10- (- 1-	cull		alat	Anc e
	FO	- v	Isua	1	tof	f of	ur	defi	lecte	ed f	oc us	bea	s poi	t .						focul eac ultor t.5-1
	del del tic del for	lection st	tio tio de te t	n se n. be 1 n to s as ime-	wit imi fu bas	tiv h po ted il s the	to to refe	and def en d ore, ge.	considect ches iame mor	sequion ; w ter e si	ent acco will sita	ty electronic la	prod nati post for	on, -de hari	thirfle	action of the second se	than engl on a obtainal	h fu h c hcce hind vol	ill-e of de lera d. tage	-hig creation tion Then the the
	Dec	-	a of	. I	Inte			ue o les t	1 .1	tor	vol D.J.	tag	e. . de	sia	ned	to	hav	-	xtra	-hig
	Ft.	is	rec	отле	nde	d t	hat	the	pos	uli st-u	or 1t or	inp v	ut p olta	ge	r t be	0 6	wat le	ss.	then	upp1
	the pri for get	her ul	to by tor	st ts gri hin fo	defi defi the	ect o.4.	ion B-t nie	ince ince	n th gri in p	id and the second secon	ers B-t o.4 are inti	tin ype and col ng	data	he id tive	ele ult io.; ily d c	cti or 2 8 re urv	rons func re c ferr es.	tio onn ed	n is ecte to s	plie bea per d to impl
	The app the pos bot uit	tie el t-d h p	post d a ectr efle erfe	dc ons oct i	vol in on d by	in tage the acce gr	a h ber ler id	cath Ighe am a atio No.5	r th fter on fi whi	its unct ch it	tui de ion co	ult flei an nvei	Is t ctio d th nien	he vol n. tly	ele Lag In oll re	e f th eci fer	or or or sA or red	to B-t fund to	whi pler ypes ctio as =	ch i atin , th n ar post
					1	Ele	ctr	ode	ing- Cir	rcui		•	••	•		-	max			ohm
ri	id-	No	.1-(lira	uit	E Re	esi	sta	nce		•	•		•	1.	.5		•	meg	ohm
	-		DJ4	•	+ 1				to 5 to 3	9	21	r co	90		20	10	40		u	/ 111
			ស្រុ	•				- 20	4 - 7	0	21		90		30	* ~	48		dc	



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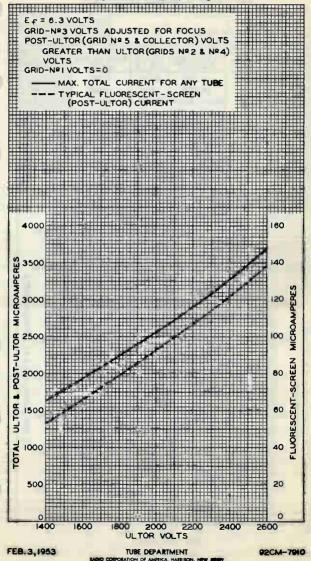


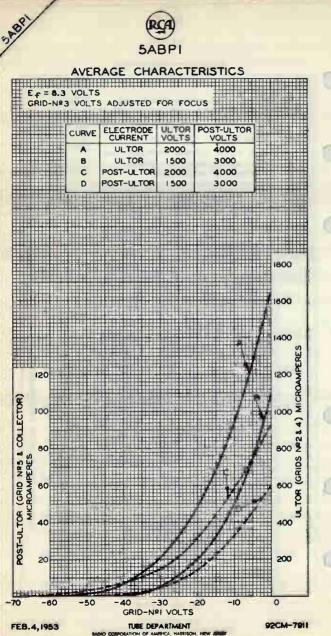
RAND CORPORATION OF AMERICA, HARRISON, NEW JERSEY

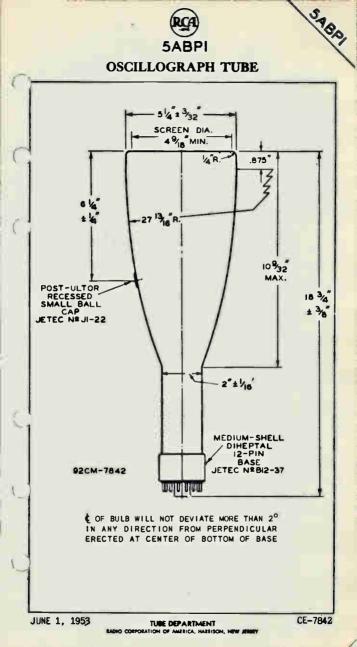


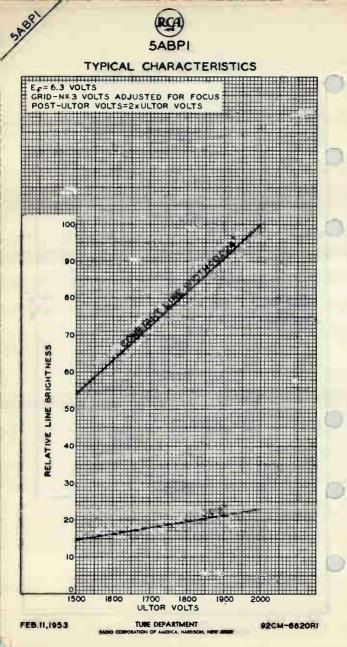
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CHARACTERISTICS











POST-DEFLECTION ACCELERATOR ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The 5ABP4 is the same as the 5ABP1 except for the following items:

General:

Phosphor (For Curves,		front	of	this	section).	. P4-Sul	fide Type
Fluorescence	• •	• •	• •	• •			• • White
Phosphorescence . Persistence .	• •	• •	• •	• •			- White Short
	•••	•••	•••	•••			• • • • • • • • •

THE PERSISTENCE CHARACTERISTICS

of the P4-sulfide phosphor are the same as those shown for the P11 phosphor at the front of this Section

5ABP7 OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The 5ABP7 is the same as the 5ABP1 except for the following items:

General:

	Phosphor (For	Curves,	see	front	of this	Section)	P7
	Fluorescend	:e					Blue
l							
l						Greeni:	
	Persister	nce					Long

5ABPII OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR ELECTROSTATIC FOCUS ELECTROSTAT

ELECTROSTATIC DEFLECTION

The 5ABP11 is the same as the 5ABP1 except for the following items:

General:

5400 H





STORI

OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

DATA

	DJa		11	Cap - P		tor
Pin 8	Dug Deflecting Electrode	×		n 12 - N	o Conn tion	ec-
	-Grid No.3 -Deflecting Electrode	of the	PI PI		eflect: Electro Du	
	-No Connec- tion-Do Not Use		0		Electro DU2	ode
Pin 2 Pin 3	-Heater -Cathode -Grid No.1			·	Grid No Grid No	5.4)
Base Basing	•••• Mediu Designation	m-Shell Dihept for BOTTOM V	EW	in (JETE	C No.B	12-37)
Mounting Cap	Position.	Recessed			EC No.	Any J1-22)
Greatest	Diameter of Useful Scree	Bulb n Diameter		5-	1/4" ±	3/32* \$-1/2*
overall	Length			. 16-	3/4" ±	3/16*
Focusing	Method			E	lectro	Medium static static
Fluore	scence orescence			* • •		Green Green
Faceplat	e. Flat	lectrodes.		2.8 to	6.3 .Clear	<i>µµ</i> f Glass
DJ2 to	all other e	lectrodes lectrodes lectrodes		4.4 to 4.4 to 2.8 to	9.2	дціf дціf дціf
Deflec	ecting elect ting electro ecting elect			1.7 to	1.3	µµ.f µµ.f
Cathod Deflec	e to all oth ting electro	er electrodes. de DJ _I to		3.1 to	5.8	μµt
Direct			s:	4.2 to		.amp µµ1
		6.3		ac		

TUBE DIVISION



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OSCILLOGRAPH TUBE



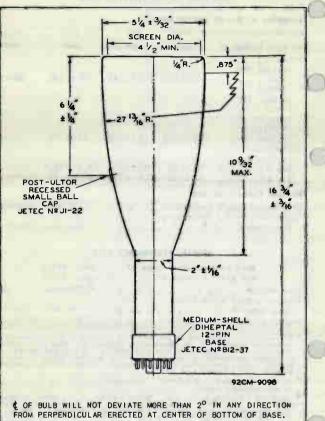
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OSCILLOGRAPH TUBE

lith post-ultor voltage of	sign Ra 2000	3000	4000	volt
	2000	1900	2000	volt
Grid-No.3				
Grid-No.1 Voltage for) to 690	300 to 515	400 to 690	volt
Visual Ex- tinction of Undeflected Focused Spot4% Deflection Factors:# DJ_& DJ_24% DJ_& DJ_23%	1 +0 52	40 to 50	53 4 to 66.6	v de/in
Maximum Circuit Values		·		
Grid-No.1-Circuit Res Resistance in Any Def	stance		1.5 max.	megohm
Electrode Circuit.			5.0 max.	megohm
SPE	CIAL PE	RFORMANCE DA		
With post-ul and ultor vo			3000 votts 1500 volts	
Line Width			0.030 max.	inc
Peak Grid-No.1 Drive Soot Cutoff	from		45 max.	volt
Raster Shape			\$	
* The deflecting electrod deflection sensitivity deflection. with post- in either horizontal o inches; without post-de diameter will ordinaril;	r vertu	acceleration,	signed to have ce less than fi h, the length of may be limited deflection to f	extra-hig ull-scree deflectio to 4-1/ ull scree
It is recommended that be approximately equal.	the de	flecting-elect	rode-circuit r	esistance
Under the following conness of 15 foot-lamber high-frequency scanning for Line-width mewidth to give sameset focus tracted until individus Line width is expressed measured at the cente measured at the cente	ditions: ts measure applied ment, the of 12 of at cento ts canni as the operation time of	heater volta ired on a 2" x d to deflecting te high-frequer im with the gri- er of tube face ng lines are jus- juotient of the if the tube face	ge of 6.3 volt 2°, 49-line ra electrodes DJ rcy scanning i: id-No.3 voltage . Raster heig st barely distir contracted ras ce divided by	s, bright aster wit and DJ ₂ adjuste adjuste ht is con guishable ter heigh the numbe
y under the following cond voltage adjusted for 1 visible raster. With so that the widest po square 3.075° on a side an inscribed square 2 the sides of the 3.071 3.075° square.	itions: focus, a 49-line ints on e, no po .925" ou 5" squar	heater voltage nd grid-No.1 v raster, the s the raster ju int on the rast h a side havin e and its cent	e of 6.3 volts, voltage adjust ize of which i st touch the s er sides will g its sides pa er at the cent	grid-No. ed to giv s adjuste ides of lie withi tralle! t ter of th

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

OSCILLOGRAPH TUBE



THE PLANE THROUGH TUBE AXIS AND EACH OF THE FOLLOWING ITEMS MAY VARY FROM THE TRACE PRODUCED BY DJ₁ AND DJ₂ BY THE FOLLOWING ANGULAR TOLERANCES (MEASURED ABOUT THE TUBE AXIS): PIN 5, \pm 10°; SIDE TERMINAL (ON SAME SIDE OF TUBE AS PIN 5), \pm 10°. ANGLE BETWEEN DJ₁ - DJ₂ TRACE AND DJ₃-DJ₄ TRACE IS 90° \pm 1°.

DJ1 AND DJ2 ARE NEARER THE SCREEN. DJ3 AND DJ4 ARE NEARER THE BASE. WITH DJ1 POSITIVE WITH RESPECT TO DJ2, THE SPOT WILL BE DEFLECTED TOWARD PIN 5; LIKEWISE, WITH DJ3 POSITIVE WITH RESPECT TO DJ4, THE SPOT WILL BE DEFLECTED TOWARD PIN 2.

12-56

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

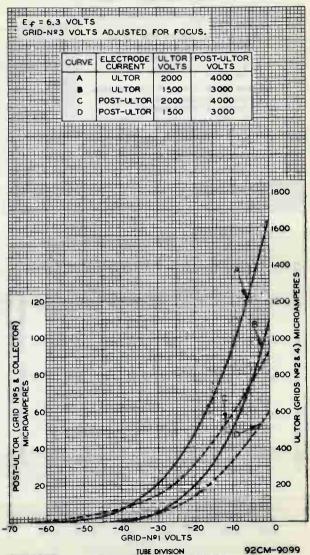
CE-9098



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AVERAGE CHARACTERISTICS

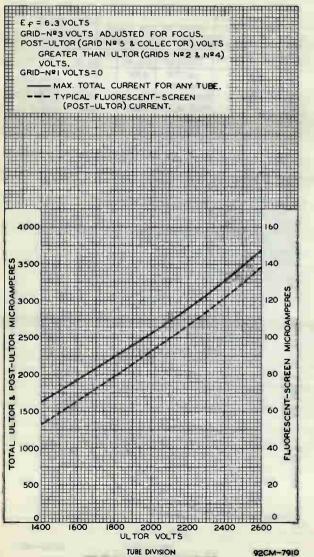


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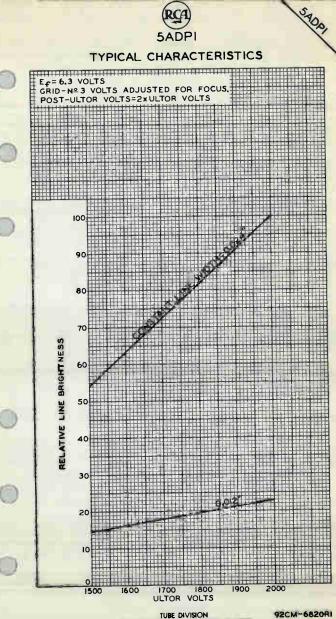


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	SAUP24
	5AUP24
	COLOR FLYING-SPOT CATHODE-RAY TUBE
	HIGH-RESOLUTION CAPABILITY ALUMINIZED SCREEN ELECTROSTATIC FOCUS MAGNETIC DEFLECTION
	For use as flying-spot scanner in color video-signal generators
	DATA
	General :
	Heater, for Unipotential Cathode:
•	Voltage
	Direct Interelectrode Capacitances: Grid No.1 to all other electrodes β μμf
	Cathode to all other electrodes 5 µµf
	External conductive neck coating to ultor
0	Faceplate, Flat
	Phosphor
	Fluorescence
	Phosphorescence
	Focusing Method
	Deflection Method Magnetic Deflection Angle (Approx.)
	Overall Length
	Minimum Useful Screen Diameter
	Operating Position
	Cap
	Base Small-Shell Duodecal 7-Pin (JETEC Group 4, No.B7-51)
	Basing Designation for BOTTOM VIEW
	Pin 1-Heater Pin 2-Grid No.1 c Pin 12-Heater
-	Pin 6-Grid No.3 Pin 7-Internal (Grid No.4,
	Connection- d (Collector)
	Do Not Use Pin 10 - Grid No.2
	Neck Coating
e	Maximum Ratings, Design-Center Values:
	ULTOR VOLTAGE
	GRID-No.2 VOLTAGE
_	Negative-bias value
	Positive-bias value
	- Indicates a change.
	9-58 ELECTRON TUBE DIVISION DATA 1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



5AUP2* COLOR FLYING-SPOT CATHODE-RAY TUBE

		0
1 1	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	0
	Characteristics Range Values for Equipment Design:	U
	For any ultor voltage (E _{cy}) between 20000 [•] and 27000 volts	
	Grid-No.3 Voltage for focus with ultor current of 200 μa . 17% to 21.5% of E ₆₄ volts Grid-No.2 Voltage when circuit design utilizes fixed grid-	
	No.1 voltage (E _{c1}) for visual extinction of undeflected fo- cused spot	С
	extinction of undeflected fo- cused spot when circuit design utilizes grid-No.2 voltage	
	(E _{C2}) at fixed value 20% to 50% of E _{C2} volts Maximum Grid-No.3 Current for	
	ultor current of 200 µa 170 µa	
	Grid-No.2 Current	
	Examples of Use of Design Ranges:	
	For ultor voltage of 27000 volts	
	Grid-No.3 Voltage for focus with ultor current of 200 μa. 4600 to 5800 wolts Grid-No.2 Voltage when circuit design utilizes fixed grid- No.1 voltage of -70 volts for	
	visual extinction of undeflec- ted focused spot	С
ł	200 volts	
	Maximum Circuit Values:	0
	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 20,000 volts.	
	OPERATING CONSIDERATIONS	
	I-Ray Warning. X-ray radiation is produced at the face of the 5AUP24 when it is operated at its normal ultor voltage. These rays can constitute a health hazard unless the tube is	С
ł	Indicates a change.	
	9-58 ELECTRON TUBE DIVISION DATA 1	

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



COLOR FLYING-SPOT CATHODE-RAY TUBE

adequately shielded for X-ray radiation. Although relatively simple shielding should prove adequate, make sure that it provides the required protection against personal injury.

The base pins of the 5AUP24 fit the Duodecal 12-contact socket. The socket contacts corresponding to the vacant pin positions should be omitted in order to provide the maximum insulation for the high-voltage pins 6 and 7. The socket should be made of high-grade, arc-resistant, insulating material and should preferably be designed with baffles.

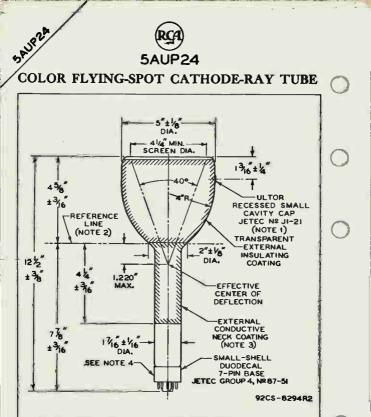
Heater Protection. Although maximum values of peak heatercathode voltage are specified in the tabulated data, it is recommended that the mid-tap or one side of the heater transformer winding be connected directly to the cathode to minimize the possibility of heater burnout. This connection will also minimize the possibility of damage due to heater-cathode shorts produced by arcing between heater and cathode when a possible momentary arc causes the voltage between heater and cathode to exceed the maximum heater-cathode ratings.

When in some circuit designs, the heater is not connected directly to the cathode, precautions must be taken to hold the peak heater-cathode voltage to the maximum values shown in the tabulated data. It is also recommended that a series limiting resistance of 50,000 ohms be placed in both the uitor and grid-No.3 leads between the tube and any filter capacitors.

Resolution of better than 800 lines at the center of the reproduced picture can be produced by the 5AUP24 when it is operated with 27,000 volts on the ultor. At lower ultor voltages, the resolution capability decreases. To obtain high resolution in the horizontal direction, it is necessary to use a video amplifier having a bandwidth of about 20 megacycles.

9-58

SAUP24



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION 3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 10°. ULTOR TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION 3.

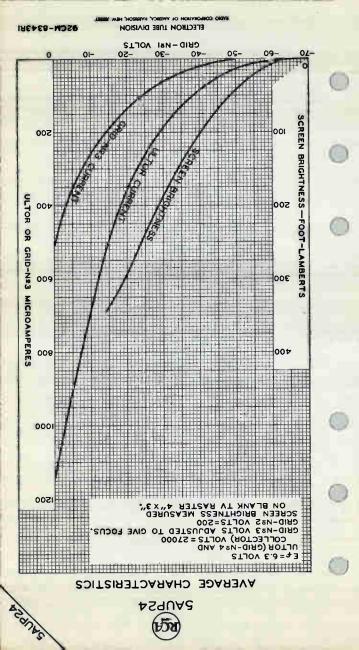
NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC NO.G-IIO (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY INTERSECTION OF PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

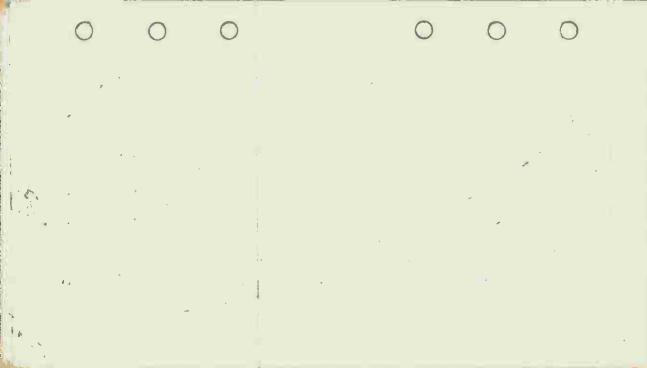
NOTE 3: EXTERNAL CONDUCTIVE NECK COATING MUST BE GROUNDED.

NOTE 4: & OF BULB WILL NOT DEVIATE MORE THAN 2⁰ IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

CE-8294R2

ELECTRON TUBE DIVISION







VIEW-FINDER KINESCOPE

METAL-BACKED SCREEN

ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

DATA

	UATA
	General:
	Heater, for Unipotential Cathode:
	Voltage 6.3 ac or dc volts
	Current 0.6 ± 10% amp
2	Direct Interelectrode Capacitances:
1	Grid No.1 to all other electrodes 6 $\mu\mu$ f Cathode to all other electrodes 5 $\mu\mu$ f
1	Cathode to all other electrodes 5 $\mu\mu$ f External conductive coating to ultor
ļ	1500 min. wif
ļ	Faceplate, Spherical Clear Glass
h	Phosphor (For curves, see frens of this section) P4-Sulfide Type,
2	Metal-Backed
	Fluorescence
	Phosphorescence
	Focusing Method.
	Deflection Method
	Deflection Angle (Approx.)
	Overall Length
	Greatest Diameter of Bulb
	Minimum Useful Screen Diameter
	Weight (Approx.)
	Mounting Position Any
	Ultor Terminal Recessed Small Ball Cap (JETEC No. J1-22)
	Bulb
	Base Long Medium-Shell Octal 8 Pin (JETEC No.88-65) BOTTOM VIEW
	Pin 1 - No Connec- tion Pin 7 - Cathode
J	Pin 2 - Heater (3) T (0) Pin 8 - Heater
	Pin 3 - Grid No.2 Cap - Ultor
	Pin 4 - No Connec- (Grid No.4.
	tion Collector)
	$Pin 5 - Grid No.1 \qquad (1 - 6)$
	Maximum Ratings, Design-Center Values:
V	
	ULTOR VOLTAGE
	GRID-No.2 VOLTAGE
	The "ultor" in a cathode-ray tube is the electrode to which is applied the bighest do voltage for accelerating the electrons in the beam prior.
	The "ultor" in a cathode-ray tube is the electrode to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection. In the SAVPM, the ultor function is performed by grid No.4. Since grid No.4 and collector are connected together within the SAVPA, they are collectively referred to simply as "ultor" for convenience in presenting data and curves.
	the SAYPA, they are collectively referred to simply as "ultor" for
	convenience in presenting data and curves.
-	
1	MAY 1, 1955 TUBE DIVISION TENTATIVE DATA

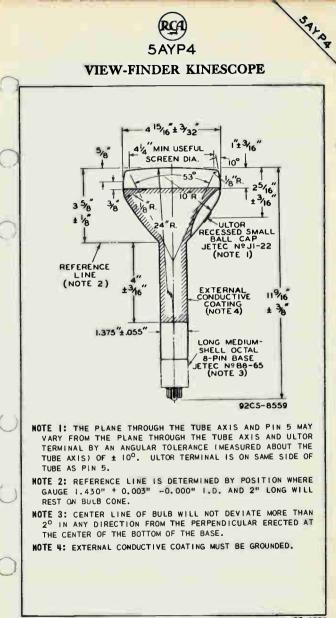
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

SAYP4

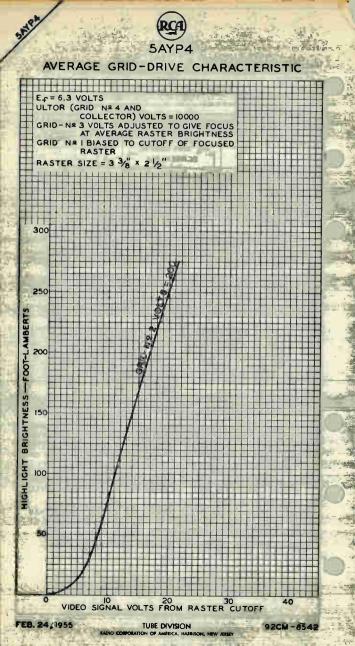
VIEW-FINDER KINESCOPE

			1
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.	180 max.	volts
Heater positive with respect		180 max.	volts
Equipment Design Ranges:			
For any ultor voltage (E _{CA}) and grid-No.2 voltage (E _{CA}	between 5000* and	1 10000 VO	lts
Grid-No.3 Voltage for Focus	/ ••••••••	410 000	
with Ultor Current of			
	0.08 4. 14 18	16 E	
100 µamp Grid-No.1 Voltage for Visual	9.8% to 14.1%	or cot	volts
Extinction of Focused			
	8.5% to 23.5%	of Err	volts
Raster	See Curve		VOILS
Grid-No.2 Current.	-15 to +1		μатр
Field Strength of Adjustable	-10 10 41		(Answer of the second
Centering Magnet	0 to 8	(ausses
ouncering magnet i i i i			
Examples of Use of Design Ran	ges:		
For ultor voltage of	7000	10000	volts
and grid-No.2 voltage of	200	300	volts
Grid-No.3 Voltage for			1
Focus with Ultor			
Current of 100 µamp	680 to 990 980	to 1410	volts
Grid-No.1 Voltage for			
Visual Extinction of			
Focused Raster	-17 to -47 -25	to -71	volts
			- /
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance .	1.	5 max. m	negohms
• • • • • • • • • • • • • • • •			ae. In
Brilliance and definition decreation general, the ultor voltage should	d not be less than 5	Sooo volts.	ge. In
** Grid-No.3 current increases as ti			
			1
WY 1, 1955		TENTATI	VE DATA
TINE I	DIVISION	Concert of	- onin

TUBE DIVISION



TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



Projection Kinescope
P4 – Aluminized Silicate Phosphor Screen
Electrostatic Focus Mognetic Deflection
Forced-Air Cooled
For Use with Reflective Optical Systems
ELECTRICAL
Heater Current at 6.3 volts 0.6 A
Focusing Method Electrostatic
Deflection Method Magnetic
Deflection Angle (Approx.)
Direct Interelectrode Capacitances (Approx.):
Grid No.1 to all other electrodes
Cathode to all other electrodes
OPTICAL
Faceplate, Spherical Clear, Browning-Resistant Glass
Minimum Useful Screen Diameter 4.50"
Minimum Optical-Quality- Circle Diameter
Refractive Index of Faceplate 1.519
Phosphor, Aluminized P4 Silicate Type
C.I.E. Coordinates:
x-coordinate
y-coordinate 0.347
Luminance White
Persistence
MECHANICAL
Tube Dimensions :
Overall Length
Greatest Diameter of Bulb
Base
Anode Lead Molded-on, Insulated Cable, 48" Long
Bulb J4OH1
Operating PositionAny
Weight (Approx.) 1-1/2 lb
MAXIMUM AND MINIMUM RATINGS, Absolute-Maximum Values
Face Temperature 100 max. °C
Anode Voltage

DATA 1 2-69

RB/ Electronic Components

Average Anode Power:	
Without forced-air cooling of faceplate	
With forced-air cooling of	
faceplate 12 max. W	
Air Flow to Face, when Average Anode Power Exceeds 9 Watta:	
An air-cooling system is required to cool the face of these	
tubes when they are operated with an average anode input	
in excess of 9 watts. The system consists of a suitable	
blower and an air duct, having an outlet diameter of about	
2 inches, directed perpendicularly onto the face of the tube. The air flow must be adequate to limit the faceplate tem-	
perature to 100° C. The cooling air must not contain water,	
dust, or other foreign matter. The air-cooling system should	
be electrically interconnected with the anode power supply	
to prevent operation of the tube without cooling.	
Cooling of the face by a tangential flow of air across the	
face is not recommended because the temperature gradient	
produced across the face may result in immediate or de-	
layed cracking of the face.	
Grid-No.3 (Focusing Electrode)	
Voltage	
Grid-No.2 Voltage	
Grid-No.1 Voltage:	
Negative bias value 150 max. V	
Positive bias value 0 max. V	
Positive peak value 2 max. V	
Peak Heater-Cathode Voltage:	
Heater negative with respect	
Heater positive with respect to cathode 10 max. V	
Heater Valtage (ag or da):	
0.9 max. V	
Under operating conditions 5.7 min. V	
RECOMMENDED OPERATING VALUES	
Unless otherwise specified, values are positive with respect to	
cathode.	
Anode Voltage 40,000 V ^c	
Average Anode Current	(
Grid-No.3 (Focusing Electrode)	
Voltage for an Anode Current of 300 microamperes	
	-

RBA Electronic Components DATA 1

Grid-No.2 and Grid-No.1 Voltages for Visual Ex- tinction of Focused Spot See accompanying Cutoff
Design Chart
TYPICAL PERFORMANCE DATA At recommended operating values
Grid-No.3 Current (Total) See accompanying Typical Grid-No.3 Current Characteristic
Grid-No.2 Current
Equivalent Passband (N _e) 270
(For sine-wave response, see accompanying
Typical Sine-Wave Response)
Center Resolution ^d 900 TV Lines
Drive Characteristics See accompanying Typical Drive Characteristics
Luminance at 300 µA
Luminance Characteristics See accompanying Typical
Luminance Characteristic

LIMITING CIRCUIT VALUES

(See accompanying Schematic Diagram of Circuit Showing Protective Elements Employed to Prevent Tube Damage)

HIGH-VOLTAGE CIRCUITS

In order to minimize the possibility of damage to the tubes caused by a momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type.

Anode-Circuit Resistance (unbypassed) Grid-No.3 Circuit Resistance	0.5 min	. MQ
(unbypassed)	0.1	MQ
LOW-VOLTAGE CIRCUITS		
Grid-No.2 Circuit Resistance (bypassed)	10	kQ
Grid-No.1 Circuit Resistance (unbypassed)	1	kΩ
Effective Grid-No.1-to-Cathode Circuit Resistance	1.5 max	. MQ
Cathode Circuit Resistance (unbypassed)	ī	kΩ
Heater Circuit Resistance (bypassed) to one side of heater	10	kΩ

b For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts.

RBA Electronic Components

DATA 2 2-69

- ⁶ Brilliance and definition may change with decreasing anode voltage. In general, the anode voltage should not be less than 30,000 volts.
- Determined for a 3-inch high TV resolution test pattern with tube operating at an average screen current of 300 microamperes.

HIGH-VOLTAGE PRECAUTIONS

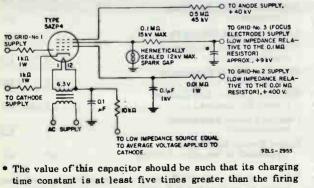
The high voltages at which this type is operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the enclosing of high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

X-RADIATION WARNING

X-radiation is produced at the face of this tube when it is operated at normal anode voltage.

These rays can constitute a health hazard unless the tube is adequately shielded. Make sure that the shielding provides the required protection against personal injury.

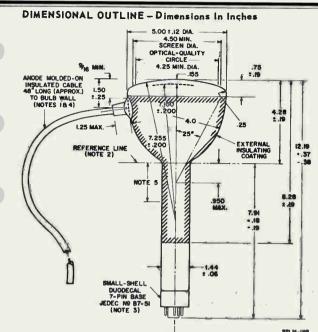
SCHEMATIC DIAGRAM OF CIRCUIT SHOWING PROTECTIVE ELEMENTS EMPLOYED TO PREVENT TUBE DAMAGE



time of the spark gap.

IR(B/L

Electronic Components DATA 2



Note 1: The plane through the tube axis and vacant pin position No.3 may vary from the plane through the tube axis and anode-cable connection at bulb wall by angular tolerance (measured about the tube axis) of $\pm 20^{\circ}$. Anode-cable connection is on same side as vacant pin position No.3

Note 2: Reference line is determined by position where gauge 1.500'' + 0.003'' - 0.000'' 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. Socket contacts corresponding to vacant pin positions No.3, 4, 5, 8 and 9 should be removed in order to provide maximum insulation for pins No.6 and 7.

Note 4: Anode cable should not be sharply bent within 3" of bulb wall.

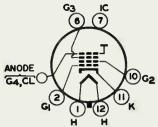
Note 5: The windings of the deflecting yoke should not extend more than 2" from the reference line toward the base. They should be insulated to withstand 20 kV and be spaced at least 1/10" from the tube neck.

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RBA Electronic Components

DATA 3 2-69 TERMINAL DIAGRAM (Bottom View)



Pin 1: Heater

Pin 2: Grid No.1

Pin 6: Grid No.3

Pin 7: Internal Connection - Do not use

Pin 10: Grid No.2

Pin 11: Cathode

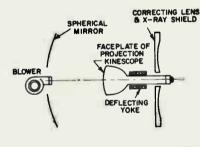
Pin 12: Heater

Flexible Cable: Anode (Grid No.4, Collector)

Note: Socket contacts for vacant pin positions No.3, 4, 5, 8, and 9 should be removed so that maximum insulation is provided for pins No.6 and 7.

REFLECTIVE OPTICAL SYSTEM

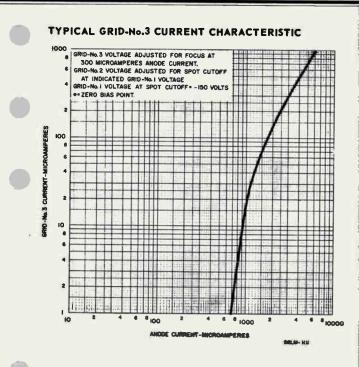
Arrangement of Typical Optical System and Air-Cooling System for Television Projector Using Reflective Optical Principles.



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DATA 3

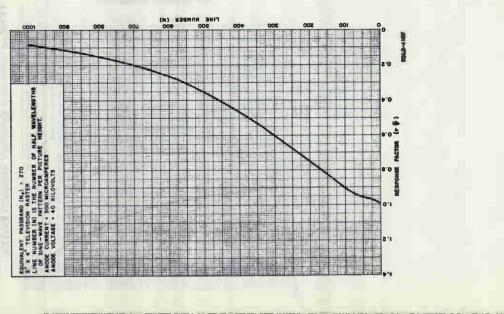
RBA Electronic Components





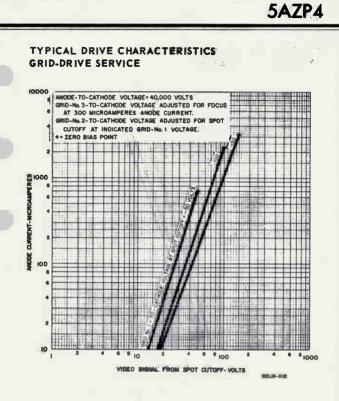
DATA 4 2-69

TYPICAL SINE-WAVE RESPONSE



DATA

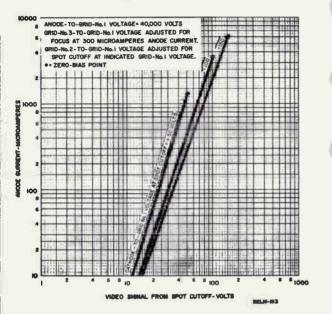
Electronic Components



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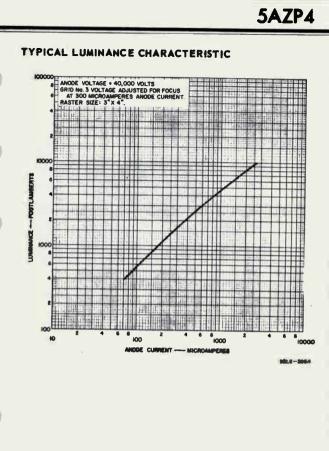
DATA 5 2-69

TYPICAL DRIVE CHARACTERISTICS



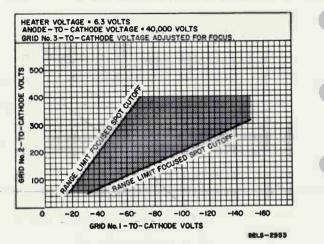
RBA Electronic Components

DATA 5



RBA Electronic Components

DATA 6 2-69



12

RBA Electronic Components

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DATA 6



SBRIA HIGH-VACUUM CATHODE-RAY TUBE Supersedes Type 5BP1

General:

	Nonton for Uniophystics Costaday
	Heater, for Unipotential Cathode:
	Voltage
	Direct Internal Constitution (A
	Direct Interelectrode Capacitances (Approx.):
	Grid No.1 to All Other Electrodes 8.0
A	DJ ₁ to DJ ₂ 1.3 µµf
	DJ3 to DJ4
	DJ1 to All Other Electrodes 9.5 μμf DJ3 to All Other Electrodes 12.0 μμf
	DJ3 to All Other Electrodes 12.0
1	DJ1 to All Other Electrodes except DJ2 . 8.0
1	DJ1 to All Other Electrodes except DJ2 . 8.0
1	UJ3 to All Other Electrodes except DJ4 . 10.0
N	DJ4 to All Other Electrodes except DJ3 . 7.5
9	Phosphor (For Curves, see front of this Section) No.1
1	Fluorescence Green Persistence
1	Persistence
	Focusing Method.
1	Deflection Method.
	Deflection Method Electrostatic Overall Length
	Constant Disease of D. 1
	Greatest Diameter of Bulb
	Minimum Useful Screen Diameter
	Mounting Position. Any
	Mounting Position Medium Shell Magnal 11-Pin
1	Basing Designation for BOTTOM VIEW
1	Pin 1-Heater Pin 7-Anode No.2
1	Pin 1-Heater Pin 7-Anode No.2, Pin 2-No Connection 307 Grid No.2
1	Pin 2-No Connection Pin 3-Deflecting Electrode DJ1 Pin 9-Deflecting Pin 9-Deflecting Pin 9-Deflecting
I	Electrode DJ1 Electr.DJ2
1	Pin 4-Anode No.1 Pin 9-Deflecting
ł	Pin 5-Internal Con.
J	Pin 5- Internal Con. Do not use Pin 6- Deflecting Pin 10-Grid No.1 Pin 10-Grid No.1
a	Pin 6-Deflecting Pin 11-Heater,
I	Electrode DJA Cathode
1	Cathour Cathour
	DJ ₁ and DJ ₂ are nearer the screen
	Dig and Dig are nearer the base
1	With DJ; positive with respect to DJ2, the spot is de-
l	flected toward pin 4. With DJ3 positive with respect to
	DJ4, the spot is deflected toward pin 1.
	The angle between the trace produced by DJ3 and DJ4 and
I	its intersection with the plane through the tube axis and
	pin I does not exceed 10°.
	The angle between the trace produced by DJ3 and DJ4 and
I	the trace produced by DJ and DJ is 900 ± 30.

JULY 1, 1945

RCA VICTOR DIVISION

DATA - 1



5BPHA

HIGH-VACUUM CATHODE-RAY TUBE

			_
(continued from preceding page)			
Maximum Ratings, Absolute Values:			
ANODE-No.2 & GRID-No.2 VOLTAGE ANODE-No.1 VOLTAGE GRID-No.1 (CONTROL ELECTRODE) VOLTAGE: Negative Value			volts volts volts volts
PEAK VOLTAGE BETWEEN ANODE NO.2 AND ANY DEFLECTING ELECTRODE	550	max.	volts
Typical Operation:			
Anode-No.2 & Grid-No.2 Voltage* . 1500 Anode-No.1 Volt. for Focus at 75%			volts
of Grid-No.1 Volt. for Cutoff . 337	450	1.0.0	volts
Grid-No.1 Volt. for Visual Cutoff#30	-40	1.0 .	volts
Max. Anode-No.1 Current Range*. Between - Deflection Sensitivity:	0.303		uamp. mm/v dc
DJ1 and DJ2 0.404 DJ3 and DJ4 0.446 Deflection Factor:**	0.334		mm/v dc
DJ1 and DJ2 63 DJ3 and DJ4			dc/in. dc/in.
 Brilliance and definition decrease with decrease In general, anode-No.2 voltage should not be lee Individual tubes may require between 255 and	305 of t	he valu	es shown
yisual extinction of stationary focused spot. S able to ± 50% of these values. See curve for average values.	upply st	iould be	adjust-
** Individual tubes may vary from these values by :	± 175.		
Spot Position:			
The undeflected focused spot will fall wi centered at the geometric center of the t	ube fa	ce and	having
one side parallel to the trace produced by			
able test conditions are: anode-No.2 vo anode-No.1 voltage, adjusted for focus; d			
resistors, I megohm each, connected to a	node-N	5.2: t	he tube
shielded from all extraneous fields. To			
tube, grid-No.l voltage should be near cut tion of anode voltages.	off be	fore a	pplica-
Maximum Circuit Values:			
Grid-No.1 - Circuit Resistance Impedance of Any Deflecting-Electrode Circuit at Heater-Supply Frequenc			megohms megohm
Resistance in Any Deflecting- Electrode Circuit*			megohms
It is recommended that all deflecting-electrode approximately equal.	-circui	t resist	tances be
			-

JULY 1, 1945

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DATA 1



OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

DATA General: Heater, for Unipotential Cathode: Voltage. 6.3 ac or de volts 0.6 Current. алл Direct Interelectrode Capacitances (Approx.): Grid No.1 to All Other Electrodes. . . μuf 8 Cathode to All Other Electrodes. . . 9 uuf 2 uuf D1 to D4.... D1 to All Other Electrodes... D2 to All Other Electrodes... D3 to All Other Electrodes... D4 to All Other Electrodes... D4 to All Other Electrodes... 2 μµf 9 μµf 9 unt 7 unt 8 unf Phosphor (For Curves, see front of this Section) . . . P1 Green Med i um Focusing Method. Electrostatic Deflection Method Electrostatic . . Minimum Useful Screen Diameter 4-1/2" Any Basing Designation for BOTTOM VIEW . . 14J1 9 - Anode No.2, Pin 1 - Heater Pin 2 - Cathode Grid No.2 Pin 3-Grid No.1 Pin 10-Deflecting Pin 4- Internal Con. Electr.DJ2 Do not use 6 Pin 11 - Deflecting Pin 5-Anode No.1 Electr. DJ Pin 7-Deflecting Pin 12 - No Con-Electrode DJ₃ nection Pin 8-Deflecting Pin 14 - Heater Electrode DJA Cap - Anode No.3 DJ1 and DJ2 are nearer the screen DJ_3 and DJ_4 are nearer the base

With DJ1 positive with respect to DJ2, the spot is deflected toward pin 5. With DJ3 positive with respect to $\mathcal{D}_{\mathbf{A}}$, the spot is deflected toward pin 2.

The plane through the tube axis and each of the following items may vary from the trace produced by DJ1 and DJ2 by the following angular tolerances measured about the tube axis: Pin 5, 10°; Cap (on same side of tube as pin 5), 10°.

The angle between the trace produced by DJ1 and DJ2 and the trace produced by DJ3 and DJ4 is $90^{\circ} \pm \overline{3}^{\circ}$.

DATA 1

SCRIT



SCRITA

5CPI-A

OSCILLOGRAPH TUBE

I	
P	laximum Ratings, Design-Center Values:
	NODE-No.3 VOLTAGE 4000 max. volts
	NODE-No.2" VOLTAGE 2000 max. volts
F	ATIO OF ANODE-No.3 VOLTAGE TO
	ANODE-No.2 VOLTAGE 2.3:1
	NODE-No.1 VOLTAGE 1000 max. volts
C	RID-No.1 VOLTAGE:
ł	Negative bias value 200 max. volts
L	Positive bias value
	Positive peak value
F	EAK VOLTAGE BETWEEN ANODE No.2 AND ANY DEFLECTING ELECTRODE 500 max. volts
k	EAK HEATER-CATHODE VOLTAGE:
r	Heater negative with respect to cathode. 125 max. volts
Ł	Heater positive with respect to cathode. 125 max. volts
Ŀ	neater positive with respect to cathode. 220 mart forto
k	quipment Design Ranges:
1	For any anode-No. 3 voltage (Ebg) between 2000 ** and 4000 volts
Ł	and any anode-No. 2 voltage (Eb ₂) between 1500 ⁻ and 2000 volts
4	node-No.1 Voltage 18.7 to 34.5% of Eb2 volts
C	rid-No.1 Voltage
4	node-No.1 Current of any
I	Operating Condition15 to +10 µamp
C	Deflection Factors:
L	When Eb3 = 2 x Eb2
L	
L	D1 & D2
L	
L	When $Bb_3 = Bb_2$
L	DJ1 & DJ2 31 to 42 v dc/in./kv of Eb2
L	DJ3 & DJ4 27 to 37 v dc/in./kv of Eb2
Þ	pot Position ##
	xamples of Use of Design Ranges:
ľ	
	For anode-No.3 voltage of 2000 3000 \$\$000 volts
L	voltage of 2000 3000 \$000 Volts and anode-No.2
Į.	voltage of 2000 1500 2000 volts
L	voitage of
ľ	
1	Deflection Factors: DJ1 & DJ2 62 to 84 59 to 80 78 to 106 •
L	D1 & D2 62 to 84 59 to 80 78 to 106 D3 & D4 54 to 74 50 to 68 66 to 90
)	faximum Circuit Values:
1	Grid-No.1-Circuit Resistance 1.5 max. megohms
	Resistance in Any
- 1'	Deflecting-Electrode Circuit 5.0 max. megohms
н	
	• • • ▲, ♣, ₩#, ■, O; See next page. → Indicates a change.

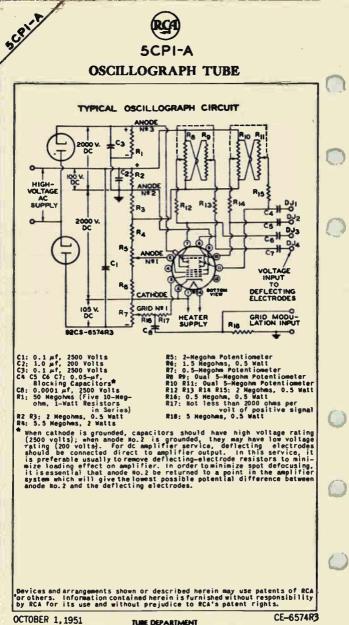
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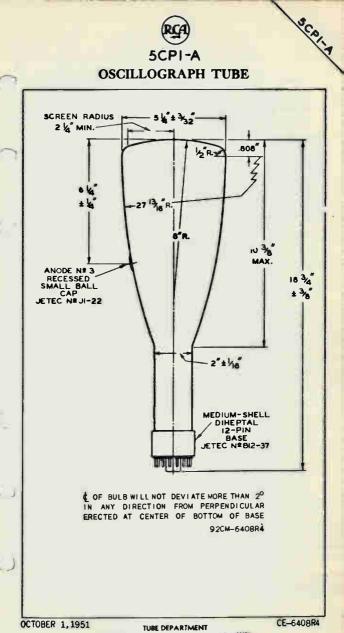


- Anode No.2 and grid No.2, which are connected together within tube, are referred to herein as anode No.2.
- At or near this rating, the effective resistance of the anode supply should be adequate to limit the anode-No.2 input power to 6 watts.
- ** It is recommended that anode-No.3 voltage be not less than 3000 volts for high-speed scanning.
- Recommended minimum value of anode-No.2 voltage.
- For visual cutoff of undeflected focused spot.
- Volts dc/in.
- With heater voltage of 6.3 volts, anode-No.3 voltage of \$000 volts, anode-No.2 voltage of 2000 volts, anode-No.1 voltage adjusted to focus, grid-No.1 voltage adjusted to give spot that is just visible, each deflecting electrode connected through 1-megohm resistor to anode No.2, and tube shielded from all extransous fields, the center of the undeflected, focused spot will fall within a circle having a 12.5-mm radius concentric with the center of the tube face.
- It is recommended that the deflecting-electrode-circuit resistances be approximately equal.

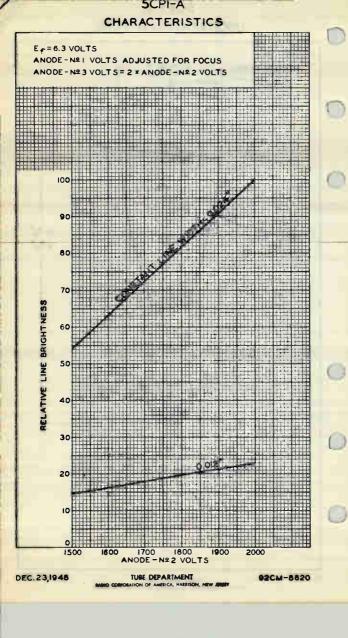
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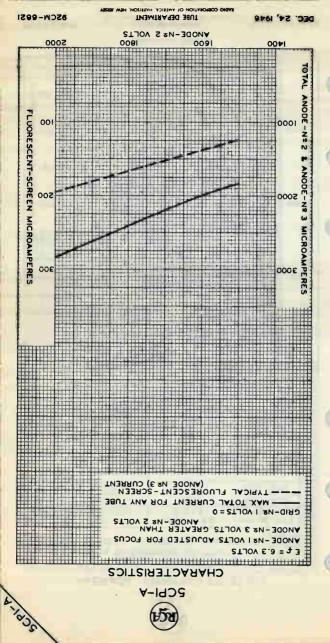
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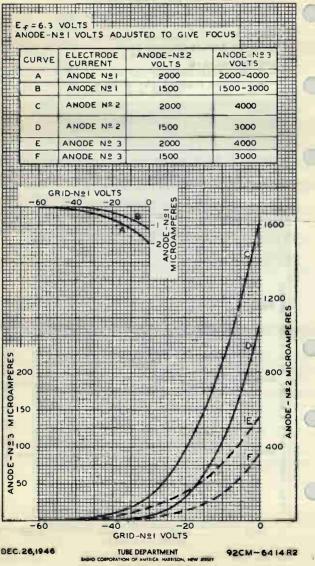






SCPITA

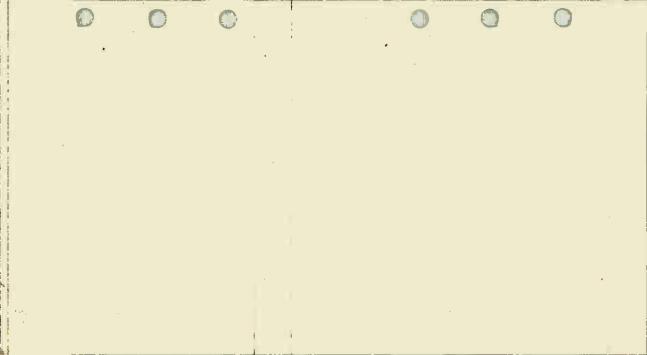
AVERAGE CHARACTERISTICS





a screen of the short-persistence, blue-fluorescence type designated P11. Its highly actinic fluorescence spot of unusually high brightness makes the 5CP11-A particularly useful for photographic recording. Because its improved phosphor has exceptional brightness for a blue screen, the 5CP11-A is also quite useful for visual observation of phenomena.

The SPECTRAL-ENERGY EMISSION CHARACTERISTIC, as well as the PERSISTENCE CHARACTERISTIC for the P11 PHOSPHOR are shown at the beginning of this Section.



5FP4A

View-Finder Kinescope

MAGNETIC FOCUS

MAGNETIC DEFLECTION

GENERAL DATA

Electrical:

Direct Interelectrode Capacitances:	
Cathode to all other electrodes 8	
Grid No.1 to all other electrodes 5	830
Heater Current at 6.3 volts 600	ma
Optical:	
Phosphor (For curves, see front of this section) . P4-Sulfid	еТуре
Fluorescence	White
Phosphorescence	White
Persistence	Short
	gnetic
Deflection Method Ma	
Deflection Angle (Approx.)	530
Nechanical:	
Overall Length	+ 3/8"
Greatest Diameter	3/32"
Minimum Useful Screen Diameter	4-1/4"
Cap Recessed Small Ball (JEDEC No.	J1-22)
Bases (Alternates):	
Long Medium-Shell Octal:	
8-Pin (JEDEC Group 1, No.B8-65)	
5-Pin (JEDEC Group 1, No.B5-80)	
Medium-Shell Octal 8-Pin:	
8-Pin (JEDEC Group 1, No.B8-11)	
NC ANODE G	
(A) [] (S)	
Pin 1-No Internal NC Pin 6-Same as	
Connection 62 3 T 6 Pin 1	
Pin Z-Heater Pin 7-Cathode	
Pin 3-Grid No.2 Pin 8-Heater	
Pin 4 - Same as HO R Cap - Anode	
Pin 1 (Grid N	0.3,
Pin 5-Grid No.1 () * (8) Collect	tor)
NC H	
Maximum Ratings, Design-Center Values:	
ANODE VOLTAGE 8000 max.	volts
GRID-No.2 VOLTAGE	volts
GRID-No.1 VOLTAGE:	_
Negative bias value	volts
Positive bias value 0 max.	volts
Positive peak value 2 max.	volts
DEAK HEATED CATHODE VOLTACE.	

PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode 150 max. Heater positive with respect to cathode 150 max. volts volts

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DATA I 8-63

Typical Operation:	
Anode Voltage ^b	
Grid-No.2 Voltage	
Grid-No.1 Voltage for Visual Extinction	100
of Undeflected Focused Spot25 to -70 volts	
Focused-Coil Current (DC, approx.) ^c 120 ± 15% ma	
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max. megohms	a

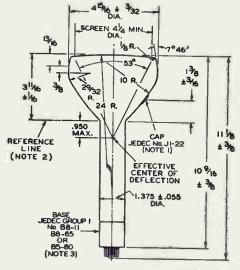
- The product of anode voltage and average anode current should be limited to 6 watts.
- Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 4000 volts.
- For specified node voltage should not be test than voltage of the positioned with 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 fool-lamberts on a 3-7/8* x 2-7/8* picture area charply focused at center of screen.

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5FP4A



92CM-6362R5

DIMENSIONS IN INCHES

NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 5 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE TERMINAL IS ON SAME SIDE OF TUBE AS PIN 5.

NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE GAUGE 1.430" +.003" -000" INSIDE DIAMETER AND 2" LONG WILL REST ON BULB CONE.

NOTE 3: CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN $2^{\rm O}$ in any direction from the perpendicular erected at the center of the bottom of the base.



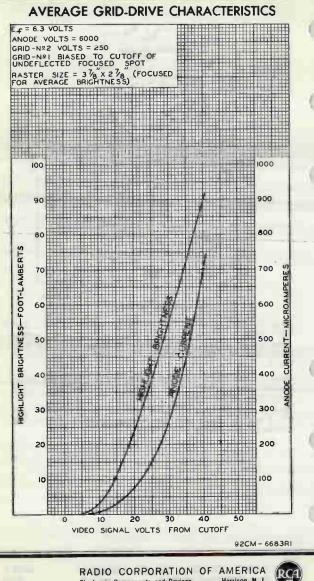
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OSCILLOGRAPH TUBE

MAGNETIC DEFLECTION

SECTION

DATA

UNIN	-
General:	
Heater, for Unipotential Cathode:	
Voltage 6.3	ac or dc volts
Current 0.6	· · · · · · · am
Direct Interelectrode Capacitances:	1
Grid No.1 to All Other Electrodes	B µµ1
Cathode to All Other Electrodes	5 μμ
Phosphor (For Curves, see front of this S	ection) P7
Fluorescence	
Phosphorescence.	. Greenish-Yellow
Persistence of Phosphorescense	Long
Focusing Method.	Magnetic
Deflection Method	Magnetic
Deflection Angle (Approx.)	••••• 53 ⁰
Overall Length	
Greatest Diameter of Bulb.	4-15/16" ± 3/32"
Minimum Useful Screen Diameter	4-1/4'
Mounting Position	Any
Cap Recessed Small B	all (JETEC No.J1-22)
Base Long Medium-Shell Octal 8-	Pin (JETEC No. 88-65)
BOTTOM VIEW	
Pin 1 - No (4)_0(5) F	fin 5-Grid No.1
Connetter a Con 1	in 6 - No
Pin 2-Heater	Connection
Pin 2 Crid No 2	in 7 - Cathode
	in 8 - Heater
	an - Ancie
	oth mitting
Maximum Ratings, Design-Center Values;	
ANODE VOLTAGE.	. 8000 max. volts
GRID-No.2 VOLTAGE.	
	. 700 max. vorts
GRID-No.1 VOLTAGE:	100 11
Negative bias value	. 180 max. volt:
Positive bias value*	. 0 max. volt:
Positive peak value.	. 2 max. volt:
PEAK GRID-No.1 DRIVE FROM CUTOFF	. 65 max. volt
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode	
Heater positive with respect to cathode	. ,125 max. volt:
Typical Operation:	
	7000
Anode Voltage**	7000 volt:
Grid-No.2 Voltage	250 volt:
* at or near this ration, the effective region	ance of the stode surely
At or near this rating, the effective resist should be adequate to limit the anode input	power to 6 watts.
Brilliance and definition decrease with decr general, the anode voltage should not be les	easing anode voltage. In
general, the anode voltage should not be les	s than 4000 volts.
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OSCILLOGRAPH TUBE

-	Grid-No.2 Current15 to +15 -15 to +15	polts µamp
->	Focusing-Coil Current (DC, approx.)# 96 ± 15% 128 ± 15% Spot Position: ##	ma

Maximum Circuit Values:

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

O For visual extinction of undeflected focused spot.

For specimen focusing coll similar to JETEC Focusing Coll No.106 positioned with air gap toward face plate, and center line of air gap 2-3/4 inches from Reference Line (see Outline Drawing), and total anode current of 200 microamperes.

The center of the undeflected, unfocused spot will fall within a circle having 9-mm radius concentric with center of tube face.

OPERATING NOTES

The 5FP7-A utilizes a long-persistence, cascade (two-layer) screen which exhibits bluish fluorescence of short persistence and greenish-yellow phosphorescence.

Because of its long persistence, the 5FP7-A is particularly useful where either low-speed non-recurring phenomena or high-speed recurring phenomena are to be observed. Furthermore, two or more phenomena can be observed simultaneously on the screen by means of a suitable switching arrangement.

The persistence is such that the 5FP7-A without filter can be operated with scanning frequencies as low as 30 cycles per second without excessive flicker. When used with yellow filter, such as Wratten No.15 (G), the 5FP7-A can be operated with much lower scanning frequencies.

In general, operation of the 5FP7-A at an anode voltage below 4000 volts will not give persistence of useable brightness.

> OUTLINE DIMENSIONS for Type 5FP7-A are the same as those for Type 5FP4-A

AVERAGE CHARACTERISTIC CURVE for Type 5FP7-A is the same as that shown for Type 7BP7-A

-bindicates a Change.

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TUBE DEPARTMENT MINO CORPORATION OF AMERICA, HARRISON, NEW JERSEY DATA



5FPI4-A

OSCILLOGRAPH TUBE

MAGNETIC FOCUS

MAGNETIC DEFLECTION

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DATA

	VAIN		
General:			- 1
Heater, for Unipotentia	1 Cathode:		
Voltage		ac or dc	volts
Current.	. 0.6 ± 10%		. amp
Direct Interelectrode C	apacitances (App	rox.):	
Grid No.1 to all othe			μµf
Cathode to all other		5	μμf
Faceplate. Spherical .		Clear	Glass
Phosphor (For curves, s	ee front of this		P14
Fluorescence			Purple
Phosphorescence			Orange
Persistence			
Focusing Method.		Ma	
Deflection Method.			anetic
Deflection Angle (Appro			530
Overall Length		11-1/8"	
Greatest Diameter of Bu		4-15/16" ±	
Minimum Useful Screen D			4-1/4"
Weight (Approx.)			b 2 oz
Mounting Position.			Any
Cap.	Recessed Small	Ball (JETEC No.	J1-221
Rulh			39-1/2
Base	ium_Shell Octal	8-Pin (JETEC No.	88-11)
Basing Designation fo	ROTTOM VIEW		. 5AN
	I DOTTOM TILIT .	Pin 6 - No Conr	
Pin 1-No Connec-	() П ()	tion	iec-
tion	3 - 10	Pin 7 - Cathode	
Pin 2 - Heater	9 1 P	Pin 8 - Heater	
Pin 3-Grid No.2	1 Th	Cap-Ultor	
Pin 4 - No Connec-	0/10	(Grid M	0.3
tion		Collec	
Pin 5-Grid No.1	00	Correc	
Maximum Ratings, Design	Conter Values:		
Maximum Racings, Design	-CENEET THEACAL		
ULTOR VOLTAGE		8000 max.	volts
GRID-No.2 VOLTAGE		700 max.	volts
GRID-No.1 VOLTAGE:			
Negative bias value.		180 max.	volts
Positive bias value		0 max.	volts
Positive peak value.		2 max.	volts
PEAK HEATER-CATHODE VOL	TAGE:	10 March 10	
Heater negative with		ode. 125 max.	volts
Heater positive with	respect to cath	ode. 125 max.	volts
	•		
* At or near this rating, should be adequate to lim	the effective resident the input power	stance of the ultor to 6 watts.	suppry
anouru de adequare co in	the end tubas bower		
1			
-			
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TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



OSCILLOGRAPH TUBE

Equipment Design Ranges:
With any ultor voltage (E_c) between 4000 ⁶ and 8000 and grid-No.2 voltage $(E_{c,p})$ between 150 and 700 vo
and grid-No.2 voltage $(E_{C_p}^{\circ})$ between 150 and 700 vo
Grid-No.1 Voltage for
Visual Extinction of
Undeflected Focused
Spot
Grid-No 2 Current _15 to +15
Focusing-Coil Current (DC) 00 [$\sqrt{E_{c_3}/4000 \times 96}$] ± 15%
Spot Position

Examples of Use of Design Ranges:

With ultor voltage of	4000	5000	volts
and grid-No.2 voltage of	250	250	volts
Grid-No.1 Voltage for Visual Extinction of			-

Undeflected Focused

. . -25 to -70 -25 to -70 volts Spot Focusing-Coil Current (DC) . 96 ± 15% 107 ± 15% ma

Maximum Circuit Values:

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

SPECIAL PERFORMANCE DATA

Line Width:

SEPIATA

For	Ultor	Voltage of	4000 Vol	ts.			0.010 n	ax.	inch
		Voltage of					0.009 n	ax.	inch

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

OO For specimen focusing coil similar to JETEC Focusing Coil No.106 positioned with air gap toward faceplate and center line of air gap 2-3/u* from Reference Line (See Dimensional Outline) and ultor current of 200 microamperes.

with the tube shielded from extraneous fields, the center of the un-deflected, unfocused, low-intensity spot will fall within a circle, having a 9-mm radius concentric with the center of the tube face.

With JETEC Deflecting Yoke No.120, or equivalent, and under the follow-ing conditions: heater voltage of 6.3 volts, ultor current of 200 microamperes, grid-No.2 voltage of 250 volts, and a 49-line raster. Raster width is adjusted to 11.4 cm and focusing-coil current is ad-justed to give sharpest focus at center of tube face. Raster height is contracted until individual scanning lines are just barely dis-tinguishable. Line width is expressed as the quotient of the contract-ed raster height measured at the center line of the tube face divided by the number of scanning lines (49).

and 8000 volts and 700 volts

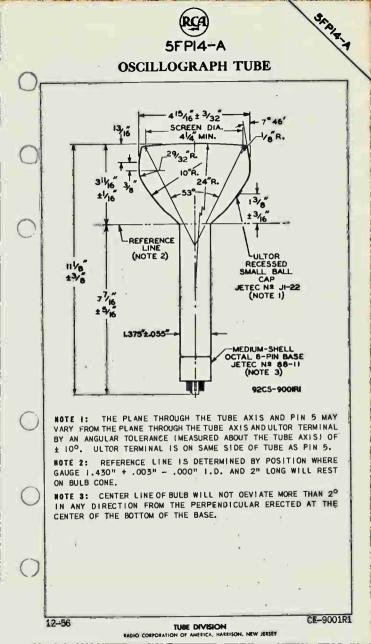
volts

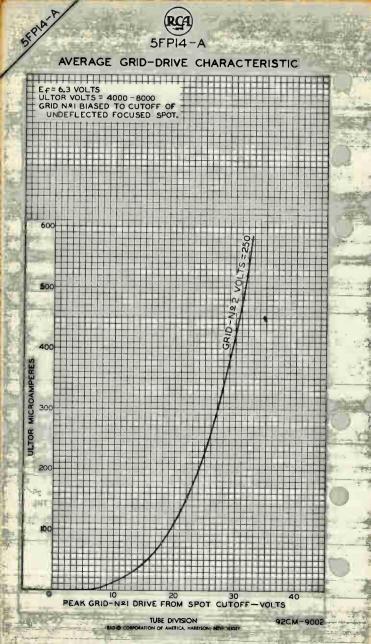
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TUBE DIVISION BADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY







SUPI

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS	ELECTROSTATIC DEFLECTI	ON
---------------------	------------------------	----

General:

	dener al.
1	Heater, for Unipotential Cathode:
	Voltage 6.3 ± 10% ac or dc volts
ĺ	Current 0.6
	Direct Interelectrode Capacitances (Approx.):
į	Grid No.1 to All Other Electrodes 8.0
	DJ1 to DJ2
1	DJ3 to DJ4
	D_{j1} to All Other Electrodes
	DJ2 to All Other Electrodes8.0μμf DJ2 to All Other Electrodes
	DJ3 to All Other Electrodes 7.0 $\mu\mu$ f
	DJ4 to All Other Electrodes 8.0
1	DJ3 to All Other Electrodes 7.0
H	Fluorescence Green
1	Persistence
ļ	Focusing Method Electrostatic
1	Deflection Method Electrostatic
	Overall Length
	Greatest Diameter of Buib
	Minimum Useful Screen Diameter
	Mounting Position
	Mounting Position. Any Base
	Basing Designation for BOTTOM VIEW
1	Pin 1-Heater Pin 8-Anode No.2,
	Pin 2-Grid No.1 Grid No.2
1	Pin 3-Cathode Pin 9-Deflecting
	Pin 4-Anode No.1 @ Electrode DJ2
	Pin 5 - Internal Con. Pin 10- Deflecting
J	Do Not Use Electrode DJ1
1	Pin 6 - Deflecting Pin 11- Internal Con.
	Electrode DJ3 KEY Do Not Use
1	Pin 7 - Deflecting Pin 12- Heater
	Electrode DJ4
2	
1	DJ ₁ and DJ ₂ are nearer the saraem
1	DJ_3 and DJ_4 are nearer the base
	With DJ positive with respect to DJ2, the spot is de-
ł	
1	flected toward pin 4. With DJ3 positive with respect to
	DJ ₄ , the spot is deflected toward pin 1.
1	The angle between the trace produced by DJ1 and DJ2 and
	its intersection with the pisne through the tube axis and
	pin I does not exceed 10°.
	The angle between the trace produced by DJ3 and DJ2 and
1	the trace produced by DJ ₁ and DJ ₂ is $90^{\circ} \pm 3^{\circ}$.

DEC. 20, 1946

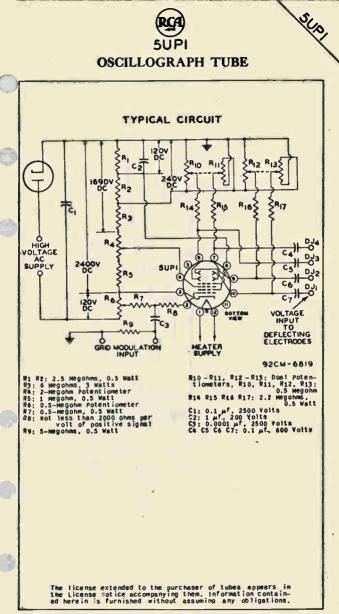
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	\square
Maximum Ratings, Design-Center Values:	
ANODE-No.2 VOLTAGE	
ANODE-No.1 VOLTAGE 1000 max. volts	
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:	
Negative bias value 200 max: volts	
Positive bias value 0 max. volts	0
Peak positive value 2 max. volts	1
PEAK VOLTAGE BETWEEN ANODE No. 2	
AND ANY DEFLECTING ELECTRODE 500 max. volts	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode. 125 max. volts	
Heater positive with respect to cathode. 125 max. volts	
neater positive with respect to cathodes and make vorte	-
Equipment Design Ranges:	()
For any anode-No. 2 voltage (Eb2) between 1000* and 2500 volts	1000
Anode-No.1 Voltage 17% to 32% of Eb2 volts	
Max. Grid-No.1 Voltage	
for Visual Cutoff 4.5% of Epg volts	
Anode-No.1 Current for	
Any Operating Condition -15 to +10 microamp	
Deflection Factors:	
DJ1 & DJ2 28 to 38.5 v dc/in./kv of Eb2	
013 & 014 23 to 31 v dc/in_/kv of Eb2	
Examples of Use of Design Ranges:	
For anode-No. 2 voltages of 1000 2000 volta	
Anode-No.1 Voltage 170 - 320 340 - 640 volts Max. Grid-No.1 Voltage	
for Visual Cutoff -45 -90 volts	
Deflection Factors:	
Dil & Dia	
DJ3 & DJ4 23-31 46-62 volts dc/in.	()
Naximum Circuit Values:	V
Grid-No. 1-Circuit Resistance 1.5 max megohms	
Resistance in Any Deflecting Electrode Circuit ^o 5.0 mate. megohms	
Electrode circuite a s . uso todas megorina	
	13
Recommended minimum value. It is recommended that the deflecting-electrode-circuit resistances	0
be approximately equal.	
Anode No.2 and grid No.2, which are connected together within tube, are referred to herein as anode No.2.	
are reterred to herein as anoue so.2.	
	()
	-

DEC. 20, 1946

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TUBE DEPARTMENT ANNO CORPORATION OF AMERICA, HARRISON, HE TENTATIVE DATA

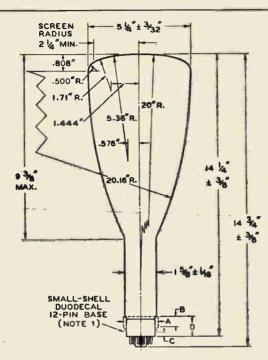


DEC. 20, 1946

TUBE DEPARTMENT

CE-6819

OSCILLOGRAPH TUBE



COF BULB WILL NOT DEVIATE MORE THAN 2⁰ IN ANY DIRECTION FROM The perpendicular erected at the center of bottom of the base.

NOTE 1: THIS BASE MAY BE SUPERSEDED BY AN ALTERNATE BASE WHICH WILL FIT THE SAME SOCKET BUT WHICH WILL HAVE A FLARED SHELL INDICATED BY THE DASHED LINES AND DIMENSIONED APPROXI-MATELY AS FOLLOWS:

A= 1.85" HAX., 8= 0.500", C= 0.200" MIN., D= 0.925".

92CH-6765

DEC. 20, 1946

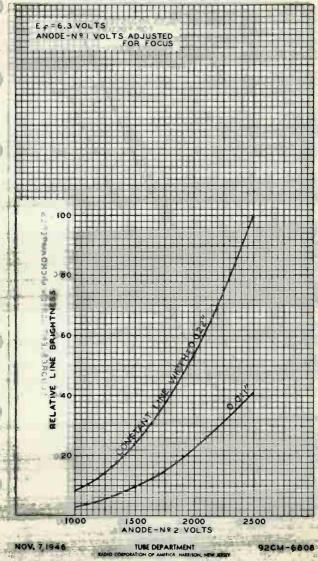
TUBE DEPARTMENT

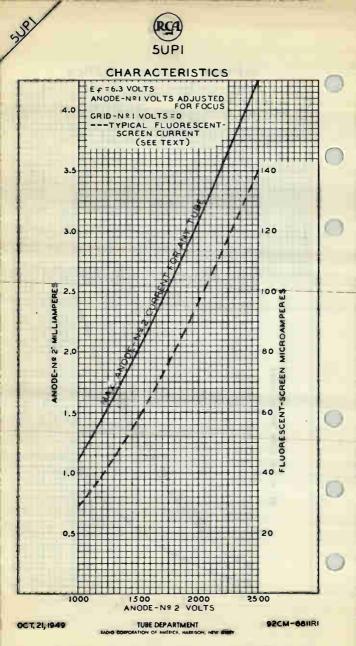
CE-6763

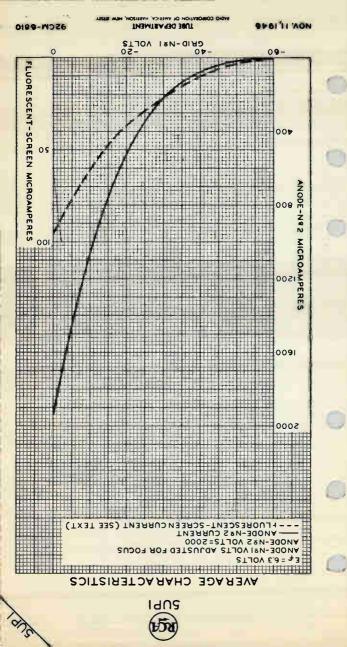


1010

AVERAGE CHARACTERISTICS







C C C C C .

5UP7

Oscillograph Tube

ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

For Extremely Low-Speed Recurrent, or Medium-Speed Non-Recurrent Image Displays

The 5UP7 is the same as the 5UP1 except for the following items:

GENERAL

Phosphor (For curve	18,	86	•	fr	on	to	of	th	i s		C	tic	n).		•				P7
Fluorescence																			. Wh	ite
Phosphorescence,	•	•	٠	٠	٠		٠	٠	٠	•	•	•		•	Ye	11	ow i	sl	1-Gr	aen
Persistence ^{a, b}		•	8	.9	٠		4										. 1	/eı	ry-Li	ong

5UP11

Oscillograph Tube

ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

For Photographic Recording and Visual Observations The SUP11 is the same as the SUP1 except for the following items:

GENERAL

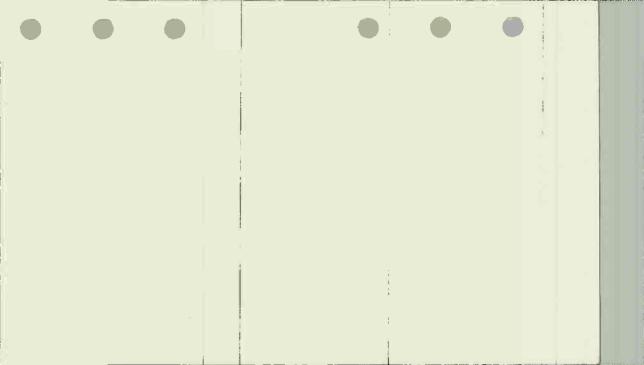
Phosphor (For curve		. 8		f	roi	nt	of	t	hi			ct	io	n)		•••• P11
Fluorescence	٠	٠	•	٠	•	٠					٠		•			Actinic-Blue
Phosphorescence, Persistence	٠	٠	•	٠	•	•	•	•	•	•	•	٠	٠	•	٠	Actinic-Blue
rersistence																Medium-Short

5UP31

Oscillograph Tube ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION For Low- or Medium-Speed Non-Recurring Image Displays The 5UP31is the same as the 5UP1 except for the following items: GENERAL Phosphor (For curves see type 7VP31) P31 Fluorescence Green Phosphorescence. .Green Persistence Medium-Short^c (Approx. 38 µsec) Persiste Persistence of usesble brightness can be obtained with an anode-No.2 voltage of as low as 1500 volta. Time for initial brightness to decay to 10% point. C Phosphoreaconce may have a useful brightness for over a minute under con-ditions of adequate excitation and low-ambient illumination.



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 9-65





TRANSCRIBER KINESCOPE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

SWAIL

T.	ELECTROSTATIC FOCOS MAGNETIC DEFLECTIO	
	DATA	
	General:	
	Heater, for Unipotential Cathode:	
	Voltage 6.3	volts
	Current 0.6	. amp
	Direct Interelectrode Capacitances:	
		. <i>µ</i> µf
	(500	. μμf
	External Conductive Coating to Anode No.2 . 500 max.	. μμτ f
	Phosphor (For Curves, see front of this Section).	. P11
	Fluorescence	Blue
	Persistence	
	Focusing Method Electros	
	Deflection Method May	
	Deflection Angle (Approx.)	50° ± 3/8"
	Overall Length	± 3/8"
	Minimum Useful Screen Diameter	4-1/4"
	Raster Size (Approx.)	3-3/8"
	Mounting Position, and a second second second	. Anv
	Cap Recessed Small (Cavity
	Base Small-Shell Duodecal	7-110
	Basing Designation for BOTTOM VIEW	. 120
	Pin 1-Heater Pin 2-Grid No.1 Pin 10-Grid No.1 Pin 11-Cathody	
	Pin 6 - Anode No.1 Pin 12 - Heater	
	Ris 7 lotornal Con	
	Do Not Use	
	Maximum Ratings, Design-Center Values:	
	ANODE-No. 2 VOLTAGE	volts
	ANODE-No.1 VOLTAGE	volts
	GRID-No.2 VOLTAGE	volts
	GRID-No.1 VOLTAGE:	
	Negative bias value	volts
	Positive bias value 0 max. Positive peak value	volts
	PEAK HEATER-CATHODE VOLTAGE:	10110
1	Heater negative with respect to cathode;	
	During equipment warm-up period not	
	exceeding 15 seconds 410 max.	volts
	After equipment warm-up period 125 max.	volts
	Heater positive with respect to cathode. 125 max.	VUILS
1	Typical Operation:	

27000 Anode-No.2 Voltage*. volts

*: See next page. FEB. 1, 1949

TUBE DEPARTMENT DIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA 1

RCA

SWPI

5 WPII

TRANSCRIBER KINESCOPE

1	Anada Na 1 Valtana Danza for
i	Anode-No.1 Voltage Range for Anode-No.2 Current of 20 µamp 4200 to 5400 volts
	Grid-No.2 Voltage**
3	Grid-No.1 Voltage for Visual Cutoff42 to -98 volts
l	Anode-No.2 Current
l	Max. Anode-No.1 Current
Î	Grid-No.2 Current Range15 to +15 µamp
1	
	Maximum Circuit Values:
	Grid-No.1-Circuit Resistance 1.5 max. megohms
1	Minimum Circuit Values:
1	When the output capacitor of the power supply is capable of
l	storing more than 250 microcoulombs, and when the inherent regu-
1	lation of the power supply permits the instantaneous short-
	circuit current to exceed 1 ampere, the effective resistance
	in circuit between indicated electrode and the output capacitor
	should be as follows:
	Grid-No.1-Circuit Resistance 180 min. ohms
	Grid-No.2-Circuit Resistance
	Anode-No.1-Circuit Resistance 6800 min. ohms
	Anode-No.2-Circuit Resistance
	The resistors used should be capable of withstanding the volt-
	ages involved.
	Components:
	Deflecting Yoke RCA Type No. 201D11
	Hor. Deflection Output Transformer:
	For use with 6AS7-G booster scanning tube
3	and separate high-voltage supply RCA Type No. 204T1
	For use with single high-voltage tripler
	supply employing 3 183-67/8016's RCA Type No. 21172
	Ver. Deflection Output Transformer RCA Type No. 204T2
	Brilliance and definition decrease with decreasing anode voltages. In
ļ	coneral anode-No 2 voltage should not be less than 15000 volts.
1	Subject variation of \pm a05 when grid-wo-1 voltage cutoff is desired at -70 volts.
	-70 volts.
ł	OPERATING NOTES
	Soft x-rays are produced when the 5WPII is operated with an
	anode-No. 2 voltage above approximately 20000 volts. These rays
	can constitute a health hazard unless the tube is adequately
	shielded. Relatively simple shielding should prove adequate,
	but the need for this precaution should be considered in equip-
	ment design.
	Resolution of better then 700 lines at the center of the re-
	produced picture can be produced by the 5WP11. 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 band-width of at least 10 megacycles.
	FEB. 1. 1949 THE DEPARTMENT TENTATIVE DATA 1
	TUBE DEPARTMENT
	and contract of multic, multic, net start



SWAI

5WPI1

TRANSCRIBER KINESCOPE

The screen of the 5WPII has highly actinic blue radiation, and is particularly effective for photography. The presistence of the radiation is sufficiently short to prevent "carry over" from one frame to the next. The persistence is dependent to some extent on the current density in the focused spot, and decreases with current density.

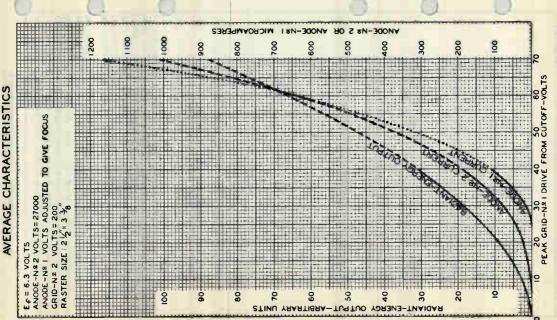
Operation of the 5WPII results in gradual browning or the face. The rate of browning increases markedly with increase in anode-No.2 voltage, is proportional to beam current, and is inversely proportional to the scanned area. The browning is most noticeable during initial operation; thereafter, a gradual increase in the amount of browning will be observed during the life of the tube.

> OUTLINE DIMENSIONS for the 5WP11 are the same as those for the 5WP15



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STATE

FLYING-SPOT CATHODE-RAY TUBE

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9

Beneral-

For use as scanner in high-quality flying-spot video-signal generators

DATA

	al: .	
Heate	r, for Unipotential Cathode:	
Vol	tage 6.3 ac or	de volt
Cur	rent. 0.6 + 10%	
Direct	t Interelectrode Capacitances:	
Grid	No.1 to all other electrodes.	μų
Catl	node to all other electrodes 5	р 4 ,
	ernal conductive neck coating to ultor. 500	max. щи
LAU	1100	min. µµ
Facep	late, Flat	ear Glas
Phosph	NOT (For Curves, see front of this Section)	- P1
		luminize
Fluc	prescence-	runnin 2e
V	isible radiation	. Viole
Ir	visible radiation	traviolo
Phos	sphorescence	
Pe	ersistence of visible radiation	erv Shor
Pe	ersistence of invisible radiation V	erv Shor
Focus	Ing Method, Fler	trostati
Deflec	tion Method.	Magneti
Defled	tion Method	A
Tube [)imensions:	•••••
Over	all length	R" + 3/8
Grea	atest diameter of bulb.	$5" \pm 1/8$
Minim	m Useful Screen Diameter	A_1/A
Weight	(Approx.)	1_1/2 16
Operat	ing Position	1-1/2 10
Cap.		No. 11 21
Socket	See Obergting Consi	deretie-
8ase .	Small-Shell Duodecal 7-Pin (JETEC	No 87_51
Basi	ng Designation for BOTTOM VIEW	12
	1-Heater Pin 12-Heate	r
Pin	2-Grid No.1 c O Cap-Ultor	
Pin	6-Grid No.3 (Grid 7-Internal	1 No.4,
Pin		lector)
	Connection C-Exter	
		uctive
Pin		Coat-
Pin	11 - Cathode ()=(2) Ing	
	the second se	
Max i mu	m Ratings, Design-Center Values:	
ULTOR	VOLTAGE	volt
GRID-N	lo.3 VOLTAGE	
GRID-N	lo.2 VOLTAGE	
	- Ind icates	. chan
		a change,

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

FLYING-SPOT CATHODE-RAY TUBE

GRID-No.1 VOLTAGE: 150 max. volts Negative bias value. . . . 0 max. volts Positive bias value. . . . 2 max. volts Positive peak value. . . 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 volts Heater positive with respect to cathode. 150 max. Fauipment Design Ranges: For any ultor voltage (Ecu) between 20000° and 27000 volts Grid-No.3 Voltage for focus with ultor current of 25 µa or less. . . . 20.5% to 26.5% of Eca volts Grid-No.2 Voltage for visual extinction of undeflected focused spot when circuit design utilizes fixed 2 to 5 times Ec. volte grid-No.1 voltage. . . . Grid-No.1 Voltage for visual extinction of undeflected focused spot when circuit design utilizes fixed -20% to -50% of Eca volts grid-No.2 voltage. . . . Grid-No.2 Current. . . . -15 to +15 uðu Examples of Use of Design Ranges: 27000 volta 20000 For ultor voltage of Grid-No.3 Voltage for focus with ultor current as . . 4100 to 5300 5500 to 7100 volts indicated. . . . Grid-No.2 Voltage for visual extinction of undeflected focused spot when circuit design utilizes fixed grid-No.1 voltage of 140 to 350 140 to 350 volts -70 volts..... Grid-No.1 Voltage for visual extinction of undeflected . focused spot when circuit design utilizes fixed grid-No.2 voltage of 200 volts. -40 to -100 -40 to -100 volts 25 µa. Ultor Current. . . . Maximum Circuit Values: 1.5 max. megohms Grid-No.1-Circuit Resistance * Brilliance and definition decrease with decreasing ultor voltage. general, the ultor voltage should not be less than 20,000 volts. l n - Indicates a change. 7-58 DATA 1 ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



FLYING-SPOT CATHODE-RAY TUBE

OPERATING CONSIDERATIONS

X-Ray Warning. X-ray radiation is produced at the face of the 5ZPI6 when it is operated at its normal ultor voltage. These rays can constitute a health hazard unless the tube is adequately shielded for X-ray radiation. Although relatively simple shielding should prove adequate, make sure that it provides the required protection against personal injury.

The base pins of the 5ZP16 fit the Duodecal 12-contact socket. The socket contacts corresponding to the vacant pin positions (pin positions 3,4,5,8, and 9) should be removed in order to provide the maximum insulation for the high-voltage pins 6 and 7. The socket should be made of high-grade, arcresistant, insulating material and should preferably be designed with baffies.

Resolution of better than 1000 lines at the center of the reproduced picture can be produced by the 5ZPl6 when it is operated with 27,000 volts on the ultor. At lower ultor voltages, the resolution capability decreases. To obtain high resolution in the horizontal direction, it is necessary to use a video amplifier having a bandwidth of about 20 megacycles.

The ultraviolet output of the 5ZPI6 is a linear function of the ultor current. For any particular value of ultor current, the ultraviolet output is approximately 50 per cent higher when the 5ZPI6 is operated with 27,000 volts on the ultor than when operated with 20,000 volts.

Underscanning over a protracted period should be avoided because an underscanned area of the screen will be burned and thus give diminished radiation when the raster is again scanned to full size and be slightly noticeable in the reproduced picture. Furthermore, it is inadvisable to permit a modulated stationary pattern to remain more than a few minutes on the face of the tube. If it remains for a longer time, the phosphor will be burned uneveniy over the pattern area.

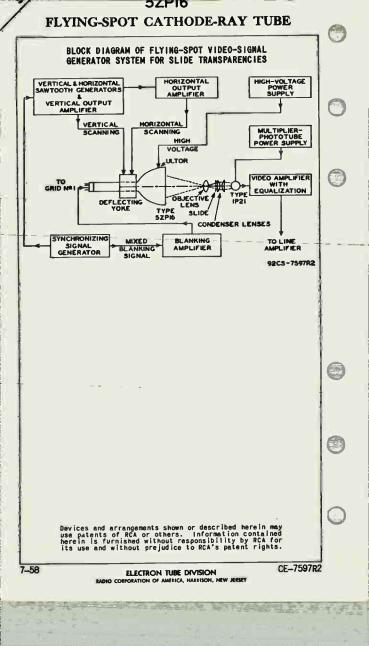
Neverallow the beam to remain stationary, even momentarlly, because the high peak energy in the beam will seriously damage the screen. Provision should be made to prevent such a possibility. Provision should also be made in equipment design to insure that the ultor voltage will drop as fast as the scanning current when the equipment is turned off; or to bias grid No. to beam-current cutoff when the equipment is turned off.

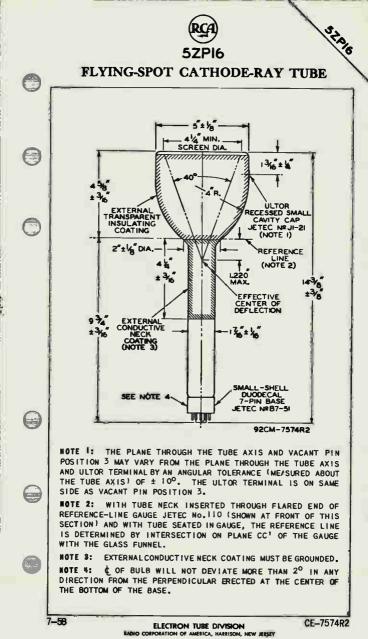
-Indicates a change.

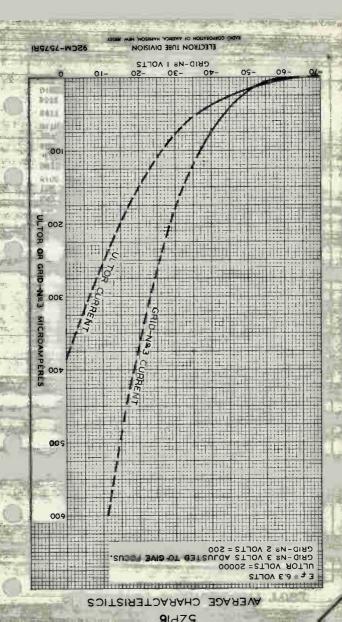
ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

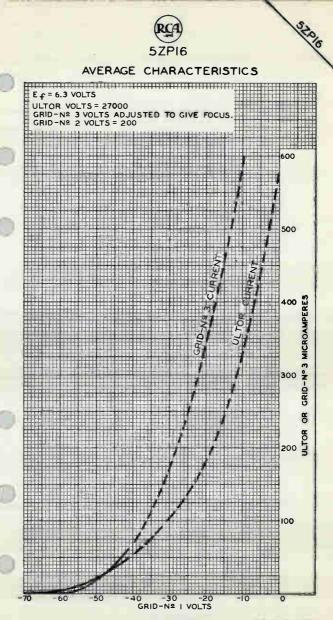
59

DATA 2



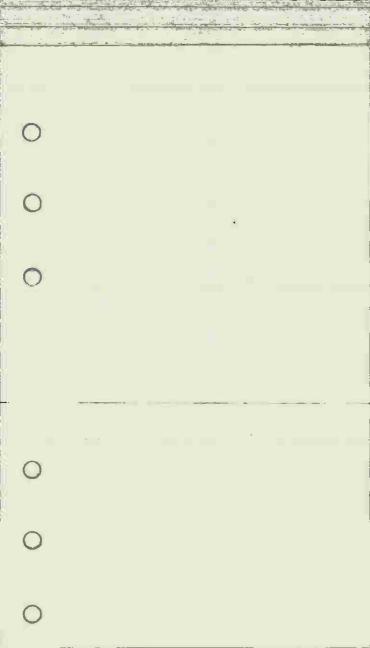






ELECTRON TUBE DIVISION

92CM-7576RI





180TA

7BP7-A

OSCILLOGRAPH TUBE

MAGNETIC FOCUS MAGNETIC DEFLECTION

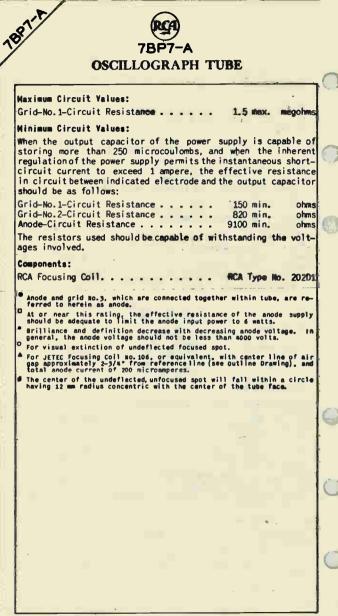
DATA

		4
1	General:	1
	Heater, for Unipotential Cathode:	ł
ľ	Voltage	_
1		
	Current 0.6	P
٢	Direct Interelectrode Capacitances (Approx.):	
4	Grid No.1 to All Other Electrodes 8.5 μμ	t
	Grid No.2 to All Other Electrodes	f
	Cathode to All Other Electrodes	f
	Phosphor (For Curves, see front of this Section) No.	7]
	Fluorescence	
ŝ	Phosphorescence Greenish-Yello	wl
1	Persistence of Phosphorescence Lon	
)	Focusing Method	
1	Deflection Method	2
1	Deflection Angle (Approx.)	ŏl
1	Overall Length	
	Createst Dispeter of Pulk	
	Greatest Diameter of Bulb	1
	Maximum Useful Screen Diameter 6	"
1	Mounting Position	χI
	Cap	Ч
	Base Long Medium-Shell Octal 8-Pi	nį
	BOTTOM VIEW	
1	Pin 1-No Pin 6-No	1
	Connection Connection	ł
ļ	Pin 2 - Heater Dia 2 - Heater Connection Pin 7 - Cathode Pin 7 - Cathode	1
	Pin 3-Grid No.2	ł
i	Pin 3-Grid No.2 Pin 4-No	ł
		ł
1	Connection (1-6) Cep - Anode,	1
	Pin 5-Grid No.1 Grid No.3	ł
	Maximum Ratings, Design-Center Values;	ł
		1
J	ANODE® VOLTAGE 8000 max. volt:	
l	GRID-No.2 VOLTAGE	s
1	GRID-No.1 VOLTAGE:	1
	Negative bias value	s
	Positive bias value ^D	
	Positive peak value	
	PEAK GRID-No.1 DRIVE FROM CUTOFF 65 max. volt	
١İ	PEAK HEATER-CATHODE VOLTAGE:	"
4	Heater negative with respect to cathode. 125 max. volt:	
	Heater positive with respect to cathode. 125 max. volt:	5
	Typical Operation:	1
	Anode Voltage" 4000 7000 volt	
	Grid-No.2 Voltage	
	Anode Voltage* 4000 7000 volt Grid-No.2 Voltage. 250 250 volt Grid-No.1 Voltage Range* -25 to -70 -25 to -70 volt Focusing-Coil Current* 75 to 102 99 to 135 mm	
1	Focusing-Coil Current ^A 75 to 102 99 to 135 m	aj
	Spot Position # -	1
	• D, • O, A, St. See next page.	1
		1
ľ		-

JUNE 15, 1948

TENTATIVE DATA

TUBE DEPARTMENT



JUNE 15, 1948

TUBE DEPARTMENT



OSCILLOGRAPH TUBE

MAGNETIC FOCUS

MAGNETIC DEFLECTION

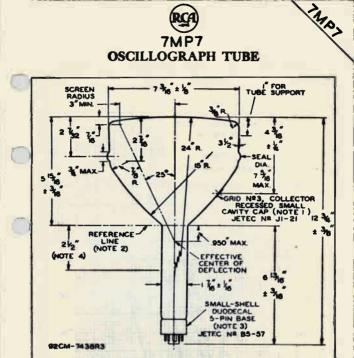
TAIDT

DATA

ł	General:
ł	Heater, for Unipotential Cathode:
	Voltage 6.3 ac or dc volts
	Current 0.6
	Direct Interelectrode Capacitances (Approx.):
١	Grid No.1 to All Other Electrodes 6 #
ļ	Cathode to All Other Electrodes 5 ##f
	Phosphor (For Curves, see front of this Section)
	Phosphorescence
ł	Focusing Method.
	Deflection Method
	Deflection Angle (Approx.)
1	Overall Length
	Greatest Diameter of Bulb
	Minimum Useful Screen Diameter 6"
	Mounting Position
1	Cap Recessed Small Cavity (JETEC No.J1-21)
	Base Small-Shell Duodecal 5-Pin (JETEC No. 85-57)
	BOTTOM VIEW
	\sim
ł	Pin 1-Heater Pin 11-Cathode
	Pin 2-Grid No.1 Pin 12-Heater
1	Pin 10-Grid No.2
	Collector
	C AND
ł	Haximum Ratings, Design-Center Values:
	Ultor [®] VOLTAGE
	GRID-No.2 VOLTAGE:
	Positive Value (DC or Peak AC) 700 max. volts
1	Negative Value (DC or Peak AC) 180 max. volts
	GRID-No.1 VOLTAGE:
	Negative bias value
-	Positive bias values
	Positive peak value
	PEAK GRID-No.1 DRIVE FROM CUTOFF 65 max. volts
I	PEAK HEATER-CATHODE VOLTAGE:
2	
1	Heater negative with respect to cathode. 125 max. volts
	Heater negative with respect to cathode. 125 max. volts
	Heater negative with respect to cathode. 125 max. volts Heater positive with respect to cathode. 125 max. volts
	Heater negative with respect to cathode. 125 max. volts Heater positive with respect to cathode. 125 max. volts
	Heater negative with respect to cathode. 125 max. volts Heater positive with respect to cathode. 125 max. volts
	Heater negative with respect to cathode. 125 max. volts Heater positive with respect to cathode. 125 max. volts
	Heater negative with respect to cathode. 125 max. volts Heater positive with resnect to cathode. 125 max. volts In the 7M-types, 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 electrodes, 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 electrones in the beam prior to
	Heater negative with respect to cathode. 125 max. volts Heater positive with resnect to cathode. 125 max. volts In the 7M-types, grid No.5 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 electrodes connected within the tube to it, to which is applied the highest de voltage for accelerating the electrons in the beam prior to its deflection.
	Heater negative with respect to cathode. 125 max. volts Heater positive with resnect to cathode. 125 max. volts In the 7M-types, grid No.5 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 electrodes connected within the tube to it, to which is applied the highest de voltage for accelerating the electrons in the beam prior to its deflection.
	Heater negative with respect to cathode. 125 max. volts Heater positive with resnect to cathode. 125 max. volts In the 7M-types, 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 electrodes, 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 electrones in the beam prior to

OSCILLOGRAPH TUBE

T		peration:		-			
		tage [*]		4000		7000	volts
		Voltage		250	•	250	volts
		Voltage		-27 to		27 to -63	volts
		Current		-15 to		15 to +15	µamp
Eor	using-	Coil Curr	ent				
	lc	C Approx.	j**	. 64 ± 1	55 8	35 ± 15%	ma.
Spo	ot Posi	tion				##	
		1 1 A . M.					_
		ircuit Va					
		-Circuit				5 max.	megohms
•	erillia	nce and def	inition d	ecrease with should not be	decreasi	ng ultor vo	ltage. In
8	general,	the uitor	lon of un	deflected, fo	r reas the	st.	
8.8	FOR SDR	cimen focus	ting coll	similar to J	ETEC FOCI	sing Coil	No. 109 po-
	sitione	f with air g	ap toward	similar to J faceplate an utline Drawi	dcenter	ine of air	gap 2-3/4"
	mi croam	beres.					
#	The cen	ter of the u	Indeflecte	d, unfocused ric with the	apot wil	fall with	in a circle
	hav i ng	12-mm radiu	s concent	ric with the	center o	the tube	TACE.
		-8-80 *		agains a graph			
				•			
				2900			1
				rh-	+		
			•				
•							
			*				_
						- Indicate	ns a changel
	OBER 1		_			- Indicate	ns a change DATA

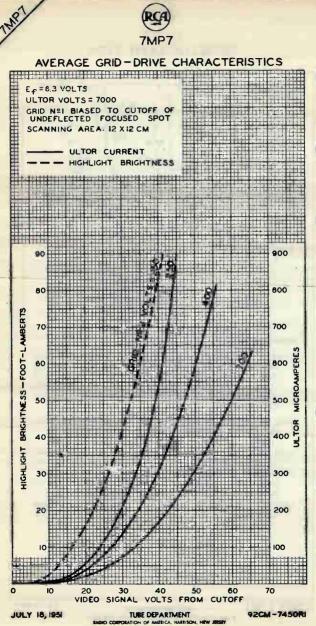


- NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION NO.3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND BULB TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 10^{\circ}$. BULB TERMINAL IS ON SAME SIDE AS VACANT PIN PO-SITION NO.3.
- NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE REFERENCE-LINE GAUGE (JETEC No.112) 1.500 + .003"-.000" 1. 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: LOCATION OF DEFLECTING YOKE MUST BE WITHIN THIS SPACE.

OCTOBER 1,1951

TUBE DEPARTMENT MBIO CONDICATION OF AMERICA, HARRISON, NEW JENER CE-7438R3



Projection Kinescopes

FORCED-AIR COOLED ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION 20 FT. x 15 FT. PROJECTED PICTURES

For Black-and-White Projection Systems in Theater and Closed-Circuit Television Applications

ELECTRICAL

Heater, for Unipotential	Cath	ode								
Voltage (AC or DC)								6.6	i ±	5% V
Current						1.		0.62	2	· A
Focusing Method								Ele	act	rostatic
Deflection Method			•••	•						Hannatic
Deflection Method.	: •		• •	•	•••	•	•	• •	• •	agnetic
Deflection Angle (Approx	·/ t.	• •	• ;	. •	• •	:	•	• •	•	35-
Direct Interelectrode Ca	pacit	anco	es (App	rox	•)				
Grid No.1 to all other	elec	:t r o	des.					· 12	2	pF
Cathode to all other e	lectr	rode	S					. (3	pF

OPTICAL

Faceplate	.Spherical, Non-Browning Glass
Quality Rectangle of Faceplate	and the second se
(See Dimensional Outline)	
	· · · · · · · · · · · · · · · · · · ·
Projection-Throw Distance for	
20 ft x 15 ft Picture	
Phosphor	inized P4-Silioate-Sulfide Type
	••••• White
Persistence	Hedium

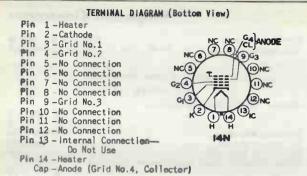
MÉCHAN I CAL

Gooling of the tube by a tangential flow of air across its face is not recommended because the temperature gradient produced across the face may result in immediate ordelayed cracking of the face.

Operating Position	Any
Tube Dimensions Overall Length	19-1/2 ± 5/8 in
Greatest Diameter of Bulb	
(Excluding side cap or cable)	
Base · · · · Plastic Filled,	
	(JEDEC No.BI4-15)

RCA

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Mote: Socket contacts for Pins No.5, 6, 7, 8, 10, 11, 12, and 13 should be removed so that maximum insulation is provided for Pin No.9.

CATHODE-DRIVE* SERVICE

Absolute-Maximum Ratings

	Anode-to-Grid-No. Voltageb	W.
	Grid-No.3-to-Grid-No.1 Voltage	- ¥_
	Grid-No.2-to-Grid-No.1 Voltage	ý.
	Cathode-to-Grid-No.I Voltage	
	Positive bias value	¥
	Negative bias value	÷ Ý
	Peak negative value. 2	v.
	Average Anode Current ^b	-
	Peak Heater-Cathode Voltage	-
	Heater negative with respect to cathode:	
	During equipment warm-up period not	
	After equipment warm-up period	
	Heater positive with respect to cathode	
•	Equipment Design Ranges	
	With may anodesto-spid-No.1 voltage (F) between	
	With any anode-to-grid-No.1 voltage (E _{c4g1}) between 70000 ⁶ and 80000 volts and grid-No.2-to-grid-No.1 voltag	
	/F) between 100 and 050 site	1 8
	(Ec2g1) between 400 and 850 volts	
	Grid-No.3-to-Grid-No.1	
	Voltage for Focus	W.
	urid-No.2-to-Grid-No.1 Voltage	
	for Visual Extinction of Focused	
	Raster when Circuit Design	
	Utilizes Fixed Cathode-to-Grid-	
	No.I Voltage (E _{kg1}) 2.50 to 3.87 times E _{kg1} plus E _{kg1} voltage	W.
	plus EL voltage	
	Cathode-to-Grid-No. Video Drive	
	from Raster Cutoff (Black Level)	
	to White-Level Value Same values as fixed catho	des
	to-grid-No. I voltage except vi	
	drive is a negative volt	
	urive is a negative voit → Indicates a chan	
i	indicates a chan	£2.

Herrison, N. J.

DATA I

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-		
	Grid-No.3 Current	pte ^d μA
	Examples of Use of Design Ranges	
	For anode-to-grid-No.1 voltage of 75000	v
	Grid-No.3-to-Grid-No.1	
	Voltage for Focus	v
	Grid-No.2-to-Grid-No.1 Voltage for	
	Visual Extinction of Focused Raster	
	when Circuit Design Utilizes Fixed	
	Cathode-to-Grid-No.1 Voltage (E _{kg1})	
	of 125 V 447 to 609 Cathode-to-Grid-No.1 Video Drive from	
	Raster Cutoff (Black Level) to White	
	Level Value	V
	Maximum Circuit Value	
		here
	Grid No.1 Circuit Resistance 1.5 mego	7100-5
	GRID-DRIVE® SERVICE	
	Absolute-Maximum Ratings	
	Anode-to-Cathode Voltage ^b	V
	Grid-No.3-to-Cathode Voltage	٧
	Grid-No.2-to-Cathode Voltage	٧
	Grid-No.1-to-Cathode Voltage	v
	Negative bias value. 250 Positive bias value. 0	
	Peak positive value	
	Average Anode Current ^b	- Am
	Peak Heater-Cathode Voltage	
	Heater negative with respect to cathode:	
	During equipment warm-up period not	v
	exceeding 15 seconds	
	Heater positive with respect to cathode 150	v
	Equipment Design Ranges	
	With any anode voltage (E_{c4k}) between 70000 ^C and 80000 volts and grid-No.2 voltage (E_{c2k}) between 400 and 600 vo	1++
	Grid-No.3 Voltage for Focus 20% to 22.6% of Ecut	
	Grid-No.2 Voltage for Visual	•
	Extinction of Focused Raster	
	when Circuit Design Utilizes	
	Fixed Grid-No.1 Voltage (Ecik) 2.58 to3.87 times Ecik	V
	Grid-No.1 Video Drive from	
	Raster Cutoff (Black Level) to	
	White-Level Value Same value as fixed grid- voltage except video drive	e is
	a positive volt	
	Grid-No.3 Current	
	Grid-No.2 Current	μ A

RCA

- Indicates a change.

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 2 12-66

Examples of Use of Design R	anges	
For anode voltage	75000	
Grid-No.3 Voltage for Focus 154 Grid-No.2 Voltage for Visual Extinction of Focused Raster when Circuit Design Utilizes Fixed Grid-No.1 Voltage (E _{clk}) of		
-155 V. Cathode-to-Grid-No. Video Drive from Raster Cutoff (Black Level) to White-	400 to 800	
Level Value	155	۷
Grid-No. Circuit Resistance	1-5	segohas

Cathode drive is the operating condition in which the video signal varies the cathode potential.

The product of anode-to-grid-No.l voltage, or anode-to-cathode voltage, and average anode current should be limited to 160 watts.

^C Brilliance and definition decrease with decreasing anode-to-grid-No.1 voltage or anode-to-cathode voltage. In general, the anode-to-grid-No.1 voltage or the anode-to-cathode voltage should not be less than 70000 volta.

^d Grid-No.3 current will be approximately 10% to 5%, or less, of anoda current. However, a grid-No.3 leakage current of up to 15 µA may be present. Grid drive, in the apparating condition in which the video signal varies

the grid-No.1 potential.

GENERAL CONSIDERATIONS

The high voltages at which this type is operated may be very dangerous. Great care should betaken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the enclosing of high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

In the use of this tube, it should always be remembered that high voltages may appear at normally low-potential points in the circuit because of capacitor breakdown or incorrect circuit connections, and that the tube aurface maintains a atatic charge for some time after the power has been turned off. Therefore, before any part of the circuit or the tube is touched, the power-supply switch should be turned off, both terminals of high-voltage capacitors should be grounded, and the terminals of the high-voltage power aupply should be grounded. After these steps have been taken and before touching the tube, discharge the anode terminal, the surface of the faceplate, and the coated surface of the cone by use of sauitable wand which is connected to ground. It is to be noted that the entire surface of the cone and of the faceplate will not be discharged by touching the wand to a single point on either surface, because the surfaces have high resistance. Therefore, to discharge each surface, it will be necessary to sweep over the entire surface with the wand.

The fluorescent screen, utilizing phosphor No.4 of the silicate-sulfide type, is aluminized. The white fluorescence of the screen has a color temperature of approximately 6300°K.

DAIA 2

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The spectral energy emission characteristic is shown in Spectral-Energy Emission Characteristic of Phosphor No.4. The persistence of the phosphorescence is such that its brightness does not exceed 7 per cent of the peak value in 33 milliseconds after excitation is removed.

Darkening of face occurs during normal operation of the tubes with resulting decrease in the light transmitted by the face. The rate of darkening increases rapidly with increase in anode voltage, is proportional to the beam current. and is inversely proportional to the scanned area. The darkening develops rapidly during initial operation; thereafter, a gradual increase in the smount of darkening will be observed during the life of the tube.

The anode connection is made to the medium cap on the side of the bulb. The anode connector should have aball-type corona shield with a dismeter of about 1-1/2 inches in order to prevent corona.

OPERATING HINTS

1 Never apply power input to the acreen suddenly because immediate or delayed cracking of the face may reault. Always increase or decrease the anode current gradually.

2. Never exceed the rated maximum anode current of 2 milliamperes.

3. Never overscan the screen because the beam will strike the neck and liberate occluded gas which may cause internal arcing.

Never fail to operate this tube in its equipment at 4 intervals of about 2 months to keep the tube in condition.

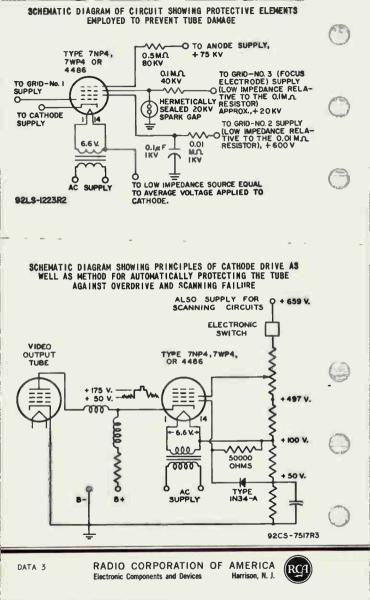
For X-radiation shielding considerations, see sheet **X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES** at front of this section



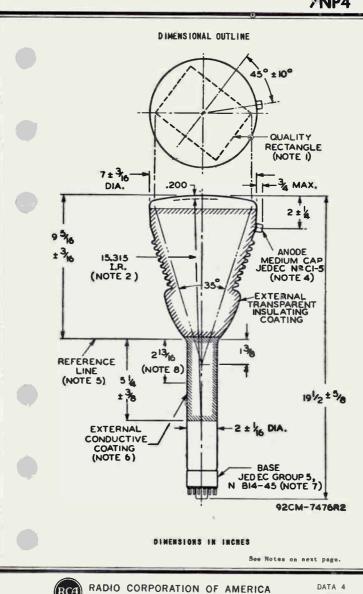
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DATA 3 9-67



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Electronic Components and Devices

Note 1: When viewed from the face of the tube, the minor axis of the 5 x 3-3/4 inch quality rectangle is located 45° ± 10° in a counter-clockwise direction from a plane through the anode terminal and the tube axis.

Note 2: Inside surface of faceplate within the quality rectangle may vary ± 0.006" from the spherical surface having a 15.315 inch radius.

Note 3: Inside surface of faceplate within the quality rectangle may vary ± 0.006 inch from the spherical surface having a 20.3 inch radius (Type 7WP4 only).

Note 4: The plane through Base Pin No.9 and the tube axis may vary from the plane through the anode terminal and the tube axis by an angular tolerance (measured about the tube axis) of ± 10°. The snode terminal is on same side as Pin No.9.

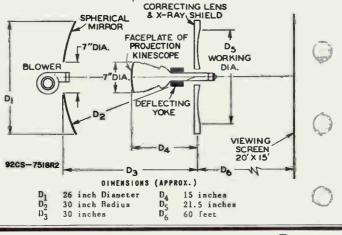
Note 5: Reference line is determined by position where gauge 2.100 ± 0.001 inch I.D. and 3 inches long will rest on bulb cone.

Note 6: External conductive costing must be grounded.

Note 7: Socket for this base should not be rigidly mounted, it should have flexible leada and be allowed to move freely. Socket contacts for Pins 5, 6, 7, 8, 10, 11, 12, and 13 should be removed in order to provide maximum insulation for Pin No.9. Note 8: Effective deflecting field must be within this space.

REFLECTIVE OPTICAL SYSTEM

Arrangement of Typical Optical System and Air-Cooling System for Theater-Television Projector Using Reflective Optical Principles and 7NP7

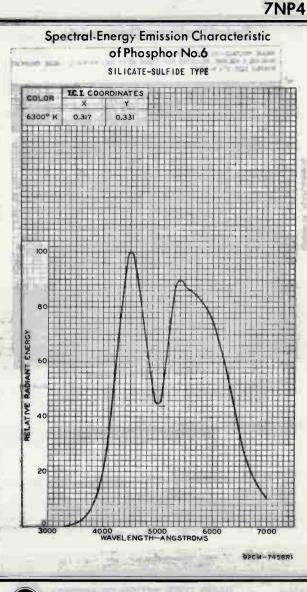


DATA 4

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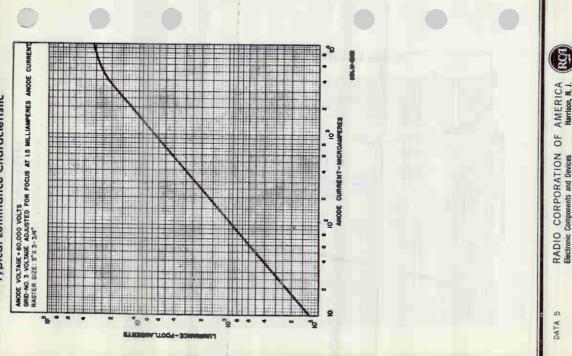
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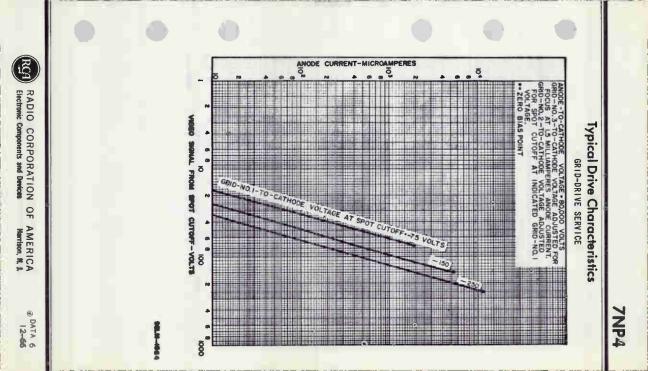
Electronic Components and Devices

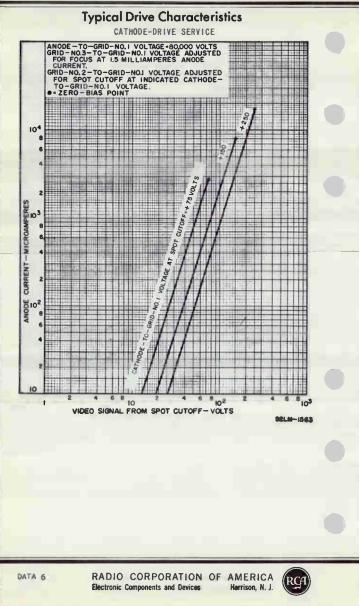
RADIO CORPORATION OF AMERICA



Characteristic **Typical Luminance**









METAL-BACKED SCREEN

ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

TRA

DATA

General:	
Heater, for Unipotential Cat	hode:
Voltage	6.3 ac or dc volts
Current	0.6 amp
Direct Interelectrode Capaci	
Grid No.1 to All Other Ele	
Cathode to All Other Elect	
Faceplate	Clear Glass
Phosphor, Metal-Backed ^o	
Fluorescence and Phosphore	
Persistence of Phosphores	
Focusing Method	
Deflection Method	
Deflection Angle (Approx.).	
Overall Length	
Minumum Useful Screen Diame	
Picture Size (Within minimum-u	
Reces	sed Small Cavity (JETEC No. J1-21)
Base Small-Shel	Duodecal 6-Pin (JETEC No. 86-63)
	TTOM VIEW
Pin 1 - Heater	Pin 12 - Heater
Pin 2 - Grid No.1	Cap - Grid No.4,
Pin 6 - Grid No.3	Collector
d	(Ultor)
Pin 10 - Grid No.2	
Pin 11 - Cathode	OT O
1	
Maximum Ratings, Design-Cem	ter Values:
ULTOR® VOLTAGE	12000 max. volts
GRID-No.3 VOLTAGE	2000 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
• For curves, see front of this	Section.
• to the 7TPH, orid No.4 which h	as the ultor function, and collector are
connected together within the	as the ultor function, and collector are tube and are conveniently referred to e "ultor" in a cathode-ray tube is the combination with one or more additional he tube to it, to which is applied the trating the electrona in the beam prior
electrode, or the electrode in	combination with one or more additional
electrodes connected within t	the tube to it, to which is applied the
to its deflection.	taring the electrone in the seam prior
	2
	· · · · ·
FEB. 1, 1992	TENTATIVE DATA
TUBE	DEPARTMENT IENTATIVE UNIT

TUBE DEPARTMENT SHOLD CORPORATION OF AMERICA, HARRISON, NEW JERSEY RCA 7 T P 4 MONITOR KINESCOPE

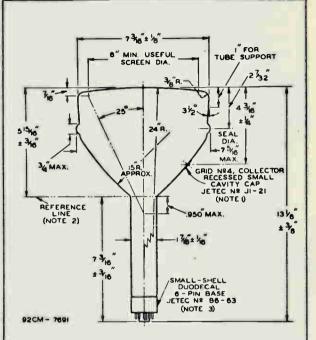
	the second se
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode:	
During equipment warm-up period	
not exceeding 15 seconds	410 max. volts
After equipment warm-up period	180 max. volts
Heater positive with respect to cathode.	180 max. volts
Equipment Design Ranges:	
For any ultor voltage (E.) between 10000	* and some walte
and grid-No. 2 voltage (E ₁₂) between 15	
	o unu 410 00000
Grid-No.3 Voltage for Focus with Ultor Current of 100 µamp 11.6% to	15 8% of F volts
Grid-No.1 Voltage for Visual	13.05 01 10 10110
Extinction of Undeflected	
Focused Spot	25.7% of Era volts
Grid-No.3 Current** See	25.7% of Ec2 volts Curves
	i to +15 µamp
Field Strength of Adjustable	
Centering Magnet 0	to 8 gausses
Examples of Use of Design Rangest	
	10000 volts 200 volts
and grid-No.2 voltage of	200 volts
Grid-No.3 Voltage for Focus with	
	to 1580 volts
Grid-No.1 Voltage for Visual	
Extinction of Undeflected Focused Spot	to -52 volts
	40113
Maximum Circuit Values:	
Grid-No. 1-Circuit Resistance	1.5 max. megohmis
	and the second se
# pathlinger and definition degrapes with degraps	the utres unlike to

Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 10000-volta. Grid-Mo.3 Current increases as the ultor voltage is decreased.

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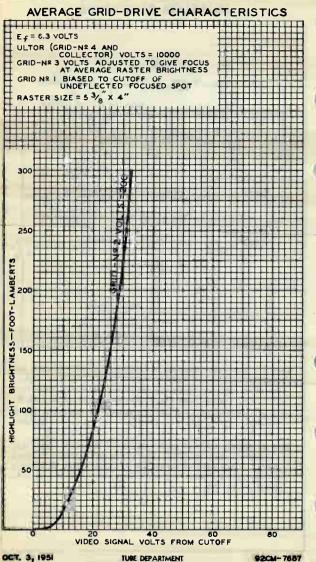


MONITOR KINESCOPE



- NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN NO.6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND BULB TERMI-NAL BY AN ANGULAR TOLERANCE IMEASURED ABOUT THE TUBE AXIS OF ± 10^o. BULB TERMINAL IS ON SAME SIDE AS PIN NO.6.
- NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE REFERENCE-LINE GAUGE (JETEC No.112) 1.500" + 0.003" - 0.000" I.D. AND 2" LONG WILL REST ON BULB CONE.
- NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BERIGIDLY 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 DIA-METER OF 1-778".

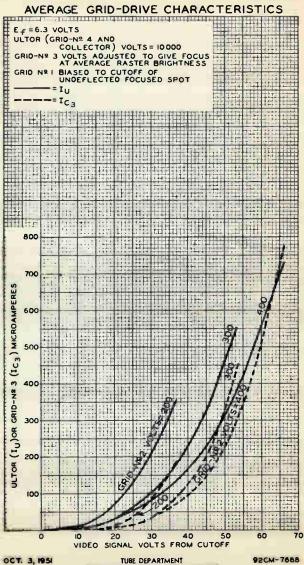
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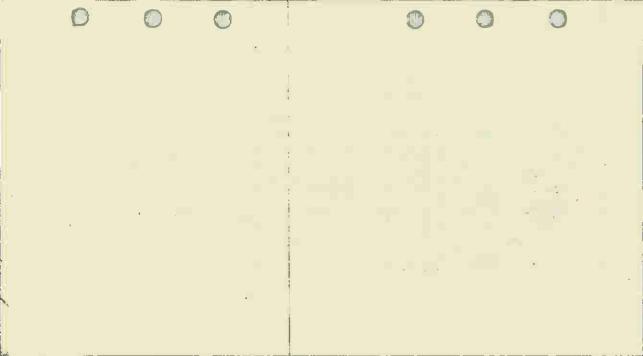
RADIC CORPORATION OF AMERICA, HARRISON, NEW JERSEY



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ADIO CORPORATION OF AMERICA HARRISON, NEW HERSEY





OSCILLOGRAPH TUBE ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

TLOI

BATA

	General:
	Heater, for Unipotential Cathode:
	Voltage 6.3 , . ac or dc volts Current 0.6
	Current 0.6
	Direct Interelectrode Capacitances (Approx.):
1	Grid No.1 to All Other Electrodes 6 . μμf
1	DJ1 to DJ2
	DJ1 to DJ2
	DJ2 to All Other Electrodes
1	DJ3 to All Other Electrodes
1	DJA to All Other Electrodes
1	Faceplate
	Phosphor (For Curves, see front of this Section) P1
	Fluorescence and Phosphorescence Green
,	Persistence of Phosphorescence Medium
	Focusing Method Electrostatic
	Focusing Method Electrostatic Deflection Method Electrostatic Overall Length 14-1/2" ± 3/8" Greatest Diameter of Bulb 7" ± 1/8"
	Overall Length \dots of Bulb $7^{+} \pm 1/8^{+}$
	Minimum Useful Screen Oiameter 6"
	Mounting Position
ļ	Bulb
ł	Bulb
-	BOTTOM VIEW
-	Pin 1-Heater Pin 9-Ultor
	Pin 2 - Cathode (Grid No.2,
	Pin 3-Grid No.1 Grid No.4.
1	Pin 4 – No Collector)
	Connection Pin 10-Deflecting Pin 5-Grid No.3 Elect. DJ2
	Pin 5-Grid No.3 Pin 7-Deflecting
	Electrode Elect. DJ
	DJ3 Pin 12- Internal
	Pin 8 - Deflecting Connection-
	Electrode Oo Not Use
	DJ4 👘 14 - Heater 👘 👘
	Dr. and Dr. and manual the second
	DJ_1 and DJ_2 are nearer the screen DJ_2 and DJ_4 are nearer the base
	With DJ1 positive with respect to DJ2, the spot is de-
	flected toward pin 5. With DJ positive with respect to
	DJA, the spot is deflected toward pin 2.
	The slame through the tube spin and sin 5 may yory from
	The plane through the tube axis and pin 5 may vary from the trace produced by Dis and Die by an angular tolerance
	the trace produced by DJ1 and DJ2 by an angular tolerance (measured about the tube axis) of $\pm 10^{\circ}$. Angle between
	$D_1 - D_2$ trace and $D_3 - D_4$ trace is $90^\circ \pm 3^\circ$.
	and and trace and any not trace to be all a
	•: See next page.

NOV. 1, 1952

TUBE DEPARTMENT O CORPORATION OF AMERICA, HARRISON, NEW JERSEY



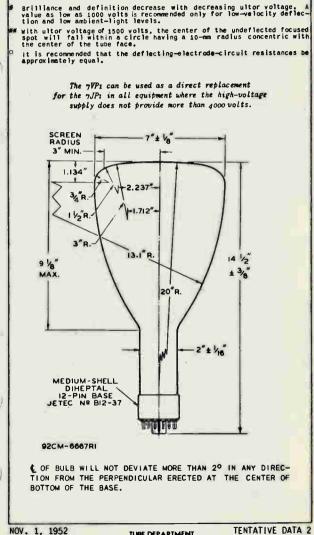
OSCILLOGRAPH TUBE

· · · ·	
Maximum Ratings, Design-Center	Values:
	4000 max. volts
ULTOR VOLTAGE	2000 max. volts
GRID-No.3 VOLTAGE	a a a a a a a 2000 max. voits
GRID-No.1 VOLTAGE:	
Negative bias value	200 max. volts
Positive bias value*	O max. volts
Positive peak value	2 max. volts
PEAK VOLTAGE BETWEEN ULTOR AN	D
ANY DEFLECTING ELECTROD	
PEAK HEATER-CATHODE VOLTAGE:	
	t to cathode . 125 max. volts
Heater negative with respec	
Heater positive with respec	tto cathode . 125 max. vorts
Fouriement Design Rengest	
Equipment Design Ranges:	
For any ultor voltage (E _u)	between 1000\$ and 4000 volts
Grid-No.3 Voltage for Focus	27% to 40% of Eu volts
Maximum Grid-No.1 Voltage	
for Visual Extinction of	a an in a
Undeflected Focused Spot	2.8% of Eu volts
Grid-No.3 Current	-15 to +10 µamp
Deflection Factors:	and the second se
DJ1 & DJ2	31 to 41 v dc/in./kv of Eu
	25 to 34 v dc/in./kv of Eu
DJ3 & DJ4	44
Spor Position	
Examples of Use of Design Ran	dest l
For ultor voltage of	1500 9000 volts
Grid-No.3 Voltage	
for Focus 409	to 600 800 to 1200 voits
Maximum Grid-No.1 Volt-	
age for Visual Extinc-	
tion of Undeflected	. 1
	-84 voits
Focused Spot	
Deflection Factors:	
	to 62 93 to 123 volts dc/in.
DJ3 & DJ4	to 51 75 to 102 volts dc/in.
· · · · ·	
Maximum Circuit Values:	
Grid No.1-Circuit Resistance	1.5 max. megohms
Resistance in Any Deflecting-	
Electrode Ci	
Lieutique ci	regree Sto make megoning
in the 7VP1, grid No.8 which has	the ultor function, grid No.2, and col-
ferred to collectively at "ultor	." The "ultor" in a cathode-ray tube
is the electrode, or the election	ode in combination with one or more
additional electrodes connected	within the tube to it, to which is
beam prior to its deflection.	the ultor function, grid No.2, and col- thin the tube and are conveniently re- " The "ultor" in a cathode-ray tube ode in combination with one or more s within the tube to it, to which is for accelerating the electrons in the
* At or near this ration the off	ctive resistance of the ultor supply
should be adequate to limit the	active resistance of the ultor supply altor input power to 6 watts.
∉,##, ⁰ ; See next pages	
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OSCILLOGRAPH TUBE



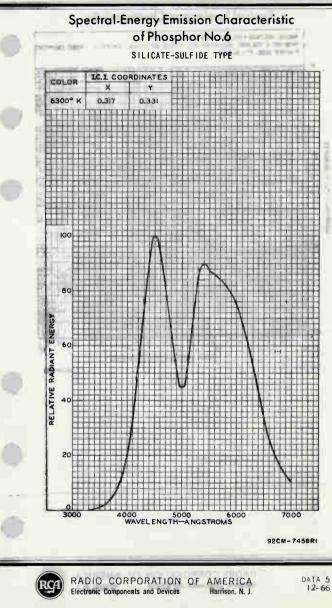
TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

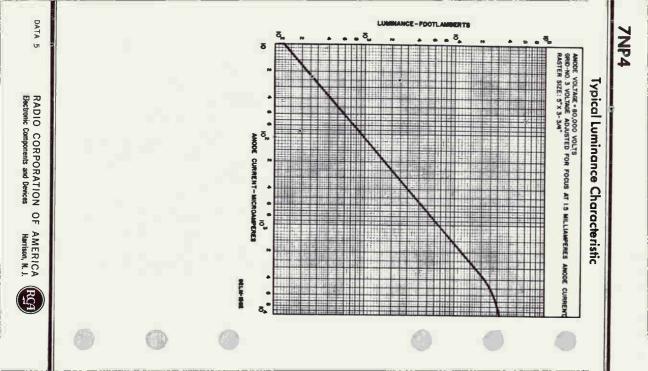


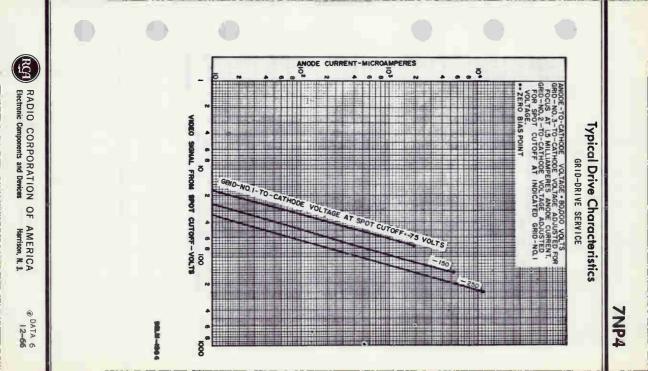
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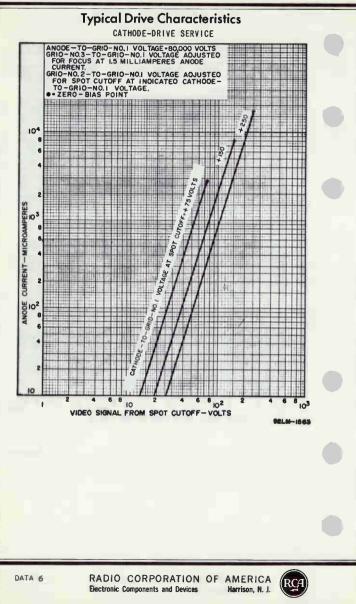
AVERAGE CHARACTERISTICS

		Ħ	77	##	111		H.	H											H.	005		CEO			0 0		os an B		13		0
																							C		N			1	N.		0
ius III																												/ E,	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1	- 20
2	VOLTS	3000	1500	1000	N 3000	N 1500	N ICOO														1									Y	- 30 1 2 1 2 1 2 1
ADJUSTED	CURRENT	TOR		TOR	ENT SCREEL	ENT SCREE	ENT SCREE																			>		1			-40 GBID-P
E 3 VOLTS	CUR	n	5	C	FLUORESCI	FLUORE SCI	FLUORESCI						###	44															X		-50
RID-NS	CURVE	<	80	υ	0				11-1		+	1		THIE	800	<u></u>	<u>1</u> =	- 1		000	I	1	400 400	<u> </u>	1		007				- 60











METAL-BACKED SCREEN

ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

TRA

DATA

	General:
1	Heater, for Unipotential Cathode:
1	Voltage 6.3 ac or dc volts
	Current 0.6 amp
1	Direct Interelectrode Capacitances (Approx.):
	Grid No.1 to All Other Electrodes 6 $\mu\mu$ f Cathode to All Other Electrodes
1	Phosphor, Metal-Backed ^o
	Persistence of Phosphorescence
	Focusing Method Electrostatic
	Deflection Method Magnetic
ł	Deflection Angle (Approx.)
1	Overall Length
	Greatest Diameter of Eulb
	Minumum Useful Screen Diameter.
	Picture Size (Within minimum-useful-screen area) 5-3/8" x 4"
1	Cap Recessed Small Cavity (JETEC No. J1-21)
	Base Small-Shell Duodecal 6-Pin (JEIEC No. 86-63)
1	BOTTOM VIEW
1	Pin 1 - Heater Pin 12 - Heater
1	Pin 2 - Grid No.1 - Cap - Grid No.4,
1	Collector
	Pin 6 - Grid No.3 (Ultor)
1	Pin 10 - Grid No.2 $\chi \wedge \chi^{\odot}$
-	Pin 11 - Cathode
4.2	00
40	Maximum Ratings, Design-Center Values:
	ULTOR® VOLTAGE
	GRID-No.3 VOLTAGE
	GRID-No.2 VOLTAGE
	GRID-No.1 VOLTAGE:
į	Negative bias value
4	Positive bias value O max. volts
Î	Positive peak value
	For curves, see front of this Section.
	In the 77PH, orid No.8 which has the ultor function, and collector are
	connected together within the tube and are conveniently referred to
	electrode, or the electrode in combination with one or more additional
	electrodes connected within the tube to it, to which is applied the
	For curves, see front of this Section. In the 7FW, grid No.W 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.
1	
-	

FEB. 1, 1952

7 T P4 MONITOR KINESCOPE

	PEAK HEATER-CATHODE VOLTAGE:	
	Heater negative with respect to cathode:	
1	During equipment warm-up period	
	not exceeding 15 seconds 410 max. volts	
R	After equipment warm-up period	
	Heater positive with respect to cathoode. 100 max. voits	
	Equipment Design Ranges:	
	For any ultor voltage (Ey) between 10000° and 12000 volts	100
	and grid-No. 2 voltage (B _c) between 150 and 410 volts	
	Grid-No.3 Voltage for Focus with	
	Ultor Current of 100 µamp 11.6% to 15.8% of Eu volts	
	Grid-No.1 Voltage for Visual	
	Extinction of Undeflected	
	Focused Spot 11% to 25.7% of Ec2 volts	Q
	Grid-No.3 Current ^{**}	
	Grid-No.2 Current15 to +15 µamo	
	Field Strength of Adjustable Centering Magnet 0 to 8 gausses	
	centering magneti i tit tit tit	
	Examples of Use of Design Rangest	
ł	For ultor voltage of 10000 volta	
1	and grid-No.2 voltage of 200 volta	
1	Grid-No.3 Voltage for Focus with	Ł
	Ultor Current of 100 µamp 1160 to 1580 volts	
	Grid-No.1 Voltage for Visual	1
ł	Extinction of Undeflected	
÷	Focused Spot22 to -52 volts	t
	Maximum Circuit Values:	
	Grid-No.1-Circuit Resistance 1.5 max. megohms	1
1	Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 10000 volts.	E
	Grid-No.3 Current increases as the ultor voltage is decreased.	E.
1		
ł		
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1		1
ł		
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		۰.
-		F .
1		
1		E

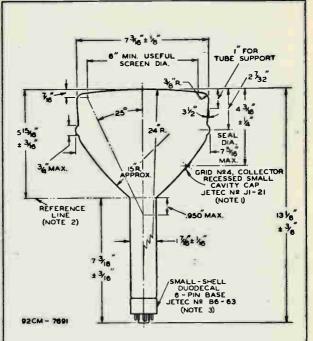
TUBE DEPARTMENT

FEB. 1, 1952

TIPA



MONITOR KINESCOPE



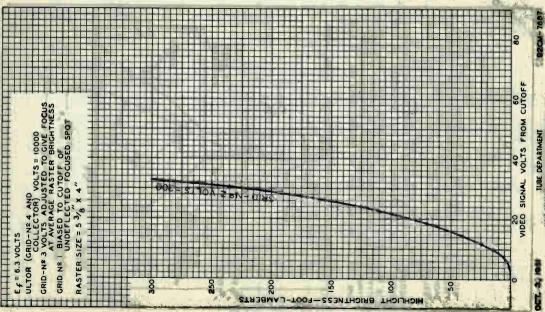
- NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN NO.6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND BULB TERMI-NAL BY AN ANGULAR TOLERANCE IMEASURED ABOUT THE TUBE AXIS OF ± 10°. BULB TERMINAL IS ON SAME SIDE AS PIN NO.6.
- NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE REFERENCE-LINE GAUGE (JETEC No.112) 1.500" + 0.003" - 0.000" 1.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 DIA-METER OF 1-778".

TIDA



7TP4

S 0 F 5 a ш Ù • œ. • Ĩ ົບ -DRIVE GRID ш C ∢ Ľ N



LVP31

Oscillograph Tube

HIGH DELFECTION ZENZITIVITY MEDINW-2HOBT-BEKZIZTENCE SCREEN ELECTROSTATIC DEFLECTION

The 7 VP31 is the same as the 797 share a solutioning items:

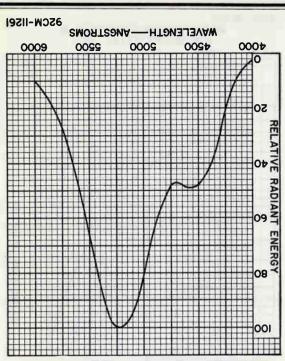
General:

(Jast	38	*2	60.1	da	H¥]	} .	1	101	S	LEN	nil	paj	A*	•	•	•	•	•	Phosphorescence.
Green																			
Green	•	•	٠	٠	•	٠	•	•	•	•	•	٠		•	•		•	•	Fluorescence .
TSd		•	•	•	•	•	•	•	•	•	-{*	-0	A. .!	ca	B	μţ,	(u)	ad	Phosphor (See accom

Time for initial brightness to decay to 10% point.

Phosphorescence may have a useful brightness for ever a minuse under combiosphorescence may have a useful brightness for ever a minustion.

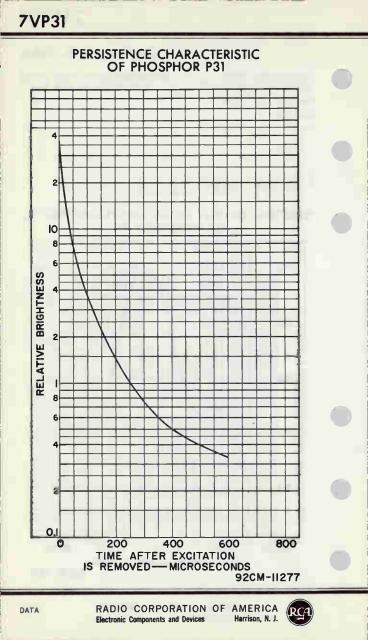
SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR P31



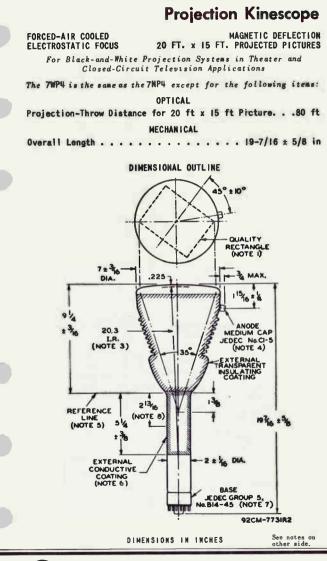
ATAG

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7WP4





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7WP4

Note 1: When viewed from the face of the tube, the minor axis of the 5 inch x 3-3/4 inch quality rectangle is located 45° ± 10° in a counter-clockwise direction from a plane through the anode terminal and the tube axis.

Note 2: Inside surface of faceplate within the quality rectangle may vary ± 0.006 inch from the apherical surface having a 15.315 inch radius (Type 7NP4 only).

Note 3: Inside surface of faceplate within the quality rectangle may vary \pm 0.006 inch from the spherical surface having a 20.3 inch radius.

Note 4: The plane through base Pin No.9 and the tube axis may vary from the plane through the anode terminal and the tube axis by an angular tolerance (measured about the tube axis) of \pm 70°. The anode terminal is on same side as Pin No.9.

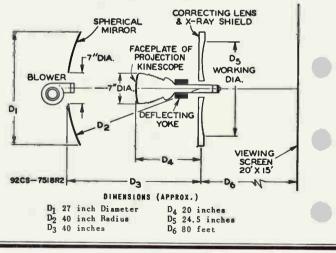
Note 5: Reference line is determined by position where gauge 2.100 inch \pm 0.001 inch I.D. and 3 inch long will rest on bulb cone.

Note 6: External conductive coating must be grounded.

Note 7: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Socket contacts for Pins 5, 6, 7, 8, 10, 11, 12, and13 should be removed in order to provide maximum insulation for Pin No.9. Note 8: Effective deflecting field must be within this space.

REFLECTIVE OPTICAL SYSTEM

Arrangement of Typical Optical System and Air-Cooling System for Theater-Television Projector Using Reflective Optical Principlés and 7WP4



DATA

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BORT

PICTURE TUBE

SMALL, COMPACT, RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

DATA

1	DATA		
General:			
Heater, for Unipotential G	athode:		
Voltage. Current. Capacitance between Extern tive Coating and Ultor.	6.3	ac or da	volts
Capacitance between Extern	0.0 ± 100		• • amp
tive Coating and Ultor .		∫350 max.	μµf
	4	(200 mm	
Faceplate, Spherical Phosphor (For Curves, see fro		Filte	rglass
Deflection Angles (Approx.	nt of this Section)	. P4-Sulfid	le lype
Diagonal			. 900
Horizontal			850
Vertical			 68°
Electron Gun	. Ion-Trap Type	Requiring Ex	ternal
Tube Dimensions:		Single-Field	Magnet
		. 10-7/16" +	5/16
Overall length		/8" + 1/16" -	1/32"
Greatest height	6-1/	16" + 1/16" -	- 1/32"
Greatest height Diagonal	8-7/	16" + 1/16" -	- 1/32"
Neck length		6-1/2" ±	: 3/16"
Radius of curvature of fa	aceplate		
(External surface)			. 27"
Screen Dimensions (Minimum Greatest width			-3/16
Greatest height			5-3/8"
Diagonal		7-	·13/16"
Projected area		35.5 s	q. in.
Operating Position Cap. Rec			- Any
Base .Dwarf-Shell Duodeca	essed Small Cavi	ty (JEIEC No.	J1-21)
Basing Designation for B	TTOM VIEW	Group 4, No.6	1248
			• 1244
Pin 1-Heater Pin 2-Grid No.1		Cap-Ultor	
Pin 3-Grid No.4	Z===]	Grid No	-2-
Pin 10-Grid No.2		(Grid No Grid No Collect	ori
Pin 11 - Cathode		C-External	
Pin 12-Heater		Conduct	
	00	Coating	
			1
Maximum Ratings, Design-Cer	ter Values;		
ULTOR VOLTAGE		8000 max.	volts
GRID-No.4 (FOCUSING) VOLTAG	F:		
Positive value		500 max.	
Negative value		500 max.	
GRID-No.2 VOLTAGE		300 max.	volts
		-Indicates a	change-
-58			DATA
ELECTRO	N TUBE DIVISION		UATA

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BOPA

9-58

PICTURE TUBE

	GRID-No.1 VOLTAGE:		
1			
	Negative-peak value	130 max.	volts
	Negative-bias value	100 max.	volts
	Positive-bias value	0 max.	volts
	Positive-peak value	Z max.	volts
	PEAK HEATER-CATHODE VOLTAGE:		
		100	
	Heater negative with respect to cathode.	180 max.	volts
	Heater positive with respect to cathode.	100 max	volts
	neater positive with respect to cathode.	TOO HIGH*	voits
			1
	Maximum Circuit Values:		
	O TIN A OTAL IN Destances	4 E	manahma
	Grid-No.1-Circuit Resistance	·XBM C.L	negonns

ELECTRON TUBE DIVISION

DATA

28 ·

31

8HP4

Monitor Kinescope

NO ION-TRAP MAGNET REQUIRED
RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 90° MAGNETIC DEFLECTION
Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 9 pf External conductive coating to anode
Heater Current at 6.3 volts 600 ± 60 ma Electron Gun
Optical: Phosphor (For Curves, see front of this Section)
Mechanical: 2.5 lbs Weight (Approx.) 9.94" ± .31" Neck Length 9.94" ± .31" Neck Length 6.00" ± .19" Projected Area of Screen .36 sq. in. External Conductive Coating:
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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C-External Conductive Coating



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8HP4

Maximum and Minimum Ratings, Absolute-Maximum Values:	
Unless otherwise specified, voltage val-	
ues are positive with respect to cathode	
Anode Voltage	volts
Positive value	volts
Negative value	volts
Grid-No.2 Voltage	volts
Grid-No.1 Voltage:	
Negative peak value	volts
Negative bias value 155 max.	volts
Positive bias value, 0 max.	volts
Positive peak value	volts
Heater Voltage	volts
[5.7 min.	volts
Peak Heater-Cathode Voltage: Heater negative with respect to cathode	volts
Heater positive with respect to cathode	volts
	VUILO
Typical Operating Conditions for Grid-Drive Service:	
Unless otherwise specified, voltage val-	
ues are positive with respect to cathode	
Anode Voltage	volts
Grid-No.4 Voltage 0 to 300	volts
Grid-No.2 Voltage	volts
Grid-No.1 Voltage for visual extinction of	
focused raster	volts
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max. m	egohns

For X-radiation shielding considerations, see sheet *I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES* at front of this Section.





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8NP4

Monitor Kinescope

Monitor Kinescope
NO ION-TRAP MAGNET REQUIRED Rectangular glass type aluminized screen Low-voltage electrostatic focus 90° magnetic deflection
Electrical:
Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf Heater Current at 6.3 volts 600 ± 30 ma Heater Warm-up Time (Average)
Optical:
Phosphor (For Curves, see front of this Section) P4-Sulfide Type,
Aluminized Faceplate
Mechanical:
Weight (Approx.) Weight (Appr
Maximum and Minimum Ratings, Design-Hazimum Values:
Unless otherwise specified, voltage val-
ues are positive with respect to cathode
Anode Voltage
Grid-No.4 Voltage: Positive value
Grid—No.1 Voltage: Negative peak value

RCA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 3-64

8NP4

Positive	e bias	value								0	max.	volts
Positive	e peak	value								2		volts
Heater Vol												volts
neater voi	tage .	•••	• • •	• •	• •		•		•	15 7	min.	volts
During not After Heater p respec	negativ t to c equip exceed equip cositiv t to c	ve wit cathoo ment ling 1 ment w re wit cathoo	h Warm- 5 sec Varm-u h le:	up p onds p pe	riod	:	•	• •	•	200	max.	volts volts
DC	IEU AC	and L	C VOI	Lage	• •	•		• •		200	max.	VOITS
UL COM	ponent	• •		• •		•	•	• •		100	max.	volts
	Oratin Unless ues ar	othe	rwise	spea	ifi	ed,	v	olt	age	val-		
Anode Volt	age.								1	6000		volts
Grid-No.4	Voltac	eª .								200		volts
Grid-No.2	Volta	e .				1		•••		300		volts
Grid-No.1	Voltag	e for	vien	al	• •		•	• •		200		VUILA
extincti					• •	•	•	• •	28	to-i	12	volts
Maximum Ci	rcuit	Value	:									
Grid-No.1	Circui	t Res	istan	ce.	• •	•	•			1.5	max. n	negohms
* The grid-A will have	o.4 vol a value	tage r anywh	equire ere be	d for	opti		fo	vol	of ts.	any i	ndivid	ual tube

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

> RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



8XP4

Test Picture Tube

NO ION-TRAP MAGNET REQUIRED Rectangular glass type aluminized screen Electrostatic self focus 90° Magnetic deflection
Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf Heater Current at 6.3 volts 600 ma Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Phosphor (For Curves, see front of this Section)P4-Sulfide Type, Aluminized Faceplate
Mechanical:
Weight (Approx.)
Pin 1 - Heater Pin 2 - Grid No.1 Pin 10 - Grid No.2, Grid No.4 Pin 11 - Cathode Pin 12 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector)
Maximum Ratings, Design-Nazimum Values:
Unless otherwise specified, voltage val-
ues are positive with respect to cathode Anode Voltage
Negative peak value. 220 max. volts Negative bias value. 155 max. volts Positive bias value. 0 max. volts Positive peak value. 2 max. volts



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

DATA 4-64

8XP4

Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	volts volts volts
Typical Operating Conditions for Cathode-Drive Service: Unless otherwise specified, voltage val- ues are positive with respect to Grid No. 1	
Anode Voltage	volts volts volts
Maximum Circuit Value: Grid-No.1-Circuit Resistance 1.5 max. m	egohms

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





8YP4

Test Picture Tube

NO ION-TRAP MAGNET REQUIREDALUMINIZED SCREENALUMINIZED SCREENIIO® MAGNETIC DEFLECTIONElectrical:Direct Interelectrode Capacitances:Cathode to all other electrodes	
Direct Interelectrode Capacitances: Cathode to all other electrodes	RECTANGULAR GLASS TYPE ALUMINIZED SCREEN
Cathode to all other electrodes	Electrical:
Phosphor (for curves, see front of this Section)P4—Sulfide Type, Aluminized Faceplate	Cathode to all other electrodes
Aluminized Faceplate	
<pre>Faceplate</pre>	Phosphor (For curves, see front of this section) P4-Sulfide Type,
Weight (Approx.)	Faceplate
Note and Length	Mechanical:
Maximum Ratings, Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage. 22000 Grid-No.2 and Grid-No.4 Voltage. 550 Grid-No.1 Voltage: 550 Negative peak value. 220 volts 155 volts volts volts 200 volts 0 volts 155 volts 155 volts 0 volts 0	Weight (Approx.) 2 lbs Overall Length 2 lbs Statematics 2 lbs Statem
Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage	
Anode Voltage. 22000 volts Grid-No.2 and Grid-No.4 Voltage. 550 volts Grid-No.1 Voltage: 220 volts Negative peak value. 220 volts Negative bias value. 155 volts Voltage: 0 volts	Unless otherwise specified, voltage values
Grid-No.2 and Grid-No.4 Voltage	
	Grid-No.2 and Grid-No.4 Voltage

RCA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

DATA 4-65

8YP4

Peak Heater-Cathode Voltage: Heater negative with				
respect to cathode:				
During equipment warm-up period				
not exceeding 15 seconds		450	volts	
After equipment-warm-up period		200	volts	
Heater positive with respect to cathode		200	volts	

Typical Operating Conditions for Cathode-Drive Service:

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

Anode Voltage.								16000	volts
Grid-No.2 and Grid-No.4 Voltag	je.							400	volts
Cathode Voltage for visual ext	tino	cti	ior	1					
of focused raster	•	•	•	•	•	•		42 to 78	volts

Maximum Circuit Value:

Grid-No.1-Circuit Resistance 1.5 megohms

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



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

9WP4

Picture Tube

LOW-GRID-No.2 VOLTAGE

PAN-O-PLY TYPE

90° MAGNETIC DE	FLECTION	
-----------------	----------	--

ELECTRICAL

Direct Interelectrode Capacitances

Lathode to all other electrodes 5	pF
Grid No.1 to all other electrodes 6	DF
External conductive coating to anode 300 min-750 max	DF
Heater Current at 12V	mA
Heater Warm-Up Time (Average)	8
Electron Gun	et

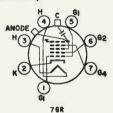
OPTICAL

MECHANICAL

Weight (Approx.).													3.1 lb
Overall Length	•••													8.28 max in
Neck Length														
Projected Area														
External Conduct	tiv	e C	oat	in	a ^a									
Type (see CRT						of	th	is	sec	ti	an	١.		Regular-Band
														aference Line

TERMINAL DIAGRAM (Bottom View)

Pin 1-Grid No.1 Pin 2-Cathode Pin 3-Heater Pin 4-Heater Pin 5-Grid No.1 Pin 6-Grid No.2 Pin 7-Grid No.4 Cap-Grid No.3, Grid No.5, Screen, Collector C-External Conductive Coating



MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES

Voltages d	ir e	p	08	i t	iν	e	#i:	th	r	espect to cathode	
										8000 min-12000 max	¥
Grid-No.4 Voltage											
Positive value .											٧
Negative value .											¥
Grid-No.2 Voltage.	•			•	•	•	•			75 min-250 max	¥



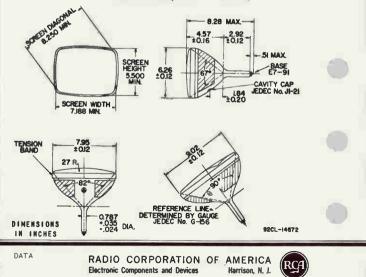
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9WP4

rid-No.I Voltage	
Negative peak value	V
Negative bias value	V
Positive bias value 0 max	Y
Positive peak value	Y
mater Voltage 10.8 min-13.2 max	V
ak Heater-Cathode Voltage	
Heater negative with respect to cathode:	
During equipment warm-up period≤ 15 s 450 max	V
After equipment warm-up period 200 max	w.
Heater positive with respect to cathode:	
Combined AC & DC voltage 200 max	W
DC component 100 max	v
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE Voltages are positive with respect to grid No.1	
ode Voltage	v
id-No.4 Voltage 0 to 300	v.
id-No.2 Voltage	Ý
thode Voltage	v
For visual extinction of focused raster	
eld Strength 0 to 8	8
Of required adjustable centering magnet	
MAXIMUM CIRCUIT VALUE	
NAXINUM CIRCUIT VALUE	MΩ

a includes implosion protection hardware.

DIMENSIONAL OUTLINE (BULB J71-1/2 BI)





MONITOR KINESCOPE

ALUMINIZED SCREEN

ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

105PH

DATA

General:		
Heater, for Unipotential Cathode: Voltage	ac or de	
Grid No.1 to all other electrodes Cathode to all other electrodes	5	µµ⊥f µµ⊥f
Faceplate, Spherical	P4-Sulfid	rglass 76 % + e Type inized
Fluorescence		.White .White .Short
Deflection Method	Ma	gnetic 50°
Overall Length	. 1D-1/2" ±	1/16" +
Picture Size (Within minimum useful screen Weight (Approx.) Operating Position Cap Recessed Small Cavit		10 lbs 🕳
Cap	in (JETEC No.	•••J84 • • 86-63)
	n 12 - Heater Çap - Ultor (Grid N Collec	0.4, tor)
Maximum Ratings, Design-Center Values:		
ULTOR VOLTAGE	20000 max. 3000 max. 410 max.	volts + volts + volts
Negative bias value	125 max.	volts
Positive bias value		
Positive peak value	2 max.	volts
Heater negative with respect to cathode: During equipment warm-up period		
not exceeding 15 seconds		volts
After equipment warm-up period Heater positive with respect to cathode.	180 max. 180 max.	volts volts
	-indicates a	
8-57 ELECTRON TUBE DIVISION		DATA

8-57



MONITOR KINESCOPE

Equipment Design Ranges:

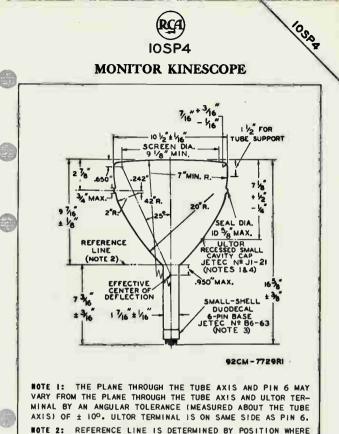
105PA

For any ultor voltage (E_{cy}) between 10000° and 20000 volts and grid-No.2 voltage (E_{cy}) between 150 and 410 volts Grid-No.3 Voltage for focus with ultor 11.7% to 15.9% of Ec. current of 100 µa. volts Grid-No.1 Voltage for visual extinction of 9% to 24% of Ec. 8" x 6" raster . . . volts Maximum Grid-No.3 Current** See Curves Grid-No.2 Current. . . -15 to +15 μa Field Strength of Adjustable Centering Magnet Q to 8 dausses Examples of Use of Design Ranges: For ultor voltage of 12000 14000 volts and grid-No.2 voltage of 200 200 volts Grid-No.3 Voltage for focus with ultor current of 100 µa. 1400 to 1900 1640 to 2225 vol ts Grid-No.1 Voltage for visual extinction of 8" x 6" raster -18 to -48 -18 to -48 volts 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 10,000 volts. ** Grid-No.3 current increases as the ultor voltage is decreased. For I-ray shielding considerations, see sheet I-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section

-Indicates a change.

DATA

8-57



ROTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE REFERENCE-LINE GAUGE (JETEC No.112) 1.500" + 0.003" -0.000" 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 I-7/B".

NOTE 4: TUBE SUPPORT MUST BE KEPT AT LEAST 2" AWAY FROM BULB TERMINAL.

ELECTRON TUBE DIVISION

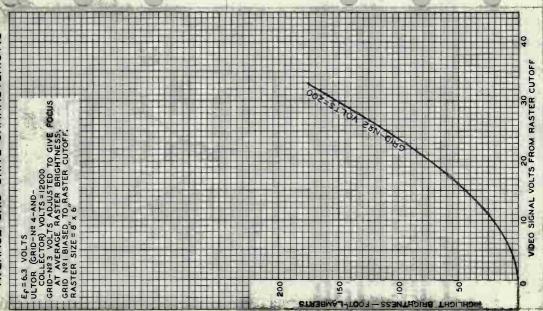
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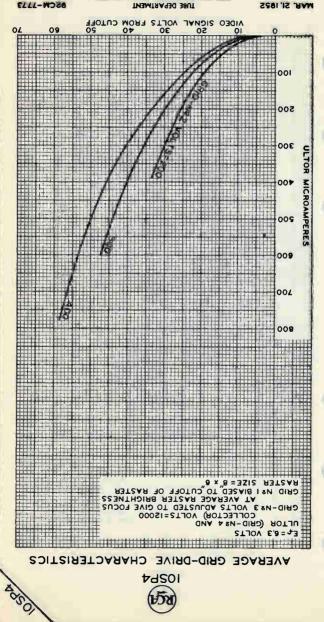
UL RIS' TE AC È 4 I Ū -DRIVE GRID AVERAGE



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TUBI

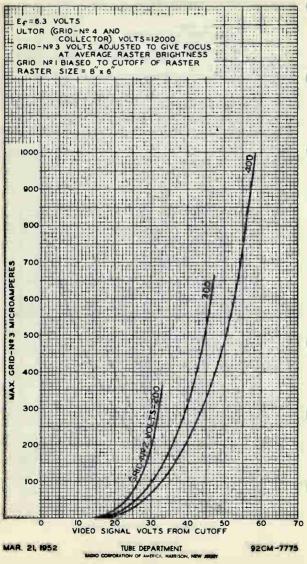
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10584

GRID-DRIVE CHARACTERISTICS



11CP4

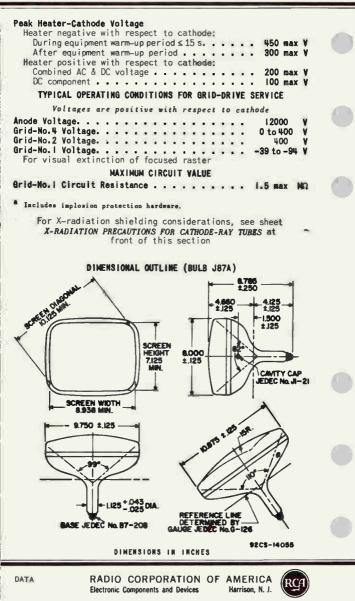
Picture Tube

PAN-O-PLY TYPE
110° MAGNETIC DEFLECTION LOW-VOLTAGE ELECTROSTATIC FOCUS
Oirect Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode 500 min-750 max pF Heater Current at 6.3 V 450 ± 20 mA
Heater Warm-Up Time (Average)
Electron Gun
OPTICAL
Phosphor
For curves, see front of this section
Faceplate
MECHANICAL
Weight (Approx.)
Overall Length 8.785 ± .250 in Neck Length
Projected Area of Screen
External Conductive Coating
Type (See CRT OUTLINES 1 at front of this section) Regular-Band
Contact area for grounding Near Reference Line Cap Recessed Small Cavity (JEDEC No.JI-21)
Base Small-Button Neoeightar 7-Pin,
Arrangement I, (JEDEC No. 87-208)
TERMINAL OIAGRAM (Bottom View)
Pin 1 - Heater ANODE Pin 2 - Grid No.1 G4
Pin 3-Grid No.2
Pin 4 - Grid No.4
Pin 6-Grid No.1 Pin 7-Cathode
Cap - Anode (Grid No. 3, Grid G
No.5, Screen, Collector)
C-External Conductive
Coating 8HR
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES
Voltages are positive with respect to cathode
Anode Voltage 8000 min-15000 max V
Grid-No.4 Voltage Positive value
Negative value
Grid-No.2 Voltage 200 min-550 max V
Grid-No.1 Voltage
Negative peak value
Positive bias value
Positive peak value
Heater Voltage 5.7 min-6.9 max V



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 6-66

11CP4



11GP4

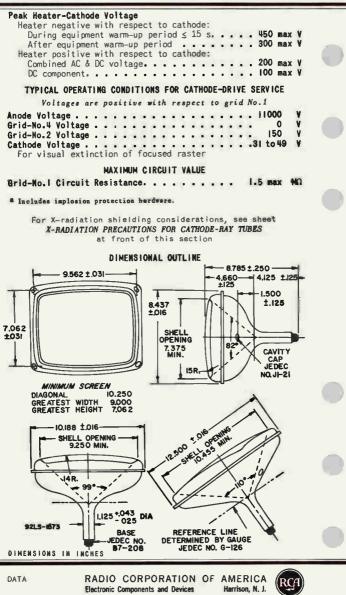
Picture Tub	e
FILLED-RIM TYPE	
110° MAGNETIC DEFLECTION INTERMEDIATE-GRID-No.2 VOLTAG	äŁ
Grid No.1 to all other electrodes	pF pF mA s et
Phosphor	
Faceplate	
	1
MECHANICAL	
Weight (Approx.). 5 Overall Length	in in in
Base Small -Button Neoeightar 7-Pir	2
Arrangement I, (JEDEC No. 87-208	
TERMINAL DIAGRAM (Bottom View)	· ·
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.4 Pin 6 - Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating	
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
Voltages are positive with respect to cathode	
Anode Voltage	۷
Positive value	٧
Negative value	٧
Grid-No.2 Voltage	¥
Negative peak value	v
Negative bias value	¥.
Positive bias value 0 max	Ŷ.
Positive peak value	٧
Heater Voltage 5.7 min-6.9 max	V

RCA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

DATA 2-67

11GP4



11HP4A

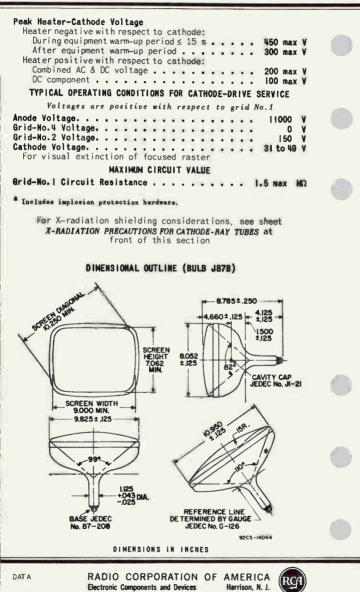
Picture Tube

	liciole lobe
PAN-O-PLY TYPE	
110° MAGNETIC DEFLECTION LOW-VOLTAGE	ELECTROSTATIC FOCUS
Direct Interelectrode Capacitances	
Cathode to all other electrodes	5 pF
Grid No.1 to all other electrodes.	
Sutereal apaduation and in the sector	
External conductive coating to anode	500 min-/50 max pF
Heater Current at 6.3 V	
Heater Warm-Up Time (Average)	. II 8
Electron Gun	ig No Ion-Trap Magnet
OPTICAL	
Phosphor	ide Type, Aluminized
For curves, see front of this section	100 17pc, ATUMTIT200
Faceplate	Filteralese
Light transmission at center (approx.).	52¢
MECHANICAL	Jz,
Weisha (Assauly)	
Weight (Approx.)	• • • • • • • • • • • • • • • • • • •
Overall Length	8.785 ± .250 in
Neck Length.	• • 4.125 ± .125 in
Projected Area of Screen	60 sq in
External Conductive Coating ^a	
Type (See CRT OUTLINES at front of this section	Regular-Band
Contact area for grounding	Near Reference Line
Cap Recessed Small Cav	ity (JEDEC No.JI-21)
Base Small-Butt	on Neoeightar 7-Pin,
Arrangement	1, (JEDEC No. B7-208)
TERMINAL DIAGRAM (Bottom	View)
Pin 1-Heater	·
Pin 2-Grid No.1	GA ANODE
Pin 3-Grid No.2	C C
Pin 4 - Grid No.4 G2	
Pin 6 - Grid No.1	GK L===1° X6°'
Pin 7 - Cathode	
Pin 8 - Heater	anh
Cap - Anode (Grid No. 3, Grid G	
No.5, Screen, Collector	
C - External Conductive	() • (8)
Coating	H SHR H
3	•
MAXIMUM AND MINIMUM RATINGS, DESIGN	
Voltages are positive with respec	
Anode Voltage	000 min-15000 max V
Positive value	IIOO max V
Negative value	550 max V
Grid-No.2 Voltage	100 min-250 max V
STID-NO. I VOITAGE	
Nontine and up)	
Negative peak value	220 max V
Negative peak value	155 max V
Negative peak value	155 max V O max V
Negative peak value. Negative bias value. Positive bias value. Positive peak value.	155 max V O max V 2 max V
Negative peak value. Negative bias value. Positive bias value. Positive peak value.	155 max V O max V
Negative peak value. Negative bias value. Positive bias value. Positive peak value.	155 max V O max V 2 max V

RCA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 6-66

11HP4A



12BNP4A

Picture Tube

	PAN-O-PLY TYPE	LOW-VOLTAGE ELECTROSTATIC FOC	US
	NO ION-TRAP MAGNET REQUIRED	IIO ^O MAGNETIC DEFLECTI	ON
	Direct Interelectrode Capacit Cathode to all other elect Grid No.1 to all other elect External conductive coating	rodes 5 ctrodes 6	PF PF PF
	Heater Current at 6.3 V Heater Warm-up Time (Average	450 ± 20)	mA 8
		Type Requiring No Ion-Trap Magne	et
		PTICAL	
	Phosphor	P4—Sulfide Type, Aluminiz	ed
-	Faceplate	Filtergla	88
	Light transmission at cente	er (Approx.) 4	9%
	MEC	HANICAL	
	Weight (Approx.)	5	
		9.348 ± .250	
		· · · · · · · · · · · · · · · · · · ·	
	External Conductive Coating		
	Type (see CRT OUTLINES 1 at front Contact area for grounding	of this section) Regular-Ba	nd
	Cap	ed Small Cavity (JEDEC No.JI-2	1)
	Base	Small-Button Neoeightar 7-Pi	n,
	Basing Designation for BOTTO	Arrangement I, (JEDEC No.87-20 4 VIEW	
		ANODE	
	Pin 1-Heater G4(4)	C Cap - Anode	
	Pin 2-Grid No.1 G2	Grid No.3.	
	Pin 3-Grid No.2	Grid No.5, Screen.	
	Pin 6-Grid No.1	Collector)	
	Pin 7-Cathode Gi	C - External Conductive	
	rin o-heater	(8) Coating	
	н	н	
	MAXIMEM AND MENTMEM RATE	INGS, DESIGN-MAXIMUM VALUES	
-		with respect to cathode	
	Anode Voltage		v
	Grid-No.4 Voltage		
	Positive value	100 max	¥
	Negative value		¥
	Grid-No.1 Voltage		
	Negative peak value		Y
	Negative bias value Positive bias value	155 max	¥.
	Positive peak value		v



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 9---65

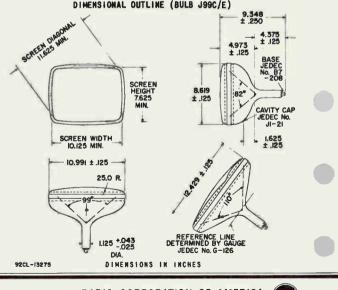
12BNP4A

Heater Voltage	۷
During equipment warm-up period≤15 sec. 450 max	V
After equipment warm-up period 300 max Heater positive with respect to cathode:	۷
Combined AC & DC voltage	٧
DC component	V
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Voltoges are positive with respect to grid No.1	
	٧
Anode Voltage	V
Anode Voltage	V V
Anode Voltage 13000 Grid-No.4 Voltage 100 Grid-No.2 Voltage 140	V V V V
Anode Voltage	V V V V
Anode Voltage 13000 Grid-No.4 Voltage 100 Grid-No.2 Voltage 140	6 7 8

MAXIMUM CIRCUIT VALUE

Includes implosion protection hardware.

^b The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between -100 and +300 volta with the combined cathode voltage and video-signal voltage adjusted to give sm mode current of 75 microamperes on a 6-3/4-inch by 9-inch pattern from an RCA-2F21 monoscope, or equivalent.



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

RC

DATA

14WP4

Picture Tube

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 90° MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time GENERAL DATA Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes . . . 5 of Grid No.1 to all other electrodes . . . 6 pf External conductive coating to anode. . {1200 max. 800 min. pf pf Heater Current at 6.3 volts . 600 ± 30 ma Heater Warm-Up Time (Average) . . . 11 seconds Electron Gun. Type Requiring No Ion-Trap Magnet Optical: Phosphor (For curves, see front of this section). P4-Sulfide Type, Aluminized Light transmission (Approx.). Mechanical: Weight (Approx.). 8.5 lbs 13-3/16" ± 5/16" Neck Length 5-1/2" ± 3/16" Projected Area of Screen. 104 sq. in. External Conductive Coating: Contact area for grounding. Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J112 A/B sheets at front of this section Small-Shell Duodecal 6-Pin (JEDEC Group 4, No. B6-63) Short Small-Shell Duodecal 6-Pin (JEDEC No.B6-203) Basing Designation for BOTTOM VIEW. 121 G4 Pin 1-Heater (6 ANODE Cap - Anode Pin 2-Grid No.1 (Grid No.3, Pin 6-Grid No.4 Grid No.5. Pin 10 -Grid No.2 Screen. Pin 11 - Cathode Collector 10)62 CL Pin 12 -Heater C-External Conductive Coating



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 4-63

14WP4

Maximum and Minimum Ratings, Design-Haximum Values: Unless otherwise specified, voltage val- ues are positive with respect to cathode	
ANODE VOLTAGE	volts
1002 VOLTAGE	volts
GRID-No. 4 (FOCUSING) VOLTAGE:	
Positive value	volts
Negative value	volts
GRID-No. 2 VOLTAGE	volts
Negative peak value	volts
Negative bias value 200 max.	volts
Positive bias value 0 max.	volts
Positive peak value 2 max.	volts
HEATER VOLTAGE	volts
HEATER VOLIAGE	volts
Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode: Combined AC and DC voltage 200 max. DC component	volts volts volts volts
Typical Operating Conditions for Grid-Drive Service:	
Unless otherwise specified, voltage val-	
ues are positive with respect to cathode	
Anode Voltage	volts
Grid-No.4 Voltage	volts
Grid-No.2 Voltage	volts
focused raster	volts
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max.	megohms
For X-radiation shielding considerations, see she I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section	et

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



15AEP22

Color Picture Tube

This data sheet is to be used in conjunction with data for RCA-15NP22

For general data, maximum and minimum ratings, equipment design ranges, limiting circuit values, and terminal diagram of the 15AEP22, refer to 15NP22 except as noted below.

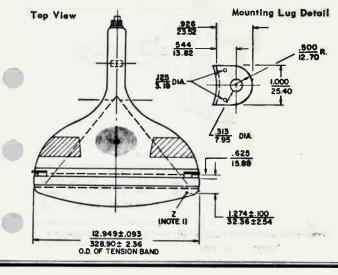
MECHANICAL

Tube Dimensions (excluding mounting lugs):

Diagonal	14.910 ± .093 in (378.21 ± 2.36 mm)
Greatest width	12.949 ± .093 in (328.90 ± 2.36 mm)
Greatest height (including tension- band clip)	
Weight (Approx.)	11.3 lb (5.1 kg)

DIMENSIONAL OUTLINE

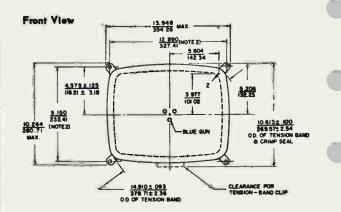
Dimensions shown are only those which are different from the corresponding dimensions for the 15NP22.



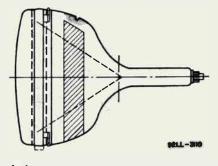
Electronic Components

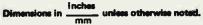
DA TA 2-70

DIMENSIONAL OUTLINE (Cont'd)









RBA Electronic Components

Note 1: "Z" is located on the outside surface of the faceplate, on the screen diagonal at a point .094 in (2.39 mm) beyond the minimum screen. This point is used as a reference for the mounting lugs.

Note 2: The tolerance of the mounting lug holes will accommodate mounting screws up to 0.250 in (6.35 mm) in diameter when positioned on the true hole centers.

DATA



TRICOLOR KINESCOPE

THREE-GUN SHADOW-MASK TYPE ELECTROSTATIC CONVERGENCE

General:

ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

15 GP 22

DATA

	General:
	Electron Guns, Three Blue, Green, Red Heater, for Unipotential Cathode of Each Gun,
	Heater, for Unipotential Cathode of Each Gun.
	Paralleled with Each of the Other Two
	Heaters within Tube:
	Voltage (AC or DC) 6.3 volts Current
1	Direct Interelectrode Capacitances(Approx.):
	Grid No.1 of Any Gun to All Other
	Electrodes Except the No.1 Grids
	of the Other Two Guns 7.5 white
1	Cathode of Blue Gun + Cathode of
1	Green Gun + Cathode of Red Gun
	to All Other Electrodes 17.5 mult
	Grid No.3 (Of Each Gun Tied within
	The terms of Celde of Other Two
	Tube to No.3 Grids of Other Two
	Guns) to All Other Electrodes 12 Huf
	Grid No.4 (Common to the Three
	Guns) to All Other Electrodes 7 Huf
1	External Conductive Coating to Ultor. {3000 max. #4f
	External conductive coating to ultor (1500 min. Heref
	Faceplate, Spherical
1	Server Elett
1	Type Metal-Backed, Tricolor, Phosphor-Dot
	Plate Filterglass
	Light Transmission (Approx.)
	Size (Rounded Sides-See Dimensional
ł	Outline) 11-1/2" x 8-5/8"
1	Out (ine) 11-1/2 x0-0/0
1	Area
	Phosphor (Three Separate Phosphors, collectively)
	Fluorescence and Phosphorescence of
ų	Separate Phosphors, respectively Blue, Green, Red
	Persistence of Group Phosphorescence Medium
	Persistence of Group Phosphorescence Medium Dot Arrangement Approx. 195,000 triangular groups,
ł	each consisting of blue dot, green dot,
	and red dot (total of 585.000 dots)
	Focusing Method and red dot (total of 585,000 dots)
	Convergence Method Electrostatic
	Deflection Method Magnetic
	Deflection Angles (Approx.):
	Deflection Angles (Approx.):
1	Horizontal
	Vertical
1	Tube Dimensions:
	Maximum Overall Length
	Greatest Diameter:
1	At faceplate
1	At metal flange
1	Greatest Diameter: 14-5/8"±5/32" At faceplate 15-3/4" max. Weight 25 lbs

MARCH 1, 1954

TUBE DEPARTMENT



150822

TRICOLOR KINESCOPE

Maunting Proition		Any
Mounting Position	Metal	Flange
Bulb	· Motori	J126
Base Small-Shell Bidecal 14-Pin (J	FTEC No. 81	4-103)
BOTTOM VIEW		
	0-14 4- 0	
	Grid No.2	
Pin 2: Cathode	of Green	
	Grid No.4	
	Grid No.2	
of Red Gun	of Blue Grid No.1	
Pin 4: Grid No.2 of Red Gun Pin 18:	of Blue	
	Cathode o	
Connection	Blue Gun	
Pin 6: Grids No.3 Pin 20:		
	lange: Ult	or
of Green Gun	(Grid No	
Pin 8: Grid No.1	Grid No	
of Green Gun	Collect	
Maximum Ratings, Design-Center Volues:		
	0000	volts
DETON FORTAGE	0000 max. 15≢max.	watts
ULTOR INPUT	1000 max.	volts
GRID-ROLT TOLINGE	5000 max.	volts
GRID-No.3 VOLTAGE	5000 max.	volts
GRID-No.2 VOLTAGE (Each Gun)	500 max.	VUIUS
GRID-No.1 VOLTAGE (Each Gun):	200 max.	volts
Negative bias value	0 max.	volts
Positive peak value	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE (Each Gun):	2 110010	
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
neater positive with rospost to pathons		
Equipment Design Ranges:		
For ultor voltage (Ecg) of 18000 to 20	ooo volts	
Grid-No.4 (Converging		
Electrode) Voltaget 42.5% to 51	S of Ecs	volts
Grid-No.3 (Focusing		
Electrode) Voltage 12% to 19%	of Ecs	volts
		applied
• The "ultor" in a cathode-ray tube is the electrode the highest dc voltage for accelerating the electro to its deflection. In the 156P22, the ultor funct grid No.5. Since grid No.5, grid No.6, and collect tether within the tube, they are collectively re "ultor", for convenience in presenting data and cur	ns in the be	am prior
to its deflection. In the 15GP22, the ultor funct	ion is perf	ormed by
grid No.5. Since grid No.5, grid No.6, and correct	ferred to s	imply as
"ultor", for convenience in presenting data and cur	ves.	
f This value is the product of ultor voltage and aver at the ultor terminal with a dc anameter.	age current	measured
at the ultor terminal with a or answerder		
t See next page.		
	TTATAT	DATA
MARCH 1, 1954 TUBE DEPARTMENT	TENTATIVE	DAIA 1
RADIO CORFORATION OF AMERICA, HARRISON, NEW JERS	EY	



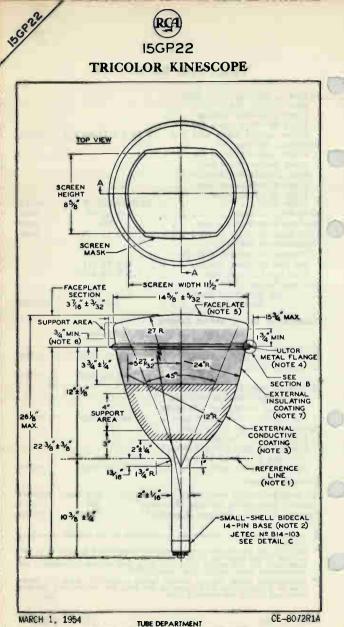
150022

TRICOLOR KINESCOPE

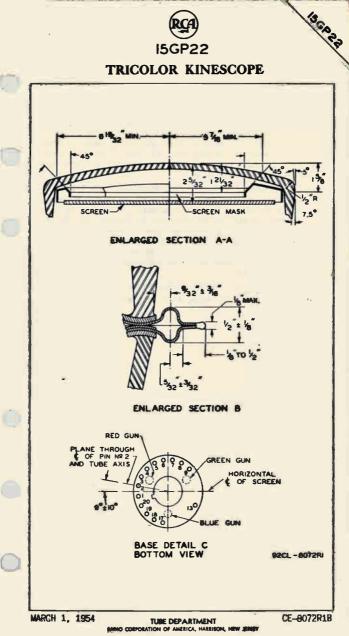
	Grid-No.2 Voltage (Each Gun)		
	when circuit design uti-		
	lizes grid-No.1 Voltage		1
	(Ec1) at fixed value for		
		2 to 4.5 times Ec1	volts
	Grid-No.1 Voltage for		
	Visual Extinction of Fo-		
	cused Raster (Each Gun)		1
	when circuit design uti-		
	lizes grid-No.2 voltage		
	(E _{c2}) at fixed value (each gun)		
		22.5% to 50% of Ec2	volts
	Grid-No.4 Current	-5 to +5	µamp
	Maximum Grid-No.3 Current	300	µamp
	Grid-No.2 Current	-15 to +15	µamp
	Beam-Current Ratio to		
	Produce Illuminant-C White:		
1	Red Gun to Green Gun	4:1 to 1:1	- 1
	Blue Gun to Green Gun	1.5:1 to 0.5:1	
	Maximum Raster Shift in		
ł	Any Direction from	4. 4 FAL	inches
	Screen Center	1-14 (2),52	Inches
1	Examples of Use of Design Ranges	Faller / in	t i
	For ultor voltage		
		.,	-
	Grid-No.4 (Converging		volts
1	Electrode) Voltaget	8500 to 10200	VOILS
1	Grid-No.3 (Focusing Electrode)	2400 + 2000	volts
	Voltage	2400 to 3800	VULLS
	Grid-No.2 Voltage (Each Gun)		
	when circuit design utilizes	NY	
	grid-No.1 voltage of -70 volts	and a Port	
	for raster cutoff (each gun) .	140 to 315	volts
	Grid-No.1 Voltage for Visual		
5	Extinction of Focused Raster		
ł	(Each Gun) when circuit design	F G C C	
	utilizes grid-No.2 voltage of	.45 ** 100	volts
	200 volts (each gun) =	-45 to -100	TUTES
	Circuit Values:		1
	Grid-No.1-Circuit Resistance (Ea	ch Gun) 1.5 mex.	megohims
	Dynamic Converging Voltage (Appr	·ox.)** 900	volts
	Dynamic Focusing Voltage (Approx	.)**	volts
	This range does not include the dc	component of the dynamic of	anverging
1	voltage.		
	Centering of the required value throw	ah each pair of deflecting	coils to
	Centering of the raster on the scree current of the required value throw compensate for the raster shift res- convergence, color purity, and conc	ulting from optimum adjust	ments for
-	tonvergence, color purity, and conce	baying essentially parabo	lic wave-
	Peak-to-peak value. This ac voltage form is synchronized with scanning	and does not include any	voltage
1	developed during the blanking time.		
1		in the second second	
	MARCH 1, 1954 TUBE DEPA	RTMENT TENTATIV	E DATA 2

PORATION OF AMERICA, HARRISON, P

1



TUBE DEPARTMENT RADIO ODRPORATION OF AMERICA, HARRISON, NEW JERSEY





TRICOLOR KINESCOPE

- NOTE I: REFERENCE LINE IS DETERMINED BY POSITION WHERE A CYLINDRICAL GAUGE 2.400" ± 0.001" I.D. WHICH IS HELD CONCENTRIC WITH TUBE NECK AXIS WILL REST ON FUNNEL.
- NOTE 2: 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 FACEPLATE-SECTION AXIS AND HAVING A DIAMETER OF 3".

NOTE S: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

- NOTE I METAL FLANGE OPERATES AT HIGH VOLTAGE. ADEQUATE INSULATION MUST BE PROVIDED BETWEEN THE FLANGE AND ANY GROUNDED ELEMENT IN THE RECEIVER TO PREVENT THE POSSI-BILITY OF ELECTRICAL LEAKAGE INCLUDING CORONA.
- NOTE 5: MASK MATERIAL BEARING ON THE FACEPLATE MUST HAVE INSULATING QUALITIES ADEQUATE FOR ONE HALF THE APPLIED ULTOR VOLTAGE TO MINIMIZE SURFACE LEAKAGE BETWEEN METAL FLANGE AND MASK.
- NOTE 6: TUBE SHOULD NOT BE SUPPORTED IN THIS AREA.
- NOTE 7: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

156922

CE-8072R1C

16BGP4

Picture Tube

PAN-O-PLY - INTEGRAL IMPLOSION PROTECTION

FAR-O-FET - TRIEGRAE THE EGITOR PROTECTION
(Provided by Formed Rim and Welded Tension Bands around Periphery of Tube Panel No Separate Safety-Glass or Integral Protective Window Required) RECTANGULAR GLASS TYPE ALUNINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4 ^O MAGNETIC DEFLECTION NO ION-TRAP MAGNET REQUIRED
Electrical:
Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 pf Cathode to all other electrodes 5 pf External conductive coating to anode ^a . {1300 max. pf 800 min. pf
Heater Current at 6.3 volts 450 ± 20 ma Heater Warm-Up Time (Average) 11 seconds Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Phosphor (Far curves, see front of this Section) P4-Sulfide Type
Aluminized
Faceplate
Mechanical:
Weight (Approx.)



RADIO CORPORATION OF AMERICA Electronic Components and Devices

DATA 4-65

16BGP4

	ar	e pi	120							פעו			•				
node Vol	tage .														20000	max.	volt
Grid-No.4	Volta														12000	n8in.	volt
Positiv															1100	max.	volt
Negativ				1	÷							1				max.	volt
Grid-No.2															(550	max.	volt
110-10.2	voita	ye .	• •	•	•		•	•	•	•	•	•	•	•	1200	min.	volt
rid-No.1	Volta	ge:															
Negativ	e peak	va	lue													max.	volt
Negativ																max.	volt
Positiv																max.	
Positiv	e peak	va	lue				•	•		•			•	•		max.	
leater Vo	Itage.															max.	volt
																	volt
Heater Durin not After	negati g equi excee equip	ve v prmen ding men	wit nt g 1 t w	hi wai 5 : arr	re: rm- seo	spe -up	p p nd: pe	pel s. er	io	bd 1	•	•	de	:	450	min. max. max.	
Heater Durin not After Heater Peak	negati g equi excee equip	ve v pmen ding men ve v	wit nt g 1 t w wit	hi wai 5: arr hi	re: sec n-i re:	spe -ui coi up spe	pect nds pect	er t	ioc	bd 1. Ca	at	•	de	:	450 300 200	max.	volt
Heater Durin not After Heater Peak DC co	negati g equi excee equip positi value. mponen	ve v pme din men ve v	wit nt g 1 t w wit	hi wai 5 : arr hi	re: seo n-i re:	spe -up spe	ect nds pect	er t	ioc	bd 1. ca	at	hor	de		450 300 200 100	max. max. max. max.	volt volt volt
Heater Durin not After Heater Peak DC co	negati g equi excee equip positi value. mponen perati Unless	ve v prme din men ve v t. ng (wit g 1 t w wit Con	hi wai 5: arr hi dii	rei rm- sei m-i re: • •	spe -uj coi up spe	p i nd: pe ec'	foi	fictorio (cated	at	hor od	de de le	Dr ag	450 300 200 100 ive Se e valu	max. max. max. max. rvice	volt volt volt
Heater Durin not After Heater Peak DC co	negati g equi excee equip positi value. mponen perati Unless are	ve v prmei men ve v t. ng (wit g 1 t w wit Con her iti	h i wai 5 : arr h i di wi ve	re: rm- sec m-i re: • •	spe -up spe on: s	pector polypector pector pector h	foi re	ric ioc to fi	od Gai ed	at th	hor od	de de lt	Dr ag	450 300 200 100 ive Se e valu d No.1	max. max. max. rvice	volt: volt volt
Heater Durin not After Heater Peak DC co ypical 0 mode Vol	negati g equi excee equip positi value. mponen Unless are tage.	ve v pmen men ve v t. ng (wit g 1 t w wit Con her	h i wai 5 : arr h i dii wi ve	rei rm- sei m-i re: tii	spe -uj coi up spe	pecting pectin	for	fi (od Gal ed ec	at th	od vo	de de lt	Dr ag ri	450 300 200 100 ive Se e valu d No.1	max. max. max. max. rvice	volt volt volt
Heater Durin not After Heater Peak DC co ypical 0	negati g equi excee equip positi value. mponen Unless are tage. Volta	ve v pme din men ve v t. ng (pos geb	wit nt g 1 t w wit Con her iti	h i wai 5 : arr h i dii wi ve	re: rm- re: re: tio	spe -uj coi up spe	pe pe b b	for	fi (od Gal ed ec	at the	od vo	de de lt g	Dr ag ri	450 300 200 100 ive Se e valu d No.1	max. max. max. rvice ses	volt: volt: volt: volt: volt:
Durin not After Heater Peak	negati g equi excee equip positi value. mponen Unless are tage. Volta Volta	ve v prmei din men ve v t ng (pos geb	wit nt g 1 t w wit Con her iti	h i wai 5 : arr h i dii ve	re: rm- sec m-i re: tic se	spe -up spe	ection of the section	foi re	fi sp	cal ed	at ith	od vo to	de de lt g	Dr ag ri	450 300 200 100 ive Se e valu d No.1	max. max. max. rvice 6000 100 300	volt volt volt volt volt
Heater Durin not After Heater Peak DC cc ypical 0 mode Vol irid-No.4 arid-No.2 cathode V of focu	negati g equi excee equip positi value. mponen perati <i>Unless</i> are tage. Volta Volta oltage ised ra	ve v pmen men ve v t. ng (pos ge ^b ge ^b ge ^c fo ste	wit nt g 1 t w wit Con her iti	h i wai 5 : arr h i ve is:		on: spe	pectinds pectinds pectinds pech	for for tin	fi octo	cal ed	th th	vo to	de 	Dr ag ri	450 300 200 100 ive Se e valu d No.1	max. max. max. rvice 6000 100 300	volt volt volt volt
Heater Durin not After Heater Peak DC co ypical 0 ypical 0 irid-No.4 irid-No.2 irid-No.2 irid-No.2	negati g equi excee equip positi value. mponen perati <i>Unless</i> are tage. Volta Volta voltage ised ra ength	ve v pme din men ve t t pos ge ge ge fo ste of	wit nt g 1 t w wit	h i wai 5 : arr h i ve is:	rei m-i rei tii se	on: spectrup	pection of the section of the sectio	for for full	fi spi	ed ed et iii	th th	od vo	de lt ge	Dr ag ri	450 300 200 100 ive Se e valu d No.1 . 1 . 28	max. max. max. rvice ess 6000 100 300 to 60	volt volt volt volt volt volt volt
Heater Durin not After Heater Peak DC cc ypical 0 mode Vol irid-No.4 arid-No.2 cathode V of focu	negati g equi excee equip positi value. mponen perati <i>Unless</i> are tage. Volta Volta voltage ised ra ength	ve v pme din men ve t t pos ge ge ge fo ste of	wit nt g 1 t w wit	h i wai 5 : arr h i ve is:	rei m-i rei tii se	on: spectrup	pection of the section of the sectio	for for full	fi spi	ed ed et iii	th th	od vo	de lt ge	Dr ag ri	450 300 200 100 ive Se e valu d No.1 . 1 . 28	max. max. max. rvice ess 6000 100 300 to 60	volt volt volt volt volt
Heater Durin not After Heater Peak DC co 'ypical O 'ypical O Anode Vol Grid-No.4 Arid-No.2 Athode V of focu	negati g equi excee equip positi value. mponen Unless are tage. Volta Volta voltage ised ra ength ng mag	ve i pme din men ve t t pos ge ge fo ste of net	wit nt g 1 t w wit	di is	rei m-i rei tii se	on: spectrup	pection of the section of the sectio	for for full	fi spi	ed ed et iii	th th	od vo	de lt ge	Dr ag ri	450 300 200 100 ive Se e valu d No.1 . 1 . 28	max. max. max. rvice ess 6000 100 300 to 60	volt volt volt volt volt volt volt

The grid-No.4 voltage required for optimum focus of any individual tube will have avalue anywhere between -100 and +300 volts with the combined cathode voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 9-inch by 12-inch pattern from an RCA-2F21 monoscope, or equivalent.

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

DATA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



16CHP4A

Picture Tube

PAN-O-PLY TYPE 114 ⁰ Magnetic Deflection	LOW-VOLTAGE ELECTROSTATIC FOCUS LOW GRID-No.2 VOLTAGE
Heater Current at 6.3 V Heater Warm-Up Time (Average) Electron Gun	odes 5 pF odes 6 pF to anode ^a 1000 min—1500 max pF 450 ± 20 mA I s ype Requiring No Ion-Trap Magnet Unipotential
	TICAL
For curves, see front of th	P4-Sulfide Type, Aluminized is section
	ANICAL
Neck Length	••••••••••••••••••••••••••••••••••••••
Type (see CRT OUTLINES 1 at front Contact area for grounding. Cap	of this section)Regular-Band Mear Reference Line ed Small Cavity (JEDEC No.JI-21) .Small-Button Neceightar 7-Pin, .rrangement I, (JEDEC No.B7-208)
	AM (Bottom View)
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 - Anode (Grid No.3, Gi No.5, Screen, Collec C - External Conductive Coating	$G_{4} \xrightarrow{ANODE} G_{4} \xrightarrow{C} G_{6}$
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 - Anode (Grid No.3, Gi No.5, Screen, Collec C - External Conductive Coating MAXIMUM AND MINIMUM RATI	GA CONTRACTOR CONTRACT
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 - Anode (Grid No.3, Gi No.5, Screen, Collec C - External Conductive Coating MAXIMUM AND MINIMUM RATI Voltages are positive	Ga G
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 - Anode (Grid No.3, Gi No.5, Screen, Coller C - External Conductive Coating MAXIMUM AND MINIMUM RATI Voltages are positives Anode Voltage Brid-Mo.4 Voltage	Ga G
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 - Anode (Grid No.3, Gi No.5, Screen, Collec C - External Conductive Coating MAXIMUM AND MINIMUM RATI Voltages are positive a Grid-No.4 Voltage Positive value	NGS, DESIGN-MAXIMUM VALUES with respect to grid No.1 •••• 12000 min-20000 max V
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 - Anode (Grid No.3, Grider No.5, Screen, Collec Coating MAXIMUM AND MINIMUM RATI Voltages are positive of Grid-No.4 Voltage Positive value Negative value Cathode Voltage	NGS, DESIGN-MAXIMUM VALUES with respect to grid No.1 12000 min-20000 max V 400 max V
Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.4 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Cap - Anode (Grid No.3, Gi No.5, Screen, Collec C - External Conductive Coating MAXIMUM AND MINIMUM RATI Voltages are positive is Anode Voltage Positive value	$\begin{array}{c} G_4 & & & & \\ & & & & \\ & & & & \\ & & & & $
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 - Anode (Grid No.3, Gi No.5, Screen, Coller C - External Conductive Coating MAXIMUM AND MINIMUM RATI Voltages are positives Anode Voltage Positive value	NGS, DESIGN-MAXIMUM VALUES with respect to grid No.1 · · · 12000 min-20000 max V · · · 1250 max V · · · · 2 max V

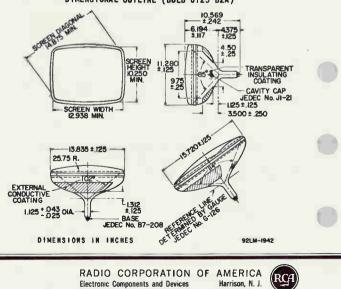


RC

DATA 7-67

16CHP4A

Grid-No.2 Voltage	20	min-	-60 max	۷
Heater Voltage	5.7	min-	-6.9 max	٧
Peak Heater-Cathode Voltage				
Heater negative with respect to cathode:				
During equipment warm-up period ≤ 15 s			450 max	V
After equipment warm-up period			300 max	V
Heater positive with respect to cathode:				
Combined AC & DC voltage			200 max	V
DC component	• •		100 max	V
TYPICAL OPERATING CONDITIONS FOR CATHO	DE-I	DRIVE	SERVICE	
Voltages are positive with respect	to	grid	No.1	
Anode Voltage.		6,	16000	V
Grid-No.4 Voltage ^b			100	v
Grid-No.2 Voltage			30	v
Cathode Voltage			22 to 45	v
For visual extinction of focused raster		•••		
Field Strength			0 to 8	G
Of required adjustable centering magnet				-
MAXIMUM CIRCUIT VALUE				
Grid-No.I Circuit Resistance			1.5 max	-
orid-woil circuit Resistance	• •	• •	1+D MRX	PRA
Includes imploaion protection hardware.				
^D The grid-No.4 voltage required for optimum focus will have a value anywhere between -100 and +300	of	any in	dividual t	ube
cathode voltage and video-signal voltage adjusted	tog	ive an	anode cur	rent
of 100 microsuperes on a 9-inch by 12-inch patte scope, or equivalent.	rn f	rom an	RCA-2F21 #	ono -
See X-RADIATION PRECAUTIONS at front	of	this	section	
DIMENSIONAL OUTLINE (BULB J)	25	B2A)		



Picture Tube

1140	MAGNETIC	DEFL	ECTION	l
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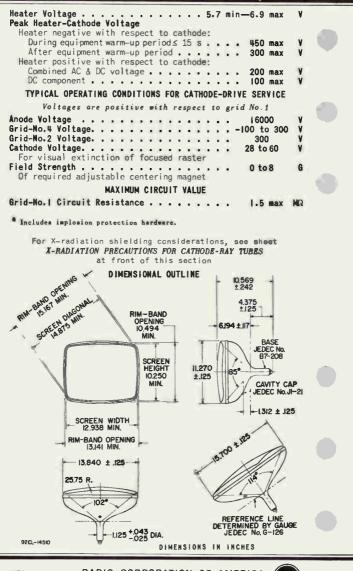
PAN-O-PLY TYPE

	ELECTRICAL	
)	Direct Interelectrode Capacitances Cathode to all other electrodes 5 p Grid No.1 to all other electrodes 6 p External conductive coating to anode. 1000 min—1500 max p Heater Current at 6.3 V	F F A
	OPTICAL	
	Phosphor	
		h
	Verall Length	in in in
	Cap Recessed Small Cavity (JEDEC NO. JI-2	L1 J
	Rece	٦.
	Arrangement I, (JEDEC No. 87-20	5)
	TERMINAL DIAGRAM (Bottom View)	
	Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4-Grid No.2 Pin 6-Grid No.1 Pin 7-Cathode Pin 8-Heater H 8HR H ANODE Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C-External Conductive Coating	
	MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
)	Voltages are positive with respect to cathode Anode Voltage 10000 min—18000 max Grid-No.4 Voltage	۷
	Positive value. 1100 max Negative value. 550 max Grid-No.2 Voltage 200 min-550 max	V V V
	Grid-No.I Voltage Negative peak value	V V V

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

DATA 12-66

16CMP4A



DATA

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RCA

16RP4B

Picture Tube

NO ION-TRAP MAGNET REQUIRED 70° MAGNETIC DEFLECTION MAGNETIC FOCUS ELECTRICAL Direct Interelectrode Capacitances Cathode to all other electrodes. . 5 DF Grid No.1 to all other electrodes. . . 6 DF (2000 max DF External conductive coating to anode . . .) 750 min DF mA OPTICAL **MECHANICAL** 18.750 ± 0.375 in Overall Length 7.500 ± 0.188 in ... 139 sq in External Conductive Coating See Picture-Tube Dimensional-Outlines and Bulb J129A/B sheets at front of this section Cap. Recessed Small Cavity (JEDEC No.JI-21) Base . . . Small-Shell Duodecal 5-Pin (JEDEC Group 4, No. 85-57) 121 Pin 1-Heater ANODE Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11 - Cathode Pin 12-Heater Cap-Anode (Grid No.3. 10)G2 Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage. 17500 max Grid-No.2 Voltage. Grid-No.1 Voltage 450 max Negative bias value. . . . 140 max Positive bias value. . . . 0 max ٧ . Positive peak value. . . . 2 max ٧



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA

16RP4B

Heater Voltage .		6.9 max 5.7 min	Y.
	de Voltage with respect to cathode: ent warm-up period not	(5.7 Min	
exceeding 15	seconds	450 max	٧
	nt warm-up period	165 max	V
	nd DC voltage	165 max	v
DC component		100 max	V C
TYPICAL OPER	ATING CONDITIONS FOR GRID-DRIVE S	ERVICE	
	therwise specified, voltage valu positive with respect to cathode	es	
		2000	٧
		300	V
	nction of focused raster	10-12	- 6
5	MAXIMUM CIRCUIT VALUE		
Grid-No. I-Circuit	Resistance	1.5 max	MΩ
For Y radiat	ion shielding considerations	abaat	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

DATA



RECTANGULAR GLASS TYPE

MAGNETIC FOCUS

MAGNETIC DEFLECTION

18TP#

DATA		
General:		
Heater, for Unipotential Cathode:		
Voltage	· · · ac or d	
Capacitance between External Conduc-		• • am
tive Coating and Ultor	(2000 max.	μµ
	750 min.	, тр. 141
aceplate, Spherical	· · · · · Filt	erolas
Phosphor (For Curves, see front of this Section	1) . P4-Sulfi	de Type
Jeffection Angles (Approx.):		
Diagonal		. 70
Horizontal		. 65
Vertical	· · · · · · ·	500
Electron Gun		
ube Dimensions:	Single-Field	Magnet
A	18-1/8"	+ 3/9
Greatest width	14_3/4"	+ 1/8
Greatest height	11-1/2"	+ 1/8
Diagonal	16-1/8"	+ 1/8'
Neck length.	6-7/8" .	+ 3/16
Radius of curvature of faceplate (Exter	mal surface).	27
creen Dimensions (Minimum);	ourracerr	•
Greatest width		13-1/2
Greatest height		10-1/8"
Diagonal		14-7/8
perating Position .		Any
ap Recessed Small Cav	ity (JETEC No.	.J1–21)
Wase Small-Shell Duodecal 5-Pin (JETE	C Group 4. No.	85-571
Basing Designation for BOTTOM VIEW		12
Pin 1-Heater	Cap - Ultor	
Pin 2-Grid No.1	(Grid I	10 3
Pin 10-Grid No.2	Collec	
Pin 11 - Cathode	C-Externa	
Pin 12-Heater	Conduc	
	Coatin	ng
00		Ŷ
aximum Ratings, Design-Center Values:		
LTOR VOLTAGE.	14000 max.	volts
RID-No.2 VOLTAGE	410 max.	volts
RID-No.1 VOLTAGE:	+IO max.	vorts
Negative-bias value	125 max.	volts
Positive-bias value.	0 max.	volts
Positive-peak value.	2 max.	volts
	65 110.6715	vorts
	-Indicates a	change.
-58		DATA

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 During equipment warm-up period not exceeding 15 seconds After equipment warm-up period Heater positive with respect to cathode. Maximum Circuit Values:	410 max. 150 max. 150 max.	volts volts volts	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode:			

Grid-No.1-Circu	it Resista	nce.			

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9-58

1.5 max. megohms

DATA

ELECTRON TUBE DIVISION



ROUND GLASS TYPE

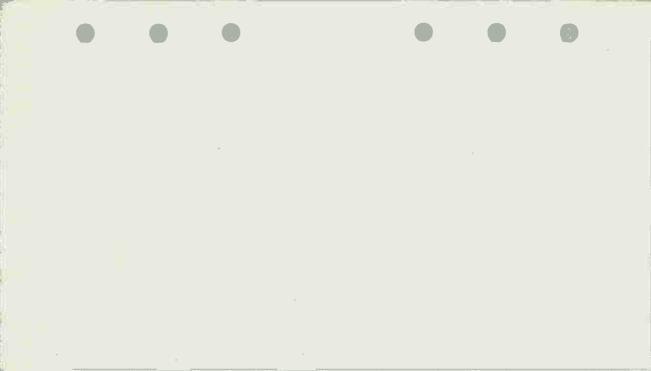
MAGNETIC FOCUS

MAGNETIC DEFLECTION

1640 BI A

DATA		
General:		
Heater, for Unipotential Cathode: Voltage	ac or 	amp
Faceplate, Spherical	n) . P4—Sulf	terglass ide Type 70 ⁰ equiring
Overall Length	17–3/4 15–7/8	" ± 3/8" " ± 1/8" 14-1/2" Any o.J1-21)
BaseSmall-Shell Duodecal 5-Pin (JEI Basing Designation for BOTTOM VIEW	IEC Group 4, N	0,65-5///
Pin 1-Heater Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater	Coll C-Exter	No.3, ector) nal uctive
Maximum Ratings, Design-Center Values;		
	16000 max.	volts
GRID-No.2 VOLTAGE	410 max.	volts
Negative-bias value	125 max.	volts
Positive-bias value	0 max.	volts
Positive-peak value PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathodes During equipment warm-up period	2 max.	volts
not exceeding 15 seconds	410 max.	volts
After equipment warm-up period		
Heater positive with respect to cathode.	125 max.	volts
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	1.5 max.	megohins
For X-ray shielding consideration X-RAY PRECAUTIONS FOR CATHODE- at front of this Section	-RAY TUBES	
Cap may be aligned with either vacant pin pr position 3.		
	+Indicates	
-58 ELECTRON TUBE DIVISION		DATA

ELECTRON TUBE DIVISION





11CAR

PICTURE TUBE

RECTANGULAR METAL-SHELL TYPE

MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:	
Heater, for Unipotential Cathode:	
Voltage 6.3	ac or dc volt
Current 0.6 ± 10%	
Current 0.6 ± 10% Faceplate, Spherical	Frosted Filterglas
Phosphor (For Curves, see front of this Section)	. P4-Sulfide Typ
Deflection Angles (Approx.):	
Diagonal	70
Horizontal	66
Vertical	50
Electron Gun	Trap Type Requirin
External	Single-Field Magne
Tube Dimensions:	5
Maximum overall length	19
Greatest width at lip	. 15-15/16" ± 1/8
Greatest height at lip	12-1/4" + 1/8
Diagonal at lip	16-13/16" + 3/16
Neck length	7-3/16" + 3/16
Radius of curvature of	
faceplate (External surface)	30
Screen Dimensions (Minimum):	
Greatest width	14-3/8
Greatest height.	10 11/16
Diagonal	10-11/10
Dragonal	13-1/4
Operating Position	Matal Shall Li
Jitor Terminal Base Small-Shell Duodecal 5-Pin (JETEC	Metal-Snell Li
Basing Designation for BOTTOM VIEW	Group 4, No. 00-5/
basing besignation for borrow view	
A A	
Pin 1-Heater	Metal-Shell Lip -
Pin 2-Grid No.1	Ultor
Pin 10-Grid No.2	(Grid No.3,
Pin 11 - Cathode	Collector)
Pin 12-Heater	
0-0	
levinum Petinge Design Conten Vetres	
Aaximum Ratings, Design-Center Values:	10000
JLTOR VOLTAGE.	16000 max. volt:
GRID-No.2 VOLTAGE.	410 max. volt
GRID-No.1 VOLTAGE:	
Negative-bias value	125 max. volt
Positive-bias value	0 max. volt
Positive-peak value	2 max. volt
	-indicates a change
	DAT

ELECTRON TUBE DIVISION RADIO CORFORATION OF AMERICA, HARRISON, NEW JERSEY 17CP4

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PICTURE TUBE

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	•		
	PRECAUTIONS FOR CATHODE-RA at front of this Section		1.1
For I-ray	shielding considerations,	see sheet	
imum Circuit V d—No .1 —Circuit		1.5 max. r	negohms
eater positive	ent warm-up period e with respect to cathode.	180 max.	volts
not exceedi	ng 15 seconds	410 max. 180 max.	volts
K HEATER-CATHO eater negative	with respect to cathode:		



RECTANGULAR METAL-SHELL TYPE

ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

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DATA

PAIA		
General:		
Heater, for Unipotential Cathode:		
Heater, for Unipotential Cathode: Voltage. 6.3 Current. 0.6 ± 10%.	ac or dc	volts
Current 0.6 ± 10%		.amp +
Faceplate, Spherical	Frosted Filter	glass
Phosphor (For Curves, see front of this Section).	. P4-Sulfide	Type
Deflection Angles (Approx.):	• • • • • • • • • • • • • • • • • • • •	
Diagonal		70 ⁰
Horizontal		66 ⁰
Vertical		. 50 ⁰
Electron Gun	Trap Type Requ	iring
External	Single-Field M	lagnet
Tube Dimensions:		
Maximum overall length	19-	-5/16"
Greatest width at lin.	. 15-15/16" :	± 1/8번
Greatest height at lip	12-1/4"	£ 1/8"
Diagonal at lip	16-13/16" ±	3/16"
Neck length.	•	3/16"
Neck length	al surface	30"
Screen Dimensions (Minimum):		
Screen Dimensions (Minimum): Greatest width	14	-3/8"
Greatest height.	10-1	1/16"
Diagonal		5-1/4"
Operating Position		
Ultor Terminal	Metal_She	11.1.1.
Base . Small-Shell Duodecal 6-Pin (JETEC	Group A No	الدة_مه
Basing Designation for BOTTOM VIEW	droup 4, nor	124
basing besignation for borrow tiew i i i		
Pin 1-Heater	etal-Shell Li	0-
Pin 2-Grid No.1	Ultor	
Pin 6-Grid No.4	(Grid N	0.3.
Pin 10-Grid No.2	Ultor (Grid No Grid No Collec	.5.
Pin 11 - Cathode	Collect	tori
Pin 12 - Heater	001100	
		1
Maximum Ratings, Design-Center Walnes:		
ULTOR VOLTAGE.	16000 max.	
GRID-No.4 (FOCUSING) VOLTAGE	5000 max.	
GRID-No.2 VOLTAGE.	500 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	
9-58: ELECTRON TUBE DIVISION		DATA

ELECTRON TUBE DIVISION MINO CONFORATION OF AMERICA, HARRISON, NEW JERSEY

17GP4

TGPA

PICTURE TUBE

58	ELECTRON TUBE DIVISION		DATA
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			1
	×		
	at front of this Secti	ion	
For J	I-ray shielding consideration -RAY PRECAUTIONS FOR CATHODE-	-RAY TUBES	
id-No.1-Ci	rcuit Resistance	. 1.5 max.	megohms
ximum Circ	uit Values:		
After equ Heater pos	uipment warm-up period itive with respect to cathod	. 180 max. e. 180 max.	volts
notexe	quipment warm—up period ceeding 15 seconds	. 410 max.	volts
Heater nega	CATHODE VOLTAGE: ative with respect to cathod	e:	

17**BJP**4

Picture Tube

RECTANGULAR GLASS TYPE ALUMII Low-Voltage electrostatic focus 90° Magnetic	NIZED SCREEN C DEFLECTION
GENERAL DATA	
Electrical:	
Direct Interelectrode Capacitances: Cathode to all other electrodes \$ Grid No.1 to all other electrodes 6	pf
External conductive coating to anode {1500	
	± 30 ma
Optical:	
Phosphor (For Curves, see front of this Section)P4-S	ulfide Type, Aluminized
	Filterglass
Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater	1/2" ± 3/16" 149 sq. in. Regular-Band ference Line ions: <i>lb J1g3 F/G</i> EC No.J1=21) , No.B6-63) 03) 12L mode Grid No.3, Grid No.5, Screen, Collector)

- Indicates a change.



RADIO CORPORATION OF AMERICA DATA Electron Tube Division Harrison, N. J. 4-63

17**B**JP4

											cathc			
											(17500			
ANODE	VOLTA	AGE.	• • •	• •	•	• •	•	٠	•	• •	111000	min	volt	s
			ING) V											
								•	٠	• •		max.		
												max		
		VOLTAG VOLTAG	E E:	• •	•	• •	•	•	•	• •	550	max		
Neg	ative	peak	value.									max		
			value.									max		
			value.									max		
Pos	itive	peak	value.						•			max		
		TAGE .										max		
			ODE VO			• •	•	•	1	• •	15.1	min	. volt	s
L Hea T (Ouring not ofter ter p cespec Combin DC com	equip exceed equipm ositiv t to c ed AC ponent	athode ment w ing 15 ment wa e with athode and DC	sed rm-i	itag	je	od	•	•		200 200 100) max) max) max) max	. volt	ts
Typic											e Serv			
											age vai o cath			
Anode												000	vol	ts
			ie						Ľ		-55 to		0 vol	ts
Grid- Grid-	-No.2 -No.1	Volta Volta	e. e for ion of	•				•	•	•		00	vol	ts
			••••					•	•	•	-28 t	0-72	vol	ts
Haxis	aum Ci	rcuit	Value											
	Ma. 1	C1	+ Dool	ota							1.5	MAX.	megoh	ms
Grid	-NO.1-	CITCU.	L nes	Sta	SUC									

at front of this Section

-+ Indicates a change.



17BP4D

Picture Tube

NO ION-TRAP MAGNET REQUIRED RECTANGULAR GLASS TYPE ALUMINIZED SCREEN MAGNETIC FOCUS 70° MAGNETIC DEFLECTION Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf External conductive coating to anode {1500 max. pf 750 min. pf
Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf [1500 max, pf
Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf [1500 max, pf
External conductive coating to anode 1 750 max.
External conductive coarring to another . 750 min. pf
Heater Current at 6-3 wolts
Optical:
Phosphor (For Curves, see Front of this Section) . P4Sulfide Type, Aluminized
Faceplate, Spherical
Mechanical:
Weight (Approx.)
Basing Designation for BOTTOM VIEW
Pin 1-Heater Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater Gi USCAR Gi USCAR H

RCA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 3--64

17**B**P4**D**

Maximum and Minimum Ratings, Design-Naximum Values:	
Unless otherwise specified, voltage val- ues are positive with respect to cathode	
Anode Voltage 17500 max. Grid-No.2 Voltage 550 max. Grid-No.1 Voltage: 550 max.	volts
Negative peak value	volts
Positive bias value 0 max.	volts
Positive peak value	volts
Heater Voltage	volts
Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	volts volts volts volts
Typical Operating Conditions for Grid-Driva Service:	
Unless otherwise specified, voltage val- ues are positive with respect to cathode	
Anode Voltage	volts
Grid-No.2 Voltage	volts
extinction of focused raster28 to -72	volts
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max.	megohms

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

RADIO CORPORATION OF AMERICA Electronic Components and Devices





	ITCF P4
	17CFP4
	PICTURE TUBE
	RECTANGULAR GLASS TYPE ALUMINIZED SCREEN
97	LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION
	DATA
	General:
	Heater, for Unipotential Cathode: Voltage (AC or DC)
	Voltage (AC or DC)
	Direct Interelectrode Capacitances:
	Grid No.1 to all other electrodes 6 $\mu\mu f$
	Cathode to all other electrodes 5 $\mu\mu f$ External conductive coating to ulter (1500 max. $\mu\mu f$
	External conductive coating to ultor . {1500 max. µµf 1200 min. µµf
	Faceplate, Spherical
	Light transmission (Approx.)
	Phosphor (For curves, see front of this Section) . P4-Sulfide Type Aluminized
	Fluorescence
	Phosphorescence
	Persistence Medium-Short
	Focusing Method
	Deflection Method Magnetic [Deflection Angles (Approx.):
	Diagonal
	Horizontal
	Vertical
	Tube Dimensions:
	Overall length
	Greatest width
	Greatest height
	Neck length
	Radius of curvature of faceplate (External surface) 20-3/4"
	Screen Dimensions (Minimum):
	Greatest width
	Diagonal
	Projected area 155 sq. in.
	Weight (Approx.)
	Operating Position
	Bulb
	Base Short Small-Shell Duodecal 6-Pin
	(JEDEC Group 4, No.86-203)
	Basing Designation for BOTTOM VIEW
	Pin 1-Heater Cap-Ultor Pin 2-Grid No.1 (Grid No.3,
	Pin 2-Grid No.1 (Grid No.3, Pin 6-Grid No.4 Grid No.5,
	Pin 10-Grid No.2 Collector
	Pin 11-Cathode C-External
	Pin 12-Heater 2 Conductive Coating
	Coating

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ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

17CFP4

PICTURE TUBE

GRID-DRIVE SERVICE

Unless otherwise specified, voltage values are positive with respect to cathode Maximum and Winimum Ratings, Design-Center Values:
are positive with respect to cathode
Maximum and Minimum Ratings, Design-Center Values;
the the state the state and the state of the
ULTOR VOLTAGE
GRID-No.4 (FOCUSING) VOLTAGE: Positive value
Negative value
GRID-No.2 VOLTAGE
GRID-NO.1 VOLTAGE:
Negative-peak value
linguette etter tereter tereter
Positive-bias value
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 (Ec_{gk}) between 12000 ^{\oplus} and 16000 volts and grid-No.2 voltage (Ec_{gk}) between 200 and 500 volts
Grid-No.4 Voltage for
focus§
Grid-No.1 Voltage for
visual extinction of
Grid-No.1 Voltage for visual extinction of focused raster
Grid-No.1 Voltage for visual extinction of focused raster See Roster-Cutoff-Range Chart for Grid-Drive Service
Grid-No.1 Voltage for visual extinction of focused raster
Grid-No.1 Voltage for visual extinction of focused raster See Rester-Cutoff-Range Chart for Grid-Drive Service Grid-No.1 Video Drive From Raster Cutoff (Black level): White-level value (Peak positive)
Grid-No.1 Voltage for visual extinction of focused raster See Rester-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 Ecik except video drive is a positive voltage Grid-No.4 Current25 to +25 µa
Grid-No.1 Voltage for visual extinction of focused raster See Rester-Cutoff-Range Chart for Grid-Drive Service Grid-No.1 Video Drive From Raster Cutoff (Black level): White-level value (Peak positive)
Grid-No.1 Voltage for visual extinction of focused raster See Rester-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 Ecik except video drive is a positive voltage Grid-No.4 Current25 to +25 µa
Grid-No.1 Voltage for visual extinction of focused rasterSee Rester-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 Ecik except video drive is a positive voltage Grid-No.4 Current25 to +25 μa Field Strength of Adjust- able Centering Magnet*O to 8 gausses Examples of Use of Design Ranges:
Grid-No.1 Voltage for visual extinction of focused raster
Grid-No.1 Voltage for visual extinction of focused rasterSee Rester-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 Ec ₁ k except video drive is a positive voltage Grid-No.4 Current25 to +25 μa Field Strength of Adjust- able Centering Magnet [*] O to 8 gausses Examples of Use of Design Ranges:
Grid-No.1 Voltage for visual extinction of focused raster See Rester-Cutoff-Range Chart for Grid-Drive Service Grid-No.1 Video Drive From Raster Cutoff (Black level): White-level value (Peak positive)
Grid-No.1 Voltage for visual extinction of focused raster See Rester-Cutoff-Range Chart for Grid-Drive Service Grid-No.1 Video Drive From Raster Cutoff (Black level): White-level value (Peak positive)

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ELECTRON TUBE DIVISION

DATA 1



						_	-
Grid-No.1 Video [m Rast	ter				
Cutoff (Black]							
White-level val	ue			. 28	to 72		volt
Maximum Circuit V	alues:						
Grid-No.1-Circuit	Resista	nce .			1.5 m	ax. n	negohn
	CATHO	DE-DR I	VE" SE	RVICE			
Unless o	therwise	speci	fied,	volta	ge valu	2.3	
are pos	itive w	ith re	spect	to e	rid No.	1	
Maximum and Minim	um Ratin	igs, De	sign-(lenter	Values.	:	
ULTOR-TO-GRID-No.		F			(16000	max.	volt
	T TOLING			• • •	12000	min.	volt
GRID-No. 4-TO-GRID					•		
Positive value					1000	max.	volt
Negative value					500	max.	volt
GRID-No.2-TO-GRID					640	max.	volt
GRID-No. 2-TO-CATH					500	max.	volt
CATHODE-TO-GRID-N	10.1 VOLT	AGE :					-
Positive-peak v	/alue				200	max.	volt
Positive-bias v	alue.			• • •	140	max.	volt
Negative-bias v	alue	•••			0	max.	volt
Negative-peak v			• • •	• • •	2	max.	volt
PEAK HEATER-CATHO				hadaa			
Heater negative During equipm	: WITH FE	spect	to cat	node:			
not exceedi	ing 15 se	ronde	1100		410	mex.	volt
After equipme						max.	
Heater positive						max.	volt
					200		
Equipment Design	-						
With any ul	tor-to-g	rid-No	.1 vol	tage	(Bc Rg)	betwe	en .
12000 [®] and	1 16000	volts	and	grid-	No. 2-t	o-gri	d
No.1 volta	ige (Ec _g	g ₁) b	etween	220	and 64	o vol	ts
Grid-No.4-to-Grid							
Voltage for for				. 0 t	o 400		volt
Cathode-to-Grid-N							
Voltage (E _{kg1})	for						
visual extincti							
of focused rast	er	• • •			-Cutoff-		
				or Ca	thode-Di	rive S	ervic
0.4.1.1.0.0.1.1							
Cathode-to-Grid-N				01 00			
Video Drive fro	m Raster		,	01 00			
Video Drive fro Cutoff (Black 1	m Raster level):		,	01 00			
Video Drive fro Cutoff (Black 1 White-level val	m Raster evel): ue		-				od fo
Video Drive fro Cutoff (Black 1	m Raster evel): ue	• • •	. Same	valu	e as det	termin	ed fo
Video Drive fro Cutoff (Black 1 White-level val	m Raster evel): ue	• • •	. Same	valu	e as det pt video	termin odriv	re is
Video Drive fro Cutoff (Black 1 White-level val	m Raster evel): ue	• • •	. Same	valu exce	e as det pt video negat	termin	re is roltag
Video Drive fro Cutoff (Black 1 White-level val (Peak negative)	m Raster evel): ue	• • •	. Same	valu exce	e as det pt video	termin odriv	re is

ELECTRON TUBE DIVISION

11CFP#

I7CFP4

PICTURE TUBE

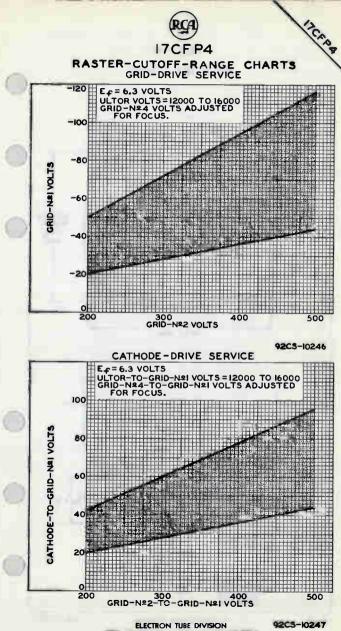
Grid-No.2 Current	• • •	-15 to +15	μæ
able Centering Magnet*		0 to 8	gausses
Examples of Use of Design Rang	jes:		
With ultor-to-grid-		68	
No.1 voltage of and grid-No.2-to-grid-	•••	16000	volts
No.1 voltage of		300	volts
Grid-No.4-to-Grid-No.1 Voltage for focus		0 to 400	volts
Cathode-to-Grid No.1			
Voltage for visual extinction of focused			
raster		28 to 60	volts
Cathode-to-Grid-No.1 Video Drive from Raster		,	
Cutoff (Black level):			
White-level value	• • •	-28 to -60	volta
Maximum Circuit Values:			are examined
Grid-No.1-Circuit Resistance .	•••	•••• 1.5 m	ax. megohms
Grid drive is the operating condi the grid-No.1 potential with resp	tion in	which the video cathode.	signal varies
This value is a working design-ce miniams ultor- or ultor-to-grid- which the serviceability of the 1	inter mi	nimum. The equiv	alent absolute
which the serviceability of the 1 designer best be responsibility (7CFP4 w	rill be impaired.	The equipment n design value
supply-voltage variation and equi ultor- or ultor-to-grid-No.1 vol	ipment	erating condition variation the ab	ons involving solute minimum
ultor- or ultor-to-grid-No.1 vol	tage is	s never less than Irid—No.1 voltage	10,800 volts. required for
The grid-No.4 voltage or grid-No focus of any individual tube is remain essentially constant for y grid-No.1 voltage) or grid-No.2 voltage) within design ranges sho	indepen values	dent of ultor cu of ultor voltage	or ultor-to-
grid-No.1 voltage) or grid-No.2 voltage) within design ranges sho	voltag wn for	these items.	-to-gr10-No.1
Distance from Reference Line for not exceed 2-1/2". Excluding ex- undeflected focused spot will fai radius concentric with the center that the earth's magnetic field tion of the spot from the center	suitat ctraneo	us fields, the	magnet should center of the
undeflected focused spot will fail radius concentric with the center	of the	in a circle having tube face. It	is to be noted
that the earth's magnetic field tion of the spot from the center	of the	tube face.	z-inch dellec-
Cathode drive is the operating varies the cathode potential wit	condit h respo	ion in which the act to grid No.1	and the other
electrodes.			
For I-ray shielding co	nside	rations, see s	heet
I-RAY PRECAUTIONS N	FOR CA	THODE-RAY TUBE	
at front of	TRIS	Section	

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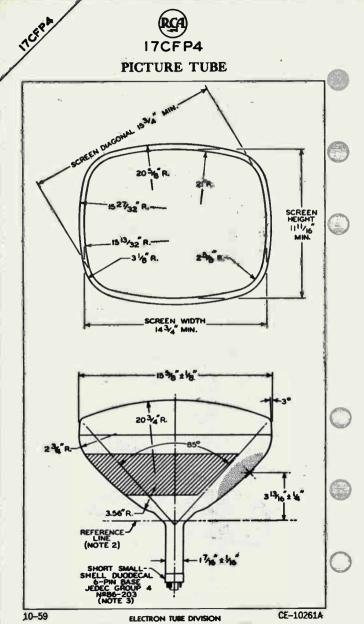
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ELECTRON TUBE DIVISION

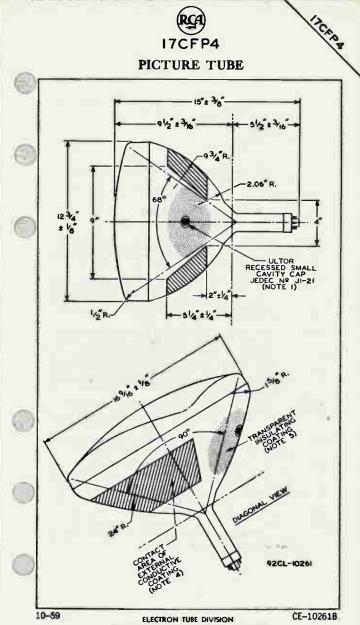
DATA 2



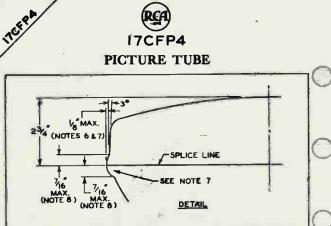
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



ELECTRON TUBE DIVISION



RADIO CORPORATION OF AMERICA, HARRISON, NEW JURSEY



THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY NOTE I: VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TER-MINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 30°. ULTOR TERMINAL 15 ON SAME SIDE AS PIN 6.

WITH TUBE NECK INSERTED THROUGH FLARED END OF NOTE 2: 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 MOUNT-ED; 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 & CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

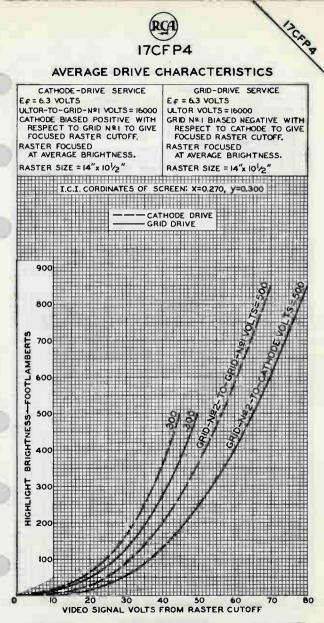
EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED. NOTE 4:

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

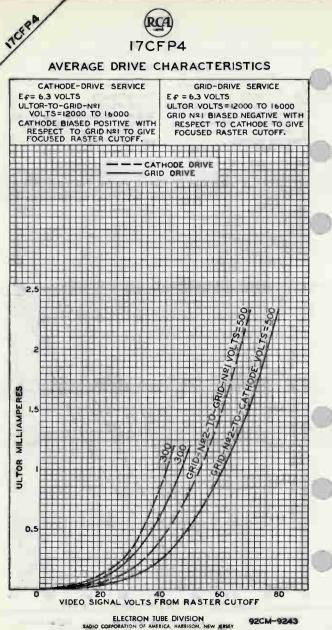
NOTE 6: MEASURED 2-9/32" ± 1/32" FROM THE PLANE TANGENT TO THE SURFACE OF THE FACEPLATE AT THE TUBE AXIS.

NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE IN-DICATED 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/B" BE-YOND THE ENVELOPE SURFACE AT THE LOCATION SPECIFIED FOR DIMENSIONING THE ENVELOPE WIDTH, DIAGONAL, AND HEIGHT.

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



ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-924IRI



17DQP4

Picture Tube

LOW-VOLTAGE ELECTROSTATIC FOCUS 110° MAGNE	MINIZED SCREEN TIC DEFLECTION ODE-DRIVE TYPE
With Heater Having Controlled Warm-Up	Time
GENERAL DATA	
Electrical:	
Heater Warm-Up Time (Average) 11 Direct Interelectrode Capacitances: Grid No.1 to all other electrodes	<i>µ</i> µւf µµւf
External conductive coating to ultor . { 1/00 1200 Electron Gun	min. µµuf
Liectron Gun	on-Irap Magnet
Optical: FaceplateLight transmission (Approx.) Phosphor (For Curves, see front of this Section) .P4—	77%
Nechanical:	
External Conductive Coating:	. 5" ± 1/8" . 155 sq. in.
Type	Reference Line
For Additional Information on Coatings and Dimer	nsions:
See Picture-Tube Dimensional-Outlines and Bull sheets at the front of this section	J132-1/2 A/B
Cap	DEC No.86-214)
	Ultor (Grid No.3, Grid No.5, Collector) External Conductive Coating



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 3-62

17DQP4

Maximum Ratings, Design-Maximum Values: ULTOR-TO-GRID-No.1 VOLTAGE 17600 max. GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:	volts	
VOLTAGE: Positive value	volts volts volts volts volts	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode 200 max.	volts volts volts	
Typical Operating Conditions: With ultor-to-grid-No.1 voltage of 14500 and grid-No.2-to-grid-No.1 voltage of 50 Grid-No.4-to-Grid-No.1 Voltage for focus	volts volts volts volts	
Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max.	megohms	

For X-radiation shielding considerations, see sheet *I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES* at front of this section



RADIO CORPORATION OF AMERICA Electron Tube Division Hairrison, N. J.

17DRP4

Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO^o Magnetic Deflection Internal Magnetic Shield

With Neater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes 3.65 pf Grid No.1 to all other electrodes 4.15 pf External conductive coating to anode . {1400 max. pf 900 min. pf
Heater Current at 2.68 volts 450 ± 45 ma Heater Warm-Up Time (Average) 11 seconds Electron Gun
Optical:
Phosphor (For curves, see front of this Section)P4-Sulfide Type,
Faceplate, Spherical Aluminized Light transmission (Approx.) Filterglass
Mechanical:
Weight (Approx.)
Basing Designation for BOTTOM VIEW
Pin 1 - Heater Pin 2 - Grid No.2 Pin 3 - Grid No.2 Pin 4 - Grid No.2 Pin 7 - Cathode Pin 8 - Heater G_1 G_2 G_2 G_2 G_3 G_2 G_2 G_3 G_2 G_3 G_2 G_3 G_2 G_3 G_2 G_3 G_2 G_3 G_2 G_3 G_2 G_3 G_2 G_3 G_2 G_3 G_2 G_3 G_3 G_2 G_3 G_2 G_3 G_3 G_2 G_3 G_3 G_2 G_3 G_3 G_2 G_3 G_2 G_3 G_3 G_2 G_3 G_3 G_3 G_2 G_3 G_3 G_3 G_3 G_2 G_3



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 4-63

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17**DRP**4

Maximum and Minimum Ratings, Design-Nazimum	Values:
Unless otherwise specified, voltag	
are positive with respect to	
ANODE VOLTAGE	17600 max. volts
GRID-No.4 (FOCUSING) VOLTAGE:	
Positive value	950 max. volts
Negative value	700 max. volts 550 max. volts
GRID-No.2 VOLTAGE	550 max. volts
GRID-No.1 VOLTAGE:	400 max. volts
Negative peak value	155 max. volts
Positive bias value	0 max. volts
Positive peak value	2 max, volts
	(2.9 max. volts
HEATER VOLTAGE	12.4 min. volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with	
respect to cathode:	
During equipment warm-up period	
not exceeding 15 seconds	450 max. volts
After equipment warm-up period	200 max. volts
Heater positive with	
respect to cathode:	200 max. volts
Combined AC and DC voltage	100 max. volts
DC component	Too max. vores
Typical Operating Conditions for Grid-Drive	Service:
Unless otherwise specified, volta	ge values
are positive with respect to	
Anode Voltage	14000 volts
Grid-No.4 Voltage	100 to 500 volts
Grid-No.2 Voltage	300 volts
Grid-No.1 Voltage for visual	
extinction of focused raster	-35 to -72 volts
Maximum Circuit Value:	
	1. E mar markens
Grid-No.1-Circuit Resistance	1.5 max. megohms
For X-radiation shielding consideration	ons, see sneet
I-RADIATION PRECAUTIONS FOR CATHODE	-RAY TUBES
at front of this Section	



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



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

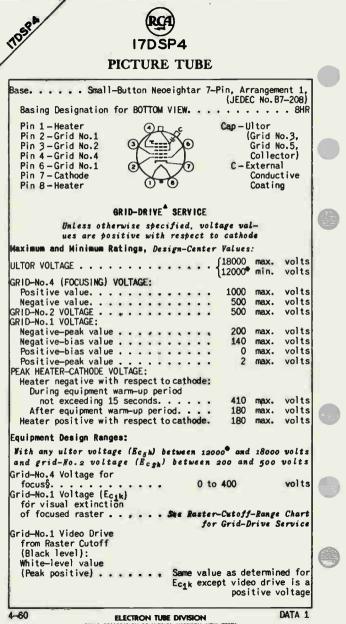
DATA

General:
Heater, for Unipotential Cathode:
Voltage (AC or DC)
Current 0.6 amp
Warm-up time (Average)
Direct Interelectrode Capacitances:
Grid No.1 to all other electrodes 6 µµf Cathode to all other electrodes 5 µµf
Cathode to all other electrodes
External conductive coating to ultor 1500 max. mut
Cathode to all other electrodes 5 $\mu\mu$ f External conductive coating to ultor {1500 max. $\mu\mu$ f 1000 min. $\mu\mu$ f
racepiate, Spherical
Light transmission (Approx.)
Phosphor (For curves, see front of this section) P4-Sulfide Type Aluminized
Aluminized Fluorescence
Phosphorescence
Persistence
Focusing Method
Deflection Method
Deflection Angles (Approx.):
Disconsi 1100
Diagonal
Vertical 870
Vertical
Tube Dimensions:
Overall length
Greatest width
Greatest height
Diagonal
Neck length
Radius of curvature of
faceplate (External surface)
Screen Dimensions (Minimum): Greatest width
Greatest width
Greatest height
Diagonal
Projected area
Weight (Approx.)
Operating Position
Cap Recessed Small Cavity (JEDEC No.J1-21)
Bulb
Socket Ucinite Part No.115446, or equivalent

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DATA 1

THE REGUL



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



PICTURE TUBE

Grid-No.4 Current		to +25	μа
Grid-No.2 Current	-	to +15	μ8
able Centering Magnet*	. 0	to B	gausses
Examples of Use of Design Rang	es:		
With ultor voltage of	16000	16000	voits
and grid-No.2 voltage of Grid-No.4 Voltage for	300	400	volts
	0 to 400	0 to 400	volts
	-38 to -72	-45 to -90	volts
White-level value	38 to 72	45 to 90	volts
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance .		. 1.5 max.	megohns
CATHODE-DR	IVE SERVIC	Æ	
Unless otherwise spe	cified, vol	tage values	
are positive with			
Maximum and Minimum Ratings, D	esign-Cente	r Values:	
ULTOR-TO-GRID-No.1 VOLTAGE		∫18000_ max	
		[12000 [®] mir	. volt
GRID-No.4-TO-GRID-No.1 (FOCUSI	NGJ		
VOLTAGE: Positive value		1000 max	. volt
Negative value		500 max	
GRID-No. 2-TO-GRID-No. 1 VOLTAGE		640 max	. volt
GRID-No.2-TO-CATHODE VOLTAGE . CATHODE-TO-GRID-No.1 VOLTAGE:		500 max	. volt
Positive-peak value		200 max	
Positive-bias value		140 max	
Negative-bias value		0 max	
Negative-peak value		2 max	• volt
Heater negative with respect During equipment warm-up p			
not exceeding 15 seconds		410 max	. volt
After equipment warm-up pe		180 max	
Heater positive with respect	to cathode.	180 mau	4 volt

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17DSP4

PICTURE TUBE

Equipment Design Ranges:			
With any ultor-to-grid-No. 1 and 18000 volts and grid-No. between 225	2-to-grid-No	.1 voltage	
Grid-No.4-to-Grid-No.1 Voltage for focus§ Cathode-to-Grid-No.1 Voltage (Ekg4) for visual extinction	. 0 to	400	volts
of focused raster	. Ses Rastes	r-Cutoff-Ran athode-Drive	
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value			
(Peak negative)	. Same val	ue as determ	ined for
(reak negative) i to tit	Ekg1 exc	ept video dr	ive is a ve value
Grid-No.4 Current	-25 t		μa
Grid-No.2 Current	15 t		μa
able Centering Magnet*	. 0 t	o 8	gausses
Examples of Use of Design Rang	681		
With ultor-to-grid-			
No. 1 voltage of and grid-No. 2-to-grid-	16000	16000	volts
No. 1 voltage of	300	400	volts
Grid-No.4-to-Grid-No.1 Voltage for focus Cathode-to-Grid-No.1 Voltage for visual extinc-	0 to 400	0 to 400	volts
tion of focused raster Cathode-to-Grid-No.1 Video Drive from Raster Cutoff	35 to 63	43 to 78	volts
(Black level): White-level value	-35 to -63	-43 to -78	volts
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance.		. 1.5 max.	megohms
Grid drive is the operating condition the grid-No.1 potential with response	tion in which ect to cathode	the video signed.	hat varies
This value is a working design-ce strisum ultor (or ultor-to-grid- which the serviceability of the 17 designer has the responsibility of such that under the worst proba supply-voltage variation and equi ultor (or ultor-to-grid-Hoch) vol	nter minimum. No.1) voltage DSP4 will be if determining ble operatin pment variati tage is never	The equivalen is 11,000 vol impaired. The a minimum de: g Conditions on the absolu less than 11,	t absolute ts, below equipment sign value involving te minimum 000 volts.
S The grid-No.% (or grid-No.4-to-gr focus of any individual tube will independent of ultor current and values of ultor (or ultor-to-grid No.2-to-grid-No.1) voltage within	have a value	between 0 and	400 volts

ITOSPA

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DATA 2



PICTURE TUBE

Distance from Reference Line for suitable PM centering magnet should not exceed $2-1/8^{\circ}$. 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.

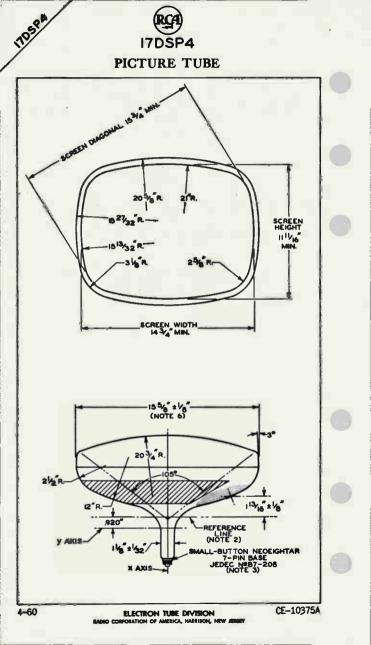
Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid Hp.1 and the other electrodes.

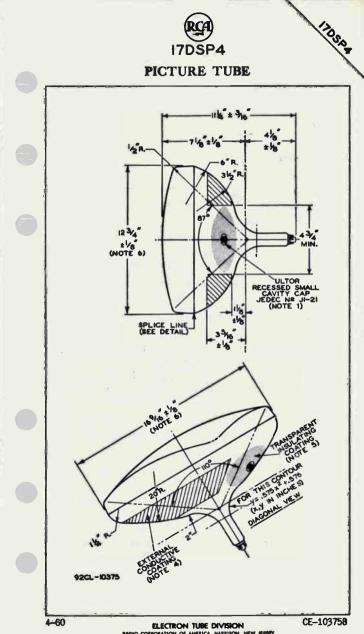
OPERATING CONSIDERATIONS

Skatter-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 I7DSP4 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 I-ray shielding considerations, see sheet I-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section

IDER

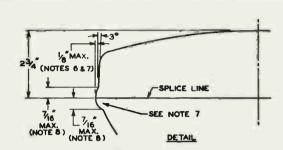




INDIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



PICTURE TUBE



NOTE I: 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°. 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 BERIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREE-LY. 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 I-3/4".

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

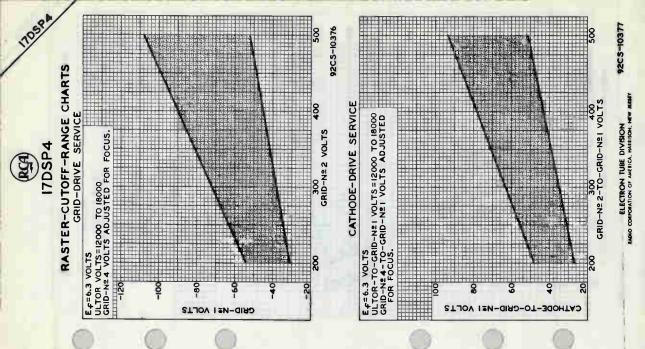
NOTE 6: MEASURED 2-9/32" \pm 1/32" FROM THE PLANE TANGENT TO THE SURFACE OF THE FACEPLATE AT THE TUBE AXIS.

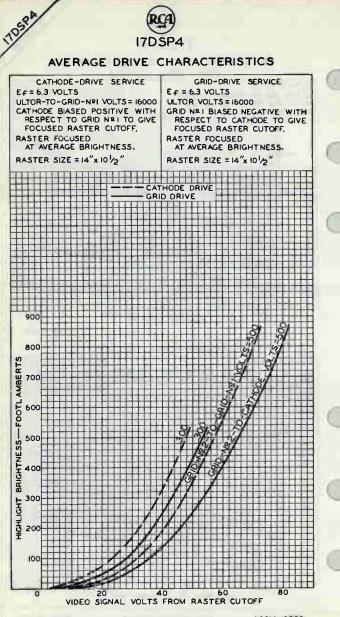
NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE IN-DICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/4", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/8" BEYOND THE ENVELOPE SURFACE AT THE LOCATION SPECIFIED FOR DIMEN-SIONING THE ENVELOPE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

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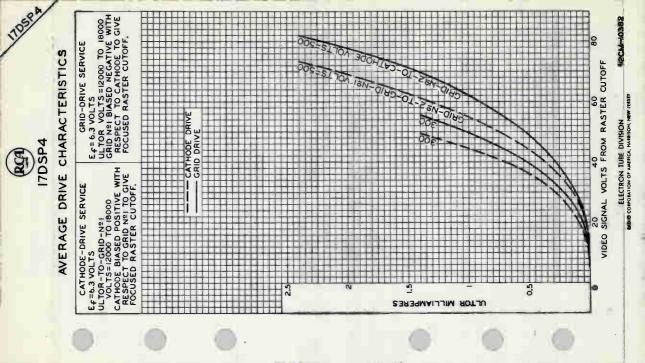
TOSPA





ELECTRON TUBE DIVISION

92CM-10380





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17**DWP4**

Picture Tube

GENERAL DATA Electrical: Heater Current at 6.3 volts	600 ± 10% ma
Heater Current at 6.3 volts	600 ± 10% ma
Direct Interelectrode Capacitances: Grid No.1 to all other electrodes Cathode to all other electrodes	6.5 μμ.f
Cathode to all other electrodes External conductive coating to ultor.	(1500 max. unf
Electron Gun Type Requir	
Optical:	
Faceplate	
Mechanical:	
Operating Position. Weight (Approx.). Overall Length. Neck Length. Projected Area of Screen. External Conductive Coating:	•••• 19-3/16" ± 3/8" •••• 7-1/2" ± 3/16" •••• 149 sq. in.
Type. Contact area for grounding. For Additional Information on Coatings See Picture-Tube Dimensional-Outlines a	. Near Reference Line and Dimensions:
at the front of this section Cap	-Shell Duodecal 6-Pin, DEC Group 4, No.B6-63)
Basing Designation for BOTTOM VIEW	•••••••••••••••••12L
Pin 1-Heater Pin 2-Grid No.1 CL	Cap-Ultor (Grid No.3, Grid No.5,
Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater G^2	Collector
H. OH	
)	



RADIO CORPORATION OF AMERICA DATA Electron Tube Division Harrison, N. J. 1–63

17DWP4

Maximum Ratings, Design-Maximum Values:

ULTOR VOLTAGE	• •	• •	•	•	•	. 22000	max.	volts
Positive value					•	. 800	max.	volts
GRID-No.2 VOLTAGE						. 700	max.	volts
GRID-No.1 VOLTAGE:								
Negative bias value								volts
Positive bias value								volts
Positive peak value		• •				. 2	max.	volts
Typical Operating Conditions:								

With ultor voltage of 18000	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 raster28 to -72	volts

For X-radiation shielding considerations, see sheet *I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES* at front of this section

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

DATA

General:		
Heater, for Unipotential Cathode:		7.4
Voltage (AC or DC)	6.3 Vo	
Current at 6.3 volts	0.45	amp
Warm-up time (Average) Direct Interelectrode Capacitances:	11	sec
Grid No.1 to all other electrodes	6	mut
Cathode to all other electrodes		µµ.€
	(1500 max.	μµf
External conductive coating to ultor	1000 min.	
Faceplate, Spherical	Filterg	ass
Phosphor (For Curves, see front of this Section).		ype
Fluorescence	• • • • • • • Wi	nite
Phosphorescence	•••••Wi	nite
Farming Nothed	Electroste	alic
Deflection Method	Magni	etic
Deflection Angles (Approx.): Diagonal		1100
Horizontal.		1050
N		0/
Electron Gun Type Requiring	No Ion-Trap Ma	gnet
The Dimensionat		
Querell longth	10-11/16" ±	1/4"
Greatest height	. 12-3/4" ±	1/8"
Greatest width	. 16-9/16" ±	1/8"
	•• 3-9/16" ±	1/8"
o it factoriation of tacon at a		
(External surface)	20-	3/4"
Greatest width	14-	3/4
Greatest height		./ 10 ~
Weight (Approx)		103
Recessed Small Lav	TY LIEUEL NO.J.	1-211
Bulb	J132-1/4	C A/D
Socket Ucinite Part No. 11	Dia Arrangement	arent
Base Small-Button Neoeightar 7-	(JEDEC No. B7-	و مع الد ا
	UEDEC NO. DI	-2001



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. 1. DATA I 8-60

Pin 6-Internal C-Exter	nal luctive
GRID-DRIVE SERVICE	()
Unless otherwise specified, voltage values are positive with respect to cathode	
Maximum and Minimum Ratings, Design-Center Values:	
(x. volts
(12000" mi	n. volts
(FEQ	x. volts 🕓
[300 mi	n. volts
GRID-No.1 VOLTAGE: Negative-peak value	
Negative-bias value	x. volts x. volts
Positive-bias value	x. volts
Positive-peak value	x. volts
During equipment warm-up period	
not exceeding 15 seconds	
After equipment warm-up period 180 ma Heater positive with respect to cathode 180 ma	
Equipment Design Ranges:	x. voita
With any ultor voltage (Ecuk) between 12000 and 160	oo volts
and grid-No. 2 voltage (Ec.k) between 400 and 55	o volts
Grid-No.3 Voltage for	(20)
focus§ 0 to 400 Grid-No.1 Voltage (Ec.k) for visual extinction	volts
of focused raster See Raster-Cutoff-Ram	nge Chart
Grid-No.1 Video Drive from	
Raster Cutoff (Black level):	(13)
White-level value	50
(Peak positive) , Same value as deter	nined for
E _{cik} except video di positive	e voltage
Grid-No.3 Current	
Grid-No.2 Current15 to +1	5 µa

RADIO CORPORATION OF AMERICA **Electron Tube Division** Harrison, N. J.



Field Strength of Adjust- able Centering Magnet	0 to	12	gausses
Examples of Use of Design Ran	ges:		
With ultor voltage of and grid-No.2 voltage of	16000 400	16000 500	volts
Grid-No.3 Voltage for focus Grid-No.1 Voltage for visual extinction	0 to 400	0 to 400	volts
of focused raster. , Grid-No.1 Video Drive from Raster Cutoff (Black level):	-34 to -63	-43 to -78	volts
White-level value	34 to 63	43 to 78	volts
Maximum Circuit Values:	\$	5	
Grid-No.1-Circuit Resistance.		1.5 maxic	megonas

CATHODE-DRIVE" SERVICE

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

Maximum and Minimum Ratings, Design-Center Values:

ULTOR-TD-GRID-No.1 VOLTAGE	maix.	volts
GRID-No.3-TO-GRID-No.1 (FOCUSING) VOLTAGE	max. max.	volts volts volts
300 GRID-10-241100E VOLIAGE	min.	volts
CATHODE-TO-GRID-No.1 VOLTAGE: Positive-peak value	max. max. max. max.	volts volts volts volts
not exceeding 15 seconds 410	max.	volts
After equipment warm-up period 180 Heater positive with respect to cathode. 180	max.	volts
Equipment Design Ranges:		
With any ultor-to-grid-No.1 voltage (E_{cyg_1}) 12000, and 16000 volts and grid-No.2-to	-grid.	-

No.1 voltage (E_{cgg_1}) between 400 and 690 volts Grid-No.3-to-Grid-No.1

Voltage for focuss. 0 to 400

volts

RCA

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N.J. DATA 2 8-60

Cathode-to-Grid-No.1 Voltage (Ekg ₁) for visual extinction of focused raster		-Cutoff-Ran sthode-Drive	
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)	Same valu	µe as deterπ ept video dr	ained for
Grid-No.3 Current Grid-No.2 Current Field Strength of Adjust- able Centering Magnet .	-25 to -15 to 0 to	0 +25 0 +15	μa μa gausses
Examples of Use of Design Ran	ges:		
With ultor-to-grid- No.1 voltage of and grid-No.2 to-grid-	16000	16000	volts
No. 1 voltage of Grid-No.3 to-Grid-	400	500	volts
No.1 Voltage for focus Cathode-to-Grid-No.1 Voltage for visual extinction of	0 to 400	0 to 400	volts
focused raster Cathode-to-Grid-No.1 Video Drive from Raster Cutoff	34 to 56	41 to 69	volts
(Black level): White-level value	-34 to -56	-41 to -69	volts

Maximum Circuit Values:

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

- 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 170xPa 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.
- ultor- or ultor-to-grid-Mo.1 voltage is never less than 11,000 volta; The grid-Mo.3 voltage required for optimum focus of any individual tube may have a value anywhere between 0 and a00 volts and is a function of the values directly with the ultor voltage at the rate of approximately as collected of the ultor voltage at the rate of approximately as collected of the ultor voltage at the rate of approximately as collected of the ultor voltage at the rate of approximately as collected of the ultor voltage at the rate of about 60 volts for each 100-volt rate of about 60 volts for each 100-microampere change in ultor current. Because the 170PH has a narrow depth of focus, it is necessary to provide means such as a potentiometer or a u-tap switch for adjusting the focusing voltage. In general, commercially acceptable focus is obtained if the focus on dif the focus on yolts of the value required for optimum focus and if the focusing voltage is maintained to within 75 volts of the optimum value during line-voltage fluctuations.

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



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Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4". Excluding extraneous fields, the center of the underlacted 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.

17DXP4

Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid Ho.1 and the other electrodes.

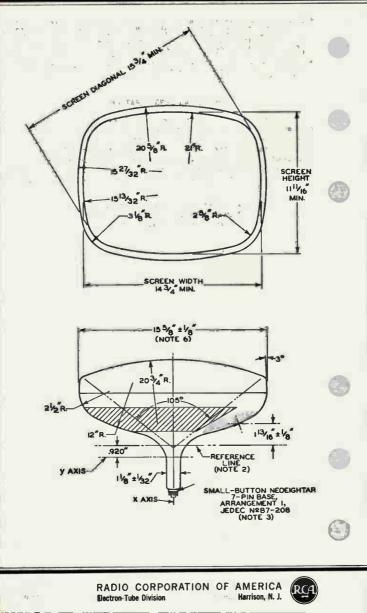
OPERATING CONSIDERATIONS

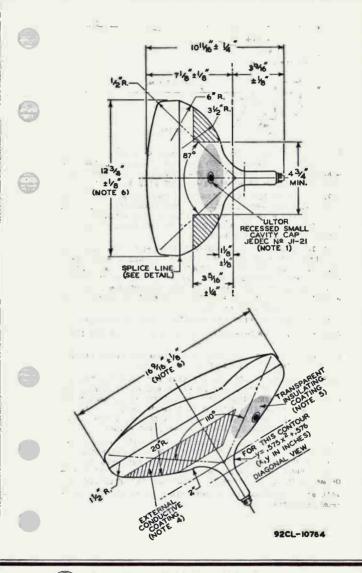
Shatter-Proof Cover Over the Tube Face. Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the I7DXP4 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal condition. This sefety cover can also provide X-ray protection when required,

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



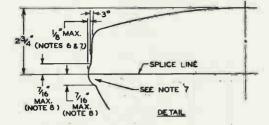
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. 1 DATA 3 8-60







RADIO CORPORATION OF AMERICA Electron Tube Division Karrison, N. & DATA 4 8-60



NOTE I: 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°. 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 LINT-LESS CLOTH.

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

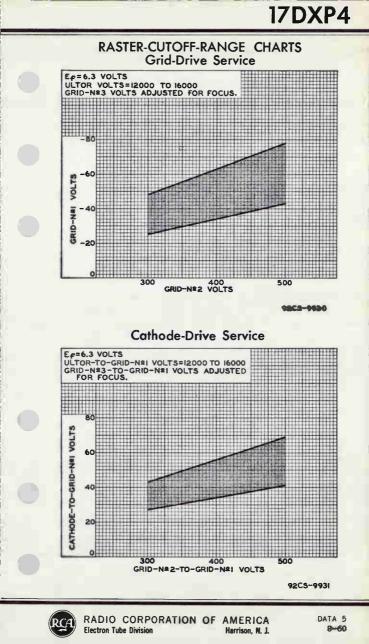
NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE IN-DICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/4¹¹, BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/8¹¹ BEYOND THE ENVELOPE SURFACE AT THE LOCATION SPECIFIED FOR DIMEN-SIONING THE ENVELOPE 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 2-7/16" FROM REFERENCE LINE.

> RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.





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17EZP22 **Color Picture Tube**

ELECTRICAL Electron Guns, Three with Axes Tilted Toward Tube Axis Heater, of Each Gun Series Connected within Tube with Each of the Other Two Heaters: Current at 6.3 V Focusing Method Focus Lens Vertical Magnetic Direct Interelectrode Capacitances (Approx.): Grid No.1 of any gun to all other electrodes Mal cathodes to all other electrodes Mal cathodes to all other electrodes 15 Diagonal. 15 Direct Interelectrode coating to anode Mal cathodes to all other electrodes 15 Pitcal
Focusing Method Electrostatic Focus Lens Unipotential Convergence Method Magnetic Deflection Method Magnetic Deflection Angles (Approx.): 90 deg. Horizontal 79 deg. Vertical 63 deg. Direct Interelectrode Capacitances (Approx.): Grid No.1 of any gun to all other electrodes 7.5 pF Grid No.4 to all other electrodes 15 pF All cathodes to all other electrodes 15 pF External conductive coating {1500 max. pF 0000 min. pF 0PTICAL
Faceplate Filterglass Light transmission at center (Approx.) Surface Polished Screen Aluminized Matrix Black opaque material
Phosphor, rare-earth (red), sulfide (blue & green)

			_
_	MECHANICAL		
	Minimum Screen Area (Projected)145 s Bulb Funnel Designation J Bulb Panel Designation JEI Base Designation ⁹ Small-But	DEC No.J 139 DEC No.FP 139 ton Diheptar 12-	B1 pin
	Basing Designation	JEDEC No.14 5 Aligns App Anode Bulb Cont	ox.
	Operating Position: For blue gun down Anode B For blue gun up Anode Bulb Weight (Approx.)	Contact on Bot	tom
	MAXIMUM AND MINIMUM RATINGS, Design-I	Naximum Values	
	Unless otherwise specified, values are for voltage values are positive with respect to	each gun and cathode	
	Anode Voltage	22,500 max. 17,000 min.	V
	Total Anode Current, Long-Term Average Grid-No.4 (Focusing Electrode) Voltage:	750 max.	μA
	Positive value	1100 max.	v
	Negative value	550 max.	V
	Including Video Signal Voltage Grid-No.1 Voltage:	1000 max.	v
	Negative bias value	400 max.	v
	Negative operating cutoff value	140 max.	V
	Positive bias value	0 max.	V
	Positive peak value	2 max.	v
		16.9 max.	v
	Under operating conditions	15.7 min.	V
	Under standby conditions ^d	5.5 max.	V
	Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period		
	not exceeding 15 seconds After equipment warm-up period:	450 max.	v
	Combined AC and DC value	200 max.	V
	DC component value	200 max.	v
	Heater positive with respect to cathode:		v
	AC component value DC component value	200 max. 0 max.	v
	So component value	· maar	-

EQUIPMENT DESIGN RANGES

RB/J

Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode

For anode voltages between 17,000 and 22,500 V

Grid-No.4 (Focusing Electrode) Voltage .. -75 to 400

Electronic Components

DATA

Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused SpotSEE CUTOFF DESIGN CHART Maximum Ratio of Grid-No.2 Voltages, Highest Gun to Lowest Gun in Any Tube (At grid-No.1 spot cutoff voltage of -100 V)1.55
Heater Voltage: ^c Under operating conditions:
When standby operation is not utilized 6.3 V When 5.0-V standby operation is utilized ^d 6.0 V Under standby conditions ^d 5.0 V
Grid-No.4 Current (Total)
Grid-No.2 Current
Ratio of cathode currenta: Min. Typ. Max. Red/blue 0.75 1.10 1.50 Red/green 0.65 1.00 1.50 Blue/green 0.60 0.91 1.30 Displacements, Measured at Center of Screen: 0.60 0.91 1.30
Raster centering displacement:
Horizontal ± 0.45 in (± 11.4 mm). Vertical ± 0.45 in (± 11.4 mm). Lateral distance between the ± 0.45 in (± 11.4 mm).
blue beam and the converged red and green beams ±0.35 in (± 6.4 mm) Radial convergence displacement excluding effects of dynamic convergence (each beam) ±0.37 in (± 9.4 mm)
Maximum Required Correction for Register ⁶ (Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the center of the Screen in any Direction 6.605 in (0.13 mm) max.
LIMITING CIRCUIT VALUES

Effective grid-No.1-to-cathode-

【八(円/八]

circuit resistance (each gun) 0.75 max. MQ The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous

Electronic

Components

DATA 2

short circuit current of more than 750 mA total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

- ⁹ The mating socket, including its associated, physicallyattached hardware and circuitry, must not weigh more than one pound.
- ^c For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.
- ^d For "instant on" applications, a maximum heater voltage 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

X-RADIATION WARNING

Because the 17EZP22 is designed to be operated at anode voltages as high as 22.5 kilovolts (design-maximum value), shielding of the 17EZP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

BASE SPECIFICATION - JEDEC No. 14BH

- Pin 1: Heater
- Pin 2: Cathode of Red Gun
- Pin 3: Grid No.1 of Red Gun
- Pin 4: Grid No.2 of Red Gun
- Pin 5: Grid No.2 of Green Gun
- Pin 6: Cathode of Green Gun
- Pin 7: Grid No.1 of Green Gun
- Pin 9: Grid No.4
- Pin11: Cathode of Blue Gun

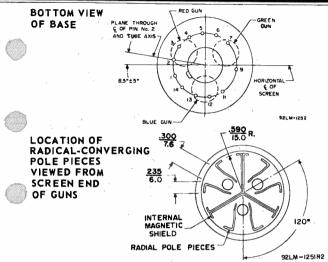
RBA Electronic Components

Pin 12: Grid No.1 of Blue Gun Pin 13: Grid No.2 of Blue Gun Pin 14: Heater

- Cap: Anode (Grid No.3, Grid No.5, Screen, Collector)
 - C: External Conductive Coating



DATA 2



NOTES FOR DIMENSIONAL OUTLINE

Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge (JEDEC No.G162) and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel.

Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.

Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

Note 4: To clean this area, wipe only with soft, dry, lintless cloth.

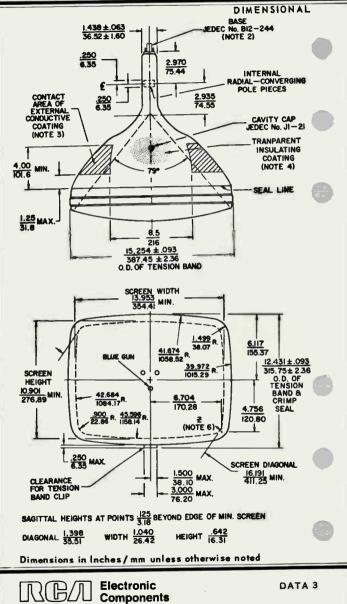
Note 5: All peripheral points of the faceplate lie on a spherical surface having a radius of 25.141 inches (638.58 mm). The center of the faceplate is located .016 inch (.41 mm) above this spherical surface.

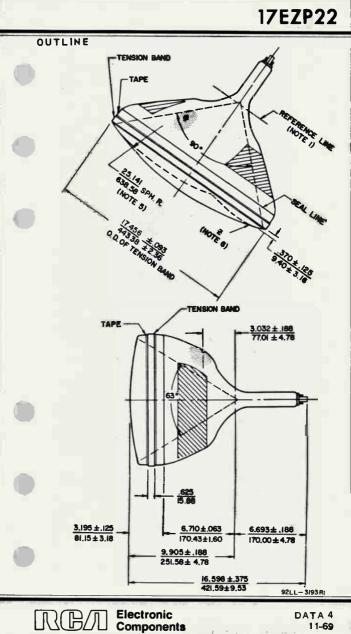
Note 6: "Z" is located on the outside surface of the faceplate, on the screen diagonal at a point .125 in (3.18 mm) beyond the minimum screen. This point is used as a reference for the tension band.

Electronic

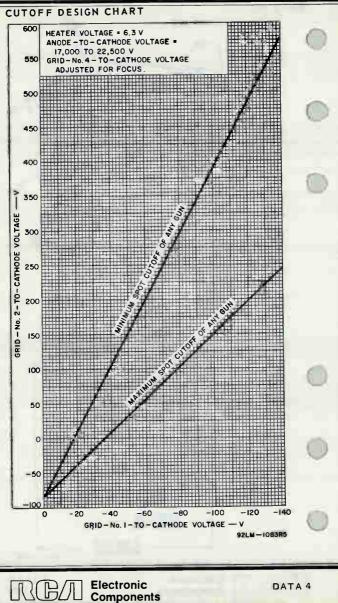
Components

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17HP4C

Picture Tube

RECTANGULAR	GLASS TYPE	
LOW-VOLTAGE	ELECTROSTATIC	FOCUS

ALUMENTZED SCREEN 70° MAGNETIC DEFLECTION

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes		S of
		J pi
Grid No.1 to all other electrodes		6 pf
External conductive coating to anode	•	{1500 max. pf 750 min. pf
Heater Current at 6.3 volts		600 ± 30 ma
Electron Gun		Type Requiring No Ion-Trap Magnet

Optical:

Phosphor (For curves, see front of	this	54	ect	lon).	.1	24.		Su	fi	i de	e Ty	ype, ized
Faceplate, Spherical		:	:	•	•	•	•	•					
Mechanical:												18	lbs

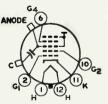
												· · · · · 10 103	
Overall Length .												19-3/16" ± 3/8"	
Neck Length									•			7-1/2" ± 3/16"	
Projected Area o	of (Sci	ree	en		•		•		•	٠	149 sq. in.	
External Conduct													
Type												Regular-Band	

Contact area for grounding Near Reference Line For Additional Information on Coatings and Dimensions:

See Picture-Tube Dimensional-Outlines and Bulb J199 B/D sheets at front of this section

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

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



Can - Anode (Grid No.3, Grid No.5. Screen. Collector) C-External **Conductive** Coat ing

Maximum and Minimum Ratings, Design-Maximum Values:

Unless otherwise specified, voltage values are positive with respect to cathode ANODE VOLTAGE. . . 17500 max. volts GRID-No.4 (FOCUSING) VOLTAGE: volts Positive value 1100 max. 550 max. volts Negative value . .



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17HP4C

GRID-No.2 VOLTAGE	volts
Negative peak value	volts
Negative bias value	volts
Positive bias value 0 max.	volts
Positive peak value	volts
(6.0. may	volts
HEATER VOLTAGE	volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	volts volts
Heater positive with respect to cathode: Combined AC and DC voltage 200 max. DC component	
Typical Operating Conditions for Grid-Drive Service:	
Unless otherwise specified, voltage values are positive with respect to cathode	
Anode Voltage	volts
Grid-No.4 Voltage	volts
Grid-No.2 Voltage	volts
Grid-No.1 Voltage for visual extinction of	
focused raster	volts
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max. m	egohms

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

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17LP4B

Picture Tube

RECTANGULAR GLASS TYPE Low-voltage electrostatic focus

ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf External conductive coating to anode . {1500 max. pf 750 min. pf Heater Current at 6.3 volts 600 ± 30 ma Electron Gun Type Requiring No Ion-Trap Magnet
Phosphor (For curves, see front of this Section). P4-Sulfide Type,
Aluminized Faceplate, Cylindrical
Mechanical: Weight (Approx.) Overall Length Image: Solution of the section Projected Area of Screen Projected Area of Screen Image: Solution of the section See Picture-Tube Dimensional-Outlines and Bulb Jigg C/B sheets at front of this section 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 Pin 1 - Heater Pin 6 - Grid No.1 Pin 6 - Grid No.2
Pin 11 - Cathode Pin 12 - Heater G_1^2 G_1^2 G_1^2 G_2^2 G_1^2 G_2^2 G_1^2 G_2^2 G_1^2 G_2^2 G_1^2 G_2^2 G_1^2 G_2^2 G_1^2 G_2^2 $G_$
Maximum and Minimum Ratings, Design-Naximum Values:
Unless otherwise specified, voltage values are positive with respect to cathode
ANODE VOLTAGE
Negative value



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17LP4B

GRID-No.2 VOLTAGE	550 max. volts	
Negative peak value	220 max. volts	
Negative bias value	155 max. volts	
Positive bias value	0 max. volts	
Positive peak value	2 max. volts	
HEATER VOLTAGE	6.9 max. volts	
PEAK HEATER-CATHODE VOLTAGE:	15.7 min. volts	
Heater negative with		
respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds	450 max. volts	
After equipment warm-up period	200 max, volts	
Heater positive with		
respect to cathode:		
Combined AC and DC voltage	200 max. volts	
DC component	100 max. volts	
Typical Operating Conditions for Grid-Drive	e Service:	
Unless otherwise specified, volta		
are positive with respect to	cathode	
Anode Voltage	14000 volts	
Grid-No.4 Voltage		
Grid-No.2 Voltage	300 volts	
Grid-No.1 Voltage for visual		
extinction of focused raster	-28 to -12 volts	
Maximum Circuit Value:		
Grid-No.1-Circuit Resistance	1.5 max. megohms	
	are many megorinia	

For X-radiation shielding considerations, see sheet I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section





17QP4B

Picture Tube

-	
()	RECTANGULAR GLASS TYPE ALUMINIZED SCREEN MAGNETIC FOCUS 70° MAGNETIC DEFLECTION
	Electrical:
	Direct Interelectrode Capacitances: Cathode to all other electrodes 5° pf Grid No.1 to all other electrodes 6 pf External conductive coating to anode . {1500 max. pf 750 min. pf
	Heater Current at 6.3 volts 600 ± 60 ma Heater Warm-Up Time (Average) 11 seconds Electron Gun
	Optical:
1	Phosphor (for curves, see front of this section). P4-Sulfide Type,
	Faceplate. Filterglass Light transmission (Approx.). 74%
	Nechanical:
	Weight (Approx.) 19 lbs Overall Length 19-3/16"±3/46" Neck Length 7-1/2"±3/16" Projected Area of Screen 149 sq. in
	Projected Area of Screen
	Type
	For Additional Information on Coatings, Dimensions, and De- flection Adgles: See Picture-Tube Dimensional-Quilines and Bullo Jigg C/E sheets
	at front of this section Cap Recessed Small Cavity (JEDEC No.J1-21) Base
-	No.85-57) Basing Designation for BOTTOM VIEW
1	ANODE
	Pin 1-Heater Cap - Anode
	Pin 2-Grid No.1 (Grid No.3,
	Pin 10-Grid No.2 Screen,
	Pin 11- Cathode Pin 12- Heater Collector)
	(2) (1) Conductive
~/ ·	GI (1) (2) K Coating
	Handaum and Miniana Dakinan
	Maximum and Minimum Ratings, vesign-Naximum Values:
	Unless otherwise specified, voltage val- ues are positive with respect to cathode
Tal.	Anode Voltage 20000 max. volts
-	Grid-No.2 Voltage
	and a second



RADIO CORPORATION OF AMERICA Electronic Components and Devices

DATA

17QP4B

Grid-No. 1 Voltaget		
Negative peak value	volts	1-
Negative bias value	volts	(
Positive bias value 0 max.	volts	1 -
Positive peak value		
Heater Voltage	volts	
l5.7 min.	volts	
Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode: Combined AC and DC voltage 200 max. DC component	volts volts volts	C
Typical Operating Conditions for Grid-Drive Service:	10110	(
Unless otherwise specified, voltage val- ues are positive with respect to cathode		
Anode Voltage	volts	
Grid-No.2 Voltage	volts	
extinction of focused raster28 to -72	volts	
Maximum Circuit Value:		
Grid-No.1-Circuit Resistance 1.5 max.	megohms	

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

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19ABP4

Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION INTERNAL MAGNETIC SHIELD

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes 3.4 pf Grid No.1 to all other electrodes 3.4 pf External conductive coating to anode. { Heater Current at 2.68 volts
Optical: Phosphor (For Curves, see front of this Section). P4-Sulfide Type,
Faceplate
Nechanical:
Weight (Approx.)
Type
at front of this section
Cap
Basing Designation for BOTTOM VIEW
Pin 1 - Heater (4) Cap - Anode
Pin 2-Grid No.2 Pin 3-Grid No.1 Pin 4-Grid No.4 Pin 6-Grid No.2 Pin 6-
Pin 7-Cathode Pin 8-Heater H H H G C-External Conductive Coating



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 4-63

19ABP4

Maximum and Minimum Ratings, Design-Naximum Values:	
Unless otherwise specified, voltage values	
are positive with respect to cathode	
ANODE VOLTAGE	volts
Positive value	volts
Negative value	volts
Negative value	volts
Negative peak value	volts
Negative bias value	volts
Positive bias value 0 max.	volts
Positive peak value	volts
HEATER VOLTAGE	volts
TEATER YOLIAGE	volts
respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode: Combined AC and DC voltage 200 max. DC component 100 max.	volts volts volts volts
Typical Operating Conditions for Grid-Drive Service:	
Unless otherwise specified, voltage values are positive with respect to cathode	
Anode Voltage	volts
Anode Voltage	volts
Grid-No.2 Voltage	volts
extinction of focused raster35 to -72	volts
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max.	megohms

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



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

19AFP4

Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Electrical
Heater Current at 6.3 volts 600 ± 5% ma Heater Warm-Up Time (Average) 11 seconds 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, uuf
Electron Gun
Optical:
Faceplate and Protective Panel
Nechanical:
Operating Position
Overall Length 11-5/8" ± 5/16" Neck Length 4-1/8" ± 1/8" Projected Area of Screen 172 sq. in. External Conductive Coating: 172 sq. in.
Type
CapRecessed Small Cavity (JEDEC No.J1-21) BaseSmall-Button Neoeightar 7-Pin, Arrangement 1 (JEDEC No. 87-208)
Basing Designation for BOTTOM VIEW
Pin 1 - Heater C4(4) C Cap - Ultor
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 H H H Grid No.5 Collector) C - External Conductive Coating



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 5-62

19AFP4

Maximum Ratings, Design-Naximum Values:				
ULTOR VOLTAGE	20000	max.	volts	
GRID-No.4 (FOCUSING) VOLTAGE:				
Positive value	1100	max.	volts	
Negative value		max.	volts	
GRID-No.2 VOLTAGE	550	max.	volts	
GRID-No.1 VOLTAGE:	000		1	
Negative peak value		max.	volts	
Negative bias value		max.	volts	
Positive bias value		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		max.	volts	
After equipment warm-up period	200	max.	volts	
Heater positive with				
respect to cathode	200	max.	volts	
Typical Operating Conditions:				
With ultor voltage of	160	00	volts	
and grid-No.a voltage of	30	0	volts	
	0 to		volts	
Grid-No.4 Voltage for focus	\$ LU	400	VOILS	
Grid-No.1 Voltage for visual extinction	25 +	0 .72	volts	
of focused raster	-)	0-12	VUILA	
Maximum Circuit Values:				
Grid-No.1-Circuit Resistance	1.5	max.	megohms	

For X-radiation shielding considerations, see sheet *I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES* at front of this section



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

19AJP4

Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION LOW GRID-No.2 VOLTAGE CATHODE-DRIVE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Liberi idali
Heater Current at 6.3 volts
Grid No.1 to all other electrodes 6 unif Cathode to all other electrodes 5 unif
External conductive coating to ultor 1100 max. Huf
Electron Gun Type Requiring No lon-Trap Magnet
Optical:
Faceplate
Nechanical:
Operating Position. Any Weight (Approx.). 14 lbs Overall Length. 11-3/8" ± 1/4" Neck Length. 4-1/8" ± 1/8" Projected Area of Screen. 172 sq. in. External Conductive Coating: 112
Type
Contact area for grounding Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb Jaco A sheets
at the front of this section
Cap
H. (4) GI
Pin 2 - Cathode Pin 3 - Heater Pin 4 - Heater Pin 5 - Grid No.1 Pin 6 - Grid No.2 Pin 7 - Grid No.2 Pi



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 5-62

19AJP4

Maximum and Minimum Ratings, Design-Haximum		
	19800 max.	volts
(-	2000 min.	volts
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE: Positive value. Negative value. GRID-No.2-TO-GRID-No.1 VOLTAGE.	1100 max. 500 max. 70 max. 40 min.	volts volts volts volts
CATHODE-TO-GRID-No.1 VOLTAGE	100 max. 7 max. 5.8 min.	volts volts volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds After equipment warm-up period Heater positive with respect to cathode	410 max. 180 max. 180 max.	volts volts volts
Typical Operating Conditions:		
With ultor-to-grid-No.1 voltage of and grid-No.2-to-grid-No.1 voltage of	14500 50	volts volts
Grid-No.4-to-Grid-No.1 Voltage for focus . Cathode-to-Grid-No.1 Voltage for	0 to 500	volts
visual extinction of focused raster	31 to 49	volts
Maximum Circuit Values: Grid-No.1-Circuit Resistance	1.5 max.	megohms
and the second second second second		ant

For X-radiation shielding considerations, see sheet **I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES** at front of this section





Picture Tube

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Lieutiter.	
Heater Current at 6.3 volts 600 ± 30 Heater Warm-Up Time (Average) 11 second	na.
Heater Warm-Up Time (Average) 11 second	ls
Deflection Method.	ic
Deflection Method	1C
Deflection Angles (Approv 1)	
Diagonal	t,
Horizontal	20
Diagonal	50
Direct Interelectrode Capacitances:	
Grid No.1 to all other electrodes 6 H Cathode to all other electrodes 5 H	μt –
Cathode to all other electrodes 5 H	μt
External conductive coating to ultor {1500 max. µ 1000 min. µ	μţ_
External conductive coaring to arcort 1 [1000 min. 4	μt
Electron Gun	et
Optical:	
Faceplate	SS
Light transmission at center (Approx.)	676
Phosphor (for curves, see front of this section) . P4	pe.
Aluminiz	ea
Fluorescence	te
Phosphorescence	te
Aluminiz Fluorescence	π
Nechanical:	
Tube Dimensions:	
Overall length $11-3/8" \pm 1/$	4*
Overall length 11-3/8" ± 1/ Greatest width 16-13/32" ± 1/	8"
Greatest height	8"
Diagona)	8"
Neck length	8"
Curvature of faceplate (External Radii):	Ĩ
Center Center	8"
Center	1"
Screen Dimensions (Minimum):	
Greatest width	8"
Greatest width	2"
Diagonal	6"
Projected area	in.
Weight (Approx.)	bs
Operating Position	Any
Operating Position	21)
Bulb	JAI
	-



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA I

Base Small-Button Neceighta	r 7-Pin Arrang	omont 1	
	LIEDEC NO		
Basing Designation for BOTTOM VIEW.		8HR	
Pin 1-Heater	Cap-Ultor		
Pin 2-Grid No.1		No.3.	
Pin 3-Grid No.2 3		No.5,	
Pin 4-Grid No.4		ector)	
Pin 6-Grid No.1	C-Exter		
Pin 7-Cathode		uctive	
Pin 8-Heater	Coat		
GRID-DRIVEA SERVI	CE		
Unless otherwise specified,	voltage values		
are positive with respec	t to cathode		
Maximum and Minimum Ratings, Design-Ha	ximum Values:		
ULTOR VOLTAGE	∫23000 max.	volts	1
	15000 min.	volts	100
GRID-No.4 (FOCUSING) VOLTAGE:			
Positive value	. 1100 max.	volts	
Negative value	550 max.	volts	
GRID-No.2 VOLTAGE	. 550 max.	volts	
CRID No. 1 NO. THOS	200 min.	volts	
GRID-No.1 VOLTAGE:			
Negative-peak value	. 220 max.	volts	
	. 154 max.	volts	
Positive-blas value	• 0 max. • 2 max.	volts volts	
HEATER VOLTAGE.	16.9 max.	volts	
	15.7 min.	volts	
PEAK HEATER-CATHODE VOLTAGE:		vorta	
Heater negative with respect to cathod	ė:		
During equipment warm-up period			
not exceeding 15 seconds.	. 450 max.	volts	
After equipment warm-up period	. 200 max.	volts	
Heater positive with respect to cathode	. 200 max.	volts	
Typical Dperating Conditions:			
With ultor voltage (Ecsh) of	20000	volts	
and grid-No.2 voltage (Eczh) 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	
Field Strength of Adjustable			
Centering Magnet♦	0 to 9	gausses	
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance	1.5 max.	medohms	



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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



CATHODE-DRIVES SERVICE

	CATHODE-DRIVE® SERVICE	
	Unless otherwise specified, voltage values	
	are positive with respect to grid No.1	
	Maximum and Minimum Ratings, Design-Naximum Values:	
	ULTOR-TO-GRID-No.1 VOLTAGE	volts
	(15000 min.	volts
	GRID-No.4-TO-GRID-No.1	
	(FOCUSING) VOLTAGE:	
	Positive value	volts
	(700	volts
	GRID-No.2-TO-GRID-No.1 VOLTAGE	volts
	GRID-No.2-TO-CATHODE VOLTAGE	volts
	CATHODE-TO-GRID-No.1 VOLTAGE:	
	Positive-peak value	volts
	Positive-bias value 154 max.	volts
	Negative-bias value 0 max.	volts
	Negative-peak value	volts
	HEATER VOLTAGE	volts
	• [5.7 min.	volts
	PEAK HEATER-CATHODE VOLTAGE:	
	Heater negative with respect to cathode: During equipment warm-up period	
	not exceeding 15 seconds 450 max,	volts
	After equipment warm-up period 200 max.	volts
	Heater positive with respect to cathode. 200 max.	volts
	Typical Operating Conditions:	
	With ultor-to-grid-No.1	
	voltage (Ecsg.) of 20000 and grid-No.2-to-grid-No.2	volts
	and grid-No.2-to-grid-No.2	
	voltage (Ec281) 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	volts
	Field Strength of Adjustable	
	Centering Magnet 0 to 9	gausses
		•
	Maximum Circuit Values:	
	Grid-No.1-Circuit Resistance 1.5 max.	megohms
	▲ Grid drive is the operating condition in which the video sign	al varias
	the grid-No.1 potential with respect to cathode.	
	The grid-No.4 (or grid-No.4-to-grid-No.1) voltage required for	er optimum
	400 volts, is independent of ultor current and will remain es	sentially
	constant for values of ultor (or ultor-to-grid-No.1) voltage No.2 (or grid-No.2-to-grid-No.1) voltage within design-maximum	or grid-
	The grid-No.4 (or grid-No.4-to-grid-No.1) voltage required for focus of any individual tube will have a value anywhere bets 400 volts, is independent of ultor current and will remeth est constant for values of ultor (or ultor-to-grid-No.1) voltage No.2 (or grid-No.2-to-grid-No.1) voltage within design-maximu shown for these items.	
	See Raster-Cutoff-Range Chart for Grid-Drive Service.	
ſ	Distance from Reference Line for sultable PM centering magn	et should

Distance from Reference Line for suitable PM centering magnet should not exceed $2-1/4^{\circ}$. The specified centering magnet compensates only for the effect which mechanical tube tolerances may have on the location of the undeflected focused spot with respect to the center of the tube face. Maximum field strength of adjustable centering magnet equals:



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. A DATA 2

Ecsk or Ecsg1 (volts) x 8 gausses 16000 (volts)

The equipment manufacturer must determine and supply additional compensation for the effects of the earth's magnetic field and extraneous fields due to choice of circuitry and components. The additional compensation should preferably be applied as part of the magnetic field of the deflecting yoke.

- 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.
- See Raster-Cutoff-Range Chart for Cathode-Drive Service.

OPERATING CONSIDERATIONS

I-Ray Warning. When operated at ultor voltages up to 16 kilovolts, this picture tube does not produce any harmful X-ray radiation. However, because the rating of this type permits operation atvoltages as high as 23 kilovolts (Designmaximum value), shielding of this picture tube for X-ray radiation may be needed to protect against possible injury from prolonged exposure at close range whenever the operating conditions involve voltages in excess of 16 kilovolts.

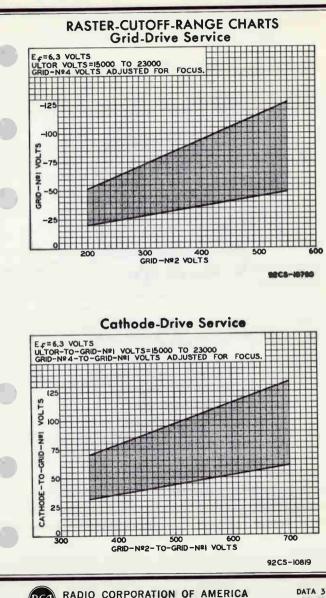
Shatter-Proof Cover Over the Tube Face. Following conventional picture tube practice, it is recommended that the cabinet be provided with a shatterproof, glass cover over the face of this picture tube to protect it from being struck accidentally and to protect against possible damage resulting from tube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

> RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



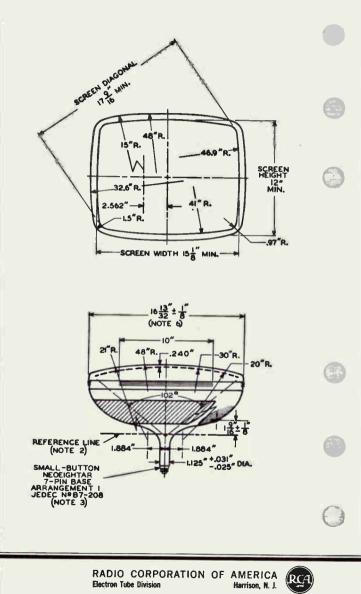
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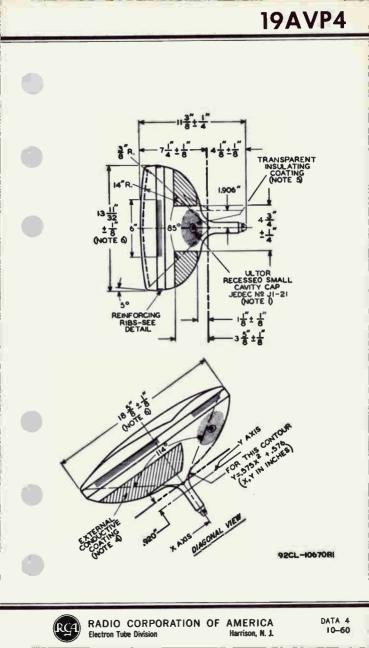


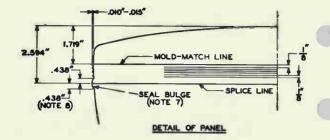




Electron Tube Division Harrison, N. J. 10-60







NOTE I: 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°. 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 I-3/4".

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

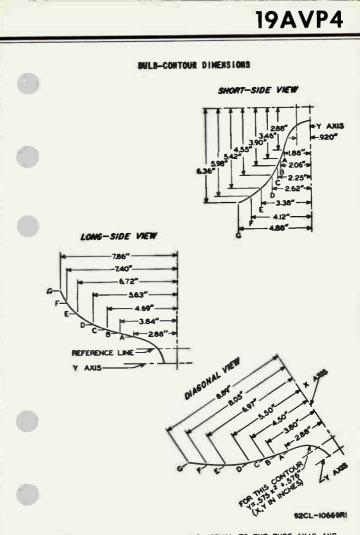
NOTE 6: MEASURED AT THE MOLD-MATCH LINE.

NOTE 7: 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 8: UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/8" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF THE TUBE SUPPORT BAND. TUBE MOUNTING AND YOKE SUPPORT CLAMPS MUST BE SPECED FROM THE TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

> RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

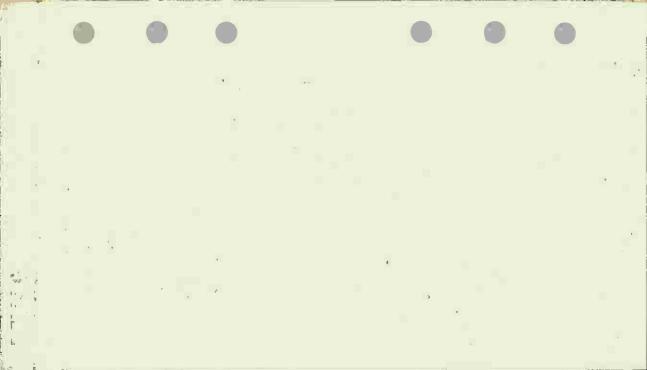




NOTE: PLANES A THROUGH G ARE NORMAL TO THE TUBE AXIS AND AT FIXED LOCATIONS FROM THE Y AXIS. THESE COORDINATES DESCRIBE THE BOGIE-BULB EXTERNAL CONTOUR IN PLANES THROUGH THE TUBE AXIS AND THE RESPECTIVE FACEPLATE AXES.



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 5



19AYP4

Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4° MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

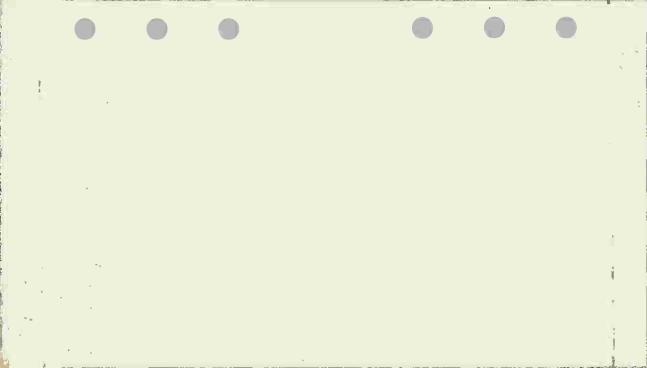
The 19AYP4 is the same as the 19AVP4 except for the following item:

Electrical:

Heater Current at 6.3 volts. 450 ± 20 ma



RADIO CORPORATION OF AMERICA DATA Electron Tube Division Harrison, N. J. 5-62



19BDP4

Picture Tube

RECTANGULAR GLASS TYPE Low-voltage electrostatic focus 92° Mag Low-grid-no.2 voltage C/

ALUMINIZED SCREEN 92° MAGNETIC DEFLECTION CATHODE-DRIVE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Electrical:
Heater Current at 6.3 volts 600 ± 10% ma Heater Warm-Up Time (Average) 11 seconds Direct Interelectrode Capacitances:
Grid No.1 to all other electrodes 6 ##f Cathode to all other electrodes 5 ##f
External conductive coating to ultor {2000 max. ##f 1500 min. ##f
Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Faceplate
Nechanical:
Operating Position. Any Weight (Approx.). 15 lbs Overall Length. 15-1/4" ± 3/8" Neck Length 5-1/2" ± 3/16" Projected Area of Screen. 172 sq. in. External Conductive Coating: 172 sq. in.
Type
See Picture-Tube Dimensional-Outlines and Bulb J149 B sheets at the front of this section
Cap
Short Small-Shell Duodecal 6-Pin (JEDEC Group 4, No.B6-203) Small-Shell Duodecal 6-Pin, Arrangement 1 (JEDEC Group 4, No.B6-63) Basing Designation for BOTTOM VIEW
GA
Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.2 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater Pin 12-Heater Pin 2-Grid No.2 Pin 11-Cathode Pin 12-Heater Pin 2-Grid No.2 Pin 12-Heater Pin 2-Grid No.2 Cap - Ultor (Grid No.3, Grid No.5, Collector) Cap - Ultor (Grid No.3, Collector) Cap - Cap - Ultor (Grid No.3, Collector) Cap - Cap - Ultor (Grid No.3, Collector) Collector) Collector Conductive Conductive Collector



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 5-62

19BDP4

Maximum and Minimum Ratings, Design-Maximum	Values:	
	9800 max. 2000 min.	volts
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:	2000 min.	volts
Positive value. Negative value. GRID-No.2-TO-GRID-No.1 VOLTAGE.	1100 max. 500 max. {70 max. 40 min.	volts volts volts volts
CATHODE-TO-GRID-No.1 VOLTAGE	100 max. 7 max. 5.8 min.	volts volts volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds After equipment warm-up period Heater positive with respect to cathode	410 max. 180 max.	volts volts volts
Typical Operating Conditions:		
Nith ultor-to-grid-No.1 voltage of and grid-No.2-to-grid-No.1 voltage of Grid-No.4-to-Grid-No.1 Voltage for focus.	50	volts volts volts
Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster	31 to 49	volts
Maximum Circuit Values: Grid-No.1-Circuit Resistance	1.5 max. me	gohms

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section





19CHP4

Picture Tube

SHORT RECTANGULAR GLASS TYPE Low-voltage electrostatic focus Low grid-no.2 voltage

ALUMINIZED SCREEN 114º MAGNETIC DEFLECTION CATHODE-DRIVE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

LIGCTICAL:
Heater Current at 6.3 volts 600 ± 30 ma Heater Warm-Up Time (Average) 11 seconds 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. uuf
Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Faceplate
Mechanical:
Operating Position. Any Weight (Approx.). 14 lbs Overall Length. 11-5/8" ± 1/4" Neck Length 4-3/8" ± 1/4" Projected Area of Screen. 4-3/8" ± 1/8" Type. 172 sq. in. External Conductive Coating: Type. Type. Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb Ji49 A sheets at the front of this section Cap . . Recessed Small Cavity (JEDEC No.J1-21) Base. Base. . .
Arrangement 1 (JEDEC No.87-208)
Basing Designation for BOTTOM VIEW
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Pin 8 - Heater



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

DATA 3-62

19CHP4

Maximum and Minimum Ratings, Design-Maximum Values:		
ULTOR-TO-GRID-No.1 VOLTAGE	volts	
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:	volts	
Positive value	volts	
Negative value 400 max.	volts	
	volts	
GRID-No.2-TO-GRID-No.1 VOLTAGE	volts	
CATHODE-TO-GRID-No.1 VOLTAGE:		
Positive peak value 150 max.	volts	
Positive bias value 100 max.	volts	
Negative bias value 0 max.	volts	
Negative peak value	volts	
HEATER VOLTAGE	volts	
heater voltade	volts	
Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode 200 max.	volts volts volts	
Typical Operating Conditions:		
With ultor-to-grid-No.1 voltage of 16000	volts	
and grid-No.2-to-grid-No.1 voltage of 50	volts	
Grid-No.4-to-Grid-No.1 Voltage for focus50 to +250 Cathode-to-Grid-No.1 Voltage for	volts	
visual extinction of focused raster 32 to 50	volts	
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance 1.5 max.	megohms	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



RADIO CORPORATION OF AMERICA Electron Tube Division Herrison, N. J.

19CMP4

Picture Tube

24

LOW-VOLTAGE ELECTROSTATIC FOCUS 114º MAGNETIC DEFLECTION

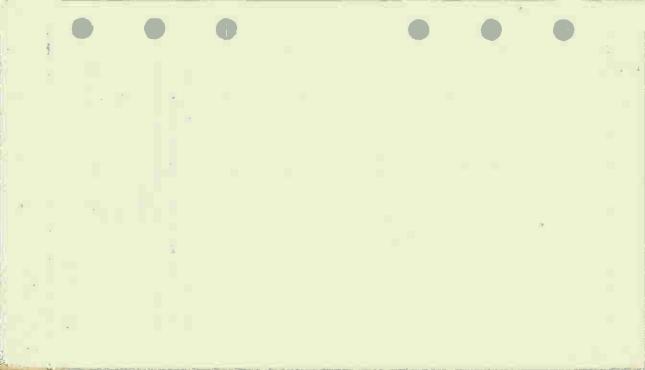
Low-Grid-No.2 Voltage — for Cathode-Drive Operation The 19CMP4 is the same as the 19CHP4 except for the following items:

ELECTRICAL

Heater Current at 6.3 volts	mÅ
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
Anode Voltage	V



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 7-65



19CXP4

Picture Tube

NO ION-TRAP MAGNET REQUIRED

LOW-VOLTAGE ELECTROSTATIC FOCUS 114º MAGNETIC DEFLECTION

Low-Grid-No.2 Voltage - for Cathode-Drive Operation

ELECTRICAL

Direct Interelectrode Capacitances	
Cathode to all other electrodes	5 pF
Grid No.1 to all other electrodes	6 pF
External conductive coating to anode {190	O max pF O min pF
Heater Current at 6.3 V	0 ±60 mA
Heater Warm-Up Time (Average)	1 5
Electron Gun Type Requiring No Ion-Tr	ap Magnet

OPTICAL

Phosphor	.P4-Sulfide Type, Aluminized
Faceplate	
Light transmission (Approx.).	

HECHANICAL

Weight (Approx.)						14 10
Overall Length						
Neck Length						4.375 ± 0.125 in
Projected Area of Sc						
External Conductive						
	groundin	g			. Ne	Regular-Band ear Reference Line
		na l -0	utlir	ie s	and	Bulb J149A sheets
at front of this :						
						A 1
Cap	Recent	ssed . Sp OM VI	Small ecial EW	Ca 6-	vity Pin	(JEDEC No.JI-21) (JEDEC No.B6-214)
Basing Designation 1	for BOTT	ssed . Sp OM VI	Small ecial EW.	Ca 6-	vity Pin	(JEDEC No.JI-21) (JEDEC No.B6-214)
Basing Designation 1 Pin 2-Cathode	For BOTT	ssed . Sp OM VI	Small ecial EW	Ca 6-	vity Pin 	(JEDEC No.JI-21) (JEDEC No.B6-214)
Basing Designation 1 Pin 2-Cathode Pin 3-Heater	for BOTT	ssed . Sp OM VI	Small ecial EW	Ca 6-	vity Pin 	(JEDEC No.JI-21) (JEDEC No.B6-214) 7FA
Basing Designation 1 Pin 2-Cathode Pin 3-Heater Pin 4-Heater	For BOTT	ssed . Sp OM VI	Small ecial EW	Ca 6-	vity Pin 	(JEDEC No.JI-21) (JEDEC No.B6-214) 7FA
Basing Designation 1 Pin 2-Cathode Pin 3-Heater	for BOTT	ssed . Sp OM VI	Small ecial EW.	Ca 6-	vity Pin H	(JEDEC No.JI-21) (JEDEC No.B6-214) 7FA
Basing Designation 1 Pin 2-Cathode Pin 3-Heater Pin 4-Heater	For BOTT	ssed . Sp OM VI	Small ecial EW.	Ca 6-	vity Pin 	(JEDEC No.J1-21) (JEDEC No.B6-214) 7FA
Basing Designation 1 Pin 2 - Cathode Pin 3 - Heater Pin 4 - Heater Pin 5 - Grid No.1	for BOTT	ssed . Sp OM VI	Small ecial EW	Ca 6-	vity Pin · ·	(JEDEC No.JI-21) (JEDEC No.B6-214)
Basing Designation 1 Pin 2-Cathode Pin 3-Heater Pin 4-Heater Pin 5-Grid No.1 Pin 6-Grid No.4 Pin 7-Grid No.2	for BOTT	ssed . Sp OM VI	Small ecial EW	Ca 6-	vit) Pin H (2)	(JEDEC No.JI-21) (JEDEC No.B6-214) 7FA
Basing Designation 1 Pin 2 - Cathode Pin 3 - Heater Pin 4 - Heater Pin 5 - Grid No.1 Pin 6 - Grid No.4	for BOTT	ssed . Sp OM VI	Small ecial EW	Ca 6-	vity Pin H ((JEDEC No.JI-21) (JEDEC No.B6-214) 7FA

RCA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

Collector) C-External Conductive

Coating

DATA

ANODE

19CXP4

MAXIM	IUM AND M	(IN I M	JM RA	TIN	GS,	DES	SIG	N M	AX	MUI	N VALI	JES	
U	Unless of												
Anode Volta	-	••••		•	•					ſ	. 1 20000 12000	max min	¥
Grid-No.4 Positive Negative Grid-No.2	value. value.		::	: :			•	•		:	500 ∫55	max max max	V V V
Cathode Vol Negative Negative Positive Positive Heater Vol	peak va bias va bias va peak va tage.	lue . lue . lue .	· · · · ·			•••	•	•	•••	••••••	2 0 100 150 ∫6.9	min max max max max max max	* * * * * *
not After Heater po Combine	egative equipme exceedin equipmen	with nt wa g 15 t war with d DC	resp seco m-up resp volt	ect p pe nds. pe ect age.	rioc to	cat	hoc	le:	•••	•••••••••••••••••••••••••••••••••••••••	200	max max max max	V V V V
		herwi itive	ises wit	pec h r	ifi esp	ed, ect	vo to	lta gr	ge id	vai No.	lues 1	000	¥
Grid-No.2 Cathode Vo For visu	Voltage Itage .		•••	•		•	:	•				5	Ŷ Ÿ
		MAX	1 MUM	CII	RCU	TV	ALL	JE					
Grid-No. (Circuit	Resis	tanc	e	• •	• •	•	•	•••	•	1.5	N BX	HΩ
	-radiati IDIATION	PRECA		ws	FOR	CAT	ГНО	DE-					

RCA

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DATA

19DQP4

Picture Tube

PAN-O-PLY-INTEGRAL IMPLOSION PROTECTION

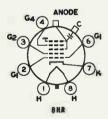
(Provided by Formed Rim and Welded Tension Bands Around Periphery of Tube Panel—No Separate Safety-Glass or Integral Protective Window Required)

LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION

ELECTRICAL

Direct Interelectrode Capacitances	
Cathode to all other electrodes 5	DF
Grid No.1 to all other electrodes 6	pF
External conductive coating to anode . 1250 min-1750 max	pF -
Heater Current at 6.3 volts	A A
Heater Warm-Up Time (Average)	8
Electron Gun Type Requising No Ion-Trap Mag	-
	101
OPTICAL	
Phosphor P4—Sulfide Type, Aluminiz	ed
For curves, see front of this section	
Faceplate	158
Light Transmission (Approx.)	18%
MECHANICAL	
Weight (Approx.)	16
Overall Length	in
Neck Length	in
Projected Area of Screen	in
External Conductive Coating ^a	10
Type	nd.
Contact area for grounding	ne
For Additional Information on Coatings and Dimensions	116
See Picture-Tube Dimensional-Outlines and Bulb J149F shee	te
at front of this section	ra.
Cap Recessed Small Cavity (JEDEC No.JI-2	11
Base Small-Button Neceightar 7-Pi	
Arrangement I, (JEDEC No.B7-20	1
	01
TERMINAL DIAGRAM (Bottom View)	
Din 1 Hanton	

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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating





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- Indicates a change.

DATA I

19DQP4

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES		
Unless otherwise specified, voltage values		
are positive with respect to cathode Anode Voltage	¥	
Grid-No.4 (Focusing) Voltage	-	
Positive value	V	
Grid-No.2 Voltage	¥.	
Grid-No.1 Voltage		
Negative peak value	¥	
Negative bias value 155 max Positive bias value 0 max	V	
Positive peak value	v	
Heater Voltage 5.7 min-6.9 max	¥	
Peak Heater-Cathode Voltage Heater negative with respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds 450 max	۷	
After equipment warm-up period 300 max Heater positive with respect to cathede:	¥	
Combined AC and DC voltage 200 max	V	
DC component	٧	
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE		
Unless otherwise specified, voltage values		
are positive with respect to grid No.1		
Anode Voltage	٧	
Grid-No.4 Voltage ^b	V	
Cathode Voltage	Ŷ	
For visual extinction of focused raster		
Field Strength of required adjustable centering magnet ^c 0 to 8	6	
	a	
MAXIMUM CIRCUIT VALUE		
Grid-No.I Circuit Resistance 1.5 max 1	Ω	
External conductive costing and implosion protection hardware must l grounded.	be	
b The grid-No.4 voltage required for optimum focus of any individual ful		
will have a value anywhere between 0 and +400 volts with the combine grid-No.1 voltage and video-signal voltage adjusted to give an ano	d	
^b The grid-No.4 voltage required for optimum focus of any individual tul will have a value anywhere between 0 and +400 volta with the combine or tid-No.1 and the second or signal voltage adjusted to give an moo carrent of 100 microamperes on a 10-1/2-inch by 14-inch pattern from a RCA-2F21 monoscope, or equivalent.	In In	
For X-radiation shielding considerations, see sheet		
X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section		

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DATA I

19DQP4

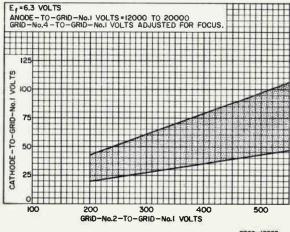
Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4 inches. The specified centering magnet compensates only for the effect which mechanical tube tolerances may have on the location of the undeflected, focused spot with respect to the center of the tube face. Maximum field strength of adjustable centering magnet equals c

> Anode volts x 8 gauss 16000 volts

The equipment manufacturer must determine and supply additional compen-sation for the effects of the earth's magnetic field and extraneous fields due to choice of circuitry and components. The additional compensation should preferably be applied as part of the magnetic field of the deflecting yoke.

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

RASTER-CUTOFF-RANGE CHART Cathode-Drive Service



92CS=12008



RADIO CORPORATION OF AMERICA **Electronic Components and Devices**

Harrison, N. J.

DATA 2 2-64



19DRP4

Picture Tube

PAN-O-PLY --- INTEGRAL IMPLOSION PROTECTION

(Provided by Formed Rim and Weided Tension Bands Around Periphery of Tube Panel — No Separate Safety-Glass or Integral Protective Window Required) RECTANGULAR GLASS TYPE NO ION-TRAP MAGNET REQUIRED LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION HEATER CONTROLLED WARM-UP TIME ALUMINIZED SCREEN

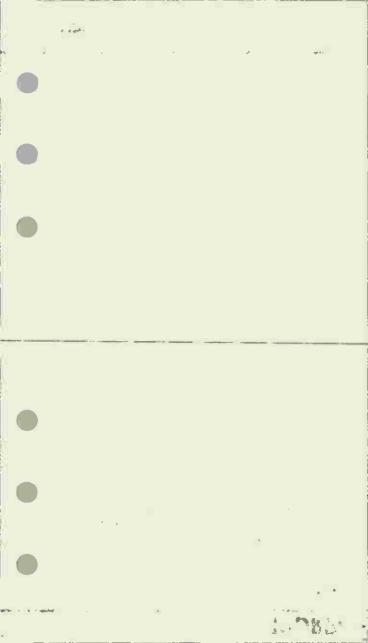
The 19DRP4 is the same as the 19DQP4 except for the following item:

Electrical:

Heater current at 6.3 volts 600 ± 30 ma



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 4-65



19DSP4

Picture Tube

PAN-O-PLY -- INTEGRAL IMPLOSION PROTECTION

(Provided by Formed Rim and Welded Tension Bands Around Periphery of Tube Panel - No Separate Safety-Glass or Integral Protective Window Required) 114º MAGNETIC DEFLECTION LOW-VOLTAGE ELECTROSTATIC FOCUS

NO ION-TRAP MAGNET REQUIRED

Law-Grid-No. 2-Voltage - for Cathode-Drive Operation

ELECTRICAL

Direct Interelectrode Capacitances Cathode to all other electrodes . 5 pF Grid No.1 to all other electrodes . 6 DF 1750 max pF-External conductive coating to anode 1250 min pF-Heater Current at 6.3 volts . 600 ± 30 a4 Heater Warm-Up Time (Average) . . н . . Electron Gun. Type Requiring No ion-Trap Magnet

ABTICAL

	VEL	TUAL		
Phosphor				Aluminized
Faceplate Light Transmission				
		ANICAL		
Weight (Approx.) Overall Length			. 11.625	.15.5 1bs-

Uverall Length	
Neck Length	4,375 ± 0,125 in
Projected Area of Screen	
	••••••••••••••••••••••••••••••••••••••
External Conductive Coating*	
Type	
Contact area for grounding	Near Reference Line
For Additional Information on Co	patings and Dimensions
	Outlines and Bulb J149 F sheets
at front of this section	
	Peoll Coulds (IEDEC No. 11 OI)
Cap Recessed	
Base	
	rangement I, (JEDEC No.B7-208)
Basing Designation for BOTTOM V	iEW 8HR
Pin 1-Heater	
	111005
Pin 2-Grid No.1	GA ANODE
Pin 3-Grid No.2	
Pin 4-Grid No.4	Go A A A
Pin 6-Grid No.1	(3) (T===Y Y6)"
Pin 7 - Cathode	
Pin 8-Heater	
Cap - Anode (Grid No. 3.	(2) (7)
	GOK
Grid No.5, Screen,	
Collector)	
C-External Conductive	<u></u>

C-External Conductive Coating

- Indicates a change.

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Harrison, N. J.

DATA 7-65

19DSP4

4.	are positive with respect to grid No.1 20000 max M Dode Voltage	
	(10000 mm	1
ur	id-No.4 (Focusing) Voltage Positive value	1
	Negative value	
Gr	id-No.2 Voltage	
Ca	thode Voltage	
	Negative peak value	
	Negative bias value O max N Positive bias value	
		v.
He	ater Voltage	V
	(5.7 min)	1
Pe	ak Heater-Cathode Voltage Heater negative with respect to c athode:	
	During equipment warm-up period	
		V
	Aller equipment warm op periods i i i a over man	V
	Heater positive with respect to cathode:	v
	Combined Ac and DC vortage	
	TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
	Unless otherwise specified, voltage values are positive with respect to grid No. 1	
A .	I 6000 H	v
Ĝ		v .
	id-No.2 Voltage	٧
Ca	thode Voltage for visual extinction	
	of focused raster	v
F	eld Strength of required adjustable centering magnet	G
	concerning magnetic restriction of the second	•
	MAXIMUM CIRCUIT VALUE	
6	id-No. Circuit Resistance 1.5 max M	Ω
a	External conductive costing and implosion protection hardware mus	t
b	be grounded. The grid-No.4 voltage required for optimum focus of any individual tub	e
	The grid-No.4 voltage required for optimum focus of any individual tub will have a value anywhere between -100 and +300 volta with the com bined grid-No.1 voltage and video-signal voltage adjusted to give a anode current of 100 microsaperes on a 10-1/2-inch by 14-inch patter from an RCA-2F21 monacope, or equivalent.	n n
	For X-radiation shielding considerations, see sheet	
	X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section	

DATA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



19EBP4

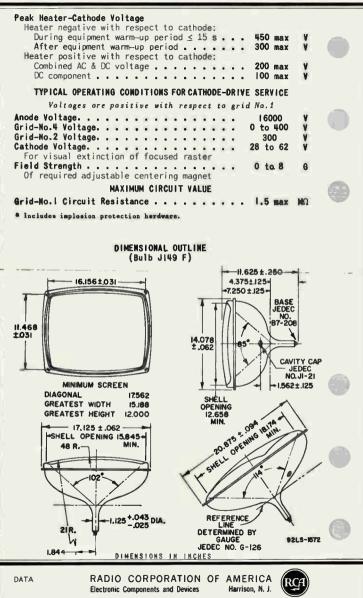
Picture Tube

	Ficture Tube
FILLED-RIN TYPE	114º MAGNETIC DEFLECTION
Direct Interelectrode Capacitances Cathode to all other electrodes. Grid No.1 to all other electrodes External conductive coating to anon Heater Current at 6.3 V. Heater Warm-Up Time (Average). Electron Gun.	5 pF s 6 pF de ^a . 1250 min—1750 max pF 600 ± 30 mA 11 s
OPTICAL	
	prox.)
Mataba (Assault)	
Overall Length	4.375 + 125 in
Type (see CRT OUTLINES 1 at front of t Contact area for grounding	Near Reference Line
Base	II-Button Neceightar 7-Pin,
Arrany	gement I, (JEDEČ No.B7-208)
TERMINAL DIAGRAM (B	ottom View)
TËRMINAL DIAGRAM (B Pin 1-Heater	
TËRMINAL DIAGRAM (B Pin 1 - Heater Pin 2 - Grid No.1	G4 (A) C
TËRMINAL DIAGRAM (B Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2	
TËRMINAL DIAGRAM (B Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4	
TËRMINAL DIAGRAM (B Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2	
TÉRMINAL DIAGRAM (B 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	
TËRMINAL DIAGRAM (B 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 - Anode (Grid No.3, Grid	
TERMINAL DIAGRAM (B Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector)	
TERMINAL DIAGRAM (B 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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive	
TERMINAL DIAGRAM (B 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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating	G2 G2 G2 G2 G2 G2 G2 G1 G1 G1 G1 G1 G1 G1 G1 G1 G1 G1 G1 G1
TERMINAL DIAGRAM (B 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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, M	Ga ANODE Ga H H H H H H H H H H H H H H H H H H H
TËRNINAL DIAGRAM (B 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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, M Voltages are positive with	Ga ANODE Ga Ga Ga Ga Ga Ga Ga H SHR H DESI GN-MAX IMUN VALUES respect to cathode
TËRNINAL DIAGRAM (B 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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, I Voltages are positive with Anode Voltage.	Ga ANODE Ga Ga Ga Ga Ga Ga Ga H SHR H DESI GN-MAX IMUN VALUES respect to cathode
TERMINAL DIAGRAM (B 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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, M Voltages are positive with Anode Voltage	ANODE G4 G2 G2 G2 G2 G2 G2 G2 G2 G2 G2
TËRNINAL DIAGRAM (B 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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, M Voltages are positive with Anode Voltage. Positive value	ANODE Ga Ga Ga Ga Ga Ga Ga Ga Ga Ga
TËRNINAL DIAGRAM (B 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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, I Voltages are positive with Anode Voltage. Positive value . Negative value .	ANODE Ga Ga Ga Ga Ga Ga Ga Ga Ga Ga
TËRNINAL DIAGRAM (B 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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, M Voltages are positive with Anode Voltage. Positive value	ANODE Ga Ga Ga Ga Ga Ga Ga Ga Ga Ga
TËRNINAL DIAGRAM (B 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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, Voltages are positive with Anode Voltage. Positive value Negative value Grid-No.2 Voltage Negative pak value, Negative pak value, Negative pak value, Negative pak value, Positive pak value pak value, Positive pak value	ANODE Ga Ga Ga Ga Ga Ga Ga Ga Ga Ga
TËRNINAL DIAGRAM (B 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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, I Voltages are positive with Anode Voltage Positive value Grid-No.4 Voltage Positive value Grid-No.1 Voltage Negative peak value	ANODE Ga Ga Ga Ga Ga Ga Ga Ga Ga Ga
TERNINAL DIAGRAM (B Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, I Voltages are positive with Anode Voltage. Grid-No.4 Voltage Positive value Negative value Grid-No.2 Voltage Negative peak value. Negative bias value. Negative bias value.	ANODE Ga Ga Ga Ga Ga Ga Ga Ga Ga Ga
TËRNINAL DIAGRAM (B 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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, Voltages are positive with Anode Voltage. Grid-No.4 Voltage Positive value . Negative peak value. Negative bias value. Negative bias value. Positive peak value. Positive peak value. Positive peak value. Positive peak value.	ANODE Ga ANODE Ga H BHR DESIGN-MAXIMUM VALUES respect to cathode . 11000 min-23000 max V . 550 max V . 200 min-550 max V . 220 max V . 155 max V . 220 max V . 22
TERNINAL DIAGRAM (B Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, I Voltages are positive with Anode Voltage. Grid-No.4 Voltage Positive value Negative value Grid-No.2 Voltage Negative peak value. Negative bias value. Negative bias value.	ANODE Ga Ga Ga Ga Ga Ga Ga Ga Ga Ga

RCA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 2-67

19EBP4



19EGP4

Picture Tube

FILLED-RIM TYPE 1140 MAGNETIC DEFLECTION LOW GRID-No.2 VOLTAGE Direct Interelectrode Capacitances Cathode to all other electrodes . . 5 ٥F Grid No.1 to all other electrodes . 6 DF External conductive coating to anode* 1000 min-1500 max oF Heater Current at 6.3 V 450 + 20 nA. Heater Warm-Up Time (Average) Electron Gun. Type Requiring No Ion-Trap Magnet OPTICAL For curves, see front of this section Faceplate . Filterolass **MECHANICAL** Weight (Approx.). 16 15 11.625 ± .250 in External Conductive Coating Type (see CRT OUTLINES 1 at front of this section). . Modified-Band Contact area for grounding. Near Reference Line Arrangement J. (JEDEC No. 87-208) TERMINAL DIAGRAM (Bottom View) ANODE Pin 1-Heater Cap - Anode (Grid No.3. Pin 2-Grid No.1 G2 3 Pin 3-Grid No.2 Grid No.5. 6 Pin 4-Grid No.4 Screen. Pin 6-Grid No.1 Collector) Pin 7 - Cathode (2 C - External 7 Pin 8-Heater Conductive Coating 8HR MAXIMUM AND MINIMUM RATINGS. DESIGN-MAXIMUM VALUES Voltages are positive with respect to grid No.1 Anode Voltage 12000 min-21000 max V Grid-No.4 Voltage Positive value. . . 1250 max Negative value. . . . 400 max ٧ . Grid-No.2 Voltage 25 min-60 max . Cathode Voltage Negative peak value . . . 2 max ٧ Negative bias value 0 max Positive bias value . . . 100 max ٧

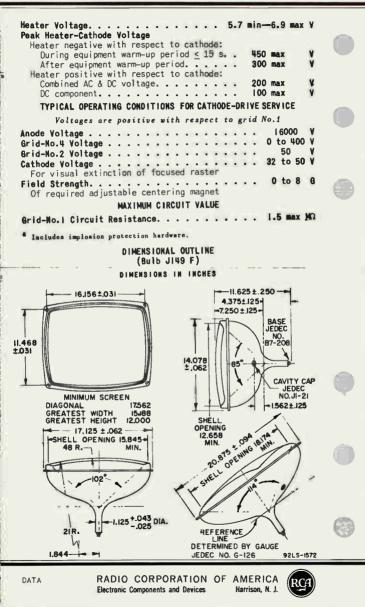
RÇA

Positive peak value .

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150 max

19EGP4



19ENP4A

Picture Tube

PAN-O-PLY-INTEGRAL IMPLOSION PROTECTION LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION LOW-GRID-No.2 VOLTAGE CATHODE-DRIVE TYPE

ELECTRICAL

Direct Interelectrode Capacitances	
Cathode to all other electrodes.	pF
Grid No.1 to all other electrodes 6	DF
External conductive coating to anode [®] , 6 [100 max [100 min]	pF
neater current at 6.3 V.	pF mÅ
Neater Warm-Up Time (Average).	
Electron Gun	let

OPTICAL

Phosphor										
Faceplate	•	•	•	•	•	Fi 1	te	rg	as 48	8
MEQUANICAL										·

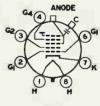
MECHANICAL

Weight (Approx.)
Neck Length
Projected Area of Screen
External Conductive Coating
Type Modified-Band
Contact area for grounding Near Reference Line
For Additional Information on Coatings and Dimensions
See Picture-Tube Dimensional-Outlines and Bulb J149 F sheets
at front of this section
Carp
Cap Recessed Small Cavity (JEDEC No.JI-21)
Base Small-Button Neceightar 7-Pin,

Arrangement I, (JEDEC No. B7-208)

TERMINAL DIAGRAM (Bottom View)

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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C-External Conductive Coating



SHR



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 2-66

19ENP4A

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
Unless otherwise specified, voltage values are positive with respect to Grid No.1	
Anode Voltage	¥
Grid-No.4 (Focusing) Voltage	
Positive value	v
(00	
Grid-No.2 Voltage	V 6
Cathode Voltage	
Negative peak value	V
Negative bias value 0 max	
Positive bias value	
Positive peak value	
Heater Voltage	•
Peak Heater-Cathode Yoltage Heater negative with respect to cathode:	
During equipment warm-up period not exceeding	
15 seconds	
After equipment warm-up period 300 max	۷
Heater positive with respect to cathode: Combined AC and DC voltage	v
Combined AC and DC voltage 200 max DC component	•
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Unless otherwise specified, voltage values are positive with respect to grid No.1	
Anode Voltage) V
Grid-No.4 Voltage	
Grid-No.2 Voltage	V C
Cathode Voltage	O V
For visual extinction of focused raster	
MAXIMUM CIRCUIT VALUE	-
Grid-No.I-Circuit Resistance 1.5 max	MΩ
📲 External conductive coating and implosion protection hardware must be grou	n ded.
^D The grid-No.4 voltage required for optimum focus of any individual	tube
^b The grid-No.4 voltage required for optimum focus of any individual will have a value anywhere between 0 to + 400 volts with the combined No.1 voltage and video-signal voltage adjusted to give an anode cur of 100 microsamperes on a 10-1/2 inch by 14-inch pattern from an HCA- monoscope, or equivalent.	grid- rent 2F21
	C
For X-radiation shielding considerations, see sheet	
X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES	
at front of this section	
	6
	-



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

19EXP22

Color Picture Tube

RECTANGULAR TURF

90° MAGNETIC DEFLECTION

ALUMINIZED TRICOLOR PHOSPHOR-DOT "Hi-Lite" SCREFN (Utilizing a Rare-Earth Red-Emitting Phosphor) MAGNETIC CONVERGENCE

3 ELECTROSTATIC-FOCUS GUNS

For Use in Color-TV Receivers

The 19EXP22 is the same as the 19EYP22 except for the following items:

OPTICAL

Faceplate . . . ceplate . Light transmission (Approx.). Filterglass . . 69% Faceplate does not have an integral protective window.

MECHANICAL

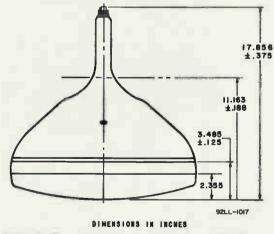
Tube Dimensions

Overall length								.	7	. 8	56	±	.375	in
Weight (Approx	.).	•		•									. 21	16

It is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 19EXP22 to protect it from being struck seci-dentally and to protect against possible demange resulting from the im-plosion under some shormal condition. This safety cover can also provide ar-radiation protection when required.

DIMENSIONAL OUTLINE

Dimensions shown are only those which are different from the corresponding dimensions for the 19EYP22



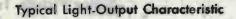
Note: In diagonal view, spherical radius = 27.3" R.

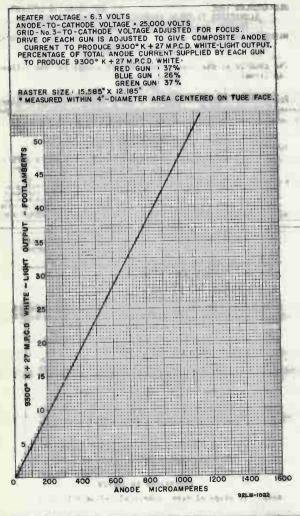


RADIO CORPORATION OF AMERICA **Electronic Components and Devices** Harrison, N. J.

DATA 9-65

19EXP22





RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N.J.



DATA

Color Picture Tube

RECTANGULAR TUBE ALUMINIZED TRICOLOR PHOSPHOR-D (Utilizing a Rare-Earth Red-E INTEGRAL FILTERGLASS PRO (Treated to Minimize Specu MAGMETIC CONVERGENCE For Use in Color-TV	mitting Phosphor) FECTIVE WINDOW lar Reflection) ELECTROSTATIC-FOCUS GUMS
ELECTRICAL	
Electron Guns, Three	
Current at 6.3 volts ^a Focusing Method	Electrostatio
Focus Lens	••••••••••••••••••••••••••••••••••••••
Deflection Angles (Approx.)	
Diagonal. Horizontal. Vertical. Direct Interelectrode Capacitances (/	
Grid No.1 of any gun to all other of All cathodes to all other electrode Grid No.3 to all other electrodes. External conductive coating to anor OPTICAL	electrodes. 6 pF es 15 pF 6.5 pF

Faceplate and Protective Window
Turne Allegiated Tables and the second
Type Aluminized, Tricolor, Phosphor-Dot
Phosphor (Three separate
phosphers, collectively) ^b
Fluorescence and phosphorescence of
separate phosphors, respectively Red, Blue, Green Persistence of group phosphorescence Medium Short Dot arrangement Each triangular group consists of
Spacing between centers of
adjacent dot trios (Approx.)



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

DATA I 10-66

MECHANICAL

	imensio	10 B										
	all ler									18.04	8 ± .37	'5 in
	lengt				• •					6.69	3 ± .18	8 in
					• •	• •	•••	•••	•		2 ± .09	
	onal.					• •	• •	• •	•		7 ± .09	
	test wi				• •				•		4 ± .09	
Grea	test he	eight	• •		· .:					13.00	4 I .03	1 3 111
Screen	Dimens	ions,	Min	i III.II	a (Pr	ojec	ted)				
Diago	onal		• •			• •	• •		• •		. 18.07	
Grea	test w	idth.									. 15.58	
Grea	test h	eight										35 in -
		•									. 180 :	in i
Weight	(Annr)	1. 1										24 16
Acorat	ing Po	ition					1.1	Inod	e Ca	D Con	tact or	TOP
Operat	rig ro	STLIG	••••	· .			mali	l Ca	Vite	LIED	EC No.J	1-21)
Cap .	* . : . :				36833 D:_ 1	0 41	ian		DE O		h Anode	Can
Pin Po	SITION	Alig	imeni			ZAI	i gin	9 AP		IEDEC	No 812	-200
Base.	• • • •	. Smal	1-81	ITTO		epta	r 14	2-61	n (e	JEDEC	No.812	14BE
Basing	Desig	natior	t foi	- 80	ELOW	VIEW	• •	• •	•	• • •	•••	14DE
Pin	1 - He	ater										
	2 - Ca		of 1	Dod (Cuin							
Pin	3 - Gr	id No.	1 0	f Re	d Gui				GLo			
Pin	3-Gr	id No.	1 o	f Re	d Gur	1			GIG	c	67	
Pin Pin	3 - Gr 4 - Gr	id No. id No.	1 o 2 o	f Re f Re	d Gur d Gur	1	ĸ	G	Gig	ç	63	
Pin Pin Pin	3 – Gr 4 – Gr 5 – Gr	id No. id No. id No.	1 0 2 0 2 0	f Re f Re f G r	d Gun d Gun een (ı Gun	ĸ	6	GIG T	va	9 ⁶³	
Pin Pin Pin Pin	3-Gr 4-Gr 5-Gr 6-Ca	id No. id No. id No. thode	1 0 2 0 2 0 0 f	f Re f Re f Gr Gree	d Gur d Gur een (n Gur	ו Gun קור G	K 20 (6	6	GIG T	od X	9 9	
Pin Pin Pin Pin Pin	3 - Gr 4 - Gr 5 - Gr 6 - Ca 7 - Gr	id No. id No. id No. thode id No.	1 0 2 0 2 0 0 f (f Re f Re f Gr Gree	d Gur d Gur een (n Gur	ו Gun קור G	ĸ 2 ₆₍₅	6	GIG T	und a	9 ⁶³	
Pin Pin Pin Pin Pin Pin	3 - Gr 4 - Gr 5 - Gr 6 - Ca 7 - Gr 9 - Gr	id No. id No. id No. thode id No. id No.	1 0 2 0 2 0 0 f 0 .1 0	f Re f Re f Gr Gree f Gr	d Gur d Gur een (n Gur een (1 Gun Gun		6	GIG T	od X	6 3	Kp
Pin Pin Pin Pin Pin Pin Pin	3 - Gr 4 - Gr 5 - Gr 6 - Ca 7 - Gr 9 - Gr 11 - Ca	id No. id No. id No. thode id No. id No. id No.	1 0 2 0 0 f 1 0 3 0 f	f Re f Re f Gr Gree f Gr Blue	d Gur een (n Gur een (Gun	1 Gun Gun G2	ĸ ² _{G(5}	66	GIG T	- Car	3	< ₈
Pin Pin Pin Pin Pin Pin Pin	3 - Gr 4 - Gr 5 - Gr 6 - Ca 7 - Gr 9 - Gr	id No. id No. id No. thode id No. id No. id No.	1 0 2 0 0 f 1 0 3 0 f	f Re f Re f Gr Gree f Gr Blue	d Gur een (n Gur een (Gun	i Gun Gun G2	R(4)		GIG T	od X	X	< ₈
Pin Pin Pin Pin Pin Pin Pin	3-Gr 4-Gr 5-Gr 6-Ca 7-Gr 9-Gr 11-Ca 12-Gr	id No. id No. id No. thode id No. id No. thode id No.	1 0 2 0 0 f 1 0 3 0 f	f Re f Re f Gr Gree f Gr Blue f Bl	d Gun een (n Gun een (Gun ue G	i Gun Gun G2	R(4)		G C T		3 11 12 6	< <u>8</u>
Pin Pin Pin Pin Pin Pin Pin Pin	3-Gr 4-Gr 5-Gr 6-Ca 7-Gr 9-Gr 11-Ca 12-Gr 13-Gr	id No. id No. id No. id No. id No. id No. id No. id No.	1 0 2 0 0 f 1 0 3 0 f	f Re f Re f Gr Gree f Gr Blue f Bl	d Gun een (n Gun een (Gun ue G	i Gun Gun G2		X	G C T			<8 8
Pin Pin Pin Pin Pin Pin Pin Pin Pin	3 - Gr 4 - Gr 5 - Gr 6 - Ca 7 - Gr 9 - Gr 11 - Ca 12 - Gr 13 - Gr 14 - He	id No. id No. thode id No. id No. thode id No id No ater	1 0 2 0 0 f 1 0 3 0 f 1 0 2 0	f Re f Re f Gr Gree f Gr Blue f Bl f Bl	d Gui een (n Gui een (Gun ue Gi ue Gi	i Gun Gun G2	R(4)					KB B
Pin Pin Pin Pin Pin Pin Pin Pin Pin	3 - Gr 4 - Gr 5 - Gr 6 - Ca 7 - Gr 9 - Gr 11 - Ca 12 - Gr 13 - Gr 14 - He Cap - An	id No. id No. thode id No. id No id No id No ater ode (1 0 2 0 0 f 1 0 .1 0 .2 0 .1 0 .2 0 Grid	f Re f Re f Gr Gree f Gr Blue f Bl f Bl f Bl	d Gui een (n Gui een (Gun ue Gi ue Gi 4,	i Gun Gun G2	R(4)	X				KB RODE
Pin Pin Pin Pin Pin Pin Pin Pin Pin	3 - Gr 4 - Gr 5 - Gr 6 - Ca 7 - Gr 9 - Gr 11 - Ca 12 - Gr 13 - Gr 14 - Hecher Cap - An	id No. id No. id No. thode id No. id No id No ater ode (rid No	1 0 2 0 2 0 0 f 1 0 .1 0 .2 0 Grid 0.5,	f Re f Re f Gr Gree f Gr Blue f Bl f Bl f Bl	d Gui een (n Gui een (Gun ue Gi ue Gi 4,	i Gun Gun G2	R(4)	X				 B HODE
Pin Pin Pin Pin Pin Pin Pin Pin Pin	3 - Gr 4 - Gr 5 - Gr 6 - Ca 7 - Gr 9 - Gr 11 - Ca 12 - Gr 13 - Gr 14 - He Cap - An G	id No. id No. id No. thode id No. id No id No ater ode (rid No ater	1 0 2 0 2 0 1 0 .1 0 .2 0 .1 0 .2 0 Grid 0.5, tor}	f Re f Gr Gree f Gr Blue f Bl f Bl f Bl No.	d Gun een (n Gun een (Gun ue Gi ue Gi 4, reen,	n G Gun Gun Gun Un	R(4)	X				<b B KODE</b
Pin Pin Pin Pin Pin Pin Pin Pin Pin	3 - Gr 4 - Gr 5 - Gr 6 - Ca 7 - Gr 9 - Gr 11 - Ca 12 - Gr 13 - Gr 14 - He Cap - An G C C - Ex	id No. id No. id No. thode id No. id No. id No. ater ode (rid No. ater ode (rid No.	1 0 2 0 0 f (1 0 3 0 f 1 0 .2 0 Grid 0.5, tor) 1 Co	f Re f Gr Gree f Gr Blue f Bl f Bl f Bl No.	d Gun een (n Gun een (Gun ue Gi ue Gi 4, reen,	n G Gun Gun Gun Un	R(4)	X				KB B KODE
Pin Pin Pin Pin Pin Pin Pin Pin Pin	3 - Gr 4 - Gr 5 - Gr 6 - Ca 7 - Gr 9 - Gr 11 - Ca 12 - Gr 13 - Gr 14 - He Cap - An G C C - Ex	id No. id No. id No. thode id No. id No id No ater ode (rid No ater	1 0 2 0 0 f (1 0 3 0 f 1 0 .2 0 Grid 0.5, tor) 1 Co	f Re f Gr Gree f Gr Blue f Bl f Bl f Bl No.	d Gun een (n Gun een (Gun ue Gi ue Gi 4, reen,	n G Gun Gun Gun Un	R(4)	X				^K B B KODE

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES

Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode

Anode Voltage	•	•	•	•	27500	max min	v	
Total Anode Current, Long-Term Average.					750		μ A	
Grid-No.3 (Focusing Electrode) Voltage.					6000	max	V	
Peak Grid-No.2 Voltage, Including Video Signal Voltage							۷	
Grid-No.1 Voltage					u 00	max	v	
Negative-bias value							v	
Negative operating cutoff value	٠	٠	•	٠		max	•	
Positive-bias value					0	max	V	
Positive-peak value					2	Max	۷	

- Indicates a change.

DATA 1

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U		l tage (A perating	g condit		• • •				6.9		1
U Pea	Inder s k Heat	tandby d er-Catho	conditio ode Volt	ns ^c . age (E	ach au		•••	•		max	
H	leater	negative	e with r	espect	to ca	thode					
	Durin	g equipr	ment war	m-up p	eriod						
	After	equipm	ing 15 s ent warm		riod	• • •	• •	•		max	
H	leater	positive	e with r	espect	to ca	thode	• • •		200		
			EQUIP	MENT D	ESIGN	RANGE	S				
			rwise sp values ar								
		For anoa	de volta	ge bet	ween 2	0000	and	27500	v		
		Voltage	B			. 16.	8% t	o 201	of	anoo	e
	d-No.2		oue								
Gr	id-No.	Voltag	ges .	.See a	ccompa	nying	Cut	off L	resie	gn Cl	ar
∣ Mav	inum P	ual exti	inction Grid-No	of toc	used s	pot					
H	liahest	aun to	lowest	aun in	anv t	ube	• •	• •	•••	• •	
(At gri	d—No.1 s	spot cut	off vo	ltage	of -1	00 V	1			
Gri	d-No.3	Current	t (Total)							μ
Gri	d-No.2	Current	of 9300				• •	-5	i to	+5	μ
10	IF Cool	s white dinates	5 x = 0.	ΥK+; 291 μ	27 M.P						
Ϋ́Ρ	ercent	age of t	total an	ode y	= 0.3	,					
	curre	nt suppl	lied by			ed	Blue	Gr	een		
	each g	jun (Ave	erage).	• • •	. 3	17	26	1	37		1
		<i>c</i>			Red to					Gree	
	atio o		ents	Min			12	Min 0.75			Va:
R	placem	ants. Me	asured	l.v at Cen	ter of	0 2. Scre	en -	0.75	1.6	00 1	.8
		centerin	ng displ	acemen	t:		•				
Dis	aster						-0	.45 t	0 +0	.45	i
Dis	aster (Vertic	cal		• • •					o +0).47	1
Dis R	aster (Vertic Horiz	ontal						.47 t			
Dis R	aster (Vertic Horiz ateral	converg	aence di	splace	ment o			.47 t			
Dis R	aster Vertio Horizo ateral blue	ontal converg beam wit	gence di th respe	splace	ment o	ŧ	-0			25	
Dis R	aster Vertio Horizo ateral blue vergeo adial	ontal. converg beam wit d red ar converge	gence di th respe nd green ence dis	splace ct to beams placem	ment o con-	ŧ	-0	.47 t .25 t		.25	i
Dis R	aster Vertic Horiza ateral blue verge adial exclue	ontal converg beam wit d red ar converge ding eff	gence di th respe nd green ence dis fects of	splace ct to beams placem dynam	ment o con- ent ic	ŧ	-0			.25	i
Dis R R	aster Vertic Horiz ateral blue verge adial exclue conve	ontal. converg beam wit d red ar converge ding eff rgence (gence di th respe nd green ence dis fects of (Each be	splace ct to beams placem dynam am)	ment o con- ent ic	ξ	-0 -0		:o +0		1
Dis R R Max	aster Vertic Horiz ateral blue verge adial exclue conve imum Re	ontal. converge beam wit red ar converge ding eff rgence (guired	gence di th respe and green ence dis fects of (Each be Correct	splace ct to beams placem dynam am) ion for	ment o con- ent ic Regis	f · · ·	-0 -0	.25 t	:o +0		
Dis R R Max	aster of Vertio Horiz ateral blue verge adial exclue conve imum Re ncludir	ontal. converge beam wit d red ar converge ding eff rgence (quired to og Effec	gence di th respe and green ence dis fects of (Each be Correct t of Ea	splace ct to beams placem dynam am) ion for rth's l	ment o con- ent ic Regis	f f ter ^d ic	-0 -0 -0	.25 t .37 t	:0 +0 :0 +0	.37	1
Dis R R Max	aster Vertie Horiza ateral blue verge adial exclue conve imum Re ncludir eld whe	ontal. converge beam wit d red ar converge ding eff rgence (quired ng Effec en Using	gence di th respe and green ence dis fects of (Each be Correct	splace t to beams placem dynam am) ion for rth's (ment o con- ent ic Regis Magnet	f f ter ^d ic	-0 -0 -0	.25 t .37 t	:0 +0 :0 +0	.37	

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DATA 2 9-65

EXAMPLES OF USE OF DESIGN RANGES

Unless otherwise specified, voltage values are for each gun and are positive with respect to cathode	
Anode Voltage	¥.
Grid-No.3 Voltage	٧
Grid-No.2 Voltage	Y
When circuit design utilizes grid—No.1 voltage of —150 V for visual extinction	
of focused spot Grid-No. Voltage	۷
Heater Yoltage Under operating conditions* Under standby conditions. 5	¥

LIMITING CIRCUIT VALUES

High-Voltage Circuits

Low-Voltage Circuits

Effective Grid-No.1-to-Cathode-

. . 0.75 max MD Circuit Resistance (Each gun) . . The low-voltage circuits, including all heater circuits. should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their reapective power aources in combination will not supply a continuous short circuit current of more than 750 milliamperes total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum diatance of 1/4 inch to prevent energy transfer to the picture tube circuita. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

- For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts.
- b For curve, see Group Phosphor P22-Rare-Barth (Red), Sulfide (Blue & Green) at front of this section.
- C For "instant on" applications, a maximum heater voltage of 5.5 volta (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- d Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

DATA 2

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GENERAL CONSIDERATIONS

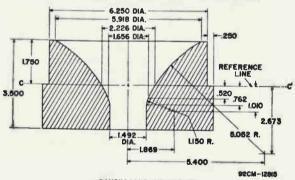
X-Radiation Warning. Because the 19EYP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 19EYP22 for X-radiation maybe needed to protect against possible injury from prolonged expoaure at close range.

Orientation. The 19EYP22 must be operated with tube axis in a horizontal position and with the blue gun uppermost (i.e., anode cap on top).

The deflecting yoke should not be used for supporting the picture tube because it should be centered on the neck and be free to move along the neck for a distance of approximately 1/2 inch from its most forward position for adjustment purposes. The yoke mount should also provide for a small amount of rotational adjustment.

Contact to the external conductive coating should be made by multiple fingers in order to prevent overheating and possible damage to the tube.

Misregister Compensation. Proper operation of the 19EYP22 requires compensation for the effects of extraneous magnetic fields, the earth's magnetic field, and other causes which may produce miaregister. Compensation for these effects may be accompliahed by the use of a purifying magnet.



REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE

DIMENSIONS IN INCHES

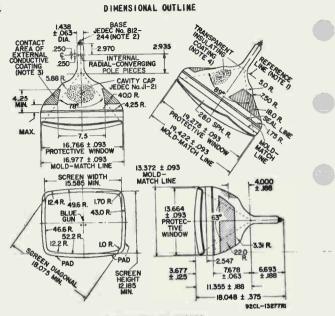
Reference line is determined by plane C-C' when gauge is seated.

LOCATION OF RADIAL-CONVERGING POLE PIECES VIEWED FROM SCREEN END OF GUNS for Type 19EYP22 is the same as that shown for Type 25AP22A



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DIMENSIONS IN INCHES

Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel.

Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottomcircumference of base will fall within a circle concentric with bulb axis and have a diameter of 2 inches.

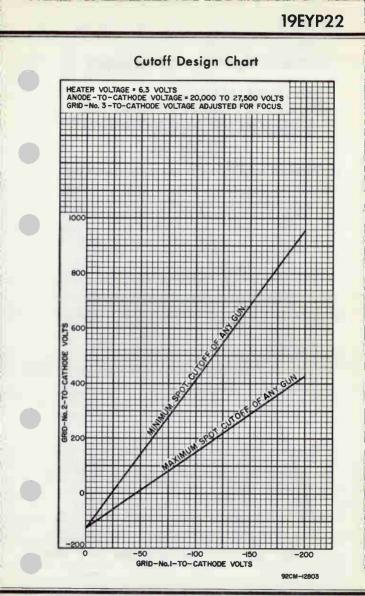
Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance.

Note 4: To clean this area, wipe only with soft, dry lintless cloth.

- Indicates a change.

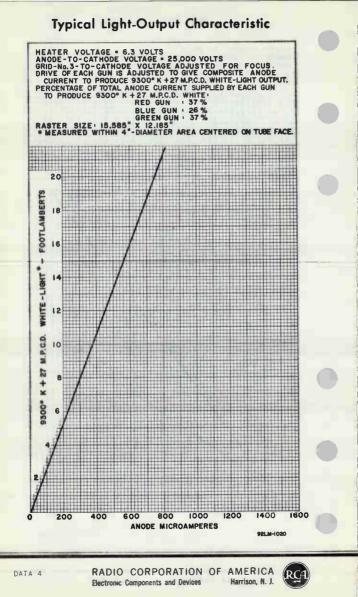


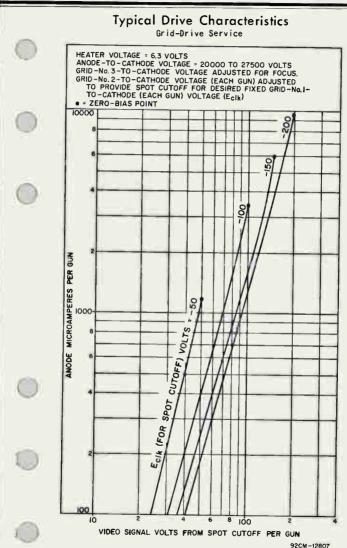
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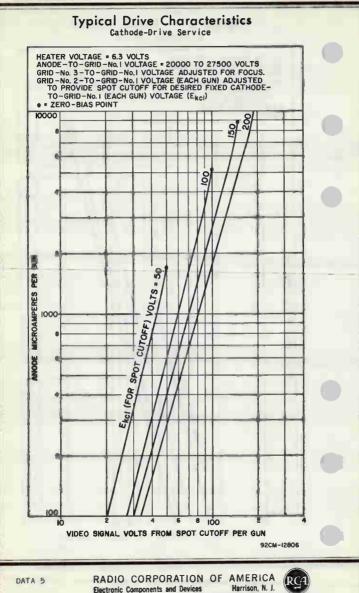




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DATA 5 9-65



19FEP4B

Picture Tube

PAN-O-PLY TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS

LOW-GRID-No.2 VOLTAGE 1140 MAGNETIC DEFLECTION

ELECTRICAL

Direct Interelectrode Capacitances	
Cathode to all other electrodes 5	pF
Grid No.1 to all other electrodes 6	pF
External conductive coating to anode1250 min-1750 max	pF
Heater Current at 6.3 volts	mA
Heater Warm-Up Time (Average)	8
Electron Gun	net
Focus Lens Unipotent	lal

OPTICAL

Phosphor	, Aluminized
For curves, see front of this section	
Faceplate	Filterglass

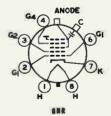
									-	-				
Light	transmis	sion a	at	center	- (appr	ox.)	•			•	•	•	48%

MECHANICAL

Weight (Approx.	.)				15 15
Overall Length				. 11.625	± .250 in
Neck Length.					
Projected Area					172 sq in
External Conduc					
Туре				Re	gular-Band
Contact area	for groundin	ng		Near Refe	rence Line
For Additional					
See Picture-1	Tube Dimensio	onal-Outl	ines an	d Bulb J1	49F sheets
at front of	this section	n			
Cap	Reco	essed Sma	11 Cavi	ty (JEDEC	No.J1-21)
Base		Smal	I-Butto	n Neoeigh	

TERMINAL DIAGRAM (Bottom View)

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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C-External Conductive Coating





RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

DATA 12-66

19FEP4B

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
Unless otherwise specified, voltage values are positive with respect togrid No.1	
Anode Voltage	٧
Positive value	v
Grid-No.2 Voltage 20 min-60 max	Ŷ
Cathode Voltage Negative peak value	y (
Negative bias value	¥ ¥
Positive peak value	V
Peak Heater-Cathode Voltage Heater negative with respect to cathode:	
During equipment warm—up period not exceeding 15 seconds	Y
After equipment warm-up period 300 max Heater positive with respect to cathode:	V
Combined AC and DC voltage 200 max DC component	¥ ¥
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Unless otherwise specified, voltage values are positive with respect to grid No.1	
Anode Voltage	V V
Grid-No.2 Voltage	ÿ
For visual extinction of focused raster Field Strength of required adjustable	
centering magnet	6
MAXIMUM CIRCUiT VALUE Grid-No.I-Circuit Resistance 1.5 max	MΩ
⁶ Includes implosion protection hardware. ⁶ The grid-No.4 voltage required for optimum focus of any individual to will have avalue anywhere between -100 and +300 volts with the combin grid-No.1 voltage and video-aignal voltage adjuated to give an ano current of 100 microsuperes on a 10.5-inch by 14-inch pattern from RCA-2F21 monoacope, or equivalent.	abe ade an
For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section	

DATA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



19FLP4

Picture Tube

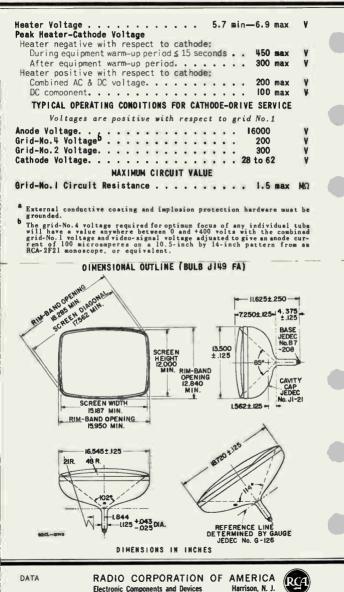
PAN-O-PLY-INTEGRAL IMPLOSION PROTECTION	
LOW-VOLTAGE ELECTROSTATIC FOCUS 114º MAGNETIC DEFLECT	ION
ELECTRICAL	
Direct Interelectrode Capacitances	
Cathode to all other electrodes 5	pF
Grid No.1 to all other electrodes. 6	pF
External conductive coating to anode [®] . 1250 min—1750 max Heater Current at 6.3 V	pF mA
Heater Warm-up Time (Average)	-
Electron Gun	net
OPTICAL	
Phosphor P4—Sulfide Type, Alumini:	her
For curves, see front of this section	
Faceplate	
Light transmission at center (approx.)	18%
MECHANICAL	
Weight (Approx.)	16
Neck Length	
Projected Area of Screen	
External Conductive Coating	
Type (See CRT OUTLINES 1 at front of this section) Regular-Be	Ind
Contact area for grounding	ine
Base Small-Button Neceightar 7-P	21) in
Arrangement I, (JEDEC No.B7-20	(80
TERMINAL DIAGRAM (Bottom View)	
Pin 1 - Heater Ga ANODE Can - Anode	
Pin 1 - Heater G4 Cap - Anode Pin 2 - Grid No.1 (Grid No.3)	
Pin 3-Grid No.2 G2 G	
Pin 4 - Grid No.4	
Pin 6-Grid No.1 Pin 7-Cathode	
GUE CLEATERING	
Pin B - Heater () (a) Conductive Coating	2
C C Coating	
н н	
H H BHR	
MAXIMUM AND NINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
MAXIMUM AND NINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage	٧
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage	۷
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage	v
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage	*
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage	* *
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage.	* ***
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage. 11000 min-23000 max Grid-No.4 (Focusing) Voltage 11000 max Positive value. 550 max Grid-No.1 Voltage. 200 min-550 max Grid-No.1 Voltage. 220 max Negative peak value. 155 max	* *** **
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage.	¥.
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage. 11000 min-23000 max Grid-No.4 (Focusing) Voltage 11000 max Positive value. 550 max Grid-No.1 Voltage. 200 min-550 max Grid-No.1 Voltage. 220 max Negative peak value. 155 max	

RADIO CORPORATION OF AMERICA **Electronic Components and Devices**

Harrison, N. J.

DATA 2-66

19FLP4



19GEP4A

Picture Tube

ELECTRICAL

D	irect	Intere	lect	rode	Capaci	tances

Cathode to all other electrodes	- 5 pF
Grid No.1 to all other electrodes .	- 6 pF
External conductive coating to anode.	-1250 min-1750 max pF
Heater Current at 6.3 V	- 450 mA
Heater Warm-Up Time (Average)	• <u></u>
Electron Gun Type Requi	iring No Ion-Trap Magnet

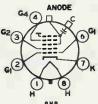
OPTICAL

MECHANICAL

Weight (Approx.).															15	16
Overall Length							•				11	. 62	25	±	.250	in
Neck Length											ц.	. 37	'5	±	.125	in
Projected Area of	S	cre	eei	٥.										17	12 sq	in
External Conducti																
T					-			_							• -	

TERNINAL DIAGRAM (Bottom View)

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-Anode (Grid No.3,	
Grid No.5, Screen,	
Collector)	
C-External Conductive	
Coating	



8 H R

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES

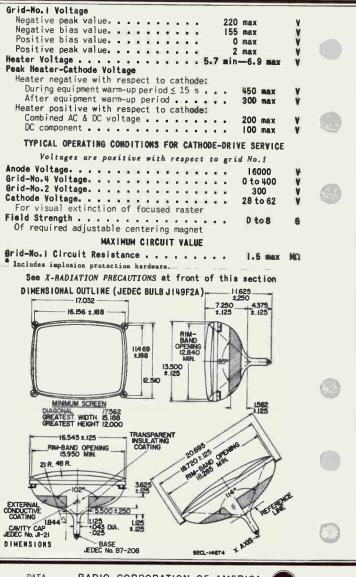
Voltages are positive with respect to cathode

Anode Voltage Grid-No.4 Voltage	•		•	•	•	•	• •	11000 min-23000 max	¥
Positive value .									۷
Negative value .								550 max	¥
Grid-No.2 Voltage.								209 min-550 max	٧

RCA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 7-67

19GEP4A



DATA

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19GJP4A

Picture Tube

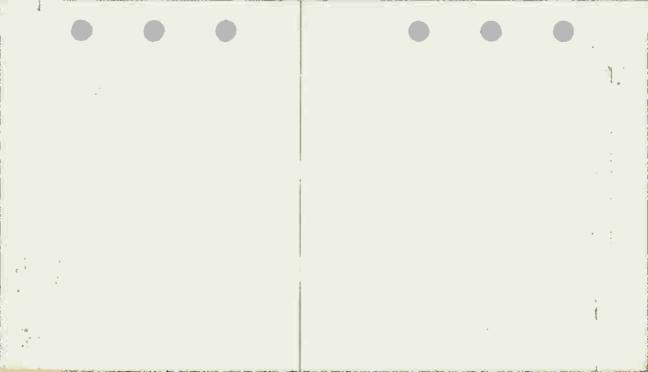
PAN-O-PLY TYPE

114º MAGNETIC DEFLECTION

The 19GJP4A is the same as the 19DQP4 except for the following item:



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19GVP22

Color Picture Tube

"PERMA-CHROME" ASSEMBLY FOR OPTIMUM FIELD PURITY AND UNIFORMITY DURING WARM-UP

RECTANGULAR TUBE MAGNETIC CONVERGENCE

90° MAGNETIC DEFLECTION **3 ELECTROSTATIC-FOCUS GUNS**

ALUMINIZED TRICOLOR PHOSPHOR-DOT "Hi-Lite" SCREEN (Utilizing a New, Improved Rare-Earth Red-Emitting Phosphor)

For Use in Color-TV Receivers

The 19GVP22 is the same as the 19GWP22 except for the following items:

OPTICAL

Faceplate does not have an integral protective windowa

MECHANICAL

Tube Dimensions

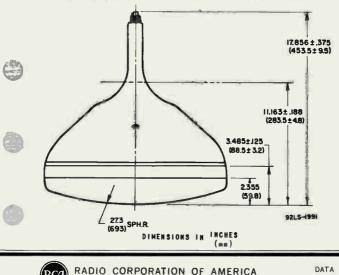
eR.

Overall length . . 17.856 ± .375 in (453.5 ± 9.5 mm) . . . Weight (Approx.) 21 1b (9.5 kg)

It is recommended that the cubine: be provided with a shatter-proof, glass cover over the face of the 19GVP22 to protect it from being struck acci-dentally and to protect against possible damage resulting from the im-plosion under some shnormal condition. This safety cover can also pro-vide x-redistion protection when required.

DIMENSIONAL OUTLINE

Dimensions shown are only those which are different from the corresponding dimensions for the 19GWP22

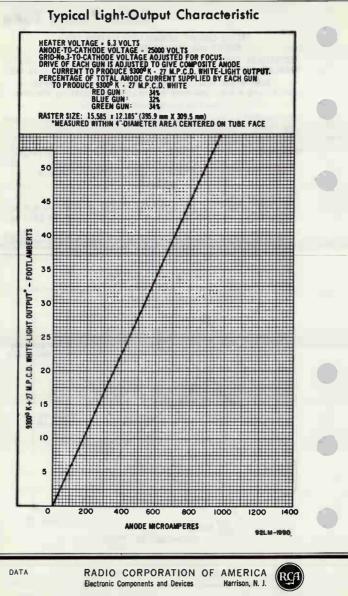


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Harrison, N. J.

Electronic Components and Devices

19GVP22



Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused SpotSee CUTOFF DESIGN CHART
Maximum Ratio of Grid-No.2 Voltages, Highest Gun to Lowest Gun in Any Tube (At grid-No.1 spot cutoff voltage of -100 volts)
Grid-No.3 Current (Total)
Grid-No.2 Current
To Produce White of 9300 ^o K + 27 M.P.C.D. (CIE Coordinates x = 0.281, y = 0.311):
Percentage of total anode current supply by Red Blue Green each gun (average)
Ratio of cathode currents: Min. Typ. Max.
Red/blue 0.75 1.10 1.50 Red/green 0.65 1.00 1.50 Blue/green 0.60 0.91 1.30
Displacements, Measured at Center of Screen:
Baster centering displacement: Horizontal
Lateral distance between the blue beam and the con- verged red and green beams ±0.25 in (± 6.4 mm)
Radial convergence displacement excluding effects of dynamic con- vergence (each beam)
Maximum Required Correction for Register ^d (Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the Center of the Screen in any Direction 0.005 in (0.13 mm) max.
LIMITING CIRCUIT VALUES
High-Voltage Circuits:
Grid-No.3 circuit resistance 7.5 max. megohms

Grid-No.3 circuit resistance 7.5 max. megohms In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the *high-voltage power supply* and the grid-No.3 power supply be of the limited-energy type, in which the shortcircuit current does not exceed 20 mA.

Low-Voltage Circuits:

Effective grid-No.1-to-cathode-

circuit resistance (each gun) ... 0.75 max. megohm The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater

RBA Electronic Components



is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short circuit current of more than 750 mA total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

^GFor maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.

^bFor curve, see Group Phosphor P22 - New Rare-Earth (Red), Sulfide (Blue & Green) at front of this section.

^cFor "instant on" applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.

^dRegister is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

X-RADIATION WARNING

Because the 19HCP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (designmaximum value), shielding of the 19HCP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

BASE SPECIFICATION (JEDEC No. 14BE)

Pin 1 - Hester Pin 2 - Cathode of Red Gun Pin 3 - Grid No.1 of Red Gun Pin 4 - Grid No.2 of Red Gun Pin 5 - Grid No.2 of Green Gun Pin 6 - Cathode of Green Gun Pin 7 - Grid No.3 Pin 9 - Grid No.3

Pin 11 - Cathode of Blue Gun

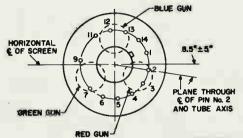
Pin 12 - Grid No.1 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater

- CAP Anode (Grid No.4, Grid No.5, Screen, Collector)
 - C External Conductive Coating

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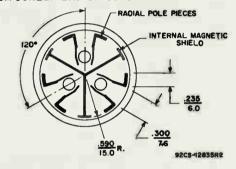
DATA 2

BOTTOM VIEW OF BASE



9205-12816

LOCATION OF RADIAL-CONVERGING POLE PLECES VIEWED FROM SCREEN END OF GUNS



NOTES FOR DIMENSIONAL OUTLINE

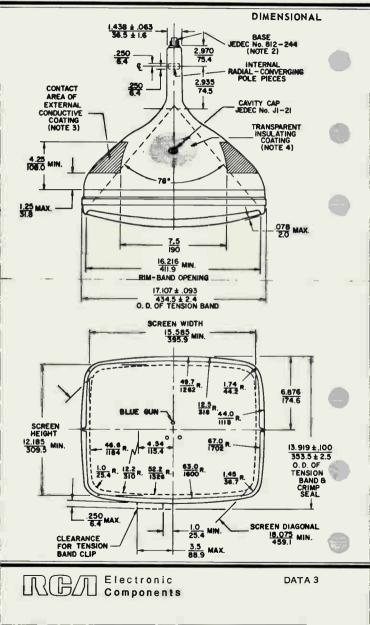
NOTE 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge JEDEC No.G162 and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel.

NOTE 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51mm) circle concentric with bulb axis.

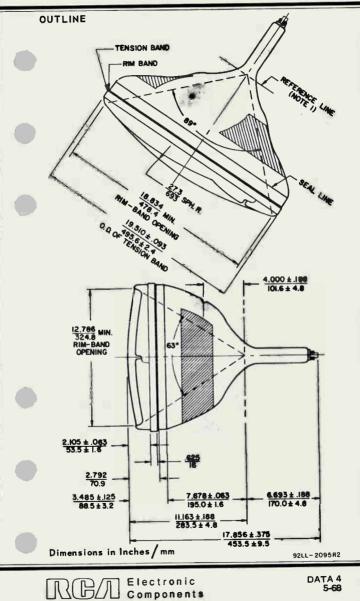
NOTE 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

NOTE 4: To clean this area, wipe only with soft, dry, lintless cloth.

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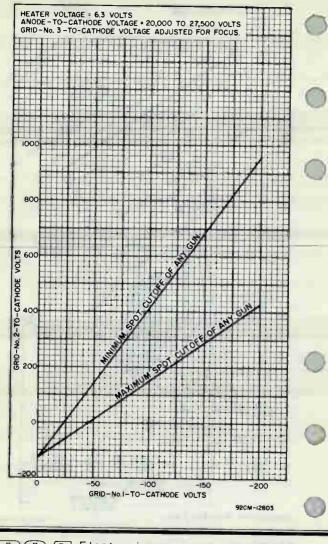






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CUTOFF DESIGN CHART



RBA Electronic Components

Color Picture Tube

ULTRA-RECTANGULAR HI-LITE SCREEN

4 X 0 Aspect Hatto	bras Gan Donni Operation
Electrical	
Electron Guns, Three with Axes	
Tilted Toward Tube Axis	
Heater, of Each Gun Series Connected Tube with Each of the Other Two He	aters:
Current at 6.3 V	
Focusing Method	
Focus Lens	Unipotential
Convergence Method	Magnetic
Deflection Method	Magnetic
Deflection Angles (Approx.):	
Diagonal	
Horizontal	
Vertical	
Direct Interelectrode Capacitance (Ap	prox.):
Grid No.1 of any gun to all other Grid No.4 to all other electrodes.	electrodes 7.5 pr
All anthonias an all athan algorithmics	- 15 oF
All catholes to all other dectroad.	and in the second second
Capacitance Between Anode and Exter Conductive Coating	2300 max. pF
Conductive Coating	1800 min. pF
Resistance Retween Metal Harmware a	ng
External Conductive Coating	
Optical	
	Eilearden
FaceplateLight transmission at center (Appr	Fillergiass
Surface	Polished
Screen	(hive & emon) P22
Phosphor, rare-earth (red) sulfide (Persistence	Ditte of green)
Array	282.000 Dot trios
Spacing between centers of adjacer	
dot trios (Approx.)	0.024 in (0.61 mm)
Mechanical	
Minimum Screen Area (Projected)	185 sq in (1194 sq cm)
Bulb Funnel Designation	JEDEC No. 1160-3/4 B1/C1
Bulb Panel Designation	JEDEC NO. P161-3/4 V1

Base Designation^a Small-Button Diheptar 12-Pin (JEDEC No.B12-244) Basing Designation JEDEC No.14BH Pin Position Alignment Pin No.5 Aligns Approx. with Anode Bulb Contact

RBA Electronic Components

DATA 1 2-72

Operating Position, preferred Anode B	ulb Contact on	Тор				
Gun Configuration		Delta				
Weight (Approx.)						
Implosion Protection						
Туре	Ba	nded				
Maximum and Minimum Ratings, Design-Maxim	um Values					
Unless otherwise specified, values are for eac values are positive with respect to cathode.	ch gun and vo	Itage				
Anode Voltage	22.5 max.	kV				
	17 min.	kV				
Anode Current, Long-Term Average ^b	1000 max.	μA				
Grid-No.4 (Focusing Electrode) Voltage:						
Positive value	1100 max.	V	6			
Peak-Grid-No.2 Voltage,	550 max.	v				
Including Video Signal Voltage	1000 max.	v				
Grid-No.1 Voltage:	Tooo max.					
Negative bias value	400 max.	V				
Negative operating cutoff value	140 max.	V				
- Positive bias value	0 max.	*				
Positive peak value	2 max.	v				
Heater Voltage (ac or dc): ^c Under operating conditions	∮ 6.9 max.	v				
Under standby conditions ^d	5.7 min.	v				
	5.5 max.	v				
Heater-Cathode Voltage: Heater negative with respect to cathode:						
During equipment warm-up period						
not exceeding 15 seconds	450 max.	v				
After equipment warm-up period:	000					
DC component value	200 max. 200 max.	V				
Heater positive with respect to cathode:	200 11122.					
DC component value	0 max.	V				
Peak value	200 max,	v				
Equipment Design Ranges						
Unless otherwise specified, values are for eac values are positive with respect to cathode.	h gun and voi	tage				
For anode voltages between 17 and 22.5 kV						
Grid-No.4 (Focusing Electrode) Voltage	75 to 400	v				
Grid-No.2 Voltage for Visual Extinction						
of Undeflected Focused Spot See CUTOFF						
At Grid No.1 voltage of -75 V	in Figu 90 to 270					

RBA Electronic Components

	At Grid No.1 voltage of -125 V At Grid No.1 voltage of -140 V		. 210 to 505 . 245 to 580	v v
	Maximum Ratio of Grid-No.2 Voltage Lowest Gun in Any Tube (At grid-N voltage of -100 V)	o.1 spot cuto	ff	86
	•			
	Heater Voltage: ^C Under operating conditions:			
	When standby operation is no	t utilized .	6.3	V
	When 5.0-V standby operation	is utilized ^d	6.0	V
	Under standby conditions ^d		5.0	V
	Grid-No.4 Current (Total)		±60	μA
	Grid-No.2 Current		±5	μA
	Grid-No.1 Current ,		±5	μA
				•
		Illum, D	Color	
	To Produce White Light of		9300 ⁰ K +	
	to rioduce white Light of	7 M.P.C.D.	27 M.P.C.D.	
	CIE Coordinates:	7 1112 .0.0.		
	×	0.313	0.281	
	Υ	0.329	0.311	
	Percentage of total anode curren	t		
	supplied by each gun (average):			
	Red	41	30	%
	Blue	24	31	*
	Green	35	39	%
	Ratio of cathode currents:			
	Red/blue:			
	Minimum	1.35	0.75	
	Typical	1.70	0.95	
	Maximum	2.20	1.25	
	Red/green:			
	Minimum	0.95	0.60	
	Typical	1.15	0.75 1.10	
	Maximum	1.70	1.10	
	Blue/green:	0.50	0.60	
	Minimum	0.50	0.80	
	Typical ,	0.95	1.10	
	Maximum	0.85	1.10	
	Displacements, Measured at Center of	T Screen:		
	Raster centering displacement: Horizontal	+ 0.4	= := /+ 11.4 -=	(ma)
		+04	5 in (± 11.4 п	1117 1200
	Vertical		5 m (± 11.4 n	
	the converged red and green bean		5 in (+ 64 m	lma
	Radial convergence displacement			
	effects of dynamic convergence	exclouing		
	(each beam)	± 0.37	in (± 9.4 m	m)
	(coor bodiny	= 3.01		
-				_
				-

RBA Electronic Components DATA 2 2-72

Maximum Required Correction for Register ⁶ (Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the Center of the Screen in any Direction						
Typical Operation Heater Voltage						
Anode Voltage						
Grid-No.4 Voltage Adjusted for focus						
Color Temperature						
Raster Size						
Typical White-Light Output Measured within 4 in (102 mm) diameter area centered on tube face:						
At anode surrant of 1000 up						
Limiting Circuit Values						
Low-Voltage Circuits: Effective grid-No.1-to-cathode- circuit resistance (each gun) 0.75 max. MD						
X-Radiation Characteristic:						
Maximum Anode Voltage at which the X-radiation emitted will not exceed 0.5 mR/h at an anode current of 300 μA						
The X-radiation emitted from this picture tube, as measured in ac- cordance with the procedure of JEDEC Publication No.64A will not exceed 0.5 mR/h throughout the useful life of the tube when opera- ted within the Design-Maximum ratings: 27.5 kV anode voltage and 1000 μ A anode current. The tube should not be operated beyond						
its Design-Maximum ratings stated above (such operation may shorten tube life or have other permanent adverse affects on its per-						
formance), but its X-radiation will not exceed 0.5 mR/h for anode						
voltage and current combinations given by the isodose-rate limit characteristics as shown in Figure 1. Operation above the values shown by the curve may result in failure of the television receiver to comply with the Federal Performance Standard for Television Re- ceivers, Sub-Part C of Part 78 of Title 42. Code of Federal Regula-						
tions (PL90-602) as published in the Federal Register Vol.34, No.						
247, Thursday, December 25, 1969. Maximum X-radiation as a						
function of anode voltage at 300 μ A anode current is shown by the curve in Figure 2. X-radiation at a constant anode voltage varies linearly with anode current.						
The mating socket, including its associated, physically-attached						
hardware and circuitry, must not weigh more than one pound						
(one-half kilogram).						
b The short-term average anode current should be limited by cir-						
cuitry to 1500 microamperes.						

C For maximum cathode life, it is recommended that the heater supply be regulated. The series impedance to any chassis con-

RBA Electronic Components

nection in the dc biasing circuit for the heater should be between 100 kilohms and 1 megohm. The surge voltage across the heater must be limited to 9.5 volts rms.

- d The use of a 5-volt standby condition in conjunction with 6-volt operating conditions is recommended to improve the reliability of the color picture tube by extending the emission wear-out life and reducing other gun-related defects. A maximum heater voltage of 5.5 volts (Design-Maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

IMPORTANT: Refer to sheet Safety Precautions For Color Picture Tubes at front of this section.

Notes For Dimensional Outline

- Note 1 With tube neck inserted through flared end of referenceline and neck-funnel-contour gauge (JEDEC No.G162) and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel.
- Note 2 Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.
- Note 3 The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

Note 4 - To clean this area, wipe only with soft, dry, lintless cloth.

SAGITTAL HEIGHTS AT POINTS .125 BEYOND EDGE OF MIN. SCREEN

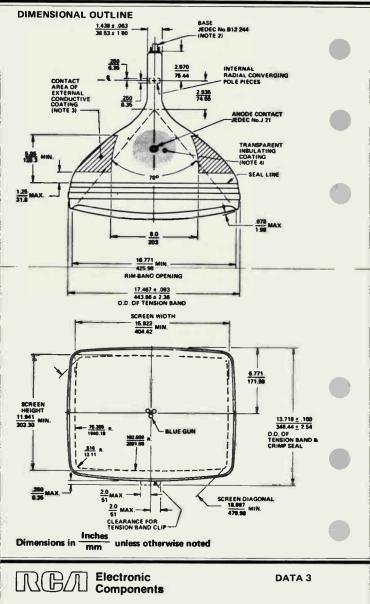
DIAGONAL 1:485

WIDTH 1.044 26.52 HEIGHT

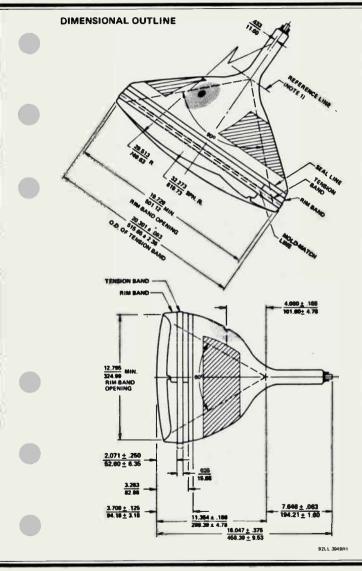
14.78

RBA Electronic Components

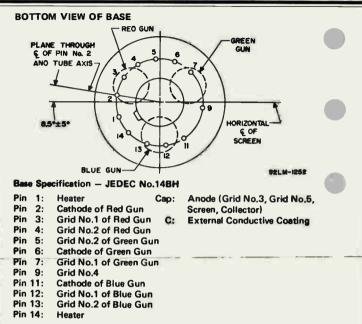
DATA 3 2-72



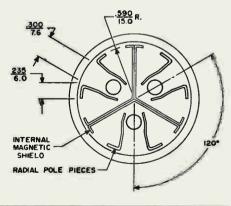




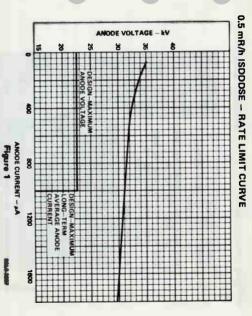
RBA Electronic Components DATA 4 2-72



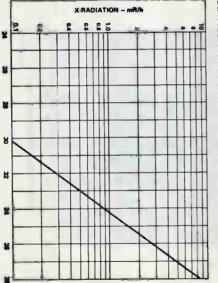
LOCATION OF RADIAL-COVERGING POLE PIECES VIEWED FROM SCREEN END OF GUNS



RBA Electronic Components 92LM-125IRI



X-RADIATION LIMIT CURVE AT A CONSTANT ANODE CURRENT OF 300 μA (X-RADIATION AT A CONSTANT ANODE **VOLTAGE VARIES LINEARLY WITH ANODE CURRENT)**



DATA 5 2-72 Figure 2

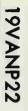
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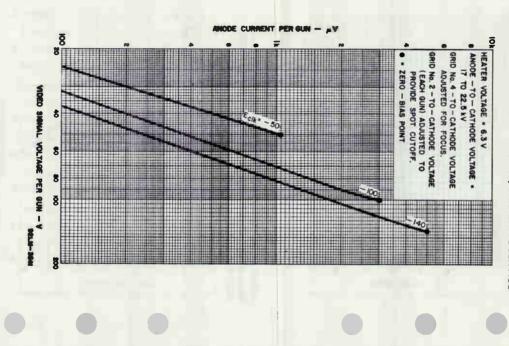
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Electronic Components

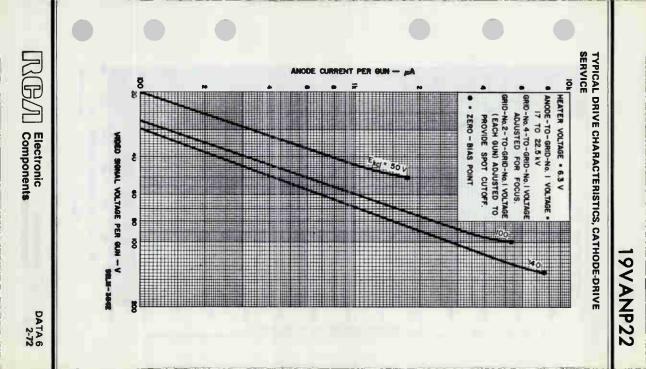


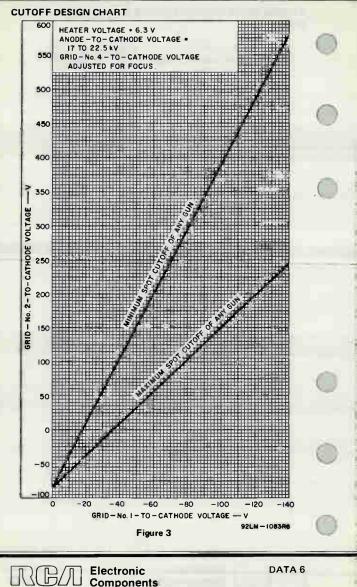
YPICAL DRIVE CHARACTERISTICS, GRID-DRIVE SERVICE



DATA 5

Electronic Components





Electronic Components

Color Picture Tube

Ultra-Rectangular	Hi-Lite Matrix Screen
4 x 3 Aspect Ratio	Light Neutral Screen Appearance
Electrical:	
Electron Guns, Three with A Tilted Toward Tube Axis . Heater:	Axes Red, Blue, Green
Voltage	6.3 V 900 mA
Focusing Method	Electrostatic
Focus Lens	Bipotential
Convergence Method	Magnetic
Deflection Method	Magnetic
Horizontal	90 deg 78 deg 60 deg tance (Approx.):
Grid No.1 of any gun to Grid No.3 to all other el All cathodes to all other	all other electrodes 6 pF ectrodes 6.5 pF electrodes 15 pF
Conductive Costing	
Resistance Between Metal H External Conductive Coating	ardware and 50 MΩ
Optical:	
Light transmission at cer Surface	nter (Approx.)
Persistence	Aluminized Black opaque material sulfide (blue & green)
Mechanical:	
Minimum Screen Area (Pro Bulb Funnel Designation .	jected) 185 sq in (1194 sq cm) JEDEC Nn J510A06
· · · · · · · · · · · · · · · · · · ·	JEDEC No.FP161-3/4 W1
	Small-Button Dihepter 12-Pin (JEDEC No.B12-244)
	JEDEC No.14BE
Pin Position Alignment	Pin No.12 Aligns Approx. with Anode Bulb Contact

RBA Electronic Components

un Configuration		
Veight (Approx.)	25 lb (11.	4 kg)
mplosion Protection:		
Type Rim Band	is and Tension	Band
laximum and Minimum Ratings, Design-Maxim	um Values;	
nless otherwise specified, values are for each alues are positive with respect to cathode.		ltagë
node Voltege	27.5 max.	kV
node Voltage	20 min.	k٧
node Current, Long-Term Average ^b	1000 max.	HA.
rid-No.3 (Focusing Electrode) Voltage		V
eak-Grid-No.2 Voltage, ncluding Video Signal Voltage	1000 max.	v
rid-No.1 Voltage:		
Negative bias value	400 max.	7
Negative operating cutoff value	200 max. 0 max.	v v
Positive peak value	2 max.	v
eater Voltage (ac or dc):C		
Under operating conditions	6.9 max.	V
Childer operating conditions	5.7 min.	×
Under standby conditionsd	5.5 max.	v
eater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period		
not exceeding 15 seconds	450 max.	V
After equipment warm-up period:		
DC component value	200 max. 200 max.	V
Heater positive with respect to cathode:	200 11184.	
DC component value	0 max.	v
Peak value	200 max.	V
uipment Design Ranges:		
nless otherwise specified, values are for each lues are positive with respect to cathode	gun and vol	tagę
or anode voltages between 20 and 27.5 kV		
rid-No.3 (Focusing Electrode) Voltage	16.8% to 209 Anode volt	

RBA Electronic Components

_		Contraction of the local division of the loc		
	Grid-No.2 Voltage for Visual Extinct of Undeflected Focused Spot S	ion Be CUTOFF	DESIGN CHA	RT
	At Grid No.1 voltage of -75 V At Grid No.1 voltage of -125 V At Grid No.1 voltage of -175 V		80 to 28	50 V 50 V
	Maximum Ratio of Grid-No.2 Voltag Lowest Gun in Any Tube (At grid-N voltage of -100 V)	es, Highest G o.1 spot cuto	iun to off	1,86
	Heater Voltage: ^c Under operating conditions: When standby operation in no When 5.0-V standby operation Under standby conditions ^d	n is utilized ^d		V
	Grid-No.3 Current (Total)			μA
	Grid-No.2 Current	3		μA
Б.	Grid-No.1 Current			μA
IJ				
	· · ·	Illum, D	Color	
	To Produce White Light of	6550 ⁰ K +	9300 ⁰ K +	
	CIE Coordinates:	7 M.P.C.D.	27 M.P.C.D	•
	X	0.313	0.281	
	Υ	0.329	0.311	
	Percentage of total anode currer	it .		
	supplied by each gun (average):			
	Red	41	30	76
	Blue	24	s.: 31.5 su 30	- 2
	Green		30	
	Red/blue:			
	Minimum	1.35	0.75	
	Typical.	1.70	0.96	
	Maximum	2.20	1.25	
	Red/green:	d of		
	Minimum	0.95 1.15	0.60	
	Typical,	1.15	1.10	
	Maximum Blue/green:	1.70	1.10	
	Minimum	0.50	0.60	
	- Typical	0.70	0.80	,
	Maximum	0.95	1.10	
7	Atg 3 to 33 t		1	
		ia - 11	16.81	£.
	Displacements, Measured at Center		14°, -	1.1
	Raster centering displacement:		Art 1- 14 44 4	
	Horizontal		.45 in (± 11.4 .45 in (± 11.4	
	Vertical		40 m (± 11.4	, ,,,,,,,
-	the converged red and green be		25 in (± 6.4	mm)
	the controlged for and green be			
-				DATA 2
	RBA Electronic Components	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	a 50 p	2.72
	Components	Frank Bring Ta		_ / _

Light-Output Characteristic:

Typical White-Light Output	80 fL
Measured within a 4 in (102 mm) diameter area centered	2/4 141
on the tube face with the following operating conditions: Anode Voltage	25 KV
Anode Current	1000 µA
Grid No.3 Voltage Adjusted Color Temperature	for focus M.P.C.D.

Limiting Circuit Values:

High-Voltage Circuits: Grid-No.3 circuit resistance		 	 	7.	S men.	ME
Low-Voltage Circuits: Effective grid-No.1-to-cathoo	ia-					
circuit resistance (each gun)		 	 	. 0.7	5 max.	MQ

X-Radiation Characteristic:

Maximum Anode Voltage at which the X-radiation emitted will not exceed 0.5 mR/h at an anode current of 300 µA 33 kW

The X-radiation emitted from this picture tube, as measured in accordance with the procedure of JEDEC Publication No.64A will not exceed 0.5 mR/h throughout the useful life of the tube when operated within the Design-Maximum ratings: 27.5 kV anode voltage and 1000 µA anode current. The tube should not be operated beyond its Design-Maximum ratings stated above (such operation may shorten tube life or have other permanent adverse affects on its performance), but its X-radiation will not exceed 0.5 mR/h for anode voltage and current combinations given by the isodose-rate limit characteristics as shown in Figure 1. Operation above the values shown by the curve may result in failure of the television receiver to comply with the Federal Performance Standard for Television Receivers, Sub-Part C of Part 78 of Title 42, Code of Federal Regulations (PL90-602) as published in the Federal Register Vol.34, No. 247, Thursday, December 25, 1969. Maximum X-radiation as a function of anode voltage at 300 µA anode current is shown by the curve in Figure 2. X-radiation at a constant anode voltage varies linearly with anode current.

- The mating socket, including its associated, physically-attached hardware and circuitry, must not weigh more than one pound (one-half kilogrem).
- b The short-term average anode current should be limited by circuitry to 1500 microemperes.
- C For maximum cathode life, it is recommended that the heater supply be regulated. The series impedance to any chassis connection in the dc biasing circuit for the heater should be between 100 kilohms and 1 megohm. The surge voltage across the heater must be limited to 9.5 volts rms.
- d The use of a 5-volt standby condition in conjunction with 6-volt operating conditions is recommended to improve the reliability of the color picture tube by extending the emission wear-out life and reducing other gun-related defects. A maximum heater voltage of 5.5 volts (Design-Maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

Notes for Dimensional Outlina

- Note 1 With tube neck inserted through flared and of referenceline and neck-funnel-contour gauge (JEDEC No.G 162) and with tube setted in gauge, the reference line is determined by the intersection of the plane C-C² of the gauge with the glass funnel.
- Note 2 Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb exis.
- Note 3 The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

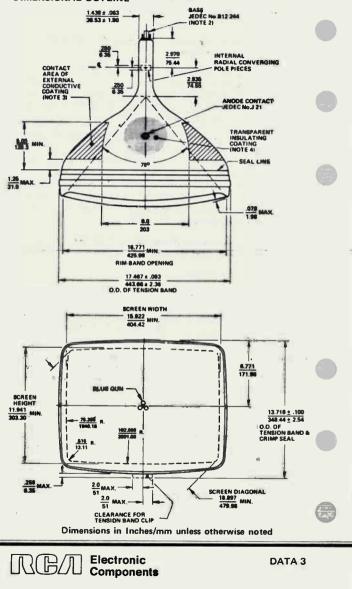
Note 4 - To clean this area, wipe only with soft, dry, lintless cloth.

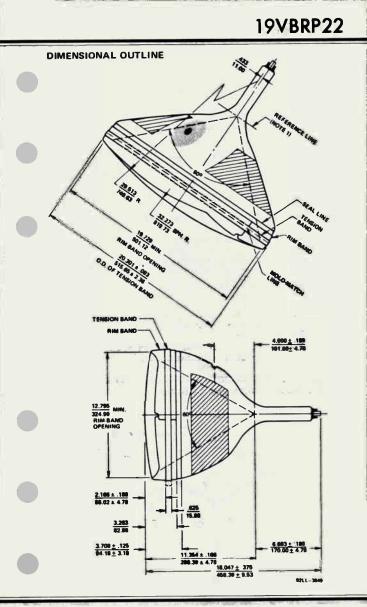
SAGITTAL HEIGHTS AT POINTS 128 BEYOND EDGE OF MIN. BCREEN DIAGONAL 1.485 WIDTH 1.044 HEIGHT 1877 14.78



DATA 3 2-72

DIMENSIONAL OUTLINE





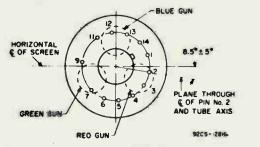
RBA Electronic Components

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DATA 4 2-72

BOTTOM VIEW OF BASE

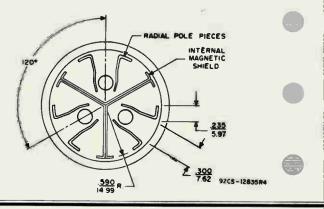


Base Specification - JEDEC No.14BE

- Pin 1-Heater
- Pin Cathode of Red Gun 2 -
- Pin Grid No.1 of Red Gun 3-
- Pin 4-Grid No.2 of Red Gun
- Pin 5-Grid No.2 of Green Gun Pin 6-
- Cathode of Green Gun Pin 7-
- Grid No.1 of Green Gun Pin 9-Grid No.3
- Pin 11-
- Cathode of Blue Gun Pin 12-
- Grid No.1 of Blue Gun Pin 13-Grid No.2 of Blue Gun
- Pin 14-
- Heater

Bulb Contact - Anode (Grid No.4, Screen, Collector) C- External Conductive Coating

LOCATION OF RADIAL-CONVERGING POLE PIECES VIEWED FROM SCREEN END OF GUNS





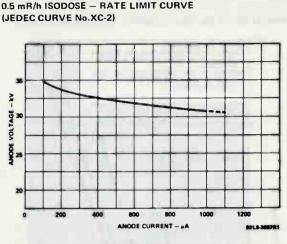
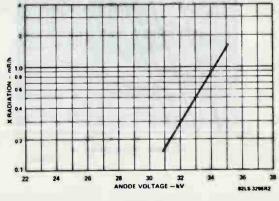


Figure 1

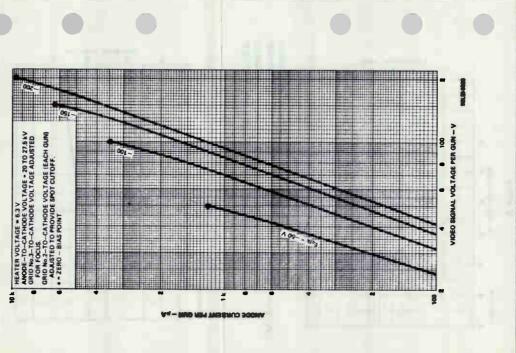
X-RADIATION LIMIT CURVE AT A CONSTANT ANODE CURRENT OF 300 µA (X-RADIATION AT A CONSTANT ANODE VOLTAGE VARIES LINEARLY WITH ANODE CURRENT) (JEDEC CURVE No.XC-1)





RBA Electronic Components

PICAL DRIVE CHARACTERISTICS, GRID-DRIVE SERVICE

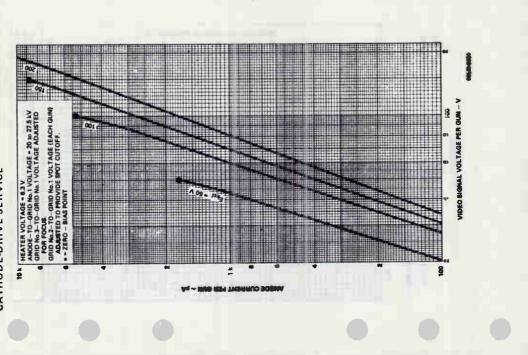


DATA 5

Electronic Components

H/J

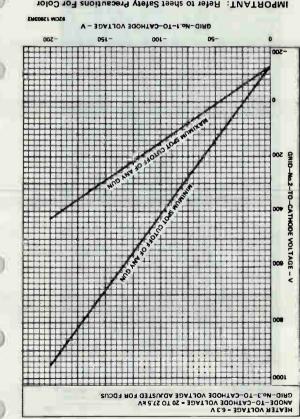
ICS. RIST ш SERVICE RACT 4 HO CATHODE-DRIVE ш > Ē 0 1 4 PIC 2



DATA

Electronic Components

CUTOFF DESIGN CHART



IMPORTENT: Refer to sheet Safety Precautions For Color Picture Tubes at front of this section.

FIGURE 3

9 ATAG

Components Components

Picture Tube

)	SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN Low-voltage electrostatic focus magnetic deflection
	With Heater Having Controlled Warm-Up Time
	GENERAL DATA
	Electrical:
	Heater Current at 6.3 volts 600 ± 30 ma
Ľ	Heater Warm-Up Time (Average) 11 seconds Focusing Method
	Focusing Method.
	Deflection Method Magnetic Deflection Angles (Approx.):
	Diagonal
	Horizontal 1020
	Vertical
S.	Vertical
1	Grid No.1 to all other electrodes 6 $\mu\mu$ f Cathode to all other electrodes 5 $\mu\mu$ f External conductive coating to ultor . {1500 max. $\mu\mu$ f
	Cathode to all other electrodes 5 $\mu\mu$ f
	External conductive coating to ultor 1500 max. Huf
	Electron Gun
	Liectron Gun
	Optical:
	Faceplate
	Light transmission at center (Approx.)
	Light transmission at center (Approx.)
	Alumining
	Fluorescence
	Phosphorescence
	Persistence
	Nechanical:
	Tube Dimensions:
	Overall length 10-13/16" ± 1/4"
	Greatest width $16-13/32'' + 1/8''$
j.	Greatest height
	Diagonal
	Diagonal
	Curvature of faceplate (External Radii):
	Center
	Screen Dimensions (Minimum):
	Greatest width
j.	0 4 4 1 1 1 4 4 4 4 1 4 1 4 1 4 1 4 1 4
	Diagonal
	Projected area
	Weight (Approx.)
	Operating Position
	Greatest neight
N	Bulb

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

DATA I 10-60

Base Small-Button Neoeightar 7-Pin, Arrangement 1, (JEDEC No. 87-208) Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.3 Pin 6 - Internal Connection Do Not Use Pin 7 - Cathode							
GRID-DRIVE SER	VIC	E					
Unless otherwise specified		-					
ues are positive with res							
Maximum and Minimum Ratings, Design-					0		
		ſ20000		volts	()		
ULTOR VOLTAGE	• •	11000		volts	~		
GRID-No.3 (FOCUSING) VOLTAGE:		(11000					
Positive value			max.	volts			
Negative value			max.	volts			
GRID-No.2 VOLTAGE			max.	volts			
		[300	min.	volts			
-GRID-No.1 VOLTAGE: - Negative-peak value		- 220	max.	volts			
Negative-bias value	• •		max.	volts			
Positive-bias value	• •		max.	volts			
Positive-peak value	•••		max.	volts			
	•••		max.	volts			
HEATER VOLTAGE			min.	volts			
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode:							
During equipment warm-up period		150					
not exceeding 15 seconds			max.	volts	Contra la		
After equipment warm-up period. Heater positive with	• •	200	max.	volts	1		
respect to cathode		200	max.	velts	-		
respect to cathoge	• •	200	INCLA +	VUILS			
Typical Operating Conditions:							
With ultor voltage (E _{cuk}) of		260	00	volts			
and grid-No.2 voltage (Eczk) of		50	0	volts			
Grid-No.3 Voltage for focus [®]				volts			

and grid-Ho.2 voltage (bc2k) of	500	VOLLS	
Grid-No.3 Voltage for focus [®] Grid-No.1 Voltage for visual	0 to 400	valts	
extinction of focused raster* Field Strength of Adjustable	-43 to -78	volts	
Centering Magnet♥	. 0 to 10	gausses	
Maximum Circuit Yalues:			
Grid-No 1-Circuit Resistance	1.5 may	manahma	F

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



CATHO	E-DR	VE.	SERV	ICE
-------	------	-----	------	-----

CATHODE-DRIVE® SERVICE						
	Unless otherwise specified, volt	sge val-				
	ues are positive with respect to g					
Maximum and Minimum Ratings, Design-Maximum Values:						
		0000 max. 1000 min.	volts volts			
	GRID-No.3-TO-GRID-No.1 (FOCUSING) VOLTAGE:					
	Positive value	850 max.	volts			
	Negative value	200 max.	volts			
	GRID-No.2-TO-GRID-No.1 VOLTAGE	∫750 max. 450 min.	volts			
	GRID-No. 2-TO-CATHODE VOLTAGE	600 max.	volts			
	CATHODE-TO-GRID-No.1 VOLTAGE:	ooo max.	VOILO			
	Positive-peak value	220 max.	volts			
	Positive-bias value	154 max.	volts			
	Negative-bias value	0 max.	volts			
	Negative-peak value	2 max.	volts			
	HEATER VOLTAGE.	6.9 max.	volts			
		15.7 min.	vorts			
	PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period					
	not exceeding 15 seconds	450 max.	volts			
	After equipment warm-up period Heater positive with	200 max.	volts			
	respect to cathode	200 max.	volts			
	Typical Operating Conditions:					
	With ultor-to-grid-No.1	16000	volts			
	voltage (Ecyg]) of and grid-No.2-to-grid-No.1	10000	A0112			
	voltage (Ec281) of	500	volts			
	Grid-No.3-to-Grid-No.1 Voltage	0 to 400	volts			
	Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster	41 to 69	volts			
	Field Strength of Adjustable Centering Magnet	0 to 10	gausses			
	Maximum Circuit Values:					
	Grid-No.1-Circuit Resistance	1.5 max.	megohms			
Grid drive is the operating condition in which the video signal variants the grid-No.1 potential with respect to cathode.						
)	the grid-Ho.1 potential with respect to calnode. The grid-Ho.3 voltage required for optimum for tube may have a value anywhere between 0 and a00 of the value of the ultor voltage. ultor current, it changes directly with the ultor voltage at the term of the outer volt change in ultor vol- grid-Ho.2 voltage at the rate of about 60 vo- change in grid Ho.2 voltage; and inversely with rate of about 60 volts for each 100-microam current. Because this tube has anerrow depth of to provide means such as a potentionneter or a H-1 the focusing voltage. In general, commercial obtained if the focusing voltage is within 2	cus or any i volts and is and grid-No.2 rate of appro- lts for each h ultor curre pere change focus, it is p switch for ly acceptable 5 volts of	a function voltage. oximately sely with 100-volt nt at the in ultor necessary adjusting focus is the value			
	obtained in the locasing to stage to statist					



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DATA 2 10-60

required for optimum focus and if the focusing voltage is maintained to within 75 volts of the optimum value during line-voltage fluctuations. See Raster-Cutoff-Range Chart for Grid-Drive Service.

Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4". The specified centering magnet compensates only for the effect which mechanical tube tolerances may have on the location of the undeflected focused spot with respect to the center of the tube face. Maximum field strength of adjustable centering magnet equals:

 $\sqrt{\frac{E_{C_{ij}k} \text{ or } E_{C_{ij}g_1} (\text{volts})}{16000 (\text{volts})}} \times 10 \text{ gausses}$

The equipment manufacturer must determine and supply additional compensation for the effects of the earth's magnetic field and extraneous fields due to choice of circuitry and components. The additional compensation should preferably be applied as part of the megnetic field of the deflecting yoke.

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

See Raster-Cutoff-Range Chart for Cathode-Drive Service.

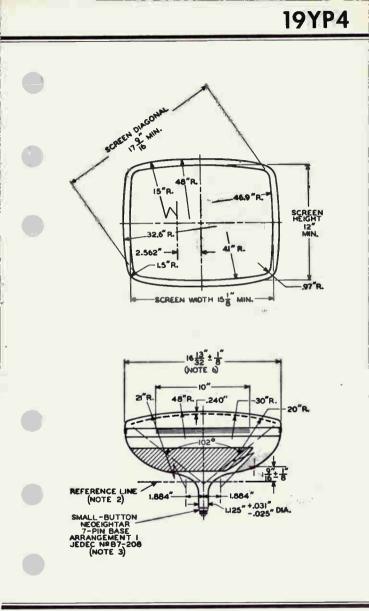
OPERATING CONSIDERATIONS

I-Ray Marning. When operated at ultor voltages up to 16 kilovolts, this picture tube does not produce any harmful X-ray radiation. However, because the rating of this type permits operation atvoltages as high as 20 kilovolts (Designmaximum value), shielding of this picture tube for X-ray radiation may be needed to protect against possible injury from prolonged exposure at close range whenever the operating conditions involve voltages in excess of 16 kilovolts.

Shatter-Proof Cover Over the Tube Face. Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatterproof, glass cover over the face of this picture tube 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.

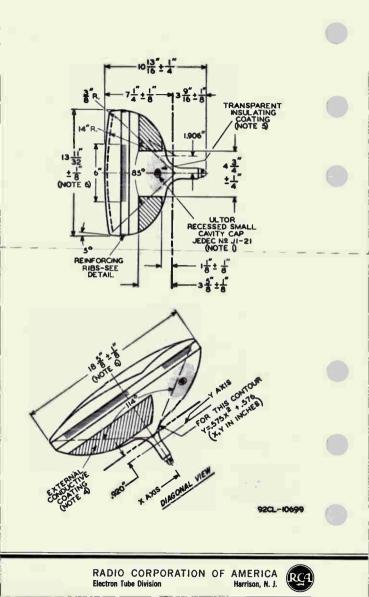
> RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

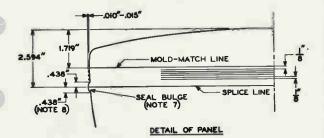






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NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 30^{\circ}$. ULTOR TERMINAL IS ON SAME SIDE AS PIN 4. NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC No.G-126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED INGAUGE, 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 LINT-LESS CLOTH.

NOTE 6: MEASURED AT THE MOLD-MATCH LINE.

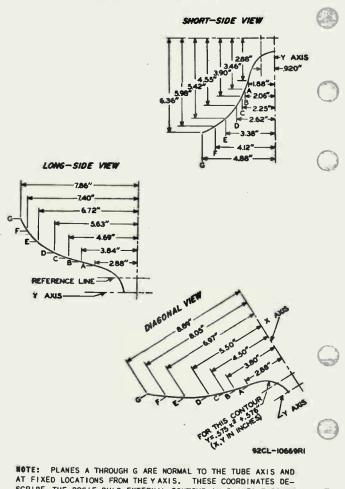
NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN I/B", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN I/I6" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

NOTE 8: UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/B" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF THE TUBE SUPPORT BAND. TUBE MOUNTING AND YOKE SUPPORT CLAMPS MUST BE SPACED FROM THE TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREG-NATED FELT, OR EQUIVALENT.



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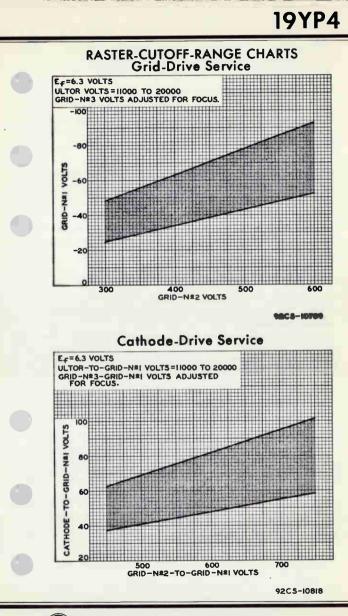
BULB-CONTOUR DIMENSIONS



SCRIBE THE BOGIE-BULB EXTERNAL CONTOUR IN PLANES THROUGH THE TUBE AXIS AND THE RESPECTIVE FACEPLATE AXES.

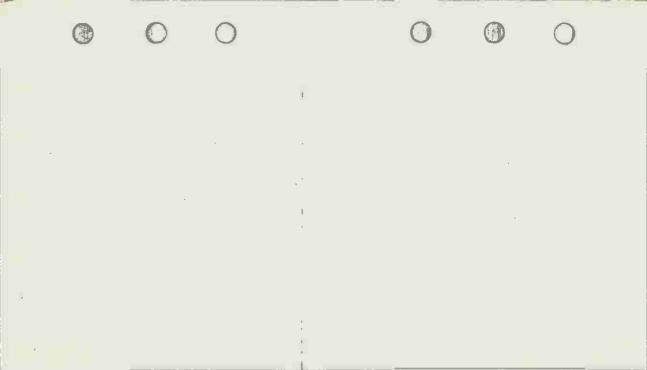
RADIO CORPORATION OF AMERICA

Electron Tube Division Harrison, N. J.



RCA Elec

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



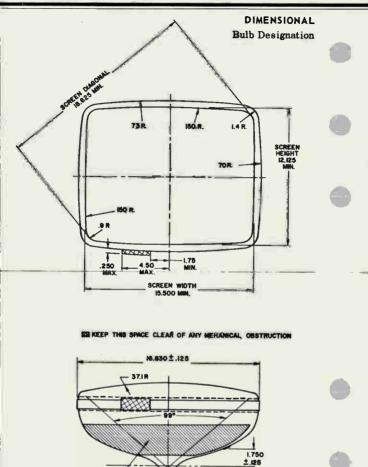
Picture Tube

Pan-o-Ply Type Low-Volta	ige Electrostatic Focus
114 ^o Magnetic Deflection	Low Grid-No.2 Voltage
Direct Interelectrode Capacitances:	
Cathode to all other electrodes .	5 pF
Grid No.1 to all other electrodes	6 pF
External conductive coating	(2000 max. pF
to anode ^a	1400 min. pF
Heater Current at 6.3 volts	
Heater Warm-Up Time (Average)	
Electron Gun Type Requ	
Focus Lens	Unipotential
Phosphor P4-	
Faceplate	Filterglass
Light Transmission at Center (A	
Weight (Approx.)	16.5 lb
Overall length	12.269" ± .250"
Neck length	
Projected Area of Screen	
Cap Designation	(JEDEC No.J1-21)
Base Designation Small-	
	nt 1, (JEDEC No.B7-208)
TERMINAL DIAGRAM	
Pin 1: Heater	ANODE
Pin 2: Grid No.1	G4 (4) The C
Pin 3: Grid No.2	
Pin 4: Grid No.4	$G^{2}(3)(\tau)^{2}(6)^{6}$
Pin 6: Grid No.1	
Pin 7: Cathode	drin h
Pin 8: Heater	c.(2) / 7)K
Cap: Anode (Grid No.3,	
Grid No.5, Screen, Collector)	
Collector) C: External Conductive	H 8HR H
Coating	
MAXIMUM AND MINIMUM RATINGS, D	ESIGN-MAXIMUM VALUES

Unless otherwise specified, voltage	values
are positive with respect to grid No	.1
Anode Voltage	0 max. V
Anode Voltage	0 min. V
Grid-No.4 Voltage:	
Positive value	i) max. V
Negative value	0 max. V

RBA Electronic Components

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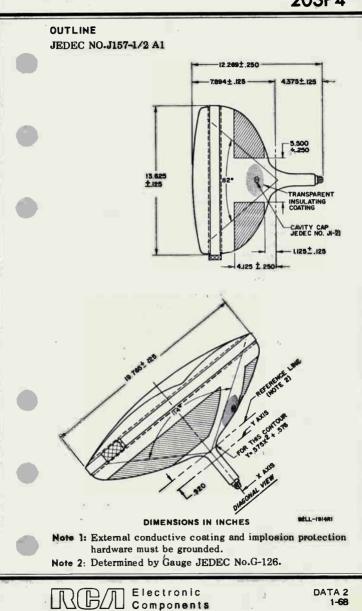
125+043 DIA

BASE JEDEC NO. B7-208

RBA Electronic Components

EXTERNAL CONDUCT COATING

(NOTE I)



MAXIMUM AND MINIMUM R	ATINGS (CONT	(D)	
	∫60 max	. V	
Grid-No.2 Voltage	20 min	. v	
Cathode Voltage:			
Negative peak value	2 max	. V	
Negative bias value	0 max	. V	
Positive bias value	100 max	. v	
Positive peak value	150 max	. V	
	(6.9 max	. v	
Heater Voltage	15.7 min	• V	
Peak Heater-Cathode Voltage:			
Heater negative with			
respect to cathode:			
During equipment warm-up			
period not exceeding			
15 seconds	450 max	v v	
After equipment warm-up	100		
period	300 max	. V	
Heater positive with			
respect to cathode:			
Combined AC & DC voltage.	200 max	. V	
DC Component	100 max	. V	
TYPICAL OPERATING CO			
CATHODE-DRIVE		n c	
Unless otherwise specified	d voltage valu	a.e	
are positive with respect t			
Anode Voltage	16.000	v	
Grid-No.4 Voltage	10,000	v	
Grid-No.2 Voltage	30	V	
Cathode Voltage for visual	30	•	
extinction of focused			
raster · · · · · · · · · · · · · · · · · · ·	00 to 40	v	
Field Strength of required	22 10 40	v	1.0111.
adjustable Centering Magnet	0 +0 8	G	
		Ģ	
MAXIMUM CIRCUIT	VALUE		
Grid-No.1 Circuit Resistance	1.5 max	. MQ	

^oIncludes implosion protection hardware.

^bThe grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between -100 and +300 volts with the combined grid-No.1 voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 11.25-inch by 15-inch pattern from an RCA-2F21 monoscope, or equivalent.

See X-RADIATION PRECAUTIONS at front of this section

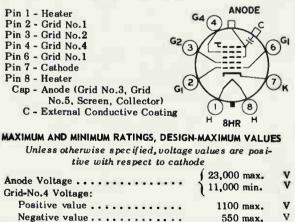
RBA Electronic Components

Picture Tube

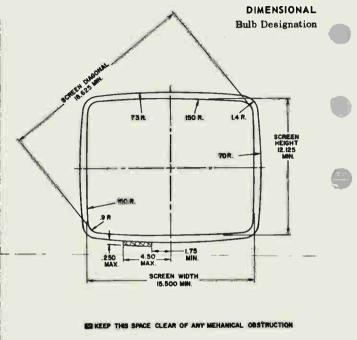
Pon-o-Ply Type Low-Voltoge Electrostotic Focus 114^o Mognetic Deflection

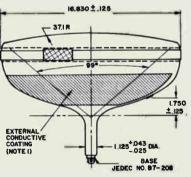
Direct Interelectrode Capacitances:	
Cathode to all other electrodes 5	pF
Grid No.1 to all other electrodes . 6	pF
External conductive coating 1 2000 max.	pF
to anode ^a	pF
Heater Current at 6.3 volts 450 ± 20	mA
Heater Warm-Up Time (Average) 11 sec	onds
Electron Gun Type Requiring No Ion-Trap Ma	ignet
Focus Lens Unipote	
Phosphor P4-Sulfide Type, Alumin	
Faceplate Filters	
Light Transmission at Center (Approx.)	
Weight (Approx.)	
Overall length 12.269 in ± .21 Neck length 4.375 in ± .11	
Projected Area of Screen	
Cap Designation Recessed Small Ca	
(JEDEC No.J)	
Base Designation Small-Button Neoeightar 7-	
Arrangement 1, (JEDEC No.B7-	208)

TERMINAL DIAGRAM (Bottom View)

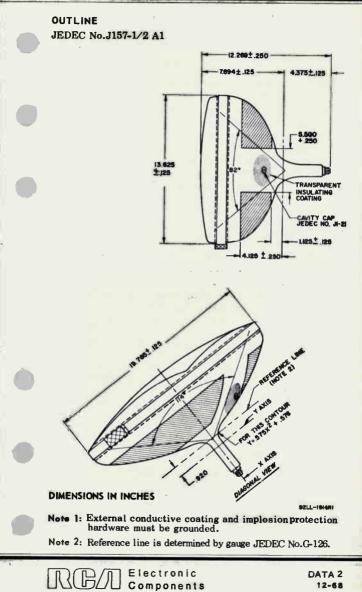


RBA Electronic Components





RBA Electronic Components



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MAXIMUM AND MINIMUM RATINGS (CONT'D)			
Grid-No.2 Voltage	550 max.	v	_
Grid-No.1 Voltage:	200 min.	v	
Negative peak value	220 max.	v	
Negative bias value	155 max.	v	
Positive bias value	0 max.	V	
Positive peak value	2 max.	v	
	6.9 max.	v	-
Heater Voltage	5.7 min.	V	
Peak Heater-Cathode Voltage:	(-
Heater negative with			
respect to cathode:			
During equipment warm-up			
period not exceeding	450 max.	V	-
15 seconds	400 max.	×	
After equipment warm-up	300 max.	v	
period	Soo mar.		
Heater positive with			
respect to cathode: Combined AC & DC Voltage	200 max.	v	
•••••••••	100 max.	v	
DC Component	100 max.		
TYPICAL OPERATING CONDITIONS			
FOR CATHODE-DRIVE SERVICE:			
Unless otherwise specified, voltage valu	es are posi-	•	
tive with respect to grid No.1			
Anode Voltage	16,000	V	
Grid-No.4 Voltageb	200	V	
Grid-No.2 Voltage	300	v	
Cathode Voltage for visual			
extinction of focused	00 4 00	87	
raster · · · · · · · · · · · · · · · · · · ·	28 to 62	Y	
Field Strength of required	04.0	•	
adjustable Centering Magnet	0 to 8	G	
MAXIMUM CIRCUIT VALUE			
Grid-No.1 Circuit Resistance	1.5 max.	MQ	
Unid-Hori Onedie Resistance			
^a Include implosion protection hardware.			
^b The grid-No.4 voltage required for optim			
individual tube will have a value anywher	re between	0 and	
+400 volts with the combined grid-No.1 vo	oltage and v	ideo-	

+400 volts with the combined grid-No.1 voltage and videosignal voltage adjusted to give an anode current of 100 microamperes on a 11.25-inch by 15-inch pattern from an RCA-2F21 monoscope, or equivalent.

See X-RADIATION PRECAUTIONS at front of this section.

RBA Electronic Components

21AMP4B

Picture Tube

RECTANGUL	AR GLASS	TYPE
MAGNETIC	FOCUS	

ALUMINIZED SCREEN 90° MAGNETIC DEFLECTION

E	ec'	tri	ica	1:
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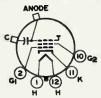
Heater Current at 6.3 volts			600 mi	a
Direct Interelectrode Capacitances:				
Grid No.1 to all other electrodes		•	6 p	F
Cathode to all other electrodes			••• p	f
External conductive coating to anode			∫2500 max. p	F
External conductive couring to anote	•	•	12000 min. p	f
Electron Gun			.Type Requiring No	0
			Ion-Trap Magne	t
0-11-11				
Optical:				
Escaplata Scharical			Filteralac	

Mechanical:

Operating Position																		
Weight (Approx.) .																. 2	4 11	DS.
Overall Length	~														20	"±	3/1	3"
Neck Length																		
Projected Area of S	Sc r	ee	n												262	sq	. ii	Π.
External Conductive	e C	ba	iti	ing	11													
Туре												•		. R	egu	lar	-Ba	nd
Contact area for																		
For Additional I	nŤd	ore	na	t i	OF	1	оп	C	50	it i	nç	1s	Di	men	sio	ns	, a	nd
Definition Anala																		

Deflection Angles: See Picture-Tube Dimensional-Outlines and Bulb J171 D/E sheets at the front of this section

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



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

Maximum Ratings, Design-Naximum Values:

Anode Voltage	٠					٠	•				20000	max.	VOITS
Grid-No.2 Voltage		•	•	•	•	•	•	•	•	•	550	max.	volts

DATA



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21AMP4B

Grid-No.1 Voltage: Negative peak value	volts volts volts volts	
respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode 200 max.	volts volts volts	
Typical Operating Conditions: With anode voltage of 16000 and grid-No.2 voltage of 300	volts volts	
Grid-No.1 Voltage for visual extinction of focused raster28 to -72	volts	
Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max.	megohms	

For X-radiation shielding considerations, see sheet **X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES** at front of this section





RADIO CORPORATION OF AMERICA Electronic Components and Devices

21AVP4C

Picture Tube

RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN 72º MAGNETIC DEFLECTION

Electrical:

Heater Current at 6.3 volts				. 600	1968
Direct Interelectrode Capacitances:					
Grid No.1 to all other electrodes	•	•	• •	. 6	pf
Cathode to all other electrodes				. 5	pf
External conductive coating to anode	•	•	•	. {2500 max.	pf
Electron Gun	Ту	pe	Re	equiring No Trap Ma	I on-

Optical:

Mechanical:

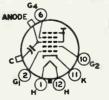
Operating Position		•	•	•	•	•	•	*	•	Any
Weight (Approx.)										
Overall Length			•							23-1/32" ± 3/8"
Neck Length					•		•			7-1/2" ± 3/16"
Projected Area of Screen					•					262 sq. in.
External Conductive Coat	ir	ng:								
Turne										Constal

Type.....Special Contact area for grounding.....Near Reference Line For Additional Information on Coatings and Dimensions:

See Picture-Tube Dimensional-Outlines and Bulb J171 B/F sheets at the front of this section

					.Recessed Small Cavity (JEDEC No.J1-21)	
Base					Small-Shell Duodecal 6-Pin,	
					Arrangement 1. (JEDEC Group 4, No. 86-63)	

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

RCA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. L DATA 2-64

21AVP4C

Mavimum Patings Design Maning

maximum katings, Design-Naximum Values:		
Anode Voltage Grid-No.4 (Focusing) Voltage:	22000 max.	volts
Positive value	1100 max.	volts
Negative value	550 max.	volts
Grid-No.2 Voltage	550 max.	volts
Grid-No.1 Voltage:	000	1.
Negative peak value.	220 max.	volts
Negative bias value	155 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	150	
not exceeding 15 seconds	450 max.	volts
After equipment warm-up period Heater positive with	200 max.	volts
respect to cathode	200 max.	volts
Typical Operating Conditions:		
With anode voltage of	18000	volts
and grid-No.2 voltage of	300	volts
Grid-No.4 Voltage for focus	-72 to +396	volts
Grid-No.1 Voltage for visual	12 10 .000	101 20
extinction of focused raster	-28 to -72	volts
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	1.5 max. m	acohac
un un nost on cure nesistance	TO B HICK. H	wyormia

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section

> RADIO CORPORATION OF AMERICA Electronic Components and Devices





21AWP4A

Picture Tube

riciole tobe
NO ION-TRAP MAGNET REQUIRED RECTANGULAR GLASS TYPE ALUMINIZED SCREEN Magnetic focus 72° Magnetic deflection
Electrical:
Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf External conductive coating to anode
Heater Current at 6.3 volts
Optical:
Phosphor (For curves, see front of this Section)
specular reflection Mechanical:
Weight (Approx.)
See Picture-Tube Dimensional-Outlines and Bulb J171 B/F sheets at front of this section
Cap
Pin 1-Heater Pin 2-Grid-No.1 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater Cap - Anode (Grid No.3, Screen,
Collector) GIOTO C-External H H Conductive Coating
Maximum and Minimum Ratings, Design-Naximum Values:
Unless otherwise specified, voltage values are positive with respect to cathode
Anode Voltage
RCA RADIO CORPORATION OF AMERICA DATA

RCA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 4-65

21AWP4A

Grid-No.1 Voltage: Negative peak value
Positive bias value
Heater Voltage
Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not
exceeding 15 seconds
Combined AC and DC voltage 200 max. volts DC component 100 max. volts
Typical Operating Conditions for Cathode-Drive Service:
Unless otherwise specified, voltage values are positive with respect to grid No.1
Anode Voltage
focused raster
Maximum Circuit Values:
Grid-No.1-Circuit Resistance 1.5 max. megohms

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



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



CIR+RICE R

COLOR KINESCOPE

	8-56 TUBE DIVISION TENTATIVE DATA 3
	●, •, †, ▲, ∞: See next page.
Ì	the grid-No.3-circuit resistance should be limited to 7.1 megohms.
)	No.3 circuit. In equipment utilizing a well-regulated ultor power supply,
	the maximum instantaneous current and voltage in the grid-
	capacitor and the grid-No.3 electrode should be not less than 50000 ohms. This resistance should be capable of withstanding
	the effective resistance between grid-No.3 power supply output
	tinuous short-circuit current to 50 milliamperes. In addition, to prevent cathode damage with resultant decrease in tube life,
)	limited-energy type with inherent regulation to limit the con-
	tube caused by a momentary internal arc, it is recommended that the ultor power supply and the grid-No.3 power supply be of the
	In order to minimize the possibility of damage to the
	High-Voltage Circuits:
-	Limiting Circuit Values:
	(Each Gun) for Visual Extinction of Focused Raster when circuit design utilizes grid-No.2-to- cathode voltage of 200 volts -45 to -100 -45 to -100 volts
	Grid-No.1-to-Cathode Voltage
	cathode voltage of -70 volts for raster cutoff 130 to 370 130 to 370 volts
	Grid-No.2-to-Cathode Voltage (Each Gun) when circuit de- sign utilizes grid-No.1-to-
	Voltage
	Grid-No.3 (Focusing Electrode)- to-Cathode (Of Each Gun)
	For ultor voltage of 20000 25000 volta
	Examples of Use of Design Ranges:
	(Shift _R - Shift _G) 0 to +1001
	pattern shift and green-pattern shift
	Difference between red-
	Sawtooth: Amplitude to provide ⁰⁰ Shift of -1/8" to +3/16"
	shift to green- pattern shift
J	Amplitude to provide ⁴ Shift of 1/8" to 3/8" Ratio of red-pattern
1	Parabola:
ю	to provide ⁰⁰ Shift of 0 to 1/4" Red pattern & green pattern—
ŝ	Sawtooth amplitude
	Vertical:

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



Low-Foltage Circuits: Grid-No.1-Circuit Resistance (Each Gun) . . . 1.5 max. megohms

When the cathode of each gun is not connected directly to the heater, the grid-No.2-to-heater circuit, the grid-No.1-to-heater circuit, and the cathode-to-heater circuit should each have an impedance such that their respective power sources in combination will not supply an instantaneous or continuous short-circuit current of more than 300 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

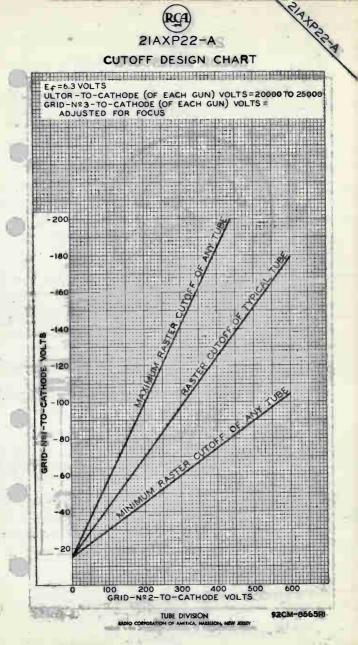
When the cathode is connected directly to the heater, the grid-No.2-to-heater circuit, and the grid-No.1-to-heater circuit should each have an impedance such that their respective power sources in combination will not supply an instantaneous or continuous short-circuit current of more than 300 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

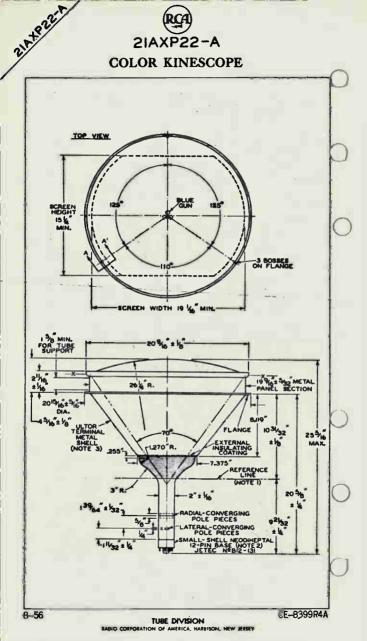
- Shift is the movement of the regions of bar-or-dot-generator pattern indicated in notes (A) and (00).
- The direction of movement of the red and green beam is opposite to that of the blue beam.
- Indicated values apply when RCA test yoke is used with the 21AXP22-A. The parabola amplitude is determined by the average value of the shifts at the extremities of the respective horizontal and vertical axes of the screen with convergence of the three beams maintained at the center of the screen. An increase in amplitude should move the blue beam toward the top of the screen; the red beam toward the lower left of the screen; and the green beam toward the lower right of the screen.
- Of The sawtooth amplitude is determined by the difference between the shifts at the extremities of the respective horizontal and vertical axes of the screen. Positive amplitude indicates that the shift at the right or bottom of the screen is greater than the shift at the left or top of the screen.

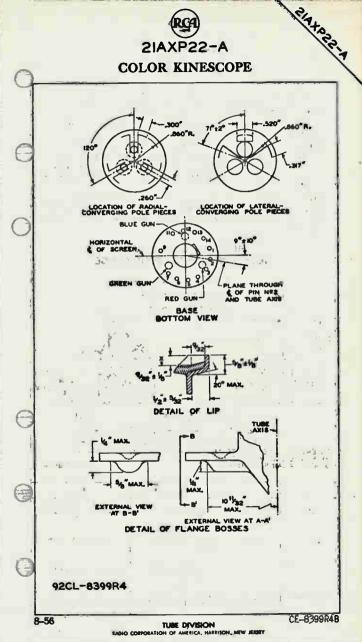
X-RAY WARNING

X-ray radiation is produced by the 21AXP22-A when it is operated at its normal ultor voltage. The radiation is through the faceplate, and is sufficient to require the adoption of safety measures in TV receivers. Shielding such as that provided by a 1/4-inch thickness of safety glass (lime) in front of the faceplate, should prove adequate to provide protection against personal injury from prolonged exposure at close range when the tube is operated at its maximum ultor voltage rating.

When this tube is being serviced outside of the TV receiver cabinet, it should never be operated without providing adequate X-ray shielding in front of faceplate. Because the ultor voltage may rise above its maximum rated value for short periods during adjustment with increase in the amount of X-ray radiation, provision should be made for placing a 3/8-inch thickness of safety glass in front of the faceplate to avoid the hazard of X-ray radiation.









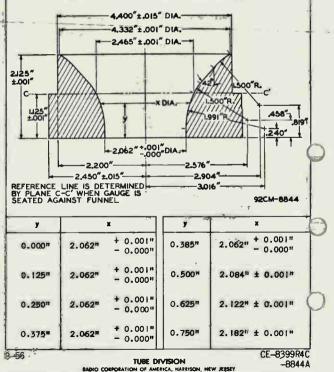
21AYP22+A

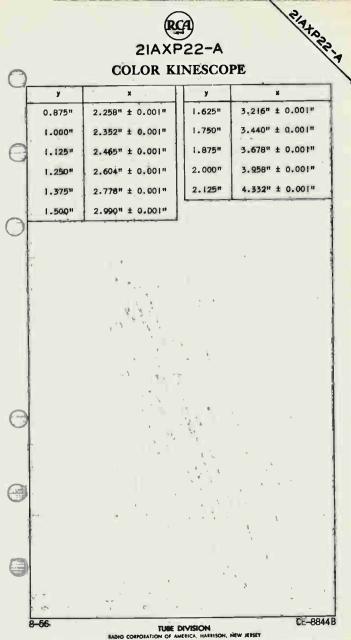
NOTE I: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE (SHOWN BELOW) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

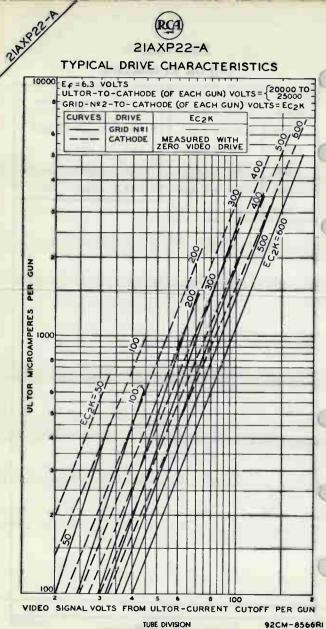
NOTE 2: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH METAL-SHELL AXIS AND HAVING A DIAMETER OF 3".

NOTE 3: METAL SHELL AND GLASS FACE OPERATE AT HIGH VOLT-AGE. ANY MATERIAL IN CONTACT WITH THE SHELL OR THE FACE MUST BE INSULATED TO WITHSTAND THE MAXIMUM APPLIED ULTOR VOLTAGE.

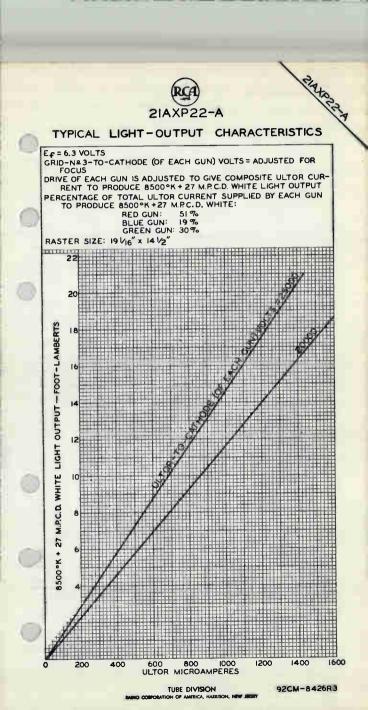
REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE

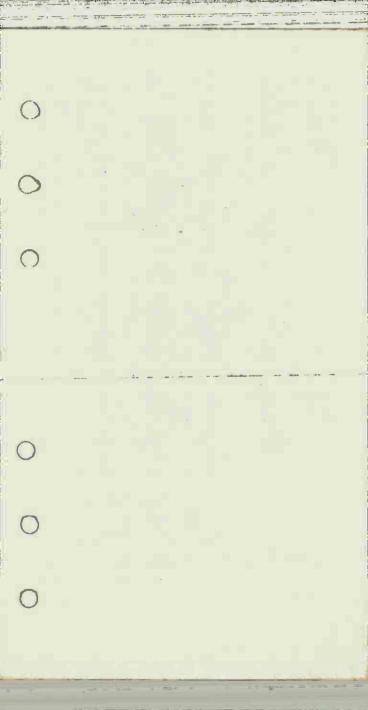






TODE DIVISION IN THE SON, NEW JEEP







ALA +P22-14

THREE-GUN SHADOW-MASK TYPE ELECTROSTATIC FOCUS MAGNETIC CONVERGENCE MAGNETIC DEFLECTION ALUMINIZED TRICOLOR PHOSPHOR-DOT SCREEN Replacement for Types 21AXP22 & 21AXP22-A

DATA

General:

	Electron Guns. Three with Axes Tilted
ŀ.	Toward Tube Axis
	Heater, for Unipotential Cathode of
	Each Gun. Paralleled with Each of
	the Other Two Heaters within Tube:
	Voltage 6.3
	Current 1.8 ± 10%
	Faceplate, Spherical
	Light transmission (Approx.).
	Screen, On Inner Surface of Faceplate:
	TypeAluminized, Tricolor, Phosphor-Dot
	Phosphor (Three separate phosphors, collectively)♥ P22
	Fluorescence and phosphorescence of
	separate phosphors, respectively Red, Blue, Green
	Persistence of group phosphorescence Medium
	Dot arrangement
1	red dot, blue dot, and green dot
	Spacing between centers of adjacent dot trios (Approx.) 0.029"
1	Size (Minimum):
	Greatest width
	Height
	Projected area
	Focusing Method Electrostatic
	Focusing Method
	Convergence Method
	Deflection Method
	Deflection Angles (Approx.): Horizontal
	Horizontal.
h.	Vertical
1	Tube Dimensions:
	Maximum overall length
	Diameter:
1	At lip
	At flange
	Weight (Approx.),
	Operating Position and the transformed to the trans
	(Base nin 12 on ton)
	(Base pin 12 on top) Ultor Terminal Metal Shell Socket Alden Nos.214NMINSC (Radial leads),
	Socket Alden Nos 214NMINSC (Radia) leads)
	214NMINC (Axial leads), or equivalent
	ZIAMMING (AXIAI leads), or equivalent

For Curves, see front of this Section.

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TENTATIVE DATA 1

ELECTRON TUBE DIVISION

ATP22-1	(RCA		
	2IAXP22	-A/2IAXP2	22	
	COLOR PI	CTURE TUR	BE	
Base Basing I	. Small-Shell Neod Designation for BOT	iheptal 12-Pin (TOM VIEW		31) 14W
Pin 1-1 Pin 2-0	Heater Grid No.1 of Red Gun		9-Grids No.3 1-Grid No.2 of Blue Gu	
Pin 3-0	Grid No.2	Pin 1	2-Grid No.1	
Pin 4-0	of Red Gun Cathode of Red Gun	Pin 1	of Blue Gu 3 - Cathode of Blue Gu	
Pin 5-0	athode of Green Gun		4 - Heater SHELL -	
Pin 6-0	Grid No.1	2.2.0	Ultor (Grid No.4,	
Pin 7-0	of Green Gun		Grid No.5, Collector)	
	atings, Design-Cent			
GRID-No.3- GRID-No.2-	CATHODE (Of each gu -TO-CATHODE (Of eac -TO-CATHODE VOLTAGE -TO-CATHODE VOLTAGE	h gun) VOLTAGE.	25000 max. vo 6000 max. vo 800 max. vo	lts
Negative Positive Positive PEAK HEATI Heater	-bias value bias value peak value R-CATHODE VOLTAGE negative with respe	(Each gun): ct to cathode:	0 max. vo	lts lts
not After	g equipment warm-up exceeding 15 secon equipment warm-up positive with respe	ds	180 max. vo	lts
-	Circuit Values:			
Inor	<i>ige Circuits:</i> der to minimize t ed by a momentary			
that the be of the limit the in additio	ultor power supply limited-energy t continuous short-c on, to prevent catho	and the grid-N ype with inheren ircuit current to de damage with r	o.g power sup; nt regulation 50 milliamper esultant decre	to es.
supply out not less t of withsta	fe, the effective r put capacitor and than 50,000 ohms. anding the maximum id-No.3 circuit.	the grid-No.3 el This resistance	ectrode should should be capa	ble
	uipment utilizing a No. <i>3-circuit resi</i> :			
	e Circuita:			
Grid-No.l-	-Circuit Resistance	(Each gun)	1.5 max. mego	hms

ELECTRON TUBE DIVISION



217 + 222

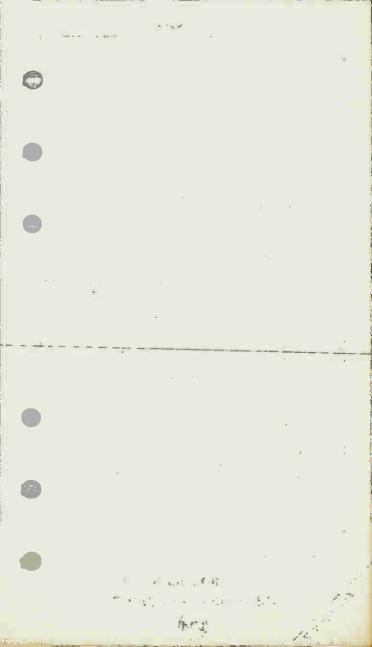
When the cathode of each gun is not connected directly to the heater, the grid-No.2-to-heater circuit, the grid-No.1-to-heater circuit, and the cathode-to-heater circuit should each have an impedance such that their respective power sources in combination will not supply an instantaneous or continuous short-circuit current of more than 300 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

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X-RAY WARNING

X-ray radiation is produced by the 21AXP22-A/21AXP22 when It is operated at its normal ultor voitage. The radiation is through the faceplate, and is sufficient to require the adoption of safety measures in television receivers. Shieldings such as that provided by a 1/4-inch thickness of safety glass (lime) in front of the faceplate, should prove adequate to provide protection against personal injury from prolonged exposure at close range when the tube is operated at its maximum ultor-voltage rating.

When this tube is being serviced outside of the television receiver cabinet, it should never be operated without providing adequate X-ray shielding in front of faceplate. Because the ultor voltage may rise above its maximum rated value for short periods during adjustment with increase in the amount of X-ray radiation, provision should be made for placing a 3/8-inch thickness of safety glass in front of the faceplate to avoid the hazard of X-ray radiation.



21CBP4A

Picture Tube

RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN 90° MAGNETIC DEFLECTION

GENERAL DATA

Electrical: Heater Current at 6.3 volts 600 ± 10% ma Direct Interelectrode Capacitances: Huf Grid No.1 to all other electrodes . 6 5 щuf Cathode to all other electrodes . {2500 max. 2000 min. μµ f External conductive coating to ultor. μµ f Electron Gun. Type Requiring No Ion-Trap Magnet Optical: Filterglass Faceplate, Spherical. . . . Light transmission (Approx.). 74% Phosphor (For curves, see front of this Section) . P4-Sulfide Type. Aluminized Mechanical: Operating Position. . Any 24 lbs Weight (Approx.). 18" ± 3/8" Overall Length. 5-1/2" ± 3/16" Neck Length Projected Area of Screen. 262 sq. in. External Conductive Coating: . . Special For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J171 D/E sheets at the front of this section Short Small-Shell Duodecal 6-Pin (JEDEC Group 4, No. B6-203) Small-Shell Duodecal 6-Pin, Arrangement 1 (JEDEC Group 4, No.B6-63) Basing Designation for BOTTOM VIEW. . . 12L ULTOR Cap - Ultor Pin 1-Heater (Grid No.3, Grid No.5, Pin 2-Grid No.1 Pin 6-Grid No.4 Collector) Pin 10 - Grid No.2 10)G2 CE C-External Pin 11 - Cathode Conductive Pin 12 - Heater Coating

RADIO CORPORATION OF AMERICA Harrison, N. J. **Electron Tube Division**

DATA 1-63

21CBP4A

Maximum and Minimum Dakings D () v ()	
Maximum and Minimum Ratings, Design-Maximum Values:	
ULTOR VOLTAGE	volts
GRID-No.4 (FOCUSING) VOLTAGE:	
Positive value 1000 max.	volts
Negative value	volts
GRID-No.2 VOLTAGE	volts
GRID-No.1 VOLTAGE:	
Negative peak value	volts
Negative bias value 155 max.	volts
Positive bias value 0 max.	volts
Positive peak value	volts
HEATER VOLTAGE	volts
15.7 min.	volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode 200 max.	volts volts
Typical Operating Conditions:	
With ultor voltage of 16000	wolts
and grid-No.2 voltage of 300	volts
Grid-No.4 Voltage for focus	volts
Grid-No.1 Voltage for visual	vores
extinction of focused raster28 to -72	volts
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max.	megohms

For X-radiation shielding considerations, see sheet I-RADIATION PRECAUTIONS FOR CATBODE-RAY TUBES at front of this section



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



PICTURE TUBE

RECTANGULAR GLASS TYPE LOW-VOLTAGE FOCUS

General:

ALUMINIZED SCREEN MAGNETIC DEFLECTION

PICE PR

DATA

- 1	ueneral:	ł
	Heater, for Unipotential Cathode:	I
	Heater, for Unipotential Cathode: Voltage	
<u> </u>		4
	Direct Interelectrode Canacitances*	ł
	Grid No.1 to all other electrodes 6 ##f	1
	Cothado to all other electrodes 5 IIII	1
	Euternal conductive contine to ulter (2500 max. muf	
ľ	External conductive coating to ultor {2500 max. mut 2000 min. mut	1
	Faceplate, Spherical	s
7	Light transmission (Approx.)	1
	Phosphor (For curves, see front of this section) . P4-Sulfide Type	ł
	Aluminized	11
	Fluorescence	4
	Phosphorescence,	1
	Short Short	۱I
	Focusing Method	1
	Deflection Method.	1
	Deflection Angles (Approx.): Diagonal	ł
	Diagonal	1
	Horizontal 105	1
	Vertical	Ί
	Electron Gun	1
	Tube Dimensions:	
	Overall length	1
	Greatest width	1
	Greatest height	٩,
	Diagonal	1
	Diagonal	ľ
}	Screen Dimensions (Minimum):	
	Greatest width	
	I Greatest height.	- L
	Diagonal	"
	Projected area	<u>:</u>
	Weight (Approx.)	3
	Mounting Position	1
	Cap Recessed Small Cavity (JEIEC NO.JI-ZI,	1
	Bulb	4
	Socket	٩
	Base	1
	Basing Designation for BOTTOM VIEW	á
		1
	Pin 1-Heater () Cap-Ultor	1
	Pin 2-Grid No.1 (Grid No.3,	
	Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1 Pin 7 - Grid No.2 Pin 7 - Grid	
	Pin 4-Grid No.4 Collector)	
	Pin 6-Grid No.1 (2) 7 C-External	
	Pin 7-Cathode Conductive	
	Pin 8-Heater OTO Coating	
		Ļ

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ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA 1

2ICEP4

2100

PICTURE TURE

GRID-DRIVE* SERVICE

Unless otherwise specified, voltage values are positive with respect to cathode Maximum Ratings, Design-Center Values; **(18000** volts III. TOR VOLTAGE. max. 12000 min. volts GRID-No.4 VOLTAGE: Positive value . . 1000 max. volts Negative value . . 500 max. volts GRID-No.2 VOLTAGE. 500 volts max. GRID-No.1 VOLTAGE: Negative peak value. . 200 max. volts Negative bias value. . . volts 140 . mex. Positive bias value. 0 max. volts Positive peak value. 2 volts max. PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode. 180 volts max. Heater positive with respect to cathode. 180 volts max. Equipment Design Ranges: With any ultor voltage (Ecs. b) between 12000 and 18000 volta and grid-No.2 voltage (Bc, k) between 200 and 500 volts Grid-No.4 Voltage for Focus§ 0 to 400 volts Grid-No.1 Voltage (Ecik) 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. Ec, k except video drive is a positive voltage Grid-No.4 Current. . . -25 to +25 μa Grid-No.2 Current. -15 to +15 μa 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 0 to 400 0 to 400 volts Visual Extinction of Focused Raster -28 to -72 volts -36 to -94 Grid drive is the operating condition in which the video signal varies the grid-wo.1 potential with respect to cathode. . S.*: See next page. 6-57 TENTATIVE DATA 1 ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



RICERS

PICTURE TUBE

With ultor voltage of1400016000voltageGrid-No.1 Video Drivegoo400voltagefrom Raster Cutoff(Black Level):White-level value28 to 7236 to 94voltageMaximum Circuit Values:Grid-No.1-Circuit Resistance1.5 max. reegoins:CATHODE-ORIVE"SERVICEUnless otherwise specified, voltage values are positive with respect to grid No.1Maximum Ratings, Design-Center Values:ULTOR-TO-GRID-No.1 VOLTAGE(BODO A-TO-GRID-No.1 VOLTAGE				
<pre>child Picture of the second picture of</pre>				volts
<pre>(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 Ratings, Design-Center Values: ULTOR-TO-GRID-No.1 VOLTAGE</pre>	Grid-No.1 Video Drive	300	400	00000
 White-level value				
Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max, wegohms CATHODE-DRIVE [®] 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: {18000 max. volts Positive value		20 to 72	Sis to GA	volte
Grid-No.1-Circuit Resistance 1.5 max, megohms CATHODE-DRIVE®SERVICE Unless atherwise 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:		20 10 12	20 10 34	VOTES
CATHODE-DRIVE®SERVICE Diless otherwise specified, voltage values are positive with respect to grid No.1 Maximum Ratings, Design-Center Values: ULTOR-TO-GRID-No.1 VOLTAGE			1 E	maahm
Unless otherwise specified, voltage values are positive with respect to grid No.1 Maximum Ratings, Design-Center Values: ULTOR-TO-GRID-No.1 VOLTAGE	Grid-No.1-Circuit Resistance		. 1.3 INEX,	toegoning
<pre>with respect to grid No.1 Maximum Ratings, Design-Center Values: ULTOR-TO-GRID-No.1 VOLTAGE</pre>	CATHODE-DF	RIVE [®] SERVICE	:	
Maximum Ratings, Design-Center Values:ULTOR-TO-GRID-No.1 VOLTAGE $\{18000 \text{ max. volts}$ GRID-No.4-TO-GRID-No.1 VOLTAGE:1000 max. voltsPositive value 1000 max. volts Negative value 1000 max. volts GRID-No.2-TO-GRID-No.1 VOLTAGE 500 max. volts GRID-No.2-TO-GRID-No.1 VOLTAGE 500 max. volts GRID-No.2-TO-CATHODE VOLTAGE 500 max. volts Positive bias value 140 max. volts Negative bias value 140 max. volts Positive bias value 140 max. volts Positive bias value 140 max. volts Negative bias value 140 max. volts Peak HEATER-CATHODE VOLTAGE: 140 max. volts Heater negative with respect to cathode. 180 max. volts Heater positive with respect to cathode. 180 max. volts and grid-No.4-to-grid-No.1 voltage (B_{cgg1}) between 12000 and 18000 voltsand grid-No.4-to-Grid-No.1 voltage for Focuss . 0 to 4000 Voltage for Focus . 0 to 4000 Cathode -to-Grid-No.1 voltage (E_{kg1}) for visual Extinction of Focused Raster. $See Raster-Cutoff-Range Charifor Cathode-Drive ServiceCathode drive is the operating condition in which the video signalvaries the cathode potential with respect to grid No.1 and theother electrodes.S The grid-No.4 voltage or grid-No.4-to-grid-No.1 voltage (or ultor-to-grid-No.4-t$	Unless otherwise specified	, voltage v	ilues are po	sitive
ULTOR-TO-GRID-No.1 VOLTAGE	with respec	t to grid No	.1	
During the product of the product o	Maximum Ratings, Design-Cente	r Values:		
GRID-H0.4-10-GRID-H0.1 V0LTAGE. 1000 max. volts Positive value . 500 max. volts GRID-No.2-TO-GRID-No.1 V0LTAGE . 640 max. volts GRID-No.2-TO-CATHODE V0LTAGE . 500 max. volts GRID-No.2-TO-GRID-No.1 V0LTAGE . 500 max. volts GRID-TO-GRID-No.1 V0LTAGE . 200 max. volts Positive peak value . 200 max. volts Negative bias value . 140 max. volts Negative bias value . 0 max. volts Negative bias value . 2 max. volts PEAK HEATER-CATHODE V0LTAGE: 180 max. volts Heater negative with respect to cathode. 180 max. volts Equipment Design Ranges: 12000 and 18000 volts and grid-No.2-to-grid-No.1 voltage (Ecgg1) between 12000 and 18000 volts Grid-No.4-to-Grid-No.1 voltage for Focus§ . 0 to 400 volts Grid-No.4-to-Grid-No.1 Voltage (Ekg1) for Visual Extinction of Focused Raster. . . . Voltage (Tid-	ULTOR-TO-GRID-No.1 VOLTAGE .			
Negative value			•	
GRID-No.2-TO-GRID-No.1 VOLTAGE 640 max. volt: GRID-No.2-TO-CATHODE VOLTAGE 500 max. volt: CATHODE-TO-GRID-No.1 VOLTAGE: Positive peak value				
GRID-No.2-TO-CATHODE VOLTAGE 500 max. volts CATHODE-TO-GRID-No.1 VOLTAGE: Positive peak value				
CATHODE-TO-GRID-No.1 VOLTAGE: Positive peak value				
Positive peak value			300 116	ix. voit:
Positive bias value			200 ma	x. volt
Negative peak value 2 max. volt: PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode. 180 max. volt: Heater positive with respect to cathode. 180 max. volt: Heater positive with respect to cathode. 180 max. volt: Equipment Design Ranges: With any ultor-to-grid-No.1 voltage (E_{Cgg1}) between 12000 and 18000 volt: and grid-No.2-to-grid-No.1 voltage (E_{Cgg1}) between 225 and 640 volt: Grid-No.4-to-Grid-No.1 Voltage for Focus§ 0 to 400 volt: Cathode-to-Grid-No.1 Voltage (Ekg1) for Visual Extinction of Focused Raster				
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode. 180 max. volt: Heater positive with respect to cathode. 180 max. volt: Heater positive with respect to cathode. 180 max. volt: Heater positive with respect to cathode. 180 max. volt: Equipment Design Ranges: With any ultor-to-grid-No.1 voltage (E _{Cgg1}) between 22000 and 18000 volt: and grid-No.2-to-grid-No.1 veltage (E _{Cgg1}) between 225 and 640 volt: Grid-No.4-to-Grid-No.1 Voltage for Focus§0 to 400 volt: Cathode-to-Grid-No.1 Voltage (Ekg1) for Visual Extinction of Focused RasterSee Raster-Cutoff-Range Char- for Cathode-Drive Service. 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. S the grid-No.4 voltage or grid-No.4-to-grid-No.1 voltage (or ultor-to- grid-No.4 voltage) or grid-No.4-to-grid-No.2-to-grid-No.1 voltage) or grid-No.2-to-grid-No.2-to-grid-No.2-to-grid-No.2-to-grid-No.2-to-grid-No.2-to-grid-No.2			0 ma	x. volt
Heater negative with respect to cathode. 180 max. volt: Heater positive with respect to cathode. 180 max. volt: Equipment Design Ranges: With any ultor-to-grid-No.1 voltage (E_{cgg1}) between 12000 and 18000 volt: and grid-No.2-to-grid-No.1 voltage (E_{cgg1}) between 225 and 640 volt: Grid-No.4-to-Grid-No.1 voltage (E_{cgg1}) between 235 and 640 volt: Grid-No.4-to-Grid-No.1 voltage (E_{cgg1}) between 235 and 640 volt: Grid-No.4-to-Grid-No.1 voltage (E_{cgg1}) between 235 and 640 volt: Grid-No.4-to-Grid-No.1 voltage (Ekg1) for Voltage (Ekg1) for Visual Extinction of Focused Raster See Raster-Cutoff-Range Char- for Cathode-Drive Service. 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 rocus of any individual tube is independent of ultor current and will remain essentially constant for values of ultor voltage (or ultor-to- grid-No.2 voltage) or grid-No.2-to-grid-No.1 voltage) within design ranges shown for these items. *: see next page. CET			2 ma	ax. volt
Heater positive with respect to cathode. 180 max. volts Equipment Design Ranges: With any ultor-to-grid-No.1 voltage (B_{Cgg1}) between 12000 and 18000 volts and grid-No.2-to-grid-No.1 voltage (E_{Cgg1}) 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 (Ekg1) for Visual Extinction of Focused Raster				
Equipment Design Ranges: With any ultor-to-grid-No.1 voltage [E _{cgg1}] between 12000 and 18000 volts and grid-No.2-to-grid-No.1 voltage [E _{cgg1}] between 225 and 640 volts Grid-No.4-to-Grid-No.1 Voltage for Focuss 0 to 400 volts Cathode-to-Grid-No.1 Voltage (Ekg1) for Visual Extinction of Focused Raster				
With any ultor-to-grid-No.1 voltage (B _{Cgg1}) between 12000 and 18000 volts and grid-No.2-to-grid-No.1 voltage (E _{Cgg1}) 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 (Ekg1) for Visual Extinction of Focused Raster See Raster-Cutoff-Range Charm for Cathode-Drive Service 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. S The grid-No.4 voltage or grid-No.4-to-grid-No.1 voltage (or ultor-to- grid-No.4 voltage) or grid-No.4-to-grid-No.2-to-grid-No.2-to- voltage) or grid-No.2-to-grid-No.2-to-grid-No.2-to-grid-No.2-to- woltage) within design ranges shown for these liems.	Heater positive with respect	to cathode.	180 ma	ax. voits
12000 and 18000 volts and grid-No.2-to-grid-No.1 voltage (B_{cgg1}) 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 (Ekg1) for Visual Extinction of Focused Raster	Equipment Design Ranges:			
<pre>12000 and 18000 volts and grid-No.2-to-grid-No.1 veltage (E_{Ggg1}) 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 (Ekg1) for Visual Extinction of Focused Raster</pre>	With any ultor-to-grid-No.1 v	oltage (Beas	,) 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 (Ekg₁) for Visual Extinction of Focused Raster			12000 and 18	Booo volts
Grid-No.4-to-Grid-No.1 Voltage for Focus§ 0 to 400 Voltage for Focus§ 0 to 400 volts Cathode-to-Grid-No.1 Voltage (Ekg ₁) for Visual Extinction of Focused Raster	and grid-No.2-to-grid-No.1 ve	ltage (Ecgg	1) between	
Voltage for Focus§ 0 to 400 volts Cathode-to-Grid-No.1 Voltage (Ekg.) for Visual Extinction of Focused Raster			225 and	040 volt:
Cathode-to-Grid-No.1 Voltage (Ekg,) for Visual Extinction of Focused Raster				
Voltage (Ekg.) for Visual Extinction of Focused Raster		••	0 to 400	volt
 Visual Extinction of Focused Raster				
of Focused Raster	Visual Extinction			
for Cathode-Drive Service 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. S 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.		See Pret	er-Cutoff_P	man Char
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. S 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.2-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.	or rocuscu hasters s s s r			
S The grid-wo.u voltage or grid-wo.u-to-grid-wo.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-wo.1 voltage) or grid-wo.2 voltage (or grid-wo.2-to-grid-wo.1 voltage) within design ranges shown for these items. *: See next page. C = 7		-		
S The grid-wo.u voltage or grid-wo.u-to-grid-wo.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-wo.1 voltage) or grid-wo.2 voltage (or grid-wo.2-to-grid-wo.1 voltage) within design ranges shown for these items. *: See next page. C = 7	Cathode drive is the operating varies the cathode potential other electrodes.	condition in with respect	which the vi to grid No.	dec signal 1 and the
• : See next page.	S The grid-No.4 voltage or arid-No	.a-to-grid-No independent of	.i voltage re f ultor curren	quired for and will
C 57 TENTATIVE DATA	focus of any individual tube is		or voltage (o	ultor-to-
C 57 TENTATIVE DATA	focus of any individual tube is remain essentially constant for grid—No.1 voltage) or grid—No.2 voltage) within design ranges sho	values of ulto voltage (or own for these	grid-No.2-to items.	-gr/0-#0.1
	·	values of ulto 2 voltage (or 5wn for these	grid-No.2-to items.	-grio-#0.1

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PICTURE TUBE

			_
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level):			
White-level value		e as determ pt video dr	
Grid-No.4 Current Grid-No.2 Current Field Strength of Adjust-	-25 to -15 to	+25	μa μa
able Centering Magnet* .	0 to	8	gausses
Examples of Use of Design Rang	es:		
With ultor-to-grid-No.1 voltage of and grid-No.2-to-grid-No.1	14000	16000	wolts
voltage of	300	400	volts
Grid-No.4-to-Grid- No.1 Voltage for Focus Cathode-to-Grid-No.1 Voltage for Visual Extinction of Focused	0 to 400	0 to 4.00	volts
Raster	28 to 60	36 to 78	volts
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 aworking design-cent	ter minimum. T	he equivalent	abaaluta

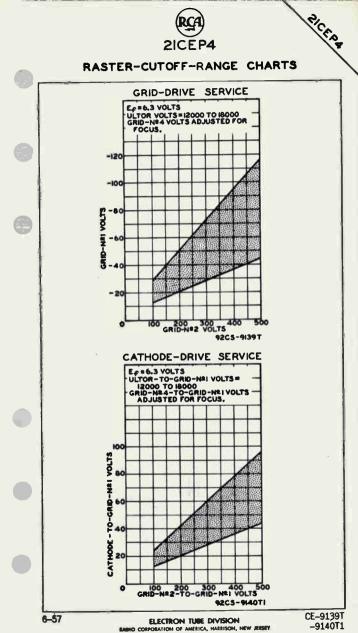
This value is aworking design-center minimum. The equivalent absolute afficum ultor- or ultor-to-grid-no.1 voltage is 11000 volts, below which the serviceability of the 21CEPA will be impaired. The equipment designer has the responsibility of determining a minimum design value such that under the worst 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 jime for suitable PM centering magnet should not exceed $2-1/4^{*}$. Excluding extraneous fields, the center of the underlected 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.

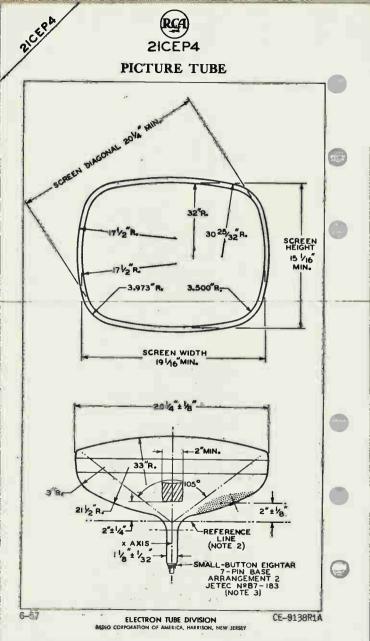
> For I-ray shielding considerations, see sheet I-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section

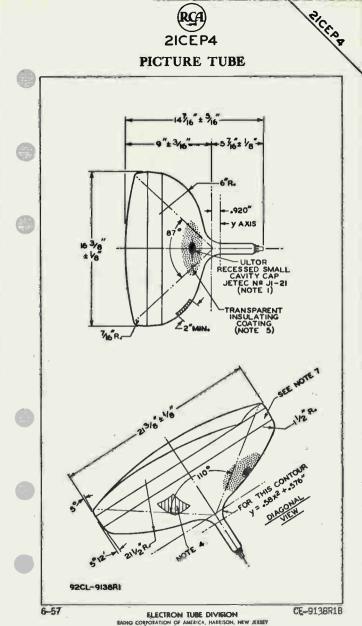
> > ELECTRON TUBE DIVISION TENTATIVE DATA 2

2ICEPA

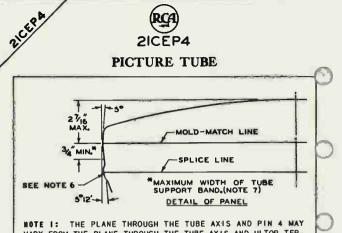


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the conformation of materice, provident form a



NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAT VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 30°. 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 CCT OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNT-ED; IT SHOULD HAVE FLEXIBLE LEADS AND RE 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 $I-3/4^{m}$.

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 INDICAT-ED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/B", 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.

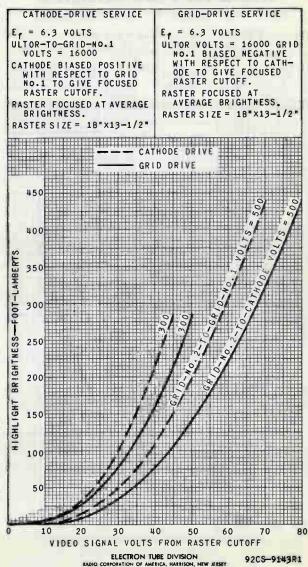
NOTE 7: UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/4" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND.



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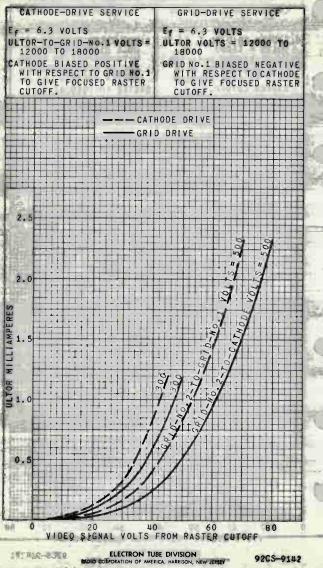
AVERAGE DRIVE CHARACTERISTICS





21CEPH

AVERAGE DRIVE CHARACTERISTICS





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

With heater having controlled warm-up time

DATA

	DATA
	General:
	Heater, for Unipotential Cathode:
	Voltage (AC or DC) 6.3 volts
	Current 0.6 ± 5% amp Warm-up time (Average)
	Warm-up time (Average)
	Capacitance between External Conductive
	[2000 mm. pp
	Faceplate, Spherical
	Aluminized
	Deflection Angles (Approx.): Diagonal
	Horizontal
	Vertical
	Tube Dimensions:
	Overall length
	Greatest width
	Greatest height 16 2/0" + 1/9"
1	Greatest height
	Neck length
	Radius of curvature of faceplate
-	(External surface)
	Screen Dimensions (Minimum):
	Greatest width
1	Greatest height
	Diagonal. 20-1/4"
	Projected area.
	Projected area
	Cap
	Base,
	Base Special (JEDEC No.B6-185) Basing Designation for BOTTOM VIEW
	Pin 2 - Cathode (a) Cap - Ultor
	Pin 3 - Heater 3 (Grid No.3, Pin 4 - Heater Grid No.5.
	Pin 5-Grid No.1 (2) Fill (0) Collector) Pin 6-Grid No.4 C-External
1	Pin 7-Grid No.2
	Pin 7-Grid No.2 c Conductive
	- Coating
	Maximum Ratings, Design-Center Values:
	ULTOR VOLTAGE
	GRID-No.4 (FOCUSING) VOLTAGE:
	Positive value 1000 max. volts
	Negative value 500 max. volts
	GRID-No.2 VOLTAGE

4-60

ELECTRON TUBE DIVISION

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GRID-No.1 VOLTAGE:			1	1						1	200	max.	volts
Negative-peak value													
Negative-bias value												max.	volts
Positive-bias value											0	max.	volts
Positive-peak value											2	max.	volts
PEAK HEATER-CATHODE						Ĩ	4			-	_		
Heater negative wit	h												
respect to cathoo	le:												
During equipment	wan	m—1	JD.	pe	er	io	d i	no	Ł				
exceeding 15 se											410	max.	volts
After equipment v	/arm	-ui	0 1	Del	rie	bd					180	max.	volts
Heater positive wit				-									
respect to cathoo											180	max.	volts
	•										-00		
Maximum Circuit Value	81												
Grid-No.1-Circuit Res	ist	and									1.5	max.	meachins

For I-ray shielding considerations, see skeet I-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section

2100PA

Color Picture Tube

THREE-GUN, GRADED-HOLE, SHADOW-MASK TYPE ALUMINIZED TRICOLOR PHOSPHOR-DOT SCREEN

ALL-GLASS ENVELOPE MAGNETIC CONVERGENCE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

Supersedes Type 21CYP22

DATA

General:
Electron Guns, Three with Axes Tilted Toward Tube Axis
Heater, for Unipotential Cathode of Each Gun, Paralleled with Each of the Other Two Heaters within Tube:
Voltage (AC or DC) [▲] 6.3 volts Current at 6.3 volts 1.6 amp
Direct Interelectrode Capacitances (Approx.): Grid No.1 of any gun to all other
electrodes except the No.1 grids of the other two guns
gun + cathode of red gun to all other electrodes
Grid No.3 (Of each gun tied within tube to No.3 grids of other two
guns) to all other electrodes 9 $\mu\mu$ f
External conductive coating to give no. o 12000 min. unf
Faceplate, Spherical
Screen, on Inner Surface of Faceplate: Type Aluminized, Tricolor, Phosphor-Dot Phosphor (Three separate phosphors, collectively)
Fluorescence and phosphorescence of separate phosphors, respectively Blue, Green, Red Persistence of group phosphorescence Medium
Dot arrangement Triangular group consisting of blue dot, green dot, and red dot
Spacing between centers of adjacent dot trios (Approx.) 0.029" Size (Minimum):
Greatest width
Height
Focusing Method
Convergence Method Magnetic
Deflection Method
Horizontal
Tube Dimensions: Overall length
Diameter
nergint (Approx.)



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA I

And the second	
Operating Position	
	d V-grooved panel pad on top)
Caps (Two) Recessed	
Socket	
214NMINC	(Axial leads), or equivalent
Base Small-Shell Neodihep	
Basing Designation for BOTTOM \	/IEW 14AL
Pin 1-Heater	O C
Pin 2-Grid No.1 of Red Gun	0220
Pin 3-Grid No.2 of Red Gun	YX Y
Pin 4-Cathode of Red Gun	(SV/2
Pin 5-Cathode of Green Gun	
Pin 6-Grid No.1	0111
of Green Gun	Miter I M
Pin 7-Grid No.2	CALL XE
of Green Gun	
Pin 9-Grid No.3	(2) (3)
Pin 11-Grid No.2	
of Blue Gun	
	Over
of Blue Gun	Pin 2-Grid No.6,
Pin 13-Cathode of Blue Gun	Collector, High-
Pin 14 - Heater	Voltage-Supply
Сар	Terminal
Over	<u>C</u> -External
Pin 1-Ultor (Grid No.4,	Conductive
Grid No.5)	Coating

Maximum Ratings, Design-Center Values:

ULTOR-TO-CATHODE (Of each gun) VOLTAGE . . 25000 max. volts

Between the Ultor Terminal and the High-Voltage-Supply Terminal (See Dimensional Outline), it is necessary to connect a resistor of 50,000 ohms as described under *Limiting Circuit Values*. The high voltage must be connected to the High-Voltage-Supply Terminal-never directly to the Ultor Terminal.

GRID-No. 3-TO-CATHODE (Of each gun)

VOLTACE	0000	-	volts	
VOLTAGE.				
GRID-No. 2-TO-CATHODE VOLTAGE (Each gun).	600	max.	volta	
GRID-No.1-TO-CATHODE VOLTAGE (Each gun):				
Negative-bias value	400	max.	volts	
Positive-bias value	0	max.	volts	
Positive-peak value	2	max.	volts	
PEAK HEATER-CATHODE VOLTAGE (Each gun):				
Heater negative with respect to cathode:				
During equipment warm-up period				
not exceeding 15 seconds	410	max.	volta	
After equipment warm-up period	180	max.	volts	
Heater positive with respect to cathode,	180	max.	volts	

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	Equipment Design Ranges:				
b	With ultor vol between 2000	tage (Bc) and 25	Acach sun 000 volt) s	
	Grid-No.3 (Focusing Electrode)-to-Cathode (Of each gun) Voltage Grid-No.2-to-Cathode Voltage (Each gun) when circuit design utilizes grid-No.1-	16,8% to 2	0% ot Ec.ake	ach gun	volts
	to-cathode voltage $(E_{c k})$ at fixed value for raster cutoff Grid-Nc.1-to-Cathode Voltage (Each gun)		.See Cutoj	f Design	Ghart
	for Visual Extinction of Focused Raster when circuit design utilizes grid-No.2- to-cathode voltage		•		
	(E _{c2k}) at fixed value	• • • • •	.See Cutoj	f Dasign	Chart
	Cutoff Between Guns in Any Tube		average of est cutoff		1
	Grid-No.3 Current		45 to +45		μа
	Grid-No.2 Current (Each gun)		-5 to +5		μa
	Each Gun: To Produce White of 8500° K + 27 M.P.C.D. (CIE Coordinates				
	x = 0.287, y = 0.316): Red gun Blue gun Green gun		49 18 33		XXX
	Ratios of Cathode Currents: To Produce White of 8500° K + 27 N.P.C.D. (CIE Coordinates				
	x = 0.287, y = 0.316):	Nin.	Typical	Haz.	
	Red cathode to green cathode	1.2	1.5	1.8	
	Red cathode to blue cathode Maximum Raster Shift in	2.1	2.7	3.3	
	Any Direction from Screen Center		7/8		inch

RC

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Maximum Required Displacements	
of Beam Trios with Respect to Associated Phosphor-Dot Trios:	
Uniform in any direction over	
entire screen area	
Adjustment to be Provided by	
the Following Components: Lateral-Converging Magnet:	
Maximum lateral shift of blue beam	
Maximum lateral shift of red beam and	
green beam ±1/8" to ±3/8"	۰.
Average of maximum lateral shift	
of red beam and green beam	N
Redial-Converging Magnet Assembly:	
For static convergence including compensation for dc component	
of dynamic convergence	
(Each beam)	8
For dynamic convergence#	
Effected by magnetomotive force	
of parabolic and/or sawtooth	
waveshape synchronized with scanning.	
Forizontal:	
Blue pattern	-
Parabola amplitude to provide*	
Sawtooth amplitude to	
provide Shift of ±50% of the	
shift caused by pa-	
rabola amplitude	3
Red pattern & green pattern- Parabola:	
Amplitude to provide"	
Ratio of red-pattern shift	
to green-pattern shift	2
Sawtooth:	
Amplitude to provide"	
of the shift caused by parabola amplitude	
Difference between red-	*
pattern shift and green-	
pattern shift (Shift _e -	
Shift _G)	K .
Fertical:	
Blue pattern-	
Parabola amplitude to	
provide" Shift of -1/8" to +1/16"	
Sawtooth amplitude to provide [®]	H
provide"	

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



	Red pattern & green p Parabola: Amplitude to prov Ratio of red-patt to green-patter Sawtooth: Amplitude to prov Difference betwee pattern shift a Shift _G)	ide [*] Sh ern shift n shift ide [®] Shif en red- und green- Shift _R -	2/3	to 3/2 +3/16"	
the state	Examples of Use of Design R	anges:			
	For ultor voltage of	20000	25000	volts	
	Grid-No.3 (Focusing Electrode)-to-Cathode (Of each gun) Voltage Grid-No.2-to-Cathode Voltage (Each gun) when	3360 to 4000	4200 to 5000	volts	
	circuit design utilizes grid-No.1-to-cathode voltage of -70 volts for raster cutoff Grid-No.1-to-Cathode Voltage (Each gun) for Visual Extinction of	130 to 370	130 to 370	volts	
	Focused Raster when circuit design utilizes grid-No.2-to-cathode voltage of 200 volts	-45 to -100	-45 to -100	volts	

Limiting Circuit Values:

High-Voltage Circuits:

in order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type with inherent regulation to limit the continous short-circuit current to 50 milliamperes. In addition, to prevent cathode damage with resultant decrease in tube life, an external resistor having a value of 50,000 ohms must be connected between the two built terminals and the effective resistance between the grid-No.3 power-supply output capacitor and the grid-No.3 electrode should not be less than 50,000 ohms. These resistances should be capable of withstanding the maximum instantaneous currents and voltages in their respective circuits. It is to be noted that the high voltage must be connected only to the High-Voltage-Supply Terminal-never directly to the Ultor Terminal. A resistor of 50,000 ohms must be connected between the Ultor Terminal and the High-Voltage-Supply Terminal.

In equipment utilizing a well-regulated high-voltage power supply, the grid-No.g-circuit resistance should be limited to 7.5 megohms.

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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 3 10-60

The maximum dc current capability of the high-voltage power supply should be limited to a value of 100 µa as measured by a dc ammeter in the lead from the high-voltage power supply to the high-voltage terminal of the tube. The product of the maximum current capability and the maximum dc voltage between the high-voltage terminal and any cathode of the tube, as measured by an electrostatic voltmeter, should not exceed 25 watts.

Low-Voltage Circuits:

Effective Grid-No.1-to-Cathode-

Circuit Resistance (Each gun). . . . 0.75 max. megohm

When the cathode of each gun is not connected directly to the heater, the grid-No.2-to-heater circuit, the grid-No.1-to-heater circuit, and the cathode-to-heater circuit should each have an impedance such that their respective power sources in combination will not supply an instantaneous or continuous short-circuit current of more than 300 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

When the cathode is connected directly to the heater, the grid-No.2-to-heater circuit, and the grid-No.1-to-heater circuit should each have an impedance such that their respective power sources in combination will not supply an instantaneous or continuous_short-circuit current of more than 300 millamperes total. Such current limitation will prevent heater, burnout in case of a momentary internal arc within the tube.

- ▲ For maximum cathode life, it is recommended that the heater supply be regulated. When current regulation is employed, the regulator should be designed to provide a heater current of 1.5 amperes with variations not exceeding ± 3% under normal line-voltage variations. When voltage regulation is employed, the regulator should be designed to provide a heater voltage of 5.5 volts with variations not exceeding ± 6% under normal line-voltage variations.
- For Curves, see front of this Section.
- Connect high-voltage supply to this cap and also connect 50,000-ohm resistor between this cap and cap over pin 1 (ultor cap).
- Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 20,000 volts.
- Centering of the raster on the screen may be accomplished by passing direct current of the required value through each pair of deflecting coils to compensate for raster shift resulting from adjustments for optimum convergence and color purity.
- If this displacement is accomplished by means of a purifying magnet located on the neck of the tube, the equivalent raster movement is about 3/4".
- Shift is the movement of the regions of dot/crosshatch-generator pattern indicated in notes (*) and (*).
- The direction of movement of the red and green beam is opposite to that of the blue beam.
- Indicated values apply when RCA test yoke is used with this color picture tube.
- * The parabola amplitude is determined by the average value of the shifts at the extremities of the respective horizontal and vertical axes of the screen with convergence of the three beams maintained at the center of the screen. An increase in amplitude should move the blue beam toward the top of the screen; the red beam toward the lower left of the screen; and the green beam toward the lower right of the screen.
- The sawtooth amplitude is determined by the difference between the shifts at the extremities of the respective horizontal and vertical axes of the screen. Positive amplitude indicates that the shift at the right or bottom of the screen is greater than the shift at the left or top of the screen.

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Electron Tube Division

DEFINITIONS

Beam frio. The red beam, green beam, and blue beam passing through a common hole in the shadow mask.

Register. Exact correspondence in position of the centers of beam trios with respect to the centers of the associated phosphor-dot trios.

Nisregister. Lack of correspondence in position of the centers of the beam trios with respect to the centers of the center of the associated phosphor-dot trios.

Displacement. Shift of the position of the beams with respect to the phosphor dots.

GENERAL CONSIDERATIONS

L-Ray-Warning. Because this color picture tube is designed to be operated at ultor voltages as high as 25 kilovolts (Design-center maximum value), shielding of this color picture tube for X-ray radiation may be needed to protect against possible injury from prolonged exposure at close range.

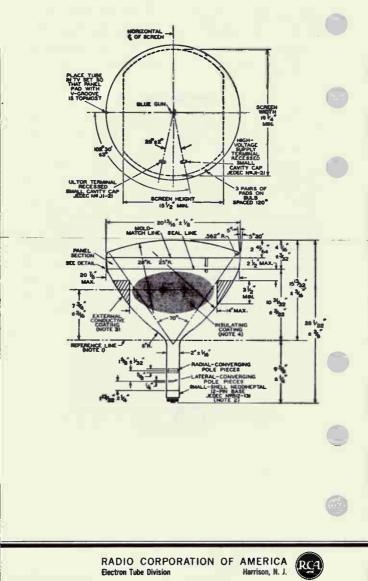
Shatter-Proof Cover Over the Tube Face. Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of this color picture tube to protect it from being struck accidentally and to protect against possible damage resulting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

High Voltages. The high voltages at which cathode-ray tubes are operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the inclosing of high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

> REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE for Type 21CYP22-A is the same as that shown for Type 21AXP22-A



RADIO CORPORATION OF AMERICA Electron Tube Division Karrison, N. J. DATA 4



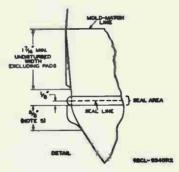


LOCATION OF RADIAL-CONVERGING POLE PECES WEWED FROM SCREEN END OF GUNS





BOTTOM VIEW





RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 5

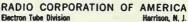
NOTE I: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFER-ENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 2: 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".

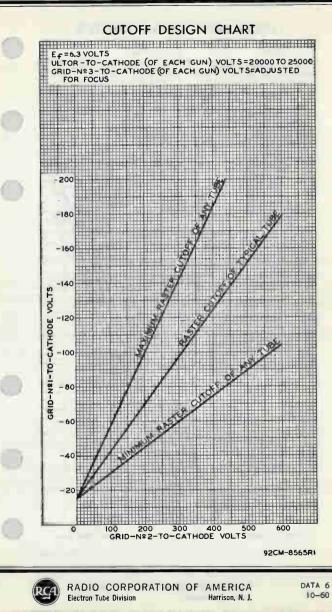
NOTE 3: THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT BAND OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THAT OF THE CONTACT BAND SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

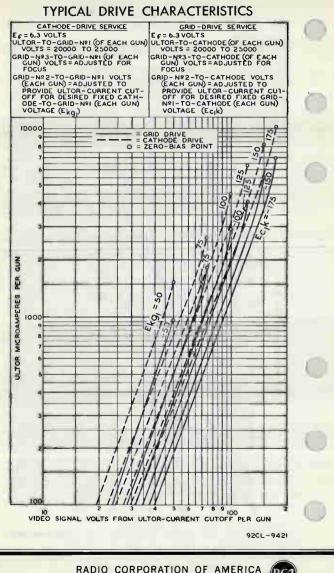
NOTE 4: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

NOTE 5: THE MAXIMUM EFFECTIVE WIDTH OF A FUNNEL PAD IS 5/8".



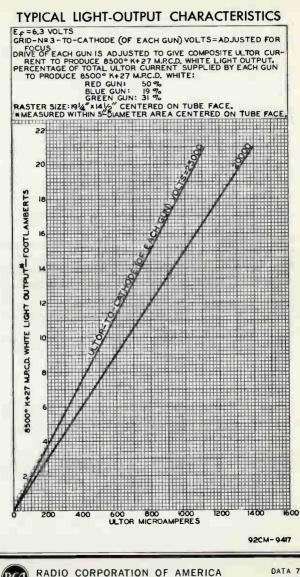






Electron Tube Division

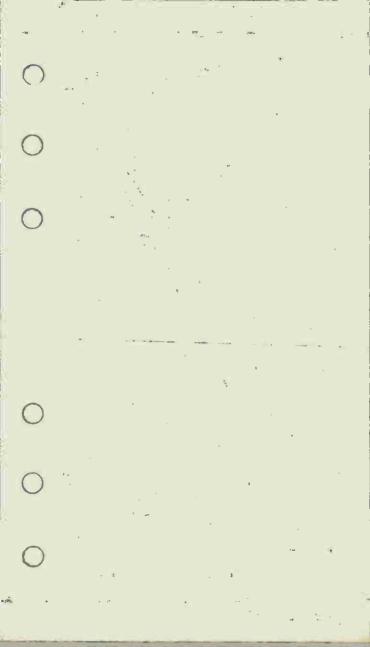
Harrison, N. J.

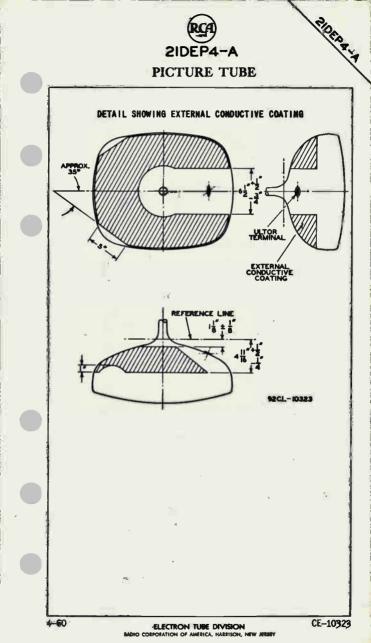


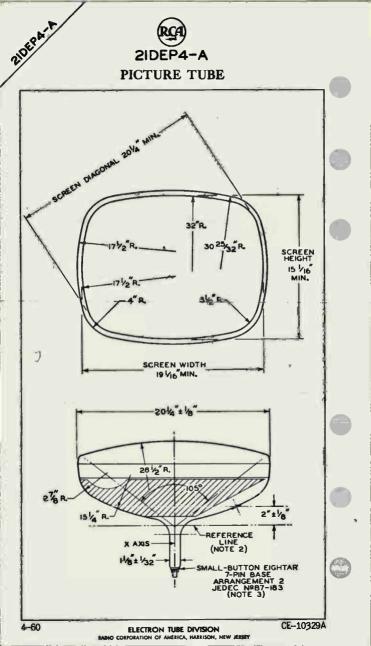
Electron Tube Division

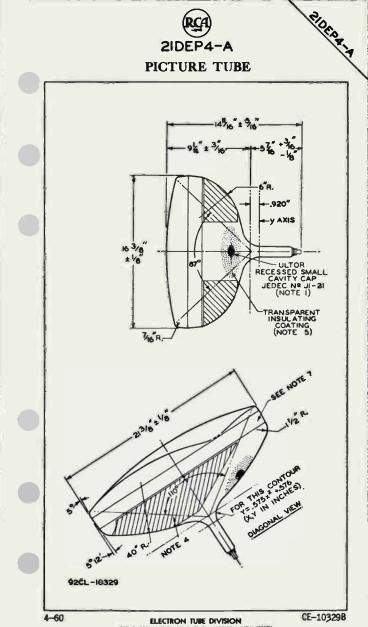
Harrison, N. J.

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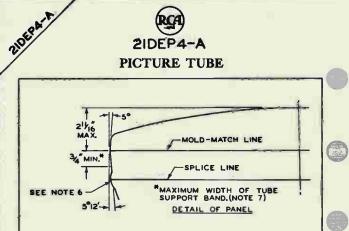








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NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 30°. ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

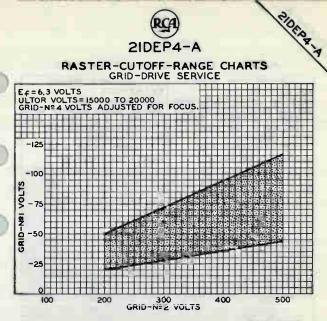
NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC NO.G-126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNT-ED; 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 LINT-LESS CLOTH.

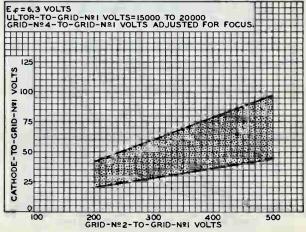
NOTE 6: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICA-TED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN I/B", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN I/IG" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

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,



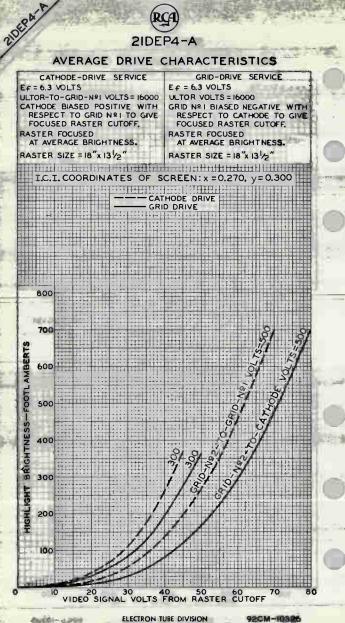
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CATHODE-DRIVE SERVICE



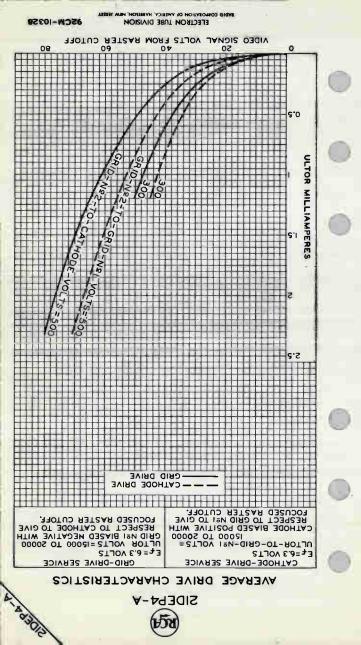
ELECTRON TUBE DIVISION

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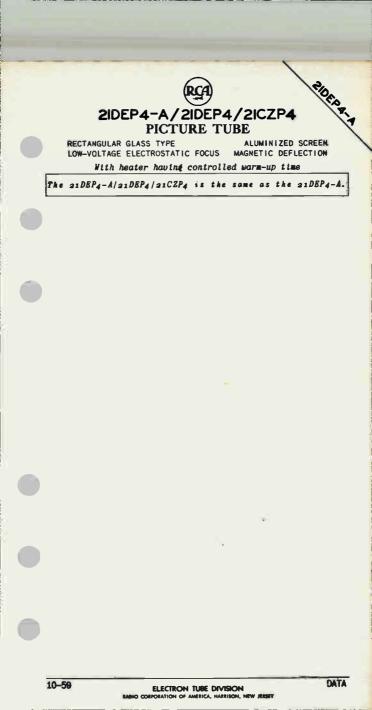
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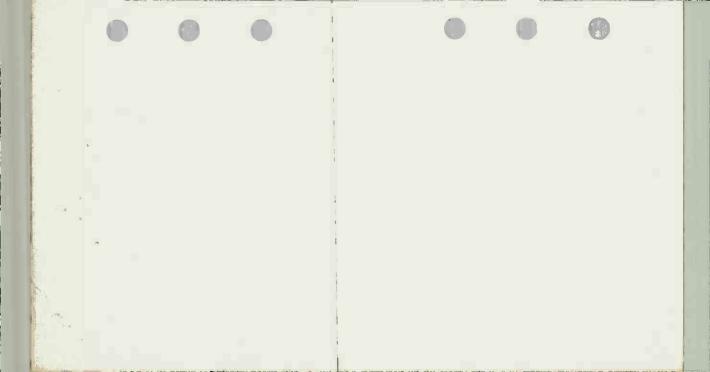


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21DHP4

Picture Tube

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO^o MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Heater Current at 6.3 volts. . . 450 ± 5% - ma Heater Warm-Up Time (Average). . . . 11 seconds Direct Interelectrode Capacitances: Grid No.1 to all other electrodes. . 6 J44 Cathode to all other electrodes. . . 5 14tf 2500 max. IHL f External conductive coating to ultor . 1700 min. **H** Optical: Faceplate. Light transmission (Approx.) 76% Phosphor (For curves, see front of this section) . P4-Sulfide Type, Aluminized Mechanical: Operating PositionAny . Weight (Approx.) 20 lbs . . Overall Length 14--11/16" + 5/16" - 5/8" • Neck Length. 5-7/16" + 1/8" - 7/16" . Projected Area of Screen . . . 262 sq. in. External Conductive Coating: See Picture-Tube Dimensional-Outlines and Bulb J171 G/K sheets at the front of this section Cap. Recessed Small Cavity (JEDEC No.J1-21) Bases (Alternates): Small-Button Eightar 7-Pin, Arrangement 2, (JEDEC No. 87-183) Small-Button Neoeightar 7-Pin, Arrangement 1, (JEDEC No.87-208) Basing Designation for BOTTOM VIEW . . SHR Pin 1-Heater Cap-Ultor Pin 2-Grid No.1 (Grid No.3. ୍ରିକ Pin 3-Grid No.2 Grid No.5. 3 Pin 4-Grid No.4 Collector) Pin 6-Grid No.1 C-External Pin 7-Cathode Conductive (2 Pin 8-Heater Coat ing



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA

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Maximum Ratings, Design-Naximum Values:			
ULTOR VOLTAGE	19800 max.	volts	
GRID-No.4 (FOCUSING) VOLTAGE:			
Positive value	1100 max.	volts	
Negative value	550 max.	volts	
GRID-No.2 VOLTAGE.	550 max.	volts	
GRID-No.1 VOLTAGE:			
Negative peak value	220 max.	volts	
Negative bias value	154 max.	volts	
Positive bias value	0 max.	volts	1
Positive peak value	2 max.	volts	
PEAK HEATER-CATHODE VOLTAGE:	any Truckey	10110	
Heater negative with			
respect to cathode:			
During equipment warm-up period			
not exceeding 15 seconds	450 max.	volts	
After equipment warm-up period	200 max.	volts	
Heater positive with	Loo marti		
respect to cathode	200 max.	volts	
respect to cathode	200 110011		
Typical Operating Conditions:			
With ultor voltage of	16000	volts	
and grid-No.2 voltage of	300	volts	
0	•		
Grid-No.4 Voltage for focus	0 to 400	volts	
Grid-No.1 Voltage for visual extinction		1.	
of focused raster	-35 to -72	volts	
Maximum Circuit Values:			
	1 5	manahma	
Grid-No.1-Circuit Resistance	1.5 max.	megohms	

For X-radiation shielding considerations, see sheet *I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES* at front of this section





RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

210LAW

DATA

	General:
	Heater, for Unipotential Cathode:
L.	Voltage 6.3 ac or dc volts Current 0.6 ± 10% amp amp
	Current 0.6 ± 10%
	Direct Interelectrode Capacitances:
	Grid No.1 to all other electrodes 6 mut
	Cathode to all other electrodes 5 mut
	External conductive coating to ultor, 2500 max. Hu
	[2000 min. μμι
	Faceplate, Spherical
	Light transmission (Approx.)
	Phosphor (For Curves, see front of this Section) P4-Sulfide Type
	Aluminized
	Fluorescence
	Phosphorescence
	Persistence
	Focusing Method Electrostatic
	Deflection Method
	Deflection Angles (Approx.):
	Diagonal
	Horizontal
	Vertical
	Electron Gun Type Requiring No Ion-Trap Magnet Tube Dimensions:
	Greatest width
	Greatest height
	Neck length
	Screen Dimensions (Minimum):
	Greatest width
	Greatest height
	Diagonal
	Projected area
	Weight (Approx.)
	Operating Position
	Operating Position
	DUID
	Base Short Small-Shell Duodecal 6-Pin (JETEC Group 4.
	No.86-203), or Small-Shell Duodecal 6-Pin
	(JETEC Group 4, No.B6-63)
	Basing Designation for BOTTOM VIEW
	Pin 1-Heater (6) Cap-Ultor
	Pin 2-Grid No.1
	Pin 6-Grid No.4
	Pin 10-Grid No.2
	Pin 11-Cathode C-External
	Pin 12 - Heater (2) (1) Conductive
Ì	U Coating
	D 50 TENTATING DATA
	9-58 ELECTRON TUBE DIVISION TENTATIVE DATA 1

ELECTRON TUBE DIVISION



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TENTATIVE DATA 1

GR I D-DR I VE	SERVICE	
Unless otherwise specified, with respect		ositive
Maximum and Minimum Ratings, De	sign-Center Values:	1
ULTOR VOLTAGE		max. volts
	12000 [•] r	min. volts
GRID-No.4 (FOCUSING) VOLTAGE; Positive value	1000 r	max. volts
Negative value		max. volts
GRID-No. 2 VOLTAGE	500 r	max. volts
GRID-No.1 VOLTAGE:	200	
Negative-peak value		max. volts max. volts
Positive-bias value		max. volts
Positive-peak value		max. volts
PEAK HEATER-CATHODE VOLTAGE:	11-12-	
Heater negative with respect to During equipment warm-up pe		
not exceeding 15 seconds		max. volts
After equipment warm-up per		max. volts
Heater positive with respect t	ocathode. 180 r	max. volts
Equipment Design Ranges:		
With any ultor voltage (Ecsk)	between 12000 and 20	ooog voits
and grid-No.2 voltage (Rc2k) between 200 and 500	volts
Grid-No.4 Voltage for		
focus§	-50 to +400	volts
Grid-No.1 Voltage (Ecik) for visual extinction		1
of focused raster	See Raster-Cutoff-	Range Chart
	for Grid-Dri	ive Service
Grid-No.1 Video Drive		
from Raster Cutoff (Black Level):		
White-level value		
(Peak positive),	Same value as det	
	Ecik except video	drive is a ive voltage
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 Range	151	
With ultor voltage of	16000	volts
and grid-No.2 voltage of	300	volts
Grid-No.4 Voltage for	0 4- 400	
focus	0 to 400	volts
A, A, S, *: See next page.		

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ELECTRON TUBE DIVISION



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PICTURE TUBE

			and the second	
Grid-No.1 Voltage for				Cont Day of
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		volt
	20	10, 76		AOT L
Maximum Circuit Values:				
Grid-No.1-Circuit Resistance	• • •	1.5 m	ax.	megohms
CATHODE-DRIVE S	FRUICE			
Unless otherwise specified, volta			posi	tive
with respect to gr	id No.	1		
Maximum and Minimum Ratings, Design-	Center	Values		
ULTOR-TO-GRID-No.1 VOLTAGE		[20000		volts
DETOR TO GRED HOLE TOEMAL	•••	12000	min.	volts
GRID-No.4-TO-GRID-No.1 VOLTAGE:		•		
Positive value	1010	1000	max.	volts
Negative value		500	max.	
GRID-No. 2-TO-GRID-No. 1 VOLTAGE	•••	640	max.	
CPID-No 2-TO-CATHODE VOLTACE	• •	500	max.	
GRID-No.2-TO-CATHODE VOLTAGE CATHODE-TO-GRID-No.1 VOLTAGE:	• •	500	mex.	VOILS
Positive-peak value		200	max.	volts
Positive-bias value		140		
Negative-bias value		0	max.	
Negative-peak value			max.	
PEAK HEATER-CATHODE VOLTAGE:	•••	۷.	meta .	VOILS
Heater negative with respect to cath	ale.			
During equipment warm-up period	lode.			
		410		
not exceeding 15 seconds	• •	410	max.	
After equipment warm-up period .		180	max.	
Heater positive with respect to cath	ode.	180	max.	volts
Fautomath Design Departs				
Equipment Design Ranges:				
With any ultor-to-grid-No.1 voltag	e (Ecz	an) bets	veen	12000
and 20000 volts and grid-No.2-to-gr	id-No.	volta	e (E	car J
between 225 and 64	o volt	s		se t.
Grid-No.4-to-Grid-No.1		•		
		150		
Voltage for focus§	Οt	0 450		volts
Cathode-to-Grid-No.1				
Voltage (Ekg) for				
visual extinction				
of focused raster See	Raster	-Cutoff-	Rang	e Chart
	for Ca	thode-Di	ive	Service
A + § - •				
▲, ●, §, *, ■: See next page.				DATA 2



PICTURE TUBE

Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak negative)	Same value as det Ekg; except video	
Grid-No.4 Current	-25 to +25	μa
Grid-No.2 Current , Field Strength of Adjust-	-15 to +15	μα
able Centering Magnet*	0 to 8	gausses
Examples of Use of Design Range		1
With ultor-to-grid- No.1 voltage of and grid-No.2-to-grid-	16000	volts
No. 1 voltage of Grid-No. 4-to-Grid-No. 1	300	volts
Voltage for focus Cathode-to-Grid-No.1 Voltage for visual	0 to 400	volts
extinction of focused raster. Cathode-to-Grid-No.1	28 to 60	volts
Video Drive from Raster Cutoff (Black Level): White-level value	-28 to -60	volts
Maximum Circuit Values:		
O TAN A CLOSE IN Destances	4 E	waaahmal

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 absoluts minimum ultor-to-grid-No.1 voltage is 11,000 volts, below which the serviceability of the 210LP& 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 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-togrid-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.

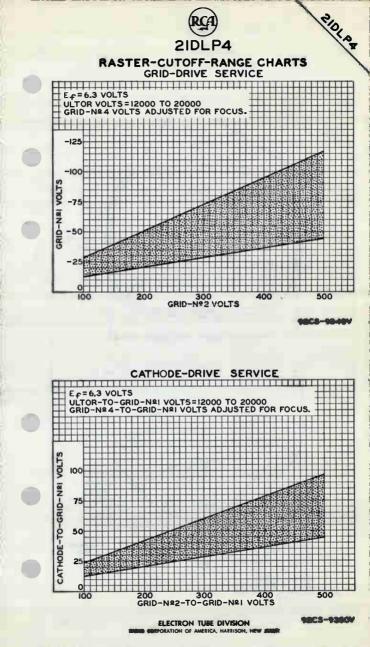
For I-ray shielding considerations, see sheet I-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section

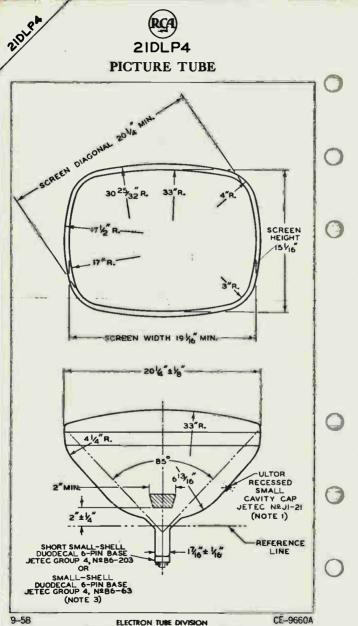
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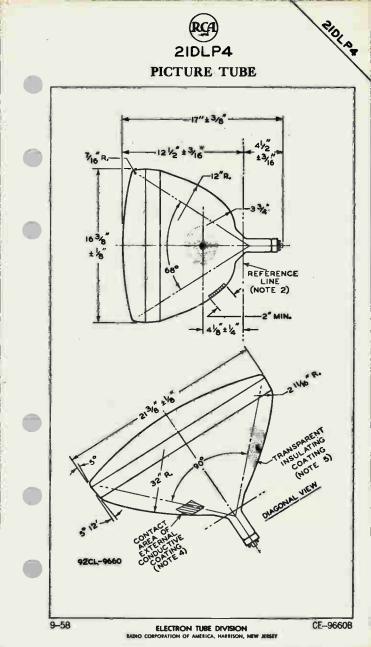
TENTATIVE DATA 2

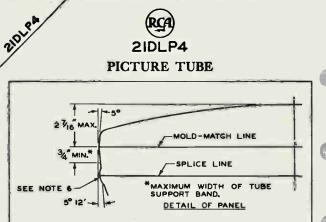
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NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 30°. ULTOR TERMINAL IS ON SAME SIDE AS PIN 6.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC NO.G-II6 (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 BERIGIDLY MOUNT-ED; 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.

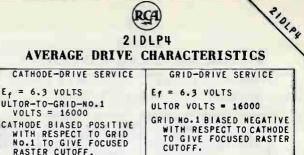
NOTE 6: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICA-TED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

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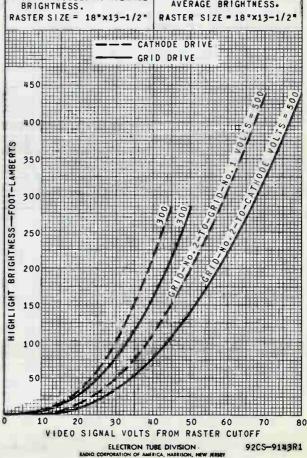
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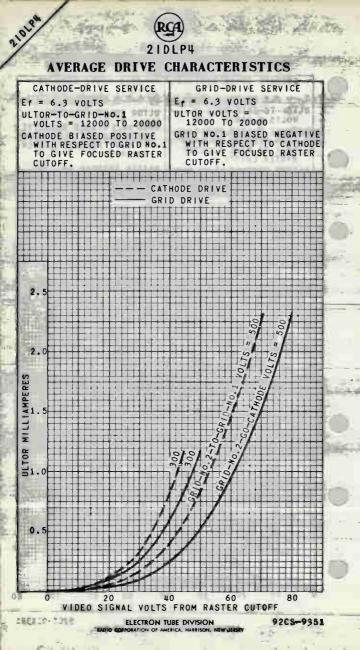


RASTER FOCUSED AT AVERAGE



RASTER FOCUSED AT AVERAGE BRIGHTNESS.







PICTURE TUBE

RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS LOW GRID-NO.2 VOLTAGE	ALUMINIZED SCREEN MAGNETIC DEFLECTION CATHODE-DRIVE TYPE
DATA	
Short Sma	6 μμf 5 μμf (2500 max. μμf (2000 min. μμf

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103PA	2IDSP4 ICTURE TUB	F	
Basing Designation	for BOTTOM VIEW		12L
Pin 1-Heater Pin 2-Grid No.1		Cap-Ultor (Grid	No 2
Pin 6-Grid No.4		Grid	
Pin 10-Grid No.2		Colle	ctor)
Pin 11 - Cathode Pin 12 - Heater	"XAX"	C - Extern	al Inctive
rin 12 - neater		Coati	
C	THODE-DRIVE" SERVI	CE	
	se specified, volt		
	with respect to	•	
Maximum and Minimum R	atings, Design-Cent		
ULTOR-TO-GRID-No.1 VO	LTAGE	{20000 max. 12000 [#] min.	volts volts
GRID-No.4-TO-GRID-No.	1 VOLTAGE:	(12000" min.	VOILS
Positive value		1000 max.	volts
Negative value		500 max.	volts
GRID-No. 2-TO-GRID-No. GRID-No. 2-TD-CATHODE	VOLTAGE.	64 max. 64 max.	volts volts
CATHODE-TO-GRID-No.1	VOLTAGE:		. Voltes
Positive-peak value		200 max.	volts
Positive-bias value Negative-bias value		140 max. 0 max.	volts volts
Negative-peak value		2 max.	volts
PEAK HEATER-CATHODE VI			
Heater negative with respect to cathod			
During equipment w	warm-up period		
not exceeding 1 After equipment wa	5 seconds	410 max. 180 max.	volts
Heater positive with	h	180 max.	volts
respect to cathode		180 max.	volts 🔾
Equipment Design Range			
With any ultor-	to-grid-No. 1 volt	age (Eczes) be	- 1
tween 12000 and 2	20000 volts and gri	id-No.2-to-grid	- 1
	Ec281) between 4	o and 04 volt	s 🛛 🔿
Grid-No.4-to-Grid-No. Voltage for focus§.		0 to 400	volts
Cathode-to-Grid-No.1	Voltage	0 10 400	
(Ekg1) for visual ex of focused raster .	xtinction		
Cathode-to-Grid-No.1	Video	ter-Cutoff-Rang	e chart
Drive from Raster Cu			2
(Black level):			0
White-level value (Peak negative)	Same va	lue as determi	ned for
		cept video dri	
		negative	

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PICTURE TUBE

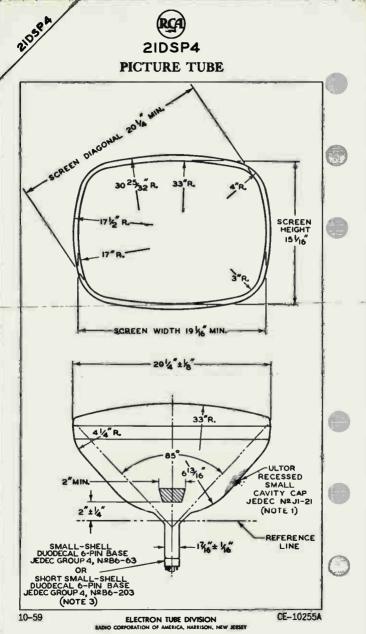
Grid-No.4 Current	-25 to +25	μa
Grid-No.2 Current	-15 to +15	μа
Centering Magnet*	0 to 8	gausses
Examples of Use of Design Ranges:		
With ultor-to-grid-		
No.1 voltage of and grid-No.2-to-grid-	18000	volts
No.1 voltage of	50	volts
Grid-No.4-to-Grid-No.1 Voltage	0 to 350	volts
Cathode-to-Grid-No.1 Voltage	0 10 300	VOILS
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
Cathode drive is the operating condition i varies the cathode potential with respect t	n which the vid	eo signal the other
electrodes. Operation below this value is not recommended		
		uired for
The grid-No.4 voltage or grid-No.4-to-grid- focus of any individual tube is independent remain essentially constant for values of u or grid-No.2-to-grid-No.1 voltage within	ltor-to-grid-No. design ranges :	and will 1 voltage shown for
these liems. * Distance from <i>Reference Line</i> for suitable P	H centering magn	et should
not exceed 2-1/4*. Excluding extransions undeflected focused spot will fall within a radius concentric with the center of the noted that the earth's magnetic field can deflection of the spot from the center of the	ields, the cent circle having a	er of the 7/16-inch
radius concentric with the center of the noted that the earth's magnetic field can	tube face. It cause as much as	1/2-inch
The cathode-to-grid-No.1 voltaga (Eko1)	e tube face. for visual extin	nction of
The cathode-to-grid-No.1 voltaga (Ekg1) focused raster will increase by approximat 1000-volt increase in ultor-to-grid-No.1 vol approximately 2 per cent for every 1000-voltage	ely 2 per cent tage and will de	for every crease by
approximately 2 per cent for every 1000-vo grid-No.i voltage.	lt decrease in	ultor-to-
For x-ray shielding consideration X-RAY PRECAUTIONS FOR CATHOD		1
at front of this Sect		1
		1
		, ,
	* **	
	-	

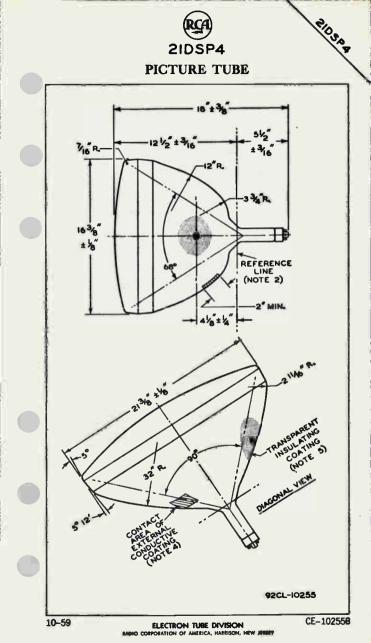
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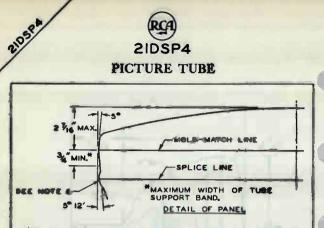
ELECTRON TUBE DIVISION

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NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMI-NAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 30°. 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-II6 (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".

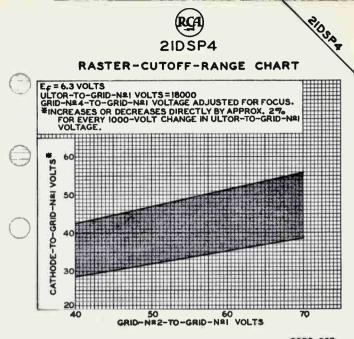
NOTE 4: THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT AREA OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THE CONTACT AREA SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

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

ELECTRON TUBE DIVISION

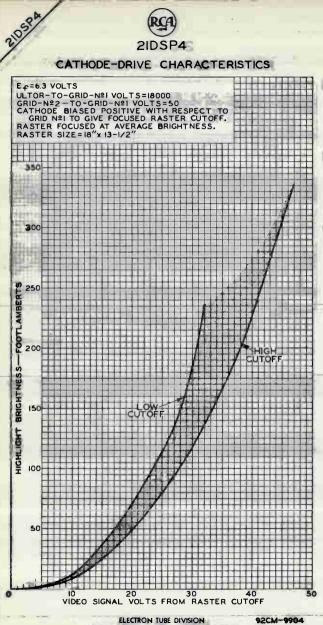
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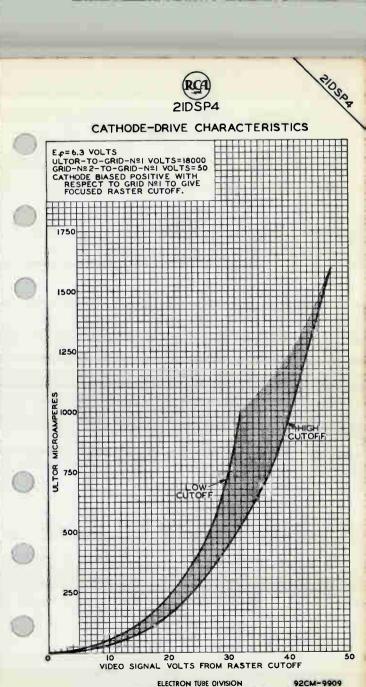
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ELECTRON TUBE DIVISION



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21EP4C

Picture Tube

RECTANGULAR GLASS TYPE Magnetic focus	70 ⁰	ALUMINIZED SCREEN MAGNETIC DEFLECTION
Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes . Grid-No.1 to all other electrodes . External conductive coating to anode Heater Current at 6.3 volts Electron Gun		. 5 pf . 6 pf . {750 max. pf . 500 min. pf . 600 ± 60 ma . Type Requiring No Ion Trap Magnet
Optical: Phosphor (For Curves, see front of this Sec Faceplate, Cylindrical Light transmission (Approx.)		Aluminized
Mechanical: Weight (Approx.). Overall Length. Projected Area of Screen. External Conductive Coating: Type. Contact area for grounding. For Additional Information on Coating: See Picture-Tube Dimensional-Outline: at front of this section CapRecessed Small BaseSmall-Shell Duodeca	s and cav	
Basing Designation for BOTTOM VIEW. Pin 1 - Heater Pin 2 - Grid No.1 Pin 10 - Grid No.2 Pin 11 - Cathode Pin 12 - Heater	0 k	Cap - Anode (Grid No.3, Screen, Collector)

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21EP4C

Maximum and Minimum Patings, Design Manimum Walvess		
Maximum and Minimum Ratings, Design-Naximum Values:		
Unless otherwise specified, voltage val- ues are positive with respect to cathode		
	1.1.1	
ANODE VOLTAGE	volts	
GRID-No.2 VOLTAGE	VOITS	
Negative peak value	volts	
Negative bias value	volts	
Positive bias value 0 max.		
Positive peak value		- 6
10.0		
HEATER VOLTAGE	volts	
Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	volts volts volts volts	
Typical Operating Conditions for Grid-Drive Service:		
Unless otherwise specified, voltage val- ues are positive with respect to cathode		
Anode Voltage	volts	
Grid-No.2 Voltage	volts	
Grid-No.1 Voltage for visual extinction of focused raster28 to -72	volts	
Maximum Circuit Value:		
Grid-No.1-Circuit Resistance 1.5 max.	megohms	

For X-radiation shielding considerations, see sheet I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section



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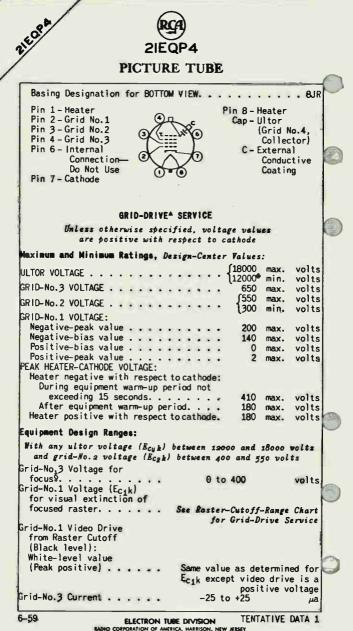


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PICTURE TUBE

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General:
Heater, for Unipotential Cathode: Voltage
For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TINE MEASUREMENT at front of Receiving Tube Section. Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 μμf Cathode to all other electrodes External conductive coating to ultor 2200 max. μμf 2000 min. μμf Cathode to all other electrodes Faceplate, Spherical
Aluminized Phosphorescence.



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21EOPA

PICTURE TUBE

Grid-No.2 Current	-15 t	o +15		μа
able Centering Magnet	0 t	o 10		gausses
Examples of Use of Design Range				
With ultor voltage of	16000	1800	0	volts
and grid-No.2 voltage of Grid-No.3 Voltage for	400	500		volts
	0 to 400	0 to 4	100	volts
focused raster Grid-No.1 Video Drive from Raster Cutoff (Black level):	-34 to -63	-43 to		
	7	47 10		
Maximum Circuit Values:				
Grid-No.1-Circuit Resistance.		1.5 m	ax.	megohms
CATHODE-DRIN	E SERVICE			
Unless otherwise specifi	ied, voltage	values	are	
positive with rest	ect to grid	No.1		
Maximum and Minimum Ratings, De	sign-Center	- Values.	:	
ULTOD TO COLD N. 1 VOLTACE	-	∫18000	max.	volts
ULTOR-TO-GRID-No.1 VOLTAGE.		12000	min.	
GRID-No.3-TO-GRID-No.1 VOLTAGE		6 50	max	
GRID-No.2-TO-GRID-No.1 VOLTAGE		690	max.	
GRID-No. 2-TO-CATHODE VOLTAGE.		{550 300	max. min.	
CATHODE-TO-GRID-No.1 VOLTAGE:		(300	meri.	vorts
Positive-peak value		200	max.	volt
Positive-bias value		140	max.	
Negative-bias value		0	max.	
Negative-peak value		2	max	volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect				
During equipment warm-up p				
exceeding 15 seconds.		410	max.	volt
After equipment warm-up pe	riod	180	max.	volt:
Heater positive with respect		180	max	volt:
Equipment Design Ranges:				
With any ultor-to-grid-No.1 and 18000 volts and grid-No.2		1 volta		
verween 400 a				

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PICTURE TUBE

	proved and g	
	Cathode-to-Grid-No.1 Volt- age (Ekg ₁) for visual ex- tinction of focused raster	
	(Peak negative) Same value as determined for Ekg1 except video drive is a negative voltage	
	Grid-No.3 Current25 to +25 μa Grid-No.2 Current15 to +15 μa Field Strength of Adjust- able Centering Magnet 0 to 10 gausses	Θ
J	Examples of Use of Design Ranges:	
	With ultor-to-grid-	
	No.1 voltage of 16000 18000 volts and grid-No.2-to-grid-	1
ł	No. 1 voltage of	
	Grid-No.3-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	
	Maximum Circuit Values:	\mathbf{r}
	Grid-No.1-Circuit Resistance 1.5 max. megohms	
	Grid drive is the operating condition in which the video signal varies the grid-Mo.1 potential with respect to cathode. This value is a working design-center minimum. The equivalent absolute ministax ultor- or ultor-io-grid-Mo.1 voltage is 1,000 volta, below which the serviceability of the 210PA will be impaired. The four designer has the responsibility of determining minimum des quiponne such that under the worst probable operating conditions involving such V-voltage variation and equipoment variation the absolute minimum	Θ
	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.3 voltage required for optimum focus of any individual tube may have a value anywhere between 0 and 400 volts and is a function of the value of the ultor voltage, ultor current, and grid-No.2 voltage. It changes directly with the ultor voltage at the rate of approximately 46 volts for each 1000-volt change in ultor voltage; inversely with grid-No.2 voltage at the rate of about 60 volts for each 1000-volt change in grid-No.2 voltage; and inversely with ultor current at the rate of about 60 volts for each 100-microampere change in ultor vortent. Because the 21EOPA has a nerrow depth of focus. It is necessary to provide means such as a potentiometer or a s-tap switch for adjusting the focus ing voltage.	0
	the focusing voltage. In general, commercially acceptable focus is	

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21EOPA

ELECTRON TUBE DIVISION TENTATIVE DATA 2 EADIO CORPORATION OF AMERICA, HARRISON, NEW JESSEY



21EOD B

PICTURE TUBE

obtained if the focusing voltage is within 75 volts of the value required for optimum focus and if the focusing voltage is maintained to within 57 volts of the optimum value during line-woltage fluctuations.

It within storage to be a set of the set of

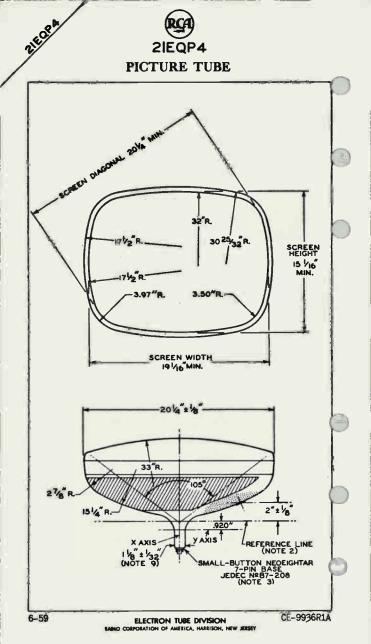
Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.

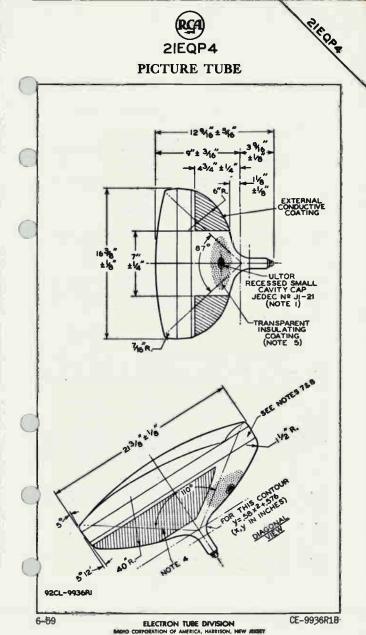
OPERATING CONSIDERATIONS

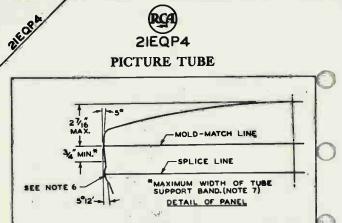
Skatter-Proof Cover Over the Tube Face. Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 21EQP4 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal conditior. 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

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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°. 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 $I-3/4^{-1}$.

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

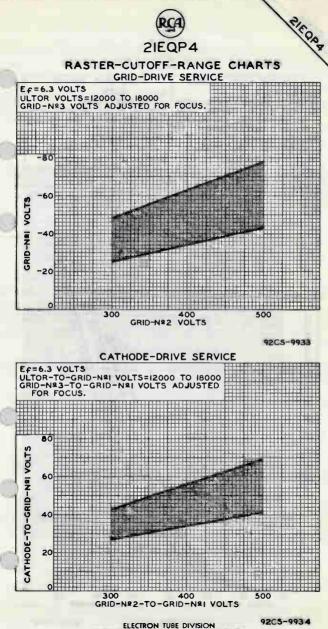
NOTE 5: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

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

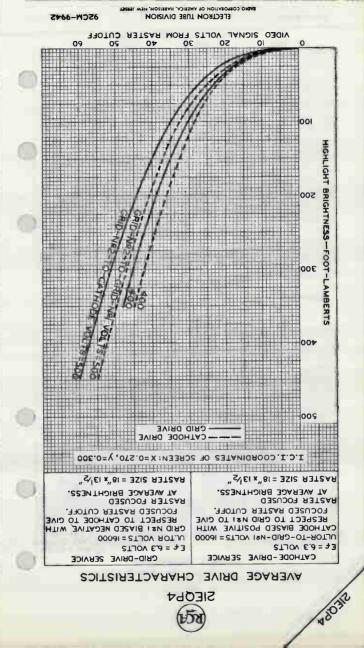
NOTE 7: WIDTH OF UNDISTURBED REGION BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/4" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND.

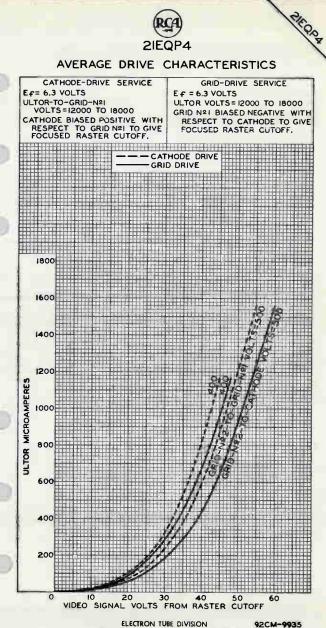
NOTE 8: JUBE MOUNTING OR YOKE SUPPORT CLAMPS MUST BE SPACED FROM TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

NOTE 9: NECK DIAMETER IS MAINTAINED TO AT LEAST 2-7/16" FROM REFERENCE LINE.



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21EYP4

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Harrison, N. J.

Monitor Kinescope

Monitor Rinescope
NO ION-TRAP MAGNET REQUIRED
RECTANGULAR GLASS TYPE ALUMINIZED SCREEN Low-voltage electrostatic focus 72º Magnetic deflection
Electrical:
Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6.5 pf External conductive coating to anode {1500 max. pf 1200 min. pf Heater Current at 6.3 volts 600 ± 60 ma
Electron Gun
Optical:
Phosphor (For Curves, see front of this section).P4—Sulfide Type, Aluminized Faceplate, Spherical
Mechanical:
Weight (Approx.)
Neck Length
External Conductive Coating: Type
sheets at front of this Section Cap Recessed Small Cavity (JEDEC No.J1-21) Base Small-Shell Duodecal 6-Pin, Arrangement 1,
Basing Designation for BOTTOM VIEW
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 - Anode (Grid No.3, Grid No.5, Screen,
Collector) C-External Conductive Coating
Maximum and Minimum Ratings, Design-Naximum Values:
Unless otherwise specified, voltage values
are positive with respect to cathode
Anode Voltage
RCA RADIO CORPORATION OF AMERICA DATA

Electronic Components and Devices

21EYP4

Grid-No.4 (Focusing) Voltage: Positive value	volts	
Negative value	volts	
Grid-No.2 Voltage	volts	
Grid-No.1 Voltage:	VUILS	
Negative peak value	volts	
Negative bias value	volts	
Positive bias value	volts	
Positive peak value		
Positive peak value 2 max.		
Heater Voltage		
Peak Heater-Cathode Voltage: [5.7 min.	volts	
Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds. After equipment warm-up period. 200 max. Heater positive with respect to cathode: Combined AC and DC voltage. DC component. 100 max.	volts volts volts volts	
Typical Operating Conditions for Grid-Drive Service:		
Unless otherwise specified, voltage values are positive with respect to cathode		
Anode Voltage	volts	
Grid-No.4 Voltage 0 to +400	volts	
Grid-No.2 Voltage	volts	
Grid-No.1 Voltage for visual extinction of		
focused raster	volts	
Maximum Circuit Value:		

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

For X-radiation shielding considerations, see sheet I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section



Harrison, N. J. Electronic Components and Devices

Color Picture Tube

THREE-GUN, GRADED-HOLE, SHADOW-MASK TYPE ALUMINIZED TRICOLOR PHOSPHOR-DOT SCREEN

ALL-GLASS ENVELOPE MAGNETIC CONVERGENCE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

For Use in Color-TV Receivers

The 21FBP22 is the same as the 21FJP22 except for the following items:

Optical:

Faceplate.Filterglass . . . Light transmission (Approx.) Faceplate does not have an integral protective window. 72%

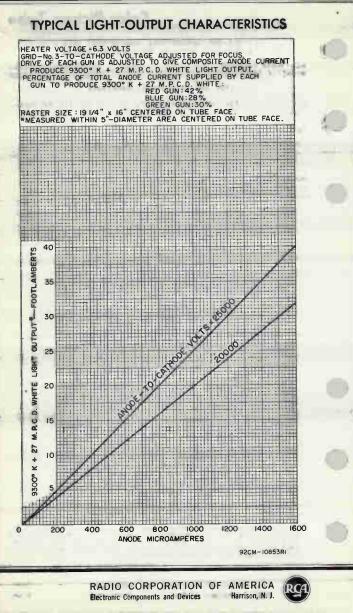
Mechanical:

Tube Dimensio	ns:								
Overall len	gth								25-1/32" ± 3/8"
									20-13/16" ± 1/8"

It is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 21FBP22 to protect it from being struck accidentally and toprotect against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide X-ray protection when required.



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



Grid-No.1-to-Cathode Voltage (Each gun) for Visual Extinction of Focused Raster when circuit design utilizes grid-No.2- to-cathode voltage (E_{C_2k}) at fixed value			.See Cut	off Design	Chart
Cutoff Between Guns in Any Tube		nd low	west cuto		
Grid-No.3 Current Grid-No.2 Current (Each gu Percentage of Total Ultor Current Supplied by Each Gun (Average):	in).		-45 to +4 -5 to +5		µа µа
	R	ed Gus	n Blue G	un Green G	1171
To Produce White of 8500° K + 27 N.P.C.D. (CIE Coordinates					
x = 0.287, y = 0.316) To Produce White of 9300° II + 27 N.P.C.D. {CIE Coordinates		44	26	30	5
x = 0.281, $y = 0.311Ratios of Cathode Current$	s:	42	28	30	\$
		to Ga		Red to B Nin. Av.	
To Produce White					
of 8500° K + 27					
N.P.C.D	0.9	1.45	2	1 1.7	2.4
<i>M.P.C.D.</i>	0.85		1.95	0.8 1.5	2.2
Maximum Raster Centering	Correc	tion		7.40	
in Any Direction ^d Adjustment to be Provided	· · ·		• • • •	7/8	Inch
the Following Component					
Purifying Magnet:					
Maximum Required Disp					
of Beam Trios in An					
with Respect to Ass Phosphor-Dot Trios		a		0.	005**
Lateral-Converging Magn					000
Maximum lateral shift	of bl		am		±1/4"
Radial-Converging Magne		mbly:			
For static convergence including compensat					
for dc component of					
dynamic convergence					
(Each beam)				. Shift of	±5/8"
and the second se					



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 2 5-61

Examples of Use of Design Ranges:

	-			
For ultor voltage of	20000		weite	
Grid-No.3 (Focusing				
Electrode)-to-Cathode				
(Of each gun) Voltage	. 3300 to 4000	1200 to 5080	voits	
Grid-No.2-to-Cathode				
Voltage (Each gun)				
when circuit design			•	
utilizes grid-No.1-to-				
cathode voltage of -70	. 130 to 370	130 to 370	volts	
volts for raster cutoff. Grid-No.1-to-Cathode	. 150 to 510	130 10 310	VUILS	
Voltage (Each gun) fer				
Visual Extinction of				
Focused Raster when				
circuit design utilizes				
grid-No.2-to-cathode				
voltage of 200 volts	45 te -199	-45 to -100	volts	

Limiting Circuit Values:

High-Voltage Circuits:

In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the *kigh-voltage power supply* and the grid-Mo.3 power supply be of the limited-energy type. Grid-No.3 Circuit Re-

sistance (Each gun) 7.5 max. megohms

Low-Voltage Circuits:

Effective Grid-No.1-to-

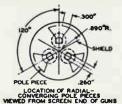
Cathode-Circuit Resistance

For Curves, see front of this Section.

- For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts.
- C Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 20,000 volts.
- d Centering of the raster on the screen may be accomplished by passing direct current of the required value through each pair of deflecting coils. With all components properly adjusted, the raster centering correction is the distance from the undeflected focused beams to the center of the screen.
- The equivalent raster movement is about 3/4".
- ⁴ Lateral converging magnet must shift the red beam and the green beam in opposite direction to the shift of the blue beam. Under conditions where the blue beam has been shifted 1/4", the shift of the red beam and green beam should be in the range of 1/8" to 3/8".

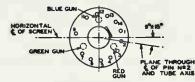
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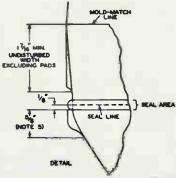




LOCATION OF LATERAL-CONVERGING POLE PECES WITH RESPECT TO GUNS







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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 4 5-61

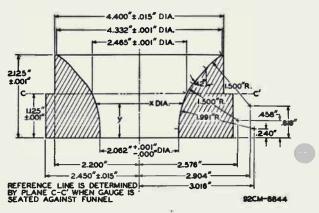
NOTE 1: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 2: 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 3: THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT BAND OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THAT OF THE CONTACT BAND SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

NOTE 4: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

NOTE 5: THE MAXIMUM EFFECTIVE WIDTH OF A FUNNEL PAD IS 5/8".



REFERENCE-LINE A	ND
NECK-FUNNEL-CONTOUR	GAUGE

y	x	y	×
0.000"	2.062" + 0.001" - 0.000"	0.375"	2.062" + 0.001" - 0.000"
0. 125"	2.062" + 0.001" - 0.000"	0.385"	2.062" + 0.001" - 0.000"
	+0.001"	0.500"	2.084" ±0.001"
0.250"	2.062" -0.000"	0.625"	2.122" ±0.001"

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



y	x
0.750"	2.182" ± 0.001"
0.875"	2.258" ± 0.001"
1.000"	2.352" ± 0.001"
1.125"	2.465" ± 0.001"
1.250"	2.604" ± 0.001"

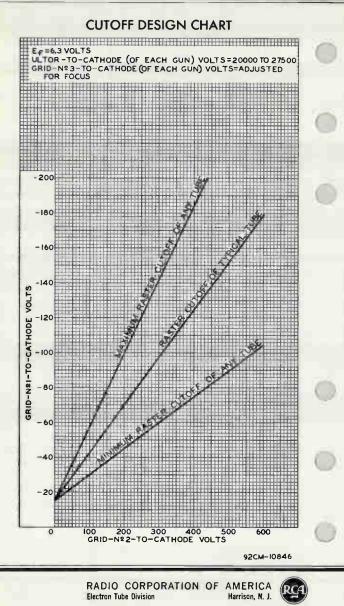
у	x
1.375"	2.778" ± 0.001"
1.500"	2.990" ± 0.001"
1.625"	3.216" ± 0.001"
1.750"	3.440" ± 0.001"
1.875"	3.678" ± 0.001"
2.000"	3.958" ± 0.001"
2.125"	4.332" ± 0.001"

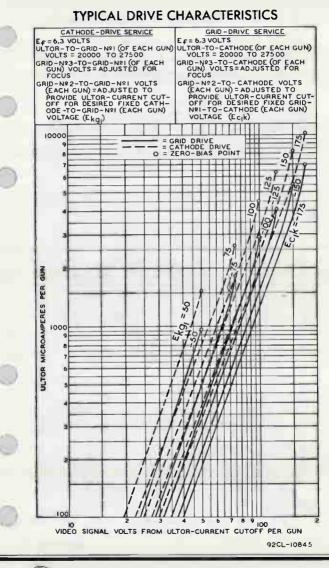


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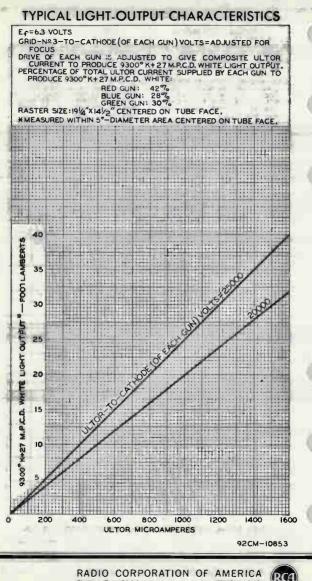








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Electron Tube Division

Harrison, N. J.



21FDP4

Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUWINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO^O MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Electrical:	
Heater Current at 6.3 volts Heater Warm-Up Time (Average)	600 ± 5% ma 11 seconds
Direct Interelectrode Capacitances:	
Grid No.1 to all other electrodes	6 <i>µµ</i> f
Cathode to all other electrodes	5 µµf
External conductive coating to ultor .	{2000 max. μμf 1500 min. μμf
Electron Gun	
Optical:	
Faceplate	Filterglass
Light transmission (Approx.)	
Light transmission (Approx.)	. P4-Sulfide Type,
	Aluminized
Mechanical:	
Operating Position	
Weight (Approx.)	
Overall Length	13-1/8" ± 1/4"
Neck Length	3-7/8" + 1/16"
Projected Area of Screen	262 sq. in.
External Conductive Coating:	
Туре	Regular Band
Contact area for grounding	Near Reference Line
For Additional Information on Coatings and See Picture-Tube Dimensional-Outlines and	Dimensions:
at the front of this section	buto J171 G/1 Sileets
Cap Recessed Small Cavi	ty (JEDEC No.,11-21)
Base	n Neceightar 7-Pin.
Arrangement	1 (JEDEC No.87-208)
Basing Designation for BOTTOM VIEW	
Pin 1 – Heater G	
Pin 3-Grid No.1	
Pin 4-Grid No.4	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Pin 6-Grid No.2 GI 3/T.	* 6 ⁶²
Pin 7 - Cathode	63,65,CI
Pin 8-Heater	
Cap-Ultor (Grid No.3,	T TRULTOR
Grid No.5, Collector) C-External Conductive	X
Coating H	• O_
Coating H	



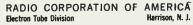
RADIO CORPORATION OF AMERICA Electron Tube Division DATA 5-62

.

21FDP4

Maximum Ratings, Design-Naximum Values:	
ULTOR VOLTAGE	volts
GRID-No.4 (FOCUSING) VOLTAGE:	
Positive value	volts
Negative value	volts
GRID-No.2 VOLTAGE	volts
GRID-No.1 VOLTAGE:	
Negative peak value	volts
Negative bias value	volts
Positive bias value	volts
Positive peak value 2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with	
respect to cathode:	
During equipment warm-up period	1.
not exceeding 15 seconds 450 max.	volts
After equipment warm-up period 200 max.	volts
Heater positive with	1.
respect to cathode 200 max.	volts
Typical Operating Conditions:	
With ultor voltage of 16000	volts
and grid-No.2 voltage of 300	volts
Grid-No.4 Voltage for	
focus	volts
Grid-No.1 Voltage for visual	
extinction of focused raster35 to -72	volts
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max.	megohms

For X-radiation shielding considerations, see sheet *I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES* at front of this section





	Equipment Design Ranges:
	With ultor voltage (Ecykeach gun) between 20000° and 27500 volts
	Grid-No.3 (Focusing
	Electrode)to-Cathode
	(Of each gun) Voltage, 16.8% to 20% of Ec.k volts
	Grid-No.2-to-Cathode
	Voltage (Each gun) when circuit design
	utilizes grid-No.1-
	to-cathode voltage
	(Ec.k) at fixed value
	for raster cutoff See Cutoff Design Chart Grid-No.1-to-Cathode
	Voltage (Each gun)
	for Visual Extinction
	of Focused Raster
	when circuit design
	utilizes grid-No.2-
	to-cathode voltage
	(E _{c2k}) at fixed
	value
	Variation in Raster
	Cutoff Between Guns
	in Any Tube ± 21% of average of highest
	and lowest cutoff values
	Grid-No.3 Current
	Grid-No.2 Current (Each gun)5 to +5 ya
	Percentage of Total Ultor
	Current Supplied by
	Each Gun (Average):
	Red Gun Blue Gun Green Gun
	To Produce White of
	9300° I + 27 N.P.C.D.
	(CIB Coordinates
	x = 0.281, y = 0.311) · · 42 28 30 \$
	Ratios of Cathode Currents:
	Red to Green Red to Blue
	Nin. Av. Nax. Nin. Av. Nax.
	To Produce White
	of 9300° I + 27
	N.P.C.D 0.85 1.4 1.95 0.8 1.5 2.2
	Maximum Raster Centering Correction
	in Any Direction ^d
	Adjustment to be Provided by
	the Following Components:
	Purifying Magnet:
	Maximum Required Displacements
	of Beam Trios in Any direction
	with Respect to Associated
	Phosphor-Dot Trios 0.005**
7	Lateral-Converging Magnet: *
	Maximum lateral shift of blue beam ±1/4"
-	



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Radial-Converging Magnet For static convergence including compensatio for dc component of dynamic convergence {Each beam)	'n	Shift of	±5/8"
Examples of Use of Design R	anges:		
For ultor voltage of	20000	25000	volts
Grid-No.3 (Focusing Electrode)-to-Cathode (Of each gun) Voltage Grid-No.2-to-Cathode Voltage (Each gun) when circuit design utilizes grid-No.1-to- cathode voltage of -70			
volts for raster cutoff. Grid-No.1-to-Cathode Voltage (Each gun) for Visual Extinction of Focused Raster when circuit design utilizes grid-No.2-to-cathode	130 to 370	130 to 370	volts
voltage of 200 volts .	-45 to -100	-45 to -100	volts

Limiting Circuit Values:

High-Voltage Circuits:

In order to minimize the possibility of damage to the tube caused by amomentary internal arc, it is recommended that the high-voltage power supply and the grid-No.g power supply be of the limited-energy type.

Low-Voltage Circuits:

Effective Grid-No.1-to-Cathode-Circuit Resistance

(Each gun) 0.75 max. megohm The grid-No.2-to-heater circuit, the grid-No.1-to-heater circuit, and the cathode-to-heater circuit should each have an impedance such that their respective power sources in combination will not supply a continuous short-circuit current of more than 300 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

- * For Curves, see front of this Section.
- b For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts.
- C Brilliance and definition decrease with decreasing ultor voltage. general, the ultor voltage should not be less than 20,000 volts.
- General, determined on the screen may be accomplished by passing direct current of the required value through each pair of deficting coils. With all components properly adjusted, the raster centering correction is the distance from the undeflected focused becams to the center of the screen.

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



The equivalent raster movement is about 3/4".

Lateral converging magnet must shift the red beam and the green beam in opposite direction to the shift of the blue beam. Under conditions where the blue beam has been shifted 1/4*, the shift of the red beam and green beam should be in the range of 1/8* to 3/8*

DEFINITIONS

Beam fric. The red beam, green beam, and blue beam passing through a common hole in the shadow mask.

Register. Exact correspondence in position of the centers of beam trios with respect to the centers of the associated phosphor-dot trios.

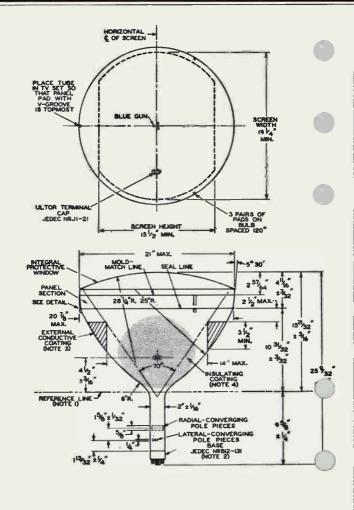
Nisregister. Lack of correspondence in position of the centers of the beam trios with respect to the centers of the associated phosphor-dot trios. Displacement. Shift of the position of the beams with respect to the phosphor dots.

GENERAL CONSIDERATIONS

I-Ray Warning. Because this color picture tube is designed to be operated at ultor voltages as high as 27.5 kilovolts (Design-maximum value), shielding of this color picture tube for X-ray radiation may be needed to protect against possible injury from prolonged exposure at close range.



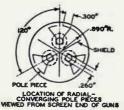
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 3 7-61



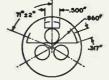
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.







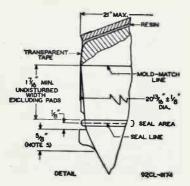
MEM



LOCATION OF LATERAL-CONVERGING POLE PECES WITH RESPECT TO GUNS



BASE BOTTOM VIEW



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

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NOTE I: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE 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 2: 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 3: THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT BAND OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THAT OF THE CONTACT BAND SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

NOTE 4: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

ROTE 5: THE MAXIMUM EFFECTIVE WIDTH OF A FURNEL PAD IS 5/8".

NECK-FUNNEL-CONTOUR GAUGE

4.400"±.015" DIA 4.332"±.001" DIA. 2.465" ±.001" DIA. 2125 ±.001* X DIA 456 7 +.00 -2.062"+.001"DIA--2.200"-2.576"--2.450" ±.015"-2.904" REFERENCE LINE IS DETERMINED BY PLANE C-C' WHEN GAUGE IS SEATED AGAINST FUNNEL 3016" 92CM-8844

y .	x	У	x
0.000"	2.062" + 0.001" - 0.000"	0.375"	2.062" +0.001" -0.000"
0. 1 25 4	2.052" + 0.001" - 0.000"	0.385"	2.052" + 0.001"
	+0.001"	0.500"	2.084" ± 0.001"
0.250"	2.062" -0.000"	0.625"	2.122" ± 0.001"

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



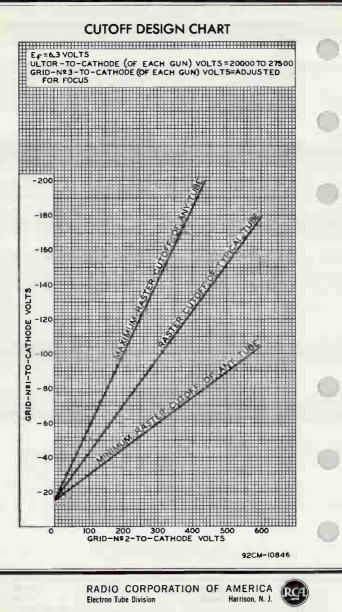
у	x	
0.750"	2.182"	±0.001"
0.875"	2.258"	±0.001"
1.000"	2.352"	±0.001"
1.125*	2.465"	±0.001"
1,250"	2.604"	± 0.001"

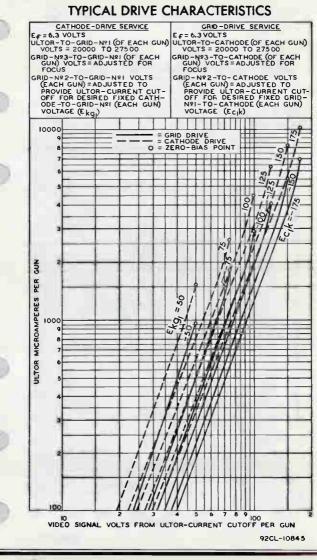
У	×
1.375"	2.778" ± 0.001"
1.500"	2.990" ±0.001"
1.625"	3.216" ± 0.001"
1.750"	3.440" ± 0.001"
1.875"	3.678" ± 0.001"
2.000"	3.958" ± 0.001"
2.125"	4.332" ± 0.001"



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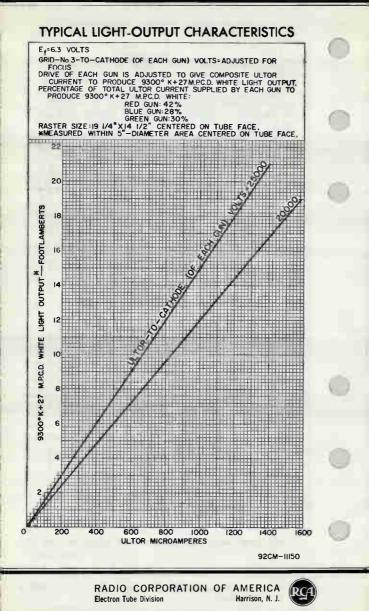
DATA 5 7-61







RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 6 7-61



21FP4D

Picture Tube

RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes 5 Grid No.1 to all other electrodes 6	pf pf
External conductive coating to anode {750 max. 500 min.	pf
Heater Current at 6.3 volts 600 ± 60	ma
Electron Gun	

Optical:

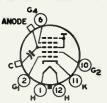
Phosphor (For Curves, see front of t	this section). P4-Sulfide Type, Aluminized
Faceplate, Cylindrical Light transmission (Approx.).	

Mechanical:

Weight (Approx.).										29 ibs
Overall Length.										
Neck Length			•							7-1/2" ± 3/16"
Projected Area of	Sci	ree	я.	•						248 sq. in.
External Conducti	ve (Coa	itī	ng	:					

See Picture-Tube Dimensional-Outlines and Bulb J170 A/C sheets at front of this section

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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating

Maximum and Minimum Ratings, Design-Maximum Values:

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

ANODE VOLTAGE	20000 max.	volts
Positive value	1100 max.	
Negative value	550 max.	volts



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA

21FP4D

GRID-No.2 VOLTAGE	•	•	•	550 max.	volts	
Negative peak value				220 max.	volts	
Negative bias value				155 max.	volts	
Positive bias value				0 max.	volts	
Positive peak value				2 max.	volts	
				(6.9 max.	volts	
HEATER VOLTAGE	•	•	•	15.7 min.	volts	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds After equipment warm-up period. Heater positive with respect to cathode: Combined AC and DC voltage DC component	•	•	•	450 max. 200 max. 200 max. 100 max.	volts volts	
Typical Operating Conditions for Gr	id-	-Dı	riv	e Service:		
Unless otherwise specifie ues are positive with re						
Anode Voltage				14000	volts	
Grid-No.4 Voltage					volts	
Grid-No.2 Voltage				300	volts	
Grid-No.1 Voltage for visual						
extinction of focused raster	•	•	•	-28 to -72	volts	
Maximum Circuit Value:						
Grid-No.1-Circuit Resistance	•	•	•	1.5 max.	megohms	

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

> RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



21FVP4

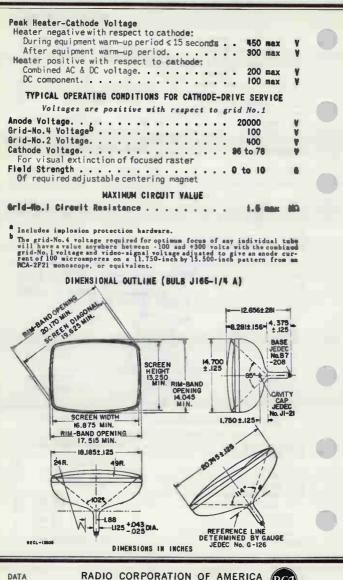
Picture Tube

	PAN-O-PLY-INTEGRAL IMPLOSION PROTECTION I 14º MAGNETIC DEFLECTION NO ION-TRAP MAGNET REQUIRED LOW-VOLTAGE ELECTROSTATIC FOCUS
	Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode 1500 min—2300 max pF Heater Current at 6.3 V 450 ± 20 mA Heater Warm-up Time (Average). 11 s Electron Gun Type Requiring No Ion-Trap Magnet
	OPTICAL
	Phosphor
	Faceplate
	MECHAN I CAL
	Weight (Approx.) 19 lb Overall Length 12.656 ± .281 in Neck Length 4.375 ± .125 in Projected Area of Screen 212 sq in External Conductive Coating [®] 2000 langle
	Type (see CRIOUTLINES 1 at front of this section)
	Reso Small-Button Receigntar /-rin,
	Arrangement I, (JEDEČ No. 87-206) TERMINAL DIAGRAM (Bottom View) ANODE
	Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.4 Pin 6 - Grid No.4 Pin 7 - Cathode Pin 8 - Heater Pin 8 - Heater Pin 8 - Heater Pin 9 - Grid No.4 Pin 9 - Grid No.4 Pin 9 - Grid No.4 Pin 9 - Grid No.4 Grid No.5 Grid No.5 Grid No.5 Grid No.5 Cap - Anode (Grid No.3, Grid No.5 Collector) Grid No.5 Collector) Collectori Conductive
	H BHR Coating
	MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES
	Voltages are positive with respect to cathode
	Anode Voltage
	Positive value
	Grid-No.2 Voltage
	Negative peak value
	Negative bias value
	Positive plas value. 2 max V
	Heater Voltage
_	

RADIO CORPORATION OF AMERICA **Electronic Components and Devices** Harrison, N. J.

DATA 10-65

21FVP4



Harrison, N. J.

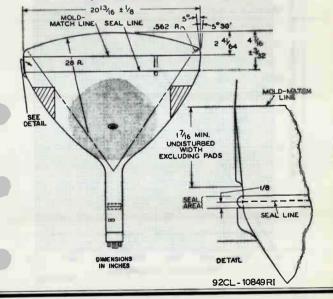
Electronic Components and Devices

21GUP22

Color Picture Tube New Rare- Earth (Red) Phosphor

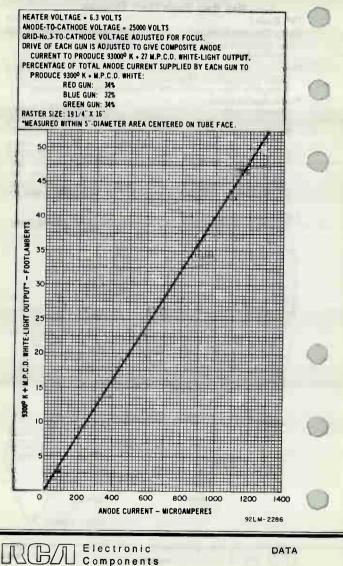
THEM INNER LETTING	
70° Round	HI-LITE Screen
Unity Current Ratios	70° Mognetic Deflection
The 21GUP22 is the same as following:	
Faceplate	
Light transmission (Approx.) Faceplate does not have an	
TUBE DIMENSIONS	
Overall length	
Diameter	**************************************
Weight (Approx.)	
shatter-proof glass cover to protect it from being	the cabinet be provided with a over the face of the 21GUP22 struck accidentally and to pro-
tect against possible d	amage resulting from tube im-
plosion under some abr	formal condition. This safety
cover can also provide quired.	x-radiation protection when re-
DIMENSIONAL OUTLINE	the second from

Dimensions shown are only those which are different from the corresponding dimensions for the 21GVP22



RBA Electronic Components

TYPICAL LIGHT-OUTPUT CHARACTERISTIC



Color Picture Tube70° RoundNew Rare-Earth (Red) PhosphorAntiglare Integrol Protective WindowHI-LITE ScreenUnity Current Rotios70° Magnetic Deflection
ELECTRICAL Electron Guns, Three with Axes Tilted Toward Tube Axis
Current at 6.3 volts ^a 1.9 *A Focusing Method Electrostatic Focus Lens Bipotential Convergence Method Magnetic Deflection Method Magnetic
Deflection Angles (Approx.): Horizontal Vertical 55 deg.
Direct Interelectrode Capacitance (Approx.): Grid No.1 of any gun to all other electrodes 10 pF Grid No.3 to all other electrodes 12 pF All cathodes to all other electrodes 16 pF External conductive coating to anode (Approx.)
OPTICAL
Faceplate and Protective Window Filterglass Light transmission at center (Approx.)
Screen, on Inner Surface of Faceplate: Type Aluminized, Tricolor, Phosphor-Dot Phosphor (three separate phosphors, collectively) P22-New Rare-Earth (Red), Sulfide (Blue & Green) Type Fluorescence and phosphorescence of separate phosphore, respectively Red, Blue, Green Persistence of group phosphorescence Medium Short
Dot ArrangementTriangular group consisting of red dot, blue dot, and green dot Spacing between centers of adjacent dot trios (Approx.)
RBA Electronic DATA 1 Components 5-68

MECHANICAL	
Minimum Screen Area (Projected)	••••• 267 sq. in
Bulb Funnel Designation JEI	DEC No.J164-1/4A1
Bulb Panel Designation JEDE	C No.FP166-1/2D1
Protective Window Designation JEDE	C No.FP166-1/2B1
Base Small-Shell Operating Position Tu	Neodiheptal 12-pin
V-grooved panel pad on top (B	De Axis Horizontal,
Socket Alden Nos.214NMI	NSC (Podial leads)
	eads), or equivalent
Weight (Approx.)	• • • • • • • • • • • • • • • • • • •
MAXIMUM AND MINIMUM RATINGS, DESIGN-N	
Unless otherwise specified, values a	re for each gun
and voltage values are positive with res	pect to cathode
	,
Anode Voltage	27,500 max. volts
Total Anode Current.	20,000 min. volts
Long-Term Average	1000 max. µA
Grid-No.3 (Focusing Electrode) Voltage .	6000 max. volts
Peak Grid-No.2 Voltage, Including	
Video Signal Voltage	1000 max. volts
Grid-No.1 Voltage:	
Negative bias value	400 max. volts
Negative operating cutoff value	200 max. volts
Positive bias value	0 max. volts
Positive peak value	2 max. volts
Heater Voltage (ac or dc):	,
Under operating conditions ^a	6.9 max. volts
	5.7 min. volts
Under standby conditions ^c	5.5 max. volts
Peak Heater-Cathode Voltage:	
Heater negative with respect to cathode	
During equipment warm-up period not	
exceeding 15 seconds	450 max. volts
After equipment warm-up period: Combined AC and DC value	
DC component value	200 max. volts
Heater positive with respect to cathode:	200 max. volts
AC component value	000
DC component value	200 max. volts 0 max. volts
	U max. voits
FOUIPMENT DESIGN DANCES	

EQUIPMENT DESIGN RANGES

RBA Electronic Components

Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode

For anode voltages between 20,000 and 27,500 volts Grid-No.3 (Focusing Electrode) Voltage 16.8% to 20% of Anode volta

DATA 1

Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused Spot Spot Maximum Ratio of Grid-No.2 Voltages, Highest Gun to Lowest Gun in Any Tube (At grid-No.1 spot cutoff voltage of -100 volts) 1.86 Grid-No.3 Current (Total) -45 to +15 μA Grid-No.2 Current -5 to +5 μA
To Produce White of 9300 ^o K + 27 M.P.C.D. (CIE Coordinates x = 0.281, y = 0.311): <i>Red Blue Green</i>
Percentage of total anode current supply by each gun(average) 34 32 34 %
Ratio of cathode currents: Min. Typ. Max.
Red/blue 0.75 1.10 1.50 Red/green 0.65 1.00 1.50 Blue/green 0.60 0.91 1.30
Displacements, Measured at Center of Screen:
Raster centering displacement: ±0.60 in Vertical ±0.45 in Lateral distance between the blue beam and ±0.45 in Lateral distance between the blue beam and ±0.40 in Radial convergence displacement excluding ±0.40 in Radial convergence displacement excluding ±0.50 in Maximum Required Correction for Register ^d (In- ±0.50 in Cluding Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the Center of the Screen in any Direction
In any Direction
Effective grid-No.1-to-cathode- circuit resistance (each gun) 0.75 max. megohm The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under

RBA Electronic Components

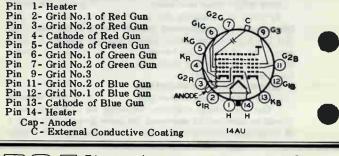
these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short-circuit current of more than 750 mA total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

- ⁶ For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.
- ^b For curve, see Group Phosphor P22-New Rare-Earth (Red), Sulfide (Blue & Green) at front of this section.
- For "instant on" applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- ^d Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

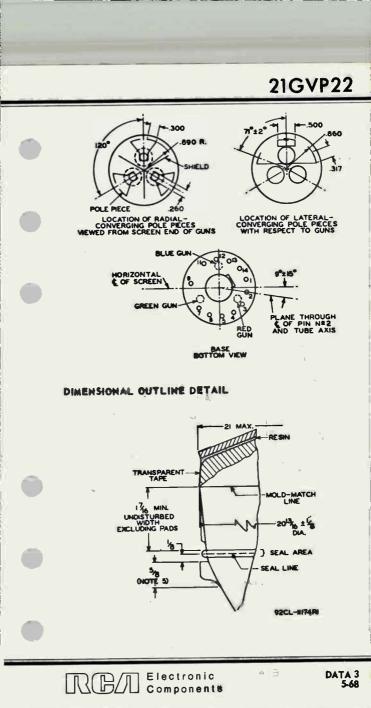
X-RADIATION WARNING

Because the 21GVP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 21GVP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

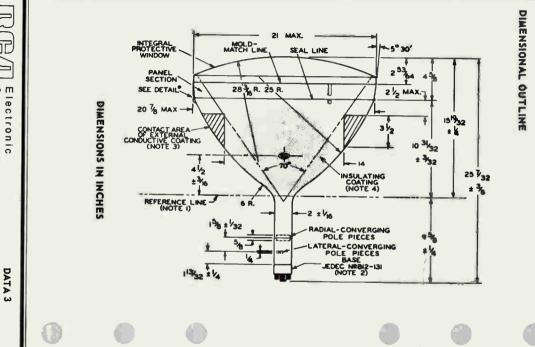
TERMINAL DIAGRAM (Bottom View)



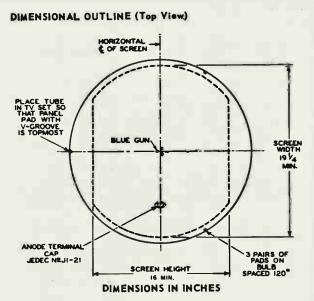
RBA Electronic Components DATA 2



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21GVP22



NOTES FOR DIMENSIONAL OUTLINE

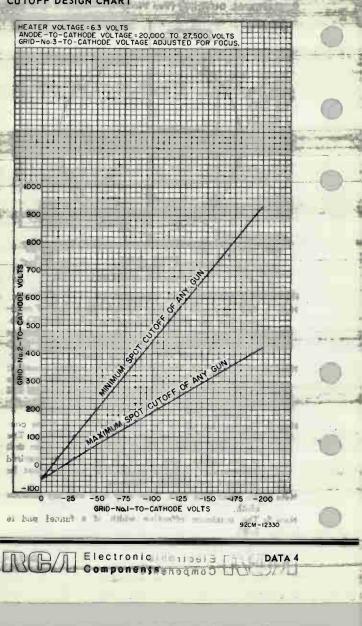
- Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge JEDEC No. G-150 and with tube seated in gauge, the reference line is determined by the intersection of the plane CC' of the gauge with the glass funnel.
- Note 2: Socket for this base should not be rigidly 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 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

Note 4: To clean this area, wipe only with soft dry lintless cloth.

Note S: The maximum effective width of a funnel pad is 5/8".

RBA Electronic Components DATA 4 5-68

CUTOFF DESIGN CHART





21MD H

PICTURE TUBE

RECTANGULAR METAL-SHELL TYPE

LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

DATA

eneral:	
Current 0.6 ± 10%. aceplate, Spherical	n) . P4—Sulfide Type
ube Dimensions: Maximum overall length Greatest width at lip	19-23/32" ± 1/8" 15-5/16" ± 1/8" 20-3/4" ± 1/4" 7-1/2" ± 3/16" rnal surface). 33" 18-1/8" 13-11/16" 19-1/8"
perating Position	
Aximum Ratings, Design-Center Values: LTOR VOLTAGE. RID-No.4 (FOCUSING) VOLTAGE: Positive value Negative value RID-No.2 VOLTAGE. RID-No.1 VOLTAGE: Negative-bias value. Positive-peak value.	16000 max. volts 1000 max. volts 500 max. volts 500 max. volts 125 max. volts 0 max. volts 2 max. volts
-58 ELECTRON TUBE DIVISION	→Indicates a change. DATA

ELECTRON TUBE DIVISION EADIO CORPORATION OF AMERICA, HARRISON, NEW JEREEY



21MP4

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
Naximum Circuit Values:		G
Grid-No.1-Circuit Resistance	1 5	
Grid-No.1-Circuit Resistance	1.5 max.	megorims
For I-ray shielding considerations,		1
I-RAY PRECAUTIONS FOR CATHODE-RA	Y TUBES	
at front of this Section		0
		1
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		1

21VAKP22

Color Picture Tube

Ultra-Rectangular 4 X 3 Aspect Ratio Electrical	Hi=Lite Matrix Screen Light Neutral Screen Appearance
	Red, Blue, Green
Heater, of Each Gun Series C Tube with Each of the Other Current at 6.3 V	onnected within Two Heaters:
Focusing Method	
Focus Lens	Bipotential
Convergence Method	Magnetic
Deflection Method	Magnetic
Horizontal	92 deg 79 deg
Grid No.3 to all other ele All cathodes to all other of	all other electrodes 7.5 pF ctrodes 6.5 pF electrodes 15 pF
Capacitance Between Anode Conductive Coating	and External 2250 max. pF 1750 min. pF
Optical	
Light transmission at cent	er (Approx.)
Surface of Safety Panel	Treated to minimize specular reflection
Matrix Phosphor, rare-earth (red) Persistence	Aluminized Black opaque material sulfide (blue & green)
dot trios (Approx.) Mechanical	fadjacent 0.026 in (0.66 mm)
	cted) 226 sq in (1458 sq cm)
	JEDEC No.FP177-3/4 W2
	Small-Button Diheptar 12-Pin
	(JEDEC No.B12-244)
Basing Designation	
	Pin No.12 Aligns Approx. with Anode Bulb Contact
	Anode barb Contact

RBA Electronic Components

21VAKP22

Operating Position, preferred Anode Bulb C Gun Configuration		Delta	
Implosion Protection			
Integral Safety Panel JEDEC No.SP177-1/4A1			
Maximum and Minimum Ratings, Design-Maximum Values			
Unless otherwise specified, values are for each gur values are positive with respect to cathode.		tage	
\$27	.5 max.	kV	
Anode Voltage	20 min.	kV	
Anode Current, Long Term Averageb 100	00 max.	μA	
Grid-No.3 (Focusing Electrode) Voltage 600	00 max.	V	
Peak-Grid-No.2 Voltage, Including Video Signal Voltage	00 max.	v	U
Negative operating cutoff value	00 max. 00 max. 0 max. 2 max.	* > > >	
Heater Voltage (ac or dc):C			
Under operating conditions	.9 max.	V	
Order operating conditions,	.7 min.	V	
Under standby conditionsd 5	.5 max.	v	
Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period			
	50 max.	v	
After equipment warm-up period: DC component value	00 max.	V	
	00 max,	v	
Heater positive with respect to cathode:	-		
DC component value	0 max.	v	
Peak value	AU IINGA.	v	

Equipment Design Ranges

Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode

For anode voltages between 20 and 27.5 kV

RBA Electronic Components

DATA 1

Grid-No.2 Voltage for Visual Extinct of Undeflected Focused Spot S	tion See CUTOFF	DESIGN CH	IART Jure 3
At Grid No.1 voltage of75 V At Grid No.1 voltage of125 V At Grid No.1 voltage of175 V		80 to	280 V 550 V
Maximum Ratio of Grid-No.2 Volta Lowest Gun in Any Tube (At grid- voltage of -100 V)	ges, Highest (No.1 spot cut	Gun to off	1.86
Heater Voltage: ^c Under operating conditions: When standby operation in n When 5.0-V standby operatic Under standby conditions ^d	n is utilized ^u		.3 V .0 V .0 V
Grid-No.3 Current (Total)		<u>+</u> '	15 μA
Grid-No.2 Current			<u>5</u> μΑ
Grid-No.1 Current			5 µA
		Color	
To Produce White Light of	lilum. D 6550 ⁰ K +	9300 ⁰ K +	
	7 M.P.C.D.	27 M.P.C.D	
CIE Coordinates:	0.313	0.281	
Ŷ	0.329	0.311	
Percentage of total anode curren	nt		
supplied by each gun (average):			
Red	41	30	*
Blue	24 35	31	76
Green	30	38	70
Red/blue:			
Minimum	1.35	0.75	
Typical	1.70	0.96	
Maximum	2.20	1.25	
Red/green:	0.95	0.60	
Minimum	1.15	0.75	
Maximum	1.70	1.10	
Blue/green:	4		
Minimum 7	0.50	0.60	
Typical	0.70	0.80 1.10	,
Maximum	0.95	1.10	
55 1 1			•
Displacements, Measured at Center	of Seman:		
Raster centering displacement:		Ł	
Horizontal		45 in (± 11.	
Vertical		45 in (± 11.4	4 mm)
Lateral distance between the bl	ue beam and	ae := /+ .e.	
the converged red and green be	ams ± 0.	20 IN (± 0.4	• mm)
RBA Electronic Components			ATA 2 2-72
	*		

Radial convergence displacement excluding effects of dynamic convergence (each beam)
Maximum Required Correction for Register [®] (Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the Center of the Screen in any Direction
Typical Operation
Heater Voltage 6.3 V Anode Voltage 25 kV Grid No.3 Voltage Adjusted for focus Color Temperature 9300° K + 27 M.P.C.D. Rester Size 17.538 x 13.256 in (445.47 x 336.70 mm) Typical White-Light Output Measured within 5 in (127 mm) diameter area centered on tube face: 58 fL 200 Nit
Limiting Circuit Values High-Voltage Circuits: Grid-No.3 circuit resistance
Low-Voltage Circuits: Effective grid-No.1-to-cathode- circuit resistance (each gun)
X-Radiation Characteristic
Maximum Anode Voltage at which the X-radiation emitted will not exceed 0.5 mR/h at an anode current of

will not exceed 0.5 mR/h at an anode current of 300 μA

The X-radiation emitted from this picture tube, as measured in accordance with the procedure of JEDEC Publication No.64A will not exceed 0.5 mR/h throughout the useful life of the tube when operated within the Design-Maximum ratings: 27.5 kV anode voltage and 1000 µA anode current. The tube should not be operated beyond its Design-Maximum ratings stated above (such operation may shorten tube life or have other permanent adverse affects on its performance), but its X-radiation will not exceed 0.5 mR/h for anode voltage and current combinations given by the isodose-rate limit characteristics as shown in Figure 1. Operation above the values shown by the curve may result in failure of the television receiver to comply with the Federal Performance Standard for Television Receivers, Sub-Part C of Part 78 of Title 42, Code of Federal Regulations (PL90-602) as published in the Federal Register Vol.34, No. 247, Thursday, December 25, 1969. Maximum X-radiation as a function of anode voltage at 300 µA anode current is shown by the curve in Figure 2. X-radiation at a constant anode voltage varies linearly with anode current.

RBA Electronic Components

DATA 2

36 LV

- The mating socket, including its associated, physically-attached hardware and circuitry, must not weigh more than one pound (one-half kilogram).
- b The short-term average anode current should be limited by circuitry to 1500 microamperes.
- C For maximum cathode life, it is recommended that the heater supply be regulated. The series impedance to any chassis connection in the dc biasing circuit for the heater should be between 100 kilohms and 1 megohm. The surge voltage across the heater must be limited to 9.5 volts rms.
- d The use of e 5-volt standby condition in conjunction with 6-volt operating conditions is recommended to improve the reliability of the color picture tube by extending the emission wear-out life and reducing other gun-related defects. A maximum heater voltage of 5.5 volts (Design-Maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

Notes For Dimensional Outline

- Note 1- With tube neck inserted through flared end of referenceline and neck-funnel-contour gauge (JEDEC No.G162) and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel.
- Note 2-- Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with blub axis.
- Note 3— The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

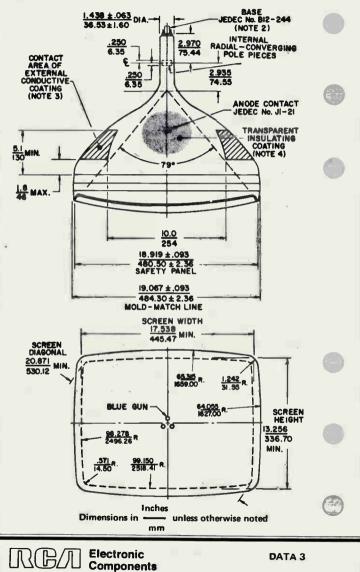
Note 4- To clean this area, wipe only with soft, dry, lintless cloth.

SAGITTAL HEIGHTS AT POINTS 125 BEYOND EDGE OF MIN. SCREEN

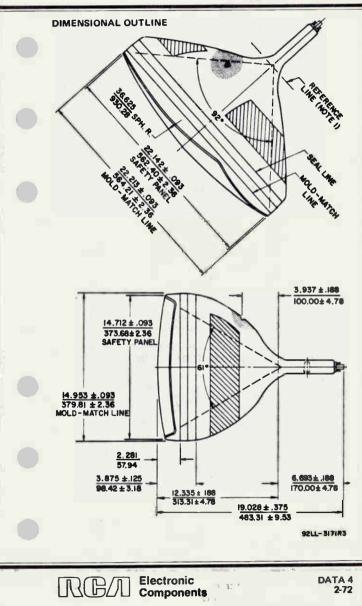
DIAGONAL 1.561 ;HORIZONTAL 1.100 ; VERTICAL 0.630 16.00

RBA Electronic Components

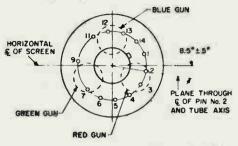
DIMENSIONAL OUTLINE







BOTTOM VIEW OF BASE



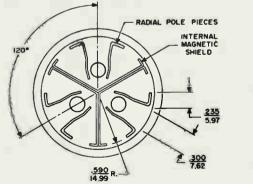
Base Specification – JEDEC No.14BE

Pin 1-Heater Pin 2-Cathode of Red Gun Pin 3-Grid No.1 of Red Gun Pin 4_ Grid No.2 of Red Gun Pin Grid No.2 of Green Gun 5-Pin 6-Cathode of Green Gun Pin Grid No.1 of Green Gun 7-Pin 9-Grid No.3 Pin 11-Cathode of Blue Gun Pin 12-Grid No.1 of Blue Gun Pin 13-Grid No.2 of Blue Gun Pin 14-Heater Cap-

RBA Electronic Components

Cap- Anode (Grid No.4, Screen, Collector) C- External Conductive Coating

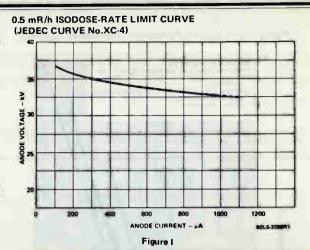
LOCATION OF RADIAL-CONVERGING POLE PIECES VIEWED FROM SCREEN END OF GUNS



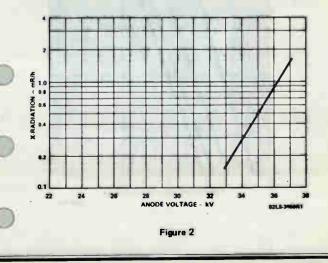
92CS-12835R4

DATA 4

9205-1286

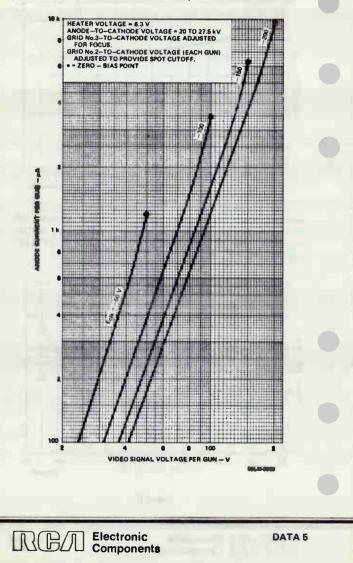


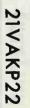
X-RADIATION LIMIT CURVE AT A CONSTANT ANODE CUR-RENT OF 300 µA (X-RADIATION AT A CONSTANT ANODE VOLTAGE VARIES LINEARLY WITH ANODE CURRENT) (JEDEC CURVE No.XC-3)



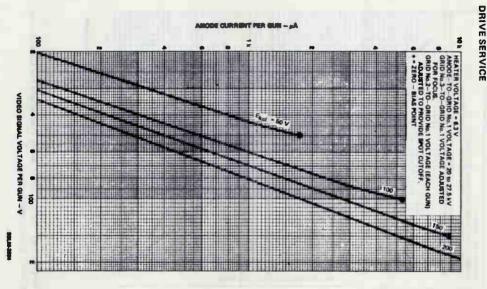
RBA Electronic Components

TYPICAL DRIVE CHARACTERISTICS, GRID-DRIVE SERVICE





TYPICAL DRIVE CHARACTERISTICS, CATHO



Components

DATA 6 2-72

CUTOFF DESIGN CHART

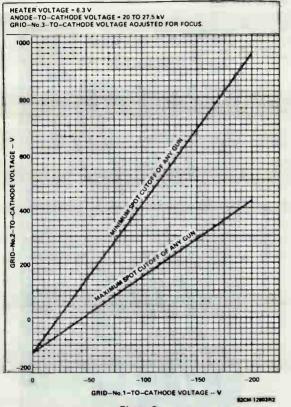


Figure 3

IMPORTANT: Refer to sheet Safety Precautions For Color Picture Tubes at front of this section.

RBA Electronic Components

21WP4B

Picture Tube

	NO ION-TRAP MAGNET REQUIRED
	MAGNETIC FOCUS 70° MAGNETIC DEFLECTION
	ELECTRICAL
	Direct Interelectrode Capacitances Cathode to all other electrodes
	External conductive coating to anode
	1500 min pF Heater Current at 6.3 V
	OPTICAL
	Phosphor P4-Sulfide Type, Aluminized
	For curves, see front of this section Faceplate
	Light Transmission (Approx.) 73%
	MECHANICAL
	Weight (Approx.)
	Overall Length
	Neck Length
	External Conductive Coating
	Type
	Contact area for grounding Near Reference Line For Additional Information on Coatings and Dimensions
	See Picture-Tube Dimensional-Outlines and Bulb J165 Z sheets
	at front of this section Cap Recessed Small Cavity (JEDEC No.JI-21)
	Base Small-Shell Duodecal 5-Pin (JEDEC Group 4, No.85-57) Basing Designation for BOTTOM VIEW
	Pin 1-Heater ANODE
	Pin 2-Grid No.1
	Pin 10-Grid No.2 Pin 11-Cathode
	Pin 12 - Heater
	Cap - Anode (Grid No.3,
	Screen Collector)
	C-External
)	Conductive Coating
	MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES
	Unless otherwise specified, voltage values are positive with respect to cathode
	Anode Voltage
	Grid-No.2 Voltage
	Grid-No.l Voltage
	Negative peak value
	Positive bias value O max V
	Positive peak value
-	
	RCA RADIO CORPORATION OF AMERICA DATA

Electronic Components and Devices

Harrison, N. J.

DATA 10-65

21WP4B

eater Voltage	6.9	max	V	
eak Heater-Cathode Voltage	(011			
Heater negative with respect to cathode:				
During equipment warm-up period not				
exceeding 15 seconds			٧	
After equipment warm-up period	200	max	¥.	
Heater positive with respect to cathode:				
Combined AC and DC voltage			٧	
DC Component	100	Max	٧	
TYPICAL OPERATING CONDITIONS FOR GRID-DRIVE	SERVI	CE		
Unless otherwise specified, voltage val	ues			
are positive with respect to cathode				
node Voltage	6000		Ý	
rid-No.2 Voltage	300		٧	-
rid-No. Voltage28	3 to -7	2	¥	
For visual extinction of focused raster				
MAXIMUM CIRCUIT VALUE				
rid-No.l-Circuit Resistance	1.5	B àx	MO	
ITO-NO.I-GITCUIL RESISLANCE	1.0	ING X	100	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

21XP4B

Picture Tube

LOW-VOLTAGE ELECTROSTATIC FOCUS 70° MAGNETIC DEFLECTION NO ION-TRAP MAGNET REQUIRED

ELECTRICAL

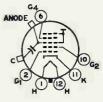
Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode {2500 max pF 2000 min pF
Heater Current at 6.3 V 600 ± 30 mA Electron Gwn
OPTICAL
Phosphor
Faceplate

MECHANICAL

Weight (Approx.) .																24 1b
Overall Length		•	•	•	•	•	•		•					22	2.4	38	± 0.375 in
Neck Length	• •		•		٠	•	•					٠	•	7		00	± 0.188 in
Projected Area							•			•	•	•	• •		•	•	224, sq in
External Conduc																	
Туре		٠	•	*	<u>.</u>	*	٠	٠	1		1	٠	1			K	egular-Band
Contact area																	
For Additional	Int	ori	nai	tic	n	10	۱ (Coi	at.	i ng	35	a	ıd l	Din	le l	18 İ I	ONS

See Picture-Tube Dimensional-Outlines and Bulb J165 Z sheets at front of this section

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



MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES

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

Anode Voltage Grid-No.4 (Focusing)	Voltage	 	• •	20000 max	۷
Positive value . Negative value .				1100 max 550 max	



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 10-65

21XP4B

Grid-No.2 Voltage	۷
Negative peak value	V
Negative bias value	v.
Positive bias value O max	Ŷ
Positive peak value	v
Headen Malan	v
Heater Voltage	v
Peak Heater-Cathode Voltage	v
Heater negative with respect to cathode:	
During equipment warm-up period	
not exceeding 15 seconds	м
After equipment warm up partial	
After equipment warm-up period	¥
Combined AC and DC unlines	
Combined AC and DC voltage 200 max	V
DC Component 100 max	٧
TYPICAL OPERATING CONDITIONS FOR GRID-DRIVE SERVICE	
Unless otherwise specified, voltage values	
are positive with respect to cathode	
· · · ·	
Anode Voltage	V
Grid-No. 4 Voltage	٧
Grid-No.2 Voltage	٧
Srid-No.1 Voltage	٧
For visual extinction of focused raster	
MAXIMUM CIRCUIT VALUE	
Grid-No. I-Gircuit Resistance 1.5 max	MO
	PAI

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



21YP4B

Picture Tube

RECTANGULAR GLASS TYPE Low-voltage electrostatic focus ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION

Electrical:	
Direct Interelectrode Capacitances: Cathode to all other electrodes Grid No.1 to all other electrodes	5 pf 6 pf
External conductive coating to anode.	. {750 max. pf 500 min. pf
Heater Current at 6.3 volts Electron Gun	• 600 ± 60 ma • Type Requiring No Ion-Trap Magnet
Optical:	
Phosphor (for curves, see front of this section	n). P4—Sulfide Type, Aluminized
Faceplate, Spherical	Filterglass
Nechanical:	
Weight (Approx.)	· · · 23-1/32" ± 3/8" · · · 7-1/2" ± 3/16"
Projected Area of Screen	
Type	Regular-Band Near Reference Line
For Additional Information on Coatings an See Picture-Tube Dimensional-Outlines an	nd Dimensions:
at front of this section	
Cap Recessed Small Cav Base Small-Shell Duodecal 6-Pin	vity (JEDEC No.J1-21) n (JEDEC Group 4, No. B6-63)
Basing Designation for BOTTOM VIEW	
Pin 1-Heater G4 Pin 2-Grid No.1 ANODE 6	Cap - Anode (Grid No.3,
Pin 6-Grid No.4 Pin 10-Grid No.2	Grid No.5, Screen,
Pin 11 - Cathode	Collector)
Pin 12 - Heater	C-External Conductive
G ² U	Coating
H H	
Maximum and Minimum Ratings, Design-Maxim	um Values;
Unless otherwise specified, vo ues are positive with respect	ltage val-
ANODE VOLTAGE	
	- 20000 maxt 10/13

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RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

21YP4B

GRID-No.4 (FOCUSING) VOLTAGE:		
Positive value	volts	
Negative value	volts	1
GRID-No.2 VOLTAGE	volts	
GRID-No.1 VOLTAGE:		
Negative peak value	volts	
Negative bias value 155 max.	volts	
Positive bias value 0 max.	volts	
Positive peak value 2 max.	volts	
10.0	volts	
HEATER VOLTAGE	volts	1
Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode: Combined AC and DC voltage 200 max.	volts volts volts	
DC component 100 max.	volts	
Typical Operating Conditions for Grid-Drive Service:		
Unless otherwise specified, voltage val-		
ues are positive with respect to cathode		
Anode Voltage	volts	
Grid-No.4 Voltage	volts	
Grid-No.2 Voltage	volts	
Grid-No.1 Voltage for visual extinction of		
focused raster	volts	
Maximum Circuit Value:		
Grid-No.1-Circuit Resistance 1.5 max.	megohms	

For X-radiation shielding considerations, see sheet *I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBBS* at front of this Section



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

21ZP4C

Picture Tube

RECTANGULAR GLASS TYPE MAGNETIC FOCUS

ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes Grid No.1 to all other electrodes	5 pf 6 pf
External conductive coating to anode	{750 max. pf 500 min. pf
Heater Current at 6.3 volts	600 ± 60 ma
Electron Gun	Type Requiring

Optical:

Phosphor (For curves, s	ee front of	this	secti	on).	P4	Sulfide Type, Aluminized
Faceplate, Spherical. Light transmission	(Approx.)			::	::	. Filterglass

Mechanical:

Weight (Approx.).									•		24 lbs
Overall Length								-			23-1/32" ± 3/8"
Neck Length											7-1/2" ± 3/16"
Projected Area of	S	cre	eei	٦.							248 sq. in.
External Conducti	ve	Co	pat	tir	ng						
Tune											Pecular_Rand

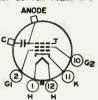
Regular-Ban Туре. . . . Contact area for grounding. Near Reference Line For Additional Information on Coatings and Dimensions:

See Picture-Tube Dimensional-Outlines and Bulb J170 B/D sheets at front of this section

. Recessed Small Cavity (JEDEC No.J1-21) Cap Base. . . . Small-Shell Duodecal 5-Pin (JEDEC Group 4, No. B5-57)

Basing Designation for BOTTOM VIEW. . .

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



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

. 12N

Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to cathode

ANODE VOLTAGE			•	•				20000 max.	volts
GRID-No.2 VOLTAGE						•		550 max.	volts



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DATA 1-64

21ZP4C

GRID-No.1 VOLTAGE: Negative peak value	volts volts volts volts volts volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period	
not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode:	volts volts
Combined AC and DC voltage 200 max. DC component 100 max.	volts volts
Typical Operating Conditions for Grid-Drive Service: Unless otherwise specified, voltage val-	
unless otherwise specified, voltage val- ues are positive with respect to cathode	
Anode Voltage	volts
Grid-No.2 Voltage	volts
focused raster	volts
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max.	negohns
For X-radiation shielding considerations, see sh	eet

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

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PICTURE TUBES

RECTANGULAR GLASS TYPES

MAGNET IC FOCUS

MAGNETIC DEFLECTION

DATA

	PATA	, ,
General:		
Heater, for Unipote		
Voltage Current	6.3 0.6 ± 10%	ac or dc volts
apacitance between	External Conduc-	•••••••amp
tive Coating and	Ultor	.∫750 max. μμf
		[500 min. μμf
aceplate, Spherica	1	
hosphor (For Curves, see front of this Section).	Type 21ZPA-A	Type 21ZP4-B
Section).	. P4-Sulfide Type	P4-Sulfide Type
		Aluminized
Deflection Angles (Approx.):	
Diagonal		· · · · · · · · 70 ⁰
Horizontal Vertical		
lectron Gun	• • • • • • • • • • • • • • • • • • •	-Trap Type Requiring
		Single-Field Magnet
ube Dimensions:	Eater nat	orngre-rieru magnet
Overall length .		23-1/32" ± 3/8"
Greatest width .		20-1/4" ± 1/8"
Greatest height.		15-9/16" ± 1/8"
Diagonal		21-7/32" ± 1/8"
Neck length		7-1/2" ± 3/16"
Radius of curvatu	re of faceplate (Exter	nal surface) 40"
creen Dimensions (
Greatest width . Greatest height.		• • • • • • • 19-1/16"
Diagonal		14-3/16"
Projected area .		••••••••••••••••••••••••••••••••••••••
nerating Position		A
ap	. Recessed Small Cav	ity LIFTEC No. 11-21)
ase Small-Shel	l Duodecal 5-Pin (JETE	C Group 4. No. 85-57)
Basing Designation	n for BOTTOM VIEW	
	n	
Pin 1-Heater		Cap-Ultor
Pin 2-Grid No.1 Pin 10-Grid No.2	CT+1+	(Grid No.3,
Pin 11 - Cathode		Collector) C-External
Pin 12 - Heater	Xnx	Conductive
THE HEALCH	O C CO	Coating
	00	coating
		1
aximum Ratings, Des	sign-Center Values:	
LTOR VOLTAGE		18000 max. volts
RID-No.2 VOLTAGE.		500 max. volts
		- indicates a change.
-58	ELECTRON TURE DIVISION	DATA

ÉLECTRON TUBE DIVISION EADID CORPORATION OF AMERICA, HARRISON, NEW JERSEY



21ZP4-A, 21ZP4-B

PICTURE TUBES

T	GRID-No.1 VOLTAGE:
-	Negative-peak value
-	Negative-bias value
	Positive-bias value
1	Positive-peak value
1	PEAK HEATER-CATHODE VOLTAGE:
	Heater negative with respect to cathode:
	During equipment warm-up period
R	not exceeding 15 seconds 410 max: volts
1	After equipment warm-up period 180 max. volts
1	Heater positive with respect to cathode. 180 max. volts
	Grid-No.1-Circuit Resistance 1.5 max. megohms
	For I-ray shielding considerations, see sheet I-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section
-	
-	
1	

 1224-68

Color Picture Tube

"PERMA-CHROME" ASSEMBLY FOR OPTIMUM FIELD PURITY AND UNIFORMITY DURING WARM-UP

RECTANGULAR TUBE

90° MAGNETIC DEFLECTION

ALUMINIZED TRICOLOR PHOSPHOR-DOT Hi-Lite SCREEN (Utilizing a New Improved Rare-Earth Red-Emitting Phosphor) INTEGRAL FILTERGLASS PROTECTIVE WINDOW

MAGNETIC CONVERGENCE

3 ELECTROSTATIC-FOCUS GUNS

For Use in Color-TV Receivers

ELECTRICAL

Electron Guns, Three	1
Axes tilted toward tube axis	
Heater, of Each Gun	
Series connected within tube with	
each of the other two heaters	
Current at 6.3 volts"	١.
Focusing Method Electrostatic	
Focus Lens	
Convergence Method	
Deflection Method	
Deflection Angles (Approx.)	
Diagonal	>
Horizontal	
Vertical	
Direct Interelectrode Capacitances (Approx.)	
Grid No.1 of any gun to all other electrodes. 6 pl	2
Grid No.3 to all other electrodes 6.5 pl	
All cathodes to all other electrodes	
External conductive coating to anode	
(2000 min p	

OPTICAL

Faceplate and Protective Window Filterglass Light transmission at center (Approx.)
Screen, on Inner Surface of Faceplate
Type Aluminized, Tricolor, Phosphor-Dot
Phosphor (Three separate phosphors, collectively) ^b P22—New Rare-Earth (Red), Sulfide (Blue & Green) Type
Fluorescence and phosphorescence of separate phosphors, respectively Red, Blue, Green Persistence of group phosphorescence Medium Short Dot arrangement Each triangular group consists of a red, green, and blue dot
Spacing between centers of adjacent dot trios (Approx.) 0.025 in (0.64 mm)

RCA

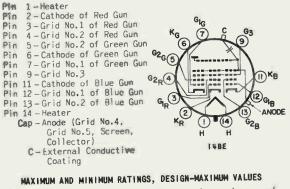
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MECHANICAL

Tube Dimensions

Overall length 19.204 ± .375 in (487.8 ± 9.5 mm)
Neck length 6.693 ± .188 in (170.0 ± 4.8 mm)
Diagonal
Greatest width
Greatest height 15.236 ± .093 in (387.0 ± 2.4 mm)
Minimum Screen Dimensions (Projected)
Diagonal
Greatest width
Greatest height
Area
Bulb Funnel Designation JEDEC No. J173-1/2 AIA
Bulb Panel Designation JEDEC No. FP173-3/4 B2
Protective Window Designation JEDEC No.FP172-1/2
Protective window pesignation
Bulb Contact Designation Recessed Small Cavity Cap (JEDEC No. J1-21)
Pin Position Alignment Pin No.12 Aligns Approx.
with Anode Bulb Contact
Operating Position Anode Bulb Contact on Top
Weight (Approx.).
Base Small-Button Diheptar 12-pin (JEDEC No.B12-244)

TERMINAL DIAGRAM (Bottom View)



Unless otherwise specified, values are for voltage values are positive with respect	each gun and to cathode	
Anode Voltage	27,500 max 20,000 min	
Typical Anode Current, Long-Term Average Grid-No.3 (Focusing Electrode) Voltage	. 1000 max	
Peak Grid-No.2 Voltage, Including Video Signal Voltage		۷

DATA 1

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Grid-No.I Voltage Negative bias value	-
Positive peak value	¥
Under operating conditions ^a	
Peak Heater-Cathode Voltage Heater negative with respect to cathode: During equipment warm-up period	
not exceeding 15 seconds	
DC component value 200 max Heater positive with respect to cathode:	¥
AC component value	A

EQUIPMENT DESIGN RANGES

Unless otherwise specified, values are for each gun and
voltage values are positive with respect to cathode
•
For anode voltages between 20,000 and 27,500 V
Grid-No.3 (Focusing Electrode) Voltage 16.8% to 20% of anode volts
Grid-No.2 and Grid-No.1 Voltages See accompanying
For visual extinction of Cutoff Design Chart
focused spot
Maximum Ratio of Grid-No.2 Voltages 1.86
Highest gun to lowest gun in any
tube (At grid-No.1 spot cutoff
voltage of -100 volts)
Grid-No.3 Current (Total)
Grid-No.2 Current
To Produce White 9300°K + 27 M.P.C.D.
(CIE Coordinates $x = 0.281$, $y = 0.311$)
Percentage of total anode
Percentage of total anode current supplied by each Red Blue Green
Percentage of total anode
Percentage of total anode current supplied by each Red Blue Green
Percentage of total anode current supplied by each gun (Average)
Percentage of total anode current supplied by each gun (Average)
Percentage of total anode current supplied by each gun (Average)
Percentage of total anode current supplied by each Red Blue Green gun (Average)
Percentage of total anode current supplied by each gun (Average). Red Blue Green 32 Blue Green 34 Green 32 Ratio of cathode currents: Red/blue. Win Typ Max 0.75 Typ Max 1.00 1.50 Red/green 0.65 1.00 1.50 Blue/greer. 0.66 1.00 1.50 Blue/greer. 0.66 1.00 1.50 Displacements, Measured at Center of Screen 0.60 0.91 1.30
Percentage of total anode current supplied by each Red Blue Green gun (Average)
Percentage of total anode current supplied by each Red Blue Green gun (Average)
Percentage of total anode current supplied by each Red Blue Green gun (Average)
Percentage of total anode current supplied by each Red Blue Green gun (Average) 34 32 34 % Ratio of cathode currents: Min Typ Max Red/blue 0.75 1.10 1.50 Red/green 0.65 1.00 1.50 Blue/greer 0.65 1.00 1.50 Displacements, Measured at Center of Screen Raster centering displacement: Horizontal ±0.47 in (±11.9 mm) Vertical
Percentage of total anode current supplied by each Red Blue Green gun (Average) 34 32 34 % Ratio of cathode currents: Min Typ Max Red/blue 0.75 1.10 1.50 Red/green 0.65 1.00 1.50 Blue/greer 0.65 1.00 1.50 Displacements, Measured at Center of Screen Raster centering displacement: Horizontal ±0.47 in (±11.9 mm) Vertical
Percentage of total anode current supplied by each Red Blue Green gun (Average)
Percentage of total anode current supplied by each Red Blue Green gun (Average)
Percentage of total anode current supplied by each Red Blue Green gun (Average)

RCA

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Maximum Required Correction for Register ^c (Including Effect of Earth's Magnet Field when Using Recommended Components) Measured at the center of the screen in any direction 0.005 in (0.13 mm) max	
EXAMPLES OF USE OF DESIGN RANGES	

Unless otherwise specified, voltage values are for each gun and are positive with respect to cathode Anode Voltage 25.000 Grid-No.3 (Focusing Electrode) Voltage. . . . 4200 to 5000 ٧ Grid-No.2 Voltage when circuit design utilizes grid-No.1 voltage of -150 volts for visual extinction 285 to 685 of focused spot. Grid-No.1 Voltage for visual extinction of focused spot when circuit design utilizes grid-No.2 . -95 to -190 voltage of 400 volts Heater Voltage 6.3 Under operating conditions* . . 5.0 Under standby conditions. . .

LIMITING CIRCUIT VALUES

High-Voltage Circuits

Grid-No.3 circuit resistance. 7.5 max №

In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type, in which the short-circuit current does not exceed 20 mA.

Low-Voltage Circuits

Effective grid-No.1-to-cathode-

circuit resistance (Each gun). 0.75 max MD

The low-voltage circuits, including all heater circuits. should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short circuit current of more than 750 mA total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

DATA 2

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



- For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.
- For curve, see Group racephor P22-New Rare-Earth (Red), Sulfide (Blue & Green) at front of this section.
- C For "instant on" epplications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages mormally applied to the tube must be removed during standby operation.
- d Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

GENERAL CONSIDERATIONS

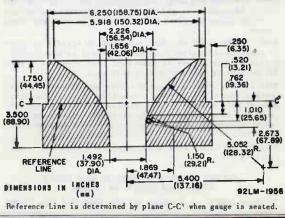
X-Radiation Warning. Because the 22JP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 22JP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

Orientation. The 22JP22 must be operated with tube axis in a horizontal position and with the blue gun uppermost (i.e., the anode contact button on top).

The Deflecting Yoke and tube axes must coincide and the yoke must be free to move along the neck for a distance of approximately 0.5 inch (13 mm) from its most forward position for adjustment purposes. The yoke mount should also provide for a small amount of rotational adjustment.

Contact to the external conductive coating should be made by multiple fingers to prevent possible damage to the tube from localized overheating due to poor contact.

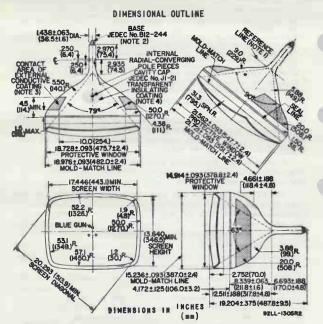
Wisregister Compensation. Proper operation of the 22JP22 requires compensation for the effects of extraneous magnetic fields, the earth's magnetic field, and other causes which may produce misregister. Compensation for these effects may be accomplished by the use of a purifying magnet.



REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE JEDEC No. 6162

RCA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 3 4-67



Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge and with tube seated in gauge, the reference line is determined by the intersection on the plane C-C' of the gauge with the glass funnel.

Note 2: Socket for this base should not be rigidly mounted; it shbuld have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-imem (51-mm) circle concentric with bulb axis.

Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

Note 4: To clean this area, wipe only with soft, dry, lintless cloth.

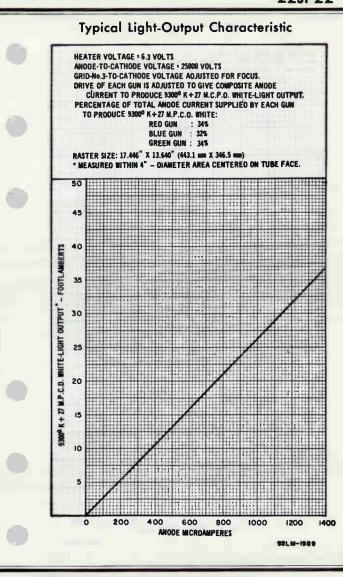
> LOCATION OF RADIAL-CONVERGING POLE PIECES VIEWED FROM SCREEN END OF GUNS

for type 22JP22 is the same as that shown for type 25XP22

DATA 3

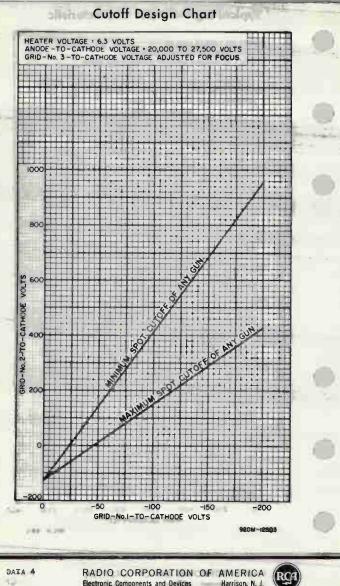
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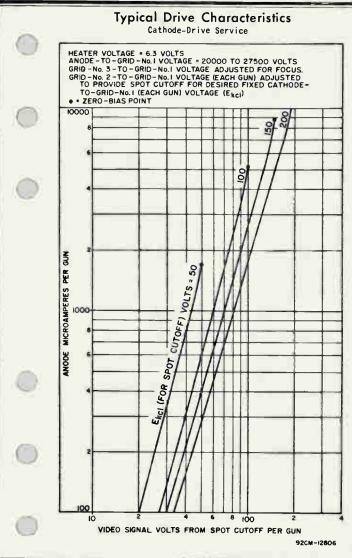


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Electronic Components and Devices Harrison, N. J.

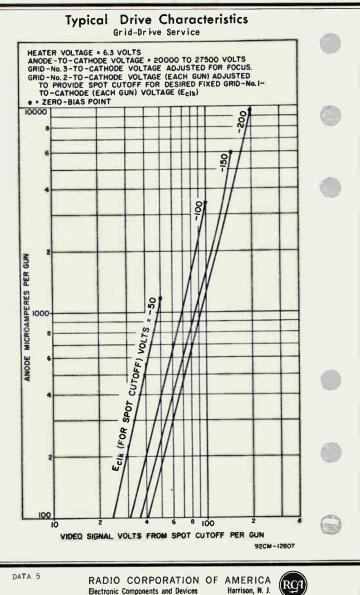




RADIO CORPORATION OF AMERICA Electronic Components and Devices

Harrison, N. J.

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22KP22

Color Picture Tube

"PERMA-CHROME" ASSEMBLY FOR OPTIMUM FIELD PURITY AND UNIFORMITY DURING WARM-UP

RECTANGULAR TUBE 90° MAGNETIC DEFLECTION

ALUMINIZED TRICOLOR PHOSPHOR-DOT "Hi-Lite" SCREEN (Utilizing an Improved Rare-Earth Red-Emitting Phosphor) MAGNETIC CONVERGENCE 3 ELECTROSTATIC-FOCUS GUMS

For Use in Color-TV Receivers

The 22KP22 is the same as the 22JP22 except for the following items:

OPTICAL

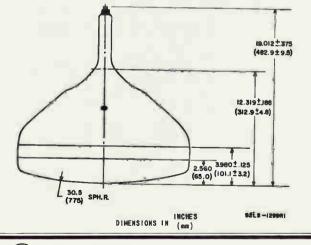
MECHANICAL

Tube Dimensions

It is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 22KP22 to protect it from being struck secidentally and to protect against possible damage resulting from tube implosion under some shortmal condition. This safety cover can also provide x-radiation protection when required.

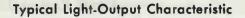
DIMENSIONAL OUTLINE

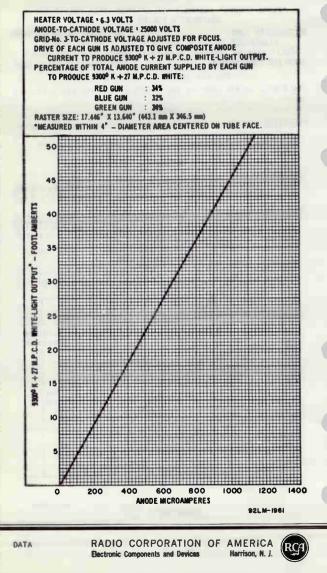
Dimensions shown are only those which are different from the corresponding dimensions for the 22JP22





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22UP22

Color Picture Tube

Perma-Chrome 90° Rectongular New Rare-Earth (Re	Banded-Type ed) Phosphor	HI-L	ITE Sci Urrent Ro	reen
ELECTRICAL Electron Guns, Three Tilted Toward Tube	with Axes Axis	Red,	Blue, G	reeñ
Heater, of Each Gun S Connected within T Each of the Other T	Series ube with			
Current at 6.3 V ^a .		(900	mA
Focusing Method		1	Electrost	atic
Focus Lens			Bipoter	ntial
Convergence Method			Magn	etic
Deflection Method. Deflection Angles (Ap			Magn	
Diagonal			90	deg.
Horizontal				deg.
Vertical Direct Interelectrode	Capacitances (A	pprox.):	63	deg.
Grid No.1 of any gu to all other elect			6	pF
Grid No.3 to all oth			6.5	pF
All cathodes to all			15	υF
External conductive to anode (Approx.	coating	25	500 max. 500 min.	
OPTICAL		•		
Faceplate			Filterg	lass
Light transmission	at center (Approx		• • • •	42%
Surface			. Polis	hed
Screen, on Inner Surfa	ce of Faceplate:			
Туре	Aluminized,	Tricolor, F	hosphor	Dot
Phosphor (three separate phosphors, collectively) ^b P22-New Rare-Earth (Red), Sulfide (Blue & Green) Type				
Fluorescence and p of separate phosp respectively	hosphorescence hors,	Red.	Blue, G	reen
Persistence of grou				
Dot Arrangement	Triangu red dot.	lar group o blue dot, a	onsistin nd green	g of dot
Spacing between cente dot trios (Approx.)	ers of adjacent	,	in (0.64	

RBA Electronic Components

DATA 1 9-68

22UP22

MECHANICAL		
Minimum Screen Area (Projected): 227 sq Bulb Funnel Designation JEDEC Bulb Panel Designation JED Base Small-Butt Pin Position Alignment Pin No.	No.J173-1/2 EC No.FP173 on Diheptar 12	A1A -3/4 2-pin prox.
With A Operating Position Anode Bu Weight (Approx.)	lb Contact on	Тор
MAXIMUM AND MINIMUM RATINGS, Design-	Aaximum Valu	es
Unless otherwise specified, values are for voltage values are positive with respect to	each gun and	
Anode Voltage	27,500 max. 20,000 min.	vv
Total Anode Current, Long-Term Average	1000 max.	μA
Grid-No.3 (Focusing Electrode) Voltage	6000 max.	v
Peak Grid-No.2 Voltage, Including Video Signal Voltage	1000 max.	v
Grid-No.1 Voltage: Negative bias value Negative operating cutoff value Positive bias value Positive peak value Heater Voltage (ac or dc):	400 max. 200 max. 0 max. 2 max.	V V V
Under operating conditions ^a	6.9 max. 5.7 min.	v
Under standby conditions ^c	5.5 max.	v
Peak Heater-Cathode Voltage:		
Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	450 max.	v
After equipment warm-up period:		
Combined AC and DC value DC component value	200 max. 200 max.	v
Heater positive with respect to cathode:		
AC component value DC component value	200 max. 0 max.	vv
EQUIPMENT DESIGN RANGES		

Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode

For anode voltages between 20,000 and 27,500 V

Grid-No.3 (Focusing Electrode) Voltage 16.8% to 20% of Anode Voltage

RBA Electronic Components

22UP22

Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused Spot See CUTOFF DESIGN CHART
Maximum Ratio of Grid-No.2 Voltages, Highest Gun to Lowest Gun in Any Tube (At grid-No.1 spot cutoff voltage of -100 V)
Heater Voltage:
Under operating conditions ^c
Grid-No.3 Current (Total)45 to +15 µA
Grid-No.2 Current
To Produce White 9300 ^o K + 27 M.P.C.D. (CIE Coordinates x = 0.281, y = 0.311):
Percentage of total anode current supplied by Red Blue Green each gun (average) 34 32 34 %
Ratio of cathode currents: Min. Typ. Max. Red/blue 0.75 1.10 1.50 Red/green 0.65 1.00 1.50 Blue/green 0.60 0.91 1.30
Displacements, Measured at Center of Screen:
Raster centering displacement:
Horizontal ± 0.47 in (± 11.9 mm)
Vertical
Lateral distance between the blue beam and the converged red and green beams ± 0.25 in (± 6.4 mm)
Radial convergence displacement excluding effects of dynamic convergence (each beam) ± 0.37 in (± 9.4 mm)
Maximum Required Correction for Registerd (Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the center of the Screen in any Direction 0,005 in (0.13 mm) max.
LIMITING CIRCUIT VALUES:

High-Voltage Circuits:

Grid-No.3 circuit resistance \dots 7.5 max. MQ In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the *high-voltage power supply* and the *grid-No.3 power supply* be of the limited-energy type, in which the shortcircuit current does not exceed 20 mA.

RBA Electronic Components

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Low-Voltage Circuits:

Effective grid-No.1-to-cathodecircuit resistance (each gun)

The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short circuit current of more than 750 mA total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

.... 0.75 max.

MO

For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.

b For curve, see Group Phosphor - P22 - New Rare Earth (Red), Sulfide (Blue & Green) at front of this section.

⁶ For "instant on" applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.

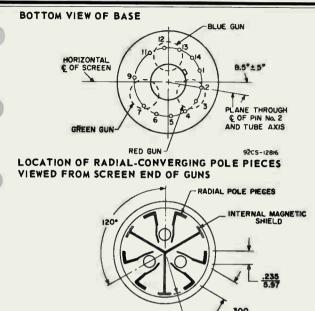
^d Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

X-RADIATION WARNING

Because the 22UP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 22UP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

BAS	E SPECIFICATION - JEDEC No. 14BE
Pin	1: Heater Pin 11: Cathode of Blue Gun
Pin	2: Cathode of Red Gun Pin 12: Grid No.1 of Blue Gun
Pin	3: Grid No.1 of Red Gun Pin 13: Grid No.2 of Blue Gun
Pin	4: Grid No.2 of Red Gun Pin 14: Heater
Pin	5: Grid No.2 of Green Gun Cap: Anode (Grid No.4,
Pin	6: Cathode of Green Gun Screen, Collector)
Pin	7: Grid No.1 of Green Gun C: External Conductive
Pin	9: Grid No.3 Coating

22UP22



NOTES FOR DIMENSIONAL OUTLINE

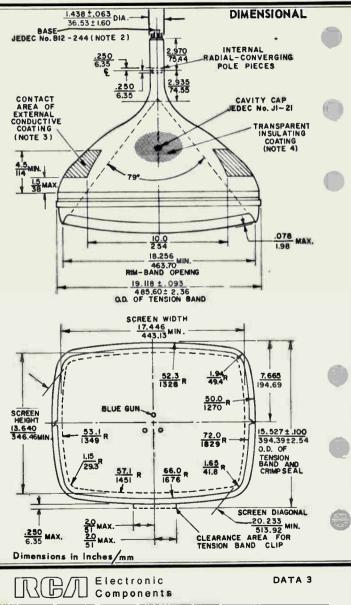
- Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge JEDEC No.G162 and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel.
- Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.
- Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.
- Note 4: To clean this area, wipe only with soft, dry, lintless cloth.

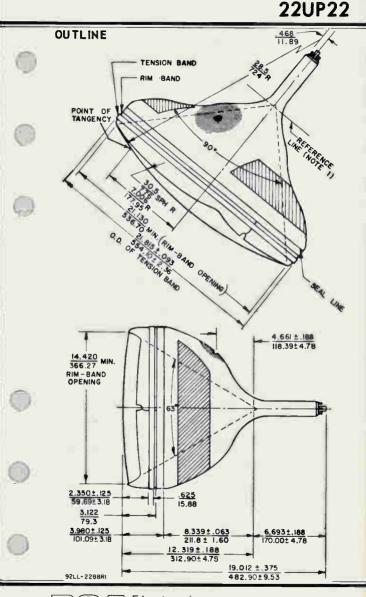
RBA Electronic Components

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9265-12835R3

22UP22

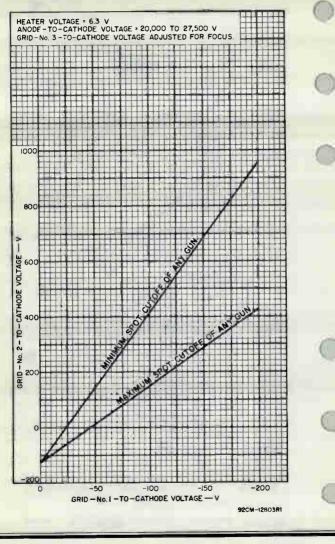




RBA Electronic Components

DATA 4

CUTOFF DESIGN CHART



RBA Electronic Components DATA 4

22WP22

DATA

8-69

Color Picture Tube

Perma-Chrome **Banded-Type Implosion Protection** 90° Rectangular HI-LITE Screen New Rare-Earth (Red) Phosphor Unity Current Ratios This data sheet is to be used in conjunction with data for RCA-22UP22.

For general data, maximum and minimum ratings, equipment design ranges, limiting circuit values, xradiation warning, and base specification of the 22WP22, refer to the 22UP22 except as noted below.

MECHANICAL

山((円/川

Tube Dimensions (excluding mounting lugs):

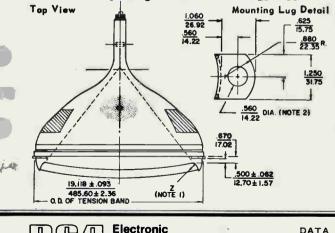
Greatest Width 19.118 \pm .093 in (485.60 \pm 2.36 mm)

Greatest Height (including tension-

band clip) 15.527 ± .100 in (394.39 ± 2.54 mm)

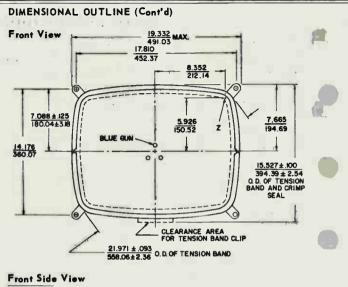
DIMENSIONAL OUTLINE

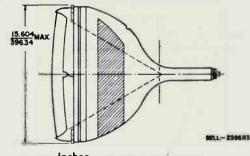
Dimensions shown are only those which are different from the corresponding dimensions for the 22UP22.



Components

22WP22





Dimensions in inches unless otherwise noted

RBA Electronic Components

Note 1: "Z" is located on the outside surface of the faceplate, on the screen diagonal at a point .125" beyond the minimum screen. This point is used as a reference for the mounting lugs.

Note 2: The tolerance of the mounting lug holes will accommodate mounting screws up to 0.375 in (9.5 mm) in diameter when positioned on the true hole centers.

Picture Tube

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Heater Current at 6.3 volts 600 ± 30 ma Heater Warm-Up Time (Average) 11 seconds Focusing Method 11 seconds Deflection Method Electrostatic Deflection Angles (Approx.): 920 Horizontal 920 Vertical 800 Vertical 5 Direct Interelectrode Capacitances: 6 Grid No.1 to all other electrodes 6 External conductive coating to ultor. 2500 max. Huff Electron Gun.
Optical:
Faceplate
Persistence
Nechanical:
Tube Dimensions: $18" \pm 3/8"$ Overall length. $20-1/2" \pm 1/16" - 1/8"$ Greatest width. $20-1/2" \pm 1/16" - 1/8"$ Greatest height $16-1/2" \pm 1/8"$ Diagonal. $23-25/64" \pm 3/32" - 1/8"$ Neck length $5-1/2" \pm 3/16"$
Curvature of faceplate (Kauli): Center
Greatest width
DU10



RADIO CORPORATION OF AMERICA DATA I Electron Tube Division Harrison, N. J. 3-61

and the second second second second second second second second second second second second second second second	
23AHP4	
Base	•
GRID-DRIVEA SERVICE	
Unless otherwise specified, voltage values	
are positive with respect to cathode	
Maximum and Minimum Ratings, Design-Naximum Values:	
ULTOR VOLTAGE	
GRID-No.4 (FOCUSING) VOLTAGE: Positive value	
GRID-No.1 VOLTAGE: Negative-peak value	
HEATER VOLTAGE	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	0
Typical Operating Conditions:	
With ultor voltage (E_{C_5k}) of18000voltsand grid-No.2 voltage (E_{C_2k}) of400voltsGrid-No.4 Voltage for focus0 to 400voltsGrid-No.1 Voltage for visualextinction of focused raster*36 to -94voltsField Strength of Adjustable0 to 1150 to 1150 to 1150 to 11	
Centering Magnet 0 to 11 gausses	
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance. , 1.5 max. megohms	0

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



CATHODE-DRIVE SERVICE

Unless otherwise specified, voltage values are positive with respect to grid No.1 Maximum and Minimum Ratings, Design-Naximum Values: (22000 max. volts ULTOR-TO-GRID-No.1 VOLTAGE. 11000 min. volts GRID-No. 4-TO-GRID-No. 1 (FOCUSING) VOLTAGE: 1250 max. volts Positive value. volts 400 max. Negative value. 700 max. volts GRID-No.2-TO-GRID-No.1 VOLTAGE. 350 min. volts 550 max. volts GRID-No.2-TO-CATHODE VOLTAGE. CATHODE-TO-GRID-No.1 VOLTAGE: 220 max. volts Positive-peak value . . volts 154 max. Positive-bias value . . . 0 max. volts Negative-bias value . . . 2 max. volts Negative-peak value . . . 6.9 max. volts HEATER VOLTAGE. . 5.7 min. volts PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds. . . 450 max. volts volts 200 max. After equipment warm-up period. Heater positive with respect to cathode. 200 max. volts **Typical Operating Conditions:** With ultor-to-grid-No.1 18000 volts voltage (Ecsel) of and grid-No.2-to-grid-No.1 voltage (Ec281) of 400 volts Grid-No.4-to-Grid-No.1 Voltage for focus[•].... Cathode-to-Grid-No.1 Voltage 0 to 400 volts for visual extinction of focused raster 36 to 78 volts . . . Field Strength of Adjustable Centering Magnet • . . 0 to 11 gausses Maximum Circuit Values: Grid-No.1-Circuit Resistance. 1.5 max. meaohms Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode. 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 anywhere between 0 and a00 volts. 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-maximum ratings shown for these items. See Raster-Cutoff-Range Chart for Grid-Drive Service. Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4". The specified centering magnet compensates only for the effect which mechanical tube tolerances may have on the location of the undeflected focused spot with respect to the center of the tube



RADIO CORPORATION OF AMERICA Electron Tube Division Somerville, N. J. DATA 2 3-61

face. Maximum field strength of adjustable centering magnet equals:

$$\sqrt{\frac{E_{c_5k} \text{ or } E_{c_5g_1} (\text{volts})}{16000 (\text{volts})}} \times 10 \text{ gausses}$$

The equipment manufacturer must determine and supply additional compensation for the effects of the earth's magnetic field and extraneous fields due to choice of circuitry and components. The additional compensation should preferably be applied as part of the magnetic field of the deflecting yoke.

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.

See Raster-Cutoff-Range Chart for Cathode-Drive Service.

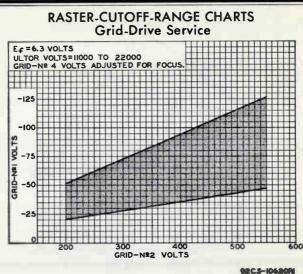
OPERATING CONSIDERATIONS

X-Ray Warning. When operated at ultor voltages up to 16 kilovolts, this picture tube does not produce any harmful X-ray radiation. However, because the rating of this type permits operation atvoltages as high as 22 kilovolts (Designmaximum value), shielding of this picture tube for X-ray radiation may be needed to protect against possible injury from prolonged exposure at close range whenever the operating conditions involve voltages in excess of 16 kilovolts.

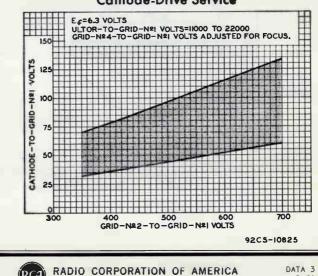
Shatter-Proof Cover Over the Tube Face. Following conventional picture tube practice, it is recommended that the cabinet be provided with a shatterproof, glass cover over the face of this picture tube to protect it from being struck accidentally and to protect against possible damage resulting from tube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

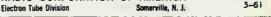


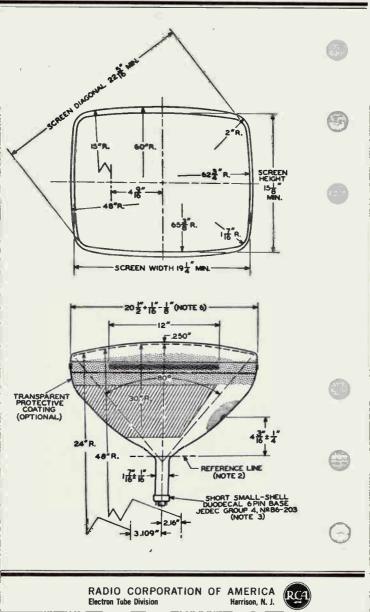


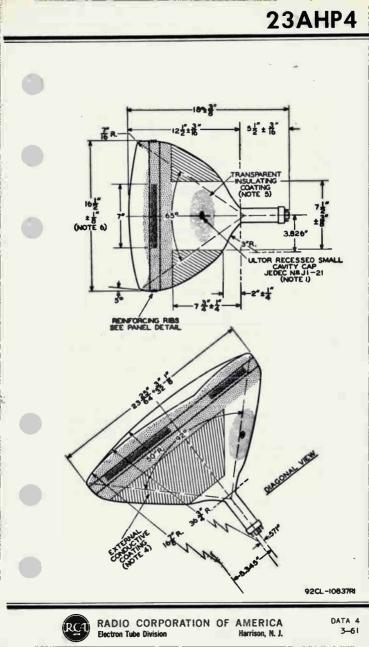


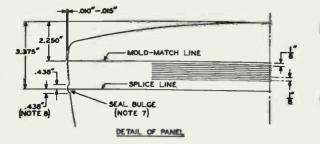
Cathode-Drive Service











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-II6 (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 BERIGIDLY MOUNT-ED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE WAFER 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. NOTE 5: TO CLEAN THIS AREA, WIPEONLY WITH SOFT DRY LINT-LESS CLOTH.

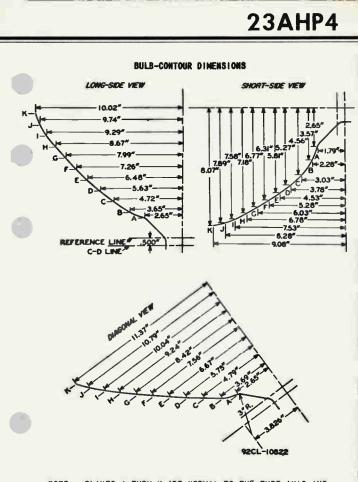
NOTE 6: MEASURED AT THE MOLD-MATCH LINE.

NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE IN-DICATED 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 LOCATION SPECIFIED FOR DIMEN-SIONING THE ENVELOPE WIDTH, DIAGONAL, AND HEIGHT.

NOTE 8: AREA BETWEEN MOLD-MATCH LINE AND SEAL BULGE IS 1/2" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND. SUPPORTS MUST BE SPACED FROM THE TUBE BY THE USE OF CUSHIONING PADS MADE OF ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

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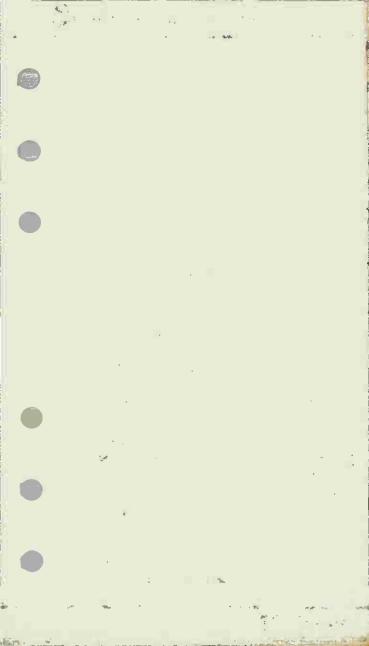




NOTE: PLANES A THRU K ARE NORMAL TO THE TUBE AXIS AND AT FIXED LOCATIONS FROM THE C-D LINE. THESE COORDINATES DESCRIBE THE BULB EXTERNAL CONTOUR IN PLANES THROUGH THE TUBE AXIS AND THE RESPECTIVE FACEPLATE AXES.



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23ARP4

Picture Tube

NO ION-TRAP MAGNET REQUIRED LOW-VOLTAGE ELECTROSTATIC FOCUS 110° MAGNETIC DEFLECTION ELECTRICAL Direct Interelectrode Capacitances Cathode to all other electrodes. . . 5 pF Grid No.1 to all other electrodes. . 6 pF (2500 max External conductive coating to anode . pF 11700 min DF 600 ± 30 mÅ EL. 8 OPTICAL Phosphor P4-Sulfide Type, Aluminized For curves, see front of this section Light transmission (Approx.) 76% **MECHANICAL** 25 lb 14.875 + 0.281 in Overall Length 5.125 ± 0.125 in Projected Area of Screen 282 sg in External Conductive Coating For Additional Information on Coatings and Dimensions See Picture-Tube Dimensional-Outlines and Bulb J187 E sheets at front of this section Cap. Recessed Small Cavity (JEDEC No.JI-21) Base Small-Button Neoeightar 7-Pin Arrangement | (JEDEC No. 87-208) TERMINAL DIAGRAM (Bottom View) Pin 1-Heater Pin 2-Grid No.1 ANODE Pin 3-Grid No.2 Pin 4-Grid No.4 6 61 Pin 6-Grid No.1 3 Pin 7-Cathode Pin 8-Heater G.(2 Cap - Anode (Grid No.3, 7 Grid No.5, Screen, Collector) C-External Conductive Coat ing SHR



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA

23ARP4

	positi														
node Voltage	• • •	• •	•	•	• •	•	•	•	•	•	•	{22000 1 2000	max	v	
irid-No.4 (Focusi	ng) Ve	olta	ge												
Positive value Negative value	• • •	• •	•	•	• •	٠	•	•	•		•	1100 550		¥	
									•	•	•	(550		v	
irid-No.2 Voltage		• •	•	•	• •		•	•		•	•	200		Ý	1
rid-No.l Voltage															
Negative peak v										•		220		V	
Negative bias v Positive bias v	alue.	• •	•	•	1.1	•	٠	٠	•	٠	٠	155	max Max	V	
Positive peak v							1	•	1		•		max	v	
leater Voltage .			-	-					•			∫6.9		V	
eak Heater-Catho				•	• •	•	•	•	•	•	1	ໄ 5.7	min	۷	
During equipm exceeding 15 After equipme Heater positive Combined AC a DC component	o secon ent war e with and DC	nds. m—u res vol	p p peo tag	er t	to	ca.	the	ode	e:	•	•	450 200 200	max max	v v v	
TYPICAL OPERA	TING C	OND	ITI	ON	SF	OR	CA	TH	100)E-	DR	IVE SE	RVICE		
Unless are p	othern ositin														
node Voltage										•		16000		¥	
irid-No.4 Voltage												0 to 400		¥	
irid-No.2 Voltage Cathode Voltage. For visual exti										•	1	400 43 to 78		¥	
		XIMU			RCUI		VAI	LUI	E			1.5		MO	

DATA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



23ASP4

Picture Tube

RECTANGULAR GLASS TYPE ALUWINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

The 23ASP4 is the same as the 23ABP4 except for the following items:

Mechanical:

Tube Dimensions:									
Overall length									17" ± 3/8"
Neck length	•	•	•	•	-	•	•		. 4-1/2" ± 3/16"



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 3-61



23BDP4

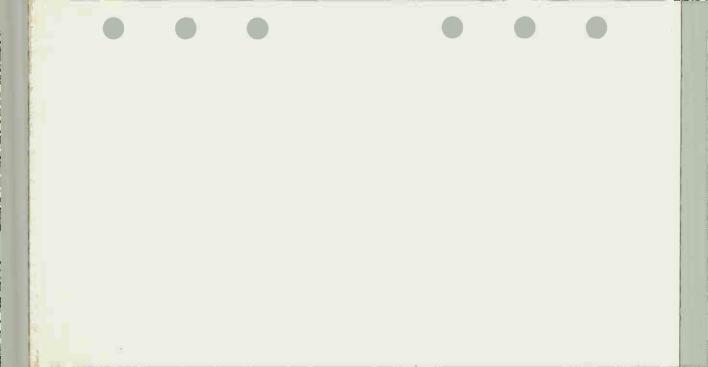
Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS With Heater Having Contro?led Warm-Up Time

The 23BDP4 is the same as the 23YP4 except for the following item:

Optical:





23BGP4

Picture Tube

LOW-VOLTAGE ELECTROSTATIC FOCUS BI-PANEL TYPE No ION-TRAP MAGNET REQUIREO	LOW-GRIO-No.2 VOLTAGE CATHODE-ORIVE TYPE IIO ^O MAGNETIC DEFLECTION
Electrical:	
Direct Interelectrode Capacitances: Cathode to all other electrodes Grid No.1 to all other electrodes. External conductive coating to anode Heater Current at 6.3 volts. Heater Warm-up Time (Average).	2500 max. pf 1700 min. pf
Electron Gun	equiring No Ion-Trap Magnet
Optical:	
Phosphor	-Sulfide Type, Aluminized tion)
Mechanical:	
Base	 15.188" ± .375" 5.125" ± .125" 282 sq. in. Regular-Band Near Reference Line gs and Dimensions: mes and Bulb J187 A sheets Cavity (JEDEC No.J1-21) I-Button Neceightar 7-Pin ment 1. (LFDEC No. 77-208)
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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating	



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Harrison, N. J.

DATA 5-65

23BGP4

Maximum and Minimum Ratings, Design-Haximum Values:		
Unless otherwise specified, voltage values are positive with respect to grid No.1		
Anode Voltage	volts volts	
Grid-No.4 (Focusing) Voltage: Positive value	volts volts volts	
Grid-No.2 Voltage	volts	3
Cathode Voltage: Negative peak value	volts volts volts volts volts	
Heater Voltage	volts	alka a Viret al
Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	volts volts volts	
DC component	AQUES	
Typical Operating Conditions for Cathode-Drive Service	ce:	
Typical Operating Conditions for Cathode-Drive Servio Unless otherwise specified, voltage values are positive with respect to grid No. 1	ce:	
Unless otherwise specified, voltage values are positive with respect to grid No. 1 Anode Voltage	volts volts velts	
Unless otherwise specified, voltage values are positive with respect to grid No. 1 Anode Voltage	volts volts	
Unless otherwise specified, voltage values are positive with respect to grid No. 1 Anode Voltage	volts volts velts	9
Unless otherwise specified, voltage values are positive with respect to grid No. 1 Anode Voltage	volts volts volts volts megóhms heet	3
Unless otherwise specified, voltage values are positive with respect to grid No. 1 Anode Voltage	volts volts volts volts megóhms heet	•
Unless otherwise specified, voltage values are positive with respect to grid No. 1 Anode Voltage	volts volts volts volts megóhms heet	•
Unless otherwise specified, voltage values are positive with respect to grid No. 1 Anode Voltage	volts volts volts volts megóhms heet	



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DATA

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23**B**JP4

Picture Tube

ALUMINIZED SCREEN RECTANGULAR GLASS TYPE 92° MAGNETIC DEFLECTION LOW-VOLTAGE ELECTROSTATIC FOCUS LOW GRID-No.2 VOLTAGE CATHODE-DRIVE TYPE With Heater Having Controlled Warm-Up Time GENERAL DATA Electrical: 600 ± 30 ma. Heater Current at 6.3 volts. Heater Warm-Up Time (Average). . . . 11 seconds Direct Interelectrode Capacitances: 6 Grid No.1 to all other electrodes. . . 14th Cathode to all other electrodes. . . 5 muf (2500 max. µµf External conductive coating to ultor 1700 min. µµf Optical: . .Filterglass Faceplate. . . . 78% Light transmission (Approx.) Phosphor (For Curves, see front of this Section) . P4-Sulfide Type, Aluminized Mechanical: Any Operating Position Overall Length 5-5/8" ± 3/16" Neck Length. Projected Area of Screen 282 sq. in. External Conductive Coating: For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J187 C/F sheets at the front of this section Cap. Recessed Small Cavity (JEDEC No.J1-21) Short Small-Shell Duodecal 6-Pin Base . (JEDEC Group 4, No.B6-203) ULTOR Cap-Ultor Pin 1 - Heater G3,G5 (Grid No.3. Pin 2-Grid No.1 Grid No.5, Pin 6-Grid No.4 Collector) Pin 10-Grid No.2 IO)G2 C-External Pin 11-Cathode c۲ Conductive Pin 12-Heater Coating



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA

23**B**JP4

Maximum and Minimum Ratings, Design-Maximum Values	\$7
ULTOP TO CPLD No. 1 VOLTACE \$25000 m	
ULTOR-TO-GRID-No.1 VOLTAGE	in. volts
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:	
Positive value	
Negative value	
GRID-No.2 TO-GRID-No.1 VOLTAGE	
L 40 III	
GRID-No.2-TO-CATHODE VOLTAGE 70 ma	ax. volts
CATHODE-TO-GRID-No.1 VOLTAGE:	
Positive peak value	
Positive bias value 154 ma	
Negative bias value 0 m	
Negative peak value	
HEATER VOLTAGE	
1 3./ m	in. volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period	
not exceeding 15 seconds 450 ma	ax. volts
After equipment warm-up period 200 m	
Heater positive with	ANI VOILS
respect to cathode 200 ma	ax. volts
Typical Operating Conditions:	
With ultor-to-grid No.1 voltage of 20000	volts
and grid-No.2-to-grid-No.1 voltage of 50	volts
Grid-No.4-to-Grid-No.1 Voltage for focus. 0 to 4(Cathode-to-Grid-No.1 Voltage for visual	00 volts
extinction of focused raster	54 volts
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 mm	ex. megohms

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section





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23BKP4

Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE Low-voltage electrostatic focus Low grid-no.2 voltage

ALUMINIZED SCREEN 92° MAGNETIC DEFLECTION CATHOOE-DRIVE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Heater Current at 6.3 volts 600 ± 30 ma Heater Warm-Up Time (Average) 11 seconds Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 µµf Cathode to all other electrodes 5 µµf External conductive coating to ultor. {2500 max. µµf 1700 min. µµf Electron Gun Type Requiring No Ion-Trap Magnet
Optical: Faceplate and Protective Panel,, Filterglass Light transmission (Approx.),, 40% Phosphor (For curves, see front of this Section), P4—Sulfide Type, Aluminized
Nechanical:
Operating Position. Any Weight (Approx.). 35 lbs Overall Length. 18-7/16" ± 7/16" Neck Length. 5-5/8" ± 3/16" Projected Area of Screen. 282 sq. in. External Conductive Coating: 282 sq. in.
Type
at the front of this section
Cap
Basing Designation for BOTTOM VIEW
Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.2 Pin 10-Grid No.2 Pin 12-Heater Pin 12-Heater H H H H H H H H H H H H H



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 5-62

23BKP4

Maximum and Minimum Ratings, Design-Maximum	Values:		
ULTOR-TO-GRID-No.1 VOLTAGE.	∫25000 max.	volts	
	l15000 min.	volts	1
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:			1
Positive value	1250 max.	volts	
Negative value	400 max.	volts	
GRID-No.2-TO-GRID-No.1 VOLTAGE	{225 max.		
	[40 min.	volts	
GRID-No.2-TO-CATHODE VOLTAGE	70 max.	volts	
Positive peak value	220 max.	volts	1
Positive bias value	154 max.	volts	0
Negative bias value	0 max.		
Negative peak value	2 max.		
HEATER VOLTAGE.	∫6. 9 max.		
	[5.7 min.	volts	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period			e
not exceeding 15 seconds	450 max.		
After equipment warm-up period Heater positive with	200 max.	volts	
respect to cathode	200 max.	volts	
Typical Operating Conditions:			
With ultor-to-grid-No.1 voltage of	2000.0	volts	
and grid-No.2-to-grid-No.1 voltage of	50	volts	
Grid-No.4-to-Grid-No.1 Voltage for focus. Cathode-to-Grid-No.1 Voltage for	0 to 400	volts	
visual extinction of focused raster	36 to 54	volts	
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance	1.5 max.	megohms	

For X-radiation shielding considerations, see sheet I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



RADIO CORPORATION.OF AMERICA Electron Tube Division Harrison, N. J.

23**BQP**4

Picture Tube

ALUMINIZED SCREEN **BI-PANEL RECTANGULAR GLASS TYPE** LOW-VOLTAGE ELECTROSTATIC FOCUS

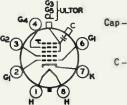
With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Erect icar.
Heater Current at 6.3 volts 450 ± 5% ma Heater Warm-Up Time (Average) 11 seconds Direct Interelectrode Capacitances:
Grid No.1 to all other electrodes 6 muf Cathode to all other electrodes 5 muf
Eutomol conductive contine to ulter \$ 2500 max.
2000 min. Juf
Electron Gun
Optical:
Faceplate and Protective Panel
Mechanical:
Operating Position Any Weight (Approx.)
Type
For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J18r A sheets
at the front of this section
Cap Recessed Small Cavity (JEDEC No.J1-21) Base
Basing Designation for BOTTOM VIEW
Pin 1-Heater G4 (4) C Cap-Ultor
Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 3 - Grid No.2 Grid No.5
Pin 4 - Grid No.4

Pin 6-Grid No.1 Pin 7 - Cathode Pin 8 - Heater



C-External Conductive Coating



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 3-62

23BQP4

	d Minimu			_				-						volts
ULTOR VOLT	AGE	• •	•	•	•	٠	٠	٠	•	٠	•	{23000 12000	min.	volts
RID-No.4	FOCUSIN	G) V	OLT	TA(GE							(12000		
Positive												1100	max.	volts
Negative												550	max.	volts
GRID-No.2 \												550	max.	volts
RID-No.1	VOLTAGE:													
Negative												220	max.	volts
Negative	bias va	lue.		•			•			•		154	max.	volts
Positive												-	max.	volts
Positive												2	max.	volts
EAK HEATER				\G	11									
Heater no														
	t to cat													
	equipme											150		
	exceedin										٠		max.	volts
	equipmen			-u	P I	Del	-10)d	•	٠	•	200	max.	volts
Heater p												200		
respect	t to cat	node	•	•	٠	1	•	٠	•	٠	•	200	max.	volts
ypical Op	erating	Cond	it	i o	ns									
With ulto	or volta	ge o	f									160	00	volts
	-No.2 vo			f								30	0	volts
one price	-	-			5							-	400	volts
								•			•	0 00	100	10112
Grid-No.4		tor												
rid-No.4	Voltage				ste	er						-35 t	0 -77	valts
Grid-No.4 Grid-No.1 extinctio	Voltage on of fo	cuse	d		ste	er	•	•	•	•	9	-35 t	0 -72	volts
Grid-No.4 V Grid-No.1 V	Voltage on of fo	cuse	d		ste	er	•	•	•	•	9	-35 t	0 -72	volts

For X-radiation shielding considerations, see sheet *I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES* at front of this section



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23BTP4

Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS ALUMINIZED SCREEN 92° MAGNETIC DEFLECTION

23CBP4

Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS The 23CBP4 is the same as the 23BQP4 except for the following item: Optical: Surface of Protective Panel.....Treated to reduce

Surface of Protective Panel.....Treated to reduce specular reflection

23CGP4

Picture Tube

 CONTROLLED HEATER WARM-UP TIME

 RECTANGULAR GLASS TYPE

 LOW-VOLTAGE ELECTROSTATIC FOCUS
 92°

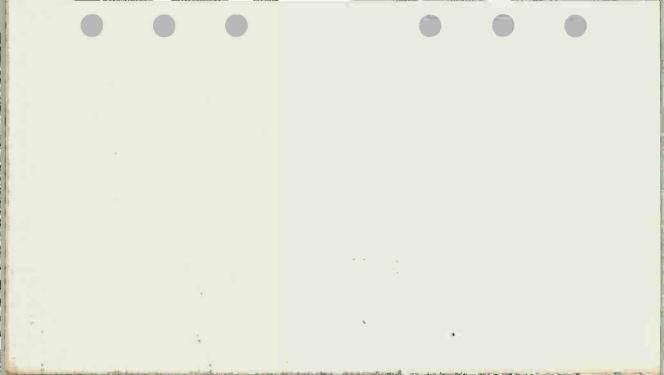
 MAGNETIC DEFLECTION
 70°

 The 23CGP4 is the same as the 23ABP4 except for the following item:

 Electrical:
 Heater Current at 6.3 volts.
 450 ± 20 ma



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Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS With Heater Having Controlled Warm-Up Time

DATA

General:

Н	eater, for Unipotential Cathode:
	Voltage (AC or DC). 6.3 ± 10% volts Current at 6.3 volts. 0.6 ± 5% amp Warm-up time (Average). 11 sec
D	irect Interelectrode Capacitances:
	Cathode to all other electrodes 5 µµf [2500 max, µµf
	External conductive coating to ultor [2000 min. wif
Fa	aceplate and Protective Panel
P	Total light transmission (Approx.)
	Aluminized
	Fluorescence
	Persistence
F	ocusing Method Electrostatic
D	eflection Method
	Diagonal
	Horizontal
Ε	lectron Gun Type Requiring No Ion-Trap Magnet
T	ube Dimensions:
	Overall length
	Greatest height
	Diagonal
	Radius of curvature of protective panel (External surface):
	Radius at center Radius at edge
	In plane of diago-
	nal deflection 50-1/4" See Dimen- sional Outline
	In plane of hori-
	zontal deflection 50-1/4" 35-1/4" In plane of verti-
	cal deflection 45-1/2" 35"
	Radius of curvature of faceplate (Internal surface):
	Radius at center Radius at edge
	In plane of diago-
	nal deflection 39-1/2" 31-1/2" In plane of hori-
	zontal deflection 39-3/4" 26-1/2"

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Radius at center Radius at edge In plane of vertical deflection. 18-1/2" 36-3/4" Screen Dimensions (Minimum): Greatest width. 19-5/16" Greatest height . . . 15-1/4" 22-5/16" 282 sq. in. Weight (Approx.)..... •••• 33 lbs Operating Position. . . Any Bulb. J187 Fitted with Protective Panel FP198 Base. Small-Button Neoeightar 7-Pin, Arrangement 1, (JEDEC No. B7-208) Basing Designation for BOTTOM VIEW. 8HR Pin 1-Heater Cap-Ultor Pin 2-Grid No.1 (Grid No.3. Pin 3-Grid No.2 Grid No.5, Pin 4-Grid No.4 Collector) Pin 6-Grid No.1 C-External Pin 7-Cathode Conductive Pin 8-Heater Coating GRID-DRIVEA SERVICE Unless otherwise specified, voltage values are positive with respect to cathode Maximum and Minimum Ratings, Design-Center Values: (20000 max, volts ULTOD VOLTACE

ULTOR VOLTAGE .		• •	• •	•	•	•	•			12000	min	volts	
GRID-No.4 (FOCUS	SINGLA	IT IO	NCF -							(+2000		torea	
Positive value										1000	max.	volts	
Negative value										500	max.	volts	
GRID-No.2 VOLTA										500	max.	volts	
GRID-No.1 VOLTA		• •		•			-			000			
Negative-peak							-		1	200	max.	volts	6
Negative-bias										140	max.	volts	6
Positive-bias	value									0	max.	volts	
Positive-peak										2	max.	volts	
PEAK HEATER-CAT							-			-			
Heater negativ				to	Ca	ath	noc	ie:					
During equi													
exceeding										410	max.	volts	C.
After equip										180	max.	volts	
Heater positiv										180	max.	volts	-
										100		TOTES	
Equipment Design	n Range	s:											
	• • -												

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CA RCA

	Grid-No.1 Voltage (E _{C1K}) for visual extinction of focused raster	ster-Cutoff- for Grid-Dr	
		value as det	ermined for
	Ł.c. į k	except video	drive is a
			ive voltage
		-25 to +25	μa
		-15 to +15	μa
	Field Strength of Adjust- able Centering Magnet♥	0 to 8	gausses
	Examples of Use of Design Ranges:		
	With ultor voltage of	18000	volts
	and grid-No.2 voltage of	400	volts
	Grid-No.4 Voltage for focus*	0 to 400	volts
	Grid-No.1 Voltage for	0 10 400	Vorts
	visual extinction of		
		-44 to -94	volts
	Grid-No.1 Video Drive		
	from Raster Cutoff		
	(Black level):		
	White-level value	44 to 94	volts
	Maximum Circuit Values:		
	Grid-No.1-Circuit Resistance	• 1.5 ma	x. megohms
	CATHODE-DRIVE SER	VICE	
	Unless otherwise specified,	voltage valu	
	are positive with respect		
	Maximum and Minimum Ratings, Design-Co	•	
	Haringen and Hillingen Hacinget besign of	(20000	
	ULTOR-TO-GRID-No.1 VOLTAGE	• • 12000•	
	GRID-No.4-TO-GRID-No.1 (FOCUSING)	(12000	
	VOLTAGE:		
	Positive value	1000	max. volts
	Negative value	. 500	max. volts
	GRID-No.2-TO-GRID-No.1 VOLTAGE		max. volts
	GRID-No.2-TO-CATHODE VOLTAGE	500	max. volts
	CATHODE-TO-GRID-No.1 VOLTAGE:	. 200	max, volts
	Positive-peak value	. 140	max, volts max, volts
	Negative-bias value		max. volts
	Negative-peak value.		max, volts
	PEAK HEATER-CATHODE VOLTAGE:		
	Heater negative with respect to catho	de:	
	During equipment warm-up period no	t	
	exceeding 15 seconds	410	max. volts
_	the second second second second second second second second second second second second second second second s		

RCA

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 2 8-60

180 max	. velts	
	. volts	
(Bong) between	19000	
d-No.1 voltage (Beggy	
volts		
0 te 400	veits	
or Cathode-Drive	Service	
motob se eulev	ined for	
-25 to +25	M	
-15 to +15	μa	
0 to 8	gausses	
	malda	
20020		
466	maite	
444		
0 40 400		
9 00 400	VUI LU	
42 to 78	volts	
-42 to -78	veits	
· . 1.5 RMX.	megohms	
which the video sid	nel veries	í
athode.		
num. The equivalen	t absolute	
be impaired. The	equipment	
lining a minimum de rating conditions	sign value	
riation the absolu	te minimum	
	<pre>cde 150 max (E cgg j) between d-No.1 voltage (volts 0 te 400 water-Cutoff-Res or Cathode-Drive value as determ except video dr negative -25 to +25 -15 to +15 0 to 8 slosse 400 0 to 400 42 to 78 -42 to -78 . 1.5 max. which the video sig about the video sig a</pre>	ode. 180 max. volts (E _{cgg1}) between 12000 ⁰ d-No.1 voltage (E _{cgg1}) 0 to 400 velts 0 to 400 velts value as determined for except video drive is a negative voltage -25 to +25 µA -15 to +15 µA 0 to 8 gausses 10 to 8 gausses 10 to 8 velts 42 to 78 velts

ultor (or ultor-to-grid-No.1) voltege 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 may have a value anywhere between 0 and 400 volts; 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.

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(RC4

23CP4

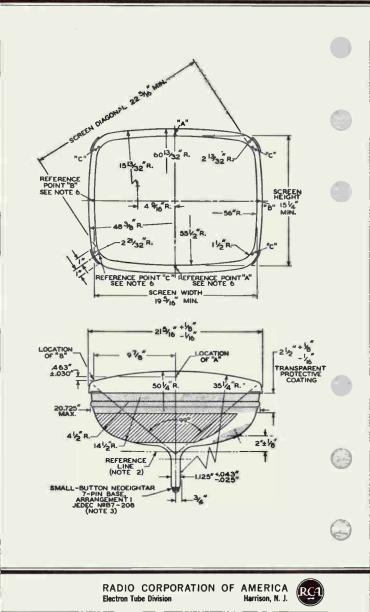
- Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4". Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 3/8-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic 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.

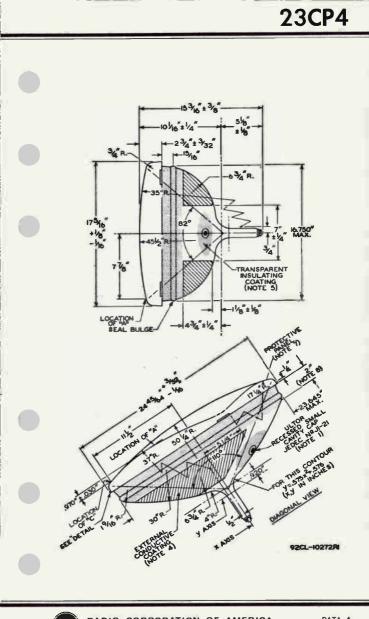
For I-ray shielding considerations, see sheet I-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section



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23CP4







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DETAIL OF MOUNTING LUG 6°30'+ PROTECTIVE PANEL (NOTE 7) ''3" R ''4 MOUNTING LUG (NOTE 6)

23CP4

NOTE I: 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°. 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 OF 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 LINT-LESS CLOTH.

NOTE 6: REFERENCE POINTS A, B, AND C ARE PROVIDED FOR USE IN DESIGN OF A MASK CONTOURED FOR CLOSE FIT TO THE PROTECTIVE PANEL.

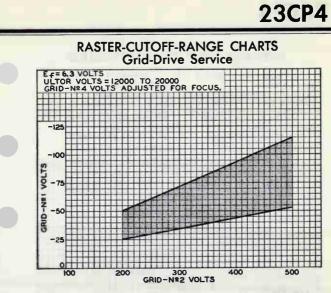
NOTE 7: THE CENTER OF THE PROTECTIVE PANEL MAY BE ECCENTRIC WITH RESPECT TO THE AXIS OF THE TUBE ENVELOPE. ASSOCIATED SHIFT OF THE PROTECTIVE PANEL ALONG ITS MINOR AND/OR MAJOR AXIS WILL NOT EXCEED I/16".

NOTE 8: KEEP THIS CIRCUMFERENTIAL AREA FREE OF MOUNTING HARDWARE.

NOTE 9: ADEQUATE TUBE SUPPORT IS OBTAINED BY CLAMPING TO THE MOUNTING LUGS PROVIDED AT EACH CORNER OF THE PROTECTIVE PANEL. TUBE MOUNTING AND YOKE SUPPORT CLAMPS MUST BE SPACED FROM THE TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS.ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

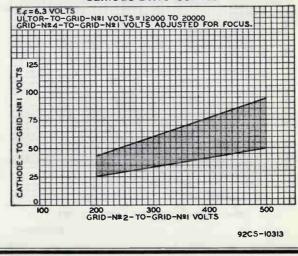
> RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.





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Cathode-Drive Service



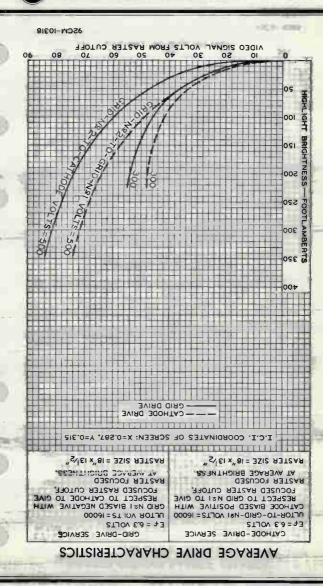
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DATA 5 8-60



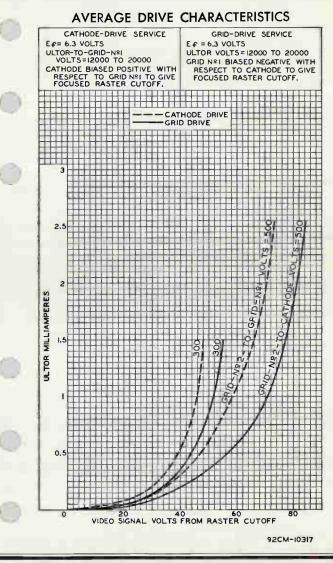
23CP4



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0 0

23CQP4

Picture Tube

LOW-VOLTAGE ELECTROSTATIC FOCUS NO ION-TRAP MAGNET REQUIRED II4º MAGNETIC DEFLECTION Electrical:
Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf External conductive coating to anode
Heater Current at 6.3 volts 450 ± 20 ma Heater Warm-Up Time (Average) 11 seconds Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Phosphor
Faceplate and Protective Window
Nechanical:
Weight (Approx.). 24 lbs Overall Length. 13.781" ± .281" Neck Length. 4.375" ± .125"
Projected Area of Screen
External Conductive Coating: TypeRegular-Band Contact area for groundingNear Reference Line
For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J187B sheets at front of this section.
Cap
Pin 1-Heater
Pin 2-Grid No.1 G4
Pin 3-Grid No.2 Pin 4-Grid No.4
Pin 6-Grid No.1
Pin 7-Cathode
Pin 8-Heater Cap - Anode
(Grid No. 3, Grid No. 5,
Screen, Collector)
C-External conductive coating
×



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23CQP4

Anode Voltage 23500 max. volts 11000 min. volts Grid-No.4 (Focusing) Voltaget Positive value 1100 max. volts 550 max. volts Segative value 550 max. volts (200 min. volts) Grid-No.2 Voltage 220 max. volts (200 min. volts) Grid-No.1 Voltage: Negative bias value 220 max. volts (200 min. volts) Positive bias value 220 max. volts (200 min. volts) Positive bias value 0 max. volts (6.9 max. volts) Positive peak value 2 max. volts (5.7 min. volts) Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds. 450 max. volts (5.7 min. volts) Peak Heater positive with respect to rathode: Combined AC and DC voltage. 200 max. volts (200 max. volts) Typical Operating Conditions for Cathode-Drive Service: Unless otherwise specified, voltage values are positive with respect to grid No.1 Anode Voltage 14000 volts Grid-No.2 Voltage 00 volts Grid-No.2 Voltage 00 volts Grid-No.2 Voltage for visual extinction of focused raster 36 to 78 volts Maximum Circuit Yalue: Grid-No.1-Circuit Resistance. 1.5 max. megohms For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAT TUBES at front of this section <th>are pos</th> <th>itive s</th> <th>ith</th> <th>resp</th> <th>ect</th> <th>to</th> <th>cat</th> <th>hode</th> <th></th> <th></th>	are pos	itive s	ith	resp	ect	to	cat	hode		
Grid-No.4 (Focusing) Voltaget 1100 max. volts Negative value. 550 max. volts Grid-No.2 Voltage. 550 max. volts Grid-No.1 Voltage: 200 min. volts Negative peak value 155 max. volts Negative peak value 155 max. volts Positive peak value 0 max. volts Positive peak value 0 max. volts Positive peak value 0 max. volts Positive peak value 0 max. volts Positive peak value 0 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive with respect to cathode: 0 max. volts During equipment warm-up period 200 max. volts Meater positive with respect to rathode: 200 max. volts DC component 100 max. volts DC component 100 max. volts Typical Operating Conditions for Cathode-Drive Service: Unless otherwise specified, voltage values are positive with respect to grid No.1<	Anode Voltage			• •	•		.{	23500 11000	max. min.	
Negative value. 550 max. volts Grid-No.2 Voltage. 550 max. volts Grid-No.1 Voltage: 200 min. volts Negative bias value 220 max. volts Positive bias value 155 max. volts Positive bias value 0 max. volts Positive bias value 0 max. volts Positive bias value 0 max. volts Positive bias value 0 max. volts Positive bias value 0 max. volts Positive bias value 0 max. volts Positive bias value 0 max. volts Positive peak value 0 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Peak Heater-Cathode Voltage: 450 max. volts Heater negative with respect to cathode: 200 max. volts During equipment warm-up period 200 max. volts Matter equipment warm-up period 200 max. volts DC component. 100 max. volts DC component. 100 max. volts Dring equipment warm-up period. 200 max. volts Combined AC and DC voltage. 200 max. volts DC component. 100 max. volts <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>										
Grid-No.2 Voltage 550 max. volts Grid-No.1 Voltage: 200 min. volts Negative peak value 155 max. volts Negative bias value 0 max. volts Positive bias value 0 max. volts Positive peak value 0 max. volts Positive peak value 0 max. volts Positive peak value 0 max. volts Positive peak value 0 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Peak Heater-Cathode Voltage: 450 max. volts Peak Heater-Cathode Voltage: 200 max. volts During equipment warm-up period 200 max. volts After equipment warm-up period 200 max. volts DC component 200 max. volts DC component 100 max. volts Typical Operating Conditions for Cathode-Drive Service: Unless otherwise specified, voltage values are positive with respect to grid No.1 Anode Voltage 14000 volts 14000 vo	Positive value				•		•			
Grid-No.1 Voltage: [200 min. volts Negative peak value 220 max. volts Negative bias value 155 max. volts Positive bias value 0 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Heater Voltage: [6.9 max. volts Heater negative with respect to cathode: During equipment warm-up period During equipment warm-up period 200 max. volts Heater positive with respect to rathode: 200 max. volts DC component 200 max. volts DC component 100 max. volts Typical Operating Conditions for Cathode-Drive Service: Unless otherwise specified, voltage values are positive with respect togrid No.1 Anode Voltage 14000 volts Voltage Grid-No.2 Voltage 14000 volts Cathode Voltage for visual extinction of focused raster 36 to 78 volts Maximum Circuit Value: 15 max. megohmas Grid-No.1-Circuit Resistance. <td< td=""><td></td><td></td><td></td><td></td><td></td><td>• •</td><td></td><td></td><td></td><td></td></td<>						• •				
Grid-No.1 Voltage: 220 max. volts Negative peak value 155 max. volts Positive bias value 0 max. volts Positive bias value 0 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Positive peak value 2 max. volts Heater Voltage. {6.9 max. volts During equipment warm-up period 5.7 min. volts Peak Heater positive with respect to cathode: 200 max. volts During equipment warm-up period 200 max. volts After equipment warm-up period 200 max. volts DC component. 200 max. volts DC component. 100 max. volts DC component. 100 max. volts Typical Operating Conditions for Cathode-Drive Service: Unless otherwise specified, voltage values are positive with respect to grid No.1 Anode Voltage. 14000 volts Grid-No.4 Voltage. 400 volts Grid-No.2 Voltage. 400 volts Grid-No.1-Circuit Resistance. 36 to 78 volts Maxinum Circuit Value: 1.5 max. me	Grid-No.2 Voltage .			• •	•	• •	٠	1550	max.	
Negative bias value										
Positive bias value										
Positive peak value	Negative bias valu	e	• •		•	• •				
Heater Voltage. 6.9 max. volts Heater Voltage. 5.7 min. volts Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period							•			
<pre>neater voltage</pre>							•			
Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	Heater Voltage				•	• •	•			
Arter explored with respect to rathode: Combined AC and DC voltage. 200 max. volts DC component. 100 max. volts Typical Operating Conditions for Cathode-Drive Service: Unless otherwise specified, voltage values are positive with respect togrid No.1 Anode Voltage. 14000 volts Grid-No.4 Voltage. 0 to 400 volts Cathode Voltage for visual extinction of focused raster. 36 to 78 volts Maximum Circuit Value: Grid-No.1-Circuit Resistance. 1.5 max. megohms For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at	Heater negative wi During equipment not exceeding	th resp warm-u 15 seco	pect p pe onds.	rio	5					
Combined AC and DC voltage 200 max. volts DC component 100 max. volts Typical Operating Conditions for Cathode-Drive Service: Unless otherwise specified, voltage values are positive with respect togrid No.1 Anode Voltage	Arter equipment	th root	oct	to	ati	hode		200	THEAT OF	101.00
DC component 100 max. volts DC component	Combined AC and	DC volt	ane	10 1	011	TUREPE		200	max.	volts
Typical Operating Conditions for Cathode-Drive Service: Unless otherwise specified, voltage values are positive with respect to grid No.1 Anode Voltage 14000 volts Grid-No.4 Voltage 0 to 400 volts Gathode Voltage for visual extinction of focused raster 36 to 78 volts Maximum Circuit Value: Grid-No.1-Circuit Resistance. 1.5 max. megohms For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at										volts
Anoue Voltage 0 to 400 volts Grid-No.2 Voltage	Unless oth are post	ierwise itive w	spec ith r	ifi	ed, ect	vol to p	tag	e valu 1 No.1	es	
of focused raster	Grid-No.4 Voltage . Grid-No.2 Voltage . Cathode Voltage for	visual	ext	inct	ion	:	• •	0 to 400	400	volts
Grid-No.1-Circuit Resistance	of focused raster							36 to	78	volts
For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at	Maximum Circuit Valu	le:								
For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at	Grid-No.1-Circuit R	esistan	ce					1.5 n	ax.	megohms
	For X-radiation X-RADIATION	PRECAUT	IONS	FOR	CAT	HOD	E-R	ns, se AY TUB	e she ES at	et



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DATA

23DAP4

Picture Tube

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 94° MAGNETIC DEFLECTION

Low-Grid-No.2-Voltage Type for Cathode-Drive Operation

GENERAL DATA

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf External conductive coating to anode . {2500 max. pf
Heater Current at 6.3 volts
Optical: Phosphor (For curves, see front of this section) P4Sulfide Type,
Aluminized Faceplate
Mechanical:
Weight (Approx.)
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Pin 8 - Heater



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Maximum and Minimum Ratings, Design-Maximum Values:	
Unless otherwise specified, voltage values	
are positive with respect to grid No.1	
ANODE VOLTAGE	
RID-No.4 VOLTAGE:	VUILS
Positive value	volts
Negative value	
RID-No.2 VOLTAGE	
[40 min.	volts
CATHODE VOLTAGE: Negative peak value	
Negative peak value 2 max. Negative bias value 0 max.	volts
Positive bias value	volts
Positive peak value	
IEATER VOLTAGE	
15.7 min.	volts
EAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode:	
During equipment warm-up period	
not exceeding 15 seconds 450 max.	
After equipment warm-up period 200 max.	volts
Heater positive with respect to cathode:	
Combined AC & DC voltage 200 max.	volts
DC Component	volts
Typical Operating Conditions for Cathode-Drive Servi	ce:
Unless otherwise specified, voltage values	
are positive with respect to grid No. 1	
Anode Voltage	volts
rid-No.4 Voltage*.	volts
rid-No.2 Voltage	volts
Cathode Voltage for visual	
extinction of focused raster 35 to 55	volts
ield Strength of required	
adjustable Centering Magnet 0 to 12	gausses
faximum Circuit Value:	
Grid-No.1 Circuit Resistance 1.5 max.	manahma
in the next circuit hesistance 1.3 max.	megohms
For X-radiation shielding considerations, see s	hast
I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBE	re
at front of this Section	
The grid-#0.4 voltage required for optimum focus of any indi will have a value anywhere between -100 and +300 volts.	vidual tube





23DBP4

Picture Tube

LOW-VOLTAGE ELECTROSTATIC FOCUS NO ION-TRAP MAGNET REQUIRED ALUMINIZED SCREEN RECTANGULAR GLASS TYPE 110° MAGNETIC DEFLECTION Low-Grid-No.2-Voltage-for Cathode-Drive Operation
Electrical:
Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf External conductive coating to anode. {2500 max. pf 2000 min. pf Heater Current at 6.3 volts 600 ± 30 ma Heater Warm-Up Time (Average) 11 seconds Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Phosphor (For Curves, see front of this Section) .P4—Sulfide Type, Aluminized Faceplate
Mechanical:
Weight (Approx.)
RADIO CORPORATION OF AMERICA DATA



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u i littetuur Debinen Desim Menimum I	la lue e t	
Maximum and Minimum Ratings, Design-Maximum 1		
Unless otherwise specified, voltage are positive with respect to Gri	d No. 1	
	22000 max.	volts
Anode Voltage	15000 min.	volts
Grid-No.4 (Focusing) Voltage:	1250 max.	volts
Positive value	400 max.	volts
Negative value	250 max.	volts
	∫100 max.	volts
Grid-No.2 to Cathode Voltage	1 40 min.	volts
Cathode Voltage: Positive peak value	220 max.	volts
Positive bias value	155 max.	volts
Negative bias value	0 max.	volts
Negative peak value	2 max.	volts
Heater Voltage	[6.9 max.	
	{5.7 min.	volts
Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds After equipment warm-up period Heater positive with respect to cathode .	450 max. 300 max. 200 max.	volts volts
Typical Operating Conditions for Cathode-Dri	ve Service:	:
Unless otherwise specified, voltage are positive with respect to gr	values	
Anode Voltage	18000	volts
Grid-No.4 Voltage.	250	volts
Grid-No.2 Voltage.	50	volts
Cathode Voltage for		
visual extinction of focused raster	34 to 52	volts
Maximum Circuit Value:		
Grid-No.1 Circuit Resistance	1.5 max. (negohns
For X-radiation shielding consideration I-RADIATION PRECAUTIONS FOR CATHODE- at front on this Section	ns, see she RAY TUBES	et



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Picture Tube

PAN-O-PLY - INTEGRAL IMPLOSION PROTECTION (Provided by Formed Rim and Welded Tension Bands around Periphery of Tube RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 92° MAGNETIC DEFLECTION NO ION-TRAP MAGNET REQUIRED Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes. . . 5 Grid No.1 to all other electrodes. . . 6 External conductive coating to anode® [2500 max. 11700 min. Heater Current at 6.3 volts. . . 450 + 20Heater Warm-Up Time (Average). 11 seconds Optical: Phosphor (For curves, see front of this section) . P4--Sulfide Type, Aluminized Faceplate.Filterglass Light transmission at center (Approx.) 42% Mechanical: Weight (Approx.) 29 lbs Overall Length 18.000" ± .375" Neck Length. . . . 5.500" ± .188" Projected Area of Screen . . 282 sq. in. External Conductive Coating: Contact area for grounding Near Reference Line For Additional Information on Coatings, Dimensions, and Deflection Angles: See Picture-Tube Dimensional-Outlines and Bulb J187 J sheets at the front of this section. Cap. Recessed Small Cavity (JEDEC No.J1-21) (JEDEC Group 4, No. 86-203) G4 Pin 1-Heater ANODE (6 Cap - Anode. Pin 2-Grid No.1

(Grid No.3. Pin 6-Grid No.4 Grid No.5. Pin 10-Grid No.2 Screen. Pin 11 - Cathode CL (10)G2 Collector) Pin 12 - Heater C-External Conductive Coating



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23EKP4

M. T	Related	
Maximum and Minimum Ratings, Design-Maximum		
Unless otherwise specified, voltag are positive with respect to	cathode	
Anode Voltage	25000 max. 11000 min.	volts volts
Grid-No.4 Voltage: Positive value	1100 max. 550 max. {550 max. 200 min.	volts volts volts volts
Grid-No.1 Voltage: Negative peak value Negative bias value Positive bias value Positive peak value Heater Voltage Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not	220 max. 155 max. 0 max. 2 max. 6.9 max. 5.7 min.	volts volts volts volts volts volts volts
exceeding 15 seconds	450 max. 300 max. 200 max. 100 max.	volts volts volts volts
Typical Operating Conditions for Cathode-Driv	e Service:	
Unless otherwise specified, volta	ge values	
Unless otherwise specified, volta are positive with respect to g	ge values rid No.1	
Unless otherwise specified, volta are positive with respect to g Anode Voltage	ge values rid No.1 20000	volts
Unless otherwise specified, volta are positive with respect to g Anode Voltage	ge values rid No.1 20000 200	volts
Unless otherwise specified, volta are positive with respect to g Anode Voltage. Grid-No.4 Voltage Grid-No.2 Voltage.	ge values rid No.1 20000	
Unless otherwise specified, volta are positive with respect to g Anode Voltage	ge values rid No.1 20000 200	volts
Unless otherwise specified, volta are positive with respect to g Anode Voltage	ge values rid No.1 20000 200 400	volts
Unless otherwise specified, volta are positive with respect to g Anode Voltage	ge values rid No. 1 20000 200 400 36 to 78	volts volts volts gauss
Unless otherwise specified, volta are positive with respect to g Anode Voltage	ge values rid No.1 20000 400 36 to 78 0 to 12 1.5 max. n sof any individ olts with the usted to give Be-inch patterr	volts volts volts gauss megohms hual tube combined an anode from an

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23ENP4

Picture Tube

PAN-O-PLY --- INTEGRAL IMPLOSION PROTECTION

(Provided by Formed Rim and Weided Tension Bands around Periphery of Tube Panel——No Separate Safety-Glass or Integral Protective Window Required) RECTANGULAR GLASS TYPE ALUMINIZEO SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 92° MAGNETIC DEFLECTION NO ION-TRAP MAGNET REQUIRED

Low-Grid-No.2-Voltage-for Cathode-Orive Operation

Electrical:

Electrical:
Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf
External conductive coating to anode ^a . 1700 min. pf
Heater Current at 6.3 volts 600 ± 30 ma Heater Warm-up Time (Average) 11 seconds Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Phosphor (for curves, see front of this Section)P4-Sulfide Type, Aluminized
Faceplate
Nechanical:
Weight (Approx.)
Contact area for grounding Near Reference Line For Additional Information on Coatings, Dimensions, and Deflec- tion Angles:
See Picture-Tube Dimensional-Outlines and Bulb J187 J
sheets at the front of this section. Cap Recessed Small Cavity (JEDEC No. J1-21)
Base
Basing Designation for BOTTOM VIEW
Pin 1 - Heater Pin 2 - Grid No.1 Pin 6 - Grid No.2 Pin 11 - Cathode Pin 12 - Heater Pin



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Maximum and Minimum Ratings, Design-Haximum	Values:	
Unless otherwise specified, voltag	e values	
are positive with respect to gr		
Anode Voltage	5000 max.	volts
	1000 min.	volts
Grid-No.4 Voltage:	4050	
	1250 max.	volts
Negative value	400 max.	volts
Grid-No.2 Voltage	∫70 max.	volts
	\40 min.	volts
Cathode Voltage:		
Negative peak value	2 max.	volts
Negative bias value	0 max.	volts
Positive bias value	100 max.	volts
Positive peak value	150 max.	volts
	6.9 max.	volts
Heater Voltage	15.7 min.	volts
Peak Heater-Cathode Voltage: Heater negative with respect to cathode:		
During equipment warm-up period	150	
not exceeding 15 seconds	450 max.	volts
After equipment warm-up period	300 max.	volts
Heater positive with respect to cathode:		
Combined AC & DC voltage	200 max.	volts.
DC Component	100 max.	volts
Typical Operating Conditions for Cathode-Dri	ve Service:	1
Unless otherwise specified, voltag	e values	
are positive with respect to g		
Anode Voltage	20000	volts
Grid-No.4 Voltage	200	volts
Grid-No.2 Voltage	50	volts

Grid-No.2 Voltage.		٠	٠	•	۰	•	50	volts
Cathode Voltage for visual extinction of focused raster Field Strength of required	•	•	•	•		•	36 to 54	volts
adjustable Centering Magnet.		•	•	•	•	•	0 to 12	gauss

Maximum Circuit Value:

Grid-No.1 Circuit Resistance 1.5 max. megohms

a includes implosion protection hardware.

The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between 0 and +400 volts with the combined grid-No.1 voltage and video-signal voltage adjusted to give an anote current of 200 microamperes on a 13-1/2-inch by 18-inch pattern from an RCA-2721 monoscope, or equivalent.

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





Picture Tube

BI-PANEL 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:

delief al.
Heater, for Unipotential Cathode:
Voltage (AC or DC) 6.3 ± 10% volts
Current at 6.3 volts 0.6 amp
Warm-up time (Average)
Direct Interelectrode Capacitances:
Grid No.1 to all other electrodes 6 µµf
Cathode to all other electrodes 5 unif
External conductive coating to ultor . (2500 max. ##f
External conductive coating to ultor {2500 max. ##f
Faceplate and Protective Panel
Total light transmission (Approx.)
Phosphor (For curves, see front of this Section) P4-Sulfide Type
Aluminized
Fluorescence
Phosphorescence
Persistence Medium Short
Focusing Method.
Deflection Method
Deflection Angles (Approx.):
Diagonal
Horizontal
Vertical
Electron Gun
Tube Dimensions:
15-2/16" + 2/9"
Overall length 15-3/16" ± 3/8" Greatest width 21-5/16" + 1/8" - 1/16" Greatest height 17-5/16" + 1/8" - 1/16" Diagonal 24-45/64" + 3/32" - 1/16"
Neck length
Radius of curvature of protective panel
(External surface):
Radius at center Radius at edge
in plane of diago-
nal deflection 50-1/4" See Dimen-
sional Outline
In plane of hori-
zontal deflection 50-1/4" 35-1/4"
In plane of verti-
cal deflection 45-1/2" 35"
Radius of curvature of faceplate (Internal surface):
Radius at center Radius at edge
In plane of diago-
nal deflection



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Radius at cente	r Radius at edge
In plane of hori-	
zontal deflection 39-3/4" In plane of verti-	28-1/2"
cal deflection	30-1/2°
Greatest width. Greatest height Diagonal. Projected area. Weight (Approx.). Operating Position. Cap. Bulb. J187 Fitted with Pro Base. Small-Button Neoeightar 7-	
Basing Designation for BOTTOM VIEW	(JEDEC No. B7-219)
Pin 2 - Internal Connection- Do Not Use Pin 3 - Cathode Pin 4 - Heater Pin 5 - Heater Pin 6 - Grid No. 1 Pin 7 - Grid No. 2	Pin 8-Grid No.4 Cap-Ultor (Grid No.3, Grid No.5, Collector) C-External Conductive Coating

CATHODE-DRIVE* SERVICE

Suless 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	{20000 12000*	max.	velta	
GRID-No. 4-TO-GRID-No. 1 (FOCUSING) VOLTAGE:	[12000	men.	40152	
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		max.	volts	
After equipment warm-up period	180	max.	volts	
Heater positive with respect to cathode.	180	max.	volts	

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Equipment Design Ranges:					
With any ultor-to-grid-No. 1 voltage (E_{CSE_1}) between 12000 and 20000 volts and grid-No. 2-to-grid No. 1 voltage (E_{CSE_1}) between 40 and 64 volts					
Grid-No.4-to-Grid-No.1 Vo	ltage				
for focus#		0 to 400	volts		
Cathode-to-Grid-No.1 Volta	age				
(Ekg) for visual extin	C-				
tion of focused raster	See Raste	r-Cutoff-Ran	ge Chart		
Cathode-to-Grid-No.1					
Video Drive from Raster					
Cutoff (Black level):					
White-level value					
(Peak negative)					
exce	pt video drive i		voltağê		
Grid-No.4 Current		-25 to +25	μa		
		-15 to +15	μa		
Field Strength of Adjusta	ble				
Centering Magnet		0 to 8	gausses		
Examples of Use of Design	Ranges:				
With ultor-to-grid-					
No.1 voltage of	10000	18000	volts		
and grid-No. 2-to-grid-	/				
No. 1 voltage of	50	50	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	Sector State (Sector)				
raster	32 to 47	34 to 49	volts		
Cathode-to-Grid-No.1					
Video Drive from Raster					
Cutoff (Black level):	00 1- 17	04 4- 10	volts		
White-level value	· · -32 to -4/	-34 10 -49	VOILS		
Maximum Circuit Values:					
Grid-No.1-Circuit Resista	000	. 1.5 max.	megohns		
Cathode drive is the opera varies the cathode potentia electrodes.	ting condition in 11 with respect to	which the vid grid No.1 and	eo signal the other		
	gn-center minimum.	The equivalen	t adsolute		
 This value is a working design minimum ultor-to-grid-No.1 serviceability of the 23EPA 	voltage is 11,00	0 volts below	which the		
has the responsibility of	determining a min	imum design v	alue such		
has the responsibility of that under the worst probab voltage variation and equip	Me operating cond	absolute mini	ng supply-		
to-grid-No.1 voltage is neve	er less than 11,000	volts.			
* The grid-so s-to-grid-so 1	oltage required to	r focus of any	Individual		

The grid-No.4-to-grid-No.1 voltage required for focus of any individual tube may have a value anywhere between 0 and 400 volts.

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 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.



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

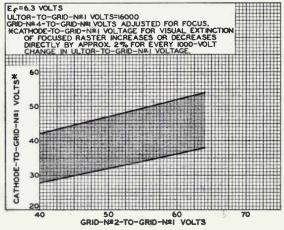


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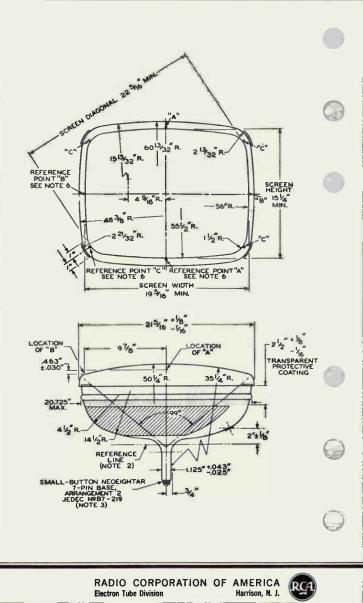
RASTER-CUTOFF-RANGE CHART Cathode-Drive Service

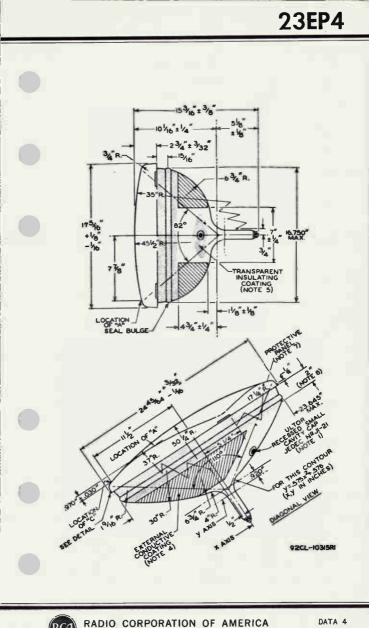


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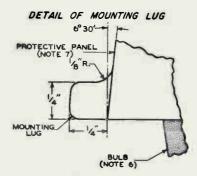




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DATA 4 8-60



NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 8 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 30°. ULTOR TERMINAL IS ON SAME SIDE AS PIN 8.

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 OF 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 LINT-LESS CLOTH.

NOTE 6: REFERENCE POINTS A, B, AND C ARE PROVIDED FOR USE IN DESIGN OF A MASK CONTOURED FOR CLOSE FIT TO THE PROTECTIVE PANEL.

NOTE 7: THE CENTER OF THE PROTECTIVE PANEL MAY BE ECCENTRIC WITH RESPECT TO THE AXIS OF THE TUBE ENVELOPE. ASSOCIATED SHIFT OF THE PROTECTIVE PANEL ALONG ITS MINOR AND/OR MAJOR AXIS WILL NOT EXCEED I/16".

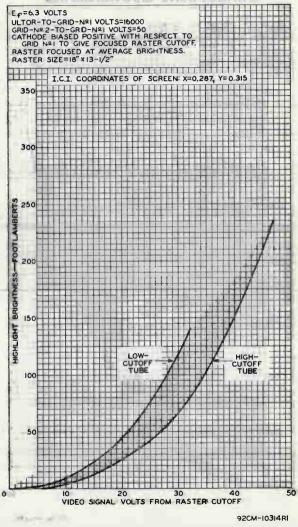
NOTE 8: KEEP THIS CIRCUMFERENTIAL AREA FREE OF MOUNTING HARDWARE.

NOTE 9: ADEQUATE TUBE SUPPORT IS OBTAINED BY CLAMPING TO THE MOUNTING LUGS PROVIDED AT EACH CORNER OF THE PROTECTIVE PANEL. TUBE MOUNTING AND YOKE SUPPORT CLAMPS MUST BE SPACED FROM THE TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

> RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



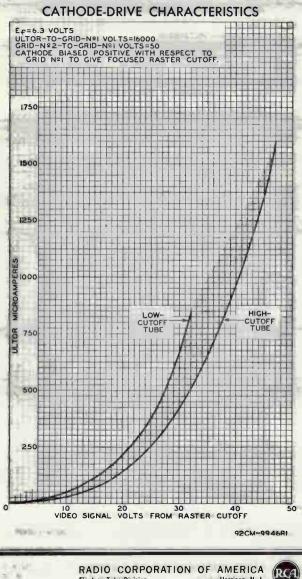




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Electron Tube Division



23EQP4

Picture Tube

PAN-O-PLY-INTEGRAL IMPLOSION PROTECTION

(Provided by Formed Rim and Weided Tension Bands Around Periphery of Tube Panel—No Separate Safety-Glass or Integral Protective Window Required) LOW-VOLTAGE ELECTROSTATIC FOCUS II4^O MAGNETIC OEFLECTION

ELECTRICAL

ELECTRICAL						
Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode1700 min—2500 max pF Heater Current at 6.3 volts						
OPTICAL						
Phosphor						
For curves, see front of this section						
Faceplate						
MECHANICAL Weight (Approx.). 28 lb Overall Length. 14.531 ± 0.281 in Neck Length. 14.531 ± 0.281 in Projected Area of Screen. 5.125 ± .125 in External Conductive Coating ^a 5.125 ± .125 in Type. 282 sq in External Conductive Coating ^a Modified-Band Contact area for grounding. Near Reference Line For Additional Information on Coatings and Dimensions See Picture-Tube Dimensional-Outlines and Bulb J187L sheets at front of this section Cap Recessed Small Cavity (JEOEC No.J1-21) Base. Small-Button Neoeightar 7-Pin, Arrangement 1, (JEOEC No.B7-208) TERMINAL DIAGRAM (Bottom View) Terminal Diagram						
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 -Anode (Grid No.3,						

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

-Indicates a change.

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA

23EQP4

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
Unless otherwise specified, voltage values	
are positive with respect to cathode	
Anode Voltage	V
Positive value	V
Negative value 550 max Grid-No.2 Voltage 200 min—550 max	V
Grid-No.2 Voltage	*
Negative peak value	٧
Negative bias value 155 max	٧
Positive bias value	V V
Positive peak value	v
Peak Heater-Cathode Voltage	
Heater negative with respect to cathode:	
During equipment warm-up period not	100
exceeding 15 seconds	V
After equipment warm-up period . 300 max	¥.
Heater positive with respect to cathode: Combined AC and DC voltage 200 max	v
DC component	v.
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Unless otherwise specified, voltage values are positive with respect to grid No.1	
Anode Voltage	V
Grid-No.4 Voltage ^b	٧
Grid-No.2 Voltage	¥.
Cathode Voltage for visual extinction of	
focused raster	¥.
centering magnet	6
MAXINUM CIRCUIT VALUE	
Grid-No.I Circuit Resistance 1.5 max	MΩ
External conductive costing and implosion protection hordware must grounded.	
^b The grid-No.4 voltage required for optimum focus of any individual t will have a value anywhere between 0 and +400 volta with the combi grid-No.1 and video-signal-voltage adjusted to give a 200-microamp mode current.	ube ned ere
For X-radiation shielding considerations, see sheet	
X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES	
at front of this section	
	1
	_

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DATA

23ERP4

Picture Tube

PAN-O-PLY TYPE

LOW GRID-No.2 VOLTAGE

The 23ERP4 is the same as the 23EQP4 except for the following items:

ELECTRICAL

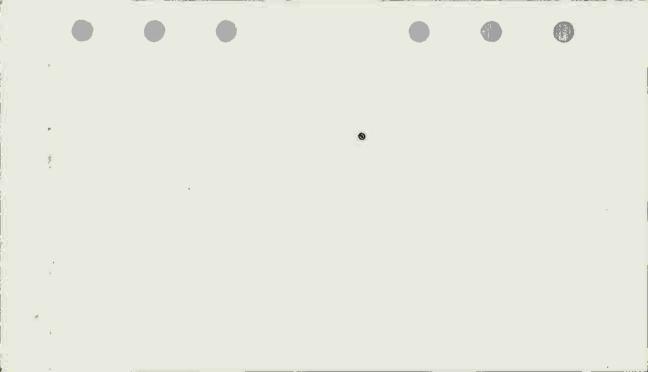
MECHANICAL

External Conductive Coating

Type (see CRT OUTLINES 1 at front of this section) . . Regular-Band Contact area for grounding Near Reference Line



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23ETP4

Picture Tube

PAN-O-PLY INTEGRAL IMPLOSION PROTECTION	
(Provided by Formed Rim and Welded Tension Bands around Periphery of Twi PanelNo Separate Safety-Glass or Integral Protective Window Required RECTANGULAR GLASS TYPE ALUMINIZED SCRE LOW-VOLTAGE ELECTROSTATIC FOCUS IIO ^o MAGNETIC DEFLECTINO NO ION-TRAP MAGNET REQUIRED) FN
Electrical:	
Direct Interelectrode Capacitances: Cathode to all other electrodes 5 Grid No.1 to all other electrodes 6 External conductive coating to anode ⁴ . {2500 max.	pf pf pf
Heater Current at 6.3 volts. 600 ± 30 Heater Warm-Up Time (Average). 11 secon Electron Gun Type Requiring No Ion-Trap Magn	pf ma ids iet
Optical:	
Phosphor (For curves, see front of this section)P4-Sulfide Typ	e.
Faceplate	ed
Mechanical:	<i>L</i> /0
Weight (Approx.)	5" A.
Type	ts
Cap Recessed Small Cavity (JEDEC No.J1-2: Base	L)
Arrangement 1, (JEDEC No.87-208 Basing Designation for BOTTOM VIEW	
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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External conductive Coating	
	-

RADIO CORPORATION OF AMERICA **Electronic Components and Devices**

Harrison, N. J.

DATA 8-64

23ETP4

	ues are p						tage v o cath		
node Vo	ltage						∫23000		volts
							11000	min.	volts
	4 Voltage:						44.00		
	ve value .	• • • •	• • •	•	• •	٠		max.	volts
0	ve value .		• • •	•	• •	•		max.	volts
rid-No.	2 Voltage.			•	• •	•		min.	volts
rid-No.	1 Voltage:						(200	parties.	VOILS
	ve peak val	ue					220	max.	volts
	ve bias val						155	max.	volts
	ve bias val						0	max.	volts
Positi	ve peak val	ue					2	max.	volts
eater V	oltage						∫6.9	max.	volts
	or tage	••••	•••		• •	1	15.7	min.	volts
Heater Duri	ter-Cathode negative w ng equipmen t exceeding	ith resp t warm-u	ect to p per	iod			450	max.	velts
	r equipment							max.	volts
	positive w						200	INGA.	vorta
	ined AC & D						200	max.	volts
	omponent.							max.	volts
Third	Operating (66.
	Unless oth are posit								
Anode Vo	are posit	ive wit	h re	spe •				No. 1	volts
Anode Vo Grid-No.	are posit oltage 4 Voltage	ive wit	h re	spe			grid	No. 1	volts volts
Anode Vo Grid-No. Grid-No.	are posit oltage 4 Voltage ^b . 2 Voltage .	ive wit	h re	spe			grid 180	No. 1 000 00	
Anode Vo Grid-No. Grid-No. Cathode	are posit oltage 4 Voltage 2 Voltage Voltage for	ive wit	h re	spe	c t	t o •	grid 180 20	No. 1 000 00	volts volts
Anode Vo Grid-No. Grid-No. Cathode extino	are posit oltage 4 Voltage 2 Voltage Voltage for ction of foo	ive wit	h re	spe	c t	t o •	grid 180 20	No. 1 000 00	volts
Anode Vo Grid-No. Cathode extino Field St	are posit oltage 4 Voltage 2 Voltage for tion of foc trength of r	ive wit	ster.	spe 	c t	t o	grid 180 20 . 30 . 28 t	No. 1 000 00 00 00	volts volts volts
Anode Vo Grid-No. Cathode extine Field St	are posit oltage 4 Voltage 2 Voltage Voltage for ction of foo	ive wit	ster.	spe 	c t	t o	grid 180 20 . 30 . 28 t	No. 1 000 00 00 00	volts volts
Anode Vo Grid-No. Grid-No. Cathode extino Field St adjust	are posit oltage 4 Voltage . 2 Voltage for tion of foo trength of r table Center	ive with r visual cused ra required ring Mag	ster.	spe 	c t	t o	grid 180 20 . 30 . 28 t	No. 1 000 00 00 00	volts volts volts
Anode Vo Grid-No. Grid-No. Cathode extino Field St adjust	are posit oltage	ive wit r visual cused ra required ring Mag	ster.	spe 	c t	t o	grid 180 20 30 28 t	No. 1 000 00 00 00 00 00 00 00 00 00 00 00 0	volts volts volts gauss
Anode Vo Grid-No. Grid-No. Cathode extino Field St adjust	are posit oltage 4 Voltage . 2 Voltage for tion of foo trength of r table Center	ive wit r visual cused ra required ring Mag	ster.	spe 	c t	t o	grid 180 20 30 28 t	No. 1 000 00 00 00	volts volts volts gauss
Anode Vo Grid-No. Grid-No. Cathode extino Field St adjust Maximum Grid-No.	are posit oltage 4 Voltage . 2 Voltage for tion of foc trength of r table Center Circuit Yal 1 Circuit F	ive wit r visual cused ra required ring Mag lue: Resistan	ster.	spe 	ct • • • • •	t o	grid 180 20 30 28 t	No. 1 000 00 00 00 00 00 00 00 00 00 00 00 0	volts volts volts gauss
Anode Vo Grid-No. Grid-No. Cathode extinc Field St adjust Maximum Grid-No.	are posit oltage 4 voltage ^b . 2 voltage for tion of foc irength of r able Center Circuit Val .1 Circuit F es implosion	ive wit visual cused ra required ring Mag lue: Resistan protectio	ster. net .	spe 	ct • • • • •	t o	grid 180 20 30 28 t 0 to	No. 1 200 20 20 20 20 20 20 20 20 20 20 20 20	velts velts velts gauss megohms
Anode Vo Grid-No. Grid-No. Cathode extinc Field S: Maximum Grid-No. Includ b The gr will h grid-No.	are posit oltage 4 Voltage . 2 Voltage for tion of foc trength of r table Center Circuit Yal 1 Circuit F	ive wit visual cused ra required ring Mag lue: Resistan protectio ge requir nywhere build output	ster. net net ce. n hard ed for etweer -signa on a 13	spe 	ct • • • • •	t o	grid 180 20 30 28 t 0 to	No. 1 200 20 20 20 20 20 20 20 20 20 20 20 20	velts velts velts gauss megohms
Anode Vo Grid-No. Cathode extino Field Si adjust Maximum Grid-No. h Includ h The gr will h grid-N grid-N curren RCA-2F	are posit oltage 4 Voltage ^b . 2 Voltage for tion of foc trength of re- table Center Circuit Val 1 Circuit F es implosion id-No.x voltage o.1 voltage de to y 200 micr	ive wit visual cused ra required ring Mag lue: Resistan protectio ge requir nowhere builden oamperes or equiv	ster. net . ce n hard ed for etween 	ware opti 1 vo -1/2	ct	foct	grid 180 20 28 t 28 t 0 to 1.5 0 volts djusted y 18-inc	No. 1 000 00 00 00 00 00 00 00 00	volts volts volts gauss megohms vidual tubb he combined e an anode

at front of this Section

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

23EZP4

Picture Tube

	•						
PAN-O-PLY TYPE WITH MOUNTING LUGS 94 ⁰ Magnetic Deflection Low-Grid-No.2 Voltage Low-Voltage Electrostatic Focus Cathode-Drive Type							
ELECTRICAL							
Direct Interelectrode Capacitances Cathode to all other electrodes. 5 pl							
Grid No.1 to all other electrodes. 6 al							
External conductive coating to anode 1700 min-2500 max pl Heater Current at 6.3 V							
Heater Warm-Up Time (Average)							
Electron Gun	Ł						
OPTICAL							
Phosphor	ł						
Faceplate	8						
MECHANICAL Weight (Approx.)							
Overall Length 17.080 ± .312 ir Neck Length 5.000 ± .125 ir Projected Area of Screen 282 sq ir External Conductive Coating [®] 10.000 ± .125	ה ה						
Type							
Cap							
TERMINAL DIAGRAM (Bottom View)							
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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating							



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 10-66

23EZP4

		1.11.1
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIM	UM VALUES	
Voltages are positive with respect to G	rid No. 1	
	n—23500 max V	
Grid-No.4 Voltage Positive value	50 max	
	V xam 00	
Grid-No.2 Voltage	n—70 max V	1
Cathode Voltage		
Negative peak value.	2 max V 0 max V	11.11 march
Negative bias value	Omax V OOmax V	
	50 max V	
	n-6.9 max	
Peak Heater-Cathode Voltage		
Heater negative with respect to cathode:		
5 1 F F F F F F F F F F F F F F F F F F	50 max	
After equipment warm-up period 3 Heater positive with respect to cathode:	00 max	
	00 max V	
	00 max	
TYPICAL OPERATING CONDITIONS FOR CATHODE-DF	RIVE SERVICE	
Voltages are positive with respect to g	grid No.1	
Anode Voltage. Grid-No.4 Voltage Grid-No.2 Voltage Cathode Voltage. For visual extinction of focused raster	200 · 50	A A A A
MAXINUM CIRCUIT VALUE		
Grid-No. Circuit Resistance	. 1.5 max M	n
Grid-Roll Gridder Resistance	• • • • • • • • •	14
Includes implosion protection hardware.		
^b The grid-No.4 voltage required for optimum focus of m will have a value asymbote between 0 and +400 voltage grid-No.1 voltage and video-signal voltage sdjuste current of 200 microsmptres on a 13-1/2 inch by 18-in RCA-2F21 monoscope, or equivalent.	ny individual tub s with the combine d to give an anod ach pattern from a	
For X-radiation shielding considerations,	, see sheet	
X-RADIATION PRECAUTIONS FOR CATHODE-RA at front of this section	AY TUBES	G
		0
		1.00



23FBP4

Picture Tube

PAN-O-PLY-INTEGRAL IMPLOSION PROTECTION

(Provided by Formed Rim and Welded Tension Bands around Periphery of Tube Panel-No Separate-Safety-Glass or Integral Protective Window Required)

RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN 92° MAGNETIC DEFLECTION

NO ION-TRAP MAGNET REQUIRED

Low-Grid-No.2 Voltage-for Cathode-Drive Operation

The 23FBP4 is the same as the 23ENP4 except for the following item: Optical:

Surface of Protective Panel. .Treated to reduce specular reflection



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23FMP4

Picture Tube

PAN-O-PLY-INTEGRAL IMPLOSION PROTECTION

(Provided by Formed Rim and Welded Tension Bands around Periphery of Tube Panel—No Separate Safety-Glass or Integral Protective Window Required)

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO^O MAGNETIC DEFLECTION NO ION-TRAP MAGNET REQUIRED

The 23FNP4 is the same as the 23ETP4 except for the following item: Electrical:



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 8-64



23FRP4

Picture Tube

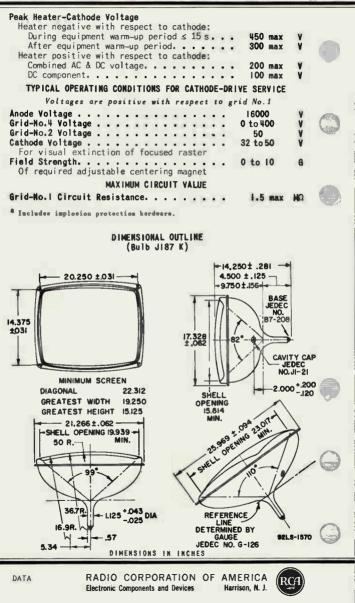
FILLED-RIM TYPE LOW GRID-No.2 VOLTAGE 110° MAGNETIC DEFLECTION Direct Interelectrode Capacitances Cathode to all other electrodes. 5 oF Grid No.1 to all other electrodes. . ٥F 6 External conductive coating to anode" 1700 min-2500 max pF Heater Current at 6.3 V. 450 ± 20 mA. Heater Warm-Up Time (Average). . . . 11 OPTICAL Faceplate. **MECHANICAL** Weight (Approx.) 29 lb 14.250 ± .281 in Overall Length Neck Length . . . 4.500 ± .125 in 282 sg in Projected Area of Screen External Conductive Coating Type (see CRT OUTLINES 1 at front of this section) . . Regular-Band Arrangement I, (JEDEC No. 87-208) TERMINAL DIAGRAM (Bottom View) Pin 1 - Heater ANODE Pin 2 - Grid No. 1 Pin 3-Grid No.2 Pin 4 - Grid No. 4 6 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater G(2 7 Cap-Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS. DESIGN-MAXIMUM VALUES Voltages are positive with respect to grid No.1 Anode Voltage 11000 min-23000 max Grid-No.4 Voltage Positive value. . . 1250 max Negative value. 400 max Grid-No.2 Voltage 25 min-60 max Cathode Voltage Negative peak value . . . 2 max . ٧ Negative bias value 0 max Positive bias value 100 max Positive peak value . . . 150 max ٧ 5.7 min-6.9 max ٧ Heater Voltage.

RADIO CORPORATION OF AMERICA Electronic Components and Devices

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DATA 2-67

23FRP4



23FSP4

Picture Tube

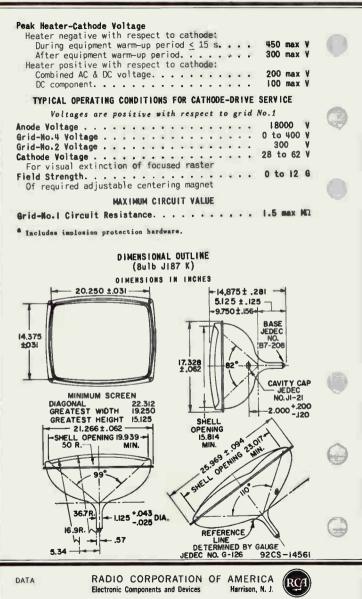
FILED-RIN TYPE 110° MAGNETIC DEFLECTION Oract Interelectrodes 5 Athode to all other electrodes 5 Grid No.1 to all other electrodes 5 Grid No.1 to all other electrodes 500 min - 2500 max pf Meater Warn-Up Time (Average) 11 Meater Warn-Up Time (Average) 11 Derton Gun. Type Requiring No Ion-Trap Magnet Derton Gun. PL-Sulfide Type, Aluminized For curves, see front of this section Filterglass Light (Approx.) 29 lb Weight (Approx.) 29 lb Merchal Conductive Coating Numerchales Meight (Approx.) 29 lb Merchal Conductive Coating Section Conductive Coating Meight (Approx.) 29 lb Meight (Approx.)			
Cathode to all other electrodes)	FILLED-RIM TYPE	10° MAGNETIC DEFLECTION
Electron Gun. Type Requiring No Ion-Trap Magnet OPTICAL Phosphor. . Phosphor. . For curves, see front of this section Faceplate . Filterglass Light transmission at center (Approx.). . Weight (Approx.). . Weight (Approx.). . Neck Length . Projected Area of Screen. . Projected Area of Screen. . Type (see CRT OUTLINES 1 at front of this section) . Recessed Small Cavity (JEDEC No.JI-21) Base. . See. . Pin 1 - Heater . Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 8 - Heater		Cathode to all other electrodes . Grid No.1 to all other electrodes . External conductive coating to anode Heater Current at 6.3 V	6 pF 1700 min-2500 max pF 600 ± 30 mA
Phosphor			
Phosphor		OPTICAL	
Faceplate		Phosphor	Bulfide Type, Aluminized
MECHANICALWeight (Approx.)		Faceplate	Filterglass
Weight (Approx.)			
Overall Length. 14.675 ± .281 in Neck Length. 5.125 ± .125 in Projected Area of Screen. 5.125 ± .125 in Projected Area of Screen. 282 sq in Interventional Conductive Coating Type (see CRT OUTLINES 1 at front of this section) Regular-Band Contact area for grounding. Near Reference Line Cap Near Reference Line Cap Small-Button Neoeightar 7-Pin, Arrangement I, (JEDEC No.17-208) TERMINAL DIAGRAM (Bottom View) Pin 1 - Heater Anode (Grid No.3 Pin 3 - Grid No.1 Ga Anode (Grid No.3 Pin 4 - Grid No.1 Ga Anode (Grid No.3 Pin 7 - Cathode Grid No.5, Screen, Collector) Pin 8 - Heater Ga Ga Ga Conductive Coating MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Anode Voltage 11000 min-23000 max V Grid-No.2 Voltage Positive value. 550 max V V Regative peak value 200 min-550 m			20 16
Type (see CRT OUTLINES 1 at front of this section)Regular-Band Contact area for grounding		Overall Length	14.875 ± .281 in 5.125 ± .125 in
Contact area for grounding			Perulas Perulas
Cap		Type (see CRT OUTLIRES 1 at front of this	Near Reference ine
Base		Cap Recessed Small	Cavity (JEDEC No.JI-21)
TERNINAL DIAGRAM (Bottom View) Pin 1 - Heater ANODE Cap - Anode Pin 3 - Grid No.1 Ga (Gid No.2) Grid No.3 Pin 4 - Grid No.1 Ga (Gid No.5, Screen, Collector) Calector) Pin 7 - Cathode Ga (Gid No.5, Screen, Collector) Calector) Pin 8 - Heater Ga (Gid No.5, Screen, Collector) Calector) NAXIMUM AND MINIMUM RATIMGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage 11000 min-23000 max V Grid-No.4 Voltage Positive value. 550 max V V Grid-No.1 Voltage 200 min-550 max V V Negative peak value 155 max V V Positive bias value 0 max V V Negative peak value 220 max V V Negative peak value 220 max V V Positive bias value 0 max V V Positive bias value 0 max V V Positive bias value 0 max V V		Base	Button Neoeightar 7-Pin,
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.2 Pin 4 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage. Not tage to the state of		Arrangeme	ent I, (JEDEC No. B7-208)
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.4 Pin 8 - Heater MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage Positive value			om View)
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 Pin 8 - Heater Pin 8 - Heater Pin 8 - Heater MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage Positive value. Negative value. Voltage Positive value. Voltage Negative peak value. Voltage Volt			Can - Anode
Pin 4 - Grid No.1 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage Positive value. Negative value. Negative value. Negative peak value Negative bias value. Negative			1
Pin 4 - Grid No.1 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage Positive value. Negative value. Negative value. Negative peak value Negative bias value. Negative		Pin 3-Grid No.2 3 () 6	Grid No.5,
Pin 7-Cathode Pin 8-Heater Waximum AND WINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage		Pin 4-Grid No.4	Screen,
HING-neater Conting HING-neater Coating HING-neater Coating Coating Coating HING-neater Coating HING-NEW Coating Coating Coating HING-NEW Coating Coating Coating HING-NEW Coating Coating Coating Voltages are positive with respect to cathode Anode Voltage 11000 min—23000 max V Grid-No.4 Voltage 1100 max V Negative value. 550 max V Grid-No.1 Voltage 200 min—550 max V Negative peak value. 155 max V Positive bias value. 0 max V Positive bias value. 2 max V		Pin 6-Grid No.1	
H BHR BH Coating HAXIMUM AND MINIMUM RATINGS, DESIGN-HAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage		Pin 8-Heater	K C LACCIDAT
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage 11000 min—23000 max V Grid-No.4 Voltage 11000 max V Negative value. 550 max V Grid-No.2 Voltage 200 min—550 max V Grid-No.1 Voltage 200 min—550 max V Negative peak value. 155 max V Negative bias value. 0 max V Negative bias value. 220 max V Positive bias value. 0 max V Positive bias value. 2 max V			
Voltages are positive with respect to cathode Anode Voltage			
Anode Voltage Il000 min—23000 max V Grid-No.4 Voltage Positive value. Positive value. Il00 max V S50 max V S50 max V Grid-No.2 Voltage 200 min—550 max V Grid-No.1 Voltage 200 min—550 max V Negative peak value. 115 max V Negative bias value. 0 max V Positive bias value. 220 max V Negative peak value. 220 max V Negative bias value. 220 max V Positive bias value. 215 max V Positive peak value. 2 max V			
Grid-No.4 Voltage Positive value. 1100 max V Negative value. 550 max V Grid-No.2 Voltage 200 min-550 max V Grid-No.1 Voltage 200 min-550 max V Negative peak value. 200 min-550 max V Negative bias value 155 max V Positive bias value 0 max V Positive peak value 2 max V		Voltages are positive with res	spect to cathode
Positive value. II00 max V Negative value. 550 max V Grid-No.2 Voltage 200 min—550 max V Grid-No.1 Voltage 200 min—550 max V Negative peak value 220 max V Negative bias value 155 max V Positive bias value 0 max V Positive peak value 2 max V			11000 min-23000 max V
Negative value. 550 max V Grid-No.2 Voltage 200 min—550 max V Grid-No.1 Voltage Negative peak value 220 max V Negative peak value 155 max V Positive bias value 0 max V Positive peak value 220 max V Negative bias value 155 max V Positive peak value 2 max V			1100 mar N
Grid-No.2 Voltage			
Grid-No.I Voltage Negative peak value			
Negative bias value155 maxVPositive bias value0 maxVPositive peak value2 maxV			
Positive bias value O max V Positive peak value 2 max V			
Positive peak value			
neater voltage			
		neater foltage	D. F MIN-0. J Max V



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DATA 2-67

23FSP4



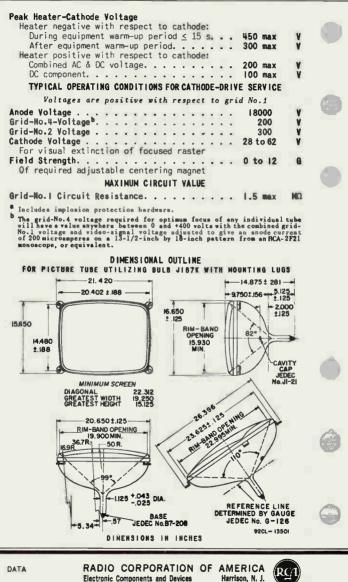
Picture Tube

PAN-O-PLY TYPE LÓW-VOLTAGE ELECTROSTATIC FOCUS NO ION-TRAP MAGNET REQUIRED 110° MAGNETIC DEFLECTION
Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode. 1700 min — 2500 max pF
Heater Current at 6.3 V 600 ± 30 mA Heater Warm-Up Time (Average)
OPTICAL
Phosphor
For curves, see front of this section Faceplate
Light transmission at center (Approx.)
MECHANICAL
Weight (Approx.)
Projected Area of Screen
Type (see CRT OUTLINES 1 at front of this section)Regular-Band
Contact area for grounding Near Reference Line Cap
Base
TERMINAL DIAGRAM (BOTTOM VIEW)
ANODE
Pin 1 - Heater G4 Cap - Anode Pin 2 - Grid No.1 (Grid No.3,
Pin 3-Grid No.2 (3) (6) Grid No.5,
Pin 4-Grid No.4 Screen,
Pin 6-Grid No.1 Pin 7-Cathode (2) (C-External
 Pin 8-Heater Conductive
() [©] (8) Coating H BHR H
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES
Voltages are positive with respect to cathode
Anode Voltage
Grid-No.4 Voltage Positive value, V
Negative value
Grid-No.2 Voltage
Grid-No.I Voltage Negative peak value
Negative bias value
Positive bias value
Positive peak value 2 max V Heater Voltage 5.7 min — 6.9 max V

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DATA 10-65

23GSP4



23HFP4A

Picture Tube

PAN-O-PLY-INTEGRAL IMPLOSION PROTECTION

(Provided by Formed Rim and Welded Tension Bands Around Periphery of Tube Panel—No Separate Safety-Glass or Integral Protective Window Required)

LOW-VOLTAGE ELECTROSTATIC FOCUS 110° MAGNETIC DEFLECTION NO 10N-TRAP MAGNET REDUIRED

The 23HFP4A is the same as the 23ETP4 except for the following items:

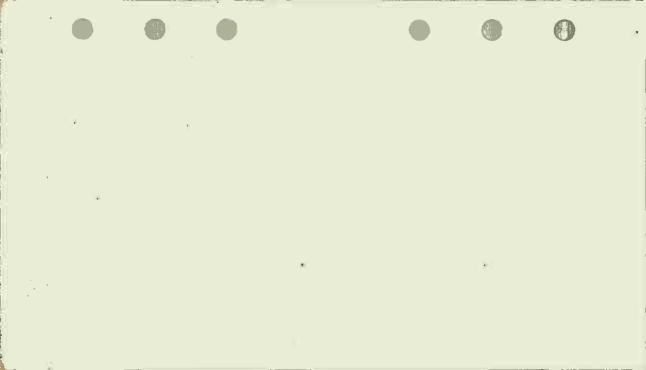
ELECTRICAL

MECHANICAL

External Conductive Coating



RADIO CORPORATION OF AMERICA DATA Electronic Components and Devices Harrison, N. J. 7–65



23NP4

Picture Tube

NO ION-TRAP MAGNET REQUIRED RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IINº MAGNETIC DEFLECTION LOW GRID-No. 2 VOLTAGE CATHODE-DRIVE TYPE
Electrical:
Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 pf Cathode to all other electrodes 5 pf External conductive coating to anode . {2500 max. pf 1700 min. pf
Heater Current at 6.3 volts
Optical:
Phosphor (For curves, see front of this Section) P4-Sulfide Type
Aluminized Faceplate
Nechanical:
Weight (Approx.)
Type
Cap Recessed Small Cavity (JEDEC No.J1-21) Base
Arrangement 1 (JEDEC No. B7-208)
Basing Designation for BOTTOM VIEW
Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Get(4) CC
Pin 4-Grid No.4 G2 3 T Gi
Pin 6-Grid No.1
Pin 8-Heater
Cap-Anode (Grid No.3, Grid No.5, Screen,
Collector)
C-External H H Conductive Coating



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

DATA 4-65

23NP4

	Unless othe are posit								
Anode Vo	Itage					. {	22000	max.	volts
	4 (Focusing)					l	11000	min.	volts
Positi	ve value	Vorta	Je.				1250	max.	volts
Negati	ve value						400	max.	volts
-	2 Voltage							max.	volts
							L40	min.	volts
Cathode Negati	voltage: ve peak valu	•					2	max.	volts
Negati	ve bias valu	e	•••	• • •			_	max.	volts
Positi	ve bias valu	e					155	max.	volts
Positi	ve peak valu	e						max.	volts
Heater V	oltage							max.	volts
	ter-Cathode						(5.7	min.	volts
Afte Heater p Combin DC com Typical	eeding 15 se r equipment ositive with ed AC and DC ponent Operating Co Unless othe are posi	warm-up respec volta nditio erwise tive wa	ns fo	iod catho r Ca ified espec	thoo	de-[300 200 100 Drive	lues	volts volts volts volts e:
Anode Vo	ltage 4 Voltage	• • •	• •	• •	• •	•	200		volts
Grid-No.	2 Voltage			•••	• •		50		volts
Cathode	Voltage for	visual	exti	ncti	on	•	00		10100
of focu	sed räster .					. :	34 to 5	2	volts
Maximum	Circuit Valu	e:							
	1 Circuit Re	sistan	ce .				1.5	max.	megohms
Grid-No.	X-radiation	n shiel							
For	X-RADIATION	PRECAU t front						1006.	5
For	X-RADIATION							1000	3



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

DATA

23FP4A

Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN Low-Voltage electrostatic focus 114º Magnetic Deflection
With Heater Having Controlled Warm-Up Time
GENERAL DATA
Electrical:
Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf External conductive coating to anode. {2500 max. pf
1700 min. of
Heater Current at 6.3 volts 600 ± 60 ma Heater Warm-Up Time (Average) 11 seconds Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Phosphor (For curves, see front of this section). P4-Sulfide Type,
Faceplate
Nechanical:
Weight (Approx.)
Base Small-Button Neoeightar 7-Pin, Arrangement 1, (JEDEC No.87-208)
Basing Designation for BOTTOM VIEW
Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4-Grid No.1 Pin 7-Cathode Pin 8-Heater Pin 8-Heater Pin 8-Heater Pin 8-Heater Pin 8-Heater Pin 8-Heater Pin 8-Grid No.1 Grid No.1



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23FP4A

Maximum and Minimum Ratings, Design-Nazimum Unless otherwise specified, voltag		
ues are positive with respect to c	athode	
ANODE VOLTAGE		volts volts
GRID-No.4 (FOCUSING) VOLTAGE: Positive value	550 max. ∫550 max.	volts volts volts
GRID-No.1 VOLTAGE:	(Live and	volts 💽
Negative peak value	154 max. 0 max. 2 max. ∫6.9 max.	volts volts volts volts volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds After equipment warm-up period Heater positive with respect to cathode: Combined AC and DC voltage	450 max. 200 max. 200 max.	volts volts volts
DC component	100 max.	volts
Typical Operating Conditions for Grid-Drive		
Unless otherwise specified, volta ues are positive with respect to c	ge vai- athode	
Anode Voltage	14000 0 to 400 450 -45 to -105	volts volts volts volts
Maximum Circuit Value: Grid—No.1—Circuit Resistance	1.5 max. m	egohms
For X-radiation shielding consideration <i>I-RADIATION PRECAUTIONS FOR CATHODE</i> at front of this Section	ns, see shee -RAY TUBES	



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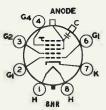
23GJP4A

Picture Tube

PAN-O-PLY TYPE 110° Magnetic deflection	LOW-VOLTAGE ELECTROSTATIC FOCUS CATHODE-DRIVE TYPE
ELEC	TRICAL
Direct Interelectrode Capacit	
Cathode to all other electro Grid No.1 to all other electro	odes 5 pF odes 6 pF
	o anode 1700 min-2500 max pF
Heater Current at 6.3 V	
Heater Warm-Up Time (Average)	
Electron Gun T	pe Requiring No Ion-Trap Magnet
OP	FICAL
Phosphor	P4—Sulfide Type, Aluminized s section
Faceplate	(approx.)
MECH	ANICAL
Neck Length	
External Conductive Coating®	Provide Provide
Contact area for arounding	
For Additional Information on	Costings Dimensions
See Picture-Tube Dimensiona at front of this section	1-Outlines and Bulb J187K sheets
Cap	ed Small Cavity (JEDEC No.JI-21) .Small-Button Neceightar 7-Pin, Arrangement I, (JEDEC No.B7-208)
TERMINAL DIAG	AAM (Bottom View)

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 - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive

Coating





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23GJP4A

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
Voltages are positive with respect to grid No.1	
Anode Voltage	¥
Grid-No.4 Voltage	
Positive value	V
Negative value	Ŷ.
Grid-No.2 Voltage	Ŷ
Cathode Voltage	
Negative peak value	٧
Negative bias value O max	V
Positive bias value 100 max	Y
Positive peak value	٧
leater Voltage 5.7 min-6.9 max	¥.
Peak Heater-Cathode Voltage	
Heater negative with respect to cathode:	
During equipment warm-up period ≤ 15 s . 450 max	V
After equipment warm-up period 300 max	¥.
leater positive with respect to cathode	
Combined AC & DC voltage 200 max	V
DC component 100 max	Y
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Voltages are positive with respect to grid No.1	
Anode Voltage	
Grid-No.4 Voltage 0 to 400	٧
Grid-No.2 Voltage	V
Cathode Voltage	¥
For visual extinction of focused raster	
MAXIMUM CIRCUIT VALUE	
Grid-No.1 Circuit Resistance 1.5 max	MO
	FB1 (

* Includes implosion protection hardware.

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



23HGP4

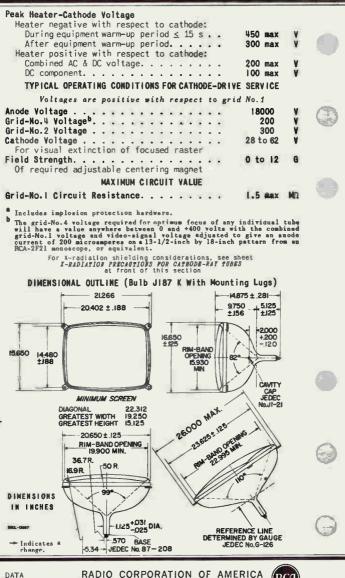
Picture Tube

PAN-O-PLY TYPE WITH MOUNTING LUGS	
110° MAGNETIC DEFLECTION LOW-VOLTAGE ELECTROSTATIC FOC	03
Direct Interelectrode Capacitances Cathode to all other electrodes 5	
	pF pF
	DF
	A
Heater Warm-Up Time (Average)	
Electron Gun Type Requiring No Ion-Trap Magne	ət
OPTICAL	
Phosphor	be
For curves, see front of this section	
Faceplate	
Light transmission at center (Approx.)	2%
MECHANICAL	
Weight (Approx.)	
Overail Length	
Projected Area of Screen	
External Conductive Coating ^a	
Type (see CRT OUTLINES 1 at front of this section)Regular-Bai	nd
Contact area for grounding Near Reference Lin Cap	ņe
Cap	1)
Base	٦,
Arrangement 1 (IEDEC No B7 201	
Arrangement 1, (JEDEČ No.87-20	8)
Arrangement 1, (JEDEČ No.87-204 TERMINAL DIAGRAM (Bottom View)	8)
TERMINAL DIAGRAM (Bottom View)	8)
TERMINAL DIAGRAM (Bottom View) ANODE Pin 1-Heater G4 (4) c Cap - Anode	8)
TERMINAL DIAGRAM (Bottom View) Pin 1-Heater Pin 2-Grid No.1 Gata Cap - Anode (Grid No.3,	8)
TERMINAL DIAGRAM (Bottom View) Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Cap - Anode (Grid No.3, Grid No.5,	8)
TERMINAL DIAGRAM (Bottom View) Pin 1-Heater Pin 2-Grid No.1 Gata Cap - Anode (Grid No.3,	8)
TERMINAL DIAGRAM (Bottom View) Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.4 Pin 4-Grid No.4	8)
TERMINAL DIAGRAM (Bottom View) Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 6-Grid No.1 Pin 7-Cathode Pin 8-Heater Pin 8-Heater Pin 6-Grid No.1 Pin 7-Cathode Pin 8-Heater	
TERMINAL DIAGRAM (Bottom View) 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 Grid No.1 Pin 2-Grid No.2 Pin 4-Grid No.4 Pin 6-Grid No.1 Pin 2-Grid No.1 Pin 2-Grid No.4 Pin	
TERMINAL DIAGRAM (Bottom View) Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4-Grid No.4 Pin 6-Grid No.4 Pin 7-Cathode Pin 8-Heater H H H H H Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C-External Conductive Conductive	
TERMINAL DIAGRAM (Bottom View) Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4-Grid No.1 Pin 7-Cathode Pin 8-Heater BHR Pin 8-Heater Pin 8-Heater Pin 8-Heater BHR	
TERMINAL DIAGRAM (Bottom View) Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4-Grid No.4 Pin 6-Grid No.4 Pin 8-Heater Pin 8-Heater MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
TERMINAL DIAGRAM (Bottom View) Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4-Grid No.1 Pin 7-Cathode Pin 8-Heater MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode	
TERMINAL DIAGRAM (Bottom View) Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.4 Pin 6-Grid No.4 Pin 6-Grid No.1 Pin 7-Cathode Pin 8-Heater RANODE Galary	
TERMINAL DIAGRAM (Bottom View) Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.4 Pin 6-Grid No.4 Pin 6-Grid No.1 Pin 7-Cathode Pin 8-Heater Bunk MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage	
TERMINAL DIAGRAM (Bottom View) 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 MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage Positive value	
TERMINAL DIAGRAM (Bottom View) Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.4 Pin 6-Grid No.1 Pin 7-Cathode Pin 8-Heater MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage Positive value	
TERMINAL DIAGRAM (Bottom View) 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 Bunk MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode (Grid No.3, Grid No.5, Screen, Collector) C-External Conductive Coating BUR MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages	
TERMINAL DIAGRAM (Bottom View) Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.4 Pin 6-Grid No.1 Pin 7-Cathode Pin 8-Heater MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage Positive value	
TERMINAL DIAGRAM (Bottom View) Pin 1 - Heater ANODE Pin 2 - Grid No.1 Gate Colspan="2">Gate Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) Pin 4 - Grid No.1 Pin 6 - Grid No.1 Gate Colspan="2">Gate Colspan="2">Collector) Pin 7 - Cathode Gate Colspan="2">Collector) Pin 8 - Heater Gate Colspan="2">BHR MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode (Grid No.3, Grid No.5, Screen, Collector) Conductive Coating BHR MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode (Grid-No.4 Voltage Positive value. 11000 max Negative value. 550 max Grid-No.1 Voltage 200 min-550 max Negative peak value 220 max Negative peak value 155 max	* ***
TERMINAL DIAGRAM (Bottom View) Pin 1 - Heater ANODE Pin 2 - Grid No.1 Gata Pin 3 - Grid No.1 Gata Pin 6 - Grid No.1 Gata Pin 7 - Cathode Gata Pin 8 - Heater Gata Bin Gata MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage 11000 min-23000 max Grid-No.4 Voltage 1100 max Positive value. 50 max Grid-No.1 Voltage 200 min-550 max Pogative peak value 155 max Pogative bias value 155 max Pogative bias value 0 max Negative bias value 0 max	* ***
TERMINAL DIAGRAM (Bottom View) Pin 1 - Heater ANODE Pin 2 - Grid No.1 Gate Colspan="2">Gate Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) Pin 4 - Grid No.1 Pin 7 - Cathode Gate Collector) Collector) Pin 8 - Heater Gate Collector) Collector) Collector) BHR MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to cathode Anode Voltage Il000 min-23000 max Grid-No.2 Voltage 1100 max Positive value 550 max Stid-No.2 Voltage 200 min-550 max Magative peak value 220 max Stom ax Stom ax	* ***

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23HGP4



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DATA

23HUP4A

Picture Tube

PAN-O-PLY TYPE LOW-G LOW-VOLTAGE ELECTROSTATIC FOCUS II0° MAG	GRID-No.2 VOLTAGE
ELECTRICAL	
Direct Interelectrode Capacitances	
Cathode to all other electrodes Grid No.1 to all other electrodes External conductive coating to anode 1700 Heater Current at 6.3 volts Heater Warm-Up Time (Average) Electron Gun Type Requiring Mo	450 ± 20 mA
OPTICAL	
Phosphor	Type, Aluminized
For curves, see front of this section Faceplate	Filterglass
Light transmission at center (approx.).	••••••••••••••••••••••••••••••••••••••
MECHANICAL	
Weight (Approx.) Overall Length Meck Length Projected Area of Screen External Conductive Coating [®]	4.375 ± .125 in -
Type. Contact area for grounding Nea For Additional Information on Coatings and Di	ar Reference Line
See Picture-Tube Dimensional-Outlines and B at front of this section	Bulb J187K sheets
Cap	leoeightar 7-Pin,
TERMINAL DIAGRAM (Bottom View)	JEDEČ No. B7-208)
Pin 1 - HeaterPin 2 - Grid No.1Pin 3 - Grid No.2Pin 4 - Grid No.4Pin 6 - Grid No.1Pin 7 - Cathode	ANODE
Pin 8 -Heater Cap -Anode (Grid No.3, Grid No.5, Screen, Collector)	Tr B
C-External Conductive H	8HR.



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- Indicates a change.

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
Unless otherwise specified, voltage values are positive with respect to grid No.1	
	. u 1
Anode Voltage	
Positive value	V
Negative value	V
Grid-No.2 Voltage 20 min-60 max	V.
Cathode Voltage	V /
Negative peak value	V (
Positive bias value	v.
Positive peak value	¥.
Heater Voltage 5.7 min-6.9 max	V
Peak Heater-Cathode Voltage	
Heater negative with respect to cathode:	
During equipment warm-up period not exceeding 15 seconds 450 max	V /
After equipment warm-up period . 300 max	V Q
Heater positive with respect to cathode:	
Combined AC and DC voltage 200 max	V
DC component 100 max	V
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Unless otherwise specified, voltage values	
are positive with respect to grid No.1	
Anode Voltage	Y
Anode Voltage	Ý
Grid-No.2 Voltage	V.
Cathode Voltage	A.
For visual extinction of focused raster	
Field Strength of required adjustable centering magnet 0 to 12	G
MAXIMUM CIRCUIT VALUE	
Grid-No.1-Circuit Resistance 1.5 max	MΩ
	6
Includes implosion protection hardware.	
The grid-No.4 voltage required for optimum focus of any individual will have a value anywhere between 0 and +400 volta with the comb grid-No.1 voltage and video-signal voltage adjusted to give an a current of 200 microsmpers on a 13.5-inch by 18-inch pattern fro RCA-2721 monoscope, or equivalent.	tube in ed
grid-No.1 voltage and video-signal voltage adjusted to give an a	node
RCA-2F21 monoscope, or equivalent.	
	C
Ever V rediction chielding second cretions and check	6
For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES	
at front of this section	
	1
	6



23HWP4A

Picture Tube

)e
PAN-O-PLY TYPE WITH MOUNTING LUGS 110° MAGNETIC DEFLECTION LOW GRID-NO.2 VOLT	AGE
ELECTRICAL	
Direct Interelectrode Capacitances	
Cathode to all other electrodes 5 Grid No.1 to all other electrodes 6 External conductive coating to	pF pF
anode ^a	mÅ 8
OPTICAL	HOL
Phosphor	zed
For curves, see front of this section Faceplate	858
Light transmission at center (Approx.)	42%
	• •
Weight (Approx.) 28 Overall Length 14.875 ± .281 Neck Length 5.125 ± .125 Projected Area of Screen 282 sq External Conductive Coating	in in
Type (See CRT OUTLINES 1 at front of this section) . Regular-Ba Contact area for grounding	ine 21) in,
Arrangement I, (JEDEČ No. B7-2	08)
TERMINAL DIAGRAM (Bottom View)	
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.1 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater H shr	,)
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
Voltages are positive with respect to grid No.1	
Anode Voltage	۷
Positive value	V
Negative value	V
Grid-No.2 Voltage	¥
Negative peak value	V
Negative bias value 0 max	V
Positive bias value	V V

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DATA 12-66

23HWP4A

Heater Voltage 5.7 min—6.9 max V Peak Heater-Cathode Voltage Heater negative with respect to cathode: During equipment warm-up period≤ 15 s	
After equipment warm-up period 300 max V Heater positive with respect to cathode: Combined AC & DC voltage 200 max V DC compcnent 100 max V TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Voltages are positive with respect to grid No.1 Anode Voltage 16000 V Ørid-No.4 Voltage 0 to 400 V Grid-No.2 Voltage 50 V Cathode Voltage 32 to 50 V	6
For visual extinction of focused raster Field Strength 0 to 10 G Of required adjustable centering magnet MAXIMUM CIRCUIT VALUE	9
Grid-No. Circuit Resistance	
DIMENSIONAL OUTLINE (Bulb J187K with Mounting Lugs) 21266	
15,650 14,480 18,650 14,480 188 14,480 14,48	
MINIMUM SCREEN DIAGONAL 22.312 GREATEST WIDTH 19.250 GREATEST HEIGHT 15.125 20.650 ± 125 RIM-BAND OPENING 19.900 MIN. 25.625 ± 125	
205025125 RIM-BAND OPENNIG 19.900 MIN. 36.7R. K.9R. 50 R. 19.900 MIN. 36.7R. 19.900 MIN. 19.900 MIN	
DIMENSIONS IN INCHES 534-JEDEC No. 87-208	0
DATA RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.	

23HXP4

Picture Tube

LOW-VOLTAGE ELECTROSTATIC FOCUS

PAN-O-PLY TYPE

110° MAGNETIC DEFLECTION

The 23HXP4 is the same as the 23ETP4 except for the faceplate which is treated to reduce specular reflections and the following items:

ELECTRICAL

MECHANICAL

External Conductive Coating



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23JP4

Picture Tube

	BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO ^o MAGNETIC DEFLECTION LOW-GRID-NO-2 VOLTAGE CATHODE-DRIVE TYPE						
	With Heater Having Controlled Warm-Up Time						
	GENERAL DATA						
	Electrical:						
	Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf						
	External conductive coating to anode {2500 max. pf						
	Heater Current at 6.3 volts 12000 min. pf Heater Warm-Up Time (Average) 11 seconds Electron Gun. Type Requiring No Ion-Trap Magnet						
	Optical:						
	Phosphor (For curves, see front of this section). P4-Sulfide Type,						
	Aluminized Faceplate and Protective Panel						
	Nechanical:						
	Weight (Approx.)						
	For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J187 A sheets						
	at front of this section						
	Cap						
	Pin 2 - Cathode Pin 3 - Heater Pin 4 - Heater Pin 5 - Grid No.1 Pin 5 - Grid No.1 H G Grid No.5, Cap - Anode (Grid No.3, Grid No.5, Screen, Grid No.5,						
	Pin 5-Grid No.1 K Pin 6-Grid No.4 Pin 7-Grid No.2 Collector) C-External Conductive Conductive Coating						
	ANODE						
-	2						
	RADIO CORPORATION OF AMERICA DATA						

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23JP4

Maximum and Minimum Ratings, Design-Haximum Values;	
Unless otherwise specified, voltage val- ues are positive with respect to grid No.1	
ANODE VÓLTAGE	volts volts
GRID-No.4 (FOCUSING) VOLTAGE: Positive value	volts volts volts
GRID-No.2 VOLTAGE	volts
CATHODE VOLTAGE: Negative peak value	volts volts volts volts volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period	volts
not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode:	volts volts
Combined AC and DC voltage 200 max. DC component	volts
Typical Operating Conditions for Cathode-Drive Service	:
Unless otherwise specified, voltage val- ues are positive with respect to grid No.1	
Anode Voltage	volts
Grid-No.4 Voltage 0 to 500 Grid-No.2 Voltage 50 Cathode Voltage for visual extinction of	volts volts
focused raster.	volts
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max.	megohms
For X-radiation shielding considerations, see she I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section	et
	C

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Picture Tube

ALUMINIZED SCREEN RECTANGULAR GLASS TYPE MAGNETIC DEFLECTION 1 OW-VOI TAGE ELECTROSTATIC FOCUS With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Electrical;
Heater Current at 6.3 volts
Cathode to all other electrodes 5 with
External conductive coating to ulter [2500 max. Huf
External conductive coarting to unter 1 [1700 min. uuf
Focusing Method Electrostatic Deflection Method
Diagonal
Horizontal
Vertical
Optical:
Faceplate
Fluorescence
Mechanical:
Tube Dimensions: Overall length
Greatest width
Greatest height
Neck length
Curvature of faceplate (Radii):
Center Intermediate Edge
External surface 50" - 36-3/4"
Internal surface 30" 48" 24" Screen Dimensions (Minimum):
Greatest width
Greatest width
Diagonal
Projected area

Weight (Approx.) Bulb

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DATA I 10-60

Any

... 24 lbs

. J187 (114°)

Base Small-Button Neoeightar 7-Pin, Arrangement 1 (JEDEC No.B7-208 Basing Designation for BOTTOM VIEW)
A	()
GR ID-DRIVE SERVICE	
Unless otherwise specified, voltage values	
are positive with respect to cathode	
Maximum and Minimum Ratings, Design-Naximum Values:	~
ULTOR VOLTAGE	
GRID-No.4 (FOCUSING) VOLTAGE: {11000 min. volt:	s Salar
Positive value	5
Negative value	
GRID-No.2 VOLTAGE \$550 max. volt	
GRID-No.1 VOLTAGE:	5
Negative-peak value	
Negative-bias value	
Positive-bias value 0 max. volt	
Positive-peak value	
HEATER VOLTAGE Volt	
PEAK HEATER-CATHODE VOLTAGE:	\$
Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. volts After equipment warm-up period 200 max. volts Heater positive with respect to cathode 200 max. volts	0
Equipment Design Ranges:	
With any ultor voltage (E _{C5k}) between 11000 and 22000 volts and grid-No.2 voltage (E _{C2k}) between 220 and 550 volts	
Grid-No.4 Voltage	-
for focus [•]	$\cdot \bigcirc$
visual extinction	
of focused raster See Raster-Cutoff-Range Chart	
Grid-No:1 Video Drive from for Grid-Drive Service	
Raster Cutoff (Black level):	
White level value	()
(Peak positive)	
for Ecik except video drive is a	
positive voltage	1

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Grid—No.4 Current	-25 to +25	μа
Grid-No.2 Current	-15 to +15	ua
Field Strength of Adjustable		
Centering Magnet [*]	0 to 8	gausses
Examples of Use of Design Ranges:		
With ultor voltage of	18000	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	100	100
extinction of focused raster Grid-No.1 Video Drive from	-36 to -94	volts
Raster Cutoff (Black level):		
White-level value	36 to 94	volts
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	1.5 max.	megohms
CATHODE-DRIVE SERVIC		
Unless otherwise specified, volt are positive with respect to		
	•	
Maximum and Minimum Ratings, Design-Hazim	um Values:	
ULTOR-TO-GRID-No.1 VOLTAGE	22000 max.	volts
	(11000 max.	volts
GRID-No.4-TO-GRID-No.1 (FOCUSING)		
VOLTAGE:	1050	-1.
Positive value	1250 max.	volts
Negative value	400 max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAGE	{700 max.	volts
GRID-No. 2-TO-CATHODE VOLTAGE	{350 min. 550 max.	volts
CATHODE-TO-GRID-No.1 VOLTAGE:	JOU max.	voits
Positive-peak value.	220 max.	volts
Positive-bias value.	154 max.	volts
Negative-bias value	0 max.	volts
Negative-peak value	2 max.	volts
	∫6.9 max.	volts
HEATER VOLTAGE	15.7 min.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with		
respect to cathode:		
During equipment warm-up period		
not exceeding 15 seconds	450 max.	voits
After equipment warm-up period	200 max.	volts
Heater positive with		
respect to cathode	200 max.	volts
Equipment Design Ranges:		
With any ultor-to-grid-No. 1 voltage (Ec	se,) between	11000
and 22000 volts and grid-No. 2-to-grid-No.	1 voltage (Beard
between 225 and 700 vol		- 4 - 1
Grid-No.4-to-Grid-No.1		
Voltage for focus [®]	0 to 400	volts
		_
		DATA 2



RADIO CORPORATION OF AMERICA DATA 2 Electron Tube Division Harrison, N. J. 10-60

Cathode-to-Grid-No.1 Voltage (Ekg ₁) for visual extinction of focused raster	.See Raste	r-Cutoff-Ran Cathode-Drive		
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)	. Same val	ue as determ cept video dr	ined for	
Grid-No.4 Current		negative 25 to +25 15 to +15 0 to 8	yoltage µa µa gausses	
Examples of Use of Design Ranges:				
With ultor-to-grid- No.1 voltage of and grid-No.2-to- grid-No.1 voltage of		18000	volts	
Grid-No.4-to-Grid-No.1 Voltage for focus Cathode-to-Grid-No.1 Voltage for visual extinction		0 to 400	volts	
of focused raster Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level):		36 to 78	volts	
White-level value		-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.
- Individual tubes will have satisfactory focus at some value of grid-No.4 (or grid-No.4-to-grid-No.1) voltage between 0 and 400 volts under conditions with the combined bias voltage and video-signal voltage adjusted to produce an ultor current of 200 microamperes.
- 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 3/B-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 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

I-Ray Warning. When operated at ultor voltages up to 16 kilovolts, this picture tube does not produce any harmful X-ray radiation. However, because the rating of this type permits operation at voltages as high as 22 kilovolts (Design-maximum value), shielding of this picture tube for X-ray radiation may be needed to protect against possible injury from prolonged

RADIO CORPORATION OF AMERICA Electroin Tube Division Harrison, N. J.



exposure at close range whenever the operating conditions involve voltages in excess of 16 kilovolts.

Shatter-Proof Cover Over the Tube Face. Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatterproof, glass cover over the face of this picture tube 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.

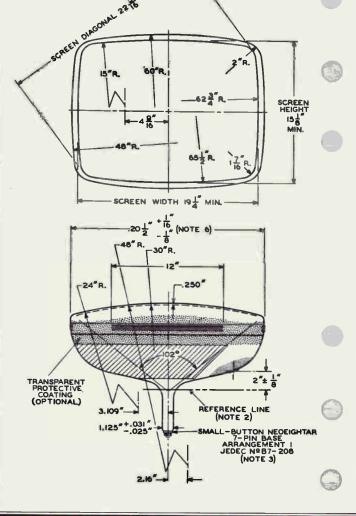


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

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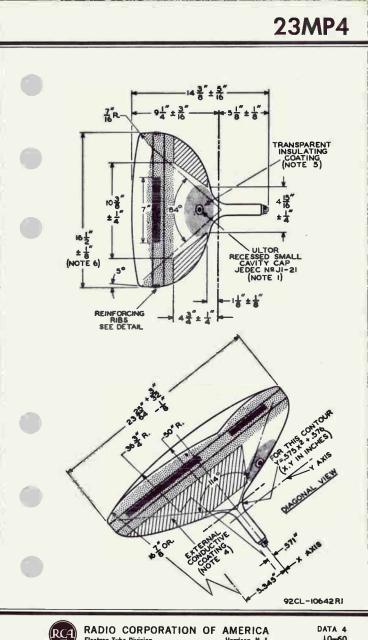
DATA 3





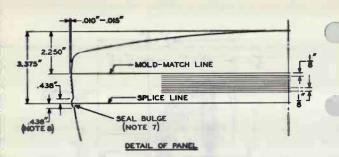
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.





Electron Tube Division

10-60 Harrison, N. J.



NOTE I: 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°. 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 MOUNT-ED; 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 LINT-LESS CLOTH.

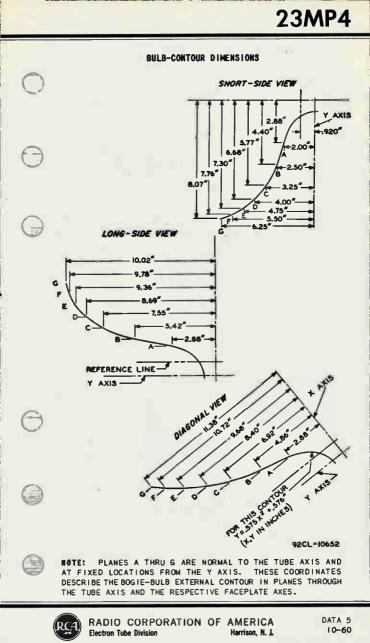
NOTE 6: MEASURED AT THE MOLD-MATCH LINE.

NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE IN-DICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN I/B", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN I/I6" BEYOND THE ENVELOPE SURFACE AT THE LOCATION SPECIFIED FOR DIMEN-SIONING THE ENVELOPE WIDTH, DIAGONAL, AND HEIGHT.

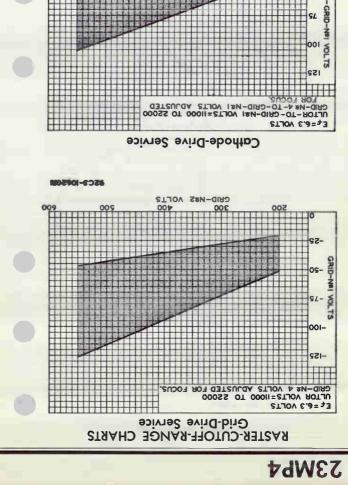
NOTE 8: AREA BETWEEN MOLD-MATCH LINE AND SEAL BULGE IS 1/2" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND. SUPPORTS MUST BE SPACED FROM THE TUBE BY THE USE OF CUSHIONING PADS MADE OF ASPHALT, IMPREGNATED FELT OR EQUIVALENT.

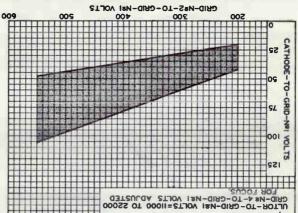
> RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.









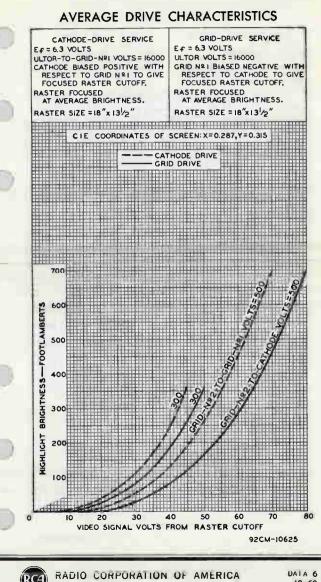


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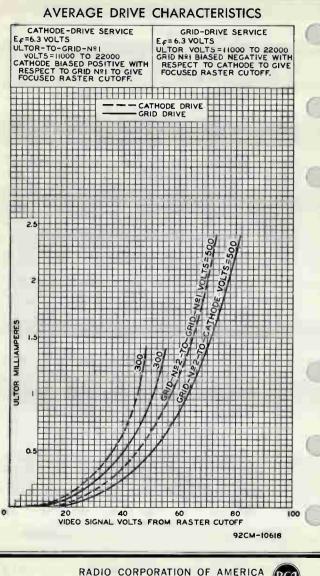




Electron Tube Division

Harrison, N. J.

10-60



Harrison, N. J.



23YP4

Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN Low-voltage electrostatic focus 92° magnetic deflection

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

	Heater Current at 6.3 volts 600 ± 5% ma Heater Warm-Up Time (Average) 11 seconds Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 µµf Cathode to all other electrodes 5 µµf External conductive coating to ultor. {2500 max. µµf 2000 min. µµf
	Electron Gun Type Requiring No Ion-Trap Magnet
)	Optical:
	Faceplate and Protective Panel
	Mechanical:
	Operating Position
	Weight (Approx.)
	Type
	See Picture-Tube Dimensional-Outlines and Bulb J187 D/G sheets at the front of this section
	Cap
	Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.4 Pin 12-Heater Pin 12-Heater



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 3-62

23YP4

Maximum and Minimum Ratings, Design-Maximum	Walues:	
ULTOR VOLTAGE	22000 max.	volts
	12000 min.	volts
GRID-No.4 (FOCUSING) VOLTAGE:	44.00	
Positive value.	1100 max. 550 max.	volts
Negative value	550 max.	volts
GRID-No.1 VOLTAGE:	JJU max.	VOILS
Negative peak value	220 max.	volts
Negative bias value	155 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	450 max.	volts
After equipment warm-up period	200 max.	volts
Heater positive with	LOU MOX.	VOILS
respect to cathode	200 max.	votts
Toutest Associate Associate		
Typical Operating Conditions:		
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 -72	volts
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	1.5 max.	megohins

For X-radiation shielding considerations, see sheet *I-RADIATION PRECAUTIONS FOR CATEODE-RAY TUBES* at front of this section





24**AEP**4

Picture Tube

GENERAL DATA Electrical: Heater Current at 6.3 volts	
Flashes Cur	μf μf
Election dun	et
Optical: Faceplate, Spherical	5% e,
Nechanical:	
Operating Position. Any Weight (Approx.). 35 lbg Overall Length. 19-1/8" ± 3/8"	5
Neck Length	al ne ts L)



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

Harrison, N. J.

DATA 1-63

24AEP4

Maximum Ratings, Design-Naximum Values:	
ULTOR VOLTAGE	ax. volts
GRID-No.4 (FOCUSING) VOLTAGE:	ax, volts
Positive value	
Negative value	
GRID-No.2 VOLTAGE	ax. volts
Negative bias value	ax. volts
Positive bias value 0 m	
Positive peak value	
PFAK HEATER-CATHODE VOLTAGE:	un. vorto
Heater negative with	
respect to cathode:	
During equipment warm-up period	
not exceeding 15 seconds 450 m	ax. volts
After equipment warm-up period 200 m	
Heater positive with	ax. voits
	ax. volts
respect to cathode 200 m	ax. voits
Typical Operating Conditions:	
With ultor voltage of 18000	volts
and grid-No.2 voltage of 300	volts
Grid-No.4 Voltage for focus	350 volts
Grid-No.1 Voltage for visual	
extinction of focused raster28 to -	72 volts
Maximum Circuit Values:	
	and the second second
Grid-No.1-Circuit Resistance 1.5 m	ax. megonms

For X-radiation shielding considerations, see sheet *I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES* at front of this section

> RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.





PICTURE TUBE

RECTANGULAR GLASS TYPE LOW-VOLTAGE FOCUS

ALUMINIZED SCREEN MAGNETIC DEFLECTION

PARTIO R

DATA

	General:
	Heater, for Unipotential Cathode:
	Voltage
9	Voltage 6.3
	Direct Interelectrode Capacitances:
	Grid No.1 to all other electrodes 6 ##f
1	Cathada to all other electrodes 5 w
5	(2500
	External conductive coating to altor. 2000 min. 44
	Faceplate, Spherical
8	light transmission (Approx
	Phosphor (For curves, see front of this Section)P4-Sulfide Type
	Aluminized
	Fluorescence
1	Phosphorescence
	Persistence
	Focusing Method Electrostatic
	Deflection Method
	Deflection Angles (Approx.):
	Diagonal.
	Horizontal 105°
	Vertical
	Electron Gun
	Tube Dimensions:
	Overall length
	Greatest width
	Greatest height
	Diagonal
	Neck length
	Screen Dimensions (Minimum):
	Greatest width.
	Greatest height
	Diagonal
	Projected area
	Weight (Approx.)
	Mounting Position
	Can Recessed Small Cavity (JETEC No.J1-21)
	Bulb. J192 (110 ^o) Base. Small-Button Eightar 7-Pin.
	Base
	Arrangement 2. (JETEC No. 87-183)
	Basing Designation for BOTTOM VIEW
	Pin 2-Grid No.1 (Grid No.3, Pin 3-Grid No.2 (Transf) Grid No.5,
	Pin 4 - Grid No.4 Collector) Pin 6 - Grid No.1 (C-External
	Pin 7-Cathode Pin 8-Heater
	rino-neater 0.0 toating
	~
	6-57 TENTATIVE DATA 1
	ELECTRON TUBE DIVISION

BADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



24AHPA

PICTURE TUBE

GRID-DRIVEA SERVICE Unless otherwise specified, voltage values are positive with respect to cathode Maximum Ratings, Design-Center Values: [20000 max. volts ULTOR VOLTAGE 12000^emin. 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 (Eczk) between 12000 and 20000 volts and grid-No.2 voltage (Ecok) between 200 and 500 volts Grid-No.4 Voltage for Focus -50 to +350 volts Grid-No.1 Voltage (Ec.k) 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 Ec.k except video drive is a positive voltage Grid-No.4 Current . -25 to +25 μa Grid-No.2 Current . . . -15 to +15 μa Field Strength of Adjustable Centering Magnet*. . 0 to 8 gausses Examples of Use of Design Ranges: With ultor voltage of 140.00 16000 volts and grid-No.2 voltage of volts 900 400 Grid-No.4 Voltage for Focus -50 to +350 -50 to +350 volts Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.

, , , *: See next page. 6-57

ELECTRON TUBE DIVISION

TENTATIVE DATA

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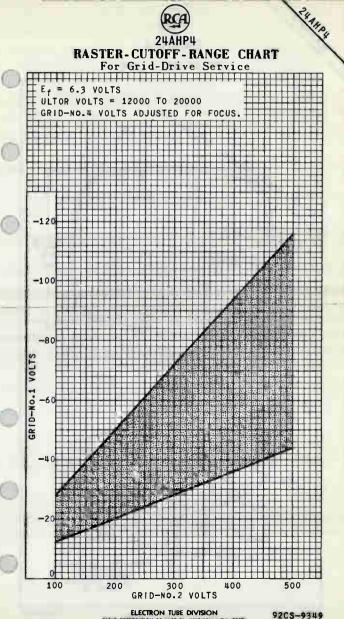
PICTURE TUBE

-		2000		
1	Grid-No.1 Voltage for			
1	Visual Extinction of			
ł	Focused Raster28 to -72	-36 to	-94	volta
I	Grid-No.1 Video Drive			
ł	from Raster Cutoff			
ļ	(Black Level):			
l	White-level value 28 to 72	36 to	94	volt
۱	milite-level values s s s s s s vo re	20 00	0.4	
ĺ	Maximum Circuit Values:			
1	Grid-No.1-Circuit Resistance	. 1.5 m	Xs I	megohn
I	CATHODE-DRIVE SERVICE			
a	Unless otherwise specified, voltage va		\$051	tive
X	with respect to grid No	. 1		
1	Maximum Ratings, Design-Center Values:			
ł	ULTOR-TO-GRID-No.1 VOLTAGE	[20000	max.	volt
ł	ULIUR-IU-GRID-NO.I VULIAGE	12000	min.	volt
ł	GRID-No.4-TO-GRID-No.1 VOLTAGE:	(
ł	Positive value	1000	max.	volt
ł	Negative value	500	max.	volt
1	GRID-No. 2-TO-GRID-No.1 VOLTAGE	640	max.	
ł	GRID-No. 2-TO-CATHODE VOLTAGE	500	max.	volt
	CATHODE-TO-GRID-No.1 VOLTAGE:	500	max.	vore
	Positive peak value	200	max.	volt
1	Positive bias value	140	max.	volt
	Negative bias value	0	max.	volt
1	Negative peak value.	2	max.	
ł	PEAK HEATER-CATHODE VOLTAGE:	-		
1	Heater negative with respect to cathode:			
ł	During equipment warm-up period			
ł	not exceeding 15 seconds	410	max.	volt
	After equipment warm-up period	180	max.	volt
H		180	max.	volt
1	Heater positive with respect to cathode.	100	max.	voru
	Equipment Design Ranges:			
J		1 1.4.4		
1	With any ultor-to-grid-No.1 voltage (Ec ₅ g) betwee	: 71	
	1	2000 and		O VOLTS
	· · · · · · · · · · · · · · · · · · ·			
	and grid-No.2-to-grid-No.1 voltage (EcgE1	l between	• • •	. 14
	and grid-No.2-to-grid-No.1 voltage (Ecgg1	l between 225 an	nd 64	o volt
	and grid-No.2-to-grid-No.1 voltage (E _{Cgg1} Grid-No.4-to-Grid-No.1) between 225 an	nd 64	o volt:
	Grid-No.4-to-Grid-No.1	1 between 225 an 50 to +351	10 04	volt:
	Grid-No.4-to-Grid-No.1 Voltage for Focust	225 at	1 <i>a</i> 04	volt
	Grid-No.4-to-Grid-No.1 Voltage for Focust	225 at	1 <i>a</i> 04	volt
	Grid-No.4-to-Grid-No.1 Voltage for Focust	225 as 50 to +350 which the to grid	vide: No.1	volt: signal and the
	Grid-No.4-to-Grid-No.1 Voltage for Focust	225 as 50 to +350 which the to grid	vide: No.1	volt: signal and the
	Grid-No.4-to-Grid-No.1 Voltage for Focust	225 as 50 to +350 which the to grid	vide: No.1	volt signa and the
	Grid-No.4-to-Grid-No.1 Voltage for Focust	225 as 50 to +350 which the to grid	vide: No.1	volt signa and the
	Grid-No.4-to-Grid-No.1 Voltage for Focus§	225 at 50 to +35 which the to grid . The equine is 110 the equine determin le operat	video No.1 No.1 No.1 No.1 No.1 No.1	volt and the nt abso- lts, be- minimum minimum ndition
	Grid-No.4-to-Grid-No.1 Voltage for Focus§	225 at 50 to +35 which the to grid . The equine in the equine in the equine in the the int be in determin le operat	video No.1 No.1 No.1 No.1 No.1 No.1	volt and the nt abso- lts, be- minimum minimum ndition
	Grid-No.4-to-Grid-No.1 Voltage for Focus§	225 at 50 to +35 which the to grid . The equine in the equine in the equine in the the int be in determin le operat	video No.1 No.1 No.1 No.1 No.1 No.1	volt and the nt abso- lts, be- minimum minimum ndition
	Grid-No.4-to-Grid-No.1 Voltage for Focus§	225 at 50 to +35 which the to grid . The equine in the equine in the equine in the the int be in determin le operat	video No.1 No.1 No.1 No.1 No.1 No.1	volt and the nt abso- lts, be- minimum minimum ndition
	Grid-No.4-to-Grid-No.1 Voltage for Focus§	225 at 50 to +350 which the to grid The equine int be in the operation age is ne	video video No.1 livale log vo mpaire Ing a ng co lon ti ver h	volt and the nt abso- lts, be- minimum minimum ndition

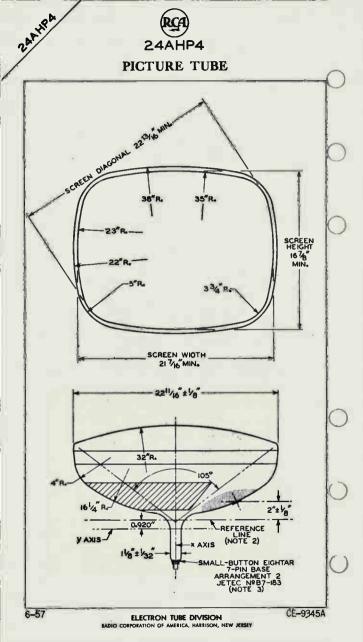
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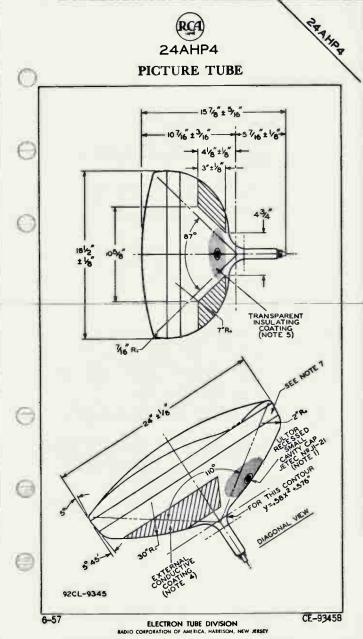
AAHPA R	(A)			
24A	HP4			
PICTUR	E TUBE			
Cathode-to-Grid-No.1 Voltage (Ekg.) for Visual Extinction of Focused Raster	See Raster-			
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak negative)	Same value		ined for	C
Grid-No.4 Current Grid-No.2 Current Field Strength of Adjust- able Centering Magnet* .	E _{kg1} excep -25 to + -15 to + 0 to 8	negative 25 15	voltage μa gåusses	G
Examples of Use of Design Rang	jes:			
With ultor-to-grid-No.1 voltage of and grid-No.2-to-grid-No.1	14000	16000	voits	
voltage of	300	400	volts	
Grid-No.4-to-Grid- No.1 Voltage for Focus Cathode-to-Grid-No.1 Voltage for Visual Extinction of Focused Raster Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value	50 to +350 28 to 60 28 to -60	-50 to +35 .36 to 78 -36 to -78	volts	C
Maximum Circuit Values:				-
Grid-No.1-Circuit Resistance. Distance from Reference Line for not exceed 2-1/4". Excluding e: undeflected focused spot will fa radius concentric with the center that the earth's magnetic field ca of the spot from the center of th The grid-No.4 voltage or grid-No focus of any individual tube is remain essentially constant for grid-No.1 voltage) or grid-No.2 voltage) within design ranges sho	suitable PM cer xtraneous field 11 within a circ of the tube fac an cause as much a	1.5 max. itering magn s, the cent le having a ie. It is t. s 1/2-inch of voltage rec tor current voltage (or id-No.2-to- ms.	et should er of the 7/16-inch o be noted deflection	6
Por I-ray shielding co I-RAY PRECAUTIONS F at front of				C
6-57 ELECTRON 1	TUBE DIVISION	TENTATIV	E DATA 2	ľ

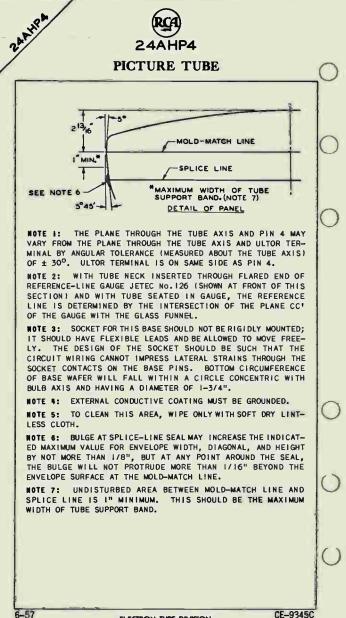
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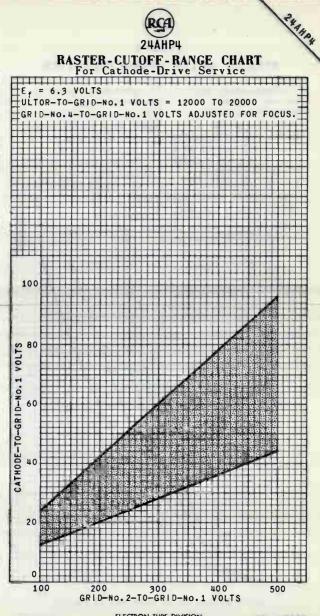
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ELECTRON TUBE DIVISION

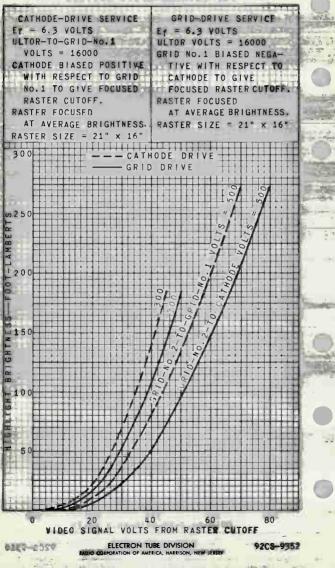
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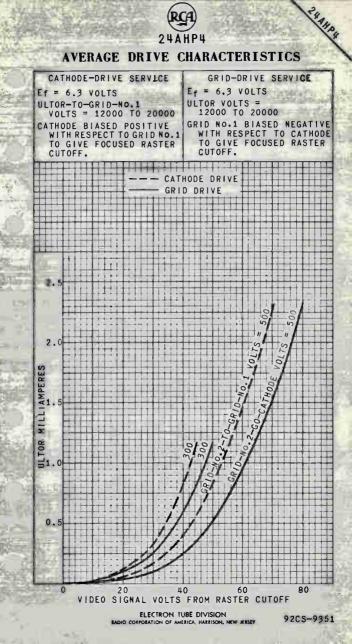


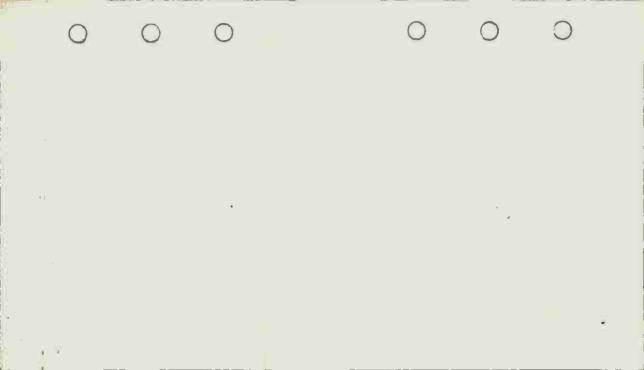
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24AHP4

AVERAGE DRIVE CHARACTERISTICS









PRAJA B

PICTURE TUBE

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

DATA

Heater, for Unipotential Cathode: Voltage	General: Heater for Unicotential Cathoda:
Voltage. 6.3	
For definition of heater warm-up time and method of attermining it, see sheet HEATER WARM-UP TINE MEASURENENT at fromt of Receiving Tube Section. Direct Interelectrode Capacitances: Grid No.1 to all other electrodes. External conductive coating to ultor Faceplate, Spherical Light transmission (Approx.) Phosphor (For curves, see front of this Section). Persistence. Phosphor scence. Whitt Phosphor scence. Whitt Phosphor scence. Whitt Phosphor scence. Whitt Phosphorscence. Whitt Phosphorescence. Whitt Phosphorescence. Whitt Persistence. Beflection Method. Cortal Approx.): Diagonal Dimensions: Overall length Curvature of faceplate (External surface). Mack length Recet width Curvature of faceplate (External surface). Screen Dimensions (Minimum): Greatest height. <tr< th=""><th>Voltage 6.3</th></tr<>	Voltage 6.3
Grid No.1 to all other electrodes	for definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of
Cathode to all other electrodes	Direct Interelectrode Capacitances:
Faceplate, Spherical	Cathode to all other electrodes
Light transmission (Approx.)	External conductive coating to ultor [1700 min
Aluminizer Phosphorescence	light transmission (Approx.)
Phosphorescence.	Alumini
Persistence	Phosphorescence,
Deflection Method. Magneti Deflection Angles (Approx.): 90 Horizontal 85 Vertical 68 Electron Gun 18-1/8" ± 3/8 Greatest width 18-1/8" ± 3/8 Greatest width 18-7/16" ± 1/8 Diagonal 24" ± 1/8 Neck length 18-7/16" ± 1/8 Screen Dimensions: 24" ± 1/8 Neck length 24" ± 1/8 Neck length 24" ± 1/8 Neck length 21-7/16 Greatest width 22-13/16 Projected area 322 sq. in Weight (Approx.) 32-1/2 lt Operating Position Ar Cap. Recessed Small Cavity (JEDEC No.J1-21 Bulb Short Small-Shell Duodecal 6-Pi (JEDEC Group 4, No.B6-203), c Small-Shell Duodecal 6-Pin, Arrangement	Persistence
Diagonal 90 Horizontal 85 Vertical 68 Electron Gun	Deflection Method
Vertical	Diagonal
Tube Dimensions:	Vertical
Greatest width	Tube Dimensions:
Greatest height. 18-7/16" ± 1/8 Diagonal 24" ± 1/8 Neck length. 4-1/2" ± 3/16 Radius of curvature of faceplate (External surface). 40 Screen Dimensions (Minimum): 21-7/16 Greatest width 16-7/8 Diagonal 22-13/16 Projected area 332 sq. in Weight (Approx.) 32-1/2 lb Operating Position	Greatest width
Neck length	Greatest height
Screen Dimensions (Minimum): Greatest width	Neck length
Greatest height	Screen Dimensions (Minimum):
Projected area	Greatest width
Operating Position	Projected area
Bulb	Operating Position
(JEDEC Group 4, No.B6-203), o Small-Shell Duodecal 6-Pin, Arrangement	Bulb
	(JEDEC Group 4, No.B6-203),

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TENTATIVE DATA 1

Arupa	24AUP4				
P	ICTURE TUB	E			~
Basing Designation f	for BOTTOM VIEW .			.12L	0
Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater		Gr Co C – Ext Co	id No id No llect	.5, or) ive	С
6	RID-DRIVE* SERVICE			r	
Unless otherwise sp wit	ecified, voltage w h respect to cath	alues are p	ositi	ve	
Maximum Ratings, Desig					C
ULTOR VOLTAGE	••••			volts	
GRID-No.4 (FOCUSING) V Positive value Negative value GRID-No.2 VOLTAGE		500 m	ax.	volts volts volts	
GRID-No.2 VOLTAGE GRID-No.1 VOLTAGE: Negative-peak value. Negative-bias value. Positive-bias value.			ax.	volts volts volts	
Positive-peak value. PEAK HEATER-CATHODE VO Heater negative with During equipment w	NLTAGE: respect to cathode varm-up period		ax.	volts	
not exceeding 15 After equipment wa Heater positive with	urm-up period	. 180 m	ax.	volts volts volts	
Equipment Design Range					C
With any ultor voltag and grid-No.2 volt Grid-No.4 Voltage for	e (E _{CSN}) between 1 age (E _{CSN}) between	200 and 500	volt	2	
focus rid-No.1 Voltage (Ect visual extinction of		-75 to +			_
focused raster	See Rast	er-Cutoff-Ri or Grid-Driv	ange (Chart	C
Frid-No.1 Video Drive Raster Cutoff (Black White-level value	from Level):				
(Peak positive)		lue as dete cept video positi	drive	is a	C
Frid-No.4 Current		-25 to	-25	μa	0
				1	



P.B.P.UR.B.

PICTURE TUBE

Grid—No.2 Current	-15	to +15		μа
Centering Magnett.	0	to 8	9	ausses
Examples of Use of Design Ranges:				
With ultor voltage of	18	000		volts
and grid-No.2 voltage of	9	00		volts
Grid-No.4 Voltage for focus Grid-No.1 Voltage for visual		o +400		volts
extinction of focused raster. Grid-No.1 Video Drive from Raster Cutoff (Black Level):	-35	to -72		volts
White-level value	35	to 72		volts
Maximum Circuit Values:				
Grid-No.1-Circuit Resistance		1.5 m	ax. n	negohns
CATHODE-DRIVE"	SERVICE			
Unless otherwise specified, volt. with respect to g			posii	tive
Maximum Ratings, Design-Center Valu	es:			
ULTOR-TO-GRID-No.1 VOLTAGE		{20000 {12000*	max. min.	volts
GRID-No.4-TO-GRID-No.1 VOLTAGE:				
Positive value		1000	max.	volt
Negative value		-500		volts
GRID-No.2-TO-GRID-No.1 VOLTAGE		640 500	max.	volt: volt:
GRID-No.2-TO-CATHODE VOLTAGE CATHODE-TO-GRID-No.1 VOLTAGE:	•••		max.	_
Positive-peak value		200	max.	volt
Positive-bias value		140	max. max.	volt: volt:
Negative-bias value		2	max.	volt
Negative-peak value	thode	4	Indias	VOTE
During equipment warm-up period				
not exceeding 15 seconds		410	max.	volt
After equipment warm-up period.		180	max.	volt
		180	max.	volt
Heater positive with respect to ca	thode.			
Equipment Design Ranges:				
	ge (Ec _l rid-No.	1 volta	ween ige (B	12000 c281 ⁾
Equipment Design Ranges: With any ultor-to-grid-No.1 volta and 20000 volts and grid-No.2-to-g between 225 and 6 Grid-No.4-to-Grid-No.1 Voltage for focus§	ge (Ecl rid-No. 540 voli	1 volta	nge (B	12000 c281) volt
Equipment Design Ranges: With any ultor-to-grid-No.1 volta and 20000 volts and grid-No.2-to-g between 225 and 0 Grid-No.4-to-Grid-No.1 Voltage for focus§	nge (Ecl prid-No. 140 voli	1 volta s	400	volt
Equipment Design Ranges: With any ultor-to-grid-No.1 volta and 20000 volts and grid-No.2-to-g between 225 and 6 Grid-No.4-to-Grid-No.1 Voltage for focus§	rid-No. 140 volt Raster	1 volta s	400 -Rang	volt

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



PICTURE TUBE

	-
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak negative)Same value as determined for Ekg1 except video drive is a negative voltage Grid-No.4 Current25 to +25 µ2 Grid-No.2 Current	С
Examples of Use of Design Ranges:	
With ultor-to-grid- No. 1 voltage of 18000 volts and grid-No. 2-to-grid- No. 1 voltage of 200 volts	
Grid-No.4-to-Grid-No.1 Voltage for focus	
of focused raster	
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-Ho.1 potential with respect to cathode. This value is a working design-center minimum. The equivalent abso- lute minimum door-or ultor-to-grid-Ho.1 voltage is 11.000 volts, be- low which the serviceability of the 24AUPL 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 abso- lute minimum door -to-grid-Ho.1 voltage is never less that	\subset
involving supply-voltage variation and equipment variation the abso- lute minimum ultor-or ultor-to-grid-Mo.1 voltage is never less than 11,000 volts.	
11.000 volts. The grid-Mo.4 voltage or grid-Mo.4-to-grid-Mo.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-Mo.1 voltage) or grid-Mo.2 voltage (or grid-Mo.2-to-grid-Mo.1 voltage) within design ranges shown for these items. T bistance from Reference Lime for suitable PM centering magnet should	C
not exceed 2-1/4 ⁴ . Excluding extraneous fields, the center of the un- deflected focused spot will fall within a circle having a 1/2-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 deflec- tion 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 Mo.1 and other elec- trodes.	6
For I-ray shielding considerations, see sheet I-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section	

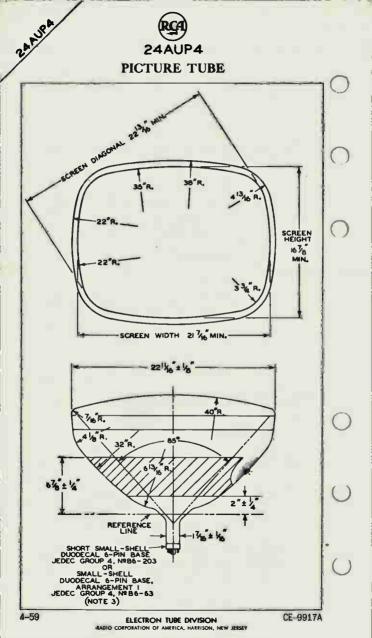
4-59

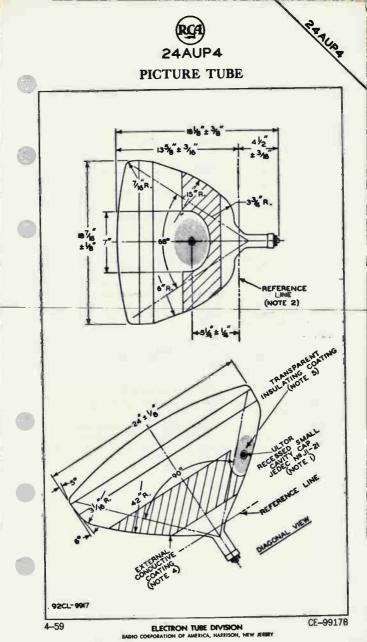
24 AUPA

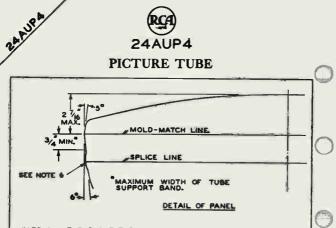
ELECTRON TUBE DIVISION TENTATIVE DATA 2 RADIO CORIORATION OF AMERICA, HARRISON, NEW JERSEY

NPA	ARTS		V I	500		focus.	S S S S S S S S S S S S S S S S S S S
24AUP4	TOFF-RANGE CH -DRIVE SERVICE	20000 TED FOR FOCUS.		300 400	DE-DRIVE SÉRVICE	I2000 TO 20000 LTS ADJUSTED FOR	400 22-TO- SRID-NEL VOLTS
	ASTER	es.3 Volts=i2000 TO	-125 -13 -13 -25 -25 -25	200	САТНОВЕ	.3 VOLTS R-TO-GRID-NRI -N84-TO-GRID	100 100 100 100 100 100 100 100
						Er=6. ULTOR GRID-	CATHODE-TO-GRID-NEI VOLTS

õ







NOTE I: 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°. 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-IIG (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.

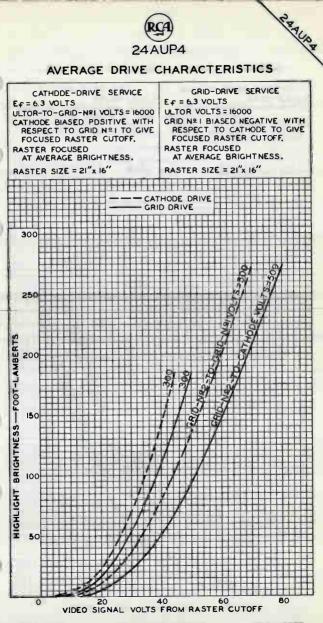
NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 3".

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

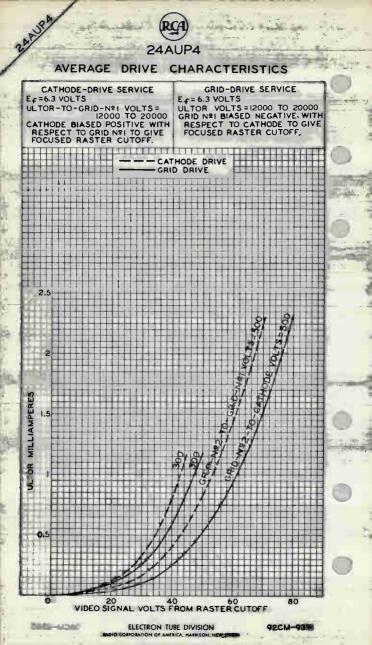
NOTE 6: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE IN-DICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN I/B", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN I/I6" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

ĆE-9917C



ELECTRON TUBE DIVISION

92CM-9352



24BEP4

Picture Tube

Picture Tube	
NO ION-TRAP MAGNET REQUIRED	
RECTANGULAR GLASS TYPE ALUMINIZED SCREEN Low-voltage electrostatic focus 110º Magnetic deflection	
Electrical:	
Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf External conductive coating to anode. Heater Current at 6.3 volts	
Phosphor (For curves, see front of this section) P4-Sulfide Type,	
Aluminized Faceplate	
Nechanical:	
Weight (Approx.)	
External Conductive Coating: Type Modified-Band Contact area for grounding Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J192 C/D sheets at front of this section. Cap	
Pin 1 - Heater Pin 3 - Grid No.1 Pin 4 - Grid No.4 Pin 6 - Grid No.2 Pin 7 - Cathode Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating	
Maximum and Minimum Ratings, Design-Maximum Values:	
Unless otherwise specified, voltage values are positive with respect to cathode	
Anode Voltage	
Grid-No.4 (Focusing) Voltage: Positive value	
RADIO CORPORATION OF AMERICA DATA	

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(RC)

DATA

24BEP4

Gri Gri	d-No.2 d-No.1	Voltag Voltag	ge ne:	•	•	•	•	•	•	•	٠	•	•	•	550	max.	volts	
N	legative	peak	valu	le.											220	max.	volts	
N	legative	bias	valu	le.											154	max.	volts	
ŀ	ositive	bias	valu	ie.											0	max.	volts	
F	Positive	peak	valu	ie.								•	•			max.	volts	
Hea	iter Vol	tage .														max.	volts	
														1	5.7	min.	volts	
	k Heate leater ne During	equip	ewit ment	h n Wa	esp	ec -up	tt pp	er	iod	1					45.0			
	After	exceed	anny mart	10	se	COL	105		• •		•	*	٠	•	450	max.	volts	
Н	leater p	ositiv	nen L	wai th	res	up :no	pe ct	to		+		•	•	•	200	max.	volts	
Тур	ical Op	eratir	ig Co	ndi	ti	ons	3 f	or	Ca	ith	od	e-	Dr	ive	Sei	rvice:		
	U	nless are p														: 8		
A	J. V.1.											_		an				
Ano Crit	de Volt	age	• •	•	•	• •	•	•	•	٠	•	•	٠		160		volts	
Gri	d-No.4 d-No.2	Voltag	e	•	•	• •		•	•	*	•	•	۰		4	100	volts	
Cat	hode Vo	ltano	for	•	•	• •	•	•	•	٠	*	•	•		4	100	volts	
	isual e			of														
	ocused													42	to	78	volts	
										•	۰.	•	•	76.		10	AALTS	
Max	imum Ci		Vału	e:														
	i mum Ci d-No.1 (rcuit			ta	nce	÷.							1.3	5 ma	ix, m	egohns	

X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES At front of this section

> RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



24CP4B

Picture Tube

RECTANGU	LAR GLASS	TYPE
MAGNETIC	FOCUS	

ALUMINIZED SCREEN 90° MAGNETIC DEFLECTION

Electrical:
Heater Current at 6.3 volts 600 ± 10% ma Direct Interelectrode Capacitances:
Grid No.1 to all other electrodes 6 pf
Cathode to all other electrodes
External conductive coating to anode {2500 max. pf
Electron Gun
Ion-Trap Magnet
Optical:
Faceplate, Spherical
Light transmission (Approx.)
Phosphor (For curves, see front of this section) P4Sulfide Type, Aluminized
Aluminized
Mechanical:
Operating Position
Weight (Approx.)
Overall Length
Neck Length. . <t< td=""></t<>
External Conductive Coating:
Type
Contact area for grounding Near Reference Line
For Additional Information on Coatings, Dimensions, and Deflection Angles:
See Picture-Tube Dimensional-Outlines and Bulb J192 A/B
sheets at the front of this section
Cap Recessed Small Cavity (JEDEC No.J1-21)
Base . Small-Shell Duodecal 5-Pin (JEDEC Group 4, No.85-57) Basing Designation for BOTTOM VIEW
Basing Designation for BOTTOM VIEW
ANODE
Pin 1-Heater Cap-Anode
Pin 2-Grid No.1 Couples I (Grid No.3,
Pin 10-Grid No.2 Collector
Pin 11 - Cathode Pin 12 - Heater Conductive
Pin 12 - Heater Conductive Coating
GI (1) (12) - K ODALING
нн

Maximum Ratings,	Design-Haximum Values:	
Anode Voltage		22000 max.

Anoue for Lage					•	•							10.03
Grid-No.2 Voltage.											550	may	volts
Grid-No.2 vorlage.	٠	٠	٠	٠		٠	•	٠	٠	٠	550	INGLA .	AALES



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA

volte

24CP4B

Grid-No.1 Voltage:			
Negative peak value	220 max.	volts	
Negative bias value		volts	
Positive bias value	0 max.	volts	1
Positive peak value		volts	
Peak Heater-Cathode Voltage:			
Heater negative with respect to catho	de:		
During equipment warm-up period			
not exceeding 15 seconds	450 max.	volts	
After equipment warm-up period	200 max.	volts	1
Heater positive with respect to catho	de, . 200 max.	volts	6
Typical Operating Conditions:			
•••			
With anode voltage of	26000	volts	
and grid-No.2 voltage of	300	volts	
Grid-No.1 Voltage for			
visual extinction of			
focused raster	-28 to -72	volts	
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance	1.5 max.	megohns	
	ALL OF FREEDOL	incgoring	

For X-radiation shielding considerations, see sheet I-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section





The second

25AJP22

Color Picture Tube

Perma-Chrome	Bonded-Type	Implosion	Protection
90° Rectangular New Rare-Earth (I	Ped) Pheeshes	HI-LI Unity Curr	TE Screen
	(ed) radspaor	Unity Curr	ent Natios
ELECTRICAL			
Electron Guns, Thre Tilted Toward Tu	e with Axes be Axis	. Red, B1	ue, Green
Heater, of Each Gun Each of the Other	Two Heaters:		with
Current at 6.3 V ^a		. 900	mA
Focusing Method .		Ele	ctrostatic
Focus Lens			ipotential
Convergence Method			Magnetic
Deflection Method.			Magnetic
Deflection Angles (
Diagonal		. 89	deg.
Horizontal		. 78	deg.
			deg.
-Direct Interelectrode	e Capacitances (Ap	prox.);	
	ctrodes		pF
	ther electrodes		pF
All cathodes to al	l other electrodes.	. 15	pF
External conduction to anode (Appro	ve coating x.)	. {2500 n	nax. pF nin. pF
OPTICAL			
Faceplate		F	ilterglass
Light transmissio	n at center (Approx		42%
Surface			Polished
Screen, on Inner Sur	face of Faceplate:		
Туре	Aluminized, 1	Tricolor, Pho	sphor-Dot
Phosphor (three sep phosphors, collec	arate tively) b P22-1	New Rare-Ea e (Blue & Gr	rth (Red),
Fluorescence and separate phosp	phosphorescence of hors, respectively .	of Red, Bl	ue, Green
Persistence of gro	oup phosphorescen	ce Med	lium Short
Dot Arrangement .		ar group con lue dot, and	sisting of green dot
Spacing between cen dot trios (Approx.			•

RBA Electronic Components DATA 1 9-68

25AJP22

MECHANICAL			
Minimum Screen Area (Projected): 295 sq.			
Bulb Funnel Designation, JEDEC N	lo.J195–1/2	A1	ſ
Bulb Panel Designation JEDEC	No.FP196-1	/2	
Base Small-Button			
Basing Designation ^c			
Pin Position Alignment Pin No.12	Aligns Appro	ox.	
with Anor	le Bulb Conta	act	(
Operating Position Anode Bulb	Contact on T	op	1
Weight (Approx.)	imum Values	(g)	
Unless otherwise specified, values are for ea and voltage values are positive with respect	to cathode		
Anode Voltage	27,500 max. 20,000 min.	vv	
Total Anode Current, Long-Term Average	1000 max.	A	
Grid-No.3 (Focusing Electrode) Voltage .	6000 max.	v	
Peak Grid-No.2 Voltage, Including Video Signal Voltage	1000 max.	v	
Grid-No.1 Voltage:			
Negative bias value	400 max.		
Negative operating cutoff value	200 max.	V	
Positive bias value	0 max. 2 max.	vv	
Positive peak value	2 max.	v	
Heater Voltage (ac or dc):	16 9 max	v	
Under operating conditions ^a	6.9 max. 5.7 min.	v	
Under standby conditions ^d	5.5 max.	V	
Peak Heater-Cathode Voltage:			
Heater negative with respect to cathode:			(
During equipment warm-up period not exceeding 15 seconds	450 max.	v	
After equipment warm-up period:	100 1102.	•	
Combined AC and DC value	200 max.	V	
DC component value	200 max.	V	
Heater positive with respect to cathode:			-
AC component value	200 max.		
DC component value	0 max.	V	

EQUIPMENT DESIGN RANGES

Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode For anode voltages between 20,000 and 27,500 V

Grid-No.3 (Focusing Electrode) Voltage 16.8% to 20% of Anode voltage

RBA Electronic Components DATA 1

5

Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused Spot See CU	TOFF DESIGN CHART			
Maximum Ratio of Grid-No.2 Voltages, Highest Gun to Lowest Gun in Any				
Tube (At grid-No.1 spot cutoff voltage of -100 V)	1.86			
Heater Voltage:				
Under operating conditions ⁶	6.3 V			
Under standby conditions ^c	5.0 V			
Grid-No.3 Current (Total)	45 to +15 µA			
Grid-No.2 Current	5 to +5 μA			
To Produce White of 9300 ^o K + 27 M.P. (CIE Coordinates x=0.281, y=0.311):	C.D.			
Percentage of total anode				
current supplied by each gun (average)	Red Blue Green 34 32 34 %			
Ratio of cathode currents:	Min. Typ. Max.			
Red/blue				
Red/green				
Blue/green Displacements, Measured at Center of S				
 Raster centering displacement: 	C10011.			
Horizontal	±0.47 in (±11.9 mm)			
Vertical	±0.45 in (±11.4 mm)			
Lateral distance between the blue beam and the con-				
verged red and green beams	±0.25 in (±6.4 mm)			
Radial convergence displacement excluding effects of dynamic				
convergence (each beam)	±0.37 in (±9.4 mm)			
Maximum Required Correction for				
Register ^e (Including Effect of				
Earth's Magnetic Field when Using Recommended Components)				
as Measured at the Center of the				
Screen in any Direction 0.0	005 in (0.13 mm) max.			
LIMITING CIRCUIT VALUES				
High-Voltage Circuits:	and the second second second second second second second second second second second second second second second			
Grid-No.3 circuit resistance				
In order to minimize the possibility caused by a momentary internal ar that the high-voltage power supply ar	of damage to the tube			
caused by a momentary internal ar	c, it is recommended			
that the high-voltage power supply as	in which the short-			
supply be of the limited-energy type circuit current does not exceed 20 mi	illiamperes.			
Low-Voltage Circuits:				
Effective grid-No.1-to-cathode-				
circuit resistance (each gun)	0.75 max. MΩ			
RP/ Electronic	DATA 2			
UUUUU Components				

The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short circuit current of more than 750 milliamperes total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by aminimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

- ⁹ For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.
- For curve, see Group Phosphor-P22-New Rare-Earth (Red), Sulfide (Blue & Green) at front of this section.
- ^c The mating socket, including its associated, physicallyattached hardware and circuitry, must not weigh more than one pound.
- ^d For "instant on" applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.

Register is defined as the relative position of the been trios with respect to the associated phosphor-dot trios.

X-RADIATION WARNING

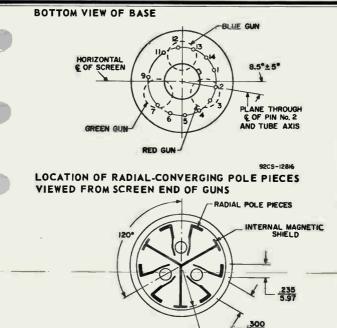
Because the 25AJP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 25AJP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

BASE SPECIFICATION - JEDEC No. 14BE

Pin 1: HeaterPin 11: Cathode of Blue GunPin 2: Cathode of Red GunPin 12: Grid No.1 of Blue GunPin 3: Grid No.1 of Red GunPin 12: Grid No.2 of Blue GunPin 4: Grid No.2 of Red GunPin 13: Grid No.2 of Blue GunPin 5: Grid No.2 of Green GunPin 14: HeaterPin 6: Cathode of Green GunCap: Anode (Grid No.4,Pin 7: Grid No.1 of Green GunScreen, Collector)Pin 9: Grid No.3Coating

RBA Electronic Components

DATA 2



NOTES FOR DIMENSIONAL OUTLINE

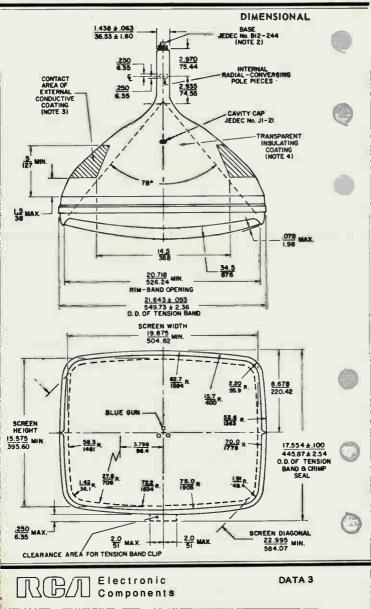
Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge JEDEC No.G162 and with tube seated in guage, the reference line is determined by the intersection on the plane C-C' of the gauge with the glass funnel.

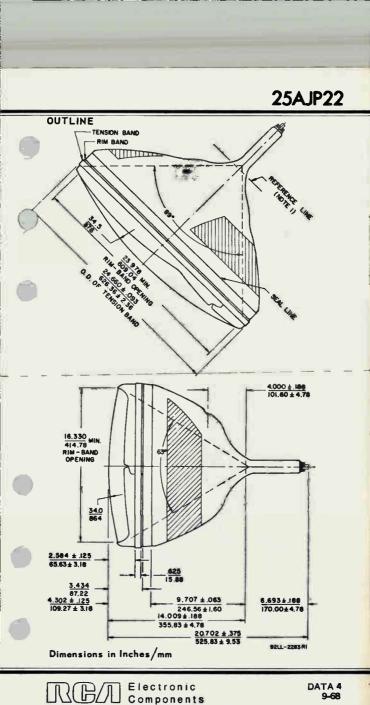
.590 R.

- Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.
- Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.
- Note 4: To clean this area, wipe only with soft, dry, lintless cloth.

RBA Electronic Components DATA 3 9-66

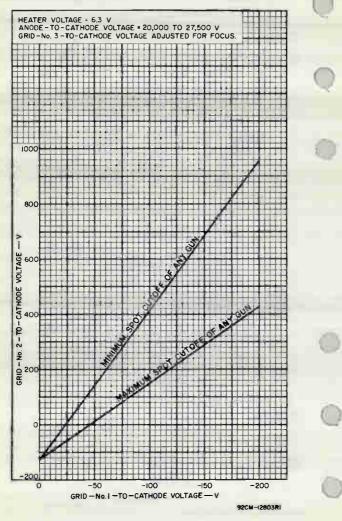
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CUTOFF DESIGN CHART



RBA Electronic Components

	25BCP22
	Color Picture Tube
	Hi-Lite Matrix Screen Perma-Chrome
1	90° Rectangular High-Resolution Gun
)	New Green Phosphor Unity Current Ratios
	Antiglare Integral Protective Window
	ELECTRICAL
	Electron Guns, Three with Axes Tilted Toward Tube Axis Red, Blue, Green
	Heater, of Each Gun Series Connected within Tube with Each of the Other two Heaters:
	Current at 6.3 V ^o 900 mA
	Focusing Method Electrostatic
	Focus Lens Bipotential
	Convergence Method Magnetic
	Deflection Method Magnetic
	Deflection Angles:
	Diagonal
	Horizontal
	Vertical
	Grid No.1 of any gun to all other electrodes 7.5 pF
	Grid No.3 to all other electrodes 6.5 pF
	All cathodes to all other electrodes 15 pF
	External conductive coating (2500 max. pF to anode
	OPTICAL
	Faceplate and Protective Window Filterglass
	Light transmission at center (Approx.) 67.5%
)	Surface of Protective Window Treated to minimize specular reflection
	Screen Aluminized
)	Matrix
	Phosphor, rare-earth (red), sulfide (blue & green)
	Persistence
	Array
	Spacing between centers of adjacent dot trios (approx.) 0.029 in (0.74 mm)

RBA Electronic Components

C

MECHANICAL			
Minimum Screen Area (Projected). 295 sq. in (1905 Bulb Funnel Designation JEDEC No.J1) sq. c 195—1/	m) 2	
Bulb Panel Designation JEDEC No.FPI			
Protective Window Designation JEDEC No.SP196-1/2			
Base ^b			
Pin Position Alignment Pin No.12 Aligns with Anode Bulb	Appro Conta	x. ct	
Operating Position Anode Bulb Contact	on To	op	
Weight (Approx.)			
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMU Unless otherwise specified, values are for each gun a age values are positive with respect to cathode	and vo		
Anode Voltage	max.	V	
20,000	min.	v	
Total Anode Current,			
Long-Term Average 1000	max. ;	IA	
Grid-No.3 (Focusing Electrode) Voltage	max.	v	
Peak-Grid-No.2 Voltage, Including Video Signal Voltage 1000	max.	v	
Grid-No.1 Voltage: Negative bias value	max.	v	
Negative operating cutoff value 200	max.	v	
	max.	v	
	max.	v	
Under operating conditions ^a 5.7 min 6.9	max.	v	
	max.	v	
Peak Heater-Cathode Voltage:		Ċ.	
Heater negative with respect to cathode:			
During equipment warm-up period not exceeding 15 seconds	max.	v	
After equipment warm-up period:	max.		
	max.	v	
	max.	v	
Heater positive with respect to cathode:	incax.	•	
AC component value 200	max.	V	
DC component value 0	max.	v	
EQUIPMENT DESIGN RANGES Unless otherwise specified, values are for each gun age values are positive with respect to cathode	and vo	lt-	
For anode voltages between 20,000 and 27,500 V			
Grid-No.3 (Focusing Electrode) Voltage 16.8 of Anode			
	DAT	A 1	
Components			

Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused
Spot See CUTOFF DESIGN CHART
Maximum Ratio of Grid-No.2 Voltages, Highest Gun to Lowest Gun in Any
Tube (At grid-No.1 spot cutoff voltage of -100 V) 1.86
Heater Voltage:
Under operating conditions: ⁶
When standby operation is not utilized6.3 V
When 5.0-V standby operation is utilized
Under standby conditions ^d 5.0 V
Grid-No.3 Current (Total)
Grid-No.2 Current
To Produce White of 9300° K + 27 M.P.C.D. (CIE Coordinates x = 0.281, y =0.311):
Percentage of total anode current supplied by each gun (average)
Ratio of cathode currents: Min. Typ. Max.
Red/blue
Red/green 0.65 1.00 1.50
Blue/green 0.60 0.91 1.30
Displacements, Measured at Center of Screen:
Raster centering displacement:
Horizontal ± 0.45 in (± 11.4 mm)
Vertical ± 0.45 in (± 11.4 mm)
Lateral distance between the blue beam and the con-
verged red and green beams $\dots \pm 0.25$ in (± 6.4 mm)
Radial convergence displacement excluding effects of dynamic convergence (each beam) ± 0.37 in (± 9.4 mm)
Maximum Required Correction for
Register ^e (Including Effect of Earth's Magnetic Field when
Using Recommended Components)
as Measured at the Center of the Screen in any Direction 0.005 in (0.13 mm) max.
LIMITING CIRCUIT VALUES
High-Voltage Circuits:
Grid-No.3 circuit resistance
Components 8-69

In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type, in which the short-circuit current does not exceed 20 milliamperes.

Low-Voltage Circuits:

Effective grid-No.1-to-cathode-

circuit resistance (each gun) 0.75 max. MQ The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short circuit current of more than 750 milliamperes total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

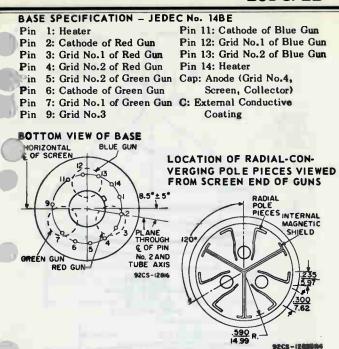
⁶ For maximum cathode life, it is recommended that the heater supply be regulated. The series impedance to any chassis connection in the dc biasing circuit for the heater should be between 100,000 ohms and 1 megohm.

^b The mating socket, including its associated, physicallyattached hardware and circuitry, must not weigh more than one pound.

d The use of a 5-volt standby condition in conjunction with 6-volt operating condition is recommended to improve the reliability of the color picture tube by extending the emission wear-out life and reducing other gun-related defects. A maximum heater voltage of 5.5 volts (Design-Maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.

• Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

X-RADIATION WARNING: Because the 25BCP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (Design-Maximum value), shielding of the 25BCP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.



NOTES FOR DIMENSIONAL OUTLINE

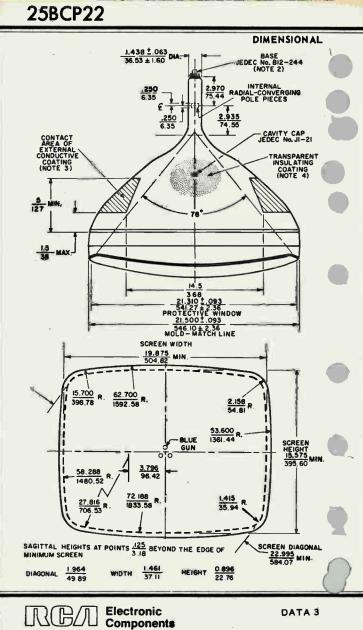
Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge (JEDEC No.G162) and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel. Note 2: Socket for this base should not be rigidly mounted;

Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis. Note 3: The drawing shows the size and location of the con-

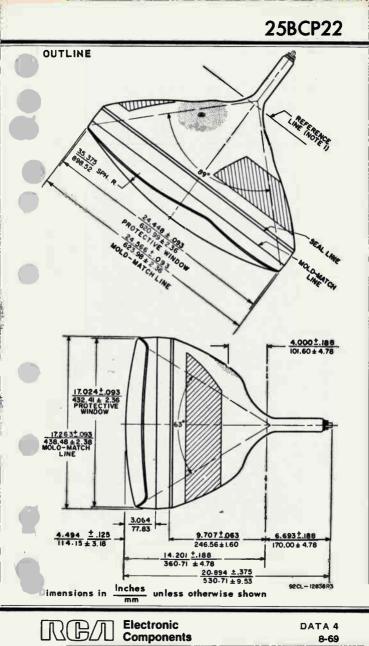
Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

Note 4: To clean this area, wipe only with soft, dry, limbless cloth.

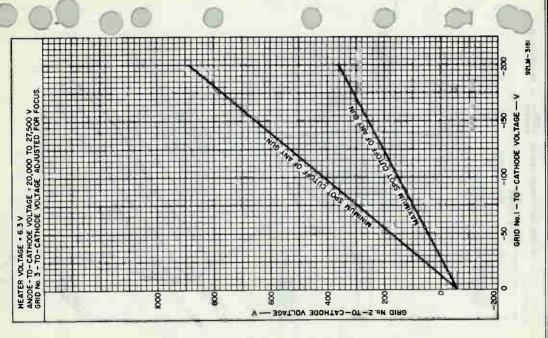
DATA 3 8-69



DATA 3



CUTOFF DESIGN CHART



ATA 4

Electronic Components

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25BDP22

Color Picture Tube

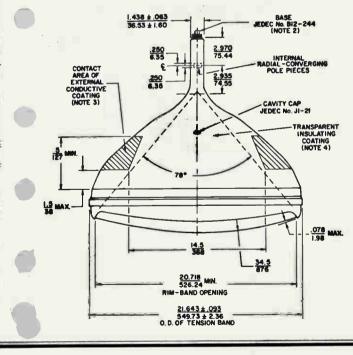
Hi-Lite Motrix Screen 90° Rectongular New Green Phosphor Permo-Chrome High-Resolution Gun Unity Current Rotios

Integral Implosion Protection - Bonded Type

The 25BDP22 is the same as the 25BCP22 except for:

OPTICAL
aceplate
Light transmission at center (Approx.) 69% Surface
MECHANICAL Weight (Approx.)

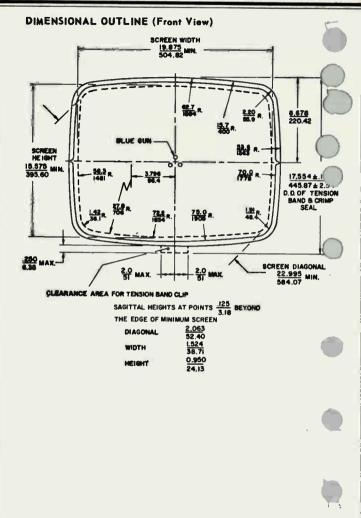
DIMENSIONAL OUTLINE (Top View)



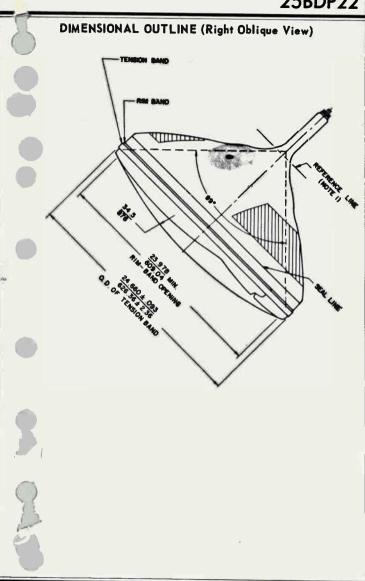
RBA Electronic Components DATA 1 8-69

25BDP22

RBA Electronic Components

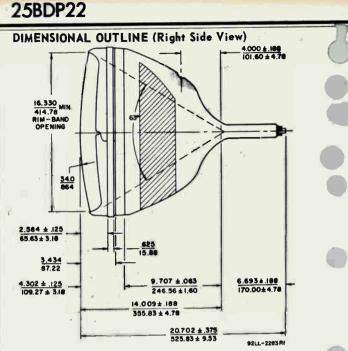


25BDP22



Electronic Components RBЛ

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Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge (JEDEC No.G162) and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel.

Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.

Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

Note 4: To clean this area, wipe only with soft, dry, lintless cloth.

Dimensions in <u>Inches</u> unless otherwise shown mm

> Electronic Components

DATA 2

Color Picture Tube

RECTANGULAR TUBE 90° MAGNETIC DEFLECTION
ALUMINIZED TRICOLOR PHOSPHOR-DOT <i>Hi-Lite</i> SCREEN (Utilizing a Rare-Earth Red-Emitting Phosphor)
INTEGRAL FILTERGLASS PROTECTIVE WINDOW (Treated to Minimize Specular Reflection)
MAGNETIC CONVERGENCE ELECTROSTATIC-FOCUS GUNS
For Use in Color-TV Receivers
Electrical:
Electron Guns, Three with Axes Tilted Toward Tube Axis
Two Heaters: 800 ma Current at 6.3 volts*
Optical:
Faceplate and Protective Window
Screen, on Inner Surface of Faceplate: Type Aluminized, Tricolor, Phosphor-Dot Phosphor (Three separate phosphors, collectively)
(See accompanying Curve) P22 — Rare-Earth (Red), Sulphide (Blue & Green) Type
Fluorescence and phosphorescence of separate phosphors, respectively Red, Blue, Greer Persistence of group phosphorescence Medium Short Dot arrangement
Spacing between centers of adjacent dot trios (Approx.) 0.029



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA I 5-65

Nechanical:

Overall length
Neck length 6.693" ± .188"
Diagonal
Greatest width
Greatest height
Minimum Screen Dimensions (Projected):
brugeruit i tit tit tit i tit i tit i tit i tit i tit i tit i tit i tit i tit i tit i tit i tit i tit i tit i t
Greatest width
Greatest height
Area
Weight (Approx.)
Operating Position Anode Cap Contact on Top
Cap Recessed Small Cavity (JEDEC No.J1-21)
Pin Position Alignment Pin 12 Align Approx. with Anode Cap
Base Small-Button Diheptar 12-Pin (JEDEC No. B12-244)
Basing Designation for BOTTOM VIEW
Pin 1-Heater
Pin 2-Cathode of Red Gun
Pin 3-Grid No.1 of Red Gun
Pin 4-Grid No.2 of Red Gun
Pin 5-Grid No.2 of Green Gun
Pin 6-Cathode of Green Gun 6
Pin 7-Grid No.1 of Green Gun 62G5
Pin 9-Grid No.3
Pin 12-Grid No. 1 of Blue Gui
Pin 13-Grid No.2 of Blue Gun
Pin 12 - Grid No. 2 of Blue Gun Pin 13 - Grid No. 2 of Blue Gun Pin 14 - Heater
Pin 12 - Grid No.1 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4,
Pin 12 - Grid No.1 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, K_R () $\mathbb{I}_{(4)}$ \mathbb{I}_{2} K_R () $\mathbb{I}_{(4)}$ \mathbb{I}_{2}
Pin 12 - Grid No.1 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4,
Pin 12 - Grid No.1 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, K_R () $\mathbb{I}_{(4)}$ \mathbb{I}_{2} K_R () $\mathbb{I}_{(4)}$ \mathbb{I}_{2}
Pin 12 - Grid No.2 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Cap - Anode (Grid No.4, Grid No.5) Screen, Collector
Pin 12-Grid No.2 of Blue Gun Pin 13-Grid No.2 of Blue Gun Fin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector C- External Conductive Coating
Pin 12-Grid No.1 of Blue Gun Pin 13 - Grid No.2 of Blue Gun In 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector . C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values:
Pin 12-Grid No.1 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector . C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun
Pin 12-Grid No.1 of Blue Gun Pin 13 - Grid No.2 of Blue Gun In 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector . C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values:
Pin 12 - Grid No.2 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode (27 500 max, volts)
Pin 12-Grid No.2 of Blue Gun Pin 13-Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector . C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode Anode Voltage
Pin 12-Grid No.2 of Blue Gun Pin 13-Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector C- External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode Anode Voltage. Anode Voltage. Maximum And Voltage. Anode Voltage. Maximum And Voltage. Anode Voltage. Maximum And Voltage. Collector Cating Collector Collec
Pin 12-Grid No.2 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode Anode Voltage. Anode Voltage. Anode Current,
Pin 12-Grid No.2 of Blue Gun Pin 13-Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector . C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode Anode Voltage. Anode Voltage. Anode Current, Long-Term Average,
Pin 12-Grid No.2 of Blue Gun Pin 13-Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector . C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode Anode Voltage. Anode Voltage. Anode Current, Long-Term Average. Grid-No.3 (Focusing Electrode) Voltage. 6000 max. volts 6000 max. volts
<pre>Pin 12 - Grid No.1 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode Anode Voltage</pre>
Pin 12-Grid No.2 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode Anode Voltage
Pin 12-Grid No.1 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector C- External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode Anode Voltage. Anode Voltage. Anode Voltage. Content of the specified of
Pin 12-Grid No.2 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode Anode Voltage. Anode Current, Long-Term Average. Grid-No.2 (Focusing Electrode) Voltage. Video Signal Voltage. Video Signal Voltage. Maximum And Voltage: Cation Cation Cation Cation Cation Cation Cation Control Cation C
Pin 12 - Grid No.2 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode Anode Voltage. Anode Voltage. Anode Current, Long-Term Average. Grid-No.2 (Focusing Electrode) Voltage. Video Signal Voltage. Negative-bias value. Maximum And Voltage. Coating Coatin
<pre>Pin 12 - Grid No.1 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode Anode Voltage</pre>
<pre>Pin 12 - Grid No.1 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode Anode Voltage</pre>
<pre>Pin 12 - Grid No.1 of Blue Gun Pin 13 - Grid No.2 of Blue Gun Pin 14 - Heater Cap - Anode (Grid No.4, Grid No.5) Screen, Collector C - External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode Anode Voltage</pre>

DATA I

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



Heater Voltage (AC or DC):
Under operating conditions" (6.9 max. volts
15.7 min. volts
Under standby conditions ^b
not exceeding 15 seconds 450 max. volts After equipment warm-up period 200 max. volts Heater positive with respect to cathode 200 max. volts
Equipment Design Ranges:
Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode
For anode voltage between 20,000 and 27,500 volts
Grid-No.3 (Focusing Electrode)
Voltage
Focused Spot See accompanying Cutoff Design Chart
Maximum Ratio of Grid-No.2 Voltages,
Highest Gun to Lowest Gun in Any Tube (At arid—No.1 spot cutoff
voltage of -100 volts)
Grid-No.2 Current
To produce White of 9300 °K + 27 M.P.C.D. (CIE Coordinates x = 0.281, y = 0.311):
Percentage of Total Anode
Current Supplied by Red Blue Green Each Gun (Average): 42 25 33 % <u>Red to Blue Red to Green</u>
Ratios of Min. Typ. Max. Min. Typ. Max. Cathode Currents. 1.0 1.7 2.0 1.0 1.3 1.8
Displacements, Measured at Center of Screen: Raster centering displacement:
Vertical0.45 to +0.45 inch
Horizontal
Lateral convergence displacement of blue beam with respect to con-
verged red and green beams0.25 to +0.25 inch
Radial convergence displacement
excluding effects of dynamic convergence (Each beam)0.37 to +0.37 inch
Maximum Required Correction for
Register ^c (Including Effect of
Earth's Magnetic Field when Using Recommended Components) as
Measured at Center of the Screen
in any Direction 0.005 inch



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Examples of Use of Design Ranges:

Unless otherwise specified, voltage values are for each gun and are positive with respect to cathode	
Grid-No.3 Voltage	voltŝ volts
volts for visual extinction of focused spot	voits
400 volts	volts
Heater Voltage: Under operating conditions ^a	volts volts

Limiting Circuit Values:

High-Voltage Circuits

In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type.

Grid-No.3 circuit resistance 7.5 max. megohms

Low-Voltage Circuits

Effective grid-No.1-to-cathode-

circuit resistance (each gun).... 0.75 max. megohm The low voltage circuits should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the grid-No.2to-heater circuit, grid-No.1-to-heater circuit, and the cathode to-heater circuits of all other tubes operating from the same heater winding as the color picture tube and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in comblnation will not supply a continuous short circuit current of more than 750 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the color picture tube.

- For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts.
- For "instant on" applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube with the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- C Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.
- The relative intensities of the narrow-emission bands of the red phosphor are dependent on the resolution of the measuring device.

DATA 2

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



GENERAL CONSIDERATIONS

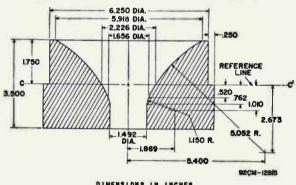
X-Radiation Warning. Because the 25AP22A is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 25AP22A for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

Orientation. The 25AP22A must be operated with tube axis in a horizontal position and with the blue gun uppermost (i.e., anode cap on top). This is the operating position for which the beam-displacement and register correction values shown in the data apply.

The deflecting yoke should not be used for supporting the picture tube because it should be centered on the neck and be free to move along the neck for a distance of approximately 1/2 inch from its most forward position for adjustment purposes. The yoke mount should also provide for a small amount of rotational adjustment.

Contact to the external conductive coating should be made by multiple fingers in order to prevent overheating and possible damage to the tube.

Misregister Compensation. Proper operation of the 25AP22A requires compensation for the effects of extraneous magnetic fields, the earth's magnetic field, and other causes which may produce misregister. Compensation for these effects may be accomplished by the use of a purifying magnet.



REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE

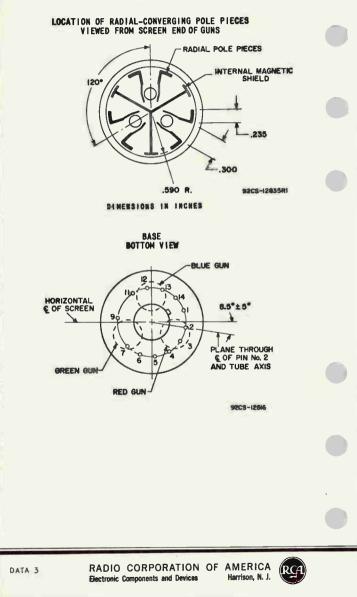
DIMENSIONS IN INCHES

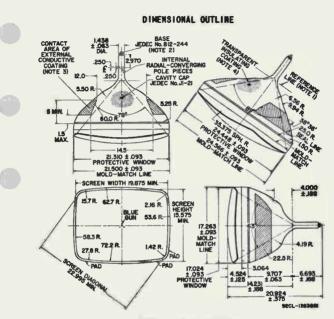
Reference line is determined by plane C-C' when gauge is seated.



RADIO CORPORATION OF AMERICA **Electronic Components and Devices** Harrison, N. J.

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DIMENSIONS IN INCHES

Note I: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel.

Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a circle concentric with bulb axis and have a diameter of 2 inches.

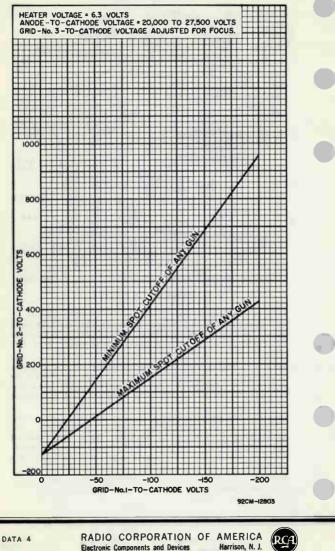
Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

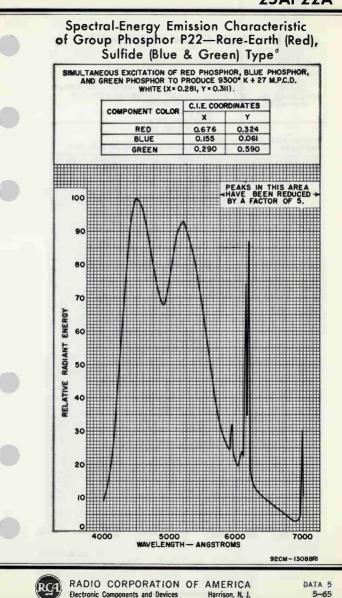
Note 4: To clean this area, wipe only with soft, dry, lintless cloth.

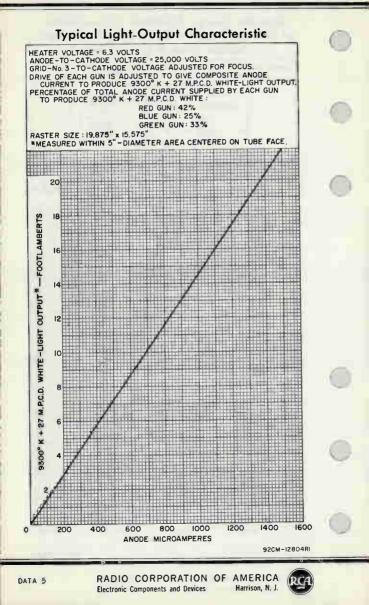


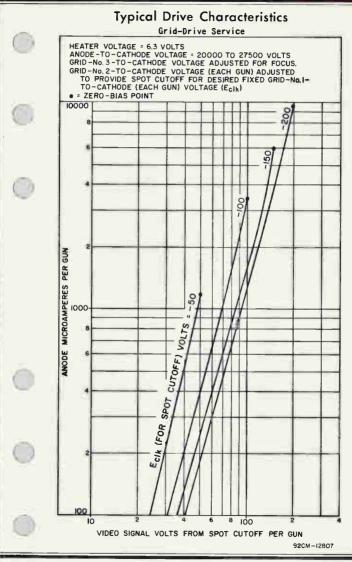
RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 4 5-65





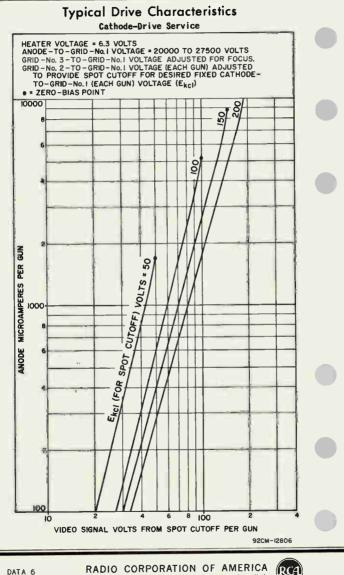








RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 6 5-65



Harrison, N. J. Electronic Components and Devices



25BGP22

Color Picture Tube

PERMA-CHROME

HI-LITE Screen

Rare-Earth (Red) Phosphor Antiglare Integral Protective Window This data sheet is to be used in conjunction with data for RCA-25XP22,

For general data, terminal diagram, maximum and minimum ratings, equipment design ranges, limiting circuit values, x-radiation warning, and general considerations of the 25BGP22, refer to the 25XP22 except as noted below.

MECHANICAL

OPTICAL

Faceplate and Protective Window Light Transmission at center (Approx.)

EQUIPMENT DESIGN RANGES

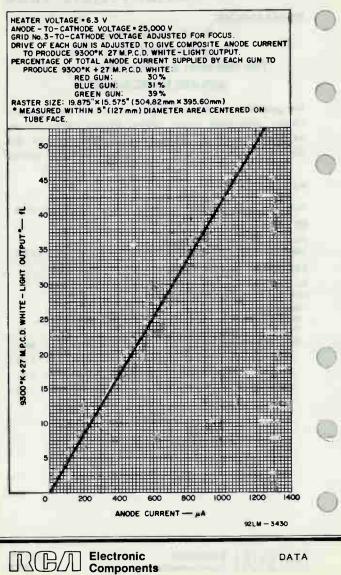
To Product White of 9300° K + 27 M.P.C.D. (CIE Coordinates x = 0.281, y = 0.311):

Percentage of total anode current supplied by	Red	Blue	Gree	
each gun (average)	30	31	39	*
Ratio of cathode currents:		Min	Тур	Max
Red/blue		0.75	0.95	1.25
Red/green		0.60	0.75	1.10
Blue/green		0.60	0.80	1.10

RBA Electronic Components

DATA 2-70

TYPICAL LIGHT-OUTPUT CHARACTERISTIC



25BHP22

Color Picture Tube



PERMA-CHROME

HI-LITE Screen

Rare-Earth (Red) Phosphor Integral Implosion Protection – Banded Type

This data sheet is to be used in conjunction with data for RCA-25AJP22.

For general data, maximum and minimum ratings, equipment design ranges, limiting circuit values, x-radiation warning and base specification of the 25BHP22, refer to the 25AJP22 except as noted below.

MECHANICAL

Bulb Panel Designation JEDEC No.FP196-1/2HI

OPTICAL

Faceplate:

Light transmission at center (Approx.) 52%

EQUIPMENT DESIGN RANGES

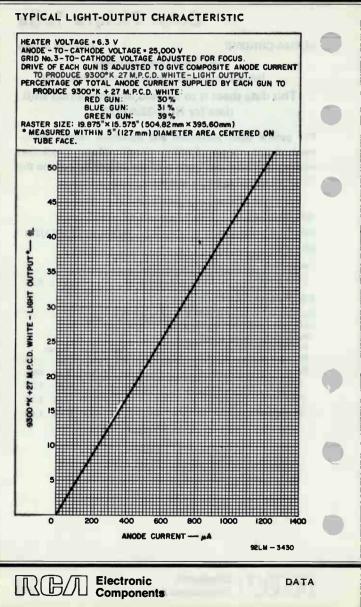
To Product White of 9300° K + 27 M.P.C.D. (CIE Coordinates x = 0.281, y = 0.311):

Percentage of total anode current supplied by each gun (average)	Red .30	Blue 31	Gree 39	n %
Ratio of cathode currents:		Min	Тур	Max
Red/blue		0.75	0.95	125
Red/green		0.60	0.75	1.10
Blue/green		0.60	0.80	1.10

RBA Electronic Components

DATA 2-70

25BHP22



25VABP22

Color Picture Tube

Ultra-Rectangular

4 x 3 Aspect Ratio

Hi-Lite Matrix Screen Light-Neutral Screen Appearance

Electrical:

Electron Guns, Three with Axes Tilted Toward Tube Axis
Heater, of Each Gun Series Connected within
Tube with Each of the Other Two Heaters: Current at 6.3 V
Focusing Method Electrostatic
Focus Lens Bipotential
Convergence Method Magnetic
Deflection Method Magnetic
Deflection Angles (Approx.): 90 deg Diagonal 90 deg Horizontal 78 deg Vertical 60 deg Direct Interelectrode Capacitance (Approx.): 67 deg Grid No.1 of any gun to all other electrodes 7.5 pF All cathodes to all other electrodes 15 pF Capacitance Between Anode and External 2500 max. pF Conductive Coating 2000 min. pF
Optical: (2000 min. pF
Faceplate and Safety Panel Filterglass Light transmission at center (Approx.) 66% Surface of Safety Panel Treated to minimize specular reflection
Screen Aluminized Matrix Black opaque material Phosphor, rare-earth (red) sulfide (blue & green) P22 Persistence Medium-Short Array 566,000 Dot trios
Spacing between centers of adjacent dot trios (approx.) 0.026 in (0.66 mm) Mechanical:
Minimum Screen Area (Projected) 315 sq. in (2032 sq. cm) Bulb Funnel Designation JEDEC No.J208-3/4 B1/D1
Bulb Panel Designation JEDEC No.FP209-3/4 W2
Base Designation ^a Small-Button Diheptar 12-Pin (JEDEC No.B12-244)
Basing Designation
Pin Position Alignment Pin No.12 Aligns Approx. with Anode Bulb Contact

RBA Electronic Components DATA 1 2-72

25VABP22

Operating Position, preferred Anode Bul	b Contact on	Тор
Gun Configuration		Delta
Weight (Approx.)	. 49 16 (22.3	3 kg)
Implosion Protection:		
Integral Safety PanelJEDEC	No.SP209-1/	4A1
Maximum and Minimum Ratings, Design-Maximum	n Values:	
Unless otherwise specified, values are for each values are positive with respect to cathode.	gun and vo	ltøge
Anode Voltage	27.5 max. 20 min.	k∨ kV
Anode Current, Long-Term Averageb	1000 max.	μA
Grid-No.3 (Focusing Electrode) Voltage	6000 max.	v
Peak-Grid-No.2 Voltage,		
Including Video Signal Voltage	1000 max.	V
Grid-No.1 Voltage:		
Negative bias value	400 max.	V
Negative operating cutoff value	200 max.	×
Positive bias value	0 max. 2 max.	v
	2 1144.	
Heater Voltage (ac or dc): ^C	(6 0 mm	v
Under operating conditions	5.7 min.	v
Under standby conditionsd	5.5 max.	V
Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period		
not exceeding 15 seconds	450 max.	V
After equipment warm-up period:		
Peak value	200 max. 200 max.	v
Heater positive with respect to cathode:	200 1100	
DC component value	0 max,	V
Peak value	200 max.	V
Equipment Design Ranges:		
Unless otherwise specified, values are for each values are positive with respect to cathode	gun and vo	Itage
For anode voltages between 20 and 27.5 kV		
Grid-No.3 (Focusing Electrode) Voltage	16.8% to 20 Anode vo	
F *		

C 101- C Velese for Minuel Engineerin		
Grid-No.2 Voltage for Visual Extinction of Undeflected Focused Spot Set	CUTOFF DI	ESIGN CHART
		in Figure 3
At Grid No.1 voltage of -75 V		95 to 295 V
At Grid No.1 voltage of -125 V .		205 to 535 V
At Grid No.1 voltage of -175 V .		315 to 780 V
Maximum Ratio of Grid-No.2 Voltage	s. Highest Gu	n to
Lowest Gun in Any Tube (At grid-No	1 spot cutoff	1000
voltage of -100 V)		1.96
Heater Voltage:C		
Under operating conditions:		
When standby operation is not	utilized	6.3 V
When 5.0-V standby operation	is utilizedd	6.0 V
Under standby conditionsd		5.0 V
Grid-No.3 Current (Total)		
Grid-No.2 Current,		
Grid-No.1 Current		
	Illum.D	Color
To Produce White Light of	6550°K +	9300°K +
CIE Coordinates:	7 M.P.C.D.	27 M.P.C.D.
X	0.313	0.281
Υ	0.329	0.311
Percentage of total anode current		
supplied by each gun (average):		20 4
Red	41 24	30 % 31 %
Blue	36	39 %
Green		
Red/blue:		
Minimum	1.35	0.75
Typical	1.70	0.95
Maximum	2.20	1.25
Red/green:		
Minimum	0.95	0.60
Typical	1.15	0.75
Maximum ,	1.70	1.10
Blue/green:	0.50	0.60
Minimum	0.50 0.70	0.80
Typical	0.95	1.10
Maximum	0.95	
Displacements, Measured at Center of	Screen:	
Raster centering displacement:		
Horizontal		in (± 11.4 mm)
Vertical	± 0.45	in (± 11.4 mm)
Lateral distance between the blue	beam and	
the converged red and green beam	s ±0.25	in (± 6.4 mm)
3 21 1 3		18 A. A. A. A. A. A. A. A. A. A. A. A. A.

RBA Electronic Components

Radial convergence displacement excluding
effects of dynamic convergence
(each beam)
Maximum Required Correction for Register ^e (Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the Center of the Screen in any Direction
Typical Operation:
Heater Voltage 6.3 V
Anode Voltage
Grid No.3 Voltage Adjusted for focus
Color Temperature
Raster Size
Typical White-Light Output Measured within 5 in
(127 mm) diameter area centered on tube face:
(127 mm) diameter area centered on tube face: At anode current of 1000 μ A
Limiting Circuit Values:
High-Voltage Circuits: Grid-No.3 circuit resistance
Low-Voltage Circuits: Effective grid-No.1-to-cathode- circuit resistance (each gun)
X-Radiation Characteristic:
Maximum Anode Voltage at which the X-radiation emitted will not exceed 0.5 mR/h at an anode current of 300 μA
The X-radiation emitted from this picture tube, as measured in ac-

The X-radiation emitted from this picture tube, as measured in accordance with the procedure of JEDEC Publication No.64A will not exceed 0.5 mR/h throughout the useful life of the tube when operated within the Design-Maximum ratings: 27.5 kV anode voltage and 1000 µA anode current. The tube should not be operated beyond its Design-Maximum ratings stated above (such operation may shorten tube life or have other permanent adverse affects on its performance), but its X-radiation will not exceed 0.5 mR/h for anode voltage and current combinations given by the isodose-rate limit characteristics as shown in Figure 1. Operation above the values shown by the curve may result in failure of the television receiver to comply with the Federal Performance Standard for Television Receivers, Sub-Part C of Part 78 of Title 42, Code of Federal Regulations (PL90-602) as published in the Federal Register Vol.34, No. 247, Thursday, December 25, 1969. Maximum X-radiation as a function of anode voltage at 300 μ A anode current is shown by the curve in Figure 2. X-radiation at a constant anode voltage varies linearly with anode current.

- The mating socket, including its associated, physically-attached hardware and circuitry, must not weigh more than one pound (one-half kilogram).
- b The short-term average anode current should be limited by circuitry to 1500 microamperes.
- For maximum cathode life, it is recommended that the heater supply be regulated. The series impedance to any chassis connection in the dc bissing cirucit for the heater should be between 100 kilohms and 1 megohm. The surge voltage across the heater must be limited to 9.5 volts rms.
- d The use of a 5-volt standby condition in conjunction with 6-volt operating conditions is recommended to improve the reliability of the color picture tube by extending the emission wear-out life and reducing other gun-related defects. A maximum heater voltage of 5.5 volts (Design-Maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

Notes for Dimensional Outline

Note 1: With tube neck inserted through flared end of referenceline and neck-funnel-contour gauge (JEDEC No.G162) and with tube seeted in gauge, the reference line is determined by the intersection of the plane C-C'of the gauge with the glass funnel.

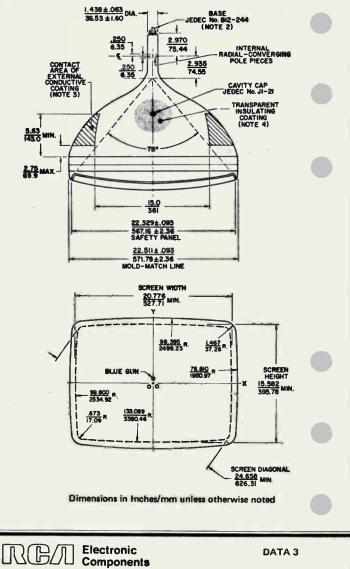
Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.

Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

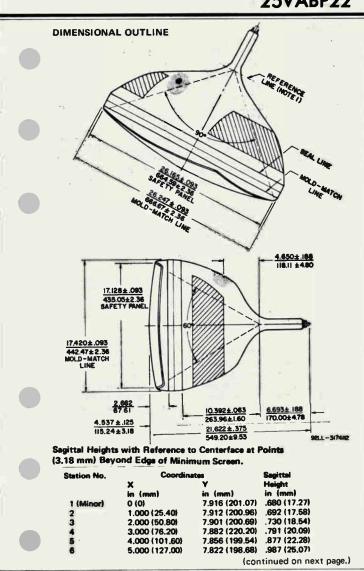
Note 4: To clean this area, wipe only with soft, dry, lintless cloth.

RBA Electronic Components DATA 3 2-72

DIMENSIONAL OUTLINE

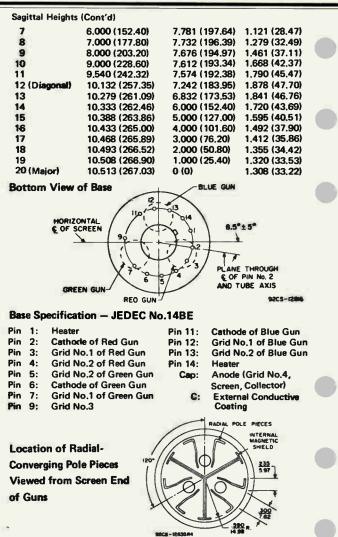






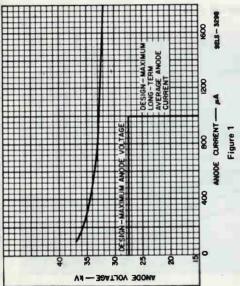
RBA Electronic Components

DATA 4 2.72



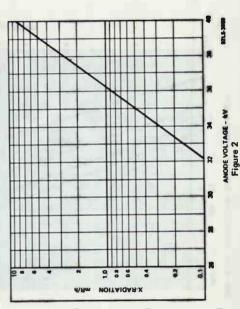
RBA Electronic Components

Ht Ħ CURVE LIMIT щ F ٦ È . ISODOSE mR/h 8 0.5



DIATION AT A CONSTANT LINEARLY WITH ANODE CURRENT) ANODE CONSTANT VE AT A CONS ADIATION AT CURVE VARIES (X-R/ 300 µA X-RADIATION LIMIT VOLTAGE CURRENT OF ANODE VOLT

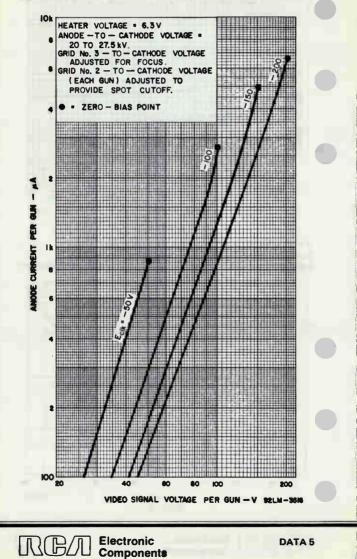
Figure

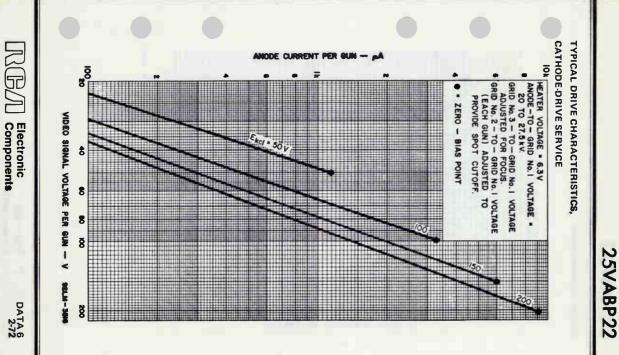


DATA 5 2-72

Electronic Components

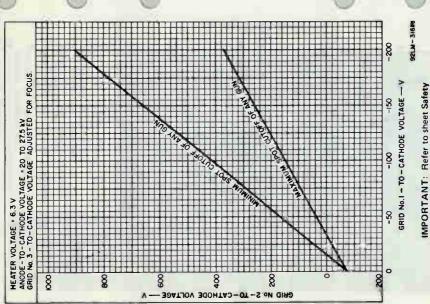






DATA 6 2-72

CUTOFF DESIGN CHART



IMPORTANT: Refer to sneet Safet Precautions for Color Picture Tubes at front of this section.

t of this section. Figure 3 DATA

Electronic Components

25BP22A

Color Picture Tube

RECTANGULAR TUBE

90° MAGNETIC DEFLECTION

ALUMINIZED TRICOLOR PHOSPHOR-DOT Hi-Lite SCREEN (Utilizing a Rare-Earth Red-Emitting Phosphor) MAGNETIC CONVERGENCE 3 ELECTROSTATIC-FOCUS GUNS

For Use in Color-TV Receivers

The 25BP22A is the same as the 25AP22A except for the following items:

Optical:

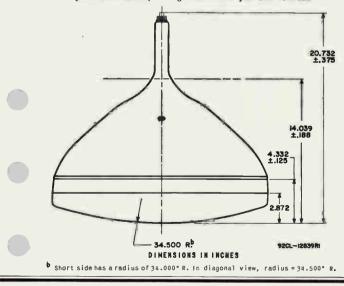
Mechanical:

Tube Dimensions:															
Overall length .								1	20.	73	2"	±	.3	75"	
Weight (Approx.)	٠			٠	٠		٠					• 0	>1	105	

It is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 258P22A to protect it from being struck accidentally and to protect against possible damage resulting from the implosion under some abnormal condition. This safety cover can also provide x-radiation protection when required.

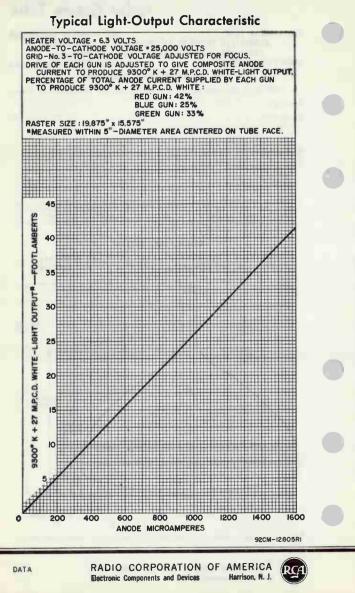
DIMENSIONAL OUTLINE

Dimensions shown are only those which are different from the corresponding dimensions for the 25AP22A





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Color Picture Tube

"PERMA-CHROME" ASSEMBLY FOR OPTIMUM FIELD PURITY AND UNIFORMITY DURING WARM-UP

RECTANGULAR TUBE

90° MAGNETIC DEFLECTION

ALUMINIZED TRICOLOR PHOSPHOR-DOT Hi-Lite Screen

(Utilizing a New Improved Rare-Earth Red-Emitting Phosphor) INTEGRAL FILTERGLASS PROTECTIVE WINDOW

MAGNETIC CONVERGENCE

3 ELECTROSTATIC-FOCUS GUNS

For Use in Color-TV Receivers

ELECTRICAL

Electron Guns, Thr Axes tilted towa				• •	• •		 led	, B1	ue, O	reen
Heater, of Each Gu	n			4						
Series connected of the other two			ew	rith	eac	h				
Current at 6.3									900	mÅ
Focusing Method .										
Focus Lens										
Convergence Method										
Deflection Method			•		• •		•	• •	. Magn	etic
Deflection Angles										
Diagonal										
Horizontal Vertical										
Direct Interelectr							• •	•••	• • •	03-
Grid No.1 of any									6	pF
All cathodes to									15	PF
Grid No.3 to all										pF
External conduct	ive coa	at ing	to	and	de.			250	0 max	pF
								(200	0 min	pF

OPTICAL

Faceplate and Protective Window
Surface of Protective Window Treated to minimize specular reflection
Screen, on Inner Surface of Faceplate
Type Aluminized, Tricolor, Phosphor-Dot
Phosphor (Three separate
phosphors, collectively) ^b P22New Rare-Earth (Red), Sulfide (Blue & Green) Type
Fluorescence and phosphorescence of
separate phosphors, respectively
Persistence of group phosphorescence Medium Short
Dot arrangement Each triangular group consists of a
Spacing between centers of red, green, and blue dot
adjacent dot trios (Approx.)



RADIO CORPORATION OF AMERICA Harrison, N. J. **Electronic Components and Devices**

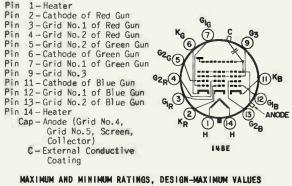
DATA I 4-67

MECHANICAL

Tube Dimensions

	ARE 1 (FALE . A.E
Overall length 20.924 ±	•3/5 IN (531+5 ± 9.5 MM)
Neck length 6.693 ±	188 in (170.0 + 4.8 mm)
Diagonal 24.566 ±	
Greatest width	
Greatest height 17.263 ±	.093 in (438.5 ± 2.4 mm)
Minimum Screen Dimensions (Projected)	
Diagonal	22.995 in (584.1 mm)
Greatest width	
Greatest height	15.575 in (395.6 mm)
Area	295 sq. in (1905 sq. cm)
Bulb Funnel Designation	JEDEC No. J195-1/2 AI
Bulb Panel Designation	
Protective Window Designation	
Bulb Contact Designation R	lecessed Small Cavity Cap
	(JEDEC No. JI-21)
Pin Position Alignment	Pin No.12 Aligns Approx.
	with Anode Bulb Contact
Operating Position	
Weight (Approx.)	
Base Small-Button Diheptar H	2-pin (JEDEC No. B12-244)

TERMINAL DIAGRAM (Bottom View)



Unless otherwise specified, values are for voltage values are positive with respect	to cathode
Anode Voltage	. {27,500 max ¥ 20,000 min ¥
Total Anode Current, Long-Term Average Grid-No.3 (Focusing Electrode) Voltage Peak Grid-No.2 Voltage,	. 1000 max µA
Including Video Signal Voltage	. 1000 max V

DATA I

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Negative operating cutoff value 200	max max	V
Positive peak value	max max	V
Under operating conditions ⁶	min	¥ ¥ ¥
Peak Heater-Cathode Voltage Heater negative with respect to cathode: During equipment warm-up period		
not exceeding 15 seconds	max	Y
DC component value	max	Ÿ
AC component value	max max	¥

EQUIPMENT DESIGN RANGES

Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode
For anode voltages between 20,000 and 27,500 V
Grid-No.3 (Focusing Electrode Voltage
Grid-No.2 and Grid-No.1 Voltages See accompanying For visual extinction of <i>Eutoff Design Chart</i> focused spot
Maximum Ratio of Grid-No.2 Voltages
Grid-No.3 Current (Total)
Percentage of total anode current supplied by each gun (Average) Red Blue Green 34 32 34 % Ratio of cathode currents: Min Typ Max Red/blue Red/blue
Displacement, Measured at Center of Screen
Raster centering displacement: Horizontal±0.47 in (±11.9 mm) Vertical±0.45 in (±11.4 mm) Lateral distance between the blue beam and the converged red and green beams. ±0.25 in (±6.4 mm) Radial convergence displacement
excluding effects of dynamic convergence (Each beam) ±0.37 in (±9.4 mm)

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DATA 2 4-67

Ano

Maximum Required Correction for Register ^c (Including Effect of Earth's Magnetic Field when Using Recommended Components) Measured at the center of the							
screen in any direction	0.005 in	(0.13 mm) max					
EXAMPLES OF USE OF DESIGN RANGES							

Unless otherwise each gun and are		
de Voltage d-No.3(Focusing Flee		

Grid-No.2 Voltage when circuit design utilizes grid-No.1 voltage of -150 volts for visual extinction			
of focused spot		285 to 685	V
Grid-No.1 Voltage for visual extinction			
of focused spot when circuit design			
utilizes grid-No.2 voltage of 400 volts.		-95 to -190	V
Heater Voltage			
Under operating conditions	 	6.3	V
Under standby conditions		5.0	Y

LIMITING CIRCUIT VALUES

High-Voltage Circuits

Grid-No.3 Circuit Resistance. 7.5 max MO

In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type, in which the ahort-circuit current does not exceed 20 mA.

Low-Voltage Circuits

Effective grid-No.1-to-cathode-

circuit resistance (Each gun). 0.75 max

The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short circuit current of more than 750 mA total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

DATA 2

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



HQ.

- For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC bissing circuit for the heater should be between 100,000 ohms and I megoha.
- ^b For curve, see Group Phosphor P22-New Rare-Barth (Red), Sulfide (Blue & Green) st front of this section.
- G For 'instant on' applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (atandby) position. All other voltages normally applied to the tube must be removed during standby operation.
- Register is defined as the relative position of the beam trics with respect to the associated phosphor-dot trics.

GENERAL CONSIDERATIONS

X-Radiation Warning. Becauae the 25XP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (designmaximum value), shielding of the 25XP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

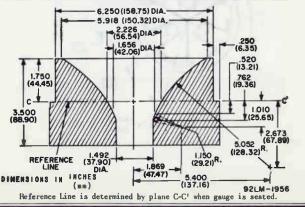
Orisntation. The 25XP22 must be operated with tube axis in a horizontal position and with the blue gum uppermost (i.e., the anode contact button on top).

The Daflecting Yoke and tube axes must coincide and the yoke must be free to move along the neck for a distance of approximately 0.5 inch (13 mm) from its most forward position for adjustment purposes. The yoke mount should also provide for a small amount of rotational adjustment.

Contact to the external conductive coating should be made by multiple fingers to prevent possible damage to the tube from localized overheating due to poor contact.

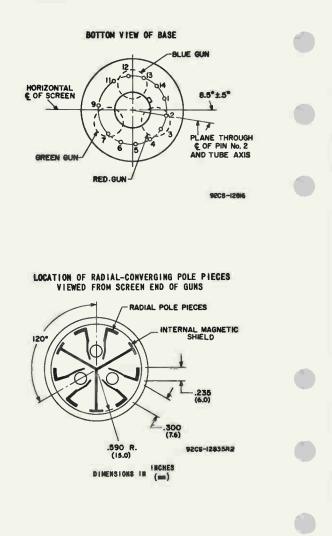
Misragistar Compansation. Proper operation of the 25XP22 requires compansation for the affects of extraneous magnetic fields, the earth's magnetic field, and other causes which may produce misregister. Compansation for these affects may be accomplished by the use of a purifying magnet.

REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE JEDEC No. 6102



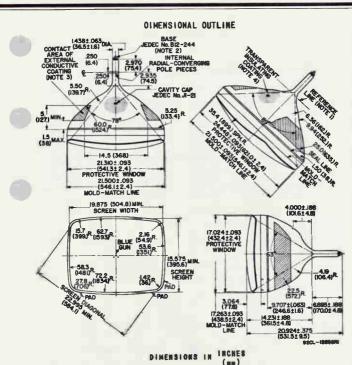


RADIO CORPORATION OF AMERICA Electronic Components and Devices Herrison, N. J. DATA 3 4-67



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.





Nots 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge and with tube seated in gauge, the reference line is determined by the intersection on the plane C-C' of the gauge with the glass funnel.

Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.

Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

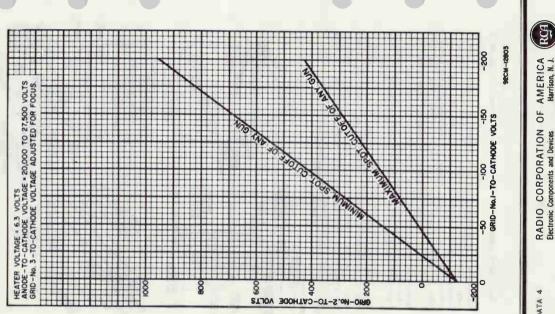
Note 4: To clean this area, wipe only with soft, dry, lintless cloth.



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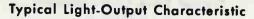


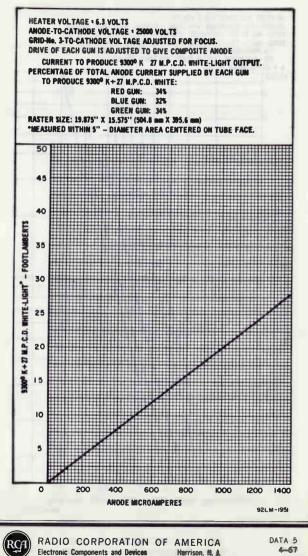


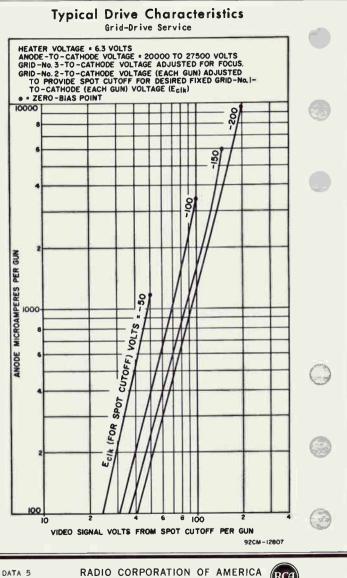
Devices

and

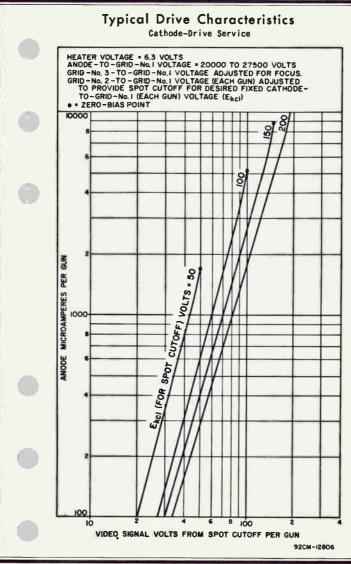
Components







Electronic Components and Devices Harrison, N. J.





RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



E. Car

W.d

25YP22

Color Picture Tube

"PERMA-CHROME" ASSEMBLY FOR OPTIMUM FIELD PURITY AND UNIFORMITY DURING WARM-UP

RECTANGULAR TUBE MAGNETIC CONVERGENCE 90° MAGNETIC DEFLECTION 3 ELECTROSTATIC-FOCUS GUNS

ALUMINIZED TRICOLOR PHOSPHOR-DOT Hi-Lite SCREEN (Wtilizing a New, Improved Rare-Earth Red-Emitting Phosphor)

For Use in Color-TV Receivers

The 251P22 is the same as the 25XP22 except for the following items:

OPTICAL

MECHANICAL

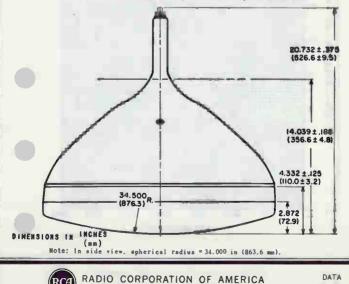
Tube Dimensions

Overall length .			20.732	±	.375 in	(526.6 ± 9.5 mm)
Weight (Approx.)		•				37 1b (16.8 kg.)

It is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 25YP22 to protect it from being struck acciv dentally and to protect against possible damage resulting from tube implosion under some shormal condition. This safety cover can also provide X-radiation protection when required.

DIMENSIONAL OUTLINE

Dimensions shown are only those which are different from the corresponding dimensions for the 25XP22

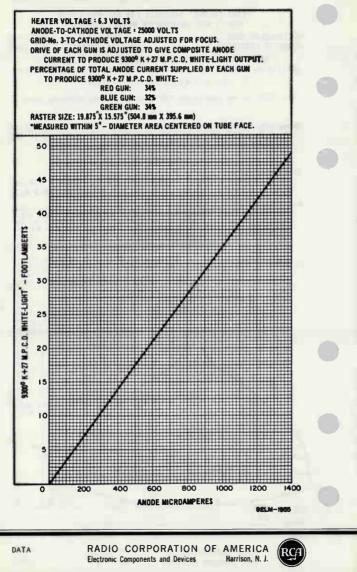


Electronic Components and Devices



Harrison, N. J.

Typical Light-Output Characteristic





902.A

DATA 1

HIGH-VACUUM CATHODE-RAY TUBE

General:

	deneral:
1	Heater, for Unipotential Cathode:
	Voltage
	Current 0.6
	Direct Interelectrode Capacitances (Approx.):
3	
2	DJ1 to All Other Electrodes 8.5
	DJA to All Other Electrodes 6.0
	DJ4 to All Other Electrodes 6.0
	Fluorescence Green
	Persistence,
	Persistence
	Deflection Method Electrostatic
2	Overall Length
	Deflection Method
	Minimum Useful Screen Diameter
	Mounting Position
	Base Medium Shell Octal 8-Pin
	Mounting Position
ł	Pin 1-Grid No.2, Pin 3-Anode No.1
	Anode No.2, (4) (5) Pin 4-Deflecting
1	Deflecting Electr.DJ1 Electr.DJ1 Bin 5- Grid No. 1
	for the second s
	Electrode DJ3
ł	Pin 2-Heater, () (B) Pin 7-Heater
	Cathode Pin 8 - No Connec-
	tion
1	BI ₁ and BI ₂ are nearer the screen
	\bar{M}_3 and \bar{M}_4 are nearer the base
J	With DJ positive with respect to DJ2, the spot is de-
	flected toward pin 3. With DJ3 positive with raspect to
ł	DJ4, the spot is deflected toward pin 1.
	The angle between the trace produced by DJ3 and DJ4 and
	its intersection with the plane through the tube axis and
, i	pin I does not exceed 10°.
)	The angle between the trace produced by DJ3 and DJ4 and
	the trace produced by DJ1 and DJ2 is 900 ± 40.
i	Maximum Ratings, Absolute Values:
	ANODE-No.2 & GRID No.2 VOLTAGE 660 max, volts
	ANODE-No.1 VOLTAGE

GRID-No.1 (CONTROL ELECTRODE) VOLTAGE: Negative Value. . 125 max. volts Positive Value. 0 max. volts PEAK VOLTAGE BETWEEN ANODE No.2 AND DEFLECTING ELECTRODE DU1 OR DU4 volts 385 max.

JULY 1, 1945

RCA VICTOR DIVISION BADIO COEPOLATION OF AMERICA, HARRISON, NEW JERSEY



HIGH-VACUUM CATHODE-RAY TUBE

		1 I
	(continued from preceding page)	\sim
	Typical Operation:	
	Anode No.2 & Grid No.2 Voltage* - • 400 600 volts	
	Anode No.1 Voltage for Focus	
	at 75% of Grid-No.1 Volt- age for Cutoff • . 100 150 volts	ā.
	age for Cutoff [●] . 100 150 volts Grid-No.1 Volt. for Visual Cutoff #40 -60 volts	
ľ	Max. Anode-No.1 Current	Current
	Range* Between -50 and +10 µamp.	
	Deflection Sensitivity:	
	DJ1 and DJ2 0.273 0.183 mm/v dc DJ3 and DJ4 0.326 0.217	
1	DJ3 and DJ4 0.326 0.217 mm/v dc Deflection Factor:**	
	DJ1 and DJ2 93 139 v dc/in.	()
	DJ3 and DJ4	\sim
1	* Prilliance and definition decrease with decreasing anode-No.2 voltage.	
	★ Brilliance and definition decrease with decreasing anode-No.2 voltage. In general, anode-No.2 voltage should not be less than 400 volts.	
ļ	● Individual tubes may require between +20% and -35% of the values shown with grid-No.1 voltages between zero and cutoff.	
	# visual extinction of stationary focused spot. Supply should be adjust-	
	able to ± 50% of these values. A See curve for average values.	
	Individual tubes may vary from these values by ± 205.	
J	Spot Position:	
	The undeflected focused spot will fall within a 10-mm square	
	centered at the geometric center of the tube face and having	
1	one side parallel to the trace produced by DJ1 and OJ2. Suit-	
	able test conditions are: anode-No.2 voltage, 600 volts; anode-No.1 voltage, adjusted for focus; deflecting-electrode	
	resistors. I megohim each for DJ; and DJ4, connected to anode	
1	No.2; the tube shielded from all extraneous fields. To avoid	-
Ę	damage to the tube, grid-No.1 voltage should be near cutoff	
	before application of anode voltages.	1.1
	Maximum Circuit Values:	
	Grid-No.1-Circuit Resistance	
	Impedance of Any Deflecting-Electrode	
	Circuit at Heater-Supply Frequency 1.0 mex. megohm	63
	Resistance in Any Deflecting- Electrode Circuit▲ 5.0 max. megohms	Cal.
	•	
	It is recommended that both deflecting-electrode-circuit resistances be approximately equal.	6
1		
1		63

902:4

Projection Kinescope

FORCED-AIR COOLED ELECTROSTATIC FOCUS MAGNETIC DEFLECTION 20 FT. x 15 FT. PROJECTED PICTURES

For Black-and-White Projection Systems in Theater and Closed-Circuit Television Applications

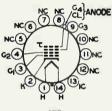
The 4486 is the same as the 7NP4 except that it is supplied with a fitted high-voltage anode cable. (See Accompanying Dimension Outline).

MECHANICAL

Cap shown for type 7NP4 does not apply for type 4486.

TERMINAL DIAGRAM (Bottom View)

Pin 1 -Heater Pin 2 - Cathode Pin 3-Grid No.1 Pin 4 -Grid No.2 Pin 5-No Connection Pin 6-No Connection Pin 7-No Connection Pin 8-No Connection Pin 9-Grid No.3 Pin 10 - No Connection Pin 11-No Connection Pin 12 - No Connection Pin 13 - Internal Connection-Do Not Use Pin 14 -Heater Cable - Anode (Grid No.4. Collector

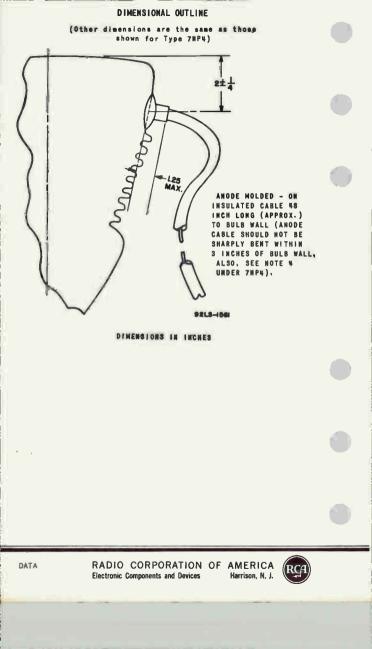


148

Note: Socket contacts for Pins No.5, 6, 7, 8, 10, 11, 12, and 13 should be removed so that maximum insulation is provided for Pin No.9.



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



4490, 4491

Oscillograph-Type Cathode-Ray Tubes

Post-deflection Accelerator

Electrostatic Deflection

Electrostatic Focus

For General Oscillographic Applications in which Low-Speed or Medium-Speed Recurrent-Wave Phenomena are to be Observed

- 61	 гτ	ъ.		
E	 		I CA	L

Heater Current at 6.3 V	0.6 A 6 pF 7.5 pF 3 pF 2 pF 9 pF 9 pF 7 pF
DJ4 to all other electrodes.	7 pF
Deflection Method	ostatic
Phosphor	. P3I .Green Im-Short
	ar Glass
4490	. 6 in
4491 • • • • • • • • • • • • • • • • • • •	••7 în
Base Medium-Shell Diheptal 12-Pin (JEDEC N	
4490 449 Overall Length Greatest Diameter Bulb	0.38 in 8.50 in
Pin 1-Heater TERNINAL DIAGRAM (Bottom View) Pin 2-Cathode Pin 3-Grid No.1 Pin 4-No Connection-Do Not Use Pin 5-Grid No.3 Pin 7-Deflecting Electrode DJ3 Pin 9-Anode (Grids No.2 & No.4) Pin 10-Deflecting Electrode DJ2 Pin 1-Deflecting Electrode DJ2 Pin 1-Deflecting Electrode DJ2 RC = Post RC = Post	ANODE
Pin 12 - Internal Connection - Do Not Use Pin 14 - Heater Cap - Post-Accelerator (Grid No.5 & Collector)	
RBA Electronic Components	DATA 1 7-71

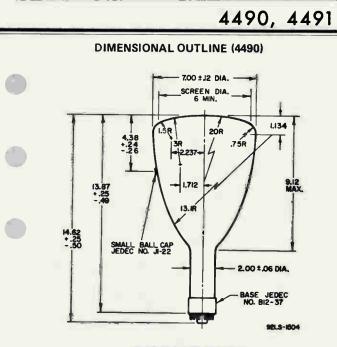
4490, 4491

ABSOLUTE-MAXIMUM AND MINIMUM RATINGS	
Post-Deflection Accelerator Voltage 8000 max	٧
Anode Voltage	٧
Grid-No.3 (Focusing-Electrode) Voltage 2000 max	V (
Grid-No. Voltage	
Negative bias value	٧
Positive bias value 0 max	Y
Positive peak value	٧
Heater Voltage	٧
[5./ min	۷
Peak Heater-Cathode Voltage	
Heater negative with respect to cathode 125 max	V V
Heater positive with respect to cathode 125 max	
TYPICAL OPERATING VALUES	
Unless otherwise specified all values	
are positive with respect to cathode	
Post-Deflection Accelerator Voltage 6000	V 🖉
	V.
Anode Voltage	٧
Grid-No.1 Voltage	¥
For visual cutoff of focused spot	
Deflection Factors 4490 4491	
Dil and Di2)/in
DJ3 and DJ4 99 to 115 85 to 101 V (dc))/in
MAXIMUM CIRCUIT VALUES	
	MQ
Grid-No.1-Circuit Resistance 1.5 max Resistance in any Deflection Electrode Circuit ^a . 5 max	MΩ
It is recommended that the deflecting-electrode-circuit resistan	ces be

approximately equal.

X-RADIATION WARNING: Shielding of these cathode-ray tubes for x-radiation may be needed to protect against possible danger of personal injury from prolonged exposure at close range.

RB/1 Electronic Components



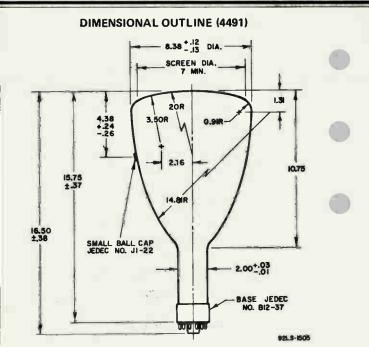
DIMENSIONS IN INCHES

 \mathbf{c} of bulb will not deviate more than 2° in any direction from the perpendicular erected at the center of bottom of the base.

The plane through the tube axis and pin 5 may vary from the trace produced by DJ1 and DJ2 by an angular tolerance (measured about the tube axis) of $\pm 10^{\circ}$. Angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is $90^{\circ} \pm 3^{\circ}$.

DJ1 and DJ2 are nearer the screen; DJ3 and DJ4 are nearer the base. With DJ1 positive with respect to DJ2, the spot will be deflected toward pin 5; likewise, with DJ3 positive with respect to DJ4, the spot will be deflected toward pin 2.

RB/ Electronic Components 4490, 4491



DIMENSIONS IN INCHES

C of bulb will not deviate more than 2⁰ in any direction from the perpendicular erected at the center of bottom of the base.

The plane through the tube axis and pin 5 may vary from the trace produced by DJ1 and DJ2 by an angular tolerance (measured about the tube axis) of $\pm 10^{\circ}$. Angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is $90^{\circ} \pm 3^{\circ}$.

DJ1 and DJ2 are nearer the screen; DJ3 and DJ4 are nearer the base. With DJ1 positive with respect to DJ2, the spot will be deflected toward pin5; likewise, with DJ3 positive with respect to DJ4, the spot will be deflected toward pin 2.

RBA Electronic Components

4499

Oscillograph-Type Cathode-Ray Tube

ELECTROSTATIC DEFLECTION 5-in DIAMETER ELECTROSTATIC FOCUS

For General Oscillographic Applications in which Recurrent-Wave Phenomena are to be Observed ELECTRICAL

Heater Current at 6.3 V	0.6	A
Grid-No.1 to all other electrodes	10	pF
Cathode to all other electrodes	5.5	pF
DJ1 to DJ2	2.5	pF
DJ3 to DJ4	3.0	pF
DJ1 to all other electrodes	10.5	pF
DJ2 to all other electrodes	8.5	pF
DJ3 to all other electrodes	8.5	pF
DJ4 to all other electrodes	9.5	pF
Focusing Method	trosta	tic
Deflection Method	trosta	tic

OPTICAL

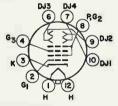
Phosphor	112	•	Pl
Fluorescence and phosphorescence.			 Yellowish-Green
Persistence			
Faceplate			 Clear Glass
Shape			 Flat. Circular
Minimum Useful Screen Diameter			4.56 in
MEQUANION			

MECHANICAL

Operating Position.															
Weight	•		• •		•				•			х.			2 16
Overall Length											12	.00)0 ± ().12	25 in
Greatest Diameter .												5.	.25 ±	0.0)6 in
Bulb								. 1			•		. J4:	2 De	ev. 66
Base		Spe	eci	al.	. :	Sma	11	-S	he	11	Due	ode	cal.	. 10)-pin
				- 1											

TERMINAL DIAGRAM (Bottom View)

Pin	1 - Heater	
Pin	2-Grid No.1	
Pin	3-Cathode	
Pin	4-Grid No.3	
Pin	6-Deflecting Electrode	DJ3
Pin	7-Deflecting Electrode	DJ4
Pin	8-Anode, Grid No.2	
Pin	9-Deflecting Electrode	DJ2
Pin	10 - Deflecting Electrode	DJ1
Pin	12-Heater	



ABSOLUTE-MAXIMUM AND MINIMUM RATINGS

Anode Voltage Grid-No.3 (Focusing-El Grid-No.1 Voltage	lectrode) Voltage	: :	2800 max 00 max	vv
Negative bias value Positive bias value Positive peak value				200 max 0 max 2 max	V V V

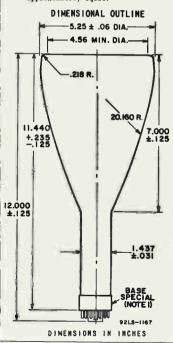


RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

RICA

4499

Heater Voltage	max V min V	
	min V	
Peak Heater-Cathode Voltage		-
Heater negative with respect to cathode 125	max V	
Heater positive with respect to cathode 125	max V	
TYPICAL OPERATING VALUES		
Unless otherwise specified all values are positive with respect to cathode		
Anode Voltage	v	
Grid-No.3 (Focusing-Electrode) Voltage. 750 to 1000		
Grid-No.1 Voltage	, v	
For visual cutoff of focused spot	•	
Deflection Factors		
	14.31	
DJ1 and DJ2	(dc)/in (dc)/in	
DJ3 and DJ4 67 to 83 ¥	(dc)/in	
MAXIMUM CIRCUIT VALUES		
Grid-No. L. Circuit Desistance		
Grid-No.1-Circuit Resistance	max MΩ	
Resistance in any Deflection Electrode Circuit ^a . 5	max MΩ	
It is recommended that the deflecting-electrode-circuit resist approximately equal.	ances be	



The plane through the tube axis and pin 4 may vary from the trace produced by DJ1 and DJ2 by an angular tolerance (measured about the tube axis) of 10°. Angle between DJ1 -DJ2 trace and DJ3 - DJ4 trace is 90° ± 3°.

DJ1 and DJ2 are nearer the screen; DJ3 and DJ4 are nearer the base. With DJ1 positive with respect to DJ2, the spot will be deflected toward pin 4; likewise, with DJ3 positive with respect to DJ4, the spot will be deflected toward Pin 1.

Note I: Base is identical to short small-shellduodecal JEDEC No. B12-207 except pin No.5 and pin No.11 are omitted.

DATA

RADIO CORPORATION OF AMERICA **Electronic Components and Devices**

Harrison, N. J.



Cathode-Ray Tube

4506

7"-DIAMETER CRT WITH MAGNETIC FOCUSING AND DEFLECTION

- Ground Optically-Flat Faceplate
- Ultra-High Resolution
- Extra-Fine Grain Phosphor
- For Photographic Reproduction
- Useful Screen Diameter 6-1/4"

General Data

Electrical:

Heater Voltage, DC	6.3 V
Heater Current at 6.3 V	0.6 A
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle (approx.)	
Direct Interelectrode Capacitances (approx.):	
Cathode to all other electrodes	10.0 pF
Grid No.1 to all other electrodes	10.0 pF

Optical:

Faceplate, flat Clear, Browning-Resistant Glass
Transmission Factor
Reflection Factor ^a
Index of Refraction 1.52
Minimum Useful Screen Diameter 6.25 in
Phosphor, Aluminized Sulfide Type
Luminescence Purplish Blue
C.I.E. coordinates (x,y)
Persistence

Mechanical:

Tube Dimensions:	
Maximum Overall Length	 22-1/8 in
Maximum Bulb Diameter	 7-1/16 in
Neck Diameter	 1-7/16 in

RBA Electronic Components

DATA 1 7-71

Base	Small-Shell, Duodecal, 7	-Pin
Anode Lead (flying) ^b		4 in
Operating Attitude		Any
Weight (approx.)	4.	8 lb
Ratings, Absolute-Maximum Valu	ies:	
Anode Voltage, DC	25,000	v
Grid-No.2 Voltage, DC		V
Grid-No.1 Voltage:		
Negative bias DC		V
Positive bias DC	0	V
Heater-to-Cathode Voltage:		
Cathode positive		V
Cathode negative	180	V
Typical Operation:		
Anode Voltage, DC	20,000	V
Grid-No.2 Voltage, DC	1,000	V
Grid-No.1 Cut-Off Voltage, DC	55 to -95	v
Performance Data:		
Maximum Line Width ^d	0.0009	in
Maximum Persistence ^e	5.0	µsec.

Circuit Requirements

Maximum Grid-No.1 Circuit Resistance	1.0 MΩ
Heater Voltage Regulation	See Note f

- The external surface of the faceplate is treated with a multiplelayer, optical coating to suppress reflections of light in the 400 to 800 nm range.
- b The anode is terminated with the assembly, AMP B 37740 which mates with the AMP Connector 830050-1 or equivalent.
- d Line width is defined as the width at the half-amplitude point of the light energy distribution of the line. The line width is measured with a slit analyzer at a cathode current of 1.0 μA.
- Persistence is defined as the time following cessation of excitation for the light output to decay to 10% of the value observed during excitation. The persistence is measured using a stationary, focused spot. Cathode current during excitation is 1.0 μA.

Heater voltage must be regulated to within 1.0% to assure optimum tube performance.

SAFETY PRECAUTIONS

X-Radiation Warning

Although X-radiation is generated primarily at the face of the tube when it is operated, the X-rays are emitted in all directions.

These rays can constitute a health hazard unless the tube is adequately shielded. Make sure that the shielding provides the required protection against personal injury.

On the neck of the tube itself the following warning appears and should be strictly adhered to:

X-RAY WARNING

This tube in operation produces X-Rays which can constitute a health hazard unless the tube is adequately shielded for radiation.

High Voltage

The high voltages at which tube type is operated may be very clangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the enclosing of high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

In the use of the tube it should always be remembered that high voltages may appear at normally low-potential points in the circuit because of capacitor breakdown or incorrect circuit connections, and that the tube surface maintains a static charge for some time after the power has been turned off. Therefore, before any part of the circuit or the tube is touched, the power-supply switch should be

RBA Electronic Components DATA 2 7-71

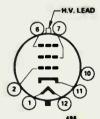
turned off, both terminals of high-voltage capacitors should be grounded, and the terminals of the high-voltage power supply should be grounded.

After these steps have been taken and before touching the tube, discharge the anode terminals, the surface of the faceplate, and the coated surface of the cone by use of a suitable wand which is connected to ground. It is to be noted that the entire surface of the cone and of the faceplate will not be discharged by touching the wand to a single point on either surface, because the surfaces have high resistance. Therefore, to discharge each surface, it will be necessary to sweep over the entire surface with the wand.

Tube Handling

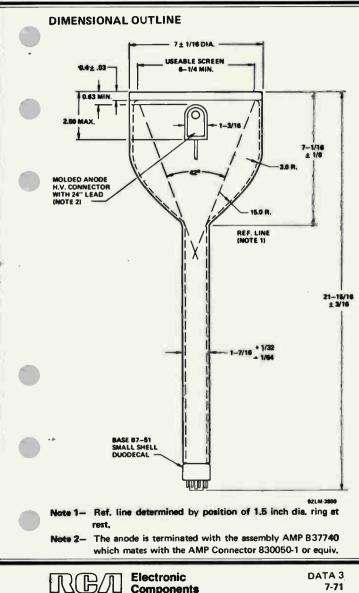
Wear "Safety" Goggles with side shields, when handling tube, to prevent possible injury from flying glass in case of tube breakage. Do not strike or scratch tube. Never subject it to more than moderate pressure when installing in or removing from equipment. Always Handle Tube with Extreme Care. Ground anode contact before touching after power is off.

TERMINAL DIAGRAM



RBA Electronic Components

Pin 1— Heater Pin 2— Grid No.1 Pin 7— Grid No.2 Pin 11— Cathode Pin 12— Heater H.V.Lead — Accelerator



Components

7-71



Oscillograph-Type Cathode-Ray Tube

5-Inch Diameter Electrostatic Deflection

Bulb.

Sase.

RBU

Post-Deflection Accelerator **Electrostatic Focus**

For General Oscillographic Applications in which Extremely Low-Speed or Medium-Speed Recurrent- or Non-Recurrent-Wave Phenomena are to be Observed

ELECTRICAL

Heater Current at 6.3 V 0.6	
Direct Interelectrode Capacitances (Approx.) Grid No.1 to all other electrodes 10	pF
Cathode to all other electrodes 5.5 DJ1 to DJ2	pr
DJ1 to all other electrodes	pF
DJ2 to all other electrodes 8. DJ3 to all other electrodes 8.	pF
DJ4 to all other electrodes 9.0 Focusing Method	static
Deflection Method Electros	static

OPTICAL

Phosphor									•	•		•	
Fluorescence.										٠			. rurpiisn-biue
Phosphorescence .										٠	٠		Tellowish-Green
Persistence													Long
Faceplate						٠.		- 60					Clear Glass
Shape												٠	.Flat, Circular
Minimum Useful Scre	196	D	ia	me	te	r.			•				4.56 in
Operating Position.		-											Any
Weight (Approx.)			-										2 1b
Overall Length	•	•	•	•	•	•			÷				12.00 + 0.13 in
Greatest Diameter .	•	•	•	•	•	•	•		•	•		•	5.31 in

TERMINAL DIAGRAM (Bottom View)

Special, Small-Shell Duodecal, 10-Pin



DATA 1

. J42 Dev. 67

Electronic Components

4-71

ABSOLUTE-MAXIMUM AND MINIMUM RATINGS

Post-Deflection Accelerator Voltage 6000 max Anode Voltage	¥ v
Negative bias value 200 max Positive bias value 0 max	V
Positive peak value 2 max	Ý V
Heater Voltage	V.
Heater positive with respect to cathode	V V

TYPICAL OPERATING VALUES

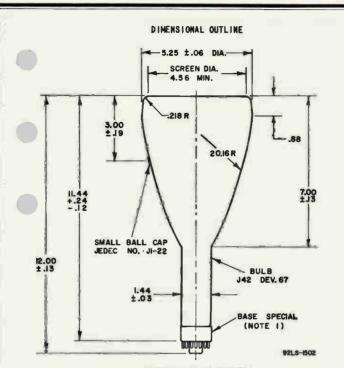
Unless otherwise specified all values	
are positive with respect to cathode	
Post-Deflection Accelerator Voltage 3000	V
Anode Voltage	V
Grid-No.3 (Focusing-Electrode) Voltage. 475 to 725	٧
Grid-No. Voltage	V
For visual cutoff of focused spot	
Deflection Factors	
DJ1 and DJ2 69 to 91	V (dc)/in V (dc)/in
DJ3 and DJ4 57 to 73	V (dc)/in

MAXIMUM CIRCUIT VALUES

	Resistance		
a It is recommended	that the deflecting-electrode-circuit	resistances be	*

X-RADIATION WARNING: Shielding of these cathode-ray tubes for x-radiation may be needed to protect against possible danger of personal injury from prolonged exposure at close range.

RBA Electronic Components



DINENSIONS IN INCHES

The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by an angular tolerance (meaaured about the tube axis) of 10° . Angle between DJ1 -DJ2 trace and DJ3 - DJ4 trace is $90^\circ \pm 3^\circ$.

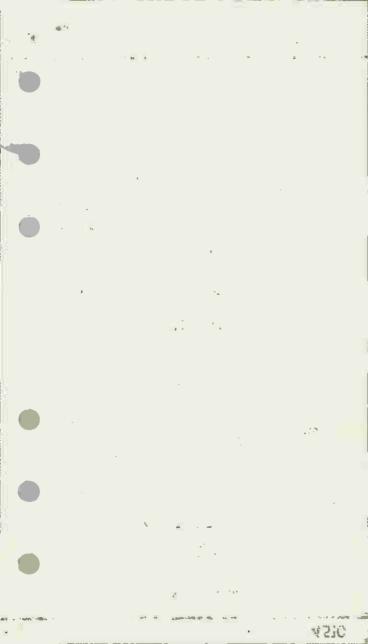
DJ1 and DJ2 are nearer the screen; DJ3 and DJ4 are nearer the base. With DJ1 positive with respect to DJ2, the spot will be deflected toward pin 5; likewise, with DJ3 positive with respect to DJ4, the apot will be deflected toward pin 1.

Note 1: Base is identical to ahort amall-shell duodecal JEDEC No.B12-207 except pin No.4 and pin No.11 are omitted.

533 RCA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 2

4510





5" Radar Display CRT

- Electrostatic focus
- Magnetic deflection
- Less than ten inches overall length
- Offset neck facilitates positioning of display origin at screen edge
- For display of airborne weather radar data in airplane cockpits

Data

- Electrical:
- Heater for Unipotential Cathode:,

Voltage ^a (AC or DC)	6.3		V
Current at 6.3 V	0.3		A
Focusing Method	6	Electrost	tatic
Deflection Method		. Magr	netic
Direct Interelectrode Capacitances:			
Grid No.1 to all other electrodes	10	max.	pF
Cathode to all other electrodes	6	max.	pP
Optical:			
Faceplate:			
Material		Clear C	Slass
Shape		Sphe	rical
Minimum useful diameter		4	.5 in
Phosphor:			
Туре	. Alt	minized	I, P7
Fluorescence		W	/hite
Phosphorescence	Yell	owish G	reen
Persistence Lor	ng (100 i	ms to 1	sec.)

Mechanical:

Tube Dimensions:	
Maximum overall length	9-13/16 in
Maximum bulb diameter	Бin
Neck diameter	7/8 in
Base	DEC No.E9-37
Anode Connector	8utton J1-22
Operating Attitude	Any
Weight	2 lb

RBA Electronic Components

Maximum	Ratings,	Absolute	Maximum	Valuesb
---------	----------	----------	---------	---------

Anode Voltage	12000	max.	V
Grid No.4 Voltage	450	max,	V
Grid No.2 Voltage	450	max.	V
Grid No.1 Voltage:			
Negative bias value	100	max.	V
Positive bias value	0	max.	V
Positive peak value	2	max.	V
Peak Heater Cathode Voltage	125	max.	V

Typical Operating Values

All values are specified with respect to cathode.

Anode Voltage	V
Grid No.4 Voltage ^c 40 to 250	v
Grid No.2 Voltage	۷
Grid No.1 Voltaged25 to -50	v
Anode Current	μA
Grid No.3 Current 10	μA
Grid No.2 Current 1.0	μA
Grid No.1 Drive Voltage	v
Resolution ^e 0.014	ìn

- For optimum life the heater voltage should be regulated at 6.3 volts.
- b A description of the Absolute-Maximum Rating is given in the General Section, titled Rating Systems for Electron Tubes.
- c Adjust for best focus.

RBA Electronic Components

- d Adjust for visual cutoff of undeflected spot.
- At center of tube face. Shrinking raster measurement.

X-Ray Warning

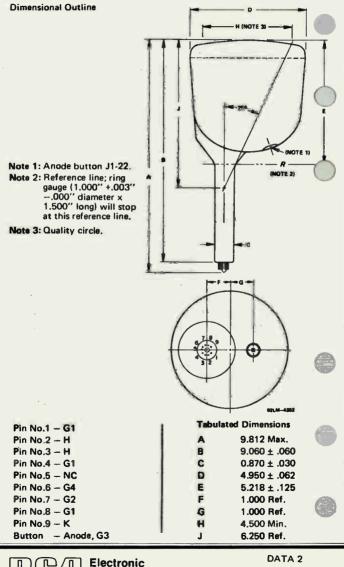
Shielding of this cathode-ray tube for X-ray radiation may be needed to protect against possible danger of personal injury from prolonged exposure at close range.

High Voltage

The high voltages at which tube type is operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the enclosing of high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

In the use of the - tube it should always be remembered that high voltages may appear at normally low-potential points in the circuit because of capacitor breakdown or incorrect circuit connections, and that the tube surface maintains a static charge for some time after the power has been turned off. Therefore, before any part of the circuit or the tube is touched, the power-supply switch should be turned off, both terminals of high-voltage capacitors should be grounded, and the terminals of the high-voltage power supply should be grounded.

After these steps have been taken and before touching the tube, discharge the anode terminals, the surface of the faceplate, and the coated surface of the cone by use of a suitable wand which is connected to ground. It is to be noted that the entire surface of the cone and of the faceplate will not be discharged by touching the wand to a single point on either surface, because the surfaces have high resistance. Therefore, to discharge each surface, it will be necessary to sweep over the entire surface with the wand.



R(B// Components

Photomultiplier Tubes

10-Stage, Head-On Types Having Bialkali Photocathode.

GENERAL

RBЛ

Spectral Response See accompanying Typical Spectral Response Characteristics
Wavelength of Maximum Response
Туре 4516
Minimum projected area
Туре 4517
Minimum projected area
Minimum diameter
Window Corning [®] No.0080, or equivalent
Index of refraction at 4360 angstroms
Shape
Type 4517 Shape
Dynodes:
Substrate Copper-Beryllium
Secondary-Emitting Surface Beryllium-Oxide
Structure
Direct Interelectrode Capacitances (Approx.): Type 4516
Anode to dynode No.10 2.4 pF
Anode to all other electrodes 3.2 pF
Type 4517
Anode to dynode No.10
Type 4516
Maximum Overall Length (Excluding semiflexible leads)
Maximum Diameter 0.78 in (2 cm)
Bulb
Base See Dimensional Outline
Magnetic Shield Millen ^e Part No.80801N, or equivalent
Operating Position
Weight (Approx.)

Electronic Components freences

GENERAL (Cant'd)
Туре 4517
Maximum Overall Length 4.57 in (116 mm)
Seated Length
Maximum Diameter
Bulb
Base
Socket Eby ^b No.9058, or equivalent
Magnetic Shield Millen ^c No.80802C, or equivalent
Operating Position Any
Weight (Approx.)

MAXIMUM RATINGS, Absolute-Maximum Values

DC Supply voltage:		
Between anode and cathode	1800 max.	V
Between anode and dynode No.10		
Туре 4516	300 max.	V
Туре 4517		V
Between consecutive dynodes		v
Between dynode No.1 and cathode		
Туре 4516	300 max.	v
Type 4517		V
Average Anode Current ^e	0.5 max.	mA
Ambient-Temperature Range	o +85	°C

CHARACTERISTICS RANGE VALUES

Under conditions with dc supply voltage (E) across a voltage divider providing electrode voltages as shown in Table I and at a temperature of 22° C, except as noted.

With E = 1500 volts (Except as noted)

Typical	Max.	
5.6×10 ⁴		A/W
47	170	A/Im
47	150	A/Im
	5.6×10 ⁴ 47	5.6x10 ⁴

Electronic

Components

RG/1

_						
	CHARACTERISTICS	RANGE	VALUES (C	ont ^e d)		
		Min.	Typical	Max.		
	Current with blue light source! (2870°K + C.S. No.5-58)				÷	
	Туре 4516 Туре 4517			2.6×10-5 2.2×10-4	A	
	Cathode Sensitivity:				-	
	Type 4516					
	Radiant ^k at 4000 angstroms	-	0.071	-	A/W	
	Luminous ^m (2870 ^o K)	5.3x 10-	5 6x10-5		A/Im	
	Current with blue light source ⁿ (2870 ^o K + C.S. No.5-58)	8x10 ⁻⁹	9×10-9		A	
	Quantum Efficiency at					
	4000 angstroms		22	-	%	
	Туре 4517					
	Radiant ^k at 4000 angstroms	_	0.079		A/W	
	Luminous ^m (2870 ^o K)	-	6.7×10-5		A/w	
	Current with blue light source ⁿ (2870° K + C.S. No.5-58).	8x10-1				
	Quantum Efficiency at	OX IU-			A	
	4000 angstroms	-	24	-	%	
	Current Amplification	-	8×105	-		
	Anode Dark Current at 7 A/ImP	-	2×10-10	6x10-10	A	
	Equivalent Anode Dark Current Input at	1	2.9x10-11P	0.0. (0.110		
	7 A/Im	1	2.9x10-149	8.6x10-11P		
		1	4.1x10-13	7.2×10-149	W	
	Equivalent Noise Input".	1	3.5x10-16	-	im	
	Dark Pulse Summation:t	(~	0.0210 10	-	W	
	1 to 32 photoelectrons (See Typical Dark-Pulse S		250	·	cps	
	Pulse Height Resolution ^u .	-	8.5	-	%	
	Anode-Pulse Rise Timev, w at 1800 V	-	1.7 ×10-9	-	5	
	Electron Transit Time ^{V,X} at 1800 V		1.8×10-8	-		
	Indicates a change or addi			~		

RBA Electronic Components

DATA 2

HARACTERISTIC RANGE	Min.	Typical	Mex.		
-Current Amplification		7x10 ⁵			
Anode Dark Current at -7 A/Im ^p	-	2×10-10	7×10-10	A	
Equivalent Anode Dark Current Input at	1-	2.9×10-11P	1×10 ^{-10P}	im	
►7 A/Im	1-	2.4×10 ⁻¹³⁹	8.4x10 ⁻¹²⁹	W	
Equivalent Noise Input.	Ì-	3.9×10 ⁻¹³ 3.3×10 ^{-16^{\$}}	-	im W	
Dark Pulse Summation:t					
1 to 32 photoelectrons . (See Typical Dark-Pulse Sp		260	-	срв	
Pulse Height Resolution ^U .	-	8.5	-	%	
Anode-Pulse Rise Time ^{V,W}					
at 1800 ∨		2.1×10-9		8	
at 1800 ∨ Electron Transit Timev,x at 1800 ∨	-	2.1×10 ⁻⁹ 2.4×10 ⁻⁸	-	*	
Electron Transit TimeV,X	- -				
Electron Transit TimeV,X at 1800 V	8.: Vo	2.4×10 ⁻⁸	Type 4517 8.13% of Sup Voltage (E) Multiplied by		
Electron Transit Time ^{V,X} at 1800 V Typical Potential Distribution Between:	8. Vo M	2,4x10 ⁻⁸ pe 4516 25% of Supply bitage (E)	8.13% of Sup Voltage (E)		
Electron Transit Time ^{v,X} at 1800 V Typical Potential Distribution	8.: Vo M	2.4x 10 ⁻⁸ pe 4516 25% of Supply bitage (E) ultiplied by :	8.13% of Sup Voltage (E) Multiplied by 1.7 1.3		
Electron Transit Time ^{V,X} at 1800 V Typical Potential Distribution Between: Cathode and Dynode No.1	8.: Vo Mi 5.2 1	2.4x10 ⁻⁸ pe 4516 25% of Supply bitage (E) ultiplied by:	8.13% of Sup Voltage (E) Multiplied by 1.7 1.3 1.3		
Electron Transit Time ^{v,x} at 1800 V Typical Potential Distribution Between: Cathode and Dynode No.1 Dynode No.1 and Dynode No.	8.: Vo Mi 5.2 1 5.3 1	2.4x10 ⁻⁸ pe 4516 25% of Supply bitage (E) ultiplied by: 1.2	8.13% of Sup Voltage (E) Multiplied by 1.7 1.3 1.3 1.0		
Electron Transit Time ^{y,x} at 1800 V Typical Potential Distribution Between: Cathode and Dynode No.1 Dynode No.1 and Dynode No. Dynode No.2 and Dynode No. Dynode No.3 and Dynode No. Dynode No.4 and Dynode No.	8.: Vo Mi 0.2 1 0.3 1 0.4 1 0.5 1	2.4x10 ⁻⁸ pe 4516 25% of Supply bitage (E) ultiplied by: 1.2 1.2 1.7 1.0	8.13% of Sup Voltage (E) Multiplied by 1.7 1.3 1.3 1.0 1.0		
Electron Transit Time ^{V,X} at 1800 V Typical Potential Distribution Between: Cathode and Dynode No.1 Dynode No.1 and Dynode No.0 Dynode No.2 and Dynode No.0 Dynode No.3 and Dynode No.0 Dynode No.4 and Dynode No.0 Dynode No.5 and Dynode No.0	8.: Vo Mi 5.2 1 5.3 1 5.4 1 5.5 1 5.6 1	2.4x10 ⁻⁸ pe 4516 25% of Supply bitage (E) ultiplied by: 1.2 1.2 1.7 1.0 1.0	8.13% of Sup Voltage (E) Multiplied by 1.7 1.3 1.3 1.0 1.0 1.0		
Electron Transit Time ^{V,X} at 1800 V Typical Potential Distribution Between: Cathode and Dynode No.1 Dynode No.1 and Dynode No Dynode No.2 and Dynode No Dynode No.3 and Dynode No Dynode No.4 and Dynode No Dynode No.5 and Dynode No Dynode No.5 and Dynode No	8.: Vo Mi 0.2 1 0.3 1 0.4 1 0.5 1 0.6 0 0.7 1	2,4x 10 ⁻⁸ pe 4516 25% of Supply bitage (E) ultiplied by: .2 .2 .7 .0 1.0 1.0	8.13% of Sup Voltage (E) Multiplied by 1.7 1.3 1.3 1.0 1.0 1.0 1.0		
Electron Transit Time ^{V,X} at 1800 V Typical Potential Distribution Between: Cathode and Dynode No.1 Dynode No.1 and Dynode No Dynode No.2 and Dynode No Dynode No.3 and Dynode No Dynode No.5 and Dynode No Dynode No.5 and Dynode No Dynode No.5 and Dynode No Dynode No.6 and Dynode No Dynode No.7 and Dynode No	8.: Vo Mi 0.2 1 0.3 1 0.4 1 0.5 1 0.6 0 0.7 0 0.8 1	2,4x 10 ⁻⁸ pe 4516 25% of Supply bitage (E) ultiplied by: 1.2 1.2 1.2 1.0 1.0 1.0 1.0	8.13% of Sup Voltage (E) Multiplied by 1.7 1.3 1.3 1.0 1.0 1.0 1.0 1.0 1.0		
Electron Transit Time ^{V,X} at 1800 V Typical Potential Distribution Between: Cathode and Dynode No.1 Dynode No.1 and Dynode No Dynode No.2 and Dynode No Dynode No.3 and Dynode No Dynode No.4 and Dynode No Dynode No.5 and Dynode No Dynode No.6 and Dynode No Dynode No.7 and Dynode No Dynode No.7 and Dynode No	8.: Vo Mi 0.2 1 0.3 1 0.4 1 0.5 1 0.6 0 0.7 0 0.8 0 0.9 1	2.4x 10 ⁻⁸ pe 4516 25% of Supply bitage (E) ultiplied by: 1.2 1.2 1.2 1.2 1.0 1.0 1.0 1.0	8.13% of Sup Voltage (E) Multiplied by 1.7 1.3 1.3 1.0 1.0 1.0 1.0 1.0 1.0 1.0		•
Electron Transit Time ^{V,X} at 1800 V Typical Potential Distribution Between: Cathode and Dynode No.1 Dynode No.1 and Dynode No Dynode No.2 and Dynode No Dynode No.3 and Dynode No Dynode No.5 and Dynode No Dynode No.5 and Dynode No Dynode No.5 and Dynode No Dynode No.6 and Dynode No Dynode No.7 and Dynode No	8.: Va Mi 0.2 1 0.3 1 0.4 1 0.5 1 0.6 1 0.7 0 0.8 0 0.9 0 0.10	2,4x 10 ⁻⁸ pe 4516 25% of Supply bitage (E) ultiplied by: 1.2 1.2 1.2 1.0 1.0 1.0 1.0	8.13% of Sup Voltage (E) Multiplied by 1.7 1.3 1.3 1.0 1.0 1.0 1.0 1.0 1.0		0

Made by Corning Glass Works, Corning, NY 14830.

RBA Electronic Components

b Made by Hugh H. Eby Company, 4701 Germantown Avanue, Philadelphia, PA 19144.

C Made by James Millen Manufacturing Company, 150 Exchange Street, Malden, MA 02148.

- e Averaged over any interval of 30 seconds maximum.
- f Tube operation at room temperature or below is recommended.
- This value is calculated from the typical anode luminous sensitivity rating using a conversion factor of 1190 lumens per watt.
- These values are calculated as shown below:

Anode Current (with blue light source) (A)

Luminous Sensitivity (A/Im) =

0.15 x Light Flux of 1 x 10⁻⁵ (im)

The value of 0.15 is the average value of the ratio of the anode current measured under the conditions specified in footnote (j) to the anode current measured under the same conditions but with the blue filter removed.

- Under the following conditions: Light incident on the cathode is transmitted through a blue filter (Corning C.S. No.5-58, polished to 1/2 stock thickness – Manufactured by the Corning Glass Works, Corning, NY 14830) from a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux incident on the filter is 1 x 10⁻⁵ lumen.
- This value is calculated from the typical cathode luminous sensitivity rating using a conversion factor of 1190 lumens per watt.
- This value is calculated as shown below:

Cathode Current (with blue light source) (A)

Cathode Luminous Sensitivity (A/Im) =

0.15 x Light Flux of 1 x 10-4

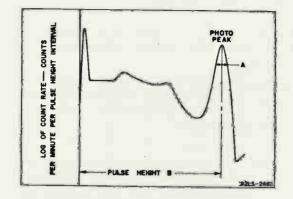
The value of 0.15 is the average value of the ratio of the cathode current measured under the conditions specified in footnote (n) to the cathode current measured under the same conditions but with the blue filter removed.

ⁿ Under the following conditions: Light incident on the cathode is transmitted through a blue filter (Corning C.S. No.5-58, polished to 1/2 stock thickness — Manufactured by the Corning Glass Works, Corning, NY 14830) from a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux incident on the filter is 1 x 10⁻⁴ lumen and 200 volts are applied between cathode and all other electrodes connected as anode.

RBA Electronic Components

- P Light incident on the cathode is transmitted through a blue filter (Corning C.S. No.5-58, polished to 1/2 stock thickness). The light flux incident on the filter is 10 microlumens. The supply voltage (E) is adjusted to obtain an anode current of 10 microamperes. Sensitivity of the tube under these conditions is approximately equivalent to 7 amperes per lumen. Dark current is measured with no light incident on the tube.
- At 4000 angstroms. These values are calculated from the EADCI values in lumens using a conversion factor of 1190 lumens per watt.
- Under the following conditions: External shield connected to cathode, an equivalent bandwidth of 1 Hz, tungsten light source at a color temperature of 2870° K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period.
- At 4000 angstroms. This value is calculated from the ENI value in lumens using a conversion factor of 1190 lumens per watt.
- * Measured with the tube in complete darkness. The pulse height for the single photoelectron equivalent is determined by using a light source operated at a low color temperature to assure the high probability of single photoelectron emission from the photocathode of the tube. The intensity of the light source is adjusted for approximately 10⁴ photons per second. This light is removed before the dark pulse summation is measured.
- The 662 keV photon from an isotope of cesium having an atomic mass of 137 (Cs¹³⁷) and a cylindrical 1-1/2" x 1-1/2" thallium-activated sodium-iodide scintillator [Nal (TI) -type 6D6] are used. This scintillator is manufactured by the Harshaw Chemical Corporation, 1945 East 97 Street, Cleveland 6, OH 44106, and is rated by the manufacturer as having a resolution capability of 8,5%. The Cs¹³⁷ source is in direct contact with the metal end of the scintillator. The faceplate end of the crystal is coupled to the tube by a coupling fluid such as Dow Corning Corp., Type DC200 (viscosity of 60,000 centistokes) Manufactured by the Dow Corning Corp., Midland, MI 48640, or equivalent. Pulse height resolution in per cent is defined as 100 times the ratio of the width of the photopeak at half the maximum count rate in the photopeak height (A) to the pulse height at maximum photopeak count rate (B).

RBA Electronic Components



- Under conditions with dc supply voltage (E) across a voltage divider providing 1/6 of (E) between cathode and dynode No.1; 1/12 of (E) for each succeeding dynode stage; and 1/12 of (E) between dynode No.10 and anode.
- Measured between 10 per cent and 90 per cent of maximum anode-pulse height. This anode-pulse rise time is primarily a function of transit time variation and is measured under conditions with the incident light fully illuminating the photocathode.
- * The electron transit time is the time interval between the arrival of a delta function light pulse at the entrance window of the tube and the time at which the output pulse at the anode terminal reaches peak amplitude. The transit time is measured under conditions with the incident light fully illuminating the photocathode.

RCA Electronic Components

OPERATING CONSIDERATIONS

SHIELDING

Electrostatic shielding of the 4516 and 4517 is ordinarily required. When a shield is used, it must be connected to the cathode terminal.

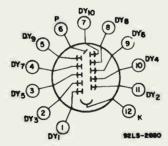
Magnetic shielding of the 4516 and 4517 is ordinarily required. See accompanying curves for the effect of variation in magnetic field intensity on the anode current for a tube with no magnetic shielding.

OPERATING VOLTAGES

In general, the operating potential between anode and cathode should not be less than 500 volts. The suggested voltage distribution shown in Table I is a typical, average distribution for obtaining a good compromise between output current and time and energy resolution. However, it may be necessary to individually adjust these distribution voltages by as much as $\pm 15\%$ to obtain optimum current amplification, pulse-height resolution, or time resolution.

LEAD CONNECTIONS (4516)

Bottom View

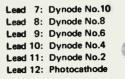


Lead 1: Dynode No.1 Lead 2: Dynode No.3 Lead 3: Dynode No.5 Lead 4: Dynode No.7 Lead 5: Dynode No.9 Lead 6: Anode

 $\Pi (B/A)$

Electronic

Components



25.7

(NOTE 21

92LS - 2681R2

DATA 5 11-70

25.7*



Note 1: Lead No.14 is cut off within 0.04 inch of the glass button for indexing.

Note 2: Lead No.13 is cut off within 0.04 inch of the glass button,

OUTLINE DIMENSIONS(4516)

25

21

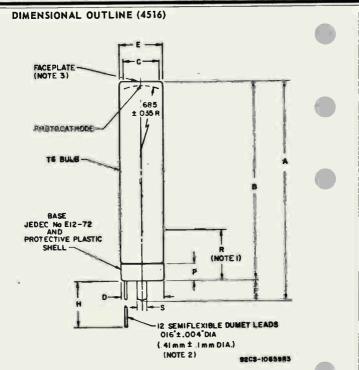
INDEX-

Dimensions	Inches	mm
A	3.94 max.	100.0 max.
8	3.50 + .06	88.9 + 1.5 - 3
C	.5 min. dia.	12.7 min. dia.
D	.78 max. dia.	19.8 max. dia.
E	.755 max. dia.	19.18 max, dia.
F	.38 max.	9.7 max.
G	.47 ± .01 dia.	11.9 ± .25 dia.
н	.75 min.	19.0 min.
P	.30 max.	7.6 max.
R	1.0 max.	25 max.
8	.17 max.	4.3 max.

The dimensions in millimeters are derived from the basic inch dimensions (1 inch = 25.4 mm)

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RBA Electronic Components



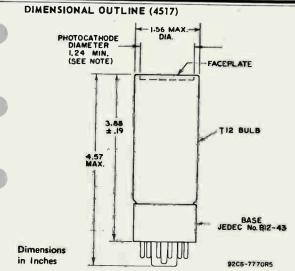
Note 1: Within this length, maximum diameter of tube is 0.78".

Note 2: The semiflexible leads of the tube may be soldered or welded into the associated circuit. If desired, the leads may be trimmed to within 1/4 inch of the protective shell. Care must be exercised when making such connections to prevent tube destruction due to thermal stress of the glass-metal seals. A heat sink placed in contact with the semiflexible leads between the point being soldered, or welded, and the protective shell is recommended. Excessive bending of the leads is to be avoided.

Deviation from flatness will not exceed 0.006" from Note 3: peak to valley.

Components

RBA Electronic



Note: Deviation from flatness will not exceed 0.010" from peak to valley.

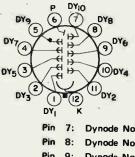
€ of bulb will not deviate more than 2º in any direction from the perpendicular erected at the center of bottom of the base.

PIN CONNECTIONS (4517)

Bottom View

Pin 1:

DIRECTION OF LIGHT:



Pin	2:	Dynode No.3
Pin	3:	Dynode No.5
Pin	4:	Dynode No.7
Pin	5:	Dynode No.9
Pin	6:	Anode

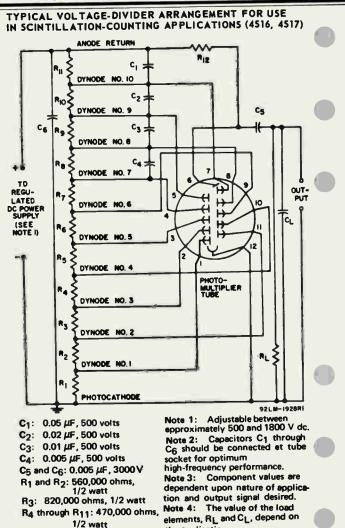
B/Л

Dynode No.1

Pin	7:	Dynode	No.10
Pin	8:	Dynode	No.8
Pin	9:	Dynode	No.6
Pin	10:	Dynode	No.4
Pin	11:	Dynode	No.2
Pin	12:	Photocar	thode

Electronic Components and Port

DATA 6 11-70



the application: RLCL = 10 microseconds for most applications

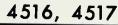
DATA 6

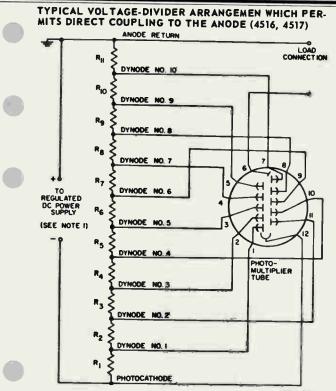
RBA Electronic Components

R12: 1 megohm, 1/2 watt

R13:

100,000 ohms, 1/2 watt





92LM-1927

R1 and R2: 560,000 ohms, 1/2 watt R3: 820,000 ohms, 1/2 watt R4 through R11: 470,000 ohms, 1/2 watt

RBA Electronic

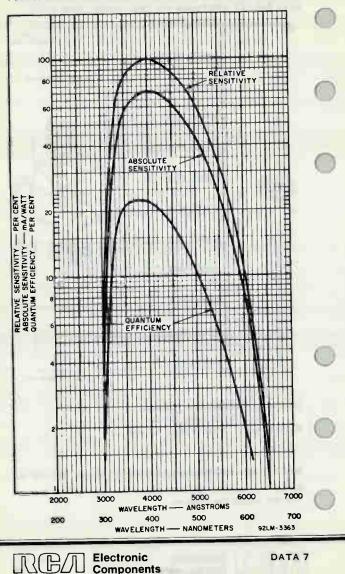
Components

Note 1: Adjustable between approximately 500 and 1800 volts dc.

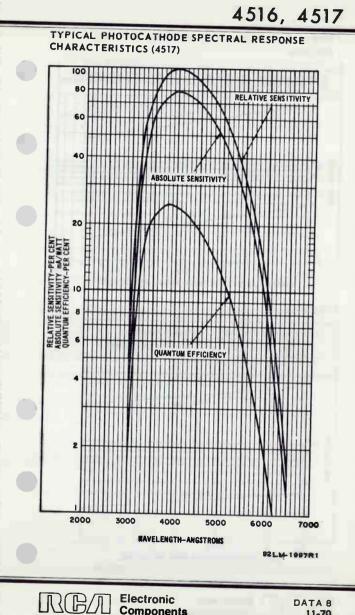
Note 2: Component values are dependent upon nature of application and output signal desired.

1 4

TYPICAL SPECTRAL RESPONSE CHARACTERISTICS (4516)



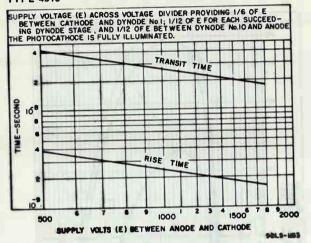
Components



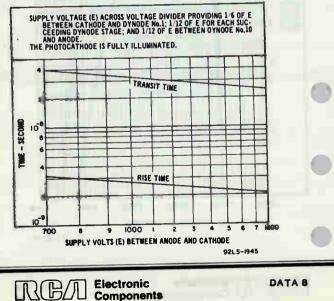
Components

DATA 8 11-70

TYPICAL TIME-RESOLUTION CHARACTERISTICS



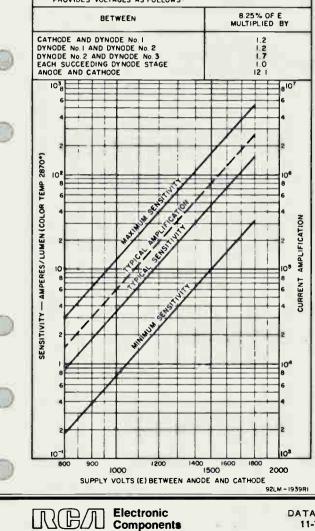
TYPE 4517



SENSITIVITY AND CURRENT AMPLIFICATION CHARACTERISTICS

TYPE 4516

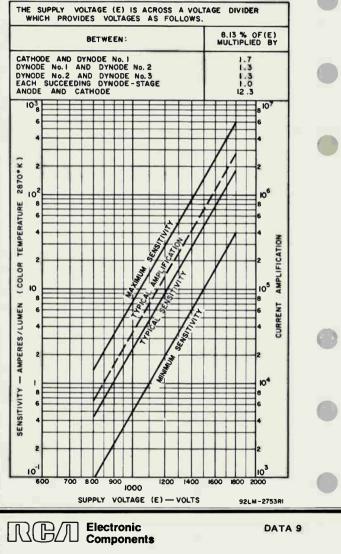
THE SUPPLY VOLTAGE (E) IS ACROSS A VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS

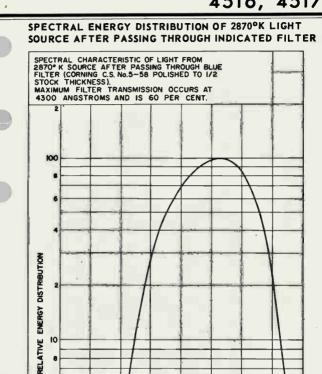


DATA 9 11-70

TYPICAL SENSITIVITY AND CURRENT AMPLIFICATION CHARACTERISTICS

TYPE 4517





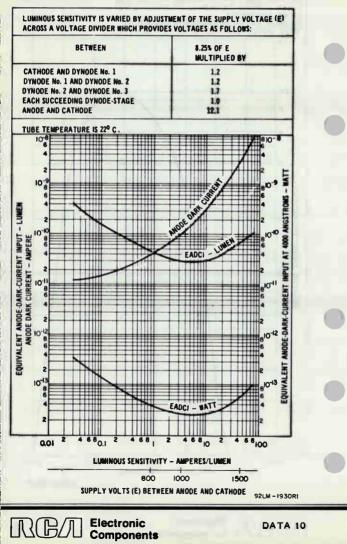
SOO 3500 4000 4500 5000 BAUELENGTH-ANGSTROMS

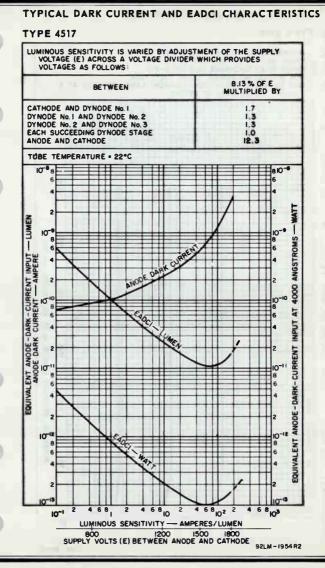
> RBA Electronic Components

DATA 10 11-70

TYPICAL ANODE DARK CURRENT AND EADCI CHARACTERISTICS

TYPE 4516



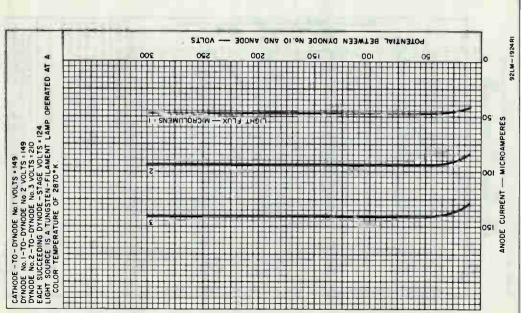


RBA Electronic Components

DATA 11 11-70

ANODE CHARACTERISTICS TYPICAL

TYPE 4516



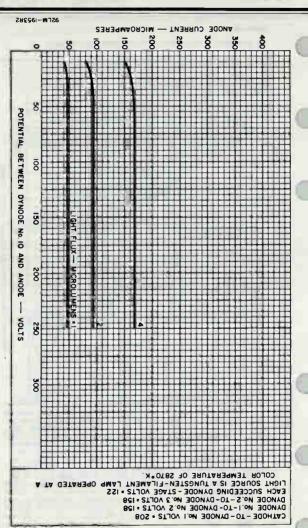
DATA

Electronic Components

LIST '9157

TYPICAL ANODE CHARACTERISTICS



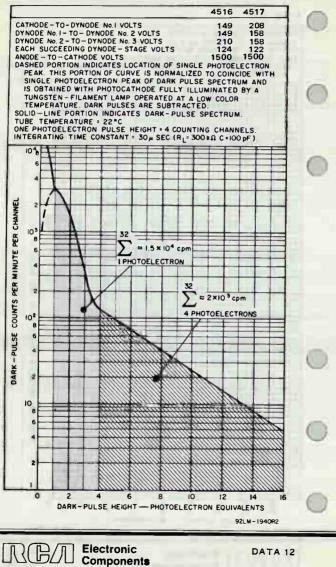


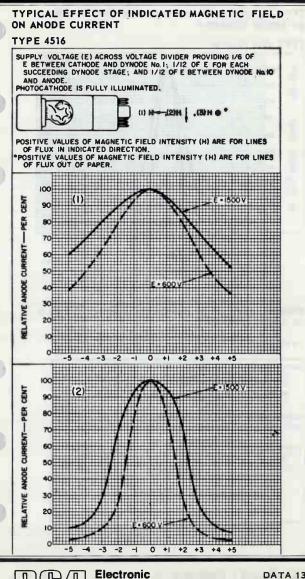
Components Components

SI ATAG

4516, 4517

TYPICAL DARK-PULSE SPECTRUM



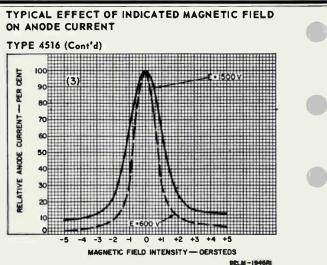


DATA 13 11-70

RG/

Components

4516, 4517



TYPICAL EFFECT OF INDICATED MAGNETIC FIELD ON ANODE CURRENT

TYPE 4517

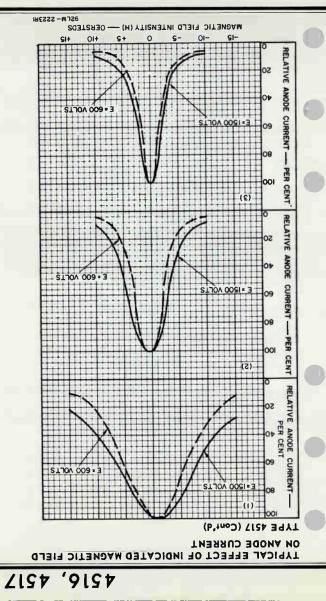
RCA

SUPPLY VOLTAGE E IS ACROSS A VOLTAGE DIVIDER PROVIDING 1/6 OF E BETWEEN CATHODE AND DYNODE-No.1; 1/12 OF E FOR EACH SUCCEEDING DYNODE-STAGE; AND 1/12 OF E BETWEEN DYNODE-NO.10 AND ANODE. PHOTOCATHODE IS FULLY ILLUMINATED. TUBE IS ORIENTED IN MAGNETIC FIELD AS SHOWN BELOW: POSITIVE VALUE OF H IN DIRECTION SHOWN: (1) - , (2) 1, (3) • * * DIRECTION (3) IS OUT OF PAPER

Electronic Components

ATAD

Components Components



4547

Display-Storage Tube			
Single Writing Gun		High Lumin	ance
Single Viewing Gun		High Resolu	Ition
High Display Uniformity		TV Capabili	ity
ELECTRICAL			
	Writing Section	Viewing Section L	Inits
Heater: For Unipotential Cathode			
Voltage (AC or DC)	6.3 ± 10%	6.3 ± 10%	V
Current at 6.3 V	0.6	0.6	A
Warmup Time ^a		60	\$
Direct Interelectrode Capacitance	85:		
Grid No.1 to all other electrodes	7.0		pF
Cathode to all other electrodes	6.0		př
Backplate to all other electrodes		150	pF
Focusing Method	Electrostatic		
Deflection Method	Magnetic		
Phosphor		., P20 (Alumir	ized)
MECHANICAL			
Minimum Useful Viewing Diame	ter	4.0	in
Maximum Overall Length (Excluding Ring) ^b		11.59	in
Maximum Seated Length (Excluding Ring) ^b		11.25	in
Maximum Diameter (Silastic Padding Ring) ^b		5.396 ± 0.015	in
Bases:			
Writing gun		JEDEC No.E	8-49
Viewing gun		JEDEC No.	E7-1
Sulb terminals (two)		JEDEC No.J	1-21
Screen connector		AMP Type L No.832692 or e	
Operating Position			Any
Weight (Approx.)	•••••	20	ŀЬ

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MAXIMUM RATINGS

Absolute-Maximum Ratings - All voltages are shown with respect to the cathode of the viewing gun unless otherwise specified.

	Min.	Max.	Units
Screen Voltage			
Peak	Ö	10,000	V
DC	Q	9,000	V
Backplate Voltage			
Peak	0	15	v
DC	-30	10	V
Viewing Section Voltages			
Collector (Grid No.5)	180	300	V
Collimator (Grid No.4)	40	150	v
Grid No.3 ⁸	10	150	V
Grid No.2		150	V
Grid No.1	-100	0	V
Heater	-125	125	V
Writing Section			
Grid No.4 ^e	10	150	V
Grid No.3 ^f	0	1200	V
Grid No.2 ⁸	10	150	V
Grid No.1 ^f	-200	Note g	V
Cathode	-2750	145	v
Heater ^f	-125	125	v
Screen Resistorh	1.0		мΩ
Collector Resistor ^h	5,000		Ω

RECOMMENDED OPERATING VALUES

All voltages are shown with respect to the cathode of the viewing gun.

Screen Voltage	8500	V
Backplate Voltage	0	v
Viewing Section Voltages		
Collector (Grid No.5)	200	V
Collimator ^j (Grid No.4)	60 to 110	V
Grid No.3 ^j	10 to 60	v
Grid No.2 ^j	110	V
Grid No.1j	-40 to 0	V

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RECOMMENDED OPERATING VALUES (Cont'd)

Writing Section Voltages

Grid No.3 ^k	-2075 to	1575 V
Grid No.1		
Cathode	-2500	V
Screen Resistor	1.0	MΩ
Collector Resistor 1	0,000	Ω

PERFORMANCE DATA AND CHARACTERISTICS

	Min.	Typical	Max,	Units
Useful Viewing Diameter	4.0			in
Luminance (Brightness)P	7.00	1300		₹L.
Viewing Duration ^r	10			s
Undeflected Spot Position			Note s	
Screen Current ^p		300	750	μΑ
Viewing Gun Collector Current [‡] .		1.0	2.4	mA
Viewing Gun Cathode Current ^u .		2.5	4.0	mA
Writing Gun Cathode Current ^v		2.5	5.0	mA
Resolution ^W	400			lines
Erase Time ^X	1.5	2.5	3.5	ms

- Viewing-gun Heater Warm-up Time must be completed before any other voltages are applied.
- b The silastic-padding ring is permanently attached to the bulb and is used to facilitate shock mounting.
- G Mates with AMP No.833589 or equiv. from AMP Inc., 155 Park Street, Elizabethtown, PA 17022.
- ^a Grids No.4 and No.2 of Writing Gun and grid No.3 of Viewing Gun are connected within the tube.
- f Voltages are shown with respect to cathode of Writing Gun.
- 9 The writing-gun grid No.1 should never be more positive than necessary to write the display to saturated brightness for a given scanning and drive condition. In no case should the writing-gun No.1 voltage have a value greater than zero with respect to the writing-gun cathode.
- h Unbypassed, current-limiting resistor.
- j Adjust for brightest, most uniform, full-size pattern.
- k Adjust for the smallest, most circular spot.

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	m	The maximum bias-voltage value for writing-beam cutoff is -130 volts with respect to writing-gun cathode.	
	P	Luminance (Brightness) and screen current are measured after the entire display is written to saturated brightness, the writing gun has been turned off, and with no erasing pulse applied.	
	r	The time required for any 1.5-inch diameter area of the useful 4- inch diameter viewing area to spontaneously rise (with no writing or erasing) from zero brightness (viewing-beam cutoff) to 10% of saturated brightness.	
	5	The undeflected spot position must fall within a circle having a 5/16-inch radius (maximum), 1-3/4-inches from the geometric center of the tube face, on the radius passing through the center of the neck of the writing gun.	
	t	With writing gun turned off, with no erasing pulse applied, and display erased to cutoff.	
	u	Measured with viewing-gun grid No.1 at zero volts and with all other electrodes at voltages shown under Recommended Oper- ating Values.	
	v	Measured with writing-gun grid No.1 at zero volts while writing an overscanned TV-type raster.	
	v	Adjust erase pulser to 60 pps, 0.5 milliseconds width, and suf- ficient amplitude to just erase any written information. Using a standard television raster, without blanking or video, adjust raster to 3.0 inch horizontal by 2-1/4 inch vertical. Adjust writing-gun grid No.1 bias to reduce the raster to just under write threshold. Adjust the video amplitude so that all half-tones, of a television pattern such as that provided by an RCA 2F21 Monoscope, are clearly discernable. Move the raster and adjust the erase-pulse	
		amplitude to eliminate undersirable picture retention. Minor re- adjustment of the write-gun grid No.1 bias, the erase pulse ampli- tude and the video drive may be necessary to obtain the best subjective picture.	
	×	Measured from saturated brightness to cutoff with an erase pulse 0.5 volt more positive than that necessary for complete erasure.	

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ENVIRONMENTAL TESTS

The 4547 is designed to withstand the following environmental tests:

Test 1. Vibration in each of the three orthogonal axes as shown in Figure 1, to a double amplitude of 0.03 inch, varied at a uniform rate from 10 to 55 Hz and back to 10 Hz over a five minute interval for each axis.

Test 2. Temperature storage for 24 hours each at 100° C and at -65° C.

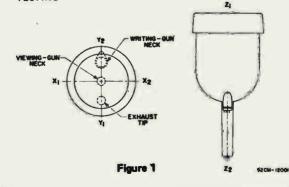
Test 3. Temperature and altitude in three phases as follows:

Phase 1. Storage for one hour at a temperature of -40° C followed by tube operation for five minutes under the conditions shown under Recommended Operating Values.

Phase 2. Temperature is increased from -40° C at a rate of 2° C per minute until a temperature of $+86^{\circ}$ C is reached. Following one hour storage at $+86^{\circ}$ C, the tube is operated for five minutes under the conditions shown under Recommended Operating Values.

Phase 3. Barometric pressure is next reduced until a pressure equivalent to an altitude of 20,000 feet is attained. The tube is then operated for five minutes under the conditions shown under Recommended Operating Values. Upon completion of the third phase of this test, pressure is increased and temperature decreased, at a rate of 2° C per minute, until ambient pressure-temperature conditions are reached.

ORTHOGONAL AXES OF 4547 USED FOR ENVIRONMENTAL TESTING



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OPERATING CONSIDERATIONS

Deflection. The undeflected, focused writing beam lands nearly normal (perpendicular) to the storage-grid surface at a distance of 1-3/4 inches from its center and in the direction of the wirting oun neck.

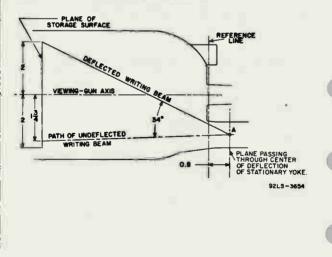
The writing beam may be deflected by two stationary pairs of coils. One pair is used for horizontal deflection, and the other pair for vertical deflection. When these coils are used, centering the undeflected writing beam can be accomplished by passing direct current of the required value through each pair of deflecting coils.

To avoid neck shadow, when the stationary coils are used, it is essential that the center of deflection should be located not more than 0.8 inch from the reference line as shown The writing beam must be deflected from its unbelow. deflected position, through a typical angle of 34° to sweep fully the storage surface.

LOCATION OF CENTER OF DEFLECTION

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CAUTION

To prevent possible damage to the tube, allow the viewinggun beam current to reach normal operating value before turning on the writing-gun beam current, and keep the viewing beam on till the writing beam is turned off.

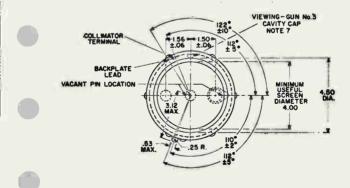
PRECAUTIONS

The following operating precautions must be followed to protect the 4547 from inadvertent damage -

- 1. Do not exceed maximum ratings.
- 2. Be sure to include the screen resistor.
- 3. Be sure to include the collector resistor.
- 4. Do not apply excessive writing-beam current density.
- 5. Protect against scanning failure.
- 6. Protect against loss of bias.
- 7. Apply voltages to tube in correct order.
- 8. Never write unless viewing beam is on.
- 9. Stay within recommended viewing-grid voltage ranges.

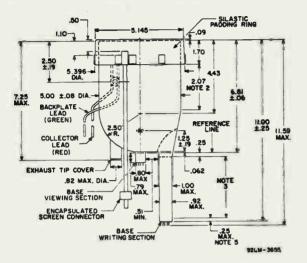
DIMENSIONAL OUTLINE (TOP VIEW)

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DIMENSIONAL OUTLINE (FRONT VIEW)

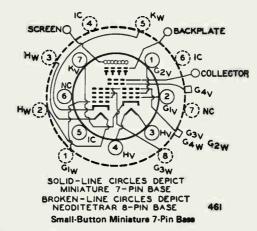


DIMENSIONAL OUTLINE NOTES

- Note 1: The silastic-padding ring is permanently attached to the bulb and fits with a light push into a gauge having an inside diameter of 5.396" ± 0.015".
- Note 2: Within this length, bulb diameter is 5.00" ± 0.08".
- Note 3: Within this length, neck diameter is 0.920" maximum.
- Note 4: Aircraft-Marine Products, Inc., type LGH Part No.832692, or equivalent. This part mates with Aircraft-Marine Products, Inc., Part No. AMP 833589, Ceramic Terminal, or Equivalent.
- Note 5: Within this length, neck diameter is 0.950" maximum.
- Note 6: Do not use these cavity caps for connection. The caps are connected internally and may be at a potential which could constitute a shock hazard. It is recommended that these caps be covered with electrical insulation.
- Note 7: Grids No.4 and No.2 of Writing Gun and grid No.3 of the Viewing Gun are connected within the tube.

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BASING DIAGRAM - BOTTOM VIEW



VIEWING SECTION

Pin 1: Grid No.2 Pin 2: Grid No.1 Pin 3: Heater Pin 4: Heater Pin 5: Internal Connection — Do Not Use Pin 5: Internal Connection — Do Not Use Pin 7: Cathode Flexible Lead (Large): Screen 8.38" ± 0.20" long Flexible Lead (Green): Backplate 10.00" ± 0.50" long Flexible Lead (Green): Backplate 10.00" ± 0.50" long Recessed Cavity Caps: JEDEC No.J1-21 Collimator (Grid No.4)

Small-Button Neoditetrar 8-Pin Base

WRITING SECTION

- Pin 1: Grid No.1 Pin 2: Heater
- FIN 2. Fiealer
- Pin 3: Heater
- Pin 4: Internal Connection Do Not Use
- Pin 5: Cathode
- Pin 6: Internal Connection Do Not Use
- Pin 7: No Connection
- Pin 8: Grid No.3

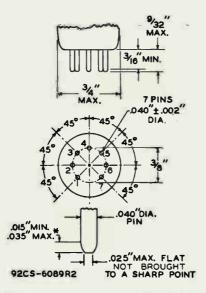
Note: Grids No.4 & No.2 are connected internally to Grid No.3 of viewing gun.

Components :

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SMALL BUTTON MINIATURE 7-PIN BASE



*This dimension around the periphery of any individual pin may vary within the limits shown.

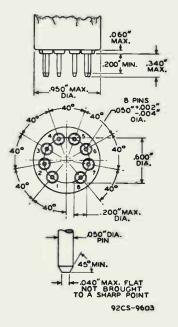
Base-pin positions are held to tolerances such that entire length of pins will, without undue force, pass into and disengage from flatplate gauge (part of gauge JEDEC No.GE7-1) having thickness of 1/4'' and eight holes with diameters of $0.0520'' \pm 0.0005''$ so located on a $0.3750'' \pm 0.0005''$ diameter circle that the distance along the chord between any two adjacent hole centers is $0.1434'' \pm 0.0005''$.

The design of the socket should be such that circuit wiring can not impress lateral strains through the socket contacts on the base pins. The point of bearing of the contacts on the base pins should not be closer than 1/8'' from the bottom of the seated tube.

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SMALL BUTTON NEODITETRAR 8-PIN BASE

Base-pin positions are held to tolerances such that entire length of pins will, without undue force, pass into and disengage from flatplate gauge having thickness of 1/4" and nine holes with diameter of $0.0700" \pm 0.0005"$ so located on a $0.6000" \pm 0.0005"$ diameter circle that the distance along the chord between any two adjacent hole centers is $0.2052" \pm 0.0005'$.



X-RADIATION WARNING: Shielding of this cathode-ray tube for x-radiation may be needed to protect against possible danger of personal injury from prolonged exposure at close range.

For further information or application assistance on this device, contact your RCA Field Representative or write, Display Tube Marketing, RCA, Lancaster, PA. 17604

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Display Cathode-Ray Tube 12¹¹-Rectangular 70°-Magnetic Deflection Display Cathode-Ray Tube Having Integral Protective Window and P4 Phosphor Screen ELECTRICAL Heater Current at 6.3 volts 0.6 A Focus Method Electrostatic Direct Interelectrode Capacitances (Typical): Grid No.1 to all other electrodes 6 pF Cathode to all other electrodes 5 DF External conductive coating (1300 max. pF 700 min. pF OPTICAL Phosphor P4-Sulfide Type, Aluminized Tube Dimensions: Overall length 16.60 max. in Neck length 7.56 ± 0.25 in Greatest width 10.94 ± 0.12 in Bulb See Dimensional Outline Anode Cap Recessed Small Cavity Cap (JEDEC No.J1-21) Small-Shell Duodecal, Arrangement 1. 6-Pin (JEDEC No.B6-63) Operating Position Any Weight (Approx.) 9-1/2 lb MAXIMUM AND MINIMUM RATINGS, Absolute-Maximum Values Unless otherwise specified, values are positive with respect to cathode. Anode Voltage 16,000 max. V Grid-No.3 (Focusing-Electrode) Voltage ... 2700 max. V Grid-No.2 Voltage 400 max. V Grid-No.1 Voltage: Negative bias value 80 max. V Positive bias value 0 max. V

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Positive peak value	2 max. V
Peak Heater-Cathode Voltage:	
Heater negative with respect to cathode	180 max. V
Heater positive with respect to cathode	180 max. V
Heater Voltage (ac or dc): Under operating conditions ^b	6.9 max. V 5.7 min. V

RECOMMENDED OPERATING VALUES

Unless otherwise specified, values are positive with respect to cathode. Raster size 6 inches by 8 inches. Standard TV Scan.

Anode Voltage 12000 V
Anode Current
Grid-No.3 (Focusing-Electrode) Voltage for an Anode Current of 100 microamperes
Grid-No.2 Voltage
Grid-No.1 Voltage for Visual Extinction of Focused Raster
See accompanying Cutoff Design Chart

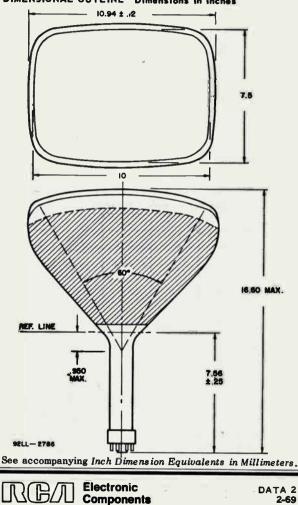
TYPICAL PERFORMANCE DATA

Grid-No.1 Circuit Resistance 1.5 max. MQ

- b For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts.
- Average luminance (brightness) at the center of a single trace scanned at a given sweep speed and refreshed at a given rate.
- ^d Measured by shrinking raster technique at an anode current of 100 microamperes.
- The center of the undeflected, unfocused spot will fall within a circle having a 0.8 inch diameter concentric with the center of the tube face.

X-RADIATION WARNING

Because the 4557 is designed to be operated at anode voltages as high as 16,000 volts, shielding of the 4557 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range. DIMENSIONAL OUTLINE Dimensions In Inches

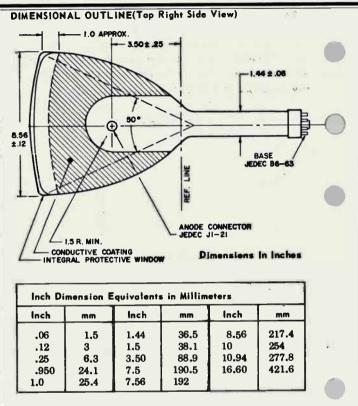


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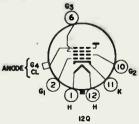




TERMINAL DIAGRAM (Bottom View)

Pin 1: Heater Pin 2: Grid No.1 Pin 6: Grid No.3 Pin 10: Grid No.2 Pin 11: Cathode Pin 12: Heater Cap: Anode (Grid No.4 and Collector)

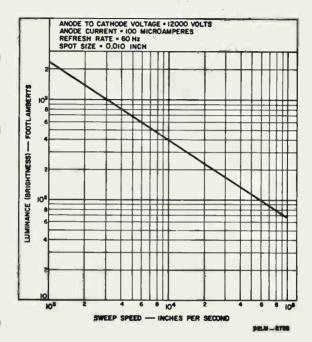
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TYPICAL TRACE LUMINANCE CHARACTERISTIC

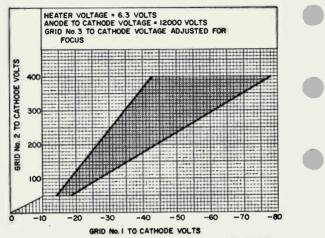
(Average brightness at center af single trace scanned at the refreshed at the indicated rate)



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CUTOFF DESIGN CHART



92L\$-2787

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Monoscopes^a

Custom-Built 2"-Diameter, Electrostatic-Focus, Electrostatic-Deflection Monoscope Tubes For Use As Alpha-Numeric Character Generators

ELECTRICAL

neater Current at 0.3 vons
Focusing Method Electrostatic
Deflection Method Electrostatic
Direct Interelectrode Capacitances (Appröx.):
Grid No.1 to all other electrodes 7 pF
Cathode to all other electrodes 5 pF
Output Signal Electrode to all other electrodes 8 pF
DJ1 to all other electrodes
DJ2 to all other electrodes 10 pF
DJ3 to all other electrodes 7 pF
DJ4 to all other electrodes 7 pF
DJ1 to DJ2 3 pF
DJ3 to DJ4 3 pF
Deflection Direction:
A positive voltage on DJ1 deflects the beam toward top of stencil.
A positive voltage on DJ3 deflects the beam toward the left side of the stencil.
MECHANICAL
Tube Dimensions:
Maximum Overall Length 11.5 in
Maximum Diameter Including Bulb Terminals
Bulb (Glass) T16
Base Medium-Shell, Diheptal 12-Pin JEDEC No.B12-37
Socket Cinch ^b Part No.3M14, or equivalent
Bulb Terminals (Two) Small Ball JEDEC J1-25
Bulb Terminal Contacts Cinch ^b Part No.3A1, or equivalent
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Stencii Electrode:	
Useful area	1.1 x 1.1 in
Typical Pattern See accompany	ying pattern.
Operating Position	Any
Weight (Approx.) ~	13 oz

MAXIMUM AND MINIMUM RATINGS,

Absolute-Maximum Values

Unless otherwise stated, values are positive with respect to cathode.
Output Signal Electrode Voltage 2500 max. V
Stencil-Electrode Voltage 2500 max. V
Deflecting Electrode Voltage:
DJ1 and DJ2 2500 max. V
DJ3 and DJ4 2500 max. V
Grid-No.4 & Grid-No.2 Voltage 2500 max. V
Grid-No.3 Voltage 1000 max. V
Grid-No.1 Voltage:
Negative Bias Value
Positive Bias Value 0 max. V
Positive Peak Value 2 max. V
Peak Heater-Cathode Voltage:
Heater Negative with respect to Cathode
Heater Positive with respect to Cathode
Heater Voltage (ac or dc): (6.9 max. V
Under Operating Conditions ^e

RECOMMENDED OPERATING VALUES

Unless otherwise specified, values are positive with respect to output signal electrode. Output Signal Electrode Voltage Ground[®] Stencil-Electrode Voltage -15 V Average Deflecting Electrode Voltage: Vertical (DJ1 and DJ2) +35 V Horizontal (DJ3 and DJ4) +35 V Grid-No.4 & Grid-No.2 Voltage ^f (Astigmatism) ... 0 to +70 V

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Grid-No.3 (Focusing Electrode) Voltage			00 to -	1500 V
Grid-No.1 Voltage ⁹				
Cathode Voltage				
Heater Voltage ^h				6.3 V
TYPICAL PERFORMANCE CHA				
CLUBS 1 COLORED	Min.	Typical	Max.	
Output Signal Current ⁱ	-	5	-	μА
Trace Angle:				
Vertical	-	2	5 d	legrees
Horizontal	-	2	6 d	legrees
Between Vertical and Horizontal			-	
Traces	89	90	91 d	legrees
Deflection Factors:"	1.1.1			
Vertical (DJ1 and DJ2)	46		60	V/in
Horizontal (DJ3 and DJ4)	46	1 2	60	V/in
Undeflected Spot Position ^m	4	1 44	0.15	in
9 A superior table destination f				ha

- ⁶ A specific tube designation in the 4560 series will be assigned to each type employing a different stencil pattern.
- ^b Made by Cinch Manufacturing Company, 1501 Morse Avenue, Elk Grove Village, IL 60007.
- ^c For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts.
- ^d The tube must be shielded to prevent stray magnetic fields from affecting performance. At no time should the undeflected beam be allowed to rest on the usable 1.1" x 1.1" area of the stencil electrode pattern.
- The output signal electrode is grounded through a 1900ohm load resistor.
- f Adjust for minimum astigmation.

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- 9 Adjust as required.
- ^h One side of heater terminal (Pin No.1) is connected to -1800 V dc.

- i For cathode current not exceeding 110 microamperes.
- k Useful area of stencil electrode is 1.1"x 1.1".
- The undeflected spot position must fall within a circle having a 0.15 inch diameter (maximum) centered on the stencil electrode pattern.

TYPICAL STENCIL ELECTRODE PATTERN

& % \$ # ' -*-7654321 ?>=<;:9 GFEDCBA@ ONMIKJ WVUTSRQ <u>| ×] « [Z Y X</u>

OPERATING CONSIDERATIONS

Tubes in the 4560 series are intended for use as character generators in conjunction with display cathoderay tubes in computer data terminal display equipment. In such equipment, the electron beam in the monoscope is first deflected to a desired character location on the stencil and at the same time the display cathode-ray tube electron beam is deflected to a desired position in the display. The monoscope electron beam is then rapidly scanned over the selected character in the stencil

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and the display cathode-ray tube electron beam is synchronously deflected on the phosphor screen.

In the monoscope, electrons which pass through the stencil are collected on the output signal electrode and generate a video signal across the output load resistor. This signal is amplified and then applied to the grid of the display cathode-ray tube.

The effect of this operation is that the character stenciled into the monoscope is displayed on the phosphor screen of the display cathode-ray tube. Other characters may be chosen by positioning the monoscope electron beam at different locations on the stencil. A character may be located anywhere in the cathode-ray tube display by appropriate positioning of its electron beam.

NOTE

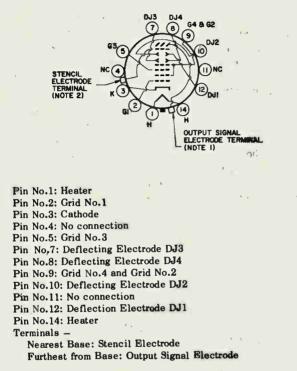
Stencil patterns supplied to RCA for incorporation in the 4560 family of monoscopes should be at least 10 times larger than the useful $1.1" \ge 1.1"$ area of the stencil electrode. The alpha-numeric characters of the pattern should be white on a dark background. Such patterns or requests for information on RCA fabricated stencil patterns should be directed to Storage Tube Marketing, RCA, Lancaster, PA 17604, or to the nearest Sales Office.

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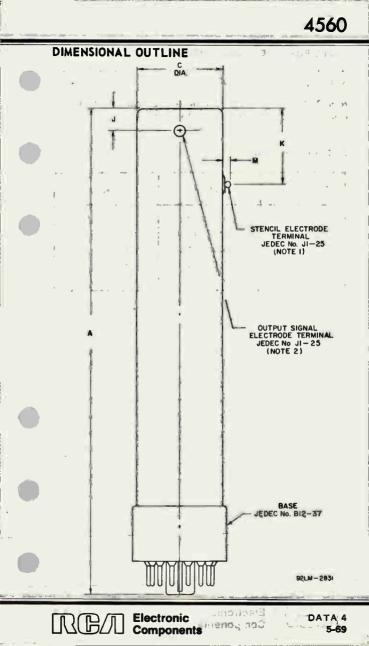
TERMINAL DIAGRAM (Bottom View)



Note 1: The plane passing through the tube axis and the key of the base does not deviate more than $\pm 10^{\circ}$ from the plane passing through the tube axis and the output signal electrode terminal cap.

Note 2: The plane passing through the tube axis and Pin No.4 of the base does not deviate more than $\pm 10^{\circ}$ from the plane passing through the tube axis and the stencil electrode cap.

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NOTES FOR DIMENSIONAL OUTLINE

Note 1: Angular orientation of the stencil electrode terminal with respect to pin No.4 of base is $\pm 10^{\circ}$.

Note 2: Angular orientation of the output signal electrode terminal with respect to key of base is $\pm 10^{\circ}$.

OUTLINE DIMENSIONS

Dimensions	Inches	mm
A	11.312 ± .188	287.32 ± 4.77
C	2.050 ± .050 Dia.	52.07 ± 1.27 Dia.
J	.500 ± .062	12.70 ± 1.57
ĸ	1.750 ± .125	44.45 ± 3.17
М	.185 max.	4.69 max.

RBA Electronic Components

Projection Kinescopes

7"-Diameter Electrostatic-Focus, Magnetic-Deflection Types

- Matched Trio of Tubes for Color Projection Systems
- Designed for Use with Schmidt Reflective Optical Systems
- Matched Phosphors
- High Picture Brightness
- Wide Range of Synthesized Colors
- Balanced Drive Characteristics

General Data

Electrical:

Heater Current at 6.6 Volts 0.6	52 A
Focusing Method Electros	tatic
Deflection Method [®]	netic
Deflection Angle (Approx.)	350
Direct Interelectrode Capacitances (Approx.):	
Grid No.1 to all other electrodes 1	2 pF
Cathode to all other electrodes	6 pF

Optical:

Faceplate, Spherical Clear, Browning-Resistant Glass
Radius of curvature (inner radius)
Minimum Optical-Quality-Rectangle 5x3-3/4 in
Refractive Index of Faceplate 1.469
Phosphors, Aluminized:
4583 Sulfide (Blue) Type
C.I.E. coordinates (x,y) 0.155, 0.048
Luminescence Blue
Persistence Medium
4584 Silicate (Green) Type
C.I.E. coordinates (x,y) 0.218, 0.728
Luminescence Green
Persistence Medium
4585 Rare-Earth (Red) Type
C.I.E. coordinates (x,y)
Luminescence Red
Persistence Medium

RBA Electronic Components

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Mechanical: Tube Dimensions: 19-1/2 ± 5/8 in Overall length Greatest diameter of hulb (excluding side cap or cable) 7 ± 3/16 in Molded-on, Insulated Cable, Anode Lead 48 in. Iona Operating Position Anv 5 lbs Weight (Approx.) Maximum and Minimum Ratings. Absolute-Maximum Valuesb Average Anode Power:C W With forced-air cooling of faceplate 160 max. Air Flow to Faced cfm 40 Anode-to-Cathode Voltage kV 80 max. Grid-No.3-to-Cathode Voltage 20 max. kV kV Grid-No.2-to-Cathode Voltage 1.05 max. Grid-No.1-to-Cathode Voltage: Negative bias value 250 max. V V Positive bias value 0 max. Peak positive value 2 31 max. Anode Current, Long-Term Average (for 5" x 3-3/4" TV raster) 2 max. mÅ Peak Heater-Cathode Voltage: Heater negative with respect to cathode 150 . . . max. Heater positive with respect to cathode 150 max. 6.93 max V Heater Voltage (AC or DC)^e 6.27 min. V Recommended Operating Values[†] 5" × 3-3/4" **Baster Size** 75 kV Anode Voltage 1:000 μA Anode Current, Long-Term Average Grid-No.3 Voltage for Focus at 15 to 17 kV an Anode Current of 1000 UA Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused Raster See Figure 1 6.6 v Heater Voltage

RBA Electronic Components

Typical Performance Data

	Bige	Green	Red	
Luminous Output of each Tube at an Anode Current of 1000 μ A for each tube	,88	1400	520	jumêns
Luminance of Each Tube at an Anode Current of 1000 μ A for Each Tube	680	10800,	4000,	fL
Luminance of Three Tubes Combine at an Anode Current of 1000 μ A on Limiting Tube and with Anode Curre of Other Two Tubes Adjusted to Produce White of 9300° K + 27 M.P.C.D.	-		8500	total fL
Percentage of Total Luminance Supplied by Each Tube	8	70	22	%
Percentage of Total Anode Current Supplied by Each Tube (Approx.)	50	27	23	%
Center Resolution9			600	TV Lines
Grid-No.3 Current (Total)h			±15	μA
Grid-No.2 Current			±15	MA

Circuit Requirements

High-Voltage Circuits

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In order to minimize the possibility of damage to the tubes and adjacent circuits caused by a momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type. An external spark gap must be provided at the grid-No.3 terminal. The following resistor and voltage values are mandatory.

Anode-Circuit Resistance (unbypassed)	0.5	min. A	AΩ
Grid-No.3 Circuit Resistance (unbypassed)	0.1	ħ	AΩ
Grid-No.3 Spark-Gap Firing Voltage	20		kV
Low-Voltage Circuits			
Grid-No.2 Circuit Resistance (bypassed)	10		kΩ
Grid-No.1 Circuit Resistance (unbypassed)	1	1	kΩ
Effective Grid-No.1-to- Cathode Circuit Resistance	1.5	max. N	AΩ

Sharp corners on the yoke assembly in the vicinity of the tube neck should be avoided. Insulation between the yoke winding and/or the core and the tube neck should be capable of with-standing at least 10 kV and preferably 15 kV.

Electronic Components

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- b A description of the Absolute Maximum Rating is given in the General Section, titled Rating Systems for Electron Tubes.
- C The product of anode-to-cathode voltage and anode current (long term average) should never exceed 160 watts.
- The specified air flow should be delivered perpendicularly from a nozzle having a diameter of about 2 inches onto the face of the tube while it is in operation. In a typical system with air filter, the total system static pressure is approximately 0.25 inch of water. The cooling air must not contain water, dust, or other foreign matter. The air-cooling system should be electrically interconnected with the anode power supply to prevent operation of the tube without cooling.

Cooling of the tube by a tangential flow of air across its face is not recommended because the temperature gradient produced across the face may result in immediate or delayed cracking of the face.

- For maximum cathode life, it is recommended that the heater supply be regulated at 6.6 volts.
- f These tubes may be operated at reduced anode voltage and/or anode current. At reduced anode voltage, center resolution will decrease. At reduced anode voltage and/or anode current, luminance will decrease. The grid-No.3 voltage for focus will be reduced in proportion to the reduction in anode voltage. Other performance characteristics may also be affected.
- 9 Determined for a 3-3/4 inch high TV resolution test pattern with tube operating at a screen current of 1000 microamperes.
- h Grid-No.3 current is normally low, as indicated in the data, when the tube is operated under recommended conditions. Lower grid-No.3 voltages (as required for focus if anode voltage is reduced) and/or higher grid-No.2 voltages can lead to a grid-No.3 current level approaching that measured in the anode circuit. Note that the fraction of available current intercepted by the grid-No.3 electrode is not constant, but increases with increasing anode current.

The Conductive Coating

RBA Electronic Components

The conductive coating on the exterior of the tube neck must be grounded. Connection to the coating may be made by using a flexible metal band fastened firmly around the neck at the base end of the coating. The metal band should be fastened only tight enough to insure good contact. If

the band is clamped very tight, resultant glass strains may eventually cause the neck to break. This coating must not be scratched and must never be washed with liquids likely to soften or dissolve lacquers.

The external coating on the neck serves to prevent corona between the neck and the yoke. Corona would damage the yoke insulation and cause breakdown in the glass of the neck. It is important that the yoke insulation be adequate for operation of the yoke against the external grounded coating. The resistance of the external conductive coating is sufficiently high so that damping of the yoke deflecting energy is negligible. Because of this high resistance, a contact area of at least 1/4 square inch should be used in making connection to the external coating.

Safety Precautions

X-Radiation Warning

Although X-radiation is generated primarily at the face of the tube when it is operated, the X-rays are emitted in all directions.

These rays can constitute a health hazard unless the tube is adequately shielded. Make sure that the shielding provides the required protection against personal injury.

On the neck of the tube itself the following warning appears and should be strictly adhered to:

X-Ray Warning

This tube in operation produces X-rays which can constitute a health hazard unless the tube is adequately shielded for radiation.

High Voltage

The high voltages at which these tubes are operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the enclosing of

Electronic

Components -

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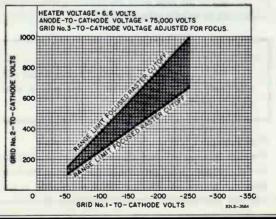
high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

In the use of these tubes it should always be remembered that high voltages may appear at normally low-potential points in the circuit because of capacitor breakdown or incorrect circuit connections, and that the tube surface maintains a static charge for some time after the power has been turned off. Therefore, before any part of the circuit or the tube is touched, the power-supply switch should be turned off, both terminals of high-voltage capacitors should be grounded, and the terminals of the high-voltage power supply should be grounded.

After these steps have been taken and before touching the tube, discharge the anode terminal, the surface of the faceplate, and the coated surface of the cone by use of a suitable wand which is connected to ground. It is to be noted that the entire surface of the cone and of the faceplate will not be discharged by touching the wand to a single point on either surface, because the surfaces have high resistance. Therefore, to discharge each surface, it will be necessary to sweep over the entire surface with the wand.

Cutoff Design Chart

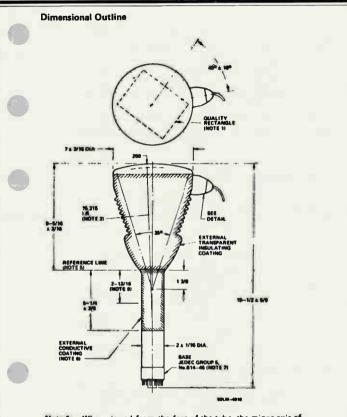
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Electronic

Components



- When viewed from the face of the tube, the minor axis of Note 1: the 5" x 3-3/4" quality rectangle is located 45° ± 10° in a counter-clockwise direction from a plane through the anode terminal and the tube axis.
- Inside surface of faceplate within the quality rectangle Note 2: may vary ± 0.006" from the spherical surface having a 15.315" radius.
- The plane through Base Pin No.9 and the tube axis may Note 4: vary from the plane through the anode terminal and the tube axis by an angular tolerance (measured about the tube axis) of $\pm 10^{\circ}$. The anode terminal is on same side as Pin No.9.

Electronic

Components

RGA



Note 5:	Reference line is determined by position where gauge
	2.100" ±0.001" I.D. and 3" long will rest on bulb cone.

Note 6: External conductive coating must be grounded.

- Note 7: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Socket contacts for Pins 5, 6, 7, 8, 10, 11, 12, and 13 should be removed in order to provide maximum insulation for Pin No.9.
- Note 8: Effective deflecting field must be within this space.
- Note 9: Anode cable should not be sharply bent within 5" of bulb svall.

Dimensional Outline Detail



Socket Connections (Bottom View)



Note: Socket contacts for Pins No. 5, 6, 7, 8, 10, 11, 12, and 13 should be removed so that maximum insulation is provided for Pin No. 9.

	1000
1: Heater	
2: Cathode	
3: Grid No.1	
4: Grid No.2	
5: No Connection	
6: No Connection	
7: No Connection	
8: No Connection	
99: Grid No.3	
10: No Connection	
11: No Connection	
12: No Connection	
13: Internal Connection	
Do Not use	
14: Heater	
le Anode	
	2: Cathode 3: Grid No.1 4: Grid No.2 5: No Connection 6: No Connection 7: No Connection 8: No Connection 99: Grid No.3 10: No Connection 11: No Connection 12: No Connection 13: Internal Connection = Do Not use 14: Heater

DATA 4

Components

Electronic

Graphechon Tube

Scan-Conversion Storage-Tube Assembly Very High Resolution Capability

Ruggedized Structure Designed to Meet MIL-E-5400 Specification

Integral Shielding and Deflection Coils

Small Size - 15" Max. Length 3.65" Diameter

0.6-Watt Heaters for Writing and Reading Guns

ELECTRICAL

Heater Current at 6.3 Volts, Each Gun
Focusing Method, Each Gun Electrostatic
Deflection Method, Each Gun Magnetic
Deflection Coils See footnote a
Total Deflection Angle, Each Gun (Approx.) 50 degrees
Deflection Coil Alignment ^b 0.5 degrees
Undeflected Spot Position, Each Gunc 5% of target diameter
Direct Interelectrode Capacitances:

	Typ.	Max.	
Output-signal-electrode to all other electrodes ^d	17	20	pF
Reading-gun grid No.1 to all other electrodes	-	15	pF
Reading-gun cathode to all other electrodes	-	9	pF
Writing-gun grid No.1 to all other electrodes	-	15	pF
Writing-gun cathode to all other electrodes	-	9	pF

MECHANICAL

RB/J

Tube Dimensions	. See Dimensional Outline
Connections	See footnote e
Operating Position	Any
Maximum Weight	5.25 tbs

Electronic DATA 1 Components samples new

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oltages are referred to ground unless otherwi	ee enerified		
or tages are referred to ground unless otherwi	Min.	Max.	
riting Gun:		Promes .	
Heater voltage9 (AC or DC)	5.7	6.9	V
Cathode voltage	-9000	-	V
Heater-cathode voltage	-125	10	v
Grid-No.1 (control grid) voltageh	-300	0	۷
Grid-No.2 voltageh	-	750	¥
Grid-No.3 (beam focus) voltageh.j	_	1500	V
Grid-No.4 (anode) voltage	Grou	ind	
eading Gun:			
Heater voltagek (AC or DC)	5.7	6.9	v
Cathode voltage	-1500	_	v
Heater-cathode voltage	-125	10	v
Grid-No.1 (control grid) voltagem	-300	0	v
Grid-No.2 voltagem	-	750	v
Grid-No.4 (beam focus) voltagej,m	-	750	v
Grids No.3 & No.5 (anode) voltage	-30	30	v
External conductive coating	Grou	nd	
arget Section:			
Output signal electrode voltage	-10	10	v
Shading electrode voltage	-30	30	v
Backplate voltage	-20	50	v
TYPICAL OPERATING CONDITIONS			
oltages are referred to ground unless otherw	ise specifie	d. 📃	
Vriting Gun:			
Heater voltage9 (AC or DC)		6.3	V
Cathode voltage		-8000	v
Grid-No.1 (control grid) voltage for beam cutoff ^h) to -70	v
Grid-No.2 voltageh			v
Grid-No.3 (beam focus) voltageh j			v
Grid-No.4 (anode) voltage			und
Reading Gun:			
Heater voltagek (AC or DC)		6.3	v
Cathode voitage		-1200	v

RBA Electronic Components

DATA 1

TYPICAL OUTPUT CONDITIONS

Reading Gun:

Grid-No.1 (control grid) voltage for beam cutoff ^m	-120 to -70	v
Grid-No.2 voltagem	300	v
Grid-No.4 (beam focus) voltagei,m	200 to 440	v
Grids No.3 & No.5 (anode) voltagen	-20 to 0	v
External conductive coating	Grou	und
arget Section:		
Output-signal-electrode voltage	0	V
Shading electrode voltagen	0 to 20	V
Backplate voltagen	-15 to 0	v

PERFORMANCE CHARACTERISTICS

The Performance Characteristics shown below are obtained in one mode of tube operation which is representative of many applications. Trade-offs in these characteristics may be made to achieve optimum tube performance in other operating modes.

	Min.	Max.
Output Signal CurrentP	Q.5	— µА
Storage Time9		See footnote r
Signal-to-Shading Ratio ⁸	5:1	-
Signal-to-Background-Shading Ratiot .	8:1	-
Center Resolution, At 50% amplitude response	1600	- TV lines/ target diameter
Edge Resolution, At 50% amplitude response		See footnote v
Writing Speed	200	μs/ target diameter
Shades of GrayW	7	
Blemishes ^x		See footnote y

ENVIRONMENTAL CONDITIONS

RBA Electronic Components

The 4598 will provide the performance specified under Performance Characteristics when the tube is exposed to the following environmental conditions:

Temperature-Altitude ^z	Requirement MIL-E-5400L, Par. 3.2.24.3, Table I Class 1A
Humidity	MIL-E-5400L, Par. 3.2.24.4
Shock	MIL-E-5400L, Par. 3.2.24.6
Vibration	. See accompanying Vibration Levels

50 1 40

DATA 2

- The deflection coils are electrically similar to type Y65 manufactured by Syntronic Instruments Inc., Addison, Illinois. A variety of inductances are available, which are suitable for either push-pull or single-ended circuit configurations.
- b The orthogonality of the horizontal and vertical axes of each deflection coil is within 1/2 degree of 90 degrees. The horizontal axis of the writing deflection coil is parallel within 1/2 degree to the horizontal axis of the reading deflection coil.
- C The undeflected spots of both guns fall within a circle having a diameter that is 5 per cent of the target diameter, and is centered on the target.
- d The value shown is the capacitance of the assembly supplied with a solderable terminal as the output signal electrode connection; if a coaxial connector or cable is supplied, their capacitance must be added to this value.
- Connection to the output signal electrode can be provided by means of a solderable terminal, coaxial connector, or coaxial cable. Connections to the deflection coils and low voltage electrodes are by flexible leads. Connections to the high voltage electrodes are made by silicone rubber leads; connectors such as type 840706 lead assemblies manufactured by AMP Inc., Capitron Division, Elizabethtown, PA, can also be supplied.
- 9 One side to be externally connected to writing-gun cathode.
- h With respect to writing-gun cathode.
- **j** Adjust for best focus.
- k One side to be externally connected to reading-gun cathode.
- m With respect to reading-gun cathode.
- h Adjust for optimum signal and storage performance.
- P This value is the saturated output signal current.
- 4 Storage time is proportional to the area scanned by the readinggun raster. The limits are given for a raster of aspect ratio 1:1, and inscribed within the target area.
- The specified performance characteristics are obtained over a range of storage times from 1.0 second maximum to 3.0 seconds minimum. The specified performance characteristics except shades of gray are obtained over a range of storage times from 0.5 second maximum to 4.0 seconds minimum. Storage time is measured to 10 per cent of signal amplitude.

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- This limit applies to the central 75 per cent of the target. The measurement is taken along that single line of the output video signal which has the lowest signal-to-shading ratio.
- ^t This limit applies to the central 75 per cent of the target. The measurement is taken along that single line of the output video signal which has the lowest signal-to-background-shading ratio.
- Resolution is measured using a raster written perpendicular to the horizontal scanning lines of the reading-gun raster, and with the writing-gun drive voltage adjusted to give a peak output signal 85 per cent of saturated signal amplitude.
- A minimum resolution of 1200 TV lines per target diameter is obtained over 75 per cent of the target diameter. A minimum resolution of 1400 TV lines per target diameter is obtained over 75 per cent of the target diameter using dynamic focusing of the reading gun.
- W A step voltage waveform with seven equally spaced levels is used as input.
- Blemishes are measured within a circular area centered on the target and with a diameter of 90 per cent of the target diameter. Blemish size is specified as a percentage of the target diameter;

blemish amplitude, as a percentage of saturated signal amplitube. Blemishes with an amplitude of less than 10 per cent are not counted. Dark blemishes with a size of less than 1/8 per cent are not counted.

Y The maximum size of any light blemish is 1/2 per cent. The amplitude and number of light blemishes are limited as shown in the following table:

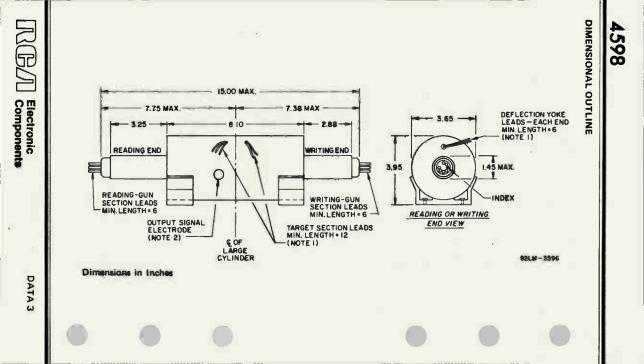
Amplitude	Maximum Number
10% to 50%	10
20% to 50%	3
Greater than 50%	0

The maximum size of any dark blemish is 1/2 per cent. The maximum number of dark blemishes is five.

The backplate voltage of the tube may be changed in a predetermined manner to compensate for the variation in storage time as a function of temperature.

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DIMENSIONAL OUTLINE (cont'd)

Note 1 - All leads are labeled.

Note 2 - Connection to the output signal electrode can be provided by means of a solderable terminal, coaxial connector, or coaxial cable.

TARGET-SECTION LEADS

Lead 1: Writing-Gun Grid No.4 Lead 2: Backplate Lead 3: Shading Electrode Lead 4: Reading Gun Grids No. 3 & 5

Lead 5: Reading-Gun External Conductive Coating

WRITING-GUN SECTION LEADS

Lead 1: Heater Lead 2: Grid No.1 Lead 3: Grid No.3 Lead 4: Grid No.2 Lead 5: Cathode Lead 6: Heater

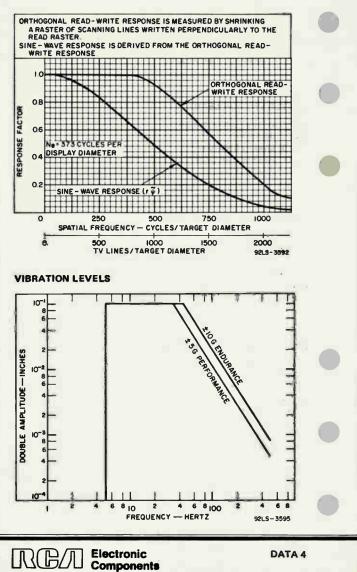
READING-GUN SECTION LEADS

Lead 1: Heater Lead 2: Grid No.1 Lead 3: Grid No.4 Lead 4: Grid No.2 Lead 5: Cathode Lead 6: Heater

RBA Electronic Components

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FREQUENCY RESPONSE CHARACTERISTICS



Projection Kinescope

5"-Diameter Electrostatic-Focus, Magnetic-Deflection Type

- For Monochrome Television Projectors
- Designed for Use with Schmidt Reflective Optics
- High Picture Luminance 3000 fL at 300 µA
- High Resolution 600 TV Lines at 300 µA
- Forced-Air Cooled
- Rare Earth (White) Phosphor
- Fine Screen Texture
- Color Temperature 7800° K + 70 MPCD

General Data

Electrical
Heater Current at 6.3 Volts 0.6 A
Focusing Method Electrostatic
Deflection Method ^a Magnetic
Deflection Angle (Approx.) 50°
Direct Interelectrode Capacitances (Approx.):
Grid No.1 to all other electrodes
Cathode to all other electrodes
Optical:
Faceplate, Spherical Clear, Browning-Resistant Glass
Radius of curvature (inner radius) 7.10 \pm 0.20 in
Minimum Useful Screen Diameter 4.50 in
Minimum Optical-Quality-Circle Diameter 4.25 in
Refractive Index of Faceplate 1.519
Phosphor, Aluminized P45 Rare Earth
C.I.E. coordinates (x,y) 0.290, 0.361
Luminescence White
Color temperature
Persistence Medium
Mechanical:
Tube Dimensions:
Overall length
Greatest diameter of bulb (Excluding cable) 5.00 \pm 0.12 in
Base Smell-Shell Duodecal 7-Pin, JEDEC No.B7-51

RBA Electronic Components

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Bulb J40H1 Operating Position Any Weight (Approx.) 1-1/2 lbs Maximum and Minimum Ratings, Absolute-Maximum Valuesb Average Anode Power: Without forced-eir cooling of faceplate 9 Maximum Valuesb Average Anode Power: W With forced-eir cooling of faceplate 12 Maximum to forced-eir cooling of faceplate 12 Maximum to forced-eir cooling of faceplate 12 Maximum to forced-eir cooling of faceplate 12 Maximum to forced-eir cooling of faceplate 12 Maximum to forced-eir cooling of faceplate 12 Maximum to forced-eir cooling of faceplate 12 Maximum to forced-eir cooling of faceplate 12 Maximum to forced-eir cooling of faceplate 12 Maximum to forced-eir cooling of faceplate 12 Maximum to forced-eir cooling of faceplate 12 Maximum to forced-eir cooling of faceplate 40 Grid-No.3-to-Cathode Voltage 9 Negative bias value 0 Peak positive value 10 Maxing transcoling of faceplate 10	Anode Lead Molded-on, Insulated Cable, 48 in long	
Weight (Approx.) 1-1/2 lbs Maximum and Minimum Ratings, Absolute-Maximum Valuesb Average Anode Power: Without forced-air cooling of faceplate 12 max. W Air Flow to Face ^C when Average Anode Power Exceeds 9 Watts 40 cfm Anode-to-Cathode Voltage 42 Grid-No.3-to-Cathode Voltage 9 Mexitive bias value 150 Mexitive bias value 0 Megitive bias value 0 Mode Current, Long-Term Average Ifor 4" x 3" TV raster) Peak positive with respect to cathode 10 max. V Peak Heater -Cathode Voltage: Heater positive with respect to cathode 10 max. V Heater positive with respect to cathode 10 max. V Recommended Operating Values [®] Raster Size 4" x 3" Anode Current, Long-Term Average 300 Max 6.9 Grid-No.3 Stotage for Focus at an Anode Voltage 40 KV Anode Current, Long-Term Average	Bulb	
Maximum and Minimum Ratings, Absolute-Maximum Valuesb Average Anode Power: Without forced-air cooling of faceplate 9 With forced-air cooling of faceplate 12 Maximum Valuesb 12 With forced-air cooling of faceplate 12 Maximum Valuesb 12 With forced-air cooling of faceplate 12 Maximum Valuesb 12 Maximum Valuesb 12 Maximum Valuesb 12 Maximum Valuesb 40 Air Flow to Face ^C when Average Anode 0 Power Exceeds 9 Watts 40 Anode-to-Cathode Voltage 9 Maximum Valuesb 40 Grid-No.3-to-Cathode Voltage: 9 Negative bias value 0 Maximum V 9 Positive bias value 0 Maximum V 150 Positive bias value 0 Maximum V 150 Positive bias value 0 Maximum V 150 Peak positive value 150 Maxet V 10 Peak positive value 10 <td>Operating Position Any</td> <td>9</td>	Operating Position Any	9
Absolute-Maximum Valuesb Average Anode Power: Without forced-eir cooling of faceplate 9 Mith forced-eir cooling of faceplate 12 max. W Air Flow to Face ^C when Average Anode 40 Power Exceeds 9 Watts 40 Anode-to-Cathode Voltage 42 max. KV Grid-No.3-to-Cathode Voltage 9 Megative bias value 0 Megative bias value 0 Mode Current, Long-Term Average 150 (for 4" x 3" TV rester) 300 Peak positive value 10 Heater negative with respect to cathode 10 for 4" x 3" TV rester) 300 Peak Heater Cathode Voltage: 40 Heater negative with respect to cathode 10 Heater Voltage (ac or dc)d 6.9 for 300 µA 7.4 to 9 Grid-No.3 Voltage for Focus at an 7.4 to 9 Anode Current, Long-Term Average 300 Grid-No.3 Voltage for Focus at an 7.4 to 9 Anode Current of 300 µA 7.4 to 9 Grid-No.2 and Grid-No.1 Voltages for See Figure 1 <td>Weight (Approx.) 1-1/2 lbs</td> <td></td>	Weight (Approx.) 1-1/2 lbs	
Without forced-sir cooling of faceplate. 9 max. W With forced-sir cooling of faceplate 12 max. W Air Flow to Face ^C when Average Anode 40 cfm Power Exceeds 9 Watts 40 cfm Anode-to-Cathode Voltage 42 max. kV Grid-No.3-to-Cathode Voltage 9 max. kV Grid-No.1-to-Cathode Voltage 400 max. V Positive bias value 0 max. V Pack positive value 2 max. V Pack positive value 10 max. V Heater negative with respect to cathode 10 max. V Heater positive with respect to cathode 10 max. V		0
Without for bedrefind of faceplate12max. WAir Flow to Face ⁶ when Average Anode40cfmAnode-to-Cathode Voltage42max. kVGrid-No.3-to-Cathode Voltage9max. kVGrid-No.1-to-Cathode Voltage9max. VPositive bias value0max. VPositive bias value0max. VPositive bias value0max. VPositive bias value0max. VPositive value2max. VPack positive value2max. VPack positive value2max. VPack positive value10max. VPeak Heater -Cathode Voltage:10max. VHeater negative with respect to cathode10max. VHeater positive with respect to cathode10max. VRecommended Operating Values ⁶ 300 μ Raster Size4'' x 3''10Anode Current, Long-Term Average300 μ Grid-No.3 Voltage for Focus at an Anode Current of 300 μ A7.4 to 9KVGrid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused SpotSee Figure 1Heater Voltage6.3VTypical Performance Data At Recommended Operating Values:600 TV LinesCenter Resolution f600 TV Lines10Luminance at 300 μ A5000fL	Average Anode Power:	\bigcirc
Air Flow to Face ^C when Average Anode Power Exceeds 9 Watts	Without forced-air cooling of faceplate 9 max. W	-
Power Exceeds 9 Watts40cfmAnode-to-Cathode Voltage42max. kVGrid-No.3-to-Cathode Voltage9max. kVGrid-No.1-to-Cathode Voltage400max. VPositive bias value150max. VPositive bias value0max. VPositive bias value2max. VPeak positive value2max. VPeak positive value2max. VPeak positive value2max. VPeak positive value10max. VPeak heater - Cathode Voltage:10max. VHeater negative with respect to cathode10max. VHeater voltage (ac or dc)d $\{6.9 \ max. V$ Faster Size4" x 3"()Anode Current, Long-Term Average300 μ Grid-No.3 Voltage for Focus at an Anode Voltage40kVAnode Current, Long-Term Average300 μ Grid-No.3 Voltage for Focus at an Anode Current of 300 μ A7.4 to 9kVGrid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused SpotSee Figure 1()Heater Voltage6.3VTypical Performance DataAt Recommended Operating Values:Cont V LinesCenter Resolution f	With forced an cooling of faceplate	
Anode Corcentrate Voltage9max.kVGrid-No.3-to-Cathode Voltage400max.VGrid-No.1-to-Cathode Voltage150max.VPositive bias value0max.VPositive bias value0max.VPeak positive value2max.VPack positive value2max.VPack positive value2max.VPack positive value2max.VPack positive value2max.VPack positive value10max.VPack positive value175max.VPack theater-Cathode Voltage:10max.VHeater negative with respect to cathode10max.VHeater voltage (ac or dc)d $\{6,9 \ max.$ VKecommended Operating Valuese40kVAnode Current, Long-Term Average300 μ AGrid-No.3 Voltage for Focus at an Anode Current of 300 μ A7.4 to 9kVGrid-No.2 and Grid-No.1 Voltages for Visuel Extinction of Focused SpotSee Figure 1ImaxHeater Voltage6.3VImaxImaxHeater Voltage6.3VImaxImaxGrid-No.2 and Grid-No.1 Voltages for Visuel Extinction of Focused SpotSee Figure 1ImaxHeater Voltage6.3VImaxImaxHeater Voltage6.3VImaxImaxHeater Voltage6.3VImaxImaxHeat		
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Grid-No.1-to-Cathode Voltage: 150 max. V Positive bias value 0 max. V Positive bias value 0 max. V Peak positive value 2 max. V Anode Current, Long-Term Average 300 max. V Ifor 4" x 3" TV rester) 300 max. V Peak Heater-Cathode Voltage: 175 max. V Heater negative with respect to cathode 10 max. V Heater positive with respect to cathode 10 max. V Heater voltage (ac or dc) ^d $\begin{cases} 6.9 \\ 6.7 \\ min. V \\ 5.7 \\ min. V Recommended Operating Valuese 4" x 3" \checkmark \land \land Raster Size 4" x 3" \checkmark \land \land \land Anode Voltage 40 kV Anode Current, Long-Term Average 300 \muA \square \square Grid-No.3 Voltage for Focus at an Anode Current of 300 \muA \neg \neg \square \square \square Heater Voltage \frown \frown \frown \frown \frown $	Grid-No.3-to-Cathode Voltage	0
Negative bias value150max.VPositive bias value0max.VPeak positive value2max.VAnode Current, Long-Term Average (for 4" x 3" TV raster)300max. μ Peak Heater-Cathode Voltage:300max. μ Heater negative with respect to cathode175max.VHeater positive with respect to cathode10max.VHeater Voltage (ac or dc)d6.9max.VKecommended Operating Values®6.9max.VRaster Size4" x 3"0Anode Voltage40kVAnode Current, Long-Term Average300 μ AGrid-No.3 Voltage for Focus at an Anode Current of 300 μ A7.4 to 9kVGrid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused SpotSee Figure 1Image: See Figure 1Heater Voltage6.3VTypical Performance DataAt Recommended Operating Values:Center Resolution f600 TV Lines3000fL	Grid-No.2-to-Cathode Voltage 400 max. V	
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Peak positive bias value2max.VPeak positive value2max.VAnode Current, Long-Term Average300max. μ APeak Heater-Cathode Voltage:300max. μ APeak Heater Cathode Voltage:175max.VHeater negative with respect to cathode10max.VHeater positive with respect to cathode10max.VHeater Voltage (ac or dc) ^d $\{6,9 \ max.$ VRecommended Operating Values ^e $\{6,7 \ min.$ VRaster Size $4'' \times 3''$ $\{6,7 \ min.$ VAnode Voltage $40 \ kV$ Anode Current, Long-Term Average $300 \ \mu$ AGrid-No.3 Voltage for Focus at an Anode Current of 300 μ A $7.4 \ to 9 \ kV$ KVGrid-No.2 and Grid-No.1 Voltages for Visuel Extinction of Focused SpotSee Figure 1 $(110)^{10}$ Heater Voltage $6.3 \ V$ V $(210)^{10}$ $(210)^{10}$ Heater Voltage $6.3 \ V$ V $(210)^{10}$ $(210)^{10}$ Heater Voltage $(210)^{10}$ $(210)^{10}$ <td>Negative bias value</td> <td></td>	Negative bias value	
Anode Current, Long-Term Average (for 4" x 3" TV raster)	Positive bias value 0 max. V	
(for 4" x 3" TV rester)300max. μ APeak Heater -Cathode Voltage:175max. VHeater negative with respect to cathode10max. VHeater positive with respect to cathode10max. VHeater Voltage (ac or dc)d $\begin{cases} 6.9 & max. V \\ 5.7 & min. V \end{cases}$ Recommended Operating Values ^e 4" x 3"Raster Size4" x 3"Anode Voltage40kVAnode Current, Long-Term AverageAnode Current of 300 μ A7.4 to 9Grid-No.3 Voltage for Focus at an Anode Current of 300 μ AGrid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused SpotSee Figure 1Heater Voltage6.3 VTypical Performance Data At Recommended Operating Values: 	Peak positive value	
Heater positive with respect to cathode10max.VHeater Voltage (ac or dc)d $\begin{cases} 6,9 & max. & V \\ 5,7 & min. & V \end{cases}$ Recommended Operating ValueseRaster Size4" x 3"Anode Voltage40 kVAnode Voltage for Focus at an Anode Current of 300 μ A7.4 to 9 kVGrid-No.3 Voltage for Focus at an Anode Current of Focus at an Anode Current of Focus at an Anode Current of Focus at an Anode Current of Focus at an Anode Current of Focus at an Anode Current of S00 μ A7.4 to 9 kVGrid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused SpotSee Figure 1Heater Voltage6.3 VTypical Performance Data At Recommended Operating Values: Center Resolution f600 TV Lines (3000 fL)	(for 4" x 3" TV raster)	
Heater Voltage (ac or dc)d $\begin{cases} 6,9 & max. V \\ 5,7 & min. V \end{cases}$ Recommended Operating Valuese $\begin{cases} 5,9 & max. V \\ 5,7 & min. V \end{cases}$ Raster Size $4'' \times 3''$ Anode Voltage $40 & kV$ Anode Voltage $40 & kV$ Anode Current, Long-Term Average $300 & \mu A$ Grid-No.3 Voltage for Focus at an Anode Current of $300 \mu A$ $7.4 \text{ to } 9 & kV$ Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused SpotSee Figure 1Heater Voltage $6.3 & V$ Typical Performance DataAt Recommended Operating Values: Center Resolution f 600 TV Lines Summer at 300 μA $3000 & \text{fL}$	Heater negative with respect to cathode 175 max. V	
Heater Voltage (ac or dc) ^d 5.7 min. V Recommended Operating Values ^e 5.7 min. V Raster Size 4" x 3" Anode Voltage 40 kV Anode Current, Long-Term Average 300 µA Grid-No.3 Voltage for Focus at an 7.4 to 9 kV Anode Current of 300 µA 7.4 to 9 kV Grid-No.2 and Grid-No.1 Voltages for See Figure 1 Visual Extinction of Focused Spot 6.3 V Typical Performance Data At Recommended Operating Values: Center Resolution f 600 TV Lines J 3000 fL	Heater positive with respect to cathode 10 max. V	
Recommended Operating Values® Raster Size 4" x 3" Anode Voltage 40 kV Anode Current, Long-Term Average 300 µA Grid-No.3 Voltage for Focus at an 7.4 to 9 kV Anode Current of 300 µA 7.4 to 9 kV Grid-No.2 and Grid-No.1 Voltages for See Figure 1 Heater Voltage 6.3 V Typical Performance Data At Recommended Operating Values: Center Resolution f 600 TV Lines J 3000 fL	Heater Voltage (ac or dc) ^d	
Anode Voltage		
Anode Current, Long-Term Average	Raster Size	\bigcirc
Anode Current, Long-Term Average	Anode Voltage 40 kV	-
Anode Current of 300 μA 7.4 to 9 kV Grid-No.2 and Grid-No.1 Voltages for See Figure 1 Image: Content of Focused Spot Visual Extinction of Focused Spot 6.3 V Heater Voltage 6.3 V Typical Performance Data At Recommended Operating Values: 600 TV Lines Center Resolution f 3000 fL	Anode Current, Long-Term Average	
Visual Extinction of Focused Spot		
Typical Performance Data At Recommended Operating Values: Center Resolution ^f	Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused Spot See Figure 1	0
At Recommended Operating Values: Center Resolution ^f	Heater Voltage 6.3 V	
Center Resolution ^f	Typical Performance Data	
Luminance at 300 //A	At Recommended Operating Values:	
Luminance at 300 //A	Center Resolution ^f	0
	Luminance at 300 //A	0

RBA Electronic Components

DATA 1

Luminous Flux	250	lumens
Grid-No.3 Current (Total)9	±10	μΑ
Grid-No.2 Current	±15	HA
Observite Descrition of		

Circuit Requirements

High-Voltage Circuits:

In order to minimize the possibility of damage to the tubes and adjacent circuits caused by a momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type. An external spark gap must be provided at the grid-No.3 terminal. The following resistor and voltage values are mandatory.

Anode-Circuit Resistance (unbypassed)	0.5	min. M Ω
Grid-No.3 Circuit Resistance (unbypassed)	0.1	мΩ
Grid-No.3 Sperk-Gap Firing Voltage	12	kV
Low-Voltage Circuits:		
Grid-No.2 Circuit Resistance (bypessed)	10	kΩ
Grid-No.1 Circuit Resistance (unbypessed)	1	kΩ
Effective Grid-No.1-to-Cathode Circuit Resistance	1.5	mex. MΩ

- Sharp corners on the yoke assembly in the vicinity of the tube neck should be avoided. Insulation between the yoke winding and/or the core and the tube neck should be capable of withstanding at least 10 kV and preferably 15 kV.
- A description of the Absolute Maximum Ratings is given in the General Section, titled Rating System for Electron Tubes.
- ⁶ The specified air flow should be delivered perpendicularly from a nozzle having a diameter of about 2 inches onto the face of the tube while it is in operation. In a typical system with air filter, the total system static pressure is approximately 0.25 inch of water. The cooling air must not contain water, dust, or other foreign matter. The air-cooling system should be electrically interconnected with the anode power supply to prevent operation of the tube without cooling.
 - Cooling of the tube by a tangential flow of air across its face is not recommended because the temperature gradient produced across the face may result in immediate or delayed cracking of the face.
- d For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts.
- This tube may be operated at reduced anode voltage and/or anode current. At reduced anode voltage, center resolution will decrease. At reduced anode voltage and/or anode current, lumi-

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nance will decrease. The grid-No.3 voltage for focus will be reduced in proportion to the reduction in anode voltage. Other performance characteristics may also be affected.

- f Determined for a 3-inch high TV resolution test pattern with tube operating at a screen current of 300 microamperes.
- Grid-No.3 current is normally low, as indicated in the data, when the tube is operated under recommended conditions. Lower grid-No.3 voltage (as required for focus if anode voltage is reduced) and/or higher grid-No.2 voltages can lead to a grid-No.3 current level approaching that measured in the anode circuit. Note that the fraction of available current intercepted by the grid-No.3 electrode is not constant, but increases with increasing anode current.

Safety Precautions

X-Radiation Warning

Although X-radiation is generated primarily at the face of the tube when it is operated, the X-rays are emitted in all directions.

These rays can constitute a health hazard unless the tube is adequately shielded. Make sure that the shielding provides the required protection against personal injury.

On the neck of the tube itself the following warning appears and should be strictly adhered to:

X-RAY WARNING

This tube in operation produces X-Rays which can constitute a health hazard unless the tube is adequately shielded for radiation.

In normal operation, this tube produces more x-radiation than the Tube Type 5AZP4 which it may replace. Make sure that shielding is adequate.

High Voltage

The high voltages at which this type is operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the enclosing of highpotential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

In the use of this tube it should always be remembered that high voltages may appear at normally low-potential points in the circuit because of capacitor breakdown or incorrect circuit connections, and that the tube surface maintains a static charge for some time after the power has been turned off. Therefore, before any part of the circuit or the tube is touched, the power-supply switch should be turned off, both terminals of high-voltage capacitors should be grounded, and the terminals of the high-voltage power supply should be grounded.

After these steps have been taken and before touching the tube, discharge the anode terminal, the surface of the faceplate, and the coated surface of the cone by use of a suitable wand which is connected to ground. It is to be noted that the entire surface of the cone and of the faceplate will not be discharged by touching the wand to a single point on either surface, because the surfaces have high resistance. Therefore, to discharge each surface, it will be necessary to sweep over the entire surface with the wand.

Tube Handling

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Wear "Safety" Goggles with side shields, when handling tube to prevent possible injury from flying glass in case of tube breakage. Do not strike or scratch tube. Never subject it to more than moderate pressure when installing in or removing from equipment. Always Handle Tube with Extreme Care. Ground anode contact before touching after power is off.



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Operating Considerations

Humidity Considerations. When humidity is high, a continuous film of moisture may form on untreated glass. If a high-voltage gradient is present, this film may permit sparking to take place over the glass surface. In order to minimize the formation of a continuous moisture film, the glass cone is treated with a transparent moisture-repellent insulating coating. This coating must not be scratched, and must be

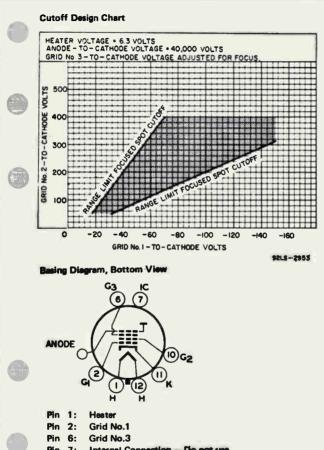
> Electronic Components

DATA 3 11/72

kept clean and free from contamination such as fingerprints. The coating may be washed with a solution of a mild soapless detergent and water. After the surface is washed, it should be rinsed with clean water and be dried immediately. Any damage to the coating or any contamination on the surface may result in sparking over the cone of the bulb.

Dust Considerations. The high voltage applied to the tube increases the rate at which dust is precipitated on the surface of the tube. The rate of precipitation is further accelerated in the presence of corona. Such dust not only decreases the insulation of the bulb coating but also reduces the amount of radiation transmitted through the bulb face. The dust usually consists of fibrous materials and may contain soluble salts. The fibers absorb and retain moisture; the soluble salts provide electrical leakage paths that increase in conductivity as the humidity increases. Because a film of dust can nullify the protection provided by the insulating coating on the bulb, the tube should be protected as much as possible from dust and should be cleaned, when necessary, as described under Humidity Considerations.

Corona Considerations. A high-voltage system may be subject to corona, especially when the humidity is high, unless suitable precautions are taken. Corona, which is an electrical discharge appearing on the surface of a conductor when the voltage gradient exceeds the breakdown value of air, causes deterioration of organic insulating materials, induces arc-over at points and sharp edges, and forms ozone, a gas which is deleterious to many insulating materials. Sharp points or other irregularities on any part of the high-voltage system may increase the possibility of corona and should be avoided. Instead, rounded contours and surfaces should be used.



Pin 7: Internal Connection - Do not use

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

Flexible Cable: Anode

Note: Socket contacts for vacant pin positions No.3, 4, 5, 8, and 9 should be removed so that maximum insulation is provided for pins No.6 and 7.

> Electronic Components

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Dimensional Outline 5 00 ± 12 CNA. 4.50 MIN. OPTICAL- QUALITY -CIRCLE -.155 NODE MOLDED-ON NULATED CABLE "LONG (APPROX) TO BULB WALL (NOTES 18.4) 1.5 + 25 7.100 1.200 25 4.28 . 0 1.25 MAX 25 7.255 12.0 ERENCE +. 37 a in Inch -1.44 MALL-SHELL DUODECAL 7-PIN BASE JEDEC Nº B7-51 U 92LM-4107

- Note 1 The plane through the tube axis and vacant pin position No.3 may vary from the plane through the tube axis and anode-cable connection at bulb wall by angular tolerance (measured about the tube axis) of ±20°. Anode-cable connection is on same side as vacant pin position No.3.
- Note 2 Reference line is determined by position where gauge 1.500" +0.003" -0.000" 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. Socket contacts corresponding to vacant pin positions No.3, 4, 5, 8 and 9 should be removed in order to provide maximum insulation for pins No.6 and 7.
- Note 4 Anode cable should not be sharply bent within 3" of bulb wall.
- Note 5 To avoid excessive interaction between the deflecting and focusing fields, the windings of the deflecting yoke should not extend more than 2 inches from the reference line toward the base.

RBA Electronic Components



MULTIPLIER PHOTOTUBE

9-STAGE TYPE WITH S-4 RESPONSE For Headlight-Control Service

DATA

	DATA
	General:
	Spectral Response
1	Minimum projected length*
	Direct Interelectrode Capacitances: Anode to dynode No.9 4.2 μμf Anode to all other electrodes 5.5 μμf
)	Maximum Overall Length (Excluding leads) 2-3/4" Maximum Envelope Length (Excluding tip) 2-1/4" Length from Envelope Seal to
	Center of Useful Cathode Area 11/4" ± 3/32" Maximum Diameter
	Mounting Position
ł	BOTTOM VIEW
	Lead 1 - Cathode Lead 7 - Dynode No.6 Lead 2 - Dynode No.1 Lead 8 - Dynode No.7
	Lead 3-Dynode No.2 Lead 4-Dynode No.3
	Lead 5 - Dynode No.4 Lead 11 - Anode Lead 6 - Dynode No.5
	DIRECTION OF LIGHT
	Maximum Ratings, Absolute Values:
	ANODE-SUPPLY VULTAGE (DC or Peak AC) 1250 max. volts SUPPLY VOLTAGE BETWEEN DYNODE No.9
	AND ANODE (DC or Peak AC)
	AMBIENT TEMPERATURE
	On plane perpendicular to the indicated direction of light (Sas Bimen- sional Outline).
	o Averaged over any interval of 90 seconds maximum.

MAY 1, 1955

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TUBE DIVISION CORPORATION OF AMERICA, HARRISON, NEW JEEREY TENTATIVE DATA



MULTIPLIER PHOTOTUBE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Under conditions with supply voltage (E) across voltage divider providing 1/10 of E between cathode and dynode No.1; 1/10 of E for each succeeding dynode stage; and 1/10 of E between dynode No.6 and anode

With E= 1000 volts

6472

	Min.	Nedian	lax.	
Sensitivity:				
Radiant, at 4000				
angstroms		32500	-	µamp/µwatt
Luminous: A				
At 0 cps	5	35	250	amp/lumen
At 100 Mc	-	33		amp/lumen
Electrode Dark Current		1.1		
(At 25°C):				
Anode	-	-	0.25	μamp
Any other electrode		-	0.75	μamp

For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 28700K. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.

With sine-wave, 60-cycle supply voltage adjusted to give sensitivity of 7.5 amperes per lumen.

OPERATING CONSIDERATIONS

The operating stability of the 6472 is dependent on the magnitude of the anode current and its duration. When the 6472 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 6472 usually recovers a substantial percentage of such loss in sensitivity.

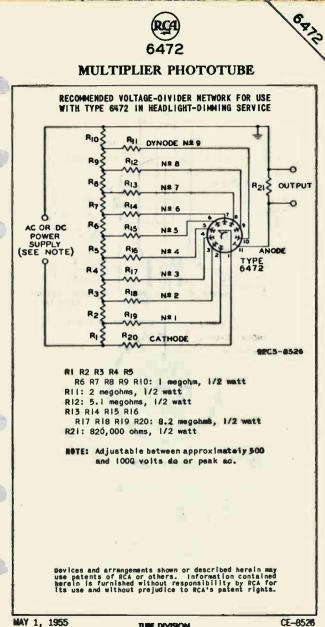
The use of an average anode current well below the maximum rated value of 0.1 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 10 microamperes.

A recommended design of voltage-divider network for use with the 6472 to provide stable operation and long tube life is shown in the accompanying circuit. This design provides linear operation within the range normally required for dimming. At higher light levels, the network design limits the tube output to a safe value. The indicated design values provide dimming operation for an anode current in the range between 5 and 10 microamperes on basis of dc operation. When operation at other current values is desired, the values of the resistors can be changed proportionately.

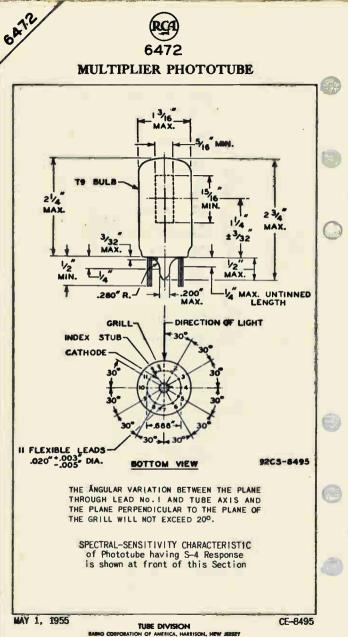
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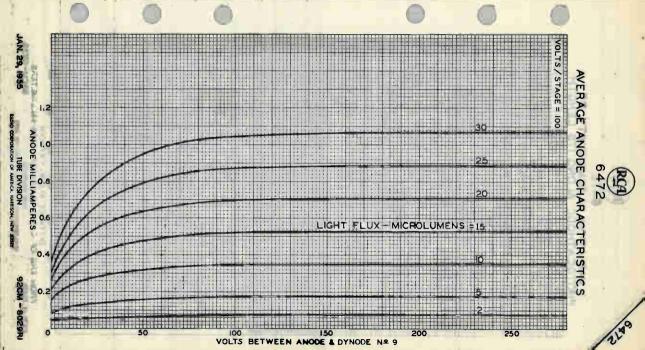
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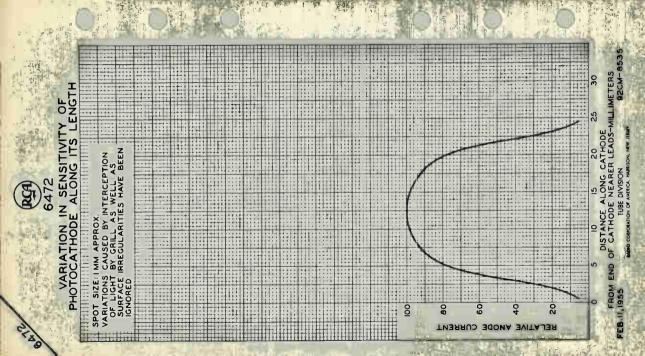


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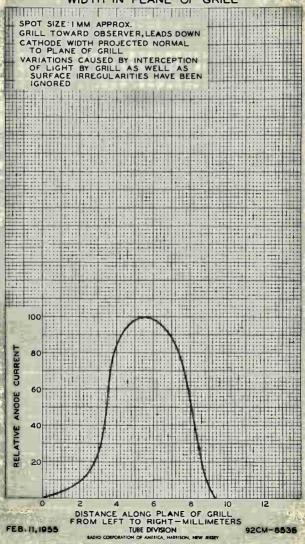


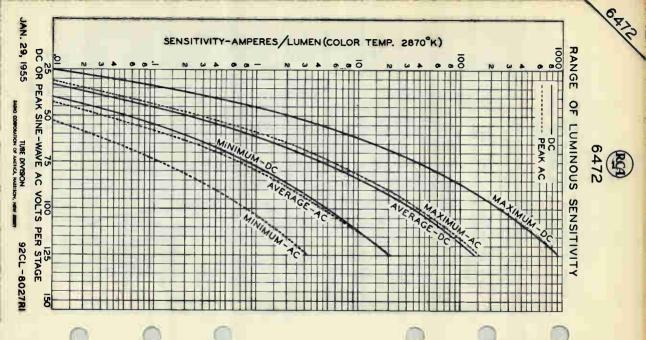




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VARIATION IN SENSITIVITY OF PHOTOCATHODE ACROSS ITS PROJECTED WIDTH IN PLANE OF GRILL







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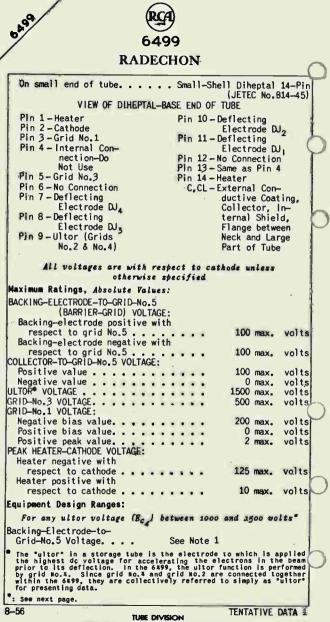
CHARGE STORAGE TUBE SINGLE-BEAM, BARRIER-GRID TYPE NON-EQUILIBRIUM WRITING CAPACITANCE-DISCHARGE READING

DATA

	eneral:	l
A	eater, for Unipotential Cathode:	-
U	Voltage 6.3 ac or dc volts	
	Current. 0.6 amp Direct Interelectrode Capacitances (Approx.):	
ľ	Grid No.1 to all other electrodes 9 muf	
- 1	Deflecting electrode DJ to all	
	other electrodes	
	Deflecting electrode \mathbb{D}_2 to all μ_f	
()	other electrodes	ľ
	other electrodes	
	Deflecting electrode DJ, to all	
	other electrodes	L
	D_1 to D_2	L
	D_3 to D_4^2	ł
	Grid No.5 to backing-electrode 800 μμ Grid No.5 and backing-electrode	L
	to collector	l
1	Collector to all other electrodes &	L
- 1	external cylindrical shield See Curve	
	ocusing method.	
	Deflection Method	
1	Treatest Diameter of Tube	1
	disimum liseful Storage-Surface Diameter	Ł
1	Any except those positions where	
	the diheptal base is up and the tube axis is at an angle of less	
()	than 60° from the vertical.	1
4	Weight (Approx.)	4
	Base:	
	On large end of tube Small-Button Twentyninar 8-Pin (JETEC No.E8-19)	
	VIEW OF TWENTYNINAR-BASE END OF TUBE	ł
~	Pin 2 Multiple Connec-	1
	Pin 6 tions to Backing-	1
-	Pin 10 Electrode. Only	
	Pin 14 One Need be Used	f
	Pin 21 - No Connec-	l
\$	tion	Į
	Pin 25-No Connec-	1
1	tion	1
	Pin 28-Grid No.5	1
	PINS 2,6,10.14,18: ON 1-7/84 (3)	1
	PINS 21,25,28: ON 7/8" 01A. SOLID-LINE CIRCLES DEPICT DIHEPTAL BASE BROKEN-LINE CIRCLES DEPICT TWENTYNINAR BASE]
	PIN CIRCLE BROKEN-LINE CIRCLES DEPCT TWENT THIS CIRCLE	

TUBE DIVISION

TENTATIVE DATA 1



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Collector-to-Grid-No.5 Voltage. Grid-No.3 Voltage for	0 to 50	volts
Focus with grid- No.1 volts = 0 Grid-No.1 Voltage for	14% to 26% of E_{C_4}	volts
Collector-current cutoff Collector Current for	-2.5% to -4.7% of Ec4	volts
grid-No.1 volts = 0 Max. Cathode Current	20 to 50	hamb
for grid-No.1 volts = 0 Deflection Factors:	See Curve	
D1 and D2 D3 and D4 Spot Position Signal-Uniformity Ratio.	85 to 105 v dc/in./k 78 to 96 v dc/in./k See Note 2 See Note 3	v of Eca v of Ecar
Examples of Use Design Ranges		
For ultor voltage of Grid-No.3 Voltage for Focus with grid-	1000	volts
No.1 volts = 0 Grid-No.1 Voltage for collector-current	140 to 260	volts
cutoff Deflection Factors:	-25 to-47	volts
\mathbb{D}_1 and \mathbb{D}_2 \mathbb{D}_3 and \mathbb{D}_4		/ dc/in.
Naximum Circuit Values:		
Grid-No.1-Circuit Resistance Resistance in Any Deflecting- Electrode Circuit*		megohms
* In general, the recommended minimu 1000 volts. Signal output and res voltage. Secondary emission cha jimit the maximum ultor voltage t	multorvoltage should not be solution decrease with decreas irracteristics of the dielectr o 1500 volts.	less than ing ultor ic layer
T it is recommended that all define be approximately equal.	ecting-electrode-circuit res	istances
Note 1: The backing-electrode, gr ated at the same dc putential. D electrode may be pulsed to ±60 vo	id No.5, and ultor are usual wring the writing cycle, the lits with respect to grid No.5	ly oper- backing-
Note 2: The undeflected focused s a diameter equal to 10% of the and having its center coincide surface.	pot will fall within a circl minimum storage-surface c ant with the center of the	e having diameter storage
Spot position is calculate of the state of 1000 v collector voltage of 1000 v collector voltage of 1050 volts, focus, grid-Ho.1 voltage adjuste current, each deflecting electrode to ultor, and the tube shielded fr	i as follows: With heater vo olts, grid-Mo.5 voltage of 100 grid-Mo.3 voltage adjusted d for 15 microamperes peak c connected through a 1-megohm cm all extraneous fields, the	ltage of 00 volts, to give ollector resistor voltages
Note 3; See next page.	44	
8-56 TUGE	DIVISION TENTATIVE	DATA 2
TADIO COPROPATION OF A	ALERICA MARTICOM LIGHT HEREY	

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



8-56

RADECHON

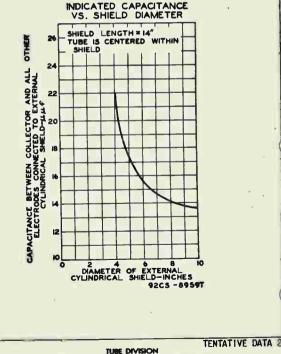
required to displace the beam from its undeflected position to the edge of the storage surface in the direction of each deflecting electrode are recorded as a for DJ_1 , b for DJ_2 , c for DJ_3 , and a for DJ_1 .

Spot Position in <u>\$ of Storage-Surface Diameter</u> = $1/2\sqrt{\left(\frac{D-a}{b+a}\right)^2 + \left(\frac{d-c}{d+c}\right)^2} \times 100$

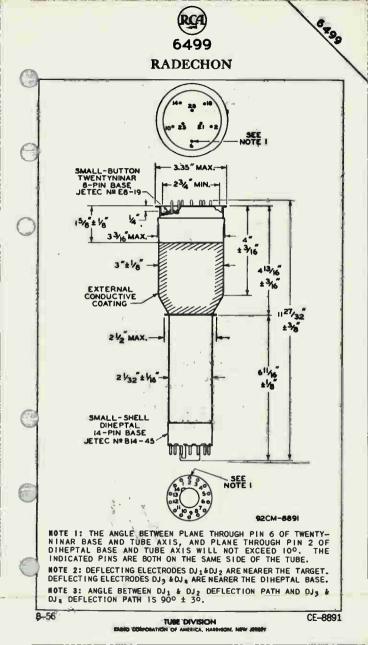
Note 3: With voltages as specified in Note 2, and with a signal written into storage by applying a series of well-formed symmetrical square waves to grid No.1 such that a series of 25 equally spaced stored elements are written across a single line scan, the ratio of the maximum to minimum signal amplitude observed as the single line scan is moved across the storage surface will not exceed 1.35.

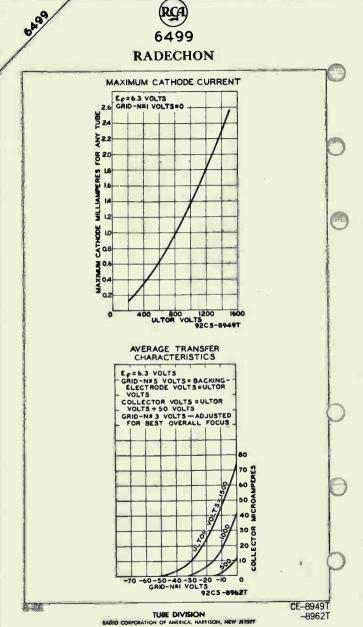
OPERATING CONSIDERATIONS

Shielding. The use of a magnetic shield of high-permeability material surrounding the tube is recommended. This shield prevents the effect of stray fields in causing unwanted deflection of the electron beam.

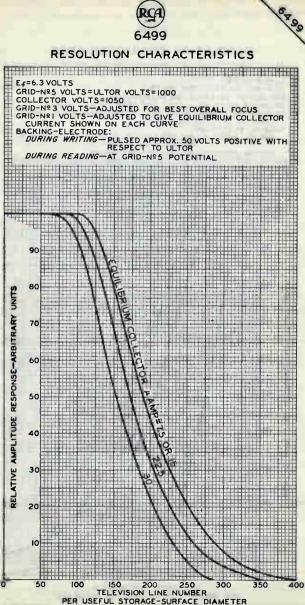


EADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY







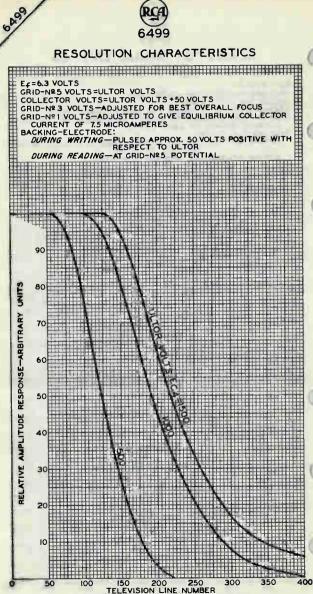


TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8948



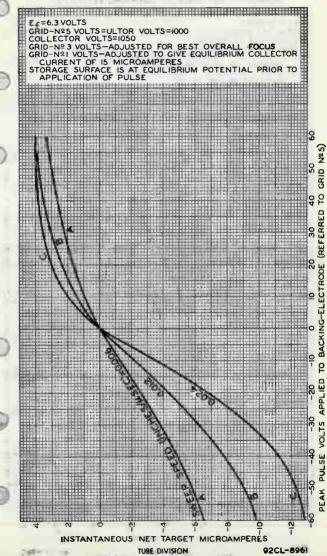


PER USEFUL STORAGE-SURFACE DIAMETER

TUBE DIVISION EADIO CORPORATION OF AMERICA, HARRISON, NEW J 92CM-8954



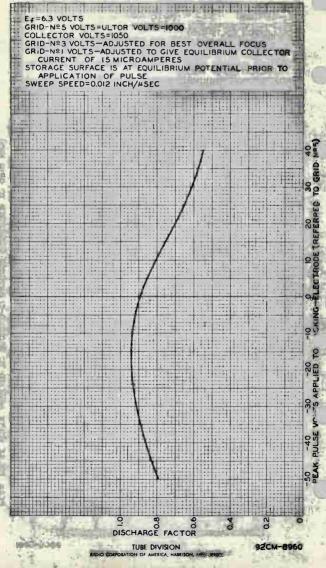
TYPICAL TARGET CHARACTERISTICS



MOID CORPORATION OF AMERICA, HARRISON, NEW JERS



APPROXIMATE DISCHARGE-FACTOR CHARACTERISTIC





volts

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DISPLAY STORAGE TUBE

DIRECT-VIEW TYPE

4"-DIAMETER DISPLAY

GRID-CONTROL READING (VIEWING) NON-EQUILIBRIUM WRITING DATA

eneral;		
· · · · ·	Writing Section	Viewing Sectio
eater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3	6.3
Current	0.6	0.6
inimum Cathode Heating Time		
before other electrode volt-		
ages are applied	*	30
irect interelectrode		
Capacitances (Approx.):0.		
Grid No.1 to all other		
tube electrodes	6	18
Cathode to all other		
tube electrodes	4.2	6.5
Deflecting electrode DJ ₁ to		
deflecting electrode DJ2	1.8	-
Deflecting electrode DJ ₃ to	12.21	
deflecting electrode Dig	1.8	-
DI to all other tube electrodes.	7.5	
DJ2 to all other tube electrodes.	8	-
DI to all other tube electrodes.	6	
DJ ₄ to all other tube electrodes.	7.	
ocusing Method	Electrostatic	None
Deflection Method		None
eflecting-Electrode Arrangement.	See Dimen-	-
-	sional Outline	Mah Manal Car
hosphor	-	High-Visual-Effi ciency Type,

Aluminized Yellow Fluorescence Yel low Phosphorescence. 41 Minimum Useful Screen Diameter. . 15-1/2" Maximum Overall Length. 14" ± 3/8" Seated Length . 3-5/32" Maximum Tube Radius 5-1/8" ± 1/16" Bulb-Flange Diameter. • 5" ± 1/16" Greatest Bulb Diameter. Bulb Terminals: Caps (Two). Recessed Small Cavity (JETEC No. J1-21) · · · · · See Dimensional Outline Flange. See Dimensional Outline Flexible cable. •••••••••••-65° to +100 °C Ambient-Temperature Range . Mounting Position 2 lbs Weight (Approx.). Alden Part No. 435SBA, or equivalent Socket. Base. Small-Button Thirtyfivar 31-Pin (JETEC No. E31-36)

O without external shletd.

10-56

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General:

Heater, for

Current . Minimum Cat

ages are Direct Inte

DJ_a to al Focusing M Deflection Deflecting Phosphor.

TENTATIVE DATA 1

TUBE DIVISION TADED CORPORATION OF AMERICA, HARRISON, HOW SERSEY



DISPLAY STORAGE TUBE

BOTTOM VIEW Pin 1 - No Connec- tion Pin 2 - Same as Pin 1 Pin 3 - Deflecting Electrode DJ of Writing Gun Pin 4 - Deflecting Electrode DJ of Writing Gun Pin 5 - Same as Pin 1 Pin 6 - Grid No.3 of Writing Gun Pin 9 - Heater of Writing Gun Pin 10 - Grid No.1 of Pin 12 - Same as Pin 1 Pin 10 - Grid No.1 of Writing Gun Pin 12 - Same as Pin 1 Pin 12 - Same as Pin 1 Pin 25 - Same as Pin 1 Pin 26 - Same as Pin 1 Pin 27 - Cathode of Writing Gun Pin 12 - Same as Pin 1 Pin 28 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 20 - Same as Pin 1 Pin 32 - Cathode of Viewing Gun of Writing Gun Writing Gun Writing Gun Writing Gun Writing Gun Writing Gun Pin 15 - Grid No.2 of Writing Gun Pin 16 - Internal Com- nection-Do Not Use Pin 17 - Grid No.4 of Writing Gun Grid No.2 of Viewing Gun Pin 18 - Same as Pin 1 Pin 19 - Grid No.4 of Writing Gun Writing Gun Pin 18 - Same as Pin 1 Pin 19 - Grid No.4 of Writing Gun Writing Gun Pin 10 - Grid No.4 of Writing Gun Pin 10 - Grid No.4 of Viewing Gun Pin 10 - Grid No.4 of Viewing Gun
Pin 1-No Connec- tion Pin 2-Same as Pin 1 Pin 3-Deflecting Electrode DJ ₃ of Writing Gun Pin 4-Deflecting Electrode DJ ₃ of Writing Gun Pin 5-Same as Pin 1 Pin 6-Grid No.3 of Writing Gun Pin 9-Heater of Writing Gun Pin 10-Grid No.1 of Writing Gun Pin 12-Same as Pin 1 Pin 13-Deflecting Electrode DJ ₁ of Writing Gun Pin 14-Deflecting Pin 15-Grid No.2 of Writing Gun, Pin 17-Grid No.4 of Writing Gun Pin 18-Grid No.4 of Writing Gun Pin 18-Grid No.4 of Writing Gun Pin 19-Grid No.4 of Writing Gun Pin 20-Grid No.4 of Pin 20-Grid No.4 o
Pin 2 - Same as Pin 1 Pin 3 - Deflecting Electrode DJ ₄ of Writing Gun Pin 4 - Deflecting Electrode DJ ₅ of Writing Gun Pin 5 - Same as Pin 1 Pin 6 - Grid No.3 of Writing Gun Pin 7 - Same as Pin 1 Pin 8 - Heater of Writing Gun Pin 9 - Heater of Writing Gun Pin 10 - Grid No.1 of Writing Gun Pin 11 - Same as Pin 1 Pin 12 - Same as Pin 1 Pin 13 - Deflecting Electrode DJ ₁ of Writing Gun Pin 14 - Deflecting Electrode DJ ₁ of Writing Gun Pin 15 - Grid No.2 of Writing Gun, Pin 17 - Grid No.4 of Writing Gun Pin 16 - Internal Com- Not Use Pin 17 - Grid No.4 of Writing Gun Pin 16 - Internal Com- Not Use Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 27 - Grid No.4 of Writing Gun Pin 28 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 20 - Same as Pin 1 P
Pin 3 - Deflecting Electrode DJ of Writing Gun Pin 4 - Deflecting Electrode DJ of Writing Gun Pin 5 - Same as Pin 1 Pin 6 - Grid No.3 of Writing Gun Pin 7 - Same as Pin 1 Pin 8 - Heater of Writing Gun Pin 9 - Heater of Writing Gun Pin 10 - Grid No.1 of Writing Gun Pin 12 - Same as Pin 1 Pin 12 - Same as Pin 1 Pin 12 - Grid No.2 of Writing Gun Pin 15 - Grid No.2 of Writing Gun Pin 17 - Grid No.4 of Pin 17 - Grid No.2 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 27 - Grid No.4 of Writing Gun Pin 28 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 30 - Cathode of Viewing Gun Pin 34 - Same as Pin 1 Pin 35 - Heater of Viewing Gun Pin 36 - Heater of Writing Gun Pin 37 - Cathode of Writing Gun Pin 38 - Cathode of Writing Gun Pin 37 - Grid No.4 of Writing Gun Pin 38 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode
Electrode DJ of Writing Gún Pin 4 - Deflecting Electrode DJ of Writing Gún Pin 5 - Same as Pin 1 Pin 6 - Grid No.2 of Writing Gun Pin 9 - Heater of Writing Gun Pin 12 - Same as Pin 1 Pin 13 - Deflecting Electrode DJ of Writing Gún Pin 14 - Deflecting Electrode DJ of Writing Gún Pin 15 - Grid No.2 of Writing Gún Pin 15 - Grid No.4 of Pin 17 - Grid No.4 of Writing Gún Pin 17 - Grid No.2 of Writing Gún Pin 17 - Grid No.2 of Writing Gún Pin 17 - Grid No.2 of Writing Gún Pin 17 - Grid No.4 of Writing Gún Pin 17 - Grid No.4 of Writing Gún Pin 17 - Grid No.4 of Writing Gún Pin 17 - Grid No.2 of Writing Gún Pin 17 - Grid No.4 of Writing Gún Pin 17 - Grid No.4 of Writing Gún Pin 17 - Grid No.4 of Writing Gún Pin 17 - Grid No.4 of Writing Gún Pin 17 - Grid No.2 of Writing Gún Pin 17 - Grid No.4 of Writing Gún
of Writing Gun Pin 4 - Deflecting Electrode DJ ₃ of Writing Gun Pin 5 - Same as Pin 1 Pin 6 - Grid No.3 of Writing Gun Pin 7 - Same as Pin 1 Pin 8 - Heater of Writing Gun Pin 9 - Heater of Writing Gun Pin 10 - Grid No.1 of Electrode DJ ₄ of Writing Gun Pin 12 - Same as Pin 1 Pin 12 - Cathode of Writing Gun Pin 14 - Deflecting Pin 15 - Grid No.2 of Writing Gun Pin 15 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 27 - Cathode of Viewing Gun Pin 28 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 30 - Cathode of Viewing Gun Pin 30 - Cathode of Writing Gun Pin 30 - Cathode of Viewing Gun Pin 30 - Cathode of Pin 30 - Cathode of Pin 30 - Cathode of Viewing Gun Pin 30 - Cathode of Pin 30
of Writing Gun Pin 4 - Deflecting Electrode DJ ₃ of Writing Gun Pin 5 - Same as Pin 1 Pin 6 - Grid No.3 of Writing Gun Pin 7 - Same as Pin 1 Pin 8 - Heater of Writing Gun Pin 9 - Heater of Writing Gun Pin 10 - Grid No.1 of Writing Gun Pin 12 - Same as Pin 1 Pin 12 - Deflecting Electrode DJ ₂ of Writing Gun Pin 15 - Grid No.2 of Writing Gun Pin 15 - Grid No.4 of Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.2 of Writing Gun Pin 17 - Grid No.2 of Writing Gun Pin 17 - Grid No.2 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.2 of Writing Gun Pin 17 - Grid No.2 of Writing Gun Pin 17 - Grid No.2 of Writing Gun Pin 17 - Grid No.2 of Writing Gun Pin 17 - Grid No.2 of Writing Gun Pin 17 - Grid No.2 of Writing Gun Pin 17 - Grid No.2 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Pin 17 - Grid No.4 of Writing Gun Writing Gun Pin 17 - Grid No.4 of Writing Gun Pi
Electrode DJ, of Writing Gun Pin 5-Same as Pin 1 Pin 6-Grid No.3 of Writing Gun Pin 7-Same as Pin 1 Pin 8-Heater of Writing Gun Pin 9-Heater of Writing Gun Pin 10-Grid No.1 of Writing Gun Pin 11-Same as Pin 1 Pin 12-Same as Pin 1 Pin 12-Same as Pin 1 Pin 12-Same as Pin 1 Pin 13-Deflecting Electrode DJ, of Writing Gun Pin 14-Deflecting Electrode DJ, of Writing Gun Pin 15-Grid No.2 of Writing Gun Pin 15-Grid No.4 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.2 of Writing Gun Pin 17-Grid No.2 of Writing Gun Pin 17-Grid No.2 of Writing Gun Pin 17-Grid No.2 of Writing Gun Pin 17-Grid No.2 of Writing Gun Pin 17-Grid No.2 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.2 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 27-Cathode of Writing Gun Pin 27-Cathode of Writing Gun Pin 28-Same as Pin 1 Pin 27-Cathode of Writing Gun Pin 28-Same as Pin 1 Pin 38-Cathode of Viewing Gun Flame-Backing- Electrode Writing Gun Flame-Backing- Electrode Writing Gun Flame-Grid No.4 of
of Writing Gún Pin 5-Same as Pin 1 Pin 6-Grid No.3 of Writing Gun Pin 7-Same as Pin 1 Pin 8-Heater of Writing Gun Pin 9-Heater of Writing Gun Pin 10-Grid No.1 of Pin 12-Same as Pin 1 Pin 23-Cathode of Viewing Gun Pin 14-Deflecting Pin 15-Grid No.2 of Writing Gun Pin 15-Grid No.4 of Writing Gun, Grid No.2 of Witing Gun Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.2 of Witing Gun, Grid No.2 of Witing Gun Pin 25-Same as Pin 1 Pin 26-Same as Pin 1 Pin 28-Same as Pin 1 Pin 28-Cathode of Viewing Gun Pin 34-Same as Pin 1 Pin 35-Heater of Viewing Gun Flexible Cable - Com- nection To Screen Writing Gun, Grid No.2 of Witing Gun Flange-Backing- Electrode Writing Gun Flange-Backing- Electrode Writing Gun Flange-Grid No.4 of
Pin 5-Same as Pin 1 Pin 6-Grid No.3 of Writing Gun Pin 8-Heater of Writing Gun Pin 9-Heater of Writing Gun Pin 10-Grid No.1 of Pin 12-Same as Pin 1 Pin 13-Deflecting Electrode DJ of Writing Gun Pin 15-Grid No.2 of Writing Gun, Pin 17-Grid No.4 of Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.2 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.2 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.2 of Writing Gun Pin 17-Grid No.2 of Writing Gun Pin 17-Grid No.2 of Writing Gun Pin 17-Grid No.2 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.2 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 17-Grid No.4 of Writing Gun Pin 27-Cathode of Writing Gun Pin 28-Same as Pin 1 Pin 29-Same as Pin 1 Pin 32-Cathode of Viewing Gun Pin 34-Same as Pin 1 Pin 35-Heater of Viewing Gun Flexible Cable-Con- nection to Screen Not Use Pin 17-Grid No.4 of Writing Gun Flexe-Backing- Electrode
Pin6 - Grid No.3 of Writing GunPin7 - Same as Pin 1Pin7 - Same as Pin 1Pin 22 - Heater of Viewing GunPin 22 - Heater of Viewing GunPin9 - Heater of Writing GunPin 25 - Same as Pin 1Pin 10 - Grid No.1 of Writing GunPin 26 - Same as Pin 1Pin 11 - Same as Pin 1 Pin 12 - Same as Pin 1Pin 28 - Same as Pin 1Pin 12 - Same as Pin 1 Pin 13 - Deflecting Electrode DJ of Writing GunPin 32 - Grid No.1 of Viewing GunPin 14 - Deflecting Writing GunPin 33 - Cathode of Viewing GunPin 15 - Grid No.2 of Writing GunPin 34 - Same as Pin 1 Viewing GunPin 16 - Internal Con- nection Do Not UseFlange - Backing- ElectrodePin 17 - Grid No.4 of Writing GunFlaxerer Tube FaceGrid No.4 of
Writing GunWriting GunPin 7 - Same as Pin 1Pin 8 - Heater of Writing GunPin 22 - Heater of Viewing GunPin 9 - Heater of Writing GunPin 25 - Same as Pin 1Pin 10 - Grid No.1 of Writing GunPin 26 - Same as Pin 1Pin 12 - Same as Pin 1Pin 27 - Cathode of Writing GunPin 12 - Same as Pin 1Pin 29 - Same as Pin 1Pin 13 - Deflecting Electrode DJ1 of Writing GunPin 32 - Grid No.1 of Viewing GunPin 14 - Deflecting Writing GunPin 33 - Cathode of Viewing GunPin 15 - Grid No.2 of Writing GunPin 34 - Same as Pin 1Pin 16 - Internal Con- nection Do Not UseFlange - Backing- ElectrodePin 17 - Grid No.4 of Writing GunFlange - Backing- ElectrodePin 17 - Grid No.2 of Writing GunFlange - Grid No.4 ofPin 17 - Grid No.2 of Writing GunFlange - Backing- ElectrodePin 17 - Grid No.2 of Writing GunFlange - Grid No.4 of
Pin B - Heater of Writing GunPin 22 - Heater of Viewing GunPin Pin 9 - Heater of Writing GunPin 25 - Same as Pin 1 Pin 26 - Same as Pin 1 Pin 26 - Same as Pin 1Pin 10 - Grid No.1 of Writing GunPin 27 - Cathode of Writing Gun Pin 28 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 32 - Grid No.1 of Viewing Gun Of Writing Gun Pin 33 - Cathode of Viewing Gun Pin 35 - Heater of Writing Gun Writing Gun Pin 35 - Heater of Writing Gun Writing Gun Pin 16 - Internal Con- nection-Do Not UsePin 39 - Cathode of Viewing Gun Pin 35 - Heater of Viewing Gun Screen Rot UsePin 17 - Grid No.4 of Writing Gun Grid No.2 of Writing Gun Writing Gun Grid No.2 of Writing Gun Writing Gun Flange - Backing- Electrode Writing Gun Writing Gun Kareer-Grid No.4 of
Pin B - Heater of Writing GunPin 22 - Heater of Viewing GunPin Pin 9 - Heater of Writing GunPin 25 - Same as Pin 1 Pin 26 - Same as Pin 1 Pin 26 - Same as Pin 1Pin 10 - Grid No.1 of Writing GunPin 27 - Cathode of Writing Gun Pin 28 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 29 - Same as Pin 1 Pin 32 - Grid No.1 of Viewing Gun Of Writing Gun Pin 33 - Cathode of Viewing Gun Pin 35 - Heater of Writing Gun Writing Gun Pin 35 - Heater of Writing Gun Writing Gun Pin 16 - Internal Con- nection-Do Not UsePin 39 - Cathode of Viewing Gun Pin 35 - Heater of Viewing Gun Screen Rot UsePin 17 - Grid No.4 of Writing Gun Grid No.2 of Writing Gun Writing Gun Grid No.2 of Writing Gun Writing Gun Flange - Backing- Electrode Writing Gun Writing Gun Kareer-Grid No.4 of
Writing GunViewing GunPin 9-Heater ofPin 25-Same as Pin 1Writing GunPin 26-Same as Pin 1Pin 10-Grid No.1 ofPin 27-Cathode ofWriting GunPin 28-Same as Pin 1Pin 11-Same as Pin 1Pin 29-Same as Pin 1Pin 12-Same as Pin 1Pin 29-Same as Pin 1Pin 13-DeflectingPin 32-Grid No.1 ofUse Same as Pin 1Pin 33-Cathode ofViewing GunPin 34-Same as Pin 1Pin 14-DeflectingViewing GunPin 15-Grid No.2 ofPin 34-Same as Pin 1Viting GunPin 35-Heater ofViewing GunPin 25-ComPin 16-Internal Con- nection Do Not UseFlange-Backing-Pin 17-Grid No.4 ofElectrodeWriting GunFlange-Backing-Pin 17-Grid No.2 of Writing GunFlange-Backing-Pin 17-Grid No.4 of Viewing GunFaceGrid No.4 of
Writing GunPin 26 - Same as Pin 1Pin 10 - Grid No.1 ofPin 27 - Cathode ofWriting GunWriting GunPin 11 - Same as Pin 1Pin 28 - Same as Pin 1Pin 12 - Same as Pin 1Pin 29 - Same as Pin 1Pin 13 - DeflectingPin 32 - Grid No.1 ofClectrode DJ1Viewing Gunof Writing GunPin 33 - Cathode ofViewing GunPin 33 - Cathode ofPin 14 - DeflectingViewing Gunof Writing GunPin 35 - Heater ofVinting GunPin 35 - Heater ofViewing GunFlexible Cable - Con-Pin 16 - Internal Con-Nettion toNot UseFlange - Backing-Pin 17 - Grid No.4 ofElectrodeWriting Gun,Recessed Cavity Cap -Grid No.2 ofViewing GunViewing GunFlange - Backing-Pin 17 - Grid No.4 ofViewing GunWriting Gun,Recessed Cavity Cap -Viewing GunFaceGrid No.4 of
Writing GunPin 26 - Same as Pin 1Pin 10 - Grid No.1 ofPin 27 - Cathode ofWriting GunWriting GunPin 11 - Same as Pin 1Pin 28 - Same as Pin 1Pin 12 - Same as Pin 1Pin 29 - Same as Pin 1Pin 13 - DeflectingPin 32 - Grid No.1 ofClectrode DJ1Viewing Gunof Writing GunPin 33 - Cathode ofViewing GunPin 33 - Cathode ofPin 14 - DeflectingViewing Gunof Writing GunPin 35 - Heater ofVinting GunPin 35 - Heater ofViewing GunFlexible Cable - Con-Pin 16 - Internal Con-Nettion toNot UseFlange - Backing-Pin 17 - Grid No.4 ofElectrodeWriting Gun,Recessed Cavity Cap -Grid No.2 ofViewing GunViewing GunFlange - Backing-Pin 17 - Grid No.4 ofViewing GunWriting Gun,Recessed Cavity Cap -Viewing GunFaceGrid No.4 of
Pin 10 - Grid No.1 of Writing GunPin 27 - Cathode of Writing GunPin 11 - Same as Pin 1Pin 28 - Same as Pin 1Pin 12 - Same as Pin 1Pin 29 - Same as Pin 1Pin 13 - Deflecting of Writing GunPin 32 - Grid No.1 of Viewing GunPin 14 - Deflecting of Writing GunPin 33 - Cathode of Viewing GunPin 15 - Grid No.2 of Writing GunPin 34 - Same as Pin 1Pin 16 - Internal Con- nection-Do Not UsePin 27 - Cathode of Viewing GunPin 17 - Grid No.4 of Grid No.2 ofPin 34 - Same as Pin 1Pin 17 - Grid No.4 of Writing Gun, Grid No.2 ofPin 36 - Hater of Viewing GunPin 17 - Grid No.4 of Viewing GunPin 27 - Grid No.4 of Writing Gun, FaceGrid No.4 of
Writing GunWriting GunPin 11 - Same as Pin 1Pin 28 - Same as Pin 1Pin 12 - Same as Pin 1Pin 29 - Same as Pin 1Pin 13 - DeflectingPin 32 - Grid No.1 ofof Writing GunPin 33 - Cathode ofPin 14 - DeflectingPin 33 - Cathode ofPin 15 - Grid No.2 ofPin 34 - Same as Pin 1Writing GunPin 35 - Heater ofWriting GunPin 35 - Heater ofWriting GunPin 36 - Same as Pin 1Of Writing GunPin 36 - Mathematical Con-Writing GunFlexible Cable - Con-Not UseFlange - Backing-Pin 17 - Grid No.4 ofElectrodeWriting Gun,Recessed Cavity Cap -Grid No.2 ofJearer TubeViewing GunFaceGrid No.4 of
Pin 11 - Same as Pin 1Pin 28 - Same as Pin 1Pin 12 - Same as Pin 1Pin 29 - Same as Pin 1Pin 13 - DeflectingPin 32 - Grid No.1 of Viewing Gunof Writing GunPin 33 - Cathode of Viewing GunPin 14 - DeflectingPin 33 - Cathode of Viewing Gunof Writing GunPin 34 - Same as Pin 1of Writing GunPin 35 - Heater of Viewing GunPin 15 - Grid No.2 of Writing GunPin 35 - Heater of Viewing GunPin 16 - Internal Con- nection-Do Not UseFlexible Cable - Con- nection to ScreenPin 17 - Grid No.4 of Grid No.2 of Writing Gun, Grid No.2 of Wiewing GunFlexerer Tube FaceGrid No.4 of
Pin 12 - Same as Pin 1Pin 29 - Same as Pin 1Pin 13 - DeflectingPin 32 - Grid No.1 ofElectrode DU1Viewing Gunof Writing GunPin 33 - Cathode ofPin 14 - DeflectingPin 33 - Cathode ofOf Writing GunPin 34 - Same as Pin 1of Writing GunPin 35 - Heater ofViewing GunPin 35 - Heater ofVirting GunPin 35 - Heater ofViewing GunPin 35 - Heater ofViewing GunPin 35 - Heater ofViewing GunFlexible Cable - Connection toScreenScreenNot UseFlange - Backing-Pin 17 - Grid No.4 ofElectrodeWriting Gun,Recessed Cavity Cap -Grid No.2 ofViewing GunFaceGrid No.4 ofFaceGrid No.4 of
Pin 13 - Deflecting Electrode DJ1 of Writing GunPin 32 - Grid No.1 of Viewing GunPin 14 - Deflecting Electrode DJ2 of Writing GunPin 33 - Cathode of Viewing GunPin 14 - Deflecting Electrode DJ2 of Writing GunPin 34 - Same as Pin 1 Pin 35 - Heater of Viewing GunPin 15 - Grid No.2 of Writing GunPin 35 - Heater of Viewing GunPin 16 - Internal Con- nection-Do Not UseFlexible Cable - Con- nection to ScreenPin 17 - Grid No.4 of Grid No.2 of Witting GunFlange - Backing- Electrode Wearer TubePin 17 - Grid No.4 of Viewing GunFaceGrid No.4 of
Electrode DJ1 of Writing Gún Pin 14 - Deflecting Electrode DJ2 of Writing Gún Pin 15 - Grid No.2 of Not Use Pin 16 - Internal Con- nection-Do Not Use Flange - Backing- Grid No.2 of Writing Gun, Recessed Cavity Cap - Grid No.2 of Writing Gun Recessed Cavity Cap - Grid No.2 of Writing Gun Recessed Cavity Cap - Grid No.2 of Writing Gun FaceGrid No.4 of
of Writing Gun Pin 14 - Deflecting Electrode DJ ₂ of Writing Gun Writing Gun Writing Gun Writing Gun Writing Gun Writing Gun Flexible Cable - Con- nection-Do Not Use Pin 17 - Grid No.4 of Writing Gun, Grid No.2 of Writing Gun Recessed Cavity Cap Viewing Gun Flexible Cable - Con- nection to Screen Not Use Writing Gun, Grid No.2 of Viewing Gun Flexible Cable - Con- nection to Screen Pin 17 - Grid No.4 of Viewing Gun Flexible Cable - Con- Not Use Flexible Cable - Con- Not Os Con- Not Use Flexible Cable - Con- Not Os Con- Con- Not Os Con- Not Os Con-
Pin 14 - Deflecting Viewing Gun Electrode DJ2 Pin 34 - Same as Pin 1 of Writing Gun Pin 35 - Heater of Viewing Gun Viewing Gun Writing Gun Flexible Cable - Con- Pin 16 - Internal Con- nection to Not Use Flange - Backing- Pin 17 - Grid No.4 of Electrode Writing Gun, Recessed Cavity Cap - Grid No.2 of Viewing Gun Viewing Gun, FaceGrid No.4 of
Electrode DJ ₂ of Writing Gun Writing Gun Writing Gun Writing Gun Not Use Pin 15-Grid No.4 of Not Use Writing Gun, Not Use Writing Gun, Bin 17-Grid No.4 of Writing Gun, Grid No.2 of Writing Gun Bin 17-Grid No.4 of Writing Gun Grid No.2 of Writing Gun Grid No.2 of Writing Gun Bin 34-Same as Pin 1 Pin 35-Heater of Viewing Gun Bin 35-Heater of Screen Electrode Bin 35-Heater of Screen Bin 35
of Writing Gün Pin 35-Heater of Pin 15-Grid No.2 of Viewing Gun Writing Gun Flexible Cable - Con- nection-Do Screen Not Use Flange - Backing- Electrode Writing Gun, Recessed Cavity Cap - Grid No.2 of Viewing Gun Viewing Gun FaceGrid No.4 of
Pin 15 - Grid No.2 of Viewing Gun Writing Gun Flexible Cable - Con- Pin 16 - Internal Con- nection to Not Use Flange - Backing- Pin 17 - Grid No.4 of Electrode Writing Gun, Recessed Cavity Cap - Grid No.2 of Viewing FaceGrid No.4 of
Writing Gun Flexible Cable - Con- nection to Pin 16 - Internal Con- nection-Do Screen Not Use Flange - Backing- Electrode Writing Gun, Grid No.2 of Recessed Cavity Cap - Viewing Gun Viewing Gun FaceGrid No.4 of
Pin 16 - Internal Con- nection-Do nection to Not Use Flange - Backing- Electrode Writing Gun, Recessed Cavity Cap - Grid No.2 of Viewing Gun FaceGrid No.4 of
nection-Do Screen Not Use Flange-Backing- Electrode Writing Gun, Recessed Cavity Cap - Grid No.2 of Vearer Tube Viewing Gun FaceGrid No.4 of
Not Use Plange – Backing- Pin 17 – Grid No.4 of Electrode Writing Gun, Recessed Cavity Cap – Grid No.2 of Vearer Tube Viewing Gun Face – Grid No.4 of
Pin 17-Grid No.4 of Writing Gun, Grid No.2 of Viewing Gun FaceGrid No.4 of Electrode Electrode Recessed Cavity Cap- Verer Tube
Writing Gun, Recessed Cavity Cap - Grid No.2 of <i>Wearer Tube</i> Viewing Gun <i>Face</i> Grid No.4 of
Grid No.2 of Viewing Gun <i>Face</i> Grid No.4 of
Viewing Gun FaceGrid No.4 of
Pin 19-Same as Pin 1. Nearer Electron
Pin 20 - Same as Pin 16 GunsGrid No.3 of
Pin 21 - Same as Pin 1 Viewing Gun
Aaximum Ratings, Absolute Volues:
Writing Section, Viewing Section**
SCREEN VOLTAGE
EAK BACKING-ELECTRODE
VOLTAGE 20 max voits
Pins 23 and 31 are not shown because they are trimmed to the same dimension as the short index pin and are not to be used.
enteneration de ence entre intres prin ano are nos su pe sobes
**: See next page.
0-56 TENTATIVE DATA 1
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



DISPLAY STORAGE TUBE

6

1

C

G

GRID-No.4 VOLTAGE		ng Section V	lewing Secti	00.88
GRID-No. 4 VOLTAGE	Equiva	lent Values		
	. 2900 max.*	150 max.#	* 300 max.	volt
GRID-No.3 VOLTAGE	. 1000 max.*		300 max.	volt
GRID-No.2 VOLTAGE	. 2750 max."	-	150 max.	volt
CATHODE VOLTAGE GRID-No. I VOLTAGE:	• -	-2900 max.**	• -	volt
Negative bias value .		00 max.*	100 max.	volt
Positive bias value .	-	0 max.*	O max.	volt
Positive peak value .		2 max.*	O max.	volt
PEAK VOLTAGE BETWEEN GRID No.4 ANO ANY		∑ Illi2A¢	U mers.	Vort
DEFLECTING ELECTRODE.		oo mex.	-	volt
PEAK HEATER-CATHODE VOLTAGE:	• • •			
Heater negative with				
respect to cathode.	• b	25 max.*	125 max.	volt
Heater positive with				
respect to cathode.	• 1	25 max.*	125 max.	volt
	VIEWING	SECTION**		
Operating Values and	d Typical P	erformance Ch	aracterist	ics:
Screen Voltage	5000	10000	10000	volt
DC Backing-Electrode				
Voltage	5	5	5	volt
Grid-No.4 Voltage	150	210	150	volt
Grid-No.3 Voltage	25 to 1	25 50 to 150	25 to 12	5 volt
Grid-No.2 Voltage *			50 to 75	volt
Grid-No. Voltage*		50 0 to -75	0 to -5	
Maximum Screen Current. Maximum Peak Backing-	• • 350	600	350	µem
Electrode Current	1.5	2	1.5	m
Maximum Grid-No.4 Curre		_	2	m
		_	1.5	
			3	ED
Maximum Grid-No.3 Curre	3			
Maximum Grid-No.3 Curre Maximum Cathode Current			-	
Maximum Grid—No.3 Curren Maximum Cathode Current Writing SpeedTT	300000	300000	300000 5	
Maximum Grid-No.3 Curren Maximum Cathode Current Writing SpeedII Number of Half-Tone Step Viewing Duration	300000	300000	300000	in./se
Maximum Grid-No.3 Curren Maximum Cathode Current Writing Speedli Number of Half-Tone Step Viewing Duration Maximum Frasing-Uniform	- 300000 - 5	300000 5	30000 0 5	in./se
Maximum Grid-No.3 Curren Maximum Cathode Current Writing Speedli Number of Half-Tone Step Viewing Duration Maximum Frasing-Uniform	- 300000 - 5	300000 5	30000 0 5	in./se
Maximum Grid-No.3 Curren Maximum Cathode Current Writing SpeedII Number of Half-Tone Step Viewing Duration	50.0000 50.5 	300000 5 20	300000 5 40 0.5	in./se se



DISPLAY STORAGE TUBE

WRITING SECTION®

Rance Values for Equipment Design:*

6866

With any grid-No.2 voltage (Ec.) between 500 and 2750 volts

Grid-No.4 Voltage (Ec.) 95% to 105% of Ec.	volts
Grid-No.3 Voltage for Focus 14% to 28% of Ec.	volts
Maximum Grid-No. I Voitage	
for Cutoff of Undeflected	
Focused Spot	volts
Maximum Grid-No.3 Current15 to +10	µamp
Maximum Cathode Current See Curve	
Deflection Factors:	
DJ1 and DJ2 28 to 38 v dc/1n	./kv of Ec.
DJ3 and DJ4	. /ky of Ec.

Focused Beam Position

Examples of Use of Design Ranges:*

With grid-No.2 voltage of	1500	2500	volts
Grid-No.4 Voltage (Ec.)	1425 to 1575	2375 to 2625	volts
Grid-No.3 Voltage for Focus	210 to 420	350 to 700	volts
Maximum Grid-No.i Voitage			
for Cutoff of Undeflected			
Focused Spot	-69	-11時	volta
Deflection Factors			
when $E_{C_4} = E_{C_2}$:		100000000000000000000000000000000000000	
DJ1 and DJ2	42 to 57	70 to 95	v dc/in.
DJ3 and DJ4	42 to 57	70 to 95	v dc/in.

Equivalent Values for Examples of Writing-Gun Voltages Referred to Cathode of Viewing Gun:

Cathode Voltage	-1450 to -1395 -2450 to -2395 volts
Grid-No.2 Voltage	-25 to +180 -75 to +230 volts
Grid-No.3 Voltage for Focus	-1240 to -975 -2100 to -1695 volts
Grid-No.4 Voltage	50 to 105 50 to 105 volts

VIEWING SECTION and WRITING SECTION

Circuit Values:

Grid-No.I-Circuit Resistance (Either gun) 1.0 max. megohm Resistance in Any Deflecting-Electrode Circuit . . . O. I max. meaohm Backing-Electrode-Circuit Resistance. 0.005 max. megohm Series Current-Limiting Resistance in Screen Circuit. 1.0 min. megohm

voltages are shown with respect to cathode of Writing Gun.

Voltages are shown with respect to cannot or writing during the source of writing the source of the

Observed with an RCA-2F21 Monoscope display.

A DD & See next page. 6-57

TENTATIVE DATA

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



DISPLAY STORAGE TUBE

- Expressed in terms of the time required for the brightness of the un-written background to rise from just zero brightness (viewing-beam cutoff) to 105 of the maximum brightness.
- Defined as $(t_2 t_1)/t_2$, where

6-57

- t1 = time measured from start of erasing to instant at which any screen area is reduced to zero brightness, t2 = time measured from start of erasing to instant at which en-tire screen area is reduced to zero brightness.
- Measured by shrinking-raster method at a display brightness of 50% of saturated brightness and with grids No.2 and No.4 of Writing Gun at +2500 voits with respect to cathode of Writing Gun.
- Measured with entire storage grid written to produce maximum bright-ness and with screen at indicated voltage.
- The cathode of the writing Gun is operated at about -2500 volts with respect to the cathode of the viewing Gun which is usually operated at ground potential.
- The center of the undeflected focused beam will fall within a circle having a 10-mm radius concentric with the center of the face under the following conditions: grids No.2 and No.4 of writing Gun at +2500 volts with respect to cathode of writing Gun, grid No.3 of writing Gun at voltage to give focus, grid No.1 of writing Gun at voltage which will permit storage of a charge just sufficient to give a barely perceptible spot on screen, viewing Section operating under normal conditions, and tube shielded against extraneous fields.
- It is recommended that the deflecting-electrode-circuit resistances ba approximately equal.

OPERATING CONSIDERATIONS

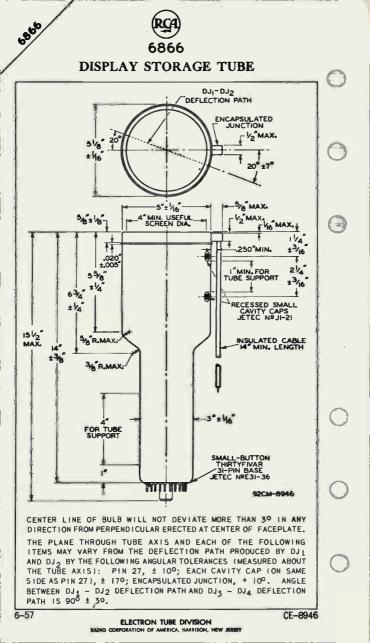
Magnetic shielding must be provided to prevent external fields from interfering with the required accurate control of the low-velocity viewing beam. A cylindrical shield of properly annealed high-permeability material about 1/16-inch thick is usually satisfactory. The screen cable should be placed outside the shield.

The metal flange at the face end of the tube requires the use of a spring-contact ring bearing against the edge of the flange.

To prevent possible damage to the tube, allow the viewinggun beam current to reach normal operating value before turning on the writing-gun beam current, and keep the viewing beam on until the writing beam is turned off.

> -Indicates a change. TENTATIVE DATA 3

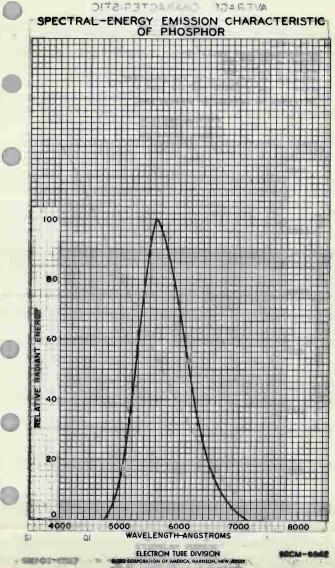
ELECTRON TUBE DIVISION ENDIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY







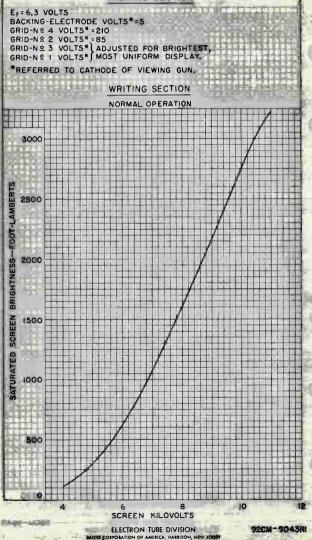
EBEE CE



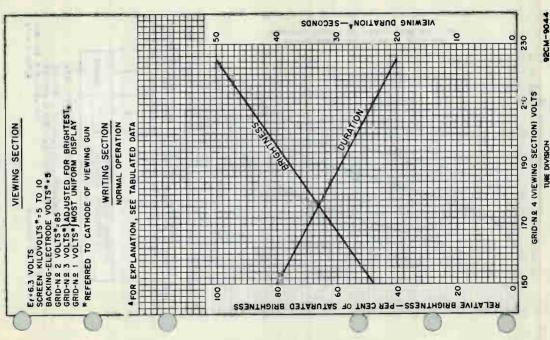


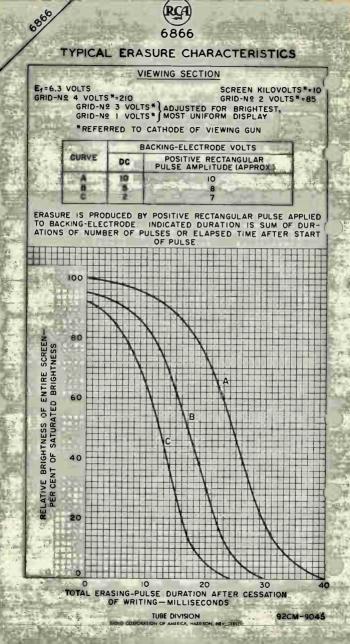
AVERAGE CHARACTERISTIC





AVERAGE CHARACTERISTICS







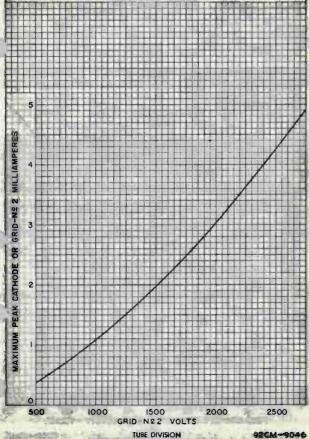
FOR WRITING GUN

WRITING SECTION

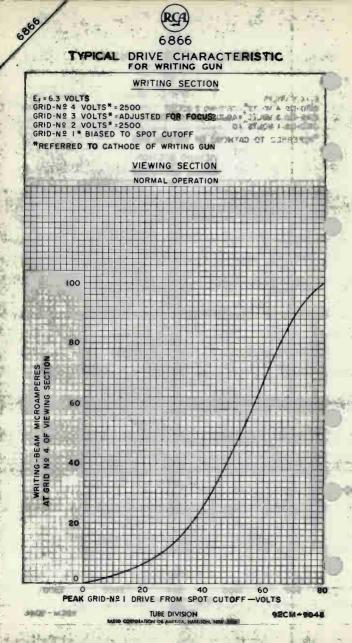
REFERRED TO CATHODE OF WRITING GUN OT GEALS 94 U-O

VIEWING SECTION

NORMAL OPERATION



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSES



Display-Storage Tube

Inch Diameter

High Display Uniformity

Improved Collimation System Design Typical Luminance of 1300 Footlamberts

For use in radar and other information-handling systems requiring bright non-flickering displays of stored information, including half-tones, for relatively long periods.

The 7183A is Directly Interchangeable with Type 7183.

GENERAL

eater, for Unipotential Cathode: Voltage (AC or DC) 6.3 ± 10% 6.3 ± 10% V Current at 6.3 volts 0.6 0.6 A Cathode Heating Time (Minimum)before other electrode voltages are applied - 60 # Direct Interelectrode Capacitances: Grid No.1 to all other - 60 # electrodes 7 - pF Cathode to all other - 100 pF electrodes - 100 pF Backplate to all other - - - electrodes - 100 pF Focusing Method - - - effection Method Magnetic - - Phosphor. - P20, - Minimum Useful Viewing Diameter - 4" - Maximum Overall Length - 11.62" - Maximum Diameter (Excluding Screen - 5.06" - Connector Assembly) - Small-Button Neoditetra 8-Pin (JEDEC No.E8-49)		Writing Section	Viewing Section	
Voltage (AC or DC) 6.3 ± 10% 6.3 ± 10% V Current at 6.3 volts 0.6 0.6 A Cathode Heating Time (Minimum)before other electrode 0.6 0.6 A Cathode Heating Time - 60 * Direct Interelectrode Capacitances: Grid No.1 to all other - 60 * Direct Interelectrode Capacitances: 7 - pF Cathode to all other - 100 pF electrodes - 100 pF Backplate to all other - 100 pF electrodes - 100 pF Focusing Method Electro- - static eflection Method Magnetic - P20, Phosphor - P20, Aluminized Minimum Useful Viewing Diameter 4" Maximum Seated Length 11.62" Maximum Diameter (Excluding Screen Connector Assembly) 5.06" Bases: Writing Gun Small-Button Neoditetras 8-Pin (JEDEC No.E8-49) Viewing Gun Small-Button Miniature 7-Pin				
Current at 6.3 volts 0.6 0.6 A Cathode Heating Time (Minimum)before other electrods voltages are applied 60 Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 7 - pF Cathode to all other electrodes 7 - pF Backplate to all other electrodes 7 - pF Backplate to all other electrodes 7 - pF Focusing Method Bagnetic Phosphor		0.0 + 100	0.0.4.100	
Cathode Heating Time (Minimum)before other electrods voltages are applied				V
(Minimum) before other electrods voltages are applied - 60 • Direct Interelectrode Capacitances: Grid No.1 to all other • 60 • Cathode to all other • 7 - pF Cathode to all other • 7 - pF Backplate to all other • 100 pF electrodes - 100 pF Focusing Method . Electro- - eflection Method Magnetic - P20, Minimum Useful Viewing Diameter . 4" Maximum Overall Length . 11.62" Maximum Diameter (Excluding Screen Connector Assembly) 5.06" Bases: Writing Gun Small-Button Neoditetrat 8-Pin (JEDEC No.E8-49) Viewing Gun Small-Button Miniature 7-Pin Used Con.E7-1) . . Recessed Small Cavity		0.0	0.6	A
voltages are applied 60 Direct Interelectrode Capacitances: Grid No.1 to all other electrodes				
Direct Interelectrode Capacitances: Grid No.1 to all other electrodes		ue	én	
Capacitances: Grid No.1 to all other electrodes		-	00	
Grid No.1 to all other electrodes				
electrodes	-			
Cathode to all other electrodes		7		-
electrodes 5 pF Backplate to all other electrodes 100 pF electrodes - 100 pF Focusing Method Electro- - static eflection Method Magnetic - P20, Aluminized Minimum Useful Viewing Diameter - P20, Maximum Overall Length - 11.62" Maximum Diameter (Excluding Screen Connector Assembly) 5.06" Bases: Writing Gun Small-Button Neoditetrar 8-Pin (JEDEC No.E8-49) Viewing Gun Small-Button Miniature 7-Pin (JEDEC No.E7-1) ub Terminals (Five) . Recessed Small Cavity			_	br.
Backplate to all other electrodes electrodes static Procusing Method eflection Method Maining Phosphor. Posphor. Posphor. Phosphor. Posphor. Posp		5		DF
electrodes - 100 pF Focusing Method Electro- static - - - eflection Method Magnetic -		-	-	8×
Focusing Method Electro-static eflection Method Magnetic Phosphor. P20, Aluminized Minimum Useful Viewing Diameter 4" Maximum Overall Length 11.62" Maximum Seated Length 11.25" aximum Diameter (Excluding Screen 5.06" Bases: Writing Gun 5.06" Bases: Writing Gun Small-Button Neoditetrar 8-Pin (JEDEC No.E8-49) Viewing Gun Small-Button Miniature 7-Pin (JEDEC No.E7-1) ub Terminals (Five) Recessed Small Cavity		_	100	pF
eflection Method Magnetic Phosphor	Focusing Method	Electro-	-	-
Phosphor. - P20, Aluminized Minimum Useful Viewing Diameter 4" Maximum Overall Length 11.62" Maximum Seated Length 11.25" aximum Diameter (Excluding Screen Connector Assembly) 5.06" Bases: Writing Gun 5.06" Writing Gun Small-Button Neoditetrar 8-Pin (JEDEC No.E8-49) Viewing Gun Small-Button Miniature 7-Pin (JEDEC No.E7-1) ulb Terminals (Five) Recessed Small Cavity		static		
Phosphor. - P20, Aluminized Minimum Useful Viewing Diameter 4" Maximum Overall Length 11.62" Maximum Seated Length 11.25" aximum Diameter (Excluding Screen Connector Assembly) 5.06" Bases: Writing Gun 5.06" Writing Gun Small-Button Neoditetrar 8-Pin (JEDEC No.E8-49) Viewing Gun Small-Button Miniature 7-Pin (JEDEC No.E7-1) ulb Terminals (Five) Recessed Small Cavity	Deflection Method	Magnetic		
Aluminized Minimum Useful Viewing Diameter 4" Maximum Overall Length 11.62" Maximum Diameter (Excluding Screen 11.25" Connector Assembly) 5.06" Bases: Writing Gun Writing Gun Small-Button Neoditetrar 8-Pin (JEDEC No.E8-49) Viewing Gun Small-Button Miniature 7-Pin (JEDEC No.E7-1) Culb Terminals (Five) Recessed Small Cavity			100	
Minimum Useful Viewing Diameter 4" Maximum Overall Length 11.62" Maximum Seated Length 11.25" aximum Diameter (Excluding Screen 11.25" Connector Assembly) 5.06" Bases: Writing Gun Writing Gun Small-Button Neoditetrar 8-Pin (JEDEC No.E8-49) Viewing Gun Small-Button Miniature 7-Pin (JEDEC No.E7-1) Culb Terminals (Five) Recessed Small Cavity		_		
Maximum Overall Length 11.62" Maximum Seated Length 11.25" aximum Diameter (Excluding Screen Connector Assembly) 5.06" Bases: Writing Gun Writing Gun Small-Button Neoditetrar 8-Pin (JEDEC No.E8-49) Viewing Gun Small-Button Miniature 7-Pin (JEDEC No.E7-1) Culb Terminals (Five) Recessed Small Cavity	Minimum Useful Viewing Diame	ter		Aft
Maximum Seated Length 11.25" aximum Diameter (Excluding Screen 5.06" Connector Assembly) 5.06" Bases: Writing Gun 5.06" Writing Gun Small-Button Neoditetrar 8-Pin (JEDEC No.E8-49) Viewing Gun Viewing Gun Small-Button Miniature 7-Pin (JEDEC No.E7-1) (JEDEC No.E7-1) culb Terminals (Five) Recessed Small Cavity	Maximum Overall Length			1 6211
aximum Diameter (Excluding Screen Connector Assembly)	Maximum Seated Length			1.25
Connector Assembly)	aximum Diameter (Excluding S	Screen		
Bases: Writing Gun Small-Button Neoditetrar 8-Pin (JEDEC No.E8-49) Viewing Gun Small-Button Miniature 7-Pin (JEDEC No.E7-1) (JEDEC No.E7-1) ulb Terminals (Five) Recessed Small Cavity				5.06"
(JEDEC No.E8-49) Viewing Gun Small-Button Miniature 7-Pin (JEDEC No.E7-1) ulb Terminals (Five) Recessed Small Cavity				
(JEDEC No.E8-49) Viewing Gun Small-Button Miniature 7-Pin (JEDEC No.E7-1) ulb Terminals (Five) Recessed Small Cavity	Writing Gun	Small-Buttor	Neoditetrar 8	-Pin
(JEDEC No.E7-1) Culb Terminals (Five) Recessed Small Cavity				
(JEDEC No.E7-1) Culb Terminals (Five) Recessed Small Cavity	Viewing Gun	Small-Butt	on Miniature 7	-Pin
			(JEDEC No.E	57-1)
	Bulb Terminals (Five)	Rece	essed Small Ca	avity

RBA Electronic Components

Screen Connector Assembly		Aircraft-M	arine
Screen Connector Assembly	Products	Inc., Type I	CH
	Dart No 8326	92 ^b , or equiv	alen
Operating Position	r art 110.0520	52, of equiv	Any
Uperating Position		1-3/-	4 lb
• • •			1 10
ABSOLUTE MAXIMUM AND MI	NIMUM RAT	INGS	
All voltages are shown w	ith respect to	the cathode	
of the viewing gun unless	otherwise sp	ecified	
	Minimum	Maximum	
Screen Voltage:			
Peak	. 0	10,000	V
DC		9,000	V
Backplate Voltage:		-,	
Peak	. 0	30	V
		10	V
Collector (Viewing-Grid-			
No.5) Voltage	. 180	300	v
Collimator (Viewing-Grid-			· · ·
No.4) Voltage	. 50	150	v
Viewing-Grid-No.3 Voltage,			
Writing-Grid-No.4 and			
Writing-Grid-No.2 Voltaged.	. 10	150	V
Viewing-Grid-No.2 Voltage		150	v
Viewing-Grid-No.1 Voltage		-100	V
Viewing-Gun Heater-to-	• •		
Cathode Voltage	-125	125	v
Writing-Grid-No.3 Voltage	-	1200	v
Writing-Grid-No.1 Voltage		(f)	V
Writing-Gun Cathode Voltage.		145	v
Writing-Gun Heater-to-			-
Cathode Voltage	-125	125	
Series Current-Limiting			
Resistor (Unbypassed) in			
Screen Circuit	. 1	-	MQ
Series Current-Limiting			
Resistor (Unbypassed) in			
Collector (Viewing-Grid-			
No.5) Circuit	. 0.005	-	MC
RECOMMENDED OPERATING			
		to the cathod	0
All voltages are shown with respect to the cathode of the viewing gun unless otherwise specified			
			v
Screen Voltage		. 0000	

Collector Voltage Collimator Voltage^h . 40 to 115 RBA Electronic Components

Backplate Voltage⁹

DATA 1

0

250

				_
Viewing-Grid-No.3 Voltage ^{d, h}		10 to	40	v
Viewing-Grid-No.2 Voltage Viewing-Grid-No.1 Voltage		10 00	100	v
Viewing-Grid-No.1 Voltageh		-40 t	0.0	v
Writing-Grid-No.3 Voltage	-192	5 to -16	375	v
Writing-Grid-No.1 Voltage		(f		v
Writing-Gun Cathode Voltage		-25	500	v
Circuit Values:				
Grid-No.1 circuit resistance				
(Either gun)		1 m	ax.	MQ
Backplate-circuit resistance	0	.005 m	ax.	MQ
Series current-limiting				
resistor (Unbypassed) in				
screen circuit		1		MΩ
Series current-limiting				
resistor (Unbypassed) in				
collector (Viewing-grid-No.5)				
circuit		0.01		MQ
PERFORMANCE DATA AND CHARA	CTER	STICS		
	Min.	Typ.	Max.	
		Typ.	Max.	
Useful Viewing Diameter	4.0	-	-	in
Luminance (Brightness) ^m	-	1300	-	fL
Viewing Duration ⁿ	10	-	1	8
Erase Time ^p	-	35	200	ms
Erasing Uniformity Factor:			10.00	
For 4"-diameter area ⁹	-	-	0.35	
Resolution ^r	50	-	- li	ines/
Undeflected Spot Position	-		(=)	in
Screen Current ^m	-	300	750	цА
Viewing-Gun Grid-No.5				
Current [†]		1.0	2.4	mA
Maximum Viewing-Gun				
Cathode Current ^u	-	2.5	4	mA
Maximum Writing-Gun				
Cathode Current ^V	-	2.5	5.0	mA
a Airgroft Moning Droducts Inc. Co.			-	
^a Aircraft-Marine Products, Inc., Cap) St., Elizabethtown, Pa.	uron D	ivision	, 155	Park
^b This part mates with Aircraft-Mari	no D	duate	Tere	Det
No.AMP833589, ceramic terminal, or	ne rro	alont	inc.,	ran
in the cooled, cerame terminal, of	equiv	arent.		

d Grids No.4 and No.2 of Writing Gun and grid No.3 of Viewing Gun are connected within the tube.

Voltages are shown with respect to cathode of Writing Gun.

The writing-gun grid No.1 should never be more positive than necessary to write the display to saturated brightness

RBA Electronic Components

for a given scanning and drive condition. In no case should the writing-gun grid-No.1 voltage have a value greater than zero with respect to the writing-gun cathode.

- 9 Dynamic erasure and bright-ring elimination circuitry are recommended. Dynamic erasure is accomplished by a series of rectangular pulses. The backplate should be maintained at zero volts between erase pulses. Bright-ring elimination is accomplished by connecting an 0.1 µF, 200 VDC capacitor between the backplate electrode and the collimator electrode.
- h Adjusted for brightest, most uniform, full-size pattern.
- I Adjusted for the smallest, most circular spot.
- The maximum bias-voltage value for writing-beam cutoff is -130 volts with respect to writing-gun cathode.
- ^m Luminance (Brightness) and screen current are measured after the entire display is written to saturated brightness, the writing gun has been turned off, and with no erasing pulse applied.
- The time required for any 1.5-inch diameter area of the useful 4-inch diameter viewing area to spontaneously rise (with no writing or erasing) from zero brightness (viewing-beam cutoff) to 10% of saturated brightness.

P With the display at saturated brightness, a series of rectangular pulses 5 milliseconds in width and at a repetition frequency of 2 pps is applied to the backplate. The number of pulses required to just erase completely the center of the display is noted. This number is multiplied by 5 milliseconds to obtain the erase time. The amplitude of the erase pulses is adjusted to obtain the minimum erase time.

⁹ Determined as follows: With no erasing pulse, overscan the storage surface with writing beam to obtain maximum pattern brightness. Then cut off writing beam and adjust erasing pulse to obtain complete erasure in approximately 10 seconds. Measure time (t_1) from start of erasing to the instant at which any area within the 4" diameter is reduced to background-brightness level, and time (t_2) from start of erasing to the instant at which the shift area within the 4" diameter area is reduced to background-brightness level. The erasing-uniformity factor is defined as $(t_2-t_1)/t_2$.

Measured by shrinking-raster method at a display brightness of 50% of saturated brightness and with grids No.2 and No. of Writing Gun at about +2500 volts with respect to cathode of Writing Gun.

RBA Electronic Components

- ⁵ The undeflected spot position must fall within a circle having a 5/16-inch radius (maximum), 1-3/4-inches from the geometric center of the tube face, on the radius passing through the center of the neck of the writing gun.
- [†] With writing gun turned off, with no erasing pulse applied, and display erased to cutoff.
- ^v Measured with viewing-gun grid No.1 at zero volts and with all other electrodes at voltages shown under *Recommended* Operating Values.
- * Measured with writing-gun grid No.1 at zero volts while writing an overscanned TV-type raster.

ENVIRONMENTAL TESTS

The 7183A is designed to withstand the following environmental tests:

Vibration parallel to each of the three orthogonal axes shown in Fig.1, and as specified in the schedule below:

Axis of Vibration	Double Amplitude inches	Frequency in Hz	Cycle Duration minutes
x	0.08	30	30
Y	0.08	30	30
Z	0.08	30	30

High and Low Temperature Storage for at least 24 hours at a temperature of $+100^{\circ}$ C and for at least 24 hours at a temperature of -65° C.

Temperature and Low Pressure (Altitude) in three concurrent phases as specified below:

Phase 1. Storage for one hour at a temperature of -40° C followed by tube operation for five minutes under the conditions shown under *Recommended Operating Values*.

Phase 2. Temperature is increased from -40° C at a rate of 2° C per minute until a temperature of $+86^{\circ}$ C is reached. Following one hour storage at $+86^{\circ}$ C, the tube is operated for five minutes under the conditions shown under *Recommended Operating Values*.

Phase 3. Barometric pressure is next reduced until a pressure equivalent to an altitude of 20,000 feet is attained. The tube is then operated for five minutes under the conditions shown under *Recommended Operating Values*. Upon completion of the third phase of this test, pressure is increased and temperature decreased, at a rate of 2° C per minute, until ambient pressure-temperature conditions are reached.

PRECAUTIONS

The following operating precautions must be followed to protect the 7183A from inadvertent damage -

- 1. Do not exceed maximum ratings.
- 2. Be sure to include the screen resistor.
- 3. Be sure to include the collector resistor.
- 4. Do not apply excessive writing-beam current density.
- 5. Protect against scanning failure.
- 6. Protect against loss of bias.
- 7. Apply voltages to tube in correct order.
- 8. Never write unless viewing beam is on.
- 9. Stay within recommended viewing-grid voltage ranges.

SCHEMATIC DIAGRAM

Showing Orthogonol Axes of 7183A Used during Environmental Tests

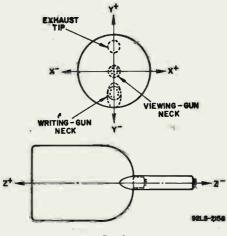
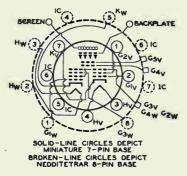


Fig.1

RBA Electronic Components DATA 4 5-68

TERMINAL DIAGRAM (Bottom View)



VIEWING SECTION

Smoll-Button Miniature 7-Pin Base

Pin 1: Grid No.2 Pin 2: Grid No.1 Pin 3: Heater Pin 4: Heater Pin 5: Internal Connection-Do Not Use Pin 6: Internal Connection-Do Not Use Pin 7: Cathode Flexible Lead (Large): Screen Flexible Lead (Small): Backplate **Recessed Cavity Caps:** Collector (Grid No.5) -Located 1.25" from tube face; 15⁰ from center line through writing and viewing gun necks away from screen connector. Collimator (Grid No.4) located 3" from tube face; 15° from center line through writing and viewing gun necks away from screen connector. Located near viewing gun-Grid No.3 and Grids No.4 & No.2 of writing gun.

WRITING SECTION

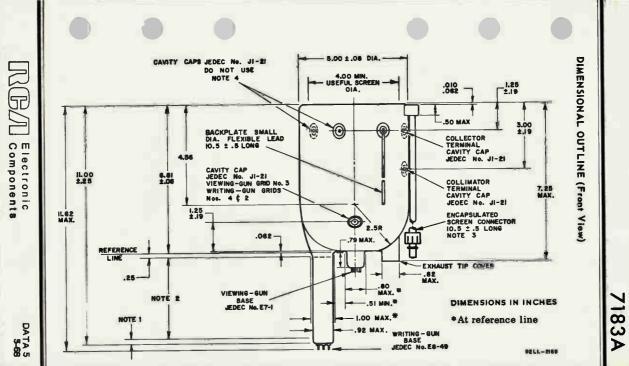
Small-Button Neoditetrar 8-Pin Base

Pin 1: Grid No.1 Pin 2: Heater Pin 3: Heater Pin 4: Internal Connection – Do Not Use Pin 5: Cathode Pin 6: Internal Connection Do Not Use Pin 7: Internal Connection Do Not Use Pin 8: Grid No.3

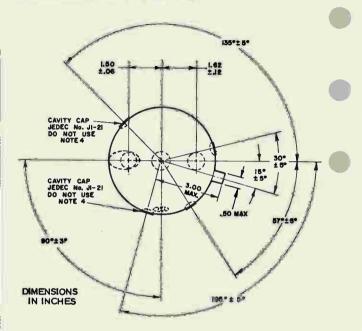
Note : Grids No.4 & No.2 are connected internally to Grid No.3 of viewing gun

RBA Electronic Components

DATA 4



DIMENSIONAL QUTLINE (Top View)



NOTES FOR DIMENSIONAL OUTLINE

Note 1: Within this distance, neck diameter is .920" max.

Note 2: Within this distance, neck diameter is .950" max.

Note 3: Aircraft-Marine Products, Inc., type LGH Part No. 832692, or equivalent. This part mates with Aircraft-Marine Products, Inc., Part No.AMP833589, ceramic terminal, or equivalent.

Note 4: Do not use these cavity caps for connection. The caps are connected internally and may be at a potential which could constitute a shock hazard. It is recommended that these caps be covered with electrical insulation.

RBA Electronic Components

DATA 5

Display-Storage Tube

FACTORY-COLLIMATED "RUGGEDIZED" TYPE 5-INCH DIAMETER TWO WRITING GUNS 4-INCH-DIAMETER DISPLAY ONE VIEWING GUN INTEGRAL MAGNETIC SHIELD

For Use in Military and Commercial Information Handling Displays Where Rough Tube Usage May Be Encountered. The 7268B is Unilaterally Interchangeable with Types 7268 and 7268A.

ELECTRICAL

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A
8

Writing Section-Bach Gun

Focusing Method	lectrostatic
Grid No.1 to all other electrodes	15 max pF
Cathode to all other electrodes	8 max pF
Deflecting electrode DJ1 to deflecting	
electrode DJ2	3 max pF
Deflecting electrode DJ3 to deflecting	
electrode DJ4	2 max pF
DJ1 to all other electrodes	10 max pF
DJ2 to all other electrodes	10 max pF
DJ3 to all other electrodes	10 max pF
DJ4 to all other electrodes	10 max pF
V: : 0 ···	

Viewing Section

Direct Interelectrode Capacitance

Backplate	to	all	other	electrodes						110	Max	pF
-----------	----	-----	-------	------------	--	--	--	--	--	-----	-----	----

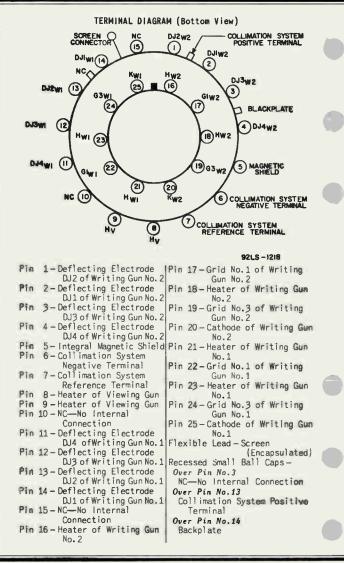
OPTICAL

MECHANICAL

Operating Position								×.						Any	
Minimum Useful Viewing Diameter									-				.4	in	
Maximum Overall Length													16	in	
Maximum Diameter		•							•			5	28	in	
Excluding screen lead															
Screen-Connector Assembly			•	Ş	86	D	ime	ens	ii	on	al	0	ut l	ine	
Weight	•					•	•				1	5-1	1/4	16	
Bulb Terminals		-													
Caps (Three)															
Base								JEC)E(0	No	. B/	25-2	216	

RÇA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA I 4-66



DATA I

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



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cr	een Volt	age										
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	egative-								•	-100	-50	
	wing-Gun							• •	•	-125	125	
	netic Sh							• •	•	-200	200	
	lecting-	Electr	ode v	olta	ge.	• •	• •	• •	•	-600	600	1
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	ach gun	licald	-LO-	vali	oue	TOTL	aye		•	-149	140	
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DATA 2 4-66

CHARACTERISTICS

						Min	Тур	Naz	
Useful Viewing Diameter .						4	-	-	in
Brightness (Luminance)] .						-	2500	-	fL
Viewing Duration ^k						15	-	-	8
Erase Time ^m						-	28	-	85
Resolution ⁿ						70	-	-	lines/in
Undeflected Spot Position						-	-	(p)	China .
Deflection Factors									
DJ1 & DJ2						82	-	100	V/in
DJ3 & DJ4	•	•	•	•	•	82	-	100	¥∕in

The collimation system includes a passive internal network which provides the proper voltages for all viewing gun electrodes; except arcena, backplate aud heater; as well as grids No.2 and 4 of the writing gum.

^D Voltages are shown with respect to cathode of writing gun.

^C The writing-gun grid No.1 should never be more positive than necessary to write the diaplay to asturated brightness for a given scanning and drive condition. In no case should the writing-gun grid No.1 voltage have a value greater than zero with respect to the writing-gun cathode.

The backplate should be maintained at 2 volts between erasing pulses when dynamic erasure is employed.

Adjusted for the smallest, most circular spot.

[†] The bias-voltage value for writing-beam cutoff is between -60 and -100 volta with respect to writing-gun cathode.

With respect to the reference terminal of the collimation system for each pair of deflecting electrodes.

h Recommended value for minimum distortion because of viewing-beam collection by the deflecting plates. Where strict display accuracy and display uniformity are not required, the impedance value for any deflecting-electrode circuit may be as high as 0.1 megohm maximum. For optimum performance, it is recommended that the deflecting-electrodei circuit impedances be approximately equal.

J Brightness (Luminance) is measured after the entire display is written to asturated brightness, the writing gun has been turned off, and with no erasing pulse spplied.

^k The time required for any 0.5-inch-diameter area of the 4-inch-diameter viewing area to rise apontaneously (with no writing or erasing) from sero brightness (viewing-beam visual cutoff) to 10% of saturated brightness.

With the display at saturated brightness, a series of rectangular pulses 5 milliseconds in width and at a repetition frequency of 2 p/s is applied to the backplate. The number of pulses required to just erase complately the center of the display is moted. This number is multiplied by 5milliseconds to obtain the minimum erase time.

Measured by the "shrinking" raster method under conditions of continuous writing and erasing, with erase pulses of 60 microseconds with and a repetition frequency of 300 p/s. The amplitude of the erase pulses is adjusted to provide 3.5-second erasure and grid No.1 is adjusted to provide 1000 footlamberts brightness of the just "shrunken" raster.

^p The undeflected spot position must fall within a square having a 15 millimeter side (maximum) centered on the tube face and parallel to a trace produced by one act of deflecting plates.

DATA 2

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Performance Data

Writing Ability and Writing Uniformity Characteristics are measured singly for both guna. A 3.5" x 3.5" raster is centered on the tube face. Vertical scanning is accomplished by an interrupted linear sawtooth waveform having a scan time of 625 microseconds and a prf of 500 p/s. Horizontal scanning is provided by a triangular waveform having a scan rate of 3.5 inches per second.

Writing Ability. The writing-gun grid No.l of the gun under test is driven above cutoff during the vertical acan time by white noise, of approximately 5 megacycle bandwidth, having a zero-to-peak amplitude of approximately 35 volts. The display brightness under these conditions shall be at least 20% of aaturated brightness.

Writing Uniformity. This characteristic is determined under the same conditions as specified above except that the rms amplitude of the white noise is adjusted to produce brightness of 40% of saturated brightness at the dimmest area in the display. The measured brightness at the brightest area of the display shall be not more than 60% of the saturated brightness.

Environmental Tests

The 7268B is designed to withstand the following operational and non-operational environmental teats.

Operational Tests

Sinusoidal Vibration: This test consists of tube vibration in each of three orthogonal axes. One of these axes is in the plane passing through the major axis of the tube and the center of the tube-base key. The tube is mounted so that its major axis is parallel to the plane of the earth. A total of 6 cycles of swept sinusoidal vibration, from 10 to 500 and back to 10 cycles per second, is performed. The duration of a sweep cycle is 15 minutes. The frequencies of any resonant points are noted. The sinusoidal vibration schedule is shown below.

Double Amplitude inches	Peak Acceleration g's	Sweep Frequency c/s	Sweep Cycle Duration minutes
0.27	-	10 to 20	1
	4	20 to 46	1
	2	46 to 500	1
-	2	500 to 46	15
	4	46 to 20	1
0.27		20 to 10)



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Vibration at Resonance. This test consists of tube vibration at the resonant point or points determined in Sinusoidal Vibration for a period of 30 minutes. If more than one resonant point is noted for a given axis, the tube is vibrated for a total of 30 minutes at that resonant point in each sxis most likely to produce tube failure. If no resonant points are determined in Sinusoidal Vibration, the tube is vibrated for 60 minutes at a frequency of 55 cycles per second.

Low Pressure-High Temperature. This test consists of tube storage for a period of not less than one hour at a temperature of $\pm 100^{\circ}$ C. At the termination of this storage period, the tube is operated with the values shown under *Recommended Operating Values* applied and st a pressure equivalent to sn altitude of 32,000 feet. The temperature is then reduced to $\pm 53^{\circ}$ C. The tube is stored at this temperature for 1 hour and then is operated with normal voltages applied at a pressure equivalent to an altitude of 60,000 feet.

Low Temperature. This test consists of the tube being maintained at a temperature of -65° C for 48 hours. At the end of this period and while the tube is still at -65° C, the tube is operated with recommended voltages applied for 15 minutes.

Non-Operational Tests

Temperature Cycling. This test consists of tube storage for a period of not less than 2 hours at a temperature of -65°C followed within 5 minutes by storage for a period of 2 hours at a temperature of ± 100 °C. A minimum of five consecutive cycles are performed.

High Pressure. This test consists of tube exposure to an absolute pressure of 45 pounds per square inch for s period of at least 60 seconds. This pressure shall be attained within 60 seconds.

Torque. This test consists of the application of a torque of 40 inch-pounds between the integral magnetic shield and the tube base.

Salt Spray. This test consists of tube exposure to a fine spray from a salt solution for a period of 48 hours. The ambient temperature is maintained at spproximately 35°C.

OPERATING PROCEDURE

The following steps should be followed when the 7268B is first placed in operation. Refer to the precautions shown under Operating Considerations in the publication ICE-277 "RCA Display-Storage Tubes". Note that all electrode voltages are referred to the reference terminal of the collimation system unless otherwise specified.

 Viewing Gun — Ground the collimation system reference terminal and magnetic shield. Apply power to the heater of the

DATA 3

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viewing gun and allow 60 seconds for the cathode to reach normal operating temperature. Next apply the following voltages, in the indicated order: +2 volts to the backplate, -55 volts to the collimation system negative terminal, and +265 volts to the collimation system positive terminal (be sure a minimum resistance of 5000 ohms is in this circuit). Then increase screen voltage slowly from 0 to 10,000 volts (be sure a minimum resistance of 1 megohm is in the screen circuit). Next apply dynamic erssing pulses to the backplate.

The storage property of the tube can be observed by setting the amplitude of the dynamic erasing pulses at +8 volta for several seconds and by then reducing it to zero volts. As the erasing pulse amplitude is reduced the screen should go dark. The 7268B is now storing an overall "black picture" and stays in this condition until the screen begins to brighten as a result of the storage grid being gradually discharged by positive ions landing on it.

- 2. Writing Gun - Apply power to the heater of the writing gun and allow 60 seconds for the cathode to reach normal operating temperature. Then, with reference to the typical operating values shown in the tabulated data under Recommended Operating Values, set the grid-No.1 voltage to cutoff, and apply dc voltages to the electrodes of the writing gun. With the screen made dark by the charging method described under (1), the grid-No.1 biss is reduced until the writing beam is seen as a spot on the screen. If the beam is caused to move, either by centering adjustment or by application of deflection voltage, it should leave a bright trace. After an area has been written to full brightness, the writing-beam spot may be seen as a slightly brighter spot on the bright background. Writingbeam focus can then be optimized by adjusting the grid-No.3 voltage.
- 3. Final Display Adjustments The dc biss and the video-signal amplitude applied to grid No.1 or csthode of the writing gun should be adjusted to set the black level and and the highlight level in the display. These adjustments depend on the scanning rate used. Resolution decreases with increasing writing-gun beam current. Excessive writing-gun beam current induction and any further beam-current increase will not produce additional highlight brightness and may also decrease half-tone rendition. It is recommended that the writing-beam current always be adjusted to a minimum value to produce the best display without saturation of highlight brightness. The dynamic erasing-pulse amplitude and duty cycle should be adjusted in accordance with the information com-tained in 1CE-277.

The following operating precautions must be followed to protect the 7268B from inadvertent damage ----

- 1. Do not exceed maximum ratings.
- 2. Be sure to include the screen resistor.

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DATA 4

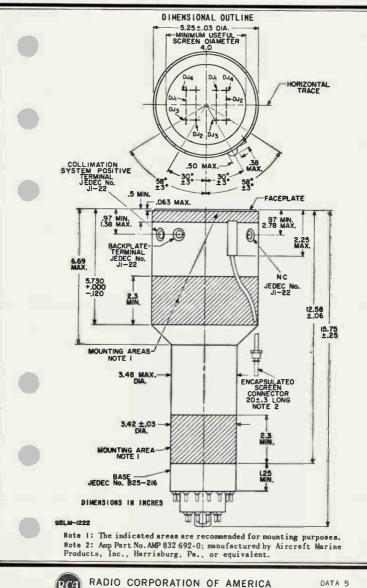
DATA 4

- Be sure to include the collimation system positive terminal resistor.
- 4. Do not apply excessive writing-beam current density.
- 5. Protect against scanning failure.
- 6. Protect against loss of bias.
- 7. Apply voltages to tube in correct order.
- 8. Never write unless viewing beam is on.



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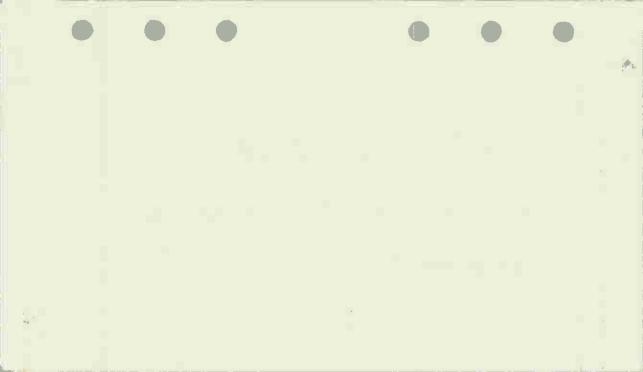




Electronic Components and Devices

Harrison, N. J.

DATA 5 4-66





DISPLAY STORAGE TUBE

DIRECT-VIEW TYPE 3.8"-DIAMETER DISPLAY

WRITING GUN:	VIEWING GUN:
ELECTROSTATIC DEFLECTION	NO DEFLECTION
ELECTROSTATIC FOCUS	NO FOCUS

DATA

	Seneral:			
		Writing Section	Viewing Section	
	Heater, for Unipotential Cathode:			
	Voltage (AC or DC)		6.3	volts
	Current		0.6	800
	Minimum Cathode Heating Time			
1	before other electrode volt-			
	ages are applied	-	30	Sec
1	Direct Interelectrode Capaci-			
	tances (Approx.);0			
	Grid No. I to all other			
	tube electrodes	6.5	11	Int
-	Cathode to all other			
-	tube electrodes	5.5	8	H
	Backplate to all other			
	tube electrodes	-	116	unt
	Deflecting electrode DJ1 to			
1	deflecting electrode DJ2	1.9	**	HUT
	Deflecting electrode DJ ₃ to		-	
-	deflecting electrode DJa	2	-	μđ
1	Di to all other tube electrodes.			Hut
	DJ ₂ to all other tube electrodes.			μμf
	DJ ₃ to all other tube electrodes.			μuť
	DJa to all other tube electrodes.		-	Hut
	Focusing Method		None	
	Deflection Method		None	
	Deflecting-Electrode Arrangement.			
	serves ingrates to a realignmenter	sional Outline		
	Phosphor (For Curves, see front	4101000 0000 1/16		
	of this Section	-	P20, Aluminized	
	Fluorescence.		Yellow-Green	
	Phosphorescence		Yellow-Green	
	Minimum Useful Viewing Diameter*			3 8"
	Maximum Overall Length			
	Seated Length		12 50!! +	0 301
	Greatest Bulb Diameter		5 25# 4	0.06
	Maximum Tube Radius			
	Bulb Terminals:		• • • • • • • • •	2.09
	Caps (Three)	Recessed Smill	Bell LIEDEC No.	11-221
	Cap			
	Temperature Range:	Nocesseu and IT (avity (JEDG: NO.	
2	Operating			000 0
2	Storage	• • • • • • • •		
	Operating Position			
	Weight (Approx.).			
-	Base Medium-Sheil Dih			
		eptal In-Pin IJEL	Act Group 9, NO.B	
-	59		TENTATIVE O	ATA 1

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ELECTRON TUBE DIVISION

TENTATIVE DATA 1





DISPLAY STORAGE TUBE

BOT	TOM VIEW
Pin 1-Heater of	BACKPLATE
Writing Gun	bridit Erite
Pin 2-Grid No. 1 of	0.0
Writing Gun	0 0
Pin 3-Grid No.3 of	
Writing Gun	() () () () () () () () () () () () () (
Pin 4-Deflecting	
Electrode DJ	
of Writing Gun	
Pin 5-Deflecting	(3) (2)
Electrode DJ	and the
of Writing Gun	
Pin 6-Grid No.2 of	
Viewing Gun,	SCREEN
Grid No.2 and	
Grid No.4 of	Pin 13-Cathode of
Writing Gun	Writing Gun
Pin 7-Grid No.1 of	Pin 14-Heater of
Viewing Gun	Writing Gun
Pin 8-Grid No.3 of	Recessed Ball Cap:
Viewing Gun	Over Pin
Pin 9-Heater of	3 - Grid No.5 of
Viewing Gun	Viewing Gun
Pin 10-Heater and	Over Pin
Cathode of	12 - Grid No.4 of
Viewing Gun	Viewing Gun
Pin II - Deflecting	On Side of Tube
Electrode DJ1	Opposite Base
of Writing Gun	Key — Backplate
Pin 12-Deflecting	Recessed Cavity Cap:
Electrode DJ ₂	Over Base
of Writing Gun	Key - Screen
aximum and Minimum Ratings, Abso	
For altitude	s up to 10,000 feet
Writing Sec	ion Viewing Section
CREEN VOLTAGE.	11000 max.** volts
ACKPLATE VOLT-	
AGE (Peak)	20 max.*** volts
Equivalent V	lues Equivalent Values
RID-No.5 VOLT-	
AGE	- 300 max.** volts
RID-No.4 VOLT-	
	0 max.** - 300 max.** volts
RID-No.3 VOLT-	
AGE 1200 max.* -155	0 max.** - {200 max.** volts
EAK VOLTAGE	10 min.**
BETWEEN GRID	
No.3 AND	
GRIDS No.2 &	
No.4 295	0 max. – volts

ELECTRON TUBE DIVISION



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DISPLAY STORAGE TUBE

	Writing Section	Viewing Section	
RID-No.2 VOLT-			
	2950 max.** 200 max.**	2950 max.** 200 max.**	voits
CATHODE VOLT-			
AGE	2750 max.**		volts
RID-No. I VOLT-			
AGE:			
Negative-bias		200	volta
value	200 mex.*	200 max.**	VOITS
Positive-blas	0	0 max.**	volt
value	0 mbx.*	O max.	VOLU
Positive-peak	2	0 max.**	volt
value	2 MEX.	e max.	WIL
PEAK VOLTAGE		t	
BETWEEN GRIDS		1	
AND ANY DE-			
FLECTING			
ELECTRODE	500 max.		volt
PEAK HEATER-	Soo make		
CATHODE		1	
VOLTAGE:			
Heater nega-		£	
tive with			
respect to			
cathode	125 max.*	-	volt
Heater posi-			
tive with			
respect to		· ·	
cathode	125 max.*	-	voit

VIEWING SECTION**

Operating Values and Typical Performance Characteristics:

To prevent possible damage to the tube, allow the viewing-gun beam current to reach normal operating value before turning on the writing-gun beam current, and keep the viewing-gun beam on till the writing beam is turned off

Screen Voltage	10000	10000	volts
Backplate Voltage (DC)	2	2	volts
Grid-No.5 Voltage	210	150	volts
Grid-No.4 Voltage*	50 to 150	30 to 90	volts
Grid-No.3 Voltage*	10 to 50	10 to 40	volts
Grid-No.2 Voltage*	150	125	volts
Grid-No. Voltage [#]	0 to -80	0 to -60	volts
Maximum Screen Current.	0.75	0.5	ma
Maximum Backplate Current (Peak)	2	1.5	(RB)
Maximum Grid-No.5 Current	3	2.5	1710
Maximum Grid-No.4 Current	3	2.5	me
Maximum Grid-No.3 Current	5	4	mô.

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ELECTRON TUBE DIVISION

TENTATIVE DATA 2



DISPLAY STORAGE TUBE

				-	-	
Maximum	Grid-No.2 Current.		3	2.5	ma	
Maximum	Cathode Current		8	6.5	776	
Number o	of Half-Tone Steps		5	5		
Viewing	Duration		20	40	SOC	
Maximum	Erasing-Uniformity	Factor	0.45	0.4		
Resoluti	ion		50		lines/in.	
Brightne	SS		2750,	1500	11	
						J
		WRITING SECTIO	H•			
Range Ye	Hues for Equipment	Design:*				
		0.2 & No.4 voltage 1500 and 2750 vol		between		
Grid-No.	3 Voltage for					
focus.		17,5% to 37,5% of	Econ		volts	0
Maximum	Grid-No. I		-2+4			
Voltag	e for cutoff					
of und	leflected					
	d spot	-4.65 of Ec2	+=		volts	
	Grid-No.3					
	t	-15 to +10			μa	
	Cathode Current.	See Curve				
	on Factors:					
	DJ2	36 to 48		v dc./in./kv	of Ec2+#	
	DJa	35 to 47		v dc/in./kv	of Ec2+#	
	Speed T	3000			In, /sec	
Witting	opeourr	5000			In, /sec	
Examples	of Use of Design (Ranges:*			1	
For grid	ls-No.2 & No.4 volta	we (Real)	2	000	volts	
	3 Voltage for focus			to 750	volts	
	Grid-No.i Voltage		250	10/90	VOITS	
	eflected focused s			92	volts	$\overline{(}$
	on Factors:			32	voites	
	DJ2		- 72	to 96	volts	
	DJ.			to 94	volts	
	nt Values of Writig		ferred		1	
to Cat	hode of Viewing Su	n:				
	Voltage			-1850	volts	Ca
	3 Voltage for focus		525 -11	00 to -1500	volts	3
Grids-No	.2 & No.4 Voltage*	. +125		+150	volts	
	VIEWING SE	CTION and WRIT	ING SEC	TION	1	
Circuit	Values:					-
Grid-No.	I-Circuit Resistand	e (Either gun).		1 mex.	megohm	\bigcirc
	<mark>ce in</mark> Any Deflectin			O.I max.	megohm	
	urrent-Limiting Res					
in Gri	d-No.5 (Viewing-Sec	tion) Circuit .		0.01 min.	megohm	
L			_			
6-59	E	ECTRON TUBE DIVIS	ION	TENTATIVE	DATA 2	

7315

ELECTRON TUBE DIVISION



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DISPLAY STORAGE TUBE

0.005 max. megohm Backplate-Circuit Resistance. Series Current-Limiting Resistance in I min. megohm 0 Without external shield. Minimum useful viewing area may be eccentric with respect to the tube face. Voltages are shown with respect to cathode of Viewing Gun. Voltages are shown with respect to cathode of Writing Gun. Grids No.2 and No.4 of Writing Gun are connected together and to grid No.2 of Viewing Gun within the tube. Adjusted for brightest, most uniform pattern. Observed with an RCA-2F21 Monoscope display. Expressed in terms of the time required for the brightness of the unwritten background to rise from just zero brightness (viewing-beam cutoff) to 10 per cent of saturated brightness. cutoff) to 10 per cent of saturated origniness. Determined as follows: with no erasing pulses, overscan the storage surface with writing beam to obtain maximum pattern brightness. Then cut off writing beam. Apply erasing pulses having an amplitude of between 8 to 10 volts and adjust duty cycle to obtain complete erasure in approximately 10 seconds. Weesure time (t₁) from start of erasing to the instant at which any area within the minimum useful viewing diameter is reduced to background-brightness level and time (t₂) from start of erasing to the instant at which the entire within the minimum useful viewing-diameter area is reduced to background-brightness level. The erasing-uniformity factor is defined as (t₂ - t₁)/t₂. Measured by shrinking-raster method at a display brightness of 50 Weasured by shrinking-raster method at a display brightness of 50 per cent of saturated brightness and with grids No.2 4 Mo.4 of writing Gun at about +2000 volts with respect to calhode of writing Gun. Neasured with entire storage grid written to produce saturated bright-ness and with screen at indicated voltage. The cathode of the Writing Gun is operated at about -2000 volts with respect to the cathode of the viewing Gun which is usually operated at ground potential. The center of the undeflected focused beam will fall within a circle having a 10-mm radius and having its center on the writing-Gun axis (See Dimensional Outline) under the following conditions: grids No.2 & No.a of writing Gun at *2000 volts with respect to cathode of writing Gun, grid No.3 of writing Gun at voltage to give focus, grid No.1 of Writing Gun at voltage which will permit storage of a charge just sufficient to give a barely perceptible spoton screen, viewing Section operating under normal conditions, and tube shielded against extraneous flelds. H returns Heasured under conditions of writing from just zero brightness (viewing-beam cutoff) to maximum brightness with grid wo.iof Writing Gun at -10 volts with respect to cathode of Writing Gun, and grids No.2 & No.4 of Writing Gun at +2000 volts with respect to cathode of Writing Gun. It is recommended that the deflecting-electrode-circuit resistances be approximately equal.

OPERATING CONSIDERATIONS

Shielding. Magnetic shielding must be provided to prevent external fields from interfering with the required accurate control of the low-velocity viewing beam. A cylindrical shield of properly annealed high-permeability material about 1/16-inch thick is usually satisfactory.

Terminal Connections. The base pins of the 7315 fit the Diheptal 14-contact socket. The Recessed Small Ball caps and the Recessed Small Cavity cap require standard flexible-lead connectors.

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100



DISPLAY STORAGE TUBE

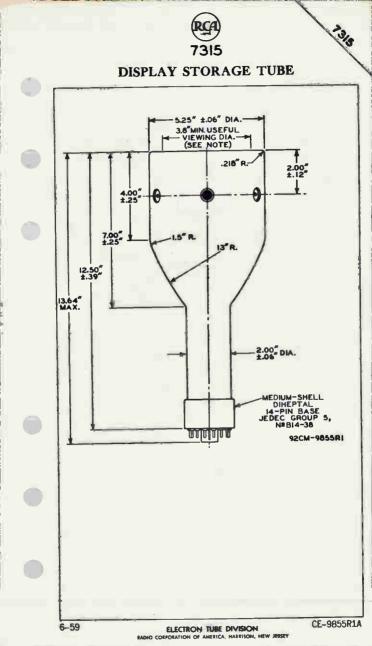
The high voltages at which the 7315 is operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Safety precautions include the enclosing of high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is desired.

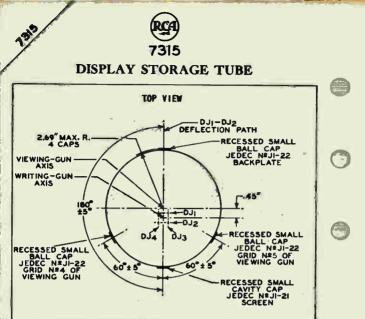
In the use of high-voltage tubes, it should always be remembered that high voltages may appear at normally lowpotential points in the circuit as a result of capacitor breakdown or incorrect circuit connections. Therefore, before any part of the circuit is touched, the power-supply switch should be turned off, and both terminals of any capacitors grounded.

To prevent possible damage to the tube, allow the Viewing-Gun beam current to reach normal operating value before turning on the Writing-Gun beam current, and keep the viewing beam on till the writing beam is turned off.

Failure of scanning while the writing beam is turned on may permanently damage the storage grid. Therefore, provision should be made to cut off automatically the writing-beam current in case of a scanning failure. The writing-beam current can be cut off by an electronic switch which applies -200 volts bias to grid No.1 of the Writing Gun. This switch should be actuated by a portion of the scanning voltages applied to both sets of deflecting electrodes.

1315





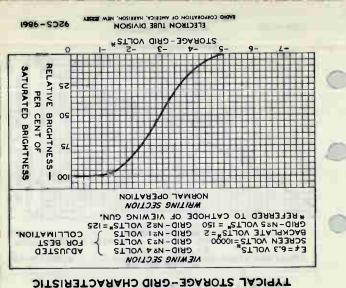
NOTE: MINIMUM USEFUL VIEWING AREA MAY BE ECCENTRIC WITH RESPECT TO THE TUBE FACE. THE MINIMUM USEFUL VIEWING AREA WILL HAVE DIAMETER OF 3.8".

CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN $2^{\rm O}$ in any direction from perpendicular erected at center of bottom of base.

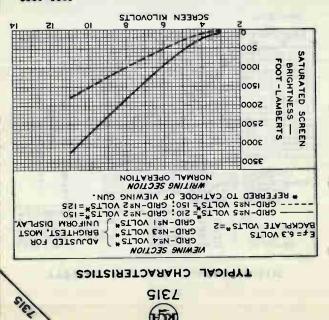
DEFLECTING ELECTRODES DJ₁ AND DJ₂ ARE NEARER THE SCREEN; DEFLECTING ELECTRODES DJ₃ AND DJ₄ ARE NEARER THE BASE. WITH DJ₁ POSITIVE WITH RESPECT TO DJ₂, THE SPOT WILL BE DEFLECTED TOWARD PIN B; LIKEWISE, WITH DJ₃ POSITIVE WITH RESPECT TO DJ₄, THE SPOT WILL BE DEFLECTED TOWARD PIN 4.

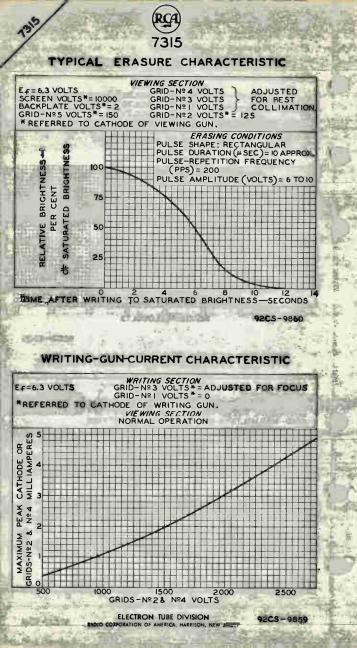
THE ANGLE BETWEEN THE DEFLECTION PATH PRODUCED BY DJ1 AND DJ2 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND THE BASE KEY BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 10°. ANGLE BETWEEN DJ1 - DJ2 DEFLECTION PATH AND DJ3 - DJ4 DEFLECTION PATH IS 90° \pm 3°.

THE ANGLE BETWEEN THE DEFLECTION PATH PRODUCED BY DJ1 AND DJ2 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND THE SCREEN CAP BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 10°.



35C2-3929





DR2000 DR2100 DR2200 Series Series Series

NUMITRON Digital Display Devices

Segmented Incandescent Types

FEATURES:

- high brightness fully adjustable
- Iow voltage operation
- high contrast segmented digits viewed against a dark background
- compatible with IC Decoder/Drivers such as the RCA CD2500E family
- high-reliability rugged construction

RBA Electronic Components

- wide-spectrum light emission permits unlimited filter selection
- DR2200 Series have a recommended DC segment operating voltage range of 1.5 to 3V
- wide viewing angle
- void of "clutter"

Fris .

- solderable base pins permits direct PC board mounting
- DR2000 Series fits popular low cost 9-pin miniature socket
- DR2100 and DR2200 Series fit popular TO-5 style, 10-pin socket
- DR2100V1 and DR2200V1 Series have formed lead to facilitate direct PC-board mounting

MECHANICAL	DR20 Series		DF	2100 2200 ries	DR2100 DR2200 Series	
Mounting Position Maximum Overall Length Maximum Seated Length Maximum Diameter Base	1.875 1.625 0.785	in. in.	1.4 0.4 9-p 0.2	Any 660 in. 150 in. 185 in. 910, 230 in. 10 circle	Any 1.705 in 1.540 in 0.485 in 9-pin, 0.380 in pin circle	
CHARACTERISTICS		DR200 Series	20	DR2100 Series	DR2200 Series	
ELECTRICAL Recommended DC Segment Operating Voltage Range DC Segment Voltage unless otherwise specified Segment Current Mean Life Expectancy (at 95% confidence) VISUAL Viewing Angle (including angle Segment Luminance (typ.) Response Times: Ascent to Visibility (typ.) Descent to 50% of Luminance	 	4.5 24 100 k 140 7000 15		3.5 to 5.0 4.5 24 100 k 120 7000 15 <20	1.5 to 3.0 2.5 14 100 k 120 4000 8 <10	V / mA h o fL ms ms
Maximum Segment Deflection From a Straight Line		0.005	- 1	200.00430:1	0.004	in
Contrast Ratio	• • • • •	30.1	1	30:1	20:1	

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DR2000 DR2100 DR2200 Series Series Series

Mechanical Characteristics DR2000 and DR2100 Series

TEST	CONDITIONS	DC Segment Volts
SHOCK* а) b)	100g, 1 ms, Half-Sine Wave 50g, 11 ms, Half-Sine Wave	4.5 Not Applied
VIBRA- TION a) b) c) d) e)*	Variable Frequency: 10 to 44 Hz, 0.1-inch DA Variable Frequency: 44 to 200 Hz, 10g Variable Frequency: 200 to 800 Hz, 1g Variable Frequency: 800 to 2000 Hz, 10g Fatigue: 25 Hz, 2.5g, 96 hr	4.5 4.5 4.5 4.5 4.5

DR2200

Series

SHOCK* a) b)	200g, 1 ms, Half-Sine Wave 50g, 11 ms, Half-Sine Wave	2.5 Not Applied
VIBRA- TION a) b) c)*	Variable Frequency: 5 to 60 Hz, 0.1-inch DA Variable Frequency: 60 to 500 Hz, 20g Fatigue: 25 Hz, 2.5g, 96 hr	2.5 2.6 2.5

* Performed in Accordance with MIL-E-1F

RBA Electronic Components

The NUMITRON digital display devices will meet the Specifications' for operational and crash safety tests; standard environmental vibration for instrument panel location in all types of aircraft, as set by the Radio Technical Commission for Aeronautics (RTCA). Document No. DO-138 Dated June 27, 1968.

				5	Segment	Designati	ons A-H			
					Base	Pin Nun	nber			
Display	Туре	1	2	3	4	5	6	7	8	9
8	DR2000 DR2100 DR2200	NC	1	E	D	С	G	A	В	F
with	DR2010 DR2110 DR2115 DR2210 DR2215	н	COMMON	E	D	с	G	A	В	F
+	DR2020 DR2120 DR2220	NC	8	NC	NC	NC	Ð	в	с	A
+	DR2030	NC		NC	NC	NC	В	NC	A	NC
+	DR2130 DR2230	NC		NC	NC	NC	NC	В	NC	A

DR2000 Series

DR2100 Series

DR2200 Series

Base Pin Number And Segment Designation Chart

NC = no connection - may be used as tie point.

Components

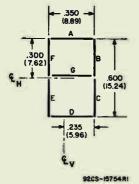
DATA 2 11/72

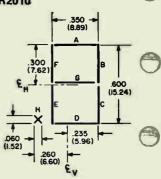


Segment Dimensions and Designations



DR2010

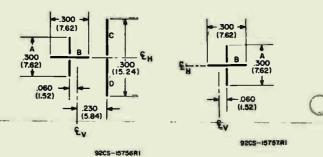




9268-15755RL

DR2020

DR2030

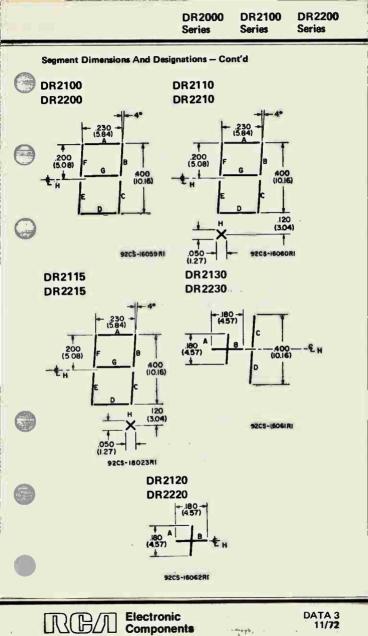


- ♥ H = Horizontal center line of display (bulb outline dimension F) with pin No. 3 toward viewer. Segment "G" is 0.030" above ♥ H.
- ¢_H = Vertical center line of device.

DR2100 and DR2200 series; vertical center line of display coincides with vertical center line of device.

Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated.

RBA Electronic Components DATA 2



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DR2000	DR2100	DR2200
Series	Series	Series

OPERATING CONSIDERATIONS

Integrated Circuit Decoder/Driver

The NUMITRON series devices are compatible with the RCA Integrated Circuit Decoder/Driver types CD2500E and CD2501E. The integrated circuit decoder/driver accepts four inputs in BCD (8-4-2-1 code) and decodes them into outputs representing a decimal number from 0 to 9 on a 7-segment display. For basic interconnection of decoder/driver and the NUMITRON display devices see Fig. 4.

Mounting Arrangements

The NUMITRON devices are designed for mounting in either commercially available sockets or directly on printed circuit boards. The DR2000 series devices fit into a standard 9-pin miniature electron tube socket. A commercial PC board socket which permits 0.8-inch center-to-center mounting is available. (See Hardware and Accessories.) The DR2100 and DR2200 series devices are available in two versions: straight leads and V1 versions with formed leads: The straight lead versions may be mounted on 0.5-inch centers directly on PC boards or may be used with standard TO-5 style, 10-pin sockets. The V1 versions facilitate direct PC board mounting on 0.5-inch centers. To use the light shield, DR3000⁺, the center-to-center mounting must be increased to 0.515-inch.

Figure 5 shows the base diagram and pin-circle dimensions for the various NUMITRON devices.

Character Formation

The following chart gives the base pin connections for forming the various character displays for each device. Pin No. 2 is the common connection for all segments in each device. For example, to form a numeral one using type DR2000, connect the segment voltage between pin No. 2 (common) and pin Nos. 5 and 8.

RBA Electronic Components

DR2000 DR2100 Series Series DR2200 Series

Digital C	haracter	Formatio	n			
	- 1					_
Display		DR2000 DR2100 DR2200	'in No. 2 C DR2010 DR2110 DR2115 DR2210 DR2215	DR2020 DR2120 DR2220	or All Typ DR2030	DR2130 DR2230
		3,4,5,7, 8,9	3,4,5,7, 8,9			
\bigcirc		5,8	5,8	6,8		
		3,4,6, 7,8	3,4,6, 7,8			
\bigcirc		4,5,6, 7,8	4,5,6, 7,8			
		5,6,8,9	5,6,8,9			
5		4,5,6, 7,9	4,5,6, 7,9			
	6	3,4,5,6, 7,9	3,4,5,6, 7,9			
\bigcirc		5,7,8	5,7,8			
	(\mathbb{B})	3,4,5,6, 7,8,9	3,4,5,6, 7,8,9			
9		4,5,6,7, 8,9	4,5,6,7, 8,9			
	+			7,9	6,8	7,9
\bigcirc				7	6	7
dec	imal		1			
		Display	Display DR 2000 DR2100 DR2200 3.4.5.7. 8.9 3.4.5.7. 8.9 1 5.8 1 5.8 1 5.8 1 5.8 1 5.8 1 5.6.8.9 1 5.6.8.9 1 5.7.8 1 5.7	Pin No. 2 C Display DR2010 DR2000 DR2100 DR2100 DR2100 DR2100 DR2010 DR2115 DR2100 3,4,5,7. 3,4,5,7. 3,4,5,7. 3,4,5,7. 3,4,5,7. 3,4,5,7. 3,4,5,7. 3,4,5,7. 3,4,5,7. 3,4,5,7. 3,4,5,7. 3,4,5,7. 3,4,5,7. 3,4,5,7. 3,4,6. 7,8 3,4,6. 7,8 5,6,8,9 5,6,8,9 5,6,8,9 5,6,8,9 5,6,8,9 5,6,8,9 5,6,8,9 5,6,8,9 5,7,8 3,4,5,6,7,9 3,4,5,6 7,9 3,4,5,6 7,8 5,7,8 3,4,5,6,7 3,4,5,6,7 8,9 9 4,5,6,7 4,5,6,7 8,9 4,5,6,7 8,9 4,5,6,7 8,9 4,5,6,7 8,9 4,5,6,7 8,9 4,5,6,7 8,9 4,5,6,7 8,9 4,5,6,7 8,9 4,5,6,7	Device Pin Nu Display DR2010 DR 2000 DR2100 DR2100 DR2100 DR2210 DR2010 DR2115 DR2020 DR2220 1 3,4,5,7, 8,9 3,4,5,7, 8,9 3,4,5,7, 8,9 3,4,5,7, 8,9 3,4,5,7, 8,9 1 5,8 5,8 6,8 1 5,8 3,4,6, 7,8 3,4,6, 7,8 1 1 5,6,8,9 5,6,8,9 1 1 1 5,6,8,9 5,6,8,9 1 1 1 5,6,8,9 5,6,8,9 1 1 1 5,6,8,9 5,6,8,9 1 1 1 5,6,8,9 5,6,8,9 1 1 1 1 5,6,8,9 5,6,8,9 1	Device Pin Number Display Display DR2000 DR2000 DR2100 DR2100 DR2115 DR2020 DR2020 DR2210 DR2220 DR2030 1 $3,4,5,7, 8,9$ $3,4,5,7, 8,9$ 0.2220 DR2030 1 $5,8$ $5,8$ $6,8$ 0.2220 DR2030 1 $5,6,8,9$ $5,6,8,9$ 0.220 0.2200 0.2200 1 $5,6,8,9$ $5,6,8,9$ 0.200 0.2000 0.2000 1 $5,7,8$ $5,7,8$ 0.200 0.2000 0.2000 1 $5,7,8$ $3,4,5,6,7,8,9$

RBA Electronic Componenta DATA 4 11/72

DR2000	DR2100	DR2200
Series	Series	Series

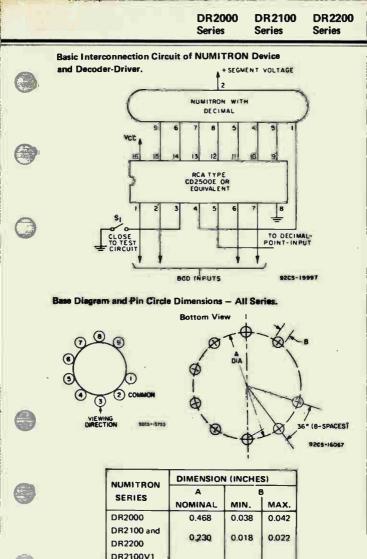
Power Supply Requirements

The NUMITRON Series devices do not require critical voltage regulation over the useable operating range. As is the case with any incandescent type device, dc voltage operation above the recommended value may result in reduced life expectancy. For multiplex operation, segment voltage above the normal range may be used provided that the appropriate duty factor is observed. (See NUMITRON Display Device Booklet, NUM-421).

Display

Because these NUMITRON devices have a wide-band light spectrum emission, filters can be used to produce any desired color display. (See Hardware and Accessories.) A display having a broader stroke can be obtained with an etched glass such as "Trusite"^{*} or a diffused filter. For a larger size display, a Fresnel lens may be used.

*Trademark "Trusite" Dearborn Glass Co., Chicago, Illinois, Hardware and Accessories Sockets Noval 9-pin Types DR2000 Series Methode Electronics, Inc., M8610 (For 0.8-inch centers) and P460 (standard) Cinch Mfg, Co., 121-51-00-040 (standard) TO-5 10-Lead Types DR2100, DR2200 Series Methode Electronics, Inc., M8620 Cinch Mfg. Co., 133-99-92-054 and 133-99-92-065 133-99-92-065 (spread-lead socket) Filters Polaroid Corp., Cambridge Mass. 02139 Circular Polarizer: Standard and Diffused Surface for Broader Stroke Panelgraphic Corp., West Caldwell, N.J. 07006 Chromafilter CF-131: Anti-Reflection Filters Plastic Light Shield to Reduce Side Reflections DR2100, DR2200 Series RCA DS3000 DATA 4 RBA Electronic Components



Electronic Components

0.380

0.018

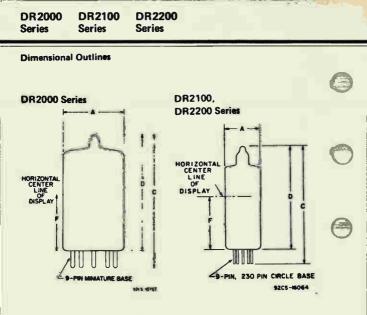
0.022

and

DR2200V1

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DATA 5 11/72



DI.		DR20	00 Series				100 and 00 Series	
MEN-	INC	HES	MILLIN	AETERS	IN	ICHES	MILLIN	ETERS
SION	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
A		0.800	—	20.32		0.485		12.32
С		1.875		47.62		1.660		42.16
D		1.625		41.27		1.450		36.83
F	0.700	0,730	17.78	18.54	0.625	0.655	15.87	16.64

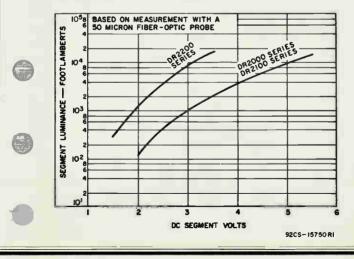
MILLIMETER DIMENSION DERIVED FROM INCH DIMENSION

RBA Electronic Components

DATA 5

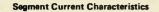
1		DR200 Series		DR210 Series		R2200. ries
0	Dimensional Outlines – Cont'd DR2100V1, DR2200V1 Series			2		
9	HORIZONTAL CENTER OF DISPLAY			0821	00V1 and	_
-		DI			OV1 Serie	-
	-+	MEN-			OV1 Serie	-
			IN MIN.	DR220 CHES MAX.	OV1 Serie	METERS
		MEN- SION		DR220 CHES MAX. 0.485	OV1 Serie MILLI	METERS MAX. 12.32
		MEN- SION		DR220 CHES MAX. 0.485 1.705	OV1 Serie MILLI	METERS MAX. 12.32 43.30
0		MEN- SION A C D	MIN.	DR220 CHES MAX. 0.485 1.705 1.450	OV1 Serie MILLII MIN.	METERS MAX. 12.32 43.30 36.83
0		MEN- SION A C D F	MIN.	DR220 CHES MAX. 0.485 1.705 1.450 0.655	OV1 Serie MILLII MIN. 15.87	METERS MAX. 12.32 43.30 36.83 16.64
0	-FORMED PINS, 380 PIN CIFCLE BASE	MEN- SION A C D	MIN.	DR220 CHES MAX. 0.485 1.705 1.450 0.655 0.090	OV1 Serie MILLII MIN.	METERS MAX. 12.32 43.30 36.83

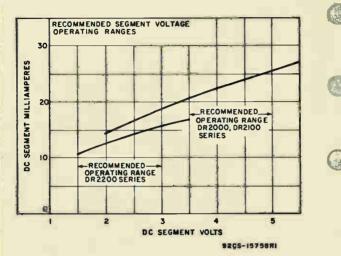
Segment Luminance Characteristics



RBA Electronic Componente DATA 6

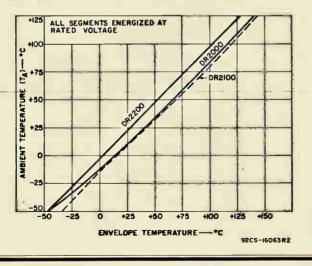
DR2000 DR2100 DR2200 Series Series Series





Envelope Temperature Characteristics

RBA



Electronic Components

DATA 6

in