RCA TUBE Handbook HB-3

CATHODE-RAY TUBE, STORAGE TUBE, & MONOSCOPE SECTION

This Section contains data for black-andwhite and color TV picture tubes, oscillograph tubes, special-purpose kinescopes, storage tubes, and monoscopes.

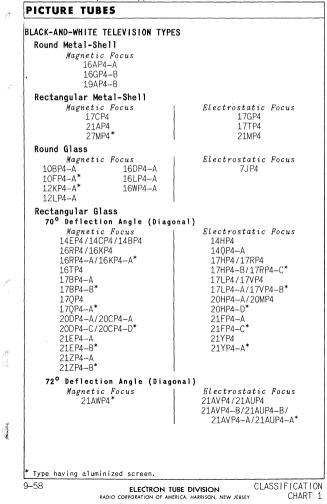
For further Technical Information, write to Commercial Engineering, Tube Division, Radio Corporation of America, Harrison, N. J.

SEPARATOR

athode-Ray Tubes, Storag Tubes, & Monoscopes



When choosing tube types, the equipment designer should refer to the RCA PREFERRED TYPES LIST and its companion list - TYPES NOT RECOMMENDED FOR NEW EQUIPMENT DESIGN both of which appear in the General Section.





PICTURE TUBES (Cont'd)

BLACK-AND-WHITE TELEVISION TYPES

90° Deflection Angle (Diagonal) Magnetic Focus Electrostatic Focus	J/
	4
21ACP4-A/21BSP4/21AMP4-A* 8DP4	1
24ADP4/24VP4-A/ 14ATP4*	
24CP4-A/24TP4* 14RP4	
14RP4-A*	
14WP4 / 14ZP4*	
17AVP4/17ATP4	-
17AV14/17AT14 17AVP4-A/17ATP4-A*	
178/14-4/178/14-4 178/P4*	\sim
21AL P4	
21ALF4 21ALP4-B/21ALP4-A*	
21ALF4-B/21ALF4-A 21ATP4-A/21ATP4*	
21ATF4-A/21ATF4 21BTP4*	
21CBP4-A*	
21DLP4*	
24AEP4*	
24DP4-A/24YP4*	
IIO ^O Deflection Angle (Diagonal)	
Electrostatic Focus	
17BWP4* 21DAP4*	
17BZP4* 21DFP4*	
17CDP4* 24AHP4*	
21CFP4*	
COLOR-TELEVISION TYPES	
Round Metal-Shell	
21AXP22*	
21AXP22-A*	- K.
Round Glass	\square
15GP22*	
21CYP22*	

* Type having aluminized screen.



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5 M M 4-1/4 Diameter 8000 5FP4-/ Transcriber Type 5 E M 4-1/4 Diameter* 27000 5WP11 STORAGE TUBES Mame Description TUBE Radechon Single-Beam, Barrier-Grid Type 6499 Computer Single-Beam, Primary-Current-Modu- lation Type 6571 Display Direct-View, 5-Inch, 2-Gun Type with Electrostatically Deflected Writing Beam 6866 Display Direct-View, 5-Inch, 2-Gun Type with Magnetically Deflected Writing Beam 7183 Granbechon Singla-Converter Type with Reading 6896	SPECIAI	PURF	OSE K	NESCOPES		
7 M M 6 Diameter 10000 70P4 7 E M 9-1/8 Diameter* 12000 7TP4 10 E M 9-1/8 Diameter* 20000 10SP4 Projection Types 5 E M 4-1/4 Diameter* 20000 5AZP4 5 E M 4-1/4 Diameter* 20000 5TP4 7 E M 5 × 3-3/4 * 800001 7NP4 7 E M 4-1/4 Diameter* 10000 5AYP4 7 E M 4-1/4 Diameter* 800001 7NP4 Yiew-Finder Types 5 E M 4-1/4 Diameter* 800001 7NP4 5 E M 4-1/4 Diameter* 10000 5AYP4 7 E M 4-1/4 Diameter* 20001 5WP4 7 F M 4-1/4 Diameter* 20001 5WP4 7 F M 4-1/4 Diameter* 27000 5WP11 Store E M 4-1/4 Diameter 6499	Bulb Dia.	ing	tion	Screen Size	Ultor	
7 E M 6 Diameter* 12000 7TP4 10 E M 9-1/8 Diameter* 20000 10SP4 Projection Types 5 E M 4-1/4 Diameter* 20000 5AZP4 5 E M 4-1/4 Diameter* 27000 5AZP4 7 E M 5 × 3-3/4* 800001 7NP4 7 E M 5 × 3-3/4* 800001 7MP4 View-Finder Types 5 E M 4-1/4 Diameter* 10000 5AYP4 5 E M 4-1/4 Diameter* 10000 5AYP4 7 E M 4-1/4 Diameter* 20000 5WP4 7 E M 4-1/4 Diameter* 20000 5WP4 7 Tanscriber Type 5 E 6499 6000 5FP4-4 7 E M 4-1/4 Diameter* 27000 5WP11 StorAGE TUBES Name Description TUBE 7183 Gomputer Single-Beam, Primary-Current-Modu- 1ati	Monitor T	ypes				
5 E M 4-1/4 Diameter** 40000† 5AZP4 5 E M 5 × 3-3/4 ** 80000† 7NP4 7 E M 5 × 3-3/4 ** 80000† 7NP4 7 E M 5 × 3-3/4 ** 80000† 7NP4 80000† TP4 5 × 3-3/4 ** 80000† 7NP4 View-Finder Types 5 E M 4-1/4 Diameter* 10000 5AYP4 5 E M 4-1/4 Diameter* 10000 5AYP4 7 E M 4-1/4 Diameter* 10000 5AYP4 7 Transcriber Type 5 E M 4-1/4 Diameter* 27000 5WP11 7 Transcriber Type 5 E M 4-1/4 Diameter* 27000 5WP11 7 Tanscriber Type 5 Name Description TUBE 7000 5WP11 7 Signe-Beam, Primary-Current-Modu- 1ation Type 6499 6499 6691 6866 0signlay Direct-View, 5-Inch, 2-Gun Type with 6866	7	Ε	M	6 Diameter*	12000	7ŤP4
5 E M 4-1/4 Diameter** 27000 5TP4 7 E M 5 × 3-3/4* 800001 7NP4 7 E M 5 × 3-3/4* 800001 7NP4 View-Finder Types 5 E M 4-1/4 Diameter* 10000 5AYP4 5 E M 4-1/4 Diameter* 10000 5AYP4 5 E M 4-1/4 Diameter* 27000 5MP4 7 F M 4-1/4 Diameter* 27000 5MP1 <t< td=""><td>Projectio</td><td>n Types</td><td></td><td></td><td></td><td></td></t<>	Projectio	n Types				
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5 M M 4-1/4 Diameter 8000 5FP4-/ Transcriber Type 5 E M 4-1/4 Diameter* 27000 5WP11 STORAGE TUBES Name Description TUBE TYPE Radechon Single-Beam, Barrier-Grid Type 6499 Computer Single-Beam, Primary-Current-Modu- lation Type 6571 Display Direct-View, 5-Inch, 2-Gun Type with Electrostatically Deflected Writing Beam 6866 Display Direct-View, 5-Inch, 2-Gun Type with Magnetically Deflected Writing Beam 7183 Graphechon Signal-Converter Type with Reading Gun and Writing Gun 6896, 1855 * Design-center values except as noted. Type having aluminized screen. 6896, Gun and Writing Gun * Design-center values except as noted. Type having aluminized screen. 6896, Gun and Writing Gun 1855 * Design-center values except as noted. Type having aluminized screen. 6896, Gun and Writing Gun 1855 * Duity-circle diameter of faceplate. When used with suitable reflective optical system, the 542FW provides a 24" x 6" picture. Absolute value. 0uality-circle diameter of faceplate. When used with suitable reflective optical system, the 547FW provides a 20" x 15" p	View-Find	er Types	i			
5 E M 4-1/4 Diameter* 27000 5WP11 STORAGE TUBES Name Description TUBE TYPE Radechon Single-Beam, Barrier-Grid Type 6499 Computer Single-Beam, Primary-Current-Modu- lation Type 6571 Display Direct-View, 5-Inch, 2-Gun Type with Electrostatically Deflected Writing Beam 6866 Display Direct-View, 5-Inch, 2-Gun Type with Magnetically Deflected Writing Beam 7183 Graphechon Signal-Converter Type with Reading Gun and Writing Gun 6896, 1855 * Design-center values except as noted. Type having aluminized screen. 6896, 001 ity-circle diameter of faceplate. When used with suitable reflective optical system, the 5474 provides an 8' x 6' picture. Absolute value. 0uality-circle diameter of faceplate. When used with suitable reflective optical system, the 5474 provides a 24" x 18" picture. Quality-circle diameter of faceplate. When used with suitable reflective optical system, the 5474 provides a 24" x 18" picture. Quality-circle diameter of faceplate. When used with suitable reflective optical system, the 7444 provides a 20" x 15" picture at a projection throw distance of 60". Like footnote (except projection-throw distance is 80'. E = Electrostatic. M = Magnetic.		E M				5AYP4 5FP4-/
Name Description TUBE TYPE Radechon Single-Beam, Barrier-Grid Type 6499 Computer Single-Beam, Primary-Current-Modu- lation Type 6571 Display Direct-View, 5-Inch, 2-Gun Type with Electrostatically Deflected Writing Beam 6866 Display Direct-View, 5-Inch, 2-Gun Type with Magnetically Deflected Writing Beam 7183 Graphechon Signal-Converter Type with Reading Gun and Writing Gun 6896. * Design-center values except as noted. Type having aluminized screen. 6896. • Design-center values except as noted. Type having aluminized screen. 6896. • Durect-View, the 5AZPH provides an 8' x 6' picture. Absolute value. 6896. • Ouality-circle diameter of faceplate. When used with suitable refletive optical system, the 5AZPH provides a 24" x 18" picture. 6896. • Ouality-circle diameter of faceplate. When used with suitable reflective optical system, the 7HP4 provides a 24" x 18" picture. 6896. • Unity rectangle of faceplate. When used with suitable reflective optical system, the 7HP4 provides a 20" x 15" picture at a projection throw distance of 60". 1100000000000000000000000000000000000			M	4-1/4 Diameter*	27000	5WP11
Name Description Radechon Single-Beam, Barrier-Grid Type 6499 Computer Single-Beam, Primary-Current-Modu- lation Type 6571 Display Direct-View, 5-Inch, 2-Gun Type with Electrostatically Deflected Writing Beam 6866 Display Direct-View, 5-Inch, 2-Gun Type with Magnetically Deflected Writing Beam 7183 Graphechon Signal-Converter Type with Reading Gun and Writing Gun 6896, 1855 * Design-center values except as noted. Type having aluminized screen. 1855 * Design-center values except as noted. Type having aluminized screen. 1855 * Julity-circle diameter of faceplate. When used with suitable reflet ive optical system, the 5474 provides a 24" x 18" picture. 1856 • Absolute value. Quality-circle diameter of faceplate. When used with suitable reflective optical system, the 5474 provides a 24" x 18" picture. 1851 • Julity-circle diameter of faceplate. When used with suitable reflective optical system, the 5474 provides a 20" x 15" picture at a projection throw distance of 60". 15" picture at a projection throw distance of 60". • Like footnote \oint except projection-throw distance is 80". 2 2 • E electrostatic. Meanue is 80". 2	STORAC	SE TUE	ES		Nana ann a' 1000 Nasann	
Computer Single-Beam, Primary-Current-Modu- lation Type 6571 Display Direct-View, 5-Inch, 2-Gun Type with Electrostatically Deflected Writing Beam 6866 Display Direct-View, 5-Inch, 2-Gun Type with Electrostatically Deflected Writing Beam 7183 Graphechon Signal-Converter Type with Reading Gun and Writing Gun 7183 Design-center values except as noted. Type having aluminized screen. 8896, 1855 Quality-circle diameter of faceplate. When used with suitable refletive optical system, the 5AZP4 provides an 8' x 6' picture. Absolute value. Quality-circle diameter of faceplate. When used with suitable refletive optical system, the 5TP4 provides a 24" x 18" picture. Quality rectangle of faceplate. When used with suitable reflective optical system, the 7NP4 provides a 20' x 15' picture at a projection throw distance of 60'. Like footnote @ except projection-throw distance is 80'. E = Electrostatic. M = Magnetic. Megnetic.	Name			Description		TUBE TYPE
Computer lation Type 0311 Display Direct-View, 5-Inch, 2-Gun Type with Electrostatically Deflected Writing Beam 6866 Display Direct-View, 5-Inch, 2-Gun Type with Magnetically Deflected Writing Beam 7183 Graphechon Signal-Converter Type with Reading Gun and Writing Gun 7183 Design-center values except as noted. Type having aluminized screen. 8896, 1855 Duric point of acceptate. When used with suitable reflet ive optical system, the 5AZP4 provides an 8' x 6' picture. Absolute value. Quality-circle diameter of faceptate. When used with suitable reflet ive optical system, the 5FP4 provides a 24" x 18" picture. Quality rectangle of faceptate. When used with suitable reflection optical system the 7FP4 provides a 20" x 15" picture at a projection throw distance of 60". Like footnote @ except projection-throw distance is 80". E = Electrostatic. M = Magnetic.	Radecho	n Sing	le-Beam,	Barrier-Grid Type		6499
Display Electrostatically Deflected Writing Beam 0000 Display Direct-View, 5-Inch, 2-Gun Type with Magnetically Deflected Writing Beam 7183 Graphechon Signal-Converter Type with Reading Gun and Writing Gun 6896, 1855	Compute			Primary-Current-M	odu	6571
Display Magnetically Deflected Writing Beam /183 Graphechon Signal-Converter Type with Reading 6896, Gun and Writing Gun 1855 Design-center values except as noted. 1855 Type having aluminized screen. Quality-circle diameter of faceplate. When used with suitable refletive optical system, the 5A2FW provides an 8' x 6' picture. Absolute value. Quality-circle diameter of faceplate. When used with suitable refletive optical system, the 5FH provides a 24" x 18" picture. Quality-circle diameter of faceplate. When used with suitable refletive optical system, the 5FH provides a 24" x 18" picture. Quality-circle diameter of faceplate. When used with suitable refletive optical system, the 7FH provides a 24" x 18" picture. Quality-circle diameter of faceplate. When used with suitable reflection optical system, the 7FH provides a 20" x 15" picture at a projection throw distance of 60'. Like footnote (except projection-throw distance is 80'. E = Electrostatic. M = Magnetic.	Display	/ Dire	ect-View, ectrostati	5-Inch, 2-Gun Type cally Deflected Wr	e with iting Beam	6866
Graphechon Gun and Writing Gun 1855 * Design-center values except as noted. * Type having aluminized screen. Quality-circle diameter of faceplate. When used with suitable refletive optical system, the 5AZP4 provides an 8' x 6' picture. Absolute value. Quality-circle diameter of faceplate. When used with suitable refletive optical system, the 5TP4 provides a 24" x 18" picture. Quality-circle diameter of faceplate. When used with suitable refletive optical system, the 7TP4 provides a 24" x 18" picture. Quality rectangle of faceplate. When used with suitable reflective optical system, the 7NP4 provides a 20' x 15' picture at a projection throw distance of 60'. Like footnote wexcept projection-throw distance is 80'. E = Electrostatic. M = Magnetic. Menused is a starter.	Display					7183
 Type having aluminized screen. Quality-circle diameter of faceplate. When used with suitable refle tive optical system, the 5AZP4 provides an 8' x 6' picture. Absolute value. Quality-circle diameter of faceplate. When used with suitable refle tive optical system, the 5TP4 provides a 24" x 18" picture. Quality rectangle of faceplate. When used with suitable reflection optical system, the 5TP4 provides a 20" x 18" picture at a projectio throw distance of 60'. Like footnote & except projection-throw distance is 80'. E = Electrostatic. M = Magnetic. 	Graphech				ding	6896 1855
	<pre>* Type havi Quality-c tive opti Absolute Quality-c tive opti Quality-c tive opti Quality-c throw dis Like foot E = Electro</pre>	ng alumin tircle dia cal syste value. tircle dia cal syste rectangle system, th stance of cnote ∳ expostatic.	meter of f meter of f m, the 5AZ meter of f m, the 5TP of facepl e 7NP4 pro 60'.	n. aceplate. When used P4 provides an 8' x 6 aceplate. When used 4 provides a 24" x 18 ate. When used with vides a 20' x 15' pic	' picture. with suitab " picture. suitable r ture at a p	le refle
	m = magnet	16.				



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FLYING	-SPOT	CATHO	DE-RAY TUBES	5		
Approx. Bulb Dia. Inches	Focus- ing Method	Deflec- tion Method	Phosphor□	Maximum Ultor Volts [⊕]	TUBE Type	
Black-and	I-White T	elevisio	n Types			
5 5	E E	M M	P15 P16	27000 27000	5WP15 5ZP16	
Color-Tel	evision	Туре				
5	E	M	P24	27000	5AUP24	1
MONO	SCOPES	5			*	\sim
Approx. Bulb Dia. Inches	Focus- ing Method	Deflec- tion Method	Feature	Maximum Ultor Volts [⊕]	TUBE Type	
5	E	M	Resolution Chart	1500	2F21	

□ See sheet FEATURES OF FLUORESCENT SCREENS. ♥ Decise conter values

Design-center values.

E = Electrostatic. M = Magnetic.



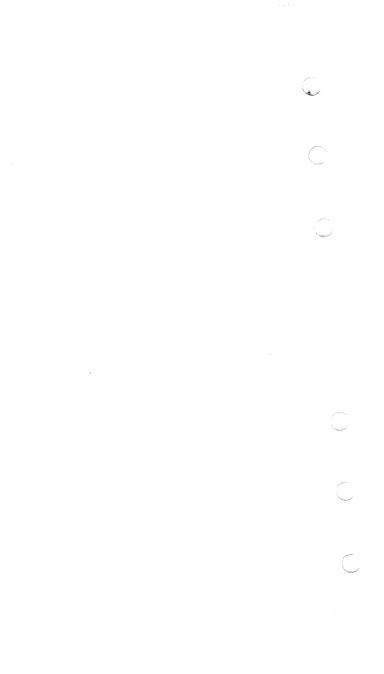
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osci	LLOGR	APH	TUBES					
Phos- phor□	Approx. Bulb Dia. Inches	Max. Ultor Volts [⊕]	TUBE TYPE		Phos- phor□	Approx. Bulb Dia. Inches	Max. Ultor Volts [⊕]	TUBE TYPE
	E	lectros	tatic-Def	e	ction a	Focus	Types	
P1 P1 P1 P1 P1 P1 P1 P1	1 2 2 3 3 3 3 3 3 5 5 7	1500 600 1000 2500 1500 2000 2500 2500	1EP1 902–A 2AP1–A 3BP1–A 3BP1–A 3KP1 3RP1			5 1 2 3 5 eflection		5UP7 1EP11 2BP11 3KP11 3WP11 5UP11 tor Types
P1 P1 P1 P2 P2 P4 P4 P5 P7	33557133333	2500 2500 2500 4000 1500 2500 2500 2500 1500 2500	3ŔP1-A 3WP1 5BP1-A 5UP1 7VP1 1EP2 3WP2 3KP4 3RP4 908-A 3KP7		P1 P1 P1 P4 P7 P7 P11 P11 P12	35555555555555	4000 6000 6000 4000 6000 4000 6000 4000 6000 4000 4000 4000	3JP1 5ABP1 5ADP1 5CP1-A 5ABP4 3JP7 5ABP7 5CP7-A 5ABP11 5CP11-A 5CP12
		Ma	gnetic-Det	F1	ection	Types		
	Magnetic	-Focus T	yþes		Εl	ectrostate	ic-Focus	Types
P7 P7 P7 P7 P7 P14 P14 P14 P15	5 7 10 12 16 5 7 5 7 5	8000 8000 10000 10000 14000 8000 8000 80	5FP7-A 7BP7-A 7MP7 10KP7 12DP7-A 16ADP7 5FP14 5FP14-A 7MP14 5FP15-A		P1 P7 P7	7 5 5	8000 10000 10000	7CP1 5AHP7 5AHP7–A∮

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



Type to be Replaced	Replace by RCA Type▲	Type to be Replaced	Replace b RCA Type4
5TP4	5TP4	14QP4	140P4A
7JP4	7JP4	14QP4A	
8DP4	8DP4	14RP4	
10BP4	10BP4A	14RP4A 14SP4	•14WP4
10BP4A			4.4504
10BP4C		140P4	●14EP4
10BP4D 10CP4	●IOFP4A	14WP4 14WP4/	
10EP4	●10BP4A	I4ZP4	14WP4
IOFP4		I 4ZP4	1 4 11 4
IOFP4A	IOFP4A	14ZP4/	
12JP4	•12KP4A	16AP4	16AP4A
12KP4		16AP4A	16AP4A
12KP4/ 12ZP4	12KP4A	16CP4	●16LP4A
12KP4A		16DP4	16DP4A
121 P4		16DP4A	2001
12LP4A	12LP4A	16GP4	
I 2LP4C		16GP4A 16GP4B	16GP4B
12LP4C		16GP4C	
12QP4 120P4A	•12KP4A	16KP4	16RP4A
127P4	●12LP4A	I 6KP4A	TOKP 4A
12ZP4		16LP4	16LP4A
I 2ZP4A	•12KP4A	16LP4A	
I 4ATP4	I 4ATP4	16QP4	●I6RP4A
I 4BAP4	I 4BAP4	16RP4 16RP4/	
14BP4		16KP4	
14BP4A	14EP4	I 6RP4A	I 6RP4A
14CP4		IGRP4A/	
I 4CP4A		16KP4A	
14DP4	●14EP4	16SP4	●16WP4A
14EP4 14EP4/		16SP4A	10704
14CP4	14EP4	16TP4	16TP4
14EP4/	14674	<u>16UP4</u>	●I6RP4A
14CP4/		16VP4	
14BP4		16WP4 16WP4/	●16WP4A
14HP4	14 HP4	16YP4	
14NP4 4np4a	•14WP4	16WP4A	16WP4A

Bold-Face Type Indicates an Aluminized Tube

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The RCA type shown is a direct replacement unless otherwise indicated.
 Minor electrical and/or mechanical set modification may be required.



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. REPLACEMENT GUIDE I I-62

Bold-Face Type Indicates an Aluminized Tube

ype to be Replaced	Replace by RCA Type▲	Type to be Replaced	Replace by RCA Type▲	
I 6WP4B	16WP4A	17CSP4	17CSP4	
L6XP4	I 6RP4A	17CWP4	17DSP4	
16YP4	•16WP4A	I7CYP4	I7CYP4	
16ZP4	●16LP4A	17DAP4	17DAP4	
17AP4	●I7BP4B	17DKP4	I7DKP4	
17ATP4		I7DLP4	17DSP4	
17ATP4/		17D0P4	17D0P4	
17AVP4 17ATP4A		I 7DSP4	I7DSP4	
I7ATP4A/		17DTP4	17DKP4	
17AVP4A	●17BJP4	17DWP4	17DWP4	
17AVP4		I7DXP4	I7DXP4	
17AVP4/ 17ATP4		I 7DZP4	170224	
I7AVP4A		17GP4	17GP4	
I7AVP4A/		17HP4		
I7ATP4A		17HP4/		
17BJP4	17BJP4	17RP4 17HP4A	17HP4B	
17BP4	●17BP4B	17HP48	1711140	
17BP4A		I7HP4B/		
178P48 178P4C	I7BP4B	I7RP4C		
7BRP4	●17BZP4	17JP4	I7BP4B	
7BUP4	•17BJP4	17LP4		
178VP4	•17CSP4	17LP4/ 17VP4		
7BWP4	1703P4	I7LP4A	17LP4A	
17BZP4	176364	I7LP4A/		
17BZP4/		17VP4B		
I7CAP4/		17QP4 17QP4A	17QP4A	
	17BZP4	17 0P4A		
I7BZP4/ I7CAP4/	I/BZP4	17RP4	17HP4B	
17CKP4/		17TP4	17TP4	
17BRP4		17UP4	170P4A	
I7CAP4	125.151	17014 17VP4	AF IY'I	
17CBP4	•17BJP4	17VP4/	I7LP4A	
17CDP4	I7CDP4	17LP4	17 LF 4A	
I7CFP4	I7CFP4	17VP4B		
17CKP4	17BZP4	17YP4	I7QP4A	
I7CLP4	●I7BJP4	19AFP4	19AFP4	
17CP4 17CP4A	17CP4	I 9AJP4	19AJP4	
L/UP4A		19ANP4	19ANP4	

The RCA type shown is a direct replacement unless otherwise indicated.
 Minor electrical and/or mechanical set modification may be required.



Type to be Replaced	Replace by RCA Type▲	Type to be Replaced	Replace by RCA Type▲
19AP4 19AP4A 19AP4B	19AP4B	21ACP4A/ 21AMP4A 21ACP4A/	
19AP40 19AP4C 19AP4D	19AF4D	2185P4 21ACP4A/	21AMP4A
I9AVP4	19AVP4	21BSP4/ 21AMP4A	
19AXP4 19AYP4	1947р4	21AFP4	●21YP4A
19BDP4	19BDP4	21ALP4	
19BFP4	19BFP4	21ALP4A 21ALP4B	●21CBP4A
19BTP4	I9BTP4	21ALP4B/	
19XP4	19XP4	21ALP4A	
19YP4	19464	21AMP4 21amp4a	2 I AMP4A
20CP4 20CP4A 20CP4B		21ANP4 21ANP4A	●21CBP4A
20CP46 20CP4C	•20DP4C	21AP4	21AP4
20CP4D 20DP4		21AQP4 21AQP4	●21AMP4A
20DP4A		21ASP4	•21XP4A
20DP4A/ 20CP4A	20DP4C	21ATP4	
20DP4B	•20DP4C	21ATP4A 21ATP4A/	•21CBP4A
20DP4C 20DP4C/ 20CP4D	20DP4C	21ATP4 21ATP4B 21AUP4	
20HP4	●20HP4D	21 AUP4A	
20HP4A 20HP4A/ 20LP4 20HP4A/ 20HP4A/	20HP4D	21AUP48 21AUP48/ 21AUP4A 21AVP4 21AVP4/ 21AVP4/	
20HP4B 20HP4C	•20HP4D	21AUP4 21AVP4A 21AVP4B	21AVP4B
20HP4D 20LP4 20MP4	20HP4D	21AVP4B/ 21AVP4A 21AVP4B/	
21ACP4 21ACP4/ 21AMP4	21AMP4A	21AUP4B/ 21AVP4A/ 21AUP4A	
21ACP4A		21AWP4	21AWP4

Bold-Face Type Indicates an Aluminized Tube

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▲ The RCA type shown is a direct replacement unless otherwise indicated. Minor electrical and/or mechanical set modification may be required.



RADIO CORPORATION OF AMERICA **Electron Tube Division**

Harrison, N. J.

REPLACEMENT GUIDE 2 1-62

Type to be Replaced	Replace by RCA Type▲	Type to be Replaced	Replace by RCA Type▲
21AYP4 21BAP4	2;XP4A 21CBP4A	21ESP4 21FAP4	21FAP4
21BNP4	2100744	21 FDP4	21FDP4
21BSP4	2 I AMP 4A	21FLP4	21CBP4A
21BTP4	●21CBP4A	21FP4	•21FP4C
21CBP4 21CBP4A		21FP4A 21FP4C	21FP4C
21CBP4A/ 21CBP4/	21CBP4A	21MP4	21MP4
21CMP4 21CBP4B		21WP4 21WP4A	21WP4A
21CEP4 21CEP4A	21DFP4	21XP4 21XP4A	2 XP4A
21CMP4	•21CBP4A	21YP4	21YP4A
21CQP4	21CQP4	21YP4A	0.175.115
21CUP4	21AMP4A	21ZP4	●21ZP4B
21CVP4 21CWP4	●21CBP4A	21ZP4A 21ZP4B	21ZP4B
21CXP4	21DSP4	23AFP4	23AFP4
21CZP4	•21DEP4A	23AHP4	23AHP4
21DAP4		23ALP4	23ALP4
21DEP4		23ANP4	23BKP4
21DEP4A 21DEP4A/	21DEP4A	23ASP4	23ASP4
21DEP4/		23AVP4	23AVP4
21CZP4		23AWP4	●23BJP4
21DFP4	21DFP4	23BDP4	23BDP4
21DHP4	21DHP4	23BJP4	23BJP4
21DLP4	21DLP4	23BKP4	23BKP4
21DMP4	21FAP4	23BLP4	238LP4
21DNP4	•21CBP4A	23BTP4	23BTP4
21DQP4	21DLP4	23CBP4	23CBP4
21DSP4	21DSP4	23CP4	23CP4
21EAP4	•21FDP4	23CTP4	23CTP4
21EMP4	21 EQP4	23EP4	23EP4
21EP4	•21EP4B	23FP4	23FP4
21EP4A 21EP4B	21EP4B	23GP4 23HP4	23CP4
21EQP4	21 EQP4	23MP4	23MP4

Bold-Face Type Indicates an Aluminized Tube

▲ The RCA type shown is a direct replacement unless otherwise indicated.

• Minor electrical and/or mechanical set modification may be required.



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

Type to be Replaced	Replace by RCA Type▲	Type to be Replaced	Replace by RCA Type▲
23UP4	23UP4	24DP4	
23WP4	23MP4	24DP4A	●24AEP4
23XP4 23YP4	23YP4	24DP4A/ 24YP4	
24ADP4		24QP4	•24CP4A
24ADP4/ 24VP4A/ 24VP4A/	24CP4A	247P4 24VP4 24VP4	24CP4A
24TP4		24XP4	•24CP4A
24AEP4	24AEP4	24YP4	•24AEP4
24AHP4	24AHP4	24ZP4	24AEP4
24ALP4	24AHP4	27EP4	●27RP4
24ANP4	•24AEP4	27GP4	-2/11/1
24ATP4	24ATP4	27MP4	27MP4
24AUP4	24AUP4	2 7NP4 27RP4	27RP4
24BAP4	248AP4	27VP4	•27XP4
24CP4 24CP4A	24CP4A	27VP4 27XP4	•27XP4
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Bold-Face Type Indicates an Aluminized Tube

The RCA type shown is a direct replacement unless otherwise indicated. • Minor electrical and/or mechanical set modification may be required.

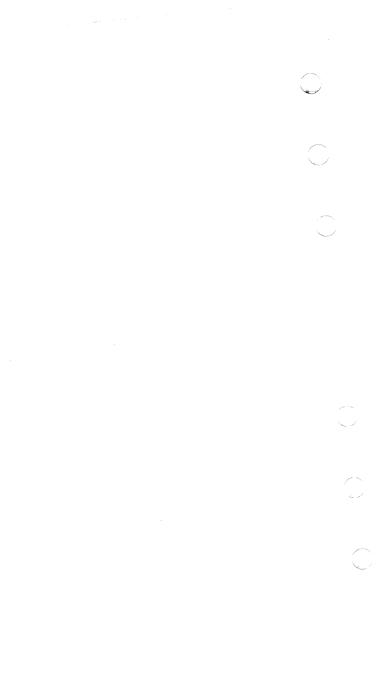


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RADIO CORPORATION OF AMERICA Electron Tube Division

Harrison, N. J.

REPLACEMENT GUIDE 3 1-62





FEATURES OF FLUORESCENT SCREENS

The fluorescent screens of the cathode-ray tubes covered in this Section are identified according to phosphor number, e.g., P1, P2, P4, P5, P7, etc.

Phosphor P1 produces a brilliant spot having yellowish-green fluorescence and medium persistence. Types having this phosphor are particularly useful for general oscillographic applications in which recurrent-wave phenomena are to be observed visually.

Phosphor P2 is a medium-persistence screen which exhibits yellowish-green fluorescence and phosphorescence. The phosphorescence may persist for over a minute under conditions of adequate excitation and low-ambient light. Types utilizing this phosphor are particularly useful for observing either low- ormedium-speed non-recurring phenomena.

Phosphor P4 is a highly efficient screen having white fluorescence and medium-short persistence. Types having this phosphor are of particular interest for television picture tubes.

Phosphor P5 produces a highly actinic spot having blue fluorescence and medium-short persistence. Types having this phosphor are especially useful in photographic applications involving film moving at very high speeds.

Phosphor P7 is a very long-persistence, cascade (two-layer) screen. During excitation by the electron beam, this phosphor produces a purplish-blue fluorescence. After excitation, the screen exhibits a yellowish-green phosphorescence which persists for several minutes. Types having this phosphor are particularly useful where either extremely low-speed recurrent phenomena or medium-speed non-recurrent phenomena are to be observed.

Phosphor P11 produces a brilliant actinic spotof blue fluorescence and medium-short persistence to permit its use in all photographic applications except those in which film moves at high speed. P11 screens, because of their unusually high brightness characteristic, may also be used for visual observation of phenomena.

Phosphor P12 is a long-persistence phosphor which exhibits both yellowish-orange fluorescence and phosphorescence. Types utilizing this phosphor are particularly useful for observing low- and medium-speed recurring phenomena.

Phosphor P14 is a long-persistence cascade (two-layer) screen. During excitation by the electron beam, this phosphor exhibits purplish-blue fluorescence. After excitation, it exhibits a yellowish-orange phosphorescence which persists for a little over a minute. Types utilizing this phosphorare particularly useful for observing either low- and medium-speed non-recurring phenomena or high-speed recurring phenomena.



FEATURES OF FLUORESCENT SCREENS

Phosphor P15 has radiation in the visible green region and in the invisible near-ultraviolet region. The ultraviolet radiation has short persistence which is appreciably shorter than that of the visible radiation. This phosphor finds application in flying-spot cathode-ray tubes.

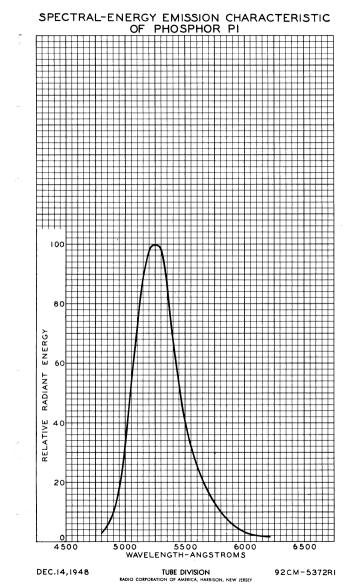
Phosphor P16 has violet as well as near-ultroviolet fluorescence and phosphorescence with very short persistence. This phosphor has a stable, exponential decay characteristic and is particularly useful for the high-speed scanning requirements of a flying-spot video-signal generator.

Phosphor P20 has high luminous efficiency, yellow-green fluorescence and medium-short persistence. The screen may be used in applications requiring relatively short persistence and good visual efficiency.

Phosphor P22 is the designation for three separate phosphors used in combination in a color picture tube. The separate phosphors are blue, green, and red, respectively. The persistence of the group phosphorescence is classified as medium.

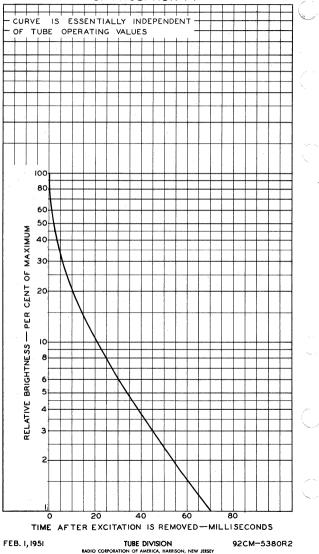
Phosphor P24 is a short-persistence phosphor with green fluorescence and phosphorescence. Its spectral-energy emission characteristic has sufficient range to provide useable energy over the visible spectrum required for generating color signals from color transparencies.



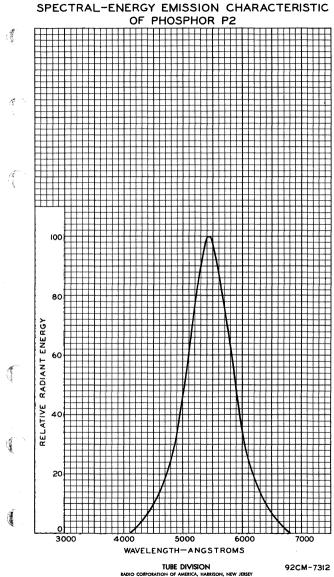




PERSISTENCE CHARACTERISTIC OF PHOSPHOR PI

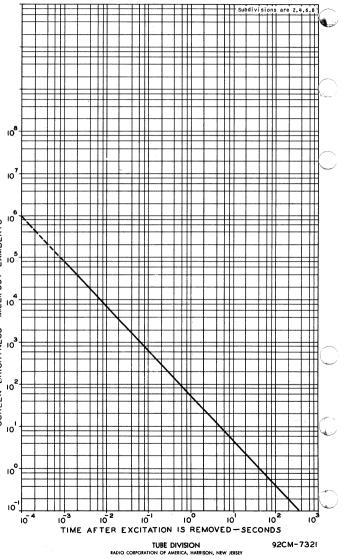




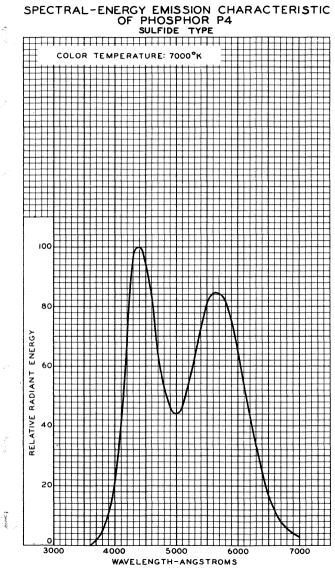




PERSISTENCE CHARACTERISTIC OF PHOSPHOR P2







TUBE DIVISION

92CM-7316

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



PERSISTENCE CHARACTERISTIC OF PHOSPHOR P4 SULFIDE TYPE

FOR KINESCOPES

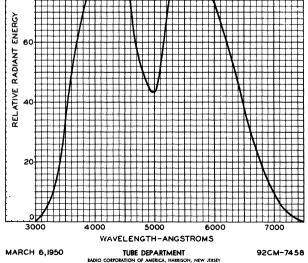
The persistence of the phosphorescence is such that its brightness does not exceed 7 per cent of the peak value in 33 milliseconds after excitation is removed.

FOR OSCILLOGRAPH TUBES

The persistence characteristics of the phosphorescence are the same as those shown for the P11 phosphor.

SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR Nº4 SILICATE-SULFIDE TYPE TTT -------TEMPERATURE: 6300°K COLOR 100 80 60

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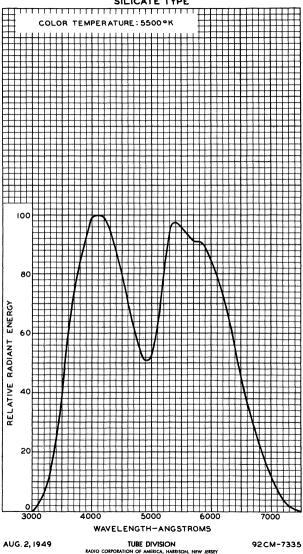


PERSISTENCE CHARACTERISTIC OF PHOSPOR Nº 4 SILICATE-SULFIDE TYPE

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. NOV. 1, 1950 PERSIST. P4 TUBE DEPARTMENT



SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR P4 SILICATE TYPE



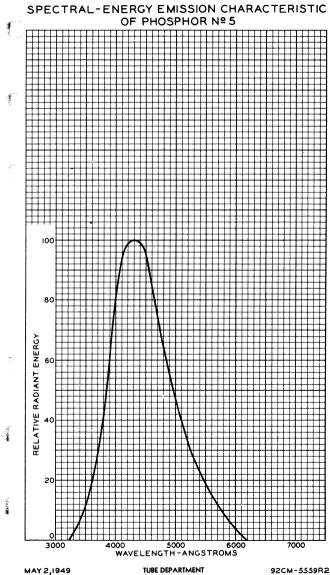


PERSISTENCE CHARACTERISTIC OF PHOSPOR P4 SILICATE TYPE

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.

PERSIST. P4 SILICATE

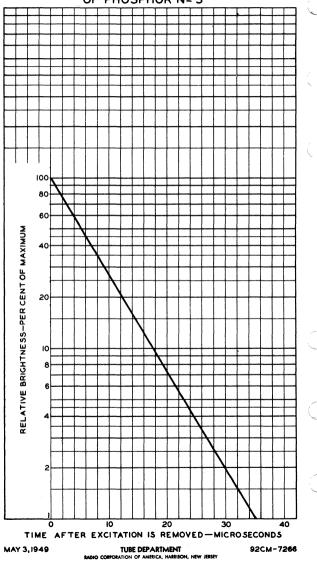




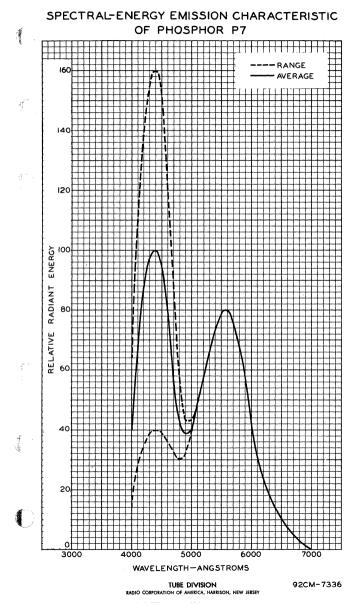
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



PERSISTENCE CHARACTERISTIC OF PHOSPHOR Nº 5

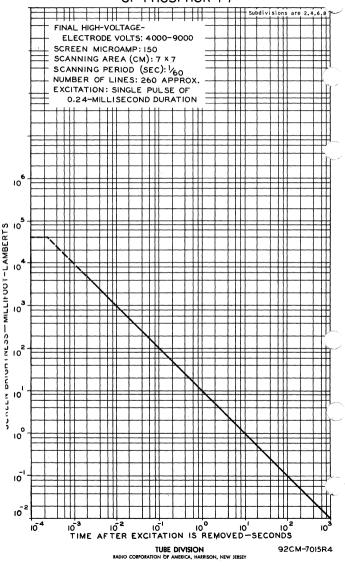








PERSISTENCE CHARACTERISTIC OF PHOSPHOR P7

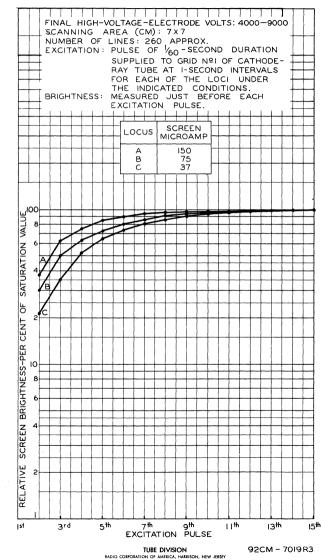




BUILDUP CHARACTERISTICS OF PHOSPHOR P7

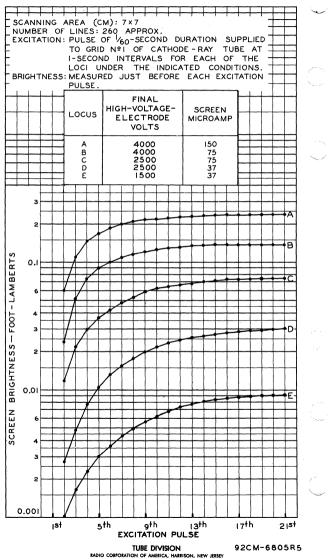
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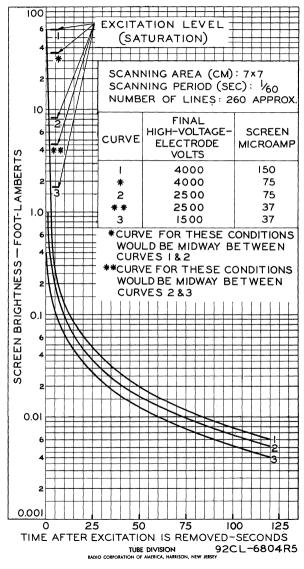


BUILDUP CHARACTERISTICS OF PHOSPHOR P7





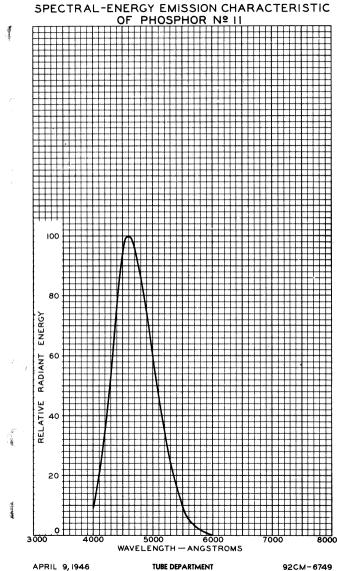
PERSISTENCE CHARACTERISTICS OF PHOSPHOR P7



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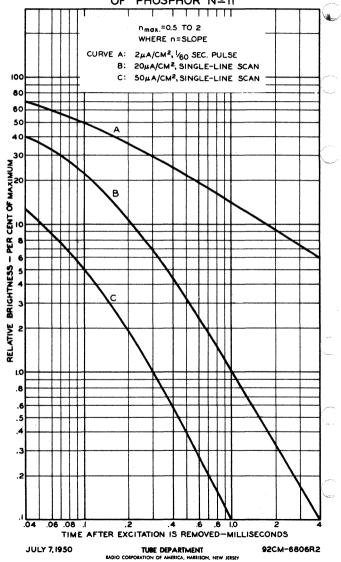


TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6749

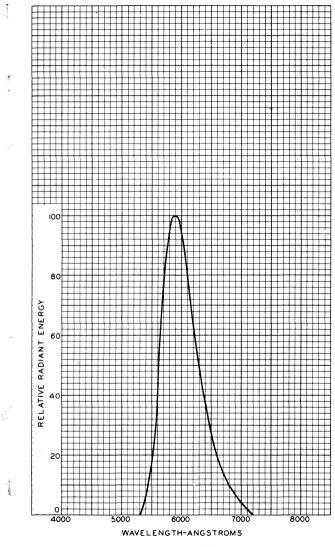


PERSISTENCE CHARACTERISTICS OF PHOSPHOR NºII





SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR P12

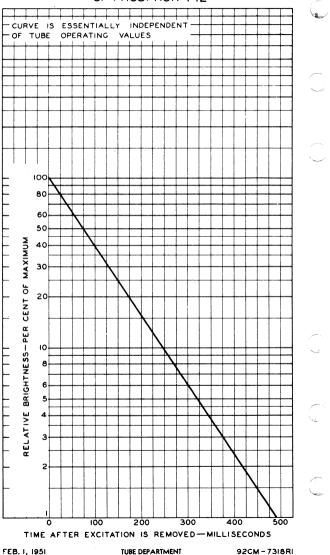


JULY 18, 1949

TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-7317



PERSISTENCE CHARACTERISTIC OF PHOSPHOR PI2

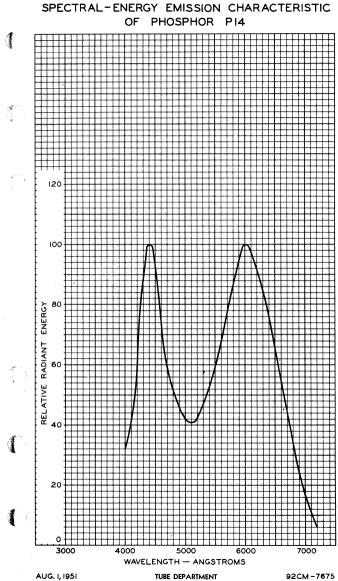


FEB. 1, 1951

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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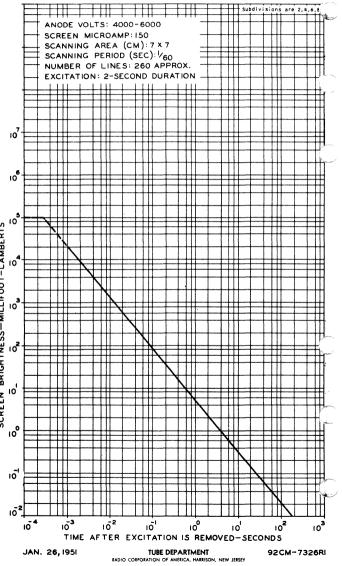




RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



PERSISTENCE CHARACTERISTIC OF PHOSPHOR P14

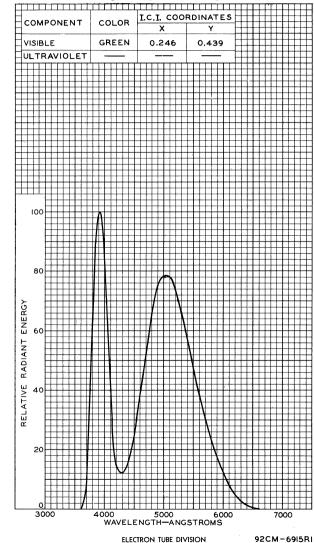




SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR PI5

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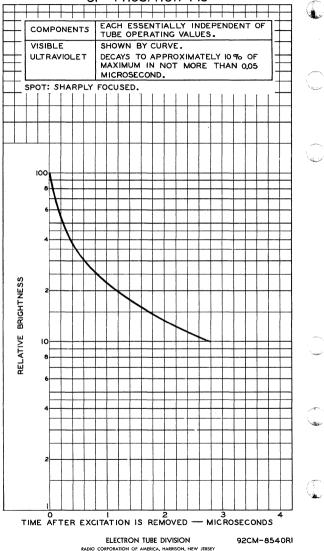
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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



PERSISTENCE CHARACTERISTIC OF PHOSPHOR PI5

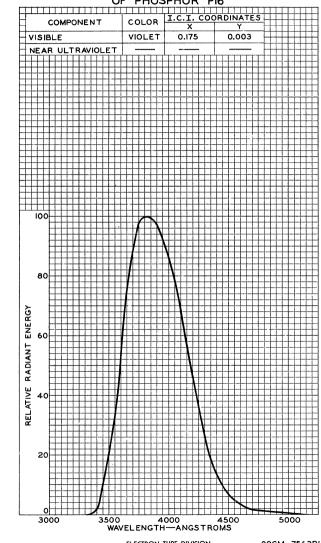




SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR PI6



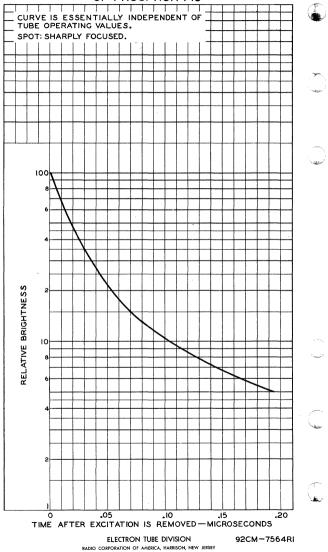
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ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM- 7563RI

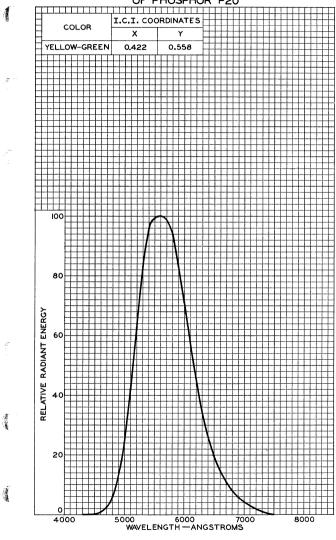


PERSISTENCE CHARACTERISTIC OF PHOSPHOR PI6





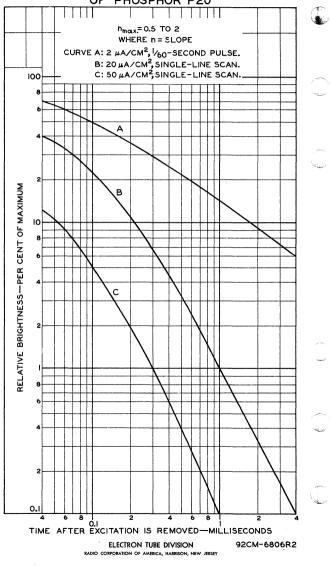
SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR P20



ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-7647RI



PERSISTENCE CHARACTERISTICS OF PHOSPHOR P20



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). COMPONENT COLOR CIE COORDINATES GENERAL JEDEC DESIGNATION* х ٧ DESCRIPTION BLUE PURPLISH-BLUE 0.146 0.052 GREEN YELLOWISH-GREEN 0.218 0.712 RED REDDISH-ORANGE 0.674 0.326 *JEDEC COLOR CLASSIFICATION CORRESPONDING CIE COORDINATE VALUES. то 100 80 RELATIVE RADIANT ENERGY 60 40 20 3500 4500 5500 6500 7500 WAVELENGTH-ANGSTROMS

92CM-7969R4



RADIO CORPORATION OF AMERICA Electron Tube Division

GROUP PHOS-PHOR P22 10-60

Harrison, N. J.

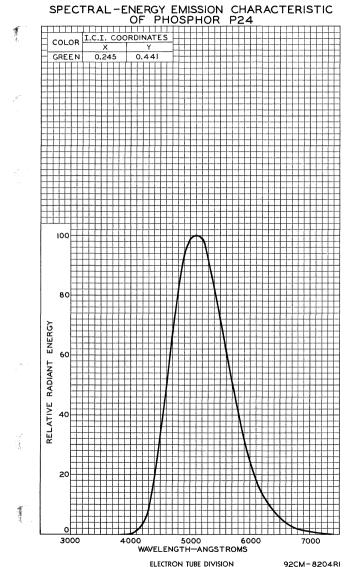
PERSISTENCE CHARACTERISTIC

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.



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

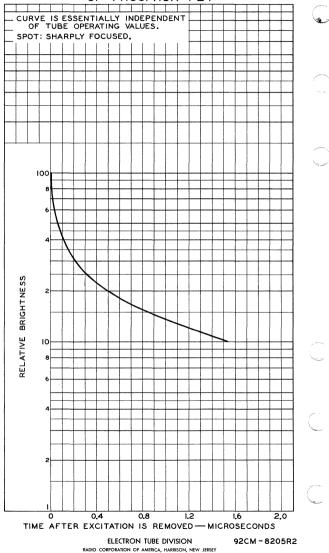




RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



PERSISTENCE CHARACTERISTIC OF PHOSPHOR P24



Picture-Tube Dimensional Outlines

The Dimensional Outlines on the following pages provide the basic dimensions of RCA 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 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.

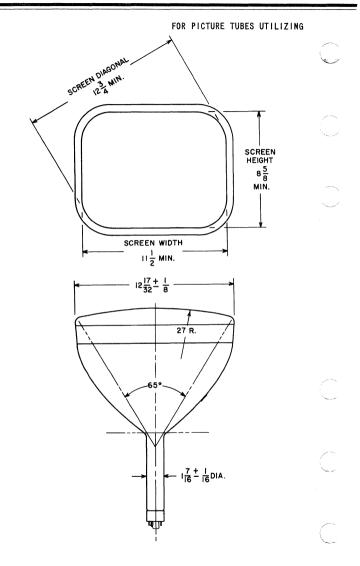


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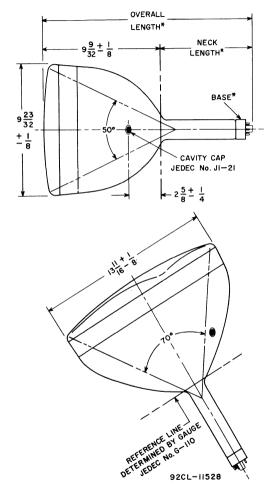
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES I 3-62





BULB J109-1/2 A/C

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ALL DIMENSIONS IN INCHES

* See data for specific tube type.



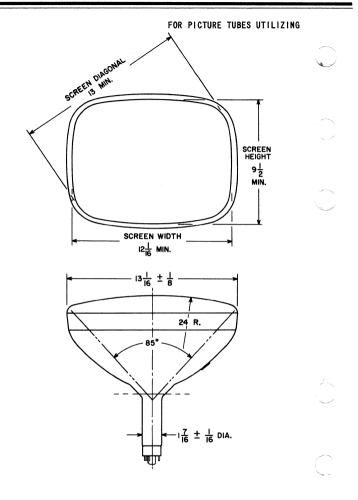
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RADIO CORPORATION OF AMERICA Electron Tube Division

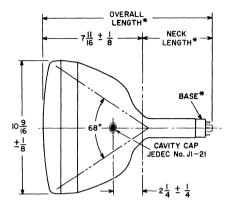
Harrison, N. J.

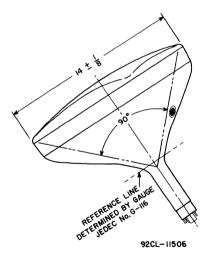
CRT OUTLINES 2 3-62





BULB JI12 A/B



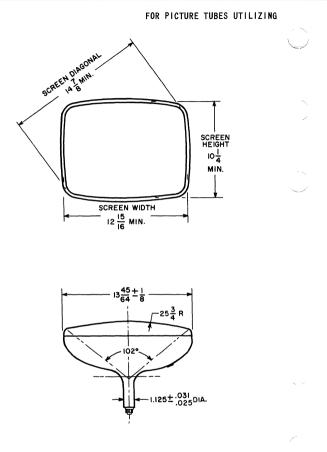


ALL DIMENSIONS IN INCHES

* See data for specific tube type.

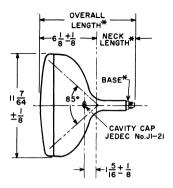


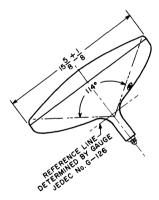
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 3 6-63





BULB J125 C2





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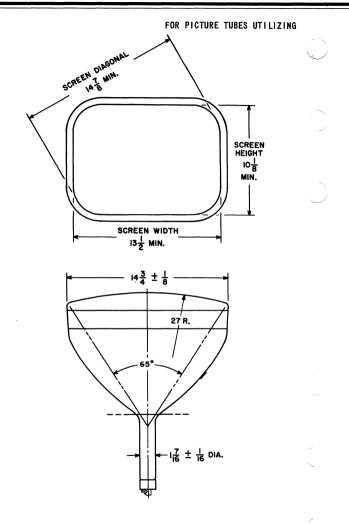
* See data for specific tube type.

Electron Tube Division



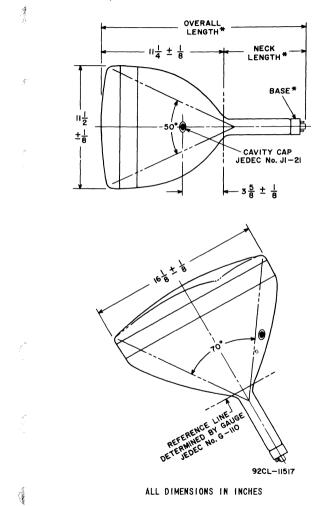
RADIO CORPORATION OF AMERICA Harrison, N. J.

CRT OUTLINES 3A 6-63





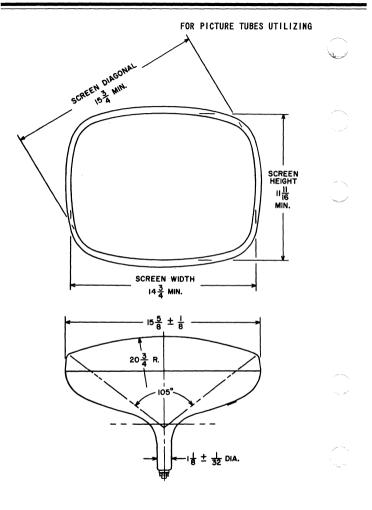
BULB J129 A/B



* See data for specific tube type.

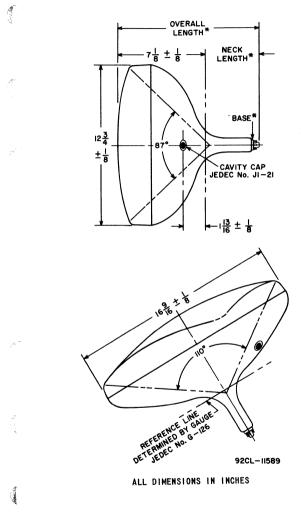


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 4 3-62





BULB J132-1/2 A/B



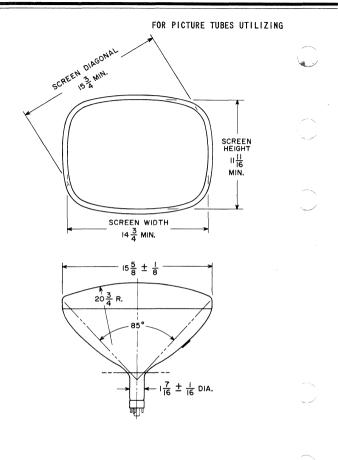
* See data for specific tube type.



RADIO CORPORATION OF AMERICA **Electron Tube Division**

Harrison, N. J.

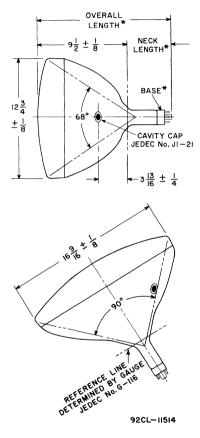
CRT OUTLINES 5 3-62





BULB J132-1/2 C/D

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ALL DIMENSIONS IN INCHES

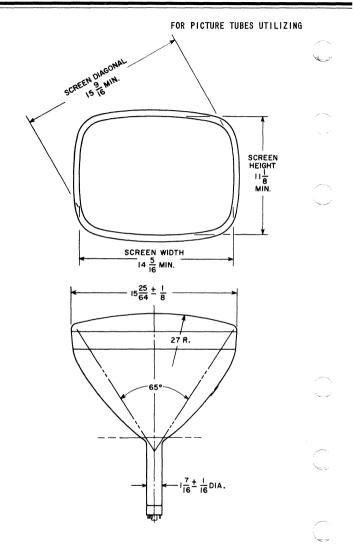
* See data for specific tube type.

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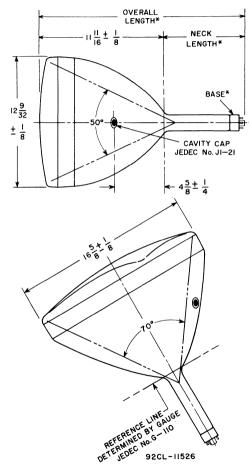
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 6 3-62





BULB JI33 B/D

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ALL DIMENSIONS IN INCHES

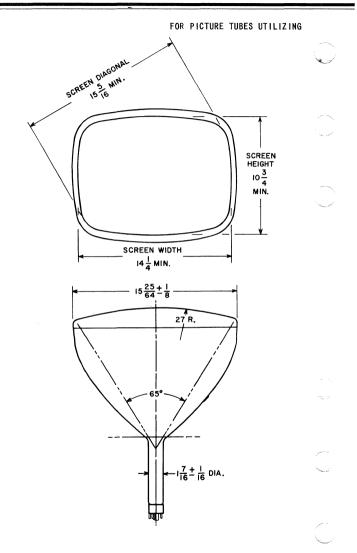
* See data for specific tube type.



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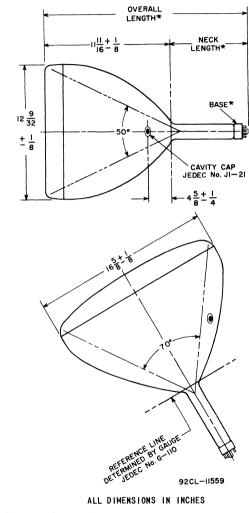
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 7 3-62





BULB JI33 C/E

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* See data for specific tube type.



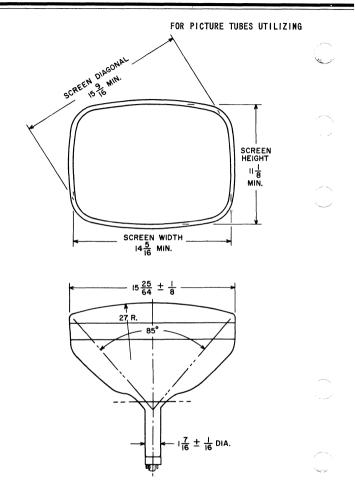
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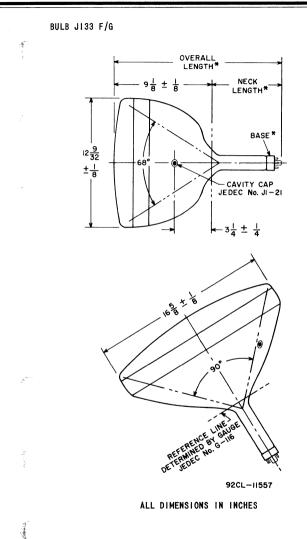
RADIO CORPORATION OF AMERICA Electron Tube Division

Harrison, N. J.

CRT OUTLINES 8 3-62







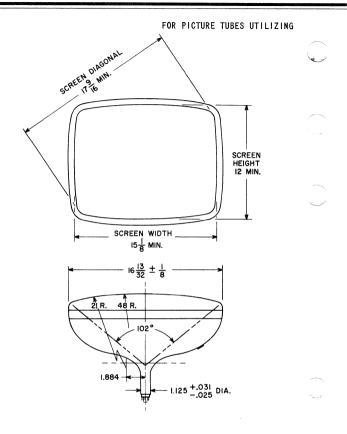
* See data for specific tube type.



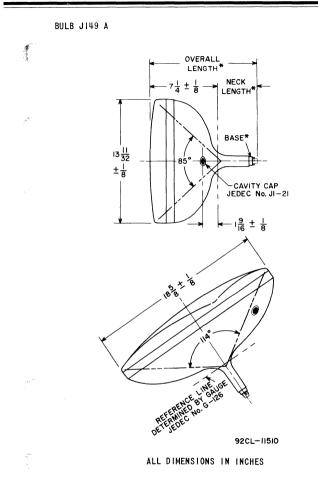
RADIO CORPORATION OF AMERICA **Electron Tube Division**

Harrison, N. J.

CRT OUTLINES 9 3–62





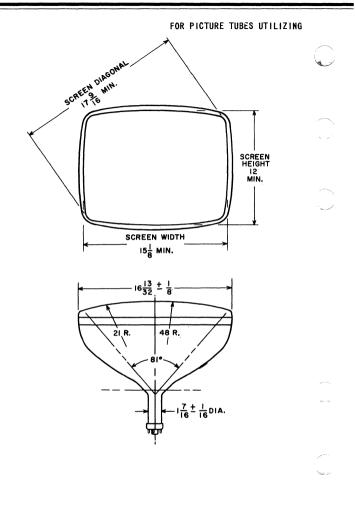


* See data for specific tube type.



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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 10 3-62



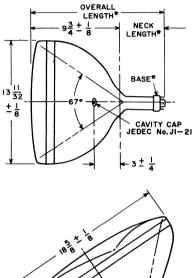
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

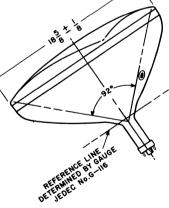




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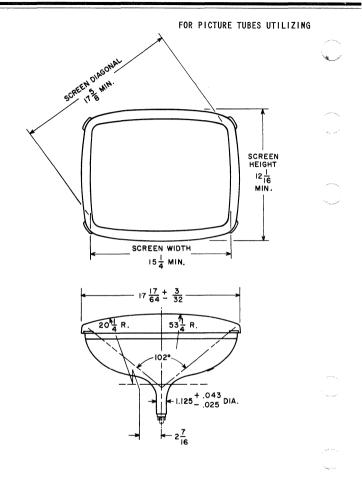
ALL DIMENSIONS IN INCHES

* See data for specific tube type.



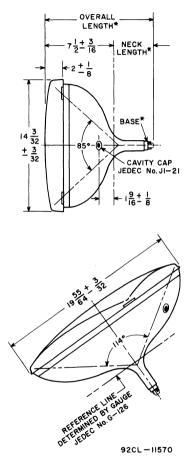
Richard

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





BULB J149 C AND PROTECTIVE PANEL



ALL DIMENSIONS IN INCHES

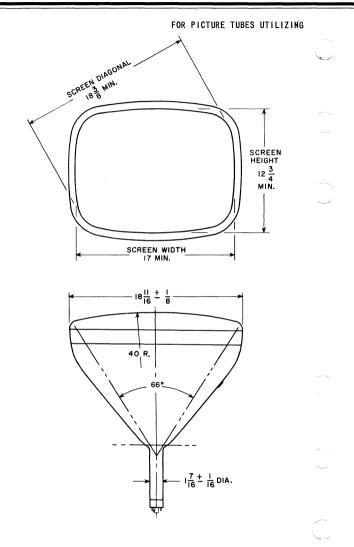
O80 14.

* See data for specific tube type.



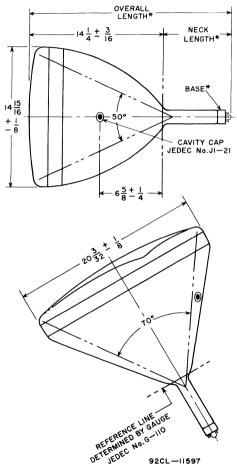
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 12 3-62

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BULB JIGI C/D

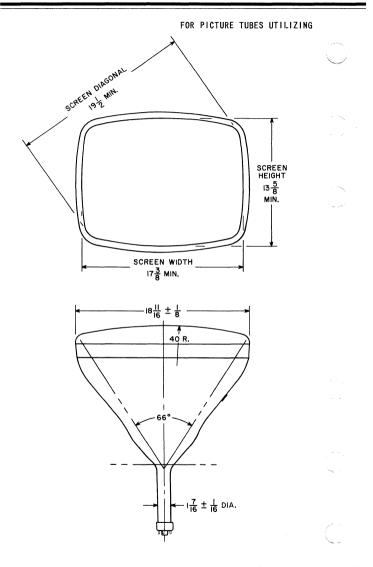


ALL DIMENSIONS IN INCHES

* See data for specific tube type.

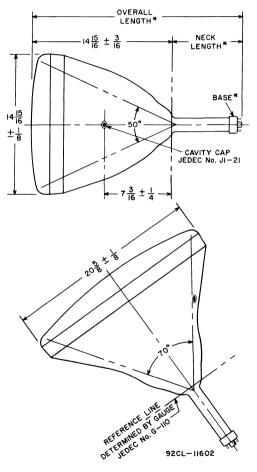


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 13 3-62





BULB J165 Z



ALL DIMENSIONS IN INCHES

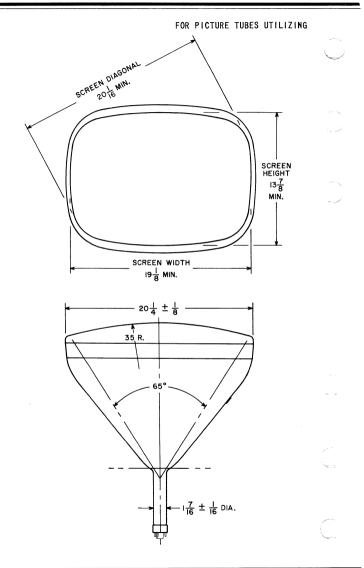
*See data for specific tube type.



RADIO CORPORATION OF AMERICA **Electron Tube Division**

Harrison, N. J.

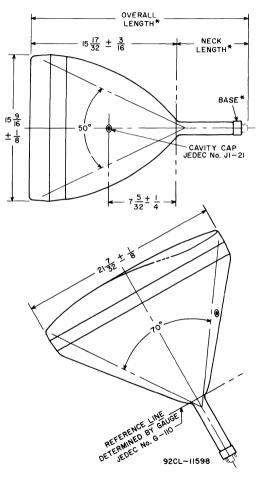
CRT OUTLINES 14 3-62





BULB J170 A/C

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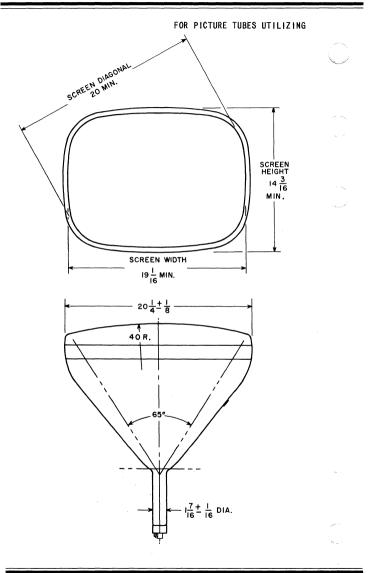


ALL DIMENSIONS IN INCHES

* See data for specific tube type.



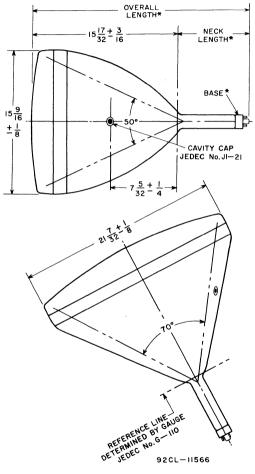
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



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



BULB JI70 B/D

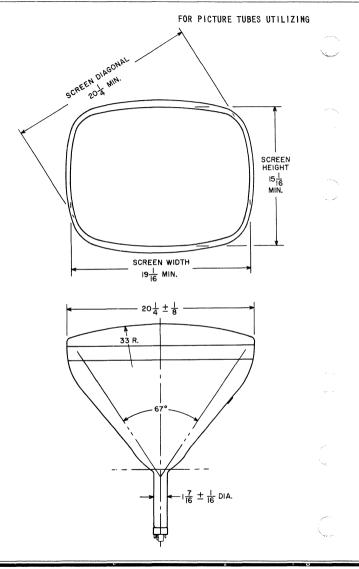


ALL DIMENSIONS IN INCHES

* See data for specific tube type.



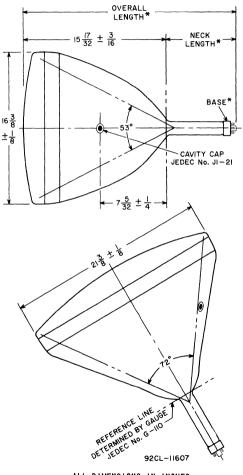
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 16 3-62





BULB J171 B/F

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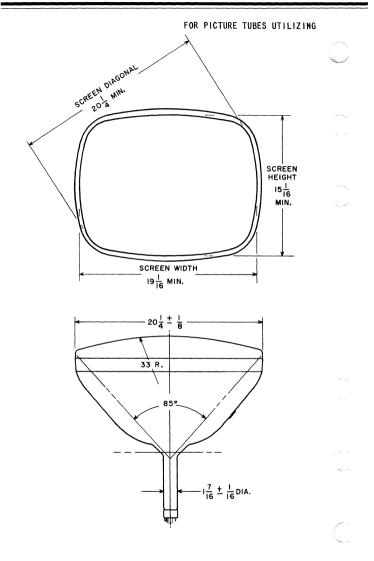


ALL DIMENSIONS IN INCHES

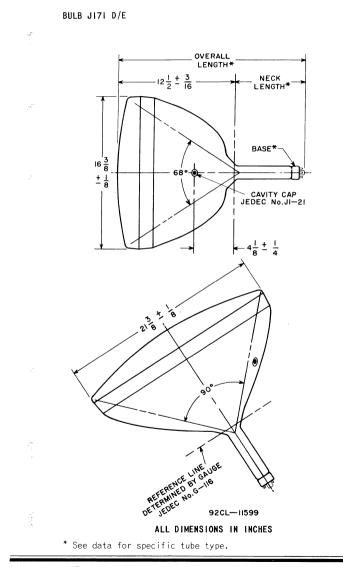
*See data for specific tube type.



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 17 3-62

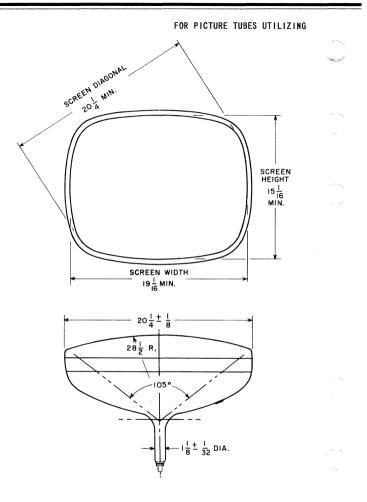




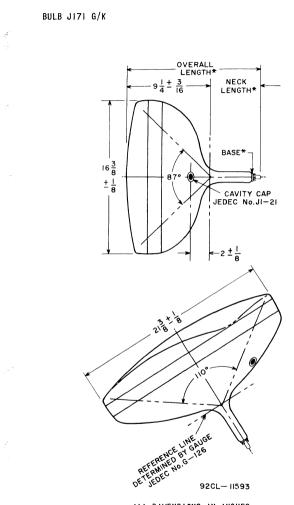




RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 18 3-62







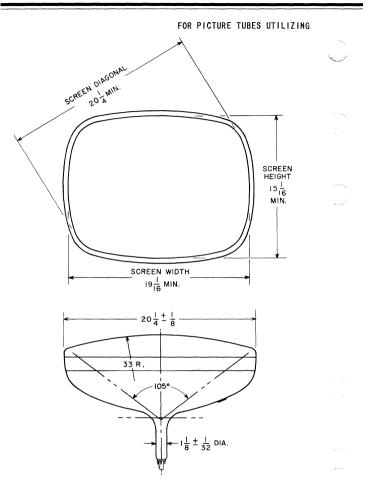
ALL DIMENSIONS IN INCHES

* See data for specific tube type.



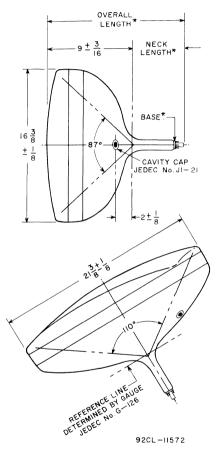
George .

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 19 3-62





BULB JI71 H/J



ALL DIMENSIONS IN INCHES

*See data for specific tube type.

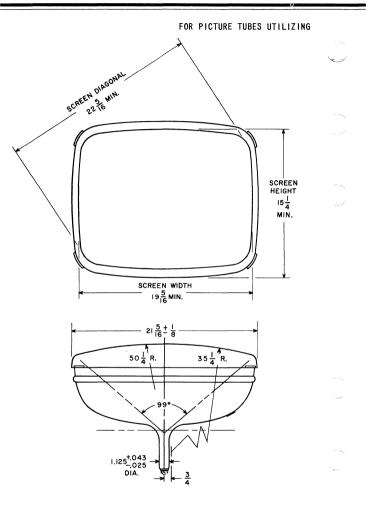


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RADIO CORPORATION OF AMERICA **Electron Tube Division**

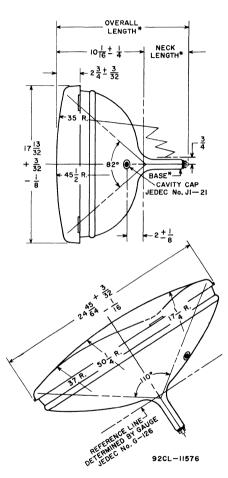
Harrison, N. J.

CRT OUTLINES 20 3-62





BULB J187 A AND PROTECTIVE PANEL

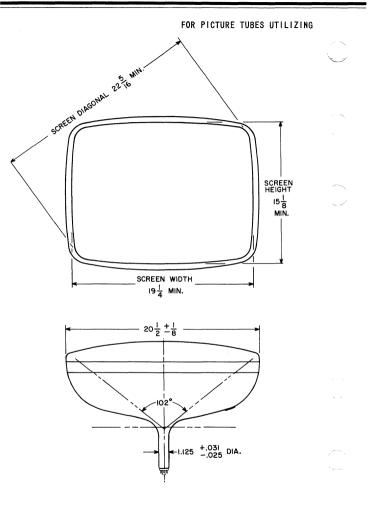


ALL DIMENSIONS IN INCHES

* See data for specific tube type.

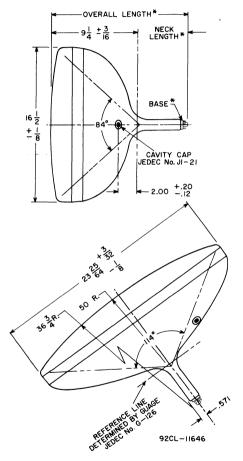


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 21 3-62









ALL DIMENSIONS IN INCHES

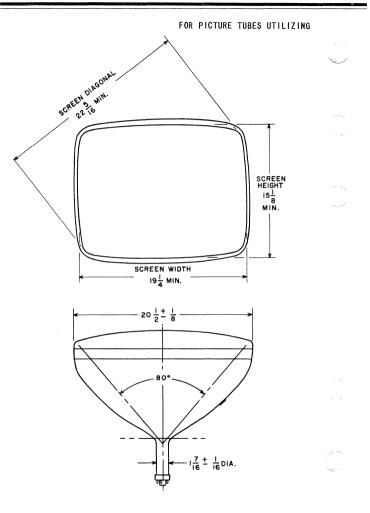
* See data for specific tube type.



RADIO CORPORATION OF AMERICA **Electron Tube Division**

Harrison, N. J.

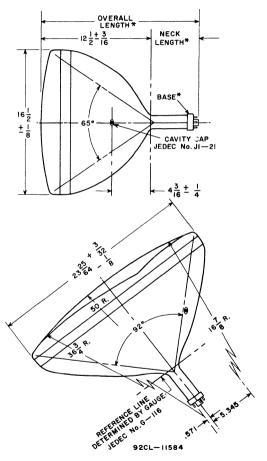
CRT OUTLINES 22 3-62





BULB J187 C/F

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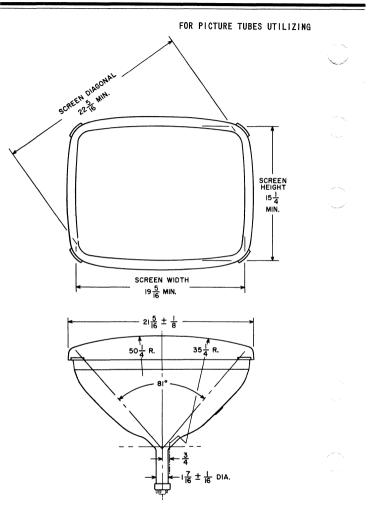


ALL DIMENSIONS IN INCHES

* See data for specific tube type.

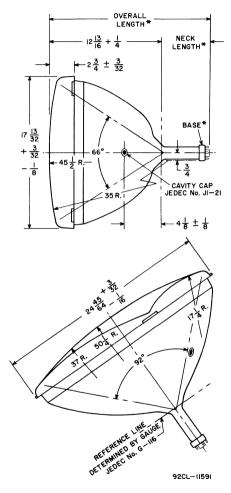


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 23 3-62





BULB J187 D/G AND PROTECTIVE PANEL

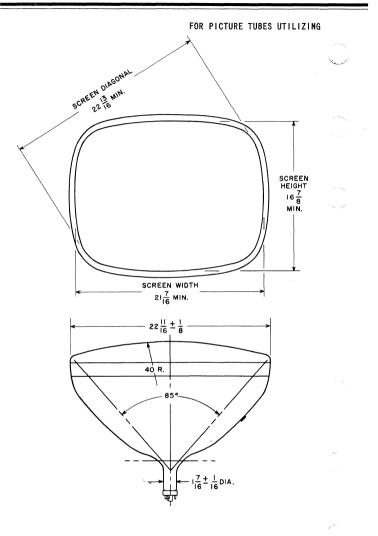


ALL DIMENSIONS IN INCHES

* See data for specific tube type.

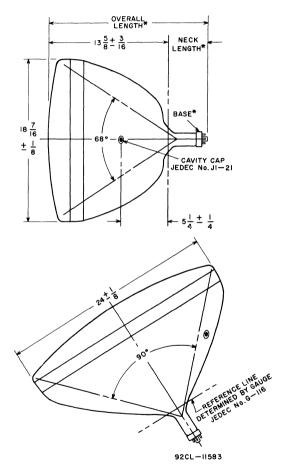


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 24 3-62







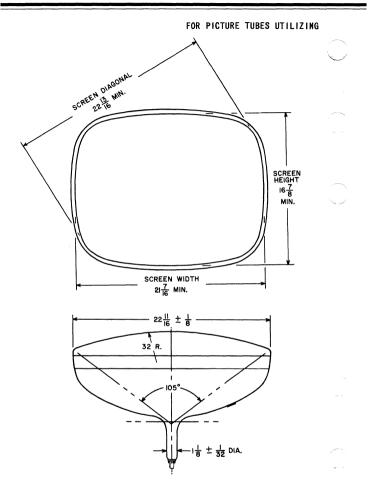


ALL DIMENSIONS IN INCHES

* See data for specific tube type.



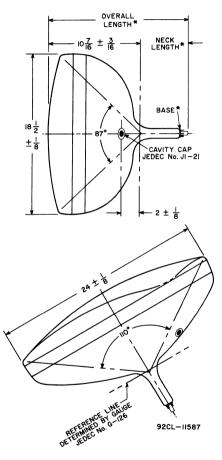
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 25 3-62





BULB J192 C/D

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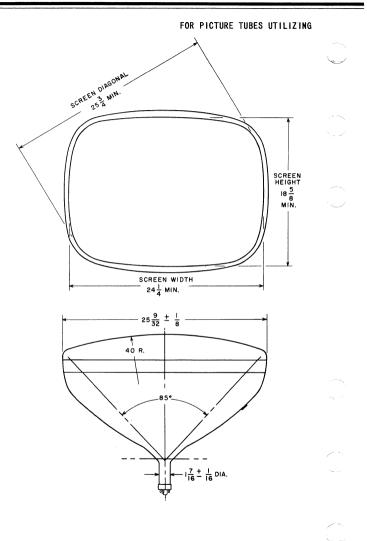
ALL DIMENSIONS IN INCHES

* See data for specific tube type.



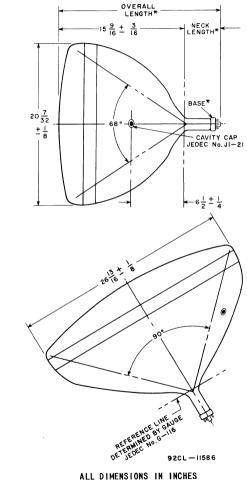
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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 26 3-62





BULB J214-1/2 A



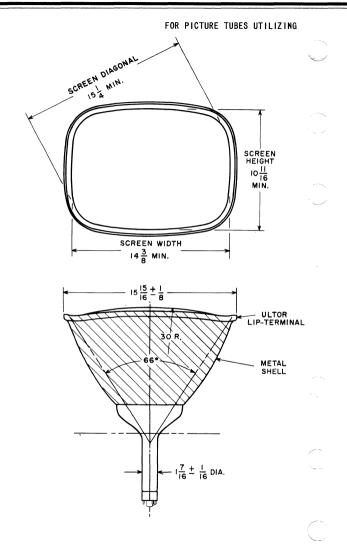
* See data for specific tube type.



RADIO CORPORATION OF AMERICA **Electron Tube Division**

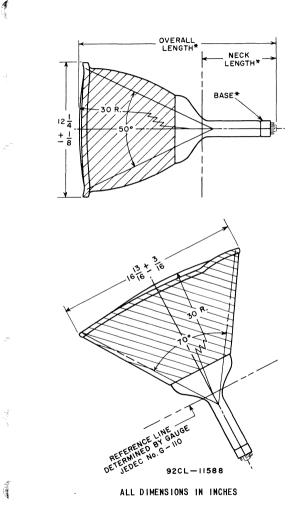
Harrison, N. J.

CRT OUTLINES 27 3-62





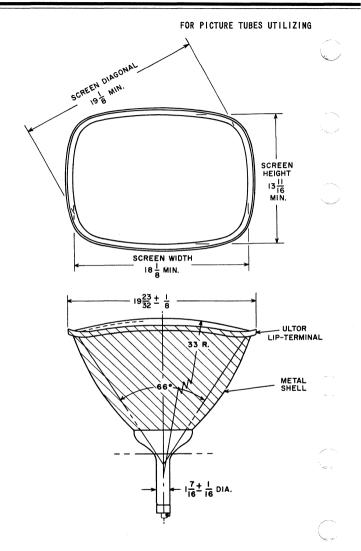
BULB MJ135 A



* See data for specific tube type.



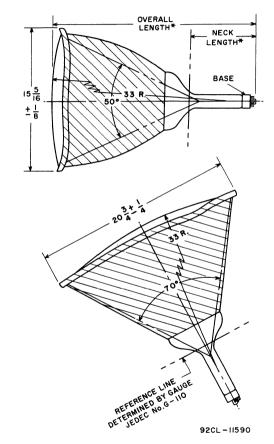
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 28 3-62





BULB MJ166 A

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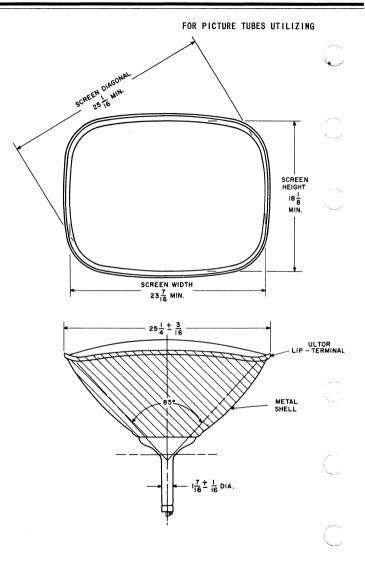
ALL DIMENSIONS IN INCHES

* See data for specific tube type.



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 29 3-62

Dimensional Outline

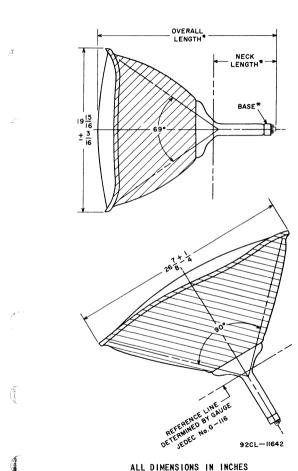


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



BULB MJ214 A

Ser.



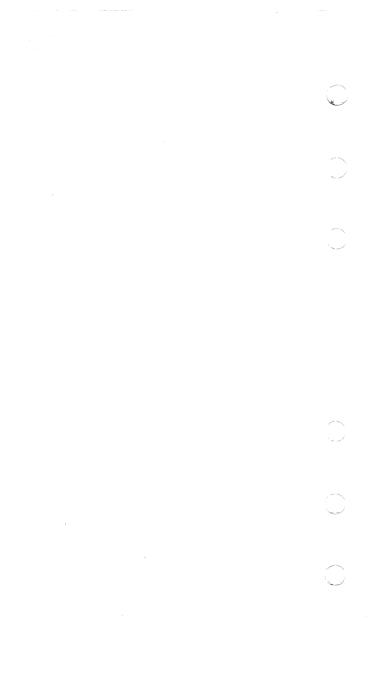
ALL DIMENSIONS IN INCHES

* See data for specific tube type.

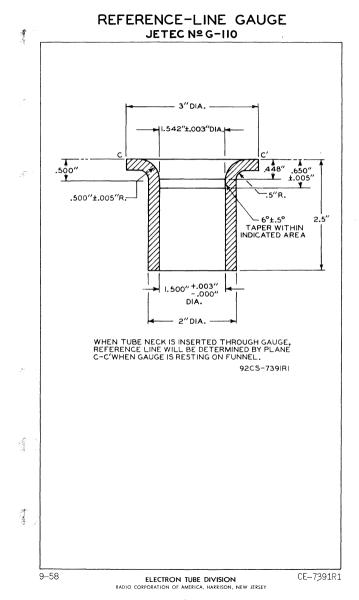


RADIO CORPORATION OF AMERICA **Electron Tube Division** Harrison, N. J.

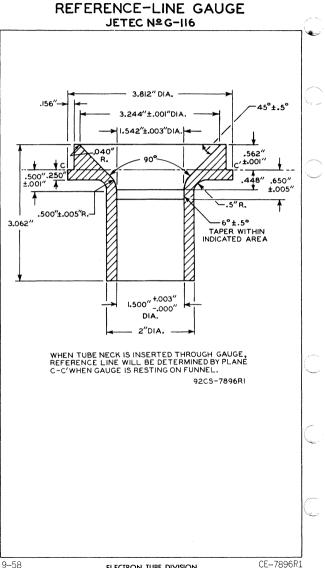
CRT OUTLINES 30 3-62





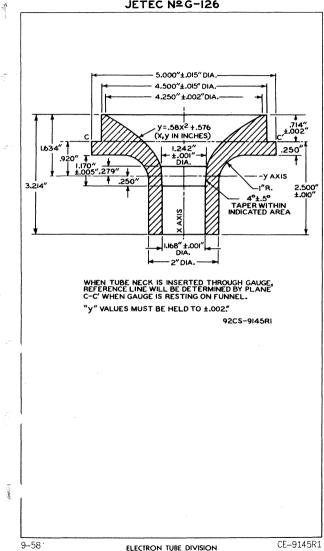












RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



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.



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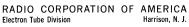
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. X-RADIATION PRECAUTIONS 3-62

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.









ELECTROSTATIC FOCUS ELECTRO

ELECTROSTATIC DEFLECTION

DATA

DATA
General:
Heater, for Unipotential Cathode: Voltage ac or dc volt: Voltage 0.6 ± 10% am Direct Interelectrode Capacitances (Approx.): Grid No.1 to all other electrodes 6.5 μμ Deflecting electrode DJ; to 6.7 4.7 μμ Deflecting electrode DJ2 1.7 μμ Deflecting electrode DJ4 0.6 μμ DJ; to all other electrodes 5 μμ DJ; to all other electrodes 5 μμ DJ; to all other electrodes 5 μμ DJ; to all other electrodes 3.8 μμ DJ; to all other electrodes 6.7 Phosphor (For Curves, see front of this Section) Fluorescence Phosphorescence Position Maximum Diameter Maximum Diameter Maximum Diameter Muthod
Pin 1 - Heater Pin 2 - Heater Pin 3 - Grid No.1 Pin 4 - Cathode Pin 5 - Grid No.3 Pin 6 - Deflecting Electrode DJ4 Pin 7 - Deflecting Electrode DJ3 Pin 10 - Deflecting Electrode DJ3 Pin 11 - Internal Connection- Do Not Use
DJ_1 and DJ_2 are nearer the screen DJ_3 and DJ_4 are nearer the base
6-56 TENTATIVE DATA

4

TUBE DIVISION



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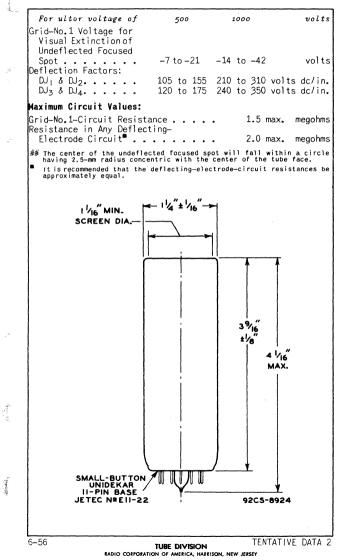
OSCILLOGRAPH TUBE

n			
With DJ ₂ positive with respect to toward the midpoint between pins with respect to DJ4, the spot is o between pins 9 and 10.	5 DJ, the sp 6 and 7. Wi leflected towa	ot is defi th DJ3 pos ard the mid	lected sitive dpoint
The angle between the trace prod intersection with the plane thr midpoint between pins 9 and 10 do	ough the tub	e axis an	
The angle between the trace prod trace prod trace produced by \mathbb{D}_1 and \mathbb{D}_2 is		and DJ4 ar	nd the
Maximum Ratings, Design-Center Va	lues:		
ULTOR VOLTAGE	1	500 max. 200 max.	volts volts
Negative bias value		200 max. 0 max.	volts volts
Positive peak value		2 max.	volts
PEAK VOLTAGE BETWEEN ULTOR AND			
ANY DEFLECTING ELECTRODE PEAK HEATER-CATHODE VOLTAGE:		500 max.	volts
Heater negative with respect to	cathode.	125 max.	volts
Heater positive with respect to		125 max.	volts
Equipment Design Ranges:			
For any ultor voltage $(E_{C,\mu})$ bet	ween *		·
recommend	ed minimum [®] a	nd 1500 vo	lts
Grid-No.3 Voltage	1. 20 <i>%</i> - £ E		
Grid—No.1 Voltage for Visual Extinction of Undeflected Focused	to 30% of E _c	•	volts
Spot1.4% Grid-No.3 Current for Any Operating Con-	to -4.2% of	Ec4	volts
dition	–15 to +10		μ amp
Deflection Factors:	210 to 310 v d	clin /ky	of Fall
$ \begin{array}{c} \square_{1} & \square_{2} \\ \square_{3} & \square_{4} \\ \end{array} $	240 to 350 v d		
Spot Position	##		
Examples of Use of Design Ranges:			(
For ultor voltage of	500	1000	volts
Grid-No.3 Voltage for Focus		0 to 300	
Brilliance and definition decrease wi ommended minimum for the 1EP1 in gen value as low as 300 volts may be used deflection and low ambient light lew and 500 volts, it is essential that th beam-current flow. Otherwise, a sc: off or distort the scanning pattern.	th decreasing ul eral service is under conditior vels. For opera e ultor voltage reen charge may	tor voltage 500 volts, as of low-ve ation betwe be applied develop to	. Rec- but a locity en 300 before block
##: See next page.			
6-56	T	ENTATIVE D	DATA 1
TUBE DIVIS	ION		

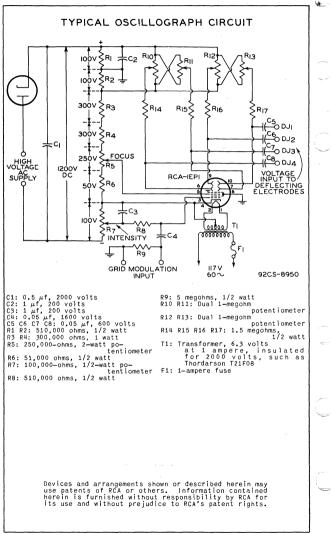


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OSCILLOGRAPH TUBE







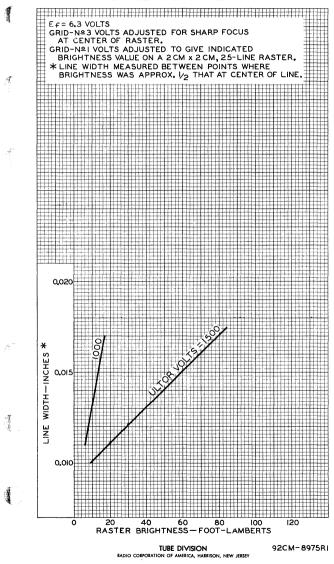
CE-8950

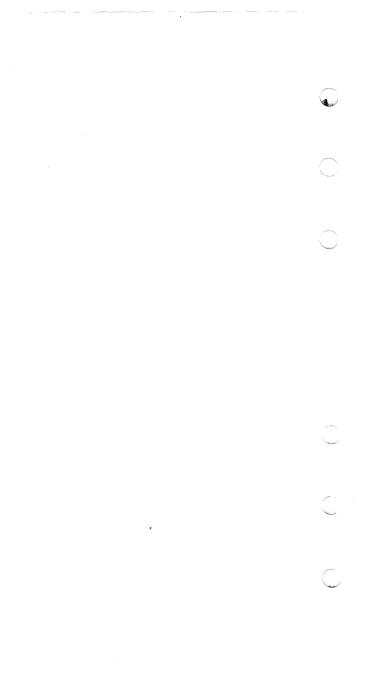
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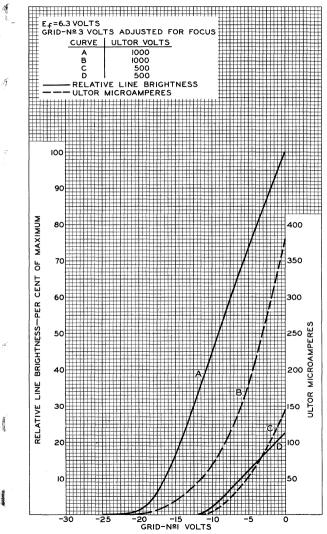
AVERAGE CHARACTERISTICS





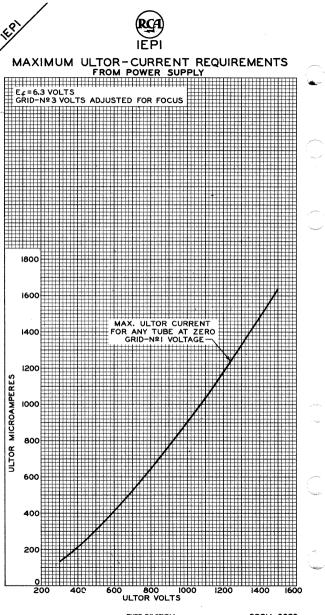


AVERAGE CHARACTERISTICS



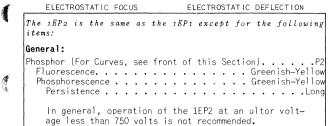
TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-8938

(Es)

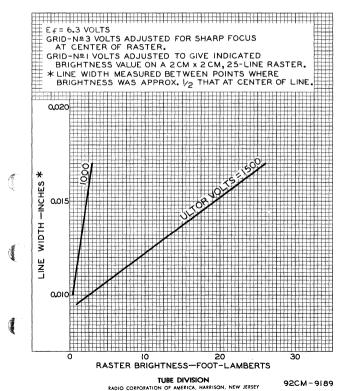


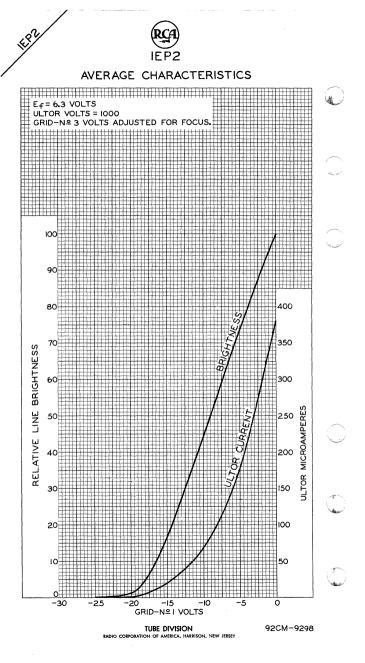
TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRIS DN, NEW JERSEY 92CM-8939



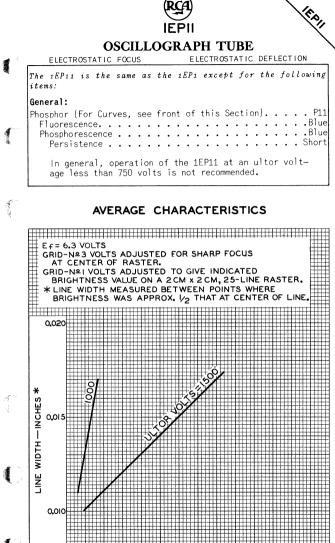


AVERAGE CHARACTERISTICS









TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6

RASTER BRIGHTNESS-FOOT-LAMBERTS

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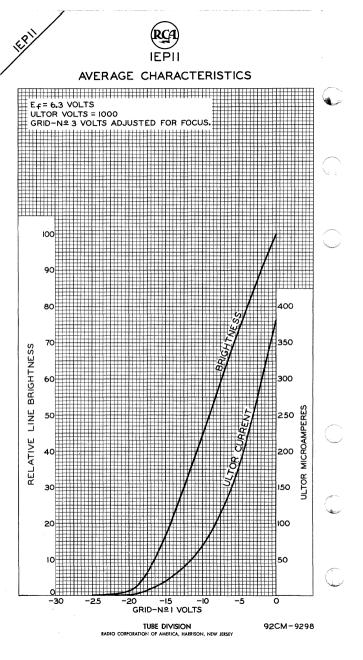
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92CM-9188

12







Supersedes Type 2AP1

General:

	Heater, for Unipotential Cathode: Voltage
	$D\!J_1$ and $D\!J_2$ are nearer the screen $D\!J_3$ and $D\!J_4$ are nearer the base
9	With DJ $_{\rm D}$ positive with respect to DJ $_2,$ the spot is deflected toward pin 4. With DJ $_3$ positive with respect to DJ $_4,$ 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 pin 1 does not exceed 10° .
,	The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is $90^{\circ} \pm 4^{\circ}$.

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HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)	I G
Maximum Ratings, Absolute Values:	1
ANODE-No.2 & GRID-No.2 VOLTAGE 1100 max. volts	
ANODE-NO.1 VOLTAGE	
Negative Value	
Positive Value 0 max. volts	
PEAK VOLTAGE BETWEEN ANODE NO.2 AND ANY DEFLECTING ELECTRODE 660 max. volts PEAK HEATER-CATHODE VOLTAGE:	1
Heater negative with respect to cathode 125 max. volts Heater positive with respect to cathode 10 max. volts	
Typical Operation:	100
	N .
Anode-No.2& Grid-No.2 Voltage* . 500 1000 volts Anode-No.1 Voltage for Focus at 75% of Grid-No.1 Volt-	
age for Cutoff 125 250 volts	
Grid-No.1 Volt. for Visual Cutoff# -30 -60 volts	
Max. Anode-No.1 Current Range▲ . Between -50 and +10 μamp. Deflection Sensitivity:	
DJ1 and DJ2 0.220 0.110 mm/v dc	
DJ3 and DJ4 0.260 0.130 mm/v dc	
Deflection Factor: **	
DJ1 and DJ2 115 230 v dc/in. DJ3 and DJ4 98 196 v dc/in.	
★ Brilliance and definition decrease with decreasing anode—No.2 voltage. In general, anode—No.2 voltage should not be less than 500 volts.	
 Individual tubes may require between +20\$ and -45\$ of the values shown with grid-No.1 voltages between zero and cutoff. 	
Visual extinction of stationary focused spot. Supply should be adjust-	
If Visual extinction of stationary focused spot. Supply should be adjust- able to ± 50\$ of these values.	
See curve for average values. ** Individual tubes may vary from these values by ± 20%.	
Spot Position:	· · · ·
The undeflected focused spot will fall within a 10-mm square centered at the geometric center of the tube face and having	
one side parallel to the trace produced by DJ_1 and DJ_2 . Suit-	
able test conditions are: anode-No.2 voltage, 1000 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 applica-	1
tion 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	
JULY 1. 1945 DATA 1	

2APTA



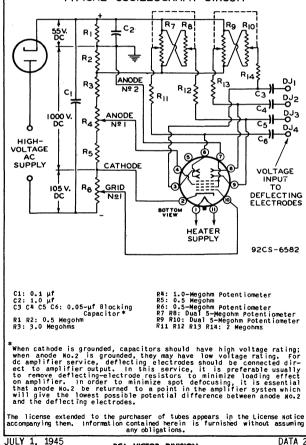
HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

Resistance in Any Deflecting-Electrode Circuit megohms 5.0 max.

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

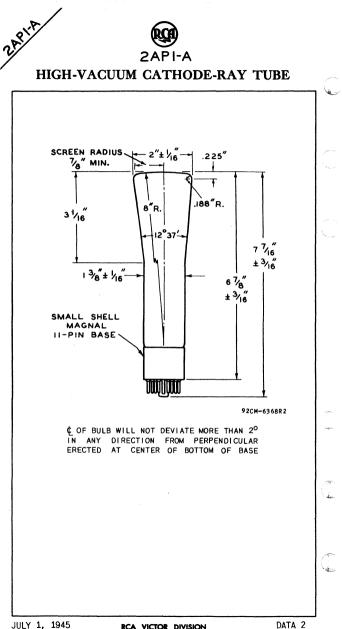
TYPICAL OSCILLOGRAPH CIRCUIT



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DATA 2

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ati-	OSCILLOGRAPH TUBE					
東北	ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION					
	DATA General:					
1	Current 0.6 Direct Interelectrode Capacitances (Approx.): Grid No.1 to All Other Electrodes	<pre> μμf μμf μμf μμf μμf μμf μμf βren Medium Electrostatic Electrostatic Electrostatic 2" ± 1/16" 1/4" Any odecal 12-Pin 12E ode No.2, flecting ectrode DJ2 eflecting lectrode DJ1</pre>				
and the second second	DJ_4 Pin 12-H DJ, and DJ_2 are nearer the screen					
÷.	DJ_3 and DJ_4 are nearer the base					
14	With DJ1 positive with respect to DJ2, the spot toward pin 4. With DJ3 positive with respect spot is deflected toward pin 1. The plane through the tube axis and pin No.4 mm the trace produced by DJ1 and DJ2 by an angula	to DJ4, the ay vary from				
1	(measured about the tube axis) of 10° . The angle between DJ1 - DJ2 trace and DJ3 - D					
	900 ± 3°.	cates a change.				

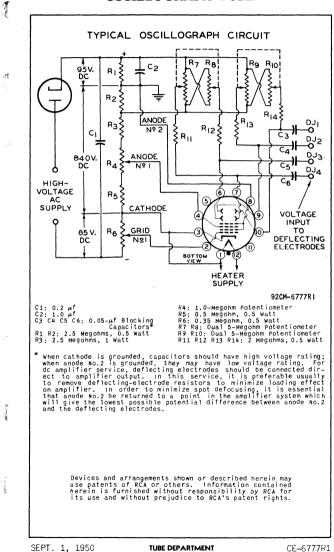
SEPT. 1, 1950



		No.
	Maximum Ratings, Design-Center Values:	
	ANODE-No.2• VOLTAGE	
	ANODE-No.1 VOLTAGE 1000 max. volts	
~	GRID-No.1 VOLTAGE:	
	Negative bias value	\sim
	Positive bias value	
	PEAK VOLTAGE BETWEEN ANODE No.2 AND	\sim
	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 anode-No.2 voltage (E_{b_2}) between 500* and 2500 volts)
	Anode-No.1 Voltage 15% to 28% of Eb ₂ volts	
->	Max. Grid-No.1 Voltage	
	for Visual Cutoff 6.75% of Eb ₂ volts	
	Max. Anode-No.1	
	Current Range15 to +10 microamperes	
	Deflection Factors: DJ_1 & DJ_2 115 to 155 v dc/in./kv of Eb2	
	D1 & D2 115 to 155 v dc/in./kv of Eb2 D3 & D4 74 to 100 v dc/in./kv of Eb2	
->	Spot Position	
	Examples of Use of Design Ranges:	
	For anode-No.2 voltage of 1000 2000 volts	
	Anode-No.1 Voltage 150 - 280 300 - 560 volts	
	Max. Grid-No.1 Voltage for Visual Cutoff. 67.5 -135 volts	
	Deflection Factors:	
	DJ1 & DJ2 115-155 230-310 volts dc/in.	\sim
	DJ3 & DJ4 74-100 148-200 volts dc/in.	s
	Maximum Circuit Values:	
	Grid-No.1-Circuit Resistance 1.5 max. megohms	
	Resistance in Any Deflecting-	
	Electrode Circuit ^o 5.0 max. megohms	
	* prilliance and definition decrease with decreasing anode-No.2 voltage.	, P
	* 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.	S.
	o It is recommended that the deflecting-electrode-circuit resistances	
	be approximately equal.	
	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 voitage and average anode-No.2 current should be limited to 6 watts.	
	The center of the undeflected, focused spot will fall within a circle	
	D 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.	1
		1 Mar
	→Indicates a change.	

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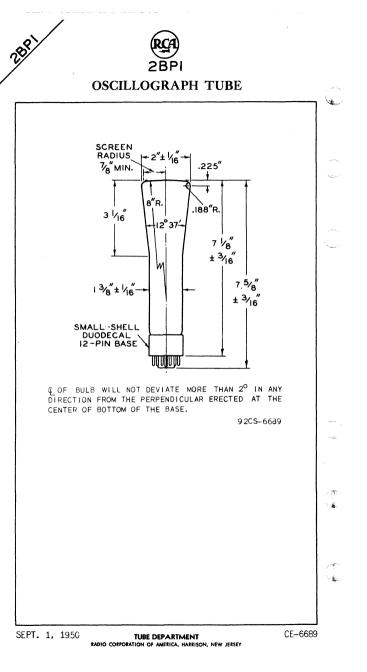


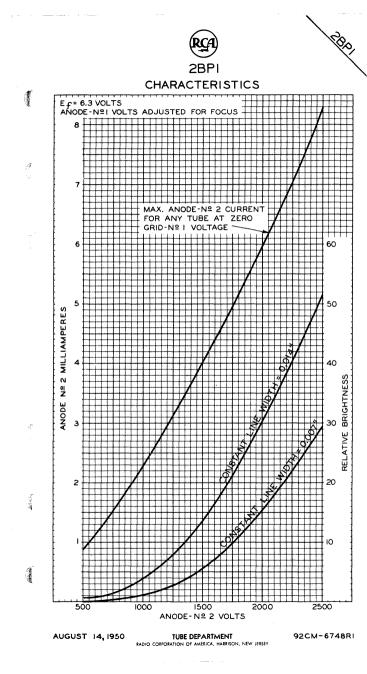


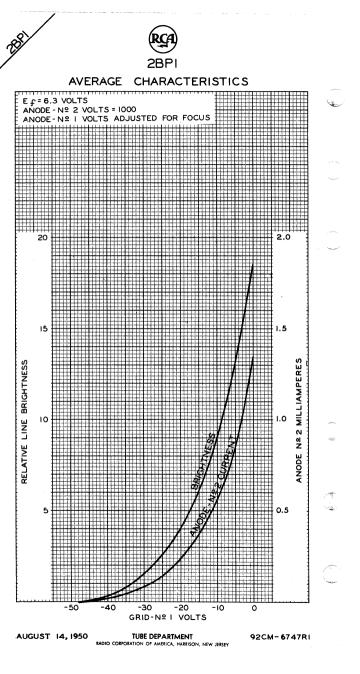
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CE-6777R1

FBP









ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

78_{0/}

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



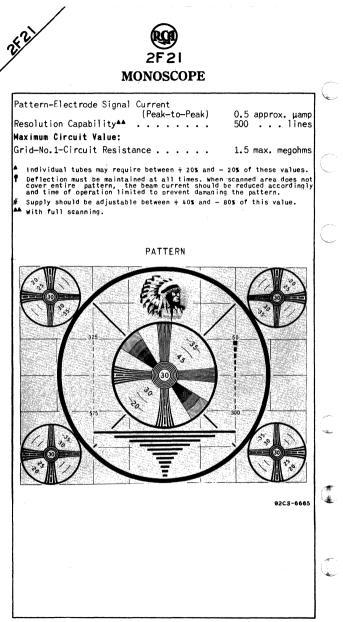


27 21

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5-INCH MA	GNETIC-DEFLECTI	ON TYPE		
Supe	ersedes Type 18	99		
General:				
Heater, for Unipotential	Cathode:			
Voltage	. 6.3 ± 10%.		ac or dc	volt
Current	. 0.6			an
Direct Interelectrode Ca	pacitances:			
Grid No.1 to All Other	Electrodes	7		. μι
Pattern Electrode to G				. μμ
Pattern:				• •
Туре	See ill	ustration	n on next	t pag
Dimensions (Approx.) .		2-5.	/16" x 3-	-1/16
Calibration		U	o to 500	line
Calibration			Electros	stati
Deflection Method			. Mag	gneti
Deflection Method Maximum Solid Deflection Overall Length	Angle			. 40
Overall Length	1	2-7/16"	+ 1/4" -	7/16
Greatest Diameter of Bul Caps (Two)	b		5-1/16	" ma>
Caps (Two)		. Reces	sed Small	Bal
Mounting Position				Ar
Base	1	_onu-Shel	Medium	6P
Basing Designation for	BOTTOM VIEW .			
Pin 1-Heater	PJ	Pin 6	-Heate	r
Pin 2-Grid No.2	34	End Cap	- Patter	
Pin 3-Grid No.3	$A \perp N$		Flect	rode
Pin 4-Grid No.1	e(Side Ca	p-Grid I	No.4
Pin 5-Cathode				
1	G4			
Maximum Ratings, Design-	Center Values:			
PATTERN-ELECTRODE VOLTAG	F	1500	max.	volt
GRID-No.4 (COLLECTOR) VO			max.	vol:
GRID-No.3 (FOCUSING ELEC			max.	volt
GRID-No.2 (ACCELERATING			max.	volt
GRID-No.1 (CONTROL ELECT				
Negative Bias Value		. 125	max.	volt
Positive Bias Value			max.	volt
PEAK HEATER-CATHODE VOLT		•		
Heater negative with r	espect to cathod	de 125	max.	volt
Heater positive with r			max.	vol
Typical Operation: 🕈				
••		4000		1
Pattern-Electrode Voltag		. 1000		vol
Grid-No.4 Voltage		. 1050	• • •	volt
Grid-No.3 Voltage for Fo	cus at			
0.5 µamp Gr	id-No.4 Current	t - 300	approx.	
Grid-No.2 Voltage		. 1000	•••	volt
Grid-No.1 Voltage for				
	toff on Monitor	*50	approx.	vol
Internal Resistance betw				
Grid No.4 and P				
Grid-No.4 Current		. 0.5		µar
♥,^,#: See next page.			TENTATIV	

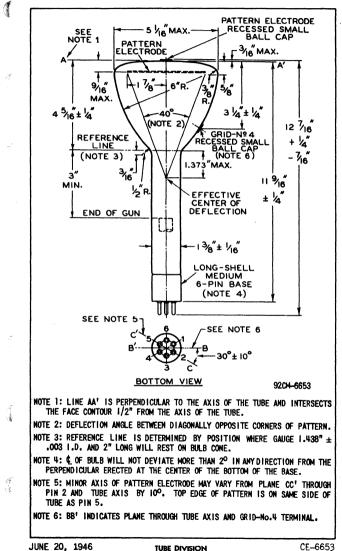


JUNE 20, 1946

TUBE DIVISION TENTATIVE DATA RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



R.S.



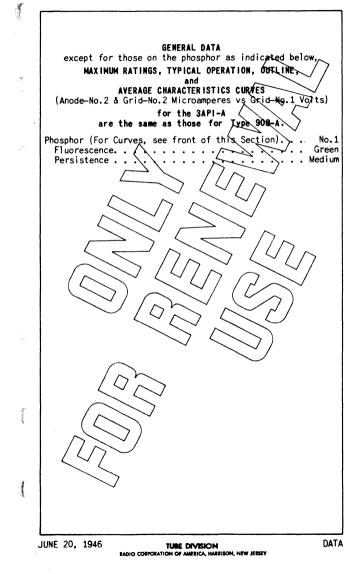
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





3 PORE

OSCILLOGRAPH TUBE





Oscillograph Tube

ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:
Voltage (AC or DC)
Current 0.6 ± 10% amp
Direct Interelectrode Capacitances (Approx.):
Grid No.1 to all other electrodes 7.5 $\mu\mu$ f
Cathode to all other electrodes 4.3 $\mu\mu$ f
Deflecting electrode DJ1 to deflecting
electrode DJ_2 5.2 $\mu\mu$ f
Deflecting electrode DJ ₃ to deflecting
electrode DJ_4
electrode DJ_4
DJ ₂ to all other electrodes 7.5 $\mu\mu$ f
DJ_3 to all other electrodes 8.1 $\mu\mu$ 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 Clear Glass
Phosphor (For Curves, see front of this Section)
Fluorescence Yellowish-Green
Phosphorescence Yellowish-Green
Persistence
Focusing Method Electrostatic
Deflection Method Electrostatic
Overall Length. 9-1/8" ± 1/4" Greatest Diameter of Bulb 3" ± 1/16" Minimum Useful Screen Diameter 2-3/4"
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 ₁ & DJ ₂ 2-3/4" By deflecting electrodes DJ ₃ & DJ ₄ 2-1/4" Operating Position Any
Operating Position
Bulb
BaseSmall-Shell Duodecal 12-Pin (JEDEC Group 4, No.B12-43)
Basing Designation for BOTTOM VIEW
Pin 1-Heater Pin 8-Ultor
Pin 2-Grid No.1 (Grid No.2.
Pin 3 – Cathode Grid No.2,
Pin 4 – Grid No.3 Collector)
$P_{1}^{i} = P_{1}^{i} = P_{1$
nection Electrode
Do Not Use C L M DJ2
Pin 6-Deflecting
Electrode
Pin 7 - Deflecting (1)-(12) Pin 11 - Internal Con-
Electrode nection-
DJ ₄ Do Not Use
Pin 12 - Heater
DJ_1 and DJ_2 are nearer the screen
DJ_1 and DJ_2 are nearer the screen DJ_3 and DJ_4 are nearer the base
Dig and Dig are nearer the base



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

3AQP1

Maximum and Minimum Ratings, Design-Center Values: {2750 max. volts ULTOR VOLTAGE. 500 min. volts UITOR INPUT (AVERAGE). . . . 6 max. watts GRID-No.3 VOLTAGE. . . volts 1100 max. GRID-No.1 VOLTAGE: Negative-bias value. 200 max. volts Positive-bias value. . . . 0 max. volts Positive-peak value. . . 2 max. volts PEAK VOLTAGE BETWEEN ULTOR AND ANY DEFLECTING ELECTRODE . . . 550 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 125 max. volts Heater positive with respect to cathode. . 125 max. volts Equipment Design Ranges: For any ultor voltage (Ecu) between 500 and 2750 volts Grid-No.3 Voltage for focus. . . . 16.5% to 31% of Ec, volts Negative Grid-No.1 Voltage for visual extinction of undeflected spot . 2.8% to 6.7% of Ec. volts Grid-No.3 Current for any operating condition. . . . -15 to +10 µа Deflection Factors: v dc/in./kv of Ec/ $DJ_1 \& DJ_2 \dots$ 73 to 99 v dc/in./kv of Ec/ $DJ_3 \& DJ_4 \dots \dots$ 26 to 35

Electron Tube Division







HIGH-VACUUM CATHODE-RAY TUBE Supersedes Type 3BP1

CONSTRAINT,

1	General:
	Heater, for Unipotential Cathode:
	Voltage 6.3 ± 10% ac or dc volts
	Current 0.6
<i></i>	Direct Interelectrode Capacitances (Approx.):
3	Grid No.1 to All Other Electrodes 8.5 µµf
'	Cathode to All Other Electrodes 8.0 µµf
	DJ1 to DJ2 2.0 μμf DJ3 to DJ4 2.0 μμf
	DJ3 to DJ4 2.0 µµf DJ1 to All Other Electrodes 8.0 µµf
	Dia to A11 Other Electrodes 60fl
	DJ1 to All Other Electrodes except DJ2 . 6.0
11	DJ2 to All Other Electrodes except DJ1 . 5.0 µµf
	DJ3 to A11 Other Electrodes except DJ4 . 4.0
	DJ4 to All Other Electrodes except DJ3 . 6.0 µµf
	Phosphor (For Curves, see front of this Section No.1
	Fluorescence Green
	Persistence
	Detlection Method Flectrostatic
	Overall Length $10" + 1/4"$
	Greatest Diameter of Bulb
	Minimum Useful Screen Diameter
	Mounting Position
	Voverall Length
	Basing Designation for BOTTOM VIEW
	(7)(8) Fill $3 = $ Alloue (0.2)
	I FIN 2 - Callide Grid No.2
	Pin 3-Grid No.1 (Control Pin 10-Deflecting Pin 4-Internal Control Pi
	Do Not Use (3) (2) DJ2
	Pin 5- Anode No.1
	Pin 7 – Deflecting $\kappa_{\rm EY}$ Electrode
	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
the second	
<u>8</u> .	With DJ ₁ positive with respect to DJ ₂ , the spot is de- flected toward pin 5. With DJ ₃ positive with respect to
	DJ_4 the spot is deflected toward pin 2.
	The angle between the trace produced by DJ_1 and DJ_2 and
	its intersection with the plane through the tube axis and
	pin 5 does not exceed 10° .
.1	
1	The angle between the trace produced by DJ ₃ and DJ ₄ and the trace produced by DJ ₁ and DJ ₂ is $90^{\circ} \pm 3^{\circ}$.
	Maximum Ratings, Abolute Values:
	NUX 1 1045 DATA 1
	JULY 1, 1945 RCA VICTOR DIVISION DATA 1 EADIO CORPORATION OF AMERICA, MARRISON, NEW JERSEY
	RADIO CORPORATION OF AMERICA, MARRISON, NEW JERSET



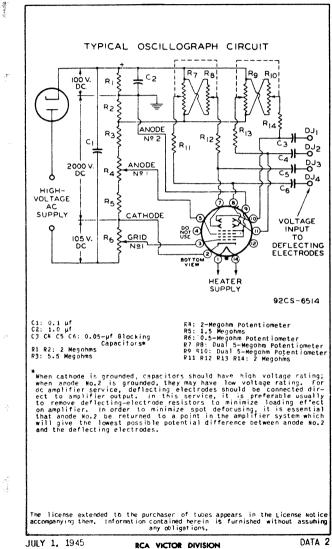
3BPHA HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)	×.
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:	
Negative Value	
Positive Value	
PEAK VOLTAGE BETWEEN ANODE No.2 AND ANY DEFLECTING FLECTRODE 550 max. volts	
ANY DEFLECTING ELECTRODE 550 max. volts PEAK HEATER-CATHODE VOLTAGE:	7
Heater negative with respect to cathode 125 max. volts	6
Heater positive with respect to cathode 10 max. volts	
Typical 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 ^A Between -50 and +10 µamp.	
Deflection Sensitivity:	
DJ1 and DJ2 0.169 0.127 mm/v dc	
DJ3 and DJ4 0.229 0.172 mm/v dc	
Deflection Factor:**	
DJ1 and DJ2 150 200 v dc/in. DJ3 and DJ4	
UJ3 and UJ4 111 148 v dc/in.	
Brilliance and definition decrease with decreasing anode—No.2 voltage. In general, anode—No.2 voltage should not be less than 1500 volts.	
Individual tubes may require between +20% and -30% 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.	
See curve for average values.	
Individual tubes may vary from these values by \pm 20%.	
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 DJ1 and DJ2. Suit-	
able 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	1
tube, grid-No.l voltage should be near cutoff before applica-	`~ ·
tion 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	į.
Resistance in Any Deflecting-	~
Electrode Circuit▲ 5.0 max. megohms	
It is recommended that all deflecting-electrode-circuit resistances be approximately equal.	
JULY 1, 1945 DATA 1	

1940





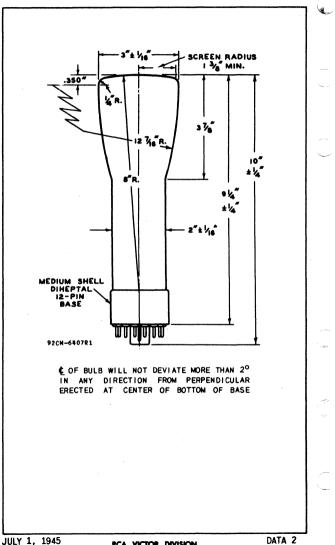


RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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HIGH-VACUUM CATHODE-RAY TUBE

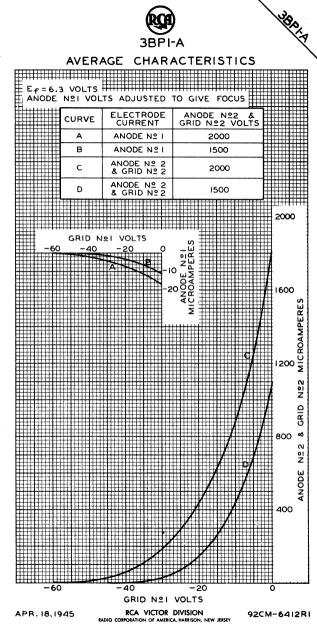


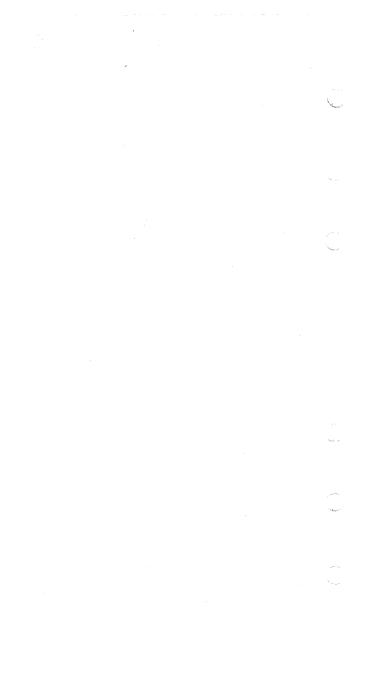
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(mint)







POST-DEFLECTION ACCELERATOR

ELECTROSTATIC DEFLECTION ELECTROSTATIC FOCUS

DATA

General:

1

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Charles.

AUG. 1, 1951	TUBE DEPARTMENT	DATA
	1 – W2 trace and W3-	-DJ4 trace is 90 ⁰ ±3 ⁰ .
Cap (on same side o	f tube as pin 5), 10	
may vary from the tr	ace produced by DJ1 a	nd DJ2 by the following
The plane through the	etube axis and each	of the following items
is deflected toward	pin 2.	
toward pin 5. With	DJg positive with r	the spot is deflected espect to DU4, the spot
, , , , , , , , , , , , , , , , , , ,	4	
	a DJ_2 are nearer in and DJ_A are nearer to	
Electrode	N4 nd DJ ₂ are nearer th	
Pin 8-Deflecting		Pin 14-Heater Cap - Anode No.3
DJ3	00	Connection
Electrode	2 (1) (4)	Pin 12 - No
Pin 5-Anode No.1 Pin 7-Deflecting		Electrode DJ1
Do Not Use		Pin 11-Deflecting
Connection	- 3 + 30	DJ2
Pin 3-Grid No.1 Pin 4-Internal	789	Electrode
Pin 2 - Cathode		Grid No.2 Pin 10-Deflecting
Pin 1-Heater		Pin 9-Anode No.2,
Basing Designatio	n for BOTTOM VIEW .	14J ₁
Base Medi	um-Shell Diheptal 12	–Pin (JETEC No.B12–37)
	Recessed Small	Ball (JETEC No.J1-22)
Minimum Usetul Scre	en viameter	
Greatest Diameter o	f Bulb	$10" \pm 1/4"$ $10" \pm 1/16'$ 2-3/4'
Overall Length		10" ± 1/4"
Deflection Method.		Electrostatic Electrostatic
Persistence of Phi	osphorescence	Medium Electrostatic
Eluorescence and	Phaspharescence	Green
Phosphor (For Curve	Electrodes s, see front of this	Section) P1
DJA to All Other	Electrodes	/μμ1 8 μμ1
DJ2 to All Other	lectrodes	7 μμ1 7 μμ1
DJi to All Other	Electrodes	8 µµ1
DJa to DJa		2 μμ
DI1 to DI2	er Electrodes	2.5 μμ1
	Other Electrodes	
Direct Interelectro	le Capacitances (App	
l Current	0.6	amp
Voltage	6.3	ac or dc volts
Heater, for Unipote		

TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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3581

OSCILLOGRAPH TUBE

Maximum Ratings, Design-Center Values:	
ANODE-No.3 VOLTAGE 4000 max. volts	
ANODE-No.2 ^o VOLTAGE	1
RATIO OF ANODE-No.3 VOLTAGE TO	
ANODE-No.2 VOLTAGE 2.3:1 max.	
ANODE-No.1 VOLTAGE 1000 max. volts	1
GRID-No.1 VOLTAGE:	- S.,
Negative bias value	
Positive bias value 0 max. volts	
Positive peak value 2 max. volts	
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	
nearer positive with respect to suchador 120 hard vorte	
Equipment Design Ranges:	
For any anode-No.3 voltage (Eb ₃) between 2000* and 4000 volts	
and any anode-No.2 voltage (Eb ₂) between 1500** and 2000 volts	
Anode-No.1 Voltage 20% to 34.5% of Eb2 volts	
Grid-No.1 Voltaget 1.5% to 4.5% of Eb2 volts	
Anode-No.1 Current for any Operating Condition50 to +10 μαmp	
Operating Condition50 to +10 μamp Deflection Factors:	
	1
When $Eb_3 = 2 \times Eb_2$ DJ1 & DJ2 85 to 115 v dc/in./kv of Eb2	
$When Eb_3 = Eb_2$ DJ1 & DJ2	
DJ3,&DJ4, 50 to 68 v dc/in./kv of Eb₂ Spot Position ¥	-
□ Anode No.2 and grid No.2, which are connected together within tube, and referred to herein as anode No.2.	
At or near this rating, the effective resistance of the anode supply	
 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 transients.	
** Recommended minimum value of anode-No.2 voltage.	17
# With heater voltage of 6.3 volts, anode-No.3 voltage of 3 000 volts, anode-No.2 voltage of 1500 volts, anode-No.1 voltage adjusted for focus,	. 7
grid-No.1 voltage adjusted to give spot that is just visible, each	
deflection electrode connected through 1-meanhy resistor to anode No. 2	
deflecting electrode connected through 1-megohm resistor to anode No.2, and tube shielded from all extraneous fields, the undeflected focused	
# With heater voltage of 6.3 volts, anode-No.3 voltage of 3000 volts, anode-No.2 voltage of 1500 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 15-mm square centered at the geometric center of the tube face and having one side parallel to the trace produced by	
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 15-mm square centered at the geometric center of the tube face and having one side parallel to the trace produced by DJ1 and DJ2.	
	6.7
	C.
	E.
	0



Examples of Use of Design Ranges:

For anode-No.3 voltage of and anode-No.2	2000	3000	1000	volts
voltage of	2000	1500	2000	volts
Anode-No.1 Volt.	400 to 690	300 to 515		volts
Grid-No.1 Volt.†	-30 to -90	22.5 to -67.5	-30 to -90	volts
Deflection Factors:				
$DJ_1 \& DJ_2 \dots$	136 to 184	127 to 173	170 to 230	
$DJ_3 \& DJ_4 \dots$	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 Circuit⁴. . . 5.0 max. megohms

For visual extinction of undeflected focused spot.

volts dc/in.

1

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

OPERATING NOTES

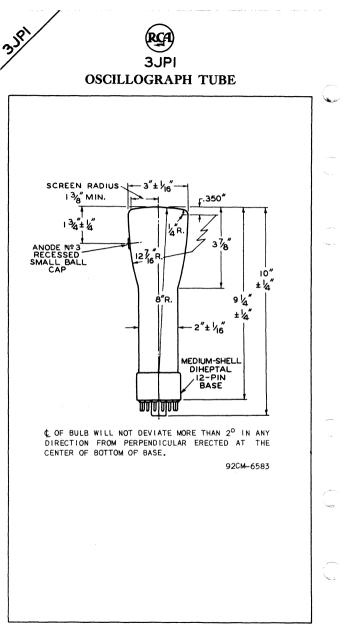
The 3JPI utilizes a medium-persistence screen having green fluorescence and phosphorescence. The screen has high visual efficiency and exceptionally good brightness contrast between the scanned line and the background. Under conditions of high ambient light, contrast may be maintained by the use of a 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.

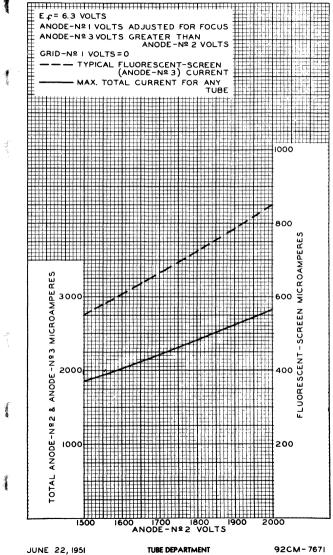
AUG. 1, 1951

w.





CHARACTERISTICS



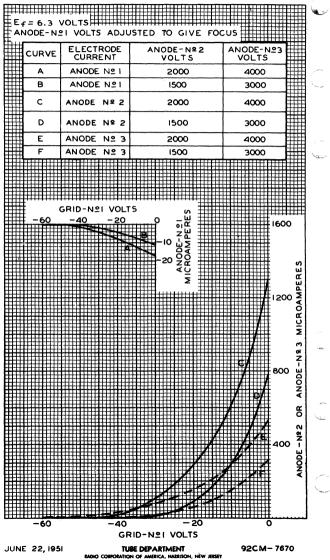
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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38

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 i-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.

AUG. 1, 1951

W.S







OSCILLOGRAPH TUBE ELECTROSTATIC DEFLECTION

ELECTROSTATIC FOCUS

DATA

General:

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State of

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														Indi	cates		
				DJ	3 an	d DJ	4 a	re 1	ie a t	e r	t h	ie b	ase	2			
					and												
				d Nc lect													
	C 111		(Gri	d No													
	Pic	7 – I	D.	4			E.	9	0	9	F	Pin	11		ater		
	Pin	6 – I		écti ctro		(e کر			စ					onne o No		
			D.				X	K	尦	P	F	Pin	10		DJ1 iterna		
		5 - 1	Defl	ecti	ng		(5	6	20)	F	111	9		lect		
		3 - 1			a							Din	٥		DJ2 flec	tin	a
	Pin	1 – I 2 – (Gric	No.	1						ŀ	'I N	8	E	flec		
	Bas	ing l	Jesi	gnat	ion	tor	BOT	ТОМ	VIE	W.	•	• •	٠	•••	•••	• •	• T T W
Вι Ba	ulb. ase.	•••	•••	: :	Medi	um—S	Shel	Ma	agna	1	. 11-	Pin	. (.	ETE	C No.	.B1:	J-24 1-66) 11M
Me	ount i	ing	Posi	tion												• •	Any
W.	imimu eight	Ε (Δr	nrc	× 1											•••	2-	-3/4" 9 oz
G		est I	Diam	eter	of	Bult	•									± :	1/16"
De	efled	ctio	n Me	thoc										. E	lect	rost	tatic 1/4"
Fr		ersi: ina N													lect		edium tatic
	Phos	spho	resc	ence	• • •					:	:	: :	:			. (Green
Pł	acepi nospi	nor prese	(For	Cur	ves,	see	e fr	ont	of	th	is	Sec	tio	on).	••	• ;	. P1 Green
Fa	uu4 acepi	to a late	all •••	othe	rel	ect:	ode	5. 	: :	:	:	: :	:	:.	8 Clea	ar (μμf Glass
	DJ3	to a	al 1	othe	r el	ectr	ode	s.				•••		•	7		μµf
	DJ1	to a to a	a]] a]]	othe	r el r el	ectr	ode ode	s.	•••	•	•	•••	•	•	11 8		μμf μμf
	de	efled	ctĭr	g el	ectr	ode	ĎJ4								2.5		μµf
	de	efle lect	ctĭr	g el	ectr	ode	DJ2			•	•	•••	•	•	2.5		$\mu\mu$ f
		d No. lect							odes	·	·	•••	·	·	8		μµf
															-		
D	i rect							tan/) I PPS	10,	non r	οx.	<u>۱</u> :	•••	•••	•	• amp
D	Curi i rect	tåge rent t In						0.6	5 ±	109	%				or (dc v	volts . amp



-



OSCILLOGRAPH TUBE

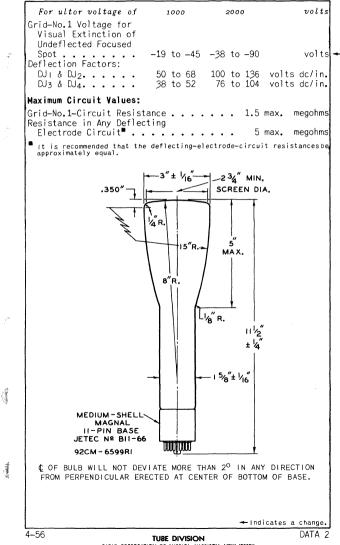
	With DJ1 positive with respect to DJ2, the spot is deflected toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1.	
	The plane through the tube axis and pin 1 may vary from the trace produced by D3 and D4 by $\pm 10^{\circ}$ (measured about the tube axis).	2
	The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°.	
	Maximum Ratings, Design-Center Values:	
•	ULTOR VOLTAGE	()
	Negative bias value 200 max. volts Positive bias value 0 max. volts Positive peak value 2 max. volts	
	PEAK VOLTAGE BETWEEN ULTOR AND ANY DEFLECTING ELECTRODE	
	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 _{C4}) between recommended minimum [*] and 2500 volts	
•	Grid-No.3 Voltage for Focus 16% to 30% of E _{c4} volts Grid-No.1 Voltage for Visual Extinction of Undeflected Focused	
	Spot 1.9% to 4.5% of E _{C4} volts Grid-No.3 Current for Any Operating Condi-	
	tionμamp Deflection Factors:	
	DJ1 & DJ2 50 to 68 v dc/in./kv of E _{c4} DJ3 & DJ4 38 to 52 v dc/in./kv of E _{c4} Spot Position ##	\sim
	Examples of Use of Design Ranges:	2
	For ultor voltage of 1000 2000 volts Grid-No.3 Voltage	
	for Focus 160 to 300 320 to 600 volts	
	Brilliance and definition decrease with decreasing ultor voltage. 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.	
	## 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.	
	→ Indicates a change.	
	4–56 DATA 1	

DATA 1

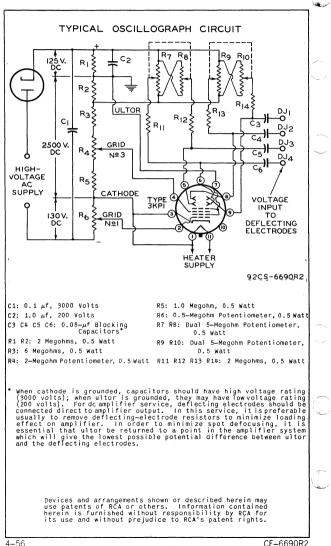




A. Carlos





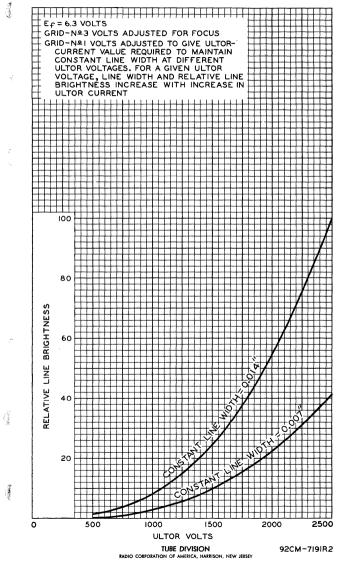


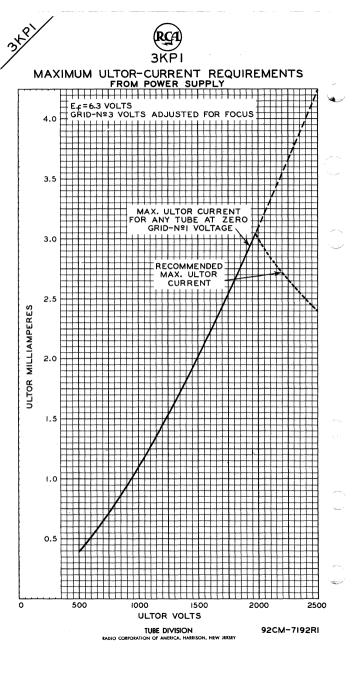
ster

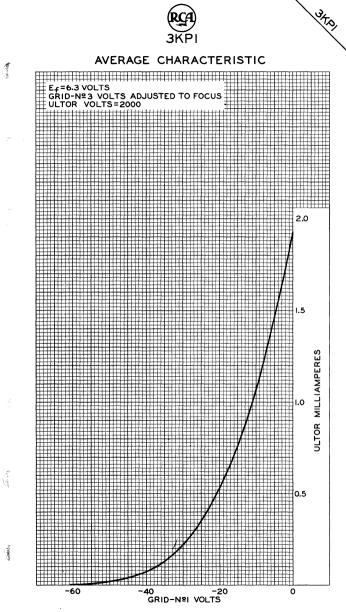


3th

CHARACTERISTICS







TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON; NEW JERSEY 92CM-6658R2







ELECTROSTATIC	FOCUS	ELECTROSTATIC	DEFLECTION

The $3KP_4$ is the same as the $3KP_1$ except for the follow-ing items:

General:

1

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 items:

General:

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

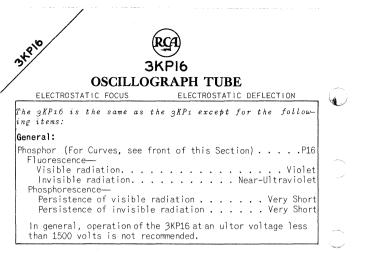
3KPII

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

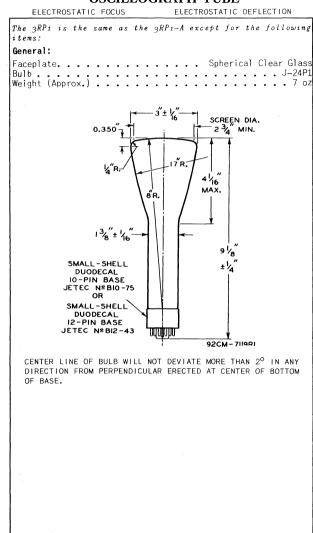
🗕 Indicates a change.















JAP 1. A

3RPI-A

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS	ELECTROSTATIC DEFLECTION
General:	4
Heater, for Unipotential Cathod	
Voltage 6.2	
Current 0.0	5 ± 10%
irect Interelectrode Capacitan	
Grid No.1 to all other electr	odes 8 🛛 🗸
Deflecting electrode DJ1 to deflecting electrode DJ2	2 .
Deflecting electrode DJ3 to	· · · · · 2 +
deflecting electrode DJ4	· · · · · 2 4
DJ1 to all other electrodes .	· · · · · 11 µ
DJ2 to all other electrodes .	
Dug to all other electrodes .	
D√4 to all other electrodes . Faceplate	
Phosphor (For Curves, see front	of this Section).
Fluorescence	
Phosphorescence	
Persistence	
	Electrostat
Deflection Method	Electrostat
Greatest Diameter of Bulb	$3'' \pm 1/1$
Minimum Useful Screen Diameter.	
Mounting Position	
Weight (Approx.)	
Bulb	ecal 10-Pin (JETEC No.B10-5
or Small-Shell Duod	ecal 12-Pin (JETEC No.B12-4
Basing Designation for BOTTOM	
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	⑦ Collector)
Pin 54- Internal 9	Pin 9 - Deflecting
Connection- @	Electrode
Pin 6 - Deflecting	Pin 10 - Deflecting
Electrode 🖉 🛆	Electrode
,DJ3 ()**	\mathbb{D}^{-} \mathbb{D}_{1}
Pin 7 – Deflecting	Pin 11 - Internal
Electrode	Connection Do Not Use
DJ 4	Do Not Use Pin 12 - Heater
	Tim 12 - Heater
DJ_1 and DJ_2 are n	
DJ_3 and DJ_4 are	nearer the base
igta Pins 5 and 11 are omitted from the	10-pin base.
	TENTATIVE DA

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



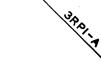
3RP1-A

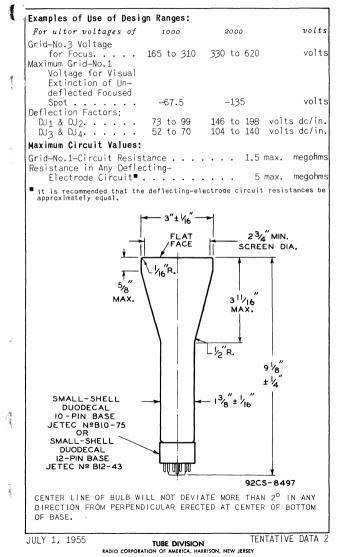
OSCILLOGRAPH TUBE

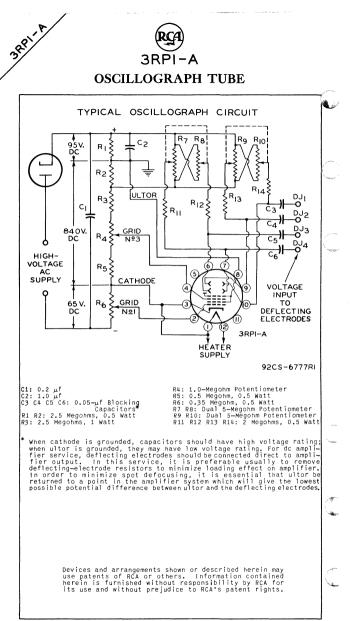
With DJ1 positive with respect to DJ2, the spot is deflected toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by 10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ± 30. Maximum Ratings, Design-Center Values: ULTOR^O VOLTAGE . . . 2500 max. volts ULTOR INPUT (AVERAGE). 6 max. watts GRID-No.3 VOLTAGE . . 1000 max. volts GRID-No.1 VOLTAGE: Negative bias value. 200 max. volts Positive bias value. . 0 max. volts Positive peak value. 2 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 ultor voltage (E_{C_A}) between 500* and 2500 volts Grid-No.3 Voltage for Focus. 16.5% to 31% of E_{C4} volts Maximum Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot -6.75% of Ec/ volts Grid-No.3 Current for Any Operating Condition -15 to +10 μamp Deflection Factor: 73 to 99 v dc/in./kv of Ec4 DJ1 & DJ2. DJ3 & DJ4. 52 to 70 v dc/in./kv of Ec4 Spot Position. . . . ## o 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 3RFL-A, the ultor function is performed by grid No.4. Since grid No.4, grid No.2, and collector are connected to-gether within the 3RFL-A, they are collectively referred to simply as "ultor" for convenience in presenting data and curves. Brilliance and definition decrease with decreasing ultor voltage. A value as low as 500 volts is recommended only for low-velocity de-flection and low ambient-light levels. ## 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.

JULY 1, 1955

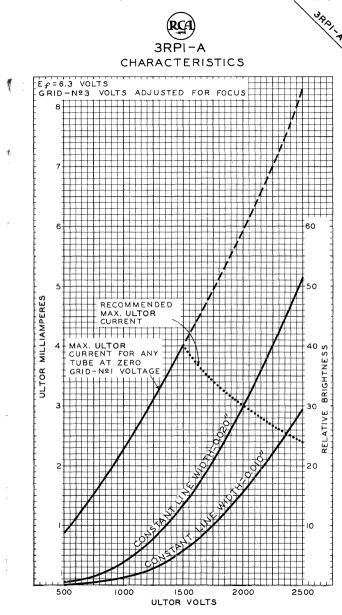






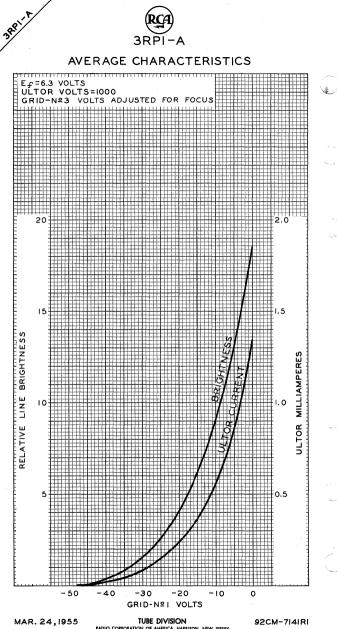


CE-6777R1



MAR. 24, 1955

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-7143RI



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



ELECTROSTATIC	FOCUS	ELECTROSTATIC	DEFLECTION

DATA

Genera	:

÷.

Heater, for Unipotential Cathode:	
Voltage 6.3 ac or dc vo	lts
Current $0.6 \pm 10\%$	amp
Direct Interelectrode Capacitances:	
	uμſ
	uμf
Deflecting electrode DJ ₁ to deflecting electrode DJ ₂ 1.7 to 3.3	f
Deflecting electrode DJ ₃ to	uμf
	uμf
Du to all other electrodes 5.5 to 10.5	uμf
DJ ₂ to all other electrodes 5.5 to 10.5	uμf
DJ ₃ to all other electrodes 3.5 to 6.8	μí
DJ2 to all other electrodes.5.5 to 10.5DJ3 to all other electrodes.3.5 to 6.8DJ4 to all other electrodes.3.5 to 6.8	uμf
Faceplate, FlatClear Gl Phosphor (For Curves, see front of this Section)	ass
Phosphor (For Curves, see front of this Section)	P1
Fluorescence	
Phosphorescence	
Focusing Method.	
Deflection Method	
Deflecting-electrode	
arrangement	
Overall Length	/8"
Greatest Diameter of Bulb	16"
Minimum Useful Screen Diameter	/4"
respect to tube face):	
By deflecting electrodes DU & DU2	12"
By deflecting electrodes DJ ₃ & DJ ₄	/4"
Weight (Approx.)	lЬ
Mounting Position	Any
Bulb	24R
Base Small-Shell Duodecal 10-Pin (JETEC No.B10-7	5),
or Small-Shell Duodecal 12-Pin (JETEC No.812- Basing Designation for BOTTOM VIEW	
5 5	12T
Pin 1 - Heater Pin 8 - Ultor Pin 2 - Grid No.1 (Grid No.2	
Pin 2 - Grid No.1 (Grid No.2) Pin 3 - Cathode (6) (7) Grid No.4	
Pin 4 – Grid No.3	
Pin 6 - Deflecting (4) 4 9 Pin 9 - Deflecting	
Electrode Electrode	
Pin 7 - Deflecting	
Electrode U-C Electrode	
DJ ₂ DJ ₃ Pin 12 - Heater	
rin 12 - heater	

(inclusion)

3 NR



Maximum Ratings, Design-Center Values:		
ULTOR VOLTAGE.	2500 max. vo	
ULTOR INPUT (AVERAGE) GRID-No.3 VOLTAGE	• • 6 max. wat	
GRID-NO.3 VOLTAGE:	••• 1000 max. vol	ts
Negative bias value	200 max. vo	ts _
Positive bias value	0 max. vo	
Positive peak value	0 max. vo	
PEAK VOLTAGE BETWEEN ULTOR AND ANY		
DEFLECTING ELECTRODE	••• 500 max. vo	ts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to catho	do 100 mov vo	ta
Heater positive with respect to catho		ts ts
	uc. 100 max. V0	
Equipment Design Ranges:		1
For any ultor voltage ($E_{C,\mu}$) betw		
minimum* and 2500 vo	lts	
Grid-No.3 Voltage	- ·	
for Focus 16.5% to 31% of Grid-No.1 Voltage	tc ₄ vo	ts
for Visual Ex-		
tinction of Unde-		
flected Focused		
Spot3% to -5% of E	c4 vo	lts
Grid-No.3 Current		
for Any Operat- ing Condition15 to +10		
ing Condition —15 to +10 Deflection Factors:		μa
$DJ_1 \& DJ_2 \dots 41.5 \text{ to } 50.5$	v dc/in./kv of E	
DJ3 & DJ4 28.5 to 35		-C4
Spot Position ##		-4
Examples of Use of Design Ranges:		
For ultor voltage of 1000 1500	2000 VO	lts
Grid-No.3 Volt-		-
age for Focus. 165 to 310 247 to 4	165 330 to 620 vo	lts
Grid-No.1		
Voltage for		
Visual Ex- tinction of		-
Undeflected		
Focused Spot30 to -50 -45 to -	-75 -60 to -100 vo	lts 👻
Deflection		
Factors:		
DJ & DJ ₂ 41.5 to 50.5 62.3 to 7	5.8 83 to 101 v dc/	
DJ ₃ & DJ ₄ 28.5 to 35 42.8 to 5	2.5 57 to 70 v dc/	In.
* Brilliance and definition decrease with d	ecreasing ultor volta	ge.
Recommended minimum for the 3WP1 in gener but a value as low as 500 volts may be used velocity deflection and low ambient-light le	al service is 1000 vo Lunder conditions of l	its ow-
velocity deflection and low ambient-light le	evels.	
##		
**: See next page.	TENTATIVE 017	
4-57	TENTATIVE DAT	

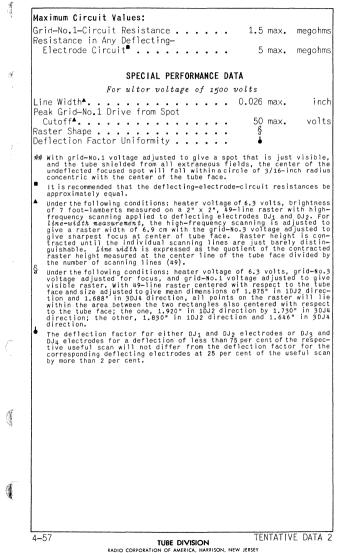
4-57

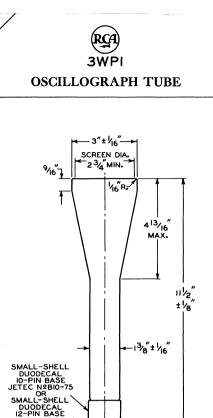
3¹¹P1



UNR,







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 DJ, AND DJ, BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 10^{\circ}$. ANGLE BETWEEN DJ₁ - DJ₂ TRACE AND DJ₃ - DJ₄ TRACE IS 90° $\pm 1^{\circ}$. 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.

€ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION

UUU

9205~9130

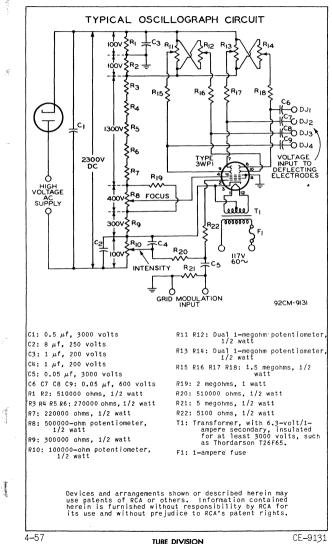
JETEC NºBI2-43

3WP1



34R

OSCILLOGRAPH TUBE

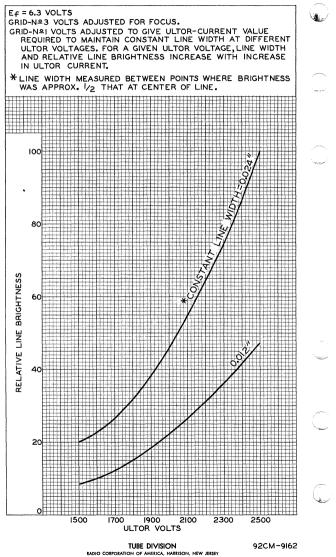


RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



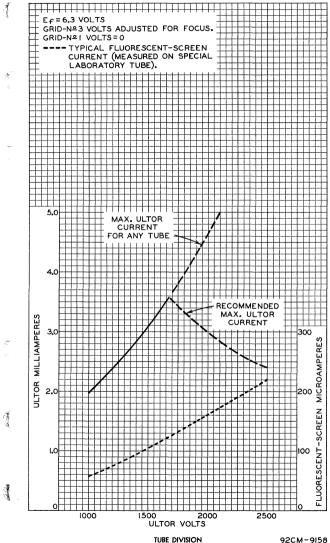
3MP1

AVERAGE CHARACTERISTICS





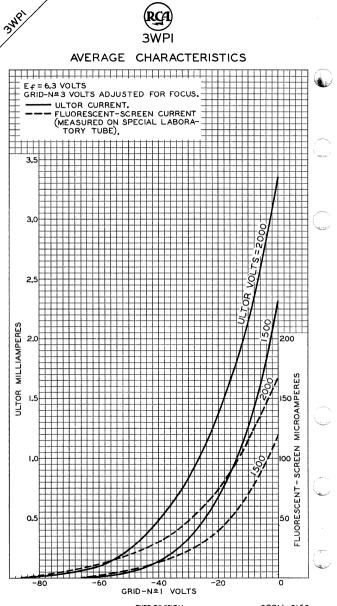
CHARACTERISTICS



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9158

3MR



TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9159





ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The 3WP2 is the same as the 3WP1 except for the following items:

General:

Phosphor (For Curves,	see	front	of this	Section)	P2
Fluorescence					
Phosphorescence					
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

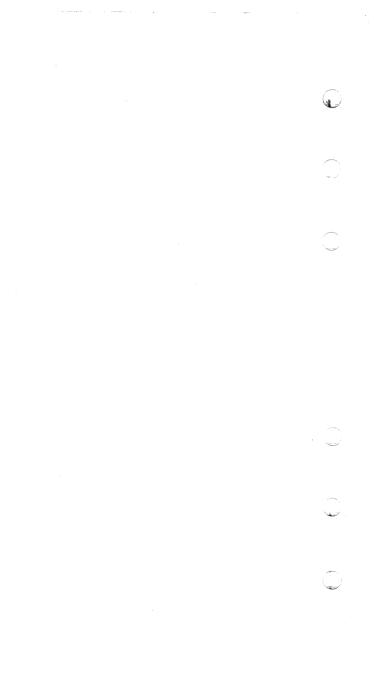
The 3WP11 is the same as the 3WP1 except for the following items:

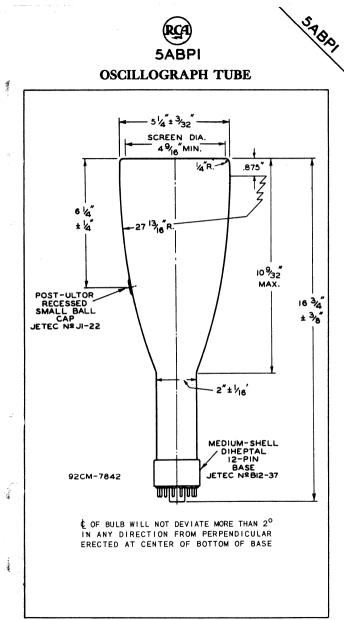
General:

Phosphor (For Curves,	see	front	of this	Section).			P11
Fluorescence							
Phosphorescence					•	•	. Blue
Persistence	• •				•	•	. Short

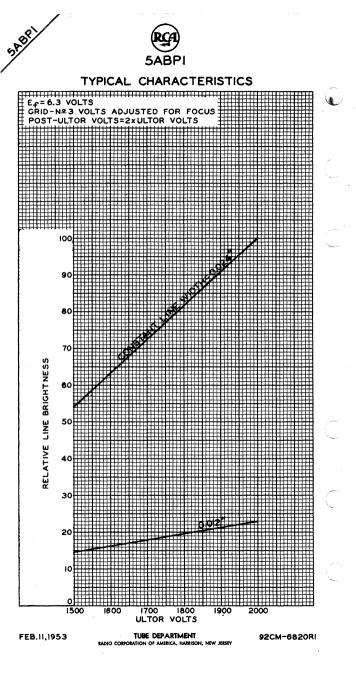
Line width and drive values for the 3WP11 are the same as those shown for type 3WP1 under the heading SPECIAL PER-FORMANCE DATA and are based upon operation at brightness values calculated from 3WP1 performance.

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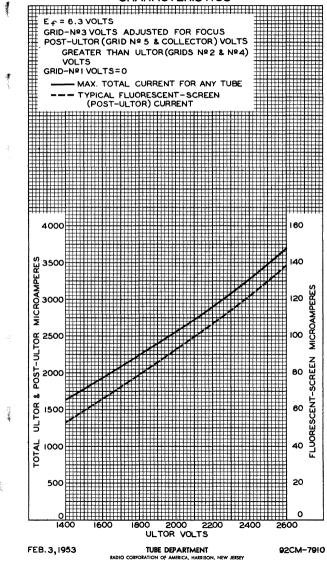
JUNE 1, 1953

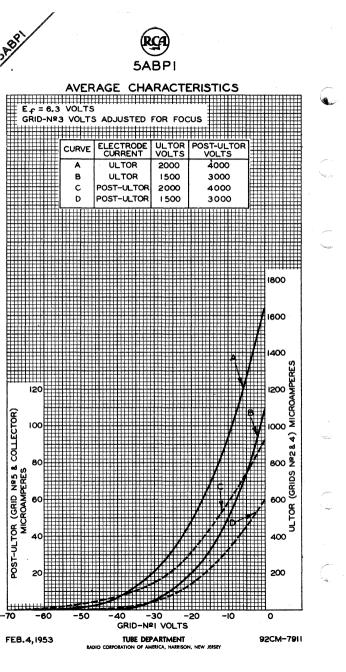


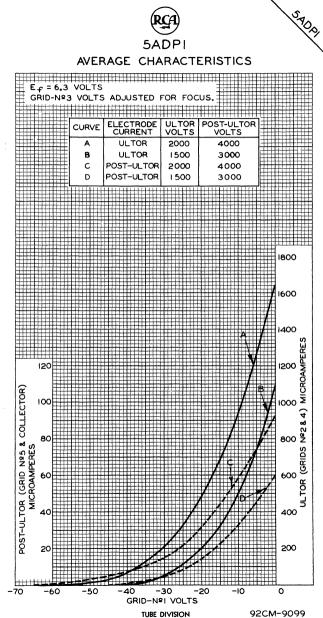




CHARACTERISTICS





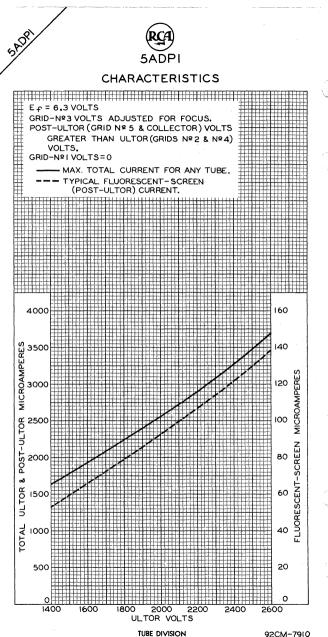


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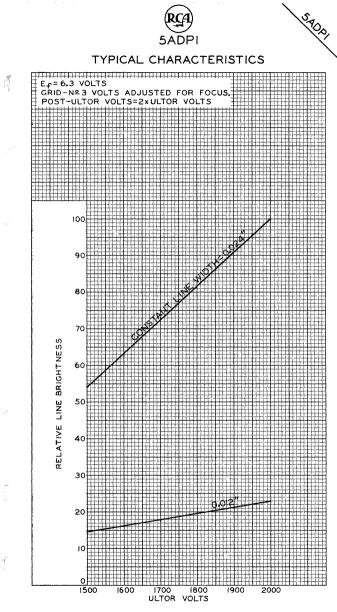
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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7910



TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-6820RI







POST-DEFLECTION ACCELERATOR ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The $5ABP_4$ is the same as the $5ABP_1$ except for the following items:

General:

Phosphor (For curves, Fluorescence Phosphorescence. Persistence	see	front	of	t.his	section).	. P4Su	lfide Type
Fluorescence							White
Phosphorescence .				• •			White
Persistence	• •	• •	• •	•••	• • • •		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 ELECTROSTAT

ELECTROSTATIC DEFLECTION

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

General:

Phosphor (For Curv	es,	see	front	of this	Section)	P7
Fluorescence.						Blue
Persistence .						Short
Phosphorescence					Greeni	sh-Yellow
Persistence .						Long

5ABPII OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR

ELECTROSTATIC DEFLECTION

The $5ABP_{11}$ is the same as the $5ABP_1$ except for the following items:

General:

FLECTROSTATIC FOCUS

Phosphor (For Curves,	se	ee	f	ron	t (of	th	is	Se	ect	ic	on)		•	•		. P11
Eluorescence																	.Blue
Phosphorescence	•	•	•	·	•	•••	•	٠	٠	•	•	•	•	·	•	٠	.Blue
Persistence	•	•	•	•	•	•••	•	•	•	•	•	•	•	٠	•	•	SHOLL





POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

STOR

DATA

General:	
Heater, for Unipotential Cathode: Voltage	
Grid No.1 to all other electrodes Cathode to all other electrodes Deflecting electrode DJ ₁ to	4.2 to 7.9 $\mu\mu f$ 3.1 to 5.8 $\mu\mu f$
deflecting electrode Dy Deflecting electrode Dy to	1.7 to 3.1 μμf
Persistence	4.4 to 9.2 µµf 2.8 to 5.3 µµf 2.8 to 6.3 µµf Clear Glass 5 Section)P1 Green
Deflection Method	
arrangement	16-3/4" ± 3/16" 5-1/4" ± 3/32" 4-1/2" 2-1/2 lbs Any Ball (JETEC No.J1-22)
Basing Designation for BOTTOM VIEW .	••••• 14J
Pin 1 - Heater Pin 2 - Cathode Pin 3 - Grid No.1 Pin 4 - No Connec- tion-Do Not Use Pin 5 - Grid No.3 Pin 7 - Deflecting Electrode DJ3 Pin 8 - Deflecting Electrode DJ4	Pin 9-Ultor (Grid No.2, Grid No.4) Pin 10-Deflecting Electrode DJ Pin 11-Deflecting Electrode DJ Pin 12-No Connec- tion Pin 14-Heater Cap-Post-Ultor (Grid No.5, Collector)

Sec.

1.4

TUBE DIVISION



Maximum Patings Design Contan Reluces
Maximum Ratings, Design-Center Values:
POST-ULTOR VOLTAGE 6000 max. volts
ULTOR VOLTAGE
RATIO OF POST-ULTOR VOLTAGE TO
ULTOR VOLTAGE 2.3:1 max.
GRID-No.3 VOLTAGE 1000 max. volts
GRID-No.1 VOLTAGE:
Negative bias value
Positive bias value
PEAK VOLTAGE BETWEEN ULTOR AND ANY
DEFLECTING ELECTRODE
PEAK HEATER-CATHODE VOLTAGE:
Heater negative with
respect to cathode
Heater positive with
respect to cathode
Equipment Design Ranges:
With any post-ultor voltage $(E_{C_{i}})$ between 2000 [*] and 6000 volts
and any ultor voltage (E_{cy}) between 1500** and 2600 volts
Grid-No.3 Voltage
for Focus 20% to 34.5% of E _{c4} volts
Grid-No.1 Voltage
tinction of Unde-
flected Focused
Spot2.25% to -3.75% of E _{C4} volts
Grid–No.3 Current
for Any Operating
Condition
Deflection Factors:#
When $E_c = 2 \times E_c$; DJ 45 DJ2 4 26.7 to 33.3 v dc/in./kv of E_{c_4} ;
$D_{1} = \frac{8^{9}}{10} + \frac{4}{10} = \frac{267 \pm 0.33}{10} + \frac{3}{10} + \frac{1}{10} +$
DJ1 & D2". 26.7 to 33.3 v dc/in./kv of E _{C4}
_ DJ3 & DJ4 20.3 to 25 ∨ dc/in./kv of E _{C4} ⊂
DJ3 & DJ4 20.3 tc 25 v dc/in./kv of E _{C4}
$DJ_3 \& DJ_4 \dots 20.3 \text{ to } 25 \text{ v dc/in./kv of } E_{c_4} \cong$ When $E_c = E_{c_4}$: $DJ_1 \& DJ_2 \dots 21.5 \text{ to } 26.5 \text{ v dc/in./kv of } E_c$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
DJ3 & DJ4 20.3 tc 25 v dc/in./kv of E_{c_4} When $E_c = E_{c_4}$: DJ & DJ2 21.5 to 26.5 v dc/in./kv of E_{c_4} DJ & DJ2 16 to 20 v dc/in./kv of E_{c_4} Spot Position ## • At or near this rating, the effective resistance of the ultor supply should be adequate to limit the ultor input power to 6 watts. * It is recommended that the post-ultor voltage be not lessthan 3000 volts for high-speed scanning. * Recommended minimum value of ultor voltage.
DJ3 & DJ4 20.3 tc 25 v dc/in./kv of E_{c_4} When $E_c = E_{c_4}$: DJ & DJ2 21.5 to 26.5 v dc/in./kv of E_{c_4} DJ & DJ2 16 to 20 v dc/in./kv of E_{c_4} Spot Position ## • At or near this rating, the effective resistance of the ultor supply should be adequate to limit the ultor input power to 6 watts. * It is recommended that the post-ultor voltage be not lessthan 3000 volts for high-speed scanning. * Recommended minimum value of ultor voltage.
DJ3 & DJ4 20.3 tc 25 v dc/in./kv of E_{c_4} When $E_c = E_{c_4}$: DJ & DJ2 21.5 to 26.5 v dc/in./kv of E_{c_4} DJ & DJ2 16 to 20 v dc/in./kv of E_{c_4} Spot Position ## • At or near this rating, the effective resistance of the ultor supply should be adequate to limit the ultor input power to 6 watts. * It is recommended that the post-ultor voltage be not lessthan 3000 volts for high-speed scanning. * Recommended minimum value of ultor voltage.
DJ3 & DJ4 20.3 tc 25 v dc/in./kv of E_{c_4} When $E_c = E_{c_4}$: DJ & DJ2 21.5 to 26.5 v dc/in./kv of E_{c_4} DJ3 & DJ4 16 to 20 v dc/in./kv of E_{c_4} Spot Position ## • At or near this rating, the effective resistance of the ultor supply should be adequate to limit the ultor input power to 6 watts. * It is recommended that the post-ultor voltage be not lessthan 3000 volts for high-speed scanning. * Recommended minimum value of ultor voltage.
$\begin{array}{cccccccccccccccccccccccccccccccccccc$
DJ3 & DJ4 20.3 tc 25 v dc/in./kv of E_{c_4} When $E_c = E_{c_4}$: DJ & DJ2 21.5 to 26.5 v dc/in./kv of E_{c_4} DJ & DJ2 16 to 20 v dc/in./kv of E_{c_4} Spot Position ## • At or near this rating, the effective resistance of the ultor supply should be adequate to limit the ultor input power to 6 watts. * It is recommended that the post-ultor voltage be not lessthan 3000 volts for high-speed scanning. * Recommended minimum value of ultor voltage.
<pre>DJ3 & DJ4 20.3 tc 25 v dc/in./kv of Ec4 When Ec = Ec; DJ3 & DJ2 21.5 to 26.5 v dc/in./kv of Ec4 DJ3 & DJ4 16 to 20 v dc/in./kv of Ec4 DJ3 & DJ4 16 to 20 v dc/in./kv of Ec4 Spot Position ## At or near this rating, the effective resistance of the ultor supply should be adequate to limit the ultor input power to 6 watts. It is recommended that the post-ultor voltage be not lessthan 3000 volts for high-speed scanning. ** Recommended minimum value of ultor voltage. ## with heater voltage of 10 volts, grid-No.3 voltage adjusted to give focus, grid-No.1 voltage adjusted to give spot that is just visible, each deflecting electrode connected through a 1-megohm resistor to ultor, and the tube shielded from all extraneous fields, the center of the undeflected, focused spot will fall within a circle having an 8-mm radius concentric with the center of the tube face. *</pre>
DJ3 & DJ4 20.3 tc 25 v dc/in./kv of E_{c_4} When $E_c = E_{c_4}$: DJ & DJ2 21.5 to 26.5 v dc/in./kv of E_{c_4} DJ & DJ2 16 to 20 v dc/in./kv of E_{c_4} Spot Position ## • At or near this rating, the effective resistance of the ultor supply should be adequate to limit the ultor input power to 6 watts. * It is recommended that the post-ultor voltage be not lessthan 3000 volts for high-speed scanning. * Recommended minimum value of ultor voltage.

SADPI





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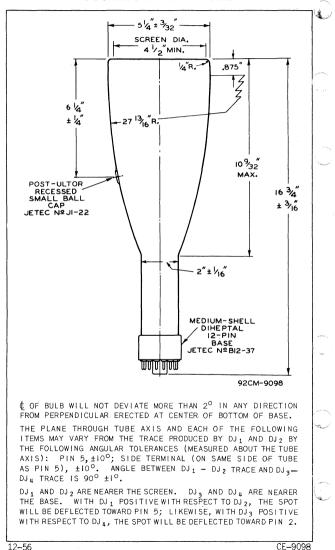
Sec. 14

	iltor volt	tage of	2000	30	000	4000	volt
and ultor i	voltage o	f	2000	15	500	2000	volt
Grid-No.3 Voltage Focus . Grid-No.1	e for	. 400) to 690	300 -	to 515	400 to 690	volt
Deflectio	Ex- on of ected I Spot.					-45 to -75 53.4 to 66.6 6 40.6 to 50	
Maximum (·			
Grid-No.1 Resistance	-Circui	t Res	stance.			1.5 max.	megohr
	de Circ					5.0 max.	megohr
Line Widt	.h ∳	• • •				0.030 max.	inc
Peak Grid	:h∳ i–No.1 [µtoff∳.	Drive 1	from	•••	· · ·	0.030 max. 45 max.	inc volt
Raster Sh # The deflection		ectrode	es in the	5ADP1	are de	signed to have (extra-hig
deflecti in eithe inches; diameter	on. With r horizo vithout p will ord	n post-d ontal o ost-def inarily	leflectio vertic lection be obta	n acce al dir acceler ined.	ieratio ection ration,	signed to have o uce less than fu n, the length of o may be limited deflection to fu	deflectio to 4-1/4 ull scree
It is re	ecommende	ed that	the def	lectin	g-elec	trode-circuit r	esistance
 Under th ness of high-fre For line to give to give tracted 	e followi 15 foot- quency si -width m a raster sharpest until ind th is expr at the	ing cond lamber canning leasurer width focus dividual ressed a center	ditions: ts measure applied of 12 cr at center scannin as the qu line of	heate red on to def high- n with of tu g line otient the t	er volt a 2" x flectin- freque the gr ube fac sare ju of the ube fa	age of 6.3 volt: 2", 49-line ra g electrodes DJ ncy scanning is id-No.3 voltage e. Raster heig st barely distin contracted ras ce divided by t	s, bright aster wit and DJ, s adjuste adjuste ht is con guishable ter heigh the numbe
Line wid measured of scann	ing lines	5 (49).				e of 6.3 volts, voltage adjuste ize of which is ust touch the s ter sides will g its sides pa ter at the cent	



SADRI

OSCILLOGRAPH TUBE





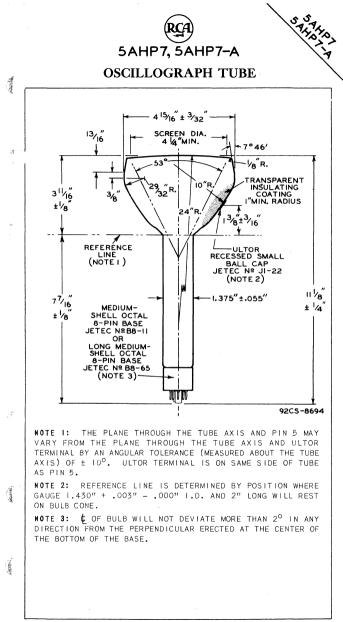
SALAN

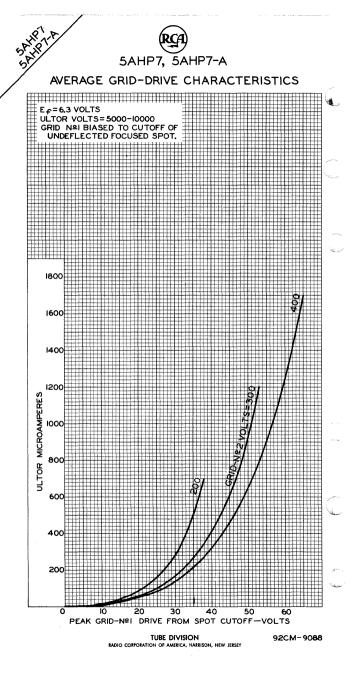
5AHP7, 5AHP7-A

OSCILLOGRAPH TUBE	र					
ELECTROSTATIC FOCUS MAGNETIC DEFLECTION	_`					
DATA						
eneral:						
Heater, for Unipotential Cathode: Voltage						
Cathode to all other electrodes 5 µµ Faceplate. Spherical	uf uf ss					
Phosphor (For Curves, see front of this Type 5AHP7 Type 5AHP7-A Section). P7 P7—Aluminized Fluorescence. Blue Blue						
Phosphorescence. Greenish-Yellow Greenish-Yellow Persistence. Long Long Focusing Method	id					
Deflection Method. Magnet Deflection Angle (Approx.) 52 Overall Length 11-1/8" ± 1/4	ic 30 4"					
Greatest Diameter of Bulb.	4"					
Mounting Position	ny 2)					
Bulb).[
Pin 1 – No Connec– Pin 7 – Cathode						
tion Pin 2 - Heater Pin 3 - Grid No.2 Pin 4 - Grid No.1 Pin 5 - Grid No.1 Pin 6 - No Connec- Pin 2 - Heater Cap - Ultor Grid No.3, Grid No.5, Collector						
tion Maximum Ratings, Design-Center Values:						
ULTOR VOLTAGE	ts					
Positive value						
Negative value 500 max. volt GRID-No.2 VOLTAGE. 700 max. volt GRID-No.1 VOLTAGE: 700 max. volt						
Negative bias value						
Positive peak value	1					
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode. Heater positive with respect to cathode. 180 max. volt	ts					
*: See next page.						
12-56 TUBE DIVISION TENTATIVE DA	TA					
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY						

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5AHP7, 5AHP7–A OSCILLOGRAPH TUBE					
Equipment D	esign Ranges:) (
With any u and gri	ltor voltage (E _{C5}) d-No.2 voltage (E _C	between 5000∦ and 10000 2) between 300 and 700 vo	volts lts		
Grid-No.4 V Focus wit					
Current o Grid-No.1 V Visual Ex	f 100 µamp	0% to 3.6% of E _{C5}	volts		
Spot Grid-No.4 C Grid-No.2 C	urrent	-11% to -25.7% of E _{C2} -25 to +25 -15 to +15 ##	volts µamp µamp		
Spot Positi					
•	Use of Design Rang r voltage of	7000	volts		
	No.2 voltage of	300	volts		
Grid-No.4 V Focus wit Current o	h Ultor f 100 μamp	0 to 250	volts		
	tinction of ed Focused	-33 to -77	volts		
	cuit Values:	<i>JJCO TT</i>			
	ircuit Resistance	1.5 max.	megohms		
		FORMANCE DATA			
Line Width:	SFECTAL FER	TORMANCE DATA			
	oltage of 7000 vol	ts 0.013 max.	inch		
	5		r supply		
<pre>should be # Brillianc Recommend</pre>	adequate to limit the e and definition decr ed minimum ultor vo	ective resistance of the ulto ultor input power to 6 watts. rease with decreasing ultor ltage for the 5AHP7 is 5000 P7-A is 7000 volts.	voltage.) volts;		
## With the undeflecte baying a 5/	tube shielded from e ed, focused, low-inte 16-inch radius concent	xtraneous fields, the center nsity spot will fall within tric with the center of the tu	r of the a circle		
 With JETE following of 100 mir raster. voltage is Raster he just barel of the cou tube face 	C Deflecting Yoke No conditions: heater roamperes, grid-No.2 Raster width is adj s adjusted to give sh ight is contracted u y distinguishable. L tracted raster heigh divided by the number	.120, or equivalent, and ur voltage of 5.3 volts, ultor voltage of 5.00 volts, and a usted to 11.4 cm and the gr arpest focus at center of tu intil individual scanning l the width is expressed as the t measured at the center lin of scanning lines (49).	nder the current 49-line id-No.4 be face. ines are quotient e of the		







SAUDAG 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: Voltage6.3ac or dc vo Current0.6 ± 10%	lts
Direct Interelectrode Capacitances: Grid No.1 to all other electrodes	μμf μμf
coating to ultor	иµf µµf
Faceplate, Flat	ass P24 zod
Fluorescence	een ← een ← ort ←
Deflection Method	tic 400 /8" /8"
Operating Position	Any lbs 21)
Basing Designation for BOTTOM VIEW	120
Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.3 Pin 7-Internal Connection- Do Not Use Pin 12-Heater Cap-Ultor (Grid No.4, Collector) C-External	
Pin 10 - Grid No.2 Total Conductive Neck Coating	g
Maximum Ratings, Design-Center Values:	
GRID-No.3 VOLTAGE 6000 max. vo	lts lts lts
Negative-bias value	lts lts lts
← Indicates a char	nge.
0.50	A 4

唐に来



SAUP24 COLOR FLYING-SPOT CATHODE-RAY TUBE

PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to c		~			
During equipment warm-up period not exceeding 15 seconds After equipment warm-up period Heater positive with respect to c	410 max. 150 max.	volts volts volts			
Characteristics Range Values for Equipment Design:					
For any ultor voltage (E_{cy}) between 20000 \bullet and 27000 volts					
Grid-No.2 Voltage when circuit design utilizes fixed grid- No.1 voltage (E _{CL}) for visual	17% to 21.5% of E _{C4}	volts			
extinction of undeflected fo- cused spot. Grid-No.1 Voltage for visual extinction of undeflected fo- cused spot when circuit design utilizes grid-No.2 voltage	2 to 5 times E _{C I}	volts			
(E _{C2}) at fixed value Maximum Grid-No.3 Current for	20% to 50% of ${\rm E_{C}}_2$	volts			
ultor current of 200 µa Grid-No.2 Current	170 -15 to +15	μа μа			
Examples of Use of Design Ranges:					
For ultor voltage of	27000	volts			
Grid-No.3 Voltage for focus with ultor current of 200 µa. Grid-No.2 Voltage when circuit design utilizes fixed grid- No.1 voltage of -70 volts for	4600 to 5800	volts			
visual extinction of undeflec- ted focused spot Grid-No.1 Voltage for visual extinction of undeflected fo- cused spot when circuit design utilizes grid-No.2 voltage of	140 to 350	volts			
200 volts	-40 to -100	volts			
Maximum Circuit Values:		6			
Grid-No.1-Circuit Resistance	1.5 max.	megohms 🕓			
 Brilliance and definition decrease with general, the ultor voltage should not be 	n decreasing ultor volt e less than 20,000 volts	age. In			
OPERATING CONSIDE	RATIONS				
<i>X-Ray Warning.</i> 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					
	→Indicates a	change.			
9-58 ELECTRON TUBE DI	VISION	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.

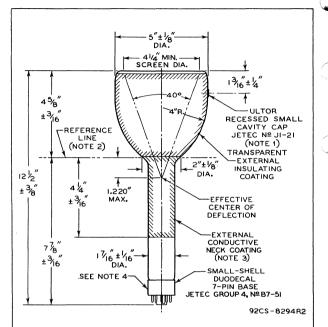
When in some circuit designs, the heater is not connected directly to the cathode, precautions must be taken to hold the peak heater-cathode voltage to the maximum values shown in the tabulated data. It is also recommended that a series limiting resistance of 50,000 ohms be placed in both the ultor and 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.

SAUPSA



COLOR FLYING-SPOT CATHODE-RAY TUBE

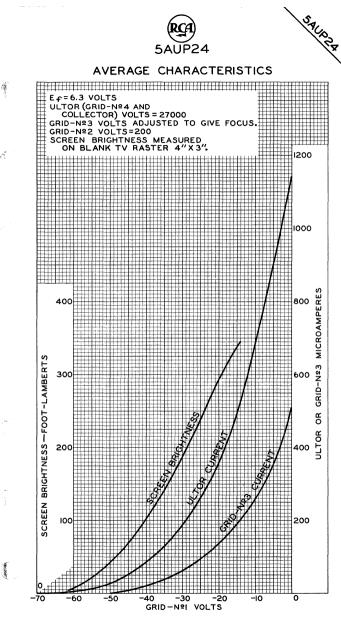


NOTE I: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION 3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 10°. ULTOR TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION 3.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No.G-II0 (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: (c) OF BULB WILL NOT DEVIATE MORE THAN 2^{O} IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

5AUP2A



ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-8343RI







METAL-BACKED SCREEN

ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

SATO

DATA General: Heater, for Unipotential Cathode: Voltage. 6.3 ac or dc volts . . Current. . . 0.6 ± 10% amp Direct Interelectrode Capacitances: Grid No.1 to all other electrodes. $\mu\mu f$ 5 μµf Cathode to all other electrodes. . (750 max. μµf External conductive coating to ultor 1500 min. μµf Faceplate, Spherical . . . Clear Glass P4-Sulfide Type. Phosphor (For curves, see front of this Section). Metal-Backed White Fluorescence . . White Phosphorescence. Short Persistence. . Electrostatic Focusina Method. Magnetic Deflection Method. 53⁰ Deflection Angle (Approx.) ± 3/8" 11-9/16" Overall Length . . 4-15/16" ± 3/32" Greatest Diameter of Bulb. 4-1/4" Minimum Useful Screen Diameter 3-3/8" ×.2-1/2" Picture Size (within minimum-useful-screen area) 1]b 6 oz Weight (Approx.) . Mounting Position. Any Ultor[®] Ťerminal. . . Recessed Small Ball No.J1-22) Cap (JETEC J-39-1/2 Bulb . . Long Medium-Shell Octal 8-Pin (JETEC No. 88-65) Base . BOTTOM VIEW Pin 1 - No Connec-Pin 6 - Grid No.3 4 _(5 Pin 7 - Cathode tion Pin 8 - Heater Pin 2 - Heater з 6 Pin 3 - Grid No.2 Cap - Ultor (Grid No.4, Pin 4 - No Connec-(2 Collector) tion Pin 5 - Grid No.1 Maximum Ratings, Design-Center Values: ULTOR VOLTAGE 10000 max. volts 1500 max. volts GRID-No.3 VOLTAGE. 410 max. volts GRID-No.2 VOLTAGE. The "ultor" in a cathode-ray tube is the electrode to which is applied the highest dcvoltage for accelerating the electrons in the beam prior to its deflection. In the 5XP4, the ultor function is performed by grid No.4. Since grid No.4 and collector are connected together within the 5XP4, they are collectively referred to simply as "ultor" for convenience in presenting data and curves.

MAY 1, 1955

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY TENTATIVE DATA

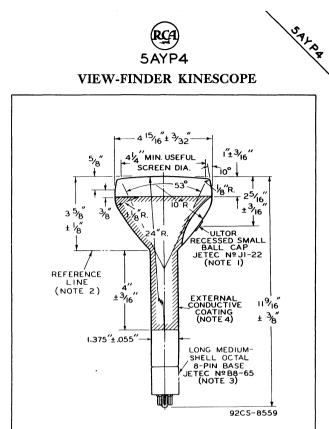


SATPA

VIEW-FINDER KINESCOPE

	- 1
GRID-No.1 VOLTAGE: Negative bias value	\sim
Heater negative with respect to cathode. 180 max. volts Heater positive with respect to cathode. 180 max. volts	1
Equipment Design Ranges:	$\sim 2^{\prime}$
For any ultor voltage (E_{C_4}) between 5000 [*] and 10000 volts and grid-No.2 voltage (E_{C_2}) between 200 and 410 volts Grid-No.3 Voltage for Focus with Ultor Current of	
100 μamp 9.8% to 14.1% of E _{c4} volts Grid-No.1 Voltage for Visual Extinction of Focused	
Raster 8.5% to 23.5% of E _{C2} volts Max. Grid-No.3 Current**	
Grid-No. 2 Current15 to +15 μamp	
Field Strength of Adjustable Centering Magnet 0 to 8 gausses	
Examples of Use of Design Ranges:	
For ultor voltage of 7000 10000 volts	
and grid-No.2 voltage of 200 300 volts Grid-No.3 Voltage for Focus with Ultor	
Current of 100 $\mu {\rm amp.}$ 680 to 990 $$ 980 to 1410 volts Grid-No.1 Voltage for Visual Extinction of	
Focused Raster17 to -47 -25 to -71 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 5000 volts. ** Grid-No.3 current increases as the ultor voltage is decreased.	
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TENTATIVE DATA

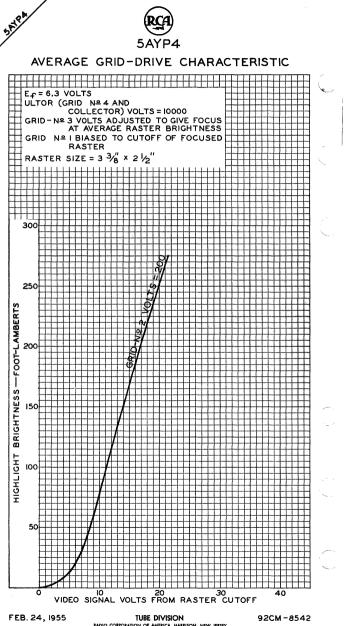


- NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN 5 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 10^{\circ}$. ULTOR TERMINAL IS ON SAME SIDE OF TUBE AS PIN 5.
- NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE GAUGE 1.430" + 0.003" -0.000" I.D. AND 2" LONG WILL REST ON BULB CONE.
- NOTE 3: CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN 2° in any direction from the perpendicular erected at the center of the bottom of the base.

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

MAY 1, 1955

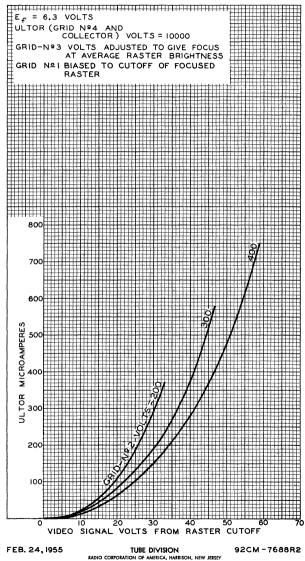
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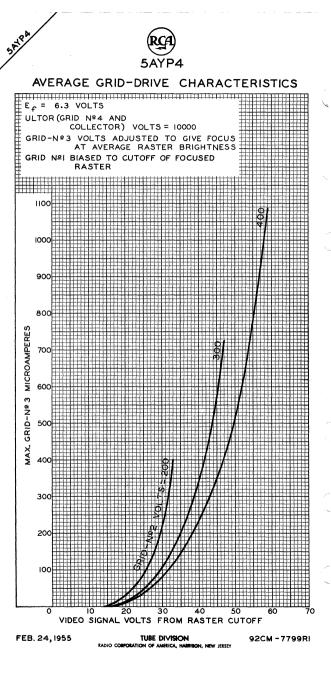




9494

AVERAGE GRID-DRIVE CHARACTERISTICS







2914C

ALUMINIZED FLUORESCENT SCREEN

FORCED-AIR COOLED AT MAXIMUM ULTOR INPUT DATA

ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

General:

1

10	Heater, for Unipotential Cathode:
	Voltage 6.3 ac or dc volts
	Current 0.6 ± 10%
	Direct Interelectrode Capacitances:
	Grid No.1 to all other electrodes 8 max. μμf Cathode to all other electrodes 5 μμf
	Cathode to all other electrodes 5 بہر Faceplate, Spherical Non-browning Glass
	Refractive index
1	Phosphor (For curves, see front of this section)P4-Silicate Type
	Aluminized
	Fluorescence White
	PhosphorescenceWhite
	Persistence
	Focusing Method
	Deflection Angle (Approx.)
	Overall Length
	Greatest Diameter of Bulb
	Minimum Useful Screen Diameter 4-1/2"
	Minimum Optical-Quality-Circle Diameter
	Weight (Approx.)
	Mounting Position
	Bulb
	Base Small-Shell Duodecal 7-Pin (JETEC No.B7-51)
	Basing Designation for BOTTOM VIEW
-	Pin 1 - Heater (6) (7) Pin 11 - Cathode
1.0	Pin 2 - Grid No 1 Pin 12 - Heater
	Pin 6 - Grid No.3 Pin 7 - Internal
	Pin 7 - Internal Cable - Ultor
	Connection- Do Not Use (2) (Grid No.4, Collector)
	Pin 10 - Grid No.2
1-14	NOTE: Socket contacts for vacant pin positions 3,4,5,8,
X	and 9 should be removed so that maximum insulation
	is provided for pins 6 and 7.
	Air Flow to Face (When average ultor input exceeds 9 watts):
	An adequate air flow sufficient to limit the faceplate temperature to the specified value should be delivered
	temperature to the specified value should be delivered perpendicularly from a nozzle having a diameter of about
1	2 inches onto the face of the tube when it is in opera-
1	tion. The blower should have adequate capacity to pro-
	vide for a total system pressure drop including that of
	the air filter. Face Temperature
	Face Temperature
	4-56 TUBE DIVISION TENTATIVE DATA 1
	RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





Maximum Ratings, Absolute Values:		
JLTOR VOLTAGE 40000 max.	volts	
ULTOR INPUT (AVERAGE):		
Without forced-air		
cooling of faceplate 9 max.	watts	~
With forced-air	ł	\frown
cooling of faceplate	watts	\subseteq
GRID-No.3 VOLTAGE	volts	
GRID-No.2 VOLTAGE	volts	
GRID-No.1 VOLTAGE:	· · · ·	
Negative bias value 150 max.	volts	
Positive bias value	volts volts	\sim
Positive peak value 2 max. PEAK HEATER—CATHODE VOLTAGE:	VOLUS	$\left(\right)$
Heater negative with respect to cathode . 175 max.	volts	~
Heater positive with respect to cathode . 10 max.		
	10100	
Equipment Design Ranges:		
For any ultor voltage (E_{c_A}) between 35000* and 40000 v	olts	
Grid-No.3 (Focusing Electrode)		
Voltage for ultor current		
of 300 μ amp 18.5% to 22.5% of E_{C_A}	volts	
Grid-No.2 Voltage when cir-		
cuit design utilizes grid-		
No.1 voltage (Ec]) at		
fixed value for raster cutoff 2.15 to 5.4 times E _{c1}	volts	
Grid-No.1 Voltage for Visual	VOILS	
Extinction of Focused		
Raster when circuit design		
Raster when circuit design utilizes grid-No.2 voltage		
utilizes grid-No.2 voltage	volts	
utilizes grid-No.2 voltage (E _{C2}) at fixed value18.5% to -46.5% of E _{C2} Maximum Grid-No.3 Current	volts	$\overline{\bigcirc}$
utilizes grid-No.2 voltağe (E _{c2}) at fixed value18.5% to -46.5% of E _{c2} Maximum Grid-No.3 Current for ultor current of		(
utilizes grid-No.2 voltage (E _C) at fixed value18.5% to -46.5% of E _{C2} Maximum Grid-No.3 Current for ultor current of 300 µamp	μ amp	(
utilizes grid-No.2 voltağe (E _{c2}) at fixed value18.5% to -46.5% of E _{c2} Maximum Grid-No.3 Current for ultor current of		(
utilizes grid-No.2 voltage (E _C) at fixed value18.5% to -46.5% of E _{C2} Maximum Grid-No.3 Current for ultor current of 300 µamp	μ amp	
utilizes grid-No.2 voltage (E _{C₂}) at fixed value18.5% to -46.5% of E _{C₂} Maximum Grid-No.3 Current for ultor current of 300 µamp 100 Grid-No.2 Current15 to +15	μ amp	0
utilizes grid-No.2 voltage (E _{C₂}) at fixed value18.5% to -46.5% of E _{C₂} Maximum Grid-No.3 Current for ultor current of 300 µamp 100 Grid-No.2 Current15 to +15 Examples of Use of Design Ranges:	μ amp	
utilizes grid-No.2 voltage (E _c) at fixed value18.5% to -46.5% of E _{c2} Maximum Grid-No.3 Current for ultor current of 300 µamp	μamp μamp	()
utilizes grid-No.2 voltage (E_{C_2}) at fixed value18.5% to -46.5% of E_{C_2} Maximum Grid-No.3 Current for ultor current of 300 μ amp	μ amp	()
utilizes grid-No.2 voltage (E_{C_p}) at fixed value18.5% to -46.5% of E_{C_2} Maximum Grid-No.3 Current for ultor current of 300 μ amp	μamp μamp	()
utilizes grid-No.2 voltage (E_{C_2}) at fixed value18.5% to -46.5% of E_{C_2} Maximum Grid-No.3 Current for ultor current of 300 μ amp	μamp μamp	
utilizes grid-No.2 voltage (E_{C_2}) at fixed value18.5% to -46.5% of E_{C_2} Maximum Grid-No.3 Current for ultor current of 300 μ amp	μamp μamp volts	()
utilizes grid-No.2 voltage (E _c) at fixed value18.5% to -46.5% of E _{c2} Maximum Grid-No.3 Current for ultor current of 300 μ amp	μamp μamp	
utilizes grid-No.2 voltage (E _c) at fixed value18.5% to -46.5% of E _{c2} Maximum Grid-No.3 Current for ultor current of 300 μ amp	μamp μamp volts	
utilizes grid-No.2 voltage (E _c) at fixed value18.5% to -46.5% of E _{c2} Maximum Grid-No.3 Current for ultor current of 300 μ amp	μamp μamp volts	$\bigcirc \qquad \bigcirc \qquad$
utilizes grid-No.2 voltage (E _c) at fixed value18.5% to -46.5% of E _{c2} Maximum Grid-No.3 Current for ultor current of 300 μ amp	μamp μamp volts	
utilizes grid-No.2 voltage (E _c) at fixed value18.5% to -46.5% of E _{c2} Maximum Grid-No.3 Current for ultor current of 300 μ amp	μamp μamp volts volts	
utilizes grid-No.2 voltage (E _c) at fixed value18.5% to -46.5% of E _{c2} Maximum Grid-No.3 Current for ultor current of 300 μ amp	μamp μamp volts	





Maximum Circuit Values:

A

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 35000 volts.

OPERATING CONSIDERATIONS

X-ray radiation is produced at the face of the 5AZP4 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 shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section.

An air-cooling system is required to cool the face of the 5AZP4 when the tube is operated with an average ultor input in excess of 9 watts. The system consists of a suitable blower and 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 temperature to 100° C. The cooling air must not contain water, dust, or other foreign matter. The aircooling system should be electrically interconnected with the ultor power supply to prevent operation of the tube without cooling.

4-56

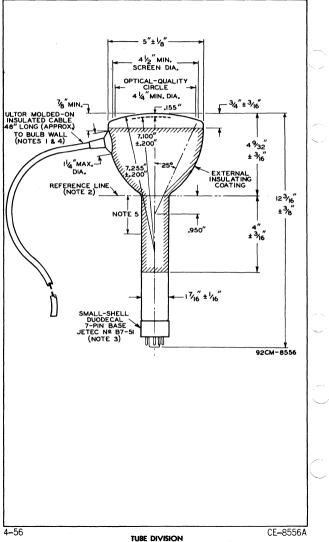
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TENTATIVE DATA 2



5h7PA

PROJECTION KINESCOPE



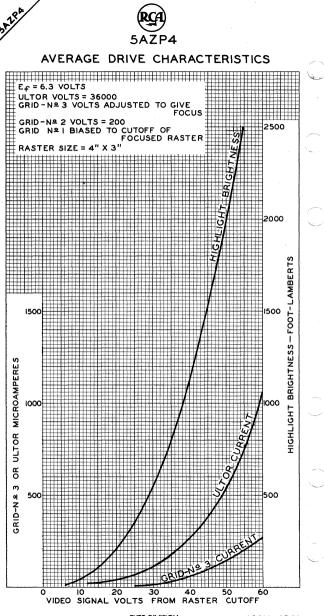




NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR-CABLE CONNECTION AT BULB WALL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF + 20°, UI-TOR-CABLE CONNECTION IS ON SAME SIDE AS VACANT PIN PO-SITION No. 3. .5 NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE GAUGE 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 MOUNT-ED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. SOCKET CONTACTS CORRESPONDING TO VACANT PYN 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: ULTOR 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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TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM - 8549





HIGH-VACUUM CATHODE-RAY TUBE Supersedes Type 5BP1

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General: Heater, for Unipotential Cathode: Voltage. 6.3 ± 10% ac or dc volts 0.6 Current. amo. Direct Interelectrode Capacitances (Approx.): Grid No.1 to All Other Electrodes. . . 8.0 μµf 1.3 μµf 1.2 uuf 9.5 uuf 12.0 uuf DJ_1 to All Other Electrodes except DJ_2 . 8.0 unf DJ2 to All Other Electrodes except DJ_1 . 7.5 unf DJ3 to All Other Electrodes except DJ4 . 10.0 uuf DJ4 to All Other Electrodes except DJ3 . 7.5 μµf Phosphor (For Curves, see front of this Section) . No.1 Fluorescence . . . Green Persistence. Medium Electrostatic Focusing Method. . Deflection Method. . Electrostatic Overall Length . . 16-3/4" ± 3/8" 5-1/4" + 1/16" Greatest Diameter of Bulb. . · 3/32" 4-1/2" Minimum Useful Screen Diameter . . . Mounting Position. Any . Medium Shell Magnal 11-Pin Base Basing Designation for BOTTOM VIEW . 11N Pin 7 - Anode No.2, Pin 1-Heater (6)Pin 2-No Connection Grid No.2 Pin Pin 3—Deflecting 4 8-Deflecting Electrode DJ1 Electr.DJ2 Pin 4- Anode No.1 Pin 9 - Deflecting Pin 5-Internal Con. Electr.DJ3 Pin 10-Grid No.1 Do not use KEY Pin 6-Deflecting Pin 11-Heater, Electrode DJ4 Cathode DJ_1 and DJ_2 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 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The angle between the trace produced by DJz and $\dot{D}J_4$ and its intersection with the plane through the tube axis and pin I does not exceed 10°. The angle between the trace produced by DJ_3 and DJ_4 and the trace produced by DJ₁ and DJ₂ is $90^{\circ} \pm 3^{\circ}$.

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10.000



SBPIA HIGH-VACUUM CATHODE-RAY TUBE

mon-viideem airmobb lair rebb	
(continued from preceding page)	V.
Maximum Ratings, Absolute Values:	
ANODE-No.2 & GRID-No.2 VOLIAGE. 2200 max. volts ANODE-No.1 VOLTAGE. 1100 max. volts GRID-No.1 (CONTROL ELECTRODE) VOLTAGE: Negative Value. 125 max. volts	
Positive Value	$\left \begin{array}{c} \\ \\ \end{array} \right $
ANY DEFLECTING ELECTRODE 550 max. volts	
Typical Operation:	
Anode-No.2 & Grid-No.2 Voltage [*] . 1500 2000 volts Anode-No.1 Volt. for Focus at 75%	
of Grid-No.1 Volt. for Cutoff . 337 450 volts	\sim
Grid-No.1 Volt. for Visual Cutoff∦30 -40 volts Max. Anode-No.1 Current Range▲. Between -50 and +10 µamp. Deflection Sensitivity:	
DJ1 and DJ2 0.404 0.303 mm/v dc DJ3 and DJ4 0.446 0.334 mm/v dc	
Deflection Factor:**	
DJ1 and DJ2 63 84 v dc/in. DJ3 and DJ4 57 76 v dc/in.	
* Brilliance and definition decrease with decreasing anode-No.2 voltage. In general, anode-No.2 voltage should not be less than 1500 volts.	
 Individual tubes may require between +25% and -30% 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 \pm 50% of these values. See curve for average values. Individual tubes may vary from these values by \pm 17%.	
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 DJ1 and DJ2. Suit- able 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.I voltage should be near cutoff before applica- tion 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 4 5.0 max. megohms	(_)
It is recommended that all deflecting-electrode-circuit resistances be approximately equal.	

JULY 1. 1945





or dc volts

amp

OSCILLOGR VPH TUBE

POST-DEFLECTION ACCELERATOR ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

		DA	ΓA					
General:								
Heater, for Unipotent	ial Ca	athode	:					
Voltage		. 6.	3.					ac
Current		. 0.	6.					
Direct Interelectrode	Capad	citanc	es l	Ap	pro	эx.):	

Direct Interelectrode Capacitances (Approx.):
Grid No.1 to All Other Electrodes 8 µµf
Cathode to All Other Electrodes 9 µµf
DJ_1 to DJ_2
DJ_3 to DJ_4
DJ ₁ to All Other Electrodes 9 µµf
DJ_2 to All Other Electrodes 9 $\mu\mu f$
DJ_3 to All Other Electrodes 7 $\mu\mu$ f
DJ_4 to All Other Electrodes 8 $\mu\mu$ f
Phosphor (For Curves, see front of this Section) P1
Fluorescence and Phosphorescence Green Persistence of Phosphorescence Medium
Forwaing Mathema
Focusing MethodElectrostatic
Deflection Method Electrostatic
Overall Length
Minimum Useful Screen Diameter
Mounting Position
Lap
Base Medium-Shell Diheptal 12-Pin (JETEC No.B12-37)
Basing Designation for BOTTOM VIEW \dots 14J $_1$
Pin 1-Heater Pin 9-Anode No.2,
Pin 2-Cathode Grid No.2
Pin 3-Grid No.1 (7) (a) Pin 10-Deflecting
Pin 4-Internal Con. Electr.DZ
Do not use 🛛 🖓 💬 🎯 Pin 11-Deflecting
Pin 5-Anode No.1 @ Electr.DJ ₁
Pin 7-Deflecting 🔬 🙀 Pin 12-No Con-
Electrode DU3
Pin 8-Deflecting 🕐 🕐 Pin 14-Heater
Electrode DJ ₄ Cap - Anode No.3
DJ and DJ are nearer the screen

 DJ_3 and DJ_4 are nearer the base

With DJ_1 positive with respect to DJ_2 , the spot is deflected toward pin 5. With DJ_3 positive with respect to DJ_4 , 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 DJ_1 and DJ_2 by the following angular tolerances measured about the tube axis: Pin 5, 10⁰; 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 $90^{\circ} \pm \overline{3}^{\circ}$.

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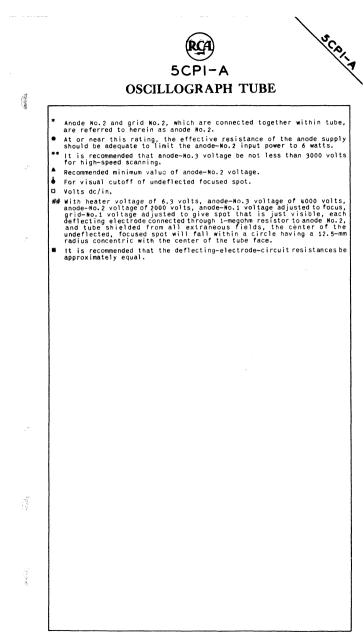
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OSCILLOGRAPH TUBE

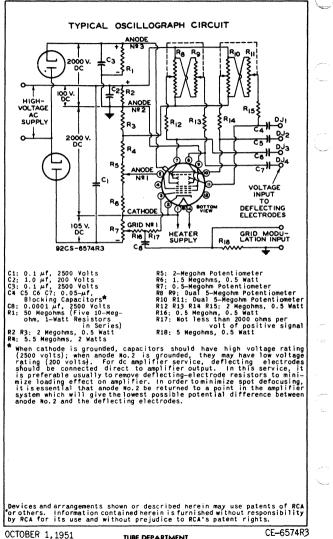
ſ		
	Maximum Ratings, Design-Center Values:	
k	ANODE-No.3 VOLTAGE 4000 max. volts ANODE-No.2* VOLTAGE 2000 max. volts	
ľ	RATIO OF ANODE-No.3 VOLTAGE TO ANODE-No.2 VOLTAGE 2:3:1	
	ANODE-No.1 VOLTAGE 1000 max. volts GRID-No.1 VOLTAGE:	
ſ	Negative bias value 200 max. volts	- 1
	Positive bias value	
	Positive peak value 2 max. volts PEAK VOLTAGE BETWEEN ANODE No.2 AND	
l	ANY DEFLECTING ELECTRODE 500 max. volts	
ľ	PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode. 125 max. volts	
	Heater positive with respect to cathode. 125 max. volts	
1	Equipment Design Ranges:	
	For any anode-No.3 voltage (Eb_2) between 2000 ^{**} and 4000 volts and any anode-No.2 voltage (Eb_2) between 1500 ^A and 2000 volts	
ļ	Anode-No.1 Voltage 18.7 to 34.5% of Eb2 volts	
٠K	Grid-No.1 Voltage• 1.5% to 4.5% of Eb2 Volts	
ł	Anode-No.1 Current of any Operating Condition μαπρ	
	Deflection Factors:	
	When $Eb_3 = 2 \times Eb_2$	
	D1 & D2 39 to 53 v dc/in./kv of Eb2	
۱	$DJ_3 \& DJ_4 \dots \dots \dots M$ 33 to 45 v dc/in./kv of Eb2	
	When $E_{b_3} = E_{b_2}$	
	DJ1 & DJ2 31 to 42 v dc/in./kv of Eb2 DJ3 & DJ4 27 to 37 v dc/in./kv of Eb2	
ł	DU3 & DU4 27 to 37 v dc/in./kv of Eb2 Spot Position ##	
1	Examples of Use of Design Ranges:	
I	For anode-No.3	
	voltage of. 2000 3000 4000 volts	
1	and anode-No.2 voltage of2000 1500 2000 volts	
	Anode-No.1 Volt. 375 to 690 280 to 515 375 to 690 volts	5
•	Grid-No.1 Volt.♦ -30 to -90 -22.5 to -67.5 -30 to -90 volts	
	Deflection Factors: DJ & DJ2 62 to 84 59 to 80 78 to 106 🔍	
	DJ & DJ2 62 to 84 59 to 80 /8 to 106 DJ3 & DJ4 54 to 74 50 to 68 66 to 90	
	Maximum Circuit Values:	
	Grid-No.1-Circuit Resistance 1.5 max. megohms	5
	Resistance in Any Deflecting-Electrode Circuit [®] 5.0 max. megohms	
	Deflecting-clectrode circuit 5.0 max. megoning	1
- 1		
	* ● ** ▲ ● ## ■ □: See next page> Indicates a change	

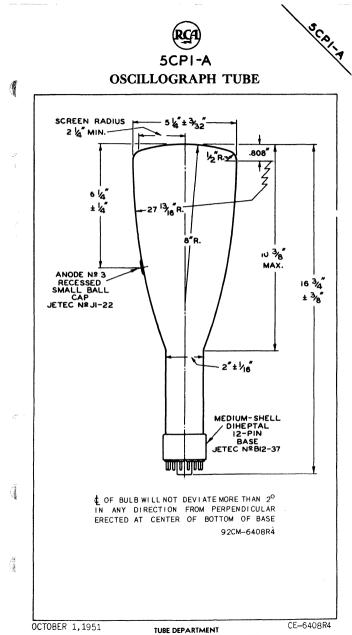


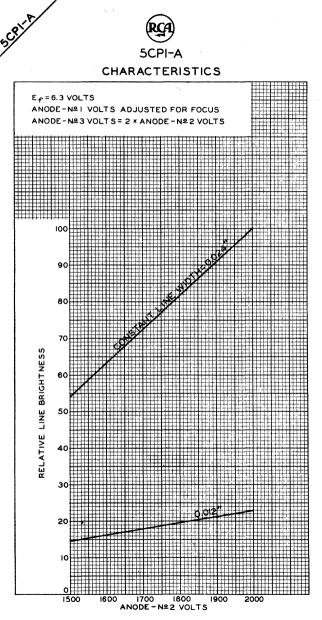


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OSCILLOGRAPH TUBE







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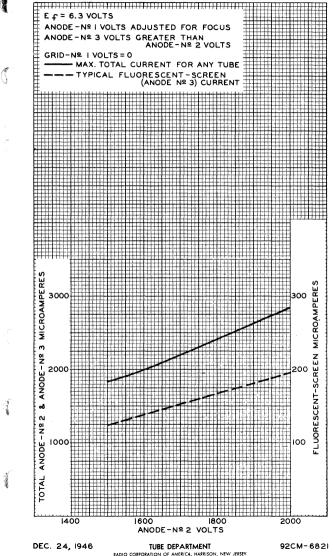
TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6820





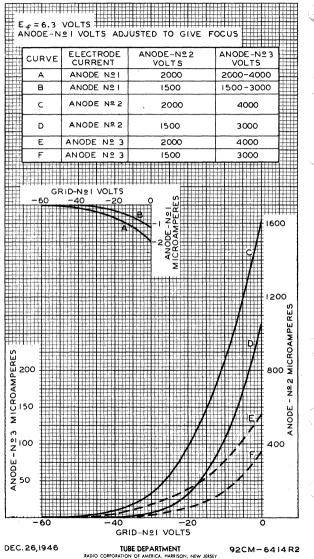






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AVERAGE CHARACTERISTICS

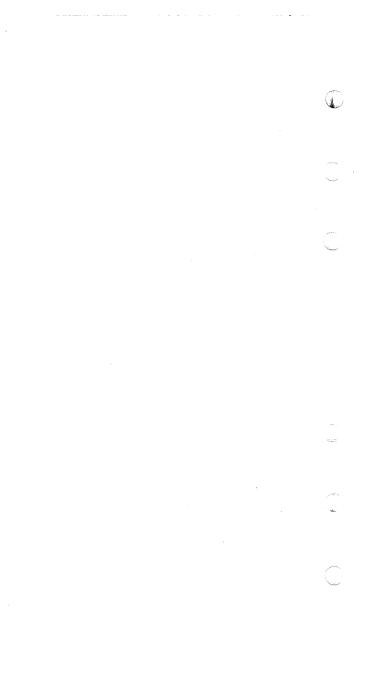


	\sim
	RCA 5CP7-A
	(diff)
	OSCILLOGRAPH TUBE POST-DEFLECTION ACCELERATOR
	ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION
, a	The 5CP7-A is the same as the 5CP1-A, except that it has a screen of the greenish-yellow, long-persistence type, designated P7.
	The SPECTRAL-ENERGY EMISSION CHARACTERISTIC, as well as PERSISTENCE CURVES of EUILDUP and DECAY for the P7 PHOSPHOR are shown at the beginning of this Section.
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	5CPII-A SCILLOGRAPH TUBE
ELECTROSTAT	POST-DEFLECTION ACCELERATOR IC FOCUS ELECTROSTATIC DEFLECTION
a screen of type designate spot of unusual ticularly use its improved a blue screen	the same as the 5CP1-A, except that it has the short-persistence, blue-fluorescence of P11. Its highly actinic fluorescent ly high brightness makes the 5CP11-A par- ful for photographic recording. Because phosphor has exceptional brightness for h, the 5CP11-A is also quite useful for ation of phenomena.
as well	TRAL-ENERGY EMISSION CHARACTERISTIC, as the PERSISTENCE CHARACTERISTIC ne P11 PHOSPHOR are shown at the beginning of this Section.







POST-DEFLECTION ACCELERATOR ELECTROSTATIC FOCUS

(Aller and Aller and Aller

ELECTROSTATIC DEFLECTION

5000

The 5CP12 is the same as the 5CP1-A except that it utilizes a medium-long-persistence screen which exhibits orange fluorescence and phosphorescence.

Because of its medium-long persistence, the 5CP12 is particularly useful where low- and medium-speed recurring phenomena are to be observed. However, it may also be used for observing low-and medium-speed, non-recurring phenomena but its efficiency is low. The persistence is such that the 5CP12 can be operated with scanning frequencies as low as 10 cycles per second without excessive flicker.

It will be noted that the phosphorescence decays exponentially with a time constant of about 120 milliseconds with the result that the low-level phosphorescence is of relatively short duration. Because of this characteristic, the 5CP12 provides high contrast between new and old information with change in target position. Therefore, the 5CP12 is suitable for short-range radar equipment involving medium-speed recurrent phenomena.

The P12 screen is more susceptible to burning than other phosphors. Therefore, the 5CP12 should be operated with the rated maximum anode-No.3 voltage and with the lowest anode-No.3 current which will give the desired brightness.

THE SPECTRAL-ENERGY EMISSION CHARACTERISTIC and the PERSISTENCE CHARACTERISTIC of the P12 Phosphor are shown at the front of this Section.



RCA 5FP7-A



OSCILLOGRAPH TUBE

الد	MAGNETIC FOCUS MAGNETIC DEFLECTION	
ſ		٦
	DATA	
	General:	
1	Heater, for Unipotential Cathode: Voltage	p ff 7 ewgcco""
	Mounting Position. An Cap)
	Maximum Ratings, Design-Center Values: ANODE VOLTAGE	-
	GRID-No.1 VOLTAGE: Negative bias value. Positive bias value* O max. volt Positive peak value. Positive peak value.	s
	PEAK GRID-No.1 DRIVE FROM CUTOFF 65 max. volt PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode. 125 max. volt Heater positive with respect to cathode. 125 max. volt	s
	Typical Operation: Anode Voltage ^{**}	
	 At or near this rating, the effective resistance of the anode suppl should be adequate to limit the anode input power to 6 watts. Brilliance and definition decrease with decreasing anode voltage. I general, the anode voltage should not be less than 4000 volts. 	y n
	←_Indicates a change	
	AUG. 1, 1951 TUBE DEPARTMENT DA	TA



OSCILLOGRAPH TUBE

	Mie
Grid-No.1 Voltage ⁰ 25 to -70 -25 to -70 volts	ve.
Grid-No.2 Current15 to +15 -15 to +15 μamp	
Focusing-Coil Current	
▶ (DC, approx.)# 96 ± 15% 128 ± 15% ma Spot Position	
Maximum Circuit Values:	C
Grid-No.1-Circuit Resistance 1.5 max. megohms	
o For visual extinction of undeflected focused spot.	
# For specimen focusing coil similar to JETEC Focusing Coil 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.	-
having 9-mm radius concentric with center of tube face.	Ś
OPERATING NOTES	
The 5FP7-A utilizes a long-persistence, cascade (two-layer) screen which exhibits bluish fluorescence of short per-	
sistence 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. Further-	
more, 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	Ĺ
br ightness.	100
OUTLINE DIMENSIONS for Type 5FP7-A are the same as those for Type 5FP4-A	
are the same as those for type of the A	
AVERAGE CHARACTERISTIC CURVE for Type 5FP7-A is the same as that shown for	Ć
Type 78P7-A	
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TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY DATA



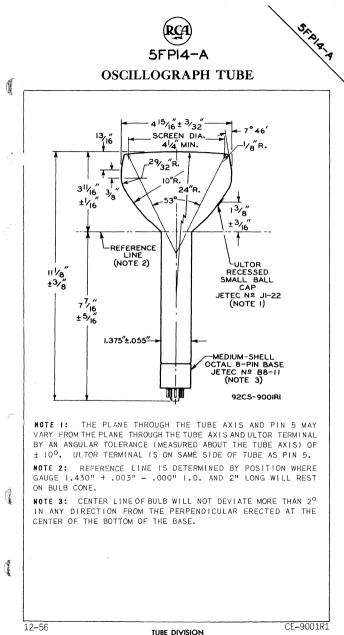
SFPI4-A OSCILLOGRAPH TUBE MAGNETIC FOCUS							
		DA	TA				
General:							
Cathode to Faceplate, Sç Phosphor (For Fluorescenc Persister Focusing Meth Deflection Me Deflection Me Deflection Me Deflection Ar Greatest Diam Minimum Useft Greatest Diam Minimum Useft Mounting Posi Cap Base Base Base Base Base Base Base Basing Desi Pin 1 - No C tic Pin 5 - Gric	electrode Ca o all other all other classical curves, sec ence ence eter of Bul ll Screen Di tion 	apacitan relectrod ee front b.	6 ± 10% ces (Apr odes es ed Smal) Octal VIEW .	s Secti Ball Pin Pin Pin	on) 	amp 	
Maximum Ratir		-Center	Values:				
ULTOR VOLTAGE GRID-No.2 VOL	TAGE		· · · ·	•••	8000 max. 700 max.		
GRID-No.1 VOL Negative bi					180 max.	volts	
Positive bi Positive pe	as value* .			•••	0 max. 2 max.		
PEAK HEATER-C Heater nega		respect	to cath to cath	ode. ode.	125 max. 125 max.		
* At or near th should be ade	is rating, t	he effect	ive resi	stance o	f the ulto	r supply	

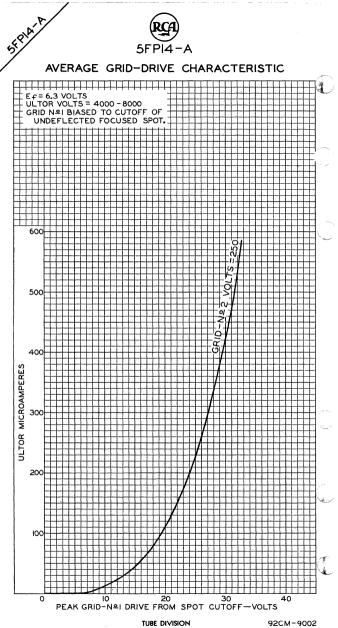
5FPI4-A

OSCILLOGRAPH TUBE

Equipment Design Ranges:				.*
With any ultor voltage (E_c) and grid-No.2 voltage (E_c^3)	between 400) between 15	0 [#] and 8000 0 and 700 v	volts olts	sa,⊃
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused				
Spot Grid-No.2 Current. Focusing-Coil Current (DC) ⁰⁰ Spot Position.	-10% to $-2-15$ t $\sqrt{E_{C_3}/4000}$	8% of E _{C2} o +15 × 96]± 15%	volts' µamp ma	neuri
Examples of Use of Design Rang	es:			
With ultor voltage of and grid-No.2 voltage of	4000 250	5000 250	volts volts	
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused				' nar
Spot	-25 to -70 96 ± 15%	-25 to -70 107 ± 15%	volts ma	
Maximum Circuit Values:				
Grid-No.1-Circuit Resistance .	•••••	1.5 max.	megohms	
SPECIAL PERF	ORMANCE DATA			
Line Width:				
For Ultor Voltage of 4000 Volt For Ultor Voltage of 5000 Volt		0.010 max. 0.009 max.		
Brilliance and definition decreas general, the ultor voltage should	e with decreas not be less t	ing ultor volt han 4000 volts	age. In	
Po For specimen focusing coil sim positioned with air gap toward f 2-3/4" from Reference Line (See D of 200 microamperes.	ilar to JETEC	Focusing Coi	1 No. 106	
With the tube shielded from extra deflected, unfocused, low-intens baying a 9-mm radius concentric w	aneous fields, sity spot will vith the center	the center of fall within of the tube f	the un- a circle face.	
 With JETEC Deflecting Yoke No.120 ing conditions: heater voltage microamperes, grid-No.2 voltage Raster width is adjusted to 11.4 	, or equivalent of 6.3 volts, of 250 volts, cm and focusi	, and under the ultor curren and a 49-line ng-coil curren	follow- t of 200 raster. t is ad-	
With JETEC Deflecting Yoke No. 120 ing conditions: heater voltage microamperes, grid-No.2 voltage Raster width is adjusted to 11.4 justed to give sharpest focus at is contracted until individual s tinguishable. <i>Line width</i> is expre ed raster height measured at the by the number of scanning lines (center of tube scanning lines ssed as the quo center line of 49).	e face. Raste are just bar tient of the c the tube face	r height ely dis- ontract- divided	Æ
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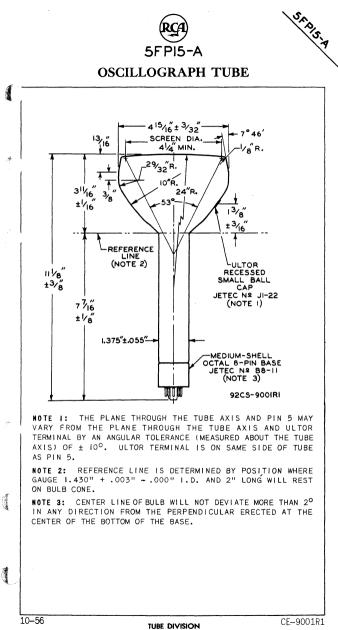
OSCILLOGRAPH TUBE

DATAGeneral:Heater, for Unipotential Cathode:VoltageVoltageCurretOteretInrect Interelectrode Capacitances (Approx.):Grid No.1 to all other electrodesMainton Colspan="2">Cathode to all other electrodesPhosphor (For Curves, see front of this Section)ProcescenceVisible radiationPersistence of visible radiationPersistence of visible radiationPersistence of invisible radiationPersistence of invisible radiationPersistence of invisible radiationPersistence of invisible radiationVisible radiationVisible radiationVisible radiationPersistence of invisible radiationVisible radiationPersistence of invisible radiationVisible radiationVisible radiationVisible radiationPersistence of invisible radiationVisible radiationVisible radiationVisible radiationVisible radiationVisible radiationPersistence of invisible radiationVisible ra
<pre>Heater, for Unipotential Cathode: Voltage 0.6 ± 10%</pre>
Voltage6.3
<pre>Visible radiation</pre>
Focusing MethodMagnetDeflection MethodMagnetDeflection Angle (Approx.)MagnetDeflection Angle (Approx.)SourceOverall length11-1/8" ± 3/3Greatest diameter of bulb4-15/16" ± 3/3Minimum Useful Screen Diameter4-15/16" ± 3/3Minimum Useful Screen Diameter4-15/16" ± 3/3Monting Position4-15/16" ± 3/3Mounting Position4-15/16" ± 3/3Mounting Position4-15/16" ± 3/3Mounting Position4-16CapSourceBulbSourceBasing Designation for BOTTOM VIEW5Pin 1 - No Connec- tionFin 8 - Grid No.2Pin 2 - HeaterFin 9Pin 3 - Grid No.2Fin 7 - CathodePin 4 - No Connec- tionFin 8 - HeaterPin 5 - Grid No.1Grid No.3, Collector)Maximum Ratings, Design-Center Values:ULTOR VOLTAGEULTOR VOLTAGEToo max. volGRID-No.1 VOLTAGEMax. volPositive bias value180 max. volPositive bias value2 max. volPEAK HEATER-CATHODE VOLTAGE:
Greatest diameter of bulb 4-15/16" ± 3/3: Minimum Useful Screen Diameter
tion Pin 2 - Heater Pin 3 - Grid No.2 Pin 4 - No Connec- tion Pin 5 - Grid No.1 Maximum Ratings, Design-Center Values: ULTOR VOLTAGE
ULTOR VOLTAGE 8000 max. vol GRID-No.2 VOLTAGE 700 max. vol GRID-No.1 VOLTAGE: Negative bias value Negative bias value 180 max. vol Positive peak value 0 max. vol Positive peak value 2 max. vol PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode 125 max. vol
GRID-No.1 VOLTAGE: Negative bias value
Heater negative with respect to cathode . 125 max. vol- Heater positive with respect to cathode . 125 max. vol-
At or near this rating, the effective resistance of the ultor supp should be adequate to limit the ultor input power to 6 watts.

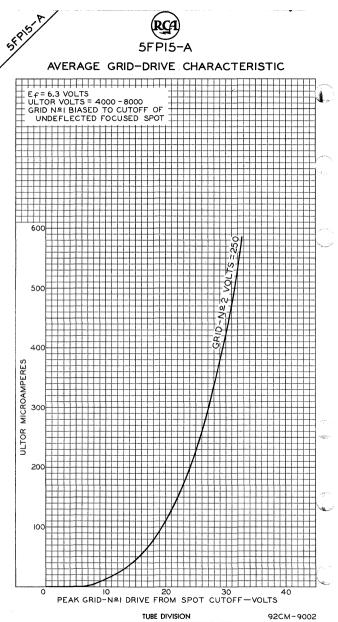
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

SEPISIA 5FP15-A OSCILLOGRAPH TUBE 1 Equipment Design Ranges: For any ultor voltage $(E_{c,2})$ between 4000% and 8000 volts and grid-No.2 voltage $(E_{c,2})$ between 150 and 700 volts Grid-No.1 Voltage for Visual Extinction of Undeflected -10% to -28% of Ec? Focused Spot volts Grid-No.2 Current -15 to +15 μamp Focusing-Coil Current (DC)⁰⁰. $\sqrt{E_{c_3}/4000} imes 96$ ± 15% ma Spot Position . . ## Examples of Use of Design Ranges: For ultor voltage of 4000 5000 volts and grid-No. 2 voltage of volts 250 250 Grid-No.1 Voltage for Visual Extinction of Undeflected -25 to -70 -25 to -70 volts Focused Spot Focusing-Coil Current (DC). 82 to 110 91 to 123 ma Maximum Circuit Values: 1.5 max. megohms Grid-No.1-Circuit Resistance. . . . SPECIAL PERFORMANCE DATA Line Width: inch For Ultor Voltage of 4000 Volts . . . 0.010 max. For Ultor Voltage of 5000 Volts . . . 0.009 max. inch Brilliance and definition decrease with decreasing ultor voltage. general, the ultor voltage should not be less than 4000 volts. In O For specimen focusing coil similar to JETEC Focusing Coil No.106 positioned with air gap toward faceplate and center line of air gap -3/4" from Reference Line (See Dimensional Outline) and ultor current of 200 microamperes. With the tube shielded from extraneous fields, the center of the undeflected, unfocused, low-intensity spot will fall within a circle having a 9-mm radius concentric with the center of the tube face. ## With With JFTEC Deflecting Yoke No.120, or equivalent, and under the following 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 adjusted to give sharpest focus at center of tube face. Raster height is contracted until individual scanning lines are just barely distin-guishable. Line width is expressed as the quotient of the contracted the number of scanning lines (49).

TENTATIVE DATA



TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



DD/ TION KINESCOPE

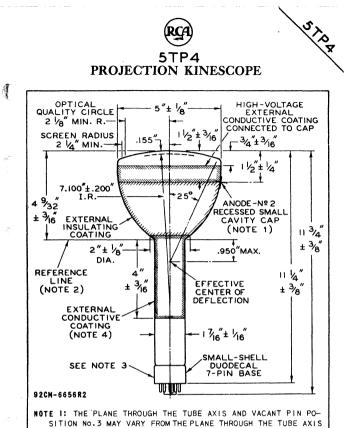
	PROJECTIO	N KINES	COPE	
	ELECTROSTATIC FOCUS	MAGNET	IC DEFLECTION	
	D	ATA		
Genera	1:			
Volt Curr Direct	r, for Unipotential Catho age	6.3 D.6	ac or do): . 7.5 5.0 .2 { 500 max. 100 min.	. amp . μμf
			(100 mm.	• µµ
Fluc Pers Focusi Deflec	or (For Curves, see from prescence and Phosphores sistence of Phosphorescent ng Method.	cence nce	Electro	White Medium ostatic agnetic
Det.lec Overal	tion Angle (Approx.) .			. 50° ± 3/8"
Greate	l Length		•••• 5"	± 1/8'
Minimu	um Useful Screen Diamete um Optical-Quality-Circle	r		4-1/2
Mounti	ng Position.	e Drameter.		4-1/4 Anv
Cap	ng Position		Recessed Small	Cavity
Base .	ng Designation for BOTT	Small~	-Shell Duodeca	7-Pir
Dasi	ng besignation for boint		• • • • • • • •	. 120
	1 - Heater 2 - Grid No.1 6 - Anode No.1 7 - Internal Con P2 Do Not Use		Pin 10-Grid M Pin 11-Cathod Pin 12-Heater Cap -Anode	de
Maximu	m Ratings, Design-Cente	r Values:		
ANODE-	No.2 VOLTAGE		27000 max.	
GRID-N	No.1 VOLTAGE		6000 max. 350 max.	
GRID-N	0.1 (CONTROL ELECTRODE)	VOLTAGE:	-	
Nega	tive bias value		150 max.	
Posi	tive bias value tive peak value		0 max. 2 max.	volts volts
ΡΕΑΚ Η	EATER-CATHODE VOLTAGE:			VUILE
	er negative with respect		e:	
Ju	ring equipment warm-up p exceeding 15 sec		410 max.	volts
Af	ter equipment warm-up pe	eriod	175 max	volts
Heat	er positive with respect	t to cathode	e 10 max.	volts
	1 Operation:			
Anode-	No.2 Voltage*		27000	volts
Anode- Anode-	No.2 Voltage [*] No.1 Voltage for Focus	200 µa		
Anode- Anode- when	No.2 Voltage*	200 μa		volts

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



PROJECTION KINESCOPE

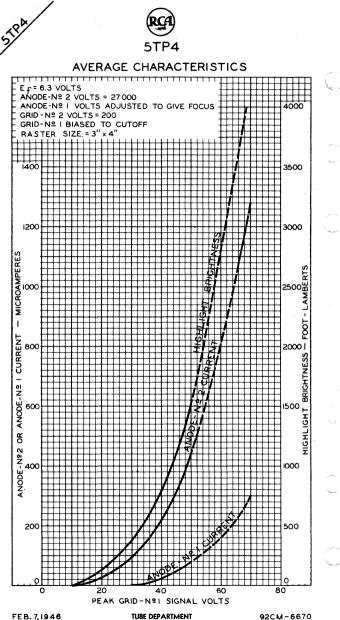
Grid-No.2 Voltage ^{**}	y I
Grid-No.1-Circuit Resistance 1.5 max.megohms	
 Minimum Circuit Values: When the output capacitor of the power supply is capable of storing more than 250 microcoulombs, and when the inherent regulation of the power supply permits the instantaneous short-circuit current to exceed 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	6.1
<pre>Components: Deflection Yoke</pre>	
	9
→Indicates a change.	



- SITION NO.3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE-NO.2 TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE-NO.2 TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION NO.3.
- NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE HINGED GAUGE 1.500" + .003" - .000" I.D. AND 2" LONG WILL REST ON BULB CONE.
- NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY.

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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FEB. 7, 1946

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6670



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OSCILLOGRAPH TUBE

	OSCILLOGRAPH TUBE
A	ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION
	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
2 ^m	DJ1 to DJ2
N.	DJ3 to DJ4
	DJ1 to All Other Electrodes 11.0 µµf
	DJ2 to All Other Electrodes 8.0 ##f
	DJ3 to All Other Electrodes. \dots 7.0 \dots $\mu\mu$ f
	DJ₄ to All Other Electrodes 8.0 μμf Phosphor (For Curves, see front of this Section) No.1
	Fluorescence
	Persistence
	Focusing Method Electrostatic
	Deflection Method Electrostatic
	Greatest Diameter of Bulb $5-1/4" + 3/32"$
	Overall Length
	Mounting Position
	Base Small-Shell Duodecal 12-Pin
	Basing Designation for BOTTOM VIEW
	Pin 2-Grid No.1 (6) (7) Grid No.2
	Pin 3-Cathode 🛛 🖉 🖉 Pin 9-Deflecting
	Pin 4 - Anode No.1 @ B D Electrode DJ2
	Pin 5 - Internal Con. Do Not Use Pin 10- Deflecting Electrode DJ1
	Pin 6 - Deflecting
	Electrode DJ3 KEY Do Not Use
	Pin 7 - Deflecting Pin 12- Heater
19	Electrode DJ ₄
	DJ_1 and DJ_2 are nearer the screen
	DJ_3 and DJ_4 are nearer the base
	With DJ1 positive with respect to DJ2, the spot is de-
	flected toward pin 4. With DJ3 positive with respect to
1 N	DJ ₄ , the spot is deflected toward pin 1.
	The angle between the trace produced by DJ_1 and DJ_2 and
	its intersection with the plane through the tube axis and pin I does not exceed 10° .
	The angle between the trace produced by DJ ₃ and DJ ₄ and the trace produced by DJ ₁ and DJ ₂ is $90^{\circ} \pm 3^{\circ}$.
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DEC. 20, 1946

TENTATIVE DATA



OSCILLOGRAPH TUBE

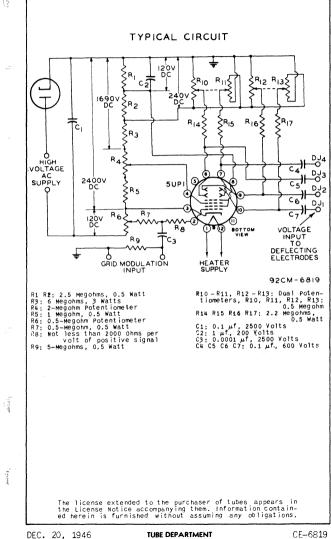
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
laximum Ratings, Design-Center Values:	
NODE-No.2 VOLTAGE	volts
ANODE-No.1 VOLTAGE	volts
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:	10100
	volts
Positive bias value	volts
Peak positive value 2 max.	volts
PEAK VOLTAGE BETWEEN ANODE No.2	1
AND ANY DEFLECTING ELECTRODE 500 max.	volts
PEAK HEATER-CATHODE VOLTAGE:	1
Heater negative with respect to cathode. 125 max.	volts
Heater positive with respect to cathode. 125 max.	
neater positive with respect to cathoder 120 maxi	10110
Equipment Design Ranges:	
For any anode-No.2 voltage $(E_{b_2})$ between 1000* and 2500	volts
Anode-No.1 Voltage 17% to 32% of $E_{b2}$	volts
	*0113
Max. Grid-No.1 Voltage	volts
for Visual Cutoff 4.5% of E _{b2}	vorts
Anode-No.1 Current for	
they operating terrained	icroamp
Deflection Factors:	<u></u>
DJ1 & DJ2 28 to 38.5 v dc/in./k	v ot tb2
DJ3 & DJ4 23 to 31 v dc/in./k	vofEba
	4
Examples of Use of Design Ranges:	
For anode-No.2 voltages of 2000	volts
Anode-No.1 Voltage 170 - 320 340 - 640	volts
Max. Grid-No.1 Voltage	
for Visual Cutoff -45 -90	volts
Deflection Factors:	]
$DJ_1 \& DJ_2 \dots 28 - 38.5 56 - 77$ volts	dc/in.
DJ3 & DJ4 23 - 31 46 - 62 volts	
$U_3 \approx U_4 \cdots \cdots \approx U_7 = $	
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max	meaohma
Resistance in Any Deflecting	
Electrode Circuit ^e 5.0 max.	megohms
Electrode Uncont 5.0 max.	negonina
* Recommended minimum value.	
It is recommended that the deflecting-electrode-circuit res	istances
be approximately equal.	
Anode No.2 and grid No.2, which are connected together with are referred to herein as anode No.2.	in tube,
are referred to herein as anode No.2.	
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TENTATIVE DATA

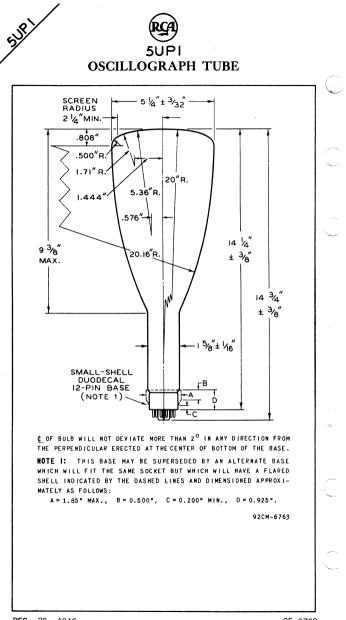


#### **OSCILLOGRAPH TUBE**



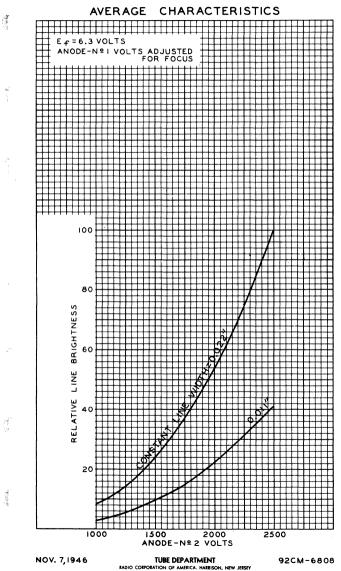
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

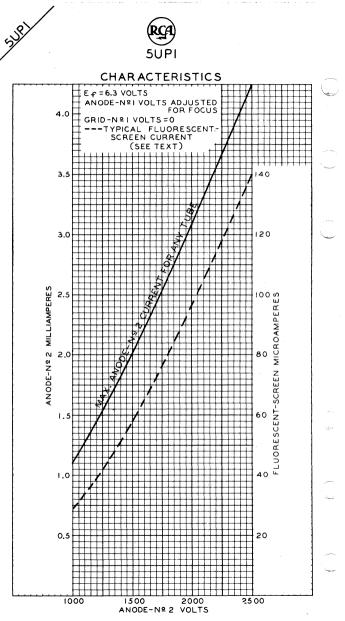
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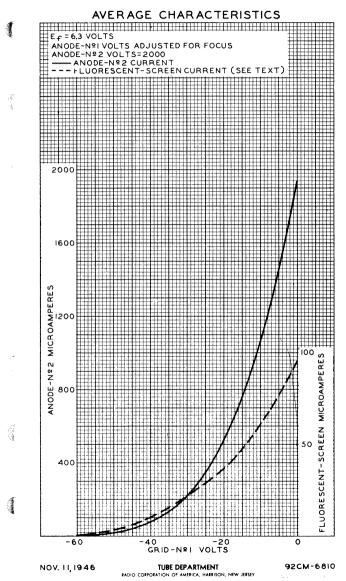
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TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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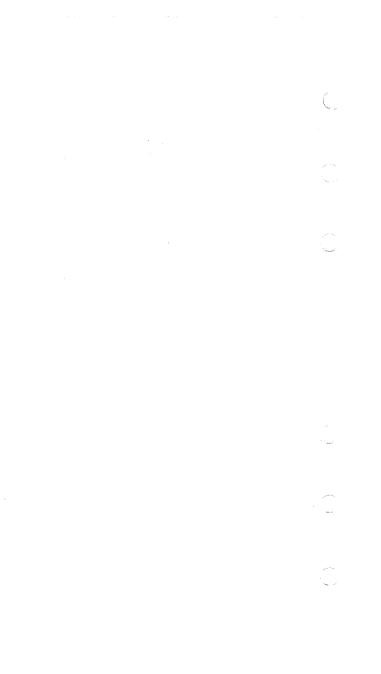




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	OSCILLOGRAPH TUBE ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION
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	The 5UP7 is the same as the 5UP1, except that it has a screen of the greenish-yellow, long-persistence type, designated P7. Persistence of useable brightness can be obtained with an anode-No.2 voltage of as low as 1500 volts.
	The SPECTRAL-ENERGY EMISSION CHARACTERISTIC, as well as PERSISTENCE CURVES of BUILDUP and DECAY for the P7 PHOSPHOR are shown at the beginning of this section
l	
Ŋ	EC. 20, 1946 TUBE DEPARTMENT TENTATIVE DATA





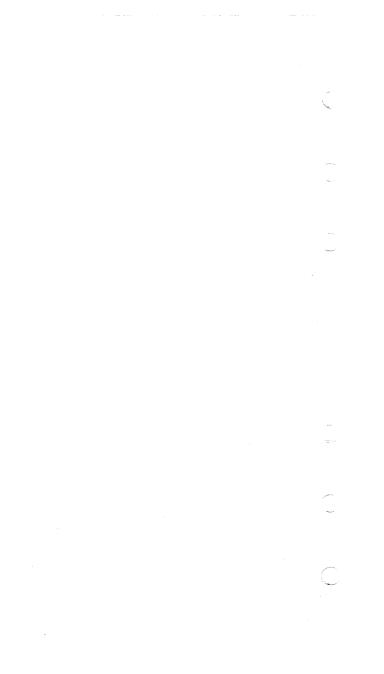
## **OSCILLOGRAPH TUBE**

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ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

SUPIL

	DEC. 20, 1946 <b>TUBE DEPARTMENT</b> RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY	TENTATIVE	DATA
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ford,			
1.			
19 29 2	The SPECTRAL-ENERGY EMISSION CHARACTED of the P11 PHOSPHOR is shown at the beginning of this section		
(Å	spot of unusually high brightness makes the ticularly useful for photographic recordin its improved phosphor has exceptional brig a blue screen, the 5UP11 is also quite visual observation of phenomena. Radiation intensity can be obtained with anode-No.2 low as 1500 volts.	g. Because ghtness for useful for of useable voltages as	
	The 5UP11 is the same as the 5UP1, except a screen of the short-persistence, blue-f type designated P11. Its highly actinic	luorescence	e







	5WPII	N
<b>A</b>	TRANSCRIBER KINESCOPE	
	DATA	
	General:	
<b>N</b>	Heater, for Unipotential Cathode: Voltage	p f f
	Phosphor (For Curves, see front of this Section) P1 Fluorescence	1etcco==yyn
1	Maximum Ratings, Design-Center Values:	
	ANODE-No.2 VOLTAGE 27000 max. volt ANODE-No.1 VOLTAGE	s
	Negative bias value.       150 max. volt         Positive bias value.       0 max. volt         Positive peak value.       2 max. volt         PEAK HEATER-CATHODE VOLTAGE:       Heater negative with respect to cathode:	s
	During equipment warm-up period not exceeding 15 seconds 410 max. volt After equipment warm-up period 125 max. volt Heater positive with respect to cathode. 125 max. volt Typical Operation:	s
	Anode-No.2 Voltage*	s
	*: See next page.	·
	FEB. 1, 1949 TUBE DEPARTMENT TENTATIVE DATA	1

TUBE DEPARTMENT



## TRANSCRIBER KINESCOPE

f	• \2-
Anode-No.1 Voltage Range for Anode-No.2 Current of 20 µamp.       4200 to 5400 volts         Grid-No.2 Voltage**       200 volts         Grid-No.1 Voltage for Visual Cutoff       -42 to -98 volts         Anode-No.2 Current       20         Mande-No.2 Current       20         pamp       20         pamp       -42 to -98 volts         Anode-No.2 Current       20         Max. Anode-No.1 Current       25         Grid-No.2 Current Range       -15 to +15	
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max. megohms	
Minimum Circuit Values:	
When the output capacitor of the power supply is capable of storing more than 250 microcoulombs, and when the inherent regu- 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	
Components: Deflecting YokeRCA Type No. 201D11 Hor. Deflection Output Transformer: For use with 6AS7-G booster scanningtube and separate high-voltage supply RCA Type No. 204T1 For use with single high-voltage tripler	
supply employing 3 183-GT/8016's RCA Type No. 211T2 Ver. Deflection Output Transformer RCA Type No. 204T2	$\langle . \rangle$
<ul> <li>Brilliance and definition decrease with decreasing anode voltages. In general, anode-No.2 voltage should not be less than 15000 volts.</li> <li>\$vbject variation of ± 40\$ when grid-No.1 voltage cutoff is desired at -70 volts.</li> </ul>	
OPERATING NOTES	6
Soft x-rays are produced when the 5WPHI 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 5WPII. 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

5MPI1

TENTATIVE DATA 1



# TRANSCRIBER KINESCOPE

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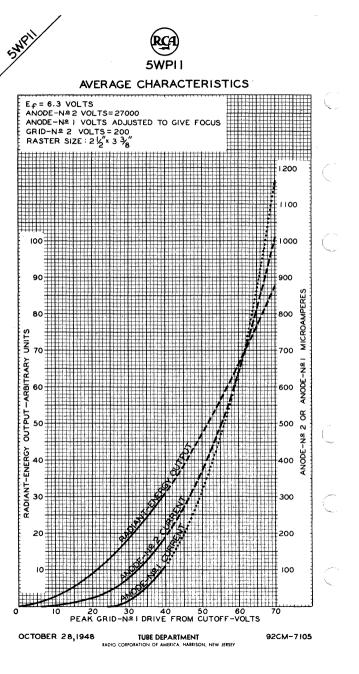
The screen of the 5WPII has highly actinic blue radiation, and is particularly effective for photography. The presistence of the radiation is sufficiently short to prevent "carry over" from one frame to the next. The persistence is dependent to some extent on the current density in the focused spot,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

FEB. 1, 1949

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ALUMINIZED SCREEN

ELECTROSTATIC FOCUS MAGNETIC DEFLECTION For use as scanner in flying-spot video-signal generators

#### DATA

#### General:

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Heater. for Unipotential Cathode: Voltage. . . . . . . 6.3 ac or dc volts 0.6 ± 10% . Current. . . .amp Direct Interelectrode Capacitances: Grid No.1 to all other electrodes. . 8 μµf Cathode to all other electrodes. . . 5 μµf (500 max. μµf External conductive neck coating to ultor. . 1100 min. μµf . .Clear Glass Faceplate. Flat. . . . . . ....P15 Phosphor (For Curves, see front of this Section) Aluminized Fluorescence-Visible radiation. . .Green . Near Ultraviolet Invisible radiation. . Phosphorescence-Persistence of visible radiation . . . .Short Persistence of invisible radiation . Very Short Focusing Method. .Electrostatic Deflection Method. . . . . . . Magnetic Deflection Angle (Approx.) . . . 50° . . Tube Dimensions: Overall length . 11-7/16" ± 3/8" 5" ± 1/8" . . 4-1/4" Greatest diameter of bulb. . . . Minimum Useful Screen Diameter . . . . . . Weight (Approx.) . . . 1-1/2 ]bs . . . . . . Operating Position . . . . . . . . . . . Anv Cap. . . . . . . . . . Recessed Small Cavity (JETEC No.J1-21) Pin 12 - Heater Pin 1-Heater Pin 2-Grid No.1 Cap-Ultor Pin 6-Grid No.3 (Grid No.4 Pin 7 - Internal Collector) Connection-C-External Do Not Use Conductive Pin 10-Grid No.2 Neck Coat-Pin 11 - Cathode ina Maximum Ratings, Design-Center Values: ULTOR VOLTAGE. . . . 27000 max. volts 6000 max. GRID-No.3 VOLTAGE. . . . volts GRID-No.2 VOLTAGE. 350 max. volts Indicates a change. 7-58 DATA 1 ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



5WP15

#### FLYING-SPOT CATHODE-RAY TUBE

GRID-No.1 VOLTAGE: 150 max. Negative bias value. . . volts 0 max. volts Positive bias value. 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 150 max. volts After equipment warm-up period . . . . Heater positive with respect to cathode. 150 max. volts Equipment Design Ranges: For any ultor voltage  $(E_{C_{\mu}})$  between 15000^{*} and 27000 volts Grid-No.3 Voltage for focus with ultor current of 150 µa or less. . . . 15% to 19% of E_{C4} volts Grid-No.2 Voltage for visual extinction of undeflected focused spot when circuit design utilizes fixed grid-No.1 voltage . . . . 2 to 5 times Ec. volts Grid-No.1 Voltage for visual extinction of undeflected focused spot when circuit design utilizes fixed grid-No.2 voltage . . . -20% to -50% of Ec2 volts Maximum Grid-No.3 Current for ultor current of 150  $\mu a$  . . μa Grid-No.2 Current . . . -15 to +15 μa Examples of Use of Design Ranges: For ultor voltage of 20000 27000 volts Grid-No.3 Voltage for focus with ultor current as volts Grid-No.2 Voltage for visual extinction of undeflected focused spot when circuit design utilizes fixed grid-No.1 voltage of -70 volts . . . . . . . . . 140 to 350 140 to 350 voits Grid-No.1 Voltage for visual extinction of undeflected focused spot when circuit design utilizes fixed grid-No.2 voltage of 200 volts . . . . . . . . volts -40 to -100 -40 to -100 Ultor Current . . 150 uа Maximum Circuit Values: Grid-No.1-Circuit Resistance. . 1.5 max. megohms *: See next page. +Indicates a change. 7-58 DATA 1



Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 15,000 volts.

#### **OPERATING CONSIDERATIONS**

X-Ray Warning. X-ray radiation is produced at the face of the 5WP15 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  $\phi$ ins of the 5WP15 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 baffles.

*Resolution* of better than 800 lines at the center of the reproduced picture can be produced by the 5WPl5 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 screen of the 5WPI5 has radiation in the visible green region and in the invisible near-ultraviolet region. The frequency response of the ultraviolet radiation is substantially constant for a range of 3 megacycles and then decreases exponentially toward zero at approximately 100 megacycles.

The PI5 screen is more sensitive to heat than other standard types of phosphors. It shows a decrease in efficiency with increase in temperature. Use of forced air from a small blower directed against the face of the tube is, therefore, suggested to counteract the heating effect of the electron beam if optimum efficiency of the screen is desired at maximum ultor current.

Care should be taken to avoid under-scanning over a protracted period because such an underscanned area will be burned and thus give Jiminished radiation when the raster is scanned to full size and be apparent in the reproduced picture. Furthermore, it is inadvisable to permita modulated stationary pattern to remain more than a few minutes on the face of the tube. If it remains for a longer time, the facewill be burned unevenly over the pattern area. When a modulated stationary pattern is used, it is recommended that the ultor current be limited to an instantaneous value of about 150 microamperes.

The second

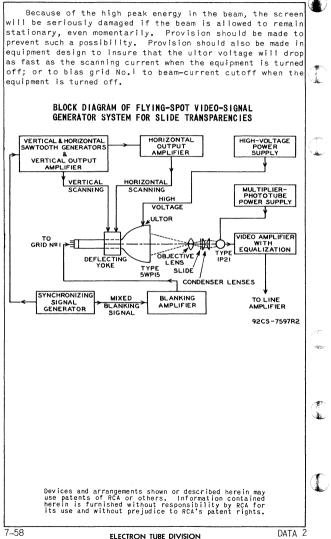
The second

Indicates a change.

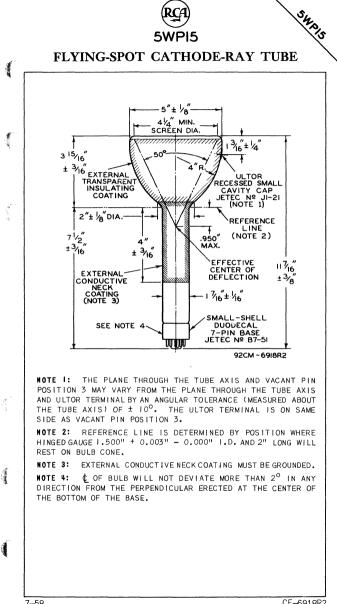
7-58

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

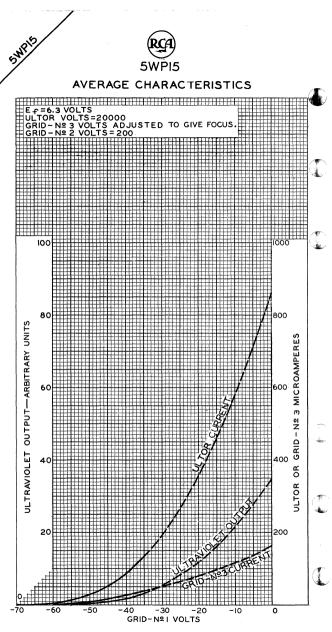




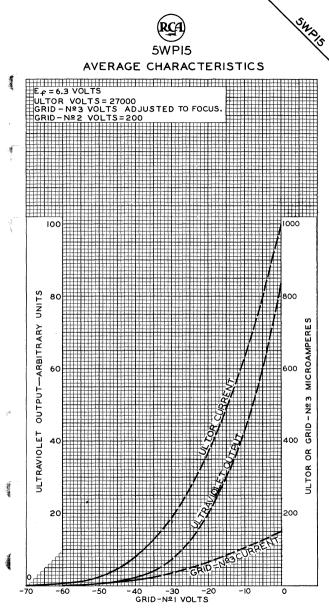
5WP15



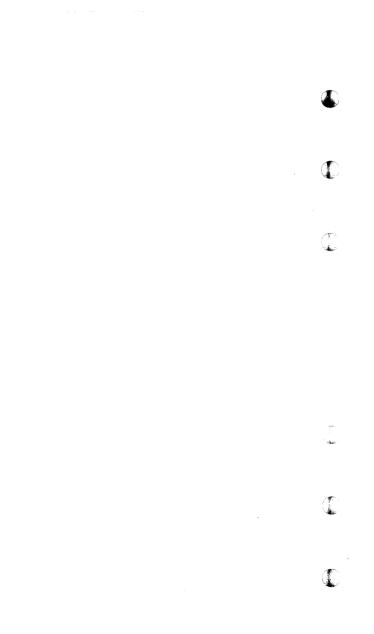
7-58



ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM - 6916RI



ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-6917RI





HIGH RESOLUTION CAPABILITY ALUMINIZED SCREEN ELECTROSTATIC FOCUS MAGNETIC DEFLECTION For use as scanner in high-quality flying-spot urideo-signal denerators

#### DATA

#### General: Heater, for Unipotential Cathode: Voltage. . . . . . . . . 6.3 . ac or dc volts Current. . . . . . $0.6 \pm 10\%$ . . . amp Direct Interelectrode Capacitances: Grid No.1 to all other electrodes. . 8 μµf Cathode to all other electrodes. . . 5 μµf (500 max. μµf External conductive neck coating to ultor. 1100 min. μµf Faceplate. Flat. . . . .Clear Glass . . . . . Phosphor (For Curves, see front of this Section) P16 Aluminized Fluorescence-Visible radiation. . Violet Invisible radiation. Near Ultraviolet Phosphorescence-Persistence of visible radiation . . Very Short Persistence of invisible radiation . . . Very Short . . . Focusing Method. . . . . .Electrostatic Deflection Method. . Magnetic 400 Deflection Angle (Approx.) Tube Dimensions: Overall length . . 14-3/8" ± 3/8" Greatest diameter of bulb. . . 5" ± 1/8" . . . 4-1/4" Minimum Useful Screen Diameter . . Weight (Approx.) . . . 1-1/2 ]bs Operating Position . . .Any . . . . . . . . . . Recessed Small Cavity (JETEC No.J1-21) Cap. . . . . . . . . ..... See Operating Considerations Socket Pin 12 - Heater Pin 1 - Heater Pin 2-Grid No.1 Cap-Ultor Pin 6-Grid No.3 (Grid No.4. Pin 7 - Internal Collector) Connection-C-External Do Not Use Conductive Pin 10-Grid No.2 Neck Coat-Pin 11 - Cathode ina Maximum Ratings, Design-Center Values: ULTOR VOLTAGE..... 27000 max. volts GRID-No.3 VOLTAGE. . . . 7000 max. volts GRID-No.2 VOLTAGE. . . 350 max. volts -Indicates a change.

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7–58 ELECTRON TUB			DATA 1
		Indicates a	
* Brilliance and definition decrease general, the ultor voltage should n	with decreasing ot be less than	ultor volta 20.000 volts	ge. In
Grid-No.1-Circuit Resistance	1	L.5 max. m	egohms
Maximum Circuit Values:			1
focused spot when circuit design utilizes fixed grid-No.2 voltage of 200 volts	0 to -100 - 25	40 to -100 15	volts µa
extinction of undeflected focused spot when circuit design utilizes fixed grid-No.1 voltage of -70 volts	0 to 350 1	.40 to 350	volts
Grid-No.3 Voltage for focus with ultor current as	0 to 5300 55		
Examples of Use of Design Ranges For ultor voltage of	20000	27000	volts
focused spot when circuit design utilizes fixed grid-No.2 voltage Grid-No.2 Current	-20% to -50% -15 to		volts µa
focused spot when circuit design utilizes fixed grid-No.1 voltage Grid-No.1 Voltage for visual extinction of undeflected	2 to 5 time	es E _{CI}	volts
Grid-No.3 Voltage for focus with ultor current of	20.5% to 26.5		volts
Equipment Design Ranges: For any ultor voltage $(E_{Cu})$ be	two an 20000*	and space a	unite
Negative bias value. Positive peak value. Positive peak value. PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect t During equipment warm-up per exceeding 15 seconds. After equipment warm-up peri Heater positive with respect t	iod not • • • • • od • • • •	150 max. 0 max. 2 max. 410 max. 150 max. 150 max.	volts volts volts volts volts volts
GRID-No.1 VOLTAGE:		100	

52P10

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



#### **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, arc-resistant, insulating material and should preferably be designed with baffles.

*Resolution* of better than 1000 lines at the center of the reproduced picture can be produced by the 5ZPI6 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 5ZP16 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 5ZP16 is operated with 27,000 volts on the ultor than when operated with 20,000 volts.

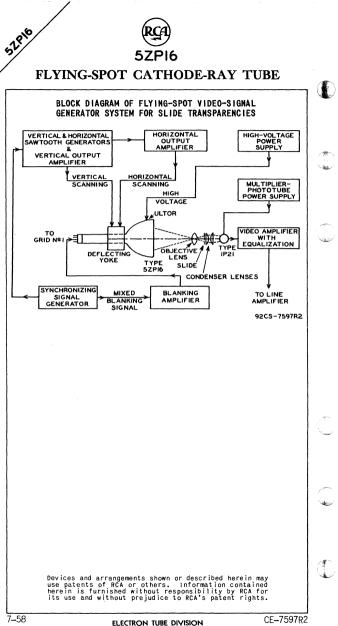
Underscanning over a protracted period should be avoided because an underscanned area of the screen will be burned and thus give diminished radiation when the raster is again scanned to full size and be slightly noticeable in the reproduced picture. Furthermore, it is inadvisable to permit a modulated 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 unevenly over the pattern area.

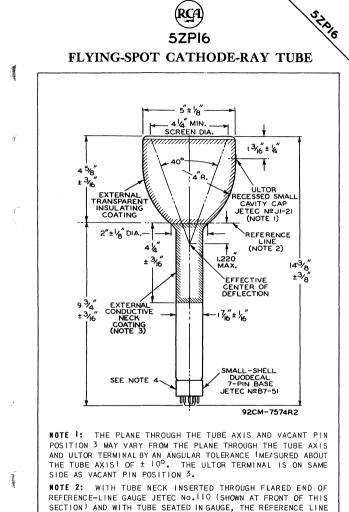
Neverallow the beam to remain stationary, even momentarily, because the high peak energy in the beam will seriously damage the screen. Provision should be made to prevent such a possibility. Provision should also be made in equipment design to insure that the ultor voltage will drop as fast as the scanning 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.

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



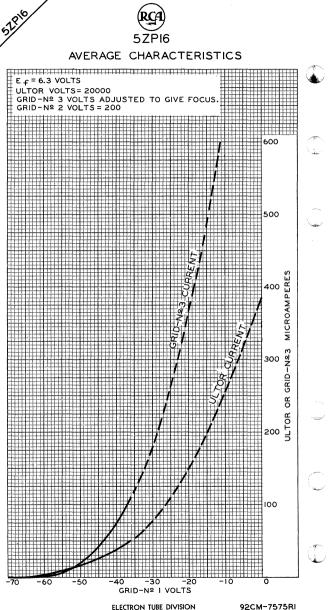


IS DETERMINED BY INTERSECTION ON PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 3: EXTERNALCONDUCTIVE NECK COATING MUST BE GROUNDED.

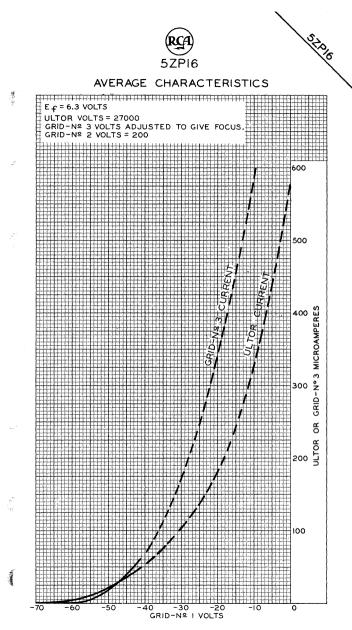
NOTE 4:  $\cap{C}$  OF BULB WILL NOT DEVIATE MORE THAN  $2^{O}$  IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

CE-7574R2



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7575RI



ELECTRON TUBE DIVISION

92CM-7576RI





10014

**OSCILLOGRAPH TUBE** 

#### MAGNETIC FOCUS MAGNETIC DEFLECTION

A.S

N. State

#### DATA

General:				
Heater, for Unipotential (				
Voltage	6.3		ac or dc	vol
Current				а
Direct Interelectrode Capa	citances (Ap	prox.):		-
Grid No.1 to All Other E Grid No.2 to All Other E	lectrodes		8.	5 µ
Grid No.2 to All Other b	lectrodes		• • • •	
Cathode to All Other Ele	ctrodes		••••	5 μ
Phosphor (For Curves, see			n)	No
Fluorescence				BI
Phosphorescence Persistence of Phosphore				
			· · · ·	Lo
Focusing Method Deflection Method		• • • •	Mag	inet
Deflection Angle (Approx.)		• • • •	••••Mag	5
Overall Length	• • • • • •		13-1/4" ±	
Greatest Diameter of Bulb.		• • •	7" ±	
Maximum Useful Screen Dian				
Mounting Position				A
Сар		. Rece	ssed Small	Ba
Base	Long M	ledium-Sh	ell Octal	8-F
E	OTTOM VIEW			
Pin 1-No	(4)  (5)	Pin 6	– No	
Connection	$\mathcal{T}$		Connect	ior
Pin 2 - Heater 3	X ==== ) Y@		– Cathode	
Pin 3-Grid No.2		Pin 8	– Heater	
Pin 4 - No (2	$\sim \mathcal{N}$	•		
Connection Pin 5-Grid No.1	() ()	Cap	- Anode, Grid No.	2
			arra No.	>
Maximum Ratings, Design-Ce				
ANODE VOLTAGE		•• 8	000 max.	vol
GRID-No.2 VOLTAGE		•••	700 max.	vol
GRID-No.1 VOLTAGE:			125 max.	
Negative bias value Positive bias value ^D		•••	125 max. 0 max.	vol
Positive peak value		•••	2 max.	vol
PEAK GRID-No.1 DRIVE FROM		••	65 max.	vol
PEAK HEATER-CATHODE VOLTAG		•••	oo max.	101
Heater negative with res		ode.	125 max.	vol
Heater positive with res	pect to cath	ode.	125 max.	vol
Typical Operation:				
	4000	-	000	
Anode Voltage*	• 4000 250	/	250	vol
Grid-No.2 Voltage Grid-No.1 Voltage Range ⁰ . Focusing-Coil Current ⁴	-25 to -7	0 -25	to -70	vol
Focusina-Coil Current	. 75 to 10	2 99	to 135	VU1
Spot Position	. *	_ 00	-	
●,□,*, ⁰ ,▲,∦: See next page.				
IIINE 15, 1948			TENTATIV	FD
JUNE 15, 1948 TU RADIO CORPORATION	BE DEPARTMENT	ON, NEW JERSEY	TENTATIV	EC





	6
Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max. megohms	
Minimum Circuit Values:	
When the output capacitor of the power supply is capable of storing more than 250 microcoulombs, and when the inherent regulation 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 150 min. ohms Grid-No.2-Circuit Resistance 820 min. ohms Anode-Circuit Resistance 9100 min. ohms	
The resistors used should be capable of withstanding the volt- ages involved.	
Components:	
RCA Focusing Coil RCA Type No. 202D1	
<ul> <li>Anode and grid No.3, which are connected together within tube, are referred to herein as anode.</li> <li>At or near this rating, the effective resistance of the anode supply should be adequate to limit the anode input power to 6 watts.</li> <li>Filliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than w000 volts.</li> <li>For visual extinction of undeflected focused spot.</li> <li>For JETEC Focusing Coil No. 106, or equivalent, with center line of air gap approximately 2-3/4" from reference line (see Outline Drawing); and total anode current of 200 microamperes.</li> <li>The center of the undeflected, unfocused spot will fall within a circle having 12 mm radius concentric with the center of the tube face.</li> </ul>	

TENTATIVE DATA



#### PICTURE TUBE

ROUND GLASS TYPE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

General:

Heater, for Unipotential Cathode: Voltage. . . . . . . . . . 6.3 . ac or dc volts 0.6 + 10%. Current. . . . . . . . . . . . . amp Faceplate, Spherical . . . . .Clear Glass . . Phosphor (For Curves, see front of this Section) P4-Sulfide Type . 14-1/2" ± 3/8" + 1/8''. Minimum Useful Screen Diameter . 6" .Anv Basing Designation for BOTTOM VIEW . 14R Pin 9-Ultor Pin 1-Heater Pin 2 - Cathode (Grid No.2. Pin 3-Grid No.1 Grid No.4. Pin 4-No Connec-Collector) tion Pin 10-Deflecting (5 Pin 5-Grid No.3 Electrode Pin 7-Deflecting DJ2 Pin 11-Deflecting Electrode DJz Electrode Pin 8-Deflecting DJ, Electrode Pin 12-Internal DJ₄ Connection-Do Not Use Pin 14-Heater  $DJ_1$  and  $DJ_2$  are nearer the screen  $DJ_3$  and  $DJ_{\mu}$  are nearer the base Maximum Ratings, Design-Center Values: ULTOR VOLTAGE. . . 6000 max. volts GRID-No.3 (FOCUSING) VOLTAGE 2800 max. volts GRID-No.1 VOLTAGE: Negative-bias value. 200 max. volts Positive-bias value. . 0 max. volts 2 max. Positive-peak value. . volts PEAK VOLTAGE BETWEEN ULTOR AND ANY 750 max. volts DEFLECTING ELECTRODE . . . 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 . . . . 125 max. volts Heater positive with respect to cathode. 125 max. volts -Indicates a change.



## PICTURE TUBE

#### Maximum Circuit Values:

1JPA

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





# **OSCILLOGRAPH TUBE**

L	
	DATA General:
ļ	Heater, for Unipotential Cathode:
	Voltage 6.3 ac or dc volt
	Current 0.6
	Direct Interelectrode Capacitances (Approx.):
	Grid No.1 to All Other Electrodes 6 Cathode to All Other Electrodes 5
	Phosphor (For Curves, see front of this Section) P Fluorescence
	Phosphorescence
	Persistence
	Focusing Method
	Deflection Method
	Deflection Angle (Approx.)
	Overall Length
	Overall Length
	Minimum Useful Screen Diameter
	Mounting Position
	Base Small-Shell Duodecal 5-Pin (JETEC No.85-57
	BOTTOM VIEW
	Pin 1-Heater Pin 11-Cathode
	Pin 2-Grid No.1
	Pin 10 - Grid No.2 V Cap - Grid No.3,
	© <b>()</b> •@ ()
	Maximum Ratings, Design-Center Values:
	₩aximum Ratings, Design-Center Values: Ultor¶ VOLTAGE
	Ultor [®] VOLTAGE
	Ultor® VOLTAGE
	Ultor® VOLTAGE 8000 max. volt GRID-No.2 VOLTAGE:
	Ultor® VOLTAGE
	Ultor® VOLTAGE
	Ultor® VOLTAGE
	Ultor VOLTAGE
	Ultor [●] VOLTAGE 8000 max. volt: GRID-No.2 VOLTAGE: Positive Value (DC or Peak AC) 700 max. volt. Negative Value (DC or Peak AC) 180 max. volt. GRID-No.1 VOLTAGE: Negative bias value
	Ultor VOLTAGE
	Ultor       VOLTAGE       8000 max. volt:         GRID-No.2 VOLTAGE:       Positive Value (DC or Peak AC)       700 max. volt:         Negative Value (DC or Peak AC)       180 max. volt:         RID-No.1 VOLTAGE:       180 max. volt:         Positive bias value.       0 max. volt:         Positive bias value.       0 max. volt:         Positive peak value.       0 max. volt:         Positive peak value.       2 max. volt:         PEAK GRID-No.1 DRIVE FROM CUTOFF       65 max. volt:         PEAK HEATER-CATHODE VOLTAGE:       125 max. volt:         Heater positive with respect to cathode.       125 max. volt:
	Ultor       VOLTAGE       8000 max. volt:         GRID-No.2 VOLTAGE:       Positive Value (DC or Peak AC)       700 max. volt:         Negative Value (DC or Peak AC)       180 max. volt:         RID-No.1 VOLTAGE:       180 max. volt:         Positive bias value.       0 max. volt:         Positive bias value.       0 max. volt:         Positive peak value.       0 max. volt:         Positive peak value.       2 max. volt:         PEAK GRID-No.1 DRIVE FROM CUTOFF       65 max. volt:         PEAK HEATER-CATHODE VOLTAGE:       125 max. volt:         Heater positive with respect to cathode.       125 max. volt:
	Ultor       VOLTAGE       8000 max. volt:         GRID-No.2 VOLTAGE:       Positive Value (DC or Peak AC)       700 max. volt:         Negative Value (DC or Peak AC)       180 max. volt:         RID-No.1 VOLTAGE:       180 max. volt:         Positive bias value.       0 max. volt:         Positive bias value.       0 max. volt:         Positive peak value.       0 max. volt:         Positive peak value.       2 max. volt:         PEAK GRID-No.1 DRIVE FROM CUTOFF       65 max. volt:         PEAK HEATER-CATHODE VOLTAGE:       125 max. volt:         Heater positive with respect to cathode.       125 max. volt:
	Ultor       VOLTAGE       8000 max. volt:         GRID-No.2 VOLTAGE:       Positive Value (DC or Peak AC)       700 max. volt:         Negative Value (DC or Peak AC)       180 max. volt:         RID-No.1 VOLTAGE:       180 max. volt:         Positive bias value.       0 max. volt:         Positive bias value.       0 max. volt:         Positive peak value.       0 max. volt:         Positive peak value.       2 max. volt:         PEAK GRID-No.1 DRIVE FROM CUTOFF       65 max. volt:         PEAK HEATER-CATHODE VOLTAGE:       125 max. volt:         Heater positive with respect to cathode.       125 max. volt:
	Ultor VOLTAGE



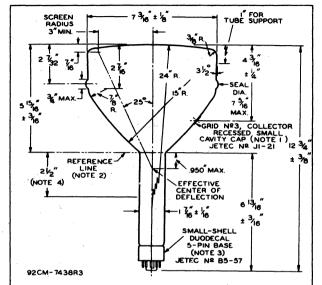
# **OSCILLOGRAPH TUBE**

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Ty	pical	0per	ation	n:											
UT	tor Vo	ltag	e*					4000			70	00		vo	lts
	id-No.			e				250			2	50		vo	lts
	id-No.						-27	to	-63	-2	27 to	5 6	3	vo	lts
	id-No.							to				5 +1		μ	amp
	cusing				ł.	• •				-			-	•	
1.0		(DC A					64	± 1	5%	۶	85 +	15%			ma
Sn	ot Po			<b>~•</b> /	•		04		0.0		**	10%			
	in um			· · ·		••					~~				
	id—No					ance	· ·			1 5	5 ma	¥.	m	eqo	hms
*								with	decr		-			0	In
	Brilli genera	il, th	e ulto	orvo	ltag	e sho	uldn	ot be	les	s tha	in 40	00 va	its.	90.	
٥	For vi	sual	extind	ction	of	undef	lecte	d, fe	ocuse	d spo	st.				
**	For sp sition from	becime heđ wi Refere	n foc thair ence l	using gap Line	coi towa (see	l sin rd fa Out	milar Icepla line	to J te an Drawi	ETEC d c en ng)	Focu ter 1 and 1	sing ine d ultou	Coil of air cur	No. gap rent	109 2-3 01	po- /4" 200
**	microa	ampere	S.												
1	The ce having	12-m	n rad	ius c	once	ntric	with	the	cent	er of	the	tube	fac	e.	
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7MP7 OSCILLOGRAPH TUBE

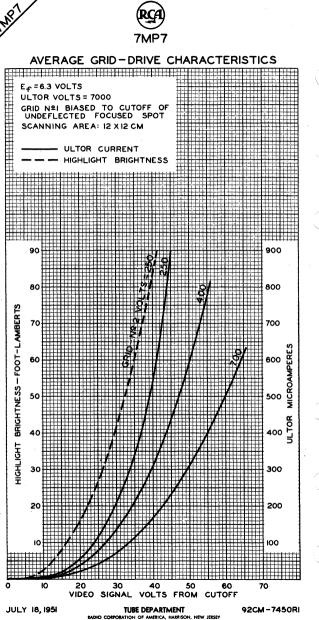


- NOTE I: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION NO.3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND BULB TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 10°. BULB TERMINAL IS ON SAME SIDE AS VACANT PIN PO-SITION NO.3.
- NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE REFERENCE-LINE GAUGE (JETEC NO.112) 1.500 + .003"-.000" I. D. AND 2" LONG WILL REST ON BULB CONE.
- NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED: IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING DIAMETER OF 1-7/8".

NOTE 4: LOCATION OF DEFLECTING YOKE MUST BE WITHIN THIS SPACE.

(Tester

ALC: NO





No.

# **PROJECTION KINESCOPE**

201 x 151 PICTURES

FORCED-AIR COOLED ALUMINIZED SCREEN ELECTROSTATIC FOCUS MAGNETIC DEFLECTION For use in theater-television equipment

#### DATA

#### General:

Para a

Heater, for Unipotential Cathode:	
Voltage	ac or dc volts
Direct Interelectrode Capacitances (Appro Grid No.1 to all other electrodes Cathode to all other electrodes	. 12 μμf
Cathode to all other electrodes Phosphor	. 6 μμf ilicate-Sulfide Type
Fluorescence	Aluminized
Phosphorescence	
Persistence	Medium
Focusing Method	Magnetic
Deflection Angle (Approx.)	
Projection-Inrow Distance for 20° x 15° P Overall Length	'icture 60 feet 19–1/2" ± 5/8"
Greatest plameter of build (Excluding side	e cap) /" ± 3/16"
Maximum Radius of Tube (Including side ca Quality Rectangle of Faceplate	
(See Dimensional Outline)	5" × 3-3/4"
Refractive Index for Faceplate Glass Weight (Approx.)	1.469
Operating Position	
Cap	ating Considerations
Base Plastic-Filled, Small-S	Shell Diheptal 14-Pin
(JELEC Basing Designation for BOTTOM VIEW	C Group 5, No.B14-45)
	10-Same as Pin 5
Pin 2 Crid No.1 $O(7)(8) O Dia$	11-Same as Pin 5 12-Same as Pin 5
'Pin 4 – Grid No. 2 GV // Via Pin	13-Internal
Pin 5 - No Connec-	Connection— Do Not Use
Pin 6-Same as Pin 5 🔍 🦯 🖉 Pin	14 – Heater
Pin 7 – Same as Pin 5 (2) – (4) Pin 8 – Same as Pin 5	Cap - Ultor (Grid No.4.
Pin 9-Same as Pin 5	Collector)
	🗕 Indicates a change.
11-58 ELECTRON TUBE DIVISION	DATA 1



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# **PROJECTION KINESCOPE**

The from face have drop	ow to Face	ly he Ild
	CATHODE-DRIVE SERVICE	
Uni	ess otherwise specified, voltage values are positive with respect to grid No.1	
Maxim	um Ratings, Absolute Values:	
GRID- GRID- GRID- CATHO Pos Nega	-TO-GRID-No.1 VOLTAGE	ts ts ts ts ts
AVERA PEAK Hea D	k-negative value 2 max. vol GE ULTOR CURRENT 2 max. HEATER-CATHODE VOLTAGE: ter negative with respect to cathode: uring equipment warm-up period not exceeding 15 seconds 410 max. vol fter equipment warm-up period 150 max. vol ter positive with respect to cathode. 150 max. vol	ma Its Its
Equip	ment Design Ranges:	
and	h any ultor-to-grid-No.1 voltage (E _{cug1} ) between 70000 [#] 80000 volts and grid-No.2-to-grid-No.1 voltage (E _{c2g1} ) between 400 and 850 volts	
Vol Grid- Vol ext ras	No.3-to-Grid-No.1 tage for focus 20% to 22.6% of E _{c4g1} vol No.2-to-Grid-No.1 tage for visual inction of focused ter when circuit ign utilizes fixed	ts
cat vol Catho Vid Cut	hode-to-grid-No.1 tage (Ekg ₁ )	
Whi	te-Level Value Same value as fixed cathoo to-grid-No.1 voltage exce video drive is a negat voltage.	ept 🗍
■,●,#:	See next page Indicates a chang	ge.
11-58	ELECTRON TUBE DIVISION DATA	1



No.

# PROJECTION KINESCOPE

Grid-No.3 Current	0 to +15 -15 to +15	μа µа
Examples of Use of Design Ranges:		,
For ultor-to-grid- No.1 voltage of	75000	volts
Grid-No.3-to-Grid-No.1 Voltage for focus Grid-No.2-to-Grid-No.1 Voltage for visual extinction of focused raster when circuit design utilizes fixed cathode-to-grid-No.1	15000 to 17000	volts
voltage (Ekg ₁ ) of 125 volts Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level) to White-Level Value	400 to 600 -125	volts volts
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	1.5 max.	megohms
GRID-DRIVE▲ SER Unless otherwise specified, volta with respect to c	ge values are pos	itive
Maximum Ratings, Absolute Values: ULTOR VOLTAGE●	80000 max	
GRID-No.3 VOLTAGE	20000 max 600 max	<ul> <li>volts</li> <li>volts</li> </ul>
GRID-No.2 VOLTAGE GRID-No.1 VOLTAGE: Negative-bias value Positive-bias value Peak-positive value. AVERAGE ULTOR CURRENT PEAK HEATER-CATHODE VOLTAGE:	20000 max 600 max 250 max 0 max 2 max 2 max	<ul> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> </ul>
GRID-No.2 VOLTAGE GRID-No.1 VOLTAGE: Negative-bias value Positive-bias value Peak-positive value AVERAGE ULTOR CURRENT	20000 max 600 max 250 max 0 max 2 max 2 max 2 max 2 max 2 max	<ul> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> </ul>
GRID-No.2 VOLTAGE. GRID-No.1 VOLTAGE: Negativa-bias value. Positive-bias value. Peak-positive value. AVERAGE ULTOR CURRENT. PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cath During equipment warm-up period not exceeding 15 seconds. After equipment warm-up period	20000 max 600 max 250 max 0 max 2 max 2 max 2 max 2 max 2 max	<ul> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> </ul>
GRID-No.2 VOLTAGE. GRID-No.1 VOLTAGE: Negativa-bias value. Positive-bias value. Peak-positive value. AVERAGE ULTOR CURRENT. PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cath During equipment warm-up period not exceeding 15 seconds. After equipment warm-up period	20000 max 600 max 250 max 0 max 2 max 2 max 2 max 2 max 2 max	<ul> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> <li>volts</li> </ul>



Equipment Design Ranges:	
With any ultor voltage $(E_{C_{4}}k)$ between 70000 $^{\#}$ and 80000 volt	s
and grid-No.2 voltage (Ec ₂ k) between 400 and 600 volts	
Grid-No.3 Voltage	
for focus 20% to 22.6% of E _{c4} k vol Grid-No.2 Voltage for visual extinction of focused raster when circuit design	ts
utilizes fixed grĭd- No.1 voltage (E _{c1k} ) 2.58 to 3.87 times E _{c1k} vol Grid-No.1 Video Drive from Raster Cutoff	ts
(Black Level) to White-Level Value Same value as fixed grid-No	. 1
voltage except video drive	
a positive voltage. Grid-No.3 Current 0 to +15	112
	<i>μ</i> а μа
	,
Examples of Use of Design Ranges:	
For ultor voltage of 75000 vol	ts
Grid-No.3 Voltage for focus.       15000 to 17000 vol         Grid-No.2 Voltage for visual       extinction of focused         raster when circuit de-       sign utilizes fixed grid-         No.1 voltage (Ec1k) of       -155 volts.         -155 volts.       .         Video Drive from Raster       Cutoff (Black Level) to         White-Level Value.       155 vol	ts
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max. megoh	ms
Cathode drive is the operating condition in which the video signal var the cathode potential.	
• The product of ultor-to-grid-No.1 voltage, or ultor voltage, a average ultor current should be limited to 160 watts.	and
Brilliance and definition decrease with decreasing ultor-to-grid-N voltage or ultor voltage. In general, the ultor-to-grid-No.1 volt or the ultor voltage should not be less than 70,000 volts.	o.1 age
<ul> <li>Grid-drive is the operating condition in which the video signal var the grid-No.1 potential.</li> </ul>	
OPERATING CONSIDERATIONS	
I-ray radiation is produced at the face of the 7NP4 will it is operated at its normal ultor voltage. These rays constitute a health hazard unless the tube is adequate	can
	ge.

DATA 2

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shielded. Make sure that the shielding provides the required protection against personal injury.

The base pins fit a Diheptal 14-contact socket. It should be designed to prevent corona between pin 9 and pin 4, pin 13, and any adjacent socket-assembly bolt. The usual commercially available Diheptal sockets do not meet this requirement. Socket contacts for pins 5, 6, 7, 8, 10, 11, 12, and 13 should be removed so that maximum insulation is provided for pin 9. The socket should be made of high-grade, low-leakage, arcresistant insulating material adequate to withstand 20,000 volts between the contact for pin 9 and the contacts for pins 4 and 13. The socket should not be rigidly mounted; it should have flexible leads and be allowed to move freely.

The ultor connection is made to the Medium capon the side of the bulb. The ultor connector should have a ball-type corona shield with a diameterof, about 1-1/2 inches in order to prevent the formation of corona.

An air-cooling system is required to cool the face of the 7NP4. The system consists of a blower, such as Pilot No.50747 or No.50748*, and an air duct, having an outlet diameter of about 2 inches, directed perpendicularly onto the face of the tube. An air flow of 40 cubic feet per minute at the tube face is required to provide adequate cooling. 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 ultor 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.

Failure of scanning while the 7NP4 draws beam current may permanently damage the screen. Provision should be made, therefore, for automatic, high-speed cutoff of the beam current in case of scanning failure.

Darkening of face occurs during normal operation of the tube with resulting decrease in the light transmitted by the face. The rate of darkening increases rapidly with increase in ultor 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 amount of darkening wil! be observed during the life of the tube.

" Made by F.A. Smith Mfg. Co., Inc., P.O. Box 509, Rochester 2, N.Y.

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#### PRECAUTION

During storage of this Projection Kinescope, occluded gas may be released within the tube. When high voltage is applied, this gas may cause internal arcing with possible damage to the tube. To prevent such an occurrence, it is recommended that this kinescope be given the following treatment at intervals of about 2 months during storage, and at time of installation in equipment: With the beam cut off, apply normal ultor voltage to the tube. Gradually increase the ultor current in steps over a period of 15 minutes until one fourth of the operating ultor-current value is reached. Operate at this reduced value of current for I hour, and then increase the ultor current to full value for a few minutes before turning off the power.

#### OPERATING HINTS

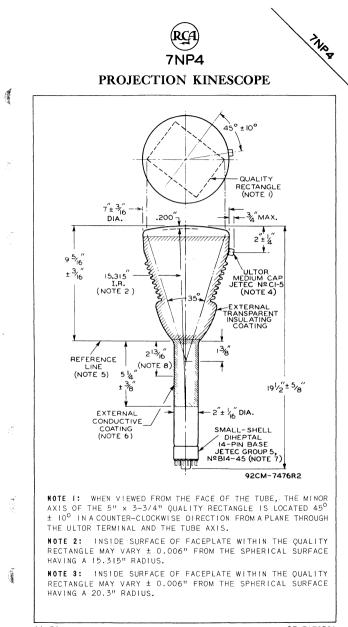
- Never apply power input to the screen suddenly because immediate or delayed cracking of the face may result. Always increase or decrease the ultor current gradually.
- Never exceed the maximum average ultor-current rating of 2 milliamperes.
- Never overscan the screen because the beam will strike the neck and liberate occluded gas which may cause internal arcing.
- Never fail to operate this tube in its equipment at intervals of about 2 months to keep the tube in condition.

4

- Indicates a change.

DATA 3

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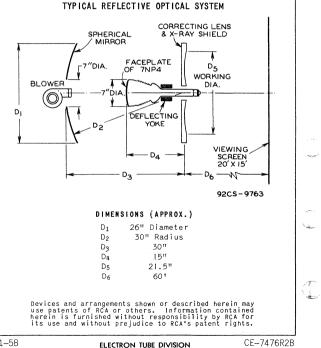
NOTE U. THE PLANE THROUGH BASE PIN 9 AND THE TUBE AXIS MAY VARY FROM THE PLANE THROUGH THE ULTOR TERMINAL AND THE TUBE AXIS BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 10°. THE ULTOR TERMINAL IS ON SAME SIDE AS PIN 9.

NOTE 5: REFERENCE LINE IS DETERMINED BY POSITION WHERE GAUGE 2.100" ± 0.001" I.D. AND 3" LONG WILL REST ON BULB CONF.

NOTE 6: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; NOTE 7: 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 9.

NOTE 8: EFFECTIVE DEFLECTING FIELD MUST BE WITHIN THIS SPACE.



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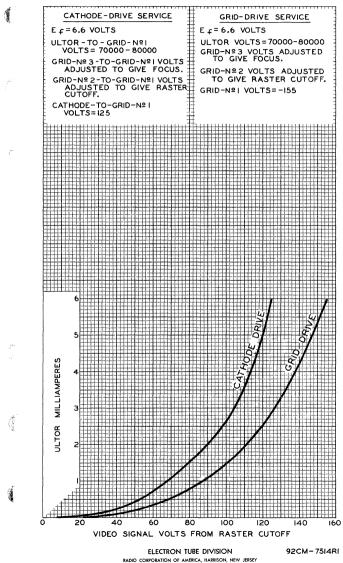
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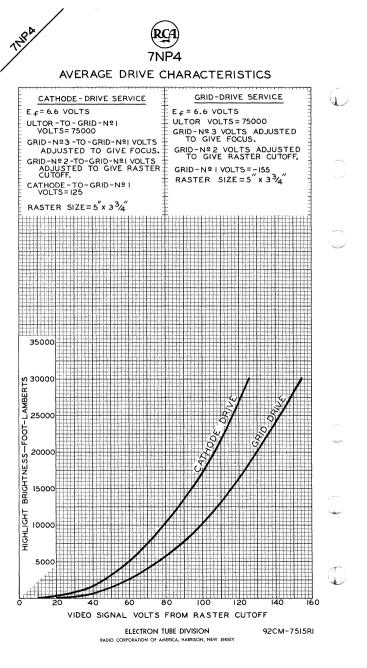
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## AVERAGE DRIVE CHARACTERISTICS

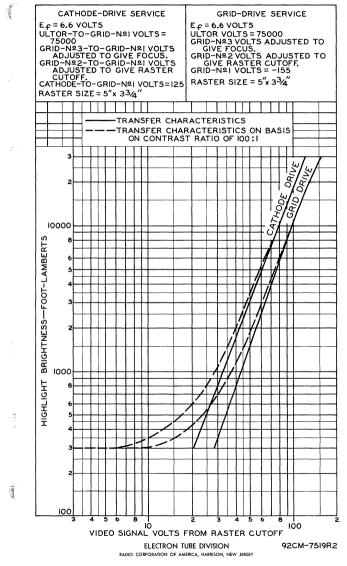


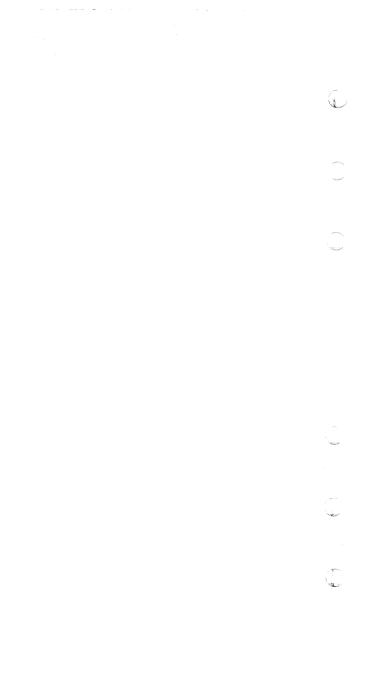




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## AVERAGE DRIVE CHARACTERISTICS







# MONITOR KINESCOPE

#### ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

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#### DATA

#### General:

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Direct Interelectrode Capacitances (Approx.): Grid No.1 to All Other Electrodes 6 Cathode to All Other Electrodes	am μμ Clear Glas ulfide Typ Clear Glas ulfide Typ For the the type Magneti Magneti Magneti Magneti 5-3/8" ± 3/8 /16" ± 1/8 5-3/8" × 4 No. J1-21 No. B6-63	ip if if is is is is is is is is is is
Pin 2 - Grid No.1 Cap - G	Grid No.4, Collector (Ultor)	
Maximum Ratings, Design-Center Values:		
ULTOR         VOLTAGE         12000           GRID-No.3         VOLTAGE         2000           GRID-No.2         VOLTAGE         410           GRID-No.1         VOLTAGE:         410           Image: State of the state of t	max. volt max. volt max. volt	ts ts
Positive peak value	max. volt max. volt	ts
In the TPM, grid No.4 which has the ultor function, and connected together within the tube and are conveniently collectively as "ultor". The "ultor" in a cathode-ray electrode, or the electrode in combination with one or motor electrodes connected within the tube to it, to which is highest dc voltage for accelerating the electrons in the to its deflection.	collector ar referred t tube is th re additiona applied th e beam prio	e e l l e r

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TENTATIVE DATA



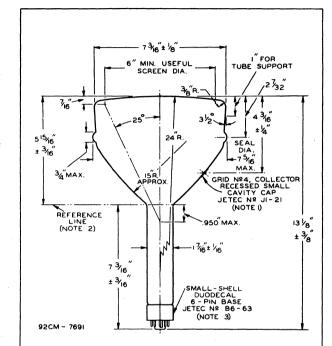
7 T P4 MONITOR KINESCOPE

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 $(E_u)$ between 10000 [*] and 12000 volts and grid-No.2 voltage $(E_{c,2})$ between 150 and 410 volts
and grid-No.2 voltage $(E_{c2})$ between 150 and 410 volts
Grid-No.3 Voltage for Focus with
Ultor Current of 100 $\mu$ amp 11.6% to 15.8% of E _u volts
Grid-No.1 Voltage for Visual
Extinction of Undeflected
Focused Spot
Focused Spot 11% to 25.7% of E _{C2} volts Grid-No.3 Current ^{**}
Field Strength of Adjustable Centering Magnet,
Centering Magnet 0 to 8 gausses
Examples of Use of Design Ranges:
and grid-No.2 voltage of 200 volts
Grid-No.3 Voltage for Focus with
Ultor Current of 100 µamp 1160 to 1580 volts
Grid-No.1 Voltage for Visual
Extinction of Undeflected
Focused Spot22 to -52 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 10000 volts.
** Grid-No.3 Current increases as the ultor voltage is decreased.
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FEB. 1. 1952 TENTATIVE DATA

TENTATIVE DATA



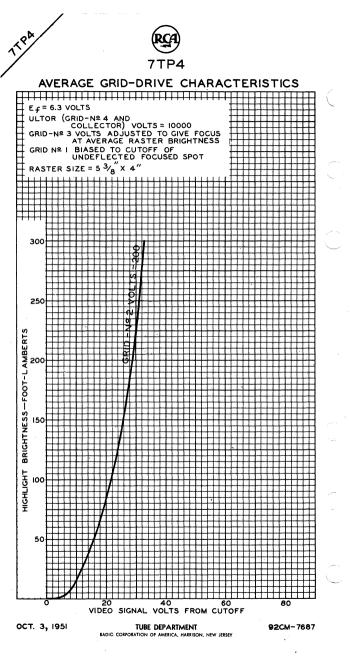
## MONITOR KINESCOPE



- 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 (MEASURED 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 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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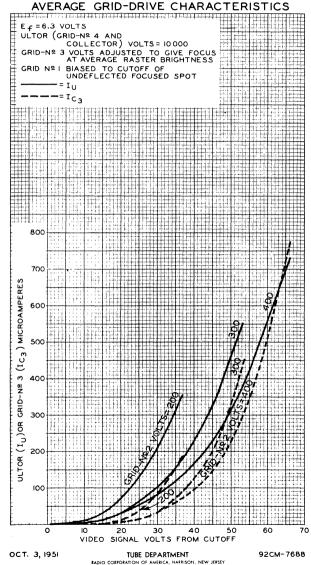
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### **OSCILLOGRAPH TUBE** ELECTROSTATIC FOCUS

ELECTROSTATIC	DEFLECTION
LECTROSTATIO	DEFECTION

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#### General:

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Heater, for Unipotential Cathode:
Voltage         6.3          ac or dc volts           Current         0.6          amp
Direct Interelectrode Capacitances (Approx.):
Grid No.1 to All Other Electrodes 6 μμf
DJ ₁ to DJ ₂
$\begin{array}{cccccccccccccccccccccccccccccccccccc$
DJ3 to DJ4 $\dots$ 2 $\mu\mu$ f DJ1 to All Other Electrodes $\dots$ 9 $\mu\mu$ f
$DJ_2$ to All Other Electrodes 9 $\mu\mu$ f
DJ3 to All Other Electrodes 7 $\mu\mu$ f
Grid No.1 to All Other Electrodes 6 $\mu\mu$ T DJ ₁ to DJ ₂ 3 $\mu\mu$ T DJ ₃ to DJ ₄ 2 2 DJ ₁ to All Other Electrodes
Facenlate
Faceplate
Eluorescence and Phosphorescence
Persistence of Phosphorescence Medium
Focusing Method Electrostatic
Deflection Method
Deflection Method , Electrostatic Overall Length
Greatest Diameter of Bulb
Minimum Useful Screen Diameter 6"
Mounting Position
Bulb
Bulb
Base Medium-Shell Uneptal 12-Pin (JETEC NO.012-37) BOTTOM VIEW
Pin 1 - Heater Pin 9 - Ultor●
Pin 3-Grid No.1 Grid No.4,
Pin 4 – No 🔍 🖓 Collector)
Connection (Pin 10 – Deflecting
Pin 5-Grid No.3 Elect. DJ2
Pin 7-Deflecting
Electrode $\bigcirc \bigcirc \bigcirc \bigcirc$ Elect. DJ ₁
DJ3 Pin 12 - Internal
Pin 8-Deflecting Connection-
Electrode Do Not Use
DJ4 Pin 14-Heater
$DJ_1$ and $DJ_2$ are nearer the screen
$DJ_3$ and $DJ_4$ are nearer the base
5 +
With $DJ_1$ positive with respect to $DJ_2$ , the spot is de-
flected toward pin 5. With DJ3 positive with respect to
DJ4, the spot is deflected toward pin 2.
The plane through the tube axis and pin 5 may vary from
the trace produced by Dia and Dia by an angular tolerance
the trace produced by $D_{11}$ and $D_{12}$ by an angular tolerance (measured about the tube axis) of ±10°. Angle between
$DJ_1 - DJ_2$ trace and $DJ_3 - DJ_4$ trace is $90^\circ \pm 3^\circ$ .
but buy made and buy-but made is so-1) .
. San part page
*: See next page.

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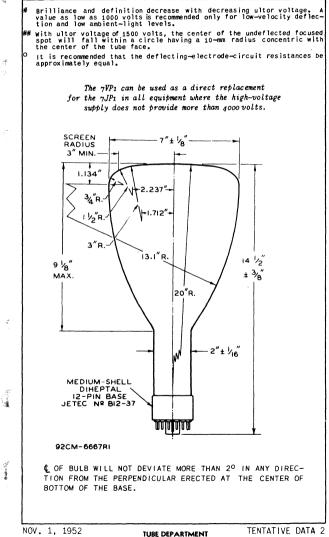
# OSCILLOGRAPH TUBE

<b>(aximum Ratings,</b> Design-Ce	nter Values	:		
JLTOR [®] VOLTAGE		400	0 max.	volts
RID-No.3 VOLTAGE			0 max.	volts
RID-No.1 VOLTAGE:			•	
Negative bias value		20	0 max.	volts
			0 max.	volts
Positive bias value*	• • • • • •	• • •	•	
Positive peak value		• • •	2 max.	volts
PEAK VOLTAGE BETWEEN ULTOP				
ANY DEFLECTING ELECT		••• /5	60 max.	volts
PEAK HEATER-CATHODE VOLTA				
Heater negative with re			25 max.	
Heater positive with re	spect to cath	node. 12	25 max.	volts
Equipment Design Ranges:				
	(E L'hatwaa			0.1+0
For any ultor voltage			4000 0	
Grid-No.3 Voltage for Foc	us 2/%/to 4	10% of Lu		volts
Maximum Grid-No.1 Voltage				
for Visual Extinction o		·		
Undeflected Focused Spo		of E _u		volts
Grid-No.3 Current	. –15 1	to +10		μamp
Deflection Factors:				
$DJ_1 \& DJ_2 \ldots \ldots$	. 31 1	to 41 v do	:/in./k	v of E _u
$DJ_3 \& DJ_4 \dots \dots$	. 25 1	to 34 v do	:/in./k	v of Eu
Spot Position		¥#		~
Examples of Use of Design	Vanne.			
· · ·	Nanges.			
For ultor voltage of	1500	3000		volts
For ultor voltage of Grid-No.3 Voltage	1500			
For ultor voltage of Grid-No.3 Voltage for Focus	1500	<i>3000</i> 800 to 120	00	volts volts
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt-	1500		00	
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc-	1500		00	
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected	1500		00	volts
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected	1500		00	
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc-	1500 400 to 600	800 to 120	00	volts
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot Deflection Factors:	1500 400 to 600	800 to 120		volts volts
For ultor voltage of Grid-No.3 Voltage for Focus Aaximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot Deflection Factors: DJ & DJ2	1500 400 to 600 -42 47 to 62	800 to 120	s volt	volts volts
For ultor voltage of Grid-No.3 Voltage for Focus Aaximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot Deflection Factors: DJ ₁ & DJ ₂ DJ ₃ & DJ ₄	1500 400 to 600 -42	800 to 120 -84 93 to 123	s volt	volts volts s dc/in.
For ultor voltage of Grid-No.3 Voltage for Focus Aaximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot Deflection Factors: DJ & DJ2	1500 400 to 600 -42 47 to 62	800 to 120 -84 93 to 123	s volt	volts volts s dc/in.
For ultor voltage of Grid-No.3 Voltage for Focus Aaximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot Doflection Factors: DJ1 & DJ2 DJ3 & DJ4 Maximum Circuit Values:	1500 400 to 600 -42 47 to 62 38 to 51	800 to 120 -84 93 to 122 75 to 102	3 volt 2 volt	volts volts s dc/in. s dc/in.
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot Deflection Factors: DJ & DJ2 DJ3 & DJ4 Maximum Circuit Values: Grid No.1-Circuit Resistan	1500 400 to 600 -42 47 to 62 38 to 51 nce	800 to 120 -84 93 to 122 75 to 102	3 volt 2 volt	volts volts s dc/in.
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot Deflection Factors: DJ ₁ & DJ ₂ DJ ₃ & DJ ₄ Maximum Circuit Values: Grid No.1-Circuit Resistan Resistance in Any Deflect	1500 400 to 600 -42 47 to 62 38 to 51 nce	800 to 120 -84 93 to 122 75 to 102 1.5	yolt volt max.	volts volts s dc/in. s dc/in. megohms
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot Deflection Factors: DJ ₁ & DJ ₂ DJ ₃ & DJ ₄ Maximum Circuit Values: Grid No.1-Circuit Resistan Resistance in Any Deflect	1500 400 to 600 -42 47 to 62 38 to 51 nce	800 to 120 -84 93 to 122 75 to 102 1.5	yolt volt max.	volts volts s dc/in. s dc/in.
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot DJ1 & DJ2 DJ3 & DJ4 Maximum Circuit Values: Grid No.1-Circuit Resistan Resistance in Any Deflect Electrod	1500 400 to 600 -42 47 to 62 38 to 51 nce ing- e Circuit ^o	800 to 120 -84 93 to 125 75 to 102 1.5 5.0	yolt volt max. max.	volts volts s dc/in. s dc/in. megohms megohms
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot DJ1 & DJ2 DJ3 & DJ4 Maximum Circuit Values: Grid No.1-Circuit Resistan Resistance in Any Deflect Electrod	1500 400 to 600 -42 47 to 62 38 to 51 nce ing- e Circuit ^o	800 to 120 -84 93 to 125 75 to 102 1.5 5.0	yolt volt max. max.	volts volts s dc/in. s dc/in. megohms megohms
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot DJ1 & DJ2 DJ3 & DJ4 Maximum Circuit Values: Grid No.1-Circuit Resistan Resistance in Any Deflect Electrod	1500 400 to 600 -42 47 to 62 38 to 51 nce ing- e Circuit ^o	800 to 120 -84 93 to 125 75 to 102 1.5 5.0	yolt volt max. max.	volts volts s dc/in. s dc/in. megohms megohms
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot DJ1 & DJ2 DJ3 & DJ4 Maximum Circuit Values: Grid No.1-Circuit Resistan Resistance in Any Deflect Electrod	1500 400 to 600 -42 47 to 62 38 to 51 nce ing- e Circuit ^o	800 to 120 -84 93 to 125 75 to 102 1.5 5.0	yolt volt max. max.	volts volts s dc/in. s dc/in. megohms megohms
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot DJ3 & DJ2 DJ3 & DJ4 Maximum Circuit Values: Grid No.1-Circuit Resistan Resistance in Any Deflect Electrode In the TVP1, grid No.4 which lector are connected togethe ferred to collectively as "u is the electrode, or the e additional electrodes conne applied the highest dc volt	1500 400 to 600 -42 47 to 62 38 to 51 nce ing- e Circuit ⁰ has the ultor r within the iltor.* The ince accel	800 to 120 -84 93 to 125 75 to 102 1.5 5.0	yolt volt max. max.	volts volts s dc/in. s dc/in. megohms megohms
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot DJ1 & DJ2 DJ3 & DJ4 Maximum Circuit Values: Grid No.1-Circuit Resistan Resistance in Any Deflect Electrode In the 7VP1, grid No.4 which lector are connected togethe ferred to collectively as " is the electrode, or the e additional electrodes conne applied the highest dc volt beam prior to its deflection:	1500 400 to 600 -42 47 to 62 38 to 51 mce ing- e Circuit ⁰ has the ultor r within the lectrode in c lotor. The lectrode in c sted within age for accel	-84 93 to 122 75 to 102 1.5 5.0 function, gr fube and are ultor in a c ombination w the tube to erating the e	y volt volt max. max. id No.2, convenie cathode- ith one it, to n ith content	volts volts s dc/in. s dc/in. megohms and col- ntly re- ray tube or more which is s in the
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot DJ1 & DJ2 DJ3 & DJ4 Maximum Circuit Values: Grid No.1-Circuit Resistan Resistance in Any Deflect Electrode In the 7VP1, grid No.4 which lector are connected togethe ferred to collectively as " is the electrode, or the e additional electrodes conne applied the highest dc volt beam prior to its deflection:	1500 400 to 600 -42 47 to 62 38 to 51 mce ing- e Circuit ⁰ has the ultor r within the lectrode in c lotor. The lectrode in c sted within age for accel	-84 93 to 122 75 to 102 1.5 5.0 function, gr fube and are ultor in a c ombination w the tube to erating the e	y volt volt max. max. id No.2, convenie cathode- ith one it, to n ith content	volts volts s dc/in. s dc/in. megohms and col- ntly re- ray tube or more which is s in the
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot DJ3 & DJ2 DJ3 & DJ4 Maximum Circuit Values: Grid No.1-Circuit Resistan Resistance in Any Deflect Electrode In the TVP1, grid No.4 which lector are connected togethe ferred to collectively as "u is the electrode, or the e additional electrodes conne applied the highest dc volt	1500 400 to 600 -42 47 to 62 38 to 51 mce ing- e Circuit ⁰ has the ultor r within the lectrode in c lotor. The lectrode in c sted within age for accel	-84 93 to 122 75 to 102 1.5 5.0 function, gr fube and are ultor in a c ombination w the tube to erating the e	y volt volt max. max. id No.2, convenie cathode- ith one it, to n ith content	volts volts s dc/in. s dc/in. megohms and col- ntly re- ray tube or more which is s in the
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot DJ1 & DJ2 DJ3 & DJ4 Maximum Circuit Values: Grid No.1-Circuit Resistan Resistance in Any Deflect Electrode In the 7VP1, grid No.4 which lector are connected togethe ferred to collectively as " is the electrode, or the e additional electrodes conne applied the highest dc volt beam prior to its deflection:	1500 400 to 600 -42 47 to 62 38 to 51 mce ing- e Circuit ⁰ has the ultor r within the lectrode in c lotor. The lectrode in c sted within age for accel	-84 93 to 122 75 to 102 1.5 5.0 function, gr fube and are ultor in a c ombination w the tube to erating the e	y volt volt max. max. id No.2, convenie cathode- ith one it, to n ith content	volts volts s dc/in. s dc/in. megohms and col- ntly re- ray tube or more which is s in the
For ultor voltage of Grid-No.3 Voltage for Focus Maximum Grid-No.1 Volt- age for Visual Extinc- tion of Undeflected Focused Spot DJ1 & DJ2 DJ3 & DJ4 Maximum Circuit Values: Grid No.1-Circuit Resistan Resistance in Any Deflect Electrode In the 7VP1, grid No.4 which lector are connected togethe ferred to collectively as " is the electrode, or the e additional electrodes conne applied the highest dc volt beam prior to its deflection:	1500 400 to 600 -42 47 to 62 38 to 51 mce ing- e Circuit ⁰ has the ultor r within the lectrode in c lotor. The lectrode in c sted within age for accel	-84 93 to 122 75 to 102 1.5 5.0 function, gr fube and are ultor in a c ombination w the tube to erating the e	y volt volt max. max. id No.2, convenie cathode- ith one it, to n ith content	volts volts s dc/in. s dc/in. megohms and col- ntly re- ray tube or more which is s in the



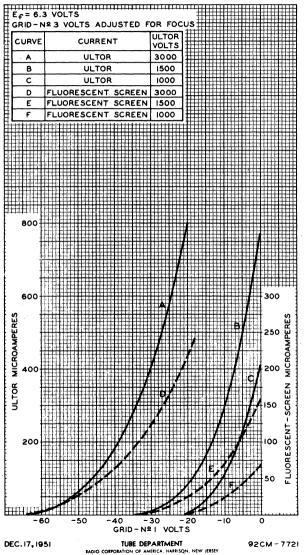


# OSCILLOGRAPH TUBE





#### AVERAGE CHARACTERISTICS





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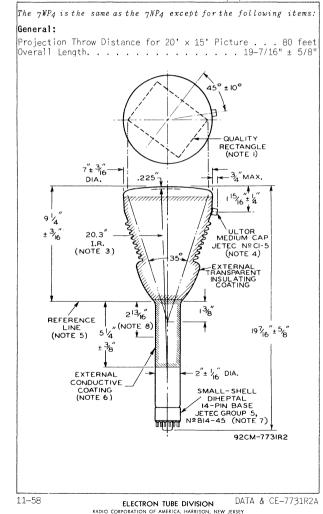
PROJECTION KINESCOPE

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Sec. 1

20' x 15' PICTURES

FORCED-AIR COOLED ALUMINIZED SCREEN ELECTROSTATIC FOCUS MAGNETIC DEFLECTION For use in theater-television equipment





NOTE I: WHEN VIEWED FROM THE FACE OF THE TUBE, THE MINOR AXIS OF THE 5"  $\times$  3-3/4" QUALITY RECTANGLE IS LOCATED 45°  $\pm$  10° in a counter-clockwise direction from a plane through the ultor terminal and the tube axis.

NOTE 2: INSIDE SURFACE OF FACEPLATE WITHIN THE QUALITY RECTANGLE MAY VARY  $\pm$  0.006" FROM THE SPHERICAL SURFACE HAVING A 15.315" RADIUS.

NOTE 3: INSIDE SURFACE OF FACEPLATE WITHIN THE QUALITY RECTANGLE MAY VARY  $\pm$  0.006" FROM THE SPHERICAL SURFACE HAVING A 20.3" RADIUS.

NOTE 4: THE PLANE THROUGH BASE PIN 9 AND THE TUBE AXIS MAY VARY FROM THE PLANE THROUGH THE ULTOR TERMINAL AND THE TUBE AXIS BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm$  10°. THE ULTOR TERMINAL IS ON SAME SIDE AS PIN 9.

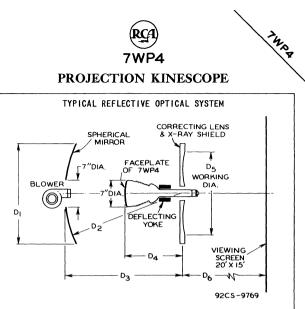
NOTE 5: REFERENCE LINE IS DETERMINED BY POSITION WHERE GAUGE 2.100"  $\pm$  0.001" I.D. AND 3" LONG WILL REST ON BULB CONE.

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 9.

**NOTE 8:** EFFECTIVE DEFLECTING FIELD MUST BE WITHIN THIS SPACE.

1WPA



#### DIMENSIONS (APPROX.)

D ₁	27" Diameter
D ₂	40" Radius
D3	40"
D́ų	20"
D ₅	24.5"
D6	80'

Devices and arrangements shown or described herein may use patents of RCA or others. Information contained herein is furnished without responsibility by RCA for its use and without prejudice to RCA's patent rights.





## PICTURE TUBE

SMALL, COMPACT, RECTANGULAR GLASS TYPE

LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

#### DATA

## General:

4

9-58 ELECTRON TUBE DIVISION	DATA				
	←Indicates a change.				
Negative value	500 max. volts 300 max. volts				
GRID-No.4 (FOCUSING) VOLTAGE: Positive value	500 max. volts				
M <b>aximum Ratings,</b> <i>Design-Center Values:</i> ULTOR VOLTAGE					
Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater	Cap - Ultor (Grid No.3, Grid No.5, Collector) C - External Conductive Coating				
(External surface) Screen Dimensions (Minimum): Greatest width Diagonal Projected area Operating Position Cap. Recessed Small Cavit Base . Dwarf-Shell Duodecal 6-Pin (JETEC C Basing Designation for BOTTOM VIEW	7-3/16" 5-3/8" 7-13/16" 35.5 sq. in. y (JETEC No.J1-21) Froup 4, No.B6-158) 12AB				
Tube Dimensions:         Overall length         Greatest width         Greatest height         Output         Bigonal         Neck length         Radius of curvature of faceplate	. 10-7/16" ± 5/16" '8" + 1/16" - 1/32" .6" + 1/16" - 1/32" .6" + 1/16" - 1/32"				
Faceplate, Spherical	Filterglass .P4—Sulfide Type 				
Heater, for Unipotential Cathode: Voltage					

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

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			-	5	
rid-No.1-Circuit		1.5	5 max.	megohms	
aximum Circuit V	alues:				
	with respect to cath		) max.	volts	
Heater negative	with respect to cath		) max.	volts	
EAK HEATER-CATHO		••• 4	max.	voits	
Positive-bias v Positive-peak v	alue		) max. ? max.	volts volts	
Negative-bias v	alue		) max.	volts	
	alue				

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SMALL, COMPACT, RECTANGULAR GLASS TYPE	
LOW-VOLTAGE ELECTROSTATIC FOCUS	MAGNETIC DEFLECT
DATA	
General:	
Heater, for Unipotential Cathode:	
Voltage (AC or DC)	6.3 vol
Current	0.6 ± 10% a
Grid No.1 to all other electrodes	9 4
Cathode to all other electrodes	µ 9 5 µ
External conductive coating to ultor.	∫350 max. µ
, i i i i i i i i i i i i i i i i i i i	[250 min. μ
Faceplate, Spherical	
Light transmission (Approx.)	
Phosphor(For Curves, see front of this Section	
Fluorescence	Aluminiz
Phosphorescence	Whi
Persistence	
Focusing Method	Electrostat
Deflection Method	<b></b>
Deflection Angles (Approx.):	
	•••••
Horizontal	
Electron Gun Type Requiri	ng No lon-Tran Magr
Tube Dimensions:	ng no ron rrap magi
Overall length	9-15/16" ± 5/1
Greatest width 7	-7/8" + 1/16" - 1/3
Greatest height 6-	1/16" + 1/16" - 1/3
Diagonal	//16" + 1/16" - 1/3
Screen Dimensions (Minimum):	•••••••± 5/1
Greatest width.	7-3/1
Greatest height	
Diagonal	7–13/1
Projected area	
Weight (Approx.).	•••••
Operating Position	vity (JEDEC No. 11-3
Bulb	J67–1
Base Small-Shell Duodecal	6-Pin, Arrangement
(JED	EC Group 4, No.B6-6
Basing Designation for BOTTOM VIEW.	1
Pin 1-Heater	Cap-Ultor
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 Pin 12 - Heater	C-External Conductive
1 11 12 - neater (2) (1) (1)	Coating
	obacing

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OF ID A



			. (
Maximum Ratings, Absolute-Maximum Values:			A.
ULTOR VOLTAGE	. 14000 ma	x. volts	
GRID-No.4 (FOCUSING) VOLTAGE:			
Positive value	. 1100 ma		
Negative value	. 550 ma		
GRID-No.2 VOLTAGE	. 550 ma	ax. volts	$\sim$
GRID-No.1 VOLTAGE:		•	1.00
Negative-peak value	. 220 ma		
Negative-bias value	. 155 ma		
Positive-bias value	. Oma 2 ma		
Positive-peak value	• Z ma	ix. voits	
Heater negative with respect to cathode.	. 180 ma	ax. volts	
Heater positive with respect to cathode.			
	. 100 m		1
Equipment Design Ranges:	* .		
With any ultor voltage $(E_{C,5}k)$ between 80	000" and 140	boo volts	
and grid-No.2 voltage $(E_{C2k})$ between	150 and 5	υυ νοιτς	
Grid-No.4 Voltage required for focus:*		<i>.</i> .	
Changes inversely with ultor current a	t the rate o	t approxi-	
mately 80 volts for each 100-µa chan For typical values, see <i>Examples of U</i>			
Grid-No.1 Voltage (E _{cik} ) for	se of Desig	n kanges.	
visual extinction of			
focused raster See Raste	r-Cutoff-Ro	unge Chart	
Grid-No.1 Video Drive from	, , , , , , , , , , , , , , , , , , , ,		
Raster Cutoff (Black level):▲			
White-level value			
(Peak positive) Same value as			
except video drive			
Grid-No.4 Current	-25 to +25		1
Grid-No.2 Current	-15 to +1	) <i>μ</i> a	ر معدر
Examples of Use of Design Ranges:			
With ultor voltage of	11000	volts	
and grid-No.2 voltage of	300	volts	
Grid-No.4 Voltage for focus			
with average ultor current			
of 100 μa•	0 to 300	volts	
Grid-No.1 Voltage for visual			100
extinction of focused raster	-28 to -72	volts	at 1
Grid-No.1 Video Drive from			
Raster Cutoff (Black level):			
White-level value (Peak positive)	28 to 72	volts	
	20 10 72	VUILS	
Aaximum Circuit Values:	1 5		A
Grid-No.1-Circuit Resistance	1.5 max.	megohms	
Brilliance and definition decrease with decre general, the ultor voltage should not be less	asing ultor v than 8000 vol	oltage. In ts.	
g			

8-59

SHP4





- The grid-No.4 voltage required for focus of any individual tube will remain essentially constant for values of ultor voltage or grid-No.2 voltage within design ranges shown for these items.
- Resolution for a given value of ultor voltage and a given value of grid-No.2 voltage decreases with increase in ultor current.
- The indicated voltage is for condition with combined grid-No.1 bias voltage and video-signal voltage (generated by RCA-2F21 monoscope) adjusted to produce the average value of ultor current shown and to provide optimum focus of the indian-Head Test Pattern from the 2F21.

#### SPECIAL PERFORMANCE DATA

#### Resolution: *

金湯

For ultor voltage of 11,000 volts. . . 600 min. TV lines

Under the following conditions: heater volts = 6.3, grid-No.2 volts = 300, combined grid-No.1 bias voltage and video-signal voltage (generated by RCA-2F21 monoscope) adjusted to produce an average ultor current of 100 microamperes, and grid-No.4 voltage adjusted to give sharpest focus at center of tube face. Resolution is measured on the RCA-2F21 monoscope test pattern, or equivalent.

#### **OPERATING CONSIDERATIONS**

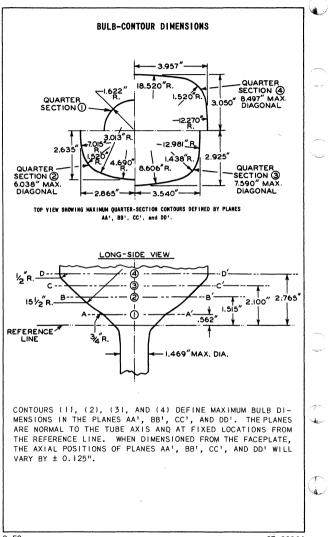
When operated at or below the maximum ratings shown in the tabulated data, the  $8\#P_4$  does not produce any harmful X-ray radiation.

The high voltages at which the 8HP4 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. Before any part of the circuit is touched, the power-supply switch should be turned off and both terminals of any capacitors should be grounded.



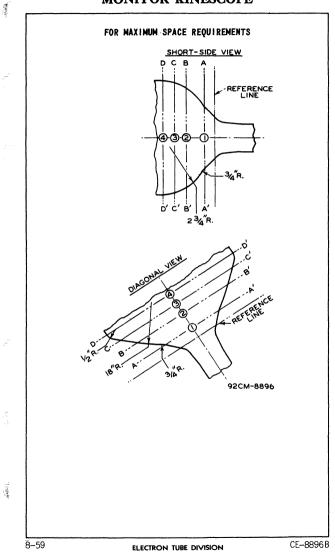
8-59





8HPA





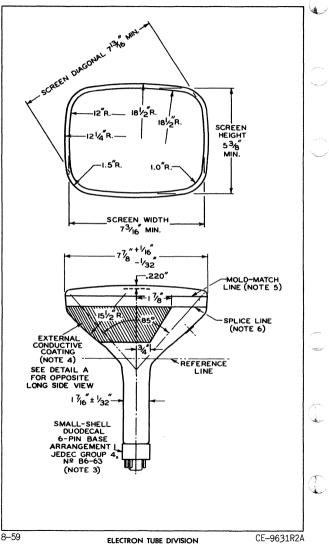
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

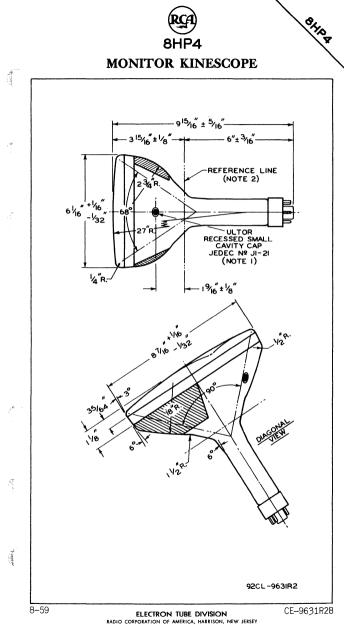
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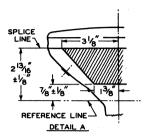
**BHP**^A

MONITOR KINESCOPE









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) IOF  $\pm$  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 AT THE REFERENCE LINE AND HAVING A DIAMETER OF 1-5/8 INCHES.

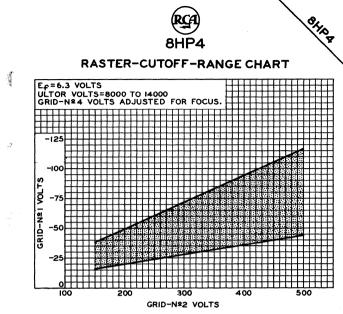
NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

NOTE 5: THE MAXIMUM RADIAL DISPLACEMENT OF THE PERI-PHERY OF THE FACE PANEL (JUST ABOVE THE MOLD-MATCH LINE) FROM ITS EXACT CENTERED POSITION ON THE NECK AXIS IS 0.040".

NOTE 6: BULGE AT SPLICE-LINE SEAL WILL NOT PROTRUDE BEYOND THE MAXIMUM ENVELOPE DIMENSIONS AT THE MOLD-MATCH LINE.

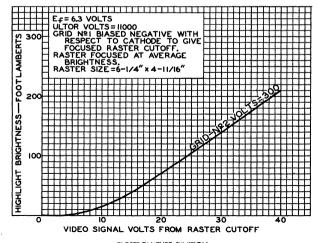
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8HPA



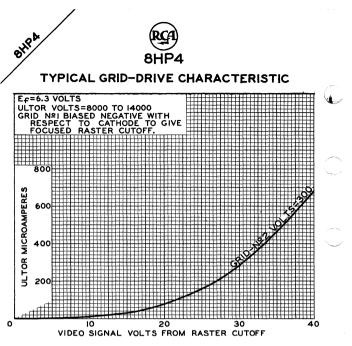
92CS-9628

#### TYPICAL GRID-DRIVE CHARACTERISTIC



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

92CS-9627



92CS-9630





MAGNETIC DEFLECTION

ROUND GLASS TYPE

#### MAGNETIC FOCUS

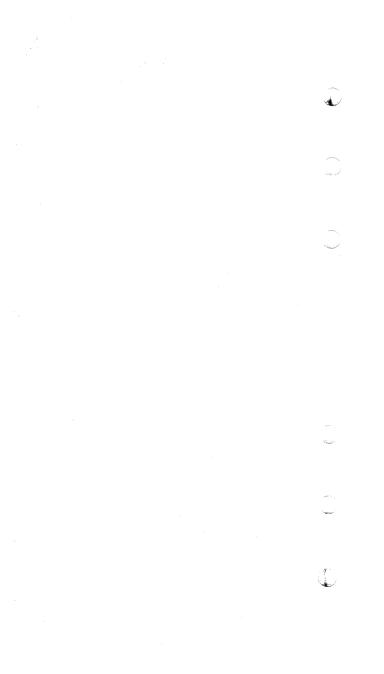
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DATA

#### General: Heater, for Unipotential Cathode: Voltage. . . . . . . . . 6.3 . ac or dc volts $0.6 \pm 10\%$ . Current. . . . . . . . . . . . amp Capacitance between External Conducμµf (2500 max. tive Coating and Ultor . . . . . 1 500 min. μµf Faceplate, Spherical . . . . . . . . . .Filterglass Phosphor (For curves, see front of this section) . P4-Sulfide Type 500 External Single-Field Magnet Overall Length . . . Minimum Useful Screen Diameter . . . . . 9-1/8" Operating Position . . . . . . .Anv . Recessed Small Cavity (JETEC No.J1-21) Сар. . . . . . . . Base . . Small-Shell Duodecal 5-Pin (JETEC Group 4, No.B5-57) Pin 1-Heater Cap≜ – Ultor Pin 2-Grid No.1 (Grid No.3, Pin 10-Grid No.2 Collector) Pin 11 - Cathode C - External 10 Pin 12 - Heater Conductive Coating Maximum Ratings, Design-Center Values: UITOR VOLTAGE. 12000 max. volts GRID-No.2 VOLTAGE. 410 max. volts GRID-No.1 VOLTAGE: Negative-bias value. . 125 max. volts Positive-bias value. . . . 0 max. volts Positive-peak value. 2 max. volts PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds . . . 410 max. volts After equipment warm-up period . . . 150 max. volts Heater positive with respect to cathode. 150 max. volts Maximum Circuit Values: Grid-No.1-Circuit Resistance... 1.5 max. megohms Cap may be aligned with either vacant pin position 6 or vacant pin position 3. Indicates a change.

9-58

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





ALUMINI	ZED	SCREEN
MACHETIC	DEEL	ECTION

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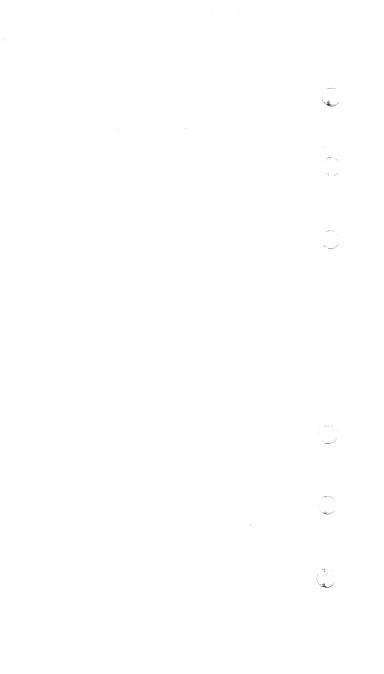
#### DATA

General:

ROUND GLASS TYPE MAGNETIC FOCUS

(

Heater, for Unipotential Cathode: Voltage. . . . . . . . . 6.3 ac or dc volts  $0.6 \pm 10\%$ Current. . . . ampl Capacitance between External Conduc-2500 max. tive Coating and Ultor . .  $\mu\mu f$ . . 500 min. μµf Faceplate, Spherical . . . . . .Filterglass . Phosphor (For Curves, see front of this Section) P4---Sulfide Type Aluminized 500 Deflection Angle (Approx.) Overall Length . . . . 17-5/8" ± 3/8" . . . . Greatest Diameter of Bulb.  $10-1/2" \pm 1/16"$ . Minimum Useful Screen Diameter 9-1/8" Operating Position . . Anv . . . Сар. . . . . Recessed Small Cavity (JETEC No.J1-21) Base . . Small-Shell Duodecal 5-Pin (JETEC Group 4. No.B5-57) Basing Designation for BOTTOM VIEW . . . . .12N Cap≜ – Ultor Pin 1-Heater Pin 2-Grid No.1 (Grid No.3, Pin 10 - Grid No.2 Collector) Pin 11 - Cathode C - External Pin 12-Heater Conductive Coating Maximum Ratings, Design-Center Values: ULTOR VOLTAGE. . . 12000 max. volts GRID-No.2 VOLTAGE. . 410 max. volts GRID-No.1 VOLTAGE: Negative-bias value. 125 max. volts Positive-bias value. . 0 max. volts Positive-peak value. 2 max. volts PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds . . . 410 max. volts After equipment warm-up period . . . 140 max. volts 140 max. volts Heater positive with respect to cathode Maximum Circuit Values: Grid-No.1-Circuit Resistance . . 1.5 max. megohms Cap may be aligned with either vacant pin position 6 or vacant pin position 3. - Indicates a change. 9-58 DATA ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





ALUMINIZED SCREEN

MAGNETIC DEFLECTION

1050x

DATA

#### General:

ELECTROSTATIC FOCUS

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8-57 ELECTRON TURE DIVISION	DATA
	←Indicates a change.
Heater positive with respect to cathode	180 max. volts
After equipment warm-up period	. 180 max. volts
not exceeding 15 seconds	. 410 max. volts
During equipment warm-up period	
Heater negative with respect to cathode	:
PEAK HEATER-CATHODE VOLTAGE:	
Positive peak value	<ul> <li>2 max. volts</li> </ul>
Positive bias value	• 0 max. volts
Negative bias value	<ul> <li>125 max. volts</li> </ul>
GRID-No.1 VOLTAGE:	
GRID-No.2 VOLTAGE	. 410 max. volts
GRID-No.3 VOLTAGE	. 3000 max. volts
ULTOR VOLTAGE	. 20000 max. volts
Maximum Ratings, Design-Center Values:	
Maximum Patinge Design Conton V-1	
Pin 11-Cathode	
Pin 10 - Grid No.2	Collector)
Pin 6-Grid No.3 $\left( \begin{array}{c} 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 $	(Grid No.4, Collector)
Pin 2-Grid No.1	Cap-Ultor
Pin 1-Heater - Heater	in 12 - Heater
<b>6</b>	
Basing Designation for BOTTOM VIEW	
Base Small-Shell Duodecal 6-	Pin (JETEC No.B6-63)
Bulb	
Cap Recessed Small Cav	ity (JETEC No.J1-21)
Operating Position	Any
Weight (Approx.)	••••••••••••••••••••••••••••••••••••••
Pricture Size (Within minimum useful scree Weight (Approx.)	n area) • • 8" × 6"
Minimum Useful Screen Diameter Picture Size (Within minimum useful scree	
Minimum Useful Sereen Diemeter	• • 10-1/2" ± 1/16"
Deflection Method. Deflection Angle (Approx.) Overall Length Greatest Diameter of Bulb.	
Overall Length	16 5/0" + 2/0"
Deflection Angle (Approx )	Enol
Deflection Method	Magnetic
leacusing Mothod	Flootroototio
Phosphorescence.	Short
Phosphorescence	white
Fluorescence	
	Aluminized
Phosphor (For curves, see front of this section).	. , P4-Sulfide Type
Light transmission (Approx.)	76%
Facenlate Scherical	Filteralass
Cathode to all other electrodes	
Grid No.1 to all other electrodes	6 μμf
Direct Interelectrode Capacitances:	
Current 0.6	
Heater, for Unipotential Cathode:	ac or dc volts
[Heater, for Unipotential Cathode:	
Heater, for Unipotential Cathode:	

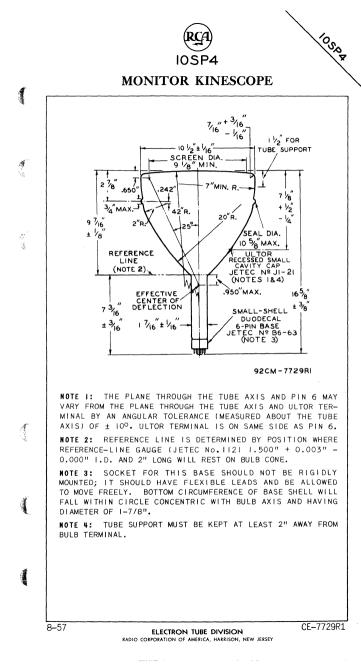
## ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



Equipment Design Ranges:

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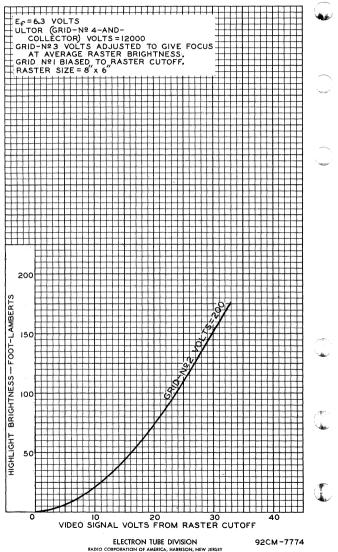
Equipment Design Ranges:	
For any ultor voltage $(E_{C_{u}})$ between 10000* and 20000 volts and grid-No.2 voltage $(E_{C_{u}})$ between 150 and 410 volts	
Grid-No.3 Voltage for focus with ultor current of 100 µa 11.7% to 15.9% of E _{C4} volts Grid-No.1 Voltage for	(
visual extinction of 8" x 6" raster	
Current**.       See Curves         Grid-No.2 Current.       -15 to +15         Field Strength of Adjustable       0 to 8       gausses	C
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 μa1400 to 1900 1640 to 2225 volts Grid-No.1 Voltage for visual extinction of 8" x 6" raster18 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 X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section	Æ Æ
	F
	1
	Ţ
→Indicates a change.	
8-57 ELECTRON TUBE DIVISION DATA	





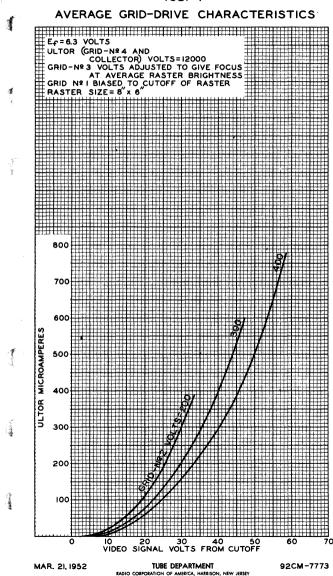
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#### AVERAGE GRID-DRIVE CHARACTERISTIC





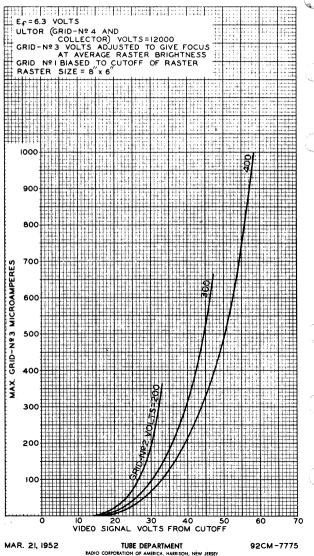








#### GRID-DRIVE CHARACTERISTICS







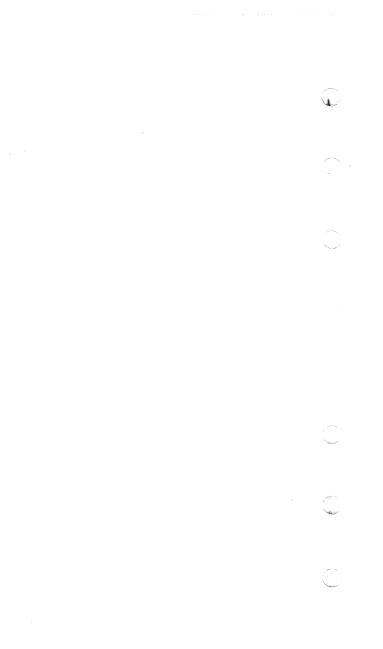
ROUND	GL	ASS	TYPE
MAGNET	IС	FOC	CUS

6.00

ALUMINIZED SCREEN MAGNETIC DEFLECTION

DATA

	DATA	
	General:	
₩. s	Heater, for Unipotential Cathode: Voltage	+
	Phosphor (For Curves, see front of this Section) . P4—Sulfide Type	
	Aluminized         Deflection Angle (Approx.)       54°         Electron Gun	++ ++
	Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater Pin 12-Heater	
	Maximum Ratings, Design-Center Values:	
 	ULTOR VOLTAGE	
	Negative-bias value.       125 max.       volts         Positive-bias value.       0 max.       volts         Positive-peak value.       2 max.       volts         PEAK HEATER-CATHODE VOLTAGE:       2       volts	
	Heater negative with respect to cathode:	
- 5	During equipment warm-up period not exceeding 15 seconds 410 max. volts	
and the second	After equipment warm-up period	
	Heater positive with respect to cathode. 140 max. volts	
	Maximum Circuit Values:	
	Grid-No.1-Circuit Resistance 1.5 max. megohms	
And a		
	Cap may be aligned with either vacant pin position 6 or vacant pin position 3.	
	←Indicates a change.	
	9-58 ELECTRON TUBE DIVISION DATA	







LOW-VOLTAGE FOCUS General: Heater. for Unipotential Cathode:

RECTANGULAR GLASS TYPE

ALUMINIZED SCREEN MAGNETIC DEFLECTION Intended for use in equipment having

series heater-string arrangement DATA

Voltage 8.4 Current 0.45 Warm-up time (Average) . 11 For definition of heater warm-up time it, see sheet HEATER WARM-UP TIME Receiving Tube Section.	e and method of determining
Direct Interelectrode Capacitances: Grid No.1 to all other electrodes Cathode to all other electrodes. External conductive coating to ul	
Faceplate, Spherical Light transmission (Approx.) Phosphor (For Curves, see front of this	500 min. μμ 
Fluorescence	
Deflection Method Deflection Angles (Approx.): Diagonal Horizontal	
Tube Dimensions:         Overall length         Greatest width         Greatest height         Diagonal         Neck length	$ 13-3/16" \pm 5/16$ $ 13-1/16" \pm 1/8$ $ 10-9/16" \pm 1/8$
Screen Dimensions (Minimum): Greatest width Diagonal Projected area Weight (Approx.) Mounting Position	

A.S.M.

· · · · · · · · · · · · · · · · · · ·	
AATPA RCA 14ATP4	
I4ATP4	
PICTURE TUBE	_
Basing Designation for BOTTOM VIEW	No.5, ctor) al ctive
GRID-DRIVE SERVICE	
Unless otherwise specified, voltage values are posi with respect to cathode	tive
Maximum Ratings, Design-Center Values:	$\square$
ULTOR VOLTAGE	volts
GRID-No.4 VOLTAGE:       1000 max.         Positive value       1000 max.         Negative value       500 max.         GRID-No.2 VOLTAGE:       500 max.         GRID-No.1 VOLTAGE:       200 max.         Negative peak value.       200 max.         Negative bias value.       140 max.         Positive bias value.       0 max.         Positive peak value.       2 max.         Positive peak value.       2 max.         PEAK HEATER-CATHODE VOLTAGE:       180 max.         Heater negative with respect to cathode.       180 max.	volts volts volts volts volts volts volts volts volts volts
Heater negative with respect to cathode. 180 max. Heater positive with respect to cathode. 180 max.	volts
Equipment Design Ranges: With any ultor voltage $(E_{C_{5}k})$ between 8000 and 14000 and grid-No.2 voltage $(E_{C_{2}k})$ between 200 and 500 vo Crid-No.4 Voltage for	volts lts
Grid-No.4 Voltage for Focus§0 to 400 Grid-No.1 Voltage (Ecik) for Visual Extinction of Focused Raster	
Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak positive)Same value as determined f	or Ec. k
except video drive is a positive v Grid-No.4 Current25 to +25 Grid-No.2 Current15 to +15 Field Strength of Adjustable Centering Magnet*0 to 8	voltage μa μa gausses
Grid drive is the operating condition in which the video signal the grid-No.1 potential with respect to cathode. §,*: See next page.	
6-57 ELECTRON TUBE DIVISION TENTATIVE radio corporation of america, marrison, new jersey	DATA 1



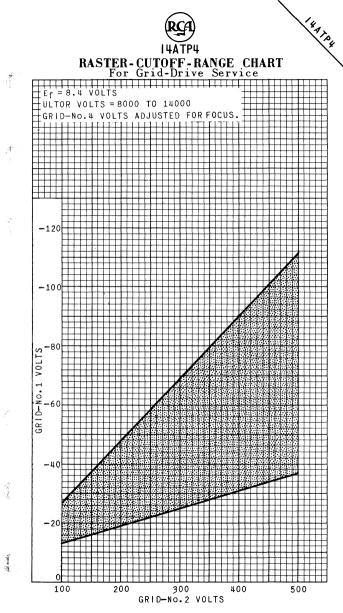


CATHODE-DRIVE® SERVICEUnless otherwise specified, voltage values are positivewith respect to grid No.1Maximum Ratings, Design-Center Values:ULTOR-TO-GRID-No.1 VOLTAGE.(14000 max. (8000 min.)GRID-No.4-TO-GRID-No.1 VOLTAGE: Positive value.1000 max. Negative value.NOLTAGE.1000 max. (8000 min.)GRID-No.4-TO-GRID-No.1 VOLTAGE: Positive value.1000 max. GRID-No.2-TO-CATHODE VOLTAGE.COO max. GRID-No.2-TO-CATHODE VOLTAGE: Positive peak valuePositive peak value00 max. Negative bias valueNegative peak value00 max. Negative bias valueNegative peak value200 max. Positive bias valueNegative peak value200 max. Positive bias valueNegative bias value200 max. Positive bias valuePEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode.180 max. Heater positive with respect to cathode.180 max. Bood and 14000 and grid-No.2-to-grid-No.1 voltage ( $E_{c_2g_1}$ ) between $225$ and 640Grid-No.4-to-Grid-No.1 Voltage for Focus§.0 to 400	vol
Focus0 to 4000 to 400Grid-No.1 Voltage for Visual Extinction of Focused Raster-25 to -69-31 to -90Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value25 to 6931 to 90Maximum Circuit Values: Grid-No.1-Circuit Resistance.1.5 max. maxGrid-No.1-Circuit Resistance.1.5 max. maxMaximum Ratings, Design-Center Values: Wittor-No.4-TO-GRID-No.1 VOLTAGE.14000 max. 8000 min.GRID-No.4-TO-GRID-No.1 VOLTAGE.1000 max. 8000 min.GRID-No.2-TO-GRID-No.1 VOLTAGE.500 max. 00 max. Negative value.GRID-No.2-TO-GRID-No.1 VOLTAGE.200 max. 00	vol
of Focused Raster25 to -69 -31 to -90 Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value 25 to 69 31 to 90 Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max. me 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	vol
Maximum Circuit Values:Grid-No.1-Circuit Resistance.1.5 max.CATHODE-DRIVE® SERVICEUnless otherwise specified, voltage values are positive with respect to grid No.1Maximum Ratings, Design-Center Values:ULTOR-TO-GRID-No.1 VOLTAGE.1000 max.Rostive value.1000 max.Rostive value.1000 max.Negative value.1000 max.Solomax.GRID-No.1 VOLTAGE:Positive value.1000 max.Negative value.1000 max.Solomax.GRID-No.1 VOLTAGE:Positive peak value00 max.Negative bias value00 max.Negative bias value00 max.Negative bias value0 max.Negative bias value1000 max.Negative bias value0 max.Negative bias value1000 max.Negative bias value0 max.Negative bias value0 max.Negative bias value0 max.Negative bias value1000 max.Negative bias value <td< td=""><td>vol</td></td<>	vol
Grid-No.1-Circuit Resistance.1.5 max.CATHODE-DRIVE® SERVICEUnless otherwise specified, voltage values are positivewith respect to grid No.1Maximum Ratings, Design-Center Values:ULTOR-TO-GRID-No.1 VOLTAGE.14000 max. 8000 min.GRID-No.4-TO-GRID-No.1 VOLTAGE:Positive value.1000 max. Negative value.Solo max. GRID-No.2-TO-GRID-No.1 VOLTAGE:Positive value.1000 max. Solo max. GRID-No.2-TO-GRID-No.1 VOLTAGE:Positive peak value00 max. CATHODE-TO-GRID-No.1 VOLTAGE:Positive peak value00 max. Positive bias valueNegative bias value00 max. Negative bias valueNegative bias value00 max. Peak HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode.Heater negative with respect to cathode.180 max. Heater positive with respect to cathode.180 max.Equipment Design Ranges: With any ultor-to-grid-No.1 voltage ( $E_{c_2g_1}$ ) between $& 5000$ and 14000and 640Grid-No.4-to-Grid-No.1Voltage for Focus§.0 to 400	vol
CATHODE-DRIVE® SERVICEUnless otherwise specified, voltage values are positive with respect to grid No.1Maximum Ratings, Design-Center Values:ULTOR-TO-GRID-No.1 VOLTAGE.(14000 max. 8000 min.GRID-No.4-TO-GRID-No.1 VOLTAGE: Positive value.1000 max. Negative value.Negative value.1000 max. S00 max.GRID-No.2-TO-GRID-No.1 VOLTAGE: Positive peak value.200 max. GRID-No.2-TO-GRID-No.1 VOLTAGE: Positive peak value.Positive peak value.00 max. Positive bias value.Negative peak value.00 max. Positive bias value.Negative peak value.200 max. Positive bias value.PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode.180 max. Heater positive with respect to cathode.180 max. PEAK HEATER-CATHODE VOLTAGE: Heater positive with respect to cathode.180 max. Bequipment Design Ranges: With any ultor-to-grid-No.1 voltage ( $E_{c_2g_1}$ ) between S000 and 14000 and grid-No.2-to-grid-No.1 voltage ( $E_{c_2g_1}$ ) between 225 and 640Grid-No.4-to-Grid-No.1 Voltage for Focus§.O to 400	egoh
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	Syon
$with \ respect \ to \ grid \ No.1$ Maximum Ratings, $Design-Center \ Values:$ ULTOR-TO-GRID-No.1 VOLTAGE	
ULTOR-TO-GRID-No.1 VOLTAGE.	ive
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
Positive value.1000 max.Negative value.500 max.GRID-No.2-TO-GRID-No.1 VOLTAGE.640 max.GRID-No.2-TO-GRID-No.1 VOLTAGE.500 max.CATHODE-TO-GRID-No.1 VOLTAGE:900 max.Positive bias value200 max.Positive bias value140 max.Negative bias value0 max.Negative bias value0 max.Peak HEATER-CATHODE VOLTAGE:400 max.Heater negative with respect to cathode.180 max.Heater positive with respect to cathode.180 max.Equipment Design Ranges:8000 and 14000With any ultor-to-grid-No.1 voltage ( $Ec_{2g1}$ ) between 225 and 640Grid-No.4-to-Grid-No.10 to 400	vol vol
Negative value.500 max.GRID-No.2-TO-GRID-No.1 VOLTAGE.640 max.GRID-No.2-TO-CATHODE VOLTAGE.500 max.CATHODE-TO-GRID-No.1 VOLTAGE.900 max.Positive peak value.200 max.Positive bias value.140 max.Negative bias value.0 max.Negative bias value.0 max.Negative bias value.0 max.Negative bias value.0 max.Negative bias value.2 max.PEAK HEATER-CATHODE VOLTAGE:Heater negative with respect to cathode.180 max.Heater positive with respect to cathode.180 max.Equipment Design Ranges:With any ultor-to-grid-No.1 voltage ( $E_{C_2g_1}$ ) between 225 and 640Grid-No.4-to-Grid-No.1voltage for Focus§.O to 400	
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	vol
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Positive peak value200 max.Positive bias value140 max.Negative bias value0 max.Negative peak value2 max.PEAK HEATER-CATHODE VOLTAGE:Heater negative with respect to cathode.180 max.Heater positive with respect to cathode.180 max.Equipment Design Ranges:With any ultor-to-grid-No.1 voltage ( $E_{c_2g_1}$ ) between 225 and 640Grid-No.4-to-Grid-No.1225 and 640Grid-No.4-to-Grid-No.10 to 400	vol vol
Positive bias value140 max.Negative bias value0 max.Negative beak value0 max.PEAK HEATER-CATHODE VOLTAGE:Heater negative with respect to cathode.180 max.Heater positive with respect to cathode.180 max.Equipment Design Ranges:With any ultor-to-grid-No.1 voltage ( $E_{c_2g_1}$ ) between 8000 and 14000and grid-No.2-to-grid-No.1 voltage ( $E_{c_2g_1}$ ) between 225 and 640Grid-No.4-to-Grid-No.1 Voltage for Focus§0 to 400	vol
Negative peak value 2 max. PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode. 180 max. Heater positive with respect to cathode. 180 max. Equipment Design Ranges: With any ultor-to-grid-No.1 voltage $(E_{c_gg_1})$ between 8000 and grid-No.2-to-grid-No.1 voltage $(E_{c_gg_1})$ between 225 and 640 Grid-No.4-to-Grid-No.1 Voltage for Focus§ 0 to 400	vol
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode.180 max.Heater positive with respect to cathode.180 max.Equipment Design Ranges: With any ultor-to-grid-No.1 voltage $(E_{c_2g_1})$ between ard grid-No.2-to-grid-No.1 voltage $(E_{c_2g_1})$ between 225 and 640Grid-No.4-to-Grid-No.1 Voltage for Focus§.0 to 400	vol
Heater positive with respect to cathode. 180 max. <b>Equipment Design Ranges:</b> With any ultor-to-grid-No.1 voltage $(E_{c_gg_1})$ between and grid-No.2-to-grid-No.1 voltage $(E_{c_gg_1})$ between 225 and 640 Grid-No.4-to-Grid-No.1 Voltage for Focus§	vol
Equipment Design Ranges: With any ultor-to-grid-No.1 voltage $(E_{C_2g_1})$ between 8000 and 14000 and grid-No.2-to-grid-No.1 voltage $(E_{C_2g_1})$ between 225 and 640 Grid-No.4-to-Grid-No.1 Voltage for Focus§	vol
With any ultor-to-grid-No.1 voltage $(E_{C_2g_1})$ between 8000 and 14000 and grid-No.2-to-grid-No.1 voltage $(E_{C_2g_1})$ between 225 and 640 Grid-No.4-to-Grid-No.1 Voltage for Focus§0 to 400	vol
8000 and 14000 and grid-No.2-to-grid-No.1 voltage (E _{C2g1} ) between 225 and 640 Grid-No.4-to-Grid-No.1 Voltage for Focus§0 to 400	
and grid-No.2-to-grid-No.1 voltage (E _{C2g1} ) between 225 and 640 Grid-No.4-to-Grid-No.1 Voltage for Focus§0 to 400	
Grid-No.4-to-Grid-No.1 Voltage for Focus§0 to 400	001
Grid-No.4-to-Grid-No.1 Voltage for Focus§0to400	vol
Voltage for Focus§0 to 400	
	vol
5 The grid-No.4 voltage or grid-No.4-to-grid-No.1 voltage requir focus of any individual tube is independent of ultor current an remain essentially constant for values of ultor voltage (or ult grid-No.1 voltage) or grid-No.2 voltage (or grid-No.2-to-gri voltage) within design ranges shown for these items.	ed f id wi or-t d-No
Cathode drive is the operating condition in which the video varies the cathode potential with respect to grid No.1 ar other electrodes.	sign nd ti
*: See next page.	



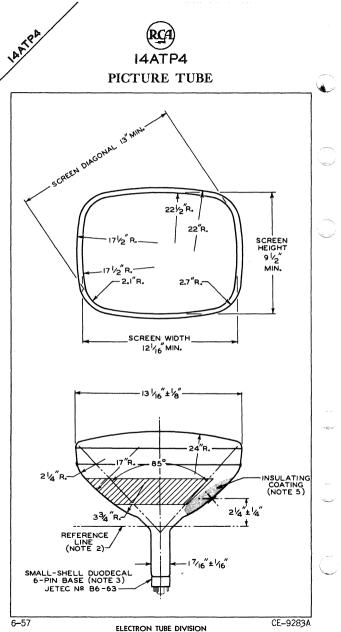
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Cathode-to-Grid-No.1 Voltage (Ekg,) for Visual Extinction of Focused Raster See Raster-Cutoff-Range Chart for Cathode-Drive Service	
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak negative)Same value as determined for Ekg,	$\bigcirc$
except video drive is a negative voltage Grid-No.4 Current25 to +25 μā Grid-No.2 Current15 to +15 μā Field Strength of Adjustable Centering Magnet [*] 0 to 8 gausses	
Examples of Use of Design Ranges:	·
With ultor-to-grid-No.1 voltage of 10000 14000 volts	
and grid-No.2-to-grid-No.1 voltage of 300 400 volts	
Grid-No.4-to-Grid- No.1 Voltage	
for Focus0 to 400 0 to 400 volts Cathode-to-Grid-No.1 Voltage for Visual Extinction of	5
Focused Raster	(
White-level value25 to -58 -31 to -75 volts	i
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max. megohms	
* Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4". Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having 1/4-incr radius concentric with the center of the tube face. It is to be note that the earth's magnetic field can cause as much as 7/16-inch de- flection of the spot from the center of the tube face.	
For X-ray shielding considerations, see sheet	
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section	
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6–57 TENTATIVE DATA 2	,
ELECTRON TUBE DIVISION	-

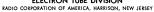
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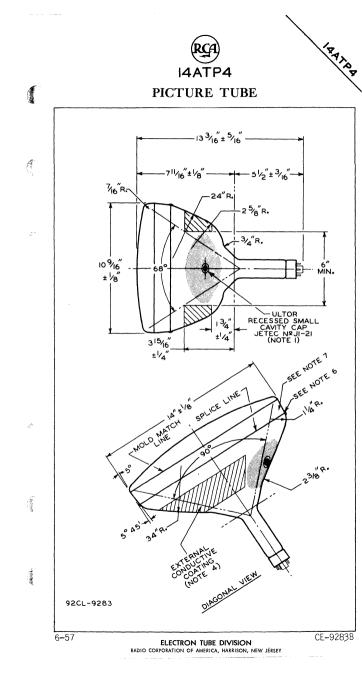


ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CS-9275









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

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

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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

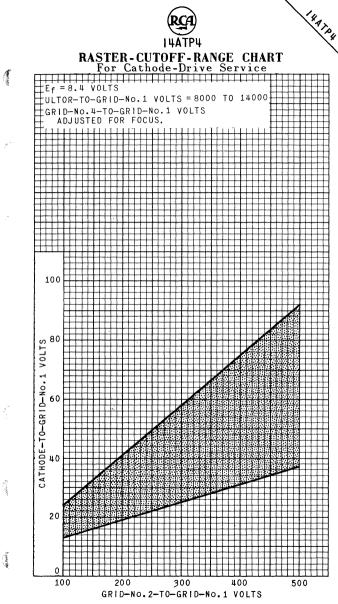
NOTE 5: TO CLEAN THIS AREA WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

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

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

LAATPA





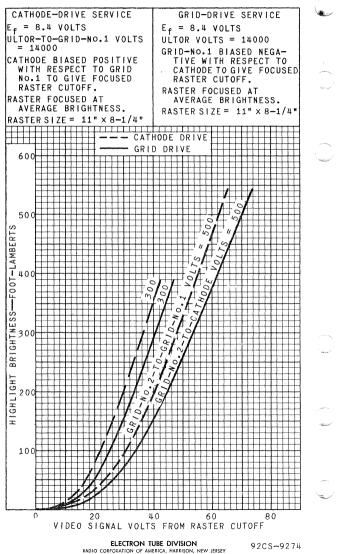
ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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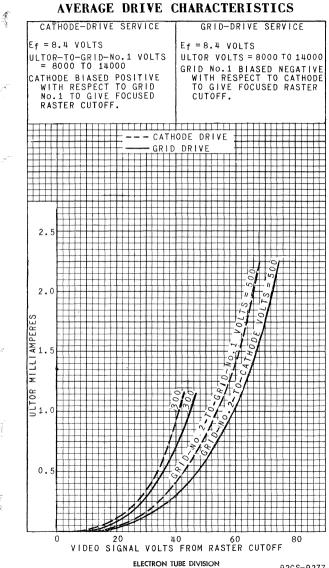
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#### AVERAGE DRIVE CHARACTERISTICS









RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



# 14**BA**P4

## **Picture Tube**

at seaso	RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 70° MAGNETIC DEFLECTION
	GENERAL DATA
	Electrical:
1	Heater Current at 6.3 volts 600 ± 10% ma Direct Interelectrode Capacitances: Grid No.1 to all other electrodes
	External conductive coating to ultor $\begin{cases} 1000 &  ext{max.} & \mu\mu f \\ 600 &  ext{min.} & \mu\mu f \end{cases}$
	Electron Gun
	Optical:
~	FaceplateFilterglass Light transmission (Approx.)
	Mechanical:
ŕ	Operating Position
ς	Basing Designation for BOŤTOM VIEW
A second	Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater
	Maximum Ratings, Design-Maximum Values:
I	ULTOR VOLTAGE



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

DATA 5-62

## 14BAP4

GRID-No.1 VOLTAGE: Negative bias value		6.
Typical Operating Conditions:		
With ultor voltage of 18000 and grid-No.2 voltage of 300	volts volts	
Grid-No.4 Voltage for focus 0 to 400 Grid-No.1 Voltage for	volts	~
visual extinction of focused raster	volts	4.2

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

RCA

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

RECTANGULAR GLASS TYPE

MAGNETIC FOCUS

#### 70° MAGNETIC DEFLECTION

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 {2000 max. 750 min.	pf
750 min.	pf
Heater Current at 6.3 volts 600 ± 30	ma
Electron Gun Ion-Trap Type Requi	
External Single-Field Ma	aanet

#### Optical:

Phosphor (For Curves, see front of this Section)P4—Sulfide Type Faceplate, Spherical
Mechanical:
Weight (Approx.).         10 lbs           Overall Length.         16-15/32" ± 3/8"           Neck Length         7-3/16" ± 3/16"           Projected Area of Screen.         96 sq.in.           External Conductive Coating:         96 sq.in.
TypeRegular-Band
Contact area for grounding Near Reference Line
For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J109-1/2 A/C
sheets at front of this section
Cap

ANODE Pin 1-Heater Cap - Anode Pin 2-Grid No.1 (Grid No.3. сĽ Pin 10-Grid No.2 Screen. Pin 11 - Cathode Collector) (10)_{G2} Pin 12 - Heater C – External Conductive Coating

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

Unless otherwise specified, voltage values					
are ‡	ositi	ve with	n respect	to cathode	
ANODE VOLTAGE .				15500 max.	volts
GRID-No.2 VOLTA	Ε.			450 max.	volts



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

# 14EP4

Positive bias value 0 max. vc	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period	
	olts
	olts -/
Heater positive with respect to cathode:	1115
Combined AC and DC voltage 165 max. vc	olts
DC component	olts
Typical Operating Conditions for Grid-Drive Service:	$\sim$
Unless otherwise specified, voltage values are positive with respect to cathode	$\sim$
Anode Voltage	olts
	olts
extinction of focused raster28 to -72 vo	olts
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max. megc	hms
For X-radiation shielding considerations, see sheet	

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





SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN

LOW-VOLTAGE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

HODD'A

DATA

General:

Heater. for Unipotential Cathode: Voltage. . . . . . . . . . 6.3 . ac or dc volts Current. .  $0.6 \pm 10\%$ . Capacitance between External Conduc-(1000 max. μµf tive Coating and Ultor . . . 600 min. μµf Faceplate. Spherical . . . . .Filterglass Phosphor (For curves, see front of this section). P4-Sulfide Type Aluminized Deflection Angles (Approx.): 700 Diagonal . . 65⁰ Horizontal Vertical . . 500 Electron Gun . External Single-Field Magnet Tube Dimensions: Overall length . 16-5/32" ± 3/8" Greatest width .  $12-17/32" \pm 1/8"$ Greatest height. . 9-23/32" ± 1/8" Diagonal . . . . . 13-11/16" ± 1/8" Neck length. . . . . . . . . . . 6-7/8" ± 3/16" . . . Radius of curvature of faceplate (External surface). 27" Screen Dimensions (Minimum): Greatest width . . . 11 - 1/2" . 8-5/8" Greatest height. Diagonal . . . . 12-3/4" Projected area . . 96 sq. in. Operating Position . . .Anv . Recessed Small Cavity (JETEC No.J1-21) Сар. . . . . . . . Base . . Small-Shell Duodecal 6-Pin (JETEC Group 4, No.B6-63) 6 Pin 1-Heater Cap-Ultor Pin 2-Grid No.1 (Grid No.3. Pin 6-Grid No.4 Grid No.5. Pin 10-Grid No.2 Collector) 10) Pin 11 - Cathode C-External Pin 12-Heater Conductive Coating Maximum Ratings, Design-Center Values: ULTOR VOLTAGE. . . 11000 max. volts GRID-No.4 (FOCUSING) VOLTAGE: Positive value . . . . . . 1000 max. volts Negative value . 500 max. volts GRID-No.2 VOLTAGE... 500 max. volts -Indicates a change. DATA



HADPARA

### PICTURE TUBE

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GRID-No.1 VOLTAGE:			•
Negative-peak value	160 max.	volts	
Negative-bias value	180 max.	volts	
Positive-bias value	0 max.	volts	
Positive-peak value	2 max.	volts	
EAK HEATER-CATHODE VOLTAGE:			. 1
Heater negative with respect to cathode:			· · · · · · · · · · · · · · · · · · ·
During equipment warm-up period not	110		
exceeding 15 seconds	410 max. 180 max.	volts volts	
Heater positive with respect to cathode.	180 max. 180 max.	volts	
	100 max.	10113	
Maximum Circuit Values:	4 5		-
rid-No.1-Circuit Resistance	1.5 max.	megohms	~
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			14
			$\langle \cdot, \cdot \rangle$
			12

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 90^o 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. {1200 max. pf 800 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, Spherical
Mechanical:         Weight (Approx.).       8.5 lbs         Overall Length.       13-3/16" ± 5/16"         Neck Length       5-1/2" ± 3/16"         Projected Area of Screen.       5-1/2" ± 3/16"         Projected Area of Screen.       104 sq. in.         External Conductive Coating:       Type.         Type.          Regular-Band       Contact area for grounding.         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       Cap.         Cap.           Bases (Alternates):       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.
Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.2 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater H H Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) Conductive Conductive Conductive



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

DATA 4–63

## 14WP4

Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to cathode ANODE VOLTAGE. . . . . . {15500 max. 9000 min. volts volts GRID-No. 4 (FOCUSING) VOLTAGE Positive value . . . . . . 1100 max. volts . . Negative value . . . GRID-No. 2 VOLTAGE . . GRID-No. 1 VOLTAGE: 550 max. volts 550 max. volts Negative peak value. . . 220 max. volts Negative bias value. . . . . . . . . . 200 max. volts Positive bias value. . . . . . . . . . 0 max. volts Positive peak value. . . . . . . . . . 2 max. volts (6.9 max. volts HFATER 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. 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 Service: Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage. . . . . . . . . . . . . . . . . . 12000 volts volts volts 300 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

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TRICOLOR KINESCOPE

THREE-GUN SHADOW-MASK TYPE ELECTROSTATIC FOCUS ELECTROSTATIC CONVERGENCE MAGNETIC DEFLECTION DATA

#### General:

1

A.C.

Electron Guns, Three Blue, Green, Red 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 1.8 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 7.5 μμf
Cathode of Blue Gun + Cathode of
Green Gun + Cathode of Red Gun
to All Other Electrodes $\dots \dots \dots$
Grid No.3 (Of Each Gun Tied within
Tube to No.3 Grids of Other Two
Guns) to All Other Electrodes $\dots$ 12 $\mu\mu$ f
Guns) to All Other Electrodes $\dots$ $12$ $\mu\mu$
Grid No.4 (Common to the Three Guns) to All Other Electrodes 7 μμf
Guns) to All Other Electrodes 7 $\mu\mu f$
External Conductive Coating to Ultor •. $\begin{cases} 3000 \text{ max. } \mu\mu f \\ 1500 \text{ min. } \mu\mu f \end{cases}$
Faceplate, Spherical Clear Glass
Screen, Flat:
Type Metal-Backed, Tricolor, Phosphor-Dot
Plate
Plate
Star (Reunded Siden See Dimonsional
Outline) 11-1/2" × 8-5/8"
Size (Rounded Sides—See Dimensional)           Outline)           Area           88.5 sq. in.           P22
Phosphor (Three Separate Phosphors, collectively) P22
Eluorescence and Phosphorescence of
Separate Phosphors, respectively Blue, Green, Red
Persistence of Group Phosphorescence Medium
Dot Arrangement Approx. 195,000 triangular groups,
each consisting of blue dot, green dot.
and red dot (total of 585,000 dots)
Focusing Method
Convergence Method
Convergence Method
Deflection Method Magnetic
Deflection Angles (Approx.): Horizontal
Vertical
Tube Dimensions:
Maximum Overall Length
Constant Diamotory
At faceplate
At metal flange
At faceplate         14-5/8" ± 5/32"           At metal flange         15-3/4" max.           Weight         25 lbs

MARCH 1, 1954

TUBE DEPARTMENT



5CP22

#### TRICOLOR KINESCOPE

Mounting Position . Any Ultor• Terminal Metal Flange Bulb. .1126 Base Small-Shell Bidecal 14-Pin (JETEC No. B14-103) BOTTOM VIEW Pin 9: Grid No.2 Pin 1: Heater Pin 2: Cathode of Green Gun of Red Gun Pin 13: Grid No.4 Pin 17: Grid No.2 Pin 3: Grid No.1 of Red Gun of Blue Gun Pin 4: Grid No.2 Pin 18: Grid No.1 of Red Gun of Blue Gun Pin 5: No Pin 19: Cathode of Blue Gun Connection Pin 20: Heater Pin 6: Grids No.3 Metal Flange: Ultor Pin 7: Cathode of Green Gun (Grid No.5. Pin 8: Grid No.1 Grid No.6. of Green Gun Collector) Maximum Ratings. Design-Center Values: 20000 max. volts UI TOR[®] VOI TAGE 15#max. watts ULTOR INPUT . . 11000 max. volts GRID-No.4 VOLTAGE . volts GRID-No.3 VOLTAGE . 5000 max. volts GRID-No.2 VOLTAGE (Each Gun). 500 max. GRID-No.1 VOLTAGE (Each Gun): 200 max. volts Negative bias value . . volts Positive bias value . 0 max. 2 max. volts Positive peak value . PEAK HEATER-CATHODE VOLTAGE (Each Gun): Heater negative with respect to cathode: During equipment warm-up period volts 410 max. not exceeding 15 seconds volts After equipment warm-up period . 180 max. Heater positive with respect to cathode 180 max. volts Equipment Design Ranges: For ultor voltage (E_{C5}) of 18000 to 20000 volts Grid-No.4 (Converging Electrode) Voltaget . . . 42.5% to 51% of Ec5 volts Grid-No.3 (Focusing volts . 12% to 19% of E_{C5} Electrode) Voltage . . . . 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 15GP2, the ultor function is performed by grid No.5. Since grid No.5, grid No.6, and collector are connected to-gether within the tube, they are collectively referred to simply as "ultor", for convenience in presenting data and curves. This value is the product of ultor voltage and average current measured at the ultor terminal with a dc ammeter. † See next page. MARCH 1, 1954 TENTATIVE DATA 1





#### TRICOLOR KINESCOPE

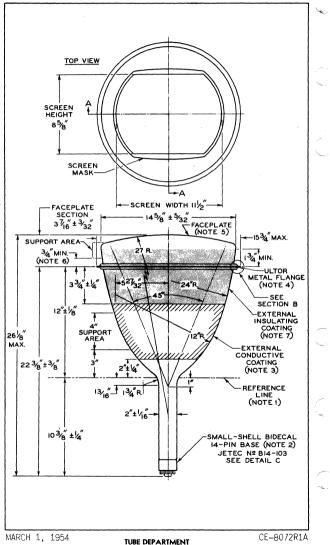
· · · · · · · · · · · · · · · · · · ·	
<pre>Grid-No.2 Voltage (Each Gun) when circuit design uti- lizes grid-No.1 Voltage (Ec_1) at fixed value for raster cutoff (each gun) 2 to 4.5 times Ec_1 Grid-No.1 Voltage for Visual Extinction of Fo- cused Raster (Each Gun) when circuit design uti- lizes grid the 2 witten</pre>	volts
lizes grid-No.2 voltage (E _{c2} ) at fixed value (each gun)	volts $\mu amp$ $\mu amp$ $\mu amp$
Beam-Current Ratio to Produce Illuminant-C White: Red Gun to Green Gun 4:1 to 1:1 Blue Gun to Green Gun 1.5:1 to 0.5:1 Maximum Raster Shift in Any Direction from	inches
Screen Center ^o 1-1/4	Thenes
Examples of Use of Design Ranges:	
For ultor voltage of 20000 volts	
Grid-No.4 (Converging Electrode) Voltage† 8500 to 10200 Grid-No.3 (Focusing Electrode)	volts
Voltage 2400 to 3800 Grid-No.2 Voltage (Each Gun)	volts
when circuit design utilizes grid-No.1 voltage of -70 volts for raster cutoff (each gun) . 140 to 315 Grid-No.1 Voltage for Visual Extinction of Focused Raster (Each Gun) when circuit design utilizes grid-No.2 voltage of	volts
200 volts (each gun)45 to -100	volts
Circuit Values: Grid-No.1-Circuit Resistance (Each Gun). 1.5 max. Dynamic Converging Voltage (Approx.)** . 900 Dynamic Focusing Voltage (Approx.)** 225	megohms volts volts
This range does not include the dc component of the dynamic c voltage.	
<ul> <li>Centering of the raster on the screen is accomplished by passi current of the required value through each pair of deflecting compensate for the raster shift resulting from optimum adjust convergence, color purity, and concentricity.</li> <li>** Peak-to-peak value. This ac voltage having essentially parabo form is synchronized with scanning and does not include any developed during the blanking time.</li> </ul>	ng direct coils to ments for lic wave- v voltage

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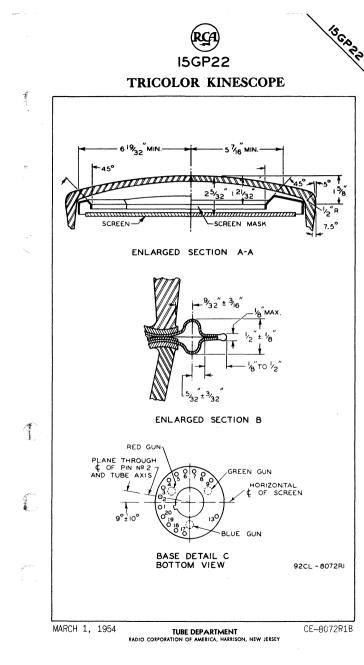


15 CP 22

### TRICOLOR KINESCOPE



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





#### TRICOLOR KINESCOPE

- NOTE 1: 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 3: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

- NOTE 4: 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.

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CE-8072R1C





#### **OSCILLOGRAPH TUBE**

DATA

METAL-SHELL ENVELOPE

MAGNETIC DEFLECTION

General	
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MAGNETIC FOCUS

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deneral:	
Heater, for Unipotential Cathode:	
Voltage 6.3	. ac or dc volts
Current 0.6	
Direct Interelectrode Capacitances (Approx.	
Grid No.1 to All Other Electrodes	
Cathode to All Other Electrodes	.5 μμf
Faceplate, Spherical	
Light Transmission (Approx.).	66%
Phosphor (For Curves, see front of this Section)	
Fluorescence	Blue
Persistence	Short
Phosphorescence	. Greenish-Yellow
	Long
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle (Approx.)	53 ^c
Greatest Diameter at Lip	. 15-7/8" + 1/8"
	14–3/8"
	Metal-Shell Lip
Ultor [•] Terminal	
Mounting Position	Any
Base Small-Shell Duodecal 7-Pi	n (JETEC No.B7-51)
BOTTOM VIEW	
6_7	• • • • •
Pin 1-Heater Pi	n 10–Grid No.2
Pin 2-Grid No.1 / Pi	n 11 – Cathode
Pin 6 – No Pi	n 12–Heater
Connection 4/ 🗖 🔊	Cap-Ultor
Pin 7 - No	(Grid No.3.
Connection	Collector)
Maximum Ratings, Design-Center Values:	44600
ULTOR [•] VOLTAGE	14000 max. volts
Positive value (DC or Peak AC)	410 max. volts
Negative value (DC or Peak AC)	180 max. volts
GRID-No.1 VOLTAGE:	
	180 max. volts
Negative bias value	
Positive bias value $\pmb{\phi}$	
Positive peak value	2 max. volts
PEAK GRID-No.1 DRIVE FROM CUTOFF	65 max. volts
• In the 16ADP7, grid No.3 which has the ultor fu	nction, and collector
are connected together within the tube and are	conveniently referred
to collectively as "ultor". The "ultor" in a ca	thode-ray tube is the
electrodes connected within the tube to it. to	which is applied the
In the 16ADP7, grid No.3 which has the ultor fu are connected together within the tube and are to collectively as "ultor". In e "ultor" in a ce electrode, or the electrode in combination with c electrodes connected within the tube to it, to highest devoltage for acceleration the electrons its deflortion.	in the beam prior to
its derrection.	
$\phi$ At or near this rating, the effective resistance should be adequate to limit the ultor input power	e of the ultor supply. of to 6 watts.
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RADIO CORPORATION OF AMERICA, HARRISON, NEW	





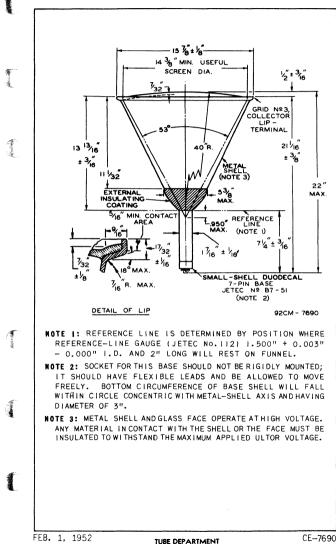
### **OSCILLOGRAPH TUBE**

PEAK HEATER-CATHODE VOLTAGE:	1
Heater negative with respect to cathode . 125	5 max. volts 5 max. volts
Typical Operation:	
Ultor Voltage [*]	
of Undeflected Focused Spot27 to Grid-No.2 Current15 to	+15 μamp 15% ma
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 r	max. megohins
Brilliance and definition decrease with decreasing ulto general, the ultor voltage should not be less than 8000	or voltage. In ) volts.
O ^{OD} For specimen focusing coil similar to JETEC Focusing C sitioned with air gap toward faceplate and center 1 3-1/4" from Reference Line (see Outline Drawing) and ul 200 microamperes.	oil No.109 po- ine of air gap tor current of
## The center of the undeflected, unfocused spot will fall v having 25-mm radius concentric with the center of the t	vithin a circle tube face.
	-
FFD 1 1050	FENTATINE DATA

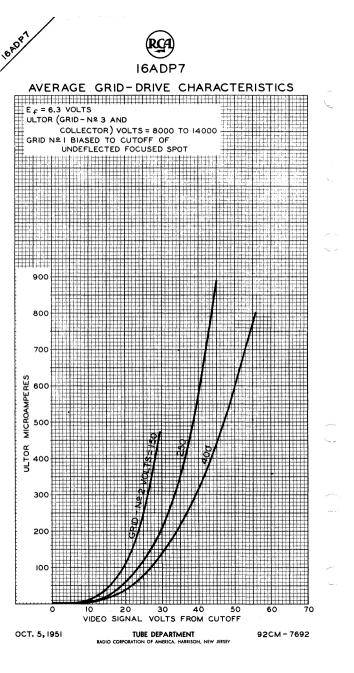




### **OSCILLOGRAPH TUBE**



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



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

#### GENERAL DATA

#### Electrical:

4

Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf External conductive coating to anode . {1300 max. pf 800 min. pf Heater Current at 6.3 volts 450 ± 20 ma Heater Warm-Up Time (Average) 11 seconds Electron Gun
Optical:
Phosphor(For curves, see front of this Section)P4—Sulfide Type, Aluminized
Faceplate
Mechanical:
Weight (Approx.)         8-1/2 lbs           Overall Length         10-1/4" ± 1/4"           Neck Length         4-1/8" ± 1/8"           Projected Area of Screen         125 sq. in.           External Conductive Coating:         125 sq. in.
Type
Cap Recessed Small Cavity (JEDEC No.J1-21) Base Small-Button Neoeightar 7-Pin, Arrangement 1, (JEDEC No. B7-208)
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 Pin 8 - Heater
Maximum and Minimum Ratings, Design-Maximum Values:
Unless otherwise specified, voltage val- ues are positive with respect to cathode
ANODE VOLTAGE



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

DATA 6-63

# 16AYP4

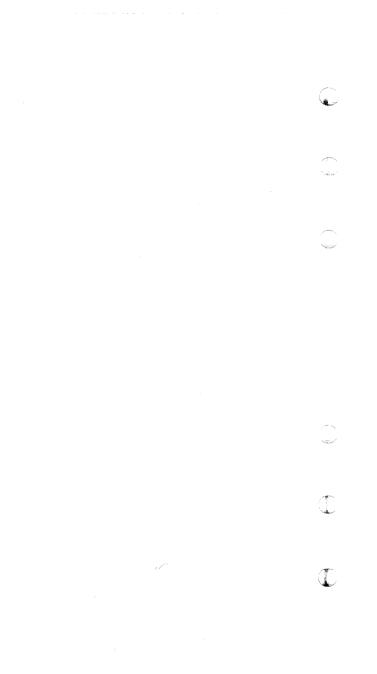
GRID-No.4 (FOCUSING) VOLTAGE:		
Positive value	volts volts	<u></u>
GRID-No 2 VOLTAGE J550 max.	volts	( in
GRID-No.1 VOLTAGE:	volts	~
Negative peak value	volts volts volts	
Positive bias value 0 max. Positive peak value	volts	. <
HEATER VOLTAGE	volts volts	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode:	VOILS	
During equipment warm-up period not exceeding 15 seconds 450 max.	volts	
After equipment warm-up period	volts	$\sim$
Heater positive with respect to cathode:		$\sim 2$
Combined AC and DC voltage 200 max. DC component	volts volts	
Typical Operating Conditions for Cathode-Drive Servic	e:	
Unless otherwise specified, voltage values		
are positive with respect to grid No.1	1.	
Anode Voltage	volts volts	
Grid-No.2 Voltage	volts	
Cathode Voltage for visual		
extinction of focused raster	volts	
Field Strength of required adjustable Centering Magnet 0 to8	gausses	
Maximum Circuit Value:		
Grid-No.1-Circuit Resistance 1.5 max.	megohms	
For X-radiation shielding considerations, see sh		

X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section

a The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between -100 and +300 volts.



10 A D A 16AP4-A PICTURE TUBE -ROUND METAL-SHELL TYPE MAGNETIC FOCUS MAGNETIC DEFLECTION DATA General: Heater, for Unipotential Cathode: Voltage.... 6.3 ac or dc volts 0.6 + 10% . . Current. . . . . . ampl Faceplate, Spherical . . . . .Filterglass . . Phosphor (For Curves, see front of this Section) . P4-Sulfide Type Deflection Angle (Approx.) 530 . . . . Electron Gun . . . . . .lon-Trap Type Requiring External Single-Field Magnet Maximum Overall Length . . 22-5/16" Greatest Diameter of Bulb. . . 15-7/8" ± 1/8" • 14-3/8" Minimum Useful Screen Diameter Operating Position . . . . .Any .Metal-Shell Lip Ultor Terminal . . . . . . 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 Maximum Ratings, Design-Center Values: ULTOR VOLTAGE. . 14000 max. volts GRID-No.2 VOLTAGE. 410 max. volts GRID-No.1 VOLTAGE: Negative-bias value. 125 max. volts 0 max. Positive-bias value. . volts 2 max. Positive-peak value. . . volts PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds . . . 410 max. volts 150 max. After equipment warm-up period . . . volts Č, 150 max. volts Heater positive with respect to cathode Maximum Circuit Values: Grid-No.1-Circuit Resistance . . . 1.5 max. megohms Indicates a change.



16DP4-A PICTURE TUBE



ROUND GLASS TYPE

DATA

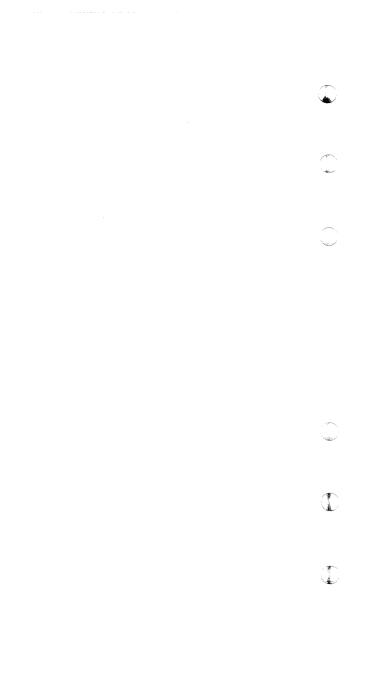
MAGNETIC DEFLECTION

#### General:

MAGNETIC FOCUS

Heater. for Unipotential Cathode: Voltage . . . . . . . . . . . . . .ac or dc volts 6.3 . A Current . . . . . . amp 0.6 ± 10% . . . . . . . . Faceplate, Spherical. . . . . . . . . . . . . . Filterolass Phosphor (For Curves, see front of this Section) . . P4---Sulfide Type Electron Gun. . . . . . . . . . Ion-Trap Type Requiring External Single-Field Magnet Overall Length. . 20-3/4" ± 1/4" . . . Greatest Diameter of Bulb . . . . . . .  $15-7/8" \pm 1/8"$ Minimum Useful Screen Diameter. . . . . . 14-1/2" Base. . .Small-Shell Duodecal 5-Pin (JETEC Group 4, No.B5-57) Basing Designation for BOTTOM VIFW. . . . . . . . . . 12D Pin 1-Heater Pin 12-Heater Pin 2-Grid No.1 Cap▲ - Ultor Pin 10-Grid No.2 (Grid No.3, Pin 11 - Cathode Collector) Maximum Ratings, Design-Center Values: ULTOR VOLTAGE . . . . . . 15000 max. volts . . . GRID-No.2 VOLTAGE volts 410 max. GRID-No.1 VOLTAGE: Negative-bias value . . 125 max. volts Positive-bias value . . volts 0 max. 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. . . . 125 max. volts Heater positive with respect to cathode. 125 max. volts 6 Maximum Circuit Values: Grid-No.1-Circuit Resistance. . . . . . 1.5 max. megohms Cap may be aligned with either vacant pin position 6 or vacant pin position 3. - Indicates a change. 9-58

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY







MAGNETIC DEFLECTION

ROUND METAL-SHELL TYPE

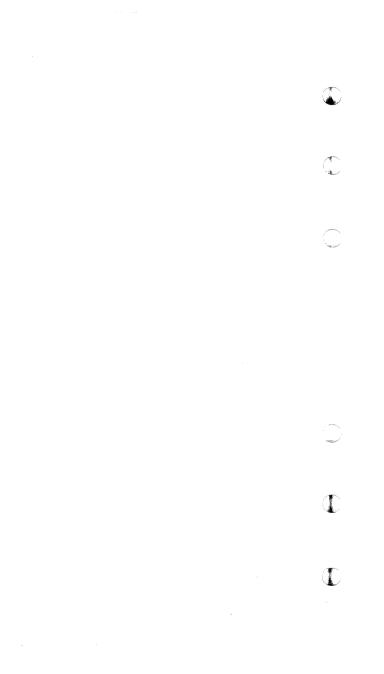
MAGNETIC FOCUS

DATA

General: Heater. for Unipotential Cathode: . . . ac or dc volts Voltage..... 6.3 Æ 0.6 ± 10% . . . . . . . Current. . . . .amo Phosphor (For Curves, see front of this Section). . P4-Sulfide Type Deflection Angle (Approx.) . . 700 . . . . . . . . . . . . . Electron Gun . . . Ion-Trap Type Requiring External Single-Field Magnet Maximum Overall Length . . . . . 17-11/16" . Greatest Diameter of Bulb. . . .  $15-7/8" \pm 1/8"$ Minimum Useful Screen Diameter . . . 14-3/8" Operating Position . . . . . . . . . . .Anv Ultor Terminal . . . . . . . . Metal-Shell Lip . . . . . . . . Base . . Small-Shell Duodecal 5-Pin (JETEC Group 4, No.B5-57) Metal-Shell Lip-Pin 1-Heater Pin 2-Grid No.1 Ultor Pin 10-Grid No.2 (Grid No.3. Pin 11 - Cathode Collector) Pin 12 - Heater Maximum Ratings. Design-Center Values: ULTOR VOLTAGE. 14000 max. volts 410 max. volts GRID-No.2 VOLTAGE. . GRID-No.1 VOLTAGE: Negative-bias value. . 125 max. volts Positive-bias value. . 0 max. volts . Positive-peak value. . . volts 2 max. PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds . . . . 410 max. volts After equipment warm-up period . . . 150 max. volts Heater positive with respect to cathode. 150 max. volts Maximum Circuit Values: Grid-No.1-Circuit Resistance . . . . . 1.5 max. megohms - Indicates a change.

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DATA



RCA 16LP4-A

#### PICTURE TUBE

ROUND GLASS TYPE MA

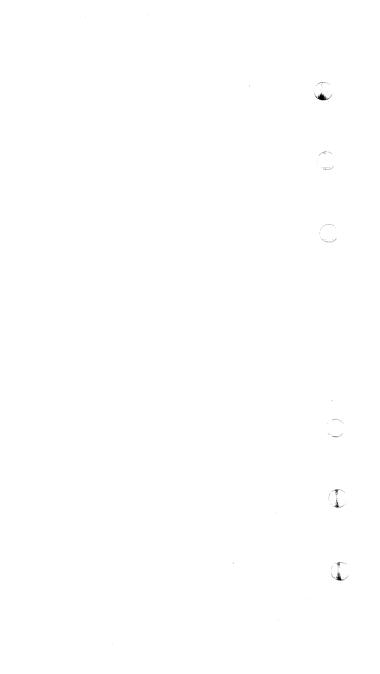
MAGNETIC DEFLECTION

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#### General:

MAGNETIC FOCUS

Heater, for Unipotential Cathode: Voltage. . . . . . . . . 6.3 . . ac or dc volts A  $0.6 \pm 10\%$ Current. . . .amp . Capacitance between External Conduc-(2000 max. μµf tive Coating and Ultor . . . . . 750 min. μµf Faceplate, Spherical . . . . . . . Phosphor (For curves, see front of this section) . P4-Sulfide Type 520 Deflection Angle (Approx.) . . . . . . . . . . Electron Gun . . . . . . . .lon-Trap Type Requiring External Single-Field Magnet Overall Length . . . Greatest Diameter of Bulb. . . . . . . 15-7/8" ± 1/8" Minimum Useful Screen Diameter . . . 14-1/2" . . . . . . . Operating Position . . . . . . . Anv . Cap. . . . . . . . Recessed Small Cavity (JETEC No.J1-21) Base . . Small-Shell Duodecal 5-Pin (JETEC Group 4, No.B5-57) Pin 1-Heater Cap▲ - Ultor Pin 2-Grid No.1 (Grid No.3. Collector) Pin 10-Grid No.2 Pin 11-Cathode C - External Pin 12-Heater Conductive Coating Maximum Ratings, Design-Center Values: 14000 max. ULTOR VOLTAGE. . . volts GRID-No.2 VOLTAGE. GRID-No.1 VOLTAGE: 410 max. volts volts Negative-bias value. . 125 max. 0 max. volts Positive-bias value. . . . Positive-peak value. . . 2 max. volts PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period 100 not exceeding 15 seconds . . . . 410 max. volts 125 max. After equipment warm-up period . . . volts 125 max. Heater positive with respect to cathode. volts Maximum Circuit Values: Grid-No.1-Circuit Resistance . . . . 1.5 max. meaohms 「日本 Cap may be aligned with either vacant pin position 6 or vacant pin position 3. Indicates a change. 9-58 DATA ELECTRON TUBE DIVISION



#### RECTANGULAR GLASS TYPE MAGNETIC FOCUS

#### ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION

#### GENERAL DATA

#### Electrical:

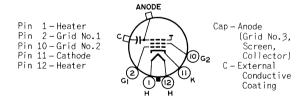
Direct Interelectrode Capacitances:	
Cathode to all other electrodes 5	pf
Grid No.1 to all other electrodes 6	pf
External conductive coating to anode. $\begin{cases} 1500 \\ \end{array}$	max pf
2750	min. pf
Heater Current at 6.3 volts 600	±30 ma
Electron Gun Ion-Trap Type	
External Single-F	ield Magnet

#### Optical:

16 lbs 18-3/4" ± 3/8" Overall Length. . . . . . . . . . . . . . 7-1/2" ± 3/16" . . . . . . . . 139 sa.in. External Conductive Coating:

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

See Picture-Tube Dimensional-Outlines and Bulb J129 A/B sheets at front of this section



Maximum and Minimum Ratings, Design-Maximum Values:	
Unless otherwise specified, voltage values	
are positive with respect to cathode	
ANODE VOLTAGE	volts
GRID-No.2 VOLTAGE	volts



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

# 16RP4A

GRID-No.1 VOLTAGE:       140 max. volt         Negative bias value       0 max. volt         Positive bias value       2 max. volt         HEATER VOLTAGE.       6.9 max. volt         5.7 min. volt	s s
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. volt After equipment warm-up period 165 max. volt Heater positive with respect to cathode: Combined AC and DC voltage 165 max. volt DC component 100 max. volt	s s s
Typical Operating Conditions for Grid-Drive Service:	
Unless otherwise specified, voltage values are positive with respect to cathode	~
Anode Voltage	s
Grid-No.2 Voltage	S
extinction of focused raster28 to -72 volt	s
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max. megohm	S
For X-radiation shielding considerations, see sheet	

X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section





#### PICTURE TUBE

DATA

RECTANGULAR GLASS TYPE

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MAGNETIC DEFLECTION

10 TRA

#### General:

MAGNETIC FOCUS

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ucilei ari									
Heater, for Uni	potentia	l Cat	hode	:					
Voltage Current			6.3				ac or	dc volt	ts
Current			0.6	± 1	0%.			an	nŗ
o	<b>_</b>		~						
Capacitance bet tive Coating	and Ulto	r				12000	) max.	μμ	ut
									μt
Faceplate, Sphe	rical .				• •		Fil	terglas	53
Phosphor (For Cu	rves, see	front	of t	nis S	ectio	n) . P4	1Su1 f	ide Typ	pe
Deflection Angl	es (Appr	ox.):							
Diagonal									
Horizontal .									
Vertical			• •	• •	• •			50	
Electron Gun .					. 10	n-Trap	Type R	Requirir	ng
				Ext	erna	l Sing	le-Fiel	d Magne	ei
Tube Dimensions						-			
Overall lengt	h						18-1/8	3″±3/8	8'
Greatest widt									
Greatest heig									
Diagonal									
Neck length.							6-7/8"	± 3/16	ô'
Radius of cur	vature c	f fac	epla	te (	Exte	rnal si	urface)	27	7'
Screen Dimensio									
Greatest widt	h				• •			13-1/2	2'
Greatest heig	ht							10-1/8	8'
Diagonal								14-7/8	8'
Operating Posit	ion							Ar	ny
Cap		Reces	sed	Smal	1 Cav	vity (J	JETEC N	lo.J1-21	1)
Base Small-	Shell Du	odeca	15-	Pin	(JETI	EC Groi	ир 4, N	lo.85-57	7)
Basing Design	ation fo	r BOT	TOM	VIEW				12	21
			1			C - 1	113 4		
Pin 1-Heate		/	T			Cap	-Ultor		
Pin 2-Grid		° th	1	л /				1 No.3,	
Pin 10-Grid		1″	ΓĦ	$\searrow$	2	~		ector)	
Pin 11 - Catho		$\sum$	$' \land$	$\bigvee$	9	C	– Exter		
Pin 12-Heate	r	2	L	<‴				luctive	
			$\bigcirc$	2) ⁻			Coat	ing	
Maximum Ratings	, Design	-Cent	er V	alue	s:				
ULTOR VOLTAGE.						14000	) max.	volt	ts
GRID-No.2 VOLTA	GE					410	) max.	volt	ts
GRID-No.1 VOLTA		-	-		-				
Negative-bias	value.					125	5 max.	volt	ts
Positive-bias							) max.	volt	
Positive-peak							2 max.	volt	
						•			
						+1	ndicates	a chang	je
9-58					SION			DAT	T/

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



### PICTURE TUBE

			1.8.
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	$\sim$
Maximum Circuit Values:			-12-24
Grid-No.1Circuit Resistance	1.5 max.	megohms	

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### PICTURE TUBE

ROUND GLASS TYPE DATA

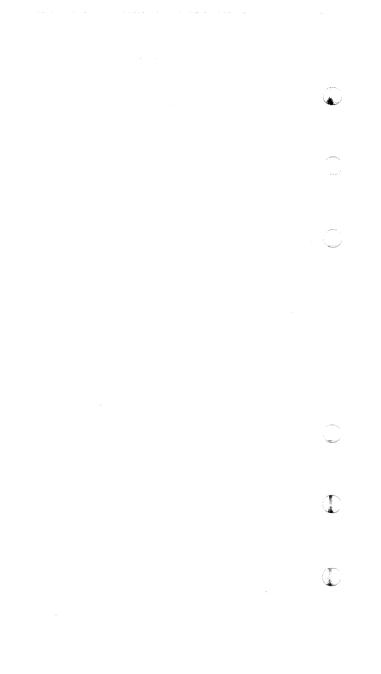
MAGNETIC DEFLECTION

1040 P. P

#### General:

MAGNETIC FOCUS

	9-58 DATA	
	Cap may be aligned with either vacant pin position 6 or vacant pin position 3. Indicates a change.	
đ	For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section	
	Grid-No.1-Circuit Resistance 1.5 max. megohms	
	Heater positive with respect to cathode. 125 max. volts Maximum Circuit Values:	
(	During equipment warm-up period not exceeding 15 seconds 410 max. volts After equipment warm-up period 125 max. volts	
	Negative-bias value	
4. 	Maximum Ratings, Design-Center Values: ULTOR VOLTAGE	
	Pin 1-Heater Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater Quertical Conductive Pin 12-Heater Pin 12-He	
	Deflection Angle (Approx.)	*
	Faceplate, Spherical	
Ċ	Heater, for Unipotential Cathode: Voltage	4
	General:	



#### RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 90° MAGNETIC DEFLECTION GENERAL DATA Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes. . . 5 pf Grid No.1 to all other electrodes. . . . 6 pf (1500 max. рf External conductive coating to anode . ີ)1000 min. bf Heater Current at 6.3 volts. . . 600 ± 30 ma Optical: Phosphor (For Curves, see front of this Section). . P4-Sulfide Type. Aluminized Filterglass Faceplate. Spherical . . . Light transmission (Approx.) 74% Mechanical: 15 lbs Weight (Approx.) . . . . Overall Length . . . . . 14-5/8" ± 3/8" . Neck Length. . . . 5-1/2" ± 3/16" 149 sa. 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 J133 F/G sheets at front of this section Cap. . . . . . . . . . Recessed Small Cavity (JEDEC No.J1-21) Bases (Alternates): Small-Shell Duodecal 6-Pin (JEDEC Group 4. No.B6-63) Short Small-Shell Duodecal 6-Pin (JEDEC No.B6-203) 12L G Pin 1-Heater Cap - Anode 6 ANODE (Grid No.3, Pin 2-Grid No.1 Pin 6-Grid No.4 Grid No.5. Pin 10-Grid No.2 Screen, Pin 11 - Cathode Collector) 10)₆₂ c٢ Pin 12 - Heater C-External Conductive Coating



Electron Tube Division

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- Indicates a change.

RADIO CORPORATION OF AMERICA Harrison, N. J. DATA 4-63 - Maximum and Minimum Ratings. Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to cathode (17500 max. volts ANODE VOLTAGE. . . 111000 min. 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. . . 155 max. volts . . . . . . Positive bias value. . . . . 0 max. volts Positive peak value. . . volts 2 max. . . . (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. 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 Service: Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage. . . . . . . . . . . . . 14000 volts Grid-No.4 Voltage. . . . -55 to +300 volts Grid-No.2 Voltage. . . . Grid-No.1 Voltage for volts 300 visual extinction of focused raster . . . -28 to -72 volts Maximum Circuit Value: Grid-No.1-Circuit Resistance . . . . . 1.5 max. meaohms For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES

at front of this Section



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#### RECTANGULAR GLASS TYPE MAGNETIC FOCUS

#### ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION

#### 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 {1500 max. 750 min.	pf
2750 min.	pf
Heater Current at 6.3 volts 600 ± 60	ma
Electron Gun Ion-Trap Type Requ	
External Single-Field M	agnet
Optical:	-

#### Phosphor (For curves, see front of this Section). P4-Sulfide Type, Aluminized . Filterglass Faceplate, Spherical. . . . . . Light transmission (Approx.). . . . . 74% <del>~</del> Mechanical:

#### 18 lbs 19-3/16" ± 3/8" . . . . . . . 7-1/2" ± 3/16" Neck Length . . . . . . . . . . . . . . . . Projected Area of Screen. . . 149 sq.in. External Conductive Coating: . . . . Regular-Band Туре. . . . . . . . . . . . . . . . . . Contact area for grounding. . . . . . Near Reference Line

For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J133 B/D sheets at front of this section

Basing Designation for BOTTOM VIEW. .

ANODE Pin 1-Heater Cap - Anode Pin 2-Grid No.1 ٢ (Grid No.3, Pin 10-Grid No.2 Screen. Pin 11 - Cathode Collector) (10)_{G2} Pin 12 - Heater C-External Conductive Coating



Electron Tube Division

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^{. . . .}Small-Shell Duodecal 5-Pin (JEDEC Group 4, Base. . No. B5-57)

Maximum and Minimum Ratings. Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to cathode ANODE VOLTAGE . . . . . 17600 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 Positive peak value . 2 max. volts (6.9 max. volts HFATFR VOLTAGE. . . . . volts )5.7 min. PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds. . . 450 max. volts 165 max. After equipment warm-up period. . . volts Heater positive with respect to cathode: Combined AC and DC voltage. . . . 165 max. volts DC component. . . . . . . . . 100 max. volts Typical Operating Conditions for Grid-Drive Service: Unless otherwise specified, voltage values are positive with respect to cathode 12000 Anode Voltage . . . . . . . . . . . . . . . volts volts Grid-No.2 Voltage . . . . . . . 300 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

-Indicates a change.



# 17CDP4

## **Picture Tube**

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 110° MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

#### GENERAL DATA

#### Electrical:

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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 800 min. pf <del>+</del>
Heater Current at 8.4 volts 450 ± 45 ma Heater Warm-Up Time (Average) 11 seconds Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Phcsphor (for curves, see front of this Section). P4——Sulfide Type, Aluminized
Faceplate, Spherical
Mechanical:
<pre>Weight (Approx.)</pre>
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 Pin 8 - Heater



Electron Tube Division

- Indicates a change.

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

## 17CDP4

- Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to cathode f17600 max. volts ANODE VOLTAGE. . . 11000 min. 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 . Positive peak value. . . volts 2 max. (6.9 max. volts HEATER VOLTAGE . . . . . 15.7 min. volts PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: 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 Service: Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage. . . . . . . . . . . . . . . 16000 volts Grid-No.4 Voltage. . . . . . . . . . . . . . 0 to 400 volts Grid-No.2 Voltage. . . . . . . 400 volts Grid-No.1 Voltage for visual extinction of focused raster . . . . --36 to --94 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 THBES at front of this section



-Indicates a change.



RECTANGULAR METAL-SHELL TYPE

MAGNETIC FOCUS

MAGNETIC DEFLECTION

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#### DATA

#### General:

Heater, for Unipotential Cathode: . . . . . . ac or dc volts Voltage. . . . . . . . . 6.3 Phosphor (For Curves, see front of this Section) . P4-Sulfide Type Deflection Angles (Approx.): 70⁰ Diagonal . . . . . 66⁰ Horizontal 500 Vertical . . Electron Gun . .lon-Trap Type Requiring External Single-Field Magnet Tube Dimensions: Maximum overall length . . . . 19" 15-15/16" ± 1/8" Greatest width at lip. . . . . . . . . . . . 12-1/4" ± 1/8" Greatest height at lip . . . . . . 16-13/16" ± 3/16" 7-3/16" ± 3/16" Diagonal at lip. . . . . . . . . . Radius of curvature of faceplate (External surface) . . . . 30" Screen Dimensions (Minimum): 14-3/8" 10-11/16" Greatest width . . . . . Greatest height. . . 15 - 1/4" Operating Position . . . . . . . . Anv . . .Metal-Shell Lip Basing Designation for BOTTOM VIEW . . . . . . . . . . 12D Pin 1-Heater Metal-Shell Lip -2-Grid No.1 Pin Ultor Pin 10-Grid No.2 (Grid No.3. Pin 11 - Cathode Collector) Pin 12-Heater Maximum Ratings, Design-Center Values: ULTOR VOLTAGE. 16000 max. volts GRID-No.2 VOLTAGE. . . GRID-No.1 VOLTAGE: 410 max. volts 125 max. Negative-bias value. . volts Positive-bias value. . . 0 max. volts Positive-peak value. . . . . 2 max. volts -Indicates a change.

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PICTURE TUBE

PEAK HEATER-CATHODE VOLTAGE:	L.	t.
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	
laximum Circuit Values:	· · · ·	
	anahma	
Grid-No.1-Circuit Resistance 1.5 max. m	egonms	
For X-ray shielding considerations, see sheet		
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES		_
at front of this Section		
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9-58 ELECTRON TUBE DIVISION	DATA	

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Picture Tube

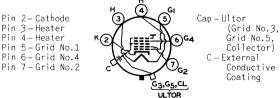
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SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO^O MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Heater Current at 6.3 volts 600 ± 5% ma Heater Warm-Up Time (Average) 11 scconds Direct Interelectrode Capacitances:
Grid No.1 to all other electrodes 6 $\mu\mu$ f
External conductive coating to ultor. $\int 1400 \text{ max}$. $\mu\mu f$
l 900 min. μμf Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Fáceplate
Mechanical: Aluminized
Operating Position. Any Weight (Approx.). 10 lbs Overall Length. 12-5/16" ± 5/16" Neck Length. 5-3/16" ± 3/16" Projected Area of Screen. 5-3/16" ± 3/16" 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 J132-1/2 A/B sheets at the front of this section
Cap Recessed Small Cavity (JEDEC No.J1-21) Base



Maximum Ratings, Design-Maximum Values:

ULTOR VOLTAGE GRID-No.4 (FOCUSING)		•••	17600 max.	volts
Positive value Negative value	 			



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

17CSP4

GRID-No.1 VOLTAGE: Negative peak value	olts olts olts olts olts
After equipment warm-up period, 200 max. vo Heater positive with	olts Olts
Typical Operating Conditions:	
and grid-No.2 voltage of 300 vo Grid-No.4 Voltage for focus50 to +350 vo Grid-No.1 Voltage for visual extinction	olts olts olts
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max. mego	ohms

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





RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION DATA General: Heater. for Unipotential Cathode: volts Voltage (AC or DC) 6.3 $0.6 \pm 10\%$ amp Direct Interelectrode Capacitances: Grid No.1 to all other electrodes. . . μµf 6 Cathode to all other electrodes. . . μµf 5 (1500 max. μµf External conductive coating to ultor . . 1200 min. μµf Filterglass Faceplate, Spherical . 79% Light transmission (Approx.) P4--Sulfide Type Phosphor (For curves, see front of this Section) . Aluminized . . .White FluorescenceWhite Phosphorescence. Medium-Short Persistence..... .Electrostatic Focusing Method. Magnetic Deflection Method. . . Deflection Angles (Approx.): 900 Diagonal . . 850 Horizontal 680 Vertical . . Electron Gun . .Type Requiring No Ion-Trap Magnet Tube Dimensions: . . 15" ± 3/8" Overall length . . 15-5/8" ± 1/8" Greatest width 12-3/4" ± 1/8" Greatest height. 16-9/16" ± 1/8" Diagonal 5-1/2" ± 3/16" Neck length. Screen Dimensions (Minimum): 14-3/4" Greatest width . . 11-11/16" Greatest height. . . . 15-3/4" Diagonal 155 sa. in. Projected area . . . 10 lbs Weight (Approx.) Operating PositionRecessed Small Cavity (JEDEC No. J1-21) Сар. J132-1/2 C1/D1 Bulb . Short Small-Shell Duodecal 6-Pin Base . (JEDEC Group 4, No.B6-203)

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

Pin 2-Grid No.1 Pin 6-Grid No.4

Pin 10-Grid No.2

Pin 11-Cathode Pin 12-Heater

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HOTOKE TODE	$\sim \infty$
GR I D−DR I VE [▲] SERVICE	
Unless otherwise specified, voltage values	
are positive with respect to cathode Maximum and Minimum 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	~/
Negative-peak value	\bigcirc
exceeding 15 seconds 410 max. volts After equipment warm-up period 180 max. volts Heater positive with respect to cathode. 180 max. volts	
Equipment Design Ranges:	
With any ultor voltage $(E_{0,5}k)$ between 12000^{\oplus} and 16000 volts and grid-No.2 voltage $(E_{0,2}k)$ between 200 and 500 volts Grid-No.4 Voltage for focus§	
Grid-No.1 Video Drive From Raster Cutoff (Black level): White-level value (Peak positive)Same value as determined for	
Ec _{1k} except video drive is a positive voltage Grid-No.4 Current25 to +25 μa	1
Grid-No.2 Current15 to +15 μa Field Strength of Adjust- able Centering Magnet* 0 to 8 gausses	\sim
Examples of Use of Design Ranges:	
With ultor voltage of 16000 volts and grid-No.2 voltage of 300 volts	
Grid-No.4 Voltage for focus50 to +350 volts Grid-No.1 Voltage for visual extinction of	\bigcirc
focused raster28 to -72 volts	



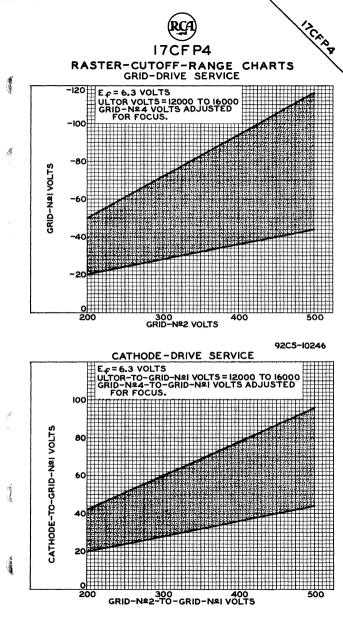


Cutoff (Black level): White-level value	Cutoff (Black level): White-level value	Γ	PICTURE TOBE
White-level value	White-level value	ľ	Grid-No.1 Video Drive from Raster
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	$\begin{array}{llllllllllllllllllllllllllllllllllll$		
CATHODE-DRIVE® SERVICEUnless otherwise specified, voltage values are positive with respect to grid No.1Maximum and Minimum Ratings, Design-Center Values:ULTOR-TO-GRID-No.1 VOLTAGE(16000 max. vol 12000* min. volGRID-No.4-TO-GRID-No.1 VOLTAGE: Positive value	CATHODE-DRIVE" SERVICEUnless otherwise specified, voltage values are positive with respect to grid No.1Maximum and Minimum Ratings, Design-Center Values:JLTOR-TO-GRID-No.1 VOLTAGEJLTOR-TO-GRID-No.1 VOLTAGE: Positive value	•	Maximum Circuit Values:
$ \begin{array}{l} \label{eq:second} Unless otherwise specified, voltage values are positive with respect to grid No.1 \\ \mbox{Maximum and Minimum Ratings, Design-Center Values:} \\ \mbox{ULTOR-TO-GRID-No.1 VOLTAGE}$	$ \begin{array}{llllllllllllllllllllllllllllllllllll$	C	Grid-No.1-Circuit Resistance 1.5 max. megoh
$ \begin{array}{l} \label{eq:second} Unless otherwise specified, voltage values are positive with respect to grid No.1 \\ \mbox{Maximum and Minimum Ratings, Design-Center Values:} \\ \mbox{ULTOR-TO-GRID-No.1 VOLTAGE}$	$ \begin{array}{llllllllllllllllllllllllllllllllllll$		CATHODE-DRIVE SERVICE
are positive with respect to grid No.1 Maximum and Minimum Ratings, Design-Center Values: ULTOR-TO-GRID-No.1 VOLTAGE	are positive with respect to grid No.1 Maximum and Minimum Ratings , Design-Center Values: JLTOR-TO-GRID-No.1 VOLTAGE		
ULTOR-TO-GRID-No.1 VOLTAGE $\begin{cases} 16000 & max. \ vol \\ 12000^{\oplus} & min. \ vol \\ 12000^{\oplus} & max. \ vol \\ 1200^{\oplus} & max. \ vol $	JLTOR-TO-GRID-No.1 VOLTAGE		
	$ \begin{array}{llllllllllllllllllllllllllllllllllll$	Þ	Maximum and Minimum Ratings, Design-Center Values:
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	$ \begin{array}{llllllllllllllllllllllllllllllllllll$	ι	
Positive value	Positive value		
Negative value	Negative value	C	
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$		
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	$ \begin{array}{llllllllllllllllllllllllllllllllllll$	(
Positive-peak value	Positive-peak value	(GRID-No.2-TO-CATHODE VOLTAGE 500 max. vol
Positive-bias value.140 max. volNegative-bias value.0 max. volNegative-peak value.0 max. volPEAK HEATER-CATHODE VOLTAGE:2 max. volHeater negative with respect to cathode:0 max. volOuring equipment warm-up period180 max. volAfter equipment warm-up period180 max. volHeater positive with respect to cathode.180 max. volEquipment Design Ranges:Nith any ultor-to-grid-No.1 voltage $(E_{c_5g_1})$ between 12000 [®] and 16000 volts and grid-No.2-to-grid- No.1 voltage (Ec_2g_1) between 220 and 640 voltsGrid-No.4-to-Grid-No.1Voltage for focus§Voltage for focus§0 to 400Voltage (Ekq1) for visual extinction of focused raster.See Raster-Cutoff-Range Cha for Cathode-Drive ServiCathode-to-Grid-No.1Video Drive from Raster Cutoff (Black level): White-level value (Peak negative).Same value as determined f Ekg1	Positive-bias value	(
Negative-bias value 0 max. vol Negative-peak value 2 max. vol PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period 410 max. vol After equipment warm-up period 180 max. vol Heater positive with respect to cathode. 180 max. vol Heater positive with respect to cathode. 180 max. vol Equipment Design Ranges: With any ultor-to-grid-No.1 voltage $(E_{c_gg_1})$ between 12000 ^{\oplus} and 16000 volts and grid-No.2-to-grid- No.1 voltage (Ec_{2g_1}) between 220 and 640 volts Grid-No.4-to-Grid-No.1 Voltage for focus§ 0 to 400 vol Cathode-to-Grid-No.1 Voltage (Ekg_1) for visual extinction of focused raster See Raster-Cutoff-Range Cha for Cathode-Drive Servi Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)	Negative-bias value 0 max. vol Negative-peak value 2 max. vol PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 410 max. vol After equipment warm-up period 180 max. vol Heater positive with respect to cathode. 180 max. vol Heater positive with respect to cathode. 180 max. vol Equipment Design Ranges: With any ultor-to-grid-No.1 voltage (E_{cgg_1}) between 12000 ^{\oplus} and 16000 volts and grid-No.2-to-grid- No.1 voltage (E_{cgg_1}) between 220 and 640 volts Grid-No.4-to-Grid-No.1 Voltage for focus§ 0 to 400 vol Cathode-to-Grid-No.1 Voltage (E_{kg_1}) for visual extinction of focused raster See Raster-Cutoff-Range Cha for Cathode-Drive Servi Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)		
Negative-peak value	Negative-peak value		
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 410 max. vol After equipment warm-up period 180 max. vol Heater positive with respect to cathode. 180 max. volEquipment Design Ranges: No.1 voltage (E_{c,gg_1}) between 12000^{\oplus} and 16000 volts and $grid-No.2-to-grid-No.1$ voltage (E_{c,gg_1}) between 2000^{\oplus} and 16000 volts and $grid-No.2-to-grid-No.1$ voltage (E_{c,gg_1}) between 2000^{\oplus} and 16000 volts and $grid-No.2-to-grid-No.1$ voltage (E_{c,gg_1}) between 2000^{\oplus} and 16000 volts and $grid-No.2-to-grid-No.1$ Voltage for focus§ 0 to 400 vol Cathode-to-Grid-No.1 Voltage (E_{kg_1}) for visual extinction of focused raster See Raster-Cutoff-Range Cha for Cathode-Drive ServiCathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)	<pre>PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 410 max. vol After equipment warm-up period 180 max. vol Heater positive with respect to cathode. 180 max. vol Equipment Design Ranges: With any ultor-to-grid-No.1 voltage (E_{C,SF_1}) between 12000^{\oplus} and 16000 volts and $grid-No.2$-to-grid- No.1 voltage $(E_{C_2S_1})$ between 220 and 640 volts Grid-No.4-to-Grid-No.1 Voltage for focus§ 0 to 400 vol Cathode-to-Grid-No.1 Voltage (Ekg1) for visual extinction of focused raster See Raster-Cutoff-Range Cha for Cathode-Drive Servi Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative) Same value as determined f E_{kg1} except video drive is negative volta</pre>		
With any ultor-to-grid-No.1 voltage (E_{cgg_1}) between 12000 ^{\oplus} and 16000 volts and grid-No.2-to-grid- No.1 voltage (Ec_2g_1) between 220 and 640 volts Grid-No.4-to-Grid-No.1 Voltage for focus§0 to 400 vol Cathode-to-Grid-No.1 Voltage (E_{kg_1}) for visual extinction of focused rasterSee Raster-Cutoff-Range Cha for Cathode-Drive Servi Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)Same value as determined f E_{kg_1} except video drive is negative volta	With any ultor-to-grid-No.1 voltage (E_{cgg_1}) between 12000 ^{\oplus} and 16000 volts and grid-No.2-to-grid- No.1 voltage (Ec_2g_1) between 220 and 640 volts Grid-No.4-to-Grid-No.1 Voltage for focus§0 to 400 vol Cathode-to-Grid-No.1 Voltage (E_{kg_1}) for visual extinction of focused rasterSee Raster-Cutoff-Range Cha for Cathode-Drive Servi Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)Same value as determined f E_{kg_1}		During equipment warm-up period not exceeding 15 seconds 410 max. vol After equipment warm-up period 180 max. vol
No.1 voltage (Ec_2g_1) between 220 and 640 volts Grid-No.4-to-Grid-No.1 Voltage for focus§ 0 to 400 vol Cathode-to-Grid-No.1 Voltage (E_{kg_1}) for visual extinction of focused raster See Raster-Cutoff-Range Cha for Cathode-Drive Servi Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative) Same value as determined f E_{kg_1} except video drive is negative volta	No.1 voltage (Ec_2g_1) between 220 and 640 volts Grid-No.4-to-Grid-No.1 Voltage for focus§0 to 400 vol Cathode-to-Grid-No.1 Voltage (E_{kg_1}) for visual extinction of focused rasterSee Raster-Cutoff-Range Cha for Cathode-Drive Servi Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)Same value as determined f E_{kg_1} except video drive is negative volta	E	Equipment Design Ranges:
No.1 voltage (Ec_2g_1) between 220 and 640 volts Grid-No.4-to-Grid-No.1 Voltage for focus§ 0 to 400 vol Cathode-to-Grid-No.1 Voltage (E_{kg_1}) for visual extinction of focused raster See Raster-Cutoff-Range Cha for Cathode-Drive Servi Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative) Same value as determined f E_{kg_1} except video drive is negative volta	No.1 voltage (Ec_2g_1) between 220 and 640 volts Grid-No.4-to-Grid-No.1 Voltage for focus§0 to 400 vol Cathode-to-Grid-No.1 Voltage (E_{kg_1}) for visual extinction of focused rasterSee Raster-Cutoff-Range Cha for Cathode-Drive Servi Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)Same value as determined f E_{kg_1} except video drive is negative volta		With any ultor-to-grid-No.1 voltage (E_{c5g_1}) between
Grid-No.4-to-Grid-No.1 Voltage for focus§0 to 400 vol Cathode-to-Grid-No.1 Voltage (Ekg1) for visual extinction of focused rasterSee Raster-Cutoff-Range Cha for Cathode-Drive Servi Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)Same value as determined f Ekg1 E	$\begin{array}{llllllllllllllllllllllllllllllllllll$		12000 ^w and 16000 volts and grid-No.2-to-grid- No.1 voltage (Ec.g.) between 220 and 640 volts
Voltage for focus§ 0 to 400 vol Cathode-to-Grid-No.1 Voltage (Ekg1) for visual extinction of focused raster See Raster-Cutoff-Range Cha for Cathode-Drive Servi Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)	Voltage for focus§ 0 to 400 vol Cathode-to-Grid-No.1 Voltage (E_{kg_1}) for visual extinction of focused raster See Raster-Cutoff-Range Cha for Cathode-Drive Servi Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative) Same value as determined f E_{kg_1} except video drive is negative volta	(
visual extinction of focused raster	visual extinction of focused rasterSee Raster-Cutoff-Range Cha for Cathode-Drive Servi Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)Same value as determined f Ekg1 except video drive is negative volta		Voltage for focus§ 0 to 400 vol Cathode-to-Grid-No.1
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)Same value as determined f Ekg1 except video drive is negative volta	Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)Same value as determined f Ekg1 except video drive is negative volta		visual extinction
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative) Same value as determined f Ekg1 except video drive is negative volta	Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative) Same value as determined f Ekg1 except video drive is negative volta		
Cutoff (Black level): White-level value (Peak negative) Same value as determined f Ekg1 except video drive is negative volta	Cutoff (Black level): White-level value (Peak negative) Same value as determined f Ekg_t except video drive is negative volta	(
(Peak negative) Same value as determined f Ekg1 except video drive is negative volta	(Peak negative) Same value as determined f Ekg1 except video drive is negative volta		Cutoff (Black level):
negative volta	liegative volta		(Peak negative) Same value as determined f Eka, except video drive is
		(negative volta

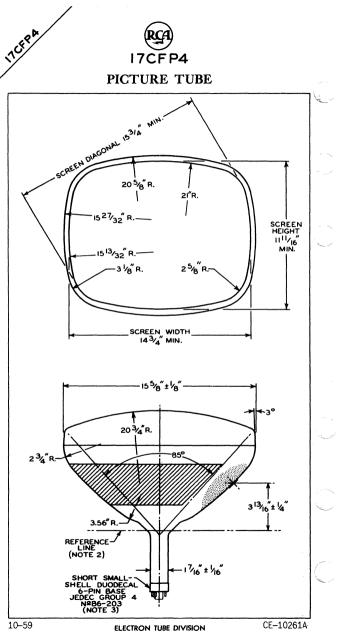


Grid-No.2 Current15 to +15 μ	a
Field Strength of Adjust- able Centering Magnet* 0 to 8 gausse	s
Examples of Use of Design Ranges:	
With ultor-to-grid- No.1 voltage of	s
No.1 voltage of	s
Grid-No.4-to-Grid-No.1 Voltage for focus0 to 400 volt Cathode-to-Grid No.1	s
Voltage for visual extinction of focused raster	s
Cutoff (Black level): White-level value	s
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max. megohm	s
Grid drive is the operating condition in which the video signal varie the grid-No.1 potential with respect to cathode.	s
This value is a working design-center minimum. The equivalent absolut minimum ultor- or ultor-to-grid-No.1 voltage is 10,800 volts, below which the serviceability of the 17CFP4 will be impaired. The equipmen designer has the responsibility of determining a minimum design valu 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 10,800 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-to-grid-No.2 voltage) (or grid-No.2 voltage) within design ranges shown for these items. * Distance from <i>Reference Line</i> for suitable PM centering magnet shoul not exceed 2-1/2". Excluding extraneous fields, the center of the tube face. It is to be note 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 signa varies the cathode potential with respect to grid No.1 and the othe electrodes. For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES	ewytegams, right dehd
at front of this Section	C
10_59 DATA	

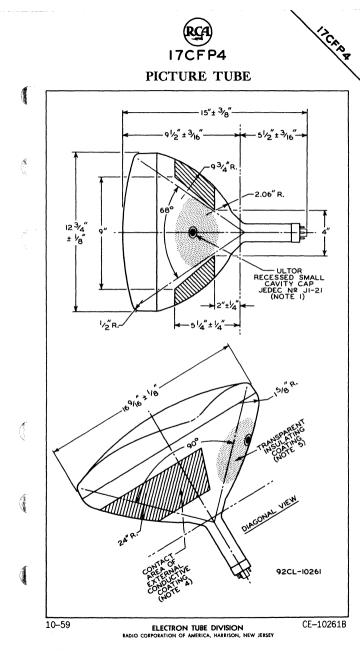
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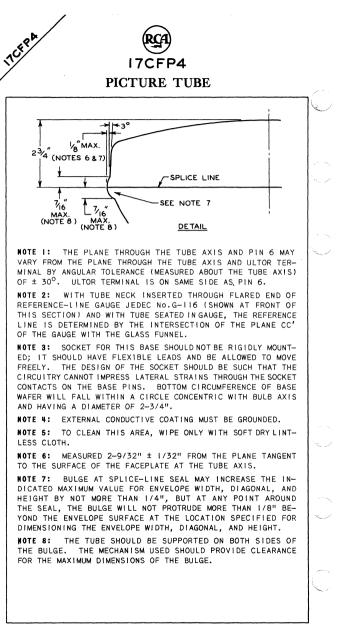
ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CS-10247



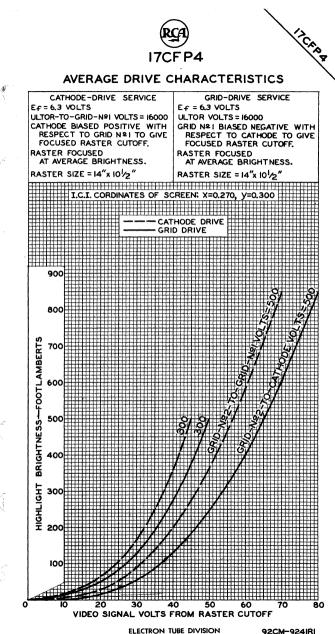
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



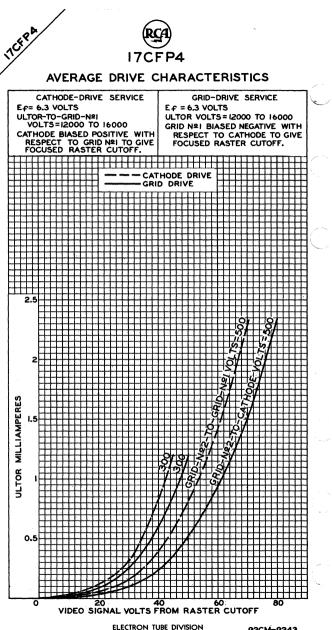
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CE-10261C



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



92CM-9243



RECTANGULAF	GLASS TYPE		ALUMINI	ZED SCREEN
LOW-VOLTAGE	ELECTROSTATIC	FOCUS	MAGNETIC	DEFLECTION

DATA

General:

Voltage (AC or DC).6.3voltsCurrent0.6ampDirect Interelectrode Capacitances:GratoGrid No.1 to all other electrodes6µµfExternal conductive coating to ultor.[1500 max. µµfFaceplate, SphericalFaceplate, SphericalPhosphor (For curves, see front of this section).P4—Sulfide TypePhosphor (For curves, see front of this section).P4—Sulfide TypePosphor (For curves, see front of this section).P4—Sulfide TypePosphorescenceWhitePersistence.PersistenceMedium-ShortFluorescence.Deflection MethodDeflection Angles (Approx.):DiagonalOverall lengthGreatest widthGreatest heightDiagonalOverall lengthMack lengthMack lengthDiagonalMack lengthDiagonalOverall lengthDiagonalDiagonalOverall lengthGreatest heightDiagonalDiagonalDiagonalDiagonal <th></th> <th>Heater, for Unipotential Cathode:</th>		Heater, for Unipotential Cathode:
Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 µµf Cathode to all other electrodes 5 µµf External conductive coating to ultor. [1500 max. µµf Faceplate, Spherical		Voltage (AC or DC)
Grid No.1 to all other electrodes 6 µµf Cathode to all other electrodes 5 µµf External conductive coating to ultor		
Cathode to all other electrodes 5 µµf External conductive coating to ultor. {1500 max. µµf Faceplate, Spherical		Direct Interelectrode Capacitances:
Cathode to all other electrodes 5 µµf External conductive coating to ultor. {1500 max. µµf faceplate, Spherical		Grid No.1 to all other electrodes 6 $\mu\mu$ f
External conductive coating to ditor.[1000 min. ##fFaceplate, Spherical		Cathode to all other electrodes 5 $\mu\mu$ f
Faceplate, Spherical		External conductive coating to ulter $\int 1500 \text{ max}, \mu\mu f$
Light transmission (Approx.)		$11000 \text{ min}, \mu\mu$
Light transmission (Approx.)		Faceplate, Spherical
Phosphor (For curves, see front of this section). .P4—Sulfide Type Aluminized Aluminized Phosphorescence		light transmission (Approx.).
Aluminized Phosphorescence	•	Phosphor (For curves, see front of this section) P4-Sulfide Type
Phosphorescence		Aluminized
Persistence		
Focusing MethodElectrostaticDeflection Magles (Approx.):		
Focusing MethodElectrostaticDeflection Magles (Approx.):		Persistence
Deflection Method		Focusing Method Electrostatic
Deflection Angles (Approx.): Diagonal		Deflection Method
Diagonal		
Horizontal.850Vertical.680Vertical.680Electron Gun.14" ± 3/8"Greatest width.15-5/8" ± 1/8"Greatest width.12-3/4" ± 1/8"Diagonal.12-3/4" ± 1/8"Neck length4-1/2" ± 3/16"Radius of curvature of faceplate (External surface).20-3/4"20-3/4"Greatest width.11-11/16"Diagonal.11-11/16"Radius of curvature of faceplate (External surface).20-3/4"11-11/16"Diagonal.11-1		Diagonal.
Vertical		Horizontal
Electron Gun. Type Requiring No Ion-Trap Magnet Tube Dimensions: 0verall length. Overall length. 15-5/8" ± 1/8" Greatest width. 15-5/8" ± 1/8" Diagonal. 16-9/16" ± 1/8" Neck length 4-1/2" ± 3/16" Radius of curvature of faceplate (External surface). 20-3/4" Greatest width. 11-11/16" Diagonal. 11-11/16" Diagonal. 15-3/4" Greatest width. 15-3/4" Projected area. 155 sq. in. Weight (Approx.). 10 lbs Operating Position.		Vertical
Tube Dimensions: Overall length.14" \pm 3/8" Greatest width.Greatest width.15-5/8" \pm 1/8" Greatest heightGreatest height12-3/4" \pm 1/8" Neck lengthNeck length4-1/2" \pm 3/16" Radius of curvature of faceplate (External surface).Coreen Dimensions (Minimum): Greatest width.4-1/2" \pm 3/16" Greatest width.Greatest width.11-11/16" Diagonal.Diagonal.11-11/16" Diagonal.Oreatest width.11-11/16" Diagonal.Diagonal.11-11/16" Diagonal.Diagonal.10 bb ULLProjected area.10 bb ULLOperating Position.132-1/2 (1/01) Base.Basing Designation for BOTTOM VIEW.121 Grid No.3 Grid No.4 Pin 10-Grid No.2Pin 12 - Heater Pin 12 - HeaterCap - Ultor C - External Conductive Coating		Electron Gun Type Requiring No Ion-Trap Magnet
Greatest width		
Greatest width		Overall length
Greatest height12-3/4" ± 1/8"Diagonal.16-9/16" ± 1/8"Neck length41/2" ± 3/16"Radius of curvature of faceplate (External surface).20-3/4"Screen Dimensions (Minimum):14-3/4"Greatest width14-3/4"Greatest height11-11/16"Diagonal.15-3/4"Projected area.155 sq. in.Weight (Approx.).10 lbsOperating Position.AnyCapBaseShort Small-Shell Duodecal 6-Pin(JEDEC Group 4, No.B6-203)Basing Designation for BOTTOM VIEWPin 1 - HeaterPin 10-Grid No.2Pin 12 - HeaterQurrentQurrentQurrentQurrentQurrentQurrentQurrentQurrentQurrentQurrentDiagonal.Diagonal.Pin 12 - HeaterQurrent <td></td> <td>Greatest width 15-5/8" ± 1/8"</td>		Greatest width 15-5/8" ± 1/8"
Diagonal		Greatest height
Neck length4-1/2" ± 3/16"Radius of curvature of faceplate (External surface). 20-3/4"Screen Dimensions (Minimum):Greatest width.14-3/4"Greatest width.11-11/16"Diagonal.11-11/16"Projected area.155 sq. in.Weight (Approx.).10 lbsOperating Position.10 lbsOperating PositionBase.Short Small-Shell Duodecal 6-Pin(JEDEC Group 4, No.B6-203)Basing Designation for BOTTOM VIEWPin 1 - HeaterCap - UltorPin 10-Grid No.4Grid No.5,Pin 12 - Heater2Pin 13 - Cathode2Pin 14 - Cathode2Pin 15 - Cathode2Pin 14 - Cathode2Pin 15 - Heater2Pin 14 - Heater2Pin 15 - Heater <td></td> <td>Diagonal</td>		Diagonal
Screen Dimensions (Minimum): Greatest width. Greatest width. Diagonal. Diagonal. Projected area. Meight (Approx.). Cap. Screen Dimensions (Minimum): Greatest width. Operating Position. Cap. Screen Dimensions (Minimum): Greatest width. Operating Position. Cap. Screen Dimensions (JEDEC No.J1-21) Bulb. Julae-1/2 C1/D1 Base. Greatest for BOTTOM VIEW. Cap-Ultor (Grid No.3, Prin 10-Grid No.4 Pin 12-Heater Diagonal Diagonal Din Buble. </td <td></td> <td>Neck length</td>		Neck length
Screen Dimensions (Minimum): Greatest width. Greatest width. Diagonal. Diagonal. Projected area. Meight (Approx.). Cap. Screen Dimensions (Minimum): Greatest width. Operating Position. Cap. Screen Dimensions (Minimum): Greatest width. Operating Position. Cap. Screen Dimensions (JEDEC No.J1-21) Bulb. Julae-1/2 C1/D1 Base. Greatest for BOTTOM VIEW. Cap-Ultor (Grid No.3, Prin 10-Grid No.4 Pin 12-Heater Diagonal Diagonal Din Buble. </td <td></td> <td>Radius of curvature of faceplate (External surface) 20-3/4"</td>		Radius of curvature of faceplate (External surface) 20-3/4"
Greatest height		
Greatest height		Greatest width
Diagonal		Greatest height
Projected area		
Operating Position. Any Cap .		Projected area
Operating Position. Any Cap .		Weight (Approx.)
Cap		Operating Position.
Bulb		Cap
(JEDEC Group 4, No.B6-203) Basing Designation for BOTTOM VIEW		Bulb
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 Pin 2-Grid No.4 Pin 12-Heater Pin 2-Grid No.2 Pin 2-Grid No.2 P		(JEDEC Group 4, No.B6-203)
Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater Pin 12-Heater Pin 12-Grid No.2 Pin		Basing Designation for BOTTOM VIEW
Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11 - Cathode Pin 12 - Heater Pin 12 - Heater Pin 12 - Grid No.2 Pin 12 - Heater Pin 12 - Heater P		Pin 1-Heater 🕥 Cap-Ultor
Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater Pin 12-Heater		
Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater Pin 12-Heater Pi		
Pin 11 - Cathode Pin 12 - Heater		
Pin 12-Heater 2 Conductive Coating		
Coating		
	1	
	l	

IIC TO B



GR ID-DR IVE SERVICE	\sim
Unless otherwise specified, voltage values	
are positive with respect to cathode	
Maximum and Minimum Ratings, Design-Center Values:	
ULTOR VOLTAGE	
GRID-No.4 (FOCUSING) VOLTAGE: ↓12000 [⊕] min. volts	
Positive value 1000 max. volts	14.2
Negative value	
GRID-No.2 VOLTAGE	
GRID-No.1 VOLTAGE:	
Negative-peak value	
Negative-bias value	
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 (E_{C5k}) between 12000 th and 16000 volts	
and grid-No.2 voltage (E_{C_2k}) between 200 and 500 volts	
Grid-No.4 Voltage for focust50 to +350 volts	
Grid-No.1 Voltage (Ec1k) for	
visual extinction	
of focused raster See Raster-Cutoff-Range Chart	
for Grid-Drive Service	
from Raster Cutoff	
(Black level):	\sim \sim
White-level value	. 1
(Peak positive) Same value as determined for	
Ec,k except video drive is a	
positive voltage	
Grid-No.4 Current25 to +25 μa	
Grid-No.2 Current15 to +15 μ a Field Strength of Adjust-	1.00
able Centering Magnet* 0 to 8 gausses	
	\searrow_{w_m}
Examples of Use of Design Ranges:	
With ultor voltage of 16000 volts	
and grid-No.2 voltage of 300 volts	
Grid-No.4 Voltage for	200
focus	
visual extinction of	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
focused raster28 to -72 volts	
0 DATA 1	J

ELECTRON TUBE DIVISION

DATA 1

ICTPA





Circle 1

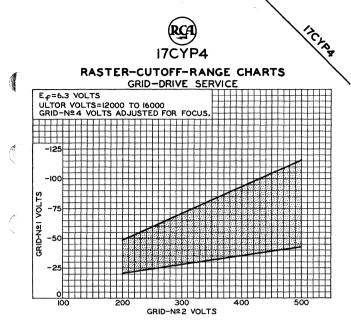
Ŵhi	ack level): te-level value 28 to 72	volt
Maxim	um Circuit Values:	
Grid-	No.1-Circuit Resistance 1.5 max. r	negohr
	CATHODE-DRIVE" SERVICE	
	Unless otherwise specified, voltage values are positive with respect to grid No.1	
Maxim	um and Minimum Ratings, Design-Center Values:	
ULTOR	-TO-GRID-No.1 VOLTAGE	volt volt
Pos Neg GRID- GRID- CATHO Pos Neg Neg PEAK Hea D	No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE: itive value	volt volt volt volt volt volt volt volt
Equip	ment Design Ranges:	
Vol Catho (Ek	With any ultor-to-grid-No.1 voltage $(E_{C,5g,1})$ be tween 12000 [•] and 16000 volts and grid-No.2-to grid-No.1 voltage $(E_{C,2g,1})$ between 225 and 640 volt No.4-To-Grid-No.1 tage for focus ⁹ 0 to 400 de-to-Grid-No.1 Voltage g ₁ for visual extinction focused raster See Raster-Cutoff-Rang. for Cathode-Drive S	- s volt e Char
Dri (B) Whi (Pe Grid- Grid-	de-to-Grid-No.1 Video ve from Raster Cutoff ack level): te-level value ak negative)Same value as determin Ekg ₁ except video driv negative No.4 Current25 to +25 No.2 Current15 to +15	/e is
	Strength of Adjust- e Centering Magnet* 0 to 8	ausse
		DATA

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



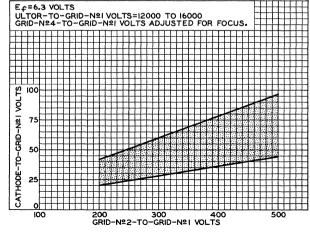
PICTURE TUBE	
xample of Use of Design Ranges:	
3	volts
0	volts
Grid-No.4-to-Grid-No.1 Voltage for focus0 to 400 Cathode-to-Grid-No.1 Voltage for visual extinction	volts
	volts
	volts
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max. me	egohms
Grid drive is the operating condition in which the video signal v the grid-No.1 potential with respect to cathode.	varies
This value is a working design minimum. The equivalent absolute as ultor (or ultor-to-grid-No.1) voltage is 11,000 volts, below whi serviceability of the 17CPH will be impaired. The equipment desinas has the responsibility of determining a minimum design value sucl under the worst probable operating conditions involving supply-vo variation and equipment variation the absolute minimum ultor (or u to-grid-No.1) voltage is never less than 11,000 volts.	inimum ch the signer h that oltage ultor-
 The grid—No.u voltage required for optimum focus of any individual will have a value between -50 and +350 volts independent of current and will remain essentially constant for values of ultor vu or grid—No.2 voltage within design ranges shown for these i 	l tube ultor oltage tems.
9 The grid-No.1to-grid-No.1 voltage required for optimum focus c individual tube will have a value between 0 and 400 volts indepe of ultor current and will remain essentially constant for valu ultor-to-grid-No.1 or grid-No.2-to-grid-No.1 voltage within d ranges shown for these items.	of any endent ues of lesign
* Distance from Reference Line for suitable PM centering magnet s not exceed 2-1/4". Excluding extraneous fields, the center o undeflected focused spot will fall within a circle having 3/8 radius concentric with the center of the tube face. It is to be that the earth's magnetic field can cause as much as 1/2-inch defle of the spot from the center of the tube face.	should of the -inch noted ection
Cathode drive is the operating condition in which the video s varies the cathode potential with respect to grid No.1 and the electrodes.	ignal other
OPERATING CONSIDERATIONS	
Shatter-Proof Cover Over the Tube Face. Following	con-
ventional picture-tube practice, it is recommended tha	
cabinet be provided with a shatter-proof, glass cover ove	
face of the 17CYP4 to protect it from being struck acciden	
and to protect against possible damage resulting from	
implosion under some abnormal condition. This safety	cover
can also provide X-ray protection when required.	
For X-ray shielding considerations, see sheet	
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES	i
at front of this Section	

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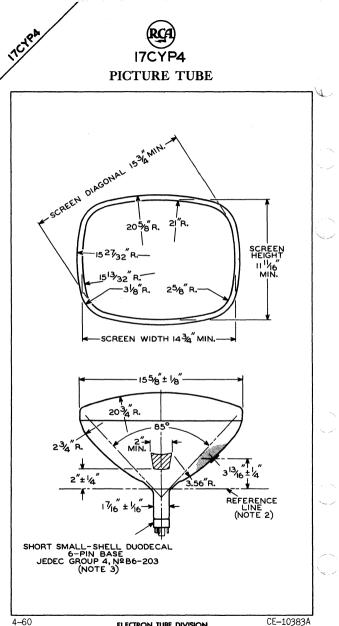
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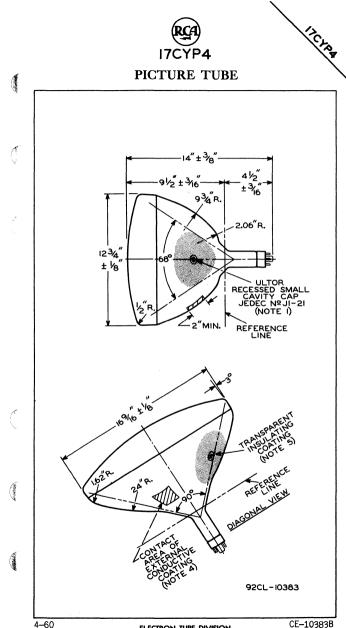
CATHODE-DRIVE SERVICE



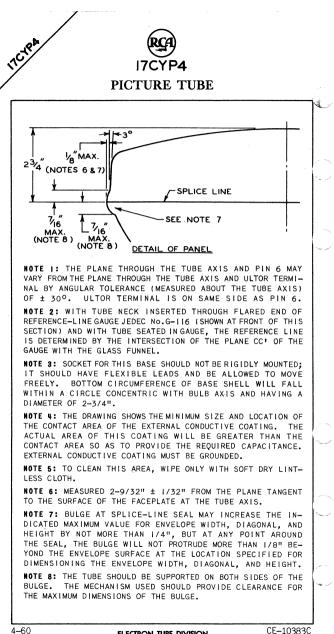
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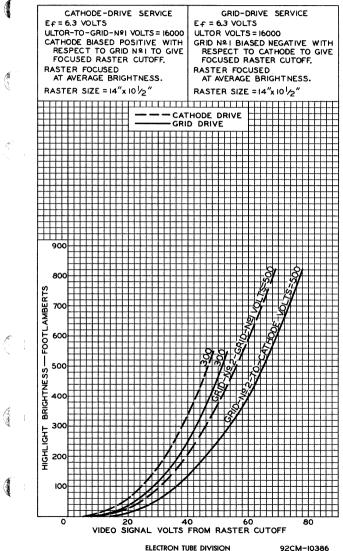
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AVERAGE DRIVE CHARACTERISTICS

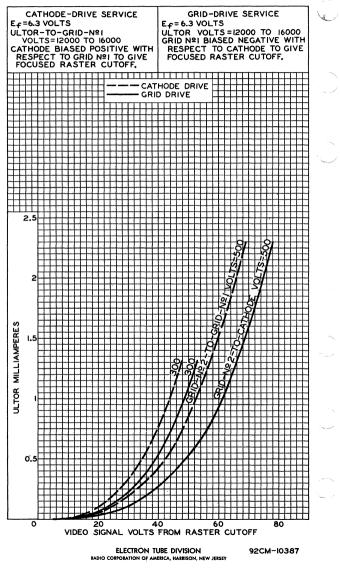


RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



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AVERAGE DRIVE CHARACTERISTICS





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

DATA

General • Heater, for Unicotential Cathode: Voltage (AC or DC). 2.68 ± 10% volts Current at 2.68 volts . . 0.45 amp . Warm-up time (Average). 11 sec Capacitance between External Conductive (1400 max. μµf Coating and Ultor 900 min. μµf Faceplate. Spherical. Filterglass Phosphor (For curves, see front of this section) . . P4-Sulfide Type Aluminized Deflection Angles (Approx.): Diagonal. . . 110⁰ 105⁰ Horizontal. 870 Vertical. . Electron Gun. Type Requiring No Ion-Trap Magnet Tube Dimensions: Overall length. . . 10-11/16" ± 3/16" 15-5/8" ± 1/8" Greatest width: 12-3/4" ± 1/8" Greatest height 16-9/16" ± 1/8" Diagonal. . . 3-9/16" ± 1/16" Neck length Radius of curvature of faceplate (External surface). . . 20-3/4" Screen Dimensions (Minimum): Greatest width. . . 14-3/4" Greatest height . 11-11/16" . . 15-3/4" Diagonal. . . . Projected area. . 155 sq. in. Operating Position. . Anv .Recessed Small Cavity (JEDEC No.J1-21) Cap Base. . . Small-Button Neoeightar 7-Pin. Arrangement 1 (JEDEC No. B7-208) Pin 1-Heater Cap - Ultor Pin 2-Grid No.2 (Grid No.3. Pin 3-Grid No.1 Grid No.5. Pin 4-Grid No.4 Collector) Pin 6-Grid No.2 C-External Pin 7-Cathode Conductive Pin 8-Heater Coating Maximum Ratings, Design-Center Values: LIFTOR VOLTAGE . . 16000 max. volts GRID-No.4 (FOCUSING) VOLTAGE: Positive value. . 850 max. volts Negative value. 630 max. volts GRID-No.2 VOLTAGE . 500 max. volts

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	\
GRID-No.1 VOLTAGE:	
Negative-peak value	volts
Negative-bias value	volts
Positive-bias value 0 max. Positive-peak value 2 max.	volts volts
Positive-peak value 2 max. PEAK HEATER-CATHODE VOLTAGE:	vorts
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	volts
Maximum Circuit Values:	N.
Grid-No.1-Circuit Resistance 1.5 max.	megohms
For X-ray shielding considerations, see shee X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES	t
at front of this Section	
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	DATA
-60 ELECTRON TUBE DIVISION	DAIA

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

DATA

General:

deneral.	
Heater, for Unipotential Cathode:	
Voltage 6.3 av	or de volte
Voltage	
Urrent 0.6	amp
Warm-up time (Average) . 11	sec
For definition of heater warm-up time and method of a	letermining
it, see sheet HEATER WARM-UP TIME MEASUREMENT at	front of
Receiving Tube Section.	, j. c.i.e oj
Direct Interelectrode Capacitances:	
Grid No.1 to all other electrodes	$\beta = \mu \mu f$
Cathode to all other electrodes	5 μμf
External conductive coating to ultor . {150(1000))max. μμf
1000 Laternal conductive coating to untor . 1000)min. µµf
Faceplate, Spherical	.Filterglass
Light transmission (Approx.)	76%
Light transmission (Approx.)	-Sulfide Type
Fluorescence	Aluminized
Fluorescence	wnite
Phosphorescence	White
Persistence	Short
Focusing Method	Electrostatic
Deflection Method	Magnetic
Deflection Angles (Approx.):	· · magnetre
Deflection Angles (Approx.).	1100
Diagonal	1100
Horizontal	1050
Vertical	· · · · 87°
Vertical	n-Trap Magnet
Tube Dimensions:	
Overall length	11/16" + 1/4"
Greatest width	
Greatest height.	
Diagonal	-9/16" ± 1/8"
Neck length	-9/16" ± 1/8"
Screen Dimensions (Minimum):	
Greatest width	14-3/4"
Greatest height	11-11/16"
Diagonal	15_3//"
Projected area	155 00 10
Projected area	100 54. 11.
weight (Approx.)	10 ibs
Operating Position	Any
Cap Recessed Small Cavity (JE	DEC No.J1-21)
Bulb J Socket	132-1/2 A1/B1
Socket Ucinite Part No. 115446	or equivalent
Base	rrangement 1
/ IED	EC No. B7-208)
(310)	

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TENTATIVE DATA 1

INFA RCA I7DKP4	
17DKP4	
PICTURE TUBE	,
Basing Designation for BOTTOM VIEW 8JR	1
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 Pin 8 - Heater Cap - Ultor (Grid No.4, Collector) C - External Conductive Coating	
GRID-DRIVE* SERVICE	
Unless otherwise specified, voltage values are positive with respect to cathode	
Maximum and Minimum Ratings, Design-Center Values:	ļ
ULTOR VOLTAGE	
GRID-No.1 VOLTAGE: 200 max. volts Negative-peak value 140 max. volts Positive-bias value 0 max. volts Positive-peak value 2 max. volts Positive-peak value 2 max. volts PEAK HEATER-CATHODE VOLTAGE: 2 max. volts Puring equipment warm-up period 10 max. volts After equipment warm-up period 180 max. volts	
Heater positive with respect to cathode . 180 max. volts	
Equipment Design Ranges: With any ultor voltage (E_{CUk}) between 12000 and 16000 volts and grid-No.2 voltage (E_{C2k}) between 400 and 550 volts	
Grid-No.3 Voltage for focus§0 to 400 volts Grid-No.1 Voltage (E _{C1} k) for visual extinction of focused raster See Raster-Cutoff-Range Chart	
Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak positive) Same value as determined for E _{C1k} except video drive is a	
Grid-No.3 Current	

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Field Strength of Adjust- able Centering Magnet	0 t	o 12	gausse
Examples of Use of Design Range	es:		
With ultor voltage of	16000	16000	volt
and grid-No.2 voltage of	400	500	volt
Grid-No.3 Voltage for			
focus	0 to 400	0 to 400	volt
Grid-No.1 Voltage for visual extinction			
of focused raster	-34 to -63	-43 to -78	volt
Grid-No.1 Video Drive			
from Raster Cutoff			
(Black level): White-level value	34 to 63	43 to 78	volt
	J4 (0 0)	4) 10 78	vort
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance.		1.5 max.	megohr
CATHODE-DRI	VE [®] SERVICE		
Unless otherwise spec	ified. volt	age values	
are positive with r			
Maximum and Minimum Ratings, De	esign-Center	- Values:	
ULTOR-TO-GRID-No.1 VOLTAGE.		∫16000 max.	. volt
		{12000 [⊕] min.	
GRID-No.3-TO-GRID-No.1 VOLTAGE. GRID-No.2-TO-GRID-No.1 VOLTAGE.		650 max. 690 max.	
		(550 max)	
GRID-No.2-TO-CATHODE VOLTAGE.		(300 min.	
CATHODE-TO-GRID-No.1 VOLTAGE:			
Positive-peak value Positive-bias value		200 max 140 max	
Negative-bias value		0 max.	
Negative-peak value		2 max	-
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect During equipment warm-up pe			
not exceeding 15 seconds.		410 max.	. volt
After equipment warm-up pe	riod	180 max.	
Heater positive with respect	to cathode.	180 max.	. volt
Equipment Design Ranges:			
	voltage (E _{CL}	g1) between	12000
With any ultor-to-grid-No.1 a		i voltage ()	E_{c2g_1}
With any ultor-to-grid-No.1 a and 16000 volts and grid-No.2-	-to-grid-No.		~ 0 -
and 16000 volts and grid-No.2- between 400 d	-to-grid-No.		
and 16000 volts and grid-No.2-	-to-grid-No. and 690 volt		volt

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ELECTRON TUBE DIVISION



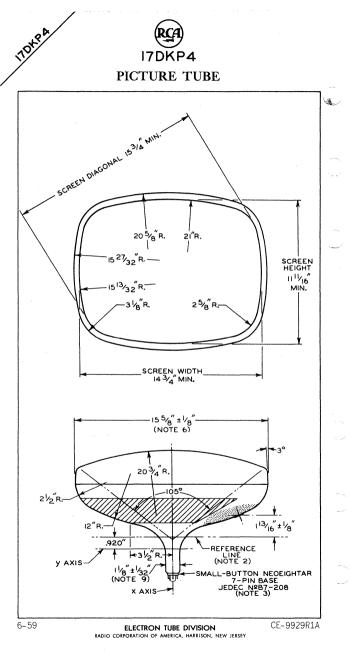
Y	7DKP4 URE TUBE	C	
Cathode-to-Grid-No.1 Voltage (E _{kg1}) for visual extinction of focused raster		er-Cutoff-Ran Cathode-Drive	
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value			
(Peak negative)		lue as detern cept video dr negative	
Grid-No.3 Current Grid-No.2 Current Field Strength of Adjust- able Centering Magnet	-15 1	to +25 to +15 to 12	μa μa qausses
Examples of Use of Design F		.0 12	yausses
With ultor-to-grid-	-		
No.1 voltage of and grid-No.2-to-grid- No.1 voltage of	16000 400	16000	volts volts
Grid-No.3-to-Grid-	400	500	DOLLS
No.1 Voltage for focus Cathode-to-Grid-No.1 Voltage for visual	. 0 to 400	0 to 400	volts
extinction of focused raster Cathode-to-Grid-No.1 Video Drive from Pactor Cutoff	. 34 to 56	41 to 69	volts
Raster Cutoff (Black level): White-level value	34 to -56	-41 to -69	volts
Maximum Circuit Values:			
Grid-No.1-Circuit Resistand	ce	. 1.5 max.	megohms
 Grid drive is the operating c the grid-No.1 potential with This value is a working design minimum ultor- or ultor-to-g which the serviceability of th 	ondition in which respect to cathod -center minimum.	the video sig je. The equivalen	nal varies t <i>absolute</i>
which the serviceability of th designer has the responsibili such that under the worst p supply-voltage variation and g ultor- or ultor-to-grid-No.1	e 17DKP4 will be ity of determinin robable operation equipment variat	impaired. The g a minimum dea ng conditions ion the absolu	equipment sign value involving te minimum
S The grid-No.3 voltage require	voitage is never d for optimum for weep 0 and 200 w	iess than 11,0 cus of any indiv	uu volts. idual tube
The grid-No.3 voltage require may have a value anywhere bet the value of the ultor voltag it changes directly with the 46 volts for each 1000-volt grid-No.3 voltage at the ra change in grid bout to volts for eac Because the 170kP4 has a na	ween 0 and 400 vc ge, ultor current ultor voltage at change in ultor ite of about 60 and inversely w h 100-microampere)its and is a f , and grid-No. the rateof app voltage; inver volts for each ith ultor curr e change in ulto	unction of 2 voltage. roximately 'sely with 1 100-volt ent at the r current

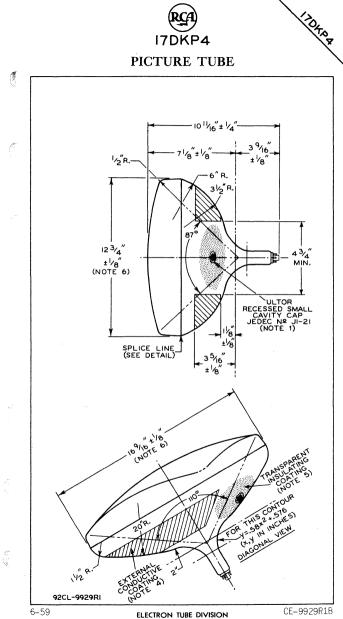
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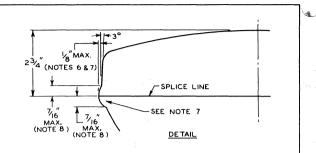
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	provide means such as a potentiometer or a 4-tap switch for adjusting the focusing voltage. In general, commercially acceptable focus is obtained if the focusing voltage is within 75 volts of the value required for optimum focus and if the focusing voltage is maintained to within 75 volts of the optimum value during line-voltage fluctuations. Distance from <i>Reference Line</i> 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 a5/16-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 de- flection of the spot from the center of the tube face. Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.
	OPERATING CONSIDERATIONS
	Shatter-Proof Cover Over the Tube Face. Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the I7DKP4 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide X-ray protection when required. For X-ray shielding considerations, see sheet
	X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section
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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 $\pm~30^\circ$. ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

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

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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

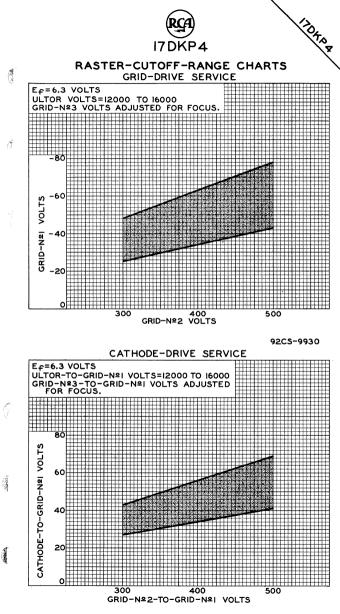
NOTE 6: MEASURED $2-9/32" \pm 1/32"$ FROM THE PLANE TANGENT TO THE SURFACE OF THE FACEPLATE AT THE TUBE AXIS.

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.

NOTE 9: NECK DIAMETER IS MAINTAINED TO AT LEAST 2-7/16" FROM REFERENCE LINE.

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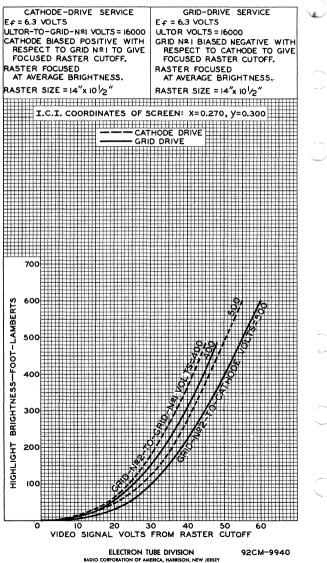


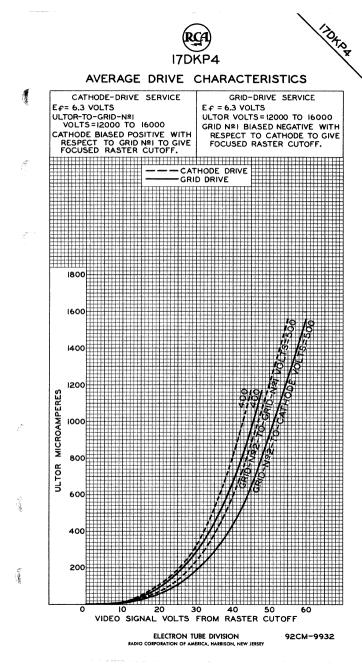
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AVERAGE DRIVE CHARACTERISTICS







17**DQP4**

Picture Tube

SHORT RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS LOW GRID-No.2 VOLTAGE

ALUMINIZED SCREEN 110° MAGNETIC DEFLECTION CATHODE-DRIVE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

A

Liecti ical.
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 $\mu\mu$ f Cathode to all other electrodes 5 $\mu\mu$ f
External conductive coating to ultor . $\begin{cases} 1700 \text{ max.} & \mu\mu f \\ 1200 \text{ min.} & \mu\mu f \end{cases}$
Electron Gun
Optical:
Faceplate
Mechanical:
Operating Position Any Weight (Approx.) 10 lbs Overall Length 12-1/8" ± 1/4" Neck Length 5" ± 1/8" Projected Area of Screen 155 sq. in. External Conductive Coating: 10
Type
See Picture-Tube Dimensional-Outlines and Bulb J132-1/2 A/B sheets at the front of this section
Cap
Pin 2 - Cathode Pin 3 - Heater Rin 4 Heater H GI Grid No.3,

Pin 4 - Heater

Pin 5-Grid No.1

Pin 6-Grid No.4

Pin 7-Grid No.2

RADIO CORPORATION OF AMERICA Electron Tube Division

Harrison, N. J.

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G3,G5,CL ULTOR

Grid No.5,

Collector)

Conductive Coating

C-External

17DQP4

Maximum Potingo Design Kasimu Kal		
Maximum Ratings, Design-Maximum Values: ULTOR-TO-GRID-No.1 VOLTAGE	volts	,-
VOLTAGE: Positive value	volts volts volts volts volts volts	
respect to cathode	volts	\odot
Typical Operating Conditions:		_
With ultor-to-grid-No.1 voltage of 14500	volts	
and grid-No.2-to-grid-No.1 voltage of 50 Grid-No.4-to-Grid-No.1 Voltage	volts	
for focus	volts	
visual extinction of focused raster . 31 to 49	volts	
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance 1.5 max.	megohms	
For X-radiation shielding considerations, see sh	eet	

X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES

at front of this section



17DRP4

Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO^O MAGNETIC DEFLECTION INTERNAL MAGNETIC SHIELD

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

A

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 . Heater Current at 2.68 volts
Optical: Phosphor (For Curves, see front of this Section)P4—Sulfide Type, Aluminized
Faceplate, Spherical
Mechanical: Weight (Approx.) Overall Length 10-13/16" ± 3/16" Neck Length Projected Area of Screen Start Contact area for grounding Type Contact area for grounding For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J132-1/2 A/B sheets at front of this section Cap. Recessed Small Cavity (JEDEC No.J1-21) Base Small-Button Neoeightar 7-Pin, Arrangement 1, (JEDEC No.87-208)
Basing Designation for BOTTOM VIEW 8JK Pin 1 - Heater Pin 2 - Grid No.2 Pin 3 - Grid No.1 Pin 6 - Grid No.2 Pin 7 - Cathode Pin 8 - Heater Pin 8 - Heater Pin 8 - Heater Bottom BOTTOM VIEW



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. Maximum and Minimum Ratings. Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to cathode ANODE VOLTAGE . . 17600 max. volts GRID-No.4 (FOCUSING) VOLTAGE: Positive value. . . . 950 max. volts Negative value. . . GRID-No.2 VOLTAGE . . 700 max. volts . . . 550 max. volts GRID-No.1 VOLTAGE: Negative peak value . . 400 max. volts . . Negative bias value . . . 155 max. . . . volts . Positive bias value . . 0 max. volts . . Positive peak value . . 2 max. volts 2.9 max. volts HEATER VOLTAGE. . . . 2.4 min. volts PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds. . . 450 max. volts volts After equipment warm-up period. . . . 200 max. 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 Service: Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage 14000 volts 100 to 500 volts Grid-No.4 Voltage Grid-No.2 Voltage 300 volts Grid-No.1 Voltage for visual extinction of focused raster. volts -35 to -72 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





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

With heater having controlled warm-up time

DATA

General:

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н	eater, for Unipotential Cathode:	
	Voltage (AC or DC)	s
	Current 0.6 am	рİ
	Warm-up time (Average) 11 se	c
D	irect Interelectrode Capacitances:	
-		f١
	Grid No.1 to all other electrodes 6 $\mu\mu$ Cathode to all other electrodes 5 $\mu\mu$	
		έl
	External conductive coating to ultor {1500 max. $\mu\mu$ 1000 min. $\mu\mu$	÷1
-	$\mu\mu$	1
ſ	aceplate, Spherical	5
	Light transmission (Approx.)	70
r	hosphor (For curves, see front of this section) P4-Sulfide Typ	e
	Aluminize	d
	Fluorescence	e
	Phosphorescence	e
	Persistence	
F	ocusing Method	c
C	Deflection Method	c
E	eflection Angles (Approx.):	
	Diagonal	0
	Horizontal	0
	Vertical 87	0
F	Vertical	+l
17	ube Dimensions:	1
- ľ'	Overall length	"
	Greatest width $15-5/8" \pm 1/8$	
	Greatest width	
	Greatest hergint $12-5/4$ I 1/0	
	Diagonal	
		"]
	Radius of curvature of	
	faceplate (External surface)	"
S	creen Dimensions (Minimum):	
	Greatest width	
	Greatest height	"
	Diagonal	n i
	Projected area,	
W	Projected area	s
C	perating Position	v
C	ap	í١
Ĩ	μ] b	11
5	ulb	Ŧ
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TICTORE TODE	Na -
Base Small-Button Neoeightar 7-Pin, Arrangement 1,	
(JEDEC No.B7-208) Basing Designation for BOTTOM VIEW	
Pin 1 - Heater (4) D c Cap - Ultor	
Pin 2-Grid No.1 (Grid No.3,	-
Pin 3-Grid No.2 (3) (Carrow Collector)	Se
Pin 6-Grid No.1 (2) (7) C-External	
Pin 7-Cathode Conductive Pin 8-Heater Coating	
GRID-DRIVE SERVICE	
Unless otherwise specified, voltage val-	سي 21
ues are positive with respect to cathode	
Maximum and Minimum Ratings, Design-Center Values: 11 TOD VOLTAGE (18000 max. volts)	
JLTOR VOLTAGE	
GRID-No.4 (FOCUSING) VOLTAGE: Positive value	
Negative value	
GRID-No.2 VOLTAGE	
GRID-No.1 VOLTAGE: Negative-peak value 200 max. volts	
Negative-bias value	
Positive-bias value 0 max. volts Positive-peak value 2 max. volts	
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode: During equipment warm-up period	
not exceeding 15 seconds 410 max. volts	
After equipment warm-up period 180 max. volts Heater positive with respect to cathode. 180 max. volts	
Equipment Design Ranges:	
With any ultor voltage (E_{C_5k}) between 12000^{\oplus} and 18000 volts	
and grid-No.2 voltage $(\tilde{E}_{c_{2k}})$ between 200 and 500 volts	
Grid-No.4 Voltage for focus§	
focus§0 to 400 volts Grid—No.1 Voltage (Ec _{1k})	م
for visual extinction of focused raster See Raster-Cutoff-Range Chart	
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	1444 au
(Peak positive) Same value as determined for Ecik except video drive is a	
positive voltage	

4-60

IDSPA





Grid-No.4 Current	-25 -15	to +25 to +15		μ μ
able Centering Magnet [*]	0	to 8	ę	gausse
Examples of Use of Design Ranges:				
With ultor voltage of 16	000	1600	0	volt
With ultor voltage of 16 and grid-No.2 voltage of 3 Grid-No.4 Voltage for	100	400		volt
focus0to Grid-No.1 Voltage for visual extinction of	o 400	0 to 4	400	volt
focused raster38 Grid-No.1 Video Drive from Raster Cutoff (Black level):	to –72	-45 to	-90	volt
White-level value 38	to 72	45 to	90	volt
Maximum Circuit Values:				
Grid-No.1-Circuit Resistance		• 1.5 ma	ax. r	negohm
-				
CATHODE-DRIVE				
Unless otherwise specifi are positive with resp				
Maximum and Minimum Ratings, Desig		•		
ULTOR-TO-GRID-No.1 VOLTAGE		ſ18000		volt
		{12000 [®]	min.	volt
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:				
Positive value		1000	max.	volt
Negative value		500	max.	volt
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 PEAK HEATER-CATHODE VOLTAGE:		2	max.	volt
Heater negative with respect to ca During equipment warm-up perio				
not exceeding 15 seconds		410	max.	volt
After equipment warm-up period		180	max.	volt
Heater positive with respect to ca		180	max.	volt
Heater positive with respect to ca	choue.	100	max.	¥011

ALC: NO

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6

RCA 17DSP4

PICTURE TUBE

		and the second	
Equipment Design Ranges:			
With any ultor-to-grid-No.1 and 18000 volts and grid-No between 22	voltage (Ec .2-to-grid-N 5 and 640 vol	0.1 voltage	12000 [®] (Ec _{2g1})
Grid-No.4-to-Grid-No.1			
Voltage for focus§ Cathode-to-Grid-No.1 Voltage (Ekg1) for visual extinctio of focused raster	n • See <u>R</u> aste		
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)	. Same val	ue as detern ept video dr	nined for
	91		ve value
Grid-No.4 Current Grid-No.2 Current	. –25 t . –15 t	o +25 o +15	<i>µ</i> а <i>µ</i> а
able Centering Magnet*	. 0 t	o 8	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	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 cond the grid-No.1 potential with res ♥ This value is a working design-c.	ition in which pect to cathod enter minimum.	the video sig e. The equivalen	nal varies t <i>absolute</i>
This value is a working design-c minimum and the service all ity of the 1 designer has the responsibility such that under the worst prob supply-voltage variation and eguitor of or ultor-to-grid-No.1) vo	-No.1) voltage 7DSP4 will be of determining able operatin hipment variati	is 11.000 vo impaired. The g a minimum de g conditions on the absolu	Its, below equipment sign value involving te minimum 000 volts
The grid-No.4 (or grid-No.4) vo focus of any individual tube will independent of ultor current and values of ultor (or ultor-to-gri No.2-to-grid-No.1) voltage withi	rid-No.1) volt l have a value l will remain (d-No.1) voltag n design range	age required f between 0 and essentially co e or grid—No.2 s shown for th	or optimum 400 volts nstant for (or grid- ese items.
	5 5		

IDSPA





Distance from Reference Line for suitable PM centering magnet should not exceed $2-1/8^{\prime\prime\prime}$. Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 5/16-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as 1/2-inch deflection of the spot from the center of the tube face.

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

OPERATING CONSIDERATIONS

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

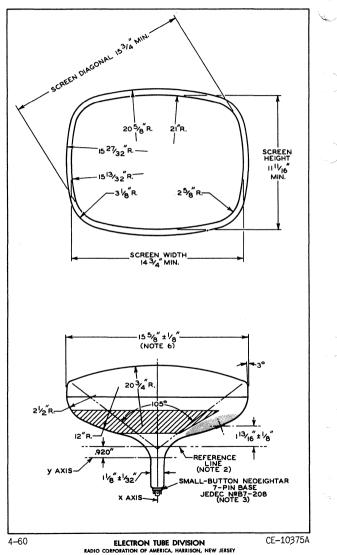
> For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section

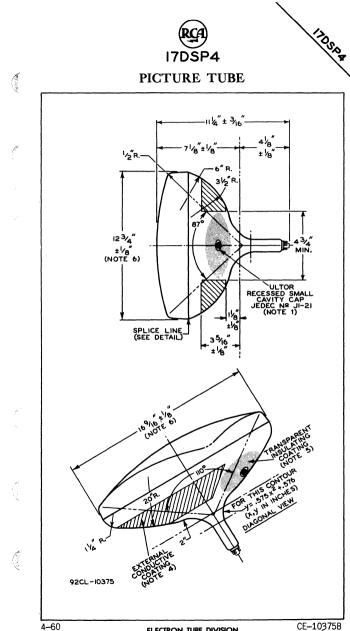




ITDSP4

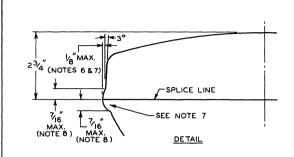
PICTURE TUBE





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





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 BERIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BEALLOWED TO MOVE FREE-LY. THE DESIGN OF THE SOCKETSHOULD 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.

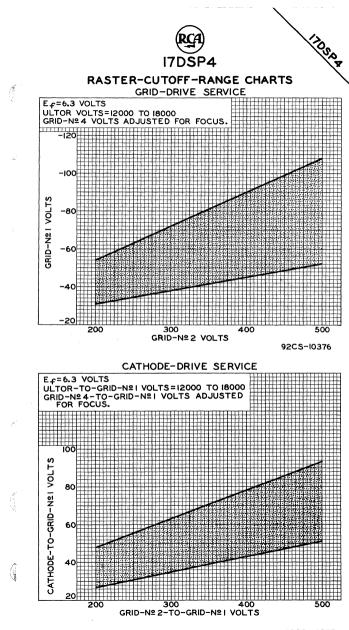
NOTE 5: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

NOTE 6: MEASURED 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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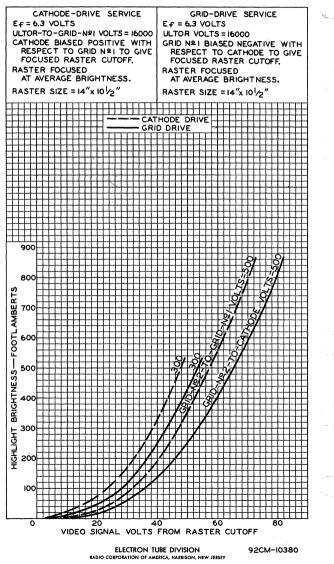


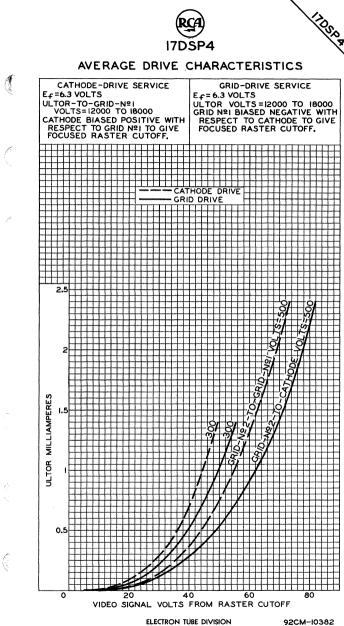
ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CS-10377



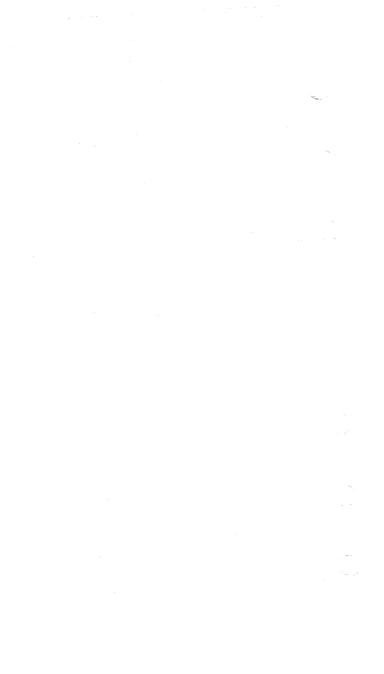
105PA

AVERAGE DRIVE CHARACTERISTICS





RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



17**DWP4**

Picture Tube

1

(Sales)

ALC: NO

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION LOW-VOLTAGE ELECTROSTATIC FOCUS

GENERAL DATA

Electrical:

Heater Current at 6.3 volts
External conductive coating to ultor {1500 max. μμf 750 min. μμf
Electron Gun Type Requiring No Ion-Trap Magnet
Optical: Faceplate
Mechanical:
Operating Position
Pin 1-Heater $G_{3G_{5}}^{G_{4}}$ Cap-Ultor Pin 2-Grid No.1 CL (Grid No.3,

Pin 6-Grid No.4 Pin 10-Grid No.2 (i)_{G2} Pin 11 - Cathode Pin 12 - Heater c١ 11 í١2

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



RADIO CORPORATION OF AMERICA **Electron Tube Division**

Harrison, N. J.

17DWP4

Maximum Ratings, Design-Maximum	Values:	
ULTOR VOLTAGE	22000 max. volts	~
Positive value	800 max. volts	4.1
GRID-No.2 VOLTAGE		
GRID-No.1 VOLTAGE:		
Negative bias value	180 max. volts	
Positive bias value		
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 raster.	••••••-28 to -72 volts	\sim

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



Picture Tube

1

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General:

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

DATA

Heater, for Unipotential Cathode: Voltage (AC or DC). 6.3 volts 0.45 amp 11 sec Direct Interelectrode Capacitances: Grid No.1 to all other electrodes . . . 6 μµf Cathode to all other electrodes . . . 5 μµf (1500 max. μµf External conductive coating to ultor. . 1000 min. μµf Phosphor (For curves, see front of this section). .P4-Sulfide Type Aluminized Fluorescence. White Deflection Angles (Approx.): 110⁰ Horizontal.... Tube Dimensions: Neck length 3-9/16" ± 1/8" Radius of curvature of faceplate (External surface). Screen Dimensions (Minimum): (JEDEC No. 87-208)

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

Basing Designation for BOTTOM VIEW.	•••••8JR
Pin 1-Heater	Pin 8-Heater
Pin 2-Grid No.1	Cap-Ultor
Pin 3-Grid No.2	(Grid No.4,
Pin 4-Grid No.3	Collector)
Pin 6-Internal	C-External
Connection— (2)	Conductive
Do Not Use	Coating
Pin 7-Cathode	5

GRID-DRIVE SERVICE

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

Maximum and Minimum Ratings, Design-Center Values:

ULTOR VOLTAGE	{16000 {12000♥		volts volts	
GRID-No.3 (FOCUSING) VOLTAGE	650	max.	volts	·
GRID-No.2 VOLTAGE.	∫550	max.	volts	/
	1300	min.	volts	
GRID-No.1 VOLTAGE:	Ç,			
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:		max.	VOICS	
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.	410 180 180	max. max. max.	volts volts volts	
	100			

Equipment Design Ranges:

With any ultor voltage $(E_{c_{4},k})$ between 12000 and 16000 volts and grid-No.2 voltage $(E_{c_{2},k})$ between 400 and 550 volts
Grid-No.3 Voltage for
focus§
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)
$E_{c,k}$ except video drive is a
positive voltage
Grid-No.3 Current25 to +25 μa
Grid-No.2 Current15 to +15 μ a



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

CATHODE-DRIVE SERVICE

Unless otherwise specified, voltage values are positive with respect to grid No.1 Maximum and Minimum Ratings, Design-Center Values:

- · · •	
ULTOR-TO-GRID-No.1 VOLTAGE	
GRID-No.3-TO-GRID-No.1 (FOCUSING)	,
VOLTAGE	5
GRID-No.2-TO-GRID-No.1 VOLTAGE 690 max. volts	
(550 may wolts	5
GRID-No.2-TO-CATHODE VOLTAGE	5
CATHODE-TO-GRID-No.1 VOLTAGE:	
Positive-peak value	ŝ
Positive-bias value	5
Negative-bias value 0 max. volts	3
Negative-peak value	5
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode:	
During equipment warm-up period	
not exceeding 15 seconds 410 max. volts	3
After equipment warm-up period 180 max. volts	3
Heater positive with respect to cathode. 180 max. volts	3
Equipment Design Ranges:	
With any ultor-to-grid-No.1 voltage (E _{cyg1}) between	
12000 and 16000 volts and grid-No.2-to-grid-	

No.1 voltage $(E_{c_2g_1})$ between 400 and 690 volts Grid-No.3-to-Grid-No.1 Voltage for focus§. 0 to 400 volts



1

Second Second

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

Cathode-to-Grid-No.1 Voltage (Ekg₁) for visual extinction of focused raster. . . See Raster-Cutoff-Range Chart for Cathode-Drive Service Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative) . . Same value as determined for Ekq, except video drive is a negative voltage Grid-No.3 Current . . -25 to +25 μa . . Grid-No.2 Current . . . -15 to +15 µа Field Strength of Adjust-0 to 12 able Centering Magnet. . gausses Examples of Use of Design Ranges: With ultor-to-grid-No.1 voltage of 16000 16000 volts and grid-No.2 to-grid-No.1 voltage of 400 volts 500 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. . 34 to 56 41 to 69 volts Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): -34 to -56 -41 to -69 White-level value . . volts Maximum Circuit Values: Grid-No.1-Circuit Resistance. 1.5 max. megohms Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode. This value is a working design-center minimum. The equivalent absolute minimum ultor- or ultor-to-grid-No.1 voltage is 11,000 volts, below which the serviceability of the 170XP4 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.

supply-voltage variation and equipment variation the absolute minimum ultor- or ultor-to-grid-Mo.1 voltage is never less than 11,000 volts. The grid-Mo.3 voltage required for optimum focus of any individual tube may have a value anywhere between 0 and 400 volts and is a functionage. 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-Mo.2 voltage at the rate of about 60 volts for each 100-volt change in grid-Mo.2 voltage; and inversely with ultor current at the rate of about 60 volts for each 100-microampere change in ultor voltage; 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 focusing voltage is within 75 volts of the value required for optimum focus and if the focusing voltage fuctuations.

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



- Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4". Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 5/16-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as 1/2-inch deflection of the spot from the center of the tube face.
- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.

OPERATING CONSIDERATIONS

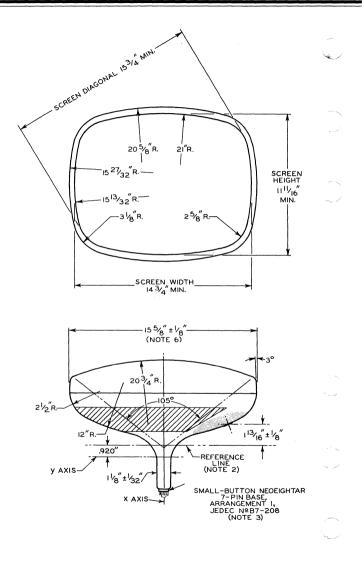
Shatter-Proof Cover Over the Tube Face. Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the I7DXP4 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion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

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

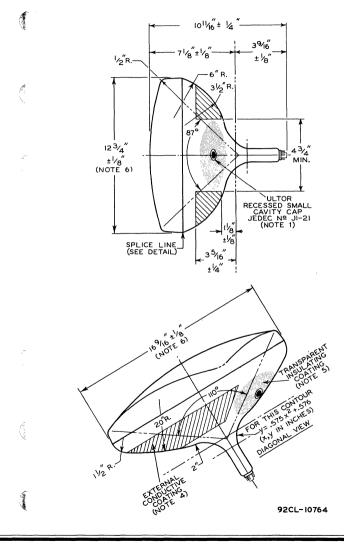


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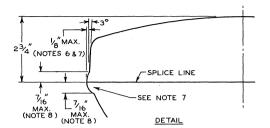




RADIO CORPORATION OF AMERICA **Electron Tube Division**

Harrison, N. J.

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 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.

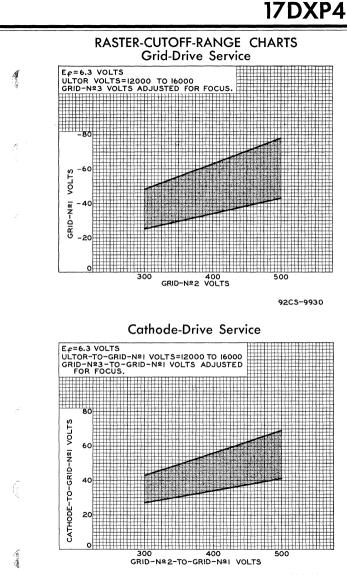
NOTE 6: MEASURED $2-9/32" \pm 1/32"$ FROM THE PLANE TANGENT TO THE SURFACE OF THE FACEPLATE AT THE TUBE AXIS.

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.

NOTE 9: NECK DIAMETER IS MAINTAINED TO AT LEAST 2-7/16" FROM REFERENCE LINE.





92CS-9931



RADIO CORPORATION OF AMERICA Electron Tube Division

Harrison, N. J.

DATA 5 8-60





RECTANGULAR METAL-SHELL TYPE

ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

100

DATA

General:

Heater, for Unipotential Cathode: Voltage..... 6.3 . . . ac or dc volts Current. . . . 0.6 ± 10%ampl . . Phosphor (For Curves, see front of this Section). . P4-Sulfide Type Deflection Angles (Approx.): 70⁰ Diagonal . . . 66⁰ Horizontal 500 Vertical (Electron Gun . .lon-Trap Type Requiring External Single-Field Magnet Tube Dimensions: Maximum overall length 19-5/16" Greatest width at lip. 15-15/16" ± 1/8" 16-13/16" ± 3/16" ••••••• 7-1/2" ± 3/16" 30" Screen Dimensions (Minimum): Greatest width . . . 14-3/8" Greatest height. . 10-11/16" Diagonal 15-1/4" . Operating PositionAnv • Ultor TerminalMetal-Shell Lip Ultor Terminal Metal-Shell Lip Base . . Small-Shell Duodecal 6-Pin (JETEC Group 4, No.B6-63) Metal-Shell Lip-Pin 1-Heater Pin 2-Grid No.1 Ultor Pin 6-Grid No.4 (Grid No.3. Pin 10-Grid No.2 Grid No.5, Pin 11 - Cathode Collector Pin 12-Heater Maximum Ratings, Design-Center Values: ULTOR VOLTAGE. . . 16000 max. volts GRID-No.4 (FOCUSING) VOLTAGE . 5000 max. volts GRID-No.2 VOLTAGE. 500 max. volts GRID-No.1 VOLTAGE: 125 max. Negative-bias value. . volts Positive-bias value. . . 0 max. volts Positive-peak value. . . . 2 max. volts Indicates a change.

ELECTRON TUBE DIVISION





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						-
	ut jront o	j this bett	101			
X-RAY	PRECAUTIONS	FOR CATHODE	-RAY T	UBES		_
For X-rav	shielding a	consideratio	ns. se	e sheet		
.1-Circuit	Resistance	• • • • • •	. 1.	5 max.	megohms	
Circuit V	alues:					-
∍r equipme r positive	nt warm-up p with respec	ct to cathod	ie. 180		volts volts	_
ot exceedi	ng 15 second	is	. 41		volts	
ina eauipm	ent warm-un	period				
	ot exceedi er equipme r positive Circuit V .1-Circuit For X-ray	ot exceeding 15 second er equipment warm-up p r positive with respec Circuit Values: .1-Circuit Resistance For X-ray shielding of X-RAY PRECAUTIONS	er equipment warm-up period r positive with respect to cathoo Circuit Values: .1-Circuit Resistance For X-ray shielding consideration X-RAY PRECAUTIONS FOR CATHODE	<pre>ot exceeding 15 seconds 41 er equipment warm-up period 180 r positive with respect to cathode. 180 Gircuit Values: .1-Circuit Resistance 1.5 For X-ray shielding considerations, se</pre>	 bit exceeding 15 seconds 410 max. bit exceeding 15 seconds 410 max. bit exceeding the period 180 max. c positive with respect to cathode. 180 max. Circuit Values: 1.1-Circuit Resistance 1.5 max. For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES 	<pre>ot exceeding 15 seconds 410 max. volts er equipment warm-up period 180 max. volts r positive with respect to cathode. 180 max. volts Circuit Values: .1-Circuit Resistance 1.5 max. megohms For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES</pre>

17HP4B

Picture Tube

RECTANGULAR GLASS TYPE ALUMINIZED LOW-VOLTAGE ELECTROSTATIC FOCUS 70° MAGNETIC DEFL	
GENERAL DATA	
Electrical:	
Direct Interelectrode Capacitances: Cathode to all other electrodes 5 Grid No.1 to all other electrodes 6 External conductive coating to anode . {1500 max. 750 min. Heater Current at 6.3 volts 600 ± 30 Electron Gun	pf pf pf ma uiring
External Single-Field	Magnet
Optical:	_
Phosphor (For curves, see front of this section)P4-Sulfide	Type,
	rglass • 749
Mechanical:	
Overall Length	3/16 q. in
Type	sheet
Cap Recessed Small Cavity (JEDEC No. Base Small-Shell Duodecal 6-Pin (JEDEC Group 4, No. Basing Designation for BOTTOM VIEW	J1-21 B6-63 . 12
Pin 1 - Heater Pin 2 - Grid No.1 Pin 6 - Grid No.4 Pin 10 - Grid No.2 Pin 11 - Cathode Pin 12 - Heater Pin 12 - Heater	lo.5, 1, ctor) 11 ctive
Maximum and Minimum Ratings, Design-Maximum Values:	
Unless otherwise specified, voltage values	
are positive with respect to cathode ANODE VOLTAGE	volt
Positive value 1100 max. Negative value 550 max.	volt volt
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.	DATA 4-63

No.

17HP4B

GRID-No.2 VOLTAGE	volts	
Negative peak value	volts	
Negative bias value	volts	6.
	volts	
Positive peak value 2 max.	volts	
HEATED VOLTAGE (6.9 max.	volts	
(5.7 mm.	volts	
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with		
respect to cathode:		. /
During equipment warm-up period		
	volts	
After equipment warm-up period 200 max.	volts	
Heater positive with		
respect to cathode:		
Combined AC and DC voltage 200 max. DC component	volts volts	
	VOILS	\sim
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		
Grid-No.2 Voltage	volts	
visual extinction of		
focused raster	volte	
	VUILS	
Maximum Circuit Value:		
Grid-No.1-Circuit Resistance 1.5 max. m	egohms	
	-	
For X-radiation shielding considerations, see shee	t	

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



17LP4A

Picture Tube RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 70° MAGNETIC DEFLECTION GENERAL DATA Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes. . 5 рf Grid No.1 to all other electrodes. 6 pf {1500 max. { 750 min. pf External conductive coating to anode . pf Heater Current at 6.3 volts. . . 600 ± 30 malon-Trap Type Requiring Electron Gun External Single-Field Magnet Optical: Phosphor (For curves, see front of this section). P4-Sulfide Type. Aluminized Faceplate, CylindricalFilterglass Light transmission (Approx.) . . 66% Mechanical: Weight (Approx.) 19 lbs 19-3/16" ± 3/8" Overall Length Neck Length. . . 7-1/2" + 3/16". 149 sa. 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 J133 C/E 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) 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 c٢ Pin 12 - Heater 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. volts GRID-No.4 (FOCUSING) VOLTAGE: Positive value 1100 max. volts Negative value . 550 max. volts RADIO DATA



Electron Tub

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CORPORATION OF	- AMERICA	
e Division	Harrison, N. J.	

4-63

17LP4A

GRID-No.2 VOLTAGE	olts
	lts 🧹
	olts
	olts
Positive peak value	olts
HEATER VOLTAGE	olts
[5./ min. vo	olts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with	
respect to cathode:	
During equipment warm-up period	14.
	olts olts
Heater positive with respect to cathode:	nts
	lts -
	olts
Tunical Anarating Conditions for Crid Drive Convict	\sim
Typical Operating Conditions for Grid-Drive Service:	
Unless otherwise specified, voltage values	
are positive with respect to cathode	
	lts
	lts
	olts ,
Grid-No.1 Voltage for visual	•
extinction of focused raster28 to -72 vo	lts
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max. mego	hms
Ŭ	
For X-radiation shielding considerations, see sheet	

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



DICTUDE TUDE

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	I7QP4	-A		00
F	PICTURE	TUBE		
RECTANGULAR GLASS MAGNETIC FOCUS	TYPE		NETIC DEFLECTION	
_	DATA			
General: Heater, for Unipotent	ial Cathodo:			
Voltage. Current. Capacitance between E tive Coating and Ul	•••• 6.3 ••• 0.6 xternal Cond		ac or dc 	а µ
Faceplate, Cylindrica Phosphor (For curves, se	e front of th		Filter	∍̃Ty
Deflection Angles (Ap Diagonal Horizontal Vertical Electron Gun	· · · · · · · ·	lon	-Trap Type Requ	7 6 5
Neck length. Radius of curvature (External horizon Screen Dimensions (Mi Greatest width.	of faceplat tal surface) nimum): . Recessed S	e 		+ 3/ + 1/ + 1/ + 1/ - 1/ - 3/1 - 3/ - 3/
Basing Designation Pin 1-Heater Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater	for BOTTOM V		Cap — Ultor (Grid No Collec C — Externa Conduc Coatin	o.3, tor) 1 tive
Maximum Ratings, Desi ULTOR VOLTAGE GRID-No.2 VOLTAGE GRID-No.1 VOLTAGE: Negative-bias value Positive-bias value	- 	ulues:	. 18000 max. . 500 max. . 125 max. . 0 max.	vol vol vol

9-58

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



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PICTURE TUBE

					DATA	
						C.
		at front of	this Section			\bigcirc
		PRECAUTIONS F	nsiderations, OR CATHODE-RA		:	
		Resistance .		1.5 max.	megohms	
Heater		with respect	to cathode.		volts	17
no	t exceeding	ent warm-up p ng 15 seconds nt warm-up pe	riod	410 max.	volts volts	
			to cathode:			



PICTURE TUBE

RECTANGULAR METAL-SHELL TYPE

LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

DATA

General:

1

Heater, for Unipotential Cathode: 6.3 Voltage. ac or dc volts Current. 0.6 ± 10% . . .ampFrosted Filterglass Faceplate. Spherical . . Phosphor (For Curves, see front of this Section). . P4-Sulfide Type Deflection Angles (Approx.): 700 Diagonal . . 66⁰ Horizontal 500 Vertical Electron Gun .lon-Trap Type Requiring External Single-Field Magnet Tube Dimensions: Maximum overall length . . 19-5/16" . . Greatest width at lip. . . 15-15/16" ± 1/8" 12-1/4" ± 1/8" Greatest height at lip . . . • . . Diagonal at lip. 16-13/16" ± 3/16" . • • . . Neck length. 7-1/2" ± 3/16" Radius of curvature of faceplate (External surface). 30" Screen Dimensions (Minimum): Greatest width . . 14-3/8" Greatest height. 10-11/16" Diagonal 15-1/4" Operating Position . .Anv . .Metal-Shell Lip Ultor Terminal . . Base . . Small-Shell Duodecal 6-Pin (JETEC Group 4, No.B6-63) 6 Metal-Shell Lip -Pin 1 - Heater Pin 2-Grid No.1 Ultor Pin 6-Grid No.4 (Grid No.3, Pin 10-Grid No.2 Grid No.5, Pin 11-Cathode Collector) Pin 12-Heater Maximum Ratings, Design-Center Values: ULTOR VOLTAGE. . . 16000 max. volts GRID-No.4 (FOCUSING) VOLTAGE: Positive value . . 1000 max. volts Negative value . . 500 max. volts GRID-No.2 VOLTAGE. 500 max. volts GRID-No.1 VOLTAGE: Negative-bias value. . 125 max. volts Positive-bias value. . volts 0 max. Positive-peak value. . 2 max. volts -Indicates a change.





PICTURE TUBE

		CTRON					DATA	
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A NAI						1 10065		-
							t	
							Ū	
		ance .				1.5 max.	megohms	-
		esheci	L LU (Jaino	ue.	TON MAX.	VOILS	-
er equipm	ent warm	-up pe	eriod			180 max.	volts	
	ing 15 s	econds	s			410 max.	volts	
	er equipm positiv Circuit 1-Circui For X-ra	er equipment warm positive with r Circuit Values: 1-Circuit Resist <i>For X-ray shield</i> <i>X-RAY PRECAUT</i> <i>at fro</i>	er equipment warm-up pa positive with respect Circuit Values: 1-Circuit Resistance . For X-ray shielding oc X-RAY PRECAUTIONS I at front of	er equipment warm-up period positive with respect to o Circuit Values: 1-Circuit Resistance For X-ray shielding conside X-RAY PRECAUTIONS FOR C. at front of this	er equipment warm-up period positive with respect to catho Circuit Values: 1-Circuit Resistance <i>For X-ray shielding considerati</i> <i>X-RAY PRECAUTIONS FOR CATHOD</i>	er equipment warm-up period positive with respect to cathode. Circuit Values: 1-Circuit Resistance For X-ray shielding considerations, X-RAY PRECAUTIONS FOR CATHODE-RA at front of this Section	<pre>positive with respect to cathode. 180 max. Circuit Yalues: 1-Circuit Resistance 1.5 max. For X-ray shielding considerations, see shee: X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section</pre>	er equipment warm-up period 180 max. volts positive with respect to cathode. 180 max. volts Circuit Values: 1-Circuit Resistance 1.5 max. megohms <i>Por X-ray shielding considerations, see sheet</i> <i>X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES</i> <i>at front of this Section</i> <i>At front of this Section</i>

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN 114° MAGNETIC DEFLECTION LOW-VOLTAGE ELECTROSTATIC FOCUS INTERNAL MAGNETIC SHIELD

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

1



RADIO CORPORATION OF AMERICA Electron Tube Division

Harrison, N. J.

DATA 4-63

Coating

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.4 (FOCUSING) VOLTAGE: Positive value. 950 max. volts Negative value. . . . GRID-No.2 VOLTAGE . . . 700 max. volts 550 max. volts GRID-No.1 VOLTAGE: Negative peak value . . 400 max. volts Negative bias 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: Combined AC and DC voltage. 200 max. volts DC component. volts 100 max. Typical Operating Conditions for Grid-Drive Service: Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage 16000 volts Grid-No.4 Voltage 100 to 500 volts Grid-No.2 Voltage volts 300 Grid-No.1 Voltage for visual extinction of focused raster. . . . -35 to -72 volts Maximum Circuit Value: Grid-No.1-Circuit Resistance. . . 1.5 max. megohms For X-radiation shielding considerations, see sheet

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



19AFP4

Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 114° MAGNETIC DEFLECTION

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

1

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E.

Sec. 1

Heater Current at 6.3 volts 600 ± 5% m Heater Warm-Up Time (Average) 11 second Direct Interelectrode Capacitances:	na Ís
Grid No.1 to all other electrodes 6 μμ Cathode to all other electrodes 5 μμ	
External conductive coating to ultor . $\begin{cases} 1500 \text{ max.} & \mu\mu \\ 1000 \text{ min.} & \mu\mu \end{cases}$	
Electron Gun	et
Optical:	
Faceplate and Protective Panel	% ?,
Mechanical:	
Operating Position An Weight (Approx.))S '' ''
Type	
Cap	n, 3)
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 Pin 8	



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

19AFP4

Maximum Ratings, Design-Maximum Values:		
ULTOR VOLTAGE	000 max.	volts
Positive value 11	100 max.	volts
		volts
GRID-No.2 VOLTAGE	550 max.	volts
	220 max.	volts
Negative bias value		volts
Positive bias value		volts
Positive peak value PEAK HEATER-CATHODE VOLTAGE:	2 max.	volts 🧠
Heater negative with		
respect to cathode:		
During equipment warm-up period not exceeding 15 seconds 4	150 max.	volts
		volts
Heater positive with		
respect to cathode 2	200 max.	volts 🤍
Typical Operating Conditions:		
		volts
and grid-No.2 voltage of	5	volts
	to 400	volts
Grid-No.1 Voltage for visual extinction of focused raster	5 to -72	volts
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance 1	l.5 max. me	gohms

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



19AHP4

Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 114° 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. {1500 max. pf 1000 min. pf
Heater Current at 6.3 volts450 ± 25 maHeater Warm-Up Time (Average)11 secondsElectron GunType Requiring No Ion-Trap Magnet
Optical: Phosphor (For Curves, see front of this Section). P4—Sulfide Type, Aluminized Faceplate
Mechanical:
Weight (Approx.). 13-1/2 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: Type. Type. Regular-Band
Type
Cap
Basing Designation for BOTTOM VIEW 8HR
G4 CANODE
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1 Pin 6 - Grid No.1 Pin 6 - Grid No.4 Pin 6 - Grid No.1 Pin 7 - Grid No.4 Pin 8 - Grid No.4 Pin 8 - Grid No.4 Pin 9 - Grid No.

C-External

Conductive Coating



Pin 7-Cathode

Pin 8-Heater

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19AHP4

Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to grid No. 1 (17600 max. volts ANODE VOLTAGE . . . 12000 min. volts GRID-No.4 (FOCUSING) VOLTAGE: Positive value. . . 1100 max. volts Negative value. . . 550 max. volts GRID-No.2 VOLTAGE . . 650 max. volts CATHODE VOLTAGE: Negative peak value . 2 max. volts Negative bias value . 0 max. volts . Positive bias value . . 154 max. volts Positive peak value . 220 max. volts (6.9 max. volts HFATER 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. . . 450 max. volts 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 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 Grid-No.2 Voltage 500 volts Cathode Voltage for visual extinction of focused raster. . . . volts 40 to 63 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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(L	SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4° MAGNETIC DEFLECTION LOW GRID-No.2 VOLTAGE CATHODE-DRIVE TYPE
	With Heater <u>Having</u> Controlled Warm-Up Time
	GENERAL DATA
A	Electrical:
U.	Heater Current at 6.3 volts 450 ± 10% 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
<i>p</i> -	External conductive coating to ultor. $\begin{cases} 1900 \text{ max.} & \mu\mu\text{f} \\ 1400 \text{ min.} & \mu\mu\text{f} \end{cases}$
Ć	Electron Gun Type Requiring No Ion-Trap Magnet
	Optical:
	Faceplate
	Mechanical:
(Operating Position. Any Weight (Approx.). 14 lbs Overall Length. 11-3/8" ± 1/4" Neck Length
	Pin 2 - Cathode Pin 3 - Heater Pin 4 - Heater Pin 5 - Grid No.1 Pin 6 - Grid No.2 Pin 7 - Grid No.2
	ULTOR



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

DATA 5-62

19AJP4

Maximum and Minimum Ratings, Design-Maximum Values:		
ULTOR-TO-GRID-No.1 VOLTAGE	volts volts	\sim
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE: Positive value	volts volts volts volts	
CATHODE-TO-GRID-No.1 VOLTAGE 100 max. HEATER VOLTAGE	volts volts	~~
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 410 max. After equipment warm-up period 180 max. Heater positive with respect to cathode	volts volts volts volts	\sim
Typical Operating Conditions:		
With ultor-to-grid-No.1 voltage of and grid-No.2-to-grid-No.1 voltage of 5014500 50Grid-No.4-to-Grid-No.1 Voltage for focus0 to 500 Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster.31 to 49	volts volts volts volts	
Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max. m	negohms	

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



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SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

The 19ANP4 is the same as the 19YP4 except for the following item: Electrical:

6



DATA 5-62



RCA 19AP4-B PICTURE TUBE



ROUND METAL-SHELL TYPE

MAGNETIC FOCUS

MAGNETIC DEFLECTION

DATA

General: Heater, for Unipotential Cathode: Voltage. 6.3 . . . ac or dc volts Current. Phosphor (For Curves, see front of this Section) . P4-Sulfide Type Deflection Angle (Approx.) . . Electron Gun External Single-Field Magnet Greatest Diameter of Bulb. 18-5/8" + 1/8" 17-1/4" Minimum Useful Screen Diameter Operating Position AnyMetal-Shell Lip Ultor Terminal . . Ultor Terminal Metal-Shell Lip Base . . Small-Shell Duodecal 5-Pin (JETEC Group 4, No.B5-57) 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 Maximum Ratings, Design-Center Values: ULTOR VOLTAGE. . . 16000 max. volts GRID-No.2 VOLTAGE. 410 max. volts GRID-No.1 VOLTAGE: Negative-bias value. . 125 max. volts Positive-bias value. . 0 max volts Positive-peak value. 2 max. volts PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 410 max. volts After equipment warm-up period . . . 150 max. volts Heater positive with respect to cathode. 150 max. volts Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max. megohms For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section -Indicates a change.



19AUP4

Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4^O MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

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Direct Interelectrode Capacitances: Cathode to all other electrodes 5 Grid No.1 to all other electrodes 6 External conductive coating to anode. Heater Current at 6.3 volts 600 Heater Warm-Up Time (Average) 11 Electron Gun Type Requiring No Ion	min. pf ± 30 ma seconds
Optical: Phosphor (For Curves, see front of this Section) . P4—S	ulfide Type, Aluminized
Faceplate and Protective Panel	Filteralass
Mechanical:	
Weight (Approx.).	-1/8" ± 1/8"
Type	ions:
Cap	EC No.J1-21) rangement 1, C No.B7-208)
	8HR
Pin 3-Grid No.2 Pin 4-Grid No.4 Pin 6-Grid No.1 Pin 7-Cathode Pin 8-Heater	node irid No.3, irid No.5, icreen, iollector) iternal ionductive ioating



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

Maximum and Minimum Ratings, Design-Maximum Values:		
Unless otherwise specified, voltage values are positive with respect to cathode	Ę	
ANODE VOLTAGE	volts	
GRID-No.4 (FOCUSING) VOLTAGE: Positive value. 1100 max. Negative value. 550 max. GRID-No.2 VOLTAGE. 550 max. GRID-No.1 VOLTAGE: 550 max.	volts volts volts	
Negative peak value 220 max. Negative bias value 155 max. Positive bias value 0 max. Positive peak value 2 max. HEATER VOLTAGE. {6.9 max. 5.7 min. 5.7 min.	volts 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	volts volts	
Heater positive with respect to cathode: Combined AC and DC voltage 200 max. DC component	volts volts	
Typical Operating Conditions for Grid-Drive Service:		
Unless otherwise specified, voltage values are positive with respect to cathode		
Anode Voltage 16000 Grid-No.4 Voltage 0 to 400 Grid-No.2 Voltage 300 Grid-No.1 Voltage for visual 300	volts volts volts	
extinction of focused raster -35 to -72	volts	
Maximum Circuit Value:Grid-No.1-Circuit Resistance	megohms	
For X-radiation shielding considerations, see sh X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES		

Maximum and Minimum Ratings, Design-Maximum Values

A-radiation snielding considerations, see snee **X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES** at front of this Section



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

GENERAL DATA

Electrical:

Contra la

Heater Current at 6.3 volts
Deflection Angles (Approx.): Diagonal
Grid No.1 to all other electrodes 6 $\mu\mu$ f Cathode to all other electrodes 6 $\mu\mu$ f External conductive coating to ultor {1500 max. $\mu\mu$ f [1000 min. $\mu\mu$ f
Electron Gun
Optical:
Faceplate
Aluminized Fluorescence
Mechanical:
Tube Dimensions: $11-3/8" \pm 1/4"$ Overall length $16-13/32" \pm 1/8"$ Greatest width $16-13/32" \pm 1/8"$ Greatest height $13-11/32" \pm 1/8"$ Diagonal $18-5/8" \pm 1/8"$ Neck length $4-1/8" \pm 1/8"$ Curvature of faceplate (External Radii):
Center
Screen Dimensions (Minimum):
Greatest width 15-1/8" Greatest height 17-1/8" Diagonal 17-9/16" Projected area 17-2 sq. in. Weight (Approx.) 14 lbs Operating Position Any Cap. Recessed Small Cavity (JEDEC No.J1-21) Bulb J149A1



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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA I 10-60 **19AVP4**

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. ଚ 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 ÷

lax i mum	and	Minimum	Ratings,	Design-Maximum	Values
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ULTOR VOLTAGE	volts volts
GRID-No.4 (FOCUSING) VOLTAGE: Positive value	volts volts
GRID-No.2 VOLTAGE	volts volts
GRID-No.1 VOLTAGE: 220 max. Negative-peak value 154 max. Positive-bias value 0 max. Positive-peak value 2 max. HEATER VOLTAGE. 6.9 max.	volts 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	volts volts volts
Typical Operating Conditions:	
With ultor voltage (E_{C_5}) of 20000 and grid-No.2 voltage (E_{C_2}) of 400 Grid-No.4 Voltage for focus [•] 0 to 400 Grid-No.1 Voltage for visual	volts volts volts
extinction of focused raster★36 to -94 Field Strength of Adjustable Centering Magnet♦ 0 to 9	volts gausses
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max.	megohms

CATHODE-DRIVE SERVICE

	CATHODE-DRIVE* SERVICE	
đ	Unless otherwise specified, voltage values are positive with respect to grid No.1	
A.	Maximum and Minimum Ratings, Design-Maximum Values:	
	ULTOR-TO-GRID-No.1 VOLTAGE	volts volts
Ċ	GRID-No.4-TO-GRID-No.1 (10000 mm.) (FOCUSING) VOLTAGE: 1250 max. Positive value. 400 max. GRID-No.2-TO-GRID-No.1 VOLTAGE. (700 max.) 350 min. (350 min.)	volts volts volts volts
	GRID-No.2-TO-CATHODE VOLTAGE	volts
Æ N	Positive-peak value 220 max. Positive-bias value 154 max. Negative-bias value 0 max. Negative-peak value 2 max. HEATER VOLTAGE. {6.9 max. 5.7 min. 5.7 min.	volts 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. 200 max.	volts volts volts
	Typical Operating Conditions:	
	With ultor-to-grid-No.1 voltage (E _{c5g1}) of 20000 and grid-No.2-to-grid-No.1	volts
	voltage (E_{c,gg_1}) of 400 Grid-No. 4-to-Grid-No. 1	volts
ſ.	Voltage for focus ⁶ 0 to 400 Cathode-to-Grid-No.1 Voltage for visual extinction of focused	volts
	raster	volts
	Centering Magnet♥ • • • • • • • • • • • • • • • • • • •	gausses
	Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max.	megohms
ß	▲ Grid drive is the operating condition in which the video signa	l varies
	Grid drive is the operating condition in which the video signa the grid-No.1 potential with respect to cathode. 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 betwe 400 volts, is independent of ultor current and will remain ess 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 shown for these items.	optimum en 0 and entially or grid- ratings
e	See Raster-Cutoff-Range Chart for Grid-Drive Service.	
Ĩ	Distance from Reference Line for suitable PM centering magne not exceed 2-1/4". The specified centering magnet compensat for the effect which mechanical tube tolerances may have location of the undeflected focused spot with respect to the c the tube face. Maximum field strength of adjustable centerin equals:	t should tes only on the enter of g magnet



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 2 10-60

$$\sqrt{\frac{E_{c_5k \text{ or } E_{c_5g_1} (volts)}}{16000 (volts)}} \times 8 \text{ gausses}$$

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.

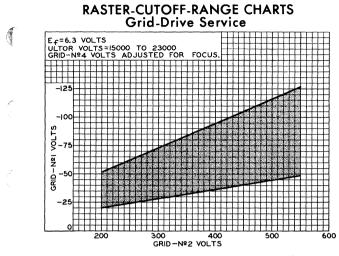
See Raster-Cutoff-Range Chart for Cathode-Drive Service.

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 23 kilovolts (Design-maximum 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.

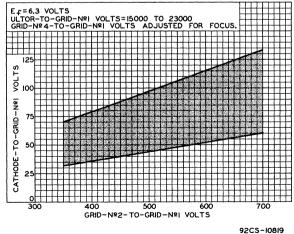
Shatter-Proof Cover Over the Tube Face. Following conventional picture tube practice, it is recommended that the cabinet be provided with a shatterproof, glass cover over the face of this picture tube to protect it from being struck accidentally and to protect against possible damage resulting from tube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





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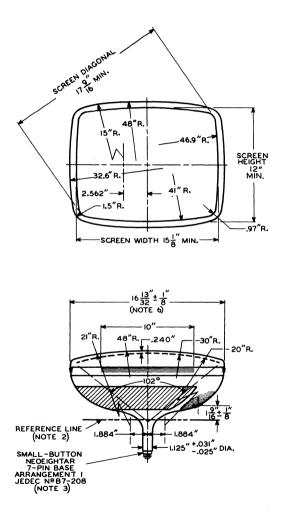




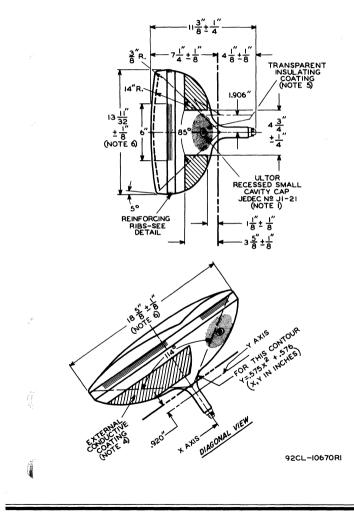


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DATA 3



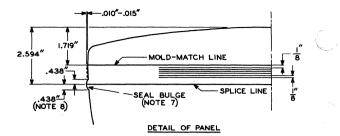






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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 4



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 $\pm 30^{\circ}$. ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

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

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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

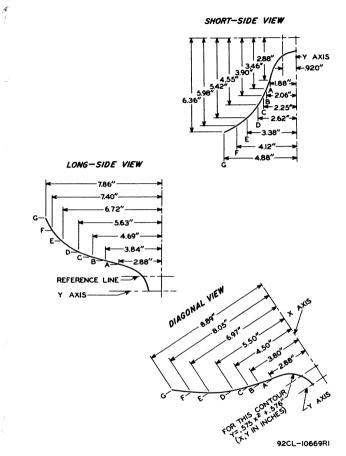
NOTE 6: MEASURED AT THE MOLD-MATCH LINE.

NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE 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.



BULB-CONTOUR DIMENSIONS



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.



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SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4° MAGNETIC DEFLECTION With Heater <u>Having Controlled W</u>arm-Up Time

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



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DATA 5-62



RECTANGULAR GLASS TYPE A LOW-VOLTAGE ELECTROSTATIC FOCUS 92° MAG LOW-GRID-No.2 VOLTAGE CA

ALUMINIZED SCREEN 92° MAGNETIC DEFLECTION CATHODE-DRIVE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

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 μµf Cathode to all other electrodes . . 5 μµf (2000 max. μµf External conductive coating to ultor. 12000 max. μµf Electron Gun. Type Requiring No Ion-Trap Magnet Optical: Light transmission (Approx.). 78% Phosphor (For curves, see front of this section) . . P4-Sulfide Type. Aluminized Mechanical: Operating Position. Anv External Conductive Coating: Type.....Regular Band Contact area for grounding.....Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J140 B sheets at the front of this section Bases (Alternates): 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. . ULTOR G3,G5 CL Pin 1-Heater Cap - Ultor Pin 2-Grid No.1 (Grid No.3, Pin 6-Grid No.4 Grid No.5. Pin 10-Grid No.2 Collector) 10₆₂ c٢ Pin 11 - Cathode C - External Pin 12-Heater Conductive Coating



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

19BDP4

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

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



RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN 92° MAGNETIC DEFLECTION

GENERAL DATA

Electrical:

Heater Current at 6.3 volts 600 ± 5% ma Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 μμf Cathode to all other electrodes 5 μμf External conductive coating to ultor
Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Faceplate
Mechanical:
Operating Position
Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater H H Cap-Ultor (Grid No.3, Grid No.5, Collector) C-External Conductive Coating



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RADIO CORPORATION OF AMERICA **Electron Tube Division**

Harrison, N. J.

DATA 5-62

Maximum Ratings, Design-Maximum Values: ULTOR VOLTAGE . . . 20000 max. volts GRID-No.4 (FOCUSING) VOLTAGE: Positive value. 1100 max. volts Negative value. . . . 550 max. volts GRID-No.2 VOLTAGE . . GRID-No.1 VOLTAGE: volts 550 max. Negative bias value . . 154 max. volts 0 max. volts Positive bias value . . 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 respect to cathode. 200 max. volts Typical Operating Conditions: With ultor voltage of 16000 volts and grid-No.2 voltage of volts. 100 Grid-No.4 Voltage for focus 0 to 400 volts Grid-No.1 Voltage for visual extinction of focused raster. . . . -36 to -94 volts Maximum Circuit Values: Grid-No.1-Circuit Resistance. 1.5 max. meachms

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



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

The 19BTP4 is the same as the 19YP4 except for the following item: Maximum and Minimum Ratings, Design-Maximum Values:

ULTOR VOLTAGE	23000 max. 11000 min	volts
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19CHP4

Picture Tube

SHORT RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS LOW GRID-No.2 VOLTAGE

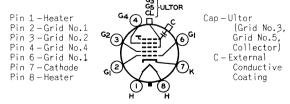
ALUMINIZED SCREEN 114° MAGNETIC DEFLECTION CATHODE-DRIVE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

600 ± 30 ma 11 seconds Direct Interelectrode Capacitances: Grid No.1 to all other electrodes . . μµf 6 Cathode to all other electrodes . . 5 μµf (1500 max. μµf External conductive coating to ultor. 11000 min. μµf Electron Gun. . . Type Requiring No Ion-Trap Magnet Optical: Faceplate Filterolass . . . Light transmission (Approx.). 78% Phosphor (For curves, see front of this section) . P4-Sulfide Type, Aluminized Mechanical: Operating Position. . Anv Weight (Approx.). 14 lbs 11-5/8" ± 1/4" Overall Length. 4-3/8" ± 1/8" Neck Length Projected Area of Screen. 172 sq. in. . . External Conductive Coating: Туре. Regular Band Contact area for grounding. Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J149 A sheets at the front of this section .Small-Button Neoeightar 7-Pin. Base. . Arrangement 1 (JEDEČ No.B7-208) Basing Designation for BOTTOM VIEW. 8HR





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

19CHP4

Maximum and Minimum Ratings, Design-Maximum Values: .{20000 max. 10000 min. volts ULTOR-TO-GRID-No.1 VOLTAGE. . . . volts GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE: Positive value. 1250 max. volts Negative value. 400 max. volts (70 max. volts GRID-No.2-TO-GRID-No.1 VOLTAGE. . 40 min. 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 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. volts After equipment warm-up period. . . 200 max. volts Heater positive with 200 max. volts respect to cathode. . . 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 focus . -50 to +250 volts Cathode-to-Grid-No.1 Voltage for 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

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



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Ć	SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4 ⁰ MAGNETIC DEFLECTION LOW-GRID-No.2 VOLTAGE CATHODE-DRIVE TYPE
	With Heater Having Controlled Warm-Up Time
	GENERAL DATA
4	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
	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.)
	Type
	at front of this section Cap
	Bases (Alternates):
	Small-Button Neoeightar 7-Pin, Arrangement 1, (JEDEC No. B7-208) 7-Pin (JEDEC No. B7-237)
	Basing Designation for BOTTOM VIEW
	ANODE
	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 Pin 8 - Heater Pin 4 - Grid No.4 Pin 7 - Cathode Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating
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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

DATA 4–63

19CKP4

Maximum and Minimum Ratings. Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to grid No.1 (22000 max. volts ANODE VOLTAGE. 115000 min. volts GRID-No.4 (FOCUSING) VOLTAGE: Positive value 1100 max. volts Negative value . . . 550 max. volts [100 max. volts GRID-No.2 VOLTAGE. . . 1 40 min. volts CATHODE VOLTAGE: Negative peak value. . . . 2 max. volts . . 0 max. volts Negative bias value. 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 not exceeding 15 seconds 450 max. volts After equipment warm-up period . . . 300 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 Cathode-Drive Service: Unless otherwise specified, voltage values are positive with respect to grid No.1 Anode Voltage. 18000 volts Grid-No.4 Voltage. 0 to 500 volts Grid-No.2 Voltage. . . . 50 volts Cathode Voltage for visual extinction of focused raster . . 31 to 49 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



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

GENERAL DATA

Electrical:

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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 $\mu\mu$ f Cathode to all other electrodes 5 $\mu\mu$ f External conductive coating to ultor
Focusing Method Electrostatic Deflection Method
Optical: Faceplate
Mechanical:
Tube Dimensions: Overall length Greatest width Greatest width Id=13/32" ± 1/8" Greatest height Diagonal Image: Neck length Image: Neck length Overall Image: Neck length Image: Neck length <tr< td=""></tr<>
Radius at center Radius at edge External surface 48" 21"
Internal surface: In plane of diago-
nal deflection 30" 20" In plane of hori-
zontal deflection 30" 20" In plane of verti-
cal deflection 30" 14"
Screen Dimensions (Minimum): 15-1/8" Greatest width 12-1/8" Greatest height 12" Diagonal 17-9/16" Projected area 172 sq. in.



6-10-2

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

19XP4

14 lbs Weight (Approx.). Anv Operating Position. Recessed Small Cavity (JEDEC No.J1-21) Сар...J149A1 Bulb. . Base. . Small-Button Neoeightar 7-Pin, Arrangement 1, . (JEDEC No. B7-208) Basing Designation for BOTTOM VIEW. . . Pin 1 - Heater Cap-Ultor Pin 2-Grid No.1 (Grid No.3, Pin 3-Grid No.2 Grid No.5. Collector) Pin 4-Grid No.4 C - External Pin 6-Grid No.1 Pin 7-Cathode Conductive Pin 8-Heater Coating

GRID-DRIVE SERVICE

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

Maximum and Minimum Ratings, Design-Maximum Values:

Maximum and Minimum Natings, Design-Maximum Values.	
	/olts /olts
GRID-No.4 (FOCUSING) VOLTAGE:	0113
	/olts
	/olts
	volts volts
GRID-No.1 VOLTAGE:	10113
	volts
PEAK HEATER-CATHODE VOLTAGE:	volts
Heater negative with respect to cathode:	
During equipment warm-up period	
	volts
	volts
Heater positive with respect to cathode . 200 max.	volts
Equipment Design Ranges:	
With any ultor voltage $(E_{C_{2}k})$ between 11000 and 20000 voltand grid-No.2 voltage $(E_{C_{2}k})$ between 220 and 550 volta	olts s
Grid-No.4 Voltage for	
	volts



Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value		
(Peak positive)Same for E _{cik} exce		ive is a
Grid-No.4 Current	~25 to +25	µа
Grid-No.2 Current	-15 to +15	μa
Centering Magnet [*]	0 to 8	gausses
Examples of Use of Design Ranges:		
With ultor voltage of and grid-No.2 voltage of	16000 400	volts volts
• • •		
Grid-No.4 Voltage for focus [●] Grid-No.1 Voltage for visual	0 to 400	volts
extinction of focused raster Grid-No.1 Video Drive from Raster Cutoff (Black level):	-36 to -94	volts
White-level value	36 to 94	volts
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	1.5 max.	megohms

CATHODE-DRIVE SERVICE

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

Maximum and Minimum Ratings,	Design-Maximum Values:
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.		
ULTOR-TO-GRID-No.1 VOLTAGE	{20000 max. 11000 min.	volts volts
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE: Positive value	1250 max. 400 max. (700 max.	volts volts volts
GRID-No.2-TO-GRID-No.1 VOLTAGE	1350 min.	volts
GRID-No.2-TO-CATHODE VOLTAGE	550 max.	volts
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
	∖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

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DATA 2

Equipment Design Ranges:

With any ultor-to-grid-No.1 voltage (E _{c51} and 20000 volts and grid-No.2-to-grid-No.1 between 225 and 700 volts	"voltage (E	
Grid-No.4-to-Grid-No.1 Voltage for focus [•]	0 to 400 -Cutoff-Rang	volts e Chart
	thode-Drive	
	e as determi ot video dri negative	ve is a
Grid-No.2 Current	-25 to +25 -15 to +15	µа 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-	16000	volts
No.1 voltage of	400	volts
Grid-No.4-to-Grid-No.1 Voltage for focus ⁶ Cathode-to-Grid-No.1 Volt-	0 to 400	volts
age for visual extinction of focused raster Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value	36 to 78 -36 to -78	volts volts
Maximum Circuit Values:		
	4 5	

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 with the combined bias voltage and video-signal voltage adjusted to produce an ultor current of 100 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 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 3/16-inch deflection of the spot from the center of the tube face.
- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.



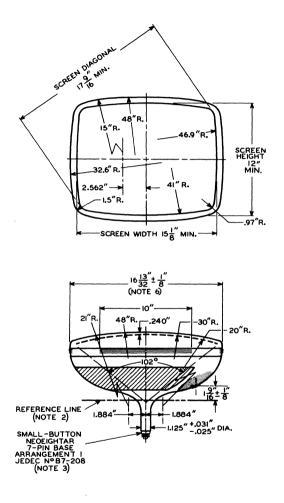
OPERATING CONSIDERATIONS

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 at voltages 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 shatter-proof, 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.

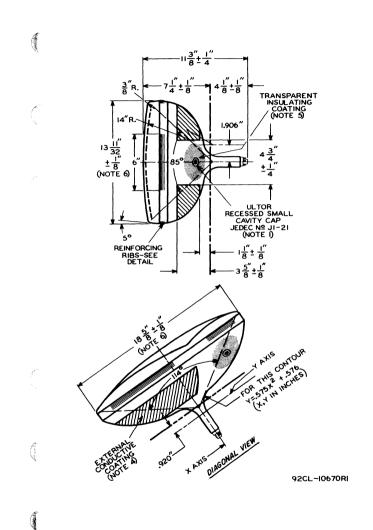


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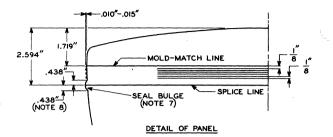


19XP4





RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 4 10-60



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 ADIAMETER OF I-3/4".

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

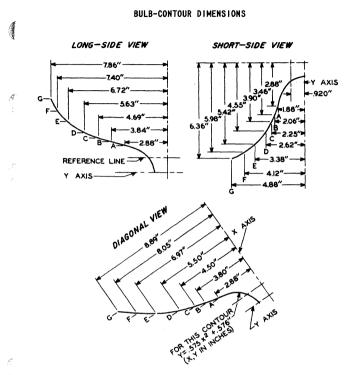
NOTE 5: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

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 SPACED FROM THE TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.





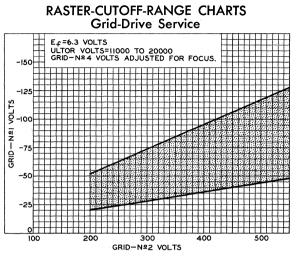
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NOTE: PLANES A THROUGH G ARE NORMAL TO THE TUBE AXIS AND AT FIXED LOCATIONS FROM THE Y AXIS. THESE COORDINATES DESCRIBE THE BOGIE-BULB EXTERNAL CONTOUR IN PLANES THROUGH THE TUBE AXIS AND THE RESPECTIVE FACEPLATE AXES.



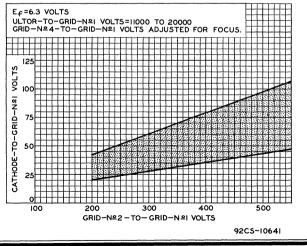
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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 5 10-60



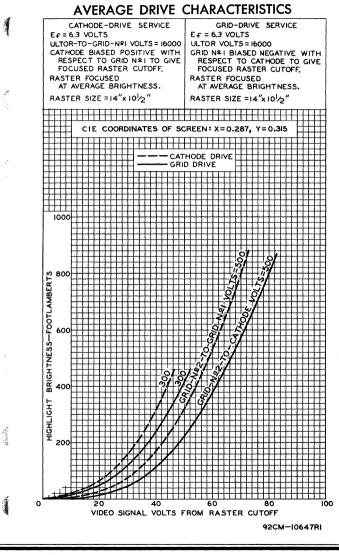
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Cathode-Drive Service



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

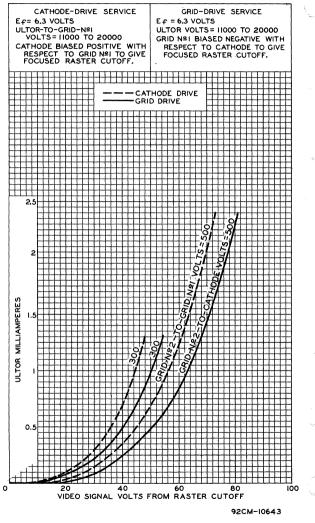






RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 6

AVERAGE DRIVE CHARACTERISTICS



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



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Contraction of the local distribution of the

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 Heater Warm-Up Time (Average). 11 seconds Focusing Method. Deflection Method. Magnetic Deflection Angles (Approx.): Diagonal Vertical 850
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 ultor . { $1500 \text{ max}. \mu\mu f$ $1000 \text{ min}. \mu\mu f$
Electron Gun
Optical: Faceplate
Aluminized Fluorescence
Mechanical:
Tube Dimensions: Overall length Greatest width Greatest height 16-13/32" ± 1/8" Greatest height 13-11/32" ± 1/8" Diagonal Neck length Curvature of faceplate (External Radii):
Center
Screen Dimensions (Minimum): 15-1/8" Greatest width 12" Greatest height 12" Diagonal 17-9/16" Projected area 172 sq. in. Weight (Approx.) 14 lbs Operating Position Any Cap. Recessed Small Cavity (JEDEC No.J1-21) Bulb J149A1

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

19YP4

	in, Arrangement 1, (JEDEC No.B7-208) 8JR n 8 - Heater Cap - Ultor (Grid No.4, Collector) C - External Conductive Coating	
GRID-DRIVE SERVICE		
Unless otherwise specified, volta		
ues are positive with respect to		
Maximum and Minimum Ratings, Design-Maximum		
	0000 max. volts 1000 min. volts	<i>≂</i> ∕
Positive value	700 max. volts	
Negative value	350 max. volts	
	600 max. volts 300 min. volts	
GRID-No.1 VOLTAGE: Negative-peak value	220 max. volts 154 max. volts 0 max. volts	
Positive-peak value	2 max. volts	
	6.9 max. 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. volts 200 max. volts 200 max. volts	
Typical Operating Conditions:		
With ultor voltage (E_{cyk}) of	16000 volts	
and grid-No.2 voltage (Ec2k) of	500 volts	
Grid-No.3 Voltage for focus [•] Grid-No.1 Voltage for visual extinction of focused raster [*]	0 to 400 volts	$\nabla_{\mathbf{u}_{k+1},i}$
Field Strength of Adjustable	43 to -78 volts 0 to 10 gausses	
Maximum Circuit Values:	0	
Grid-No.1-Circuit Resistance	1.5 max. megohms	$\langle \rangle$



CATHODE-DRIVE SERVICE

CATHODE-DR					
Unless otherwise spe ues are positive with					
				8	
Maximum and Minimum Ratings, D	esig	n-!	nax:	,	
ULTOR-TO-GRID-No.1 VOLTAGE]20000 max.]11000 min.	vo vo
GRID-No.3-TO-GRID-No.1				(11000 mm.	•0
(FOCUSING) VOLTAGE:					
Positive value				850 max.	vo
Negative value	• •		• •	200 max.	vo
GRID-No.2-TO-GRID-No.1 VOLTAGE				{750 max. {450 min.	VO VO
GRID-No.2-TO-CATHODE VOLTAGE.				600 max.	vo vo
CATHODE-TO-GRID-No.1 VOLTAGE:	•••	• •	•••	000 11102.	•0
Positive-peak value				220 max.	vo
Positive-bias value				154 max.	vo
Negative-bias value	•••	• •	• •	0 max.	vo
Negative-peak value	•••	• •	• •	2 max. (6.9 max.	vo vo
HEATER VOLTAGE	•••	• •		{5.7 min.	vo vo
PEAK HEATER-CATHODE VOLTAGE:				(017 1111	•0
Heater negative with					
respect to cathode:					
During equipment warm-up p				450	
not exceeding 15 seconds After equipment warm-up pe			• •	450 max. 200 max.	vo vo
Heater positive with	riou	• •	• •	ZUU Max.	v0
respect to cathode				200 max.	vo
Typical Operating Conditions:					
With ultor-to-grid-No.1					
voltage $(E_{c_{4}g_{1}})$ of				16000	vo
and grid-No.2-to-grid-No.1 voltage (Ec _{2g1}) of				500	vo
Grid-No.3-to-Grid-No.1 Voltage				900	00
for focus [•]				. 0 to 400	vo
Cathode-to-Grid-No.1 Voltage f	or v	isı	al		
extinction of focused raster	۰.		•	. 41 to 69	vo
Field Strength of Adjustable				0 1 10	
Centering Magnet♥	•••	• •	•	. 0 to 10	gaus
Maximum Circuit Values:					
Grid-No.1-Circuit Resistance.				. 1.5 max.	mego
▲ Grid drive is the operating condi-	tion	in	whio	ch the video sia	nal var
Grid drive is the operating condition the grid-No.1 potential with response.	ect t	o c	atho	ode.	
The grid-No.3 voltage required it tube may have avalue anywhere bett of the value of the ultor voltage, it changes directly with the ultor N6 volts for each 1000-volt chan grid-No.2 voltage at the rate o change in grid No.2 voltage; and rate of about 60 volts for eac current Recause this tuhe has a	for o ween	pti 0 a	mum nol≯	focus of any i 400 volts and is	ndivid a funct
of the value of the ultor voltage, It changes directly with the ultor	ulto volt	r c age	urre at	ent, and grid-No. the rate of ann	2 volta
46 volts for each 1000-volt chan orid-No. 2 voltage at the rate of	ge in	เ๊บ่ าแป	ltor	voltage; inver	sely w
change in grid No.2 voltage; and	Inve	rse	19	with ultor curre	ent at
rate of about 60 volts for eac	h 100	0 - m	ICT	oampere change	in ul

current. Because this tube has anarrow depth of focus, it is necessary to provide means such as a potentiometer or a 4-tap switch for adjusting the focusing voltage. In general, commercially acceptable focus is obtained if the focusing voltage is within 75 volts of the value



E

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

$$\sqrt{\frac{E_{C4k} \text{ or } E_{C4g_1} (\text{volts})}{16000 (\text{volts})}} \times 10 \text{ gausses}$$

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

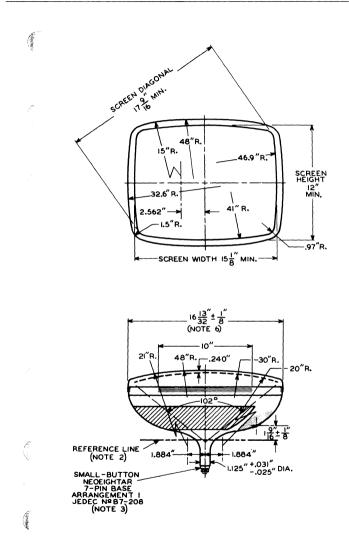
- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.
- See Raster-Cutoff-Range Chart for Cathode-Drive Service.

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 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.

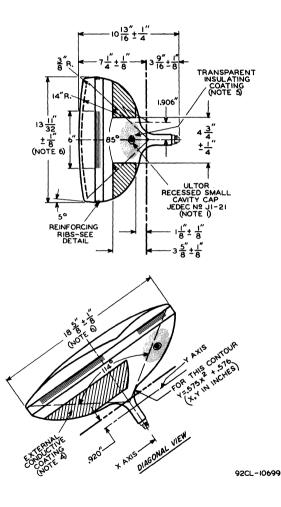
Shatter-Proof Cover Over the Tube Face. Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatterproof, glass cover over the face of this picture tube to protect it from being struck accidentally and to protect against possible damage resulting from tube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



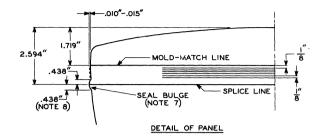




RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 3 10-60







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".

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

NOTE 5: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRYLINT-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/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.

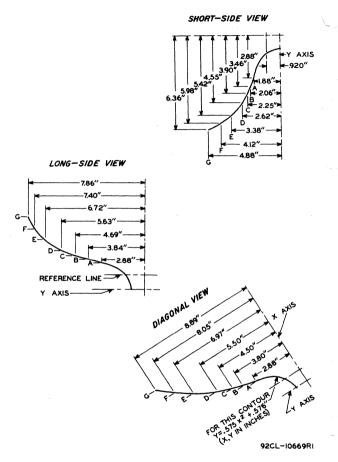
NOTE 8: UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/8" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF THE TUBE SUPPORT BAND. TUBE MOUNTING AND YOKE SUPPORT CLAMPS MUST BE SPACED FROM THE TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREG-NATED FELT, OR EQUIVALENT.



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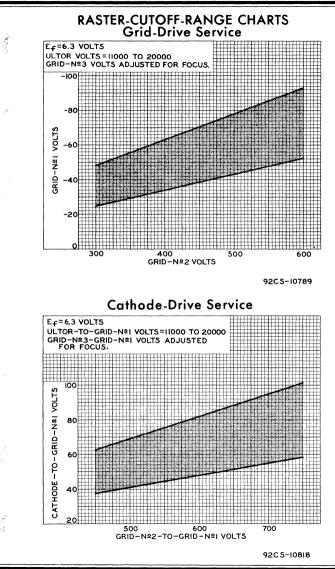
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 4 10-60

BULB-CONTOUR DIMENSIONS



NOTE: PLANES A THROUGH G ARE NORMAL TO THE TUBE AXIS AND AT FIXED LOCATIONS FROM THE YAXIS. THESE COORDINATES DE-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. DATA 5 10-60



RECTANGULAR GLASS TYPE MAGNETIC FOCUS

ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION

GENERAL DATA

Electrical:

(The second seco

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. 500 min.	pf
	pf
Heater Current at 6.3 volts 600 ± 30	ma
Electron Gun Ion-Trap Type Requi	
External Single-Field Ma	gnet
Ontical:	

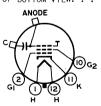
Optical:

Phosphor (For Curves, see front of this Section). P4-Sulfide Type,
Aluminized
Faceplate, Spherical
Nacharian I.

Mechanical:

at 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, Screen, Collector) C - External Conductive Coating

Maximum and Minimum Ratings, Design-Maximum Values:

		ss otherwise st				
	are	positive wit.	h respect	to	cathode	
NOOF	VOLTIOF			~	0000	

ANODE VOLTAGE													volts
GRID-No.2 VOLTAGE	•	•	·	•	•	·	•	•	·	•	·	450 max.	volts



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

20DP4C

GRID-No.1 VOLTAGE: Negative bias value								
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 100 max.								
Typical Operating Conditions for Grid-Drive Service:								
Unless otherwise specified, voltage values are positive with respect to cathode								
Anode Voltage	volts volts							

Maximum Circuit Value:

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

extinction of focused raster. . . . -28 to -72

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



volts

20HP4D

Picture Tube

RECTANGULAR GLASS TYPE	ALUMINIZED SCREEN											
	MAGNETIC DEFLECTION											
GENERAL DATA												
Electrical: Heater Current at 6.3 volts Direct Interelectrode Capacitances: Grid No.1 to all other electrodes Cathode to all other electrodes External conductive coating to anode.	600 ± 30 ma 6 pf 5 pf ∫1500 max. pf											
Electron Gun	↓ 500 min. pf -Trap Type Requiring Single-Field Magnet											
Optical:												
Phosphor (For Curves, see front of this Section	Aluminized											
Faceplate, Spherical	•••• Filterglass											
Mechanical:												
Weight (Approx.). Overall Length. Neck Length. Projected Area of Screen. External Conductive Coating: Type. Contact area for grounding. For Additional Information on Coatings and	7-1/2" ± 3/16" 215 sq.in. Regular-Band Near Reference Line											
See Picture-Tube Dimensional-Outlines and	<i>d Bulb J161 C/D</i> sheets											
at front of this section Cap	C Group 4, No.B6-63)											
Pin 1 - Heater Pin 2 - Grid No.1 Pin 6 - Grid No.4 Pin 10 - Grid No.2 Pin 11 - Cathode Pin 12 - Heater G_{1}^{2}	Cap - Anode (Grid No.3, Screen, Collector) C - External Conductive Coating											
Maximum and Minimum Ratings, Design-Maxim	um Values:											
Unless otherwise specified, vol are positive with respect t												
ANODE VOLTAGE	17500 max. volts											

-				_	 	-		-	-					
	Negative	value.	•		•	•	•	•	•	•	•	•	550 max.	volts
	Positive													volts
	RID-No.4													



Electron Tube Division

RADIO CORPORATION OF AMERICA Harrison, N. J.

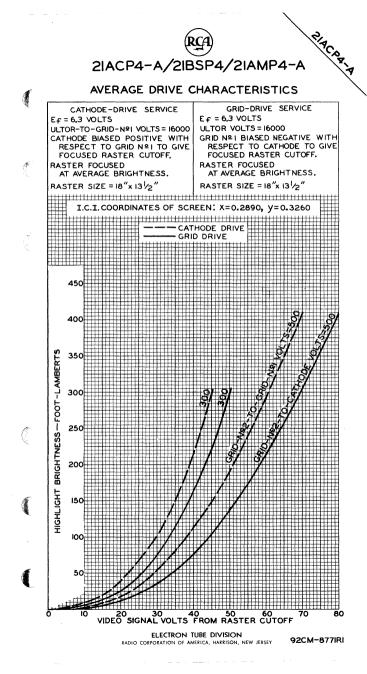
DATA 4-63

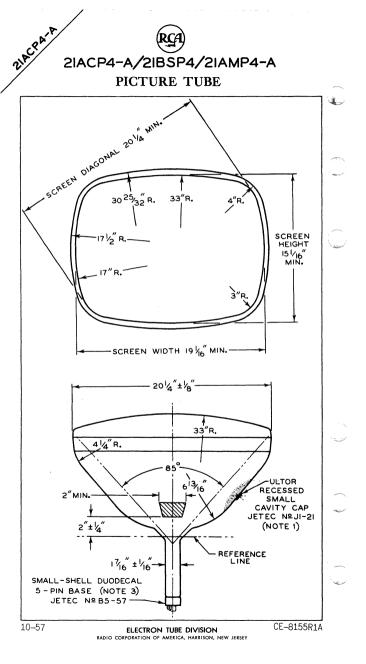
20HP4D

GRID-No.2 VOLTAGE 550 max. GRID-No.1 VOLTAGE: 140 max. Negative bias value 0 max. Positive bias value 2 max. HEATER VOLTAGE. 6.9 max.	volts volts volts volts volts volts volts	Í.
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 volts	
Typical Operating Conditions for Grid-Drive Service:		\smile
Unless otherwise specified, voltagevalues are positive with respect to cathode		
Anode Voltage 14000 Grid-No.4 Voltage -56 to +310 Grid-No.2 Voltage 300 Grid-No.1 Voltage for visual 200 extinction of focused raster -28 to -72	volts volts volts 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







RECTANGULAR GLASS TYPE MAGNETIC FOCUS

ALUMINIZED SCREEN 90° MAGNETIC DEFLECTION

GENERAL DATA

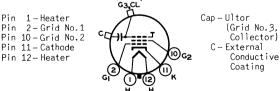
Electrical:

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Heater Currer Direct Intere					600	ma
	o all other					μµf
Cathode to	all other el	ectrodes			5	μμf
External co	onductive coa	atina to	ultor.	!	2500 max.	μμf
				1	2000 min.	μµf
Electron Gun.	•••••				Type Requ e-Field M	
Optical:						
Faceplate, Sp	oherical				. Filter	glass
Light trans	smission (App	prox.)				. 74%
Phosphor (For	Curves, see fro	ont of thi	s Sectio	n). P4-	—Sulfide	Type,
					Alumi	nized
Mechanical:						
Operating Pos	sition					. Any
Weight (Appro Overall Lengt	x.)				2	4 lbs
Overall Lengt	.h		• • •		. 20" ±	3/8"
Neck Length .					7-1/2" ± j	3/16"
Projected Are			• • •		. 262 sq	. in.
External Conc					Popular	Rood
Contact are	ea for ground	••••	• • •	Noar	Poference	Line
For Additiona						Line
	-Tube Dimensi					heets
	nt of this se				,	
Сар			Small Ca	avity (.	EDEC No.J	1–21)
Base Smal						
Basing Desi	ignation for	BOTTOM V	IEW			. 12N
		ULTOR				
		G3,CL				
		n				





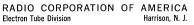
Electron Tube Division

RADIO CORPORATION OF AMERICA Harrison, N. J. DATA 1-63

21AMP4A

Maximum Ratings, Design-Maximum Values:		
ULTOR VOLTAGE	volts	/
GRID-No.2 VOLTAGE	volts	Ń.
GRID-No.1 VOLTAGE:		~~~
Negative peak value	volts	
Negative bias value	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	1.	
not exceeding 15 seconds	volts	
After equipment warm-up period 200 max.	volts	
Heater positive with respect to cathode	uelte.	
respect to cathode 200 max.	volts	~~
Typical Operating Conditions:		
With ultor voltage of 16000	volts	\sim
and grid-No.2 voltage of 300	volts.	
	00003.	
Grid-No.1 Voltage for visual	1.	
extinction of focused raster28 to -72	volts	
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance 1.5 max.	megohms	
For X radiation chielding considerations, see the	t	

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









RECTANGULAR METAL-SHELL TYPE

MAGNETIC FOCUS

MAGNETIC DEFLECTION

DATA

General:

[Heater, for Unipotentia] Cathode:		ļ
Voltage 6.3 Current 0.6 ± 10% . Faceplate, Spherical	ac or de volts	
Current $0.6 \pm 10\%$	amo	-
Esceptate Scherical	Erected Filteralace	1
	Frosted Filterglass	
Phosphor (For Curves, see front of this Section) . P4Suitide Type	1
Deflection Angles (Approx.):		
Diagonal	70 ⁰	
Diagonal		(
Vertical	50 ⁰	
Electron Gun	-Trap Type Requiring	
External	Single-Field Magnet	
Tube Dimensions:	orngre i rera magnet	
Maximum averall length		
Maximum overall length		-
Greatest width at lip	$19-23/32" \pm 1/8"$	
Greatest height at lip	15-5/16" ± 1/8"	
Diagonal at lip	20-3/4" ± 1/4"	
Neck length	7-1/2" ± 3/16"	+
Neck length	nal surface) 33"	
Screen Dimensions (Minimum):		-
Greatest width	18_1/8"	1
Greatest height.	12 11/16"	
	10-11/10	
Diagonal	· · · · · · 19-1/8	ł
Operating Position		1
Ultor Terminal	Metal-Shell Lip	}
Base Small-Shell Duodecal 5-Pin (JETE	C Group 4, No.B5-57)	-
Basing Designation for BOTTOM VIEW	12D	+
Pin 1-Heater	Metal-Shell Lip -	Í
Pin 2-Grid No.1 $\left(l_{\tau} \right)$	Ultor	1
Pin 10 - Grid No.2	(Grid No.3.	}
Pin 11 - Cathode $\sqrt{2}$	Collector)	1
Pin 12 - Heater	corrector,	
Maximum Ratings, Design-Center Values:		}
ULTOR VOLTAGE.	18000 max. volts	
ULTOR VOLTAGE.		
ULTOR VOLTAGE	18000 max. volts 500 max. volts	
ULTOR VOLTAGE	500 max. volts	
ULTOR VOLTAGE. GRID-No.2 VOLTAGE. GRID-No.1 VOLTAGE: Negative-bias value	500 max. volts 125 max. volts	
ULTOR VOLTAGE	500 max. volts 125 max. volts 0 max. volts	
ULTOR VOLTAGE	500 max. volts 125 max. volts	
ULTOR VOLTAGE	500 max. volts 125 max. volts 0 max. volts	
ULTOR VOLTAGE. GRID-No.2 VOLTAGE. GRID-No.1 VOLTAGE: Negative-bias value. Positive-bias value. Positive-beak value. Positive-peak value. PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode:	500 max. volts 125 max. volts 0 max. volts	
ULTOR VOLTAGE	500 max. volts 125 max. volts 0 max. volts	
ULTOR VOLTAGE	500 max. volts 125 max. volts 0 max. volts	
ULTOR VOLTAGE	500 max. volts 125 max. volts 0 max. volts 2 max. volts 410 max. volts	
ULTOR VOLTAGE. GRID-No.2 VOLTAGE. GRID-No.1 VOLTAGE: Negative-bias value. Positive-bias value. Positive-beak value. Positive-peak value. PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds. After equipment warm-up period	500 max. volts 125 max. volts 0 max. volts 2 max. volts 410 max. volts 180 max. volts	
ULTOR VOLTAGE	500 max. volts 125 max. volts 0 max. volts 2 max. volts 410 max. volts	

9-58

E.

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



PICTURE TUBE

Maximum Circuit Values:

212.24

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

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

21AVP4B

Picture Tube

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 72º MAGNETIC DEFLECTION

GENERAL DATA

Electrical:

A

Heater Current at 6.3 volts 600	ma
Direct Interelectrode Capacitances:	_
Grid No.1 to all other electrodes 6	μµf
Cathode to all other electrodes 5	μµf
External conductive coating to ultor $\begin{cases} 2500 \text{ max.} \\ 2000 \text{ min.} \end{cases}$	μµf
Electron Gun Ion-Trap Type Requiring Exte	
Single-Field Ma	gnet

Optical:

Mechanical:

 Operating Position.
 Any

 Weight (Approx.).
 24 lbs

 Overall Length.
 23-1/32" ± 3/8"

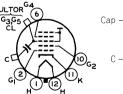
 Neck Length.
 7-1/2" ± 3/16"

 Projected Area of Screen.
 262 sq. in.

 External Conductive Coating:
 24 lbs

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

		ULTOR 7
Pin	1 – Heater	G3.G5
Pin	2-Grid No.1	CL X
Pin	6 – Grid No.4	
Pin	10-Grid No.2	× (*
Pin	11 – Cathode	cH/
Pin	12 – Heater	\mathcal{A}
		_(2)







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

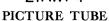
21AVP4B

. , , ,		
ULTOR VOLTAGE	volts	.~
GRID-No.4 (FOCUSING) VOLTAGE:	. 1.	(
Positive value	volts	, etc 1
Negative value	volts	
GRID-No.2 VOLTAGE	volts	
GRID-No.1 VOLTAGE:		
Negative peak value	volts	
Negative bias value	volts	
Positive bias value 0 max.		
Positive peak value	volts	
	VUILS	· ·
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	\sim
	10113	
Typical Operating Conditions:		
With ultor voltage of 18000	volts	
and grid-No.2 voltage of 300	volts	
o o o o	volts	
Grid-No.4 Voltage for focus72 to +396	vorts	
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	
GITU-NO.I-CITCUIT RESISTANCE I.J Max.	megonins	
For X-radiation shielding considerations, see she	eet	

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









RECTANGULAR GLASS TYPE

MAGNETIC FOCUS

F

ALUMINIZED SCREEN MAGNETIC DEFLECTION

DATA

General:	
Heater, for Unipotential Cathode: Voltage	+ +
Aluminized	
Deflection Angles (Approx.): 72° Diagonal 72° Horizontal 67° Vertical 53° Electron Gun Electron Gun Electron Single-Field Magnet	
Tube Dimensions: Overall length Greatest width Greatest width Greatest height Jiagonal Length Radius of curvature of faceplate (External surface) Screen Dimensions (Minimum):	
Greatest width	4 4 4 4 4
Pin 1-Heater Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater Pin 12-Heater P	
Maximum Ratings, Design-Center Values: ULTOR VOLTAGE	
GRID-No.1 VOLTAGE: 200 max. volts Negative-peak value. 200 max. volts Positive-bias value. 140 max. volts Positive-peak value. 0 max. volts Positive-peak value. 2 max. volts	
← Indicates a change. 9–58 ELECTRON TUBE DIVISION DATA	

ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

2IAWP4

ZIAMPA

PICTURE TUBE

58		ELECTRON TUBE I			DATA
		t front of this		10000	
		ielding consid CAUTIONS FOR C			
	1-Circuit Re			1.5 max.	megohms
Heater	positive wit	th respect to ca	thode.	180 max.	volts
по	t exceeding	warm-up perio 15 seconds warm-up period		410 max. 180 max.	volts volts



2124402218

THREE-GUN SHADOW-MASK TYPE ELECTROSTATIC FOCUS MAGNETIC CONVERGENCE MAGNETIC DEFLECTION ALUMINIZED TRICOLOR PHOSPHOR-DOT SCREEN Supersedes Type 21AXP22

DATA

General:

đ

deneral.
Electron Guns, Three with Axes Tilted
Toward Tube Axis Blue, Green, Red
Heater, for Unipotential Cathode of
Each Gun, Paralleled with Each of
the Other Two Heaters within Tube:
Voltage 6.3 ac or dc volts
Current 1.8 ± 10%
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 $\mu\mu$ f
Cathode of blue gun + cathode of green
gun + cathode of red gun to all
other electrodes 16 μμf
Grid No.3 (Of each gun tied within
tube to No.3 grids of other two
guns) to all other electrodes 9 μμf
Faceplate, Spherical
Light transmission (Approx.)
Screen, on Inner Surface of Faceplate:
Type Aluminized, Tricolor, Phosphor-Dot
Phosphor (Three separate phosphors, collectively) P22
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
Projected area
Focusing Method.
Convergence Method
Deflection Method.
Deflection Angles (Approx.):
Horizontal \dots
Horizontal
Tube Dimensions:
Maximum overall length
Diameter:
At lip
At flange
Weight (Approx.)
Weight (Approx.)
(base pin 12 on top)
, prin 12 on top)
8–56 TENTATIVE DATA 1

TUBE DIVISION

TENTATIVE DATA 1

21AXP22-A

214792214

COLOR KINESCOPE

Ultor Terminal. Metal Shell Base. . . Small-Shell Neodiheptal 12-Pin (JETEC No.B12-131) . Alden Nos.214NMINSC (Radial leads), 214NMINC (Axial leads), or equivalent Socket. . Basing Designation for BOTTOM VIEW. 14 A H . . . Pin 1-Heater Pin 9-Grids No.3 Pin 2-Grid No.1 Pin 11-Grid No.2 of Red Gun of Blue Gun Pin 3-Grid No.2 Pin 12-Grid No.1 of Red Gun of Blue Gun Pin 4 - Cathode Pin 13-Cathode of Blue Gun of Red Gun Pin 14 - Heater Pin 5 - Cathode of Green Gun METAL SHELL: Pin 6-Grid No.1 Ultor (Grid No.4. of Green Gun Grid No.5 Pin 7-Grid No.2 of Green Gun Collector) Maximum Ratings, Design-Center Values: ULTOR-TO-CATHODE (Of each gun) VOLTAGE. . . 25000 max. volts ULTOR CURRENT, (Average, each gun). . . 500*max. µamp GRID-No.3-TO-CATHODE (Of each gun) VOLTAGE 6000 max. volts GRID-No.2-TO-CATHODE VOLTAGE (Each gun) . . 800 max. volts GRID-No.1-TO-CATHODE VOLTAGE (Each gun): 400 max. Negative bias value volts 0 max. volts Positive bias value . 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. volts . . After equipment warm-up period. . . 180 max. volts Heater positive with respect to cathode . 180 max. volts Equipment Design Ranges: With any ultor voltage $(E_{C_A}k_{each gun})$ between 20000# and 25000 volts Grid-No.3 (Focusing electrode)-to-Cathode (Of each gun) Voltage . 15.2% to 21.2% of Ec4keach gun volts Grid-No.2-to-Cathode Voltage (Each gun) when circuit design utilizes grid-No.1to-cathode voltage (E_{C1}k) at fixed value for raster See Cutoff Design Chart cutoff. ,[#]: See next page. 8-56 TENTATIVE DATA 1 TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

2IAXP22-A

212+02212

COLOR KINESCOPE

Gi	rid-No.1-to-Cathodd age (Each gun) for Extinction of Focu Raster when circu sign utilizes grid to-cathode voltage	r Visual used it de- d-No.2- e							
Va	(E _{C2} k) at fixed va ariation in Raster Cutoff Between Gur in Any Tube				. See % of ave lowest	rag	eof		
Gi	rid-No.3 Current fo		a	nu				varues	
	current of 800 µar		•••	•			+75		μam
	rid-No.2 Current (E ercentage of Total Supplied by Each (Ultor Cu	ren	t	-5	to	+5		µar
	To produce Illur (I.C.I. Coordina x = 0.310, y = 0.3 Red gun	ates 316):	Vhit	е	47	to	67	08	r cen
	Blue gun	· • • • • •		:	11	to	24		r cen
	Green gun To produce White 27 M.P.C.D. (.C ates x = 0.287, y	e of 8500 C.I. Coord	lin-	•		to		pe	r cen
	Red gun Blue gun Green gun	· · · · · ·	· · ·		12	to to to		pe	r cen r cen r cen
Ma	aximum Raster Shift Direction from Scr	: in Any reen Cente	er¤.			1			inc
Ac	djustment to be Pro the Following Con Purifying magnet .	nponents:		•				of 1" ma on from	
	Magnetic-field equ	ualizer .		•	spect posit	tc ion	of ma	ementwi sphoro ux.dis lgeofs "to±	dot a place
	Tangential Radial		 	:	•••	±0	.0005	o" to ±(0.005
*	A value of average ul will increase picture cathode life.								
	Centering of the raste current of the requir compensate for raster vergence and color pu Brilliance and defini general, the ultor vo	rity.							
	general, the bitor vo	Trage shear	•						

TUBE DIVISION

Assembly: For static convergence— After adjustment has been made for optimum color purity and dynamic convergence (Each beam)	221	/	RCA	
Lateral-Converging Magnet: After adjustment has been made for color purity and dynamic convergence Max. shift of blue beam	,	21A)	KP22-A	4
After adjustment has been made for color purity and dynamic convergence— Max. shift of blue beam	·	COLOR	KINESC	OPE
made for color purity and dynamic convergence— Max. shift of blue beam	Latera)-	Converging Magnet:®•	· · · · ·	
Max. shift of blue beam	made f	or color purity and		
Average of max. shift of red and green beams	Max. s Max. s	ift of blue beam ift of red and gree	n beams	±1/4" ±1/8" to ±3/8"
Assembly: For static convergence— After adjustment has been made for optimum color purity and dynamic convergence (Each beam)	Averag	e of max. shift of r id green beams	ed	
After adjustment has been made for optimum color purity and dynamic convergence (Each beam)		Assembly:	Đ	
<pre>(Each beam)</pre>	Afte fo	- adjustment has bee - optimum color puri	ty	
Effected by magnetomotive force of parabolic and/or saw- tooth waveshape synchron- ized with scanning. Horizontal: Blue pattern— Parabola amplitude to provide ^A Shift of 1/4" to 9/16". Sawtooth amplitude to provide ^O Shift of 1/4" to 9/16". Sawtooth amplitude to provide ^O Shift of 1/4" to 9/16". Sawtooth amplitude to provide ^O Shift of 1/4" to 9/16". Sawtooth amplitude to rabola amplitude Red pattern & green pattern— Parabola: Amplitude to provide ^A Shift of 1/8" to 3/8" Ratio of red-pattern shift1/2 to 2 Sawtooth: Amplitude for red pattern to provide ^{OO} Shift of -35% to +85% of the shift caused by parabola amplitude Amplitude for green pattern to provide ^{OO} Shift of -85% to +35% of the shift caused by parabola amplitude Difference between red— pattern shift and green- pattern shift (Shift _R - Shift _G) 0 to +100% Vertical: Blue pattern— Parabola amplitude to provide ^A Shift of 0 to 1/8"	an (Ea	l dynamic convergenc ich beam)	e • • • • •	Shift of ±5/8"
<pre>ized with scanning. Horizontal: Blue pattern— Parabola amplitude to provide^A Shift of 1/4" to 9/16". Sawtooth amplitude to provide^{OO} Shift of 1/4" to 9/16". Sawtooth amplitude to provide^{OO} Shift of 1/4" to 9/16". Sawtooth amplitude to provide^{OO} Shift of 1/4" to 9/16". Shift caused by pa- rabola amplitude Red pattern & green pattern— Parabola: Amplitude to provide^A Shift of 1/8" to 3/8" Ratio of red-pattern shift 1/2 to 2 Sawtooth: Amplitude for red pattern to provide^{OO} Shift of -35% to +85% of the shift caused by parabola amplitude Amplitude for green pattern to provide^{OO} Shift of -85% to +35% of the shift caused by parabola amplitude Difference between red— pattern shift and green- pattern shift. (Shift_R - Shift_G) 0 to +100% Vertical: Blue pattern— Parabola amplitude to provide^A Shift of 0 to 1/8"</pre>	Effe	ted by magnetomotiv	e force	
Blue pattern Parabola amplitude to provide ⁴ Shift of 1/4" to 9/16". Sawtooth amplitude to provide ⁰⁰ Shift of 1/4" to 9/16". Sawtooth amplitude to provide ⁰⁰ Shift of 1/50% of the shift caused by pa- rabola amplitude Red pattern & green pattern Parabola: Amplitude to provide ⁴ Shift of 1/8" to 3/8" Ratio of red-pattern shift1/2 to 2 Sawtooth: Amplitude for red pattern to provide ⁶⁰ Shift of -35% to +35% of the shift caused by parabola amplitude Difference between red pattern shift (Shift _R - Shift _G) 0 to +100% Vertical: Blue pattern Parabola amplitude to provide ⁴ Shift of 0 to 1/8"	iz	ed with scanning.	on-	
provide ^A Shift of 1/4" to 9/16". Sawtooth amplitude to provide ^{OO} Shift of \pm 50% of the shift caused by pa- rabola amplitude Red pattern & green pattern Parabola: Amplitude to provide ^A Shift of 1/8" to 3/8" Ratio of red-pattern shift to green-pattern shift of red pattern to provide ^{OO} Shift of -35% to \pm 85% of the shift caused by parabola amplitude Amplitude for green pattern to provide ^{OO} Shift of -35% to \pm 85% of the shift caused by parabola amplitude Difference between red- pattern shift and green- pattern shift (Shift _R - Shift _G) O to \pm 100% Vertical: Blue pattern Parabola amplitude to provide ^A	B1	e pattern-	o '	
$\begin{array}{c} \qquad		provide [▲]		Shift of 1/4" to 9/16"
Parabola: Amplitude to provide ^A Shift of 1/8" to 3/8" Ratio of red-pattern shift to green-pattern shift 1/2 to 2 Sawtooth: Amplitude for red pattern to provide ⁰⁰ Shift of -35% to +85% of the shift caused by parabola amplitude Amplitude for green pattern to provide ⁰⁰ Shift of -85% to +35% of the shift caused by parabola amplitude Difference between red- pattern shift and green- pattern shift (Shift _R - Shift _G) 0 to +100% Vertical: Blue pattern— Parabola amplitude to provide ^A Shift of 0 to 1/8"				Shift of ±50% of the shift caused by pa- rabola amplitude
Ratio of red-pattern shift to green-pattern shift to green-pattern Sawtooth: Amplitude for red pattern to provide ⁰⁰ Shift of -35% to +85% of the shift caused by parabola amplitude Amplitude for green pattern to provide ⁰⁰ Shift of -85% to +35% of the shift caused by parabola amplitude Difference between red- pattern shift and green- pattern shift (Shift _R - Shift _G) 0 to +100% Vertical: Blue pattern Parabola amplitude to provide ⁴ Shift of 0 to 1/8"		arabola:		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		Ratio of red-patte	rn	Shift of 1/8 to 5/8
to provide ⁰⁰ Shift of -35% to +85% of the shift caused by parabola amplitude for green pattern to provide ⁰⁰ Shift of -85% to +35% of the shift caused by parabola amplitude Difference between red-pattern shift and green-pattern shift (Shift _R - Shift _G) 0 to +100% Vertical: Blue pattern-Parabola amplitude to provide ⁴ Shift of 0 to 1/8"		shift Sawtooth:	• • • • •	1/2 to 2
Amplitude for green pattern to provide ⁰⁰ Shift of -85% to +35% of the shift caused by parabola amplitude Difference between red- pattern shift and green- pattern shift (Shift _R - Shift _G) 0 to +100% Vertical: Blue pattern Parabola amplitude to provide ⁴ Shift of 0 to 1/8"		Amplitude for red to provide ⁰⁰	pattern ••••	of the shift caused by
parabola amplitude Difference between red- pattern shift and green- pattern shift (Shift _R - Shift _G) 0 to +100% Vertical: Blue pattern Parabola amplitude to provide ⁴ Shift of 0 to 1/8"		Amplitude for gree to provide ⁰⁰	n pattern	Shift of -85% to +35%
pattern shift and green- pattern shift (Shift _R - Shift _G) 0 to +100% <i>Vertical:</i> Blue pattern Parabola amplitude to provide ^A Shift of 0 to 1/8"		Difference between	red-	parabola amplitude
Vertical: Blue pattern Parabola amplitude to provide ^A Shift of 0 to 1/8"		pattern shift an pattern shift	d green-	0 to +100%
	.81	cal: me pattern Parabola amplitude t	0	
				Shift of O to 1/8"

21AXP22-A



COLOR KINESCOPE

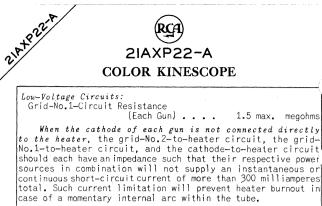
ų	For dynamic convergence [†] (Cont'd): <i>Vertical:</i>
	Sawtooth amplitude to provide ⁰⁰ Shift of 0 to 1/4"
A	Red pattern & green pattern- Parabola:
	Amplitude to provide ⁴ Shift of 1/8" to 3/8" Ratio of red-pattern
	shift to green- pattern shift
	Sawtooth: Amplitude to provide ⁰⁰ Shift of -1/8" to +3/16" Difference between red-
	pattern shift and green-pattern shift (Shift _R - Shift _G) 0 to +100%
	Examples of Use of Design Ranges:
	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 de- sign utilizes grid-No.1-to- cathode voltage of -70 volts for raster cutoff 130 to 370 130 to 370 volts Grid-No.1-to-Cathode Voltage (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
	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 ultor power supply and the grid-No.3 power supply be of the limited-energy type with inherent regulation to limit the con- tinuous short-circuit current to 50 milliamperes. In addition, to prevent cathode damage with resultant decrease intube life, the effective resistance between grid-No.3 power supply output capacitor and the grid-No.3 electrode should be not less than 50000 ohms. This resistance should be capable of withstanding the maximum instantaneous current and voltage in the grid-
	No.3 circuit. In equipment utilizing a well-regulated ultor power supply,

the grid-No.3-circuit resistance should be limited to 7.5 megohms.

.†.▲.⁰⁰: See next page. ⊕ 🌡

8-56

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When the cathode is connected directly to the heater, the grid-No.2-to-heater circuit, and the grid-No.1-to-heater circuit cuit 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.

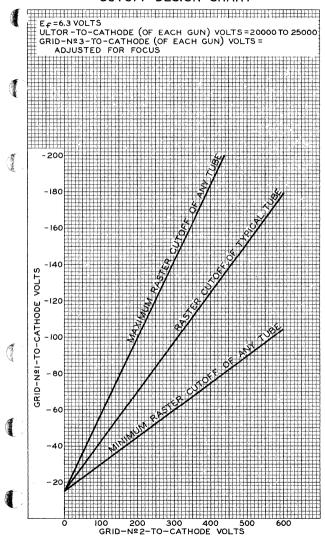
- ^e Shift is the movement of the regions of bar-or-dot-generator pattern indicated in notes (^A) and (⁰⁰).
- The direction of movement of the red and green beam is opposite to that of the blue beam.
- Indicated values apply when RCA test yoke is used with the 21AXP22-A. The parabola amplitude is determined 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.
- ⁰⁰ 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.

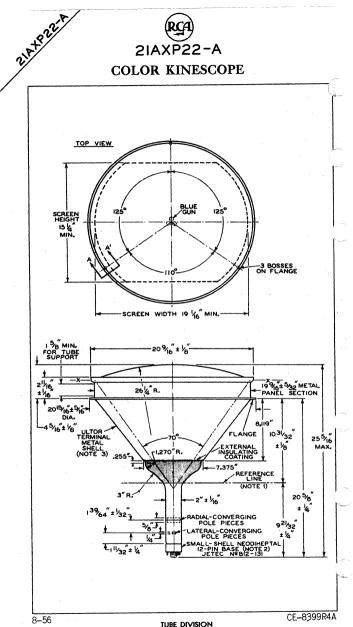




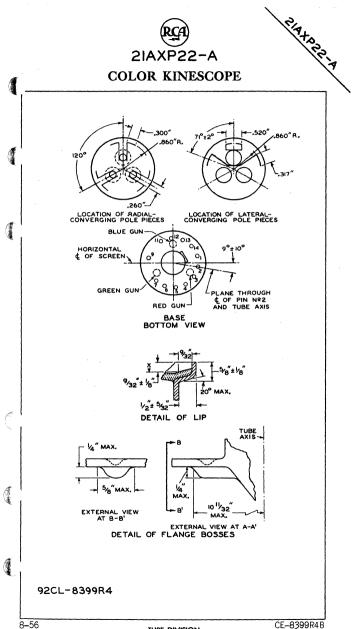
TUBE DIVISION

92CM-8565RI

12 to 22



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

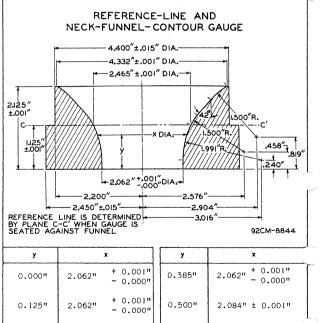
2IAXP22-A

COLOR KINESCOPE

NOTE 1: 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.



0.250"

0.375"

2147822-4

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

0.625"

0.750"

+ 0.001"

- 0.000" + 0.001"

- 0.000"

2.062"

2.062"

CE-8399R4C -8844A

2.122" ± 0.001"

2.182" ± 0.001"





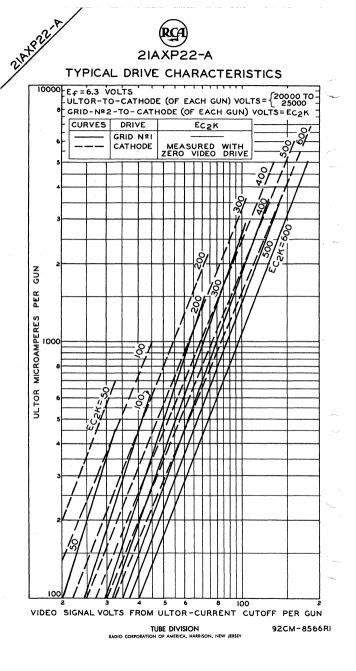
COLOR KINESCOPE

	у	x		[
	0.875"	2.258" ± 0.001"		
	1.000"	2.352" ± 0.001"		
ſ	1.125"	2.465" ± 0.001"		
	1.250"	2.604" ± 0.00!"		
	1.375"	2.778" ± 0.001"		
	1.500"	2.990" ± 0.001"	.	

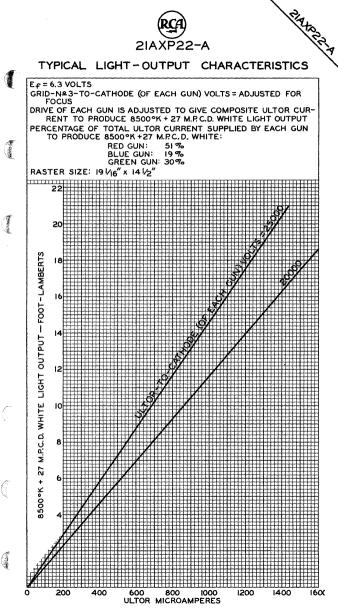
у	×
1.625"	3.216" ± 0.001"
1.750"	3.440" ± 0.001"
1.875"	3.678" ± 0.001"
2.000"	3.958" ± 0.001"
2.125"	4.332" ± 0.001"

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8-56







TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-8426R3





2IAXP22-A/2IAXP22 COLOR PICTURE TUBE



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 Toward Tube Axis
Each Gun, Paralleled with Each of the Other Two Heaters within Tube: Voltage 6.3
Current 1.8 ± 10% amp Faceplate, Spherical. Filterglass Light transmission (Approx.) Filterglass Screen, On Inner Surface of Faceplate:
Type Aluminized, 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
Size (Minimum): Greatest width
Deflection Angles (Approx.): Horizontal
Maximum overall length
At lip
Weight (Approx.)
 Ultor Terminal Alden Nos.214NMINSC (Radial leads), Socket Alden Nos.214NMINSC (Radial leads), 214NMINC (Axial leads), or equivalent

For Curves, see front of this Section.

6-59

No.

ELECTRON TUBE DIVISION

TENTATIVE DATA 1

. .

21AT 2IAXP22-A/2IAXP22 COLOR PICTURE TUBE	
21AXP22-A/2IAXP22	
COLOR PICTURE TUBE	
Base Small-Shell Neodiheptal 12-Pin (JEDEC No.B12-131) Basing Designation for BOTTOM VIEW	~
Pin 1 - Heater Pin 2 - Grid No.1 of Red Gun Pin 3 - Grid No.2 of Red Gun Pin 4 - Cathode of Green Gun Pin 6 - Grid No.1 of Green Gun Pin 7 - Grid No.2 of Red Gun Pin 12 - Grid No.2 of Blue Gun Pin 12 - Grid No.1 of Blue Gun Pin 13 - Cathode of Green Gun Pin 6 - Grid No.1 of Green Gun Pin 7 - Grid No.2 of Blue Gun Pin 14 - Heater (Grid No.4, Grid No.5, Collector)	
Maximum Ratings, Design-Center Values: ULTOR-TO-CATHODE (Of each gun) VOLTAGE. 25000 max. volts GRID-No.3-TO-CATHODE (Of each gun) VOLTAGE. 6000 max. volts GRID-No.2-TO-CATHODE VOLTAGE (Each gun) 800 max. volts GRID-No.1-TO-CATHODE VOLTAGE (Each gun): 800 max. volts Negative-bias value 400 max. volts Positive-bias value 0 max. volts Positive-bias value 2 max. volts Positive-peak value 2 max. volts Positive-peak value 2 max. volts Positive-peak value 10 max. volts PACH 10 max. volts After equipment warm-up period 100 max. volts After equipment warm-up period 180 max. 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 ultor power supply and the grid-No.3 power supply	5 e
be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 50 milliamperes. In addition, to prevent cathode damage with resultant decrease in tube life, the effective resistance between grid-No.3 power- supply output capacitor and the grid-No.3 electrode should be not less than 50,000 ohms. This resistance should be capable of withstanding the maximum instantaneous current and voltage in the grid-No.3 circuit.	~
In equipment utilizing a well-regulated ultor power supply, the grid-No.3-circuit resistance should be limited to 7.5 megohms.	-
Low-Voltage Circuits: Grid-No.1-Circuit Resistance (Each gun) 1.5 max. megohms	



Erto.

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 otal. 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 'han 300 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

X-RAY WARNING

X-ray radiation is produced by the 21AXP22-A/21AXP22 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 television 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 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.

6-59

TENTATIVE DATA 2



21CBP4A

Picture Tube

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN 90° MAGNETIC DEFLECTION LOW-VOLTAGE ELECTROSTATIC FOCUS GENERAL DATA Flectrical: Heater Current at 6.3 volts . . . $...600 \pm 10\%$ ma Direct Interelectrode Capacitances: Grid No.1 to all other electrodes . 6 μµf Cathode to all other electrodes . 5 μµf .{2500 max. 2000 min. μµf External conductive coating to ultor. μµf Optical: Light transmission (Approx.). 74% Phosphor (For curves, see front of this section). . P4-Sulfide Type. Aluminized Mechanical: Operating Position. Anv Weight (Äpprox.). 24 lbs . . 18" ± 3/8" Overall Length. 5-1/2" + 3/16". . 262 sq. in. External Conductive Coating: Type.....Special Contact area for grounding. Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J171 D/E sheets at the front of this section Bases (Alternates): 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 Pin 1-Heater Cap - Ultor G3,G5 2-Grid No.1 Pin (Grid No.3, Pin 6-Grid No.4 Grid No.5. Pin 10 - Grid No.2 Collector) 10₆₂ c٢ Pin 11 - Cathode C - External Pin 12 - Heater Conductive Coating



Contraction of

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

21CBP4A

Manimum and Minimum Baddana D				** 7		
Maximum and Minimum Ratings, Design						
ULTOR VOLTAGE	·	•	•	22000 max.	volts /	
GRID-No.4 (FOCUSING) VOLTAGE:					. (
Positive value			•	1000 max.	volts 🛸	
Negative value				500 max.	volts	
GRID-No.2 VOLTAGE			•	550 max.	volts	
GRID-No.1 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	
HEATER VOLTAGE				∫6.9 max.	volts	
HEATER VOLIAGE	·	•	•	(5.7 min.	volts	
PEAK HEATER-CATHODE VOLTAGE:						
Heater negative with						
respect to cathode:						
During equipment warm-up period						١.
not exceeding 15 seconds			·	450 max.	volts	7
After equipment warm-up period.	•	·	٠	200 max.	volts 🤍	
Heater positive with						
respect to cathode		·	·	200 max.	volts	
Typical Operating Conditions:						
				16000	volts	
With ultor voltage of					volts	
and grid-No.2 voltage of				300		
Grid-No.4 Voltage for focus	•	•	•	0 to 450	volts	
Grid-No.1 Voltage for visual				00 1 70		
extinction of focused raster	·	·	·	-28 to -72	volts	
Maximum Circuit Values:						
Grid-No.1-Circuit Resistance				. 1.5 may	megohms	
ding no.1 offcare neararance	•	•	•	• 1.0 max.	megonina	

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 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)..... 6.3 volts Current $0.6 \pm 5\%$ amp Warm-up time (Average). . . 11 sec Capacitance between External Conductive (2500 max. μµf Coating and Ultor 2000 min. μµf Faceplate, Spherical. Filterglass Phosphor (For Curves, see front of this Section). .P4-Sulfide Type Aluminized Deflection Angles (Approx.): Diagonal... 1100 Horizontal. 105⁰ Vertical. . . · 870 Electron Gun. . . Type Requiring No Ion-Trap Magnet Tube Dimensions: Overall length. . . 14-7/16" ± 3/8" 20-1/4" ± 1/8" Greatest width. 16-3/8" ± 1/8" 21-3/8" ± 1/8" Greatest height . Diagonal. Neck length 5-3/16" ± 3/16" Radius of curvature of faceplate (External surface). . . . 28-1/2" Screen Dimensions (Minimum): Greatest width. . 19 - 1/16" 15-1/16" Greatest height 20-1/4" Diagonal. . . . Projected area. . 262 sq. in. Operating Position. . . Any Special (JEDEC No.B6-185) Base. Cap-Ultor Pin 2 - Cathode (4 Pin 3-Heater (Grid No.3, Pin 4 - Heater Grid No.5. Pin 5-Grid No.1 Collector) Pin 6-Grid No.4 C-External Pin 7-Grid No.2 Conductive Coating Maximum Ratings, Design-Center Values: ULTOR VOLTAGE. . . 18000 max. volts GRID-No.4 (FOCUSING) VOLTAGE: Positive value . . 1000 max. volts Negative value . . 500 max. volts GRID-No.2 VOLTAGE. . 500 max. volts

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PICTURE TUBE

GRID-No.1 VOLTAGE: Negative-peak value. Negative-bias value. Positive-bias value. Positive-peak value. PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not	. 140) max.	volts			
exceeding 15 seconds						
Heater positive with respect to cathode) max.	volts			
Maximum Circuit Values:						
Grid-No.1-Circuit Resistance	. 1.5	max.	megohms			
For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section						

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ricion

COLOR PICTURE TUBE

THREE-GUN, GRADED-HOLE, SHADOW-MASK TYPE ALUMINIZED TRICOLOR PHOSPHOR-DOT SCREEN ALL-GLASS ENVELOPE ELECTROSTATIC FOCUS MAGNETIC CONVERGENCE MAGNETIC DEFLECTION

DATA

General:
Electron Guns, Three with Axes Tilted Toward Tube Axis Blue, Green, Red Heater, for Unipotential Cathode of Each Gun, Paralleled with Each of
the Other Two Heaters within Tube: Voltage
electrodes except the No.1 grids of the other two guns
other electrodes 16 μμf Grid No.3 (Of each gun tied within tube to No.3 grids of other two
guns) to all other electrodes 9 µµf External conductive coating togrid No.6. {2500 max. µµf (2000 min. µµf
Faceplate, Spherical
Type Aluminized, Tricolor, Phosphor-Dot Phosphor (Three separate phosphors, collectively) P22 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
Focusing Method Electrostatic Convergence Method
Deflection Method Magnetic Deflection Angles (Approx.): Horizontal
Vertical
Overall length 25-1/32" ± 3/8" Diameter 20-13/16" ± 1/8" Weight (Approx.) 36-1/2 lbs
Operating Position Tube Axis Horizontal (Base pin 12 and V-grooved panel pad on top)

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ELECTRON TUBE DIVISION

2ICYP22

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COLOR PICTURE TUBE

		_(
Socket Alden M		-
5 8 ·		
Pin 1-Heater	Pin 13-Cathode	100
Pin 2-Grid No.1	of Blue Gun Big 14 Hantar	1
of Red Gun Pin 3-Grid No.2	Pin 14-Heater Cap Over	
of Red Gun	Pin 1-Ultor	
Pin 4-Cathode	(Grid No.4,	
of Red Gun	Grid No.5	
Pin 5-Cathode	T Capt Over	
of Green Gun	Pin 2-Grid No.6,	
Pin 6-Grid No.1	Collector,	Kard
of Green Gun	V@ High-	
Pin 7-Grid No.2	Voltage-	1
of Green Gun	Supply	1
Pin 9-Grid No.3	Terminal	1
Pin 11-Grid No.2	C – External	
of Blue Gun	Conductive	
Pin 12-Grid No.1	Coating	1
of Blue Gun		
Maximum Ratings, Design-Center Va	lues	
ULTOR-TO-CATHODE (Of each gun) VC		ŝ
Between the Ultor Terminal an Terminal <i>(See Dimensional Out</i>		
connect a resistor of 50,000		1
Limiting Circuit Values. The h		
ted to the High-Voltage-Supply		1
to the Ultor Terminal.		1
GRID-No.3-TO-CATHODE (Of each gur) VOLTAGE. 6000 max. volts	A.
GRID-No.2-TO-CATHODE VOLTAGE (Ĕac	h gun) 600 max. volts	Same /
GRID-No.1-TO-CATHODE VOLTAGE (Eac	h gun):	
Negative bias value		
Positive bias value	••••• 0 max. volts	
Positive peak value	••••• 2 max. volts	5
PEAK HEATER-CATHODE VOLTAGE (Each		1
Heater negative with respect to		18-
During equipment warm-up peri		Ki.
not exceeding 15 seconds		
After equipment warm-up perio		
Heater positive with respect to	cathode . 180 max. volts	
Equipment Design Ranges:		
With ultor voltage (Ecukeach gu	l between 20000 [#] and	
under the second s	n 25000 volts	T
Grid-No.3 (Focusing		1
Electrodel to Cathodo		
(Of each gun) Voltage . 16.8%	to 20% of Ec.k. volts	
#. soo part page	4 reach gun	1
,#: See next page.	TENTATULE OLTA	1
3-57 ELECTRON TUBE		-
RADIO CORPORATION OF AMERICA		

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





COLOR PICTURE TUBE

Same of

a c	
	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
	to-cathode voltage (E _{C2} k) at fixed value
	Variation in Raster Cutoff Between Guns in Any Tube ± 21% of average of highest and lowest cutoff values
	Grid-No.3 Current45 to +45 μa
	Grid-No.2 Current (Each gun)5 to +5 μa Percentage of Total Ultor
	Current Supplied by Each Gun: To Produce White of 8500° K+27 M.P.C.D. (I.C.I. Coordinates
	x = 0.287, y = 0.316): Red gun
	Blue gun
	Ratios of Ĉathode Currents: To Produce White of 8500° K + 27 M.P.C.D. (I.C.I. Coordinates
	$ \begin{array}{cccc} x = o.287, \ y = o.316): & Min. & Typical & Max. \\ \text{Red cathode to green cathode } & 1 & 1.6 & 2 \\ \end{array} $
	Red cathode to blue cathode 1.5 2.7 4
C	Maximum Raster Shift in Any Direction from Screen Center ^D . 7/8 inch Maximum Required Displacements of Beam Trios with Respect to Associated Phosphor-Dot Trios:
	Uniform in any direction over entire screen area 0.005"*
	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.
•	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".
	": See next page.
	8-57 ELECTRON TUBE DIVISION TENTATIVE DATA 2
	RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

2ICYP22

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COLOR PICTURE TUBE

	ίa.
Localized around edge of screen-	
Tangential	
Radial	
Adjustment to be Provided by the Following Components:	
Lateral-Converging Magnet:	
Maximum lateral shift of blue beam	\frown
Maximum lateral shift of red beam and	· ven
green beam	
Average of maximum lateral shift	
of red beam and green beam ±7/32" to ±9/32"	
Radial-Converging Magnet Assembly:	
For static convergence including	
compensation for dc component of dynamic convergence	
(Each beam)	"-attar
For dynamic convergence [†]	
Effected by magnetomotive force	
of parabolic and/or sawtooth	
waveshape synchronized with	
scanning.	
Horizontal:	
Blue pattern	
Parabola amplitude to provide ^A Shift of 3/16" to 1/2"	
Sawtooth amplitude to	
provide ⁰⁰	
shift caused by pa-	
rabola amplitude	
Red pattern & green pattern	
Parabola:	
Amplitude to provide▲ Shift of 1/16" to 5/16" Ratio of red-pattern shift	
to green-pattern shift	\sim
Sawtooth:	متعسية ا
Amplitude to provide ⁰⁰ Shift of -60% to +60%	
of the shift caused by	
parabola amplitude	
Difference between red-pattern	
shift and green-pattern shift (Shift _R - Shift _G)	~
$(\sin 1) c_{\rm R} = \sin 1) c_{\rm G} / \cdot - 10 / 0 / 0 / 10 / 0 / 0 / 10 / 0 / 0 / $	
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Centering of the raster on the screen may be accomplished by passing direct current of the required value through each pair of defecting coils to compensate for raster shift resulting from adjustments for	
coils to compensate for raster shift resulting from adjustments for optimum convergence and color purity.	
^e Shift is the movement of the regions of dot/crosshatch-generator pattern indicated in notes ( ^A ) and ( ^{OO} ).	~
The direction of movement of the red and green beam is opposite to that of the blue beam.	- Sugger
Indicated values apply when RCA test yoke is used with the 21CYP22.	
▲, ⁰⁰ : See next page.	
8-57 ELECTRON TUBE DIVISION TENTATIVE DATA 2	



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### COLOR PICTURE TUBE

Vertical: Blue pattern---Parabola amplitude to provide . . . . . . . . . . Shift of -1/8" to +1/16" Sawtooth amplitude to Red pattern & green pattern-Parabola: Amplitude to provide*. . . . Shift of 1/8" to 5/16" Ratio of red-pattern shift Sawtooth: Amplitude to provide⁰⁰ . . Shift of -1/8" to +3/16" A Difference between red-pattern shift and green-pattern shift Examples of Use of Design Ranges: For ultor voltage of 20000 25000 volts Grid-No.3 (Focusing Electrode)-to-Cathode (Of each gun) Voltage. . 3360 to 4000 4200 to 5000 volts Grid-No.2-to-Cathode Voltage (Each gun) when circuit design utilizes grid-No.1-to-cathode voltage of -70 volts for raster cutoff. . . . 130 to 370 130 to 370 volts Grid-No.1-to-Cathode Voltage (Each gun) for Visual Extinction of Focused Raster when circuit design utilizes grid-No.2to-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 continuous short-circuit current to 50 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 solution the green beam balance 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.

8-57

ELECTRON TUBE DIVISION

TENTATIVE DATA 3

PICYP22

### COLOR PICTURE TUBE

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 bulb 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 weıl-regulated ultor power supply, the *grid-No.3-circuit resistance* shou¦d be limited to 7.5 megohms.

Low-Voltage Circuits:

2107822

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 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

#### DEFINITIONS

Beam Irio. 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. *Hisregister*. 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

*I-Ray Warning.* Because the 21CYP22 is designed to be operated at ultor voltages as high as 25 kilovolts (design-center maximum value), shielding of the 21CYP22 for X-ray radiation may be needed to protect against possible injury from prolonged exposure at close range.



215-1822

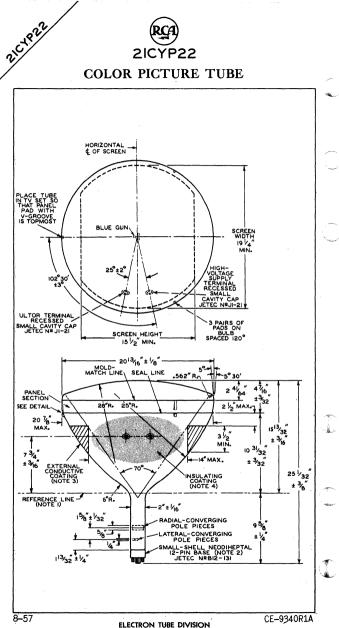
### COLOR PICTURE TUBE

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 21CYP22 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.

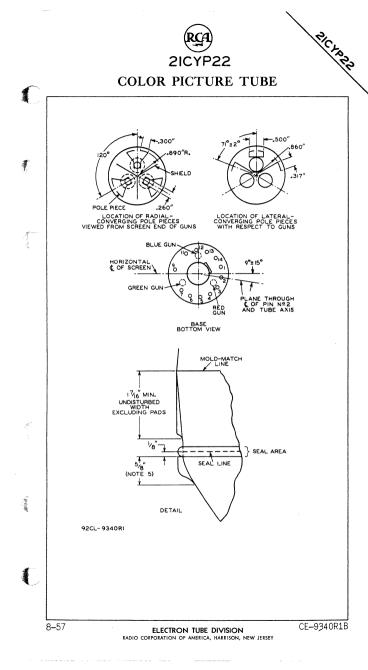
High Voltages. The high voltages at which cathode-ray tubes are operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the enclosing of high-potential terminals and the use of interlocking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

#### REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE for Type 21CYP22 is the same as that shown for Type 21AXP22-A

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



21CYP22

### COLOR PICTURE TUBE

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.

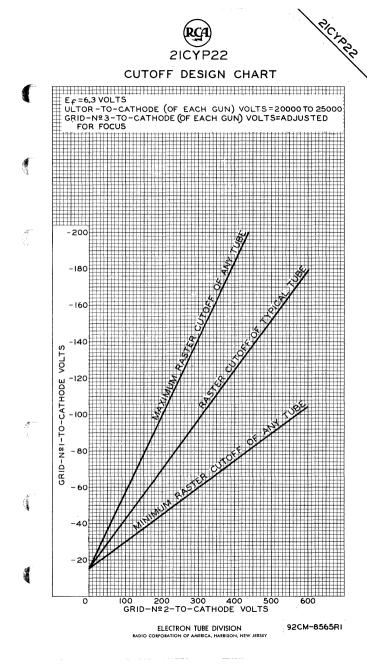
NOTE 2: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 3".

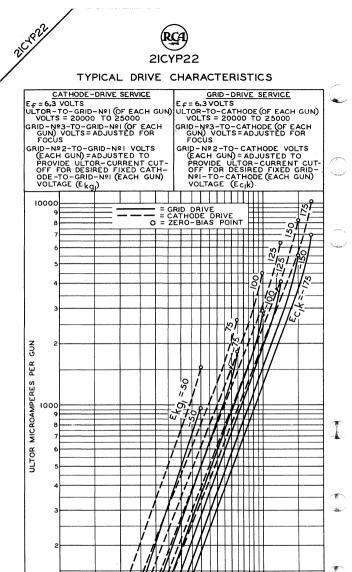
NOTE 3: THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT BAND OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THAT OF THE CONTACT BAND SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

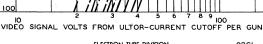
NOTE 4: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

NOTE 5: THE MAXIMUM EFFECTIVE WIDTH OF A FUNNEL PAD IS 5/8".

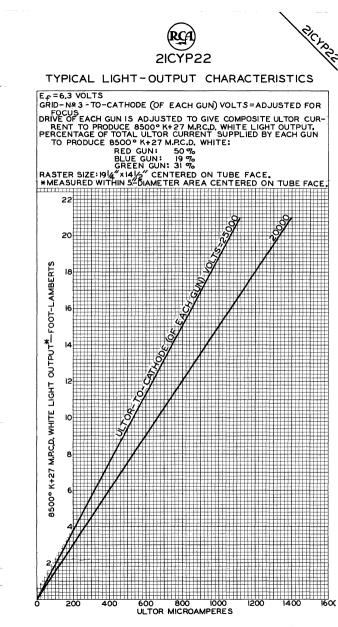
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ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM ~ 9417

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## **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:

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ACC)

Electron Guns, Three with Axes Tilted Toward Tube Axis Blue, Green, Red 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 volts6.3 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
other electrodes
guns) to all other electrodes 9 μμf External conductive coating to grid No.6 {2500 max. μμf 2000 min. μμf
External conductive coating to grid No.0 {2000 min. $\mu\mu$ f
Faceplate, Spherical
Type Aluminized, Tricolor, Phosphor-Dot Phosphor (Three separate phosphors, collectively) P22 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
Projected area
Convergence Method
Deflection Method
Deflection Angles (Approx.):
Horizonta]
Tube Dimensions:
Overall length
Weight (Approx.)



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

Operating Position Tube Axis Horizontal (Base pin 12 and V-grooved panel pad on top)
Caps (Two) Recessed Small Cavity (JEDEC No.J1-21) Socket
BaseSmall-Shell Neodiheptal 12-Pin (JEDEC No.B12-131) Basing Designation for BOTTOM VIEW
Pin 1-Heater Pin 2-Grid No.1 of Red Gun
Pin 3-Grid No.2 of Red Gun Pin 4-Cathode of Red Gun Pin 5-Cathode of Green Gun
Pin 6-Grid No.1
Pin 7-Grid No.2 of Green Gun
Pin 9-Grid No.3 Pin 11-Grid No.2
of Blue Gun Pin 12-Grid No.1 Cap [★] Over of Blue Gun Pin 2-Grid No.6,.
Pin 13 - Cathode of Blue Gun Collector, High- Pin 14 - Heater Voltage-Supply
Cap Terminal Over C – 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 chms 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)

VOLTAGE	5000	max.	volts
GRID-No.2-TO-CATHODE VOLTAGE (Each gun)	600	max.	volts
GRID-No.1-TO-CATHODE VOLTAGE (Each gun):			
Negative-bias value	400	max.	volts
Positive-bias value	0	max.	
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.	volts
After equipment warm-up period	180	max.	
Heater positive with respect to cathode.	180	max.	volts



	Equipment Design Ranges:				
<i>e</i>	With ultor vol	tage (Ecu	Reach due	)	
	between 20000	and 25	000 volt	s	
0.	Grid-No.3 (Focusing				
	Electrode)-to-Cathode	10 00 1 0	04 + 5		
	(Of each gun) Voltage Grid-No.2-to-Cathode	16.8% to 2	U% OT EC4Ke	each gun	volts
	Voltage (Each gun)				
	when circuit design				
1.	utilizes grid-No.1-				
	to-cathode voltage				
	(E _{cik} ) at fixed value		0 -		
	for raster cutoff		.See Cuto;	f Design	Chart
	Grid-Nc.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		See Outer	(f. Deeiru	Chant
	valūe Variation in Raster		.See Cuto;	J Design	Churi
	Cutoff Between Guns				
	in Any Tube	± 21% of	average of	highest	
	,	and lowe	est cutoff		
	Grid-No.3 Current.		-45 to +45		μa
	Grid-No.2 Current		-5 to +5		
	(Each gun)		-3 10 +5		μa
	Current Supplied by				
	Each Gun:				
	To Produce White of				
	8500° K + 27 M.P.C.D.				
	(CIE Coordinates				
	x = 0.287, y = 0.316); Red gun		49		%
	Blue gun		18		%
	Green gun		33		%
	Ratios of Cathode Currents:				
	To Produce White of				
	$8500^{\circ}$ K + 27 M.P.C.D.				
	(CIE Coordinates	Min.	Typical	Max.	
i la compañía de la c	x = 0.287, y = 0.316): Red cathode to	HIN.	1 yp ical	Max.	
X	green cathode	1.2	1.5	1.8	
	Red cathode to				
	blue cathode	2.1	2.7	3.3	
	Maximum Raster Shift in				
	Any Direction from Screen Center		7/8		inch
A.			110		
ġ.					



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 2 10-60

Maximum Required Displacements of Beam Trios with Respect to Associated Phosphor-Dot Trios: Uniform in any direction over . . . . .0.005" entire screen area . . . Adjustment to be Provided by the Following Components: Lateral-Converging Magnet .*, * Maximum lateral shift of blue beam . . . ....±1/4" Maximum lateral shift of red beam and areen beam . . . . . . . . . . ±1/8" to ±3/8" Average of maximum lateral shift of red beam and green beam . . . . . ±7/32" to ±9/32" Radial-Converging Magnet Assembly: For static convergence including compensation for dc component of dynamic convergence .... Shift of ±5/8" (Each beam). . . . . . For dynamic convergence#___ Effected by magnetomotive force of parabolic and/or sawtooth waveshape synchronized with scanning. Horizontal: Blue pattern-Parabola amplitude to provide^{*} . . . . . . . . . . Shift of 3/16" to 1/2" Sawtooth amplitude to provide[®] . . . . . . . . . . Shift of ±50% of the shift caused by parabola amplitude Red pattern & green pattern-Parabola: Amplitude to provide*. . . .Shift of 1/16" to 5/16" Ratio of red-pattern shift Sawtooth: Amplitude to provide[₽]....Shift of -60% to +60% of the shift caused by parabola amplitude Difference between redpattern shift and greenpattern shift (Shift_R -Shift_c). . . . . . . . Vertical: Blue pattern-Parabola amplitude to provide* . . . . . . . . Shift of -1/8" to +1/16" Sawtooth amplitude to 



Red pattern & green pattern Parabola: Amplitude to provide* Shift of 1/8" to 5/16" Ratio of red-pattern shift to green-pattern shift 2/3 to 3/2 Sawtooth: Amplitude to provide* Shift of -1/8" to +3/16" Difference between red- pattern shift and green- pattern shift (Shift _R - Shift _G )100% to +100%
Examples of Use of Design Ranges:
For ultor voltage of 20000 25000 volts
Grid-No.3 (Focusing Electrode)-to-Cathode (Of each gun) Voltage 3360 to 4000 4200 to 5000 volts Grid-No.2-to-Cathode Voltage (Each gun) when circuit design utilizes grid-No.1-to-cathode
voltage of -70 volts for raster cutoff 130 to 370 130 to 370 volts Grid-No.1-to-Cathode Voltage (Each gun) for Visual Extinction of Focused Raster when circuit design utilizes grid-No.2-to-cathode voltage of 200 volts45 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 bulb 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  $|100\ \mu a$  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 milliamperes 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.



#### DEFINITIONS

The red beam, green beam, and blue beam passing through a Beam Trio. 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.

Misregister. 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

Because this color picture tube is de-X-Rav-Warning. signed 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.

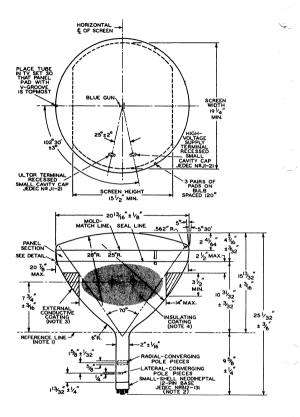
Shatter-Proof Cover Over the Tube Face. Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of this color picture tube to protect it from being struck accidentally and to protect against possible damage resulting 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.

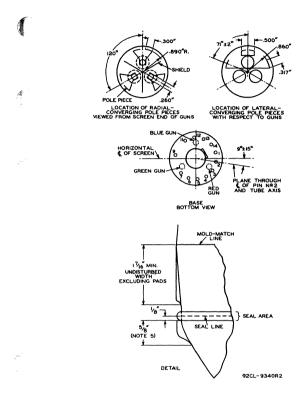
> REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE for Type 21CYP22-A is the same as that shown for Type 21AXP22-A



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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 5 10-60

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.

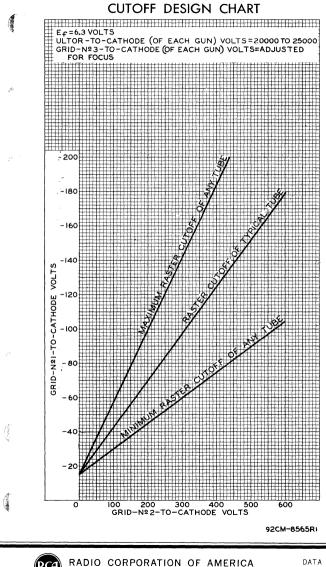
NOTE 2: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 3".

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".



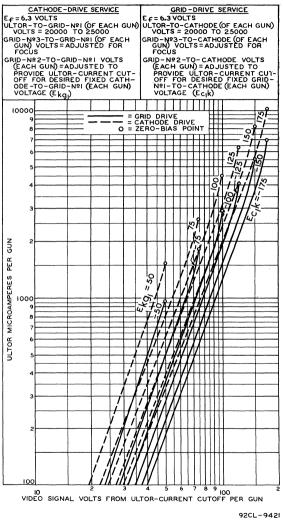


Electron Tube Division

DATA 6 10-60

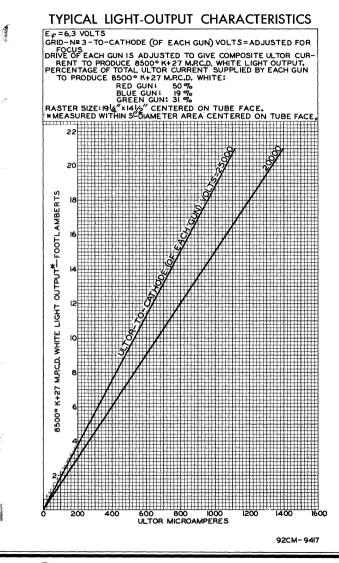
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### TYPICAL DRIVE CHARACTERISTICS



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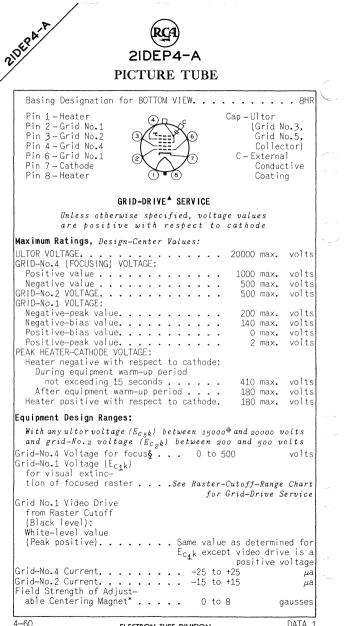
RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

With heater having controlled warm-up time

#### DATA

#### General: Heater, for Unipotential Cathode: Voltage (AC or DC). 6.3 volts 0.6 amp Warm-up time (Average). . . . . 11 sed Direct Interelectrode Capacitances: Grid No.1 to all other electrodes . 6 μµf Cathode to all other electrodes . 5 $\mu\mu f$ (2500 max. $\mu\mu f$ External conductive coating to ultor. 2000 min. $\mu\mu f$ . . . Filterglass Faceplate. Spherical. . . . Light transmission (Approx.). . . . . . . . 76% .P4-Sulfide Type Phosphor (For Curves, see front of this Section). Aluminized . . White Fluorescence. . . . White Phosphorescence . Persistence . . .Medium-Short Focusing Method . Electrostatic Deflection Method .Magnetic . Deflection Angles (Approx.) Diagonal. . . 110⁰ Horizontal. . 105⁰ Vertical. . . • • • 87⁰ . . . . . Type Requiring No Ion-Trap Magnet Electron Gun. . . Tube Dimensions: Overall length. . 14-11/16" ± 5/16" 20-1/4" ± 1/8" Greatest width. . Greatest height . 16-3/8" ± 1/8" 21-3/8" ± 1/8" Diagonal. . . Neck length . . . . . 5-7/16" + 3/16" - 1/8" . . . . . . Radius of curvature of faceplate (External surface). . . . 28-1/2" Screen Dimensions (Minimum): Greatest width. . . 19-1/16" Greatest height . 15-1/16" Diagonal. . . . . . . 20-1/4" 262 sa. in. Projected area. . . Weight (Approx.). . . 22 lbs . . Operating Position. . . Any . . .Recessed Small Cavity (JEDEC No.J1-21) Cap . . . Bulb. . .... J171G1/K1 . . . . . . . . . . Small-Button Eightar 7-Pin, Base. . Arrangement 2, (JEDEC No. B7-183)

PIDER . A



DATA 1





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Examples of Use of Design Rang	ges:				
With ultor voltage of		16000			vo
and grid-No.2 voltage of		400			υo
Grid-No.4 Voltage for focus Grid-No.1 Voltage for visual extinction of	0	) to 50	0		VO
Grid—No.1 Video Drive from Raster Cutoff (Black level):	3				VO
	••• 3	6 to 9	4		VO
Maximum Circuit Values:					
Grid-No.1-Circuit Resistance			1.5 m	ax. m	iego
CATHODE-DR		NICE			
			,		
Unless otherwise spe are positive with					
Maximum Ratings, Design-Center	r Values	:			
ULTOR-TO-GRID-No.1 VOLTAGE . GRID-No.4-TO-GRID-No.1 (FOCUS				max.	
Positive value				max.	VO
Negative value GRID-No.2-TO-GRID-No.1 VOLTAGI	••••	• • •		max.	
GRID-NO.2-TO-GRID-NO.1 VOLTAGE .	<b>L</b>	· · ·		max. max.	
CATHODE-TO-GRID-No.1 VOLTAGE:		• • •	500	max.	vu
Positive-peak value			200	max.	vo
Positive-bias value			140	max.	vo
Negative-bias value				max.	
Negative-peak value			2	max.	VO
PEAK HEATER-CATHODE VOLTAGE:		1			
Heater negative with respec During equipment warm-up p		node:			
not exceeding 15 second			410	max	vo
After equipment warm-up of	eriod		180		
After equipment warm-up pe Heater positive with respec	t to cat	hode	180	max. max.	vo
Equipment Design Ranges:					
With any ultor-to-grid-No.1 v	oltage (	$E_{C_5g_1}$	betwee	en 150	00®
and 20000 volts and grid-No.2- between 225	-to-grid	-No.1 ·	voltage	e (Ĕ _c 2	g 1)
Grid-No.4-to-Grid-No.1					
Voltage for focus§	0	to 500	C		VO
Cathode-to-Grid-No.1					
Voltage (Ekg <u>ı</u> ) for visual extinction					
VISUAL EXTINCTION					
of focused raster	Coo D	and an 1	n	D	01

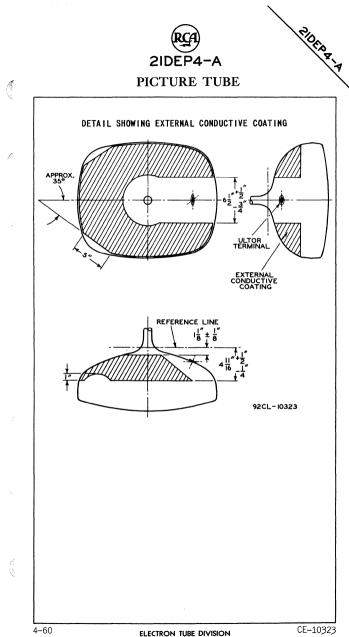
E.S.S.

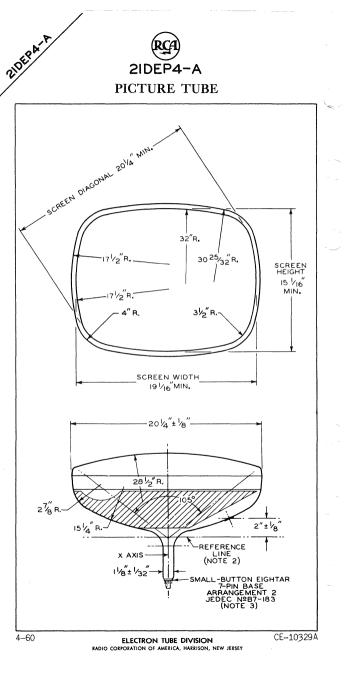


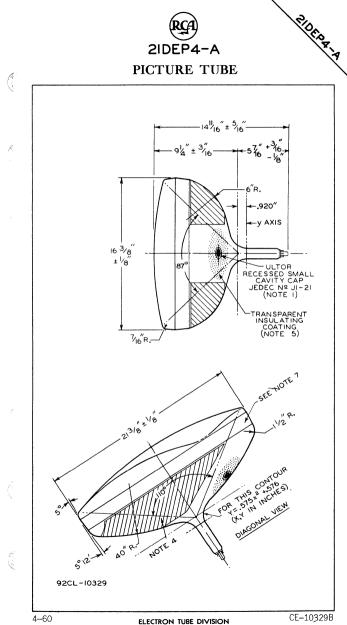
### PICTURE TUBE

Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level):		
White-level value (Peak negative)	. Same value as de Ekg ₁ except vide nega	termined for o drive is a tive voltage
Grid-No.4 Current	-25 to +25 -15 to +15	μa μa
able Centering Magnet [*]	. 0 to 8	gausses
Examples of Use of Design Ranges	5:	
With ultor-to-grid- No.1 voltage of and grid-No.2-to-grid-	16000	volts
No.1 voltage of	400	volts
Grid-No.4-to-Grid-No.1 Voltage for focus. Cathode-to-Grid-No.1 Voltage for visual	0 to 500	volts
extinction of focused raster	36 to 78	volts
White-level value	-36 to -78	volts
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	••••• 1.5 m	ax. megohms
Grid drive is the operating condition the grid-No.1 potential with respectively.	on in which the video t to cathode.	o signal varies
Brightness and focus quality decree In general, the ultor voltage sho	ase with decreasing uld not be less than	ultor voltage. 15,000 volts.
§ The grid-No.4 voltage or grid-No.4 focus of any individual tube is in remain essentially constant for va grid-No.1 voltage) or grid-No.2 v voltage) within design ranges showr	dependent of ultor cu lues of ultor voltage oltage (or grid-No.2 for these items.	rrent and will (or ultor-to- 2-to-grid-No.1
* Distance from Reference Line for s not exceed 2-1/4". Excluding ext undeflected focused spot will fall radius concentric with the center of that the earth's magnetic field ca tion of the spot from the center of	uitable PM centering raneous fields, the within a circle hav f the tube face. It n cause as much as 1/ the tube face.	magnet should center of the ing a 3/8-inch is to be noted 2-inch deflec-
Cathode drive is the operating cc varies the cathode potential with electrodes.	ndition in which the respect to grid No.1	e video signal and the other
For X-ray shielding con X-RAY PRECAUTIONS FO. at front of t	R CATHODE-RAY TUBE	
4-60 ELECTRON N		

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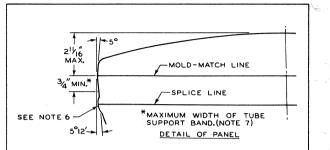




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### PICTURE TUBE



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.

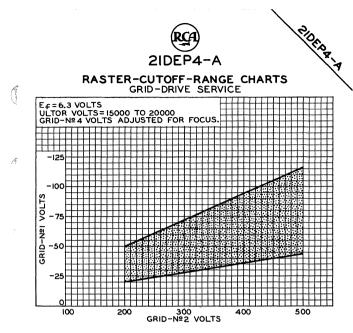
NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNT-ED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. THE DESIGN OF THE SOCKET SHOULD BE SUCH THAT THE CIRCUITRY CANNOT IMPRESS LATERAL STRAINS THROUGH THE SOCKET CONTACTS ON THE BASE PINS. BOTTOM CIRCUMFERENCE OF BASE WAFER WILL FALL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

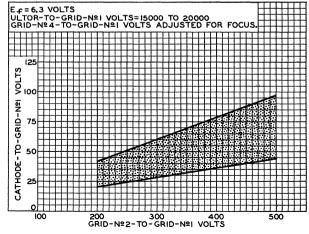
NOTE 7: UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/4" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND.

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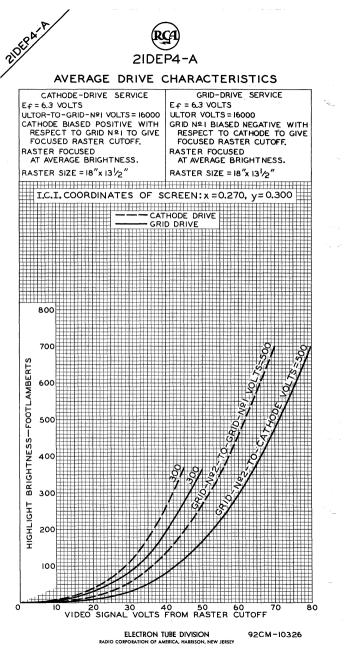
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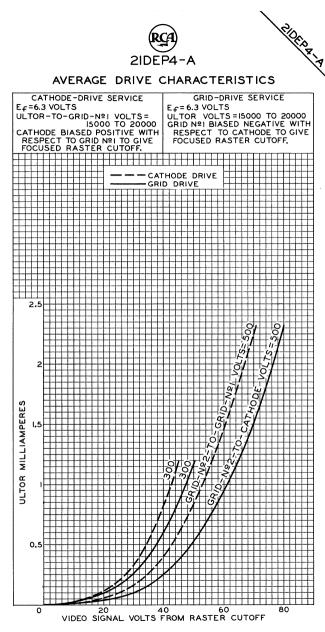
#### CATHODE-DRIVE SERVICE



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92CS-10325





ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-10328





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#### TIDE DIC ...

<b>6</b>	PICTURE TU	JBE
l	RECTANGULAR GLASS TYPE LOW-VOLTAGE FOCUS	ALUMINIZED SCREEN MAGNETIC DEFLECTION
	DATA	
	General:	
(	Current 0.6 Direct Interelectrode Capacitances: Grid No.1 to all other electrodes . Cathode to all other electrodes .	ac or dc volts amp 6 μμf 5 μμf
	External conductive coating to uito	$\mu \mu f$
đ	Faceplate, Spherical	Filterglass
	Fluorescence. Phosphorescence Persistence Focusing Method Deflection Method Deflection Angles (Approx.): Diagonal.	White White Short Electrostatic Magnetic
	Horizontal Vertical Electron Gun Type Requ	
<i>Æ</i> :	Tube Dimensions: Overall length. Greatest width. Greatest height Diagonal. Neck length.	20-1/4" ± 1/8" 16-3/8" ± 1/8" 21-3/8" ± 1/8"
Q	Screen Dimensions (Minimum): Greatest width Greatest height Diagonal. Projected area Weight (Approx.).	20-1/4" 262 sq. in. 23 lbs
Ĩ	Operating Position	Cavity (JETEC No.J1-21) 
(	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	Сар-Ultor (Grid No.3,

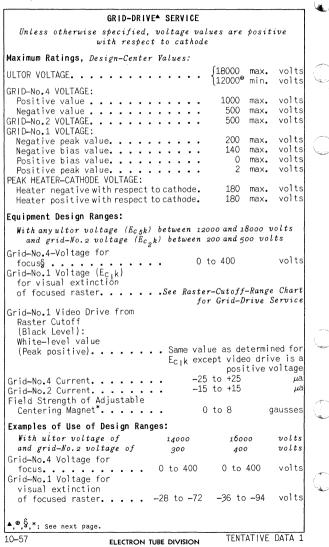
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ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA 1







RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



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### PICTURE TUBE

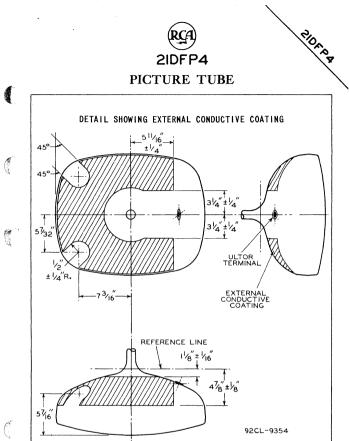
l	Grid-No.1 Video Drive from Raster Cutoff
	(Black Level): White-level value 28 to 72 36 to 94 volts
	Maximum Circuit Values:
	Grid-No.1-Circuit Resistance 1.5 max. megohms
	CATHODE-DRIVE [®] SERVICE
	Unless otherwise specified, voltage values are positive with respect to grid No.1
	Maximum Ratings, Design-Center Values:
	ULTOR-TO-GRID-No.1 VOLTAGE
	GRID-No.4-TO-GRID-No.1 VOLTAGE:       1000 max. volts         Positive value       500 max. volts         GRID-No.2-TO-GRID-No.1 VOLTAGE       640 max. volts         GRID-No.2-TO-CATHODE VOLTAGE       500 max. volts         CATHODE-TO-GRID-No.1 VOLTAGE       500 max. volts
	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:       180 max. volts         Heater negative with respect to cathode.       180 max. volts         Heater positive with respect to cathode.       180 max. volts
	Equipment Design Ranges:
Æ	With any ultor-to-grid-No.1 voltage $(E_{C_{S}g_{1}})$ between 12000 and 18000 volts and grid-No.2-to-grid-No.1 voltage $(E_{C_{Z}g_{1}})$ between 225 and 640 volts
Â	Grid-No.4-to-Grid-No.1 Voltage for focus§0 to 400 volts Cathode-to-Grid-No.1 Voltage (E _{kg1} ) for visual extinction of focused rasterSee Raster-Cutoff-Range Chart for Cathode-Drive Service
•	Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak negative) Same value as determined for Ekg1 except video drive is a negative voltage
■.	Grid-No.4 Current
	▲,⊕,Ŝ,*,■: See next page.
	10-57 ELECTRON TUBE DIVISION TENTATIVE DATA 2
	RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



#### PICTURE TUBE

Grid-No.2 Current Field Strength of Adjustable	••• -15 t	to +15	μa	۰.
Centering Magnet*	Ot	to 8	gausses	
Examples of Use of Design Rang	nes'			
With ultor-to-grid-	3001			1
No.1 voltage of	14000	16000	volts	
and grid-No.2-to-grid-	14000	10000	00000	Aler
No.1 voltage of	300	400	volts	
Grid-No.4-to-Grid-	5	1		
No.1 Voltage				
for focus	0 to 400	0 to 400	volts	
Cathode-to-Grid-No.1				15-16
Voltage for				1 La J
visual extinction				~
	28 to 60	36 to 78	volts	
Cathode-to-Grid-No.1				
Video Drive from				
Raster Cutoff				
(Black Level):	-28 to -60	26 to 79	volte	
White-level value	-28 10 -60	-20 10 -70	VOILS	
Maximum Circuit Values:				
Grid-No.1-Circuit Resistance .		1.5 max. I	negohms	
			Ŭ	
Grid drive is the operating cond the grid-No.1 potential with res	ition in which t	he video signa	l varies	
This value is a working design-cel	nter minimum. T	he equivalent	absolute	
This value is a working design-centric minimum ultor-, or ultor-to-griwhich the serviceability of the 2	d-No.1 voltage	is 11,000 volt	s, below	
designer has the responsibility	of determining a	a minimum desi	gn value	
which the serviceability of the 2 designer has the responsibility such that under the worst prob supply-voltage variation and equ ultor-, or ultor-to-grid-No.1 vo	able operating ipment variation	n the absolute	minimum	
ultor-, or ultor-to-grid-No.1 vo	ltage is never l	ess that 11,00	0 volts.	
S The grid-No.4 voltage or grid-Nu focus of any individual tube is remain essentially constant for grid-No.1 voltage) or grid-No.1 voltage) within design ranges sho	o.4-to-grid-No.1 independent of (	L voltage requ	ired for and will	$\sim$
remain essentially constant for	values of ultor	voltage (or u	ltor-to-	Sec. 2
grid-No.1 voltage) or grid-No.3	2 voltage (or g own for these it	rid-No.2-to-g ems.	rid-No.1	-
* Distance from Reference Line for not exceed 2-1/4". Excluding of undeflected focused spot will far radius concentric with the cente that the earth's magnetic field tion of the spot from the center	r suitable PM ce	entering magne	t should	
not exceed 2-1/4". Excluding e	extraneous field	ds, the cente	r of the	
radius concentric with the cente	r of the tube fa	ice. It is to	be noted	
that the earth's magnetic field	can cause as mu	ch as 1/2—inch e.	deflec-	
Cathode drive is the operating	condition in w	hich the vide	o signal	1
Cathode drive is the operating varies the cathode potential wi	th respect to gr	id No.1 and t	he other	de
electrodes.				
For X-ray shielding co				
X-RAY PRECAUTIONS F		Y TUBES		
at front of	this Section			
Curves and Charts sh	own under Typ	e 21CEP4		-1-
also apply	to the 21DFP4			
L				

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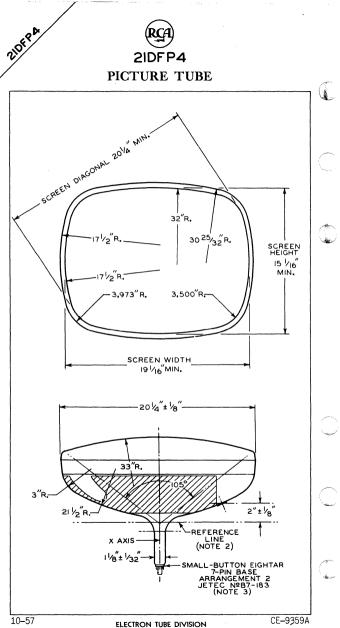


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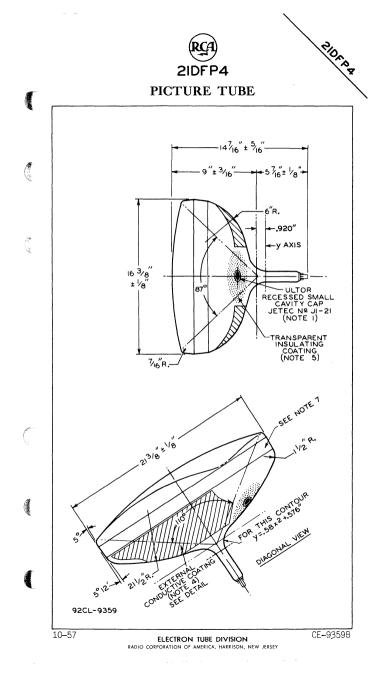
ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

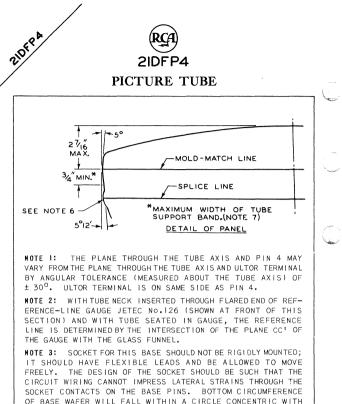
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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





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 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 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.

# 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:

Constant of

Heater Current at 6.3 volts
Optical:
Faceplate
Mechanical:
Operating Position
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 4-Grid No.1 Pin 7-Cathode Pin 8-Heater Pin 8-Heater



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

# 21DHP4

Maximum Ratings, Design-Maximum Values:	
ULTOR VOLTAGE	volts
Positive value	volts 🔍
Negative value	
GRID-No.2 VOLTAGE	volts
Negative peak value	volts
Negative bias value	
Positive bias value 0 max.	
Positive peak value 2 max.	volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with	
respect to cathode:	
During ëquipment warm-up period	
not exceeding 15 seconds 450 max.	
After equipment warm-up period 200 max.	volts 🦟
Heater positive with respect to cathode	volts
respect to cathode 200 max.	VULLS
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	2 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

183







LOW-VOLTAGE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

#### DATA

#### General:

4

(BANK)

Heater, for Unipotential Cathode: Voltage 6.3ac or dc volts
Current 0.6 ± 10%
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. $\mu\mu f$
$ \begin{array}{cccc} \mbox{Faceplate, Spherical} \\ \mbox{Faceplate, Spherical} \\ \mbox{Light transmission (Approx.)} \\ \mbox{Phosphor (For Curves, see front of this Section)} \\ \mbox{Pd} \mbox{Pd} \mbox{Section} \\ \mbox{Pd} \mbox{Pd} \mbox{Pd} \mbox{Pd} \mbox{Section} \\ \mbox{Pd} Pd$
Light transmission (Approx.)
Aluminized
Fluorescence
Phosphorescence
Persistence Short Focusing Method
Deflection Method
Deflection Angles (Approx.): Diagonal
$[Vertica] \cdot
Vertical
Overall length
Greatest width
Greatest height
Neck length
Greatest width
Greatest height
Diagonal
Weight (Approx.)
Coperating Position
Bulb
No.B6-203), or Small-Shell Duodecal 6-Pin
(JETEC Group 4, No.B6-63) Basing Designation for BOTTOM VIEW
Pin 1-Heater
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 C C C C C C C C C C C C C C C C C C
9-58 ELECTRON TUBE DIVISION TENTATIVE DATA 1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



## 2IDLP4 PICTURE TUBE

<b>GRID-DRIVE</b> Unless otherwise specified, a		e positive
with respect		e positive
Maximum and Minimum Ratings, Des	sign-Center Value	s:
ILTOR VOLTAGE	· · · · · {20000 12000	
GRID-No.4 (FOCUSING) VOLTAGE: Positive value	1000	) max. volts
Positive value		
GRID-No.2 VOLTAGE	500	
Negative-peak value.		
Negative-bias value Positive-bias value		) max. volts ) max. volts
Positive-peak value		
EAK HEATER-CATHODE VOLTAGE: Heater negative with respect to		
During equipment warm-up per		
not exceeding 15 seconds .		
After equipment warm-up per		
Heater positive with respect to	cathode. 180	) max. volts
quipment Design Ranges:		
With any ultor voltage (E _{C5k} ) ( and grid-No.2 voltage (E _{C2k} )	between 12000 and between 200 and	20000 volts 500 volts
Grid-No.4 Voltage for		
focus§	-50 to +400	volts
Grid-No.1 Voltage (E _{cik} ) for visual extinction		
of focused raster	See Raster-Cutof	f-Range Chart
		Drive Service
Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value	·	
(Peak positive)	Same value as c	letermined for
	Ecik except vid	
		sitive voltage
Arid-No.4 Current	-25 to +25	μa
Grid-No.2 Current Field Strength of Adjust-	-15 to +15	μа
able Centering Magnet*	0 to 8	qausses
• •		3446666
xamples of Use of Design Range		
With ultor voltage of	16000	volts
and grid-No.2 voltage of	300	volts
Grid-No.4 Voltage for	0 to 400	
	0 10 400	volts
,⊕,\$,*: See next page		

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





## PICTURE TUBE

Grid-No.1 Voltage f visual extinction focused raster. Grid-No.1 Video Dri from Raster Cutof (Black Level):	of  ve f		-		to -72		V
White-level value				28	to 72		V
<b>Maximum Circuit Val</b> Grid-No.1-Circuit R					1.5 m	ax. I	nega
	CATHODE-DR	VE [■]	SERV	ICE			
Unless otherwise w	specified, ith respect					posi	tive
Maximum and Minimum	Ratings, De	sign	-Cen	ter	Values	:	
ULTOR-TO-GRID-No.1	VOLTAGE				{20000 \12000 [⊕]	max. min.	
GRID-No.4-TO-GRID-N Positive value . Negative value . GRID-No.2-TO-GRID-N GRID-No.2-TO-CATHOD CATHODE-TO-GRID-No. Positive-peak val Negative-bias val Negative-bias val Negative-peak val PEAK HEATER-CATHODE Heater negative wi During equipmen not exceeding After equipment Heater positive wi Equipment Design Ra	o.1 VOLTAGE E VOLTAGE. 1 VOLTAGE: ue ue VOLTAGE: th respect tt t warm-up pe 15 seconds warm-up pet th respect t	o cat	hode I	· · · · · · · · · · · · · · · · · · ·	1000 500 640 500 200 140 0 2 2 410 180 180	max. max. max. max. max. max. max. max.	
With any ultor-to- and 20000 volts an	-grid-No.1 1 dgrid-No.2-	∙to-g	rid-	No.:	i volta	ween ge (E	1200 28
Grid-No.4-to-Grid-No. Voltage for focus Cathode-to-Grid-No. Voltage (Ekg _l ) fo visual extinction	§ 1	ena (	40 V		o 450		V
of focused raster		Se e			-Cutoff thode-D		
▲,⊕, [§] ,*,■: See next pag							

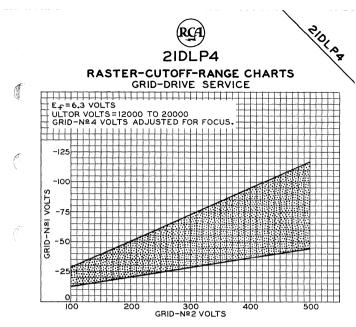




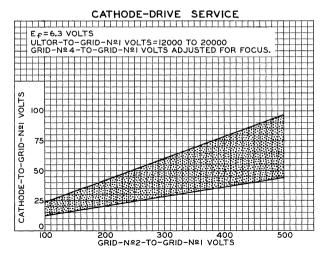
### PICTURE TUBE

Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value		
(Peak negative)	Same value as det Ekg _l except video negat	ermined for drive is a ive voltage
Grid-No.4 Current	-25 to +25 -15 to +15	μa μa
able Centering Magnet*	0 to 8	gausses
xamples of Use of Design Range	es:	
With ultor-to-grid- 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 Cathode-to-Grid-No.1 Voltage for visual	0 to 400	volts
extinction of focused raster Cathode-to-Grid-No.1 Video Drive from Raster Cutoff	28 to 60	volts
(Black Level): White-level value	-28 to -60	volts
<b>Maximum Circuit Values:</b> Grid-No.1-Circuit Resistance.	1.5 ma	x. megohms
Grid drive is the operating condition the grid-No.1 potential with resp	tion in which the video ect to cathode.	signal varies
This value is a working design-c: lute ministrum ultor- or ultor-to-g low which the serviceability of equipment designer has the resp design value such that under t tions involving supply-voltage v absolute minimum ultor- or ultor than 11.000 volts.	enter minimum. The equ rid-No.1 voltage is 11, 'the 21DLP4 will be in onsibility of determin he worst probable oper ariation and equipment '-to-grid-No.1 voltage'	ivalent abso- 000 volts, be- npaired. The ing a minimum ating condi- variation the is never less
9 The grid-No.4 voltage or grid-No focus of any individual tube is i remain essentially constant for v grid-No.1 voltage) or grid-No.2 voltage) within design ranges sho	.4-to-grid-No.1 voltage independent of ultor cur values of ultor voltage voltage (or grid-No.2- wn for these items.	required for rent and will (or ultor-to- -to-grid-No.1
Distance from Reference Line for not exceed 2-1/4". Excluding e undeflected focused spot will fal radius concentric with the cen noted that the earth's magnetic deflection of the spot from the c	- suitable PM centering xtraneous fields, the 11 within a circle havin ter of the tube face. field can cause as muc enter of the tube face.	magnet should center of the ng a 7/16-inch It is to be h as 1/2-inch
Cathode drive is the operating varies the cathode potential wit electrodes.	condition in which the h respect to grid No.1	video signal and the other
For X-ray shielding co X-RAY PRECAUTIONS F	nsiderations, see sh FOR CATHODE-RAY TUBES this Section	
2.50		ATIVE DATA 2

ELECTRON TUBE DIVISION TENTATIVE DATA 2 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



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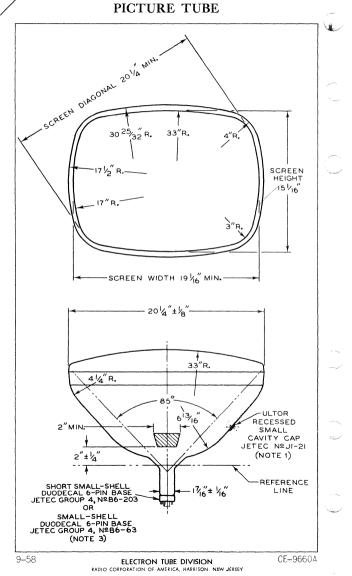
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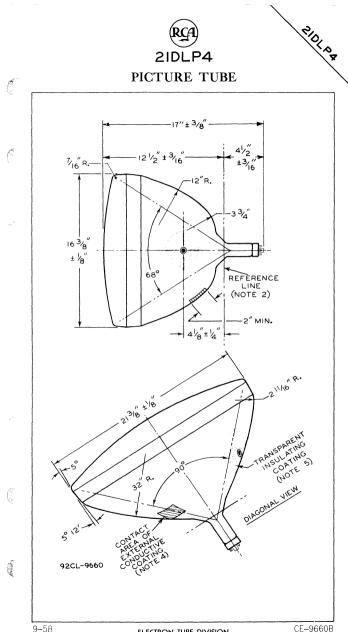
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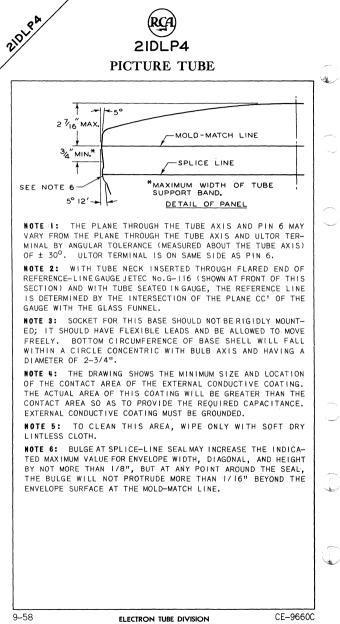


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ELECTRON TUBE DIVISION

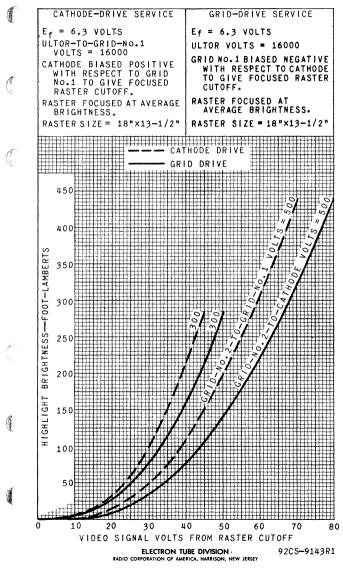


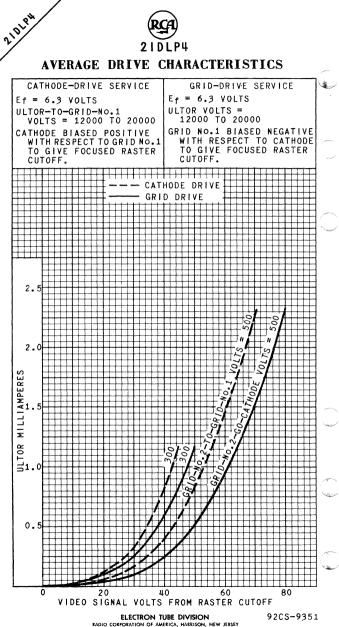
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



210104

AVERAGE DRIVE CHARACTERISTICS







### PICTURE TUBE

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

#### DATA

#### General:

New York

	Heater, for Unipotential Cathode: Voltage (AC or DC) Current Direct Interelectrode Capacitances: Grid No.1 to all other electrodes	6.3 0.6 6	volts amp μμf
	Cathode to all other electrodes	5	μμf
		(2500 max	
	External conductive coating to ultor.	12000 min	
	Faceplate, Spherical	Fil .P4—Sulf	terglass 74% ide Type
	Fluorescence		. White
	Phosphorescence		. White
	Persistence		
	Focusing Method		
	Deflection Method		
	Deflection Angles (Approx.):		magnetre
	Diagonal		90 ⁰ 85 ⁰
	Vertical		680
	Electron Gun Type Requiring N	lo Ion-Tra	p Magnet
	Tube Dimensions:		
	Overall length	18	" + 3/8"
	Greatest width	20-1/4	" + 1/8"
	Greatest height		
		. 10-3/0	± 1/0
	Neck length	· 21~5/0	E 1/0
Ì		. 5-1/2"	± 3/10"
	Radius of curvature of faceplate (External	surface)	• • 33"
	Screen Dimensions (Minimum):		
	Greatest width		
	Greatest height		
	Diagonal		20-1/4"
	Projected area	262	sq. in.
	Weight (Approx.)		24 lbs
	Operating Position		Any
	Cap Recessed Small Cavity	/ (JEDEC N	o.J1-21)
	Bulb	· · · J1	71 D2/F1
	Cap	oin. Arran	gement 1
	(JEDEC Group	4. No. 86	-63), or
	Short Small-She	11 Duodec	al 6-Pin
		oup 4. No	
	(02020 01		

(Second

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Basing Designation for BOTTOM VIEW		RCA) 2IDSP4 FURE 1	•	E			
Unless otherwise specified, voltage values are positive with respect to grid No.1 Maximum and Minimum Ratings, Design-Center Values: ULTOR-TO-GRID-No.1 VOLTAGE	Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode co		w	·	(Grid Grid Colle Extern Condu	No.3, No.5, ctor) al ctive	
are positive with respect to grid No.1 Maximum and Minimum Ratings, Design-Center Values: ULTOR-TO-GRID-No.1 VOLTAGE							
Maximum and Minimum Ratings, Design-Center Values:ULTOR-TO-GRID-No.1 VOLTAGE. $20000 \text{ max. volts}$ GRID-No.4-TO-GRID-No.1 VOLTAGE: $10000 \text{ max. volts}$ Positive value. $1000 \text{ max. volts}$ Negative value. $1000 \text{ max. volts}$ GRID-No.2-TO-GRID-No.1 VOLTAGE. $64 \text{ max. volts}$ GRID-No.2-TO-GRID-No.1 VOLTAGE. $64 \text{ max. volts}$ GRID-No.2-TO-GRID-No.1 VOLTAGE. $64 \text{ max. volts}$ CATHODE-TO-GRID-No.1 VOLTAGE. $64 \text{ max. volts}$ Positive-peak value $200 \text{ max. volts}$ Negative-bias value $2 \text{ max. volts}$ Negative-peak value $2 \text{ max. volts}$ PEAK HEATER-CATHODE VOLTAGE: $410 \text{ max. volts}$ Heater negative with respect to cathode: $2 \text{ max. volts}$ During equipment warm-up period not exceeding 15 seconds. $180 \text{ max. volts}$ After equipment warm-up period not exceeding 15 seconds. $180 \text{ max. volts}$ Equipment Design Ranges: With any ultor-to-grid-No.1 voltage ( $E_{csg1}$ ) be- tween 12000 and 20000 volts and grid-No.2-to-grid- No.1 voltage ( $E_{csg1}$ ) between 40 and 64 voltsGrid-No.4-to-Grid-No.VoltageVoltage for focuss. $100 \text{ volts}$ Cathode-to-Grid-No.1 Voltage( $Ekg1$ ) for visual extinction of focused raster See Raster-Cutoff-Range ChartCathode-to-Grid-No.1 Video Drive from Raster Cutoff (B							
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	Maximum and Minimum Ratin	<b>gs,</b> Design	-Cent	er Value	s:		
Positive value			•••	{20000 12000 <b>#</b>	max. min.		
Positive-peak value	Positive value Negative value GRID-No.2-TO-GRID-No.1 VO GRID-No.2-TO-CATHODE VOLT	  LTAGE	  	500 64	max. max.	volts volts	
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	Positive-peak value Positive-bias value Negative-bias value Negative-peak value PEAK HEATER-CATHODE VOLTAW Heater negative with	· · · · · ·	• • • • • •	140 0	max. max.	volts volts	
<pre>Equipment Design Ranges: With any ultor-to-grid-No.1 voltage (E_{c5g1}) be- tween 12000 and 20000 volts and grid-No.2-to-grid- No.1 voltage (E_{c2g1}) between 40 and 64 volts Grid-No.4-to-Grid-No. Voltage for focus§0 to 400 volts Cathode-to-Grid-No.1 Voltage (Ekg1) for visual extinction of focused raster See Raster-Cutoff-Range Chart Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)</pre>	During equipment warm not exceeding 15 se After equipment warm- Heater positive with	conds		180	max.	volts	
<pre>With any ultor-to-grid-No.1 voltage (E_{c5g1}) be- tween 12000 and 20000 volts and grid-No.2-to-grid- No.1 voltage (E_{c2g1}) between 40 and 64 volts Grid-No.4-to-Grid-No. Voltage for focus\$0 to 400 volts Cathode-to-Grid-No.1 Voltage (Ekg1) for visual extinction of focused raster See Raster-Cutoff-Range Chart Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative) Same value as determined for Ekg1 except video drive is a negative voltage</pre>							
Voltage for focus§ 0 to 400 volts Cathode-to-Grid-No.1 Voltage $[Ekg_1]$ for visual extinction of focused raster See Raster-Cutoff-Range Chart Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative) Same value as determined for $Ekg_1$ except video drive is a negative voltage	With any ultor-to-g tween 12000 and 2000 No.1 voltage (E _{C2}	o volts an	d gri	d-No.2-t	o-grid	-	
(Black level): White-level value (Peak negative)Same value as determined for E _{kg1} except video drive is a negative voltage	Voltage for focus§ Cathode-to-Grid-No.1 Volt. (Ekg1) for visual extim of focused raster Cathode-to-Grid-No.1 Vide	ction •••See 0	Rast				
	(Black level): White-level value	Sa		cept vid	leo dri	ve is a	
10-59 ELECTRON TUBE DIVISION DATA 1	10–59 <b>FI ECT</b>						1

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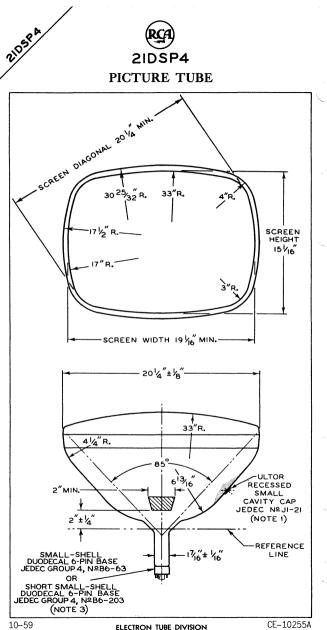


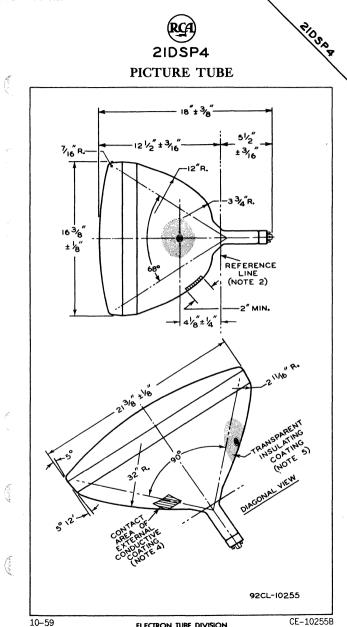
#### PICTURE TUBE

Grid-No.4 Current	-25 to +25 -15 to +15 0 to 8	μa μa qausses
Examples of Use of Design Ranges: With ultor-to-grid-		5
No.1 voltage of and grid-No.2-to-grid-	18000	volts
No.1 voltage of Grid-No.4-to-Grid-No.1 Voltage	50	volts
for focus	0 to 350	volts
of focused raster	32 to 47	volts
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 in varies the cathode potential with respect to electrodes. Operation below this value is not recommended		eo signal the other
The grid-No.4 voltage or grid-No.4-to-grid-N focus of any individual tube is independent or remain essentially constant for values of ul or grid-No.2-to-grid-No.1 voltage within of these items.		uired for and will 1 voltage shown for
Distance from Reference Line for suitable PM not exceed 2-1/4". Excluding extraneous fi undeflected focused spot will fall within a c radius concentric with the center of the noted that the earth's magnetic field can ca deflection of the spot from the center of the	centering magn elds, the cent ircle having a tube face. It ause as much as tube face.	et should er of the 7/16-inch is to be 1/2-inch
The cathode-to-grid-No.1 voltage (E _{kg1} ) for focused raster will increase by approximate 1000-volt increase in ultor-to-grid-No.1 volt approximately 2 per cent for every 1000-vol grid-No.1 voltage.	or visual extin ly 2 per cent age and will de	nction of for every ecrease by
For x-ray shielding consideration X-RAY PRECAUTIONS FOR CATHODE at front of this Secti	-RAY TUBES	

Contraction of the second

6





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

21DSP4 21DSP4 PICTURE TUBE 27₁₆[°] MAX. 34[°] MIN.* SEE NOTE 6 5° 12' - SPLICE LINE *MAXIMUM WIDTH OF TUBE SUPPORT BAND. DETAIL OF PANEL

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.

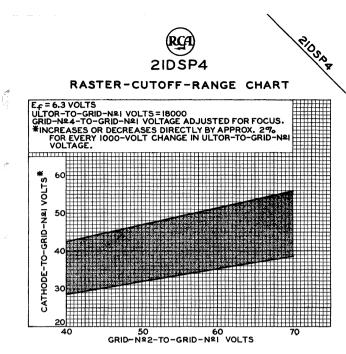
NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC NO.G-II6 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

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.

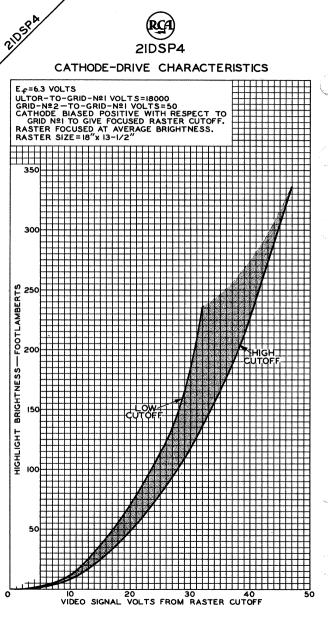
NOTE 5: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

NOTE 6: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDI-CATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 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.



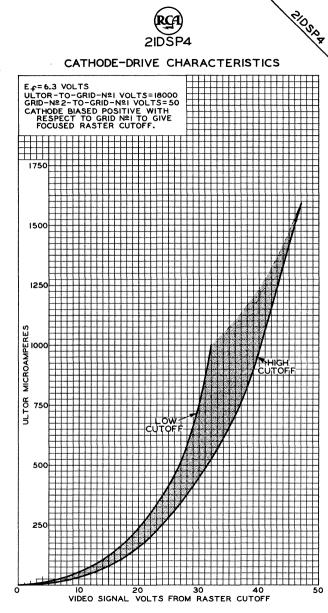
92CS-9911

(Acres)



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

92CM-9904



ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-9909



## 21EP4B

## **Picture Tube**

RECTANGULAR GLASS TYPE Magnetic focus	ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION
GENERAL DATA	
Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes . Grid-No.1 to all other electrodes . External conductive coating to anon	6 pf
Heater Current at 6.3 volts Electron Gun	600 ± 60 ma
Optical:	
Phosphor (For Curves, see front of this Se	
Faceplate, Cylindrical Light transmission (Approx.)	Aluminized Filterglass 
Mechanical:	+
Weight (Approx.) Overall Length. Neck Length	23-1/32" ± 3/8" 7-1/2" ± 3/16"
Type	Near Reference Line gs and Dimensions:
Cap Recessed Smal Base	
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) Coductive Conductive Coating

🗕 Indicates a change.



1

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. - Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to cathode 19800 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 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. . . . 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 Service: Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage . . . . . . . . . . . . 12000 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. meaohms For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section

-- Indicates a change.





With heater having controlled warm-up time

SHORT RECTANGULAR GLASS TYPE

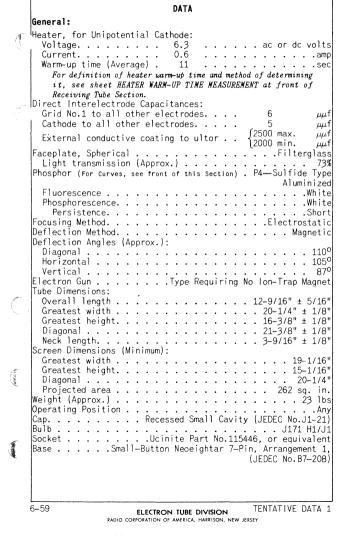
LOW-VOLTAGE ELECTROSTATIC FOCUS

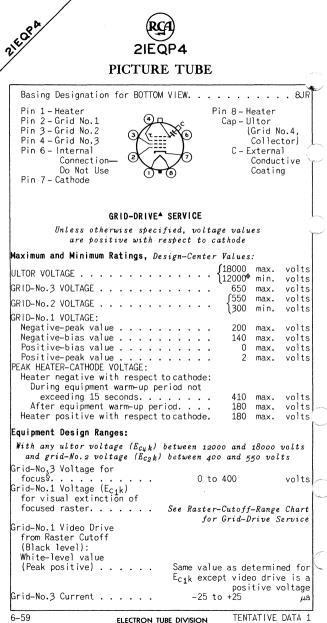


ALUMENTZED SCREEN

MAGNETIC DEFLECTION

RIK ORD





RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



Sec. 12



### PICTURE TUBE

Č	PICTUR	E TUBE		
	Grid-No.2 Current	-15 to +15		μa
	Field Strength of Adjust- able Centering Magnet	0 t	o 10	gausses
	Examples of Use of Design Rang	es:		
6	With ultor voltage of	16000	18000	volts
	and grid-No.2 voltage of	400	500	volts
	Grid-No.3 Voltage for focus	0 to 400	0 to 400	volts
. 51	focused raster Grid-No.1 Video Drive from Raster Cutoff	-34 to -63	-43 to -78	8 volts
	(Black level): White-level value	34 to 63	43 to 78	volts
	Maximum Circuit Values:			
	Grid-No.1-Circuit Resistance.		1.5 max.	megohms
	CATHODE-DRI	VE" SERVICE		
	Unless otherwise specif positive with res			
	Maximum and Minimum Ratings, D	esign-Center	- Values:	
	ULTOR-TO-GRID-No.1 VOLTAGE		∫18000 max	
	GRID-No.3-TO-GRID-No.1 VOLTAGE GRID-No.2-TO-GRID-No.1 VOLTAGE		12000 [⊕] mir 650 max 690 max	<. volts <. volts </td
1 an	GRID-No.2-TO-CATHODE VOLTAGE.			
C	CATHODE-TO-GRID-No.1 VOLTAGE: Positive-peak value Positive-bias value		200 max 140 max	<. volts
	Negative-bias value		0 max	
(	Negative-peak value PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect During equipment warm-up p	to cathode:	2 may	<. volts
1	exceeding 15 seconds.		410 max	. volts
	After equipment warm-up pe Heater positive with respect		180 max 180 max	
	Equipment Design Ranges:			
	With any ultor-to-grid-No.1 and 18000 volts and grid-No.2 between 400	-to-grid-No.	1 voltage	12000 Ec _{2g1} )
	Grid-No.3-to-Grid-No.1 Voltage for focus§	. 0	to 400	volts

2IEQP4

PICTURE TUBE

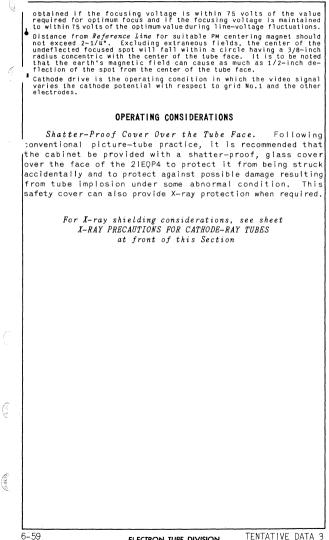
				<b>b</b> /-
Cathode-to-Grid-No.1 Volt- age (Ekg ₁ ) for visual ex- tinction of focused raster Cathode-to-Grid-No.1 Video		r-Cutoff-Ran sthode-Drive		
Calibode-10-310-NO.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)		ue as determ ept video dr negative	ive is a	
Grid-No.3 Current Grid-No.2 Current Field Strength of Adjust- able Centering Magnet	-15 t	to +25 to +15 o 10	μa μā gausses	M
Examples of Use of Design Rang	ies:			
With ultor-to-grid-				
No.1 voltage of and grid-No.2-to-grid- No.1 voltage of	16000	18000	volts volts	
Grid-No.3-to-Grid-No.1 Voltage for focus	<i>400</i> 0 to 400	<i>500</i> 0 to 400	volts	
Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster	34 to 56		volts	
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value	-34 to -56	-41 to -69	volts	(
Maximum Circuit Values:	<i>,</i>			~
Grid-No.1-Circuit Resistance.		1.5 max.	megohms	
Grid drive is the operating condition of the grid-No.1 potential with resp this value is a working design-cen minimum diverse of the service ability of the 21 designer has the responsibility of such that under the worst probe supply-voltage variation and equilation of the grid-No.3 voltage required for may have a value anywhere between the value of the ultor voltage. it changes directly with the ulto do volts for each 1000-volt chang rate of about 60 volts for each 100 rate of about 60 volts for each 100	ect to cathode ter minimum. -No.1 voltage EQP4 will be i of determining able operating ipment variati age is never l or optimum focu	The equivalent is 11,000 vol mpaired. The a minimum des g conditions on the absolut ess than 11,00 is of any indivit	t absolute ts, below equipment sign value involving te minimum D0 volts. idual tube	
Because the 21EQP4 has a narrow provide means such as a potention the focusing voltage. In genera	meter or a 4-t	ap switch for	adiusting	
A				-

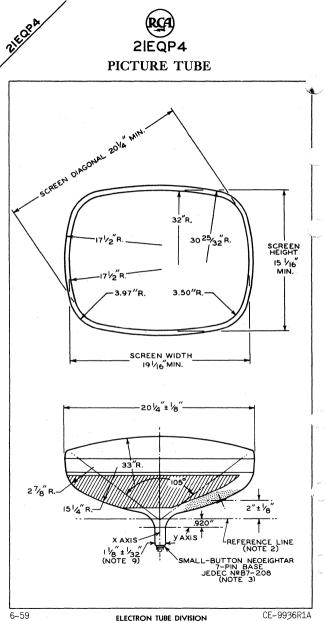
21EOPA

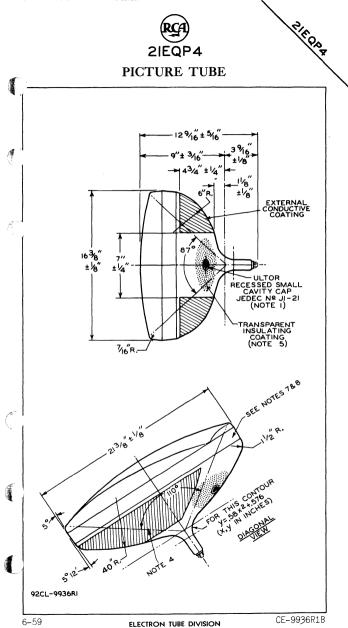


ALKOR A

### PICTURE TUBE



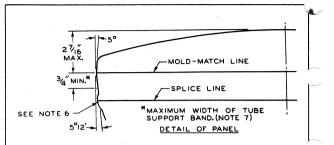




RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



2IEQP4 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 BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. THE DESIGN OF THE SOCKET SHOULD BE SUCH THAT THE CIRCUIT WIRING CANNOT IMPRESS LATERAL STRAINS THROUGH THE SOCKET CONTACTS ON THE BASE PINS. BOTTOM CIRCUMFERENCE OF BASE WAFER WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 1-3/4".

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

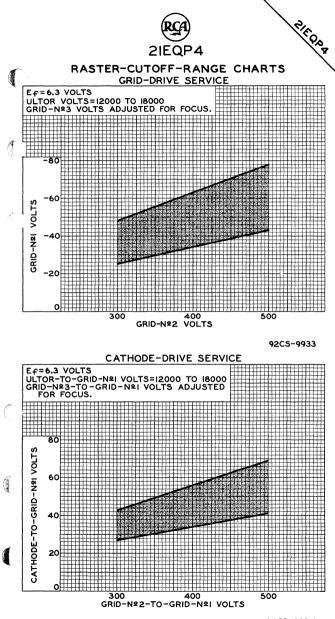
NOTE 5: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

NOTE 6: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE 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.

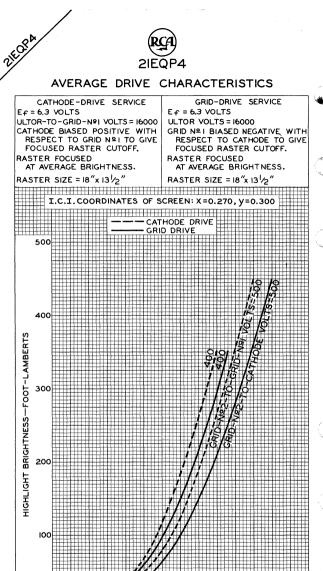
NOTE 7: WIDTH OF UNDISTURBED REGION BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/4" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND.

NOTE 8: TUBE MOUNTING OR YOKE SUPPORT CLAMPS MUST BE SPACED FROM TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

NOTE 9: NECK DIAMETER IS MAINTAINED TO AT LEAST 2-7/16" FROM REFERENCE LINE.



ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CS-9934

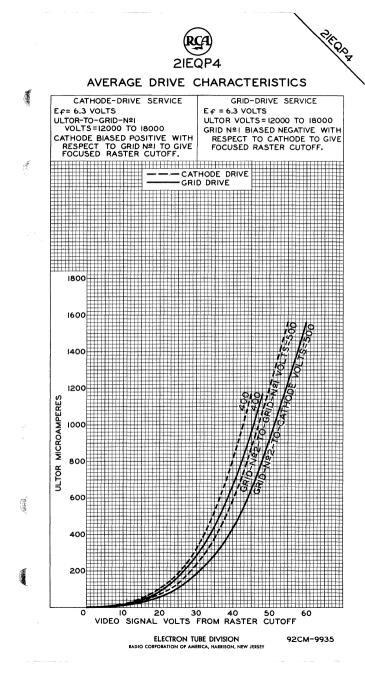




VOLTS FROM RASTER CUTOFF

VIDEO SIGNAL

92CM-9942





# **21EVP4**

# **Picture Tube**

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN IOW-VOLTAGE ELECTROSTATIC FOCUS 110° MAGNETIC DEFLECTION INTERNAL MAGNETIC SHIELD With Heater Having Controlled Warm-Up Time GENERAL DATA Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes . . . 3 65 nf Grid No.1 to all other electrodes . . pf 4.15 (2000 max. рf External conductive coating to anode. 1500 min. nf Heater Current at 2.68 volts. .  $450 \pm 45$ 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 . . Filteralass Faceplate. Spherical. . . . Light transmission (Approx.). . . . . 75.5% Mechanical: Weight (Approx.). . . . 20 lbs Overall Length. . . . . . . 12-15/16" ± 1/4" . . . . . 3-11/16" ± 1/16" Projected Area of Screen. . . . . 262 sq. in. External Conductive Coating: . . . . . . . . . . Regular-Band Туре. . . . . . . . . . . . . . Contact area for grounding. . . . . . Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J171 G/K sheets at front of this section . . . . . Recessed Small Cavity (JEDEC No.J1-21) Cap . . . . . . . . Small-Button Neoeightar 7-Pin, Arrangement 1, Base. . (JEDEC No. 87-208) Basing Designation for BOTTOM VIEW. . . G4 Pin 1-Heater Cap - Anode Pin 2-Grid No.2 (Grid No.3, ୖ୶ୢ GI3 Grid No.5. Pin 3-Grid No.1 Pin 4-Grid No.4 Screen. DANODE Collector) Pin 6-Grid No.2 62⁽² 7)K Pin 7-Cathode C – External Pin 8-Heater Conductive Coating



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. 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.4 (FOCUSING) VOLTAGE: Positive value. . . . . . 950 max. volts Negative value. . . 700 max. volts GRID-No.2 VOLTAGE . . . 550 max. volts GRID-No.1 VOLTAGE: Negative peak value . . 400 max. volts Negative bias value . . 155 max. volts Positive bias value . . . . 0 max. volts volts Positive peak value . . 2 max. (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: Combined AC and DC voltage. 200 max. volts DC component. . . . . . . 100 max. volts Typical Operating Conditions for Grid-Drive Service: Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage . . . . . . . . . . . volts 16000 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: Grid-No.1-Circuit Resistance. . . . . 1.5 max. meaohms

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



# **21FAP4**

# **Picture Tube**

# 

C

## SHORT RECTANGULAR GLASS TYPE ALUMINIZED 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 600 ± 5% m Heater Warm-Up Time (Average) 11 second Direct Interelectrode Capacitances:	na Is
Grid No.1 to all other electrodes 6 μμ Cathode to all other electrodes 5 μμ	f
External conductive coating to ultor {2500 max. μμ 2000 min. μμ	
Electron Gun Type Requiring No Ion-Trap Magne	
Optical:	
Faceplate	s %
Mechanical:	
Operating Position	is " " id
See Picture-Tube Dimensional-Outlines and Bulb J171 G/K sheet at the front of this section	S
CapRecessed Small Cavity (JEDEC No.J1-21 BaseSmall-Button Neoeightar 7-Pin Arrangement 1 (JEDEC No.B7-208	), 3)
Basing Designation for BOTTOM VIEW 8J	R
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.3 Pin 6 - IC Do Not Use Pin 7 - Cathode Pin 1 - Heater Cap - Ultor Global Conductive Cap - Ultor Global Conductive Conductive Conductive Conductive Conductive Conductive	



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

# 21FAP4

Maximum Ratings, Design-Maximum	Val	ues	. :				
ULTOR VOLTAGE GRID-No.3 (FOCUSING) VOLTAGE:				•	22000 max	• volts	
Positive value.					700 max	. volts	ù .
GRID-No.2 VOLTAGE					600 max		~
GRID-No.1 VOLTAGE:							
Negative peak value					220 max	. volts	
Negative bias value					154 max		
Positive bias value					0 max		
Positive peak value					2 max	. volts	~
PEAK HEATER-CATHODE VOLTAGE:							
Heater negative with							· · /
respect to cathode:							
During equipment warm-up pe	riod						
not exceeding 15 seconds.					450 max	. volts	
After equipment warm-up per	iod.				200 max	. volts	
Heater positive with							
respect to cathode					200 max	. volts	
T 1 1 0 111 0 0 111							$\sim$
Typical Operating Conditions:							
With ultor voltage of					16000	volts	
and grid-No.2 voltage of					500	volts	
Grid-No.3 Voltage for focus					0 to 400	volts	
Grid-No.1 Voltage for visual							
extinction of focused raster.					-43 to -7	8 volts	
Maximum Circuit Values:							
Grid-No.1-Circuit Resistance					1.5 max	. megohms	
						-	
						1 .	

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



s. . .

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

### GENERAL DATA

### Electrical:

6

Electrical.	
Heater Current at 6.3 volts.600 ± 5%maHeater Warm-Up Time (Average).11seconds	
Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 μμf Cathode to all other electrodes 5 μμf	
External conductive coating to ultor . {2000 max. µµf 1500 min. µµf	
Electron Gun	
Optical:	
Faceplate	
Mechanical:	
Operating Position	
Type	
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-Ultor (Grid No.3, Grid No.5, Collector) C-External Conductive Coating	



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

# 21FDP4

Maximum Ratings, Design-Maximum Values:

Havinan Hatinge, Design havinan faraesi		
ULTOR VOLTAGE	20000 max.	volts
Positive value	1100 max.	volts 🗤
	550 max.	volts
Negative value		
GRID-No.2 VOLTAGE	550 max.	volts
GRID-No.1 VOLTAGE:		
Negative peak value	400 max.	volts
Negative bias value	155 max.	volts
Positive bias value	0 max.	volts
Positive peak value	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:	Z max.	VOILS
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		
	200 max.	volts 👾
respect to cathode	ZUU Max.	voits ~~
Typical Operating Conditions:		
With ultor voltage of	16000	volts
and grid-No.2 voltage of	300	volts
5	300	00005
Grid-No.4 Voltage for		
focus	+100 to +500	volts
Grid-No.1 Voltage for visual		
extinction of focused raster	–35 to –72	volts
	<i>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</i>	
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	1.5 max.	megohms
		0

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



# 21FP4C

# **Picture Tube**

RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION

## 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	pf
	pf
	ma
Electron Gun Ion-Trap Type Requiring External Sing	
Field Mag	net

### Optical:

Phosphor (For Curves, see front of this Section), P4-Sulfide Type. Aluminized . . Filterglass . . . . 74% Mechanical: Weight (Approx.). . . . . . . . . 29 lbs . 23-1/32" ± 3/8" Overall Length. . . . . . . . . . . . . . . . 7-1/2" ± 3/16" . . 248 sa. 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 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 . GRID-No.4 (FOCUS		•••	• •	•	19800 max.	volts
Positive value Negative value	 					



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

# 21FP4C

GRID-No.2 VOLTAGE	volts	
Negative peak value	volts	
Negative bias value	volts	6
Positive bias value 0 max.	volts	_
Positive peak value	volts	
(C. O. may	volts	
HEATER VOLTAGE	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.	volts volts	
Heater positive with respect to cathode: Combined AC and DC voltage	volts volts	
		$\sim$
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	
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 sh	eet	

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





# PICTURE TUBE

RECTANGULAR METAL-SHELL TYPE

IOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

### DATA

### General:

A.

Heater, for Unipotential Cathode: Voltage. . . . . . . . . 6.3 . . . . . . ac or dc volts Faceplate, Spherical . . . . . . . . . . . . Frosted Filterolass Phosphor (For Curves, see front of this Section) . P4-Sulfide Type Deflection Angles (Approx.): 700 Diagonal . . . . . . . . . Horizontal . . . . . . . 660 . . . 500 Vertical . . . . . . . . . . . . . . Ion-Trap Type Requiring Electron Gun . . . . . External Single-Field Magnet Tube Dimensions: Maximum overall length . . . . . 22-5/8" . 15-5/16" ± 1/8" Greatest height at lip . . . . . . Diagonal at lip, . . . . . ... 20-3/4" ± 1/4" . . . Radius of curvature of faceplate (External surface). . 33" Screen Dimensions (Minimum): Greatest width . . . . . . . . . 18-1/8" Greatest height. . . . . . . . . 13-11/16" . 19-1/8" Operating Position . . . . . . . . . . . . .Anv Ultor Terminal . . . . . . . . . . . . . . Metal-Shell Lip Base . . Small-Shell Duodecal 6-Pin (JETEC Group 4, No.B6-63) Metal-Shell Lip -Pin 1-Heater Pin 2-Grid No.1 Ultor Pin 6-Grid No.4 (Grid No.3. Pin 10 - Grid No.2 Grid No.5. Pin 11 - Cathode Collector) Pin 12 - Heater Maximum Ratings, Design-Center Values: ULTOR VOLTAGE. 16000 max. volts GRID-No.4 (FOCUSING) VOLTAGE: Positive value . . . 1000 max. volts Negative value . . . 500 max. volts GRID-No.2 VOLTAGE. . . . 500 max. volts GRID-No.1 VOLTAGE: Negative-bias value. . 125 max. volts Positive-bias value. . 0 max. volts. Positive-peak value. . 2 max. volts - Indicates a change. 9 - 58DATA

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 2111B

2IMP4

# PICTURE TUBE

not exceeding 15 seconds 410 max. volts After equipment warm-up period 180 max. volts Heater positive with respect to cathode					DATA
After equipment warm-up period 180 max. volts Heater positive with respect to cathode. 180 max. volts aximum Circuit Values: rid-No.1-Circuit Resistance 1.5 max. megohms For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES					
After equipment warm-up period 180 max. volts Heater positive with respect to cathode. 180 max. volts aximum Circuit Values: rid-No.1-Circuit Resistance 1.5 max. megohms For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES					
After equipment warm-up period 180 max. volts Heater positive with respect to cathode. 180 max. volts aximum Circuit Values: rid-No.1-Circuit Resistance 1.5 max. megohms For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES					
After equipment warm-up period 180 max. volts Heater positive with respect to cathode. 180 max. volts aximum Circuit Values: rid-No.1-Circuit Resistance 1.5 max. megohms For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES					
After equipment warm-up period 180 max. volts Heater positive with respect to cathode. 180 max. volts aximum Circuit Values: rid-No.1-Circuit Resistance 1.5 max. megohms For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES					
After equipment warm-up period 180 max. volts Heater positive with respect to cathode. 180 max. volts aximum Circuit Values: rid-No.1-Circuit Resistance 1.5 max. megohms For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES					
After equipment warm-up period 180 max. volts Heater positive with respect to cathode. 180 max. volts aximum Circuit Values: rid-No.1-Circuit Resistance 1.5 max. megohms For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES					
After equipment warm-up period 180 max. volts Heater positive with respect to cathode. 180 max. volts aximum Circuit Values: rid-No.1-Circuit Resistance 1.5 max. megohms For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES					
After equipment warm-up period 180 max. volts Heater positive with respect to cathode. 180 max. volts aximum Circuit Values: rid-No.1-Circuit Resistance 1.5 max. megohms For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES					
After equipment warm-up period 180 max. volts Heater positive with respect to cathode. 180 max. volts aximum Circuit Values:			RECAUTIONS FOR CATHODE-	RAY TUBES	
After equipment warm-up period 180 max. volts				1.5 max.	megohms
Heater negative with respect to cathode: During equipment warm-up period	Dur nı Afte Heate	ing equipmen ot exceeding er equipmen r positive w	nt warm-up period g 15 seconds t warm-up period ith respect to cathode.		

21MP4

# 21WP4A

# Picture Tube

RECTANGULAR GLASS TYPE Magnetic focus	ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION
GENERAL DATA	4
Electrical:	
Direct Interelectrode Capacitances: Cathode to all other electrodes . Grid No.1 to all other electrodes External conductive coating to ano	6 pf
Heater Current at 6.3 volts Electron Gun	
Optical:	
Phosphor (For curves, see front of this se	ection). P4Sulfide Type, Aluminized
Faceplate, Spherical Light transmission (Approx.)	
Mechanical:	
Weight (Approx.) Overall Length Neck Length Projected Area of Screen External Conductive Coating:	7-1/2" ± 3/16"
Type. Contact area for grounding. For Additional Information on Coatin See Picture-Tube Dimensional-Outli at front of this section	Near Reference Line ngs and Dimensions:
Cap Recessed Smal Base	5-Pin (JEDEC Group 4, No. B5-57)
Basing Designation for BOTTOM VIEW	V 12N
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
Maximum and Minimum Ratings, Design- Unless otherwise specified ues are positive with resp	l, voltage val-
ANODE VOLTAGE	19800 max. volts



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

# 21WP4A

GRID-No.2 VOLTAGE	3
Negative peak value	5
Negative bias value	- -
Positive bias value 0 max. volts	
Positive peak value	
HEATER VOLTAGE	
PEAK HEATER-CATHODE VOLTAGE:	,
Heater negative with	~
respect to cathode:	
During equipment warm-up period	
not exceeding 15 seconds 450 max. volts	5
After equipment warm-up period 200 max. volt	
Heater positive with	
respect to cathode:	
Combined AC and DC voltage 200 max. volt	s –
DC component 100 max. volt	S
	`~.
Typical Operating Conditions for Grid-Drive Service:	
Unless otherwise specified, voltage val-	
ues are positive with respect to cathode	
Anode Voltage	s
Grid-No.2 Voltage	s
Grid-No.1 Voltage for	
visual extinction of	
focused raster	s
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max. megohm	s
For X-radiation shielding considerations, see sheet	
For X-radiation shielding considerations, see sheet	

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





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# PICTURE TUBE

RECTANGULAR	GLASS TYPE		ALUMINI	ZED SCREEN
LOW-VOLTAGE	ELECTROSTATIC A	FOCUS I	MAGNETIC	DEFLECTION

# DATA

# General:

C

E

Heater, for Unipotent	
Voltage	6.3
Current.	$ 0.6 \pm 10\%$ $ amp$
Capacitance between E	[2500 max. μμf]
	12000 min. uuti
Faceplate, Spherical	••••••••••••••••••••••••••••••••••••••
Phosphor (For Curves, s	ee front of this section) . P4-Sulfide Type
	Aluminized
Deflection Angles (Ap Diagonal	prox.): 
Horizontal	
Vertical	500
	lon-Trap Type Requiring
	External Single-Field Magnet
Tube Dimensions:	axternal enigre riere magnet
Overall length	••••••••••••••••••••••••••••••••••••••
	••••••••••••••••••••••••••••••••••••••
	••••••••••••••••••••••••••••••••••••••
Neck length	••••••••••••••••••••••••••••••••••••••
Screen Dimensions (Mi	of faceplate (External surface) 40"
Greatest height	
Diagonal	
Projected area	
Operating Position .	
Cap	. Recessed Small Cavity (JEDEC No.J1-21)
	Duodecal 6-Pin (JEDEC Group 4, No.B6-63)
Basing Designation	for BOTTOM VIEW
Pin 1-Heater	6 Cap-Ultor
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	Conductive
	Coating
Maximum Ratings, Desi	gn-Center Values:
ULTOR VOLTAGE	18000 max. volts
GRID-No.4 (FOCUSING)	VOLTAGE:
Positive value	1000 max. volts
GRID-No.2 VOLTAGE.	
UNID-NU.Z VULIAUE	
4-59	ELECTRON TUBE DIVISION TENTATIVE DATA
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ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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PICTURE TUBE

GRID-No.1 VOLTAGE:	
Negative-bias value	olts
Positive-bias value	olts
	olts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode:	
During equipment warm-up period	and a second
	olts
	olts
Heater positive with respect to cathode. 180 max. v	olts
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max. meg	ohms
For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES	
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TENTATIVE DATA

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 70° MAGNETIC DEFLECTION

# 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. {750 max. pf			
Leternar conductive coating to disect in [500 min. pf         Heater Current at 6.3 volts       600 ± 60 ma         Electron Gun.       Ion-Trap Type Requiring         External Single-Field Magnet			
<b>Optical:</b> Phosphor (For Curves, see front of this section) · P4—Sulfide Type, Aluminized			
Faceplate, Spherical			
Mechanical:			
Weight (Approx.)			
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 12 -He			
Maximum and Minimum Ratings, Design-Maximum Values: 🛶			

Unless otherwise specified, voltage values are positive with respect to cathode ANODE VOLTAGE . 19800 max. volts

- Indicates a change.



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# 21YP4A

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:       550 max.       volts         Negative peak value       220 max.       volts         Negative bias value       154 max.       volts         Positive bias value       0 max.       volts         Positive peak value       2 max.       volts         HEATER VOLTAGE.       {6.9 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 respect to cathode: Combined AC and DC voltage 200 max. 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	
Grid-No.4 Voltage64 to +350 volts Grid-No.2 Voltage	
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



# 21ZP4B

# **Picture Tube**

### RECTANGULAR GLASS TYPE MAGNETIC FOCUS

ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION

## GENERAL DATA

# Electrical:

	pf pf pf
	ma ng
<b>Optical:</b> Phosphor (For curves, see front of this section). P4—Sulfide Typ Aluminiz	
Faceplate, Spherical	iss

### Mechanical:

Basing Designation for BOTTOM VIEW. . .

ANODE Cap - Anode Pin 1-Heater (Grid No.3, Pin 2-Grid No.1 Screen. Pin 10 - Grid No.2 Collector) Pin 11 - Cathode 4 C - External Pin 12 - Heater 10)_{G2} Conductive Coating 11 12

 Maximum and Minimum Ratings, Design-Maximum Values:

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

 ANODE VOLTAGE
 .
 .
 19800 max. volts

 GRID-No.2 VOLTAGE
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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. . . 12N

# 21ZP4B

GRID-No.1 VOLTAGE:       220 max.         Negative peak value       154 max.         Positive bias value       0 max.         Positive peak value       2 max.         HEATER VOLTAGE.       6.9 max.	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
Combined AC and DC voltage 200 max. DC component	
Typical Operating Conditions for Grid-Drive Service:	
Unless otherwise specified, voltage val- ues are positive with respect to cathode	
Anode Voltage	volts volts
focused raster	volts
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max.	megohms
For X-radiation shielding considerations, see she	eet

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



## BIPANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 92^o MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

## GENERAL DATA

# Electrical:

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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.       Any         Weight (Approx.).       34-1/2 lbs         Overall Length.       18-13/16" ± 7/16"         Neck Length.       6" ± 3/16"         Projected Area of Screen.       6" ± 3/16"         Projected Area of Screen.       282 sq. in.         External Conductive Coating:       7/16" ± 7/16"         Type.       Regular-Band         Contact area for grounding.       Near Reference Line         For Additional Information on Coatings and Dimensions:       See Picture-Tube Dimensional-Outlines and Bulb J187 D/G sheets at the front of this section         Cap.       Recessed Small Cavity (JEDEC No.J1-21)         Base       Short Small-Shel Duodecal 6-Pin         UEDEC Group 4, No.B6-2031       No.B6-2031
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



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

# 23AFP4

Maximum and Minimum Ratings, Design-Maximum Values:		
ULTOR VOLTAGE	volts	1
(12000 1111:	volts	ί.
GRID-No.4 (FOCUSING) VOLTAGE:		
Positive value	volts	
Negative value.         550 max.           GRID-No.2 VOLTAGE         550 max.	volts volts	
GRID-NO.2 VOLTAGE	voits	
Negative peak value	volts	
Negative bias value	volts	~ ~
Positive bias value 0 max.	volts	
Positive peak value	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	volts	
respect to cathode 200 max.	vorts	
Typical Operating Conditions:		
With ultor voltage of 20000	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 raster35 to -72	volts	
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance 1.5 max.	megohms	
	0	

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



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# S L

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

The 23ALP4 is the same as the 23MP4 except for the following item: Electrical:

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DATA 5–62



# 23AVP4

# Picture Tube

## BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO^O MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

The 23AVP4 is the same as the 23CP4 except for the following item: Optical:



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# BI-LOW

## BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 92° MAGNETIC DEFLECTION With Heater <u>Having Controlled</u> Warm-Up Time

The 23BDP4 is the same as the 23YP4 except for the following item:

## Optical:



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

ALUMINIZED SCREEN 92° MAGNETIC DEFLECTION CATHODE-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 μµſ 5 μµf Cathode to all other electrodes. 2500 max. μµf External conductive coating to ultor . 11700 min. μµf . . . Type Requiring No Ion-Trap Magnet Electron Gun .

## Optical:

### Mechanical:

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) Base . . . . . . . . . . . . . Short Small-Shell Duodecal 6-Pin (JEDEC Group 4, No.B6-203)

ULTOR GA Cap-Ultor Pin 1-Heater GaGS Pin (Grid No.3, 2-Grid No.1 Pin 6-Grid No.4 Grid No.5, Collector) Pin 10-Grid No.2 10)₆₂ Pin 11 - Cathode C - External c۲ Pin 12-Heater Conductive Coating



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

# 23BJP4

Maximum and Minimum Ratings, Design-Maximum Values: (25000 max. volts ULTOR-TO-GRID-No.1 VOLTAGE. ∙∫11000 min. volts GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE: Positive value. . . . . 1250 max. volts 450 max. Negative value. . . . volts 225 max. volts GRID-No.2 TO-GRID-No.1 VOLTAGE. 40 min. volts GRID-No.2-TO-CATHODE VOLTAGE. volts 70 max. CATHODE-TO-GRID-No.1 VOLTAGE: Positive peak value . . . 220 max. volts 154 max. volts Positive bias value . . . . . volts Negative bias value . . 0 max. . . . volts Negative peak value . 2 max. . . 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 200 max. volts After equipment warm-up period. . Heater positive with respect to cathode. . . 200 max. volts Typical Operating Conditions: With ultor-to-grid No.1 voltage of volts 20000 and grid-No.2-to-grid-No.1 voltage of volts 50 Grid-No.4-to-Grid-No.1 Voltage for focus. 0 to 400 volts Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster. . . . 36 to 54 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



### BI-PANEL RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS LOW GRID-No.2 VOLTAGE

ALUMINIZED SCREEN 92° MAGNETIC DEFLECTION CATHODE-DRIVE TYPE

## With Heater Having Controlled Warm-Up Time

## GENERAL DATA

# Electrical:

See.

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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. $\begin{cases} 2500 \text{ max.} & \mu\mu f \\ 1700 \text{ min.} & \mu\mu f \end{cases}$
Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Faceplate and Protective Panel
Mechanical:
Operating Position
Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater Pin 12-Heater



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

# 23**B**KP4

Maximum and Minimum Ratings, Design-Maximum	-		
ULTOR-TO-GRID-No.1 VOLTAGE	{25000 max. }15000 min.	volts	_
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:	(12000 mm.	volts	í.
Positive value.	1250 max.	volts	C.
Negative value	400 max.	volts	
GRID-No.2-TO-GRID-No.1 VOLTAGE	∫225 max.	volts	
	(40 min.	volts	
GRID-No.2-TO-CATHODE VOLTAGE	70 max.	volts	
Positive peak value	220 max.	volts	, e.e.,
Positive bias value	154 max.	volts	×
Negative bias value	0 max.	volts	
Negative peak value	2 max.	volts	
HEATER VOLTAGE.	6.9 max.	volts	
	(5.7 min.	volts	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with			10.5
respect to cathode:			1. J
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 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. 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. m	egohms	
······			

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



## BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 92^o Magnetic deflection LOW-grid-No.2 Voltage Cathode-drive type

# With Heater Having Controlled Warm-Up Time

The 23BLP4 is the same as the 23BKP4 except for the following item:

## Optical:

A

6





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



#### BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO[®] MAGNETIC DEFLECTION

With Heater Having Controlled Warm-Up Time

#### GENERAL DATA

#### Electrical:

1

Heater Current at 6.3 volts
Heater Warm-Up Time (Average) 11 seconds
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 ultor . $\begin{cases} 2500 \text{ max.} & \mu\mu\text{f} \\ 2000 \text{ min.} & \mu\mu\text{f} \end{cases}$
Electron Gun
Optical:
Faceplate and Protective Panel
Light transmission (Approx.)
Aluminized
Mechanical:
Operating Position
Weight (Approx.)
Neck Length
Projected Area of Screen
Type
Contact area for grounding Near Reference Line For Additional Information on Coatings and Dimensions:
See Picture-Tube Dimensional-Outlines and Bulb J187 A sheets
at the front of this section Cap Recessed Small Cavity (JEDEC No.J1-21)
Base Small-Button Neoeightar 7-Pin,
Arrangement 1 (JEDEC No.B7-208) Basing Designation for BOTTOM VIEW
Pin 1-Heater G4 Cap-Ultor Pin 2-Grid No.1 Grid No.3
Pin 3-Grid No.2 G2 3 () 6 GI Grid No.5,
Pin 4-Grid No.4 Collector) Pin 6-Grid No.1 C-External
Pin 7 - Cathode (2) 7 7 Conductive
Pin 8-Heater Coating
H H



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# 23**BQP**4

Maximum and Minimum Ratings, Design-Maximum Values:	
ULTOR VOLTAGE	-
GRID-No.4 (FOCUSING) VOLTAGE:	, ,
Positive value	
Negative value	
GRID-No.2 VOLTAGE	
Negative peak value	
	~
Negative bias value	
	~ /
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with	
respect to cathode:	
During equipment warm-up period not exceeding 15 seconds 450 max, volts	
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 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 raster35 to -72 volts	
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max. megohms	
For V modiation abialding and donations and about	

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



#### BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 92^o MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time



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BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO ^O MAGNETIC DEFLECTION
With Heater Having Controlled Warm-Up Time
The 23CBP4 is the same as the 23UP4 except for the following items: Optical:
Surface of Protective Panel Treated to reduce specular reflection
Maximum and Minimum Ratings, Design-Maximum Values:
ULTOR VOLTAGE

C

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

#### DATA

#### General:

Í

Heater, for Unipotential Cathode:Voltage (AC or DC).6.3 ± 10% voltsCurrent at 6.3 volts.0.6 ± 5% ampWarm-up time (Average).11 secDirect Interelectrode Capacitances:6 µµfGrid No.1 to all other electrodes.6 µµfCathode to all other electrodes.5 µµf
External conductive coating to untor. (2000 min. $\mu\mu f$
Faceplate and Protective Panel
Fluorescence
Phosphorescence
Focusing Method
Deflection Method
Deflection Angles (Approx.): Diagonal
Vertical
Tube Dimensions:
Overall length
Radius at center Radius at edge
In plane of diago-
nal deflection 50-1/4" See Dimen- sional Outline
zontal deflection 50-1/4" 35-1/4"
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
zontal deflection 39–3/4" 26–1/2"



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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 1 8-60 23CP4

Pin 8-Heater

Radius at center Radius at edge In plane of vertical deflection. . . . 36-3/4" 18-1/2" Screen Dimensions (Minimum): Greatest width. . . . .19-5/16" Greatest height . . . 15-1/4" 22-5/16" Diagonal. . . . . Projected area. . . . . . 282 sa. in. . . . Weight (Approx.). . . 33 lbs . . . . . . . . Operating Position. . . . . . Anv . . J187 Fitted with Protective Panel FP198 Bulb. . . . Small-Button Neoeightar 7-Pin, Arrangement 1, Base. . (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

#### GRID-DRIVE* SERVICE

Unless otherwise specified, voltage values are positive with respect to cathode Maximum and Minimum Ratings, Design-Center Values:

(20000 max. volts ULTOR VOLTAGE . . . 12000[•] min. volts GRID-No.4 (FOCUSING) VOLTAGE: volts Positive value. . . . . . 1000 mav Negative value. . . . 500 volts max. volts GRID-No.2 VOLTAGE . . . 500 max. GRID-No.1 VOLTAGE: Negative-peak value . . . . 200 max. volts volts Negative-bias value . . . . 140 max. 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 may volts After equipment warm-up period. . . . 180 max. volts Heater positive with respect to cathode . 180 max. volts Equipment Design Ranges: With any ultor voltage ( $E_{C_5k}$ ) between 12000  $^{\bullet}$  and 20000 volts and grid-No.2 voltage ( $E_{C_2k}$ ) between 200 and 500 volts Grid-No.4 Voltage for 0 to 400 volts



Coating

23CP4

Grid-No.1 Voltage (E _{cik} ) for visual extinction of focused raster	Raster-Cutoff-Ra for Grid-Driz	
Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value	jor gria-prii	e Service
(Peak positive) Same	e value as deter < except video o positiv	
Grid-No.4 Current	-25 to +25 -15 to +15	μa μa
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 Grid-No.4 Voltage for	400	volts
focus <b>*</b>	0 to 400	volts
focused raster	-44 to -94	volts
White-level value	44 to 94	volts
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	••• 1.5 max	. megohms
CATHODE-DRIVE SE	RVICE	
Unless otherwise specified,	voltage values	3
are positive with respec	t to grid No.1	
Maximum and Minimum Ratings, Design-(	Center Values:	
ULTOR-TO-GRID-No.1 VOLTAGE	{20000 m	
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:	·· {12000● m	in. volts
Positive value	1000 m	ax. volts
Negative value	••• 500 ma	ax. volts
GRID-No.2-TO-GRID-No.1 VOLTAGE		ax. volts
GRID-No.2-TO-CATHODE VOLTAGE CATHODE-TO-GRID-No.1 VOLTAGE:	••• 500 m	ax. volts
Positive-peak value	• • 200 mi	ax. volts
Positive-bias value		ax. volts
Negative-bias value		ax. volts
Negative-peak value PEAK HEATER-CATHODE VOLTAGE:	••• 2 m	ax. volts
Heater negative with respect to cath	ode.	
During equipment warm-up period p		

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



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

DATA 2 8-60

After equipment warm-up period Heater positive with respect to cathe		x. volts x. volts
Equipment Design Ranges:		
With any ultor-to-grid-No.1 voltage and 20000 volts and grid-No.2-to-grid between 225 and 640	d-No.1 voltage	12000 • (E _{c2g1} )
Grid-No.4-to-Grid-No.1 Voltage for focus* Cathode-to-Grid-No.1 Volt- age (E _{kg1} ) for visual ex- tinction of focused	0 to 400	volts
	aster-Cutoff-Ra or Cathode-Driv	
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)Same	value as deter except video d	mined for
	negativ	e voltage
Grid-No.4 Current	-25 to +25 -15 to +15 0 to 8	μa μa gausses
	0 00 0	9
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	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 Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level):	42 to 78	volts
White-level value	-42 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.
- This value is a working design-center minimum. The equivalent absolute minimum ultor (or ultor-to-grid-wo.1) voltage is 11,000 volts below which the serviceability of the 23CP4 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-wo.1) voltage is never less than 11,000 volts.
- The grid-No.1 (or grid-No.1) tortage is not tage 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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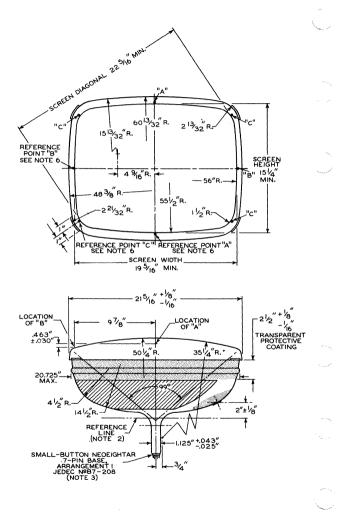
Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/u*. Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 3/8-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field 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 X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section



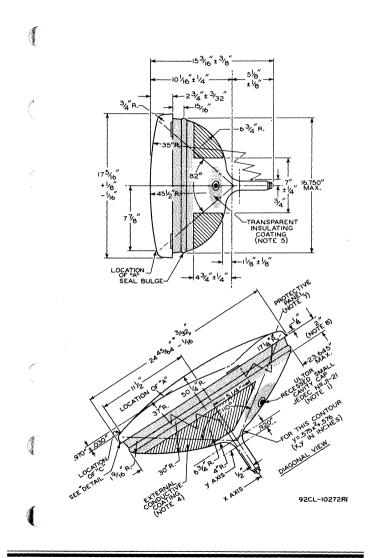
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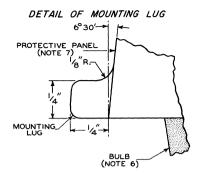


23CP4





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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.

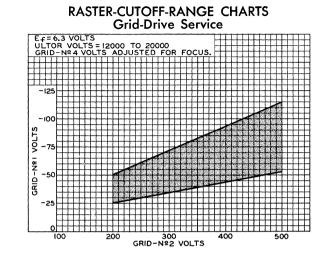
NOTE 7: THE CENTER OF THE PROTECTIVE PANEL MAY BE ECCENTRIC WITH RESPECT TO THE AXIS OF THE TUBE ENVELOPE. ASSOCIATED SHIFT OF THE PROTECTIVE PANEL ALONG ITS MINOR AND/OR MAJOR AXIS WILL NOT EXCEED 1/16".

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.

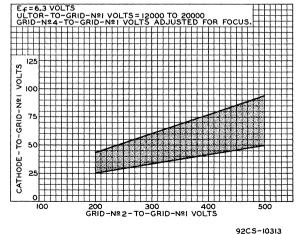


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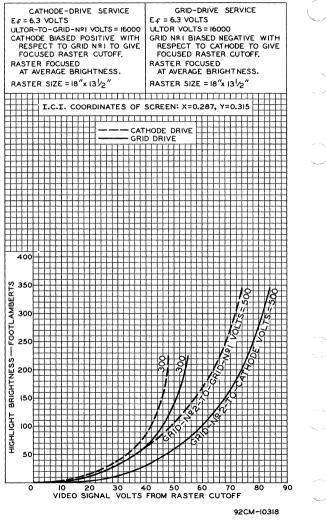
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DATA 5 8-60

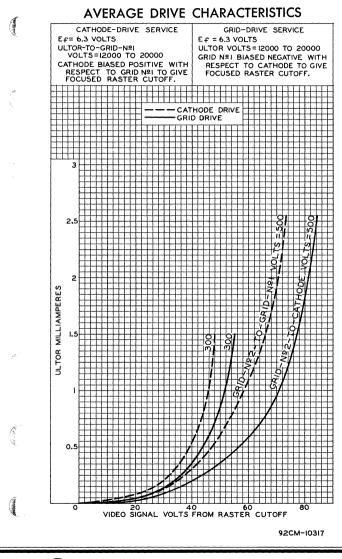
### AVERAGE DRIVE CHARACTERISTICS



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23CP4





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#### BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO^O 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 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 and Protective Panel
Mechanical:
<pre>Weight (Approx.)</pre>
Basing Designation for BOTTOM VIEW 8HR
Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4-Grid No.4 Pin 6-Grid No.1 Pin 7-Cathode Pin 8-Heater Pin 4-Grid No.4 Pin 8-Heater Pin 4-Grid No.4 Pin 8-Heater Pin 4-Grid No.4 Pin 8-Heater Pin 4-Grid No.4 Pin 7-Cathode Pin 8-Heater Pin 8-Heater



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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to cathode {23500 max. 14000 min. volts ANODE VOLTAGE . . . . volts GRID-No.4 (FOCUSING) VOLTAGE: Positive value. . . . . . . 1100 max. volts . Negative value. . . volts . 550 max. volts GRID-No.2 VOLTAGE . . 550 max. GRID-No.1 VOLTAGE: Negative peak value . . 220 max. volts Negative bias value . . 154 max. volts . . . . Positive bias value . . . volts 0 max. . . 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. . . . 450 max. volts After equipment warm-up period. . . . volts 300 max. Heater positive with respect to cathode: Combined AC and DC voltage. . 200 max. volts volts DC Component. . . . . . . . . . 100 max. Typical Operating Conditions for Grid-Drive Service: Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage . . . . . . . . 18000 volts Grid-No.4 Voltage . . . . . 0 to 400 volts . Grid-No.2 Voltage . . . 400 volts Grid-No.1 Voltage for visual extinction of focused raster . . . . . -44 to -94 volts Maximum Circuit Value: For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES

at front of this Section



# 23EP4

## **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:	
Heater, for Unipotential Cathode: Voltage (AC or DC) Current at 6.3 volts Warm-up time (Average) Direct Interelectrode Capacitances: Grid No.1 to all other electrodes.	0.6 amp 11 sec
Cathode to all other electrodes	5 μμf
External conductive coating to ultor	··· {2500 max. μμf 1700 min. μμf
Faceplate and Protective Panel Total light transmission (Approx.) . Phosphor (For curves, see front of this Secti	
Phosphorescence	
Diagonal	
Overall length	7-5/16" + 1/8" - 1/16" 45/64" + 3/32" - 1/16" 5-1/8" ± 1/8"
Radius at ce	nter 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" In plane of verti-	35-1/4"
cal deflection 45-1/2" Radius of curvature of faceplate (Int	35" ernal surface):
	nter Radius at edge
In plane of diago- nal deflection 39-1/2"	31-1/2"

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

DATA I 8-60

	Radius at center	r Radius at edge
In plane of hori- zontal deflection . In plane of verti-	•• 39-3/4"	26-1/2"
cal deflection Screen Dimensions (Minimum		18-1/2"
Greatest width. Greatest width. Diagonal. Projected area. Weight (Approx.). Operating Position. Cap. Bulb. J187 Base. Small-But	essed Small Cavi Fitted with Pro	
Basing Designation for B	OTTOM VIEW	•••••8KP
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

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

Maximum and Minimum Ratings, Design-Center Values:

ULTOR-TO-GRID-No.1 VOLTAGE	{20000 12000	max. min.	volts volts
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:			
Positive value	1000	max.	volts
Negative value	500	max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAGE.	64	max.	volts
CATHODE-TO-GRID-No.1 VOLTAGE:			
Positive-peak value	200	max.	volts
Positive-bias value	140	max.	volts
Negative-bias value	0	max.	volts
Negative-peak value	2	max.	volts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode:			
During equipment warm-up period not			
exceeding 15 seconds	410 180 180	max. max. max.	volts volts volts



23EP4

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With any ultor-to-grid-No.1 v and 20000 volts and grid-No.2- between 40	to-grid No	.i voltage ()	² c ₂ g ₁ ⁾
Grid-No.4-to-Grid-No.1 Voltage			
for focus*		0 to 400	volts
(Ekg]) for visual extinc- tion of focused raster Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)Sau	me value as	s determined	for Eka1
		is a negative	0
Grid-No.4 Current		-25 to +25 -15 to +15	μa μa
Field Strength of Adjustable Centering Magnet♦		0 to 8	qausses
Examples of Use of Design Range	es:	0 00 0	9440000
With ultor-to-grid-			
No.1 voltage of and grid-No.2-to-grid-	16000	18000	volts
No.1 voltage of	50	50	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 400	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level):	32 to 47	34 to 49 -34 to -49	volts volts
Maximum Circuit Values:	/2	<i>y</i> , <i>i</i>	
Grid-No.1-Circuit Resistance .		. 1.5 max.	megohms
<ul> <li>Cathode drive is the operating c varies the cathode potential with electrodes.</li> </ul>			
This value is a working design-cent minimum ultor-to-grid-Mo.1 volta serviceability of the 23EPH will has the responsibility of detern that under the worst probable ope voltage variation and equipment to-grid-Mo.1 voltage is never 1 ess	5 than 11,000	1 10113.	
The grid-No.4-to-grid-No.1 voltage tube may have a value anywhere bet	ween 0 and 4	100 volts.	
Distance from <i>Reference Line</i> for not exceed 2-1/4". Excluding ex- undeflected focused spot will fal radius concentric with the center that the earth's magnetic field car of the spot from the center of the	suitable PM traneous fi I within a c of the tube	centering magr elds, the cent circle having a face. It is t	er of the a 3/8-inch b be noted



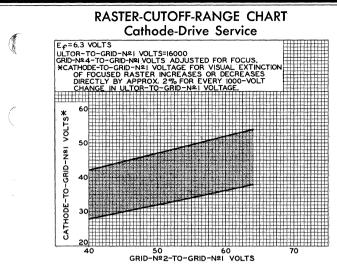
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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 2 8-60 For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section



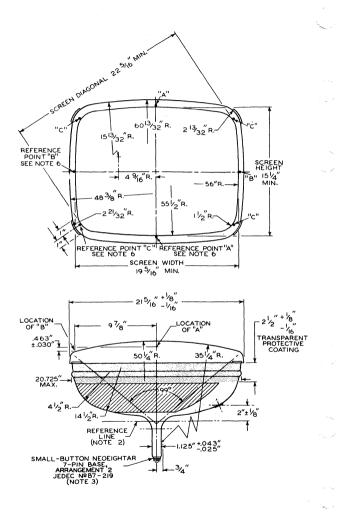


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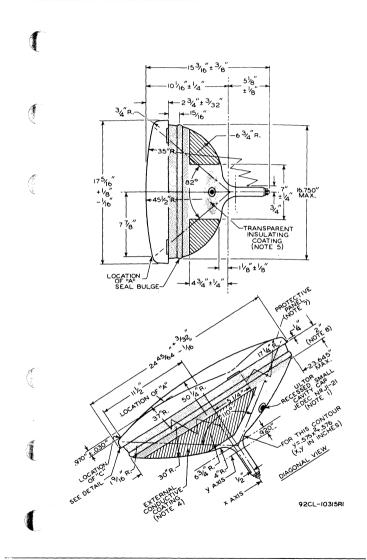
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 3 8-60





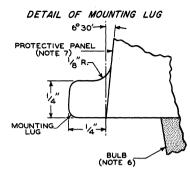


23EP4





RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. 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  $\pm 30^{\circ}$ . 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 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: REFERENCE POINTS A,B, AND C ARE PROVIDED FOR USE IN DESIGN OF A MASK CONTOURED FOR CLOSE FIT TO THE PROTECTIVE PANEL.

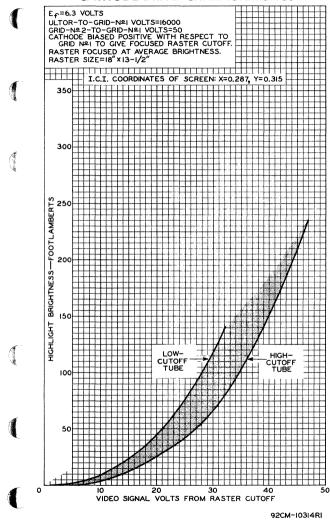
NOTE 7: THE CENTER OF THE PROTECTIVE PANEL MAY BE ECCENTRIC WITH RESPECT TO THE AXIS OF THE TUBE ENVELOPE. ASSOCIATED SHIFT OF THE PROTECTIVE PANEL ALONG ITS MINOR AND/OR MAJOR AXIS WILL NOT EXCEED I/I6".

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.



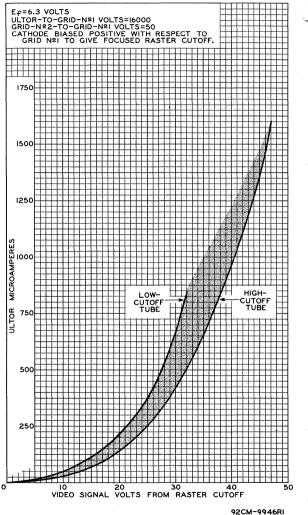






RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 5 8-60





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



#### SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

#### GENERAL DATA

#### Electrical:

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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. pf Heater Current at 6.3 volts 600 ± 60 ma Heater Warm-Up Time (Average) 11 seconds Electron Gun Type Requiring No Ion-Trap Magnet
<b>Optical:</b> Phosphor (For Curves, see front of this Section). P4—Sulfide Type, Aluminized
Faceplate
Mechanical:
Weight (Approx.)
front of this section
Cap
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 Pin 8-Heater Pin 4-Grid No.4 Pin 6-Grid No.4 Pin 8-Heater Pin 8-Heater ANODE Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) Conductive Coating



(and

# 23FP4A

Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to cathode (23500 max. volts ANODE VOLTAGE . . . 11000 min. volts GRID-No.4 (FOCUSING) VOLTAGE: Positive value. . . . . . 1100 max. volts volts Negative value. . . 550 max. (550 max. volts GRID-No.2 VOLTAGE . . . 200 min. volts GRID-No.1 VOLTAGE: Negative peak value . 200 max. volts . . Negative bias value . . volts 154 max. Positive bias value . 0 max. volts . volts Positive peak value . . 2 max. . (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. 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 Service: Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage . . . 14000 volts Grid-No.4 Voltage . . 0 to 400 volts . . . Grid-No.2 Voltage . . . 450 volts Grid-No.1 Voltage for visual extinction of focused raster . . . -45 to -105 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



**BI-PANEL RECTANGULAR GLASS TYPE** ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 110° MAGNETIC DEFLECTION CATHODE-DRIVE TYPE LOW-GRID-NO.2 VOLTAGE 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 ρf (2500 max. рf External conductive coating to anode. 2000 min. pf 450 ± 25 Heater Current at 6.3 volts . . . . 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 . . Filterglass Faceplate and Protective Panel. . . . light transmission (Approx.). . . . 40% Mechanical: Weight (Approx.). . . . . . 32-1/2 lbs . . Overall Length. . . . . . . 15-7/16" ± 7/16" . . . 5-3/8" ± 3/16" . . . 282 sq. in. External Conductive Coating: Type.....Regular-Band Contact area for grounding. . . . . . Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J187 A sheets at front of this section . . . JEDEC No.B6-214 Base. . . . . . Basing Designation for BOTTOM VIEW. . . . . . . . . 7FA н Pin 2 - Cathode Cap - Anode  $(\mathbf{A}$ Gı Pin 3-Heater (Grid No.3, (з Grid No.5. Pin 4 - Heater Pin 5-Grid No.1 6)G4 Screen. K(2 Pin 6-Grid No.4 Collector) Pin 7-Grid No.2 C - External Conductive Coating NODE



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. Maximum and Minimum Ratings, Design-Maximum Values: Inless otherwise specified, voltage values are positive with respect to grid No.1 (22000 max. volts ANODE VOLTAGE . . . . 115000 min. volts GRID-No.4 (FOCUSING) VOLTAGE: volts Positive value. . . 1100 max. Negative value. . . 550 max. volts volts (70 max. GRID-No.2 VOLTAGE . . volts 144 min. CATHODE VOLTAGE: Negative peak value . 2 max. volts Negative bias value . 0 max. volts . Positive bias value . . 100 max. volts . . Positive peak value . . volts 150 max. · (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. 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 Cathode-Drive Service: Unless otherwise specified, voltage values are positive with respect to grid No.1 Anode Voltage . . . . . . . . . . . . . . . . 16000 volts Grid-No.4 Voltage . . . . volts 0 to 500 . . . . . . . . Grid-No.2 Voltage . . . . . volts 50 . . . Cathode 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 X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES

at front of this Section



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

#### GENERAL DATA

#### Electrical:

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Heater Current at 6.3 volts
Focusing Method Electrostatic Deflection Method
Optical:         Faceplate.
Aluminized Fluorescence
Tube Dimensions:       14-3/8" ± 5/16"         Overall length       20-1/2" ± 1/16" - 1/8"         Greatest width       20-1/2" ± 1/16" - 1/8"         Greatest height       16-1/2" ± 1/8"         Diagonal       23-25/64" ± 3/32" - 1/8"         Neck length       5-1/8" ± 1/8"         Curvature of faceplate (Radii):
Center Intermediate Edge
External surface 50" - 36-3/4" Internal surface 30" 48" 24"
Screen Dimensions (Minimum):       19-1/4"         Greatest width.       15-1/8"         Diagonal.       22-5/16"         Projected area       282 sq. in.         Weight (Approx.)       24 bb         Operating Position       Any         Cap.       Recessed Small Cavity (JEDEC No.J1-21)         Bulb       J187 (114°)

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

Basing Designation for BOTTOM VIEW	Base Small-Butt	Ū	(JEDEC No. B7-208)	
Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.1 Pin 6 - Grid No.1 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 7 - Cathode Grid No.3, Grid No.3, Grid No.5, Collector) C - External Conductive	Basing Designation for E	BOITOM VIEW	••••••••••••••••••••••••••••••••••••••	
	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.3, Grid No.5, Collector) C-External Conductive	4

## GRID-DRIVE SERVICE

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

Maximum and Minimum Ratings, Design-Maximum Values:

Maximum anu Millinum Katings, Design-Maximum Values:	
ULTOR VOLTAGE	
GRID-No.4 (FOCUSING) VOLTAGE:	5
Positive value	c
Negative value	
(FEO may walt	
GRID-No.2 VOLTAGE	-
GRID-No.1 VOLTAGE:	0
Negative-peak value	s
Negative-bias value 154 max. volt	s
Positive-bias value 0 max. volt	s
Positive-peak value	S
HEATER VOLTAGE	
(5.7 min. volt	S
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. volt After equipment warm-up period 200 max. volt Heater positive with respect to cathode 200 max. volt	s
Equipment Design Ranges:	
With any ultor voltage $(E_{CSk})$ between 11000 and 22000 volts and grid-No.2 voltage $(E_{CSk})$ between 220 and 550 volts Grid-No.4 Voltage	
for focus [•]	5
Grid-No.1 Voltage (E _{cik} ) for	U
visual extinction	
of focused raster See Raster-Cutoff-Range Char for Grid-Drive Servic	
Grid-No:1 Video Drive from	
Raster Cutoff (Black level):	~
White level value	
(Peak positive)	
for E _{cik} except video drive is	a

or E_{cik} except video drive is a positive voltage

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



Grid-No.4 Current	-25 to +25 -15 to +15 0 to 8	μa μa gausses
Examples of Use of Design Ranges:		
With ultor voltage of and grid-No.2 voltage of	18000 400	volts volts
Grid-No.4 Voltage for focus [●]	0 to 400	volts
extinction of focused raster Grid-No.1 Video Drive from Raster Cutoff (Black level):	-36 to -94	volts
White-level value	36 to 94	volts
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	1.5 max.	megohms

#### CATHODE-DRIVE SERVICE

Unless otherwise specified, voltage values are positive with respect to grid No.1 Maximum and Minimum Ratings, Design-Maximum Values:

Maximum and Minimum Racings, Design-Maximum Va	<i>uuuuuuuuuuuuu</i>	
ULTOR-TO-GRID-No.1 VOLTAGE	0 max. volts 0 max. volts	
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:	0 max. volts	
Positive value	0 max. volts	
Negative value	0 max. volts	
GRID-No.2-TO-GRID-No.1 VOLTAGE	0 max. volts	
L35	0 min. volts	
GRID-No.2-TO-CATHODE VOLTAGE 55 CATHODE-TO-GRID-No.1 VOLTAGE:	0 max. volts	
Positive-peak value	0 max. volts	
	4 max. volts	
	0 max. volts	
Negative-peak value	2 max. volts	
	9 max. volts	
ξ5.	7 min. volts	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period		
not exceeding 15 seconds 45	0 max. volts	
After equipment warm-up period 200 Heater positive with	0 max. volts	
respect to cathode 20	0 max. volts	
Equipment Design Ranges:		
With any ultor-to-grid-No.1 voltage (E _{C581} ) and 22000 volts and grid-No.2-to-grid-No.1 vo between 225 and 700 volts	between 11000 ltage (E _{C281} )	
Grid-No.4-to-Grid-No.1	o 400 volts	

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Harrison, N. J.



Electron Tube Division

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Cathode-to-Grid-No.1 Voltage (Ekg1) for visual extinction of focused rasterSee <i>Raster-Cutoff-Range Chart</i>	-
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value	<u> </u>
(Peak negative) Same value as determined for $E_{kg_1}$ except video drive is a negative voltage	
Grid-No.4 Current.         -25 to +25 μa           Grid-No.2 Current.         -15 to +15 μa           Field Strength of Adjustable         -15 to +15 μa	·· ×
Centering Magnet* 0 to 8 gausses	
Examples of Use of Design Ranges:	
With ultor-to-grid- No.1 voltage of 18000 volts and grid-No.2-to-	-7./
grid-No.1 voltage of 400 volts	
Grid-No.4-to-Grid-No.1 Voltage for focus ⁶ 0 to 400 volts Cathode-to-Grid-No.1 Voltage for visual extinction	
of focused raster	
White-level value36 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.	
<ul> <li>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.</li> </ul>	
★ Distance from <i>Reference-Line</i> 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 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**

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 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



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.

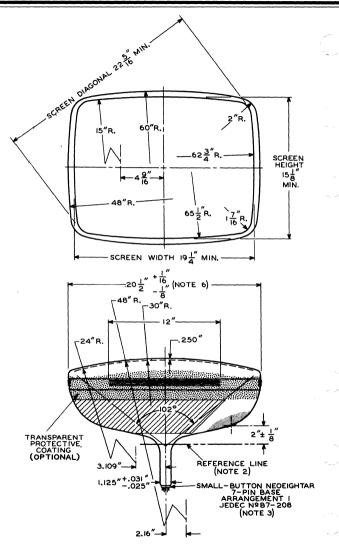
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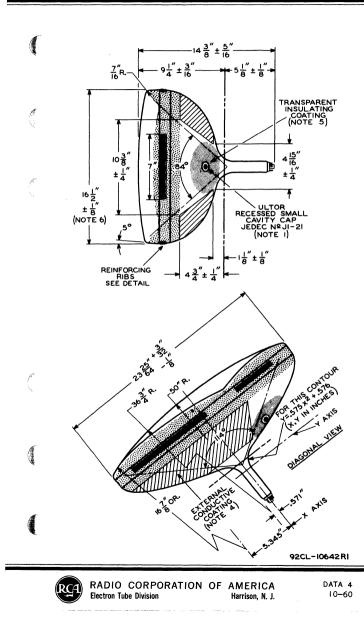
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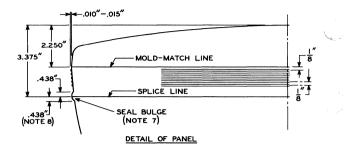


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 3 10-60









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 BERIGIDLY 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 DRYLINT-LESS CLOTH.

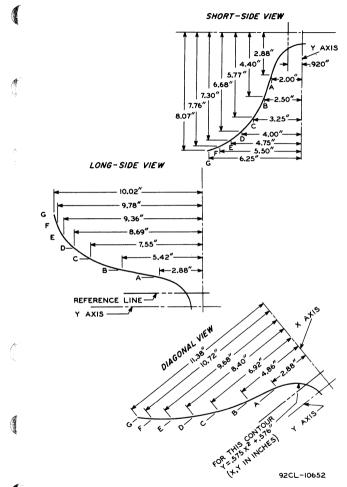
NOTE 6: MEASURED AT THE MOLD-MATCH LINE.

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.



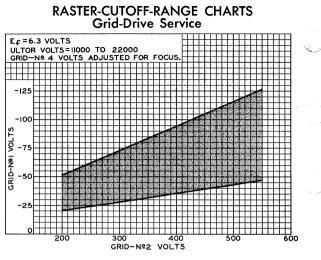
BULB-CONTOUR DIMENSIONS



NOTE: PLANES A THRU 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.

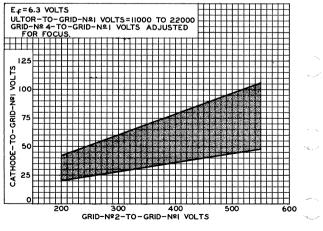


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 5



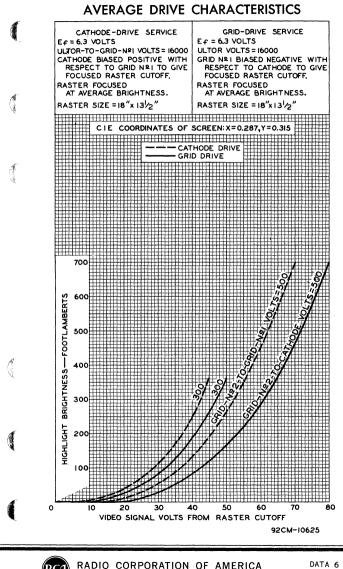
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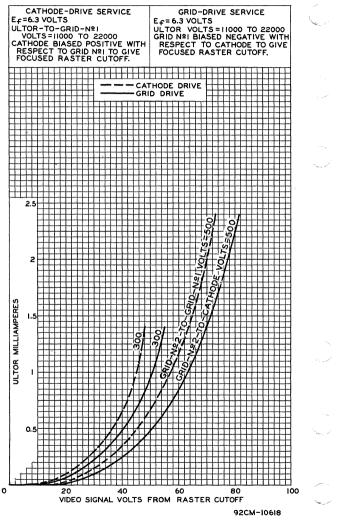


**Electron Tube Division** 

10-60

Harrison, N. J.

## AVERAGE DRIVE CHARACTERISTICS



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



## Picture Tube



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#### **BI-PANEL RECTANGULAR GLASS TYPE** ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 110° MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

### GENERAL DATA

#### Electrical:

ł	Heater Current at 6.3 volts
(	Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 µµf Cathode to all other electrodes 5 µµf Extended to all other electrodes
	External conductive coating to ultor 2500 max. µµf 2000 min. µµf
l	Electron Gun Type Requiring No Ion-Trap Magnet
(	Optical:
	Faceplate and Protective Panel
I	Mechanical:
( ( 	Operating Position.         Any           Weight (Approx.).         32-1/2 lbs           Overall Length.         15-3/16" ± 3/8"           Veck Length.         5-1/8" ± 1/8"           Projected Area of Screen.         282 sq. in.           External Conductive Coating:         282 sq. in.
	Type
	Cap
	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 - Grid No.1 Pin 9 - Grid No.1 Grid No.2 Grid No.2 Grid No.2 Grid No.2 Grid No.2 Grid No.2 Grid No.2 Collector) C - External Conductive Conductive Conductive

Harrison, N. J.

DATA 5-62

Coating

# 23UP4

Maximum and Minimum Ratings, Design-Maximum Values:	
ULTOR VOLTAGE	~
GRID-No.4 (FOCUSING) VOLTAGE:	(
Positive value	×.
GRID-No.2 VOLTAGE	
Negative peak value	
Negative bias value 154 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	$\sim$ $\sim$
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 raster35 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



## **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:

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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 $\mu\mu f$ Cathode to all other electrodes 5 $\mu\mu f$
External conductive coating to ultor. $\begin{cases} 2500 \text{ max.} & \mu\mu\text{f} \\ 2000 \text{ min.} & \mu\mu\text{f} \end{cases}$
Electron Gun
Optical:
Faceplate and Protective Panel
Mechanical:
Operating Position.       Any         Weight (Approx.).       34-1/2 lbs         Overall Length.       18-5/16" + 7/16"         Neck Length       5-1/2" ± 3/16"         Projected Area of Screen.       222 sq. in.         External Conductive Coating:       Type.         Type.       Regular Band         Contact area for grounding.       Near Reference Line         For Additional Information on Coatings and Dimensions:
See Picture-Tube Dimensional-Outlines and Bulb J187 D/G sheets
at the front of this section Cap
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



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

# 23YP4

Maximum and Minimum Ratings, Design-Maximum Values:		
ULTOR VOLTAGE	volts	~
(12000 000).	volts	(
GRID-No.4 (FOCUSING) VOLTAGE:	1.	We
Positive value	volts	
Negative value.         550 max.           GRID-No.2 VOLTAGE         550 max.	volts volts	
GRID-NO.2 VOLTAGE	VOLUS	
Negative peak value	volts	
Negative bias value	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	<u></u>
Heater positive with	10100	$\sim_{\sim}$
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 0 to 400	volts	
Grid-No.1 Voltage for visual extinction		
of focused raster	volts	
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance 1.5 max.	megohms	
	<b>U</b> -	

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



## **Picture Tube**

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ALUMINIZED SCREEN 90° MAGNETIC DEFLECTION

### GENERAL DATA

### Electrical:

RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS

Heater Current at 6.3 volts
Optical: Faceplate, Spherical
<pre>Mechanical: Operating Position</pre>
Pin 1-Heater Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater Pin 2-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater H $C_{3}G_{5}$ Current Carlow Cap-Ultor Grid No.3, Collector) Collector Collector Conductive Coating



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

## 24**A**EP4

Maximum Ratings, Design-Maximum 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 bias value 155 max.	volts	
Positive bias value 0 max.	volts	
Positive peak value 2 max.	volts	1997 - S.
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	10103	~~~
respect to cathode	volts	
	VOILS	~/
Typical Operating Conditions:		
With ultor voltage of 18000	volts	
and grid-No.2 voltage of 300	volts	
Grid-No.4 Voltage for focus50 to +350	volts	
Grid-No.1 Voltage for visual	10100	
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





## PICTURE TUBE

DATA

RECTANGULAR GLASS TYPE LOW-VOLTAGE FOCUS ALUMINIZED SCREEN MAGNETIC DEFLECTION

PARTIO A

#### General:

1

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Heater, for Unipotential Cathode:
Voltage
Current 0.6 ± 10%
Direct Interelectrode Capacitances:
Grid No.1 to all other electrodes 6 $\mu\mu$
Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 $\mu\mu^{1}$ Cathode to all other electrodes 5 $\mu\mu^{1}$
External conductive coating to ultor {2500 max. µµ1 2000 min. µµ1
Faceplate, Spherical
Light transmission (Approx.)
Light transmission (Approx.)
Aluminized
Fluorescence
Phosphorescence
Persistence
Focusing Method Electrostatic Deflection Method
Deflection Method
Deflection Angles (Approx.): Diagonal
Horizontal
Vertical
Electron Gun Iype Requiring No Ion-Irap Magnet
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
Mounting Position
Bulb
Base Small-Button Eightar 7-Pin,
Arrangement 2, (JETEC No.B7-183)
Basing Designation for BOTTOM VIEW 8HR
Pin 1-Heater Q P Cap-Ultor
Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4-Grid No.1 Pin 6-Grid No.1 Pin 6-Grid No.1 Pin 6-Grid No.1 Pin 6-Grid No.1
Pin 4 - Grid No.4
Pin 6 - Grid No.1 $(2)$ $(7)$ C - External
Pin 7 - Cathode Conductive
Pin 8 - Heater U ® Coating
Chine Houses C C C Courting

€

TENTATIVE DATA 1

ELECTRON TUBE DIVISION



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 . 112000**⊕**min. volts GRID-No.4 VOLTAGE: Positive value. . 1000 max. volts Negative value. . 500 max. volts GRID-No.2 VOLTAGE 500 max. volts GRID-No.1 VOLTAGE: Negative peak value . 200 max. volts Negative bias value . 140 max. volts 0 max. 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 not exceeding 15 seconds. . . . 410 max. volts After equipment warm-up period. 180 max. volts Heater positive with respect to cathode. 180 max. volts Equipment Design Ranges: With any ultor voltage  $(E_{C_5\,k})$  between 12000 and 20000 volts and grid-No.2 voltage  $(E_{C_2k})$  between 200 and 500 volts Grid-No,4 Voltage for Focus9. -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 16000 volts 14000 and grid-No.2 voltage of volts 300 400 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. .9.*: See next page. TENTATIVE DATA 1 6-57

## ELECTRON TUBE DIVISION





A



Grid-No.1 Voltage Visual Extinctio	on of			70	0	<b>.</b> .		1.
Focused Raster . Grid-No.1 Video Di from Raster Cuto	rive	-28	3 to	-72	-3	5 to	-94	volts
(Black Level): White-level valu	ue	28	3 to	72	3	6 to	94	volts
Maximum Circuit Va	alues:							
Grid-No.1-Circuit	Resistan	ce.	•••	•••	. 1	.5 m	ax. r	negohms
	CATHODE	E-DRiV	E" S	ERV I	CE			
Unless otherwi	se specif with res					are	posi	tive
Maximum Ratings, <i>l</i>	)esign-Ce	nter 1	lue	s :				
ULTOR-TO-GRID-No.2			•••	• •		000 000 <b>⊕</b>	max. min.	volts volts
GRID-No.4-TO-GRID- Positive value .		TAGE:			1	000	max.	volts
Negative value .				• •		500	max.	volts
GRID-No.2-TO-GRID-		TAGE				640	max.	volts
GRID-No.2-TO-CATHO CATHODE-TO-GRID-No	DE VOLTA	GE	••	• •		500	max.	volts
Positive peak va		• • •	•••	• •		200	max.	volts
Positive bias va Negative bias va		• • •	•••	• •		140 0	max. max.	volts volts
Negative blas va Negative peak va PEAK HEATER-CATHOL Heater negative	alue DE VOLTAG		cat	hode		2	max.	volts
During equipme	ent warm-	up per	iod					
not exceedir				• •		110	max.	volts
After equipmer Heater positive				•••		180 180	max. max.	volts volts
Equipment Design R		ectio	Cath	oue.		100	max.	VUILS
With any ultor-to-	-	1 volt	age	(E _c ,	g 1) b	twee	e n	
					12000	and	20000	volts
and grid-No.2-to-g		voita	gei	^L c ₂ g	1 22	s an	id 640	volts
Grid-No.4-to-Grid- Voltage for Focu					–50 to	+350	)	volts
Cathode drive is t varies the cathod other electrodes.	.he operat 1e potenti	ing con ial wi	nditi th re					
🖶 This value is a wo								
This value is a wo lute minimum ultor- low which the serv equipment designer design value such involving supply-v lute minimum ultor 11000 volts.	rking desi -or ultor- viceabilit has the that under oltage var -or wltor-	gn-cent to-gric y of t respons the wo iation -to-gri	ter m i-No. he 21 sibil orst and d-No.	inimu 1 vol IAHP4 ity c proba equip 1 vo	m. The will of detended ble op ment v ltage	e equ s 110 be im rmini erati ariat s ne	ivalen 00 vol 1pairec ing a 1 ng con 1on th ver le	t abso- ts, be- ninimum ditions e abso- ss than
lute minimum ultor low which the serv equipment designer design value such involving supply-v lute minimum ultor 11000 volts. *,§: See next page.	rking desi -or ultor viceabilit - has the that under oltage var -or ultor-	gn-cent to-gric y of t respons the wo iation -to-gri	ter m he 21 sibil orst i and o d-No.	inimu 1 vol AHP4 ity c proba equip 1 vo	m. Th tage i will of dete ble op ment v ltage	e equ s 110 be im rmini erati ariat s ne	ivalen 00 vol npairec ing a n ng con ion th ver le	t abso- ts, be- J. The ninimum ditions e abso- ss than



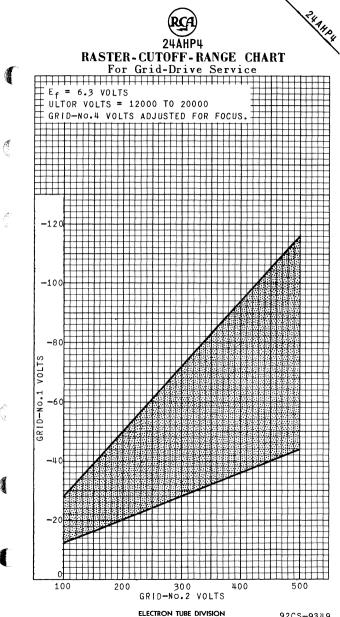
24AHPA

PICTURE TUBE

ſ				V
Cathode-to-Grid-No.1 Voltage (Ekg ₁ ) for Visual Extinction of Focused Raster		r-Cutoff-Rang uthode-Drive		
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value	<i>jur ca</i>	linoae-Drive	Service	 * 572 ⁻
(Peak negative)	Same valu E _{kgi} exce	ue as determi ept video dri negative	ve is a	
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 Ra	inges:			
With ultor-to-grid-No.1 voltage of and grid-No.2-to-grid-No.1	'	16000	volts	
voltage of		400	volts	
Grid-No.4-to-Grid- No.1 Voltage for Focus Cathode-to-Grid-No.1 Voltage for Visual Extinction of Focused	-50 to +350	-50 to +350	volts	
Raster	28 to 60	36 to 78	volts	
White-level value	-28 to -60	-36 to -78	volts	
Maximum Circuit Values:				1000
Grid-No.1-Circuit Resistance		1.5 max.	megohms	
* Distance from <i>Reference Line</i> f not exceed 2-1/4". Excluding undeflected focused spot will radius concentric with the cent that the earth's magnetic field of the spot from the center of	for suitable PM c extraneous fie fall within a cii ter of the tube f can cause as much the tube face.	entering magne lds, the cente rcle having a 7 ace. It is to as 1/2—inch de	t should r of the /16-inch be noted flection	(
S The grid-No.4 voltage or grid- focus of any individual tube i remain essentially constant fo grid-No.1 voltage) or grid-No voltage) within design ranges s	-No.4-to-grid-No. s independent of r values of ulto: .2 voltage (or o shown for these i	1 voltage requ ultor current r voltage (or u grid-No.2-to-g tems.	ired for and will ltor-to- rid-No.1	
For X-ray shielding X-RAY PRECAUTIONS at front (		AY TUBES		( )
6-57 ELECTRON		TENTATIVE	ΠΑΤΑ 2	

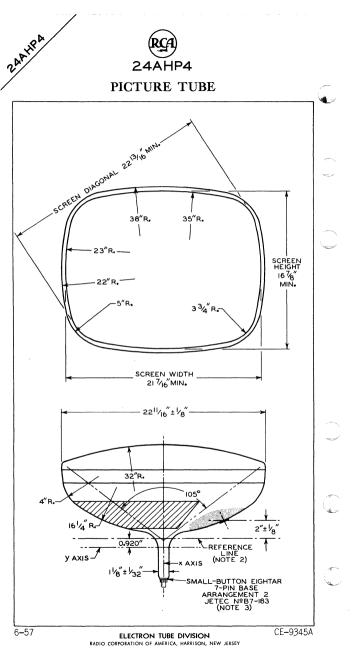
ELECTRON TUBE DIVISION TENTATIVE DATA 2 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

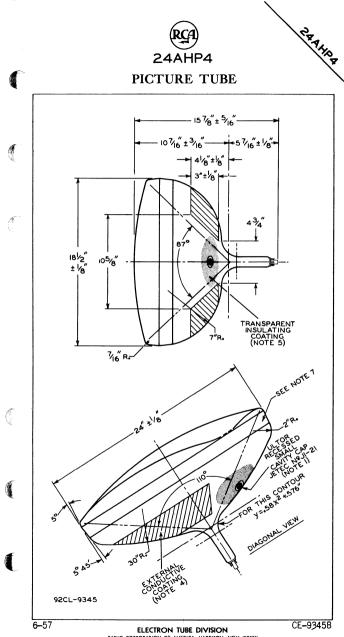




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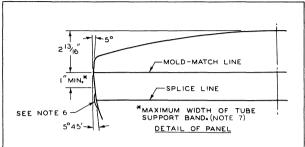




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### PICTURE TUBE



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 JETEC NO.126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE 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.

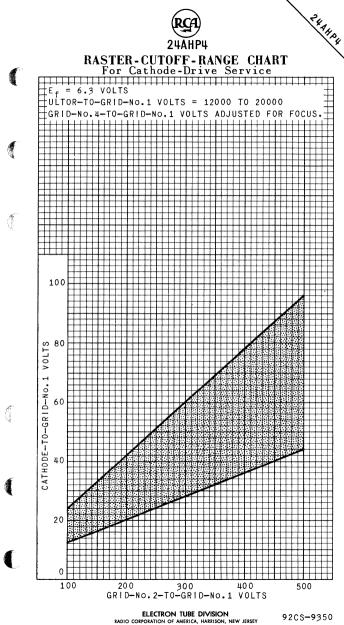
NOTE 5: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

NOTE 6: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICAT-ED 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.

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

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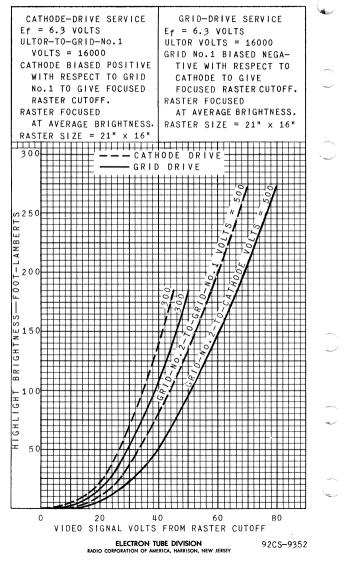


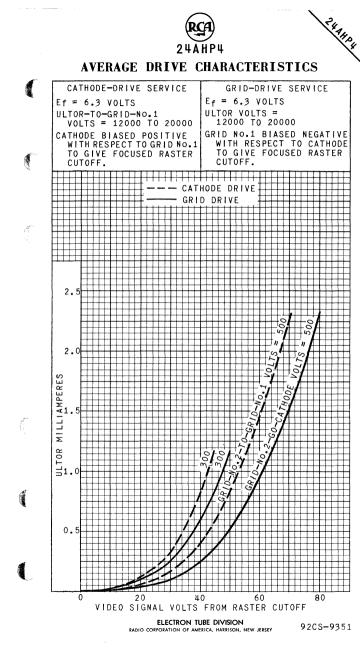




24AHP4

## AVERAGE DRIVE CHARACTERISTICS







## 24ATP4

## **Picture Tube**

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

With Heater Having Controlled Warm-Up Time

### DATA

#### General:

Heater for Heinstertiel Cathoday	
Heater, for Unipotential Cathode: Voltage (AC or DC)	6.3 volts
Current at 6.3 volts.	0.6 amp
Warm-up time (Average)	11 sec
Direct Interelectrode Capacitances:	11 500
Grid No.1 to all other electrodes	6 <i>μ</i> μf
Cathode to all other electrodes	5 μμ
External conductive coating to ultor	(2500 max. μμf
•	12000 min. uuf
Faceplate, Spherical	Filterglass
Faceplate, Spherical	73%
Phosphor (For Curves, see front of this Section) .	.P4—Sulfide Type
Fluorescence	White
Phosphorescence	White
Persistence	Medium Short
Focusing Method	Electrostatic
Deflection Method	Magnetic
Deflection Angles (Approx.):	000
Diagonal.	
Horizontal	· · · · · · · · 80°
Vertical	No. I op. Trop. Magnet
Tube Dimensions:	No ron-rrap Magner
Overall length.	10 1/0" + 2/0"
Greatest width.	$22_{11}/16" + 1/8"$
Greatest height	
Diagonal.	24" + 1/8"
Diagonal Neck length	5-1/2" + 3/16"
Radius of curvature of faceplate	// 10
	40"
Screen Dimensions (Minimum):	
Greatest width	21-7/16"
Greatest height	16–7/8"
Diagonal	22–13/16"
Projected area	332 sq. in.
Diagonal Projected area Weight (Approx.).	35 lbs
Operating Position	Any
Cap	y (JEDEC No.J1-21)
Bulb	J192 A2/B2
Boose Small Shall Durderal 6 D	-12, or equivalent
Dase	III, Arrangement 1,
(JEDEC)	Group 4, No.B6-63)

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

# 24ATP4

Basing Designation Pin 1 - Heater Pin 2 - Grid No.1 Pin 6 - Grid No.4 Pin 10 - Grid No.2 Pin 11 - Cathode Pin 12 - Heater	for BOTTOM VIEW	12L Cap-Ultor (Grid No.3, Grid No.5, Collector) C-External Conductive Coating	, j	
CATHODE-DRIVE [®] Service				
Unless otherwise specified, voltage values are positive with respect to grid No.1				

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

ULTOR-TO-GRID-No.1 VOLTAGE	max.	volts	
	min.	volts	
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:			
Positive value	max.	volts	
Negative value	max.	volts	
GRID-No.2-TO-GRID-No.1 VOLTAGE 68	max.	volts	
CATHODE-TO-GRID-No.1 VOLTAGE:			
Positive-peak value	max.	volts	
Positive-bias value	max.	volts	
Negative-bias value 0	max.	volts	
Negative-peak value 0	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	
		volts	
Heater positive with respect to cathode. 180	max.	volts	

### Equipment Design Ranges:

With any ultor-to-grid-No.1 voltage $(E_{C5g_1})$ between 12000 ⁴ and 20000 volts and grid-No.2-to- grid-No.1 voltage $(E_{C2g_1})$ between 40 and 68 volts	
Grid-No.4-to-Grid-No.1 Voltage for focus [§] . 0 to 400 volts Cathode-to-Grid-No.1 Voltage (E _{kg1} ) for visual extinction	• _
of focused raster ⁴ See Raster-Cutoff-Range Chart for Cathode-Drive Service	
Cathode-to-Grid-No.1 Video	
Drive from Raster Cutoff (Black level): White-level value	
(Peak negative) Same value as determined for E _{kg1} except video drive is a negative voltage	
Grid-No.4 Current25 to +25 μa	
Grid-No.2 Current	~
Centering Magnet [*] 0 to 8 gausses	·

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



#### Examples of Use of Design Ranges:

With ultor-to-grid-No.1 voltage of and grid-No.2-to-grid-No.1	16000	volts
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
<pre>visual extinction of focused raster Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level):</pre>	32 to 47	volts
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 in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.
- This value is a working design-center minimum. The equivalent *absolute-minimum* ultor-to-grid-No.1 voltage is 11,000 volts, below which the serviceability of the 2447PH 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 valation and equipment variation the absoluteminimum ultor-to-grid-No.1 volts.
- The grid-No.4-to-grid-No.1 voltage required for optimum focus of any individual tube may have a value anywhere between 0 and #00 volts and is independent of ultor current and will remain essentially constant for values of ultor-to-grid-No.1 voltage or grid-No.2-to-grid-No.1 voltage within design ranges shown for these items.
- The cathode-to-grid-No.1 voltage (Ekg1) will increase by approximately 2 per cent for every 1000-volt increase in ultor-to-grid-No.1 voltage and will decrease by approximately 2 per cent for every 1000-volt decrease in ultor-to-grid-No.1 voltage.
- Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4". Excluding extraneous fields, the center of the undeflected 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 deflection of the spot from the center of the tube face.

#### OPERATING CONSIDERATIONS

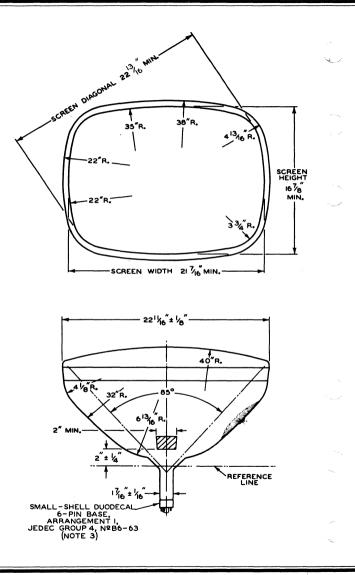
Shatter-Proof Cover Over the Tube Face. Following conventional picture-tube practice, it is recommended that the cabinet be provided with ashatter-proof, glass cover over the face of the 24ATP4 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide X-ray protection when required.

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



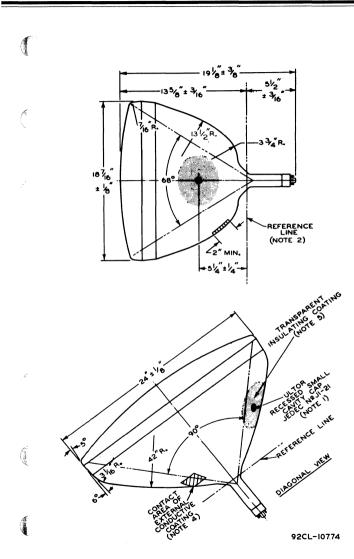
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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 2 8-60





## 24ATP4

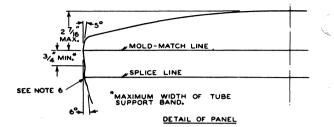




RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

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DATA 3 8-60



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°. 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.

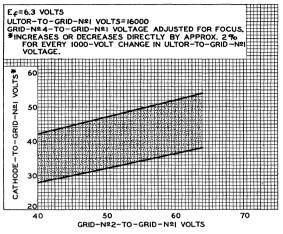
NOTE 5: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

NOTE 6: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE 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.



## 24ATP4

## RASTER-CUTOFF-RANGE CHART Cathode-Drive Service



92CS-10765

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### PICTURE TUBE

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

#### DATA

#### General:

and the

general.								
Heater, for Unipote	ential	Catho	de:					
Voltage		. 6	3.			. ac c	or de v	olt
Current		. 0	6 + 5	%				. an
Warm-up time (Av	oranal	• •	11	•	• •	• • •	• • •	
manneup chile (Ave	eraye/	•		•,•	· · ·		• • •	• 30
For definition of	neater	warm-u	o time	ana me	tnoa	oj aete	rmining	
it, see sheet Hb	ATER W	AKMUP	TIME	EASUR	EMEN	l'at fr	ont of	
Receiving Tube Sec	ction.							
Direct Interelectro	ode Ca	pacitar	nces:					
Grid No 1 to all	other	elect	odes.			6		
Cathode to all of	ther o	lectro	ioc	•••	•••			- mp
	Lifer e	rectro		•••	•••	(2500	may	μμ
External conducti	ive co	ating [.]	to ult	or .		12300	max.	$\mu\mu$
	,					(1/00	min.	$\mu\mu$
aceplate, Spherica	al 🗛 🔸	• • •	• • •	•••	•••	• • • F	ilterg	las
Light transmissio	on (Ap	prox.)		• •				74
Phosphor (For Curves,	see fr	ont of	this Se	ection	)	P4-Su	lfide	Тур
Eluorescence							W	hit
Phosphorescence				•••			w	hi+
Paraiatanaa		• • •	• • •	•••	•••	• • •	•••"	11 I U
rersistence.	• • •	• • •	• • •	•••	•••	· · - i -	• • • • •	001
				• •			. Magn	eti
Diagonal								90
Horizontal								85
Vertical	•••	• • •		•••	•••	•••	•••	68
	• • •	· · · ·	• • •		- 1.	· · · ·	· · ·	- 00
	• • •	• • • • • • •	e req	unnn	g nu	1011-1	rap Ma	gne
								~ . ~
Uverall length .	• • •	• • •	• • •	•••	•••	. 18-1	/8" ± )	3/8
Greatest width .				• •		22-11/	16"±.	1/8
Greatest height.						18-7/	16" ± 1	1/8
Diagonal							24" ± :	1/8
Neck length						. 4-1/	2" + 3	/16
Radius of curvati	ire of	facen	ate (	Fytor	nal	surfac		10
creen Dimensions	(Minim	uml ·	arci	LALCI	nai	Surrac	c/• •	40
							21 7	110
Greatest width	• • •	• • •	• • •	•••	•••	•••	. 21-1	710
Greatest height.		• • •	· · ·	•••	•••	• • •	. 16-	115
Diagonal				• •			22-13	/16
Projected area .						3	32 sq.	ir
Weight (Approx.) .							32-1/2	11
Derating Position								. Ar
an		erecco	Smal	1 (2)	itv	LIEDEC	No 11	_21
Jap	• • R	000000	Judi	i cav	ıцу	JULUEU	110.01	24
	•••	•••	• • •	• • • •	÷.,		• • 119	2A/
		• • SI	ort S	mall-	Shei	I Duod	ecal 6	-P i
base				( C	un A	No B	6 2021	~
ase			JUCUC	.c Gro	up 4	, 110.0	0-2031	, 0
<pre>it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of Receiving Tube Section. Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 Cathode to all other electrodes 6 External conductive coating to ultor . {2500 max. 1700 min. Faceplate, Spherical Filterg Light transmission (Approx.)</pre>						nt		
For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of Receiving Tube Section.         Direct Interelectrode Capacitances: Grid No.1 to all other electrodes.       6         Cathode to all other electrodes.       5         External conductive coating to ultor       22500 max. 1700 min.         Faceplate, Spherical       .         Phosphor (For curves, see front of this Section).       P4—Sulfide Alumin         Fluorescence       .         WPhosphorescence.       .         Deflection Method.       .         Deflection Angles (Approx.):       Diagonal         Diagonal       .         Horizontal       .         Section Gun       .         Radius of curvature of faceplate (External surface).						nt		

4-59

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ELECTRON TUBE DIVISION

TENTATIVE DATA 1

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AT .	24AUP4		
, I	PICTURE TUBE	C	
Basing Designation	for BOTTOM VIEW	,	12L
Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater		Cap - Ultor (Grid N Grid N Collec C - Externa Conduc Coatin	o.5, tor) l tive
	GRID-DRIVEA SERVICE		
	specified, voltage vo ith respect to cathoo		ive
Maximum Ratings, Des			
ULTOR VOLTAGE		{20000 max. 12000 [⊕] min.	volts volts
GRID-No.4 (FOCUSING) Positive value Negative value GRID-No.2 VOLTAGE GRID-No.1 VOLTAGE:		1000 max. 500 max. 500 max.	volts volts volts
Negative-peak value Positive-bias value Positive-peak value Positive-peak value PEAK HEATER-CATHODE \ Heater negative wit During equipment	e. e. volTAGE: h respect to cathode: warm-up period	200 max. 140 max. 0 max. 2 max.	volts volts volts volts
After equipment v	15 seconds warm-up period h respect to cathode.	410 max. 180 max. 180 max.	volts volts volts
Equipment Design Rang	ges:		
and grid-No.2 vol	age (E _{C5k} ) between 12 ltage (E _{C2k} ) between	2000 and 20000 200 and 500 vol	volts ts
Grid-No.4 Voltage for focus§ Grid-No.1 Voltage (Ed visual extinction d		-75 to +400	volts
focused raster	See Rast	er-Cutoff-Range or Grid-Drive S	
Grid-No.1 Video Drive Raster Cutoff (Blac White-level value (Peak positive)	ck Level): Same va	lue as determin	
Grid-No.4 Current	Ec ₁ k ex	cept video driv positive v -25 to +25	

ELECTRON TUBE DIVISION IENTATIVE DATA 1 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



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# PICTURE TUBE

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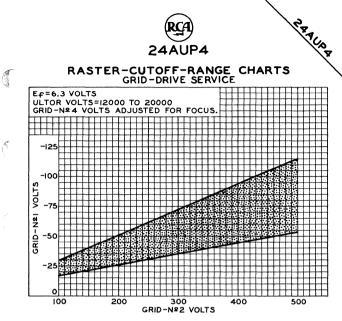
P14	
Grid-No.2 Current	иг
Centering Magnet t 0 to 8 gausse	38
Examples of Use of Design Ranges:	
With ultor voltage of 18000 volt	
and grid-No.2 voltage of 300 volt	t s
Grid-No.4 Voltage for focus75 to +400 volt Grid-No.1 Voltage for visual	ts
extinction of focused raster35 to -72 volt Grid-No.1 Video Drive from Raster Cutoff (Black Level):	ts
White-level value	ts
Maximum Circuit Values;	
Grid-No.1-Circuit Resistance 1.5 max. megohr	ns
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	
GRID-No.4-TO-GRID-No.1 VOLTAGE:	
Positive value	
Negative value         500 max. volt           GRID-No.2-TO-GRID-No.1 VOLTAGE         640 max. volt	
GRID-No.2-TO-CATHODE VOLTAGE	
Positive-peak value 200 max. volt	t٤
Positive-bias value	
Negative-bias value 0 max. volt	
Negative-peak value 2 max. volt PEAK HEATER-CATHODE VOLTAGE:	t٤
Heater negative with respect to cathode: During equipment warm-up period	
not exceeding 15 seconds 410 max. volt	t s
After equipment warm-up period 180 max. volt	
Heater positive with respect to cathode. 180 max. volt	ts
Equipment Design Ranges:	
With any ultor-to-grid-No.1 voltage $(E_{C5g1})$ between 12000 and 20000 volts and grid-No.2-to-grid-No.1 voltage $(E_{C2g1})$	
between 225 and 640 volts	
Grid-No.4-to-Grid-No.1 Voltage for focus§	t
Cathode-to-Grid-No.1 Voltage (E _{kg1} ) for visual extinction	
of focused raster See Raster-Cutoff-Range Chan for Cathode-Drive Servic	
4-59 TENTATIVE DATA	-



## PICTURE TUBE

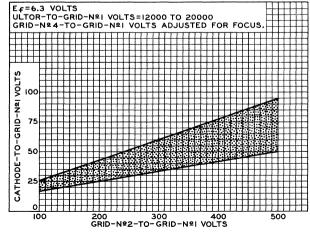
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak negative)Same value as determined for E _{kg1} except video drive is a	
negative voltage Grid-No.4 Current25 to +25 μa Grid-No.2 Current15 to +15 μa Field Strength of Adjustable Centering Magnet 0 to 8 gausses	
Examples of Use of Design Ranges:	
With ultor-to-grid- No.1 voltage of 18000 volts and grid-No.2-to-grid-	88.
No.1 voltage of 300 volts	
Grid-No.4-to-Grid-No.1 Voltage for focus	
of focused raster	
White-level value33 to -60 volts	
Maximum Circuit Values: Grid-No.1-Circuit Resistance	
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 abso- lute minimum ultor-or ultor-to-grid-No.1 voltage is 11.000 volts, be- low which the serviceability of the 24.4UPu 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 ultor-or ultor-to-grid-No.1 voltage is never less than [1.1000 volts.	
9 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.	-
I Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4". 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 No.1 and other elec- trodes.	
For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES	
at front of this Section	

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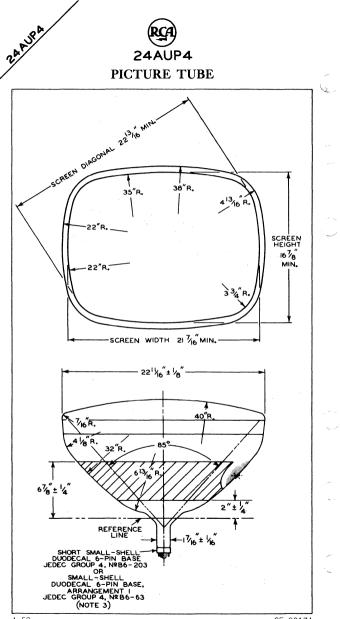
CATHODE-DRIVE SERVICE



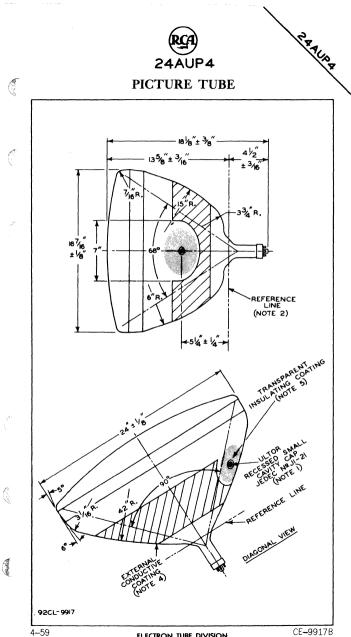
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ELECTRON TUBE DIVISION

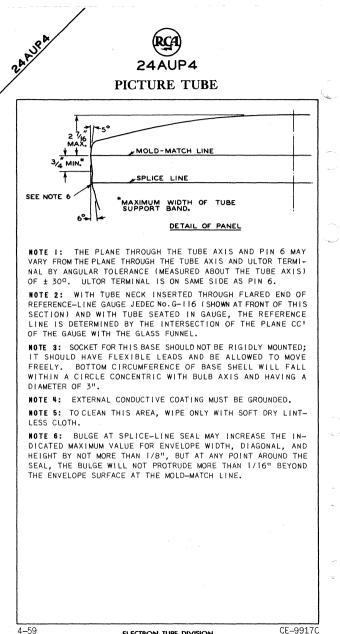
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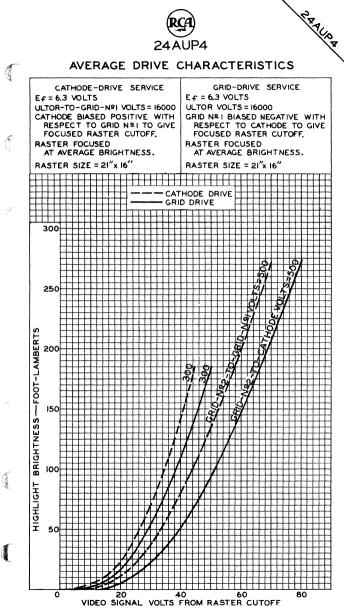
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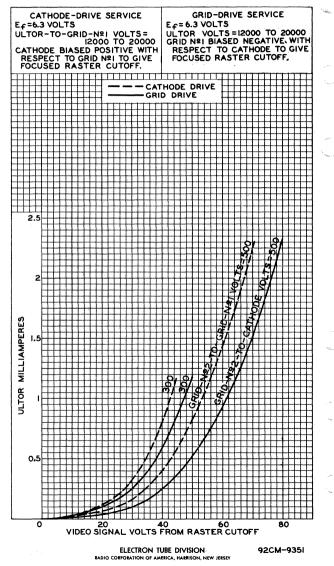
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ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-9352



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### AVERAGE DRIVE CHARACTERISTICS





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

#### DATA

#### General:

General:
Heater, for Unipotential Cathode: Voltage (AC or DC) 6.3 volts Current 0.6 amp Direct Interelectrode Capacitances:
Grid No.1 to all other electrodes 6 $\mu\mu$ t Cathode to all other electrodes 5 $\mu\mu$ t External conductive coating to ultor 22500 max. $\mu\mu$
Faceplate, Spherical
Fluorescence
Diagonal
Overall length       15-7/8" ± 5/16'         Greatest width       22-11/16" ± 1/8'         Greatest height       18-1/2" ± 1/8'         Diagonal       24" ± 1/8'         Neck length       5-7/16" ± 1/8'         Radius of curvature of faceplate (External surface)       32'         Screen Dimensions (Minimum):       5-7/16" ± 1/8'
Greatest width         21-7/16'           Greatest height         16-7/8'           Diagonal         22-13/16'           Projected area         332 sq. in.           Weight (Approx.)         28 lbs
Operating Position

-Indicates a change.

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DATA 1

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	ABAPA RCA 24BAP4
r	24BAP4
/	PICTURE TUBE
	Basing Designation for BOTTOM VIEW 8HR
	Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4-Grid No.1 Pin 6-Grid No.1 Pin 7-Cathode Pin 8-Heater Pin 8-Heater Pin 8-Heater Pin 8-Grid No.2 Pin 4-Grid No.4 Pin 8-Heater Pin 8-Heater Pin 8-Heater Pin 8-Grid No.2 Pin 9-Grid No.4 Pin 9-Grid No.1 Pin 9-Grid No.1 Pin 9-Grid No.2 Pin 9-Grid No.4 Pin 9-Grid No.2 Pin 9-Grid No.4 Pin 9-Grid N
	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
	GRID-No.4-TO-GRID-No.1 VOLTAGE:          {12000 [®] min. volts         Positive value.       1000 max. volts         Negative value.       500 max. volts         GRID-No.2-TO-GRID-No.1 VOLTAGE.       64 max. volts
•	CATHODE-TO-GRID-No.1 VOLTAGE: Positive-peak value 200 max. volts Positive-bias value
	Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 410 max. volts After equipment warm-up period 180 max. volts Heater positive with respect to cathode. 180 max. volts
	Equipment Design Ranges:
	With any ultor-to-grid-No.1 voltage $(E_{C_{g_{1}}})$ between 12000 and 20000 volts and grid-No.2-to-grid-No.1 voltage $(E_{C_{g_{1}}})$ between 40 and 64 volts
	Grid-No.4-to-Grid-No.1 Voltage for focus§ 0 to 400 volts Cathode-to Grid-No.1 Voltage
	<pre>(Ekg1) for visual extinc- tion of focused raster See Raster-Cutoff-Range Chart Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value</pre>
	(Peak negative) Same value as determined for Ekg except video drive is a negative voltage Grid-No.4 Current
	Grid—No.2 Current

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



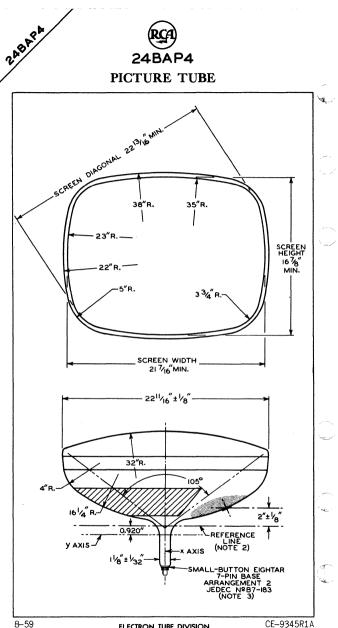
### PICTURE TUBE

······································			
Examples of Use of Design Ran With ultor-to-grid-	ges:		
No. 1 voltage of	16000	20000	volt
and grid-No.2-to-grid-			
No.1 voltage of	50	64	volt
Grid-No.4-to-Grid-No.1			
Voltage for focus	. 0 to 400	0 to 400	volt
Cathode-to-Grid-No.1			
Voltage for visual extinction of focused			
raster	32 to 47	42 to 58	volt
Cathode-to-Grid-No.1	. )2	12 00 00	
Video Drive from Raster			
Cutoff (Black level):			
White-level value	• -32 to -47	-42 to -58	volt
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance		1.5 max. r	negohm
Cathode drive is the operating varies the cathode potential wit electrodes.	condition in wh h respect to gri	ich the video id No.1 and th	signa e other
[®] This value is a working design-cc minimum ultor-to-grid-No.1 vol serviceability of the 24BAP4 will has the responsibility of determi under the worst probable operatir variation and equipment variatio No.1 voltage is never less than	n the absolute m	e equivalent a olts below wh he equipment d esign value su olving supply- inimum ultor-t	bsolute ich the esigner ich that voltage o-grid-
Š The grid-No.4-to-grid-No.1 volta individual tube may have a value independent of ultor current; and values of ultor-to-grid-No.1 volta within design ranges shown for th	ge required for anywhere betwee will remain ess ge,orgrid-No.2- hese items.	optimum focus n 0 and 400 vo entially const to-grid-No.1 v	of any lts; is ant for oltage,
Distance from Reference Line for not exceed 2-1/4". Excluding e undeflected focused spot will f radius concentric with the center that the earth's magnetic field tion of the spot from the center	suitable PM cer xtraneous field	ntering magnet s, the center	should of the
OPERATING (	ONSIDERATIONS		
X-Ray Warning. When opera kilovolts, the 24BAP4 does radiation. However, because operation at voltages as high a value), shielding of the 24E needed to protect against p exposure at close range whene volve voltages in excess of l	not produce the rating of s 22 kilovolts BAP4 for X-ray possible inju ver the operat	any harmful this type p (Absolute- radiation ry from pro	X-ra permit maximu may b longe

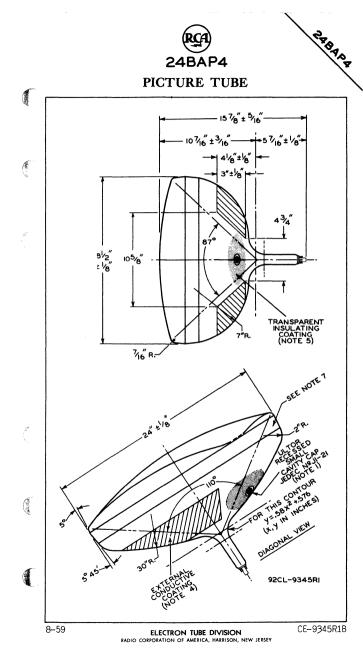
Shatter-Proof Cover Over the Tube Face. Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 24BAP4 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide X-ray protection when required.

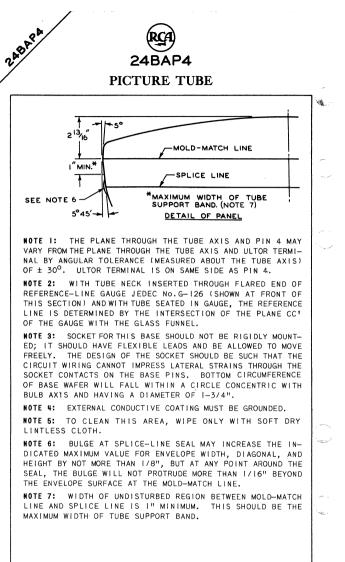
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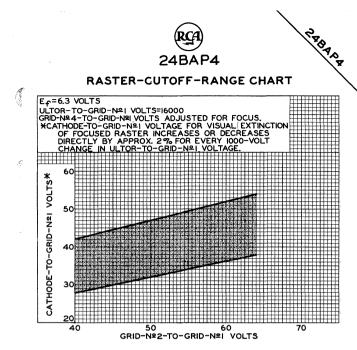
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ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

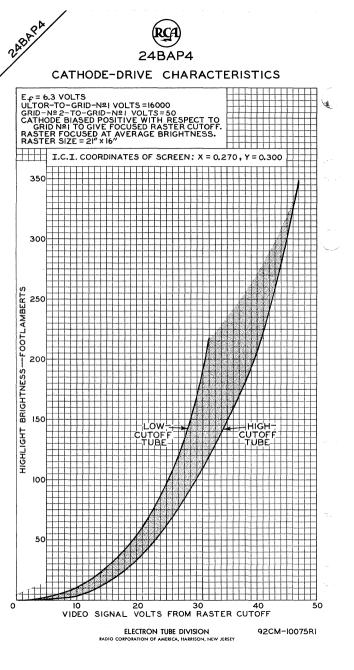


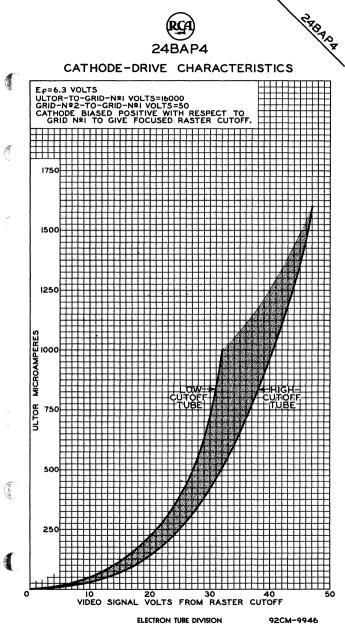




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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

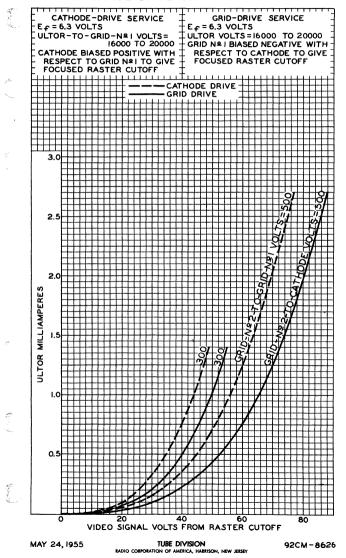
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AVERAGE DRIVE CHARACTERISTICS





# 24CP4A

# **Picture Tube**

#### RECTANGULAR GLASS TYPE MAGNETIC FOCUS

ALUMINIZED SCREEN 90° MAGNETIC DEFLECTION

GENERAL DATA

#### Electrical:

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Electrical:
Heater Current at 6.3 volts 600 ±10% ma 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. ##f
Electron Gun Ion-Trap Type Requiring External Single-Field Magnet
Optical:
Faceplate, Spherical
Mechanical:
Operating Position.       Any         Weight (Approx.).       35 lbs         Overall Length.       35 lbs         Overall Length.       21-1/8" ± 3/8"         Neck Length.       7-1/2" ± 3/16"         Projected Area of Screen.       332 sq. in.         External Conductive Coating:       7.1.2" ± 3/16"         Type.       .       .         For Additional Information on Coatings and Dimensions:       See Picture-Tube Dimensional-Outlines and Bulb Jiga A/B sheets at the front of this section
Cap
Basing Designation for BOTTOM VIEW
Pin 1-Heater Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater Given Cap-Ultor (Grid No.3, Collector) C - External Conductive Conductive Conductive Conductive Conductive

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

ULTOR VOLTAGE														max.	volts
GRID-No.2 VOLTAGE	Ε,	 •	•	•	-	·	·	•	•	•	۰.	•	550	max.	volts



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

# 24CP4A

GRID-No.1 VOLTAGE:			
Negative peak value	220 max.	volts	
Negative bias value	155 max.	volts	
Positive bias value	0 max.	volts	. ش
Positive peak value	2 max.	volts	<u> </u>
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to c	athode:		
During equipment warm-up period			
not exceeding 15 seconds	450 max.	volts	
After equipment warm-up period	200 max.	volts	, er. <
Heater positive with respect to c	athode . 200 max.	volts	
			~ 2
Tunion) Operating Conditions:			~ ~
Typical Operating Conditions:			
With ultor voltage of	16000	volts	
•	16000 300	volts volts	
With ultor voltage of and grid-No.2 voltage of			~ ~
With ultor voltage of			
With ultor voltage of and grid-No.2 voltage of Grid-No.1 Voltage for	300	volts	
With ultor voltage of and grid-No.2 voltage of Grid-No.1 Voltage for visual extinction of focused raster	300		$\sum$
With ultor voltage of and grid-No.2 voltage of Grid-No.1 Voltage for visual extinction of	300	volts	$\sum$
With ultor voltage of and grid-No.2 voltage of Grid-No.1 Voltage for visual extinction of focused raster	<i>300</i>	volts	$\sum$
With ultor voltage of and grid-No.2 voltage of Grid-No.1 Voltage for visual extinction of focused raster	<i>300</i>	volts volts	$\bigcirc$

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









RECTANGULAR METAL-SHELL TYPE MAGNETIC FOCUS ALUMINIZED SCREEN MAGNETIC DEFLECTION

DATA

#### General:

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Heater, for Unipotential Cathode: Voltage. . . . . . . . . 6.3 . . . . . ac or dc volts Current. . . . . . . . . Phosphor (For curves, see front of this Section). . P4-Sulfide Type Aluminized Deflection Angles (Approx.): Diagonal . . 900 85⁰ Horizontal Vertical . . 69⁰ Electron Gun . . .lon-Trap Type Requiring External Single-Field Magnet Tube Dimensions: Maximum overall length . . . . 25-1/4" ± 3/16" Greatest width at lip. . . . . . . . . . Greatest height at lip . . 19-15/16" ± 3/16" . . . . . . . . . . 26-7/8" ± 1/4" Diagonal at lip. . . . . . . . . Neck length. . . . . . . . . . . . . . Radius of curvature of faceplate (External surface). . . . ♦ Screen Dimensions (Minimum): Greatest width . . . 23-7/16" Greatest height. . 18-1/8" Diagonal . . . . 25-1/16" Operating Position . . . . . . . . . . . . . . . .Anv Base . . Small-Shell Duodecal 5-Pin (JETEC Group 4, No.B5-57) 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 Maximum Ratings, Design-Center Values: ULTOR VOLTAGE. . . . 18000 max. volts . . 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 change. : See next page. 9-58 DATA ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

27MP4

## PICTURE TUBE

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	X-RAY PRECAUTIONS FOR ( at front of thi		Y TUBES		
1	or X-ray shielding consid	derations,	see sheet		- 1
50 140					
the sur perimet 50" rad	ajor area, the radius of cur ace at the boundary of this a ical shape conforming to t	rea blends he surface	into the rim of a sphere	and has a having a	
Within	ajor area, the radius of cur	vature is 4	0". The cur	vature of	
	-Circuit Resistance		1.5 max.	megohms	
	ircuit Values:				
	positive with respect to		180 max. 180 max.	volts	
no [.]	exceeding 15 seconds . equipment warm-up perio		410 max.	volts volts	
Duri	g equipment warm-up peri	od			
	negative with respect to	cathode:		1	

21MPA



PICTURE TUBE

RECTANGULAR GLASS TYPE MAGNETIC FOCUS

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ALUMINIZED SCREEN MAGNETIC DEFLECTION

LIPPA

#### DATA

General:	
Heater, for Unipotential Cathode: Voltage (AC or DC) Current Capacitance between External Conductive Coating and Ultor	6.3 volt 0.6±10% am {2500 max. μμ 500 min. μμ
Faceplate, Spherical	Filterglas P4—Sulfide Typ Aluminize
Deflection Angles (Approx.): Diagonal Horizontal Vertical Electron Gunlon External	
Tube Dimensions: Overall length. Greatest width. Greatest height Diagonal. Neck length Radius of curvature of faceplate	. 20-7/32" ± 3/16 . 26-13/16" + 3/16
(External surface) Screen Dimensions (Minimum):	40
Greatest width. Greatest height	
Basing Designation for BOTTOM VIEW Pin 1-Heater	Cap-Ultor (Grid No.3, Collector) C-External Conductive Coating
Maximum Ratings, Design-Center Values:	
ULTOR VOLTAGE	20000 max. volt 500 max. volt
Negative-peak value	200 max. volt 140 max. volt 0 max. volt 2 max. volt

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

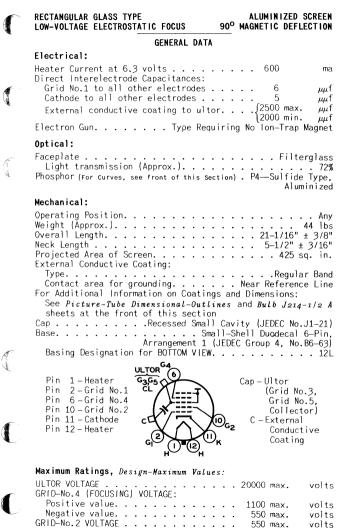


## PICTURE TUBE

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		max.	
Heater positive with			
respect to cathode	180	max.	volts
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance	1.5	max.	megohms
For X-ray shielding considerations, X-RAY PRECAUTIONS FOR CATHODE-RA at front of this Section			

2TRPA

# **Picture Tube**



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

# 27VP4

GRID-No.1 VOLTAGE:			
Negative peak value	220 max.	volts	
Negative bias value	155 max.	volts	
Positive bias value		volts	1
Positive peak value		volts	1 Contraction
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	$\sim$
Typical Operating Conditions:			1
	16000	volts	~/
Typical Operating Conditions: With ultor voltage of and grid-No.2 voltage of	16000 300	volts volts	~/
With ultor voltage of and grid-No.2 voltage of	300	volts	~./
With ultor voltage of and grid-No.2 voltage of Grid-No.4 Voltage for focus	300	volts	
With ultor voltage of and grid-No.2 voltage of Grid-No.4 Voltage for focus Grid-No.1 Voltage for visual extinction	300 -72 to +396	<i>volts</i> volts	
With ultor voltage of and grid-No.2 voltage of Grid-No.4 Voltage for focus	300 -72 to +396	volts	$\sim$
With ultor voltage of and grid-No.2 voltage of Grid-No.4 Voltage for focus Grid-No.1 Voltage for visual extinction	300 -72 to +396	<i>volts</i> volts	$\langle \rangle$
With ultor voltage of and grid-No.2 voltage of Grid-No.4 Voltage for focus Grid-No.1 Voltage for visual extinction of focused raster	300 -72 to +396 -28 to -72	volts volts volts	$\sim$
With ultor voltage of and grid-No.2 voltage of Grid-No.4 Voltage for focus Grid-No.1 Voltage for visual extinction of focused raster	300 -72 to +396 -28 to -72	<i>volts</i> volts	$\sim$

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







HIGH-VACUUM CATHODE-RAY TUBE Supersedes Type gosGeneral:Heater, for Unipotential Cathode: Voltage	Supersedes Type gozGeneral:Heater, for Unipotential Cathode:Voltage.6.3 ± 10%Ac or dc voltCurrent.0.6Direct Interelectrode Capacitances (Approx.):Grid No.1 to All Other Electrodes.DJ to All Other Electrodes.DJ4 to All Other Electrodes.Bother Electrodes.DJ4 to All Other Electrodes.Bother Electrodes.Persistence.Persistence.MediuFocusing Method.ElectrostatiDeflection Method.Deflecting telectrode DJ2Deflecting Electrode DJ2Deflecting Electrode DJ3Pin 1 - Grid No.2; Anode No.2; Deflecting Electrode DJ3Diflecting Electrode DJ3Diflecting Electrode DJ3Diflecting Electrode DJ3Pin 2 - Heater, CathodeDJ, and DJ2 are nearer the screen DJ3 and DJ4 are nearer the baseWith DJ positive with respect to DJ2, the spot is deflected toward pin 1.The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ3 and DJ4 and the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is 900" ± 40.Maximum Ratings, Absolute Values:ANODE -No. 2 & GRID No.2 VolTAGE.
---------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



# HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)	1
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 Grid-No.1 Volt. for Visual Cutoff #, -40 -60 volts Max. Anode-No.1 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 mm/v dc Deflection Factor:**	
DJ1 and DJ2	1
<ul> <li>★ Brilliance and definition decrease with decreasing anode-No.2 voltage. In general, anode-No.2 voltage should not be less than 400 volts.</li> <li>Individual tubes may require between +20\$ and -35\$ of the values shown with grid-No.1 voltages between zero and cutoff.</li> </ul>	
<ul> <li>\$\$ visual extinction of stationary focused spot. Supply should be adjust- able to ± 50\$ of these values.</li> <li>\$ See curve for average values.</li> <li>** individual tubes may vary from these values by ± 20\$.</li> </ul>	
Spot Position:	
The undeflected focused spot will fall within a 10-mm square centered at the geometric center of the tube face and having one side parallel to the trace produced by DJ and DJ2. Suit- able test conditions are: anode-No.2 voltage, 600 volts; anode-No.1 voltage, adjusted for focus; deflecting-electrode resistors, I megohm each for DJ and DJ, 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 max. megohms ^{▲▲} It is recommended that both deflecting-electrode-circuit resistances be approximately equal.	1
	0
	5

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CHARGE STORAGE TUBE

SINGLE-BEAM, BARRIER-GRID TYPE NON-EQUILIBRIUM WRITING

CAPACITANCE-DISCHARGE READING

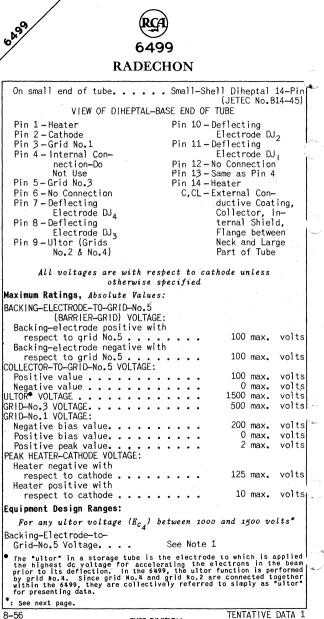
#### DATA

#### General:

1

Heater. for Unipotential Cathode: 部 Voltage. . . . . 6.3 ac or dc volts 0 . . Current. . 0.6 amp Direct Interelectrode Capacitances (Approx.) Grid No.1 to all other electrodes. q μµf Deflecting electrode DJ, to all other electrodes . 13 μµf Deflecting electrode DJ₂ to all other electrodes . 13 μµf Deflecting electrode DJz to al 11.5 other electrodes .  $\mu\mu f$ Deflecting electrode DJ to al 11.5 other electrodes . μµf 3 DJ, to DJ2 . μµ.f R  $DJ_{3}$  to  $DJ_{4}$  $\mu\mu f$ 800 Grid No.5 to backing-electrode μµf Grid No.5 and backing-electrode μµf to collector . Collector to all other electrodes external cylindrical shield. See Curve Focusing Method. . Electrostatic Electrostatic Deflection Method. 11-27/32" ± 3/8" Overall Length . . Greatest Diameter of Tube. 3.30" ± 0.05" . 2-1/4" Minimum Useful Storage-Surface Diameter. . . Mounting Position. . 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. Weight (Approx.) 1 lh Base: . Small-Button Twentyninar 8-Pin On large end of tube (JETEC No.E8-19) VIEW OF TWENTYNINAR-BASE END OF THBF Pin Multiple Connec-「「 Pin 6 tions to Backing-Pin 10 Electrode. Only Pin 14 One Need be Used Pin 18 Pin 21-No Connection Pin 25-No Connection Pin 28-Grid No.5 PINS 2,6,10,14,18: ON 1-7/8" DIA. PIN CIRCLE SOLID-LINE CIRCLES DEPICT DIHEPTAL BASE PINS 21.25.28: ON 7/8" DIA. PIN CIRCLE 8 - 56TENTATIVE DATA 1 TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY







## RADECHON

	RADECHON					
ų.	Collector-to-Grid-No.5 Voltage Grid-No.3 Voltage for	0 to 50	volts			
ŕ	Focus with grid- No.1 volts = 0 Grid-No.1 Voltage for collector-current	14% to 26% of E _{C4}	volts			
	cutoff	-2.5% to -4.7% of $E_{C_4}$	volts			
	grid-No.1 volts = 0 Max. Cathode Current for grid-No.1	20 to 50	µamp			
	volts = 0 Deflection Factors:	See Curve				
	DJ and DJ2. DJ3 and DJ4. Spot Position. Signal-Uniformity Ratio.	85 to 105 v dc/in./kv 78 to 96 v dc/in./kv See Note 2 See Note 3	of E _{C4} of E _{C4}			
	Examples of Use Design Ranges:					
	For ultor voltage of Grid-No.3 Voltage for Focus with grid- No.1 volts = 0	1000 140 to 260	volts			
	Grid-No.1 Voltage for collector-current cutoff		volts			
	Deflection Factors: D1 and D2 D3 and D4.	85 to 105 v	dc/in. dc/in.			
	Maximum Circuit Values:	4.5	.			
	'Grid-No.1-Circuit Resistance . Resistance in Any Deflecting- Electrode Circuit	1.5 max.	megohms megohm			
	In general, the recommended minimum 1000 volts. Signal output and resc voltage. Secondary emission char limit the maximum ultor voltage to	nultorvoltage should not be l olution decrease with decreasi racteristics of the dielectr o 1500 volts.	ess than ng ultor ic layer			
(† 3	It is recommended that all deflet be approximately equal.	cting-electrode-circuit res	istances			
73	Note 1: The backing-electrode, gri ated at the same dc putential. Ou electrode may be pulsed to ±60 vol					
87	a diameter equal to 10% of the and having its center coincider surface.		liameter storage			
G	Spot position is calculated 6.3 volts, ultor voltage of 1000 vo collector voltage of 1050 volts, focus, grid-No.1 voltage adjusted current, each deltecting electrode to ultor, and the tube shielded fro	as forfows: with heater vo grid-No.3 voltage of 100 for 15 microamperes peak c connected through a 1-megohm m all extraneous fields, the	0 volts, to give ollector resistor voltages			
	Note 3: See next page.					
		TENTATIVE	. DATA 2			
	RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY					



### 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 DJ₁, b for DJ₂, c for DJ₃, and a for DJ₁.

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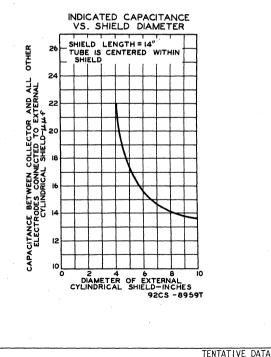
2

Spot Position in \$ of Storage-Surface Diameter =  $1/2\sqrt{\left(\frac{b-a}{b+a}\right)^2 + \left(\frac{d-c}{d+c}\right)^2} \times 100$ 

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.

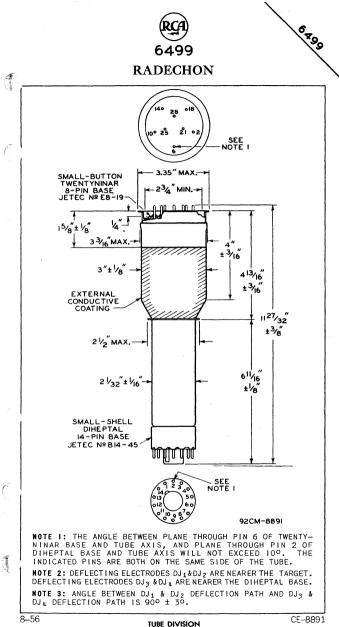
#### OPERATING CONSIDERATIONS

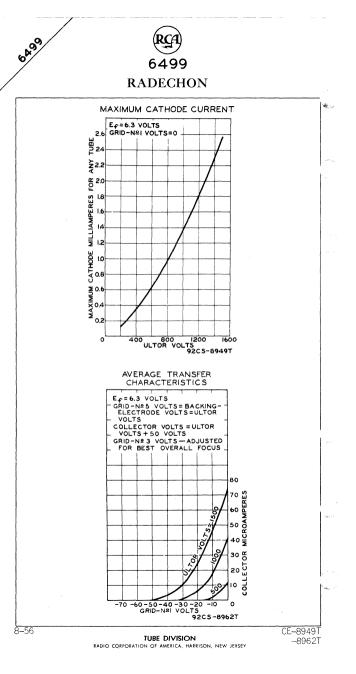
Shielding. The use of a magnetic shield of high-permeability material surrounding the tube is recommended. This shield prevents the effect of stray fields in causing unwanted deflection of the electron beam.



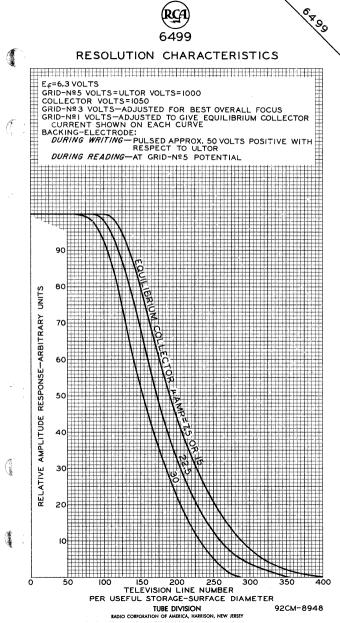
TUBE DIVISION

6⁴⁹⁹











6⁴00

## RESOLUTION CHARACTERISTICS Er=6.3 VOLTS GRID-Nº5 VOLTS=ULTOR VOLTS COLLECTOR VOLTS=ULTOR VOLTS +50 VOLTS GRID-Nº 3 VOLTS-ADJUSTED FOR BEST OVERALL FOCUS GRID-NºI VOLTS-ADJUSTED TO GIVE EQUILIBRIUM COLLECTOR CURRENT OF 7.5 MICROAMPERES DURING WRITING -PULSED APPROX. 50 VOLTS POSITIVE WITH RESPECT TO ULTOR DURING READING-AT GRID-Nº5 POTENTIAL 90 RELATIVE AMPLITUDE RESPONSE-ARBITRARY UNITS 80 70 60 50 40 30 20 10 50 100 150 200 250 300 350

PER USEFUL STORAGE-SURFACE DIAMETER TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

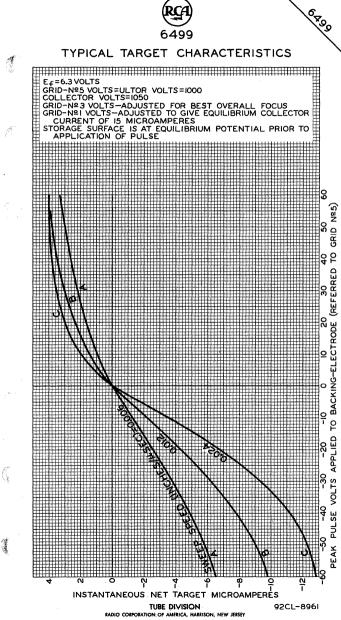
SION LINE NUMBER

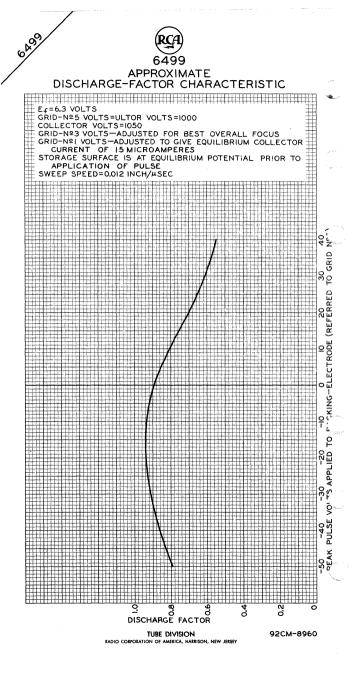
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92CM-8954

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### COMPUTER STORAGE TUBE

SINGLE-BEAM, PRIMARY-CURRENT-MODULATION TYPE REDISTRIBUTION WRITING CAPACITANCE-DISCHARGE READING

DATA

#### General:

T

	Heater, for Unipotential Cathode: Voltage 6.3 ac or dc volts Current 0.6
	W1 to all other electrodes.       9       μμ1         DJ2 to all other electrodes.       8       μμf         DJ4 to all other electrodes.       7       μμf         Focusing Method.       1       1         Deflection Method.       1       1         Deflection Method.       1       1         Deflection Method.       1       1         Deflection Method.       1       1         Deflecting-electrode       1       1         arrangement.       1       1         Storage Surface.       0       1         Signal-Output Electrode.       1       1         Metal plate or 50-line (minimum)       mesh covering external surface         of faceplate and capacitively       coupled to thestorage surface.         (This electrode is not supplied       1
Č.	with the tube). Overall Length
	Pin 1-Heater Pin 2-Grid No.1 Pin 3-Cathode Pin 4-Grid No.3 Pin 6-Deflecting Electrode DJ4 Pin 7-Deflecting Electrode DJ4 Pin 7-Deflecting Electrode DJ4 Pin 8-Ultor (Grids No.2 & No.4)
	<ul> <li>The Signal-Output Electrode is capacitively coupled to the Storage Surface.</li> <li>MAY 1, 1955</li> <li>TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY</li> </ul>





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Maximum Ratings, Design-Center Values:	] <
COLLECTOR VOLTAGE: Difference between collector	
voltage and ultor voltage 150 max. volt	
ULTOR VOLTAGE	
GRID-No.3 VOLTAGE 1000 max. volt	5 5
GRID-No.1 VOLTAGE: Negative bias value	$\sim$
Positive bias value	
Positive peak value	
PEAK VOLTAGE BETWEEN ULTOR AND	1
ANY DEFLECTING ELECTRODE 500 max. volt	s
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with	
respect to cathode	5 ~
Heater positive with	
respect to cathode	š
Equipment Design Ranges:	
For any ultor voltage $(E_{C_4})$ between 1000 and 2500 volts	
Collector Voltage 95% to 105% of E _{C4} volt	
Grid-No.3 Voltage 20% to 28% of Ec4 volt	5
Max. Grid-No.1 Voltage	
for Beam-Current Cutoff 2.4% of Ec4 volt	3
Max. Grid-No.3 Current Range	
<b>Deflection</b> Factors: $-15 t0 + 10$ $\mu$ and	1
Dia $\delta$ Dia 39 to 53 y dc/in /ky of Fe	
U3 & D4	
Focused-Beam Position. ##	1
Examples of Use of Design Ranges:	
For ultor voltage of 1000 2500 volt	
Collector Voltage 950 to 1050 2375 to 2625 volt	- · ·
Grid-No.3 Voltage. 200 to 280 500 to 700 volt	
Max. Grid-No.1 Volt-	
age for Beam-	
Current Cutoff24 -60 volt	5
Deflection Factors:	
D1 & D2 39 to 53 97.5 to 133 volts dc/in D3 & D4 35.5 to 48.5 89 to 122 volts dc/in	•
The "ultor" in a storage tube is the electrode to which is applied the highest dc voltage for accelerating the electrons in the beam prio to its deflection. In the 6571, the ultor function is performed by grid No.4. Since grid No.4 and grid No.2 are connected together within the 6571, they are collectively referred to simply as "ultor" for con- venience in presenting data and curves.	
highest dc voltage for accelerating the electrons in the beam prio to its deflection. In the 6571, the ultor function is performed by	
grid No. 4. Since grid No. 4 and grid No. 2 are connected together withi	1
venience in presenting data and curves.	1
The center of the undeflected focused beam will fall within a circle having a 7.5-mm radius concentric with the center of the tube face.	1 2
naving a 7.5-mm radius concentric with the center of the tube face.	- S.,
	-

MAY 1, 1955





Storage Characteristics for Ultor Voltage of 2	2500 Volts:
Storage-Surface Boundary (In terms of deflection voltage):	
In the D1-D2 direction from posi- tion of undeflected focused beam . ±10 In the D12-D14 direction from posi-	)9 volts
tion of undeflected focused beam ±10 Blemish Factor*, for storage surface	00 volts
within indicated boundary 0. Spill (Determined for Double-Dot Pattern):**	5 max.
Under conditions involving 255 references to and 1 reference to "test" elemen	
Separation Between Storage Elements, in either the D1-D2 or D3-D4 direction in terms of deflection	
voltage: At center of storage surface At midpoint on each side of	8 max. volts
storage-surface boundary	l0 max. volts
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1. Resistance in Any Deflecting-	5 max. megohms
Electrode Circuit [®] 1.	0 max. megohm
* Blemish factor is defined as the factor by which t signal is reduced by the blemish.	
Spill is indicative of the amount of binary inform stored by the tube. The storage capability is deter ration between two storage elements at which th element is changed by no more than a specified amo references to the other element. For the 6571, measured, in terms of deflection voltage, when th- negative signal of the "test" element has decrea maximum negative amplitude. The maximum negative a mined by separating the two elements far enough effects of secondary electron redistribution from t	mined by the sepa- e signal from one unt after repeated the separation is e amplitude of the sed to 50% of its mplitude is deter- to eliminate the me "spill" element.

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

#### OPERATING CONSIDERATIONS

Shielding. In typical computer applications, the 6571 is mounted in a compartment having effective magnetic and electrostatic shielding. It is recommended that the bulb be provided with a tight-fitting electrostatic shield extending from the base to the collector coating. (See Dimensional Outline). This external shield supplements the shielding action of the collector in preventing crosscoupling between the electron gun and the external signal electrode.

A signal-output electrode shaped to conform with the external contour of the faceplate and placed in contact with the entire area of the faceplate is required. The signal-output electrode is connected to a low-noise video

MAY 1, 1955

TENTATIVE DATA 2

TUBE DIVISION



amplifier having sufficient gain to amplify signals from a fraction of a millivolt to the desired level.

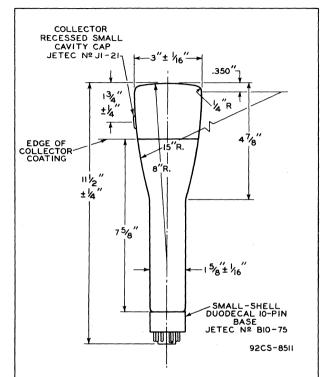
The amount of information that can be stored by the 6571 is dependent on the manner in which it is operated, and is affected by the stability of the deflecting system, freedom from noise in the associated output circuit, the number of regenerations compared with the number of addresses, and the effectiveness of the electrostatic and magnetic shielding.

In general, the number of storage elements is proportional to the operating ultor voltage. For the greatest number of storage elements, the 6571 should be operated at the rated maximum ultor voltage and so that the peak grid-No.1 drive is less than that required for the maximum positive amplitude but high enough to provide a satisfactory output signal.

It is recommended that the beam current be limited to the minimum value which provides satisfactory signal amplitude.

The storage characteristics in the tabulated data and curve are based on the use of a double-dot pattern. In this method of storage, the positive signal is produced by adjusting the beam current and the distance between two dot storage elements so that the optimum positive signal is produced when the "test" element is addressed. Other methods of storage such as superimposed focused and defocused spots or dots and dashes may be used equally well with the 6571.





CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN  $2^{\rm O}$  IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.

DJ1 AND DJ2 ARE NEARER THE STORAGE SURFACE: DJ3 AND DJ4 ARE NEARER THE BASE. WITH DJ1 POSITIVE WITH RESPECT TO DJ2, THE BEAM WILL BE DEFLECTED TOWARD PIN 2; LIKEWISE, WITH DJ3 POSITIVE WITH RESPECT TO DJ4, THE BEAM WILL BE DEFLECTED TOWARD VACANT PIN POSITION 11.

THE PLANE THROUGH TUBE AXIS AND EACH OF THE FOLLOWING ITEMS MAY VARY FROM THE DEFLECTION PATH PRODUCED BY DJ₁ AND DJ₂ BY THE FOLLOWING ANGULAR TOLERANCES (MEASURED ABOUT THE TUBE AXIS): PIN 2, IO⁰; SIDE TERMINAL (ON SAME SIDE AS PIN 8), IO⁰. ANGLE BETWEEN DJ₁-DJ₂ DEFLECTION PATH AND DJ₃-DJ₄ DEFLECTION PATH IS 90⁰ ± 3⁰.

MAY 1, 1955

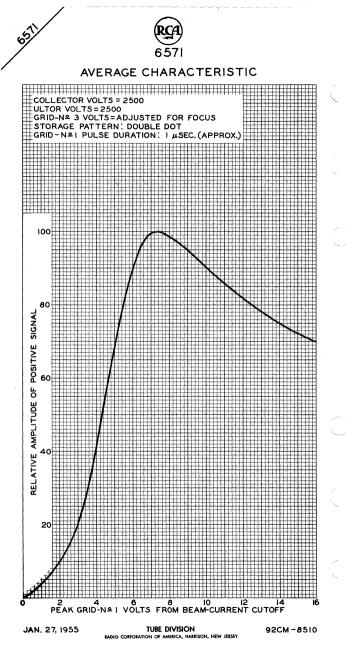
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OF 12

### **MULTIPLIER PHOTOTUBE**

9-STAGE TYPE WITH S-4 RESPONSE For Headlight-Control Service

DATA	
General:	
Spectral Response	3—4 5m:
Cathode: Minimum projected length*	
Weight (Approx.)	16 Г 4n 0
Terminals, Flexible Lead See Dimensional Outl BOTTOM VIEW	ın
Lead 1 - Cathode Lead 2 - Dynode No.1 Lead 3 - Dynode No.3 Lead 5 - Dynode No.4 Lead 6 - Dynode No.5	7 3
DIRECTION OF LIGHT	
Maximum Ratings, Absolute Values:	
ANODE-SUPPLY VOLTAGE (DC or Peak AC) 1250 max. vol SUPPLY VOLTAGE BETWEEN DYNODE No.9	t
AND ANODE (DC or Peak AC)	n M
<ul> <li>On plane perpendicular to the indicated direction of light (See Dim sional Outline).</li> <li>Averaged over any interval of 30 seconds maximum.</li> </ul>	en.

MAY 1, 1955

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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.q and anode

With E = 1000 volts

6472

	Min.	Median	Max.	
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
(At 25°C):			· · .	
Anode	-	-	0.25°	$\mu$ amp
Any other electrode	-	-	0.75	$\mu$ amp

For conditions where the light source is a tungsten-filament lamp oper-ated at a color temperature of 2870%. 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.

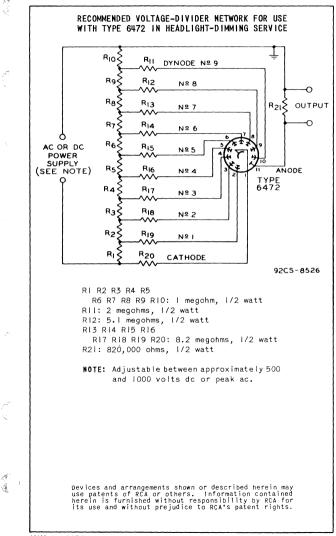
A recommended design of voltage-divider network for use with the 6472 to provide stable operation and long tube life is shown in the accompanying circuit. This design provides linear operation within the range normally required for dimming. At higher light levels, the network design limits the tube output 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.

MAY 1, 1955

TENTATIVE DATA



### **MULTIPLIER PHOTOTUBE**

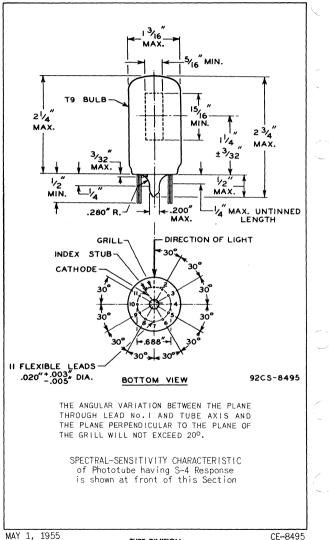


MAY 1, 1955

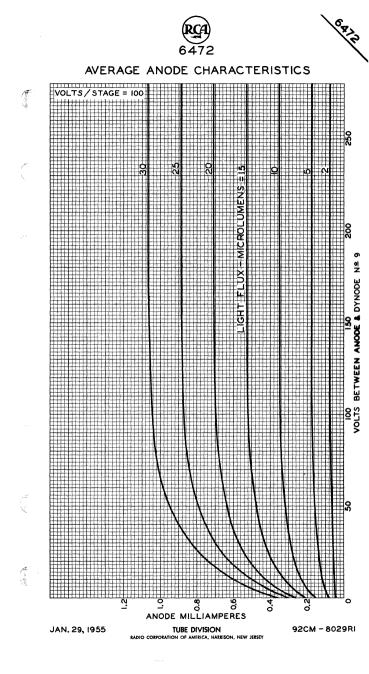
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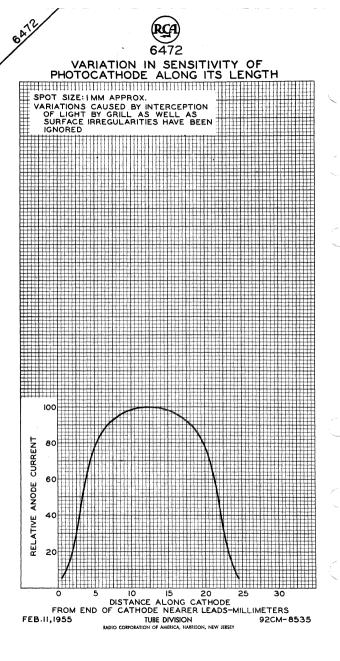


### **MULTIPLIER PHOTOTUBE**

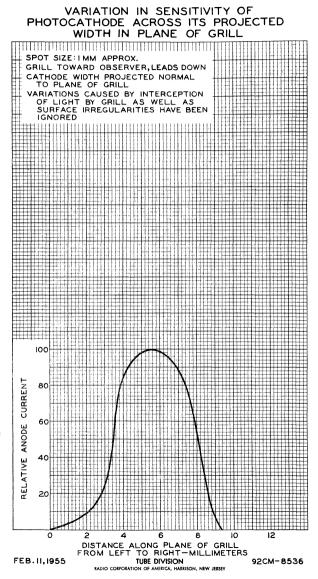


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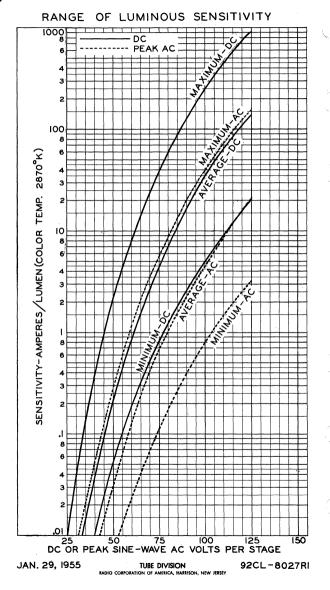






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DIRECT-VIEW TYPE 4"-DIAMETER DISPLAY

NON-EQUILIBRIUM WRITING GRID-CONTROL READING (VIEWING)

#### DATA

#### General:

si.

	Writing	Section	Viewing	Section	
Heater, for Unipotential Cathode	:				
Voltage (AC or DC)		.3	6.	3	volts
Current		.6	0.		amp
Minimum Cathode Heating Time					
before other electrode volt-					
ages are applied		-	Z	0	sec
Direct Interelectrode	•		-		
Capacitances (Approx.):0					
Grid No.1 to all other					
tube electrodes		6	1	8	μμ
Cathode to all other	•	0			14-
tube electrodes	. 4	.2	6.	5	μμ
Deflecting electrode DJ, to	•			-	744
deflecting electrode DJ ₂ .		.8			μµ
Deflecting electrode DJ ₂ to	• •	•••			j.q.
deflecting electrode DJ ₂ .	1	.8	-		μµ
$DJ_1$ to all other tube electrodes		.5	_		μμ μμ
DJ ₂ to all other tube electrodes	-	8			μμ
$DJ_3$ to all other tube electrodes		6	_		μμ
D ₃ to all other tube electrodes		7.		-	μμ μμ
Focusing Method			No	-	μμ
Deflection Method			No		
Deflecting-Electrode Arrangement			10		
Derrecting-Liectrode Arrangement		Outline			
Phosphor			ligh-Visua	I-Effi-	
	•		ciency		
			Alumin		
Fluorescence		-	Yelle		
Phosphorescence.		-	Yello		
Minimum Useful Screen Diameter.					4
Maximum Overall Length					
Seated Length	••••			14"	+ 3/8
Maximum Tube Radius	••••				5-5/32
Bulb-Flange Diameter					
Greatest Bulb Diameter.					E 1/16
Bulb Terminals:				• • •	
Caps (Two).	Recess	ed Small	Cavity (J	ETEC No.	.11-21
Flange					
Flexible cable	••••		See Dimen	sional (	hutlin
Ambient-Temperature Range				65 ⁰ to -	+100 0
Mounting Position	••••		• • •		An
Weight (Approx.).	••••				2 16
Socket.	Ald	••• Part N	0.4355BA	orequi	valen
Base Small-But	ton Thir	tvfivar 3	I-Pin (JF	TEC No. F	31-36
base	con min	Silva 2			
^O Without external shield.					
10-56			TENT	ATIVE	

10-56

TENTATIVE DATA 1

TUBE DIVISION





## DISPLAY STORAGE TUBE

	BOTTOM VIEW - MU C -FLANGE	S.
Pin 1-No Connec-		
tion Pin 2-Same as Pin 1		
Pin 3-Deflecting		
Electrode DJ ₄		,,
of Writing Gü Pin 4-Deflecting		
Electrode DJ _z	$\mathcal{A}$	
of Writing Gú		
Pin 5-Same as Pin 1 Pin 6-Grid No.3 of		
Writing Gun	SHORT	
Pin 7-Same as Pin 1		
Pin 8-Heater of Writing Gun	Pin 22-Heater of Viewing Gun	-10-12
Pin 9-Heater of	Pin 25-Same as Pin 1	
Writing Gun	Pin 26-Same as Pin 1	
Pin 10-Grid No.1 of	Pin 27-Cathode of Writing Gun	
Writing Gun Pin 11-Same as Pin 1	Pin 28 - Same as Pin 1	
Pin 12-Same as Pin 1	Pin 29-Same as Pin 1	
Pin 13-Deflecting	Pin 32-Grid No.1 of	
Electrode DJ ₁ of Writing Gu	viewing Gun n Pin 33-Cathode of	
Pin 14 - Deflecting	Viewing Gun	
Electrode DJ ₂		
of Writing Gu Pin 15-Grid No.2 of	n Pin 35-Heater of Viewing Gun	
Writing Gun	Flexible Cable - Con-	
Pin 16 - Internal Con-	nection to	
nection-Do Not Use	Screen Flange - Backing-	
Pin 17-Grid No.4 of	Electrode	
Writing Gun,	Recessed Cavity Cap -	$= \  g_{0}  _{T^{1}}$
Grid No.2 of Viewing Gun	Nearer Tube FaceGrid No.4 of	
Pin 18-Same as Pin 1	Viewing Gun	
Pin 19-Same as Pin 1	Nearer Electron	
Pin 20-Same as Pin 16   Pin 21-Same as Pin 1	<i>Guns-</i> -Grid No.3 of Viewing Gun	~ ~
	·	
Maximum Ratings, Absolut		
	Writing Section Viewing Section**	
SCREEN VOLTAGE		
VOLTAGE.	– 20 max volts	
Pins 23 and 31 are not sl	nown because they are trimmed to the same	
dimension as the short ind	nown because they are trimmed to the same ex pin and are not to be used.	Ser
**: See next page.		
10-56	TUBE DIVISION	
RADIO CORPORA	TIDE DIVISION TION OF AMERICA, HARRISON, NEW JERSEY	

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





			Writing	Section Vi	ewing Sectio	n**
			Equivaler	it Values		
GRID	-No.4 VOLTAGE	. 29	00 max.*	150 max.**	300 max.	vol
GRID	-No.3 VOLTAGE	. 10	00 max.*	-	300 max.	vol
GRID	⊢No.2 VOLTAGE	. 27	50 max.*	-	150 max.	vol
CATH	ODE VOLTAGE		-	-2900 max.**	-	vol
	⊷No.I VOLTAGE:					
	gative bias value .	•	200	max.*	100 max.	vol
Po	sitive bias value .	•	0	max.*	0 max.	vol
PEAK	sitive peak value VOLTAGE BETWEEN	•	2	max.*	0 max.	vol
DE PEAK	ID No.4 AND ANY FLECTING ELECTRODE HEATER-CATHODE	•	500	max.	-	vol
	ater negative with					
	respect to cathode.	_	125	max.*	125 max.	vol
He	ater positive with	•	120		12	.01
	respect to cathode.	•	125	max.*	125 max.	vo
		VI	EWING SE	CTION**		
	rating Values and	Ту	pical Per			
	en Voltage	• •	5000	10000	10000	vo
	acking-Electrode			_	-	
	Itage	•••	5	5	5	vol
arid	-No.4 Voltage -No.3 Voltage [#] -No.2 Voltage [†] #	•••	150	210	150	vol
Grid	-No.3 Voltage"	••	25 to 125	50 to 150	25 to 125	
ui iu	-no.z vortage	• •	50 to 75	70 to 105	50 to 75	vo
	-No.I Voltage [#]	• •	0 to <b>-</b> 50	0 to -75	0 to -50	
	mum Screen Current.	•••	350	600	350	με
	mum Peak Backing-					
	ectrode Current	1	1.5	2	1.5	
	mum Grid-No.4 Current		2	3	2	
	mum Grid-No.3 Current	t <b>~</b> .	1.5	2	1.5	
Maxi	mum Cathode Current [●] .	• •	3	4	3	:- /-
writ	ing Speed ^{††} er of Half-Tone Steps ^c		300000	300000	300000 5	in./s
	ing Duration		5 40	5 20	5 40	s
	mum Erasing-Uniformit		40	20	40	
	ctor ^{DD}	~ <i>y</i>	0.5	0.5	0.5	
Reso	Lution [®]					ines/i
Brin	htness		-			
Reso Brig ** v # A † G t F	lution [#]	t, m ing	50 275 espect to ost unifor Gun is cor	50 2750 cathode of Vie m pattern. inected interna	50   1500 wing Gun. ally to grid	No.
* ++	,□, <b>▲</b> ,□□, <b>⊕, dd</b> : See ne:				Indiantes	
		xt p	age.	4	← Indicates a TENTATIVE	
6 - 57						



## **DISPLAY STORAGE TUBE**

	1.
WRITING SECTION®	
Range Values for Equipment Design:*	
With any grid-No.2 voltage (E _{C $g$} ) between 500 and 2750 volts	1.1
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	$\left( \cdot \right)$
Focused Spot.     -4.6% of E _{C2} volts       Maximum Grid-No.3 Current     -15 to +10     μamp       Maximum Cathode Current     See Curve       Deflection Factors:	
DJ1 and DJ2       28 to 38 v dc/in./kv of Ecu         DJ3 and DJ4       28 to 38 v dc/in./kv of Ecu         Focused Beam Position       ##	
Examples of Use of Design Ranges:*	
With grid-No.2 voltage of15002500voltsGrid-No.4 Voltage ( $E_{C_{11}}$ )1425 to15752375 to2625voltsGrid-No.3 Voltage for Focus.210 to420350 to700voltsMaximum Grid-No.1 Voltage	
$ \begin{array}{ccccccc} \text{for Cutoff of Undeflected} & & & & & \\ \text{Focused Spot.} & & & & & & \\ \text{Focused Spot.} & & & & & & \\ \text{Deflection Factors} & & & & & \\ \text{when } E_{C_4} = E_{C_2}; & & & & \\ \text{D}_1 \text{ and } \text{D}_2 & & & & & \\ \text{Out and } \text{D}_2 & & & & & \\ \end{array} $	
DJ ₃ and DJ ₄ 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         -1240 to -975         -2100 to -1695         volts           Grid-No.4 Voltage         -0.5         50 to 105         50 to 105         volts	(_)
VIEWING SECTION and WRITING SECTION	
Circuit Values:	
Grid-No.I-Circuit Resistance (Either gun) I.O max. megohm Resistance in Any Deflecting-Electrode Circuit 0.1 max. megohm Backing-Electrode-Circuit Resistance 0.005 max. megohm Series Current-Limiting Resistance in Screen Circuit. I.O min. megohm	()
* Voltages are shown with respect to cathode of Writing Gun. TI Measured under conditions of writing from just zero brightness (view- ing-beam cutoff) to maximum brightness with grid No.1 of Writing Gun at -10 volts with respect to cathode of Writing Gun, and grids No.2 and No.4 of Writing Gun at +2500 volts with respect to cathode of Writ- ing Gun.	T
O Observed with an RCA-2F21 Monoscope display. ▲,□□,⊕,♠,●,辨,■: See next page. 6-57 TENTATIVE DATA 2	
ELECTRON TUBE DIVISION	

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



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### DISPLAY STORAGE TUBE

- 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% of the maximum brightness.
- Defined as  $(t_2 t_1)/t_2$ , where

  - 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.
- 6 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 volts with respect to cathode of Writing Gun.
- 41 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 be 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.



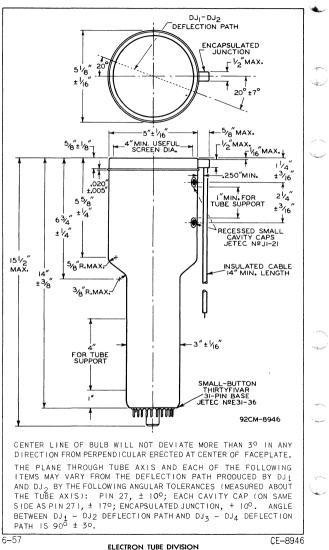
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-Indicates a change. TENTATIVE DATA 3

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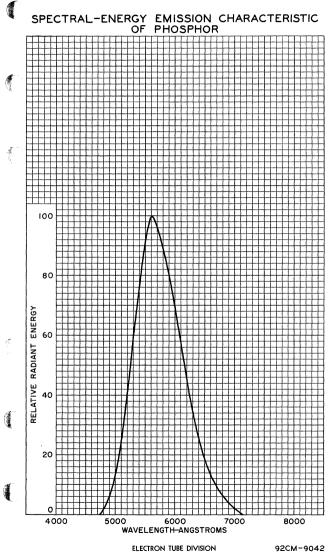


### DISPLAY STORAGE TUBE







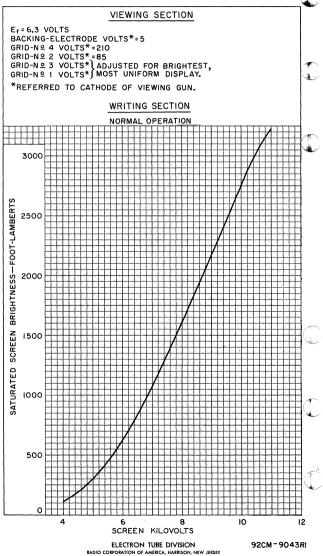


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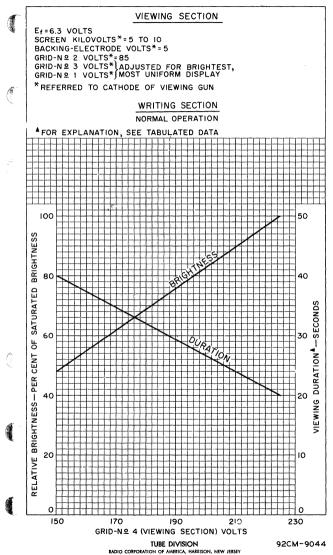
### AVERAGE CHARACTERISTIC

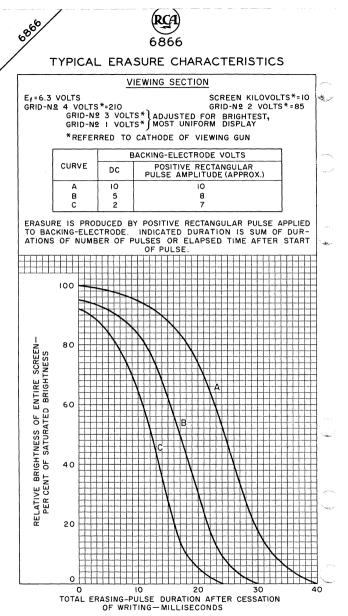




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### AVERAGE CHARACTERISTICS





TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-9045





#### WRITING SECTION

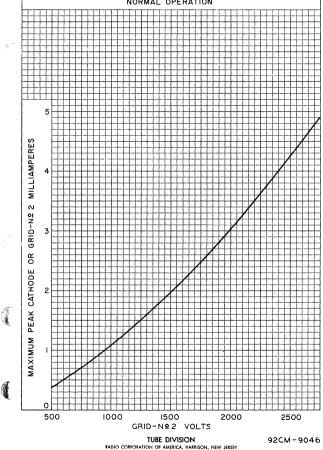
# Ef=6.3 VOLTS GRID-Nº 4 VOLTS GRID-Nº 3 VOLTS GRID-Nº 3 VOLTS = ADJUSTED FOR FOCUS GRID-Nº 1 VOLTS^{*}=0

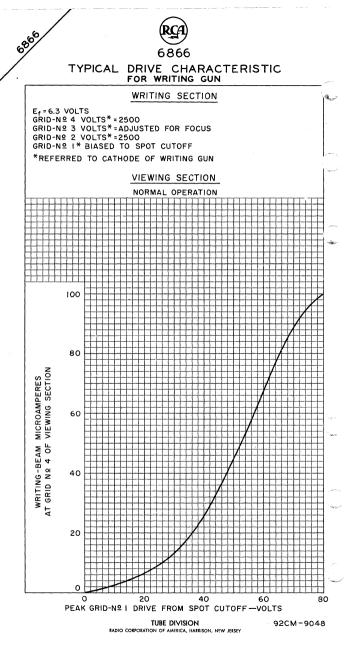
1

*REFERRED TO CATHODE OF WRITING GUN

#### VIEWING SECTION

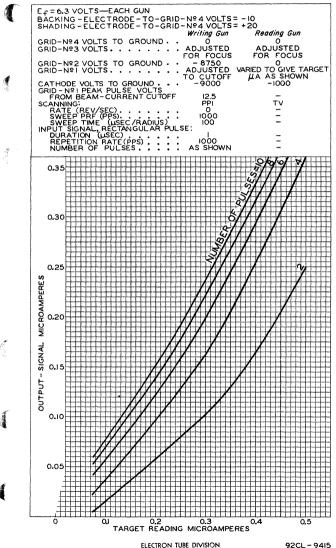
NORMAL OPERATION







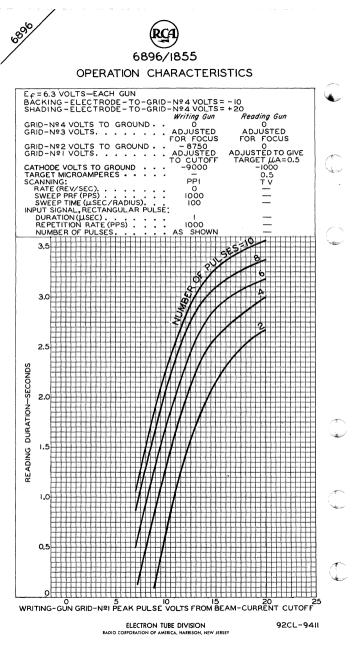
#### OPERATION CHARACTERISTICS



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

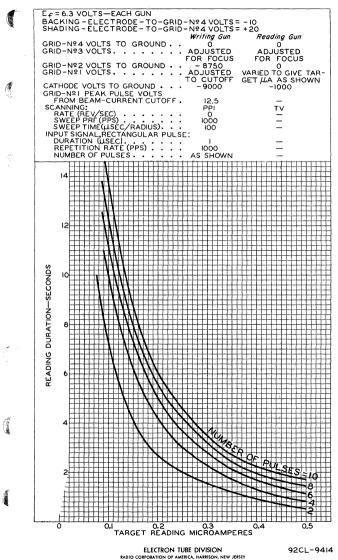
92CL - 9415

6000

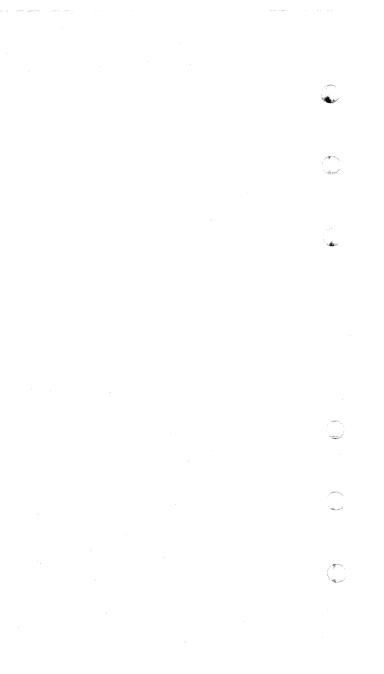




#### OPERATION CHARACTERISTICS



6000





DIRECT-VIEW TYPE 4"-DIAMETER DISPLAY

WRITING GUN: MAGNETIC DEFLECTION ELECTROSTATIC FOCUS

VIEWING GUN: NO DEFLECTION NO FOCUS

Writing SectionViewing SectionHeater, for Unipotential Cathode: Voltage (AC or DC) 6.3 ± 10% 6.3 ± 10% volCurrent 0.60.6Current 0.60.6aminimum Cathode Heating Time before other electrode voltages are applied 30 sDirect Interelectrode Capacitances (Approx.)*0 Grid No. I to all other tube electrodes 77.5Grid No. I to all other tube electrodes 55packplate to all other tube electrodesGouing MethodElectrostatic NoneDeflection MethodMagnetic POSphorPhosphor		DATA		
Heater, for Unipotential Cathode: Voltage (AC or DC) . 6.3 ± 10% 6.3 ± 10% vol Current 0.6 0.6 a Minimum Cathode Heating Time before other electrode voltages are applied 30 s Direct Interelectrode Capacitances (Approx.): ⁰ Grid No. I to all other tube electrodes 7 7.5 µ Cathode to all other tube electrodes 5 5 µ Backplate to all other tube electrodes 300 µ Focusing Method Electrostatic None Deflection Method Magnetic None Deflection Method Vellow-Green Phosphor Yellow-Green Minimum Userall Length	General:			
Cathode: Voltage (AC or DC) . 6.3 ± 10% 6.3 ± 10% vol Current 0.6 0.6 a Minimum Cathode Heating Time before other electrode voltages are applied 30 s Direct Interelectrode Capacitances (Approx.): ⁰ Grid No. I to all other tube electrodes 7 7.5 $\mu$ Cathode to all other tube electrodes 5 5 $\mu$ Backplate to all other tube electrodes 5 $\mu$ Cathode to all other tube electrodes 300 $\mu$ Focusing Method Electrostatic None Deflection Method Magnetic None Deflection Angle $-$ Yellow-Green Phosphor Yellow-Green Minimum Useful Screen Diameter		Writing Section	Viewing Section	
Voltage (AC or DC) $6.3 \pm 10\%$ $6.3 \pm 10\%$ $6.3 \pm 10\%$ volCurrent. $0.6$ $0.6$ $a$ Minimum Cathode HeatingTime before otherelectrode voltages $a$ are applied. $ 30$ sDirect InterelectrodeCapacitances(Approx.): ⁰ Grid No. I to all other $t$ tube electrodes. $7$ $7.5$ $\mu$ Cathode to all other $t$ tube electrodes. $5$ $5$ $\mu$ Backplate to all other $t$ tube electrodes. $ 300$ $\mu$ Focusing Method.ElectrostaticDeflection Angle $-$ Phosphor $-$ Phosphor $-$ Phosphor $-$ Phosphor $-$ Naximum Overall Length $-$ Maximum Tube Radius. $-$ Seated Length. $-$ Greatest Bulb Diameter $-$ Maximum Tube Radius. $                                          -$ <	Heater, for Unipotential			
Current 0.6 0.6 a Minimum Cathode Heating Time before other electrode voltages are applied 30 s Direct Interelectrode Capacitances (Approx.): ⁰ Grid No. I to all other tube electrodes 7 7.5 µ Cathode to all other tube electrodes 5 5 µ Backplate to all other tube electrodes 300 µ Focusing Method Electrostatic None Deflection Method Magnetic None Deflection Angle P20, Aluminized Fluorescence Yellow-Green Phosphor Yellow-Green Phosphorescence Yellow-Green Minimum Use Full Length		6.3 + 10%	$6.3 \pm 10\%$	volt
Minimum Cathode Heating Time before other electrode voltages are applied				a
are applied – 30 s Direct Interelectrode Capacitances (Approx.): ^O Grid No. I to all other tube electrodes 7 7.5 µ Cathode to all other tube electrodes 5 5 µ Backplate to all other tube electrodes – 300 µ Focusing Method Electrostatic None Deflection Method Magnetic None Deflection Angle – 720, Aluminized Fluorescence – Yellow-Green Phosphor – P20, Aluminized Fluorescence – Yellow-Green Phosphorescence – Yellow-Green Phosphorescence – Yellow-Green Phosphorescence – Yellow-Green Maximum Overall Length 11.6" ± 0.4 Maximum Tube Radius 5.1 Greatest Bulb Diameter	Minimum Cathode Heating Time before other			
Direct Interelectrode Capacitances (Approx.): ^O Grid No. I to all other tube electrodes 7 7.5 µ Cathode to all other tube electrodes 5 5 µ Backplate to all other tube electrodes 300 µ Focusing Method Electrostatic None Deflection Angle P20, Aluminized Phosphorscence Yellow-Green Minimum Useful Screen Diameter	5	_	30	s
tube electrodes.       7       7.5       µ         Cathode to all other       5       5       µ         tube electrodes.       5       5       µ         Backplate to all other       -       300       µ         Focusing Method.       Electrostatic       None         Deflection Angle.       -       -       300       µ         Phosphor.       Magnetic       None       Deflection       P         Phosphorsecnce.       -       Yellow-Green       -       Yellow-Green         Minimum Useful Screen Diameter       -       Yellow-Green       -       11.6         Seated Length.       -       -       Yellow-Green       -       -         Maximum Tube Radius.       -       -       -       -       -       -         Maximum Tube Radius.       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -<	Direct Interelectrode Capacitances (Approx.): ⁰			
Cathode to all other tube electrodes 5 5 µ Backplate to all other tube electrodes 5 5 µ Focusing Method Electrostatic None Deflection Method Magnetic None Deflection Angle		-		
tube electrodes.       5       5       p         Backplate to all other       300       p         tube electrodes.       -       300       p         Focusing Method.       Electrostatic       None         Deflection Method.       Magnetic       None         Deflection Angle       -       -         Phosphor       -       -         Phosphor.       -       -         Phosphorescence.       -       Yellow-Green         Minimum Useful Screen Diameter       -       -         Waximum Tube Radius.       11.6" ± 0.4         Waximum Tube Diameter.       5.00" ± 0.0         Ambient-Temperature Range.       -       -         Operating Position       -       -         Meight (Approx.)       -       -       -         Caps (Three)       -       -       -         Flexible leads (Two)       -       -       -         Base:       Writing qun.       -       Small-Button Neoditetrar 8-Pin (JETEC No.E8-4		7	7.5	μ
Backplate to all other tube electrodes		-	-	
tube electrodes 300 p Focusing Method Electrostatic None Deflection Method Magnetic None Deflection Angle P20, Aluminized Fluorescence Yellow-Green Minimum Useful Screen Diameter		5	5	٢
Focusing Method.       Electrostatic       None         Deflection Method.       Magnetic       None         Deflection Angle       -       -         Phosphor       -       P20, Aluminized         Fluorescence       -       Yellow-Green         Phosphorescence       -       Yellow-Green         Winimum Useful Screen Diameter       -       11.6" ± 0.4         Waximum Overall Length       11.6" ± 0.4         Waximum Tube Radius       3.0         Vaximum Tube Diameter       5.00" ± 0.2         Ambient-Temperature Range       -       -65° to +100°         Operating Position       -       -         Bulb Terminal Connectors       .       .       .         Caps (Three)       .       .       .         Bulb Terminals:       Caps (Three)       .       .         Caps (Three)       .       .       .         Base:       Writing gun       .       .       .         Writing gun       .       .       .       .         Caps (Three Punder       .       .       .       .         Plexible leads (Two)       .       .       .       .         Waximum Tube leads			300	
Deflection Method Magnetic None Deflection Angle		- Fleetrestatio	200	μ
Deflection Angle       -         Phosphor       -         Phosphorescence       -         Yellow-Green         Phosphorescence       -         Waximum Overall Length       -         Vaximum Tube Radius       -         Vaximum Tube Radius       -         Operating Position       -         Ambient-Temperature Range       -         Operating Position       -         Built Capprox.)       -         Caps (Three)       -         Flexible leads (Two)       -         Sease:       Writing qun.         Writing qun.       -				
Phosphor       -       P20, Aluminized         Fluorescence       -       Yellow-Green         Winimum Useful Screen Diameter       -       Yellow-Green         Waximum Overall Length       -       11.6         Waximum Tube Radius,       -       -         Waximum Tube Radius,       -       -         Overall Length       -       -         Waximum Tube Radius,       -       -         Operating Position       -       -         Ambient-Temperature Range.       -       -         Operating Position       -       -         Sulb Terminal Connectors.       .       .         Caps (Three)       .       .         Flexible leads (Two)       .       .         Base:       Writing gun.       .       Small-Button Neoditetrar 8-Pin (JETEC No.E8-4		Magnetic	NOTIC	
Fluorescence       -       Yellow-Green         Phosphorescence       -       Yellow-Green         Winimum Useful Screen Diameter       .       .         Waximum Overall Length       .       .         Seated Length       .       .       .         Vaximum Tube Radius       .       .       .         Vaximum Tube Diameter       .       .       .         Maximum Tube Diameter       .       .       .         Greatest Bulb Diameter       .       .       .         Operating Position       .       .       .         Meight (Approx.)       .       .       .       .         Caps (Three)       .       .       .       .       .         Caps (Three)       .       .       .       .       .       .         Base:       Writing gun.       .       .       Small-Button Neoditetrar 8-Pin (JETEC No.E8-4		<b>v</b>	P20 Aluminized	
Phosphorescence.         -         Yellow-Green           Minimum Useful Screen Diameter         11.6           Waximum Overall Length         11.6           Waximum Tube Radius.         3.0           Waximum Tube Radius.         3.0           Waximum Tube Diameter         5.1           Greatest Bulb Diameter         5.00" ± 0.0           Ambient-Temperature Range.         -65° to ±100°           Operating Position		_		
Minimum Useful Screen Diameter       11.6         Waximum Overall Length       11.6         Seated Length       11.6         Waximum Tube Radius       3.0         Waximum Tube Radius       5.1         Greatest Bulb Diameter       5.1         Greatest Bulb Diameter       5.1         Operating Position       -65° to +100°         Weight (Approx.)       1-3/4         Terminal Connectors				
Maximum Overall Length       11.6         Seated Length       11.6         Waximum Tube Radius       3.0         Maximum Tube Diameter       5.0         Greatest Bulb Diameter       5.0         Ambient-Temperature Range       -65° to +100°         Operating Position       -45° to +100°         Bulb Connectors       -65° to +100°         Bulb Terminal Connectors       -65° to +100°         Bulb Terminals:       -274 l         Caps (Three)       -80° to +100°         Flexible leads (Two)       -80° to +100°         Base:       Writing gun.       Small-Button Neoditetrar 8-Pin (JETEC No.E8-4		ter		
Seated Length.       II.16" ± 0.4         Waximum Tube Radius.       3.0         Waximum Tube Diameter.       5.1         Greatest Bulb Diameter.       5.1         Greatest Bulb Diameter.       5.1         Ambient-Temperature Range.       -65° to +100°         Operating Position       -65°         Meight (Approx.)       -1-3/4 1         Terminal Connectors.				
Waximum Tube Radius.       3.0         Vaximum Tube Diameter.       5.1         Greatest Bulb Diameter.       5.0" ± 0.0         Ambient-Temperature Range.				
Waximum Tube Diameter.       5.1         Greatest Bulb Diameter       5.00" ± 0.0         Ambient-Temperature Range.       -65° to ± 100°         Operating Position       -65° to ± 100°         Weight (Approx.)       -1-3/4 I         Terminal Connectors.          Bulb Terminals:       Caps (Three)         Caps (Three)				
Greatest Bulb Diameter				
Operating Position       A         Weight (Approx.)       I-3/4           Terminal Connectors       I-3/4           Bulb Terminals:       See Operating Consideration         Caps (Three)       Recessed Small Cavity (JETEC No.JI-2         Flexible leads (Two)       See Dimensional Outli         Base:       Writing gun.         Writing gun.       Small-Button Neoditetrar 8-Pin (JETEC No.E8-4				
Operating Position       A         Weight (Approx.)       I-3/4           Terminal Connectors       I-3/4           Bulb Terminals:       See Operating Consideration         Caps (Three)       Recessed Small Cavity (JETEC No.JI-2         Flexible leads (Two)       See Dimensional Outli         Base:       Writing gun.         Writing gun.       Small-Button Neoditetrar 8-Pin (JETEC No.E8-4	Ambient-Temperature Range.		65 ⁰ to +	1000
Terminal Connectors	Operating Position			. A
Bulb Terminals: Caps (Three)Recessed Small Cavity (JETEC No.JI-2 Flexible leads (Two)Recessed Small Cavity (JETEC No.JI-2 Base: Writing gunSmall-Button Neoditetrar 8-Pin (JETEC No.E8-4				
Bulb Terminals: Caps (Three)Recessed Small Cavity (JETEC No.JI-2 Flexible leads (Two)Recessed Small Cavity (JETEC No.JI-2 Base: Writing gunSmall-Button Neoditetrar 8-Pin (JETEC No.E8-4	Terminal Connectors	Se	e Operating Consider	atio
Flexible leads (Two) See Dimensional Outli Base: Writing gun Small-Button Neoditetrar 8-Pin (JETEC No.E8-4	Bulb Terminals:			
Base: Writing gun Small-Button Neoditetrar 8-Pin (JETEC No.E8-4				
Writing gun Small-Button Neoditetrar 8-Pin (JETEC No.E8-4	Flexible leads (Two)		. See Dimensional O	utli
Writing gun Small-Button Neoditetrar 8-Pin (JETEC No.E8-4 Viewing gun Small-Button Miniature 7-Pin (JETEC No.E7-				
Viewing gun	Writing gun Sr	mall-Button Neoditet	rar 8-Pin (JETEC No.	E8-4
	Viewing gun	.Small-Button Minia	ture 7-Pin (JETEC No	.E7-

⁰,♥: See next page.

9-58

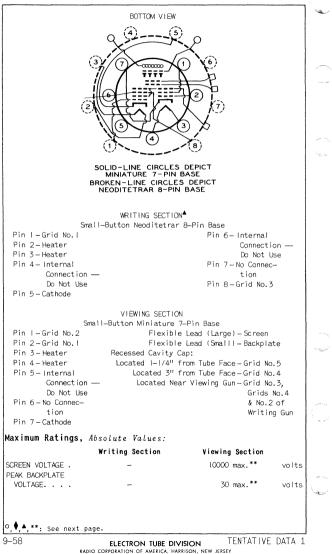
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## DISPLAY STORAGE TUBE





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## DISPLAY STORAGE TUBE

	Writing	Section	Viewing	Section	
	Equivalen	t Values	Equivalen	t Values	
GRID-No.5					
VOLTAGE	-	-	-	300 max.**	volts
GRID-No.4					
VOLTAGE	2900 max.*▲	150 max.**	-	150 max.**	volts
GRID-No.3					
VOLTAGE	1200 max.*		2900 max.*▲	150 max.**	volts
GRID-No.2					
VOLTAGE				150 max.**	
CATHODE VOLTAGE.		-2750 max.**	-	-	volts
GRID-No.I					
VOLTAGE:					
Negative-bias					
value	200 m	iax.*	100 ma	ax.**	volts
Positive-bias		*		~ <b>*</b>	
value	Om	iax.*	0 ma	ax.**	voits
Positive-peak				**	
value	2 m	ax.*	0 ma	ax.**	volts
PEAK HEATER-					
CATHODE VOLT-					
AGE:					
Heater nega- tive with					
respect to cathode	125 m	*	125 ma	**	volts
Heater posi-	125 m	ых.	125 ma	1X.	VOITS
tive with					
respect to					
cathode	125 m	19v *	125 ma	**	voits
cathoue	1201	αл.	120 116		voits
	VIE	VING SECTIO	)N**		

#### Operating Values and Typical Performance Characteristics:

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

9–58	ELECT	RON	TUBE	DIN	/ISIC	TENTATIVE	E DATA 2
o, <b>♦,</b> ▲;**,*,#, <b>↓</b> : See nex	t page.						
Maximum Grid-No.5 Curre	nt ^e	•••		• •	·	2.4	ma
Maximum Peak Backplate						2	ma
Maximum Screen Current						0.6	ma
Grid-No.1 Voltage [#]						0 to -75	volts
Grid-No.2 Voltage [#]						100	volts
1						2510 to 2540*	volts
Grid-No.3 Voltage ^{#▲}						∫ 10 to 40**	volts
Grid-No.4 Voltage [#]						40 to 100	volts
Grid-No.5 Voltage [#]						220 to 250	volts
DC Backplate Voltage .						0	volts
Screen Voltage						8500	volts
					-		

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1	1 I			а.
Ì	Maximum Grid-No.4 Current [®]	0.3	ma	•
	Maximum Grid—No.3 Current ^e	0.5	ma	
	Maximum Grid—No.2 Current [●]	0.08	ma	
ļ	Maximum Cathode Current	4	ma	
1	Number of Half-Tone Steps ¹¹	5		
-	Viewing Duration ⁴⁴	20	sec	
1	Maximum Erasing-Uniformity Factor:			
	For 4"-diameter area (A ₄ )	0.65	-	
1	For the 3.5"-diameter portion (A3.5)			
1	centered on A ₄	0.50		
1	Resolution [#]	50 line	es/in.	
	Brightness 🔲	1500	fl	
	-		1	

#### WRITING SECTION®

#### Operating Values:

1183

	Equivalent	Values	
Grid-No.4 Voltage [#] ▲	2510 to 2540*	10 to 40**	volts
Grid-No.3 Voltage for focus	425 to 925*	-	volts
Grid-No.2 Voltage ^{#▲}	2510 to 2540*	10 to 40**	volts
Maximum Grid-No.   Voltage forcutoff			
of undeflected focused spot	-130*	-2630**	volts
Cathode Voltage	-	-2500**	volts
Maximum Grid-No.3 Current	-15 to -	+10	μa
Maximum Peak Cathode Current	4.5		ma

#### VIEWING SECTION AND WRITING SECTION

#### Maximum and Minimum Circuit Values:

	n Grid-No.5 (Viewing-Section) Circuit 0.005 min. megohm kplate-Circuit Resistance 0.005 max. megohm	
Ser	ies Current-Limiting Resistance in	1
S	creen Circuit	
•	Without external shield. See accompanying drawing CB-9578 showing angles of deflection. Grids No.4 & No.2 of Writing Gun are connected together and to grid	
	No.3 of Viewing Gun within the tube.	
*	Voltages are shown with respect to cathode of Viewing Gun. Voltages are shown with respect to cathode of Writing Gun.	~
11	Adjusted for brightest, most uniform pattern. For conditions with combined adjustment of grid-No.1 voltage, grid-No.2	
	voltage, grid-No.3 voltage, and grid-No.4 voltage to give brightest, most uniform pattern. After final adjustment, the grid-No.1 voltage should not bemore positive than -20 volts to maintain electrode current within the maximum value indicated.	
	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\$ of saturated brightness.	~~ <u>~</u>
œ,	♥,♣, ♥: See next page.	
9-5		



>_{/83}

### DISPLAY STORAGE TUBE

m 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 adjusterasing pulse to obtain complete erasure in approximately 10 seconds. Measure time  $\{t_i\}$  from start of erasing to the instant at which any area within the 4^H diameter (or the 3.5^H-diameter portion) is reduced to background-brightness level, and time  $\{t_2\}$  from start of erasing to the instant at which the end of the 3.5^H-diameter portion) is reduced to background-brightness level, and time  $\{t_2\}$  from start of erasing to the instant at which the entire area within the 4^H diameter (area (or the 3.5^H-diameter portion) 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 per cent of saturated brightness and with grids No.2 & No.4 of Writing Gun at about +2500 volts with respect to cathode of Writing Gun.

Measured with entire storage grid written to produce saturated brightness 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.

#### OPERATING CONSIDERATIONS

Support and shielding for the 7183 may be provided by a shield made of properly annealed high-permeability material. The screen lead and the backplate lead should be placed outside the shield.

Terminal Connectors. The base pins of the Neoditetrar 8-pin base on the Writing-Gun neck fit the Ditetrar 8-contact connector, such as Cinch No.54A18088, or equivalent. The base pins of the Small-Button Miniature 7-pin base on the Viewing-Gun neck fit the Miniature 7-contact socket. The recessed cavity caps require standard flexible-lead connectors as used for television picture tubes.

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.

9 - 58

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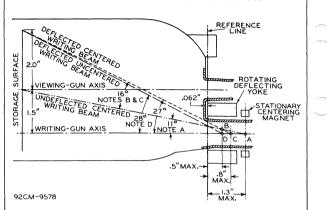
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TENTATIVE DATA 3



ANGLES OF DEFLECTION AND CENTERS OF DEFLECTION FOR WRITING GUN WHEN USED WITH ROTATING 2-COIL YOKE AND STATIONARY 4-COIL YOKE

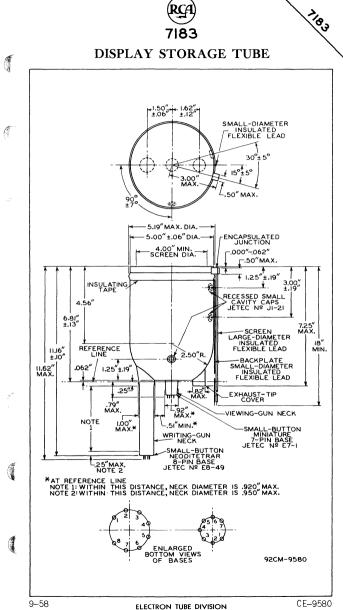


NOTE A: CENTERING OF THE WRITING BEAMON THE STORAGE SUR-FACE IS NECESSARY FOR A CENTERED PPI DISPLAY. THE BEAM IS CENTERED BY SHIFTING IT FROM THE WRITING-GUN AXIS THROUGH AN ANGLE OF II^O WITH A CENTERING MAGNET WHOSE EFFECTIVE CENTER (A) IS LOCATED 1.3" FROM REFERENCE LINE.

NOTE B: WITH ROTATING YOKE WHOSE EFFECTIVE CENTER OF DEFLECTION (B) IS LOCATED 0.5" FROM REFERENCE LINE, THE CENTERED WRITING BEAM (NOTE A) MUST BE DEFLECTED THROUGH AN ANGLE OF 32⁰ TO SWEEP FULLY THE STORAGE SURFACE.

NOTE C: WITH STATIONARY TV-TYPE YOKE WHOSE EFFECTIVE CENTER OF DEFLECTION (C) IS LOCATED 0.8" FROM REFERENCE LINE, THE CENTERED WRITING BEAM MUST BE DEFLECTED THROUGH AN ANGLE OF 52° TO SWEEP FULLY THE STORAGE SURFACE.

NOTE D: WHEN ROTATING YOKE IS USED WITH UNCENTERED DIS-PLAY, i.e., THE WRITING BEAM IS NOT CENTERED (NOTE A) BUT STRIKES THE STORAGE SURFACE ON THE WRITING-GUN AXIS, AND WITH THE EFFECTIVE CENTER OF DEFLECTION OF THE ROTATING YOKE LOCATED 0.5" FROM THE REFERENCE LINE, THE UNCENTERED WRITING BEAM MUST BE DEFLECTED THROUGH AN ANGLE OF 56° TO SWEEP FULLY THE STORAGE SURFACE.

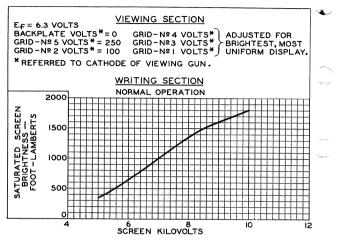


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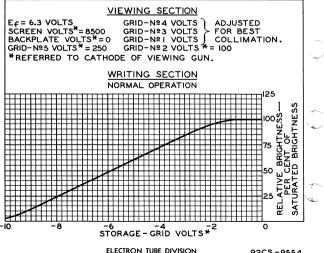
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#### TYPICAL CHARACTERISTIC



92CS-9553

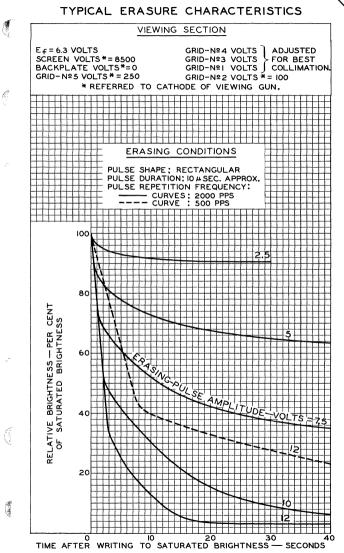
### TYPICAL STORAGE-GRID CHARACTERISTIC



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ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-9555

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DIRECT-VIEW TYPE 3.8"-DIAMETER DISPLAY

VIEW	NG GUN:
NO	DEFLECTION
NO	FOCUS

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ELECTROSTATIC FOCUS		NO FOCUS	
	DATA		
General:			
	Writing Pratice	Visuing Section	
	writing section	Viewing Section	
Heater, for Unipotential Cathode:			
Voltage (AC or DC)	6.3	6.3	vol
Current	0.6	0.6	a
Minimum Cathode Heating Time			
before other electrode volt-			
ages are applied	-	30	s
Direct Interelectrode Capaci-			
tances (Approx.): ⁰			
Grid No.1 to all other			
tube electrodes	6.5	11	μ
Cathode to all other			
tube electrodes	5.5	8	н
Backplate to all other			
tube electrodes	-	116	μ
Deflecting electrode DJ ₁ to			, ,
deflecting electrode DJ ₂	1.9	-	μ
Deflecting electrode DJ ₃ to			1.3
deflecting electrode DJ _µ	2	-	μ
DJ ₁ to all other tube electrodes.	6	-	μ
$DJ_2$ to all other tube electrodes.		_	μ
$DJ_3$ to all other tube electrodes.		_	μ μ
$DJ_{\perp}$ to all other tube electrodes.		-	μ
Focusing Method		None	M
Deflection Method		None	
Deflecting-Electrode Arrangement.		-	
berrecting-crectrode Arrangement.	sional Outline	-	
Phosphor (For Curves, see front	Stonat Outithe		
of this Section)		P20. Aluminized	
Fluorescence		Yellow-Green	
	-	Yellow-Green	
Phosphorescence	-		7
Maximum Overall Length			. ). 17 6
Seated Length			
Greatest Bulb Diameter			
Maximum Tube Radius			2.0
Bulb Terminals:	Oursearch Court		
Caps (Three)			
Cap	Recessed Small (	cavity (JEDEC No.	J1-2
		CEQ + 1	1000
Operating			
Storage			
Operating Position			
Weight (Approx.)			
Base Medium-Shell Dih	eptal 14-Pin (JED	DEC Group 5, No.B	14-3

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WRITING GUN:

ELECTROSTATIC DEFLECTION

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TENTATIVE DATA 1





BOTTOM VIEW		i,
Pin I-Heater of	BACKPLATE	
Writing Gun		
Pin 2-Grid No. 1 of		
Writing Gun	0	
Pin 3-Grid No.3 of	5 ZIII	1
Writing Gun		
Pin 4-Deflecting		
Electrode DJ3		
of Writing Gun		
Pin 5-Deflecting	3/16/202	
Electrode DJu	and the	
of Writing Gun		
Pin 6-Grid No.2 of		
Viewing Gun.	SCREEN	
Grid No.2 and	SCILLEN	
Grid No.4 of	Pin 13-Cathode of	
Writing Gun	Writing Gun	
6	÷	
Pin 7-Grid No. L 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 IO-Heater and	Over Pin	
Cathode of	12 Grid No.4 of	
Viewing Gun	Viewing Gun	
Pin II-Deflecting	On Side of Tube	
Electrode DJ ₁	Opposite Base	
of Writing Gun	Key — Backplate	
Pin 12-Deflecting	Recessed Cavity Cap:	
Electrode DJ ₂	Over Base	
of Writing Gun	Key Screen	
•	· · · · · · · · · · · · · · · · · · ·	
Maximum and Minimum Ratings, Absolute-Maxim		
For altitudes up to 10	·	
Writing Section	Viewing Section	
SCREEN VOLTAGE	11000 max.** volts	
BACKPLATE VOLT-		
AGE (Peak) –	20 max.** volts	_
Equivalent Values	Equivalent Values	4
GRID-No.5 VOLT-		
AGE	- 300 max.** volts	
GRID-No.4 VOLT-	See mar. Vorta	
AGE 2950 max.*▲ 200 max.**	- 300 max.** volts	
GRID-No.3 VOLT-	- JOU max. VOILS	
	(200 max.**) volto	-
	- {200 max. 10 min.** { volts	
PEAK VOLTAGE		4
BETWEEN GRID		
No.3 AND		
GRIDS No.2 &		
No.4 – 2950 max.	volts	
ELECTRON TUBE DIV		

ELECTRON TUBE DIVISION



13/5

# DISPLAY STORAGE TUBE

	r					
. <b>I</b>		Writing	Section	Viewin	g Section	
	GRID-No.2 VOLT-			1		1
	AGE CATHODE VOLT-	2950 max.*▲	200 max.**	2950 max."	* <b>4</b> 200 max.**	volts
	AGE	-	-2750 max.**	-	-	volts
Æ.	GRID-No. I VOLT-					1
Ø. Y	AGE:			1		1
	Negative-bias					
	value	200	max.*	200	max.**	volts
	Positive-bias					
	value	0	max.*	0	max.**	volts
	Positive-peak					1
	value	2	max.*	0	max.**	volts
) )	PEAK VOLTAGE					1
	BETWEEN GRIDS			Ì		
	No.2 & No.4			1		
	AND ANY DE-			1		
	FLECTING					
	ELECTRODE	500	max.			volts
	PEAK HEATER-					
	CATHODE					
	VOLTAGE:					1
	Heater nega-					1
	tive with					
	respect to					
	cathode	125	max.*	-		volts
	Heater posi-					
	tive with					
	respect to					
	cathode	125	max.*	1 -		volts
e.		VI	EWING SECTIO	)N**		ł
	Operating Values	and Typical	Performance C	haracterist	tics:	
	To prev	ent bossibl	e damage to	the tube.	allow the	1
			urrent to rea			
			g on the write			
			ng-gun beam			
<i>a</i> '.			eamis turned a			1
į.	Screen Voltage			10000	10000	volts
2	Backplate Voltage			2	2	volts
	Grid-No.5 Voltage			210	150	volts
	Grid-No 4 Voltage	<b>,</b> #	5	50 to 150	30 to 90	volts
	Grid-No.3 Voltage	#		10 to 50	10 to 40	volts
	Grid-No.2 Voltage	<b>A</b>		150	125	volts
s.	Grid-No.1 Voltage			0 to80	0 to -60	volts
ĺ.	Maximum Screen Cu	urrent		0.75	0.5	ma
Ĕ.	Maximum Backplate			2	1.5	ma
	he a second second			_		

. Maximum Grid-No.3 Current . . . . . . 5 ELECTRON TUBE DIVISION

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TENTATIVE DATA 2

2.5

2.5

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Maximum Grid-No.5 Current . .

Maximum Grid-No.4 Current . .

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Maximum Grid—No.2 Current	3 2.5	ma	1
Maximum Cathode Current	8 6.5	ma	
Number of Half-Tone Steps	5 5		
	20 40	sec	
Maximum Erasing-Uniformity Factor ^{DD} 0.	.45 0.4		
Resolution [⊕] ,	50 50	lines/in.	
Brightness ••	750 1500	fl	
WRITING SECTION®			
Range Values for Equipment Design:*			
For any grids-No.2 & No.4 voltage (1 1500 and 2750 volts▲			
Grid-No.3 Voltage for			
focus	2+4	volts	
focused spot4.6% of E _{C2+4} Maximum Grid-No.3		volts	
Current		μa	
Maximum Cathode Current. See Curve Deflection Factors:		,	
DJ ₁ & DJ ₂	v dc/in./kv	of E _{C2+8}	
DJ ₃ & DJ ₄	v dc/in./kv	of Ec2+4	
Focused Beam Position ## Writing Speedtt 3000		in./sec	
Examples of Use of Design Ranges:*			
For grids-No.2 & No.4 voltage (E _{C2+4} )▲	2000	volts	
Grid-No.3 Voltage for focus	350 to 750	volts	
Maximum Grid-No.1 Voltage for cutoff of undeflected focused spot	-92	volts	
Deflection Factors:	52	10100	
DJ ₁ & DJ ₂	72 to 96	volts	
$DJ_3 \& DJ_4$	70 to 94	volts	
Equivalent Values of Writing-Gun Voltages Refe to Cathode of Viewing Gun:	rred		
-	1050		l ·
Cathode Voltage	1850	volts	
Grid-No.3 Voltage for focus1125 to -1525 Grids-No.2 & No.4 Voltage [▲] . +125	-1100 to -1500 +150	volts volts	l
GITUS-NO.2 & NO.4 VOILage . TI25	+190	voits	
VIEWING SECTION and WRITIN	G SECTION		
Circuit Values:			
Grid-No. I-Circuit Resistance (Either gun)	I max	. megohm	
Resistance in Any Deflecting-Electrode Circuit			
Series Current-Limiting Resistor (Unbypassed) in Grid-No.5 (Viewing-Section) Circuit		-	
			1

6-59



2.3/5

### DISPLAY STORAGE TUBE

Backplate-Circuit Resistance. . . . . 0.005 max. megohm Series Current-Limiting Resistance in Screen Circuit. . . . . . . . . . . . . . . 1 min. megohm 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. ٠ 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 or saturated or generates. Determined as follows: With no erasing pulse, 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. Measure time (1/) 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 (12) from start of erasing to the instant at which the entire area within the minimum useful viewing-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 per cent of saturated brightnessandwith grids No.2 & No.4 of Writing Gun at about +2000 volts with respect to cathode of Writing Gun. Measured 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.4 of Writing Gun at +2000 volts with respect to cathode of Writing Gun, grid No.3 of Writing Oun at voltage to give focus, grid No.1 of Writing Gun at voltage which will permit storage of a charge just sufficient to give abarely perceptible spoton screen, Viewing Section operating under normal conditions, and tube shielded against extraneous fields. H fields. Measured under conditions of writing from just zero brightness (viewing-beam cutoff) to maximum brightness with grid No.1 of 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

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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TENTATIVE DATA 3

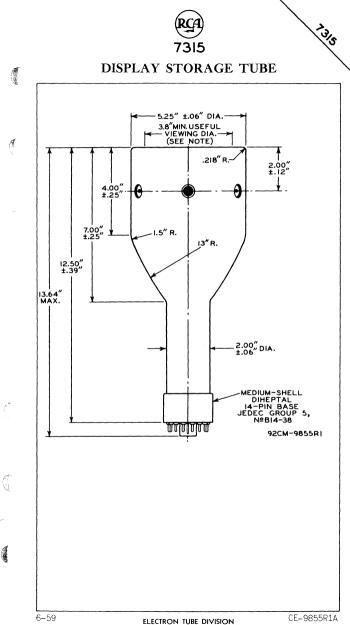


The high voltages at which the 7315 is operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Safety precautions include the enclosing of high-potential terminals and the use of interlocking switches 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.

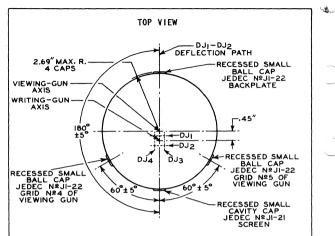
To prevent possible damage to the tube, allow the Viewing-Gun beam current to reach normal operating value before turning on the Writing-Gun beam current, and keep the viewing beam on till the writing beam is turned off.

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.



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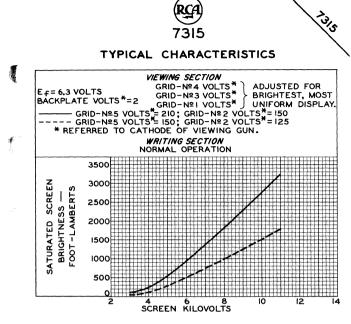
NOTE: MINIMUM USEFUL VIEWING AREA MAY BE ECCENTRIC WITH RESPECT TO THE TUBE FACE. THE MINIMUM USEFUL VIEWING AREA WILL HAVE DIAMETER OF 3.8".

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 8; LIKEWISE, WITH DJ3 POSITIVE WITH RESPECT TO DJ4, THE SPOT WILL BE DEFLECTED TOWARD PIN 4.

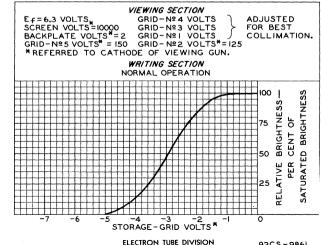
THE ANGLE BETWEEN THE DEFLECTION PATH PRODUCED BY DJ1 AND DJ2 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND THE BASE KEY BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm$  10°. ANGLE BETWEEN DJ1 - DJ2 DEFLECTION PATH AND DJ3 - DJ4 DEFLECTION PATH IS 90°  $\pm$  3°.

THE ANGLE BETWEEN THE DEFLECTION PATH PRODUCED BY DJ_ AND DJ_ MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND THE SCREEN CAP BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm$  10°.



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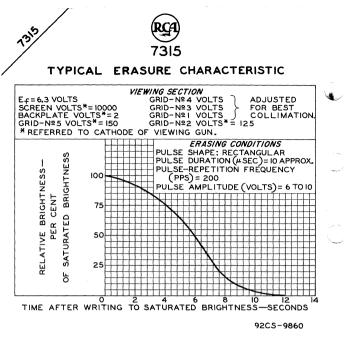




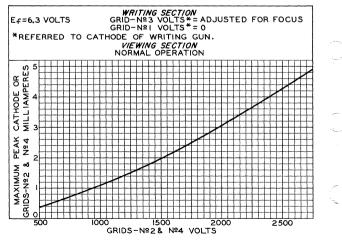
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ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CS - 9859



DIRECT-VIEW TYPE 3.8"-DIAMETER DISPLAY

WRITING GUN:	
ELECTROSTATIC	DEFLECTION
ELECTROSTATIC	FOCUS

VIEWING GUN: NO DEFLECTION NO FOCUS

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#### DATA

1	General:			
5 IF 8.		Writing Section	Viewing Section	
	Heater, for Unipotential Cathode:			
	Voltage (AC or DC)	6.3	6.3	volts
	Current	0.6	0.6	amp
	Minimum Cathode Heating Time			
	before other electrode volt-			
	ages are applied	-	30	sec
	Direct Interelectrode Capaci-			
	tances (Approx.): ⁰			
	Grid No.1 to all other			
	tube electrodes	6.5	11	μµuf
	Cathode to all other			
	tube electrodes	5.5	8	μµf
	Backplate to all other			
	tube electrodes	-	116	µµuf
	Deflecting electrode DJ ₁ to			
	deflecting electrode DJ2	1.9	-	µµuf
	Deflecting electrode DJ ₃ to			
	deflecting electrode DJ4	2	-	µµuf
	DJ ₁ to all other tube electrodes.	6	-	μµf
	DJ ₂ to all other tube electrodes.	7	-	μµf
	DJ ₃ to all other tube electrodes.	5.5	-	µµf
	DJ4 to all other tube electrodes.	4.8	-	µµuf
	Focusing Method		None	
	Deflection Method		None	
21	Deflecting-Electrode Arrangement.		-	
		sional Outline		
	Phosphor (For Curves, see front			
	of this Section)		P20, Aluminized	
	Fluorescence	-	Yellow-Green	
	Phosphorescence	-	Yellow-Green	7 01
	Minimum Useful Viewing Diameter.			
F.S.	Maximum Overall Length			
W.	Seated Length			
	Greatest Bulb Diameter			2.69"
	Maximum Tube Radius			2.69"
	Caps (Three).	Decessed Constit	Dell (IEDEC No	
	Temperature Range:	Recessed Sharr (	avity (JEDEC NO.,	1-21)
and the second s	Operating		55 ⁰ to 1	LOEO C
1	Storage			
•	Operating Position.			
	Weight (Approx.).			4 Ibs
	Base Medium-Shell Dih			
		optar i+rin (JEL	. ,	
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7448

# DISPLAY STORAGE TUBE

BOTTOM VIEW		
		-
Pin I-Heater of	BACKPLATE	
Writing Gun		
Pin 2-Grid No. 1 of		
Writing Gun		
Pin 3-Grid No.3 of		$\sim$
Writing Gun		
Pin 4-Deflecting		200
Electrode DJ ₃		1
of Writing Gun	ANTI CLAR	
Pin 5-Deflecting		
Electrode DJ ₄		
of Writing Gun		
Pin 6-Grid No.2 of	0,0	
Viewing Gun,	SCREEN	1
Grid No.2 and		l
Grid No.4 of	Pin 13-Cathode of	1
Writing Gun	Writing Gun	
Pin 7-Grid No.1 of	Pin 14-Heater of	1
Viewing Gun	Writing Gun	
Pin 8-Grid No.3 of	Recessed Ball Cap:	ł
Viewing Gun	Over Pin	
Pin 9-Heater of	3Grid No.5 of	1
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	1
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	
Maximum and Minimum Ratings, Absolute-Maxi	mm Values	Ľ
For altitudes up to 10		~~~~
Writing Section	Viewing Section	
-	-	
SCREEN VOLTAGE	11000 max.** volts	
BACKPLATE VOLT-		1
AGE (Peak).	20 max.** voits	1
Equivalent Values	Equivalent Values	
GRID-No.5 VOLT-		
AGE	- 300 max.** volts	
GRID-No.4 VOLT-		
AGE 2950 max.*▲ 200 max.**	- 300 max.** volts	
GRID-No.3 VOLT-	(200 max.**)	
AGE 1200 max.* -1550 max.**	- { 10 min.** { volts	F.
PEAK VOLTAGE		Ľ.
BETWEEN GRID	1	1.4
No.3 AND		
GRIDS No.2 &		1
No.4 2950 max.	– – voits	j
8-59 ELECTRON TURE DI	DATA 1	

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	Writing	Section	Viewing	Section	
GRID-No.2 VOLT-					
AGE	2950 max.*▲	200 max.**	2950 max.**	200 max.**	volt
CATHODE VOLT-					
AGE	-	-2750 max.**	-	-	volt
GRID-No.I VOLT-					
AGE:			1		
Negative-bias		*		**	
value	200	max.*	200 m	ax.	volt
Positive-bias	0	max.*	0 -	ax.**	
value	0	max.	] Um.	ax.	volt
Positive-peak	0	max.*	0	**	
value	2	max.	0 m	ax.**	volt
PEAK VOLTAGE BETWEEN GRIDS					
			1		
NO.2 & NO.4 AND ANY DE-			]		
AND ANY DE FLECTING					
ELECTRODE	500	-			
PEAK HEATER-	500	max.	-		volt
CATHODE					
VOLTAGE:			1		
Heater nega-					
tive with					
respect to					
cathode	125	max.*	_		volt
Heater posi-	12	lika.	_		VUIL
tive with					
respect to					
cathode	125	max.*	_		volt
	125		1		1010
	V	EWING SECTI	ON**		
Operating Values	and Typical	Performance (			
		Torrormance c	haracteristic	s:	
To pr	event possit	le damage to			
viewi	ng-gun beam	le damage to current to re	the tube, a ach normal of	llow the berating	
viewi value	ng-gun beam before tu <del>r</del> ni	le damage to current to re ng on the writ	the tube, a ach normal og ing-gun beam	llow the berating current,	
viewi value	ng-gun beam before turni eep the vieu	ble damage to current to re ng on the writ ving-gun beam	the tube, a ach normal of ing-gun beam on till the	llow the berating current,	
viewi value	ng-gun beam before turni eep the vieu	le damage to current to re ng on the writ	the tube, a ach normal of ing-gun beam on till the	llow the berating current,	
viewij value and k Screen Voltage.	ng-gun beam before turni eep the vieu	the damage to current to re ng on the writ ying-gun beam beam is turned	the tube, a ach normal of ing-gun beam on till the off 10000	llow the berating current, writing 10000	volt
viewij value and k Screen Voltage. Backplate Voltag	ng-gun beam before turni eep the vieu  e (DC)	the damage to current to re ng on the writ ying-gun beam beam is turned	the tube, an ach normal op ing-gun beam on till the off 10000 2	low the berating current, writing 10000 2	
viewin value and k Screen Voltage. Backplate Voltag Grid-No.5 Voltag	ng-gun beam before turni eep the vieu  e (DC) e	ele damage to current to re ng on the writ ving-gun beam beam is turned 	the tube, and ach normal of ing-gun beam on till the off 10000 2 210	low the berating current, writing 10000 2 150	volt volt
viewin value and k Screen Voltage. Backplate Voltag Grid-No.5 Voltag Grid-No.4 Voltag	ng-gun beam before turni eep the vieu  e (DC) e [#]	le damage to current to re ng on the writ ying-gun beam beam is turned	the tube, and ach normal of ing-gun beam on till the off 10000 2 210 50 to 150	low the berating current, writing 10000 2 150 30 to 90	volt volt volt
viewin value and k Screen Voltage. Backplate Voltag Grid-No.5 Voltag Grid-No.4 Voltag Grid-No.3 Voltag	ng-gun beam before turni eep the vieu  e (DC) e [#] e [#]	ele damage to current to re ng on the writ ring-gun beam beam is turned	the tube, and ach normal of ring-gun beam on till the off 10000 2 210 50 to 150 10 to 50	low the berating current, writing 10000 2 150 30 to 90 10 to 40	volt volt volt volt
viewin value and k Screen Voltage. Backplate Voltag Grid-No.5 Voltag Grid-No.3 Voltag Grid-No.2 Voltag	ng-gun beam before turni ee¢ the vieu  e (DC) e [#] e [#] e [#]	ble damage to current to re ng on the writ ving-gun beam beam is turned	the tube, a ach normal op ing-gun beam on till the off 10000 2 210 50 to 150 10 to 50 150	llow the berating current, writing 10000 2 150 30 to 90 10 to 40 125	volt volt volt volt volt
viewi value and k Screen Voltage. Backplate Voltag Grid-No.5 Voltag Grid-No.3 Voltag Grid-No.2 Voltag Grid-No.2 Voltag Grid-No.1 Voltag	ng-gun beam before turni eep the view e (CC) e# e# e# e# e#	ble damage to current to re ng on the writ ving-gun beam beam is turned	the tube, a ach normal of ing-gun beam on till the off 10000 2 210 50 to 150 10 to 50 150 0 to -80	low the berating current, writing 10000 2 150 30 to 90 10 to 40 125 0 to -60	volt: volt: volt: volt: volt: volt:
viewi value and k Screen Voltage. Backplate Voltag Grid-No.5 Voltag Grid-No.4 Voltag Grid-No.4 Voltag Grid-No.2 Voltag Grid-No.1 Voltag	ng-gun beam before turni eep the vieu 	le damage to current to re ng on the writ ying-gun beam beam is turned	the tube, a ach normal op ing-gun beam on till the off 10000 2 210 50 to 150 10 to 50 150 0 to -80 0.75	2 low the berating current, writing 10000 2 150 30 to 90 10 to 40 125 0 to -60 0.5	volt: volt: volt: volt: volt: volt: m
viewin value and k Screen Voltage. Backplate Voltag Grid-No.5 Voltag Grid-No.4 Voltag Grid-No.2 Voltag Grid-No.2 Voltag Grid-No.2 Voltag Maximum Screen C waximum Backplat	ng-gun beam before turni eep the vieu  e (DC) e [#] e [#] e [#] e [#] urrent e Current (P	le damage to current to re ng on the writ ying-gun beam beam is turned 	the tube, a ach normal of ing-gun beam on till the off 10000 2 210 50 to 150 10 to 50 150 0 to -80 0.75 2	low the berating current, writing 10000 2 150 30 to 90 10 to 40 125 0 to -60 0.5 1.5	volt: volt: volt: volt: volt: volt: mm
viewin value and k Screen Voltage. Backplate Voltag Grid-No.5 Voltag Grid-No.4 Voltag Grid-No.3 Voltag Grid-No.2 Voltag Grid-No.1 Voltag Grid-No.1 Voltag Maximum Screen C Maximum Grid-No.	ng-gun beam before turni eep the vieu  e (DC) e [#] e [#] e [#] e [#] e [#] e [*] e [*] e Current (P 5 Current 1)	le damage to current to re ng on the writ ying-gun baam beam is turned	the tube, a ach normal of ing-gun beam on till the off 10000 2 210 50 to 150 10 to 50 150 0 to -80 0.75 2 3	low the berating current, writing 10000 2 150 30 to 90 10 to 40 125 0 to -60 0.5 1.5 2.5	volt: volt: volt: volt: volt: volt: mm mm
viewin value and k Screen Voltage. Backplate Voltag Grid-No.5 Voltag Grid-No.4 Voltag Grid-No.2 Voltag Grid-No.2 Voltag Grid-No.2 Voltag Maximum Screen C waximum Backplat	ng-gun beam before turni eep the vieu  e e [#] e [#] e [#] e [#] urrent e Current (P 5 Current (P 5 Current .	le damage to current to re ng on the writ jong-gun beam is turned	the tube, a ach normal of ing-gun beam on till the off 10000 2 210 50 to 150 10 to 50 150 0 to -80 0.75 2	low the berating current, writing 10000 2 150 30 to 90 10 to 40 125 0 to -60 0.5 1.5	volt: volt: volt: volt: volt: volt: ma ma ma ma

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				1.00
Maximum Grid-No.2 Current	3	2.5	ma	- <b>-</b>
Maximum Cathode Current	8	6.5	ma	
Number of Half-Tone Steps	5	5		
Viewing Duration ^{AA}	20	40	sec	
Maximum Erasing-Uniformity Factor	0.45	0.4		
Resolution [®] ,	50	50	lines/in.	$\sim$
Brightness ••	2750	1500	fl	
				~~ ~
WRITING SECTION®				
Range Values for Equipment Design:*				
For any grids-No.2 & No.4 voltage 1500 and 2750 volts	(E _{C2+4} )	between		$\sim$
Grid-No.3 Voltage for				<u>ب</u> ،
focus 17.5% to 37.5% of E	С2+11		volts	
Maximum Grid-No.l Voltage for cutoff of undeflected				
focused spot4.6% of Ec2+4			volts	
Maximum Grid-No.3				
Current			μa	
Maximum Cathode Current. See Curve			1	
Deflection Factors:				
$DJ_1 \& DJ_2 \dots \dots 36 \text{ to } 48$	۷	dc/in./k	v of E _{C2+4}	
DJ ₃ & DJ ₄	```	/ dc/in./k	v of E _{C2+4}	
Focused Beam Position ## Writing Speedtt 300000			in./sec	
Examples of Use of Design Ranges:*				
For grids-No.2 & No.4 voltage (E _{C2+4} )▲	200	0	volts	
Grid-No.3 Voltage for focus	350 to	750	volts	
Maximum Grid-No.I Voltage for cutoff				
of undeflected focused spot	9	2	volts	ر
Deflection Factors:				
$DJ_1 \& DJ_2 \dots \dots \dots \dots \dots \dots \dots \dots$	72 to		volts	
DJ ₃ & DJ ₄	70 to	94	volts	
Equivalent Values of Writing-Gun Voltages Refe	arred			
to Cathode of Viewing Gun:				-
Cathode Voltage		- 1875	volts	$\sim$
Grid-No.3 Voltage for focus1100 to -1500	0 -112	25 to -152		- se
Grids-No.2 & No 4 Voltage [▲] +150		+125	volts	
ů				
VIEWING SECTION and WRITI	-			
	NG SECT	IUN		
Circuit Values:				A.
Grid-No.1-Circuit Resistance (Either gun)		l ma:		- 
Resistance in Any Deflecting-Electrode Circui	t <b>-</b>	0.1 ma:	x. megohm	
Series Current-Limiting Resistor (Unbypassed)				
in Grid-No.5 (Viewing-Section) Circuit		0.01 min	n. megohm	
8-59 ELECTRON TURE DIVISION				
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<b>Q</b>	Backplate-Circuit Resistance
	Screen Circuit
	O Without external shield.
	Minimum useful viewing area may be eccentric with respect to the tube face.
-F	** 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.
eng I	With writing beam cut off. Since grid No.2 of the Viewing Gun and grids No.2 and No.4 of the Writing Gun are connected together within the tube, the maximum total current collected by these electrodes is essential- ly equal to the sum of the maximum grid-No.2 current of the Viewing Gun and the maximum cathode current of the Writing Gun (See Writing-Gun- Current-Characteristic Curre).
	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.
	Determined as follows: With no erasing pulse, overscan the storage surface with writing beam. Apply rectangular erasing pulses having an amplitude of between 8 to 10 volts and adjust duty cycle 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 minimum useful viewing diameter is reduced to background-brightness level, and time (t ₂ ) from start of erasing to the instant at which the entire area within the minimum useful viewing-diameter area is reduced to background-brightness level. The erasing-uniformity factor is defined as $(t_2 - t_1)/t_2$ .
	Beasured by shrinking-rester method at a display brightness of 50 per cent of saturated brightness and with grids No.2 & No.4 of Writing LA Gun at about *2000 volts with respect to cathode of Writing Gun.
	Measured 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 it.
	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.
ν. 	## 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 (Steps: Steps: Steps
(19) (19) (19) (19) (19) (19) (19) (19)	I Measured under conditions of writing from just zero brightness (viewing- beam cutoff) tomaximum brightness with grid No.10 fWriting 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.
14	Writing Gun at +2000 voits with respect to cathode or Writing Gun. It is recommended that the deflecting—electrode-circuit resistances be approximately equal.
	OPERATING CONSIDERATIONS
No.	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.

8-59

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Terminal Connections. The base pins of the 7448 fit the Diheptal (4-contact socket. The Recessed Small Ball caps and the Recessed Small Cavity cap require standard flexible-lead connectors.

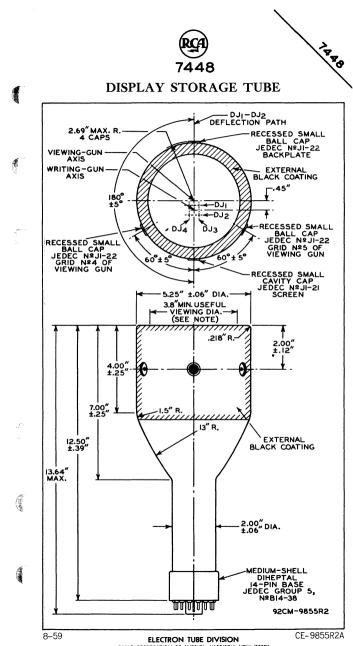
The high voltages at which the 7448 is operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Safety precautions include the enclosing of high-potential terminals and the use of interlocking switches 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.





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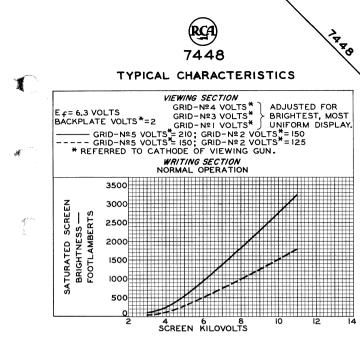


NOTE: MINIMUM USEFUL VIEWING AREA MAY BE ECCENTRIC WITH RESPECT TO THE TUBE FACE. THE MINIMUM USEFUL VIEWING AREA WILL HAVE DIAMETER OF 3.8".

CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN  $2^{\circ}$  in any Direction from PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.

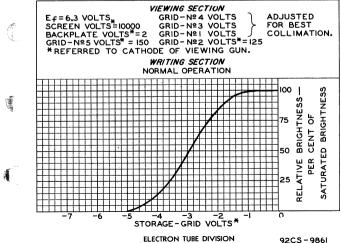
DEFLECTING ELECTRODES DJ₁ AND DJ₂ ARE NEARER THE SCREEN: DEFLECTING ELECTRODES DJ₃ AND DJ₄ ARE NEARER THE BASE. WITH DJ₁ POSITIVE WITH RESPECT TO DJ₂, THE SPOT WILL BE DEFLECTED TOWARD PIN 8; LIKEWISE, WITH DJ₃ POSITIVE WITH RESPECT TO DJ₄, THE SPOT WILL BE DEFLECTED TOWARD PIN 4.

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°. 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°. ANGLE BETWEEN DJ₁ – DJ₂ DEFLECTION PATH AND DJ₃ – DJ₄ DEFLECTION PATH 1S 90°  $\pm$  3°.

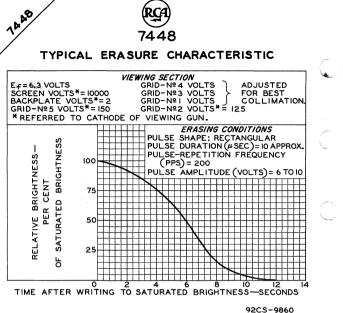


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#### TYPICAL STORAGE-GRID CHARACTERISTIC

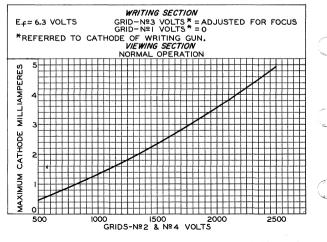


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