RCA TUBE HANDBOOK HB-3

CATHODE-RAY TUBE SECTION

This section pertains to RCA tubes for signal-to-image, image-to-signal, and image-to-image applications. It includes data on cathode-ray tubes for oscillographic and picture-reproduction use, camera tubes for television pickup, and monoscopes for testing the performance of television equipment.

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

7-52

CLASSIFICATION CHART
FOR TYPES IN CATHODE-RAY TUBE SECTION

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

KINESCOPES

Approx. Envelope Diam. In.	Phosphor◊	Max. HV Electrode Volts	Focusing Method	Deflection Method	Min. Screen Size In.	TUBE TYPE
Direct-Viewing						
3	P4	2500	S	S	2-3/4 Diam.	3KP4
7	P4	8000	S	M	6 Diam.	7DP4
7	P4	6000	S	S	6 Diam.	7JP4
9	P4	7000	S	M	7-7/8 Diam.	9AP4
10	P4	12000	M	M	9-1/8 Diam.	10BP4-A
10	P4	12000	M	M	9-1/8 Diam.	10FP4-A
12	P4	7000	S	M	10-3/4 Diam.	12AP4
12	P4	12000	M	M	11-1/8 Diam.	12KP4-A
12	P4	12000	M	M	11 Diam.	12LP4-A
14	P4	14000	M	M	11-1/8 x 8-5/16	14CP4
14	P4	14000	M	M	11-1/8 x 8-5/16	14EP4
16	P4	14000	M	M	14-3/8 Diam.	16AP4-A
16	P4	15000	M	M	14-1/2 Diam.	16DP4-A
16	P4	14000	M	M	14-3/8 Diam.	16GP4
16	P4	14000	M	M	14-3/8 Diam.	16GP4-B
16	P4	14000	M	M	13-1/2 x 10-1/8	16KP4
16	P4	14000	M	M	14-1/2 Diam.	16LP4-A
16	P4	16000	M	M	13-1/2 x 10-1/8	16RP4
16	P4	14000	M	M	13-1/2 x 10-1/8	16TP4
16	P4	16000	M	M	14-1/2 Diam.	16WP4-A
17	P4	16000	M	M	14-1/4 x 10-3/4	17BP4-A
17	P4	16000	M	M	14-3/8 x 10-11/16	17CP4
17	P4	16000	S	M	14-3/8 x 10-11/16	17GP4
17	P4	16000	S	M	14-1/4 x 10-3/4	17HP4
17	P4	18000	M	M	14-1/4 x 10-3/4	17JP4
17	P4	16000	S	M	14-1/4 x 10-3/4	17LP4
17	P4	16000	M	M	14-1/4 x 10-3/4	17QP4
17	P4	16000	S	M	14-3/8 x 10-11/16	17TP4
19	P4	19000	M	M	17-1/4 Diam.	19AP4-A
19	P4	19000	M	M	17-1/4 Diam.	19AP4-B
20	P4	18000	M	M	17 x 12-3/4	20CP4
20	P4	16000	S	M	17 x 12-3/4	20MP4
21	P4	18000	M	M	18-1/8 x 13-11/16	21AP4
21	P4	16000	S	M	18-1/8 x 13-11/16	21MP4

◊,S,M: See next page.

CLASSIFICATION CHART
FOR TYPES IN CATHODE-RAY TUBE SECTION

KINESCOPES (cont'd)

Approx. Envelope Diam. In.	Phosphor♦	Max. HV Electrode Volts	Focusing Method	Deflection Method	Min. Screen Size In.	TUBE TYPE
Monitor						
7	P4	10000	M	M	6 Diam.	7QP4
7	P4	12000	S	M	6 Diam.	7TP4
10	P4	14000	S	M	9-1/8 Diam.	10SP4
Projection						
5	P4	27000	S	M	4-1/4 Diam.●	5TP4
7	P4	80000	S	M	5 x 3-3/4○	7NP4
7	P4	80000	S	M	5 x 3-3/4□	7WP4
View-Finder						
5	P4	8000	M	M	4-1/4 Diam.	5FP4-A
Transcriber						
5	P11	27000	S	M	4-1/4 Diam.	5WP11

CAMERA TUBES

Major Use	Focusing Method	Deflection Method	Image Size In.	TUBE TYPE
Iconoscopes				
Film Pickup	S	M	4-3/4 x 3-9/16	1850-A
Industrial & Laboratory	S	S	1.4 Diagonal	5527
Image Orthicons				
Outdoor Pickup	M	M	1.6 Diagonal	5820
Studio Pickup	M	M	1.6 Diagonal	5826
Vidicon				
Industrial	M	M	0.62 Diagonal	6198

S = Electrostatic M = Electromagnetic

● Quality circle diameter of faceplate. When used with typical reflective optical system, the 5TP4 provides 24" x 18" picture.

○ Quality rectangle of faceplate. When used with suitable reflective optical system, the 7NP4 provides 20" x 15" picture at a projection-throw distance of 60".

□ Like ○ except 80".

♦ See sheet FEATURES OF FLUORESCENT SCREENS at the front of this Section.

CLASSIFICATION CHART
FOR TYPES IN
CATHODE—RAY TUBE SECTION

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

OSCILLOGRAPH TUBES

Approx. Bulb Diam. In.	Max. HV Electrode Volts†	TUBE TYPES Classified by Phosphor♦					
		P1	P5	P7	P11	P12	P14
Electrostatic Focus and Deflection							
1	500	913	–	–	–	–	–
2	600	902–A	–	–	–	–	–
2	1000	2AP1–A	–	–	–	–	–
2	2500	2BP1	–	–	2BP11	–	–
3	1500	3AP1–A	908–A	–	–	–	–
3	2000	3BP1–A	–	–	–	–	–
3	2500	3KP1	–	–	3KP11	–	–
3	2500	3MP1	–	–	–	–	–
3	2500	3RP1	–	–	–	–	–
5	2000	905–A	–	–	–	–	–
5	2000	5BP1–A	–	–	–	–	–
5	2500	5UP1	–	5UP7	5UP11	–	–
5	15000	912	–	–	–	–	–
7	6000	7JP1	–	–	–	–	–
9	7000	914–A	–	–	–	–	–
Post–Deflection Accelerator Types							
3	4000	3JP1	–	3JP7	–	–	–
5	4000	5CP1–A	–	5CP7–A	5CP11–A	5CP12	–
Magnetic Focus and Deflection							
5	8000	–	–	5FP7–A	–	–	5FP14
7	8000	–	–	7BP7–A	–	–	–
7	8000	–	–	7MP7	–	–	7MP14
10	10000	–	–	10KP7	–	–	–
12	10000	–	–	12DP7–B	–	–	–
12	10000	–	–	12SP7	–	–	–
16	14000	–	–	16ADP7	–	–	–
Electrostatic Focus, Magnetic Deflection							
7	8000	7CP1	–	–	–	–	–

♦, †: See next page.

CLASSIFICATION CHART
FOR TYPES IN
CATHODE-RAY TUBE SECTION

MISCELLANEOUS

Approx. Bulb Diam. In.	Phosphor♦	Max. High-Voltage Electrode Volts	Focusing Method	Deflection Method	TUBE TYPE
Flying-Spot Cathode-Ray Tubes					
5	P15	27000	S	M	5WP15
5	P16	27000	S	M	5ZP16
Monoscope					
5	Resolution Chart	1500	S	M	2F21

♦ See sheet FEATURES OF FLUORESCENT SCREENS at the front of this Section.
S = Electrostatic † Design-Center Values. M = Electromagnetic

PRICES[□]
OF CATHODE-RAY TUBE TYPES

Type	Schedule D[⊕]	Schedule D[▲]
2API-A[♣]	-	$ 10.55
2BPI	-	9.60
2BPII	-	11.00
2F21	-	105.00
3API-A[♣]	-	15.75
3BPI-A	-	16.50
3JPI	-	19.00
3JP7	-	23.00
3KPI	-	14.50
3KP4[♣]	$20.00	-
3KPII	-	16.50
3MPI	-	14.75
3RPI	-	14.50
5BPI-A[♣]	-	22.50
5CPI-A	-	23.25
5CP7-A	-	27.25
5CPII-A	-	27.50
5CPI2	-	27.00
5FP4-A	-	41.75
5FP7-A	-	30.25
5FPI4	-	30.25
5TP4	60.00	-
5UPI	-	17.75
5UP7	-	20.25
5UPII	-	22.00
5WPII	-	70.00
5WPI5	-	70.00
5ZPI6	-	71.25
7BP7-A	-	48.50
7CPI	-	30.75
7DP4	31.50	-
7JPI	-	23.50
7JP4	26.00	-
7MP7	-	39.50
7MPI4	-	39.50
7NP4	-	600.00
7QP4	-	39.50
7TP4	-	52.00
7VPI	-	25.00
7WP4	-	630.00
9AP4	-	•
10BP4	-	•
10BP4-A	28.00	-
10FP4-A[♣]	35.00	-
10KP7	-	50.00
10SP4	-	54.00
12AP4*	-	•
12DP7-B	-	72.50
12KP4-A[♣]	$39.50	-
12LP4	-	•
12LP4-A	32.00	-
12SP7	-	47.40
14CP4[♣]	35.00	-
14EP4	35.00	-
16ADP7	-	55.00
16AP4-A	46.00	-
16DP4-A[♣]	39.00	-
16GP4	46.00	-
16GP4-A	-	•
16GP4-B	46.00	-
16GP4-C	-	•
16KP4[♣]	37.00	-
16LP4-A[♣]	40.00	-
16RP4[♣]	37.00	-
16TP4[♣]	37.00	-
16WP4-A[♣]	40.00	-
17BP4-A	36.00	-
17CP4	35.00	-
17GP4	46.00	-
17HP4	38.25	-
17JP4	36.00	-
17LP4	38.25	-
17QP4	36.00	-
17TP4	36.50	-
19AP4	-	•
19AP4-A	59.00	-
19AP4-B	59.00	-
19AP4-D	-	•
20CP4	51.50	-
20MP4	54.00	-
21AP4	55.00	-
21MP4	57.00	-
902-A[♣]	-	12.50
905-A[♣]	-	65.25
908-A[♣]	-	16.50
912	-	155.00
913[♣]	-	15.50
914-A	-	93.50
1850-A	-	540.00
5527	-	49.90
5820	-	1200.00
5826	-	1300.00
6198	-	360.00

• Discontinued type. Data sheet has been retained in book for reference purpose only.

□, ⊕, ▲, ♣, *: See next page.

PRICES□
OF CATHODE-RAY TUBE TYPES

□ This price list applies only in the United States of America and is subject to change without notice. All prices are exclusive of all Federal, State and local excise, sales, and similar taxes.

● Schedule D shows list prices for tube types priced for distribution through dealer and service channels.

▲ Schedule U shows list prices for tube types priced for distribution through other than dealer and service channels.

♣ Not recommended for new equipment design.

* For data see 9AP4/1804-P4 and 12AP4/1803-P4, respectively.

INFORMATION ON PURCHASING ABOVE TYPES

Information as to where *RCA Cathode-Ray Tube Types* can be purchased may be obtained from our *regional office* nearest you or from *Tube Department, Radio Corporation of America, Harrison, N.J.*

D U

5ABP1 31.00
5ABP7 35.00
5ABP11 35.25

FEATURES OF FLUORESCENT SCREENS

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

Phosphor P1 produces a brilliant spot having 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 P4 is a highly efficient screen having white fluorescence and medium persistence. Types having this phosphor are of particular interest for television picture tubes.

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

Phosphor P7 is a long-persistence, cascade (two-layer) screen. During excitation by the electron beam, this phosphor produces a bluish fluorescence of short persistence. After excitation, the screen exhibits a greenish-yellow 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 spot of bluish fluorescence and has sufficiently short persistence to permit its use in all moving film photographic applications without blurring except in those where film moves at a high speed. P11 screens, because of their unusually high brightness characteristic, may also be used for visual observation of phenomena.

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

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

Phosphor P15 produces a spot of very short persistence and having both blue-green and near-ultraviolet fluorescence. The persistence of the latter is even shorter than that of the blue-green fluorescence, a feature which makes this phosphor particularly suitable for the high-speed scanning requirements of a flying-spot signal generator.

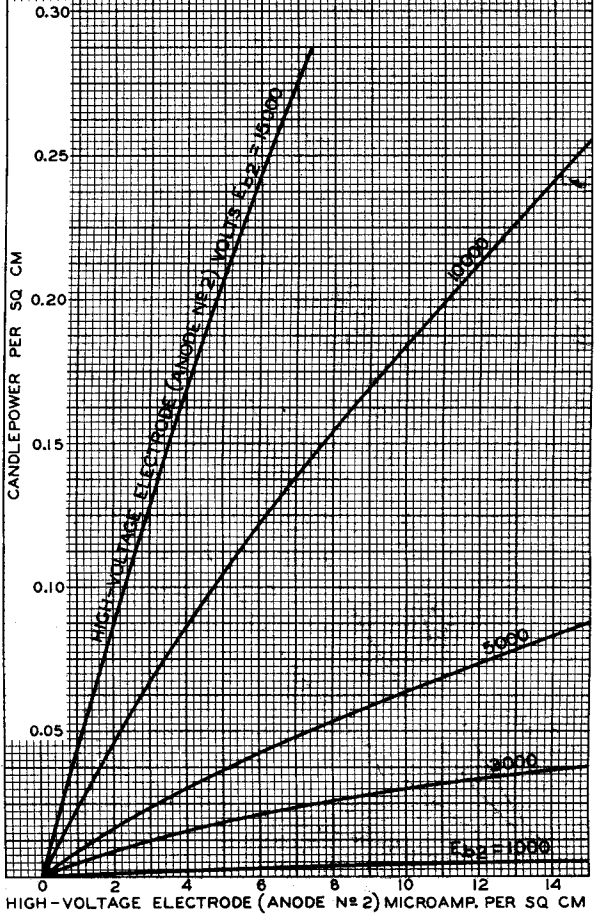
FEATURES OF FLUORESCENT SCREENS

Phosphor P16 produces a spot of extremely short persistence and has both violet and near-ultra violet fluorescence and phosphorescence. This phosphor is particularly useful for the high-speed scanning requirements of a flying-spot signal generator because it features a stable exponential decay characteristic.

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

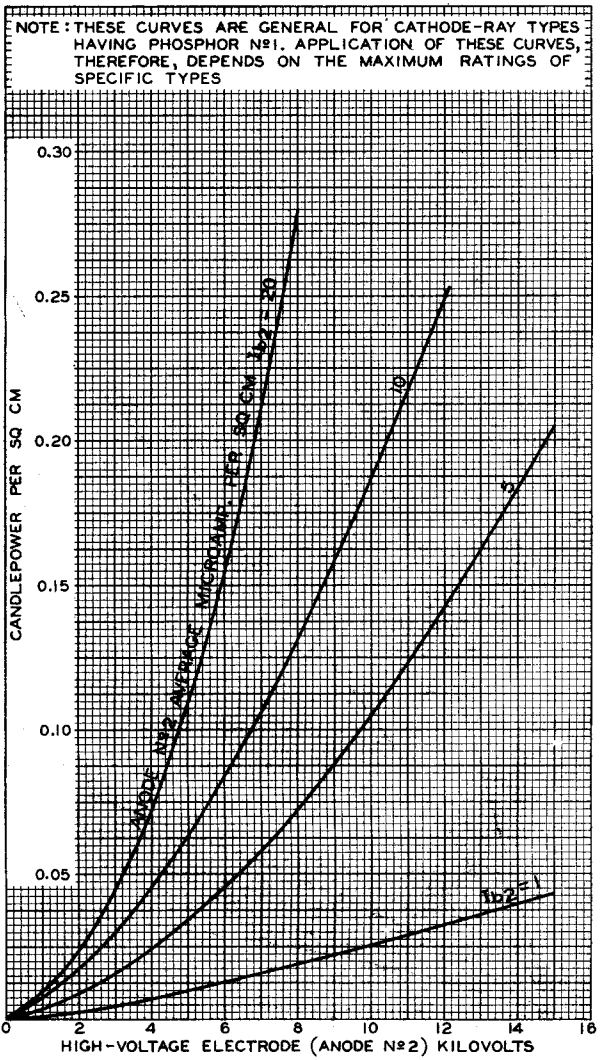
AVERAGE CHARACTERISTICS OF PHOSPHOR Nº 1

NOTE: THESE CURVES ARE GENERAL FOR CATHODE-RAY TYPES HAVING PHOSPHOR Nº 1. APPLICATION OF THESE CURVES, THEREFORE, DEPENDS ON THE MAXIMUM RATINGS OF SPECIFIC TYPES

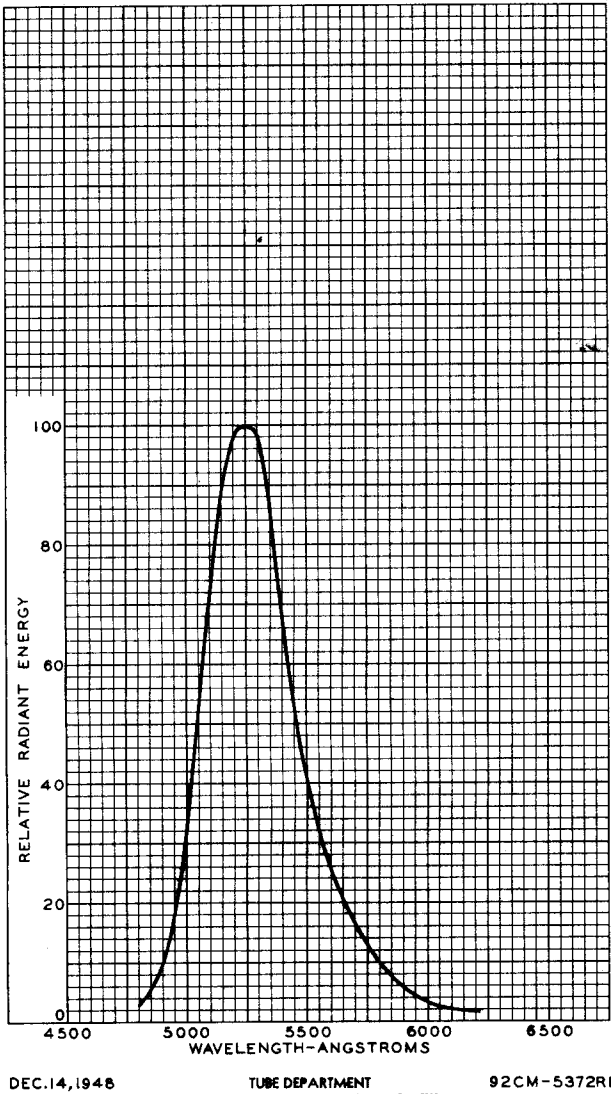


AVERAGE CHARACTERISTICS OF PHOSPHOR Nº 1

NOTE: THESE CURVES ARE GENERAL FOR CATHODE-RAY TYPES HAVING PHOSPHOR Nº1. APPLICATION OF THESE CURVES, THEREFORE, DEPENDS ON THE MAXIMUM RATINGS OF SPECIFIC TYPES



SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR Nº1

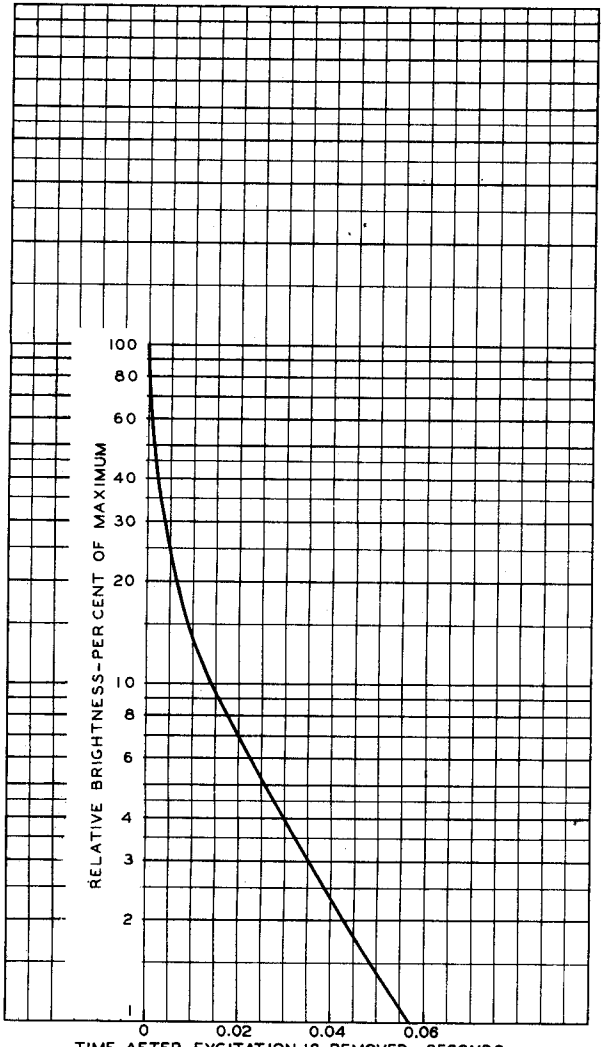


DEC. 14, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-5372R1

PERSISTENCE CHARACTERISTIC OF PHOSPHOR Nº 1

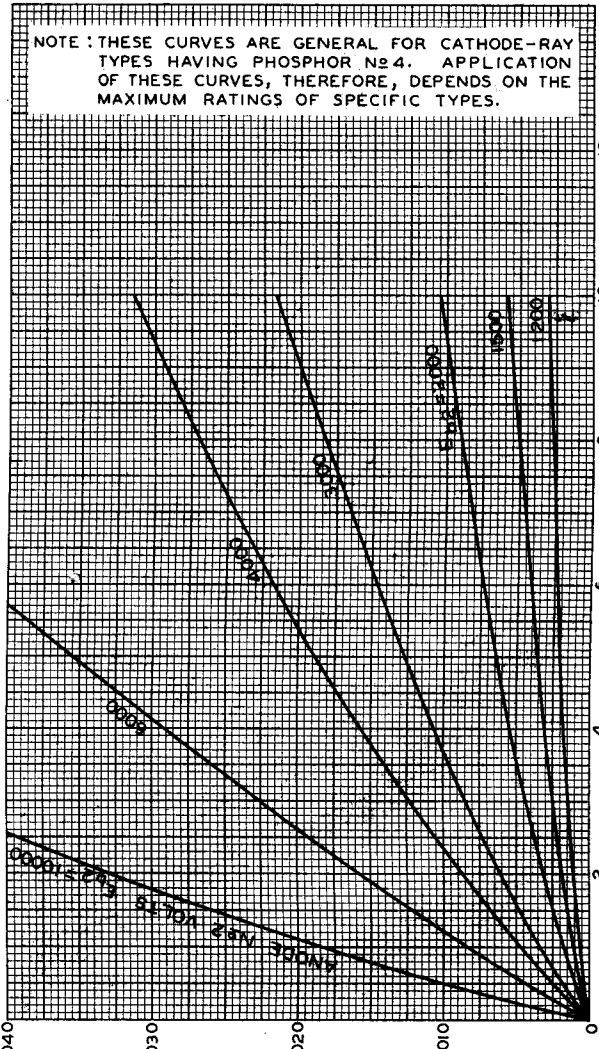


FEB. 28, 1936

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-5380

AVERAGE CHARACTERISTICS OF PHOSPHOR №4

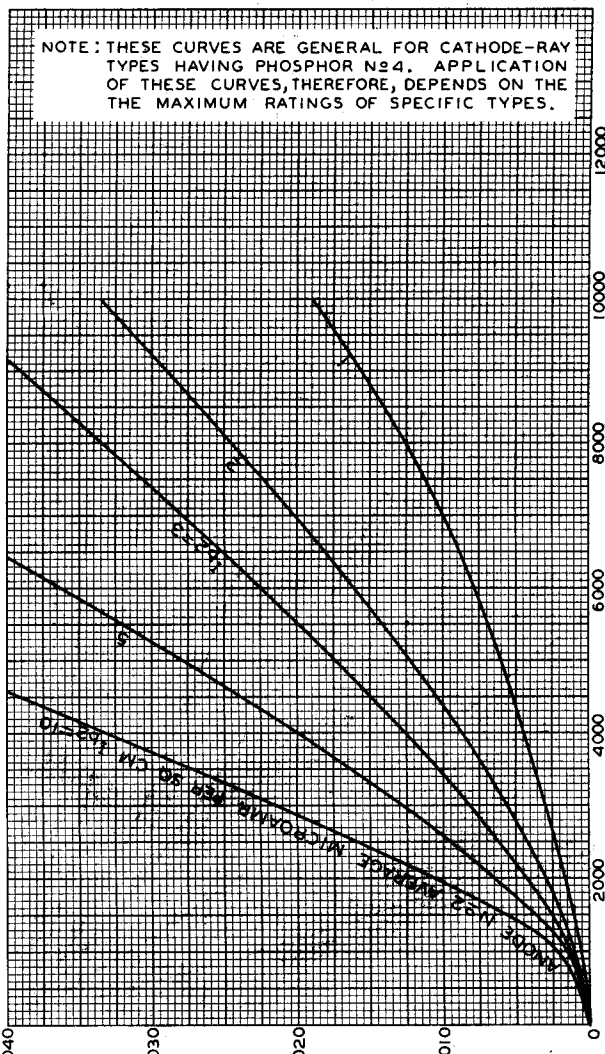


OCT. 5, 1938

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4979

AVERAGE CHARACTERISTICS OF PHOSPHOR №4



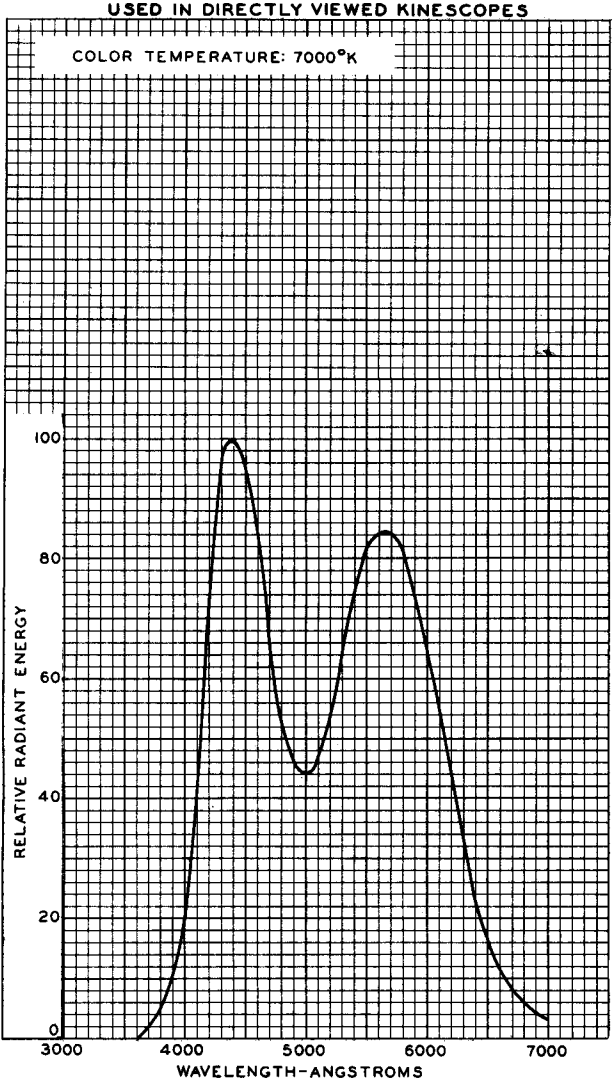
OCT. 5, 1938

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4978

SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR №4

USED IN DIRECTLY VIEWED KINESCOPES



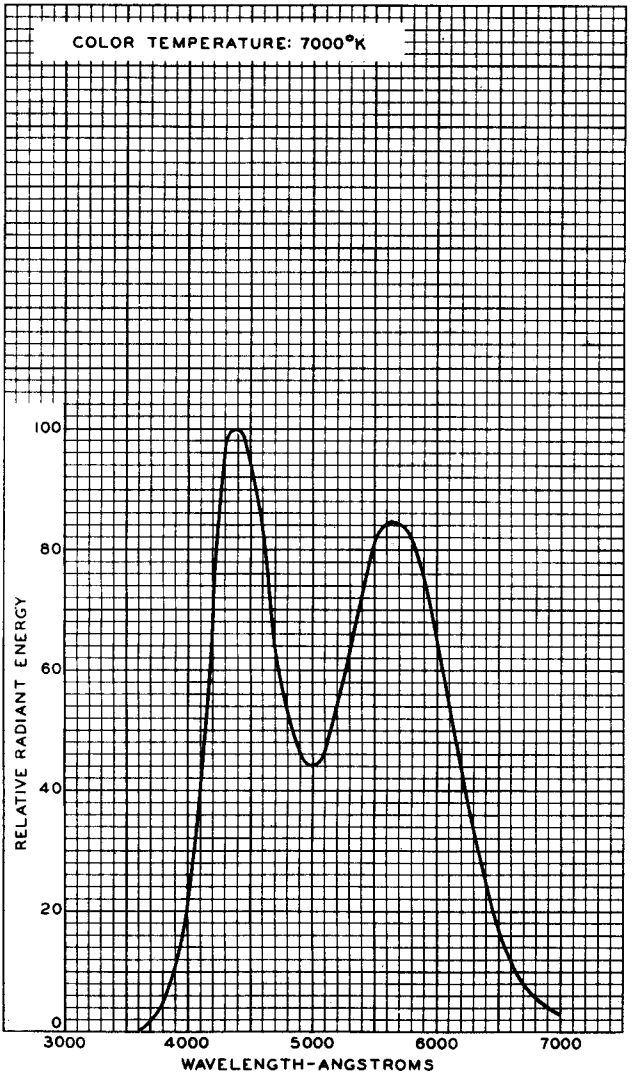
JULY 5, 1949

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7311

SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR Nº4

SULFIDE TYPE



JULY 5,1949

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

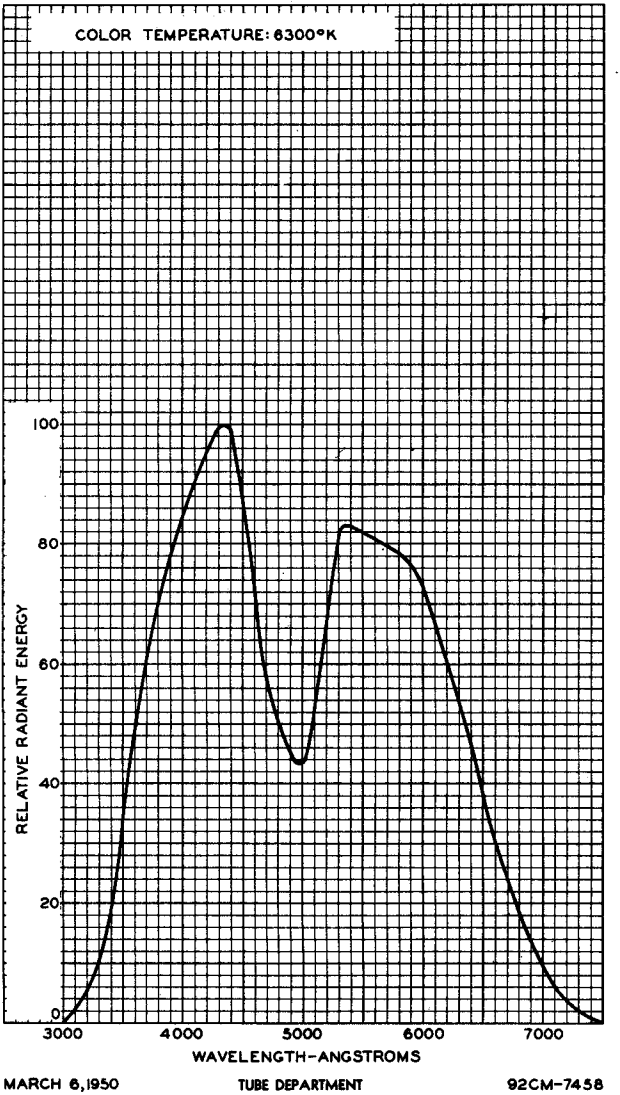
92CM-7316

PERSISTENCE CHARACTERISTIC OF PHOSPOR Nº 4
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.

SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR Nº4

SILICATE-SULFIDE TYPE



MARCH 6, 1950

TUBE DEPARTMENT

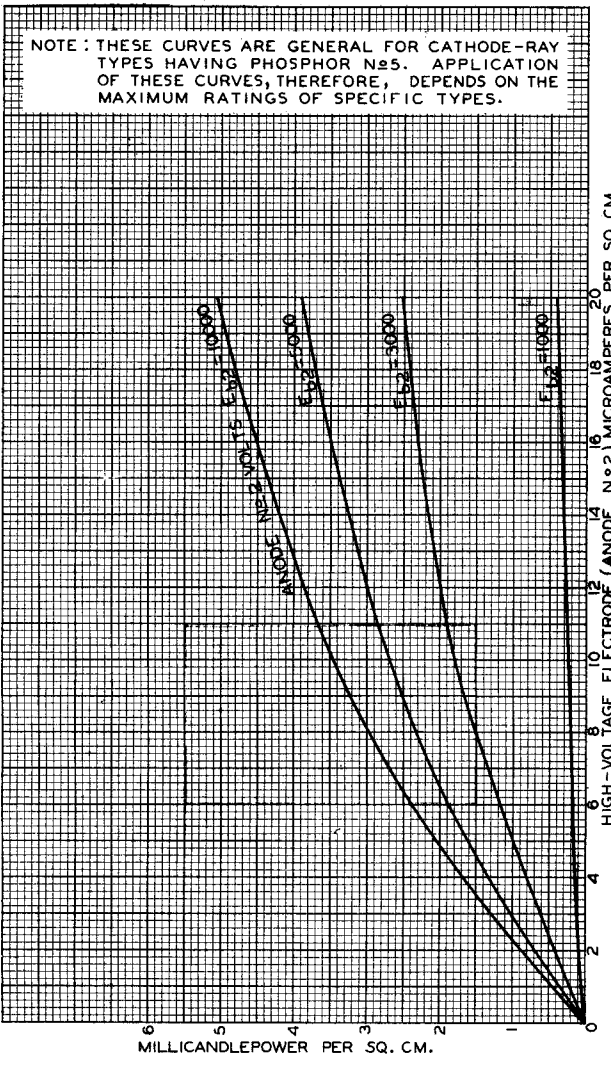
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7458

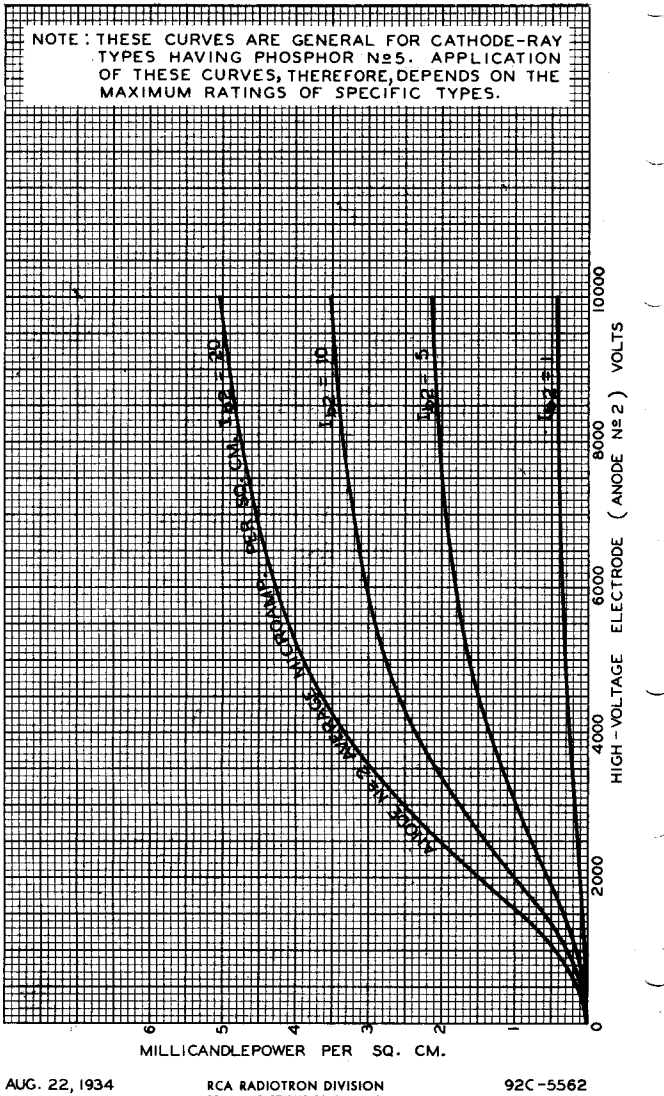
PERSISTENCE CHARACTERISTIC OF PHOSPOR Nº 4
SILICATE-SULFIDE TYPE

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.

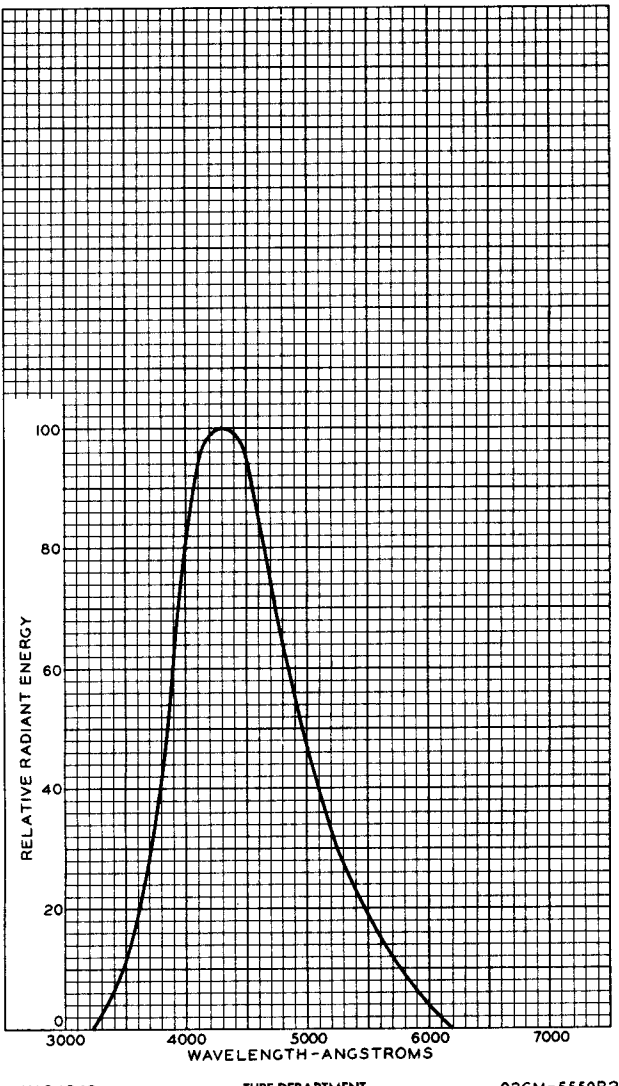
AVERAGE CHARACTERISTICS OF PHOSPHOR №5



AVERAGE CHARACTERISTICS OF PHOSPHOR №5



SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR Nº 5

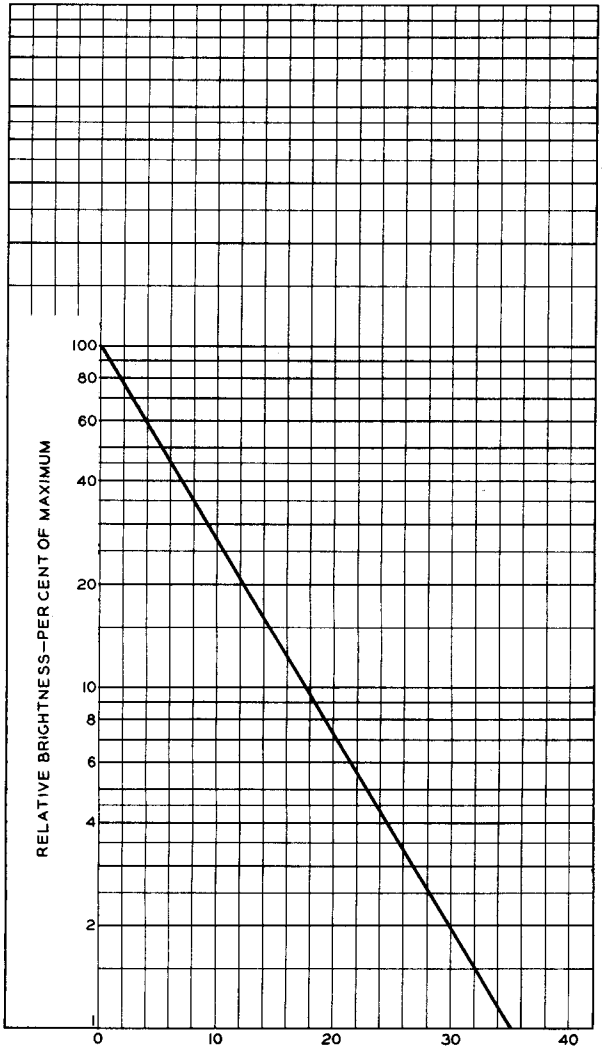


MAY 2,1949

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-5559R2

PERSISTENCE CHARACTERISTIC OF PHOSPHOR Nº 5

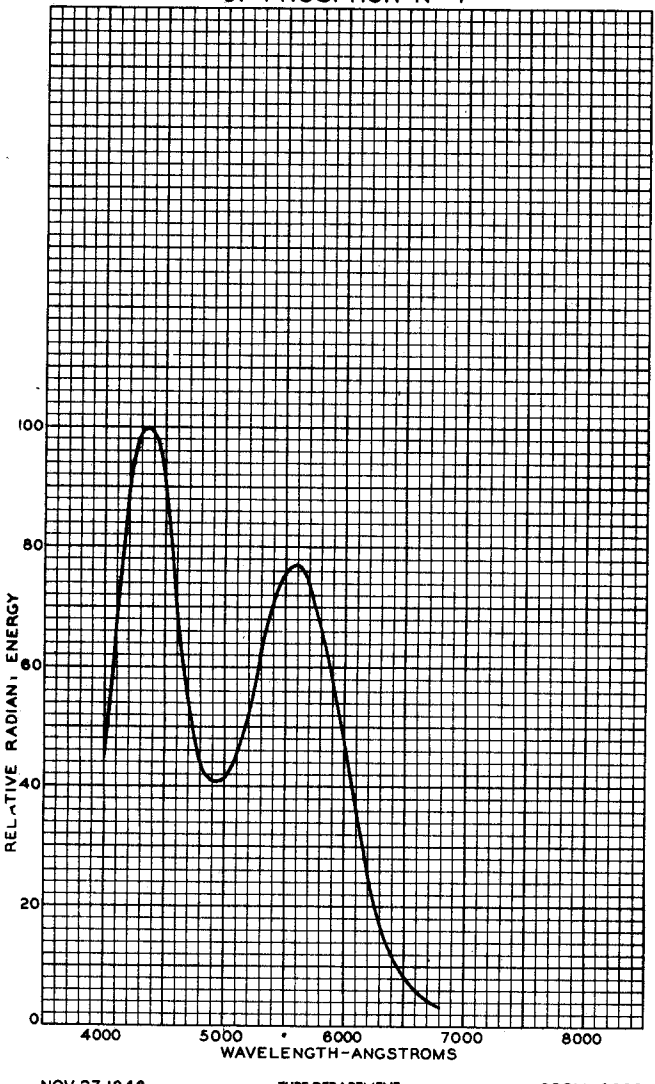


MAY 3, 1949

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7266

SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR Nº 7



NOV. 27, 1946

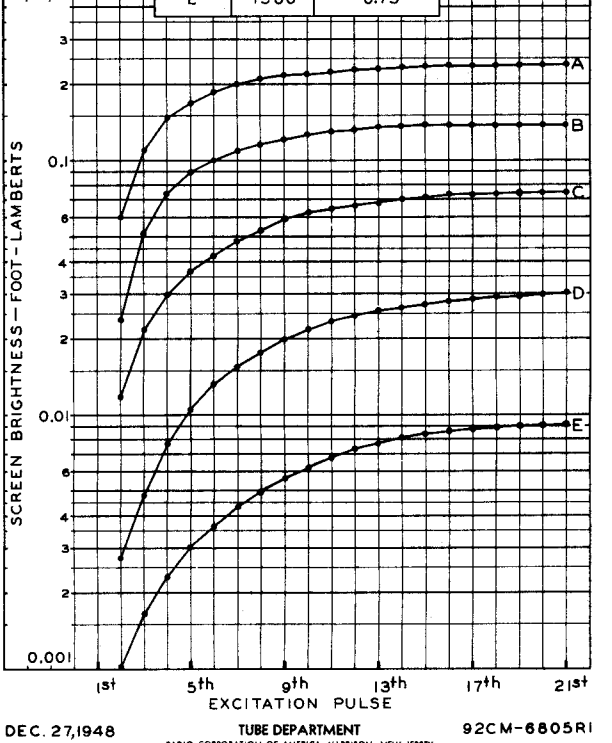
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6809

BUILDUP CHARACTERISTICS OF PHOSPHOR Nº7

SCANNING AREA: 2"x 2"
NUMBER OF LINES: 200
EXCITATION: PULSE OF 1/60 SEC. DURATION SUPPLIED TO GRID Nº1 OF CATHODE-RAY TUBE AT 1 SEC. INTERVALS FOR EACH OF THE LOCI UNDER THE INDICATED CONDITIONS
BRIGHTNESS: MEASURED JUST BEFORE EACH EXCITATION PULSE

LOCUS	FINAL ANODE VOLTS	SCREEN MICROAMP/ SQ.CM.
A	4000	3.0
B	4000	1.5
C	2500	1.5
D	2500	0.75
E	1500	0.75

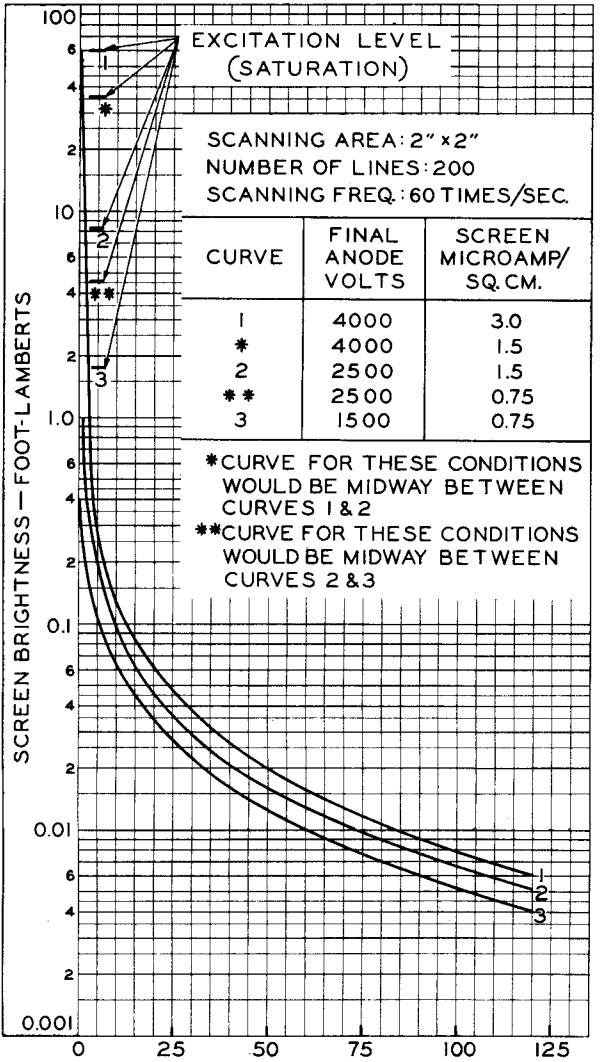


DEC. 27, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6805R1

PERSISTENCE CHARACTERISTICS OF PHOSPHOR Nº7



JAN. 7, 1949

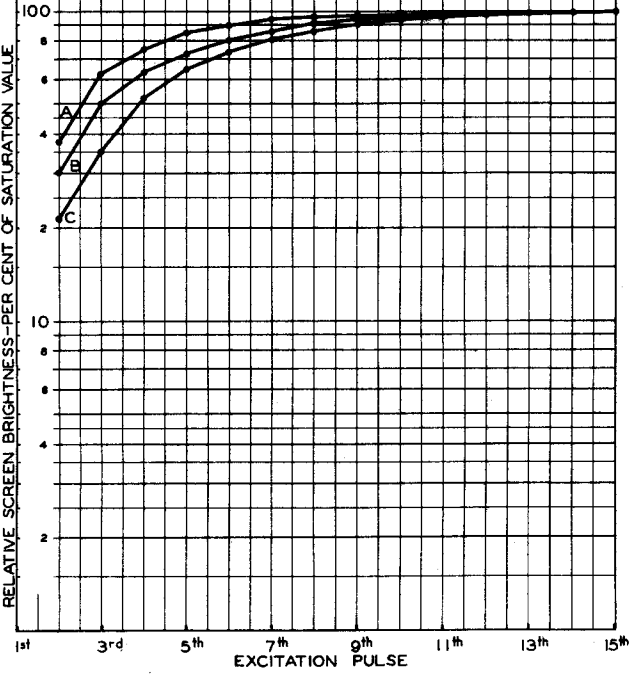
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CL-6804RI

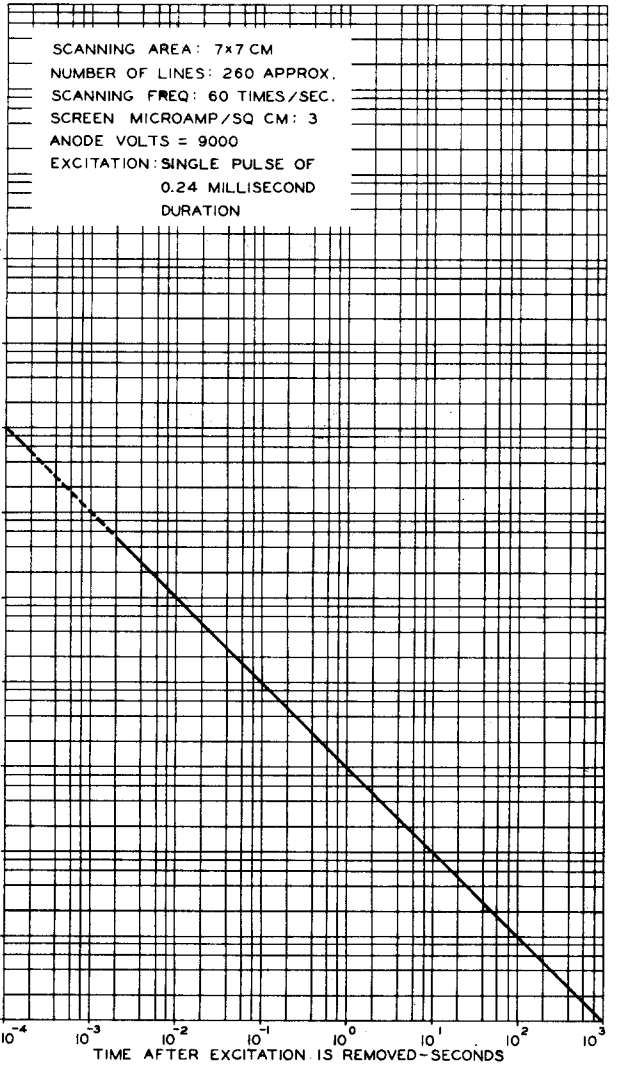
BUILDUP OF PHOSPHOR Nº 7

SCANNING AREA: 7 x 7 CM
NUMBER OF LINES: 260 APPROX.
ANODE VOLTS = 9000
EXCITATION: PULSE OF 1/60 SEC. DURATION SUPPLIED TO GRID Nº 1 OF CATHODE-RAY TUBE AT 1 SEC. INTERVALS FOR EACH OF THE LOCI UNDER THE INDICATED CONDITIONS
BRIGHTNESS: MEASURED JUST BEFORE EACH EXCITATION PULSE

LOCUS	SCREEN MICROAMP/ SQ. CM.
A	3.0
B	1.5
C	0.75



PERSISTENCE CHARACTERISTIC OF PHOSPHOR No 7

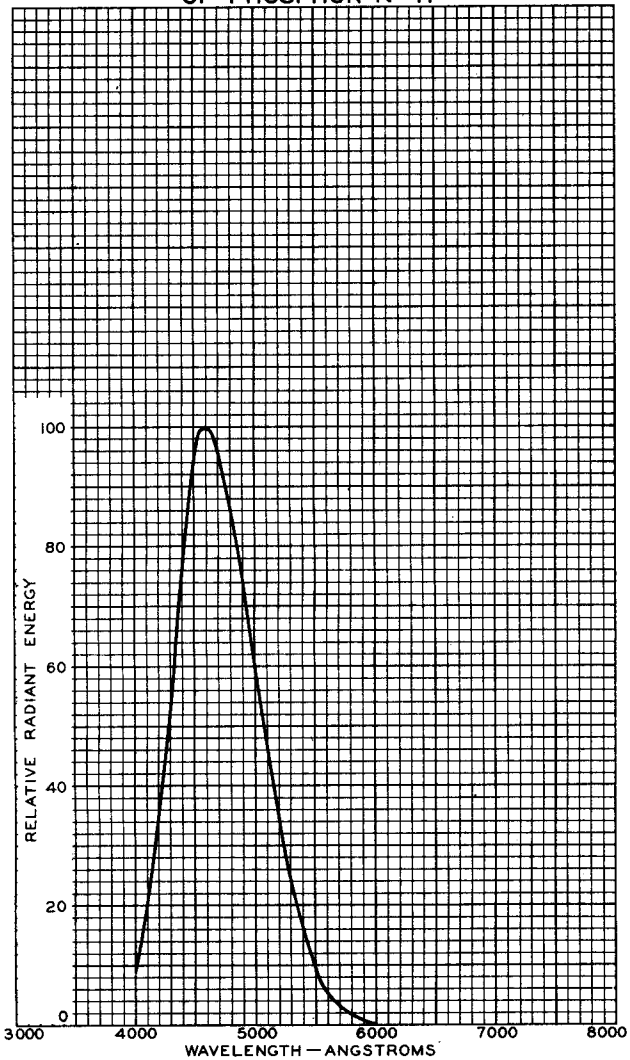


SEPT. 30, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7015R1

SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR Nº 11

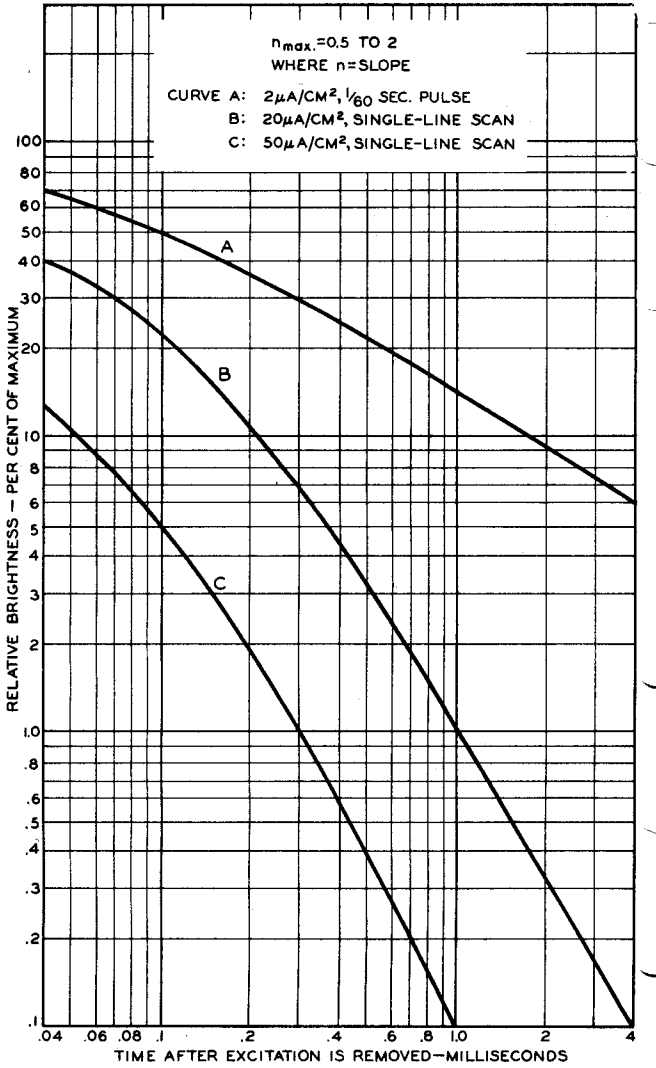


APRIL 9, 1946

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6749

PERSISTENCE CHARACTERISTICS OF PHOSPHOR No. 11

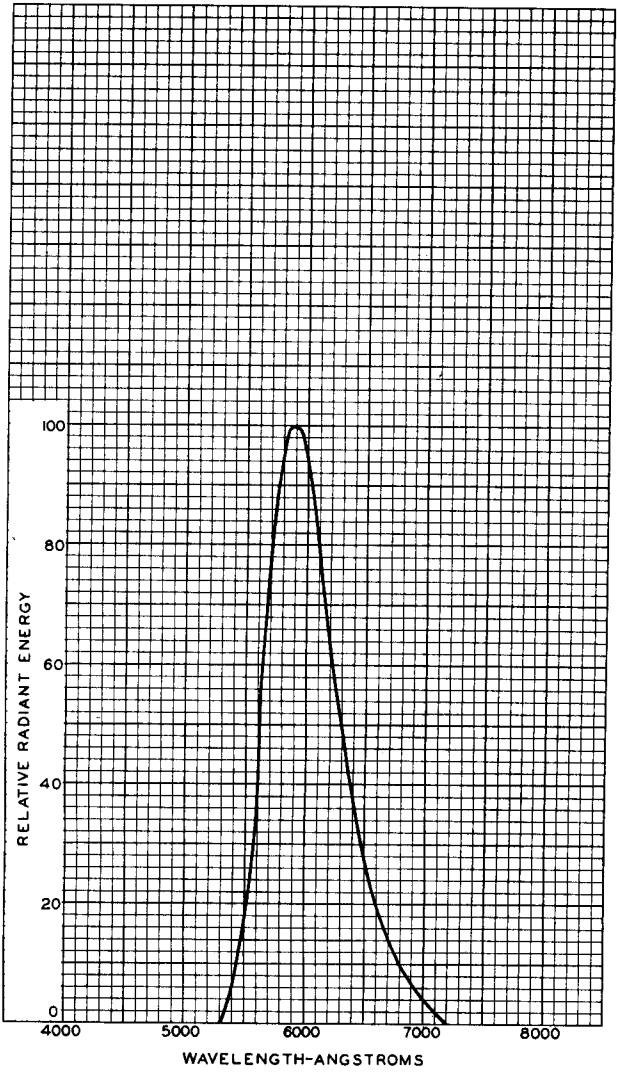


JULY 7, 1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6806R2

SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR P12

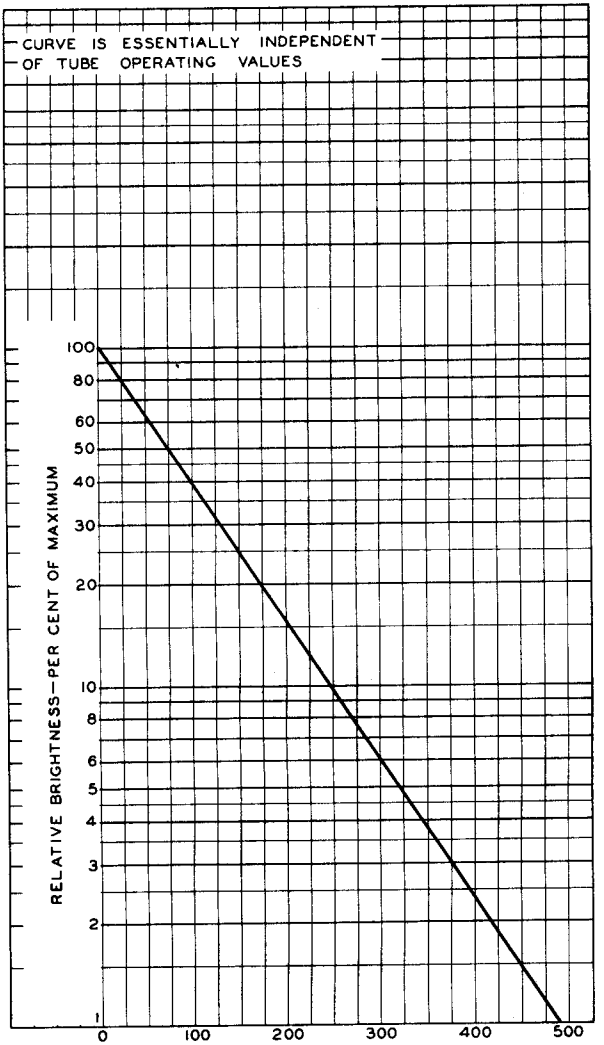


JULY 18, 1949

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7317

PERSISTENCE CHARACTERISTIC OF PHOSPHOR P12

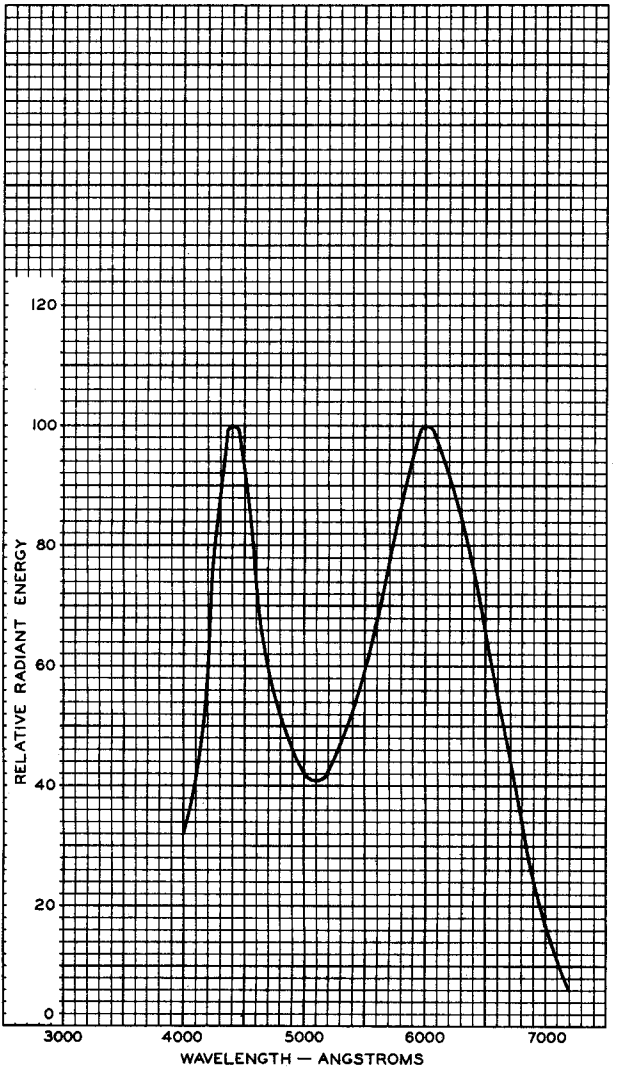


FEB. 1, 1951

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7318RI

SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR P14

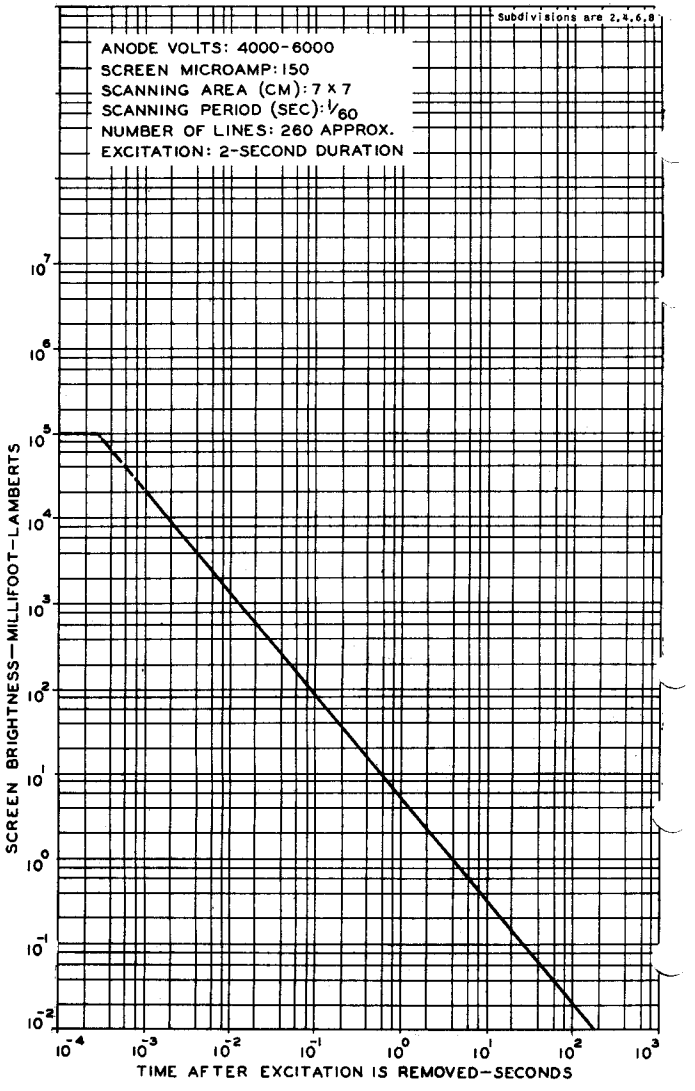


AUG. 1, 1951

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7675

PERSISTENCE CHARACTERISTIC OF PHOSPHOR P14

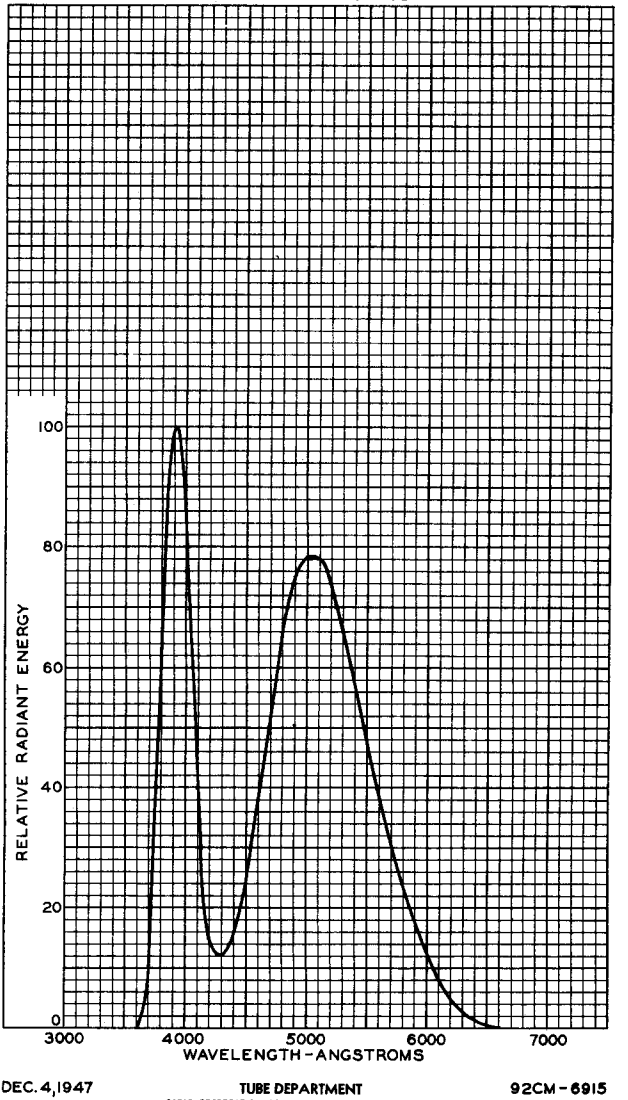


JAN. 26, 1951

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7326RI

SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR Nº15

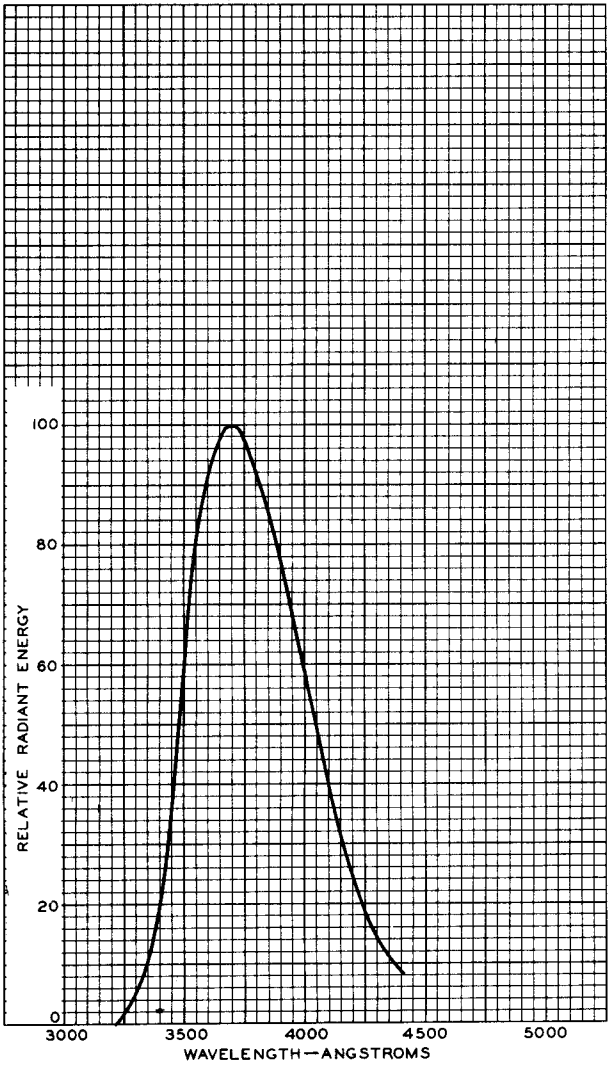


DEC. 4, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6915

SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR Nº 16

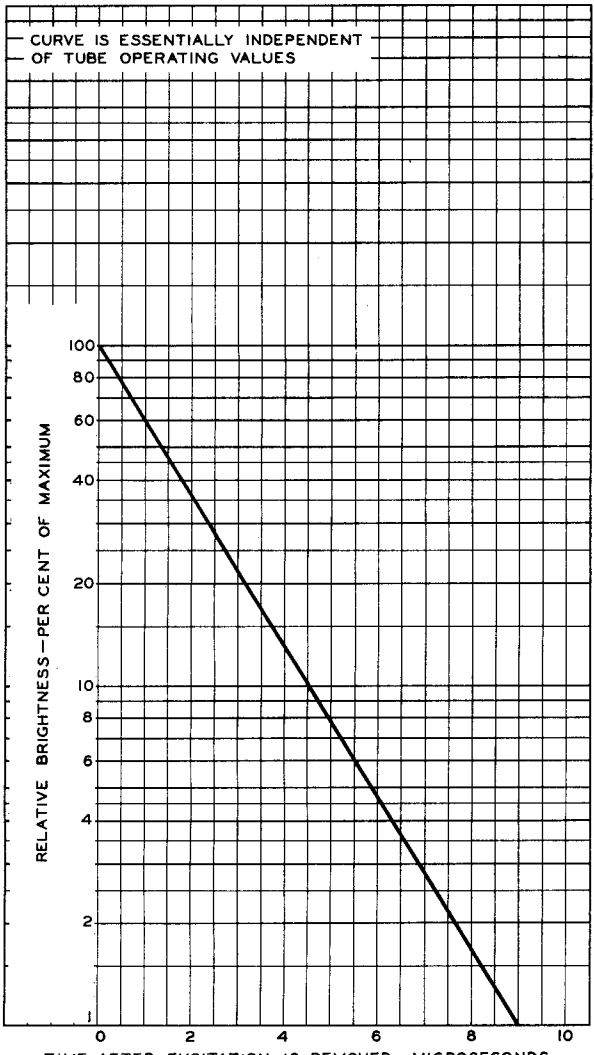


OCT. 30, 1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7563

PERSISTENCE CHARACTERISTIC OF PHOSPHOR Nº 16

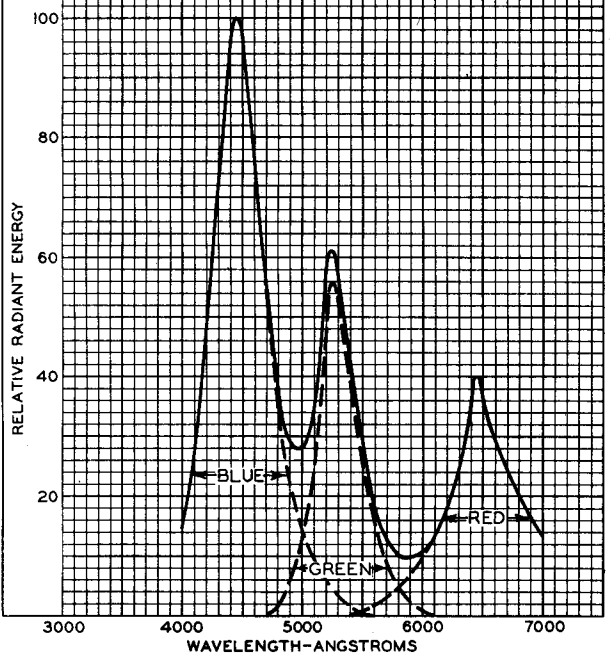


OCT. 30, 1950 TUBE DEPARTMENT 92CM-7564
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF GROUP PHOSPHOR P22

EQUAL EXCITATION OF EACH PHOSPHOR

PHOSPHOR	RANGE OF MAX. VALUE ANGSTROMS
BLUE EMITTING	4420 TO 4520
GREEN EMITTING	5230 TO 5270
RED EMITTING	6360 TO 6580



JAN. 14, 1954

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7969R2

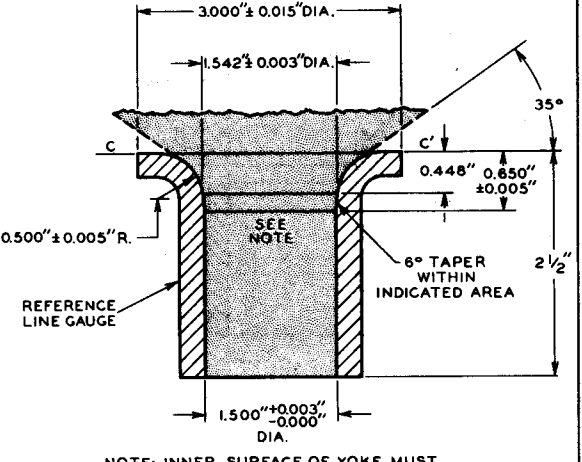
PERSISTENCE CHARACTERISTIC OF GROUP PHOSPHOR P22

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.

REFERENCE-LINE GAUGE

JETEC Nº 110

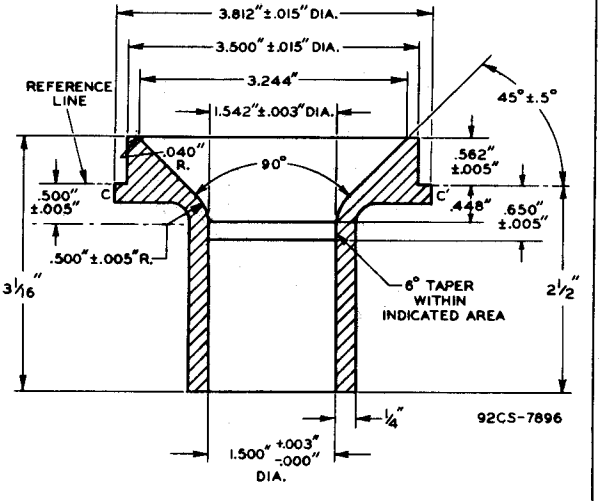
With Supplementary Information on Recommended Inside Contour of Yoke to Provide Proper Location of Yoke on Neck-Funnel Section.



NOTE: INNER SURFACE OF YOKE MUST NOT EXTEND INTO SHADED REGION

92CS-7391

REFERENCE-LINE GAUGE
JETEC Nº 116



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

X-RAY PRECAUTIONS
FOR CATHODE-RAY TUBES

WARNING

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

Above 16 kilovolts, special shielding precautions for x-ray radiation may be necessary.

REFERENCES

1. *"Medical X-ray Protection Up To Two Million Volts"*, National Bureau of Standards Handbook H41.
2. *"Safety Code for Industrial Use of X-rays"*, American Standards Association. ASA Code Z54. 1-1946.

2AP1-A

HIGH-VACUUM CATHODE-RAY TUBE

Supersedes Type 2AP1

General:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.6	amp.
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	8.0	μμf
Cathode to All Other Electrodes	5.5	μμf
DJ_1 to DJ_2	0.6	μμf
DJ_3 to DJ_4	1.1	μμf
DJ_1 to All Other Electrodes	8.5	μμf
DJ_3 to All Other Electrodes	9.0	μμf
DJ_1 to All Other Electrodes except DJ_2	8.0	μμf
DJ_2 to All Other Electrodes except DJ_1	4.6	μμf
DJ_3 to All Other Electrodes except DJ_4	7.5	μμf
DJ_4 to All Other Electrodes except DJ_3	6.0	μμf
Phosphor (For Curves, see front of this Section)		No.1
Fluorescence		Green
Persistence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		7-7/16" ± 3/16"
Greatest Diameter of Bulb		2" ± 1/16"
Minimum Useful Screen Diameter		1-3/4"
Mounting Position		Any
Base		Small Shell Magnal 11-Pin
Basing Designation for BOTTOM VIEW		11L

Pin 1 – Heater
Pin 2 – Cathode
Pin 3 – Deflecting Electrode DJ_1
Pin 4 – Anode No.1
Pin 5 – No Connection
Pin 6 – Deflecting Electrode DJ_4
Pin 7 – Anode No.2, Grid No.2

Pin 8 – Deflecting Electrode DJ_2
Pin 9 – Deflecting Electrode DJ_3
Pin 10 – Grid No.1
Pin 11 – Heater

DJ_1 and DJ_2 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 4. With DJ_3 positive with respect to DJ_4, the spot is deflected toward pin 1.

The angle between the trace produced by DJ_3 and DJ_4 and its intersection with the plane through the tube axis and pin 1 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° ± 4°.

2API-A

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

Maximum Ratings, *Absolute Values*:

ANODE-No.2 & GRID-No.2 VOLTAGE	1100 *max.*		volts
ANODE-No.1 VOLTAGE	550 *max.*		volts
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:			
Negative Value	125 *max.*		volts
Positive Value	0 *max.*		volts
PEAK VOLTAGE BETWEEN ANODE No.2 AND ANY DEFLECTING ELECTRODE	660 *max.*		volts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	125 *max.*		volts
Heater positive with respect to cathode	10 *max.*		volts

Typical Operation:

Anode-No.2 & Grid-No.2 Voltage★	500	1000	volts
Anode-No.1 Voltage for Focus at 75% of Grid-No.1 Voltage 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:			
DJ_1 and DJ_2	0.220	0.110	mm/v dc
DJ_3 and DJ_4	0.260	0.130	mm/v dc
Deflection Factor:**			
DJ_1 and DJ_2	115	230	v dc/in.
DJ_3 and DJ_4	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 adjustable 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. Suitable test conditions are: anode-No.2 voltage, 1000 volts; anode-No.1 voltage, adjusted for focus; deflecting-electrode resistors, 1 megohm each, connected to anode No.2; the tube shielded from all extraneous fields. To avoid damage to the tube, grid-No.1 voltage should be near cutoff before application of anode voltages.

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 *max.*	megohms
Impedance of Any Deflecting-Electrode Circuit at Heater-Supply Frequency	1.0 *max.*	megohm

2API-A

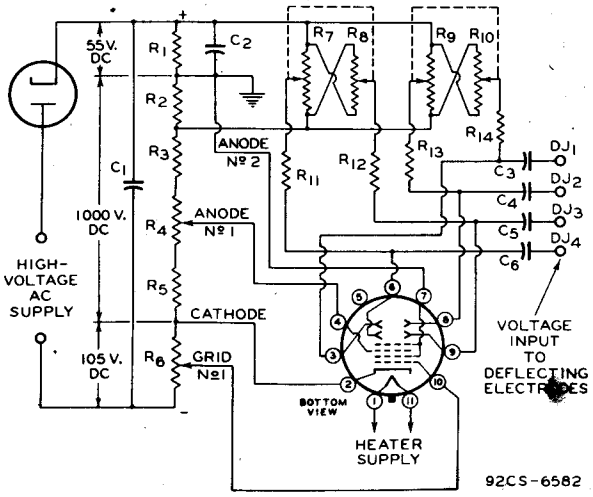
HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

Resistance in Any Deflecting-Electrode Circuit▲▲ 5.0 *max.* megohms

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

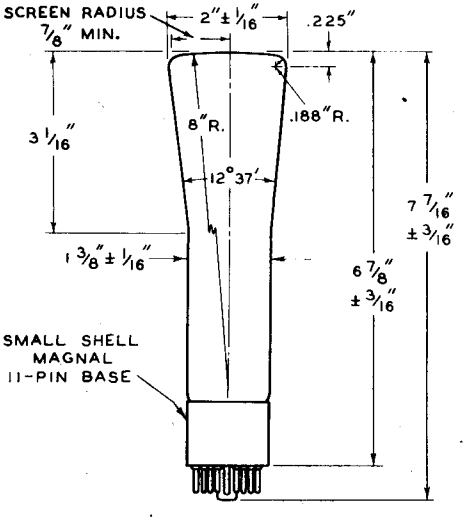
TYPICAL OSCILLOGRAPH CIRCUIT



C1: 0.1 μf
C2: 1.0 μf
C3 C4 C5 C6: 0.05-μf Blocking Capacitor*
R1 R2: 0.5 Megohm
R3: 3.0 Megohms
R4: 1.0-Megohm Potentiometer
R5: 0.5 Megohm
R6: 0.5-Megohm Potentiometer
R7 R8: Dual 5-Megohm Potentiometer
R9 R10: Dual 5-Megohm Potentiometer
R11 R12 R13 R14: 2 Megohms

*When cathode is grounded, capacitors should have high voltage rating; when anode No.2 is grounded, they may have low voltage rating. For dc amplifier service, deflecting electrodes should be connected direct to amplifier output. In this service, it is preferable usually to remove deflecting-electrode resistors to minimize loading effect on amplifier. In order to minimize spot defocusing, it is essential that anode No.2 be returned to a point in the amplifier system which will give the lowest possible potential difference between anode No.2 and the deflecting electrodes.

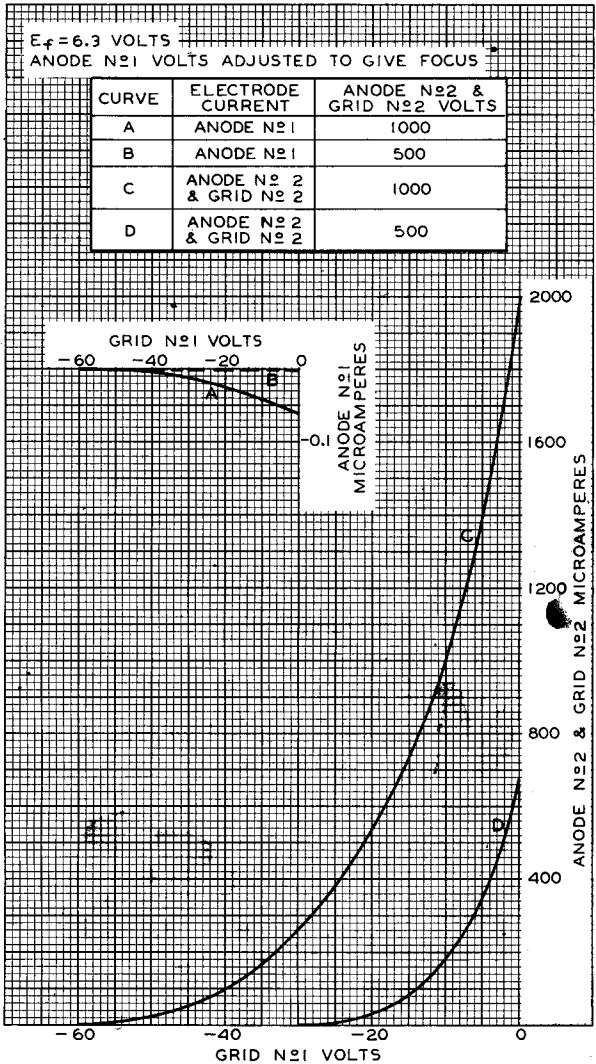
2API-A
HIGH-VACUUM CATHODE-RAY TUBE



℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE

2API-A

AVERAGE CHARACTERISTICS



2BP1
OSCILLOGRAPH TUBE

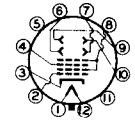
ELECTROSTATIC FOCUS — ELECTROSTATIC DEFLECTION

DATA

General:

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	8	μμf
DJ_1 to DJ_2	2	μμf
DJ_3 to DJ_4	2	μμf
DJ_1 to All Other Electrodes	11	μμf
DJ_2 to All Other Electrodes	8	μμf
DJ_3 to All Other Electrodes	7	μμf
DJ_4 to All Other Electrodes	8	μμf ←
Phosphor (For Curves, see front of this Section)		No.1
Fluorescence		Green
Persistence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		7-5/8" ± 3/16"
Greatest Diameter of Bulb		2" ± 1/16"
Minimum Useful Screen Diameter		1-3/4"
Mounting Position		Any
Base		Small-Shell Duodecal 12-Pin
Basing Designation for BOTTOM VIEW		12E

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 3 – Cathode
Pin 4 – Anode No.1
Pin 5 – Internal Connection—Do Not Use
Pin 6 – Deflecting Electrode DJ_3
Pin 7 – Deflecting Electrode DJ_4



Pin 8 – Anode No.2, Grid No.2
Pin 9 – Deflecting Electrode DJ_2
Pin 10 – Deflecting Electrode DJ_1
Pin 11 – Internal Connection—Do Not Use
Pin 12 – Heater

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 plane through the tube axis and pin No.4 may vary from the trace produced by DJ1 and DJ2 by an angular tolerance (measured about the tube axis) of 10°.

The angle between DJ1 – DJ2 trace and DJ3 – DJ4 trace is 90° ± 3°.

← Indicates a change.

RCA

2BP1

OSCILLOGRAPH TUBE

Maximum Ratings, *Design-Center Values:*

ANODE-No.2● VOLTAGE	2500 max.	volts
ANODE-No.1 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 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

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 E_{b_2}	volts
→ Max. Grid-No.1 Voltage for Visual Cutoff	6.75% of E_{b_2}	volts
Max. Anode-No.1 Current Range	−15 to +10	microamperes
Deflection Factors:		
DJ_1 & DJ_2	115 to 155	v dc/in./kv of E_{b_2}
DJ_3 & DJ_4	74 to 100	v dc/in./kv of E_{b_2}
→ 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:			
DJ_1 & DJ_2	115 – 155	230 – 310	volts dc/in.
DJ_3 & DJ_4	74 – 100	148 – 200	volts dc/in.

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms
Resistance in Any Deflecting-Electrode Circuit○	5.0 max.	megohms

* Brilliance and definition decrease with decreasing anode-No.2 voltage. A value as low as 500 volts is recommended only for low-velocity deflection and low room-light levels.

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

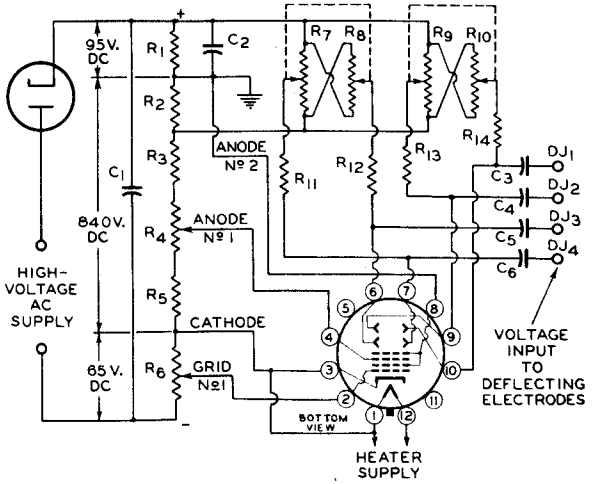
● Anode No.2 and grid No.2 which are connected together within tube, are referred to herein as anode No.2. The product of anode-No.2 voltage and average anode-No.2 current should be limited to 6 watts.

□ 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.

→ Indicates a change.

2BP1
OSCILLOGRAPH TUBE

TYPICAL OSCILLOGRAPH CIRCUIT



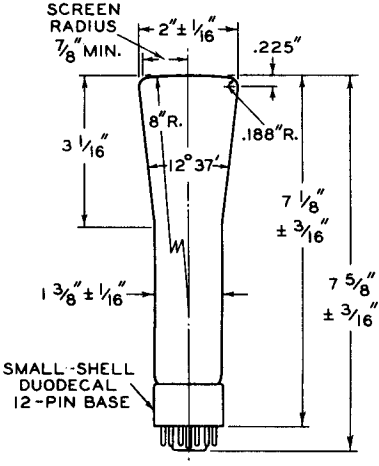
92CM-6777R1

C1: 0.2 μf
C2: 1.0 μf
C3 C4 C5 C6: 0.05-μf Blocking Capacitors*
R1 R2: 2.5 Megohms, 0.5 Watt
R3: 2.5 Megohms, 1 Watt
R4: 1.0-Megohm Potentiometer
R5: 0.5 Megohm, 0.5 Watt
R6: 0.35 Megohm, 0.5 Watt
R7 R8: Dual 5-Megohm Potentiometer
R9 R10: Dual 5-Megohm Potentiometer
R11 R12 R13 R14: 2 Megohms, 0.5 Watt

* When cathode is grounded, capacitors should have high voltage rating; when anode No.2 is grounded, they may have low voltage rating. For dc amplifier service, deflecting electrodes should be connected direct to amplifier output. In this service, it is preferable usually to remove deflecting-electrode resistors to minimize loading effect on amplifier. In order to minimize spot defocusing, it is essential that anode No.2 be returned to a point in the amplifier system which will give the lowest possible potential difference between anode No.2 and the deflecting electrodes.

2BP1

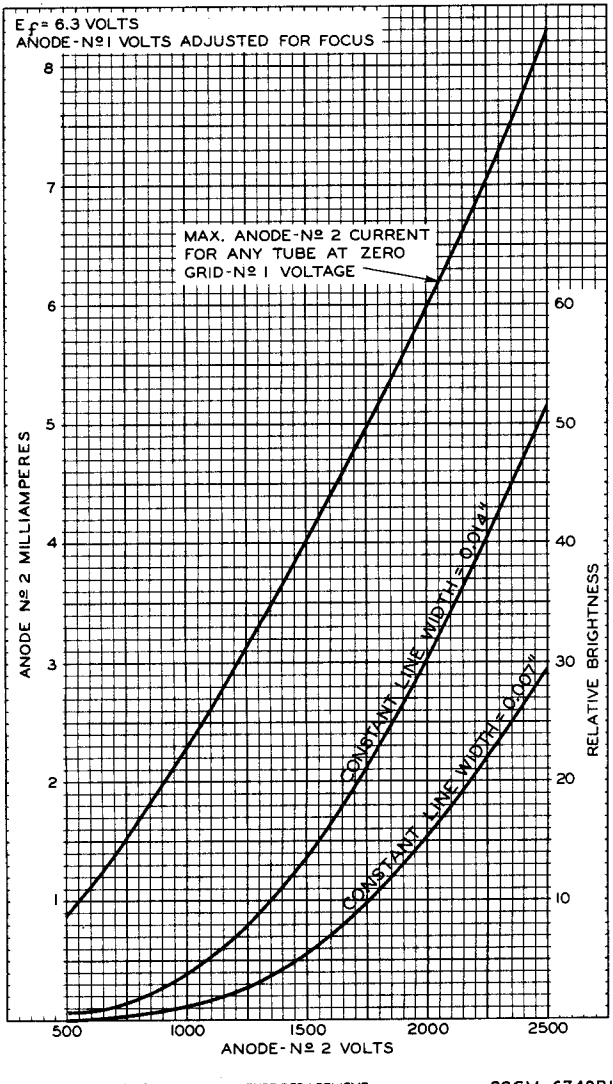
OSCILLOGRAPH TUBE



℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

92CS-6689

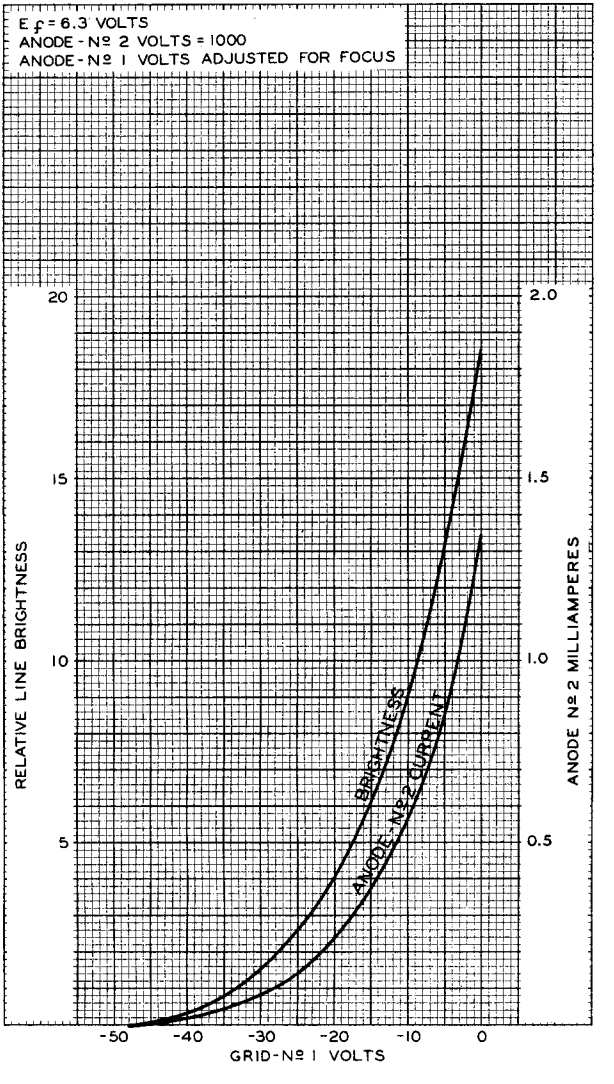
2BP1
CHARACTERISTICS



RCA

2BP1

AVERAGE CHARACTERISTICS



2BP11

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

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

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

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

2F21
MONOSCOPE

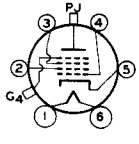
5-INCH MAGNETIC-DEFLECTION TYPE

Supersedes Type 1899

General:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	7	μμf
Pattern Electrode to Grid No.4	5	μμf
Pattern:		
Type	See illustration on next page	
Dimensions (Approx.)	2-5/16" x 3-1/16"	
Calibration	Up to 500 lines	
Focusing Method	Electrostatic	
Deflection Method	Magnetic	
Maximum Solid Deflection Angle	40°	
Overall Length	12-7/16" + 1/4" - 7/16"	
Greatest Diameter of Bulb	5-1/16" max.	
Caps (Two)	Recessed Small Ball	
Mounting Position	Any	
Base	Long-Shell Medium 6-Pin	
Basing Designation for BOTTOM VIEW	6BV	

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



Pin 6 - Heater
End Cap - Pattern Electrode
Side Cap - Grid No.4

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

PATTERN-ELECTRODE VOLTAGE	1500 max.	volts
GRID-No.4 (COLLECTOR) VOLTAGE	1500 max.	volts
GRID-No.3 (FOCUSING ELECTRODE) VOLTAGE	600 max.	volts
GRID-No.2 (ACCELERATING ELECTRODE) VOLT.	1600 max.	volts
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:		
Negative Bias Value	125 max.	volts
Positive Bias Value	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

Typical Operation: ❡

Pattern-Electrode Voltage	1000	volts
Grid-No.4 Voltage	1050	volts
Grid-No.3 Voltage for Focus at 0.5 μamp Grid-No.4 Current▲	300 approx.	volts
Grid-No.2 Voltage	1000	volts
Grid-No.1 Voltage for Visual Cutoff on Monitor#	-50 approx.	volts
Internal Resistance between Grid No.4 and Pattern Electrode	Greater than 1 meg.	
Grid-No.4 Current	0.5	μamp

❡, ▲, #: See next page.

2F21

2F21
MONOSCOPE

Pattern-Electrode Signal Current (Peak-to-Peak)		0.5 approx. μamp
Resolution Capability▲▲	. . . . .	500 . . . lines
Maximum Circuit Value:		
Grid-No.1-Circuit Resistance	. . . . .	1.5 max. megohms

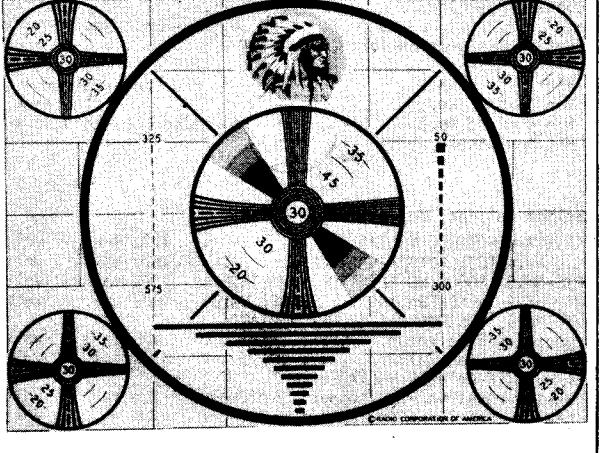
▲ Individual tubes may require between + 20% and − 20% of these values.

† Deflection must be maintained at all times. When scanned area does not cover entire pattern, the beam current should be reduced accordingly and time of operation limited to prevent damaging the pattern.

Supply should be adjustable between + 40% and − 80% of this value.

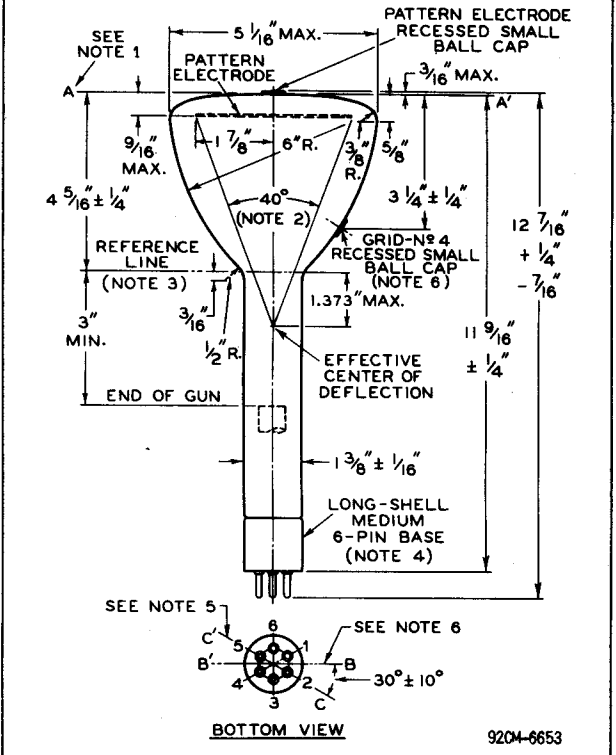
▲▲ With full scanning.

PATTERN



92CS-6665

2F21
MONOSCOPE



BOTTOM VIEW

920M-6653

NOTE 1: LINE AA' IS PERPENDICULAR TO THE AXIS OF THE TUBE AND INTERSECTS THE FACE CONTOUR 1/2" FROM THE AXIS OF THE TUBE.

NOTE 2: DEFLECTION ANGLE BETWEEN DIAGONALLY OPPOSITE CORNERS OF PATTERN.

NOTE 3: REFERENCE LINE IS DETERMINED BY POSITION WHERE GAUGE 1.438" ± .003 I.D. AND 2" LONG WILL REST ON BULB CONE.

NOTE 4: ℄ 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 5: MINOR AXIS OF PATTERN ELECTRODE MAY VARY FROM PLANE CC' THROUGH PIN 2 AND TUBE AXIS BY 10°. TOP EDGE OF PATTERN IS ON SAME SIDE OF TUBE AS PIN 5.

NOTE 6: BB' INDICATES PLANE THROUGH TUBE AXIS AND GRID-No.4 TERMINAL.

3API-A
OSCILLOGRAPH TUBE

GENERAL DATA
except for those on the phosphor as indicated below,
MAXIMUM RATINGS, TYPICAL OPERATION, OUTLINE,
and
AVERAGE CHARACTERISTICS CURVES
(Anode-No.2 & Grid-No.2 Microamperes vs Grid-No.1 Volts)
for the 3API-A
are the same as those for Type 908-A.

Phosphor (For Curves, see front of this Section)	No.1
Fluorescence	Green
Persistence	Medium

3BP1-A

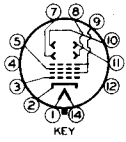
HIGH-VACUUM CATHODE-RAY TUBE

Supersedes Type 3BP1

General:

Heater, for Unipotential Cathode:			
Voltage	6.3 ± 10%		ac or dc volts
Current	0.6		amp.
Direct Interelectrode Capacitances (Approx.):			
Grid No.1 to All Other Electrodes	8.5		μμf
Cathode to All Other Electrodes	8.0		μμf
DJ_1 to DJ_2	2.0		μμf
DJ_3 to DJ_4	2.0		μμf
DJ_1 to All Other Electrodes	8.0		μμf
DJ_3 to All Other Electrodes	6.0		μμf
DJ_1 to All Other Electrodes except DJ_2	6.0		μμf
DJ_2 to All Other Electrodes except DJ_1	5.0		μμf
DJ_3 to All Other Electrodes except DJ_4	4.0		μμf
DJ_4 to All Other Electrodes except DJ_3	6.0		μμf
Phosphor (For Curves, see front of this Section)			No.1
Fluorescence			Green
Persistence			Medium
Focusing Method			Electrostatic
Deflection Method			Electrostatic
Overall Length			10" ± 1/4"
Greatest Diameter of Bulb			3" ± 1/16"
Minimum Useful Screen Diameter			2-3/4"
Mounting Position			Any
Base	Medium Shell Diheptal 12-Pin		
Basing Designation for BOTTOM VIEW			14G

Pin 1 – Heater
Pin 2 – Cathode
Pin 3 – Grid No.1
Pin 4 – Internal Con. Do Not Use
Pin 5 – Anode No.1
Pin 7 – Deflecting Electrode DJ_3
Pin 8 – Deflecting Electrode DJ_4



KEY

Pin 9 – Anode No.2, Grid No.2
Pin 10 – Deflecting Electrode DJ_2
Pin 11 – Deflecting Electrode DJ_1
Pin 12 – No Conn.
Pin 14 – Heater

DJ_1 and DJ_2 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 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°.

The angle between the trace produced by DJ_3 and DJ_4 and the trace produced by DJ_1 and DJ_2 is 90° ± 3°.

Maximum Ratings, *Abolute Values*:

ANODE-No.2 & GRID-No.2 VOLTAGE	2200 *max.*	volts
ANODE-No.1 VOLTAGE	1100 *max.*	volts

3BP1-A
HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:			
Negative Value.		200 *max.*	volts
Positive Value.		0 *max.*	volts
PEAK VOLTAGE BETWEEN ANODE No.2 AND ANY DEFLECTING ELECTRODE		550 *max.*	volts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode		125 *max.*	volts
Heater positive with respect to cathode		10 *max.*	volts

Typical Operation:

Anode-No.2 & Grid-No.2 Voltage■	1500	2000	volts
Anode No.1 Voltage for Focus at 75% of Grid-No.1 Voltage for Cutoff● .	430	575	volts
Grid-No.1 Volt. for Visual Cutoff#	−45	−60	volts
Max. Anode-No.1 Current Range▲	Between −50 and +10		μamp.
Deflection Sensitivity:			
DJ_1 and DJ_2	0.169	0.127 . .	mm/v dc
DJ_3 and DJ_4	0.229	0.172 . .	mm/v dc
Deflection Factor:**			
DJ_1 and DJ_2	150	200 . .	v dc/in.
DJ_3 and DJ_4	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 adjustable 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 15-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. Suitable test conditions are: anode-No.2 voltage, 1500 volts; anode-No.1 voltage, adjusted for focus; deflecting-electrode resistors, 1 megohm each, connected to anode No.2; the tube shielded from all extraneous fields. To avoid damage to the tube, grid-No.1 voltage should be near cutoff before application of anode voltages.

Maximum Circuit Values:

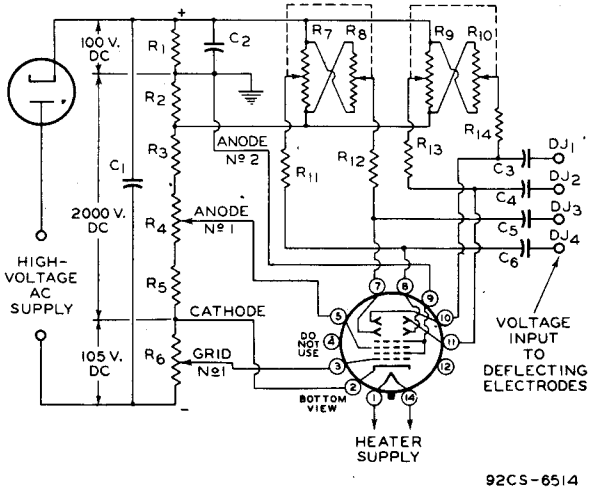
Grid-No.1-Circuit Resistance	1.5 *max.*	megohms
Impedance of Any Deflecting-Electrode Circuit at Heater-Supply Frequency	1.0 *max.*	megohm
Resistance in Any Deflecting-Electrode Circuit▲▲	5.0 *max.*	megohms

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

3BP1-A

HIGH-VACUUM CATHODE-RAY TUBE

TYPICAL OSCILLOGRAPH CIRCUIT

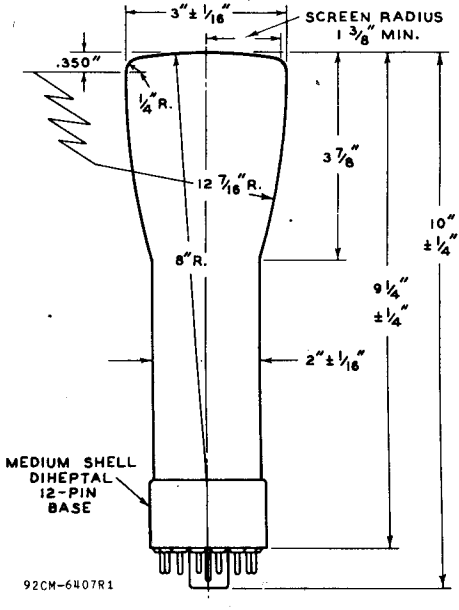


C1: 0.1 μf
C2: 1.0 μf
C3 C4 C5 C6: 0.05-μf Blocking Capacitors*
R1 R2: 2 Megohms
R3: 5.5 Megohms
R4: 2-Megohm Potentiometer
R5: 1.5 Megohms
R6: 0.5-Megohm Potentiometer
R7 R8: Dual 5-Megohm Potentiometer
R9 R10: Dual 5-Megohm Potentiometer
R11 R12 R13 R14: 2 Megohms

* When cathode is grounded, capacitors should have high voltage rating; when anode No.2 is grounded, they may have low voltage rating. For dc amplifier service, deflecting electrodes should be connected direct to amplifier output. In this service, it is preferable usually to remove deflecting-electrode resistors to minimize loading effect on amplifier. In order to minimize spot defocusing, it is essential that anode No.2 be returned to a point in the amplifier system which will give the lowest possible potential difference between anode No.2 and the deflecting electrodes.

3BP1-A

HIGH-VACUUM CATHODE-RAY TUBE



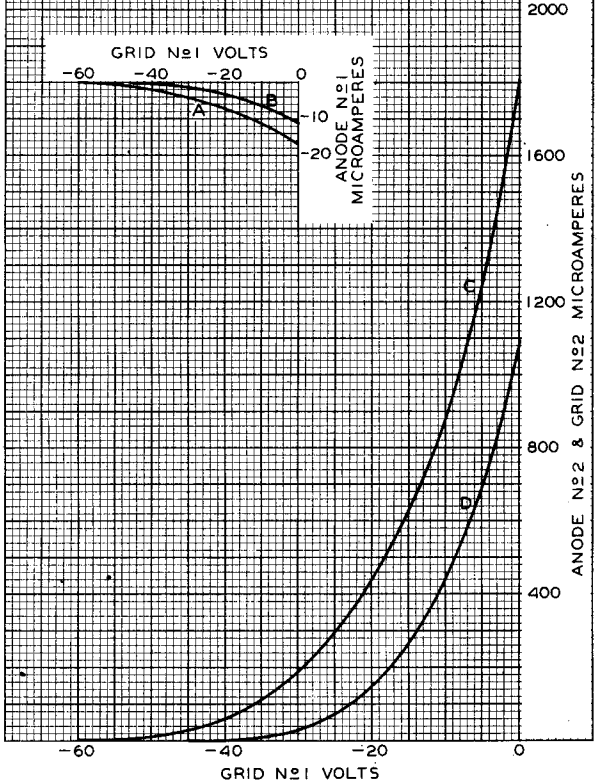
℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE

3BP1-A

AVERAGE CHARACTERISTICS

$E_f = 6.3$ VOLTS
ANODE №1 VOLTS ADJUSTED TO GIVE FOCUS

CURVE	ELECTRODE CURRENT	ANODE №2 & GRID №2 VOLTS
A	ANODE № 1	2000
B	ANODE № 1	1500
C	ANODE № 2 & GRID № 2	2000
D	ANODE № 2 & GRID № 2	1500



RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

3JP1

OSCILLOGRAPH TUBE

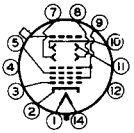
POST-DEFLECTION ACCELERATOR
ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

DATA

General:

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	8	μμf
Cathode to All Other Electrodes	8	μμf
DJ_1 to DJ_2	2.5	μμf
DJ_3 to DJ_4	2	μμf
DJ_1 to All Other Electrodes	8	μμf
DJ_2 to All Other Electrodes	7	μμf
DJ_3 to All Other Electrodes	7	μμf
DJ_4 to All Other Electrodes	8	μμf
Phosphor (For Curves, see front of this Section)		P1
Fluorescence and Phosphorescence		Green
Persistence of Phosphorescence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		10" ± 1/4"
Greatest Diameter of Bulb		3" ± 1/16"
Minimum Useful Screen Diameter		2-3/4"
Mounting Position		Any
Cap		Recessed Small Ball (JETEC No.J1-22)
Base		Medium-Shell Diheptal 12-Pin (JETEC No.B12-37)
Basing Designation for BOTTOM VIEW		$14J_1$

Pin 1 - Heater
Pin 2 - Cathode
Pin 3 - Grid No.1
Pin 4 - Internal Connection - Do Not Use
Pin 5 - Anode No.1
Pin 7 - Deflecting Electrode DJ_3
Pin 8 - Deflecting Electrode DJ_4
Pin 9 - Anode No.2, Grid No.2
Pin 10 - Deflecting Electrode DJ_2
Pin 11 - Deflecting Electrode DJ_1
Pin 12 - No Connection
Pin 14 - Heater Cap - Anode No.3



DJ_1 and DJ_2 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, 10°; Cap (on same side of tube as pin 5), 10°.

The angle between $DJ_1 - DJ_2$ trace and $DJ_3 - DJ_4$ trace is $90° \pm 3°$.

3JP1

3JP1

OSCILLOGRAPH TUBE

Maximum Ratings, *Design-Center Values*:

ANODE-No.3 VOLTAGE	4000 max.	volts
ANODE-No.2□ VOLTAGE	2000 max.	volts
RATIO OF ANODE-No.3 VOLTAGE TO ANODE-No.2 VOLTAGE	2.3 : 1 max.	
ANODE-No.1 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 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

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 Eb_2	volts
Grid-No.1 Voltage†	1.5% to 4.5% of Eb_2	volts
Anode-No.1 Current for any Operating Condition	−50 to +10	μamp
Deflection Factors:		
When $Eb_3 = 2 \times Eb_2$		
DJ_1 & DJ_2	85 to 115	v dc/in./kv of Eb_2
DJ_3 & DJ_4	62.5 to 85	v dc/in./kv of Eb_2
When $Eb_3 = Eb_2$		
DJ_1 & DJ_2	68 to 92	v dc/in./kv of Eb_2
DJ_3 & DJ_4	50 to 68	v dc/in./kv of Eb_2
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 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.

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 DJ_1 and DJ_2.

†: See next page.

3JP1

OSCILLOGRAPH TUBE

Examples of Use of Design Ranges:

For anode-No.3 voltage of	*2000*	*3000*	*4000*	*volts*
and anode-No.2 voltage of	*2000*	*1500*	*2000*	*volts*
Anode-No.1 Volt.	400 to 690	300 to 515	400 to 690	volts
Grid-No.1 Volt.†	-30 to -90	22.5 to -67.5	-30 to -90	volts
Deflection Factors:				
DJ_1 & DJ_2. . . .	136 to 184	127 to 173	170 to 230	■
DJ_3 & DJ_4. . . .	100 to 136	94 to 128	125 to 170	■

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max. megohms
Resistance in Any Deflecting-Electrode Circuit▲. . . .	5.0 max. megohms

† For visual extinction of undeflected focused spot.

■ Volts dc/in.

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

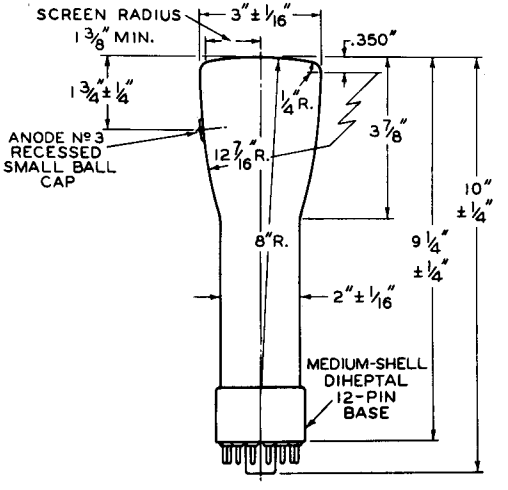
OPERATING NOTES

The 3JP1 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 3JP1 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 3JP1 can be operated with scanning frequencies as low as 20 cycles per second without excessive flicker.

3JP1
OSCILLOGRAPH TUBE

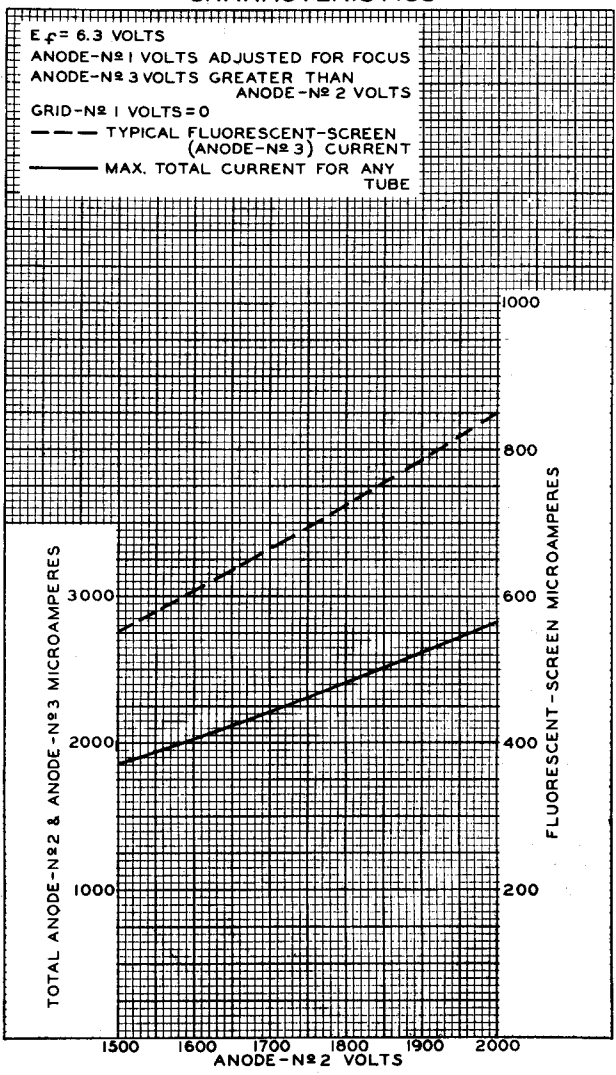


℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF BASE.

92CM-6583

3JP1

CHARACTERISTICS



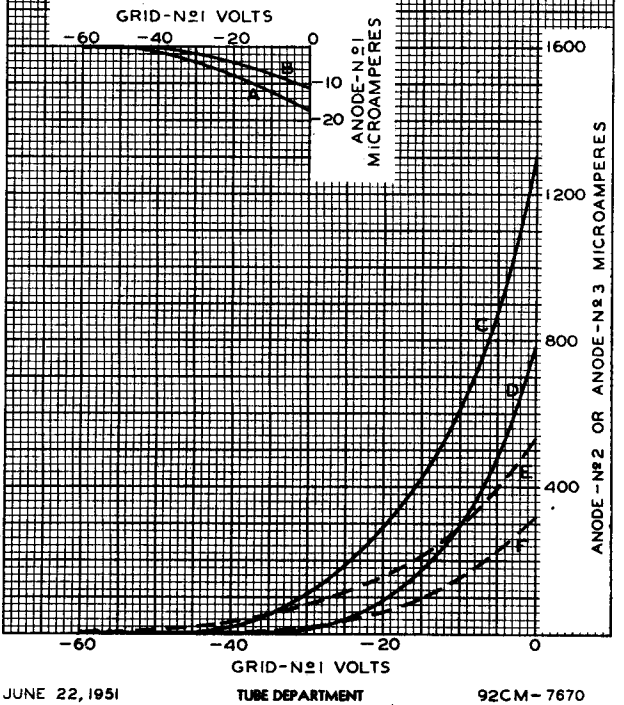
RCA

3JP1

AVERAGE CHARACTERISTICS

E_f = 6.3 VOLTS
ANODE-№1 VOLTS ADJUSTED TO GIVE FOCUS

CURVE	ELECTRODE CURRENT	ANODE-№2 VOLTS	ANODE-№3 VOLTS
A	ANODE № 1	2000	4000
B	ANODE № 1	1500	3000
C	ANODE № 2	2000	4000
D	ANODE № 2	1500	3000
E	ANODE № 3	2000	4000
F	ANODE № 3	1500	3000



3JP7

OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR
ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

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

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

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

GENERAL DATA, MAXIMUM RATINGS, AND EQUIPMENT DESIGN RANGES

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

With heater voltage of 6.3 volts, anode-No.3 voltage of 4000 volts, anode-No.2 voltage of 2000 volts, anode-No.1 voltage adjusted for focus, grid-No.1 voltage adjusted to give spot that is just visible, each deflecting electrode connected through 1-megohm resistor to anode No.2, and tube shielded from all extraneous fields, the undeflected focused spot will fall within a 12-mm square centered at the geometric center of the tube face and having one side parallel to the trace produced by DJ_1 and DJ_2.

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

3KP1

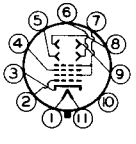
OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS — ELECTROSTATIC DEFLECTION

General: DATA

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	8	μμf
DJ_1 to DJ_2	2.5	μμf
DJ_3 to DJ_4	2.5	μμf
DJ_1 to All Other Electrodes	11	μμf
DJ_2 to All Other Electrodes	8	μμf
DJ_3 to All Other Electrodes	7	μμf
DJ_4 to All Other Electrodes	8	μμf
Phosphor (For Curves, see front of this Section)		No.1
Fluorescence		Green
Persistence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		11-1/2" ± 1/4"
Greatest Diameter of Bulb		3" ±1/16"
Minimum Useful Screen Diameter		2-3/4"
Mounting Position		Any
Base		Medium-Shell Magnal 11-Pin
Basing Designation for BOTTOM VIEW		11M

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 3 – Cathode
Pin 4 – Anode No.1
Pin 5 – Deflecting Electrode DJ_3
Pin 6 – Deflecting Electrode DJ_4
Pin 7 – Anode No.2, Grid No.2
Pin 8 – Deflecting Electrode DJ_2
Pin 9 – Deflecting Electrode DJ_1
Pin 10 – Internal Con., Do Not Use
Pin 11 – Heater



DJ_1 and DJ_2 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 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 DJ_3 and DJ_4 and the trace produced by DJ_1 and DJ_2 is $90° \pm 3°$.

← Indicates a change.

3KP1

3KP1

OSCILLOGRAPH TUBE

Maximum Ratings, *Design-Center Values:*

ANODE-No.2●	2500 max.	volts
ANODE-No.1 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 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

Equipment Design Ranges:

→ *For any anode-No.2 voltage (Eb_2) between recommended minimum* and 2500 volts*

Anode-No.1 Voltage	16% to 30% of Eb_2	volts
Max. Grid-No.1 Voltage for Visual Cutoff	4.5% of Eb_2	volts
Max. Anode-No.1 Current Range	−15 to +10	μamp
Deflection Factors:		
DJ1 & DJ2	50 to 68	v dc/in./kv of Eb_2
DJ3 & DJ4	38 to 52	v dc/in./kv of Eb_2
→ Spot Position	#	

Examples of Use of Design Ranges:

For anode-No.2 voltage of	*1000*	*2000*	*volts*
Anode-No.1 Voltage	160 − 300	320 − 600	volts
Max. Grid-No.1 Voltage for Visual Cutoff	−45	−90	volts
Deflection Factors:			
DJ1 & DJ2	50 − 68	100 − 136	volts dc/in.
DJ3 & DJ4	38 − 52	76 − 104	volts dc/in.

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms
Resistance in Any Deflecting-Electrode Circuit□	5.0 max.	megohms

● Anode No.2 and grid No.2, which are connected together within the tube, are referred to herein as anode No.2. The product of anode-No.2 voltage and average anode-No.2 current should be limited to 6 watts.

* Brilliance and definition decrease with decreasing anode-No.2 voltage. Recommended 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.

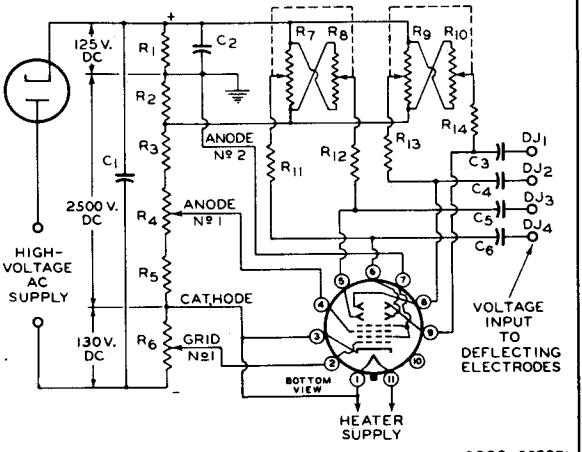
□ It is recommended that the deflecting-electrode-circuit resistances be approximately equal.

→ Indicates a change

3KP1

OSCILLOGRAPH TUBE

TYPICAL OSCILLOGRAPH CIRCUIT



92CS-6690R1

C1: 0.1 μf
C2: 1.0 μf
C3 C4 C5 C6: 0.05-μf Blocking Capacitors*

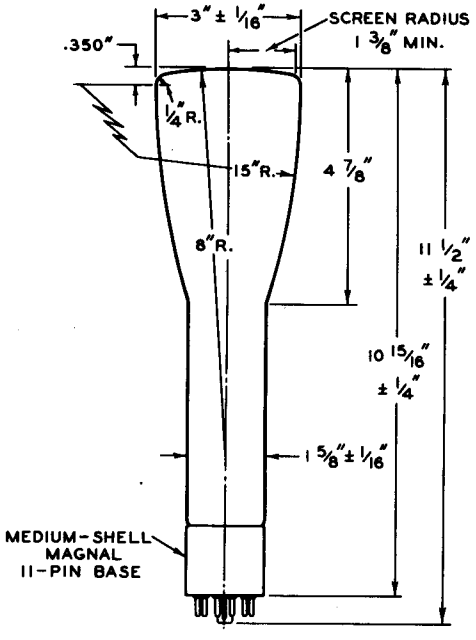
R1 R2: 2 Megohms
R3: 6 Megohms
R4: 2-Megohm Potentiometer
R5: 1.0 Megohm
R6: 0.5-Megohm Potentiometer
R7 R8: Dual 5-Megohm Potentiometer
R9 R10: Dual 5-Megohm Potentiometer
R11 R12 R13 R14: 2 Megohms

*When cathode is grounded, capacitors should have high voltage rating; when anode No.2 is grounded, they may have low voltage rating. For dc amplifier service, deflecting electrodes should be connected direct to amplifier output. In this service, it is preferable usually to remove deflecting-electrode resistors to minimize loading effect on amplifier. In order to minimize spot defocusing, it is essential that anode No.2 be returned to a point in the amplifier system which will give the lowest possible potential difference between anode No.2 and the deflecting electrodes.

RCA

3KP1

OSCILLOGRAPH TUBE



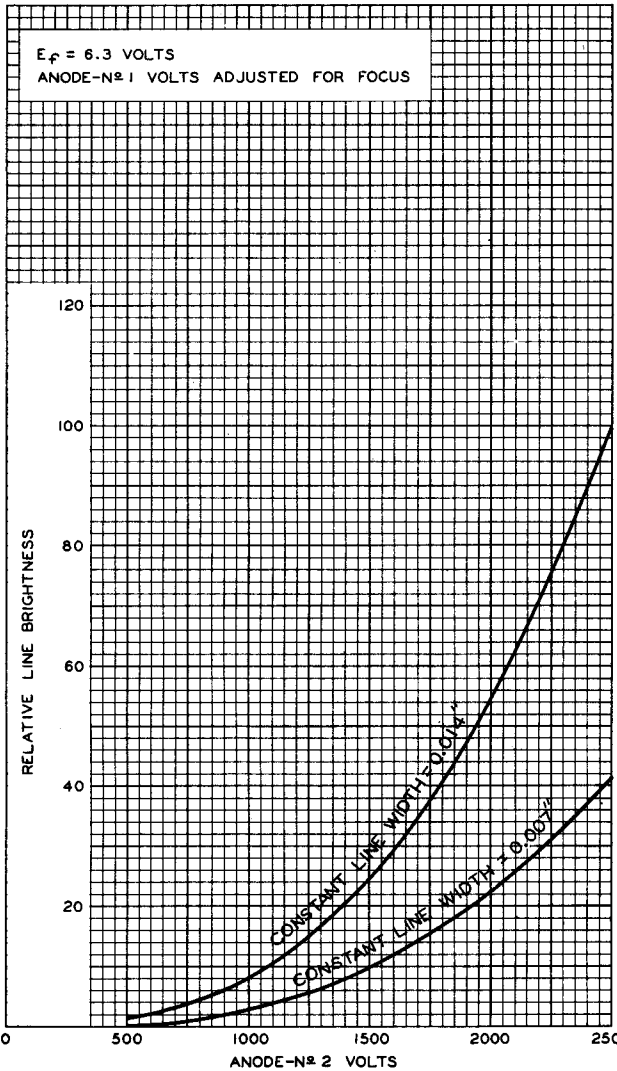
℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.

92CM-6599

RCA

3KP1

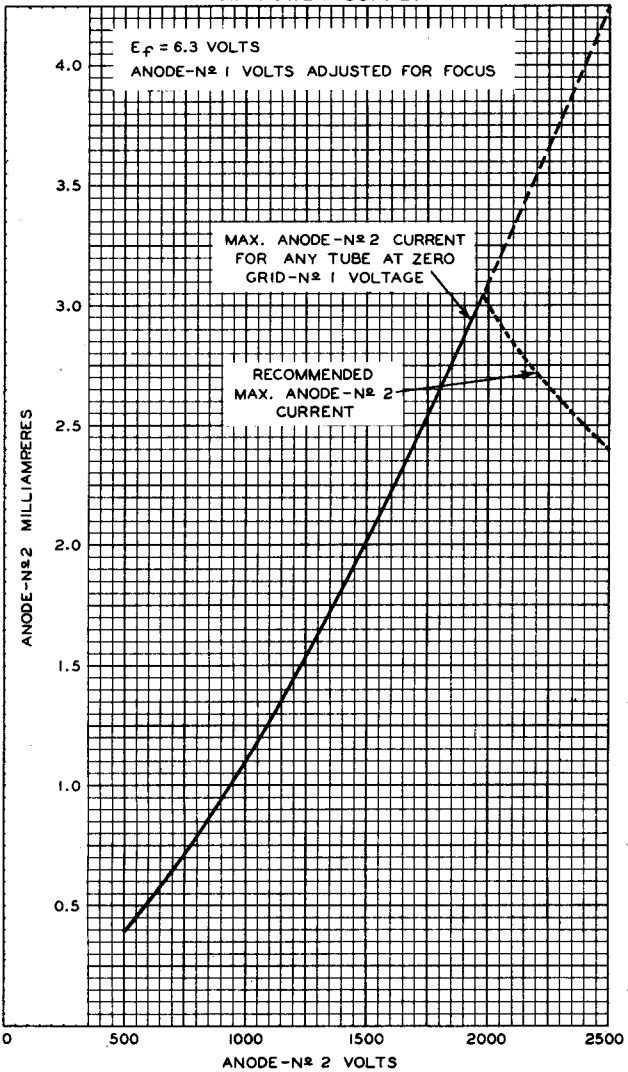
CHARACTERISTICS



3KP1

3KP1

MAX. ANODE-Nº 2 CURRENT REQUIREMENTS FROM POWER SUPPLY



FEB. 24,1949

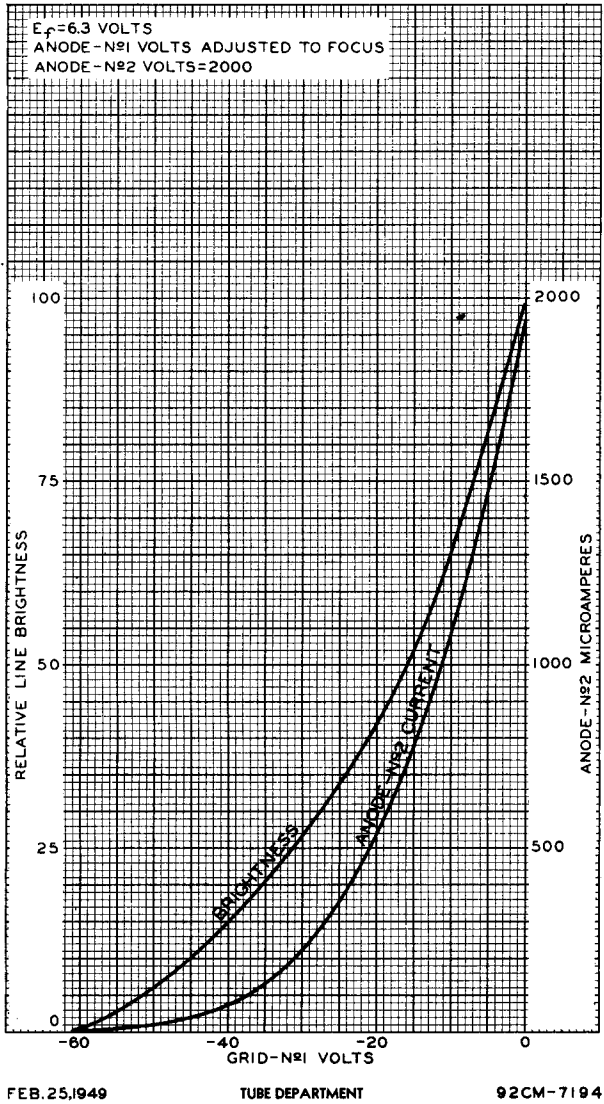
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7192

RCA

3KP1

AVERAGE CHARACTERISTICS



3KP4
KINESCOPE

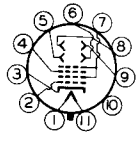
ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

DATA

General:

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	8	μμf
Cathode to All Other Electrodes	5	μμf
DJ_1 to DJ_2	2.5	μμf
DJ_3 to DJ_4	2.5	μμf
DJ_1 to All Other Electrodes	11	μμf
DJ_2 to All Other Electrodes	8	μμf
DJ_3 to All Other Electrodes	7	μμf
DJ_4 to All Other Electrodes	8	μμf
Phosphor (For Curves, see front of this Section)		No.4
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		11-1/2" ± 1/4"
Greatest Diameter of Bulb		3" ± 1/16"
Minimum Useful Screen Diameter		2-3/4"
Raster Size (Approx.)		1-7/8" x 2-1/2"
Mounting Position		Any
Base		Medium-Shell Magnal 11-Pin
Basing Designation for BOTTOM VIEW		11M

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 3 – Cathode
Pin 4 – Anode No.1
Pin 5 – Deflecting Electrode DJ_3
Pin 6 – Deflecting Electrode DJ_4



Pin 7 – Anode No.2, Grid No.2
Pin 8 – Deflecting Electrode DJ_2
Pin 9 – Deflecting Electrode DJ_1
Pin 10 – Internal Connection – Do Not Use
Pin 11 – Heater

DJ_1 and DJ_2 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 4. With DJ_3 positive with respect to DJ_4, the spot is deflected toward pin 1.

The angle between the trace produced by DJ_3 and DJ_4 and its intersection with the plane through the tube axis and pin 1 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° ± 3°.

3KP4
KINESCOPE

Maximum Ratings, *Design-Center Values:*

ANODE-No.2 VOLTAGE■	2500 max.	volts
ANODE-No.1 VOLTAGE	1000 max.	volts
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:		
Negative bias value	200 max.	volts
Positive bias value	0 max.	volts
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

Equipment Design Ranges:

For any anode-No.2 voltage (Eb_2) between 1500 and 2500 volts*

Anode-No.1 Voltage for Focus□	16% to 30% of E_{b_2}	volts
Grid-No.1 Voltage for Visual Cutoff	1.9% to 4.5% of E_{b_2}	volts
Anode-No.1 Current for Any Operating Condition	−15 to +10	μamp
Deflection Factors:		
DJ1 & DJ2	50 to 68 v dc/in./kv of Eb_2	
DJ3 & DJ4	38 to 52 v dc/in./kv of Eb_2	
Spot Position	⊕	

Examples of Use of Design Ranges:

For anode-No.2 voltage of 2000 volts

Anode-No.1 Voltage□	320 to 600	volts
Grid-No.1 Voltage for Visual Cutoff	−38 to −90	volts
Deflection Factors:		
DJ1 & DJ2	100 to 136	volts dc/in.
DJ3 & DJ4	76 to 104	volts dc/in.

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms
Resistance in Any Deflecting Electrode Circuit○	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	220 min.	ohms
Anode-No.1-Circuit Resistance	1100 min.	ohms
Anode-No.2-Circuit Resistance	3000 min.	ohms

■, *, □, ⊕, ○: See next page.

3KP4
KINESCOPE

The resistors should be capable of withstanding the applied voltage.

■ Anode No. 2 and grid No. 2 which are connected together within tube are referred to herein as anode No. 2.

* Brilliance and definition decrease with decreasing anode-No. 2 voltage.

□ With the combined grid-No. 1-bias voltage and video-signal voltage adjusted for a highlight brightness of 2 foot-lamberts on a 1-7/8"x2-1/2" picture area.

⊕ With 1500 volts on anode No. 2, grid-No. 1 bias adjusted so that spot is just visible, and no deflection, the center of the spot will fall within a circle having 7.5-mm radius concentric with the center of the tube face.

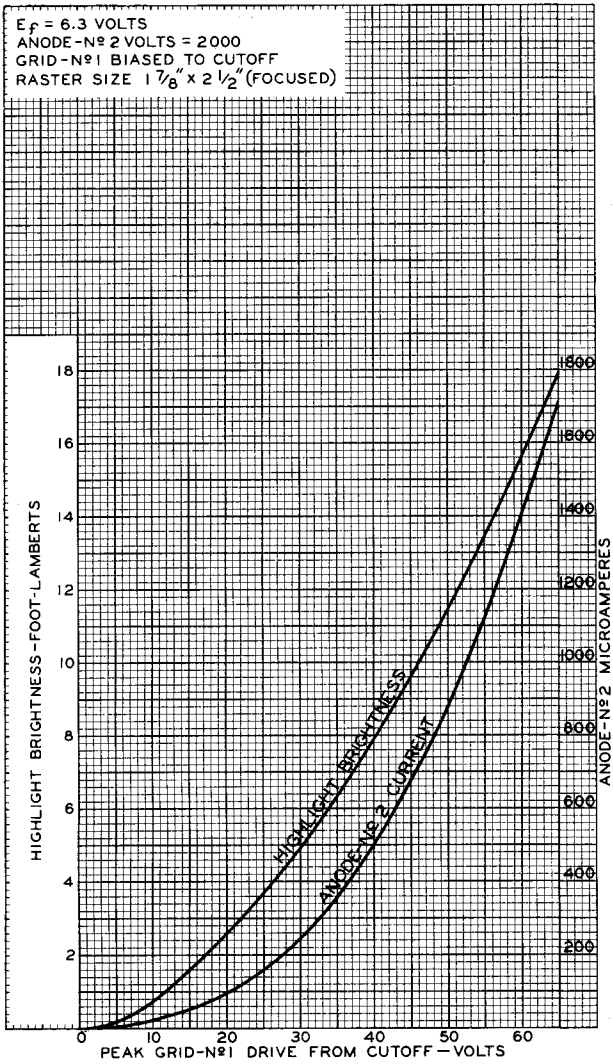
○ It is recommended that the deflecting-electrode-circuit resistances be approximately equal.

OUTLINE DIMENSIONS for Type 3KP4
are the same as those shown for Type 3KP1

RCA

3KP4

AVERAGE CHARACTERISTICS



3KP11
OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The 3KP11 is the same as the 3KP1 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 3KP11 in all moving-film photographic applications without blurring except in those where film moves at a high speed. The 3KP11 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 3KP11 at an anode-No.2 voltage less than 1500 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

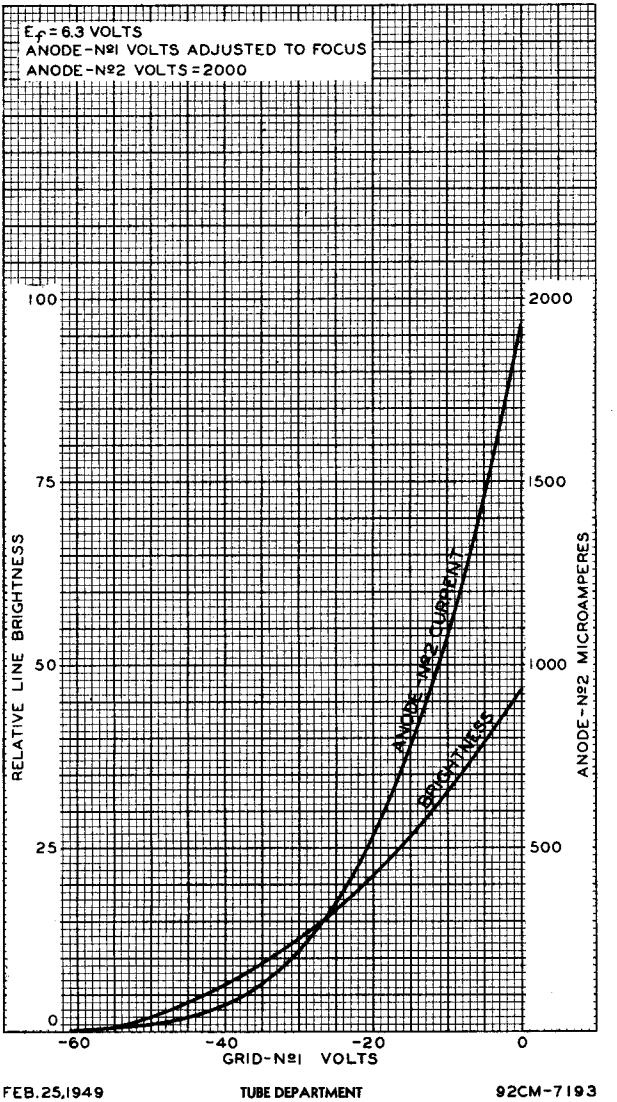
The curve showing MAXIMUM ANODE-No.2 CURRENT REQUIREMENTS FROM POWER SUPPLY for Type 3KP1 also applies to the 3KP11

3KP11

RCA

3KP11

AVERAGE CHARACTERISTICS



RCA

3MP1

OSCILLOGRAPH TUBE

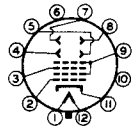
ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):		
Cathode to All Other Electrodes	2.2	
Grid No.1 to All Other Electrodes	10.3	μμf
DJ_1 to DJ_2	1.3	μμf
DJ_3 to DJ_4	1.2	μμf
DJ_1 to All Other Electrodes Except DJ_2	4.4	μμf
DJ_2 to All Other Electrodes Except DJ_1	5.6	μμf
DJ_3 to All Other Electrodes Except DJ_4	5.0	μμf
DJ_4 to All Other Electrodes Except DJ_3	4.5	μμf
Phosphor (For Curves, see front of this Section)		No.1
Fluorescence		Green
Persistence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		8" ± 1/4"
Greatest Diameter of Bulb		3" ± 1/16"
Minimum Useful Screen Diameter		2-3/4"
Mounting Position		Any
Base		Small-Shell Duodecal 12-Pin
Basing Designation for Bottom View		12F

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 3 – Anode No.1
Pin 4 – Deflecting Electrode DJ_3
Pin 5 – Deflecting Electrode DJ_4
Pin 6 – No Connection
Pin 7 – Deflecting Electrode DJ_1
Pin 8 – Deflecting Electrode DJ_2
Pin 9 – Anode No.2, Grid No.2
Pin 10 – No Connection
Pin 11 – Cathode
Pin 12 – Heater



DJ_1 and DJ_2 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 4. With DJ_3 positive with respect to DJ_4, the spot is deflected toward pin 1.

The plane through the tube axis and pin 4 may vary from the trace produced by DJ_1 and DJ_2 by an angular tolerance (measured about the tube axis) of 10°.

Maximum Ratings, *Design-Center Values*:

ANODE-No.2• VOLTAGE# . . . . . 2500 max. volts

• Anode No.2 and grid No.2 which are connected together within tube, are referred to herein as anode No.2.

The product of anode-No.2 voltage and average anode-No.2 current should be limited to 6 watts.

3MP1

RCA

3MP1

OSCILLOGRAPH TUBE

ANODE-No.1 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 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

Equipment Design Ranges:

For any anode-No.2 voltage (Eb_2) between recommended minimum and 2500 volts*

Anode-No.1 Voltage	20% to 35% of Eb_2	volts
Max. Grid-No.1 Voltage for Visual Cutoff	6.3% of Eb_2	volts
Anode-No.1 Cur. for any Operating Condition	−15 to +10	microamperes
Deflection Factors:		
DJ_1 & DJ_2	115 to 145	v dc/in./kv of Eb_2
DJ_3 & DJ_4	110 to 140	v dc/in./kv of Eb_2

Examples of Use of Design Ranges:

For anode-No.2 voltage of	*1000*	*2000*	*volts*
Anode-No.1 Voltage	200–350	400–700	volts
Max. Grid-No.1 Voltage for Visual Cutoff	−63	−126	volts
Deflection Factors:			
DJ_1 & DJ_2	115–145	230–290	volts dc/in.
DJ_3 & DJ_4	110–140	220–280	volts dc/in.

Maximum Circuit Values:

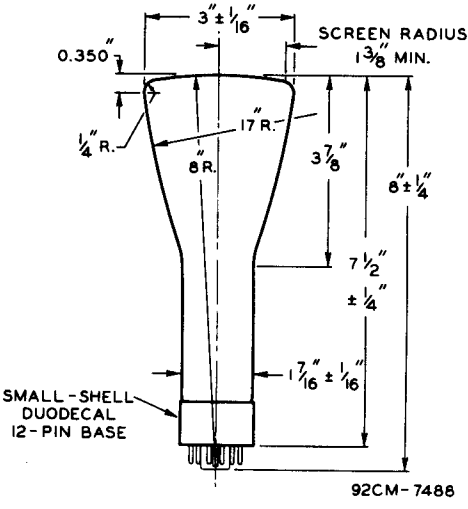
Grid-No.1-Circuit Resistance	1.5 max.	megohms
Resistance in Any Deflecting-Electrode Circuit□	5.0 max.	megohms

* Brilliance and definition decrease with decreasing anode-No.2 voltage. Recommended minimum for the 3MP1 in general service is 1000 volts but a value as low as 500 volts may be used under conditions of low-velocity deflection and low ambient-light levels.

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

3MP1

OSCILLOGRAPH TUBE



RCA

3RP1

OSCILLOGRAPH TUBE

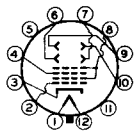
ELECTROSTATIC FOCUS — ELECTROSTATIC DEFLECTION

DATA

General:

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	8	μμf
DJ_1 to DJ_2	2	μμf
DJ_3 to DJ_4	2	μμf
DJ_1 to All Other Electrodes	11	μμf
DJ_2 to All Other Electrodes	8	μμf
DJ_3 to All Other Electrodes	7	μμf
DJ_4 to All Other Electrodes	8	μμf
Phosphor (For Curves, see front of this Section)		No.1
Fluorescence		Green
Persistence		Medium
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"
Mounting Position		Any
Base		Small-Shell Duodecal 12-Pin
Basing Designation for BOTTOM VIEW		12E

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 3 – Cathode
Pin 4 – Anode No.1
Pin 5 – Internal Connection—Do Not Use
Pin 6 – Deflecting Electrode DJ_3
Pin 7 – Deflecting Electrode DJ_4



Pin 8 – Anode No.2, Grid No.2
Pin 9 – Deflecting Electrode DJ_2
Pin 10 – Deflecting Electrode DJ_1
Pin 11 – Internal Connection—Do Not Use
Pin 12 – Heater

DJ_1 and DJ_2 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 4. With DJ_3 positive with respect to DJ_4, the spot is deflected toward pin 1.

The angle between the trace produced by DJ_3 and DJ_4 and its intersection with the plane through the tube axis and pin No.1 does not exceed 10°.

The angle between $DJ_1 - DJ_2$ trace and $DJ_3 - DJ_4$ trace is 90° ± 3°.

3RP1

RCA

3RP1

OSCILLOGRAPH TUBE

Maximum Ratings, *Design-Center Values*:

ANODE-No.2● VOLTAGE#	2500 max.	volts
ANODE-No.1 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 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

Equipment Design Ranges:

For any anode-No.2 voltage (Eb_2) between 500 and 2500 volts*

Anode-No.1 Voltage	16.5% to 31% of Eb_2	volts
Maximum Grid-No.1 Voltage for Visual Cutoff	6.75% of Eb_2	volts
Anode-No.1 Cur. for any Operating Condition	-15 to +10	microamperes
Deflection Factors:		
DJ1 & DJ2	73 to 99	v dc/in./kv of Eb_2
DJ3 & DJ4	52 to 70	v dc/in./kv of Eb_2
Spot Position▲		

Examples of Use of Design Ranges:

For anode-No.2 voltage of	*1000*	*2000*	*volts*
Anode-No.1 Voltage	165 – 310	330 – 620	volts
Maximum Grid-No.1 Voltage for Visual Cutoff	-67.5	-135	volts
Deflection Factors:			
DJ1 & DJ2	73 – 99	146 – 198	volts dc/in
DJ3 & DJ4	52 – 70	104 – 140	volts dc/in

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms
Resistance in Any Deflecting-Electrode Circuit○	5.0 max.	megohms

● Anode No.2 and grid No.2 which are connected together within tube are referred to herein as anode No.2.

\# The product of anode-No.2 voltage and average anode-No.2 current should be limited to 6 watts.

* Brilliance and definition decrease with decreasing anode-No.2 voltage. A value as low as 500 volts is recommended only for 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.

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

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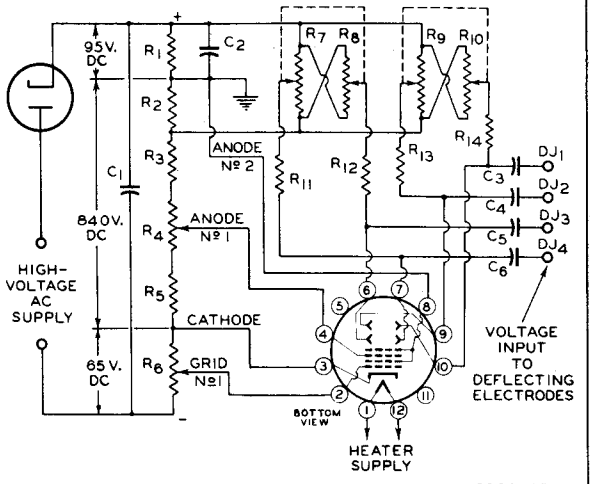
3RP1

OSCILLOGRAPH TUBE

TYPICAL OSCILLOGRAPH CIRCUIT



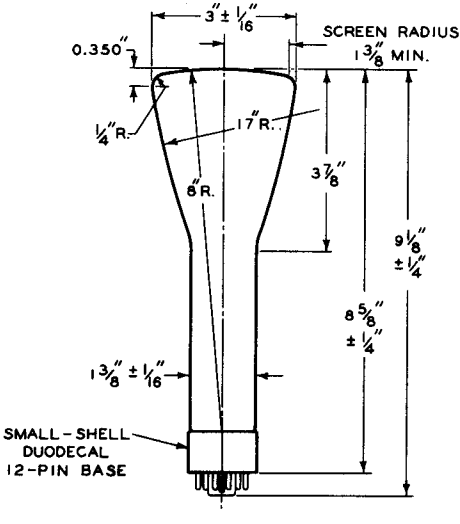
C1: 0.2 μf
C2: 1.0 μf
C3 C4 C5 C6: 0.05-μf Blocking Capacitors*
R1 R2: 2.5 Megohms, 0.5 Watt
R3: 2.5 Megohms, 1 Watt
R4: 1.0-Megohm Potentiometer
R5: 0.5 Megohm, 0.5 Watt
R6: 0.35 Megohm, 0.5 Watt
R7 R8: Dual 5-Megohm Potentiometer
R9 R10: Dual 5-Megohm Potentiometer
R11 R12 R13 R14: 2 Megohms, 0.5 watt

* When cathode is grounded, capacitors should have high voltage rating; when anode No.2 is grounded, they may have low voltage rating. For dc amplifier service, deflecting electrodes should be connected direct to amplifier output. In this service, it is preferable usually to remove deflecting-electrode resistors to minimize loading effect on amplifier. In order to minimize spot defocusing, it is essential that anode No.2 be returned to a point in the amplifier system which will give the lowest possible potential difference between anode No.2 and the deflecting electrodes.

RCA

3RP1

OSCILLOGRAPH TUBE



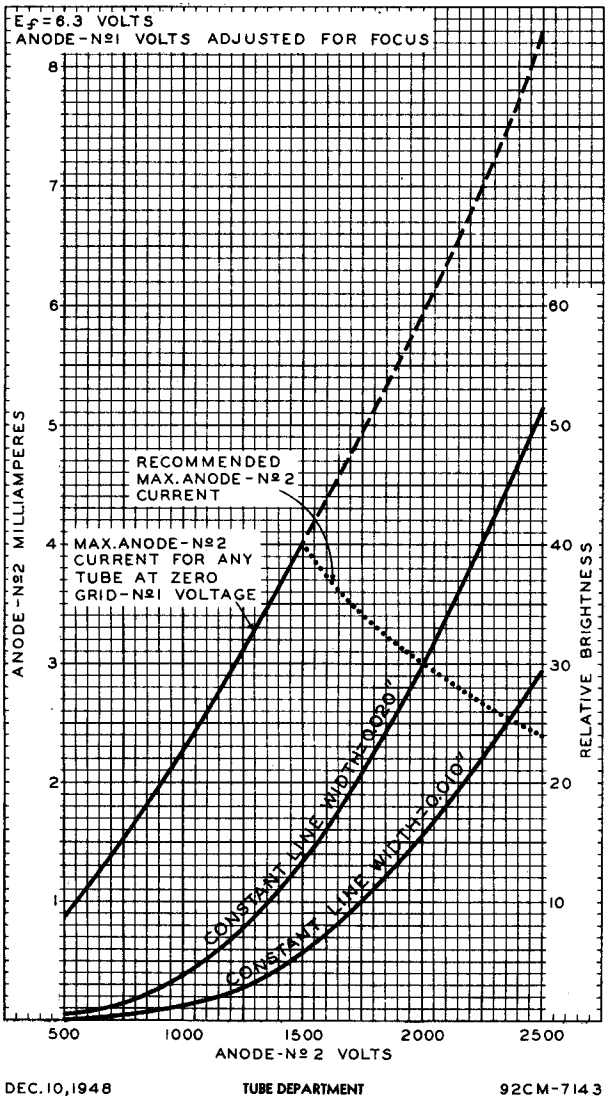
℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.

92CM-7119

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

3RP1

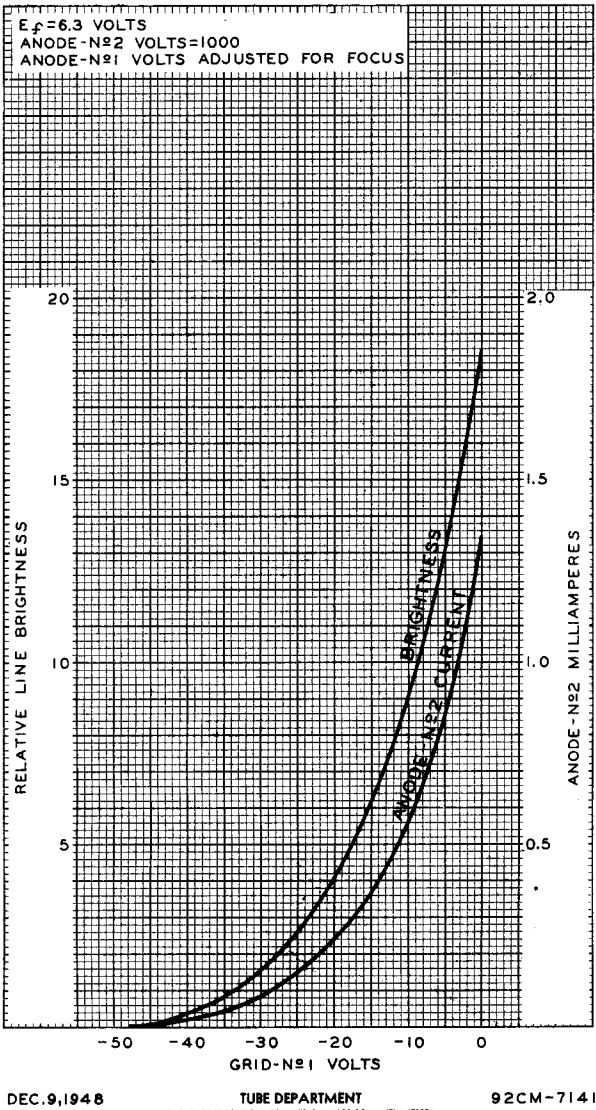
CHARACTERISTICS



RCA

3RP1

AVERAGE CHARACTERISTICS



5ABP1

OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

DATA

General:

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	8	μμf
Cathode to All Other Electrodes	5	μμf
DJ_1 to DJ_2	2.5	μμf
DJ_3 to DJ_4	1.3	μμf
DJ_1 to All Other Electrodes	9	μμf
DJ_2 to All Other Electrodes	9	μμf
DJ_3 to All Other Electrodes	5	μμf
DJ_4 to All Other Electrodes	6	μμf
Faceplate, Flat		Clear Glass
Phosphor (For Curves, see front of this Section)		P1
Fluorescence and Phosphorescence		Green
Persistence of Phosphorescence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		16-3/4" ± 3/8"
Greatest Diameter of Bulb		5-1/4" ± 3/32"
Minimum Useful Screen Diameter		4-9/16"
Bulb		J42
Weight (Approx.)		2-1/2 lbs
Mounting Position		Any
Cap	Recessed Small Ball (JETEC No.J1-22)	
Base	Medium-Shell Diheptal 12-Pin (JETEC No.B12-37)	

BOTTOM VIEW

Pin 1 - Heater
Pin 2 - Cathode
Pin 3 - Grid No.1
Pin 4 - No Connection—Do Not Use
Pin 5 - Grid No.3
Pin 7 - Deflecting Electrode DJ_3
Pin 8 - Deflecting Electrode DJ_4

Pin 9 - Ultor (Grid No.2, Grid No.4)
Pin 10 - Deflecting Electrode DJ_2
Pin 11 - Deflecting Electrode DJ_1
Pin 12 - No. Conn.
Pin 14 - Heater
Cap - Post-Ultor (Grid No.5, Collector)

DJ_1 and DJ_2 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

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5ABP1
OSCILLOGRAPH TUBE

the following angular tolerances (measured about the tube axis): Pin 5, 10°; side terminal (on same side of tube as pin 5), 10°. Angle between $DJ_1 - DJ_2$ trace and $DJ_3 - DJ_4$ trace is 90° ± 1.5°.

Maximum Ratings, *Design-Center Values:*

POST-ULTOR[•] VOLTAGE	6000 max.	volts
ULTOR[▲] VOLTAGE	2600 max.	volts
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	200 max.	volts
Positive bias value[o]	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 post-ultor voltage (E_{c_5}) between 2000 and 6000 volts and any ultor voltage (E_{c_4}) between 1500** and 2600 volts*

Grid-No.3 Voltage for Focus	20% to 34.5% of E_{c_4}	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	2.6% to 4.3% of E_{c_4}	volts
Grid-No.3 Current for Any Operating Condition	−15 to +10	μamp
Deflection Factors:[#]		
When $E_{c_5} = 2 \times E_{c_4}$		
DJ_1 & DJ_2	26.5 to 36	v dc/in./kvof E_{c_4}
DJ_3 & DJ_4	18 to 24	v dc/in./kvof E_{c_4}
When $E_{c_5} = E_{c_4}$		
DJ_1 & DJ_2	21.5 to 29	v dc/in./kvof E_{c_4}
DJ_3 & DJ_4	14.5 to 19.5	v dc/in./kvof E_{c_4}
Spot Position	[##]	

Examples of Use of Design Ranges:

For post-ultor voltage of	*2000*	*3000*	*4000*	*volts*
and ultor voltage of	*2000*	*1500*	*2000*	*volts*
Grid-No.3 Volt. for Focus	400 to 690	300 to 515	400 to 690	volts
Grid-No.1 Volt.[□]	−52 to −87	−39 to −65	−52 to −87	volts

•,▲,o,*,**,#,##,□: See next page.

RCA

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OSCILLOGRAPH TUBE

Deflection Factors:#

DJ_1 & DJ_2	43 to 58	40 to 54	53 to 72	v dc/in.
DJ_3 & DJ_4	29 to 39	27 to 36	36 to 48	v dc/in.

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms
Resistance in Any Deflecting-Electrode Circuit■	5.0 max.	megohms

● The "post-ultor" in a cathode-ray tube is the electrode to which is applied a dc voltage higher than the ultor voltage for accelerating the electrons in the beam after its deflection. In the 5AB-types, the post-deflection acceleration function and the collector function are both performed by grid No.5 which is conveniently referred to as "post-ultor".

▲ 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 5AB-types, the ultor function is performed by grid No.4. Since grid No.4 and grid No.2 are connected together within the 5AB-types, they are collectively referred to simply as "ultor" for convenience in presenting data and curves.

○ 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 less than 3000 volts for high-speed scanning.

** Recommended minimum value of ultor voltage.

The deflecting electrodes DJ_3 and DJ_4 are designed to have extra-high deflection sensitivity and consequently produce less than full-screen deflection. With post-deflection acceleration, the length of deflection may be limited to 4 inches; without post-deflection acceleration, deflection to full screen diameter will ordinarily be obtained. These electrodes are, therefore, more suitable for the signal voltage than for the time-base voltage.

With heater voltage of 6.3 volts, post-ultor voltage of 4000 volts, ultor voltage of 2000 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 tube shielded from all extraneous fields, the center of the undeflected, focused spot will fall within a circle having a 12.5-mm radius concentric with the center of the tube face.

□ For visual cutoff of undeflected focused spot.

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

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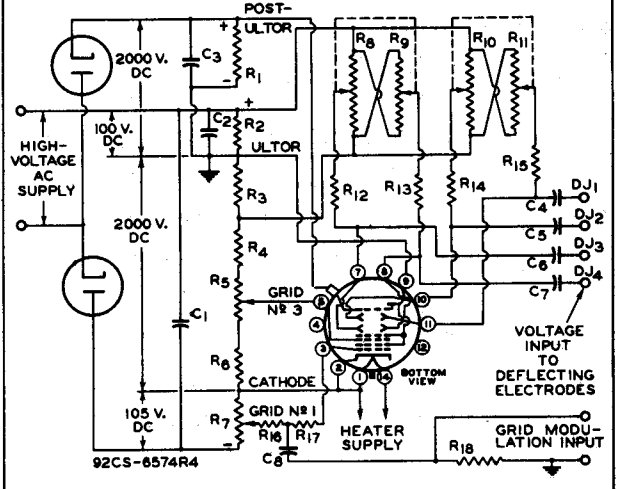
5ABP1

OSCILLOGRAPH TUBE

TYPICAL OSCILLOGRAPH CIRCUIT



C1: 0.1 μf, 2500 Volts
C2: 1.0 μf, 200 Volts
C3: 0.1 μf, 2500 Volts
C4 C5 C6 C7: 0.05-μf, Blocking Capacitors*
C8: 0.0001 μf, 2500 Volts
R1: 50 Megohms (Five 10-Megohm, 1-Watt Resistors In Series)
R2 R3: 2 Megohms, 0.5 Watt
R4: 5.5 Megohms, 2 Watts
R5: 2-Megohm Potentiometer
R6: 1.5 Megohms, 0.5 Watt
R7: 0.5-Megohm Potentiometer
R8 R9: 5-Megohm Potentiometer
R10 R11: Dual 5-Megohm Potentiometer
R12 R13 R14 R15: 2 Megohms, 0.5 Watt
R16: 0.5 Megohm, 0.5 Watt
R17: Not less than 2000 ohms per volt of positive signal
R18: 5 Megohms, 0.5 Watt

* When cathode is grounded, capacitors should have high voltage rating (2500 volts); when ultor is grounded, they may have low voltage rating (200 volts). For dc amplifier service, deflecting electrodes should be connected direct to amplifier output. In this service, it is preferable usually to remove deflecting-electrode resistors to minimize loading effect on amplifier. In order to minimize spot defocusing, it is essential that ultor be returned to a point in the amplifier system which will give the lowest possible potential difference between ultor and the deflecting electrodes.

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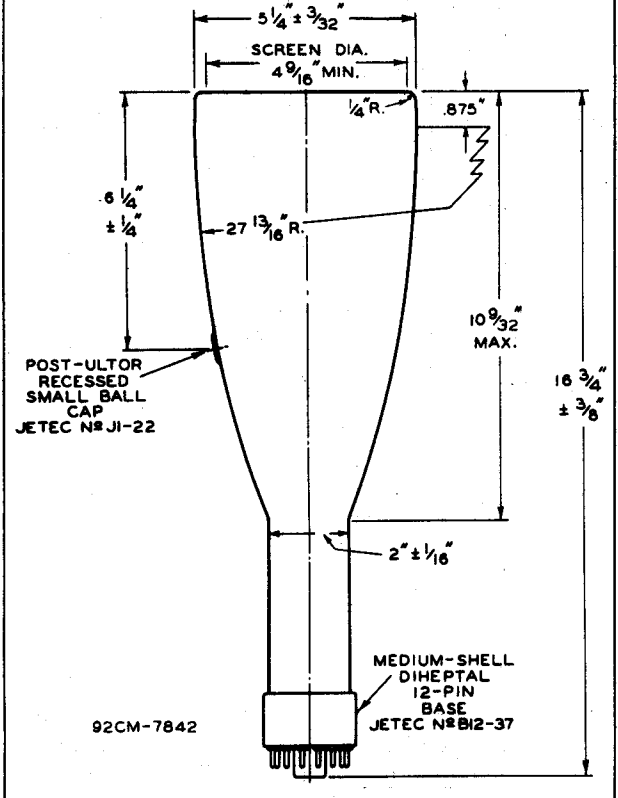
OSCILLOGRAPH TUBE



℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE

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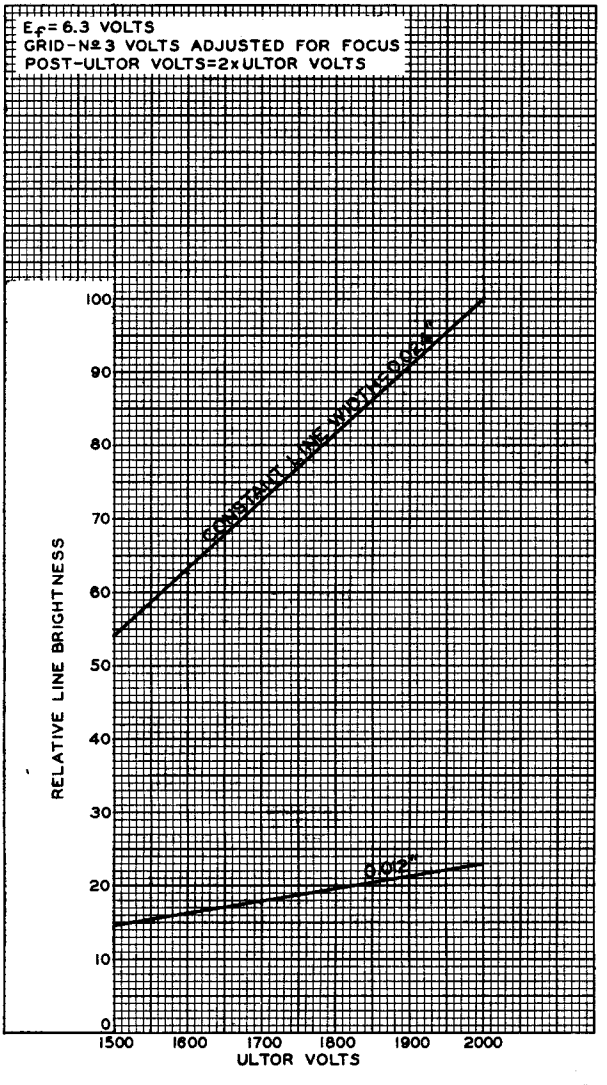
5ABP1

RCA

5ABP1

TYPICAL CHARACTERISTICS



RCA

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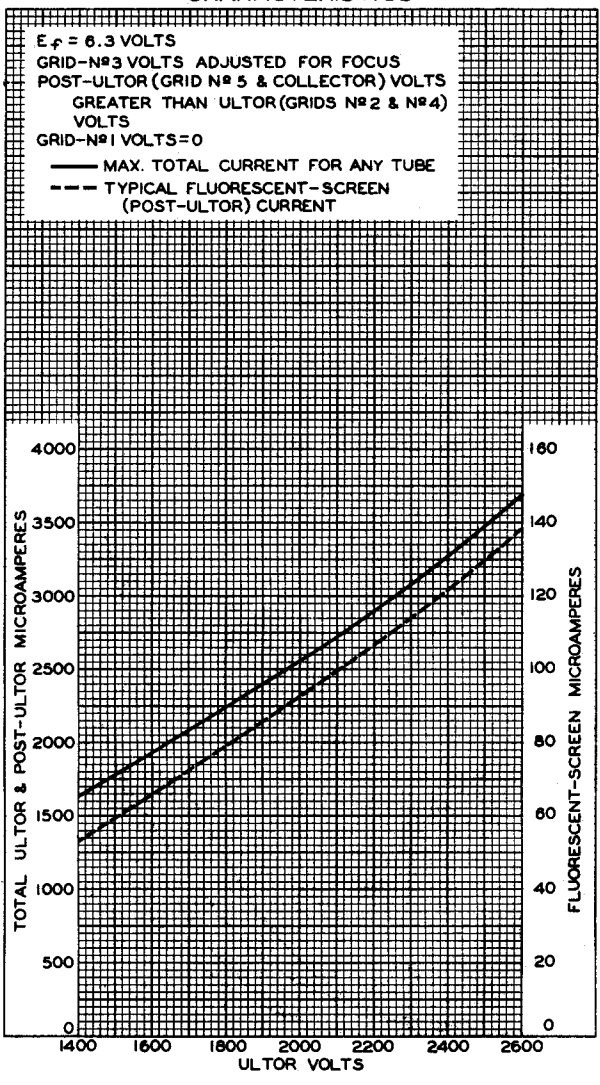
CHARACTERISTICS



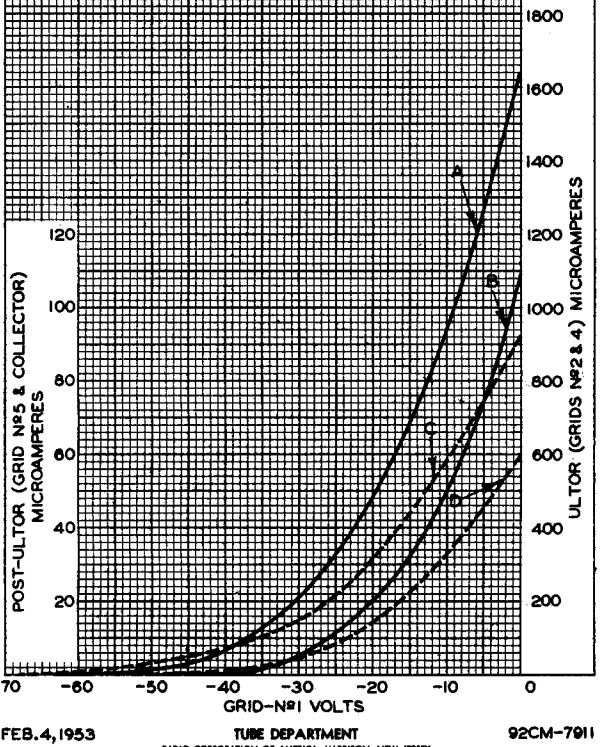
RCA

5ABP1

AVERAGE CHARACTERISTICS

E_f = 6.3 VOLTS
GRID-№3 VOLTS ADJUSTED FOR FOCUS

CURVE	ELECTRODE CURRENT	ULTOR VOLTS	POST-ULTOR VOLTS
A	ULTOR	2000	4000
B	ULTOR	1500	3000
C	POST-ULTOR	2000	4000
D	POST-ULTOR	1500	3000



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92CM-7911

5ABP7

OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The 5ABP7 is the same as the 5ABP1, except that it utilizes a long-persistence, cascade (two-layer) 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 5ABP7 is particularly useful where either low-speed non-recurring phenomena or high-speed recurring phenomena are to be observed. Furthermore, two or more phenomena can be observed simultaneously on the screen by means of a suitable switching arrangement.

The persistence is such that the 5ABP7 without filter can be operated with scanning frequencies as low as 30 cycles per second without excessive flicker.

The SPECTRAL-ENERGY EMISSION CHARACTERISTIC, as well as PERSISTENCE CURVES of BUILDUP and DECAY of the P7 PHOSPHOR are shown at the front of this Section.

5ABP11
OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The 5ABP11 is the same as the 5ABP1, except that it utilizes a short persistence screen which exhibits blue fluorescence and phosphorescence. The blue radiation of its fluorescent screen is highly actinic and has sufficiently short persistence to permit use of the 5ABP11 in all photographic applications without blurring except in those where film moves at a high speed.

The 5ABP11 is also quite satisfactory for visual observation of phenomena because it utilizes an improved phosphor having unusally high brightness for a blue screen. The brightness of the P11 screen is about one-half that of the P1 screen under the same conditions of excitation.

The SPECTRAL-ENERGY EMISSION CHARACTERISTIC, and the PERSISTENCE CHARACTERISTIC of the P11 PHOSPHOR are shown at the front of this Section.

5BP1-A

HIGH-VACUUM CATHODE-RAY TUBE

Supersedes Type 5BP1

General:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.6	amp.
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	8.0	μμf
DJ_1 to DJ_2	1.3	μμf
DJ_3 to DJ_4	1.2	μμf
DJ_1 to All Other Electrodes	9.5	μμf
DJ_3 to All Other Electrodes	12.0	μμf
DJ_1 to All Other Electrodes except DJ_2	8.0	μμf
DJ_2 to All Other Electrodes except DJ_1	7.5	μμf
DJ_3 to All Other Electrodes except DJ_4	10.0	μμf
DJ_4 to All Other Electrodes except DJ_3	7.5	μμf
Phosphor (For Curves, see front of this Section)		No.1
Fluorescence		Green
Persistence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		16-3/4" ± 3/8"
Greatest Diameter of Bulb		5-1/4" $^{+\ 1/16"}_{-\ 3/32"}$
Minimum Useful Screen Diameter		4-1/2"
Mounting Position		Any
Base		Medium Shell Magnal 11-Pin
Basing Designation for BOTTOM VIEW		11N

Pin 1 – Heater
Pin 2 – No Connection
Pin 3 – Deflecting Electrode DJ1
Pin 4 – Anode No.1
Pin 5 – Internal Con. Do not use
Pin 6 – Deflecting Electrode DJ4

Pin 7 – Anode No.2, Grid No.2
Pin 8 – Deflecting Electr. DJ2
Pin 9 – Deflecting Electr. DJ3
Pin 10 – Grid No.1
Pin 11 – Heater, Cathode

DJ_1 and DJ_2 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 4. With DJ_3 positive with respect to DJ_4, the spot is deflected toward pin 1.

The angle between the trace produced by DJ_3 and DJ_4 and its intersection with the plane through the tube axis and pin 1 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° ± 3°.

5BP1-A

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

Maximum Ratings, *Absolute Values*:

ANODE-No.2 & GRID-No.2 VOLTAGE	2200 *max.*	volts
ANODE-No.1 VOLTAGE	1100 *max.*	volts
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:		
Negative Value	125 *max.*	volts
Positive Value	0 *max.*	volts
PEAK VOLTAGE BETWEEN ANODE No.2 AND 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
Grid-No.1 Volt. for Visual Cutoff#.	−30	−40	volts
Max. Anode-No.1 Current Range▲.	Between −50 and +10		μamp.
Deflection Sensitivity:			
DJ_1 and DJ_2	0.404	0.303	mm/v dc
DJ_3 and DJ_4	0.446	0.334	mm/v dc
Deflection Factor:**			
DJ_1 and DJ_2	63	84	v dc/in.
DJ_3 and DJ_4	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 adjustable to ± 50% of these values.

▲ See curve for average values.

** Individual tubes may vary from these values by ± 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 DJ_1 and DJ_2. Suitable test conditions are: anode-No.2 voltage, 1500 volts; anode-No.1 voltage, adjusted for focus; deflecting-electrode resistors, 1 megohm each, connected to anode-No.2; the tube shielded from all extraneous fields. To avoid damage to the tube, grid-No.1 voltage should be near cutoff before application of anode voltages.

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 *max.*	megohms
Impedance of Any Deflecting-Electrode Circuit at Heater-Supply Frequency	1.0 *max.*	megohm
Resistance in Any Deflecting-Electrode Circuit▲▲	5.0 *max.*	megohms

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

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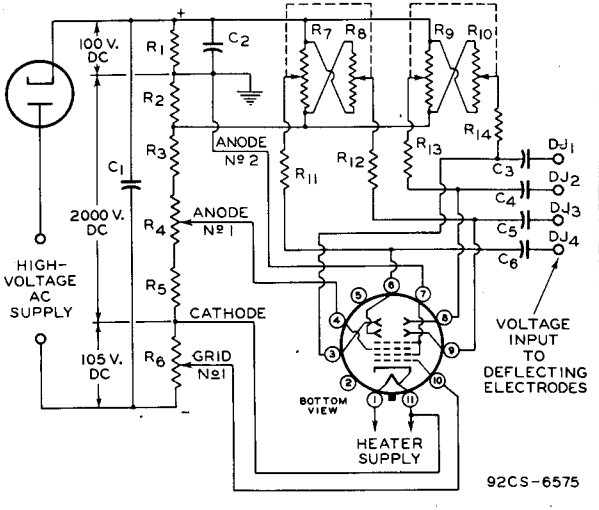
5BP1-A

HIGH-VACUUM CATHODE-RAY TUBE

TYPICAL OSCILLOGRAPH CIRCUIT



C1: 0.1 μf
C2: 1.0 μf
C3 C4 C5 C6: 0.05-μf Blocking Capacitors*
R1 R2: 2 Megohms
R3: 6 Megohms
R4: 2-Megohm Potentiometer
R5: 1.0 Megohm
R6: 0.5-Megohm Potentiometer
R7 R8: Dual 5-Megohm Potentiometer
R9 R10: Dual 5-Megohm Potentiometer
R11 R12 R13 R14: 2 Megohms

*When cathode is grounded, capacitors should have high voltage rating; when anode No.2 is grounded, they may have low voltage rating. For dc amplifier service, deflecting electrodes should be connected direct to amplifier output. In this service, it is preferable usually to remove deflecting-electrode resistors to minimize loading effect on amplifier. In order to minimize spot defocusing, it is essential that anode No.2 be returned to a point in the amplifier system which will give the lowest possible potential difference between anode No.2 and the deflecting electrodes.

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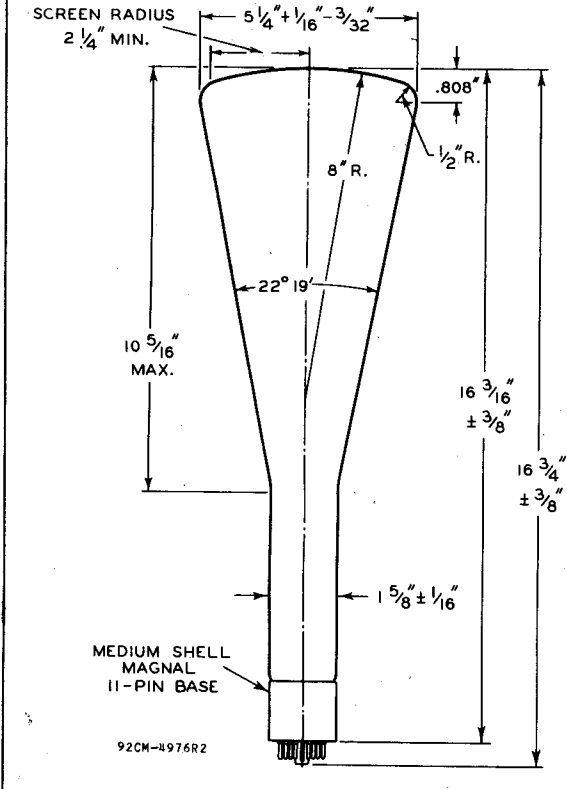
HIGH-VACUUM CATHODE-RAY TUBE



℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE

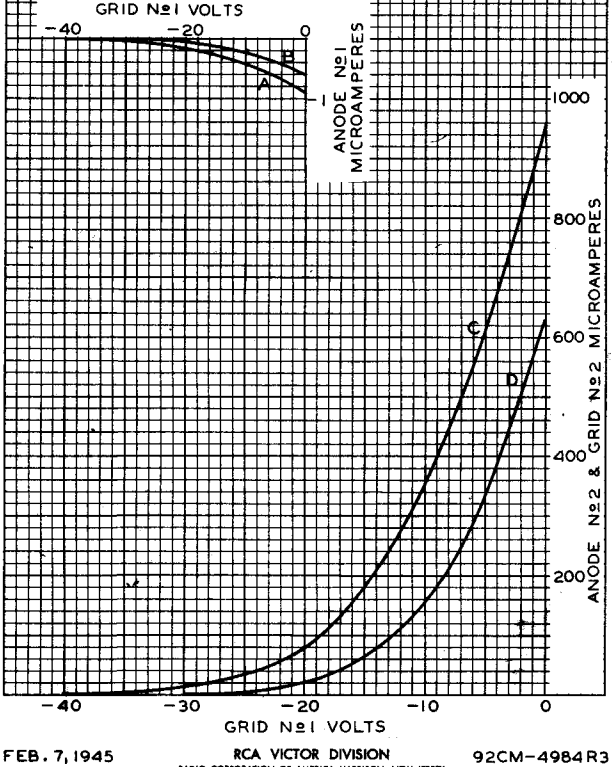
5BP1-A

AVERAGE CHARACTERISTICS

$E_f = 6.3$ VOLTS

ANODE Nº1 VOLTS ADJUSTED TO GIVE FOCUS

CURVE	ELECTRODE CURRENT	ANODE Nº2 & GRID Nº2 VOLTS
A	ANODE Nº1	2000
B	ANODE Nº1	1500
C	ANODE Nº2 & GRID Nº2	2000
D	ANODE Nº2 & GRID Nº2	1500



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5CP1-A

OSCILLOGRAPH TUBE

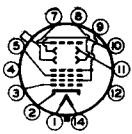
POST-DEFLECTION ACCELERATOR
ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

DATA

General:

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	8	μμf
Cathode to All Other Electrodes	9	μμf
DJ_1 to DJ_2	2	μμf
DJ_3 to DJ_4	2	μμf
DJ_1 to All Other Electrodes	9	μμf
DJ_2 to All Other Electrodes	9	μμf
DJ_3 to All Other Electrodes	7	μμf
DJ_4 to All Other Electrodes	8	μμf
Phosphor (For Curves, see front of this Section)		P1
Fluorescence and Phosphorescence		Green
Persistence of Phosphorescence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		16-3/4" ± 3/8"
Greatest Diameter of Bulb		5-1/4" ± 3/32"
Minimum Useful Screen Diameter		4-1/2"
Mounting Position		Any
Cap		Recessed Small Ball (JETEC No.J1-22)
Base		Medium-Shell Diheptal 12-Pin (JETEC No.B12-37)
Basing Designation for BOTTOM VIEW		$14J_1$

Pin 1 – Heater
Pin 2 – Cathode
Pin 3 – Grid No.1
Pin 4 – Internal Con. Do not use
Pin 5 – Anode No.1
Pin 7 – Deflecting Electrode DJ_3
Pin 8 – Deflecting Electrode DJ_4



Pin 9 – Anode No.2, Grid No.2
Pin 10 – Deflecting Electr. DJ_2
Pin 11 – Deflecting Electr. DJ_1
Pin 12 – No Connection
Pin 14 – Heater
Cap – Anode No.3

DJ_1 and DJ_2 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, 10°; Cap (on same side of tube as pin 5), 10°.

The angle between the trace produced by DJ_1 and DJ_2 and the trace produced by DJ_3 and DJ_4 is 90° ± 3°.

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OSCILLOGRAPH TUBE

Maximum Ratings, *Design-Center Values:*

ANODE-No.3 VOLTAGE	4000 max.	volts
ANODE-No.2* VOLTAGE	2000 max.	volts
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:		
Negative bias value	200 max.	volts
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

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	18.7 to 34.5% of Eb_2	volts
→ Grid-No.1 Voltage♦	1.5% to 4.5% of Eb_2	volts
Anode-No.1 Current of any Operating Condition	−15 to +10	μamp

Deflection Factors:

When $Eb_3 = 2 \times Eb_2$

DJ_1 & DJ_2	39 to 53 v dc/in./kv of Eb_2
DJ_3 & DJ_4	33 to 45 v dc/in./kv of Eb_2

When $Eb_3 = Eb_2$

DJ_1 & DJ_2	31 to 42 v dc/in./kv of Eb_2
DJ_3 & DJ_4	27 to 37 v dc/in./kv of Eb_2
Spot Position	##

Examples of Use of Design Ranges:

For anode-No.3 voltage of	*2000*	*3000*	*4000*	*volts*
and anode-No.2 voltage of	*2000*	*1500*	*2000*	*volts*
→ Anode-No.1 Volt.	375 to 690	280 to 515	375 to 690	volts
→ Grid-No.1 Volt.♦	−30 to −90	−22.5 to −67.5	−30 to −90	volts
Deflection Factors:				
DJ_1 & DJ_2	62 to 84	59 to 80	78 to 106	□
DJ_3 & DJ_4	54 to 74	50 to 68	66 to 90	□

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms
Resistance in Any Deflecting-Electrode Circuit■	5.0 max.	megohms

*, ●, **, ▲, ♦, ##, ■, □: See next page. → Indicates a change.

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5CP1-A

OSCILLOGRAPH TUBE

* Anode No.2 and grid No.2, which are connected together within tube, are referred to herein as anode No.2.

● At or near this rating, the effective resistance of the anode supply should be adequate to limit the anode-No.2 input power to 6 watts.

** It is recommended that anode-No.3 voltage be not less than 3000 volts for high-speed scanning.

▲ Recommended minimum value of anode-No.2 voltage.

◆ For visual cutoff of undeflected focused spot.

□ Volts dc/in.

With heater voltage of 6.3 volts, anode-No.3 voltage of 4000 volts, anode-No.2 voltage of 2000 volts, anode-No.1 voltage adjusted to focus, grid-No.1 voltage adjusted to give spot that is just visible, each deflecting electrode connected through 1-megohm resistor to anode No.2, and tube shielded from all extraneous fields, the center of the undeflected, focused spot will fall within a circle having a 12.5-mm radius concentric with the center of the tube face.

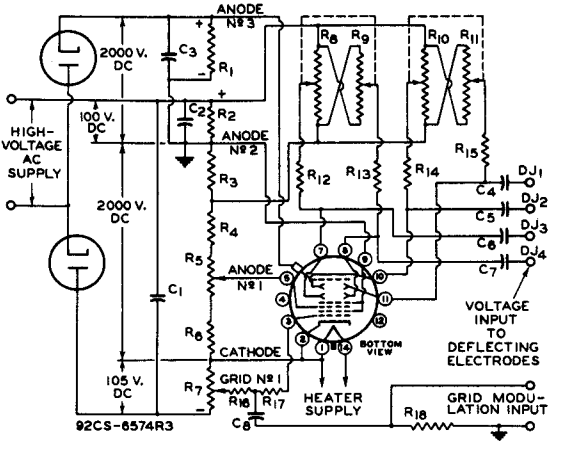
■ It is recommended that the deflecting-electrode-circuit resistances be approximately equal.

5CP1-A

5CP1-A

OSCILLOGRAPH TUBE

TYPICAL OSCILLOGRAPH CIRCUIT

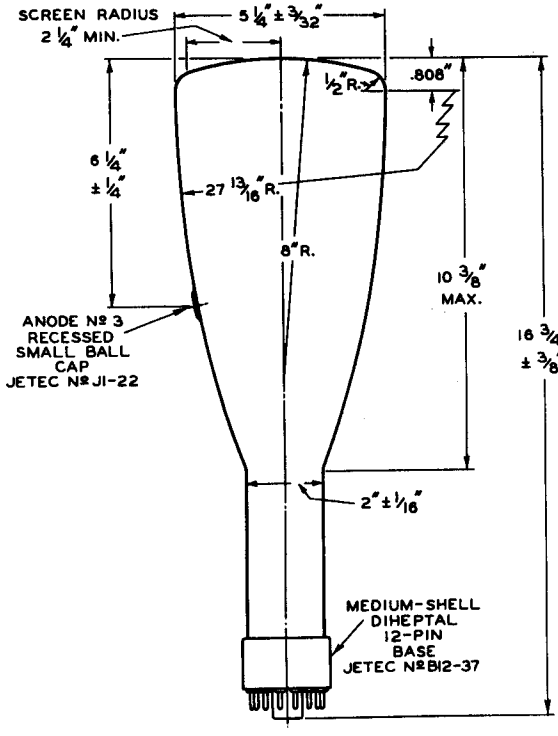


C1: 0.1 μf, 2500 Volts
C2: 1.0 μf, 200 Volts
C3: 0.1 μf, 2500 Volts
C4 C5 C6 C7: 0.05-μf, Blocking Capacitors*
C8: 0.0001 μf, 2500 Volts
R1: 50 Megohms (Five 10-Megohm, 1-Watt Resistors in Series)
R2 R3: 2 Megohms, 0.5 Watt
R4: 5.5 Megohms, 2 Watts
R5: 2-Megohm Potentiometer
R6: 1.5 Megohms, 0.5 Watt
R7: 0.5-Megohm Potentiometer
R8 R9: Dual 5-Megohm Potentiometer
R10 R11: Dual 5-Megohm Potentiometer
R12 R13 R14 R15: 2 Megohms, 0.5 Watt
R16: 0.5 Megohm, 0.5 Watt
R17: Not less than 2000 ohms per volt of positive signal
R18: 5 Megohms, 0.5 Watt

* When cathode is grounded, capacitors should have high voltage rating (2500 volts); when anode No.2 is grounded, they may have low voltage rating (200 volts). For dc amplifier service, deflecting electrodes should be connected direct to amplifier output. In this service, it is preferable usually to remove deflecting-electrode resistors to minimize loading effect on amplifier. In order to minimize spot defocusing, it is essential that anode No.2 be returned to a point in the amplifier system which will give the lowest possible potential difference between anode No.2 and the deflecting electrodes.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5CP1-A
OSCILLOGRAPH TUBE



℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE

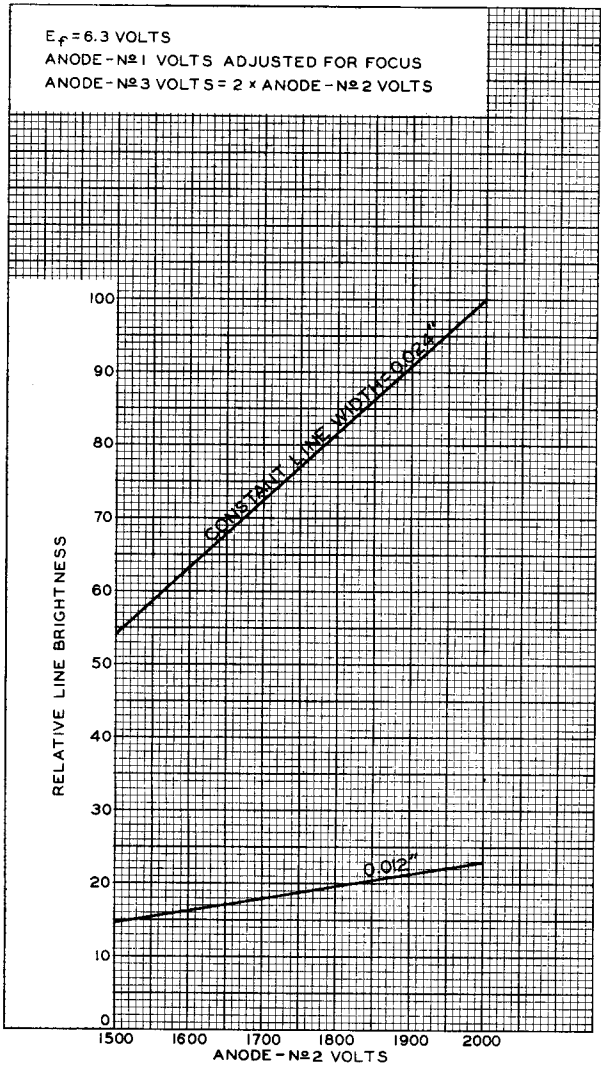
92CM-6408R4

5CP1-A

RCA

5CP1-A

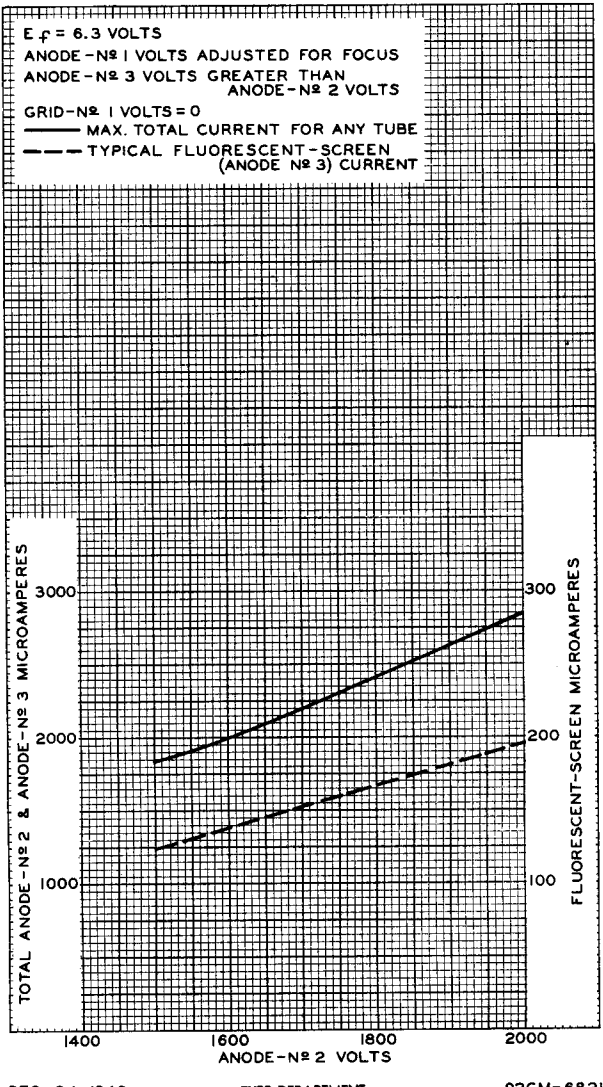
CHARACTERISTICS



RCA

5CPI-A

CHARACTERISTICS



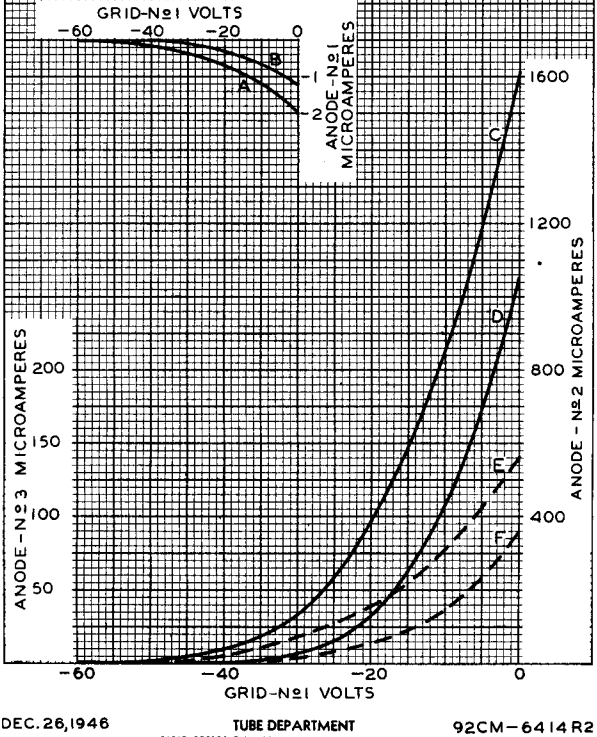
RCA

5CP1-A

AVERAGE CHARACTERISTICS

E_f = 6.3 VOLTS
ANODE-№1 VOLTS ADJUSTED TO GIVE FOCUS

CURVE	ELECTRODE CURRENT	ANODE-№2 VOLTS	ANODE-№3 VOLTS
A	ANODE №1	2000	2000-4000
B	ANODE №1	1500	1500-3000
C	ANODE №2	2000	4000
D	ANODE №2	1500	3000
E	ANODE №3	2000	4000
F	ANODE №3	1500	3000



5CP7-A
OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR
ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

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 BUILDUP and DECAY for the P7 PHOSPHOR are shown at the beginning of this Section.

5CP11-A
OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR
ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The 5CP11-A is the same as the 5CP1-A, except that it has a screen of the short-persistence, blue-fluorescence type designated P11. Its highly actinic fluorescent spot of unusually high brightness makes the 5CP11-A particularly useful for photographic recording. Because its improved phosphor has exceptional brightness for a blue screen, the 5CP11-A is also quite useful for visual observation of phenomena.

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

5CP12

OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

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.

5FP4-A
VIEW-FINDER KINESCOPE

MAGNETIC FOCUS — MAGNETIC DEFLECTION

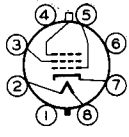
DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	8	μμf ←
Cathode to All Other Electrodes	5	μμf
Phosphor (For Curves, see front of this Section)	P4—Sulfide Type	
Fluorescence and Phosphorescence	White	
Persistence of Phosphorescence	Short	
Focusing Method	Magnetic	
Deflection Method	Magnetic	
Deflection Angle (Approx.)	53°	
Overall Length	11-1/8" ± 3/8"	
Greatest Diameter of Bulb	4-15/16" ± 3/32"	
Min. Useful Screen Diameter	4-1/4"	
Mounting Position	Any	
Cap	Recessed Small Ball (JETEC No.J1-22)	
Base	Long Medium-Shell Octal 8-Pin	

BOTTOM VIEW

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



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

Maximum Ratings, *Design-Center Values*: ←

ANODE VOLTAGE*	8000 max.	volts
GRID-No.2 VOLTAGE	410 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value	0 max.	volts
Positive peak value	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	150 max.	volts
Heater positive with respect to cathode	150 max.	volts

Typical Operation: ←

Anode Voltage**	6000	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-25 to -70	volts

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

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

← Indicates a change.

5FP4-A

5FP4-A
VIEW-FINDER KINESCOPE

→ Focusing-Coil Current (DC, approx.)●. . .	120 ± 15%	ma

Maximum Circuit Values:

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

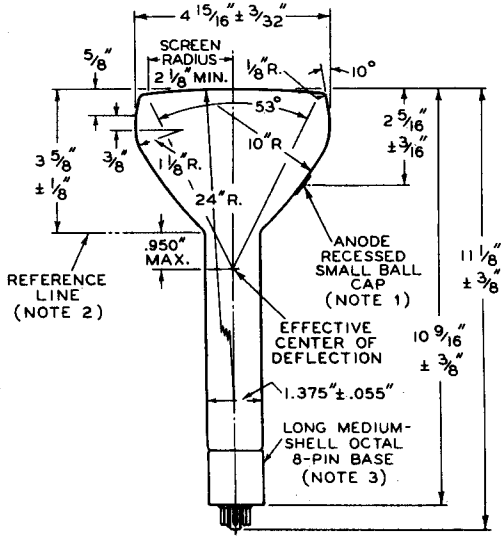
● For specimen focusing coil similar to JETEC Focusing Coil No. 106 positioned with air gap toward kinescope screen, and center line of air gap 3-1/8" from Reference Line (see Outline Drawing). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted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

→ Indicates a change.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5FP4-A

VIEW-FINDER KINESCOPE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN No. 5 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 10°. ANODE TERMINAL IS ON SAME SIDE OF TUBE AS PIN No. 5.

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

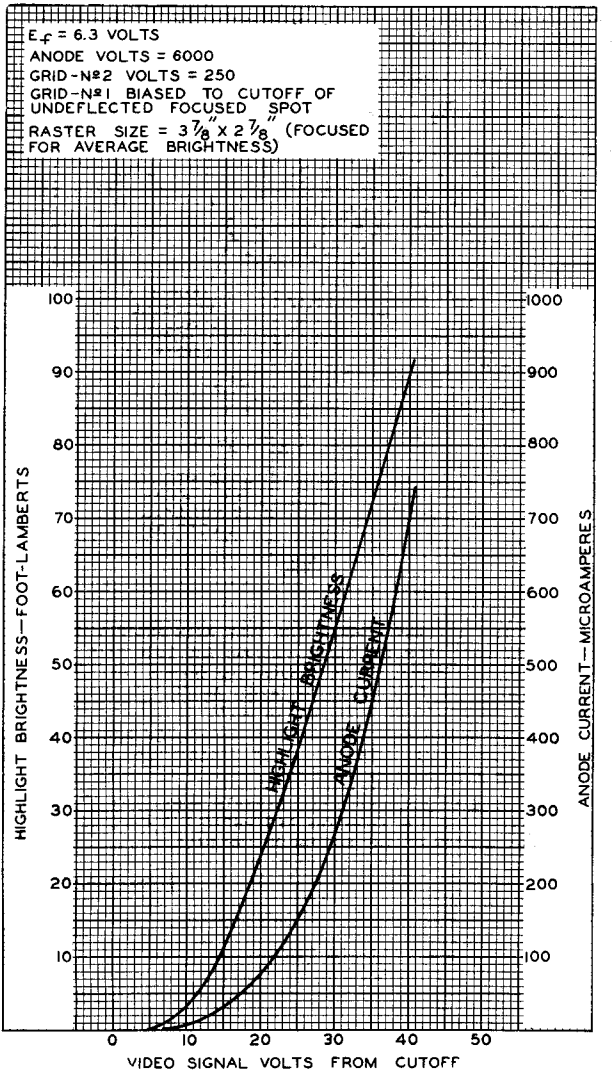
NOTE 3: ℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

92CM-6362R4

RCA

5FP4-A

AVERAGE GRID-DRIVE CHARACTERISTICS



5FP7-A

OSCILLOGRAPH TUBE

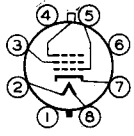
MAGNETIC FOCUS — MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	8	μμf ←
Cathode to All Other Electrodes	5	μμf
Phosphor (For Curves, see front of this Section)		P7
Fluorescence		Blue
Phosphorescence		Greenish-Yellow
Persistence of Phosphorescence		Long
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angle (Approx.)		53°
Overall Length		11-1/8" ± 3/8"
Greatest Diameter of Bulb		4-15/16" ± 3/32"
Minimum Useful Screen Diameter		4-1/4"
Mounting Position		Any
Cap		Recessed Small Ball (JETEC No.J1-22)
Base		Long Medium-Shell Octal 8-Pin (JETEC No.B8-65)

BOTTOM VIEW



Pin 1 – No Connection
Pin 2 – Heater
Pin 3 – Grid No.2
Pin 4 – No Connection
Pin 5 – Grid No.1
Pin 6 – No Connection
Pin 7 – Cathode
Pin 8 – Heater
Cap – Anode

Maximum Ratings, *Design-Center Values:*

ANODE VOLTAGE	8000 max.	volts
GRID-No.2 VOLTAGE	700 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	180 max.	volts ←
Positive bias value*	0 max.	volts
Positive peak value	2 max.	volts
PEAK GRID-No.1 DRIVE FROM CUTOFF	65 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

Typical Operation:

Anode Voltage**	4000	7000	volts
Grid-No.2 Voltage	250	250	volts

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

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

← Indicates a change.

5FP7-A

OSCILLOGRAPH TUBE

Grid-No.1 Voltage°	−25 to −70	−25 to −70	volts
→ Grid-No.2 Current.	−15 to +15	−15 to +15	μamp
Focusing-Coil Current			
→ (DC, approx.)#	96 ± 15%	128 ± 15%	ma
Spot Position.	##	—	

Maximum Circuit Values:

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

° 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 airgap 2-3/4 inches from Reference Line (see Outline Drawing), and total anode current of 200 microamperes.

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

OPERATING NOTES

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

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

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

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

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

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

→ indicates a change.

5FP14

OSCILLOGRAPH TUBE

MAGNETIC FOCUS MAGNETIC DEFLECTION

The 5FP14 is the same as the 5FP7-A except that it utilizes a medium-long-persistence, cascade (two-layer) screen which exhibits purple fluorescence of short persistence and orange phosphorescence which persists for a little over a minute under conditions of adequate excitation and low ambient light.

Because of its medium-long persistence, the 5FP14 is particularly useful where either low- and medium-speed non-recurring phenomena or high-speed recurring phenomena are to be observed. Furthermore, two or more phenomena can be observed simultaneously on the screen by means of a suitable switching arrangement.

The persistence is such that the 5FP14 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 5FP14 can be operated with much lower scanning frequencies.

In general, operation of the 5FP14 at an anode voltage below 4000 volts will not give persistence of useable brightness.

THE SPECTRAL-ENERGY EMISSION CHARACTERISTIC
and the PERSISTENCE CHARACTERISTIC of
the P14 Phosphor are shown at the
front of this Section.

5HP1-A

HIGH-VACUUM CATHODE-RAY TUBE

Supersedes Type 5HP1

The 5HP1-A is like the 5BP1-A except that the 5HP1-A is equipped with a Micanol base and, therefore, is less easily damaged by repeated base-pin flashovers which may occur when the tube is used at low atmospheric pressure.

5TP4
PROJECTION KINESCOPE

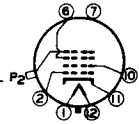
ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

DATA

General:

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	7.5 μμf
Cathode to All Other Electrodes	5.0 μμf
External Conductive Coating to Anode No.2	500 max. μμf 100 min. μμf
Phosphor (For Curves, see front of this Section)	No.4
Fluorescence and Phosphorescence	White
Persistence of Phosphorescence	Medium
Focusing Method	Electrostatic
Deflection Method	Magnetic
Deflection Angle (Approx.)	50°
Overall Length	11-3/4" ± 3/8"
Greatest Diameter of Bulb	5" ± 1/8"
Minimum Useful Screen Diameter	4-1/2"
Minimum Optical-Quality-Circle Diameter	4-1/4"
Mounting Position	Any
Cap	Recessed Small Cavity
Base	Small-Shell Duodecal 7-Pin
Basing Designation for BOTTOM VIEW	12C

Pin 1 - Heater
Pin 2 - Grid No.1
Pin 6 - Anode No.1
Pin 7 - Internal Con. - Do Not Use



Pin 10 - Grid No.2
Pin 11 - Cathode
Pin 12 - Heater
Cap - Anode No.2

Maximum Ratings, *Design-Center Values*:

ANODE-No.2 VOLTAGE	27000 max.	volts
ANODE-No.1 VOLTAGE	6000 max.	volts
GRID-No.2 VOLTAGE	350 max.	volts
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:		
Negative bias value	150 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	175 max.	volts ←
Heater positive with respect to cathode	10 max.	volts

Typical Operation:

Anode-No.2 Voltage*	27000	volts
Anode-No.1 Voltage for Focus when anode-No.2 current is 200 μa.	4320 to 5400	volts ←

* See next page. ← Indicates a change.

5TP4

5TP4
PROJECTION KINESCOPE

Grid-No.2 Voltage**	200	volts
→Grid-No.1 Voltage for Visual Cutoff°	-42 to -98	volts
Anode-No.2 Current	200	μa
→Max. Anode-No.1 Current	65	μa
Max. Grid-No.2 Current	±15	μa

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	180 min.	ohms
Grid-No.2-Circuit Resistance	390 min.	ohms
Anode-No.1-Circuit Resistance	6800 min.	ohms
Anode-No.2-Circuit Resistance	30000 min.	ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

Deflection Yoke	RCA Type No.201D2
Horizontal Output Transformer (for use with two 6BG6-G's)	RCA Type No.211T2
Vertical Output Transformer	RCA Type No.204T2

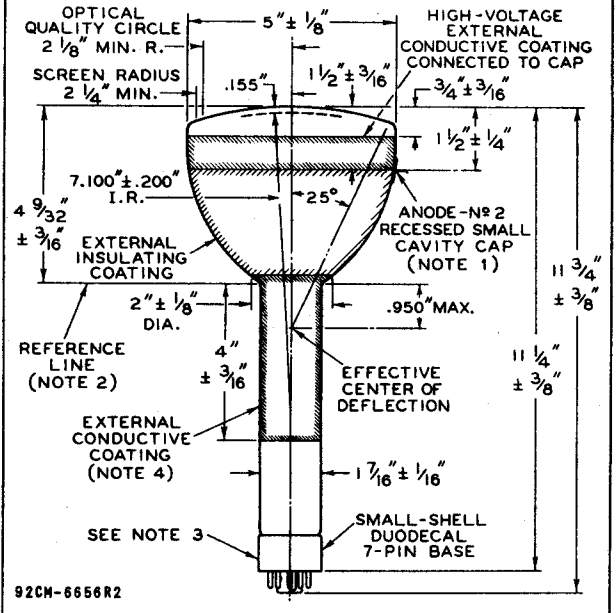
* Brilliance and definition decrease with decreasing anode voltages. In general, anode No.2 voltage should not be less than 20000 volts.

** Subject to variation of ±40% if it is desired to operate any tube at a grid-No.1 cutoff bias of -70 volts.

° Visual extinction of undeflected focused spot.

→Indicates a change.

5TP4
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 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.

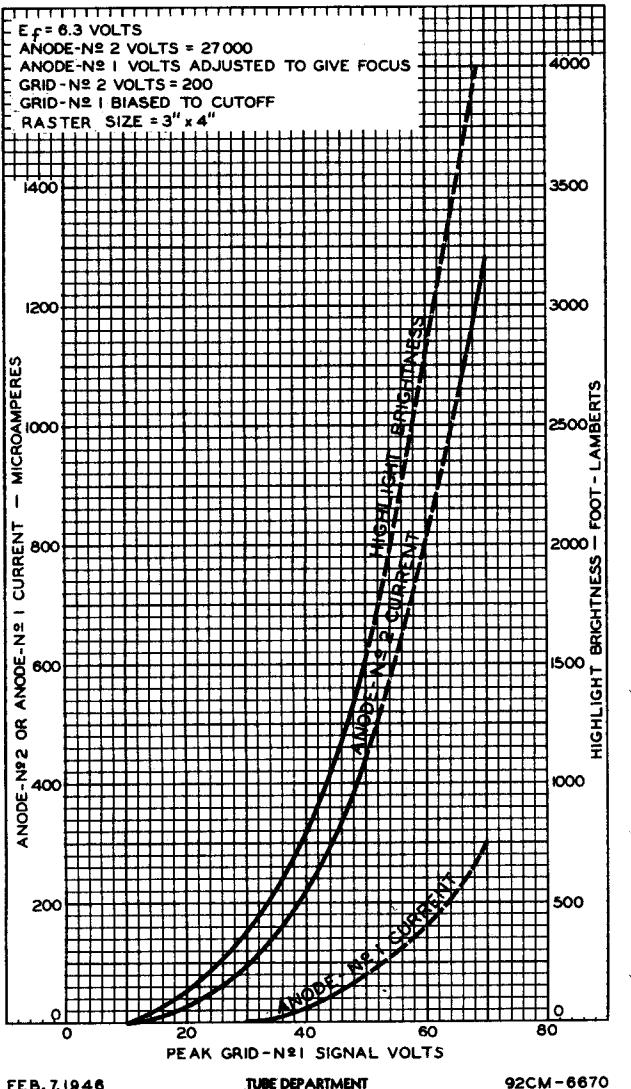
NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE HINGED GAUGE 1.500" + .003" – .000" I.D. AND 2" LONG WILL REST ON BULB CONE.

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.

5TP4

AVERAGE CHARACTERISTICS



5UP1

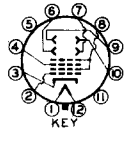
OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS — ELECTROSTATIC DEFLECTION

General:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	8.0	μμf
DJ_1 to DJ_2	2.5	μμf
DJ_3 to DJ_4	2.5	μμf
DJ_1 to All Other Electrodes	11.0	μμf
DJ_2 to All Other Electrodes	8.0	μμf
DJ_3 to All Other Electrodes	7.0	μμf
DJ_4 to All Other Electrodes	8.0	μμf
Phosphor (For Curves, see front of this Section)		No.1
Fluorescence		Green
Persistence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		14-3/4" ± 3/8"
Greatest Diameter of Bulb		5-1/4" ± 3/32"
Minimum Useful Screen Diameter		4-1/2"
Mounting Position		Any
Base		Small-Shell Duodecal 12-Pin
Basing Designation for BOTTOM VIEW		12E

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 3 – Cathode
Pin 4 – Anode No.1
Pin 5 – Internal Con. Do Not Use
Pin 6 – Deflecting Electrode DJ_3
Pin 7 – Deflecting Electrode DJ_4



Pin 8 – Anode No.2, Grid No.2
Pin 9 – Deflecting Electrode DJ_2
Pin 10 – Deflecting Electrode DJ_1
Pin 11 – Internal Con. Do Not Use
Pin 12 – Heater

DJ_1 and DJ_2 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 4. With DJ_3 positive with respect to 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 1 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° ± 3°.

5UP1

5UP1
OSCILLOGRAPH TUBE

Maximum Ratings, *Design-Center Values:*

ANODE-No.2 ■ VOLTAGE	2500 max.	volts
ANODE-No.1 VOLTAGE	1000 max.	volts
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:		
Negative bias value	200 max.	volts
Positive bias value	0 max.	volts
Peak positive 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

Equipment Design Ranges:

For any anode-No.2 voltage (Eb_2) between 1000 and 2500 volts*

Anode-No.1 Voltage	17% to 32% of E_{b2}	volts
Max. Grid-No.1 Voltage for Visual Cutoff	4.5% of E_{b2}	volts
Anode-No.1 Current for Any Operating Condition	−15 to +10	microamp
Deflection Factors:		
DJ1 & DJ2	28 to 38.5	v dc/in./kv of E_{b2}
DJ3 & DJ4	23 to 31	v dc/in./kv of E_{b2}

Examples of Use of Design Ranges:

For anode-No.2 voltages of	*1000*	*2000*	*volts*
Anode-No.1 Voltage	170 – 320	340 – 640	volts
Max. Grid-No.1 Voltage for Visual Cutoff	−45	−90	volts
Deflection Factors:			
DJ1 & DJ2	28 – 38.5	56 – 77	volts dc/in.
DJ3 & DJ4	23 – 31	46 – 62	volts dc/in.

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms
Resistance in Any Deflecting Electrode Circuit□	5.0 max.	megohms

* Recommended minimum value.

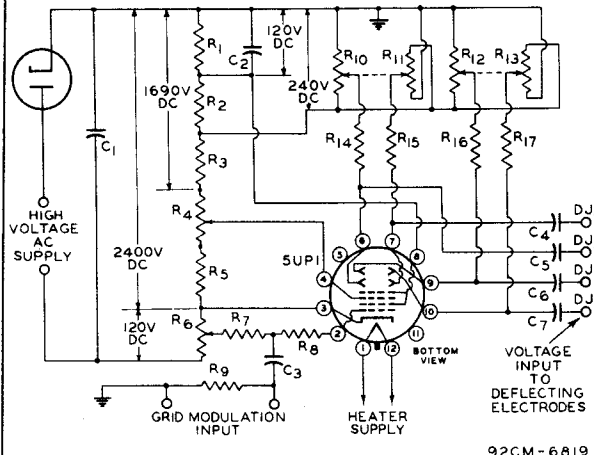
□ It is recommended that the deflecting-electrode-circuit resistances be approximately equal.

■ Anode No.2 and grid No.2, which are connected together within tube, are referred to herein as anode No.2.

5UP1

5UP1
OSCILLOGRAPH TUBE

TYPICAL CIRCUIT



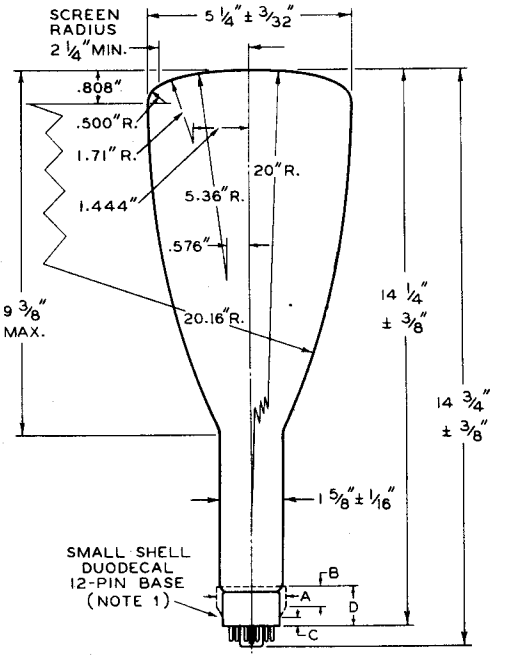
92CM-6819

R1 R2: 2.5 Megohms, 0.5 Watt
R3: 6 Megohms, 3 Watts
R4: 2-Megohm Potentiometer
R5: 1 Megohm, 0.5 Watt
R6: 0.5-Megohm Potentiometer
R7: 0.5-Megohm, 0.5 Watt
R8: Not less than 2000 Ohms per volt of positive signal
R9: 5-Megohms, 0.5 Watt

R10-R11, R12-R13: Dual Potentiometers, R10, R11, R12, R13: 0.5 Megohm
R14 R15 R16 R17: 2.2 Megohms, 0.5 Watt

C1: 0.1 μf, 2500 Volts
C2: 1 μf, 200 Volts
C3: 0.0001 μf, 2500 Volts
C4 C5 C6 C7: 0.1 μf, 600 Volts

5UP1
OSCILLOGRAPH TUBE



℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

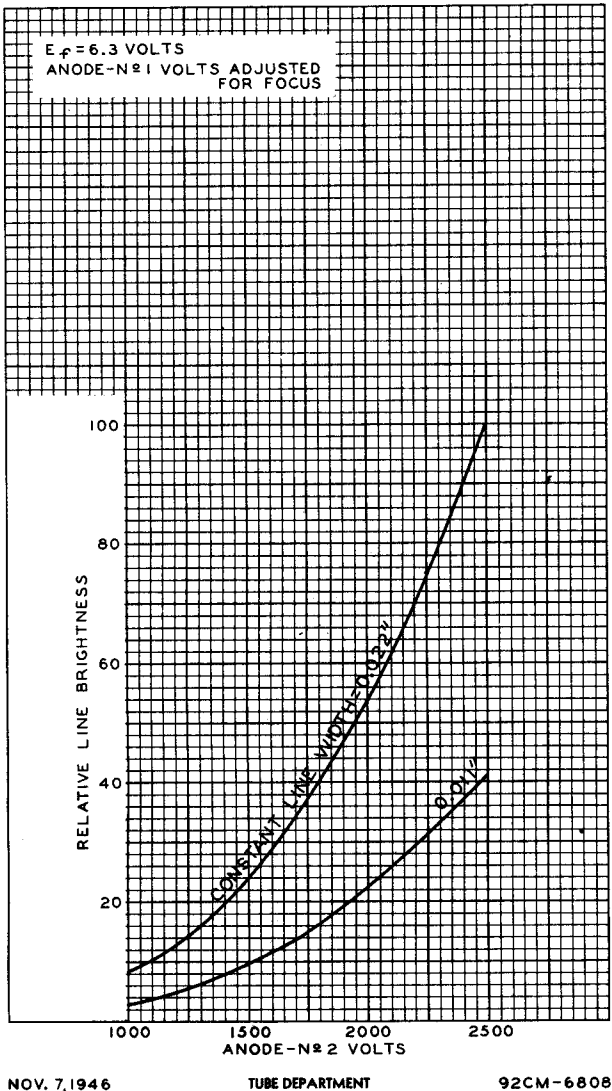
NOTE 1: THIS BASE MAY BE SUPERSEDED BY AN ALTERNATE BASE WHICH WILL FIT THE SAME SOCKET BUT WHICH WILL HAVE A FLARED SHELL INDICATED BY THE DASHED LINES AND DIMENSIONED APPROXIMATELY AS FOLLOWS:

A = 1.85" MAX., B = 0.500", C = 0.200" MIN., D = 0.925".

92CM-6763

5UP1

AVERAGE CHARACTERISTICS

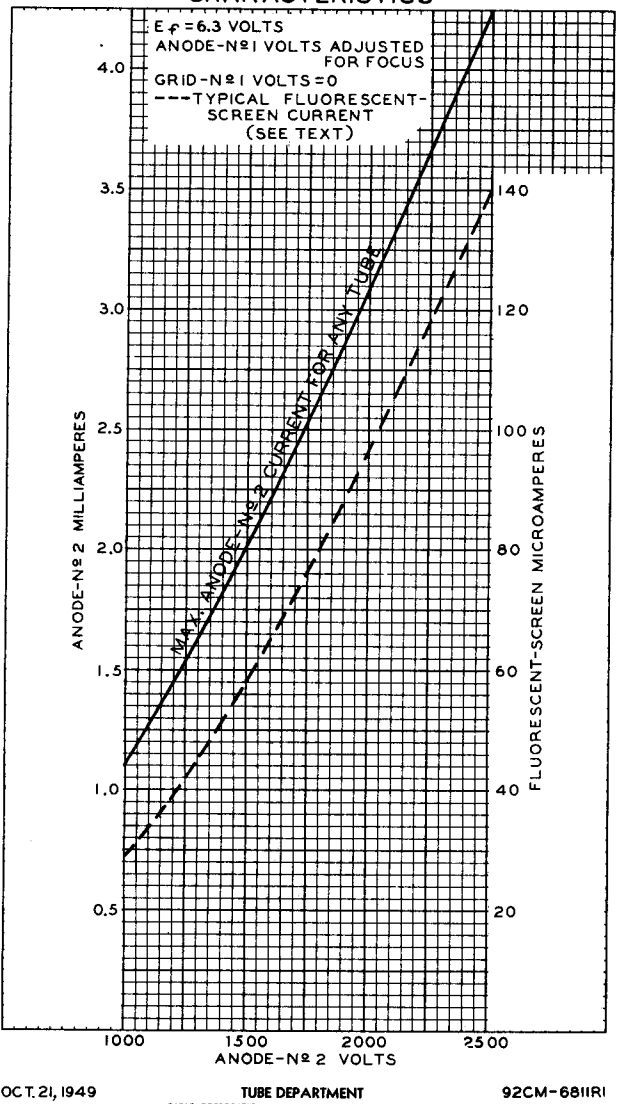


5UP1

RCA

5UP1

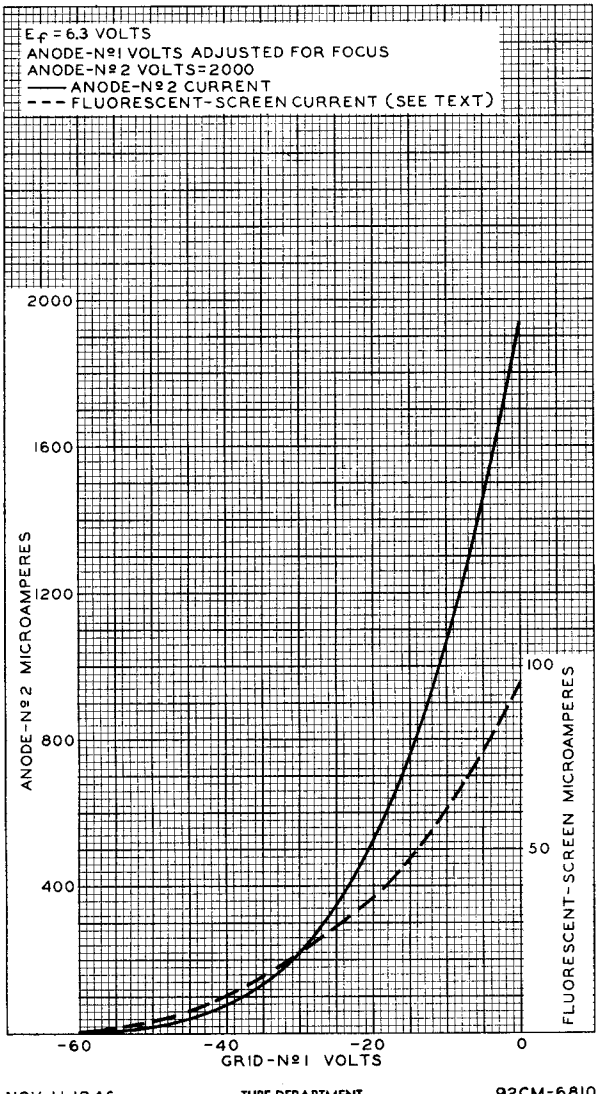
CHARACTERISTICS



RCA

5UP1

AVERAGE CHARACTERISTICS



5UP7

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

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

5UP11

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The 5UP11 is the same as the 5UP1, except that it has a screen of the short-persistence, blue-fluorescence type designated P11. Its highly actinic fluorescent spot of unusually high brightness makes the 5UP11 particularly useful for photographic recording. Because its improved phosphor has exceptional brightness for a blue screen, the 5UP11 is also quite useful for visual observation of phenomena. Radiation of useable intensity can be obtained with anode-No.2 voltages as low as 1500 volts.

The SPECTRAL-ENERGY EMISSION CHARACTERISTIC of the P11 PHOSPHOR is shown at the beginning of this section

RCA

5WP11

TRANSCRIBER KINESCOPE

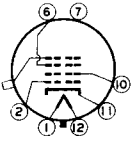
ELECTROSTATIC FOCUS — MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	7.5	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Anode No.2	500 max. / 100 min.	μμf
Phosphor (For Curves, see front of this Section)		P11
Fluorescence		Blue
Persistence		Short
Focusing Method		Electrostatic
Deflection Method		Magnetic
Deflection Angle (Approx.)		50°
Overall Length		11-7/16" ± 3/8"
Greatest Diameter of Bulb		5" ± 1/8"
Minimum Useful Screen Diameter		4-1/4"
Raster Size (Approx.)		2-1/2" x 3-3/8"
Mounting Position		Any
Cap		Recessed Small Cavity
Base		Small-Shell Duodecal 7-Pin
Basing Designation for BOTTOM VIEW		12C

Pin 1 - Heater
Pin 2 - Grid No.1
Pin 6 - Anode No.1
Pin 7 - Internal Con. - Do Not Use



Pin 10 - Grid No.2
Pin 11 - Cathode
Pin 12 - Heater
Cap - Anode No.2

Maximum Ratings, *Design-Center Values*:

ANODE-No.2 VOLTAGE	27000 max.	volts
ANODE-No.1 VOLTAGE	6000 max.	volts
GRID-No.2 VOLTAGE	350 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	150 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	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

Typical Operation:

Anode-No.2 Voltage*	27000	volts

*: See next page.

5WP11

5WP11

TRANSCRIBER KINESCOPE

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		μamp
Max. Anode-No.1 Current	25		μamp
Grid-No.2 Current Range	-15 to +15		μamp

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	180 min.	ohms
Grid-No.2-Circuit Resistance	390 min.	ohms
Anode-No.1-Circuit Resistance	6800 min.	ohms
Anode-No.2-Circuit Resistance	30000 min.	ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

Deflecting Yoke	RCA Type No. 201D11
Hor. Deflection Output Transformer:	
For use with 6AS7-G booster scanning tube and separate high-voltage supply	RCA Type No. 204T1
For use with single high-voltage tripler supply employing 3 1B3-GT/8016's	RCA Type No. 211T2
Ver. Deflection Output Transformer	RCA Type No. 204T2

* Brilliance and definition decrease with decreasing anode voltages. In general, anode-No.2 voltage should not be less than 15000 volts.

** Subject variation of ± 40% when grid-No.1 voltage cutoff is desired at -70 volts.

OPERATING NOTES

Soft x-rays are produced when the 5WP11 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 equipment design.

Resolution of better then 700 lines at the center of the reproduced picture can be produced by the 5WP11. To utilize such resolution capability in the horizontal direction with the standard scanning rate of 525 lines, it is necessary to use a video amplifier having a band-width of at least 10 megacycles.

5WP11

TRANSCRIBER KINESCOPE

The screen of the 5WP11 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.

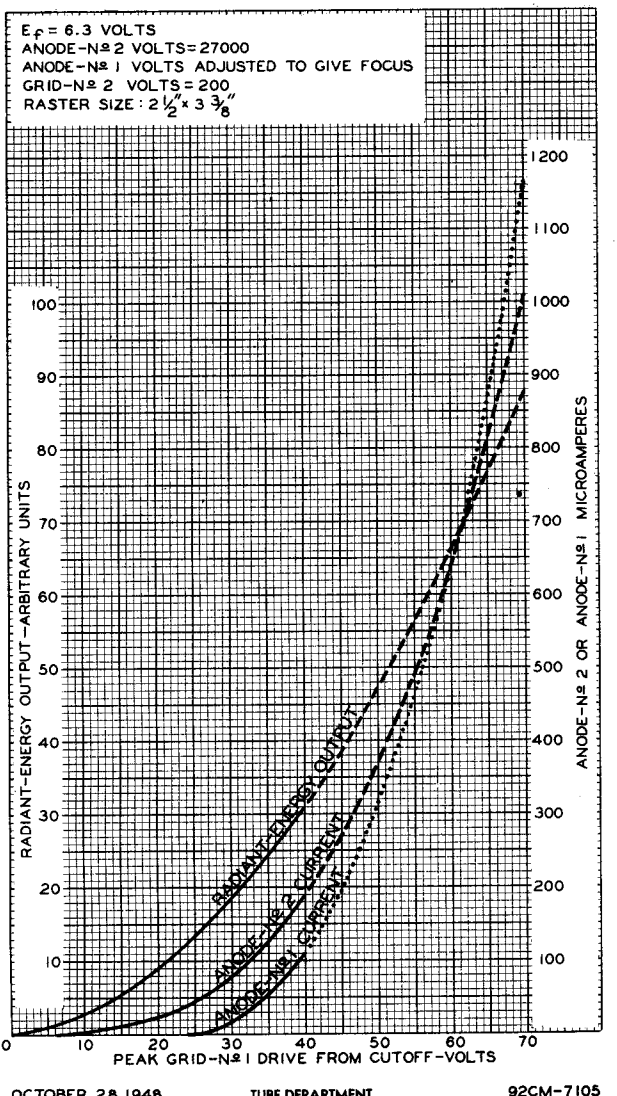
Operation of the 5WP11 results in gradual browning of the face. The rate of browning increases markedly with increase in anode-No.2 voltage, is proportional to beam current, and is inversely proportional to the scanned area. The browning is most noticeable during initial operation; thereafter, a gradual 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

RCA

5WP11

AVERAGE CHARACTERISTICS



5WP15
FLYING-SPOT CATHODE-RAY TUBE

ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

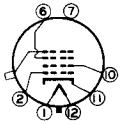
For use in Flying-Spot Video-Signal Generators

DATA

General:

Heater, for Unipotential Cathode:	
Voltage	6.3 ac or dc volts
Current	0.6 amp
Direct Interelectrode Capacitances:	
Grid No.1 to All Other Electrodes	7.5 μμf
Cathode to All Other Electrodes	5 μμf
External Conductive Coating to Anode No.2	500 max. μμf; 100 min. μμf
Phosphor	No.15
Fluorescence:	
Visible Radiation	Blue-Green
Invisible Radiation	Near Ultraviolet
Phosphorescence:	
Persistence of Visible Radiation	Very Short
Persistence of Invisible Radiation	Extremely Short
Focusing Method	Electrostatic
Deflection Method	Magnetic
Deflection Angle (Approx.)	50°
Overall Length	11-7/16" ± 3/8"
Greatest Diameter of Bulb	5" ± 1/8"
Minimum Useful Screen Diameter	4-1/4"
Minimum Inside Diameter of Deflecting Coil	1.505"
Mounting Position	Any
Cap	Recessed Small Cavity
Base	Small-Shell Duodecal 7-Pin
Basing Designation for BOTTOM VIEW	12C

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 6 – Anode No.1
Pin 7 – Internal Con. – Do Not Use



Pin 10 – Grid No.2
Pin 11 – Cathode
Pin 12 – Heater
Cap – Anode No.2

Maximum Ratings, *Design-Center Values:*

ANODE-No.2 VOLTAGE	27000 max.	volts
ANODE-No.1 VOLTAGE	6000 max.	volts
GRID-No.2 VOLTAGE	350 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	150 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	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

5WP15
FLYING-SPOT CATHODE-RAY TUBE

Typical Operation:

Anode-No.2 Voltage*	20000	volts
Anode-No.1 Voltage Range for Anode-No.2 Current of 150 μamp.	3000 to 3800	volts
Grid-No.2 Voltage**	200	volts
Grid-No.1 Voltage for Visual Cutoff°	-42 to -98	volts
Anode-No.2 Current	150	μamp
Max. Anode-No.1 Current	200	μamp
Grid-No.2 Current Range	-15 to +15	μamp

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	180 min.	ohms
Grid-No.2-Circuit Resistance	390 min.	ohms
Anode-No.1-Circuit Resistance	6800 min.	ohms
Anode-No.2-Circuit Resistance	30000 min.	ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

Deflecting Yoke	RCA Type No. 201D11

* Brilliance and definition decrease with decreasing anode voltages. In general, anode-No.2 voltage should not be less than 15000 volts.

** Subject to variation of ±40% when grid-No.1 voltage cutoff is desired at -70 volts.

° Visual extinction of undeflected focused spot.

OPERATING NOTES

Soft x-rays are produced when the 5WP15 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 equipment design.

Resolution of better than 700 lines at the center of the reproduced picture can be produced by the 5WP15. 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.

The blue-green radiation decays hyperbolically to about 30 per cent of its initial value in 1.5 microseconds. The ultra-

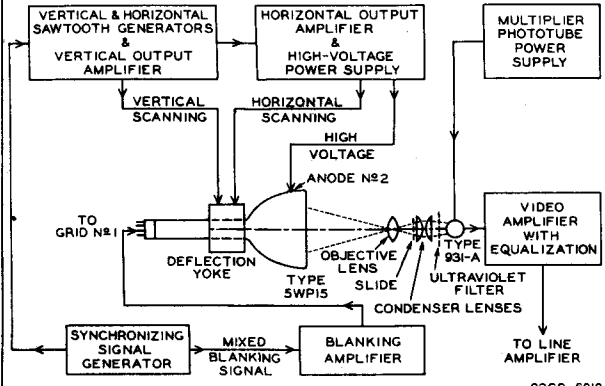
5WP15
FLYING-SPOT CATHODE-RAY TUBE

violet radiation has an equivalent exponential decay with a time constant less than 0.05 microsecond. 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 P15 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 when optimum efficiency of the screen is desired at maximum anode-No. 2 current.

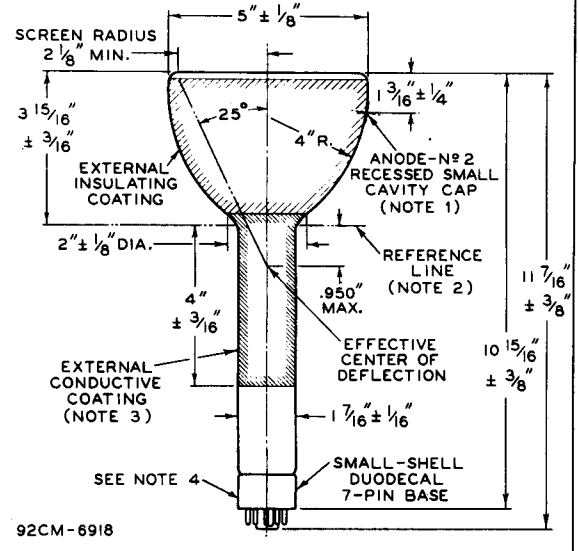
Operation of the 5WP15 results in gradual browning of the face. The rate of browning increases markedly with increase in anode-No. 2 voltage, is proportional to beam current, and is inversely proportional to the scanned area. The browning is most noticeable during initial operation; thereafter, a gradual increase in the amount of browning will be observed during the life of the tube.

BLOCK DIAGRAM OF FLYING-SPOT VIDEO SIGNAL GENERATOR SYSTEM FOR SLIDE TRANSPARENCIES



92CS-6919

5WP15
FLYING-SPOT CATHODE-RAY TUBE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No. 3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE-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" AND 2" LONG WILL REST ON BULB CONE.

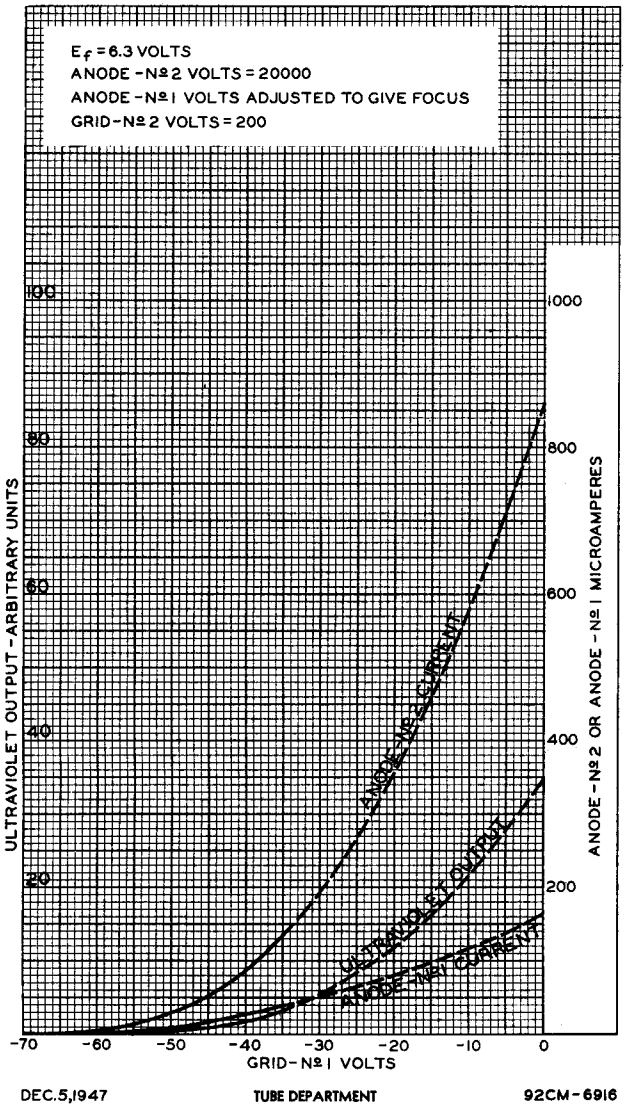
NOTE 3: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

NOTE 4: ℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

RCA

5WP15

AVERAGE CHARACTERISTICS

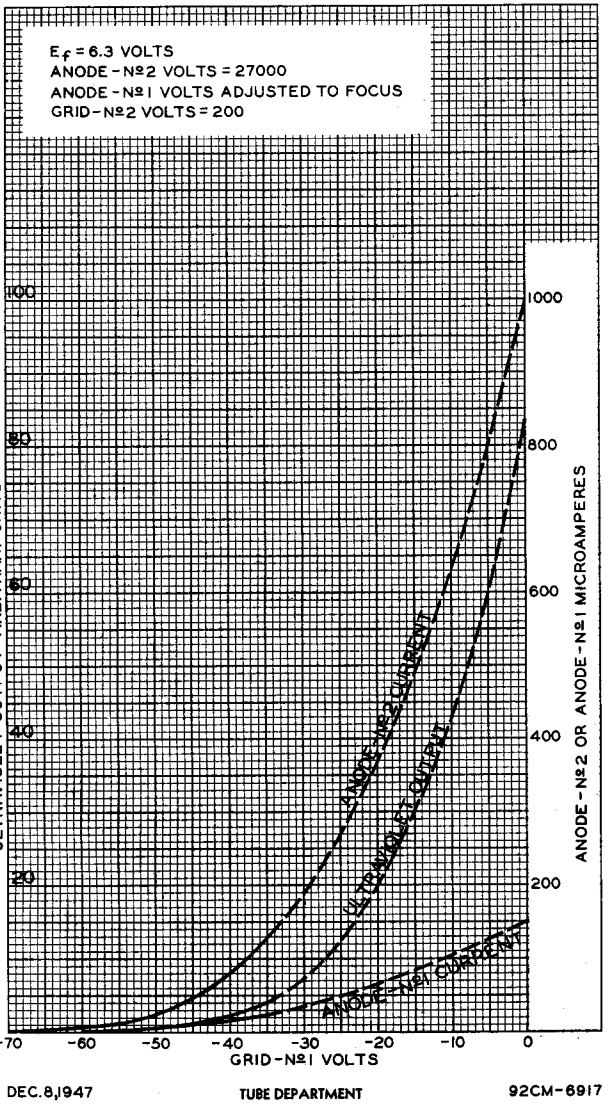


5WP15

RCA

5WP15

AVERAGE CHARACTERISTICS



DEC. 8, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6917

5ZP16

FLYING-SPOT CATHODE-RAY TUBE

ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

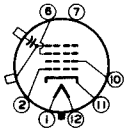
For use in Flying-Spot Video-Signal Generators

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	8	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Anode	500 max. / 100 min.	μμf
Phosphor (For Curves, see front of this Section)		No.16
Fluorescence		Violet and Near-Ultraviolet
Phosphorescence		Violet and Near-Ultraviolet
Persistence		Extremely Short
Focusing Method		Electrostatic
Deflection Method		Magnetic
Deflection Angle (Approx.)		40°
Overall Length		14-3/8" ± 3/8"
Greatest Diameter of Bulb		5" ± 1/8"
Minimum Useful Screen Diameter		4-1/4"
Mounting Position		Any
Cap		Recessed Small Cavity (JETEC No.J1-21)
Base		Small-Shell Duodecal 7-Pin (JETEC No.B7-51)

BOTTOM VIEW



Pin 1 – Heater
Pin 2 – Grid No.1
Pin 6 – Grid No.3
Pin 7 – Internal Con. – Do Not Use
Pin 10 – Grid No.2
Pin 11 – Cathode
Pin 12 – Heater
Cap – Anode
C – External Conductive Coating

SOCKET CONTACTS CORRESPONDING TO VACANT PIN POSITIONS 3, 4, 5, 8, & 9 SHOULD BE REMOVED

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

ANODE VOLTAGE	27000 max.	volts
GRID-No.3 VOLTAGE	7000 max.	volts
GRID-No.2 VOLTAGE	350 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	150 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

5ZP16

5ZP16

FLYING-SPOT CATHODE-RAY TUBE

Typical Operation:			
Anode Voltage*	20000	27000	volts
Grid-No.3 Voltage Range for Anode Current as Indicated	4700 ± 12%	6300 ± 12%	volts
Grid-No.2 Voltage**	200	200	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot°	−70	−70	volts
Anode Current	25	15	μamp
Max. Grid-No.3 Current for Anode Current as Indicated	75	25	μamp
Grid-No.2 Current Range	−15 to +15	−15 to +15	μamp

Maximum Circuit Values:

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

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 20000 volts.

** Subject to variation of ± 40% when grid-No.1 voltage cutoff is desired at the average cutoff value of −70 volts.

° Subject to variation of ± 40% when grid-No.2 voltage is maintained at 200 volts.

OPERATING NOTES

X-Ray Warning. X-ray radiation is produced at the face of the 5ZP16 when it is operated at its normal anode 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.

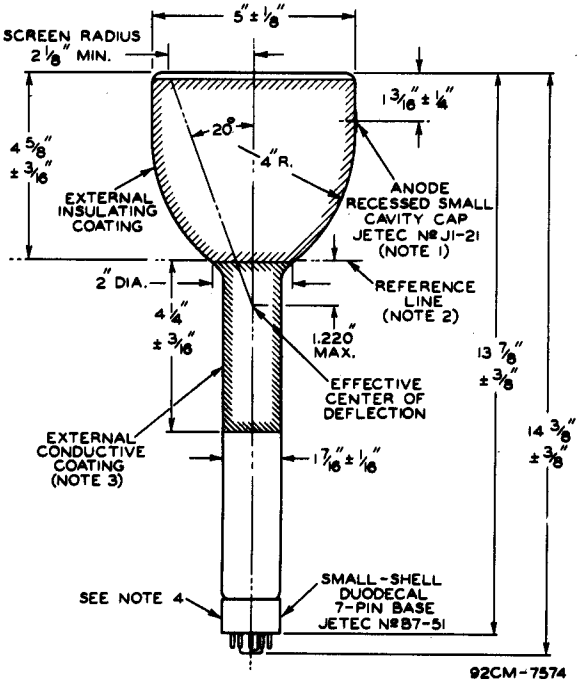
Resolution of better than 1000 lines at the center of the reproduced picture can be produced by the 5ZP16 when it is operated with 27000 volts on the anode. At lower anode voltages, the resolution capability decreases. To obtain high resolution in the horizontal direction, it is necessary to use a video amplifier having a bandwidth of about 20 megacycles.

The *ultraviolet output* of the 5ZP16 is a linear function of the anode current. For any particular value of anode current, the ultraviolet output is approximately 50 per cent higher when the 5ZP16 is operated with 27000 volts on the anode than when operated with 20000 volts.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5ZP16

FLYING-SPOT CATHODE-RAY TUBE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No. 3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 10°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No. 3.

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

NOTE 3: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

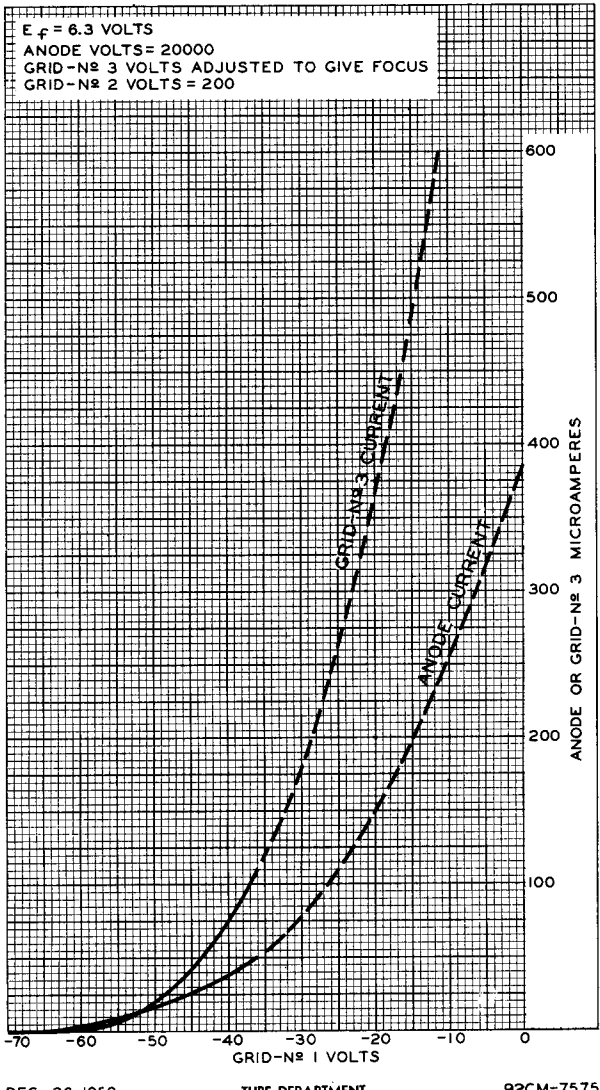
NOTE 4: ℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

5ZP16

RCA

5ZP16

AVERAGE CHARACTERISTICS



DEC. 26, 1950

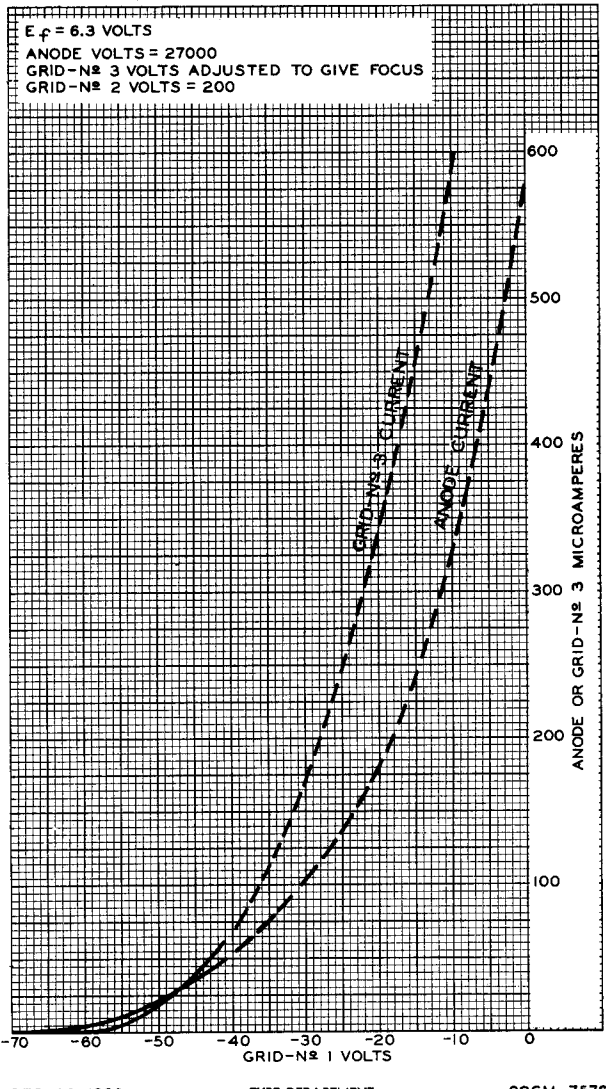
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7575

RCA

5ZP16

AVERAGE CHARACTERISTICS



7BP7-A
OSCILLOGRAPH TUBE

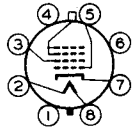
MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:

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	8.5 μμf
Grid No.2 to All Other Electrodes	7 μμf
Cathode to All Other Electrodes	5 μμf
Phosphor (For Curves, see front of this Section)	No.7
Fluorescence	Blue
Phosphorescence	Greenish-Yellow
Persistence of Phosphorescence	Long
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle (Approx.)	53°
Overall Length	13-1/4" ± 3/8"
Greatest Diameter of Bulb	7" ± 1/8"
Maximum Useful Screen Diameter	6"
Mounting Position	Any
Cap	Recessed Small Ball
Base	Long Medium-Shell Octal 8-Pin

BOTTOM VIEW



Pin 1 – No Connection
Pin 2 – Heater
Pin 3 – Grid No.2
Pin 4 – No Connection
Pin 5 – Grid No.1
Pin 6 – No Connection
Pin 7 – Cathode
Pin 8 – Heater
Cap – Anode, Grid No.3

Maximum Ratings, *Design-Center Values*:

ANODE● VOLTAGE	8000 max.	volts
GRID-No.2 VOLTAGE	700 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 GRID-No.1 DRIVE FROM CUTOFF	65 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

Typical Operation:

Anode Voltage*	4000	7000	volts
Grid-No.2 Voltage	250	250	volts
Grid-No.1 Voltage Range○	-25 to -70	-25 to -70	volts
Focusing-Coil Current▲	75 to 102	99 to 135	ma
Spot Position	#	–	

●,□,*,○,▲,#: See next page.

7BP7-A
OSCILLOGRAPH TUBE

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 voltages involved.

Components:

RCA Focusing Coil.	RCA Type No. 202D1

● Anode and grid No.3, which are connected together within tube, are referred to herein as anode.

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

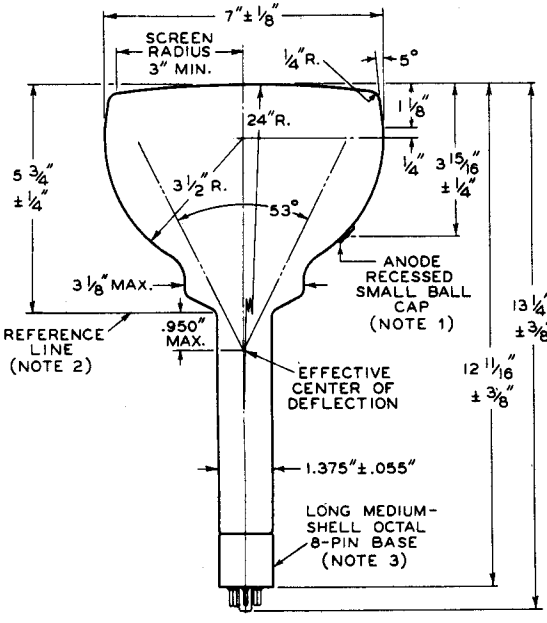
* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 4000 volts.

○ For visual extinction of undeflected focused spot.

▲ 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.

\# The center of the undeflected, unfocused spot will fall within a circle having 12 mm radius concentric with the center of the tube face.

7BP7-A
OSCILLOGRAPH TUBE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN No.5 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE TERMINAL IS ON SAME SIDE OF TUBE AS PIN No.5.

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

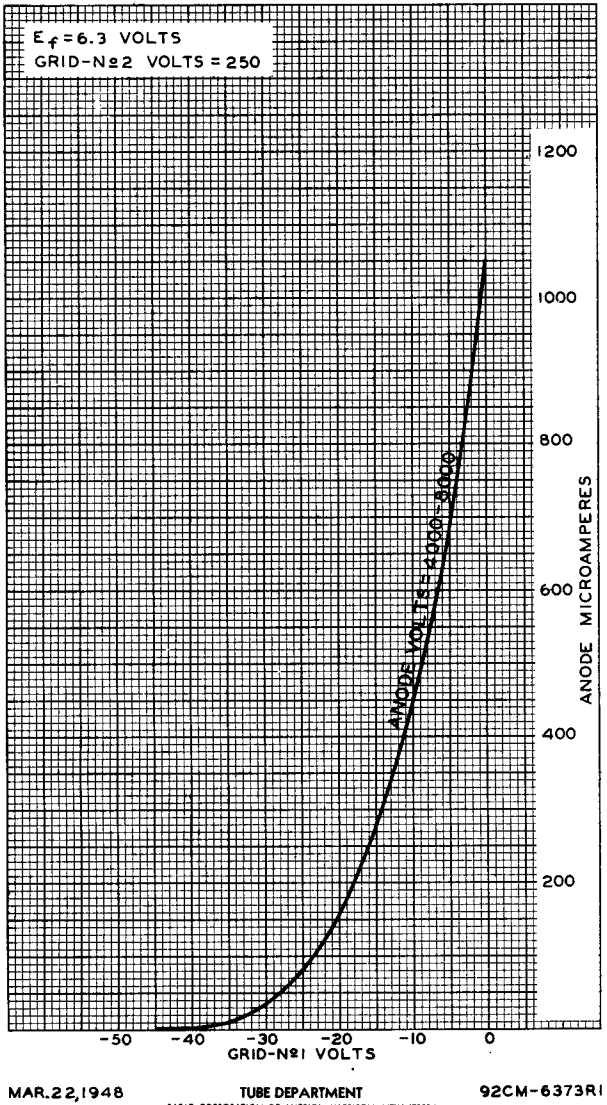
NOTE 3: ℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

92CM-6367R3

RCA

7BP7-A

AVERAGE CHARACTERISTIC



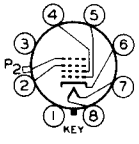
7CP1
OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS, MAGNETIC DEFLECTION

General:

Heater, for Unipotential Cathode:	
Voltage	6.3 ± 10% ac or dc volts
Current	0.6 amp
Direct Interelectrode Capacitances (Approx.):	
Grid No.1 to All Other Electrodes	8.0 μμf
Cathode to All Other Electrodes	6.5 μμf
Phosphor (For Curves, see front of this Section)	No.1
Fluorescence	Green
Persistence	Medium
Focusing Method	Electrostatic
Deflection Method	Magnetic
Solid Deflection Angle (Approx.)	57°
Overall Length	13-7/16" ±3/8"
Greatest Diameter of Bulb	7" ±1/8"
Minimum Useful Screen Diameter	6-1/2"
Cap	Recessed Small Ball
Mounting Position	Any
Base	Long Medium-Shell Octal 8-Pin
Basing Designation for BOTTOM VIEW	6AZ

Pin 1 – No Connection
Pin 2 – Anode No.1
Pin 3 – No Connection
Pin 4 – Grid No.2
Pin 5 – Grid No.1



Pin 6 – Cathode
Pin 7 – Heater
Pin 8 – Heater
Cap – Anode No.2

Maximum Ratings, *Design-Center Values:*

ANODE-No.2 VOLTAGE	8000 max.	volts
ANODE-No.1 VOLTAGE	2400 max.	volts
GRID-No.2 VOLTAGE	300 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

Typical Operation:

Anode-No.2 Voltage*	4000	7000	volts
Anode-No.1 Voltage for Focus at 75% of Grid-No.1 Voltage for Cutoff°	780	1365	volts
Grid-No.2 Voltage	250	250	volts
Grid-No.1 Voltage for Visual Cutoff**	-45	-45	volts

*, °, **: See next page.

RCA

7CP1

OSCILLOGRAPH TUBE

* Brilliance and definition decrease with decreasing anode-No.2 voltage. In general, the anode-No.2 voltage should not be less than 4000 volts.

o Individual tubes may require between -30% and +20% of the values shown with grid-No.1 voltages between zero and cutoff.

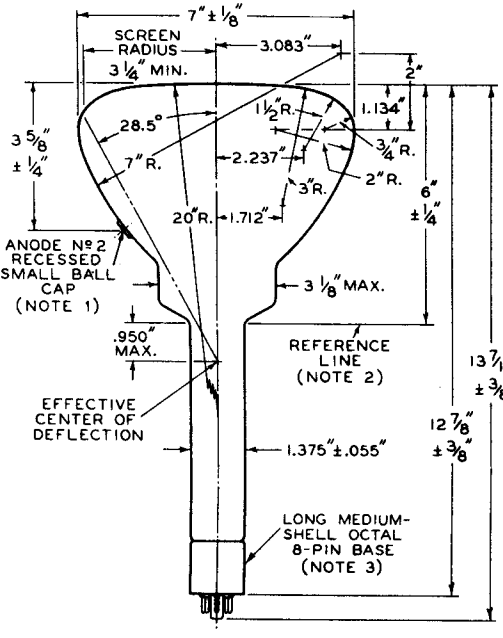
** Visual extinction of undeflected focused spot. Supply should be adjustable to ±50% of indicated value.

Maximum Circuit Values:

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

7CP1

OSCILLOGRAPH TUBE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN No. 2 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 OF TUBE AS PIN No. 2.

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

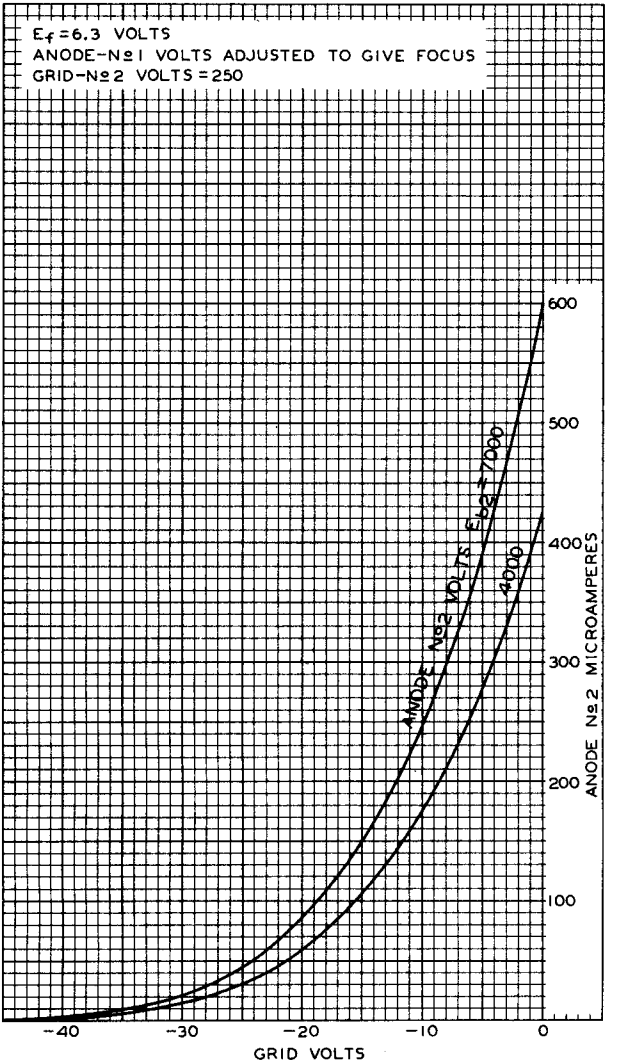
NOTE 3: ℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

92CM-6364R2

RCA

7CP1

AVERAGE CHARACTERISTICS



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7DP4

KINESCOPE

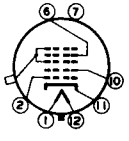
ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

DATA

General:

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 ←
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Anode No.2	1500 max. 400 min.	μμf μμf
Phosphor (For Curves, see front of this Section)		No.4
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Medium
Focusing Method		Electrostatic
Deflection Method		Magnetic
Deflection Angle (Approx.)		50°
Ion Trap		Magnetic
External Coating		Conductive
Overall Length		14-1/16" ± 3/8"
Greatest Diameter of Bulb		7-3/16" ± 1/8"
Minimum Useful Screen Diameter		6"
Raster Size (Approx.)		4" x 5-1/2"
Mounting Position		Any
Cap		Recessed Small Cavity
Base		Small-Shell Duodecal 7-Pin

BOTTOM VIEW



Pin 1 - Heater
Pin 2 - Grid No.1
Pin 6 - Anode No.1
Pin 7 - Internal Con. - Do Not Use
Pin 10 - Grid No.2
Pin 11 - Cathode
Pin 12 - Heater
Cap - Anode No.2, Grid No.3

Maximum Ratings, *Design-Center Values*:

ANODE-No.2■ VOLTAGE●	8000 max. volts
ANODE-No.1 VOLTAGE	2400 max. volts
GRID-No.2 VOLTAGE	410 max. volts
GRID-No.1 (CONTROL ELECTRODE) 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 ←

■, ●: See next page.
← Indicates a change.

7DP4
KINESCOPE

Typical Operation:

Anode-No.2 Voltage*	6000	volts
Anode-No.1 Voltage for Focus°	1215 to 1645	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 Voltage for Visual Cutoff**	-27 to -63	volts
Max. Anode-No.1 Current Range	-15 to +10	μamp

Maximum Circuit Values:

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

→**Minimum Circuit Values:**

The power supply should be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 5 ma. If the supply permits the instantaneous short-circuit current to exceed 1 ampere, or is capable of storing more than 250 microcoulombs, 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	470 min.	ohms
Anode-No.1-Circuit Resistance	2700 min.	ohms
Anode-No.2-Circuit Resistance	9100 min.	ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

Ion-Trap Magnet#	RCA Type No.203D1
→Deflecting Yoke*	RCA Type No.201D12

■ Anode No.2 and grid No.3, which are connected together within tube, are referred to herein as anode No.2.

● The product of anode-No.2 voltage and average anode-No.2 current should never exceed 6 watts.

* Brilliance and definition decrease with decreasing anode-No.2 voltage. In general, anode-No.2 voltage should not be less than 5000 volts.

° With the combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 12 foot-lamberts on a 4" x 5-1/2" picture area.

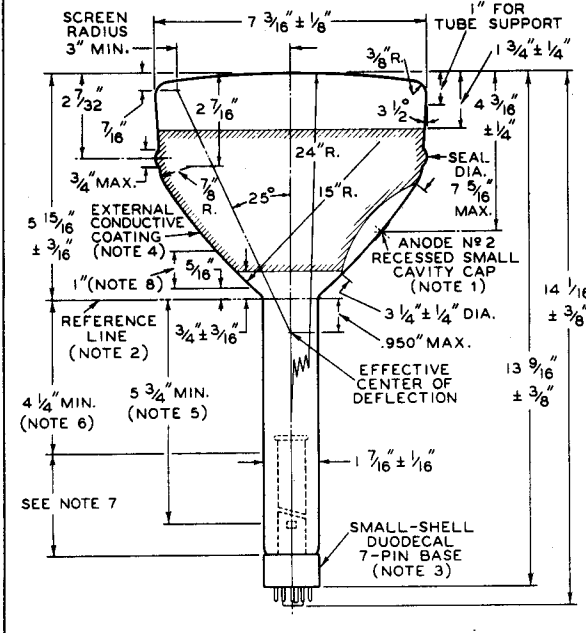
** Visual extinction of undeflected focused spot.

\# The dc current required by this magnet is approx. 70 ma. for the typical operating conditions shown.

★ The horizontal deflecting-coil current required by this yoke to produce 5-1/2" picture width is approx. 410 ma. peak-to-peak under the typical operating conditions shown. The current varies directly as the square root of the anode-No.2 voltage.

→Indicates a change.

7DP4
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 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. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING DIAMETER OF 1-7/8".

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

NOTE 5: DISTANCE TO INTERNAL POLE PIECES. PLANE THROUGH

7DP4
KINESCOPE

(continued from preceding page)

PIN No.6 AND TUBE AXIS PASSES THROUGH LINE JOINING CENTERS OF POLE PIECES. DIRECTION OF PRINCIPAL FIELD OF ION-TRAP MAGNET SHOULD BE SUCH THAT NORTH POLE IS ADJACENT TO PIN No.6 AND SOUTH POLE TO PIN No.12.

NOTE 6: LOCATION OF DEFLECTING YOKE MUST BE WITHIN THIS SPACE.

NOTE 7: KEEP THIS SPACE CLEAR FOR ION-TRAP MAGNET.

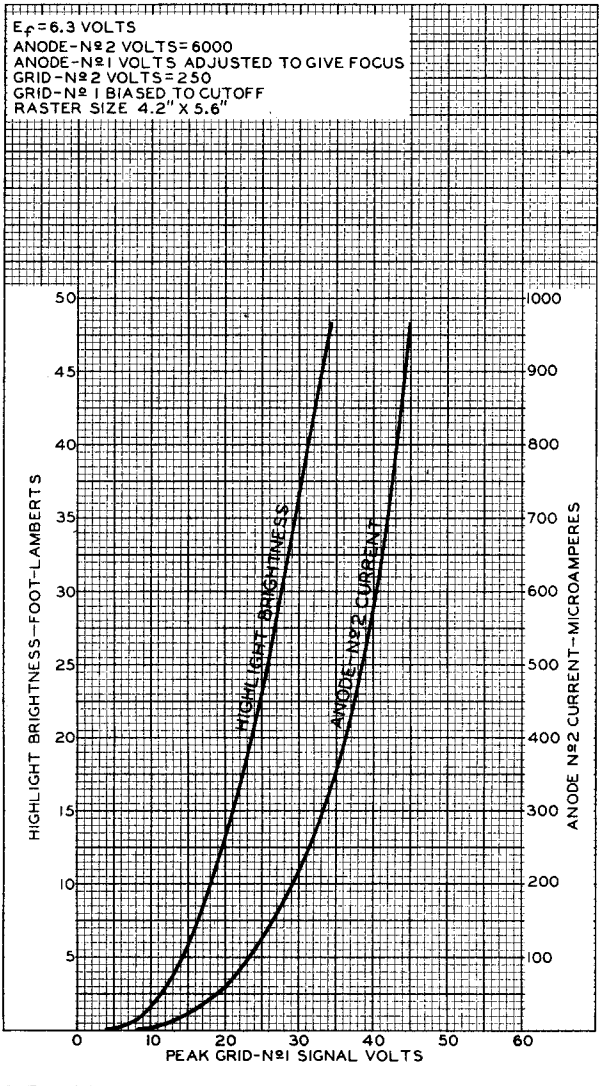
NOTE 8: FOR TUBE SUPPORT WHICH MUST NOT COVER SPECIFIED CLEAR AREA AROUND ANODE CAP.

92CM-6664R1

RCA

7DP4

AVERAGE CHARACTERISTICS



RCA

7JP1

OSCILLOGRAPH TUBE

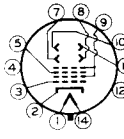
ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

DATA

General:

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	3	μμf
DJ_3 to DJ_4	2	μμf
DJ_1 to All Other Electrodes	9	μμf
DJ_2 to All Other Electrodes	9	μμf
DJ_3 to All Other Electrodes	7	μμf
DJ_4 to All Other Electrodes	7	μμf
Phosphor (For Curves, see front of this Section)		No.1
Fluorescence and Phosphorescence		Green
Persistence of Phosphorescence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Deflecting-Electrode Arrangement		See Outline Drawing
Overall Length		14-1/2" ± 3/8"
Greatest Diameter of Bulb		7" ± 1/8"
Minimum Useful Screen Diameter		6"
Mounting Position		Any
Base		Medium-Sheil Diheptal 12-Pin
Basing Designation for BOTTOM VIEW		$14G_1$

Pin 1 – Heater
Pin 2 – Cathode
Pin 3 – Grid No.1
Pin 4 – No Connection
Pin 5 – Anode No.1
Pin 7 – Deflecting Electrode DJ_3
Pin 8 – Deflecting Electrode DJ_4



Pin 9 – Anode No.2, Grid No.2
Pin 10 – Deflecting Electrode DJ_2
Pin 11 – Deflecting Electrode DJ_1
Pin 12 – Internal Connection–Do Not Use
Pin 14 – Heater

DJ_1 and DJ_2 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 pin 5 may vary from the trace produced by DJ_1 and DJ_2 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° ± 3°.

7JP1

7JP1

OSCILLOGRAPH TUBE

Maximum Ratings, *Design-Center Values:*

ANODE-No.2● VOLTAGE□	6000 max.	volts
ANODE-No.1 VOLTAGE	2800 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 ANODE No.2 AND ANY DEFLECTING ELECTRODE	750 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 1000 and 6000 volts*		
Anode-No.1 Voltage	27% to 40% of E_{b_2}	volts
Max. Grid-No.1 Voltage for Visual Cutoff	2.8% of E_{b_2}	volts
Anode-No.1 Current for any Operating Condition	−15 to +10	microamp
Deflection Factors:		
DJ1 & DJ2	31 to 41 v dc/in./kv of E_{b_2}	
DJ3 & DJ4	25 to 34 v dc/in./kv of E_{b_2}	
Spot Position	#	

Examples of Use of Design Ranges:

For anode-No.2 voltage of	*2000*	*4000*	*volts*
Anode-No.1 Voltage	540–800	1080–1600	volts
Max. Grid-No.1 Voltage for Visual Cutoff	−56	−112	volts
Deflection Factors:			
DJ1 & DJ2	62–82	124–164	volts dc/in.
DJ3 & DJ4	50–68	100–136	volts dc/in.

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms
Resistance in Any Deflecting-Electrode Circuit○	5.0 max.	megohms

Minimum Circuit Values:

The power supply should be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 5 milliamperes. If the supply permits the instantaneous short-circuit current to exceed 1 ampere, or is capable of storing more than 250 microcoulombs, the effective resistance in circuit between indicated electrode and the output capacitor should be as follows:

Grid-No.1-Circuit Resistance	220 min.	ohms

●,□,*,#,○: See next page.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

7JP1

OSCILLOGRAPH TUBE

Anode-No.1-Circuit Resistance. . . . . 3000 min. ohms
Anode-No.2-Circuit Resistance. . . . . 6800 min. ohms

The resistors used should be capable of withstanding the applied voltage.

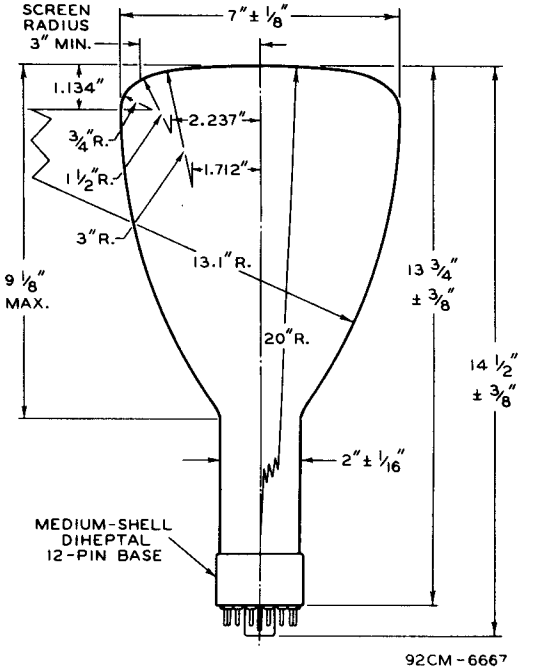
- Anode No.2 and grid No.2, which are connected together within tube, are referred to herein as anode No.2.

□ For operation at or near 0 volts on grid No.1 and with 4000 to 6000 volts on anode No.2, it is essential that the effective resistance of the anode-No.2 supply be adequate to limit the anode-No.2 input power to 6 watts.

* Brilliance and definition decrease with decreasing anode-No.2 voltage. A value as low as 1000 volts is recommended only for low-velocity deflection and low ambient-light levels.

\# The center of the undeflected, focused spot will fall within a circle having a 10-mm radius concentric with the center of the tube face.

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

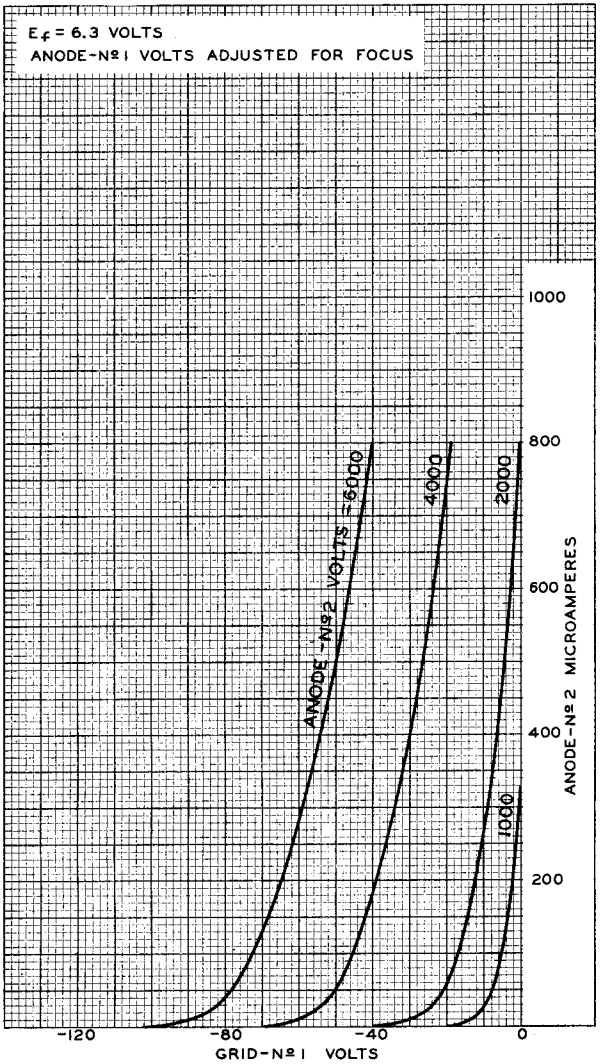


℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

7JP1

7JP1

AVERAGE CHARACTERISTICS



AUGUST 4, 1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7521

7JP4
KINESCOPE

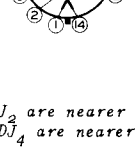
ELECTROSTATIC FOCUS—ELECTROSTATIC DEFLECTION

*Supersedes Type 7GP4**

General:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	8.5	μμf
Cathode to All Other Electrodes	9.5	μμf
DJ_1 to DJ_2	3.5	μμf
DJ_3 to DJ_4	2.0	μμf
DJ_1 to All Other Electrodes	11.0	μμf
DJ_2 to All Other Electrodes	11.0	μμf
DJ_3 to All Other Electrodes	8.0	μμf
DJ_4 to All Other Electrodes	8.0	μμf
Phosphor (For Curves, see front of this Section)		No.4
Fluorescence		White
Persistence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		14-1/2" ± 3/8"
Greatest Diameter of Bulb		7" ± 1/8"
Minimum Useful Screen Diameter		6"
Raster Size		4" x 5-1/2"
Mounting Position		Any
Base	Medium-Shell Diheptal	12-Pin
Basing Designation for BOTTOM VIEW		14-G

Pin 1 – Heater
Pin 2 – Cathode
Pin 3 – Grid No.1
Pin 4 – No Connection
Pin 5 – Anode No.1
Pin 7 – Deflecting Electrode DJ_3
Pin 8 – Deflecting Electrode DJ4



Pin 9 – Anode No.2, Grid No.2
Pin 10 – Deflecting Electrode DJ_2
Pin 11 – Deflecting Electrode DJ_1
Pin 12 – Internal Connection—Do Not Use
Pin 14 – Heater

DJ_1 and DJ_2 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 pin 5 may vary from the trace produced by DJ_1 and DJ_2 by an angular tolerance (measured about the tube axis) of 10°.

The angle between the trace produced by DJ_1 and DJ_2 and the trace produced by DJ_3 and DJ_4 is $90^{\circ} \pm 3^{\circ}$.

* The 7JP4 replaces the 7GP4 provided no connections are made to the 7GP4 socket contacts for pins 4 and 12.

7JP4

7JP4
KINESCOPE

Maximum Ratings, *Design-Center Values:*

ANODE–No.2 & GRID–No.2 VOLTAGE	6000 max.	volts
ANODE–No.1 VOLTAGE	2800 max.	volts
GRID–No.1 (CONTROL ELECTRODE) VOLTAGE:		
Negative bias value	200 max.	volts
Positive bias value#	0 max.	volts
Positive peak value	2 max.	volts
PEAK VOLTAGE BETWEEN ANODE No.2 AND ANY DEFLECTING ELECTRODE	750 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 anode–No.2 voltage (E_{b_2}) between 3000 and 6000 volts*

Anode–No.1 Voltage for Focus□	27% to 40% of E_{b_2}	volts
Grid–No.1 Voltage for Visual Cutoff	1.2% to 2.8% of E_{b_2}	volts
Anode–No.1 Current for Any Operating Condition	−15 to +10	μamp
Deflection Factors:		
DJ_1 & DJ_2	31 to 41	v dc/in./kv of E_{b_2}
DJ_3 & DJ_4 ⊕	25 to 34	v dc/in./kv of E_{b_2}

Examples of Use of Design Ranges:
For anode–No.2 voltage of 6000 volts

Anode–No.1 Voltage	1620 to 2400	volts
Grid–No.1 Voltage for Visual Cutoff	−72 to −168	volts
Deflection Factors:		
DJ_1 & DJ_2	186 to 246	volts dc/in.
DJ_3 & DJ_4	150 to 204	volts dc/in.

Maximum Circuit Values:

Grid–No.1–Circuit Resistance	1.5 max.	megohms
Resistance in Any Deflecting Electrode Circuit○	5.0 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	220 min.	ohms
Anode–No.1–Circuit Resistance	3000 min.	ohms
Anode–No.2–Circuit Resistance	6800 min.	ohms

#.*.□.○.⊕: See next page.

7JP4
KINESCOPE

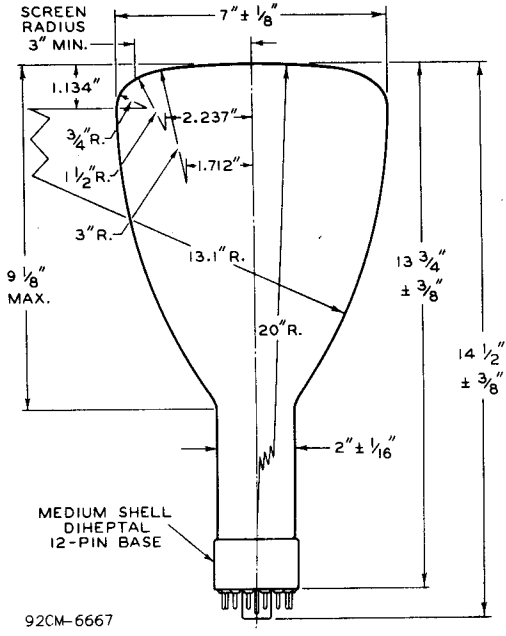
⋇ At or near this rating, with 4000 to 6000 volts on anode No.2, the effective resistance of the anode-No.2 supply should be adequate to limit the anode-No.2 input power to 6 watts.

* Brilliance and definition decrease with decreasing anode-No.2 voltage.

□ With the combined grid-No.1 bias voltage and video-signal voltage adjusted for a highlight brightness of 12 foot-lamberts on a 4" x 5-1/2" picture area.

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

⊕ The 7JP4 is designed to be used in television circuits with horizontal deflection applied to deflecting electrodes D_{J3} and D_{J4}, and should be so used to obtain maximum picture width. When the 7JP4 is operated in this way, the deflecting voltage required to produce the vertical height is approximately the same as that required to produce the horizontal width of a television picture of standard proportions.

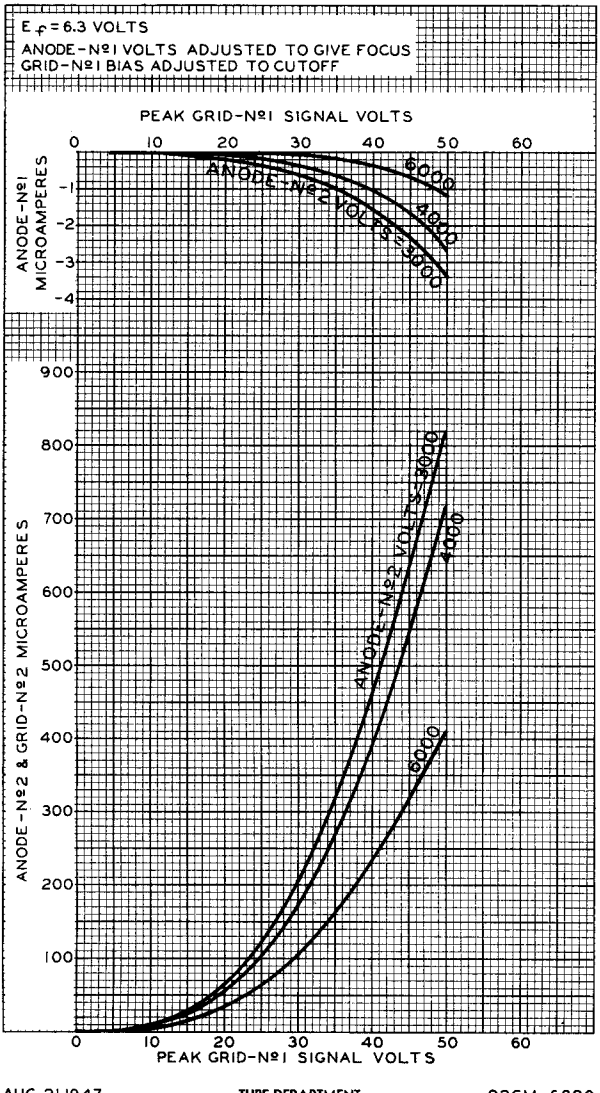


℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

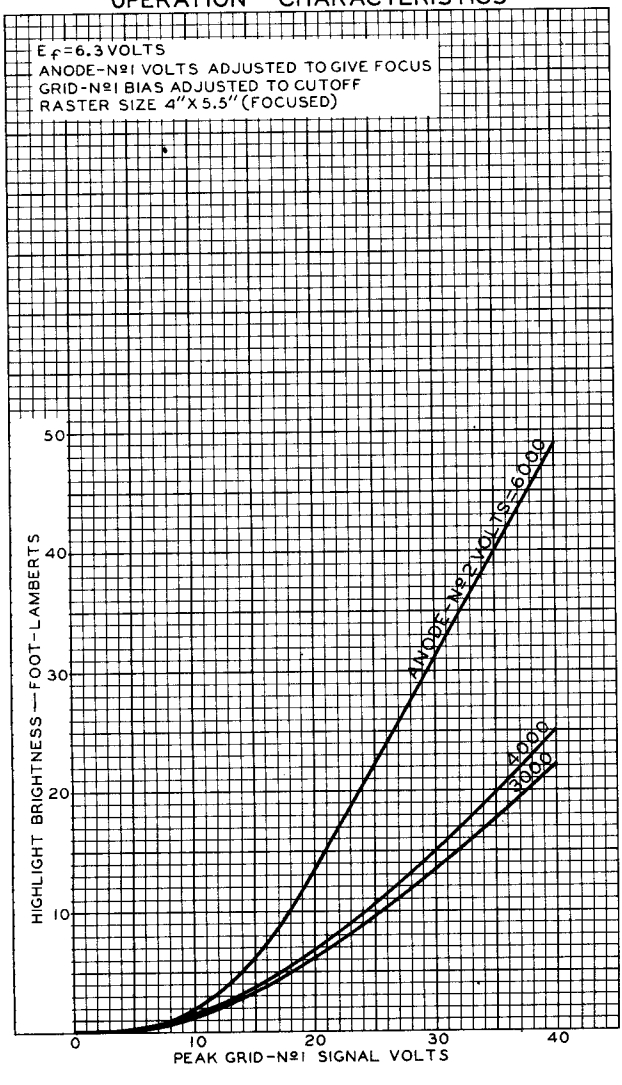
RCA

7JP4

OPERATION CHARACTERISTICS



OPERATION CHARACTERISTICS



7MP7

OSCILLOGRAPH TUBE

MAGNETIC FOCUS MAGNETIC DEFLECTION

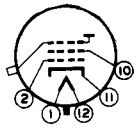
DATA

General:

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
Cathode to All Other Electrodes	5	μμf
Phosphor (For Curves, see front of this Section)		P7
Fluorescence		Blue
Phosphorescence		Greenish-Yellow
Persistence		Long
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angle (Approx.)		50°
Overall Length		12-3/4" ± 3/8"
Greatest Diameter of Bulb		7-3/16" ± 1/8"
Minimum Useful Screen Diameter		6"
Mounting Position		Any
Cap	Recessed Small Cavity (JETEC No.J1-21)	
Base	Small-Shell Duodecal 5-Pin (JETEC No.B5-57)	

BOTTOM VIEW

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



Pin 11 - Cathode
Pin 12 - Heater
Cap - Grid No.3, Collector

Maximum Ratings, *Design-Center Values*:

Ultor• VOLTAGE	8000 max.	volts
GRID-No.2 VOLTAGE:		
Positive Value (DC or Peak AC)	700 max.	volts
Negative Value (DC or Peak AC)	180 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	180 max.	volts
Positive bias value#	0 max.	volts
Positive peak value	2 max.	volts
PEAK GRID-No.1 DRIVE FROM CUTOFF	65 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

• In the 7M-types, grid No.3 which has the ultor function, and collector are connected together withih the tube and are conveniently referred to collectively as "ultor". The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

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

7MP7

7MP7
OSCILLOGRAPH TUBE

Typical Operation:

Ultor Voltage*	4000	7000	volts
Grid-No.2 Voltage	250	250	volts
Grid-No.1 Voltage °	-27 to -63	-27 to -63	volts
→ Grid-No.2 Current	-15 to +15	-15 to +15	μamp
→ Focusing-Coil Current (DC Approx.)**	64 ± 15%	85 ± 15%	ma
→ Spot Position	-	##	

Maximum Circuit Values:

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

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

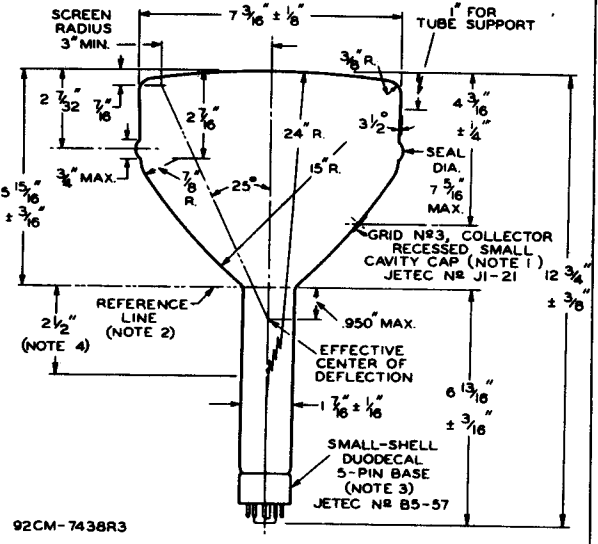
° For visual extinction of undeflected, focused spot.

** For specimen focusing coil similar to JETEC Focusing Coil No.109 positioned with air gap toward faceplate and center line of air gap 2-3/4" from Reference Line (see Outline Drawing) and ultor current of 200 microamperes.

The center of the undeflected, unfocused spot will fall within a circle having 12-mm radius concentric with the center of the tube face.

→ Indicates a change

7MP7
OSCILLOGRAPH TUBE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND BULB TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 10°. BULB TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.3.

NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE REFERENCE-LINE GAUGE (JETEC No.112) 1.500 + .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".

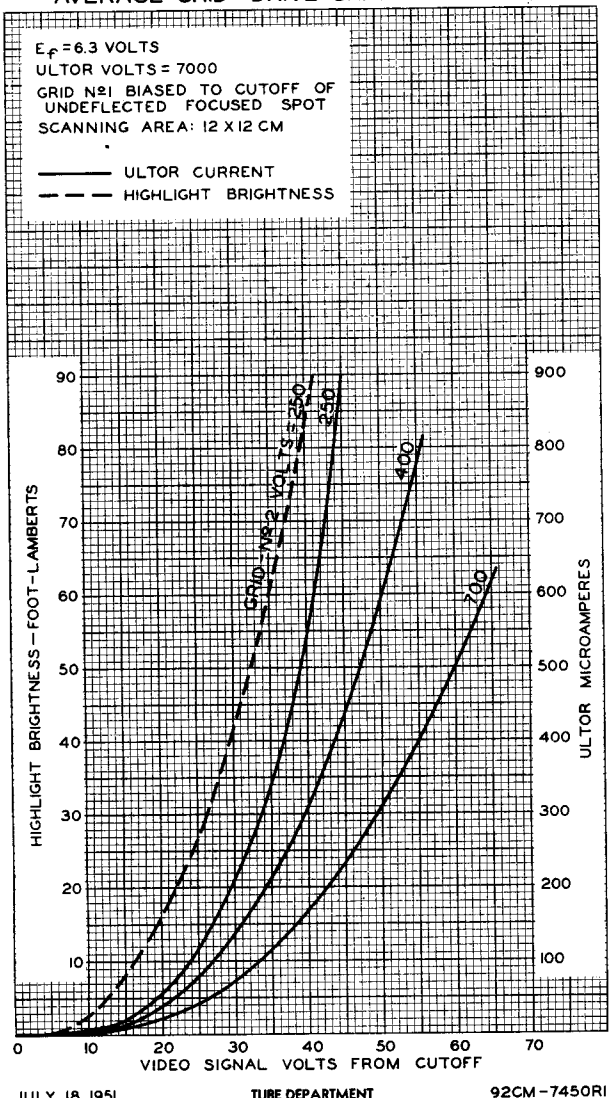
NOTE 4: LOCATION OF DEFLECTING YOKE MUST BE WITHIN THIS SPACE.

7MP7

RCA

7MP7

AVERAGE GRID-DRIVE CHARACTERISTICS



7MP14
OSCILLOGRAPH TUBE

MAGNETIC FOCUS MAGNETIC DEFLECTION

The 7MP14 is the same as the 7MP7 except that it utilizes a medimum-long-persistence, cascade (two-layer) screen which exhibits purple fluorescence of short persistence and orange phosphorescence which persists for a little over a minute under conditions of adequate excitation and ambient light.

Because of its medium-long-persistence, the 7MP14 is particularly useful where either low- and medium-speed non-recurring phenomena or high-speed recurring phenomena are to be observed. Furthermore, two or more phenomena can be observed simultaneously on the screen by means of a suitable switching arrangement.

The persistence is such that the 7MP14 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 7MP14 can be operated with much lower scanning frequencies.

In general, operation of the 7MP14 at an ultor voltage below 4000 volts will not give persistence of useable brightness.

THE SPECTRAL-ENERGY EMISSION CHARACTERISTIC and the PERSISTENCE CHARACTERISTIC of the P14 Phosphor are shown at the front of this Section

7NP4

PROJECTION KINESCOPE

METAL-BACKED FLUORESCENT SCREEN
FORCED-AIR COOLED
ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.6	ac or dc volts ←
Current	0.62	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	12	μμf
Cathode to All Other Electrodes	6	μμf
Phosphor (For Curves, see front of this Section)	No.4—Silicate-Sulfide Type	
Fluorescence and Phosphorescence	White	
Persistence of Phosphorescence	Medium	
Focusing Method	Electrostatic	
Deflection Method	Magnetic	
Deflection Angle (Approx.)	35°	
Overall Length	19-1/2" ± 5/8"	
Greatest Diameter of Bulb (Excluding Side Cap)	7" ± 3/16"	
Maximum Radius of Tube (Including Side Cap)	4-11/32"	
Quality Rectangle of Face Plate (See Outline Drawing)	5" x 3-3/4"	
Cap	Medium	
Mounting Position	Any	
Base	Plastic-Filled, Small-Shell Diheptal 14-Pin	
Basing Designation For BOTTOM VIEW	14N	

Pin 1 – Heater
Pin 2 – Cathode
Pin 3 – Grid No.1
Pin 4 – Grid No.2
Pin 5 – No Conn.
Pin 6 – No Conn.
Pin 7 – No Conn.
Pin 8 – No Conn.

Pin 9 – Grid No.3
Pin 10 – No Conn.
Pin 11 – No Conn.
Pin 12 – No Conn.
Pin 13 – Int. Conn. – Do Not Use
Pin 14 – Heater
Cap – Anode

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

Air Flow to Face	40	cfm

The specified air flow should be delivered perpendicularly from a nozzle having a diameter of about 2 inches onto the face of the tube while it is in operation. The blower should have adequate capacity to provide for a total system pressure drop including that of the air filter.

Face Temperature	100 max.	°C

CATHODE-DRIVE* SERVICE

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

Maximum Ratings, *Absolute Values*:

ANODE-to-GRID-No.1 VOLTAGE°	80000 max.	volts

*,°: See next page ← Indicates a change

RCA

7NP4

PROJECTION KINESCOPE

GRID-No.3-to-GRID-No.1 VOLTAGE	20000 max.	volts
GRID-No.2-to-GRID-No.1 VOLTAGE	850 max.	volts
GRID-No.2-to-CATHODE VOLTAGE	600 max.	volts
CATHODE-to-GRID-No.1 VOLTAGE:		
Positive bias value	250 max.	volts
Negative bias value	0 max.	volts
Peak negative value	2 max.	volts
AVERAGE ANODE CURRENT	2 max.	ma
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

Typical Operation:

Anode-to-Grid-No.1 Voltage#	75000	volts
Grid-No.3-to-Grid-No.1 Voltage	16000 - 18000	volts
Grid-No.2-to-Grid-No.1 Voltage for Pattern Cutoff	400 - 600	volts
Cathode-to-Grid-No.1 Voltage	125	volts
Cathode-to-Grid-No.1 Video Voltage:		
Peak positive value (Black level)	0	volts
Peak negative value (White Level)	125	volts
Max. Grid-No.3 Current	15	μamp
Max. Grid-No.2 Current Range	-15 to +15	μamp

GRID-DRIVE** SERVICE

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

Maximum Ratings, *Absolute Values*:

ANODE VOLTAGE°	80000 max.	volts
GRID-No.3 VOLTAGE	20000 max.	volts
GRID-No.2 VOLTAGE	600 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	250 max.	volts
Positive bias value	0 max.	volts
Peak positive value	2 max.	volts
AVERAGE ANODE CURRENT	2 max.	ma
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

** Grid drive is the operating condition in which the video signal varies the grid-No.1 potential.

° The product of anode-to-grid-No.1 voltage, or anode voltage, and average anode current should be limited to 160 watts.

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

#: See next page.

7NP4

PROJECTION KINESCOPE

Typical Operation:

Anode Voltage#	75000	volts
Grid-No.3 Voltage	16000 – 18000	volts
Grid-No.2 Voltage for Pattern Cutoff	400 – 600	volts
Grid-No.1 Voltage	−155	volts
Grid-No.1 Video Voltage:		
Peak negative value (Black level)	0	volts
Peak positive value (White level)	155	volts
Max. Grid-No.3 Current	15	μamp
Max. Grid-No.2 Current Range	−15 to +15	μamp

Maximum Circuit Values:

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

\# Brilliance and definition decrease with decreasing anode-to-grid-No.1 voltage or anode voltage. In general, the anode-to-grid-No.1 voltage or the anode voltage should not be less than 70000 volts.

OPERATING NOTES

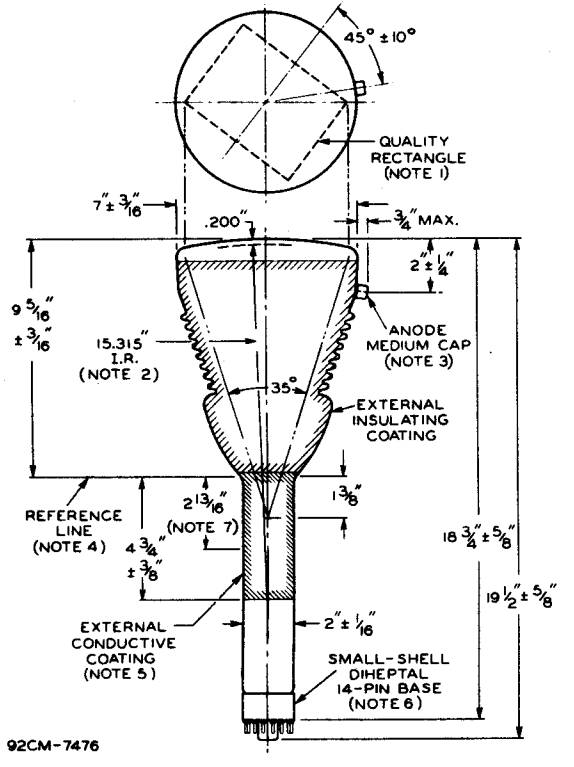
X-ray radiation is produced at the face of the 7NP4 when it is operated at its normal anode voltage. These rays can constitute a health hazard unless the tube is adequately shielded. Make sure that the shielding provides the required protection against personal injury.

The air-cooling system required to cool the face of the 7NP4 consists of a blower 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 anode power supply to prevent operation of the tube without cooling.

Darkening of face occurs during normal operation of the 7NP4 with resulting decrease in the light transmitted by the face. The rate of darkening increases rapidly with increase in anode voltage, is proportional to the beam current, and is inversely proportional to the scanned area. The darkening develops rapidly during initial operation; thereafter, a gradual increase in the amount of darkening will be observed during the life of the tube. The darkening, however, can be decreased periodically throughout the life of the tube by bleaching the face as prescribed in the 7NP4 bulletin.

7NP4

PROJECTION KINESCOPE



NOTE 1: WHEN VIEWED FROM THE FACE OF THE TUBE, THE MINOR AXIS OF THE 5" x 3-3/4" QUALITY RECTANGLE IS LOCATED 45° ± 10° IN A COUNTER-CLOCKWISE DIRECTION FROM A PLANE THROUGH THE ANODE TERMINAL AND THE TUBE AXIS.

NOTE 2: INSIDE SURFACE OF FACE PLATE WITHIN THE QUALITY RECTANGLE MAY VARY ± 0.006" FROM THE SPHERICAL SURFACE HAVING A 15.315" RADIUS.

NOTE 3: THE PLANE THROUGH BASE PIN No.9 AND THE TUBE AXIS MAY VARY FROM THE PLANE THROUGH THE ANODE TERMINAL AND THE TUBE AXIS BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. THE ANODE TERMINAL IS ON SAME SIDE AS PIN No.9.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7NP4

PROJECTION KINESCOPE

NOTE 4: REFERENCE LINE IS DETERMINED BY POSITION WHERE GAUGE 2.100" ± .001" I.D. AND 3" LONG WILL REST ON BULB CONE.

NOTE 5: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

NOTE 6: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. SOCKET CONTACTS FOR PINS 5, 6, 7, 8, 10, 11, 12, AND 13 SHOULD BE REMOVED IN ORDER TO PROVIDE MAXIMUM INSULATION FOR PIN No.9.

NOTE 7: EFFECTIVE DEFLECTING FIELD MUST BE WITHIN THIS SPACE.

RCA

7NP4

AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE

E_f = 6.6 VOLTS

ANODE-TO-GRID-№1 VOLTS = 70000-80000

GRID-№3-TO-GRID-№1 VOLTS ADJUSTED TO GIVE FOCUS

GRID-№2-TO-GRID-№1 VOLTS ADJUSTED TO PATTERN CUTOFF

CATHODE BIASED POSITIVE WITH RESPECT TO GRID №1 (VOLTS) = 125

GRID-DRIVE SERVICE

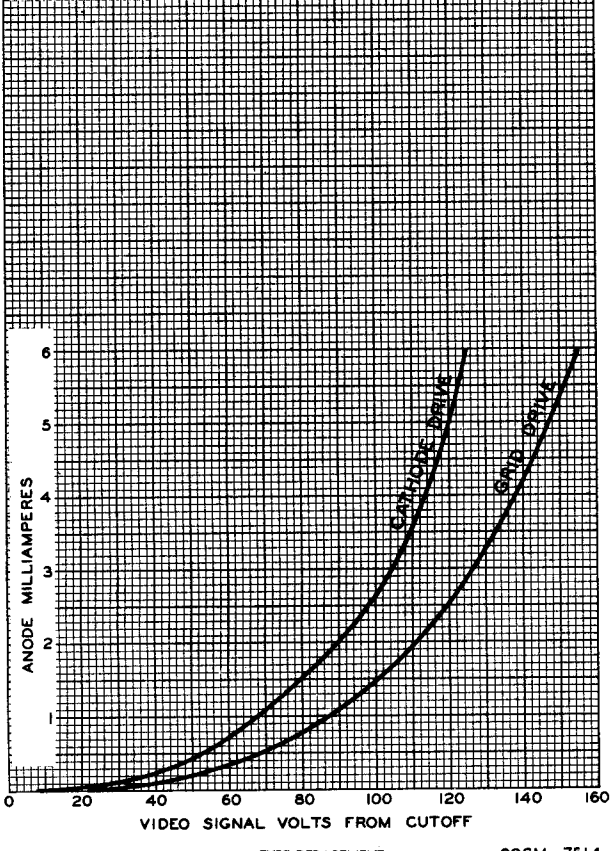
E_f = 6.6 VOLTS

ANODE VOLTS = 70000-80000

GRID №3 VOLTS ADJUSTED TO GIVE FOCUS

GRID №2 VOLTS ADJUSTED TO PATTERN CUTOFF

GRID-№1 BIAS VOLTS = -155



7NP4

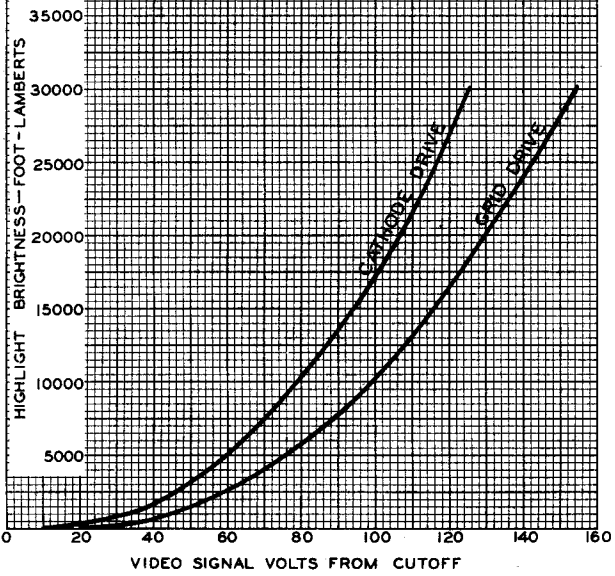
AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE

E_f = 6.6 VOLTS
ANODE-TO-GRID-№1 VOLTS = 75000
GRID-№3-TO-GRID-№1 VOLTS ADJUSTED TO GIVE FOCUS
GRID-№2-TO-GRID-№1 VOLTS ADJUSTED TO PATTERN CUTOFF
CATHODE BIASED POSITIVE WITH RESPECT TO GRID №1 (VOLTS) = 125
RASTER SIZE: 5" x 3¾"

GRID-DRIVE SERVICE

E_f = 6.6 VOLTS
ANODE VOLTS = 75000
GRID-№3 VOLTS ADJUSTED TO GIVE FOCUS
GRID-№2 VOLTS ADJUSTED TO PATTERN CUTOFF
GRID-№1 BIAS VOLTS = -155
RASTER SIZE: 5" x 3¾"



7NP4

RCA

7NP4

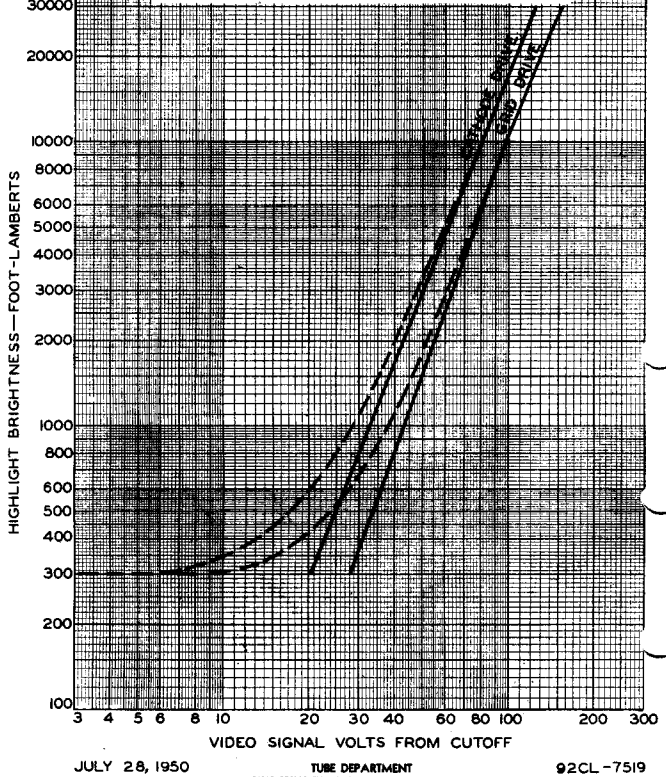
AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE

E_f = 6.6 VOLTS
ANODE-TO-GRID-№1 VOLTS = 75000
GRID-№3-TO-GRID-№1 VOLTS ADJUSTED TO GIVE FOCUS
GRID-№2-TO-GRID-№1 VOLTS ADJUSTED TO PATTERN CUTOFF
CATHODE BIASED POSITIVE WITH RESPECT TO GRID №1 (VOLTS) = 125
RASTER SIZE: 5" x 3 3/4"

GRID-DRIVE SERVICE

E_f = 6.6 VOLTS
ANODE VOLTS = 75000
GRID-№3 VOLTS ADJUSTED TO GIVE FOCUS
GRID-№2 VOLTS ADJUSTED TO PATTERN CUTOFF
GRID-№1 BIAS VOLTS = -155
RASTER SIZE: 5" x 3 3/4"



JULY 28, 1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CL-7519

7QP4

MONITOR KINESCOPE

MAGNETIC FOCUS — MAGNETIC DEFLECTION

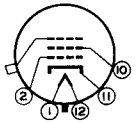
DATA

General:

Heater, for Unipotential Cathode:	
Voltage	6.3 ac or dc volts
Current	0.6 amp
Direct Interelectrode Capacitances (Approx.):	
Grid No.1 to All Other Electrodes	6 μμf
Cathode to All Other Electrodes	5 μμf
Phosphor (For Curves, See front of this Section)	No.4-Sulfide Type
Fluorescence	White
Phosphorescence	White
Persistence	Short
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle (Approx.)	52°
Ion-Trap Gun	Requires External, Single-Field Magnet
Overall Length	12-7/8" ± 3/8"
Greatest Diameter of Bulb	7-3/16" ± 1/8"
Screen Diameter	6-1/4"
Mounting Position	Any
Cap	Recessed Small Cavity
Base	Small-Shell Duodecal 5-Pin

BOTTOM VIEW

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 10 – Grid No.2



Pin 11 – Cathode
Pin 12 – Heater
Cap – Anode

Maximum Ratings, *Design-Center Values*:

ANODE VOLTAGE*	10000 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

Typical Operation:

Anode Voltage**	8000 volts

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

** Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 6000 volts.

RCA

7QP4

MONITOR KINESCOPE

Grid-No.2 Voltage	300	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-33 to -77	volts
Focusing-Coil Current (DC, approx.)#	80	ma
Field Strength of Single-Field Ion-Trap Magnet°	35	gausses

Maximum Circuit Values:

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

Minimum Circuit Values:

The power supply should be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 5 milliamperes. If the supply permits the instantaneous short-circuit current to exceed 1 ampere, or is capable of storing more than 250 microcoulombs, 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	470 min.	ohms
Anode-Circuit Resistance	11000 min.	ohms

The resistors used should be capable of withstanding the applied voltage.

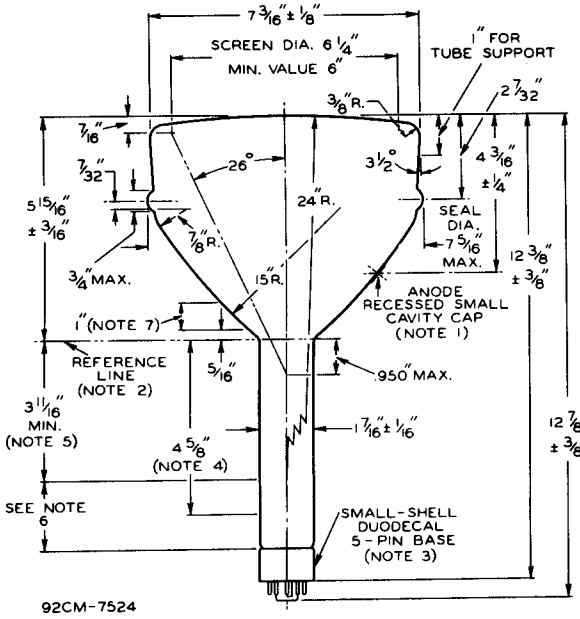
\# For specimen focusing coil similar to JETEC Focusing Coil No.109, positioned with air gap toward kinescope screen, and center line of air gap 3 inches from Reference Line (see *Outline Drawing*). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 40 foot-lamberts on a 5-3/8" x 4" picture area sharply focused at center of screen.

° Measured at center of field with General Electric Gauss Meter, Cat. No.409X51.

RCA

7QP4

MONITOR KINESCOPE



92CM-7524

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE 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. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING DIAMETER OF 1-7/8".

NOTE 4: DISTANCE FROM REFERENCE LINE FOR LOCATING CENTER OF ION-TRAP MAGNETIC FIELD. DIRECTION OF FIELD OF THE ION-TRAP MAGNET SHOULD BE SUCH THAT NORTH POLE IS ADJACENT TO VACANT PIN POSITION No.8 AND SOUTH POLE TO PIN No.2.

7QP4

MONITOR KINESCOPE

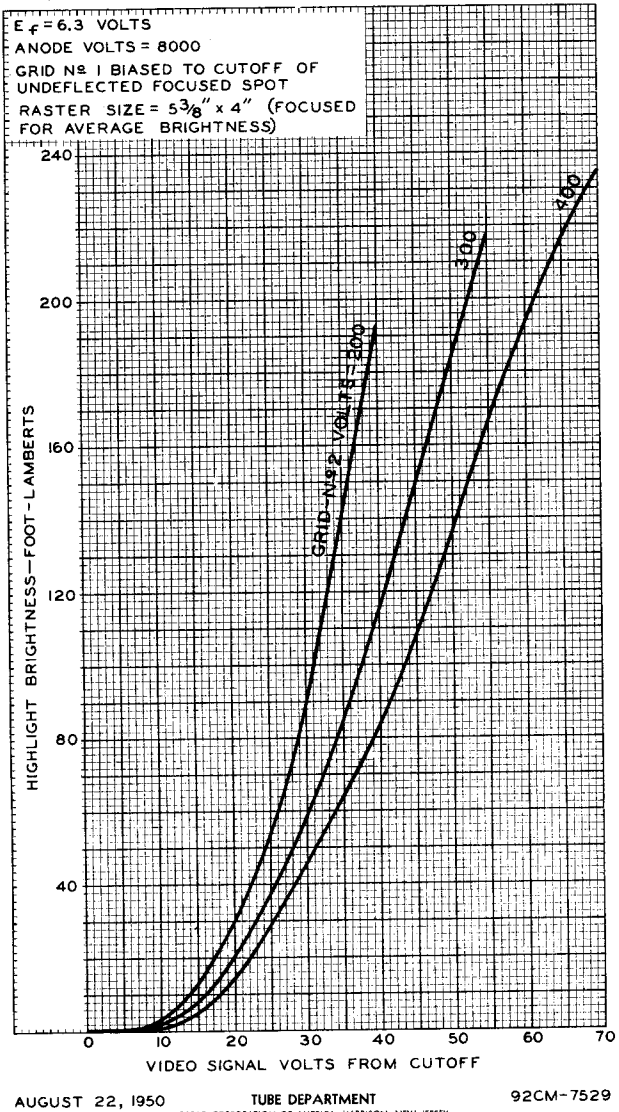
NOTE 5: LOCATION OF DEFLECTING YOKE MUST BE WITHIN THIS SPACE.

NOTE 6: KEEP THIS SPACE CLEAR FOR SINGLE-FIELD, ION-TRAP MAGNET.

NOTE 7: FOR TUBE SUPPORT WHICH MUST BE KEPT AT LEAST 2" AWAY FROM ANODE CAVITY CAP.

7QP4

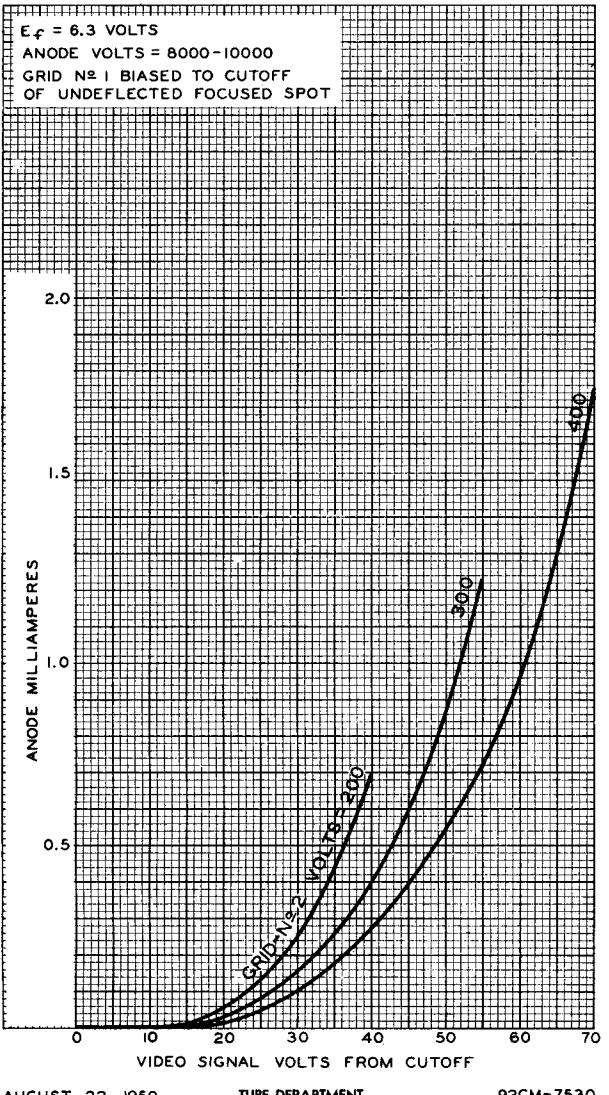
AVERAGE GRID-DRIVE CHARACTERISTICS



RCA

7QP4

AVERAGE GRID-DRIVE CHARACTERISTICS



7TP4
MONITOR KINESCOPE

METAL-BACKED SCREEN

ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

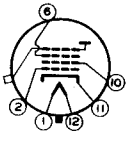
DATA

General:

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
Cathode to All Other Electrodes	5	μμf
Faceplate		Clear Glass
Phosphor, Metal-Backed[o]		P4—Sulfide Type
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Short
Focusing Method		Electrostatic
Deflection Method		Magnetic
Deflection Angle (Approx.)		50°
Overall Length		13-1/8" ± 3/8"
Greatest Diameter of Bulb		7-3/16" ± 1/8"
Minumum Useful Screen Diameter		6"
Picture Size (Within minimum-useful-screen area)		5-3/8" x 4"
Cap		Recessed Small Cavity (JETEC No. J1-21)
Base		Small-Shell Duodecal 6-Pin (JETEC No. B6-63)

BOTTOM VIEW

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 6 – Grid No.3
Pin 10 – Grid No.2
Pin 11 – Cathode



Pin 12 – Heater
Cap – Grid No.4, Collector (Ultor)

Maximum Ratings, *Design-Center Values*:

ULTOR• VOLTAGE	12000 max.	volts
GRID-No.3 VOLTAGE	2000 max.	volts
GRID-No.2 VOLTAGE	410 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value	0 max.	volts
Positive peak value	2 max.	volts

° For curves, see front of this Section.

• In the 7TP4, grid No.4 which has the ultor function, and collector are connected together within the tube and are conveniently referred to collectively as "ultor". The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

7TP4

7TP4
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_{c2}) between 150 and 410 volts*

Grid-No.3 Voltage for Focus with Ultor Current of 100 μamp. . .	11.6% to 15.8% of E_u	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot.	11% to 25.7% of E_{c_2}	volts
Grid-No.3 Current**.	See Curves	
Grid-No.2 Current.	-15 to +15	μamp
Field Strength of Adjustable Centering Magnet.	0 to 8	gausses

Examples of Use of Design Ranges:

For ultor voltage of	*10000*	*volts*
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 Spot	-22 to -52	volts

Maximum Circuit Values:

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

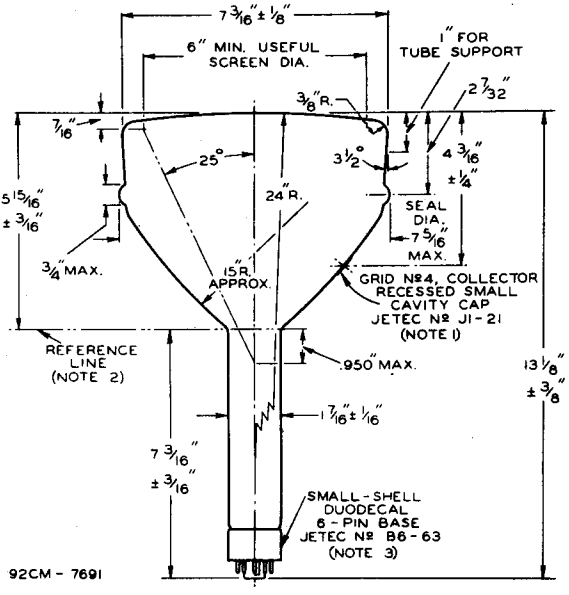
* Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 10000 volts.

** Grid-No.3 current increases as the ultor voltage is decreased.

RCA

7TP4

MONITOR KINESCOPE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN No.6 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 PIN No.6.

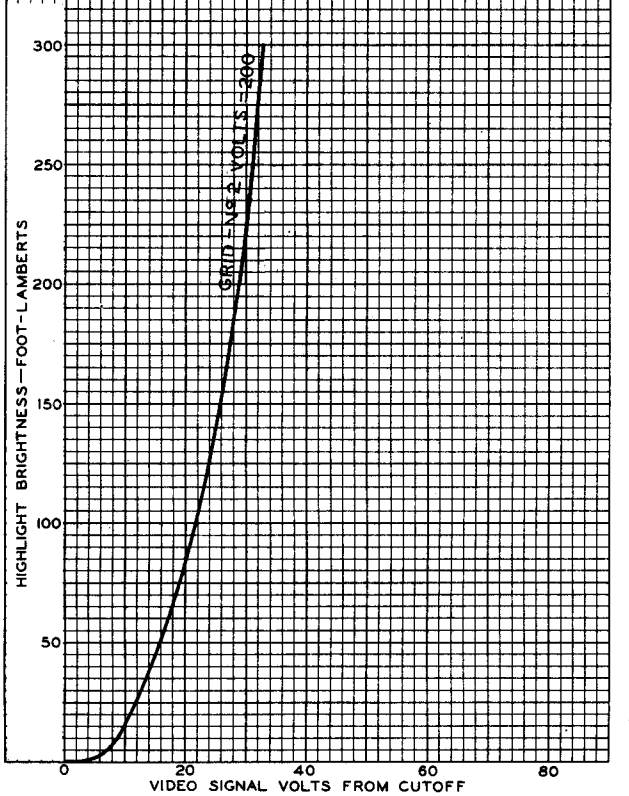
NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE REFERENCE-LINE GAUGE (JETEC No.112) 1.500" + 0.003" - 0.000" I.D. AND 2" LONG WILL REST ON BULB CONE.

NOTE 3: SOCKET FOR THIS BASE SHOULD NOT 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".

7TP4

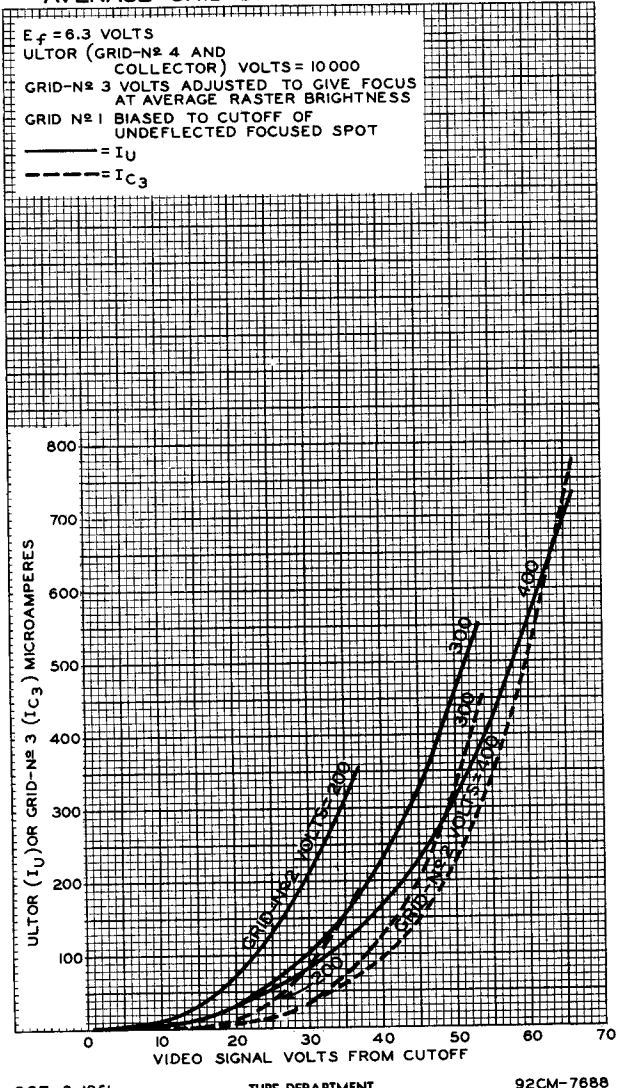
AVERAGE GRID-DRIVE CHARACTERISTICS

E_f = 6.3 VOLTS
ULTOR (GRID-№ 4 AND COLLECTOR) VOLTS = 10000
GRID-№ 3 VOLTS ADJUSTED TO GIVE FOCUS AT AVERAGE RASTER BRIGHTNESS
GRID № 1 BIASED TO CUTOFF OF UNDEFLECTED FOCUSED SPOT
RASTER SIZE = $5\frac{3}{8}$" X 4"



7TP4

AVERAGE GRID-DRIVE CHARACTERISTICS



7VP1

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

DATA

General:

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	3	μμf
DJ_3 to DJ_4	2	μμf
DJ_1 to All Other Electrodes	9	μμf
DJ_2 to All Other Electrodes	9	μμf
DJ_3 to All Other Electrodes	7	μμf
DJ_4 to All Other Electrodes	7	μμf
Faceplate		Clear Glass
Phosphor (For Curves, see front of this Section)		P1
Fluorescence and Phosphorescence		Green
Persistence of Phosphorescence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		14-1/2" ± 3/8"
Greatest Diameter of Bulb		7" ± 1/8"
Minimum Useful Screen Diameter		6"
Mounting Position		Any
Bulb		J56H
Base	Medium-Shell Diheptal 12-Pin (JETEC No.B12-37)	

BOTTOM VIEW

Pin 1 – Heater
Pin 2 – Cathode
Pin 3 – Grid No.1
Pin 4 – No Connection
Pin 5 – Grid No.3
Pin 7 – Deflecting Electrode DJ_3
Pin 8 – Deflecting Electrode DJ_4
Pin 9 – Ultor● (Grid No.2, Grid No.4, Collector)
Pin 10 – Deflecting Elect. DJ_2
Pin 11 – Deflecting Elect. DJ_1
Pin 12 – Internal Connection–Do Not Use
Pin 14 – Heater

DJ_1 and DJ_2 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 pin 5 may vary from the trace produced by DJ_1 and DJ_2 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° ± 3°.

●: See next page.

7VP1

7VP1

OSCILLOGRAPH TUBE

Maximum Ratings, *Design-Center Values*:

ULTOR● VOLTAGE	4000 max.	volts
GRID-No.3 VOLTAGE	2000 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	750 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_u) between 1000# and 4000 volts

Grid-No.3 Voltage for Focus	27% to 40% of E_u	volts
Maximum Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	2.8% of E_u	volts
Grid-No.3 Current	-15 to +10	μamp
Deflection Factors:		
DJ_1 & DJ_2	31 to 41	v dc/in./kv of E_u
DJ_3 & DJ_4	25 to 34	v dc/in./kv of E_u
Spot Position	##	

Examples of Use of Design Ranges:

For ultor voltage of	*1500*	*3000*	*volts*
Grid-No.3 Voltage for Focus	400 to 600	800 to 1200	volts
Maximum Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-42	-84	volts
Deflection Factors:			
DJ_1 & DJ_2	47 to 62	93 to 123	volts dc/in.
DJ_3 & DJ_4	38 to 51	75 to 102	volts dc/in.

Maximum Circuit Values:

Grid No.1-Circuit Resistance	1.5 max.	megohms
Resistance in Any Deflecting-Electrode Circuit°	5.0 max.	megohms

● In the 7VP1, grid No.4 which has the ultor function, grid No.2, and collector are connected together within the tube and are conveniently referred to collectively as "ultor." The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

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

#,##,°: See next page.

7VP1

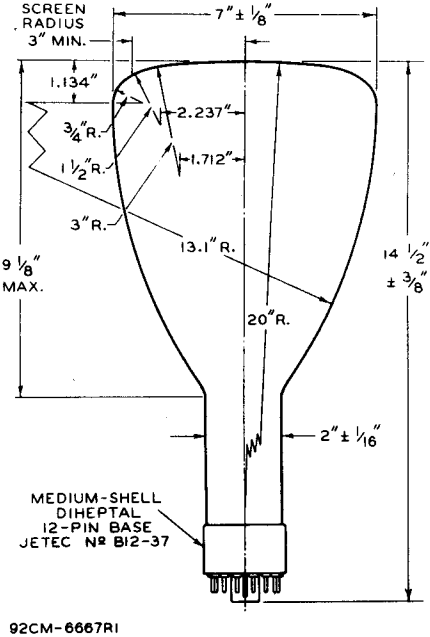
OSCILLOGRAPH TUBE

Brilliance and definition decrease with decreasing ultor voltage. A value as low as 1000 volts is recommended only for low-velocity deflection and low ambient-light levels.

With ultor voltage of 1500 volts, the center of the undeflected focused spot will fall within a circle having a 10-mm radius concentric with the center of the tube face.

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

The 7VP1 can be used as a direct replacement for the 7JP1 in all equipment where the high-voltage supply does not provide more than 4000 volts.



92CM-6667R1

℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

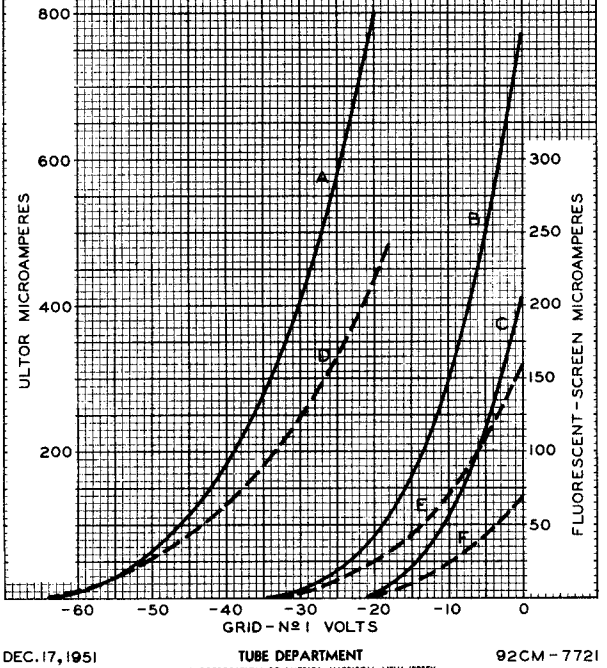
RCA

7VP1

AVERAGE CHARACTERISTICS

E_f = 6.3 VOLTS
GRID-№ 3 VOLTS ADJUSTED FOR FOCUS

CURVE	CURRENT	ULTOR VOLTS
A	ULTOR	3000
B	ULTOR	1500
C	ULTOR	1000
D	FLUORESCENT SCREEN	3000
E	FLUORESCENT SCREEN	1500
F	FLUORESCENT SCREEN	1000



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

7WP4

PROJECTION KINESCOPE

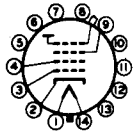
METAL-BACKED FLUORESCENT SCREEN
FORCED-AIR COOLED
ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.6 ± 5%	ac or dc volts
Current	0.62	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	12	μμf
Cathode to All Other Electrodes	6	μμf
Phosphor (For Curves, see front of this Section)	P4—Silicate-Sulfide Type	
Fluorescence and Phosphorescence	White	
Persistence of Phosphorescence	Medium	
Focusing Method	Electrostatic	
Deflection Method	Magnetic	
Deflection Angle (Approx.)	35°	
Overall Length	19-7/16" ± 5/8"	
Greatest Diameter of Bulb (Excluding Side Cap)	7" ± 3/16"	
Maximum Radius of Tube (Including Side Cap)	4-11/32"	
Quality Rectangle of Faceplate (See Outline Drawing)	5" x 3-3/4"	
Refractive Index for Faceplate Glass	1.469	
Cap	Medium (JETEC No.C1-5)	
Mounting Position	Any	
Base	Plastic-Filled, Small-Shell Diheptal 14-Pin (JETEC No.B14-45)	

BOTTOM VIEW



Pin 1 – Heater
Pin 2 – Cathode
Pin 3 – Grid No.1
Pin 4 – Grid No.2
Pin 5 – No Conn.
Pin 6 – No Conn.
Pin 7 – No Conn.
Pin 8 – No Conn.
Pin 9 – Grid No.3
Pin 10 – No Conn.
Pin 11 – No Conn.
Pin 12 – No Conn.
Pin 13 – Int. Conn.– Do Not Use
Pin 14 – Heater
Cap – Ultor (Grid No.4, Collector)

NOTE: Socket Contacts for pins No.5, 6, 7, 8, 10, 11, 12, and 13 should be removed so that maximum insulation is provided for pin No.9.

Air Flow to Face	40	cfm

The specified air flow should be delivered perpendicularly from a nozzle having a diameter of about 2 inches onto the face of the tube while it is in operation. The blower should have adequate capacity to provide for a total system pressure drop including that of the air filter.

Face Temperature	100 max.	°C

7WP4

7WP4

PROJECTION KINESCOPE

CATHODE-DRIVE* SERVICE

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

Maximum Ratings, *Absolute Values*:

ULTOR•-to-GRID-No.1 VOLTAGE°	80000 max.	volts
GRID-No.3-to-GRID-No.1 VOLTAGE	20000 max.	volts
GRID-No.2-to-GRID-No.1 VOLTAGE	850 max.	volts
GRID-No.2-to-CATHODE VOLTAGE	600 max.	volts
CATHODE-to-GRID-No.1 VOLTAGE:		
Positive bias value	250 max.	volts
Negative bias value	0 max.	volts
Peak negative value	2 max.	volts
AVERAGE ULTOR CURRENT	2 max.	ma
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

Typical Operation:

Ultor-to-Grid-No.1 Voltage#	75000	volts
Grid-No.3-to-Grid-No.1 Voltage	16000 – 18000	volts
Grid-No.2-to-Grid-No.1 Voltage for Pattern Cutoff	400 – 600	volts
Cathode-to-Grid-No.1 Voltage	125	volts
Cathode-to-Grid-No.1 Video Voltage:		
Peak positive value (Black level)	0	volts
Peak negative value (White level)	125	volts
Max. Grid-No.3 Current	15	μamp
Max. Grid-No.2 Current Range	-15 to +15	μamp

GRID-DRIVE** SERVICE

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

Maximum Ratings, *Absolute Values*:

ULTOR• VOLTAGE°	80000 max.	volts

• In the 7WP4, grid No.4 which has the ultor function and collector are connected together within the tube and are conveniently referred to collectively as "ultor". The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

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

** Grid drive is the operating condition in which the video signal varies the grid-No.1 potential.

° The product of ultor-to-grid-No.1 voltage, or ultor voltage, and average ultor current should be limited to 160 watts.

See next page.

RCA

7WP4

PROJECTION KINESCOPE

GRID-No.3 VOLTAGE	20000 max.	volts
GRID-No.2 VOLTAGE	600 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	250 max.	volts
Positive bias value	0 max.	volts
Peak positive value	2 max.	volts
AVERAGE ULTOR CURRENT	2 max.	ma
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

Typical Operation:

Ultor Voltage#	75000	volts
Grid-No.3 Voltage	16000 - 18000	volts
Grid-No.2 Voltage for Pattern Cutoff	400 - 600	volts
Grid-No.1 Voltage	-155	volts
Grid-No.1 Video Voltage:		
Peak negative value (Black level)	0	volts
Peak positive value (White level)	155	volts
Max. Grid-No.3 Current	15	μamp
Max. Grid-No.2 Current Range	-15 to +15	μamp

Maximum Circuit Values:

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

Brilliance and definition decrease with decreasing ultor-to-grid-No.1 voltage or ultor voltage. In general, the ultor-to-grid-No.1 voltage or the ultor voltage should not be less than 70000 volts.

OPERATING NOTES

X-ray radiation is produced at the face of the 7WP4 when it is operated at its normal ultor voltage. For x-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section.

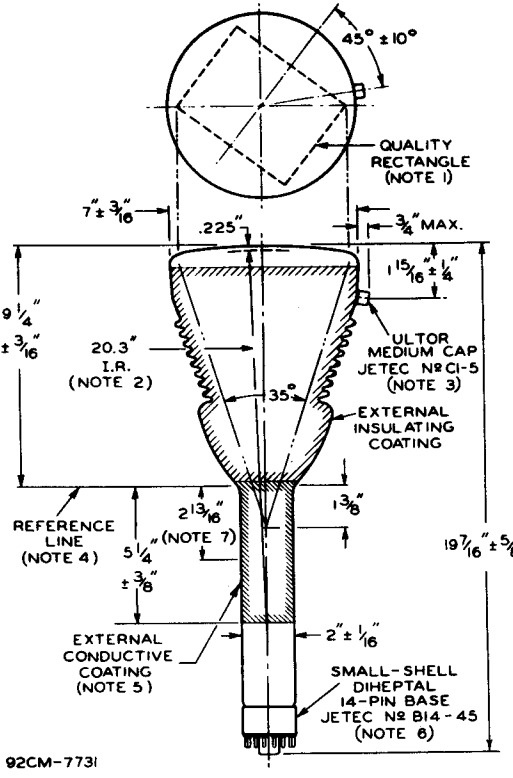
The air-cooling system required to cool the face of the 7WP4 consists of a blower and an air duct, having an outlet diameter of about 2 inches, directed perpendicularly onto the face of the tube. An air flow of 40 cubic feet per minute at the tube face is required to provide adequate cooling. In a typical 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.

7WP4

PROJECTION KINESCOPE

OPERATING NOTES (Cont'd)

Darkening of face occurs during normal operation of the 7WP4 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 will be observed during the life of the tube. The darkening, however, can be decreased periodically throughout the life of the tube by bleaching the face as prescribed in the bulletin.



7WP4

PROJECTION KINESCOPE

NOTE 1: WHEN VIEWED FROM THE FACE OF THE TUBE, THE MINOR AXIS OF THE 5" x 3-3/4" QUALITY RECTANGLE IS LOCATED 45° ± 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 ± 0.006" FROM THE SPHERICAL SURFACE HAVING A 20.3" RADIUS.

NOTE 3: THE PLANE THROUGH BASE PIN No.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 No.9.

NOTE 4: REFERENCE LINE IS DETERMINED BY POSITION WHERE GAUGE 2.100" ± 0.001" I.D. AND 3" LONG WILL REST ON BULB CONE.

NOTE 5: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

NOTE 6: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. SOCKET CONTACTS FOR PINS 6, 7, 8, 10, 11, 12, AND 13 SHOULD BE REMOVED IN ORDER TO PROVIDE MAXIMUM INSULATION FOR PIN No.9.

NOTE 7: EFFECTIVE DEFLECTING FIELD MUST BE WITHIN THIS SPACE.

RCA

7WP4

AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE

E_f = 6.6 VOLTS

ULTOR-TO-GRID-№1 VOLTS = 70000-80000

GRID-№3-TO-GRID-№1 VOLTS ADJUSTED TO GIVE FOCUS

GRID-№2-TO-GRID-№1 VOLTS ADJUSTED TO PATTERN CUTOFF

CATHODE BIASED POSITIVE WITH RESPECT TO GRID №1 (VOLTS) = 125

GRID-DRIVE SERVICE

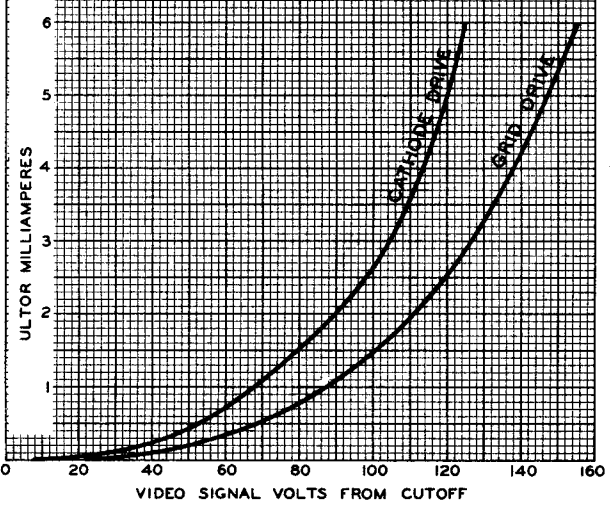
E_f = 6.6 VOLTS

ULTOR VOLTS = 70000-80000

GRID №3 VOLTS ADJUSTED TO GIVE FOCUS

GRID №2 VOLTS ADJUSTED TO PATTERN CUTOFF

GRID-№1 BIAS VOLTS = -155



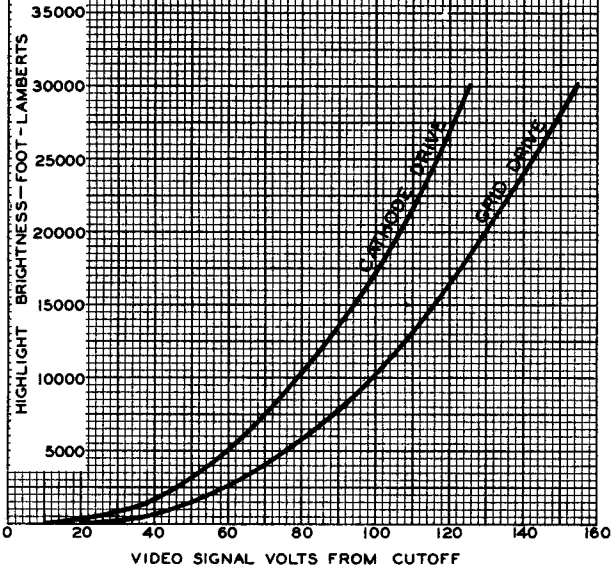
AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE

- E_f = 6.6 VOLTS
- ULTOR-TO-GRID-№1 VOLTS = 75000
- GRID-№3-TO-GRID-№1 VOLTS ADJUSTED TO GIVE FOCUS
- GRID-№2-TO-GRID-№1 VOLTS ADJUSTED TO PATTERN CUTOFF
- CATHODE BIASED POSITIVE WITH RESPECT TO GRID №1 (VOLTS) = 125
- RASTER SIZE: 5" x 3¾"

GRID-DRIVE SERVICE

- E_f = 6.6 VOLTS
- ULTOR VOLTS = 75000
- GRID-№3 VOLTS ADJUSTED TO GIVE FOCUS
- GRID-№2 VOLTS ADJUSTED TO PATTERN CUTOFF
- GRID-№1 BIAS VOLTS = -155
- RASTER SIZE: 5" x 3¾"



RCA

7WP4

AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE

E_f = 6.6 VOLTS
ULTOR-TO-GRID-№1 VOLTS = 75000
GRID-№3-TO-GRID-№1 VOLTS ADJUSTED TO GIVE FOCUS
GRID-№2-TO-GRID-№1 VOLTS ADJUSTED TO PATTERN CUTOFF
CATHODE BIASED POSITIVE WITH RESPECT TO GRID №1 (VOLTS) = 125
RASTER SIZE: 5" x 3 3/4"

GRID-DRIVE SERVICE

E_f = 6.6 VOLTS
ULTOR VOLTS = 75000
GRID-№3 VOLTS ADJUSTED TO GIVE FOCUS
GRID-№2 VOLTS ADJUSTED TO PATTERN CUTOFF
GRID-№1 BIAS VOLTS = -155
RASTER SIZE: 5" x 3 3/4"

JULY 28, 1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CL-7519

Obsolete

9JP1/~~1809-P1~~

7-9JP1

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode		
Voltage	2.5	a-c or d-c	volts
Current	2.1		amp.
Focusing Method		Electrostatic	
Deflection Method		Electrostatic and Magnetic	
Electrode DJ_1 is on same side of tube as base pin 2			
Electrode DJ_2 is on same side of tube as base pin 6			
Phosphor		No.1	
Fluorescence		Green	
Persistence		Medium	
Direct Interelectrode Capacitances:			
Control Electrode to All Other Electrodes		8	μμf
Deflecting Electrode DJ_1 to Deflecting Electrode DJ_2		1	μμf
Either Deflecting Electrode DJ_1 or DJ_2 to All Other Electrodes		3.6	μμf
Cathode to All Other Electrodes		8	μμf
Overall Length		15-11/16"	± 3/8"
Bulb Diameter at Screen End		9"	± 1/8"
Minimum Diameter of Screen		8"	
Bulb Side Terminals		Snap Connectors	
Base		Small Wafer Octal 8-Pin, Sleeve	
Deflection Yoke:			
Position on Tube Neck		Lip Flush with Bulb Reference Line (see OUTLINE DRAWING)	
Working Length for 55° Angle Deflection		2" max.	

Maximum Ratings Are Design-Center Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Anode No.2 (High-Voltage Electrode) Voltage		5000 max.	volts
Anode No.1 (Focusing Electrode) Voltage		2000 max.	volts
Grid (Control Electrode) Voltage		Never positive	
Peak Voltage Between Anode No.2 and Either Deflecting Electrode		3000 max.	volts
D-C Heater-to-Cathode Potential		125 max.	volts
Grid-Circuit Resistance		1.5 max.	megohms
Typical Operation:			
Anode No.2 Voltage #	2500	5000	volts
Anode No.1 Voltage for Focus at 75% of Grid Voltage for Cut-Off (Approx.)*	785	1570	volts
Grid Voltage for Cut-Off** ##	-45	-90	volts
Deflection Sensitivity: Electrodes DJ_1 and DJ_2	0.272	0.136	mm/volt D.C.
Deflection Factor: Electrodes DJ_1 and DJ_2	93.8	187	volts D.C./in.

NOTE 1: The d-c potential of each deflecting electrode is maintained essentially equivalent to that of anode No.2 by connecting resistors having values not greater than 10 megohms between each deflecting electrode and anode No.2. This arrangement by suitable choice of resistor

(continued on next page)

#, *, **, ##: See next page.

9JP1

HIGH-VACUUM CATHODE-RAY TUBE

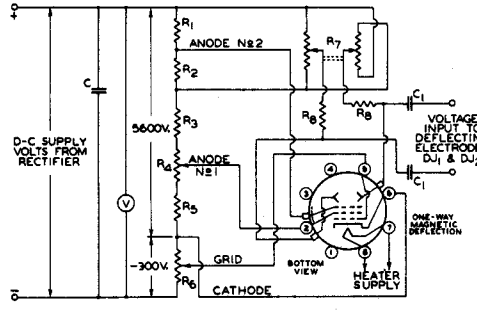
(continued from preceding page)

values minimizes pattern distortion and pattern drift resulting from unbalanced potentials on the deflecting electrodes. The smaller the resistor values, the less the distortion for a given beam current.

\# Brilliance and definition decrease with decreasing anode No.2 voltage. In general, anode No.2 voltage should not be less than 2500 volts.
* Supply should be adjustable to ±20% of this value.
\#\# Supply should be adjustable to +50% of this value.
** Visual extinction of a stationary focused spot.

Characteristic Curves of phosphor No.1 are shown at the beginning of this section.

TYPICAL OSCILLOGRAPH CIRCUIT



C = FILTER CONDENSER, 0.5 TO 2.0 μf
C_1 = SEE NOTE 2
R_1, R_2 = 0.4 MEGOHM
R_3 = 1.2 MEGOHMS
R_4 = 0.5-MEGOHM POTENTIOMETER
R_5 = 0.5 MEGOHM
R_6 = 0.15-MEGOHM POTENTIOMETER
R_7 = 1.5-MEGOHM (EACH SECTION) DUAL POTENTIOMETER FOR BEAM CENTERING
R_8 = POTENTIAL EQUALIZING RESISTORS, SEE NOTES 1 & 2

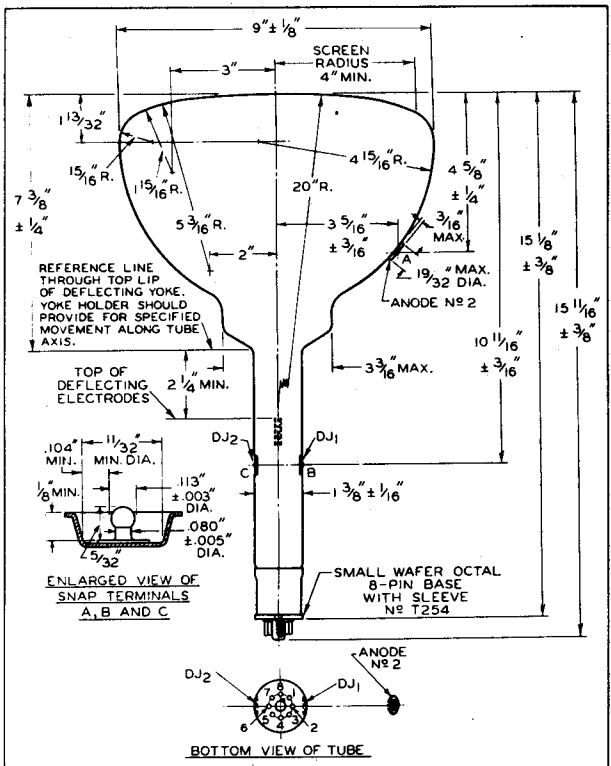
NOTE 2: When the cathode or the negative end of the cathode-ray high-voltage supply is grounded, blocking condensers C_1 should have a high voltage rating. When anode No.2 is grounded, condensers C_1 may be low-voltage condensers.

For d-c amplifier service, the deflecting electrodes should be coupled direct to the output of the amplifier by omitting the blocking condensers. In addition, it will usually be preferable to remove the associated deflecting electrode resistor in order to minimize the loading effect of the resistor on the d-c amplifier. With the resistor removed, it is essential, in order to minimize the spot defocusing, that anode No.2 be returned to some point in the d-c amplifier circuit such that the potential difference between anode No.2 and the average voltage across the deflecting electrodes will be as low as possible.

Obsolete

9JP1

HIGH-VACUUM CATHODE-RAY TUBE

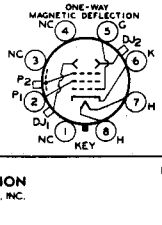


THE PLANE THROUGH THE TUBE AXIS AND EACH OF THE FOLLOWING ITEMS MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE NO.2 TERMINAL BY THE ANGULAR TOLERANCES (MEASURED ABOUT THE TUBE AXIS) AS SHOWN:

ITEM	TOLERENCE
PIN NO.2	± 9°
DJ_1	± 5°
DJ_2	± 13°
TRACE PRODUCED BY DJ_1 & DJ_2	± 7°

BOTTOM VIEW OF SOCKET CONNECTIONS

DJ_1, DJ_2 = Deflecting Electrodes
P_2 = Anode No.2
P_1 = Anode No.1
G_1 = Grid (Control Electrode)
H = Heater
K = Cathode
NC = No Connection



June 1, 1942

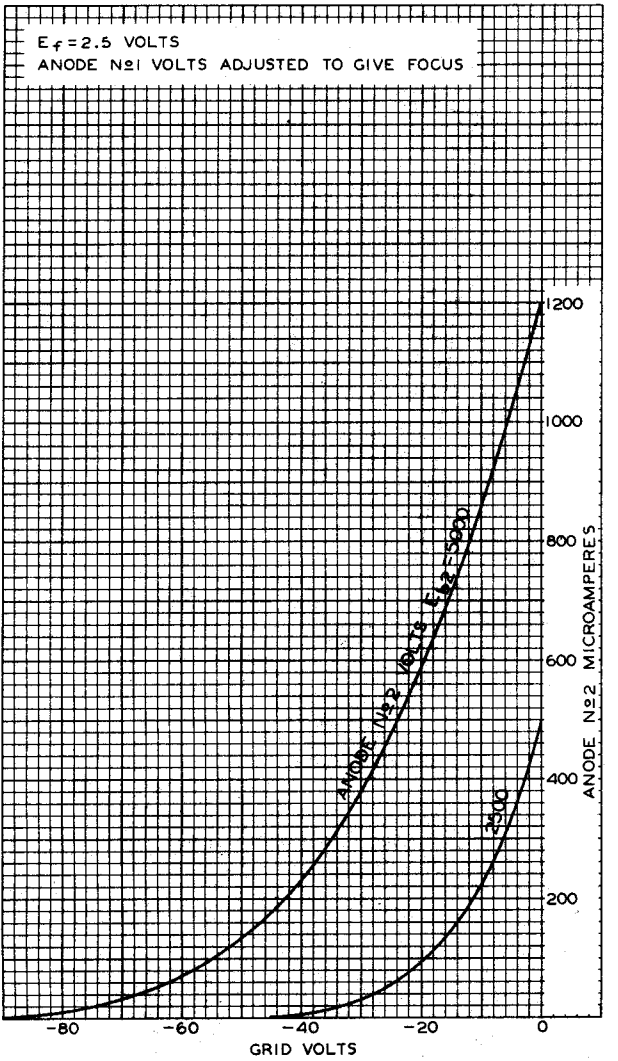
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

CE-6331

9JP1

9JP1/1809-P1

AVERAGE CHARACTERISTICS



10BP4

KINESCOPE

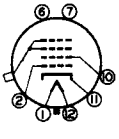
MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	6.5	μμf
Cathode to All Other Electrodes	5.0	μμf
External Conductive Coating to Anode No.2	2500 max. 500 min.	μμf μμf
Phosphor (For Curves, see front of this Section)		No.4
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Medium
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angle (Approx.)		50°
Ion Trap		Magnetic
External Coating		Conductive
Overall Length		17-5/8" ± 3/8"
Greatest Diameter of Bulb		10-1/2" ± 1/8"
Minimum Useful Screen Diameter		9"
Raster Size (Approx.)		6" x 8"
Mounting Position		Any
Cap		Recessed Small Cavity
Base		Small-Shell Duodecal 7-Pin

BOTTOM VIEW



Pin 1 - Heater
Pin 2 - Grid No.1
Pin 6 - No Connection
Pin 7 - No Connection
Pin 10 - Grid No.2
Pin 11 - Cathode
Pin 12 - Heater
Cap - Anode, Grid No.3

Maximum Ratings, *Design-Center Values*:

ANODE VOLTAGE■	10000 max. volts
GRID-No.2 VOLTAGE	410 max. volts
GRID-No.1 (CONTROL ELECTRODE) 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	125 max. volts
Heater positive with respect to cathode	125 max. volts

■ See next page.
← Indicates a change.

10BP4
KINESCOPE

→Typical Operation:

Anode Voltage*	9000	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 Voltage°	-27 to -63	volts

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	470 min.	ohms
Anode-Circuit Resistance	11000 min.	ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

Ion-Trap Magnet#	RCA Type No.203D1
Deflection Yoke♣	RCA Type No.201D1
Focusing Coil**	RCA Type No.202D1

■ The anode and grid No.3 which are connected together within tube are referred to herein as anode.

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 8000 volts.

° Visual extinction of undeflected focused spot.

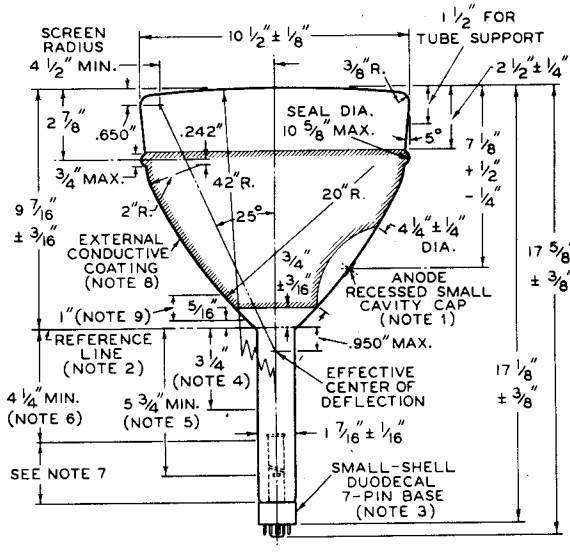
The dc current required by this magnet is approx. 109 ma. for the typical operating conditions shown.

♣ The horizontal deflecting-coil current required by this yoke to produce 8" picture width is approx. 470 ma. peak-to-peak under the typical operating conditions shown. The current varies directly as the square root of the anode voltage.

** The dc current required by this coil is approx. 115 ma. for the typical operating conditions shown and using combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 20 foot-lamberts on a 6" x 8" picture area. Distance from reference line (see Outline Drawing) to center line of air gap is approx. 3-1/4".

→indicates a change.

10BP4
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 ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE 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. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING DIAMETER OF 1-7/8".

NOTE 4: APPROX. DISTANCE TO CENTER OF FOCUSING-COIL AIR GAP.

NOTE 5: DISTANCE TO INTERNAL POLE PIECES. PLANE THROUGH PIN No. 6 AND TUBE AXIS PASSES THROUGH LINE JOINING CENTERS OF POLE PIECES. DIRECTION OF PRINCIPAL FIELD OF ION-TRAP MAGNET SHOULD BE SUCH THAT NORTH POLE IS ADJACENT TO PIN No. 6 AND SOUTH POLE TO PIN No. 12.

10BP4
KINESCOPE

(continued from preceding page)

NOTE 6: LOCATION OF DEFLECTING YOKE AND FOCUSING-COIL AIR GAP MUST BE WITHIN THIS SPACE.

NOTE 7: KEEP THIS SPACE CLEAR FOR ION-TRAP MAGNET.

NOTE 8: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

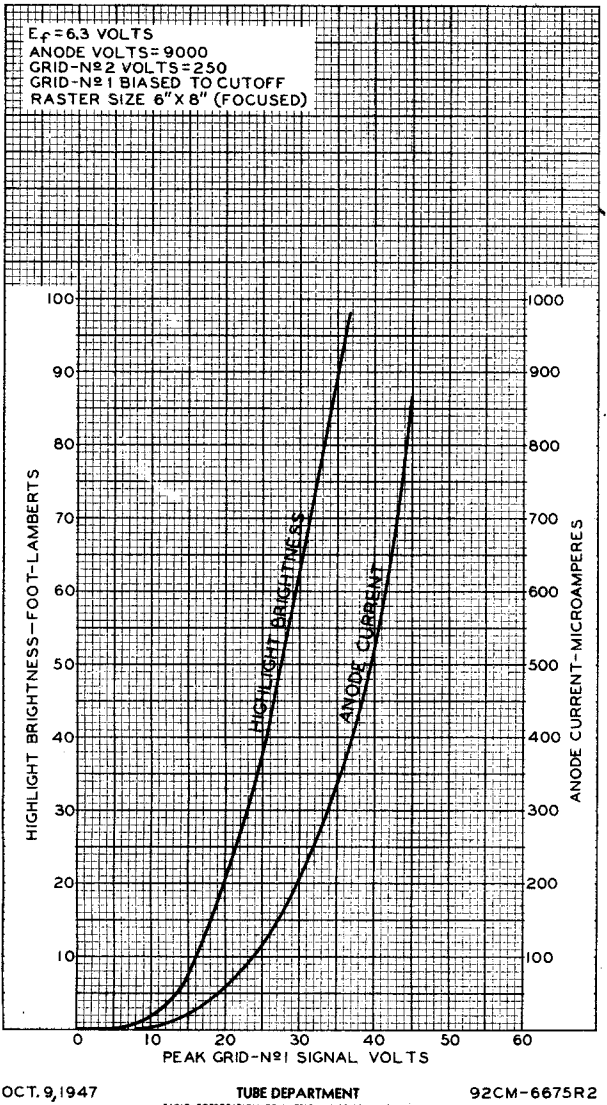
NOTE 9: FOR TUBE SUPPORT WHICH MUST NOT COVER SPECIFIED AREA AROUND ANODE CAP.

92CM-6663R2

RCA

10BP4

AVERAGE CHARACTERISTICS



10BP4-A
KINESCOPE

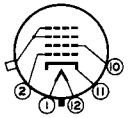
MAGNETIC FOCUS — MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Anode	2000 max. 500 min.	μμf μμf
Face Plate (Transmission of about 65%)	RCA "Filterglass"	
Phosphor (For Curves, see front of this Section)	No.4-Sulfide Type	
Fluorescence and Phosphorescence	White	
Persistence of Phosphorescence	Medium	
Focusing Method	Magnetic	
Deflection Method	Magnetic	
Deflection Angle (Approx.)	52°	
Ion-Trap Gun	Requires External Double-Field Magnet	
Overall Length	17-5/8" ± 3/8"	
Greatest Diameter of Bulb	10-1/2" ± 1/8"	
Screen Diameter	9-3/8"	
Mounting Position	Any	
Cap	Recessed Small Cavity	
Base	Small-Shell Duodecal 5-Pin	
Basing Designation for BOTTOM VIEW	$12D_1$	

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 10 – Grid No.2



Pin 11 – Cathode
Pin 12 – Heater
Cap – Anode, Grid No.3

Maximum Ratings, *Design-Center Values:*

ANODE°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

° Anode and grid No.3, which are connected together within tube, are referred to herein as anode.

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

10BP4-A

KINESCOPE

Typical Operation:

Anode Voltage*	9000	11000	volts
Grid-No.2 Voltage	250	250	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-27 to -63	-27 to -63	volts
Focusing-Coil Current (DC, Approx.)†	115	125	ma
Ion-Trap-Magnet Current (DC, Approx.)#	155	180	ma

Maximum Circuit Values:

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

Minimum Circuit Values:

The power supply should be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 5 ma. If the supply permits the instantaneous short-circuit current to exceed 1 ampere, or is capable of storing more than 250 microcoulombs, 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	470 min.	ohms
Anode-Circuit Resistance	15000 min.	ohms

The resistors used should be capable of withstanding the applied voltage.

Components:

Horizontal-Deflection-Output & High-Voltage Transformer: For use with pulse-operated high-voltage supply giving 10000-12000 volts	RCA-217T1
Horizontal Linearity Control	RCA-207R1
Width Control	RCA-206R1
Vertical-Deflection Output Transformer	RCA-204T9
Deflecting Yoke	RCA-205D1
Ion-Trap Magnet (Permanent-Magnet Type)	RCA-203D3
Focusing Coil°°	RCA-202D1

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 8000 volts.

† For JETEC Focusing Coil No.106, or equivalent, positioned with center line of air gap approximately 3-1/4 inches from Reference Line (See Outline Drawing). The indicated currents are for the condition with the combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 25 foot-lamberts for 9000 volts, or 30 foot-lamberts for 11000 volts, on an 8" x 6" picture area.

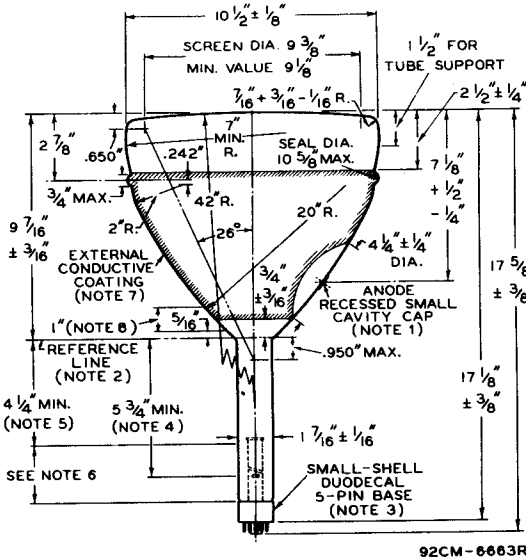
\# For JETEC Ion-Trap Magnet No.108, or equivalent, located with main pole pieces longitudinally opposite internal pole pieces, and rotated to give maximum brightness.

°° Renewal Sales item only.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

10BP4-A

KINESCOPE



92CM-6663R3

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE 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 MORE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING DIAMETER OF 1-7/8".

NOTE 4: DISTANCE TO INTERNAL POLE PIECES. PLANE THROUGH VACANT PIN POSITION No.6 AND TUBE AXIS PASSES THROUGH LINE JOINING CENTERS OF POLE PIECES. DIRECTION OF PRINCIPAL FIELD OF ION-TRAP MAGNET SHOULD BE SUCH THAT NORTH POLE IS ADJACENT TO VACANT PIN POSITION No.6 AND SOUTH POLE TO PIN No.12.

NOTE 5: LOCATION OF DEFLECTING YOKE AND FOCUSING-COIL MUST BE WITHIN THIS SPACE.

10BP4-A
KINESCOPE

NOTE 6: KEEP THIS SPACE CLEAR FOR ION-TRAP MAGNET.

NOTE 7: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

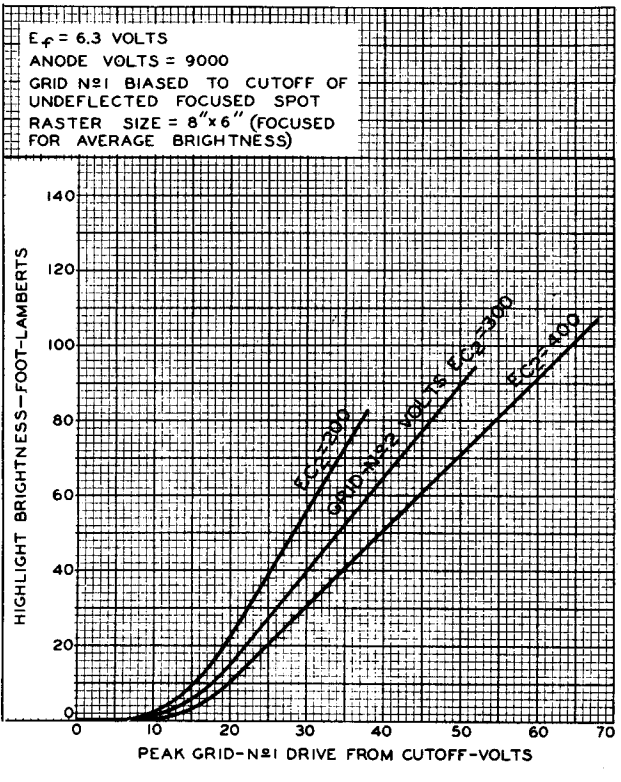
NOTE 8: FOR TUBE SUPPORT WHICH MUST NOT COVER SPECIFIED CLEAR AREA AROUND ANODE CAP.

10BP4-A
KINESCOPE

CURVES

The following Grid-Drive Characteristics Curves are for the condition with grid No.1 biased to give visual extinction of the undeflected, focused spot. In viewing television pictures, it will be found that the actual cutoff voltage corresponding to black in the picture is approximately 5 volts less negative than shown on the curves; similarly, the grid-No.1 drive to obtain a given anode current or light output is also about 5 volts less.

AVERAGE GRID-DRIVE CHARACTERISTICS

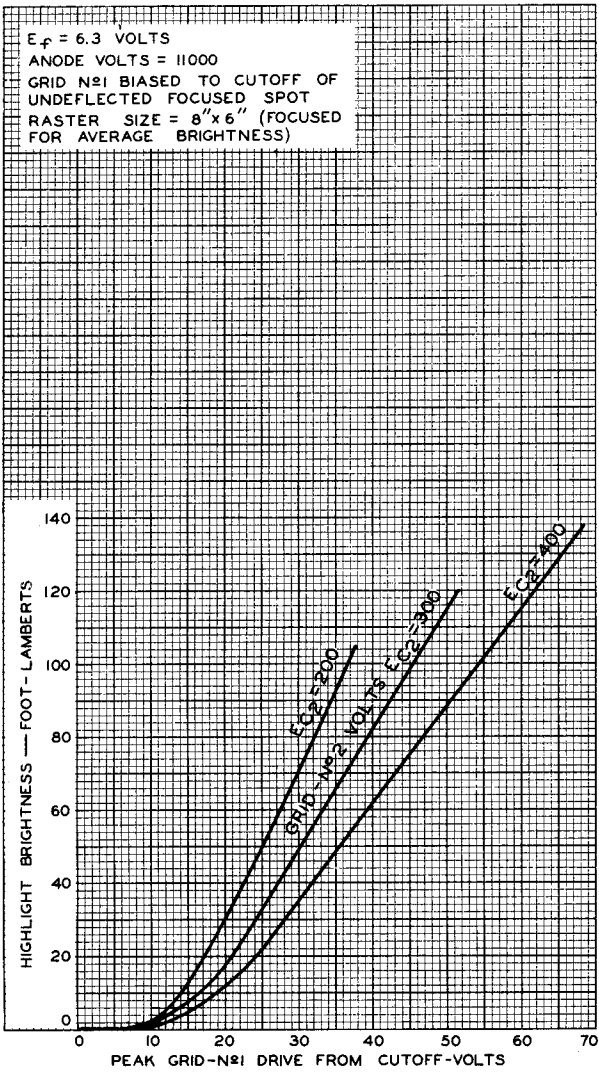


92CM-7448

RCA

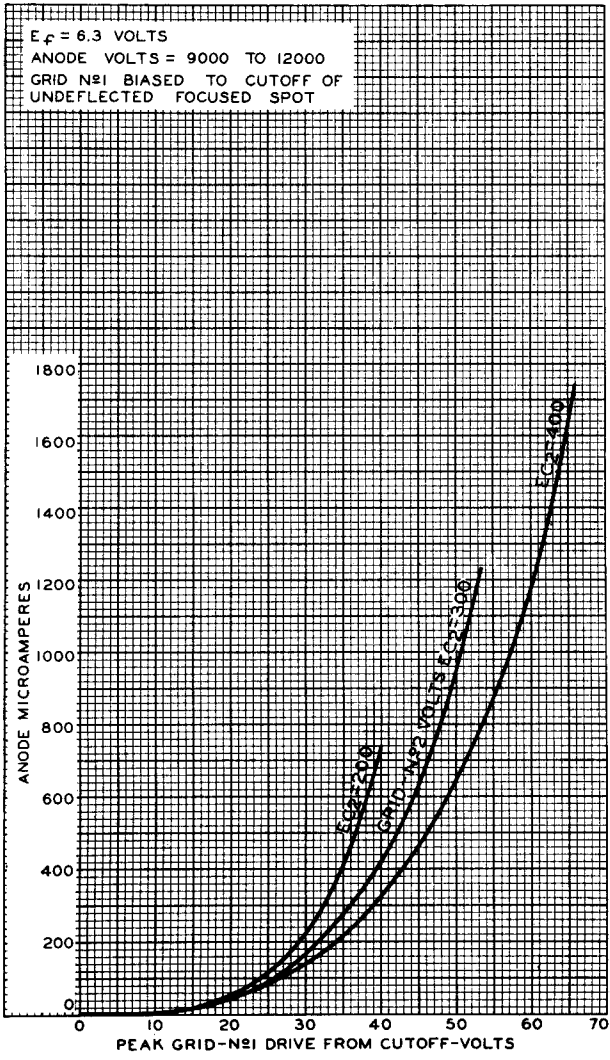
10BP4-A

AVERAGE GRID-DRIVE CHARACTERISTICS



10BP4-A

AVERAGE GRID-DRIVE CHARACTERISTICS



10FP4-A
KINESCOPE

METAL-BACKED FLUORESCENT SCREEN
MAGNETIC FOCUS MAGNETIC DEFLECTION

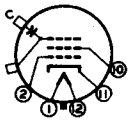
DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Anode	2500 max. 500 min.	μμf μμf
Face Plate (With about 66% light transmission)	Filterglass	
Phosphor (For Curves, see front of this Section)	P4—Sulfide Type	
Fluorescence and Phosphorescence	White	
Persistence of Phosphorescence	Short	
Focusing Method	Magnetic	
Deflection Method	Magnetic	
Deflection Angle (Approx.)	50°	
Overall Length	17-5/8" ± 3/8"	
Greatest Diameter of Bulb	10-1/2" ± 1/8"	
Minimum Useful Screen Diameter	9-1/8"	
Mounting Position	Any	
Cap	Recessed Small Cavity (JETEC No.J1-21)	
Base	Small-Shell Duodecal 5-Pin (JETEC No.B5-57)	

BOTTOM VIEW

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



Pin 12 – Heater
Cap – Anode
C – External Conductive Coating

Maximum Ratings, *Design-Center Values*:

ANODE 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
Heater positive with respect to cathode	140 max.	volts

10FP4-A
KINESCOPE

Typical Operation:

Anode Voltage*	11000	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-27 to -63	volts
Focusing-Coil Current (DC, approx.)●	110	ma
Spot Position	#	

Maximum Circuit Values:

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

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode-voltage should not be less than 8000 volts.

● For specimen focusing coil similar to JETEC Focusing Coil No.106 positioned with air gap toward kinescope screen and center line of air gap 3-1/4 inches from Reference Line (see Outline Drawing). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 50 foot-lamberts on an 8" x 6" picture area sharply focused at center of screen.

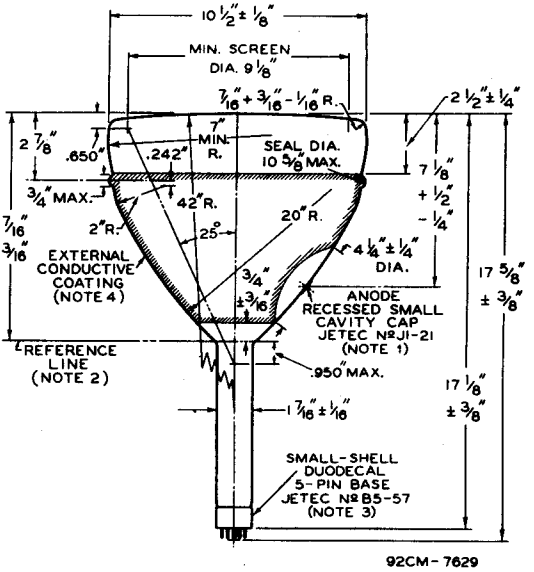
\# The center of the undeflected, unfocused spot will fall within a circle having 16-mm radius concentric with the center of the tube face.

OPERATING NOTES

X-Ray Warning. When operated at or below the maximum ratings shown in the tabulated data, the 10FP4-A does not produce any harmful x-ray radiation. All types of picture tubes may be operated at voltages (if ratings permit) up to 16 kilovolts (absolute value) without personal injury on prolonged exposure at close range. Above 16 kilovolts, special shielding precautions for x-ray radiation may be necessary.

10FP4-A

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 ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 10°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.3.

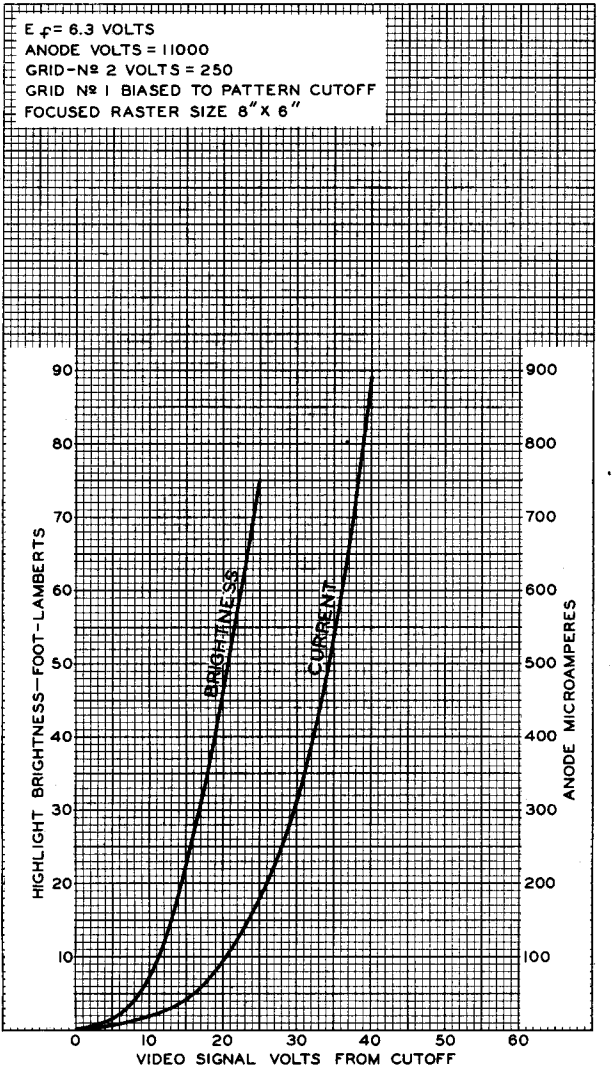
NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE JETEC REFERENCE-LINE GAUGE No.112 (1.500" + .003" −.000" I.D. AND 2" LONG) WILL REST ON BULB CONE.

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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

10FP4-A

AVERAGE GRID-DRIVE CHARACTERISTICS



10KP7
OSCILLOGRAPH TUBE

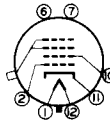
MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:

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	6.5 μμf
Cathode to All Other Electrodes	5 μμf
Phosphor	No.7
Fluorescence	Blue
Phosphorescence	Greenish-Yellow
Persistence	Long
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle (Approx.)	50°
Overall Length	17-5/8" ± 3/8"
Greatest Diameter of Bulb	10-1/2" ± 1/8"
Minimum Useful Screen Diameter	9"
Mounting Position	Any
Cap	Recessed Small Cavity
Base	Small-Shell Duodecal 7-Pin

BOTTOM VIEW



Pin 1 – Heater
Pin 2 – Grid No.1
Pin 6 – No Connection
Pin 7 – No Connection
Pin 10 – Grid No.2
Pin 11 – Cathode
Pin 12 – Heater
Cap – Anode, Grid No.3

Maximum Ratings, *Design-Center Values*:

ANODE● VOLTAGE	10000 max.	volts
GRID-No.2 VOLTAGE:		
Positive value (DC or Peak AC)	700 max.	volts
Negative value (DC or Peak AC)	180 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	180 max.	volts
Positive bias value□	0 max.	volts
Positive peak value	2 max.	volts
PEAK GRID-No.1 DRIVE FROM CUTOFF	65 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

Typical Operation:

Anode Voltage*	7000	9000	volts
Grid-No.2 Voltage	250	250	volts
Grid-No.1 Voltage Range○	-27 to -63	-27 to -63	volts
Focusing Coil Cur. (Approx.)▲	93	105	ma
Spot Position	–	#	

●,□,*,○,▲,#: See next page.

10KP7
OSCILLOGRAPH TUBE

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	200 min.	ohms
Grid-No.2-Circuit Resistance	820 min.	ohms
Anode-Circuit Resistance	11000 min.	ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

RCA Focusing Coil.	RCA Type No. 202D1

● Anode and grid No.3, which are connected together within tube, are referred to herein as anode.

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

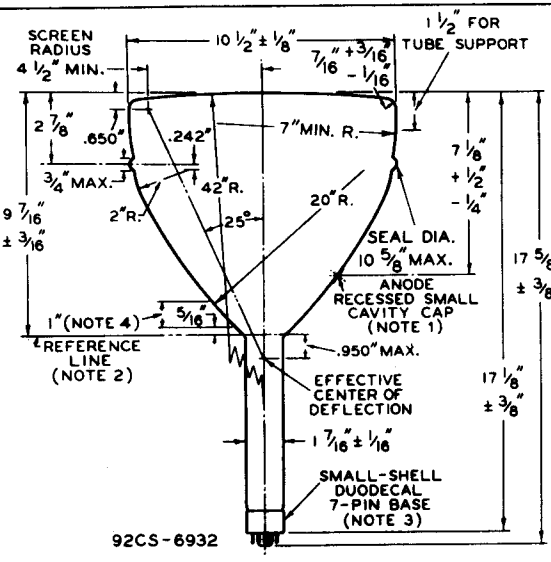
* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 7000 volts.

○ For visual extinction of undeflected, focused spot.

▲ For JETEC Focusing Coil No.106, or equivalent, with center-line of air gap approximately 3-3/4" 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 18 mm radius concentric with the center of the tube face.

10KP7
OSCILLOGRAPH TUBE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.3.

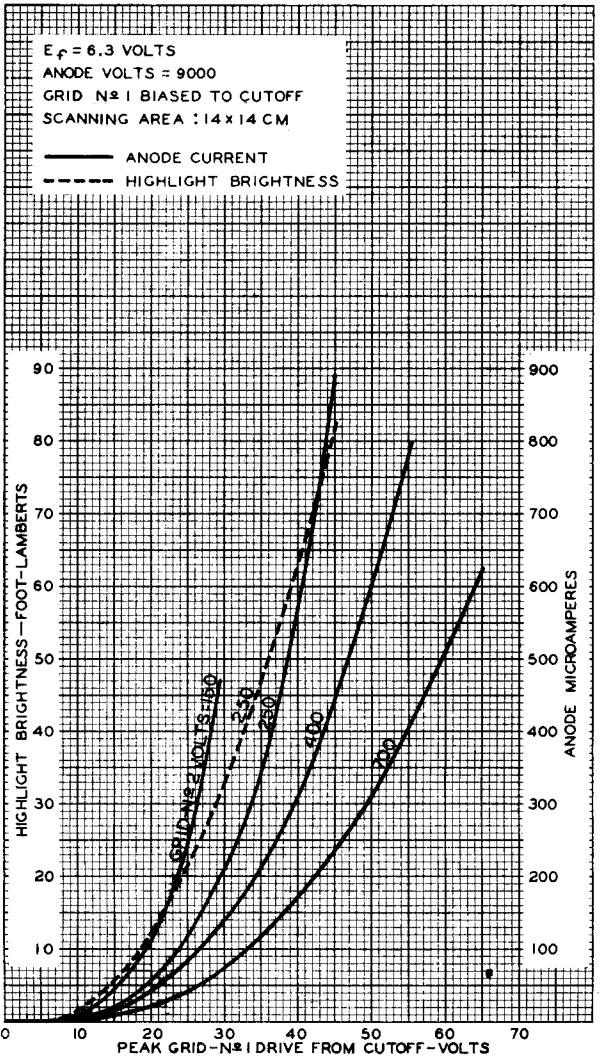
NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE HINGED GAUGE 1.500" + .003" - .000" I.D. AND 2" LONG WILL REST ON BULB CONE.

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

NOTE 4: FOR TUBE SUPPORT WHICH MUST BE KEPT AT LEAST 2" AWAY FROM ANODE CAP.

10KP7

AVERAGE GRID-DRIVE CHARACTERISTICS



RCA

10SP4

MONITOR KINESCOPE

METAL-BACKED SCREEN

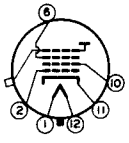
ELECTROSTATIC FOCUS — MAGNETIC DEFLECTION

DATA

General:

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
Cathode to All Other Electrodes	5	μμf
Faceplate, Spherical		Filterglass
Light Transmission (Approx.)		66%
Phosphor°, Metal-Backed		P4—Sulfide Type
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Short
Focusing Method		Electrostatic
Deflection Method		Magnetic
Deflection Angle (Approx.)		50°
Overall Length		16-5/8" ± 3/8"
Greatest Diameter of Bulb		10-1/2" ± 1/8"
Minimum Useful Screen Diameter		9-1/8"
Picture Size (Within minimum-useful-screen area)		8" x 6"
Mounting Position		Any
Cap		Recessed Small Cavity (JETEC No. J1-21)
Base		Small-Shell Duodecal 6-Pin (JETEC No. B6-63)

BOTTOM VIEW



Pin 1 – Heater
Pin 2 – Grid No.1
Pin 6 – Grid No.3
Pin 10 – Grid No.2
Pin 11 – Cathode
Pin 12 – Heater
Cap – Ultor (Grid No.4 & Collector)

Maximum Ratings, *Design-Center Values*:

ULTOR• VOLTAGE	14000 max.	volts
GRID-No.3 VOLTAGE	2700 max.	volts
GRID-No.2 VOLTAGE	410 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value	0 max.	volts
Positive peak value	2 max.	volts

° For curves, see front of this Section.

• In the 10SP4, grid No.4 which has the ultor function, and collector are connected together within the tube and are conveniently referred to collectively as "ultor". The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

RCA

10SP4

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 14000 volts and grid-No.2 voltage (E_{c_2}) between 150 and 410 volts*

Grid-No.3 Voltage for Focus with Ultor Current of 100 μamp	11.7% to 15.9% of E_u	volts
Grid-No.1 Voltage for Visual Extinction of 8" x 6" Raster	9% to 24% of E_{c_2}	volts
Max. Grid-No.3 Current**	See Curves	
Grid-No.2 Current	-15 to +15	μamp
Field Strength of Adjustable Centering Magnet	0 to 8	gausses

Examples of Use of Design Ranges:

For ultor voltage of / *and grid-No.2 voltage of*	*12000* / *200*	*14000* / *200*	*volts* / *volts*
Grid-No.3 Voltage for Focus with Ultor Current of 100 μamp	1400 to 1900	1640 to 2225	volts
Grid-No.1 Voltage for Visual Extinction of 8" x 6" Raster	-18 to -48	-18 to -48	volts

Maximum Circuit Values:

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

* Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 10000 volts.

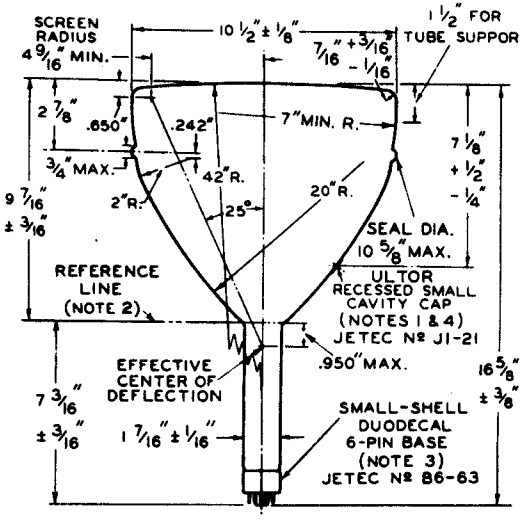
** Grid-No.3 Current increases as the ultor voltage is decreased.

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

RCA

10SP4

MONITOR KINESCOPE



92CM-7729

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN No.6 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 PIN No.6.

NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE REFERENCE-LINE GAUGE (JETEC No.112) 1.500" + 0.003" - 0.000" I.D. AND 2" LONG WILL REST ON BULB CONE.

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

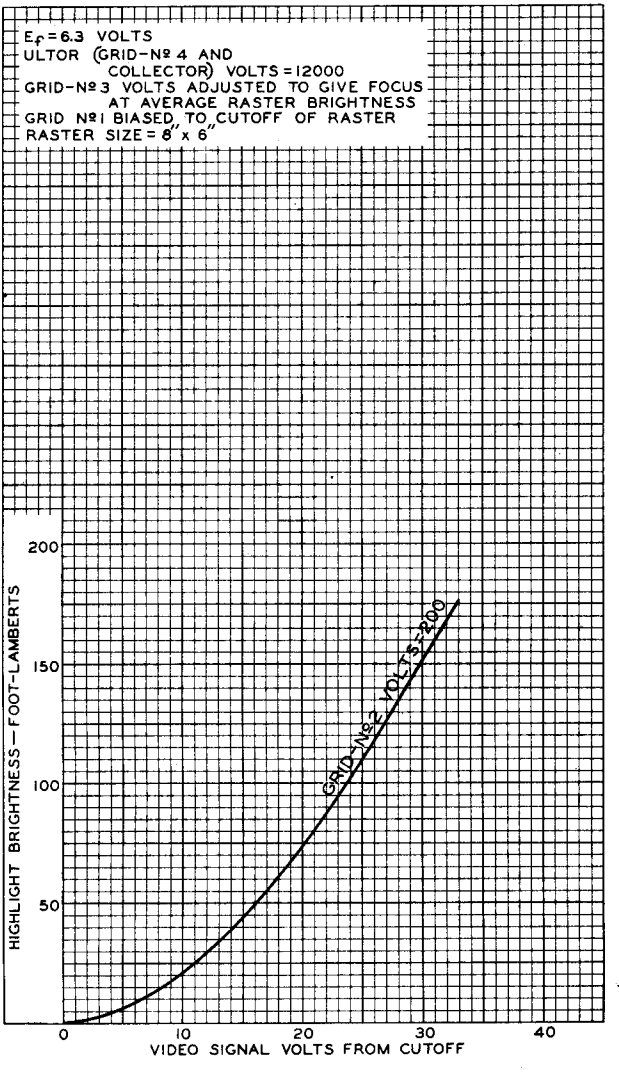
NOTE 4: TUBE SUPPORT MUST BE KEPT AT LEAST 2" AWAY FROM BULB TERMINAL.

RCA

10SP4

AVERAGE GRID-DRIVE CHARACTERISTIC

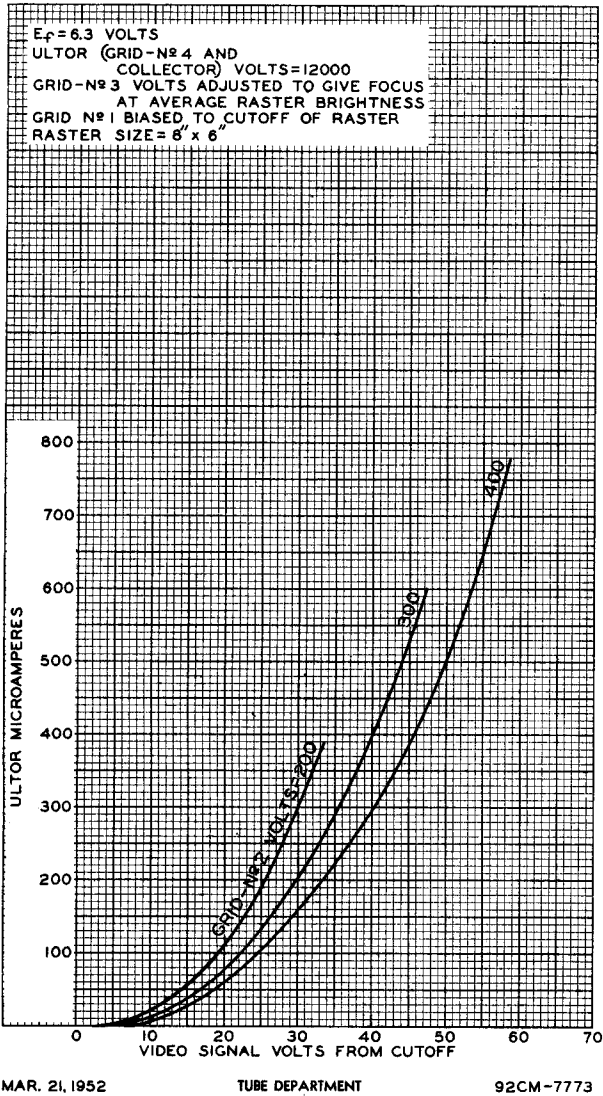
E_f = 6.3 VOLTS
ULTOR (GRID-Nº 4 AND COLLECTOR) VOLTS = 12000
GRID-Nº 3 VOLTS ADJUSTED TO GIVE FOCUS AT AVERAGE RASTER BRIGHTNESS
GRID Nº1 BIASED TO CUTOFF OF RASTER
RASTER SIZE = 8" x 6"



RCA

10SP4

AVERAGE GRID-DRIVE CHARACTERISTICS

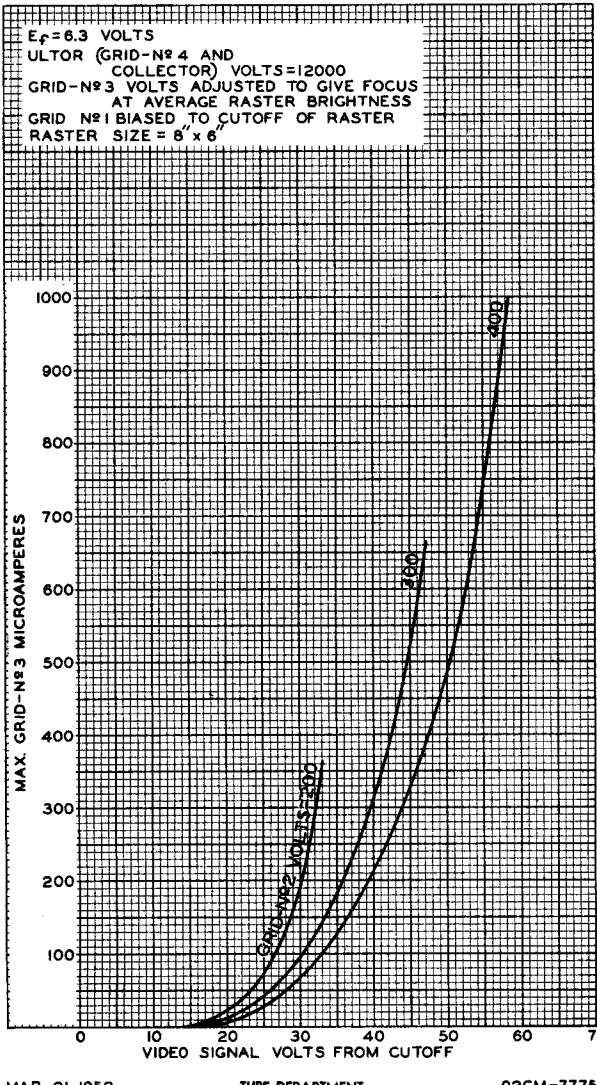


10SP4

RCA

10SP4

GRID-DRIVE CHARACTERISTICS



MAR. 21, 1952

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7775

12DP7-A

OSCILLOGRAPH TUBE

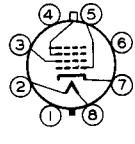
MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:

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	9 μμf
Grid No.2 to All Other Electrodes	7.5 μμf
Cathode to All Other Electrodes	6 μμf
Phosphor (For Curves, see front of this Section)	No.7
Fluorescence	Blue
Phosphorescence	Greenish-Yellow
Persistence of Phosphorescence	Long
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle (Approx.)	50°
Overall Length	19-5/8" ± 1/2"
Greatest Diameter of Bulb	12" ± 3/16"
Minimum Useful Screen Diameter	10"
Mounting Position	Any
Cap	Medium
Base	Long Medium-Shell Octal 8-Pin

BOTTOM VIEW



Pin 1 - No Connection
Pin 2 - Heater
Pin 3 - Grid No.2
Pin 4 - No Connection
Pin 5 - Grid No.1
Pin 6 - No Connection
Pin 7 - Cathode
Pin 8 - Heater
Cap - Anode, Grid No.3

Maximum Ratings, *Design-Center Values*:

ANODE● VOLTAGE	10000 max.	volts
GRID-No.2 VOLTAGE	700 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 GRID-No.1 DRIVE FROM CUTOFF	65 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

Typical Operation:

Anode Voltage*	4000	7000	volts
Grid-No.2 Voltage	250	250	volts
Grid-No.1 Voltage Range○	-25 to -70	-25 to -70	volts
Focusing-Coil Current▲	75 to 102	99 to 135	ma
Spot Position	#	-	

●,□,*,○,▲,#: See next page.

12DP7-A
OSCILLOGRAPH TUBE

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	11000 min.	ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

RCA Focusing Coil. . . . . RCA Type No. 202D1

● Anode and grid No.3, which are connected together within tube, are referred to herein as anode.

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

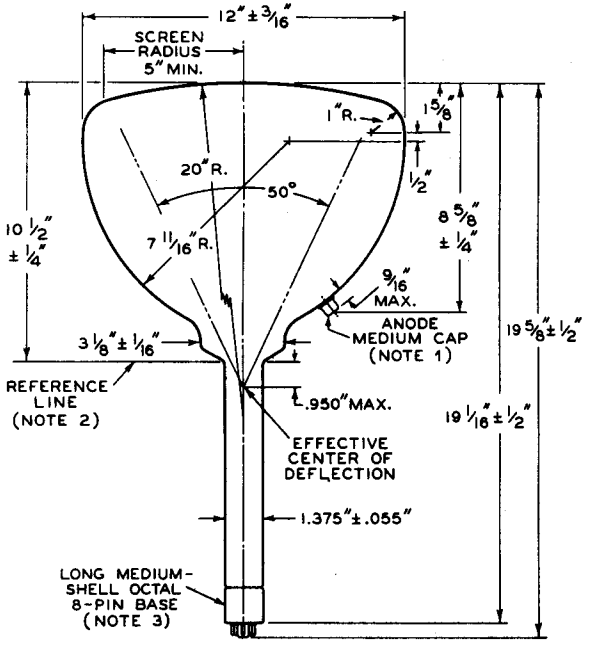
* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 4000 volts.

○ For visual extinction of undeflected focused spot.

▲ For JETEC Focusing Coil No.106, or equivalent, with center line of air gap approximately 4-1/8" 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 20 mm radius concentric with the center of the tube face.

12DP7-A
OSCILLOGRAPH TUBE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN No. 5 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE TERMINAL IS ON SAME SIDE OF TUBE AS PIN No. 5.

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

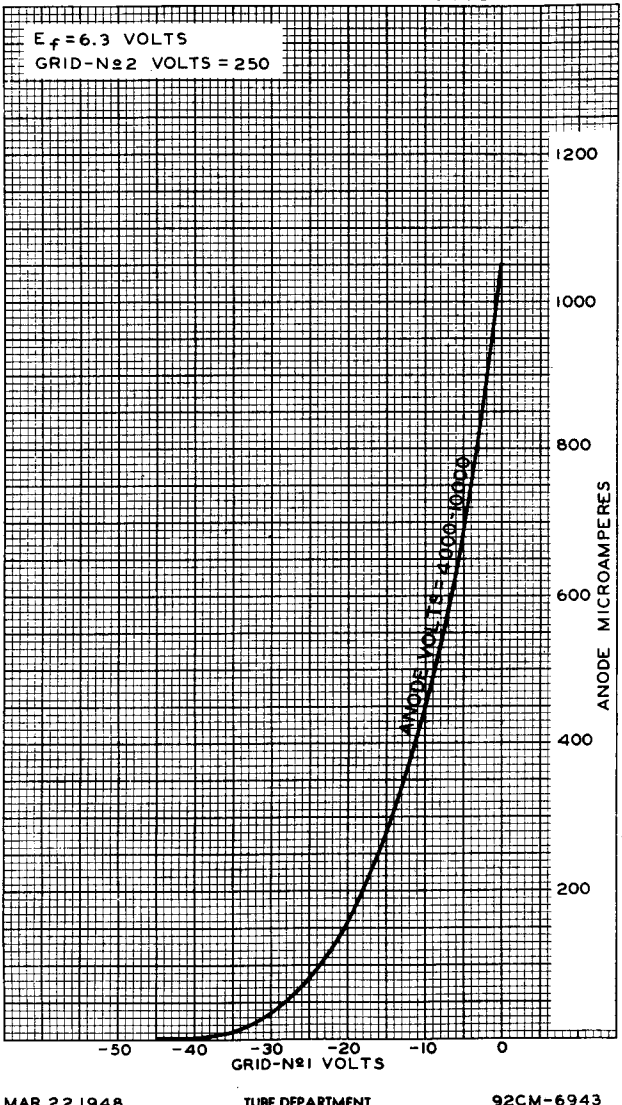
NOTE 3: ℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

92CM-6375R3

RCA

12DP7-A

AVERAGE CHARACTERISTIC



12DP7-B

OSCILLOGRAPH TUBE

MAGNETIC FOCUS — MAGNETIC DEFLECTION

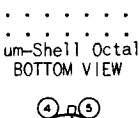
Supersedes Type 12DP7-A

DATA

General:

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	9 μμf
Cathode to All Other Electrodes	6 μμf
Faceplate (With about 66% light transmission)	Filterglass
Phosphor (For Curves, see front of this Section)	P7
Fluorescence	Blue
Persistence	Short
Phosphorescence	Greenish-Yellow
Persistence	Long
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle (Approx.)	50°
Overall Length	19-5/8" ± 1/2"
Greatest Diameter	12" ± 3/16"
Minimum Useful Screen Diameter	10"
Weight (Approx.)	8 lbs
Mounting Position	Any
Cap	Medium (JETEC No.C1-5)
Bulb	J96K
Base	Long Medium-Shell Octal 8-Pin (JETEC No.B8-65)

BOTTOM VIEW



Pin 1 - No Connection
Pin 2 - Heater
Pin 3 - Grid No.2
Pin 4 - No Connection
Pin 5 - Grid No.1
Pin 6 - No Connection
Pin 7 - Cathode
Pin 8 - Heater
Cap - Ultor (Grid No.3, Collector)

Maximum Ratings, *Design-Center Values:*

ULTOR● VOLTAGE	10000 max. volts
GRID-No.2 VOLTAGE:	
Positive value (DC or Peak AC)	700 max. volts
Negative value (DC or Peak AC)	180 max. volts
GRID-No.1 VOLTAGE:	
Negative bias value	180 max. volts
Positive bias value▲	0 max. volts
Positive peak value	2 max. volts

● In the 12DP7-B, grid No.3 which has the ultor function and collector are connected together within the tube and are conveniently referred to collectively as "ultor". The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

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

12DP7-B

OSCILLOGRAPH TUBE

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

Equipment Design Ranges:

For any ultor voltage (E_u) between 4000 and 10000 volts and grid-No.2 voltage (E_{c_2}) between 150 and 700 volts*

Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot.	10% to 28% of E_{c_2}	volts
Grid-No.2 Current.	−15 to +15	μamp
Focusing-Coil Current (DC)^{oo}	$\left[\sqrt{\frac{E_u}{4000}} \times 88.5\right]$ ± 15%	ma
Spot Position	##	

Examples of Use of Design Ranges:

For ultor voltage of. . / *and grid-No.2 voltage of*	*4000* / *250*	*7000* / *250*	*volts* / *volts*
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot.	−25 to −70	−25 to −70	volts
Focusing-Coil Current (DC) .	88.5 ± 15%	117 ± 15%	ma

Maximum Circuit Values:

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

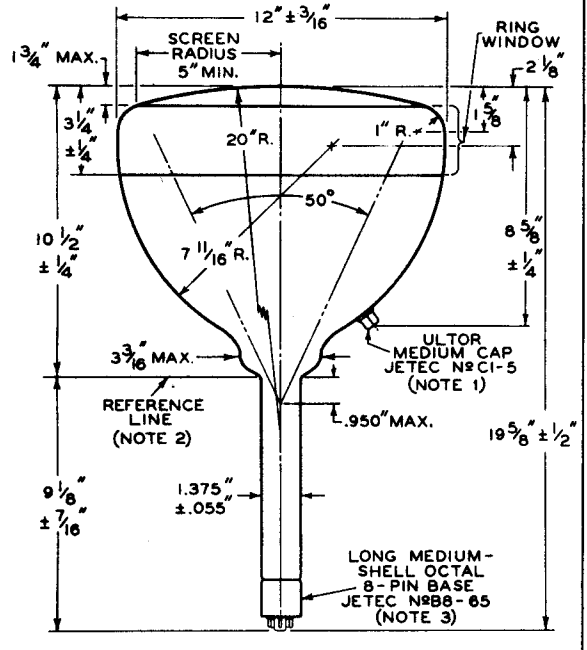
* Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 4000 volts.

oo For specimen focusing coil similar to JETEC Focusing Coil No.106 positioned with air gap toward faceplate and center line of air gap 4-1/8" from Reference Line (see *Outline Drawing*) and ultor current of 200 microamperes.

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

12DP7-B

OSCILLOGRAPH TUBE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN No.5 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 10°. ULTOR TERMINAL IS ON SAME SIDE OF TUBE AS PIN No.5.

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

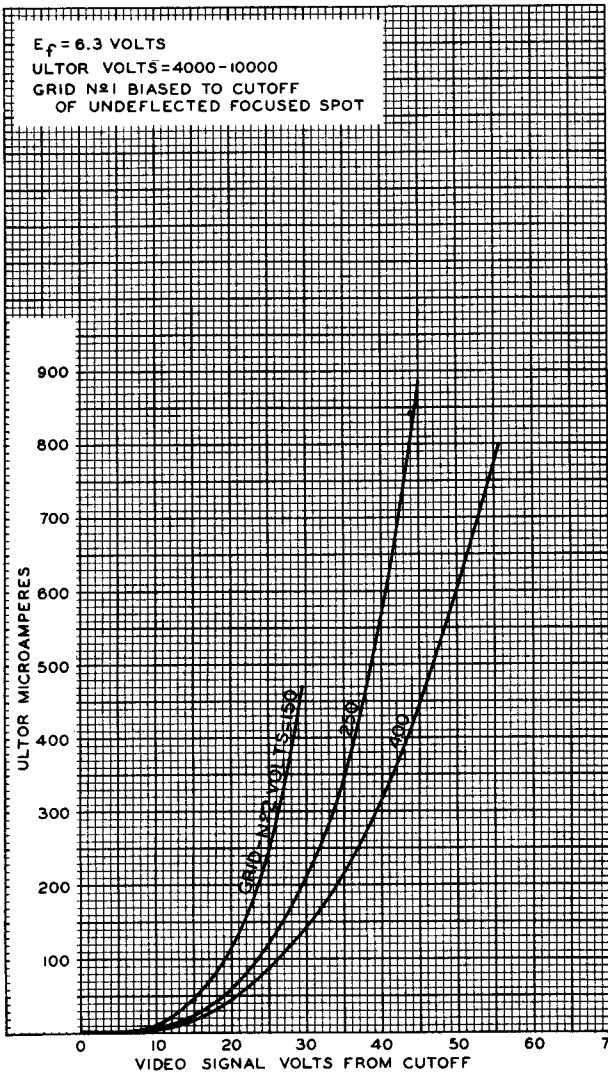
NOTE 3: ℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

92CM-6375R5

RCA

12DP7-B

AVERAGE GRID-DRIVE CHARACTERISTICS



12KP4-A
KINESCOPE

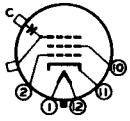
METAL-BACKED FLUORESCENT SCREEN
MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Anode	2500 max. 500 min.	μμf μμf
Face Plate (With about 66% light transmission)		Filterglass
Phosphor (For Curves, see front of this Section)		P4—Sulfide Type
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Short
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angle (Approx.)		54°
Overall Length		17-5/8" ± 3/8"
Greatest Diameter of Bulb		12-7/16" ± 1/8"
Minimum Useful Screen Diameter		11-1/8"
Mounting Position		Any
Cap		Recessed Small Cavity (JETEC No.J1-21)
Base		Small-Shell Duodecal 5-Pin (JETEC No.B5-57)

BOTTOM VIEW



Pin 1 - Heater
Pin 2 - Grid No.1
Pin 10 - Grid No.2
Pin 11 - Cathode
Pin 12 - Heater
Cap - Anode
C - External Conductive Coating

Maximum Ratings, *Design-Center Values:*

ANODE 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
Heater positive with respect to cathode	140 max.	volts

12KP4-A

12KP4-A

KINESCOPE

Typical Operation:

Anode Voltage*	11000	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-27 to -63	volts
Focusing-Coil Current (DC, approx.)●	135	ma
Spot Position	#	

Maximum Circuit Values:

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

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 9000 volts.

● For specimen focusing coil similar to JETEC Focusing Coil No.106 positioned with air gap toward kinescope screen and center line of air gap 3-1/4 inches from Reference Line (see Outline Drawing). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 35 foot-lamberts on a 10" x 7-1/2" picture area sharply focused at center of screen.

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

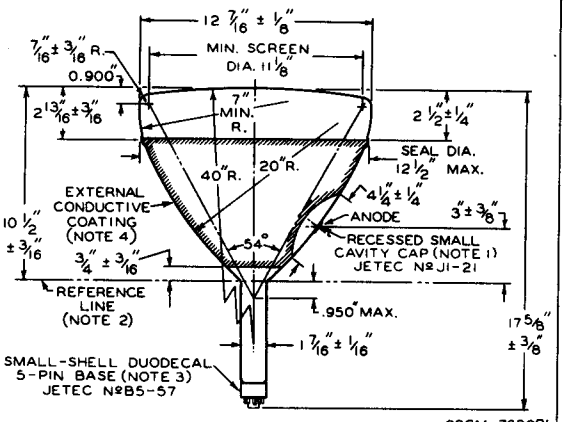
OPERATING NOTES

X-Ray Warning. When operated at or below the maximum ratings shown in the tabulated data, the 12KP4-A does not produce any harmful x-ray radiation. All types of picture tubes may be operated at voltages (if ratings permit) up to 16 kilovolts (absolute value) without personal injury on prolonged exposure at close range. Above 16 kilovolts, special shielding precautions for x-ray radiation may be necessary.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

12KP4-A

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 ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 10°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.3.

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

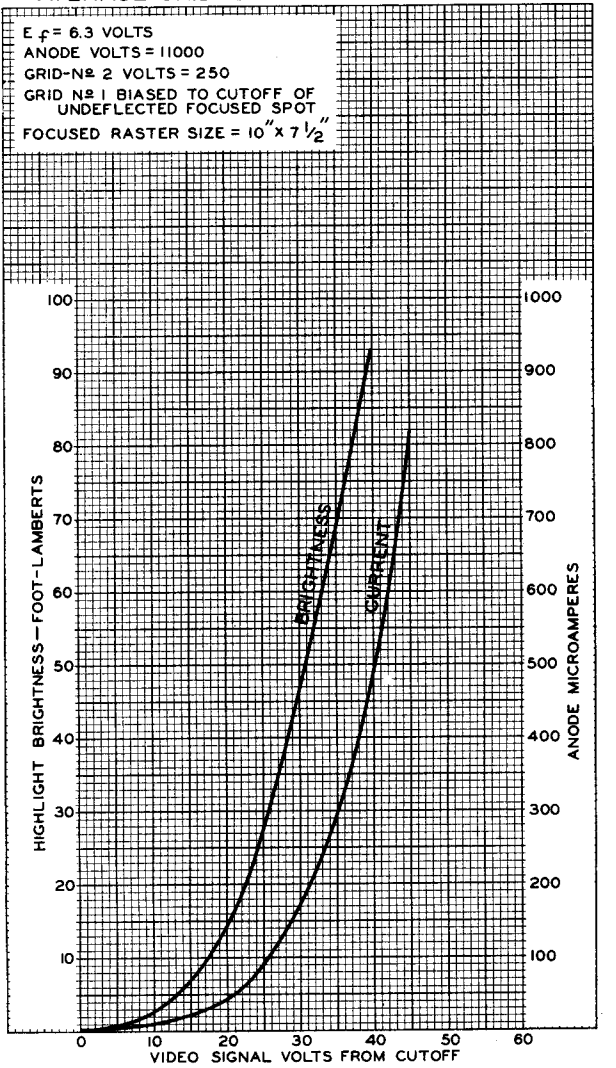
NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY.

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

RCA

12KP4-A

AVERAGE GRID-DRIVE CHARACTERISTICS



12LP4

KINESCOPE

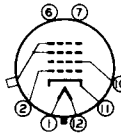
MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Anode	3000 max. 750 min.	μμf μμf
Phosphor (For Curves, see front of this Section)		No.4
Fluorescence		White
Phosphorescence		White
Persistence		Medium
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angle (Approx.)		57°
Ion-Trap Gun	Requires External Double-Field Magnet	
Overall Length		18-3/4 ± 3/8"
Greatest Diameter of Bulb		12-7/16 ± 1/8"
Screen Diameter		11-3/8"
Raster Size (Approx.)		7-1/2" x 10"
Mounting Position		Any
Cap		Recessed Small Cavity
Base		Small-Shell Duodecal 7-Pin
Basing Designation for BOTTOM VIEW		12D

Pin 1–Heater
Pin 2–Grid No.1
Pin 6–No Connection
Pin 7–No Connection



Pin 10–Grid No.2
Pin 11–Cathode
Pin 12–Heater
Cap –Anode, Grid No.3

Maximum Ratings, *Design-Center Values*:

ANODE VOLTAGE■	12000 max.	volts
GRID-No.2 VOLTAGE	410 max.	volts
GRID-No.1 (CONTROL ELECTRODE) 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

■ Anode and grid No.3, which are connected together within tube, are referred to herein as anode.

12LP4

12LP4
KINESCOPE

Typical Operation:

Anode Voltage*	9000	11000	volts
Grid-No.2 Voltage	250	250	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-27 to -63	-27 to -63	volts
Focusing-Coil Current (DC, Approx.)**	115	125	ma
Ion-Trap Magnet Current (DC)#	155	180	ma

Maximum Circuit Values:

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

Minimum Circuit Values:

The power supply should be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 5 milliamperes. If the supply permits the instantaneous short-circuit current to exceed 1 ampere, or is capable of storing more than 250 microcoulombs, 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	470 min.	ohms
Anode-Circuit Resistance	15000 min.	ohms

The resistors should be capable of withstanding the applied voltages.

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 9000 volts.

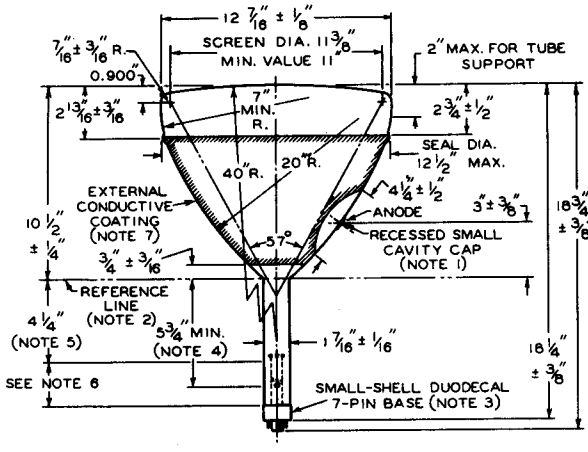
** For JETEC Focusing Coil No.106, or equivalent, positioned with center line of air gap approximately 3-1/4" from Reference Line (See Outline Drawing). The indicated currents are for the condition with the combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 25 foot-lamberts for 9000 volts, or 30 foot-lamberts for 11000 volts, on a 7-1/2" x 10" picture area.

\# For JETEC Ion-Trap Magnet No.108, or equivalent, located with main pole pieces longitudinally opposite internal pole pieces, and rotated to give good line focus with maximum brightness.

CURVES

The following Grid-Drive Characteristics Curves are for the condition with grid No.1 biased to give visual extinction of the undeflected, focused spot. In viewing television pictures, it will be found that the actual cutoff voltage corresponding to black in the picture is approximately 5 volts less negative than shown on the curves; similarly, the grid-No.1 drive to obtain a given anode current or light output is also about 5 volts less negative.

12LP4
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 ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE 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. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING DIAMETER OF 1-7/8".

NOTE 4: DISTANCE OF INTERNAL POLE PIECES. PLANE THROUGH PIN No.6 AND TUBE AXIS PASSES THROUGH LINE JOINING CENTERS OF POLE PIECES. DIRECTION OF PRINCIPAL FIELD OF ION-TRAP MAGNET SHOULD BE SUCH THAT NORTH POLE IS ADJACENT TO PIN No.6 AND SOUTH POLE TO PIN No.12.

NOTE 5: LOCATION OF DEFLECTING YOKE AND FOCUSING-COIL MUST BE WITHIN THIS SPACE.

NOTE 6: KEEP THIS SPACE CLEAR FOR ION-TRAP MAGNET.

NOTE 7: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

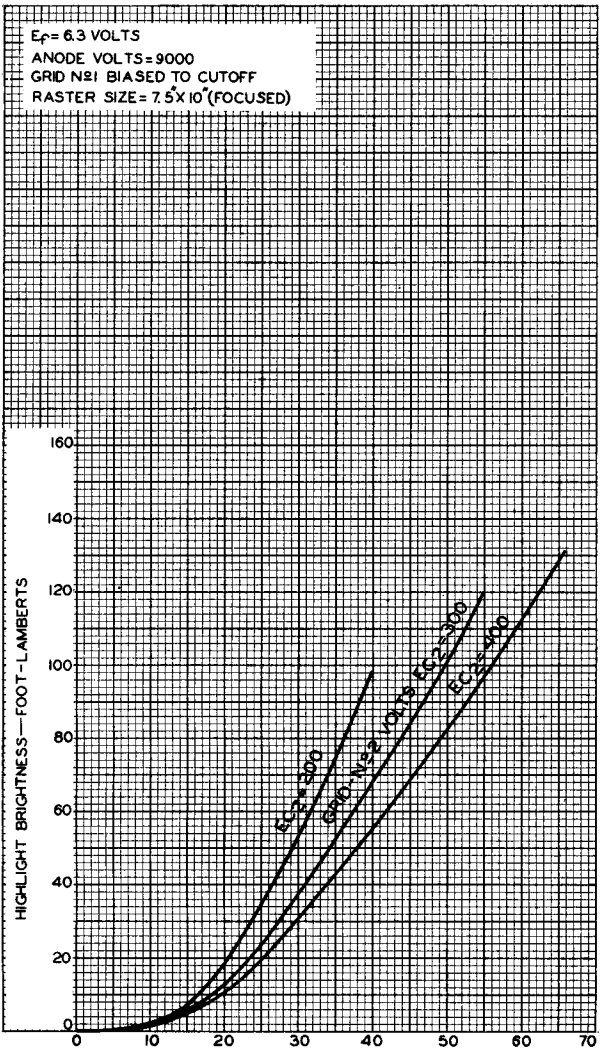
92CM-7276

12LP4

RCA

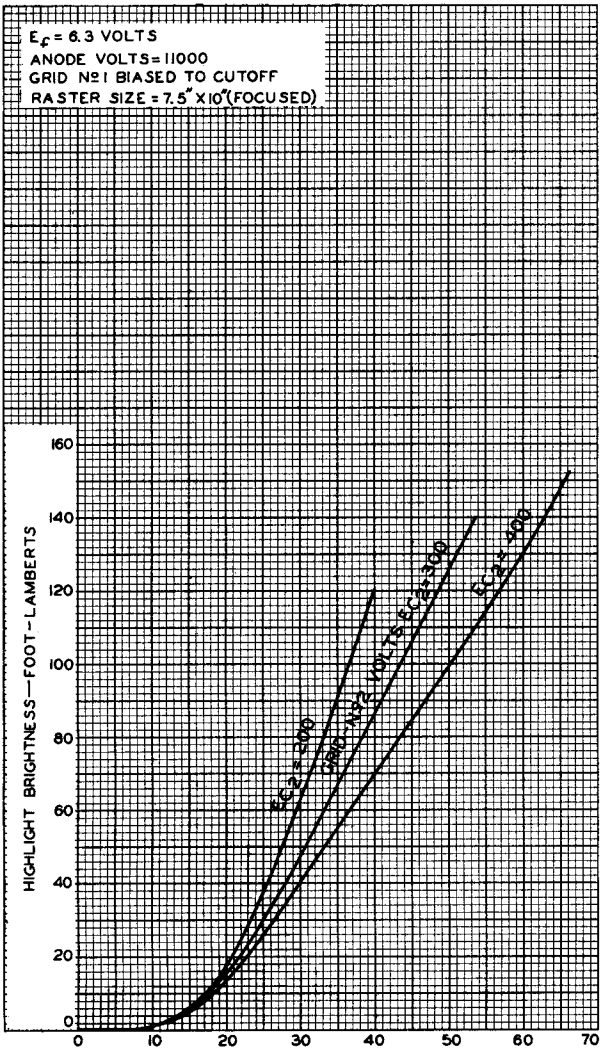
12LP4

AVERAGE GRID-DRIVE CHARACTERISTICS



12LP4

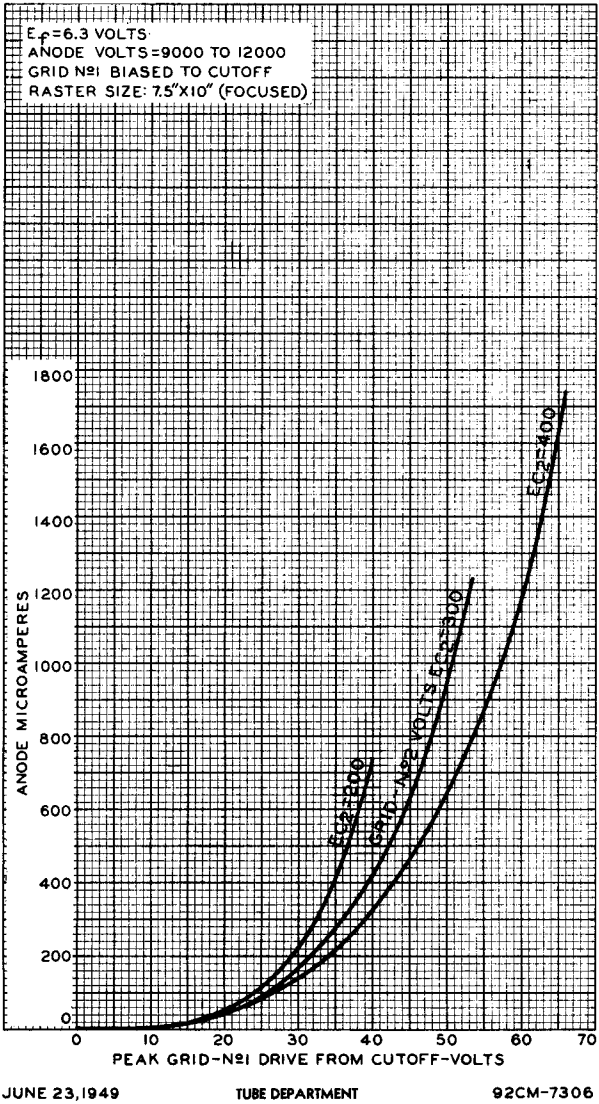
AVERAGE GRID-DRIVE CHARACTERISTICS



RCA

12LP4

AVERAGE GRID-DRIVE CHARACTERISTICS



12LP4-A

KINESCOPE

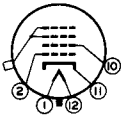
MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Anode	2000 max. 750 min.	μμf μμf
Face Plate (Transmission of about 65%)		RCA "Filterglass"
Phosphor (For Curves, see front of this Section)		No.4–Sulfide Type
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Medium
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angle (Approx.)		57°
Ion-Trap Gun	Requires External Double-Field Magnet	
Overall Length		18-3/4 ± 3/8"
Greatest Diameter of Bulb		12-7/16 ± 1/8"
Screen Diameter		11-3/8"
Mounting Position		Any
Cap		Recessed Small Cavity
Base		Small-Shell Duodecal 5-Pin
Basing Designation for BOTTOM VIEW		$12D_1$

Pin 1–Heater
Pin 2–Grid No.1
Pin 10–Grid No.2
Pin 11–Cathode
Pin 12–Heater
Cap –Anode, Grid No.3



Maximum Ratings, *Design-Center Values*:

ANODE□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

□ Anode and grid No.3, which are connected together within tube, are referred to herein as anode.

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

12LP4-A

KINESCOPE

Typical Operation:

Anode Voltage*	9000	11000	volts
Grid-No.2 Voltage	250	250	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-27 to -63	-27 to -63	volts
Focusing-Coil Current (DC, Approx.)**	115	125	ma
Ion-Trap Magnet Current (DC)#	155	180	ma

Maximum Circuit Values:

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

Minimum Circuit Values:

The power supply should be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 5 milliamperes. If the supply permits the instantaneous short-circuit current to exceed 1 ampere, or is capable of storing more than 250 microcoulombs, 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	470 min.	ohms
Anode-Circuit Resistance	15000 min.	ohms

The resistors should be capable of withstanding the applied voltages.

Components:

Horizontal-Deflection-Output & High-Voltage Transformer: For use with pulse-operated high-voltage supply giving 10000-12000 volts	RCA-217T1
Horizontal Linearity Control	RCA-207R1
Width Control	RCA-206R1
Vertical-Deflection Output Transformer	RCA-204T9
Deflecting Yoke	RCA-205D1
Ion-Trap Magnet (Permanent-Magnet Type)	RCA-203D3
Focusing Coil[oo]	RCA-202D1

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 9000 volts.

** For JETEC Focusing Coil No.106, or equivalent, positioned with center line of air gap approximately 3-1/4" from Reference Line (See Outline Drawing). The indicated currents are for the condition with the combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 17 foot-lamberts for 9000 volts, or 20 foot-lamberts for 11000 volts, on a 10" x 7-1/2" picture area.

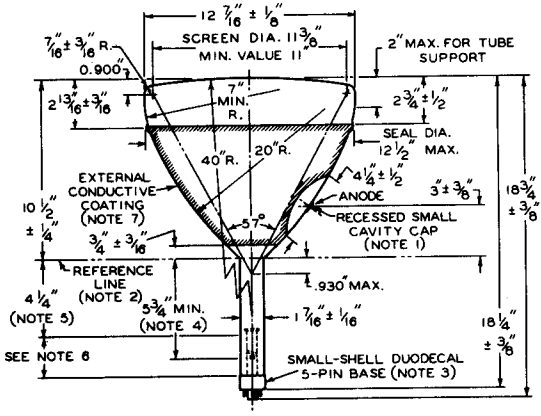
\# For JETEC Ion-Trap Magnet No.108, or equivalent, located with main pole pieces longitudinally opposite internal pole pieces, and rotated to give maximum brightness.

oo Renewal Sales item only.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

12LP4-A

KINESCOPE



92CM-7276R2

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE 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. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING DIAMETER OF 1-7/8".

NOTE 4: DISTANCE TO INTERNAL POLE PIECES. PLANE THROUGH VACANT PIN POSITION No.6 AND TUBE AXIS PASSES THROUGH LINE JOINING CENTERS OF POLE PIECES. DIRECTION OF PRINCIPAL FIELD OF ION-TRAP MAGNET SHOULD BE SUCH THAT NORTH POLE IS ADJACENT TO VACANT PIN POSITION No.6 AND SOUTH POLE TO PIN No.12.

NOTE 5: LOCATION OF DEFLECTING YOKE AND FOCUSING-COIL MUST BE WITHIN THIS SPACE.

NOTE 6: KEEP THIS SPACE CLEAR FOR ION-TRAP MAGNET.

NOTE 7: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

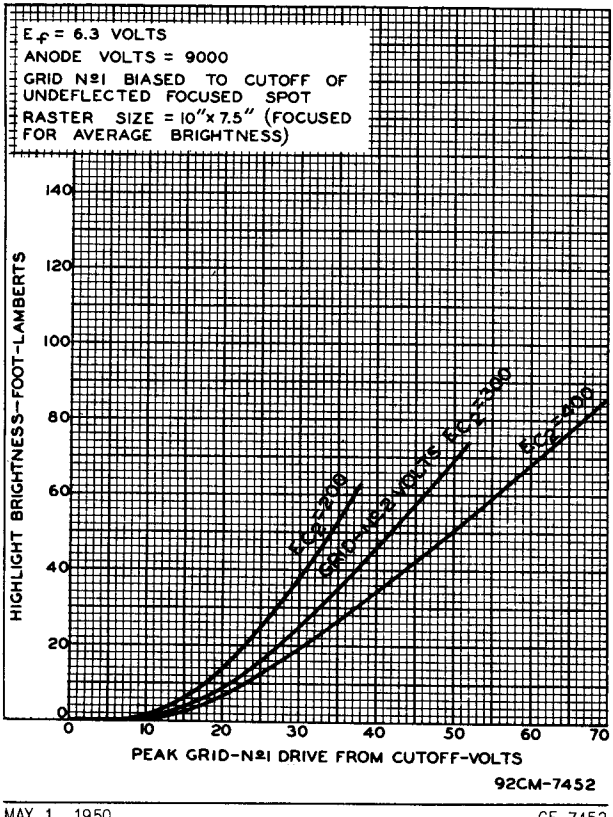
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

12LP4-A
KINESCOPE

CURVES

The following Grid-Drive Characteristics Curves are for the condition with grid No.1 biased to give visual extinction of the undeflected, focused spot. Inviewing television pictures, it will be found that the actual cutoff voltage corresponding to,black in the picture is approximately 5 volts less negative than shown on the curves; similarly, the grid-No.1 drive to obtain a given anode current or light output is also about 5 volts less.

AVERAGE GRID—DRIVE CHARACTERISTICS

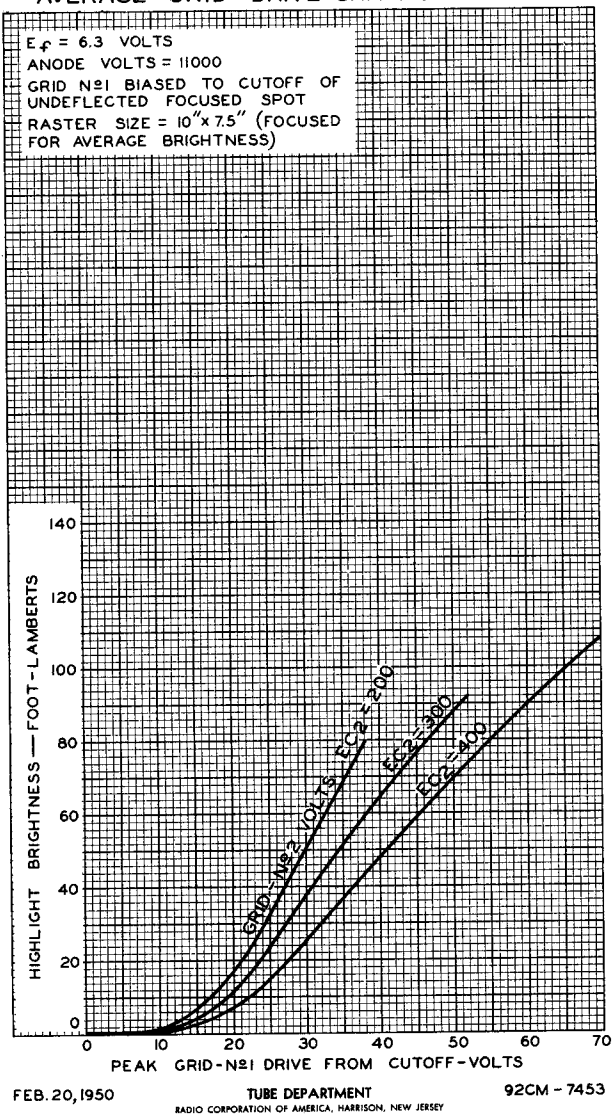


92CM-7452

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

12LP4-A

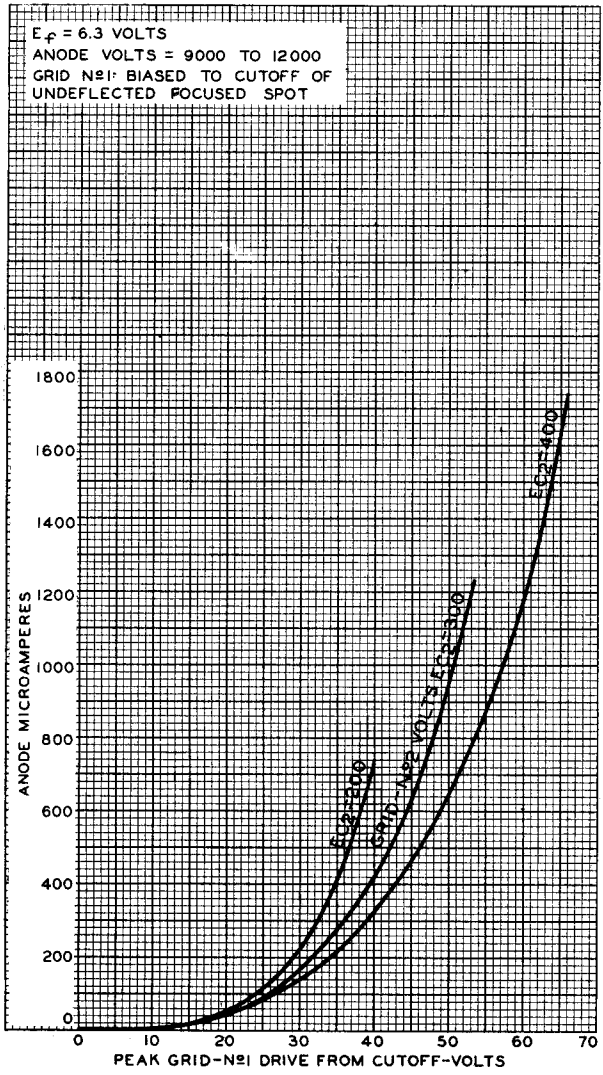
AVERAGE GRID-DRIVE CHARACTERISTICS



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

12LP4-A

AVERAGE GRID-DRIVE CHARACTERISTICS



RCA

12SP7

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS — MAGNETIC DEFLECTION

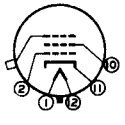
DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
Phosphor		P7
Fluorescence		Blue
Phosphorescence		Greenish-Yellow
Persistence		Long
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angle (Approx.)		54°
Overall Length		18-3/4" ± 3/8"
Greatest Diameter of Bulb		12-7/16" ± 1/8"
Minimum Useful Screen Diameter		11"
Mounting Position		Any
Cap		Recessed Small Cavity (JETEC No.J1-21)
Base		Small-Shell Duodecal 5-Pin (JETEC No.B5-57)

BOTTOM VIEW

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 10 – Grid No.2



Pin 11 – Cathode
Pin 12 – Heater
Cap – Anode

Maximum Ratings, *Design-Center Values*:

ANODE VOLTAGE	10000 max.	volts
GRID-No.2 VOLTAGE:		
Positive value (DC or Peak AC)	410 max.	volts
Negative value (DC or Peak AC)	180 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	180 max.	volts
Positive bias value#	0 max.	volts
Positive peak value	2 max.	volts
PEAK GRID-No.1 DRIVE FROM CUTOFF	65 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

Typical Operation:

Anode Voltage*	9000	volts
Grid-No.2 Voltage	250	volts

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

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 8000 volts.

12SP7

12SP7

OSCILLOGRAPH TUBE

Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot.	-27 to -63	volts
Grid-No.2 Current.	-15 to +15	μamp
Focusing-Coil Current (DC)**	107 ± 10%	ma
Spot Position.	##	

Maximum Circuit Values:

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

** For specimen focusing coil similar to JETEC No.106 with air gap toward tube face, center line of air gap 3-1/4" from Reference Line (see Outline Drawing), and total anode current of 200 microamperes.

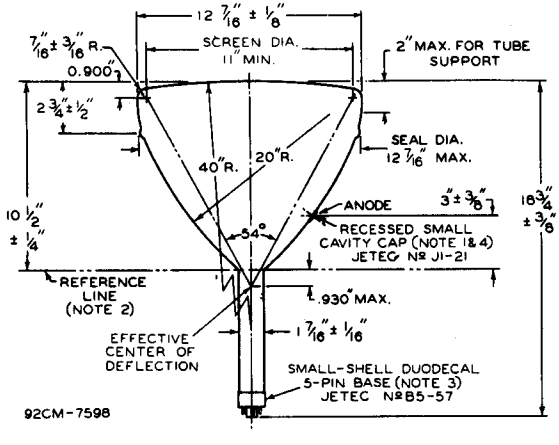
The center of the undeflected, unfocused spot will fall within a circle having 18-mm radius concentric with the center of the tube face.

OPERATING NOTES

X-Ray Warning. When operated at or below the maximum ratings shown in the tabulated data, the 12SP7 does not produce any harmful x-ray radiation. All types of cathode-ray tubes may be operated at voltages (if ratings permit) up to 16 kilovolts (absolute value) without personal injury on prolonged exposure at close range. Above 16 kilovolts, special shielding precautions for x-ray radiation may be necessary.

12SP7

OSCILLOGRAPH TUBE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 10°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.3.

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

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

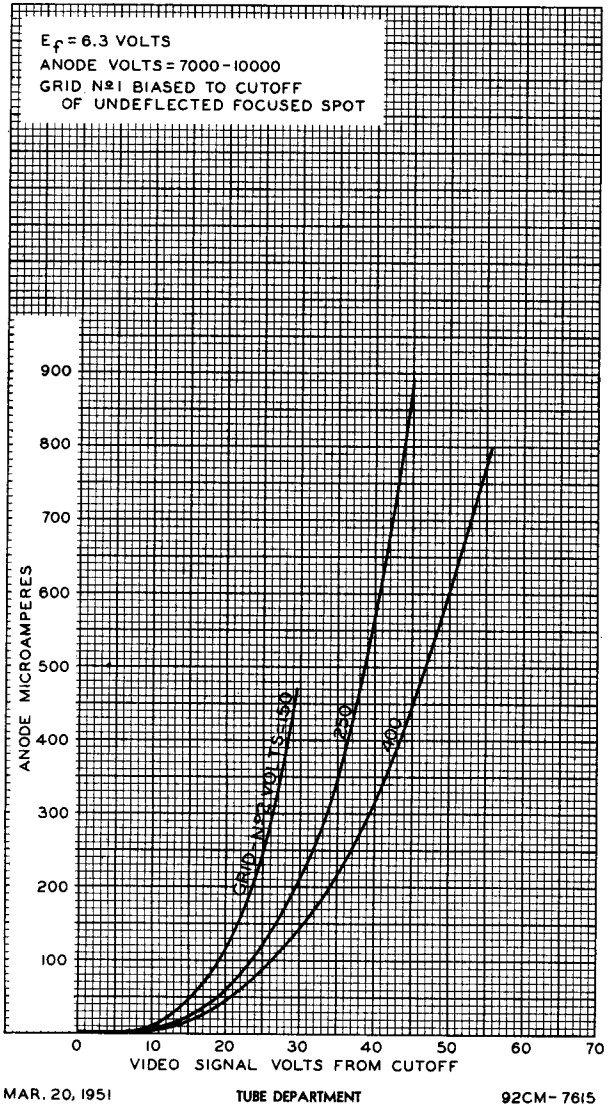
NOTE 4: TUBE SUPPORT MUST BE KEPT AT LEAST 2" AWAY FROM ANODE CAP.

12SP7

RCA

12SP7

AVERAGE GRID-DRIVE CHARACTERISTICS



14CP4

KINESCOPE

RECTANGULAR GLASS TYPE

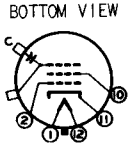
MAGNETIC FOCUS — MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Anode	2000 max. 750 min.	μμf μμf
Face Plate (With about 66% light transmission)		Filterglass
Phosphor (For Curves, see front of this Section)		P4—Sulfide Type
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Short
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angles (Approx.):		
Diagonal		70°
Horizontal		65°
Vertical		50°
Ion-Trap Gun	Requires External, Single-Field Magnet	
Overall Length	16-3/4" ± 3/8"	
Greatest Diagonal of Tube at Face	13-11/16" ± 1/8"	
Greatest Width of Tube at Face	12-17/32" ± 1/8"	
Greatest Height of Tube at Face	9-23/32" ± 1/8"	
Screen Size	11-3/8" x 8-1/2"	
Mounting Position		Any
Cap	Recessed Small Cavity (JETEC No.J1-21)	
Base	Small-Shell Duodecal 5-Pin (JETEC No.B5-57)	

BOTTOM VIEW



Pin 1 – Heater
Pin 2 – Grid No.1
Pin 10 – Grid No.2
Pin 11 – Cathode
Pin 12 – Heater
Cap – Anode
C – External Conductive Coating

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

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

14CP4

KINESCOPE

Typical Operation:		
Anode Voltage*	12000	volts
Grid-No.2 Voltage	300	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-33 to -77	volts
Focusing-Coil Current (DC, approx.)●	92	ma
Field Strength of Single-Field Ion-Trap Magnet (Approx.)#	35	gausses
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	1.5 max.	megohms

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 10000 volts.

● For specimen focusing coil similar to JETEC Focusing Coil No.109 positioned with air gap toward kinescope screen and center line of air gap 3 inches from Reference Line (see Outline Drawing). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 35 foot-lamberts on an 11-3/8" x 8-1/2" picture area sharply focused at center of screen.

\# Measured at center of field with General Electric Gauss Meter, Cat. No.409X51.

OPERATING NOTES

X-Ray Warning. When operated at or below the maximum ratings shown in the tabulated data, the 14CP4 does not produce any harmful x-ray radiation. All types of picture tubes may be operated at voltages (if ratings permit) up to 16 kilovolts (absolute value) without personal injury on prolonged exposure at close range. Above 16 kilovolts, special shielding precautions for x-ray radiation may be necessary.

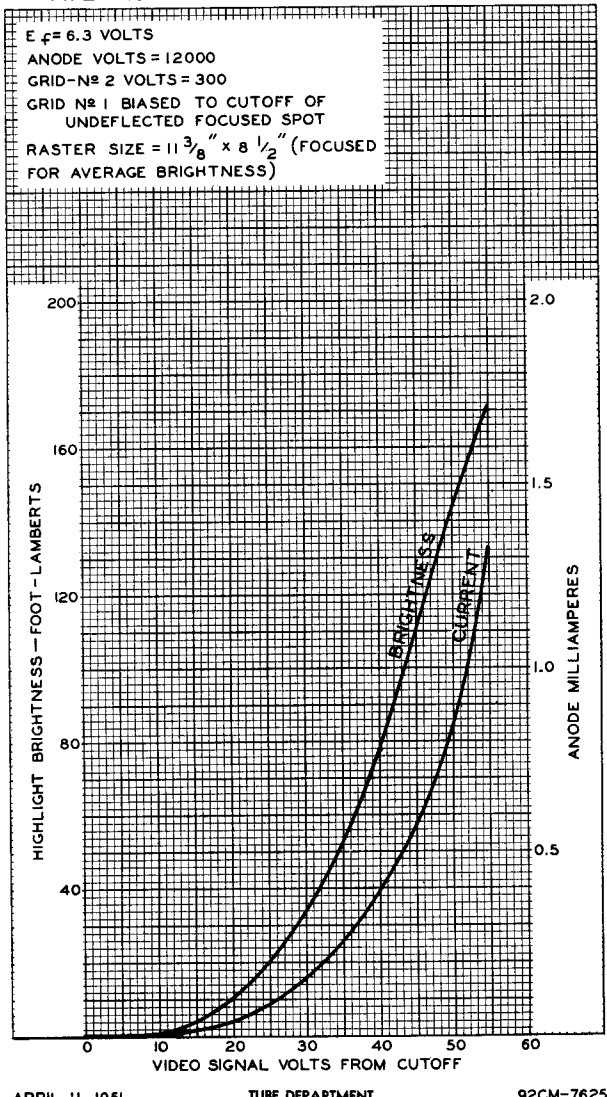
Direction of the field of the ion-trap magnet should be such that the north pole is adjacent to vacant pin position No.8 and the south pole to pin No.2.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

14CP4

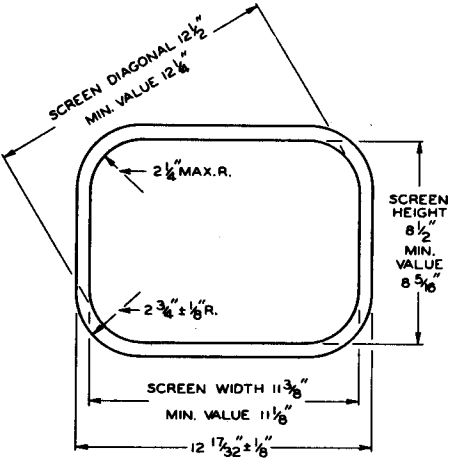
AVERAGE GRID-DRIVE CHARACTERISTICS

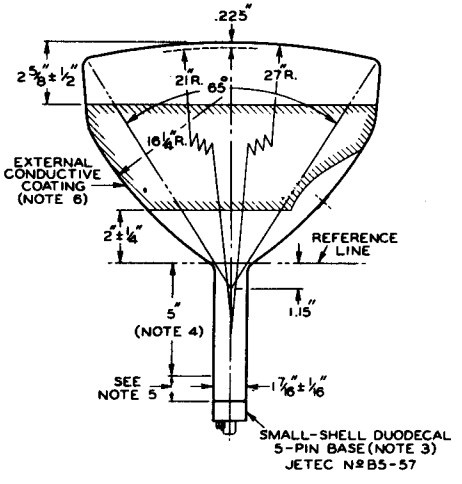


RCA

14CP4

KINESCOPE

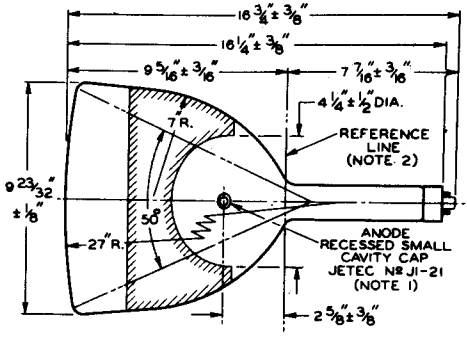


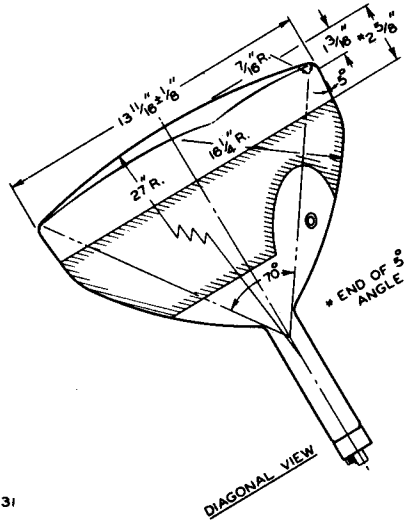


RCA

14CP4

KINESCOPE





92CL-7631

14CP4

14CP4

KINESCOPE

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 30°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.6.

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

NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-1/2".

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

NOTE 5: KEEP THIS SPACE CLEAR FOR SINGLE-FIELD, ION-TRAP MAGNET.

NOTE 6: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

14EP4

KINESCOPE

RECTANGULAR GLASS TYPE

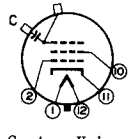
MAGNETIC FOCUS — MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:	
Voltage	6.3 ac or dc volts
Current	0.6 amp
Direct Interelectrode Capacitances:	
Grid No.1 to All Other Electrodes	6 μμf
Cathode to All Other Electrodes	5 μμf
External Conductive Coating to Anode	2000 max. μμf 750 min. μμf
Face Plate (With about 66% light transmission)	Filterglass
Phosphor (For Curves, see front of this Section)	No.4—Sulfide Type
Fluorescence and Phosphorescence	White
Persistence of Phosphorescence	Medium
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angles (Approx.):	
Diagonal	70°
Horizontal	65°
Vertical	50°
Ion-Trap Gun	Requires External, Single-Field Magnet
Overall Length	16-1/2" ± 3/8"
Greatest Diagonal of Tube at Face	13-11/16" ± 1/8"
Greatest Width of Tube at Face	12-17/32" ± 1/8"
Greatest Height of Tube at Face	9-23/32" ± 1/8"
Screen Size	11-3/8" x 8-1/2"
Mounting Position	Any
Cap	Recessed Small Cavity (JETEC No.J1-21)
Base	Small-Shell Duodecal 5-Pin (JETEC No.B5-57)

BOTTOM VIEW



Pin 1 – Heater
Pin 2 – Grid No.1
Pin 10 – Grid No.2
Pin 11 – Cathode
Pin 12 – Heater
Cap – Anode
C – External Conductive Coating

Maximum Ratings, *Design-Center Values*:

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

14EP4

14EP4

KINESCOPE

Typical Operation:

Anode Voltage*	12000	volts
Grid-No.2 Voltage	300	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-33 to -77	volts
Focusing-Coil Current (DC)▲	96 ±6%	ma
Field Strength of Single-Field Ion-Trap Magnet (Approx.)#	45	gausses
Ion-Trap Magnet Current (DC, approx.)●	70	ma

Maximum Circuit Values:

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

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 10000 volts.

▲ For specimen focusing coil similar to JETEC Focusing Coil No.109 positioned with air gap toward kinescope screen, and center line of air gap 3 inches from Reference Line (see Outline Drawing). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a high-light brightness of 30 foot-lamberts on a 11-1/8" x 8-5/16" picture area sharply focused at center of screen.

Measured at center of field with General Electric Gauss Meter, Cat. No.409X51.

● For specimen ion-trap magnet similar to JETEC Ion-Trap Magnet No.111, located in optimum position and rotated to give maximum brightness.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

14EP4

KINESCOPE

OPERATING NOTES

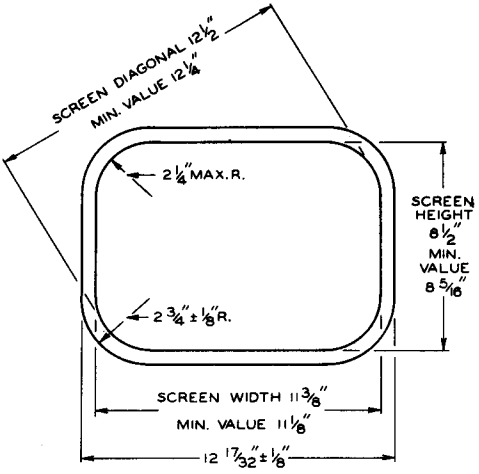
When operated at or below the maximum ratings shown in the tabulated data, the 14EP4 does not produce any harmful x-ray radiation. All types of picture tubes may be operated at voltages (if ratings permit) up to 16 kilovolts (absolute value) without personal injury on prolonged exposure at close range. Above 16 kilovolts, special shielding precautions for x-ray radiation may be necessary.

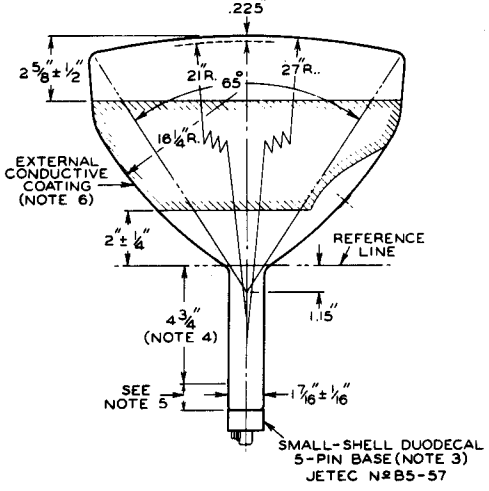
Direction of the field of the ion-trap magnet should be such that the north pole is adjacent to vacant pin position No.8 and the south pole to pin No.2.

RCA

14EP4

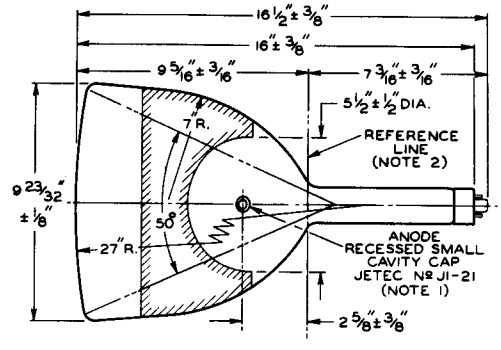
KINESCOPE

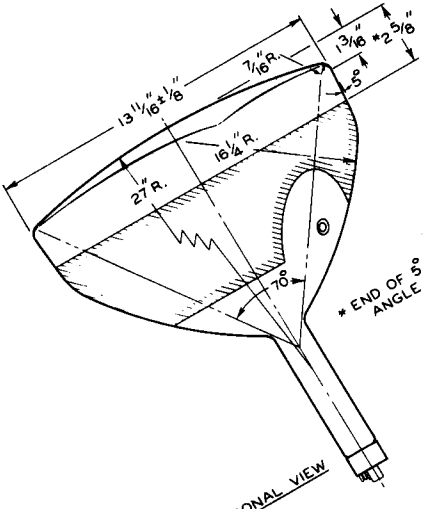




14EP4

KINESCOPE





92CL-7554R2

RCA

14EP4

KINESCOPE

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 30°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.6.

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

NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-1/2".

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

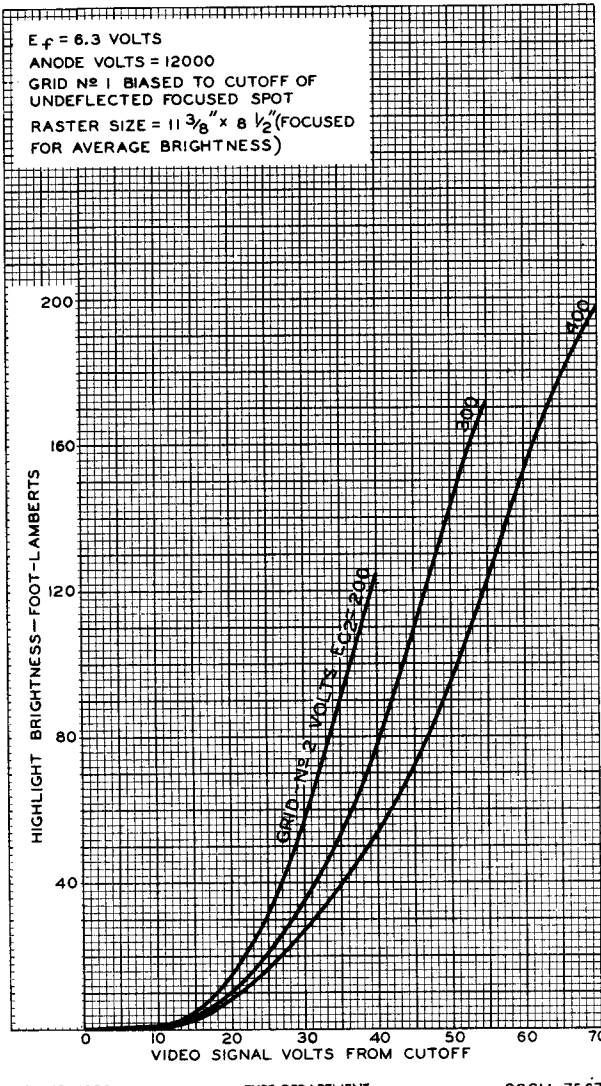
NOTE 5: KEEP THIS SPACE CLEAR FOR SINGLE-FIELD, ION-TRAP MAGNET.

NOTE 6: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

RCA

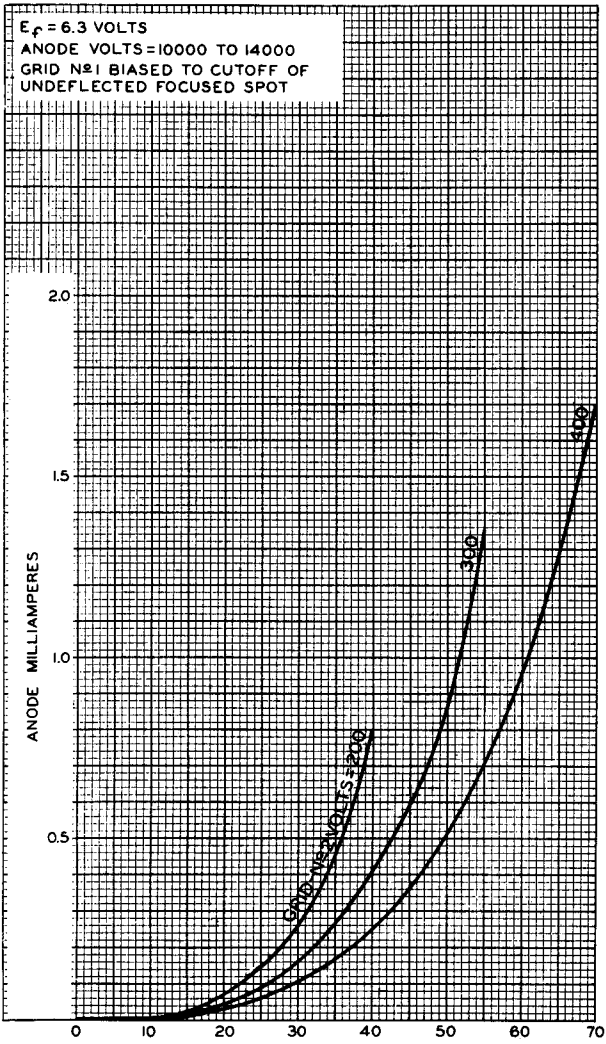
14EP4

AVERAGE GRID-DRIVE CHARACTERISTICS



14EP4

AVERAGE GRID-DRIVE CHARACTERISTICS



15GP22

TRICOLOR KINESCOPE

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

DATA

General:

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	17.5	μμf
Grid No.3 (Of Each Gun Tied within Tube to No.3 Grids of Other Two Guns) to All Other Electrodes	12	μμf
Grid No.4 (Common to the Three Guns) to All Other Electrodes	7	μμf
External Conductive Coating to Ultor•	3000 max. 1500 min.	μμf μμf
Faceplate, Spherical	Clear Glass	
Screen, Flat:		
Type	Metal-Backed, Tricolor, Phosphor-Dot	
Plate	Filterglass	
Light Transmission (Approx.)	70%	
Size (Rounded Sides—See Dimensional Outline)	11-1/2" x 8-5/8"	
Area	88.5 sq. in.	
Phosphor (Three Separate Phosphors, collectively)	P22	
Fluorescence 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	Electrostatic	
Convergence Method	Electrostatic	
Deflection Method	Magnetic	
Deflection Angles (Approx.):		
Horizontal	45°	
Vertical	35°	
Tube Dimensions:		
Maximum Overall Length	26-1/8"	
Greatest Diameter:		
At faceplate	14-5/8" ± 5/32"	
At metal flange	15-3/4" max.	
Weight	25 lbs	

15GP22

15GP22

TRICOLOR KINESCOPE

Mounting Position	Any
Ultor• Terminal	Metal Flange
Bulb	J126
Base	Small-Shell Bidecal 14-Pin (JETEC No.B14-103)

BOTTOM VIEW

Pin 1: Heater
Pin 2: Cathode of Red Gun
Pin 3: Grid No.1 of Red Gun
Pin 4: Grid No.2 of Red Gun
Pin 5: No Connection
Pin 6: Grids No.3
Pin 7: Cathode of Green Gun
Pin 8: Grid No.1 of Green Gun
Pin 9: Grid No.2 of Green Gun
Pin 13: Grid No.4
Pin 17: Grid No.2 of Blue Gun
Pin 18: Grid No.1 of Blue Gun
Pin 19: Cathode of Blue Gun
Pin 20: Heater
Metal Flange: Ultor (Grid No.5, Grid No.6, Collector)

Maximum Ratings, *Design-Center Values:*

ULTOR• VOLTAGE	20000 max.	volts
ULTOR INPUT	15# max.	watts
GRID-No.4 VOLTAGE	11000 max.	volts
GRID-No.3 VOLTAGE	5000 max.	volts
GRID-No.2 VOLTAGE (Each Gun)	500 max.	volts
GRID-No.1 VOLTAGE (Each Gun):		
Negative bias value	200 max.	volts
Positive bias value	0 max.	volts
Positive peak value	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE (Each Gun):		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds	410 max.	volts
After equipment warm-up period	180 max.	volts
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) Voltage†	42.5% to 51% of E_{c5}	volts
Grid-No.3 (Focusing Electrode) Voltage	12% to 19% of E_{c5}	volts

• 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 15GP22, the ultor function is performed by grid No.5. Since grid No.5, grid No.6, and collector are connected together 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.

RCA

15GP22

TRICOLOR KINESCOPE

Grid-No.2 Voltage (Each Gun) when circuit design utilizes grid-No.1 Voltage (E_{c1}) at fixed value for raster cutoff (each gun) . . .	2 to 4.5 times E_{c1}	volts
Grid-No.1 Voltage for Visual Extinction of Focused Raster (Each Gun) when circuit design utilizes grid-No.2 voltage (E_{c2}) at fixed value (each gun)	22.5% to 50% of E_{c2}	volts
Grid-No.4 Current	-5 to +5	μamp
Maximum Grid-No.3 Current . . .	300	μamp
Grid-No.2 Current	-15 to +15	μamp
Beam-Current Ratio to Produce Illuminant-C White:		
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 Screen Center□ . . .	1-1/4	inches

Examples of Use of Design Ranges:

For ultor voltage of 20000 volts

Grid-No.4 (Converging Electrode) Voltage† . .	8500 to 10200	volts
Grid-No.3 (Focusing Electrode) Voltage . . .	2400 to 3800	volts
Grid-No.2 Voltage (Each Gun) when circuit design utilizes grid-No.1 voltage of -70 volts for raster cutoff (each gun) .	140 to 315	volts
Grid-No.1 Voltage for Visual Extinction of Focused Raster (Each Gun) when circuit design utilizes grid-No.2 voltage of 200 volts (each gun)	-45 to -100	volts

Circuit Values:

Grid-No.1-Circuit Resistance (Each Gun). .	1.5 max.	megohms
Dynamic Converging Voltage (Approx.)** . .	900	volts
Dynamic Focusing Voltage (Approx.)** . . .	225	volts

† This range does not include the dc component of the dynamic converging voltage.

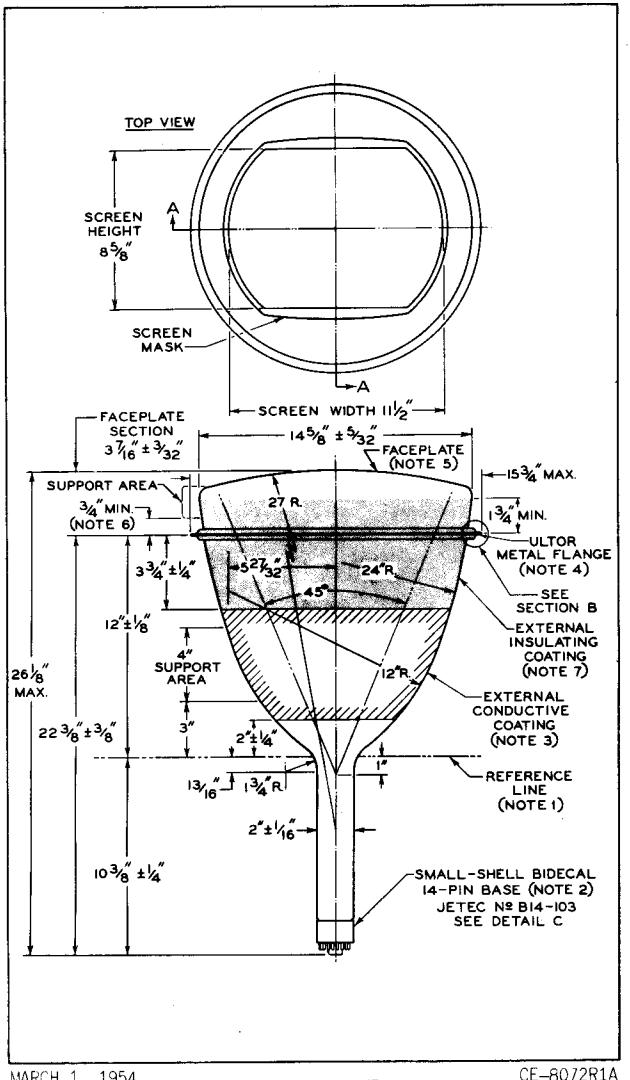
□ Centering of the raster on the screen is accomplished by passing direct current of the required value through each pair of deflecting coils to compensate for the raster shift resulting from optimum adjustments for convergence, color purity, and concentricity.

** Peak-to-peak value. This ac voltage having essentially parabolic waveform is synchronized with scanning and does not include any voltage developed during the blanking time.

15GP22

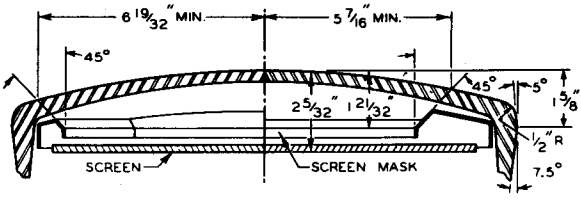
15GP22

TRICOLOR KINESCOPE

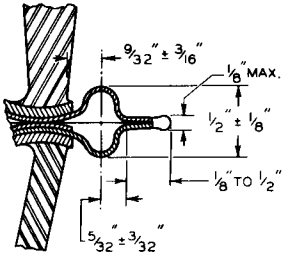


15GP22

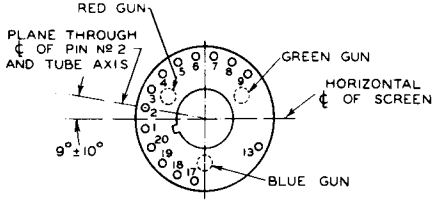
TRICOLOR KINESCOPE



ENLARGED SECTION A-A



ENLARGED SECTION B



BASE DETAIL C
BOTTOM VIEW

92CL-8072RI

15GP22

15GP22

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 POSSIBILITY 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.

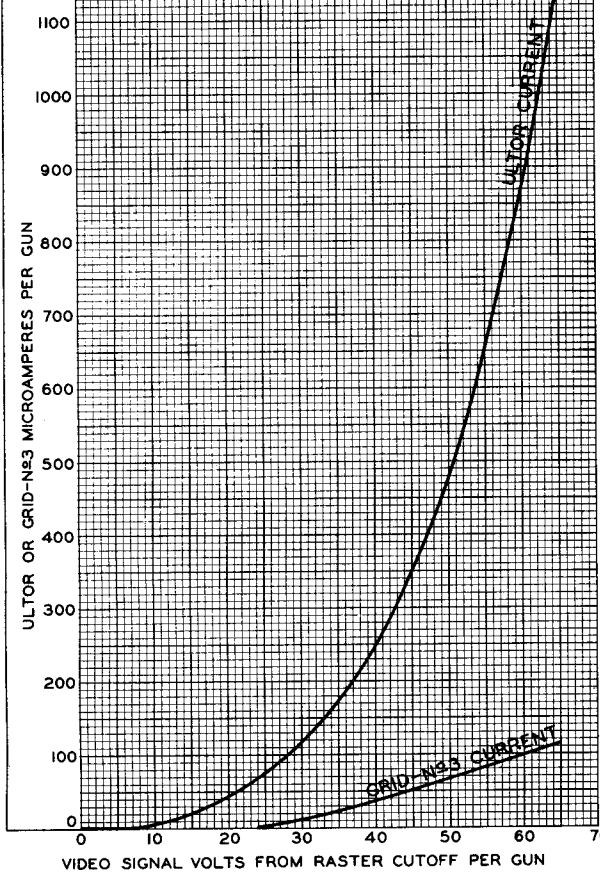
NOTE 7: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

RCA

15GP22

TYPICAL DRIVE CHARACTERISTIC

E_f = 6.3 VOLTS
ULTOR (GRIDS-№5 & №6 AND COLLECTOR) VOLTS = 20000
GRID-№4 VOLTS = ADJUSTED FOR CONVERGENCE
GRID-№3 VOLTS = ADJUSTED FOR FOCUS
GRID-№2 VOLTS OF EACH GUN = 200
GRID-№1 OF EACH GUN IS BIASED TO RASTER CUTOFF
RASTER SIZE 11½"×8⅝"

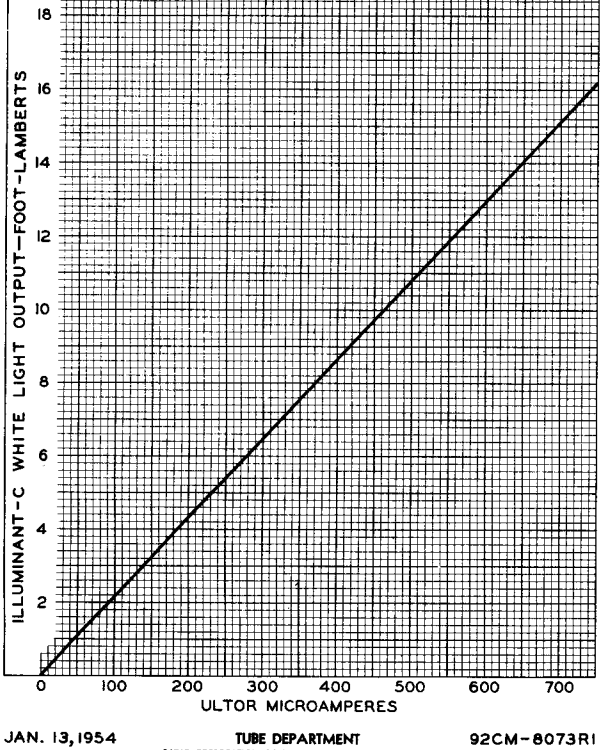


RCA

15GP22

TYPICAL LIGHT-OUTPUT CHARACTERISTIC

E_f=6.3 VOLTS
ULTOR VOLTS=20000
GRID-№4 VOLTS=ADJUSTED FOR CONVERGENCE
GRID-№3 VOLTS=ADJUSTED FOR FOCUS
GRID-№2 VOLTS OF EACH GUN=200
GRID-№1 OF EACH GUN IS BIASED TO RASTER CUTOFF
GRID-№1 DRIVE FROM RASTER CUTOFF OF EACH GUN IS ADJUSTED TO GIVE COMPOSITE ULTOR CURRENT TO PRODUCE ILLUMINANT-C WHITE LIGHT OUTPUT
BEAM-CURRENT RATIO TO PRODUCE ILLUMINANT-C WHITE:
RED GUN TO GREEN GUN=3:1
BLUE GUN TO GREEN GUN=0.85:1
RASTER SIZE=11½"×8⅝"



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

16ADP7

OSCILLOGRAPH TUBE

METAL-SHELL ENVELOPE

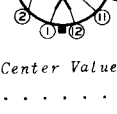
MAGNETIC FOCUS — MAGNETIC DEFLECTION

DATA

General:

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
Cathode to All Other Electrodes	5 μμf
Faceplate, Spherical	Filterglass
Light Transmission (Approx.)	66%
Phosphor (For Curves, see front of this Section)	P7
Fluorescence	Blue
Persistence	Short
Phosphorescence	Greenish-Yellow
Persistence	Long
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle (Approx.)	53°
Maximum Overall Length	22"
Greatest Diameter at Lip	15-7/8" + 1/8"
Minimum Useful Screen Diameter	14-3/8"
Ultor• Terminal	Metal-Shell Lip
Mounting Position	Any
Base	Small-Shell Duodecal 7-Pin (JETEC No.B7-51)

BOTTOM VIEW



Pin 1 - Heater
Pin 2 - Grid No.1
Pin 6 - No Connection
Pin 7 - No Connection
Pin 10 - Grid No.2
Pin 11 - Cathode
Pin 12 - Heater
Cap - Ultor (Grid No.3, Collector)

Maximum Ratings, *Design-Center Values*:

ULTOR• VOLTAGE	14000 max. volts
GRID-No.2 VOLTAGE:	
Positive value (DC or Peak AC)	410 max. volts
Negative value (DC or Peak AC)	180 max. volts
GRID-No.1 VOLTAGE:	
Negative bias value	180 max. volts
Positive bias value ϕ	0 max. volts
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 function, and collector are connected together within the tube and are conveniently referred to collectively as "ultor". The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

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

16ADP7
OSCILLOGRAPH TUBE

PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	125 max.	volts
Typical Operation:		
Ultor Voltage*	12000	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-27 to -63	volts
Grid-No.2 Current	-15 to +15	μamp
Focusing-Coil Current (DC)oo	95 ± 15%	ma
Spot Position	##	
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 8000 volts.

oo For specimen focusing coil similar to JETEC Focusing Coil No.109 positioned with air gap toward faceplate and center line of air gap 3-1/4" from Reference Line (see Outline Drawing) and ultor current of 200 microamperes.

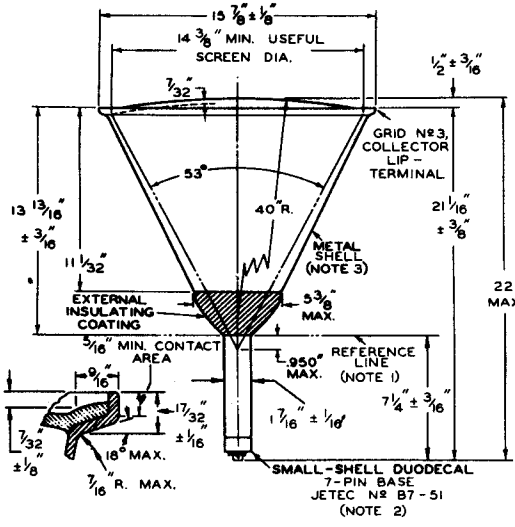
The center of the undeflected, unfocused spot will fall within a circle having 25-mm radius concentric with the center of the tube face.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

16ADP7

OSCILLOGRAPH TUBE



DETAIL OF LIP

92CM-7690

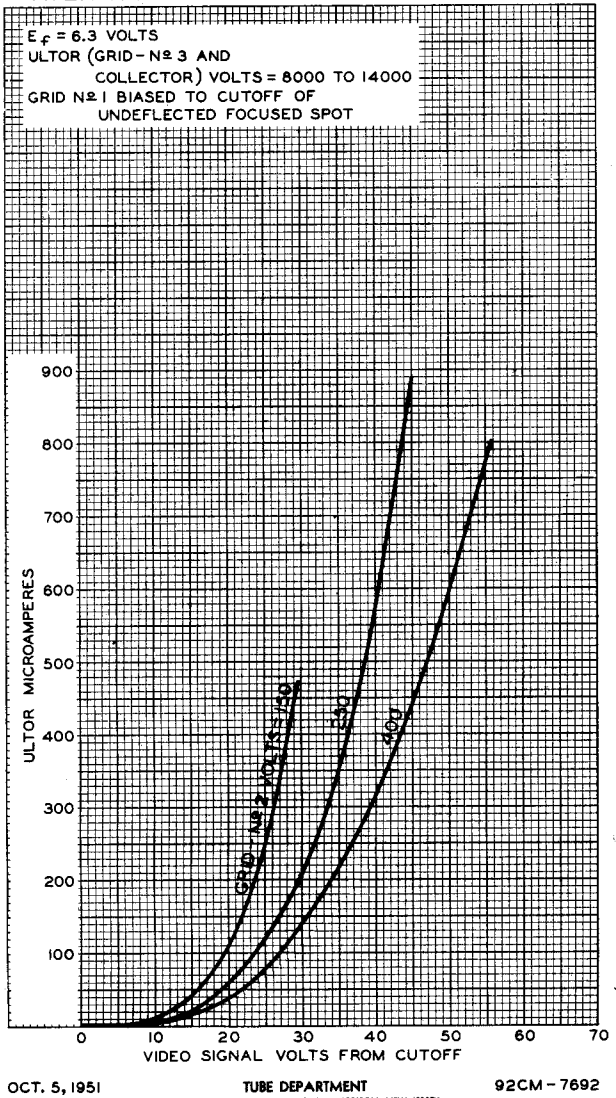
NOTE 1: REFERENCE LINE IS DETERMINED BY POSITION WHERE REFERENCE-LINE GAUGE (JETEC No. 112) 1.500" + 0.003" - 0.000" I.D. AND 2" LONG WILL REST ON FUNNEL.

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 CIRCLE CONCENTRIC WITH METAL-SHELL AXIS AND HAVING DIAMETER OF 3".

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

16ADP7

AVERAGE GRID-DRIVE CHARACTERISTICS



16AP4-A

KINESCOPE

METAL-CONE ENVELOPE

MAGNETIC FOCUS MAGNETIC DEFLECTION

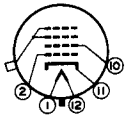
Supersedes Type 16AP4

DATA

General:

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
Cathode to All Other Electrodes	5	μμf
Face Plate (Transmission of about 65%)	RCA "Filterglass"	
Phosphor (For Curves, see front of this Section)	No.4-Sulfide Type	
Fluorescence and Phosphorescence	White	
Persistence of Phosphorescence	Medium	
Focusing Method	Magnetic	
Deflection Method	Magnetic	
Deflection Angle (Approx.)	53°	
Ion-Trap Gun	Requires External Double-Field Magnet	
Maximum Overall Length	22-5/16"	
Greatest Diameter of Bulb	15-7/8" ±1/8"	
Screen Diameter	14-5/8"	
Mounting Position	Any	
Anode Terminal	Metal-Cone Lip	
Base	Small-Shell Duodecal 5-Pin	
Basing Designation for BOTTOM VIEW	$12D_1$	

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



Pin 12 - Heater
Metal-Cone Lip:
Anode,
Grid No.3

Maximum Ratings, *Design-Center Values*:

ANODE□ VOLTAGE○	14000 max.	volts
GRID-No.2 VOLTAGE	410 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value	0 max.	volts
Positive peak value	2 max.	volts
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

□ Anode and grid No.3, which are connected together within tube, are referred to herein as anode.

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

16AP4-A

KINESCOPE

Typical Operation:

Anode Voltage*	9000	12000	volts
Grid-No.2 Voltage	300	300	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-33 to -77	-33 to -77	volts
Focusing-Coil Current (DC)▲	75	90	ma
Ion-Trap Magnet Current (DC, approx.)#	155	200	ma

Maximum Circuit Values:

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

Minimum Circuit Values:

The power supply should be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 5 ma. If the supply permits the instantaneous short-circuit current to exceed 1 ampere, or is capable of storing more than 250 microcoulombs, 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	470 min.	ohms
Anode-Circuit Resistance	16000 min.	ohms

The resistors used should be capable of withstanding the applied voltage.

Components:

Horizontal-Deflection-Output and High-Voltage Transformer: For use with pulse-operated high-voltage supply giving 11500-13500 volts	RCA-211T5
Horizontal Linearity Control	RCA-201R5
Width Control	RCA-201R4
Vertical-Deflection Output Transformer	RCA-204T9
Deflecting Yoke	RCA-201D12
Ion-Trap Magnet (Permanent-Magnet Type)	RCA-203D3
Focusing Coil∞	RCA-202D2

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 9000 volts.

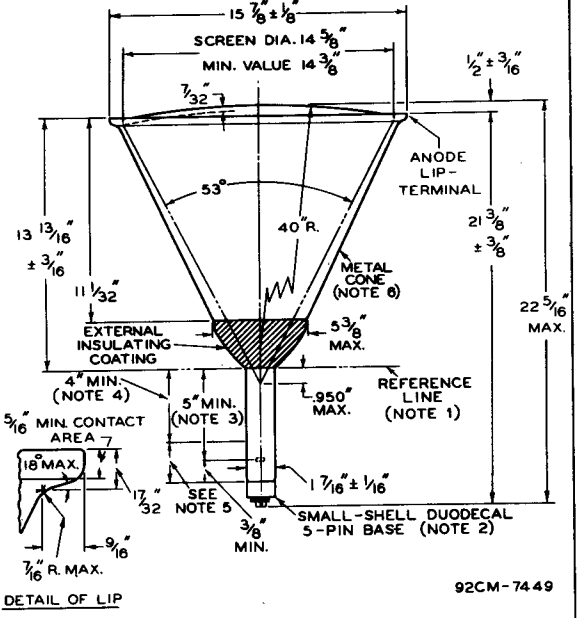
▲ For JETEC Focusing Coil No.109, or equivalent, positioned with air gap toward kinescope screen, and center line of air gap about 3 inches from Reference Line (see Outline Drawing). The indicated currents are for the condition with the combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 30 foot-lamberts on a 13-1/4" x 10" picture area.

For JETEC Ion-Trap Magnet No.108, or equivalent, located with main pole pieces longitudinally opposite internal pole pieces, and rotated to give maximum brightness.

∞ Renewal Sales item only.

16AP4-A

KINESCOPE



DETAIL OF LIP

NOTE 1: REFERENCE LINE IS DETERMINED BY POSITION WHERE HINGED GAUGE 1.500" + .003" – .000" I.D. AND 2" LONG WILL REST ON CONE.

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 CIRCLE CONCENTRIC WITH CONE AXIS AND HAVING DIAMETER OF 3".

NOTE 3: DISTANCE TO INTERNAL POLE PIECES. PLANE THROUGH VACANT PIN POSITION No.6 AND TUBE AXIS PASSES THROUGH LINE JOINING CENTERS OF POLE PIECES. DIRECTION OF PRINCIPAL FIELD OF ION-TRAP MAGNET SHOULD BE SUCH THAT NORTH POLE IS ADJACENT TO VACANT PIN POSITION No.6 AND SOUTH POLE TO PIN No.12.

NOTE 4: LOCATION OF DEFLECTING YOKE AND FOCUSING-COIL MUST BE WITHIN THIS SPACE.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

16AP4-A
KINESCOPE

NOTE 5: KEEP THIS SPACE CLEAR FOR ION-TRAP MAGNET.

NOTE 6: METAL CONE AND GLASS FACE OPERATE AT HIGH VOLTAGE. ANY MATERIAL IN CONTACT WITH THE CONE OR THE FACE MUST HAVE INSULATING PROPERTIES ADEQUATE FOR 15500 VOLTS.

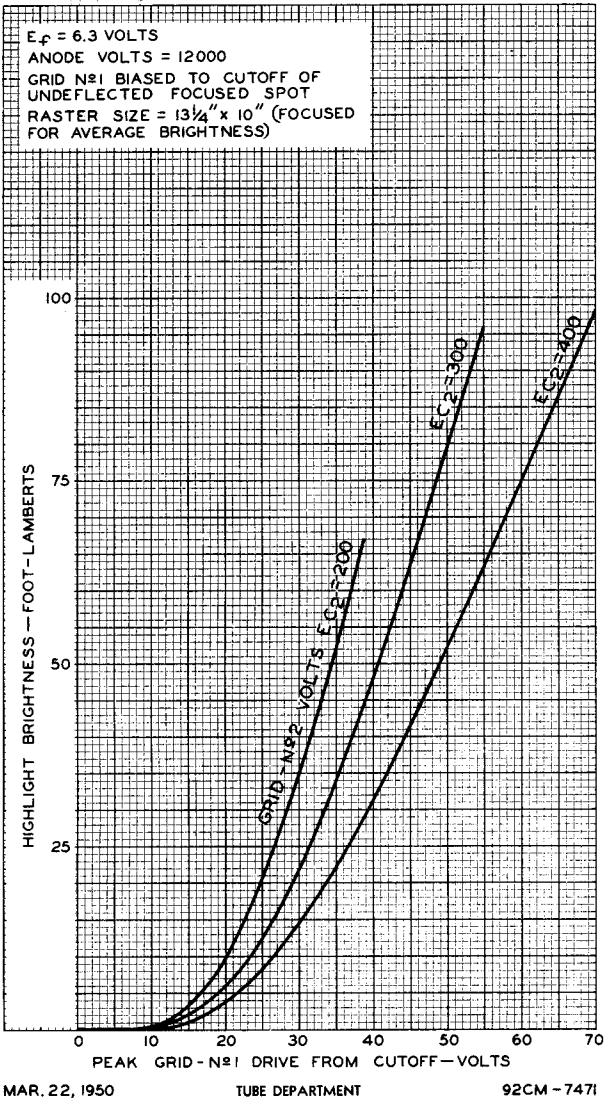
CURVES

The following Grid-Drive Characteristics Curves are for the condition with grid No.1 biased to give visual extinction of the undeflected, focused spot. In viewing television pictures, it will be found that the actual cutoff voltage corresponding to black in the picture is approximately 5 volts less negative than shown on the curves; similarly, the grid-No.1 drive to obtain a given anode current or light output is also about 5 volts less.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

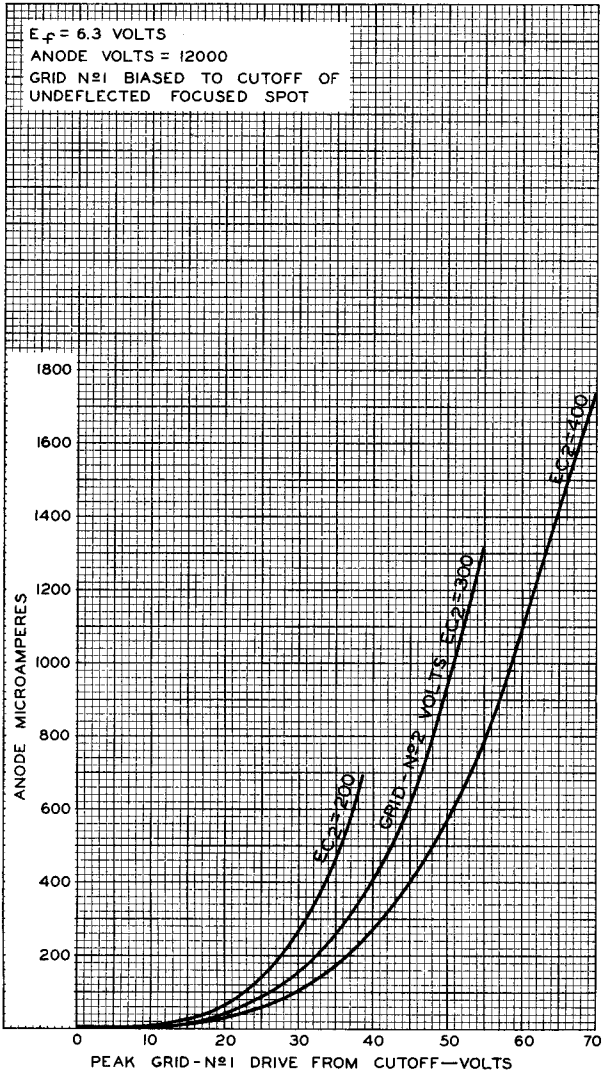
16AP4-A

AVERAGE GRID-DRIVE CHARACTERISTICS



16AP4-A

AVERAGE GRID-DRIVE CHARACTERISTICS



16DP4-A
KINESCOPE

ROUND GLASS TYPE

MAGNETIC FOCUS MAGNETIC DEFLECTION

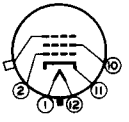
DATA

General:

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
Cathode to All Other Electrodes	5	μμf
Faceplate, Spherical		Filterglass
Light Transmission (Approx.)		66%
Phosphor (For Curves, see front of this Section)		P4–Sulfide Type
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Short
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angle (Approx.)		60°
Ion-Trap Gun	Requires External Double-Field Magnet	
Overall Length		20-3/4" ± 1/4"
Greatest Diameter of Bulb		15-7/8" ± 1/8"
Minimum Screen Diameter		14-1/2"
Mounting Position		Any
Cap	Recessed Small Cavity (JETEC No.J1-21)	
Base	Small-Shell Duodecal 5-Pin (JETEC No.B5-57)	

BOTTOM VIEW

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 10 – Grid No.2



Pin 11 – Cathode
Pin 12 – Heater
Cap – Anode

Maximum Ratings, *Design-Center Values*:

ANODE VOLTAGE	15000 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	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

Typical Operation:

Anode Voltage*	12000	volts

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 9000 volts.

16DP4-A

KINESCOPE

Grid-No.2 Voltage	250	volts
Grid-No.1 Voltage°	-27 to -63	volts
Focusing-Coil Current (DC, Approx.)†	115	ma
Ion-Trap-Magnet Current (DC, Approx.)#	110	ma

Maximum Circuit Values:

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

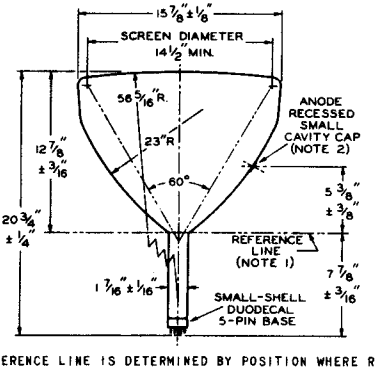
° For visual extinction of undeflected, focused spot.

† For specimen focusing coil similar to JETEC Focusing Coil No.109 positioned with air gap toward kinescope screen and center line of air gap 3-1/4 inches from Reference Line (see Outline Drawing). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 20 foot-lamberts on a 14-1/2" x 10-1/4" picture area sharply focused at center of screen.

For specimen ion-trap magnet similar to JETEC Ion-Trap Magnet No.108 located in optimum position and rotated to give maximum brightness.

OPERATING NOTES

X-Ray Warning. When operated at anode voltages up to 16 kilovolts, the 16DP4-A does not produce any harmful x-ray radiation. However, because the rating of the tube permits operation at voltages as high as 16.5 kilovolts (absolute value), shielding of the 16DP4-A 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.



NOTE 1: REFERENCE LINE IS DETERMINED BY POSITION WHERE REFERENCE-LINE GAUGE (JETEC No.112) 1.500" + 0.003" - 0.000" I.D. AND 2" LONG WILL REST ON BULB CONE.

NOTE 2: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 10°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.3.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

16GP4

KINESCOPE

METAL-CONE ENVELOPE

MAGNETIC FOCUS MAGNETIC DEFLECTION

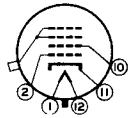
DATA

General:

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
Cathode to All Other Electrodes	5 μμf
Face Plate▲	RCA "Filterglass"
Phosphor (For Curves, see front of this Section)	No.4—Sulfide Type
Fluorescence and Phosphorescence	White
Persistence of Phosphorescence	Medium
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle (Approx.)	70°
Ion-Trap Gun	Requires External, Single-Field Magnet
Maximum Overall Length	17-11/16"
Greatest Diameter	15-7/8" ± 1/8"
Screen Diameter	14-5/8"
Mounting Position	Any
Anode Terminal	Metal-Cone Lip
Base	Small-Shell Duodecal 5-Pin

BOTTOM VIEW

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 10 – Grid No.2
Pin 11 – Cathode
Pin 12 – Heater
Metal-Cone Lip: Anode, Grid No.3



Maximum Ratings, *Design-Center Values*:

ANODE° VOLTAGE*	14000 max. volts
GRID-No.2 VOLTAGE	410 max. volts
GRID-No.1 (CONTROL-ELECTRODE) 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

° Anode and grid No.3, which are connected together with tube, are referred to herein as anode.

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

▲ Has transmission factor of about 65%.

16GP4

16GP4
KINESCOPE

Typical Operation:

Anode Voltage**	12000	volts
Grid-No.2 Voltage	300	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-33 to -77	volts
Focusing-Coil Current (DC, approx.)oo	100	ma
→ Field Strength of Single-Pole, Ion-Trap Magnet#	45	gausses

Maximum Circuit Values:

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

Minimum Circuit Values:

The power supply should be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 5 ma. If the supply permits the instantaneous short-circuit current to exceed 1 ampere, or is capable of storing more than 250 microcoulombs, 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	470 min.	ohms
Anode-Circuit Resistance	16000 min.	ohms

The resistors used should be capable of withstanding the applied voltage.

oo For JETEC Focusing Coil No.109 positioned with air gap toward kinescope screen, and center line of air gap 3 inches from Reference Line (see Outline Drawing). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 30 foot-lamberts on a 10" x 13-1/4" picture area.

\# Measured at center of field with General Electric Gauss Meter, Cat. No.409X51.

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

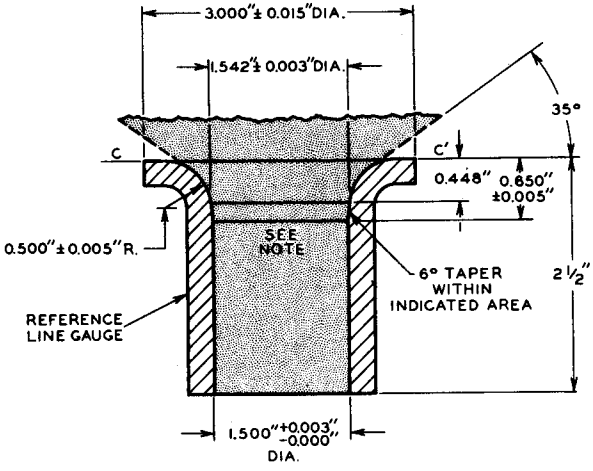
→ Indicates a change.

16GP4

KINESCOPE

REFERENCE-LINE GAUGE

Reference-Line Gauge with Supplementary Information on Recommended Inside Contour of Yoke to Provide Proper Location of Yoke on Neck-Cone Section

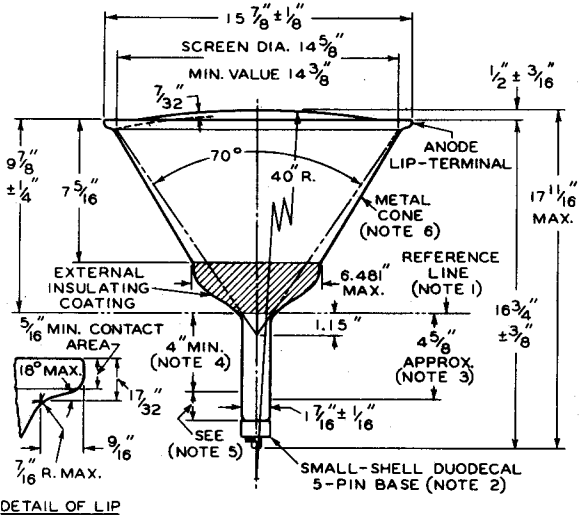


NOTE: INNER SURFACE OF YOKE MUST NOT EXTEND INTO SHADED REGION

92CS-7391

16GP4

16GP4
KINESCOPE



DETAIL OF LIP

NOTE 1: WITH TUBE NECK INSERTED THROUGH FLARED END OF GAUGE SHOWN ON PRECEDING PAGE AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS CONE.

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 CONE AXIS AND HAVING A DIAMETER OF 2-1/2".

NOTE 3: DISTANCE FROM REFERENCE LINE FOR LOCATING CENTER OF ION-TRAP MAGNETIC FIELD. DIRECTION OF FIELD OF THE ION-TRAP MAGNET SHOULD BE SUCH THAT NORTH POLE IS ADJACENT TO VACANT PIN POSITION No.8 AND SOUTH POLE TO PIN No.2.

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

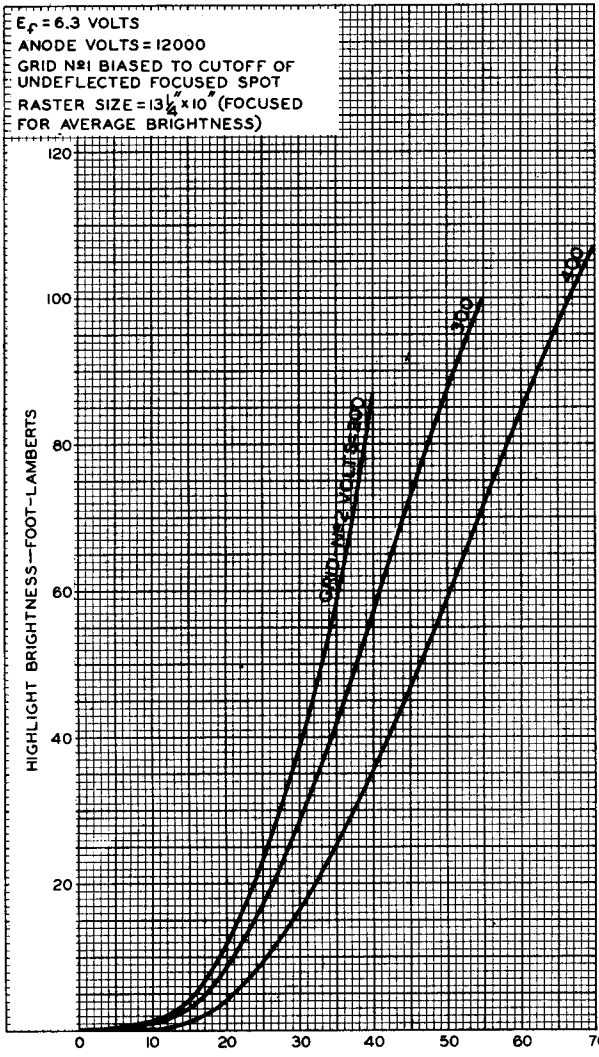
NOTE 5: KEEP THIS SPACE CLEAR FOR SINGLE-FIELD, ION-TRAP MAGNET.

NOTE 6: METAL CONE AND GLASS FACE OPERATE AT HIGH VOLTAGE. ANY MATERIAL IN CONTACT WITH THE CONE OR THE FACE MUST HAVE INSULATING PROPERTIES ADEQUATE FOR 15500 VOLTS.

92CM-7374

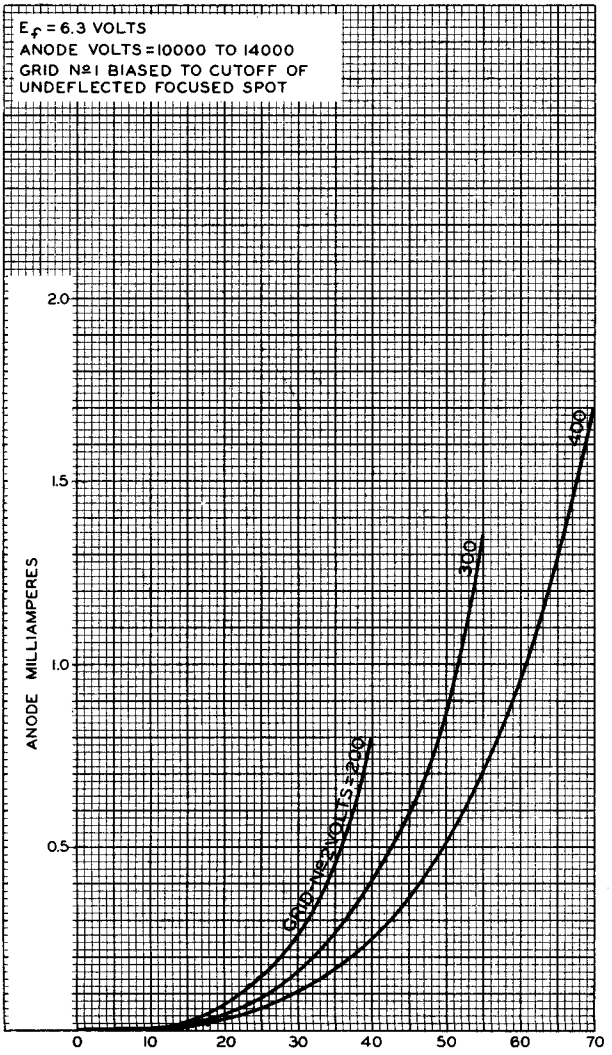
16GP4

AVERAGE GRID-DRIVE CHARACTERISTICS



16GP4

AVERAGE GRID-DRIVE CHARACTERISTICS



16GP4-A
KINESCOPE

The 16GP4-A is like the 16GP4 except that it has a face plate made of ***unfrosted, clear glass.*** As a result, the light output is about 30 per cent greater than shown by the curves under Type 16GP4.

16GP4-B
KINESCOPE

The 16GP4-B is like the 16GP4 except that it has a ***frosted Filterglass*** face plate. Frosting of the face diffuses reflections of bright objects in the room which might otherwise be objectionable. The light output is essentially the same as that of the 16GP4.

16GP4-C
KINESCOPE

The 16GP4-C is like the 16GP4 except that it has a face plate made of ***frosted, clear glass.*** Frosting of the face diffuses reflections of bright objects in the room which might otherwise be objectionable. The light output is about 30 per cent greater than shown by the curves under Type 16GP4.

As soon as feasible, the 16GP4-B will supersede the 16GP4, 16GP4-A, and 16GP4-C.

16KP4

16KP4

KINESCOPE

The 16KP4 is like the 16RP4 except that the distance from the Reference Line (see Outline Drawing) to the near edge of the external conductive coating is 2" ± 3/16"; and the distance from the center of the face to the coating is 3" ± 1/2".

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

16LP4-A
KINESCOPE

ROUND GLASS TYPE

MAGNETIC FOCUS — MAGNETIC DEFLECTION

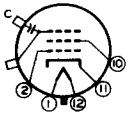
DATA

General:

Heater, for Unipotential Cathode:	
Voltage	6.3 ac or dc volts
Current	0.6 amp
Direct Interelectrode Capacitances:	
Grid No.1 to All Other Electrodes	6 μμf
Cathode to All Other Electrodes	5 μμf
External Conductive Coating to Anode	2000 max. μμf 750 min. μμf
Faceplate, Spherical	Filterglass
Light Transmission (Approx.)	66%
Phosphor (For Curves, see front of this Section)	P4–Sulfide Type
Fluorescence and Phosphorescence	White
Persistence of Phosphorescence	Short
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle (Approx.)	52°
Ion-Trap Gun	Requires External Double-Field Magnet
Overall Length	22-1/4" ± 3/8"
Greatest Diameter of Bulb	15-7/8" ± 1/8"
Minimum Screen Diameter	14-1/2"
Mounting Position	Any
Cap	Recessed Small Cavity (JETEC No. J1-21)
Base	Small-Shell Duodecal 5-Pin (JETEC No. B5-57)

BOTTOM VIEW

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



Pin 12 – Heater
Cap – Anode
C – External Conduct. Coating

Maximum Ratings, *Design-Center Values*:

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

Typical Operation:

Anode Voltage	12000	volts

TUBE DEPARTMENT
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16LP4-A
KINESCOPE

Grid-No.2 Voltage	300	volts
Grid-No.1 Voltage°	-33 to -77	volts
Focusing-Coil Current (DC, Approx.)▲	110	ma
Ion-Trap-Magnet Current (DC, Approx.)#	120	ma

Maximum Circuit Values:

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

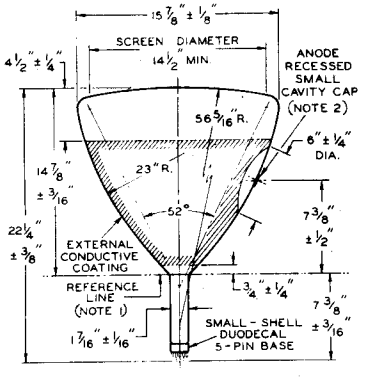
° For visual extinction of undeflected focused spot.

▲ For specimen focusing coil similiar to JETEC Focusing Coil No.106 positioned with air gap toward kinescope screen, and center line of air gap about 3-1/4" inches from Reference Line (see Outline Drawing). The indicated current is for the condition with the combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a high-light brightness of 20 foot-lamberts on a 14-1/2" x 10-1/4" picture area sharply focused at center of screen.

For specimen ion-trap magnet similiar to JETEC Ion-Trap Magnet No.108 located in optimum position and rotated to give maximum brightness.

OPERATING NOTES

X-Ray Warning. When operated at or below the maximum anode-voltage rating shown in the tabulated data, the 16LP4-A does not produce any harmful x-ray radiation. All types of picture tubes may be operated at voltages (if ratings permit) up to 16 kilovolts (absolute value) without personal injury on prolonged exposure at close range. Above 16 kilovolts, special shielding precautions for x-ray radiation may be necessary.



NOTE 1: REFERENCE LINE IS DETERMINED BY POSITION WHERE REFERENCE-LINE GAUGE (JETEC No.112) 1.500" + 0.003" - 0.000" I.D. AND 2" LONG WILL REST ON BULB CONE.

NOTE 2: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ±10°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.3.

16RP4

KINESCOPE

RECTANGULAR GLASS TYPE

MAGNETIC FOCUS — MAGNETIC DEFLECTION

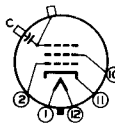
DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Anode	2000 max. / 750 min.	μμf
Face Plate (With about 66% light transmission)		Filterglass
Phosphor (For Curves, see front of this Section)		P4—Sulfide Type
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Short
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angles (Approx.):		
Diagonal		70°
Horizontal		65°
Vertical		50°
Ion-Trap Gun	Requires External, Single-Field Magnet	
Overall Length		18-3/4" ± 3/8"
Greatest Diagonal of Tube at Face		16-1/8" ± 3/16"
Greatest Width of Tube at Face		14-3/4" ± 3/16"
Greatest Height of Tube at Face		11-1/2" ± 3/16"
Minimum Screen Size		13-1/2" x 10-1/8"
Mounting Position		Any
Cap	Recessed Small Cavity (JETEC No.J1-21)	
Base	Small-Shell Duodecal 5-Pin (JETEC No.B5-57)	

BOTTOM VIEW

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



Pin 12 – Heater
Cap – Anode
C – External Conductive Coating

Maximum Ratings, *Design-Center Values*:

ANODE 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

16RP4

16RP4
KINESCOPE

Typical Operation:

Anode Voltage*	12000	14000	volts
Grid-No.2 Voltage	300	300	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-33 to -77	-33 to -77	volts
Focusing-Coil Current (DC, approx.)°	100 ± 20%	108 ± 20%	ma
Field Strength of Single-Field Ion-Trap Magnet (Approx.)	45	50	gausses

Maximum Circuit Values:

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

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

° For specimen focusing coil similar to JETEC Focusing Coil No. 109 positioned with air gap toward kinescope screen and center line of air gap 3-1/2 inches from Reference Line (see Outline Drawing). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 30 foot-lamberts on a 13-1/2" x 10-1/8" picture area sharply focused at center of screen.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

16RP4

KINESCOPE

OPERATING NOTES

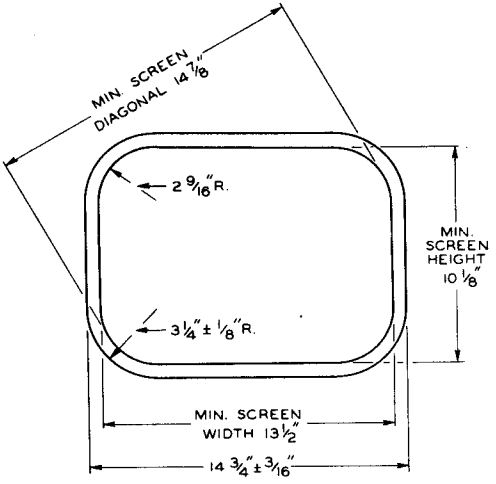
X-Ray Warning. When operated at anode voltages up to 16 kilovolts, the 16RP4 does not produce any harmful x-ray radiation. However, because the rating of the tube permits operation at anode voltages as high as 17.6 kilovolts (absolute value), shielding of the 16RP4 for x-ray radiation may be needed to protect against possible injury from prolonged exposure at close range whenever the operating conditions involve voltages in excess of 16 kilovolts.

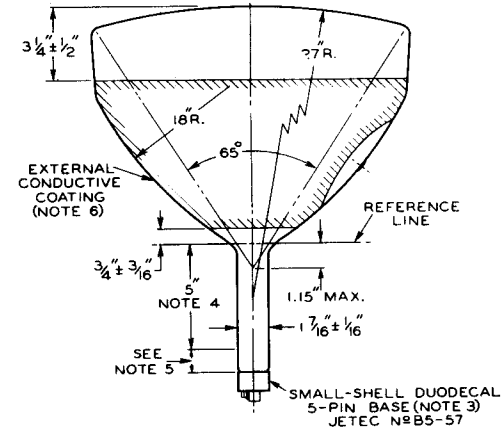
Direction of the field of the ion-trap magnet should be such that the north pole is adjacent to vacant pin position No.8 and the south pole to pin No.2.

16RP4

16RP4

KINESCOPE





TUBE DEPARTMENT

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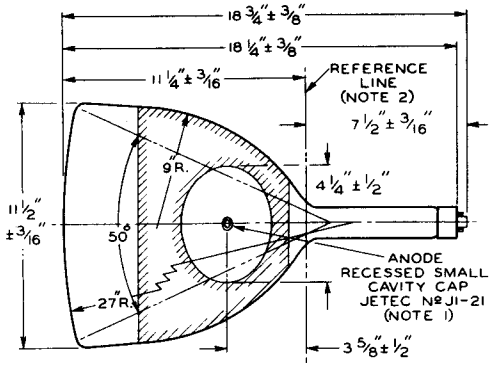
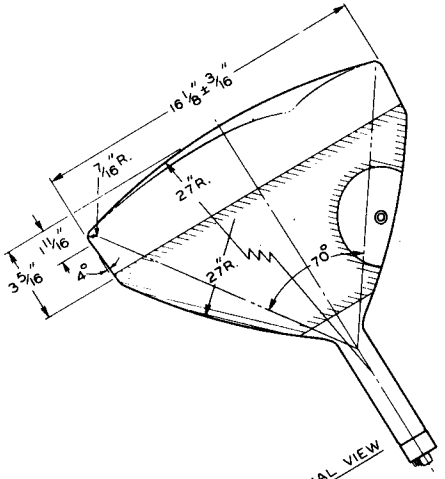
RCA

16RP4

KINESCOPE





92CL-7627

16RP4

KINESCOPE

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 30°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.6.

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

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

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

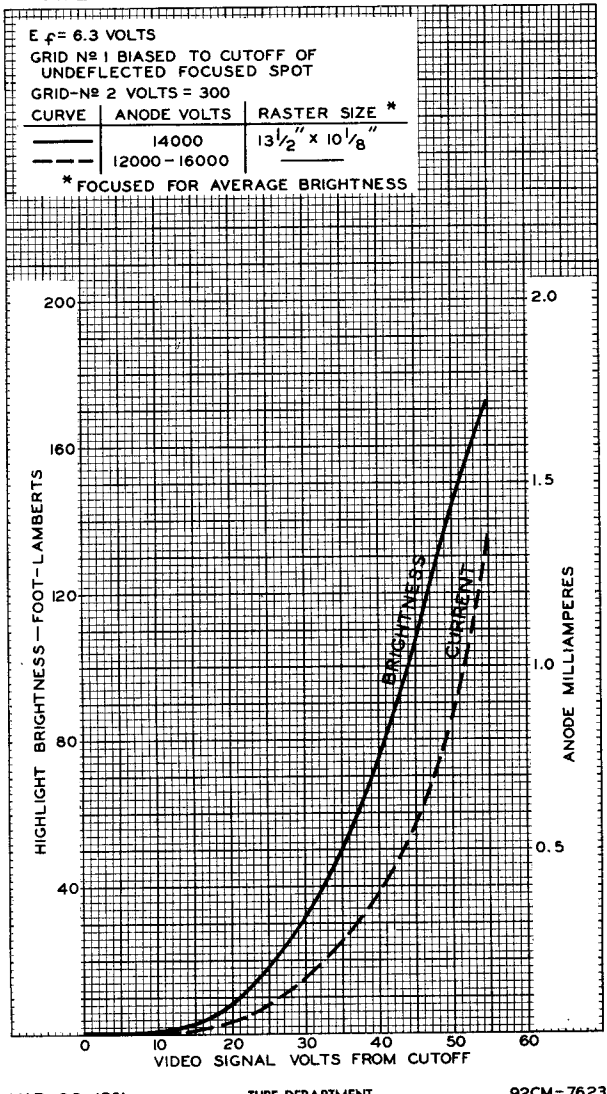
NOTE 5: KEEP THIS SPACE CLEAR FOR SINGLE-FIELD, ION-TRAP MAGNET.

NOTE 6: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

16RP4

AVERAGE GRID-DRIVE CHARACTERISTICS



16TP4
KINESCOPE

RECTANGULAR GLASS TYPE

MAGNETIC FOCUS MAGNETIC DEFLECTION

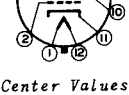
DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Anode	2000 max. 750 min.	μμf μμf
Face Plate (With about 66% light transmission)	Filterglass	
Phosphor (For Curves, see front of this Section)	P4—Sulfide Type	
Fluorescence and Phosphorescence	White	
Persistence of Phosphorescence	Short	
Focusing Method	Magnetic	
Deflection Method	Magnetic	
Deflection Angles (Approx.):		
Diagonal	70°	
Horizontal	65°	
Vertical	50°	
Ion-Trap Gun	Requires External, Single-Field Magnet	
Overall Length	18-1/8" ± 3/8"	
Greatest Diagonal of Tube at Face	16-1/8" ± 3/16"	
Greatest Width of Tube at Face	14-3/4" ± 3/16"	
Greatest Height of Tube at Face	11-1/2" ± 3/16"	
Minimum Screen Size	13-1/2" x 10-1/8"	
Mounting Position	Any	
Cap	Recessed Small Cavity (JETEC No. J1-21)	
Base	Small-Shell Duodecal 5-Pin (JETEC No. B5-57)	

BOTTOM VIEW

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



Pin 12 – Heater
Cap – Anode
C – External Conductive Coating

Maximum Ratings, *Design-Center Values*:

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

16TP4

16TP4

KINESCOPE

Typical Operation:			
Anode Voltage*	12000	14000	volts
Grid-No.2 Voltage	300	300	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-33 to -77	-33 to -77	volts
Focusing-Coil Current (DC, approx.)°	100	108	ma
Field Strength of Single-Field Ion-Trap Magnet (Approx.)	45	50	gauses
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance	1.5 max.		megohms

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

° For specimen focusing coil similar to JETEC Focusing Coil No.109 positioned with air gap toward kinescope screen and center line of air gap 3 inches from Reference Line (see Outline Drawing). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 30 foot-lamberts on a 13-1/2" x 10-1/8" picture area sharply focused at center of screen.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

16TP4

KINESCOPE

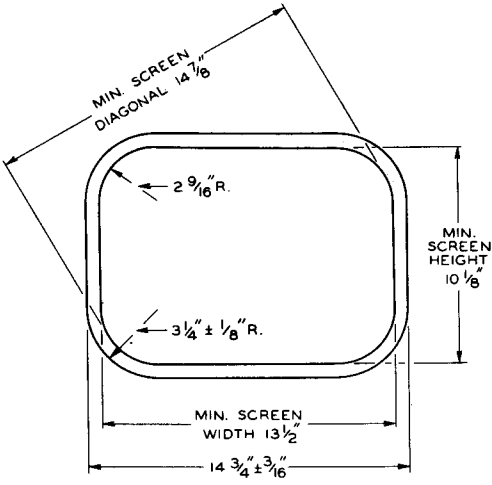
OPERATING NOTES

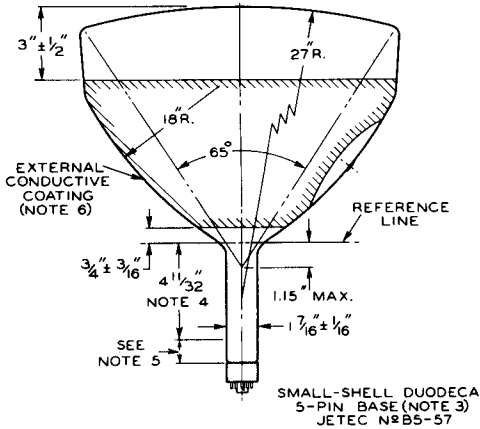
X-Ray Warning. When operated at or below the maximum ratings shown in the tabulated data, the 16TP4 does not produce any harmful x-ray radiation. All types of picture tubes may be operated at voltages (if ratings permit) up to 16 kilovolts (absolute value) without personal injury on prolonged exposure at close range. Above 16 kilovolts, special shielding precautions for x-ray radiation may be necessary.

Direction of the field of the ion-trap magnet should be such that the north pole is adjacent to vacant pin position No.8 and the south pole to pin No.2.

16TP4

16TP4
KINESCOPE





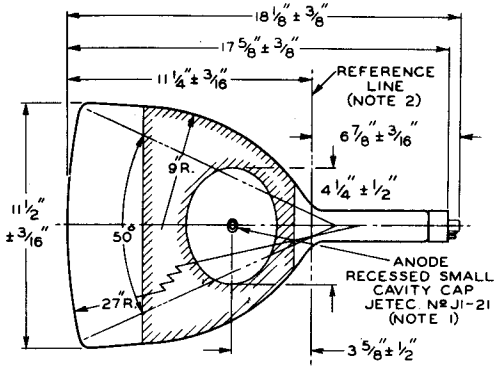
TUBE DEPARTMENT

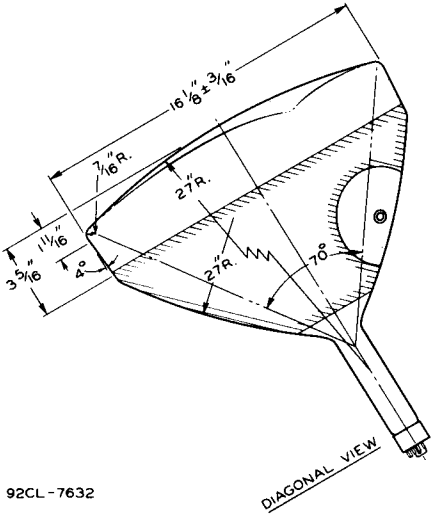
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

16TP4

KINESCOPE





92CL-7632

16TP4

16TP4
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 ANODE TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 30°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.3.

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

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

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

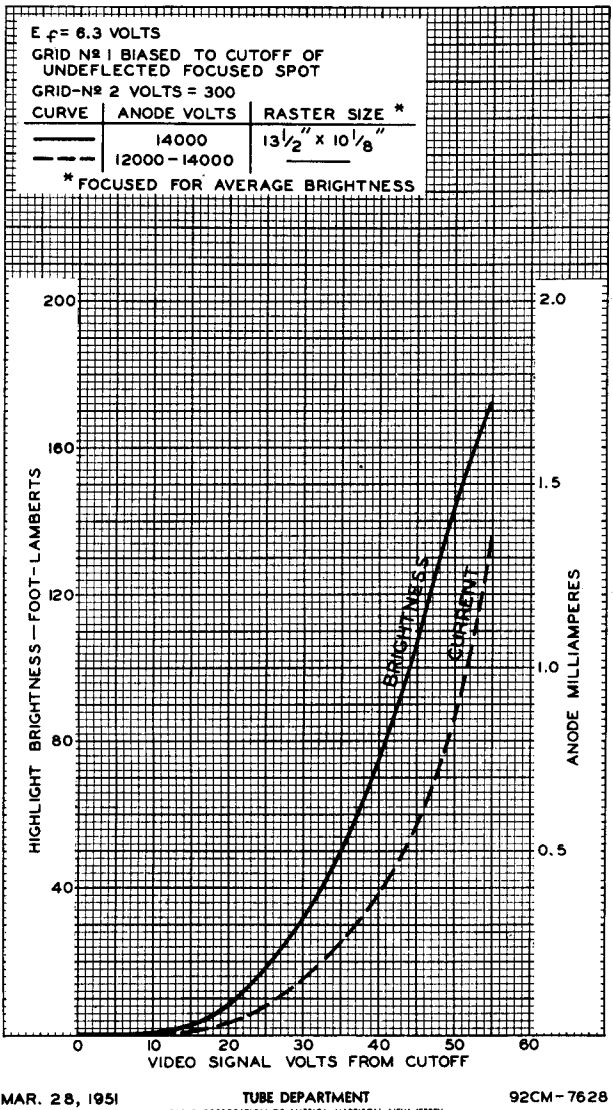
NOTE 5: KEEP THIS SPACE CLEAR FOR SINGLE-FIELD, ION-TRAP MAGNET.

NOTE 6: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

RCA

16TP4

AVERAGE GRID-DRIVE CHARACTERISTICS



16WP4-A
KINESCOPE

ROUND GLASS TYPE

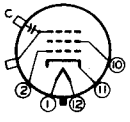
MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Anode	1500 max. 750 min.	μμf μμf
Faceplate, Spherical		Filterglass
Light Transmission		66%
Phosphor (For Curves, see front of this Section)		P4-Sulfide Type
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Short
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angle (Approx.)		70°
Ion-Trap Gun	Requires External Double-Field Magnet	
Overall Length	17-3/4" ± 3/8"	
Greatest Diameter of Bulb	15-7/8" ± 1/8"	
Minimum Screen Diameter	14-1/2"	
Mounting Position		Any
Cap	Recessed Small Cavity (JETEC No. J1-21)	
Base	Small-Shell Duodecal 5-Pin (JETEC No. B5-57)	

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



Pin 12 – Heater
Cap – Anode
C – External Conduct. Coating

Maximum Ratings, *Design-Center Values*:

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

Typical Operation

Anode Voltage	12000	volts
Grid-No.2 Voltage	250	volts

16WP4-A

16WP4-A
KINESCOPE

Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot.	-27 to 63	volts
Focusing-Coil Current (DC, Approx.)° . .	100	ma
Ion-Trap Current (Approx.)†	120	ma

Maximum Circuit Values:

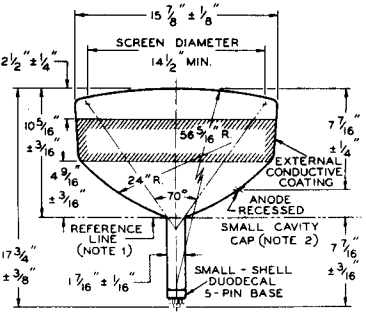
Grid-No.1-Circuit Resistance	1.5 max.	megohms

° For specimen focusing coil similar to JETEC Focusing Coil No.106 positioned with air gap toward kinescope screen and center line of air gap 3-1/4 inches from Reference Line (see Outline Drawing). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 20 foot-lamberts on a 14-1/2" x 10-1/4" picture area sharply focused at center of screen.

† For specimen ion-trap magnet similar to JETEC Ion-Trap Magnet No.108 located in optimum position and rotated to give maximum brightness.

OPERATING NOTES

X-Ray Warning. When operated at anode voltages up to 16 kilovolts, the 16WP4-A does not produce any harmful x-ray radiation. However, because the rating of the tube permits operation at anode voltages as high as 17.6 kilovolts (absolute value), shielding of the 16WP4-A 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.



NOTE 1: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC NO.110 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 2: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION NO.3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 10°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION NO.3.

17BP4-A

KINESCOPE

RECTANGULAR GLASS TYPE

MAGNETIC FOCUS — MAGNETIC DEFLECTION

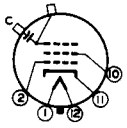
DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Anode	2000 max. / 750 min.	μμf
Face Plate (With about 66% light transmission)	Filterglass	
Phosphor (For Curves see front of this Section)	No.4—Sulfide Type	
Fluorescence and Phosphorescence	White	
Persistence of Phosphorescence	Short	
Focusing Method	Magnetic	
Deflection Method	Magnetic	
Deflection Angles (Approx.):		
Diagonal	70°	
Horizontal	65°	
Vertical	50°	
Ion-Trap Gun	Requires External, Single-Field Magnet	
Overall Length	19-1/4" ± 3/8"	
Greatest Diagonal of Tube	16-5/8" ± 1/8"	
Greatest Width of Tube	15-3/8" ± 1/8"	
Greatest Height of Tube	12-9/32" ± 1/8"	
Screen Size	14-3/8" x 11-1/16"	
Mounting Position	Any	
Cap	Recessed Small Cavity (JETEC No.J1-21)	
Base	Small-Shell Duodecal 5-Pin (JETEC No.B5-57)	

BOTTOM VIEW

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



Cap - Anode
C - External Conductive Coating

Maximum Ratings, *Design-Center Values*:

ANODE 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

17BP4-A

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		150 max.	volts
Heater positive with respect to cathode.		150 max.	volts
Typical Operation:			
Anode Voltage*	12000	14000	volts
Grid-No.2 Voltage	300	300	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-33 to -77	-33 to -77	volts
Focusing-Coil Current (DC)▲	92 ± 10%	99 ± 10%	ma
Field Strength of Single-Field Ion-Trap Magnet#	45	50	gausses
Ion-Trap Magnet Current (DC, Approx.)○	70	-	ma
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance		1.5 max.	megohms

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

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

Measured at center of field with General Electric Gauss Meter, Cat. No.409X51.

○ For specimen ion-trap magnet similar to JETEC Ion-Trap Magnet No.111 located in optimum position and rotated to give maximum brightness.

OPERATING NOTES

When operated at anode voltages up to 16 kilovolts, ***the 17BP4-A does not produce any harmful x-ray radiation.*** However, because the rating of the tube permits operation at anode voltages as high as 17.6 kilovolts (absolute value), shielding of the 17BP4-A 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.

Direction of the field of the ion-trap magnet should be such that the north pole is adjacent to vacant pin position No.8 and the south pole to pin No.2.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

17BP4-A

AVERAGE GRID-DRIVE CHARACTERISTICS

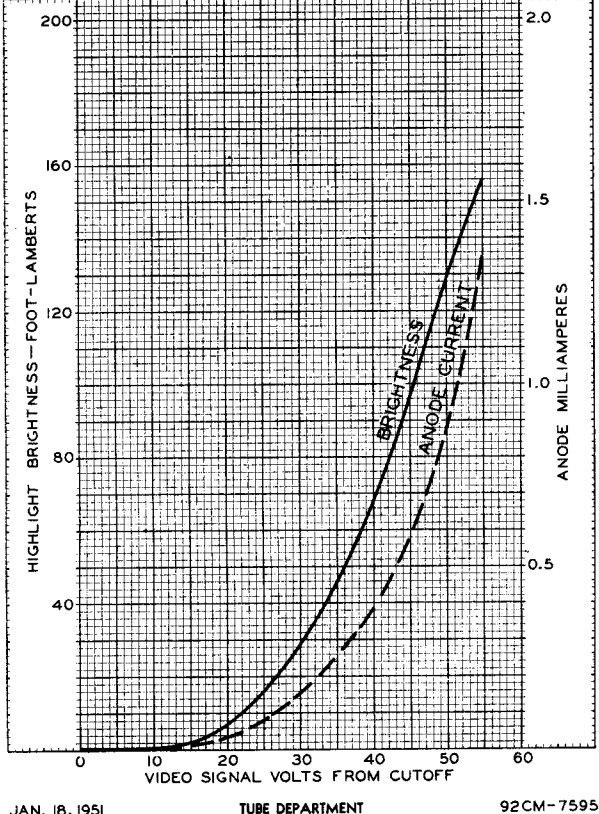
E_f = 6.3 VOLTS

GRID Nº 1 BIASED TO CUTOFF OF UNDEFLECTED FOCUSED SPOT

GRID-Nº 2 VOLTS = 300

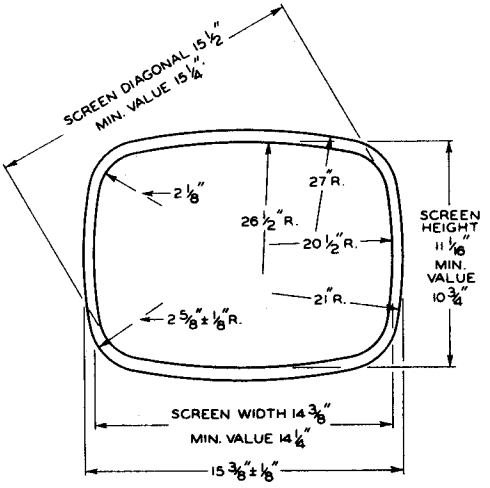
CURVE	ANODE VOLTS	RASTER SIZE*
———	14000	14 3/8" X 11 1/16"
– – –	12000 – 16000	

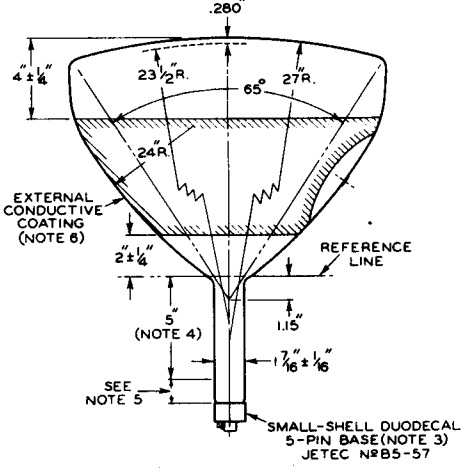
*FOCUSED FOR AVERAGE BRIGHTNESS



17BP4-A

17BP4-A
KINESCOPE





MAY 1, 1951

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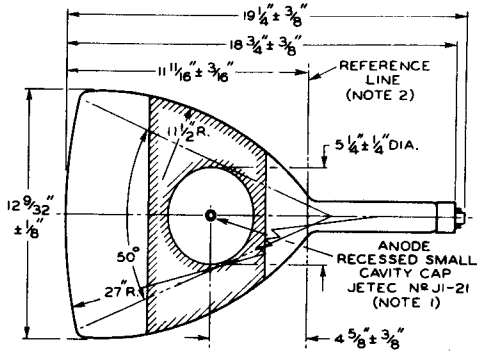
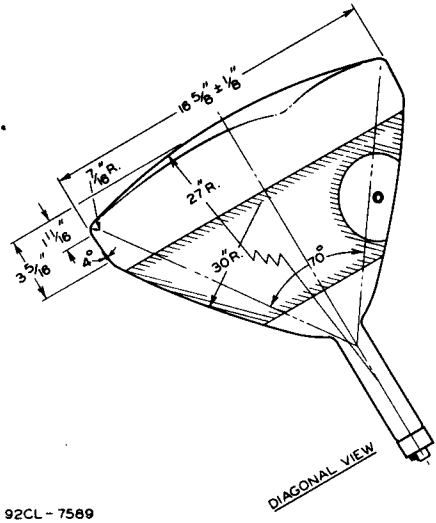
17BP4-A

KINESCOPE





92CL-7589

17BP4-A
KINESCOPE

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 30°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.6.

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

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

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

NOTE 5: KEEP THIS SPACE CLEAR FOR SINGLE-FIELD, ION-TRAP MAGNET.

NOTE 6: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

17CP4

KINESCOPE

RECTANGULAR METAL-SHELL TYPE

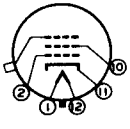
MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:

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
Cathode to All Other Electrodes	5	μμf
Face Plate (Transmission of about 65%)	Frosted Filterglass	
Phosphor (For Curves, see front of this Section)	No.4-Sulfide Type	
Fluorescence and Phosphorescence	White	
Persistence of Phosphorescence	Short	
Focusing Method	Magnetic	
Deflection Method	Magnetic	
Deflection Angles (Approx.):		
Diagonal	70°	
Horizontal	66°	
Vertical	50°	
Ion-Trap Gun	Requires External, Single-Field Magnet	
Maximum Overall Length	19"	
Greatest Diagonal of Tube at Lip	16-13/16" ± 3/16"	
Greatest Width of Tube at Lip	15-15/16" ± 1/8"	
Greatest Height of Tube at Lip	12-1/4" ± 1/8"	
Screen Size	14-5/8" x 11"	
Mounting Position	Any	
Anode Terminal	Metal-Shell Lip	
Base	Small-Shell Duodecal 5-Pin (JETEC No.B5-57)	
Basing Designation for BOTTOM VIEW	$12D_1$	

Pin 1 - Heater
Pin 2 - Grid No.1
Pin 10 - Grid No.2
Pin 11 - Cathode
Pin 12 - Heater
Metal-Shell Lip: Anode



Maximum Ratings, *Design-Center Values*:

ANODE VOLTAGE[0]	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	180 max.	volts
Heater positive with respect to cathode	180 max.	volts

[0] The product of anode voltage and average anode current should be limited to 6 watts.

17CP4

KINESCOPE

Typical Operation:

Anode Voltage*	12000	14000	volts
Grid-No.2 Voltage	300	300	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-33 to -77	-33 to -77	volts
Focusing Coil Current (DC)▲	96 ± 6%	104 ± 6%	ma
Field Strength of Single-Field Ion-Trap Magnet§	45	50	gausses
Ion-Trap Magnet Current (DC, approx.)#	70	-	ma

Maximum Circuit Values:

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

Minimum Circuit Values:

The power supply should be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 5 ma. If the supply permits the instantaneous short-circuit current to exceed 1 ampere, or is capable of storing more than 250 microcoulombs, 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	470 min.	ohms
Anode-Circuit Resistance	18000 min.	ohms

The resistors used should be capable of withstanding the applied voltage.

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

▲ For specimen focusing coil similiar to JETEC Focusing Coil No.109, positioned with air gap toward kinescope screen, and center line of air gap about 3 inches from Reference Line (see Outline Drawing). The indicated currents are for the condition with the combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 30 foot-lamberts on a 14-3/8" x 10-11/16" picture area sharply focused at center of screen.

§ Measured at center of field with General Electric Gauss Meter, Cat. No.409X51.

\# For specimen ion-trap magnet similiar to JETEC Ion-Trap Magnet No.111, located in optimum position and rotated to give maximum brightness.

OPERATING NOTES

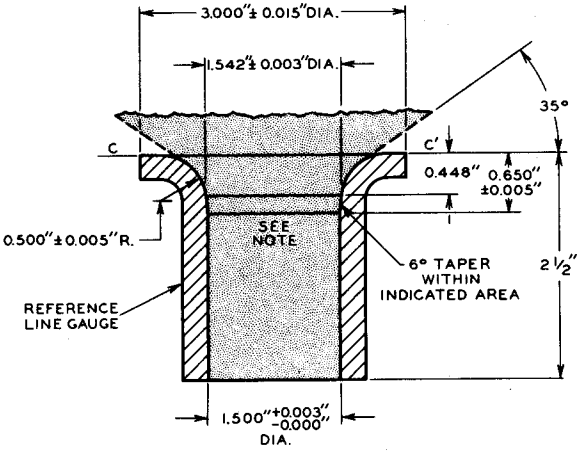
When operated at anode voltages up to 16 kilovolts, the 17CP4 does not produce any harmful x-ray radiation. However, because the rating of the tube permits operation at anode voltages as high as 17.6 kilovolts (absolute value), shielding of the 17CP4 for x-ray radiation may be needed to protect against possible injury from prolonged exposure at close range whenever the operating conditions involve voltages in excess of 16 kilovolts.

17CP4

KINESCOPE

REFERENCE-LINE GAUGE

Reference-Line Gauge (JETEC No. 110) with Supplementary Information on Recommended Inside Contour of Yoke to Provide Proper Location of Yoke on Neck-Funnel Section

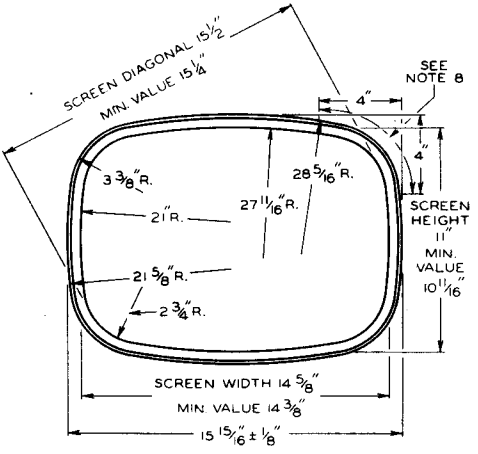


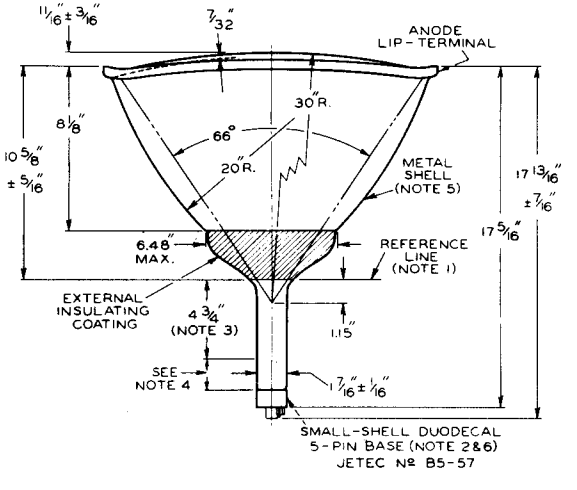
NOTE: INNER SURFACE OF YOKE MUST NOT EXTEND INTO SHADED REGION

92CS-7391

17CP4

KINESCOPE





17CP4

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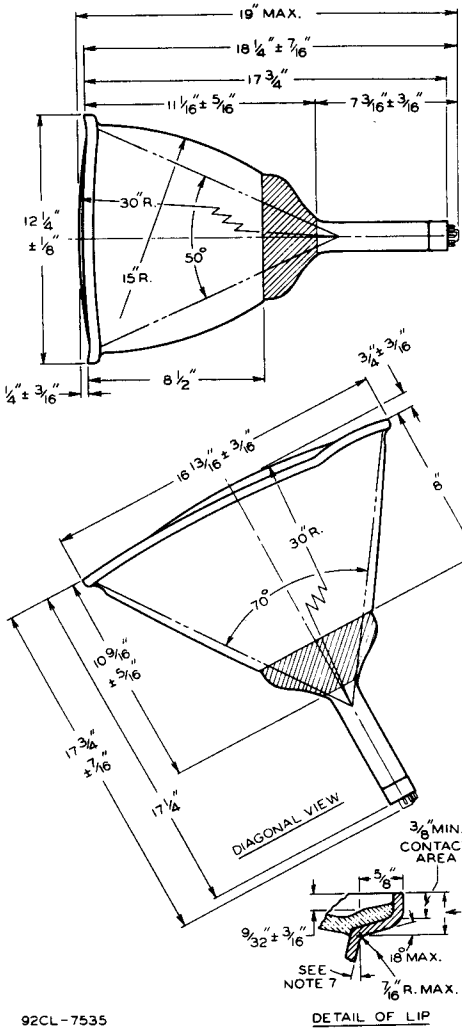


92CL-7535

17CP4

KINESCOPE

NOTE 1: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE (JETEC No.110) 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 2-3/4".

NOTE 3: LOCATION OF DEFLECTING YOKE AND FOCUSING DEVICE MUST BE WITHIN THIS SPACE.

NOTE 4: KEEP THIS SPACE CLEAR FOR SINGLE-FIELD, ION-TRAP MAGNET. DIRECTION OF THE FIELD OF THE ION-TRAP MAGNET SHOULD BE SUCH THAT THE NORTH POLE IS ADJACENT TO VACANT PIN POSITION No.8 AND THE SOUTH POLE TO PIN No.2.

NOTE 5: METAL SHELL AND GLASS FACE OPERATE AT HIGH VOLTAGE. ANY MATERIAL IN CONTACT WITH THE SHELL OR THE FACE MUST HAVE INSULATING PROPERTIES ADEQUATE TO WITHSTAND THE APPLIED ANODE VOLTAGE PLUS 10%.

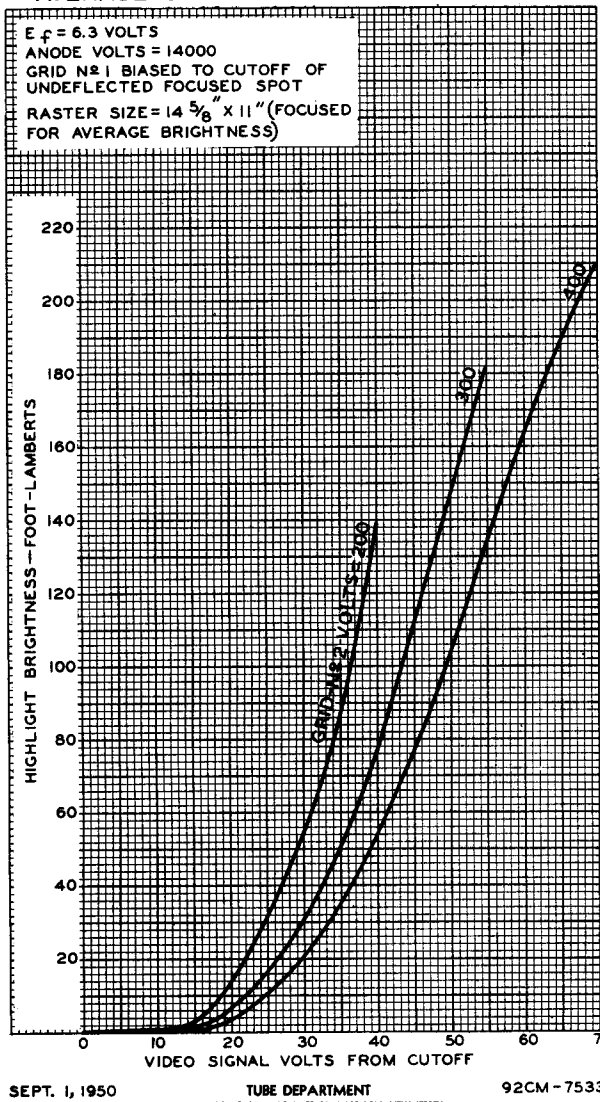
NOTE 6: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.6 MAY VARY FROM THE MAJOR AXIS OF THE GLASS FACE BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°.

NOTE 7: IN THIS REGION THE ANGULAR VARIATION AROUND PERIPHERY OF SHELL IS 0° TO 18°.

NOTE 8: SUPPORT TUBE BY LIP ONLY AT CORNERS WITHIN THIS SPACE.

17CP4

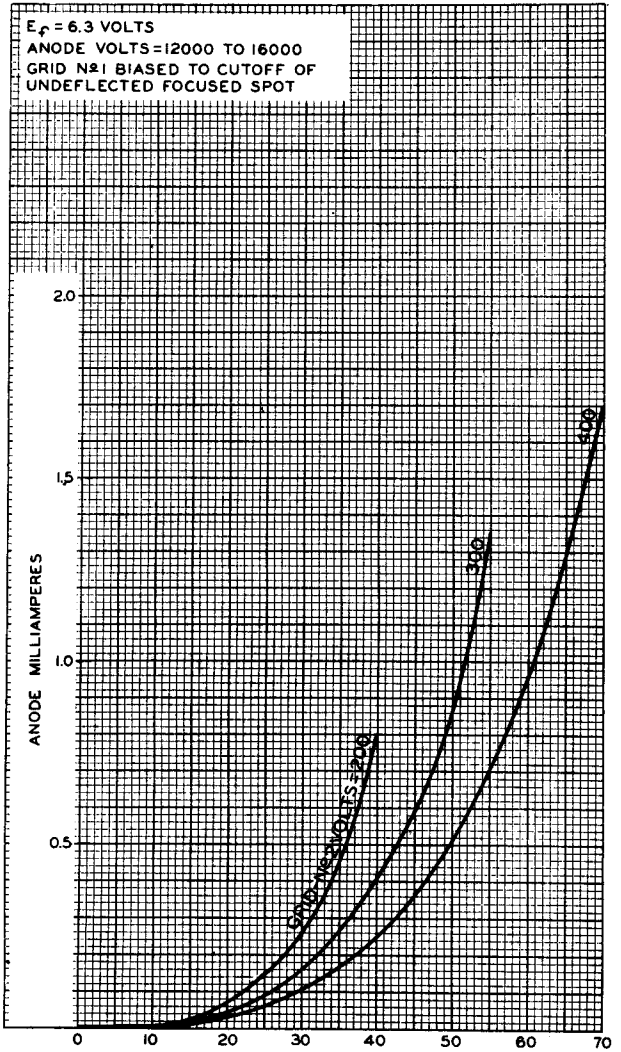
AVERAGE GRID-DRIVE CHARACTERISTICS



17CP4

17CP4

AVERAGE GRID-DRIVE CHARACTERISTICS



OCT. 3, 1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7548

RCA

17GP4

KINESCOPE

RECTANGULAR METAL-SHELL TYPE

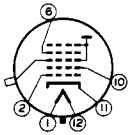
ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
Face Plate (With about 66% light transmission)	Frosted Filterglass	
Phosphor	No.4-Sulfide Type	
Fluorescence and Phosphorescence	White	
Persistence of Phosphorescence	Short	
Focusing Method	Electrostatic	
Deflection Method	Magnetic	
Deflection Angles (Approx.):		
Diagonal	70°	
Horizontal	66°	
Vertical	50°	
Ion-Trap Gun	Requires External, Single-Field Magnet	
Maximum Overall Length	19-5/16"	
Greatest Diagonal of Tube at Lip	16-13/16" ± 3/16"	
Greatest Width of Tube at Lip	15-15/16" ± 1/8"	
Greatest Height of Tube at Lip	12-1/4" ± 1/8"	
Screen Size	14-5/8" x 11"	
Mounting Position	Any	
Ultor● Terminal	Metal-Shell Lip	
Base	Small-Shell Duodecal 6-Pin (JETEC No.B6-63)	

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
Metal-Shell Lip - Grid No.3, Grid No.5, Collector

Maximum Ratings, *Design-Center Values*:

ULTOR● VOLTAGE	16000 max.	volts
GRID-No.4 VOLTAGE	5000 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
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds	410 max.	volts
After equipment warm-up period	180 max.	volts
Heater positive with respect to cathode	180 max.	volts

●: See next page.

17GP4

KINESCOPE

Equipment Design Ranges:

For any ultor voltage (E_u) between 12000 and 16000 volts and grid-No.2 voltage (E_{c_2}) between 150 and 500 volts*

Grid-No.4 Voltage for Ultor Current of 100 μamp.	19.1% to 25.9% of E_u	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	11% to 25.7% of E_{c_2}	volts
Grid-No.4 Current.	−15 to +25	μamp
Grid-No.2 Current.	−15 to +15	μamp
Field Strength of Single-Field Ion-Trap Magnet (Approx.)	$\sqrt{\frac{E_u}{12000}} \times 35$	gausses
Field Strength of Adjustable Centering Magnet	0 to 8	gausses

Examples of Use of Design Ranges:

For ultor voltage of	*12000*	*14000*	*volts*
and grid-No.2 voltage of	*300*	*300*	*volts*
Grid-No.4 Voltage for Ultor Current of 100 μamp	2290 to 3100	2670 to 3620	volts
Grid-No.1 Voltage†	−33 to −77	−33 to −77	volts
Ion-Trap Magnet (Rated Strength)	35	40	gausses

Maximum Circuit Values:

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

• In the 17GP4, grid No.5 which has the ultor function, grid No.3, and collector are connected together within the tube and are conveniently referred to collectively as "ultor". The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

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

† For visual extinction of undeflected focused spot.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

17GP4

KINESCOPE

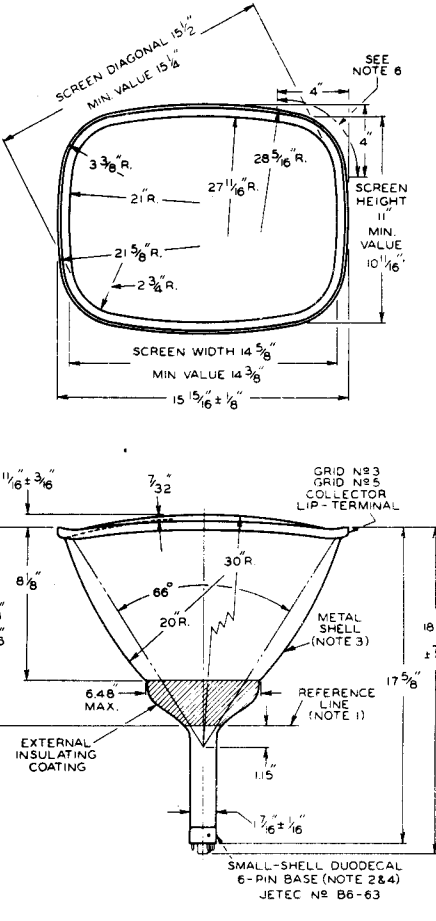
OPERATING NOTES

X-Ray Warning. When operated at ultor voltages up to 16 kilovolts, the 17GP4 does not produce any harmful x-ray radiation. However, because the rating of the tube permits operation at voltages as high as 17.6 kilovolts (absolute value), shielding of the 17GP4 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.

Direction of the field of the ion-trap magnet should be such that the north pole is adjacent to vacant pin position No.8 and the south pole to pin No.2.

17GP4

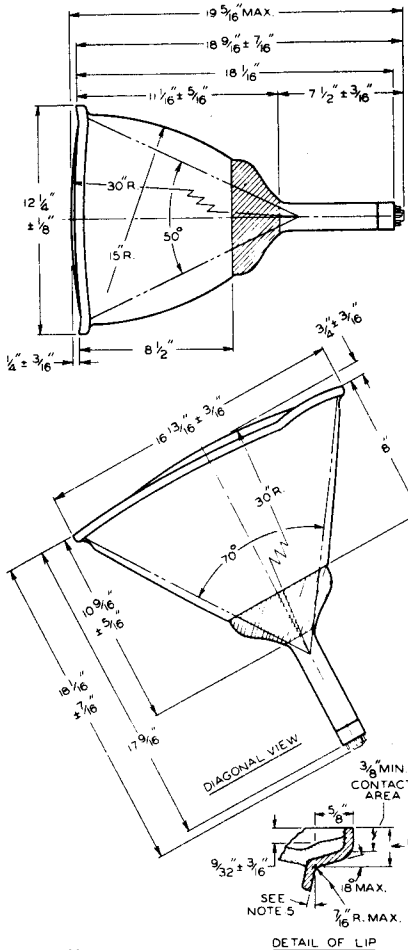
17GP4
KINESCOPE



RCA

17GP4

KINESCOPE



92CL-7601

17GP4
KINESCOPE

NOTE 1: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No. 110 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 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 2-3/4".

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

NOTE 4: THE PLANE THROUGH THE TUBE AXIS AND PIN No.6 MAY VARY FROM THE HORIZONTAL AXIS OF THE GLASS FACE BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 10°.

NOTE 5: IN THIS REGION THE ANGULAR VARIATION AROUND PERIPHERY OF METAL SHELL IS 0° TO 18°.

NOTE 6: SUPPORT TUBE BY LIP ONLY AT CORNERS WITHIN THIS SPACE.

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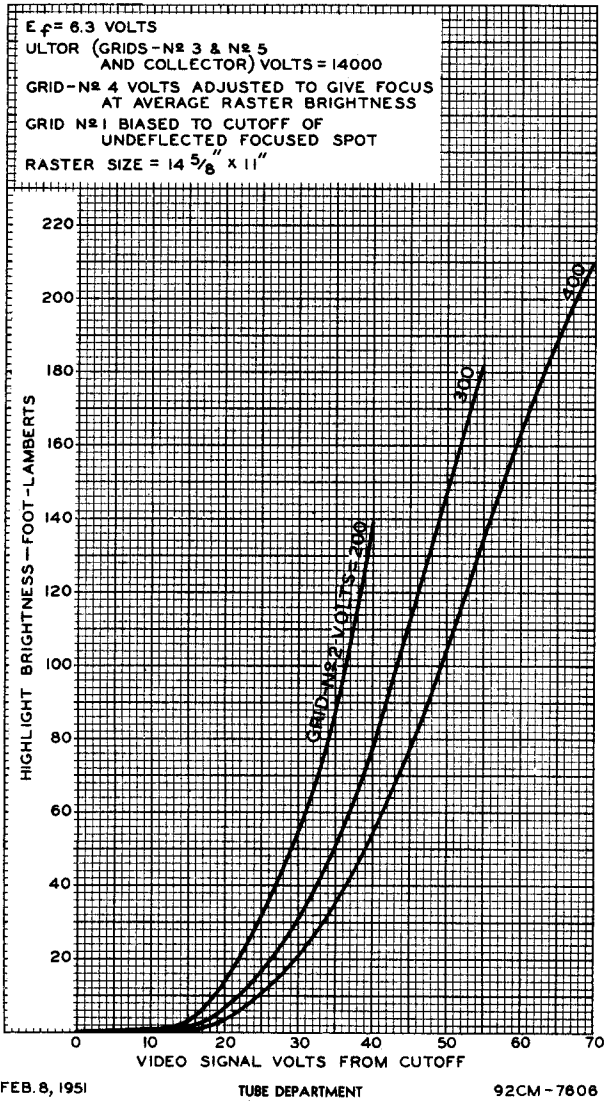
17GP4

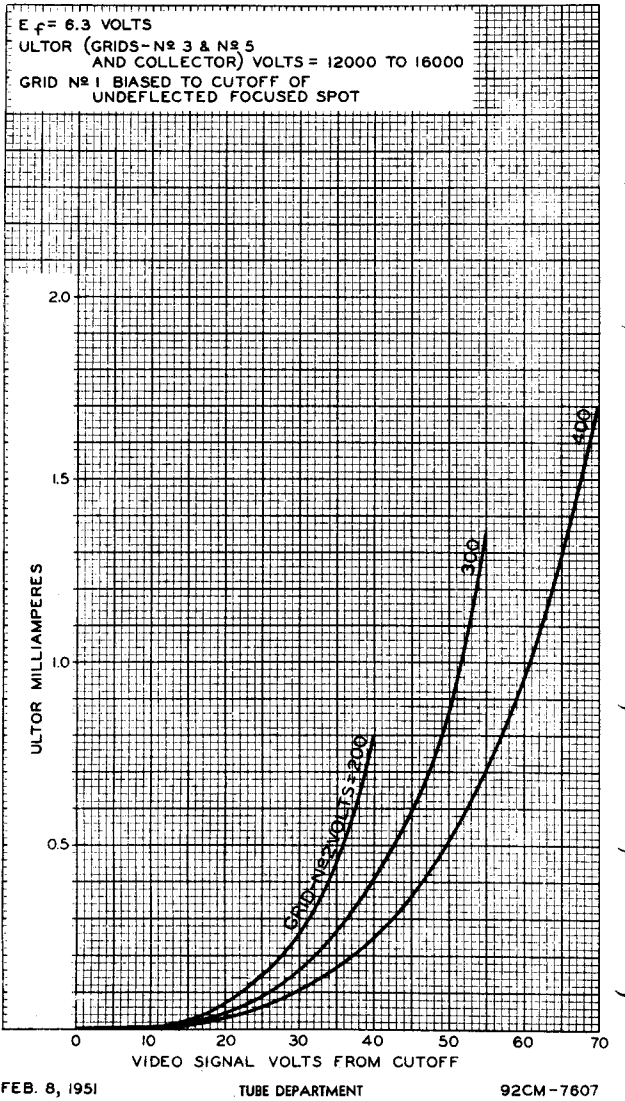
AVERAGE GRID-DRIVE CHARACTERISTICS



17GP4

17GP4

AVERAGE GRID-DRIVE CHARACTERISTICS



RCA

17HP4

KINESCOPE

RECTANGULAR GLASS TYPE

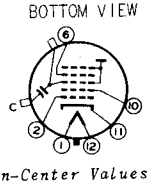
LOW-VOLTAGE FOCUS — MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Ultor●	1500 max. / 750 min.	μμf
Faceplate, Spherical		Filterglass
Light Transmission (Approx.)		66%
Phosphor (For Curves, see front of this section)		P4—Sulfide Type
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Short
Focusing Method		Electrostatic
Deflection Method		Magnetic
Deflection Angles (Approx.):		
Diagonal		70°
Horizontal		65°
Vertical		50°
Ion-Trap Gun	Requires External, Single-Field Magnet	
Overall Length		19-3/16" ± 3/8"
Greatest Diagonal of Tube		16-5/8" ± 1/8"
Greatest Width of Tube		15-3/8" ± 1/8"
Greatest Height of Tube		12-9/32" ± 1/8"
Screen Size		14-3/8" x 11-1/16"
Mounting Position		Any
Cap	Recessed Small Cavity (JETEC No. J1-21)	
Base	Small-Shell Duodecal 6-Pin (JETEC No. B6-63)	

BOTTOM VIEW



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

Cap – Grid No. 3, Grid No. 5, Collector
C – External Conductive Coating

Maximum Ratings, *Design-Center Values*:

ULTOR● VOLTAGE	16000 max.	volts
GRID-No.4 VOLTAGE:		
Positive value	1000 max.	volts
Negative value▲	500 max.	volts
GRID-No.2 VOLTAGE	500 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value	0 max.	volts
Positive peak value	2 max.	volts

●▲ See next page.

17HP4

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 12000 and 16000 volts and grid-No.2 voltage (E_{c_2}) between 150 and 500 volts*

Grid-No.4 Voltage for Ultor Current of 100 μamp. . .	-0.4% to 2.2% of E_u	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	11% to 25.7% of E_{c_2}	volts
Grid-No.4 Current.	-25 to +25	μamp
Grid-No.2 Current.	-15 to +15	μamp
Field Strength of Single-Field Ion-Trap Magnet (Approx.)	$\sqrt{\frac{E_u}{12000}} \times 42$	gausses
Field Strength of Adjustable Centering Magnet. .	0 to 8	gausses

Examples of Use of Design Ranges:

For ultor voltage of	*14000*	*16000*	*volts*
and grid-No.2 voltage of	*300*	*300*	*volts*
Grid-No.4 Voltage for Ultor Current of 100 μamp	-55 to +300	-65 to +350	volts
Grid-No.1 Voltage†	-33 to -77	-33 to -77	volts
Ion-Trap Magnet (Rated Strength). . . .	45	50	gausses

Maximum Circuit Values:

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

• In the 17HP4, grid No.5 which has the ultor function, grid No.3, and collector are connected together within the tube and are conveniently referred to collectively as "ultor". The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

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

† For visual extinction of undeflected focused spot.

▲ This value has been specified to take care of the condition where an ac voltage is provided for dynamic focusing.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

17HP4
KINESCOPE

OPERATING NOTES

X-Ray Warning. When operated at ultor voltages up to 16 kilovolts, the 17HP4 does not produce any harmful x-ray radiation. However, because the rating of the tube permits operation at voltages as high as 17.6 kilovolts (absolute value), shielding of the 17HP4 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.

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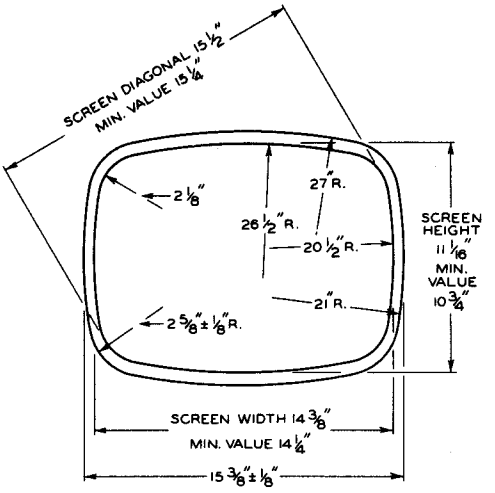
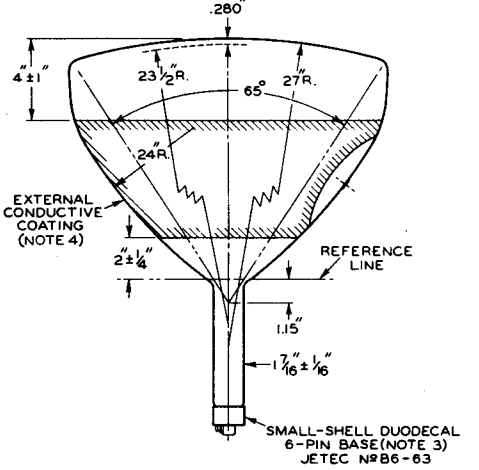
17HP4

17HP4

KINESCOPE

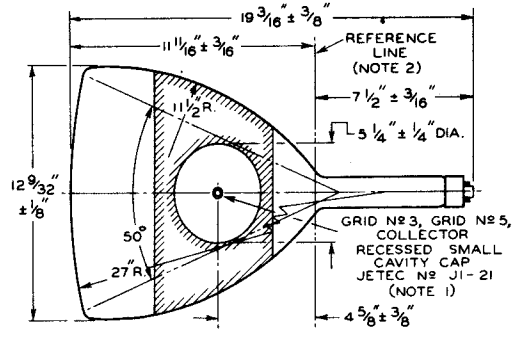


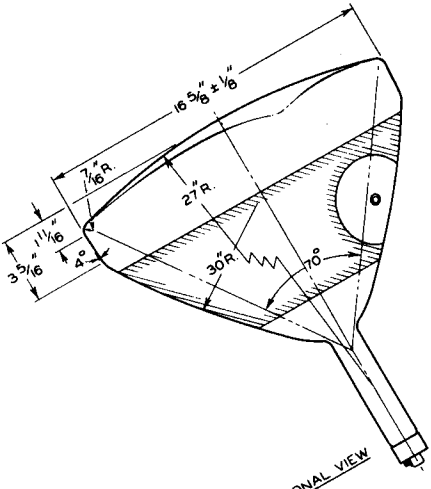


TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

17HP4

KINESCOPE





92CL-7686

17HP4

KINESCOPE

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN No.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 No.6.

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

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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

TUBE DEPARTMENT
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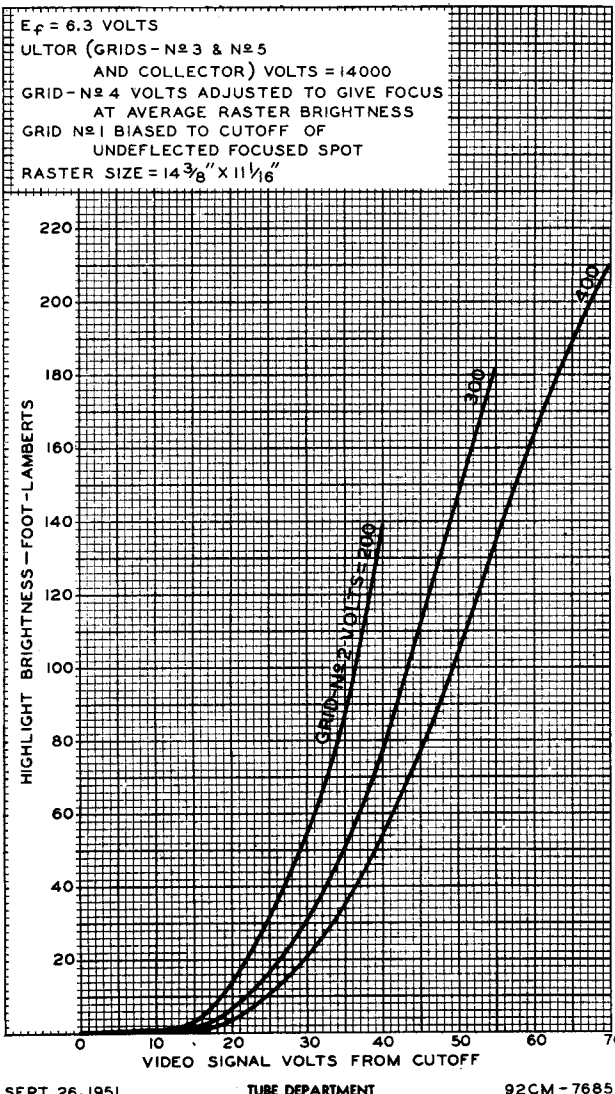
RCA

17HP4

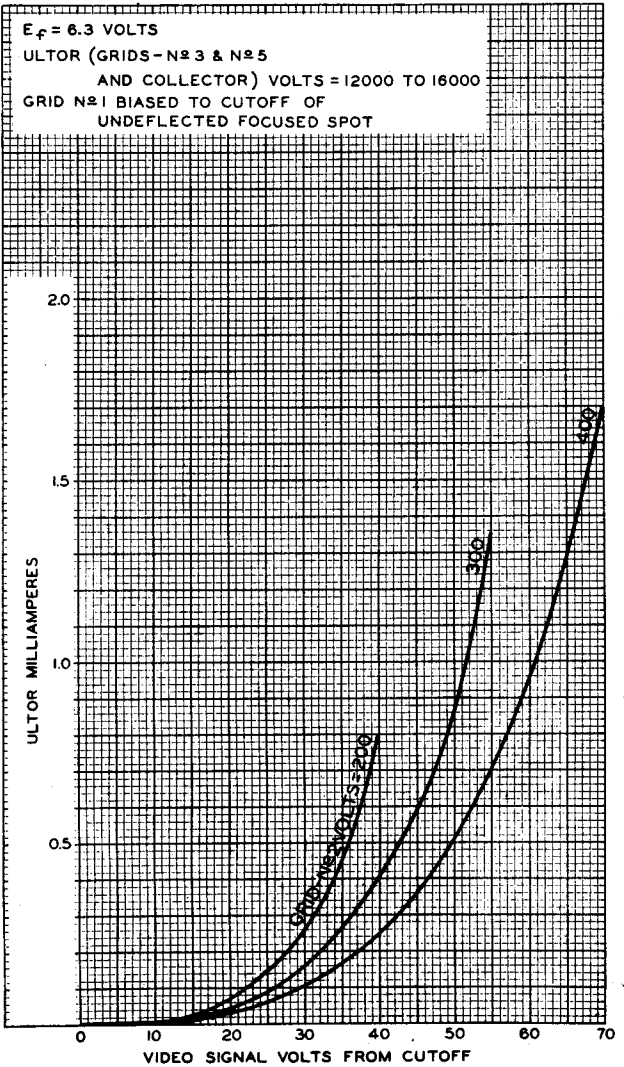
AVERAGE GRID-DRIVE CHARACTERISTICS



RCA

17HP4

AVERAGE GRID-DRIVE CHARACTERISTICS



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

17JP4
KINESCOPE

RECTANGULAR GLASS TYPE

MAGNETIC FOCUS — MAGNETIC DEFLECTION

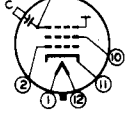
DATA

General:

Heater, for Unipotential Cathode:	
Voltage	6.3 ac or dc volts
Current	0.6 amp
Direct Interelectrode Capacitances:	
Grid No.1 to All Other Electrodes	6 μμf
Cathode to All Other Electrodes	5 μμf
External Conductive Coating to Ultor•	750 max. μμf 500 min. μμf
Faceplate, Spherical	Filterglass
Light Transmission (Approx.)	66%
Phosphor (For Curves, see front of this Section)	P4—Sulfide Type
Fluorescence and Phosphorescence	White
Persistence of Phosphorescence	Short
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angles (Approx.):	
Diagonal	70°
Horizontal	65°
Vertical	50°
Ion-Trap Gun	Requires External, Single-Field Magnet
Tube Dimensions:	
Overall Length	19-3/16" ± 3/8"
Greatest Diagonal	16-5/8" ± 1/8"
Greatest Width	15-3/8" ± 1/8"
Greatest Height	12-9/32" + 1/8" -7/32"
Minimum Screen Dimensions:	
Greatest Width	14-1/4"
Greatest Height	10-3/4"
Diagonal	15-1/4"
Weight (Approx.)	18 lbs
Mounting Position	Any
Cap	Recessed Small Cavity (JETEC No. J1-21)
Base	Small-Shell Duodecal 5-Pin (JETEC No.B5-57)

BOTTOM VIEW

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



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

Maximum Ratings, *Design-Center Values*:

ULTOR• VOLTAGE	18000 max. volts

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

17JP4

KINESCOPE

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

Equipment Design Ranges:

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

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

Examples of Use of Design Ranges:

For ultor voltage of and grid-No.2 voltage of	*14000* *300*	*16000* *300*	*volts* *volts*
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-33 to -77	-33 to -77	volts
Focusing-Coil Current (DC)	104 ± 10%	110 ± 10%	ma
Ion-Trap Magnet (Rated Strength)	45	50	gauss

Maximum Circuit Values:

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

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

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

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

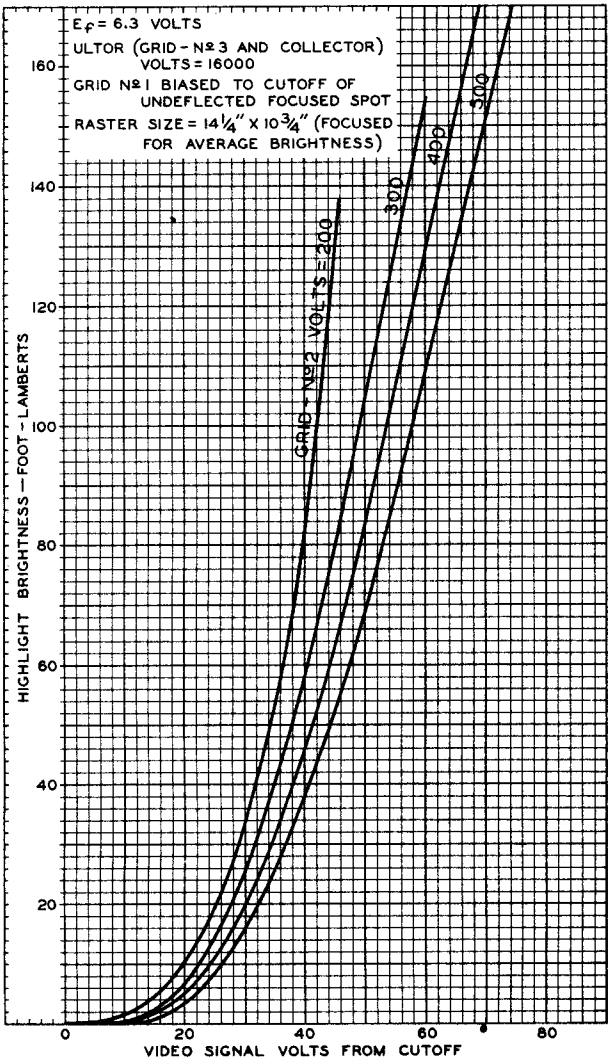
For x-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

17JP4

AVERAGE GRID-DRIVE CHARACTERISTICS

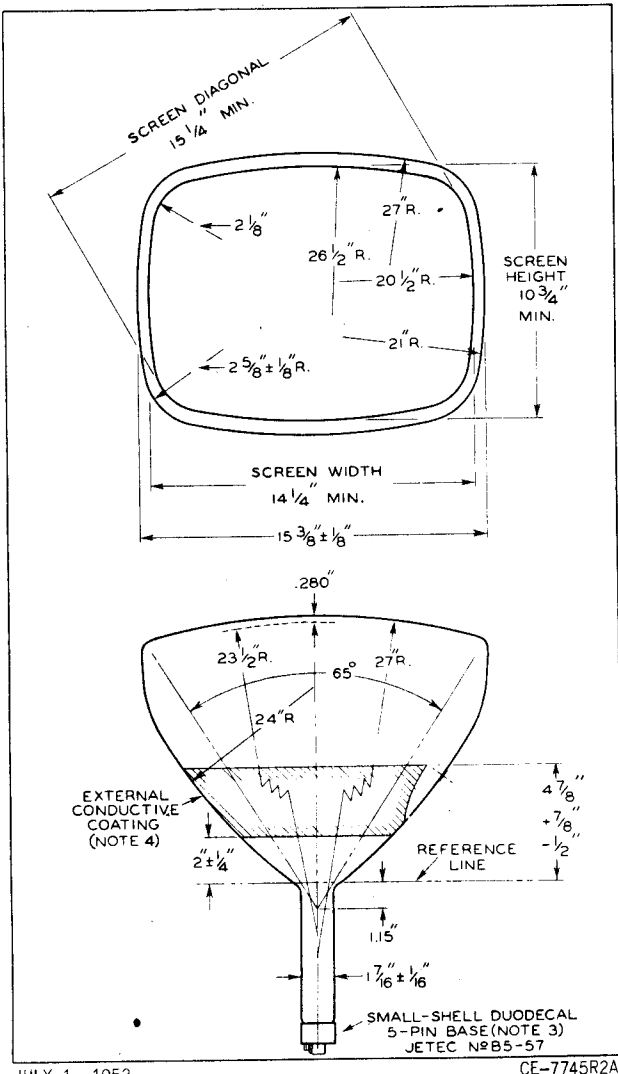


17JP4

RCA

17JP4

KINESCOPE



JULY 1, 1952

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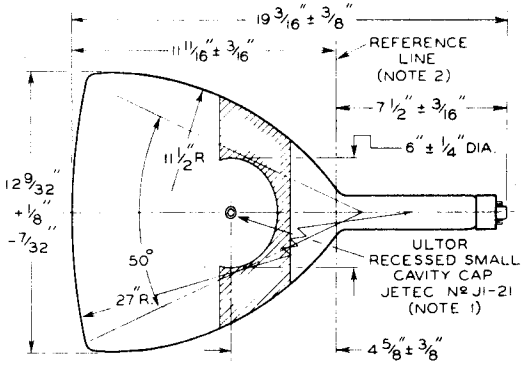
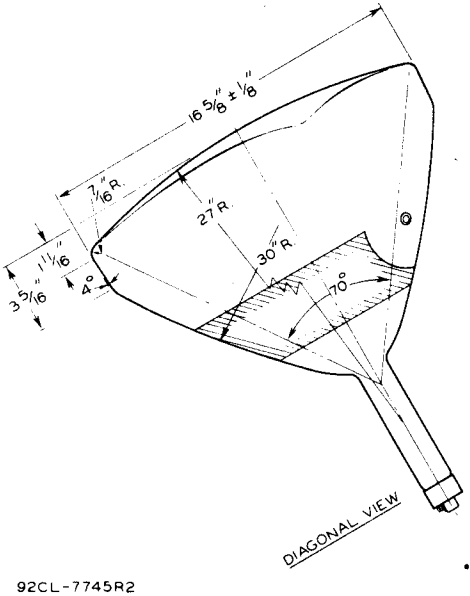
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

17JP4

KINESCOPE





92CL-7745R2

17JP4

KINESCOPE

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

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

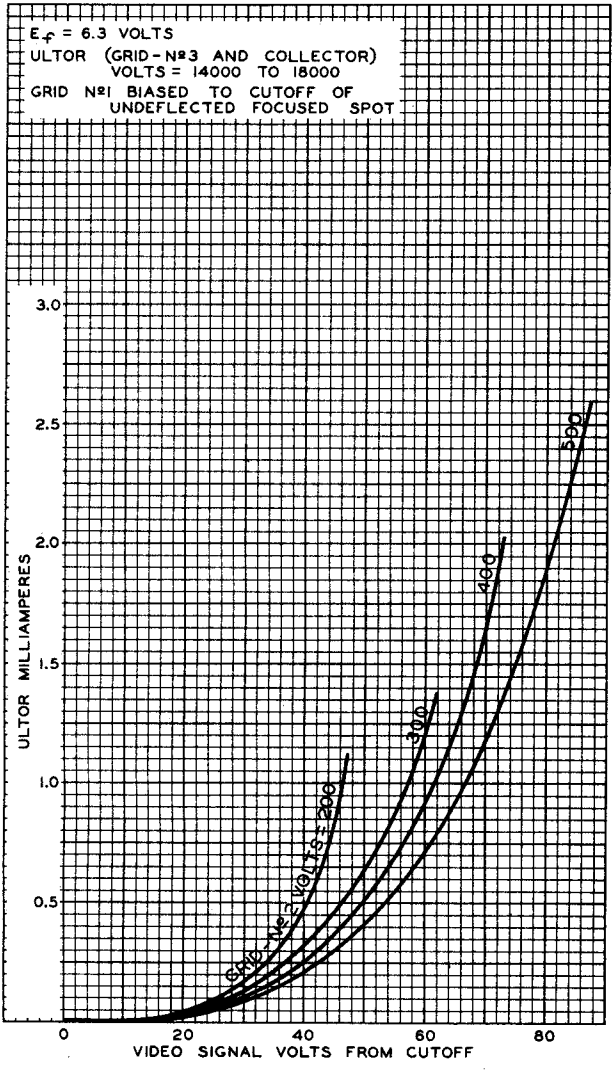
NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

RCA

17JP4

AVERAGE GRID-DRIVE CHARACTERISTICS



17LP4
KINESCOPE

RECTANGULAR GLASS TYPE

LOW-VOLTAGE FOCUS — MAGNETIC DEFLECTION

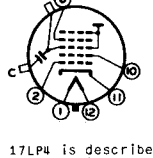
DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Ultor●	1500 max. 750 min.	μμf μμf
Faceplate, Cylindrical with Toric Inner Surface†		Filterglass
Light Transmission (Approx.)		66%
Phosphor (For Curves, see front of this Section)		P4—Sulfide Type
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Short
Focusing Method		Electrostatic
Deflection Method		Magnetic
Deflection Angles (Approx.):		
Diagonal		70°
Horizontal		65°
Vertical		50°
Ion-Trap Gun		Requires External, Single-Field Magnet
Tube Dimensions:		
Overall Length		19-3/16" ± 3/8"
Greatest Diagonal		16-5/8" ± 1/8"
Greatest Width		15-3/8" ± 1/8"
Greatest Height		12-1/4" ± 1/8"
Minimum Screen Dimensions:		
Greatest Width		14-1/4"
Greatest Height		10-3/4"
Diagonal		15-5/16"
Weight (Approx.)		19 lbs
Mounting Position		Any
Cap		Recessed Small Cavity (JETEC No.J1-21)
Base		Small-Shell Duodecal 6-Pin (JETEC No.B6-63)

BOTTOM VIEW

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



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

† The toric surface in the 17LP4 is described by a segment of a circle having a radius of about 60" rotated about a straight line which is (1) parallel to the axis of the outer cylindrical surface, (2) positioned in a plane passing through the axis of the cylindrical surface and the center element thereof, and (3) spaced approximately 24" from the cylindrical surface.

● See next page.

17LP4

17LP4

KINESCOPE

Maximum Ratings, *Design-Center Values*:

ULTOR● VOLTAGE	16000 max.	volts
GRID-No.4 VOLTAGE:		
Positive value	1000 max.	volts
Negative value*.	500 max.	volts
GRID-No.2 VOLTAGE.	500 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value.	125 max.	volts
Positive bias value.	0 max.	volts
Positive peak value.	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds.	410 max.	volts
After equipment warm-up period	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

Equipment Design Ranges:

For any ultor voltage (E_u) between 12000# and 16000 volts and grid-No.2 voltage (E_{c_2}) between 150 and 500 volts

Grid-No.4 Voltage for Focus with Ultor Current of 100 μamp	−0.4% to +2.2% of E_u	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot.	11% to 25.7% of E_{c2}	volts
Grid-No.4 Current.	−25 to +25	μamp
Grid-No.2 Current.	−15 to +15	μamp
Field Strength of Single-Field Ion-Trap Magnet (Approx.).	$\sqrt{\frac{E_u}{12000}} \times 42$	gausses
Field Strength of Adjustable Centering Magnet	0 to 8	gausses

Examples of Use of Design Ranges:

For ultor voltage of	*14000*	*16000*	*volts*
and grid-No.2 voltage of	*300*	*300*	*volts*
Grid-No.4 Voltage for Focus with Ultor Current of 100 μamp	−55 to +300	−65 to +350	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focus Spot.	−33 to −77	−33 to −77	volts
Ion-Trap Magnet (Rated Strength)	45	50	gausses

Maximum Circuit Values:

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

●,*,#: See next page.

17LP4

KINESCOPE

● In the 17LP4, grid No.5 which has the ultor function, grid No.3, and collector are connected together within the tube and are conveniently referred to collectively as "ultor." The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

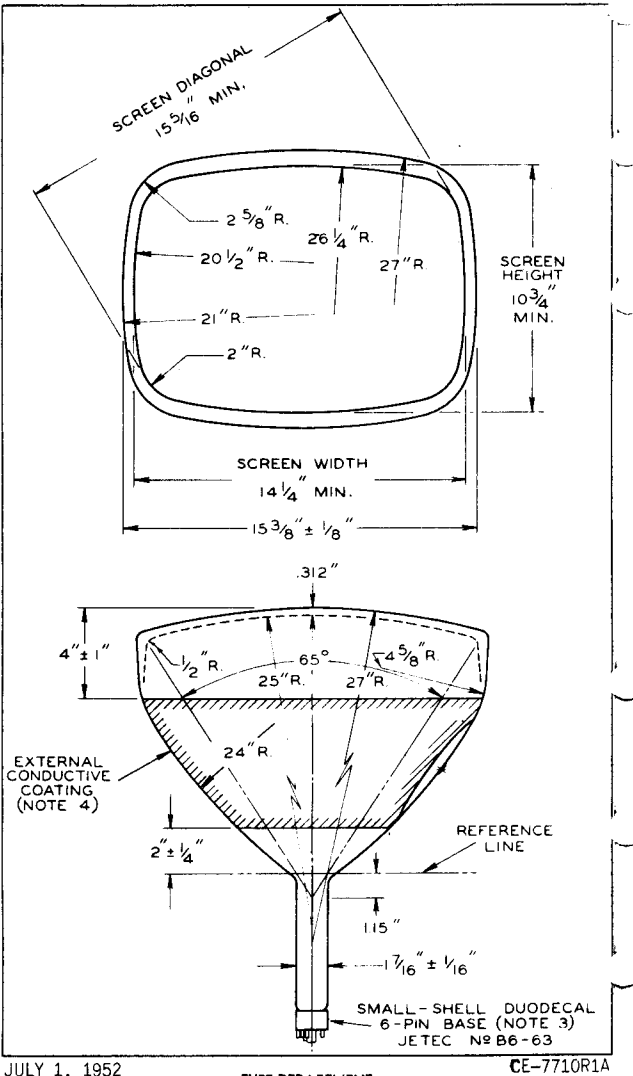
* This value has been specified to take care of the condition where an ac voltage is provided for dynamic focusing.

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

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

17LP4

17LP4
KINESCOPE



JULY 1, 1952

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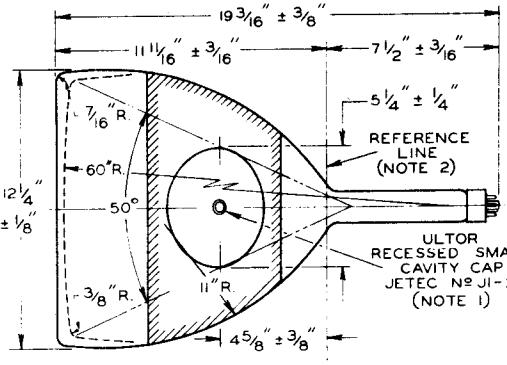
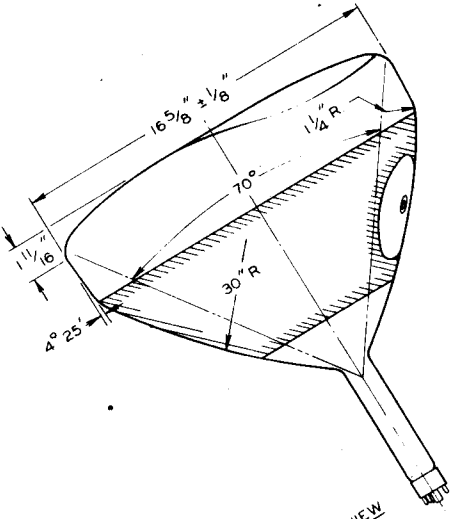
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

17LP4

KINESCOPE





DIAGONAL VIEW

92CL-7710R1

17LP4

KINESCOPE

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN No.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 No.6.

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

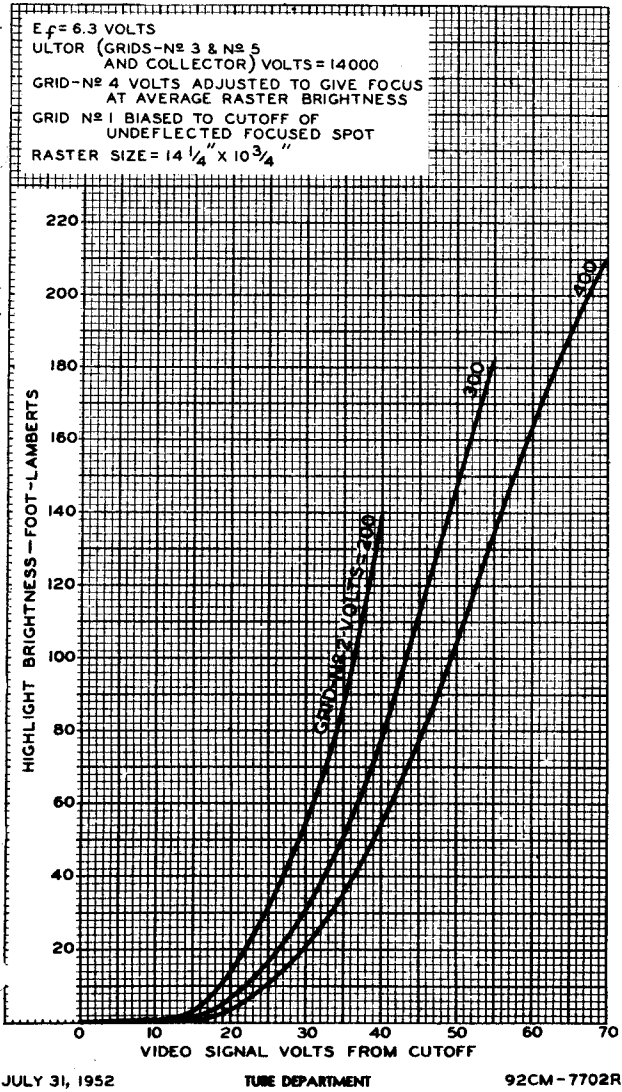
NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

RCA

17LP4

AVERAGE GRID-DRIVE CHARACTERISTICS



JULY 31, 1952

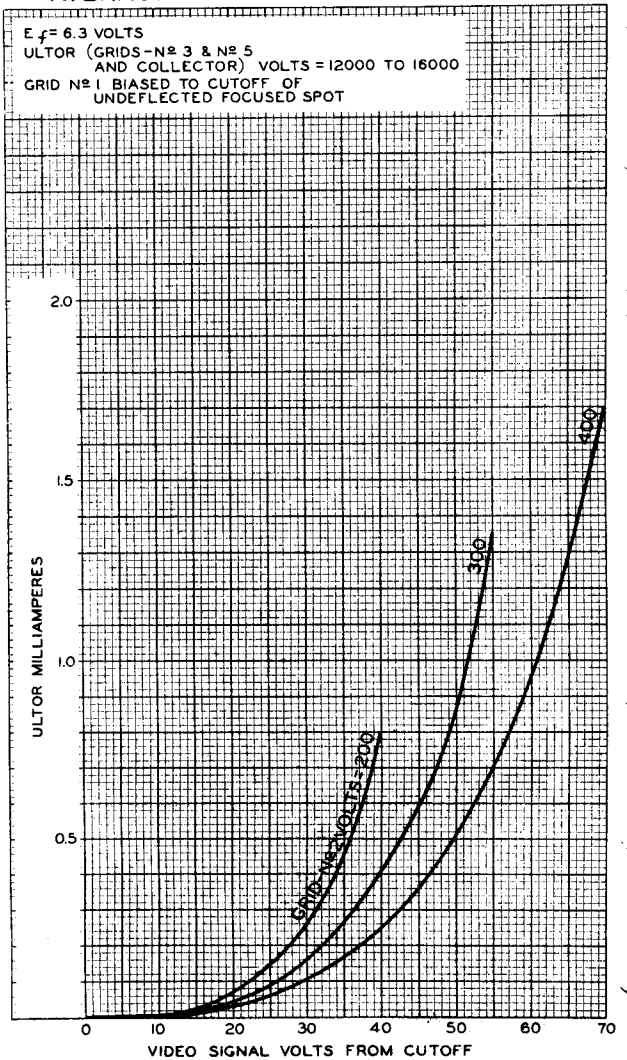
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7702RI

RCA

17LP4

AVERAGE GRID-DRIVE CHARACTERISTICS



RCA

17QP4

KINESCOPE

RECTANGULAR GLASS TYPE

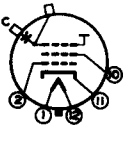
MAGNETIC FOCUS — MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Ultor●	1500 max. 750 min.	μμf μμf
Faceplate, Cylindrical With Toric Inner Surface†	Filterglass	
Light Transmission (Approx.)	66%	
Phosphor (For Curves, see front of this Section)	P4—Sulfide Type	
Fluorescence and Phosphorescence	White	
Persistence of Phosphorescence	Short	
Focusing Method	Magnetic	
Deflection Method	Magnetic	
Deflection Angles (Approx.):		
Diagonal	70°	
Horizontal	65°	
Vertical	50°	
Ion-Trap Gun	Requires External, Single-Field Magnet	
Tube Dimensions:		
Overall Length	19-3/16" ± 3/8"	
Greatest Diagonal	16-5/8" ± 1/8"	
Greatest Width	15-3/8" ± 1/8"	
Greatest Height	12-1/4" ± 1/8"	
Minimum Screen Dimensions:		
Greatest Width	14-1/4"	
Greatest Height	10-3/4"	
Diagonal	15-5/16"	
Weight (Approx.)	19 lbs	
Mounting Position	Any	
Cap	Recessed Small Cavity (JETEC No. J1-21)	
Base	Small-Shell Duodecal 5-Pin (JETEC No.B5-57)	

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



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

† The toric surface in the 17QP4 is described by a segment of a circle having a radius of about 60" rotated about a straight line which is (1) parallel to the axis of the outer cylindrical surface, (2) positioned in a plane passing through the axis of the cylindrical surface and the center element thereof, and (3) spaced approximately 25" from the cylindrical surface.

●: See next page.

RCA

17QP4

KINESCOPE

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

Equipment Design Ranges:

For any ultor voltage (E_u) between 12000# and 16000 volts and grid-No.2 voltage (E_{c_2}) between 150 and 410 volts

Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	11% to 25.7% of E_{c_2}	volts
Grid-No.2 Current	−15 to +15	μamp
Focusing-Coil Current (DC)oo	$\left[\sqrt{\frac{E_u}{12000}} \times 96\right]$ ±6%	ma
Field Strength of Single-Field Ion-Trap Magnet (Approx.)**	$\sqrt{\frac{E_u}{12000}} \times 42$	gausses
Field Strength of Adjustable Centering Magnet	0 to 8	gausses

Examples of Use of Design Ranges:

For ultor voltage of	*12000*	*14000*	*volts*
and grid-No.2 voltage of	*300*	*300*	*volts*
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	−33 to −77	−33 to −77	volts
Focusing-Coil Current (DC)	96 ± 6%	104 ± 6%	ma
Ion-Trap Magnet (Rated Strength)	40	45	gausses

Maximum Circuit Values:

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

• In the 17QP4, grid No.3 which has the ultor function and collector are connected together within the tube and are conveniently referred to collectively as "ultor." The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

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

oo,**: See next page.

17QP4

KINESCOPE

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

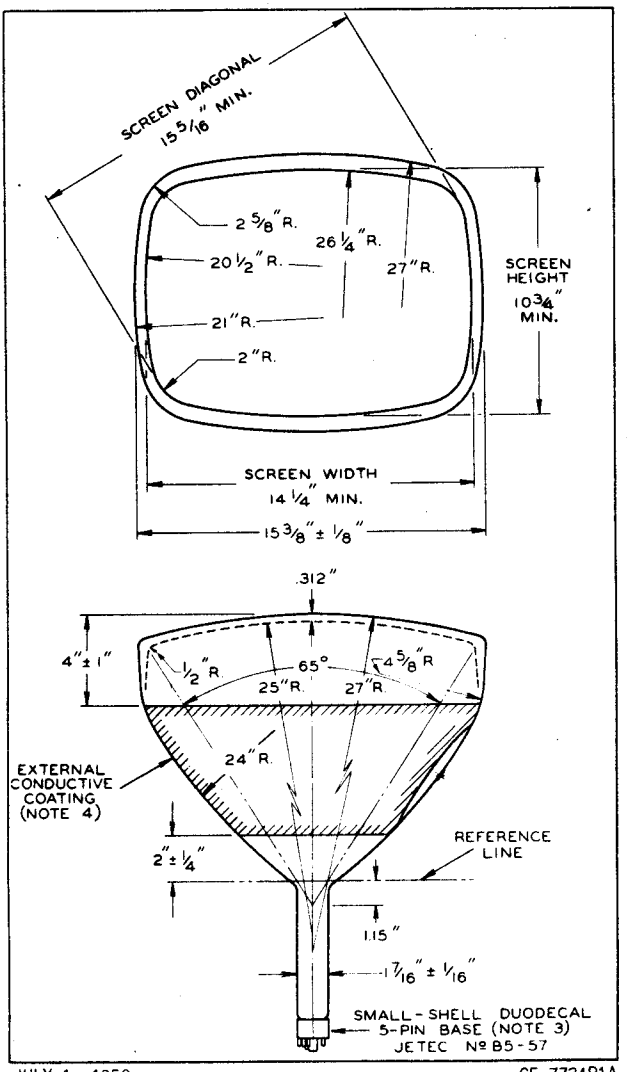
** With a specimen ion-trap magnet similar to JETEC Ion-Trap Magnet No.111 located in optimum position and rotated to give maximum brightness, the ion-trap magnet current is 70 milliamperes dc when the ultor voltage is 12000 volts and grid-No.2 voltage of 300 volts.

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

17QP4

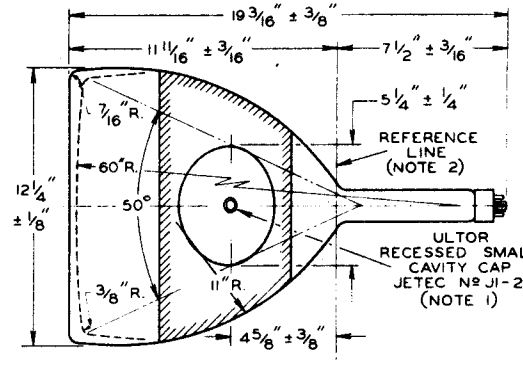
17QP4

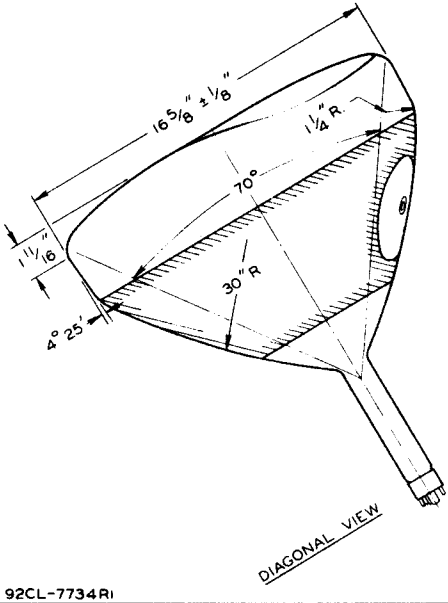
KINESCOPE



17QP4

KINESCOPE





92CL-7734R1

17QP4

KINESCOPE

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND BULB TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 30°. BULB TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.6.

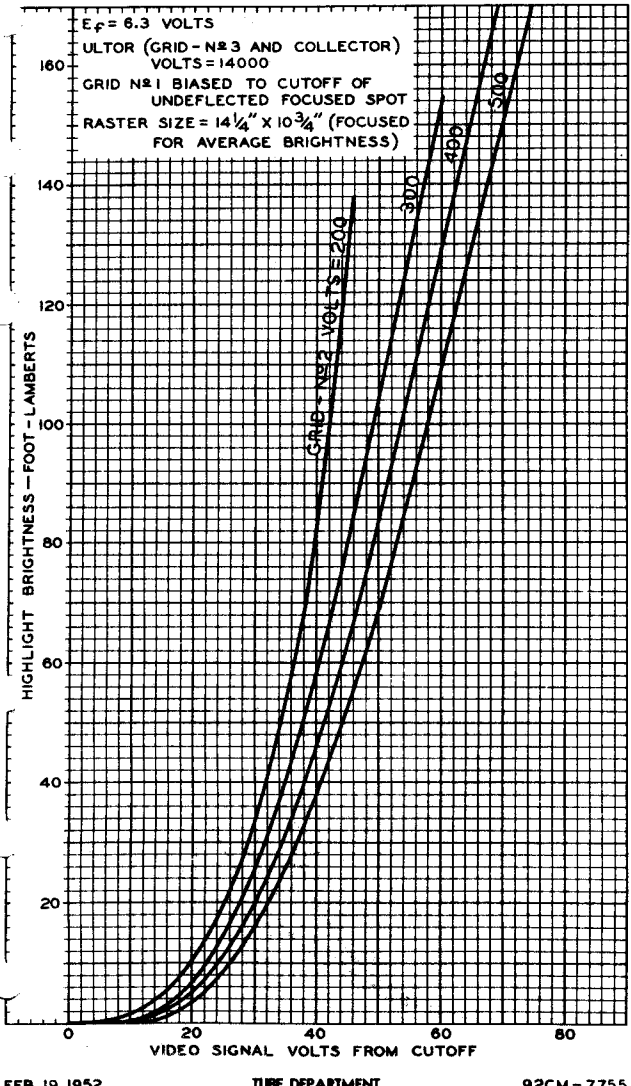
NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No.110 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

17QP4

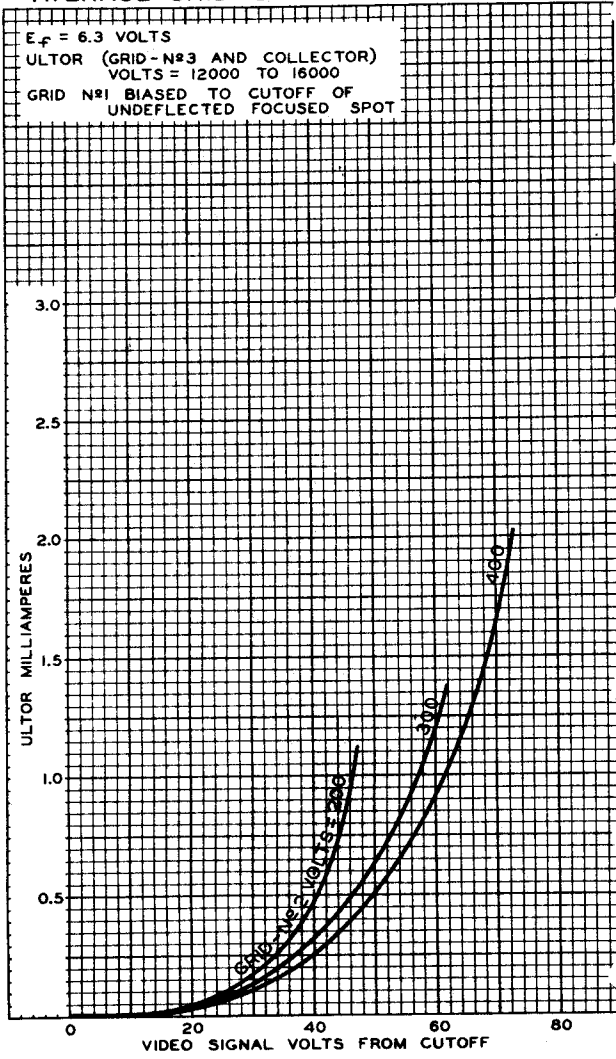
AVERAGE GRID-DRIVE CHARACTERISTICS



RCA

17QP4

AVERAGE GRID-DRIVE CHARACTERISTICS



17TP4

KINESCOPE

RECTANGULAR METAL-SHELL TYPE

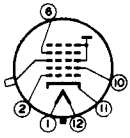
LOW-VOLTAGE FOCUS — MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:	
Voltage	6.3 ac or dc volts
Current	0.6 amp
Direct Interelectrode Capacitances:	
Grid No.1 to All Other Electrodes	6 μμf
Cathode to All Other Electrodes	5 μμf
Face Plate (With about 66% light transmission)	Frosted Filterglass
Phosphor (For Curves, see front of this Section)	No.4- Sulfide Type
Fluorescence and Phosphorescence	White
Persistence of Phosphorescence	Short
Focusing Method	Electrostatic
Deflection Method	Magnetic
Deflection Angles (Approx.):	
Diagonal	70°
Horizontal	66°
Vertical	50°
Ion-Trap Gun	Requires External, Single-Field Magnet
Maximum Overall Length	19-5/16"
Greatest Diagonal of Tube at Lip	16-13/16" ± 3/16"
Greatest Width of Tube at Lip	15-15/16" ± 1/8"
Greatest Height of Tube at Lip	12-1/4" ± 1/8"
Screen Size	14-5/8" x 11"
Mounting Position	Any
Ultor● Terminal	Metal-Shell Lip
Base	Small-Shell Duodecal 6-Pin (JETEC No.B6-63)

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
Metal-Shell Lip - Grid No.3, Grid No.5, Collector

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

ULTOR● VOLTAGE	16000 max.	volts
GRID-No.4 VOLTAGE	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
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds	410 max.	volts
After equipment warm-up period	180 max.	volts
Heater positive with respect to cathode	180 max.	volts

●: See next page

17TP4

17TP4
KINESCOPE

Equipment Design Ranges:

For any ultor voltage (E_u) between 12000 and 16000 volts and grid-No.2 voltage (E_{c2}) between 150 and 500 volts*

Grid-No.4 Voltage for Focus With Ultor Current of 100 μamp	0% to 2.5% of E_u	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	11% to 25.7% of E_{c2}	volts
Grid-No.4 Current	-25 to +25	μamp
Grid-No.2 Current	-15 to +15	μamp
Field Strength of Single-Field Ion-Trap Magnet (Approx.)**	$\sqrt{\frac{E_u}{12000}} \times 33$	gausses
Field Strength of Adjustable Centering Magnet	0 to 8	gausses

Examples of Use of Design Ranges:

For ultor voltage of. . .	*14000*	*16000*	*volts*
and grid-No.2 voltage of.	*300*	*300*	*volts*
Grid-No.4 Voltage for Focus With Ultor Current of 100 μamp	0 to 350	0 to 400	volts
Grid-No.1 Voltage†	-33 to -77	-33 to -77	volts
Ion-Trap Magnet (Rated Strength)	35	40	gausses

Maximum Circuit Values:

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

• In the 17TP4, grid No.5 which has the ultor function, grid No.3, and collector are connected together within the tube and are conveniently referred to collectively as "ultor". The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

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

** With a specimen ion-trap magnet similar to JETEC Ion-Trap Magnet No. 111 located in optimum position and rotated to give maximum brightness, the ion-trap magnet current is 65 milliamperes dc when the ultor voltage is 14000 volts.

† For visual extinction of undeflected focused spot.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

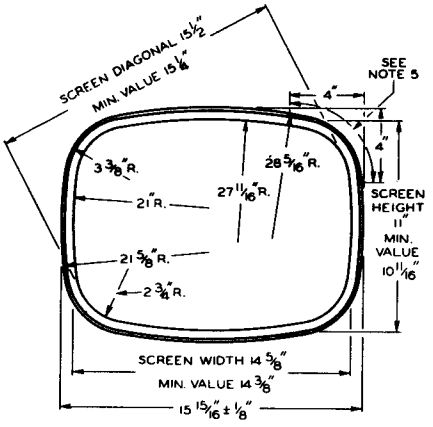
17TP4
KINESCOPE

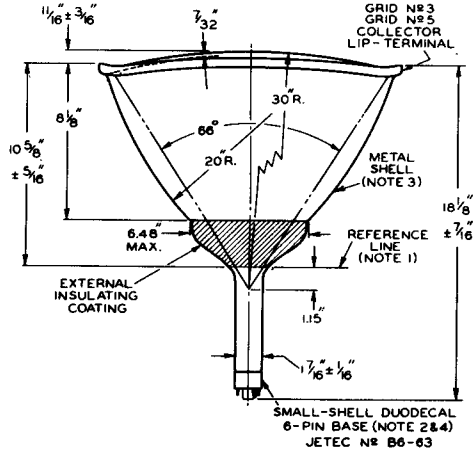
OPERATING NOTES

X-Ray Warning. When operated at ultor voltages up to 16 kilovolts, the 17TP4 does not produce any harmful x-ray radiation, However, because the rating of the tube permits operation at voltages as high as 17.6 kilovolts (absolute value), shielding of the 17TP4 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.

Direction of the field of the ion trap magnet should be such that the north pole is adjacent to vacant pin position No. 8 and the south pole to pin No. 2.

17TP4
KINESCOPE





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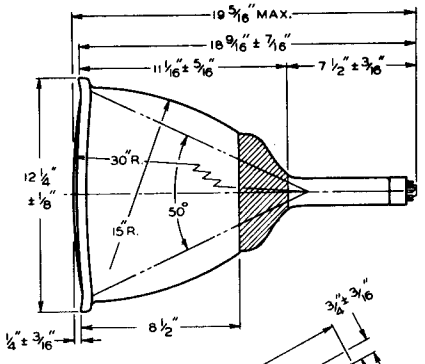
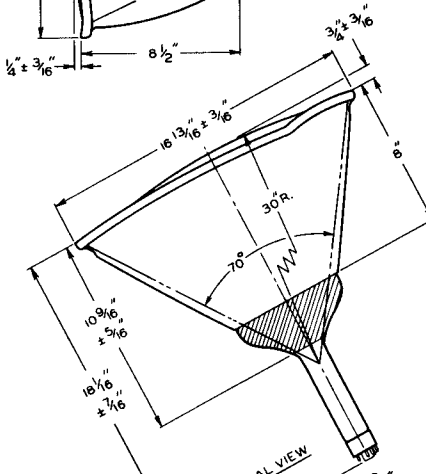
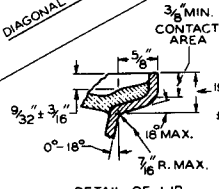
17TP4
KINESCOPE







DETAIL OF LIP

92CL-7601R1

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

17TP4
KINESCOPE

NOTE 1: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No. 110 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 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 2-3/4".

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

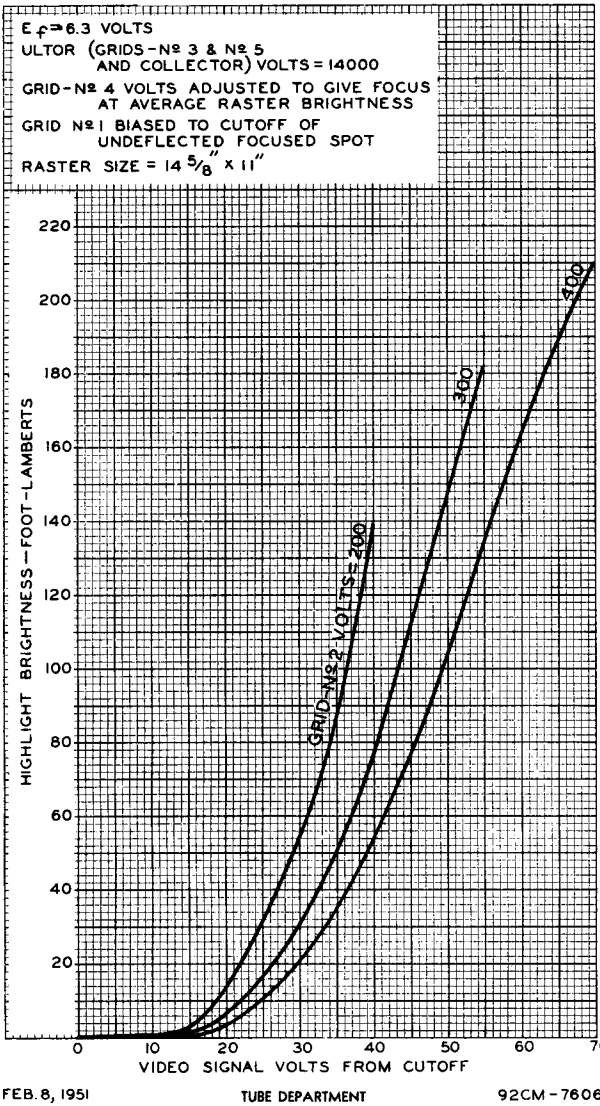
NOTE 4: THE PLANE THROUGH THE TUBE AXIS AND PIN No.6 MAY VARY FROM THE HORIZONTAL AXIS OF THE GLASS FACE BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 10^{\circ}$.

NOTE 5: SUPPORT TUBE BY LIP ONLY AT CORNERS WITHIN THIS SPACE.

RCA

17TP4

AVERAGE GRID-DRIVE CHARACTERISTICS



FEB. 8, 1951

TUBE DEPARTMENT

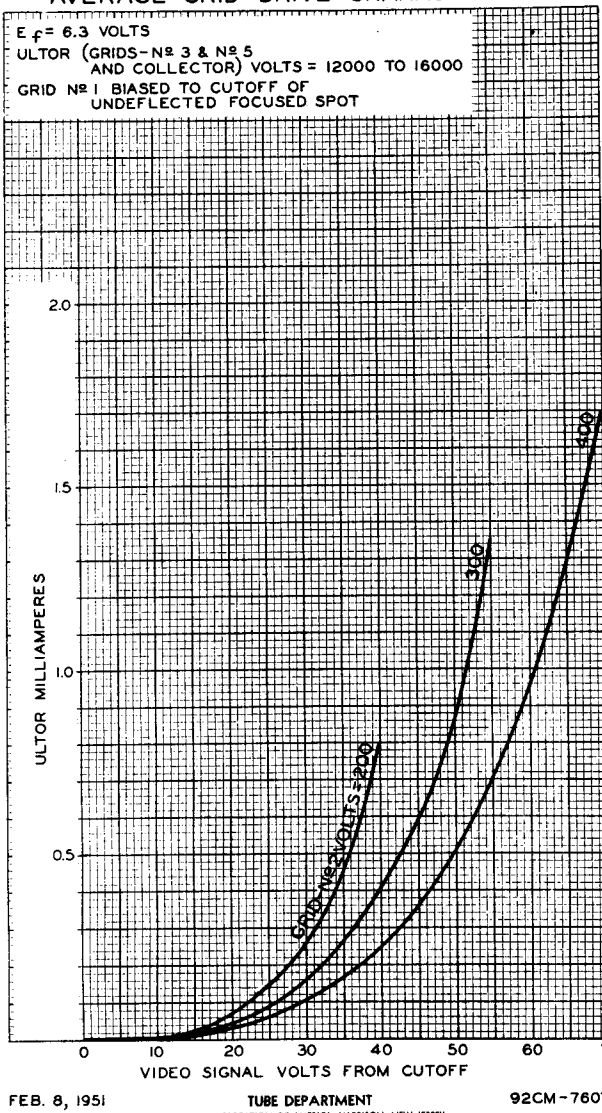
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7606

RCA

17TP4

AVERAGE GRID-DRIVE CHARACTERISTICS



19AP4
19AP4-A

19AP4

KINESCOPE

The 19AP4 is like the 19AP4-B except that it has a face plate made of ***unfrosted, clear glass.*** As a result, the light output is about 30% greater than shown by the curves under Type 19AP4-B.

19AP4-A

KINESCOPE

The 19AP4-A is like the 19AP4-B except that it has an ***unfrosted Filterglass*** face plate. The light output is essentially the same as that of the Type 19AP4-B.

As soon as feasible, the 19AP4-B will supersede the 19AP4 and 19AP4-A.

19AP4-B
KINESCOPE

METAL-CONE ENVELOPE

MAGNETIC FOCUS MAGNETIC DEFLECTION

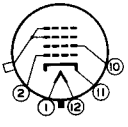
Supersedes Type 19AP4-A

DATA

General:

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	7	μμf
Cathode to All Other Electrodes	5	μμf
Face Plate▲	Frosted RCA "Filterglass"	
Phosphor (For Curves, see front of this Section)	No.4-Sulfide Type	
Fluorescence and Phosphorescence	White	
Persistence of Phosphorescence	Medium	
Focusing Method	Magnetic	
Deflection Method	Magnetic	
Deflection Angle (Approx.)	66°	
Ion-Trap Gun	Requires External Single-Field Magnet	
Overall Length	21-1/2" ± 1/2"	
Greatest Diameter of Envelope	18-5/8" ± 1/8"	
Screen Diameter	17-3/8"	
Mounting Position	Any	
Anode Terminal	Metal-Cone Lip	
Base	Small-Shell Duodecal 5-Pin	
Basing Designation for BOTTOM VIEW	$12D_1$	

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



Pin 12 - Heater
Metal-Cone Lip:
Anode,
Grid No.3

Maximum Ratings, *Design-Center Values*:

ANODE□ VOLTAGE●.	19000 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

□ Anode and grid No.3, which are connected together within tube, are referred to herein as anode.

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

▲ Has transmission of about 65%.

19AP4-B
KINESCOPE

Typical Operation:

Anode Voltage*	12000	14000	volts
Grid-No.2 Voltage	300	300	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-33 to -77	-33 to -77	volts
Focusing-Coil Current (DC, Approx.)■	140	150	ma
Ion-Trap Magnet Current (DC, Approx.)#	75	80	ma
Field Strength of Single-Field, Ion-Trap Magnet (Approx.)†	45	50	gausses

Maximum Circuit Values:

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

Minimum Circuit Values:

The power supply should be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 5 ma. If the supply permits the instantaneous short-circuit current to exceed 1 ampere, or is capable of storing more than 250 microcoulombs, 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	470 min.	ohms
Anode-Circuit Resistance	22000 min.	ohms

The resistors used should be capable of withstanding the applied voltage.

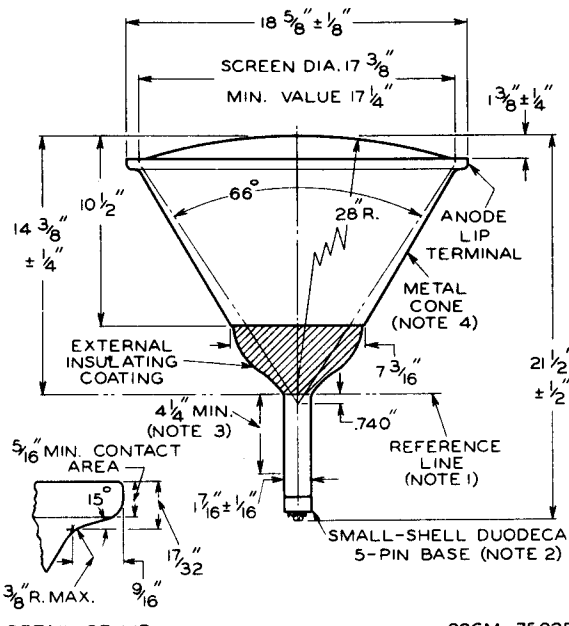
* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 12000 volts.

■ For JETEC Focusing Coil No.106, or equivalent, positioned with air gap toward kinescope screen, and center line of air gap about 3 inches from Reference Line (see Outline Drawing). The indicated currents are for the condition with the combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 18 foot-lamberts for 12000 volts, or 22 foot-lamberts for 14000 volts, on a 15-5/8" x 11-3/4" picture area.

\# For JETEC Ion-Trap Magnet No.111, or equivalent, located in optimum position and rotated to give maximum brightness.

† Measured at center of field with General Electric Gauss Meter, Cat. No.409X51.

19AP4-B
KINESCOPE



DETAIL OF LIP

92CM-7502R1

NOTE 1: REFERENCE LINE IS DETERMINED BY POSITION WHERE HINGED GAUGE 1.500" + .003" – .000" I.D. AND 2" LONG WILL REST ON CONE.

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 CIRCLE CONCENTRIC WITH CONE AXIS AND HAVING DIAMETER OF 3".

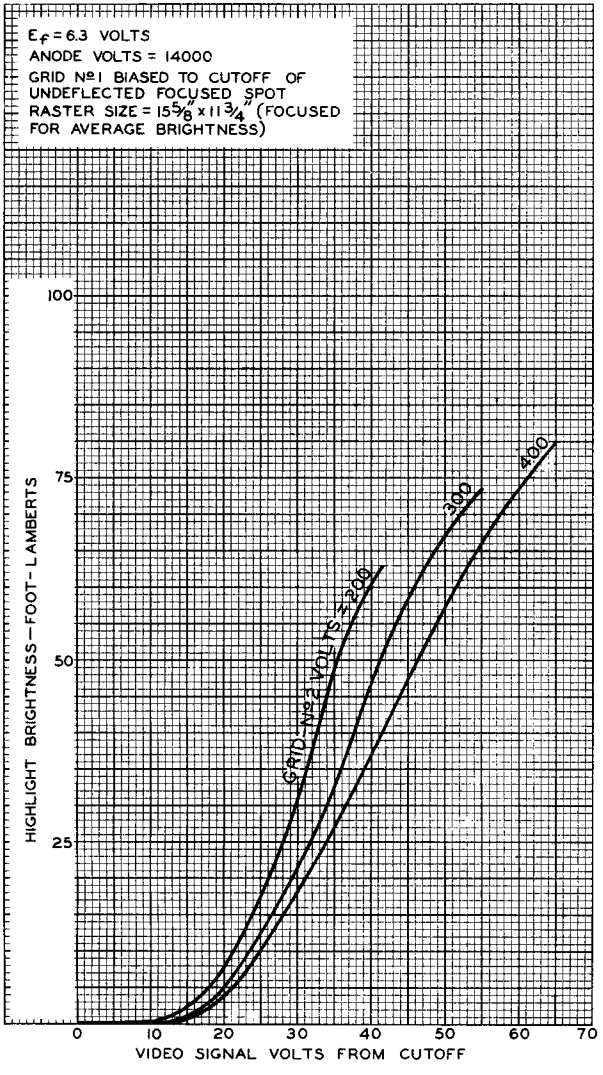
NOTE 3: LOCATION OF DEFLECTING YOKE AND FOCUSING COIL MUST BE WITHIN THIS SPACE.

NOTE 4: METAL CONE AND GLASS FACE OPERATE AT HIGH VOLTAGE. ANY MATERIAL IN CONTACT WITH THE CONE OR THE FACE MUST HAVE INSULATING PROPERTIES ADEQUATE TO WITHSTAND THE APPLIED ANODE VOLTAGE PLUS 10%.

RCA

19AP4-B

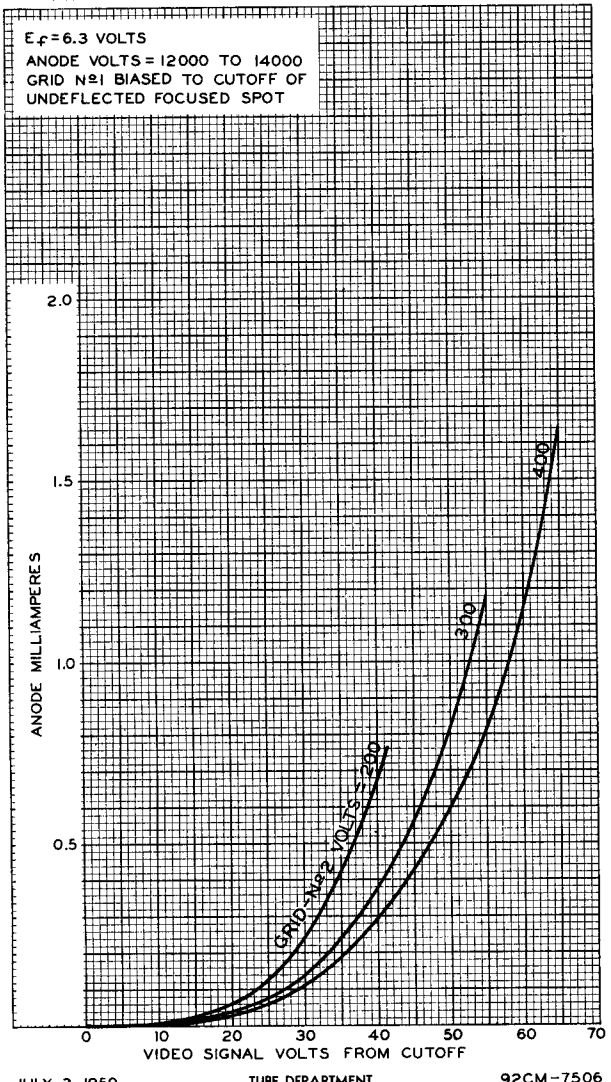
AVERAGE GRID-DRIVE CHARACTERISTICS



RCA

19AP4-B

AVERAGE GRID-DRIVE CHARACTERISTICS



19AP4-D

KINESCOPE

The 19AP4-D is like the 19AP4-B except that it has a face plate made of *frosted, clear glass.* As a result, the light output is about 30% greater than shown by the curves under Type 19AP4-B.

As soon as feasible, the 19AP4-B will supersede the 19AP4-D.

20CP4
KINESCOPE

RECTANGULAR GLASS TYPE

MAGNETIC FOCUS MAGNETIC DEFLECTION

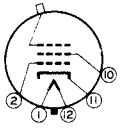
DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
Face Plate (With about 66% light transmission)		Filterglass
Phosphor (For Curves, see front of this Section)		No.4–Sulfide Type
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Short
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angles (Approx.):		
Diagonal		70°
Horizontal		66°
Vertical		50°
Ion-Trap Gun	Requires External, Single-Field Magnet	
Overall Length		21-7/16" ± 3/8"
Greatest Diagonal of Tube at Face		20-3/32" ± 3/16"
Greatest Width of Tube at Face		18-11/16" ± 3/16"
Greatest Height of Tube at Face		14-15/16" ± 3/16"
Screen Size		17-1/4" x 13-1/4"
Mounting Position		Any
Cap	Recessed Small Cavity (JETEC No.J1-21)	
Base	Small-Shell Duodecal 5-Pin (JETEC No.B5-57)	

BOTTOM VIEW

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 10 – Grid No.2



Pin 11 – Cathode
Pin 12 – Heater
Cap – Anode

Maximum Ratings, *Design-Center Values*:

ANODE VOLTAGE	18000 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

RCA

20CP4

KINESCOPE

Typical Operation:

Anode Voltage*	14000	16000	volts
Grid-No.2 Voltage	300	300	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-33 to -77	-33 to -77	volts
Focusing-Coil Current (DC)□	104 ± 10%	110 ± 10%	ma
Field Strength of Single-Field, Ion-Trap Magnet (Approx.)†	50	55	gausses

Maximum Circuit Values:

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

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 14000 volts.

□ For specimen focusing coil similiar to JETEC Focusing Coil No.109, positioned with air gap toward kinescope screen, and center line of air gap about 3 inches from Reference Line (see Outline Drawing). The indicated currents are for the condition with the combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 30 foot-lamberts on a 17" x 12-3/4" picture area sharply focused at center of screen.

† Measured at center of field with General Electric Gauss Meter, Cat. No.409X51.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

20CP4
KINESCOPE

OPERATING NOTES

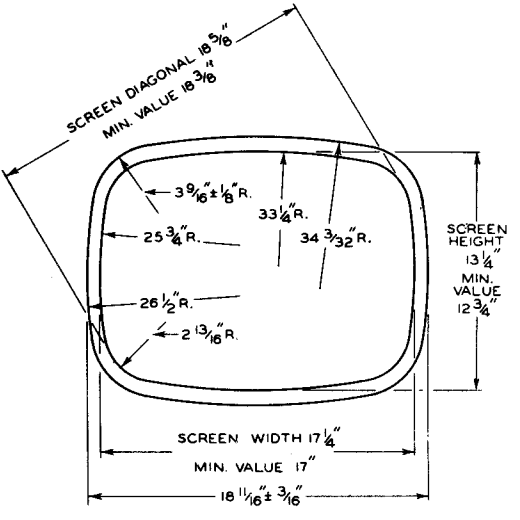
X-Ray Warning. When operated at or below 16000 volts, the 20CP4 does not produce any harmful x-ray radiation. In general, picture tubes may be operated at voltages (if ratings permit) up to 16000 volts without personal injury on prolonged exposure at close range. Above 16000 volts, special shielding precautions for x-ray radiation may be necessary.

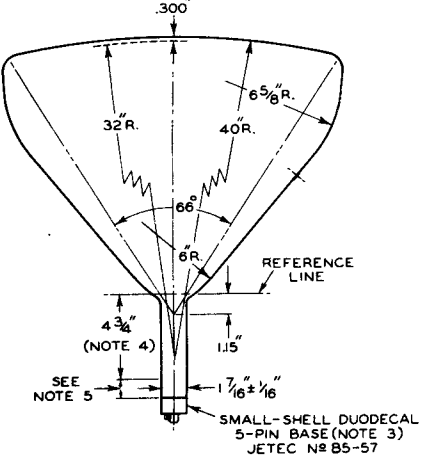
Direction of the field of the ion-trap magnet should be such that the north pole is adjacent to vacant pin position No.8 and the south pole to pin No.2.

RCA

20CP4

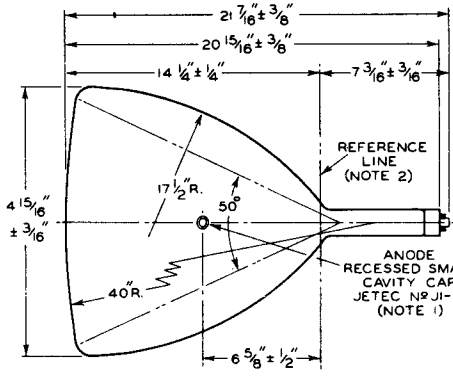
KINESCOPE

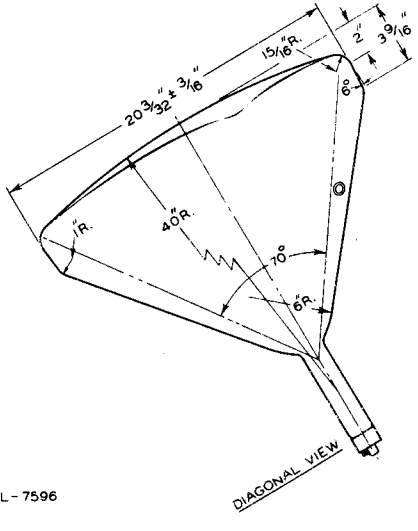




20CP4

KINESCOPE





92CL-7596

20CP4

KINESCOPE

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 30°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.6.

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

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

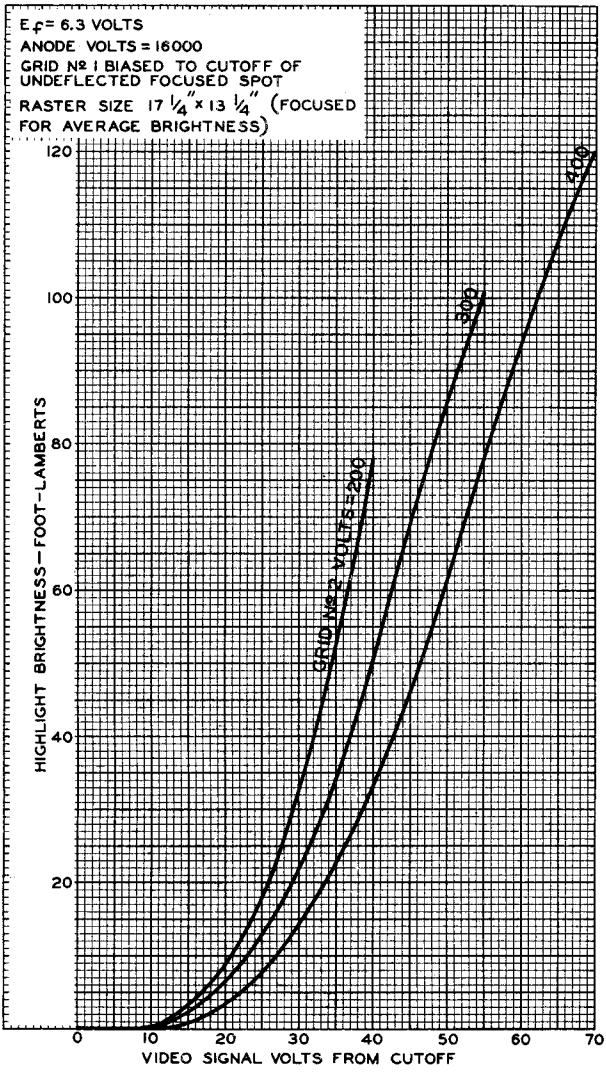
NOTE 4: LOCATION OF DEFLECTING YOKE AND FOCUSING DEVICE MUST BE WITHIN THIS SPACE.

NOTE 5: KEEP THIS SPACE CLEAR FOR SINGLE-FIELD, ION-TRAP MAGNET.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

20CP4

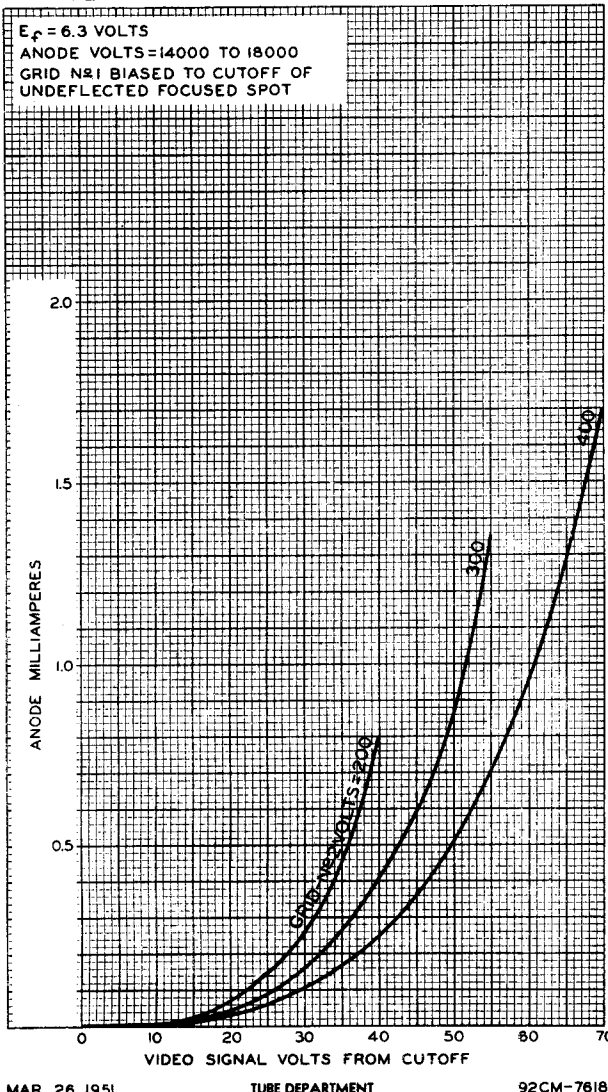
AVERAGE GRID-DRIVE CHARACTERISTICS



RCA

20CP4

AVERAGE GRID-DRIVE CHARACTERISTICS



20MP4
KINESCOPE

RECTANGULAR GLASS TYPE

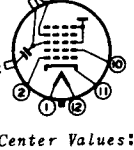
LOW-VOLTAGE FOCUS — MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:	
Voltage	6.3 ac or dc volts
Current	0.6 amp
Direct Interelectrode Capacitances:	
Grid No.1 to All Other Electrodes	6 μμf
Cathode to All Other Electrodes	5 μμf
External Conductive Coating to Ultor●	750 max. μμf 500 min. μμf
Faceplate, Spherical	Filterglass
Light Transmission (Approx.)	66%
Phosphor (For Curves, see front of this Section)	P4—Sulfide Type
Fluorescence	White
Phosphorescence	White
Persistence	Short
Focusing Method	Electrostatic
Deflection Method	Magnetic
Deflection Angles (Approx.):	
Diagonal	70°
Horizontal	66°
Vertical	50°
Ion-Trap Gun	Requires External, Single-Field Magnet
Tube Dimensions:	
Overall Length	21-3/4" ± 3/8"
Greatest Diagonal	20-3/32" ± 3/16"
Greatest Width	18-11/16" ± 3/16"
Greatest Height	14-15/16" ± 3/16"
Screen Dimensions:	
Greatest Width	17-1/4"
Greatest Height	13-1/4"
Diagonal	18-5/8"
Weight (Approx.)	27 lbs
Mounting Position	Any
Cap	Recessed Small Cavity (JETEC No.J1-21)
Base	Small-Shell Duodecal 6-Pin (JETEC No.B6-63)

BOTTOM VIEW



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

Cap – Grid No.3, Grid No.5, Collector
C – External Conductive Coating

Maximum Ratings, *Design-Center Values*:

ULTOR● VOLTAGE	16000 max. volts

● In the 20MP4, grid No.5 which has the ultor function, grid No.3, and collector are connected together within the tube and are conveniently referred to collectively as "ultor." The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

20MP4

20MP4
KINESCOPE

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 bias value	125 max.	volts
Positive bias value	0 max.	volts
Positive peak value	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds	410 max.	volts
After equipment warm-up period	180 max.	volts
Heater positive with respect to cathode	180 max.	volts

Equipment Design Ranges:

For any ultor voltage (E_u) between 14000 and 16000 volts and grid-No.2 voltage (E_{c_2}) between 150 and 500 volts*

Grid-No.4 Voltage for Focus with Ultor Current of 100 μamp	−0.4% to +2.2% of E_u	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	11% to 25.7% of E_{c_2}	volts
Grid-No.4 Current	−25 to +25	μamp
Grid-No.2 Current	−15 to +15	μamp
Field Strength of Single-Field Ion-Trap Magnet (Approx.)	$\sqrt{\frac{E_u}{14000}} \times 45$	gausses
Field Strength of Adjustable Centering Magnet	0 to 8	gausses

Examples of Use of Design Ranges:

For ultor voltage of / *and grid-No.2 voltage of*	*14000* / *300*	*16000* / *300*	*volts* / *volts*
Grid-No.4 Voltage for Focus with Ultor Current of 100 μamp	−55 to +300	−65 to +350	volts
Grid-No.1 Voltage†	−33 to −77	−33 to −77	volts
Ion-Trap Magnet (Rated Strength)	45	50	gausses

Maximum Circuit Values:

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

* Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 14000 volts.

† For visual extinction of undeflected focused spot.

▲ This value has been specified to take care of the condition where an ac voltage is provided for dynamic focusing.

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

TUBE DEPARTMENT
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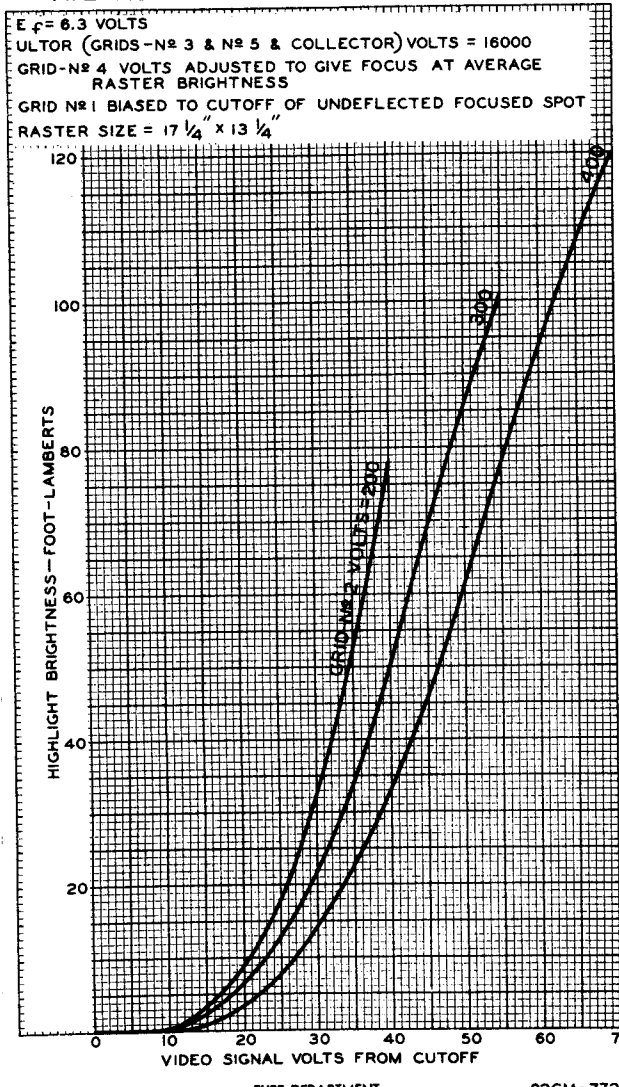
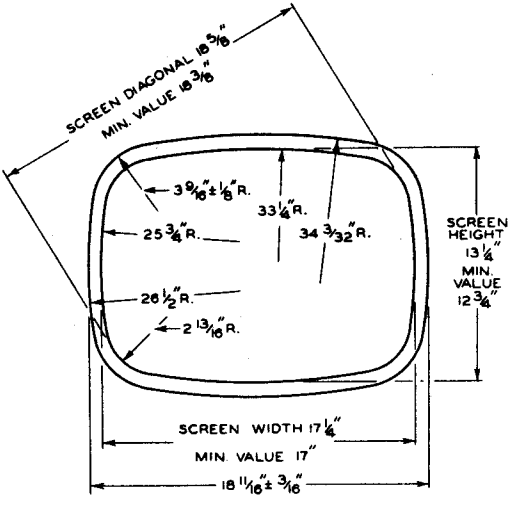
RCA

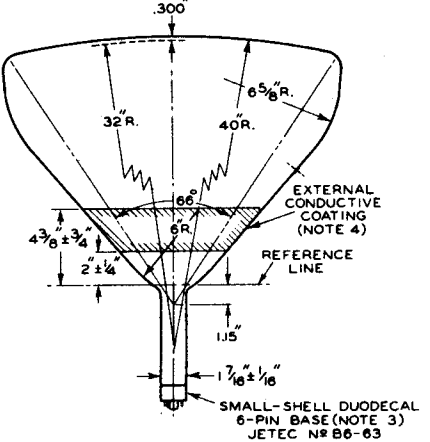
20MP4

AVERAGE GRID-DRIVE CHARACTERISTICS

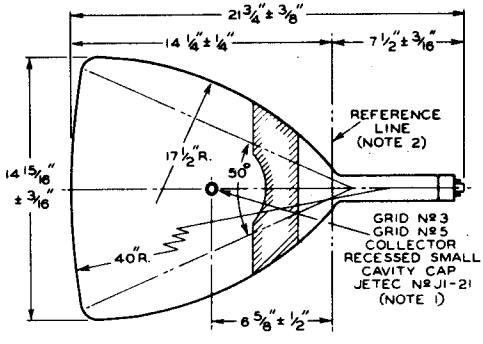


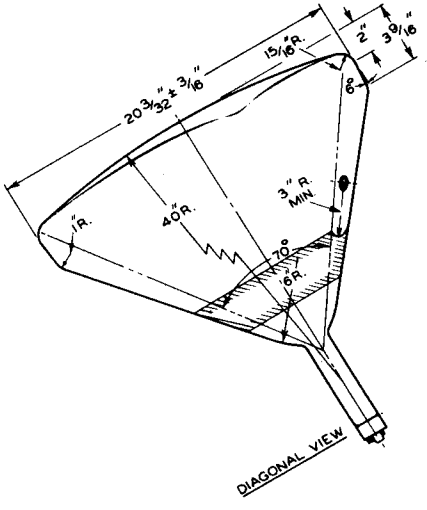
20MP4
KINESCOPE





20MP4
KINESCOPE





92CL-7722

FOR NOTES, SEE NEXT PAGE

20MP4
KINESCOPE

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN NO. 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND CAP BY ANGULAR TOLERENCE (MEASURED ABOUT THE TUBE AXIS) OF ± 30°. CAP IS ON SAME SIDE AS PIN NO. 6.

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

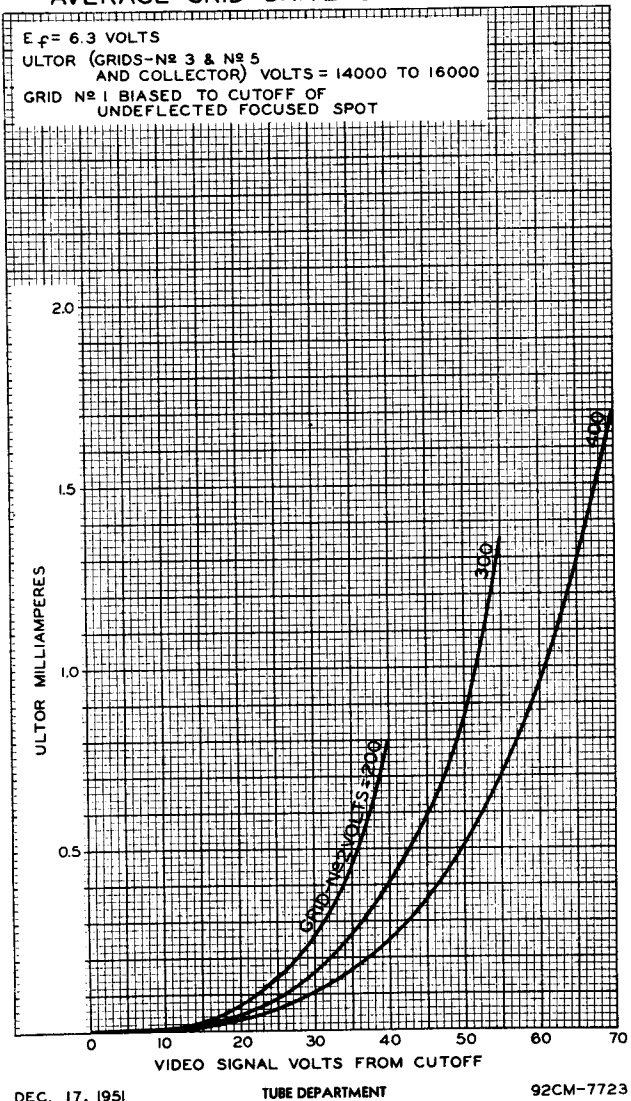
NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 3".

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

RCA

20MP4

AVERAGE GRID-DRIVE CHARACTERISTICS



RCA

21AP4

KINESCOPE

RECTANGULAR METAL-SHELL TYPE

MAGNETIC FOCUS MAGNETIC DEFLECTION

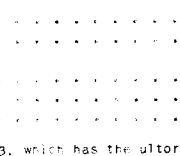
DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
Faceplate (With about 66% light transmission)		Frosted Filterglass
Phosphor (For Curves, see front of this Section)		No.4—Sulfide Type
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Short
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angles (Approx.):		
Diagonal		70°
Horizontal		66°
Vertical		50°
Ion-Trap Gun		Requires External, Single-Field Magnet
Maximum Overall Length		22-5/16"
Greatest Diagonal of Tube at Lip		20-3/4" ± 1/4"
Greatest Width of Tube at Lip		19-23/32" ± 1/8"
Greatest Height of Tube at Lip		15-5/16" ± 1/8"
Screen Size		18-3/8" x 13-15/16"
Mounting Position		Any
Ultor• Terminal		Metal-Shell Lip
Base		Small-Shell Duodecal 5-Pin (JETEC No.B5-57)

BOTTOM VIEW

Pin 1 - Heater
Pin 2 - Grid No.1
Pin 10 - Grid No.2
Pin 11 - Cathode
Pin 12 - Heater
Metal - Shell Lip — Grid No.3, Collector



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

• In the 21AP4, grid No.3, which has the ultor function, and collector are connected together within the tube and are conveniently referred to collectively as "ultor". The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

21AP4

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
Typical Operation:			
Ultor Voltage*	14000	16000	volts
Grid-No.2 Voltage.	300	300	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-33 to -77	-33 to -77	volts
Focusing-Coil Current (DC)oo .	104 ±6%	110 ±6%	ma
Field Strength of Single-Field Ion-Trap Magnet . . .	45	50	gausses
Ion-Trap Magnet Current (DC, approx.)#.	90	-	ma
Field Strength of Adjustable Centering Magnet. . . .	0 to 8	0 to 8	gausses
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance		1.5 max.	megohms

* Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 14000 volts.

oo For specimen focusing coil similar to JETEC Focusing Coil No.109 positioned with air gap toward kinescope screen and center line of air gap 3 inches from Reference Line (see Outline Drawing). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 30 foot-lamberts on a 18-3/8" x 13-15/16" picture area sharply focused at center of screen.

\# For specimen ion-trap magnet similar to JETEC Ion-Trap Magnet No.111 located in optimum position and rotated to give maximum brightness.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

21AP4

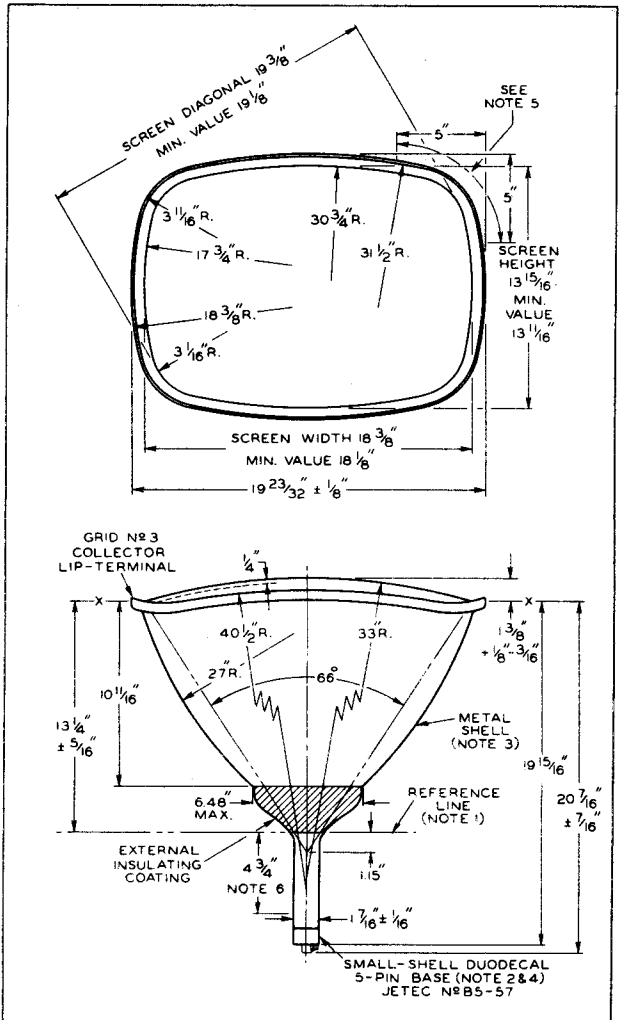
KINESCOPE

OPERATING NOTES

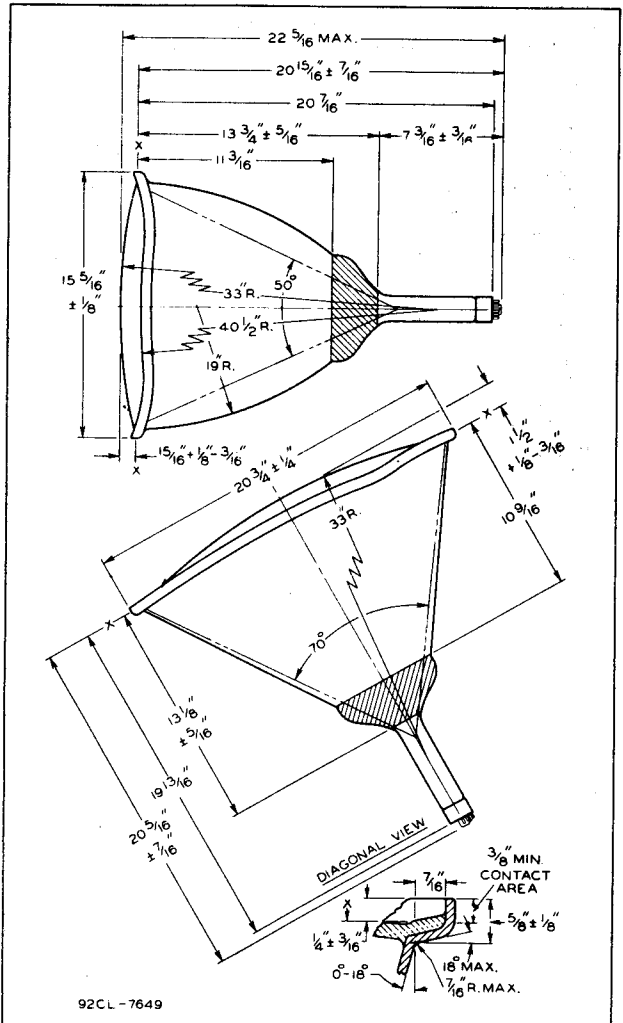
X-Ray Warning. When operated at ultor voltages up to 16 kilovolts, the 21AP4 does not produce any harmful x-ray radiation. However, because the rating of the tube permits operation at voltages as high as 19.8 kilovolts (absolute value), shielding of the 21AP4 for x-ray radiation may be needed to protect against possible injury from prolonged exposure at close range whenever the operating conditions involve voltages in excess of 16 kilovolts.

Direction of the field of the ion-trap magnet should be such that the north pole is adjacent to vacant pin position No.8 and the south pole to pin No.2.

21AP4
KINESCOPE



21AP4
KINESCOPE



21AP4

KINESCOPE

NOTE 1: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No. 110 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 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 3-1/4".

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

NOTE 4: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.6 MAY VARY FROM THE HORIZONTAL AXIS OF THE GLASS FACE BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm$ 10°.

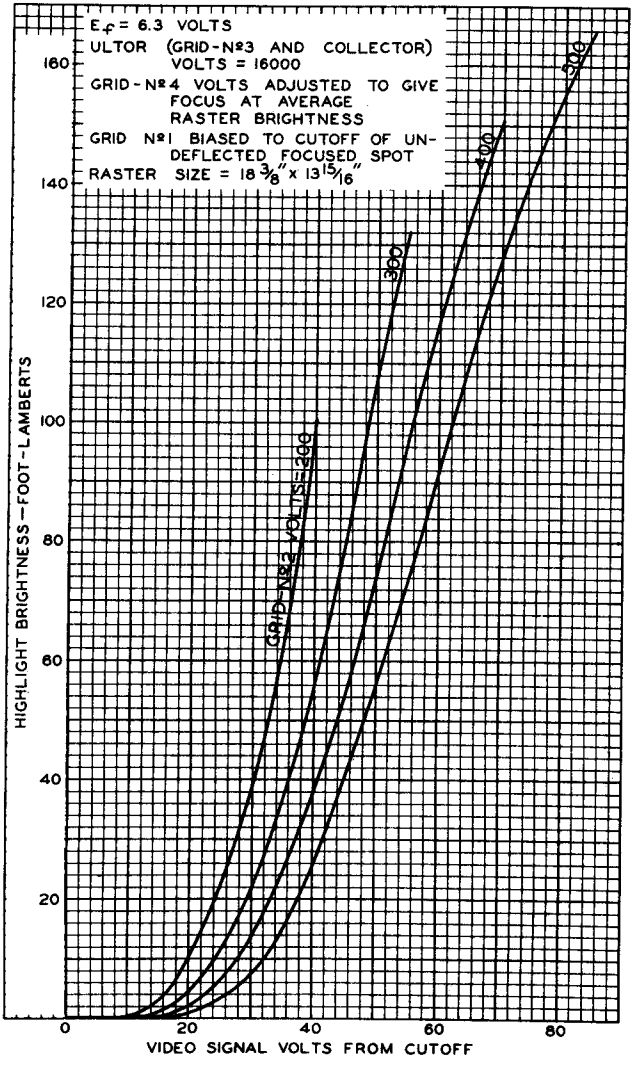
NOTE 5: SUPPORT TUBE IN LIP REGION ONLY AT CORNERS WITHIN THIS SPACE.

NOTE 6: LOCATION OF DEFLECTING YOKE AND FOCUSING DEVICE MUST BE WITHIN THIS SPACE.

RCA

21AP4

AVERAGE GRID-DRIVE CHARACTERISTICS



MAY 18, 1951

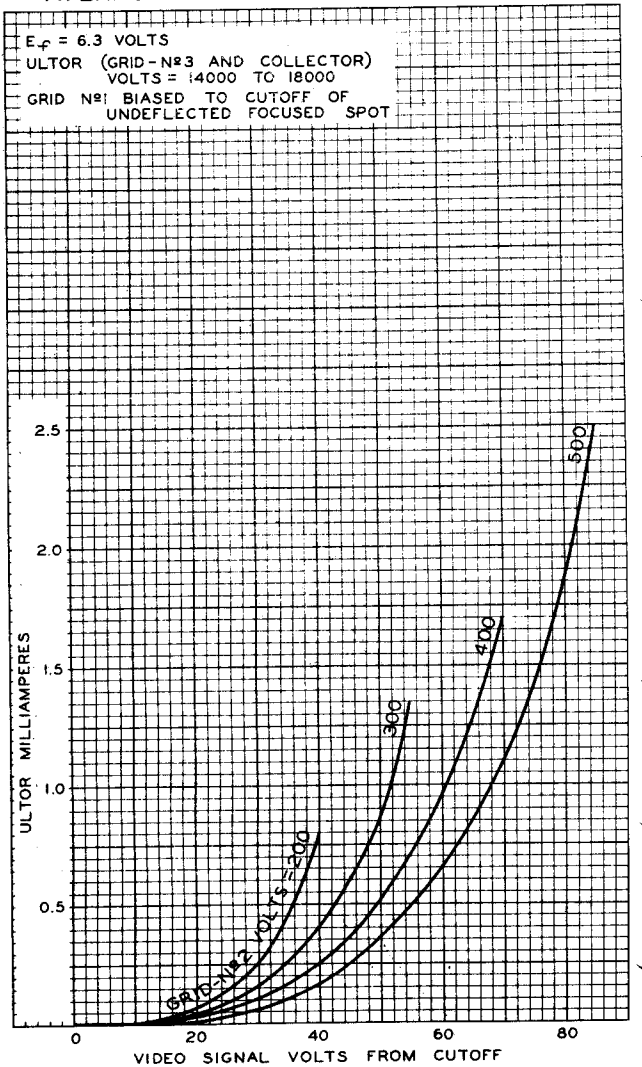
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7653

RCA

21AP4

AVERAGE GRID-DRIVE CHARACTERISTICS



MAY 11, 1951

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

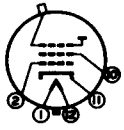
92CM-7652

21EP4

KINESCOPE

The 21EP4 is like the 21EP4-A except that it has no external conductive bulb coating.

BOTTOM VIEW



Pin 1 - Heater
Pin 2 - Grid No.1
Pin 10 - Grid No.2
Pin 11 - Cathode
Pin 12 - Heater
Cap - Ultor (Grid No.3, Collector)

21EP4-A
KINESCOPE

RECTANGULAR GLASS TYPE

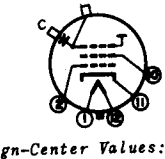
MAGNETIC FOCUS — MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:	
Voltage	6.3 ac or dc volts
Current	0.6 amp
Direct Interelectrode Capacitances:	
Grid No.1 to All Other Electrodes	6 μμf
Cathode to All Other Electrodes	5 μμf
External Conductive Coating to Ultor●	{750 max. μμf {500 min. μμf
Faceplate, Cylindrical	Filterglass
Light Transmission (Approx.)	66%
Phosphor (For Curves, see front of this Section)	P4—Sulfide Type
Fluorescence and Phosphorescence	White
Persistence of Phosphorescence	Short
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angles (Approx.):	
Diagonal	70°
Horizontal	65°
Vertical	50°
Ion-Trap Gun	Requires External, Single-Field Magnet
Tube Dimensions:	
Overall Length	23" ± 3/8"
Greatest Diagonal	21-7/32" ± 3/16"
Greatest Width	20-1/4" ± 3/16"
Greatest Height	15-9/16" ± 3/16"
Minimum Screen Dimensions:	
Greatest Width	19-1/8"
Greatest Height	13-7/8"
Diagonal	20-1/16"
Weight (Approx.)	29 lbs
Mounting Position	Any
Cap	Recessed Small Cavity (JETEC No. J1-21)
Bulb	J170
Base	Small-Shell Duodecal 5-Pin (JETEC No.B5-57)

BOTTOM VIEW



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

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

Maximum Ratings, *Design-Center Values:*

ULTOR● VOLTAGE	18000 max. volts

● 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 21E-types, the ultor function is performed by grid No.3. Since grid No.3 and collector are connected together within the 21E-types, they are collectively referred to simply as "ultor" for convenience in presenting data and curves.

2IEP4-A
KINESCOPE

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
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_{c3}) between 14000# and 18000 volts and grid-No.2 voltage (E_{c2}) between 200 and 500 volts

Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	11% to 25.7% of E_{c2}	volts
Grid-No.2 Current	−15 to +15	μamp
Focusing-Coil Current (DC)^{oo}	$\left[\sqrt{\frac{E_{c3}}{14000}} \times 104\right] \pm 10\%$	ma
Field Strength of Single-Field Ion-Trap Magnet (Approx.)	$\sqrt{\frac{E_{c3}}{14000}} \times 45$	gausses
Field Strength of Adjustable Centering Magnet	0 to 8	gausses

Examples of Use of Design Ranges:

For ultor voltage of	*14000*	*16000*	*volts*
and grid-No.2 voltage of	*300*	*300*	*volts*
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	−33 to −77	−33 to −77	volts
Focusing-Coil Current (DC)	104 ± 10%	110 ± 10%	ma
Ion-Trap Magnet (Rated Strength)	45	50	gausses

Maximum Circuit Values:

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

Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 14000 volts.

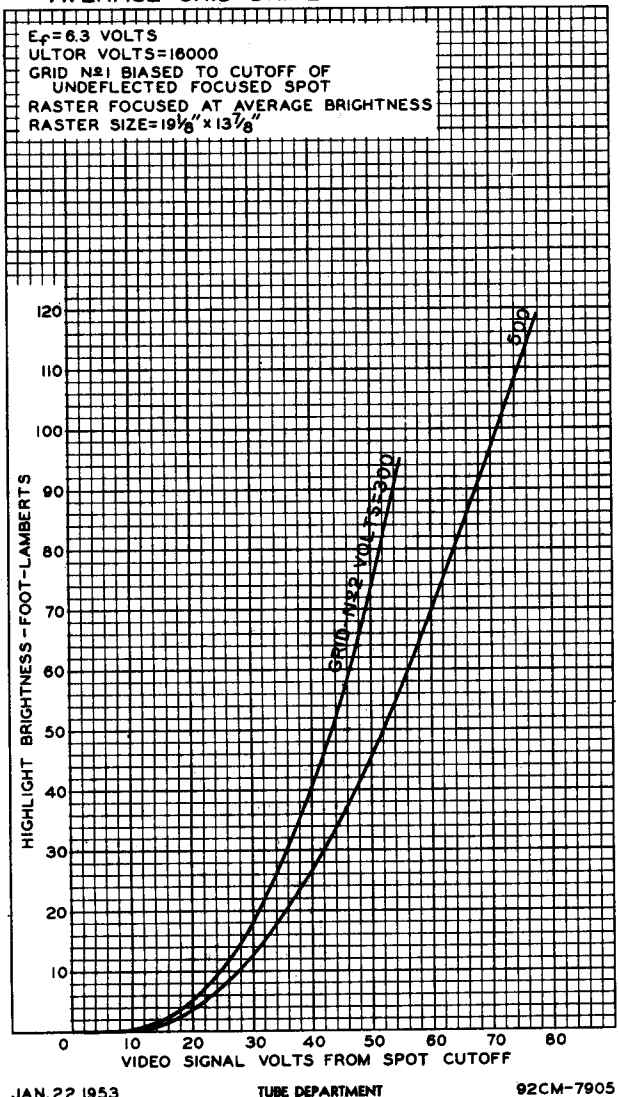
oo For specimen focusing coil similar to JETEC Focusing Coil No.109 positioned with air gap toward kinescope screen, and center line of air gap 3 inches from Reference Line (see *Outline Drawing*). The indicated current is for condition with combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 30 foot-lamberts on a 19-1/8" x 13-7/8" picture area sharply focused at center of screen.

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

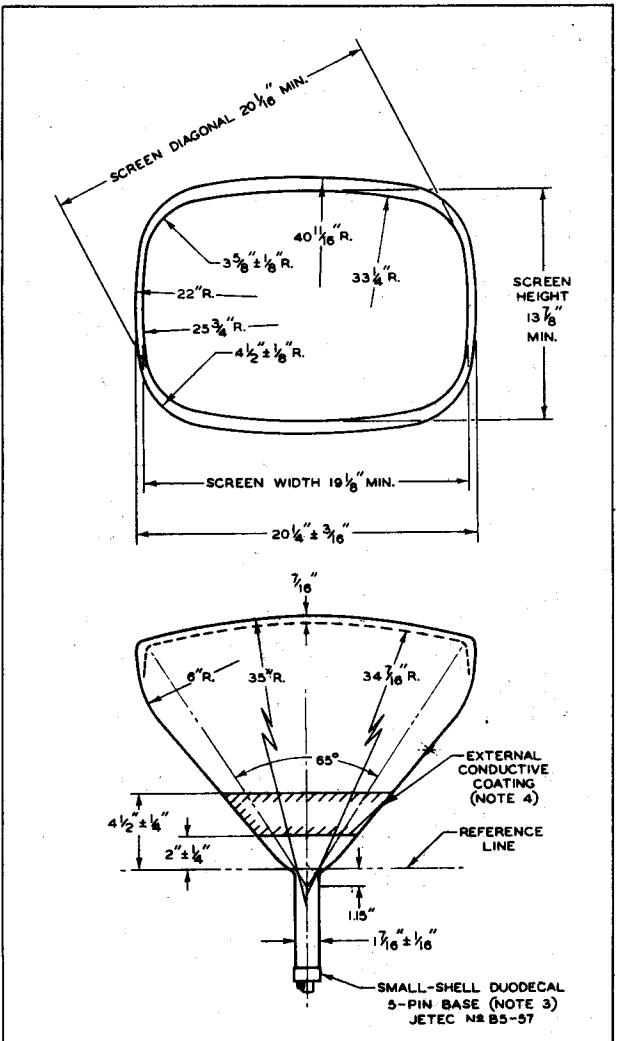
RCA

21EP4-A

AVERAGE GRID-DRIVE CHARACTERISTICS



21EP4-A
KINESCOPE



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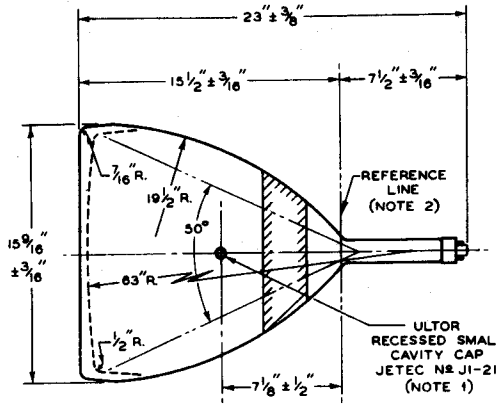
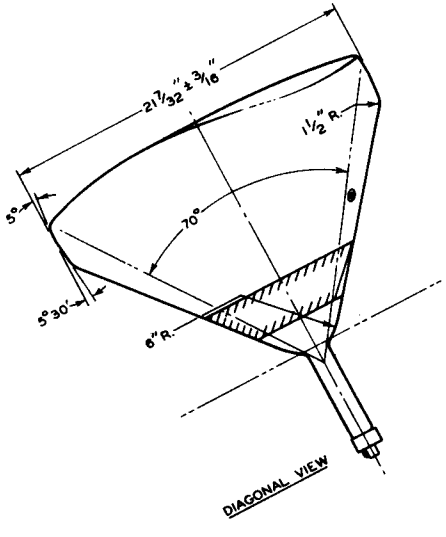
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

21EP4-A
KINESCOPE





92CL-7903

21EP4-A
KINESCOPE

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND BULB TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 30°. BULB TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No.6.

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

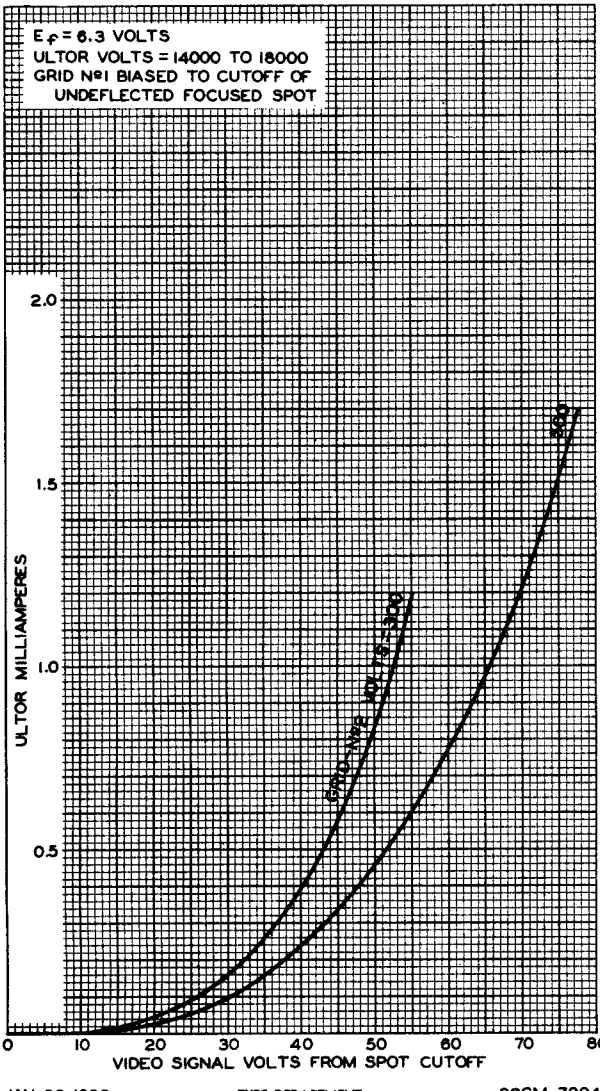
NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED: IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

RCA

21EP4-A

AVERAGE GRID-DRIVE CHARACTERISTICS



21FP4-A

KINESCOPE

RECTANGULAR GLASS TYPE

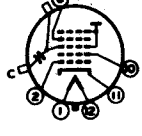
LOW-VOLTAGE FOCUS — MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances:		
Grid No.1 to All Other Electrodes	6	μμf
Cathode to All Other Electrodes	5	μμf
External Conductive Coating to Ultor*	750 max. 500 min.	μμf
Faceplate, Cylindrical		Filterglass
Light Transmission (Approx.)		66%
Phosphor (For Curves, see front of this Section)		P4—Sulfide Type
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Short
Focusing Method		Electrostatic
Deflection Method		Magnetic
Deflection Angles (Approx.):		
Diagonal		70°
Horizontal		65°
Vertical		50°
Ion-Trap Gun	Requires External, Single-Field Magnet	
Tube Dimensions:		
Overall Length		23" ± 3/8"
Greatest Diagonal		21-7/32" ± 3/16"
Greatest Width		20-1/4" ± 3/16"
Greatest Height		15-9/16" ± 3/16"
Minimum Screen Dimensions:		
Greatest Width		19-1/8"
Greatest Height		13-7/8"
Diagonal		20-1/16"
Weight (Approx.)		31 lbs
Mounting Position		Any
Cap	Recessed Small Cavity (JETEC No.J1-21)	
Bulb		J170
Base	Small-Shell Duodecal 6-Pin (JETEC No.B6-63)	

BOTTOM VIEW



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

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

Maximum Ratings, *Design-Center Values:*

ULTOR* VOLTAGE	18000 max. volts

*: See next page.

21FP4-A
KINESCOPE

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 bias value	125 max.	volts
Positive bias value	0 max.	volts
Positive peak value	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds	410 max.	volts
After equipment warm-up period	180 max.	volts
Heater positive with respect to cathode	180 max.	volts

Equipment Design Ranges:

For any ultor voltage (E_{c5}) between 14000 and 18000 volts and grid-No.2 voltage (E_{c2}) between 200 and 500 volts*

Grid-No.4 Voltage for Focus with Ultor Current of 100 μamp	−0.4% to +2.2% of E_{c5}	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	11% to 25.7% of E_{c2}	volts
Grid-No.4 Current	−25 to +25	μamp
Grid-No.2 Current	−15 to +15	μamp
Field Strengh of Single-Field Ion-Trap Magnet (Approx.)	$\sqrt{\frac{E_{c5}}{14000}} \times 45$	gausses
Field Strength of Adjustable Centering Magnet	0 to 8	gausses

Examples of Use of Design Ranges:

For ultor voltage of	*14000*	*16000*	*volts*
and grid-No.2 voltage of	*300*	*300*	*volts*
Grid-No.4 Voltage for Focus with Ultor Current of 100 μamp	−55 to +300	−65 to +350	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focus Spot	−33 to −77	−33 to −77	volts
Ion-Trap Magnet (Rated Strength)	45	50	gausses

Maximum Circuit Values:

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

● 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 21FP4-A, the ultor function is performed by grid No.5. Since grid No.5, grid No.3, and collector are connected together within the 21FP4-A, they are collectively referred to simply as "ultor" for convenience in presenting data and curves.

21FP4-A

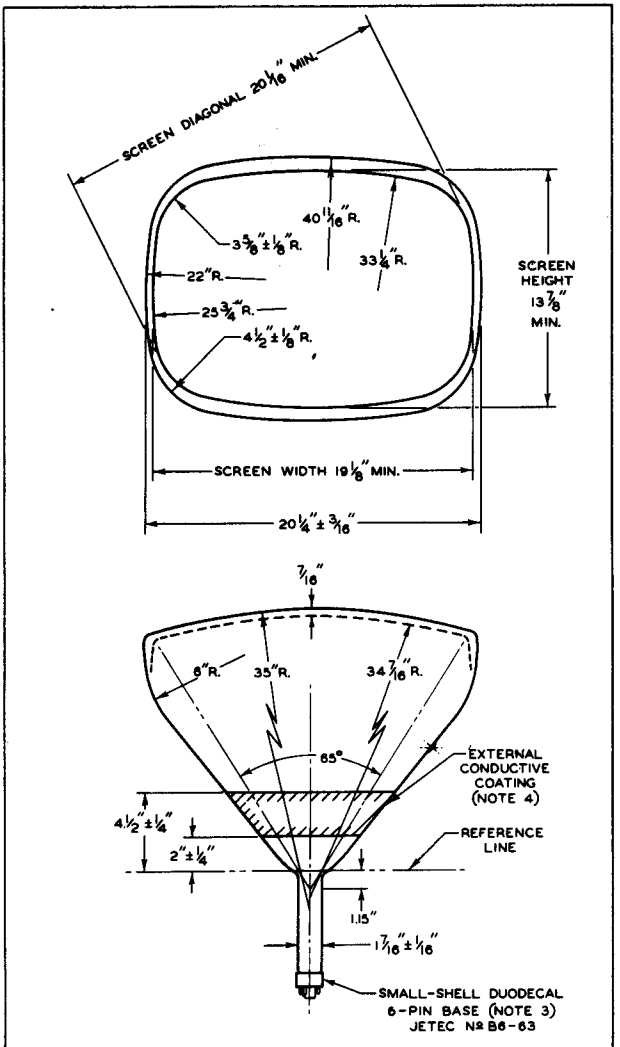
KINESCOPE

* This value has been specified to take care of the condition where an ac voltage is provided for dynamic focusing.

\# Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 14000 volts.

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

21FP4-A
KINESCOPE



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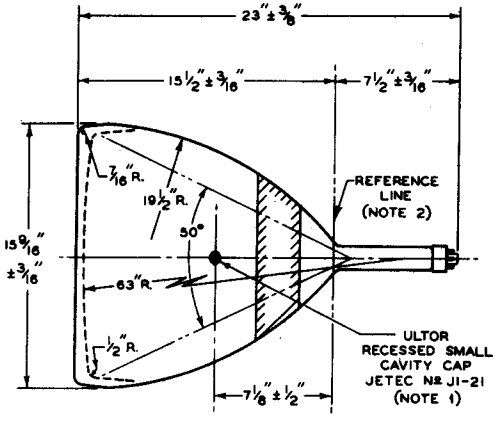
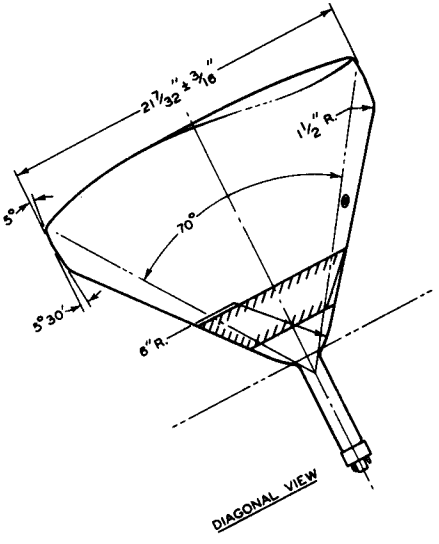
21FP4-A
KINESCOPE





92CL-7944

21FP4-A

KINESCOPE

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN No.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 No.6.

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

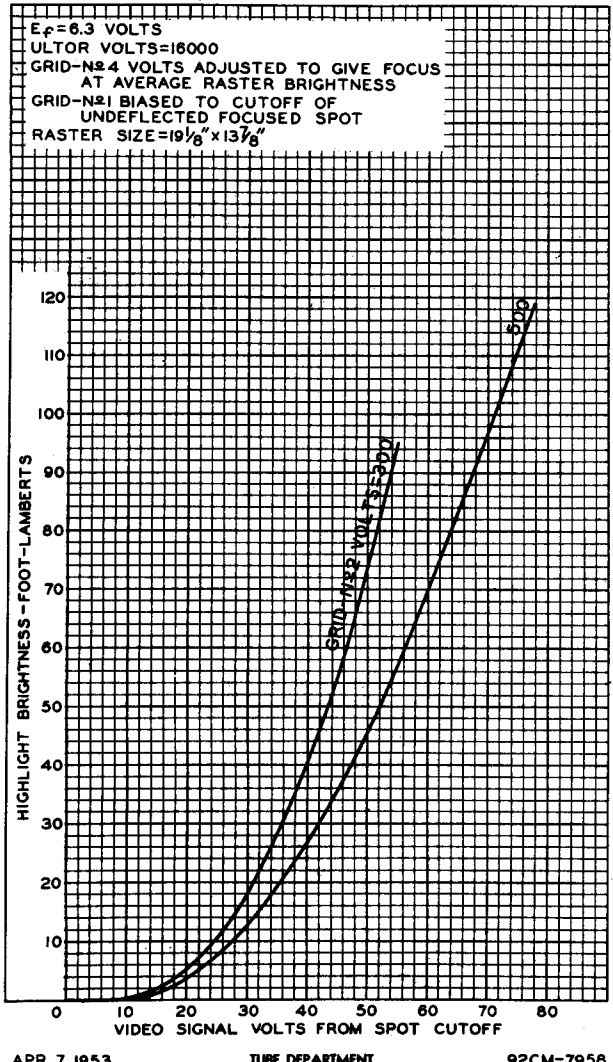
NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED: IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

RCA

21FP4-A

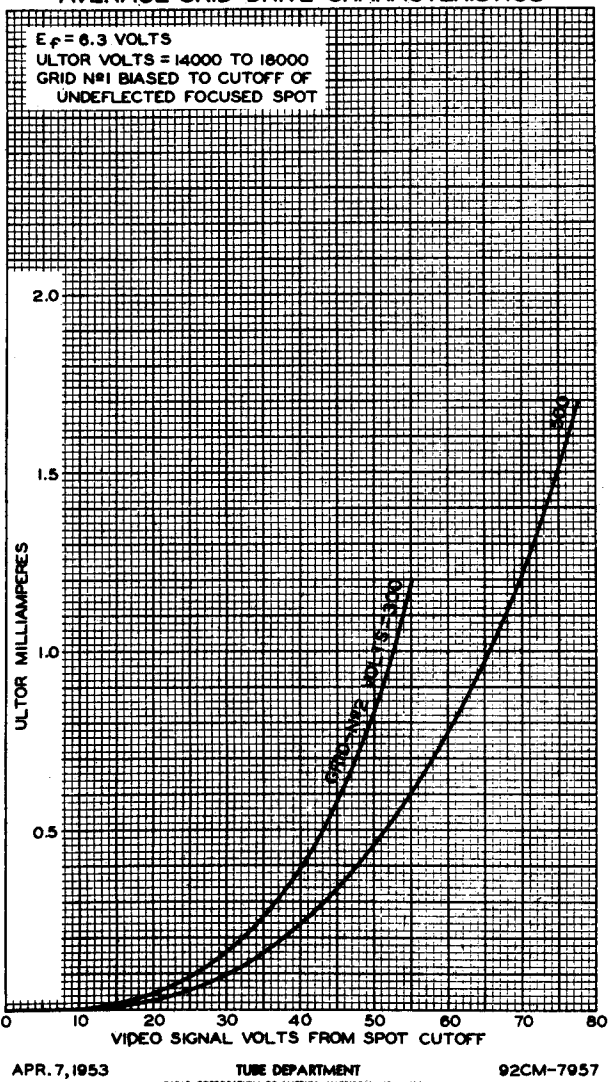
AVERAGE GRID-DRIVE CHARACTERISTICS



RCA

21FP4-A

AVERAGE GRID-DRIVE CHARACTERISTICS



21MP4
KINESCOPE

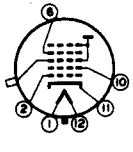
RECTANGULAR METAL-SHELL TYPE
LOW-VOLTAGE FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:	
Voltage	6.3 ac or dc volts
Current	0.6 amp
Direct Interelectrode Capacitances:	
Grid No.1 to All Other Electrodes	6 μμf
Cathode to All Other Electrodes	5 μμf
Faceplate, Spherical	Frosted Filterglass
Light Transmission (Approx.)	66%
Phosphor (For Curves, see front of this Section)	P4—Sulfide Type
Fluorescence	White
Phosphorescence	White
Persistence	Short
Focusing Method	Electrostatic
Deflection Method	Magnetic
Deflection Angles (Approx.):	
Diagonal	70°
Horizontal	66°
Vertical	50°
Ion-Trap Gun	Requires External, Single-Field Magnet
Tube Dimensions:	
Maximum Overall Length	22-5/8"
Greatest Diagonal	20-3/4" ± 1/4"
Greatest Width	19-23/32" ± 1/8"
Greatest Height	15-5/16" ± 1/8"
Screen Dimensions:	
Greatest Width	18-3/8"
Greatest Height	14"
Diagonal	19-3/8"
Weight (Approx.)	18 lbs
Mounting Position	Any
Ultor* Terminal	Metal-Shell Lip
Base	Small-Shell Duodecal 6-Pin (JETEC No.B6-63)

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
Metal-Shell Lip - Grid No.3, Grid No.5, Collector

Maximum Ratings, *Design-Center Values*:

ULTOR* VOLTAGE	16000 max. volts

* In the 21MP4, grid No.5 which has the ultor function, grid No.3, and collector are connected together within the tube and are conveniently referred to collectively as "ultor." The "ultor" in a cathode-ray tube is the electrode, or the electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

21MP4

KINESCOPE

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 bias value	125 max.	volts
Positive bias value	0 max.	volts
Positive peak value	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds	410 max.	volts
After equipment warm-up period	180 max.	volts
Heater positive with respect to cathode	180 max.	volts

Equipment Design Ranges:

For any ultor voltage (E_u) between 14000# and 16000 volts and grid-No.2 voltage (E_{c_2}) between 150 and 500 volts

Grid-No.4 Voltage for Focus with Ultor Current of 100 μamp	-0.4% to +2.2% of E_u	volts
Grid-No.1 Voltage for Visual Extinction of Undeflected Focused Spot	11% to 25.7% of E_{c_2}	volts
Grid-No.4 Current	-25 to +25	μamp
Grid-No.2 Current	-15 to +15	μamp
Field Strength of Single-Field Ion-Trap Magnet (Approx.)	$\sqrt{\frac{E_u}{14000}} \times 45$	gausses
Field Strength of Adjustable Centering Magnet	0 to 8	gausses

Examples of Use of Design Ranges:

For ultor voltage of . . . and grid-No. 2 voltage of	*14000 / 300*	*16000 / 300*	*volts / volts*
Grid-No.4 Voltage for Focus with Ultor Current of 100 μamp	-55 to +300	-65 to +350	volts
Grid-No.1 Voltage†	-33 to -77	-33 to -77	volts
Ion-Trap Magnet (Rated Strength)	45	50	gausse

Maximum Circuit Values:

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

* This value has been specified to take care of the condition where an ac voltage is provided for dynamic focusing.

\# Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 14000 volts.

† For visual extinction of undeflected focused spot.

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

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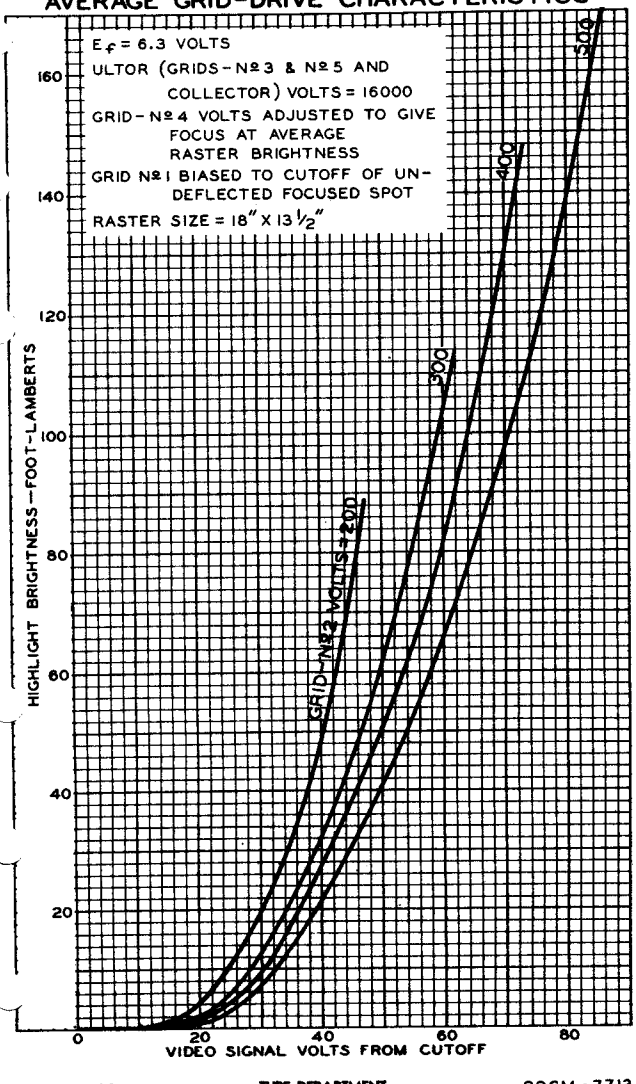
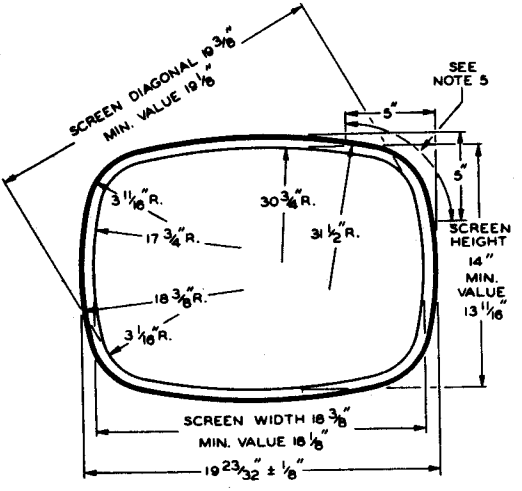
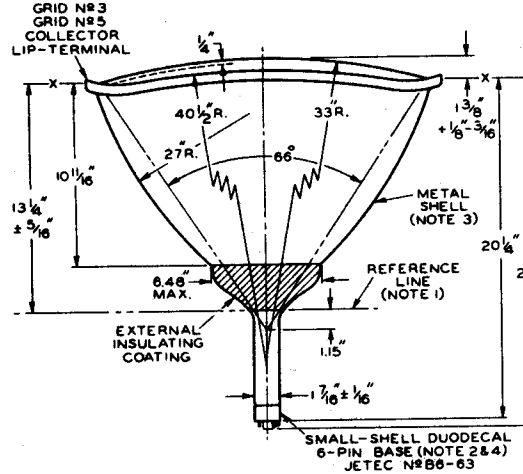
21MP4

AVERAGE GRID-DRIVE CHARACTERISTICS

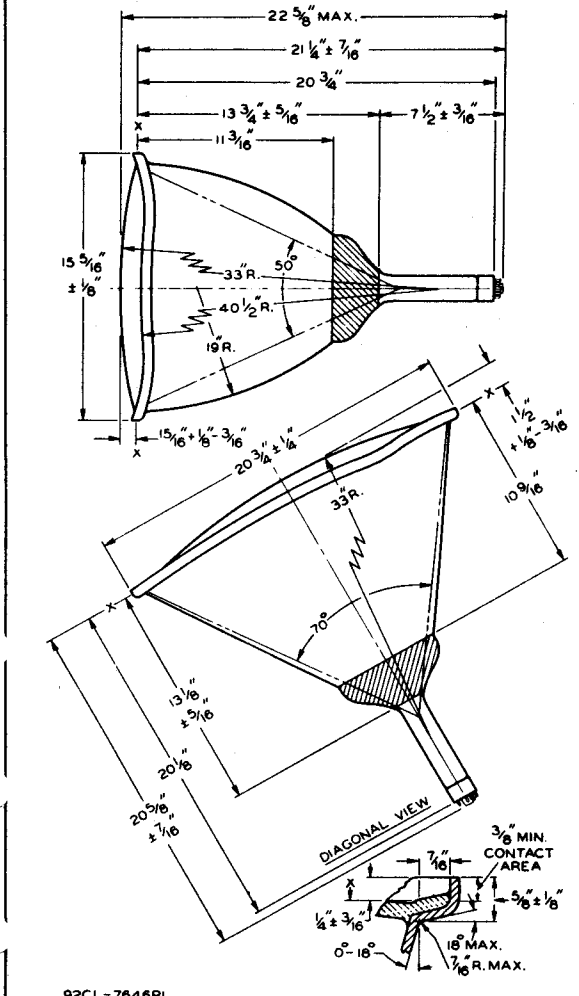


21MP4
KINESCOPE





21MP4
KINESCOPE



FOR NOTES, SEE NEXT PAGE

21MP4
KINESCOPE

NOTE 1: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No. 110 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 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 3-1/4".

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

NOTE 4: THE PLANE THROUGH THE TUBE AXIS AND PIN NO. 6 MAY VARY FROM THE HORIZONTAL AXIS OF THE GLASS FACE BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 10^{\circ}$.

NOTE 5: SUPPORT TUBE IN LIP REGION ONLY AT CORNERS WITHIN THIS SPACE.

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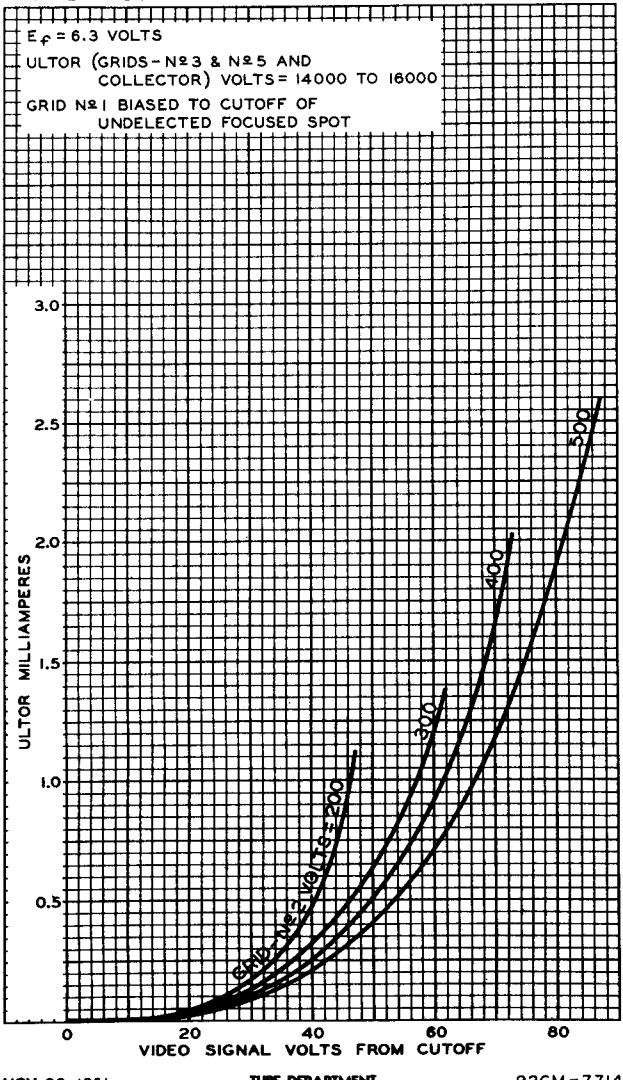
2IMP4

AVERAGE GRID-DRIVE CHARACTERISTICS



27MP4

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RECTANGULAR METAL-SHELL TYPE
MAGNETIC FOCUS

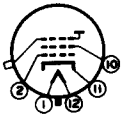
METAL-BACKED SCREEN
MAGNETIC DEFLECTION

DATA

General:

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
Cathode to All Other Electrodes	5 μμf
Faceplate, Spherical	Frosted Filterglass
Light Transmission (Approx.)	66%
Phosphor (For curves, see front of this Section)	P4--Sulfide Type
Fluorescence	White
Phosphorescence	White
Persistence	Short
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angles (Approx.):	
Diagonal	90°
Horizontal	85°
Vertical	69°
Ion-Trap Gun	Requires External, Single-Field Magnet
Tube Dimensions:	
Maximum Overall Length	22-3/16"
Greatest Diagonal	26-7/8" ± 1/4"
Greatest Width	25-1/4" ± 3/16"
Greatest Height	19-15/16" ± 3/16"
Screen Dimensions (Minimum):	
Greatest Width	23-7/16"
Greatest Height	18-1/8"
Diagonal	25-1/16"
Weight (Approx.)	30 lbs
Mounting Position	Any
Ultor● Terminal	Metal-Shell Lip
Base	Small-Shell Duodecal 5-Pin (JETEC No.B5-57)

BOTTOM VIEW



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

Metal-Shell Lip — Ultor (Grid No.3, Collector)

GRID-DRIVE▲ SERVICE

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

Maximum Ratings, *Design-Center Values*:

ULTOR● VOLTAGE	18000 max. volts

●,▲: See next page.

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KINESCOPE

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

Equipment Design Ranges:

With any ultor voltage (E_{c3k}) between 16000* and 18000 volts and grid-No.2 voltage (E_{c2k}) between 200 and 500 volts

Grid-No.1 Voltage for Visual Extinction of Focused Raster	12.3% to 24.3% of E_{c2k}	volts
Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak positive)	12.3% to 24.3% of E_{c2k}	volts
Grid-No.2 Current	-15 to +15	μamp
Focusing-Coil Current (DC)^{oo}.	$\left[\sqrt{\frac{E_{c3k}}{16000}} \times 110\right] \pm 10\%$	ma
Field Strength of Single-Field Ion-Trap Magnet (Approx.) .	$\sqrt{\frac{E_{c3k}}{16000}} \times 50$	gausses
Field Strength of Adjustable Centering Magnet	0 to 8	gausses

Examples of Use of Design Ranges:

With ultor voltage (E_{c3k}) of	*16000*	*16000*	*volts*
and grid-No. voltage (E_{c2k}) of	*300*	*400*	*volts*
Grid-No.1 Voltage for Visual Extinction of Focused Raster	-37 to -73	-49 to -97	volts
Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak positive)	37 to 73	49 to 97	volts
Focusing-Coil Current (DC). .	110 ± 10%	110 ± 10%	ma
Ion-Trap Magnet (Rated Strength)	50	50	gausses

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

●,*,oo: See next page.

RCA

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KINESCOPE

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	18000 max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAGE	625 max.	volts
GRID-No.2-TO-CATHODE VOLTAGE	500 max.	volts
CATHODE-TO-GRID-No.1 VOLTAGE:		
Positive bias value	125 max.	volts
Negative bias value	0 max.	volts
Negative peak value	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds . . .	410 max.	volts
After equipment warm-up period	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

Equipment Design Ranges:

With any ultor-to-grid-No.1 voltage (E_{c3g1}) between 16000 and 18000 volts*

and grid-No.2-to-grid-No.1 voltage (E_{c2g1}) between 220 and 620 volts

Cathode-to-Grid-No.1 Voltage for Visual Extinction of Focused Raster	11% to 19.7% of E_{c2g1}	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level):		
White-level value (Peak negative)	11% to 19.7% of E_{c2g1}	volts
Grid-No.2 Current	-15 to +15	μamp
Focusing-Coil Current (DC)○○ .	$\left[\sqrt{\frac{E_{c3g1}}{16000}} \times 110\right] \pm 10\%$	ma

● 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 27MP4, the ultor function is performed by grid No.3. Since grid No.3 and collector are connected together within the 27MP4, they are collectively referred to simply as "ultor" for convenience in presenting data and curves.

■ 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.

* Brilliance and definition decrease with decreasing ultor voltage or ultor-to-grid-No.1 voltage. In general, the ultor voltage or the ultor-to-grid-No.1 voltage should not be less than 16000 volts.

○○: See next page.

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KINESCOPE

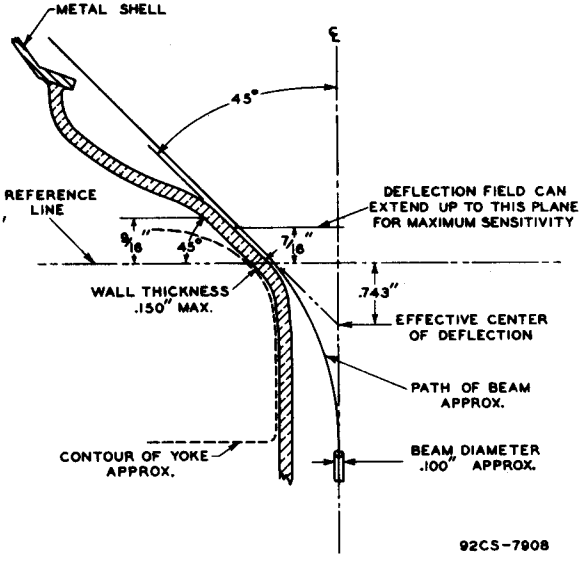
Field Strength of Single-Field Ion-Trap Magnet (Approx.) . .	$\sqrt{\frac{E_{c3g1}}{16000}} \times 50$		gausses
Field Strength of Adjustable Centering Magnet	0 to 8		gausses
Examples of Use of Design Ranges:			
With ultor-to-grid-No.1 voltage (E_{c3g1}) of	*16000*	*16000*	*volts*
and grid-No.2-to-grid-No.1 voltage (E_{c2g1}) of	*300*	*400*	*volts*
Cathode-to-Grid-No.1 Voltage for Visual Extinction of Focused Raster	33 to 59	44 to 79	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level):			
White-level value (Peak negative)	-33 to -59	-44 to -79	volts
Focusing-Coil Current (DC) . .	110 ± 10%	110 ± 10%	ma
Ion-Trap Magnet (Rated Strength)	50	50	gausses
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance	1.5 max.		megohms

oo For specimen focusing coil similar to JETEC Focusing Coil No.109 positioned with air gap toward kinescope screen and center line of air gap 3 inches from Reference Line (see *Dimensional Outline*). The indicated current is for condition with combined bias voltage and video signal voltage adjusted to produce a highlight brightness of 30 foot-lamberts on a 23-7/16" x 18-1/8" picture area sharply focused at center of screen.

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

27MP4
KINESCOPE

Shape of Neck-Funnel Section with Indication of Recommended Approximate Inside Contour of Yoke Based on Dimensions of Reference-Line Gauge (JETEC No. 116) Shown at Front of this Section.



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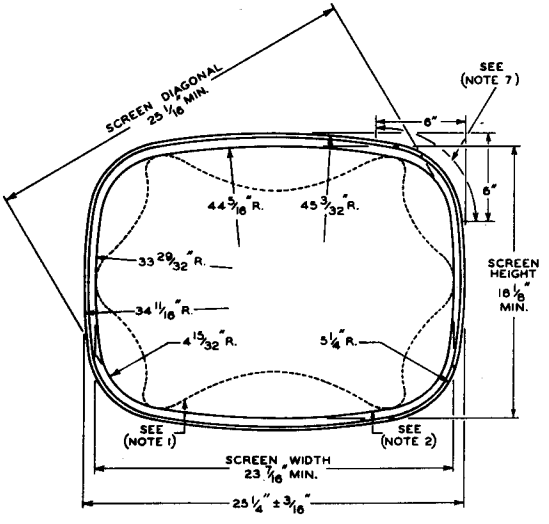

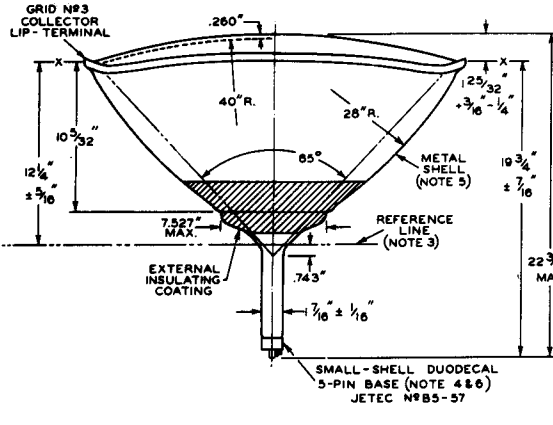

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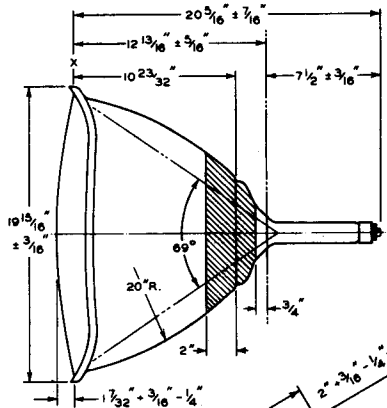
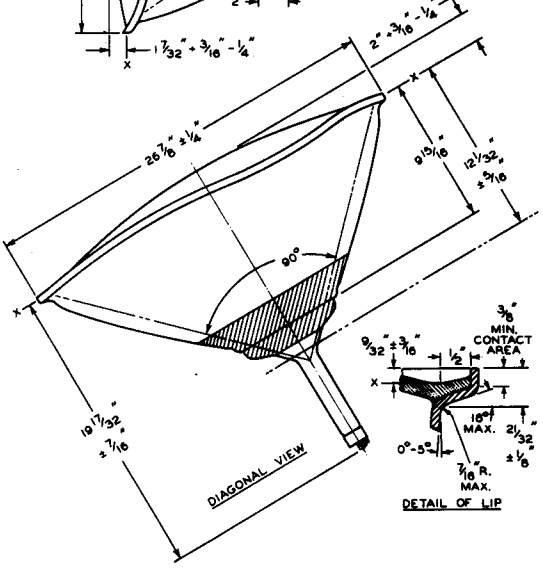




92CL-7924RI

27MP4
KINESCOPE

NOTE 1: APPROXIMATE BOUNDARY OF SPHERICAL SURFACE HAVING 40" RADIUS. OUTSIDE THIS BOUNDARY, THE CURVATURE OF THE SURFACE IS BLENDED INTO THE RIM. (SEE NOTE 2).

NOTE 2: FACEPLATE SHAPE AT PERIMETER OF SCREEN CONFORMS TO SURFACE OF SPHERE HAVING 50" RADIUS.

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

NOTE 4: 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 3-1/4".

NOTE 5: METAL SHELL AND GLASS FACE OPERATE AT HIGH VOLTAGE. ANY MATERIAL IN CONTACT WITH THE SHELL OR THE FACE MUST BE INSULATED TO WITHSTAND THE MAXIMUM APPLIED ULTOR VOLTAGE.

NOTE 6: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No.6 MAY VARY FROM THE HORIZONTAL AXIS OF THE GLASS FACE BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 10°.

NOTE 7: SUPPORT TUBE IN LIP REGION ONLY AT CORNERS WITHIN THIS SPACE.

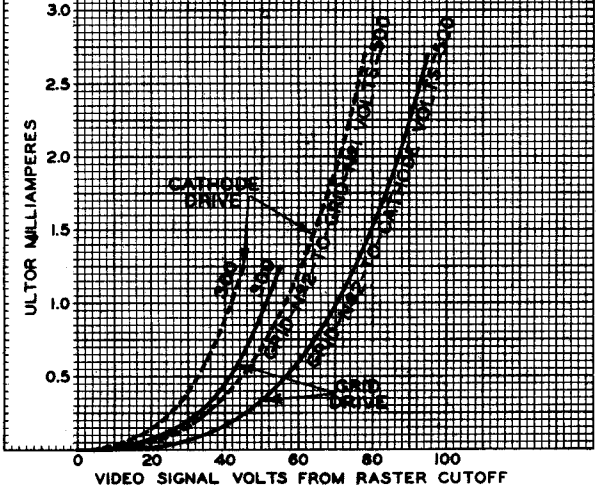
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

27MP4

AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE
E_f = 6.3 VOLTS
ULTOR-TO-GRID-№1 VOLTS = 16000 TO 18000
CATHODE BIASED POSITIVE WITH RESPECT TO GRID №1 TO GIVE FOCUSED RASTER CUTOFF

GRID-DRIVE SERVICE
E_f = 6.3 VOLTS
ULTOR VOLTS = 16000 TO 18000
GRID №1 BIASED NEGATIVE WITH RESPECT TO CATHODE TO GIVE FOCUSED RASTER CUTOFF



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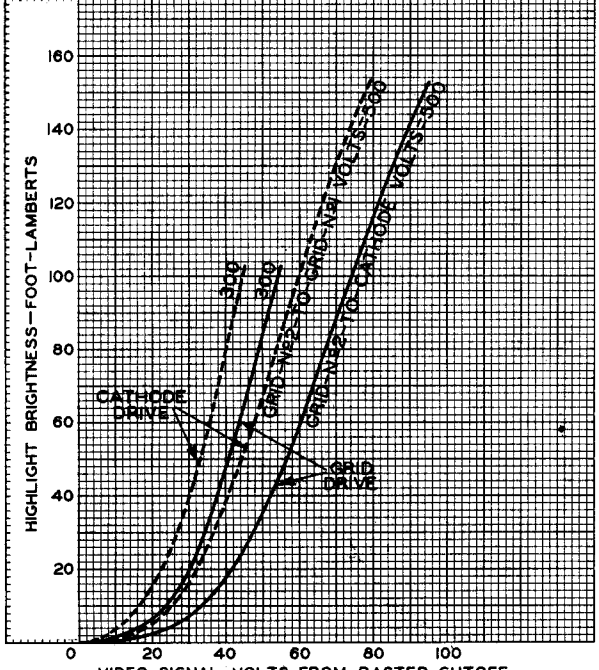
AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE	GRID-DRIVE SERVICE
E_f = 6.3 VOLTS	E_f = 6.3 VOLTS
ULTOR-TO-GRID-Nº1 VOLTS = 16000	ULTOR VOLTS = 16000
CATHODE BIASED POSITIVE WITH RESPECT TO GRID Nº1 TO GIVE FOCUSED RASTER CUTOFF	GRID Nº1 BIASED NEGATIVE WITH RESPECT TO CATHODE TO GIVE FOCUSED RASTER CUTOFF
RASTER FOCUSED AT AVERAGE BRIGHTNESS	RASTER FOCUSED AT AVERAGE BRIGHTNESS
RASTER SIZE=23 7/16" × 18 1/8"	RASTER SIZE=23 7/16" × 18 1/8"

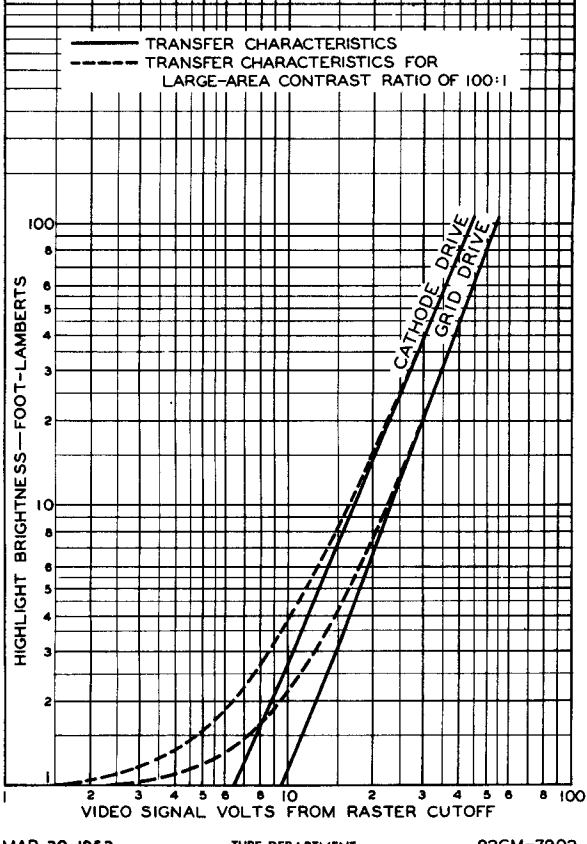


RCA

27MP4

AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE	GRID-DRIVE SERVICE
E_f = 6.3 VOLTS	E_f = 6.3 VOLTS
ULTOR-TO-GRID-№1 VOLTS=16000	ULTOR VOLTS=16000
GRID-№2-TO-GRID-№1 VOLTS =300	GRID-№2-TO-CATHODE VOLTS =300
CATHODE BIASED POSITIVE WITH RESPECT TO GRID №1 TO GIVE FOCUSED RASTER CUTOFF	GRID №1 BIASED NEGATIVE WITH RESPECT TO CATHODE TO GIVE FOCUSED RASTER CUTOFF
RASTER FOCUSED AT AVERAGE BRIGHTNESS	RASTER FOCUSED AT AVERAGE BRIGHTNESS
RASTER SIZE: 23 7/16" x 18 1/8"	RASTER SIZE: 23 7/16" x 18 1/8"



902-A

HIGH-VACUUM CATHODE-RAY TUBE

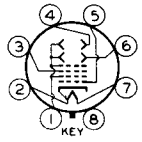
Supersedes Type 902

General:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.6	amp.
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	7.5	μμf
DJ_1 to All Other Electrodes	8.5	μμf
DJ_4 to All Other Electrodes	6.0	μμf
Phosphor (For Curves, see front of this Section)		No.1
Fluorescence		Green
Persistence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		7-7/16" ± 3/16"
Greatest Diameter of Bulb		2" ± 1/16"
Minimum Useful Screen Diameter		1-3/4"
Mounting Position		Any
Base		Medium Shell Octal 8-Pin
Basing Designation for BOTTOM VIEW		8CD

Pin 1 – Grid No.2, Anode No.2, Deflecting Electrode DJ_2, Deflecting Electrode DJ_3

Pin 2 – Heater, Cathode



Pin 3 – Anode No.1

Pin 4 – Deflecting Electr. DJ_1

Pin 5 – Grid No.1

Pin 6 – Deflecting Electr. DJ_4

Pin 7 – Heater

Pin 8 – No Connection

DJ_1 and DJ_2 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 3. With DJ_3 positive with respect to DJ_4, the spot is deflected toward pin 1.

The angle between the trace produced by DJ_3 and DJ_4 and its intersection with the plane through the tube axis and pin 1 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° ± 4°.

Maximum Ratings, ***Absolute Values*****:**

ANODE-No.2 & GRID No.2 VOLTAGE	660 *max.*	volts
ANODE-No.1 VOLTAGE	330 *max.*	volts
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:		
Negative Value	125 *max.*	volts
Positive Value	0 *max.*	volts
PEAK VOLTAGE BETWEEN ANODE No.2 AND DEFLECTING ELECTRODE DJ_1 OR DJ_4	385 *max.*	volts

902-A

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

Typical Operation:

Anode No.2 & Grid No.2 Voltage★	400	600	volts
Anode No.1 Voltage for Focus at 75% of Grid-No.1 Voltage 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:			
DJ_1 and DJ_2	0.273	0.183	mm/v dc
DJ_3 and DJ_4	0.326	0.217	mm/v dc
Deflection Factor:**			
DJ_1 and DJ_2	93	139	v dc/in.
DJ_3 and DJ_4	78	117	v dc/in.

★ Brilliance and definition decrease with decreasing anode-No.2 voltage. In general, anode-No.2 voltage should not be less than 400 volts.

● Individual tubes may require between +20% and -35% of the values shown with grid-No.1 voltages between zero and cutoff.

♯ Visual extinction of stationary focused spot. Supply should be adjustable 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. Suitable test conditions are: anode-No.2 voltage, 600 volts; anode-No.1 voltage, adjusted for focus; deflecting-electrode resistors, 1 megohm each for DJ_1 and DJ_4, 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.

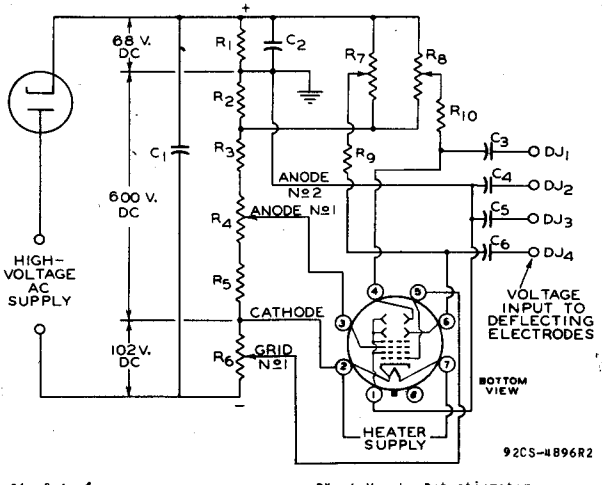
Maximum Circuit Values:

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.

HIGH-VACUUM CATHODE-RAY TUBE

TYPICAL OSCILLOGRAPH CIRCUIT

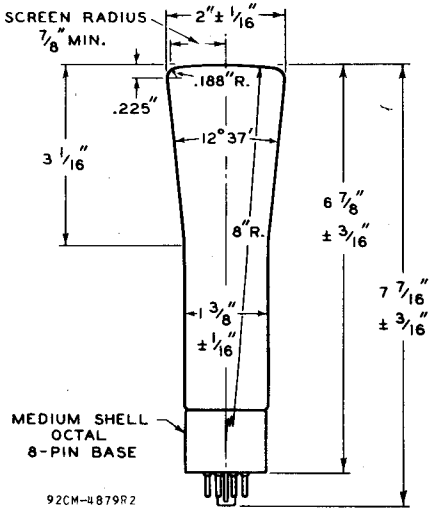


C1: 0.1 μf
C2: 1.0 μf
C3 C4 C5 C6: 0.05-μf Blocking Capacitors*
R1 R2: 1.0 Megohm
R3: 1.3 Megohms
R4: 1-Megohm Potentiometer
R5: 0.3 Megohm
R6: 0.5-Megohm Potentiometer
R7 R8: Dual 2-Megohm Potentiometer
R9 R10: 2 Megohms

*When cathode is grounded, capacitors should have high voltage rating; when anode No.2 is grounded, they may have low voltage rating. For dc amplifier service, deflecting electrodes should be connected direct to amplifier output. In this service, it is preferable usually to remove deflecting-electrode resistors to minimize loading effect on amplifier. In order to minimize spot defocusing, it is essential that anode No.2 be returned to a point in the amplifier system which will give the lowest possible potential difference between anode No.2 and the deflecting electrodes.

902-A

HIGH-VACUUM CATHODE-RAY TUBE



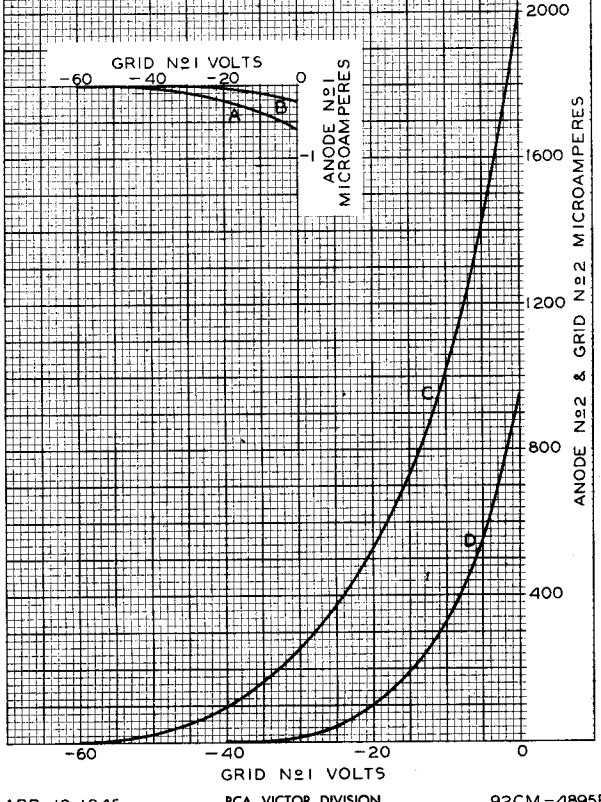
℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE

902-A

AVERAGE CHARACTERISTICS

E_f = 6.3 VOLTS
ANODE №1 VOLTS ADJUSTED TO GIVE FOCUS

CURVE	ELECTRODE CURRENT	ANODE №2 & GRID №2 VOLTS
A	ANODE №1	600
B	ANODE №1	400
C	ANODE №2 & GRID №2	600
D	ANODE №2 & GRID №2	400



RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

Obsolete

904

HIGH-VACUUM CATHODE-RAY TUBE

ELECTROSTATIC-MAGNETIC TYPE

WITH 5" MEDIUM-PERSISTENCE SCREEN FOR OSCILLOGRAPHIC USE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Fluorescent Screen:		
Material		Phosphor No.1
Pattern Color		Greenish
Direct Interelectrode Capacitances:		
Grid #1 to all other Electrodes		10 max. μμf
Deflecting Plate to Deflecting Plate		1 max. μμf
Overall Length		16-1/4" ± 3/8"
Maximum Diameter		5-1/16"
Bulb		J-40
Caps (Three)		Small Metal
Base		Medium 6-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

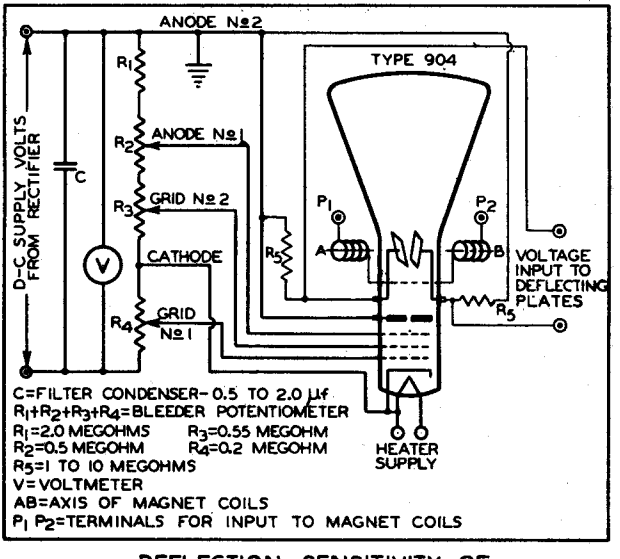
High-Voltage Electrode (Anode #2) Voltage			4600 max.	volts
Focusing Electrode (Anode #1) Voltage			1500 max.	volts
Accelerating Electrode (Grid #2) Voltage			250 max.	volts
Control Electrode (Grid #1) Voltage			Never positive	
Grid #1 Voltage for Current Cut-off *			-140 approx.	volts
Peak Voltage between Anode #2 and any deflecting plate			4000 max.	volts
Fluorescent-Screen Input Power/sq cm			10 max.	mw
Typical Operation:				
Heater Voltage	2.5	2.5	2.5	volts
Anode #2 Voltage	1000	3000	4600	volts
Anode #1 Voltage	210	630	970 approx.	volts
Grid #2 Voltage	100	100	250	volts
Grid #1 Voltage	Adjusted to give suitable luminous spot			
Deflection Sensitivity (Electrostatic)	0.40	0.13	0.09	mm/volt d.c. ←

* with maximum voltages applied to Grid #2, Anode #1, and Anode #2. ←

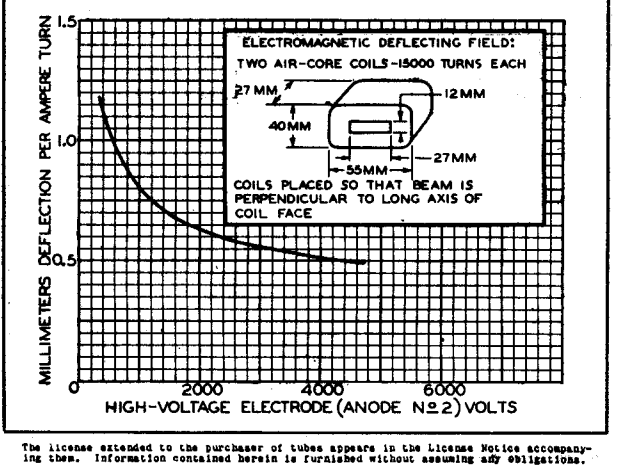
← indicates a change

904

TYPICAL OSCILLOGRAPH CIRCUIT



DEFLECTION SENSITIVITY OF AN AIR-CORE MAGNETIC SYSTEM

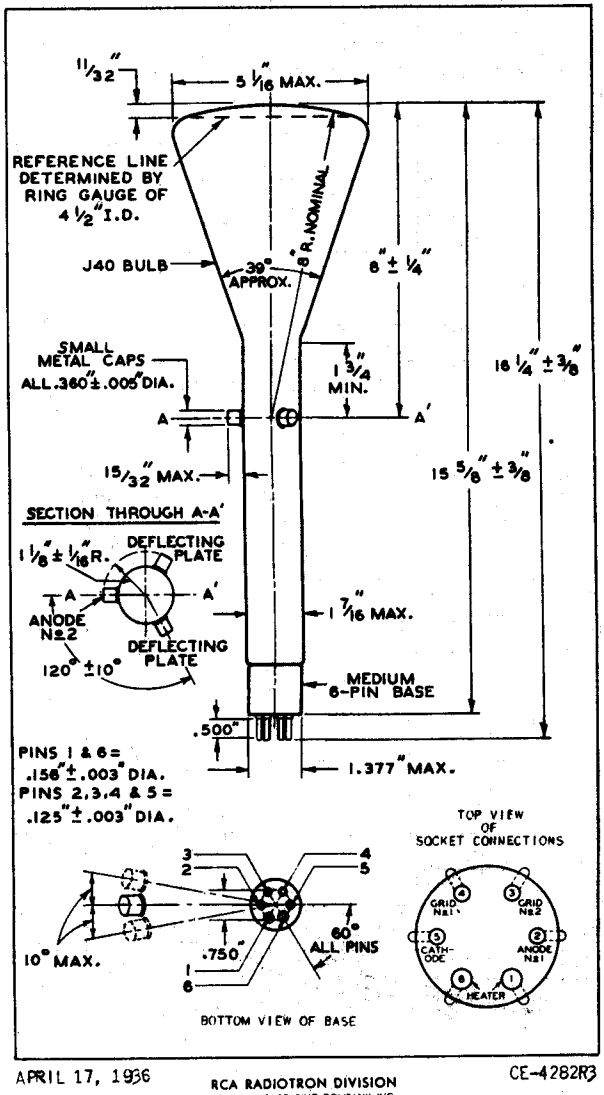


Obsolete

904

904

CATHODE-RAY TUBE



APRIL 17, 1936

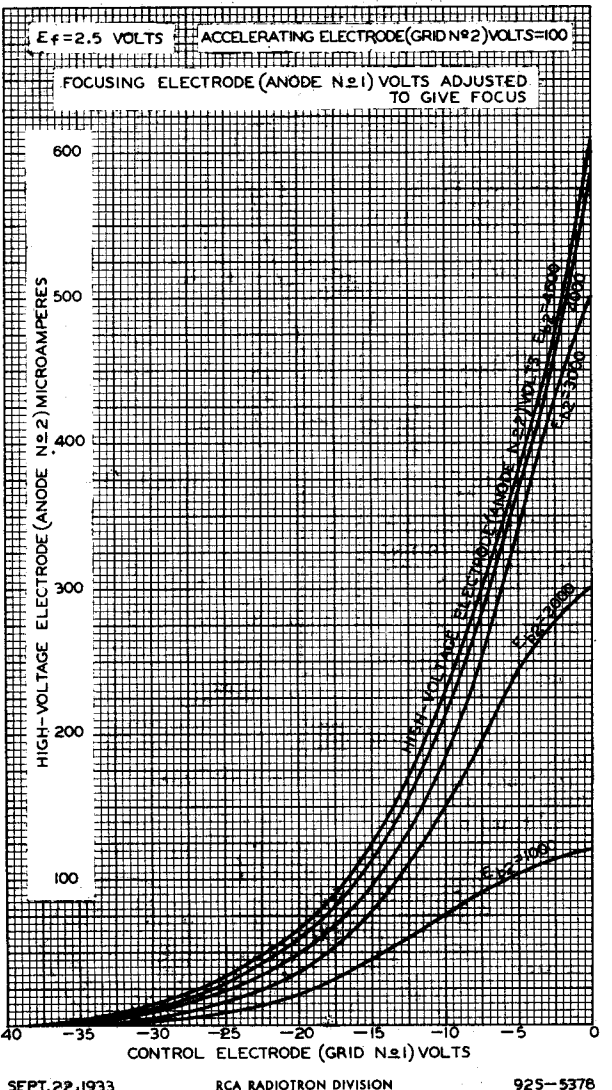
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

CE-4282R3

RCA

904

AVERAGE CHARACTERISTICS

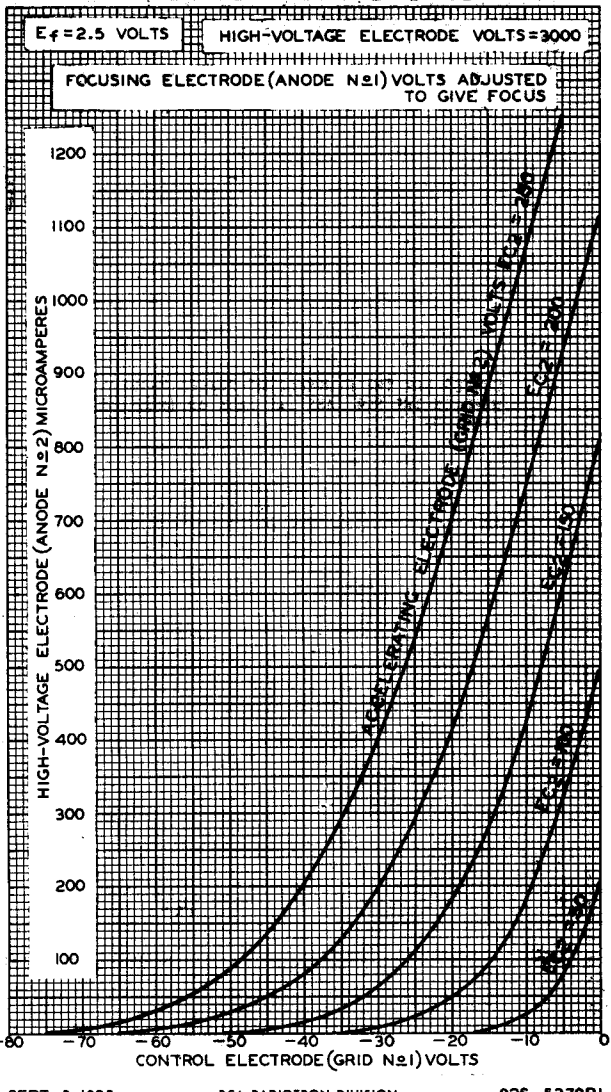


Obsolete

RCA 904

904

AVERAGE CHARACTERISTICS



904

FLUORESCENT-SCREEN CHARACTERISTICS

CURVES FOR THE FLUORESCENT-SCREEN MATERIAL USED IN THE 904 ARE THE SAME AS THOSE FOR TYPE 903.

905-A Wet Rec.

905-A

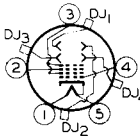
HIGH-VACUUM CATHODE-RAY TUBE

Supersedes Type 905

General:

Heater, for Unipotential Cathode:		
Voltage	2.5 ± 10%	ac or dc volts
Current	2.1	amp.
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	9.0	μμf
DJ_1 to DJ_2	2.0	μμf
DJ_3 to DJ_4	1.0	μμf
Phosphor (For Curves, see front of this Section)		No.1
Fluorescence		Green
Persistence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		16-1/2" ± 3/8"
Greatest Diameter of Bulb		5-1/4" + 1/16" − 3/32"
Minimum Useful Screen Diameter		4-1/2"
Mounting Position		Any
Caps (Four)		Small
Base		Long-Shell Medium 5-Pin, Micanol
Basing Designation for BOTTOM VIEW		5BR

Pin 1 – Heater
Pin 2 – Anode No.1
Pin 3 – Anode No.2, Grid No.2
Pin 4 – Grid No.1
Pin 5 – Heater, Cathode
Cap over Pin 3 { Deflecting Electrode DJ_1



Cap over Pins 1 and 5 { Defl'g Electr. DJ_2
Cap over Pin 2 { Deflecting Electrode DJ_3
Cap over Pin 4 { Deflecting Electrode DJ_4

DJ_1 and DJ_2 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 3. 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 3 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° ± 6°.

Maximum Ratings, ***Absolute Values*****:**

ANODE-No.2 & GRID-No.2 VOLTAGE	2200 *max.*	volts
ANODE-No.1 VOLTAGE	660 *max.*	volts
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:		
Negative Value	125 *max.*	volts
Positive Value	0 *max.*	volts
PEAK VOLTAGE BETWEEN ANODE No.2 AND ANY DEFLECTING ELECTRODE	1100 *max.*	volts

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

905-A

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

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●	338	450	volts
Grid-No.1 Volt. for Visual Cutoff#	-26	-35	volts
Max. Anode-No.1 Current Range▲	Between -50 and +10		μamp.
Deflection Sensitivity:			
DJ_1 and DJ_2	0.295	0.221	mm/v dc
DJ_3 and DJ_4	0.348	0.262	mm/v dc
Deflection Factor:**			
DJ_1 and DJ_2	86	115	v dc/in.
DJ_3 and DJ_4	73	97	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 -30% and +25% of the values shown with grid-No.1 voltages between zero and cutoff.

Visual extinction of stationary focused spot. Supply should be adjustable 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 12-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. Suitable test conditions are: anode-No.2 voltage, 1500 volts; anode-No.1 voltage, adjusted for focus; deflecting-electrode resistors, 1 megohm each, connected to anode-No.2; the tube shielded from all extraneous fields. To avoid damage to the tube, grid-No.1 voltage should be near cutoff before application of anode voltages.

Maximum Circuit Values:

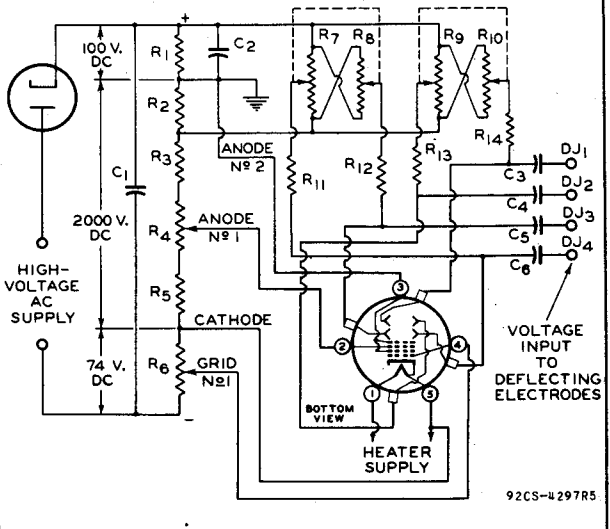
Grid-No.1-Circuit Resistance	1.5 *max.* megohms
Resistance in Any Deflecting-Electrode Circuit▲▲	5.0 *max.* megohms

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

905-A

HIGH-VACUUM CATHODE-RAY TUBE

TYPICAL OSCILLOGRAPH CIRCUIT

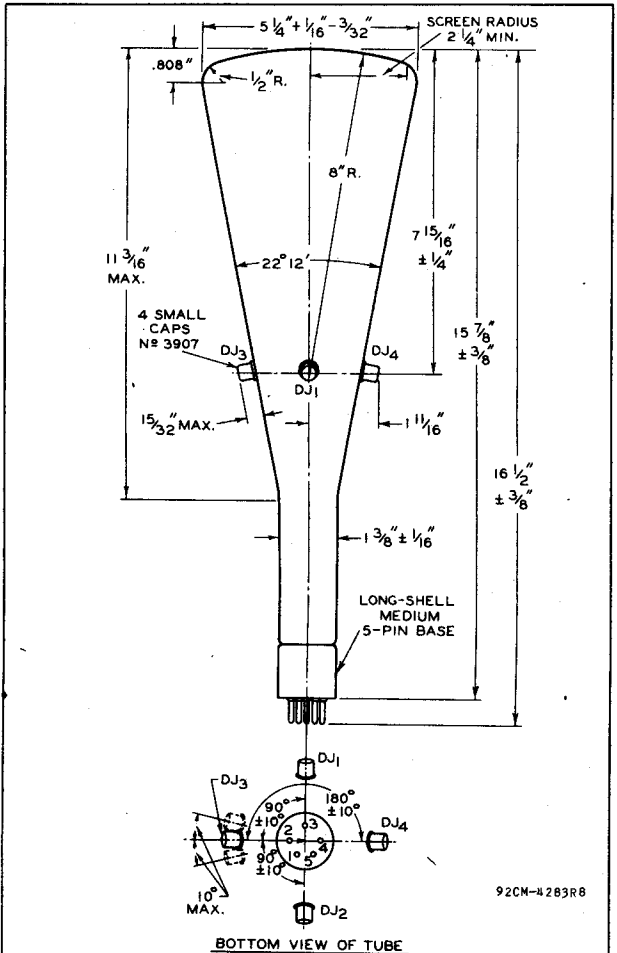


C1: 0.1 μf
C2: 1.0 μf
C3 C4 C5 C6: 0.05-μf Blocking Capacitors *
R1 R2: 2 Megohms
R3: 6 Megohms
R4: 2-Megohm Potentiometer
R5: 1.0 Megohm
R6: 0.35-Megohm Potentiometer
R7 R8: Dual 5-Megohm Potentiometer
R9 R10: Dual 5-Megohm Potentiometer
R11 R12 R13 R14: 2 Megohms

* When cathode is grounded, capacitors should have high voltage rating; when anode No.2 is grounded, they may have low voltage rating. For dc amplifier service, deflecting electrodes should be connected direct to amplifier output. In this service, it is preferable usually to remove deflecting-electrode resistors to minimize loading effect on amplifier. In order to minimize spot defocusing, it is essential that anode No.2 be returned to a point in the amplifier system which will give the lowest possible potential difference between anode No.2 and the deflecting electrodes.

905-A

HIGH-VACUUM CATHODE-RAY TUBE



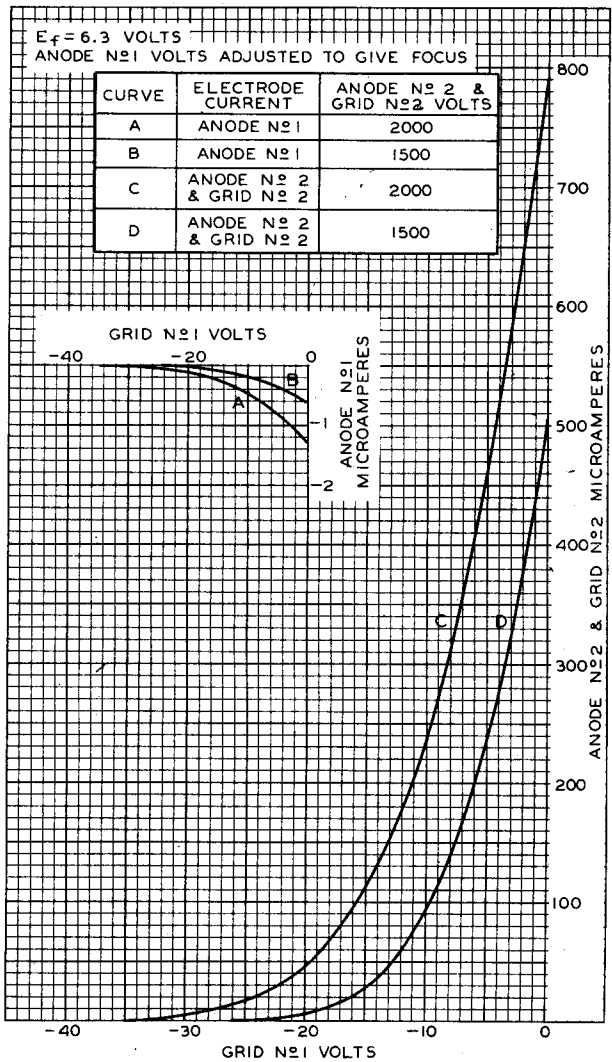
BOTTOM VIEW OF TUBE

℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE

AVERAGE CHARACTERISTICS

$E_f = 6.3$ VOLTS
ANODE №1 VOLTS ADJUSTED TO GIVE FOCUS

CURVE	ELECTRODE CURRENT	ANODE №2 & GRID №2 VOLTS
A	ANODE №1	2000
B	ANODE №1	1500
C	ANODE №2 & GRID №2	2000
D	ANODE №2 & GRID №2	1500



RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

Obsolete

907 908

907

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Phosphor		No.5
Fluorescence		Bluish
Persistence	Brightness negligible in less than 30 microseconds	

For further ratings, operating conditions, dimensions, connections, circuit, and average characteristic curve, refer to Type 905. The 907 and 905 are identical except for the screen material.
Characteristic Curves of phosphor No.5 are shown at the beginning of this section.

908

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Focus		Electrostatic ←
Deflection		Electrostatic ←
Electrodes DJ_1 and DJ_2 (upper): nearest the screen		
Electrodes DJ_3 and DJ_4 (lower): nearest the base		
DJ_1 is on same side of tube as pins No.4 & No.5		
DJ_2 is on same side of tube as pins No.2 & No.3		
Phosphor		No.5
Fluorescence		Bluish
Persistence	Brightness negligible in less than 30 microseconds	
Direct Interelectrode Capacitances:		
Control Electrode (Grid) to All Other Electrodes		9.0 μμf ←
Deflecting Electrode DJ_1 to All Other Electrodes		8.5 μμf
Deflecting Electrode DJ_3 to All Other Electrodes		6.5 μμf
Overall Length		11-1/2" ± 3/8"
Diameter		3" ± 1/16" ←
Bulb		J-24
Base		Medium 7-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Maximum Ratings Are Based on a Line-Voltage Design Center of 117 Volts ←

High-Voltage Electrode (Anode No.2) Volt.	1500 max.	volts
Focusing Electrode (Anode No.1) Volt.	1000 max.	volts ←
Control Electrode (Grid) Volt.	Never positive	
Peak Voltage Between Anode No.2 and Any Deflecting Electrode	600 max.	volts
Grid Circuit Resistance	1.5 max.	megohms ←
Impedance of Any Deflecting-Electrode Circuit at the Heater-Supply Frequency	1.0 max.	megohm ←

Typical Operation:

Anode No.2 Volt.	600	800	1000	1200	1500	volts
Anode No.1 Volt.□	170	230	285	345	475	approx. volts
Grid Volt.○	Adjusted to give suitable luminous spot					

(continued on next page)

□, ○: See next page. ← Indicates a change.

RCA RADIOTRON DIVISION
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908

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

Deflection Sensitivity:

Electrodes D_1 and D_2	0.55	0.41	0.33	0.27	0.22	mm/volt d.c.
Electrodes D_3 and D_4	0.58	0.44	0.35	0.29	0.23	mm/volt d.c.

NOTE 1: Brilliance and definition decrease with decreasing anode voltages. In general the anode No.2 voltage should not be less than 600 volts.

NOTE 2: The d-c potential of each deflecting electrode is maintained essentially equivalent to that of anode No.2 by connecting resistors having values not greater than 10 megohms between each deflecting electrode and anode No.2. This arrangement by suitable choice of resistor values minimizes pattern distortion and pattern drift resulting from unbalanced potentials on the deflecting electrodes. The smaller the resistor values, the less the distortion for a given beam current.

□ Supply should be adjustable to ± 20% of the value shown.

° Approximately 20% of Anode No.1 voltage is required for current cut-off when, in some applications, it is necessary to use the maximum permissible grid-circuit resistance.

Characteristic Curves of phosphor No.5 are shown at the beginning of this section.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

908-A

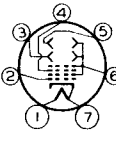
OSCILLOGRAPH TUBE

Supersedes Type 908

General:

Heater, for Unipotential Cathode:		
Voltage	2.5 ± 10%	ac or dc volts
Current	2.1	amp.
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	9.0	μμf
DJ_1 to All Other Electrodes	8.5	μμf
DJ_3 to All Other Electrodes	6.5	μμf
Phosphor (For Curves, see front of this Section)		No.5
Fluorescence		Blue
Persistence		Very Short
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		11-1/2" ± 3/8"
Greatest Diameter of Bulb		3" ± 1/16"
Minimum Useful Screen Diameter		2-3/4"
Mounting Position		Any
Base		Medium 7-Pin
Basing Designation for BOTTOM VIEW		7CE

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 3 – Deflecting Electrode DJ_3
Pin 4 – Anode No.1
Pin 5 – Deflecting Electrode DJ_1



Pin 6 – Grid No.2, Anode No.2, Deflecting Electr.DJ_2, Deflecting Electr.DJ_4
Pin 7 – Heater, Cathode

DJ_1 and DJ_2 are nearer the screen
DJ_3 and DJ_4 are nearer the base

With DJ_2 positive with respect to DJ_1, the spot is deflected toward pin 1. With DJ_4 positive with respect to DJ_3, the spot is deflected toward pin 6.

The angle between the trace produced by DJ_3 and DJ_4 and its intersection with the plane through the tube axis and pin 6 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° ± 3°.

Maximum Ratings, *Design-Center Values:*

ANODE-No.2 & GRID No.2 VOLTAGE	1500 *max.*	volts
ANODE-No.1 VOLTAGE	1000 *max.*	volts
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:		
Negative Value	125 *max.*	volts
Positive Value	0 *max.*	volts
PEAK VOLTAGE BETWEEN ANODE No.2 AND DEFLECTING ELECTRODE DJ_1 OR DJ_3	500 *max.*	volts

908-A

OSCILLOGRAPH TUBE

(continued from preceding page)

Typical Operation:

Anode No.2 & Grid No.2 Voltage*	1000	1500	volts
Anode No.1 Voltage for Focus at 75% of Grid-No.1 Voltage for Cutoff●	287	430	volts
Grid-No.1 Volt. for Visual Cutoff#	-33	-50	volts
Max. Anode-No.1 Current Range▲	Between -50 and +10		μamp.
Deflection Sensitivity:			
DJ_1 and DJ_2	0.334	0.223	mm/v dc
DJ_3 and DJ_4	0.348	0.233	mm/v dc
Deflection Factor:**			
DJ_1 and DJ_2	76	114	v dc/in.
DJ_3 and DJ_4	73	109	v dc/in.

* Brilliance and definition decrease with decreasing anode-No.2 voltage. In general, anode-No.2 voltage should not be less than 1000 volts.

● Individual tubes may require between +29% and -44% of the values shown with grid-No.1 voltages between zero and cutoff.

Visual extinction of stationary focused spot. Supply should be adjustable 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 15-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. Suitable test conditions are: anode-No.2 voltage, 1500 volts; anode-No.1 voltage, adjusted for focus; deflecting-electrode resistors, 1 megohm each for DJ_1 and DJ_3, 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:

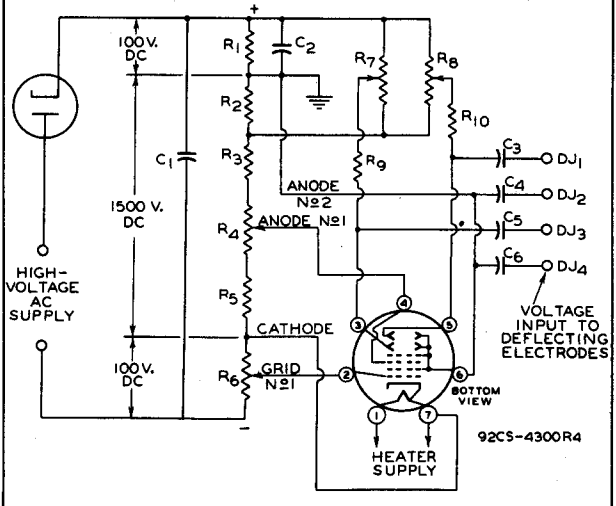
Grid-No.1 Circuit Resistance	1.5 *max.*	megohms
Impedance of Any Deflecting-Electrode Circuit at Heater-Supply Frequency	1.0 *max.*	megohm
Resistance in Any Deflecting-Electrode Circuit▲▲	5.0 *max.*	megohms

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

908-A

OSCILLOGRAPH TUBE

TYPICAL OSCILLOGRAPH CIRCUIT

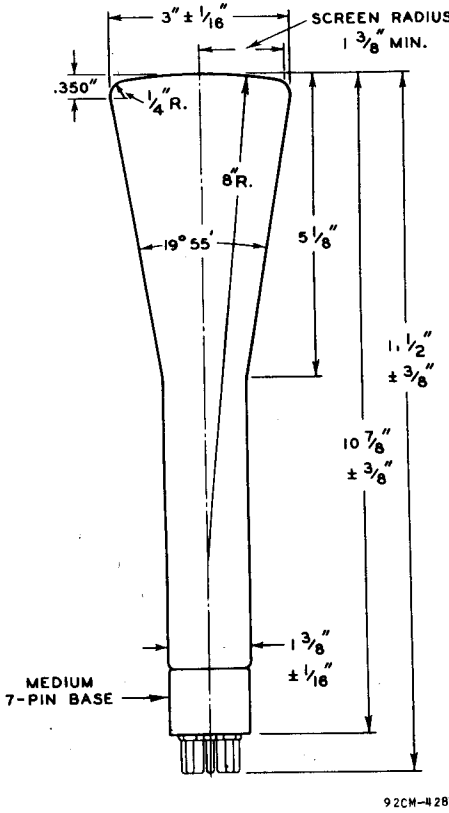


C1: 0.1 μf
C2: 1.0 μf
C3 C4 C5 C6: 0.05-μf Blocking Capacitors*
R1 R2: 1.5 Megohms
R3: ¼ Megohms
R4: 2-Megohm Potentiometer
R5: 1.0 Megohm
R6: 0.5-Megohm Potentiometer
R7 R8: Dual 3-Megohm Potentiometer
R9 R10: 2-Megohms

*When cathode is grounded, capacitors should have high voltage rating; when anode No.2 is grounded, they may have low voltage rating. For dc amplifier service, deflecting electrodes should be connected direct to amplifier output. In this service, it is preferable usually to remove deflecting-electrode resistors to minimize loading effect on amplifier. In order to minimize spot defocusing, it is essential that anode No.2 be returned to a point in the amplifier system which will give the lowest possible potential difference between anode No.2 and the deflecting electrodes.

908-A

OSCILLOGRAPH TUBE

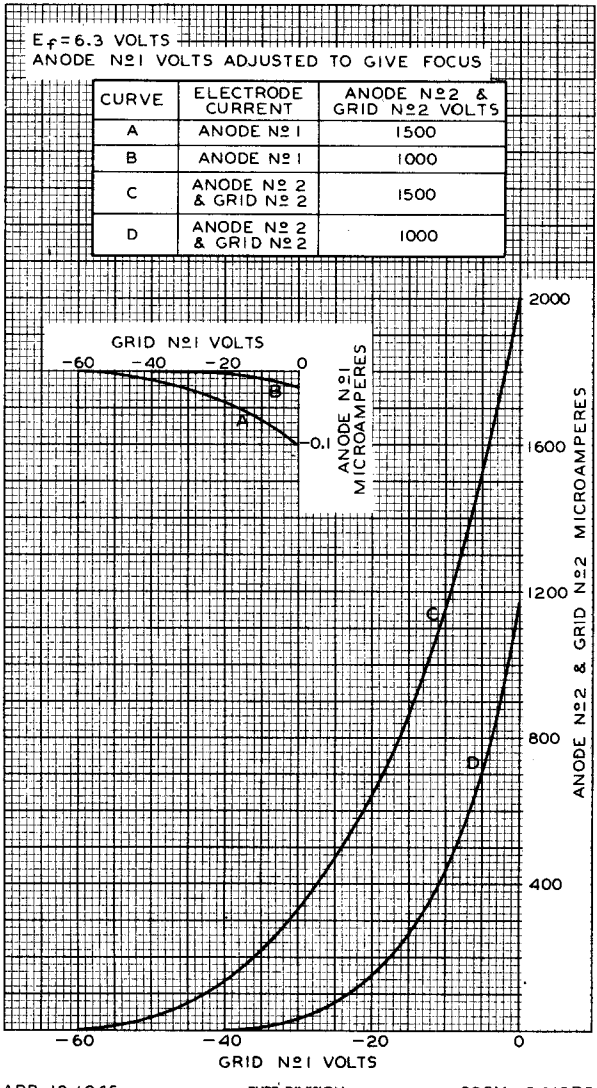


℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

908-A

AVERAGE CHARACTERISTICS



CURVE	ELECTRODE CURRENT	ANODE Nº2 & GRID Nº2 VOLTS
A	ANODE Nº 1	1500
B	ANODE Nº 1	1000
C	ANODE Nº 2 & GRID Nº 2	1500
D	ANODE Nº 2 & GRID Nº 2	1000

Obsolete

909 910

909
HIGH-VACUUM CATHODE-RAY TUBE

ELECTROSTATIC-DEFLECTION TYPE WITH 5" LONG-PERSISTENCE SCREEN FOR OSCILLOGRAPHIC USE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Fluorescent Screen:		
Material		Phosphor No.2
Pattern Color		Bluish White

For further ratings, operating conditions, dimensions, connections, circuit, and curve 92S-5409R1, refer to Type 905. The 909 and 905 are identical except for the screen material.

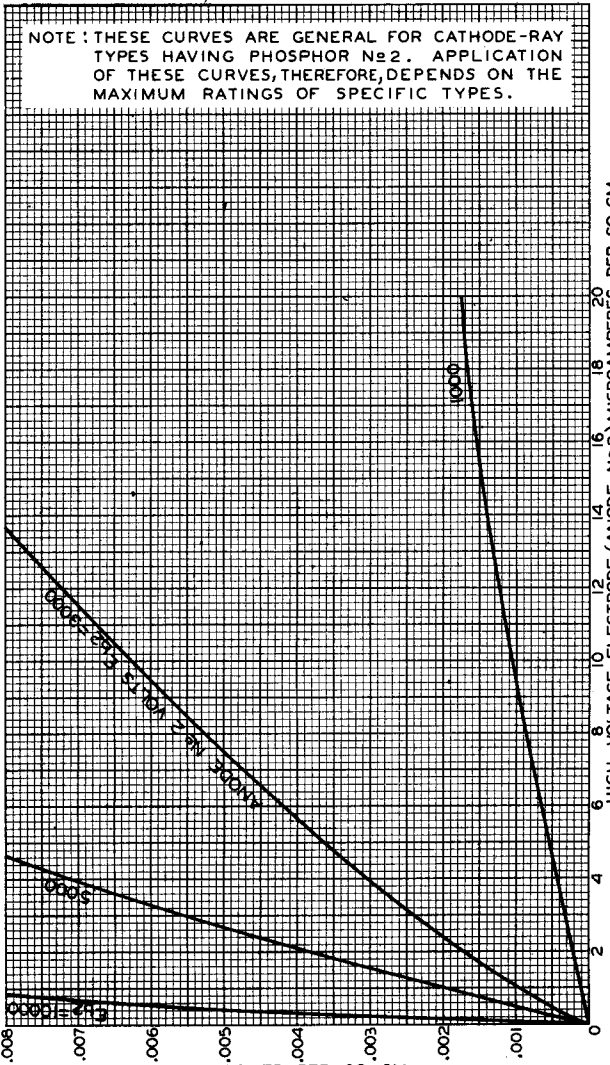
910
HIGH-VACUUM CATHODE-RAY TUBE

ELECTROSTATIC-DEFLECTION TYPE WITH 3" LONG-PERSISTENCE SCREEN FOR OSCILLOGRAPHIC USE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Fluorescent Screen:		
Material		Phosphor No.2
Pattern Color		Bluish White

For further ratings, operating conditions, and dimensions, refer to Type 908. See Type 906 for connections, circuit and Average Characteristics curve.

AVERAGE CHARACTERISTICS OF PHOSPHOR №2



OCT. 14, 1935

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4498

Obsolete

TYPES: 909, 910

AVERAGE FLUORESCENT-SCREEN CHARACTERISTICS

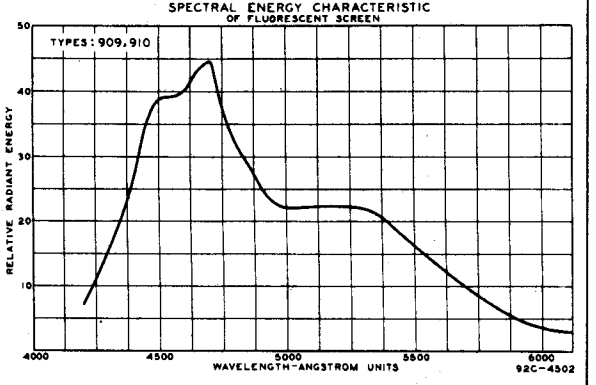
OCT. 11, 1935

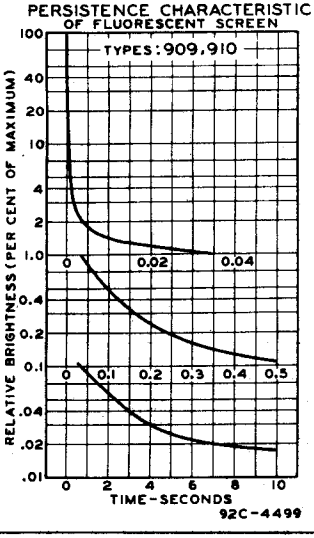
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4495

TYPES: 909, 910

CHARACTERISTICS CURVES

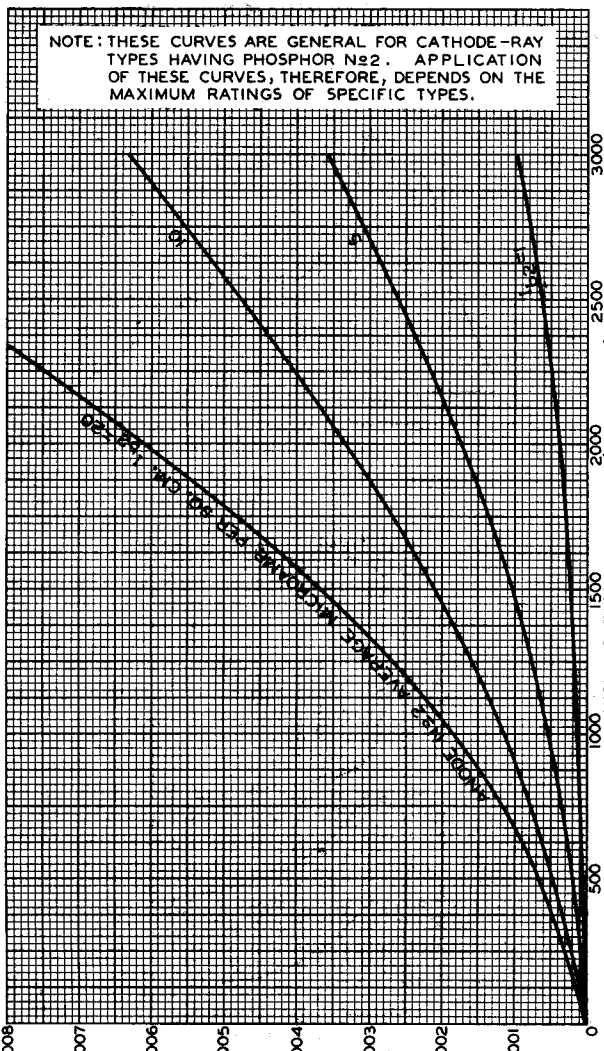




Obsolete

TYPES: 909, 910

AVERAGE FLUORESCENT-SCREEN CHARACTERISTICS



OCT. 11, 1935

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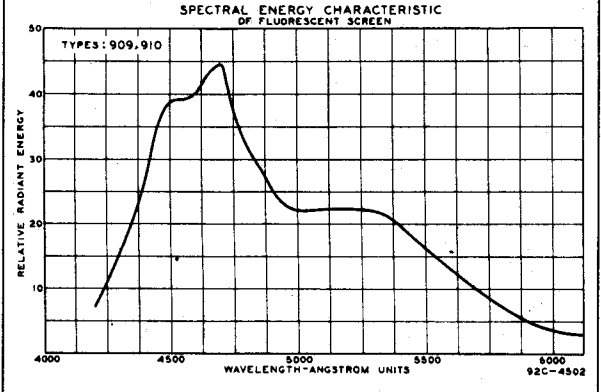
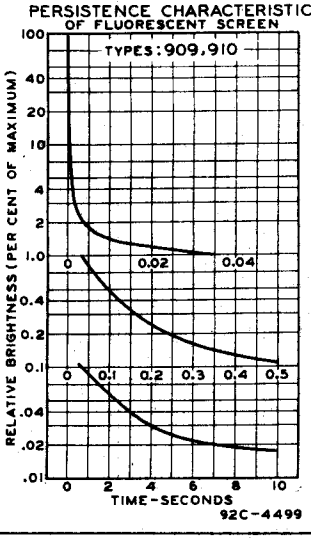
92C-4495

909
910

TYPES: 909, 910

CHARACTERISTICS CURVES





912

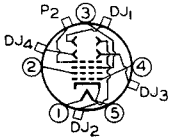
HIGH-VACUUM CATHODE-RAY TUBE

HIGH-INTENSITY ELECTROSTATIC-DEFLECTION TYPE
WITH 5" MEDIUM-PERSISTENCE SCREEN FOR OSCILLOGRAPHIC USE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Fluorescent Screen:		
Material		Phosphor No.1
Pattern Color		Greenish
Direct Interelectrode Capacitances:		
Grid to all other electrodes		14 max. μμf
DJ_1 to DJ_2		3 max. μμf
DJ_3 to DJ_4		1.5 max. μμf
Overall Length		16-1/2" ± 3/8"
Maximum Diameter		5-1/4" + 1/16" - 3/32"
Bulb		J-42
Caps:		
Anode No.2		Medium Metal
Deflecting Electrodes (Four)		Small Metal
Base		Medium 5-Pin Micanol ←

BOTTOM VIEW

Pin 1 - Heater
Pin 2 - Grid No.2
Pin 3 - Anode No.1
Pin 4 - Grid No.1
Pin 5 - Heater, Cathode
Single Medium Cap - Anode No.2
Cap Over Pin 3 } { Deflecting Electrode DJ_1



Cap Over Pins 1 & 5 } { Deflecting Electrode DJ_2
Cap Over Pin 2 } { Deflecting Electrode DJ_3
Cap Over Pin 4 } { Deflecting Electrode DJ_4

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

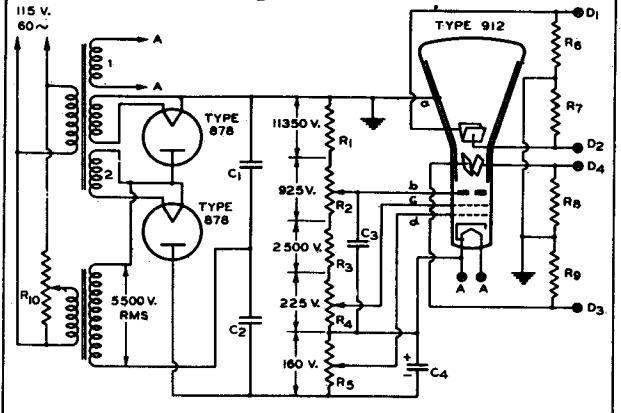
Maximum Ratings Are Based on a Line-Voltage Design Center of 117 Volts

High-Voltage Electrode (Anode #2) Voltage			15000 max.	volts
Focusing Electrode (Anode #1) Voltage			4500 max.	volts
Accelerating Electrode (Grid #2) Voltage			250 max.	volts
Control Electrode (Grid #1) Voltage			Never positive	
Grid Voltage for Current Cut-off *			-125 approx.	volts
Peak Voltage Between Anode #2 and any deflecting electrode			7000 max.	volts
Typical Operation:				
Heater Voltage	2.5	2.5	2.5	volts
Anode #2 Voltage	5000	10000	15000	volts
Anode #1 Voltage	1000	2000	3000	approx. volts
Grid #2 Voltage	250	250	250	volts
Grid #1 Voltage	Adjusted to give suitable luminous spot			
Deflection Sensitivity:				
DJ_1 to DJ_2	0.083	0.041	0.028	mm/volt d.c.
DJ_3 to DJ_4	0.102	0.051	0.034	mm/volt d.c.

* With maximum voltages on Anode #1 and Grid #2.
← Indicates a change.

912

TYPICAL OSCILLOGRAPH CIRCUIT USING THE 912 WITH VOLTAGE-DOUBLING POWER SUPPLY



C_1, C_2 = 0.5 μf, 10000 V.	R_3 = 0.55 MEGOHM, 20-WATT	a = ANODE №2
C_3 = 1.0 μf, 5000 V.	R_4 = 50000 OHMS, 2-WATT	b = ANODE №1
C_4 = 16 μf, 200 V.	R_5 = 35000 OHMS, 2-WATT	c = GRID №2
→ R_1 = 2.5 MEGOHMS, 75-WATT	R_6, R_7, R_8, R_9 = 2 TO 5 MEGOHMS	d = GRID №1
R_2 = 0.2 MEGOHM, 10-WATT	R_{10} = 100 OHMS, 600-WATT	

NOTE: AS THE TOTAL VOLTAGE ACROSS THE BLEEDER IS REDUCED BY MEANS OF R_{10}, THE ELECTRODE VOLTAGES ARE REDUCED IN CORRECT PROPORTION, EXCEPT FOR GRID NO.2 VOLTAGE; THIS MAY HAVE TO BE READJUSTED BY THE USE OF DIFFERENT VALUES FOR R_2 AND R_3. THEIR TOTAL RESISTANCE BEING KEPT THE SAME. CONDENSERS C_3 AND C_4 CAN BE OMITTED IF GRID-VOLTAGE SWITCHING (FOR HIGH-SPEED PHOTOGRAPHY) IS NOT CONTEMPLATED. FILAMENT WINDINGS NOS. 1 and 2 SHOULD BE INSULATED FOR 20000 VOLTS.

92C-4621R1

FLUORESCENT-SCREEN CHARACTERISTICS

CURVES SHOWING THE AVERAGE CHARACTERISTICS, SPECTRAL ENERGY CHARACTERISTIC, AND PERSISTENCE CHARACTERISTIC OF PHOSPHOR No.1 ARE SHOWN AT THE BEGINNING OF THIS SECTION.

→Indicates a change.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

912

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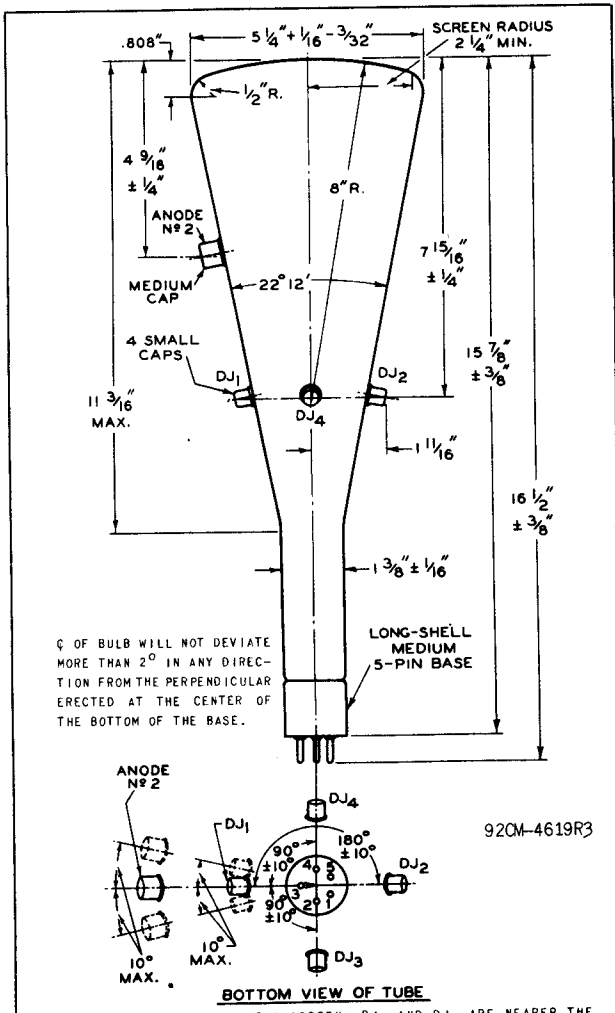
HIGH-VACUUM CATHODE-RAY TUBE



℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

BOTTOM VIEW OF TUBE

DJ_1 AND DJ_2 ARE NEARER THE SCREEN; DJ_3 AND DJ_4 ARE NEARER THE BASE. ANGLE BETWEEN $DJ_1 - DJ_2$ TRACE AND $DJ_3 - DJ_4$ TRACE IS 90° ± 6°.

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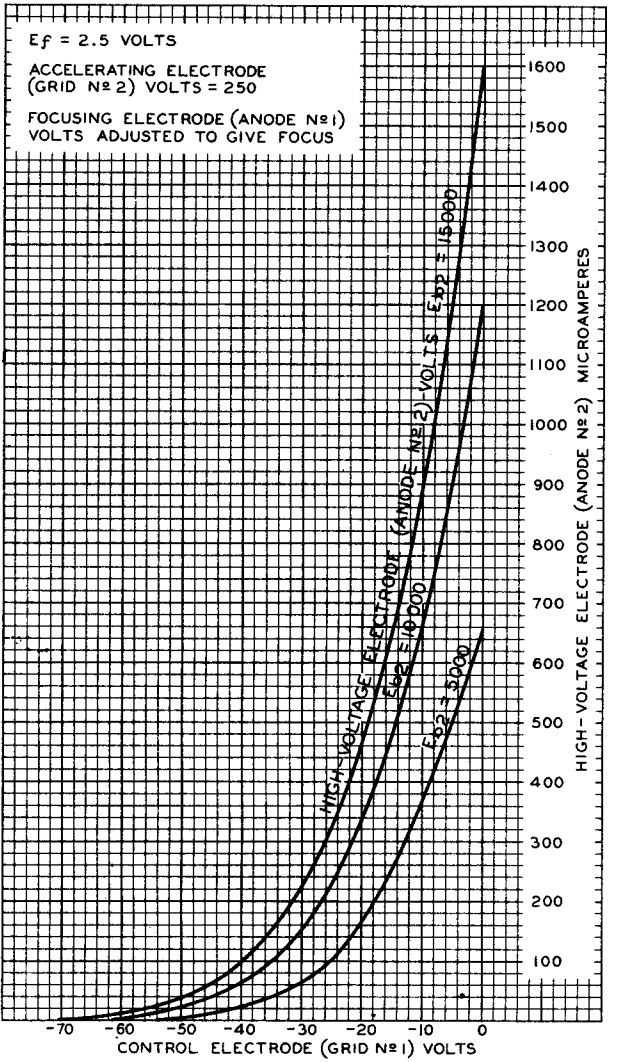
AVERAGE CHARACTERISTICS



913

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.6	amp.
Focus		Electrostatic ←
Deflection		Electrostatic ←

Electrodes DJ_1 and DJ_2 (upper): nearest to screen
Electrodes DJ_3 and DJ_4 (lower): nearest to base
DJ_1 is on the same side of tube as pins No.2 and No.4
DJ_3 is on the same side of tube as pins No.2 and No.8

Phosphor	No.1
Fluorescence	Green ←
Persistence	Medium
Direct Interelectrode Capacitances:	
Control Electrode (Grid) to All Other Electrodes	8 μμf
Deflecting Electrode DJ_1 to Deflecting Electrode DJ_2	2.5 μμf
Deflecting Electrode DJ_3 to Deflecting Electrode DJ_4	2.5 μμf
Maximum Overall Length	4-3/4"
Maximum Diameter	1-5/8" ←
Bulb	Metal Shell, MT-10
Base	Small Wafer Octal 8-Pin ←

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Maximum Ratings Are Based on a Line-Voltage Design Center of 117 Volts ←

High-Voltage Electrode (Anode No.2) Volt.		500 max.	volts
Focusing Electrode (Anode No.1) Volt.		200 max.	volts ←
Control Electrode (Grid) Volt.		Never positive	
Peak Voltage Between Anode No.2 and Any Deflecting Electrode		250 max.	volts
Grid Circuit Resistance		1.5 max.	megohms ←
Impedance of Any Deflecting-Electrode Circuit at Heater-Supply Frequency		1.0 max.	megohm ←
Typical Operation:			
Anode No.2 Voltage	250	500	volts
Anode No.1 Voltage □	50	100 approx.	volts
Grid Voltage ○	Adjusted to give suitable luminous spot		
Deflection Sensitivity:			
Electrodes DJ_1 & DJ_2	0.15	0.07	mm/volt d.c.
Electrodes DJ_3 & DJ_4	0.21	0.10	mm/volt d.c.

NOTE 1: Brilliance and definition decrease with decreasing anode voltages. In general the anode No.2 voltage should not be less than 250 volts. ←

NOTE 2: The d-c potential of each deflecting electrode is maintained essentially equivalent to that of anode No.2 by connecting resistors having values not greater than 10 megohms between each deflecting electrode and anode No.2. This arrangement by suitable choice of resistor values minimizes pattern distortion and pattern drift resulting from unbalanced potentials on the deflecting electrodes. The smaller the resistor values, the less the distortion for a given beam current. ←

□, ○: See next page.
← Indicates a change.

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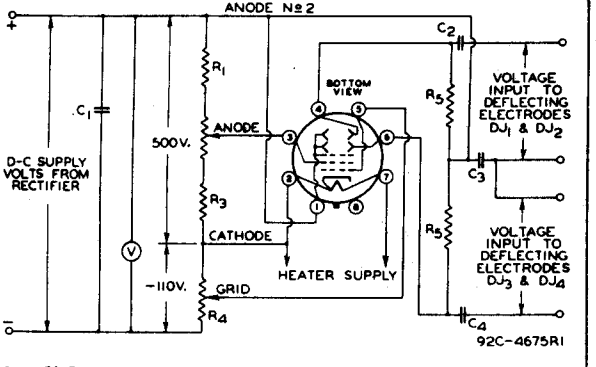
HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

→ a Supply should be adjustable to ± 30% of the value shown.
→ o Approximately 80% of Anode No.1 voltage is required for current cut-off when, in some applications, it is necessary to use the maximum permissible grid-circuit resistance.

Characteristic Curves of phosphor No.1 are shown at the beginning of this section.

TYPICAL OSCILLOGRAPH CIRCUIT



C_1 = FILTER CONDENSER
C_2, C_3, C_4 = SEE NOTE 3
$R_1 + R_2 + R_3 + R_4$ = BLEEDER POTENTIOMETER
R_1 = 0.200 MEGOHM
R_2 = 0.050 MEGOHM
R_3 = 0.030 MEGOHM
R_4 = 0.050 MEGOHM
R_5 = SEE NOTE 2 AT END OF DATA
V = VOLTMETER

NOTE 3: When the cathode or the negative end of the cathode-ray high-voltage supply is grounded, blocking condensers C_2, C_3, and C_4 should have a high voltage rating. When anode No.2 is grounded, C_3 may be omitted and C_2 and C_4 may be low-voltage condensers.

For d-c amplifier service, the deflecting electrodes should be coupled direct to the output of the amplifier by omitting the blocking condensers. In addition, it will usually be preferably to remove the associated deflecting electrode resistor in order to minimize the loading effect of the resistor on the d-c amplifier. With the resistor removed, it is essential, in order to minimize spot defocusing, that anode No.2 be returned to some point in the d-c amplifier circuit such that the potential difference between anode No.2 and the average voltage across the deflecting electrodes will be as low as possible.

→ Indicates a change.

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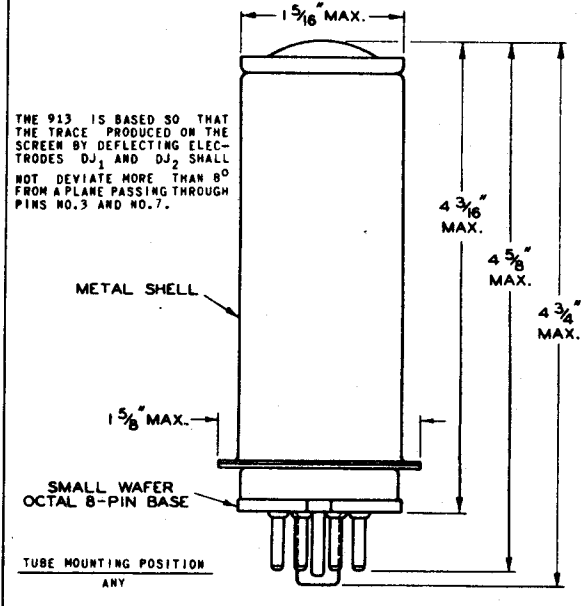
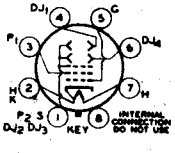
HIGH-VACUUM CATHODE-RAY TUBE



BOTTOM VIEW OF SOCKET CONNECTIONS

DJ_1 to DJ_4 = Deflecting Electrodes
P_2 = Anode No.2
P_1 = Anode No.1
G_2 = Grid No.2
G_1 = Control (Grid No.1) Electrodes
H = Heater
K = Cathode
S = Shell
NC = No Connection



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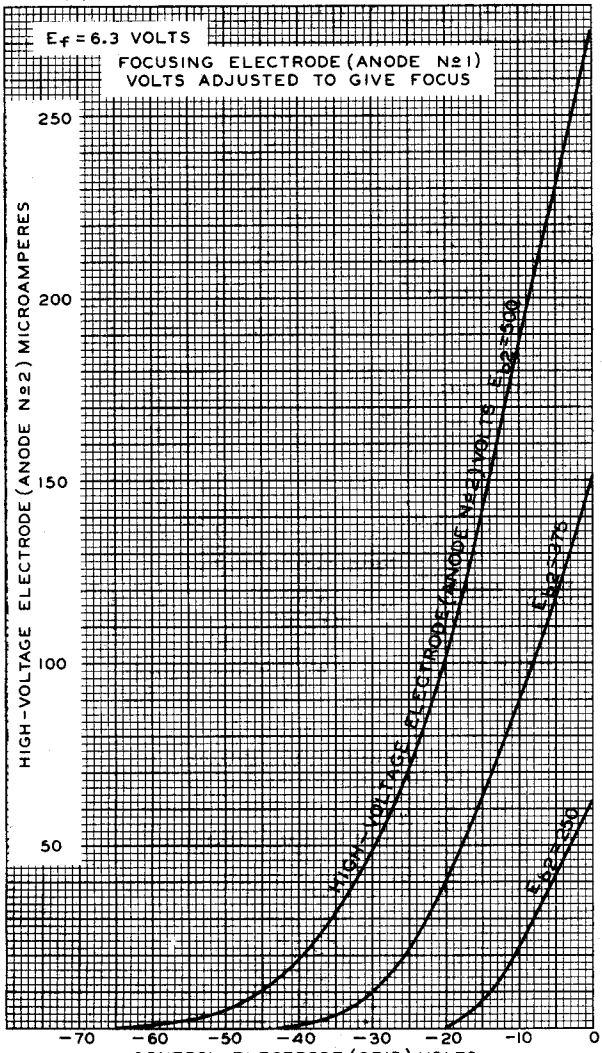
AVERAGE CHARACTERISTICS



914-A

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

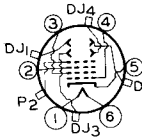
DATA

General:

Heater, for Unipotential Cathode:		
Voltage	2.5	ac or dc volts
Current	2.1	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	10.5	μμf
DJ_1 to DJ_2	2.0	μμf
DJ_3 to DJ_4	1.0	μμf
Phosphor (For Curves, see front of this Section)		No.1
Fluorescence		Green
Persistence		Medium
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Overall Length		20-1/16" ± 3/8"
Greatest Diameter of Bulb		9-1/4" ± 1/8"
Minimum Useful Screen Diameter		8-1/4"
Mounting Position		Any
Caps:		
Anode No.2		Medium
Deflecting Electrodes (Four)		Small
Base		Long Medium-Shell Small 6-Pin

BOTTOM VIEW

Pin 1 – Heater
Pin 2 – Anode No.1
Pin 3 – Grid No.2
Pin 4 – Grid No.1
Pin 5 – Cathode
Pin 6 – Heater
Single Medium Cap – Anode No.2
Cap over Pin 2 { Deflecting Electrode DJ_1



Cap over Pin 5 { Deflecting Electrode DJ_2
Cap over Pins 1 & 6 { Deflecting Electrode DJ_3
Cap over Pins 3 & 4 { Deflecting Electrode DJ_4

DJ_1 and DJ_2 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 2. With DJ_3 positive with respect to DJ_4, the spot is deflected toward pins 1 and 6.

The angle between the trace produced by DJ_1 and DJ_2 and its intersection with the plane through the tube axis and pin 2 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° ± 6°.

Maximum Ratings, *Design-Center Values*:

ANODE-No.2 VOLTAGE°	7000 max. volts
ANODE-No.1 VOLTAGE	1900 max. volts

° The product of anode-No.2 voltage and average anode-No.2 current should never exceed 6 watts.

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OSCILLOGRAPH TUBE

GRID No.2 VOLTAGE.	300 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 VOLTAGE BETWEEN ANODE No.2 AND ANY DEFLECTING ELECTRODE	3000 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 (Eb_2) between 1500 and 7000 volts**

Anode-No.1 Voltage. . .	15% to 26% of Eb_2	. . . .	volts
Grid-No.2 Voltage . . .	250	. . . .	volts
Max. Grid-No.1 Voltage for Visual Cutoff.	30% of Eb_2	. . . .	volts
Max. Anode-No.1 Current Range.	-15 to + 10	. . . .	μamp
Deflection Factors:			
DJ_1 to DJ_2.	38 to 54	v dc/in./kv of Eb_2	
DJ_3 to DJ_4.	30 to 44	v dc/in./kv of Eb_2	

→ **Examples of Use of Design Ranges:**

For Anode-No.2 Volt. of	*1500*	*2500*	*5000*	*7000*	*volts*
Anode-No.1 Voltage. .	225-390	375-650	750-1300	1050-1800	volts
Grid-No.2 Voltage . .	250	250	250	250	volts
Max. Grid-No.1 Volt. for Visual Cutoff	-75	-75	-75	-75	volts
Deflection Factors:					
DJ_1 to DJ_2.	57-81	93-135	190-270	266-378	v dc/in
DJ_3 to DJ_4.	45-66	75-110	150-220	210-308	v dc/in

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms
Resistance in Any Deflecting-Electrode Circuit□ . .	5 max.	megohms

→ **Minimum Circuit Values:**

The power supply should be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 5 milliamperes. If the supply permits the instantaneous short-circuit current to exceed 1 ampere, or is capable of storing more than 250 microcoulombs, the effective resistance in circuit between indicated electrode and the output

* Brilliance and definition decrease with decreasing anode-No.2 voltage. In general, anode-No.2 voltage should not be less than 1500 volts.

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

→ Indicates a change.

OSCILLOGRAPH TUBE

capacitor should be as follows:

Grid-No.1-Circuit Resistance.	150 min.	ohms
Grid-No.2-Circuit Resistance.	330 min.	ohms
Anode-No.1-Circuit Resistance	2000 min.	ohms
Anode-No.2-Circuit Resistance	8200 min.	ohms

The resistors should be capable of withstanding the applied voltages.

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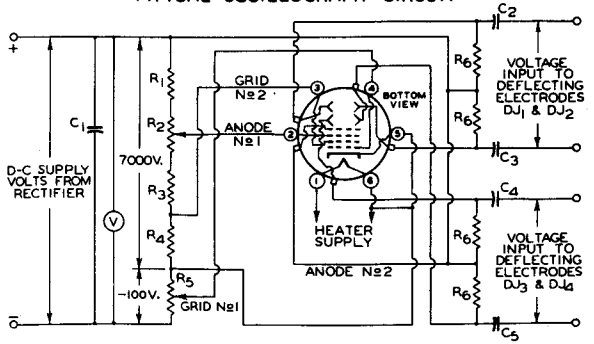
OSCILLOGRAPH TUBE

TYPICAL OSCILLOGRAPH CIRCUIT



92CS-4754R3

C_1 = FILTER CAPACITOR 0.5 to 2.0 μf
C_2, C_3, C_4, C_5 = SEE NOTE
$R_1 + R_2 + R_3 + R_4 + R_5$ = BLEEDER POTENTIOMETER
R_1 = 2.5 MEGOHMS
R_2 = 0.5 MEGOHM
R_3 = 0.375 MEGOHM
R_4 = 0.125 MEGOHM
R_5 = 0.050 MEGOHM
R_6 = SEE □ ON BACK OF DATA 1
V = VOLTMETER

NOTE: When the cathode or the negative end of the cathode-ray high-voltage supply is grounded, blocking capacitors C_2, C_3, C_4, and C_5 should have a high voltage rating. When anode No.2 is grounded, C_2, C_3, C_4, and C_5 may be low-voltage capacitors.

For dc amplifier service, the deflecting electrodes should be coupled direct to the output of the amplifier by omitting the blocking capacitors. In addition, it will usually be preferable to remove the associated deflecting-electrode resistor in order to minimize the loading effect of the resistor on the dc amplifier. With the resistor removed, it is essential, in order to minimize spot defocusing, that anode No.2 be returned to some point in the dc amplifier circuit such that the potential difference between anode No.2 and the average voltage across the deflecting electrodes will be as low as possible.

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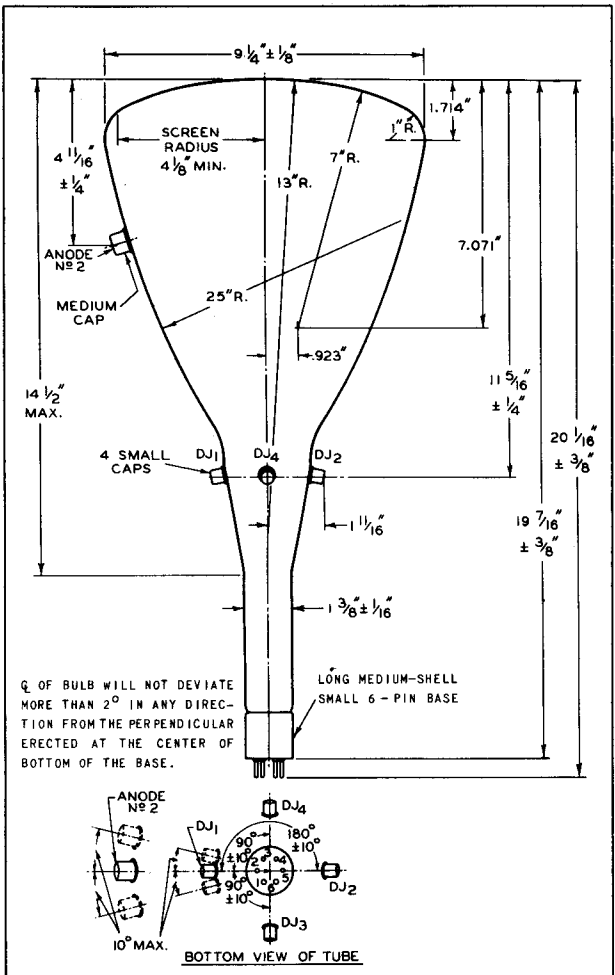
OSCILLOGRAPH TUBE



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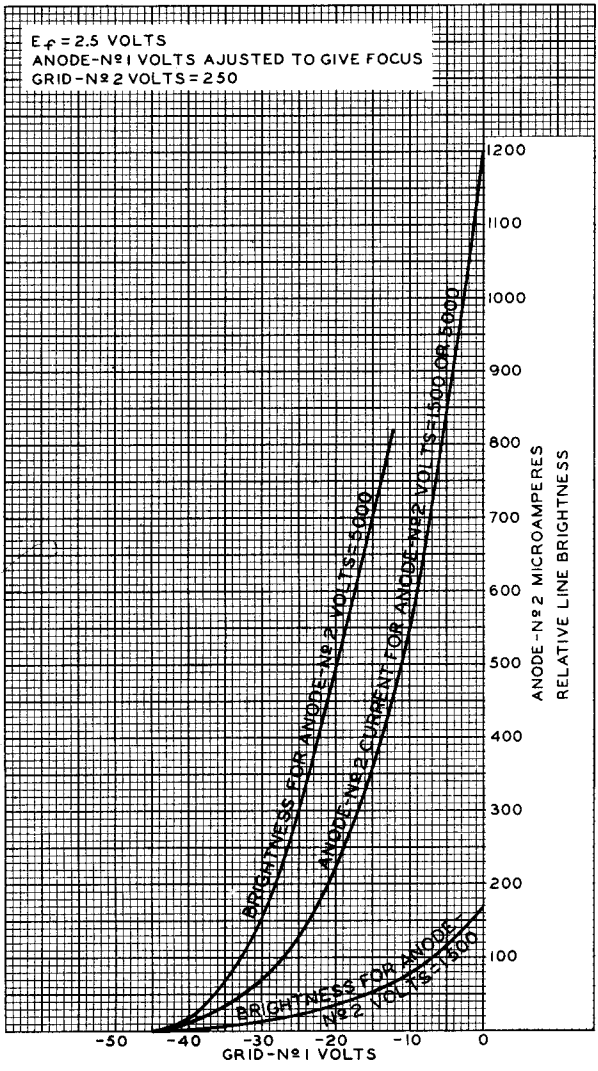
AVERAGE CHARACTERISTICS



RCA

1850-A

ICONOSCOPE

FOR PICKUP FROM MOTION-PICTURE FILM OR SLIDES

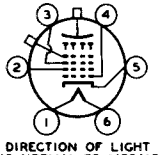
DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	6.5	μμf
Signal Electrode to Grid No.4[o]	10	μμf
Mosaic, Photosensitive:		
Response		See Curve
Useful Size of Rectangular Image (4 x 3 Aspect Ratio)	5.75" max.	diagonal ←
Focusing Method		Electrostatic
Deflection Method		Magnetic
Deflection Angle (Approx.)		55[o] ←
Max. Width of Mounted Tube		8-1/8"
Height of Mounted Tube		10-3/16" ± 3/4"
Depth of Mounted Tube		12-13/16" ± 3/4"
Mounting Position		Mosaic in vertical plane
Minimum Deflecting-Coil Inside Diameter		1-1/2" ←
Maximum Deflecting-Coil Length		2-1/4" ←
Caps (Two)		Medium (JETEC No.C1-5)
Base		Long Medium-Shell Small 6-Pin

BOTTOM VIEW

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



DIRECTION OF LIGHT IS NORMAL TO MOSAIC

Caps { See Outline Drawing
S_j - Signal Electrode
G_4 - Grid No.4 (Collector)

Maximum Ratings, *Absolute Values*:

AVERAGE MOSAIC ILLUMINATION•	50 max.	ft-c ←
OPERATING TEMPERATURE OF BULB AT LARGE END OF TUBE	40 max.	°C ←
SIGNAL-ELECTRODE VOLTAGE	1200 max.	volts
GRID-No.4 (COLLECTOR) VOLTAGE	1200 max.	volts
GRID-No.3 VOLTAGE	450 max.	volts
GRID-No.2 VOLTAGE	1200 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	10 max.	volts
GRID-No.4 CURRENT	0.5 max.	μamp

[o] With external shield.

• Averaged over any interval of 1 sec. max.

← Indicates a change.

1850-A
ICONOSCOPE

Typical Operation and Characteristics:		
Signal-Electrode Voltage	1000	volts
Grid-No.4 Voltage	1000	volts
Grid-No.3 Voltage (Beam Focus)— 24% to 36% of Grid-No.4 Voltage	240 to 360	volts
Grid-No.2 Voltage	1000	volts
→ Max. Grid-No.1 Voltage for Pattern Cutoff— 7% of Grid-No.4 Voltage	-70	volts
→ Grid-No.4 Current (With no illumination on mosaic)*	0.1 to 0.2	μamp
External Load Resistance	0.1	megohm
→ Illumination on Mosaic:		
Steady Highlight Value for Slides	4 to 6	ft-c
Average Pulsed Highlight Value for Motion-Picture Film	10 to 20	ft-c
→ Ratio of Peak-to-Peak Highlight Video-Signal Current to RMS Noise Current (Approx.)	100	
→ Minimum Peak-to-Peak Blanking Voltage	20	volts
→ Deflecting-Coil Current (Approx.):**		
Horizontal (Peak to peak)	600	ma
Vertical (Peak to peak)	140	ma
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	1.0 max.	megohm

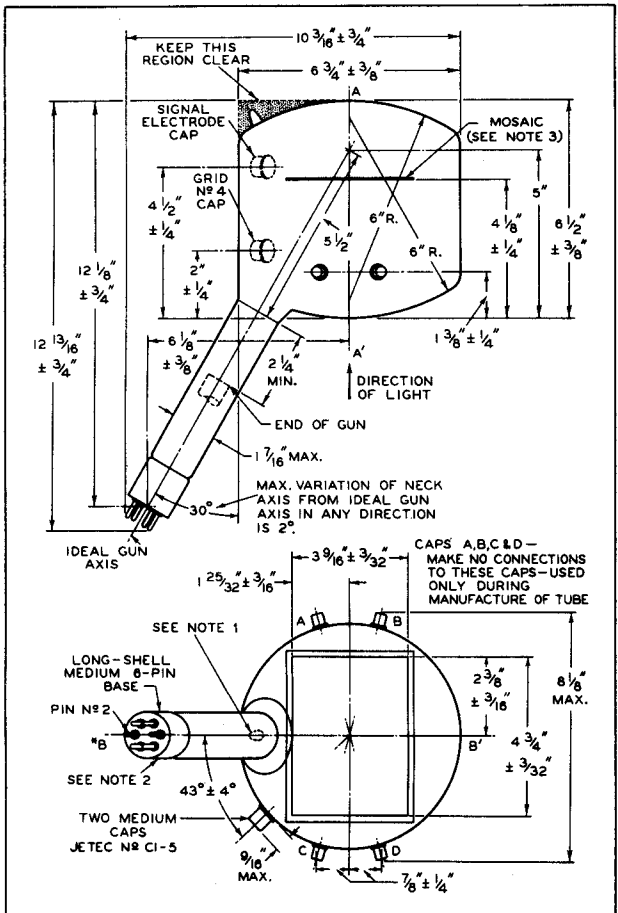
* Allowance should be made for leakage currents.

** For RCA Deflecting Yoke No. 201D76.

→ Indicates a change.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

1850-A
ICONOSCOPE



* BB' IS THE PLANE THROUGH THE BULB AXIS AA' AND THE IDEAL GUN AXIS.

← Indicates a change.

1850-A

1850-A

ICONOSCOPE

NOTE 1: VARIATION OF TIP CENTER FROM PLANE BB' IS 1/2".

NOTE 2: MAXIMUM ROTATION OF LINE THROUGH PINS 2 AND 5 ABOUT IDEAL GUN AXIS IS ± 10°, MEASURED FROM PLANE BB'.

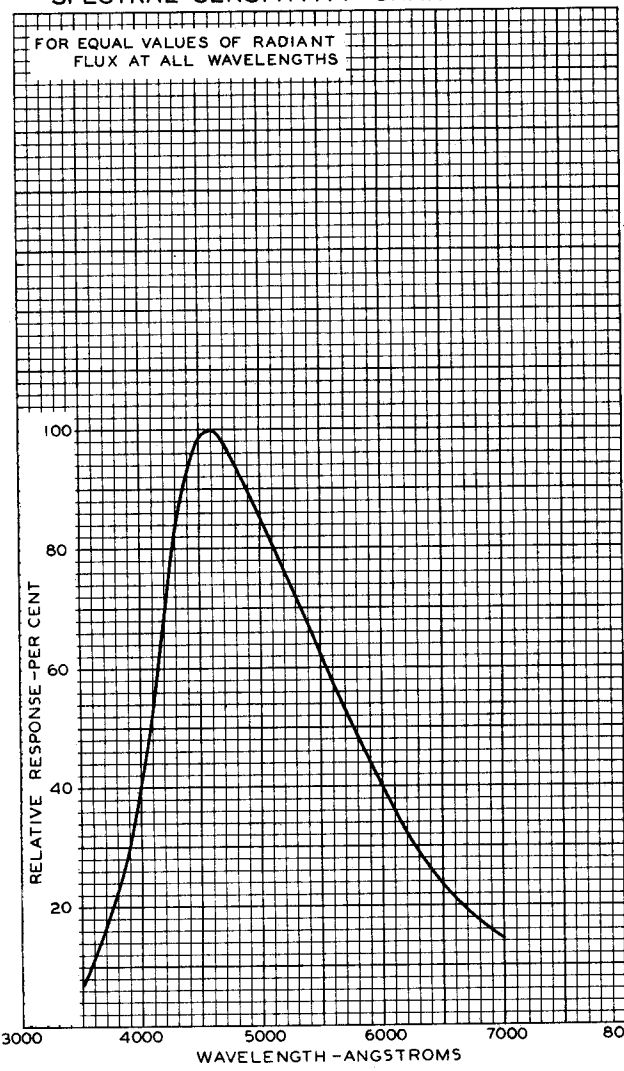
NOTE 3: DEVIATION OF PLANE OF MOSAIC FROM PLANE PERPENDICULAR TO THE BULB AXIS AA' IS 2.5° MAX. ROTATION OF MOSAIC ABOUT THE BULB AXIS AA' WITH RESPECT TO A LINE OF INTERSECTION FORMED BY MOSAIC PLANE AND PLANE BB' IS 2.5° MAX.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

1850-A

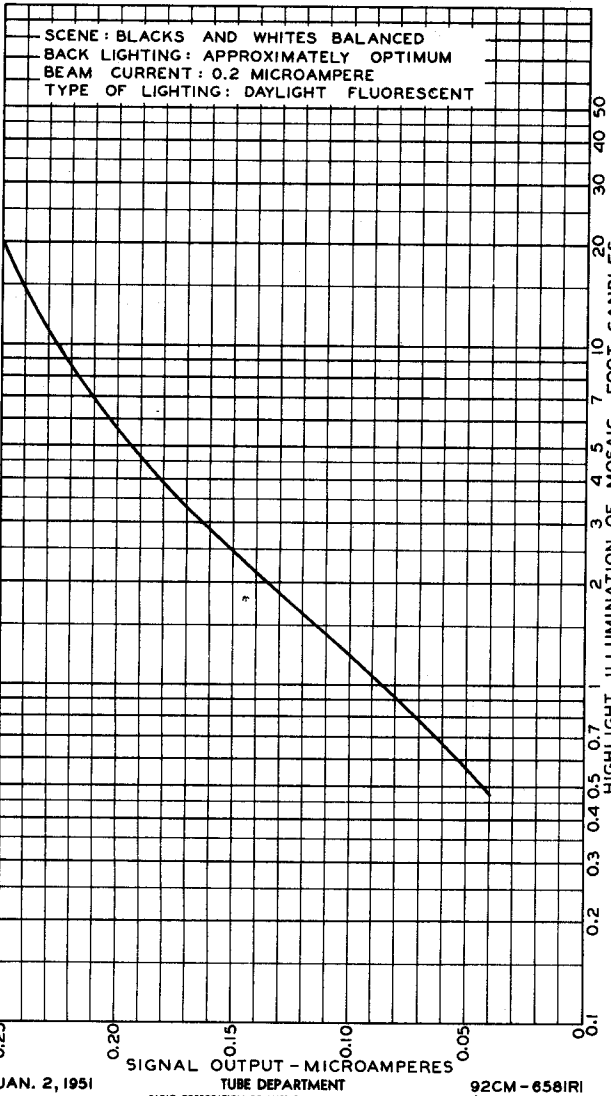
SPECTRAL SENSITIVITY CHARACTERISTIC



RCA

1850-A

TYPICAL SIGNAL-OUTPUT CHARACTERISTIC



JAN. 2, 1951

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6581RI

Obsolete

1898

MONOSCOPE

3" ELECTROSTATIC-DEFLECTION TYPE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Pattern:		
Type		Girl's Head
Diameter		2-5/8"
Direct Interelectrode Capacitances:□		
Pattern Electrode to Anode #1	2.5	μμf
Deflecting Plate D_1 to All Other Electrodes	15	μμf
Deflecting Plate D_2 to All Other Electrodes	15.5	μμf
Grid to All Other Electrodes	11.6	μμf
Overall Length		11-7/8" ± 3/8"
Maximum Diameter		3-1/16"
Bulb		J-24
Cap		Skirted Miniature - Style A
Base		Medium 7-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

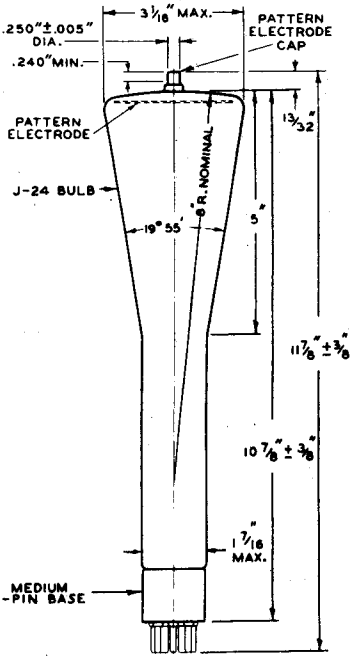
Pattern Electrode Voltage			1300 max.●	volts
Focusing Electrode #2 (Anode #2) Voltage			1200 max.●	volts
Focusing Electrode #1 (Anode #1) Voltage			500 max.●	volts
Control Electrode (Grid) Voltage			Never positive	
Pattern Electrode Dissipation/sq cm			1 max.●	mw
D-C Resistance between:				
Cathode and Grid			1 max.	megohm
Cathode and Deflecting Plate D_1			5 max.	megohm
Cathode and Deflecting Plate D_3			5 max.	megohm
Typical Operation:				
Heater Voltage	2.5	2.5	2.5	volts
Pattern Electrode Voltage	750	950	1150	volts
Anode #2 Voltage	800	1000	1200	volts
Anode #1 Voltage	240	300	360	approx.volts
Grid Voltage	Adjusted to give suitable resolution and signal amplitude			
Grid Voltage for Current Cut-off	-50	-60	-70	approx.volts
Vertical-Deflection Volt., # on Deflecting Plates $D_1 - D_2$	125	155	185	volts
Horizontal-Deflection Volt.,# on Deflecting Plates $D_3 - D_4$	135	170	200	volts
Internal Resistance between Anode #2 & Pattern Electrode	Greater than 1			megohm
Beam Current*	1	2	3	approx.μamp.
Pattern Electrode Signal Current, peak-to-peak value	1	2	3	approx.μamp.

□ Without external shielding.
● Design maximum for 117-volt line.
Peak-to-peak values of deflection voltages required for scanning largest rectangle having 4 : 3 aspect ratio and contained in pattern electrode.
* Determined by measurement of current to pattern electrode when operated 25-30 volts positive with respect to Anode #2.

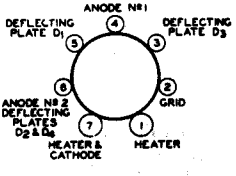
1898

1898

MONOSCOPE



TOP VIEW OF SOCKET CONNECTIONS



MOUNTING POSITION
NO RESTRICTIONS

DEC. 1, 1939

CE-6068

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

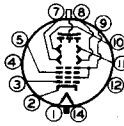
5527
ICONOSCOPE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

General:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):▲		
Grid No.1 to All Other Electrodes	7.5	μμf
Signal Electrode to All Other Electrodes and External Shield	5	μμf
Focusing Method	Electrostatic	
Deflection Method	Electrostatic	
Image Size (4 x 3 aspect ratio)	1.4" Diagonal	
Overall Length	9" ± 1/4"	
Seated Length	8-1/4" ± 1/4"	
Maximum Diameter	2-1/4"	
Mounting Position	Any	
Cap	Recessed Small Cavity	
Base	Medium-Shell Diheptal 12-Pin	
Basing Designation for BOTTOM VIEW	14L	

Pin 1 – Heater
Pin 2 – Cathode
Pin 3 – Grid No.1
Pin 4 – Internal Connection – Do Not Use
Pin 5 – Grid No.3
Pin 7 – Deflecting Electrode DJ_3
Pin 8 – Deflecting Electrode DJ_4



DIRECTION OF LIGHT: INTO END OF BULB

Pin 9 – Anode No.2, Grid No.4
Pin 10 – Deflecting Electrode DJ_2
Pin 11 – Deflecting Electrode DJ_1
Pin 12 – Internal Connection – Do Not Use
Pin 14 – Heater
Cap – Signal Electrode

Maximum Ratings, *Design-Center Values*:

SIGNAL-ELECTRODE VOLTAGE	900 max.	volts
GRID-No.4 & GRID-No.2 VOLTAGE	900 max.	volts
GRID-No.3 VOLTAGE	450 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	100 max.	volts
Positive bias value	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	10 max.	volts
AMBIENT TEMPERATURE	40 max.	°C
MOSAIC ILLUMINATION	50 max.	foot-candles

▲ With external shield.

5527

5527
ICONOSCOPE

Typical Operation:

Signal-Electrode Voltage	800	volts
Grid-No.4 & Grid-No.2 Voltage	800	volts
Grid-No.3 Voltage for Focus	125 to 250	volts
Grid-No.1 Voltage	Adjust for best picture	
Max. Grid-No.1 Voltage for Picture Cutoff	−75	volts
Max. Deflecting Voltages (Peak-to-Peak)*:		
DJ_1 & DJ_2 (Vertical)	120	volts
DJ_3 & DJ_4 (Horizontal)	100	volts
Min. Peak-to-Peak Blanking Voltage	30	volts
Signal-Output Current (Approx.)	0.025	μamp
Output Resistor (Approx.)	1.0	megohm

Maximum Circuit Values:

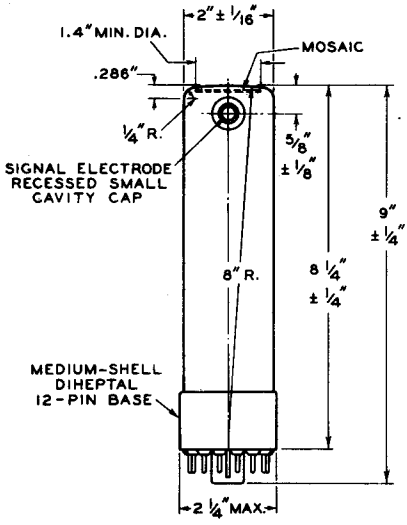
Grid-No.1-Circuit Resistance	1.0 max.	megohm
Resistance in any Deflecting-Electrode Circuit□	5.0 max.	megohms

* To scan picture of 1.4" diagonal (4 x 3 aspect ratio).

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

The SPECTRAL SENSITIVITY CHARACTERISTIC curve for the 5527 is the same as that shown for Type 1850-A.

5527
ICONOSCOPE



℄ OF BULB WILL NOT DEVIATE MORE THAN 2°. IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

THE PLANE THROUGH THE TUBE AXIS AND BASE-PLUG KEY MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND SIGNAL ELECTRODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 20°. SIGNAL ELECTRODE TERMINAL IS ON SAME SIDE AS BASE-PLUG KEY.

DJ1 AND DJ2 ARE NEARER THE MOSAIC; DJ3 AND DJ4 ARE NEARER THE BASE. WITH DJ1 POSITIVE WITH RESPECT TO DJ2, THE SPOT IS DEFLECTED TOWARD PIN 5. WITH DJ3 POSITIVE WITH RESPECT TO DJ4, THE SPOT IS DEFLECTED TOWARD PINS 1 AND 2. WITH DJ1 AND DJ2 USED FOR VERTICAL DEFLECTION, THE VERTICAL AXIS OF THE SCANNED AREA OF THE MOSAIC IS PARALLEL TO VERTICAL PLANE THROUGH PINS 5 AND 12 WITHIN ±15°. THE ANGLE BETWEEN THE SCANNING DIRECTION PRODUCED BY DJ3 AND DJ4 AND THE SCANNING DIRECTION PRODUCED BY DJ1 AND DJ2 IS 90° ± 3°.

92CS-6803

5820
IMAGE ORTHICON

MAGNETIC FOCUS — MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:
- Voltage . . . . . 6.3 ± 10% . . . ac or dc volts
- Current . . . . . 0.6 . . . . . amp

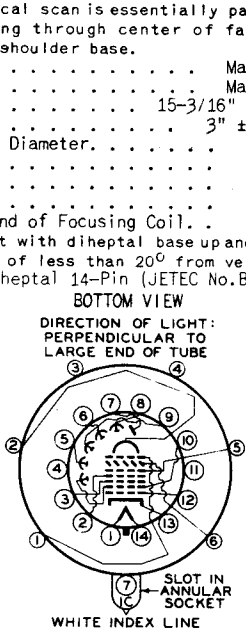
Direct Interelectrode Capacitance:
- Anode to All Other Electrodes 20 . . . . . μμf

Photocathode, Semi-Transparent:
- Response . . . . . See Curve
- Useful Size of Rectangular Image (4 x 3 aspect ratio) . . . . . 1.6" max. diagonal
- Orientation of Rectangular Image — Proper orientation is obtained when the vertical scan is essentially parallel to the plane passing through center of face plate and pin No.7 of the shoulder base.

Focusing Method . . . . . Magnetic
Deflection Method . . . . . Magnetic
Overall Length . . . . . 15-3/16" ± 1/4" ←
Greatest Diameter of Bulb . . . . . 3" ± 1/16"
Minimum Deflecting-Coil Inside Diameter . . . . . 2-1/8"
Deflecting-Coil Length . . . . . 5"
Focusing-Coil Length . . . . . 10"
Alignment-Coil Length . . . . . 15/16"
Photocathode Distance Inside End of Focusing Coil . . 1/2"
Operating Position: Any except with diheptal base up and tube axis at angle of less than 20° from vertical
End Base . . . Small-Shell Diheptal 14-Pin (JETEC No.B14-45)

Pin 1 – Heater
Pin 2 – Grid No.4
Pin 3 – Grid No.3
Pin 4 – Internal Connection—Do Not Use
Pin 5 – Dynode No.2
Pin 6 – Dynode No.4
Pin 7 – Anode
Pin 8 – Dynode No.5
Pin 9 – Dynode No.3
Pin 10 – Dynode No.1, Grid No.2
Pin 11 – Internal Connection—Do Not Use
Pin 12 – Grid No.1
Pin 13 – Cathode
Pin 14 – Heater

BOTTOM VIEW



Shoulder Base . . . . . Keyed Jumbo Annular 7-Pin
Pin 1 – Grid No.6
Pin 2 – Photocathode
Pin 3 – Internal Connection—Do Not Use
Pin 4 – Internal Connection—Do Not Use
Pin 5 – Grid No.5
Pin 6 – Target
Pin 7 – Internal Connection—Do Not Use

← Indicates a change.

5820
IMAGE ORTHICON

Maximum Ratings, *Absolute Values*:		
PHOTOCATHODE VOLTAGE	−550 max.	volts
PHOTOCATHODE ILLUMINATION	50 max.	ft-c
OPERATING TEMPERATURE OF ANY PART OF BULB	65 max.	°C
OPERATING TEMPERATURE OF BULB AT LARGE END OF TUBE (Target Section)	35 min.	°C
TEMPERATURE DIFFERENCE BETWEEN TARGET SECTION AND ANY PART OF BULB HOTTER THAN TARGET SECTION	5 max.	°C
GRID-No.6 VOLTAGE	−550 max.	volts
TARGET VOLTAGE:		
Positive value	50 max.	volts
Negative value	50 max.	volts
GRID-No.5 VOLTAGE	150 max.	volts
GRID-No.4 VOLTAGE	300 max.	volts
GRID-No.3 VOLTAGE	400 max.	volts
GRID-No.2 & DYNODE-No.1 VOLTAGE	350 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	10 max.	volts
ANODE-SUPPLY VOLTAGE⊕	1650 max.	volts
VOLTAGE PER MULTIPLIER STAGE	350 max.	volts

Typical Operation:		
Photocathode Voltage (Image Focus)	−300 to −500	volts
Grid-No.6 Voltage (Accelerator)—		
→ 75% of photocathode voltage	−225 to −375	volts
Target Voltage●	0	volts
Grid-No.5 Voltage (Decelerator)●●	0 to 100	volts
Grid-No.4 Voltage (Beam Focus)	160 to 240	volts
Grid-No.3 Voltage✱	225 to 330	volts
Grid-No.2 & Dynode-No.1 Voltage	300	volts
Grid-No.1 Voltage (For Picture Cutoff)	−45 to −115	volts
Dynode-No.2 Voltage	600	volts
Dynode-No.3 Voltage	880	volts
Dynode-No.4 Voltage	1160	volts
Dynode-No.5 Voltage	1450	volts
Anode Voltage	1500	volts
Anode Current	50	μamp
Target Temperature Range	35 to 60	°C

⊕ Ratio of dynode voltages is shown under Typical Operation.

● Adjustable from −3 to + 5 volts with blanking voltage off.

●● Taps at 0, 30, 60, and 90 volts are recommended. Set at voltage giving most uniform resolution and signal output over entire picture area.

✱ Adjust to give the most uniformly shaded picture near maximum signal.

→ Indicates a change

5820
IMAGE ORTHICON

Highlight Illumination on Photocathode for Maximum Signal Output: With 2870°K Tungsten Illumination, Daylight, or White Fluorescent Illumination. . . .	0.01	ft-c
Ratio of Peak-to-Peak Highlight Video-Signal Cur. to RMS Noise Current (Approx.)	35	
Minimum Peak-to-Peak Blanking Voltage. . .	10	volts
Field Strength at Center of Focusing Coil.	75	gausses
Focusing-Coil Current (Approx. for coil listed below)□.	75	ma
Deflecting-Coil Current (Approx. for assembly listed below):		
Horizontal (Peak to Peak).	625	ma
Vertical (Peak to Peak).	290	ma
Alignment-Coil Current (Approx. for coil listed below)	0 to 30	ma

Components:

Deflecting-Coil Assembly (Includes Keyed Jumbo Annular 7-Pin Socket). . .	RCA Type No. 201D75
Focusing-Coil Assembly	RCA Type No. 202D75
Alignment-Coil Assembly.	RCA Type No. 204D75
Hor. Deflection Output Transformer . . .	RCA Type No. 204T1
Ver. Deflection Output Transformer . . .	RCA Type No. 204T2

□ Direction of current should be such that a north-seeking pole is attracted to the image end of focusing coil.

OPERATING NOTES

After the 5820 has been inserted in its sockets and the voltages applied, allow it to warm up for 1/2 to 1 hour with the camera lens iris closed. Then, proceed with normal operating adjustments.

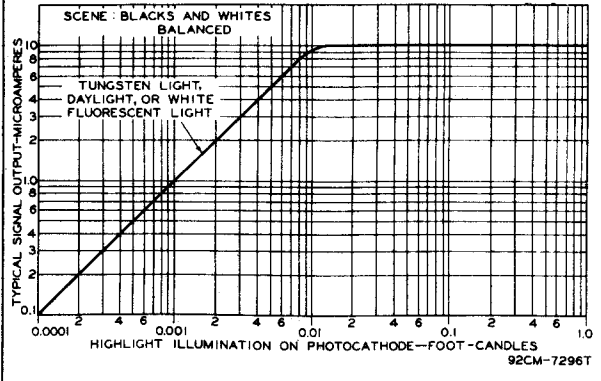
When the equipment design or operating conditions are such that the maximum temperature rating or maximum temperature difference will be exceeded, provision should be made to direct a blast of cooling air from the diheptal-base end of the tube along the entire length of the bulb surface, i.e., through the space between the bulb surface and the surrounding deflecting coil and its extension. For this purpose, a small blower is satisfactory, but it should run at low speed to prevent vibration of the 5820 and the associated amplifier equipment. Unless vibration is prevented, distortion of the picture may occur. To keep the operating temperature of the large end of the tube from falling below 35°C, some form of controlled heating should be employed. Ordinarily, adequate heat will be supplied by the focusing coil, deflecting coils, and associated amplifier tubes so that the temperature can be controlled by the amount of cooling air directed along the bulb surface.

5820
IMAGE ORTHICON

Resolution of better than 500 lines at the center of the picture can be produced by the 5820 when the highlight illumination from an RMA Standard Test Chart is above the knee of the typical signal-output curve for this type. To utilize such resolution capability in the horizontal direction with the standard scanning rate of 525 lines, it is necessary to use a video amplifier having a bandwidth of at least 6 megacycles. The maximum resolution obtainable is limited by the mesh-screen portion of the target.

On very bright days, it may not be possible to stop the lens down far enough to reduce the highlight illumination on the photocathode to a value near the knee of the signal-output curve. When such a condition is encountered, the use of a Wratten neutral filter selected to give the required reduction in illumination is recommended. Ordinarily, two filters—one having 5% transmission and the other 10%—will give sufficient choice.

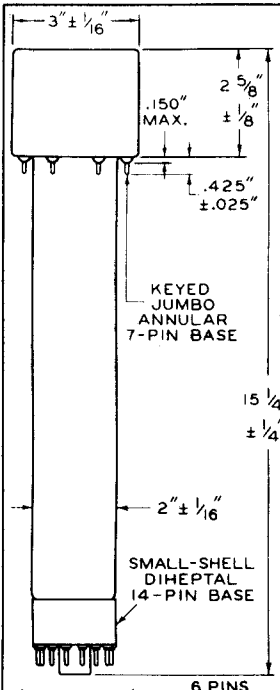
TYPICAL SIGNAL OUTPUT

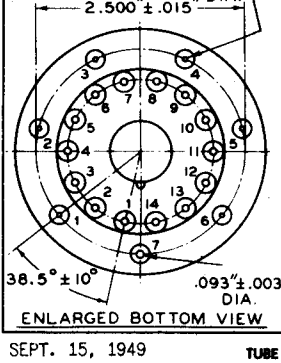


RCA

5820

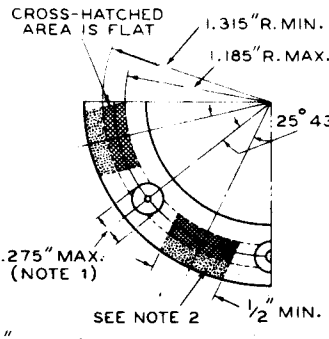
IMAGE ORTHICON





ENLARGED BOTTOM VIEW

DETAIL OF BOTTOM VIEW OF KEYED JUMBO ANNULAR BASE



NOTE 1: MEASURED AT DISTANCE OF 1/32" BELOW BOTTOM OF ANNULAR BASE.

NOTE 2: DOTTED AREA IS FLAT OR EXTENDS TOWARD DIHEPTAL-BASE END OF TUBE BY 0.060" MAX.

KEYED ANNULAR BASE GAUGE

ANGULAR VARIATIONS BETWEEN PINS AS WELL AS ECCENTRICITY OF NECK CYLINDER WITH RESPECT TO PHOTOCATHODE CYLINDER ARE HELD TO TOLERANCES SUCH THAT PINS AND NECK CYLINDER WILL FIT FLAT-PLATE GAUGE WITH:

a. SIX HOLES HAVING DIAMETER OF 0.065" ± 0.001" AND ONE HOLE HAVING DIAMETER OF 0.150" ± 0.001". ALL HOLES HAVE DEPTH OF 0.265" ± 0.001". THE SIX 0.065" HOLES ARE ENLARGED BY 45° TAPER TO DEPTH OF 0.047". ALL HOLES ARE SPACED AT ANGLES OF 51°26' ± 5' ON CIRCLE DIAMETER OF 2.500" ± 0.001".

b. SIX STOPS HAVING HEIGHT OF 0.187" ± 0.001", CENTERED BETWEEN PIN HOLES, TO BEAR AGAINST FLAT AREAS OF BASE.

c. RIM EXTENDING OUT A MINIMUM OF 1/8" FROM 2-13/16" DIAMETER AND HAVING HEIGHT OF 0.126" ± 0.001".

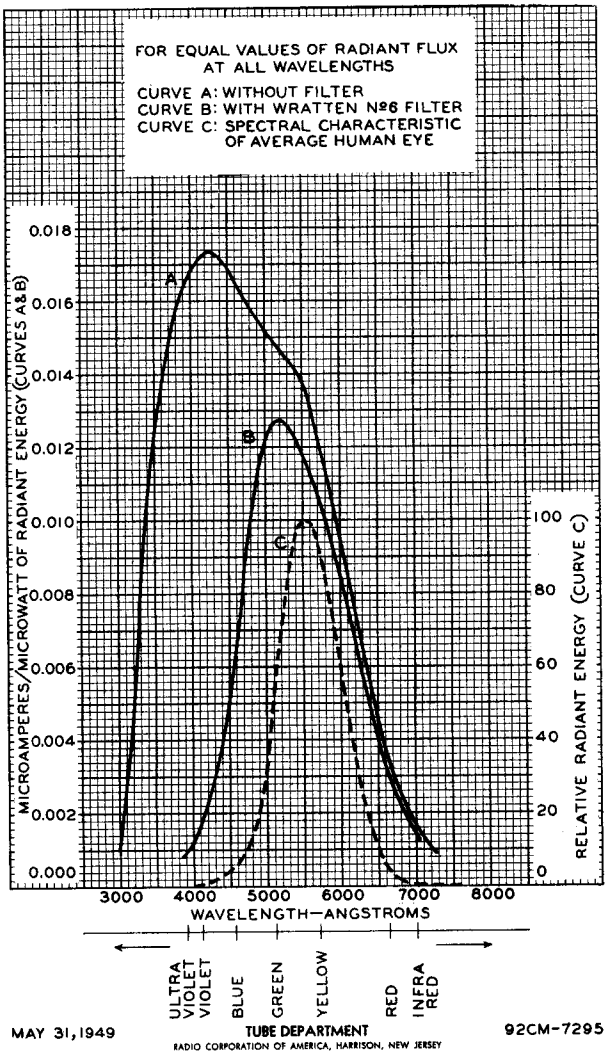
d. NECK-CYLINDER CLEARANCE HOLE HAVING DIAMETER OF 2.200" ± 0.001".

5820

RCA

5820

SPECTRAL SENSITIVITY CHARACTERISTIC WITH AND WITHOUT FILTER



MAY 31, 1949

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7295

5826

IMAGE ORTHICON

MAGNETIC FOCUS — MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:

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

Direct Interelectrode Capacitance:

Anode to All Other Electrodes	20	μμf

Photocathode, Semi-Transparent:

Response	See Curve
Useful Size of Rectangular Image (4 x 3 aspect ratio)	1.6" max. diagonal

Orientation of Rectangular Image— Proper orientation is obtained when the vertical scan is essentially parallel to the plane passing through center of face plate and pin No.7 of the shoulder base.

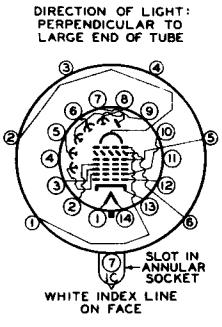
Focusing Method	Magnetic
Deflection Method	Magnetic
Overall Length	15-3/16" ± 1/4" ←
Greatest Diameter of Bulb	3" ± 1/16"
Minimum Deflecting-Coil Inside Diameter	2-1/8"
Deflecting-Coil Length	5"
Focusing-Coil Length	10"
Alignment-Coil Length	15/16"
Photocathode Distance Inside End of Focusing Coil	1/2"

Operating Position: Any except with diheptal base up and tube axis at angle of less than 20° from vertical

End Base . . . Small-Shell Diheptal 14-Pin (JETEC No.B14-45)

Pin 1 – Heater
Pin 2 – Grid No.4
Pin 3 – Grid No.3
Pin 4 – Internal Connection—Do Not Use
Pin 5 – Dynode No.2
Pin 6 – Dynode No.4
Pin 7 – Anode
Pin 8 – Dynode No.5
Pin 9 – Dynode No.3
Pin 10 – Dynode No.1, Grid No.2
Pin 11 – Internal Connection—Do Not Use
Pin 12 – Grid No.1
Pin 13 – Cathode
Pin 14 – Heater

BOTTOM VIEW



Shoulder Base . . . . . Keyed Jumbo Annular 7-Pin

Pin 1 – Grid No.6
Pin 2 – Photocathode
Pin 3 – Internal Connection—Do Not Use
Pin 4 – Internal Connection—Do Not Use
Pin 5 – Grid No.5
Pin 6 – Target
Pin 7 – Internal Connection—Do Not Use

← Indicates a change.

5826

5826

IMAGE ORTHICON

Maximum Ratings, *Absolute Values*:

PHOTOCATHODE VOLTAGE	−550 max.	volts
PHOTOCATHODE ILLUMINATION	50 max.	ft-c
OPERATING TEMPERATURE OF ANY PART OF BULB	65 max.	°C
→ OPERATING TEMPERATURE OF BULB AT LARGE END OF TUBE (Target Section)	35 min.	°C
TEMPERATURE DIFFERENCE BETWEEN TARGET SECTION AND ANY PART OF BULB HOTTER THAN TARGET SECTION	5 max.	°C
GRID-NO.6 VOLTAGE	−550 max.	volts
TARGET VOLTAGE:		
Positive value	50 max.	volts
Negative value	50 max.	volts
GRID-No.5 VOLTAGE	150 max.	volts
GRID-No.4 VOLTAGE	300 max.	volts
GRID-No.3 VOLTAGE	400 max.	volts
GRID-No.2 & DYNODE-No.1 VOLTAGE	350 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	10 max.	volts
ANODE-SUPPLY VOLTAGE⊕	1500 max.	volts
VOLTAGE PER MULTIPLIER STAGE	350 max.	volts

Typical Operation:

Photocathode Voltage (Image Focus)	−300 to −500	volts
Grid-No.6 Voltage (Accelerator)—		
→ 75% of photocathode voltage	−225 to −375	volts
Target Voltage●	0	volts
Grid-No.5 Voltage (Decelerator)●●	0 to 100	volts
Grid-No.4 Voltage (Beam Focus)	160 to 240	volts
Grid-No.3 Voltage##	225 to 330	volts
Grid-No.2 & Dynode-No.1 Voltage	300	volts
Grid-No.1 Voltage (For Picture Cutoff)	−45 to −115	volts
Dynode-No.2 Voltage	600	volts
Dynode-No.3 Voltage	800	volts
Dynode-No.4 Voltage	1000	volts
Dynode-No.5 Voltage	1200	volts
Anode Voltage	1250	volts
Anode Current	50	μa
→ Target Temperature Range	35 to 60	°C

⊕ Ratio of dynode voltages is shown under Typical Operation.

● Adjustable from −3 to + 5 volts with blanking voltage off.

●● Taps at 0, 30, 60, and 90 volts are recommended. Set at voltage giving most uniform resolution and signal output over entire picture area.

Adjust to give the most uniformly shaded picture near maximum signal.

→ Indicates a change

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5826

IMAGE ORTHICON

Highlight Illumination on Photocathode for Maximum Signal Output: With 2870°K Tungsten Illumination, White Fluorescent Illumination, or Daylight. .	0.04	ft-c
Ratio of Peak-to-Peak Highlight Video-Signal Cur. to RMS Noise Current (Approx.)	70	
Minimum Peak-to-Peak Blanking Voltage. . . .	10	volts
Field Strength at Center of Focusing Coil. .	75	gausses
Focusing-Coil Current (Approx. for coil listed below)□.	75	ma
Deflecting-Coil Current (Approx. for assembly listed below):		
Horizontal (Peak to Peak).	625	ma
Vertical (Peak to Peak).	290	ma
Alignment-Coil Current (Approx. for coil listed below)	0 to 30	ma

Components:

Deflecting-Coil Assembly (Includes Keyed Jumbo Annular 7-Pin Socket). . .	RCA Type No. 201D75
Focusing-Coil Assembly	RCA Type No. 202D75
Alignment-Coil Assembly.	RCA Type No. 204D75
Hor. Deflection Output Transformer . . .	RCA Type No. 204T1
Ver. Deflection Output Transformer . . .	RCA Type No. 204T2

□ Direction of current should be such that a north-seeking pole is attracted to the image end of focusing coil.

OPERATING NOTES

After the 5826 has been inserted in its sockets and the voltages applied, allow it to warm up for 1/2 to 1 hour with the camera lens iris closed. Then, proceed with normal operating adjustments.

When the equipment design or operating conditions are such that the maximum temperature rating or maximum temperature difference will be exceeded, provision should be made to direct a blast of cooling air from the diheptal-base end of the tube along the entire length of the bulb surface, i.e., through the space between the bulb surface and the surrounding deflecting coil and its extension. For this purpose, a small blower is satisfactory, but it should run at low speed to prevent vibration of the 5826 and the associated amplifier equipment. Unless vibration is prevented, distortion of the picture may occur. To keep the operating temperature of the large end of the tube from falling below 45°C, some form of controlled heating should be employed. Ordinarily, adequate heat will be supplied by the focusing coil, deflecting coils, and associated amplifier tubes so that the temperature can be controlled by the amount of cooling air directed along the bulb surface.

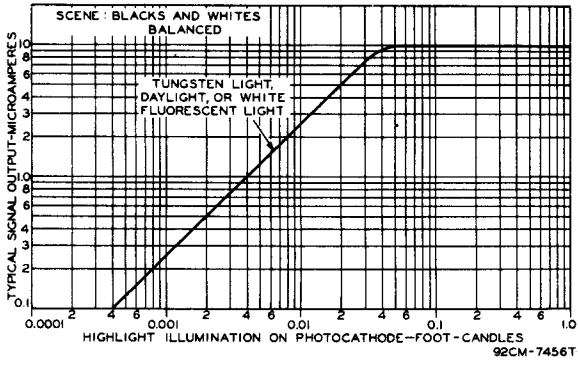
RCA

5826

IMAGE ORTHICON

Resolution of better than 500 lines at the center of the picture can be produced by the 5826 when the highlight illumination from an RMA Standard Test Chart is above the knee of the typical signal-output curve for this type. To utilize such resolution capability in the horizontal direction with the standard scanning rate of 525 lines, it is necessary to use a video amplifier having a bandwidth of at least 6 megacycles. The maximum resolution obtainable is limited by the mesh-screen portion of the target.

TYPICAL SIGNAL OUTPUT



SPECTRAL SENSITIVITY CHARACTERISTIC
and
OUTLINE DIMENSIONS
are the same as those shown for Type 5820

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6198

VIDICON

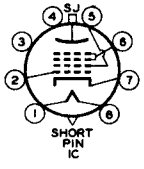
MAGNETIC FOCUS — MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitance:		
Signal Electrode to All Other Electrodes	4.5	μμf
Spectral Response		See Curve
Photoconductive Layer:		
Maximum Useful Diagonal of Rectangular Image (4 x 3 Aspect Ratio)	0.62	inch
Orientation of Quality Rectangle—Proper orientation is obtained when the horizontal scan is essentially parallel to the plane passing through the tube axis and short index pin.		
Focusing Method		Magnetic
Deflection Method		Magnetic
Overall Length		6-1/4" ± 1/4"
Greatest Diameter (Excluding Side Tip)		1.125" ± 0.010"
Maximum Radius (Including Side Tip)		0.805"
Bulb		T-8
Operating Position		Any
Base	Small-Button Ditetrar 8-Pin (JETEC No.E8-11)	

BOTTOM VIEW



Pin 1 – Heater
Pin 2 – Grid No.1
Pin 3 – Int. Conn.—Do Not Use
Pin 4 – Int. Conn.—Do Not Use
Pin 5 – Grid No.2
Pin 6 – Grid No.3, Grid No.4
Pin 7 – Cathode
Pin 8 – Heater
Flange (SJ) – Signal Electrode
Short Index Pin – Int. Conn.—Make No Conn.

DIRECTION OF LIGHT: INTO FACE END OF TUBE

Maximum Ratings, ***Absolute Values:***

SIGNAL-ELECTRODE VOLTAGE	125 max.	volts
GRID-No.4 & GRID-No.3 VOLTAGE	350 max.	volts
GRID-No.2 VOLTAGE	350 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	10 max.	volts
FACEPLATE TEMPERATURE	60 max.	°C

6198

6198

VIDICON

Typical Operation and Characteristics:

For scanned area of 1/2" x 3/8"

Signal-Electrode Voltage for Dark Current of 0.02 μamp	10 to 125	volts
Grid-No.4 (Decelerator) & Grid-No.3 (Beam Focus) Voltage	200 to 300	volts
Grid-No.2 (Accelerator) Voltage	300	volts
Grid-No.1 Voltage (For picture cutoff)	-45 to -100	volts
Signal-Output Current:*		
Normal Operating Range	0.1 to 0.2	μamp
Minimum, with 0.6 foot-candle of uniform 2870°K tungsten illumination on tube face	0.02	μamp
Uniform 2870°K Tungsten Illumination on Tube Face to Produce Signal-Output Current of 0.1 to 0.2 μamp	3 to 10	ft-c
Ratio (Approx.) of Tube-Face Illumination Required to Produce Signal-Output Current of 0.2 μamp to That Required to Produce 0.02 μamp	30	
Minimum Peak-to Peak Blanking Voltage:		
When applied to grid No.1	30	volts
When applied to cathode	10	volts
Field Strength at Center of Focusing Device	40	gausses
Field Strength of Adjustable Alignment Coil	0 to 4	gausses

* Defined as the component of the signal-electrode current after the dark-current component has been subtracted.

OPERATING CONSIDERATIONS

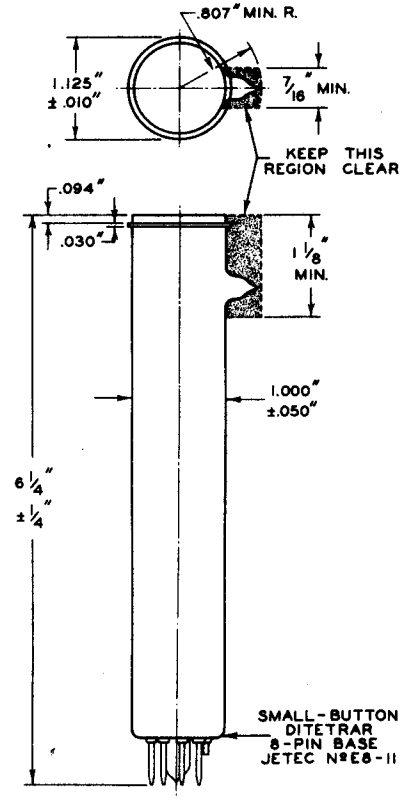
The *base pins* of the 6198 fit the ditetrar 8-pin connector such as Cinch No.54A18088, or equivalent.

Resolution of better than 350 lines at the center of the picture can be produced by the 6198. To utilize the resolution capability of the 6198 in the horizontal direction with the standard scanning rate of 525 lines, it is necessary to use a video amplifier having a bandwidth of at least 6 megacycles per second. The maximum resolution obtainable is limited by the size of the scanning-beam spot.

RCA

6198

VIDICON

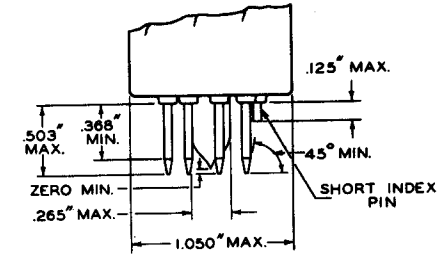


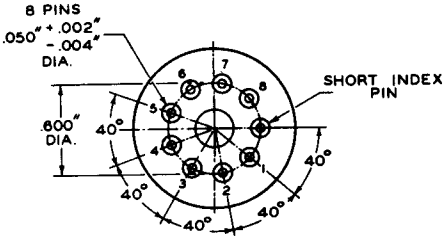
RCA

6198

VIDICON

SMALL-BUTTON DITETRAR
8-PIN BASE
JETEC NºE8-11





92CS-7765

Base-pin positions are held to tolerances such that pins will fit a flat-plate gauge having thickness of 1/4" and 9 holes 0.0700" ± 0.0005" so located on a 0.6000" ± 0.0005" diameter circle that the distance along the chord between any two adjacent hole centers is 0.2052" ± 0.0005". Gauge is provided with center hole having diameter of 0.300" ± 0.001" and same center as the pin circle.

RCA

6198

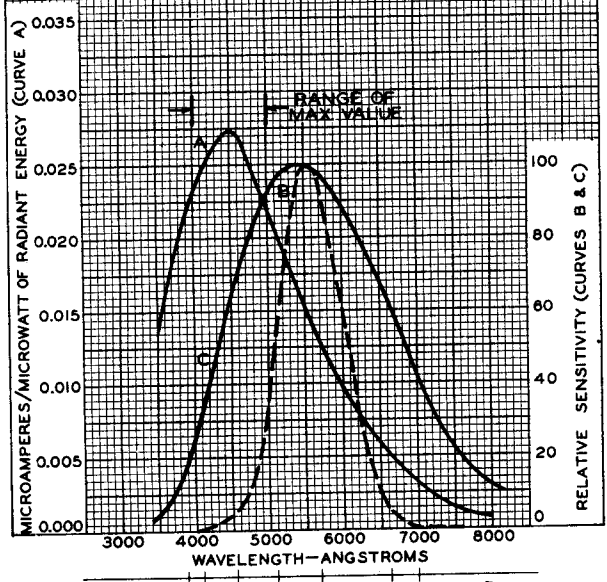
SPECTRAL SENSITIVITY CHARACTERISTIC

CURVE A: FOR EQUAL VALUES OF SIGNAL—OUTPUT CURRENT AT ALL WAVELENGTHS

SIGNAL—OUTPUT MICROAMPERES FROM SCANNED AREA OF $\frac{1}{2}$" x $\frac{3}{8}$" = 0.02

CURVE B: SPECTRAL CHARACTERISTIC OF AVERAGE HUMAN EYE

CURVE C: FOR EQUAL VALUES OF SIGNAL-OUTPUT CURRENT WITH RADIANT FLUX FROM TUNGSTEN SOURCE AT 2870° K



JUNE 18, 1952

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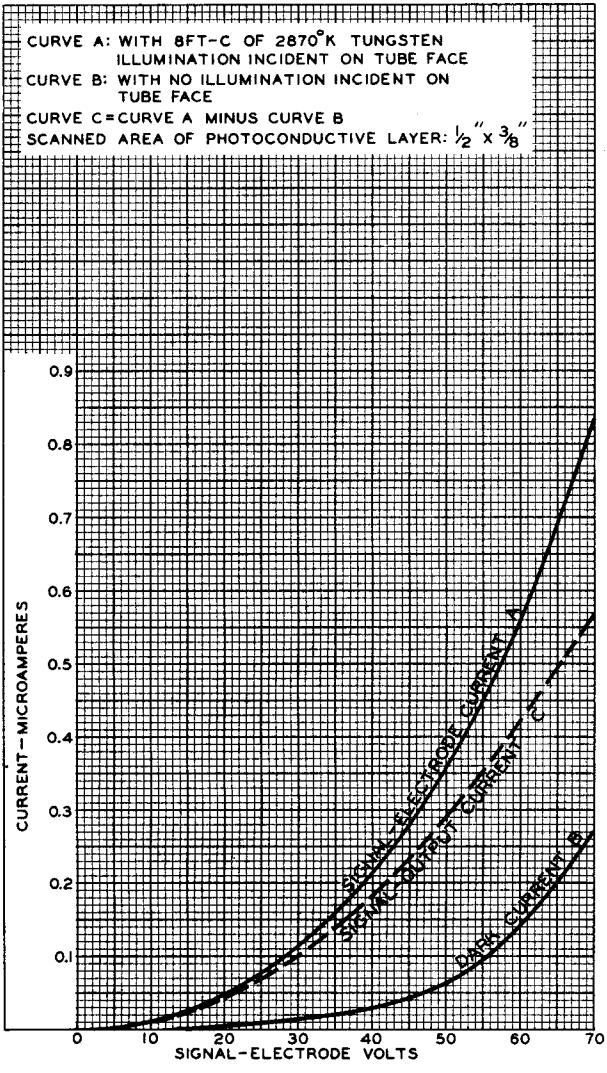
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7783RI

RCA

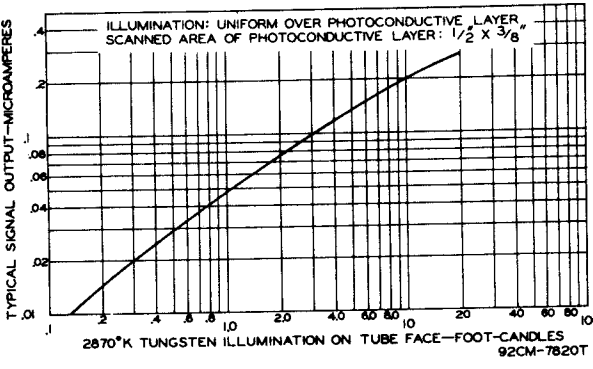
6198

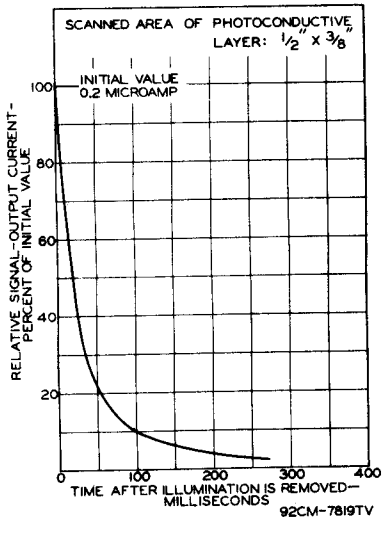
TYPICAL CHARACTERISTICS



6198

VIDICON





6326

VIDICON

FOR PICKUP FROM MOTION-PICTURE FILM
600-LINE RESOLUTION

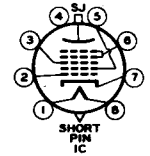
DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitance:♦		
Signal Electrode to All Other Electrodes	4.5	μμf
Spectral Response		See Curves
Photoconductive Layer:		
Maximum Useful Diagonal of Rectangular Image (4 x 3 Aspect Ratio)	0.62	inch
Orientation of Quality Rectangle—Proper orientation is obtained when the horizontal scan is essentially parallel to the plane passing through the tube axis and short index pin.		
Focusing Method		Magnetic
Deflection Method		Magnetic
Overall Length		6-1/4" ± 1/4"
Greatest Diameter (Excluding side tip)		1.125" ± 0.010"
Maximum Radius (Including side tip)		0.805"
Bulb		T-8
Operating Position		Approx. horizontal, or faceplate up
Weight (Approx.)		2 oz
Base		Small-Button Ditetrar 8-Pin (JETEC No.E8-11)

BOTTOM VIEW

Pin 1: Heater
Pin 2: Grid No.1
Pin 3: Grid No.3
Pin 4: Int. Conn.—Do Not Use
Pin 5: Grid No.2
Pin 6: Grid No.4, Grid No.5



DIRECTION OF LIGHT: INTO FACE END OF TUBE

Pin 7: Cathode
Pin 8: Heater
Flange (SJ): Signal Electrode
Short Index Pin: Int. Conn.—Make No Connection

Maximum Ratings, *Absolute Values:*

SIGNAL-ELECTRODE VOLTAGE	125 max.	volts
GRID-No.5 & GRID-No.4 VOLTAGE	350 max.	volts
GRID-No.3 VOLTAGE	350 max.	volts
GRID-No.2 VOLTAGE	350 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	10 max.	volts

♦ This capacitance, which effectively is the output impedance of the 6326, is increased by about 3 μμf when the tube is mounted in the RCA deflecting-yoke and focusing-coil assembly. The resistive component of the output impedance is in the order of 100 megohms.

6326
VIDICON

FACEPLATE:		
Illumination	1000 max.	ft-c
Temperature	60 max.	°C

Typical Operation with Static Focusing:

Grid No.3 connected to grids No.4 and No.5; scanned area of 1/2" x 3/8"

Faceplate Illumination:		
Average Highlight▲, for pickup from film	100 to 300	ft-c
Constant, for pickup from transparencies or opaques	10	ft-c
Signal-Electrode Voltage:		
For pickup from film	10 to 30	volts
For pickup from transparencies or opaques	30 to 60	volts
Grid-No.5 (Decelerator) and Grids-No.4 & No.3 (Beam-Focus Electrodes*) Voltage	200 to 300	volts
Grid-No.2 (Accelerator) Voltage	300	volts
Grid-No.1 Voltage for Picture Cutoff	-45 to -100	volts
Highlight Signal-Electrode Current	0.3 to 0.4	μamp
Average Signal-Output Current#	0.1 to 0.2	μamp
Maximum Dark Current:		
For pickup from film	0.004	μamp
For pickup from transparencies or opaques	0.02	μamp
Average "Gamma" of Transfer Characteristic for signal-output current between 0.02 μamp and 0.2 μamp	0.65	
Visual Equivalent Signal-to-Noise Ratio (Approx.)o	300:1	
Minimum Peak-to-Peak Blanking Voltage:		
When applied to grid No.1	40	volts
When applied to cathode	10	volts
Field Strength of Adjustable Alignment Coil	0 to 4	gausses

▲ Averaged over the time of one TV frame.

* Beam focus is obtained by combined effect of grids-No.4 & No.3 voltage which should be adjustable over indicated range, and RCA-217D1 Focusing Coil with 40 milliamperes passing through it.

\# Defined as the component of the signal-electrode current after the dark-current component has been subtracted.

o For amplifier system of the low-noise cascode type having 8-Mc bandwidth. Because the noise in such a system is predominately of the high-frequency type, the visual equivalent signal-to-noise ratio is taken as the ratio of highlight video-signal current to rms noise current, multiplied by a factor of 3.

6326
VIDICON

Typical Operation with Dynamic Focusing:

Grid No.3 used separately as Dynamic Focusing Electrode; scanned area of 1/2" x 3/8"

Values are the same as shown above for *Typical Operation with Static Focusing* except as follows:

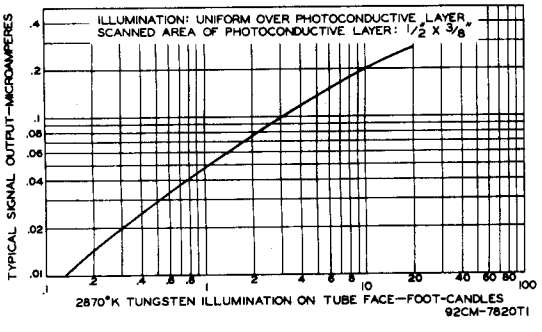
Grid-No.5 (Decelerator) and Grid-No.4 (Beam-Focus Electrode**) Voltage	200 to 300	volts
Grid-No.3 (Dynamic-Focus Electrode**) Voltage:		
DC value	200 to 300	volts
Peak-to-peak value (Approx.).	60	volts

** Static beam focus is obtained by combined effect of grid-No.4 voltage which should be adjustable over indicated range, and RCA-217D1 Focusing Coil with 40 milliamperes passing through it. Dynamic beam focus to give improved edge focus is supplementary to static beam focus and is accomplished by adjusting the dc grid-No.3 voltage to the same value as that of grid No.4 and by applying to grid No.3 an ac voltage having parabolic waveform.

BASE CONNECTOR

The *base pins* of the 6326 fit the ditetrar 8-contact connector, such as Cinch No.54A18088, or equivalent.

SPECTRAL SENSITIVITY CHARACTERISTIC,
DIMENSIONAL OUTLINE,
and
BASE DIMENSIONS
are the same as shown for Type 6198

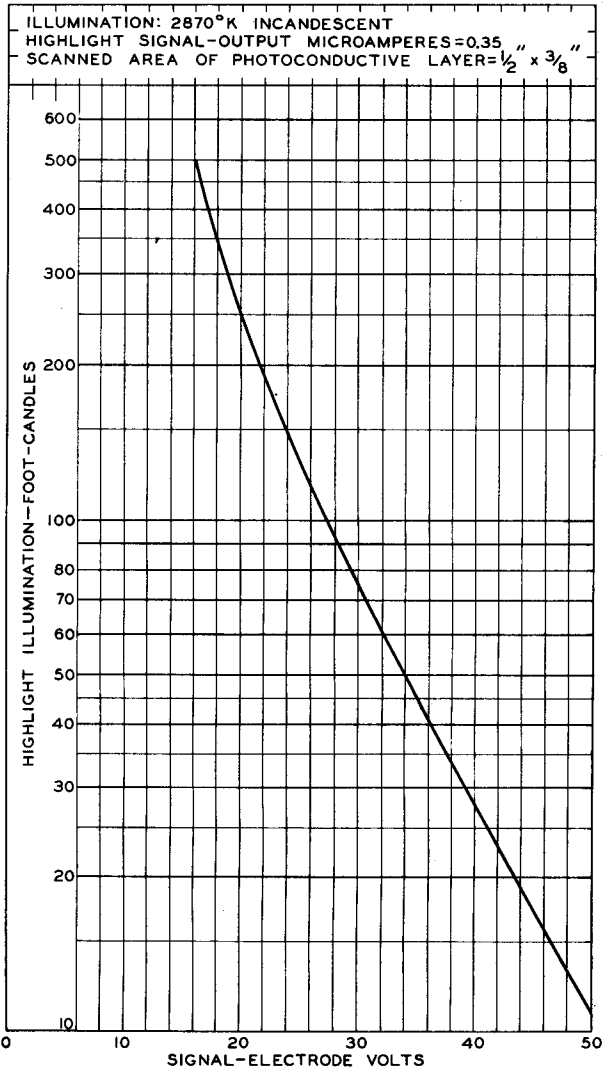


6326

RCA

6326

TYPICAL CHARACTERISTIC



OCT. 12, 1953

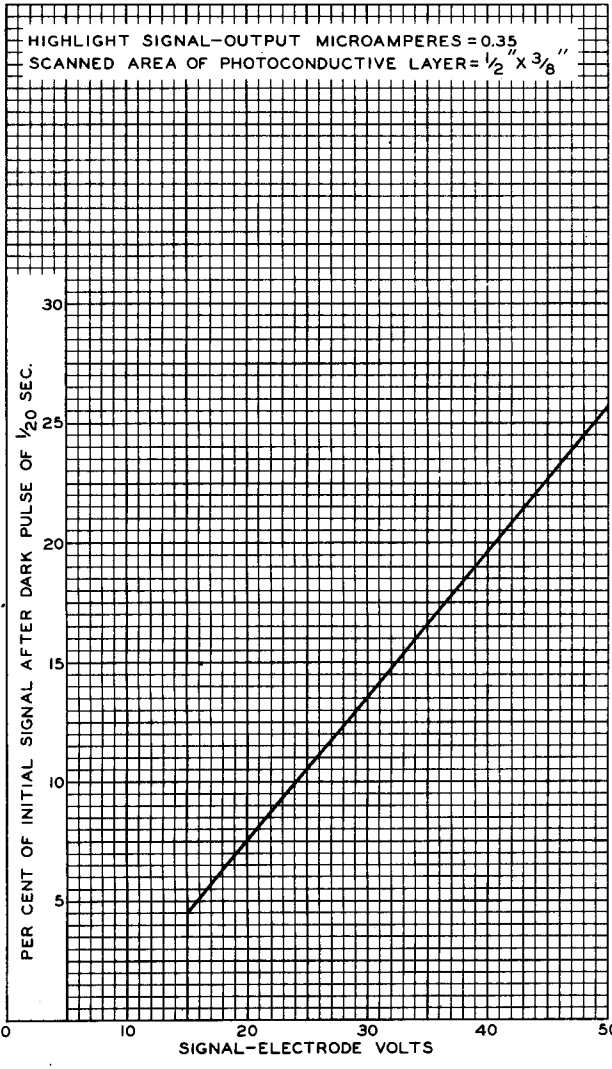
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8118

RCA

6326

PERSISTENCE CHARACTERISTIC



OCT. 12, 1953

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8119