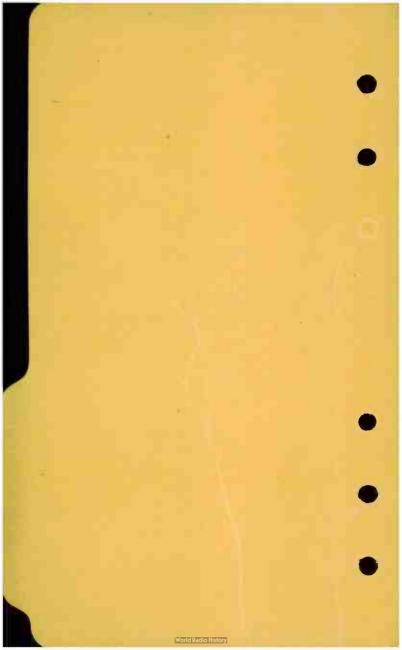
RCA TUBE HANDBOOK HB-3



MISCELLANEOUS TUBE SECTION

This Section contains data on certain tubes not falling within the scope of other Sections of this Handbook.

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





CLASSIFICATION CHART FOR TYPES IN MISCELLANEOUS TUBE SECTION

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

Description	TUBE TYPE
UBES FOR UHF APPLICATIONS	
corn Types	
Oscillator Triode	6F4
Oscillator Triode	6L4
Sharp-Cutoff Pentode	954
Medium-Mu Triode	955
Remote-Cutoff Pentode	956
Medium-Mu Triode	957
Medium-Mu Triode	958-à
Sharp-Cutoff Pentode	959
UHF Diode	9004
UHF Diode	9005
	3003
Pencil Types" Medium-Mu Triode	5675
Fixed-Tuned Oscillator Triode	5794
High-Mu Triode	5876
Medium-Mu Triode	5893
UHF Diode	6173
Medium-Mu Triode	6263
Medium-Mu Triode	6264
Fixed-Tuned Oscillator Triode	6564
	0302
her Types for UHF Applications	
Lighthouse Triode	2C40
Lighthouse Triode	2C43
Klystron	2K26
High-Mu Triode	6J4 ^D
Oscillator Triode	6026°
Traveling-Wave Tube	6861
Sharp-Cutoff Pentode	9001
Medium-Mu Triode	9002
Remote-Cutoff Pentode	9003 ^a
UHF Diode	9006
CUUM-GAUGE TUBES	
Thermocouple Type	1945
Pirani Type	1947
Hard-Glass Bulb, Ionization Type	1949
india diada baile, ibilizacion lype	1950

Miniature type.

Subminiature type.



CLASSIFICATION CHART FOR TYPES IN MISCELLANEOUS TUBE SECTION

Description	TUBE TYPE
TUBES FOR SPECIAL APPLICATIONS	
Mechano-Electronic Transducer	5734
Remote—Cutoff Beam Pentode (For use in Shunt Voltage—Regulator Service)	5890

Max i		Maximum Peak Inverse		ent (F) ter (H)	TUBE
Average	Peak	Plate Volts♥	Volts	Amperes	TYPE
Half-Wav	e Vacuum	Types			
2 5 7.5 20 25 100	40 20 60 150 270 750	60000 20000 12500 ⁴ 40000 ⁴ 20000 40000	1.6 F 2.5 F 2.5 H 2.5 F 2.5 F 5 F	1.25 5 1.75 5 6	5825 878 2X2-A 8013-A 579-B 8020

Atsolute values, except as noted.

This value may be increased to 55,000 volts when the 8013-A is immersed in oil.

Design-center value.

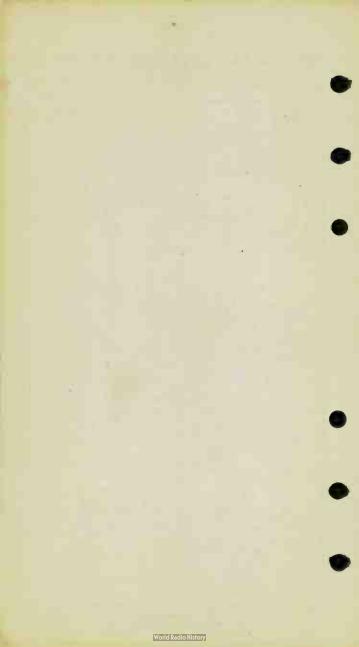


MAX. D-C HEATER-CATHODE POTENTIALS OF MISCELLANEOUS TYPES

Based on JAN Specifications as of January 3, 1944

The following Miscellaneous Tubes appear in the JAN Specifications as having an atsolute maximum heater-cathode potential rating as shown below. The corresponding design-center maximum ratings may be taken as 90 volts and 80 volts, respectively, for the 100- and 90-volt absolute maximum values. Types for which heater-cathode potential ratings are given on their data pages are not included in this list.

Туре	Absolute Max. Volts
2C21/1642	100
2C22	100
6C4	100
12A6	100
954	90
955	90
956	90
1629	100
1635	100
9001	90
9002	90
9003	90





2.141 MAGNETRON

FREQUENCY-STABILIZED TYPE Tunable: 9300-9320 Mc

GENERAL DATA

Electrical:

Heater, for Unipotential Cathod:

-	Voltage ac or oc volt	.5	
	Current		
1	Ninimum Cuthode Hesting Time 1 minut		
ı	Frequency	C	
н	Frequency Runnie	Ac	
ı	19300 min. N	Ac	
١	Mayimum Pulling Frequency:		

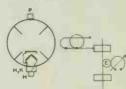
MINN LINE										
At 9	= J()	Mc		 				٠	2.5	Mc
At B									1.5	Mc
At 9									2.5	Mc
M x m										
									0.025	Mc/°C

Mechanical:

7,00,100,100,100
Mountira Pasition
imensions See Dimensional Outline
Veight (Approx.)
Mating Output RF Connector MIL Ty . UG-40/U
Base Short Skirted Miniature Double Bayonet
Terminal Cornections (See Dimensional Ostline):

H - Heater 4 - Citizia

P - 1/1 1



PULSED OSCILLATOR SERVICE

Maximum and Minimum Ratings, Absolute Values: For Duty Cycle of a pop

101	Davy	0,00	 , ,,,	003				
PEAK ANDDE VELTAGE .			 			3000	mis.	volts
EAR IN CO PREST						11.	ma.	amp
200 200 200 200			 		•	0.8	mi.	amp)
EA PARK INPIT .			 			3.6	mi.	Lw
VERIGE FUER INFUT			 			10.8	ma.	watts
PULSE DURATION			 , .			0.6	mit.	μsec
FER TICK TIME IN A	NY 10)_						
MICHOEL ON INTER	ML .		 			-4	SHE.	μsec
METERT TEMPERATURE			 			85	WHILE.	oC

LESSLITE FIRE SURE ON NAVEGI DE VINDOM. . . 3.) mi.. ps i I AL YOLTAGE STANLING-WAVE FALLO 1.5 mar. TIME OF FISE OF VOLTAGE PULSE. . . U. mur. ₩ eci





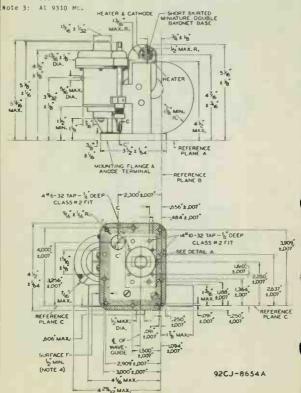
MAGNETRON

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

			Note	Min.	Max.	
Heater Current			1	0.32	0.40	amp
Peak Anide Voltage			1,2,3	2350	2650	volts
Peak Power Output:						
At 9300 Mc			1,2	240	-	watt
At 9310 Mc				300	-	watt
At 9320			1,2	240		watts

Note 1: With 5 volts a or do on heater.

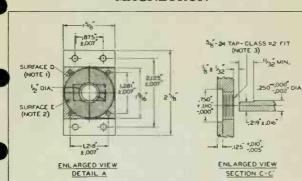
Note 2: with peak anoth current of 1 ampere, duty cycle of 0.003, pulse duration of 0.5 µSec ± 10\$, load voltage standing-wave ratio, 1.1 msx.





MAGNETRON





Reference plane A is defined as the plane through a plane surface on which the mounting flarge rests.

Reference plane B is defined as the plane which is perpendicular to the reference plane A and passes through the exact centers of the indicated mounting flange holes.

Reference plane C is defined as the plane which is mutually perpendicular to the reference planes A and B and passes through the exact center of the indicated mounting flange hole.

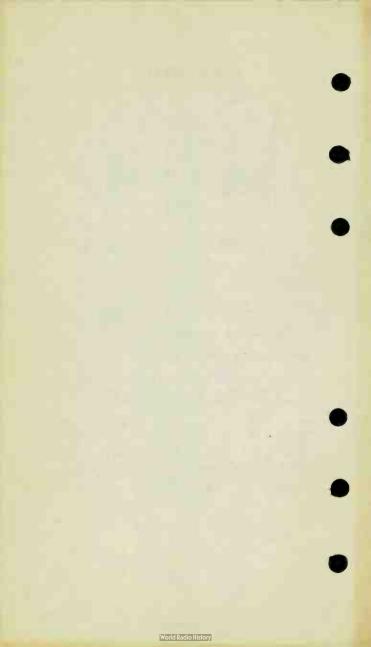
NOTE I: When resting on a plane surface, surface D has a flatness such that a 0.010" thickness gauge, 1/8" wide will not enter between surface D and the plane surface by more than 0.020".

NOTE 2: Surface E recessed not more than 0.035" and not less than 0.010" and parallel to surface D within 0.0 0".

NOTE 3: Hole and shaft are concentric within 0.020".

NOTE 4: With the mounting flange resting on a plane surface, the flatness of surface F is such that a 0.010" thinkness gauge, 1/8" wide will not enter more than 1/4".

92CJ-8654B







2-5/8"

2-1/16"

GAS-TRIODE

COLD-CATHODE GLOW-DISCHARGE TYPE

Maximum Overali Length Maximum Seated Height Maximum Diameter Bulb

Base
Pin 1 - No Connection

Pin 5 - Anode

Mounting Position

Pin 2 - Cathode
Pin 3 - No Connection
Pin 5 - Anode

1-5/16" T-9 Intermed.Sh.Octal 6-Pin

Pin 7-Grid
Pir 8-No Connection
-Gas Tube Type

- Gas Tube ype

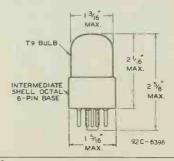
CHARACTERISTICS

Peak Amode Breakdown Voltage (Grid tied to cathode) 180 min. volts volts f 66 min. Peak Positive Grid Breakdown Voltage 1 80 max. volts D-C Anode Extinction Voltage 73 approx volts 25 av. Grid Current (For transition of disµатр. charge to anode at 100 volts peak) 50 max. µamp. Anode Voltage-Drop 73 approx. volts Grid Voltage-Drop 55 approx. volts

Maximum Ratings Are Design-Center Values

MAXIMUM RATINGS

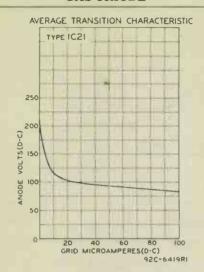
100 max. Peak Cathode Current ma. D-C Cathode Current 25 max. ma. Typical Operation as Relay Tube: D-C Anode-Supply Voltage Peak Positive Grid-Bias Voltage 125 - 145volts 66 max. volts Peak Grid-Signal Voltage 40 min. volts Sum of Grid-Bias and Grid-Signal 100 min. Voltages (Peak) volts D-C Grid Current 100 µamp.



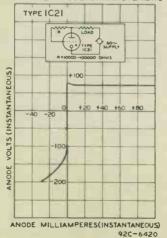
(2)



GAS-TRIODE



AVERAGE ANODE CHARACTERISTIC



Dec. 1, 1942



PARC

GAS-TRIODE

HOT-CATHODE CONTROL-GRID TYPE Filament Coated 2.5 Voltage* a-c or d-c volts Current amp. Maximum Overal Length 4-1/8" 3-9/16" Maximum Seated Height Maximum Diameter 1-9/16" Bulb ST-12 Base Small Shell Octal 7-Pin Pin 1-No Connection Pin 2-Filament + Fin 5-Grid Pin 7-Filament -

Pin 3-Plate
Pin 4-No Connection
Wounting Position

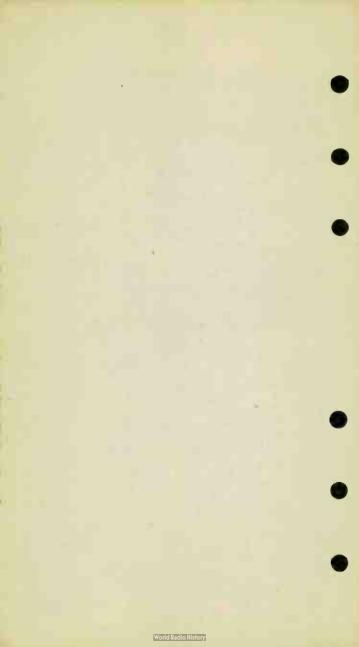
Any

Fin 8 - No Connection

BOTTOM VIEW (G-557) RELAY SERVICE

Peak Inverse Anode Voltage	200	max.	volts
Peak Forward Anode Voltage			volts
Peak Voltage Fetween Any Two Electrodes			volts
Peak Anode Current	1.25	max.	апр.
Average Anode Current (Averaged over			
Any Period of 45 Seconds)	0.10		
Anode Drop	15		volts

^{*} Filament voltage should be applied for 2 seconds before current is drawn from the anode.





2C40

LIGHTHOUSE TRIODE

Supersedes Types 446-A and 446-B in Military Equipment

GENERAL DATA

Electrical:

	Heater for Unipotential Cathode:	1
	Voltage 6.3 ± 5% ac or dc volts	ı
	Current	ļ
1	Direct Interelectrode Capacitances:	l
	Crid to Platos 1 2	I

THI 2.1 Grid to Cathode* ццf Plate to Cathode*4 . . . 0.02 . . **LLL**f Cathoge to Shell 100 approx. HLF Characteristics, Class A1 Amplifier:

DC Plate Voltage . . . volts Cathoge-Bias Resistor**. . 200 . Amplitication Factor . . . 36 Plate Resistance . . 7500 ohms Transconductance . 4800 . umhos Plate Current . . 16.5 . ma.

Mechanical:

Operating Position Mounting . Tube should be supported by its metal shell and not by its base or other terminals Dimensions and Terminals See Outline Drawing Small H-Wafer Octa 6-Pin BOTTOM VIEW

Pin 1 - Internal Con. Do Not Use Pin 2 - Heater Pin 3 - Cathode Pin5 - Cathode

Pin 7 - Heater

Pin8-Cathode



Shell | Cathode ISI RF Terminal Center Grid Disc [Terminal (G) Post &) [Plate End D scipi Terminal

RF AMPLIFIER & OSCILLATOR - Class C Telegraphy

Maximum Ratings, Design-Center Values:

	DC PLATE														max.	volts
)	DC PLATE	CURRENT												22	max.	volts
	PLATE DI	SSIPATION	ł											5	max.	watts
	PEAK HEAT															
	Heater	negative	w	ith	re	Sp	ect	t t	0 (cat	ho	de		90	max.	volts

Heater positive with respect to cathode 90 max. volts

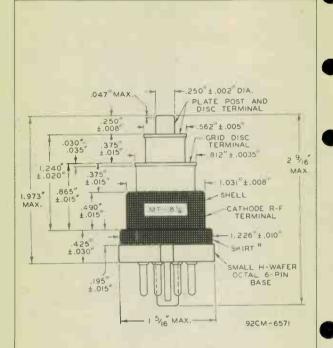
with cathode connected directly to shell. **

Fixe: bias is not recommended.

With shield having diameter of 2-3/8° in place of grid disc terminal, Under extremely high ambient temperatures, the place-seal temperature must never exceed 200°C.



LIGHTHOUSE TRIODE



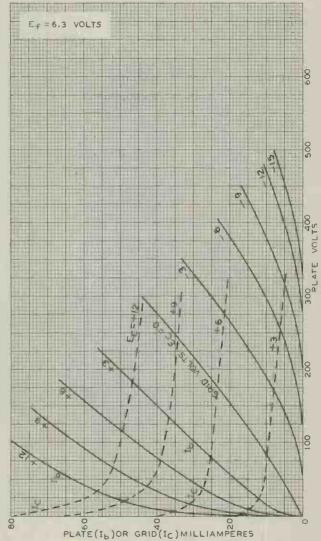
LATE POST, GRID DISC TERMINAL, AND CATH-DDE RF TERMINAL ARE CONCENTRIC WITH RE-PEC TO EACH OTHER WITHIN 1/64".

* NOT TO BE USED FOR RF CONTACT IN NEW EQUIPMENT DESIGNS.



12C NO

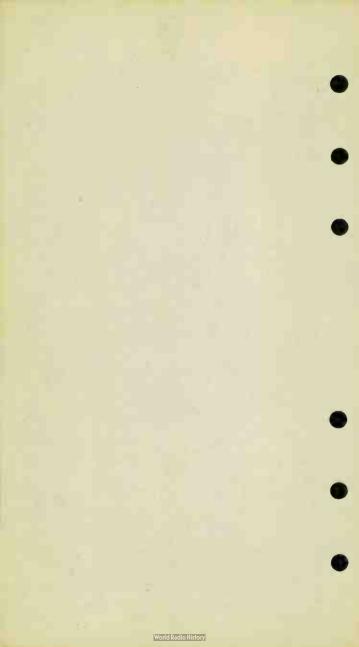
AVERAGE PLATE CHARACTERISTICS



MAR. 3, 1945

RCA VICTOR DIVISION

92CM-6507





2C43

PC R3

LIGHTHOUSE TRIODE

GENERAL DATA
Electrical:
Heater for Unipotential Cathode: Voltage 6.3 ± 5% ac or dc volts Current 0.9 amp. Direct Interelectrode Capacitances:
Grid to Plate* 1.7 μμf Grid to Cathode* 2.8 μμf Plate to Cathode*Δ 0.02 μμf
Characteristics, Class A ₁ Amplifier:
DC Plate Voltage 250 volts Cathode-Bias Resistor** 100 ohms Amplification Factor 48 Plate Resistance 6000 ohms
Plate Resistance 6000 ohms Transconductance 8000 µmhos Plate Current 20 ma
Mechanical:
Operating Position
Dimensions and Terminals See Outline Drawing Base
Pin1 - Internal Con. Do Not Use Pin 2 - Heater Pin3 - Cathode G 5 Cathode G 6 G 7 G 7 G 7 G 7 G 7 G 7 G 7 G 7 G 7
Pin5 - Cathode (G) [Termina]
Pin 8 - Cathode S S B End Disc(P) Plate Terminal
RF AMPLIFIER & OSCILLATOR - Class C Telegraphy
Maximum Ratings, Design-Center Values:
DC PLATE VOLTAGE
Heater negative with respect to cathode 90 max. volts Heater positive with respect to cathode 90 max. volts

* With cathode connected directly to shell.

Fixed bias is not recommended.

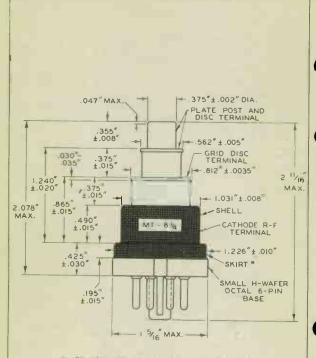
A with shield naving diameter of 2-3/8° in plane of grid disc terminal.

Junder extremely high ambient temperatures, the plate-seal temperature must never exceed 200°C.

. . . . 150 max. OC

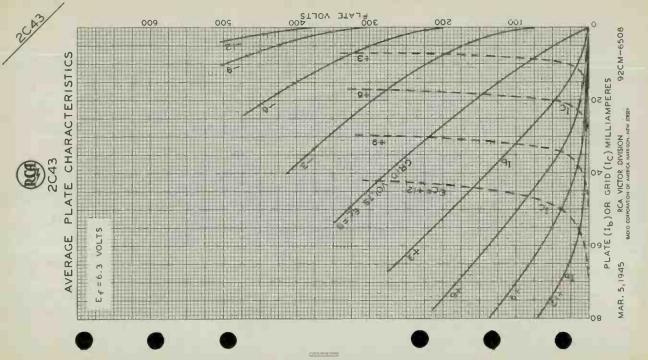


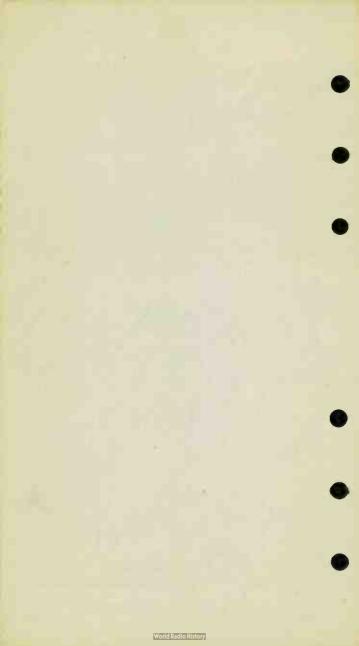
LIGHTHOUSE TRIODE



PLAT POST, OF LOUIS TERMINAL, A COATH-OVE OF TERMINAL AGE CONCENTRIC WITH RE-PROTECTION AND OTHER MITHIN 1/64".

* TT TO TE USEU FOR AT CONTACT IN NEW EQUIPMENT DESIGNS.







SINGLE-RESONATOR, REFLEX TYPE Frequency: 6250 to 7060 Mc.

	GENERAL DATA
	Electrical: Heater, for Unipotential Cathode: Voltage 6.3 ± 0.5 ac or do volts Current 0.44 amp
	Frequency Range 6250 to 7060 Mc
	Mechanical:
	Vounting Position Any Dimensions, Terminal Connections, and Machinical Tuning Mechanism See Outline Drawing
	Resonant Covity Metal Envelope
	Base Small-Wafer Octai 4-Pin with Pin No.4
	replaced by Coaxial Output Line BOTTOM VIEW
	Pin 1 - Shell, Resonator Pin 8 - Cathode
	Pin 2 - Heater Cap - Reflector Terminal
	NOTE: COAXIAL OUTPUT LINE PASSES THROUGH
	VACANT PIN POSITION NO. 4
	CW OSCILLATOR - C'ass C
	Maximum Ratings, Absolute Values:
)	CC RESONATOR VOLTAGE
	Positive Value 0 max. volts Nega ive Value
	DC RESONATOR CURRENT
	PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode. 50 max. volts
	Heater positive with respect to cathode. 50 max. volts
1	AMBIENJ TEMPERATURE OF SHELL 110 max. °C TEMPERATURE OF COAXIAL OUTPUT LINE 90 max. °C
	Typical Operation at 6660 Mc in Mode "A" with 3/4" x 1-1/2" Wave Guide
	DC Personator Voltage 300 volts
	DC Reflector Voltage Range65 to -120 volts
	DC Repnator Current
	(continued on next pag-)
	C. A. See next page.
	NOV. 15, 1948 TUBE DEPARTMENT TENTATIVE DATA 1





Half-Power Electronic						
Frequency Change	 				55	Mo
Power Output	 				120	m×

Adjusted for maximum power output at the given operating frequency.

Change in frequency between the two half-power points when the reflector voltage is varied above and below the point of maximum power output torresponding to the given frequency.

The coaxial output line is coupled to the specified wave guide through the wide-band coaxial coupling unit shown on following pages.

INSTALLATION NOTES

A socket for the 2k26 may be obtained by removing the clip from the No.4 pin position of an octal socket and drilling the No.4 opening large enough to admit the co-axial line and the surrounding coupling unit. To guard against excessive strain on the coaxial output line, the tube must be securely fastened by a clamp on the base of the socket mounting. Bumping or continued pressure on the output line will seriously damage the tube. The proper area for clamping on the shoulder of the header skirt is shown on the Outline Drawing.



OPERATING NOTES

All tabulated data and curve information shown for the 2K26 were taken with the specified coupling unit and wave guide. It is important that this coupling unit or its electrical equivalent be used to insure tube interchangeability and satisfactory tuning characteristics. In addition, the standing-wave ratio of the coupler should not exceed 0.8 db. (I.I voltage-standing-wave ratio).

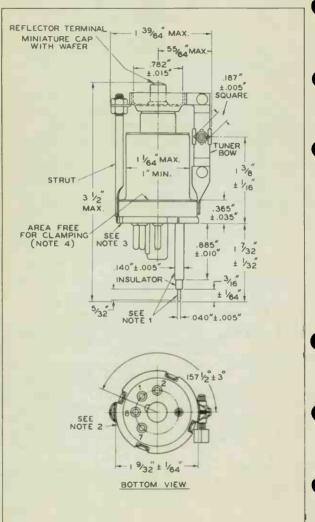
In most applications the cathode of the 2K26 is operated at a negative potential with respect to ground so that the tube shell, which is integral with the resonator, is at ground potential. In those applications which do not operate with the shell at ground pitertial, it is essential that the 2K26 be surrounded by a grounded shield and tuned with an insulated tool, in order to protect the user from contact with high voltage. The shield design should permit adequate ventilation to assure that ambient temperature, as measured with a thermometer inserted between the metal tube shell and the shield, will be less than the maximum rated value. Ambient temperature changes will cause the resonator to expand or contract, producing a change in frequency. For Best frequency stability, the 2K26 should be operated at nearly constant ambient temperature and with a well-regulated power supply.

Shielding of the reflector and resonator voltage leads as close to the tube as possible is essential to avoid modulation of the tube output by any external voltages. In addition, the connectior to the reflector terminal must be insulated to withstand the total acceleration and reflector voltage. To avoid damage to the tube, the reflector potential must never become positive with respect to the cathode.

Tuning of the 2K26 is accomplished by mechanical and electronic means. The mechanical tuning system is designed to permit approximate adjustment of frequency, but is not recommended for use where continual or frequent adjustment of frequency is required. Approximately five full turns of the frequency-adjustment screw are sufficient to tune the tube over its rated frequency range. The electronic tuning range is dependent upon reflector voltage, the type of load and the lind of coupling to the load.

Voltage modes are regions within the total range of reflector voltage in which oscillations will occur. The typical operating conditions and curves shown for type 2K26 apply to mode "A", the only mode recommended for this tube.

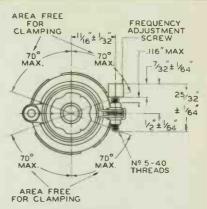






RAPE.

KLYSTRON



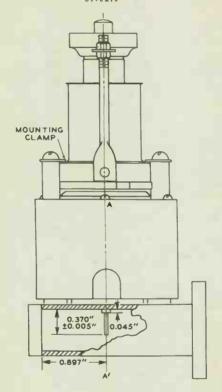
TOP VIEW

- NOTE 1: THE INNER AND DUTER CONDUCTOR'S OF THE COAXIAL DUTPUT LINE ARE CONCENTRIC WITHIN 0.010".
- NOTE 2: BASE-PIN AND COAXIAL-OUTPUT-LINE POSITIONS ARE HELD TO TOLERANCES SUCH THAT PINS AND OUTPUT LINE WILL FIT FLAT-PLATE GAUGE HAVING (a) THICKNESS OF 1~7/32", (b) 4 HOLES WITH DLAMETER OF 0,1030" ± 0.0005" FROM TOP SURFACE OF GAUGE TO A DEPTH OF 0.25" AND THEN WITH DIAMETER INCREASED BY APPROXI-MATELY 1/64" FOR REMAINING DEPTH OF HOLE, 50 LOCATED ON A 0.6870" ± 0.0005" DIAMETER CIRCLE THAT THE DISTANCE ALONG THE CHORD BETWEEN ANY TWO ADJACENT HOLE CENTERS IS 0.2630° ± 0.0005", (c) ONE HOLE WITH DIAMETER OF 0.1600" ± 0.0005" TO DEETH OF 1-7/32" WHOSE CENTER IS LOCATED ON THE SPECIFIED PIN CIRCLE A DISTANCE DETERMINED BY LAYING OFF ON THE TOP SURFACE OF THE GAUGE COUNTERCLOCKWISE FROM THE LAST OF THE FOUR HOLES TWO CONSECUTIVE CHORDS EACH 0.2630" ± 0.0005", AND (d) A CENTER HOLE W!TH A MINIMUM DIAMETER OF 0.400" TO CLEAR THE BASE PLUG AND KEY. PIN AND OUTPUT-LINE FIT IN GAUGE SHALL BE SUCH THAT GAUGE TOGETHER WITH SUPPLEMENTARY WEIGHT TOTALING 2 LBS. WILL NOT BE LIFTED WHEN PINS AND COAXIAL OUTPUT LINE ARE WITHDRAWN.
- NOTE 3: SMALL-WAFER OCTAL 4-PIN BASE WITH PIN No.4 REPLACED BY COAXIAL OUTPUT LINE.
- NOTE 4: MINIMUM WIDTH OF SHOULDER 15 0.045".



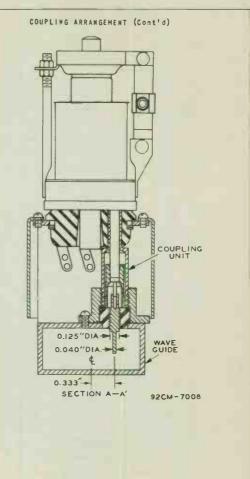
COUPLING ARRANGEMENT

RCA-2N26 Coupled to a 3/4" x 1-1/2" Nave Guide Through a Coaxial Transducer Coupling Circuit

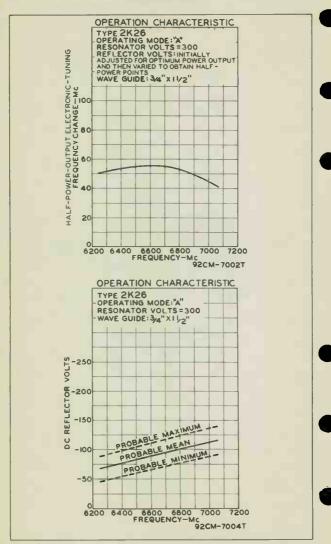




KLYSTRON



RCA 2K26 KLYSTRON

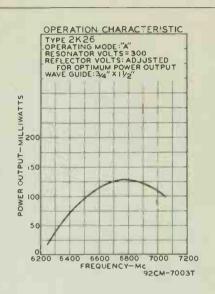


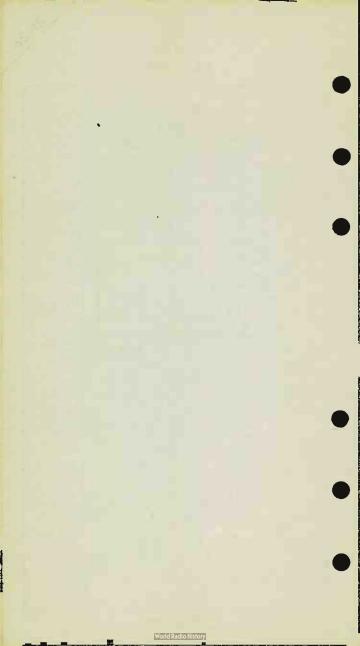
NOV. 15, 1948

TUBE DEPARTMENT

CE-7002T-7004T

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY







2K56 KLYSTRON

SINGLE-RESONATOR, REFLEX TYPE

	Frequency: 3840 to 4460 Ms.
1	GENERAL DATA
	Electrical:
1	Heater, for Unipotential Cathode:
	Voltage 6.3 ± 0.5 ac or dc volts Current
)	Current
	Mechanical:
	Mounting Position Any
	Dimensions, Terminal Connections, and Mechanical Tuning Mechanism See Outline Drawing
۱	Resonant Cavity Integral Part of Tube
,	Envelope
	Cap Miniature with Wafer Base Small-Wafer Ccta! 4-Pin with Pin No.4
	Base Small-Wafer Cctal 4-Pin with Pin No.4 replaced by Coaxial Outgut Line
	OTTO! VIEW
	Pin 1 - Shell. Pin 7 - Heater
	Resonatur Pin 8 - Cathode
	Cap - Refiector
	Pin - Heater Terminal
	1 8
	NOTE: COAXIAL OUTPAIT LINE PASSES THROUGH VACANT PIN POSITION NO.3
	CW OSCILLATOR - Class C
	Maximum Ratings. Absolute Values:
)	DC RESONATOR VOLTAGE
	Positive Value 0 max, volts
	Negative Value 400 max. volts
	DC RESOMATOR CURRENT
	Heater negative with respect to cathode. 50 max. volts
	Heafer positive with respect to cathode, 50 max, volts
	AMBIENT TEMPERATURE OF SHELL
	THE THE OF COUNTRY COIL OF EACH
	Typical Operation at 4150 Mc in Mode "A"
	with I" x 2" Wave Guide
	[] to another Valtons
	DC Reflector Voltage Range8 to -150 volts
)	DC Reflector Voltage Range85 to -150 volts
)	DC Reflector Voltage
)	DC Resonator Current 25 ma
	DC Resonator Current



Half-Power Electronic-Tuning	
Frequency Change	3 ^E Nc
Fower Output	90 mw
A	

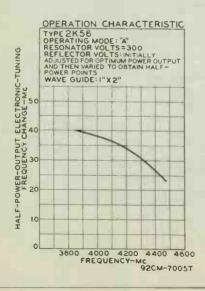
Adjusted for maximum power output at the given operating frequency.

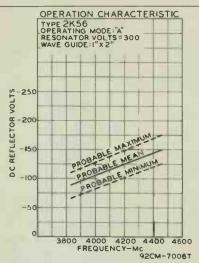
Change in frequency between the two half-power points when the reflector voltage is varied above and below the point of maximum power output corresponding to the given frequency.

The coaxial output lim is roupled to the specified wave guide through the wide-bind coaxial coupling unit shown on the following pages.

INSTALLATION and OPERATING NOTES for the 2K56 are the same as those shown for the 2K26, except that consideration should be given to the different coupling unit and wave guide required for the 2K56.

OUTLINE DIMENSIONS for Type 2K56 are the same as those for Type 2K26



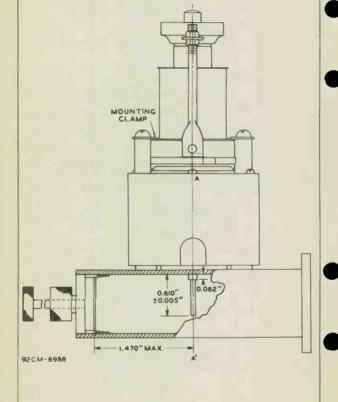






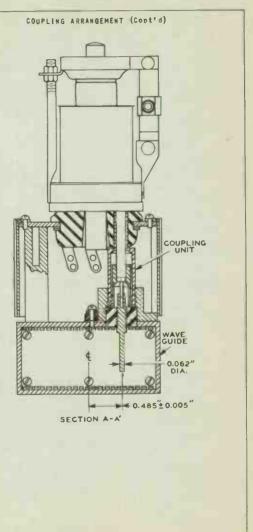
COUPLING ARRANGEMENT

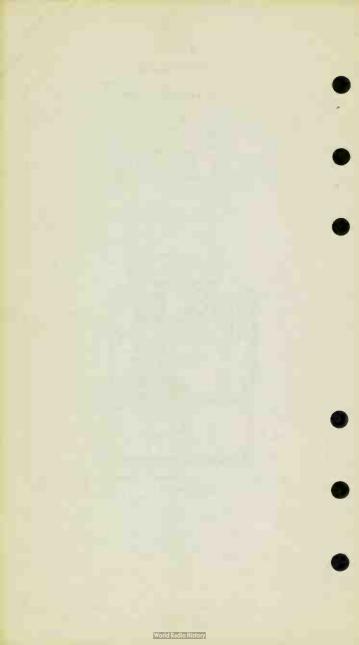
RCA-2856 Coupled to a 1" x 2" Wave Guide Through a Coaxial Transducer Coupling Circuit





KLYSTRON







FORCED-AIR COCLED Fixed Frequency: 9375 + 30 Mc

GENERAL DATA

Electrical:

hat r tri ipotential Cathode:

Voltage ac or dc voltage ac or dc voltage

Star ing Current: The maximum in tinh near tirting current out never xcc 1 12 amp r , cv i m mertarily Minimu Cathode Heating Time 4

Freque cy 375 ± 30 10 Maximum Frequency Pulling at V WR of 1.5/1 15 Mes

Maximum Frequency Change with

Anyth I mperature Change

Mechanical:

Dimension of Terminal or actions: See Dimensional Jutline

H-beat r K-Chthats

M-1 10

P - Anod

Connector (For heater terminal

and heater-cathode terminal) . . . Ucinite* ND. 115364 with built-in sa-

citor, or equivalent

17.2 1

Wount'ra fosition . . Air Flow:

To "Ma -- An air stream should be direct dalong the cooling fins tow of the body of the tube. The tream may be obtained from a rectangular nozzle about 3-1/4" by 3/4" located so that the plane through the 3-1/4" ide is parallel with the plane of a cooling fin and so that the nozzle is centered on the body of the tube. Adequal and low should be provided so that the temperature of the anode block does not exceed 150°C.

To Ping -- An air stream should be direct dulong the cooling fins

To Meater-Cathode ferminal -- Adequate flow should be provided to main-tain the temperature of the heater-cathode terminal below 1550. Weight (Approx.). . - 9-1/2 lbs

PULSED OSCILLATOR SERVICE

Maximum and Minimum Ratings, Absolute Values:

For Duty Cycle of 3.001 max.

PEAK ANODE VOLTAGE 71 max. 23 mans. kv 27.5 max. PEAK ANODE CURRENT 18 max. amp PEAK POWER INPUT . 380 max. 635 max. KW. AVERAGE POWER INPUT . . . 0.38 m.x. 0.635 max. Acres PULSE DURATION . . . 6.0 ax. 1.2 max. µsec.

- * Ucicite Div. of United-Carr Fastener Corp., Newtonville 60, Mass.
- For atmospheric pressures greater than 60 centimeters of mercury, operation at pressures lower than 60 centimeters of mercury may result in arc-over with consequent damage to the tube.





OPERATION TIME IN 100-MICROSECONO RATE OF RISE OF N	OLT. PULSE .	6.0 max. {110 max. {70 min. 150 max.	70 min.	μsec kv/μsec kv/μsec
HEATER-CATHODE TI	RMINAL TURE	165 max.	165 max.	°C
With Heater Voltage . Magnetic Field .	Duty Cycle of	See Operat Supplied b	o.oo1	erations t magnet

20

18

1

1.0

140

21.0 21.5

27.5

5

3.0

23.5

3

1.0

kv

amp

COS

Mc.

kw

usec

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

				Note	Min.	Max.	
Heater Current				1	3.0	3.75	amp
Peak Anode Voltage	٠			-	20	23	kv
Peak Power Output				2	225	-	kw

Note 1: With 13.75 volts ac or dc on heater.

Peak Anode Voltage . . .

Peak Anode Current . . .

Pulse Repetition Rate

Pu'se Duration

Maximum RF Bandwidth .

Peak Power Output .

Note 2: With peak anode current = 27.5 amperes corresponding to a peak anode voltage in the order of 21500 volts, añode-block temperature (approx.) = 100°C, pulse duration = 1 microsecond, and maximum load-voltage standing-wave ratio equal to or less than 1.05.

A it is essential that the input circuit be designed so that if arcing occurs the energy per pulse delivered to the tube cannot greatly exceed the normal energy per pulse. To satisfy this requirement, it is recommended that pulsers of the discharging-network type be used.

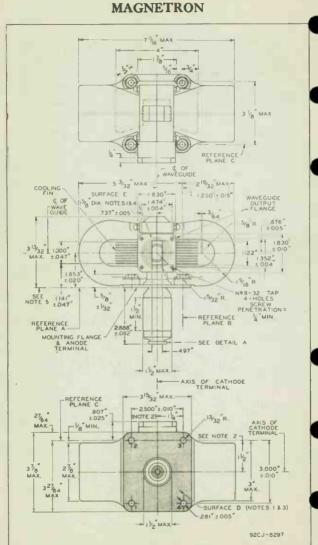
OPERATING CONSIDERATIONS

Rated voltage (13.75 volts) should be applied to the heater for at least 4 minutes to allow the cathode to reach normal operating temperature. When the cathode has reached normal operating temperature, high-voltage pulses, negative with respect to the anode (ground), may be applied to the heater-cathode terminal. As soon as the 4J50 starts to oscillate, the heater voltage (E $_{\rm f}$) must be reduced approximately in accordance with the following formula depending on the value of average power input (P $_{\rm i}$) to the tube:

TENTATIVE DATA 1

This formula applies to the conditions involving the pulse curations and pulse repetition rates under Typical Operation. If the 4J50 is to be operated with pulse durations and repetition rates different from those shown. write for recommendations as to required reduction in heater voltage to Commercial Engineering, RCA, Harrison, New Jersey, giving complete details as to the proposed service. When the tube is oscillating, the cathode is subjected to considerable electron bombardment which raises the temperature of the cathode. The magnitude of such heating is a function of the total dissipation and must be compensated by reduction of the heater voltage in order to prevent overheating of the cathode. Failure to start the tube at rated heater voltage and to reduce the heater voltage as soon as oscillation starts may seriously affect tube life. The heater should be protected against input pulse power by a suitable capacitor connected in shunt with the heater leads as near the input stem as possible in order to limit high transient voltages from developing across the heater.

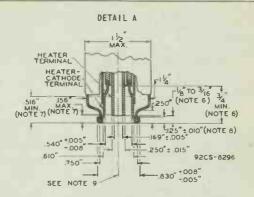






£50

MAGNETRON



Reference plane A is defined as the plane through a plane surface on which the mounting flange rests.

Reference plane B is defined as the plane which is perpendicular to plane A and plane C and passes through the exact center of mounting flange holes No.3 and No.4.

Reference plane C is defined as the plane which is perpendicular to plane A and passes through the exact certers of mounting flange holes No. 2 and No. 3.

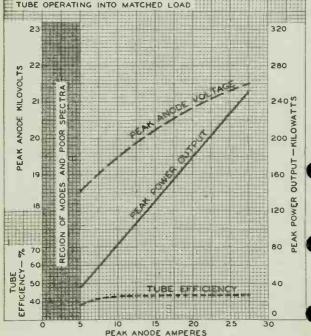
- NOTE 1: THE WAVEGUIDE OUTPUT FLANGE AND THE MOUNTING FLANGE
 ARE MADE SO THAT THEY MAY BE USED TO PROVIDE A HERNETIC
 SEAL AT SUFFACE D AND SURFACE E.
- NOTE 2: THE AXIS OF THE HEATER-CATHODE TERMINAL WILL BE WITHIN THE CONFINES OF A CYLINDER WHOSE RADIUS IS \$/64" AND WHOSE AXIS IS PERPENDICULAR TO REFERENCE PLANE A AND LOCATED AS DIMENSIONED FROM PLANES B AND C.
- NOTE 1: ALL POINTS ON MOUNTING SURFACE D WILL BE WITHIN 0.005" OF MOUNTING PLANE A.
- NOTE 4: WHEN RESTING ON A PLANE SURFACE, SURFACE E OF THE WAVEGUIDE OUTPUT FLANGE HAS A FLATNESS SUCH THAT A 0.005" THICKNESS GAUGE I/B" WIDE WILL NOT ENTER BETWEEN SURFACE E AND THE PLANE SURFACE.
- MOTE 5: NO PART OF THE TUBE SUPPORT FASTENED TO THE MOUNTING FLANGE SHOULD EXTEND BEYOND THE SURFACE OF A CYLINDER WHOSE RADIUS IS 3/4" AND WHOSE AXIS IS PERPENDICULAR TO REFERENCE PLANE A AND LOCATED AS DIMENSIONED FROM PLANES B AND C.
- NOTE 6: THESE DIMENSIONS DEFINE EXTREMITIES OF THE 0.169"
 INTERNAL DIAMETER OF THE CYLINDRICAL HEATER TERMINAL.



- NOTE 7: THESE DIMENSIONS DEFINE EXTREMITIES OF THE 0.540" INTERNAL DIAMETER OF THE CYLINDRICAL HEATER-CATHODE TERMINAL.
- NOTE 8: NO PART OF THE CONNECTOR DEVICE FOR THE HEATER AND HEATER-CATHODE TERMINALS SHOULD BEAR AGAINST THE UNDERSIDE OF THIS LIP.
- NOTE 9: THE HEATER TERMINAL AND THE HEATER-CATHODE TERMI-NAL ARE CONCENTRIC WITHIN 0.010".

PERFORMANCE CHART

OPERATING FREQUENCY: 9375 ± 30 MC
PULSE DURATION: I MICROSECOND
PULSE REPETITION RATE: 1000 PPS
PULLING FIGURE: 9.5 MC
TUBE OPERATING INTO MATCHED LOAD



92CM-8260 CE-8297B--8260



FORCED-AIR COOLED

Fixed Frequency: 9375 ± 30 Mc

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage 12.6 ± 10% ac or ac volts Current .

Starting Current: The maximum instantaneous starting current must never exceed 8 amperes, even momentarily

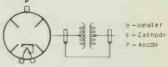
Minimum Cathode Heating Time 12 minutes 9375 ± 30 V.C NIC

Maximum Frequency Change with Anode

Temperature Change . . . Mc/00

Mechanical:

Dimens ons and Terminal Connections: See Outline Drawing



X JS2

Connector (For heater terminal and heater-cathode terminal) . . . Ucinite* No. 115316 or No. 1 5462 with

built-in capacitor, or equivalent. e o tline Dr ing Dimensions . .

Air Flow to Fins:

An air stream should be directed along the cooling fins toward the body of the tube. The stream may be obtained from a rectangular nozz e $3-1/4^{\circ}$ by $3/4^{\circ}$ located so that the plane through the $3-1/4^{\circ}$ side is parallel with the plane of a cooling fin and so that the nozz'e is centered on the body of the tube. Adequate flow should be provided so that the temperature of the anode block does not exceed 1500° .

Weight (Approx.)

PULSED OSCILLATOR SERVICE

Maximum Ratings, Absolute Values:

For Duty Cycle of v.oc2 max.

PEAK AND E DITAGE 16 mux. 16 ma. kv PEAK ANOTE CURPENT 20 max. 30 amp PEAK POWER INPUT. 300 ma. 451 mix. kw AVERALE POVER 1 PUT U.3 mar. 1.45 mas. M. PULSE DURATION 5.0 ... 1. 71. M LC OPERATION TIVE IT MY 100-

MICROSECOND INTERVAL 6. tr ma. 6.0 max. u ec BC ANODE-BLOCK TEMPERATURE . . . 150 mar. 150 mas.

Outrishown for this type are in accord if JA -1A 5, cific Fice 5152.

ucirity iv. of united-Carr Fastener Corp., Wewtonville 60, was .

• For thospheric pressures greater than 60 centimeters of murcury.

Open in at pressures lower than 60 centimeters of ercury reoul in arcover with consequent damage to the tube.



4J52

MAGNETRON

Typical Operation with Load-Voltage Standing-Wave Ratio Equal to or Less Than 1.05*:

	Wedt Duty Could of	6			
	With Duty Cycle of	0.0000	0.001	0.001	
ì	Heater Voltage		See Operat	ing Consid	derations
ł	Magnetic Field		Suppli 1 t	y pervanes	nt magne*
ı				interrul	
ı	Peak Anode Voltage	15	* L	16	kv
ı	Peak Anode Current	15	15	15	amp
ı	Pulse Repetition Rate .	2000	1000	200	cps
ı	Pulse Duration	0.3	1	5	μsec
ı	Maximum RF Bandwidth	9	3	1	Mc
ı	Maximum Rate of Rise of				
ı	voltago Pulse	130	130	100	kv/µsec
ı	Peak Power Output	80	80	8	kw

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	1.8	2.4	amp
Peak Anode Voltage		14	16	kv
Peak Power Output	2	65		kw

Note 1: With 12.6 volts ac or dc on heater.

Note 2: with peak anode current = 15 amperes corresponding to a peak anode voltage in the order of 15000 volts, anode-blocktemperature (approx.) = 100°C, and maximum load-voltage standing-wave ratio equal to or less than 1.05.

It is essential that the input circuit be designed so that if arcing occurs the energy per pulse delivered to the tube cannot greatly exceed the normal energy per pulse. To satisfy this requirement, it is recommended that pulsers of the discharging-network type be used.

OPERATING CONSIDERATIONS

Rated voltage (12.6 volts) should be applied to the heater for at least 4 minutes to allow the cathode to reach normal operating temperature. When the cathode has reached normal operating temperature, high-voltage pulses, negative with respect to the anode (ground), may be applied to the heater-cathode terminal. As soon as the 4J52 starts to oscillate, the heater voltage (Ef) must be reduced approximately in accordance with the following formula depending on the value of average power input (P;) to the tube:

P; up to 130 watts: E; = 12.6 volts -0.04P; P; from 130 to 450 watts: E; = 10.5 volts -0.02P;

where P_i is the average power input to the tube. This formula applies to conditions for pulse durations of I microsecond or less and for pulse repetition rates of ICOO pps or more. Normal pulse shape and regulation are assumed; the effect of power supply regulation is not considered. For longer pulse durations and lower pulse

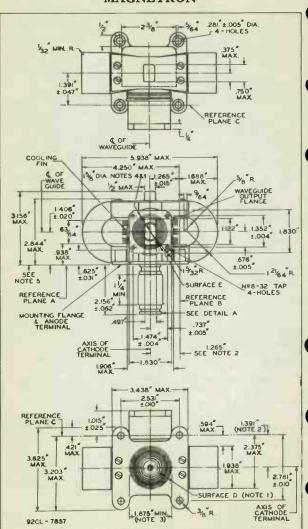


MAGNETRON

restition rites, the higher voltage must be increased. The increase in heater voltage is often between I and 2 v Its deconding the particular application. The of rise of the voltage pulse faster thin those indicated under Typical Operation are not recommended because they tend to cluse unitable operation. A very poor regulation characteristic during the first part of the pulse may indicate, if in table operation of urs, that an increase in heater voltage is desirable. Increasing the heater voltage under these conditions may, however, decrease the life of the tube. When the tube is ospillating, the cathode s subjected to considerable electron bumbardment which raises the temperature of the cathode. The magnitube of the heating is a function of the total discipation and rust be compensated by reduction of the heater voltage in order to prevent overheating of the cathode. Failure to start the tube at rated heater voltage and to reduce the heater voltage as soon as osci'lation starts may seriously affect tube life. The heater should be protected against input pulse power by placing a suitable capacitor in sount with the heater leads as near the input see as possible in order to limit high ransient curren's from developing across the heater.



MAGNETRON

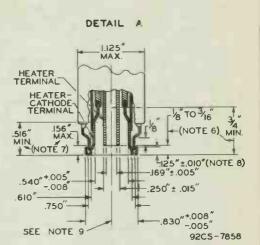


OCT. 1, 1953

TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY CE-7857A







Reference Plane A is defined as the plane through a plane surface on which the mounting flange rests.

Reference Plane B is defined as the plane which is perpendicular to plane A and plane C and passes through the exact center of mounting flange holes No.3 and No.4.

Reference Plane C is defined as the plane which is perpendicular to plane A and passes through the exact centers of mounting flange holes No.2 and No.5.

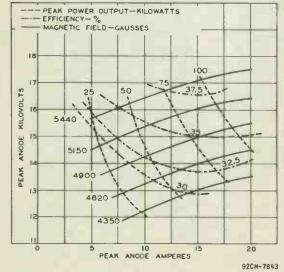
- NOTE 1: THE WAVEGUIDE OUTPUT FLANGE AND THE MOUNTING FLANGE ARE MADE SO THAT THEY MAY BE USED TO PROVIDE A HERMETIC SEAL AT SURFACE D AND SURFACE E.
- WOTE 2: THE AXIS OF THE HEATER-CATHODE TERMINAL WILL BE WITHIN THE CONFINES OF A CYLINDER WHOSE RADIUS IS 3/64" AND WHOSE AXIS IS PERPENDICULAR TO REFERENCE PLANE A AND LOCATED ON THE TRUE CENTER OF THE MOUNTING FLANGE.
- NOTE 3: WHEN RESTING ON A PLANE SURFACE (REFERENCE PLANE A), THE SURFACE D HAS A FLATNESS SUCH THAT A 0.010" THICKNESS GAUGE 1/8" WIDE WILL NOT ENTER BETWEEN SURFACE D AND THE PLANE SURFACE. ALSO, THE MOUNTING-FLANGE SURFACE OUTSIDE OF SURFACE D WILL BE WITHIN 0.010" OF THE PLANE SURFACE.



MAGNETRON

- WOTE 4: WHEN RESTING ON A PLANE SURFACE, SURFACE E OF THE WAVEGUIDE OUTPUT FLANGE HAS A FLATNESS SUCH THAT A 0.005" THICKNESS GAUGE 1/8" WIDE WILL NOT ENTER BETWEEN SURFACE E AND THE PLANE SURFACE.
- NOTE 5: NO PART OF THE TUBE SUPPORT FASTENED TO THE MOUNTING FLANGE SHOULD EXTEND BEYOND THE SURFACE OF A CYLINDER WHOSE RADIUS 1S 5/8" AND WHOSE AXIS IS PERPENDICULAR TO REFERENCE PLANE A AND LOCATED AT THE TRUE CENTER OF THE MOUNTING FLANGE.
- NOTE 6: THESE DIMENSIONS DEFINE EXTREMITIES OF THE 0.169"
 INTERNAL DIAMETER OF THE CYLINDRICAL HEATER TERMINAL.
- NOTE 7: THESE DIMENSIONS DEFINE EXTREMITIES OF THE 0.540"
 INTERNAL DIAMETER OF THE CYLINDRICAL HEATER-CATHODE
 TERMINAL.
- NOTE 8: NO PART OF THE CONNECTOR DEVICE FOR THE HEATER AND HEATER-CATHODE TERMINALS SHOULD BEAR AGAINST THE UNDERSIDE OF THIS LIP.
- NOTE 9: THE HEATER TERMINAL AND THE HEATER-CATHODE TER-MINAL ARE CONCENTRIC WITHIN 0.010".

PERFORMANCE CHART



HALF-WAVE GAS RECTIFIER

	HOT-CATHODE TIES	
Filament	Thoriated Tungsten	
Voltage	2.2	a-c volts
Current	18	amp.
Overall Length		6-5/8" ± 3/8"
Maximum Diameter		3-1/4"
Bulb		GT-25
End Terminal		See Outline Brawing
Base		Mogul Screw
Mounting Position		Any
	,	

Maximum Ratings Are Absolute Values	
RECTIFIER	,
Peak Inverse Anode Voltage:	
In Single-Phase, Half-Wave Circuit 375 max.	volts
In Single-Phase, Full-Wave Circuit 250 max.	volts
In Polyphase Circuit 250 max.	volts
Peak Anode Current 36 max.	amp.
D-C Output Current 6 max.	amp.
Characteristics:	
Instantaneous Starting Anode Voltage* 13 approx.	
Tube Voltage Drop 8 approx.	volts
•	

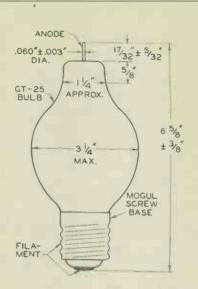
To insure starting throughout tube life, an ancide-supply voltage of not less than 20 volts (rms) is recommended. The actual design value above this minimum will depend on the nature of the load on the tube in any particular application.

If the output of the 4B26/2000 is filtered. the filter should be of the choke-input type.

Suitable circuits for use with the 4B26/2000 are the same as those shown for Type 872-A/872.



HALF-WAVE GAS-RECTIFIER



92CM-6147RI

Aur. 15, 1944



26A6

R-F AMPLIFIER PENTODE

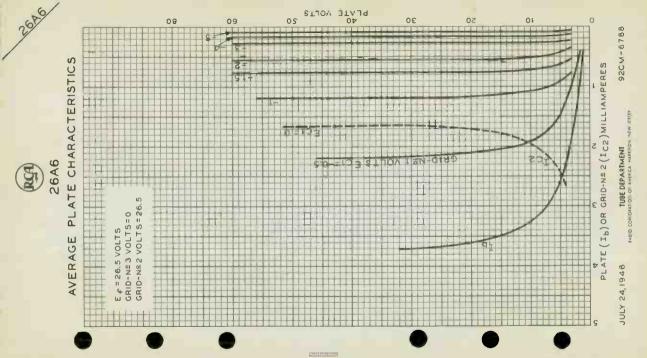
For use with 12-cell storage-battery supply

	GENERAL DATA
	Electrical:
	Heater, for Unipotential Cathode: Voltage 26.5 ac or dc volts Current amp
	Direct Interelectrode Canacitances.
	Grid No.1 to Plate . 0.0035 max
	Mechanical:
	Mounting Position. Any Maximum Overall Length 2-1/8" Maximum Seated Length 1-7/8"
	Length from Ease Seat to Bulb Top (excluding tip)
	Maximum Diameter 3/4"
	Bulb
	Basing Designation for BOTTOM VIEW 7BK ₁
	Bi a G Blata
	Internal Shield 3 (6 Pin 6-Grid No. 2
	Pin 3 - Heater Pin 7 - Cathode
	CLASS A1 AMPLIFIER
	Maximum Ratings, Design-Center Values:
	PLATE VOLTAGE 250 max. volts
	GRID-No.2 (SCREEN) VOLTAGE 100 max. volts
	GRID-No.2 SUPPLY VOLTAGE 250 max. volts PLATE DISSIPATION
i	GRID-No.2 DISSIPATION 0.4 max. watt GRID-No.1 (CONTROL GRID) VOLTAGE:
	Negative tias value 50 max. volts
	Positive tias value 0 max. volts PEAK HEATER-CATHODE VOLTAGE:
	Heater negative with respect to cathode 90 max. volts
	Heater negative with respect to cathode Heater positive with respect to cathode 90 max. volts Typical Operation and Characteristics:
	Heater negative with respect to cathode Heater positive with respect to cathode Typical Operation and Characteristics: Plate Voltage 76.5 250 volts
	Heater negative with respect to cathode 90 max. volts Heater positive with respect to cathode 90 max. volts Typical Operation and Characteristics: Plate Voltage
	Heater negative with respect to cathode Heater positive with respect to cathode 90 max. volts Typical Operation and Characteristics: Plate Voltage
	Heater negative with respect to cathode Heater positive with respect to cathode 90 max. volts Typical Operation and Characteristics: Plate Voltage
	Heater negative with respect to cathode Heater positive with respect to cathode 90 max. volts Typical Operation and Characteristics: Plate Voltage
	Heater negative with respect to cathode Heater positive with respect to cathode 90 max. Typical Operation and Characteristics: Plate Voltage



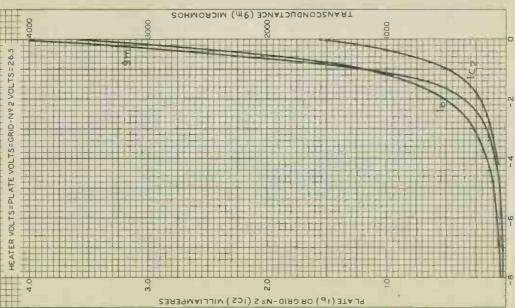
R-F AMPLIFIER PENTODE

Plate Resistance (Approx.) Transconductance	0.2°, 2000	1.0	megohm : µmhos
Grid-No.1 Bias (Approx.) for transconductance of 40 µmhos	-	-25	volts
Grid-No.1 Bias (Approx.) for transconductance of 20 µmhos	-8 1.7	10.5	volts
Plate Current	0.7	4.0	ma. I





FRAGE CHARACTERISTIC



92CM-

TUBE DIVISION

346

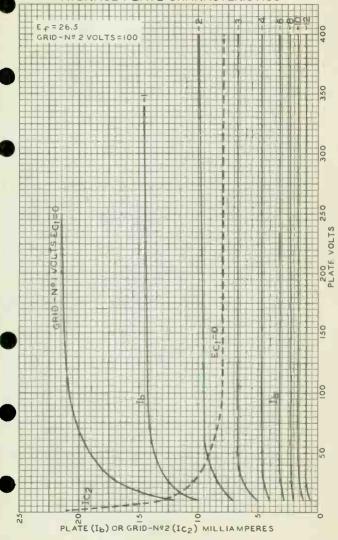
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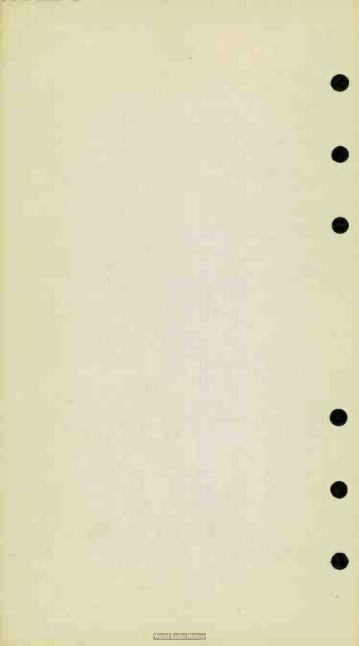
orld Radio History



REAG

AVERAGE PLATE CHARACTERISTICS







26A7-GT TWIN BEAM POWER TUBE

PEATICA PER

GENERAL DATA Flectrical: Heater, for Unipotential Cathode: Voltage. 26.5 ac or do volts Direct Interelectrode Capacitances (Approx.):0 Grid No.1 to plate ▲ MILE Grid No.1 to cathode & grid No.3. grid No.2, and heater Muf Plate to cathode & grid No.3, grid No.2, and heater4 . . . 13 1419 Grid No.1 of unit No.1 to grid No.1 of unit No.2 MILE Plate of unit No.1 to plate of unit No.2 . . Mit Grid No.1 of unit No.1 to plate of unit No.2 . . . uu f Grid No.1 of unit No.2 to plate of unit No.1 . . . MILE Mechan cal: Bulb Intermediate-Shell Oc al 8-Pin (JETEC No.B8-6), o- Short Intermediate-Shell Octal 8-Pin (JETEC No. B3-58) Ba ing Designation for BOITOM VIEW 8BU Fin 1 - Plate of Pir _ - Grid No. 1 of Ur t c.1 it Ac. 2 Pin 2 - Cathod . in 5 - Crid No. Grid No.3 of Init No. 1 3 10.2 of Units No. 1 4 No. 2 Pin F - Hat r Pin - - Gris o.1 of Pin 7 - Heater finit lin. Min 4 - Plat of Unit No. 1 AMPLIFIER - Class A. Values are for Each Unit Maximum Ratings, Design-Center Values:

-Indicates a Change.

O Without external shield.

Each unit.

2017.07

RCA) 26A7-GT

TWIN BEAM POWER TUBE

ip-	GRID-No.2 INPUT	0.5	max. wat	t
	Heater negative with respect to cathode.		max. volt	
	Heater positive with respect to cathode.	90	max. voit	. 5
-	Typical Operation and Characteristics (Each	unit):		
	Flate Voltage	26.5	volt	
	Grid-No.2 Voltage	26.5	volt	is
	Grid-No.1 (Control-Grid) Voltage	4.5	volt	s
	Peak AF Grid-No.1 Voltage	4.5	volt	s
	Zero-Signal Plate Current		n	na
	MaxSignal Plate Current	. 20.5	Г	na
	Zero-Signal Grid-No.2 Current		n	na
	MaxSignal Grid-No.2 Current		n	na l
	Transconductance		umh	os
	Load Resistance		ohr	ns
	Total Harmonic Distortion	. 7		%
	MaxSignal Power Output	180	r	nw l
		200		
	Maximum Circuit Values:			
	Grid-No.1-Circuit Resistance:			
	For maximum rated conditions:			
	With cathode bias	. 0.5	max. megol	m
	With fixed bias	. 0.1	max. megol	וחו
	For conditions where the maximum			
	design values of plate voltage and			1
	grid-No.2 voltage do not exceed			
	26.5 volts:			
	With grid-resistor bias	. 0.5	max. megol	חח
	AE ROWED AMPLIEUED Class A			
	AF POWER AMPLIFIER - Class A			
	Unless otherwise specified, values are on a	Per-1	ube Basis	
	Maximum Ratings, Design-Center Values:			
	PLATE VOLTAGE	. 50	max. vol	ts
	GRID-No.2 (SCREEN) VOLTAGE	. 50	max. vol	ts
	PLATE DISSIPATION (Per unit)	. 2	max. wat	t s
	GRID-No.2 INPUT (Per unit)		max. wa	tt
	PEAK HEATER-CATHODE VOLTAGE:			
	Heater negative with respect to cathode.	. 90	max. vol	ts
	Heater positive with respect to cathode.	. 90	max. vol	ts
	Typical Push-Pull Operation:		_ ,	
	Plate Voltage		vol	
	Grid-No.2 Voltage	. 26.5	vol	
	Grid-No.1 (Control-Grid) Voltage	7	vol	ts
	Peak AF Grid-No.1-to-			
	Grid No.1 Voltage	. 14	vol	
	Zero-Signal Plate Current	. 19		ma.
		. tadi		
		-Inuica	tes a change	

DATA 1



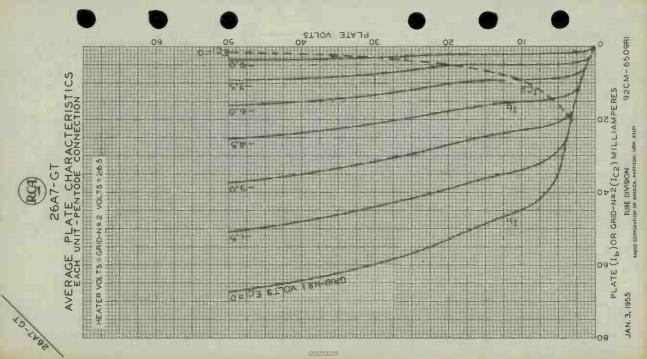
26A7-GT

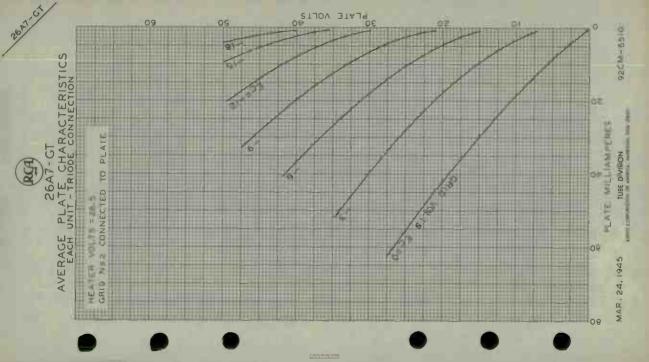
5047.CX

TWIN BEAM POWER TUBE

Max.—Signal Plate Current	ma ma
MaxSignal Grid-No.2 Current (Approx.) . 8.5	ma
Effective Load Resistance (Plate to plate)	ohms
Max.—Signal Power Output 500	WITI
Maximum Circuit Values:	
Grid-Nc.1-Circuit Resistance:	
For maximum rated conditions: With cathode bias 0.5 max. With fixed bias 0.1 max.	
For conditions where the maximum	meger
design values of plate voltage and grid—No.2 voltage do not exceed	
26.5 volts:	
With grid-resistor bias 0.5 max.	megohm

-Indicates a change.





MAR. 21, 1945

TUBE DIVISION OF AMERICA, MAR

92CM-6579



DUPLEX-DIODE TRIODE

MINIATURE TYPE

for use with 12-cell storage-battery supply

GENERAL DATA

12606

Electrical: Heater, for Unipotential Cathode: Voltage. 26.5 . . . ac or dc volts 0.07 Current. Direct Interelectrode Capacitances: Triode Unit: Grid to Plate ицf Grid to Cathode & Heater. . . 1.8 uuf Plate to Cathode & Heater . . 1.4 uuf Mechanical: Mounting Position. Anv Maximum Seated Length. Length from Base Seat to Bulb Top (excluding tip) 1-1/2" ± 3/32" 3/4" T-5-1/2 Base . . Miniature Button 7-Pin Pasing Designation for 80TTOM VIEW 7BT Pin 5 - Diode Plate No. 2 Pin 1 - Triode Grid (4)_(5) Pin 2 - Cathode Pin 6 - Diode Plate No. 1 Pin 7 - Triode Plate Pin 3-Heater Pin 4-Heater TRIODE UNIT - Class A1 ANDLIFIER Maximum Ratings Design-Center Values:

	The Attention of the Contract			1
				volts
1	PLATE D ST PAT CM	2.5	max.	wat t
1	PEAK HEATER-CATHODE VOLTAGE:			
				- 1 A -

Heater negative with respect to cathode 90 max. volts
Heater positive with respect to cathode 90 max. volts

From a grid resistor of. . . . 2.0 megohms Amplification Factor 17 16 15500 5500 ohms Plate Resistance 1100 1900 umhos Transconductance 9.5 . . Plate Carrent. . . ma.

Typical Operation with Resistance Coupling:
See RESISTANCE-COUPLED AMPLIFIER CHART, Type ORT.

O with whernal hill connected to which, salue or approximate.



DUPLEX-DIODE TRIODE

DIODE UNITS - Two

The two diode plates are placed around a cathode, the sleeve of which is common to the triode unit. Each diode plate has its own base pin. Diode curves in the front of the RECEIVING TUBE SECTION apply to the 2606.

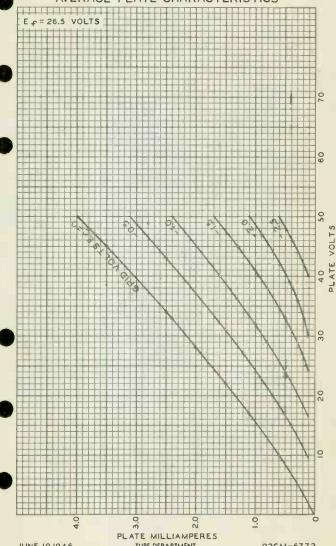
Additional curves applying to the 26C6 are shown under Types 5R7, and 6SR7

JUNE 20, 1946



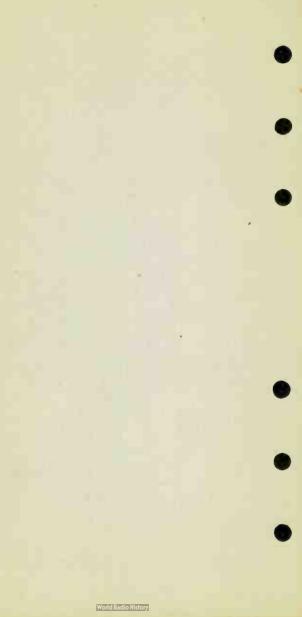
Rece

AVERAGE PLATE CHARACTERISTICS



JUNE 10,1946

TUBE DEPARTMENT RADIO CORPORATION OF MARRISON, NEW JERSEY 92CM-6772





PENTAGRID CONVERTER

12606

For use with 12-cell storage-battery supply GENERAL DATA Electrical: Heater, for Unipotential Cathode: Voltage. 26.5 . . ac or dc volts Current. 0.07 Direct Interelectrode Capacitances: Grid #3 to All Other Electrodes (RF Input) 7.5 uuf Plate to All Other Electrodes (Mixer Output) 14 MAL Grid #1 to All Other Electrodes (Osc. Input) 5.8 uuf 0.30 max. μµf 0.15 max. Grid #1 to Grid #3 uuf Grid #1 to Plate . 0.03 max. uuf Grid #1 to External Shield and All Other Electrodes Except Cathode & Grid No.5 MAT 2.9 Grid #1 to Cathode & Grid #5 2.84 μμf Cathode to External Shield and All Other Flectrodes Except Grid #1 15.5 uuf Mechanical: Any Maximum Overall Length 2-1/8" Waximum Seated Length. . . . Length from Base Seat to . . 1-1/2" ± 3/32" Bulb Top (excluding tip) T-5-1/2 Bulb Miniature Button 7-Pin Basing Designation for BOTTOV VIEW . Pin 5 - Plate Pin 1 - Grid No.1 Pin 2 - Cathode, Pin 6 - Grid No. 2. Grid No.5 Grid No. 4 Pin 3 - Heater Pin 7 - Grid No. 3 Pin 4 - Heater CONVERTER Maximum Ratings, Design-Center Values: PLATE VOLTAGE. . . 300 max. volts GRIDS-No. 2 & No. 4 (SCREEN) VOLTAGE 100 max. volts GRIDS-No. 2 & No. 4 SUPPLY VOLTAGE 300 max. volts 1.0 max. watt 1.0 max. watt 14 max. TOTAL CATHODE CLIRRENT. GRID-No.3 (CONTROL GRID) VOLTAGE: Negative bias value. 50 max. volts Positive bias value. . . . 0 max, volts PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode 90 max. volts Heater positive with respect to cathode 90 max. volts with external shield connected to cathods.

with external shield connected to other electrodes.



PENTAGRID CONVERTER

Characteristics - Separate Exc	itation:	o		
Flate Voltage	26.5	100	250	volts
Crids-10.2 & No.4 Voltage	26.5	10)	100	volts
Grid-No.3 Voltage	-0.5	-1.5	-1.5	volts
Grid-vo.1 (Oscillator-				
Grid Pesistor	20000	20000	20000	ohms
Flate Resistance (Approx.) .	-	0.5	1.0	megohm
Conversion Transconductance	270	455	475	umhos
Conversion Transconductance				
(Approx.)*	-	4	4	umhos
Conversion Transconductance				
(Approx.)**	8	-	_	umhos
Plate Current	0.45	2.8	3.0	ma.
Grids-No. 2 & No. 4 Current	1.6	8.0	7.8	ma.
Grid-No.1 Current	0.1	0.5	0.5	ma.
Total Cathode Current	2.15	11.3	11.3	ma.
Characteristics of Oscillator	Section			
Plate Voltage		26.5	100	volts
Grids-No. 2 & No. 4 Voltage		26.5	100	volts
Grid-No.3 Voltage		0	0	volts
Grid-No.1 Voltage		0	0	volts
Amplification Factor		-	11	
Transconductance		4500	7200	umhos
Plate Current		5.5	27	ma.

The characteristics shown with separate excitation correspond very closely with those obtained in a self-excited oscillator circuit operating with zero bias.

The curves under Type 6BE6 also apply to the 26D6

with grid-No.3 bias of -30 volts.

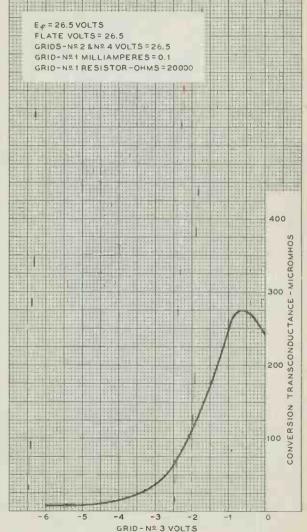
^{**} with grid-No.3 bias of -6 volts.

Measured between grid No.1 and grids-No.2 and No.4 connected to plate (not oscillating).



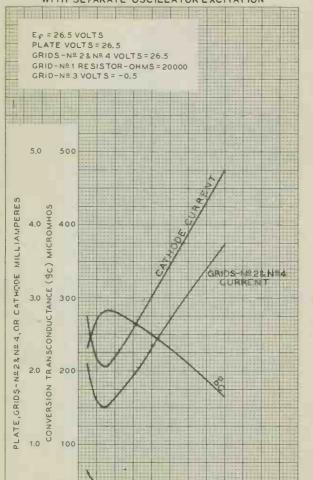
26D6 OPERATION CHARACTERISTICS







OPERATION CHARACTERISTICS SEPARATE OSCILLATOR EXCITATION



0.4 GRID-Nº 1 MILLIAMPERES

ATE CURRENT

0.6

0,8

1,0

LIGHTHOUSE DIODE

GENERAL DATA
Electrical:
Heater For Unipotential Cathode: Voltage 6.3 ± 5% ac or dc volts Current 0.75 amp. Direct Interelectrode Capacitance (Approx.): Plate to Cathode 2.70 μμf
Mechanical:
Operating Position
Pin 1 - Internal Con. Do Not Use Pin 2 - Heater Pin 2 - Cathode Pin 5 - Cathode Pin 7 - Heater Pin 8 - Cathode Pin 7 - Cathode Pin 8 - Cathode
HALF-WAVE RECTIFIER
Maximum Ratings, Design-Center Values:

	PEAK INVERSE PLATE VOLTAGE				200	max.	volts
	PEAK PLATE CURRENT				180	max.	ma.
	AVERACE PLATE CURRENT					max.	ma.
i	PEAK HEATER-CATHODE VOLTAGE:						

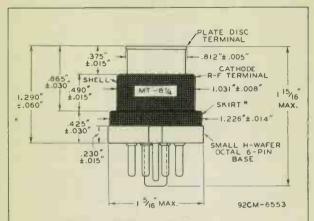
Heater negative with respect to cathode. 90 max. volts
Heater positive with respect to cathode. 90 max. volts
PLATE-SEAL TEMPERATURE*. 150 max. 90

^{*} Under extremely high ambient temperature, the plate-seal temperature must never exceed 200°C.





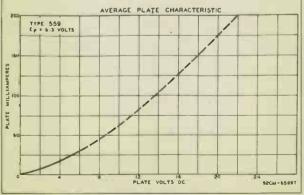
LIGHTHOUSE DIODE



MAXIMUM ECCENTRICITY OF ((AXIS) OF THE FOLLOWING ITEMS WITH RESPECT TO (OF SHELL AS REFERENCE IS:

PLATE DISC TERMINAL: 0.020" SKIRT: 0.035"

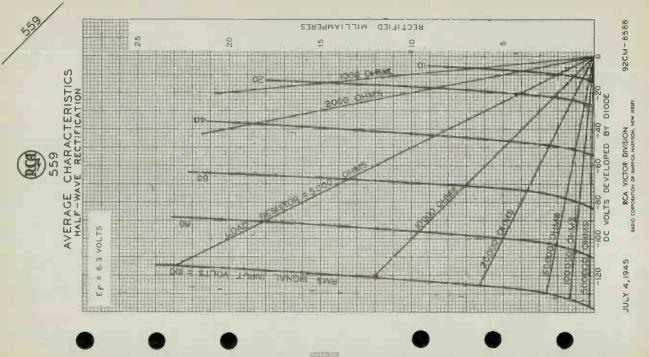
*NOT TO BE USED FOR RF CONTACT IN NEW EQUIPMENT DESIGNS.

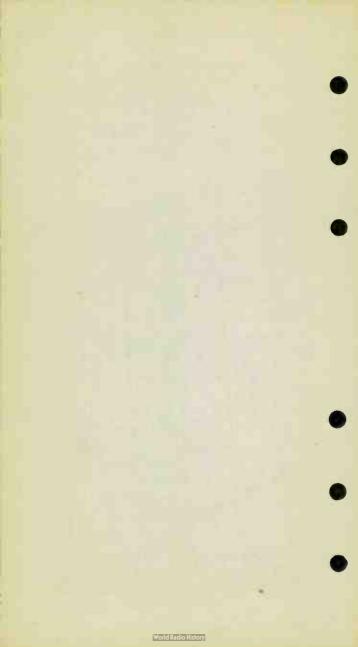


Nov. 15, 1945

RCA VICTOR DIVISION

TENTATIVE DATA







15-10 H HALF-WAVE HIGH-VACUUM RECTIFIER

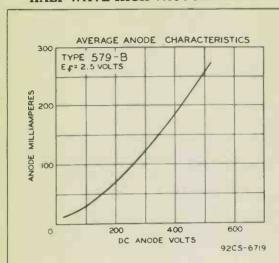
<u>D</u>	ATA
Electrical:	
Filament, Thoriated Tungsten: Voltage	2.5 ± 5% volt. 6 any
Mechanical:	
Mounting Position Diveral Length Maximum Diameter Bulb Bulb Terminal Base	
Maximum Ratings, Absolute Val	ues:
APPROX.	20000 max. volt 270 max. ma 25 max. ma 50 max. 0 75 max. 0
73"± 1" 716 ± 4	
	MEDIUM SHELL SUPER-JUMBO 4-PIN BASE
	FILAMENT

92CS-6720

579.8



HALF-WAVE HIGH-VACUUM RECTIFIER





QCA .

AMPLIFIER

LOW	MICROPHO	NIC DESIGN	

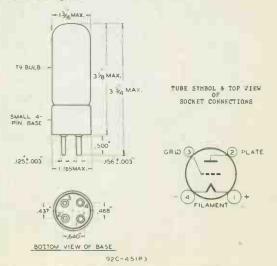
Filament	Coated	
Voltage	1.1	d-c volts
Current	0.25	amp.
Direct Interelecti	rode Capacitances:	
Grid to Plate	5.3	µµf
Grid to Filament	3.3	μμf
Plate to Filamer	nt 2.1	nuf
Maximum Overall Le	ength	3-3/4
Maximum Diameter		1-3/16
Bulb		T-9
Base		Small 4-Pi

AMPLIFIER - Class A

Operating Conditions and Characteristics:

Filament V	Voltage	F - 1	1.1 d-	-c volts
Plate Vol	tage	90	135 max.	volts
Grid Volto	ige	-4.5	-9	volts
Amplificat	tion Factor	8.2	8.2	
Plate Resi	istance	13°00	12700	ohms
Mutual Cor	nductance	410	645	шппов
Plate Curr	rent	2.9	3.5	ma.
Amplificat Plate Resi Mutual Cor	tion Factor istance nductance	8.2 13.00	8.2 12700 645	ohms

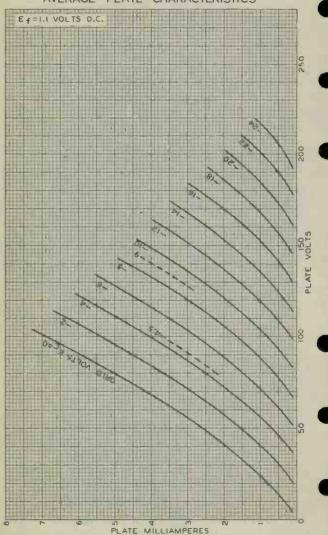
If a grid-coupling resistor is used, its aximum abuse should not exceed 2.0 megoums.



86A



AVERAGE PLATE CHARACTERISTICS



OCT.18,1932

RCA RADIOTRON DIVISION

925-5201



VOLTAGE REGULATOR

GLOW DISCHARGE

Cold Maximum Overall Length

Maximum Seated Height Maximum Diameter Bulb

Regulation (10 to 50 ma.)

Base Pin _ - Cathode Pin 2 - Jumper Mounting Position

Cathode

5-3/8" 4-3/4" 2-1/16" ST-16 Medium 4-Pin Eayonet

Pin 3- Anode Pin 4-Jumper Any

volts

BOTTOM VIEW (43)

Maximum and Minimum Ratings Are Absolute Values REGULATOR SERVICE

ı	D-C Anode Supply Voltage*					VOITS	
	D-C Operating Current (Continuous)				max. min.		
ı	Ambient Temperature Range	-55	to	+90		oC.	
l	Characteristics:						
ı	C-C Starting Voltage (Approx.)			115		volts	
ı	D-C Operating Voltage (Approx.)			90		volts	
ı	C-C Operating Current (Continuous)		10	to	50	ma.	

- with suitable socket connections, jumper within take act as switch to open power-supply circuit whin voltage rigulator tub is removed from socket.
- Not less than indicated supply like's hould to provid disc insure "starting" throughout tube life. throughout tub"

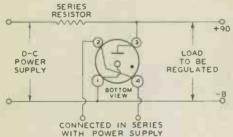
Sufficient resistance must always be used in series with this type to limit the current through the tube to 50 milliamperes under continuous (steady state) operating conditions. During the interval of 5 to 10 seconds which may be required for the regulated tubes in associated equipment to warm up and draw plate current, a maximum current of 100 mill amperes is permissible provided each such starting period is followed by a steady-state operating period of at least several minutes. Unless this precaution is observed, tube performance will be impaired.

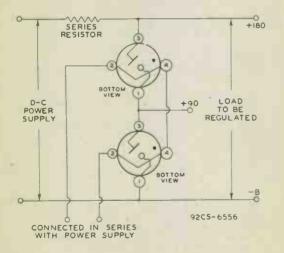
In voltage-regulator tubes of the slow-discharge type, regulation is somewhat dependent on past operating conditions. For example, the regulation value of a tube operated for a protracted period at 10 milliamperes and then changed to 35 milliamperes, may be somewhat different from the value that will be obtained after a long period of operation at 50 milliamperes. Likewise, the regulation value may change somewhat after a long idle period.



VOLTAGE REGULATOR

TYPICAL CIRCUIT CONNECTIONS







80

HALF-WAVE HIGH-VACUUM RECTIFIER FOR USE WITH CATHODE-RAY TUBES

Filament	Tungsten	
Voltage	2.5	a-c volts
Current	5.0	anp.
Overall Length Maximum Diameter		7" to 7-5/8" 1-13/16"
Bulb		T-14
Cap		Medium Metal Skirted
8ase		Medium 4-Pin

Operating Conditions:

Filament Voltage	2.5		a-c volts
A-C Plate Voltage (RMS)	7100	max.	volts
Peak Inverse Voltage	20000	max.	volts
D-C Output Current (Continuous)	5	max.	na.

The 878 is for use in suitable rectifying derices to supply the d-c voltage requirements of cathode-ray tubes.

It is important that the filament transformer secondary be inhulated to withstand the maximum peak inverse voltage encountered in the installation.

The maximum peak plate current of the 878 is limited by the available emission from the filament. In normal operation, the peak current is practically independent of the size of input filter condenser and is approximately 20 milliamperes.

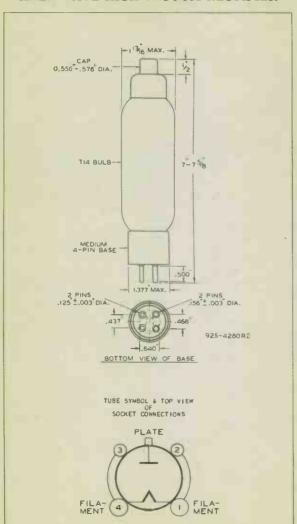
Filter requirements are ordinarily met by the use of a 0.5 to 2.0 pf condenser shouted across the bleeder circuit. The shunt condenser should have a rating sufficient to withstand the instantaneous peak value of the a-c input voltage. If this filtering is indecquate for a definite application, a two-section filter is recommended.

In a voltage-doubler circuit, two 878's may be operated to deliver approximately twice the voltage obtainable from a half-wave rectifier circuit for the same a-c input voltage. However, a separate filament-supply winding is required for each tube.





HALF-WAVE HIGH-VACUUM RECTIFIER





DETECTOR AMPLIFIER PENTODE
ACORN TYPE
Aspecially, for wavelengths as short as 0.7 meter

Coated Unipotential Cathode Heater Voltage 6.3 a-c or d-c volts Current amp. Direct Interelectrode Capacitances: Grid to Plate 0.007 max. MILE 3.4 Input MALE Output **BB**f Overa'l Length 1-11/16" + 3/16" 1-3/32" + 1/16" Overail Liameter Bulb. T-44 See Outline in End Terminal Two GENERAL SECTION Small Radial 5-Pin Rase Pin 5 - Cathode Pin 1- Hearer P-Piate Pin 2-Grid No. 2 . G1 -- Grid No. 1 Pin 3-Grid No.3 Pin 4 - Heater RCA Socket Stock No. 9925 RCA Grid & Plate Clips Stock No. 9939 Any Mounting Position P is an Long Part of Bull; Tup G1 is on Short Part of Bulb: Fattor BOTTOM VIEW (5/B) kaximum and Minimum Ratings Are De.ign-Center Values A-F AMPLIFIER D-C Flate Voltage 250 max. volts D-C Screen (Grid No. 2) Voltage 100 max. volts D-C Grid (No. 1) Voltage -3 min. volts Plate Dissipation .5 max. watt Screen Dissipation 0.1 max. watt D-C Heater-Cathode Potential BO max. volts Characteristics - Class A, Amplifier: D-6: Plate Voltage 90 volts Suppressor (Grid No.3) Connected to cathode at socket D-C Screen Voltage 90 100 v voits D-C Grid Voltage* volts -- 3 Plate Resistance Greater than 1.0 1.0 megohm Transconductance 1100 1400 umhos D-J Plate Current 1.2 ma. D-I Screen Current 0.5 0.7 ma. Typical Operation with Resistance-Coupling: Plate-Supoly Voltage o volts Suppressor Connected to cathode at socket

. O: See next page.

D-C Screen Voltage

D-C Grid Voltage*

D-C Plate Current

Second Harmonic Distortion

Lcad Resistance

Voltage Cutput

Voltage Gain

Indic tr a chingu.

volts

voits

ma.

volts

meaohm

50

0.5

40 to 50 RM

100 approx.



DETECTOR AMPLIFIER PENTODE

(continued from preceding page)

DETECTOR D-C Plate Voltage 250 max.

D-C Screen (Grid No. 2) Voltage 100 max. volts D-C Heater-Cathode Potential 80 max. volts

Typical Operation - Biased Detector: volts Flate-Lupply Voltage 0

Suppressor (Grid No.3) Connected to cathode at socket C-C Screen Voltage volts

D-C Grid (No.1) Voltage -b approx.volts Load Resistance megohm

Adjust d to 0.1 m, est n apply signal [-C Finte Current Cathode Resistor 20000 to 50000 ohms

- · it hill befl.
- indirection in the rest of the state of the
- fine plot dely altay vio . The oltimal ferior it the plot will be a poly live in the plot of piece do not only the plate of the control of the plot of the plot

- v west, f g or r plead 1 take two trial i re-gard ft fool g cliff, it f 950 fr ultra-hiab-fragury uses ar to ""timed, the gorlot is to of the plt of creclerid in uits the articlering of the company in the total relifier threat meanturn in unt. It was and reserve and the state of t the true, its appreciat, the plate, and the later.

TYPICAL R-F AMPLIFIER CIRCUIT

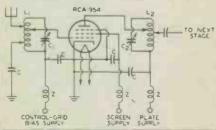
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plate a ding sof pin' i ding "or r right 1, T o f oil o wit ' [1 plt] in receipting to prot fator realts,

Ten continuers small

To be of tendt privile of mition if inni d w'r at ord a ry (,) as

95(СМ	-4	38	6 F	\$2
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WAVE-LENGTH RANGE	2.75 TO 5.3 METERS APPROX.	METERS APPROX.	O.8 ETER APPROX.
TURNS WIRE CLIPLE COUTSIDE DIA. LE GTH	VE 6. B. C.*	4 Nei6 B. C.* 3/8 5, 6	Nº 30 B.C.*
C IC2 (VAR ABLE)	3 10 25 445	3 10 25 MM	3 10 4 µµf
С	100 TO 500	100 TO 500	100 TO 500
TURNS 2 WIRE OUTS DE DIA. WINDING	15 Ne30 1/4 S.L.	15 N230 1/4 S. L . P	15 230 1/4 5.L.=

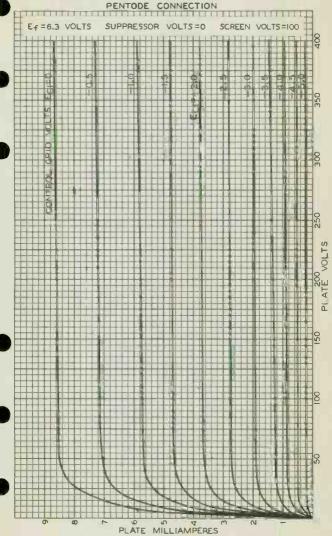
*B.C.= BARE COPPER "S.L.= SINGLE LAYER

- ITU THE ABOVE DATA ARE NECESSARILY APPROXIMATE

volts



AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION

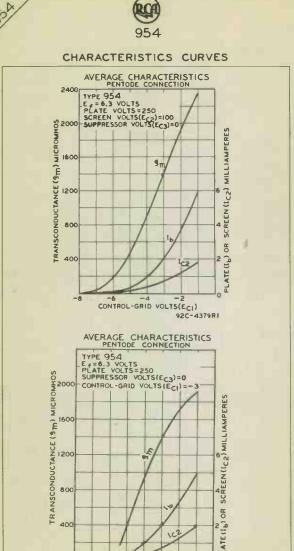


954





CHARACTERISTICS CURVES



చ

160

920-4380

VOLTS (ECZ)

40

SCREEN

DETECTOR, AMPLIFIER, OSCILLATOR

	ACORN			£	
a pecially for ta	ed Inpote			3	
Heater Coat	6.			-c ar d-	10140
Current	0.1		A.	-6 61 1-	= TID.
Lirect Intere ctrode		_			_ 110 .
Grid to Plate	1.				uuf
Grid to Cathode	1.				uuf
Plat to Cathode	0.				uuf
Overall Leigth				1-7/32"	+ 5/32"
Diveral Diameter					± 1/16"
Bulbl	See Out	ine n	5		T-42
Base	GENERAL	SECTION	Small	11 Radi	
Pin 1-Heater	Es	_3		Pin 4 -	
Pin 2-Plate	(-			Pin 5 -	Cathode
Pin 3-Grid	(
RCA Scoket	13	1		Stock	Na. 9925
Mounting Position	45-9				Any
	Short art of		7		
Yaxımum Ra			nter la	lues	
D. C. Dines Male ale	A-F A	willer	2	50 000	110110
D-C Plate Voitage				50 max.	volts
Plate Dissipation D-C H-ater-Cathode Po	* au + 1			on rax.	watts volts
		inter a			
Typical Operation and D-C Plate 'Oltaje	Lagracter	0 135	190	250	volts
E-C Grid Voltage	-2.			77	voits
Applitication Facto				25	***************************************
Plate distance	1470	ป 1 รวบบ		11400	ohms
Transcondictance	170	1000	2000	22011	umhos
D-C Plate Carrent	2.	5 2.5	4.5	F. 2	ma.
Lo-d desistance	-		20000		ohms
Second Harmonic Dis	t. –	-	5		%
Pomer Oitput			1 35		mw j
Typical Operation wit	h Resistan	ce-Coupl			
Plate-Supply Voltag	6		130		volts
D-0 Grid folt ge*			-3.5 250000		volts
Load Resistance Plate Current			0.42		ohms
Second Harmonic Dis	tortion		5		ma.
Voltage Output	tor tron			RMS	volts
Voltage Gain				approx.	VOILE
,	1 (57/57) (17/5	00111110			
R-F PILER MAP	te Yodulat			SSC	
C-C Plate Voltage	ie sodulai	ea or c.		зх.	voite
C-C Plate Current				nax.	ma.
C-C Grid Current				nax.	ma.
D-C Heater-Cathode Po	tential			Tax.	volta
Typ:cal Operation:					
D-C Plate Voltage			190		volts
D-C arid Voltage			_ 35	approx.	volts
D-C Plate Current			7		ma.
• * 0.					
•, *, O: See next page.			-4- II	dic te.	Chance
19 E 97, 10 14					





DETECTOR, AMPLIFIER, OSCILLATOR

(continued from preceding page)

D-C Grid Current 1.5 approx.ma. Fower output **

0.5 approx.watt

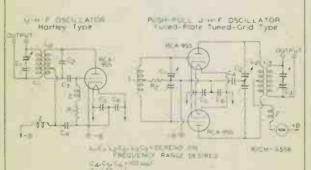
	DETECTOR	
Typical Operation:	Biasea	Gria-Leak
Plate-Supply Voltage	180	4 volt
Grid Volt a	-₹ approx.	Grid Return volt
Load Resitne	0.25	- muaohim
Flate Current Ad 1	'-d !? -i. ippr?	- ma.
(those Rusistor	tound approx.	- oh s
Grid Leik	-	1 to megohm
Grid Condenser		C.00025 uf

with no external bield.

und rangemented indition, to rail to it to still ruit rold of a strong or a strong or a strong or a Tri i a plat - rest l'ara lue. Tre eltage ffe tie é pl t will beglé - apply l'ara rest la gre i l'éres s'y plat urrer.

At officery and rit during in the vilu will be found for a list of the list of the will be really as reall the veluchted red,

R-F crosnain to and crack replaced close to the tobsin in a gaired in the full capabilitie of the Din for olderlinguage to the bt in d.



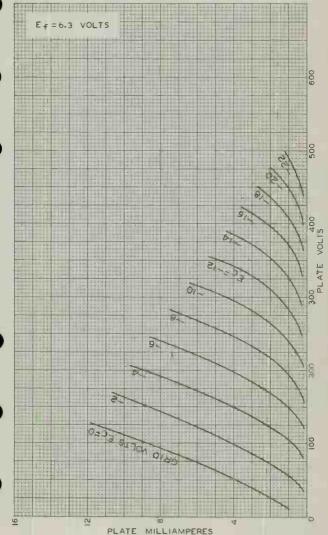
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R - 3000 TO LESSO CHART MATT

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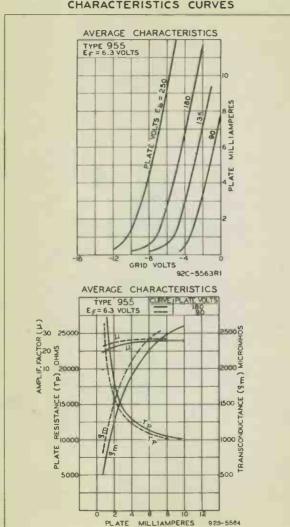
AVERAGE PLATE CHARACTERISTICS







CHARACTERISTICS CURVES



SUPER-CONTROL R-F AMPLIFIER PENTODE

ACORN TYPE					
Hea		Unipotential Cat		1 1	
	ol tage	0.3	-c or	der volte	
	irrent	0.15		mp.	
	ct Inter 1 ctrode 1				
	ric to Pl-t	().(i()? mix.		Lμf	
	npu t	3.4		μμ†	
	itput	3.0	4 44 /40	μμ†	
	rail Lemin		1-11/16		
1 7 7 7	ra l liameter		1-3/3		
Bull				T_4	
End	1 = 1 1 1 1 1 1 1 1 1	See Outline in	Į	THE	
Bas		GENERAL SECTION	mull Rac	ial 5-Fin	
	in 1- Heater			Cathode	
	in 2-Grid No.2			P'ate	
	ir 3-Grid No.3	-9		Gria No.1	
	ir 4-Heater		1-	0.10 HO.1	
		(:::::)	Stan	k No. 9925	
	Socket			k No.9925	
	Crid & Flate Clips	(1)	2101		
Moul	ning Position	0.5 4		Ariy	
		on Long Part of -ulb: T Short Part of Bulb: of			
		OTTOM VIEW (SBB;			
1			- 0 1		
	Maximum and Minimum		gn-Center V	alues	
		AMPLIFIER_			
D-C	Plate Voltage		250 max.	volts	
D-C	Screen (Grid No. 2)	Voltage	100 max.	volts	
Gri	a (No.1) Voltage		−3 min.	volts	
Pla	te Dissipation		1.7 max.	watts	
Scr	een Dissipation		0.3 max.	watt	
D-C	Heater-Cathode Pote	ential	80 max.	volts	
Cha	racteristics - Class	A, Amplifier:			
	-C Plate Voltage	4	250	volts	
	uppressor (Grid No. 3	Connected to ca	thode at so	cket	
	-C Screwn Voltage		100	volts	
	-C Grid (No. 1) Volta	ige*	-3	volts	
	ate Resistance			rox.megohm	
	ransconductance		1800	umhos	
1	rid Bias for				
	Transcond. of appro	ox. 2 umhos	-45	volts	
D	-C Plate Current		6.7	ma.	
	-C Screen Current		4.7	ma.	
		Connellational			
		Superheterodyne			
D-C	Plate Veltage Screen voltage		250 max. 100 max.	volts	
D-C	Heater-cathode Potentia	1	HO max.	volte	
2 y 2 1	cal Operation: -C Plate Voltage	100	250	volt	
S.	ppr-sso.	Connect d to	c thode t .	ock t	
C-	-C Ser . voltag-	100	100	volt.	
	-C Grid Folt ge	-10		ox. volt	
The	grid bia. shown is minimu e value, are optimum.	m for an oscillator	peak voitage	or 9 vorts.	
1				-	
0, 8	:See next page.		-d- Indiest	es a change,	
11.000	20 174			DATA	



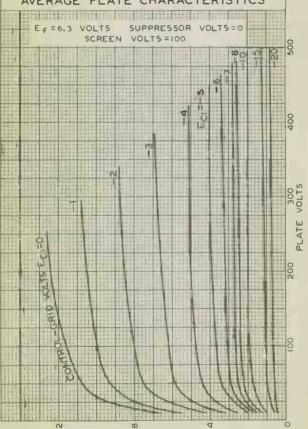
SUPER-CONTROL R-F AMPLIFIER PENTODE

(continued from preceding page)

with shield baffle.
Under maximum rated conditions, the resistance in the grid circuit should
not exceed 0.5 megohm with fixed bias, or 1.0 megohm with cathode bias.

Typical R-F Amplifier Circuit for the 955 is the same as that for Type ons.

AVERAGE PLATE CHARACTERISTICS



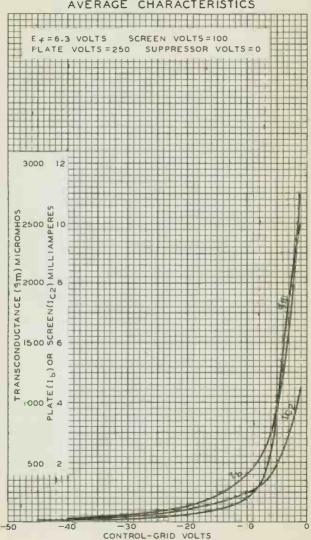
MILLIAMPERES PL ATE

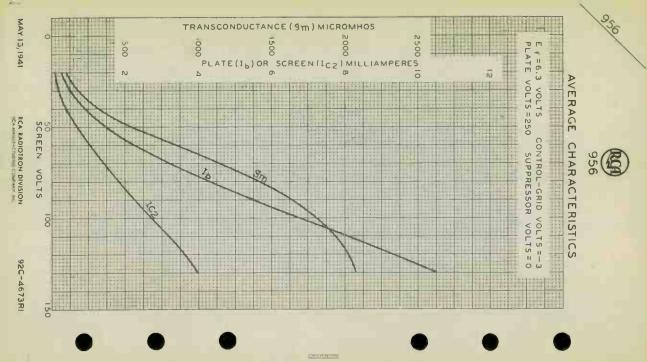
RCA VICTOR DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY World Radio History 9:04-4671F1



956

AVERAGE CHARACTERISTICS







35,

Stock No. 9925

DETECTOR, AMPLIFIER, OSCILLATOR

Filament	Cost]
Voltige	1.25	±c volt	L
Current	0.05	imp.	L
Direct Intere - ros-	positiona :		П
Grid to Plate	1.2	in the first of th	П
Grid to Filament	0.3	uut.	L
Plat to Fife of	0.7	ццf	L
Overall Length		1-7/32" - 3/3/"	П
Overall Liameter		1-3/32" I 1/10"	1
Bulbl	See Outline in	T-4	ı
Base }	GENERAL SECTION	[Smull Radia 5-Pin	-
Pin 1 - Fil ment		Pin 5 - Filament -	L
Pin 2-Plate	2.5	AA! - Plane of	П
Pin 3-Gri		Electrodes	L
Pin 4-Fil ment -			

Shirt Park of Bulb: Bott m

Maximum hatings Are Pessin-unter Values

Vitil tiEr		
D-C P'ate Voltage	135	max. volts
Characteristics — Class A, Amplifier: D-C Plate voltage D-C Grid Voltage* Amo ification Factor	135 -5	volts volts
Plate - sist ince Transconductance D-C Plate Current	2 800 650 2	approx.ohms µmhos a.

with no oten le ield.

RCA Sccket

Mounting Position

Horiotil priin priit sifple land i vrtic 1 (p) to on spel.

* und r | xi = r tr' ondition , term it no in the aris in it hould not x; d u.l gor with fir d bi , ' 0.5 gs, with that bis.

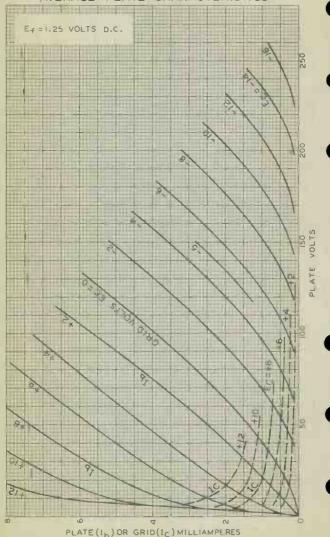
R-F grounding by means of condensers placed close to the tube pins is required if the full capabilities of the 9°7 for ultrahigh-frequency uses are to be obtained.

- I dicate a and .





AVERAGE PLATE CHARACTERISTICS



JUNE 15, 1944

RCA VICTOR DIVISION

92CM- 6336RI



AMPLIFIER TRIODE ACORN TYPE

Filament Coated Voltage 1.25 d-c volts Current 0.10 алр.

Direct Interelectrode Capacitances: 0 Grid to Plate 2.6 MUST Grid to Filament 0.6 LLL f

Plate to Filament 0.8 uuf Overall Length 1-7/32" + 5/32" Overall Diameter 1-3/32" + 1/16"

Bulbl See Outline Base Small Radial 5-Pin GENERAL SECTION

Pin 1 - Filament + Pin 5 - Filament -Pin -- Plate AA' - Plane of

Pin 3-Grid **Flectrodes** Pin - Filament -RCA Socket Stock No. 9925

Mounting Position Short Part of Bulb: Bottom BOTTOM VIEW (5ED)

Maximum Ratings Are Design-Center Values

A-F AMPLIFIER

D-C Plate Voltage 135 max. volts D-C Plate Current 5 max. ma. 600 max. Plate Dissipation THE Characteristics - Class A, Amplifier:

D-C Plate Voltage 135 volts D-C Grid Vo'tage volts Ampl fication Factor Plate Resistance ohms Transconductance umhos D-C Plate Current

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy fay-lown conditions per tube without modulation*

D-C Flate Voltage 135 max. volts D-C Grid Voltage -30 max. volts D-C Plate Current 7 max. ma. D-C Grid Current 1 max. ma. D-C Plate Input 950 max. mw

Plate Cissipation 500 max. mw Typical Operation at Moderate Frequencies:

D-C Plate Voltage 135 volts -20 volts D-C Grid Voltage® 20000 ohms 2500 ohms

Peak R-F Grid Voltage 40 volts D-C Plate Current ma. D-C Grid Current** 1 approx.ma. Driving Power* 35 approx.mw

Power Output

Vertical

ma.





AMPLIFIER TRIODE

(continued from preceding page)

with no starnal stall.

- Harist larging riting of all of literal in reinlight of a
- * dult: tially spin by the distriction is a set of the rein conbit udic-fre unney evelop doe not seed 1155 of the rein condition.
- Obt i d by grid resistor (2000), cathode resistor (2504), or fixed
- ub) t ' wid-veristion to explained u for T.D. Strop in or or lection.

NOTE: The 9°8-A is capable of producing a useful power outout at frequencial up to approx. 3.0 m gas, cles.

-F rounding by means of condensers placed close to the tube ins is required if the full capabilities of the 958-A for litra-him-frequency uses are to be obtained.



AVERAGE PLATE CHARACTERISTICS

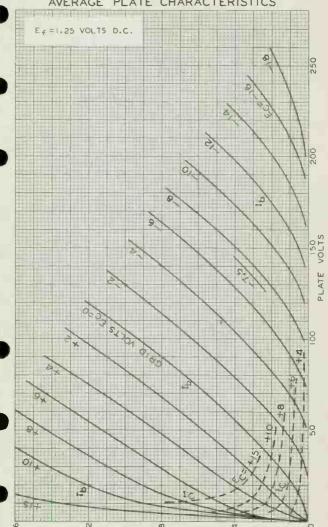
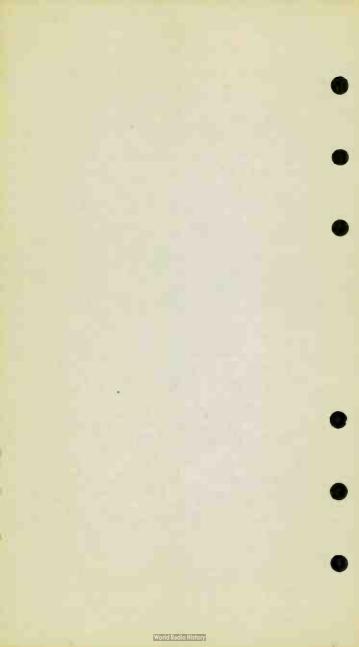


PLATE (Ib) OR GRID (IC) MILLIAMPERES

JUNE 15,1944

92CM-6334RI



DETECTOR AMPLIFIER PENTODE

	ACORN TYPE	
Filacit	Dated	
voltage	1.25	d-€ volts
Current	0.05	amp.
Direct Interelectrode		
Gria to Plate	0.015 max.	μμf
Input	1.8	uuf
Output	2.5	ıµf
Overall Length		1-11/10" = 1/1(" 1-3/2" = 1/10"
Overall ita eter		
Bulb]		T-42
End Terminals	See Outline n	Two
Base	GENERAL SECTION	
Pin 1 - Filament		Small Radia' 5-Pin P - Plate
Pin 2-Grid No. 2		G ₁ - Grid No. 1
Pin 3 - Grid No. 3		A
Pin 4 - Filament -	P	AA' - Plane of
Pin 5 - Filament -	my and	Electrodes
PCA Socket	im (::::)	Stock No. 3925
RCA Grid & Plate Clips	****	Stock No. 9939
Mounting Position	A A	ertical [©]
3		le lical.

P is on Long Part of 8w b: lop by is on Short Part of Rulb: Refton BOTTLM VIEW (53E)

Maximum Ratings are Design-Center Values

AMPLIFIER

D-C Plate Voltage	145 max.	volts	
D-C Screen (Grid No.2) Voltage	7.5 max.	volts	
Characteristics - Class A, Amplifie	T7		
D-C Plate Voltage	135	volts	
Superessor (Grid No.3) Connected	to 'ilament(-) at	socket	
D-C Screen Voltage	67.5	volts	
D-C Grid (No. 1) Voltage #	-3	volts	
Plate Resistance	0.8 approx.	megohm	
Transconductance	600	μπhos	
D-C Plate Current	1.7	ma.	
D-C Screen Current	0.4	ma.	
		1	

O with shield baffle.

R-J grounding by means of condensers placed close to the tube terminals is required if the full capabilities of the 959 for ultra-high-frequency uses are to be obtained. It is important in the cases of the plate and control-grid direcuits that separate r-f greunding returns be nade to a common point in order to avoid r-f inter-action through common return circuits. It may also be advisable in some applications to supplement the action of the by-pass condensers by 1-f cnokes placed close to the condensers in the return or supply lead for the grid, the screen, the suppressor, the plate, and the filament.

O Horizontal operation permitted if plane of electrodes is vertical (plate on edge).

[#] Under maximum rated conditions, the resistance in the grid circuit should not exceed 0.1 megchm with fixed bias, or 0.5 meg-whm with rathode bias.



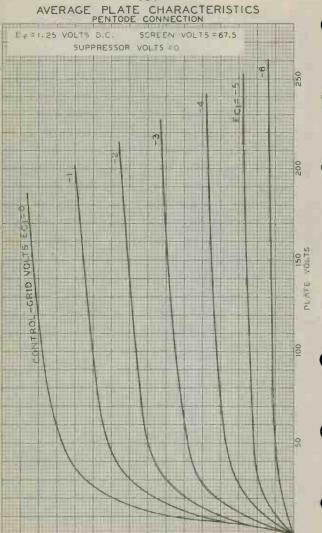


PLATE MILLIAMPERES

JUNE 14, 1946

RCA VICTOR DIVISION World Radio History 925 N-63311R

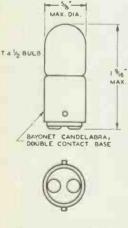




VOLTAGE REGULATOR

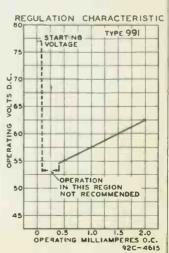
Туре Glow Discharge Maximum Overall Length 1-9/16" Maximum Diameter 5/8" Bulb T-4-1/2 Base Bayonet Candelabra, Double Contact Operating Conditions: Starting-Supply Voltage (D.C.) 87 min. volts Peak Current 3 max. ma. Continuous Current (D.C.) ** 2 max. ma. (67 max. volts Operating Voltage[△] 48 min. volts

If the 991 is used with a pulsating or alternating supply voltage, the peak current should be limited to 3 ma. Sufficient resistance must always be used in series with this tube to 1 mint its d-c current to 2 ma. For d-c operating current between 0.4 and 2 ma.

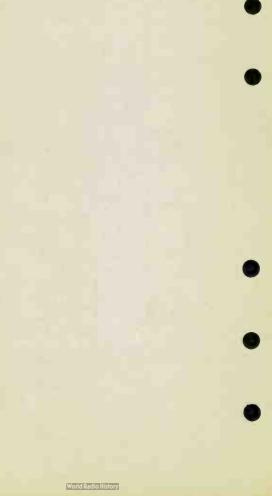


BOT TOM VIEW OF BASE

920-4614



TUBE MOUNTING POSITION VERTICAL OR HORIZONTAL





AMPLIFIER TRIODE

For applications critical as to microphonics.

Previously designated as RCA-10 Special.

Previously designated as	non-it opecial.
Filament Thoriated Tung	sten
Voltage 7.5	a-c or d-c volts
Current 1.25	amp.
Amplification Factor 8	
Direct Interelectrode Capacitances	(approx.):
Grid to Plate 7	μμf
Grid to Filament 4	µµf
Plate to Filament 3	μμf
Maximum Overall Length	5-5/8"
	2-3/16"
	S-17
	Medium 4-Pin Eayonet
	Filament Thoriated Tung Voltage 7.5 Current 1.25 Amplification Factor 8 Direct Interelectrode Capacitances Grid to Plate 7 Grid to Filament 4

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F	POWER	AMPLIFIER	& MODULATOR	- Class A
-----	-------	------------------	-------------	-----------

D-C Plate Voltage Plate Dissipation			425 i 12 i	max.	volts watts
Typical Operation:					
Filament Voltage	7.5	7.5	7.5	a-c	volts
D-C Plate Voltage	250	350	425		volts
C-C Grid Voltage	-23.5	-32	-40		volts
Peak A-F Grid Voltage	18.5	27	35		volts
D-C Plate Current	10	16	18		ma.
Plate Resistance	6000	5150	5000		ohms
Tran sconductance	1330	1550	1600		umhos
Load Resistance	13000	1100C	10200		ohms
U.P.O. (5% second harmonic)	0.4	0.9	1.6		watts

A-F POWER AMPLIFIER & MODU! ATCR - Class B

D-C Plate Voltage	425 max. volts	
Max-Signal D-C Plate Current*	60 max. ma.	1
Max-Signal Plate Input*	25 max. watts	
Plate Dissipation*	12 max. watts	1
Typical Operation:		1

Unless otherwise specified, values are for a tubes

Filament Voltage	7.5	7.5	7.5	a-c volts
D-C Plate Voltage	250	350	425	volts
D-C Grid Voltage	-28	_4 t)	-50	volts
Peak A-F Grid-to-Grid Volt	. 220	240	260	volts
Zerc-Sig. D-C Plate Cur.	8	8	8	ma.
Max-Sig. D-C Plate Cur.	110	110	110	ma.
Load Resistance (per tube)	1000	1500	2000	ohms
Effective Load Res.		0000	0000	
(plate to plate)	4 000	6000	8000	ohms
Max-Signal Driving Power	2.1	2.3	2.5 a	approx.watts
Max-Signal Power Output	13	20	25	ADDECX. WATTS

Averaged over any audio frequency cycle of sine-wave form. Indicates a change.

-





AMPLIFIER TRIODE

(continued from preceding page)

	H-1 TOHEN MAILETT	ILK - Class D	rerephony	
Carı	rier conditions per tube for	use with a nax.	modulation fact.	of 1.0
0-0	Plate Voltage		450 пах.	volts
D-C	Plate Current		45 max.	ma.
Pla	te Input		18 max.	viatts
Pla	te Dissipation		15 max.	watts
Fyp	ical Operation:			
	ilament voltage	7.5	7.5 a-c	volts
D	-C Plate Voltage	350	450	volts
0	-C Grid voltage	-40	-53	volts
P	eak R-F Grid Voltage	75	85	volts
	-C Plate Current	40	40	ma.
0	-C Grid Current **	1	1 approx	.ma.
D	riving Power 0 **	2		
P	ower Output	3		

At crest of a-f cycle with modulation factor of 1.0.

PLATE - MCDL LATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per twoe for use with a	max. mo	dulatio	on fact.	of 1.0
-C Plate Voltage		350	max.	volts
D-C Grid Voltage		-200	пак.	volts
D-C Plate Current			max.	ma.
C-C Grip Current				ma.
Flate Imput				watts
Flate Dissination		10	max.	watts
Typical Operation:				
Filament Voltage	7.5	7.5		volts
-C Plate Voltage	250	350		volts
C-C Grid Voltage	-95	-135		volts
Peak R-+ Grio Voltage	195	235		volts
C-C Plate Current	45	45		ma.
D-C Grid Current **	15		approx.	
Oriving Power **	3		approx.	
Power Output	5.5	8	approx.	watts

R-F POWER AMPLIFIER & CSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

ney-work conditions per the brone-			
D-C Plate Voltage	450 ma.	x. volts	
D-C Grid Voltage	-200 ma	x. volts	
D-C Plate Current	60 ma	x. ma.	
D-C Gria Current	15 па	x. ma.	
Plate Input	27 ma	x. watts	
Plate Dissipation	15 ma	x. watts	
Typical Operation:			
Filament Voltage 7.5	7.5	a-c volts	
D-C Plate Voltage 350	450	volts	
0-0. Grid Voltage -90	-115	volts	ı
Prak K-F Grid Voltage 190	215	volts	

^{**, #:} See next page.



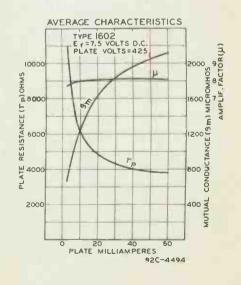
AMPLIFIER TRIODE

(continued from preceding page)

D-C Flate Current ma. D-C Crid Current 15 15 ma. Driving Power "" 3 3.3 approx.watts Power Output 9 13 approx.watts

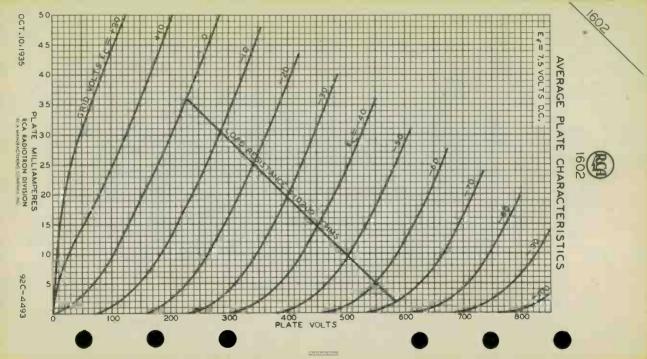
For use of the 1602 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs Frequency.

> OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 1602 are the same as for the 841.



Modulation essentially negative may be used if the positive peak of the andio-frequency envelope does not exceed 115% of the carrier con-ditions.

^{**} Subject to wide variations as explained on sheet TRANS, TUBE RATINGS.







TRIPLE-GRID DETECTOR AMPLIFIER

	For applications critical as to microphenics, noise, and	h u=
	Heater Coated Unipotential Cathode	
	Direct Interniectende Comenitannes.	mp.
	Irtode Connection (Approx.) - Grids at a at tied to pla	
		μf μf
	Pentpde Connection	μf
	Input 4.6	µ ք µ ք
Ц	Output 6.5 Overall Length 4-11/16° to 4-15	uf /16°
	Seated Height #-1/16° to -5/ Maximum Diameter 1-9	
	Bulb Small M	-12
	Base Small 6	−Pin
	Pin 1 - Heater Pin 2 - Plate Pin 6 - Heate	de r
	Pin 3 - Screen Pin 4 - Suppressor Cap - Grid	
	Mounting Position BOTTOM VIEW	Any
	SINGLE-TUBE AMPLIFIER	
	Plate Voltage 250 max. vo Screen Voltage 180 max. vo	lts
	Screen Voltage Typical Operation and Characteristics - Class A, Amplif	lts ier:
	Pentode Connection Triode Connection	
	Screen 100 100 180 vo	lts
	Grid -3 -3 -3 -8 vo	lts
	Amp. Fact 20* 20*	ohm
- {	Transcond. 1185 1225 2000 1300 1900 µm	hos
	Plate Cur. 2 2 8.3 5.3 6.5 ma	
	Screen Cur. 0.5 0.5 2.1 ma	
	Greater than 1.5. Approx. # Approx., for cath. cur. cut PUSH-PULL AMPLIFIER - Tricde Connection	-off.
	Typical Operation - Class A, Amplifier:	
	Inless otherwise specified, values are for 2 tubes	
		lts
	Catrode Resistor 625 on	m s
	Load Res. (place to place) 100000 oh	n S
	Power Output DETECTOR	
-		
1	Plate Supply0 110 250 250 vo	lts
	Grid -1.16 -1.83 -1.95 -4.3 vo	lts
.	Suppressor Connected t cathode at cocket	
	Cath. Cur. (no sig.) 0.063 0.133 0.65 0.43 ma Place Resistor 1.00 0.75 0.25 0.50 me	ohm
-	R-F Signal (RMS)** 1.05 1.50 1.18 1.37 vo	ohm
	In circuits where the cathode is not directly connected to the hea the potentia' difference between heater and cathode should be kep	ter,
	low as possible.	
	within the table	
	" With close-fitting shield connected to cathode. 2 Voltage at plate will be "Plate Supply" voltage minus voltage dro	p in
	plate resistor caused by plate current. For the following amplifier tube.	
-	* See next page.	
	Indicate a Thange.	
-		ATA



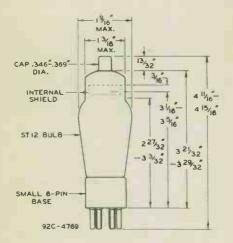


TRIPLE-GRID DETECTOR AMPLIFIER

(continued from preceding page)

with these signal values modulated 20%, the voltage output under each set of conditions is 17 peak volts at the grid of the following amplifier. This value is sufficient to insure full audio output from a 42 (for 6.3-volt operation) or a 2A5 (for 2.5-volt operation) under 250-volt plate conditions.

For Curves, refer to Types 6J7 and 57. For additional Data, refer to RESISTABES-COURLED AMPLIFIER CHART.







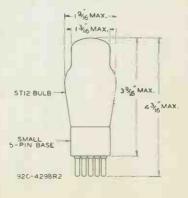
AMPLIFIER PENTODE

ror applicatio	ns critical as to	microphonics
Filament	Coated	
Vol tage	1.1	d-c volts
Current	0.25	amp.
Direct Interelectrode	Capacitances:0	
Grid to Plate	1.0	μμf
Input	7	μpf
Output	7	μμf
Maximum Overall Length		4-3'16"
Maximum Seated Height		j-9′1€"
Maximum Diameter		1-9/16"
Bulb	3	ST-12
Base	(As)	Small 5-Pin
Pin 1 - Filament +	(2)	Pin 4 - Screen
Pin 2-Plate		Pin 5 - Filament -
Pin 3-Grid	00	
Mounting Position	BOTTOM VIEW	Any

Maximum Ratings Are Absolute Values

A-F AMPLIFIER	
Plate Voltage	135 max. volts
Screen Voltage	67.5 max. volts
Typical Operation and Characteristics -	Class A, Amplifier:
Plate	135 volts
Screen	67.5 valts
Gric *	-1.5 volts
Plate Res.	0.4 approx. megohm
Transcond.	725 µrhos
Plate Cur.	2.5 ma.
Screen Cur.	0.65 ma.

Without shield.
 The U-c resistance in the grid circuit of the 1609 should not exceed
 0.5 megohm for fixed-bias conditions.

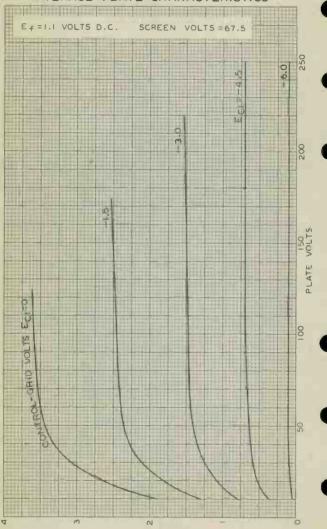


- Indicates a charge.





AVERAGE PLATE CHARACTERISTICS

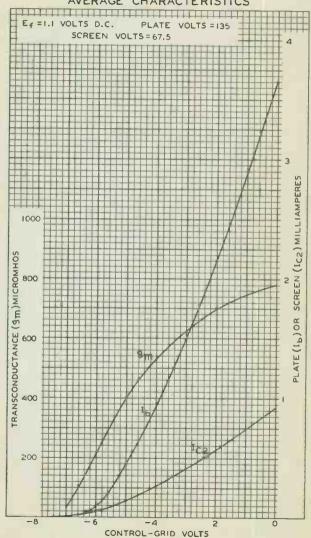


7

PLATE MILLIAMPERES



AVERAGE CHARACTERISTICS







POWER AMPLIFIER PENTODE

The 1611 is a power pentode intended for use as a relay tube in equipment on ships for automatically announcing SOS signals. To meet the special requirements of such service, the 1611 features an ip-eg characteristic having suitable slope and minimized variation between tubes. Physical characteristics of the 1611 are the same as those of Type 6F6.

RCA-1611 is available only through Radiomarine Corporation of America, 75 Varick Street, New York, N.Y.

ΠΔΤΔ

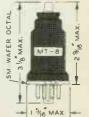




PENTAGRID AMPLIFIER

	For at lications critical as	te microthonics	
1	Heater Coated Unipotential	Cathode	
	Voltage 6.3	a-c or d-c volts	1
	Current 0.3	amo.	L
	Direct Interelectrode Capacitances:		4
	Grid #1 to Grid #3	0.20 max. µµf	
	Grid #1 to Plate	0.001 max. µµf	
_	Grid *3 to Plate Grid *1 to All Other Electrodes	0.10 max. µµf	ı
	Grid #3 to All Other Electrodes		П
	Plate to All Other Electrodes	10 µµf	
	Maximum Overall Length	3-1/8"	L
	Maximum Seated Height	2-9/16"	
	Maximum Diameter	1-5/16"	1
	Bulb	Metal Shel . MT-8	
	Cap	Viniature	1
	Base @ ⑤	Small Wafer Octal 7-Pin	
	Pin 1 - Shell	Pin 5-Grid #3	
	Pin 2-Heater	Pin 7 - Heater	1
	Pin 3-Plate	Pin 8 - Cathode	
	Pin 4 - Grids #2 & #4	Cap - Grid #1	
	Mounting Position BOTTOM VIEW	Any	
	Haximum Ratings Are Design	-Center Values	
	AMPLIFIER		
	Plate Voltage	250 max. volts	
	Screen Voltage	100 max. volts	
	Plate Dissipation	1.5 max. watts	
	Screen Dissipation	1.0 max. watt	
	Typical Operation and Characteristic		1
	Plate	250 volts	1
	Screen (Grids #2 & #4)	100 voits	1
	Control Grid (Grid #1)	-3 volts	ı
	Control Grid (Grid #3)	-3 volts	L
	Plate Res.	0.6 megohm	.
	Transcond. (Grid #1 - Plate)	1100 umhos	ı
	Transcond. (Grid #1 - Plate)"	5 approx. umhos	ı
	Plate Cur.	5.3 ma.	
	Screen Cur.	6.5 ma.	1
	In circuits where the cathode is not di-	MINIATURE	Г
	rectly connected to the heater, the po- tential difference between heater and	CAP	ı
	o cathode should be kept as low as possible. with shell connected to cathode.	The Contract of	
	With Brid #1 bian -15 volts; Grid #3	₹ .	П
	bias = -15 volts.	AAX.	
		m x x x x x x x x x x x x x x x x x x x	1
		L S MT-R	

Curves under Type 617 also apply to the 1612.



← Indicates = stange.

Jan. 1 1943





TRIPLE-GRID DETECTOR AMPLIFIER

Por applications critical as to microphonics

Coated Unipotential Cathode

	Voltage Current	6.3	a-c or	d-c volt	
	Direct Interelectrode Car			G	
	Pentode Connection Grid to Plate	0.005 max.		μμτ	
	Input Output	7.0		ז עע	
		12.0		pµf 0.4./0.1	
	Maximum Overall Length			3-1/8"	
	Vaximum Seated Height			2-9/16"	
	Maximum Diameter		1 1 0	1-5/16"	
	Bulb			ell, MT-8	
	Cap	(A) (S) C		Miniature	
	Base Shall	OF TR	mall Wafer Oc		
	Pin 1 - Shell Pin 2 - Heater	9	Pin 5 - Sup		
ļ		2 7	Pin 7 – Hea		
1	Pin 3 - Plate	0-0	Pin 8 - Cat		
	Pin 4 – Screen	DOTTON ULF	Cap - Gri		
		BOTTOM VIEW	77 1	Any	
	Maximum Rating				
	AMPLIFIER	- Pentode Con	nection		
	Plate Voltage		250 max		
	Screen Voltage		100 max	. volts	
+	Typical Operation and Chi	aracteristics		plifier:	
	Plate	100	250	volts	
	Screen	100	100	volts	
	Grid #	-3	-3	volts	
	Suppressor	connected to c		ket	
	Plate Res.	1.0	A	me ohm	
	Transcond.	1185	1225	umhos	
	Grid Bias for cathode				
	current cut-off	-7	-7	volts	
	Plate Cur.	2.0	2.0	ma.	
	Screen Cur.	0.5	0. 5	ma.	
	AMPLIFIER	- Triode Conne	ection ⁰⁰		
+	Plate Voltage		250 man	c. volts	
	Typical Operation and Ch	aracteristics	- Class A, Ar	plifier:	
	Plate	180	250	W0115	
	Grid # Amp. Fact.	-5.3 20	-8 20	volts	
	Plate Res.	11000	10500	ohms	
	Transcond. Plate Cur.	1800	1905	umhos ma.	
	For cathode-bias operatio	r of the 1626 a	minimum cathor	te- elistor	
->-	by-bass condenser of 25 uf	is recommended	to minimize num.	nart ifu-	
	larly in circuits where when a 25 µf condenser or	the 1620 is foll	lowed by high-ga	erence be-	
	tween heater and cathode	is not critical.	but it should	De want	
	low at possible. 'f less or negative biasing of the	than a 25 uf co	ndenser is used,	position	
	quired, but the bias valu	e chosen for mi	nimum hum should	be within	
	o the range of +5 to +50 v with shell connected to ca		0 .0188.		
	# Under maximum rated condit	ican, the d-c r	esistance in the	grid tir-	
	Cuit should not exceed 1.0 Greater than 1.0 megohm.	megonm.	- Indicate	a chang .	
	Screen and suppressor tied				
	OUTLINE CIVENSIONS for	the 1520 are	the same as f	or 112.	

Curves under Type 61- also apply to the 1620.



POWER AMPLIFIER PENTODE

For appl	ic	at	io	n s	4	equ	iri	n g	00	on t	Unu	ty	of	service

,	For applications requiring continuit	y of servi	ce
	Heater " Coated Unipotential Cathod	le	
	Voltage 6.3	a-c or d	-c volts
	Current 0.7		amp.
	Direct Interelectrode Capacitances (Approx	.):0	
	Grid to Plate 0.20		µµ f
	Input 7.5		µµ f
	Output 11.5		μμf
	Maximum Overall Length		3-1/4"
	Maximum Seated Height		2-11/16"
	Maximum Diameter		1-5/16"
	Bulb	Metal She	
	Base Small		
	Pin 1 - Shell	Pin 5-G	
	Pin 2 - Heater Pin 3 - Plate	Pin 7-H Pin 8-C	
		FIII 8-C	atriode
	Pin 4 - Screen Mounting Position BOTTOM VIEW		Δρ.,
	Haximum Ratings Are Design-Cente	- Values	Any
	PUSH-PULL AMPLIFIER - Triode Con		
	Recommended with Cathode-Bias Oper		
	Plate Voltage Plate Dissipation		x. volts
		8.3 ma	x. watts
	Typical Operation - Class A, Amplifier: Unless otherwise specified, values ar	e for 2 tu	bes
	Plate Supply *	327.5	volts
	Cathode Resistor *	500	ohms
	Peak A-F Grid-to-Grid Voltage	54	volts
	Zero-Sig. Plate Current	55	ma.
	MaxSig. Plate Current	59	ma.
	Load Resistance (plate-to-plate)	5000	ohms
	Total Harmonic Distortion	1	of the state of th
	Power Output	2	watts
	* Actual voltage between cathode and plate will be	plate-suppl	y voltage
	minus drop in cathode resistor.	e too much r	esistance
	Type of input coupling used should not introduc in the grid circuit. Transformer- or impedance	-coupling de	v ces are
	recommended. The grid circuit may have a resistant preater than, 0.5 megohm provided the heater volt	ce as high a	s, but not
	in the grid circuit. Transformer- or impedance recommended. The grid circuit may have a resistan greater than, 0.5 megohm provided the heater volt rise more than 10% above rated value under any co	ndition of c	peration.
	PUSH-PULL AMPLIFIER - Pentode Con	nnection	
	Plate Voltage	300 ma	x. volts
7	Screen Voltage	300 ma	
4	Plate Dissipation		x watts
	Screen Input		x. watts
	Typical Operation - Class A, Amplifier:		
	Unless otherwise specified, values are	for 2 tu	bes
	Plate	300	volts
	Screen	300	volts
	D-C Grid Voltage #	-30	volts
1	Peak A-F Grid-to-Grid Voltage	60	volts
	Zerc-Sig. Plate Current	38	ma.
	MaxSig. Plate Current	69	ma.
	• t. %C: See next page.	_Indicates	a change
	1 1 d 1 occ up a hader	, no real es	o turnings.





POWER AMPLIFIER PENTODE

(continued from preceding pa	ge)	
7ero-Sig. Screen Current	8.5	ma.
MaxSig. Screen Current	1)	ma.
Load Pesistance iplate-to-plate!	4000	chm
Tota' Harmonic D stortion	3	5
Power Output	7	watts

In circuits where the cathode is not directly connected to the heater, the potential difference between heater and chode should be kept as low as positive.

With shell connected to athode.

With shell connected to athod. Screen connected to plate. Type insurface plate in the surface plate is surface plate in the surface plate in the surface plate in the surface plate is not allowed to rismore than 10% such as the surface plate in the surface plate plate in the surface plate in the surface plate in the surface plate plate in the surface plate plate in the surface plate pl

nitting niversions for the 1671 are the sime - those for T 5 '6.

Curres under Type 6f6 also apply to the 1521.



10.5

4000

BEAM POWER AMPLIFIER For applications requiring continuity of service

151 apprications requiring continuity of scrotte	
Heater Coated Unipotential Cathode	1
Voltage 6.3 a-c or d-c volts	1
Current 0.9 amp.	ı
Direct Interelectrode Capacitances (approx.):0	ı
Grid to Plate 0.4 μμf	ı
input 10 μμf	1
Output 12 µµf	1
Maximum Overall Length 4-5/16"	1
Maximum Seated Height 3-3/4"	1
Waximum Diameter 1-9/16" ± 1/16"	1
Eulb Metal Shell, MT-10	ı
Base Small Wafer Octal 7-Pin	П
Pin 1 - Shell Pin 5 - Grid	ı
Pin - Heater Pin 7 - Heater	П
Pin 3-Plate Pin 8 - Cathode	ı
Pin Screen	ı
Mounting Position BOTTOM VIEW (7AC) Any	ı
Maximum Ratings Are Design-Center Values	ı
	ı
PUSH-PILL AMPLIFIER	ı
Plate Voltage 300 max volts	ı
Screen Voltage 250 max volts	ı
Plate Dissipation 13.9 max watts	ı
Screen Dissipation 1.4 max. watts	
Typical Operation - Class A, Amplifier:	1
inless otherwise specified, values are for 2 tubes	ı
Plate Voltage 300 volts	1
Screen Volfage 250 volts	1
D—C Grid Voltage # —20 volts	-
Pear A-F Grid-to-Grid Voltage 40 volts	-
Zero-Sig. Plate Current 86 ma.	
Max -Sig. Plate Current 125 ma.	1
Zero-Sig. Screen Current 4 ma.	

The neater veltage should never fluctuate so that it exceeds 7 volt. The potential difference between heater and athode should be kept as

he type of inpu low as possible.

The type of input coupling used should not introduce too much resistance in the irid circuit. Transformer- or impedance-coupling devices are recommended, when the grid circuit has a resistance not higher than 0.1 megohm, fixed bias may be used; for higher values, cathode bias, is required. With cathode bias, the grid circuit may have a resistance not to exceed 0.5 megohm, provided the heater voltage is not allowed to rise nore than 10% above the rated value under any condition of operation.

With shell connected to cathode.

Max -Sig. Screen Current

Total Harmonic Distortion

Power Output

Load Resistance (plate to plate)

Curves under Type 616 also apply to the 1622 within the limstations of its maximum ratings.

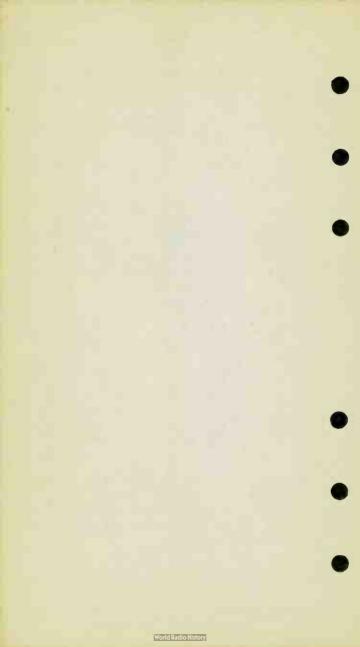
- Indicates a change.

AUG. 2, 1943

ma.

ohms

watts







Pin 8 - Cathode

Any▲

ELECTRON-RAY TUBE

INDICATOR TYPE WITH TRIODE UNIT Heater Coated Unipotential Cathode Voltage 12.6 a-c or d-c volts 0.15 Current amp. Overall Length 3-15/16" + 3/16" Seated Height 3-3/8" ± 3/16" Maximum Diameter 1-3/16" 15 1b T-9 RASIL Small Shell Octal 7-Pin Pin 1 - No Connection Pin 2 - Heater Pin 5 - Grid Pin 7 - Heater

BOTTOM VIEW (7AL)

Maximum and Manimum Ratings Are Design-Center Values

INDICATOR SERVICE		
Plate-Supply Voltage		max. voits
Target Voltage		max. volts
D. C. Ulanton, Cathada Batantin 1		min. volts
D-C Heater-Cathode Potential Typical Operation:	90	max. volts
Plate and Target Supply Voltage 200	250	volts
Series Triode Plate Resistor 1	1	megohm
Target Current t 0 3	4	ma.
Tricde-Plate Current 0.19	0.24	ma.
Triade-Grid Voltage (Approx.)		
	-8.0	volts
For shadow angle of 90° 0	U	volts

[□] Desigeated as R in the circuit diagram under Type 6E5, in the Receiving Tube Section.

Pin 3 - Place

Pin 4 - Target Mounting Position

Curves for Type 1629 are the same as for the 6E5 in the Receiving-Tube Section.

[†] Subjet to wid variation.

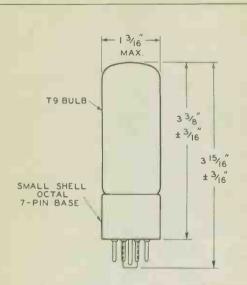
O for triode-gric bias of 0 volts.

A The plane of the ray-control electrode passes through the tube axis and base key.





ELECTRON-RAY TUBE



92CM-6554





amp.

Any

BEAM POWER AMPLIFIER

For applications critical as to uniformity of characteristics

Heater Coated Unipotential Cathode

Voltage 12.6 a-c or d-c volts

Current 0.45 amp.

Plate Dissipation 16 max. watts

Other ratings, characteristics, dimensions, and socket connections for the 1631 are the same as those for Type 6L6. Typical operating data for the 6L6 also apply to the 1631 within the limitation of the maximum platedissipation rating.

1632

BEAM POWER AMPLIFIER

For applications critical as to uniformity of characteristics Heater Coated Unipotential Cathode Voltage 12.6 a-c or d-c volts Current 0.6 amp. Plate Voltage 117 max. volts Screen Voltage 117 maz. volts Plate Dissipation 5.5 max. watts

Dimensions and socket connections for the 1632 are the same as for Type 25L6. Typical operating data for the 1632 are the same within its plate voltage and dissipation limitations as for the 25L6.

1633

TWIN-TRIODE AMPLIFIER

For applications critical as to matching of the two triode units

Heater Coated Unipotential Cathode

Voltage 25 a-c or d-c volts

Current 0.15
Direct Interelectrode Capacitances (Approx.):

Triode Unit T, Triode Unit To Grid to Plate 3.6 3.6 **LLL**f Grid to Cathode 3.0 2.8 **LLLI** Plate to Cathode 0.8 LLL Maximum Overall Length 3-5/16" Maximum Seated Height 2-3/4" Maximum Diameter 1-5/16" Bu1b T-9 Base Intermediate Shell Octal 8-Pin

Pin 1 - Grid T₂
Pin 2 - Plate T₁
Pin 6 - Cathode T₁

Pin 3 - Cathode T₂
Pin 4 - Grid T₁
Mounting Position

Pin 7 - Heater
Pin 8 - Heater

BOTTOM VIEW (8BD)

For convenience, one triode unit is identified as f; the other as 1,.

O See next page.





TWIN-TRIODE AMPLIFIER

(continued from preceding page)

Maximum And Minimum Ratings Are Design-Center Values

AMPLIFIER - Each Office				
Plate Voltage	300	ax.	volts	
Grid Voltage	0	min.	volts	
Cathode Current		max.		
Plate Dissipation			watts	
D-C Heater-Cathode Potential	90	max.	volts	
Characteristics - Class A, Amplifier:			-	
Plate Voltage	250		volt	
Grid Voltage*	-8		volts	
Amplification Factor	18			
Plate Re istance	-900		ohm	
Transcenductance	2600		µmhos	

O with no external shield.

Plate Current

Curves for Type 1632 are the same as for the C.J., and OSM7-17.

TWIN-TRIODE AMPLIFIER

For applications critical as to matching of the two triode units

Maximum ratings, characteristics, dimensions, and socket connections for the 1644 are the same as for Type 128C7.

ma.

⁶ The d-c resistance in the grid circuit should not exceed 1.0 megohm under maximum rated conditions per unit.



635

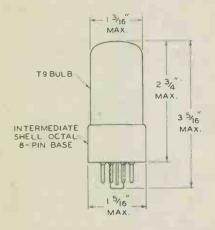
HIGH-MU TWIN POWER TRIODE

	GENERAL DATA
	Electrical:
	Heater for Unipotential Cathode: Voltage 6.3 ac or oc volts Current 0.6 amp
	Mechanical:
The second second second	Mounting Position. Any Maximum Overall Length 3-5/16" Maximum Seated Length 2-3/4" Maximum Diameter 1-5/16" Bulb T-9 Base Intermediate-Shell Octal 8-Pin Basing Designation for BOTTOM VIEW G-8B
	Pin 1 - No Conrection Pin 2 - Heater Pin 3 - Plate of Unit No. 2 Pin 4 - Grid of Unit No. 2 Pin 5 - Grid of Unit No. 1 Pin 6 - Plate of Unit No. 1 Pin 7 - Heater Pin 8 - Cathode
	45 POWED 440 45 450 Cl
	AF POWER AMPLIFIER - Class B
	Maximum Ratings, Design-Center Values:
-	DC PLATE VOLTAGE
1	Typical Operation:
	Palues are for 2 units unless otherwise specified
1	DC Plate Voltage 300 300 volts
	DC Grid Voltage 0 0 volts Peak AF Grid-to-Grid Voltage 70 108 volts
	Peak AF Grid-to-Grid Voltage 70 108 volts Zero-Signal DC Plate Current 6.6 6.6 ma.
I	Max.—Signal DC Plate Current 54 54 ma.
-	Peak Grid Current (per unit) 38 39 ma.
-	Plate—Supply Impedance 0 1000° ohms
	Effective Load Resistance (plate-to-plate) 12000 12000 ohms
	Effective Grid-Circuit Impedance
	(per unit) 0 516" ohms
	Tota' Harmonic Distortion 4 5 % Max.—Signal Power Output 10.4 10.4 watts
1	MaxSignal Power Output 10.4 10.4 watts
	, *. See rext page. #Indicates a change.
ſ	



HIGH-MU TWIN POWER TRIODE

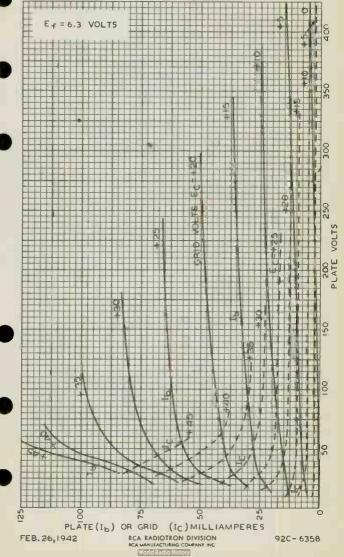
- In ludes peak voltage drop through the 15- 'cui' prid no.
 Practical design value.
- At 400 cy les for class B tag in which the ff to ris'n progrid incust is 500 ohms, and the long rest not be supling from former is 50 millihenty. The drist hould be stood supplying the grids of the class B stood with the perifical low distortion.



92C-6393



AVERAGE PLATE CHARACTERISTICS



37/



AVERAGE PLATE CHARACTERISTICS

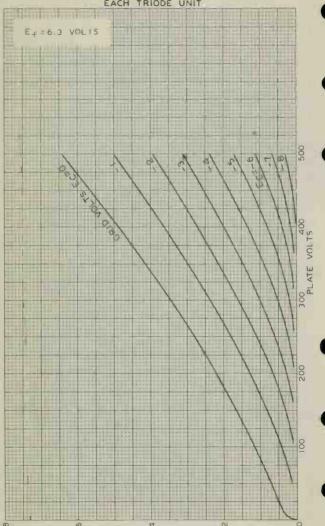


PLATE MILLIAMPERES

FEB. 27, 1942

RCA RADIOTRON DIVISION
World Radio History

920-6369

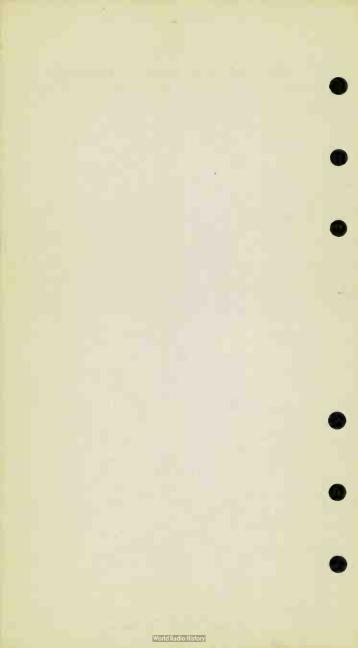


16_P

TWIN-PENTODE POWER AMPLIFIER

For applications critical as to matching of the pentode units

Maximum Ratings, Characteristics, Curves, Dimensions, and Socket Connections for Type 1644 are the same as those for Type 12L8-GT.





1654 HALF-WAVE VACUUM RECTIFIER

MINIATURE TYPE

GENERAL DAT	A
-------------	---

Electrical:

Direct nterelectrode Capacitance (Ap;rox.):0
Plate to Filament. . . 1,4

With n external shield.

Mechanical:

Pin . - Filament -Pin 1 - Internal Con. Do Not Use Pin 3 - Internal Con.

Do Not Use Pin 4 - No Connection Pin 5 - No Connection



Pin 6 Internal Con.
Do Not Use
Pin 7 - Filament +

E 1b Terminal Plate

HALF-WAVE RECTIFIED

Maximum Ratings, Design-Center Values: •

Typical Operation:

AC Plate-Supply Voltage			voits
Filter-Input Capacitor	0.025		μf
Total Effective Plate-Supply Impedance	150000		ohms
DC Output Current	1		ma
DC Output Voltage (At Input to Filter)*	1230		volte

Circuit Values:

A plate-supply impedance of 150000 shms is required in order that the "hot-switching" current will not exceed the permissible value of 15 ma. under conditions of normal line-voltage fluctuation. For plate-supply voltages lower than 1500 voltage, the plate-supply impedance may be correased provided the resultant peak-current rating of 6 ma. and the "hot-switching" current of 15 ma. are not exceeded.

• See next page. • Indicates a change.



HALF-WAVE VACUUM RECTIFIER

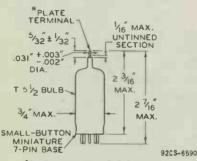
These ratings apply to the 165% when it is operated from a power supply having a frequency up to 500 cycles per second. If a contemplated application involves higher supply frequencies, please write, stating the proposed operating frequency, to commercial Engineering, RCA, Marrison, N. J., as to the required reduction in ratings.

A peak value of 15 ma. for 0.1 second is permitted under conditions of "hot-witching", i.e., switching the plate circuit "on" while the filement is hot.

Values are approximate.

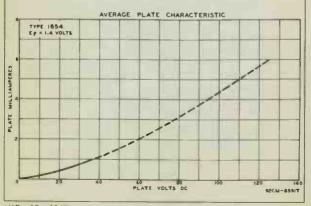
1654

> Indicates a change.



*PLATE TERMINAL AT TIP WAY
BE ECCENTRIC WITH RESPECT

TO BASE AXIS BY 1/8" MAX.



MAR. 15, 1948

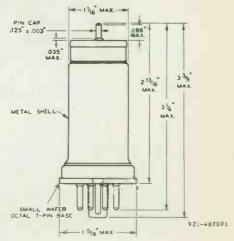
TUBE DEPARTMENT

DATA

TELEVISION AMPLIFIER PENTODE

I BBB V IO	1011 1111			DITTO	<i>D</i> <u>D</u>
Heater # (Cuated Unipo	tential C	athode		
Voltage		6.3	ä	a-c or	i-c volts
Current		.45			amp.
Direct Interelect	rode Capaci	tances: 0			
Grid to Plate	(0.02 max.			μμf
Input	1	1.5			μμf
Output		5.2			μμf
Maximum Overall L	ength				3-3/8"
Maximum Diameter					1-5/16"
Bult			Me	etal Sha	8-TM , 11:
Cap					Pin Cap
Base			Small Wa	afer Oct	tal 7-Pin
with shell connec	ted to cathode				

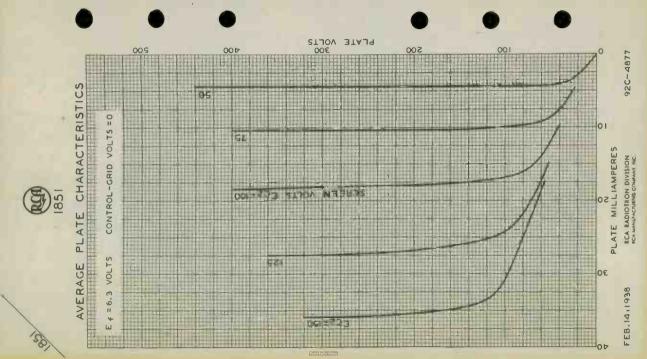
For additional data and curves, refer to Type 1852. The 1851 and 1852 are identical electrically except for capacitances.





c		GRI	0	_		G2		G	,	
G.1	-			-		42		~	3	
G ₂	100	SCR				(4)	5) G	i
G3	- 5	SUR	PRE	SSOR	0	1		1	\Diamond	
Н		HEA	TER		-	3)		-	1	
K	-	CAT	HODE	E		7			1	
Р		PLA	TE		-	1	-		1	3
S	=	SHE	LL		H	1/2	1	V.	1	JH
						(1)	5))	
						S	KE	Y	K	

MOUNTING POSITION VERTICAL: Base up or down. HDR1ZONTAL: Per-missible with Pins \$2 & \$7 in verti-cal plane.





TAN TO SERVICE OF THE SERVICE OF THE

VACUUM-GAUGE TUBE

HYDROGEN-SENSITIVE, IONIZATION TYPE

GENERAL DATA	
Electrical:	
Heater, for Unipotential Cathode: Voltage 6.3 ± 105 Current 0.75	%ac or dc volts
Mechanical:	
Mounting Position. Maximum Overall Length Maximum Diameter Tubulation Bulb Base BOTTOM VIEW	6-3/8" 1-5/16" See Outline Drawing
Pin 1 - Cathode	Pir 6 - Cathode
Pin 2 - Heater Pin 3 - Ion Collector	Pin 7 - Heater Pin 8 - Getter
Pin 4 - Cathod Pin 5 - Plate, Shell DO NOT USE FOR GETTER CONNECTION	Shell - Plate, Getter Connection to Hemagonal Section of Tubulation
LEAK DETECTOR	
Maximum Ratings, Absolute Values:	
PLATE VOLTAGE	300 max. volts -30 max. volts -15 min. volts 50 max. ma.
PLATE DISSIPATION	7 max. watts
Typical Operation: Plate Voltage	185 volts
Ninimum Plate-Supply Voltage	250 volts 22.5 volts 32 ma.
Ion-Collector Current	. Less than 0.5^* μ amp 6 . watts
"With no hydrogen in the gauge. When rydrithe gauge tube, the ion-collector current it in order to obtain a definite reading a collector current, it is necessary to use a feing de currents of the order of 0.005 as	igen from minute leaks enters may increase by less than of such small changes in ion— a amplifier capable of ampli— amp.

The metal shell of the 1945 contains an indirectly-heated cathode, an ion-collector and a plate made of palladium. The palladium plate located across the inner end of the tabulation serves, when cold, as a vacuum-tight barrier to the vacuum system. This construction permits the metal enclosure to be exhausted to a much better vacuum than



VACUUM-GAUGE TURE

(continued from preceding page)

wormally exists in a vacuum system. However, when heated, the palladium plate serves as a permeable membrane which permits any hydrogen in the vacuum system to which the 1945 s connected to flow into the tube.

Practical application of the 1945 to locating a leak consists simply of connecting it to the vacuum system and of probing the system with a jet of gas containing a high percentage of hydrogen. If a leak is present, hydrogen enters the vacuum system at the point of leakage, passes through the hot palladium plate, and produces an increase in current to the ion-collector.

Because of its high vacuum, the 1945 can detect far smaller leaks than are detectable using conventional ionization gauges operating at the same pressure as the vacuum system. Actually, an increase in hydrogen pressure of less than 10^{-7} mm of mercury (10^{-4} microns) can be detected by the 1945.

The 1945 can be connected to a hard-glass, soft-glass, or metal vacuum system.

Connection to a hard-glass system may readily be made by breaking off the tip of the glass tubulation (see Outline Drawing), and sealing the (Corning Code 772 Nonex) tubulation to the glass system.

Connection to a soft-glass system requires a graded seal between the hard-glass tubulation of the 1945 and the soft glass of the system.

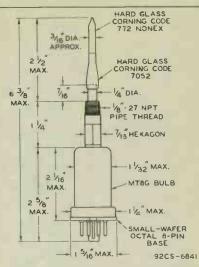
Connection to a metal system requires that the glass tubulation first be removed by pinching the glass with pliers at a point close to the Kovar seal. Then, the 1945 can be connected to a metal system by a straight pipe coupling which is necessary for clearance of the metal exhaust tubulation. Always apply the wrench to the hexagonal section and never to the metal shell. After the coupling has been tightened, it should be coated with Glyptal to insure that the joint is vacuum tight.

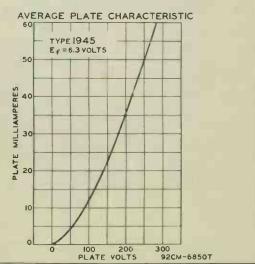
Suitable support should be provided for the 1945. In a grass system, it should be supported by a suitable clamp encircling the metal shell. The clamp should be lined with an asbestos pad so that the clamp does not place a strain on the welds. In a metal system, the 1945 can usually be supported by the pipe coupling.

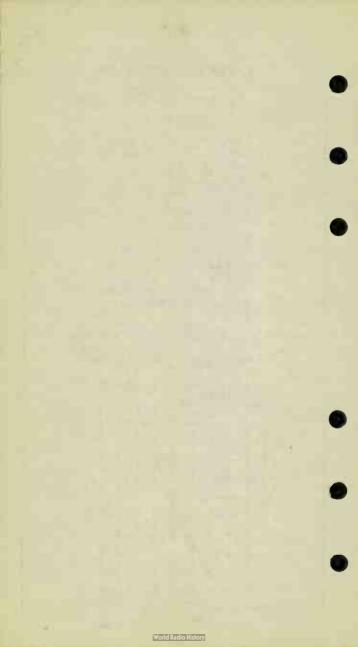
For safety reasons, it is advisable to have the metal shell of the 1945 at ground potential (positive polarity).



VACUUM-GAUGE TUBE









VACUUM-GAUGE TUBE

THERMOCOUPLE TYPE DATA

General:

Heater, for Thermocouple:

Voltage (Approx.). . . .

Current. 0.070 Resistance of Thermocouple 5 approx.

Maximum Overall Length (with tubulation) . Maximum Diameter . .

Bult Tubulation . .

Terminal Arrangement . .

Terminal Connections:

H - Heater

To - Thermocauple

See Outline Drawing

3/8" Diameter Hard Glass,

Corning Code 772 Nonex

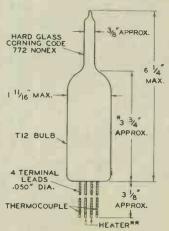
ac or dc volts

5-1/4"

1-11/16"

Calibration:

See rext page.

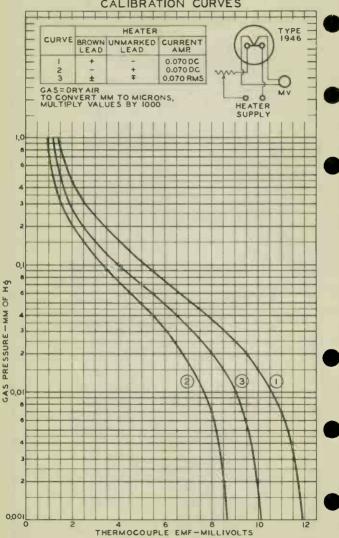


*MEASURED FROM BULB END TO BULB-TOP LINE AS DETERMINED BY RING GAUGE OF 1/2" I.D.

**BROWN HEATER LEAD SHOULD BE CONNECTED TO POSITIVE TERMINAL OF DC HEATER SUPPLY. 920S-6815



CALIBRATION CURVES



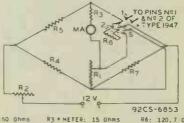
MAR. II, 1947

TUBE DEPARTMENT RADIO CORPORATION OF AMERICA. HARRISON, NEW JERSEY 92CM-6852



VACUUM-GAUGE TUBE

PIRANI TYPE
General:
Filament, Platinum Iridium: Voltage (Approx.) 10 dc volts
Current (Varies with
Gas Pressurel 70 – 100 ma.
Resistance between base
pins No.1 & No.2 un-
der vacuum better than 3×10^{-5} mm of mercury 135.8 ohms
Maximum Overall Length (including tubu ation) ?-9/16"
Maximum Diameter
Bulb
Tubulation
Corning Code 001 Lead
Base Sma'l-Shell Small 4-Pin
BOTTOM VIEW
Pin 1-Filament 2 3
Pin 2 - Filament R - Series F lament-
Pin 3 - No Connection Pin 4 - Internal Calibrat ng Resistor in
Pin 4 - Internal Connection - Resistor in base of tube
Do Not Use
Maximum Ratings. Absolute Values:
FILAVENT VOLTAGE 16 max. volts
Calibration for 1947 in Accompanying Circuit:
See curve on following sheet.
PIRANI GAUGE BRIDGE CIRCUIT
- TO 0000 000
R3 1, TO PINS №1
MR5 MAO
TREAS IS
Wind & Wall
I RI NY



R1: 50 Ohms R3 + METER: 15 Ohms R2: 25 Ohms R4 R5: 10 Ohms each R6: 120.7 Ohms R7: 135.8 Ohms

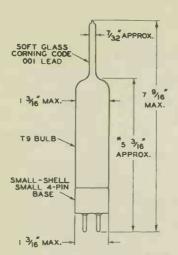
STEP 1: With switch S in position 2, adjust R2 so that meter reads 2.5 milliamperes.

STEP 2: With switch S in position 1, and with dry air at atmospheric pressure in the 1947, adjust R1 so that meter reads 5.0 milliamperes.

STEP 3: with no further adjustment and with switc S in position 1, proceed to use gauge.



VACUUM-GAUGE TUBE



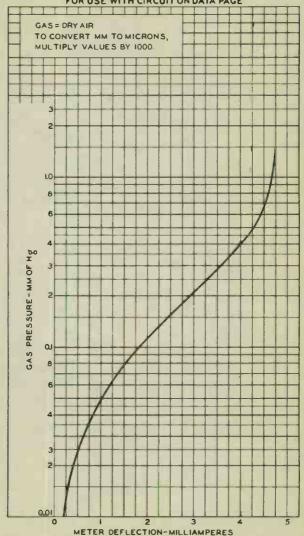
MEASURED FROM END OF BASE PINS TO BULB-TOP LINE AS DETERMINED BY RING GAUGE OF V2" I.D.

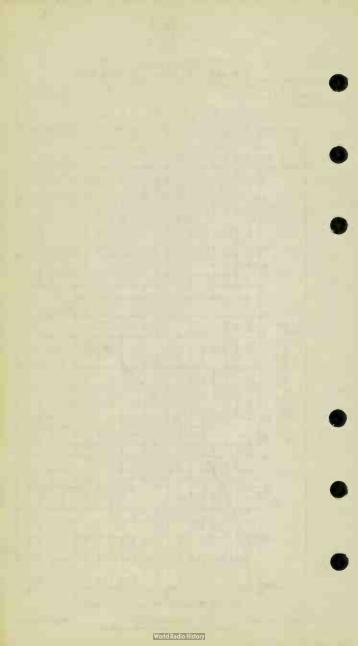
92CS-68I6



10 RI

CALIBRATION CURVE FOR USE WITH CIRCUIT ON DATA PAGE







1949 VACUUM-GAUGE TUBE

HARD-GLASS BULB, ONIZATION TYPE

DATA

	General:
	Filament, Tungsten: Voltage (Approx.) 5 ac or dc volts Currest (Approx.) 3.5 amp
	Currest (Approx.) 3.5 amp Maximum Tube Length (Including tubulation)
	Maximum Tube Radius
-	Maximum Bulb Length
	Maximum Bulb Diameter
	Bulb
	Tubulation
	Operating Position Vertical with tubulation up or
	down; Horizontal, with stem
•	press in vertical plane
	Terminal Arrangement See Outline Drawing Terminal Lead Connections:
	Lead 1 - Common Lead 4 - Grid
	Lead to Filaments TUBULATION
	Lead 2 - Filament
	Lead 3 - Filament
	(Spare) 3 2 Top Lead - Plate
	Maximum Ratings, Absolute Values:
	FILAMENT VOLTAGE 6.5 max. volts
	DC PLATE VOLTAGE DURING OPERATION100 max. volts
	DC GRID VOLTAGE DURING OPERATION +200 max. volts
	VOLTAGE ON GRID & PLATE TIED TOGETHER
	DURING DEGASSING (DC OR PEAK AC) 650 max. volts GRID & PLATE DISSIPATION (TOTAL)
	DURING DEGASSING 150 max. watts
	AMBIENT TEMPERATURE DURING OPERATION. 100 max. °C
	GAS PRESSURE 0.001 max. mm of Hg
	Typical Degassing Conditions:
	Grid Connected to Plane
	Filament Voltage (AC or DC) 6 olts
	rid & Plate Voltage 350 rms 500 dc volts
	Grid & Plate
	Current (Average) 100 150 ma
	Typical Operation:
	DC Plate Voltage22.5 -22.5 -22.5 volts
1	The 1949 contains two filaments, one of which is a spare. Values shown
	The 1949 contains two filaments, one of which is a spare. Values shown are for either filament operated alone. The filament voltage should be kept as low as possible during degassing because use of low filament voltage materially increases filament life.

Indicates a change

19_{Rg}





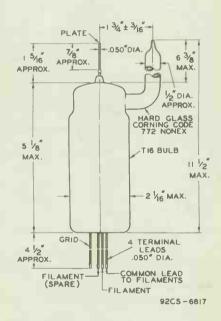
VACUUM-GAUGE TUBE

DC Grid Voltage				+80	+110	+160	volts
Grid Current .				10	10	10	ma
Sensitivity				80	110	140	μa/micron [♠]

Calibration:

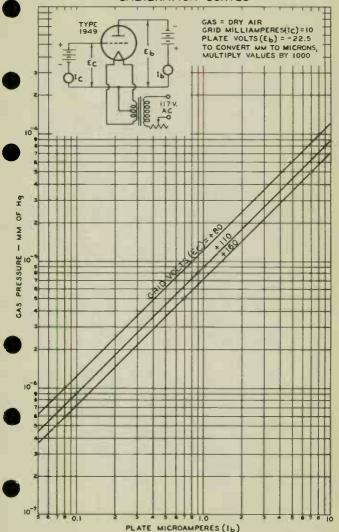
See curve on following sheet.

1 micron = 0.001 mm of mercury.



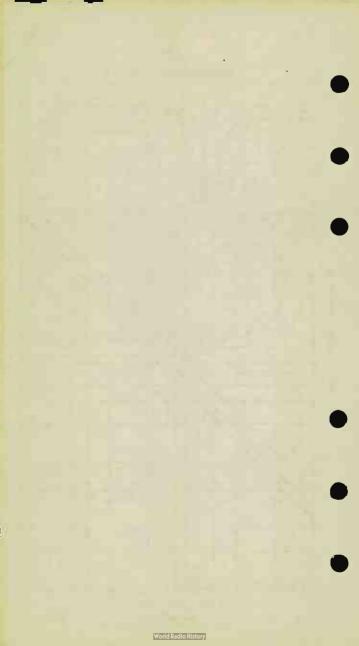


CALIBRATION CURVES



MAR. 11, 1947

TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





VACUUM-GAUGE TUBE SOFT-GLASS BULB, IONIZATION TYPE

General:

Filament, Tung ten:

Voltage (Approx.) . Current (Approx.) .

Waximum Tube Langth (Including tubulation) Maximum Tube Radius . .

Maximum Bulb Langth . Maximum Bulb Diameter

Tubulation Operating Position .

Terminal Arrangement

DATA

ac or it volts

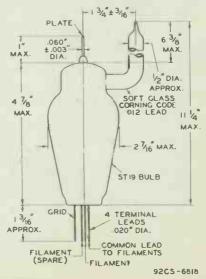
11-1/4" 2-3/16" 4-7/8" 2-7/16" ST-19 /2" Diameter Soft Glass,

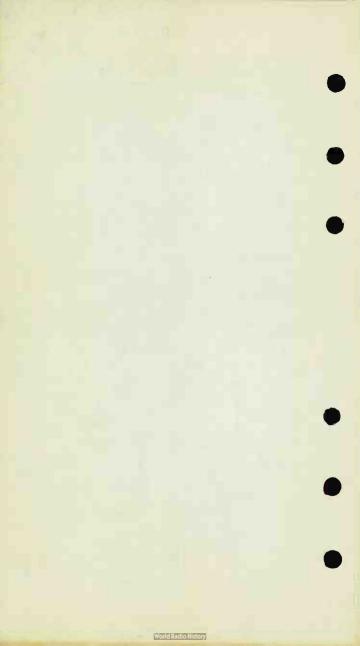
Corning Code 012 Lead . . . Vertical, with tubulation up or down: Horizontal with stem

priss in vertical plane . . See Outline Drawing

The 1950 contains two filaments, one of which is a space. Values shown are for either filament operated alone. The filament voltage should be kept—low as possible during degassing because use of a low filament voltage materially increases filament life.

Maximum Rating , Typical Degassing Conditions, Typical Operation, Calibration and Terminal Lead Connections for the 1950 are the same as for the 1949.







VOLTAGE-REFERENCE TUBE

MINIATURE GLOW-DISCHARGE TYPE

DATA

_								
G	e	n	e	r	a	1	:	

		-
	Cathode	
	Maximum Overall Length	١.
	Maximum Seated Length	1
	Length from Base Seat to Bulb Top (excluding tip) 1-1/2' ± 3/32'	1
į	Maximum Diameter	4
	Bulb	
ı	Mounting Position Any	1
п	Rasa Small Rutton Ministers 7 Die	

Pin 1- Anode Pin 2- Cathode

Pin 4 - Cathode

Pin 3 - Internal Connection -Do Not Use

Pin 5 - Anode Pin 6 - Internal

Connection
-Do Not Use
Pin 7 - Cathode

Maximum Ratings. Absolute Values:

DC OPERATING CURREN	T (Continuous).		3.5 max.	ma	
AMBIENT TEMPERATURE	RANGE		-55 to +90	°C	

Characteristics and Operation Range Values:

Basing Designation for BOTTOM VIEW . . .

		Min.	Av.	Max.		
	DC Starting Voltage	-	107	115"		volts
	DC Operating voltage	82		93		volts
	DC Operating Current	1.5	-	3.1		ma
i	Reg latin (1.5 1. to 3.5 ma.)	-	-	- 3		volts
ı	Stability ^o	-		0.1		volt

Circuit Values:

	shunt	Canadi								2 /	2.2			
	SHUIL	ap 10	Tol.					and a	_		36		μf	
4	Series	Ducie						C	NOTE	D 1				

A supply voltage of not less ton this value should be provided to insure "starting" throughout tupe life.

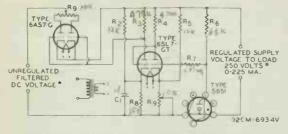
Defined as the maximum voltage fluctuation at any current live within the operating current range.

MOTE: A series resistor must always be used with the 5651. The resistance value must be chosen to this (1) the maximum current rating of 3.5 mm. is not acceded at the highest anode-supply voltage employed, and (2) the minimum current rating of 1.5 mm. is always exceeded when the anode-supply voltage is at its lowest value.



VOLTAGE-REFERENCE TUBE

SERIES TYPE OF STABILIZED VOLTAGE SUPPLY USING RCA-5651 AS VOLTAGE-REFERENCE TUBE



- C1 0.1 µf, 4 0 volts
 R1 Plate current balancing potentiometer,
 160 ofms. 10 watts
 R 12707 cfms. 2 watts
 R2 4(-0.00 ofms. 5 wst.
 R3 70 00 ofms. 0.5 watt
- R5 = 120 0 hm , 2 witte R5 = 68000 ohms, 1 watt R6 1 meachm, 0.5 wrtt R7 = 15000 ohms, 2 wetts R8 = Outpu' voltage on 1000 ohms in ter.
- 375 volts approx. at zero load current; 325 volts approx. at 225 milliampere load current.
- The voltage regulation of this supply operated at a fixed line voltage of 117 volts and aroutput voltage of 250 volts is less than 0.2 volt over the surrer range of 0 to 225 milliamperes. At full current, the regulation for a variation of \$\pm\$ 10 per cent in line voltage if 1 is than 0.1 volt. Socket connections for the 5651 are made so that removal of the 5651 from its socket open the load.

Medium-Mu Triode

GLASS-METAL PENCIL TYPE

FAST WARM-UP TIME INTEGRAL PLATE RADIATOR
STURDY COAXIAL-ELECTRODE STRUCTURE

For Mobile or Aircraft Applications as a Frequency-Multiplier, RF-Power-Amplifier, or Oscillator Tube

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage (AC of DC).		
Under transmitting conditions	6 ± 10%	volts
Under standby conditions	6.3 max.	volts
Current at 6 volts	0.28	amp
Amplification Factor	40	
Transconductance, for dc plate ma. = 18.5		

and dc plate volts = 200 6800

Direct Interelectrode Capacitances:

				External Shield	External Shield*	
Grid to plate				1.75	1.5	uuf
Grid to cathode.				2.95	_	ME
Plate to cathode				0.07 max.		mf

Mechanical:

Terminal Connections (See Dimensional Outline):

H - Heater
K - Cathode

G-Grid

umhos

P-Plate

In many applications, the 6264-A does not require forced-air cooling. The radiator in combination with a connector having adequate heat conduction capability will generally provide adequate cooling under conditions of free circulation of air. The cooling must be sufficient to limit the plate-seal temperature to 175°C. When conditions do not provide adequate circulation of air, provision should be made to direct a blast of cooling air from a small blower through the radiator fins. The quantity of air should be sufficient to limit the plate-seal temperature to 175°C. See Curves.

6264-A

Plate-Seal Temperature (Measure plate seal) Weight (Approx.) Socket for Heater Pins . Grayhi	175 max. 24 grams 11 No.22-3, Cinch No	°C (0.85 oz) .54A16325, equivalent
RF POWER AMPLIFIER AND OSCIL	LATOR CITES OF THE	b
Key-down conditions per tube		dulation -
Maximum Ratings, Absolute-Naxim		
For Altitudes	up to 60,000 ft	
	CCS* ICAS	
DC PLATE VOLTAGE DC GRID VOLTAGE. DC PLATE CURRENT DC GRID CURRENT. DC CATHODE CURRENT PLATE INPUT. PLATE DISSIPATION.	330 max. 400 ma -100 max. 55 ma 40 max. 55 ma 25 max. 25 ma 13.2 max. 22 ma 8 max. 13 ma	x. volts x. ma x. ma x. ma x. watts
PEAK HEATER—CATHODE VOLTAGE: Heater negative with respect to cathode Heater positive with respect to cathode	50 max. 50 ma	x. voits
Typical Operation as Oscillator	in Cathode-Drive Ci	reuit:
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	At 500 Mc	· Cave.
	CCS [★] ICAS	
DC Plate-to-Grid Voltage DC Cathode-to-Grid Voltage DC Plate Current Usefu' Power Output (Approx.)	325 380 25 30 35 35 11 13 5 6	volts volts ma ma watts
	At 1700 Mc	
	ccs*	
DC Plate-to-Grid Voltage DC Cathode-to-Grid Voltage DC Plate Current DC Grid Current (Approx.) Useful Power Output (Approx.).	263 13 40 13 1	volts volts ma ma watt
Typical Operation as RF Power A	mplifier in	
* *	thode-Drive Circuit	at 500 Mc:
	CCS [★] ICAS	
DC Plate-to-Grid Voltage DC Cathode-to-Grid Voltage DC Plate Current DC Grid Current (Approx.) Driver Power Output (Approx.). Useful Power Output (Approx.).	342 395 42 45 35 40 13 15 2.4 3 7.5 10	volts volts ma ma watts watts
Table Comment and Company		natts



megohm

0.1 max.

0.1 max.

FREQUENCY MULTIPLIER	
•	
2 '	
· · · · · · · · · · · · · · · · · · ·	
DC PLATE VOLTAGE . 300 max. 350 max. DC GRID VOLTAGE125 max140 max. DC PLATE CURRENT . 33 max. 45 max. DC GRID CURRENT . 25 max. 25 max. DC CATHODE CURRENT . 45 max. 55 max. PLATE INPUT . 9.9 max. 15.9 max. PLATE DISSIPATION . 6 max. 9.5 max. PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode . 50 max. 50 max. Heater positive with respect to cathode . 50 max. 50 max.	volts volts ma ma watts watts volts
Typical Operation as Tripler to 510 Mc in	
Cathode-Drive Ci	rcuit:
CCS [★] ICAS •	
DC Plate-to-Grid Voltage	volts volts ma ma watts watts
Maximum Circuit Values:	
Grid-Circuit Resistance 0.1 max. 0.1 max.	megohm
A flat plate shield 1-1/4" diameter located parallel to the p the grid flange and midway between the grid flange and the r. plate terminal. The shield is tied to the cathode. Modulation, essentially negative, may be used if the positive the audio-frequency envelope does not exceed 115% of the conditions. **Continuous Commercial Service.** Intermittent Commercial and Amateur Service. From a gric resistor, or from a suitable combination of grid rand fixed supply or grid resistor and cathode resistor.	adiator peak of carrier
	DC PLATE VOLTAGE . 300 max. 350 max. DC GRID VOLTAGE125 max140 max. DC PLATE CURRENT . 33 max. 45 max. DC GRID CURRENT . 25 max. 25 max. DC GRID CURRENT . 45 max. 55 max. PLATE INPUT . 9.9 max. 15.9 max. PLATE DISSIPATION . 6 max. 9.5 max. PLATE DISSIPATION . 50 max. 50 max. PLATE respect to cathode . 50 max. 50 max. Heater negative with respect to cathode . 50 max. 50 max. Typical Operation as Tripler to 510 Mc in Cathode-Drive Ci CCS* ICAS* DC Plate-to-Grid Voltage . 410 472 DC Cathode-to-Grid Voltage . 110 122 DC Plate Current 26 36.5 DC Plate Current 26 36.5 DC Grid Current (Approx.) . 4.1 5.8 Driver Power Output (Approx.) 2.75 4.5 Useful Power Output (Approx.) 2.1 3.4 Maximum Circuit Values: Grid-Circuit Resistance . 0.1 max. 0.1 max. A flat plate shield 1-1/8* diameter located parallel to the profile terminal. The shield is tied to the cathode. Modulation, essentially negative, may be used if the positive the addio-frequency envelope does not exceed 115s of the conditions. Continuous Commercial Service. Intermittent Commercial and Amateur Service.

Maximum Circuit Values:
Grid-Circuit Resistance. . . .

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

This value of useful power is measured at load of output circuit having an efficiency of about 75%.

			Note	Min.	Max.	
	Heater Current		1	0.265	0.295	ma
	Grid-to-Plate Capacitance		_	1.5	2	μμε
,	Grid-to-Cathode Capacitance.		-	2.5	3.4	μμε
	Plate-to-Cathode Capacitance		-	-	0.07	μμf
	Reverse Grid Current		1.2	-	0.5	иа

6264-A

				Note	Nin.	Nax.	
Plate Current (1)				1.3	13	24	ma
Plate Current (2)				1,4	-	55	μa
Amplification Factor				1,3	30	50	
Transconductance				1,3	5400	8200	⊭mhos
Heater-Cathode Leakage							
Current: Heater negative with							
respect to cathode				1 6		100	_
Heater positive with	•	•	•	1,5	_	100	μa
respect to cathode				1.6	_	100	μa
Emission Voltage				1.7	_	10	volts
Leakage Resistance:				•			
From grid to plate and							
_ cathode tied together.				1.8	25	-	megohms
From plate to grid and							
cathode tied together.				1,9	25	-	megohms
Power Output					6.5	-	watts
Change in Power Output	٠	٠	٠	11		0.5	watt

- Note 1: With 6 volts ac or dc on heater.
- Note 2: With dc plate voltage of 200 volts, dc grid voltage of -2 volts, grid resistor of 0.5 megohm.
- Note 3: With dc plate supply voltage of 200 volts, cathode resistor of 100 \pm 1% ohms, and cathode bypass capacitor of 1000 μ f.
- Note 4: With dc plate voltage of 200 volts, dc grid voltage of -12 volts, cathode resistor of 0 ohms.
- Note '5: With 50 volts dc between heater and cathode, heater negative with respect to cathode.
- Note 6: With 50 volts dc between heater and cathode, heater positive with respect to cathode.
- Note 7: Withdc voltage on grid and plate which are tied together adjusted to produce a cathode current of 30 ma.
- Note 8: With grid 100 volts negative with respect to plate and cathode which are tied together.
- Note 9: With plate 300 volts negative with respect to grid and cathode which are tied together.
- Note 10: With dc plate voltage of 350 volts, grid resistor adjusted to give a dc plate current of 50 milliamperes in a cavity-type oscillator operating at 500 Mc and having an efficiency of approximately 75 per cent.
- Note 11: At end of Power-Oscillation test, reduce heater voltage to 5 volts and note change in power output.

SPECIAL TESTS & PERFORMANCE DATA

Low-Pressure Voltage Breakdown Test:

This test is performed on a sample, lot of tubes from each production run. Tubes are tested in a chamber at an air pressure equivalent to an altitude of 60,000 feet. Breakdown will not occur when an rms voltage of 500 volts is applied between the plate cylinder and grid flange.

Low-Frequency Vibration Performance:

This test $\{MIL-E-ID, paragraph 4.9.19.1\}$ is performed on a sample lot of tubes from each production run under the following conditions:



Heater voltage of 6 volts, dc plate supply voltage of 200 volts, grid voltage of -2 volts, and plate load resistor of 10,000 ohms. The tubes are vibrated in a plane perpendicular to the tube axis at 25 cycles per second at an acceleration of 2.5 g. The rms output voltage across the plate load resistor as a result of vibration of the tube will not exceed 100 millivolts.

High-Frequency Vibration Performance:

This test (similar to MIL-E-ID, paragraph 4.9.19.2) is performed on a sample lot of tubes from each production run. The tube is vibrated perpendicular to its axis, with no voltages applied to the tube. Vibration frequency is 40 to 60 cps and acceleration is 10 g. At the end of this test, tubes will not show temporary or permanent shorts or open circuits and will meet the following limits:

Heater-Cathode Leakage Current. 100 max. μa For conditions shown under Characteristics Range Values Notes 1,5 and 1,6.

Low-Frequency Vibration (rms) 100 max. mv For conditions shown above under $Low-Frequency\ Vibration\ Performance.$

Plate Current (2) 55 max. μa
For conditions shown under Characteristics Range Values
Notes 1.4.

Shorts and Continuity Test:

This test (MIL-E-ID, paragraph 4.7.5) is performed on all tubes from each production run. In this test, a tube is considered inoperative if it shows a permanent or temporary short or open circuit, an air leak, or reverse grid current in excess of I microampere for the conditions shown under Characteristics Range Values, Notes 1,2.

Heater Cycling Life Performance:

This test (similar to MIL-E-ID, paragraph 4.11.7) is performed on a sample lot of tubes from each production run. With 6 volts on heater and no voltage on plate and grid, the heater is cycled three minutes on and three minutes off for at least 2000 cycles. At the end of this test, tubes will not show temporary or permanent shorts or opens, and are required to meet the following limits:

Grid-Plate and Cathode Leakage Resistance . 25 min. megohms For conditions shown under Characteristics Range Values Notes 1,8.

Heater-Cathode Leakage Current. 150 max. μa For conditions shown under Characteristics Range Values Notes 1,5.

I-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that the tubes have been properly stabilized. Tubes are operated under the following conditions: heater voltage of 6 volts, plate dissipation of 2.5



6264-A

to 3 watts. At the end of I hour, the change in transconductance value for each tube, referred to its initial transconductance reading, will not exceed 15% of the initial value, for conditions shown under Characteristics Range Values, Notes 1,2.

50-Hour Survival Life Performance:

This test is performed on a sample lot of tubes from each production run to insure a low percentage of early inoperatives. Life—test conditions are the same as those specified for $\emph{1-Hour}$ Stability Life Performance except that all voltages are cycled at the rate of IIO minutes on and IO minutes of $\emph{1}$. At the end of 50 hours, the tubes are required to meet the following limits:

Power Output 5 min. watts For conditions shown under Characteristics Range Values Notes 1,7.

Plate Current (2). 100 max. μ a For conditions shown under Characteristics Range Values Notes 1,3.

Shorts and Continuity Test specified above.

Intermittent Dynamic Life Performance;

This test is performed on a sample lot of tubes from each production run to insure high quality of rf performance. Each tube is life-tested in a cavity-type oscillator at 500 ± 15 Mc under the following conditions:

Heater voltage of 6 volts, plate supply voltage of 400 volts, grid resistor is adjusted to give a dc plate current of 40 ma. and value is recorded, cathode resistor of 0 ohms, plate-circuit load resistance of 100 \pm 5 ohms, heater positive with respect to cathode by 50 volts, and plate-seal temperature of 175 $^{\circ}$ C min. Heater voltage is cycled at a rate of 110 minutes on and 10 minutes off.

At the end of 500 hours, the tube will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes falling to meet the following limits:

Reverse Grid Current μ a For conditions shown under Characteristics Range Values Notes 1,2.

Power Output 5 min. watts For conditions shown under Characteristics Range Values Notes 1,7.

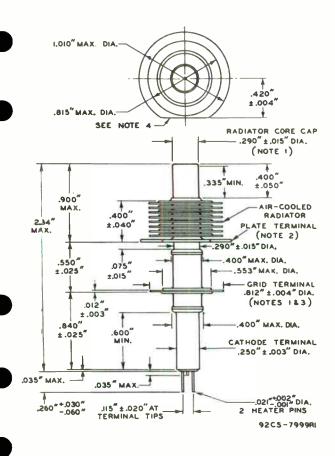
OPERATING CONSIDERATIONS

The heater leads of the 6264-A should not be soldered to circuit elements. The heat of the soldering operation may crack the glass seals of the heater pins and damage the tube.

The cathode should preferably be connected to one side of the heater. When, in some circuit designs, the heater is not



connected directly to the cathode, precautions must be taken to hold the peak heater-cathode voltage to the maximum values shown in the tabulated data.



6264-A

WILL NOT EXCEED 0.025".

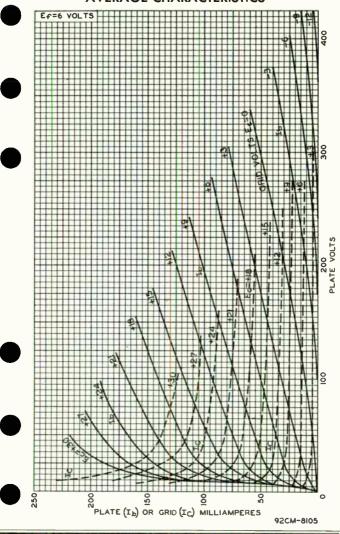
NOTE 1: MAXIMUM ECCENTRICITY OF CENTER LINE (AXIS) OF RADIATOR—CORE CAP OR GRID—TERMINAL FLANGE WITH RESPECT TO THE CENTER LINE (AXIS) OF THE CATHODE TERMINAL IS 0.015". NOTE 2: TILT OF PLATE—TERMINAL FIN OF RADIATOR WITH RESPECT TO ROTATIONAL AXIS OF CATHODE CYLINDER IS OE—TERMINED BY CHUCKING THE CATHODE TERMINAL, ROTATING THE TUBE, AND GAUGING THE TOTAL TRAVEL DISTANCE OF THE PLATE—TERMINAL FIN PARALLEL TO THE AXIS AT A POINT APPROXIMATELY 0.020" INWARO FROM THE STRAIGHT EDGE OF THE PLATE—TERMINAL

NOTE 3: TILT OF GRID-TERMINAL FLANGE WITH RESPECT TO ROTATIONAL AXIS OF CATHODE TERMINAL IS DETERMINED BY CHUCKING THE CATHODE TERMINAL, ROTATING THE TUBE, AND GAUGING THE TOTAL TRAVEL DISTANCE OF THE GRID-TERMINAL FLANGE PARALLEL TO THE AXIS AT A POINT APPROXIMATELY 0.020" INWARD FROM ITS EDGE FOR ONE COMPLETE ROTATION. THE TOTAL TRAVEL DISTANCE WILL NOT EXCEED 0.025".

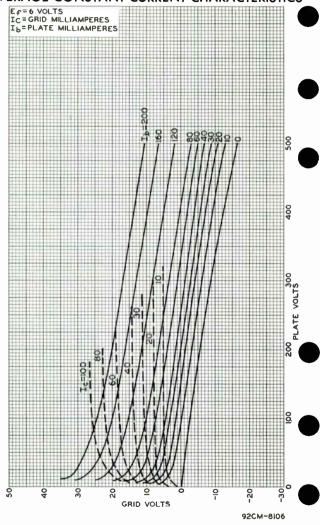
FIN FOR ONE COMPLETE ROTATION. THE TOTAL TRAVEL DISTANCE

NOTE 4: THE STRAIGHT EDGE ON THE PERIMETER OF THE LARGE FIN (PLATE TERMINAL) IS PARALLEL TO A PLANE THROUGH THE CENTERS OF THE HEATER PINS AT THEIR SEALS WITHIN 15°.

AVERAGE CHARACTERISTICS



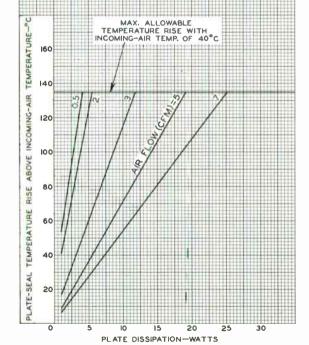
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



COOLING REQUIREMENTS

Er=6 VOLTS MAX, PLATE-SEAL TEMPERATURE= 175° C AIR-DUCT OPENING=1-5/32"x1-5/32" WITH AIR DUCT LOCATED AS SHOWN ON SKETCH.





92CM-8120RI



Tunable Oscillator Triode

PENCIL TYPE WITH INTEGRAL RESONATORS

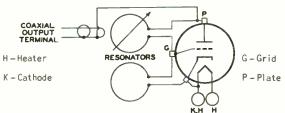
For Radiosonde Service at Frequencies between 1660 and 1700 Mc

GENERAL DATA

Electrical:

)	Heater, for Unipotential Cathode: Voltage range (AC or DC) Current at 6 volts Frequency (Approx.) Tuning Range	5.2 to 6.6 ⁴ 0.16 1680 ⁶ 1660 to 1700	volts amp Mc Mc
	RF Coaxial Output Terminal: Characteristic impedance (Approx.). Tuning Screws (2):	50	ohms
)	Maximum Torque (Absolute) at tuning-range stops	6.5	oz-in.

Mechanical:
Operating Position
Dimensions See Dimensional Outline
Tunable Resonators (2) Integral part of tube
Weight (Approx.) 0.8 oz
Terminal Connections (See Dimensional Outline):



UHF OSCILLATOR - Class C

Maximum and Minimum Ratings, Absolute-Naximum Values:

At frequencies between 1660 and 1700 Mc and altitudes up to 100,000 feet

		 -,	 , .	 ,	
	DC PLATE-TO-GRID VOLTAGE .				
•	DC PLATE CURRENT	 	 		
	DC GRID CURRENT	 	 	8 max.	ma
	PLATE INPUT	 	 	4 max.	
	PLATE DISSIPATION			3.6 max.	
	AMBIENT-TEMPERATURE RANGE.	 	 	-55 tp +75	oC

Typical Operation as Cathode-Driven Oscillator:

Heater	Voltag	je .							6	6	6	volts
DC Plat	e-to-0	irid	Vo	11	tac	1e			124.5	124	123	volts

1660 1680

At frequency of

Nc

1700

At frequency of			1700	
DC_Cathode-to-Grid Voltage	7.5	6.75	6	volts
From grid resistor of	1500	1500	1500	ohms
DC Cathode Current	35	31.5	32	
DC Grid Current	5	4.5	6	ma
Useful Power Output (Approx.)	575	575	475	mw

Circuit Values:

Grid-Circuit Resistance.										{2400 max. 1300 min.	ohms ohms
--------------------------	--	--	--	--	--	--	--	--	--	-------------------------	--------------

- This range of heater voltage is for radiosonde applications in which the heater is supplied from batteries and in which the equipment design requirements of minimum size, light weight, and high efficiency are the primary considerations even though the average life expectancy of the 7533 in such service is only a few hours.
- As supplied, tubes are adjusted to 1680 ± 4 Mc.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Hin.	Max.	
Heater Current		0.135	0.157	amp
Grid Resistor		1300	2400	ohms
Useful Power Output (1)		250	-	mw
Plate Current (1)		_	34	ma
Useful Power Output (2)		250	_	mw
Plate Current (2)	6	-	34	ma
Useful Power Output (3)	7	270	-	mw

- Note 1: With 5.2 volts on heater.
- Note 2: With heater voltage of 6.6 volts, dc plate supply voltage of 117 volts, plate load resistor of 50 ohms, frequency adjusted to 1660 +3 -1 MC., output VSWR of 1.1 maximum, and grid resistor adjusted to give plate current as close as possible to, but not exceeding 33 ma. Record Grid-Resistor value.
- Note 3: With frequency and grid-resistor value of Note 2, decrease heater voltage and plate supply voltage to 5.2 volts and 95 volts, respectively, and measure Useful Power Dutput.
- Note 4: With heater voltage of 6.6 volts, plate supply voltage of 117 volts, plate load resistor of 50 ohms, using same value of grid resistor as determined in Note 2, frequency adjusted to 1700 +1-3 Mc., and output VSWR of 1.1 maximum.
- Note 5: Same as Note 4, except heater voltage and plate supply voltage are 5.2 volts and 95 volts, respectively.
- Note 6: Same as Note 4, except frequency is adjusted to 1680 \pm 4 Mc with VSWR of 1.1 maximum.
- Note 7: Same as Note 6, except heater voltage and plate supply voltage values are 5.2 volts and 95 volts, respectively.

SPECIAL TESTS & PERFORMANCE DATA

Low-Pressure Voltage Breakdown Test:

This test (similar to MIL-E-ID, paragraph 4.9.12.1) is performed on a sample lot of tubes from each production run. Tubes are tested in a chamber at an air pressure equivalent to an altitude of 100,000 feet. Arcing will not occur when an rms voltage of 200 volts is applied between the plate terminal and the grid terminal and heater-cathode terminal tied together.



High-Frequency Vibration Performance:

This test (similar to MIL-E-ID, paragraph 4.9.19.2) is performed on a sample lot of tubes from each production run. The tube is vibrated in two planes, parallel and perpendicular respectively to its axis, with no voltages applied to the tube. Vibration frequency is 50-to-60 cps and acceleration is 10 g. At the end of this test, tubes will not show temporary or permanent shorts or open circuits.

Shorts and Continuity Test:

This test (similar to MIL-E-ID, paragraph 4.7.5) is performed on all tubes from each production run. In this test, a tube is considered inoperative if it shows a permanent or temporary short or open circuit.

Temperature-Frequency Performance:

This test is performed on a sample lot of tubes from each production run to determine the ability of this tube type to maintain the oscillator frequency without significant change when ambient temperature and operating voltages are reduced gradually during a given time interval. Tube under test is operated with a heater voltage of 6.6 volts, dc plate supply voltage of 117 volts, plate load resistor of 50 ohns, pscillator frequency of 1680 \pm 4 Mc, output VSWR of I.I maximum, dc plate current of not more than 34 ma. obtained by adjusting the value of the grid resistor between 1300 and 2400 ohms, and at an ambient temperature of approximately 22° C for a period of 5 minutes. Record Oscillator Frequency. The ambient temperature is then gradually reduced to -40° C during a 30-minute operating period. Both the heater voltage and plate supply voltage are reduced simultaneously so that during the final 15minute interval of this test period the heater voltage is 5.2 volts and the plate supply voltage is 95 volts. Any change in frequency will not be more than +4 Mc or -1 Mc from the recorded initial test value. The rate of frequency change during this test will not exceed 2 Mc in any 15-second interval.

5-Hour Radiosonde Life Performance:

This test is performed on a sample lot of tubes from each production run under conditions of maximum-rated plate dissipation to insure excellent performance in radiosonde applications. Each 'tube tested 's operated for 5 hours under the following conditions: heater voltage of 6.6 volts, dc plate supply voltage of 117 volts, plate load resistor of 50 ohms, dc plate current of 34 ma., obtained by adjusting the grid-resistor value between 1300 and 240D ohms, cscillator frequency of 1680 ± 4 Mc and output VSWR of 1.1 maximum. At the end of 5 hours, the tubes will not show permanent shorts or open circuits, and will meet the following limits:

Useful Power Output (3) 210 min. mw For conditions shown under Characteristics Range Values, Notes 5.7. Change in Useful Power
Output (3) From Initial Value 30 max. %
For conditions shown under Characteristics Range Values,
Notes 6.7.

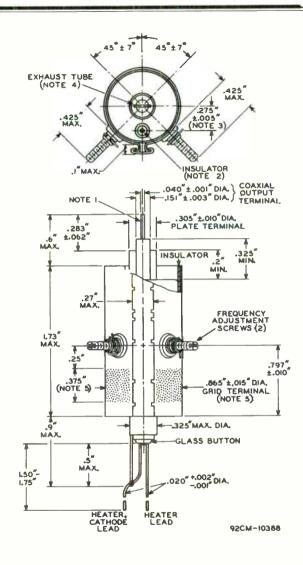
DPERATING CONSIDERATIONS

The flexible heater leads of the 7533 may be soldered to the circuit elements, but not closer than 3/4" from the surface of the glass button. Otherwise the heat of the soldering operation may crack the glass button and damage the tube.

Support for the 7533 should be provided by a suitable clamp around the metal shell of the tube, preferably in the indicated zone shown on the Dimensional Outline. Care must be taken to avoid clamping so tightly as to cause distortion of the resonator cavity with resultant change in operating frequency.

Connections to the grid terminal and to the plate terminal should be made by means of spring contacts only. Under no circumstances should connections be soldered to these terminals.

Accurate frequency adjustment in the 1660-to-1700-Mc operating range together with minimum frequency drift, may be obtained by using both tuning screws. Alternately turn each tuning screw not more than one-half turn at a time, in a clockwise direction to lower the frequency. Repeat this procedure until the desired lower frequency adjustment is reached. To reach a higher frequency, follow the same procedure except that the tuning screws are turned in a counterclockwise direction.



NOTE 1: THE AXES OF THE INNER AND OUTER CONDUCTORS OF THE COAXIAL OUTPUT TERMINAL COINCIDE WITHIN 0.010".

NOTE 2: THE END OF THE INSULATOR IN THE COAXIAL OUTPUT TERMINAL ALIGNS WITH THE EDGE OF THE OUTER CONDUCTOR (Q.151" ± 0.303" DIAMETER) WITHIN 0.005".

NOTE 3: OISTANCE BETWEEN CENTER LINE OF PLATE TERMINAL AND CENTER LINE OF INNER CONDUCTOR (0.040" ± 0.001" DIAMETER).

NOTE 4: ORIENTATION OF PINCH-OFF IS NOT CONTROLLED.

NOTE 5: STIPPLED REGION (WHICH EXTENDS AROUND TUBE)



High-Mu Triode

CERAMIC-METAL PENCIL TYPE
FAST WARM-UP TIME STURDY COAXIAL-ELECTRODE STRUCTURE

For Use as a Low-Noise Amplifier Tube in Receiver Applications up to 1000 Mc

GENERAL DATA

_	Electrical:
	Heater, for Unipotential Cathode: Voltage (AC or DC)
	<pre>volts = 0, cathode resistor (ohms) = 0, and load resistor (ohms) = 10 10 max. sec Direct Interelectrode Capacitances:</pre>
	Grid to plate
	Characteristics, Class A ₁ Amplifier:
	Plate Supply Voltage. 125 volts Cathode Resistor. 50 ohms Amplification Factor. 80 Plate Resistance (Approx.) 6150 ohms Transconductance. 13000 μmhos Plate Current 12.5 ma
	Mechanical:
	Operating Position
	Heater-terminals connector Amerac® No.1018—88* or Grayhil! ♦ No.22-5, or equivalent
	Cavities (Including heater- terminals connector) J-V-M No.D-7980 Series Terminal Connections (See Dimensional Outline):

RCA

H - Heater K - Cathode G-Grid P-Plate

RF AMPLIFIER — Class A₁ (Cathode-Drive Service)

Maximum and Minimum CCS Ratings, Absolute-Naximum Values:

For altitudes up to 100,000 feet and frequencies up to 1000 Mc

OC PLATE-TO-GRID VOLTAGE										
OC SATHODE-TO-GRID VOLTAGE.								0	min.	volts
OC PLATE CURRENT								25	max.	ma
PLATE DISSIPATION								2.5	max.	watts.
PEAK HEATER-CATHODE VOLTAGE:										
Heater negative with respe	ec 1	: 1	0	ca	ith	100	le	50	max.	volts
Heater positive with respe	ec1	t 1	0	ca	ith	100	le	50	max.	volts
PLATE-SEAL TEMPERATURE										

Typical CCS Operation:

At 550 Mc	
DC Plate-to-Grid Supply Voltage 125	volts
Cathode Resistor 50	ohms
Input-Signal Level70	d bm
DC Plate Current 12.5	ma
Power Gain for a bandwidth of 5 Mc 16.5	db
Noise Factor 6.5	db

Maximum Circuit Values:

Grid⊣	Circuit Res	i st ance:							
For	fixed-bias	operation.					. Not	recor	mended
For	cathode-bia	as operation	١				0.25	max.	megohm

- Without external shield.
- Amerac, Inc., Dunham Road, Beverly, Massachusetts.
- * for use with cavities.
- ♥ Grayhill, Inc., 561 Hillgrove Ave., LaGrange, Illinois.
- ◆ Cantinuous Commercial Service.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

011111111111111111111111111111111111111	111111111111111111111111111111111111111		20 1011	- Ad 1114F	W. DEGIG	**
			Note	Min.	Max.	
Heater Current			1	0.205	0.245	amp
Direct Interelectrode						
Capacitances:						
Grid to plate			_	2.1	2.8	μμf
Grid to cathode			_	3.8	4.8	μμf
Plate to cathode			_	_	0.03	μμf
Transconductance			1,2	10000	16000	umhos
Reverse Grid Current.			1,3	-	0.3	μa
Heater-Cathode Leakage	e Curre	ent.	1,4	-	30	μa
Leakage Resistance:						,
From grid to plate a	ind cath	node				
connected togethe	r		1,5	100		megohms
From plate to grid a	ind cath	node				_
connected togethe	r		1,6	100	-	megohms
Plate Current (1)			1,2	8.5	16.5	ma

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



	Plate Current (2)			1,7	-	50	μа
	Plate Current (3)			1,8	100		μα
h	Power Gain			1,9	14	-	db
,	Noise Factor			1.9	-	7	db
	Change in Power Gain .				-	-1	db
	Change in Noise Factor				-	+0.5	db

Note 1: With 6.3 volts ac or dc on heater.

With dc plate supply voltage of 125 volts, and cathode resistor of 50 ohms shunted by 1000 μf_{\ast} Note

with dc plate voltage of 200 volts, grid resistor of C.5 megohm, Note and dc grid voltage of -2 volts.

With 60 volts do between heater and cathode, and heater positive with respect to cathode. Note

with grid 100 volts negative with respect to plate and cathode tied together. Note

With plate 300 volts negative with respect to grid and cathode tied together. Note 6:

With dc plate voltage of 125 volts and dc grid voltage of Note -5 volts.

with dc plate voltage of 125 volts and dc grid voltage of Note 8: -2.5 volts.

In a single-tube rf amplifier of the cavity type having a bandwidth of 5 Mc, signal input of -70 dbm, and operating frequency of 550 Mc. Note 9:

Reduce heater voltage to 5.7 volts. Change in Power-Gain and Noi:-e-Factor values from those obtained with 6.3 volts on heater will not exceed indicated values. Note 10:

SPECIAL TESTS & PERFORMANCE DATA

Low-Pressure Voltage Breakdown Test:

This test (similar to MIL-E-ID, paragraph 4.9.12.1) is performed on a sample lot of tubes from each production run. Tubes are tested in a chamber at an air pressure equivalent to an altitude of 100,000 feet. Breakdown will not occur when an rms voltage of 300 volts is applied between the plate cylinder and grid flange.

Low-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run under the following conditions: heater voltage of 6.3 volts, dc plate supply voltage of 125 volts, cathode resistor of 50 ohms, and plate load resistor of 10,000 ohms. The tubes are vibrated in a plane perpendicular to the tube axis at 40 cycles per second at an acceleration of 10 g. The rms output voltage across the plate load resistor as a result of vibration of the tube will not exceed 100 millivolts.

Variable-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run. Tube operating conditions are the same as for Low-Frequency Vibration. The tube is vibrated perpendicular to its major axis through a frequency range from 5 to 2000 cps and back. From 5 to 50 cps, the tube shall be vibrated at a constant displacement of 0.0400 ± 0.0025 inch. From 50 to 2000 cps, the tube shall be vibrated at a constant



acceleration of 10 ± 2 g. Total time to complete a sweep cycle shall be 10 ± 5 minutes. During the test, the tubes will not show an rms output voltage across the plate load resistor in excess of 150 millivolts. Each tube shall be vibrated for 60 seconds at the frequency which gives maximum vibrational noise output. If, at the end of 60 seconds the vibrational noise output is still increasing, the test shall continue until there is no further increase. The rms output voltage across the plate load resistor as a result of the vibration of the tube must not exceed the specified limit at any time during the test.

Shock Test:

This test (similar to MIL-E-ID, paragraph 4.9.20.5) is performed on a sample lot of tubes from each production run. Tubes are held rigid and are subjected in three different positions to an impact acceleration of 500 g, 5 blows in each position.

At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet the following limits:

Heater-Cathode Leakage Current. 60 max, μ a For conditions shown under Characteristics Range Values. Notes 1,4.

Low-Frequency Vibration Output...... 200 max, mv For conditions shown above under Low-Frequency Vibration Performance.

Change in transconductance. 10 max. 9

From initial value for conditions shown under Characteristics Range Values, Notes 1,2.

Change in Reverse Grid Current. I max. μ a

From initial value for conditions shown under Characteristics Range Values, Notes 1, 7.

Fatigue Vibration Test:

This test (similar to MIL-E-ID, paragraph 4.9.20.6) is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected to 2.5 g vibrational acceleration in two positions (XI, YII) for 32 hours each. At the end of this test, tubes will meet the limits specified for the $\it Shock\ Test$.

Shorts and Continuity Test:

This test is performed on all tubes from each production run. In this test, a tube is considered inoperative if it shows a permanent or temporary short or open circuit, an air leak, or reverse grid current in excess of 1 microampere for the conditions shown under Characteristics Range Values. Notes 1,4.



Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. With 6.3 volts on heater and no voltage on plate or grid, the heater is cycled three minutes on and three minutes off for at least 2000 cycles. At the end of this test, tubes will not show temporary or permanent shorts or opens, and are required to meet the following limits:

Grid-to-Cathode Leakage Resistance. . . . 50 min. megohms For conditions shown under Characteristics Range Values. Notes 1,5.

Heater-tc-Cathode Leakage Current 60 max. For conditions shown under Characteristics Range Values. Notes 1.4.

1-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that the tubes have been properly stabilized. Tubes are operated under the following conditions: heater voltage of 6.3 volts, plate supply voltage of 215 volts, and cathode resistor of 150 ohms. At the end of I hour, the change in transconductance value for each tube, referred to its initial transconductance reading, will not exceed 15 per cent of the initial value for conditions shown under Characteristics Range Values, Notes 1,2.

44-Hour Grid-Emission Life Performance:

This test is performed on a sample lot of tubes from each production run to insure excellent overall performance and to quard against epidemic failures of tubes to meet this test requirement. Tubes are operated under the following conditions: heater voltage of 7.5 volts, dc plate voltage of 215 volts, grid voltage of -2 volts, and grid resistor of 0.5 megohm. At the end of 44 hours, the reverse grid current will not exceed 2 microamperes when grid resistor is shorted and grid voltage is increased to -5 volts, other conditions remaining unchanged from the above values.

100-Hour Survival Life Performance:

This test is performed on a sample lot of tubes from each production run to insure a low percentage of early inoperatives. Life-test conditions are the same as those specified for 1-Hour Stability Life Performance except that all voltages are cycled at the rate of 110 minutes on and 10 minutes off. At the end of 100 hours, the tubes will meet the following limits:

Transconductance. 8000 min. For conditions shown under Characteristics Range Values. Notes 1.2.

Plate Current (2) 50 max. For conditions shown under Characteristics Range Values, Notes 1,7.

500-Hour Average Life Performance:

This test is performed on a sample lot of tubes from each production run to insure excellent overall performance and to guard against epidemic failures of tubes to meet any of the characteristics indicated below. Each tube is life tested under the following conditions: heater voltage of 6.3 volts, plate supply voltage of 215 volts, cathode resistor of 150 ohms, heater positive with respect to cathode by 67.5 volts, and plate—seal temperature of 225° C. Heater voltage is cycled at a rate of 110 minutes on and 10 minutes off. At the end of 500 hours, the tube will not show permanent shorts or open circuits, and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to pass the following limits:

Reverse Grid Current. μα
For conditions shown under Characteristics Range Values.

Insulation Resistance:

Notes 1,3.

Grid to plate and cathode 60 min. megohms Plate to grid and cathode 60 min. megohms

For conditions shown under Characteristics Range Values, Notes 1,5, and 1,6, respectively.

Change in Noise Factor. I max. db

From initial value for conditions shown under Characteristics Range Values, Notes 1,9.

Change in Power Gain. -2 max. db

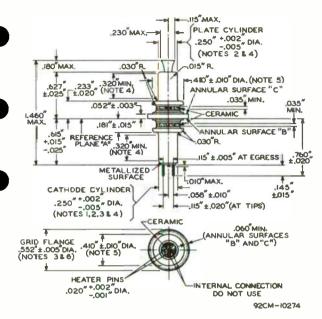
From initial value for conditions shown under Characteristics Range Values, Notes 1, q.

OPERATING CONSIDERATIONS

Connections to the cathode cylinder, grid flange, and plate cylinder should be made by flexible spring contacts. The connectors should make firm, large-surface contact, yet must be sufficiently flexible to insure that no part of the tube is subjected to excessive strain.

The cathode should preferably be connected to one side of the heater. When, in some circuit designs, the heater is not connected directly to the cathode, precautions must be taken to hold the peak heater-cathode voltage to the maximum-rated values shown in the tabulated data.





REFERENCE PLANE "A" IS DEFINED AS THAT PLANE AGAINST WHICH ANNULAR SURFACE "B" OF THE GRID FLANGE ABUTS.

ANNULAR SURFACE "B" IS ON THE SIDE OF THE GRID FLANGE TOWARD THE CATHODE CYLINDER.

ANNULAR SURFACE "C" IS ON THE SIDE OF THE GRID FLANGE TOWARD THE PLATE CYLINDER.

NOTE I: WITH ANNULAR SURFACE "B" RESTING ON REFERENCE PLANE "A", THE AXIS OF THE CATHODE CYLINDER WILL BE WITHIN 2° OF A LINE PERPENDICULAR TO REFERENCE PLANE "A".

NOTE 2: THE AXES OF THE PLATE CYLINDER AND CATHODE CYLINDER WILL COINCIDE WITHIN D.D!O"

NOTE 3: THE AXES OF THE CATHODE CYLINDER AND GRID FLANGE WILL COINCIDE WITHIN D.DD5".

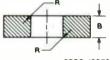
NOTE %: THE DIAMETER ALONG THE D.320" MINIMUM LENGTH IS MEASURED WITH "GO" AND "NO-GO" RING GAUGES G_1-1 AND G_1-2 , RESPECTIVELY:

MOTE 5: THIS DIAMETER IS MEASURED WITH "GO" AND "NO-GO" GAUGES $G_2{=}1$ AND $G_2{=}2$, RESPECTIVELY.

NOTE 6: THIS DIAMETER IS MEASURED WITH "GO" AND "NO-GO" GAUGES G_3-1 AND G_3-2 , RESPECTIVELY.

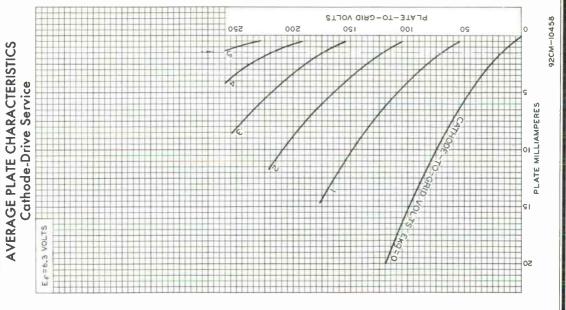






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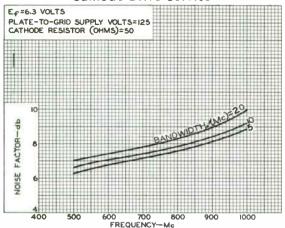
Gauge	Туре	Dimension									
		Diam	eter A	Thick	ness B	Radiu	s R				
G ₁ -I	GO	0.25200"	+0.00000" -0.00007"	0.320"	+0.001"	0.003"	MAX.				
G ₁ -2	NO-GO	0.24500"	+0.00007" -0.00000"		-	_					
G ₂ -1	GO	0.42000"	+0.00000"		_	-					
G ₂ -2	NO-GO	0.40000"	+0.00007" -0.00000"		_	-					
G ₃ -1	GO	0.55700"	+0.00000"	_							
G ₃ -2	NO-GO	0.54700"	+0.00007" -0.00000"	-		-					





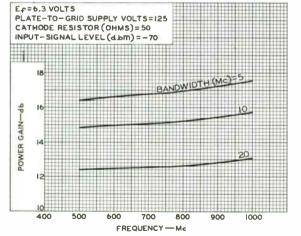
AMERICA Harrison, N. J. CORPORATION Electron Tube Division RADIO

NOISE-FACTOR CHARACTERISTICS Cathode-Drive Service



92CS-10455

POWER-GAIN CHARACTERISTICS Cathode-Drive Service



92CS-10456

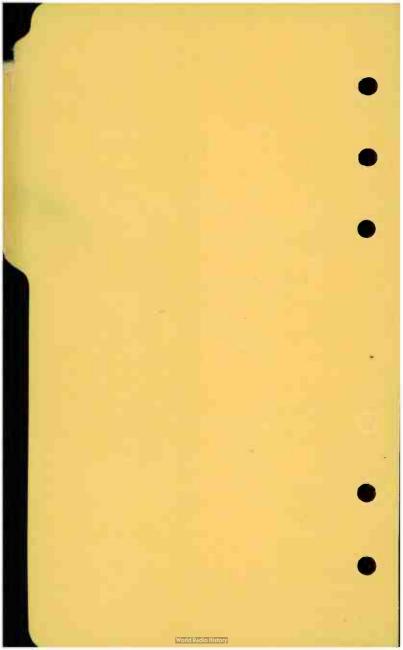
RCA TUBE HANDBOOK HB-3



THYRATRON, IGNITRON, & GLOWDISCHARGE TUBE SECTION

This Section contains data on thyratrons, ignitrons, and glow-discharge (cold-cathode) tubes used for voltage-regulator, relay, and voltage-reference applications.

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





THYRATRON, IGNITRON, & GLOW-DISCHARGE TUBE CLASSIFICATION CHART

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

Maxid		1	4aximum		ent (F)	TUBE
Cathode	Amp.	1	k Inverse	-	ter (H)	TYPE
Av.	Peak	And	ode Volts	Volts	Amp.	1111
Triodes		_				
	y-Va‡01					
0.5	2.0	5000	40–80°C	2.5 F	5.0	5557
0.64	2.5	2500	25-700	2.5 F	6.0	627
1.5	6.0	∫1250 200	-40 to +80° \ -40 to +100°	2.5 F	7.0	3023-
∫1.6	6.4	20000	25-50°	5.0 F	10.0	5563-A
11.8	10.C	15000	25–55°∫		1	
2.5	15.C	1000	40–80°	5.0 H	4.5	5559
2.5 4.0	15.C	1000	40-80 ⁰ 30 - 50 ⁰	5.0 H	4.5	5°28/FG-6
6.4	40.C	2500	40-80°			677
2.5	77.C*	750 A	40-90°}	5.0 H	10.0	676
Gas Ty	pes					
0.04	0.2	350	-40 to +70°	2.5 H	2.6	629
∫0.075	0.3	300 [®]	-75 to +90° \	6.3 H	0.6	884
(0.075	0.3	350	-75 to +90° ∫			
		for Typ		2.5 H	1.5	885
1.0	8.0	1250	-55 to +75°	2.5 F	6.3	£1K/6014
2.5 2.5	30	1250	-55 to +75 ⁰ -55 to +75 ⁰	2.5 F	9.0	C3J/5632 C3J~A/568
6.4	30: 77	1250	-55 to +750	2.5 F	21	05J-A7508
6.4	77	1250	-55 to +75	2.5 F	21	Ct+J-A/568
16	1601				_	
(18	100	1250	-55 to +75°	2.5 F	31	C16J/5665
Tetrodes						
Hercur	y-Vapor	Types				
2.5	15.0	1000	40 - 80°	5.0 H	4.5	5560
2.5	30.0	1500	40-80°	5.0 H	5.0	632-B
3.2	40.0	2500	40 -8 0°	5.0 H	5.0	672-A
6.4 2.5	40.0	2000 750	40 -8 0 ⁰ 30 -9 5 ⁰	5.0 H 5.5 H	10.0	172
6.4	77.0ª 40.0	2500	30−95° 40−80° \		1 1	
4.0*	16.0*	10000*	25-50°	5.0 H	10.0	105

In these two columns, values for filament types are for Maximum Anode Amperes.

Meta'-shell type. Intermittent Service. CLASSIFICATION

Welder-Control Service.

Miniature type. Relaxation Oscillator (Sweep-Circuit Service).

Relay & Grid-Controlled Rectifier Service.



THYRATRON, IGNITRON, & GLOW-DISCHARGE TUBE CLASSIFICATION CHART

Maximum Cathode® Amp.		Pe	Maximum ak Inverse		Filamen or Heat	TUBE	
Av.	Peak	Anode Volts			Volts	Amp.	TYPE
Tetrode	8						
Gas 1	ypes						
0.025	0.1	500	-55 to	190°	6.3 H	0.15	5696 ^D
0.1	0.5	1300	-75 to	190°	6.3 H	0.6	2021
∫0.1	1.0	1300]	-55 to	1900	6.3 H	0.6	502-A
]0.2	1.0	360	<i></i>	1			
∫0. I	1.0	1300}	-75 to	+90°	6.3 H	0.6	2050
₹0.2 0.5	5.0	360 J	-75 to	100P	6.3 H	2.6	6012
0.5	8.0	1500	-75 to		6.3 H	2.6	3D22-A
GNITRO	NS						
		Max	imum Rati	ngs			
1	for powe	r-suppl)	frequenc	y from	25 to 60	c ps	
Av.	Peak		Avigig.	RHS	Peak	Inverse	TUBE
Anode	Anode	KVA	Time	Supply	orf	orward	ITTE
Amp.	Amp.	Demand	Sec.	Volts	V	olts	
AC Wels	ier-Cont	rol Serv	ice‡				
	1 550	1 100	22	1 250	1	_	1
22.4	230	100	9.2	600	-	_	5550
12.1	1680	300	22	250		_	Size /
12.1	700	300	9.2	600	-	_	1
	1 1130	I 200	1 18	1 250	1	_	1
56 56	470	200	7.5	600		_	5551
30.2	3350	600	18	250		_	Size 8
30.2	1400	600	7.5	600	}	-	l l
113	1 360	600♦	1 0.5	1 2400	1	_	1
75	720	1200	1.5	2400		_	5554
	1 2240	1 400	1 14	1 250	1	_	1
140	930	400	5.8	600		_	5552
	6730	1200	14	250		_	Size (
75.6			1			_	
75.6	1 2000		. 5.0				
207	1 650	1 1105 €	1 0.5	1 2400			5555
75.6	2800	1200	5.8	600		-	1 3123

4.6

4.6

355

192

4500 1

1870

13500

5600

800

800

2400

2400

250

600

250

600

5553

Size Di

In these two columns, values for filament types are for Maximum Anode Amperes.

Ratings shown are on a per-tube basis with two tubes connected in inverse parallel. $$_{\perp}$$ Miniature type.



THYRATRON, IGNITRON, & GLOW-DISCHARGE TUBE CLASSIFICATION CHART

Maximum Ratings For power-supply frequency from 25 to 60 cps						
Av. Anode Amp.	Peak Anode Amp.	KVA Demand	Av'g'g. Time Sec.	RMS Supply Volts	Peak Inverse or Forward Volts	TUBE
Frequen	cy-Chang	er Resis	tance-Wel	ding Sec	rvice	
56 16 70 20	336 1200 420 1500	-	6.25 6.25 6.25 6.25	-	1500 1500 1200 1200	5822
Rectific	er Servi	ce				
200 150	1800	_	1	-	900	5555
100 75	900	-	_	_	900	5554
Intermi:	ttent Re	ctifier	6	I -	1 500	
1 n t e r m i 1 00 40 GL OW-D I :	ttent Re 1 1600 1 700 SCHARGE	TUBES	6	0 c	500	1 555
Intermi 100 40 GLOW-DI	ttent Re 1 1600 1 700 SCHARGE	TUBES	6	0 c	500	
Intermi 100 40 GLOW-D1:	ttent Re 1 1600 1 700 SCHARGE DC ing Volterox.	TUBES	6 6 Operatin	OC g-Curren	500	1 5551
Intermi 100 40 GLOW-D1: Operat App	ttent Re 1 1600 1 700 SCHARGE DC ing Volt	TUBES	0 Operation	0 C g-Curren Ma. 0.4 to 2 5 to 40 5 to 30	500	991 0A3 8B2
Intermi 100 40 GLOW-DI: Operat App	ttent Re 1 1600 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 700 1 70	TUBES	0 Operatin	0c g-Curren Ma.	500	555 TUBE TYPE 991 0A3
Intermi 100 40 GLOW-DI: Operat App	ttent Re 1 1600 1 700 SCHARGE DC ing Volt rorx. Regulat 59 75 08 08 08 51	TUBES s	6 6 Operatin	0 c g-Curren Ma. 0.4 to 2 5 to 40 5 to 30 5 to 40 5 to 30	500	991 0A3 6B74 0C3 0A2

Miniature type.

Trinabile type.

1 - Premium type having very stable characteristics and intended for applications critical as to shock and vibration.



THYRATRON, IGNITRON, & GLOW-DISCHARGE TUBE CLASSIFICATION CHART

Maximum Peak-Inverse Anode	Ma Ca	TUBE TYPE	
Yolts	Peak	Average	
telay Types			
1B0 200 225	100 100	25 25 25	1C21 5B23 ^C 0A4-6

Miniature type.



GRID-CONTROLLED RECTIFIER CIRCUITS

Numerical Relationships Among Electrical Quantities

E = Trans. Sec. Voltage (RMS) Eav = Average DC Gutput Voltage

Ehmi = Peak Inverse Anode Voltage

Em = Peak DC Gutput Voltage Er = Major Ripple Voltage (RMS)

f = Supply Frequency

f = Major Ripple Frequency

Iav = Average DC Output Current

Ib = Average Anode Current In = Anode Current (RMS)

I nm = Peak Anode Current Pal = Line Volt-Amperes

Pan = Trans. Pri. Volt-Amperes Pas = Trans. Sec. Volt-Amperes

Pdr = DC Power (Eav x 1av)

Note: Conditions assumed involve sine-wave supply; zero voltage drop in tubes; no losses in transformer and cir-

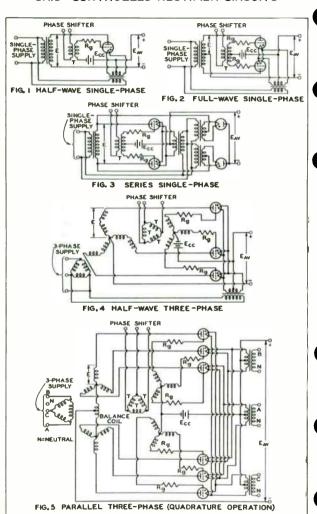
RAT10	Fig. i	Fig. 2	Fig.3	Fig. 4	Fig.5"	Fig. 6	Fig. 7	Fig. 8
oltage Ratios								
E/E _{av}	2.22	1.11	1.11	0.854	0.854	0.427	0.785	0.74
E _{bmi} /E	1.41	2.83	1.41	2.45	2.45	2.45	2.83	2.83
E _{bmi} /E _{av}	3.14	3.14	1.57	2.09	2.09	1.05	2.22	2.0
E _m /E _{av}	3.14	1.57	1.57	1.21	1.05	1.05	1,11	1.0
E _r /E _{av}	1.11	0.472	0.472	0.177	0.04	0.04	0.106	0.0
requency Ratio								
f _r /f	l	2	2	3	6	6	4	
Current Ratios								
I _p /I _{av}	1.57	0.785	0.785	0.578	0.289	0.578	0.5	0.40
l _b /l _{av}		0.5	0.5	0.33	0.167	0.33	C.25	0.16
Resistive Load								
I _{pm} /I _{av}	3.14	1.57	1.57	1.21	0.52	1.05	1,11	1.0
1 _{pm} /1 _b	3.14	3.14	3.14	3.63	3.14	3.14	4.5	6.
Inductive Load								
1 _{pm} /1 _{av}	_	1	1	I	0.5	1	1	
Power Ratios								
Resistive Load								
Pas/Pdc	3.49	1.74	1.24	_	_	_	_	-
Pap/Pdc	2.69	1.23	1.24	_	_		-	-
Pa1/Pdc	2.69	1.23	1.24	_	_	_		-
Inductive Load							}	
Pas/Pdc	_	1.57	1.11		1.48	1.05	l .	1.8
Pap/Pdc	-	1.11	1.11		1.05	1.05		le a
Pal/Pdc	-	1.11	1.11	1.21	1.05	1.05	1.11	1.0

for balance coil and thus avoid poor regulation at light loading.

The use of a large filter-input choke is assumed.



GRID-CONTROLLED RECTIFIER CIRCUITS



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



GRID-CONTROLLED RECTIFIER CIRCUITS

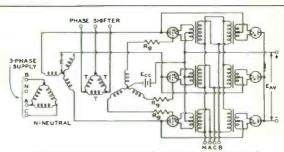


FIG. 6 SERIES THREE-PHASE (QUADRATURE OPERATION)

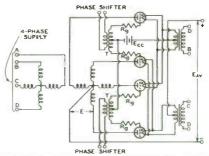
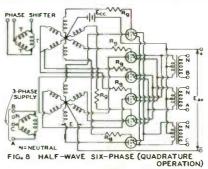
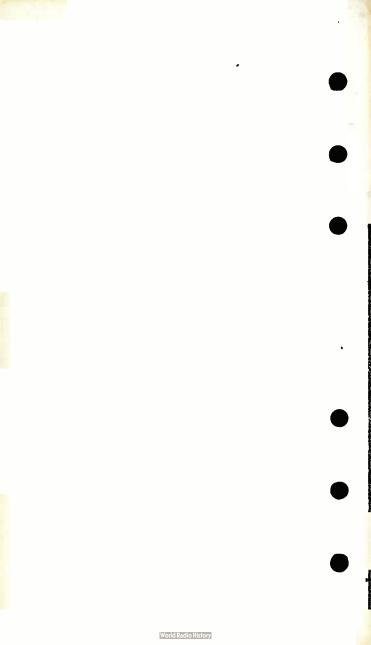


FIG. 7 HALF-WAVE FOUR-PHASE (QUADRATURE OPERATION)



T=PEAKING TRANSFORMER

92CL-8340





2D21

THYRATRON

GAS TETRODE, MINIATURE TYPE

GENERAL DAT	Ά
-------------	---

	GENERAL DATA		
	.ectrical:		
	Heater, for Unipotential Cathode: Min. Av. Voltage (AC or DC) 5.7 6.3 Current, with heater volts = 6.3 0.54 0.60	6.9	volts
>	Cathode: Heating Time, prior to tube conduction 10		sec
	Direct Interelectrode Capacitances (Approx.): Grid No.1 to Anode	0.026	щf
	Output	1.6	μμ.f
	For conditions: dc anode volts = 100; grid-No. I souare-pulse volts = 50; peak anode amp.	0.5	
	during conduction = 0.5	0.5	μsec
	1000; dc anode amp. = 0.1 For conditions: dc anode volts = 125; grid-No.1 volts = -10; grid-No.1 resistor (phms) =	35	μsec
	1000; dc anode amp. = 0.1	75	μsec
	Anode Voltage Drop Approx.)	0.5	μαmp volts
	resistor (megohms) = 0; grid-No.2 volts = 0 Grid-No.2 Control Ratio (Approx.) with gr d-No.1 resistor (megohms) = 0; grid-No.2 resistor		250
	(megohms) = 0; grid-No.1 volts = 0		1000
	Mechanical:		
	Mount ng Position		٨٥٠٠
	Maximum Overall Length		2-1/8"
	Maximum Seated Length	T- niature	3/4" 5-1/2 1-Pin
	Basing Designation for BOITOM VIEW		. /BN
	Pin 2 - Cathode Pin 6	5-Grid 5-Anode 7-Grid	

Pin 4 - Heater

← Indicates a change.



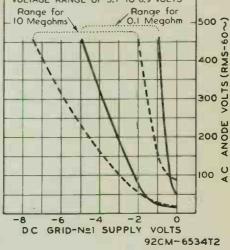
	RELAY and GRID-CONTROLLED RECTIFIER SERVICE	1
	Maximum Ratings, Absolute Values:	
	PEAK ANODE VOLTAGE: Forward	
	Inverse	1
	Peak, before anode conduction100 max. volts Average, during anode conduction10 max. volts GR¹D-No.1 (CONTROL-GRID) VOLTAGE:	
	Peak, before anode conduction100 max. volts Average, during anode conduction ■10 max. volts CATHODE CURRENT:	
	Peak 0.5 max. amp Average	
A A	Surge, for duration of 0.1 sec. max 10 max. amp GRID-No.2 CURRENT: Average	
	GRID-No.1 CURRENT: Average +0.01 max. amp PEAK HEATER-CATHODE VOLTAGE:	
	Heater negative with respect to cathode . 100 max. volts Heater positive with respect to cathode . 25 max. volts	1
	AMBIENT TEMPERATURE RANGE75 to +90 °C	
1	Typical Operating Conditions for Relay Service:	
	RMS Anode Voltage. 117 400 volts Grid-No. 2 Voltage. 0 0 volts RMS Grid-No. 1 Bias Voltage 5 - volts	3
1	RMS Grid-No.1 Bias Voltage 5 volts	1-
1	DC Grid-No.1 Bias Voltage6 volts Peak Grid-No.1 Signal Voltage 5 6 volts	1
ı	Grid-No.1-Circuit Resistance 1.0 1.0 megohm	
ı	Anode-Circuit Resistance* 1200 2000 ohms	
ı	Maximum Circuit Values:	
	Grid-No.1-Circuit Resistance 10 max. megohms	
	Averaged over any interval of 30 sec. max. Approximately 180° out of phase with the anode voltage.	
	# sufficient resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings. Indicates a change.	-

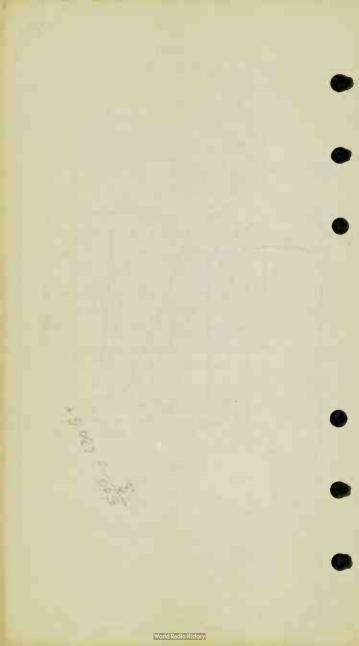




OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE

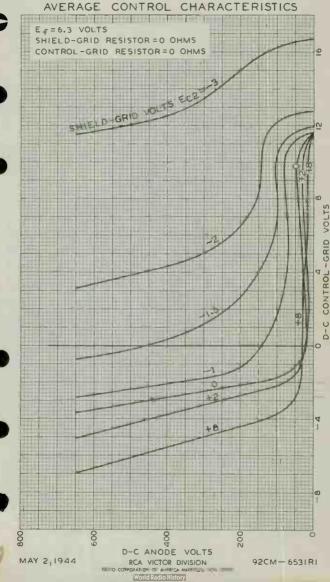
TYPE 2D21 SHIELD-GRID VOLTS=0
RANGES SHOWN ARE FOR TWO VALUES
OF GRID RESISTOR - 0.1 MEG. AND 10
MEG. -AND TAKE INTO ACCOUNT INITIAL
DIFFERENCES BETWEEN INDIVIDUAL
TUBES & SUBSEQUENT DIFFERENCES
DURING TUBE LIFE, FOR A HEATERVOLTAGE RANGE OF 5.7 TO 6.9 VOLTS





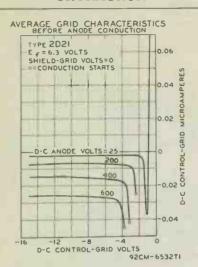


AVERAGE CONTROL CHARACTERISTICS

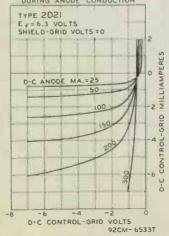




THYRATRON



AVERAGE GRID CHARACTERISTICS





GAS-AND-MERCURY-VAPOR THYRATRON

NEGATIVE-CONTROL TRIODE TYPE

	ALGORITHE GOATING TIME OF THE
	GENERAL DATA
	Electrical:
	Filament, Coated:
	Voltage 2.5 ± 5% ac or dc volts Current at 2.5 volts amp
	Minimum heating time prior to
	tube conduction 15 sec
1	Direct Interelectrode Capacitance (Approx.):0
	Grid to anode
	ionization Time (Approx.): For conditions: dc anode volts = 100,
	peak grid volts = +30, and peak
	anode amperes = 6 3 μsec
9	Deionization Time (Approx.):
	For conditions: dc anode volts = 120, dc grid-supply volts = -20, grid re-
	sistor (ohms) = 10000, and dc
	anode amperes = 1.5
	For conditions: dc anode volts = 120,
	dc grid-supply volts = -500, grid re- sistor (ohms) = 100000, and dc
	anode amperes = 1.5 60 μsec
	Anode Voltage Drop (Approx.) 15 volts
	Mechanical:
	Mounting Position Vertical, base down
	Maximum Overall Length
	Seated Length
	Maximum Diameter
	Weight (Approx.)
	Bulb
	Cap Medium (JETEC No.C1-5)
	Base Medium-Shell Small 4-Pin with Bayonet (JETEC No.A4-10)
	Basing Designation for BOTTOM VIEW
	7 /
	Pin 2 - No Connection Cap - Anode
9	Pin 3-Grid
	1111)-0110
	CONTROL SERVICE
	Maximum Ratings, Absolute Values: For supply frequency up to 400 cbs
	Operating Condensed-Mercury Temperature Range
	Temperature Range -40° to +100°C -40° to +80°C
	PEAK ANODE VOLTAGE:
	Forward 200 max. 1250 max. volts
	Inverse 200 max. 1250 max. volts
	⁰ without external shield. ← Indicates a change.
	4-56 TUBE DIVISION DATA

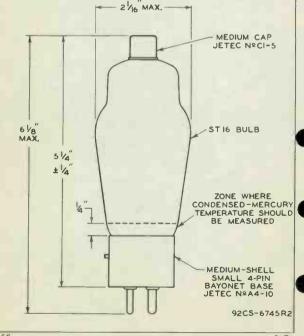




GAS-AND-MERCURY-VAPOR THYRATRON

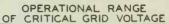
	Operat	ting Conde Temperatur	insed-M	ercury	
COLD VOLTICE	-40° to	+100°C	-40° t	0 +80°C	
GR'D VOLTAGE:					
Peak or DC, before					
tube conduction	-500	max.	-500	max.	volts
Average*, during					
tube conduction	-10	may.	-10	may	voite
ANODE CURRENT:	. 10	, incly ,	- 10	IIIGIA+	+0115
	- 0		6		
Peak			6		amp
Average	. 1.5	max.	1.5	max.	amp
Fault, for duration of					
0.1 second max	. 120	max.	120	max.	amp
GRID CURRENT:					
Average	±0 01	may	n 01	mav	amo
arciage	. +0.01	IIIdA.	.0.01	max.	amp
Averaged over one conducting perio	sd.				

- averaged over any interval of 5 seconds maximum.
- averaged over period of grid conduction.

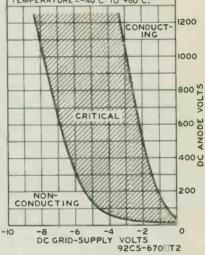


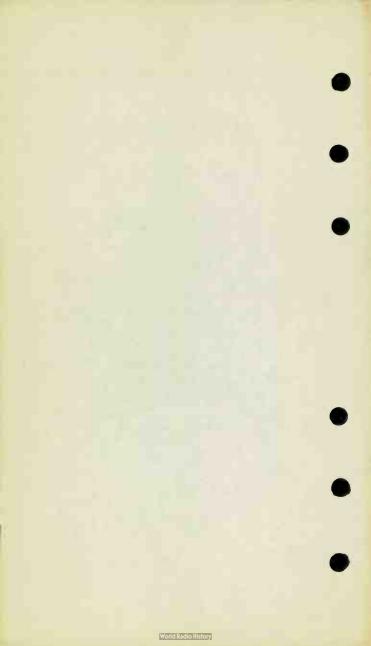


GAS-AND-MERCURY-VAPOR THYRATRON



RANGE IS FOR CONDITIONS WHERE: ϵ_2 =2.5 volts a C±5 σ_0 ; Circuit returns to center tap of filament transformer. The range includes initial and life variations of individual tubes. Grid resistor=0 to 100000 ohms. Condensed-mercury temperature=-40°C to +80°C.







3D22 **THYRATRON**

GAS TETRODE

ı	GENERAL DATA		
ı	Electrical:		
ı		Max.	
i	Voltage (AC or DC) 5.7 6.3		volts
8	Current, with neater volts = 6.3 2.35 2.60 Cathode:	2.85	атр
	Heating Time, prior to		
	tube conduction 30 -		sec
	Outage Time, without reheating	3	sec
	Direct Interelectrode Capacitances (Approx.): Grid No.1 to Anode	G.1	µµf
	Input	7	щ
	Output	3.6	μμτ
	Without external shield, and with base shell floating.		
	Ionization Time (Approx.): For conditions: dc anode volts = 100; grid-No.		
	square-pulse volts = +100; and peak anode		
	amp. during conduction = 8	0.5	μsec
	Deionization Time (Approx.):		
	For conditions: dc anode volts = 125; grid-No.1 volts = -200, grid-No.1 resistor (ohms) =		
	1000; and dc anode amp. = 0.8	150	μsec
	For conditions: dc anode volts = 125, grid-No. I		
	volts = -14.8; grid-No. resistor (ohms) =	400	
	Maximum Critical Grid Current, with ac anode—supply	400	μsec
	volts (rms) = 460, and average anode amp.		
	= 0.8	0.8	μатр
	Anode Voltage Drop (Approx.)	10	volts
	resistor imegohms) = 0 to 0.1; grid-No.2 re-		
	sistor (megohms) = 0; and grid-No.2 volts = 0		. 150
4	Grid-No.2 Control Ratio (Approx.) with grid-No.1		
	resistor (megohms) = 0; grid-No.2 resistor (megohms) = 0 to 0.1; and grid-No.1 volts		
	= -3		. 650
	Mechanical:		
	Mounting Position		. Any
	Maximum Overall Length		4-5/8"
1	Maximum Seated Length		. 4" 2-3/8"
	Maximum Diameter		
	Bulb	Pin, B	ayonet
	Basing Designation for BOTTOM VIEW		. 7BV
	Pin 1 - Heater 3 Pin 5-	Grid	No 2
	Pin 2 - Grid No.2 A- Pin 6-		
	Pin 3 - Cathode 2 Pin 7-		
	Pir 4 - Grid No.1	Heate	
	AA'= PLANE OF ELECTRODES Indic	ates a	change.



RELAY and GRID-CONTROLLED RECTIFIER SERVICE

	RELAT AND GRID-CONTROLLED RECTIFIER SERVICE	ı
	Maximum Ratings, Absolute Values:	
	PEAK ANODE VOLTAGE:	ı
	Forward 650 max. volts	ı
->	Inverse	ı
	GRID-No.2 (SHIELD-GRID) VOLTAGE: Peak, before anode conduction100 max. volts	ı
	Average, during anode conduction10 max. volts	l
_	GRID-No.1 (CONTROL-GRID) VOLTAGE:	ı
	Peak, before anode conduction200 max. volts	ı
->	Average, during anode conduction10 max. volts	ı
->	CATHODE CURRENT:	ı
	Peak 8 max. amp	
	Average 0.8 max. amp	ŀ
	Surge, for duration of 0.1 sec. max 30 max. amp	
	GRID-No.2 CURRENT: Average + 0.1 max. amp	
->	GRID-No.1 CURRENT:	
	Average +0.05 max. amp	
	PEAK HEATER-CATHODE VOLTAGE:	
	Heater negative with respect to cathode. 100 max. volts	
	Heater positive with respect to cathode. 25 max. volts	
	AMBIENT TEMPERATURE RANGE75 to +90 °C	

Maximum Circuit Values:

Grid-No.1-Circuit Resistance 2 max. megohms

NOTE: Sufficient anode-circuit resistance, including tube load, must be used under all conditions of operation to prevent exceeding the current ratings of the tube.

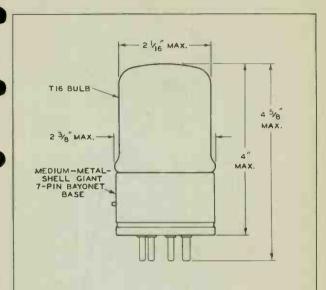
→ Indicates a change.

Averaged over any interval of 30 sec. max.



3D22 THYRATRON





92CM-6569RI



OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE

TYPE 3D 2 2

GRID-Nº2 (SHIELD) VOLTS=0

RANCES SHOWN ARE FOR TWO VALUES OF

GRID RESISTOR—OLINEG, AND 2 MEG—AND

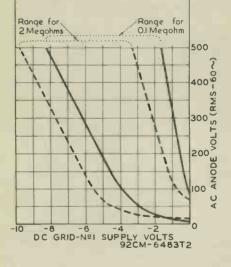
ARE INTO ACCOUNT INITIAL DIFFERENCES

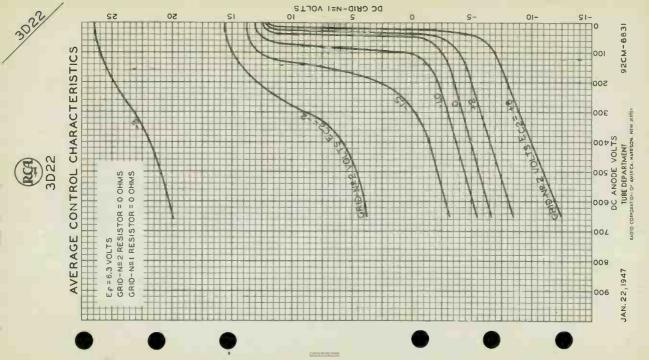
BETWEEN INDIVIDUAL TUBES AND SUBSE—

OUENT DIFFERENCES DURING TUBE LIFE,

FOR HEATER—VOLTAGE RANGE OF 5.7 TO

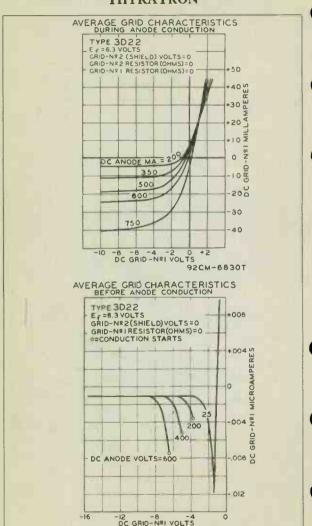
6.9 VOLTS, AND FOR AN AMBIENT TEMPER
ATURE RANGE OF -40TO +90°C.







THYRATRON



92CM-6865T



3022.7

FILATIVE -: ONT OU FIROUE TYPE

Suf	ersed. T	vie all	
	GENERAL	DATA	

FI	-4	 : 0	- 1	

	Electrical:			
	Heater, for a instantial little:			
)	Volume Av.	# ₂ 1.	= (or ac lts
	Cathode:			
	Mix my seating time or in the		200	
	tota commention		30	sec
	Medman car a time eithout a heatin.		3	31 C
	Discoult for Introse Cop it missi			
·	(Approx.):		0.1	
4	Griss total to enough	•	U. 1	μμf
	Brill No.1 to cathode, grid No.2,		6.3	μμε
	rate (all), rate for	•	0.1	μμι
	ti hell, ars heter		4.5	μμ
	loni, tion in (Acores.):	•	4.0	pope 1
	for condition : de mod volth			
	grid-ws. garn-uller it			
	and risk in do any re-during co-			
	duction		0.5	F . I-C
	Deicn zaliar Ti (-sprax.):			
	For conditional to another volte 125,			
	de grid-lo. volts - 20, grid-lo.			
	resi for the) = 1 -3, and do mod-		4240	
	amperen = 1		12	N 21 C
	rer co divine : de an i li - F,			
	dc arid-4 . 1 . Its = -1 . 3, (rid-10.)			
	resistor (onm) = 10 , and do and		400	u ec
	amp res	٠	4.0	A CC
)	Maximum crit clario-o. urrent:			
	_ 10 (rm), na r r n r n r r			
	= 99 1 Cm 1, 112 = 1 Cm 1		O.E.	, mp
	Abore Voltage Ume (Appros.)		10	volts
	Grin-ho			
	For condi ic : grid D. rei ta			
	(m gohm) a to 0.1, rid No.2 re-			
,	sistor (m : hm) = d grid-la.			
	walsh a O		150	
	Grip-New A faction Fortin (Spacox.):			
	For assolitions gridelia. I resiste			
	(couchman) = , grid-ho., resistor			
	(me onm) _ 1 to U.I, and grid-ha. h		I Late	
1	volta = -3 · · · · · · · · · ·		1957	
	O with the state of the state o			

O WILL STATE I GET 2.

^{*} gitt 11 there I strudt and note the 11 to the feet of read.



	Mechanical:	
	Mounting Position	Any
	Musicus Overall Leigth	78"
	Marinu antin Lagot	
	Miximum Dinnitir	18 H
	Willight (Approx.)	
	Medical Westing Westing Westing Smith Spart 7-	-11
	Basing Designation for Hotton View	
	The state of the s	/EV
	Pin 1 - Heater (1) Pin 5 - seid No.	,
	Pires - Cathode 2 - 10 - 1 He has been	
	Pin 4 - Orig No. 1	
	AA'z PLANE OF ELECTRODES	
	RELAY AND GRID-CONTROLLED RECTIFIER SERVICE	'4" . 4" . 7'8" . 0"PinPin7: 7 7 7.
	Maximum Ratings, Ab o'ut la ue :	
	FFAK ANT. 1 A.E.	
	forwird	1 4 1
	lover	
	GFID 2 (, HIFLD-HID) VOLIA +:	
		ten
		l in
	GEILLAN, LICOTES CENTO, NOTAN:	
		178
		1430
	CATHODE CLOSENT:	
	Fault, for middle at 0.1 micros and 30 mix.	
	FEAK HEATER-CATHORIC VOLUME:	-197
	meter peating with	
		11
ı	Herter conition with	
		12
	ALEXANDER COMPLETE CONTRACTOR CON	ric .
١	Manieur Circuit Walness	
	Maximum Circuit Values:	

Gris-To.1-Circuit Instatute.....



3022

SPECIAL PERFORMANCE TESTS

Made in conformance with indicates of ctions of MIL-E-1B Specification dated 2 May 1952

4.9.19.2 (F-66) High-Frequency Vibration:

The table i rigidle mounted on a table vibrating with imple has it atting it of the complitude of 0.000 % to 0.00 5" (intal excursion is double the amplitude). Maximum acceleration is 100. No voltage is opplied during vibration. Total in item 4 der 10 minutes in such a more that table motion is also cortest line teacher anone an eathour. This test will not cause tube to be importable.

4.10.19 (F-64) Thyratron High-Voltage Operation:

In. Yar.

imiliar to type of firmoise to t) in direction from content to ance or ner the following condition: heater voltage of 6.3 voltage, another uply voltage of 500 voltages, grid No.2 tild to enthuse, loss resistance of 2000 ohms, and grid-No.1 circuit exists accordangement. Tube conduction is indicated by an oscilloscope connected between another cathode and ceases when the prid-No.1 supply voltage is increased negligible within indicate accordance.

Grid-No.1 Supply Voltage (2) -4.4 -9. volts
This test is rade a for Grid-No.1 Supply voltage (1), -y-

cept that the top are made in direction from ancde to cathode.

Voltage Difference - 1 volt

The difference between the value of grid-No. 1 wooly voltage in the first and second grid-No.1 sugal voltage to the will not exceed the specified value.

OPERATING CONSIDERATIONS

Sufficient anode-circuit resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings of the tube.

3022-1



GRID-CONTROLLED RECTIFIER CIRCUITS

DC Voltage Control

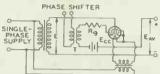


FIG. I HALF-WAVE SINGLE-PHASE

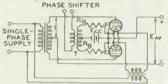


FIG. 2 FULL-WAVE SINGLE-PHASE

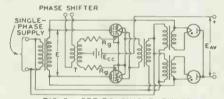


FIG. 3 SERIES SINGLE-PHASE

AC Voltage Control

PHASE SHIFTER

SINGLEPHASE
SUPPLY

RQ

T RQ

000

FIG.4 FULL-WAVE SINGLE-PHASE

NOTES 92CL-8596
T=PEAKING TRANSFORMER
IN FIG 3. THE RECTIFIER TUBES MAY BE
3D22-A'S USED AS DIODES THE 3D22-A
IS USED AS DIODE BY CONNECTING
GRIDS Nº 2 AND Nº 1 TO CATHODE (PIN 3)

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

JULY 1, 1955

TUBE DIVISION
RADIO CORPORATION OF AMERICA, MARRIGON, NEW JERSEY

DATA 2



GRID - CONTROLLED RECTIFIER CIRCUITS Numerical Relationships Among Electrical Quantities

E = Trans. Sec. voltage (RMS)

Eav = Average DC Output Voltage

Ebmf - Peak Forward Anode voltage

E Pask DC dutput Voltage

E . * Major Ripple voltage (RMS)

f Supply Frequency

f - Frequency

In = Anote current (RMS) Ehmi - Peak Invirse Anode Voltage Iom - Peak Anode Current

P c Load Volt-Amperes Pal = Lime Volt-Amperes

P Trans. Pri. volt-Amperes P. = Tr n . S .. Volt-Amperes

I average DC Output Current

Ib = Average Anode Current

Pdc - DC Power E . . In)

Note: Conditions assumed involve sine-wave subfly; zero voltage drep in tubes; no losses in transformer and circust; no back emf in the load circuit; and no phase-back.

	RATIO	Fig. I	Fig. 2	Fig. 3	Fig. 4
	Voltage Ratios				
	E *E	2.22	1.11	1.11	_
	Ebmi/E	1.41	2.83	1.41	1.41
	Et-1/F av	3.14	3.14	1.57	-
1	1-m1 à	3.14	1.57	1.57	_
	Er/Tav	1.11	0.41	0.47	-
	Ebmf/1:				
	Resisting Load	1.41	1.41	1.41	1,41
	Inductive Lad	1.41	2.81	1,41	1.41
	Frequency Ratio				
	fr/f		2	2	-
	Current Ratios				
T	1,/lav	1.33	0.185	(705	-
	1 _b /1 _a	T	0.6	9.8	-
	Resistive Load				
1	Inw/Iav	3.14	1.0	1.5	_
	I I n / I b	3.14	3.14	3.16	5.14
	In luctive List				
	rm/1			1	-
	Power Ratios				
	Fac I bi bof		- 1	-	1.5
	Kesistiv Liad				
	Pa /Pdo	3.49	1.74	11.28	-
	Par/I da	۵,۱٫۵	1,22	1024	-
	Pal/Fde	2.69	1.2	1,25	-

: See next page.

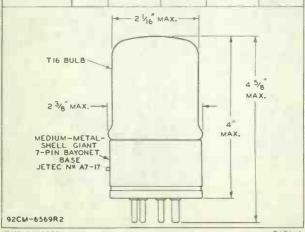




RATIO	Fig. 1	Fig. 2	Fig. 3	Fig. W
ower Ratios (Cont's	f)			
Inductive Load				
P /P		1.5	1.11	-
Par/Pi		1.11	1.11	-
P=1/F=		1,11	1,11	_

The provide the filter input the structure of the circuit

CIRCUIT Single-Phase	MAX. TRANS. SEC. VOLTS (RMS)	APPROX. DC OUTPUT YOLTS TO FILTER Eav	MAX. DC OUTPUT AMPERES	MAX. OC OUTPUT WATTS TO FILTER	AC OUTPUT VOLT- AMPERES
Fig. Half-Wave	460	2 7	0.8	₹, ,	-
Fig. 2 Full-Wave: Resistive Load Inductive Load	4 v 2 st	411	1.6	660 330	-
Fig. 3 Series	460	410	1.5	660	-
Fig. 4 Full-Wave	460	-	-	_	800



JULY 1, 1955

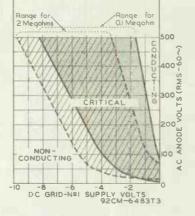
TUBE DIVISION

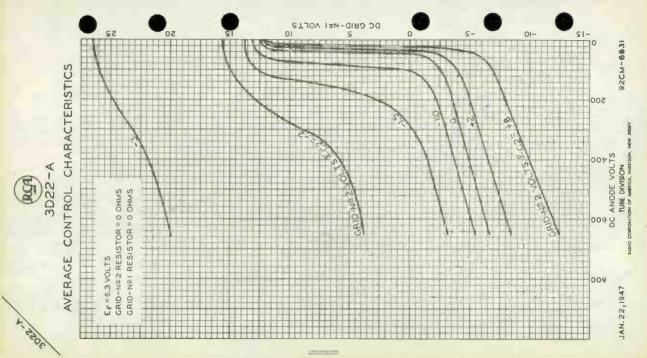
DATA 3

3022.4



GRID Nº2 (SHIELD) CONNECTED TO CATHODE RANGES SHOWN ARE FOR TWO VALUES OF GRID-Nº1 RESISTOR, OI MEG. AND ZWEZ, AND TAKE INTO ACCOUNT INITIAL DIFFERENCES BETWEEN INDIVIDUAL TUBES AND SUBSEQUENT DIFFERENCES DURING TUBE LIFE, FOR HEATER-VOLTAGE RANGE OF S, FTO 6,9 VOLTS, AND FOR AN AMBIENT TEMPERATURE RANGE OF -40TO +90°C.



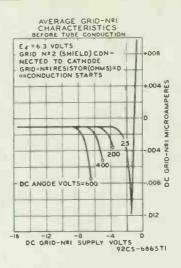


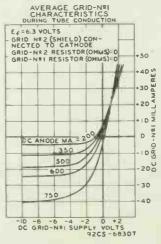


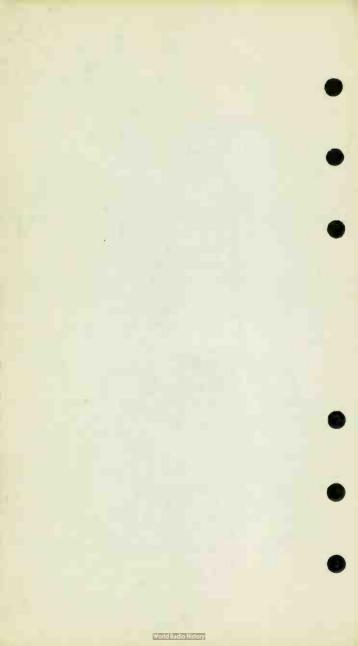
3D22-A

302214

CHARACTERISTIC CURVES







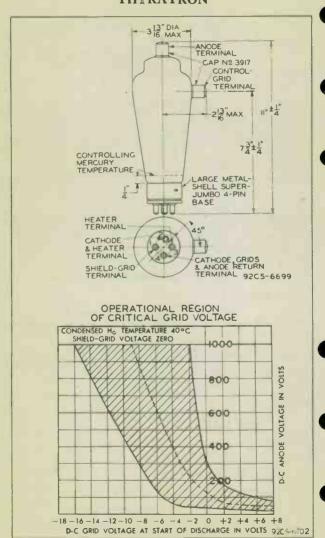


MERCURY-VAPOR TETRODE

		_		
	DATA			
	Electrical:			
		inuous	Intermi	
		vice_	Servi	ce
	Heater, for Unipotential Cathode:		5 5	- a - 3.
	Voltage* 5.0 Current 10.0	10.0	5.5	5.0 volts
	Direct Interelectrode Capacitance:	10.0	11.0 1	0.0 Emp
		0.3	0.0	0 16
	Peak Voltage Drop (Approx.)		0.3	0.) ppf lp volts
	Approx. Control Gharacteristics:	10	10	lo volts
	Anode Voltage 100	1000	100 1	OOD volts
	Grid-No.2 Voltage		0	0 volts
	Grid-No.1 Voltage +1		+1	
	Ionization Time (Approx.) 10		10	
	Deionization Time (Approx.). 1000			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
	Detonit Ba cton Tims (Approx. / 1000	1000	1000 1	000 µsec.
	Mechanical:			
	THE STREET			
	Mounting Position	· · ·	Tertical	Ruse Hown
	Overall Length			11" ± 1/4"
	Seated Length			/4" ± 1/4"
				2-13/16"
	Bulb			. ST-30
	_			
	Base Super	-Jumbo		th Bayonet
			4 - 411,	
	Maximum Ratings, Absolute Values:			
	Continuous	Inter	mittent	
	Service	Set	rvice	
	PEAK FORWARD ANODE VOLT. 2500	750	10000	mex.volts
	PEAK INVERSE ANODE VOLT. 2500	750	10000	max.volts
ı	GRID-No.1 (CONT.GRID) VOLT.:			
4	Before Conduction1000	-1000	-1000	max.volts
	During Conduction10	-10	-10	max.volts
	GRID-No.2 (SH'LD GRID) VOLT .:			
	Before Conduction500	-500	-500	max.volts
	During Conduction10	-10	-10	max.volts
	INSTANTANEOUS ANODE CUR.:			
	Below 25 Cycles 12.8	5.0	8.0	max.amp
	25 Cycles and Higher . 40	77	16	mex.amp
	AVERAGE ANODE CURRENT 6.4	2.5	4.0	dure.xem
	SURGE ANODE CUR., for	100	2/6	
	0.1 sec., max. 400	400	160	max.amp
1	INSTANTANEOUS GRID-No.1 CUR. 1.0	1.0	1.0	max.amp
	AVERAGE GRID-No.1 CUR 0.25	0.25	0.25	max.amp
	INSTANTANEOUS GRID-No.2 CUR. 2.0 AVERAGE GRID-No.2 CUR. 0.5	2.0	2.0	max.amp
	TIME OF AVERAGING CURRENT 15	0.5	0.5	max.emp
	CONDMERCURY TEMP. RANGE 40-80	30.05	25-50	max.gec OC
		30-95		
	* Must be applied 5 minutes before an			applied.
l	A Recommended condensed-mercury temp	erature	= 40°C.	

105/







THYRATRON

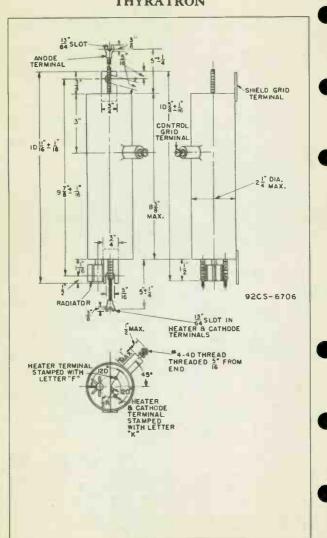
VETAL MERCURY VAFOR ETFLOE

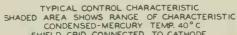
	ATA			
Electrical:	ATA			
Cont	inuous	Welder-		
	V1Ce	Serv	1 ce	
Heater, for Unipotential Cath				
	5.0	5.0	5.5	volts
Current 10.0		10.0	11.0	amp
Direct Interelectrode Capacit				
Grid No.1 to Anode 0.07		0.07	0.07	ши
Peak Voltage Drop 16		16	16	volts
Approx. Control Characteristi				
	2000	100	2000	volts
Grid_No.1 Voltage . +1.0		+1.0	-14	volts
Grid-No.2 Voltage . 0		0	0	volts
Ionization Time(Approx.) 10	10	10	10	usec
Deionization Time		2000	2500	
(Approx.) 1000	1000	1000	1000	HEOC
Mechanical:				
Mounting Position		Vertical,	Radiato	r Down
Overall Rigid Length				
Greatest Radius				
Terminals		. See O	utline L	rawing
Mandana Daddana Abaalada Hal				
Maximum Ratings, Absolute Val	ues:	We	ldom	
Maximum Ratings, Absolute Val			lder-	
Maximum Ratings, Absolute Val	Continu	uous Co	ntrol	
	Contin	ce Se	ntrol rvice	บกโ+ส
PEAK FORWARD ANODE VOLT.	Continu Servi	ce Se	ntrol rvice 50 max.	volts
PEAK FORWARD ANODE VOLT PEAK INVERSE ANODE VOLT	Contin	ce Se	ntrol rvice	volts
PEAK FORWARD ANODE VOLT PEAK INVERSE ANODE VOLT GRID-No.1 (CONT. GRID) VOLT.:	Continu Servi 2000 r	uous Co.ce Se Se Max. 7	ntrol rvice 50 max. 50 max.	volts
PEAK FORWARD ANODE VOLT PEAK INVERSE ANODE VOLT GRID-No.1 (CONT. GRID) VOLT: Before Conduction	2000 r 2000 r	nex10	ntrol rvice 50 max. 50 max.	volts
PEAK FORWARD ANODE VOLT. PEAK INVERSE ANODE VOLT. GRID-No.1 (CONT. GRID) VOLT.: Before Conduction During Conduction	Continu Servi 2000 r	nex10	ntrol rvice 50 max. 50 max.	volts
PEAK FORWARD ANODE VOLT. PEAK INVERSE ANODE VOLT. GRID-No.1 (CONT. GRID) VOLT.: Before Conduction During Conduction GRID-No.2 (SHL'D GRID) VOLT.:	2000 r 2000 r 2000 r	nous Co .ce Se max. 7 max10	ntrol rvice 50 max. 50 max. 10 max.	volts
PEAK FORWARD ANODE VOLT. PEAK INVERSE ANODE VOLT. GRID-No.1 (CONT. GRID) VOLT.: Before Conduction During Conduction GRID-No.2 (SHL'D GRID) VOLT.: Before Conduction	2000 r 2000 r	max10	ntrol rvice 50 max. 50 max. 00 max.	volts volts
PEAK FORWARD ANODE VOLT. PEAK INVERSE ANODE VOLT. GRID-No.1 (CONT. GRID) VOLT: Before Conduction During Conduction GRID-No.2 (SHL'D GRID) VOLT: Before Conduction During Conduction	Continu Servi 2000 r 2000 r -1000 r -300 r	max10	ntrol rvice 50 max. 50 max. 10 max.	volts volts volts
PEAK FORWARD ANODE VOLT. PEAK INVERSE ANODE VOLT. GRID-No.1 (CONT. GRID) VOLT.: Before Conduction GRID-No.2 (SHL'D GRID) VOLT.: Before Conduction During Conduction INSTANTANEOUS ANODE CUR.:	Continu Servi 2000 r 2000 r -100 r -10 r -300 r -5.0 r	DOUS CO Se MAX. 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	ntrol rvice 50 max. 50 max. 00 max. 10 max.	volts volts volts volts volts
PEAK FORWARD ANODE VOLT. PEAK INVERSE ANODE VOLT. GRID-No.1 (CONT. GRID) VOLT.: Before Conduction GRID-No.2 (SHL'D GRID) VOLT.: Before Conduction During Conduction INSTANTANEOUS ANODE CUR.: Below 25 Cycles	Continu Servi 2000 r 2000 r -1000 r -300 r	DOUS CO Se MAX. 7 MAX10 MAX3 MAX5 MAX. 13	ntrol rvice 50 max. 50 max. 00 max.	volts volts volts volts volts amp
PEAK FORWARD ANODE VOLT. PEAK INVERSE ANODE VOLT.: GRID-No.1 (CONT. GRID) VOLT.: Before Conduction During Conduction GRID-No.2 (SHL'D GRID) VOLT.: Before Conduction During Conduction During Conduction Eslow 25 Cycles	Continu Servi 2000 r 2000 r -1000 r -10 r -300 r -5.0 r 40 r	DOUS CO Se MAN. 7 MAX10 MAX3 MAX5 MAX. 13 MAX. 13	ntrol rvice 50 max. 50 max. 00 max. 00 max0 max0 max.	volts volts volts volts volts amp
PEAK FORWARD ANODE VOLT. PEAK INVERSE ANODE VOLT. GRID-No.1 (CONT. GRID) VOLT.: Before Conduction During Conduction Before Conduction During Conduction INSTANTANEOUS ANODE CUR.: Below 25 Cycles AVERAGE ANODE CURRENT** .	Continu Servi 2000 r 2000 r -100 r -10 r -300 r -5.0 r	DOUS CO Se MAN. 7 MAX10 MAX3 MAX5 MAX. 13 MAX. 13	ntrol rvice 50 max. 50 max. 00 max. 00 max0 max.	volts volts volts volts volts amp
PEAK FORWARD ANODE VOLT. PEAK INVERSE ANODE VOLT.: GRID-No.1 (CONT. GRID) VOLT.: Before Conduction During Conduction GRID-No.2 (SHL'D GRID) VOLT.: Before Conduction During Conduction During Conduction Eslow 25 Cycles	Continu Servi 2000 r 2000 r -1000 r -10 r -300 r -5.0 r 40 r	max3 max10 max3 max13 max. 2	ntrol rvice 50 max. 50 max. 00 max. 00 max0 max0 max.	volts volts volts volts volts amp
PEAK FORWARD ANODE VOLT. PEAK INVERSE ANODE VOLT. GRID-No.1 (CONT. GRID) VOLT.: Before Conduction During Conduction GRID-No.2 (SHL'D GRID) VOLT.: Before Conduction During Conduction During Conduction INSTANTANEOUS ANODE CUR.: Below 25 Cycles 25 Cycles and Higher . AVERAGE ANODE CURRENT** . SURGE ANODE CURRENT for O.1 sec. max.	Continue Servi 2000 r 2000 r 2000 r -100 r -10 r -300 r -5.0 r -40 r 6.4 r	MOUS CO. Ce Se MEAN. 7 MEAN10 MEAN3 MEAN5 MEAN. 13 MEAN. 2 MEAN. 4	ntrol rvice 50 max. 50 max. 10	volts volts volts volts volts amp amp
PEAK FORWARD ANODE VOLT. PEAK INVERSE ANODE VOLT. GRID-No.1 (CONT. GRID) VOLT.: Before Conduction GRID-No.2 (SHL'D GRID) VOLT.: Before Conduction During Conduction INSTANTANEOUS ANODE CUR.: Below 25 Cycles 25 Cycles and Higher AVERAGE ANODE CURRENT** SUNGE ANODE CURRENT for	Continue Servi 2000 r 2000 r -100 r -10 r	DOUS CO Se	ntrol rvice 50 max. 50 max. 10 max. 10 max0	volts volts volts volts amp amp
PEAK FORWARD ANODE VOLT. PEAK INVERSE ANODE VOLT. GRID-No.1 (CONT. GRID) VOLT: Before Conduction During Conduction GRID-No.2 (SHL'D GRID) VOLT: Before Conduction During Conduction INSTANTANEOUS ANODE CUR.: Below 25 Cycles 25 Cycles and Higher AVERAGE ANODE CURRENT** . SUNGE ANODE CURRENT for O.1 sec. MBAX. INSTANTANEOUS GRID-No.1 CUR.	Continue Servi 2000 r 2000 r 2000 r -100 r -10 r	MAX3 MAX10 MAX3 MAX5 MAX. 13 MAX. 2 MAX. 14 MAX. 4 MAX. 4 MAX. 4	ntrol rvice 50 max. 50 max. 60 max. 00 max. 00 max. 00 max. 00 max. 00 max. 00 max.	volts volts volts volts amp amp amp
PEAK FORWARD ANODE VOLT. PEAK INVERSE ANODE VOLT. GRID-No.1 (CONT. GRID) VOLT.: Before Conduction During Conduction During Conduction Before Conduction INSTANTANEOUS ANODE CUR.: Below 25 Cycles 25 Cycles and Higher . AVERAGE ANODE CURRENT** . SURGE ANODE CURRENT for O.1 sec. max. INSTANTANEOUS GRID-No.1 CUR. AVERAGE GRID-No.1 CUR.	Contimus Servi 2000 r 2000 r 2000 r -10 r	MAX. 13 MAX. 2 MAX. 4 MAX. 1 MAX. 2 MAX. 2 MAX. 2 MAX. 2 MAX. 2 MAX. 2	ntrol rvice 50 max. 50 max. 60 max. 00 max. 00 max. 00 max. 00 max. 00 max. 00 max. 5 max.	volts volts volts volts volts amp amp amp amp
PEAK FORWARD ANODE VOLT. PEAK INVERSE ANODE VOLT. GRID-No.1 (CONT. GRID) VOLT.: Before Conduction During Conduction GRID-No.2 (SHL'D GRID) VOLT.: Before Conduction During Conduction During Conduction INSTANTANEOUS ANODE CUR.: Below 25 Cycles 25 Cycles and Higher AVERAGE ANODE CURRENT** . SURGE ANODE CURRENT for O.1 sec. max. INSTANTANEOUS GRID-No.1 CUR.** . INSTANTANEOUS GRID-No.2 CUR.** .	Continue Servi 2000 r 2000 r 2000 r -10 r	MAX3 MAX5 MAX10 MAX5 MAX. 13 MAX. 1 MAX. 1 MAX. 0. MAX. 0. MAX. 0.	ntrol rvice 0 max. 50 max. 50 max. 60 max. 00 max. 00 max. 00 max. 00 max. 00 max. 00 max. 25 max. 00 max.	volts volts volts volts volts amp amp amp amp

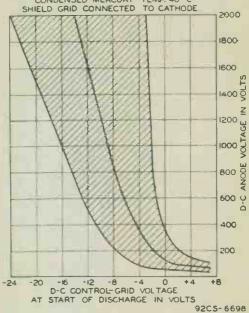
- Must be applied at least 5 minutes before anode voltage is applied.
- ** Averaged over any 15-second interval.
- A Recommended concensed-mercury temperature 40°C.

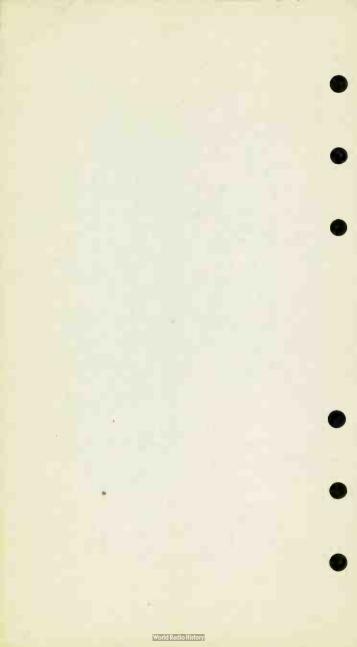


THYRATRON





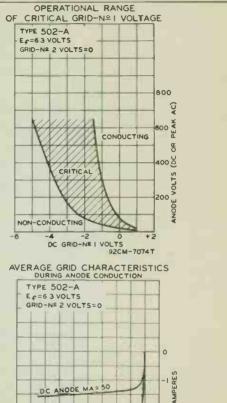


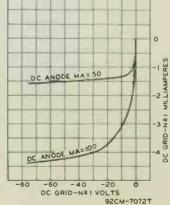




502-A THYRATRON



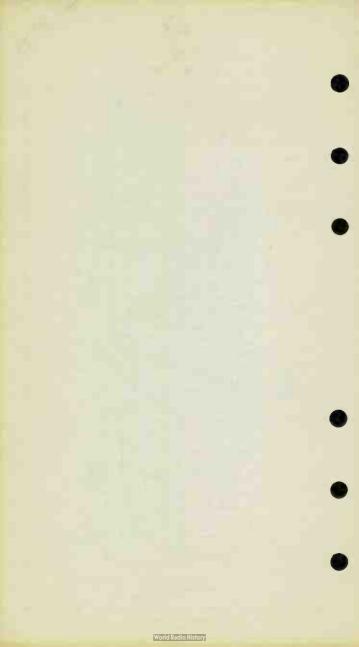




SEPT. 30, 1948

TUBE DEPARTMENT

CE-7074T-7072T





502-A GAS THYRATRON

NEGAT VE-CONTROL TETRODE TYPE WITH METAL SHELL

1		
	GENERAL DATA	
	Electrical:	
	Peater, for Unipotential Cathode:	
ı	Min. Av. Max.	1.
	Voltage 5.7 6.3 7 ac or do	
	Current at 8.3 volts 0.6 0.66	. amp
	Cathode: Minimum besting time	
	or or to tube conduction 10	sec
	Direct Intere or roue Capacitances:	
	Grid No. 1 tal rode 0.2	μμί
	Grid N 1 to cathode & shell, grid	μμf
	N-2, ad heater	μSec
	tioni itic Tite Acprex.):	22000
	For conditions: dc mode ma = 100,	
	g id-No.1-ricuit resistor (ohms)	
	COO, and do grid-No. I supply	No.
	regron in instruction de anode mar 100,	$\mu \in C$
	grid-tal-circuit resistor (ohms)	
	= 100 , and 1- grid-No.1 supply	
	150 -15	μsec
	Waximum Critical Grid-No.1 Gurrent:	
	For condition: anode volts (rms)	
	= .61, ind a grid-No.1 volts ad- justed to cutof	µamp
	Angle /oital Drop 8	volts
	Mechanical:	A
	Mounting Fusition	2_5/8"
	We simum Court L math	+ 3/32"
	Seated Length. 1-3./32* Vaximum [mat.r	1-5/16"
	Weight appropriate the second	2 02
	Bulb Metal She	H MISG
	Base	. 58-211
	POTTOM AIEM	0- 1
	Pin 1 - to long C 4 5 Pin 5 - Grid	
	Pin 2 - Heat	
	Pin 3 - Anche Pir 8 - Cath	
	Pir - lo conoc- 2 17 7 Ste	11
	10 (8)	
	RELAY and GRID-CONTROLLED RECTIFIER SERVICE	
	Maximum Ratings, Assolute Values:	

MAY 1, 1955

TUBE DIVISION

DATA

202.4



502-A GAS THYRATRON

	GRID-No.2 (SHIELD-GRID) VOLTAGE: Peak, before tube				
	conduction	-100	max100	max. vol	ts
	conduction	-5	max5	max. vol	t s
	VOLTAGE:				
	Peak, before tube conduction	250	max250	max. vol	ts
	Average, during tube conduction	 10	max10	max. vol	ts
	CATHODE CURRENT:	1.0	max. 1.0		
	Average•		max. 0.1		mp
	Fault, for duration of 0.1 second max	 . 10	max. 10	max. a	mp
	GRID-No.2 CURRENT: Average	 +0.01	max. +0.01	may a	mp
	GRID-No.1 CURRENT:				
	Average		max. +0.01	max. a	mp
	Heater negative with respect to cathode.	 . 100	max. 100	max. vol	ts
ı	Heater positive with respect to cathode.				
	AMBIENT-TEMPERATURE RANGE		max. 25 +90 -55 to		oc

Averaged over 1 cycle.

For Dimensional Outline, see GENERAL SECTION

Averaged over any interval of 30 seconds maximum.



502-A

GAS THYRATRON

GAS THIRATRON



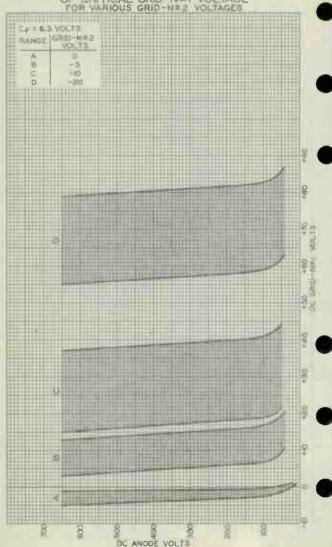
E, = 6.3 VOLTS ± 10 %

GRID Nº2 CONNECTED TO CATHODE
GRID-Nº1 RESISTOR (OHMS) =
0 TO 0.1 MEGOMM
THIS RANGE INCLUDES INITIAL AND
LIFE VARIATIONS OF INDIVIDUAL TUBES
AND COVERS AN AMBIENT TEMPERATURE
RANGE OF −55 TO +90°C.

205.4



502-A OPERATIONAL RANGES OF CRITICAL GRO HE I VOLTAGE FOR VARIOUS GRID-HE I VOLTAGE



20, 1950

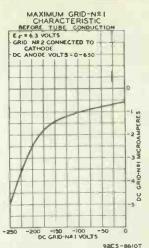
TUBE DIVISION
World Radio History

EE-M-0507

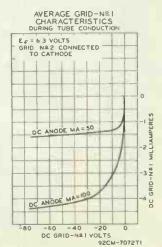


502-A CHARACTERISTIC CURVES

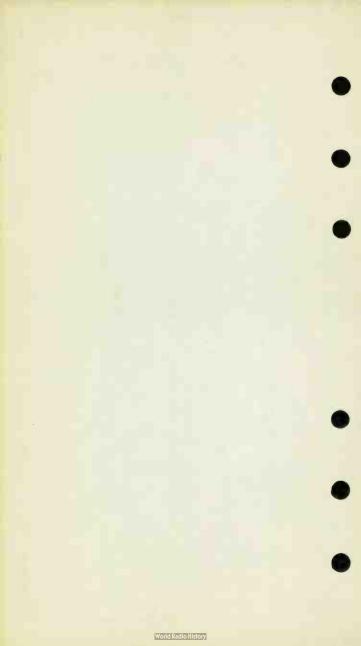




925.3-0010



MAY 1, 1955



6/2

THYRATRON

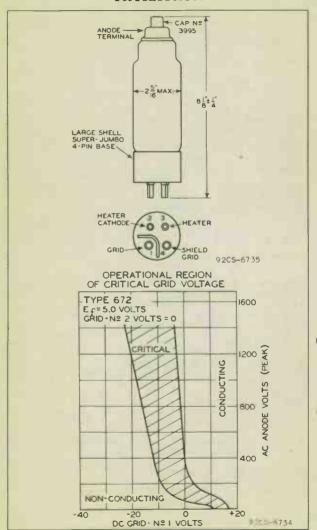
MERCURY-VAPOR TETRODE

Electrical:	DATA
Heater, for Unipotential Co	athode:
Current	6
Direct Interelectrode Capac Grid No.1 to Anode	0.04
Grid No.2 to Anode	
Peak Voltage Drop Control Characteristic	12 volts
Ionization Time (Approx.). Deionization Time (Approx.	10 µseconds
Delonization Time (Approx.) 1000 µseconds
Mechanical:	
Mounting Position	Vertical, Base Down
	8-1/3" ± 1/4"
	2-5/16"
Cap	No.3995
Base	Large Shell Super-Jumbo 4-Pin
Maximum Ratings, Absolute For frequencie	Values: es up to 150 cycles
For frequencie	es up to 150 cycles
For frequencie PEAK FORWARD ANODE VOLTAGE PEAK INVERSE ANODE VOLTAGE	es up to 150 cycles 1500 max. volts 1500 max. volts
For frequencial PEAK FORWARD ANODE VOLTAGE PEAK INVERSE ANODE VOLTAGE PEAK GRID-No.1 (CONTROL-GR	es up to 150 cycles 1500 max. volts 1500 max. volts
For frequencial PEAK FORWARD ANODE VOLTAGE PEAK INVERSE ANODE VOLTAGE PEAK GRID-No.1 (CONTROL-GR: Before Conduction PEAK GRID-No.2 (SHIELD-GRI	es up to 150 cycles
For frequencial PEAK FORWARD ANODE VOLTAGE PEAK INVERSE ANODE VOLTAGE PEAK GRID-No.1 (CONTROL-GR: Before Conduction PEAK GRID-No.2 (SHIELD-GRI Before Conduction	
For frequencial PEAK FORWARD ANODE VOLTAGE PEAK INVERSE ANODE VOLTAGE PEAK GRID-No.1 (CONTROL-GR: Before Conduction PEAK GRID-No.2 (SHIELD-GRI	es up to 150 cycles
For frequencial PEAK FORWARD ANODE VOLTAGE PEAK INVERSE ANODE VOLTAGE PEAK GRID-No.1 (CONTROL-GR: Before Conduction PEAK GRID-No.2 (SHIELD-GRI: Before Conduction PEAK ANODE CURRENT AVERAGE ANODE CURRENT for O.	## up to 150 cycles 1500 max. volts
For frequencial PEAK FORWARD ANODE VOLTAGE PEAK INVERSE ANODE VOLTAGE PEAK GRID-No.1 (CONTROL-GRIBEFORE CONDUCTION) PEAK GRID-No.2 (SHIELD-GRIBEFORE CONDUCTION) PEAK ANODE CURRENT AVERAGE ANODE CURRENT FOR O GRID-No.1 CURRENT, Before	### 150 cycles 1500 max
For frequencial PEAK FORWARD ANODE VOLTAGE PEAK INVERSE ANODE VOLTAGE PEAK GRID-No.1 (CONTROL-GR: Before Conduction. PEAK GRID-No.2 (SHIELD-GRI: Before Conduction. PEAK ANODE CURRENT . AVERAGE ANODE CURRENT for O. GRID-No.1 CURRENT, Before PEAK GRID-No.1 CURRENT AVERAGE GRID-No.1 CURRENT.	## Up to 150 cycles 1500 max
For frequencial PEAK FORWARD ANODE VOLTAGE PEAK INVERSE ANODE VOLTAGE PEAK GRID-No.1 (CONTROL-GRIBESTOR CONDUCTION) PEAK GRID-No.2 (SHIELD-GRIBESTOR CONDUCTION) PEAK ANODE CURRENT AVERAGE ANODE CURRENT for O.1 GRID-No.1 CURRENT AVERAGE GRID-No.1 CURRENT AVERAGE GRID-No.1 CURRENT PEAK GRID-No.2 CURRENT PEAK PEAK PEAK PEAK PEAK PEAK PEAK PEAK	es up to 150 cycles
For frequencial PEAK FORWARD ANODE VOLTAGE PEAK INVERSE ANODE VOLTAGE PEAK GRID-No.1 (CONTROL-GR: Before Conduction. PEAK GRID-No.2 (SHIELD-GRI: Before Conduction. PEAK ANODE CURRENT . AVERAGE ANODE CURRENT for O. GRID-No.1 CURRENT, Before PEAK GRID-No.1 CURRENT AVERAGE GRID-No.1 CURRENT.	## 150 cycles 1500 max
FOR frequencial For frequencial PEAK FORWARD ANODE VOLTAGE PEAK INVERSE ANODE VOLTAGE PEAK GRID-No.1 (CONTROL-GRIBEFORE CONDUCTION) PEAK GRID-No.2 (SHIELD-GRIBEFORE CONDUCTION) PEAK ANODE CURRENT AVERAGE ANODE CURRENT for O. GRID-No.1 CURRENT AVERAGE GRID-No.1 CURRENT AVERAGE GRID-No.2 CURRENT	ES UP to 150 cycles
For frequencial PEAK FORWARD ANODE VOLTAGE PEAK INVERSE ANODE VOLTAGE PEAK GRID-No.1 (CONTROL-GR: Before Conduction. PEAK GRID-No.2 (SHIELD-GRI: Before Conduction. PEAK ANODE CURRENT: AVERAGE ANODE CURRENT for O. GRID-No.1 CURRENT. AVERAGE GRID-No.1 CURRENT. AVERAGE GRID-No.1 CURRENT. AVERAGE GRID-No.2 CURRENT. AVERAGE GRID-No.2 CURRENT. AVERAGE GRID-No.2 CURRENT.	ES UP to 150 cycles

Recommended Condensed-Mercury Temperature 45-50°C.



THYRATRON



MAY 1, 1946

GAS-TRIODE

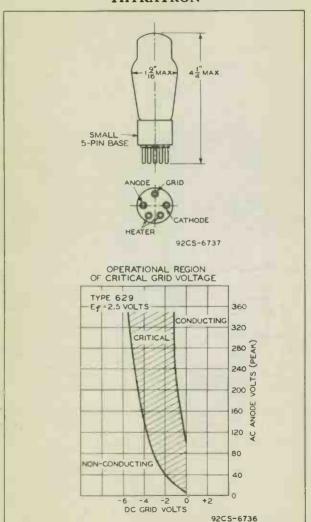
1	0
	1/62
	10

Electrical:
Heater, for Unipotential Cathode: Voltage* 2.5 volts Current 2.6
Mechanical:
Mounting Fosition Any Maximum Overall Length 4-1/4" Maximum Seated Length 3-5/8" Maximum Diameter 1-9/16" Bulb ST-12 Base Small 5-Pin
Maximum Ratings, Absolute Values: PEAK FORWARD ANODE VOLTAGE . 350 max. volts PEAK INVERSE ANODE VOLTAGE . 350 max. volts PEAK GRID VOLTAGE90 max volts PEAK ANODE CURRENT . 0.2 max. amp AVERAGE ANODE CURRENT** 0.04 max. amp SURGE ANODE CURRENT** 2.0 mex. amp GRID CURRENT, Before Conduction . 2.5 max. amp PEAK GRID CURRENT** . 20 max. ma. AVERAGE GRID CURRENT** . 0.4 max. ma. DC HEATER—CATHODE POTENTIAL RANGE45 to +5 volts AMBIENT TEMPERATURE RANGE40 to +70

- * Heater voltage must be applied at least 30 seconds before start of tube conduction.
- ** Averaged over any 10-second interval.







MAY 1, 1946

CE-6737-6736



672-A THYRATRON

MERCURY-VAPOR TETRODE Supersedes Type 672

GENERAL DATA
Electrical:
Heater, for Unipotential Cathode: Voltage ac or dc volts Current amp Cathode:
Min. Heating Time, prior to tube conduction 5 minutes Direct Interelectrode Capacitances:
Grid No.1 to Anode 0.04 μμf Grid No.2 to Anode 3 μμf Ionization Time (Approx.) 10 μsec Deionization Time (Approx.) 1000 μsec Maximum Critical Grid Current 2 μamp Anode Voltage Drop (Approx.) 12 volts
Mechanical:
Mounting Position Vertical, Base Down

-1	overait	Lengin							b						7-778 ± 174"
ŀ	Seated L	ength.													7-1/8" ± 1/4"
ı	Maximum	Diamete	r.												2-5/16"
1	Bulb									, .					T-18
1	Cap														Skirted Medium
1	Base					Lar	qe-	Sh	ell	Sı	ipe	r-	Jum	bo	4-Pin, Bayonet
1	Basing	Design	atio	n	fo	r Ri	ĎΤΤ	OM	VII	W					4CF

Pin 1-Grid No.1 Pig 2-Heater, Cathode

PEAK ANODE VOLTAGE:



Pin 3 - Heater Pin 4-Grid No. 2 Cap - Anode

GRID-CONTROLLED RECTIFIER SERVICE

For frequencies up to 150 cycles

Maximum Ratings, Absolute Values:

Forward		 2500	max.	volts
Inverse		2500	max.	volts
GRID-No.2 (SHIELD-GRID) VOLTAGE:				
Peak, before anode conduction		 -300	max	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:				
Peak, before anode conduction		 -1000	max.	volts
CATHODE CURRENT:				
Peak		40	max	amn

Average* 3.2 max. атр Surge, for duration of 0.1 sec. max. . . 150 m x. атр

See next page.

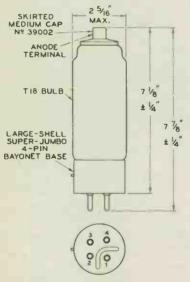
(continued on next page)



GRID-No. 2	CURREN	νT:								
Peak								1	max.	amp
Average*	٠							0.25	max.	amp
GRID-No.1										
Peak									max.	amp
Average*										amp
COND _MERC	TIPY T	MPFR	ATI IRI	- DA	NCFA			40 t	0.80	00

Averaged over any interval of 15 sec. max.

Recommended condensed-mercury temperature is between 45° and 50°C.



BOTTOM VIEW OF BASE

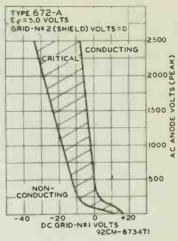
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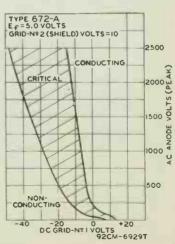


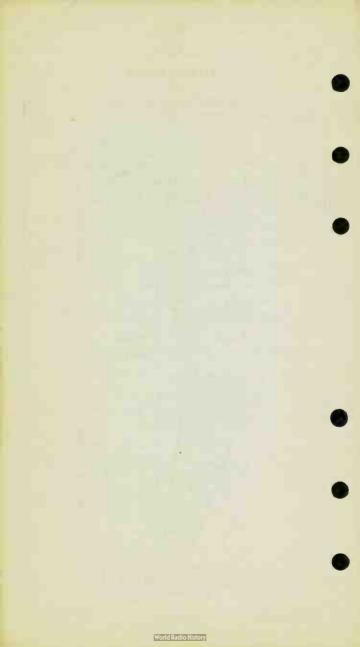
612.4

THYRATRON

OPERATIONAL RANGES
OF CRITICAL GRID-NºI VOLTAGE







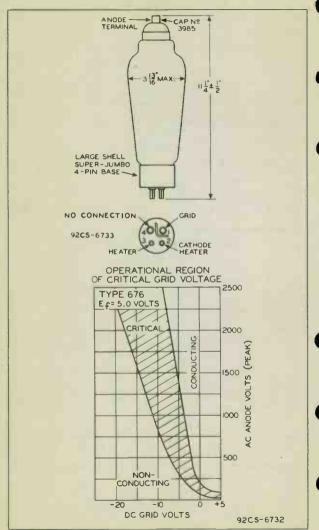
MERCURY-VAPOR TRIODS

Electrical:	ATA		
Heater, for Unipotential Cath	ode:		
Voltage*			volts
Current			
Direct Interelectrode Capacit			
			nuc
Grid to Anode (Approx.) Peak Voltage Drop	12		vol+e
Control Characteristic. Ne	antino		VOL 03
Ionization Time (Approx.)		дз	conde
Deionization Time (Approx.) 1			conde
Delo.iizacion lime (Approx.) I			Condo
Wechanical:			
mochanicar;			
Mounting Position	17	owticel Beer	Down
Overall Length			
Bulb			
Base			
Base	Parka Suerr	Paher-1 mino	4-P1n
Maximum Ratings, Absolute Val			
For frequencies	up to 150 cyc		
		Welder-	
	Continuous	Control	
	Service	Service	
PEAK FORWARD ANODE VOLTAGE		750 max.	
PEAK INVERSE ANODE VOLTAGE	2500 max.	750 max.	volta
PEAK GRID VOLTAGE:			
Before Conduction	-500 max.		
PEAK ANODE CURRENT	40 max.	77 max.	
I EAR ANODE CONTRELLE			
AVERAGE ANODE CURRENT	6.4 max.		
AVERAGE ANODE CURRENT		2.5 max.	amp
AVERAGE ANODE CURRENT SURGE ANODE CURRENT for	6.4 max.	2.5 max.	amp
AVERAGE ANODE CURRENT SURGE ANODE CURRENT for O.1 sec. max.	6.4 max.	2.5 max.	amp
AVERAGE ANODE CURRENT SURGE ANODE CURRENT for O.1 sec. max. GRID CURRENTs: Before con-	6.4 max. 200 max.	2.5 max. 200 max. 5 max. 1 max.	amp
AVERAGE ANODE CURRENT SURGE ANODE CURRENT for	6.4 max. 200 max. 5 max.	2.5 max. 200 max. 5 max.	amp amp
AVERAGE ANODE CURRENT SURGE ANODE CURRENT for O.1 sec. max. GRID CURRENT; Before conduction (Grid Negative) PEAK GRID CURRENT	6.4 max. 200 max. 5 max. 1 max. 0.25 max. 15 max.	2.5 max. 200 max. 5 max. 1 max.	amp mamp amp amp sec
AVERAGE ANODE CURRENT SURGE ANODE CURRENT for O.1 sec. mex. GRID CURRENT;: Before con- duction (Grid Negative) PEAK GRID CURRENT AVERAGE GRID CURRENT	6.4 max. 200 max. 5 max. 1 max. 0.25 max.	2.5 max. 200 max. 5 max. 1 max. 0.25 max.	amp amp amp

^{*} Heater voitage must be applied for at least 5 minutes before anode voltage is applied.

A Recommended condensed-mercury temperature range, 45 - 55°C.







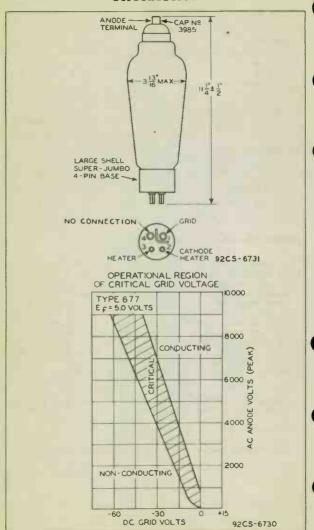
MERCURY-VAPOR TRIODE

° DATA	
Electrical:	
Heater, for Unipotential Cathode:	
Voltage*	
Current	amp
Direct Interelectrode Capacitance:	•
Grid to Anode (Approx.) . 5	
Peak Voltage Drop 12 Control Characteristic: Negative	. VOIUS
Ionization Time (Approx.) . 10	IRACONDA
Deionization Time (Approx.) 1000	
potonizou vizino (Approvi) zodo	Moodellan
Mechanical:	
Mounting Position Vertical,	
Overall Length	
Maximum Diameter	
Bulb	
Base Large Shell Super-Ju	
base	moo 4-111
Maximum Ratings, Absolute Values:	
For frequencies up to 150 cycles	
PEAK FORWARD ANODE VOLTAGE 10000 ma	x. volts
PEAK INVERSE ANODE VOLTAGE 10000 ma	
PEAK GRID VOLTAGE:	
Before Conduction500 ma	
Anode Negative 10 ma	
PEAK ANODE CURRENT 15 ma	
AVERAGE ANODE CURRENT** 4 ma	
SURGE ANODE CURRENT for 0.1 sec., max 16 ma	
GRID CURRENT: Before Conduction (Grid Neg.) 5 ma	х. µамр
AVERAGE GRID CURRENT*** 0.25 ms	
CONDMERCURY TEMPERATURE RANGE	
voint maintain and and and and and and and and and an	

- * Heater voltage must be applied for at least 5 minutes before anode voltage is applied.
- ** Averaged over any 15-second interval.
- Recommended condensed_mercury temp. range, 35 45°C.



THYRATRON



MAY 1, 1946

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CF-6771-6730



884,885 THYRATRONS

0000

For new equipment design, RCA-884 is recommended

	for new equipment design	n, RCA-884 15	recommended.	
	GENE	RAL DATA		ī
	Electrical: Type	88.1 Type 88	35	
	Heater Coated Ur	ripotential Cat	thode	
	Voltage 6.3 ±	10% 2.5 ± 10	% a-cord-c volt	S
	Current 0.6 Direct Interelectrode	1.5	amp	
	Capacitances:			
	Grid to Anode 6 Grid to Cathode 2	6	μμ	f
		2	µµ	
	Anode to Cathode 0.6 Tube Voltage Drop 16		μμ approx.volt	
		10	прргиях. чог с	
	Physical:			
	Mounting Position Any			
1	Maximum Overall Length 4-1/ Maximum Seated Length 3-9/			
	Maximum Diameter 1-9/			
	Bulb ST-1			
1	Raso (Small S			
	Uctai			
	Basing Designation G-60	D ₂ = A ₂		
]	Pin 1 - No Connection	(§ (3)	Pin 1 - Heater	
1	Pin 2 - Heater Pin 3 - Anode	1	Pin 2 - Anode Pin 3 - Grid	
	Pin 5 - Grid	100	Pin 4 - Cathode	2
	Pin 7 - Heater	6 00	Pin 5-Heater	
ı	Di- D C-4b-d-	OTTOM VIEWS		
١				

RELAXATION OSCILLATOR - Sweep-Circuit Service

	Maximum Ratings, Absolute Values:	
١	PEAK ANODE VOLTAGE	00 max. volts
١	PEAK CATHODE CURRENT	
	PEAK GPID CURRENT	1 max. ma.
	PEAK VOLTAGE BETWEEN ANY TWO ELECTRODES	
	OR DETWEEN ANY ELECTRODE AND HEATER 35	00 max. volts
	D-C HEATER-CATHODE POTENTIAL100 1	to +25 volts

△ For best lire results, it is desirable to delay tube conduction for about 10 seconds after applying heater voltage in order to allow the cathode to reach normal operating temperature.

AMBIENT TEMPERATURE RANGE -75 to +90

- In sweep circuits designed so that the p-ak cathode current of 300 milliamperes will not be exceeded during condenser discharge, the resultant average cathode current is so small in comparison with the average-current tapability of the cathode that a maximum rating for average cathode current is omitted because it has no practical significance.
- The resimtance of the grid resistor should be not less than 1000 ohms per maximum instantaneous volt applied to the grid. Resistance values in excess of 500000 ohms may cause circuit instability.

Indicates a change.





(continued from preceding page)

RELAY & GRID-CONTROLLED RECTIFIER SERVICE DAt Frequencies Below 75 Cycles per Second

Maximum Ratings, Absolute Values:

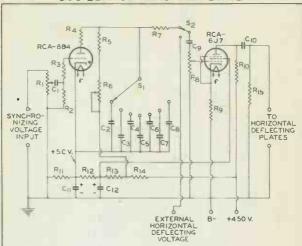
	PEAK ANODE VOLTAGE 350 max. volt	s
	PEAK CATHODE CURRENT	
	AVERAGE CATHODE CURRENT #	1.
ı	PEAK VOLTAGE BETWEEN ANY TWO ELECTRODES	

The heater voltage should be applied for 10 seconds before tube conduction occurs.

[#] For an averaging period of 30 seconds.



LINEAR SWEEP-CIRCUIT OSCILLATOR AND AMPLIFIER



CI = 0.25 MF OR GREATER

C2 = 0.25 MF \$00 V.

C3 = 0.1 MF, 500 V.

C4 = 0.04 HF, 500 V. C5=0.015 MF, 500 V.

C6=0.005 MF, 500 V.

C7 = 0.002 MF, 500 V.

CB = 0.0008 µF, 500 V.

Cg = 0.5 Mf, 250 V.

CIC = 0.5 MF, 500 V

C11 = 25 MF, 15 V.

CI2=8 MF, 200 V

RI = 5000 OHM(MAX)POTENTIOMETER R2=NOT GREATER THAN 50000 OHMS

R== 2000 - 3000 OHMS, 0.5 WATT

R4 = 350-500 OHMS, 0.5 WATT R5 = 0.3 - 0.5 MEGOHM, 0 5 WATT R6 = I MEGOHM POTENTIOMETER

R7 = I MEGOHM, 0.5 WATT

R8 = 0.5 MEGOHM POTENTIOMETER Rg = 850 OHMS, 0.5 WATT

RIO = 0 I MEGOHM, 0.5 WATT

R11 = 1500 OHMS, 0.5 WATT

R12 = 25000 OHMS, I.O WATT

R13 = 60000 OHMS, 1.0 WATT

RI4 = 60000 OHMS, I.O WATT

R15 = 2.0 MEGOHMS, I.O WATT

SI = 7-CONTACT S.P. SW'TCH

S2 = S.P.D.T. SWITCH

92CM-4875RI

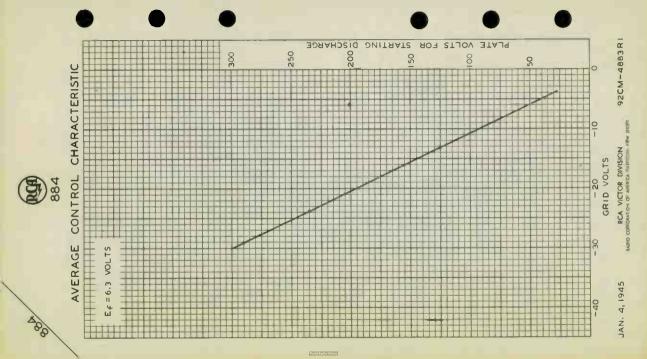
DATA

APPROXIMATE FREQUENCY RANGE (CYCLES/SEC.)

ж17 н	(s ₁) on							
R. AF	MAX.	20	40	110	280	670	1500	3600
.6	MIN.	60	130	340	860	2200	4900	11400

The lie ne tend d to the pur have of the popules in the Lie ne hold companying them. Infor-w thout a umin any obliction. Information on fired horein a furnish d indic to a hand .

DEC. 15, 1944



Ignitron

WATER-COOLED, METAL-JACKETED, MERCURY-POOL-CATHODE TYPE HAVING MOUNTING PLATE FOR THERMOSTATIC CONTROL

For Intermittent-Power-Rectifier and Resistance-Welding-Control Applications

GENERAL DATA

	GENERAL DATA	
E	ectrical:	
Ca	thode Excitation	
	Peak ignitor voltage required to fire 200 vo	lts amp
Pe		sec
	3400	lts
Me	chanical:	
	erating Position Vertical, flexible lead ximum Overall Length:	lup
	Including flexible lead	13"
	ight (Approx.)	lbs
	P-Anode Terminal (Flexible lead) K-Cathode Terminal (Bar opposite anode terminal) I-Ignitor Terminal (Within jacket skirt a cathode end) S-Shell	i t
	ermal: oling:	
	TypeWa Minimum inlet-water temperature 0 Maximum cooling-system temperature	ter °C
	(Measured at thermostat mount): For Intermittent-Power-Rectifier Service 45 For Resistance-Welding-Control Service at rms anode supply volts =	οС
	600	оС оС оС

1051A

Typical cooling requirements for Resistance— Welding-Control Service at rms anode supply volts = 500:

Inlet Water Temperature (°C)	Required Water Flow (gpm)	Pressure Drop (ps:)	
With 100% load: 15 30 40	1/4 1/2 1–1/2	0.4 0.75 3	
With 50% load: 15 30 40	1/16 1/8 1/4	0.1 0.2 0.4	
Water-temperature rise at flow of 1 gpm Temperature Rise (Appro			oC
to thermostat, with 1 flow of 1 gpm		4	oC

INTERMITTENT POWER-RECTIFIER SERVICE

Maximum Ratings, Absolute-Naximum Values:

For zero phase-control angle and frequencies from 50 to 60 cps
PEAK ANODE VOI TACE.

FEAR ANODE VOLTAGE.							
Forward							volts
Inverse	500	max.	1200	max.	1500	max.	volts
ANCOE CURRENT:							
Peak	700	max.	600	max.	480	max.	amp
Corresponding			_				
average					4		amp
Average	40	max.	22.5	max.	18	max.	amp
Corresponding			125		100		
peak							amp
AVERAGING TIME	0	max.	10	max.	10	max.	sec
RATIO OF AVERAGE							
ANODE CURRENT TO REAK ANODE CURRENT							
for maximum averag-							
ing time (seconds)			0 166		0.100		
= 0.2	-		0.100	max.	0.166	max.	
ANODE CURRENT TO							
PEAK ANODE CURRENT.	12 5		12 5		12 5		
FALLT-ANODE-CURRENT	12.5	max.	12.5	max.	12.5	max.	
DURATION	0 15	may	0.15	mau	0.15	ma	

RESISTANCE-WELDING-CONTROL SERVICE

Movimum	Patings	Abentute-Marinum	Values:	

For two tubes in inverse parallel circust, zero phase-control angle, frequencies from 25 to 60 cps, and rms

	supply voltages from 250 to 600 volts	
	DEMAND 600 max.	kva
	Corresponding average anode	
	current (Per tube) 30.2 max.	атр
ı	AVERAGE ANODE CURRENT (Per Tube) 56 max.	amp
	Corresponding demand 200 max.	kva
	AVERAGING TIME at rms supply volts =	
	600°	sec
	250°	sec
	RMS ANODE CURRENT (Per Tube) c See Rating	Chart
	PEAK FAULT ANODE CURRENT (Per Tube) Limited 1	0 280%
1	of maximum RMS Anode (urrent

IGNITOR

Maximum Ratings, Absolute-Naximum Values:

PEAK IGNI													
Positiv	e.								. [Equal	to	anode	volts
Negativ	e.										5	max.	volts
IGN TOR C													
Pe-kk											100	max.	amp
Average											1	max.	amp

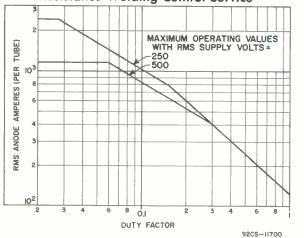
10 max. amp AVERAGING TIME. sec

b With the use of log-log graph paper, straight-line interpolation be-tween tabulated points may be used to determine intermediate maximum ratings for Peak Anode Gurrent and Average Anode Current.

C With the use of log-log graph paper, straight-line interpolation between tabulated points may be used to determine intermediate maximum ratings for RMS Anode Current and Average Anode Current or Averaging Time and RMS Supply Voltage.

^a Ignition will occur if either the minimum peak ignitor voltage is applied or the minimum peak ignitor current flows for the minimum starting time.

ANODE-CURRENT RATING CHART Resistance-Welding-Control Service



Ignitron

WATER-COOLED, METAL-JACKETED, MERCURY-POOL-CATHODE TYPE HAVING MOUNTING PLATE FOR THERMOSTATIC CONTROL

For Intermittent-Power-Rectifier and Resistance-Welding-Control Applications

GENERAL DATA

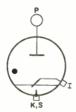
Electrical:

Cathode Excitation		
Peak ignitor voltage required to fire Peak ignitor current required to fire	200	volts amp
Starting time at required ignitor voltage or current	100	μsec
6800	28 1 <i>A</i>	volts

Mechanical:

Operating Position Vertical, flexible lead up	
Maximum Overall Length (Including flexible lead) 26-9/16"	
Maximum Radius (Including water connections) 3-5/8"	
Weight (Approx.)	
Terminal Diagram:	

P – Anode
Terminal
(Flexible
lead)
K - Cathode
Terminal
(Bar oppo-
site anode
terminali



I - lanitor Terminal (Within jacket skirt at cathode end) S - Shell

Thermal: C--1:---

cooring.																
Type															Wa	ter
Minimum	inlet	-water	ten	pera	iture	٠.							_		0	00
Maximum	cooli	na-svs	tem	tem	erai	ш	6									_
		t then														
		ttent-						Se	rv	ic	ο.				15	00

F	or Re												ro	1	Se	rv	ic	е ;	at		•				
	rms																								
	500	٠	۰	٠	۰	٠	٠	٠	٠	٠	•	•	٠	•	٠	٠	•	•	•	٠	٠	٠	•	45	00

000												45	O.C.
500												50	oC
250												55	oC

1052A

Typical cooling requirements for Resistance-Welding-Control Service at rms anode supply volts = 500:

supply voits - 500.			
Inlet Water Temperature (°C)	Required Water Flow (gpm)	Pressure Drop (ps:)	
With 100% load: 15 30 40	3/8 1/2 1-1/4	0.6 0.9 4	
With 50% load: 15 30 40	1/8 1/4 1/2	0.2 0.4 0.9	
Water-temperature rise at flow of 1 gpm Temperature Rise (Approx to thermostat, with 10	x.), inlet wate		°C
flow of 1 gpm		4	oC

INTERMITTENT POWER-RECTIFIER SERVICE

Maximum Ratings, Absolute-Naximum Values:

For zero phase-control angle and frequencies from 25 to 60 cps

PEAK ANODE VOLTAGE:							
Forward							
Inverse					500	max.	volts
ANODE CURRENT:							
Peak					1600	max.	amp
Average					100	max.	amp
AVERAGING TIME					6	max.	sec
PEAK FAULT ANODE CURRENT.					6000	max.	amp
FAULT-ANODE-CURRENT DURATI	ON.				0.15	max.	sec

RESISTANCE-WELDING-CONTROL SERVICE

Maximum Ratings, Absolute-Maximum Values:

For two tubes in inverse parallel circuit, zero phase-control angle, frequencies from 25 to 60 cps, and rms supply voltages from 250 to 600 volts

DEMAND			1200	max.	kva
Corresponding average anode co	urrent				
(Per tube)			75.6	max.	amp
AVERAGE ANODE CURRENT (Per Tube) b		140	max.	amp
Corresponding demand			400	max.	kva
AVERAGING TIME at rms supply vo					
600 ^b			8.75	max.	sec
250 b			21	max.	sec
	lts =		8.75	max.	se

RMS ANODE CLRRENT (Per Tube) See Rating Chart
PEAK FAULT ANODE CURRENT (Per Tube) Limited to 280% of maximum RMS Anode Current

IGNITOR

Maximum Ratings, Absolute-Maximum Value	aximum Ratino	s. A	bsolute-Max	imum Va	lues:
-----------------------------------------	---------------	------	-------------	---------	-------

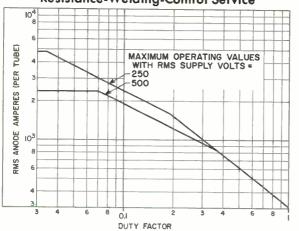
	-	- 2																		
PEAK IGNIT	TOF	? \	10	LT.	4GI	E:														
Positive	٠.														. 6	Ξqι	Jai	to	anode	volts
Negative			,		٠	•		,	٠	٠	٠	٠	٠	٠			٠	5	max.	volts
IGNITOR CL																				
Peak							,											100	max.	amp
Average													,			,		1	max.	amp
RMS							٠				,						٠	10	max.	amp
AVERAGING	T	M	Ξ.						,					٠				5	max.	sec

Ignition will accur if either the minimum peak ignitor voltage is applied or the minimum peak ignitor current flows for the minimum starting time.

b with the use of log-log graph paper, stræight-line interpolation be-tween tabulated points may be used to determine intermediate maximum ratings for RMS Anode Current and Average Anode Current or Averaging Time and RMS Supply Voltage.

1052A

ANODE-CURRENT RATING CHART Resistance-Welding-Control Service







THYRATRON

GAS TETRODE

	GENERAL DATA		
ı	Electrical:		
	meater, for our potential cathode.	Max.	1.
	Voltage (AC or DC) 5.7 6.3 Current, with heater volts = 6.3 0.54 0.60	6.9 0.45	volts
1	Cathode:	0.40	dinp
	Heating Time, prior to		
	tube conduction 10 - Direct Interelectrode Capacitances (Approx.):	-	sec
	Grid No.1 to Anode	0.26	µµf
	Input	4.2	μμf
	Output	3.6	μμf
4	For conditions: dc anode volts = 100; grid-No. I		
	square-pulse volts = 50; and peak anode amp.		
	during conduction = 1.0	0.5	μsec
	For conditions: dc anode volts = 125; qrid-No.		
	volts = -250; grid-No. resistor (ohms) =		
	1000; dc anode amp. = 0,1	50	μsec
	For conditions: dc anode volts = 125; grid-No. I volts = -10; grid-No. I resistor (ohms) = 1000;		
	dc anode amp. = 0.1 , , , , ,	100	μsec
	Maximum Critical Grid Current, with ac anode-		
	supply voits (rms) = 460, and average anode amp. = 0.1	0.5	датр
	Tube Voltage Drop (Approx.)	8	volts
	Grid-No.1 Control Ratio (Approx.) with grid-No.1		250
	resistor (megohms) = 0; grid-No.2 volts = 0 Grid-No.2 Control Ratio (Approx.) with grid-No.1		250
	resistor (megohms) = 0; grid-No.2 resistor		
	(megohms) = 0; grid-No. I volts = 0		800
4	Without external shield.		
	Mechanical:		
	Mounting Position		Any
	Maximum Overall Length		4-1/8"
i	Maximum Seated Length		
	Bulb		ST-12
	Base Small-Shell		
	Basing Designation for BOTTOM VIEW		. 082
	Pin 1 - Nc Connection 4 5 Pin 5-		
	Pin 2 - Heater Pin 3 - Anode Pin 7 -		
1	Pin 3 - Anode Pin 4 - No Connection Pin 8-		
	200		
	() (8)		

← Indicates a change.



2050 THYRATRON

RELAY and GRID-CONTROLLED RECTIFIER SERVICE

Maximum Ratings, Absolute Values:

	maximum natings, mostute values.	
	PEAK ANODE VOLTAGE:	
ı	Forward	lts
ł	Inverse	lts
ı	GR'D-No. 2 (SHIELD-GRID) VOLTAGE:	1.7
ı	Peak, before anode	- 11
ı,	conduction100 max100 max. vo	lts
ı	Average, during anode	
I		1ts
	GRID-No.1 (CONTROL-GRID) VOLTAGE:	1 (3
ľ	Feak, before anode	
ı		lts
ı	Average, during anode	152
		14-
	conduction10 max10 max. vo	lts
		атр
		атр
	Surge, for duration	
	of 0.1 sec. max 10 max. 10 max.	атр
*	GRID-No. 2 CURRENT:	- 1
	Average +0.01 max. +0.01 max.	атр
>	GRID-No.1 CURRENT:	
	Average +0.01 max. +0.01 max.	атр
	PEAK HEATER-CATHODE VOLTAGE:	
	Heater negative with	
		lts
	Heater positive with	
	respect to cathode 25 max. 25 max. vo	lts
	AMBIENT TEMPERATURE RANGE75 to +90 -75 to +90	oc
	Turing Air A title 6 D. h. a. i	
*	Typical Operating Conditions for Relay Service:	
	RMS Anode Voltage 117 400 vo	lts
	Grid-No.2 Voltage	
	RWS Grid-No 1 Rias Voltage 50	lts
	DC Grid-No.1 Bias Voltage6 vo	
	Peak Grid-No.1 Signal Voltage. 5 6 vo	
	Peak Grid-No.1 Signal Voltage. 5 6 vo Grid-No.1-Circuit Resistance . 1.0 1.0 meg	ohm
	Anode-Circuit Resistance# 1200 2000 0	hms
		(
	Maximum Circuit Values:	
	Grid-No.1-Circuit Resistance:	
	For average anode current below 0.1 amp. 10 max. mego	hms
	For average anode current above 0.1 amp. 2 max. mego	hms
	Averaged over any interval of 30 sec. max.	
	Approximately 180° out of phase with the arode voltage.	
	sufficient recistance including the table land	

-> Indicates a change.

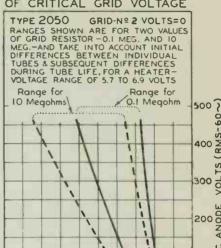
Sufficient resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings.



2050 THYRATRON

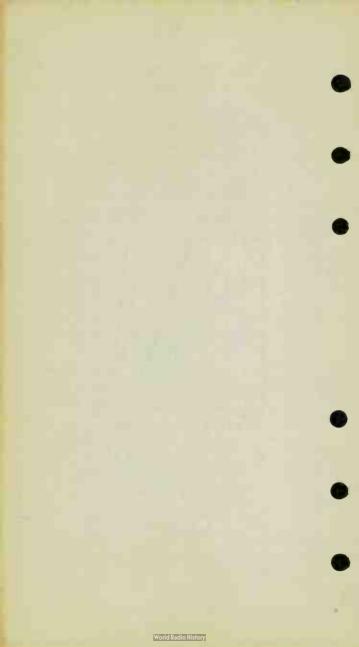


OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE



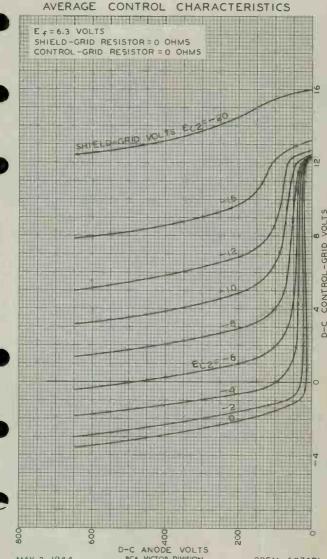
-8 -6 -4 -2 0
DC GRID-NºI SUPPLY VOLTS
92CM-6540TI

100 €





AVERAGE CONTROL CHARACTERISTICS



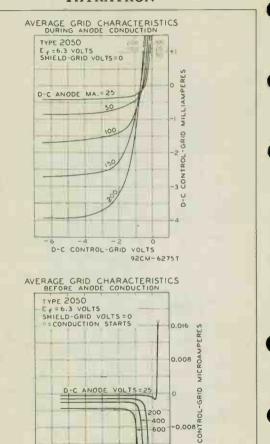
MAY 3, 1944

RCA VICTOR DIVISION

92CM-6274RI



THYRATRON



APRIL 1, 1944

-16

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

-8

D-C CONTRDL-GRID VOLTS

92CV-6275T 92CV-6541T

-0.016 O

92CM-6541T

Gas Thyratron

TETRODE TYPE

For Relay and Grid-Controlled-Rectifier Service

GENERAL DATA

	Electrical:	
	Heater, for Unipotential Cathode:	
	Voltage (AC or DC) 6.3 ± 10% volts Current at 6.3 volts 0.6 amp	_
	Cathode:	_
	Minimum heating time prior to	
	tube conduction 10 sec Direct Interelectrode Capacitances (Approx.):*	
	Grid No.1 to anode 0.15	F
	Grid No.1 to anode 0.15 μμ1 Grid No.1 to cathode and grid No.2 2.2 μμ1	_
	Ionization Time (Approx.):	
	For dc anode volts = 100, grid-No.1	
	volts (square-wave pulse) = 50, peak anode amperes during conduction = 1 0.5 µsec	
	Deionization Time (Approx.):	,
	With dc anode volts = 125, grid-No.1	
	volts = -250, grid-No.1 resistor (ohms)	
	= 1000, dc anode amperes = 0.1 50 μ sec With dc anode volts = 125, grid-No.1	
	volts = -10, grid-No.1 resistor (ohms)	
	= 1000, dc anode amperes = 0.1 100 μsec	;
	Maximum Critical Grid-No.1 Current for	
	dc anode supply volts (rms) = 460, average anode amperes = 0.1 0.5	4
	Anode Voltage Drop (Approx.)8 volts	
	Grid-No.1 Control Ratio (Approx.) for grid-	
	No.1 resistor (ohms) = 0, grid No.2 connected to cathode at socket 250	
	Grid-No.2 Control Ratio (Approx.) for	
	grid-No.1 resistor (ohms) = 0, grid-No.2	
	resistor (ohms) = 0, grid No.1 connected	
	to cathode at socket 800	
	Mechanical:	
	Operating Position	/
_	Maximum Överall Length	
	Maximum Diameter	
	Dimensional Outline See General Section	2
	Bulb	
	with External Barriers (JEDEC Group 1, B6 -229)	

2050-A

Basing Designation for BOTTOM VIEW. 6BS

Pin 2-Heater Pin 3-Anode Pin 5-Grid No.1



Pin 6-Grid No.2 Pin 7-Heater Pin 8-Cathode

RELAY AND GRID-CONTROLLED-RECTIFIER SERVICE

Maximum and Minimum Ratings, Absolute-Maximum Values:

For anode supply	freque	ncy o	f 60 cp	s	
PEAK ANODE VOLTAGE:					
Forward	180	max.	650	max.	volts
Inverse					volts
GRID-No.2 (SHIELD-GRID)	,,,,				
VOLTAGE:					
Peak, before tube					
conduction	-100	may.	-100	max.	volts
Average, during tube	100		100		40163
	_10	may	-10	may	volts
GRID-No.1 (CONTROL-GRID)	-10	IIICLA •	-10	max.	V0165
VOLTAGE:					
Peak, before tube					
conduction	-250	max.	250	max.	volts
Average ^b , during tube	-230	max.	-250	max.	VOIES
	-10		-10		volts
CATHODE CURRENT:	-10	max.	-10	max.	VOIES
	4		4		
Peak	1	max.	0.1		amp
Averageb	0.2	max.	0.1	max.	amp
Fault, for duration of 0.1	10		10		
second maximum	10	max.	10	max.	amp
GRID-No.2 CURRENT:	. 0 . 04		. 0 . 04		
Average GRID-No.1 CURRENT:	+0.01	max.	+0.01	max.	amp
Averageb	+0.01	max.	+0.01	max.	amp
Heater negative with	1.00		1.00		-14
respect to cathode	100	max.	100	max.	volts
Heater positive with	20		25		1.
respect to cathode			25		volts
AMBIENT-TEMPERATURE RANGE	-/5 t	0 +90	-/5 to	+90	oC.
Typical Operation for Relay S	Service	•			
• • • • • • • • • • • • • • • • • • • •		-	400		14
RMS Anode Voltage					volts
Grid No.2.		ected	to cath	lode at	
RMS.Grid-No.1 Bias Voltage.					volts
DC Grid-No.1 Bias Voltage	-		-6		volts
Peak Grid-No.1 Signal	-				-14
Voltage	5		6		volts
Grid-No.1-Circuit					

megohm

ohms

Maximum Circuit Values:

Grid-No.1-Circuit Res			
For average anode c	urrent below		
0.1 ampere		 10 max.	meg ohms
For average anode c	urrent above		
0.1 ampere		 2 max.	megohms

a without external shield.

b Averaged over any interval of 30 seconds maximum.

c Approximately 1800 out of phase with the anode voltage.

d Sufficient resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings.

OPERATING CONSIDERATIONS

The heater is designed to operate on either ac or dc at 6.3 volts. Regardless of the heater-voltage supply used, the heater voltage must never be allowed to deviate from its rated range. Heater operation outside of this voltage range will impair tube performance and may cause tube failure. Low heater voltage causes low cathode temperature with resultant cathode sputtering and consequent destruction of the cathode; high heater voltage causes high cathode temperature with resultant heating of the grid and consequent grid emission which produces unprecictable shifts in the critical grid-No.1 voltage for conduction.

The cathode should be allowed to reach normal operating temperature before anode current is drawn. The delay period should not be less than 10 seconds after application of heater voltage. Unless this recommendation is followed, the cathode will be damaged.

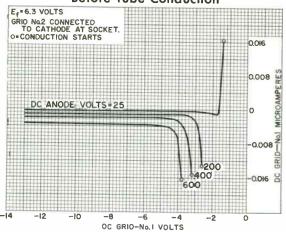
The shield grid (grid No.2) is normally connected to the cathode at socket. It may, however, be used as a control electrode because the control characteristic of grid No.1 may be shifted by varying the potential of grid No.2. As grid No.2 is made negative, the grid-No.1 characteristic is shifted in the positive direction. The use of grid No.2 as the control electrode (with grid No.1 connected to cathode at socket) has the advantage of increased sensitivity but consideration must be given to the higher preconduction current, higher capacitance to anode, and less stability of operation.

A grid-No.1 resistor having a value as high as 10 megohms to give circuit sensitivity can be used with the 2050-A because its control-grid current is very low. However, when a high value of grid resistor is used, care should be taken to keep the tube base and socket clean and dry in order to make the effect of leakage currents between the control-grid base pin and anode base pin very small.

Sufficient anode-circuit resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings of the tube.

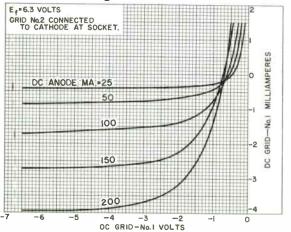
2050-A

AVERAGE GRID-No.1 CHARACTERISTICS Before Tube Conduction



92CS-654IR2

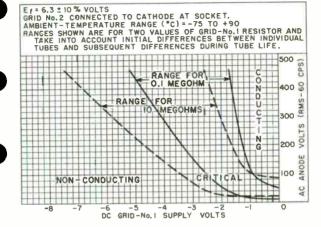
During Tube Conduction



92CS-6275R2

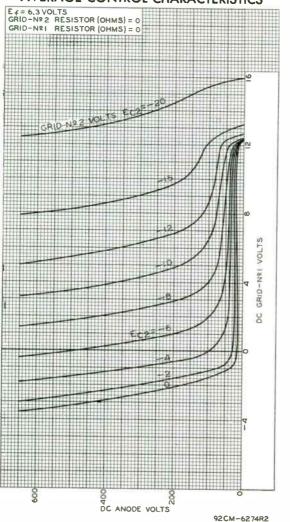


OPERATIONAL RANGE OF CRITICAL GRID-No.1 VOLTAGE



92CS-6540R3

AVERAGE CONTROL CHARACTERISTICS



Ignitron

SEALED, CLAMP-COOLED, MERCURY-POOL-CATHODE TYPE For Resistance-Welding Control

GENERAL DATA

	GEREKAL DATA
	Electrical:
	Cathode Excitation
_	Peak ignitor voltage required to fire 200 volts Peak ignitor current required to fire 30 amp Starting time at required voltage or current . 100 Tube Voltage Drop: At peak anode current of 1697 amperes 30 volts At peak anode current of 70.4 amperes 12 volts
	Mechanical:
	Operating Position
	P-Anode Terminal (Flexible lead) K-Cathode Terminal (Lower portion of shell) I-Ignitor Terminal (Adjacent to exhaust tube)
	Cooling: Type Air or water-cooled clamp Clamp height (Approx.)

RESISTANCE-WELDING-CONTROL SERVICE®

Two Tubes in Inverse-Parallel Circuit

Maximum Ratings, Absolute-Maximum Values:

Clamp location. . . .

For frequencies from 25 to 60 cps

Ratings I-A and I-B Apply to Operation with a Clamp-Temperature Range of 10° to 75° C

RATING I-A

		C	olumn 1	Column 2	
SUPPLY DEMAND	VOLTAGE (RMS)	. 2	50 max. 50 max.	250 max. 150 max.	volts kva
			-	-Indicate: a	change.

See Dimensional Outline

	Col			umn b		
DUTYC,d	. 10	max.	1.8	max.	%	
Peak	. 282	max.	846	max.	атр	_
conduction)	. 200	max.	600	max.	атр	
maximum) •		max.	4.86		атр	
second maximum		max.	1680	max.	amp	
RATING						
	Coli		Col 2	umn b		
SUPPLY VOLTAGE (RMS)		max.		max.	volts	
DEMAND POWER (During conduction) .		max.		max.	kva	
DUTY C. d		max.	4.32		%	
Peak	. 118	max.	354	max.	amp	
conduction)* Average (Averaged over any interval of 11.6 seconds	. 83	max.	250	max.	атр	
maximum) •	. 9	max.	4.86	max.	атр	
second maximum	. 700	max.	700	max.	атр	
Ratings Ⅲ—A and Ⅲ—B Ap a Clamp—Temperature Ra						
RATING I	II-A					
	Coli	umn b		umn b		
SUPPLY VOLTAGE (RMS) DEMAND POWER (During conduction).		max. max.		max. max.	volts kva	
DUTY C. d ANODE CURRENT (Per tube):	12.4		2.24		%	
Peak	. 564	max.	1692	max.	атр	
conduction)*	. 400	max.	1200	max.	атр	
maximum)	. 22.4	max.	12.1	max.	атр	
	3360	max.	3360	max.	атр	
RATING I	II-B					
	Coli	umn b	Col	umn b		
SUPPLY VOLTAGE (RMS) DEMAND POWER (During conduction) DUTY ^{c,d}	. 100	max. max. max.	300	max. max.	volts kva %	
	, ,0	HRAA .	J.4	max.		

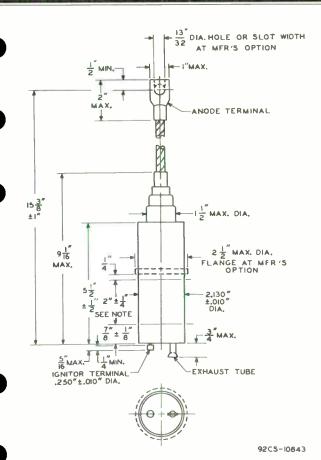


ANODE CURRENT (Per						126		700			
Peak	na	•	•	•	•	230	пах.	706	max.	amp	
conduction)						167	max.	500	max.	amp	
Average (Averaged	over	апу	1								
interval of 9.2	secor	nds				22 A	may	12 1	mav	amp	
maximum)* Fault, for durati	on of	0.1	.5	•	•	22.4	нах.	12.1	IIICIA.	anth	
second maximum.										amp	
RESISTANCE-V								RGE SER	AICE	-	•
Maximum Ratings, Ab	solute						32.				
			AT:								
CLAMP TEMPERATURE .			٠	٠	٠	70	max.	40	max.	oC	
NUMBER OF DISCHARGE: PER SECOND						60	max.	60	max.		
PEAK ANODE VOLTAGE:											
Forward					•	3000	max.	3000	max.		
Inverse ANODE CURRENT:		•	٠	•	•	3000	max.	3000	max.	volts	
Peak						500	max.	500	max.	amp	
Average ^f Averaging time-in		,.				3	max.	15	тах.	amp	
Averaging time-in	terva	۲.		•	٠	3.3	max.	0.66	max.	sec	
DURATION OF CATHODE PER DISCHARGE						0 02	may	0.02	may	sec	
TEN DIOCHANGE							man.	0.02	mar.	300	
		- 4	ΛTΙ			_				00	
CLAMP TEMPERATURE . NUMBER OF DISCHARGE							max.		max. max.	οС	
PEAK ANODE VOLTAGE:		ادرر)19L		٠	00	ilidix.				
Forward						6000	max.	6000	так.	volts	
Inverse			٠	•	•	3000	тах.	3000	ma×.	volts	
ANODE CURRENT: Peak						500	max.	500	max.	amp	
Average f					:	2.5	max.	8	max.	amp	
Average f	terva	f.				4	max.	1.25	max.	sec	
DURATION OF CATHODE PER DISCHARGE									max.	sec	
. In Digonalde			•	•	•			0.02			
		ı	GN	IIT	06	1					+
Maximum Ratings, Ab	solut	- Na	ıx i	7814	710	Value	es:				
PEAK IGNITOR VOLTAG											
Positive				٠	•					volts	
Negative IGNITOR CURFENT:			٠	•	•	• •		. 5	max.	volts	
Peak								. 100	max.	amp	
Average (Averaged					1						
interval of 5 s	econd:	s ma	1 X E	mu	ım)			. 10		amp amp	
11110			•	•	٠			. 10	max.	u.iip	



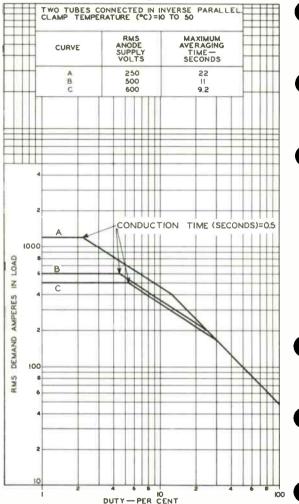
- RMS Voltage, current, and demand kva are on the basis of full-cycle conduction (no phase delay) regardless of whether or not phase control is used.
- b Column 1 represents operation at maximum average anode current; Column 2 represents operation at maximum demand power.
- C Jefined as (cycles "on")/(cycles "on" + cycles "off") during the specified averaging time.
- For supply voltages between 250 volts and 600 volts, duty is proportional to supply voltage. For supply voltages lower than 250 volts, the values for 250 volts apply.
- For supply voltages between 250 volts and 600 volts, demand anode current and averaging time are each inversely proportional to supply voltage. For supply voltages lower than 250 volts, the values for 250 volts apply.
- f with the use of log-log paper, straight~line interpolation between tabulated points may be used to obtain average-anode-current and maximumaveraging-time ratings at clamp temperatures between the two tabulated values.





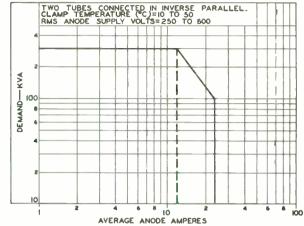
NOTE: CATHODE TERMINAL AND CLAMP-COOLED AREA.

RATING CHART 1 Resistance-Welding-Control Service

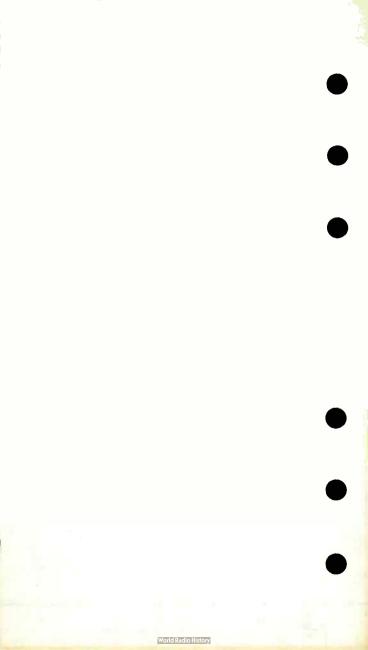


92CM-10840RI

RATING CHART 2 Resistance-Welding-Control Service



92CS-10842RI





IGNITRON SIZE B

	DATA
	General:
	Peak Voltage Drop
	Type
	Minimum Flow l gallon/m.nute
	Maximum Outlet Water Temperature
	Pressure Drop per tube, at Min. Flow 1.6 lt./sq.in.
	Temp. Rise at Minimum Flow (Average
	current 4) amp/anode) Approx 2°C
	Mounting Position Vertical, Flexible Lead Up
	Max. Rigid Length (Approx.)
	Max. Diameter, including Cooling Connections 5-3/4"
	AC WELDER-CONTROL SERVICE ®
	Ratings are for any voltage from 2 0 to 600 volts rms at frequencies from 25 to 60 cycles
	Maximum Ratings, Absolute Values:
1	DEMAND 600 max. kva
	COPRESPONDING AVERAGE ANODE CURRENT 30.2 max. ump
	AVERAGE ANOTE CURPENT
	COFRESPONDING DEMAND 200 max. kva
	TIME OF AVERAGING ANODE CURRENT: At 500 voits rms 9 max. sec
	At 250 voits rms sec
	SURGE ANODE CURRENT peak amp
	PEAK POSITIVE ICNITOR VOLTAGE § 900 max. volts
	200 min. volts
	PEAK NFGATIVE IGNITOR VOLTAGE 5 max. volts
	PEAK IGNITOR CURRENT §
	AVERAGE IGNITOR CURRENT* amp
	IGNITION TIME §
	CURVES FOR THE 5551 IN THIS CLASS OF SERVICE
	ARE SHOWN UNDER TYPE 5550
	INTERMITTENT RECTIFIER SERVICE
	For frequencies from 25 to 60 cycles
	Maximum Ratings, Absolute Values:
	PEAK FORWARD ANODE VOLTAGE 500 mag. volts
	PEAK INVERSE ANODE VOLTAGE 500 max. volts
I	PEAK ANODE CURRENT
	AVERAGE ANODE CURRENT#
	SURGE ANODE CURRENT for 0.15 sec. max. 8000 max. amp
	*, *, \$, *. See next page.



EFAY DOCTOTHE TONTOON	VOI	er a	CE	2						5	900	max.	volts
FEAK POSITIVE IGNITOR	A ()1	olr	UE	3	•	•	٠	*	٠	્રે	200	min.	volts
FEAK NEGATIVE IGNITOR													volts
										ſ	100	max.	volts
PEAK IGNITOR CURRENT §		•	•	٠	٠	۰	۰	٠	۰	{	30	min.	volts
AVERAGE IGNITOR CURREN													amp
IGNITION TIME &													изес

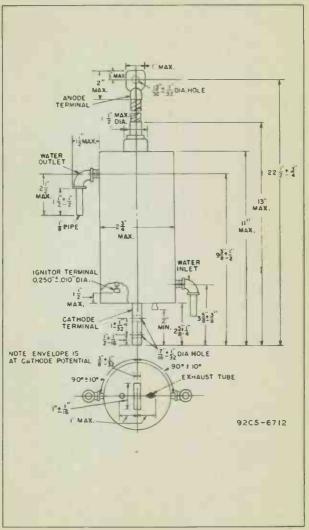
- * Averaged over any 5-second interval.
- # Averaged over any 3-second interval.

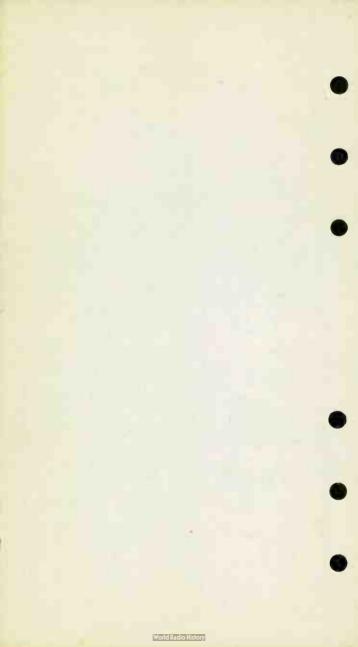
 Must be limited to 280% of maximum rms demand current.
- RMS demand-voltage, -current, and -kva are on the basis of full-cycle conduction(no phase delay)regardless of whether or not phase-control is used. Use the 250-volt rating for voltages below 250 volts.
- § Ignition will occur if either minimum peak positive ignitor potential is applied, or minimum peak ignitor current flows, for the rated maximum ignitor ignition time.



IGNITRON









IGNITRON

	SIZE C
	DATA
ı	General:
ı	Peak Voltage Drop
I	Cooling: Type
Ì	
ı	Minimum Flow
ı	Maximum Outlet Water Temperature 40°C Minimum Outlet Water Temperature 10°C
J	Temp. Rise at Min. Flow (Average
H	Ourrent 100 amp/anode) Approx 30C
ı	Mounting Position Vertical, Flexible Lead Up Maximum Rigid Length (Approx.)
ı	Maximum Diameter, Including Cooling Connections
	Terminal Connections:
	op op
	I – Ignitor P – Anode
-	K - Cathode
1	
-1	K.
١	AC WELDER-CONTROL SERVICE®
	Ratings are for any voltage from 250 to 600 volts rms
١	at frequencies from 25 to 60 cycles per second
	Maximum Ratings, Absolute Values:
	Two Tubes in Inverse Parallel
ı	DEMAND 1200 max. kva
	Average Anode Current at Maximum Demand. 75.6 max. amp
ı	ANODE CURRENT: Average*
	Demand at Max. Average Anode Current . 400 max. kva
	Fault:
ı	At 600 volts rms
ı	At 250 volts rms amp PEAK IGNITOR VOLTAGE:
ı	Positives 1900 max. volts
	[200 min, volts
	Negative 5 max. volts
	Peak§
	30 min. amp
	Average**
1	IGNITOR IGNITION TIME§ 100 max. μsec

DATA TUBE DEPARTMENT

- Indicates a change.

RMS demand-voltage, -current, and -kva are on the basis of full-cycle conduction (no phase delay) regardless of whether or not phase-control is used. Use the 250-volt rating for voltages below 250 volts. * averaged over any 5.8-second maximum interval for operation at 600 volts rms and over any 14-second maximum interval at 250 volts rms.

§. 34: See next page.

MARCH 1, 1951



IGNITRON

INTERMITTENT RECTIFIER SERVICE

For frequencies from 25 to 60 cycles per second

Maximum Ratings. Absolute Values:

The state of the s	
PEAK ANODE VOLTAGE:	
Forward 500 max.	volts
Inverse 500 max.	volts
ANCDE CURRENT:	
Peak	атр
Average ⁰ 100 max.	атр
Fault, for 0.15 second maximum 6000 max.	атр
PEAK IGNITOR VOLTAGE:	
Positive§	volts
1200 min.	volts
Negative 5 max.	volts
IGN, TOR CURRENT:	
Peak§	amp
30 min.	amp
Average**	amn

Innition will occur if either minimum peak positive Ignitor potential is applied, or minimum peak Ignitor current flows, for the rated maximum ignition time.

100 max.

μsec

** Averaged over any 5-second maximum interval.

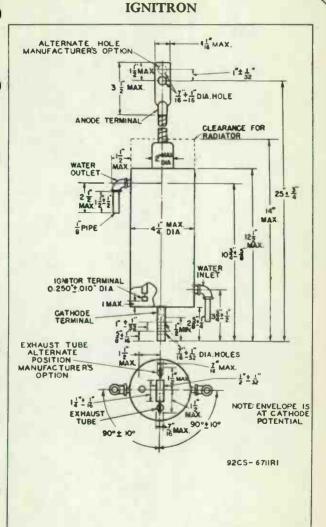
IGN'TOR IGNITION TIMES

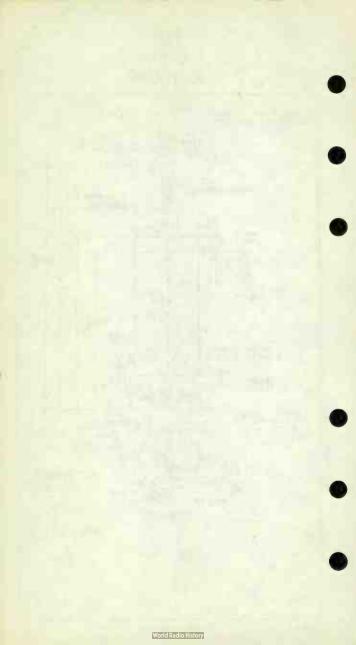
Averaged over any 6-second maximum interval.

Curves for the 5552 in AC Welder-Control Service are shown under Type 5550









IGNITRON

SIZE D

General:			
Peak Voltage Drop		1.0	vol+e
Cooling:			VOIUS
Type			Water
Minimum Flow			
Pressure Drop per tube, at Minimum Flow.	5.1	lb./s	q. in.
Waximum Outlet Water Temperature			
Minimum Inlet Water Temperature			10 °C
Temp. Rise at Min. Flow (Average			5 °C
current 200 amp/anode), Approx. Mounting Position Vertical.			, ,
Maximum Rigid Length (Approx.)			
Maximum Diameter, including Cooling Connect	ons.		9-3/8"
The state of the s			, ,, ,
AC WELDER-CONTROL SERVICE			
Ratings are for any voltage from 250 to	600	volts	rms
at frequencies from 25 to 60 c	cles		
Maximum Ratings, Absolute Values:			
DEMAND	2400	ma	kva
COTRESPONDING ANDREAGE ANODE CUR	192	maz.	
AVERAGE ANODE CURHENT	355	man.	amp
			amp
	833		
TIME OF AVERAGING ANDDE CURRENT:		max.	kva
TIME OF AVERAGING AN DE CURFENT:	5.6	max.	kva sec
TIME OF AVERAGING AND CURRENT: At 500 volts RMS	5.6	max. max. max.	kva sec sec
TIME OF AVERAGING ANDDE CURRENT: At 500 volts RMS	5.6	max. max. pe	sec sec
TIME OF AVERAGING AND CURRENT: At 500 volts RMS	5.6 11 900	max. max. pe	sec sec sec ak amp
TIME OF AVERAGING ANDDE CURRENT: At 500 volts RMS	5.6 11 900 200	max. max. pemax. min.	sec sec
TIME OF AVERAGING ANDDE CURRENT: At 500 volts RMS At 250 volts RMS SURGE ANODE CURRENT. PEAR POSITIVE IGNITOR VOLTAGE §	5.6 11 900 200 5	max. max. pe max. min. max.	sec sec ak amp volts

IGNITION TIME 6 CURVES FOR THE 5553 IN THIS CLASS OF SERVICE ARE SHOWN UNDER TYPE 5550

* Averaged over any 5-second interval.

AVERAGE IGNITOR CURRENT* .

Must be held to 280% of maximum demand rms currert.

* RMS demand-voltage, -current, and -kva are on the basis of full-cycle conduction(no phase delay) regardless of whether or not phase-control is used. Use the 250-volt rating for voltages below 250 volts.

§ Ignition will occur if either minimum peak positive ignitor potential is applied, or minimum peak ignitor current flows,

for the rated maximum ignitor ignition time.

emp

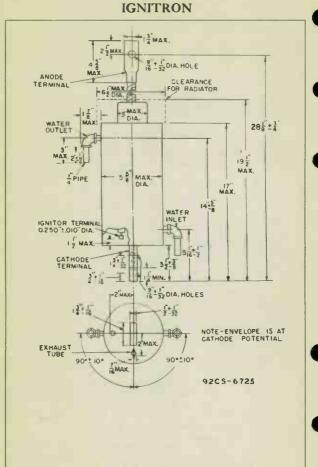
цѕес

1 max.

LOU mean.









5554 IGNITRON

252×

DATA	
General:	
Cathode	Pool Type
Number of Ignitors	
Number of Main Anodes	
Number of Auxiliary Anodes	
At 100 Amp. Peak-Anode Current	12.6 volts
At 300 Amp. Peak Anoge Current	14.4 volts
At 600 Amp. Peak Anode Current	17.3 volts
Cooling:	
Туре	Water
T pical Flow 1.5 to	3 ml./min.
Pressure Drop at Above Flow 2 to 5	lt./sq.in.
Temperature Rise at Lower Rate of Flow	. 0
(150 ALP per Anode) .	6°C
Mounting Position Vertical, Flexi	ble Lead Up
Maximum Rigid Length (Approx.)	17-1/2"
Diameter, including Cooling Couplings 7	-1, 2" ± 1/3"
RECTIFIER SERVICE	
For frequencies from 25 to 60 Cycles, Phase	Petari=0
Maximum Ratings, Absolute Values:	
PEAK PURWIND ANOTE VOLTAGE 900 max. 2100	mux. volts
PEAK INVERTE ANOTH VILTAGE 900 max. 2100	
PFAK ANODE C'd MENT 900 max. 600	
AV TAGE CUNTINURIS ANODE CUR. 100 max. 75	
2-FOUR AVERAGE ANODE CURRENT* 150 max. 112.5	
1-MINUTE AVERAGE ANODE CUR. + 200 max. 150	max. amp
SURGE ANODE CURPENT for 0.15 sec. new. 6000 max. 4500	max. amp
OUTLET WATER TEMPERATURE 60 max. 45	
	min. oc
WATER FLOW, AT CONTINUOUS	matt.
AVERAGE ANODE CUR. RATING 1.5 min. 1.5	min. gpm
WATER FLOW, AT NO LOAD# 0.5 min. 0.5	
DIAK THUR OF HIVE TARY AND TO TACE.	-
With Anode Conducting 25 max. 25	max. volts
With Anode Not Conducting 150 max. 150	max. volts
AVERAGE AUXILIARY ANODE CUR 5 max. 5	
PEAK POSITIVE IGNITOR VOLTAGE. 900 max. 2100	
PEAK NEGATIVE IGNITOR VOLTAGE 5 max.	· · volts
PEAK IGNITOP CURRENT 100 max.	volts
AVFRAGE IGNITOR CUPRENT## z max.	
ICNITION TIME 100 max.	volts
GENERAL REQUIREMENTS FOR SELF-EXCITATION	
SEFAPATE EXCITATION are given on the next	

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



IGNITRON AC WELDER-CONTROL SERVICE

Ratings for 2400 volts.rms, 25 to 60 cycles

Maximum Ratings, Absolute Values:		
DEMAND	max.	kva
CORRESPONDING AVERAGE ANODE CURRENT. 75	max.	amp
	max.	amp
CORRESPONDING DEMAND 600	max.	kva
TIME OF AVERAGING ANODE CURRENT:		
	max.	
SURGE ANODE CURRENT, for 0.15 sec. max. 3000	max.	алр
WATER FLOW 1.5	min.	gpm
OUTLET WATER TEMPERATURE	max.	oc
PEAK INVERSE AUXILIARY ANODE VOLTAGE:		
With Anode Conducting 25	max.	volts
With Anode Not Conducting 150	max.	volts
AVERAGE AUXILIARY ANODE CUR 5	max.	amp
PEAK POSITIVE IGNITOR VOLTAGE 2400	max.	volts
	max.	volts
	max.	
	max.	
IGNITION TIME 100	EUX.	µsec

GENERAL REQUIREMENTS for SELF-EXCITATION and SEPARATE-EXCITATION are given below

SELF-EXCITATION (ANODE FIRING) See Circuit 92CS-6722

PEAK IGNITOR CURRENT	40 min.	amp
Ignitor series resistance for anode firing		
at anode voltages of:		
600 volts or less	4	ohms
601 to 1000 volts (Approx.)	10	amio
1001 to 1500 volts (Approx.)	20	ohms
1501 to 2000 volts (Approx.)	35	ohms
2001 to 2400 volts (Approx.)	50	ohms

SEPARATE EXCITATION (CAPACITOR FIRING) See Circuit 92CS-6722

Minimum volt-ampere requirements are shown on Curve 92CS-6723

- · Use only one ignitor at a time.
- * Averaged over any 2-minute interval.

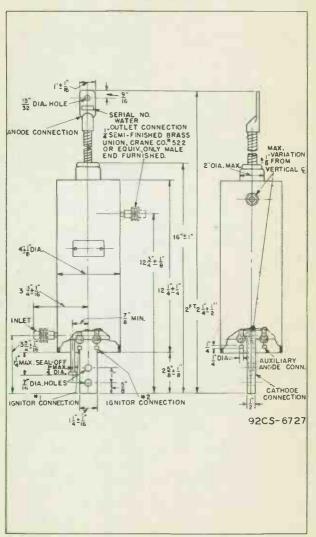
PEAK IGNITOR VOLTAGE

- ** Averaged over any 1-minute interval.
- # For systems in which the flow of water is controlled by the load.
- ## Averaged over any 10-second interval.

150 min. volts



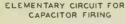


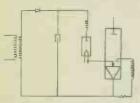


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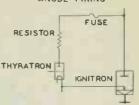


IGNITRON



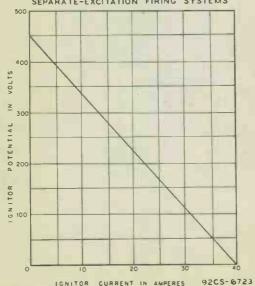


ELEMENTARY CIRCUIT FOR ANODE FIRING



92CS-6722

MINIMUM VOLT-AMPERE REQUIREMENTS FOR SEPARATE-EXCITATION FIRING SYSTEMS

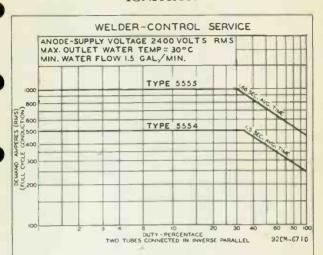


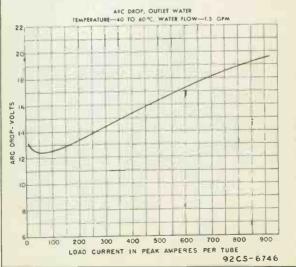
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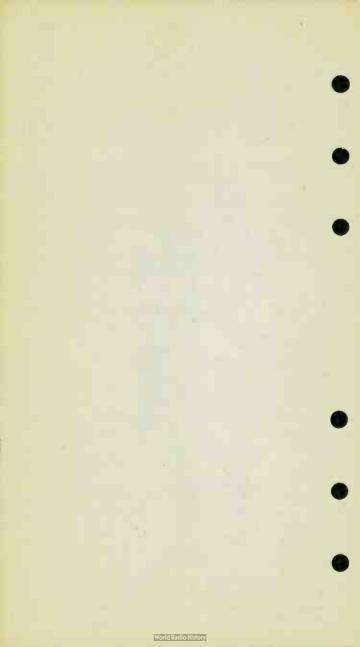
TUBE DIVISION

FADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CE-6722-6723







Ignitron

WATER-COOLED, STEEL-JACKETED, MERCURY-POOL-CATHODE TYPE For Power-Rectifier and ResistanceWelding-Control Applications

weldin	g-control	APPIIC	ations	
	GENERAL	DATA		
Electrical:				
Cathode Excitation Cathode-Spot Starting Minimum Requirements				
Peak ignitor voltag Peak ignitor currer Starting time at re	ge required to nt required t	o fire . o fire .	. 150	volts amp
or current Tube Voltage Drop:			. 100	μsec
At peak anode amper	res = 600		. 16.2 ± +).	5 volts
Mechanical:				
Operating Position Length, Botzom of Cat Center of Hole in A Maximum Radius {Incl Weight (Approx.) Terminal Diagram (See	thode Termina Anode Termina uding water c	l to l connectio	28-1'8	" ± 3/4" 4-9/16"
P - Anode I _I - Ignitor No.1 ^a I ₂ - Ignitor No.2 ^a	I ₂	PH	P _H - Holding K - Cathode S - Shell	

Thermal:		
Cooling:		
Туре		. Water
Minimum inlet-water temperature:		
For substantially constant loads		6 °C
For widely fluctuating loads		25 °C
Maximum outlet-water temperature for		
peak inverse anode volts =		
900		60 °C
2100		45 °C
Minimum water flow:		
At maximum-rated continuous average		
anode current		3 gpm
At no load		1 gpm
Maximum water-temperature rise		
Maximum pressure drop at water flow (gpm) = 3		6 psi
101 1		

K,S

- Indicates a change.

						
POWER-RECTIFIER						
Maximum Ratings, Absolute-Maximum V	alues:					
For zero phase-contro						
frequencies from 25 PEAK ANODE VOLTAGE:	to oo cps					
Forward	900 max. 2100 max. volts 900 max. 2100 max. volts					
Peak	800 max. 1200 max. amp					
	200 max. 150 max. amp					
	400 max. 300 max. amp					
0.15 second maximum 12	000 max. 9000 max. amp					
TESISTANCE-WELDING-CON	TOOL SERVICED					
Two Tubes in Inverse-Pa						
Maximum Ratings, Absolute-Maximum V.						
For frequencies from						
ror frequencies from	Column Column					
	1 C 2 C					
SUPPLY VOLTAGE (RMS)2 DEMAND POWER (During	400 max. 2400 max. volts					
conduction ^d)	105 max. 2400 max. kva					
interval of 1.66 seconds maximum						
→ IGNITORS — Two®						
Maximum Ratings, Absolute-Maximum V	'alues:					
PEAK IGNITOR VOLTAGE:						
Positive	Equal to anode volts					
IGNITOR CURRENT:						
Peak	, 100 max. amp val _					
of 10 seconds maximum RMS	2 max. amp					
HOLDENG AND	nne -					

HOLDING ANODE

Maximum Ratings, Absolute-Naximum Values:
PEAK HOLDING-ANODE VOLTAGE:

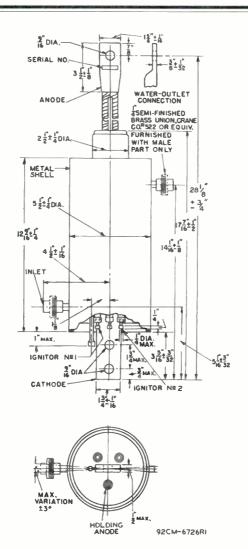
- Indicates a change.

Inverse: Main anode conducting	max.	volts
Main anode not conducting 160) max.	volts
HOLDING-ANODE CURRENT:		
Peak) max.	amp
Average (Averaged over any interval		
of 10 seconds maximum)	max.	amp
RMS) may	
	/ TIE4/A •	anip

To insurm longer life, this type is provided with two ignitors, only one which is used at a time.

RMS voltage, current, and demand kva are on the basis of full-cycle conduction (no phase delay) regardless of whether or not phase control $\frac{1}{2}$ is used.

c Column 1 represents operation at maximum average anode current; Column 2 represents operation at maximum demand current.



IGNITRON

General: DATA	
Cathode Pool	tuno
Number of Ignitors	. ype
Number of Main Anodes	
Number of Auxiliary Anodes	
Peak Voltage Drop:	
At 100 Amp Peak Anode Current 12.6	volts
At 300 Amp Peak Anode Current	
At 600 Amp Peak Anode Current 16.2	
At 1200 Amp Peak Anode Current 19.1	volts
Cooling:	
Type	Mater
Typical Flow 3 to 5 gal.,	min.
Pressure Drop at Above Flow 3 to 8 lb./so	q.1n.
Temp. Rise at Lower Rate of Flow	700
(300 Amp per Anode)	oll be
Maximum Rigid Length (Auprox.)	1/2"
Maximum Rigid Length (Approx.)	1/8"
balance, including containing to the containing	-, -
RECTIFIER SERVICE	
For Frequencies from 25 to 60 cycles, Phase Retard =	0
Maximum Ratings, Absolute Values:	
	volts
	volts
PEAK ANODE CURFENT 1800 max. 1200 max.	amp
AVERAGE CONTINUOUS ANODE CUR. 200 max. 150 max. 2—HOUR AVERAGE ANODE CUR.*. 300 max. 225 max.	amp
	amp
1-MINUTE AVERAGE ANODE CUR.** 400 max. 300 max.	amp
	amp
OUTLET WATER TEMPERATURE 60 max. 45 max.	°c.
INLET WATER TEMPERATURE 6 min. 6 min.	∘င်
WATER FLOW, AT CONTINUOUS	ı "I
AVERAGE ANODE CUR. RATING 3 min. 3 min.	gpn
WATER FLOW, AT NO LOAD# 1 min. 1 min.	gpm
PEAK INVERSE AUXILIARY ANODE VOLTAGE:	
	volts
	volts
	amp
	volts
PEAK NEGATIVE IGNITOR VOLTAGE 5 max	volts
PEAK IGNITOR CURRENT 100 max.	amp
AVERAGE IGNITOR CURRENT## 2 max IGNITION TIME 100 max	amp
INVITION LIME	дзес
GENERAL REQUIREMENTS for SELF-EXCITATION and	
SEPARATE EXCITATION are given on the next page	
Daniel Property	

•, *, **, #, ##: See next page.



IGNITRON

AC WELDER - CONTROL SERVICE

Ratings for 2400 volts rms, 25 to 60 cycles

Maximum Ratings, Absolute Values:

Martine Martings, Manager Agrange.	
DEMAND	/&
CORRESPONDING AVERAGE ANODE CURRENT. 135 max. an	ap
AVERAGE ANODE CURRENT 207 max. an	ap
CORRESPONGING DEMAND 1105 max. ky	/8.
TIME OF AVERAGING ANODE CURRENT	
at 2400 volts rms 1.66 max. se	c
SURGE ANODE CURRENT, for 0.15 sec.max. 6000 max. as	np
WATER FLOW 3 min. gal.	./
mir	
OUTLET WATER TEMPERATURE 30 max.	°C
PEAK INVERSE AUXILIARY ANODE VOLTAGE:	
Fith anode conducting 25 max. vol	a
Fith anode not conducting 150 max. vol	ts
AVERAGE AUXILIARY ANODE CURRENT 5 max. am	ap
PEAK POSITIVE IGNITOR VOLTAGE 2400 max. vol	ts
PEAK NEGATIVE IGNITOR VOLTAGE 5 max. vol	as
PEAK IGNITOR CURRENT 100 max. au	np
AVERAGE IGNITOR CURRENT## 2 max. &	
IGNITION TIME 100 max. use	

Demand-ampere requirements are shown on curve 92CM-6710 under type 5554

SELF-EXCITATION (ANODE FIRING)

See Circuit 92CS-6722 under type 5554

PEAK IGNITOF VOLTAGE	150 min.	volts
PEAK IGNITOR CURFENT	40 min.	атр
Ignitor series resistance for anode firing		
at anode voltages of:		
6) volts or less (approx.)	4	ohms
601 to 1000 volts (Approx.)	10	ohms
1001 to 1500 volts (Approx.)	20	ohms
1501 to 2000 volts (Approx.)	35	ohms
2001 to 2400 volts (Approx.)	50	amdo

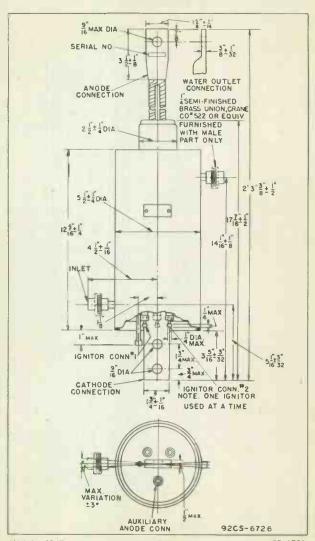
SEPA-ATE EXCITATION (CAPACITOR FIRING)

See Circuit 92CS-6722 under type 5554
Minimum volt-ampere requirements are shown on curve 92CS-6723
under type 5554

- " Use only one ignitor at a time.
- * Averaged over any 2-minute interval.
- ** Averaged over any 1-minute interval.
- # For systems in which the flow of water is controlled by the load.
- ## Averaged over any 10-second interval.



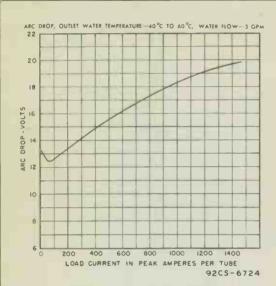




25,25



5555 IGNITRON





MERCURY-VAPOR THYRATRON

NEGATIVE-CONTROL TRIODE TYPE

NEGATIVE-CONTROL TRIODE TYPE
GENERAL DATA
Electrical:
Filament, Coated:
Min. Av. Max. Voltage. 2.38 2.5 2.62 ac or dc vol Current at 2.5 volts. - 5.0 5.5
tube conduction 5 sDirect Interelectrode Capacitances (Approx.):0
Grid to anode
lonization Time (Approx.)
Anode Voltage Drop (Approx.) 16 vol
techanical:
Operating Position
Pin 1 - Filament Pin 2 - No Connection Pin 3 - Grid Pin 4 - Filament Cap - Anode
Temperature Cortrol: Heating—When the ambient temperature is so low that the normal rise of condensed—mercury temperature above the ambient temperature will not bring the condensed—mercury temperature up to the minimum value of the operating ranges specified under Maximum Ratings, some form of heat—conserving enclosure or auxiliary heater will be required.
Cooling—When the operating conditions are such that the maximum value of the operating condensed—mercury temperature is exceeded, provision should be made for forced—air cooling sufficient to prevent exceeding the maximum value.
emperature Rise of Condensed Mercury to Equilibrium Above Ambient Temperature (Approx.): No load
with filament volts = 2.38 and no heat-conserving enclusure.



MERCURY-VAPOR THYRATRON

CONTROL SERVICE

-- Maximum Ratings, Absolute Values:

For anode-supply frequency of 60 cps

Operating Condensed-Mercury-

Temperature Range 40° to 90° C 40° to 80° C 40° to 60° C

		40. 0	an. r	40 (0	100 C	40 (0	80 C	1
	PEAK ANODE VOLTAGE: Forward	1250	max.	2500	max.	5000	max.	volts
	Irverse GRID VOLTAGE:	1250	max.	5000	max.	10000	max.	volts
ı	Peak or DC, before					500		, .
	tube conduction. Average*. during	-500	max.	-500	max.	-500	max.	volts
	tube conduction. ANODE CURRENT:	-10	max.	-10	max.	-10	max.	volts
ı	Peak	3	max.	2	max.	1	max.	атр
	Average#	1	max.	0.5	max.	0.25	max.	атр
	of 0.1 second	40	mav	40	mav	40	mav	атр
	GRID CURRENT:	40	IIICIX.	40	IIIQIX a	40	HIGLA.	amb
	Average , positive with anode							
	positive	0.05	max.	0.05	max.	0.05	max.	атр

Averaged over one conducting period.

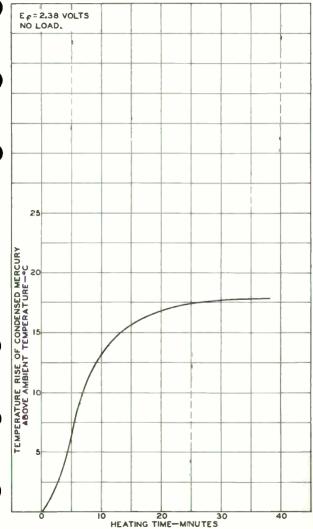
DIMENSIONAL OUTLINE for Type 5557 is the same as that shown for Type 3C23

-- Indicates a change.

Averaged over any interval of 15 seconds maximum.

Averaged over period of grid conduction.

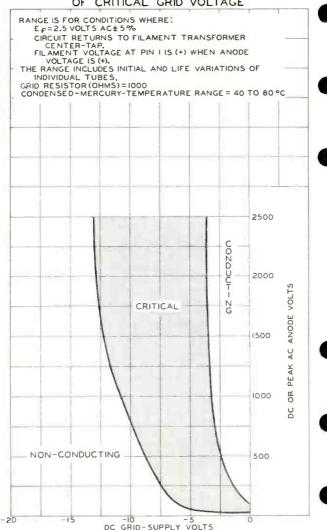
5557 5557
RATE OF RISE
OF CONDENSED-MERCURY TEMPERATURE



TUBE DIVISION RAD'O CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-930IT

RCA 5557

OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE

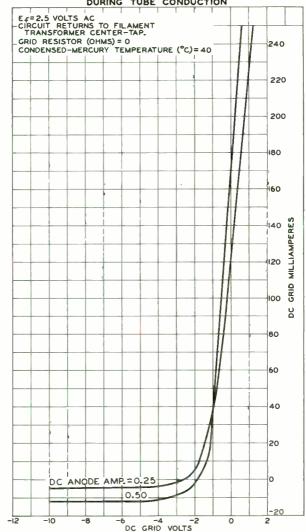


TUBE DIVISION

RADIO COPPORATION OF AMERICA, HARRISON, NEW JEISEY

92CM-9300T

AVERAGE GRID CHARACTERISTICS
DURING TUBE CONDUCTION







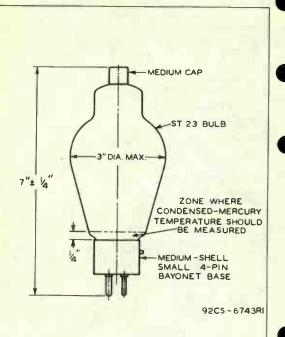
5559 THYRATRON

MERCURY-VAPOR TRIODE



DATA	
Electrical:	
Heater, for Unipotential Cathode: Voltage 5.0 volts Current 4.5 amp	
Cathode: Minimum Heating Time, prior to tube conduction minutes Direct Interelectrode Capacitances (Approx.):	*
Grid to Anode 2.5	
Mechanical:	3
Pin 1 - Heater Pin 2 - Cathode; Circuit Returns Pin 3 - Grid Pin 4 - Heater, Cathode Cap - Anode	
Maximum Ratings, Absolute Values:	
PEAK ANODE VOLTAGE: Forward	- 1
Before Conduction	
Peak	
Average **	
Averaged over any interval of 15 sec. max. Recommended operating temperature is 100°C.	
← Indicates a change	







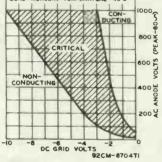
THYRATRON

OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE

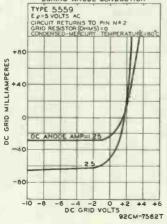
TYPE 5559

ITYL DODY

RANGE IS FOR CONDITIONS WHERE
EARLY YOUTS AS \$5% CIRCUIT RETURNS
INITIAL & LIFE VARIATIONS OF INDOMOLIAL
TUBES, AS WELL AS CHANGE IN CHARAACTERISTICS DUE TO HEATER PHASING,
GRID RESISTON (OHMS) = 0
COND-METORY TEMPERATURE = 40°C

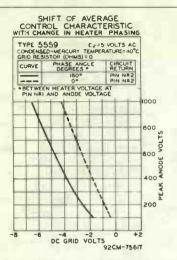


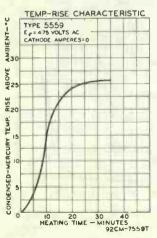
AVERAGE GRID CHARACTERISTICS DURING ANODE CONDUCTION





THYRATRON







THYRATRON

MERCURY-VAPOR TETRODE

	MERCORI-VAPOR TETRODE	1
	DATA	
	Electrical:	l
	Heater, for Unipotential Cathode:	ı
	Voltage 5.5° 5.0 volts Current 5.0° 4.5	
	Current 5.0° 4.5 amp	
	Cathode:	
	Minimum Heating Time, prior	ı
	to tube conduction minutes	
	Direct Interelectrode Capacitances(Approx.):	П
	Grid No.1 to Anode 0.2 μμ f	П
	Grid No.1 to Cathode 4.4	1
1	Ionization Fime (Approx.). 10 μsec	
1	Deionization Time (Approx.) 1000	
1	Grid-No 1 Control Ratio Monroy I with write he	ı
	Grid-No.1 Control Ratio (Approx.) with wrid-No.1 resistor (ohms) = 0; grid-No.1 and grid-No.2 volts = 0 170	4
	Grid-No.2 Control Ratio (Approx.) with grid No.1 resistor (ohms) = 0; grid-No.1 and grid-No.2 volts = 0 300	L
	resistor (dhms) = 0; grid-No. [and grid-No. 2 volts = 0 300	1
		1
	Mechanical:	1
	Mounting Position Vertical, Base Down	L
	Overall Length	
	Seated Length	-
	Greatest Radius	
	Bulb	1
	Caps (Two)	1
	Basing Designation for BOTTOM VIEW 4CD	
		Н
	Pin 1 - Heater 2 Pin 4 - Heater,	L
	Pin 2 - Cathode; Cathode	
	Circuit Top Cap - Anode	
1	Returns Side Cap - Grid No. 1	
	Pin 3-Grid No. 2	L
	Maximum Ratings, Absolute Values:	ı
	PEAK ANODE VOLTAGE:	
	Forward 1000 max. volts	
	Inverse 1000 max. volts	
	GRID-No.2 (SHIELD-GRID) VOLTAGE:	1
	Before Conduction300 max. volts During Conduction5 max. volts	П
	During Conduction —5 max. volts GRID-No.1 (CONTROL—GRID) VOLTAGE:	П
	Before Conduction1000 max. volts	П
	During Conduction	
ĺ	CATHODE CURRENT:	4
	Peak 30 max. 0 15 max. amp	
	Average** 0.5 max. 2.5 max. amp	
	Fault, for 0.1 sec. maximum 200 max. amp	
Ì	□ **: See next page. ←Indicates a change.	
1	. got next page.	J



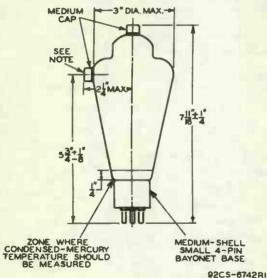
THYRATRON

	7	
GRID-No.2 CURRENT:	-1	
Average** 0.25 max. amp)	
GRID No.1 CURRENT:	1	
Average**		
	- 1	
OPERATING FREQUENCY 150 max. cps	5	1
	- 1	

Applies when this tube is used for igniter firing.

Averaged over any interval of 15 sec. max.

Recommended operating temperature is %0°C.



PECS UNERI

NOTE: THE PLANE THROUGH TUBE AXIS AND CENTER OF GRID-NºL CAP IS 45°±5° FROM THE PLANE THROUGH THE TUBE AXIS AND CENTER OF BAYONET PIN. GRID-NºL CAP IS ON SAME SIDE AS PIN Nº3.

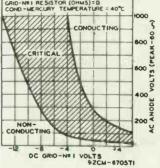
TEMPERATURE-RISE CHARACTERISTIC of the 5560 is the same as that shown for Type 5559



THYRATRON

OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE

OF CHITICAL GRID VOLTAGE
TYPE 5560
RANGE IS FOR CONDITIONS WHERE:
€ = 5 VOLTS AC ±5 %: GRID-M? 2 (SHIELD)
VOLTS = 0; CIRCUIT RETURNS TO PIN NR
2. THE RANGE INCLUDES INITIAL AND
LIFE WARIATIONS OF INDIVIDUAL TUBES,
AS WELL AS CHANCE IN CHARACTERS—
TICS DUE TO HEATER PHASING.
GRID-NR I RESISTOR (ORMS)= D

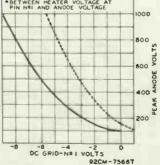


SHIFT OF AVERAGE CONTROL CHARACTERISTIC WITH CHANGE IN HEATER PHASING

TYPE 5560 E--5 VOLTS AC
GRID-N2 (SHIELD) VOLTS=0
CONDENSED-MERCHY TEMPERATURE: 440
GRID-N2 I RESISTOR (OHMS)=0

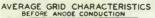
CURVE PRASE ANGLE
CURVE PR

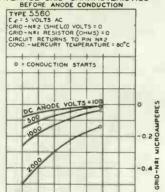
PHASE ANGLE DEGREES 9 PIN Nº2 ----BETWEEN HEATER VOLTAGE AT





THYRATRON





92CM - 7556T

+400

-0.6

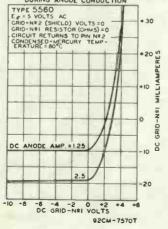
AVERAGE GRID CHARACTERISTICS DURING ANODE CONDUCTION

-400

DC GRID - NºI VOLTS

-1200

-800



THYRATRON

MERCURY-VAPOR TRICOE

GENERAL DATA
Electrical:
Filament, Coated: Voltage 5 volts Current 10 amp Minimum Heating Time:
At initial installation with— out anode voltage, for proper distribution of condensed mercury 15 minutes
Juring subsequent operation and prior to conduction, for bringing condensed-mercury temperature with-in operating range. Direct Interelectrode Capacitances:
Grid to Anode.
Anode Voltage Drop 15 approx volts Grid Control Ratio 200 approx. with no external shield.
Mechanical:
Mounting Position Vertical, base down Overall Length
Pin 1-Grio Pin 2-Filament, Internal Shield Pin 3-No Connection Pin 4-Filament Cap - Anode
Maximum Ratings, Absolute Values: For Anode-Supply Frequencies between 25 and 150 cps
COND. MERCURY TEMP. RANGED . 25 - 55 25 - 50 °C PEAK ANODE VOLTAGE:
Forward 10000 max. 15000 max. volts Inverse 10000 max. 15000 max. volts GRID VOLTAGE: Before Anode
Conduction (Peak or DC) -500 max500 max. volts During Anode
Conduction (Average) . —10 max. —10 max. volts





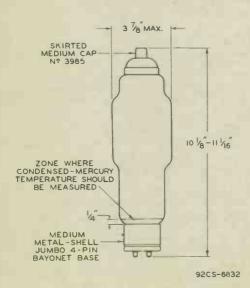
CATHODE CURRENT:			_ [
Puak	10 max.	6.4 max.	amp
Average	1.8 max.	1.6 max.	amp
Surge, for max. duration			
of 0.1 second		200 max.	
Averaging Time	1	1	cycle
GRID CURRENT:			
Peak	+1 max.	+1 max.	amp
Average	+0.1 max.	+0.1 max.	
Averaging Time	1	1	cycle
Maximum Circuit Values			

For conditions with 0.1-megohm grid resistor, circuit returns to pin Wp.2 as datum of potential, and filament voltage at pin Wo.4 1800 out of phase with the anode voltage.

0.1 max. 0.1 max. megohm

- Recommended operating value is 40° ± 5°C.
- Averaged over one conducting cycle.

Grid-Circuit Resistance. . .



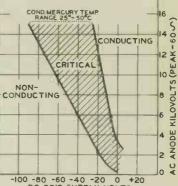


THYRATRON

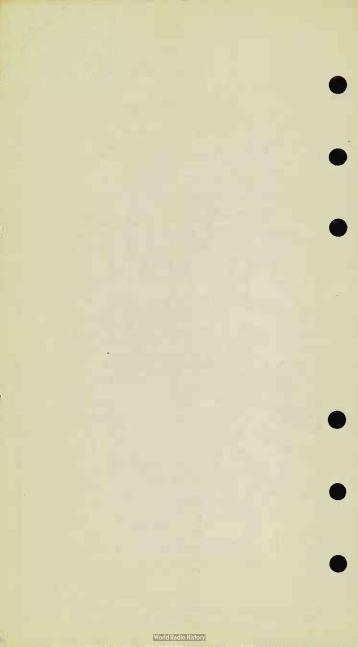
OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE

TYPE 5563
RANGE IS FOR CONDITIONS WHERE:

E_f = 5 VOLTS AC ± 5%; CIRCUIT RE TURNS TO PIN Nº2; FIL VOLTAGE AT PIN Nº4; S() WHEN ANODE VOLTAGE IS ()GRIDRESIS FOR = 10000 OHMS; GRID-FILAMENT BYPASS CAPACITOR = 0.005; AC THE RANGE INCLUDES INITIAL & LIFE VARIATIONS OF INDIVIDUAL TUBES.



DC GRID SUPPLY VOLTS 92CM-6842T 5563





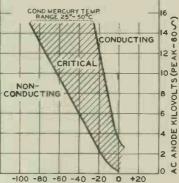
5563

THYRATRON

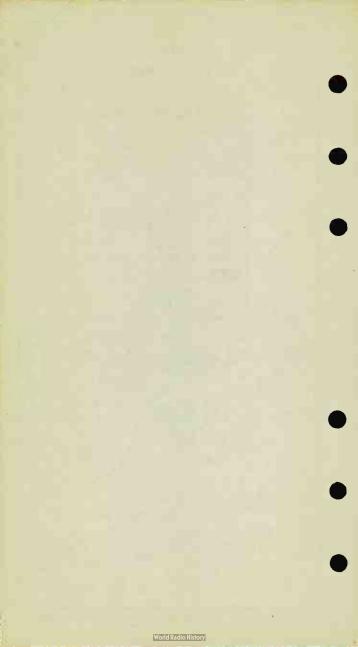


TYPE 5563 RANGE IS FOR CONDITIONS WHERE:

Ef=5 VOLTS AC 25%; CIRCUIT RETURNS TO PIN Nº2; FIL. VOLTAGE AT PIN Nº4 IS(-) WHEN ANODE VOLTAGE IS(+)GRIDRESISTOR = 10000
OHMS;GRID-FILAMENT BYPASS CAPACITOR
=0.005 pc. THE RANGE INCLUDES INITIAL & LIFE VARIATIONS OF INDIVIDUAL TUBES.



DC GRID SUPPLY VOLTS 92CM-6842T





55631A

MERCURY-VAPOR THYRATRON

NEGATIVE-CONTROL TRIODE TYPE Supersedes Type 5563

GEN	ERAL DATA			
Electrical:				
Filament, Coated:				
	Min.	Aυ.	Max.	
Voltage	4.75	5	5.25	volt
Current at 5 volts	-	10	11	ami
Minimum Heating Time:				
On initial installation, w	rith no vo	l†age		
on grid or anode, for red				
mercury to lower part of			. 15	ninute
During subsequent operat				
filament to reach operati				
prior to tube conduction Direct Interelectrode Capac	n		1	minut
Grid to amode	rances.		. 4	μ
Grid to cathode			. 16	
Ionization Time (Approx.).			. 10	
Deionization Time (Approx.)			. 1000	
Maximum Critical Grid Curren				,
instantaneous anode volts			5G	1
Anode Voltage Drop (Approx.				
At anode amperes = 11.5.			15	
At anode amperes = 70			25	volt
Grid Control Ratio (Approx.)				
Under conditions: 10000-				
circuit returns to pin 2				
at pin 4 out of phase w by 180°, and condensed-r				
of 40 °C		mperatu	275	5
			• •	
Mechanical:				
Operating Position			ertical,	
Overall Lergth				
Maximum Diameter				
Bulb				
Weight (Approx.) Cap Megium with		· · · ·	LIETEC	. 13 c
Socket medium with				
Base Skir	ted Medium	r	-Shell tu	mbo 1-Pi
Dase	with	Rayonet	t (JETEG	No. 44-69
Basing Designation for BO				
Pin 1 – Grid	A00		n 3 – Np	
Pin 2 - Filament,	70			ion
Internal	1 - 1	Pir	n 4 - Fil	ament
Shield,	7	(Cap - And	de
Circuit	M			
Returns				
O Without external shield.			← Indicates	a abar
Althout extelligi Sulaid.			- HUTCATES	a change



Temperature Control:



MERCURY-VAPOR THYRATRON

remperature	CONTRION.								1
Heating—when the ambient temperature is so low that the normal rise of condensed—mercury temperature above the ambient temperature will not bring the condensed—mercury temperature up to the minimum value of the operating range specified under Maximum Ratings, some form of heat—conserving enclosure or auxiliary heater will be required.									
	When the op value of the applicable s made for for the maximum	oper ervi ced-	atii ce air	ng c rati	ondense	d-merc	ury temp	erature sion s	for the
(Approx.): No load .	um Above A								3 °C
Full load	CONTROL	lute	V	z l u	es:	·		,	.7 °C
				-		-	densed-		rv-
				V P			ture Ra		.,
					25 to	55 °C	25 to	0° 03	
PEAK ANODE	VOLTAGE:								
Inverse. GRID VOLTAG	E:		:		15000 15000		20000 20000		volts volts
Peak or D tube co Average♠,	nduction.				-500	max.	-500	max.	volts
tube co ANODE CURRE	nduction.		•		-10	max.	-10	max.	volts
Peak					10	max.	6.4	max.	amp
	r duration		•		1.8	max.	1.6	max.	amp
	ond maximu				70	max.	70	max.	amp
Average p	ositive** tive with				100	max.	100	max.	mai
	egative .				5	max.	5	max.	та
Maximum Cir	cuit Value	s:							
Grid-Circui									megohm
With filameFilament vo the anode v	nt volts = 4 Itage has a p oltage.								spect to
▲: See nex	t page.						→ indi	cates a	a change.



5563.A

MERCURY-VAPOR THYRATRON

CONTROL	SERVICE	Duadrature	Operation oo

Maximum Ratings, Absolute Values:

ANODE VALTACE

For supply frequency of 25 to 60 cps

Operating Condensed-Mercury-Temperature Range 25 to 55 °C 25 to 50 °C

J	PEAK ANODE VOLTAGE:						
1	Forward		15000	max.	20000	max.	volts
ı	Inverse		15000	max.	20000	max.	volts
1	GRID VOLTAGE:						
	Peak or DC, before						
	tube conduction		-500	max.	-500	max.	volts
ı	Average*, during						1
	tube conduction		-10	ma>.	-10	max.	volts
	ANODE CURRENT:						
į	Peak		11.5	max.	11.5	max.	amp
	Average		2.5	max.	2.5	max.	amp
	Fault, for duration of						
	0.1 second maximum .		70	max.	70	max.	amp
	GRID CURRENT:						
	Average positive	¥	100	ma⊀.	100	max.	ma
	Peak positive with						
	anode negative	•	5	maĸ.	5	max.	ma
	Maximum Circuit Values:						
	i e						
	Grid-Circuit Resistance.		0.1	max.	0.1	max.	megohm

HIGH-SPEED LOAD-CIRCUIT PROTECTION SERVICE

Maximum Ratings, Absolute Values:

PEAK ANODE VOLTAGE:

Operating Condensed-Mercury-Temperature Range 40 to 55 °C 40 to 50 °C

Forward	15000 max.	20000 max.	volts
inverse	15000 max.	20000 max.	volts
GRID VOLTAGE:			j
Peak or DC, before			1
tube conduction	-500 max.	-500 max.	volts
Average*, during tube			1
conduction	-10 max.	-10 max.	volts
ANCDE CURRENT:			
Peak	100 max.	100 max.	amp
Average Average	70 max.	70 max.	атр
Average	1.05 max.	1.05 max.	amp
			j
Maximum Circuit Values:			

Grid-Circuit Resistance. . 0.1 max. 0.1 max. megohm ▲ •• oo • □ §: See next page.

- Indicates a change.



MERCURY-VAPOR THYRATRON

Averaged over one grid-conducting period.

Averaged over any period of 20 seconds maximum.

OO Filament voltage is 60° to 120° out of phase (leading or lagging) with the anode voltage.

In this service, the faults may occur in quick succession or may be separated by several months.

Averaged over any period of 0.1 second maximum.

Averaged over any period of 20 seconds maximum. This average—anode current value is specified to indicate the number of faults that are permissible within the 20-second interval. The number of faults that may occur in any 20-second interval depends on the value of anode current over the averaging period less than 0.1 second and may be determined by

> Number of Faults = $\frac{1.05 \times 20}{\text{Average Anode Current Duration}}$ during fault \times of Fault

Example:

Assume that the maximum average anode current is 70 amperes for the maximum duration of 0.1 second. On substitution of these values in the equation, the permissible number of faults is determined to be 3. If the average anode current is less than 70 amperes over an averaging period of less than 0.1 second, it will be obvious that a greater number of faults may occur.

OPERATING CONSIDERATIONS

I rays are produced when the 5563-A is operated with a peak inverse anode voltage above 16000 volts (absolute value). 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 it provides the required protection to the operator.

Shields and rf filter circuits should be provided for the 5563-A if it is subjected to extraneous high-frequency fields during operation. These fields tend to produce breakdown effects in mercury vapor and are detrimental to tube life and performance. When shields are used, special attention must be given to providing adequate ventilation and to maintaining normal condensed-mercury temperature. Radio-frequency filters are employed to prevent damage caused by rf currents which might otherwise be fed back into the 5563-A.

Indicates a change.



5563-A MERCURY-VAPOR THYRATRON

For Circuit Figures, see Front of this Section

Fig. 7	For Circuit Figures, see Front of this Section						
Nalf-Wave Single-Phase 14000	CIRCUIT	TRANS. SEC. VOLTS (RMS)	DC OUTPUT VOLTS TO FILTER	DI OUT! AMPE	C PUT ERES	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	C PUT W Ilter
Full-Have Single-Phase In-Phase Operation Fig.3 Series In-Phase Operation In-Operation In	Half-Wave Single-Phase						
Series Single-Phase In-Phase Operation In-P	Full-Wave Single-Phase						
Half-Have Three-Phase 6100 9500 4.8 45 38	Series Single-Phase					l	
Parallel	Half-Wave Three-Phase			ı			
Series Size Size	Parallel Three-Phase					ı	
Fig. 7	Series Three-Phase						
Fig. 8 Half-Wave Six-Phase TOOM OFFI Load Load Load Load Load Load Load Load	Half-Wave Four-Phase			tive Load	tive Load	tive Load 90	Induc- tive Load 90 67
	Half-Wave			Load	tive Load	tive Load	Induc- tive Load 110 81

For maximum p+ak inverse anode voltage of 20000 volts, and condensedmercury-temperature range of 25 to 50 °C.

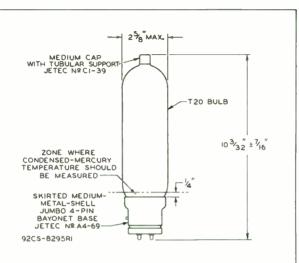
556314

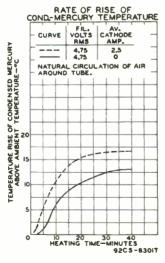
A For maximum peak inverse anode voltage of 15000 volts, and condensedmercury-temperature range of 25 to 55°C.

25031A

RCA) 5563-A

MERCURY-VAPOR THYRATRON



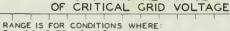




5563.4

5563-A

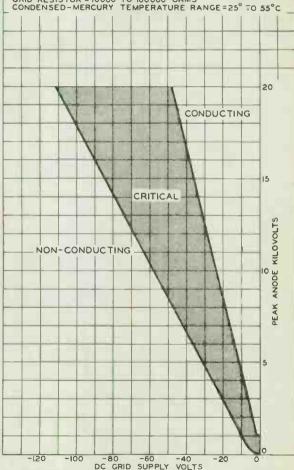
OPERATIONAL RANGE



RANGE IS FOR CONDITIONS WHERE: $E_{+}=5.0$ VOLTS AC $\pm 5\%$; CIRCUIT RETURNS TO PIN 2. FILAMENT VOLTAGE AT PIN 4 IS (-) WHEN ANODE VOLTAGE IS (+).

THE RANGE INCLUDES INITIAL AND LIFE VARIATIONS OF INDIVIDUAL TUBES.

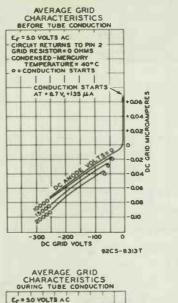
GRID RESISTOR = 10000 TO 100000 OMMS
CONDENSED-MERCURY TEMPERATURE RANGE = 25° TO 55°C

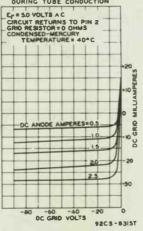


5503.1

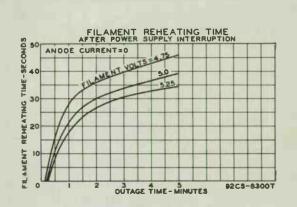
5563-A

CHARACTERISTIC CURVES

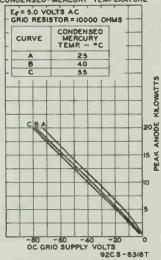




CHARACTERISTIC CURVES



SHIFT OF AVERAGE CONTROL CHARACTERISTIC WITH CHANGE IN CONDENSED-MERCURY TEMPERATURE





SHIFT OF AVERAGE CONTROL CHARACTERISTICS WITH CHANGE IN FILAMENT PHASING AND CIRCUIT RETURN

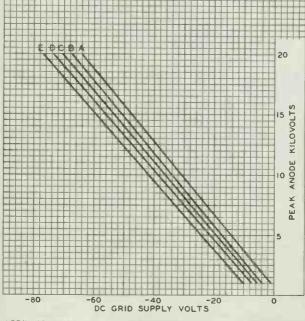
Ef=5.0 VOLTS AC
GRID RESISTOR=10000 OHMS
CONDENSED-MERCURY TEMPERATURE =40°C

ľ	D-MERCORT TEMPERATURE -4						
	CURVE	PHASE ANGLE*	CIRCUIT				
	Α	0°	PIN 2				
	8	0°	CTD				
	С	0°,180° 90°	PIN 4 ANY •				
	D	180°	CTO				
	Ε	180°	PIN 2				

*BETWEEN FILAMENT VOLTAGE AT PIN 4 AND ANODE VOLTAGE

CENTER TAP OF FILAMENT TRANSFORMER

PIN 2, PIN 4, OR CT





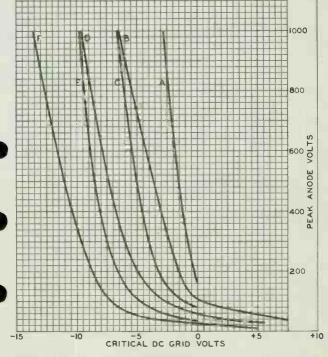
5583.4 5563-A SHIFT OF AVERAGE CONTROL CHARACTERISTICS WITH CHANGE IN FILAMENT PHASING AND CIRCUIT RETURN AT LOW ANODE VOLTAGES

Ef=5.0 VOLTS AC GRID RESISTOR = 10000 OHMS
CONDENSED - MERCURY TEMPERATURE = 40°C

CURVE	PHASE ANGLE *	CIRCUIT
A	00	PIN 2
В	180°	PIN 4
C	0°	CT [□]
D	180°	CT D
E	0°	PIN 4
F	180°	PIN 2

BETWEEN FILAMENT VOLTAGE AT PIN 4 AND ANODE VOLTAGE

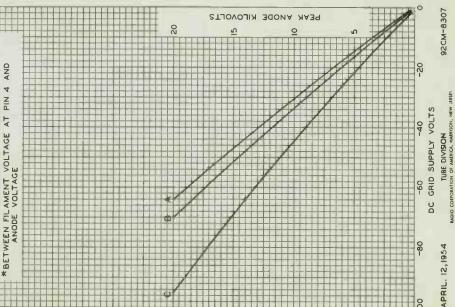
CENTER TAP OF FILAMENT TRANSFORMER



OL CHARACTERISTICS - RESISTOR VALUE CONTROL GRID z AVERAGE (TH CHANGE WITH 9 SHIF.



AND 4 NIA TA AGE VOLT FIL



GAS PHOTOTUBE

WITH S-4 RESPONSE

WITH 5-4 RESPONSE
DATA
General:
Spectral Response
Cathode: 4000 ± 500 angstroms
Shape Semi-Cylindrical Minimum Projected Length*
Minimum Projected Width*
Direct Interelectrode Capacitance 2.0 µµf
Maximum Overall Length
Seated Length to Center of Cathode 1-1/4" ± 3/32"
Wax 1 muni Dianetel
Bulb
Mounting Position. Any Base Small-Shell Peewee 3-Pin
Basing Designation for EDTTOM VIEW 2F
DIRECTION, OF LIGHT
(2)
Pin 1 - No Connection Pin 2 - Anode Pin 3 - Cathode
connection / _ > cathode
(\ \ , \
(3)
Maximum Ratings, Absolute Values:
ANODE-SUPPLY VOLTAGE (DC or Peak AC) 100 max volts PEAK CATHODE CURRENT
PEAK CATHODE-CURRENT DENSITY 100 max. Hamp/so in
AVERAGE CATHODE CURRENTO 2 max µamp
AMBIENT TEMPERATURE
Characteristics:
Min. Av. Hax.
Dark Current at 90 Volts 0.050 µamp Sensitivity:
At 4000 argstroms 0.125 - μamp/μwatt
Luninous:
At 0 cps 75 135 205 µamp/lumen
At 5000 cps 124 - μamp/lumen At 1000C cps 108 - μamp/lumen
At 1000C cps 108 - uamp/lumen Gas Amplification Factor 5.5
Minimum Circuit Values:
DC Load Resistance:
With anode-supply voltage of 80 volts or less
For do gurrants Sabove 3 µamp 0.1 megohm
below 3 mamp No Minimum
With ancde-supply voltage of 100 volts
For dc currents $\left\{ \begin{array}{llllllllllllllllllllllllllllllllllll$
*, O, A: See next page. — Indicates a change.
AAY ' 1951 THRE DEPARTMENT DATA



GAS PHOTOTUBE

On plane perpendicular to indicated direction of incident light.

O Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 80 volts.

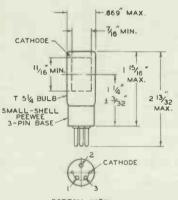
Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY AND SHISTIVITY MEASUREMENTS" at front of this Section.

SPECTRAL-SENSITIVITY CHARACTERISTIC

and

FREQUENCY-RESPONSE CHARACTERISTIC of Gas Phototube having S-4 Response are shown at tront of this Section

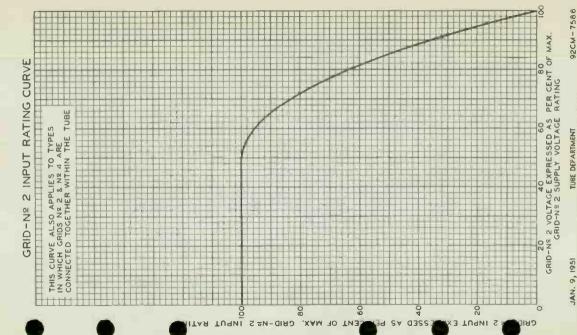
AVERAGE ANODE CHARACTERISTICS of Type 5583 are the same as those shown under Type 5581

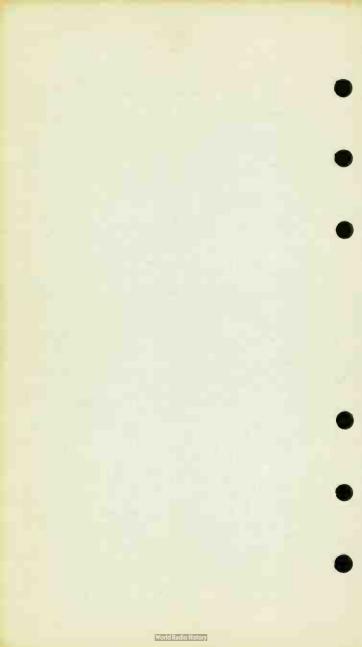


BOTTOM VIEW

92CM - 6053R4

-- Indicates a change.





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THYRATRON

GAS-TETROOE, MINIATURE TYPE

	GENERAL DATA	1
	Electrical: Heater, for Unipotential Cathode: Voltage 6.3 ac or dc volts Current 0.150 amp Cathode:	
Ī	Minimum Heating Time, prior to tube conduction . 10 sec Direct Interelectrode apacitances (Approx.):0	
	Grid No.1 to Anode 0.03	
	Output 0.54	
	square-pulse volts = +50; peak cathode amperes during conduction = 0.15θ 0.5 μsec Deionization Time (Approx.): For conditions: dc anode volts = 500; grid-No.1	
	volts = -100, grid-No.1 resistor (ohms) = 1000; dc cathode amperes = $0.025 \dots 25 \mu sec$ For conditions: dc anode volts = 500 ; grid-No.1	
	volts = -!3; grid-No.1 resistor (ohms) = 1000; dc cathode amperes = 0.025	
	anode-supply volts (rms) = 350, and average cathode amperes = 0.025 0.5 μamp Anode Voltage Drop (Approx.)	
	resistor (megohms) = 0; grid-No.2 volts = 0	
	Without external shield.	
-	Mechanical: Mounting Position	'
)	Maximum Seated Length	,
	Pin 1 - Grid No.1 Pin 2 - Cathode Pin 6 - Anode	-
1	Pin 3 - Heater Pin 4 - Heater	



THYRATRON

RELAY and GRID-CONTROLLED RECTIFIER SERVICE	
Maximum Ratings, Absolute Values:	
PEAK ANODE VOLTAGE:	
Forward	
Inverse 500 max.	volts
GRID-No.2 (SHIELD-GRID) VOLTAGE: Peak, before anode conduction50 max.	velte
Average, during anode conduction -10 max.	
GRID-No.1 (CONTROL-GRID) VOLTAGE:	***************************************
Peak, before anode conduction100 max.	volts
Average, during anode conduction10 max.	volts
CATHODE CURRENT:	
Peak	
Average 0.025 max. Surge, for duration of 0.1 sec. max 2 max.	
GRID-No. 2 CURRENT:	anp
Average +0.005 max.	атр
IGRID-No.1 CURRENT:	
Average	amp
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode . 100 max.	volte
Heater positive with respect to cathode . 25 max.	volts
AMBIENT TEMPERATURE RANGE55 to +90	OC.
Typical Operating Conditions for Relay Service:	, ,
RMS Anode Voltage	
Grid No. 2 Connected to cathode at	
RMS Grid-No.1 Bias Voltage ⁰	volts
Grid-No.1-Circuit Resistance 0.1	megohm
Anode-Circuit Resistance* 5000	ohms
Maximum Circuit Values:	

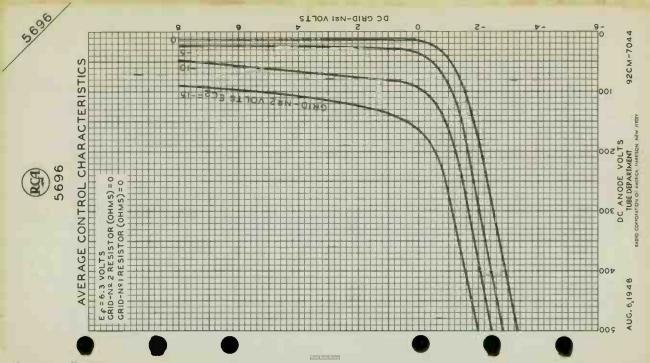
Grid-No.1-Circuit Resistance . . .

10 max.megohms

Averaged over any interval of 30 sec. max.

Approximately 180° out of phase with the anode voltage.

Sufficient resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings.

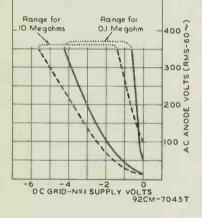




THYRATRON

OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE

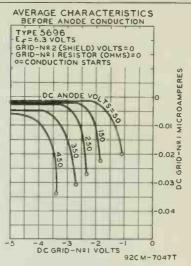
TYPE 5696
GRID-Nº2 (SHIELD) VOLTS=0
RANGES SHOWN ARE FOR TWO VALUES
OF GRID RESISTOR—0.1 MEG. AND IO
MEG.—AND TAKE INTO ACCOUNT INITIAL
DIFFERENCES BETWEEN INDIVIDUAL
TUBES & SUBSEQUENT DIFFERENCES
DURING TUBE LIFE, FOR A HEATER—
VOLTAGE RANGE OF 5.7 TO 6.9 VOLTS
AND FOR AN AMBIENT TEMPERATURE
RANGE OF -55 TO +90°C

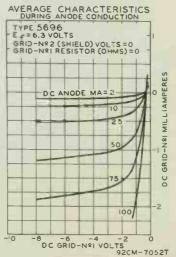


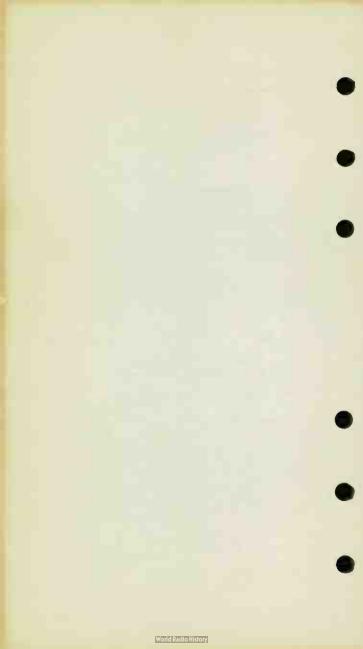


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THYRATRON









GAS THYRATRON 7-PIN MINIATURE TETRODE TYPE

BOENIUM TRAK

	GENERAL DATA	
	Electrical:	
	Heater, for Unipotential Cathode: Voltage 6.3 ± 10%	or do volts
	Minimum heating time prior to tube conduction 20 Direct Interelectrode Capacitances	sec
	(Approx.): O Grid No.1 to anode 0.026 Grid No.1 to cathode, grid No.2,	μμf
	and heater 2.4 Anode to cathode, grid No.2,	μμf
	and heater. 1.6 Ionization Fime (Approx.): For dc anode volts = 100, grid- No.1 volts (square-wave pulse) =	μμf
	50, peak anode amperes during conduction = 0.5	μsec
	= -100	μsec
-	= -10	μsec
1	and average anode amperes = 0.1 0.5	μa
	Anode Voltage Drop (Approx.)	volts
-	= 0, grid-No.2 volts = 0	
	= 0, grid-No.1 volts = 0 1000 Mechanical:	
	Operating Position Maximum Overall Length. Maximum Seated Length Length, Base Seat to Bulb Top (Excluding tip). 1-1 Maximum Diameter. Dimensional Outline See Gene Bulb	ral Section T5-1/2
l	BaseSmall-Button Miniature 7-Pin (JET ',º: See next page.	EU No.E/-1)





GAS THYRATRON

Pin 5-Grid No.2 Pin 1-Grid No.1 Pin 6 - Anode Pin 2 - Cathode Pin. 7 - Grid No. 2 Pin 3 - Heater Pin 4 - Heater RELAY AND GRID-CONTROLLED RECTIFIER SERVICE Maximum and Minimum Ratings, Absolute Values: For anode-supply frequency of 60 cps PEAK ANODE VOLTAGE: 650 max. volts Forward. volts 1300 max. Inverse. GRID-No.2 (SHIELD-GRID) VOLTAGE: -100 max. volts Peak, before tube conduction . . volts Average, during tube conduction . . -10 max. GRID-No.1 (CONTROL-GRID) VOLTAGE: volts Peak, before tube conduction -100 max. -10 max. volts Average*, during tube conduction . CATHODE CURRENT: 0.5 max. атр Peak атр 0.1 max. Average Fault, for duration of 0.1 second max.. 10 max. атр GRID-No.2 CURRENT: +0.01 max. amp Average GRID-No.1 CURRENT: +0.01 max. атр Average . . PEAK HEATER-CATHODE VOLTAGE: volts Heater negative with respect to cathode . 100 max. volts Heater positive with respect to cathode . 25 max. BULB TEMPERATURE (At hottest point O.C. 150 max. on bulb surface) OC -75 min. AMBIENT TEMPERATURE. . Typical Operation for Relay Service: volts 400 117 RMS Anode Voltage. volts 0 Grid-No.2 Voltage. volts RMS Grid-No.1 Bias Voltage. . volts -6 DC Grid-No.1 Bias Voltage. . . . volts 6 Peak Grid-No.1 Signal Voltage. . megohm Grid-No.1-Circuit Resistance . . . 2000 ohms 1200 Anode-Circuit Resistance*. Maximum Circuit Values: 10 max. megohms Grid-No.1-Circuit Resistance . . .

*.O. ■. D. #: See next page.

GAS THYRATRON

PULSE-MODULATOR SERVICE

For rectangular-wave shapes, duty cycle of 0.001 max., pulse duration of 5 µsec. max., and pulse-repetition rate of 500 pps max.

. 1		1000		-					
	Maximum and Minimum	Ratin	gs,	Abs	solu	t e	Values:		
7	PEAK ANODE VOLTAGE:								
	Forward						. 500	max.	volts
	Inverse						. 100	max.	volts
	GRID-No.2 (SHIELD-GF	V (GIS	OLT/	GE:	:				
	Peak, before tube	condu	ctic	n.			50	max.	volts
	Average, during tu	be co	nduc	tic	on .		10	max.	· volts
۱	GRID-No.1 (CONTROL-C								
,	Peak, before tube	condu	ctio	n.			100	max.	
	Average, during tu	be co	nduc	tic	on .		10	max.	volts
	CATHODE CURRENT:								
	Peak						. 10	max.	amp
	Average						. 0.01	max.	атр
	Rate of change PEAK GRID-No.2 CURRE						. 100	max.	amp/μsec
	PEAK GRID-No.2 CURRE	NT					. 0.02	max.	amp
	PEAK GRID-No.1 CURRE	NT					. 0.02	max.	amp
	PEAK HEATER-CATHODE								
	Heater negative wi	th res	pect	to	cat	hod	e 0	max.	volts
	Heater positive wi	th res	pect	to	cat	hod	e 0	max.	volts
	BULB TEMPERATURE (At	hott	est	poi	nt				
	on bulb surface).						. 150	max.	oC.
i	AMBIENT TEMPERATURE						- 75	min.	°C
i	Maximum and Minimum	Cirou	: 4 1	.1.					
j									
ı	Grid-No.1-Circuit Re	sista	nce.	•		•	. 0.5	max.	megohm
ĺ	Grid-No.2-Circuit Re	sista	nce.				. {25000		
							1 2000	min.	ohms
i	CHARACTER 1ST (S RAN	GE 1	/ALI	JES	FOR	EQUIPME	NT DE	SIGN
1	Values are i	nitia	l. 1	n Le	2.8.8	oth	rrwise s	bec ufi	ied
i	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		-, -				Min.		
1									
	Heater Current					L	540	660	ma
į	Grid-No.1 Supply Vol					_			1.
	Tube Conduction (1				1,	, 2	-2.9	-4.5	volts
	Grid-No.1 Supply Vol								
	Tube Conduction (2				1,	.3	_	-5.2	volts
	Grid-No.1 Supply Vol					_			1.
	Tube Conduction (3			•	4	,3	-	-6.4	volts
J	Anode-Supply Voltage				4	_		22	14
J	Tube Conduction (1		·. ·	•	1,	. 5	-	38	volts
1	Anode-Supply Voitage	tor	lube		4	_		E ^	volts
	Conduction (1) at		ours	•	1,	, 5	-	50	VOITS
ı	Anode-Supply Voltage Tube Conduction (2				6	-		50	volts
			• •	•	0	, 5	-	50	VOILS
	*,0,5,0,#: See next page								

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GAS THYRATRON

	Note	Min.	Nax.	
Anode-Supply Voltage for Tube Conduction (3) RMS Grid-No.2 Supply Voltage for Tube Conduction (This	7.8	650	-	volts
voltage is 180° out of phase with anode-supply voltage) Heater—Cathode Leakage Current: Heater 25 volts positive	1,9	1.9	3.3	volts
with respect to cathode	1	-	15	μа
Heater 100 volts negative with respect to cathode Heater-Cathode Leakage	1	-	15	μа
Current at 500 hours: Heater 25 volts positive				
with respect to cathode Heater 100 volts negative	1	-	20	μа
with respect to cathode	1	-	20	μа
Leakage Resistance: Grid-No.2 to anode Leakage Resistance:	1,10	760	-	megohms
Grid-No.2 to anode at 500 hours.	1,10	380	-	megohms
luces is wish a gunlee or or do on he				

- Note 1: with 6.3 volts ac or dc on heater.
- Note 2: With anode-supply volts (rms) = 460, grid-No.2 volts = 0, load resistor (ohms) = 3000, and grid-No.1 resistor (megohms) = 0.1.
- Note 3: With anode-supply volts (rms) = 460, grid-No.2 volts = 0, load resistor (ohms) = 3000, and grid-No.1 resistor (megohms) = 10.
- Note 4: with 7.0 volts ac or dc on heater.
- Note 5: With grid-No.2 volts = 0, grid-No.1 volts = 0, load resistor (ohms) = 1000, and grid-No.1 resistor (megohms) = 0.1.
- Note 6: with 5.7 volts ac or dc on heater.
- Note 7: With 0 volts on heater.
- Note 8: with grid-No.1 volts = -100, grid-No.2 volts = 0, and load resistor (ohms) = 10000.
- Note 9: With anode-supply volts (rms) = 150, grid-No.1 supply volts (rms and in phase with anode-supply voltage) = 16.
- Note 10: with grid-No.2 volts = ±380 with respect to anode and all other electrodes floating.
- * for pulse-modulator service, tolerance is +10%, -5%.
- Without external shield.
- Averaged over any interval of 30 seconds maximum.
- approximately 1800 out of phase with the anode voltage.
- # Sufficient resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings.

SPECIAL RATINGS AND PERFORMANCE DATA

Shock Rating:

GAS THYRATRON

four different positions. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for heater-cathode leakage current, grid-No.1 supply voltage for tube conduction (1) and anode-supply voltage for tube conduction (1).

Fatigue Rating:

Heater-Cycling Life Performance:

Cycles of Intermittent Operation. . . . 2000 min. cycles Under the following conditions: Heater volts = 7.5 cycled one minute on and one minute off, heater 100 volts negative with respect to cathode, and all other elements connected to ground.

Shorts and Continuity Test:

This test is performed on a sample lot of tubes from each production run. In this test a twbe is considered inoperative if it shows a permanent or temporary short or open circuit.

I-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that tubes have been properly stabilized. Conditions of life testing are specified under 50G-hour intermittent life performance, except test run at room temperature. Tubes are initially read for grid-No.1 supply voltage for tube conduction (1). At the end of I hour, grid-No.1 supply voltage is read. The variation in the O-hour and I-hour readings will not exceed 15 per cent. Tubes must also meet established limits of grid-No.1 supply voltage.

100-Hour Survival Life Performance:

This test is performed on a sample lot of tubes from each production run to insure a low percentage of early inoperatives. Conditions of life testing are specified under 500-hour intermittent life performance, except test run at room temperature. At the end of 100 hours, a tube is considered inoperative if it shows a permanent or

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temporary short or open circuit or fails to meet established limits of grid-No. I supply voltage for tube conduction

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. Life testing is conducted under the following conditions: Heater volts = 6.3, anodesupply volts (rms) = 460, grid-No.2 supply volts = 0, average anode milliamperes = 80, peak anode milliamperes = 500, grid-No. | resistor (ohms) = 50000, and minimum bulb temperature (°C) = 150. At the end of 500 hours, tube will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to pass established initial limits of heater current, grid-No. I supply voltage (1), and 500-hour limits for anode-supply voltage (1), heater-cathode leakage current, and leakage resistance shown under CHARACTERISTICS RANGE VALUES.

OPERATING CONSIDERATIONS

Sufficient anode-circuit resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings of the tube.

Curves shown under Type 2D21 also apply to the 5727



5728/FG-67 MERCURY-VAPOR THYRATRON

NEGATIVE/POS	HTIVE-CONT	ROI. TRIO	DE TYPE	
	GENERAL D	ATA		
Electrical:				
Heater, for Unipotential	Cathode:			
V 10 /AC DC)	Min.	Αυ. 5.0	Max. 5.25	volts
Voltage (AC or DC) Current at 5.0 volts .	. 4.70	4.5	4.9	VOLUS
Cathode:	•	7.5	7.0	ar reg.
Minimum Heating Time,				
prior to tube conduc	tion		. 5	minutes
Miximum Outag Time, without rehating .				San Cumas
Direct Interel ctrode Ca				see curves
(Approx., witho			:	
Grid to Anode			. 3.25	μμή
Grid to Cathode			. 8.9	μμ1
Maximum Critica ¹ Grid Cu with ac anode volts		0 .	. 10	uam
Anode Voltage Drop (Appr				volts
lonization Tim (Approx.				
For conditions: dc and				
= 100, peak grid volts peak anode amperes = 1			. 15	μsec
Deionization Time (Appro				
For conditions: dc and	de volts =	120,		
dc grid-supply volts =	-500, grid	1.		
resistor (ohms) = 1000.			. 5	μsec
For conditions: do and	de volts =	120.	. ,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
dc arid-supply volts =	O. grid re	stor		
(ohm) = 1000, and do	anode ampe	res = 2.5	. 850	μse
Mechanical:				
Mounting Position		\	ertical,	base down
Marinum Overall Length				/
Seated Length			>-	1/8" ± 1/4"
Marina Diamet r Bulb				ST-23
Car		. Well	ium (JETE	C No.C1-5
Car Bane . Med um-Shell	Small 4-Pi	r. Bayon	et (JET€C	No. A4-10
	BOTTOM VI	EN		
	01	(3)	n: ~ 2	Grid
Pin 1: Heater	XI	7	_	
Pin 2: Cithode (Grid & Anode	(\	•)	PIN 4:	Heater, Cathode
(Gria & Anode Return)	(tr)	6		Juenouc
		0		

RCA) 5728/FG-67

MERCURY-VAPOR THYRATRON

Temperat	ure	Control	:
Competat	aic	CONTIO	

Heating—When the ambient temperature is so low that the normal rise of condensed-mercury temperature above the ambient temperature will not bring the condensed-mercury temperature up to the minimum value of the operating range specified under Maximum Ratings, some form of heat-conserving enclosure or auxiliary heater will be required.

Cooling—When the operating conditions are such that the maximum value of the operating condensed—mercury temperature is exceeded, provision should be made for forced—air cooling sufficient to prevent exceeding the maximum value.

Temperature Rise of Condensed Mercury to Equilibrium Above Ambient Temperature

INVERTER SERVICE

Maximum Ratings. Absolute Values:

DEAD	ANODE	1101	TACE.
FFAR	AMULIA	VIII	I ALSE.

LAK ANODE VOLTAGE:		Н
Forward	c. volts	ı
Inverse 1000 max	c. volts	ı
GRID VOLTAGE:		L
Peak, before anode conduction500 max	c. volts	Г
Average*, during anode conduction5 max	c. volts	l
ATHODE CURRENT:		ı
Peak	c. amp	ı
Average •• 2.5 max	c. amp	
	c. amp	L
RID CURRENT:		
Average +0.3 max	k. amp	L
CONDENSED-MERCURY TEMPERATURE RANGE +40 to +80		
	Forward	Forward

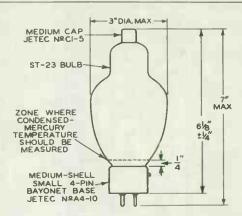
With heater voltage = 4.75 volts and no heat-conserving enclosure.

Averaged over one conducting cycle.

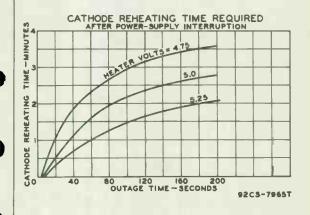
Averaged over any interval of 15 seconds maximum.

2128

5728/FG-67 MERCURY-VAPOR THYRATRON



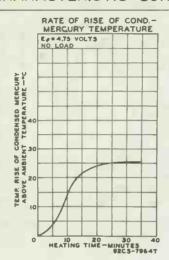
92CS-670IR3



5728

RCA

5728/FG-67 CHARACTERISTIC CURVES



OPERATIONAL RANGE
OF CRITICAL GRID VOLTAGE

RANGE IS FOR CONDITIONS WHERE:
E4-SOUGLIS AC 5 5%; CIRCUIT
E4-SOUGLIS E4-SOUGLI

DC GRID SUPPLY VOLTS

+20

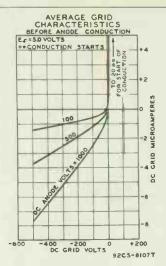
92C3-8108T

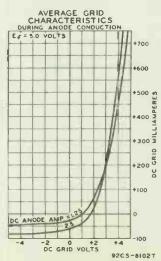
NON-CONDUCTING



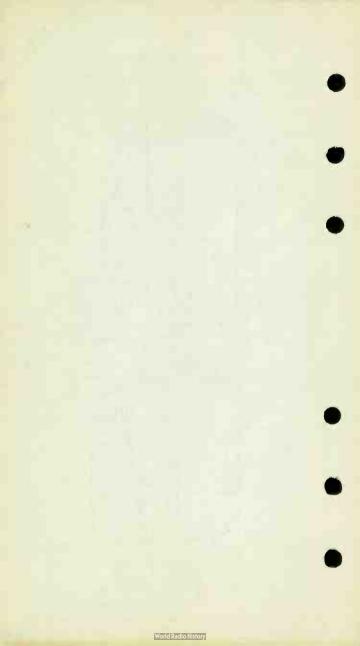
5728/FG-67

CHARACTERISTIC CURVES





5/20



Gas and Mercury-Vapor Thyratron

NEGATIVE-CONTROL TRIODE TYPE

GENERAL DATA

E 1	-	۰	ica	1 .
L 1	CC	L.I	ıva	

Filament Coated

	riament, Coated.	
	Voltage (AC or DC) between pins	
	1 and 4 2.5 volts	
0.	Current at 2.5 volts 9 ± 2 am	9
	Minimum heating time prior to	
	tube conduction 20 sec	2
	Direct Interelectrode Capacitances (Approx.):	
	Grid to anode 2 μμ	t
	Grid to cathode 12 μμ	f
	Ionization Time (Approx.) 10 µsec	0
	Deionization Time (Approx.) 1000 µse	2
	Peak Tube Voltage Drop at anode	
	amperes = 8 10 volts	5
	ampered of the transfer	

Mechanical:

Operating	g Po	SIL	I on						٠						. 1	er	ŢΙ	ca	н,		as	ie.	dow	H
Maximum C	Över	all	Lei	ngt	h										٠							6-	-1/4	11
Maximum [Diam	ete	r.											٠								1-	5/8	**
Weight (A	Appr	ox.) .																				4 0	Z
Bulb																							T1	3
Cap														Me	ed	iun	1	JE	DE	C	No	0.0	1-5	1)
Socket .																	. 5	Sma	111	4	1-(Con	tac	t
Base													Me	-di	ur	n-S	She	-11		Sma	al 1	4	-Pi	n
base		•	• •	•	•	Ť	•			Ĭ,	w i i	th.	Ba	376) De	et.	1.	E)E(: 1	₩о.	. A4	-10))
Basing	Dos	ian	at i	on	fo	r	20	T.	TOA															
basing	Des	riga	CIEI	OH	10	•	C/C		101	4.5							٠	•	•	•	•			

Pin 1-Filament Pin 2-Filament Tap, Circuit Returns



Pin 3. Grid
Pin 4 - Filament
Cap - Anode

Thermal:

Type of Cooling Conve	ction
Temperature Rise of Condensed Mercury to Equi-	
librium Above Ambient Temperature (Approx.):	
No load	oC
Full load	00

GRIO-CONTROLLED-RECTIFIER SERVICE

Maximum and Minimum Ratings, Absolute-Maximum Values:

For anode-supply frequency of 60 cps

PEAK ANODE VOLTAGE:

710/6011

PEAK NEGATIVE GRID VOLTAGE:	
Before tube conduction 500 max.	volts
During tube conduction 10 max.	volts
CATHODE CURRENT:	
Peak	amp
Average 2.5 max.	amp
Fault	атр
CONDENSED-MERCURY TEMPERATURE	
RANGE (Operating)c	oC

^{*} Without external shield.

b Averaged over any interval of 5 seconds maximum.

C For longest life, the operating condensed-mercury temperature range after warm-up should be kept between +80° and +80° C which corresponds approximately to +10° to +50° C ambient.

Gas and Mercury-Vapor Thyratron

NEGATIVE-CONTROL TRIODE TYPE

GENERAL DATA

ΕI	ectr	i ca	: a

Filament, Coated:	
Voltage (AC or DC) 2.5	volts
out tone at any territory	amp
Minimum heating time prior to	
tube conduction 5	sec
Direct Interelectrode Capacitance (Approx.):b	
Grid to anode 2	μμf
Ionization Time (Approx.) 10	μsec
Deionization Time (Approx.) 1000	μsec
Maximum Critical Grid Current 5	μa
Peak Tube Voltage Drop at anode	
amneres = 3 15	volts

Mechanical:
Operating Position Vertical, base down
Maximum Överall Length
Maximum Diameter
Weight (Approx.)
Bulb
Cap
Socket Small 4-Contact
Base
with Bayonet (JEDEC No.A4-10)
Basing Designation for BOTTOM VIEW

Pin 1 - Filament Pin 2-No Internal Connection



Pin 3-Grid Pin 4 - Filament Cap - Anode

Thermal:

Type of Cooling		.Convection
Temperature Rise of Condensed Mercury to Equi-		
librium Above Ambient Temperature (Approx.)	15	°C

GRID-CONTROLLED-RECTIFIER SERVICE®

Maximum and Minimum Ratings, Absolute-Maximum Values:

For anode-supply frequency of 60 cps

PEAK ANODE VOLTAGE:

Forward								1250	max.	volts
Inverse										
PEAK NEGATIVE										
Roforo tubo	cond	uct i	on					500	may	volts

During tube conduction. 10 max. volts



714/7021

AMOUNE	CURRENT:	
MINOUL	COMMENT.	

Peak	 		3 max.	amp
Average ^c	 		1 max.	amp
Fault	 		50 max.	amp
CONDENSED-MERCURY TEMPERATURE				
RANGE (Operating) d	 		-40 to +80	oC.

a With circuit returns to filament-transformer center-tap.

b Without external shield.

C Averaged over any interval of 5 seconds maximum.

d For longest life, the operating condensed-mercury temperature range after warm-up should be kept between +80° and +80° C which corresponds approximately to +10° to +50° C ambient.

Gas and Mercury-Vapor Thyratron

NEGATIVE-CONTROL TRIODE TYPE

GENERAL DATA

E	lecti	rica	1	: a
---	-------	------	---	-----

Filament, Coated:	
Voltage (AC or DC) 2.5	volts
	VOILS
Current at 2.5 volts 6.3 ± 0.8	amp
Minimum heating time prior to	
tube conduction	sec
Direct Interelectrode Capacitance (Approx.):b	
Grid to anode	μμf
Ionization Time (Approx.)	μsec
Deionization Time (Approx.) 1000	μsec
Maximum Critical Grid Current 10	μa
Peak Tube Voltage Drop at anode	
amperes = 5 8	volts

Mechanical:

Operating Position					Vertical,	base down
Maximum Överall Length.						. 4-3/8"
Diameter					. 1.438"	to 1.562"
Weight (Approx.)						3 oz
Bulb						T12
Socket					Small	4-Contact
Base				. Medi	um-Shell Sr	nall 4-Pin
						No.A4-10)
Basing Designation for	- B0	TTOM	VIEW	1		4D

Pin 1 - Filament Pin 2 - Anode



Pin 3-Grid Pin 4-Filament

Thermal:

Type of Cooling		.Convection
Temperature Rise of Condensed Mercury to Equi-		
librium Above Ambient Temperature (Approx.)	30	OC.

GRID-CONTROLLED-RECTIFIER SERVICE a

Maximum and Minimum Ratings, Absolute-Maximum Values:

	For	anode-supply	frequency	of	60	c ps
PEAK AND	DE VOLTA	GE:				

Forward.									٠			1250	max.	voits
Inverse.												1250	max.	volts
PEAK NEGAT	IVE	GR	1D	V(DLTA	GE	:							
Before t	ube	CO	nd	uc1	tion							500	max.	volts

716/6855

CATHODE CURRENT:

	Peak.															8		атр	
	Avera	ge'	С.													1		атр	4
	Fault															80	max.	amp	1
0	DNDFNSI	FD.	-MF	PR	'HIE	5Y	TI	FMI	PF	AÇ	THE	PF.							•

 OC

 $[{]f a}$ With circuit returns to filament-transformer center-tap. ${f b}$ Without external shield.

 $[\]frac{\mathbf{c}}{\mathbf{A}}$ Averaged over any interval of 5 seconds maximum.

d For longest life, the operating condensed-mercury temperature range after warm-up should be kept between +40° and +80° C which corresponds approximately to +10° to +50° C ambient.

Gas and Mercury-Vapor Thyratron

NEGATIVE-CONTROL TRIODE TYPE

GENERAL DATA

E	lectr	ical	: 8
---	-------	------	-----

volts
2 amp
sec
_{LLL} f
μsec
μsec
µа
volts

Operating Position Vertical, base down
Maximum Overall Length
Maximum Diameter
Weight (Approx.)
Cap
Socket Super-Jumbo 4-Contact
Base Large-Metal-Shell Super-Jumbo 4-Pin
with Bayonet (JEDEC No.A4-18)
Basing Designation for BOTTOM VIEW 4BZ

Pin 1 - Grid Pin 2 - Filament Pin 3-Filament



Pin 4 - No Internal Connection Cap - Anode

. 1500 max. volts

Thermal:

Type of Cooling		.Convection
Temperature Rise of Condensed Mercury to		
Equilibrium Above Ambient		
Temperature (Approx.)	30	90

GRID-CONTROLLED-RECTIFIER SERVICE*

Maximum and Minimum Ratings, Absolute-Haximum Values:

For anode-supply frequency of 60 cps

	PEAK	ANODE	VOLTAGE:	
--	------	-------	----------	--

Inverse							1500	max.	volts
PEAK NEGATIVE	GRID VOLTAG	GE:							
Before tube	conduction						500	max.	volts

10 max. volts



760/6858

CATHODE	CU	RR	REN	IT:																
Peak.																	77	max.	атр	
Avera	gec																6.4	max.	атр	4
																	770	max.	amp	•
CONDENS	ED-	ME	R	CUF	₹Y	T	EM!	PEF	₹A`	ΓUI	₹E	R	ANC	GΕ						
10nor	at i	20	-14	1													-40 ±	180	00	

A with circuit returns to filament-transformer center-tap.

b Without external shield.

c Averaged over any interval of 15 seconds maximum.

d For longest life, the operating condensed-mercury temperature range after warm-up should be kept between *40° and *80° C which corresponds approximately to *10° to *50° C ambient.



GAS THYRATRON

NEGATIVE-CONTROL TETRODE TYPE



	GENERAL DATA	
н	Electrical:	
	Heater, for Unipotential Cathode: Voltage 5.7 6.3 6.9 ac or dc volts Current at 6.3 vol* 2.6 2.85 amp Cathode:	
	Minimum heating time prior to tube conduction	
	Grid No.1 to anode 0.23	
	Grid No.1 to cathode, grid No.2, and heater 5.8 μμf Anode to cathode, grid No.2,	
	and heater 3.9 µµf (onization Tine (Approx.):	-
	For conditions: dc anode volts = 100, grid-No.2 volts = 0, grid-No.1 square-pulse volts = +50, and peak anode amperes during conduction	
	a 5	+
	peres = 0.5	
	<pre>(megohms) = 0, and grid-No.2 volts = 0</pre>	
	(megohms) 0, and grid-No.1 volts	
•	Mechanical:	
•	Mechanical: Any Mounting Position. 3-7/8" Maximum Overall Length 3-5/16" Maximum Seated Length 3-5/16" Maximum Diameter 1-23/32" Balb T-12 Base Large-Wafer Octal 3-Pin with External Barriers and Sleeve (JETEC No.B6-100)	-

o without external shield.

- Indicates a change.





GAS THYRATRON

Basing Designation for BOTTOM VIEW .

6CD

Pin 1 - Cathode

Pin 2 - Heater

Pin 3 - Grid No. 1

PEAK ANODE VOLTAGE:

Forward



Pin 5 - Anode

Pin 7 - Heater

Pin 8 - Grid No. 2

650 max, volts

-75 to +90

RELAY AND GRID-CONTROLLED RECTIFIER SERVICE

For anode-subbly frequency of 60 cbs

Maximum Ratings. Absolute Values:

	TOTAL CONTRACTOR OF THE CONTRA	
	Inverse	volts
ı	GRID-No.2 (SHIELD-GRID) VOLTAGE:	
	Peak, before tube conduction100 max.	volts
	Average*, during tube conduction10 max.	volts
ı	GRID-No.1 (CONTROL-GRID) VOLTAGE:	
	Peak, before tube conduction200 max.	volts
	Average*. during tube conduction10 max.	volts
	CATHODE CURRENT:	
	Peak 5 max.	апр
	Average* 0.5 max.	апір
	Fault, for duration of Q.1 second max 20 max.	апр
	AVERAGE GRID-No.2 CURRENT# +0.05 max.	amp
	AVERAGE GRID-No.1 CURRENT# +0.05 max.	amp
	PEAK HEATER-CATHODE VOLTAGE:	,
	Heater negative with respect to cathode. 100 max.	volts
	Heater oositive with respect to cathode, 25 max.	volts
	TE L. 100	00

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . 2 max. megohms

AMBIENT-TEMPERATURE RANGE.

- Indicates a change.

^{*} Averaged over any interval of 30 seconds maximum.



GAS THYRATRON

TABLE I

Ecc = DC Grid-No.1 Supply Voltage (Volts)

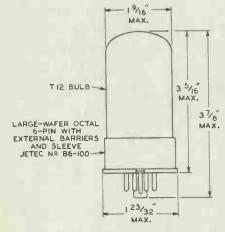
Ecc = DC Grid-No.2 Supply Voltage (Volts)

Rg = Grid-No.1 Resistor (Megohms)

Rg2 = Grid-No.2 Resistor (Ohms)

92											
DC Anode Volts	de Volts 125			C Anode Volts 125			250		Ecc	Rg2*	Ecc.
DC Anode Amperes	0.5	1.0	0.5	1.0	Rgi	-66	92	2			
DEIONIZATION TIME	175 350 650	225 375 700	250 450 1100	275 475 1200	0.1	} -13	1000	0			
μsec (Approx.)	100 125 250	125 150 275	100 150 275	125 175 300	0.001	}-100	1000	0			

^{*} Series resistor between grid No.2 and cathode.



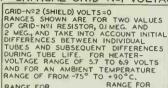
92CS-7635RI

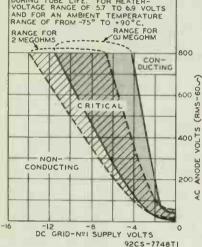


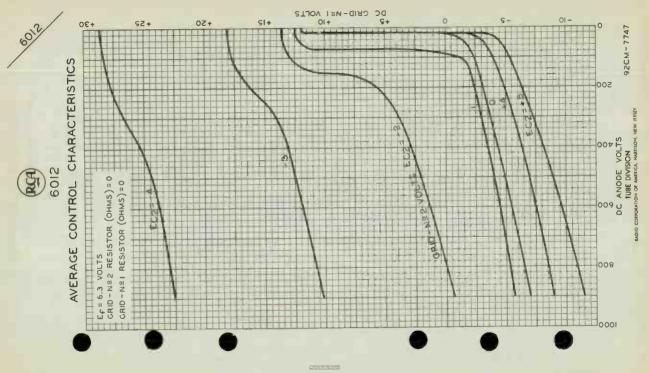
6012

GAS THYRATRON

OPERATIONAL RANGE
OF CRITICAL GRID-NºI VOLTAGE

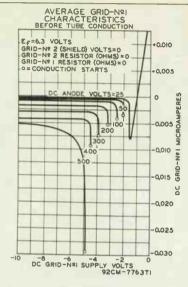


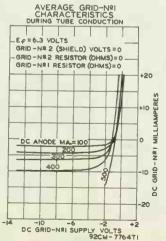






CHARACTERISTIC CURVES







6130/3C45

HYDROGEN THYRATRON

POSITIVE-CONTROL TRIODE TYPE For Operation at Altitudes up to 50000 Feet

	GENERAL DATA
	Electrical:
	Heater, for Unipotential Cathode:
	Voltage 6.3 +5% -10% ac or dc volts
ı	Current at 6.3 volts:
	Minimum 2.0 amp Average 2.3 amp
	Maximum 2.5 amp
	Minimum heating time 2 minutes
	Direct Interelectrode Capacitances (Approx.):
	Grid to anode 3.9 µµf
	Grid to cathode
ï	lonization Time (Approx.) lonization Time (Approx.)
	Anode—Cathode Voltage Drop (Approx.)
	At middle of pulse duration L50 volts
	Maximum Variation in Firing Time (Jitter) 0.06 μsec
	Mechanical:
	Operating Position Any
	Overall Length 5" ± 3/16"
ı	Seated Length
	Maximum D'ameter 1-9/16" Bulb T-12
	Cap
	Base Nedium-Vicanol-Shell Sm 11 4-Pin (JETEC No.A4-9)
	BOTTOM VIEW
	(2) (3)
	Pin 1 - Heater
ı	Pin 2 - 3 thode Cathode
	Pin 3-Gril Cap - Anode
	. ()
	Cooling
	PULSE MODULATOR SERVICE
	FULSE MUDULATUR SERVICE

Maximum and Minimum CCS Ratings, Absolute Values:

For Pressures Down to 70 mm of Hg#

DC ANODE-SUPPLY VOLTAGE . . . 800 min. volts

Defined as the time interval between the point on the rising portion of the grid pulse which is 26% of the peak unloaded pulse amplitude and the point on the anode-current pulse which is 26% of its peak amplitude. The anode-current pulse has a time rile of 0.05 microsecond maximum, The grid pulse has a peak amplitude of 1.30 volts minimum, has a rise time of 0.5 microsecond maximum, and is supplied by a driver having 1500 ohm maximum internal impedance.

- Continuous Commercial Service.
- Corresponds to altitude of about 50000 feet.



HYDROGEN THYRATRON

PEAK ANODE VOLTAGE: Forward (E _{bmf})*	volts
Peak 35 max Average ⁰ 0.045 max Rate of Rise 750 max.an OPERATION FACTORT 3 x 108 max PULSE DURATION● 6 max	mp/μsec
AMBIENT TEMPERATURE	°C
Pulse Duration of 0.5 usec	
DC Ancde-Supply Voltage	volts
Forward	volts
current pulse 530 Grid Voltage:	volts
Negative, before conduction 0 Peak positive pulse (Unloaded) 175 Effective Grid-Circuit Resistance 1000	volts volts ohms
Anode Current: Peak	атр
Pulse Transformer (T) 43000	watts
Maximum Circuit Values: Effect ve Grid-Circuit Resistance 1500 max.	ohms

e: See next page.

TENTATIVE DATA 1

In applications where the anode voltage is applied instantaneously, the power-supply filter should be designed so that the peak forward anode voltage is applied at a rate not to exceed 75000 volts per second.

Exclusive of spike not having more than 0.05 microsecond duration.

Operation with a bulb temperature within the approximate range of 600 uperation with a build temperature within the approximate range of 60° to 900° measured on the bulb directly opposite the anode is recommended for longest life. To attain this temperature under operating conditions involving low ambient temperature, the use of a heat-conserving enclosure for the tube may be necessary.

O Averaged over any cycle.

Define: as Peak Porward Anode Folts x Pulse Repetition Rate (pps) x Peak Anode Amperes (excluding spike).

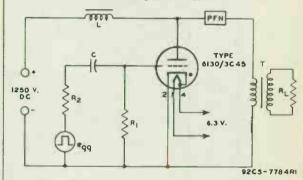




HYDROGEN THYRATRON

Pulse duration is defined as the time interval between points on the pulse envelope at which instantaneous amplitudes are equal to 70.7% of the maximum amplitude excluding spike.

Typical Pulse-Modulator Circuit Operating at 2000 pps



C: Blocking Capacitor, 0.001 μf

egg: Pulse Generator supplying peak positive-pulse grid
voltage of 175 volts (unloaded)

L: Charging Choke, 5 henries

PFN: Pulse-Forming Network with iterative impedance of 50 ohms, and a two-way transmission time of 0.5 microsecond

R: Grid Resistor, 30000 ohms

R₂: Effective Resistance of pulse generator, 1000 ohms

R_L: Load Resistance. Value reflected into primary of transformer (T) is 35 ohms.

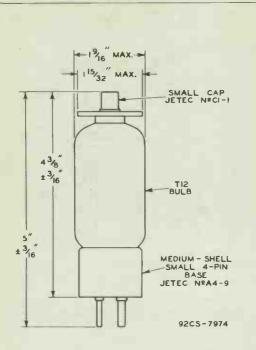
T: Matching Pulse Transformer

OPERATING CONSIDERATIONS

Cooling of the 6130/3C45 is accomplished by natural circulation of air around it. Under no circumstances should a stream of cooling air be applied to the glass envelope.



HYDROGEN THYRATRON



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

JUNE 14, 1954

TUBE DIVISION



NEGATIVE-CONTROL TRIODE TYPE FORCED-AIR COOLED

GENERAL DATA	
Electrical:	
Filament, Coated:*	
	ac volts
Current at 2.5 volts 92	amp
Minimum heating time, prior to	
tube conduction	sec
Direct Interelectrode Capacitances:0	
Grid to anode	μμf
Grid to filament 7.5	μμή
Ionization Time (Approx.)	μsec
Maximum Critical Grid Current for	μsec
instantaneous anode volts = 650 50	μаι
Peak Tube Voltage Drop See Characteristics &	
Maximum Commutation Factor® 400	va/μsec ²
Grid Control Ratio (Approx.):	107 page 0
Under conditions: 10000-ohm grid	
resistor, returns to filament	
terminal FS, voltage on filament	
terminal F in phase with anode	
voltage (with respect to voltage	
at FS), anode voltage between 100	
and 700 volts, and piate load	
of 2000 ohms 100	
Mechanical:	
Operating Position	Any
Maximum Overall Length	11.8"
Maximum Radius (Including grid terminal)	2.88"
Maximum Diameter (Excluding grid terminal)	4.62"
Weight (Approx.)	3 1bs
[Bulb	T36
Terminal Connections (See Dimensional Outline):	
Р	
P – Anode FS –	Filament
	Cathode
G-Grid	Shield,
(• ^ /	Circuit
F-Filament	Returns
FS F	
Air Flow	60 cfm
The specified air flow, from a 2- to 3-inch diam	
located about 12 inches from the anode end of the	
on the tube axis, should be directed at the and	
permitted to flow freely around the outside of	
cup, grid-seal band, and glass bulb. These requi	
for operation at sea level and at an ambient tem	
* O # @ See next page.	
· · · · · · · · · · · · · · · · · · ·	





30°C. Athigheraltitude flow must be increased temperatures and the anode Anode Temperature (Measured 1/2 inch of region where terminal blade joins anode Temperature of Anode Seal, Seals, and Filament Seals	to ma temper withing anoto surface Grid	intai rature in de ce)	n the resp within maxi	ective seal
Maximum Ratings, Absolute V	alues:			
For supply freq	quency	of 25	to 60 cps	
		inuous vice	Intermit Servic	
PEAK ANODE VOLTAGE: Forward Inverse GRID VOLTAGE:		max. max.	650 ma. 650 ma.	
Peak, before tube con- duction	-150	max.	-150 ma	x. volts
conduction ANODE CURRENT:		max.	-10 ma	
Peak	160 40	max. max.	4 00 ma 7 ma	x. amp
0.1 second maximum . GRID CURRENT:	4000	max.	4000 ma	x. amp
Average positive Peak positive with	2.0		2.0 ma	
anode negative AMBIENT-TEMPERATURE		max.	0.1 ma	
RANGE Typical Operation:	-55 to	0 +/5	-55 to +	75
For intermittent ac c utilizing inverse-par anode-supply	rallel	circu	it of Fig. 1	ower with
"On" (Conduction) Period . "Off" (Non-Conduction) Peri RMS Anode-Supply Voltage Grid-Bias Voltage . Grid-Circuit Resistance . Grid-Pulse Voltage . Anode Current (Per Tube): Peak . Average . Load RMS Demand Current .	od		34 220 50	

*,0,#,@,m,d,@,O,A,A: See next page.

Maximum Circuit Values:

Continuous Intermittent Service Service

Grid-Circuit Resistance. . . 0.1 max. 0.1 max. megohm

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Throughout Tube Life

					MOLE	Min.	. 3,43 P.	- 1	
Filament Cwrrent					1	87	97	amp	
Peak Tube Voltage Drop					1,2	_	40	volts	
Peak Critical Anode Voltage.					1.3		100	volts	
	Peak Tube Voltage Drop	Filament Current	Filament Cwrrent	Filament Current	Filament Cwrrent				

Note 1: With 2.5 volts rms on filament.

Note 2: With peak anode current of 400 amperes provided by a half-cycle pulse from a 60-cps sine wave. Pulse recurs once mach second. Tube drop is measured by an oscilloscope connected between anode and the filament terminal FS. The wrid is tied to anode through a 10,000-ohn resistor.

Note 3: The voltage at terminal F is in chase with the anode voltage (with respect to voltage at filamest terminal FS). Circuit returns are made to terminal FS. Grid resistor = 0to 100,000 other.

In single—phase applications, to avoid excessive heating of the filament and for maximum tube life, the voltage at *llament terminal F should be in phase with the voltage at the anode terminal (with respect to voltage at filament terminal FS). All returns should be made to filament terminal FS in order to reduce the amount of rms current flowing through the filament terminal FS in order to reduce the amount of rms current flowing through the filament and filament teads by the anode-return current earling of the filament and filament leads by the anode-return current earling quadrature operation, the filament and snode voltages should be 900 out of phase for optimum results. However, in practical spications, nearly full realization of the advantages of this type of excitation is possible with the filament and once voltage between 600 and 1200 out of phase. In polyphase operation where the anode voltage transfers from one phase to another during the current-conduction period, quadrature operation is obtained when the filament voltage passes through zero at the center of the current-conduction period.

O Without external shield.

- # Measured by Capacitor-Discharge Method as described in "Standard on Electron Tubes: Methods of Testing, 1950 (50 IRE 7.S2)" available from The Institute of Radio Engineers, 1 East 79 St., New YDrk 21, N. Y. Also available in "Proceedings of the 1.3.E.", Vol.38, N+.9. page 1092 (September 1950). Conditions of measurement involve anode-supply voltage (Epb) of 300 volts, grid-supply voltage (Ecb) of 500 ohms and anode current (Ib) of 21 amperes.
 - Commutation factor is the product of the rate of current decay in amperes per microsecond just before conduction ceases and the rate of inverse-voltage rise in volts per microsecond following current conduction.
- Continuous Service is defined as service where conduction recurs for each cycle of the anode-supply voltage.
- Intermittent Service is defined as serwice where conduction does not take place as often as every cycle of the anode-supply voltage.
- Averaged over any period of 15 seconds maximum.
- This rating applies when the average or the rms load current is at a maximum with respect to the phase-retard angle. This condition obtains with zeru phase-retard angle, as the phase-retard angle is increased, the average or rms load current is reduced but the severity of duty on the 7M86 is not reduced.





The angle of phase retard is the angle by which the grid signal (or the resultant tube conduction) lags the time at which the incoming and outgoing tubes have equal instantaneous values of voltage from the sirusoidal supply.

- A Averaged over any period of 36 seconds maximum.
- Averaged over the "on" period of 2 seconds.

OPERATING CONSIDERATIONS

The mounting may support the 7086 in any position. suitable mounting arrangement is provided by the use of three insulated I/4-inch-diameter studs set perpendicularly in a rigid surface at locations which are spaced to correspond with the spacing of the terminal holes as shown on the Dimensional Outline. The studs should extend a minimum distance of 5 inches out from the surface, and should be threaded for a minimum length of 2 inches on their free end. Place a nut followed by a brass or copper washer on each stud so that I-1/2 inches of the free end extends beyond the washer. Then mount the tube by slipping the holes of the tube's terminals onto the studs. The terminal lugs of the connecting leads to the tube can then be slipped onto their respective studs. Tighten the connection with a second nut on each stud. In order not to subject the glass-to-metal seals to stress which may damage them, use two wrenches--one on each side of the tube terminals when tightening a connection.

Filament leads should be made of No.2 stranded copper wire, or equivalent. The tube end of the wire lead should be hard soldered to a 225-ampere (minimum) copper terminal lug. Be sure that this terminal lug is placed in direct contact with the filament terminal before tightening the nut.

The anode lead should be made of No.5 copper wire, or equivalent, and terminate at the tube end in a 150-ampere (minimum) copper terminal lug.

The grid lead should terminate at the tube end in a lug that may be fastened to the grid terminal by a No.6 screw & nut.

Sufficient anode-circuit resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings of the tube.



XENON THYRATRON

Numerical Relationships Among Electrical Quantities

cuit; no back emf in the load circuit; and no phase-back.

E = Trans. Sec. Voltage (RMS)

Eav * Average DC Output Voltage
Ebmf = Peak Fosward Anode Voltage

E_{Dmi} = Peak Inverse Anode Voltage

Em = Peak DC Output Voltage

Er = Major Ripple Voltage (RMS)

f = Supply Frequency

f = Major Ripple Frequency

I_{av} = Average DC Output Current
I_h = Average Anode Current

I = RMS Load Current

t_p = Anode Current (RMS) t_{pm} = Peak Anode Current

Pac * Average Power in Load

Pal = Line Volt-Amperes

Pap = Trans, Pri, Volt-Amperes
Pas = Trans, Sec. Volt-Amperes

Pdc = DC Power (E_{av} x I_{av})
P_D * Peak Load Volt-Amperes

1_b = Average Anode Current

Note: Conditions assumed involve sine-wave supply; zero
voltage drop in tubes; no losses in transformer and cir-

RATIO	Fig. 1	Fig. 2	Fig. 3	Fig. 4	Fig. 5
Voltage Ratios					
E/E _{av}	-	-	2.22	1.11	1.11
E _{bmi} /E	1.41	1.41	1.41	2.83	1.41
E _{bmi} /E _{av}	-	_	3.14	3.14	1.57
E _m /E _{av}	_	_	3.14	1.57	1.57
E _r /E _{av}	_	-	1.11	0.472	0.472
E _{bmf} /E:					
Resistive Load	1.41	1.41	1.41	1.41	1.41
Inductive Load	1.41	1.41	1.41	2.83	1.41
requency Ratio					
f _r /f	-	-	1	2	2
urrent Ratios					
1 _b /1 _{av}	_	_	1	0.5	0.5
Resistive Load					
lp/:av	-	-	1.57	0.785	0.785
l _{pm} /lav	-	-	3.14	1.57	1.57
l _{pm} /l _b	3.14	3.14	3.14	3.14	3.14
1 ₁ /1 _b	2.22	2.22k*	-	-	-
Inductive Load					
lp/lav	-	-	-	C.707	0.707
i _{pm} /lav	-	-	-	1	l l
l _{pm} /l _b	-	-	-	2	2
1b/lav	_	_	_	0.5	0.5

: See next page.





RATIO	Fig. I	Fig. 2	Fig. 3	Fig. 4	Fig.5
Power Ratios					
Pac/!bEbmf	1.57	1.57	-	_	_
Resistive Load					
Pas / Pdc	-	_	3.49	1.74	1.24
Pap/Pdc	-	-	2.69	1.23	1.24
Pa1/Pdc	-	_	2.69	1.23	1.24
Inductive Load					1
Pas/Pdc	-	_	-	1.57	1.11
Pap/Pdc	-	-	-	1.11	1.11
Pa1/Pdc	-	_	-	1.11	1.11

The use of a large filter-input choke is assumed except for the circuit of Figs.1 and 2.

^{*} k = 1/2 number of turns in secondary of transformer T $_p$ divided by the number of turns in the primary of T $_p$.

CIRCUIT Sirgle-Phase	MAX. TRANS. SEC. VOLTS (RMS) E	APPROX. DC OUTPUT VOLTS TO FILTER Eav	MAX. DC OUTPUT AMPERES	MAX. DC OUTPUT KW TO FILTER Pdc	MAX. AV. AC OUTPUT KVA
Fig. Inverse-Parallel (AC Voltage Control)					(1=0 A
Intermittent Service	460	-	- '	-	∫130 ↑ 7 ♦
Continuous Service	460	-	-	-	40 ₺
Fig.2 Full-Wave Reflected Impedance (AC Voltage Control)	460	_	_	-	40₺
Fig. 3 Half-Wave {DC Voltage Control)	460	205	40	8	_
Fig.4 Full-Wave (DC Voltage Control) With Resistive Load With Inductive Load	230 230	205 205	80 80	16 16	
Fig.5 Series (DC Voltage Control)	460	410	80	32.5	-

 $^{^{\}blacktriangle}$ under conditions with "on" period of 2 seconds and "off" period of 3% seconds.

Averaged over any period of 36 seconds maximum.

Averaged over any period of 15 seconds maximum.



XENON THYRATRON

AC Voltage Control

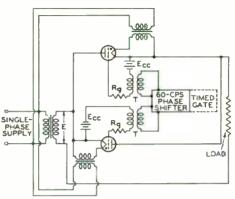


FIG. : SINGLE-PHASE INVERSE-PARALLEL

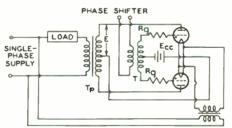


FIG. 2 FULL-WAVE SINGLE-PHASE REFLECTED IMPEDANCE

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



7086 XENON THYRATRON

DC Voltage Control

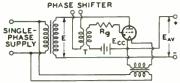


FIG.3 HALF-WAVE SINGLE-PHASE

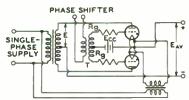


FIG.4 FULL-WAVE SINGLE-PHASE

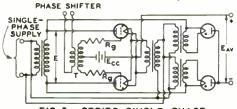


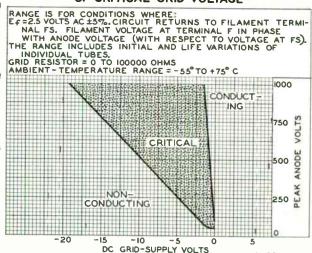
FIG. 5 SERIES SINGLE-PHASE

NOTES

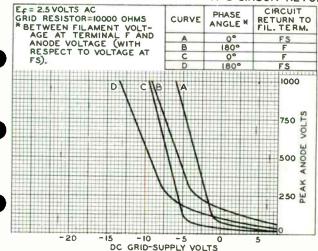
ECC = GRID-BIAS SUPPLY VOLTAGE RG = GRID CIRCUIT RESISTANCE T = PEAKING TRANSFORMER IN FIG. 5, THE RECTIFIER TUBES MAY BE USED AS DIODES. THE 7086 IS USED AS A DIODE SY CONNECTING THE GRID TO FILAMENT TERMINAL FS.

92CL-9438

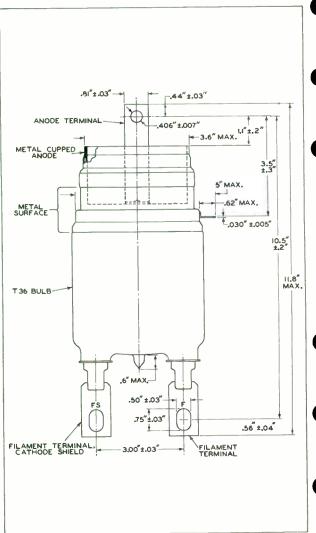
OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE



92CS - 9436 SHIFT OF TYPICAL CONTROL CHARACTERISTICS WITH CHANGE IN FILAMENT PHASING AND CIRCUIT RETURN



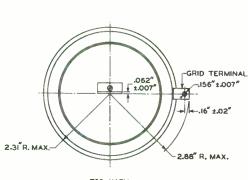
XENON THYRATRON



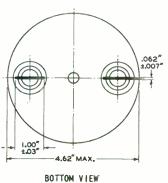
4-58







TOP VIEW

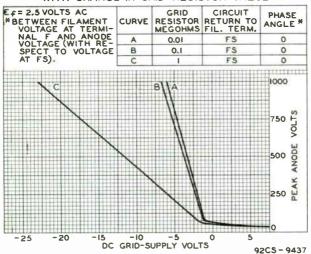


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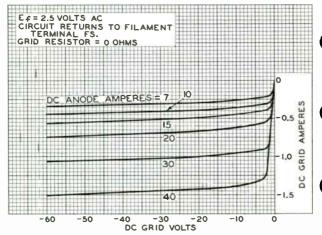




SHIFT OF CONTROL CHARACTERISTICS WITH CHANGE IN GRID-RESISTOR VALUE

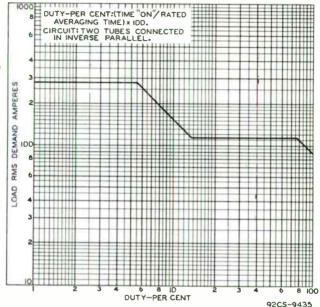


TYPICAL GRID CHARACTERISTICS DURING TUBE CONDUCTION





CURRENT DEMAND CHARACTERISTIC AC VOLTAGE CONTROL SERVICE







CIK/6014

XENON THYRATRON

NEGATIVE-CONTROL TRIODE TYPE

GENERAL	DATA						
Electrical:	VATA						
Filament. Coated: Win.	Αυ		Мах				
Voltage 2.4			2.6	-	0-	gc vo	lts
Current at 2.5 volts. 5.5	6.		7.				amp
Minimum heating time prior to				-			
tube conduction				25	5		sec
Direct Intereletrode Capacitances	(Apr	orox.):				
Grid to anode			•	1			μμf
Grid to cathode		• • •	•	10 500			μμt .sec
Maximum Critical Grid Current			•	500		,	amo
Anode Voltage Drop:		• • •	•		,	μ	cump
Average, at beginning of life				8	3	VO	lts
Maximum, at end of life				14		VO	lts
Maximum Commutation Factor*,							
averaged over first 500 volts				0.11			-
inverse anode voltage rise			•	0.15)	va/	µS²
Grid Control Ratio (Approx.): For conditions: 10000-ohm grid							
resistor, circuit returns to							
filament transformer center-							
tap, dc anode voltage, and dc							
grid voltage				230)		
Mechanical:							
Mounting Pasition			_				Any
Maximum Overall Length						4-1	
Maximum Diameter						1-9/	16"
Weight (Approx.)							ΟZ
Bulb	• .: •		:				-12
				Shell (JETE			
Basing Designation for BOTTOM				(JETE	- IN	U. A4-	4D
basing besignation for borrow		• • •	•		• •		70
Pin 1-Filament	X			Pin 3	– Gr	id	
(/)			P. 1		,	
Pin 2 - Anode	1			Pin 4	- F.	lamen	ĩ
	1						
0							
GRID-CONTROLLED RE	CTIFI	ER S	ERV	ICE			
Maximum Ratings, Absolute Values	:						
PEAK ANODE VOLTAGE:							
Forward				1000			lts
Inverse			٠	1250	max	. VO	lts
GRID VOLTAGE:				100			1 .
Peak, before tube conduction.		• •	٠	-100		•	lts
Defined as the product of the rate microsecond just before conduction voltage rase in volts per microseco	of c	urren	t de	ecay i	am	peres	per
voltage rese in volts per microsec	ond to	11 ow	ing	current	c c	nducti	on.





ANODE CURRENT:			
Peak		8 max.	атр
Average		1 max.	amp
(0	.56 sec	8 max.	amp
	1 sec	4.5 max.	amp
Overload*, for duration of <	2 sec	2.25 max.	amp
	3 sec	1.5 max.	amp
(4 sec	1.13 max.	amp
Fault, for duration of 0.1 sec	ond		
maximum		77 max.	amp
AMBIENT-TEMPFRATURE RANGE		-55 to +75	od

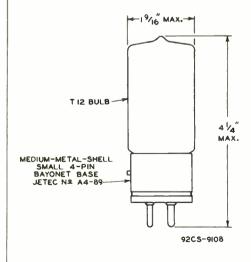
- Averaged over any period of 4.5 seconds.
- * Averaged for duration of overload occurring no more than once in any period of 4.5 seconds.

OPERATING CONSIDERATIONS

Circuit returns may be made to either side of filament or to transformer center-tap.

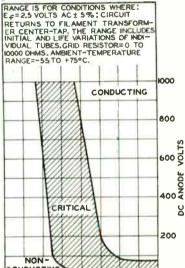
The anode of the CIK/6014 may show a red color when the tube is operated at full load.

Sufficient anode-circuit resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings of the tube.









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C3J/5632

Car

XENON THYRATRON

NEGATIVE-CONTROL TRIODE TYPE

GEN	IERAL	DA	TA						
Electrical:									
	Min.		Av.		Max.				
Mid-tapped:									
Voltage between pins 1	2.4		2 (2 6			4	1
and 4	2.4		2.5	>	11	3	IC OF		its amo
Minimum heating time prior				7	11				ariip
tube conduction							30		sec
Direct Interelectrode Capac		95	(Ar	: :on	ox.)	:	<i></i>		300
Grid to amode							2		μμξ
Grid to cathooe							14		μμf
Maximum Deignization Time .							1000	μ	sec
Maximum Critical Grid Curre	nt						10	μ	amp
Anode Voltage Drop:									
Average, at beginning of							10		lts
Maximum, at end of life .							14	VO	lts
Maximum Commutation Factor↓									
averaged over first 350 v inverse anode voltage ris	0115 (7.0					0 65	/	2
Inverse anode voltage ris Grid Contro! Ratio (Approx.	e	• •		•		•	0.00	Va./	μ5-
For conditions: 10000-uh		4							
resistor, circuit retur									
filament mid-tap, dc	anode	e							
voltage, and dc grid vo							200		
Mechanical:									
Mounting Position									Arıy
Maximum Overall Length									6"
Maximum Diameter								. 1-9/	
Weight (Approx.)						٠.,		3	ΟZ
								No.C1	-5]
Bulb		٠.,		14.	1	CL - 1		T	
Base	. , Me	ed i	um-	-Me	tai-	one i	II am	all 4- No.A4-	001
Basing Designation for 60									
basing besignation for bo	TION	V 1 C	.17	•					701
Pin 1-Filament @		V	3				3 - G		
Pin 2-Filament /	1 -	1	1					ilamen	t
Mid-Tap &		1	1			Ca	ар — А	mode	
Circuit	In		1						
Returns (7	4)						
GRID-CONTROLL	ED RE	СТ	IFU	ER	SERV	IÇE			
Maximum Ratings, Absolute V	alues								
PEAK ANODE VOLTAGE:									
Forward						-		x. vo	
Inverse						12	50 ma	x. VC	olts

Defined as the product of the rate of current decay ir amperes per microsecond just before conduction ceases and the rate of inverse voltage rise in volts per microsecond following current conduction.



GRID VOLTAGE: Pmak, before tube conduction ANODE CURRENT:			-100	max.	volts
Peak			30	max.	amp
Average	٠	÷	2.5	max.	amp
[0.37 sec.			30	max.	amp
Rating I*, for 0.50 sec.			22.5	max.	amp
duration of 1 sec.			11.25	max.	amp
2 sec.			5.63		алр
3 sec.			3.75	max.	атр
Rating II**, for' (3 sec.			2.82		атр
7 300.			3.75		amp
duration of 4 sec.			3.40		amp
4.5 sec.			3.30	max.	amp
Fault, for duration of 0.1 secon	id				
maximum			300	max.	amp
AMBIENT-TEMPERATURE RANGE			-55 to	+75	°C

- Averaged over any period of 4.5 seconds.
- Averaged over duration of overload occurring no more than once in any period of 4.5 seconds.
- Averaged over duration of overload occurring no more than once in any period of 30 seconds.

OPERATING CONSIDERATIONS

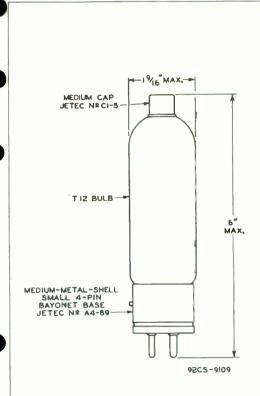
Circuit returns should be connected to filament mid-tap (pin 2).

The anode of the C3J/5632 may show a red color when the tube is operated at full load.

Sufficient anode-circuit resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings of the tube.







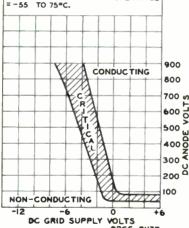
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C3J/5632

XENON THYRATRON

OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE

RANGE IS FOR CONDITIONS WHERE: E = 2.5 VOLTS ± 5%; CIRCUIT RE-TURNS AND PIN 2 CONNECTED TO FILAMENT TRANSFORMER CENTER-TAP. THE RANGE INCLUDES INITIAL AND LIFE VARIATIONS OF INDIVIDUAL TUBES, GRID RESISTOR=0 TO 10000 OHMS, AMBIENT-TEMPERATURE RANGE





C3J-A/5684

XENON THYRATRON
NEGATIVE-CONTROL TRIOGE TYPE

GENERAL DATA

	j GENER	INL D	M I M			
	Electrical:					
	Filament, Coated and Mid-tapped:	Min.	Aυ.	Max.		
D	Current at 2.5 volts	2.4	2.5	2.6 11	ac or	de volts amp
	Minimum heating time prior to tube conduction Direct Interelectrode Capacita		(Anni	rox.):	. 3) sec
	Grid to anode	: :			1000	<u>и</u> f) иsec
	Average, at beginning of li Maximum, at end of life Maximum Commutation Factor,	• •		: : :	. 14	
	averaged over first 350 vol inverse anode voltage rise. Grid Control Ratio (Approx.): For conditions: 10000-ohm g resistor, circuit returns filament mid-tap, dc and	rid to			. 0.6	S va/μs ²
	voltage, and dc grid volt Mechanical:	age.			. 200)
D	Mounting Position	. Med	lium-Me	etal-S	hell Sma	Any 6" 1-9/16" 3 oz Nc.C1-5) T-12 all 4-Pin
	Basing Designation for BOTT					4CF
	Pin 1 - Filament Pin 2 - Filament Mid-Tap & Circuit Returns				in 3-G in 4-F Cap-A	ilament
	GRID-CONTROLLED	RECT	TFIER	SERVI	CE	
	Maximum Ratings, Absolute Val	ues:				
	PEAK ANODE VOLTAGE: Forward	::			1250 ma.	x. volts x. volts
	Defined as the product of the r microsecond just before conduc voltage rise in volts per micro	tion secon	f curs ceases d follo	ent dec and th wing c		
	12 56					TIVE DATA



C3J-A/5684

XENON THYRATRON

GRID VOLTAGE: Peak, before ANODE CURRENT:		tion	 -100 max.	
1 00				
Average			 2.5 max.	. amp
		(0.37 sec.	 30 max.	amp
Rating I*,	for	0.50 sec.	 22.5 max.	. атр
	of	J 1 sec.	 11.25 max.	amp
ga, ac. c.		2 sec.	 5.63 max.	
		3 sec.	 3.75 max.	amp
	_	4 sec.	 2.82 max.	
Rating II*		3 sec.	 3.75 max.	
duration	of	4 sec.	 3.40 max.	
		(4.5 sec.	 3.30 max.	 amp
Fault, for di	uration of O	.1 second		
			300 max.	
AMBIENT-TEMPER	ATURE RANGE.		 -55 to +7	5 °C
• Averaged over	any period of	4.5 seconds.		

- Averaged over any period of 4.5 seconds.
- Averaged over duration of overload occurring no more than once in any period of 4.5 seconds.
- Averaged over duration of overload occurring no more than once in any period of 30 seconds.

OPERATING CONSIDERATIONS

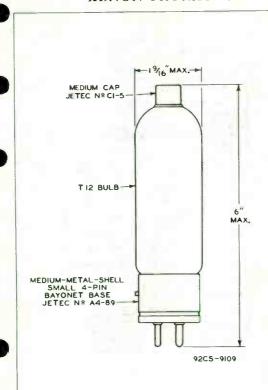
Circuit returns should be connected to filament mid-tap (pin 2).

The anode of the C3J-A/5684 may show a red color when the tube is operated at full load.

Smfficient anode-circuit resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings of the tube.

C3J-A/5684 XENON THYRATRON

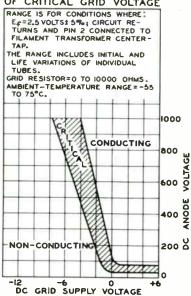




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(RCA) C3J-A/5684 XENON THYRATRON

OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE



92CS-9112T

Xenon Thyratron

NEGATIVE-CONTROL TRIODE TYPE

GENERAL DATA

GENERAL DATA			
Electrical:	.,	4	
Filament, Coafed and Mid-Tapped: Voltage (AC or DC)	Min.	Aυ.	Max.
between pins 2 and 3 Currert Minimum heating time prior	7	2.5 9	
to tube conduction	·····		30 sec
Grid to anode		. 10	10 μsec 000 μsec
Maximum Commutation Factor® averaged over first 350 volts of inverse			
Mechanical:			
Maximum Overall Length. Maximum Seated Length Maximum D'ameter. Weight (Aoprox.). Cap. Base. Terminal Diagram: BOTTOM VIEW	 .Medi	um (JE	6-3/4" 6" 2-3/16" 3 oz
Pin 1 – Grid Pin 2 – Filament Pin 3 – Filament)		Tap & Circuit Returns
Filament, Coafed and Mid-Tapped: Voltage (AC or DC) between pins 2 and 3. 2.4 2.5 2.5 volts Currert. 7 9 11 amp Minimum heating time prior to tube conduction. 30 sec Direct Interelectrode Capacitances (Approx.): Grid to anode			
Min. Av. Max. Filament, Coafed and Mid-Tapped: Voltage (AC or DC) between pins 2 and 3. 2.4 2.5 2.5 volts Currert . 7 9 11 amp Minimum heating time prior to tube conduction. 30 sec Direct Interelectrode Capacitances (Approx.): Grid to anode			
PEAK ANODE VOLTAGE: Forward		900 1250	max. volts
During tube conduction		10	max. volts

ANODE CURRENT:		
Fault		
AMBIENT-TEMPERATURE	RANGE during operation	55 to +75 °C

Defined as the product of the rate of current decay in amperes per microsecond just before conduction ceases and the rate of inversevoltage rise in volts per microsecond following current conduction.

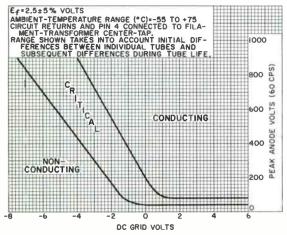
Averaged over any period of 4.5 seconds.

OPERATING CONSIDERATIONS

 ${\it Circuit\ returns}$ should be connected to filament midtap (Pin 4).

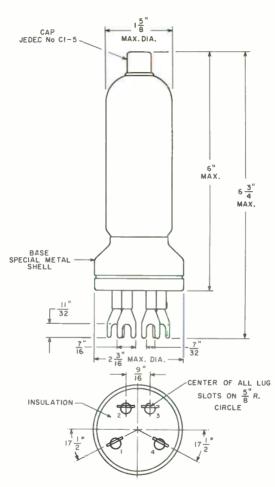
Sufficient anode-c:rcu:t res:stance, including the tube load, must be used under any conditions of operation to prevent exceeding the maximum current ratings of the tube.

OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE



92CS-II323





92CM-11314





Ce

XENON THYRATRON NEGATIVE-CONTROL TRIODE TYPE

GENERA	L DA	ΓA				
Electrical:						
Voltage	2.4	2.5	Max 2.6 23	ac ac	or c	dc volts amp
to tube conduction Direct Interelectrode Capacita					50	sec
Grid to anode			: :	. 10	21 200 10	μμf μμf μsec μamp
Average, at beginning of lif Maximum, at end of life Maximum Cormutation Factor.				:	9 12	
averaged over first 350 volt inverse anode voltage rise. Grid Control Ratio (Approx.): For conditions: 10000—ohm g				. 0.	.66	va/μs²
transformer center-tap, f pin 2 negative with resp filament pin 3 when anode i tive, dc anode voltage, grid voltage	ect s pos and	to i- dc		. 4	210	
Mounting Position Maximum Overall Length. Maximum Diameter. Weight (Approx.) Cap Bulb. Base. Mediu			Mediu Shell	um (JE	TEC	9–1/2' 2–1/32' 7 o: No.C1–5
Basing Designation for BOTTO	OM VIE	₩				482
Pin 1 - Grid Pin 2 - Filament	\square	9	Pir	1 4 -	No C tio	onnec- in
Pin 3 – Filament	\sim	5	(Cap -	Anod	е
GRID-CONTROLLED Maximum Ratings, Absolute Vals		IFIEF	R SER	VICE		

						-		·-·	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	• • •		-	_		- 0	 •	-11	٠,	-14	100		
M	ax i	NUM	Ra	at i	ing	js ,	, /	163	sol	u	te	V	2 l 1	ie:	s:							
	EAK																					
																						volts
1	Inv	/er	se					٠	•	•		•	٠	٠			٠			125G	max.	volts
ė	: Se	e n	ext	pa	age																	



C6J/5C2I XENON THYRATRON

GRID VOLTAGE: Peak, before tube conduction ANODE CURRENT:	-100 max.	volts
Peak	77 max. 6.4 max.	amp amp
Rating I*, for duration of	77 max. 38.5 max. 19.2 max. 12.8 max. 9.6 max.	amp amp amp amp
Rating II**, for duration of . { 3 sec 4 sec	7.7 max. 12.8 max. 11.2 max. 10.3 max. 9.6 max.	amp amp amp amp amp amp
Familt, for duration of 0.1 second maximum	770 max. -55 to +75	amp
A Doffmed be the acadust of the out of		1

- Defined as the product of the rate of current decay in amperes per microsecond just before conduction ceases and the rate of inverse voltage rise in volts per microsecond following current conduction.
- Averaged over any period of 6 seconds.
- Averaged over duration of overload occurring no more than once in any period of 6 seconds.
- *** Averaged over duration of overload occurring no more than once in any period of 30 seconds.

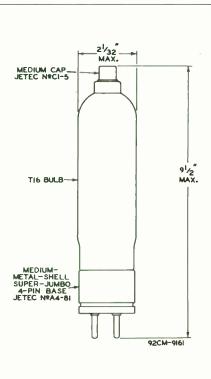
OPERATING CONSIDERATIONS

The anode of the C6J/5C2I will show a red color when the tube is operated at full load.

Sufficient anode-circuit resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings of the tube.

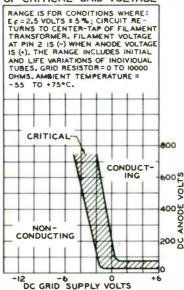








OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE



92CS-912IT



C6J-A/5685

XENON THYRATRON NEGATIVE-CONTROL TRIODE TYPE

	GENERAL DATA		
Electrical:	GEHERAL DATA		
Filament. Coated:	Nin. Av.	Max.	
Voltage	2.4 2.5	2.6 ac	or do volts
Voltage Current at 2.5 volts	19 21	23	атр
Minimum heating time	prior to		
tube conduction		60	sec
Direct Interelectrode C Grid to anode		ox.,. 4	μμf
Grid to cathode			
Maximum Deionization T	ime	1000	
Maximum Critical Grid	Current	10	μ amp
Anode Voltage Drop:	6.116.	9	volts
Average, at beginnin Maximum, at end of 1	g of lite	12	
Maximum Commutation Fa	ctor.		***************************************
averaged over first	350 volts of		2
inverse anode voltag		0.66	va/μs²
Grid Control Ratio (Ap For concitions: 1000			
sistor, circuit retu			
transformer center-	-tap, filament		
pin 2 negative wi			
filament pin 3 when			
tive, cc anode vo		210	
Mechanical:			
Mounting Position		Vertical	. base down
Maximum Overall Length			9-1/2"
Maximum Diameter			. 2-1/32"
Weight (Approx.)		Madium / IET	7 oz
Cap		medium (JEI	T-16
Base	. Medium-Metal-S	hell Super-	Jumbo 4-Pin
			C No.A4-81)
Basing Designation f	or BOTTOM VIEW .		4BZ
Pin 1 - Grid	3	Pin 4-N	lo Connec-
	$() \perp /)$		tion
Pin 2-Filament		Cap - A	innde
Pin 3 - Filament	2	Cap - F	(IIDGE
	ITROLLED RECTIFIER	SERVICE	
Maximum Ratings, Absol	ute Values:		
PEAK ANODE VOLTAGE:		1000	
Forward			max. volts
Inverse		1230	INCLA VOIES
•: See next page.			NTATIVE DAT
12-56	TURE DIVISION	TŁ	NTATIVE DAT

C03-1

(RCA) C6J-A/5685

XENON THYRATRON

		_						
GRID VOLTAGE: Peak, before tube ANODE CURRENT:	conduct	ion				-100	max.	volts
Peak						77	max.	amp
Average Overload:	• • • • •			•	 •		max.	amp
	(0.5	sec			77	max.	amp
Rating I*, for			sec			38.5	max.	amp
duration of.			sec			19.2	max.	amp
duration or.	1		sec			12.8	max.	amp
			sec			9.6		amp
	Ĺ		sec			7.7		amp
Rating II**, fo	r [sec				max.	amp
duration of.			sec				max.	amp
]		sec				max.	атр
E 14 6 1 41			sec		 ٠	9.6	max.	amp
Fault, for durati maximum AMBIENT-TEMPERATURE						770 -55 te	max.	amp OC
.								

- Defined as the product of the rate of current decay in amperes per microsecond just before conduction ceases and the rate of inverse voltage rise in volts per microsecond following current conduction.
- Averaged over any period of 6 seconds.
- Averaged over duration of overload occurring no more than once in any period of 6 seconds.
- Averaged over duration of overload occurring no more than once in any period of 30 seconds.

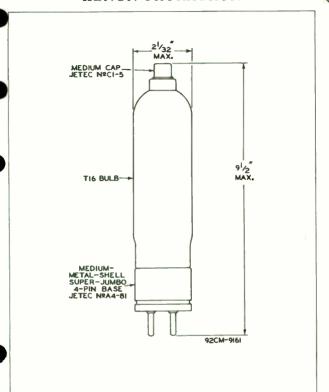
OPERATING CONSIDERATIONS

The anode of the C6J-A/5685 will show a red color when the tube is operated at full load.

Sufficient anode-circuit resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings of the tube.



XENON THYRATRON



12-56

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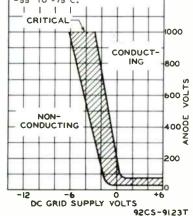
C67-A

C6J-A/5685

XENON THYRATRON

OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE

RANGE IS FOR CONDITIONS WHERE: £ = 2.5 VOLTS ± 5%; CIRCUIT RE-TURNS TO CENTER-TAP OF FILAMENT TRANSFORMER, FILAMENT VOLTAGE AT PIN 2 IS (-) WHEN ANODE VOLTAGE IS (+), THE RANGE INCLUDES INITIAL AND LIFE VARIATIONS OF INDIVIDUAL TUBES, GRID RESISTOR=0 TO 10000 OHMS, AMBIENT TEMPERATURE = -55 TO *75°C.





CI6J/5665

Cle

XENON THYRATRON

NEGATIVE-CONTROL TRIODE TYPE

	NEGATIVE-CONTROL TRIOUE TITE
	GENERAL DATA
	Electrical:
	Filament, Coated: Min. Av. Max. Voltage
0	tube conduction 60 sec Direct Interelectrode Capacitances (Approx.):
	Grid to anode
D	Average, at beginning of life
	averaged over first 330 volts of inverse ancde voltage rise 0.66 va/μs ² Grid Control Ratio (Αρργοχ.): For conditions: 10000-ohm grid re-
	sistor, circuit returns to filament transformer center-tap, filament lead F- negative with respect to filament lead F+ during conduction period, dc anode voltage and dc grid voltage
	Mounting Position Vertical, base down Tube and Base Bracket Dimensions
	FFilamert G-Grid Lead
D	F+-Filament Lead P-Anode Lead (On end opposite bracket)
	Ŏr-
	GRID-CONTROLLED RECTIFIER SERVICE
	Maximum Ratings, Absolute Values:
D	PEAK ANODE VOLTAGE: Forward

(RCA) C16J/5665

XENON THYRATRON

GRID VOLTAGE: Peak, before tube conduction		-100	max.	-100	max.	volts
Peak		160	max.	100	max.	amp
Average			max.		max.	amp
Overload:	. •			-0		C.I.II
[1	sec.	72	max.	81	max.	amp
Rating I*, for 2	sec.	36	max.		max.	атр
duration of { 3	sec.	24	max.	27	max.	amp
3.5	sec.	21	max.	22.8	max.	amp
	sec.	18	max.	20.3	max.	amp
	sec.		max.	_		атр
duration of 3.5	sec.	23			max.	атр
, 4	sec.	22		22.5		amp
[4.5	sec.	21.3	max.	22	max.	amp
Fault, for duration of 0.1 second maximum AMBIENT-TEMPERATURE RANGE.		1000 -55 to		1000 -55 to		amp

- Averaged over any period of 4.5 seconds.
- Averaged over duration of overload occurring no more than once in any period of 4.5 seconds.
- *** Averaged over duration of overload occurring no more than once in any period of 30 seconds.

OPERATING CONSIDERATIONS

The anode of the CI6J/5665 will show a red color when the type is operated at full load.

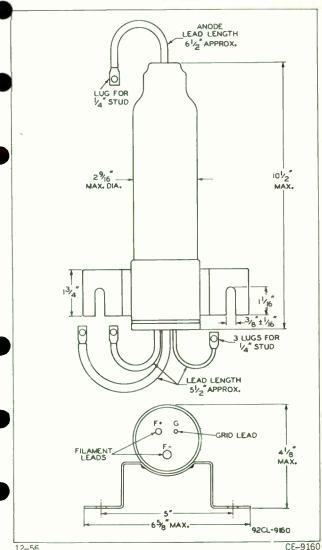
Sufficient anode-circuit resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings of the tube.



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CI6J/5665

XENON THYRATRON



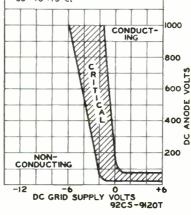
C18.3

CI6J/5665

XENON THYRATRON

OPERATIONAL RANGE OF CRITICAL GRID VOLTAGE

RANGE IS FOR CONDITIONS WHERE; E.F.= 2.5 VOLTS ± 5%; CIRCUIT RE— TURNS TO FILAMENT TRANSFORMER CENTER-TAP; FILAMENT LEAD F— NEGATIVE WITH RESPECT TO FILA— MENT LEAD F+ DURING CONDUCTION PERIOD, THE RANGE INCLUDES INITIAL AND LIFE VARIATIONS OF INDIVIDUAL TUBES, GRID RESISTOR = 0 TO 10000 OHMS, AMBIENT TEMPERATURE RANGE -55 TO +75°C.



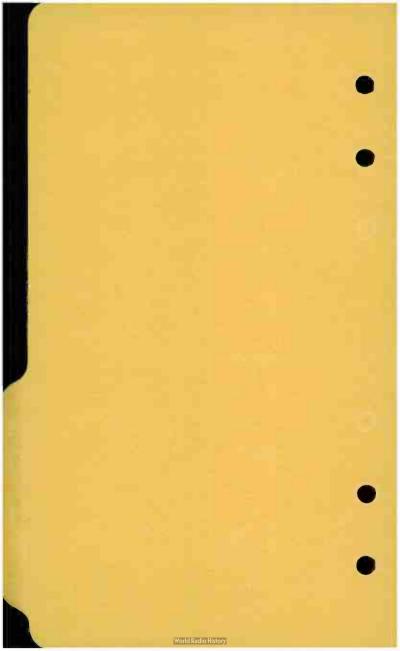
RCA TUBE HANDBOOK HB-3



PHOTOSENSITIVE DEVICE SECTION

This Section contains data on phototubes of the single-unit, twin-unit, and multiplier types; photocells; television camera tubes such as image orthicons, iconoscopes, and vidicons; and other devices employing photosensitive materials.

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



RCA PHOTOCELL DATA TABLES

The following tables contain defining data for the various photocells currently available from RCA. Additional techni-

cal data for types 6694A, 6957, 7163, 7412, 7467, and 7536 are given on the individual data sheets in this section.

PHOTOCONDUCTIVE CELLS - Cadmium-Sulfide Types

		MAXIMUM RATINGS					MAX. D	IMENSIONS	CHA	ARACTERIS	STICS A	T 250	C
RCA Type	Spectral Response	Voltage Between Terminals DC or Peak AC	Power Dissi- pation	Photo- current	Ambient Temp. Range	Length	Diameter	Voltage Between Terminals	Illum- ination foot-		urrent	Max. Decay Current	
arment.		volts	watt	ma	oC	in.	in.	volts	candles	Min.	Max.	μа	
4402	S- 15	200	0.05	5	-75 to +60	0.580a	0.30	12 (dc)	10	1.6	10-	12	
4403	S- 15	250	0.3	50	-75 to +60	0.9	1. 26	50 (ac)	1	7	16	78	
4404	S- 15	600	0.3	50	-75 to +60	0.9	1. 26	50 (ac)	1	2.5	5	40	
4408	S- 15	250	0.5	50	-75 to +60	1. 25a	1. 185	50 (ac)	1	1	3	40	
4410	S- 15	250	0.5	50	-75 to +60	1. 25a	1. 185	50 (ac)	1	2.5	5	40	
4413	S- 15	110	0.05	5	+60	0.587a	0.300	12 (dc)	10	1	2.75	12	
4423	S- 15	250	0.2	20	-75 to +60	0.550a	0.500	12 (dc)	10	2	8	10	
4424	S- 15	110	0.2	50	-75 to +60	0.670b	0.665	12 (dc)	1	3.6	14.5	80	
4425	S-15	110	0.2	50	-75 to +60	0.550a	0.500	12 (dc)	1	3	9	35	
4442	S- 15	600	0.3	50	-75 to +60	0.9	1. 26	50 (ac)	1	2.5	5	40	
4447	S- 15	600	0.3	50	-75 to +60	0.9	1. 26	50 (ac)	1	3	5	40	
4448	S- 15	600	0.3	50	-75 to +60	0.9	1. 26	50 (ac)	1	1.5	4	40	
4450	S- 15	600	0.3	50	-75 to +60	0.9	1. 26	50 (ac)	3.5	2	3, 5	40	
4451	S- 15	600	0.3	50	-75 to +60	0.9	1. 26	50 (ac)	35	2	3.5	40	
4453	S- 15	600	0.3	50	-75 to +60	0.9	1. 26	50 (ac)	1	3	7	40	
6694A ^C	S-12	150	0.03		0 to +70	0.500	0. 22x d	90 (dc)	30	0.057	0.65	0.1	
6957 ^e	S- 15	600	0.5	50	-75 to +60	2-7/32	1-9/32	50 (dc)	1	2	8	40	
7163	S-15	600	0.3	50	-75 to +60	0.9	1. 26	50 (ac)	1	1	3	40	
7412	S- 15	200	0.05	1	+60	1.35a	0.30	12 (dc)	1	0.065	0.275	1	
7536f	S- 15	200	0.05	1	+60	1. 35ª	0.30	12 (dc)	1	0.065	0.275	1	

d Excluding flexible leads. Cell face is rectangular.





Excluding pin length.

e For renewal use.

C Single crystal. f Side-on version of 7412.

PHOTOJUNCTION CELLS

		MAXIMUM RATINGS								
	Spectral Response	Voltage Between Terminals dc volts	Power Dissi- pation watt	Photo- current ma	Ambien Temp. Range					
4420	S- 14	50	0.03	130 - 140 Y 1-11 1-31 Y	-40 to					
7 467	S- 14	50	0.03		-40 to +50					

SOLOHE VOL

Germanium P-N Alloy Types

MAX. D	IMENSIONS	CHARACTER	ISTICS	AT 25° C	RCA Type	
Length	Diameter	Voltage Between Terminals dc volts	Illum. Sensi- tivity µa/fc			
1. 10 ^a	0.350	45	0.7	35	4420	
0.875 ^a	0.35	45	0.7	35	7467	

a Excluding flexible leads.

PHOTOVOLTAIC CELLS

		CHARACTERISTICS AT 28° ± 3° C				
RCA Type	Spectral Response	Minimum Current	Minimum Power Output	Minimum Efficiency		
		ma	mw	per cent		
4800	g	89h	40 h	10.5 ^h		
4801	g	40 h	18 ^h	10.0 h		

Wavelength of max. response 8800 ± 500 angstroms.

Approx. spectral range 4750 to 10750 angstroms.

Silicon N on P Types

MAX. DIMENSIONS			SENSIT				
Length		Width	Length	Width	Area	RCA Type	
in		in.	in.	in.	sq. in.		
0.79	91	0.791	0.742	0.782	0.58	4800	
0.39	26	0.791	0.351	0.782	0.274	4801	

h With incident radiant power of 100 mw/cm² and load resistor adjusted to obtain 0.45 volt.

RCA Photocell Replacement Directory

Type to be Replaced	Replace with Similar RCA Type ^a	Type to be Replaced	Replace with Similar RCA Type ^a
8100	4423	CL607	4402
8142	4425	D-1767	4448
8143	4423	K20	6957
8346	4425	NSL-5	7163
8347	4423	NSL-6	4404
B935	4410	NSL-7	4403
CdS-9	7163	NSL-45	7163
CdS-9F	4404	NSL-46	4404
CL402	7412	NSL-47	4453
CL402S	7536	ORP-11	4425
CL407	7412	0RP-30	6957
CL407S	7536	0RP-60	7412
CL505	4423	0RP-61	7536
CL505L	4425	PB201	7412
CL602	4402	PB204	4425
CL605	4402	PB205	4423

PD401

7412

4402

RCA types shown in this column are not directly interchangeable with the types to be replaced because of differences in mechanical and/or electrical characteristics, physical structure, or types of tests to which they are subjected. For more information as to degree of interchangeability, refer to RCA PHOTOCELL DATA TABLES sheet.



CL605L





DEFINITIONS OF PHOTOSENSITIVE DEVICE TERMS

Radiant Sensitivity. The quotient of output current by incident radiant power of a given wavelength, at constant electrode voltages.

Cathode Radiant Sensitivity. The quotient of current leaving the photocathode by incident radiant power of a given wavelength.

Luminous Sensitivity. The quotient of output current by incident luminous flux, at constant electrode voltages.

Luminous Intensity Sensitivity. The quotient of the output current by the incident luminous intensity, at constant electrode voltages.

Cathode Luminous Sensitivity. The quotient of current leaving the photocathode by the incident luminous flux,

Dynamic Sensitivity. The quotient of the modulated component of the electrical output by the modulated component of the incident radiation.

Current Amplification. Ratio of the output current to the photocathode current, at constant electrode voltages.

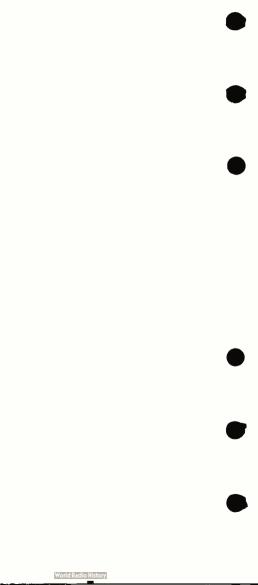
Equivalent Anode-Dark-Current Input. The quotient of the anode dark current by the luminous sensitivity.

Equivalent Noise Input. That value of incident huminous flux which when modulated in a stated manner produces an rms output current equal to the rms noise current within a specified bandwidth.

Electrode Dark Current. The electrode current which flows when there is no radiant flux incident on the photocathode. Transit-Time Spread. The increase in width of the output

nulse over that of the input pulse. Pulse width is measured at 50 per cent of the pulse height,

Median. That value in a series such that half of the tubes in the series are on one side of it, and half on the other.





PHOTOTUBE CLASSIFICATION CHART

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

	Response	S-1	S-3	S-4	S-5	S-8	S-9	S-10	5-11	
	SINGLE-UNIT PHOTOTUBES									
	Vacuum Types	917 919 922 925 6570	926 ⁿ	1P39 929 934 5653	935		1P42*			
	Gas Types	1P40 1P41 868 918 921 923 924 927 928 930 6405/ 1640‡	1P29	1P37 5581 5582 ⁰ 5583						
	TWIN PHOTOTUBES									
	Vacuum Types			5652						
	Gas Types	920		5584						
Î	MULTIPLIE	MULTIPLIER PHOTOTUBES								
	Vacuum Types			1P21* 931-A* 6323\$* 6328\$* 6472\$*	1P28*	1P22*		5217 °°	5819° 6199° 6342° 6372° 6655° 6810°	

PHOTOCONDUCTIVE CELLS See Semiconductor Device Section

Cartridge type.

- Low-microphoric type.
- Head-on type.
- * Non-directional type.
- 9 For headlight-control ervice.
- ▲ 9- tage type.
- 10-stage type.
- 14-Stage type.



DEFINITIONS OF PHOTOTUBE TERMS

Radiant Sensitivity. The quotient of output current by incident radiant power of a given wavelength, at constant electrode voltages.

Cathode Radiant Sensitivity. The quotient of current leaving the photocathode by incident radiant power of a given wavelength.

Luminous Sensitivity. The quotient of output current by incident luminous flux, at constant electrode voltages.

Cathode Luminous Sensitivity. The quotient of current leaving the photocathode by the incident luminous flux.

Current Amplification. Ratio of the output current to the photocathode current, at constant electrode voltages.

Equivalent Anode-Dark-Current Input. The quotient of the

Equivalent Noise Input. That value of incident luminous lux which when modulated in a stated manner produces an rms output current equal to the rms noise current within a specified bandwidth.

Electrode Dark Current. The electrode current which flows when there is no radiant flux incident on the photocathode.

Median. That value in a series such that half of the tubes in the series are on one side of it, and half on the other.



PHOTOTUBE SENSITIVITY SENSITIVITY MEASUREMENTS

GENERAL CONSIDERATIONS

The range of luminous-sensitivity limits given for a phototube on the data sheets of this Section is that which the tube will display when operated under low-current conditions.

If the tube is to be operated under conditions approaching its maximum-current rating, the equipment design should provide for a wider sensitivity range having a minimum value equal to one-half of that shown for low-current operation. The sensitivity of a phototube under such high-current conditions is dependent upon the tube type, as follows:

1. Single-Unit and Twin Phototubes

- a. Gas Types: For high-current operation, and particularly in applications in which the type is subjected to these higher values continuously, a drop in sensitivity below the values for low-current operation may be expected, the extent of the drop being affected by the severity of the operating conditions. After a period of idleness, a gas phototube usually recovers most of its initial sensitivity.
- b. Vacuum Types: Unlike gas phototubes, this class of phototubes shows negligible drop in sensitivity values for different degrees of illumination and over long periods of use. The output current of a vacuum phototube is a linear function of the exciting illumination under normal operating conditions. The frequency response is flat up to frequencies at which transit-time effects become the limiting factor.

2. Multiplier Phototubes

Although RCA Multiplier Phototubes are vacuum types, a drop in sensitivity is to be expected from this class of phototubes when operated at high anode-current values. The extent of the drop is affected by the nature and severity of the operating conditions to which the tube is subjected. After aperiod of idleness, the multiplier phototube usually recovers a substantial percentage of this loss of sensitivity.

Multiplier-phototube-sensitivity values are dependent on the respective amplification of each dyrode stage. Hence, large variations in sensitivity can be expected between individual tubes of a given type. The overall amplification of a multiplier phototube is equal to the average amplification per stage raised to the nth power, where n is the number of stages. Thus, very small variations in amplification per stage produce very large changes in overall tube amplification.

Because these overall charges are very large, it is advisable for designers to provide adequate adjustment of the supply voltage per stage so as to be able to acjust the amplification of individual tubes to the desired design It is suggested that an overall voltage-adjustment

(continued on next page)



PHOTOTUBE SENSITIVITY SENSITIVITY MEASUREMENTS

range of at least z to I be provided. When the output ourrent can be controlled by change in the illumination of the photocathcde of the multiplier phototybe, the required range f adjustment in the sitage are stage can be reduced.

SENSITIVITY MEASUREMENTS

The luminous socitivity value nown the data ages of this Siction are majure incirding to the following procedures:

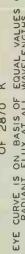
1. Single-Unit and Twin Phototubes

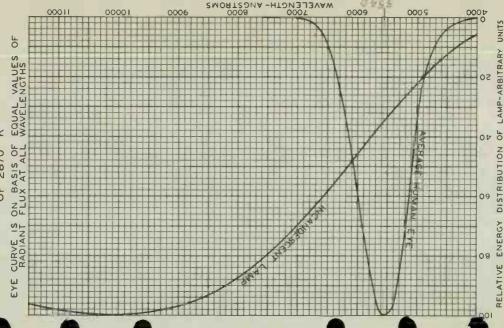
- a. Gas Types: The light source convists of a tungsten lamp operating at a filament color temperature of 2870°K. For the O-cycle measurements, a light input of O.I lumon is used, unless otherwise specified. For the 5000- and 10000 cycle measurements, the light input is varied sinu oidally about a mean value of 6.015 lumen from zero to a maximum of twice the mean. For all measurement, add anode-upply voltage of 9 volt and a 1.0-m grhm lord resistor are enplayed. Under these condition, the effect of tube capacitance is negligible.
- b. Vacuum Types: The light source consists of a tungsten I mp operating It a filament color temperature of 2870°K. A steady light input of O.I lumen is used, unless otherwise specified, together with a dc anode-supply voltage of 250 volts and a 1-mequhm load resistor.

2. Multiplier Phototubes

The light source consists of a tungsten lamp operating at a "illment color temperature of 2870°K. A light flux of 10 microlumens from a rectangular aperture approximately 0.8" long and 0.2" wide is projected normal to the cathode in the direction noted on the basing disgram and outline. The load resistor has a value of 0.01 meguhm. The pali d voltage are specified on the individual data sheets.





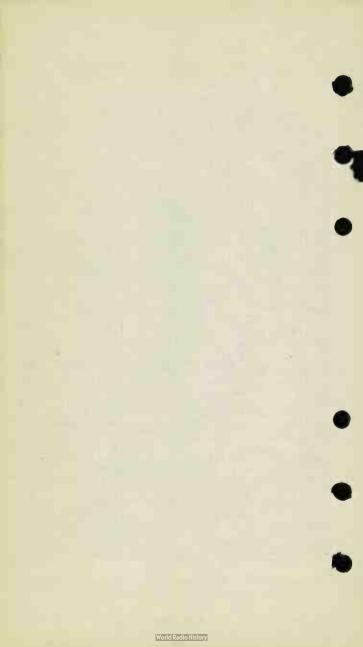


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92CM-6435R

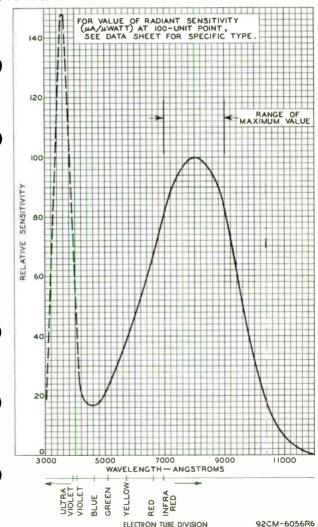
TUBE DEPARTMENT





SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-I RESPONSE

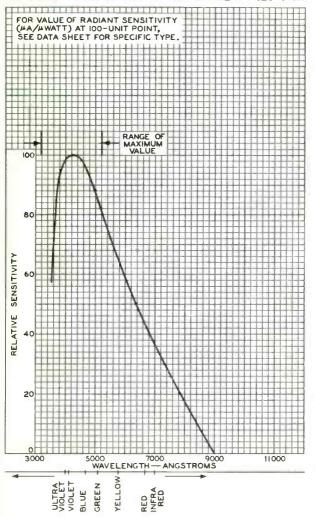
FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS





SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-3 RESPONSE

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



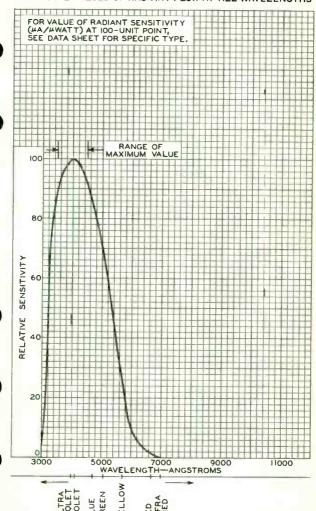
ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6057R6



SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-4 RESPONSE

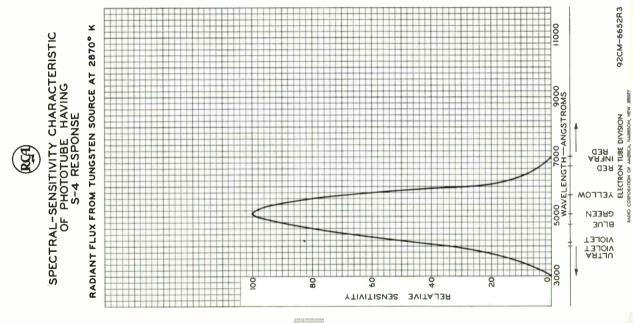
FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



ELECTRON TUBE DIVISION

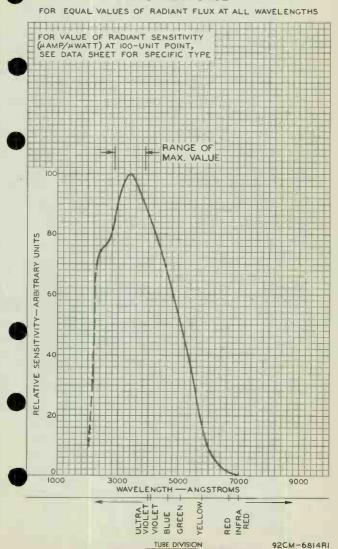
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6152R9





SPECTRAL SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-5 RESPONSE

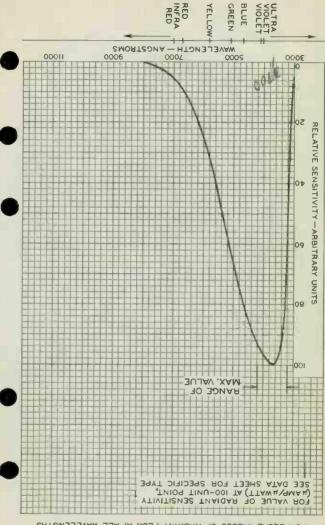


RADIO CORPORATORIO DE GIOLO DE GIOLO NAREISON NEW JERSEY



SPECTRAL SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-8 RESPONSE

POR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS

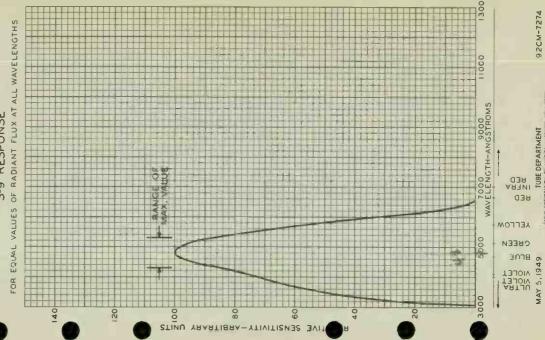


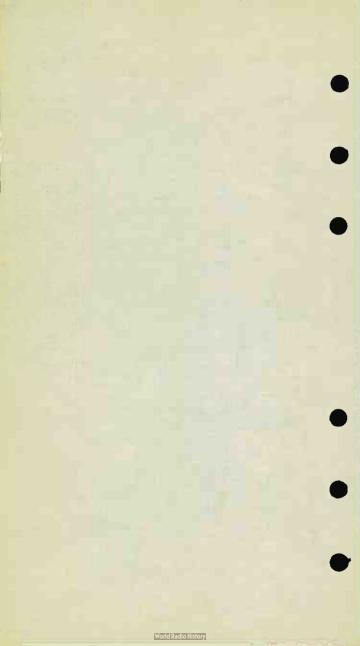
BADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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PHOTO SENSIT

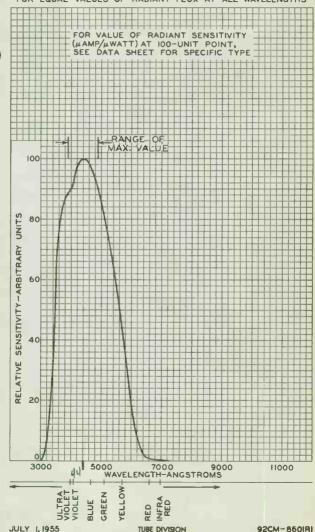




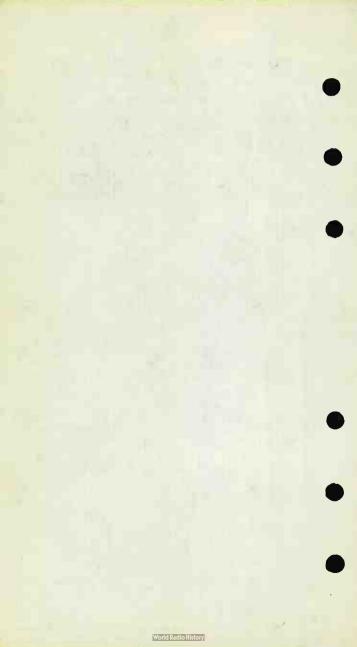


SPECTRAL SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-II RESPONSE

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



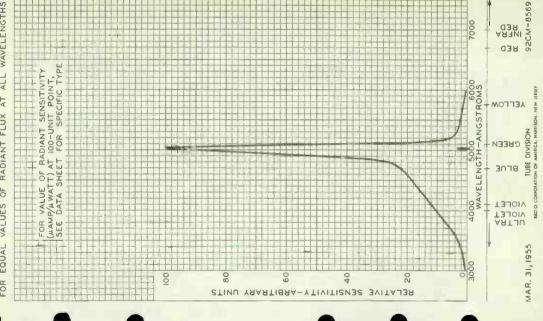
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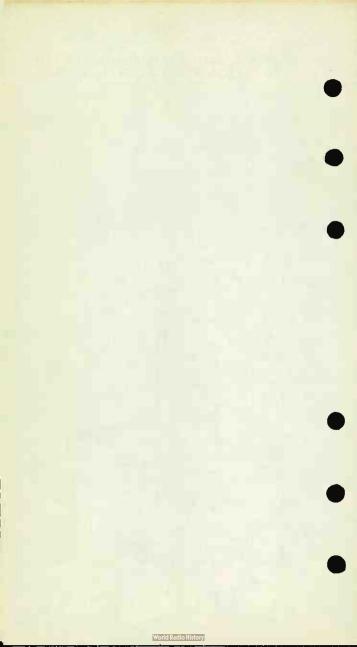




HAVING CHANCELL SPECTRAL SENSITIVOF PHOTOCONDUC

EQU FOR

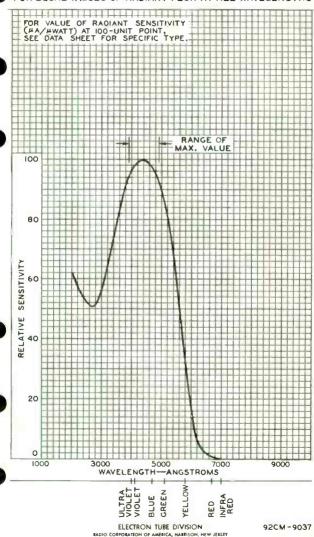






TENTATIVE SPECTRAL SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-13 RESPONSE

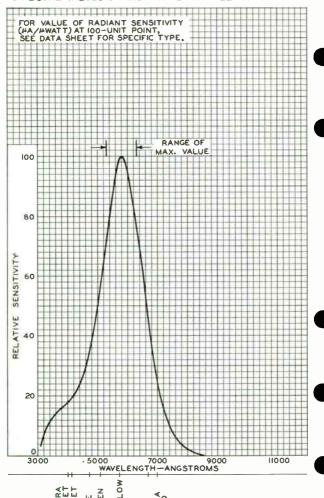
FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS





TENTATIVE SPECTRAL SENSITIVITY CHARACTERISTIC OF PHOTOCONDUCTIVE CELL HAVING S-15 RESPONSE

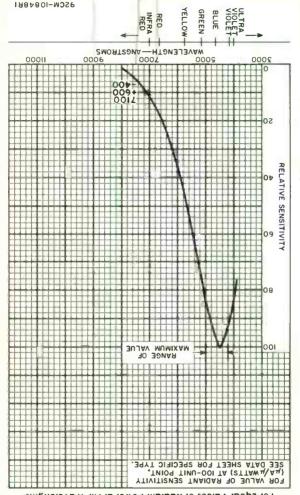
FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



Response 5-18

PHOTOSENSITIVE DEVICE HAVING 5-18 RESPONSE SPECTRAL-SENSITIVITY CHARACTERISTIC OF

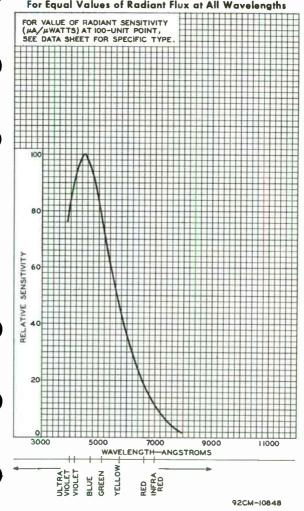
For Equal Values of Radiant Power at All Wavelengths





SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOSENSITIVE DEVICE HAVING S-18 RESPONSE

For Equal Values of Radiant Flux at All Wavelengths

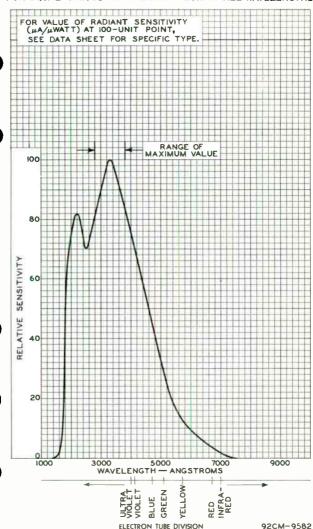


World Radio History



TENTATIVE SPECTRAL - SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-19 RESPONSE

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS

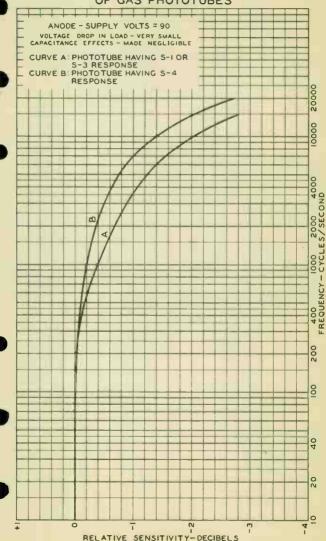


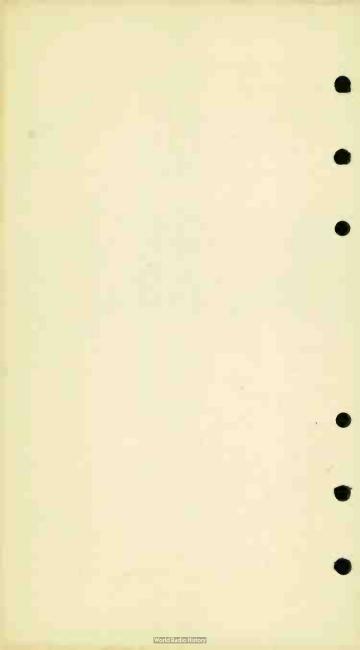
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
World Radio History





FREQUENCY-RESPONSE CHARACTERISTICS OF GAS PHOTOTUBES







MULTIPLIER PHOTOTUBE

9-STAGE TYPE WITH S-4 RESPONSE

For applications involving extremely low light levels



IP2

MULTIPLIER PHOTOTUBE

	Min.	Median	Max.	
Cathode radiant, at				
4000 angstroms	****	0.04	-	μ amp/ μ watt
At 0 cps	40	80	800	amp/lumen
At 100 Mc	_	76	-	amp/lumer
Cathode luminous⁴	_	40		μamp/lumen
Current Amplification .	_	2 x 10 ⁶	_	
Equivalent Anode-Dark-				
Current Input®	-	-	5 x 10 ⁻¹⁰	lumen
Equivalent Noise				
Input*	-	5 x 10 ⁻¹³		lumen
With E = 750 volts (exce	pt as	noted)		
	Hin.	Median	Max.	
Sensitivity: Radiant, at 4000				
angstroms	_	12000	_	μamp/μwatt
Cathode radiant, at				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
4000 angstroms	_	0.04	-	μamp/μwatt
Luminous				7-0-1-4-1-0-1-0-1
At 0 cps	_	12	-	amp/lumen
Cathode luminous⁴	_	40	_	µamp/lumen
Current Amplification .	-	300000		F
* On plane perpendicular to	the ind	icated direct	ion of inci	dent light.

- On plane perpendicular to the indicated direction of incident light
- Averaged over any interval of 30 seconds maximum.
- For conditions where the light source is a tungsten-filamentlamp operated at a color temperature of 28700K. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.
- For conditions the same as shown under (b) except that the value of light flux is 0.01 lumen and 100 volts are applied between cathode and all other electrodes connected together as anode.
- Measured at a tube temperature of 25°C and with the supply voltage (E) adjusted to give a luminous sensitivity of 20 amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.
- For maximum signal-to-noise ratio, operation with a supply voltage (E) below 1000 volts is recommended.
- Winder the following conditions: supply voltage (f) is 1000 volts, external shield operated at -1000 volts with respect to anode, 2500 tube :emperature, ac-amplifier bandwidth of 1 cycle per second, tungsten light Source at color temperature of 2870% interripted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

OPERATING CONSIDERATIONS

The operating stability of the IP21 is dependent on the magnitude of the anode current and its duration. When the IP21 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the IP21 usually recovers a substantial percentage of such loss in sensitivity.

Indicates a change.

12-56

DATA 1



MULTIPLIER PHOTOTURE

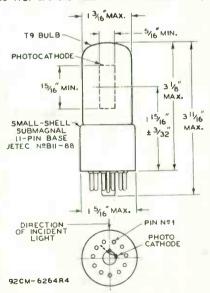
The use of an average anode current well below the maximum rated value of 0.1 milliampere is recommended when stability of operation is important. Whem maximum stability is required, the anode current should not exceed 10 microamperes, and the tube should be given a warm-up period of about 1/2 hour under load conditions.

Electrostatic and/or magnetic shielding of the IP21 may be necessary.

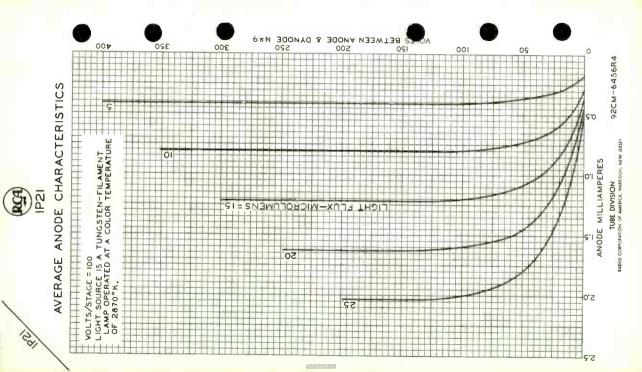
> SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-4 Response is shown at the front of this Section

Curves showing EFFECT OF MAGNETIC FIELD ON ANODE CURRENT. VARIATION IN SENSITIVITY OF PHOTOCATHODE ALONG ITS LENGTH. and

VARIATION IN SENSITIVITY OF PHOTOCATHODE ACROSS ITS PROJECTED WIDTH IN PLANE OF GRILL for Type IP21 are the same as those shown for Type 931-A

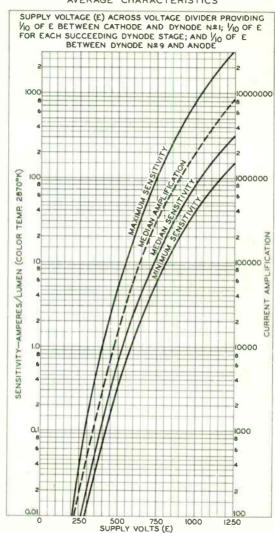


\$ OF BULB WILL NOT DEVIATE MORE THAN 20 IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.





AVERAGE CHARACTERISTICS

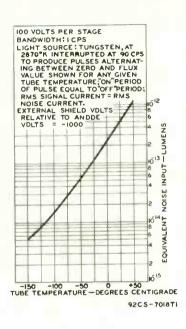


TUBE DIVISION
PORATION OF AMERICA, MARRISON MEN JESSE

92CL-6454R3



EQUIVALENT-NOISE-INPUT CHARACTERISTIC



Pin

MULTIPLIER PHOTOTUBE

9-STAGE TYPE WITH S-8 RESPONSE

	DATA
	General:
	Spectral Response
	Wavelength of Maximum Response 4200 ± 500 angstroms
	Cathode:
	Minimum Projected Length*
	Minimum Projected Width* 5/16"
	Direct Interelectrode Capacitances:
	Anode to Dynode No. 9 4 µµf
	Anode to All Other Electrodes 6.5 µµf
	Maximum Overall Length
	Maximum Seated Length
	Seated Length to Center of Cathode 1-15/16" ± 3/32"
	Maximum Diameter
	Bulb
	Mounting Position Any
	Base Small-Shell Submagnal L1-Pin,
	Non-Hygroscopic
	Basing Designation for BOTTOM VIEW
	Pin 1- Dynode No.1 5 7 Pin 7- Dynode No.7
	Pin 2- Dynode No. 2 42 8 Pin 8- Dynode No. 8
	Pin 3- Dynode No 3
	Pin 4- Dynode No.4 Pin 10- Anode
	Pin 5- Dynode No.5 2 Pin 11- Cathode
	Pin 6- Dynode No.6
	DIRECTION OF LIGHT
	Maximum Ratings, Absolute Values:
	ANODE-SUPPLY VOLTAGE (DC or Peak AC) 1250 max. volts
	SUPPLY VOLTAGE BETWEEN DYNODE No.9
1	and ANODE (DC or peak AC) 250 max. volts
4	PEAK ANODE CURRENT 10 max. ma
	AVERAGE ANODE CURRENTO 1 max. ma
	AMBIENT TEMPERATURE 50 max. °C
	Characteristics:
	With 100 volts per dynode stage and
	100 volts between dynode No.9 and anode
	Min. Av. Max.
	Anode Dark Current# 0.25 µamp
	Sensitivity:
	At 4200 Angstroms – 370 – μamɔ/μwatt
	Luminous* 0.115 0.6 50 amp/lumen
	Current Amp ification 200000 -
	Luminous Detectivity* 1 x 10 ⁻¹⁰ lumen
	The use of azout 50 volts between dynode No.9 and anode will give improved operating stability without sacrifice in sensitivity as explained in note under Type 931-A.
	in note under Type 931-A.
	On plane perpendicular to indicated direction of incident light.
	Referred to cathode.
	O, ₩, •, ♠, ■. A: See next page. ← Indicates a change.
	NAP 15 10/8

653



MULTIPLIER PHOTOTUBE

→ Characteristics:

With 75 volts per dynode stage and 50 volts between dynode No. 0 and anode

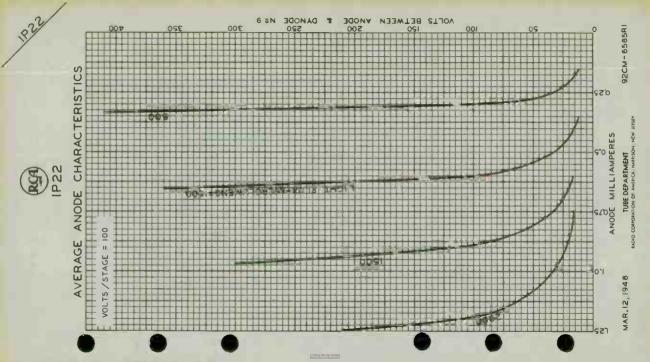
,			-			-	
Sensitivity:							Aυ.
At 4200 Angstroms	÷			٠			55 μamp/μwatt
Luminous*							0.09 amp/lumen
Current Amplification							30000

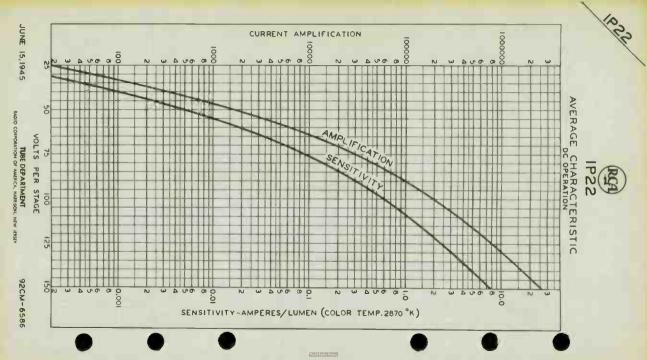
- Averaged over any interval of 30 seconds maximum.
- B Dark current due to thermionic emission and ion feedback may be reduced by the use of refrigerants.
- For maximum signal-to-noise ratio, operation below 1000 volts is recommended.
- Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY AND SENSITIVITY MEASUREMENTS" at the front of this Section.
- Ratio of anode sensitivity to cathode sensitivity.
- **Matto of anode Sensitivity to calloude Sensitivity.

 **Defined as the value where the ms output current is equal to the rms noise current determined under the following conditions: 100 volts per stage, 25°C tube temperature, bandwidth of 1 cycle per second, tungsten light source at 2870°K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value state. The 'on' period of the pulse is equal to the 'off' period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

OUTLINE DIMENSIONS for Type 1P22 are the same as those for Type 931-A

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-8 Response is shown at the front of this Section







P28

MULTIPLIER PHOTOTUBE

4-STACE TYPE WITH 5-5 ESFONSE

	,
/	10
	1,2
	150
	10

	DATA	
	General:	١
	Spectral Research S-5	
)	Cith d: Minimum project d lerath*	
	Direct Interfected Caratter (cro.): And try december 1 to broke 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	Maximum and Lenith	
	ful pither roll 1-5 =" + 3/32"	l
	Maximum Di ~ ter	
	Wright (Accross.)	ı
	Ball	
	Busica Cerianation for BUTON MEN	١
	1	
	Pin 5 - Oya da No.4 Pin 5 - Oya da No.4 Pin 6 - Oya da No.4 Pin 6 - Oya da No.4	
	DIRECTION OF INC DE T	ĺ
	Maximum Ratings, Absolute Values	ı
	AN DE-SUPPLY NOTICE (IT or P 15 volts SUPPLY VOLTAGE BETALEN DYNOUT N	١
	AND AND A COMMENT OF THE NAME	
	Characteristics Range Values for Equipment Design:	ı
	Under conditions with supply vite (f) creatinge divider providing 1/10 or a between cathode in dynode to.1; 1/10 of E for each succeeding lynoditing; and 1/10 of E between dynode No.9 and another the succeeding lynoditing	
	With = 100c velts (excett as net ')	l
	Min. Midian Max.	
	Klint, t 3100	
	On plane percendicular to the interest direction of incident radiation.	

- Indicates a change.

Averaged over any interval of 30 conds m ximum.





MULTIPLIER PHOTOTUBE

Cathoda radiose se	Min.	Median	Max.	
Cathode radiant, at 3400 angstroms	-	0.050	-	μamp/μwatt
At 0 cps At 100 Mc	10	50 47.5	300	amp/lumen
Cathode luminous Current Amplification.	_	40 1,250,000		μamp/lumen
Equivalent Anode-Dark- Current Input® • • • • • • • • • • • • • • • • • • •	-	-	1.25 × 10 ⁻⁹	lumen
Luminous* Ultraviolet†	-	7.5×10^{-13} 8×10^{-16}	-	lumer
With E = 750 volts (exc				
0 111 11	Min.	Median	Max.	

Sensitivity:

Sensitivity:				
Radiant at 3400	***	7900		μamp/μwatt
Cathode radiant, at 3400 angstroms	-	0.050	_	μamp/μwatt
At 0 cps	_	6.4		amp/lumen
Cathode luminous≜		40	1100	μamp/lumen
Current Amplification.	_	160000	-	

For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870°K. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.

A for conditions the same as shown under (b) except that the value of light flux is 0.01 lumen and 100 volts are applied between cathode and all other electrodes connected together as anode.

Measured at a tube temperature of 25°C and with the supply voltage (f) adjusted to give a luminous sensitivity of 20 amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.

For maximum signal-to-noise ratio, operation with a supply voltage (E) below 1000 volts is recommended.

* Under the following conditions: Supply voltage (E) is 1000 volts, 25°C tube temperature, ac-amplifier band-width of tcycle per second, tungsten light source at color temperature of 2870°K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and they alue stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

† Determined under the same conditions as shown under (*) except that use is made of a monochromatic source having radiation at 2537 angstroms.

Curves showing VARIATION IN SENSITIVITY OF PHOTOCATHODE for Type 1P28 are the same as those shown for Type 931-A

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-5 Response is shown at the front of this Section



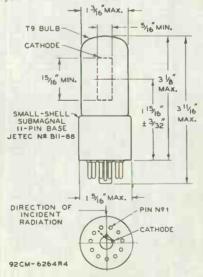
MULTIPLIER PHOTOTUBE

OPERATING CONSIDERATIONS

The operating stability of the IP28 is dependent on the magnitude of the anode current and its duration. When the IP28 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleress, the IP28 usually recovers a substantial percentage of such loss in sensitivity.

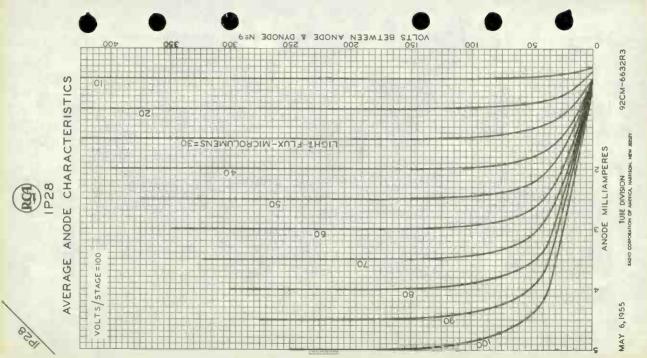
The use of an average anode current well below the maximum rated value of 0.5 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 10 microamperes, and the tube should be given a warm-up period of about 1/2 hour under load conditions.

Electrostatic and/or magnetic shielding of the IP2B may be necessary.

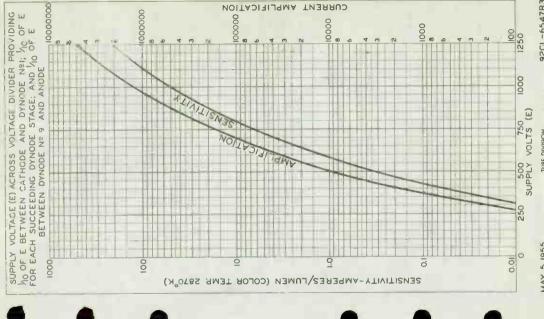


BOTTOM VIEW

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

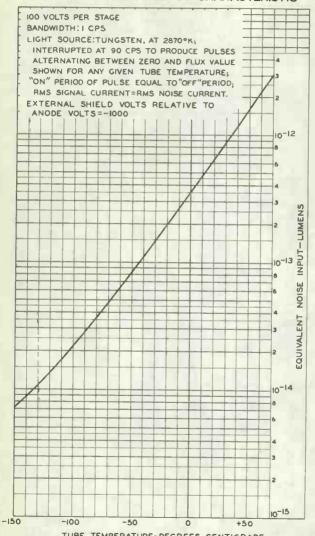


VERAGE CHARACTERISTICS





EQUIVALENT-NOISE-INPUT CHARACTERISTIC



TUBE TEMPERATURE-DEGREES CENTIGRADE

MAY 7, 1955

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-7503RI

Gas Phototube

SIDE-ON TYPE HAVING S-3 RESPONSE

DATA

Spectral Response	
	S-3
	OC amgstroms
Cathode:	inulindainal
Shape	1_1 / / #
Minimum projected width ^a	
Direct Interelectrode Capacitance (Approx.)	
Maximum Overall Length	4-1/8"
	3-1/2"
Seated Length to Center of Cathode 2-	
Maximum Diameter	
Operating Position	
Bulb	
Socket Amphenol No.77-MIP-4-T, or	r equivalent -
Base	
Basing Designation for BOTTOM VIEW	· · · · 2K
2 3	
Pin 1 - No Connection () Pin 3 - No (
Pin 2 – Anode Pin 4 – Phot	tocathode
DIRECTION OF LIGHT	
DIRECTION OF EGHT	
Maximum Ratings, Absolute-Naximum Values:	•
Rating I Rating II	
ANODE-SUPPLY VOLTAGE	
(DC or Peak AC) 80 max. 100 max.	
(DC or Peak AC) 80 max. 100 max. AVERAGE CATHODE—CURRENT	volts
(OC or Peak AC) 80 max. 100 max. AVERAGE CATHODE-CURRENT DENSITY 50 max. 25 max.	volts $\mu z/\mathrm{sq.}$ in.
(DC or Peak AC) 80 max. 100 max. AVERAGE CATHODE—CURRENT DENSITY 50 max. 25 max. AVERAGE CATHODE CURRENT 10 max. 5 max.	volts
(DC or Peak AC) 80 max. 100 max. AVERAGE CATHODE—CURRENT DENSITY 50 max. 25 max. AVERAGE CATHODE CURRENT 100 max. 5 max. AMBIENT TEMPERATURE 100 max. 100 max.	volts $\mu z/\mathrm{sq.}$ in.
(DC or Peak AC) 80 max. 100 max. AVERAGE CATHODE—CURRENT DENSITYP 50 max. 25 max. AVERAGE CATHODE CURRENT 100 max. 5 max. AMBIENT TEMPERATURE 100 max. 100 max. Characteristics:	volts $\mu z/\mathrm{sq.}$ in.
(DC or Peak AC) 80 max. 100 max. AVERAGE CATHODE—CURRENT DENSITY	volts $\mu z/\mathrm{sq.}$ in.
(DC or Peak AC) 80 max. 100 max. AVERAGE CATHODE—CURRENT DENSITY b	volts μa/sq. in. μa ^O C
(DC or Peak AC) 80 max. 100 max. AVERAGE CATHODE—CURRENT DENSITYD	volts μa/sq. in. μa ^O C
(DC or Peak AC) 80 max. 100 max. AVERAGE CATHODE—CURRENT	volts μa/sq. in. μa ^O C
(DC or Peak AC) 80 max. 100 max. AVERAGE CATHODE—CURRENT DENSITY b 50 max. 25 max. AVERAGE CATHODE CURRENT b 10 max . 5 max. AMBIENT TEMPERATURE 100 max. 100 max. Characteristics: With an anode-supply voltage of go volts unless otherwise specified Min. Median Max. Sensitivity: Radiant, at 4200 angstroms 0.011 - Luminous: C	volts μa/sq. in. μa OC x. amp/watt
(DC or Peak AC) 80 max. 100 max. AVERAGE CATHODE—CURRENT DENSITYD	volts μa/sq. in. μa οC
(DC or Peak AC) 80 max. 100 max. AVERAGE CATHODE—CURRENT DENSITY b	volts μa/sq. in. μa OC x. amp/watt 7D μa/lumen μa/lumen μa/lumen μa/lumen
(DC or Peak AC) 80 max. 100 max. AVERAGE CATHODE—CURRENT DENSITYD 50 max. 25 max. AVERAGE CATHODE CURRENTD 10 max. 5 max. AMBIENT TEMPERATURE 100 max. 100 max. Characteristics: With an anode-supply voltage of go volts unless otherwise specified Min. Median Na: Sensitivity: Radiant, at 4200 angstroms 0.011 - Luminous: Luminous: At 0 cos 20 40 At 5000 cps 35	volts μa/sq. in. μa OC x. amp/watt 70 μa/lumen μa/lumen μa/lumen
(DC or Peak AC) 80 max. 100 max. AVERAGE CATHODE—CURRENT DENSITYD	volts μa/sq. in. μa οC x. - amp/watt 7D μa/lumen - μa/lumen - μa/lumen 9

Minimum Circuit Values:

With an anode-supply voltage of 80 or less volts DC Load Resistance: For dc currents above 5 µa. . . 0.1 min. meaohm For dc currents below 5 μ a. . . 0 min. megohms

100

For dc currents above 3 μ a. . . 2.5 min. megohms For dc currents below 3 μ a. . 0.1 min. megohm

- On plane perpendicular to indicated direction of incident light.
- Averaged over any interval of 30 seconds maximum.
- C For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A dc anode supply voltage of 90 volts and a 1-megohm load resistor are used. For the 0-cycle measurement, a light input of 0.1 lumen is used. For the 5000- and 10,000-cycle measurements, the light input is varied sinusoidally about a mean value of 0.015 lumen from zero to a maximum of twice the mean value
- d The ratio of luminous sensitivity at an anode supply voltage of 90 volts to luminous sensitivity at an anode supply voltage of 25 volts. In each case, sensitivity is obtained under conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K, the light input is 0.1 lumen, and the load resistor has a value of 1 megohm.

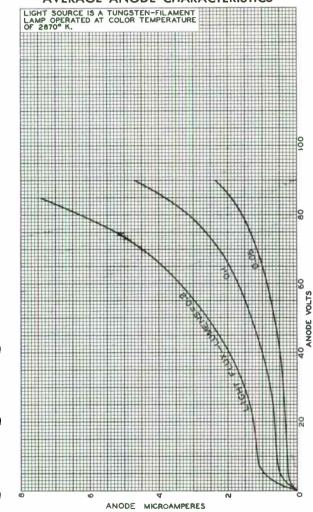
SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOSENSITIVE DEVICE HAVING S-3 RESPONSE

and

FREQUENCY-RESPONSE CHARACTERISTICS OF GAS PHOTOTUBES are shown at the front of this section

DIMENSIONAL OUTLINE shown under Type IP37 also applies to the IP29

AVERAGE ANODE CHARACTERISTICS



92CM-6472R2



World Radio History

Gas Phototube

SIDE-ON TYPE HAVING S-4 RESPONSE

DATA

	DATA
	General:
	Spectral Response
	Cathode: Shape Semicylindrical Minimum projected length [®]
	Direct Interelectrode Capacitance (Approx.) 3 $\mu\mu f$ Maximum Overall Length
	Maximum Diameter. 1-1/8" Operating Position. Any Weight (Approx.). 1.1 oz-
	Bulb
	Pin 1 - No Connection Pin 2 - Arode Pin 3 - No Connection Pin 4 - Photocathode
	Maximum Ratings, Absolute-Maximum Values: Rating I Rating II
_	ANODE-SUPPLY VOLTAGE (DC or Peak AC) 80 max. 100 max. volts AVERAGE CATHODE-CURRENT
	DENSITY $^{\rm b}$ 50 max. 25 max. $\mu a/{\rm sq. in.}$ AVERAGE CATHODE CURRENT $^{\rm b}$ 10 max. 5 max. $\mu a/{\rm sq. in.}$ AMBIENT TEMPERATURE 75 max. 75 max. $^{\rm o}$ OC
	Characteristics:
	With an anode-supply voltage of 90
	volts unless otherwise specified
	Min. Median Max.
	Sensitivity: Radiant, at 4000 angstroms 0.13 - $\mu a/\mu w$ Luminous:
	At 0 cps
	Gas Amplification Factor 5.5 Anode Dark Current at 25° C 0.05 μα
	Anode Dark Current at 25° C − − 0.05 μa — Indicates a change.
_	

Minimum Circuit Values:

With an anode-supply voltage of	80 or less	100	volts
DC Load Resistance:			
For dc currents above 5 μa .	. 0.1 min.	_	megohm
For dc currents below 5 μa	. 0 min.	_	megohms
F		2 6	

For dc currents above 3 μa . . 2.5 min. megohms For dc currents below 3 ua . . 0.1 min. megohm

b Averaged over any Interval of 30 seconds maximum.

For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870 K. A dc anode supply voltage of 90 volts and a 1-megohm load resistor are used. For the 0-cycle measurement, a light input of 0.1 lumen is used. For the 5000- and 10,000-cycle measurements, the light input is varied sinusoidally about a mean value of 0.015 lumen from zero to a maximum of twice the mean value.

The ratio of luminous sensitivity at an anode supply voltage of 90 volts to luminous sensitivity at an anode supply voltage of 25 volts. In each case, sensitivity is obtained under conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K, the light input is 0.1 lumen, and the load resistor has a value of 1 megohm.

SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOSENSITIVE DEVICE HAVING S-4 RESPONSE

and

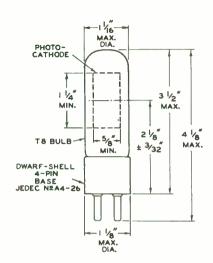
FREQUENCY-RESPONSE CHARACTERISTICS OF GAS PHOTOTURES

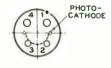
are shown at the front of this section

AVERAGE-ANODE-CHARACTERISTICS CURVE shown under Type 5581 also applies to the IP37

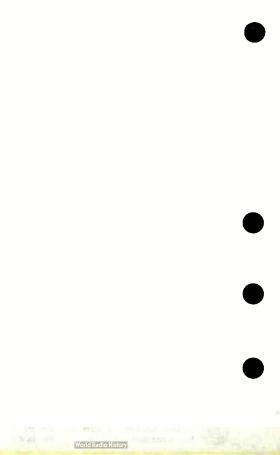


On plane perpendicular to indicated direction of incident light.





92CM-470R5





Page 1

VACUUM PHOTOTUBE

WITH S-4 RESPONSE
For applications critical as to leakage
under high-humidity conditions

The 1P39 is like the 929, except that the 1P39 has a maximum dark current of $0.005~\mu a$ at 250 volts, and has a non-hygroscopic base which insures a value of resistance between anode and cathode pins about 10 times higher than conventional bases under adverse service conditions of high humidity.

← Indicates a change.

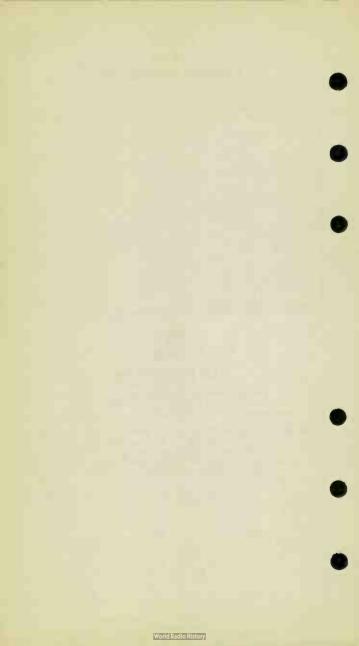


GAS PHOTOTUBE

WITH S-1 RESPONSE
For applications critical as to leakage
under high-humidity conditions

The 1P40 is like the 930, except that the 1P40 has a maximum dark current of $0.005~\mu a$ at 90 volts, and has a non-hygroscopic base which insures a value of resistance between anode and cathode pins about 10 times higher than conventional bases under adverse service conditions of high humidity.

. Indicates a change.





GAS PHOTOTUBE
HEAD-ON TYPE WITH S-1 RESPONSE

N	HEAD-ON TYPE WITH S-1 RESPONSE	
	DATA	
	General:	
	General: Spectral Response	+ +
	Pin 1 - No Connection Pin 2 - Anode Pin 3 - Cathode Pin 3 - Cathode	
	Maximum Ratings, Absolute Values:	
	Rating I Rating II ANODE-SUPPLY VOLTAGE (DC or Peak AC)	
	AVERAGE CATHODE CURRENTO	ŀ
	Characteristics, With go Volts on Anode: Min. Median Max.	
	Sensitivity: Radiant, at 8000 angstroms 0.008 - μamp/μwatt	-
	Luminous: At 0 cps 50 90 145 μamp/lumen At 5000 cps 77 - μamp/lumen At 10000 cps 67 - μamp/lumen Gas Amplification Factor 8.5	1
	Anode Dark Current at 25 °C	-
	°, e: See next page. ← Indicates a change.	
	2-57 TUBE DIVISION DATA	i

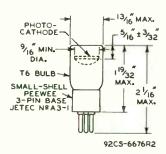


Minimum Circuit Values:			
With anode-supply voltage of	70 or less	90	volts
DC Load Resistance: For dc currents above			
1.5 μamp	0.1 min.	-	megohm
For dc currents below 1.5 μamp	O min.	-	megohm.
1 µamp	-	2.5 min.	megohms
1 μamp,	-	0.1 min.	megohm

Averaged over any interval of 30 seconds maximum.

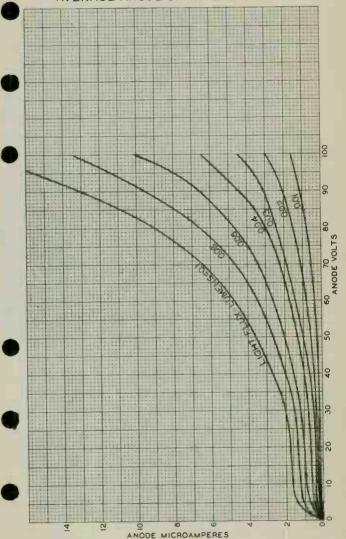
For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870 °K. A dc anode supply of 90 volts and a 1-megohm load resistor are used. For the 0-cycle measurements, a light input of 0.06 lumen is used. For the 5000- and 10000-cycle measurements, the light input is varied sinusoidally about a mean value of 0.015 lumen from zero to a maximum of twice the mean.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-1 Response and FREQUENCY-RESPONSE CHARACTERISTICS of Gas Phototubes are shown at the front of this Section





AVERAGE ANODE CHARACTERISTICS



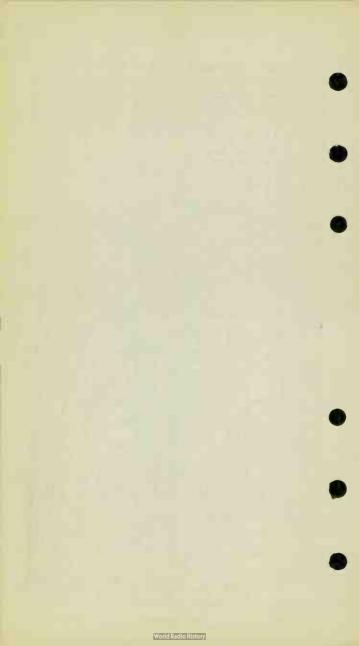
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TUBE DEPARTMENT

O COP OF AN O COF AMERICA FARE SUMMERS FOR WARREST AND AN EPSET

92CM-5217R3

ID RI



Vacuum Phototube

HEAD-ON TYPE WITH S-9 RESPONSE

DATA

	General:
	Spectral Response
	Wavelength of Maximum Response 4800 ± 500 angstroms
_	Cathode, Semitransparent:
	Shape
J	Window:
	Area
	Minimum diameter 0.19"
	Direct Interelectrode Capacitance 1.9 μμf
	Maximum Overall Length 1-11/32" ± 1/16"
	Maximum Diameter
	Operating Position
	Weight (Approx.)
	Bulb
	Terminal Diagram (See Dimensional Outline)

Small End: Anode



Large End: Cathode

DIRECTION OF LIGHT:

Maximum	Ratings,	Absolute-Maximum	Values:
---------	----------	------------------	---------

ANODE-SUPPLY VOLTAGE (DC or PEAK /			volts
AVERAGE CATHODE-CURRENT DENSITY* .		25 max.	μa/sq. in.
AVERAGE CATHODE CURRENT*		0.4 max.	μa
AMBIENT TEMPERATURE		75 max.	μa

Characteristics:

With an anode-supply voltage of 180 volts unless otherwise specified

Min. Median Max.

Sens	2 I T	1 1/ 1	TV	,
0011	,,,		LJ.	,

			angstroms	-	0.025	-	μa/μw
- 1	uminous.	<i>*</i>		20	37	70	μa/lumen
And	ode Dark	Current	at 25° C.	-	-	0.005	μа

Averaged over any interval of 30 seconds maximum.

-Indicates a change.



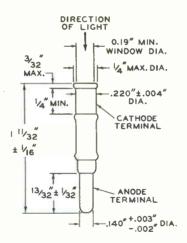
[#] For conditions where the light source is a tungsten-filament lamp operated a color temperature of 2870° k. The supply voltage is 180 volts, the load resistor is 1 megohm, and the light input is 0.015 lumen.

OPERATING CONSIDERATIONS

Exposure to intense illumination, such as direct sunlight, may decrease the sensitivity of the IP42 even though no voltage is applied to the tube. The magnitude and duration of the decrease depend on the length of the exposure.

Shielding of the IP42 and its leads to the amplifier is recommended when amplifler gain is high or when the phototube load resistance is high. Whenever frequency response is important in a phototube circuit, the leads from the phototube to the amplifier should be made short so as to minimize capacitance shunting of the phototube load. It is important that insulation of associated circuit parts and wiring be adequate.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-9 Response is shown at front of this Section



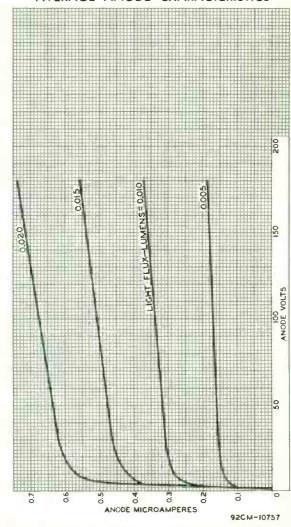
NOTE: WHEN TUBE IS ROTATED ABOUT THE LONGITUDINAL AXIS OF ITS CATHODE TERMINAL, NO PART OF THE ANODE TERMINAL WILL FALL OUTSIDE OF A 0.241"-DIAMETER CIRCLE CONCENTRIC WITH THE LONGITUDINAL AXIS OF THE CATHODE TERMINAL.

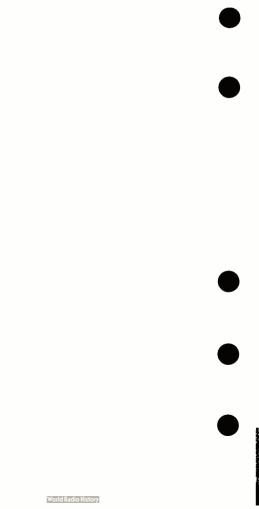
92CS-679IR2

- Indicates a change.



AVERAGE ANODE CHARACTERISTICS





Gas Phototube

SIDE-ON TYPE HAVING S-I RESPONSE

DATA

Cathode: Shape. Shape. Shape. Minimum projected length* Minimum projected width* Shape. Direct Interelectrode Capacitance (Approx.). Maximum Overall Length. Maximum Seated Length. Seated Length. Seated Length to Center of Cathode. Maximum Diameter. Maximum Diameter. Maximum Diameter. Maximum Projected width* Seated Length to Canter of Cathode. Maximum Diameter. Maximum Projected width* Maximum Diameter. Maximum Diameter. Maximum Projected width* Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No Connection Prin 4 – Photocathode Prin 3 – No C		Spectral Response
Pin 2 - Anode Direction of Radiation Maximum Ratings, Absolute-Maximum Values: Rating 1 Rating 11 ANODE-SUPPLY VOLTAGE (DC or Peak AC) 80 max. 100 max. volts AVERAGE CATHODE-CURRENT DENSITY AVERAGE CATHODE CURRENT AVERAGE CATHODE CURRENT OC Characteristics: With an anode-supply veltage of 90 volts unless otherwise specified Nin. Nedian Nax. Sensitivity: Radiant, at 8000 angstroms 0.0084 - amp/watt Luminous: At 0 cps 50 90 145 µa/lumen At 10000 cps 77 - µa/lumen At 10000 cps 67 - µa/lumen At 10000 cps 8 Anode Dark Current at 25° C 0.1 µa		Cathode: Shape
ANODE_SUPFLY VOLTAGE		Pin 2 - Anode Pin 2 - Anode Pin 4 - Photocathode
ANODE-SUPPLY VOLTAGE (DC or Peak AC) 80 max. 100 max. volts AVERAGE CATHODE-CURRENT DENSITY 50 max. 25 max. μa/sq. in. AVERAGE CATHODE CURRENT . 10 max. 5 max. μa AMBIENT TEMPERATURE 100 max. 100 max. 0C Characteristics: With an anode-supply voltage of 90 volts unless otherwise specified Min. Nedian Nax. Sensitivity: Radiant, at 8000 angstroms 0.0084 - amp/watt Luminous: At 0 cps 50 90 145 μa/lumen At 10000 cps 77 - μa/lumen At 10000 cps 67 - μa/lumen Gas Amplification Factord 8 Anode Dark Current at 25° C 0.1 μa		Maximum Ratings, Absolute-Maximum Values:
(DC or Peak AC) 80 max. 100 max. volts AVERAGE CATHODE-CURRENT DENSITY		
With an anode-supply vultage of 90 volts unless otherwise specified Nin. Nedian Nax.		(DC or Peak AC) 80 max. 100 max. volts AVERAGE CATHODE-CURRENT DENSITY ΔVERAGE CATHODE CURRENT 10 max. 25 max. μa/sq. in. ΔVERAGE CATHODE CURRENT 10 max. 5 max. μa
Nin. Nedian Nax. Sensitivity: Radiant, at 8000 angstroms - 0.0084 - amp/watt Luminous: At 0 cps		Characteristics:
Radiant, at 8000 angstroms 0.0084 - amp/watt Luminous: At 0 cps 50 90 145 μa/lumen At 5000 cps 77 - μa/lumen At 10000 cps 67 - μa/lumen Gas Amplification Factor 8 Anode Dark Current at 25° C 0.1 μα		volts unless otherwise specified
Anode Dark Current at 25 C		Nin. Nedian Max.
	•	Sensitivity: Radiant, at 8000 angstroms 0.0084 - amp/watt Luminous: ^c At 0 cps 50 90 145 μa/lumen At 5000 cps 77 - μa/lumen At 10000 cps 67 - μa/lumen Gas Amplification Factor ^d 8
	•	Sensitivity: Radiant, at 8000 angstroms 0.0084 - amp/watt Luminous: ^C At 0 cps 50 90 145 μa/lumen At 5000 cps 77 - μa/lumen At 10000 cps 67 - μa/lumen Gas Amplification Factor ^d 8 Anode Dark Current at 25° C 0.1 μa

General:

Minimum Circuit Values:

With an anode-supply			
voltage of	80 or less	100	volts
DC Load Resistance:			
For dc currents above			
5 μa	0.1 min.	_	megohm
For dc currents below			
5 μa	O min.	_	megohms
For dc currents above			3
3 μa	neg.	2.5 min.	meaohms
For dc currents below			- 3
3 μa	-	0.1 min.	megohm

On plane perpendicular to indicated direction of incident radiation.

Averaged over any Interval of 30 seconds maximum.

For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° k. A dc anode supply voltage of 90 volts and a 1-megohm load resistor are used. For the 0-cycle measurement, a light input of 0.1 lumen is used. For the 5000- and 10.300-cycle measurements, the light input is varied sinusoidally about a mean value of 0.015 lumen from zero to a maximum of twice the mean value.

The ratio of luminous sensitivity at an anode supply voltage of 90 volts to luminous sensitivity at an anode supply voltage of 25 volts. In each case, sensitivity is obtained under conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870 %, the light input is 0.1 lumen, and the load resistor has a value of 1 megohm.

SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOSENSITIVE DEVICE HAVING S-I RESPONSE

FREQUENCY-RESPONSE CHARACTERISTICS OF GAS PHOTOTUBES

are shown at the front of this section

DIMENSIONAL OUTLINE shown under Type 1P37 also applies to the 868

AVERAGE-ANODE-CHARACTERISTICS CURVE shown under Type IP41 also applies to the 868



VACUUM PHOTOTUBE

LOW-LEAKAGE TYPE WITH ANODE-TERMINAL CAP AND 1-1 RESPONSE

For 1) tht-measuring and relay applications

DATA

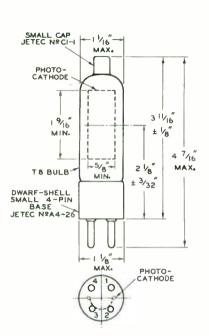
	DATA				
General:					
Spectral Response				S-1	
Spectral Response	onse .		8000 ± 10	00 angstroms	
Cathode:					
Shape. Minimum projected length			Sem	icylindrical	
Minimum projected length				1-9/16"	
Minimum projected width				5/8"	
Direct Interelectrode Capa Maximum Overal Length					
Seated Length				1'16" ± 1/8"	
Seated Length to Center of					
Maximum Diameter				1-1/8"	
Mounting Pasition				Any	
Weight (Approx.)					
Bulb				T-8	
Сар	CL 11	C11 4	Small (JE	TEC No.CI-1)	
Base Dwarf					
basing besignation for bi	OTTOWN V	(CW		LA	
	3	(3)			
Pin 1 - No Connec-	1/5	7	Pin 3-	No Connec-	
tion	10	1		ion	
Pin 2 - No Connec-		1	Pin 4 - 0		
tion		4	Cap -	Алосе	
DIRE	CTION OF	LIGH"			
Maximum Ratings, Absolute	Values:				
ANODE-SUPPLY VOLTAGE (DC o	r Peak	AC) .	500 max.	volts	
AVERAGE CATHODE-CURRENT DE				wamp/sq.in.	-
AVERAGE CATHODI CUFRENTO .			10 max.	μатр	
AMBIENT TEMPERATURE			100 max.	oC	
Characteristics, At 250 Vo	lts on	Anode:			
	Hin.	Neasan	Max.		
Sensitivity:					
Radiant, at					
8000 argstroms		0.0018		μamp/μwatt	
Luminous	12	20	40	μamp/lumen	
Anode Dark Current			0.005		
	_			μamp	
* On plane perpendicular to ind				t light,	
Averaged over any interval of					
A For conditions where the light at a color 'emperature of 2870 megohm loar reliator, and a l	Ck. Ad	c anode s	supply of 2 1 lumen are	SI volts, a 1- ased.	
SPECTRAL-SENS	ITIVITY	CHARAC	TERISTIC		
		0 . 0			1

- Indicates a change.

of Phototube having S-I Response is shown at front of this Section



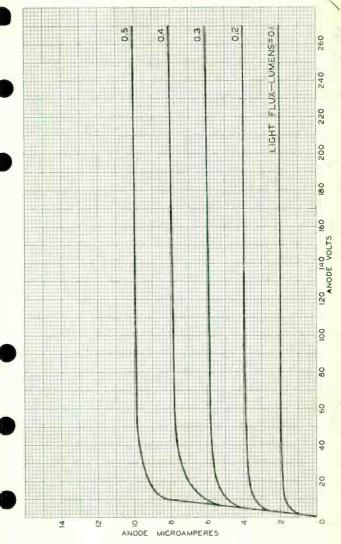
VACUUM PHOTOTUBE



92CS-4359R6

RCA 917

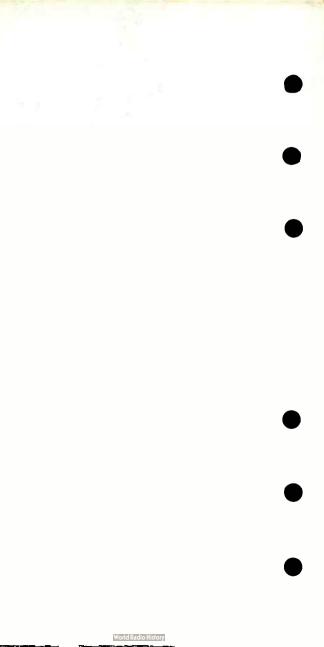
AVERAGE ANODE CHARACTERISTICS



TUBE DIVISION

RAD O CORPORATION OF MERICA HARRISON, NEW ERSE

92CM-4360R2



Gas Phototube

SIDE-ON TYPE HAVING S-I RESPONSE

DATA

PATE .
General:
Spectral Response
Cathode: Shape
Pin 1 - No Connection Pin 2 - Anode Pin 3 - No Commection Pin 4 - Photocathode
Maximum Ratings, Absolute-Maximum Values:

ANADE OUDDLY NO TAGE		Rating 1	Rating 11	
ANODE—SUPPLY VOLTAGE (DC or Peak AC) AVERAGE CATHODE—CURRENT	٠.	70 max.	90 max.	volts
DENSITYD		10 max.	5 max.	μa/sq. in. μα ος

AMBIENT TEMPERATURE 10	U IIIda.	TOO III	2.4.	
Characteristics:				-
With an anode-supp volts unless othe				
	Min.	Median	Max.	
Sensitivity: Radiani, at 8000 angstroms Luminous:	-	0.014	-	amp/watt
At 0 cps	_	150 120 105	220 _ _	μα/lumen μα/lumen μα/lumen
Gas Amplification Factord Anode Dark Current at 25° C	-	- -	10.5 0.1	μа
			dicatas	e chence

Minimum Circuit Values:

With an anode-supply voltage of	70 or less	90	volts	
DC Load Resistance:	70 01 1633	90	00112	
For dc currents above				
_ 5 μa	0.1 min.	_	megohm	
For dc currents below				
_ 5 μa	O min.	_	megohms	
For dc currents above			_	
_ 3 μa	_	2.5 min.	megohms	
For dc currents below				
3 μa	_	0.1 min.	megohm	

On plane perpendicular to indicated direction of incident radiation.
 Averaged over any interval of 30 seconds maximum.

For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A dc anode supply voltage of 93 volts and a 1-megohm load resistor are used. For the 0-cycle measurement, a light input of 0.1 lumen is used. For the 5000- and 10,000-cycle measurements, the light input is varied sinusoidally about a mean value of 0.015 lumen from zero to a maximum of twice the mean value.

dean value.

The ratio of luminous sensitivity at an anode supply voltage of 90 volts to luminous sensitivity at an anode supply voltage of 25 volts, in each case, sensitivity is obtained under conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° M, the light input is 0.1 lumen, and the load resistor has a value of 1 megohm.

SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOSENSITIVE DEVICE HAVING S-I RESPONSE

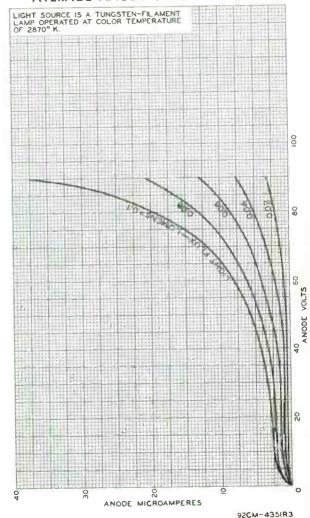
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FREQUENCY-RESPONSE CHARACTERISTICS
OF GAS PHOTOTUBES

are shown at the front of this section

DIMENSIONAL OUTLINE shown under Type 1P37 also applies to the 918

AVERAGE ANODE CHARACTERISTICS







VACUUM PHOTOTUBE

LOW-LEAKAGE TYPE WITH CATHODE-TERMINAL CAP AND S-1 RESPONSE

For light-measuring and relay applications

The 919 is the same as the 917 except for the following item:

General:

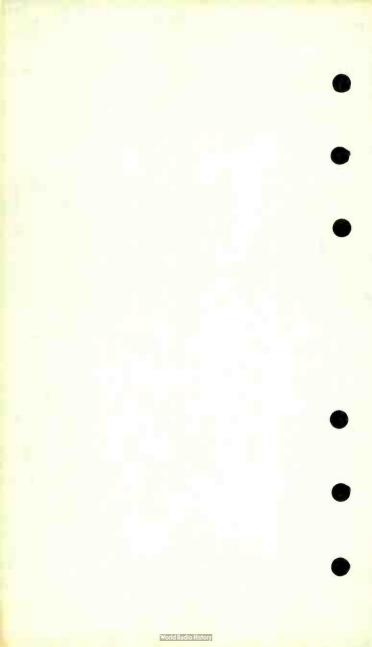
Pin 1 - No Connec-

Pin 2 - Anode Pin 3 - No Connection



Pin 4 - No Connection

Cap - Cathode





920

GAS PHOTOTUBE TWIN TYPE WITH S- I RESPONSE

	General:
	Spectral Response
	Cathodes (Each):
)	
	Shape Quarter-Cylindrical Minimum Projected Length
	Minimum Projected Width*
	Direct Interelectrode Capacitances:
	Cathode to Anode 1.6 µµf
	Cathode to Cathode 1.8 µµf
	Arode to Anode
	Maximum Overall Length 4"
	Maximum Seated Length
	Maximum Seated Length
	[Maximum Diameter
	Bulb
	Mounting Position
	Base Small-Shell Small 4-Pin
	BOLLOW ALEM
	2.3
	Pin 1 - Cathode, Pin 3 - Anode,
	Unit No.2 (STZ) Unit No.1
	Pin 2 - Arade, Pin 4 - Cathode,
	Letit No.2 (1) 4 Unit No.1
	DIRECTION OF LIGHT
	Maximum Ratings, Absolute Values (Each Unit):
	ANODE-SUPPLY VOLTAGE (DC or Peak AC) 90 max volts
	PEAK CATHORE CURRENT
	PEAK CATHODE CURRENT 6 maxμamp PEAK CATHODE-CURRENT DENSITY 50 maxμamp/sq.in. AVERAGE CATHODE CURRENTO 2 maxμamp
4	WEDNOS SATIONS CURRENTO
	AVERAGE CATHODE CURRENTO 2 max
	Characteristics:
	Min. Av. Max.
	Dark Current at 90 Volts 0.1 μαπρ
	Sensitivity:
	At 8000 Angstroms 0.010 - $\mu amp/\mu watt$
	Luminous.
	At 0 Cycles 50 100 175 μεmp/lumen
	At 500¢ Cycles 85 - μεmp/lumen
	At 10000 Cycles 74 - µamp/lumen
	Gas Amplification Factor 9
	On plane perpendicular to indicated direction of incident light.

- Each unit, with other unit grounded.
- Anodes grounded.
- Cathodes grounded.
- O Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 70 volts.

← Indicates a change. Measured with ,04 lumen.



Minimum Circuit Values:

DC Load Resistance:

With anode-supply voltage of 70 volts or less:

above 2 μ amp . . . 0.1 For do currents below 2 µamp

. . . megohm No Minimum

2.5

megohms megohm

. 0.1

OUTLINE DIMENSIONS for Type 920

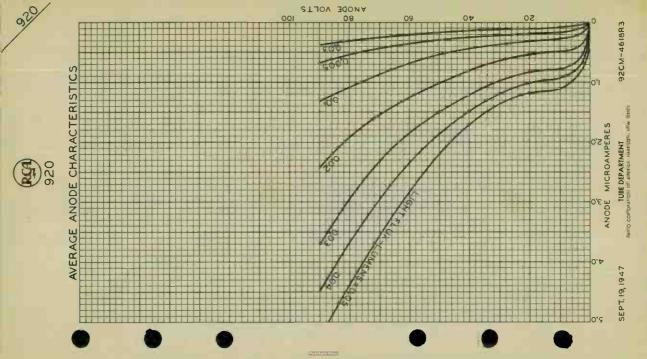
are the same as those for Type 5584 SPECTRAL-SENSITIVITY CHARACTERISTIC

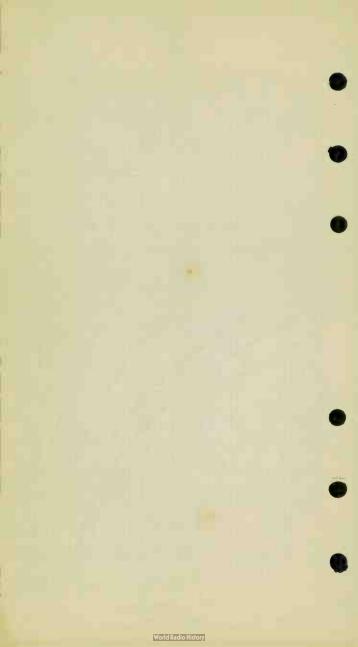
of Phototube having S-1 Response and

FREQUENCY-RESPONSE CHARACTERISTICS

of Gas Phototubes are shown at the beginning of this Section

- Indicates a change. AUGUST 15, 1947







CARTRIDGE TYPE WITH S-I RESPONSE

For relay applications

DATA	
General:	
Spectral Response	
Cathode: Shape. Shape. Minimum projected length* Minimum projected width* 1/2" Direct Interelectrode Capacitance. 1 Coveral Length. Length 1-21/32" ± 1/16" Seated Length. Length from Center of Useful Cathode Area to Plane A-A' (See Dimensional Outline). Maximum Diameter Maximum Diameter Meight (Approx.) Mounting Position Terminals: Recessed cap. Protruding cap. JETEC No. J1-23 Basing Designation. Semicylindrical 7/8" 1/16" 1-21/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1-13/32" ± 1/16" 1	-
Recessed Anode Protruding Cathode Cap Cap	
DIRECTION OF LIGHT? INTO CONCAVE SIDE OF CATHODE	
Maximum Ratings, Absolute Values: ANODE—SUPPLY VOLTAGE (DC or Peak AC) . 90 max. volts AVERAGE CATHODE—CURRENT DENSITYO . 30 max. μamp/sq.in. AVERAGE CATHODE CURRENTO 3 max. μamp AMBIENT TEMPERATURE	-
Characteristics, At 90 Volts on Anode:	
Nin. Nedian Nax.	
Sensitivity: Radiant, at 8000 angstroms 0.012 - μamp/μwatt	-
Luminous: ^A At 0 cps 75 115 205 μamp/lumen At 5000 cps 119 - μamp/lumen At 10000 cos 108 - μamp/lumen	
Gas Amplification Factor. – 10 Anode Dark Current at 25°C – 0.01 μamp	-
a On plane perpendicular to indicated direction of incident light.	
O,A: See next page. → Indicates a Change.	





Minimum Circuit Values:

2 μamp

With anode-supply voltage of 70 or less volts 90 DC Load Resistance: For dc currents above $3 \mu amp \dots$ 0.1 min. megohm For dc currents below $3 \mu amp \dots$ 0 min. megohr For dc currents above 2 μamp 2.5 min. megohms For dc currents below

O Averaged over any interval of 30 seconds maximum. This value may be doubled when anode-supply voltage is limited to 70 volts.

0.1 min.

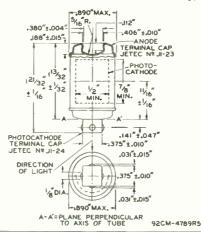
megohm

For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870°K. A dc anode supply of 90 volts and at-megohm load resistor are used. For the 0-cycle measurements, a light input of 0.1 lumen is used. For the 500° and 10000° cycle measurements, the light input is varied sinusoidally about a mean value of 0.015 lumen from zero to a maximum of twice the mean.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-1 Response and

FREQUENCY-RESPONSE CHARACTERISTICS
of Gas Phototubes
are shown at the front of this Section

AVERAGE ANODE CHARACTERISTICS for Type 921 are the same as those shown for Type 930





VACUUM PHOTOTUBE

CARTRIDGE TYPE WITH S-I RESPONSE For relay applications

		DATA				
General:						
Spectral Response						. S-
Wavelength of Max				8000 + 10	000 angs	
Cathode:	1100			0000 1 2	ang.	, e i Oiii.
Ch				Ser	nicyline	Irica
Minimum project				001	nicy i inc	5/8
Minimum project						1/2
Direct Interelect						щ
Overall Length	rouc cap	ac rearies	1=1	21/32" +	132" -	1/16
Seated Length				1-13		1/32
Length from Cente			node Are		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	11/2
to Plane A-A' (1,16" ±	1/16
Max'mum Diameter.	Dee Deme			.,		.890
Vorting Position						. An
Weight (Approx						.4 0
Terminals:						0
Recessed cap					ETEC No.	11-2
Protruding cap.					ETEC No.	
Basing Designation						
basing beingneren		CESSED				
	N.E.	CESSEU				
Recessed Anoc	10	/ _	1	rotruding	Cath	odo
Cap	ie			Cap	Call	iode
		1 4				
	DIR	ECTION OF	ROTRUDING			
	IN	ECTION OF	E SIDE			
14 '- B 13		CF CATHO				
Maximum Ratings,						
ANODE-SUPPLY VOLT				500 max.		volt
AVERAGE CATHODE-C				30 max.	μamp/s	
AVERAGE CATHODE C				5 max.		μam
AMBIENT TEMPERATU	RE			100 max.		0
Characteristics,	44 050 5	lalta am	Amadas			
onal actor istres,	AL 250 V					
		Min.	Median	Max.		
Sensitivity:						
Radia t. at						
8000 angstrom	is .	_	0.0018	_	иатр/	uwat
Luminous		10	20	40	иатр/	
Anode Dark Currer	ıt.	10		40	pag.,p.	1 01110
at 25°C		_	_	0.005		μam
4. 20 0				0.005		pacific
* On plane perpendic	ular to in	ndicated d	lirection	of inciden	1 light.	
Averaged over any						
For conditions whe ated at a color te a 1-megohm load re	re the lig	ht source	is a tu	ngsten-fila	ment lam	p oper
ated at a cotor te	mperature	01 2870	. A dc	anoge suppl	y OT 250	VOITS

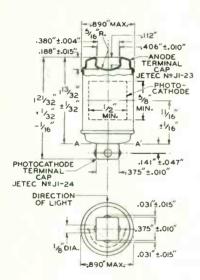
- Indicates a change.



VACUUM PHOTOTUBE

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-I Response is shown at the front of this Section

AVERAGE ANODE CHARACTERISTICS for Type 922 are the same as those shown for Type 917



A-A'=PLANE PERPENDICULAR
TO AXIS OF TUBE

92CM-4818R5



923 GAS PHOTOTUBE

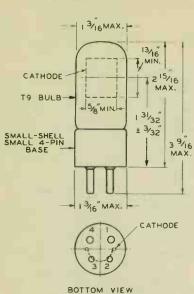
WITH S- I RESPONSE

DATA General: Spectral Response . . Wavelength of Maximum Response. . 8000 € 1000 Angs/troms Cathode: Shape . Semi-Exlind/ical Minimum Projected Length Minimum Projected Width* Direct Interelectrode Capacitance Maximum Overall Length. . Maximum Seated Length . Seated Length to Center of Cathode. Maximum Diameter. / . . Mounting Position-Base. Small 1-Basing Designation for BOTTOM & IEW: Pin 1 - No co P/n 3 - No Connection Connection Pin 2 - Anode in 4 - Cathode Characteristics, and Curves for the 923 the as those shown Type * On plane perpendicular to indicated direction of incident light.

<- Indicates a change.



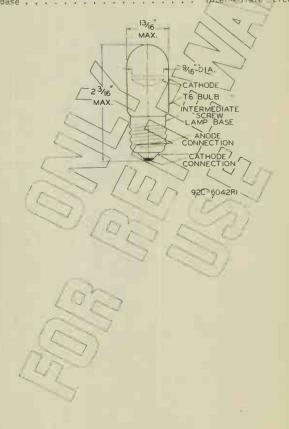
923 GAS PHOTOTUBE

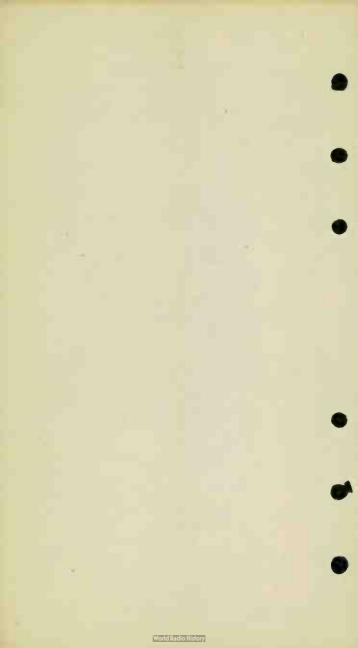


92CM-4788R3

On P

The 324 is the ame electrically a the real with the coption of its interelectrons capacitance. Mechanically, the 924 and 1P21 differ a to bac, base connections, and overall length.





Vacuum Phototube

SIDE-ON TYPE HAVING S-I RESPONSE

DATA

delierar.
Spectral Response
Navierength of Maximum Response
Bulb
(JEDEC Group 1, No.B5-10) Basing Designation for BOTTOM VIEW
DIRECTION OF RADIATION
Pin 1-No Internal Connection Pin 2-No Internal Connection Pin 2-No Internal Connection Pin 8-Photocathode
Maximum Ratings, Absolute-Maximum Values:

ANODE-SUPPLY VOLTAGE (DC or Peak AC). . 250 max. volts AVERAGE CATHODE-CURRENT DENSITY 30 max. μa'sq.in. AVERAGE CATHODE CURRENT' 5 max. μa AMBIENT TEMPERATURE. . . 100 max.

Characteristics:

With an anode-supply voltage of 250 volts

Min. Median Max.

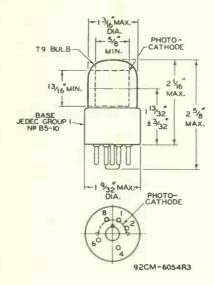
Sensitivity: Radiant, at 8000 angstroms. . -0.0019 amp/watt 20 40 μa/lumen шa

- Indicates a change.



- on plane perpendicular to indicated direction of radiation.
- Averaged over any interval of 30 seconds maximum.
- C For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A 1-megohm load resistor and a light input of 0.1 lumen are used.

SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOSENSITIVE DEVICE HAVING S-1 RESPONSE is shown at the front of this section







VACUUM PHOTOTUBE

SHORT TYPE WITH S- RESPONSE

D	A	Т	Α	
=	-	-	_	

	DATA
	General:
	Spectral Response
┫	Wavelength o' Maximum Response 8000 ± 1000 Angstroms
	Cathode:
4	Snape Semi-Cy indrical
	Minimum Projected Length*
	Min mum Projected Width
	Direct Interelectrode Capacitance 1.6 µµf
	Maximum Overall Length
7	Maximum Seated Length 2-1/16" Seated Length to Center of Cathode 1-9/32" ± 3/32"
1	Maximum Diameter
	Tulb
	Dullo
	Mounting Position
	Basing Designation for BOTTOM VIEW
	DIRECTION OF LIGHT
	(a)
	Pin 1 - No Pin 4 - Anode
	Connection (Pin 6 - No Connection
	Pin 2 - No Connection Pin 8 - Cathode
	Connection 2 Fill 8 - Cathode
	0 8
	The St.
	M '
	Maximum Ratings, Absolute Values:
	ANODE-SUPPLY VOLTAGE (DC or Peak AC) 250 max volts
	PEAK CATHODE CURRENT μαπρ
	PEAK CATHODE-CURRENT DENSITY 100 max. μamp/sq.in.
	AVERACE CATHODE CURRENTO 5 max
	AMBIENI TEMPERATURE
	Characteristics:
	Min. Av. Max.
	Dark Current at 250 Volts 0.0125 µamp
	Sensitivity:
	At 800C Angstroms 0.0015 - μamp/μwatt
	Luminous 10 20 40 μamp/lumen

* On plane perpendicular to indicated direction of incident light.

Averaged over any interval of 30 seconds maximum.

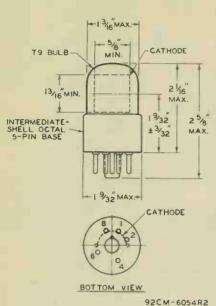
SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-1 Response is shown at the beginning of this Section

. Indicates a change.



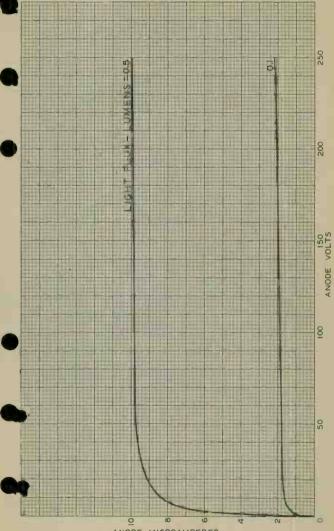


VACUUM PHOTOTUBE

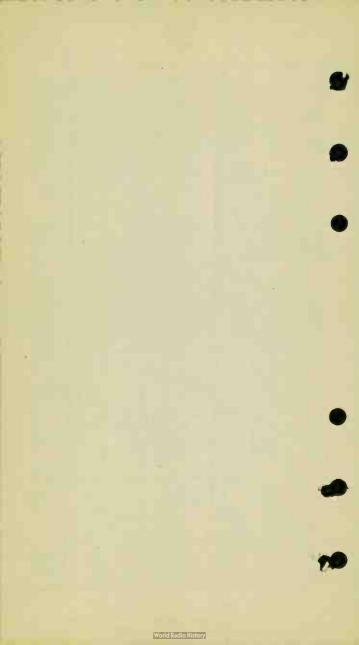


RCA 925

AVERAGE ANODE CHARACTERISTICS



ANODE MICROAMPERES





VACUUM PHOTOTUBE

CARTRIDGE TYPE #17# S-3 RESPONSE
For colorimetric applications

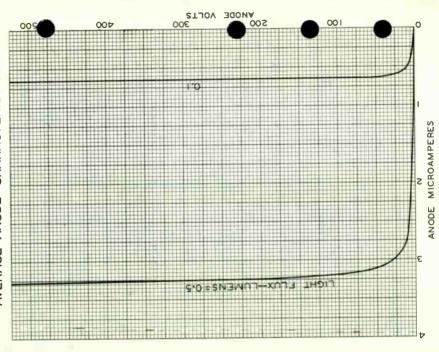
	DATA	
	General:	Į
	Spectral Response	
_	Wavelength of Maximum Response 4200 ± 1000 angstroms	
	Shape	
	Minimum projected length	
	Minimum projected width"	
	Direct Interelectrode Capacitance	
	Uverall Length	
	Seated Length	
	to Plane A-A' (See Dimensional Outline) 11/16" ± 1/16".	
	Maximum Diameter	
	Weight (Approx.)	-
	Mounting Position	
	Recessed cap JETEC No.J1-23	-
	Protruding cap JETEC No.J1-24	
	Basing Designation	-
	Recessed Protruding	
	Cap Anode Cap Cathode	
	(\ \ /)	
	DIRECTION OF LIGHT: INTO CONCAVE SIDE OF CATHODE	
	Maximum Ratings, Absolute Values:	
	ANODE CURRING THE THE CO.	
	VERAGE CATHODECURRENT DENSITY · 30 max. μamp/sq.in.	
	AVERAGE CATHODE CURRENTO 5 max. wamp	
	ANBIENT TEMPERATURE 100 max.	
1	Characteristics, At 250 Volts on Anode:	
	Min. Median Max.	
_	Sensitivity:	
	Radiant, at	
1	4200 angstroms 0.001B - μamp/μwatt	+
	Luminous A 4 6.5 15 μαπο/lumen Anode Dark Current	
	at 25°C 0.005	
1	, and the same of	
1	on plane perpendicular to indicated direction of incident light. Averaged over any interval of 30 seconds maximum.	
J	For conditions where the light source is a tungsten-filament lamp oner-	
1	For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 28700%. A dc anode supply of 250 volts, a 1-megodmin load resistor, and a light input of 9.1 lumen are used.	
	3	
1	→ Inoicates a frange.	
1	2 FC	



VACUUM PHOTOTUBE

92 Type Sect ion CHARACTERISTIC S-3 Response OUTLINE that shown of having DIMENSIONAL the same as SPECTRAL-SENSITIVITY Phototube shown at 67 976 s Type for

CHARACTERISTICS ANODE AVERAGE



ANODE MICROAMPERES
TUBE DIVISION
MARICAL HARRISON, NEW JEE

92CM - 6209RI



GAS PHOTOTUBE

WITH 5-1 RESPONSE

· DATA
General:
Spectral Response
Cathode:
Shape Sami-Cylindrical
Minimum Projected Length*
Direct Interelectrode Capacitance 2 µµf
Maximum Overall Length. 2-13/3" Maximum Seated Length 1-1/2"
Seated Length to Center of Cathode 1-1/4" + 3/32"
Maximum Diameter 0.669"
Bulb
Base
Basing Designation for BOTTOW VIEW 2F
Pin 1 – No Pir 2 – Anode
Connection Pir 3 - Cathode
(4)
003
Maximum Ratings, Absolute Values: ANODE—SUPPLY VOL*AGE (DC or Peak AC) 90 max volts
PEAK CATHODE CURRENT 6 max µamp
PEAK CATHOCE-CURRENT DENSITY 100 max. μamp/sq.in.
AVERAGE CATHODE CUPRE TO 4 max
Characteristics:
Min. At. Max.
DC Dark Current - 0.1 µатр
Sensitivity; At 8000 angstroms 3.1125 - wamp/wwatt
Luminous:
At 0 cos
At 10000 cps 110 - μamp/lumen At 10000 cps 100 - μamp/lumen
Gas Amplification Factor 10
On plane perpendicular to indicated direction of incident light.
Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 70 volts.
At 250C and 90 volts.

«- Indicates a change.

927



927 GAS PHOTOTUBE

Minimum Circuit Values:

DC Load Resistance:

With anode-supply voltage of 70 volts or less:

For dc currents $\left\{ \begin{array}{llll} {\rm above~2~\mu amp~...~0.1} \\ {\rm below~2~\mu amp~...~No~Mini} \end{array} \right.$

0.1 ... megohm No Minimum

megohms

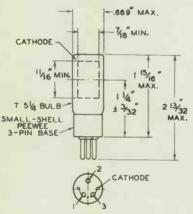
With anode-supply voltage of go volts:

For dc currents $\left\{ \begin{array}{ll} \text{above 1.0 } \mu\text{amp} & . & . & 2.5 \\ \text{below 1.0 } \mu\text{amp} & . & . & 0.1 \end{array} \right.$

0 μamp . . 0.1 . . . megohm

SPECTRAL—SENSITIVITY CHARACTERISTIC of Phototube having S-1 Response and FREQUENCY—RESPONSE CHARACTERISTICS

of Gas Phototubes are shown at the front of this Section



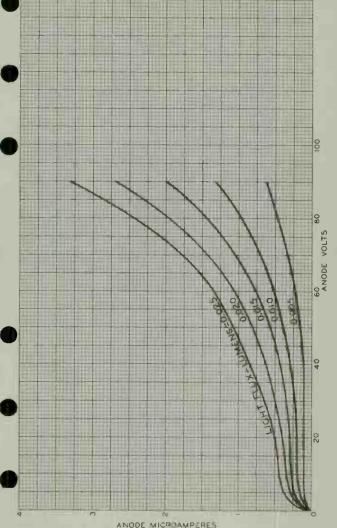
BOTTOM VIEW

92CM-6053R4

→ Indicates a change.



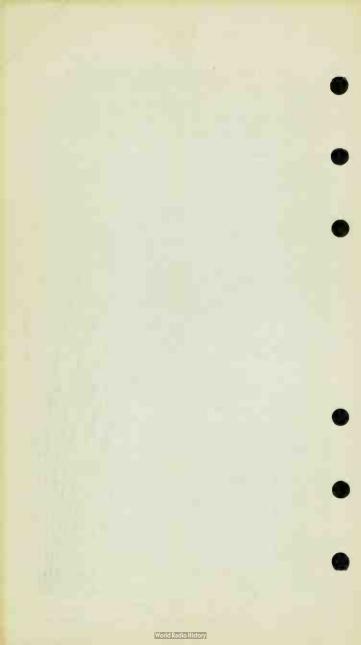
AVERAGE ANODE CHARACTERISTICS



APRIL 5,1950

TUBE DEPARTMENT

92CM-6 58R2



Gas Phototube

NON-DIRECTIONAL TYPE HAVING S-I RESPONSE

DATA

	Wavelength of Maximum Response Cathode:	e	8000 ±	1000	argstroms
	Shape. Minimum length Minimum diameter Direct Interelectrode Capacita Maximum Overall Length Maximum Seated Length. Seated Length to Center of Ca Maximum Diameter Operating Position Weight (Approx.) Bulb Socket Socket Basing Designation for BOTTG	thode	mox.)1	-31/3	13/16" 5/8" 3 \ \mu f \ 3-9/16" 2-15/16" 2" \ \mathred{\pm} 3/32" 1-3/16" . \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
	Pin 1 - No Connection Pin 2 - Arode		Pin 3- Pin 4-	No Cor Photoc	nnection cathode
	Maximum Ratings, Absolute-naxi	imum Value	:s:		-
	AMODE SUPPLY VOLTAGE	Rating 1	Rating	11	
	AVERAGE CATHODE-CURRENT	70 max.	90 ma		volts
	DENSITY D	60 max. 6 max. 100 max.	30 ma 3 ma 100 ma	ıx.	a/sq. in. µa °C
	Characteristics:				-
	With an anode-su	pply volt	age of g	0	
	volts unless ot		specijie Nedian		
	Sensitivity:			noz.	
	Radiant, at 8000 angstroms	. –	0.0061	_	amp/watt
	At 0 cps	40 -	65 56 50	100 _ _	μα/lumen μα/lumen μα/lumen
	Gas Amplification Factor ^d Anode Dark Current at 25° C	_	_	10 0.1	μa
			→ In		a change.
_					

General:

Spectral Response.

Minimum Circuit Values:

With an anode-supply valtage of DC Load Resistance: For do currents above	70 or less	90	volts
3 µa	0.1 min.	-	megohm
3 μa	O min.	-	megohms
2 μa	-	2.5 min.	megohms
2 μa	_	0.1 min.	megohm

On plane perpendicular to indicated direction of incident radiation.

Averaged over any Interval of 30 seconds maximum.

Averaged over any interval of 20 seconds maximum.

For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870 k. A dc anode supply voltage of 90 volts and a 1-megohm load resistor are used. For the 0-cycle measurement, a light input of 0.1 lumen is used. For the 5000 and 10.000-cycle measurements, the light input is varied sinusoidally about a mean value of 0.015 lumen from zero to a maximum of twice the mean value.

The ratio of luminous sensitivity at an anode supply voltage of 90 volts to luminous sensitivity at an anode supply voltage of 25 volts, in each case, sensitivity is obtained under conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K, the light input is 0.1 luman, and the load resistor has a value of 1 megohm.

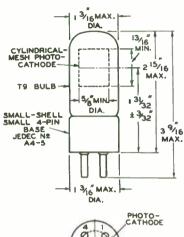
SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOSENSITIVE DEVICE HAVING S-I RESPONSE

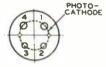
and

FREQUENCY-RESPONSE CHARACTERISTICS OF GAS PHOTOTUBES

are shown at the front of this section

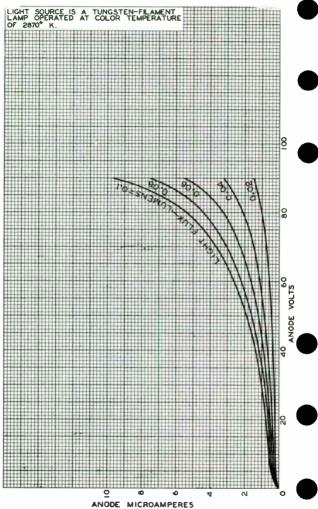






92CM-6IIIR3

AVERAGE ANODE CHARACTERISTICS



92CM-6117RI

Vacuum Phototube

SIDE-ON TYPE HAVING S-4 RESPONSE

DATA

	General:
	Spectral Response
	Wavelength of Maximum Response 4000 ± 500 angstroms
_	Cathode:
	Shape
	Minimum projected length*
	Minimum projected widtha
	Direct Interelectrode Capacitance (Approx.) 2.6 µµf
	Maximum Overall Length
	Maximum Seated Length
	Seated Length to Center of Cathode 1-5/8" ± 3/32"
	Maximum Diameter
	Operating Position
	Weight (Approx.)
	Bulb
	Socket Cinch No.8 JM-1, or equivalent -
	Base Intermediate-Shell Octal 5-Pin, Arrangement 1
	(JEDEC Group 1, No. 85–10) +
	Basing Designation for BOTTOM VIEW
	basing obsignation for bottom VIEW

Pin 1 - No Internal Connection Pin 2-No Internal

Connection



Pin 4 - Anode Pin 6 - No Internal Connection Pin 8 - Cathode

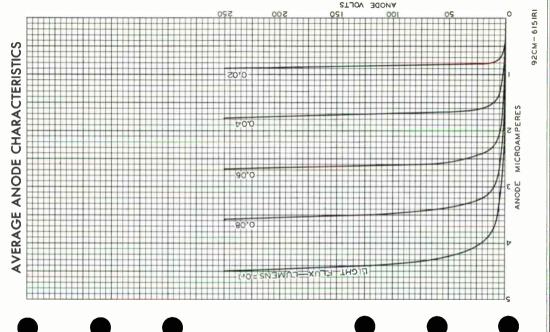
(1) • (8)	
Maximum Ratings, Absolute-Naximum Value ANODE-SUPPLY VCLTAGE (DC or Peak AC)	. 250 max. volts . 25 max. μa/sq.in. . 5 max. μa
Characteristics:	
With an anode-supply voltage	of 250 volts
Nin. Nedi	an Max.
Sensitivity: Radiant, at 4000	
angstroms 0.04 Luminous ^e 25	
Luminous ^c	70 μa/lumen
Anode Dark Current at 25° C	0.0125 μα
	-Indicates a change.

- a On plane perpendicular to indicated direction of radiation.
- b Averaged over any interval of 30 seconds maximum.
- C For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A 1-megohm load resistor and a light input of 0.1 lumen are used.

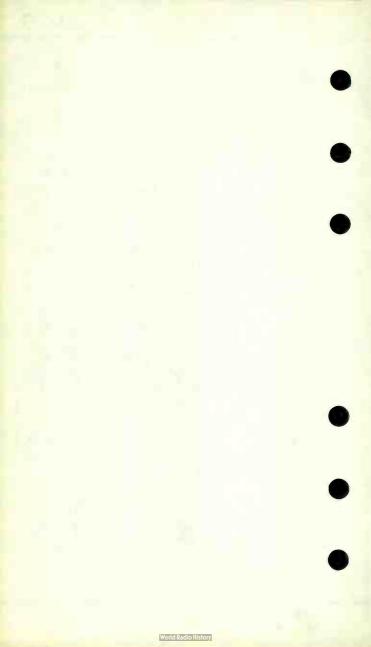
SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOSENSITIVE DEVICE HAVING S-4 RESPONSE is shown at the front of this section

DIMENSIONAL OUTLINE shown under Type 5581 also applies to the 929









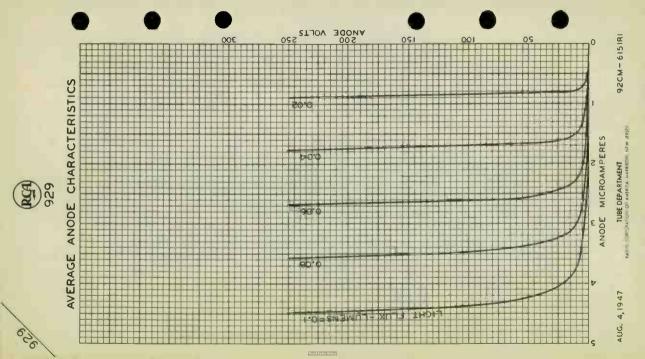


929 VACUUM PHOTOTUBE

920

ALLH - 4 RESPONT

ı	<u>DATA</u>	
	General:	
	pritral response	
	Way le gith of Mills of Reports 400 for it Argstrand	
	Shape	ļ
	Minimum Der Loret at the sets *	ı
	Vinitum Project 1 With	ı
	Direct Interclicatrole valuatiturce	ı
	Maximum Overall Length	ı
	Vaximum Self d Legtt	١.
	Waximum Tramet r	ľ
	Bulb	ı
	Mounties Preition Are	1
	Bases Designation for SOTTOM VIEW	ł
	Rasing Designation for SOTTOM VIEW	ŀ
	U-E-70 - C VH	ı
	Pin 1 - Anule	١
	Connection (- 16 Pin F 19	ı
	Pin 1 - No Cornection	ı
	Free tion (2) Pin 8 - thole	ı
	0.6	ı
		ı
		I
	Maximum Ratings, Absolute Values:	1
	ANDLE- LEFLY VOLTAGE " I PLAK C) TE	
	PEAK, ATHODE WILEN	
	PEAK CATHODE CURRENT SENTITY	
	AMBIENT TE PERATURE	ì
	Characteristics:	l
	Yin. Av. Yaz.	ſ
	Dark Correct of 150 velts	l
	Sensitivity:	Ì
	At .00 μη τημη 0.142 μ mp/μνιξή	1
	Luminou	1
	on plane perpendicular to indicated direction of mid-mid-mid-mid-mid-mid-mid-mid-mid-mid-	١
	Averaged over any internal of 30 second	ı
	Archaged over the property of the best of	-
	TI INC. THE TANK OF THE TANK O	ı
	HTLLE IMENSIONS for Type 3.3	ı
	are the same as this e is type as i	-
	FECTRAL INCITIVIT CHAPACTERISTIC	-
	at Photograph having San Response	1
	is then at the beginning of this Section	



Gas Phototube

Pin 8 - Photocathode

SIDE-ON TYPE HAVING S-I RESPONSE

DATA

General:
Spectral Response
Wavelength of Maximum Response 8000 ± 1000 angstroms
Cathode: Semicylindrical Shape
Base
Arrangement 1, (JEDEC No.B5-10) Basing Designation for BOTTOM VIEW
DIRECTION OF RADIATION
Pin 1 - Na Cornection Pin 6 - No Cannection
TILL T IN COLLECTION 1 1 TILL O NO CONNECTION

Maximum Ratings, Absolute-Naximum Values:

	Rating I	Rating II	
ANODE—SUPPLY VOLTAGE (DC or Peak AC)	70 max.	90 max.	volts
DENSITY ^b	60 max. 6 max. 100 max.	30 max. 3 max. 100 max.	μa/sq. in. μα ΟC

Characteristics:

Pin 2 - Na Connection Pin 4 - Arode

With an anode-supply voltage of 90 volts unless otherwise specified

Nin. Nedian Nax.

Sensitivity: Radiant, at	R	ດດເ)								
angstroms				•			-	-	0.013	_	amp/watt→

-Indicates a change.



			Min.	Median	Max.	
Luminous:c						
At 0 cps			90	135	205	μa/lumen
At 5000 cps			-	111	-	μa/lumen
At 10000 cps			-	101	_	μa/lumen
Gas Amplification Factord			_		10	,
Anode Dark Current at 25°	С		_	_	0.1	μa

Minimum Circuit Values:

With an anode-supply voltage of 70 or less 90 volts DC Load Resistance:

For dc currents above 3 μa . 0.1 min. — megohm For dc currents below 3 μa . 0 min. — megohms For dc currents above 2 μa . — 2.5 min. megohms For dc currents below 2 μa . — 1 min. megohm

an plane perpendicular to indicated direction of incident radiation.

b Averaged over any interval of 30 seconds maximum.

- For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A dc anode supply voltage of 90 volts and a 1-megohm load resistor are used. For the 0-cycle measurement, a light input of 0.1 lumen is used. For the 5000- and 10.000-cycle measurements, the light input is varied sinusoidally about a mean value of 0.015 lumen from zero to a maximum of twice the mean value.
- The ratio of luminous sensitivity at an anode supply voltage of 90 volts to luminous sensitivity at an anode supply voltage of 25 volts. In each case, sensitivity is obtained under conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870 K, the light input is 0.1 lumen, and the load resistor has a value of 1 megohm.

SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOSENSITIVE DEVICE HAVING S-I RESPONSE

and

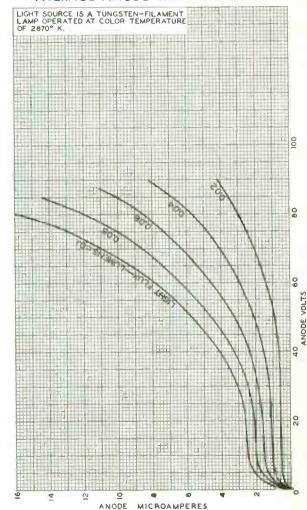
FREQUENCY-RESPONSE CHARACTERISTICS OF GAS PHOTOTUBES

are shown at the front of this section

DIMENSIONAL OUTLINE shown under Type 5581 also applies to the 930



AVERAGE ANODE CHARACTERISTICS







931-A MULTIPLIER PHOTOTUBE

9-STAGE TYPE WITH S-4 RESPONSE

DATA

	General:	
	Spectral Response	
	Minimum projected length*	
	Anode to dynode No.9	
1	Maximum Seated Length	
	Mounting Position	
	Basing Designation for BOTTOM VIEW	
	Pin 1 - Dynode No.1 Pin 2 - Dynode No.2 Pin 3 - Dynode No.3 Pin 4 - Dynode No.4 Pin 5 - Dynode No.5 Pin 6 - Dynode No.6	
	DIRECTION OF LIGHT	
)	Maximum Ratings, Absolute Values: ANODE_SUPPLY VOLTAGE (DC or Peak AC)	
	Characteristic Range Values for Equipment Design:	
•	Under conditions with supply voltage (E) across voltage divider providing 1/10 of E between cathode and dynode No.1; 1/10 of Efcreach succeeding dynode stage; and 1/10 of E between dynode No.9 and anode	

With E = 1000 volts (except as noted)

Min. Median Max.

Sensitivity:

Radiant, at 4000

angstroms - 24000

24000 – μamp/μwatt

On plane perpendicular to the indicated direction of incident light.
 Averaged over any interval of 30 seconds maximum.

→ Indicates a change.

DATA 1





MULTIPLIER PHOTOTURE

	Min.	Nedian	Nax.	
Cathode radiant, at				
4000 angstroms	-	0.03	_	μamp/μwatt
Luminous:				
At 0 cps		24	300	amp/lumen
At 100 Mc		23	-	amp/lumen
Cathode luminous		30	-	μamp/lumen
Current Amplification .	-	800,000	-	
Equivalent Anode-Dark-			2.5 x 10 ⁻⁹	,
Current Inpute Equivalent Noise	-	_	2.5 × 10 °	' lumen
Inputa		9.5 × 10 ⁻¹³	3	lumen
Tilpute		9.J x 10 -	_	rumen
With E = 750 volts (exce	ot as	noted)		
7,50 00003 (0.000				
	Aln.	Median	Max.	
Sensitivity:				
Radiant, at 4000				

Cathode luminous* . . 30 µamp/lumen Current Amplification 110,000 For conditions where the light source is a tungsten-filament lamp opera-ted at a color temperature of 2870°K. A light input of 10 microlumens as used. The load resistor has a value of 0.01 megohm.

3300

For conditions the same as shown under (ϕ) except that the value of light flux is 0.01 lumen and 100 volts are applied between cathode and all other electrodes connected together as anode.

angstroms . . .

Cathode radiant, at 4000 angstroms. ...

Luminous: At 0 cps. . . .

Measured at a tube temperature of 25°C and with the supply voltage (E) adjusted to give a luminous sensitivity of 20 amperes per lumen. Dark current Caused by thermionic emission and ion feedback may be reduced my the use of a refrigerant.

For maximum signal-to-noise ratio, operation with a supply voltage (E) pelow 1000 volts is recommended.

Under the following conditions: Supply voltage (E) is 1000 volts, external shield operated at -1000 volts with respect to anode, 25°C tube temperature, ac-amplifier bandwidth of 1 cycle per second, tungsten light source at color temperature of 2870°K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and thevalue stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

OPERATING CONSIDERATIONS

The operating stability of the 931-A is dependent on the magnitude of the anode current and its duration. When the 931-A is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 931-A usually recovers a substantial percentage of such loss in sensitivity.

uamo/uwatt

μamp/μwatt

amp/lumen



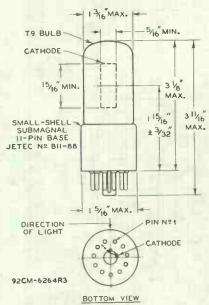
93/14

MULTIPLIER PHOTOTUBE

The use of an average anode current well below the maximum rated value of 1.0 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 10 microamperes, and the tube should be given a warm-up period of about 1/2 hour under load conditions.

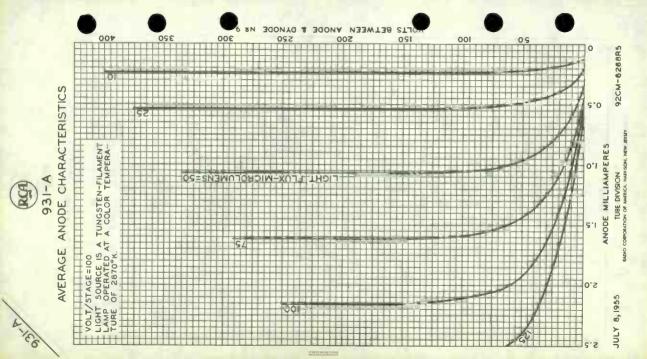
Electrostatic and/or magnetic shielding of the 931-a may be necessary.

> SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-4 Response is shown at the front of this Section



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

DATA 2



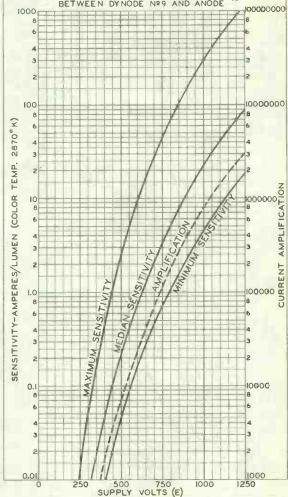


93/14

93I-A

AVERAGE CHARACTERISTICS

SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER PROVIDING VIO OF E BETWEEN CATHODE AND DYNODE Nº1; VIO OF E FOR EACH SUCCEEDING DYNODE STAGE; AND VIO OF E BETWEEN DYNODE Nº9 AND ANODE



JULY 8, 1955

TUBE DIVISION

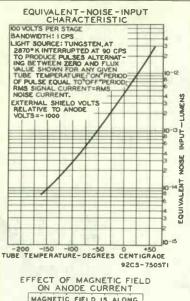
RABIO COMPORATION OF ANTICA, HAZE SON, NEW JETS

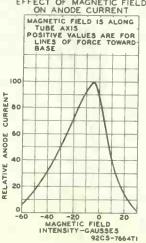
92CL-6459R3

931-1



CHARACTERISTIC CURVES

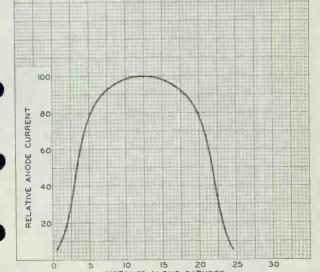






VARIATION IN SENSITIVITY OF PHOTOCATHODE ALONG ITS LENGTH

SPOT SIZE: I MM APPROX. VARIATIONS CAUSED BY INTERCEPTION OF LIGHT BY GRILL AS WELL AS SURFACE IRREGULARITIES HAVE BEEN IGNORED



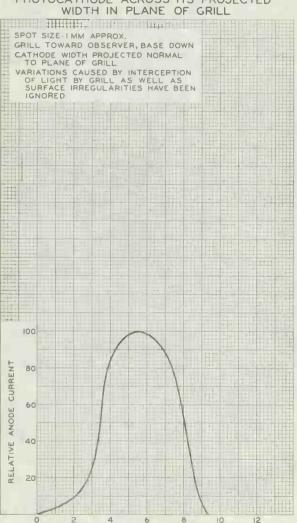
DISTANCE ALONG CATHODE FROM END OF CATHODE NEARER BASE-MILLIMETERS 92CM-7663RI TUBE DIVISION MAR.18,1954

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY
World Radio History





VARIATION IN SENSITIVITY OF PHOTOCATHODE ACROSS ITS PROJECTED WIDTH IN PLANE OF GRILL



DISTANCE ALONG PLANE OF GRILL FROM LEFT TO RIGHT-MILLIMETE TO RIGHT-MILLIMETERS MAR. 18,1954 TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRION, NEW MESSEY WORLD REGION HISTORY

92CM-7667RI



VACUUM PHOTOTUBE

WITH S-4 RESPONSE

DATA	1
General:	ı
Spectral Response	
DIRECTION OF LIGHT	l
Pin 1-No Connection Pin 2 - Anode Pin 3 - Cathode	
Martine O. Alinea, O. J. A. Walant	ı
Maximum Ratings, Absolute Values: ANODE-SUPPLY VOLTAGE (DC or Peak AC) 250 max volts PEAK CATHODE CURRENT	
Vin. Av. Max. DC Dark Current ^Q - 0.005 μamp Sensitivity: At 4000 angstroms 0.028 - μamp/μwatt Luminous 15 30 70 μamp/tumen	

- * On plane perpendicular to indicated direction of incident light.
- Averaged over any interval of 30 seconds maximum.
- G At 25°C and 250 volts.

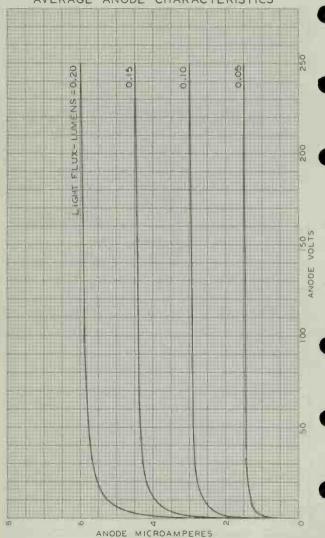
OUTLINE DIMENSIONS for Type 934 are the same as those for Type 927

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-4 Response is shown at the front of this Section

- Indicates a change.



AVERAGE ANODE CHARACTERISTICS



OCT. 16, 1944

TUBE DEPARTMENT

9201-6479

Vacuum Phototube

SIDE-ON TYPE HAVING \$-5 RESPONSE

DATA

General:
Spectral Response
Cathode: Shape. Shape. Semicylindrical Minimum projected lengtha. Minimum projected widtha. Direct Interelectrode Capacitance (Approx.) Maximum Overall Length Seated Length Seated Length Center of Cathode Maximum Diameter Operating Position Weight (Approx.) Seated Length (Approx.) Operating Position Maximum Diameter Operating Position Maximum Diameter Operating Position Maximum Diameter Operating Position Maximum Diameter Operating Position Operating Positi
Cap
Basing Designation for BOTTOM VIEW

Pin 1-No Internal Connection Pin 2-No Internal Connection Pin 4 - No Internal

Connection



Pin 6 - No Internal Connection Pin 8 - Photocathode Cap - Anode

Maximum Ratings, Absolute-Maximum Values:

ANODE-SUPPLY	VOLTAGE										
(DC or Peak	AC)	,						٠	250	max.	volts
AVERAGE CATHO	DE-CURRE	NT	DEN	ISI	TY	b	٠	٠	30	max.	μa/sq.in.
AVERAGE CATHO										max.	μа
AMBIENT TEMPE	RATURE.								75	max.	ρC

Characteristics:

With an anode-supply voltage of 250 volts Min. Median Max.

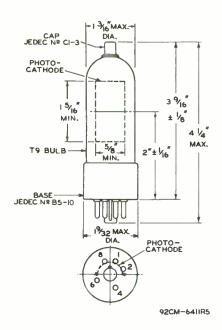
Sensitivity:				
Radiant, at 3400 angstroms	_	0.043	_	amp/watt
Luminous ^c		35	70	μa/lumen
Anode Dark Current at 25° C.	-	-	0.0005	μа

- Indicates a change.



- a On plane perpendicular to indicated direction of radiation.
- Averaged over any interval of 30 seconds maximum.
- C For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A 1-megohm load resistor and a light input of 0.1 lumen are used.

SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOSENSITIVE DEVICE HAVING S-5 RESPONSE is shown at the front of this section







935

VACUUM PHOTOTUBE

WITH S-5 RESPONSE

	DATA	l
	General:	ı
	Spectral Response	
,	Shape Semi-Cylindrical Minimum Projected Length* 1-5/16" Minimum Projected Width* 5/8" Direct Interelectrode Capacitance 0.6 \(\mu\)ft (byerall Length 4-1/8" ± 1/8"	
)	Seated Length 3-9'16" ± 1/8" Seated Length to Center of Cathode 2" ± 1/16" Maximum Diameter 1-9/32" Bulb T-9 Mounting Position Any	
	Cap	
	Pin 1 - No DIRECTION OF INCIDENT RADIATION Pin 6 - No Connection	
	Pin 2 – No Connection	
	Pin 4 - No Connection 2 Cap - Anode	
	Maximum Ratings, Absolute Values:	
	ANODE—SUPPLY VOLTAGE (DC or Peak AC) PEAK CATHODE CURRENT	
	Characteristics:	
	Min. Av. Max. Dark Current at 250 Volts 0.0005 μamp Sensitivity:	
	At 3400 Angstroms — 0.032 — μamp/μwatt Luminous 18 35 70 μamp/lumen	
	On plane perpendicular to indicated direction of incident radiation. Of averaged over any interval of 30 seconds maximum. Measured under conditions specified on sheat "PHOTOTUBE SENSITIVITY AND SENSITIVITY MEASUREMENTS" at the front of this section.	
,		ı

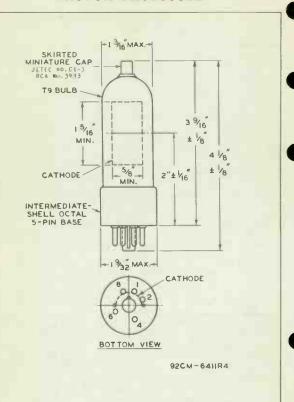
SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having 5-5 Response
is shown at the beginning of this Section

— Indicales a change.



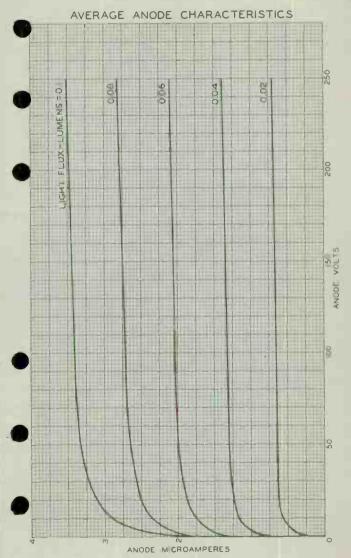


VACUUM PHOTOTUBE

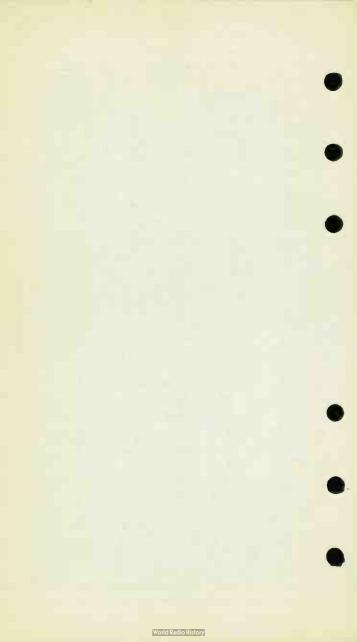


RCA 935

1835



92CM-6478RI

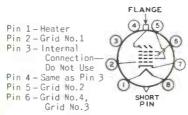


Vidicon

LOW-POWER (0.6-WATT) HEATER 600-T0-900-LINE RESOLUTION
For Use Under Severe Shock and Vibration, High
Humidity, and at Altitudes up to 50,000 Feet

DATA

	General:
)	Heater, for Unipotential Cathode: Voltage (AC or DC)
	Direct Interelectrode Capacitance: a
	Target to all other electrodes 3 ### Spectral Passages
	Spectral Response See Curve Photoconductive Layer:
	Maximum useful diagonal of
1	rectangular image (4 x 3
	aspect ratio)
	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
	Deflection Method
	Overall Length
	contact)
	Weight (Approx.)
	Operating Position
	Bulb
	Socket Cinch No.54A18088b, or equivalent
	Base
	Basing Designation for BCTTOM VIEW 8HM



Pin 7 - Cathode Pin 8 - Heater Flange - Target Short Pin -Same as Pin 3

DIRECTION OF LIGHT: INTO FACE END OF TUBE

Maximum Ratings, Absolute-Maximum Values:

For altitudes up to 50,000 feet and scanned area of 1 2" x 3/8"

2048A

GRID-No.1 VOLTAGE:	
Negative-bias value 300 max. Positive-bias value 0 max. PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode. 125 max. Heater positive with respect to cathode. 10 max.	
TARGET VOLTAGE	
PEAK TARGET CURRENTS 0.55 max. FACEPLATE:	
Illumination	
Typical Operation:	
For scanned area of 1/2" x 3/8" and faceplate temperature of 30° to 35° C	
Grid-No.4 (Decelerator) & Grid-No.3	_
(Beam-Focus-Electroded) Voltage 250° to 30°	00 volts
Grid-No.2 (Accelerator) Voltage 300 Grid-No.1 Voltage for picture cutoff45 to -10	volts 00 volts
Average "Gamma" of Transfer Characteristic	
for signal-output current between $0.02 \mu a$ and $0.2 \mu a$ 0.57	
Visual Equivalent Signal-to-Noise	
Ratio (Approx.) 9 300:1 Lag (Per cent of initial value of signal-	
output current 1/20 second after	
illumination is removed) for initial signal-output current of 0.2 μa, dark	
current of 0.02 µa:	
Typical	%
Minimum Peak-to-Peak Blanking Voltage:	
When applied to grid No.1	volts volts
Field Strength at center of focusing	
coil (Approx.) 40 Field Strength of Adjustable	gausses
Alignment Coilh 0 to 4	gausses
Maximum-sensitivity operation—0.1 footcandle on fa	ceplate
Faceplate Illumination (Highlight) 0.1 Target Voltage J, k	fc volts
Dark Current 0.2	μa
Signad-Output Current:" Typical0.14	μа
Intermediate-sensitivity operation—0.5 footcandle on 3	faceplate
Faceplate Illumination (Highlight) 0.5	fc
Target Voltagej.k. 30 to 60 Dark Current** 0.1	volts µa
Signal-Output Current:"	
Typical	μ a



	Average-	- 5 6	n s	ı t	12	12	tу	0	pe	ra	t ı	0 n	-	1 ;	fol	o t	ca	nd.	l e	on facetl	ate
	Faceplate																				
)	Target Vol	ta	ige	j,	k															20 to 40	volts
	Dark Curre	ent	m			٠														0.02	μа
	Signal-Out																				
	Typical																			0.2	μa
	Minimum					٠													۰	0.15	μa

This capacitance, which effectively is the output impedance of the 2008A, is increased when the tube is mounted in the deflecting-yoke and focusirg-coil assembly. The resistive component of the output impedance is in order of 100 megohms.

b Cinch Manufacturing Corporation, 1026 South Homan Avenue, Chicago 24, Illinois.

^C video amplifiers must be designed properly to handle target currents of this magnitude to avoid amplifier overload or picture distortion.

d Beam focus is obtained by combined effect of grid-40.3 voltage which should oe adjustable over indicated range, and a focusing coil having and average field strength of 40 gausses.

Definition, focus uniformity, and picture quality decrease with decreasing grid-No.4 and grid-No.3 voltage. In general, grid No.4 and grid-No.3 should be operated above 250 volts.

T With no blanking voltage on grid No. 1.

Measured with high-gain, low-noise, cascode-input-type amplifier having bandwidth of 5 Mc and a peak signal-output turrent of 0.35 microampere. Because the noise in such a system is predominately of the high-Trequency type, the visual equivalent signal-to-noise ratio is taken as the ratio of the highlight video-signal current to rms noise current, multiplied by a factor of 3.

h The alignment coil should be located on the tube so that its center is at a distance of 3-11/16 inches from the face of the rube, and be positioned so that its axis is coinciden with the axis of the tube, the deflecting yoke, and the focusing coil.

Indicated range for each type of service serves only to illustrate the operating target-voltage range normally encountered.

The target voltage for each 2048A must be adjusted to that value which gives the desired operating dark current.

The deflecting circuits must provide extremely linear scanning for good black-level reproduction. Dark-current signal is proportional to the scanning velocity. Any change in scanning velocity produces a black-level error indirect proportion to the change in scanning velocity.

Defined as the component of the highlight target current after the dark-current component has been subtracted.

SPECIAL PERFORMANCE DATA

In connection with the following tests, sample 2048A'S will maintain resolution as determined with a RETMA Resolution Chart, or equivalent.

Vibration Tests:

These tests are performed under conditions for Average-Sensitivity Operation on a sample lot of tubes from each production run. Tubes and their associated components $^{\rm p}$ are vibrated on apparatus providing dynamic conditions similar to those described in MIL-E-52728 $^{\rm r}$, paragraph 4.7.1.

Resonance. Tubes and associated components $^{\rm p}$ are vibrated (per the method of MIL-E-5272B $^{\rm f}$, paragraph 4.7.11 for 1 hour at +25 $^{\rm o}$ C, for 15 minutes at D $^{\rm o}$ C, and for 15 minutes at +55 $^{\rm o}$ C.

Cycling. Tubes and associated components are vibrated (perthemethod of MIL-E-5272B^r, paragraph 4.7.1.2 pertaining



2048A

to specimen without vibration isolators) for I hour at $\pm 25^{\circ}$ C, for I5 minutes at 0° C, and for I5 minutes at $\pm 55^{\circ}$ C.

Temperature-Pressure (Altitude) Tests:

Tubes and associated components p are subjected (per the method of MIL-E-5400 8 , paragraph 3.2.20, 3.2.20.1, and 3.2.20.1.1) to the separate and combined effects of varying temperature 0 0 to $^{+55}$ 0 C and varying barometric pressure 30 to 3.4 inches of mercury. The pressures correspond to sea level and to an altitude of 50,000 feet, respectively.

Shock Tests:

These tests are performed with no voltages applied and on a sample lot of tubes from each production run. Tubes and their associated components are subjected in these tests (per MILE-54008, paragraph 3.2.21.2.1) to 18 impact shocks of 15 g consisting of 3 shocks in opposite directions along each of three mutually perpendicular axes of the tube. Each shock impulse has a duration of 11 ± 1 milliseconds with a maximum impact acceleration occurring at approximately 5.5 milliseconds. Tube mounting accessories assurethe rigid fastening of the tube to the shock-test apparatus.

Temperature-Humidity Tests:

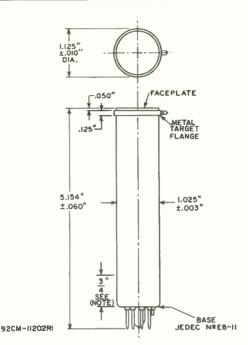
These tests are performed with no voltages applied to the 2048A. The 2048A and associated components $^{\rm p}$ are subjected (per the method of MIL-E-5400 $^{\rm s}$, paragraph 3.2.20.28) to relative humidities up to and including 95 per cent at temperatures up to and including $^{\rm +50^{\circ}}$ C.

- P Tube socket such as Cinch No.5#A18088 and RCA Assembly No.8#47880, or equivalent, which consists of the deflecting coils, focusing coil, alignment coil, shield, and target connector. This assembly is available from RCA Defense Electronic Products, Equipment Maintenance and Support, Building 7-5, Camden, New Jersey.
- r 5 June 1957, Procedure I of Military Specifications.
- ⁸ 1 January 1956.

OPERATING CONSIDERATIONS

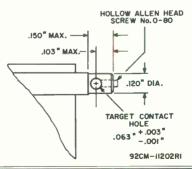
Support for the 2048A should be provided such that, under vibration and shock, the tube will not be displaced with respect to the focusing, deflecting, and alignment fields. Suitable support is provided for the tube and its socket in the RCA Deflection Assembly 8447880, or equivalent. Orientation of the 2048A in its support should be such that the horizontal scan is essentially parallel to the plane passing through the tube axis and short index pin.



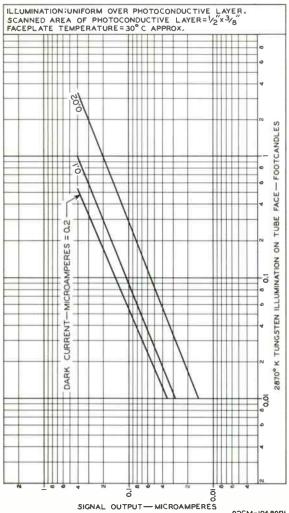


NOTE: WITHIN THIS DISTANCE, DIAMETER OF BULB IS 1.025" + 0.010" - 0.030".

DETAIL OF TARGET-FLANGE CONTACT



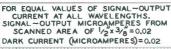
TYPICAL LIGHT-TRANSFER CHARACTERISTICS

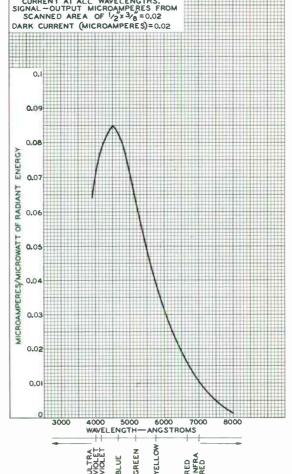


92CM-10689RI



TYPICAL SPECTRAL-SENSITIVITY CHARACTERISTIC





92CM-10698RI



Gas Phototube

SIDE-ON TYPE HAVING S-4 RESPONSE

DATA

	Spectral Response
	Shape
	Direct Interelectrode Capacitance(Approx.) 2.6 $\mu\mu$ f Maximum Overall Length
	Maximum Diameter 1-9/32"- Operating Position Any Weight (Approx.) 0.9 oz- Bulb Socket Cinch No.8JM-1, or equivalent- Base Intermediate-Shell Octal 5-Pin Arrangement 1,
	(JEDEC Ño.85-10) Basing Designation for BOTTOM VIEW
	Pin 1 – No Connection Pin 2 – No Connection Pin 4 – Anode Pin 4 – Anode
	(3) · •
	Maximum Ratings, Absolute-Haximum Values:
_	Rating 1 Rating 11

ANODE-SUPPLY VOLTAGE	noorng 2	Yearing 11	
(DC or Peak AC)AVERAGE CATHODE—CURRENT	. 80 max.	100 max.	volts
DENSITY AVERAGE CATHODE CURRENT AMBIENT TEMPERATURE.	. 6 max.	30 max. 3 max. 75 max.	μa/sq. in. μα οC

Characteristics:

General:

With an anode-supply voltage of 90 volts unless otherwise specified

					-,		
				Min.	Median	Max.	
Sensitivity:							
Radiant, at 4000							
angstroms				_	0.13	-	amp/watt
Luminous: c							
At 0 cps				75	135	205	μa/lumen
						200	
At 5000 cps				_	124	-	μa/lumen
At 10000 cps .	٠	٠		_	108	_	μa/lumen
					_	1-41-44	

Gas Amplification Factor ^d Anode Dark Current	Min. Medi 	5.5	μa
Minimum Circuit Values:			
With an anode-supply voltage of DC Load Resistance: For dc currents above	80 or less	100	volts
3 μa	0.1 min.	-	megohm
3 μa	O min.	-	megohms
1 μa	-	2.5 min.	megohms
1 μα	-	0.1 min.	megohm

a On plane perpendicular to indicated direction of incident light.

Averaged over any interval of 30 seconds maximum.

SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOSENSITIVE DEVICE HAVING S-4 RESPONSE

and

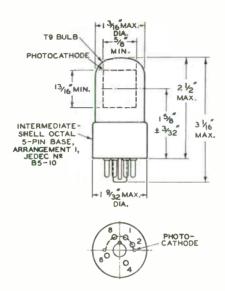
FREQUENCY-RESPONSE CHARACTERISTICS OF GAS PHOTOTUBES

are shown at the front of this section



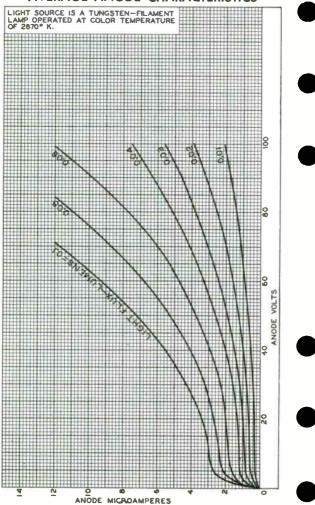
For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870 k. A dc anode supply voltage of 90 volts and a 1-megohm load resistor are used. For the 0-cycle measurement, a light input of 0.1 lumen is used. For the 5000- and 10.000-cycle measurements, the light input is verted sinusoidally about a mean value of 0.015 lumen from zero to a maximum of twice the mean value.

The ratio of luminous sensitivity at an anode supply voltage of 90 volts to luminous sensitivity at an anode supply voltage of 25 volts, in each case, sensitivity is obtained under conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K, the light input is 0.1 lumen, and the load resistor has a value of 1 megohm.



92CM-6I37R3

AVERAGE ANODE CHARACTERISTICS



92CM-6822RI



GAS PHOTOTUBE

5582

CARTRIDGE TYPE WITH S-4 RESPONSE

For sound reproduction involving a dye-image sound track

in cc	njunction wil		intescent	right 3	504/ CE
		DATA			
General:					
Spectral Res	ponse				S-4
Wavelength a	f Maximum Re	sponse .	4	000 ± 5	OC angstroms
Cathode:					
Shape				Serr	icylindrical
	rojected leng				5/8'
Minimum p	ojected widt	h*			1/2'
Direct Inter	relectrode Ca	pacitance			· · · 1 /44
Overall Leng	th			. 1-21	/32" ± 1/16
Seated Lengt	:h			. 1-13	/32" ± 1/32"
Length from	Center of Us	eful Cath	ode Area	1.1	/ 61 1 1/16
to Plane	-A' (See Dim	ensional	Out Line).	11	1/10 ± 1/10
	neter				
	rox.)				0.4 o.
	sition				· · · · · · · · · · · · · · · · · · ·
Terminals:	20			IF	TEC No.J1-2
Recessed					TEC No.J1-2
Basing Desi					2A
basing besi	gilation				20
		1			
Recessed }	Anada		P	rotrudir	Cathode
Cap {	Alloge			Cap	} cathode
		1 4	. /		
		HRECTION OF	LIGHT:		
	- 17	OF CATHO	SIDE		
Maximum Rat	ings, Absolut	e Values:			
ANODE-SUPPL	Y VOLTAGE (DO	or Peak	AC) . 10	00 max.	volt
AVERAGE CAL	HODE-CURRENT	DENSITYO			μamp/sq.in
AVERAGE CAT	HODE CURRENT			2 max.	
AMBIENT TEM	PERATURE			75 max.	0
Characteris	tics, At go	olts on A	lnode:		
	, ,	Nin.	Nedian	Nax.	
Sensitivity					
Radiant.					
	qstroms		0.12	_	μamp/μwat
luminous:					,
At 0 cp		. 80	120	175	µamp/lume
	cps		110	_	μamp/lume
	0 cps		96	_	μamp/lume
	cation Factor	r . –	_	5.5	
Anode Dark					1.0
at 25°C.			-	0.05	дат
on plane ne	rpendicular to	indicated d	irection o	f incider	nt light.
O. A: See nex					cates a change
12_56	· page.			- ,	DAT
1 / 56					1JA



GAS PHOTOTUBE

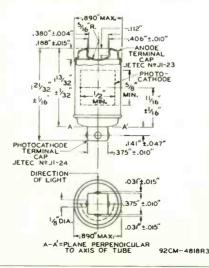
Minimum Circuit Values:			
With anode-supply voltage of	80 or less	100	volts
DC Load Resistance: For dc currents above			
3 μamp	0.1 min.	nine .	meyohm
For dc currents below			- 3
3 μamp	O min.		megohm
For dc currents above		0.5	
l μamp	_	2.5 min.	megohms
For dc currents below			
$1~\mu$ amp	_	0.1 min.	megohm

Averaged over any interval of 30 seconds maximum. This value may be doubled when anode-supply voltage is limited to 80 volts.

For conditions where the light source is a tungster-filament lamp operated at a color temperature of 2870%. A dc anode supply of 90 volts and a 1-megohm load resistor are used. For the 0-cycle measurements, a light input of 0.1 lumen is used. For the 5000- and 10000-cycle measurements, the light input is varied sinusoidally about a mean value of 0.025 lumen from zero to a maximum of twice the mean.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
and

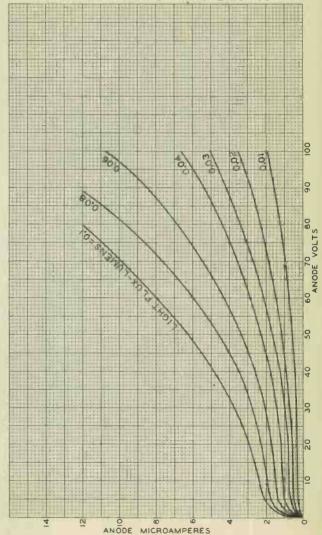
FREQUENCY-RESPONSE CHARACTERISTICS of Gas Phototubes are shown at the front of this Section

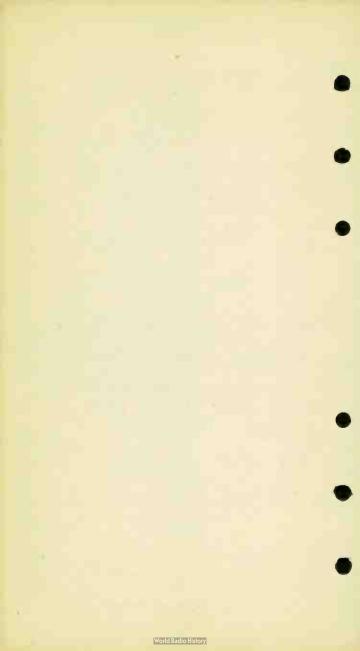




5582

AVERAGE ANODE CHARACTERISTICS





Gas Phototube

SIDE-ON TYPE HAVING S-4 RESPONSE

DATA

Spectral Response
Cathode:
DIRECTION, OF LIGHT
Pin 1 - No Comnection Pin 2 - Anode Pin 3 - Photocathode
Maximum Ratings, Absolute-Nazimum Values:
• •
Rating I Rating II
ANODE-SUPPLY VOLTAGE
(DC or Peak AC) 80 max. 100 max. volts AVERAGE CATHODE—CURRENT
WEDLOS OLTUDOS OLIDOSUTA
AMBIENT TEMPERATURE 75 max. 2 max. µa
AMDIENT TEMPERATORE 75 Max. 75 Max
Characteristics:
With an anode-supply voltage of go
volts unless otherwise specified
Min. Nedian Max.
Sensitivity:
Radiant, at 4000 angstroms 0.13 - amp/watt
At 0 cos
At 10000 cps
πι πορο ερά μα/ (unien
→ Indicates a change.

General:

Gas Amplification Factor ^d Anode Dark Current at 25 ^o C	#in. - -	Media: - -	n Max. 5.5 0.05	μa
Winimum Circuit Values: With an anode-supply valtage of DC Load Resistance: For dc currents above	80 or	less	100	volts
3 μa	0.1 m	nin.	-	megohm
3 μa	0 m	nîn.	-	megohms
1 μa	-	*	2.5 min.	megohms
1 μa	-		0.1 min.	megohm

On plane perpendicular to indicated direction of incident light.

b Averaged over any interval of 30 seconds maximum.

SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOSENSITIVE DEVICE HAVING S-4 RESPONSE

and

FREQUENCY-RESPONSE CHARACTERISTICS OF GAS PHOTOTUBES

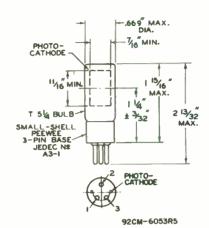
are shown at the front of this section

AVERAGE-ANODE-CHARACTERISTICS CURVE shown under Type 5581 also applies to the 5582



For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 28700 K. A dc anode supply voltege of 90 volts and a 1-megohm load resistor are used. For the 0-cycle measurement, a light input of 0.1 lumen is used. For the 5000- and 10.000-cycle measurements, the light input is varied sinusoidally about a mean value of 0.015 lumen from zero to a maximum of twice the mean value.

The ratio of luminous sensitivity at an anode supply voltage of 90 volts to luminous sensitivity at an anode supply voltage of 25 volts. In each case, sensitivity is obtained under conditions where the light Source is a tungsten-filament lamp operated at a color temperature of 2870° K, the light input is 0.1 lumen, and the load resistor has a value of 1 megohm.

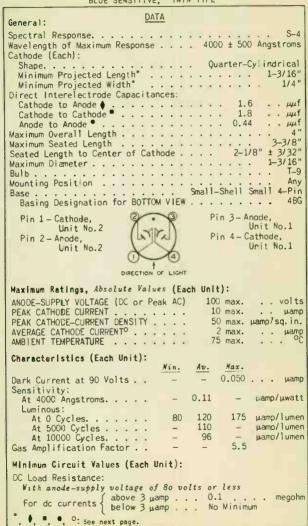






5584 GAS PHOTOTUBE

BLUE SENSITIVE. TWIN TYPE



258×





GAS PHOTOTUBE

With anode-supply voltage of 100 volts For dc currents $\begin{cases} \text{above 1 } \mu\text{amp} \dots 2.5 \dots \text{megohms} \\ \text{below 1 } \mu\text{amp} \dots 0.1 \dots \text{megohm} \end{cases}$

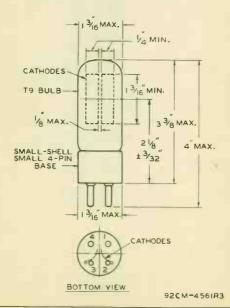
- * On plane perpendicular to indicated direction of incident light.
- Each unit, with other unit grounded.
- Anodes grounded.
- · Cathodes grounded.
- Averaged over any interval of 30 seconds maximum. Average current may by doubled when anode-supply voltage is limited to 80 volts.

SPECTRAL-SENSITIVITY CHARACTERISTIC

and

FREQUENCY-RESPONSE CHARACTERISTIC of Gas Phototube having S-4 Response are shown at beginning of this Section

AVERAGE ANODE CHARACTERISTICS of Type 5584 are the same as those shown under Type 5582





5652 VACUUM PHOTOTUBE

COMPOSITE ANODE-CATHODE TYPE WITH S-4 RESPONSE

	DATA	
i	General:	
	Spectral Response	
	Wavelength of Maximum Response 4000 ± 500 Angstroms	
	Cathode:	
	Shane	
	Minimum Projected Length*	
	Minimum Projected Width* 19/32"	١
	Minimum Projected Width*	l
	Balancing Capacitance (C2) 1 µµf	
	Canacitance Difference Between	ı
	C1 and C2 Not more than 0.3 µµf	ı
	Maximum Overall Length 2-7/8"	ı
	Maximum Seated Length	ı
	Seated Length to Center of Cathode 1-5/8" ± 3/32"	ı
	Maximum Diameter	1
	Bulb	ı
	Mounting Position	۱
	Base Intermediate—Shell Octal	ı
	5-Pin, Non-hygroscopic	l
	DIRECTION OF LIGHT	l
	Pin 1: No	١
	Connection	ı
	Pin 2: Balancing Pin 8: Anode or Cathoge	l
	Capacitance	l
	Pin 4: Cathode or	ı
	Anode	ı
	(1) * (8)	ı
		ł
	Maximum Ratings, Absolute Values:	ı
	ANODE-SUPPLY VOLTAGE (DC or Peak AC). 250 max volts	ı
	PEAK CATHOCE CURRENT (For	1
	either electrode) 12 max μamp	ł
	PEAK CATHODE-CURRENT DENSITY 100 max. µamp/sq.in.	ı
	AVERAGE CATHODE CURRENT (For	1
	either electrode) 4 max	1
	AMBIENT TEMPERATURE	1
		1
	Characteristics:	ı
	Dark Current at 250 Volts 0.01 µamp	1
	Sensitivity:	1
	At 4000 Augstroms 0.042 - μamp/μwatt	
	Luminous 30 45 70 µamp/lumer	1
	on plane perpendicular to indicated direction of incident light.	1
		1
	Measured between base pins 4 and 8. Discourse between base pins 2 and 4.	1
	Measured between base pins 2 and 4.	1

O Averaged over any interval of 30 seconds maximum.

2625

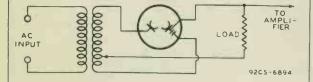


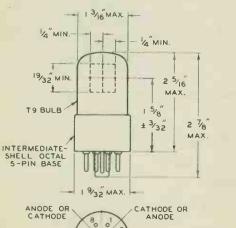
5652 VACUUM PHOTOTUBE

SPECTRAL SENSITIVITY CHARACTERISTIC of Phototube having S-4 Response is shown at the beginning of this Section

The curve shown under Type 929 is also applicable to the 5652

TYPICAL CIRCUIT





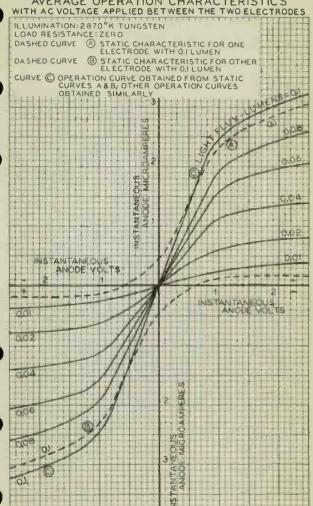
ANODE OR CATHODE OR ANODE

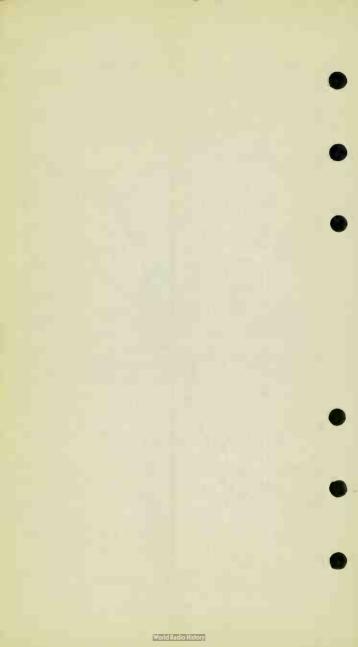
BOTTOM VIEW

OCTOBER 1, 194/

92CS-6869

AVERAGE OPERATION CHARACTERISTICS WITH AC VOLTAGE APPLIED BETWEEN THE TWO ELECTRODES





VACUUM PHOTOTUBE

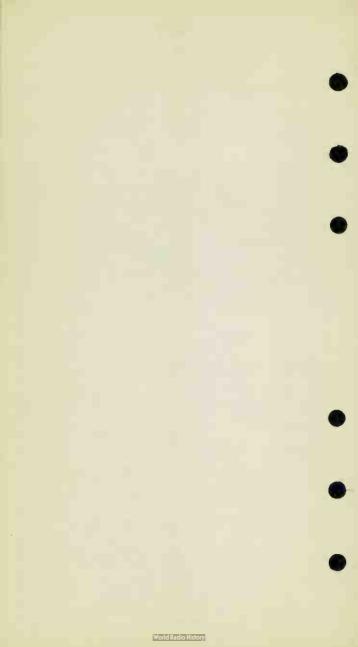
WITH S-4 RESPONSE

/	WITH 3-4 RESTONSE
	DATA
	General:
	Spectral Reconse
	Wave ength of Maximum Response 4000 ± 500 Angstroms
	Cathode:
)	Shape Semi-Cy indrical
	Minimum Projected Length*
	Minimum Projected Width*
	Direct Interelectrode Capacitance 2.6 µµf
	Maximum Overall Length
	Maximum Seated Length
)	Maximum Diameter
4	Bulb
	Mounting Position Any
	Mounting Position Any Base Intermediate—Shell Octal 5-Pin Basing Designation for BOTTOM VIEW
	DIRECTION OF LIGHT
	Pin 1 – No Pin 4 – Anode
	Connection Pin 6 - No
	Pin 2 - No Connection
	Connection Pin 8 - Cathode
	3 7
	000
	Maximum Ratings, Absolute Values:
	ANODE-SUPPLY VOLTAGE (DC or Peak AC) 250 max volts PEAK CATHODE CURRENT 20 max
	PEAK CATHODE-CURRENT DENSITY 100 max. µamp/sq.in.
	AVERAGE CATHODE CURRENTO
	AMBIENT TEMPERATURE
,	Characteristics:
	Nin. At. Max.
	Dark Current at 250 Volts 0.25 µamp
	Sensitivity:
	At 4000 Angstroms 0.042 - μωπρ'μwatt Luminous 20 45 100 μωπρ'lumen
	On plane perpendicular to indicated direction of incident light.
	O Averaged over any interval of 30 seconds ma imum.
	DUTY INC. BUNGALONG S T COSO
	OUTLINE DIMENSIONS for Type 5653 are the same as those for Type 5581
	1 116 116 2016 42 11026 101 1406 2201

are the same as those for Type 5581

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-4 Response is shown at beginning of this Section

AVERAGE ANODE CHARACTERISTICS of Type 5653 are the same as those shown under Type 929





5819

MULTIPLIER PHOTOTUBE

50/0

ID-STAGE, HEAD-ON TYPE WITH

1-11/16" SEMITRANSPARENT CATHODE AND S-11 RESPONSE

	T	

	DATA	
	General:	
)	Spectral Response	-
	Window: Area	* *
)	Anode to dynode No. 10	4 4 4
	Base Medium—Shell Diheptal 14-Pin (JETEC Mo. 314-38), Non-hygroscopic Basing Designation for BOTTOM VIEW	
)	Pin 7 - Dynode No.7 Pin 8 - Dynode No.8 Pin 9 - Dynode No.9 Direction of Light. Pin 14 - Cathode INTO END OF BULB	
	Maximum Ratings, Absolute Values:	
	ANODE-SUPPLY VOLTAGE (DC or Peak AC) 1250 max. volts SUPPLY VOLTAGE BETWEEN DYNODE No.10 AND ANODE (DC or Peak AC) 250 max. volts	-
	DYNODE-No.1 SUPPLY VOLTAGE (DC or Peak AC)	

Averaged over any interval of 30 seconds maximum.

- Indicates a change.





5819

MULTIPLIER PHOTOTUBE

Characteristics Range Values for Equipment Design:

	(exc	ep	t	as no	ted)		
				Min.	Median	Max.	
Sensitivity:							
Radiant, at 4400 angstroms. Cathode radiant,				-	20000	-	μamp/μwat
at 4400 angstrom	s.	•		-	0.040	-	μamp/μwat
At 0 cps With dynode No.1	· ·	•	•	10	25	300	amp/lume
as output electrodet Cathode luminous:		•	•	-	15	-	amp/lume
With tungsten light source				40	50	-	μamp/lume
With blue light source®♥ Current Amplificatio	n.				500000	_	μan
Equivalent Anode-Dar Current Input ^{es} . Equivalent Noise Inp Dark Current to Any	k- ut [‡]		:	-	8.5 × 10 ⁻¹⁰ 7 × 10 ⁻¹²	2 x 10-	9 lume
Electrode Except Arode (At 25°C) .		٠		-	-	0.75	μar
With E = 750 volts (exc	e p t		as not	ed)		
				Min.	Median	Max.	
Sensitivity:							
Radiant, at 4400 angstroms. Cathode radiant,				-	2000	-	μamp/μwa1
at 4400 angstron	ns .		•	-	0.040	-	μamp/μwa
At 0 cps With dynode No.1		•	•	-	2.5	-	amp/lum
as output electrodet. • Cathode luminous:			•	-	1.5	-	amp/lum
				40	50	-	μamp/lum
With tungsten light source With blue light	• •	٠	•				

MULTIPLIER PHOTOTUBE

For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870°K. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.

An output current of opposite polarity to that obtained at the anode may be provided by using dynode No.10 as the output electrode. With this arrangement, the load is connected in the dynode-No.10 circuit and the anode serves only as collector.

For conditions the same as shown under (\dot{b}) except that the value of light flux is 0.01 lumen and 150 volts are applied between cathode and all other electrodes connected together as anode.

Under the following conditions: Light incident on the cathode is transmitted through a blue filter (Corning, Glass Code Mo.5113 philished to 1/2 stock thiskness) from a tungsten-filament lamp operated at a color temperature of 2870°K. The value of light "lux on the filter is 0.01 lumen. The luad resistor has avalue of 0.01 megohm, and 150 voits are applied between cathode and all other electrodes connected together as anode.

For spectral characteristic of this source, see sheet SPECTRAL CHARACTERISTIC OF 2870 K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870 K SHURCE AFTER PASSING THROUGH INDICATED BLUE FILTER at front of this section.

Measured at a tube temperature of 25°C and with the supply voltage (E) adjusted to give a luminous sensitivity of 20 amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.

For maximum signal-to-noise ratio, operation with a supply voltage (E) below 1000 volts is recommended.

below lour voits is recommended.

Under the following conditions: Supply voltage (E) is 1000 volts, 25°C tube temperature, ac-amplifier bandwidth of 1 cycle per second, tungsten light source at color temperature of 287°K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

OPERATING CONSIDERATIONS

The operating stability of the 5819 is dependent on the magnitude of the anode current and its duration. When the 5819 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 5819 usually recovers a substantial percentage of such loss in sensitivity.

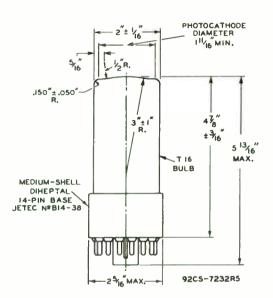
The use of an average anode current well below the maximum rated value of 0.75 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 100 microamperes.

Electrostatic and/or magnetic shielding of the 5819 may be necessary.

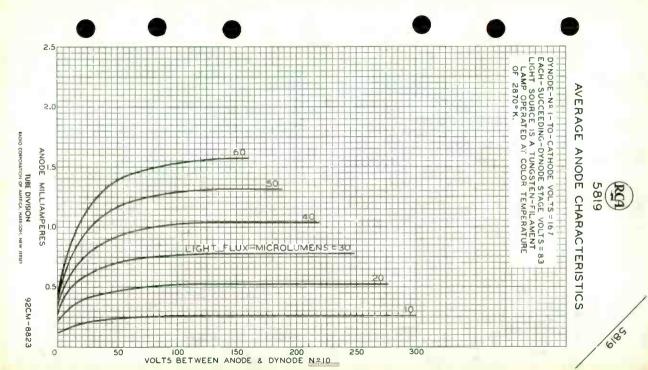
SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-11 Response is shown at the front of this Section



MULTIPLIER PHOTOTUBE

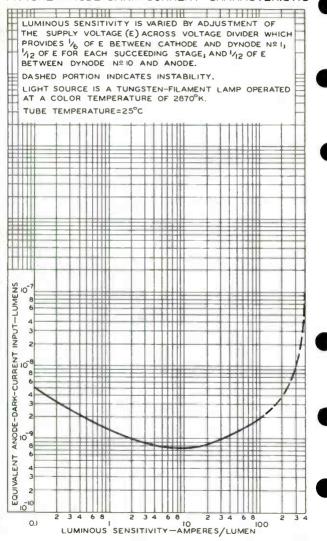


♠ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.



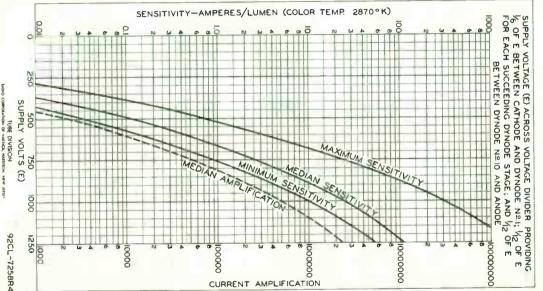


TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC





CHARACTERISTICS



-2



EFFECT OF MAGNETIC FIELD ON ANODE CURRENT MAGNETIC FIELD IS PARALLEL TO DYNODE -CAGE AXIS. POSITIVE VALUES ARE FOR LINES OF FORCE FROM LEFT TO RIGHT WITH BASE DOWN AND BASE KEY TOWARD OBSERVER. DYNODE-NºI-TO-CATHODE VOLTS=150 EACH-SUCCEEDING-STAGE VOLTS=100 100 80 RELATIVE ANODE CURRENT 60 40 20

MAGNETIC FIELD INTENSITY-GAUSSES



For outdoor and studio pickup

MAGNETIC FOCUS

MAGNETIC DEFLECTION

MAGNETIC FOCUS	MAGNETIC DEFLECTION
	ATA .
General:	
	de: .3 ± 10% ac or dc volts .6 amp
Direct Interelectrode Capacita Anode to all other electrodes	nce:
Photocathode, Semi,transparent:	See accompanying Spectral-
	sitivity-Characteristics curves
Rectangular image (4 x 3 asp	
Useful size of	1.8" max. diagonal
	optical image focused on the
	adjusted so that its maximum
	eed the specified Value. The
	image on the target should have
	corners of the rectangle just
touch the target ring.	
	Proper prientation is obtained
	is essentially parallel to the
	nter of faceplate and pin 7 of
the shoulder base.	
ocusing Method	Magnetic
effection Method	Magnetic 15.20" ± 0.25"
veral! Length	15.20" ± 0.25"
reatest Diameter of Bulb	3.00" ± 0.06"
	Diameter 2-3/8"
eflecting-Coil Length	5"
ocusing-Coil Length	10"
llignment-Coil Length	15/16"
	nd of Facusing Coil 1/2"
perating Position	. See Operating Considerations
Veight (Approx.)	1 lb 6 oz
moulder Base	Keyed Jumbo Annular 7-Pin
BOTTO	M VIEW
Pin 1-Grid No.6	Pin 5-Grid No.5
Pin 2-Photocathode	
Pin 3 - Internal Connec-	Pin 6 - Target
tion—Do Not Use	5: 7 1 4 - 1 5 -
Pin 4 - Internal Connec-	Pin 7 - Internal €omec-

See basing diagram on next page.

Pin 4 - Internal Connection-Do Not Use

- Indicates a change.

tion-Do Nat Use



End Base. . . . Small-Shell Diheptal 14-Pin (JETEC No.B14-45) BOTTOM VIEW

Pin 1 - Heater

Pin 2-Grid No.4

Pin

3-Grid No.3 4-Internal Connec-Pin tion-Do Not Use

Pin 5 - Dynode No. 2

Pin 6 - Dynode No.4

Pin 7 - Anode

Pin 8 - Dynode No.5 Pin 9 - Dynode No.3

Pin 10 - Dynode No.1, Grid No.2

Pin 11 - Internal Connection-Do Not Use

Pin 12-Grid No.1

Pin 13 - Cathode Pin 14 - Heater

DIRECTION OF LIGHT: PERPENDICULAR TO LARGE END OF TUBE 5 2 ш

WHITE INDEX LINE

Maximum and Minimum Ratings, Absolute Values:

PHOTOCATHODE:		
	max.	volte
	max.	
OPERATING TEMPERATURE:	max.	11-0
		°C
Of bulb at large end of tube	max.	
		00
	min.	٦,
TEMPERATURE DIFFERENCE:		
Between target section and any part		0.0
	max.	°C
	max.	volts
TARGET VOLTAGE:		
		volts
Negative value 10	max.	volts
	max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	max.	volts
		volts
PEAK HEATER-CATHODE VOLTAGE:	man.	***
	max.	volts
	max.	volts
		volts
	max.	
VOLVAGE FER MULTIFLIER STAGE 350	max.	volts

See next page.



3000

uа

volts

gausses

gausses

Typical Operation and Characteristics:		
Photocathode Voltage (Image Focus) Grid-No.6 Voltage (Accelerator)—	-400 to -540	volts
Approx. 75% of photocathode voltage.	-300 to -405	volts
Target-Cutoff Voltage ^O	-3 to +1	volts
Grid-No.5 Voltage (Decelerator)	0 to 125	volts
Grid-No.4 Voltage (Beam Focus)	140 to 180	volts
Grid-No.3 Voltage*	225 to 330	volts
Grid-No.2 & Dynode-No.1 Voltage	300	volts
Grid-No.1 Voltage for picture cutoff.	-45 to -115	volts
Dynode-No.2 Voltage	600	volts
Dynode-No.3 Voltage	800	volts
Dynode-No.4 Voltage	1000	volts
Dynode-No.5 Voltage	1200	volts
Anode Voltage	1250	volts
Anode Current (DC)	30	,,a

3 to 24

35 to 45

75

0 to 3

* Ratio of dynode voltages is shown under Typical Operation.

Signal-Output Current (Peak to peak) .

Target-Temperature Range

Ratio of Peak-to-Peak Highlight Video-Signal Current to RMS Noise Current (Approx.). . Minimum Peak-to-Peak Blanking Voltage.

Field Strength of Alignment Coil (Approx.)......

Field Strength at Center of Focusing Coil

O Normal setting of target voltage is +2 volts from target cutoff. The target-supply voltage should be adjustable from -3 to +5 volts.

Adjust to give the most uniformly shaded picture near maximum signal.

A Direction of current should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.

OPERATING CONSIDERATIONS

The aperating position of the 5820 should preferably besuch that any loose particles in the neck of the tube will not fall down and strike or become lodged on the target. Therefore, it is recommended that the tube never be operated in a vertical position with the Diheptal-base end up nor in any other position where the axis of the tube with base up makes an angle of less than 20° with the vertical.

When the equipment-design or operating conditions are such that the maximum temperature rating or maximum temperature difference as given under Maximum and Minimum Ratings will be exceeded, provision should be made to direct a blast of cooling air from the Diheptal-base end of the tube along the entire length of the bulb surface, i.e., through the space between the bulb surface and the surrounding deflectingcoil assembly and its extension. Any attempt to effect cooling

-Indicates a change.





of the tube by circulating even a large amount of air around the focusing coil will do little good, but a small amount of air directly in contact with the bulb surface will effectively drop the bulb temperature. For this purpose, a small blower is satisfactory, but it should be run at low speed to prevent vibration of the 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. If, in special cases, a target heater is required, it should fit between the focusing coil and the bulb near the shoulder of the tube, and be non-inductively wound.

Resolution in excess of 500 lines at the center of the picture can be produced by the 5820. The Square—Wave Response Characteristics curves show the center square—wave amplitude response versus television line number for the 5820 when it is operated with the highlights at the knee of the light-transfer characteristic and at one lens stop above the knee and at a temperature of 35° C. The values of response plotted on the curves are those obtained after optimum adjustments are made.

To utilize the resolution capability of the 5820 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.

For very high illumination or for individual tubes with exceptionally high photocathode sensitivity, 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 transfer characteristic. 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 IO% transmission and the other 20%—will give sufficient choice. Such filters with lensadapter rings can be obtained at a photographic—supply store.

-- Indicates a change.

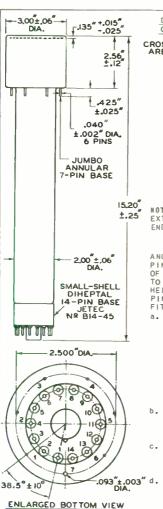


5820

5020

"MIN.

IMAGE ORTHICON



DETAIL OF BOTTOM VIEW
OF JUMBO ANNULAR BASE

CROSS-HATCHED
AREA IS FLAT

1.315"R.MIN.
1,185"R.MAX.

NOTE 1: DOTTED AREA IS FLAT OR EXTENDS TOWARD DIFEPTAL-BASE END OF TUBE BY 0.C60" MAX.

SEE NOTE I

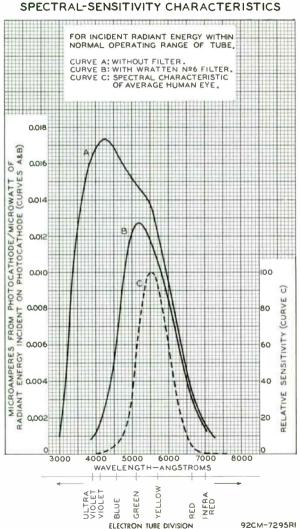
ANNULAR-BASE GAUGE

ANGULAR VARIATIONS BETWEEN PINS AS WELL AS ECCENTRICITY OF NECK CYLINOER WITH RESPECT TO PHOTOCATHODE CYLINOER ARE HELD TO TOLERANCES SUCH THAT PINS AND NECK CYLINDER WILL FIT FLAT-PLATE GAUGE WITH:

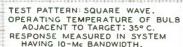
- a- SIX HOLES HAVING OIAMETER OF 0.065" ± 0.001" AND ONE HOLE HAVING DIAMETER OF 0.150" ± 0.001". ALL HOLES HAVE DEPTHOF 0.265" ± 0.001". THE SIX 0.065" HOLES ARE ENLARGED BY 45" TAPER TO DEPTH OF 0.047". ALL HOLES ARE SPACED AT ANGLES OF 51°26' ± 51 ON CIRCLE DIAMETER OF 2.500" ± 0.001".
- b. SEVEN STOPS HAVING HEIGHT OF 0.187" ± 0.001", CENTEREO BETWEEN PIN HOLES, TO BEAR AGAINST FLAT AREAS OF BASE.
- C. RIM EXTENDING OUT A MINIMUM OF 0.125" FROM 2.312" DIAMET TER AND HAVING HEIGHT OF 0.126" ± 0.001".
- NECK-CYLINDER CLEARANCE HOLE
 HAVING DIAMETER OF 2.200"
 ± 0,001".

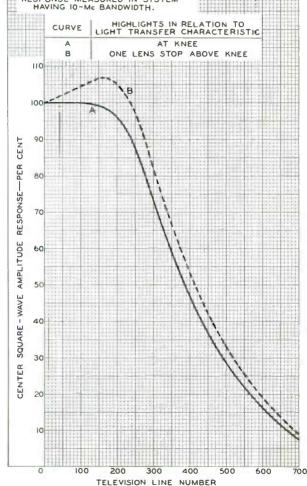
92CM-8293R3





SQUARE-WAVE RESPONSE CHARACTERISTICS

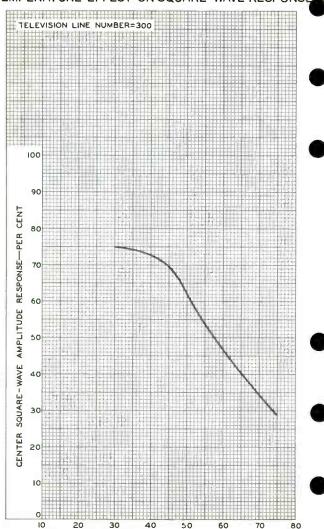






RCA 5820

TEMPERATURE EFFECT ON SQUARE-WAVE RESPONSE

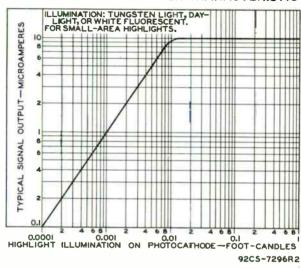


BULB TEMPERATURE ADJACENT TO TARGET-C



A) 20

BASIC LIGHT-TRANSFER CHARACTERISTIC







6032

For use, in combination with suitable optical systems, in viewing a scene with infrared radiation

DATA	
General:	
Spectral Response	
Shape	
Phosphor (For curves, see front of Cathode-Ray See also Operating Considerations). Fluorescence. Phosphorescence. Persistence. Fluorescent Screen: Shape. Min imum diameter Focusing Method. Overall Length Maximum Diameter Weight (Approx.)	Tube Section. P20 Yellow-Green Yellow-Green Medium-Short Circular S/8" Electrostatic 4-15/32' ± 1/16" 2-3/32" ± 1/32"
Operating Position	line):
CL - Collector	G ₂ - Grid No.2
G ₁ - Grid No.1	K - Photocathode
Maximum Ratings, Absolute Values:	
GRID-Nc.2 VOLTAGE (DC or Peak AC) GRID-No.1 VOLTAGE	20000 max. volts 2700 max. volts
(Continuous Operation)	1 max. μa 75 max. ος
Characteristics:	
Grid-No.2* Voltage	20000 volts 2150 to 2650 volts 0.5
*, : See mext page.	





Paraxial Magnification Factor	0.5	0.5	
Radiant, at 8000 angstroms. Infrared	0.0038 5 8	0.0038 5 10	μα/μωwatt μα/lumen
Minimum Resolution (In central area of photocathode) *•	18	18	line-pairs per mm

- Grid No.2 serves the dual function of high-voltage electrode for accelerating the electron beam and of collector through which the electrons leave the tube after their energy has been transformed with in the tube.
- Referred to photocathode.
- Under the following conditions: 2870° K tungsten light source; light flux of 0.1 lumen incident on Corning No.2540 Infrared Filter (Melt 1613, 2.61-mm thick, or equivalent); irradiated area of photocathode is 3/4" in diameter.
- Ratio of light flux from fluorescent screen to the product of the light flux incident on the infrared filter multiplied by the filter factor.
- A The resolution, both horizontally and vertically, in a 0.3"-diameter circle centered on the photocathode is determined with a pattern consisting of alternate black and white lines of equal width. Any two adjacent lines are designated as a "line-pair."
- Magnification is defined as the ratio of the distance from the tube axis of an image point on the fluorescent screen to the distance from the tube axis of an object point on the photocathode. Paraxial magnification is the magnification observed along the tube axis.

OPERATING CONSIDERATIONS

The curves glving the spectral-energy emission characteristic and the persistence characteristics of phosphor P20 are located in the front of the Cathode-Ray Tube Section. Only persistence-characteristic curve A applies to the 6032.

Subjecting the 6032 to intense incident-radiation levels may temporarily decrease the tube's sensitivity even though there is no voltage applied. The magnitude and duration of this decrease depend on the length of exposure. Permanent damage to the tube may result if it is exposed to radiant energy so great as to cause excessive heating of the photocathode.

The sensitivity values for the 6032 are average values. The average values are representative of this type when operated with low values of photocathode current. At high values of photocathode current, a drop in sensitivity below the values shown may be expected. The extent of the drop is affected by the nature and severity of the operating conditions to which the 6032 is subjected. After a period of idleness, the 6032 usually recovers a substantial percentage of such loss in sensitivity.

Support for the 6032 may be provided at the photocathode end by a cushioned arrangement and at the screen end by a suitable fixture which will exert adequate but not excessive pressure to hold the tube firmly against the cushioned arrangement.

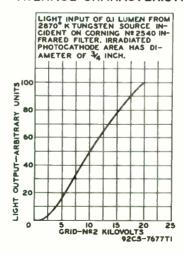


Shielding of the 6032 is required to minimize the effects of extraneous fields on tube performance. If an iron or steel case is used, care should be taken in its construction to insure that the case is completely demagnetized. The shielding case may be designed, if desired, to include an arnular end piece to position the tube properly in the optical system. The circular opening of the end piece should have a diameter less than I-1/2" in order to bear on the rim of the tube face (See Dimensional Outline).

Connections to the respective terminals of the tube, indicated on the Dimensional Outline, should not be soldered to the terminals. They should be made by flexible metal bands fastened firmly around the tube in the contact areas shown on the Dimensional Outline. The bands should be fastened only tight enough to insure good contact. If the bands are too tight, the metal-glass seals may be damaged.

> The curve showing the Spectral-Sensitivity Characteristic of Phototube having S-I Response located at the front of this Section also applies to the 6032

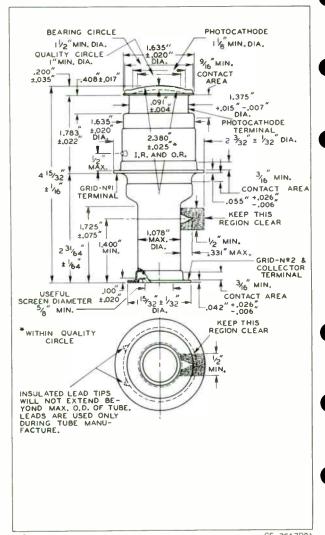
AVERAGE CHARACTERISTIC

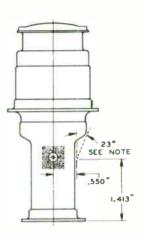


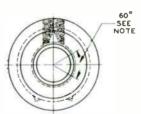
6032



IMAGE-CONVERTER TUBE





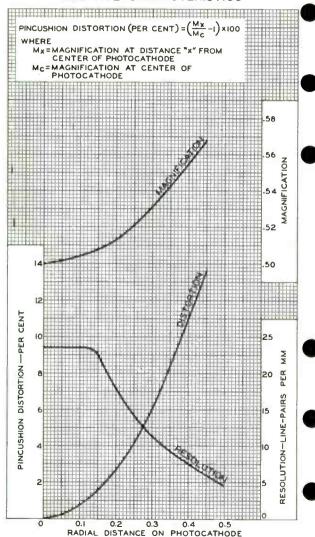


NOTE: THE CONTOUR OF THE FLARED GLASS NECK WILL BE WITHIN THE DOTTED LINE OVER A 60° SECTION AS SHOWN ON END VIEW.

92CL - 7617R2



AVERAGE CHARACTERISTICS



FROM CENTER TOWARD EDGE—INCHES
ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, MARRISON, NEW JERSEY

92CM-8624



6032-A

IMAGE-CONVERTER TUBE

For use, in combination with suitable optical systems, in viewing a scene with infrared radiation

The 6032-A is unilaterally interchangeable with the 6032.

The 6032-A is like the 6032 except that it is processed and tested to meet the following special-performance test:

Maximum luminous equivalent of infrared

radiation for threshold visibility* . . 4.1 x 10-11 lumen

Radiation from a tungsten lamp operating at a color temperature of 2870° K is passed through a Corning No. 25%0 Infrared Filter and focused to a point on the photocathode. The resulting image on the fluorescent screen is viewed by a dark-adapted eye through a 10-power ocular. The amount of infrared radiation for threshold visibility is determined by reducing the incident radiation until the image on the screen can just be discerned. The luminous equivalent of this amount of infrared radiation is the value of luminous flux from a 2870° K source which produces a response equal to that produced by the infrared radiation when both are measured with a receiver having S-1 spectral response.

603214





6/98.4

600-LINE RESOLUTION
For use in industrial applications

The 6198-A is an improved version of the 6198 and is unilaterally interchangeable with it.

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 µµt Spectral Response See Curves
Photoconductive Layer: Maximum useful diagonal of rectangular image (4 x 3 aspect ratio)
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Internal Connection— Da Not Use Pin 4 - Same as Pin 3 Pin 5 - Grid No.2 Pin 6 - Grid No.4, Grid No.3 DIRECTION OF LIGHT: INTO FACE END OF TUBE
Maximum Ratings, Absolute Values: SIGNAL—ELECTRODE VOLTAGE 100 max. volts GRID—No.4 & GRID—No.3 VOLTAGE 350 max. volts GRID—No.2 VCLTAGE 350 max. volts
This capacitance, which effectively is the output impedance of the 6198-A, is increased by about 3 µµf when the tube is mounted in the deflecting-yoke and focusing-coil assembly. The resistive-component of the output impedance is in the order of 100 megohms.



GRID-No.1 VOLTAGE: Negative bias value	volts volts
respect to cathode 125 max. Heater positive with	volts
respect to cathode 10 max. FACEPLATE:	volts
Illumination (Highlight) 1000 max. Temperature 60 max.	
Typical Operation and Characteristics:	
For scanned area of 1/2" x 3/8"	
Faceplate Illumination (Highlight) . 10 to 20 Signal-Electrode Voltage 10 to 70 Grid-No.4 (Decelerator) & Grid-No.3	ft-c volts
(8eam Focus) Voltage	volts volts
cutoff	volts μα μα
nal-Output Current of 0.1 to G.2 μa	ft-c
rent between 0.02 and 0.2 μ a 0.65 Visual Equivalent Signal-to-Noise	
Ratio (Approx.)*	
When applied to grid No.1 40	volts
When applied to cathode 10 Field Strength at Center of	volts
Focusing Device 40 Field Strength of Adjustable	gausses
Alignment Coil 0 to 4	gausses
Wefinition, focus uniformity, and picture quality decrea	ase with

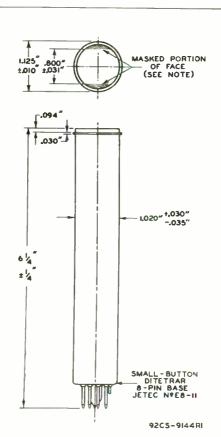
Mefinition, focus uniformity, and picture quality decrease with decreasing grid—No.3 and grid—No.4 voltage. In general, grid Mo.3 and grid No.4 should not be operated below 250 volts.

With no blanking voltage on grid No.1.

Measured with a high-gain, low-noise, cascode-input-type amplifier having bandwidth of 5 Mc and determined primarily by the signal-output level of the vidicon and the noise generated in the input amplifier. Because the noise in such a system is predominately of the high-requency type, the visual equivalent signal-to-noise ratio is taken as the ratio of the highlight video-signal current to rms noise current, multiplied by a factor of 3.



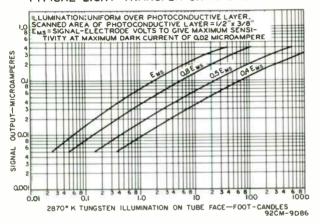




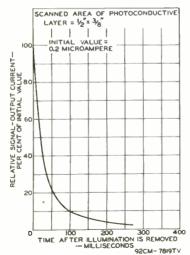
THE PLANE PASSING THROUGH TUBE AXIS AND SHORT INDEX PIN.



TYPICAL LIGHT-TRANSFER CHARACTERISTICS

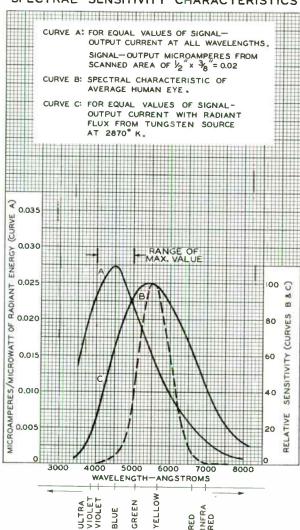


PERSISTENCE CHARACTERISTIC





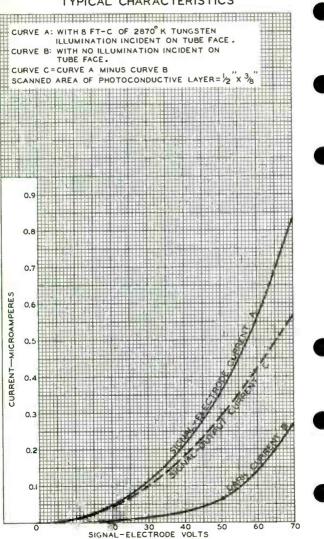
SPECTRAL SENSITIVITY CHARACTERISTICS



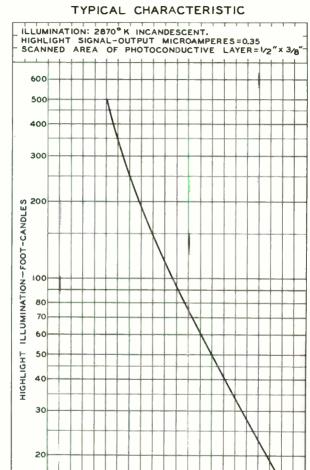
6198-1



TYPICAL CHARACTERISTICS







30

20

10

10

50

40

6/98:4

World Radio History







For use in industrial applications

DATA
General:
Heater, for Unipotential Cathode: Voltage 6.3 ± 10% ac or dc volts Current 0.6
tained when the horizontal scan is essentially parallel to the plane passing through the tube axis and short index pin. Focusing Method
Pin 1 - Heater Pin 2 - Grid No. 1 Pin 3 - Internal Connection— Do Not Use Pin 4 - Same as Pin 3 Pin 5 - Grid No. 2 Pin 6 - Grid No. 4, Grid No. 3 Pin 5 - Grid No. 3 DIRECTION OF LIGHT: NTO FACE END OF TUBE
Maximum Ratings, Absolute Values: TARGET (S.GNAL—ELECTRODE) VOLTAGE
▲ See next page. ← Indicates a change.



FACEP ATE:



VIDICON

	Illumination	ft-c	
-	Typical Operation and Characteristics:		
	For scanned area of 1/2" x 3/8"	ĺ	
	Faceplate Illumination (Highlight). 10 to 20 Target (Signal-Electrode) Voltage . 10 to 70 Grid-No.4 (Decelerator) & Grid-No.3	ft-c volts	
	(Beam-Focus) Voltage 250 to 300 Grid-No.2 (Accelerator) Voltage 300 Grid-No.1 Voltage for picture	volts	
)	cutoff	volts μα μα	
7	Uniform 2870 ^o K Tungsten Illumina— tion on Tube Face to Produce Sig— nal—Output Current of 0.1 to 0.2 µa	ft-c	
3	Average "Gamma" of Transfer Charac- teristic for Signal-Output Cur- rent between 0.02 and 0.2 µa 0.65		
	Visual Equivalent Signal-to-Noise Ratio (Approx.)*300:1 Minimum Peak-to-Peak Blanking / Voltage:		
	When applied to grid No.1 40 When applied to cathode 10 Field Strength at Center of	volts volts	
	Focusing Device	ausses ausses	
	# Defined as the component of the target current after the dark-	current	

component has been subtracted.

-Indicates a change.

Definition, focus uniformity, and picture quality decrease with decreasing grid-No.3 and grid-No.4 voltage. In general, grid No.3 and grid No.4 should not be operated below 250 volts.

With no blanking voltage on grid No.1.

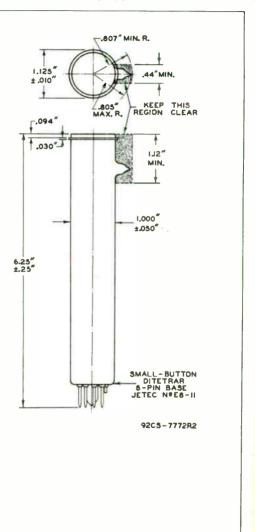
Measured with a high-gain, low-noise, cascode-input-type amplifier having bandwidth of 5 Mc.

This capacitance, which effectively is the output impedance of the 6198, is increased when the tube is mounted in the deflecting-yoke and focusing-coil assembly. The resistive component of the output impedance is in the order of 100 megohms.

OP SOLETE

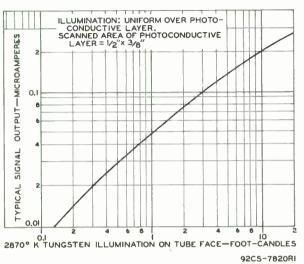




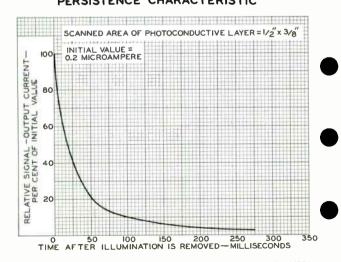




TYPICAL SIGNAL OUTPUT



PERSISTENCE CHARACTERISTIC





6/90

SPECTRAL-SENSITIVITY CHARACTERISTICS



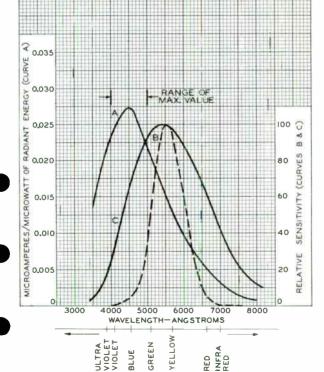
OUTPUT CURRENT AT ALL WAVELENGTHS.
SIGNAL—OUTPUT MICROAMPERES FROM

SCANNED AREA OF 1/2" × 3/8" = 0.02

DARK CURRENT (MICROAMPERES) = 0.02

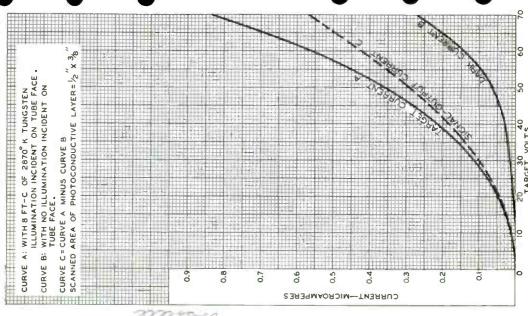
CURVE B: SPECTRAL CHARACTERISTIC OF AVERAGE HUMAN EYE.

CURVE C: FOR EQUAL VALUES OF SIGNAL-OUTPUT CURRENT WITH RADIANT FLUX FROM TUNGSTEN SOURCE AT 2870° K.





TYPICAL CHARACTERISTICS



ELECTRON TUBE DIVISION

92CM-7818RI



IO-STAGE, HEAD-ON TYPE WITH 1.24" SEMITRANSPARENT CATHODE AND S-II RESPONSE

DATA

Genera	

į	Spectral Response	-
	Wavelength of Maximum Response 4400 ± 500 angstroms	-
	Cathode Semitransparent:	

Shape. Circular Window: Area . 1.2 sq. in.

Minimum diameter 1.24 in. Index of refraction. 1.51 Direct Interelectrode Capacitances (Approx.): Anode to dynode No.10

μμf Anode to all other electrodes $\mu\mu$ f 4-9/16" Maximum Overall Length Seated Length. . . ± 3/16"

Maximum Diameter 1-9/16" Mounting Position. Weight (Approx.) 2 ozl T-12 Bulb . .

No. B12-43). Base . Small-Shell Duodeca1 Non-hygroscopic

Basing Designation for BOTTOM VIEW . 12AE

Pin 1 - Dynode No.1

Pin 2 - Dyrode No.3 Pin 3 - Dynode No.5

Pin 4 - Dynode No. 7

Pin 5 - Dynode No.9

Pin 6 - Anode

AVERAGE ANODE CURRENT®

AMBIENT TEMPERATURE. .

INTO FUD OF BUILD

Pin 7 - Dynode No.10 Pin 8 - Dynode No.8

⁶/₉0

Pin 9 - Dynode No.6 Pin 10 - Dynode No.4

Pin 11 - Dynode No. 2

0.75 max.

Pin 12 - Cathode

Maximum Ratings, Absolute Values:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	•		1250 ms	ax. vol	ts
AND ANODE (DC or Peak AC)			250 ma	ax. vol	ts
DYNODE-No.1 SUPPLY VOLTAGE			300 me	ax. vol	ts

Averaged over any interval of 30 seconds maximum.

- Indicates a change.

ma

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- Characteristics kande values for Equipment Desi	aracteristics Range Values for Equi	ipment Design
---------------------------------------------------	-------------------------------------	---------------

Under conditions with supply voltage (E) across voltage divider providing 1/6 of E between cathode and dynode No.1; 1/12 of E for each succeeding dynode stage; and 1/12 of E between dynode No.10 and anode

With E = 1000 volts (except as noted)

		Min.	Median	Max.		1
i	Sensitivity: Radiant, at					
	4400 angstroms Cathode radiant, at	-	21600	-	μamp/μwatt	
	4400 angstroms	-	0.036	-	μamp/μwatt	
	At 0 cps	10	27	300	amp/lumen	•
	as output elec- trodet Cathode luminous:	-	16	-	amp/lumen	
	With tungsten light source With blue light	30	45	-	μamp/lumen	
	source [®] Current Amplification .		600000	_	<i>µ</i> атр	
	Equivalent Anode-Dark- Current Input Equivalent Noise Input Dark Current to Any	_	8 x 10 ⁻¹⁰ 4 x 10 ⁻¹²	2.5 x 10 ⁻⁹	lumen lumen	
	Anode (At 25°C)		-	0.75	μ amp	
	With E = 750 volts (exc	ept as	noted)			
		Min.	Nedian	Max.		
	Sensitivity:					
	Radiant, at 4400 angstroms		2160	-	μamp/μwatt	
	Radiant, at 4400 angstroms Cathode radiant, at 4400 angstroms		2160 0.036	-	μαπρ/μwatt μαπρ/μwatt	
	Radiant, at 4400 angstroms Cathode radiant, at			-		
	Radiant, at 4400 angstroms Cathode radiant, at 4400 angstroms Łuminous: At 0 cps		0.036	- - -	μamp/μwatt	
	Radiant, at 4400 angstroms. Cathode radiant, at 4400 angstroms. Luminous: At 0 cps. With dynode No.10 as output electrodet Cathode luminous: With tungsten light source	 	0.036	-	μamp/μwatt amp/lumen	
	Radiant, at 4400 angstroms. Cathode radiant, at 4400 angstroms. Luminous: At 0 cps. With dynode No.10 as output electrode! Cathode luminous: With tungsten		0.036 2.7 1.6	-	μamp/μwatt amp/lumen amp/lumen	

.▲. ♥ .♥ .■ .*: See next page.

- Indicates a change.

for conditions where the light source is a tungsten-filament lamp operated at a color temperature of $2870^\circ \rm K$. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.

An output current of opposite polarity to that obtained at the anode may be provided by using dynode No.10 as the output electrode. With this arrangement, the load is connected in the dynode-No.10 circuit and the anode serves only as collector.

For conditions the same as shown under $(\frac{1}{2})$ except that the value of light flux is 0.01 lumen and 150 volts are applied between cathode and all other electrodes connected together as anode.

Under the following conditions: Light incident on the cathode is transmitted through a blue filter (corning, Glass Code No. 5113 polished to 1/2 stock thickness) from a tungsten-filament lamp operated at a color temperature of 2870°K. The value of light flux on the filter is 0.01 lumen. The load resistor has avalue of 0.01 megohm, and 150 volts are applied between cathode and all other electrodes connected together as anode.

For spectral characteristic of this source, see sheet SPECTRAL CHARACTERISTIC OF 2870°K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870°K SOURCE AFTER PASSING THROUGH INDICATED BLUE FILTER at front of this section.

Measured at a tube temperature of $25^{\circ}C$ and with the supply voltage (£) adjusted to give a luminous sensitivity of 20 amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.

For maximum signal-to-noise ratio, operation with a supply voltage (E) below 1000 volts is recommended.

tunder the following conditions: Supply voltage (E) is 1000 volts, 25°C uner the forlowing conditions: Supply voltage (E) is 1000 volts, 25°C tube temperature, ac-amplifier bandwidth of Lycle per second, tungsten light source at color temperature of 2870°K interrupted at a low audio frequency to poduce inclient radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

OPERATING CONSIDERATIONS

The operating stability of the 6199 is dependent on the magnitude of the anode current and its duration. When the 6199 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 6199 usually recovers a substantial percentage of such loss in sensitivity.

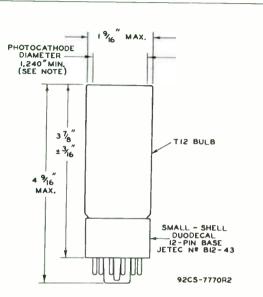
The use of an average anode current well below the maximum rated value of 0.75 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 100 microamperes.

Electrostatic and/or magnetic shielding of the 6199 may be necessary.

> SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-11 Response is shown at the front of this Section

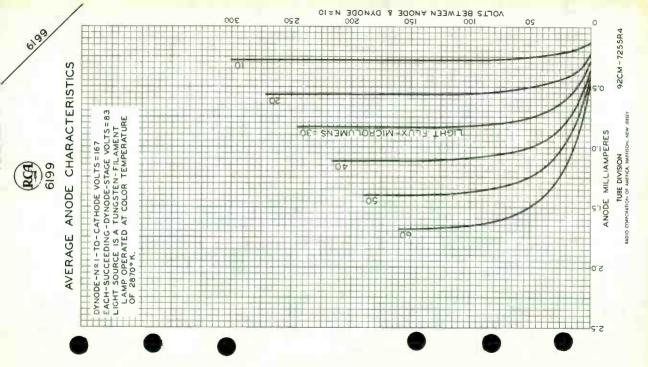
> > - Indicates a change.





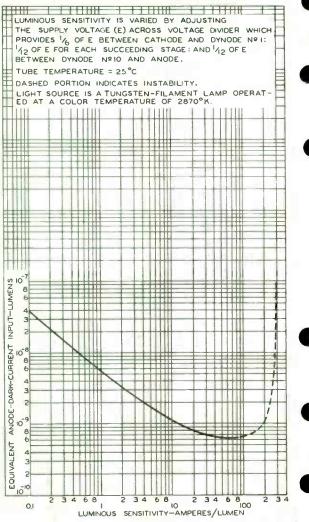
NOTE: DEVIATION FROM FLATNESS WITHIN THE 1.240"-DIAM-ETER AREA WILL NOT EXCEED 0.010" FROM PEAK TO VALLEY.

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





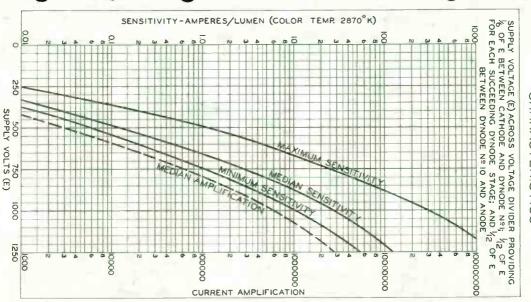
TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC



TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW ARREY

92CM-7814R2

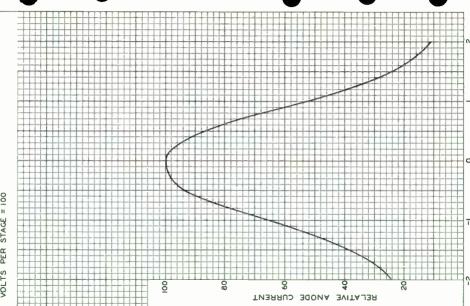




92CL-7812RI

CURRENT ANODE Z MAGNETIC P.

2 AGE AXIS FROM LEFT TOWARD DYNODE-CA OF FORCE I BASE KEY LINES LAND MAGNETIC FIELD IS PARALLE
POSITIVE VALUES ARE FOR I
RIGHT WITH BASE DOWN
OBSERVER
VOLTS PER STAGE = 100



TUBE DIVISION

92CM-7813

AUSSES

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INTENSIT

FIELD

MAGNETIC

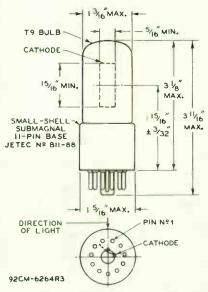


MULTIPLIER PHOTOTUBE

9-STAGE TYPE WITH S-4 RESPONSE For Headlight-Control Service

The 6323 is the same as the 6328 except for the following items:

	General:	ı
	Direct Interelectrode Capacitances (Approx.):	l
,	Anode to dynode No.9 4.4 μμf	
	Anode to all other electrodes	ı
	Maximum Overall Length	l
	Maximum Seated Length	
	Length from Base Seat to Center	l
	of Useful Cathode Area 1-15/16" ± 3/32"	l
	Weight (Approx.)	
1	Base Small-Shell Submagnal 11-Pin (JETEC No. B11-88),	
,	Non-hydrasconic	



BOTTOM_VIEW

C OF BULB WILL NOT DEVIATE MORE THAN 20 IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM DF THE BASE.

NOTE: THE MAXIMUM ANGULAR VARIATION BETWEEN THE PLANE THROJGH PINS NO. I AND NO. II AND THE PLANE OF THE GRILL WILL NOT EXCEED 60.





A) 6326

VIDICON

600—LINE RESOLUTION
For film pickup
with color or black—and—white TV cameras

	DATA
General:	
Heater, for Unipotentia Voltage Current Direct Interelectrode C Target (Signal electr	6.3 ± 10% ac or dc volts amp apacitance: bode) to all
other electrodes Spectral Response Photoconductive Layer:	
Maximum useful diagor image (4 x 3 aspect Orientation of qualit tained when the ho	al of rectangular ratio)
Focusing Method	
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.3 Pin 4 - Internal Connection— Do Not Use Pin 5 - Grid No.2 Pin 6 - Grid No.4, Grid No.5	Pin 7 - Cathode Pin 8 - Heater Flange - Target (Sig- nal Electrode) Short Index Pin- Internal Connection Do Not Use
	DIRECTION OF LIGHT: NTO FACE END OF TUBE
Maximum Ratings, Absolu	ite Values:
For sca	nned area of 1/2" x 3/8"
GRID-No.5 & GRID-No.4 V	OLTAGE 350 max. volts
: See next page.	← Indicates a change.





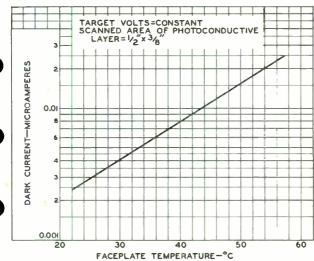
Target (Signal-Electrode) Voltage:† Før pickup from film			
DARK CURRENT PEAK TARGET (SIGNAL-ELECTRODE) CURRENT PEAK TARGET (SIGNAL-ELECTRODE) CURRENT ACCEPLATE: Illumination Temperature 1000 max. 11000 max. 1100	Negative bias value. Positive bias value. PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathoo	0 max. de. 125 max.	volts
Temperature. 60 max. OC Typical Operation: Grid No.3 connected to grids No.4 and No.5; scanned area of 1/2" x 3/8"; faceplate temperature of 30° to 35° C Faceplate Illumination: Average highlight, for pickup from film. 50 to 300 ft-c Constant highlight, for pickup from live scenes 20 ft-c Maximum Target (Signal-Electrode) Voltage required to produce dark current of 0.02 µa in any tube*. 100 volts Target (Signal-Electrode) Voltage: For pickup from live scenes 40 to 70 volts For pickup from film 20 to 40 volts For pickup from live scenes 40 to 70 volts Grid-No.5 (Decelerator) and Grids-No.4 & No.3 (Beam-Focus-Electrodes) Voltage 300 volts Grid-No.2 (Accelerator) Voltage 500 volts Grid-No.1 Voltage for picture cutoff 40 to -100 volts Signal-Output Current:* Peak 0.3 to 0.4 µa Average 0.3 to 0.4 µa Average Gamma" of Transfer Characteristic for signal-output current between 0.02 µa and 0.2 µa	DARK CURRENT PEAK TARGET (SIGNAL-ELECTRODE) CURRENT	0.025 max.	μа μа
Grid No.3 connected to grids No.4 and No.5; scanned area of 1/2" x 3/8"; faceplate temperature of 30° to 35° C Faceplate Illumination: Average highlight, for pickup from film	Temperature		
Average highlight*, for pickup from film. Constant highlight, for pickup from live scenes. Maximum Target (Signal-Electrode) Voltage required to produce dark current of 0.02 µa in any tube* Target (Signal-Electrode) Voltage:† For pickup from film. For pickup from live scenes. Grid-No.5 (Decelerator) and Grids-No.5 (Decelerator) and Grids-No.4 & No.3 (Beam-Focus-Electrodes*) Voltage. Grid-No.2 (Accelerator) Voltage. Grid-No.1 Voltage for picture cutoff* Signal-Output Current:* Peak. Average. O.3 to 0.4 µa Average. Oark Current: For pickup from film. For pickup from film. For pickup from film. For pickup from seenes. O.02 µa Average "Gamma" of Transfer Craracteristic for signal-output current between 0.02 µa and 0.2 µa. Visual Equivalent Signal-to-Noise Ratio (Approx.) Minimum Peak-to-Peak Blanking Voltage: When applied to grid No.1. When applied to cathode. Field Strength at Center of Focusing Coil (Approx.). Fie'd Strength of Adjustable Alignment Coil* O to 4 gausses	Grid No.3 connected to grids No.4 and No.1/2" x 3/8"; faceplate temperature		
from live scenes. 20 ft-c Maximum Target (Signal-Electrode) Voltage required to produce dark current of 0.02 µa in any tube*. 100 volts Target (Signal-Electrode) Voltage:† Før pickup from film . 20 to 40 volts Før pickup from live scenes 40 to 70 volts Grid-No.5 (Decelerator) and Grids-No.4 & No.3 (Beam- Føcus-Electrodes*) Voltage 250* to 300 volts Grid-No.1 Voltage for picture cutoff* Grid-No.1 Voltage for picture cutoff* Peak 0.3 to 0.4 µa Average 0.1 to 0.2 µa Average 0.1 to 0.2 µa Average "Gamma" of Transfer Craracteristic for signal- output current between 0.02 µa and 0.2 µa . 0.65 Visual Equivalent Signal-to-Noise Ratio (Approx.) 300:1 When applied to grid No.1 40 volts When applied to cathode 10 volts Fie'd Strength of Adjustable Alignment Coil* 0.004 gausses	Average highlight , for pickup from film	50 to 300	ft-c
any tube**. 100 volts Target (Signal-Electrode) Voltage:† For pickup from film . 20 to 40 volts For pickup from live scenes . 40 to 70 volts Grid-No.5 (Decelerator) and Grids-No.4 & No.3 (Beam-Focus-Electrodes) Voltage . 250° to 300 volts Grid-No.2 (Accelerator) Voltage . 300 volts Grid-No.1 Voltage for picture cutoff -45 to -100 volts Signal-Output Current: Feath . 0.3 to 0.4 μa Average . 0.1 to 0.2 μa Average . 0.1 to 0.2 μa For pickup from film . 0.004 μa For pickup from live scenes . 0.02 μa Average "Gamma" of Transfer Characteristic for signal - 0.002 μa and 0.2 μa 0.65 Visual Equivalent Signal-to-Noise Ratio (Approx.)	from live scenes	20	ft-c
For pickup from film	any tube**	100	volts
Focus-Electrodes*) Voltage	For pickup from film		
Signal—Output Current:* Peak	Focus-Electrodes*) Voltage	300	
Average. Dark Current: For pickup from film		-45 to -100	volts
For pickup from film	Average		μа μа
and 0.2 µa . 0.65 Visual Equivalent Signal-to-Noise Ratio (Approx.) ⁰ 300:1 Minimum Peak-to-Peak Blanking Voltage: When applied to grid No.1 . 40 volts When applied to cathode . 10 volts Field Strength at Center of Focusing Coil (Approx.) . 40 gausses Fie'd Strength of Adjustable Alignment Coil . 0 to 4 gausses	For pickup from film For pickup from live scenes Average "Gamma" of Transfer Cnaracteristic for signal—		µа µа
Ratio (Approx.) 0	and 0.2 μa	0.65	
When applied to grid No.1	Ratio (Approx.)	300:1	
Focusing Coil (Approx.)	When applied to grid No.1		volts volts
Alignment Coil ^o 0 to 4 gausses	Focusing Coil (Approx.)	40	gausses
	Alignment Coilo		gausses
- Indicates a change.	å. å. **, †. *. ⊕, •. #. ○. □: See next page.	Indicates	a change.

7-58

- capacitance, which effectively is the output impedance of the is increased when the tube is mounted in the deflecting-your cousing-coil assembly. The resistive component of the output This capacitance, 6326, is increased when the tube is mou and focusing-coil assembly. The resist impedance is in the order of 100 megohms.
- Averaged over the time of one TV frame
- The targe: (signal-electrode) voltage for each 6326 must be adjusted to that value which gives the desired operating dark current.
- Indicated range for each type of service serves only to illustrate the operating target— (signal-electrode—) voltage range normally encountered.
- Beam focus is obtained by combined effect of grids-No.4 & No.3 voltage which should be adjustable over indicated range, and a focusing coil having an average field strength of 40 gausses. If desired, grid No.3 may be operated separately to permit vernier control of focus. Under such cond tions, the instantaneous grid-No.3 voltage must always be equal to or greater than the grid-No.4 voltage.
- Definition, focus uniformity, and picture quality decrease with decreasing grida-Mo.5 & No.4 & No.3 voltage. In general, qrics No.5 & No.4 & No.3 should not be operated below 250 volts.
- With no blanking voltage on grid No.1.
- Defined as the component of the target (signal-electrode) current after the dark-current component has been subtracted.
- Measured with high-qain, low-noise, cascode-type amplifier having bandwidthof5 Mc. Because the noise in such a system is predominately of the high-frequency type, the visual equivalent signal-to-noise ratio is taken as the ratio of highlight video-signal current to rms noise current, multiplied by a factor of 3.
- The alignment coil should be located on the tube so that its center is at a distance of 3-11/16 inches from the face of the tube, and be positioned so that its axis is coinciden; with the axis of the tube, the deflecting yoke, and the focusing coil.

DATA 2

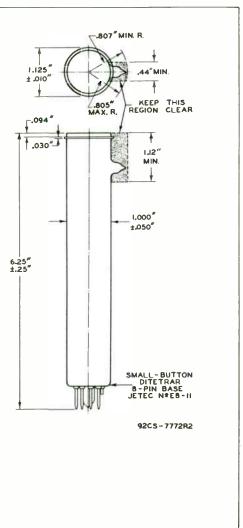
TYPICAL CHARACTERISTIC



92CS-9540

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY World Radio History





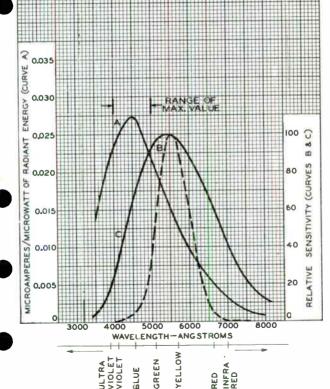
SPECTRAL-SENSITIVITY CHARACTERISTICS

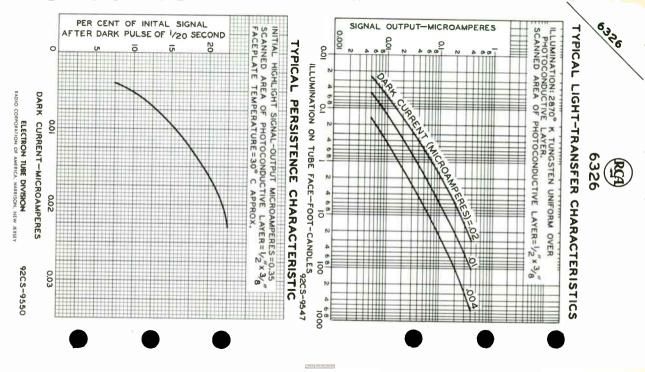


SIGNAL-OUTPUT MICROAMPERES FROM SCANNED AREA OF 1/2" x 3/4"= 0.02 DARK CURRENT (MICROAMPERES)= 0.02

CURVE B: SPECTRAL CHARACTERISTIC OF AVERAGE HUMAN EYE .

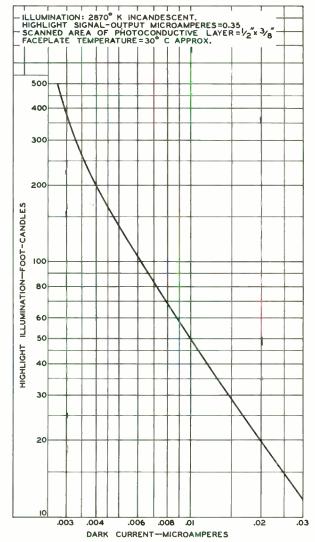
CURVE C: FOR EQUAL VALUES OF SIGNAL-OUTPUT CURRENT WITH RADIANT FLUX FROM TUNGSTEN SOURCE AT 2870° K.







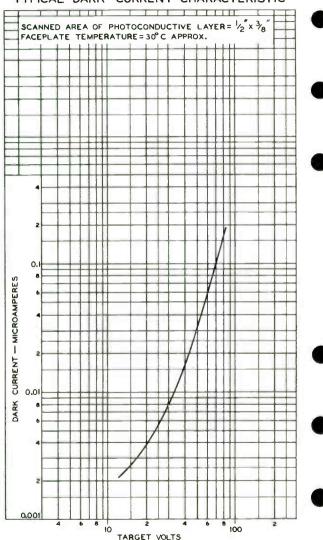




ELECTRON TUBE DIVISION



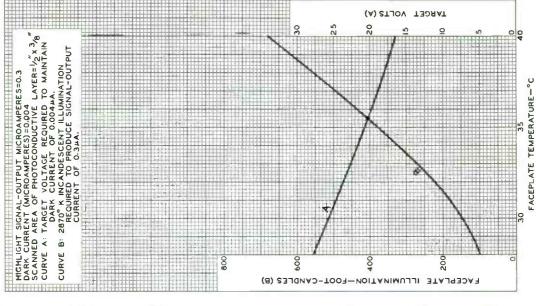
TYPICAL DARK-CURRENT CHARACTERISTIC



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



YPICAL CHARACTERISTICS



ELECTRON TUBE DIVISION





600-LINE RESOLUTION For live pickup with color or black-and-white TV cameras

The 6326-A is an improved version of the 6326 and is unilaterally interchangeable with it.

DATA
General:
Heater, for Unipotential Cathode: Voltage 6.3 ± 10%ac or dc volts Current 0.6 amp Direct Interelectrode Capacitance: Target (Signal electrode) to all other electrodes 4.5 μμf
Spectral Response
Maximum useful diagonal of rectangular image (4 x 3 aspect ratio)
Deflection Method Magnetic Overall Length 6.25" ± 0.25" Greatest Diameter 1.125" ± 0.010" Weight (Approx.) 2 oz Operating Position Approx. horizontal, or faceplate up Bulb T8 Base Connector

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

Do Not Use Pin 5-Grid No.2 Pin 6-Grid No.4. Grid No.5

Pin 7 - Cathode (3

Pin 8-Heater Flange - Target (Sig-nal Electrode) Short Index Pin-Internal Connection-Do Not Jse

DIRECTION OF LIGHT: INTO FACE END OF TUBE

: See next page.

← Indicates a change.





Maximum Ratings, Absolute Values: .		
For scanned area of 1/2"	x 3/8"	
GRID-No.5 & GRID-No.4 VOLTAGEGRID-No.3 VOLTAGEGRID-No.2 VOLTAGEGRID-No.1 VOLTAGE:	350 max.	volts volts volts
Negative bias value. Positive bias value. PEAK HEATER—CATHODE VOLTAGE:		volts
Heater negative with respect to catho Heater positive with respect to catho DARK CURRENT	de. 10 max. 0.12 max.	volts volts μα μα
Illumination	1000 max.	ft-c °C
← Typical Operation:		
Grid No.3 connected to grids No.4 and 1/2" x 3/8"; faceplate temperatur Faceplate Illumination:	No.5; scanned ar reof 30° to 35° C	ea of
Constant highlight, for pickup from live scenes	2 to 5	ft-c
from film	50 to 300	ft-c
current of 0.1 μ a in any tube** Target (Signal-Electrode) Voltage:†	100	volts
For pickup from live scenes	60 to 80	volts
For pickup from film Grid-No.5 (Decelerator) and Grids-No.4 & No.3 (Beam-Focus Elec-	20 to 40	volts
trodes*) Voltage	250 [®] to 300	volts
Grid-No.2 (Accelerator) Voltage Grid-No.1 Voltage for picture cutoff Signal-Output Current:#	300 -45 to -100	volts
Peak	0.3 to 0.4 0.1 to 0.2	μa μa
For pickup from live scenes For pickup from film Average "Gamma" of Transfer	0.1 0.004	μα: μα
Characteristic for signal-output current between 0.02 μ a and 0.2 μ a. Visual Equivalent Signal-to-Noise	0.65	
Ratio (Approx.) O	300:1	
When applied to grid No.1 When applied to cathode	40 10	volts volts
• • • • • • • • • • • • • • • • • • •	→ Indicates a	change.
		DATA 1

6326-A	
VIDICON	
Field Strength at Center of	40

This capacitance, which effectively is the output impedance of the 6326-A, is increased when the tube is maunted in the deflecting-yoke and focusing-coil assembly. The resistive component of the output impedance is in the order of 100 megahms.

Averaged over the time of one TV frame.

** The target (signal-electrode) voltage for each 6326-A must be adjusted to that value which gives the desired operating dark current.

Indicated range for each type of service serves only to i`lustrate the operating target—(signal—electrode—) voltage range normally encountered.

Beam focus is obtained by combined effect of grids-No.4 & No.3 voltage which should be adjustable over indicated range, and a focusing coil having an average field strength of No gausses. If desired, grid No.3 may be operated separately to permit vernier control of focus, under such conditions, the instantaneous grid-No.3 voltage must always be equal to or greater than the grid-No.4 voltage.

Definition, focus uniformity, and picture quality decrease with decreasing grids-No.5 & No.4 & No.3 voltage. In general, grids No.5 & No.4 & No.3 should not be operated below 250 volts.

With no blanking voltage on grid No.1.

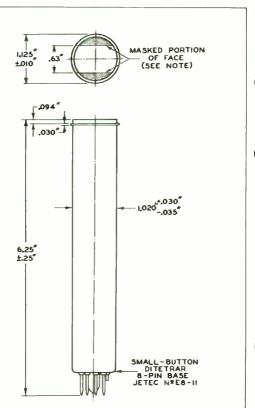
Defines as the component of the target (signal-electrode) current after the dark-current component has been subtracted.

Measured with high-gain, low-noise, cascode-type ampl fier having bandwidth of 5 Mc. Because the noise in such a system is predominately of the high-frequency type, the visual equivalent signal-te-moise ratio is taken as the ratio of highlight video-signal current to rms noise current, multiplied by a factor of 3.

The alignment coil should be located on the tube so that its center is at a distance of 3-11/16 inches from the face of the tube, and be positioned so that its axis is coincidert with the axis of the tube, the deflecting yoke, and the focusing coil.

6320-A





92CS - 908IRI

NOTE: STRAIGHT SIDES OF MASKED PORTIONS ARE PARALLEL TO THE PLANE PASSING THROUGH TUBE AXIS AND SHORT INDEX PIN.



6326 A SPECTRAL-SENSITIVITY CHARACTERISTICS

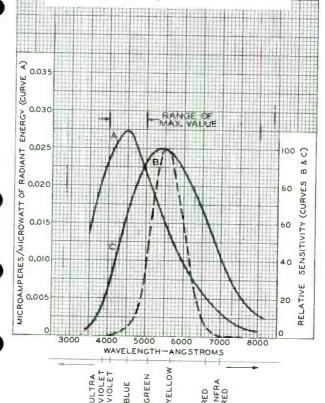


SIGNAL-OUTPUT MICROAMPERES FROM SCANNED AREA OF 1/2" x 3/8"= 0.02

DARK CURRENT (MICROAMPERES) = 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

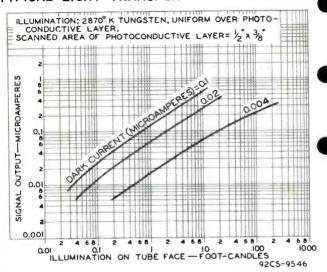
AT 2870° K.



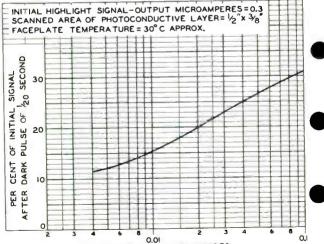
GREEN



TYPICAL LIGHT-TRANSFER CHARACTERISTICS

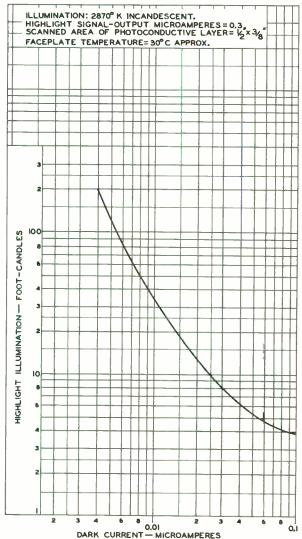


TYPICAL PERSISTENCE CHARACTERISTIC





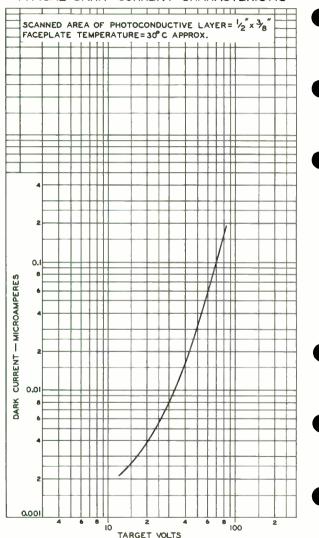




6326-1



TYPICAL DARK-CURRENT CHARACTERISTIC



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

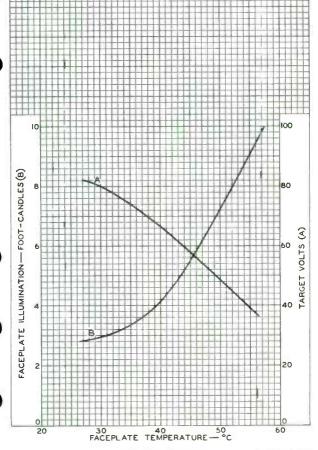


TYPICAL CHARACTERISTICS

HIGHLIGHT SIGNAL-OUTPUT MICROAMPERES = 0.3 DARK CURRENT (MICROAMPERES) = 0.1 SCANNED AREA OF PHOTOCONDUCTIVE LAYER = 1/2 x 3/8 CURVE A: TARGET VOLTAGE REQUIRED TO MAINTAIN DARK CURRENT OF 0.1 \(\mu \).

CURVE B: 2870 \(k \) INCANDESCENT ILLUMINATION REQUIRED TO PRODUCE SIGNAL-OUTPUT

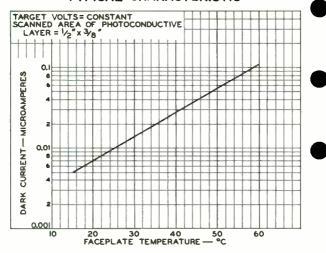
CURRENT OF 0.3 HA.



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



TYPICAL CHARACTERISTIC



92CS-9539

9-STAGE TYPE WITH S-4 RESPONSE For ac automobile-headlight-control service DATA

Radiant, at 4000 angstroms . *,0: See nex1 page. 7-58		350		icates a	
	_	35()00	_	μαν
LIMIN LLIVIEV:		25/	300		μa/
Sensitivity:	Min.	Med	ian	Max.	
With E = 1000 volts dc					
between dynode					
1/10 of E for each succeeding					
Under conditions with supply divider providing 1/10 of Ebet					
· · · · · · · · · · · · · · · · · · ·			_		1++00
Characteristics Range Values for	- Caul		Dee i a		
AVERAGE ANUJE CURRENT				5 max.	
AND ANODE (Peak AC or DC) AVERAGE ANODE CURRENTO				0 max. 1 max.	
SUPPLY VOLTAGE BETWEEN DYNODE NO	0.9				
ANODE-SUPPLY VOLTAGE (Peak AC or			1250	0 max.	vol
Maximum Ratings. Absolute Values	s:				
Pin 6 - Dynode No.6 DIRECTION	OF LIGHT				
Pin 5 – Dynode No.5			TT 1	rnoto— catho	
Pin 4 – Dynode No.4	<u></u>		10 - 4	Anode Photo—	
Pin 3 – Dynode No.3	1,00			Dynode	NO.9
Pin 2 – Dynode No. 2	1)ynode	
Pin 1 – Dynode No.1	200)ynode	
- (6)					
Basing Designation for BOTTOM	VIEW .			n–hygπ	oscopi 11
BaseSmall—Shell Neosubmagn	nal 11-	-Pin (J	ETEC	No. B11	1-104)
Bulb]
Operating Position					
Maximum Diameter			٠.		1.31
of Useful Cathode Area			. 1	56"	0.09
Maximum Seated Length Length from Base Seat to Center					2.08
Maximum Overall Length					3.12 2.69
Anode to dynode No.9 Anode to all other electrodes.				5.5	щ
Direct Interelectrode Capacitano	es:			1 2	μμ
Minimum projected width*					0.31
minimum projected rengen					
Cathode: Minimum projected length*					0.93

General:

Spectral Response.



l		Hin.	Median	Max.	
	Luminous: A At 0 cps	_	35 33	_	amp/lumen amp/lumen
l	Dark Current, Any Electrode Except Anode at 25° C With E = adjustable ac voltage	-	-	0.75	μa
	Anode-to-Cathode Voltage (RMS)*.		Median 750	Max. 990	volts

 * On plane perpendicular to the indicated direction of incident light. O Averaged over any interval of 30 seconds maximum.

For conditions where light source is a tungsten-filament lamp operated at a color temperature of 2870% x; a light input of 10 microlumens is used; and the load resistor has a value of 0.01 megohm.

For conditions where the light flux from a tungsten-filament lamp operated at a color temperature of 2870° k is transmitted through a filter (corning No.2418 having an effective transmission of luminous flux of 5%) onto the photocathode. The value of light flux incident on the filter is 10 microlumens and the load resistor is 0.01 megohm. Supply voltage (E) is adjusted to give an anode current of 8 microamperes.

For conditions same as (#) except no radiant flux on photocathode.

OPERATING CONSIDERATIONS

The operating stability of the 6328 is dependent on the magnitude of the anode current and its duration. When the 6328 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 6328 usually recovers a substantial percentage of such loss in sensitivity.

The use of an average anode current well below the maximumrated value of 0.1 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 10 microamperes.

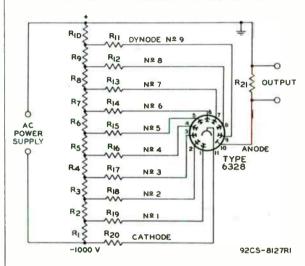
A recommended design of voltage-divider network for use with the 6328 to provide stable operation and long tube life is shown in the accompanying circuit. This design provides linear operation within the range normally required for head-light control. At higher light levels, the network design limits the tube output to a safe value. The indicated design values provide headlight-control operation for an anode current in the range between 5 and 10 microamperes.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-4 Response is shown at the front of this Section



MULTIPLIER PHOTOTUBE

RECOMMENDED VOLTAGE-DIVIDER NETWORK FOR USE WITH TYPE 6328 IN HEADLIGHT-CONTROL SERVICE



R1 R2 R3 R4 R5

R6 R7 R8 R9 RIO: I megohm, 1/2 watt

RIL: 2 megohms, 1/2 watt

R12: 5.1 megohms, 1/2 watt

RI3 RI4 RI5 RI6

RI7 RI8 RI9 R20: 8.2 megohms, 1/2 watt

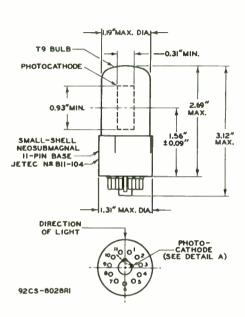
R21: 820,000 ohms, 1/2 watt

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

SZP0



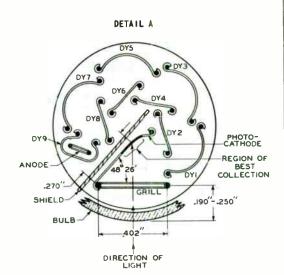
MULTIPLIER PHOTOTUBE



 $\mbox{\it \cline{C}}$ OF BULB WILL NOT DEVIATE MORE THAN $2^{\mbox{\it \cline{C}}}$ IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

NOTE: THE MAXIMUM ANGULAR VARIATION BETWEEN THE PLANE THROUGH PINS † AND †† AND THE PLANE OF THE GRILL WILL NOT EXCEED 60 .

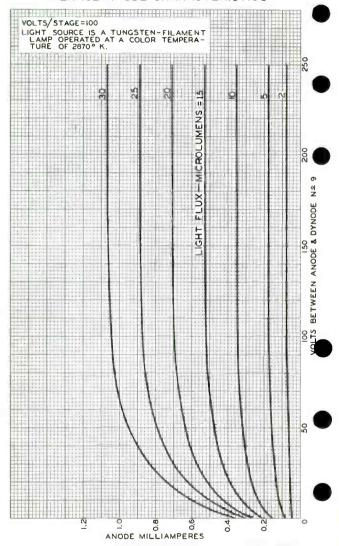




92CS-8674RI



AVERAGE ANODE CHARACTERISTICS



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, MARRISON, NEW JERSEY

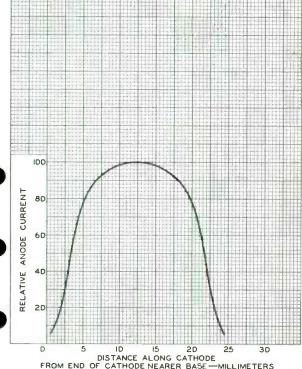
WORLD REGION HISTORY

92CM-8029R2



VARIATION IN SENSITIVITY OF PHOTOCATHODE ALONG ITS LENGTH

VARIATIONS CAUSED BY INTERCEPTION OF LIGHT BY GRILL AS WELL AS SURFACE IRREGULARITIES HAVE BEEN IGNORED,



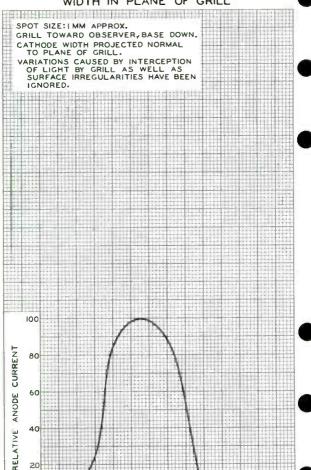
FROM END OF CATHODE NEARER BASE-MILLIMETERS ELECTRON TUBE DIVISION 92CM-7663RI

RADIO CORPORATION OF AMÉRICA, HARRISON, NEW JERSEY

World Radio History



VARIATION IN SENSITIVITY OF PHOTOCATHODE ACROSS ITS PROJECTED WIDTH IN PLANE OF GRILL



DISTANCE ALONG PLANE OF GRILL FROM LEFT TO RIGHT—MILLIMETERS ELECTRON TUBE DIVISION

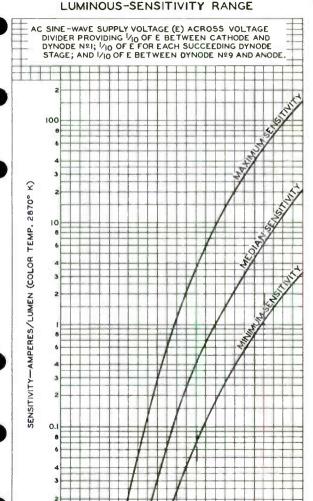
92CM-7667RI

12

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



LUMINOUS-SENSITIVITY RANGE



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

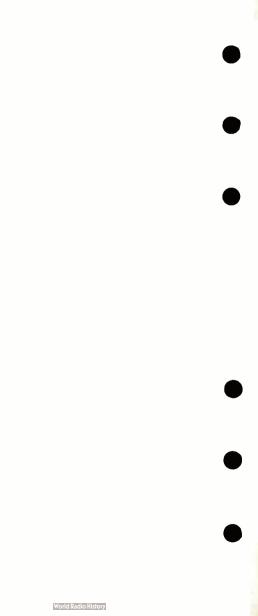
250 500 750 PEAK AC SUPPLY VOLTS (E)

92CM-957I

1250

1000

0.01





10-STAGE, HEAD-ON TYPE WITH I-11/16" SEMITRANSPARENT CATHODE AND S-11 RESPONSE SHORT TIME-RESOLUTION CAPABILITY

	DATA	
	General:	
	Spectral Response	
	Wavelength of Maximum Response 4400 ± 500 angstroms	-
,	Cathode, Semitransparent:	
	Shape	
	Window:	
	Area 2.2 sq. in.	*
	Minimum diameter	-
	Direct Interelectrode Capacitances (Approx.):	
	Anode to dynode No.10 4.4	
	Anode to all other electrodes 7	
	Maximum Overall Length	-
	Seated Lergth	
	Maximum Diameter	
	Mounting Position Any	
	Weight (Approx.)	+
	Bulb	
	Non-hydroscopic	
	EOTTOM VIEW	
	Pin 1 - Dynode No.1 Pin 10 - Dynode No.10	
	Pin 2 - Dynode No.2	
	Pin 3 – Dynode No.3 Pin 4 – Dynode No.4 Open 4 – Dynode No.4 Open 5 – Dynode No.4	
	Pin 4 - Dynode No.4 Pin 5 - Dynode No.5 Onnection- Do Not Use	
	Pin 6 - Dynode No.6 Pin 13 - Focusing	
	Pin 7 - Dynode No.7 Electrode	
	Pin 8 - Dynode No.8 Pin 14 - Cathode	
	Pin 9 - Dynode No.9 GIRECTION OF LIGHT:	
	PIN 9 - DYNOGE NO.9 OIRECTION OF LIGHT:	
	Maximum Ratings, Absolute Values:	
	ANODE-SUPPLY VOLTAGE (DC or Peak AC 1500 max. volts SUPPLY VOLTAGE BETWEEN DYNODE No.10	
	AND ANODE (DC or Peak AC)	
1	DYNODE-No.1 SUPPLY VOLTAGE	_
,	(DC or Peak AC) 400 max. volts	
	FOCUSING-ELECTRODE VOLTAGE (DC or Peak AC) . 400 mac. volts	
	AVERAGE ANODE CURRENT 2 max. ma	
	AMBIENT TEMPERATURE 75 max. °C	
	Averaged over any interval of 30 seconds maximum.	
	And ages over any interval of jo seconds maximum.	

- Indicates a change.



MULTIPLIER PHOTOTUBE

Characteristics Range Values for Equipment Design:

Under conditions with supply voltage (E) across voltage divider providing 1/6 of E between cathode and dynode No.1; 1/12 of E for each succeeding dynode stage; and 1/12 of E between dynode No.10 and anode

Min. Median Nax.

With E = 1250 volts (except as noted) and

Focusing Electrode* connected to Dynode No. 1 at socket

	14 0 10 0	NE LE D LE / G	NO.	
Sensitivity:				
Radiant, at				
4400 angstroms.	-	6000	-	μamp/μwatt
Cathode radiant,				
at 4400 angstroms .	_	0.048	-	μamp/μwatt
Luminous:				
At O cps	3	7.5	100	amo/lumen
Cathode luminous:				
With tungsten				
light source ••	40	60	_	μamo/lumen
With blue light				
source €.	0.04	_	_	иатр
Current Amplification	_	125000	_	
Equivalent Anode-Dark-				
Current Input® •	_	2 × 10 ⁻¹⁰ 7 × 10 ⁻¹²	2×10^{-9}	lumen
Equivalent Noise Input*.	_	7×10^{-12}	_	lumen
With E = 1500 volts (exces	t as 1	noted) and		

With E = 1500 volts (except as noted) and
Focusing Electrode* connected to Dynode No. 1 at socket

	Min.	nealan	max.	
Sensitivity:				
Radiant, at				
4400 angstroms.	_	28000	-	μamp/μwatt
Cathode radiant,				
at 4400 angstroms.	-	0.048	-	μamp/μwatt
Luminous:				
At 0 cps	-	35	-	amp/lumen
Cathode luminous:				
With tungsten				
light source⁴.	40	60	_	μamp/lu men
With blue light				
	0.04	_	_	μamp
Current Amplification	-	600000	-	

In general, the focusing electrode is connected to dynode Mo.1 at the socket and operated at the same fixed potential as dynode Mo.1. However, ir applications critical as to magnitude, uniformity, or speed of the response, the focusing electrode may be connected to the adjustable arm of a potentiometer between cathode and dynode Mo.1 in the voltage divider, and operated at an optimum potential within a range of 10 to 60 per cent of the dynode-Mo.1 potential.

Fer conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870 $^{\circ}$ K. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.

▲, ●, ♦, ■, ★: See next page.

- Indicates a change.

DATA 1

SEPT. 1, 1955

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JEPSEY



MULTIPLIER PHOTOTUBE

• For conditions the same as shown under (•) except that the value of light flux is 0.01 lumen and 200 volts are applied between cathode and all other electrodes connected together as a rode.

Under the following conditions: Light incident on the cathode is transmitted through a blue filter (Corning, Glass Code No.5113 pcl ished to 1/2 stock thiskness, from a tungsten-filament lamp operated at a color temperature of 2870°K. The value of light flux on the filter is 0.01 lumen. The luad resistor has avalue of 0.01 megohm, and 200 volts are applied between cathode and all other electrides connected together as anode.

For spectral characteristic of this source, see sheet SPECTRAL CHARACTERISTIC OF 2870°K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870°C SOURCE AFTER PASSING THROUGH INDICATED BLUE FILTHR at front of this section.

Heasured at a tube temperature of 25°C and with the supply voltage (E) adjusted to give a luminous sensitivity of 20 amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.

For maximum signal-to-noise ratio, operation with a supply voltage (E) below 1250 volts is recommended.

Under the following conditions: Supply voltage (E) is 1250 volts, 25°C tube temperature, ac-amplifier bandwidth of 1 cycle per second, tungsten light source of 2870% interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The 'on' period of the pulse is equal to the 'off' period. The outcurrent is measured through a filter which passes only the fundamental frequency of the pulses.

OPERATING CONSIDERATIONS

The operating stability of the 6342 is dependent on the magnitude of the anode current and its duration. When the 6342 is operated at high values of anode current, a drop in sensitivity isometimes called fatigue may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 6342 usually recovers a substantial percentage of such loss in sensitivity.

The use of an average anode current well below the maximum rated value of 2 milliamperes is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 250 microamperes.

Electrostatic and/or magnetic shielding of the 6342 may be necessary.

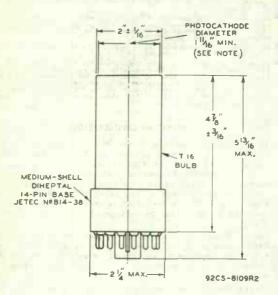
The material of which the dynodes of the 6342 are made has stable, high-current carrying capabilities and permits the use of a tube manufacturing process which minimizes regenerative effects such as afterpulses. The relative freedom of the 6342 from afterpulses and its small spread in electron transit time make it particularly useful for fast coincidence scintillation counting.

Because the 6342 offers the advantage of small spread in electron transit time, it has a fast pulse rise time. For an input pulse having a rise time of I millimicrosecond or less, the rise time of the pulse at the anode is about



5 millimicroseconds as measured between its 10- and 90-per cent magnitude points when the supply voltage is 1500 volts and the focusing electrode is connected to dynode No.1.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-11 Response is shown at the front of this Section



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

• OF BULB WILL NOT DEVIATE MORE THAN 2°

IN ANY DIRECTION FROM THE PERPENDICULAR

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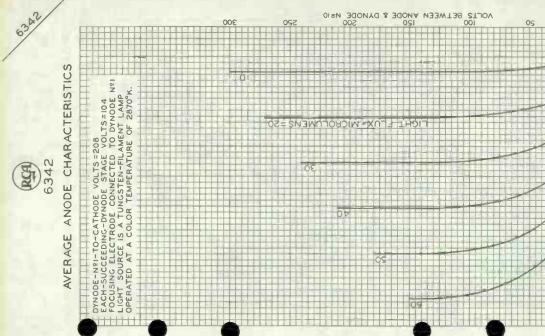
• OF BULB WILL NOT DEVIATE MORE THAN 2°

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• OF BULB WILL NOT DEVIATE MORE THAN 2°

• OF BULB WILL NOT DEVIATE MOR

MOTE: WITHIN MINIMUM DIAMETER, DEVIATION FROM FLAT-NESS WILL NOT EXCEED 0.010" FROM PEAK TO VALLEY.



World Padio Hist

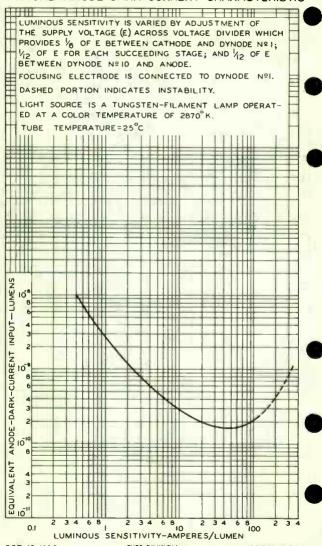
MICROAMPERES

ANODE





TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC

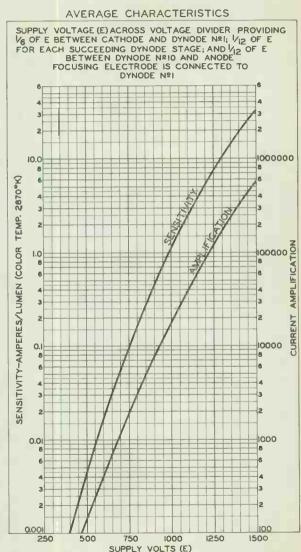


OCT. 15, 1953

TUBE DIVISION 92CM-8124



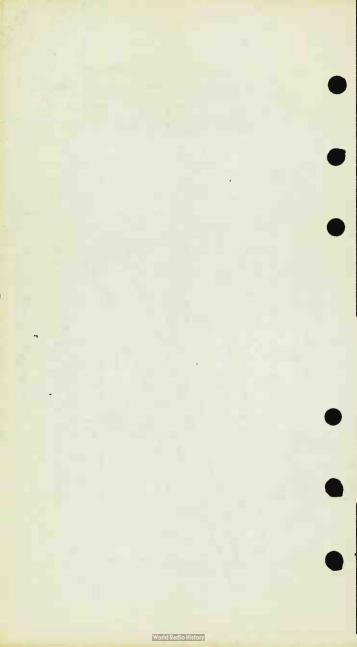
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OCT. 15, 1953

TUBE DEPARTMENT

92CL-8123





10-STAGE TYPE WITH 4-1/8" x 3" SEMITRANSPARENT CATHODE AND S-11 RESPONSE

	General:
	Spectral Response,
ı	Wavelength of Maximum Response 4400 ± 500 angstroms -
Ì	Cathode, Semitransparent:
4	Shape
	Window:

HITIOUT.		
Minimum length 4-1/8		in.
Minimum width (Along		
circumference of bulb)		in.
Minimum area 12–3/8	sq.	in.
Index of refraction 1.48		
rect Interelectrode Canacitances (Annroy):		

ı	Anode to dynode No. 10	 		5	μμ
ı	Anode to all other electrodes				μμf
Į	Maximum Overall Length				7-3/4"
	Maximum Seated Length				7-1/4"
	Length from Base Seat to Center				
	of Useful Cathode Area			3-5/8"	± 1/8"

Maximum Diameter	
Mounting Position	. Any
Weight (Approx.)	. 9 oz
Bulb	. T-20
Base Small-Button Twentyninar 22-Pin (JETEC No.)	

Base	۰			Small-Button	Twentyninar	22-Pin (JETEC	No. E22-16)
						BOTTOM VIEW	
Pi	0	- 1	_	Anode			

Pin 2 - Dynode No. 10 Pin 3 - Dynode No.9 Pin 4 - Dynode No.8 5 - Dynode No. 7 Pin Pin 6 - Dynode No.6

Pin 7 - Dynode No.5 Pin 8 - Dynode No. 4

Pin 9 - Dynode No.3

Pin 10 - Dynode No. 2 Pin 11 - Dynode No.1

Pin 12 - Internal Connection-Do Not Use Pin 13 - Focusing

Electrode Pin 14 - Same as Pin 12

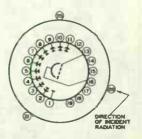
Pin 15 - Same as Pin 12 Pin 16 - Cathode

Pin 17 - Same as Pin 12 Pin 18 - Same as Pin 12

Pin 19 - Same as Pin 12

Pin 21 - Same as Pin 12 Pin 25 - Same as Pin 12

Pin 28 - Same as Pin 12



PINS I-III ON $1\frac{1}{4}^{\prime\prime}$ DIA. PIN CIRCLE PINS 21,25,281 ON $\frac{7}{6}^{\prime\prime}$ DIA. PIN CIRCLE PIN CIRCLES ARE CONCENTRIC

- Indicate, a change.

DATA 1





		-
	Maximum Ratings, Absolute Values:	
	ANODE-SUPPLY VOLTAGE (DC or Peak AC) 1200 max. volts	
	SUPPLY VOLTAGE BETWEEN DYNODE No. 10	
	AND ANODE (DC or Peak AC) 180 max. volts	
	DYNODE-No.1 SUPPLY VOLTAGE (DC or Peak AC) 300 max. volts	1
	FOCUSING-ELECTRODE VOLTAGE	
	(DC or Peak AC) 300 max. volts	
	AVERAGE ANODE CURRENT 0.75 max. ma	
	AMBIENT TEMPERATURE 75 max. °C	
	Characteristics Range Values for Equipment Design:	
	Under conditions with supply voltage (E) across a voltage	í
	divider providing 1/12 of E between cathode and focusing	
	electrode; 1/12 of E between focusing electrode and dynode	
	No.1; 1/12 of E for each succeeding dynode stage; and 1/12 of E between dynode No.10 and anode	
	With E=1000 volts (except as noted)	
	Min. Median Max	
	Sensitivity:	
-	Radiant, at 4400	
	angstroms 16000 - μ amp/ μ watt	
-	Cathode radiant, at	
	4400 angstroms - 0.026 - μamp/μwatt	

Luminous: At 0 cps. amp/lumen At 100 Mc . . . 19 amp/lumen Cathode luminous: With tungsten light source uamp/lumen With blue light sourcet 0.026 µато Current Amplification Equivalent Anode- 5×10^{-9} Dark-Current Input® Equivalent Noise 1×10^{-10}

averaged over any interval of 30 seconds maximum.

Input*

For conditions the same as shown under $(\dot{\bullet})$ except that the value of light flux is 0.01 lumen and 150 volts are applied between cathode and all other electrodes connected together as anode.

Under the following conditions: Light incident on the cathode is transmitted through a blue filter (corning, Glass Code No. 5113 polished to 1/2 stock thickness) from a tungsten-filament lamp operated at a color temperature of 2870 k. The value of light flux on the filter is 0.01 bumen. The load resistor has a value of 0.01 megohm, and 150 volts are applied between cathode and all other electrodes connected together as anode.

.... see next page.

- Indicates a change.

lumen

For conditions when the light source is a tungsten-filament lamp operated at a color temperature of 2870 k. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.

For Spectral Characteristic of this source, see sheet SPECTRAL CHARACTERISTIC OF 2870°K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870°K SOURCE AFTER PASSING THROUGH INDICATED BLUE FILTER at front of this section.

Measured at a tube temperature of 25°C and with the supply voltage (E) adjusted to give a luminous sensitivity of 20 amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.

Under the following conditions: Supply voltage (E) is 1000 volts, 25°C tube temperature, ac-amplifier bandwidth of 1 cycle per second, tungsten light source of 2870°K interrupted at a low aueio frequency to produce incident radiation pulses alternating between zero and the value stated. The 'on' period of the pulse is equal to the 'off' period. The output current is measured through a filter which passes only the funoamental frequency of the pulses.

For maximum signal-to-noise ratio, operation with a supply voltage (E) below 1000 volts is recommended.

OPERATING CONSIDERATIONS

The operating stability of the 6372 is dependent or the magnitude of the anode current and its duration. When the 6372 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sansitivity values depends on the severity of the operating conditions. After a period of idleness, the 6372 usually recovers a substantial percentage of such loss in sensitivity.

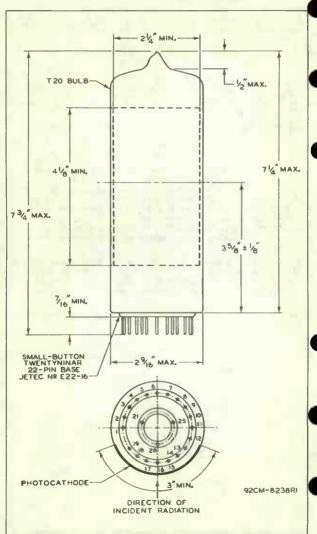
The use of an average anode current well below the maximum rated value of 0.75 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 100 microamperes.

Electrostatic and/or magnetic shielding of the 6372 may be necessary.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-11 Response is shown at the front of this Section



MULTIPLIER PHOTOTUBE



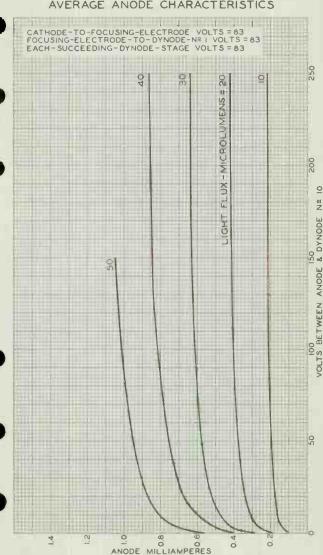
SEPT. 1, 1955

CE-8238R1



63/2

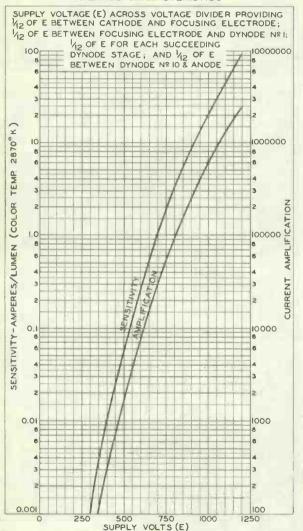
AVERAGE ANODE CHARACTERISTICS



o



AVERAGE CHARACTERISTICS



FEB. 26, 1954

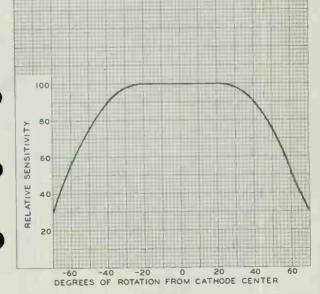
TUBE DIVISION
ADIO CORPORATION OF AMERICA, HARRISON, NEW ARRIST

92CL-8257



VARIATION IN SENSITIVITY

LIGHT SPOT 1/2 INCH DIA. APPROX. POSITIONED MIDWAY ALONG LENGTH OF PHOTOCATHODE VARIATIONS CAUSED BY INTERCEPTION OF LIGHT BY GRILL HAVE BEEN IGNORED



APRIL 9, 1954

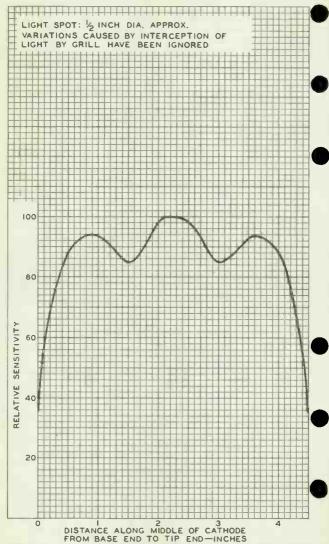
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92CM-8304

6372/



VARIATION IN SENSITIVITY



APRIL 9,1954

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

92CM-8306



6405/1640

6_AOS

GAS PHOTOTUBE LOW-MICROPHONIC TYPE WITH S-I RESPONSE

D.	A	T	٠
u	А	ш	а

	9414
	General:
	Spectral Response
	Wavelength of Maximum Response 8000 ± 1000 angstroms
	Cathode:
b	Shape Semicylindrical Minimum projected length
	Minimum projected width*
	Direct Interelectrode Capacitance
	Overall Length
	Seated Length
	Seated Length to Center of Cathode 2-1/8" ± 3/32"
	Maximum Diameter
,	Mounting Position Any
	Weight (Approx.)
	Bulb
	Non-hygroscopic
	BOTTOM VIEW
	Pin 1 – No Pin 3 – No
	Connection Connection
	Pin 2 - Anode Pin 4 - Cathode
	PIN 2 - AROGE
	DIRECTION OF LIGHT
	DIRECTION OF LIGHT
	Maximum Ratings, Absolute Values:
	Rating I Rating II
	ANODE-SUPPLY VOLTAGE (DC or Peak AC) 70 max. 90 max. volts
	AVERAGE CATHODE-
	CURRENT DENSITY 50 max. 25 max. µamp/sq.in.
	AVERAGE CATHODE
	CURRENTO 10 max. 5 max. µamp AMBIENT TEMPERATHRE 100 max. 100 max. °C
	AMBIENT TEMPERATHRE 100 max. 100 max. °C
	Characteristics at 90 Volts on Anode:
	Min. Av. Max.
	Sensitivity:
	Radiant at
	8000 angstroms $0.0135 - \mu \text{amp}/\mu \text{watt}$
	* on plane perpendicular to indicated direction of incident light.
	O Averaged over any interval of 30 seconds maximum.





GAS PHOTOTUBE

	Min.	Av.	Max.	
Sensitivity; Luminous:				
At 0 cps	80	135 116		μamp/lumer μamp/lumer
At 10000 cps	_	100		µamp/lumen
Sensitivity Difference Between Highest Value				
and Lowest Value Along			25	ome/lumos
Cathode Length		_	9	μamp/lumen
Anode Dark Current: At 25°C	_		0.1	μ mg
			0.2	
Minimum Circuit Values:				
With anode-supply voltage of	70 or	less	90	volts
DC_Load Resistance:				
For dc currents above 5 μamp	0.1	min.	-	megohm
For dc currents below				
5 μamp	0	min.	_	megohm
3 μamp			2.5 min.	. megohms
For dc currents below 3 µamp			0.1 min.	, megohm
) have be a second				

For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870°K. A dc anode supply of 90 voltand a 1-megohm load resistor are used. For the 0-cycle measurements, a "ight input of 0.1 lumen is used. For the 5000 and 10000-cycle measurements, the light input is varied sinusoidally about a mean value of 0.015 lumen from zero to a maximum of twice the mean.

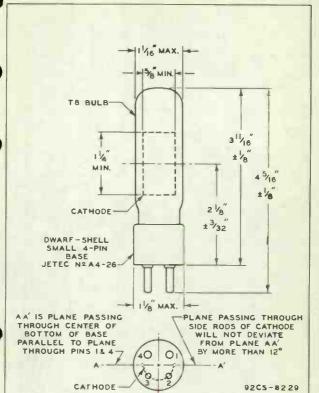
Measured under the same conditions as indicated under (*) with light input of 0.1 lumen and a light spot 1/2 inch in diameter.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-1 Response and FREQUENCY-RESPONSE CHARACTERISTICS of Gas Phototubes are shown at the front of this Section



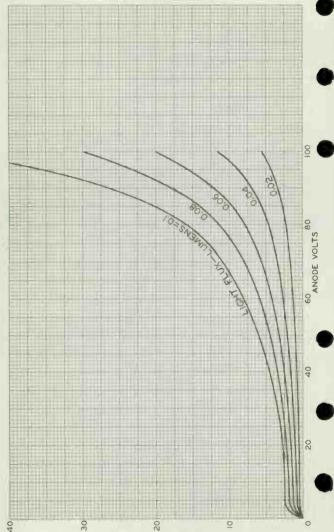
GAS PHOTOTUBE







AVERAGE ANODE CHARACTERISTICS



JAN. 22,1954

ANODE MICROAMPERES
TUBE DIVISION

AND O COMPAND O WORLD REGISTRATES AND A SECOND REGISTRATES AND

92CM-8227



9-STAGE TYPE WITH S-4 RESPONSE For Headlight-Control Service

ATA			
		-	

	DATA	
	General:	
	Spectral Response	
	Cathode:	S L I OINS
ı		15/16"
	Minimum projected width*	5-16"
	Direct Interelectrode Capacitances:	
	Anode to dynode No.9 4.2 Anode to al' other electrodes 5.5	μμf
	Maximum Overall Length (Excluding leads)	7-3/4"
	Maximum Envelope Length (Excluding tip)	1/4"
þ	Length from Envelope Seal to	
	Center of Jseful Cathode Area 1-1/4"	3/32"
	Maximum Diameter	
	Mounting Position	
	Weight (Approx.)	2 oz
	Terminals, Flexible Lead See Dimensional O	utline
	BOTTOM VIEW	
	Lead 1 - Cathode	
	Lead 2 - Dynode No.1 Lead 8 - Dynod-	
	Lead 3 - Dynode No.2 Lead 4 - Dynode No.3	
	Lead 5 - Dynode No.4 Lead 11 - Anode	10.5
	Lead 6 - Dynode No.5	
	DIRECTION OF LIGHT	
	Maximum Ratings, Absolute Values:	
	ANODE-SUPPLY VULTAGE (DC or Peak AC) 1250 max.	volts
,	SUPPLY VOLTAGE BETWEEN DYNODE No.9	
	AND ANODE (DC or Peak AC) 250 max.	
	AVERAGE ANODE CURRENTO	ma oc
	AMBIENT TENTERATURE	

On plane perpendicular to the indicated d rection of light (See Dimensional Outline).

O Averaged over any interval of 30 seconds max mum.



MULTIPLIER PHOTOTUBE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Under conditions with supply voltage (E) across voltage divider providing 1/10 of E between cathode and dynode No. 1; 1/10 of E for each succeeding dynode stage; and 1/10 of E between dynode No. q and anode

With E = 1000 volts

Any other electrode. . .

	Min.	Median	Max.	
Sensitivity:				
Radiant, at 4000				
angstroms	100	32500	~~	μαπρ/μwatt
Luminous: A	5	35	250	amp/lumeni
At 100 Mc	-	33	-	amp/lumen
(At 25°C):				

For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 28700%. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.

with sine-wave, 60-cycle supply voltage adjusted to give sensitivity of 7.5 amperes per lumen.

OPERATING CONSIDERATIONS

The operating stability of the 6472 is dependent on the magnitude of the anode current and its duration. When the 6472 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 6472 usually recovers a substantial percentage of such loss in sensitivity.

The use of an average anode current well below the maximum rated value of O.I milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 10 microamperes.

A recommended design of voltage-divider network for use with the 6472 to provide stable operation and long tube life is shown in the accompanying circuit. This design provides linear operation within the range normally required for dimming. At higher light levels, the network cesign limits the tube output to a safe value. The indicated design values provide dimming operation for an anode current in the range between 5 and 10 microamperes on basis of dc operation. When operation at other current values is desired, the values of the resistors can be changed proportionately.

Mamp

шатр

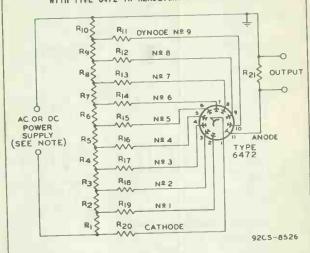
0.75



6AY

MULTIPLIER PHOTOTUBE

RECOMMENDED VOLTAGE-DIVIDER NETWORK FOR USE WITH TYPE 6472 IN HEADLIGHT-DIMMING SERVICE



R1 R2 R3 R4 R5

R6 R7 R8 R9 RIO: I megchm, 1/2 watt

RII: 2 megohms, 1/2 watt

R12: 5.1 megohms, 1/2 watt

RI3 RI4 RI5 RI6

RI7 RI8 RI9 R20: 8.2 megohms, 1/2 watt

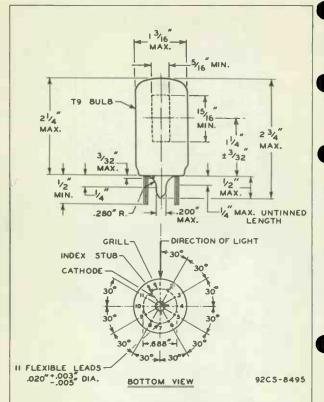
R21: B20,000 ohms, 1/2 watt

NOTE: Adjustable between approximately 500 and 1000 volts dc or peak ac.

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



MULTIPLIER PHOTOTUBE

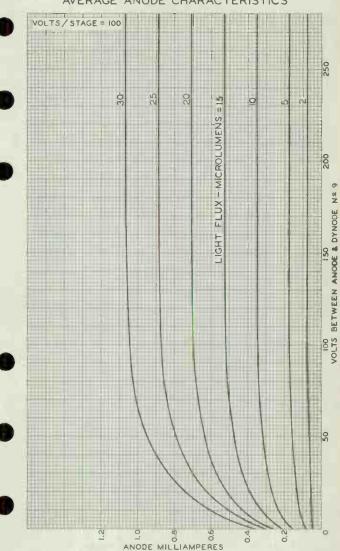


THE ANGULAR VARIATION BETWEEN THE PLANE THROUGH LEAD NO. I AND TUBE AXIS AND THE PLANE PERPENDICULAR TO THE PLANE OF THE GRILL WILL NOT EXCEED 200.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-4 Response is shown at front of this Section

RCA 6472

AVERAGE ANODE CHARACTERISTICS

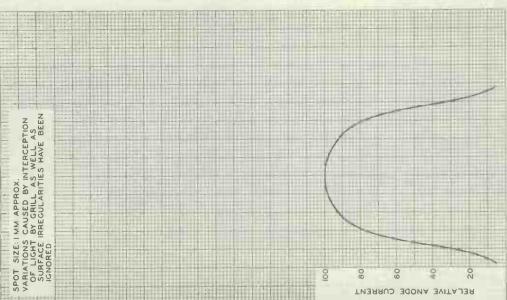


JAN. 29, 1955

TUBE DIVISION

92CM - 8029RI

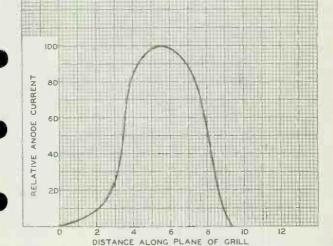
CA TO



VARIATION IN SENSITIVITY OF PHOTOCATHODE ACROSS ITS PROJECTED WIDTH IN PLANE OF GRILL

SPOT SIZE I MM APPROX. GRILL TOWARD OBSERVER, LEADS DOWN CATHODE WIDTH PROJECTED NORMAL TO PLANE OF GRILL

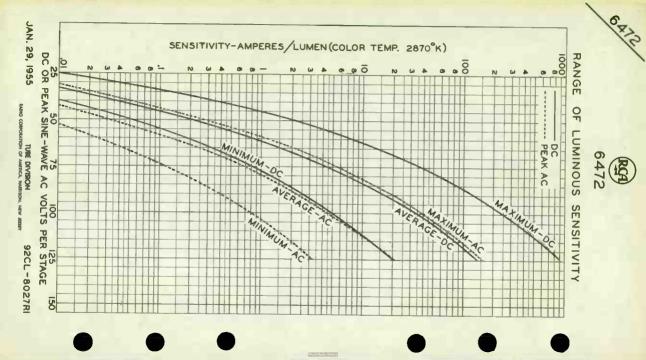
VARIATIONS CAUSED BY INTERCEPTION OF LIGHT BY GRILL AS WELL AS SURFACE IRREGULARITIES HAVE BEEN IGNORED



FROM LEFT TO RIGHT-MILLIMETERS FEB. 11, 1955 TUBE DIVISION

UAT O CORPURATION OF AMERICA MARE ON IT W ESEY

92CM-8536





VACUUM PHOTOTUBE

6270

LOW-MICROPHONIC TYPE WITH S-I RESPONSE

n	4	$\overline{}$	4
D	A	ь.	A

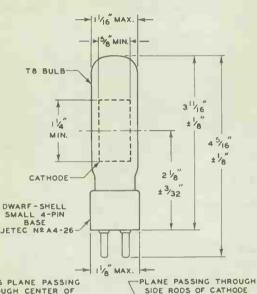
	PO 10
	General:
	Spectral Response
	Wavelength of Maximum Response 8000 ± 1000 arostroms
	Cathode:
	Shape Semicylindrical
	Minimum organized length*
	Minimum projected length*
	Minimum projected width
	Direct Intere ¹ ectrode Capacitance 3 μμf Overall Length
	Uverall Length
	Seated Length
	Seated Length to Center of Cathode 2-1/8° ± 3/32"
	Maximum Diameter
•	Mounting Position Any
	Weight (Approx.)
	Bulb
	Bulb
	Non-hygroscopic
	BOTTOM VIEW
	2/3
	Pin 1 – No Pin 3 – No
	Connection (Connection
	Pin 2 - Anode Pin 4 - Cathode
	1)4
	DIRECTION OF LIGHT
	Maximum Ratings, Absolute Values:
	ANODE-SUPPLY VOLTAGE
	(DC or Peak AC) 500 max. volts AVERAGE CATHODE—CURRENT DENSITY 25 max. µanp/sq.in.
	AVERAGE CATHODE CURRENTO 5 max. µamp
	AVERAGE CATHODE CURRENTO 5 max. µamp AMBIENT TEMPERATURE 100 max. °C
	AMBIENT TEMPERATURE 100 max.
	Characteristics at 250 Volts on Anode:
	Min. Av. Max.
	Sensitivity:
	Radiant at 8000 anostroms 0.0027 - µamp/µwatt Lumincus# 20 30 40 µamp/lumen
	Luminous* 20 30 40 uamp/lumen
	Sensitivity Difference Between
	Highest Value and Lowest
	Value Along Cathode Length 4.5 μamp/lumen
	Anode Dark Current at 25°C 0.013 µamp
	* On plane perpendicular to indicated direction of incident light.
	O Averaged over any interval of 30 seconds maximum.
_	War and the same of the same o

For conditions where the light source is a tungsten-filament lamp operated at a color temperature of $280^\circ k$. A dc anode supply of $250^\circ v$ olts, a 1-megohm load resistor, and a light input of 0.1 lumen are used. Measured under the same conditions as indicated under ($^\#$) with light input of 0.1 lumen and a light spot 1/2 inch in diameter.



VACUUM PHOTOTUBE

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-1 Response is shown at the front of this Section



AA' IS PLANE PASSING THROUGH CENTER OF BOTTOM OF BASE PARALLEL TO PLANE THROUGH PINS 18 4

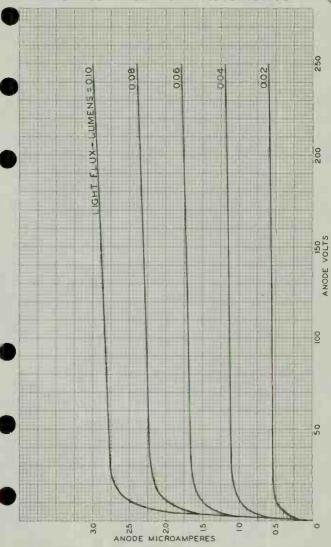
SIDE RODS OF CATHODE
WILL NOT DEVIATE
FROM PLANE AA'
BY MORE THAN 12°

CATHODE 92CS-8229

RCA 6570

6570

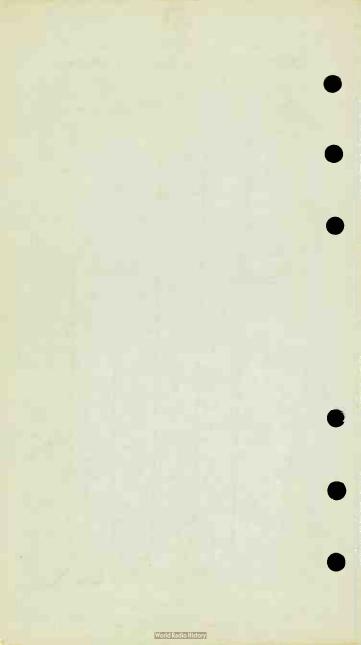
AVERAGE ANODE CHARACTERISTICS



DEC. 3, 1954

TUBE DIVISION

92CM - 8491





COMPUTER STORAGE TUBE

SINGLE-BEAM, PRIMARY-CHIEF I-M D IATION TYP REDISTRIBUTION WRITING CAPACITANCE-DISCHARGE READING

REDISTRIBUTOR WRITING	CAPACITARCE-DISCHARGE RESULTED
	DATA
General:	
Heater, for Unipotential Cath	ode:
Voltage	6.3 ac or de volts
Direct Into electrode Capacit Grid No.1 to all other elec	
Grid No. 1 to deflecting ele	rtrode D ₁ 0.2
Grid No. 1 to deflecting ele	
Grid No.1 to deflecting ele	
Grid No.1 to deflecting ele	ctrode DJA 0.2 µµf
Cathode to all other electr	
\mathbb{D}_1 to \mathbb{D}_2	
DJ3 to DJ4	2.6 μμ f
Di to all other electrodes	
DJ3 to all other electrode	
Di to all other electrode.	7 <u>µµ</u> f
Focusing Method	Electrostatic
Deflection Method	Electrostatic
Deflecting-electrode	
arrang∈men*	See Dimensional Outline
	. On inner surface of faceplate
Signal Cuttout Electrode	. Metal plate or 50-line (minimum) mesh covering external surface
	of faceplate and c_pa+ itively
	coupled to the storage surface.
	(This electrode is not supplied
	with the tube).
Overall Length	
Greate t Diameter of Bulb	3" ± 1/16"
Weight (Approx.)	. Center of tube face must be at
The deficiency present the second sec	same elevation as or at higher
	elevation than tube base.
	rd Small Cavity (JETEC No.J1-21)
	Ducdecal 10-Pin (JET C Nc. B10-75)
80	TOM V EW
Pin 1-H at r	Pin 9 - Deflecting
Pin - tarid No. 1	0 0 Pints Pintrode DJ2
Pin 3 - Cathode Pin 3 - Crid No. 3	SS Pinifi-Deflecting El tribe Du
Pin 6 - Lefterting	Finic-Heat r
Electrode DJ 3	Cip - collector
Pin 7-1 fi ting 2	S - Stor ge
Fle trade DJ3	D (2) Surface
Pin 8-Ultar (arida	
No. 2 & No. 4)	

▲ The Signal-Ourput Electrod is capacitively coupled to the Storage Surfice.



COMPUTER STORAGE TUBE

ı	Maximum Ratings, Design-Center Values:	1
	COL_ECTOR VOLTAGE: Difference between collector	
1	voltage and ultor voltage 150 max.	volts
ı	ULTOR VOLTAGE	volts
П	GRII-No.3 VOLTAGE 1000 max.	volts
ı	GRIU-NO.1 VOLIAGE:	
ı	Negative bias value 200 max.	volts
1	Positive bias value 0 max.	volts
	Positive peak value 2 max.	volts
	PEAM VOLTAGE BETWEEN ULTOR AND	
	ANY DEFLECTING ELECTRODE 500 max.	volts
	PEAK HEATER-CATHODE VOLTAGE:	
	Heater negative with	
1	respect to cathode 125 max.	volts
1	Heater positive with	1
ı	respect to cathode 125 max.	volts
1		
ı	Equipment Design Ranges:	
	For any ultor voltage (E_{C_4}) between 1000 and 2500 vol	ts
ı		volts
		volts
1	Max. Grid-No.1 Voltage	
ı	for Beam-Current Cutoff 2.4% of Ec4	volts
1	Max. Grid-No.3 Current	
1	Range15 to +10	µатр
	Deflection Factors:	
1	Di & Di 2 39 to 53 v dc/in./kv o	f Ecal
1	DJ & DJ	f Eca
1	Focused Poor Position	4

Examples of Use of Design Ranges:

Focused-Beam Position. .

DJ3 & DJ4.

	For ultor voltage of	1000	2500	volts
	Collector Voltage	950 to 1050	2375 to 2625	volts
	Grid-No.3 Voltage	200 to 280	500 to 700	volts
	Max. Grid-No.1 Volt-			
	age for Beam- Current Cutoff	-24	-60	volts
	Deflection Factors:	-24	-60	VOLES
ı	DI1 & DI2	39 to 53	97 5 to 133	volts de/in

The "ultor" in a storage tube is the electrode to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection. In the 6571, the ultor function is performed by grid No.4. Since grid No.4 and grid No.2 are connected together within the 6571, they are collectively referred to simply as "ultor" for convenience in presenting data and curves.

35.5 to 48.5 89 to 122 volts dc/in.

The center of the undeflected focused beam will fall within a circle having a 7.5-mm radius concentric with the center of the tube face.

volts

COMPUTER STORAGE TUBE

Storage	Characteris	tics for	Bltor \	Voltage	of	2500	Volts:

Storage-Surface Boundary (In terms of deflection voltagel:

In the DI1 - DI2 direction from posivolts tion of undeflected focused beam . . +109

In the DJ3 - DJ4 direction from position of undeflected focused beam . . Blemish Factor*, for storage surface

within indicated boundary. Spill (Determined for Double-Dot Pattern): "

Under conditions involving 255 references to "spil!" element and 1 reference to 'test" element

Separation Between Storage Elements, in either the D1-D2 or D3-D4 direction in terms of deflect on

voltage: At center of storage surface . . .

8 max. volts At midpoint on each side of storage-surface boundary . 10 max. volts

Maximum Circuit Values:

S

meanhms Grid-No.1-Circuit Resistance . . 1.5 max. Resistance in Any Deflecting-Electrode Circuit 1.0 max. megohm

Blemish factor is defined as the factor by which the normal positive signal is reduced by the blemish.

Signal is reduced by the blemish.

Spill is indicative of the amount of binary information that can be stored by the tube. The storage capability is determined by the separation between two storage elements at which the signal from one element is changed by no more than a specified amount after repeated efferency to the other element. For the 6571, the separation is measured, in terms of deflection voltage, when the amplitude of the negative signal of the "test" element has decreased to 50% of its maximum megative amplitude. The maximum negative amplitude is determined by separating the two elements far enough to eliminate the effects of secondary electron redistribution from the "spill" element. it is recommended that the deflecting-electrode-circuit resistances be approximately equal.

OPERATING CONSIDERATIONS

Shielding. In typical computer applications, the 6571 is mounted in a compartment having effective magnetic and electrostatic shielding. It is recommended that the bulb be provided with a tight-fitting electrostatic shield extending from the base to the collector coat ng. (See Bimensianal Outline). This external shield supplements the shielding action of the collector in preventing crosscoupling between the electron gun and the external signal electrode.

A signal-output electrode shaped to conform with the external contour of the faceplate and placed in contact with the entire area of the faceglate is required. signal-output electrode is connected to a low-noise video



COMPUTER STORAGE TUBE

amplifier having sufficient gain to amplify signals from a *raction of a millivolt to the desired level.

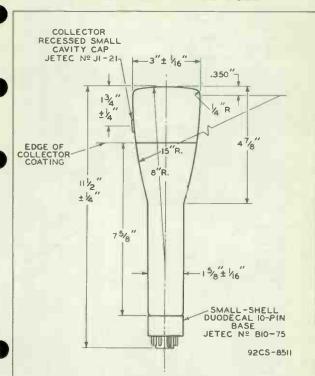
The amount of information that can be stored by the 6571 is dependent on the manner in which it is operated, and is affected by the stability of the deflecting system, freedom from noise in the associated output circuit, the rumber of regenerations compared with the number of address s, and the effectiveness of the electrostatic and magnitic shielding.

In general, the number of storage elements is proportional to the operating ultor voltage. For the greatest number of storage elements, the 6571 should be operated at the rat d maximum ultor voltage and so that the peak grid-No.1 drive is less than that required for the maximum positive amplitude but high enough to provide a satisfactory output signal.

It is recommended that the beam current be limited to the minimum value which provides satisfactory signal amplitude,

The storage characteristics in the tabulated data and curve are based on the use of a double-dot pattern. In this method of storage, the positive signal is produced by adjusting the beam current and the distance between two dot storage elements so that the optimum positive signal is produced when the "test" element is addressed. Other methods of storage such as superimposed focused and defocused spots or dots and dashes may be used equally well with the 6571.

COMPUTER STORAGE TUBE

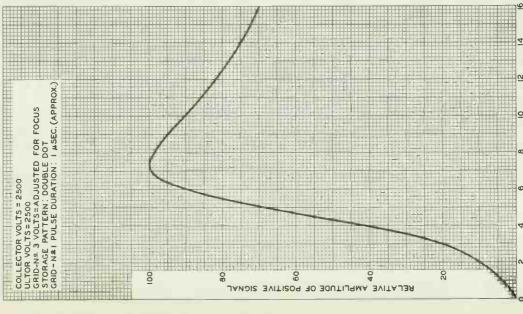


CERTER LINE OF BULB WILL NOT DEVIATE MORE THAN $2^{\rm C}$ IN any direction from perpendicular erecter at center of bottom of base.

DJ] AND DJ $_2$ ARE NEARER THE STORAGE SURFACE: DJ $_3$ AND DJ $_4$ ARE NEARER THE BASE. WITH DJ $_1$ POSITIVE WITH RESPECT TO DJ $_2$, THE BEAM WILL BE DEFLECTED TOWARD PIN 2; LIKEWISE, WITH DJ $_3$ POSITIVE WITH RESPECT TO DJ $_4$, THE BEAM WILL BE DEFLECTED TOWARD VACANT PIN POSITION II.

THE PLANE THROUGH TUBE AXIS AND EACH OF THE FOLLOWING ITEMS MAY VARY FROM THE DEFLECTION PATH PRODUCED BY DJ1 AND DJ2 BY THE FOLLOWING ANGULAR TOLERANCES IMEASURED ABOUT THE TUBE AXIS): PIN 2, $10^{\rm G}$; SIDE TERMINAL 10N SAME SIDE AS PIN 81, $10^{\rm O}$. ANGLE BETWEEN DJ1-OJ2 DEFLECTION PATH AND DJ3-DJ4 DEFLECTION PATH IS $90^{\rm O}\pm3^{\rm O}$.

RAGE CHARACTERISTIC



92CM - 85

5 TUBE

27 1055



MULTIPLIER PHOTOTUBE

10-STAGE, HEAD-ON TYPE WITH

1-11/16" SEMITRANSPARENT CATHODE AND S-11 RESPONSE

DATA	
General;	
Spectral Response	
Window: Area 2.2 sq. in. Minimum diameter	
Anode to dynode No.10.	*
Basing Designation for BOTTOM VIEW	-
Maximum Ratings, Absolute Values:	
ANODE-SUPPLY VOLTAGE (DC or Peak AC) 1250 max. volts SUPPLY VOLTAGE BETWEEN DYNODE No.10	
AND ANODE (DC or Peak AC)	4
(DC or Peak AC)	
(DC or Peak AC)	
• Averaged over any interval of 30 seconds maximum.	

-Indicates a change.



Sone it ivitus



MULTIPLIER PHOTOTUBE

Characteristics Range Values for Equipment Design:

Under conditions with supply voltage (E) across voltage divider providing I/6 of E between cathode and dynode No. I; 1/12 of E for each succeeding dynode stage; and 1/12 of E between dynode No. 10 and anode

Median

Max.

With E = 1000 volts (except as noted) and

Focusing Electrode" connected to Dynode No. 1 at socket Min.

Sensitivity: Radiant, at					ı
4400 angstroms		20000	-	μamp/μwatt	
Cathode radiant, at		0.040			
4400 angstroms Luminous:	-	0.040	_	μamp/μwatt	
At 0 cps With dynode No.10 as output elec-	10	25	-	amp/Tumen	
trode** Cathode luminous:	-	15	g	amp/lumen	
With tungsten light source▲ With blue light	40	50	-	μamp/lumen	
source®♦ Current Amplification.	-	500000	_	μamp	
Equivalent Anode-Dark- Current Inpute Equivalent Noise Inpute Dark Current to Any	_	8.5 × 10 ⁻¹⁰ 7 × 10 ⁻¹²	2 × 10 ⁻⁹	lumen lumen	
E ¹ ectrode Except Amode (At 25°C)	-	date	0.75	μ amp	
		e notedl and		- 1	
With E = 750 volts (ex					
With E = 750 volts (exp Focusing Electrode" con	necte	d to Dynode	No.1 at so	ocket	
	necte			ocke t	
Focusing Electrode" con Sensitivity: Radiant, at 4400 angstroms	necte Min.	d to Dynode	No.1 at so	ocket μamp/μwatt	
Focusing Electrode" con Sensitivity: Radiant, at 4400 angstroms Cathode radiant, at 4400 angstroms	necte Min.	d to Dynode . Median	No.1 at so		
Focmsing Electrode" con Sensitivity: Radiant, at 4400 angstroms Cathode radiant, at 4400 angstroms Luminous: 6 At 0 cps Cathode luminous:	nnecte Min. - -	d to Dynode Median	No.1 at so	μamp/μwatt	
Focmsing Electrode" con Sensitivity: Radiant, at 4400 angstroms Cathode radiant, at 4400 angstroms Luminous: 6 At 0 cps Cathode luminous: With tungsten light source	Min.	d to Dynode Median 2000 0.040	No.1 at so	μamp/μwatt μamp/μwatt	
Focmsing Electrode" con Sensitivity: Radiant, at 4400 angstroms Cathode radiant, at 4400 angstroms Luminous: At 0 cps Cathode luminous: With tungsten	######################################	2000 0.040 2.5	No.1 at so	μamp/μwatt μamp/μwatt amp/lumen	

 far conditions where the light source is a tungsten-filament lamp oper-ated at a color temperature of 28700K. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm. *.**. A. G. G. B. A: See next page.

DATA 1

- Indicates a change.

MULTIPLIER PHOTOTUBE

- In general, the focusing electrode is connected to dynode No.1 at the socket and operated at the same fixed potential as dynode No.1. However, in applications critical as to magnitude, uniformity, or speed of the response, the focusing electrode may be connected to the adjustable arm of a potentiometer between cathode and dynode No.1 in the voltage divider, and operated at an optimum potential within a range of 10 to 60 per cent of the dynode-No.1 potential.
- An output current of opposite polarity to that obtained at the anode may be provided by using dynode No.10 as the output electrode. With this arrangement, the load is connected in the dynode-No.10 circuit and the anode serves only as collector.
- For conditions the same as shown under (*) except that the value of light flux is 0.01 lumen and 200 volts are splied between .atnode and all other electrodes connected together as anode.
- Wunder the following conditions: Light incident on the cathod- is transmitted through a blue filter (Corning, Glas Code No.5113 polished to 1/2 stock thick ess) from a tungsten-filament lamp operated at a color temperature of 28700K. The value of light flux on the filter is 0.01 lumen. The load resistor has a value of 3.01 megohm, and 200 voits are applied between cathode and all other electroces connected together as anode.
 - For spectral characteristic of this source, see sheet SPECTRAL CHARACTERISTIC OF 2870°K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870°K SOURCE AFTER PASSING THROUGH INDICATED BLUE FILTER at front of this section.
- Measured at a tube temperature of 25°C and with the supply woltage (E) adjusted to give a luminous sensitivity of 20 amperes per lumen, Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.
- For maximum signal-to-noise ratio, operation with a supply voltage (E) below 1000 volts is recommended.
 - Under the following conditions: Supply voltage (E) is 1000 volts, 25°C tube temperature, ac-amplifier bandwijth of 1 cycle per second, tungsten light source of 2870°K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The 'on' period of the pulse is equal to the 'off period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

OPERATING CONSIDERATIONS

The operating stability of the 6655 is dependent on the magnitude of the anode current and its duration. When the 6655 is operated at high values of anode current, a drop in mensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 6655 usually recovers a substantial percentage of such loss in sensitivity.

The use of an average anode current well below the maximum rated value of 0.75 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 100 microamperes.

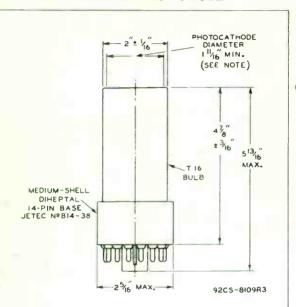
Electrostatic and/or magnetic shielding of the 6655 may be necessary.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-II Response is shown at the front of this Section

- Indicates a change.



MULTIPLIER PHOTOTUBE



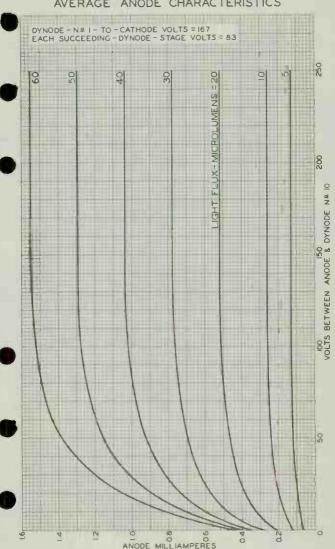
₱ DF BULB WILL NOT DEVIATE MORE THAN 2°
IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

■ THE BA

NOTE: WITHIN MINIMUM DIAMETER, DEVIATION FROM FLAT-NESS WILL NOT EXCEED 0.010" FROM PEAK TO VALLEY.



AVERAGE ANODE CHARACTERISTICS



APRIL 20, 1955

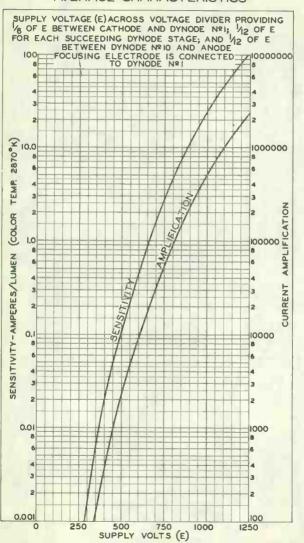
TUBE DIVISION World Radio History 92CM-86D3

6655

653/



AVERAGE CHARACTERISTICS



MAY 27, 1955

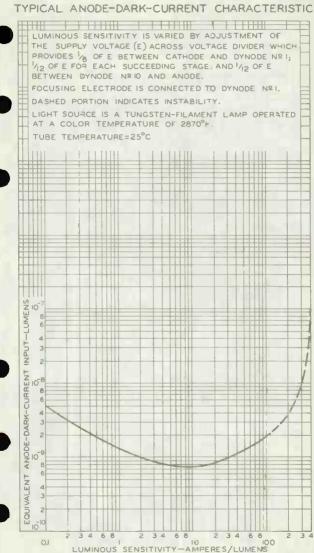
TUBE DIVISION

BADIO CORPORATION OF AMERICA, HARRISON, NEW JESSEY

92CL-8638



TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC



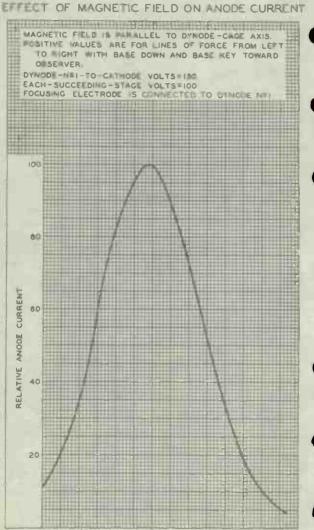
MAY 27, 1955

TUBE DIVISION

92CM-8636







MAY 7, 1955

MAGNETIC FIELD INTENSITY-THU. SES TULE DIVISION

#2CM-8136RI



6694-A

669 R.A

PHOTOCONDUCTIVE CELL

CADMIUM-SULFIDE TYPE

	CADMIUM-SULFIDE TYPE
	DATA
	General:
	Spectral Response
	Wavelength of Maximum Response 5000 ± 500 angstroms
	Sensitive Area:
B	Shape
•	Dimensions (Minimum) 0.020" x 0.018" Direct Intere ectrode Capacitance
	Maximum Overa'l Length 0.500" Maximum Seated Length
	Width 0.350" ± 0.025"
	Depth 0.200" ± 0.020"
	Mounting Position
"	Weight (Approx.)
	Base Small-Rectangle Linotetrar 2-Pin (JETEC No.E2-33)
	Socket Cinch Part Nc.46AZ20248, or equivalent
	(min
	TERMINAL OTTERMINAL
	DIRECTION OF LIGHT!
	A indicates that the primary characteristic of the element within the envelope symbol is designed to vary under the influence of light.
	Maximum Ratings, Absolute Values:
	POLARIZING VOLTAGE 150 mak. volts
	POWER DISSIPATION
	AMBIENT-TEMPERATURE RANGE 0 to +70 °C
	Characteristics:
	Under conditions with polarizing voltage of 90 volts
	and at ambient temperature of 25°C
	Hin. Median Nax.
	Sensitivity:
	Radiant ⁴ , at 5000 angstroms - 415 - µamo/µwatt
	Luminous", at 0 cps 1 - amp/lumen
	at 0 cos 1.9 4 - μamp/ft-c
	Dynamic
	Dark Current 0.1 μamp
	Dark Noise Essentially lower than that
	of associated circuit
	Photocurrent: Rise
	Decay
	For conditions where the incident power is 0.2 µwatt.
	For conditions where the light source is a tungsten-filament lamp
	For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870 K. A light flux of about 100 nicrolumens is used.

: See next page.



6694-A PHOTOCONDUCTIVE CELL

For light conditions the same as shown under $\binom{*}{*}$ except that an incident light intensity of 30 foot-candles is used.

DEFINITIONS

Rudiant Sensitivity. The quotient of output current by incident radiant power of a given wavelength, at constant electrode voltages.

Luminous Sensitivity. The quotient of output current by incident luminous flux, at constant electrode voltages.

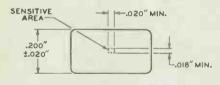
Luminous Intensity Sensitivity. The quotient of output current by the incident luminous intensity, at constant electrode voltages.

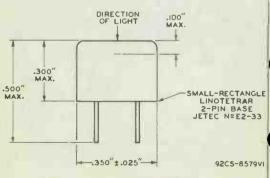
Dynamic Sensitivity. The quotient of the modulated component of the electrical output by the modulated component of the incident radiation.

OPERATING CONSIDERATIONS

The polarizing voltage for the 6694-A may be applied without regard to polarity. To obtain the full sensitivity of the cell, it is essential that its entire photosensitive area be illuminated. Otherwise, a blocking action produced by the unilluminated area of the cell will occur and cause unsatisfactory operation.

> SPECTRAL-SENSITIVITY CHARACTERISTIC of Photoconductive Cell having S-12 Response is shown at the front of this Section

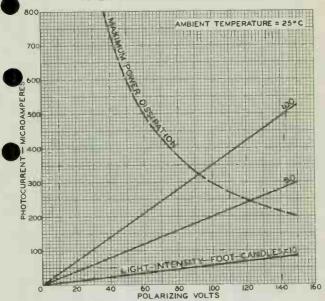






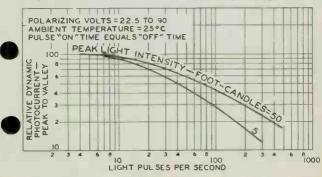
669 W.A

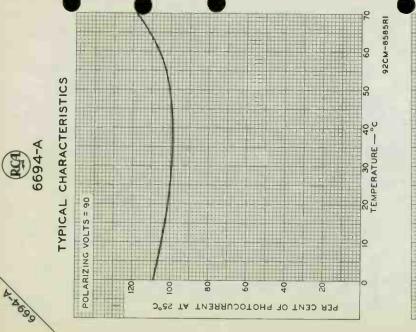
AVERAGE CHARACTERISTICS

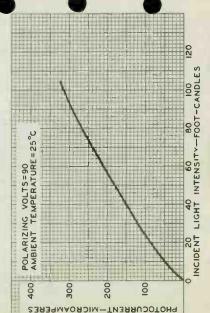


92CM-8583VI

DYNAMIC SENSITIVITY CHARACTERISTICS

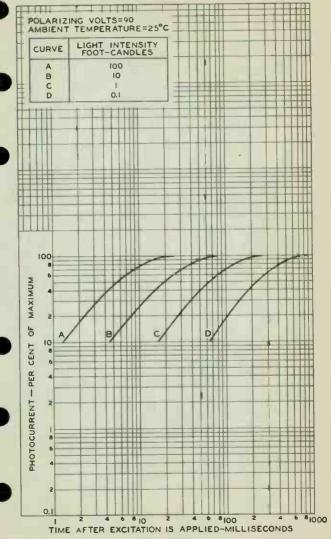








TYPICAL RISE CHARACTERISTICS



TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

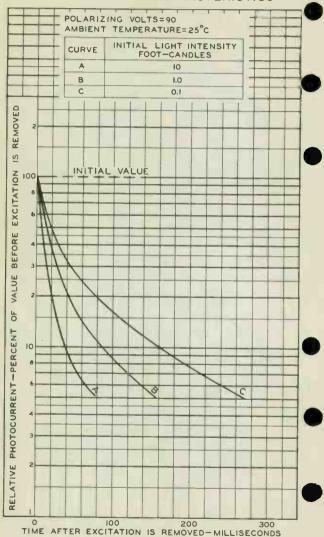
92CM-8873

669 V. A

669 A'A



TYPICAL DECAY CHARACTERISTICS



TUBE DIVISION
RADIO COPPORATION OF AMERICA, HARRISON, NEW JERSEY



MULTIPLIER PHOTOTUBE

14-STAGE, HEAD-ON TYPE WITH 1-11/16" SEMITRANSPARENT CATHODE AND S-11 RESPONSE SHOFT TIME-RESOLUTION CAPABILITY

	DATA
	General:
0	Spectral Response
	Area
8	Bulb
0	Pin 10- Anode Pin 20 - Photocathode Aaximum Ratings, Absolute Values:
	ANODE—SUPPLY WOLTAGE (DC)
	Averaged over any interval of 30 seconds maximum.





MULTIPLIER PHOTOTUBE

Characteristics Range Value	s for E	quipment (esign:	
Under conditions with sup	ply vol	tage (E) a	across	a voltage
divider providing elect	rode vo	Itages sho	own in	Table 1
With E = 2000 volts lexc	ept as	noted) a	nd Acc	elerating-
Electrode. Voltage adjusted	to give	maximum g	ain	
	Min.	Median	Max.	
Sensitivity:				
Radiant, at				
4400 ing stroms	-	0.6	-	amp/µwatt
Cathode radiant;		0.010		, =,
at 4400 angstroms		0.048		μamp/μwatt
At 0 cps	120	750	4500	amp/lumen
ith dynode No. 14				ampr ramor
BS output				
electrodet		525	-	amp/lumen
Cathode luminous:				
With tungsten light warce	4()	60		μ imp/lumen
"ith blu light	40	. 0		μαπρ/ TunieT
ource⊕♦	0.04	_	_	μатр
Current Amplification	-	12.5×10^6	-	
Equivalent Anode-Durk-		5 40 10		
Current Input⊕	-	5 × 10-10		
Equivalent Noise Input*	_	E # 10-12	_	lumen
Electrode Except				
node (At 75°C)	-	-	0.75	μamp
N 44 C	. 4 4	- 4 - 2.1		
With E = 2300 volts lexco Flectrode Voltage adjusted				elerating-
Trebroat vortage aujusteu		Median		
C 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	пън.	пеціан	HUX.	
Secitivity:				
440 angetrom	_	3.2	_	amp/pwatt
(thode radiant.		7.2		Tarrier partie C
at 4400 angstrome	-	0.048	-	μamp/μwatt
Luminous:				
At 0 cps	660	4000	28000	amp/lumer
with dynode No. 14				
electrodet	-	2800		amp/lumen
Cathode luminous:				
With tungsten				
light source	40	60	-	μump/lumen
with blue light	0.04			
ource⊕♦ Current Amplification	0.04	-6 x 106	I	μаті
Current Apprilication		20 X 100		

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♣,†,♠,⊕,♠,⊕,m,±: See next page.

TENTATIVE DATA 1



MULTIPLIER PHOTOTUBE

TABLE I

VOLTAGE TO BE PROVIDED BY DIVIDER

Between	5.4% of Supply Voltage (E) multiplied by
Cathode and Focusing Electrode Focusing Electrode and Dynode Nc.1 Dynode Nc.1 and Dynode No.2 Dynode Nc.2 and Dynode No.3 Dynode Nc.3 and Dynode No.4 Dynode Nc.3 and Dynode No.5 Dynode Nc.5 and Dynode No.6 Dynode Nc.6 and Dynode No.6 Dynode Nc.7 and Dynode No.7 Dynode Nc.8 and Dynode No.9 Dynode Nc.9 and Dynode No.10 Dynode Nc.10 and Dynode No.11 Dynode Nc.11 and Dynode No.12 Dynode Nc.12 and Dynode No.13 Dynode No.13 and Dynode No.14 Dynode No.14 and Anode Anode and Cathode	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Anoue and Californ	10.0

- For conditions where the light source is a tungsten-filament lam; operated at a colo: temperature of 28700x. A light input of 0.1 microlumen is used. The load resistor has a value of 0.01 megohm.
- An output current of opposite polarity to that obtained at the anode may be provided by using dynode No.14 a. the output electrode. With this arrangement, the load is connected in the dynode-No.14 circuit and the anode serves only as collector. The value of sensitivity at dynode No.14 is approximately 70% of that when the anode in the output electrode. Specifically, the sensitivity measured at synode No.14 is equal to (1-1/g) times the sensitivity measured at the anode, where "g" is the gain of the dynode-No.14 stage.
- for conditions the same as shown under (b) except that the value of light flux is 0.01 lumen and 200 volts are applied between cathode and all other electrodes connected together is anode.
- Under the following conditions: Light incident on the cathode is transmitted through a blue filter (Corning, Glass Code No.5113 polished to 1/2 stock thickness) from a tungsten-filament lamp operated at a color temperature of 2870 k. The value of light "lux on the filter is 0.01 lumen. The load resistor has avalue of 9.01 megohm, and 20 volts are applied between cathode and all other electrodes connected together as anode.
 - For spectral characteristic of this source, see sheet SPECTRAL CHARACTERISTIC OF 28700K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 28700K SOURCE AFTER PASSING THROUGH INDICATED BLUE FILTER at front of this section.
- Measured at a tube temperature of 25°C and with the supply voltage (E) adjusted to give a luminous sensitivity of 20°C amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.
- For maximum signal-to-noise ratio, operation with a supply voltage (E) below 2000 volts is recommended.
- A Under the following conditions: Supply voltage (f) is 2000 colts, 2500 tube temperature, external shield potential of -2000 volts, an -amplifier bandwidth of 1 cycle per second, tungsten tight source of 2870% interrupted at allow audio frequency to produce incident radiallow pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The subput current is measured through a filter which passes only the fundsmental frequency of the pulses.



MULTIPLIER PHOTOTUBE

OPERATING CONSIDERATIONS

The operating stability of the 6810 is dependent on the magnitude of the anode current and its duration. When the 6810 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 6810 usually recovers a substantial percentage of such loss in sensitivity.

The use of an average anode current well below the maximum rated value of 2 milliamperes is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 250 microamperes.

Electrostatic and/or magnetic shielding of the 6810 may be necessary.

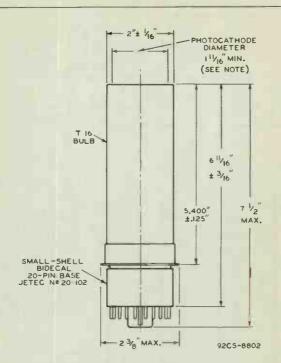
The material of which the dynodes of the 6810 are made has stable, high-current carrying capabilities and permits the use of a tube manufacturing process which minimizes regenerative effects such as afterpulses. The relative treedom of the 6810 from afterpulses and its small spread in electron transit time make it particularly useful for fast coincidence scintillation counting.

Because the 6810 offers the advantage of small spread in electron transit time, it has a fast pulse rise time. As a result, the 6810 has very short time-resolution capability, i.e., in the order of 1 or 2 millimicroseconds. For an input pulse having a duration of 1 millimicrosecond or less, the time spread of the pulse at the anode is about 9 millimicroseconds measured at 50 per cent of the maximum pulse height, when the supply voltage is 2000 volts and the focusing electrode is connected to dynode No.1.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-11 Response is shown at the front of this Section



MULTIPLIER PHOTOTUBE



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

NOTE: WITHIN MINIMUM DIAMETER, DEVIATION FROM FLAT-NESS WILL NOT EXCEED 0.010" FROM PEAK TO VALLEY.



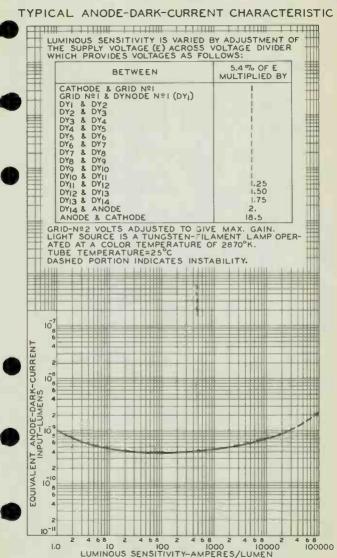
Ö



AVERAGE ANODE CHARACTERISTICS CATHODE-TO-GRID-Nº1 VOLTS = 108 GRID-NºI-TO-DYNODE NºI (DYI) VOLTS = 108 DYI - TO -DY2 DY11 - TO -DY12 VOLTS = 135 DY2 - TO - DY3 DY12- TO - DY13 VOLTS = 160 - VOLTS = 108 ETC. TO DY13- TO - DY14 VOLTS = 189 GRID-Nº2 VOLTS ADJUSTED TO DYIO- TO -DYII GIVE MAX. GAIN LIGHT SOURCE IS TUNGSTEN FILAMENT LAMP OPERATED AT A COLOR TEMPERATURE OF 2870 ° K. :47 N 10 8 d O DYNODE Nº 14 TOX I 03





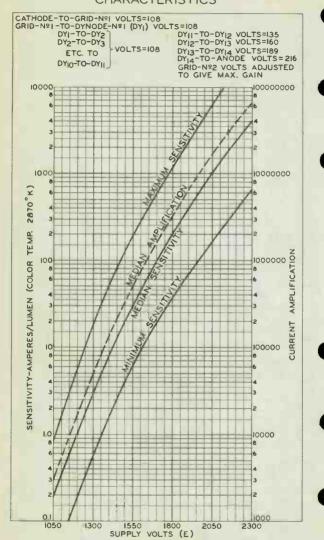


TUBE DIVISION NEW JERSEY RADIO CORPORATION OF AMERICA, HAMISSON NEW JERSEY

92CM-8848







TUBE DIVISION
HOLD CORPORATION OF AMERICA, MARRISON, NEW JESSEY

92CL-8845



6810-A

68/0,4

MULTIPLIER PHOTOTUBE

14-STAGE, HEAD-ON, FLAT-FACEPLATE TYPE WITH 1-11/16"
CURVED, SEMITRANSPARENT CATHODE AND S-11 RESPONSE
VERY SHORT TIME-RESOLUTION CAPABILITY
Supersedes Type 6810

DATA	
General:	
Spectral Response	
Shape	Curveo Circular
Area Minimum diameter. Index of refraction Direct Interelectrode Capacitances (Approx.):	2.2 sq. in. 1-11/16 in. 1.51
Anode to dynode No.14 Anode to all other electrodes Dynode No.14 to all other electrodes	. 5.5 μμτ . 7.5 μμτ
Maximum Overall Length. Seated Length Maximum Diameter. Operating Position.	
	8 oz
Base Small-Shell Bidecal 20 Basing Designation for BOTTOM VIEW.	20B
Pin 1-No Connection Tion Pin 2-Dynode No.1 7	Pin 11 - Dynode No.14 Pin 12 - Dynode No.12 Pin 13 - Dynode No.10
Pin 3 - Dynode No.3 Pin 4 - Dynode No.5 Pin 5 - Dynode No.7 Pin 6 - Dynode No.9	Pin 14 – Dynode No.8 Pin 15 – Dynode No.6 Pin 16 – Dynode No.4
Pin 7 - Dynode No.11 Pin 8 - Dynode No.13	Pin 17 - Dynode No.2 Pin 18 - No Cennec- tion Pin 19 - Grid No. 1
(Accelerating INTO END OF BULB	(Focusing
Electrode) Pin 10 - Anode	Electrode) Pin 20 - Photocathode
LOW-LIGHT, LOW-NOISE, HIGH-	GAIN SERVICE
With supply voltage (E) across vo	iltage divider pro-
viding electrode voltages shown is Maximum Ratings, Absolute Values:	n Table I-Column A
ANODE-SUPPLY VOLTAGE (DC) SUPPLY VOLTAGE BETWEEN DYNODE No.14	2400 max. volts
AND ANODE (DC)	400 max. volts

6810-A



MULTIPLIER PHOTOTUBE

SUPPLY VOLTAGE BETWEEN CONS DYNODES (DC) SUPPLY VOLTAGE BETWEEN ACCI			500 r	max. volts
ELECTRODE AND DYNODE No.	12 /001	NG-	±500 n	max. volt:
YNODE-No.1 SUPPLY VOLTAGE				max. volt:
OCUSING-ELECTRODE SUPPLY				nax. volt:
VERAGE ANODE CURRENT	VOLIMUL	100/		
MB ENT TEMPERATURE				nax. max. o
Characteristics Range Valu	es for	Equipment D	esign:	
With E = 2000 volts (excepted to the electrode voltage as				
electrone voltage a	-	_	Nax.	, ta + 11
	Hin.	Median	Hax.	
Sensitivity:				
Radiant, at 4400		0.6		amp/μ
angstroms	-	0.6	-	anp/ p
Cathode radiant, at	_	0.048	_	μα/μ
4400 angstroms Luminous:#	_	V. V40	_	μανμ
At 0 cps	120	750	4500	amp/lume
With dynode No.14 as	120	130	1000	J.,
output electrodet	_	525	_	amp/lume
Cathode luminous:				
With tungsten light				
source	40	60	-	μa/lume
With blue light				
source**♥	0.04	- 456	-	μ
Current Amplification		12.5×10^6	-	
Equivalent Anode-Dark-		- 40=10		9 1.
Current Input®	-	5 × 10 ⁻¹⁰	2 x 10 ⁻	
Equivalent Noise Input*	-	6 × 10 ⁻¹²	-	1 ume
Greatest Transit-Time				
Spread:				
Within a circle centered	1			
on tube face and having				
a diameter of—	_	1	_	milliµse
1-1/8"	_	3	_	milliµse
1-9/10	_	,		
HIGH-OUT	FPUT-PU	LSE SERVICE		
With supply voltage	(E) acr	oss voltage	divide	r pro-
viding electrode volt	ages s	hown in Tabl	e I—Co	lumn B
Maximum Ratings, Absolute				
			2800	max. volt
ANOBE-SUPPLY VOLTAGE (DC). SUPPLY VOLTAGE BETWEEN DYN	NODE NO	14	2000	······································
AND ANODE (DC)	NODE NO		400	max, volt
SUPPLY VOLTAGE BETWEEN				
CONSECUTIVE DYNODES (DC))		500	max. volt
CONSECUTIVE BINODES (DO.				
• # † 	age.			
_ , , , , , , , , , doo now , ,	3		TENT	ATIVE DATA

8-57



SAIO-A

6810.4

MULTIPLIER PHOTOTUBE

Cathode luminous: With tungsten light source . 40 60 - \(\mu a\)/lumen With blue light source 0.04 \(\mu a\)/ Current Amplification - 12.5 \times 10^6 - Equivalent Anode- Dark-Current Input 1.1 \times 10^9 - lumen Equivalent Noise		MULI	LILI		rnoioi		
Characteristics Range Values for Equipment Design: With E = 2400 volts (except as noted) and accelerating— electrode voltage adjusted to give maximum gain Nin. Nedian Nax. Sensitivity: Radiant, at 4400 angstroms 0.6 - amp/µw Cathode radiant, at 4400 angstroms 0.048 - µa/µw Luminous: At 0 cps 750 - amp/lumen With dynode No.14 as output electroded 525 - amp/lumen With dynode No.14 as output electroded 525 - amp/lumen With blue light source 4 0 60 - µa/lumen With blue light source 5 0.04 - µa/ Current Amplification - 12.5 x 106 - Equivalent Anode- Dark-Current Input 6 - 1.1 x 10-9 - lumen Equivalent Noise Input 4 8 x 10-12 - lumen Averaged over any interval of 30 seconds maximum. With the following conditions: The light source is a tungsten-filament Iamp operated at a color temperature + 7270° K. A light input of 0.1 microlumer is yeed. The load resistor has a value of 0.01 megohm. An output current of opposite polarity to that obtained at the anode may be provided by using dynode No.18 as the output electrode. With this arrangement, the load is connected in the dynode-No.18 circuit and the amode isverse only as collectos. Buder the following conditions: The light source is a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux is 0.01 lumen and 200 volts are applied between cathode and all other electrodes connected tugether as anode. The load resistor has a value of 0.01 megohm. **Ender the following conditions: Light inclident on the cathode is transmitted through a lue filter (corning, Glass Code No.5:13 polished to 1/2 stuck thickness) from a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux on the filter is 0.01 lumen. The load resistor has a value of 0.01 megohm. **Ender the following conditions: Light inclident on the cathode is transmitted through abue filter (corning, Glass Code No.5:13 polished to 1/2 stuck thickness) from a tungsten-filament lamp operated at a color tem	DY FO	ELECTRODE AND DYNO NODE-No.1 SUPPLY V CUSING-ELECTRODE S VOLTAGE (DC)	DE N OLTA UPPL	o.13 (D GE (DC)	C)	400 r	max. volts max. volts
#ith E = agov volts (except as noted) and accelerating— electrode voltage adjusted to give maximum gain **Nin.** **Nedian** **Nax.** **Sensitivity: Radiant, at 4400 angstroms 0.6 - amp/μw Cathode radiant, at 4400 angstroms 0.048 - μa/μw Luminous: **At 0 cps 750 - amp/lumen **With dynode No.14 as output electrodet 525 - amp/lumen **With tungsten light source** . 40 60 - μa/lumen **With blue light source** 0.04 - μa/lumen **With blue light source** 0.04 - μa/lumen **Current Amplification - 12.5 × 106 - Equivalent Anode— Dark-Current Input* - 1.1 × 10 ⁻⁹ - lumen **Equivalent Noise Input** 8 × 10 ⁻¹² - lumen **Averaged over any interval of 30 seconds maximum.** **Bunder the following conditions: The light source is a tungsten-filament **Lamp operated at a color temperature of 20 of 0.1 magohm.** **Averaged over any interval of 30 seconds maximum.** **Inder the following conditions: The light source is a tungsten-filament lamp operated at a color temperature of 2870° K. The value of 11ght flux is 0.01 lumen and 200 velts are applied between cathode and all other electrodes connected tugether as anode. The load resistor has a value of 0.01 magohm.**							
Rediant Adv	Ch	aracteristics Rang	je Va	lues fo	r Equipment D	esign:	
Nin. Nedian Nax. Sensitivity: Radiant, at 4400 angstroms							
Sensitivity: Radiant, at 4400 angstroms 0.6 - amp/\(\triangle \) and Cathode radiant, at 4400 angstroms 0.048 - \(\triangle \) all \(\triangle \) and Luminous: At 0 cps 750 - amp/lumen With dynode No.14 as output electrodet 525 - amp/lumen Cathode luminous: With tungsten light sourcet 40 60 - \(\triangle \) all umen With blue light sourcet 0.04 - \(\triangle \) all umen With blue light sourcet 0.04 - \(\triangle \) all umen Current Amplification - 12.5 x 106 - Equivalent Anode- Dark-Current Inputer 1.1 x 10-9 - lumen Equivalent Noise Input** 8 x 10-12 - lumen Averaged over any interval of 30 seconds maximum. under the following conditions: The light source is a tungsten-filament Iamp operated at a color temperature of 2870 k. A light input of 0.1 microlumer is ased. The load resistor has a value of 0.01 megohm. In output current of opposite polarity to that obtained at the anode may be provided by using dynode No.1% as the output electrode. With this arrangement, the load is connected in the dynode-No.1% circuit and the amode serves only as collector. Under the following conditions: The light source is a tungsten- filamen: lamp operated at a color temperature of 2870 k. The value of light flux is 0.01 lumen and 200 volts are applied between cathode and all other electrodes connected trigether as anode. The load re- sistor has a value of 0.01 megohm. Under the following conditions: Light incident on the cathode is transmitted through ablue filter (corning, Glass Code No.5:19 polished to 1/2 stock thickness) from a tungs-en-filament lamp operated at a color temperature of 2870 k. The value of light flux on the filter is 0.01 lumen. The load resistor has a value of 0.01 megohm, and 200 volts are applied between cathode and all other electrodes connected of temperature of 2870 k. The value of light flux on the filter is 0.01 lumen the load resistor has a value of 0.01 megohm, and color temperature of 2870 k. The value of light flux on the filter is 0.01 lumen th		electrode vol	tage	•	•		yain
Radiant, at 4400 angstroms	100	acitivity:					
At 0 cps 750 - amp/lumen With dynode No.14 as output electrode† 525 - amp/lumen Cathode luminous: With tungsten light source⁴ 40 60 - μa/lumen With blue light source⁴ 0.04 - μa/lumen With blue light source⁴ 0.04 - μa/lumen Current Amplification - 12.5 x 106 - Equivalent Anode- Dark-Current Input • 1.1 x 10-9 - lumen Equivalent Noise Input ** 8 x 10-12 - lumen Averaged over any interval of 30 seconds maximum. under the following conditions: The light source is a tungsten-filament lamp operated at a color temperature ≈ 2870° K. A light input of 0.1 microlumer is seed. The load resistor has a value of 0.01 megohm. An output current of opposite polarity to that obtained at the anode may be provided by using dynode No.1% as the output electrode. With this arrangement, the load is connected in the dynode-No.1% circuit and the amode serves only as collectos. Buder the following conditions: The light source is a tangsten- filamen: lamp operated at a color temperature of 2870° K. The value of light flux is 0.01 lumen and 200 volts are applied between cathode and all other plectrodes connected tugether as anode. The load re- sistor has a value of 0.01 megohm. **Total the following conditions: Light incident on the cachode is transmitted through ablue filter (corning, Glass Code No.513 pollshed to 1/2 stock thickness) from a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux on the cachode is transmitted through ablue filter (corning, Glass Code No.513 pollshed to 1/2 stock thickness) from a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light lux on the cachode is transmitted through ablue filter (corning, Glass Code No.513 pollshed to 1/2 stock thickness) from a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light lux on the filter from 2870° K. Source and Sectral Characteristic of Light from 2870° K source. See seet SPECTRAL CHAR ACTERISTIC OF 2870		Radiant, at 4400 angstroms.		-	0.6	-	amp/μw
At 0 cps		4400 angstroms.		-	0.048	-	µа/µw
electrodef 525 - amp/lumen Cathode luminous: With tungsten light sourcef 40 60 - \(\mu\) \(\mu\) / \(\mu\) with blue light sourceff 0.04 \(\mu\) \(\mu\) / \(\mu\		At O cps With dymode No.1		-	750	-	amp/lumen
light source*. 40 60 — µa/lumen With blue light source* 0.04 — — — µa Current Amplification . — 12.5 x 106 — Equivalent Anode— Dark—Current Input*. — 1.1 x 10 ⁻⁹ — lumen Equivalent Noise Input** — 8 x 10 ⁻¹² — lumen Equivalent Noise Input** — 8 x 10 ⁻¹² — lumen **Averaged over Any interval of 30 seconds maximum. **Under the following conditions: The light source is a tungsten—filament Iamp operated at a color temperature #7 2870 K. A light input of 0.1 microlumer is %sed. The load resistor has a value of 0.01 megohm. **A noutput current of opposite polarity to that obtained at the anode may be provided by using dynode Mo.1% as the output electrode. With this arrangement, the load is connected in the dynode—No.1% circuit and the amode serves only as collector. **Dunder the following conditions: The light source is a tangsten— filamen: lamp operated at a color temperature of 2870 K. The value of light flux is 0.01 lumen and 200 volts are applied between cathode and all other electrodes connected tugether as anode. The load re- sistor has a value of 0.01 megohm. **Under the following conditions: Light incident on the cathode is transmitted through ablue filter (corning, Glass Code Mo.5:19 polished to 1/2 stuck thickness) from a tungsten—filament lamp operated at a color temperature of 2870 K. The value of light flux on the filter is 0.01 lumenn. The load resistor has a value of 0.01 megohm, and 200 volts are applied between cathode and all other electrodes connect— of temperature of 2870 K. The value of light flux on the filter is 0.01 lumenn. The load resistor has a value of 0.01 megohm, and 200 volts are applied between cathode and all other electrodes connect— of temperature of 2870 K. The value of light flux on the filter is 0.01 lumenn. The load resistor has source, see sheet SPECTRAL CHAR- ACTERISTIC OF 2870 K Light source and SPECTRAL CHARACTERISTIC of 7870 K Light source. See sheet SPECTRAL CHARACTERISTIC of 16 is section.		electrodet Cathode luminous:		-	525	-	amp/lumen
Current Amplification . — 12.5 x 10 ⁶ — Equivalent Anode— Dark—Current Input . — 1.1 x 10 ⁻⁹ — lumen Equivalent Noise Input**		light source▲		40	60	-	μ≘/lumen
Current Amplification . — 12.5 x 10 ⁶ — Equivalent Anode— Dark—Current Input . — 1.1 x 10 ⁻⁹ — lumen Equivalent Noise Input — 8 x 10 ⁻¹² — lumen experience of a second sec				0.04	_	_	μа
Dark-Current Input 1.1 x 10 ⁻⁹ - lument Equivalent Noise Input 8 x 10 ⁻¹² - lument Averaged over any interval of 30 seconds maximum. **under the following conditions: The light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A light input of 0.1 microlumer is saed, The load resistor has a value of 0.01 megohm. An output current of opposite polarity to that obtained at the anode may be provided by using dynade No.1% as the output electrode. With this arrangement, the load is connected in the dynade-No.1% circuit and the amode serves only as collectos. **Under the following conditions: The light source is a tungstenfilament lamp operated at a color temperature of 2870° K. The value of light flux is 0.01 lumen and 200 voits are applied between cathode and all other electrodes connected tugether as anode. The load resistor has a value of 0.01 megohm. ***Under the following conditions: Light incident on the cathode is transmitted through ablue filter (corning, class code No.5:13 polished to 12 stock through as plue filter (corning, class code No.5:13 polished to 12 stock through as plue filter (corning, class code No.5:13 polished to 12 stock through as plue filter (corning, class code No.5:13 polished to 12 stock through as plue filter (corning, class code No.5:13 polished to 12 stock through as plue filter (corning, class code No.5:13 polished to 12 stock through as plue filter (corning, class code No.5:13 polished to 12 stock through as plue filter (corning, class code No.5:13 polished to 12 stock through as plue filter (corning, class code No.5:13 polished to 12 stock through as plue filter (corning, class code No.5:13 polished to 12 stock through as plue filter (corning, class code No.5:13 polished to 12 stock through as plue filter (corning, class code No.5:13 polished to 12 stock through as plue filter (corning, class code No.5:13 polished to 12 stock through as plue filter (corning, class code No.5:13 polished to 12 stock through as plue filter (corning, class code		rrent Amplification	on .	-	12.5×10^6	-	· ·
Input** 8 x 10 ⁻¹² lumen Averaged over any interval of 30 seconds maximum. Under the following conditions: The light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A light input of 0.1 microlumer is read. The load resistor has a value of 0.01 megohm. An output current of opposite polarity to that obtained at the anode may be provided by using dynode No.1% as the output electrode. With this arrangement, the load is connected in the dynode-No.1% circuit and the amode gerves only as collectos. Duder the following conditions: The light source is a tangsten-filament lamp operated at a color temperature of 2870° K. The value of light flux is 0.01 lumen and 200 volts are applied between cathode and all other electrodes connected tugsther as anode. The load resistor has a value of 0.01 megohm. tuder the following conditions: Light incident on the cathode is transmitted through ablue filter (corning, Glass Code No.5:13 polished to 1/2 stock thickness) from a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux on the filter is 0.01 lumen. The load resistor has a value of 0.01 megohm, and 200 volts are applied between cathode and all other electrodes connected together as anode. For spectial characteristic of this source, see sheet SPECTBAL CHARACTERISTIC OF 2870° K. SOURCE AFTER PASSING THROUGH INDICATED SLIE FILTER at front of this section.		Dark-Current Input	de.	-	1.1×10^{-9}	-	lumen
under the following conditions: The light source is a tungsten-filament lamp operated at a color temperature +7 2870° K. A light input of 0.1 microlumer is staed. The load resistor has a value of 0.01 megohm. An output current of opposite polarity to that obtained at the anode may be provided by using dynode No.1% as the output electrode. With this arrangement, the load is connected in the dynode-No.1% circuit and the amode serves only as collectos. Under the following conditions: The light source is a tangsten-filament lamp operated at a color temperature of 2870° K. The value of light flux is 0.01 lumen and 200 volts are applied between cathode and all other electrodes connected tugsther as anode. The load resistor has a value of 0.01 megohm. tuder the following conditions: Light incident on the cathode is transmitted through ablue filter (corning, Glass Code No.5:13 polished to 1/2 stock thickness) from a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux on the filter is 0.01 lumen. The load resistor has a value of 0.01 megohm, and 200 volts are applied between cathode and all other electrodes connected to 1 the 1 the connected to 1 the 1	Eu			-	8 × 10 ⁻¹²	-	lumen
may be provided by using dynade Mo.18 as the output electrode. With this arrangement, the load is connected in the dynade-Mo.18 circuit and the amode serves only as collector. Dunder the following conditions: The light source is a tangstenfilamen: lamp operated at a color temperature of 28700 K. The value of light flux is 0.01 lumen and 200 volts are applied between cathode and all other electrodes connected trigether as anode. The load resistor has a value of 0.01 megohm. The flux is 0.01 memorated trigether as anode. The load resistor has a value of 0.01 megohm transmitted through ablue filter (corning, Glass Code Mo.5119 polished to 1/2 stuck thickness) from a tungsten-filament lamp operated at a color temperature of 28700 K. The value of light flux on the filter is 0.01 lumen. The load resistor has a value of 0.01 megohm, and 200 volts are applied between cathode and all other electrodes connected to the control of the provided to 1/2 stock the control of the c	*	under the following c lamp operated at a c microlumer is used.	ondit olor The l	ions: Th temperat oad resi	e lipht source i ure ⇔f 2870 ⁰ K. stor has a value	sa tung: A light c cf 0.0	input of 0.1 1 megohm.
** Indeer the following conditions: Light incident on the cathode is transmitted through ablue filter (Corning, Glass Code No.5:13 polished to 1/2 stuck thickness) from a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux on the filter is 0.01 lumen. The load resistor has a value of 0.01 megohm, and 200 volts are applied between cathode and all other electrodes connected together as anode. For spectical characteristic of this source, see sheet SPECTRAL CHARACTERISTIC OF 2870° K SOURCE AFTER PASSING THROUGH INDICATED BLHE FILTER at front of this section.	Ţ	An output current of may be provided by until this arrangement, the and the amode serves	oppo sing ne lo: only	dynode P ad is co as coll	arity to that o lo.14 as the out nnected in the o ectos.	btained put elec dynode-N	at the anode trode. With 0.1% circuit
200 Volts are applied between Cathode into all of the Fetch odes Connected of together as anode. For spectral characteristic of this source, see sheet SPECTRAL CHARACTERISTIC OF LIGHT FROM 2070 K SOURCE AFTER PASSING THROUGH INDICATED BLIE FILTER at front of this section. B. A. A. D. A. See next page.	^	SISTOL USS & ATING O	1 0.0	1 megonm	•		
⊕ m x b ⊕ xx: See next page.	**	ed together as anode	· Detw	een catn	oue and all other	election	odes connect-
See next page.	•				is source, see RCE AND SPECTRA ASSING THROUGH I	sheet SF L CHARAC NDICATED	PECTRAL CHAR- CTERISTIC OF D BLUE FILTER
	•,	#,*,•,e,#A: See next	page.				

6810-A

MULTIPLIER PHOTOTUBE

Measured at a tube temperature of 25° C and with the supply voltage (£) adjusted to give a luminous sensitivity of 2000 amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.

For maximum signal-to-noise ratio, operation with a supply voltage (E) below 2000 volts is recommended.

Inger the following conditions: Supply voltage (E) is 2000 volts, 25°C tube temperature, external shield potential of -2000 volts, ac-amplifier bandwidth of 1 cycle per second, tungsten light source of 2870°K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The current is measured through a filter which passes only the fundamental variations of the nulse which passes only the fundamental frequency of the pulses.

Measured at a tube temperature of 25°C and with the supply voltage (£) adjusted to give a luminous sensitivity of 2000 amperes per lumen. Dark current caused by the rminonic emission may be reduced by the use

of a refrigerant.

For maximum signal-to-noise ratio, operation with a supply voltage (E) below 2300 volts is recommended.

Same as (\bigstar) except the supply voltage (E) is 2400 volts, and the external shield potential is -2400 volts.

TABLE I

VOLTAGE TO RE PROVIDED BY DIVIDED

TOLINGE TO BE P	COVIDED BY DIVID	EK
	COLUMN A	COLUMN B
Between	5.4% of Supply Voltage (E) multiplied by	2.75% of Supply Voltage (E) multiplied by
Cathode and		
Focusing Electrode Focusing Electrode and	1	1
Dynode No.1	1	1
Dymode No.1 and Dynode No.2	1	1
Dymode No.2 and Dynode No.3	1	1
Dymode No.3 and Dynode No.4	1	1
Dynode No.4 and Dynode No.5	1	1
Dynode No.5 and Dynode No.6	1	1
Dynode No.6 and Dynode No.7	1	1.2
Dynode No.7 and Dynode No.8	1	1.5
Dynode No.8 and Dynode No.9	1	1.9
Dynode No.9 and Dynode No.10	1	2.4
Dynode No.10 and Dynode No.11	1	3
Dynode No.11 and Dynode No.12	1.25	3.8
Dynode No. 12 and Dynode No. 13	1.5 1.75	4.8
Dynode No.13 and Dynode No.14	2 2	6
Dynode No. 14 and Anode	18.5	4.8
Anode and Cathode	10.0	36.4



68₁₀,4

MULTIPLIER PHOTOTUBE

OPERATING CONSIDERATIONS

The operating stability of the 6810-A is dependent on the magnitude of the anode current and its duration. When the 6810-A is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 6810-A usually recovers a substantial percentage of such loss in sensitivity.

The use of an average anode current well below the maximum rated value of 2 milliamperes is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 250 microamperes.

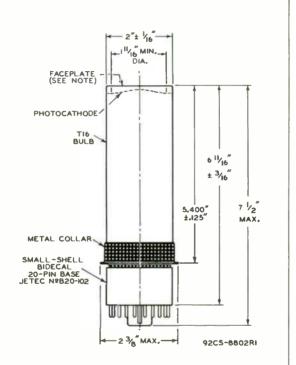
Electrostatic and/or magnetic shielding of the 6810-A may be necessary.

SPECTRAL-SEMSITIVITY CHARACTERISTIC of Phototube having S-II Response is shown at the front of this Section

6810'A



MULTIPLIER PHOTOTUBE



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

NOTE: WITHIN 1-11/16" DIAMETER, DEVIATION FROM FLAT-NESS OF EXTERNAL SURFACE OF FACEPLATE WILL NOT EXCEED 0.DIO" FROM PEAK TO VALLEY.



AVERAGE ANODE CHARACTERISTICS LOW-LIGHT, LOW-NOISE, HIGH-GAIN SERVICE

CATHODE-TO-GRID-NºI VOLTS = 108
GRID-NºI-TO-DYNODE NºI (DY) VOLTS = 108

DY1 - TO - DY2 DY2 - TO - DY3 ETC. TO

DYIO- TO -DYII

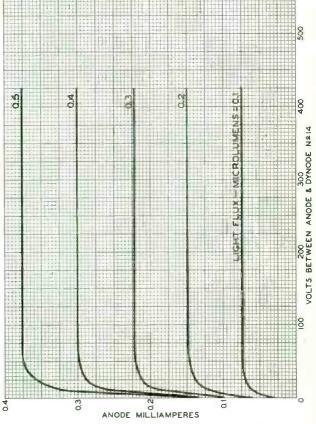
> VOLTS = 108

DY₁₁-TO-DY₁₂ VOLTS=135 DY₁₂-TO-DY₁₃ VOLTS=160 DY₁₃-TO-DY₁₄ VOLTS=189

GRID-Nº2 VOLTS ADJUSTED TO

681014

GIVE MAX. GAIN.
LIGHT SOURCE IS TUNGSTEN-FILAMENT LAMP OPERATED AT A
COLOR TEMPERATURE OF 2870 K.



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

92CM-8846

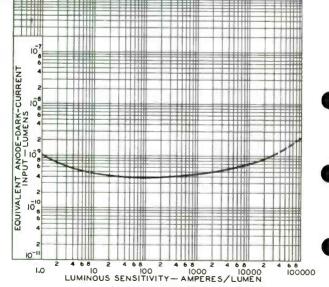


6810-A TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC LOW-LIGHT, LOW-NOISE, HIGH-GAIN SERVICE

LUMINOUS SENSITIVITY IS VARIED BY ADJUSTMENT OF THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS: 5.4 % OF E BETWEEN MULTIPLIED BY CATHODE & GRID Nº1 GRID NºI & DYNODE NºI (DYI) DY2 DYI DY2 DY3 8 DY3 8. DYA DY4 DY5 DY6 DY₅ 8. DY6 8 DYŽ DY7 8 DYa DYa 8 DYg DY DYIO DYII DYÍO & DYII ā DYIZ 1.25 DYIS 1.50 DYI2 & DY14 DY13 & 1.75 DYI4 & ANODE 2. ANODE & CATHODE 18.5

GRID-Nº2 VOLTS ADJUSTED TO GIVE MAXIMUM GAIN. LIGHT SOURCE IS A TUNGSTEN-FILAMENT LAMP OPERATED AT A COLOR TEMPERATURE OF 2870° K. TUBE TEMPERATURE = 25° C

DASHED PORTION INDICATES INSTABILITY.

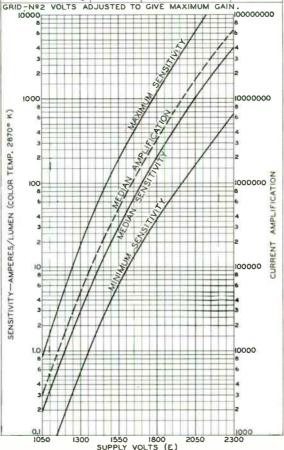


ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-8848



CHARACTERISTICS

	MULT, BY	BETWEEN	5.4% OF E
ATHODE & GRID NºI	1	DYIL DYIZ	1,25
BID MAI & DANODE NAI	1	DYIZ& DYI3	1,5
ANODE No (DA) & DAS	1	DYI3 & DYIA	1.75
TC. THRU DYIO & DYII		DYI4 & ANODE	2







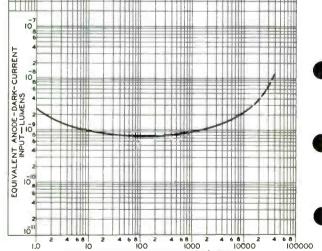
TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC HIGH-OUTPUT-PULSE SERVICE

LUMINOUS SENSITIVITY IS VARIED BY ADJUSTMENT OF THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS:

BETWEEN	2.75 % OF E MULTIPLIED BY
CATHODE & GRID Nº I GRID Nº I & DYNODE Nº I (DYI) DYI & DY2 DY2 & DY3 DY3 & DY4 DY4 & DY5 DY5 & DY6 DY6 & DY7 DY7 & DY8 DY8 & DY9 DY9 & DY9 DY9 & DY10 DY10 & DY11 DY11 & DY12 DY12 & DY13 DY13 & DY14 DY13 & DY14 DY14 & ANODE	1 1 1 1 1.2 1.5 1.9 2.4 3.0 3.8 4.8
ANODE & CATHODE	36.4

GRID-Nº2 VOLTS ADJUSTED TO GIVE MAXIMUM GAIN. LIGHT SOURCE IS A TUNGSTEN-FILAMENT LAMP OPERATED AT A COLOR TEMPERATURE OF 2870° K. TUBE TEMPERATURE = 25° C.

TUBE TEMPERATURE = 25° C
DASHED PORTION INDICATES INSTABILITY.



LUMINOUS SENSITIVITY—AMPERES/LUMEN
ELECTRON TUBE DIVISION

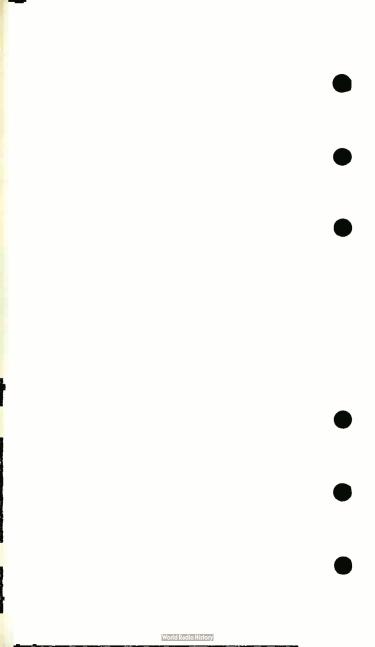
92CM-9356

SENSITIVITY-AMPERES/LUMEN (COLOR TEMP. 2870° K) 5050 PROVIDES VOLTAGE BETWEEN 1550 ADJUSTED SUPPLY SUPPLY ACROSS LOWS: VOLTS VOLTAGE Ē BETWEEN DY9 ANODE 2300 DIVIDER WHICH 2.75 % OF E CURRENT AMPLIFICATION

ELECTRON TUBE DIVISION

6810-A CHARACTERISTICS H-OUTPUT-PULSE SERVICE

4.0180



MULTIPLIER PHOTOTUBE

IO-STAGE, HEAD-ON TYPE WITH

1-5/8" SEMITRANSPARENT CATHODE AND S-13 RESPONSE

	DATA
	General:
	Spectral Response
	Shape
	Window: Area
)	Anode to all other electrodes 7
	Maximum *hickness 0.150" Base Medium-Shell Diheptal 14-Pin (JETEC Na.814-38) Non-hygroscopic Basing Designation for BOTTCM VIEW 14AA
)	Pin 1 - Dynode No.1 Pin 2 - Dynode No.2 Pin 3 - Dynode No.3 Pin 4 - Dynode No.5 Pin 6 - Dynode No.6 Pin 7 - Dynode No.7 Pin 8 - Dynode No.8 Pin 9 - Dynode No.9 Pin 10 - Dynode No.10 Pin 11 - Anode Pin 12 - Internal Connection Do Not Use Pin 13 - Focusing Electrode Pin 13 - Focusing Electrode Pin 14 - Cathode
	Maximum Ratings, Absolute Values:
	ANODE-SUPPLY VOLTAGE (DC or Peak AC) 1250 max. volts SUPPLY VOLTAGE BETWEEN DYNODE No.10 AND ANCDE (DC or Peak AC) 250 max. volts DYNODE-Nc.1 SUPPLY VOLTAGE
•	(DC or Peak AC) 300 max. volts FOCUSING—ELECTRODE VOLTAGE (DC or Peak AC)
	AWERAGE ANODE CURRENT*
	Averaged over any interval of 30 seconds maximum.



MULTIPLIER PHOTOTURE

Characteristics Range Values for Equipment Design: Under conditions with supply voltage (E) across voltage divider providing I/6 of E between cathode and dynode No.1; 1/12 of E for each succeeding dynode stage; and 1/12 of E between dynode No.10 and anode With E = 1000 volts (except as noted) and Focusing Electrode" connected to Dynode No. 1 at socket Median Min. Max. Sensitivity: Radiant, at 4400 angstroms . . 19000 μamp/μwatt Cathode radiant, at 4400 angstroms . . 0.047 μamp/μwatt Luminous: At 0 cps . . . 24 240 amp/lumen With dynode No.10 as output electrode**.... 14 amo/lumen Cathode luminous: With tungsten light source. . 40 uamp/lumen With blue light source ● . . 0.04 μamp Current Amplification. 400000 Equivalent Anode-Dark-Current Input 1×10^{-9} 3×10^{-9} lumen Equivalent Noise Input: Luminous*. 6.7×10^{-12} lumen Ultraviolet 1.6×10^{-14} watt Dark Current to Any Electrode Except Anode (At 25°C) 0.75 µamp With E = 750 volts (except as noted) and Focusing Electrode" connected to Dynode No. 1 at socket

Min. Median Max.

l					Sensitivity:
l					Radiant, at
l	μamp/μwatt	_	1650	_	4400 angstroms
l			0.047		Cathode radiant, at 4400 angstroms
	μamp/μwatt	-	0.047	_	Luminous:
i	amp/lumen	_	2.1	_	At 0 cps
					With dynode No.10
					as output elec-

For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870 K. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.

▗▀▀▗▲▗▀▗**♥**▗█▗█▗ቚ▗[†]▗ See next page.

trode*

TENTATIVE DATA 1

amp/lumen

690³



MULTIPLIER PHOTOTUBE

	Min.	Median	Max.	
Cathode luminous:				
	40	60	-	μamp/¹umen
With blue light source ^{®†}	0.04	-	_	μ amp
Current Amplification.	_	35000		

In general, the focusing electrode is connected to dynode No.1 at the socket and operated at the same fixed potential as dynode No.1. Nowever, in applications critical as to magnitude, uniformity, or speed of the response, the focusing electrode may be connected to the adjustable arm of a potentiometer between cathode and dynode No.1 in the voltage divider, and operated at an optimum potential within a range of 10 to 60 per cent of the dynode-No.1 potential.

- An output current of opposite polarity to that obtained at the anode may be provided by using dynode No. 10 as the output electrode. With this arrangement, the load is connected in the dynode-No.1G circuit and the anode serves only as collector.
- For conditions the same as shown under (a) except that the value of light flux is 0.01 lumen and 150 volts are applied between cathode and all other electrodes connected together as anode.
- under the following conditions: Light incident on the cathode is 'ransmitted through a blue filter (Corning, Glass Code No.5113 poi shed to 1/2 stock thickness) from at ungsten-filament lamp operated a' a color temperature of 2870 k. The value of light flux on the filter in 0.01 lumen. The load resistor has a value of 0.01 megohm, and 150 volts are applied between cathode and all other #lectrodes connected together as anode.
 - For spectral characteristic of this source, see sheet SPECTPAL CHARACTERISTIC OF 2870 K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870 K SOURCE AFTER PASSING THROUGH INDICATED BLUE FILTER at front of this section.
 - Measured at a tube temperature of 25° C and with the supply voltage (E) adjusted to give a luminous sensitivity of 20 amperes per lumen. Oark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.
- For maximum signal-to-noise ratio operation with a supply voltage (E) below 1000 volts is recommended.
 - under the following conditions: Supply vo'tage (E) is 1000 volts, 25°C tube temperature, ac-amplifier bandwidth of 1 cycle per second, tungsten light source of 2870 k interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to "he "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.
 - Determined under the same concitions as shown under (A) except that use is nade of monochromatic source having radiation of 2537 angstroms.

OPERATING CONSIDERATIONS

The operating stability of the 6903 is dependent on the magnitude of the anode current and its duration. When the 6903 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the swverity of the operating conditions. After a period of idleness, the 6903 usually recovers a substantial percentage of such loss in sensitivity.

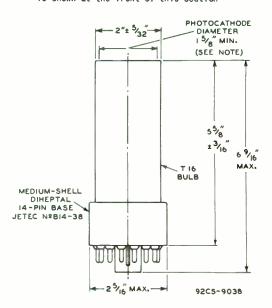


MULTIPLIER PHOTOTUBE

The use of an average anode current well below the maximum rated value of 0.75 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed ICO microamperes.

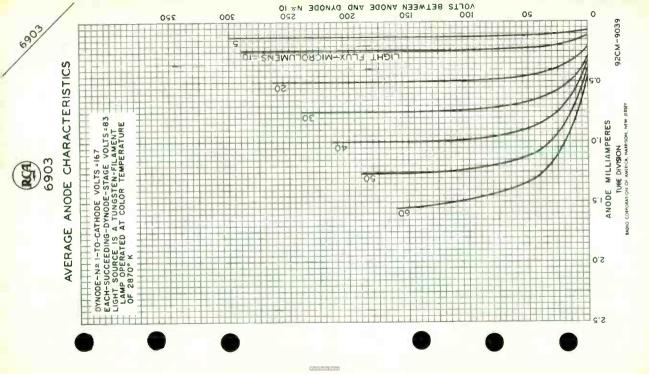
Electrostatic and/or magnetic shielding of the 6903 may be necessary.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-13 Response is shown at the front of this Section



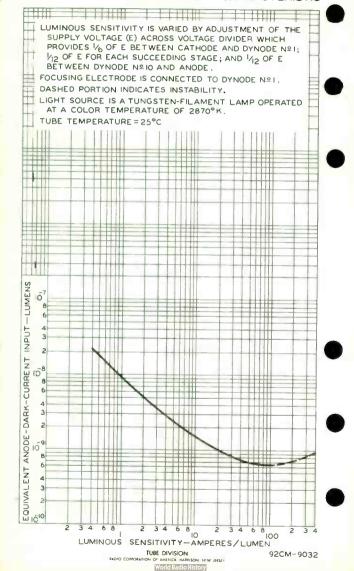
↓ OF BULB WILL NOT DEVIATE MORE THAN 3°
IN ANY DIRECTION FROM THE PERPENDICULAR
ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

NOTE: WITHIN MINIMUM OLAMETER, OEVIATION FROM FLAT-NESS WILL NOT EXCEED O.CIO" FROM PEAK TO VALLEY.



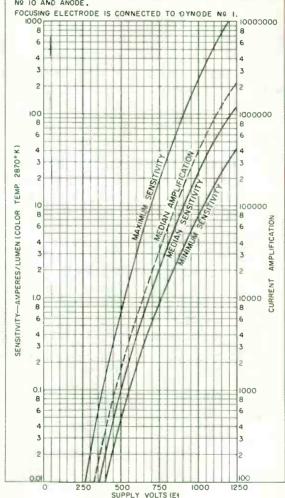
(RCA) 6903

TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC



CHARACTERISTICS

SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER PROVIDING 1/6, OF E BETWEEN CATHODE AND DYNODE NQ 1; 1/12 OF E FOR EACH SUCCEEDING DYNODE STAGE; AND 1/12 OF E BETWEEN DYNODE NQ 10 AND ANODE.



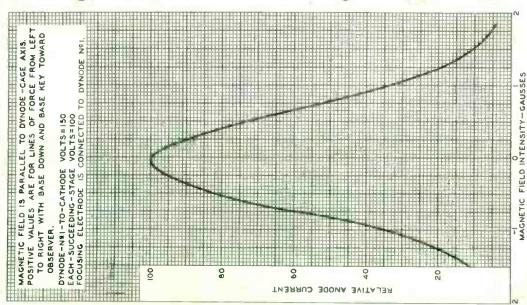
TUBE DIVISION

EAD O COMPORATION OF AMERICA, HARVISON HEW JERSEY

92CL-9033



CURPENT



Gas Phototube

8000 ± 1000 angstroms

.Semicylindrical

SIDE-ON TYPE HAVING UNOBSTRUCTED PHOTOCATHODE AREA AND S-I RESPONSE

DATA

Shape. Min.mum unobstructed projected lem Minimum urobstructed projected wid Direct Interelectrode Capacitance (A Maximum Overall Length Maximum Seated Length . Seated Length to Center of Cathode Maximum Diameter Operating Position Weight (Approx.) Bulb . Socket	ngth ^a
DIRECTION OF RADIA	
Pin 1 - No Connection	Pin 4 - Anode Pin 6 - No Connection Pin 8 - Photocathode
Maximum Ratings, Absolute-Naximum Va	alues:
	ng 1 Rating 11
ANODE-SUPPLY VOLTAGE (DC or Peak AC) 70 ma AVERAGE CATHODE-CURRENT	max. 90 max. volts
DENSITY 60 ma AVERAGE CATHODE CURRENT 6 ma AMBIENT TEMPERATURE 100 ma	max. 3 max. μa
Characteristics:	•
With an anode-supply involts unless otherwise	
Sensitivity: Radiant, at 8000	n. Nedian Nax.
angstroms	- 0.019 - amp/watt

General:

Cathode:

- Indicates a change.

Luminous: ^c	Min. M	edian	Max.	
At 0 cps	140	200 165 150 -	330 - - 10 0.1	μα/lumen μα/lumen μα/lumen
Minimum Circuit Values:				,
With an anode-supply voltage of DC Load Resistance: For dc currents above	70 or le	s s	90	volts
3 μa	0.1 min	•	-	megohm
3 μa	0 min	•	_	megohms
2 μa		2.5	min.	megohms
2 µа	-	1	min.	megohm

On plane perpendicular to indicated direction of incident radiation.

Averaged over any interval of 30 seconds maximum.

SPECTRAL-SENSITIVITY CHARACTERISTIC
OF PHOTOSENSITIVE DEVICE HAVING S-I RESPONSE

and

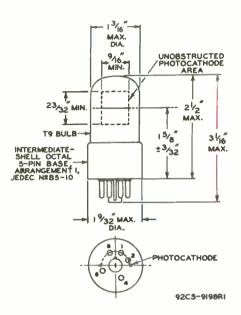
FREQUENCY-RESPONSE CHARACTERISTICS
OF GAS PHOTOTUBES

are shown at the front of this section

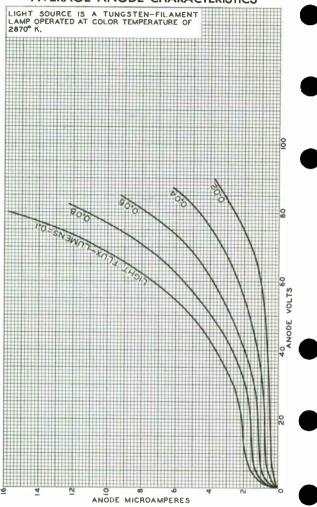


For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870 k. A dc anode supply voltage of 90 volts and a 1-megohm load resistor are used. For the 0-cycle measurement, a light input of 0.1 lumen is used. For the 5000- and 10,000-cycle measurements, the light input is varied sinusoidally about a mean value of 0.015 lumen from zero to a maximum of twice the mean value.

The ratio of luminous sensitivity at an anode supply voltage of 90 volts to luminous sensitivity at an anode supply voltage of 25 volts in each case, sensitivity is obtained under conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K, the light input is 0.1 lumen, and the load resistor has a value of 1 megohm.



AVERAGE ANODE CHARACTERISTICS



92CM - 9226

PHOTOCONDUCTIVE CELL

CADMIUM-SULFIDE, HEAD-ON TYPE

DATA	
General:	
Spectral Resporse	5800 + 500 andstroms
Sensitive Surface, Including Met	allic Strips:
Shape	0.650 0.540 0.35 sg. in
Maximum Overall Length	1–11/16
Seated Length to Plane of Sensit Maximum Diameter	ive Surface 1" ± 3/32
Operating Position	
Base Intermediate—Shell Basing Designation for BOTTOM	Octal 5-Pin (JETEC No.B5-10)
Pin 1 - Nc Cornec-	Pin 4 - Terminal
tion 4	7) Pin 6 - No Connec-
Pin 2 – Na Connection	tion Pin 8-Terminal
DIRECTION OF INTO END OF	LIGHT: BULB
Maximum Ratings, Absolute Values.	:
POLARIZING VOLTAGEPOWER DISSIPATION: Sensitive surface fully	250 max. volts
	0.5 max. wat
illuminated	1.4 max. watts/sq. in
PHOTOCURRENT	50 max. m75 to +60
Characteristics:	
Under conditions with polarize and at ambient temperature and a conditions with polarize and a condition with a condi	ing voltage of 50 volts dc crature of 25°C
1	Vin. Median Max.
Sensitivity: Radiant#, at 5800 angstroms	– 300 – μa/μa
5800 angstroms Luminous*, at 0 cps []]	- 0.85 - amp/lume
	2000 4000 8000 µa/ft— — — 20 µa
Rise	See Curve:
For conditions where the incident pow	
*, •. •: See next page.	
57	TENTATIVE DAT



PHOTOCONDUCTIVE CELL

- For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A light flux of about 2.5 millilumens is used.
- For conditions the same as shown under (*) except that an incident illumination of 1.0 foot-candle is used.
- Measured approximately 10 seconds after removal of incident illumination of 1.0 foot-candle.

OEFINITIONS

Illumination Sensitivity. The quotient of the output current by the incident illumination, at constant electrode voltages.

OPERATING CONSIDERATIONS

The $polarising\ voltage$ for the 6957 may be applied without regard to polarity.

Exposure of the 6957 to radiation so intense as to cause excessive heating of the cell may permanently damage it.

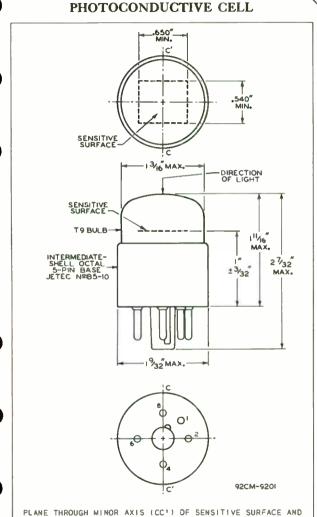
The angle of view of the 6957 may be narrowed by the use of a hood of the desired length placed around the bulb end of the ceil.

In some applications where the light source is several feet from the cell, a simple lens arrangement in which a suitable lens at the light source is used to collimate the light beam and another lens is used in front of the cell to converge the beam onto the sensitive area, will serve to utilize the available amount of light most effectively.

For a given illumination, the output current will have its highest value when the incident illumination is normal (angle of incidence is 90°) to the face of the cell. For smaller angles of incidence, the output current decreases. The decrease depends upon several factors including the angle of incidence of the illumination, the amount of illumination, and the area of sensitive surface illuminated.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Photoconductive Cell having S-15 Response
is shown at the front of this Section

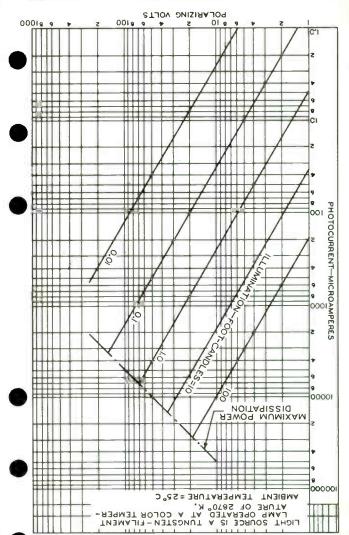




CELL AXIS MAY VARY FROM PLANE THROUGH THE CELL AXIS AND PINS 4 AND 8 BY ANGULAR TOLERANCE (MEASURED ABOUT THE CELL AXIS) OF $\pm~10^{\circ}\,.$



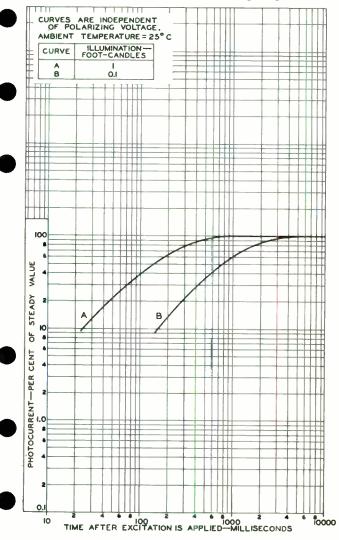
AVERAGE CHARACTERISTICS





695,

TYPICAL RISE CHARACTERISTICS

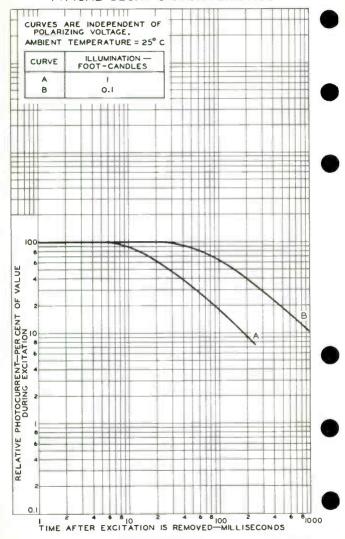


ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM - 9205



TYPICAL DECAY CHARACTERISTICS

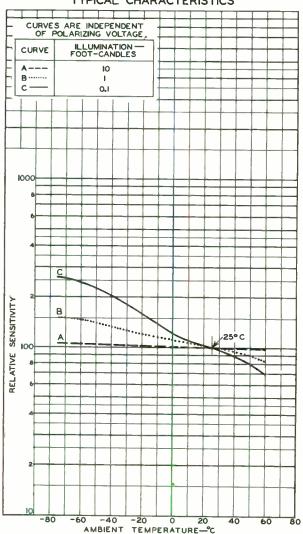


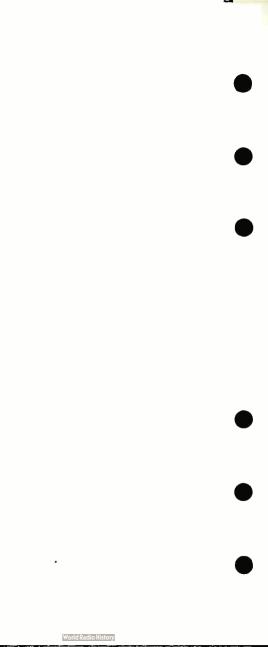
ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9202











MULTIPLIER PHOTOTUBE

10-STAGE, DORMER-WINDOW TYPE WITH SEMITRANS-PARENT CATHODE ON REFLECTIVE SUBSTRATE AND S-17 RESPONSE

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: See next page.





MULTIPLIER PHOTOTUBE

Characteristics Range Values for Equipment Design:

Under conditions with supply voltage (E) across voltage divider providing 1/11 of E per stage

With E = 1000 volts (except as noted)

	Min.	Median	Max.	
Sensitivity:				
Radiant, at 4900 angstroms.	_	27200	-	µа1 µм
Cathode radiant, at 4900				
angstroms	-	0.085	_	μa/μw
Luminous	10	40	300	amp/lumen
Cathode luminous:				
With tungsten light				
source With blue light source ••••••••••••••••••••••••••••••••••••	100	125	-	μa/lumen
With blue light source • • •	0.006	-	-	μa
Current Amplification	_	320000	_	
Equivalent Anode-Dark-				
Current Input	-	4 x 10 ⁻¹⁰	_	lumen
Equivalent Noise Input*	-	1.1×10^{-11}	-	lumen

- Averaged over any interval of 30 seconds maximum.
- For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870 K. A light input of 1 microlumen is used. The load resistor has a value of 0.01 megohm.
- For conditions the same as shown under (a) except that the value of light flux is 0.001 lumen and 100 volts are applied between cathode and all other electrodes connected together as anode.
- Under the following conditions: Light incident on the cathode is transmitted through a blue filter (Corning Glass Code Mo.5113 polled to 1/2 stock thickness) from a tungsten-filament lamp operated at a color temperature of 2870° k. The value of light flux on the filter is 0.001 lumen. The load resistor has a value of 0.01 megohm, and 100 volts are applied between cathode and all other electrodes connected together as anode.
- ◆ For spectral characteristic of this source, see sheet SPECTRAL CHARACTERISTIC OF 2070 & LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2070 X SOURCE AFTER PASSING THROUGH INDICATED BLUE FILTER at front of this Section.
- Measured at a tube temperature of 25°C and with the supply voltage (E) adjusted to give a luminous sensitivity of 20 amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.
- For maximum signal-to-noise ratio, operation with a supply voltage (ξ) below 1000 volts is recommended.
- under the following conditions: Supply voltage (E) is 1000 volts, 25°C tupe temperature, ac-amplifier bandwidth of 1 cycle per second, tungsten light source at color temperature of 2870°K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

SPECIAL PERFORMANCE DATA

4-Hour Stability Life Performance:

This test is performed on each 7029. Before this test is made, the tube is kept in total darkness for 24 hours. Under conditions with supply volts E = 1000, tube temperature of 25° C, and light flux adjusted to give an

MULTIPLIER PHOTOTUBE

anode current = 10 microamperes within 1 minute after turning on light source, the tube is operated for 4 hours. At the end of this period the anode current will not increase by more than 1 microampere nor decrease by more than 1.5 microamperes.

OPERATING CONSIDERATIONS

The operating stability of the 7029 is dependent on the magnitude of the anode current and its duration. When the 7029 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 7029 usually recovers a substantial percentage of such loss in sensitivity.

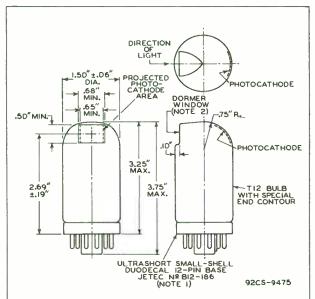
The use of an average anode current well below the maximum rated value of 20 microamperes is recommended when stability of operation is important. When greater stability is required, the anode current should not exceed 10 microamperes.

Electrostatic and/or magnetic shielding of the 7029 may be necessary. It is to be noted that the use of an external magnetic and/or electrostatic shield at high negative potential presents a safety hazard unless the sh'eld is connected through a high impedance in the order of 10 megohms to the potential. If the shield is not so connected, extreme care should be observed in providing adequate safeguards to prevent personnel from coming in contact with the high potential of the shield.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-17 Response is shown at the front of this Section

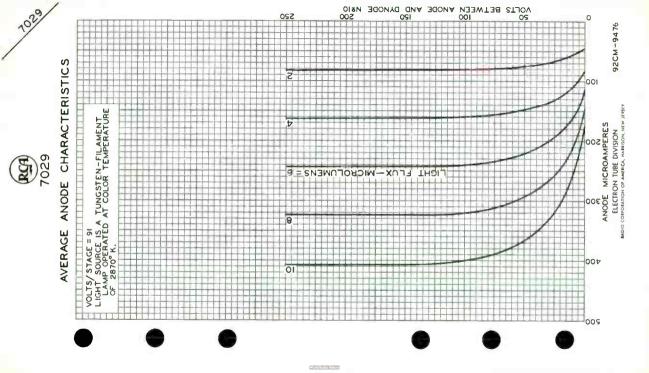


MULTIPLIER PHOTOTUBE

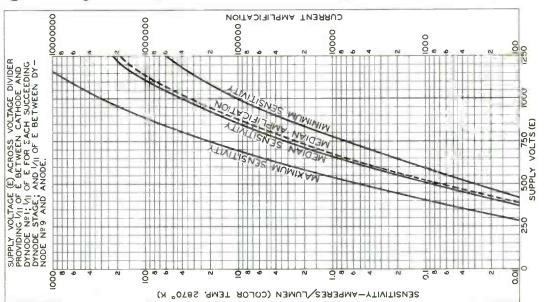


NOTE 2: DORMER WINDOW IS ON OPPOSITE SIDE OF TUBE FROM BASE KEY.

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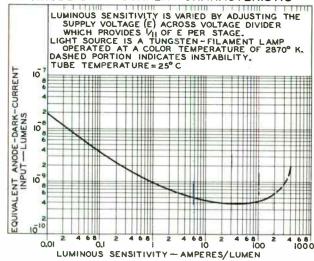
CHARACTERISTICS



ELECTRON TUBE DIVISION AND CORPOLATION OF AMERICA, MARRISON, N



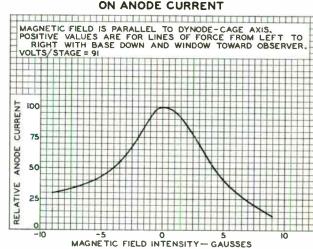
TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC



92CS-9478

7020

ON ANODE CURRENT







1037

IMAGE ORTHICON

For simultaneous color pickup

MAGNETIC FOCUS

MAGNETIC DEFLECTION

DATA	
General:	
Heater, for Unipotential Cathode: Voltage 6.3 ± Current 0.6 Direct Interelectrode Capacitance: Anode to all other electrodes . Photocathode, Semitransparent: Response	See accompanying Spectralivity Characteristics curve ratio): 1.8" max. Diagonal cal image focused on the justed so that its maximum the specified value. The mage on the target should corners of the rectangle rientation is obtained when ally parallel to the plane faceplate and pin 7 of the Magnetic Magnetic 15.20" ± 0.25" 3.00" ± 0.06" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" 10" .
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 Counection—Do Not Use Pin 12-Grid No.1 Pin 13-Cathode Pin 14-Heater



IMAGE ORTHICON

Shoulder Base Keyed Jumbo Annular 7-Pin BOTTOM VIEW

Pin 1-Grid No.6

Pin 2 - Photocathode

Pin 3 - Internal Connec-

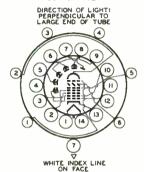
Pin 4 - Internal Connection—Do Not Use

Pin 5-Grid No.5

Pin 6 - Target

PHOTOCATHODE:

Pin 7 - Internal Connection-Do Not Use



-550 max.

Maximum and Minimum Ratings, Absolute Values:

		max.	VUILS
	Illumination	max.	ft-c
		max.	o _C
	Of any part of bulb 50 Of bulb at large end of tube	max.	- C
		min.	00
	TEMPERATURE DIFFERENCE:	10110.	
i	Between target section and any part		
		max.	oC.
			volts
	TARGET VOLTAGE:	HICLA .	VUILS
		max.	volts
			volts
		max.	
ı		max.	volts
	GRID-No.1 VOLTAGE:		
			volts
		max.	volts
	PEAK HEATER-CATHODE VOLTAGE:		
	Heater negative with		
	respect to cathode	max.	volts
	Heater positive with		
			volts
	ANODE-SUPPLY VOLTAGE*	max.	volts

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*: See next page.

VOLTAGE PER MULTIPLIER STAGE.

volts

350 max.

IMAGE ORTHICON

Typical Operation and Characteristics	Range Values:	
Photocathode Voltage (Image Focus) . Grid-No.6 Voltage (Accelerator)— Approx. 75% of photocathode	-400 to -540	volts
	-300 to -405	volts
voltage	-3 to +1	volts
Grid-No.5 Voltage (Decelerator)	0 to 125	volts
Grid-No.4 Voltage (Beam Focus)	140 to 180	volts
Grid-No.3 Voltage#	225 to 330	volts
Grid-No.2 & Dymode-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	
Dynode-No.4 Voltage	1000	volts
Dynode-No.5 Voltage	1200	volts
Anode Voltage	1250	volts
Anode Current (DC)	30	μa
Signal-Output Current (Peak to peak).	3 to 24	μa
Target-Temperature Range	40 to 45	O.C.
Ratio of Peak-to-Peak Highlight		ĺ
Video-Signal Current to RMS		
Noise Current (Approx.)	60	
Minimum Peak-to-Peak Blanking		
Voltage	5	volts
Field Strength at Center of	7.5	
Focusing Coil	75	gausses
Field Strength of Alignment	0 4 2	
Coil (Approx.)	0 to 3	gausses
* Ratio of dynode voltages is shown under Ty:	bical Operation.	

- O Normal setting of target voltage is +2 volts from target cutoff. target-supply voltage should be adjustable from -3 to +5 volts.
- Adjust to give the most uniformly shaded picture near maximum signal.
- Direction of current should be such that a north-seaxing pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.

OPERATING CONSIDERATIONS

The operating position of the 7037 should preferably be such that any loose particles in the neck of the tube will rot fall down and strike or become lodged on the target. Therefore, it is recommended that the tube never be operated in a vertical position with the Diheptal-base end up nor in any other position where the ax.s of the tube with base up makes an angle of less than 200 with the vertical.

When the equipment design or operating conditions are such that the maximum temperature rating or maximum temperature difference as given under Maximum Ratings will be exceeded, provision should be made to direct a blast of «ooling air



from the Diheptal-base end of the tube along the entire length of the bulb surface, i.e., through the space between the bulb surface and the surrounding deflecting-coil assembly and its extension. Any attempt to effect cooling of the tube by circulating even a large amount of air around the focusing coil will do little good, but a small amount of air directly in contact with the bulb surface will effectively drop the bulb temperature. For this purpose, a small blower is satisfactory, but it should be run at low speed to prevent vibration of the 7037 and the associated amplifier equipment. Unless vibration is prevented, distortion of the picture may occur.

Ordinarily, the temperature in a camera equipped with a blower will not exceed 45°C, except in very hot weather or unless the target heater is left on accidentally for a long period.

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. If, in special cases, a target heater is required, it should fit between the focusing coil and the bulb near the shoulder of the tube, and be non-inductively wound.

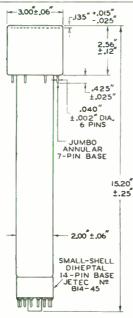
Resolution in excess of 500 lines at the center of the picture can be produced by the 7037 when operated for color reproduction.

To utilize the resolution capability of the 7037 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.



703×

IMAGE ORTHICON



2.500 "± .003 DIA. ENLARGED BOTTOM VIEW

DETAIL OF BOTTOM VIEW OF JUMBO ANNULAR BASE CROSS-HATCHED 1.315"R.MIN. AREA IS FLAT 1.185"R. MAX. 25°43' SEE NOTE I MIN.

NOTE 1: DOTTED AREA IS FLAT OR NOTE I: DOTTED AREA ISFLAT OR EXTENCS TOWARD DIHEPTAL-BASE END OF TUBE BY D.D6G" MAX.

ANNULAR-BASE GAUGE

ANGULAR VARIATIONS BETWEEN PINS AS WELL AS ECCENTRICITY OF NECK CYLINDER WITH RESPECT TO PHOTOCATHODE CYLINDER ARE HELD TO TOLERANCES SUCH THAT PINS AND NECK CYLINDER WILL FIT FLAT-PLATE GAUGE WITH:

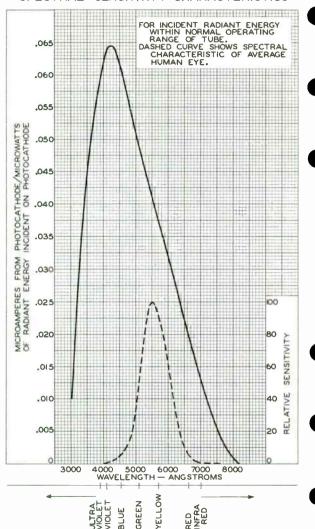
- a. SIX HOLES HAVING DIAMETER OF 0.D65" ± D.DCI" AND ONE HOLE HAVING DIAMETER OF D. 150" ± D. DDI". ALL HOLES HAVE DEPTH OF D. 265" # D. OD 1". THE SIX D.D65" HOLES ARE ENLARGED BY 45° TAPER TO DEPTH OF O.D47". ALL HOLES ARE SPACED AT ANGLES OF 51°26' ± 5' ON CIRCLE DIAME-TER OF 2.500" ± 0.001".
- b. SEVEN STOPS HAVING HEIGHT OF O.187" ± O.DDI", CENTERED BETWEEN PIN HOLES. TO BEAR AGAINST FLAT AREAS OF BASE.
- c. RIM EXTENDING OUT A MINIMUM OF D. 125" FROM 2.812" DIAME-TER AND HAVING HEIGHT OF D.126" ± D.DDI".

NECK-CYLINDER CLEARANCE HOLE HAVING DIAMETER OF 2.200" ± 0.001".

92CM-8293R3

703¹ RG

SPECTRAL-SENSITIVITY CHARACTERISTICS

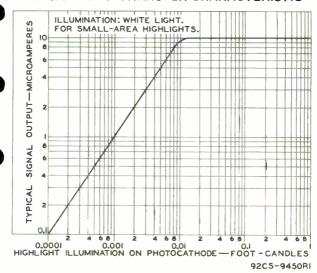


ELECTRON TUBE DIVISION
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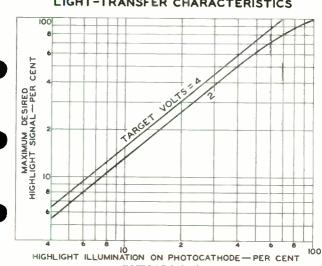
92CM-9442

703×

BASIC LIGHT-TRANSFER CHARACTERISTIC



LIGHT-TRANSFER CHARACTERISTICS



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

92CS-9441





600-LINE RESOLUTION For film and live pickup with color or black-and-white TV cameras

DATA

	General:
	Heater, for Unipotential Cathode: Voltage 6.3 ± 10% ac or dc volts Current
	Direct Interelectrode Capacitance: Target to all other electrodes 4.6 µµf
	Spectral Response See Curves Photoconductive Layer:
,	Maximum useful diagonal of rectangular image (4 x 3 aspect ratio) 0.62"
	Orientation of quality rectangle—Proper orientation is obtained when the horizontal scan is essentially parallel
	to the straight sides of the masked portions of the face- plate. The straight sides are parallel to the plane
	passing through the tube axis and short index pin. The masking is for orientation only and does not define the
	proper scanned area of the photoconductive layer. Focusing Method Magnetic Deflection Method Magnetic
	Overall Length 6.25" ± 0.25" Greatest Diameter 1.125" ± 0.010"
	Weight (Approx.)
	Bulb
	Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Internal Pin 3 - Internal Pin 3 - Internal
	Connection— Do Not Use Same as
	Pin 4 – Same as Pin 3 Pin 5 – Grid No. 2 Pin 6 – Grid No. 4, Grid No. 3 INTO FACE END OF TUBE
	Maximum Ratings, Absolute Values:
	For scanned area of 1/2" x 3/8"
	GRID-No.3 & GR'D-No.4 VOLTAGE 350 max. volts GRID-No.2 VOLTAGE
	Negative bias value
	t See next page.

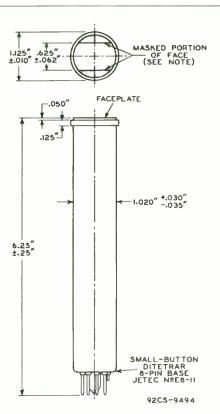
PEAK HEATER-CATHODE VOLTAGE:



PEAK HEATER—CATHODE VOLIAGE: Heater negative with respect to cathod Heater positive with respect to cathod DARK CURRENT PEAK TARGET CURRENT FACEPLATE:	de. 10 max.	volts μa
Illumination	1000 max.	
Typical Operation:		
For scanned area of 1/2" x	3/8" and	
faceplate temperature of 30	to 35° C	
Grid-No.4 (Decelerator) & Grid-No.3 (Beam-Focus Electrode*) Voltage Grid-No.2 (Accelerator) Voltage Grid-No.1 Voltage for picture	250 th to 300	volts volts
cutoff•	-45 to −100	volts
teristic for signal-output current between 0.02 μa and 0.2 μa Visual Equivalent Signal-to-Noise Ratio (Approx.)°	0.65 300:1	
Minimum Peak-to-Peak Blanking Voltage: When applied to grid No.1 When applied to cathode	75 20	volts volts
Field Strength at Center of Focusing Coil (Approx.)	40	gausses
Alignment Coil	0 to 4	gausses
Maximum-Sensitivity Operation for	Live-Scene Pic	kup
Faceplate Illumination (Highlight) . Maximum Target Voltage required to	2	ft-c
produce dark current of 0.2 µa in any tube* Target Voltage Dark Current* Target Current (Highlight)*	110 60 to 100 0.2 0.4 to 0.5	volts volts μα μα
Signal-Output Current:# Peak	0.2 to 0.3 0.08 to 0.1	µа µа
Average-Sensitivity Operation for	Live-Scene Pic	kup
Faceplate Illumination (Highlight) .	15	ft-c
produce dark current of 0.02 µa in any tube Target Voltage Dark Current Target Current (Highlight)	60 30 to 50 0.02 0.3 to 0.4	volts volts μα μα
		IC DATA 4

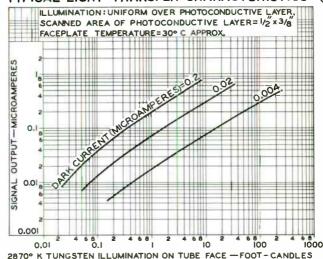
	1000	
	gnal-Output Current:# Peak 0.3 to 0.4	
	Average 0.1 to 0.2	μa μa
	•	μα
	Minimum-Lag Operation for Film Pickup	
	ceplate Illumination (Highlight). 100	ft-c
	ximum Target Voltage required to produce dark current of 0.004 µa	
	in any tube*	volts
	rget Voltage [†]	volts
aı	rk Current 0.004	μa
aı	rget Current (Highlight)■ 0.3 to 0.4	μa
	gnal-Output Current:#	
F	Peak 0.3 to 0.4	μa
1	Average 0.1 to 0.2	μα
	This capacitance, which effectively is the output impe	dance of the
	7038, is increased when the tube is mounted in the def	lecting-voke
	and focusing-coil assembly. The resistive component o impedance is in the order of 100 megohms.	
	Beam focus is obtained by combined effect of grid-No.3 v should be adjustable over indicated range, and a focusing an overage field strength of #0 gausses.	oltage which
	an average field strength of #0 gausses.	g ccii naving
	Definition, focus uniformity, and picture quality decreasing grid-No.8 and grid-No.3 voltage. In general,	ase with de-
	grid No.3 should be operated above 250 velts.	iria no. a ana
	with no blanking voltage on grid No.1.	
1	Measured with high-gain, low-noise, cascode-input-ty, having bandwidth of 5 Mc. Because the noise in such	pe amplifler
	predominately of the high-frequency type the visual equiva-	aleet sienel-
	to-noise ratio is taken as the ratio of highlight video-s to rms noise current, multiplied by a factor of 3.	ignal current
1	The alignment coil should be located on the tube so the	it its center
	is at a distance of 3-11/16 inches from the face of the positioned so that its axis is coincident with the axis	tube and he
*	the deflecting yoke, and the focusing coil.	
-	The target voltage for each 7038 must be adjusted to that gives the desired operating dark current.	t value which
	indicated range for each type of service serves only t	o illustrate
	the operating target-voltage range normally encountered.	
	The deflecting circuits must provide extremely linear good black-level reproduction. Dark-current signal is	scanning for proportional
	good black-level reproduction. Dark-current signal is to the scanning velocity. Any change in scanning velocit black-level error in direct proportion to the change	y produces a
	velocity.	in scanning
	Video amplifiers must be designed properly to handle tar of this magnitude to avoid amplifier overload or picture	get currents
	Defined as the component of the target current after the	
	component has been subtracted.	





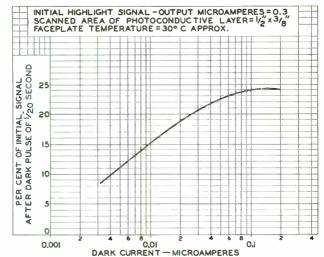
NOTE: STRAIGHT SIDES OF MASKED PORTIONS ARE PARALLEL TO THE PLANE PASSING THROUGH TUBE AXIS AND SHORT INDEX PIN.

TYPICAL LIGHT-TRANSFER CHARACTERISTICS



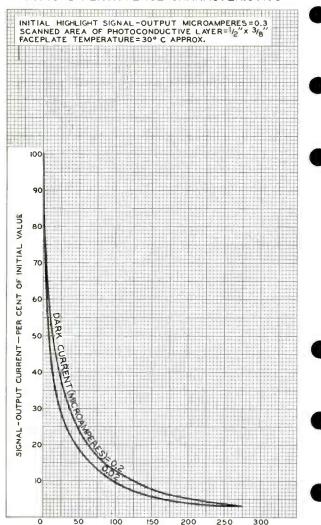
2870° K TUNGSTEN ILLUMINATION ON TUBE FACE — FOOT - CANDLES 92CS-94**9**5

TYPICAL PERSISTENCE CHARACTERISTIC



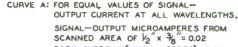


TYPICAL PERSISTENCE CHARACTERISTICS



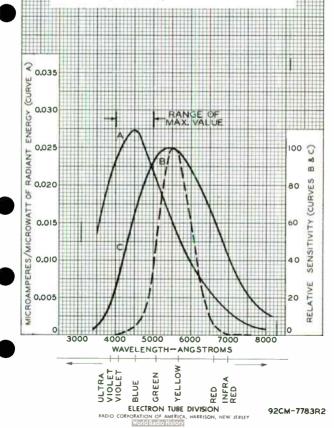
TIME AFTER ILLUMINATION IS REMOVED-MILLISECONDS

SPECTRAL-SENSITIVITY CHARACTERISTICS



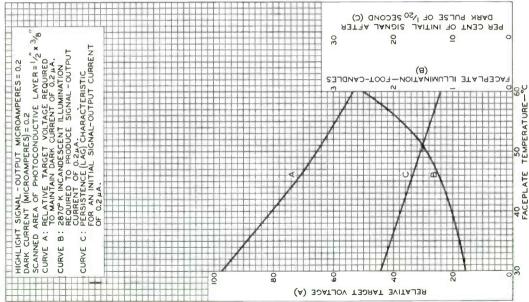
DARK CURRENT (MICROAMPERES) = 0.02 CURVE B: SPECTRAL CHARACTERISTIC OF AVERAGE HUMAN EYE.

CURVE C: FOR EQUAL VALUES OF SIGNAL-OUTPUT CURRENT WITH RADIANT FLUX FROM TUNGSTEN SOURCE AT 2870° K.



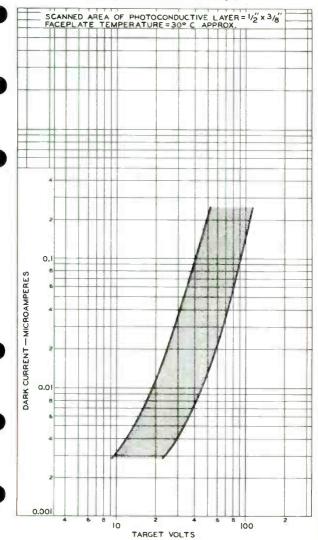


TYPICAL CHARACTERISTICS



ELECTRON TUBE DIVISION

DARK-CURRENT RANGE

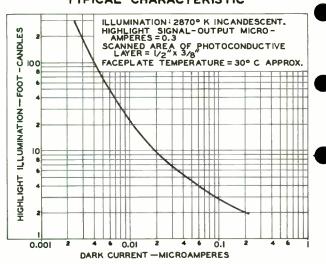


ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9497

RCA 7038

TYPICAL CHARACTERISTIC



92CS-9493



VACUUM PHOTOTUBE

10 RJ

NCN-DIRECTIONAL TYPE WITH S-4 RESPONSE

DATA	1
General:	l
Spectral Response	
Shape	
Pin 1 - No Connection Pin 2 - No Connection Pin 2 - No Connection Pin 8 - Cathode DIRECTION OF LIGHT: ANY THAT IS PERFEMBLUAR TO ANIS OF PHOTOCATHODE	
Maximum Ratings, Absolute Values:	1
ANODE-SUPPLY VOLTAGE (DC or Peak AC). 250 max. volts AVERAGE CATHODE-CJRRENT DENSITY 25 max. \(\mu_1/\sq\in.\) AVERAGE CATHODE CURRENT 5 max. \(\mu_2/\sq\in.\) AMBIENT TEMPERATURE	
Characteristics:	l
With an anode-supply voltage of 250 th volts unless otherwise specified	
Min. Median Max.	l
Sensitivity: Radiant, at 4000 angstroms,	
angstroms, 0.045 - μα/μν Luminous:*	1
At 250 volts 20 45 65 μα/lumer	
At 90 volts 41 - μa/lumer Luminous-Sensitivity	1
Uniformity* 1.55 Ratio of Luminous Sersitivity at 250 Volts to Luminous Sensitivity	
at 90 Volts 1.25 Anode Dark Current at 25°C 0.0125 με	
.A See next page.	1



VACUUM PHOTOTUBE

- Averaged over any interval of 30 seconds maximum.
- A Operation of the 7043 below 50 volts is not recommended.
- Fer conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A 1-megohm load resistor and a light input of 0.1 lumen are used.
- Ratio of highest sensitivity to lowest sensitivity when tube is rotated about its axis through 360°, with incident light perpendicular to axis or photocathode, and with light spot 1/2 inch in diameter.

OPERATING CONSIDERATIONS

Exposure to intense illumination, such as direct sunlight, may decrease the sensitivity of the 7043 even though no voltage is applied to the tube. The magnitude and duration of the decrease depend on the length of the exposure.

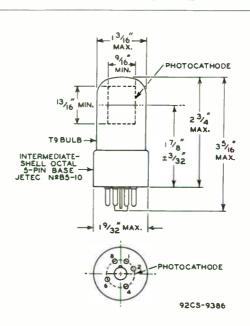
Shielding of the 7043 and its leads to the amplifier is recommended when amplifier gain is high or when the phototube load resistance is high. Whenever frequency response is important in a phototube circuit, the leads from the phototube to the amplifier should be made short so as to minimize capacitance shunting of the phototube load. Since a phototube is a high-resistance device, it is important that insulation of associated circuit parts and wiring be adequate.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
is shown at the front of this Section



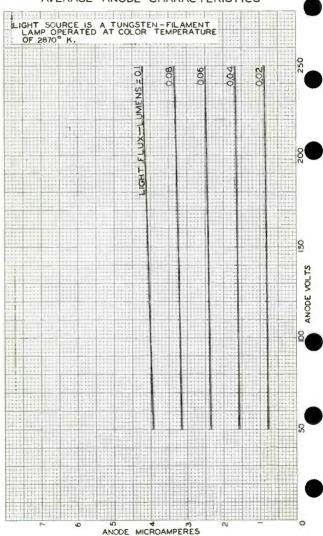
TORUS

VACUUM PHOTOTUBE





AVERAGE ANODE CHARACTERISTICS



14-STAGE, HEAD-ON, FLAT-FACEPLATE TYPE WITH 4-7/16"

CURVED, SEMITRANSPARENT CATHODE AND EXTENDED S-11 RESPONSE

VERY-SHORT TIME-RESOLUTION CAPABILITY

VERY-SHORT TIME-RESOLUTI	ON CAPABILITY
DATA	
General:	
Spectral Response	Extended S-11 (See Curve) 4200 ± 500 angstroms
Faceplate, with flat external surface Ultra	violet-Transmitting Glass
Cathode, Semifransparent:	Curved Circular
Window: Area	15.5 sq. in.
Minimum d.ameter	4-7/16 in 1.468
Direct Interelectrode Capacitances (Approx.):	
Anode to dynode No.14 Anode to all other electrodes	5 <u>uu</u> f
Dynode No.14 to all other electrod Maximum Overall Length	es. 7 $\mu\mu$ f
Seated Length	See Dimensional Outline
Cathode Terminal	Metal Flange
Weight (Approx.)	No.435SBA, or equivalent
Base Small-Button Thirtyfivar Basing Designation for BOTTOM VIEW	21-Pin (JETEC No.E21-40)
Pin 1-Grid No.1 Pin 2-Dynode No.1	
Pin 3 - Dynode No.3 Pin 4 - Dynode No.5	9000
Pin 5 - Dynade No.7 Pin 6 - Dynade No.9	8 41 17 14
Pin 7 - Dynode No.11 Pin 8 - Dynode No.13	1 1 6
Pin 9-Grid No.3 (Ac-	
Electrodel	3
Pin 10 - No Connec- tion Pin 11 - Anode	(a) (b) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c
Pin 12 - Dynode No.14	INDEX FLANGE
Pin 13 – Dynode No.12 Pin 14 – Dynode No.10	DIRECTION OF LIGHT: INTO END OF BULB
Pin 15 - Dynode No.8 Pin 16 - Dynode No.6 Pin 17 - Dynode No.4	Pin 20 - Grid Na.2
Pin 17 - Dynade No.4 Pin 18 - Dynade No.2	Pin 21 - No Connec- tion
Pin 19 - No Connec-	Metal Flange-

tion

Cat hode



MULTIPLIER PHOTOTUBE

Maximum Ratings, Absolut	e Val	ues:		Ī
DC ANODE-SUPPLY VOLTAGE.			3400 max	. volts
AND ANODE			400 max	. volts
DYNODES			400 max	k. volts
AND DYNODE No.13 DC GRID-No.2 SUPPLY VOL DC SUPPLY VOLTAGE BETWEE	TAGE.	 	500 max 1500 max	
AND ANODE DC GRID-No.1 SUPPLY VOLT DC SUPPLY VOLTAGE BETWEE	TAGE.		2300 max 1200 max	
AND GRID No.2			400 max	
AVERAGE ANODE CURRENT AND IENT-TEMPERATURE RANGE			2 may -125 to +1	
Characteristics Range V	alues	for Equipme	nt Design:	
Under conditions with divider providing e				
With E = 2800 volts No.3, grid-No.1, a	ınd dyn	pt as noted ode-No.1 vo aximum gain	ltages adjus	grid- sted
	*	Nedian		
Sensitivity:				
Radiant, at 4200 angstroms	-	0.140	-	amp/μw
Cathode radiant, at				anip/ µw
4200 angstroms	_	0.046	_	μа/μw
Luminous:# At O cps With dynode No.14	40	0.046	- 1500	
Luminous:* At 0 cps With dynode No.14 as output electrode† Cathode luminous:	-		- 1500 -	μа/μw
Luminous:# At 0 cps	-	180	- 1500 - -	μα/μw amp/lumen
Luminous: At 0 cps	- 40 4	180 108 60	- 1500 - - -	μα/μw amp/lumen amp/lumen
Luminous:* At 0 cps With dynode No.14 as output electrode† Cathode luminous: With tungsten light source* With blue light source**	- 40 4	180 108 60 - 3 × 10 ⁶ 2 × 10 ⁻⁹ 26 × 10 ⁻⁵ ♣	- 1500 - - - - 1.2 × 10 ⁻⁸ 156 × 10 ⁻⁵ •	μα/μw amp/lumen amp/lumen μα/lumen μα
Luminous: At 0 cps	- 40 4	180 108 60 - 3 × 10 ⁶ 2 × 10 ⁻⁹	- - - 1.2 × 10 ⁻⁸	μα/μw amp/lumen amp/lumen μα/lumen μα

,#,†,**^**,**,**♦**,•,#,**♦**,*: See next page.

TENTATIVE DATA 1

	Min.	Median	Max.	
Greatest Transit-Time				
Spread: Within a circle				
centered on tube				
face and having a				
diameter of—		α ε		m:111:
3 inches	-	0.5 4	_	milliµsec milliµsec
With E = 3400 volts (except a	as noted), a	and wit	h grid-
No.3, grid-No.1, and				
tog	ive maxir	num gain		
	Min.	Median	Max.	
Sensitivity:				
Radiant, at 4200				,
angstroms	-	0.91	_	amp/μw
Cathode radiant, at 4200 andstroms	_	0.D46	_	µа/µw
Luminous:#		0.040		124 124
At O cps	-	1200	_	апір/lumen
With dynode No. 14 as				.1
output electrodef.	-	800	-	amp/lumen
Cathode luminous: With tungsten light				
source	40	60	_	⊭a/1umen
With blue light				,
source**♦	4		-	μа
Current Amplification .	_	20×10^{6}	_	

- Averaged over any interval of 30 seconds maximum.
- # Under the fallowing conditions: The light source is a tungsten-filament lamp operated at a color temperature of 2870 k. A light input of 0.1 microlumen is used. The load resistor has a value of 0.01 megohm.
- An output current of opposite polarity to that obtained at the anode may be provided by using dynode No.14 as the output electrode. With this arrangement, the load is connected in the dynode-No.14 circuit and the anode serves only as collector. This type of operation is suitable only for small output signals or for applications where linearity is not required.
- Under the following conditions: The light source is a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux is 0.41 lumen and 200 volts are applied between cathode and all other electrodes connected together as anode. The load resistor has a value of 0.01 megohm.
- **Under the following conditions: Light incident on the cathode is transmitted through ablue filter (corning, Glass Code No.5119 polished to 1/2 stock thickness) from a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux on the filter is 0.01 lumen. The load resistor has a value of 0.01 megohm, and 200 volts are applied between cathode and all other electrodes connected together as anode.

For spectral characteristic of this source, see sheet SPECTRAL CHARACTERISTIC OF 2870° K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870° K SOURCE AFTER PASSING THROUGH INDICATED BLUE FILTER at front of this section.

•,•,•,*: See next page.



- Measured at a tube temperature of 25°C and with the supply voltage (E) adjusted to give a luminous sensitivity of 500 amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.
- For maximum signal-to-noise ratio, operation with a supply voltage (E) below 2000 volts is recommended.
- ▲ Measured at 4200 angstroms.
- * Under the following conditions: Supply voltage (E) is 2800 volts, 25°C tube temperature, tungsten light source of 2870°K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a fitter which passes only the fundamental frequency of the pulses.

TABLE I

VOLTAGE TO BE PROVIDED BY DIVIDER

Between	3.8% of Supply Yoltage (E) Multiplied By
Cathode and Grid No.1	2 approx.*
Cathode and Grid No.2	11.5
Grid No.2 and Dynode No.1	1 approx.*
Grid No.2 and Dynode No.2	2
Dynode No.2 and Dynode No.3	1 1
Dynode No.3 and Dynode No.4	1
Dynode No.4 and Dynode No.5	1
Dynode No.5 and Dynode No.6	1
Dynode No.6 and Dynode No.7	1
Dynode No.7 and Dynode No.8	1
Dynode No.8 and Dynode No.9	1
Dynode No.9 and Dynode No.10	1
Dynode No.10 and Dynode No.11	1
Dynode No.11 and Dynode No.12	1
Dynode No.12 and Dynode No.13	1
Dynode No.13 and Dynode No.14	1
Dynode No.14 and Anode	1
Anode and Cathode	26.5

^{*} Adjusted to give maximum gain.

OPERATING CONSIDERATIONS

Connection to the *metal flange* is made by a spring-finger ring bearing against the edge of the flange.

The operating stability of the 7046 is dependent on the magnitude of the anode current and its duration. When the 7046 is operated at high average values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the

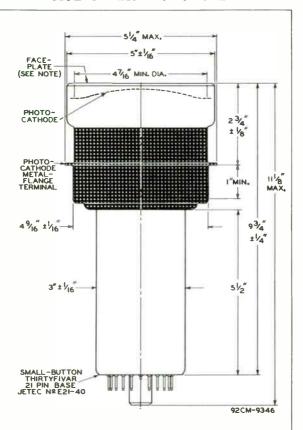
7046 usually recovers a substantial percentage of such loss in sensitivity.

The use of ar average anode current well below the maximum-rated value of 2 milliamperes is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 100 microamperes.

With certain orientations of the 7046, it will be observed that the earth's magnetic field is sufficient to cause a noticeable decrease in the response of the tube. To prevent such decrease in response of the tube, magnetic snielding must be provided. A suitable shield may be obtained from James Millen Mfg. Co., Malden, Mass. by ordering Part No.80805P. In general, it is recommended that the shield be connected to rathode potential.

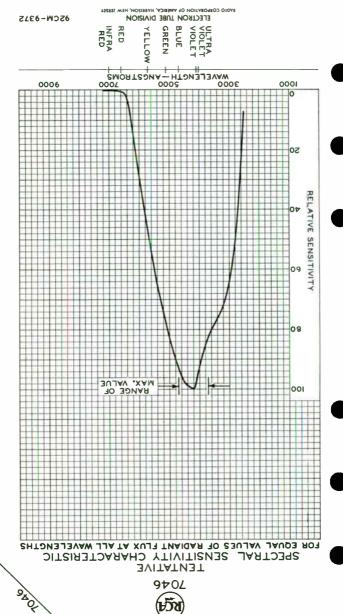


MULTIPLIER PHOTOTUBE



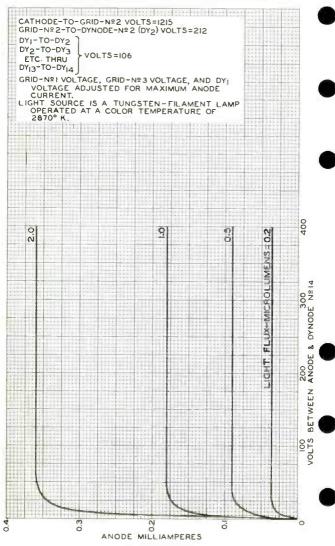
 $\ensuremath{\mathbb{C}}$ GF BULB WILL NOT DEVIATE MORE THAN $2^{\ensuremath{\text{O}}}$ IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

NOTE: WITHIN 4-7/16" DIAMETER, DEVIATION FROM FLATNESS OF EXTERNAL SURFACE OF FACEPLATE WILL NOT EXCEED D.DI5" FROM PEAK TO VALLEY.





AVERAGE ANODE CHARACTERISTICS



ELECTRON TUBE DIVISION

BADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

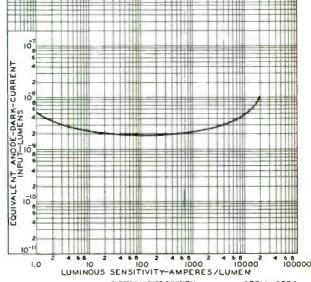
92CM-9377

TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC

4	+	1111	1	\perp	11111	1	11111			Ш	\rightarrow	++++	-	$\rightarrow + + +$
+	+	LU	JMIN	ous	SEN	SITIV	ITY	IS VAR	HED	BY	ADJ	UST	MENT	OF 1
4	4	-	THE	SUI	PPLY	VOLT	AGE	(E) AC	ROS	5 V	OLTA	AGE	DIVIDE	R ·
ı	1							TAGES						
_	_		_								_			_

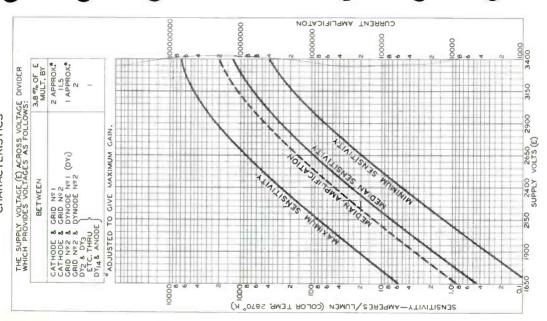
William I Havible Valinole no realeme.	
BETWEEN	3.8 % OF E MULTIPLIED BY
CATHODE & GRID Nº1 CATHODE & GRID Nº2 GRID Nº2 & DYNODE Nº1 (DY1) GRID Nº2 & DY3 DY3 & DY4 DY4 & DY5 DY5 & DY6 DY6 & DY7 DY7 & DY8 DY8 & DY9 DY9 & DY9 DY9 & DY10 DY10 & DY11 DY11 & DY12 DY13 & DY14 DY14 & ANODE	2 APPROX.* II.5 I APPROX.* 2 I
ANODE & CATHODE	26,5

*ADJUSTED TO GIVE MAXIMUM GA:N.
LIGHT SOURCE IS A TUNGSTEN-FILAMENT LAMP
OPERATED AT A COLOR TEMPERATURE OF 2870° K.
TUBE TEMPERATURE = 25° C





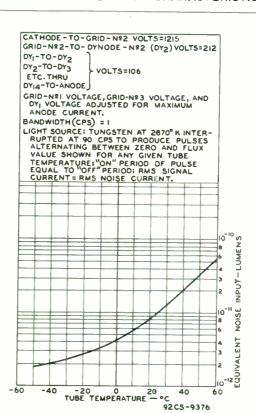
7046 CHARACTERISTICS





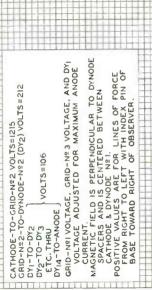
OPE

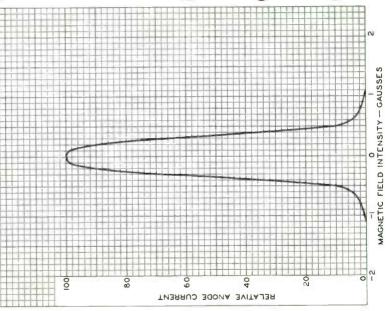
EQUIVALENT-NOISE-INPUT CHARACTERISTIC





CURREN' ANODE NO O FIELD MAGNETIC PP EFFECT







10-STACE, HEAD-ON, FLAT-FACEPLATE TYPE WITH 1.24"-DIAMETER FLAT, SEMITRANSPARENT CATHODE AND S-I RESPONSE CAPABLE OF VERY SHORT TIME-RESOLUTION

DATA			
General:			
Spectral Response	9000 1 1	000	. S-1
Cathode. Semitransparent:	0000 1 1	.uuu ang	12 f L Outs
Shape		Flat Ci	rcula
Area		1.2 9	q. in.
Minimum diameter		1.24	in.
Index of refraction		1.51	
Direct Interelectrode Capacitances (Appr	ox.):		
Anode to dynode No.10			4 μμ
Anode to all other electrodes			-7 μμd
Maximum Overall Length			4.57
Seated Length		3.88" 1	0.19
Maximum Diameter			1.56
			Anj
Weight (Approx.)			. 2_0
Bulb			T12
Socket Eby N	0.9058,	or equi	valen
Base Small-Shell Duodecal 12-F	'in (JETE	C No.BI	2-431
Basing Designation for BOTTOM VIEW		on-hygro	. 12AE
Pin 1 – Dynode No.1	in 7 - 0	ynode N	0.10
Pin 2 - Dynode No.3 9 P	in 8-0	lynode N	0.8
Pin 3 - Dynode No.5 P	in 9-0	vnode N	0.6
	in 10 - D	*	
		*	
Pin 5 - Dynode No.9	in 11-0)yn o de N	0.2
	in 12 - C	athode	
DIRECTION OF INCIDENT RADIATION OF BULB	ION:		
Maximum Ratings, Absolute Values:			
ANODE-SUPPLY VOLTAGE (DC or Peak AC)	. 150	00 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE NO.10 AND	20	0	- 1 4 -
ANODE (DC or Peak AC)	. 25	0 max.	volts
CUIDDLY VOLTAGE DETWEEN CATHODE AND			
SUPPLY VOLTAGE BETWEEN CATHODE AND	AC	M ====	
DYNODE No.1 (DC or Peak AC)		00 max.	volts
	. 1	00 max. .0 max. 75 max.	volts με

: See next page.



Characteristics Range Values for Equipment Design:

Under conditions with supply voltage (E) across voltage divider providing 1/6 of E between cathode and dynade No.1; 1/12 of E for each succeeding dynade stage; and 1/12 of E between dynade No.10 and anade

With E = 1250 volts (except as noted)

	Min.	Median	Max.	
Sensitivity:				
Radiant, at				
8000 angstroms	-	400	_	µа/µw
Cathode radiant, at				
8000 angstroms	**	0.0027	-	μa/μw
Luminous: •				
At 0 cps	1	4.5	30	amp/lumen
With dynode No.10				
as output electrode*		2.7		(1
Cathode luminous:	_	2.7		amp/lumen
With tungsten				
light source⁴	10	30		μa/lumen
With infrared	10	20	_	μα/ rumen
source®♦	0.012	0.036	_	μa
Current Amplification.	_	150000	_	~
Equivalent Anode-	,	_		[
Dark-Current Input®.	{ -	3×10^{-7}	5 x 10 ⁻⁶	lumen
Equivalent Noise	} -	3.3 × 10 ⁻⁹ 1	5.5 x 10 ⁻⁸	T watt
Input*	{ -	3×10 ⁻⁷ 3.3 × 10 ⁻⁹ † 1.5 × 10 ⁻¹⁰ 1.7 × 10 ⁻¹² †	8.4 x 10 ⁻¹²	lumen
	(–	1.7 × 10 121	8.4 × 10 ⁻¹²	T watt

With E = 1500 volts (except as noted)

ŀ	2 2)00 00000 102	0000 03	1100000			
		Min.	Median	Max.		
١	Sensitivity:					
l	Radiant, at				- 1	
ı	8000 angstroms	-	1250	_	μa/μw	
ı	Cathode radiant, at					
ľ	8000 angstroms		0.0027		μa/μw	
	Luminous:∳					
	At 0 cps	-	14	_	amp/lumen	
	With dynode No.10					
	as output elec-				l.	
	trode*	-	8.4	_	amp/lumen	
	Cathode Luminous:				·	
	With tungsten				- 1	
	light source⁴	10	30	_	μa/lumen	
	With infrared				. [
	source⊕♦	0.012	0.036	_	μa	
(Current Amplification.	-	465000		.	

Averaged over any interval of 30 seconds maximum.

4-58

[♦],*,**♠**,**⊕**,**♦**,**†**: See next page.

- For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° κ . A light input of 10 mic.rolumens is used. The load resistance has a value of 0.01 megohm.
- An output current of opposite polarity to that obtained at the anode may be provided by using dynode Mo.10 as the output electrode. With this arrangement, the load is connected in the dynode-Mo.18 circuit and the anode serves only as collector.
- A For conditions the same as shown under (♠) except that the value of light flux is 0.01 lumen and 150 volts are applied betweer cathode and all other electrodes connected together as anode.
- Under the following conditions: 2070 K tungsten light source; light flux of 0.01 lumen incident on Corming No.2540 Infrared Filter (Melt 1613, 2.61 mm thick, or equivalent); irradiated area of photocathode is: 1.24 inch in diameter.
- ♦ For spectral characteristic of this source, see sheet SPECTRAL CHARACTERISTIC OF 2870 K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870 K SOURCE AFTER PASSING THROUGH INDICATED INFRARED FILTER at front of this section,
- Measured at a tube temperature of 25° C and with the supply voltage (E) adjusted to give a luminous sensitivity of 4 ampere: per lumen. Dark current caused by thermionic emission and ion feedback map. reduced by the use of a refrigerant.
- Under the following conditions: Supply voltage (E) 1250 volts, 25° C tube temperature, ac-amplifier bandwidth of 1 cycle per second, tungsten light source at color temperature of 2870° k interrupted at a low audio light Source at Color temperature of 2870° K interrupted at a low addition frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.
- Measured at 8000 angstroms.

OPERATING CONSIDERATIONS

The 7102 is capable of very short time-resolution. For an input pulse having a duration of I millimic rosecond or less, the time spread of the pulse at the anode is about 5 millimicroseconds measured at 50 per cent of the maximum pu'se height. This time spread corresponds to an electron transit-time spread of about 4 millimicroseconds. The transit-time spread can be reduced to about 2 millimic roseconds by irradiating only a small central area of the photocathode.

When stability of operation is important, the use of an average anode current well below the maximum rated value of 10 microamperes is recommended. This maximum rating should never be exceeded because operation at higher average output currents may cause a permanent decrease in infrared sensitivity and a consequent decrease in tube life.

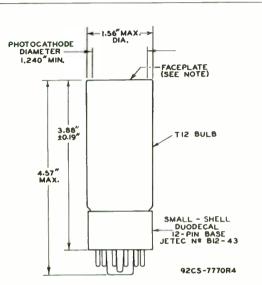
A small temporary loss of infrared sensitivity may be observed after long periods of operation. The sensitivity recovers during idle periods but only very slowly at temperatures below 250 C.

Electrostatic and/or magnetic shielding of the 7102 may be necessary.

> SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-I Response is shown at front of this Section



MULTIPLIER PHOTOTUBE



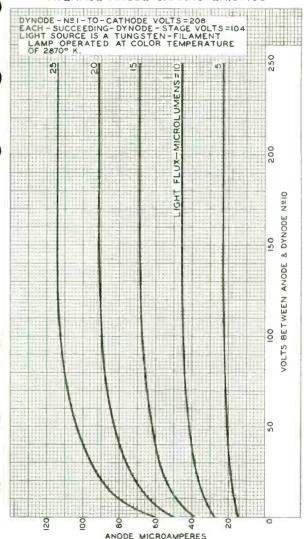
NOTE: WITHIN 1.24" DIAMETER, DEVIATION FROM FLATNESS OF EXTERNAL SURFACE OF FACEPLATE WILL NOT EXCEED 0.010" FROM PEAK TO VALLEY.

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



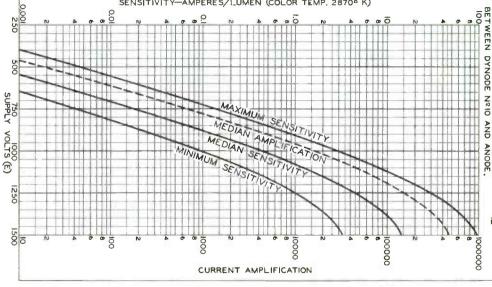
1/02

AVERAGE ANODE CHARACTERISTICS



CHARACTERISTICS

VOLTAGE (E) ACROSS BETWEEN CATHODE DYNODE SUCCEEDING Nº IO DYNODE AND יים DYNODE NºI; לא OF E ANODE PROVIDING

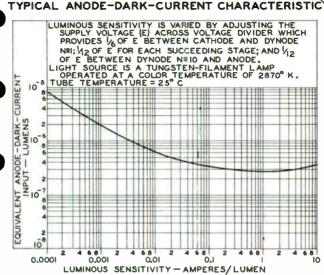


SENSITIVITY-AMPERES/LUMEN (COLOR TEMP. 2870° K)

ELECTRON TUBE DIVISION PROBATION OF AMERICA, HARRISON, P

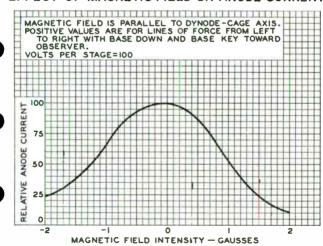
92CL - 9455





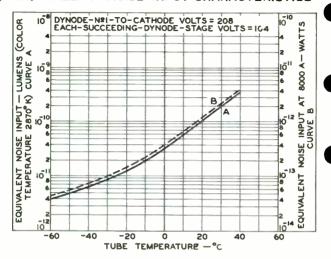
92CS - 9459

EFFECT OF MAGNETIC FIELD ON ANODE CURRENT



7102

EQUIVALENT-NOISE-INPUT CHARACTERISTICS



92CS - 9462



9-STAGE TYPE WITH S-4 RESPONSE For dc automobile-headlight-control service DATA

DATA	
General:	
Spectral Response	4000 ± 500 angstroms
Cathode: Minimum projected length* Minimum projected width*	0.93"
Direct Interelectrode Capacitances: Anode to dyncde No.9	
Anode to all other electrodes	
Maximum Overall Length	
Length from Base Seat to Center of Useful Cathode Area	1.56" ± 0.09"
Maximum Diameter	
Operating Position	
Weight (Approx.)	1.6 oz
Bulb	n (JETEC No. B11-104),
	Non-hygroscopic
Basing Designation for BOTTOM VIEW	11K
Pin 1 – Dynode No.1 (5) (7)	Pin 7 - Dynode No.7
Pin 2 - Dynode No.2	Pin 8 - Dyrode No.8
Fin 3 - Dynode No.3 (3) 4 (1)	Pin 9 - Dynode No.9
Pin 4 - Dynode No.4	Pin 10 - Anode
Pin 5 - Dynode No.5	Pin 11 - Photo-
Pin 6 - Dynode No.6 DIRECTION OF LIGHT	cathode
Maximum Ratings, Absolute Values:	
ANODE-SUPPLY VOLTAGE (DC)	1250 max. volts
SUPPLY VOLTAGE BETWEEN DYNODE No.9	000
AND ANODE (DC)	250 max. volts 0.1 max. ma
AVERAGE ANODE CURRENTO	O.I BIAK. IIIA

Characteristics Range Values for Equipment Design:

Under conditions with supply voltage (E) across a voltage divider providing I/IO of Ebetween cathode and dynode No.1; 1/10 of E for each succeeding dynode stage; and 1/10 of E between dynode No.9 and anode

With E = 1000 volts dc

AMBIENT TEMPERATURE. .

	Min.	Median	Nax.	
Sensitivity:				
Padiant at 4000 annetrome	_	35000	-	ua/ m

*.O: See next page.

75 max.



MULTIPLIER PHOTOTUBE

	Hin.	Median	Hax.	
Luninous: A At 0 cps	_	35 33	_	amp/lumen amp/lumen
at 25 ⁰ C: Anode	-	-	0.1	μa μa
With E = adjustable dc voltage				
Anode-to-Cathode Voltage (DC)#	Nin. 630	Median 900	Max. 1100	volts
l•				

^{*} On plane perpendicular to the indicated direction of incident light.

O Averaged over any interval of 30 seconds maximum.

For conditions where the light flux from a tungsten-filament lamp operated at a color temperature of 2870° K is transmitted through a filter (Corning No.3482) onto the photocathode. The value of light flux incident on the filter is 10 microlumens and the load resistor is 0.01 megohm. Supply voltage (E) is adjusted to give an anode current of 50 micromperes.

OPERATING CONSIDERATIONS

The operating stability of the 7117 is dependent on the magnitude of the anode current and its duration. When the 7117 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 7117 usually recovers a substantial percentage of such loss in sensitivity.

The use of an average anode current well below the maximumrated value of 0.1 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 10 microamperes.

A recommended design of voltage-divider network for use with the 7117 to provide stable operation and long tube life is shown in the accompanying circuit. This design provides linear operation within the range normally required for head-light control. At higher light levels, the network design limits the tube output to a safe value. The indicated design values provide headlight-control operation for an anode current in the range between 5 and 10 microamperes.

SPECTRAL-SEMSITIVITY CHARACTERISTIC of Phototube having S-4 Response is shown at the front of this Section

7117

A For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K; a light input of 10 micro—lumens is used; and the load resistor has a value of 0.01 megohm.



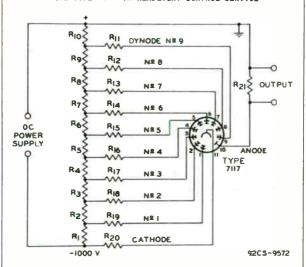
71/2

MULTIPLIER PHOTOTUBE

DIMENSIONAL OUTLINE and

AVERAGE-ANODE-CHARACTERISTICS and VARIATION-IM-SENSITIVITY-OF-PHOTOCATHODE curves shown under Type 6328 also apply to the 7117

RECOMMENDED VOLTAGE-DIVIDER NETWORK FOR USE WITH TYPE 7117 IN HEADLIGHT-CONTROL SERVICE



R | R2 R3 R4 R5

R6 R7 R8 R9 RIO: I megohm, 1/2 watt

R11: 2 megohms, 1/2 watt

RI2: 5.1 megohms, 1/2 watt

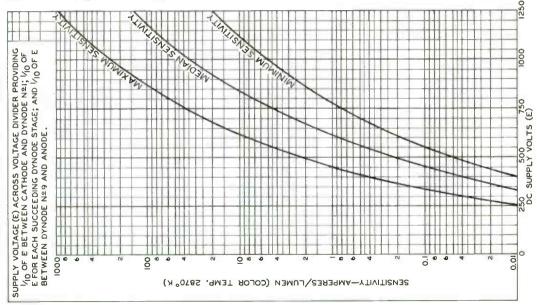
RI3 RI4 RI5 RI6

R[7 R[8 R[9 R20: 8.2 megohms, 1/2 watt

R21: 820,000 ohms, 1/2 watt

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

RANGE LUMINOUS-SENSITIVITY



ELECTRON TUBE DIVISION

JEDEC No. E2-47

Photoconductive Cell

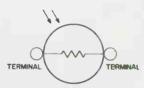
CADMIUM-SULFIDE, HEAD-ON TYPE

DATA

General:

Base .

	Spectral Response
	Sensitive Surface, Including Metallic Strips:
1	Shape
_	Length (Minimum) 0.65 in.
	Width (Minimum)
	Area (Minimum) 0.35 sq. in.
	Maximum Overall Length
	Greatest Diameter 1.24" ± 0.02"
	Seated Length 0.28" ± 0.06"
	Maximum Axial Distance from
)	External Surface of Window to
	Sensitive Surface
	Case
	Envelope Seals
	Operating Position
	Weight (Approx)
	Weight (Approx.) 0.4 oz



DIRECTION OF LIGHT: INTO FACE OF CELL

A indicates that the primary characteristic of the element within the envelope symbol is designed to vary under the influence of light.

Maximum Ratings, Absolute-Naximum Values:	
VOLTAGE BETWEEN TERMINALS (DC or Peak AC)250 max. POWER DISSIPATION:	volts
Sensitive surface fully illuminated:	
Continuous service 0.3 max. Demand service ^a 0.5 max. Sensitive surface partially illuminated:	watt watt

- Indicates a change.

watt/sq.

watt/sq.

0.85 max.

1.42 max.

-75 to +60

50 max.



Continuous service . . .

Demand service*. . . .

AMBIENT-TEMPERATURE RANGE. .

PHOTOCURRENT . .

in.

in.

ma

Characteristics:

Under conditions with ac voltage (rms) of 50 volts, 60 cps between terminals and ambient temperature of 25° C

Min. Median Max.

Sensitivity:										
Radianth, a								290) –	amp/watt
Luminous ^c ,	at I	0 с	ps.			_		0.82	-	amp/lumen
Illuminatio								- 2	2 3	ma/fc
Decay Current								-	40	μа
Photocurrent:										
Rise								See	accompan	ying Curve
Decay								See	accompan	vina Curve

The demand rating may be utilized twice every 24 hours for a period of 20 minutes each time provided the interval between demand periods is not less than 4 hours.

 $^{\mathbf{b}}$ For conditions where the incident power is 6.9 μ watt.

C for conditions where light flux from a tungsten-filament lamp operated a: 2870° K is transmitted through a filter (Corning No.C.S. 1-62, Glass No.5900 which has an effective transmission of luminous flux of 13,3 per cent) onto the sensitive surface. The value of illumination incident on the sensitive surface is 7.5 footcandles measured before positioning the filter between the lamp and the cell. Area of illuminated sensitive surface is approx. 0.35 sq. in.

This characteristic is determined after the 7163 has been exposed to 500 footcandle illumination (white fluorescent light) for a period of 16 to

24 hours.

e For conditions where light flux from a tungsten-filament lamp operated at 2870 K is transmitted through a filter (Corning No.C.S. 1-62, Glass No.5900 which has an effective transmission of luminous flux of 13,3 per cent) onto the sensitive surface. The value of illumination incidenton the sensitive surface is 7.5 footcandles measured before positioning the filter between the lamp and the cell. The sensitive surface of the cell is fully illuminated.

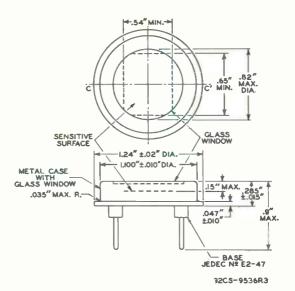
Measured 10 seconds after removal of incident-illumination level as established in (e).

OPERATING CONSIDERATIONS

Electrical connection can be made to the base pins of the 7163 by soldering directly to the pins. Soldering of connections to the pins may be made close to the pin seals provided care is taken to conduct excessive heat away from the pin seal. Otherwise, the heat of the soldering operation will crack the glass seals of the pins and damage the cell. Connection can also be made to the base pins by use of insulated clips.

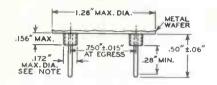
SPECTRAL-SENSITIVITY CHARACTERISTIC
OF PHOTOSENSITIVE DEVICE HAVING S-15 RESPONSE
is shown at front of this section

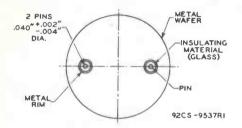




PLANE THROUGH WINOR AXIS (CC') OF SENSITIVE SURFACE AND THE CELL AXIS WAY VARY FROM PLANE THROUGH CELL AXIS AND THE, TWO PINS BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE CELL AXIS) OF \pm 10°.

2-PIN BASE JEDEC No.E2-47

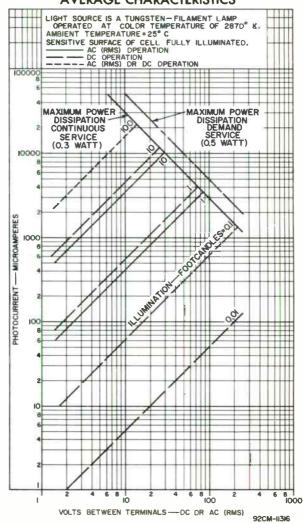




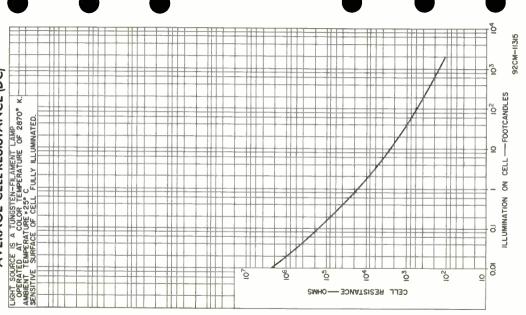
NOTE: FOR SOCKET DESIGN, PROVIDE CLEARANGE HOLE HAVING MINIMUM DIAMETER OF 1.188".

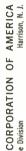


AVERAGE CHARACTERISTICS



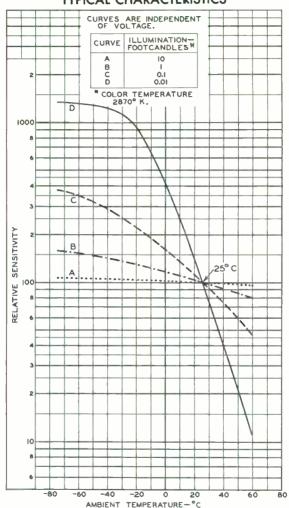
CELL RESISTANCE AVERAGE





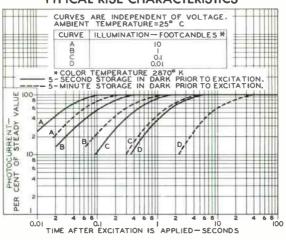


TYPICAL CHARACTERISTICS



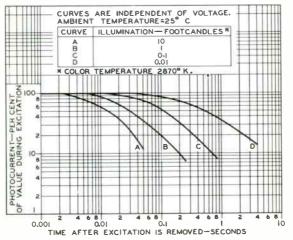
92CM-9538

TYPICAL RISE CHARACTERISTICS



92CS-9532

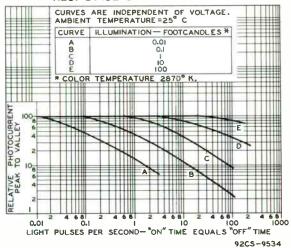
TYPICAL DECAY CHARACTERISTICS



9205-9533



RESPONSE CHARACTERISTICS





PHOTOCONDUCTIVE CELL

CADMIUM-SULFIDE, HEAD-ON TYPE

			DATA			
General:						
Sensitive	desponse. of Maximu Surface,	Including	Metail	lic Stri	ps:	S-15 00 angstroms .Rectangular
Length (Width (N	Minimum) Minimum). nimum).	 				0.65 in. 0.54 in. 0.35 sq. in.
Maximum Ov Greatest D Seated Len	erall Len liameter. gth	gth 			1	0.9' .24" ± 0.02" .28" ± 0.06"
Sensitiv Case	Surface e Surface	of Window				0.15"
	Position prox.).					Hermetic Any 0.4 oz TEC No.E2-47
			λ			
	1			CELL		
λ indico envelope	tes that the	primary ch designed t	aracteri O vary u	stic of th nder the	e elemen influence	twithin the of light.
Maximum Ra	_		lues:			
POWER DISS	eak AC).		· · ·	. 250	max.	volts
illumi Sensitiv	nated e surface	partiall	У			watt
illumi	nated			. 0.85	max.	watt/sq. in.

PHOTOCURRENT . . .

ma oC





PHOTOCONDUCTIVE CELL

Characteristics:

With ac voltage (rms) of 50 volts between terminals and ambient temperature of 25° C

Min. Median Max.

Sensitivity:								- 1
Radiant#, at 5800								
angstroms	_	2	90		_			µа/µw
Luminous*, at 0 cps	_	0.	80	2	_		am	p/lumen
Illumination*, at 0 cps	1		2		3		ſ	ma/ft-c
Photocurrent					4()		μa
Rise							See	Curves
Decay							See	Curves

^{*} For conditions where the incident power is 6.9 microwatts.

Measured approximately 10 seconds after removal of incident-illumination level as established by filter in (*).

DEFINITIONS

Illumination Sensitivity. The quotient of output current by the incident illumination, at constant electrode voltages.

OPERATING CONSIDERATIONS

Electrical connection can be made to the base pins of the 7163 by soldering directly to the pins. Soldering of connections to the pins may be made close to the pin seals provided care is taken to conduct excessive heat away from the pin seal. Otherwise, the heat of the soldering operation will crack the glass seals of the pins and damage the cell. Connection can also be made to the base pins by use of insulated clips.

The voltage between terminals of the 7163 may be applied without regard to polarity.

The incident illumination should cover an area of at least 0.1" in diameter.

Exposure of the 7163 to radiation so intense as to cause excessive heating of the cell may permanently damage it.

The angle of view of the 7163 may be narrowed by the use of a hood of the desired length placed in front of the cell.

In some applications where the light source is several feet from the cell, a simple lens used to collimate the light beam will serve to utilize the available amount of light most effectively.

For conditions where light flux from a tungsten-filament lamp operated at 2870° K is transmitted through a filter (corning No.5900 having an effective transmission of luminous flux of 12.5 per cent) onto the sensitive surface. The value of illumination incident on the sensitive surface is 8 foot-candles measured before positioning the filter between the lamp and the cell.



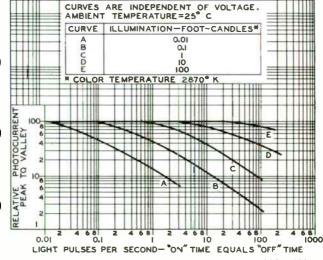
PHOTOCONDUCTIVE CELL

For a given illumination, the cutput current will have its highest value when the incident illumination is normal {angle of incidence is 90°) to the face of the cell. For smaller angles of incidence, the output current decreases. The decrease depends upon several factors including the angle of incidence of the illumination, the amount of illumination, and the area of sensitive swrface illuminated.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Photoconductive Cell having S-15 Response
is shown at the front of this Section

TENTATIVE DATA 2

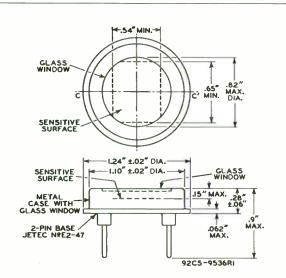
RESPONSE CHARACTERISTICS







PHOTOCONDUCTIVE CELL



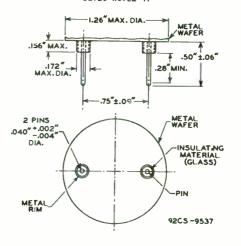
PLANE THROUGH MINOR AXIS (CC) OF SENSITIVE SURFACE AND THE CELL AXIS MAY VARY FROM PLANE THROUGH CELL AXIS AND THE TWO PINS BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE CELL AXIS) OF \pm 10°.



7163 PHOTOCONDUCTIVE CELL

163

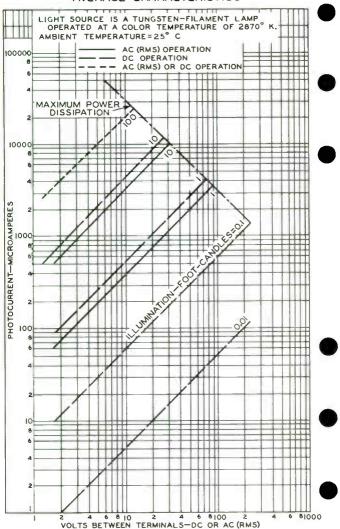
2-PIN BASE JETEC No.E2-47



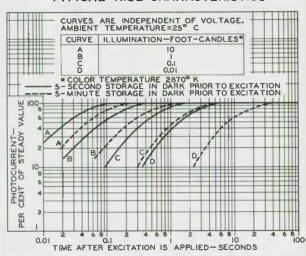




AVERAGE CHARACTERISTICS

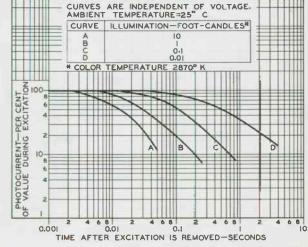


TYPICAL RISE CHARACTERISTICS



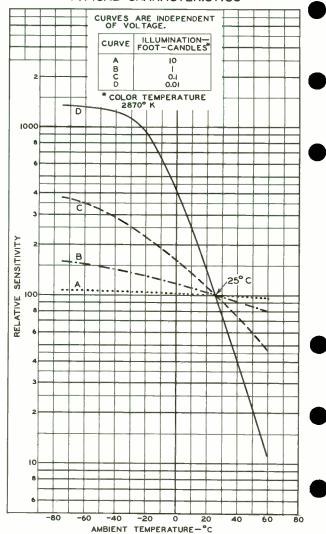
92CS-9532

TYPICAL DECAY CHARACTERISTICS





TYPICAL CHARACTERISTICS



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



MULTIPLIER PHOTOTUBE

9-STAGE TYPE HAVING S-19 RESPONSE For detection and measurement of ultraviolet radiation

	DATA	
General:		
Spectral Response Wavelength of Maximum R		S-19 . 3300 ± 500 angstroms
Minimum projected ler Minimum projected wid Direct Interelectrode (ith [•]	
Anode to dynode No.9 Anode to all other el Maximum Overall Length	ectrodes	4.4 μμf 6 μμf 5.69"
Maximum Seated Length. Length from Base Seat t Useful Cathode Area. Maximum Diameter	to Center of	3.94" ± 0.09"
Weight (Approx.)	Fused-Silica Se	1.8 oz Any ection with Graded Seal
Base Small—She Basing Designation fo	ell Submagnal 11-	-Pin (JETEC No.B11-88), Non-hygroscopic
Pin 1 - Dynode No.1	<u> </u>	Pin 7 - Dynode No.7
Pin 2 - Dynode No.2	0/4 × 10	Pin 8-Dynode No.8
Pin 3 - Dynode No.3	3/4 W	Pin 9-Dynade No.9
Pin 4 - Dynode No.4	2 2	Pin 10 - Anode
Pin 5 - Dynode No.5	U W	Pin 11 - Photo- cathcde
Pin 6 - Dynode No.6	DIRECTION OF LIGHT	Cathoge
Maximum Ratings, Absolu		_
SUPPLY VOLTAGE BETWEEN (DC or Peak AC) SUPPLY VOLTAGE BETWEEN		DE . 1250 max. volts
DYNODE No.9 (DC or Pe		
AVERAGE ANODE CURRENT* AMBIENT-TEMPERATURE RAN	IGE	. 0.5 max. ma 80 to +75 °C



Characteristics:

Under conditions with dc supply voltage (E) across a voltage divider providing 1/10 of E between cathode and dynode No.1; 1/10 of E for each succeeding dynode stage; and 1/10 of E between dynode No.9 and anode

With E = 1000 volts dc (except as noted)

	Min.	Median	Max.	
Sensitivity:				
Radiant, at				
3300 angstroms	_	65000	and the same of th	μa/μw
Cathode radiant, at				
3300 angstroms	_	0.065	_	μa./μw
Luminous:#				
At 0 cps	15	40	300	amp/lumen
Cathode luminous .	20	40	_	μa/lumen
Current Amplification	_	1000000	_	
Equivalent Anode-Dark-				
Current Input ♣□	_	2 x 10-10	2×10^{-9}	lumen
Equivalent Noise				
Input:				
Luminous*				
At +25° C	_	7.5×10^{-13}	_	1 umen
At -78° C	_	4×10^{-14}	-	lumen
Ultraviolet†				
At +25° C	_	6.6×10^{-16}	_	watt
At -78° C	_	4×10^{-17}	_	watt

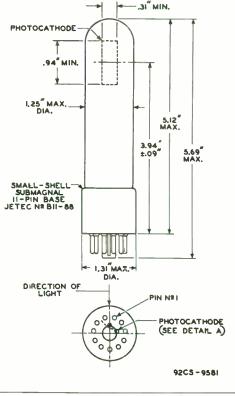
- On plane perpendicular to the indicated direction of incident light.
- * Averaged over any interval of 30 seconds maximum.
- For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A light input of 10 micro-lumens is used. The load resistor has a value of 0.01 megohm.
- For conditions the same as shown under (#) except that the value of light flux is 0.01 lumen and 100 volts are applied between cathode and all other electrodes connected together as anode.
- A Supply voltage (E) adjusted to give a luminous sensitivity of 20 amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.
- For maximum signal-to-noise ratio, operation with a supply voltage (E) below 1000 volts is recommended.
- *Under the following conditions: Supply voltage (E) is 1000 volts, external shield operated at -1000 volts with respect to anode, 25° C tube temperature, ac-amplifier bandwidth of 1 cycle per second, tungsten light source at color temperature of 2870° K interrupted at alow audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.
- Determined under the same conditions as shown under (*) except that use is made of monochromatic source having radiation of 2537 angstroms.

OPERATING CONSIDERATIONS

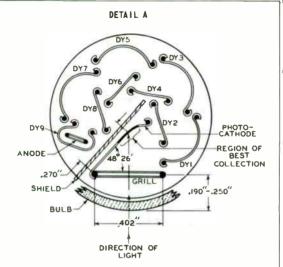
The use of an average anode current well below the maximum rated value of D.5 milliampere is recommended when stability of operation is important,

Electrostatic and/or magnetic shielding of the 7200 may be necessary.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-19 Response is shown at the front of this Section



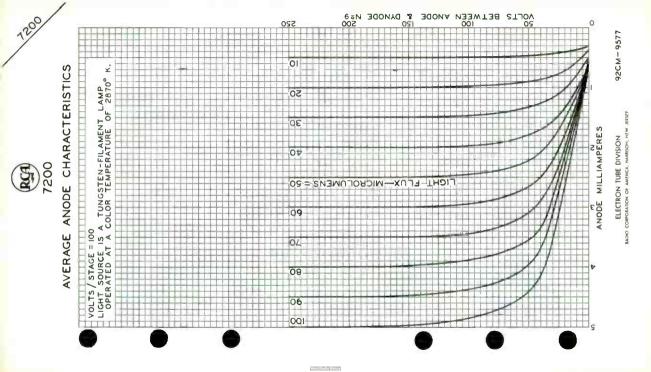




92CS-8674RI

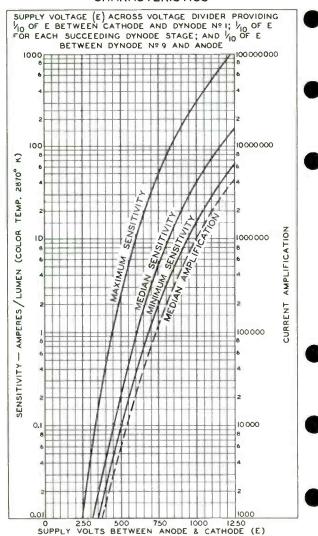
NOTE 1: CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.

NOTE 2: THE MAXIMUM ANGULAR VARIATION BETWEEN THE PLANE THROUGH PINS I AND II AND THE PLANE OF THE GRILL WILL NOT EXCEED 6°_{\bullet}





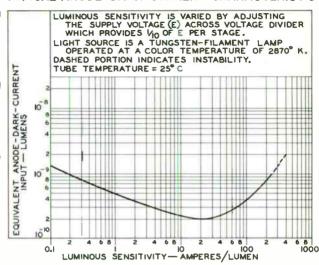
CHARACTERISTICS



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

92CM-9583

TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC



92CS-9586



Vidicon

LOW-POWER (0.6-WATT) HEATER 600-TC-900-LINE RESOLUTION For Live-Scene Pickup with Compact, Transistorized TV Cameras in Industrial Closed-Circuit Systems. The 7262-A is Unilaterally Interchangeable with Type 7262.

DATA

DATA
General:
Heater, for Unipotential Cathode: Voltage (AC or DC)
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Internal Connection— Do Not Use Pin 4 - Same as Pin 3 Pin 5 - Grid No.4, Grid No.3 DIRECTION OF LIGHT: INTO FACE END OF TUBE
Maximum Ratings, Absolute-Maximum Values:
For scanned area of 1/2" x 3/8"
GRID-No.3 & GRID-No.4 VOLTAGE 750 max. volts

GRID-No.2 VOLTAGE

7262-A

CDUD IV. 4 VIOLENCE	
GRID-No.1 VOLTAGE: Negative-bias value 300 max. volts	
Positive-bias value 300 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	
TARGET VOLTAGE	
PEAK TARGET CURRENT	
FACEPLATE:	`
Illumination 1000 max. fc	
Temperature 71 max. °C	
Typical Operation:	
For scanned area of 1/2" x 3/8" and	
faceplate temperature of 30° to 35° C	
Grid-No.4 (Decelerator) &	
Grid-No.3 (Beam-Focus- Electrode*) Voltage 250 to 300 volts	
Grid-No.2 (Accelerator) Voltage 300 volts	
Grid-No.1 Voltage for picture cutoff45 to -100 volts	
Average "Gamma" of Transfer	
Characteristic for signal-	
output current between 0.02 μa and 0.2 μa 0.57	
Visual Equivalent Signal-to-	
Noise Ratio (Approx.) ♣ 300:1	
Lag:	
Typical	
Minimum Peak-to-Peak Blanking Voltage:	1
When applied to grid No.1 75 volts	
When applied to cathode 20 volts	
Field Strength at Center of	
Focusing Coil (Approx.) 40 gausses Field Strength of Adjustable	
Alignment Coil 0 to 4 gausses	
Maximum-sensitivity operation — 0.1 footcandle on faceplate	
Faceplate Illumination	_
(Highlight)	
Target Voltage®,*	
Dark Current" 0.2 μa Signal-Output Current:	
Typical 0.14 μ a	
Intermediate-sensitivity operation - 0.5 footcandle on faceplate	
Faceplate Illumination	_
(Highlight) 0.5 fo	
Target Voltage ^{⊕,#} 30 to 60 volts	
Dark Current	
Signal-Output Current: Typical 0.27 ua	
Typical 0.27 ша	



Average-sensitivity operation - 1 footcandle on faceblate

Faceplate Illumi	nat	io	n							
(Highlight) .									1	fc
Target Voltage®,	# .								20 to 40	volts
Dark Current* .									0.02	μa
Signal-Output Cu										
Typical									0.2	$\mu \lambda$
Minimum									0.15	ца

This capacitance, which effectively is the output imperiance of the 7262-A, is increased when the tube is mounted in the deflecting-yoke and focusing-coil assembly. The resistive component or the output and focusing-coil assembly. The resist impedance is in the order of 100 megorms.

Video amplifiers must be designed properly to handle target currents of this magnitude to avoid amplifier overload or picture distortion.

Beam focus is obtained by combined effect of grid-No.3 voltage which should be adjustable over indicated range, and a focusing coil having an average field strength of 40 gausses.

Definition, focus uniformity, and picture quality decrease with decreasing grid-No.4 and grid-No.3 voltage. In general, grid No.4 and grid No.3 should be operated above 250 volts.

With no blanking voltage on grid No.1.

Measured with a peak signal-output current of 0.35 microampere using a high-gain, low-noise, cascode-input-type amplifler hav ng bandwidth of 5 Mc. Because the noise in such a system is predomirately of the high-frequency type, the visual equivalent signal-to-noise ratio is taken as the ratio of the highlight viden-signal current to rms noise current, multiplied by a factor of 3.

Defined a, the per cent of initial value of signal-output current 1/20 second after illumination is removed. Values snown are for initial signal-output current of 0.2 microampere and a dark current of 0.02 microampere.

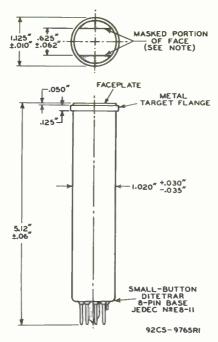
The alignment coil should be located on the tube so that its center is at a distance of 3-11/16 incres from the face of the tube, and be positioned so that its axis is coincident with the axis of the tube, the deflecting yoke, and the focusing coil.

Indicated range for each type of service serves only to illustrate the operating larget-voltage range normally encountered.

The target voltage for each 7262-A must be adjusted to that value which gives the desired operating dark current.

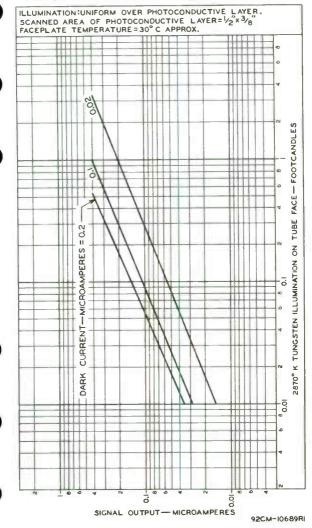
The deflecting circuits must provide extremely linear scanning for good black-level reproduction. Dark-current signal is proportional to the scanning velocity. Any change in scanning velocity produces a black-level error in direct porportion to the change in scanning velocity.

Defined as the component of the highlight target current after the dark-current component has been subtracted.

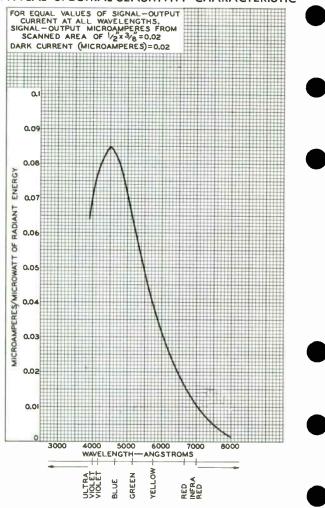


MOTE: STRAIGHT SIDES OF MASKED PORTIONS ARE PARALLEL TO THE PLANE PASSING THROUGH TUBE AXIS AND SHORT INDEX PIN.

TYPICAL LIGHT-TRANSFER CHARACTERISTICS



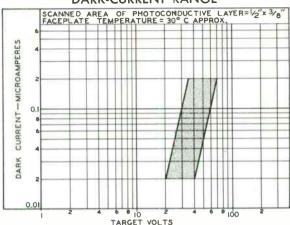
TYPICAL SPECTRAL-SENSITIVITY CHARACTERISTIC



92CM-10698RI

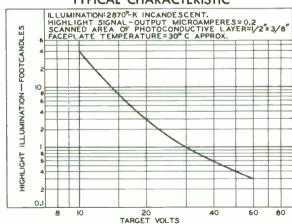


DARK-CURRENT RANGE



92CS-10684RI

TYPICAL CHARACTERISTIC



92CS-10685RI



Vidicon

LOW-POWER (0.6-WATT) HEATER 600-TO-900-LINE RESOLUTION For Use Under Severe Shock and Vibration, High Humidity, and at Altitudes up to 50,000 Feet in Small, Compact, Transistorized TV Cameras. The 7263-A is Unilaterally Interchangeable with Type 7263.

DATA
General:
Heater, for Unipotential Cathode: Voltage (AC or DC)
Photoconductive Layer: Maximum useful diagonal of rectangular image (4 x 3 aspect ratio)
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Internal Connection Do Not Use Pin 4 - Same as Pin 3 Pin 5 - Grid No.2 Pin 6 - Grid No.4, Grid No.3 DIRECTION OF LIGHT: INTO FACE END OF TUBE
Maximum Ratings, Absolute-Maximum Values:
For altitudes up to 50,000 feet and scanned area of 1/2" x 3/8"
GRID-No.3 & GRID-No.4 VOLTAGE

GRID-No.2 VOLTAGE GRID-No.1 VOLTAGE:
Negative-bias value . . .

Positive-bias value .

volts

volts

750 max.

300 max.

0 max.

PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode. Heater positive with respect to cathode. TARGE VOLTAGE.	125 max. volts 10 max. volts 100 max. volts	•
DARK CURRENT	0.25 max. μa 0.55 max. μa	
Illumination	1000 max. fc 71 max. °C	
Typical Operation:		
For scanned area of 1/2" x 3/ faceplate temperature of 30° t		
Grid-No.4 (Decelerator) & Grid-No.3 (Beam-Focus- Electrode♥) Voltage	250 to 300 volts	
Grid-No.2 (Accelerator) Voltage Grid-No.1 Voltage for picture	300 volts	
cutoff. Average "Gamma" of Transfer Characteristic for signal— output current between	-45 to -100 volts	
0.02 μa and 0.2 μa	0.57	
Noise Ratio (Approx.)‡ Lag:	300:1	
Typical Maximum Minimum Peak-to-Peak Blanking Voltage:	25 % 20 %	
When applied to grid No.1	75 volts 20 volts	
focusing coil (Approx.) Field Strength of Adjustable	40 gausses	
Alignment Coil®	0 to 4 gausses	_
Maximum-sensitivity operation - 0.1 footo	andle on faceplate	
Faceplate Illumination (Highlight)	0.1 fc	
Target Voltage*,*	35 to 70 volts	
Dark Current SignaT-Output Current:†	0.2 μa	
Typical	0.14 μα	_
Intermediate-sensitivity operation - 0.5 for		
Faceplate Illumination (Highlight)	0.5 fc	
Target Voltage#,*	30 to 60 volts 0,1 μα	
Dark Current	0.1 μa 0.27 μa	
* *		_
Average-sensitivity operation — 1 footca		
Facep¹ate Illumination (Highlight) Target Voltage#,*	1 fc 20 to 40 volts	
Dark Current	0.02 μa	

Signal-Output	Cur	ren	t:†						
Typical				٠	٠			0.2	μα
Minimum							٠	0.15	μа
,									

This capacitance, which effectively is the output impedance of the 7263-A, is increased when the tube is mounted in the defincting-yoke and focusing-coil assembly. The resistive component of the output impedance is in order of 100 megohms.

Made by Circh Manufacturing Corporation, 1026 South Homan Avenue, Chicago 24, Illinois.

video amplifiers must be designed properly to handle target currents of this magnitude to avoid amplifier overload or picture distortion. Beam focus is obtained by combined effect of grid—No.3 voltage which should be adjustable over indicated range, and a focusing coil having an average "ield strength of 40 gausses.

Definition, focus uniformity, and picture quality decrease with decreasing grid-No.3 and grid-No.3 voltage. In general, grid No.4 and grid No.3 should be operated above 250 volts.

With no blanking voltage on grid No. 1. Measured with high-gain, low-noise, cascode-input-type amplifier having bandwidth of 5 Mc and a peak signal-output current of 0.35 microampere. Because the noise in such a system is predominately of the high-irrequency type, the visual equivalent signal-to-noise ratio is taken vs the ratio of the highlight viseo-signal current to rms noise current, maltiplied by a factor of 3.

Defined as the per cent of initial value of signal-output current 1/20 second after illumination is removed. Values shown are for initial signal-output current of 0.2 microampere and a dark current

of 0.02 microampere.

The alignment coil should be located on the tube so that its center is at a distance of 3-11/16 inches from the face of the subr, and be positioned so that its axis is coincident with the axis of the tube. the deflecting yoke, and the focusing coil.

Indicated range for each type of service serves only to iTlustrate the operating target-voltage range normall∉ encountered.

The target voltage for each 7263-A must be adjusted to that value which gives the desired operating dark current.

The deflecting circuits must provide extremely linear scanning good black-level reproduction. Dark-current signal is proportional ood black-level reproduction. Dark-current signal is proportional to the scanning velocity. Any change in s-anning velocity produces a black-leve' error in direct proportion to the change in scanning velocity produces a black-leve' error in direct proportion to the change in scanning velocity.

Defined as the component of the highlight target current after the dark-current component has been subtracted.

SPECIAL PERFORMANCE DATA

In connection with the following tests, sample 7263-A's will maintain resolution as determined with a RETMA Resolution Chart, or equivalent, and will faithfully reproduce all resolution wedges and grey scales of the chart.

Vibration Tests:

These tests are performed under conditions for Average-Sensitivity Operation on a sample lot of tubes from each production run. Tubes and their associated components are vibrated or apparatus providing dynamic conditions similar to those described in MIL-E-527280, paragraph 4.7.1.

Resonance. Tubes and associated components are vibrated (per the method of MIL-E-52728 $^{\Omega}$, paragraph 4.7.1) for (hour at +25° C, for 15 minutes at 0° C, and for 15 minutes at +550 C.

Cycling. Tubes and associated components are vibrated (per the method of MIL-E-52728^D, paragraph 4.7.1.2 pertaining

7263-A

to specimen without vibration isolators) for 1 hour at + 25°C, for 15 minutes at 0°C, and for 15 minutes at +55°C.

Temperature-Pressure (Altitude) Tests:

Tubes and associated components $^{\circ}$ are subjected (per the method of MIL-E-5400 , paragraph 3.2.20, 3.2.20.1, and 3.2.20.1.1) to the separate and combined effects of varying temperature $^{\circ}$ 0 to $^{+}55^{\circ}$ C and varying barometric pressure 30 to 3.4 inches of mercury. The pressures correspond to sea level and to an altitude of 50,000 feet, respectively.

Shock Tests:

These tests are performed with no voltages applied and on a sample lot of tubes from each production run. Tubes and their associated components are subjected in these tests (per MIL-E-5400°), paragraph 3.2.21.2.1) to 18 impact shocks of 15 consisting of 3 shocks in opposite directions along each of three mutually perpendicular axes of the tube. Each shock impulse has a duration of 11 ± 1 milliseconds with a maximum impact acceleration occurring at approximately 5.5 milliseconds. Tube mounting accessories assure the rigid fastening of the tube to the shock-test apparatus.

Temperature-Humidity Tests:

These tests are performed with no voltages applied to the 7263-A. The 7263-A and associated components \$ are subjected (per the method of MIL-E-5400 $^{\circ}$, paragraph 3.2.20.2B) to relative humidities up to and including 100 per cent at temperatures up to and including $+50^{\circ}$ C.

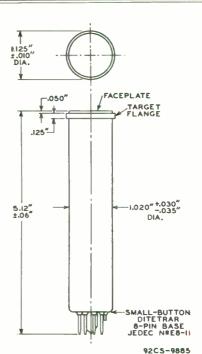
- § Tube socket such as Cinch No.54A18088 and RCA Assembly No.200SDU501. or equivalent, which consists of the deflecting coils, focusing coil, alignment coil, shield, and target connector.
- 5 June 1957, Procedure I of Military Specifications.
- 1 January 1956.

OPERATING CONSIDERATIONS

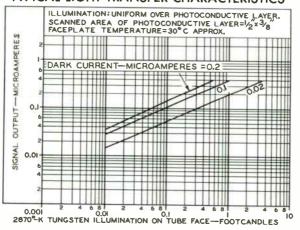
The target connection is made by a suitable spring contact bearing against the edge of the metal ring at the face end of the tube. This spring contact may conveniently be provided as part of the focusing-coil design.

Support for the 7263-A should be provided such that, under vibration and shock, the tube will not be displaced with respect to the focusing, deflecting, and alignment fields. Sultable support is provided for the tube and its socket in the RCA Deflection Assembly 200SDU501, or equivalent. Orientation of the 7263-A in its support should be such that the horizontal scan is essentially parallel to the plane passing through the tube axis and short index pin.



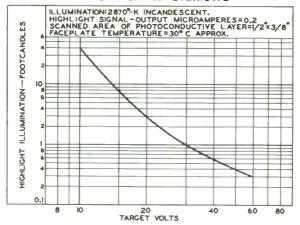


TYPICAL LIGHT-TRANSFER CHARACTERISTICS



92CS-10689R2

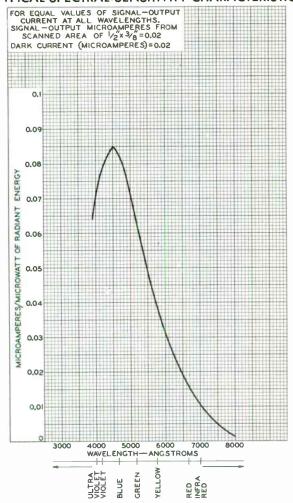
TYPICAL CHARACTERISTIC



92CS-10685RI



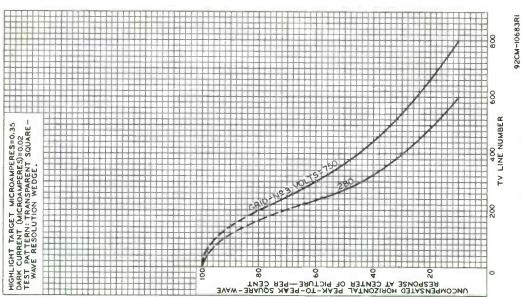
TYPICAL SPECTRAL-SENSITIVITY CHARACTERISTIC



92CM-10698RI

7263-4

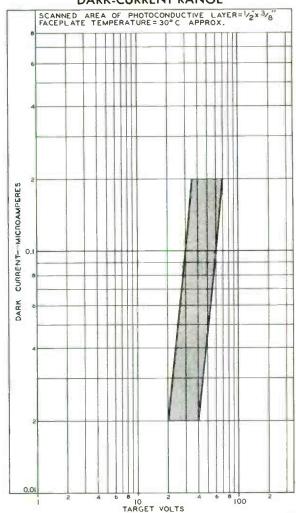
HORIZO RESPON TED SQUARE-W UNCOMPENS







DARK-CURRENT RANGE





Vidicon

600-TO-900-LINE RESOLUTION

For Live-Scene Pickup with Color or Black-and-White TY Cameras in Andustrial Closed-Circuit Systems. The 7735-A is Unilaterally Interchangeable with Type 7735.

DATA

deneral:
Heater, for Unipotential Cathode:
Voltage (AC or DC)
Current at 6.3 volts 0.6 amp
Target to all other electrodes
Spectral Response See Curve
Photoconductive Layer:
Maximum useful diagonal of rectangular
image (4 x 3 aspect ratio) 0.62"
Orientation of quality rectangle—Proper orientation is
obtained when the horizontal scan is essentially parallel
to the straight sides of the mask+d portions of the face-
plate. The straight sides are parallel to the plane
passing through the tube axis and short index pin. The masking is for orientation only and does not define the
proper scanned area of the photocheductive layer.
Focusing Method
Deflection Method
Overall Length 6.25" ± 0.25"
Greatest Diameter 1.125" ± 0.010"
Operating Fosition Any
Weight (Approx.)
Bulb
Socket
Basing Designation for BOTTOM VIEW 8HM
basing besignation for bottom view
Pin 1 - Heater Pin 7 - Cathode
Pin 2 - Grid No.1
Min 3 - Internal Con- Flange - Target
rection— Snort Index Pin—
Co Not Use Same as Pin 4 - Same as Pin 3 Pin 3
Pin 5-Grid No.2
Pin 6-Grid No.4,
Grid No. 2 DIRECTION OF LIGHT.
INTO FACE END OF TUBE
Maximum Ratings, Absolute-Haximum Values:
for scanned area of 1/2" x 3/8"
GRID-No.3 & GR D-No.4 VOLTAGE 750 max. volts
GRID-No.2 VOLTAGE
GRID-No.1 VOLTAGE:
Negative-bias value 300 max. volts
Positive-bias value 0 max. volts

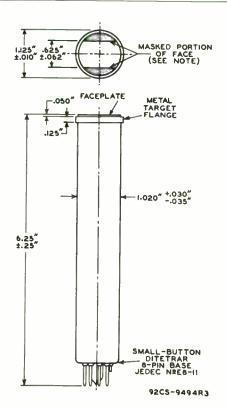
General:

7735-A

PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to catho Heater positive with respect to catho TARGET VOLTAGE DARK CURRENT PEAK TARGET CURRENT FACEPLATE: Illumination Temperature.	de 10 max	c. volts c. μα c. μα c. μα	
Typical Operation:			Ì
For scanned area of 1/2" x			,
faceplate temperature of 30 Grid-No.4 (Decelerator) & Grid-No.3 (Beam-Focus-Electrode*) Voltage Grid-No.2 (Accelerator) Voltage Grid-No.1 Voltage for picture cutoff • Average "Gamma" of Transfer Characteristic for signal-output current between 0.02 μa and 0.2 μa Visual Equivalent Signal-to-Noise	. 250 to 300 . 300 45 to -100	volts volts volts	
Ratio (Approx.)♥	. 300:1		
Lag: Typical. Maximum. Min'mum Peak-to-Peak Blanking Voltage:	. 20	% %	
When applied to grid No.1	. 75	volts	
When applied to cathode Field Strength at Center of Focusing Coil (Approx.)	. 20	volts	
Field Strength of Adjustable Alignment Coil		gausses	
Maximum-sensitivity operation — 0.2 for Faceplate Illumination	ootcandle on fo	aceplate	
_ (Fighlight)	0.1	fc	
Target Voltage®, #	30 to 70	volts	١
Dark Current* Signal-Output Current:*	0.2	μа	ļ
Typical	0.14	νμа	
Intermediate-sensitivity operation — 0.5			
Faceplate Illumination (Highlight) Target Voltage*,*	0.5 30 to 60	fc volts	
Dark Current*	0.1	μa	
Signal-Output Current: Typical	0.27	μ a	
Average-sensitivity operation — 1 foo	tcandle on fac	eplate	
Faceplate Illumination (Highlight)	1	fc	
Target Voltage*,*	20 to 40	volts	
Dark Current* Signal-Output Current:*	0.02	μа	
Typical	0.2 0.15	μа μа	



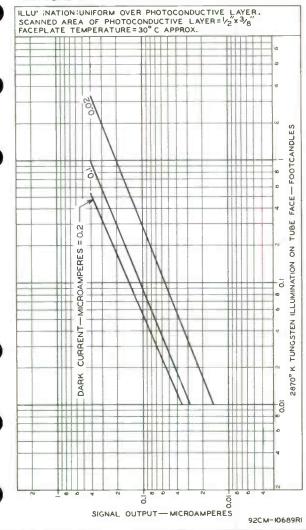
- This capacitance, which effectively is the output impedance of the 7755-A, is increased when the tube is mounted in the deflecting-yoke and focusing-coil assembly. The resistive component of the output impedance is in order of 100 megohms.
- video amplifiers must be designed properly to handle target currents of this magnitude to avoid amplifier overload or picture oistortion.
- * Beam focus is obtained by combined effect of grid-No.3 vo'tage which should be adjustable over indicated range, and a focusing coil having and average field strength of NO gausses.
- Definition, focus uniformity, and picture quality decrease with decreasing grid-No.% and grid-No.5 voltage. In general, grid No.8 and grid No.3 should be operated above 250 volts. In general, grid No. 4 and
- with no blanking voltage on grid No.1.
- Measured with a peak signal-output current of 0.35 microampere using measured with a peak signal-obusing the part of the having bandwidth of 5 Mc. Because the noise in such system is predominately of the high-frequency type, the visual equivalent signal-to-noise ratio is taken as the ratio of the highlight video-signal current to rms noise current, multiplied by a factor of 3.
- Defined as the per cent of initial value of signal-output current 1/20 second after illumination is removed. Values shown are for initial signal-output current of 0.2 microampere and a dark corrent of 0.02 microampere.
- The alignment coil should be located on the tube so that its center is at a distance of 3-11/16 inches from the face of the tube, and be positioned so that its axis is coincident with the axis of the tube, the deflecting yoke, and the focusing coil.
- Indicated range for each type of service serves only to illustrate the operating target-voltage range normally encountered.
- # The target voltage for each 7735-A must be adjusted to that value which gives the desired operating dark current.
- The deflecting circuits must provide extremely linear scanning good black-level reproduction. Dark-current signal is proportional to the scanning velocity. Any change in scanning velocity produces a black-level error in direct proportion to the change in scanning velocity.
- Defined as the component of the highlight target current after the dark-current component has been subtracted.



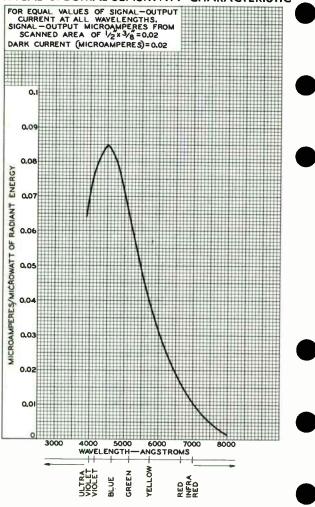
NOTE: STRAIGHT SIDES OF MASKED PORTIONS ARE PARALLEL TO THE PLANE PASSING THROUGH TUBE AXIS AND SHORT INDEX PIN.



TYPICAL LIGHT-TRANSFER CHARACTERISTICS

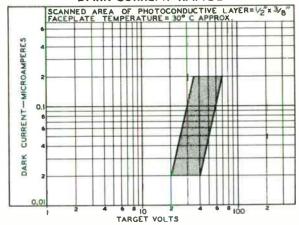


TYPICAL SPECTRAL-SENSITIVITY CHARACTERISTIC



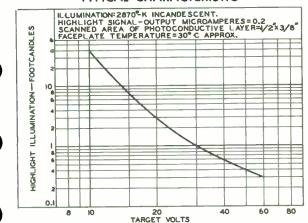
92CM-10698RI

DARK-CURRENT RANGE



92CS-10684RI

TYPICAL CHARACTERISTIC



92CS-10685RI



Image Orthicon

MAGNETIC FOCUS

MAGNETIC DEFLECTION

ANTI-GHOST IMAGE SECTION

For Outdoor and Studio Pickup with Black-and-White TV Cameras DATA

ue	ne	r	a	ı	•	

Heater, for Unipotential Cathode:	
Voltage (AC or DC)	6.3 ± 10% volts
Current at 6.3 volts	0.6 amp
Direct Interelectrode Capacitance	(Approx.):
Anode to all other electrodes .	12 μμf
Spectral Response	
Wavelength of Maximum Response	4500 ± 300 angstroms
Photocathode, Semitransparent:	_
Rectangular image (4 x 3 aspect	ratio):

Useful size of. 1.8" max. diagonal Note: The size of the optical image focused on the photocathode should be adjusted so that its maximum diagonal does not exceed the specified value. The corresponding electron image on the target should have a size such that the corners of the rectangle just touch the target ring; a condition that may be achieved in some camera designs with a 1.6" diagonal image on the photocathode.

Orientation of. . Proper orientation is obtained when the vertical scan is essentially parallel to the plane passing through center of faceplate and pin 7 of the shoulder base. The horizontal and vertical scan should preferably start at the corner of the raster nearest pin6 of the shoulder base.

Focusing Method .																				
Deflection Method																- 1	lac	ว่าเล	etic	
Overall Length														15.	20	7"	±	Ό.	25"	
Greatest Diameter																				
Minimum Deflection																				
Deflecting-Coil L																				
Focusing-Coil Len																				
Alignment-Coil:		-	-	•	-	-	-	•	-	_	•	•	•	•	•	•				

Length. . . . Position on neck. .Centerline of coil located 8.5" from flat area of the

jumbo annular base. Photocathode Distance Inside End of Focusing Coil . . . 1/2" Operating Position. . . The tube should never be operated in a vertical position with the Diheptal-base endup nor in any other position where the axis of the tube with the base up makes an angle of less than

20° with the vertical.

7293A

TEMPERATURE DIFFERENCE:

GRID-No.6 VOLTAGE. .

Negative value . GRID-No.5 VOLTAGE.

TARGET VOLTAGE:
Positive value .

Between target section and any part

of bulb hotter than target section .

Shoulder Base. . . .Keyed Jumbo Annular 7-Pin BOTTOM VIEW Pin 1-Grid No.6 Pin 5-Grid No.5 Pin 2 - Photocathode Pin 3 - Internal Connec-Pin 6 - Target tion-Do Not Use Pin 4 - Internal Connec-Pin 7 - Internal Connection-Do Not Use tion-Do Not Use End BaseSmall-Shell Diheptal 14-Pin (JEDEC Group 5, No.B14-45) BOTTOM VIEW DIRECTION OF LIGHT: PERPENDICULAR TO LARGE END OF TUBE Pin 1 - Heater 2-Grid No.4, Pin Field Mesh Pin 3-Grid No.3 P:n 4 - Internal Connection-Do Not Use Pη 5 - Dynode No.2 5 10 P:n 5 6 - Dynode No.4 Pin. 7 - Anode 11 Pin 8 - Dynode No.5 Pin 9 - Dynode No.3 Pin 10 - Dynode No.1. Grid No.2 P'n 11 - Internal Connection-Do Not Use Pin 12 - Grid No.1 Pin 13 - Cathode. Suppressor Grid Pin 14 - Heater WHITE INDEX LINE MOTE: In the tube symbol, the suppressor grid connected to the cathode, and the field-mesh grid connected to grid No.4, are intentionally without numbers to avoid upsetting industry practice of associating functional camera control knobs with specified grid numbers. For example, beam-focus control is generally associated with knob identified as Gu (grid No.4). Maximum and Minimum Ratings, Absolute-Naximum Values: PHOTOCATHODE: Voltage. . . . -700 max. volts Illumination . . . 50 max. fc OPERATING TEMPERATURE: Any part of bulb . . 65 max. Of bulb at large end of tube 00 (Target section) . 35 min.

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

oC

volts

volts

volts

volts

5 max.

10 max.

10 max.

150 max.

-700 max.

•	GRID-No.4 VOLTAGE	volts volts volts volts volts volts volts volts volts
	Typical Operating Values: b	
	Photocathode Voltage (Image Focus) c400 to -540 Grid-No.6 Voltage (Accelerator) — Approx. 75% of photocathode voltage d300 to -405 Target-Cutoff Voltage c3 to +1	
	Grid-No.5 Voltage (Decelerator). 0 to 40 Grid-No.4 Voltage (Beam Focus). 140 to 180 Grid-No.3 Voltagef. 260 to 3300 Grid-No.2 & Dyrode-No.1 Voltage. 300 Grid-No.1 Voltage for Picture Cutoff45 to -115 Dynode-No.2 Voltage. 600 Dynode-No.3 Voltage. 800 Dynode-No.4 Voltage. 1000 Dynode-No.5 Voltage. 1200 Anode Voltage. 1250 Target-Temperature Range. 35 to 45 Minimum Peak-to-Peak Blanking Voltage. 5 Field Strength at Center of Focusing Coil ⁹ . 75	volts gausses gausses
	Performance Data:	
•	With conditions shown under Typical Operating Values with camera lens set to bring the picture highlights stop above the "knee" of the light-transfer characters. Nin. Average Nax. Cathode Radiant Sensitivity	one
	at 4500 angstroms 0.028 - Luminous Sensitivity (2870° K)	µа/µw µа/1m µа
	[Peak to peak] 5 - 30 Ratio of Peak-to-Peak Highlight Video-Signal Current to RMS Noise Current for bandwidth of 4.5 Mc 30:1 37:1 - Photocathode Illumination at 2870° K required to reach	μа
	"knee" of light-transfer characteristic 0.01 0.028	fc

7293A

Amplitude Response at 400 TV lines per picture height (Per cent of large-area black to

large-area white) h. 30 40 Limiting Horizontal Resolution. 500 TV lines

a Dynode-voltage values are shown under Typical Operating Values.

C Adjust for best focus.

Mormal setting of target voltage is +2 volts from target cutoff. target supply voltage should be adjustable from -3 to +5 volts.

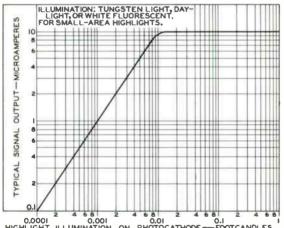
Adjust to give the most uniformly shaded picture near maximum signal.

9 Direction of current should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.

h Measured with amplifier having flat frequency response.

SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOSENSITIVE DEVICE HAVING S-10 RESPONSE is shown at front of this Section

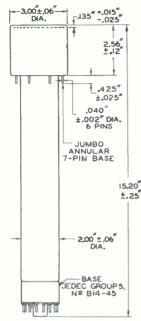
BASIC LIGHT-TRANSFER CHARACTERISTIC

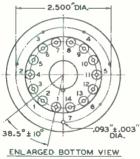


HIGHLIGHT ILLUMINATION ON PHOTOCATHODE--FOOTCANDLES 92CS-7296R2

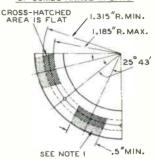
With 7293A operated in RCA-TK-11 or -TK-31 camera. Other cameras may require slightly different voltage ranges.

For minimum highlight flare or "ghost" the grid-No.6 voltage should be 73 per cent of the photocathode voltage.





OF JUMBO ANNULAR BASE



NOTE :: DOTTED AREA IS FLAT OR EXTENDS TOWARD DIHEPTAL— BASE END OF TUBE BY 0.060" MAX.

ANNULAR-BASE GAUGE

ANGULAR VARIATIONS BETWEEN PINS AS WELL AS ECCENTRICITY OF NECK CYLINDER WITH RESPECT TO PHOTO-CATHODE 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 450 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. SEVEN STOPS HAVING HEIGHT OF C.187" ± 0.001", CENTERED BETWEEN PIN HOLES TO BEAR AGAINST FLAT AREAS OF BASE.
- C. PIM EXTENDING OUT A MINIMUM OF ·C. 125" FROM 2.812" DIAM— ETER AND HAVING HEIGHT OF 0.126" ± 0.001".
- d. NECK-CYLINDER CLEARANCE HOLE MAVING DIAMETER OF 2.200" ± 0.001".



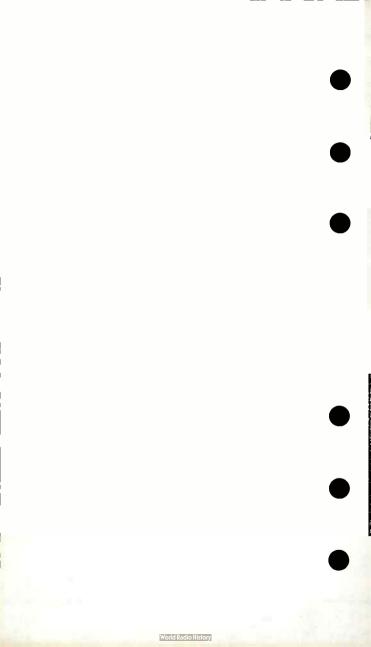


Image Orthicon

MAGNETIC FOCUS
MAGNETIC DEFLECTION
EXCELLENT RESOLUTION CAPABILITY

For Outdoor and Studio Pickup with High-Quality Black-and-White TV Cameras. The 7295-A is Unilaterally Interchangeable with Type 7295.

DATA

DATA
General:
Heater, for Unipotential Cathode: Voltage (AC or DC)6.3 \pm 10% volts Current at 6.3 volts0.6 amp Direct Interelectrode Capacitance: Anode to all other electrodes
Wavelength of Maximum Response 4500 ± 300 argstroms Photocathode, Semitransparent: Rectangular image (4 × 3 aspect ratio): Useful size of 1.6" max. diagonal
Note: The size of the optical image focused on the photocathode should be adjusted so that its maximum diagonal does not exceed the specified value. The corresponding electron image on the target should
have a size such that the corners of the rectangle just touch the target ring. Orientation of Proper orientation is obtained when the vertical scan is essentially parallel to the plane
passing through center of the faceplate and the grid- No.6 envelope terminal. The horizontal and vertical scan should start at the corner of the picture between the grid-No.6 and the photocathode envelope terminals.
Target-to-Mesh Spacing 0.002 in. Focusing Method
$ \begin{array}{llllllllllllllllllllllllllllllllllll$
Position on neckCenterline of magnetic field should be located 9.25" from the flat area of the shoulder.
Operating Dosition See Operating Considerations Weight (Approx.) 2.3 lbs Envelope Terminals

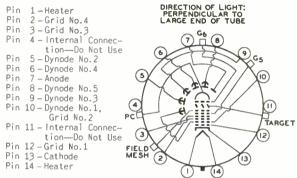
See basing diagram on next page.



Terminal Over Pin 2-Field Mesh Terminal Over Pin 4-Photocathode (PC) Terminal On Side of Envelope Opposite Base Key - Grid No.6 (G₆) Terminal Over Pin 9-Grid No.5 (Gs) Terminal Over Pin 11 - Target

End Base. . . . Small-Shell Diheptal 14-Pin





Maximum and Minimum Ratings, Absolute-Maximum Values:

PHOTOCATHODE:				
Voltage		-700	max.	volts
Illumination		50	max.	fc
OPERATING TEMPERATURE:				
Any part of bulb		65	max.	oC.
Of bulb at large end of tube				
(Image section)		35	min.	oC
TEMPERATURE DIFFERENCE:				
Between image section and any part				
of bulb hotter than image section.			max.	oC
GRID-No.6 VOLTAGE		-700	max.	volts
TARGET VOLTAGE:				
Positive value		10	max.	volts
Negative value		10	max.	volts
FIELD-MESH VOLTAGE®		30	max.	volts
GRID-No.5 VOLTAGE		300	max.	volts
GRID-No.4 VOLIAGE		350	max.	volts
GRID-NO.3 VOLIAGE		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	e.	125	max.	volts
Heater positive with respect to cathode	ρ	10	max.	volts
ANODE SUPPLY VOLTAGE*		1650	max.	volts

VOLTAGE PER MULTIPLIER STAGE .

volts

350 max.

	Typical Operating Values:♥			
	Photocathode Voltage		-600	volts
	Grid-No.6 Voltage (Image Focus)			
	Approx. 50% of photocathode voltage.		-250 to -350	volts
_	Target Voltage Above Cutoff		2 to 3	volts
	Field-Mesh Voltage•		15 to 25	volts
	Grid-No.5 Vc tage (Decelerator)		40	volts
	Grid-No.4 Vaitage (Beam Focus)		70 to 90	volts
	Grid-No.3 Valtage*		250 to 275	volts
	Grid-No.2 & Dynode-No.1 Voltage		280	volts
	Grid-No.1 Valtage for picture cutoff			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
	Target-Temperature Range		35 to 45	oC
	Minimum Peak-to-Peak Blanking Voltage .	٠	5	volts
	Field Strength of Focusing Coil			
	(Approx.):			
	At center of scanning section			gausses
	In plane of photocathode		120	gausses
	Field Strength of Alignment Coil		0 to 3	gausses

Performance Data:

With conditions shown under Typical Operating Values, target voltage adjusted to 3 valts above cutoff, and with the camera lens adjusted so that the picture highlights are twice those required to reach the "knee" of the accompanying Basic Light-Transfer-Characteristic Curve except as otherwise specified

	Min.	Average	Nax.	
Cathode Radiant Sensitivity at 4500 argstroms Anode Current (DC) Signal-Output Current	_	0.028 30	_	μа/μ w μа
(Peak to Peak)	5	-	30	μa
Ratio of Peak-to-Peak High- light Video Signal Current to RMS Noise Current for Bandwidth of 4.5 Mc Photocathode Illumination at 2870° K Required to	_	65:1	_	
Reach "Knee" of Light Transfer Characteristic Amplitude Response at 400 TV Lines per Picture Height	-	0.04	0.075	fc
(Per cent of large—area black to large—area white)#	40	56	_	%

7295-A

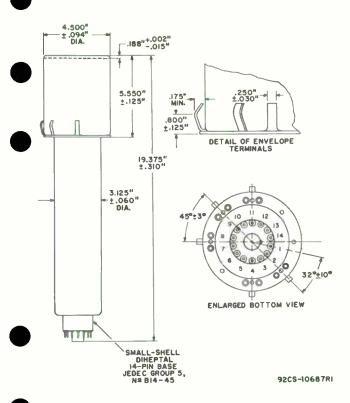
- With respect to grid No.4.
- 🕇 Dynode-voltage values are shown under Typical Operating Values.
- ♥ With 7295-A operated in RCA TK-12 camera at fixed photocathode voltage. Adjust for optimum focus.
- The target supply voltage should be adjustable from -5 to 5 volts.
- Adjust to give the most uniformly shaded picture near maximum signal. Direction of current should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.
- * Heasured with amplifier having flat frequency response.

OPERATING CONSIDERATIONS

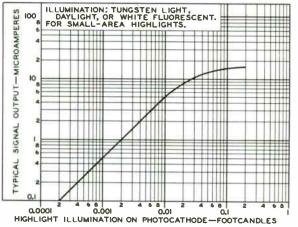
The operating position of the 7295-A should preferably be such that any loose particles in the neck of the tube will not fall down and strike or become lodged on the target. Therefore, it is recommended that the tube never be operated in a vertical position with the Diheptal-base end up nor in any other position where the axis of the tube with base up makes an angle of less than 200 with the vertical.

> SPECTRAL-SENSITIVITY CHARACTERISTIC of Photosensitive Device having S-10 Response is shown at the front of this Section





BASIC LIGHT-TRANSFER CHARACTERISTIC



92CS-10692

Image Orthicon

MAGNETIC FOCUS MAGNETIC DEFLECTION VERY HIGH SIGNAL-TO-NOISE RATIO

For High-Quality Black-and-White Studio TV Cameras. The 7389-A is Unilaterally Interchangeable with Type 7389.

DATA

General:
Heater, for Unipotential Cathode:
Voltage (AC or DC) 6.3 ± 10% volts
Current at 6.3 volts 0.6 amp
Direct Interelectrode Capacitance:
Anode to all other electrodes 12
Spectral Response
Photocathode, Semitransparent:
Rectangular image (4 x 3 aspect ratio):
Useful size of 1.6" max. diagonal
Note: The size of the optical image focused on the
photocathode should be adjusted so that its maximum
diagonal does not exceed the specified value. The
corresponding electron image on the target should
have a size such that the corners of the rectangle
just touch the target ring.
Orientation of Proper orientation is obtained when the
vertical scan is essentially parallel to the plane
passing through center of faceplate and the grid-No.6
envelope terminal. The horizontal and vertical scan
should start at the corner of the picture between the
grid-No.6 and the photocathode envelope terminals.
Target-to-Mesh Spacing 0.001 in.
Focusing Method
Deflection Method
Overall Length 19.375" ± 0.310"
Greatest Diameter of Bulb 4.500" ± 0.094"
Minimum Deflecting-Coil Inside Diameter 3.2"
Deflecting-Coil Length
Focusing-Coil Length
Alignment-Cail:
Position on neck Centerline of magnetic field should be located 9.25" from the flat area
of the shoulder.
Operating Position See Operating Considerations
Weight (Approx.)
Envelope Terminals
BOTTOM VIEW

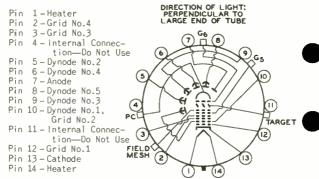
Terminal Over Pin 2-Field Mesh Terminal Over Pin 4-Photocathode (PC) Terminal On Side Of Envelope

Opposite Base Key-Grid No.6 (G6) See basing diagram on next page.



Terminal Over Pin 9-Grid No.5 (G₅) Terminal Over Pin 11-Target

BOTTOM VIEW



Maximum and Minimum Ratings, Absolute-Maximum Values:

PHOTOCATHODE:									
Voltage							-700 max	volts	
Illumination								fc	
OPERATING TEMPERATURE:	•	•			•	•	JU IIIAX.	10	
							CE	°C	
Any part of bulb		•			•	•	os max.	90	
Of bulb at large end of tube							25 :	00	
(Image section)	٠	•			•	•	35 min.	oC	
TEMPERATURE DIFFERENCE:									
Between image section and an									
of bulb hotter than image se	cti	ion					5 max.	OC.	
GRID-No.6 VOLTAGE							-700 max.	volts	
TARGET VOLTAGE:									í
Positive value							10 max.	volts	
Negative value							10 max.	volts	
FIELD-MESH VOLTAGE*	Ċ				Ċ		30 max.	volts	
GRID-No.5 VOLTAGE	Ĭ.	•		•	٠	•	300 max.	volts	
GRID-No.4 VOLTAGE	•	•	•	•	٠	•	350 max.	volts	
GRID-No.3 VOLTAGE	•	•		•	•	•	400 max.	volts	
GRID-No.2 & DYNODE-No.1 VOLTAG	٠.	•		•	•	•			
	Ľ.	•		•	•	٠	350 max.	volts	
GRID-No.1 VOLTAGE:							4.00		1
Negative-bias value	•	•				٠	125 max.	volts	
Positive-bias value							0 max.	volts	
PEAK HEATER-CATHODE VOLTAGE:									
Heater negative with respect	to) C	ath	nod	e.		125 max.	volts	
Heater positive with respect								volts	
ANODE-SUPPLY VOLTAGE*								volts	
VOLTAGE PER MULTIPLIER STAGE .						Ĺ	350 max.	volts	
				-	•	•	,		•

	Typical Operating Values: ♦	
	Photocathode Voltage600	volts
	Grid-No.6 Voltage (Image focus) Approx.	
V	50% of photocathode voltage250 to -350	volts
	Target Voltage Above Cutoff 2 to 3	volts
	Field Mesh Voltage 15 to 25	volts
	Grid-No.5 Voltage (Decelerator) 40	volts
	Grid-No.4 Voltage (Beam Focus) 70 to 90	volts
	Grid-No.3 Voltage* 250 to 275	volts
	Grid-No.2 & Dynode-No.1 Voltage 280	volts
	Grid-No.1 Voltage for Picture Cutoff45 to -115	volts
	Dynode-No.2 Voltage	volts volts
	Dynode-No.3 Voltage 800 Dynode-No.4 Voltage 1000	volts
	Dynode-No.5 Voltage	volts
	Anode Voltage	volts
	Target Temperature Range	oC
	Minimum Peak-to-Peak Blanking Voltage . 5	volts
	Field Strength of Focusing Coil:	
	At center of scanning section	
	(Approx.) 60	gausses
	In plane of photocathode (Approx.) 120	gausses
	Field Strength of Alignment Coil 0 to 3	gausses
	Performance Data:	
	With conditions shown under Tyfical Operating target voltage adjusted to 3 volts above cutoff, the camera lens set to bring the picture highligstop above the "knee" of the Basic Light-Tr. Characteristic Curve except as atherwise sp.	and with thts 1/2
		ecified
	Nin. Average No	
	Cathode Radiant Sensitivity at 4500 argstroms 0.028	
	Cathode Radiant Sensitivity at 4500 argstroms 0.028 Anode Current (DC) 30 °	xx.
	Cathode Radiant Sensitivity at 4500 argstroms 0.028 Anode Current (DC) 30 ° Signal-Output Current (Peak	- μa/μw - μa
	Cathode Radiant Sensitivity at 4500 angstroms 0.028 Anode Current (DC) 30 ° Signal-Output Current (Peak to Peak) 5 -	xx. - μa/μw
•	Cathode Radiant Sensitivity at 4500 argstroms 0.028 Anode Current (DC) 30 ° Signal-Output Current (Peak to Peak) 5 - Ratio of Peak-to-Peak High-	- μa/μw - μa
•	Cathode Radiant Sensitivity at 4500 argstroms 0.028 Anode Current (DC) 30 ° Signal-Output Current (Peak to Peak) 5 - Ratio of Peak-to-Peak High- light Video-Signal Current	- μa/μw - μa
•	Cathode Radiant Sensitivity at 4500 argstroms	- μa/μw - μa
•	Cathode Radiant Sensitivity at 4500 argstroms	- μa/μw - μa
•	Cathode Radiant Sensitivity at 4500 argstroms	- μa/μw - μa
•	Cathode Radiant Sensitivity at 4500 argstroms	- μa/μw - μa
•	Cathode Radiant Sensitivity at 4500 argstroms	- μa/μw - μa
•	Cathode Radiant Sensitivity at 4500 argstroms	ж. - µа/µw - µа 40 µа
•	Cathode Radiant Sensitivity at 4500 argstroms	ж. - µа/µw - µа 40 µа
•	Cathode Radiant Sensitivity at 4500 argstroms	- μa/μw - μa 40 μa 15 fc
•	Cathode Radiant Sensitivity at 4500 argstroms	ж. - µа/µw - µа 40 µа
•	Cathode Radiant Sensitivity at 4500 argstroms	- μa/μw - μa 40 μa 15 fc

^{*} Dynode-voltage values are shown under Typical Operating Values.

[♠] The target supply voltage should be adjustable from -5 to 5 volts.



[♦] with 7389-A operated in RCA TK-12 camera at fixed photocathode voltage.

Adjust for optimum focus.

7389-A

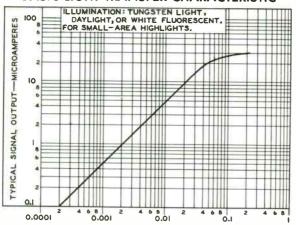
- Direction of current should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.
- # Measured with amplifier having flat frequency response.

OPERATING CONSIDERATIONS

The operating position of the 7389—A should preferably be such that any loose particles in the neck of the tube will not fall down and strike or become lodged on the target. Therefore, it is recommended that the tube never be operated in a vertical position with the Diheptal—base end up nor in any other position where the axis of the tube with base up makes an angle of less than 20° with the vertical.

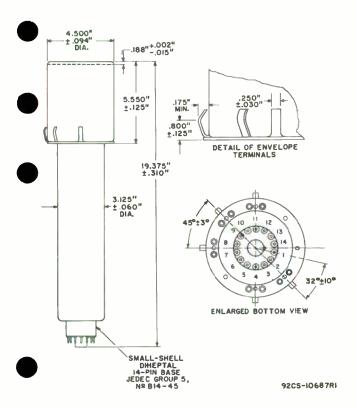
SPECTRAL-SENSITIVITY CHARACTERISTIC of Photosensitive Device having S-IO Response is shown at the front of this Section

BASIC LIGHT-TRANSFER CHARACTERISTIC



HIGHLIGHT ILLUMINATION ON PHOTOCATHODE -- FOOTCANDLES 92CS-10690







Vidicon

For Industrial TV Applications with Black-and-White TV Cameras

DATA

dellet at .
Heater, for Unipotential Cathode: Voltage {AC or DC} 6.3 \pm 10% volts Current at 6.3 volts 0.6 amp Direct Interelectrode Capacitance: Target to all other electrodes 3.1
rectangular image (4 x)
aspect ratio)
Overall Length 6.250" ± 0.063"
Greatest Diameter
Weight (Approx.)
Operating Position Any
Bulb
Socket
Basing Designation for BOTTOM VIEW 8HM
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Internal Connection— Do Not Use Pin 7 - Cathode Pin 8 - Heater Flange - Target Short Index Pin - Same as
Pin 4 – Same as Pin 3
Pin 5 - Grid No.2 SHORT
Pin 6 - Grid No.4, Pin
Grid No.3 DIRECTION OF LIGHT:
Maximum Ratings, Absolute-Naximum Values:
For scanned area of 1/2" x 3/8"
GRID-No.3 & GRID-No.4 VOLTAGE
GRID—No.2 VOLTAGE 750 max. volts GRID—No.1 VOLTAGE:
Negative-bias value 300 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

General:

PEAK TARGET CURRENT*. 0.6 max. FACEPLATE:	μa fc oC
Typical Operation:	
For scanned area of 1/2" x 3/8" and faceplate temperature of 30° to 35° C	
Grid-No.4 (Decelerator) & Grid-No.3 (Beam-Focus-Electrode ^b) Voltage 200° to 300 Grid-No.2 (Accelerator) Voltage 300 Grid-No.1 Voltage for picture cutoff ^d 45 to -100 Average "Gamma" of Transfer	volts volts volts
Characteristic for signal-output current between 0.05 μ a and 0.2 μ a . 0.55 Target Voltage to produce 0.02 μ a dark current:	
Maximum 30 Typical 25	volts volts
Minimum Peak-to-Peak Blanking Voltage: When applied to grid No.1 30 When applied to cathode 10 Field Strength at center of focusing	volts volts
coil (Approx.)	gausses
Alignment Coil [®] 0 to 4	gausses
Maximum-sensitivity operation	
Faceplate Illumination (Highlight). 0.5 Target Voltagef	fc volts μa μa
a Video amplifiers must be designed properly to handle target c this magnitude to avoid amplifier overload or picture distor.	urrents of

this magnitude to avoid amplifier overload or picture distortion,

Beam focus is obtained by combined effect of grid-No.3 voltage which should be adjustable over indicated range, and a focusing coil having an average field strength of 40 gausses.

Definition, focus uniformity, and picture quality decrease with decreasing grid-Mo.4 and grid-Mo.3 voltage. In general, grid Mo.4 and grid Mo.3 should be operated above 250 volts.

With no blanking voltage on grid No.1.

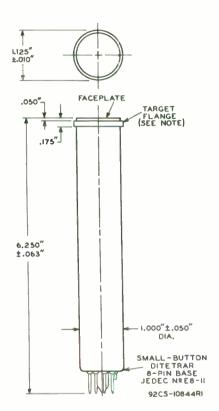
The alignment coil should be located on the tube so that its center is at a distance of 3-11/16 inches from the face of the tube, and be positioned so that its axis is coincident with the axis of the tube, the deflecting yoke, and the focusing coil.

The target voltage for each 7697 must be adjusted to that value which gives the desired operating dark current.

The deflecting circuits must provide extremely linear scanning for good black-level reproduction. Dark-current signal is proportional to the scanning velocity to yo change in scanning velocity produces a black-level error in direct proportion to the change in scanning velocity.

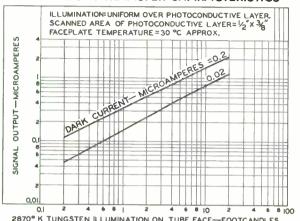
Defined as the component of the highlight target current after the darkcurrent component has been subtracted.





NOTE: THE TARGET CONNECTOR MUST BE CAPABLE OF MAKING CONTACT AT ANY POINT ON TARGET FLAMGE.

TYPICAL LIGHT-TRANSFER CHARACTERISTICS



2870° K TUNGSTEN ILLUMINATION ON TUBE FACE-FOOTCANDLES

92CS-10847

Multiplier Phototube

IO-STAGE, HEAD-ON, SPHERICAL-FACEPLATE TYPE HAVING ENCLOSED, IN-LINE DYNODE STRUCTURE, I.68"-DIAMETER, SPHERICAL, SEMITRANSPARENT PHOTOCATHODE, S-II RESPONSE, AND VERY SHORT TIME-RESOLUTION CAPABILITY

DATA

G	eneral:	
W	pectral Response	
C	athode, Semitransparent:	
	Shape	cal
	Area (Projected) 2.2 sq.	
		in.
	Index of refraction 1.51	
0	Firect Interelectrode Capacitances	
_	(Approx.):	
	Anode to dynode No.10 3.8	μμf
	Anode to all other electrodes 5	μμξ
		μμτ
		12"
	Seated Length	
l,	Maximum Diameter	31"
	Operating Position	
	/eight (Approx.)	
Č	Bulb	116
i c	Socket Cinch No.3M14, or equival Base Medium—Shell Diheptal 14-	ent
,		
	(JEDEC Group 5, No.814-Basing Designation for BOTTOM VIEW	
	Pin 1-Dynode No.1	
	Pin 2 - Dynode No.3	
	Pin 3 - Dynode No.5	
	Pin 4 - Dynode No. 7	
	Pin 5 – Dynode No.9	
_	Pin 6 – Anode	
	Pin 7 - Dynode No. 10 (1)	
	Pin B - Dynode No. B	
	Pin 9 - Dynode No.6	
	Pin 10 – Dynode No.4	
	Pin 11 – Dynode No.2	
	Pin 12 - internal Con-	
	nection—	
	Do Not Use	
	Pin 13 - Focusing Electrode DIRECTION OF LIGHT:	
	Pin 14 – Photocathode INTO END OF BULB	
M	aximum Ratings, Absolute-Naximum Values:	
9	UPPLY VOLTAGE BETWEEN ANODE AND	
		lts
	200 1141. 40	

-					
SUPPLY VOLTAGE BETWEEN DY AND ANODE (DC) SUPPLY VOLTAGE BETWEEN CC DYNODES (DC) SUPPLY VOLTAGE BETWEEN DY	NSECI	UTIVE	400 m		
AND CATHODE (DC) SUPPLY VOLTAGE BETWEEN FO			600 m	ax. volts	
ELECTRODE AND CATHODE (AVERAGE ANODE CURRENT* AMBIENT TEMPERATURE	DC).		600 m 2 m 75 m	ax. ma	
Characteristics Range Val	ues	for Equipmen	t Design:		
Under conditions with d age divider providing e					
With E = 2000 volts (Exc voltage adjusted to give	ept a	s noted) and	d focusing	-electrode	
				ion	_
	Min.	Median	Max.		
Sensitivity: Radiant, at 4400 angstroms	_	9.6 x 10 ⁵	_	amp/watt	
Cathode radiant, at 4400 angstroms	_	0.056	_	amp/watt	
Luminous, at 0 cps Cathode luminous:	200	1200	6000	amp/lumen	
With tungsten light source* ⋅ ⋅ With blue	50	70	-	μa/lumen	
light source Current Amplification . Equivalent Anode-Dark- Current Input at	0.05	1.7 × 10 ⁷	_	μа	
of 230 amperes/lumen. Equivalent Noise Input Anode-Pulse Rise Time Greatest Delay Between Anode Pulses:	-	9 x 10 ⁻¹⁰ 6 x 10 ⁻¹² 2 x 10 ⁻⁹	3.5 x 10 ⁻¹	9 lumen lumen sec	
Due to position from which electrons are simultaneously re- leased within a circle centered on tube face having a diameter of— 1.4". 1.6"	-	3 × 10 ⁻¹⁰ 5 × 10	_ _	sec sec	•
With E = 1500 volts (Exc					
voltage adjusted to give	Min.			O R	
Sensitivity:	min.	ned1 an	Max.		
Radiant, at 4400 angstroms Cathode radiant,	_	1 x 10 ⁵	- to	amp/watt	•
at 4400 angstroms . Luminous, at 0 cps .	- 23	0.056 130	- 680	amp/watt amp/lumen	



		Min.	Median	Max.	
	Cathode luminous: With tungsten light source* Current Amplification. Equivalent Anode-Dark-	50	70 1.8 × 10 ⁶	<u>-</u>	μa/lumen
)	Current Input® at iuminous sensitivity of 20 amperes/lumen . Equivalent Noise Input® Pulse Height Resolution#	- - -	8 × 10-10 4 × 10-12 8.5	2.5 × 10 ⁻⁹ 1 × 10 ⁻¹¹ 9	lumen lumen %

With E = 1000 volts (Except as noted) and focusing-electrode voltage adjusted to give maximum current amplification

	Nax.	Median	Min.	
				Sensitivity:
amp/watt	_	4.8×10^{3}		Radiant, at 4400 angstroms
amp/watt amp/lumen	- 30	0.056 6	- 1	Cathode radiant, at 4400 angstroms. Luminous, at 0 cps.
μa/lumen	_	70	50	Cathode luminous: With tungsten light source*
	-	8.6 × 10 ⁴	-	Current Amplification . Equivalent Anode-Dark- Current Input at
lumen lumen	_	5 x 10 ⁻¹⁰ 5 x 10 ⁻¹²	_	luminous sensitivity of 6 amperes/lumen. Fourvalent Noise Input

Averaged over any interval of 30 seconds maximum.

Under the following conditions: The light source is a tungsten-filament lamp operated at a color temperature of 2870 $^{\rm O}$ K. A light input of 0.1 microlumen is used.

Under the following conditions: The light source is a tungsten-filament lamp operated at a color temperature of 2870° k. The value of light flux is 0.01 lumen and 200 volts are applied between cathode and all other electrodes connected together as anode.

Under the following conditions: Light incident on the cathode is transmitted through a blue filter (Corning No.C.S. 5-58. Glass Code No.513 polished to 1/2 stock thickness) from a tungsten-filament lamp operated at a color temperature of 2N700 K. The value of light flux on the filter is 0.01 lumen. A voltage of 200 volts is applied between cathode and all other electrodes connected together as anode.

For spectral characteristic of this source, see sheet SPECTRAL CHARACTER-ISTIC OF 2870 K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870 K SOURCE AFTER PASSING THROUGH INDICATED BLUE FILTER at front of this section.

Measured at a tube temperature of $25^{\mbox{\scriptsize G}}$ C. Oark current $\mbox{\scriptsize m.iy}$ be reduced by the use of a refrigerant.

Under the following conditions: Supply voltage (E) is as shown, 25°-C tube temperature, external shield is connected to cathode, bandwidth 1 cycle per second, tungsten light source of 2870 K Interrupted at a low audio frequency to produce incident radiation pulse, alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

Measured between 10 per cent and 90 per cent of maximum anode-pulse height. This anode-pulse rise time is primarily a function of transit-time variations in the multiplier stages and is measured under conditions with an incident-light spot approximately 1 millimeter in diameter with an incident-light spot approximately 1 millimeter in diameter

centered on the photocathode.



These values represent the difference in time of transit between the photocathode and dynode No.1 for electrons simultaneously released from the center and from the periphery of the specified areas.

* Measured with supply voltage (E) = 1200 to 1200 volts; radiation source, an isotope of cesium having an atomic mass of 137 (cs. 137); scintillation counter crystal, a cylindrical 2 " x 2" thallium-activated sodium-iodide type [MgI(TI) — type 808550, Serial Mo.AL281, manufactured by Harshaw Chemical Co., 1945 E. 97 Street, Cleveland 6, 0hio].

TABLE I

VOLTAGE TO BE PROVIDED	BY OIVIOER
Between	8.06% of Supply Voltage (E) multiplied by
Cathode and Dynode No.1	2
Dynode No.1 and Dynode No.2	1.4
Dynode No.2 and Dynode No.3	1
Dynode No.3 and Dynode No.4	1
Dynode No.4 and Dynode No.5	1
Dynode No.5 and Dynode No.6	1
Dynode No.6 and Dynode No.7	1
Dynode No.7 and Dynode No.8	1
Dynode No.8 and Dynode No.9	1
Dynode No.9 and Dynode No.10	1
Dynode No.10 and Anode	1
Anode and Cathode	12.4

Focusing electrode is connected to arm of potentioneter between cathode and dynode No.1. The focusing-electrode voltage is varied to give maximum current amplification.

OPERATING CONSIDERATIONS

The operating stability of the 7746 is dependent on the magnitude of the anode current and its duration. When the 7746 is operated at high average values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 7746 usually recovers a substantial percentage of such loss in sensitivity.

The use of an average anone current well below the maximumrated value of 2 milliamperes is recommended when stability of operation is important. When maximum stability is required, the average anode current should not exceed 10 microamperes.

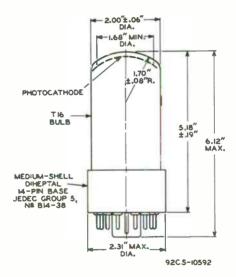
 $\it Electrostatic$ and/or $\it magnetic$ $\it shielding$ of the 7746 may be necessary.

Adequate light shielding should be provided to prevent extraneous light from reaching any part of the 7746.



The high voltages at which the 77.66 is operated are very dangerous. Care should be taken in the design of apparatus to prevent the operator from coming in contact with these high voltages. Precautions should include the enclosure of high-potential terminals and the use of interlock switches to break the primary circuit of the high-voltage power supply when access to the apparatus is required.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-II Response is shown at front of this Section



CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN $2^{\rm O}$ IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE,

TYPICAL ANODE CHARACTERISTICS

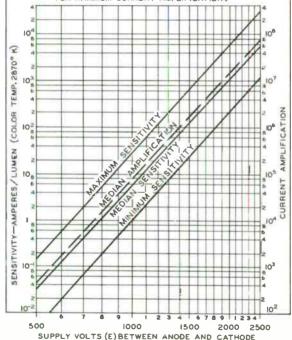
DYNODE - No.1-TO - CATHODE VOLTS = 160
DYNODE - No.1-TO - DYNODE - No.2 VOLTS = 110
EACH SUCCEEDING - DYNODE - STAGE VOLTS = 80 FOCUSING-ELECTRODE VOLTAGE ADJUSTED FOR MAXIMUM CURRENT AMPLIFICATION.
LIGHT SOURCE IS A TUNGSTEN-FILAMENT LAMP OPERATED AT A
COLOR TEMPERATURE OF 2870° K. 0 4 9 S ER DYNODE ø Ls. ANODE BETWEEN 0 ANODE MICROAMPERES 92CM - 10596RI

CHARACTERISTICS

THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS:

BETWEEN	8.06% OF E		
CATHODE & DYI	2		
DYI & DY2	1.4		
DY2 & DY3	1		
DY3 & DY4			
DY4 & DY5	ı		
DYS & DYS			
DY6 &DY7	1		
DY7 & DY8	1		
DY8 & DY9	E		
DY9 & DYIO			
DYIO & ANODE			
ANODE & CATHODE	12.4		

FOCUSING-ELECTRODE VOLTAGE IS ADJUSTED FOR MAXIMUM CURRENT AMPLIFICATION.



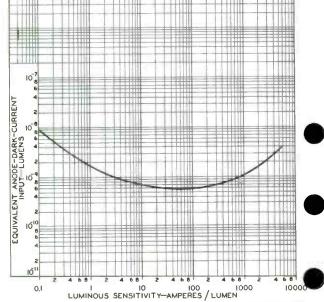
TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC

LUMINOUS SENSITIVITY IS VARIED BY ADJUSTMENT OF THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS:

BETWEEN	8.06% OF E MULTIPLIED BY
CATHODE & DYI	2
DYI & DY2	1.4
DY28 DY3	1 1
DY3 & DY4	
DY4 & DY5	
DY5 & DY6	1 - 1
DY6 & DY7	
DY7 & DY8	
DY8 & DY9	4
DY9 & DY10	
DYIO & ANODE	
ANODE & CATHODE	12.4

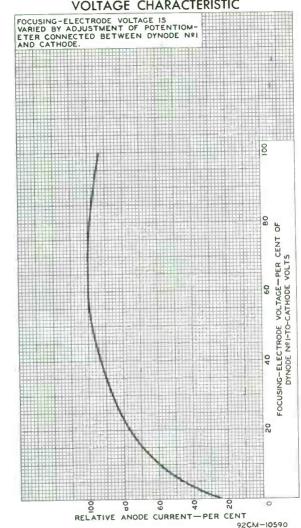
FOCUSING-ELECTRODE VOLTAGE IS ADJUSTED FOR MAXIMUM CURRENT AMPLIFICATION.

LIGHT SOURCE IS A TUNGSTEN-FILAMENT LAMP OPERATED AT A COLOR TEMPERATURE OF 2870° K. TUBE TEMPERATURE=25° C

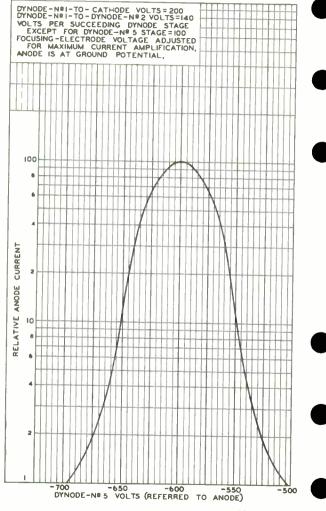


92CM-10593RI

AVERAGE FOCUSING-ELECTRODE-VOLTAGE CHARACTERISTIC



TYPICAL ANODE-CURRENT CHARACTERISTIC



92CM-10598



Multiplier Phototube

6-STAGE, MEAD-ON, FLAT-FACEPLATE, COMPACT TYPE HAVING IN-LINE DYNODE STRUCTURE, 0.5"-DIAMETER CURVED, CIRCULAR, SEMITRANSPARENT PHOTOCATHODE AND S-II RESPONSE

DATA

Sp Wa	meral: mectral Response evelength of Max athode, Semitrar Shape Window: Area	imum Respo sparent:	nse					00 angs ved Cir	
Ma Se Ma Op We Bu	Minimum diame Index of refirect Interelect Anode to dynode Anode to all ot iximum Overall Leated Length. iximum Diameter erating Positicight (Approx.)	eter	itances	s (#	 	ox. }	0.5 51 : 1.8 2.8	18" ±	in. ##f ##f 2.75" 0.06" 0.78" .Any 0.6 oz . T6 alent 9-371
	Pin 1 – Dynode † Pin 2 – Dynode † Pin 3 – Dynode † Pin 4 – Anode Pin 5 – Dynode † Pin 6 – Dynode †	lo.3 (lo.5 (lo.6 (lo.4 (THE PROPERTY OF THE PROPERTY O	O O O LIGHT BULB) P) P	in 8	l – Inte neo Do l – Pho	ode No. ernal C ction— Not Us to— thode	on-
SU	ximum Ratings, JPPLY VOLTAGE BE CATHODE (DC or	TWEEN ANOD Peak AC).	E AND				1500	max.	volts
	PPLY VOLTAGE BE AND ANODE (DC o PPLY VOLTAGE BE	r Peak AC)					300	max.	volts
SU	DYNODES (CC or IPPLY VOLTAGE BE AND CATHODE (C)	TWEEN DYNO	DE No.1	1					volts volts
	PERAGE ANODE CUP IBLENT TEMPERATI	RENT					0.5	max. max.	ma oC

Characteristics Range Values for Equipment Design:

Under conditions with dc supply voltage (E) across a voltage divider providing 1/4 of E between cathode and dynode No.1; 1/8 of E for each succeeding stage; and 1/8 of E between dynode No.6 and anode

With E = 1200 volts (Except as noted)

	Min.	Median	Max.	
Sensitivity:				
Radiant, at 4400 angstroms Cathode radiant, at		0.00024	_	amp/μw
4400 angstroms		0.048	_	amp/watt
Luminous, at 0 cps.	. 0.1	0.3	1.0	amp/lumen
Cathode luminous: With tungsten				
light source* . With blue light		60	***	μa/lumen
source♥*		0.06 5 x 10^3	_	μа
Current Amplification.		5×10^{3}	_	
Equivalent Anode- Dark-Çurrent				
Input		1×10^{-8}	3×10^{-8}	lumen
Equivalent Noise		2 40 10		
Input ⁴ · · · · · ·	•	3 x 10-10	1 × 10 ⁻⁹	lumen
A				

- Averaged over any interval of 30 seconds maximum.
- Under the following conditions: The light source is a tungstenflament lamp operated at a color temperature of 2870° K. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.
- the following conditions: The light source is a tungstenfilament lamp operated at a color temperature of 2870° K. The value of light flux is 0.01 lumen and 200 volts are applied between cathode and all other electrodes connected together as anode.
- Under the following conditions: Light incident on the cathode is tramsmitted through ablue filter (Corning, Glass Code No.5113 pollshed to 1/2 stock thickness) from a tungsten-filament lamp operated at celor temperature of 2870 k. The value of light flux on the filter is 0.01 lumen, The load resistor has a value of 0.01 megohm and 200 volts are applied between cathode and all other electrodes connected together as anotes.
- * For spectral characteristic of this source, see sheet SPECTRAL CHARACTERISTIC OF 2870° K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870° K SOURCE AFTER PASSING THROUGH INDICATED BLUE FILTER at front of this section.
- Measured at a tube temperature of 25° C and with the supply voltage (E) adjusted to give a luminous sensitivity of 0.3 ampere per lumen. Dark current may be reduced by the use of a refrigerant.
- ♦ under the following conditions: Supply voltage (E) is as shown, 25°-C tube temperature, external shield is connected to cathode, bandwidth i cycle per second, tungsten light source of 2870° K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulses is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

OPERATING CONSIDERATIONS

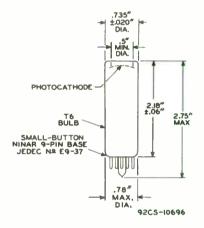
The use of an average anode current will below the maximum-rated value of 0.5 milliampere is recommended when stability of operation is important.



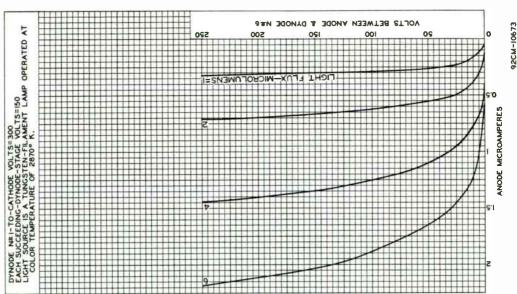
Electrostatic and/or magnetic shielding of the 7764 may be necessary.

The high voltages at which the 7764 is operated are very dangerous. Before any part of the circuit is touched, the power-supply switch should be turned off and both terminals of any capacitors grounded.

> SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-II Response is shown at front of this Section

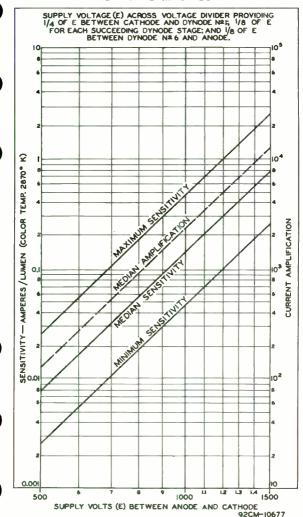




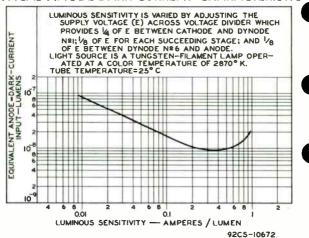




CHARACTERISTICS



TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC



Multiplier Phototube

IO-STAGE, HEAD-ON, FLAT-FACEPLATE, COMPACT TYPE HAVING IN-LINE DYNODE STRUCTURE, 0.5"-DIAMETER, CURVED, CIRCULAR, SEMITRANSPARENT PHOTOCATHODE AND S-II RESPONSE

DATA

	general:	
	Spectral Response	
	Cathode, Semitransparent:	
	Shape	
	Area	
	Direct Interelectrode Capacitances (Approx.): Anode to dynode No.10 2.4 Anode to all other electrodes 3.2 Maximum Overall Length (Excluding	
	flexible leads)	' / z 5 1
	Lead 1 - Dynode No.1 Lead 2 - Dynode No.5 Lead 3 - Dynode No.5 Lead 4 - Dynode No.5 Lead 5 - Dynode No.9 Lead 6 - Anode Lead 7 - Dynode No.10 DIRECTION OF LIGHT. WITO END OF BULB	
	Maximum Ratings, Absolute-Haximum Values:	
	SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE (DC or Peak AC)1500 max. volt:	5
	SUPPLY VOLTAGE BETWEEN DYNODE No.10 AND ANODE (DC or Peak AC) 300 max. volt: SUPPLY VOLTAGE BETWEEN CONSECUTIVE	S
	DYNODES (DC or Peak AC)200 max. volt: SUPPLY VOLTAGE BETWEEN DYNODE No.1	S
	AND CATHODE (DC or Peak AC)	a
_		

General:

Characteristics Range Values for Equipment Design:

Under conditions with supply voltage (E) across voltage divider providing 1/6 of E between cathode and dynode No.1; 1/12 of E for each succeeding dynode stage; and 1/12 of E between dynode No.10 and anode

With B = 1250 volts dc (Except as noted)

50		,		
	Min.	Median	Max.	
Sensitivity:				
Radiant, at 4400				
angstroms	-	0.006	-	amp/μw
Cathode radiant, at				
4400 angstroms		0.048	_	amp/watt
Luminous, at 0 cps.		7.5	60	amp/lumen
Cathode luminous*		60	-	μa/lumen
Current Amplification.		1.25×10^{5}	-	•
Equivalent Anode-Dark-				
_ Current Input♦	-	5 x 10-10	5 x 10-9	lumen
Equivalent Noise				
Inputé	_	3 × 10-12	1×10^{-11}	lumen

Averaged over any interval of 30 seconds maximum.

Under the following conditions: The light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.

Under the following conditions: The light source is a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux is 0.01 lumen and 200 volts are applied between cathode and all other electrodes connected together as anode. The load resistor has a value of 0.01 megohm.

 \P Measured at a tube temperature of 25 $^{\rm O}$ C. Dark current may be reduced by the use of a refrigerant.

Under the following conditions: Supply voltage (f) is as shown, Z50-C tube temperature, external shield is connected to cathode, bandwidth 1 cycle per second, tungsten light source of 2870° K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

OPERATING CONSIDERATIONS

The use of an average anode current well below the maximum-rated value of 0.5 milliampere is recommended when stability of operation is important.

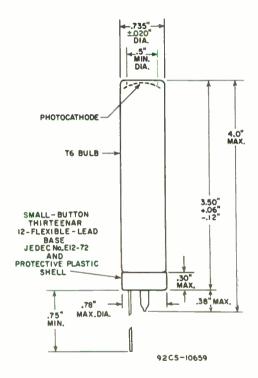
 ${\it Electrostatic} \ \ {\it and/or} \ {\it magnetic} \ \ {\it shielding} \ \ {\it of} \ \ {\it the} \ \ {\it 7767} \ \ {\it may} \\ {\it be} \ \ {\it necessary}.$

The high voltages at which the 7767 is operated are very dangerous. Before any part of the circuit is touched, the power supply switch should be turned off and both terminals of any capacitors grounded.

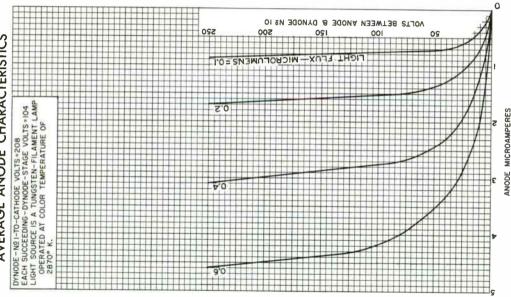
The flexible leads of the 7767 may be soldered into the associated circuit. If desired, the leads may be trimmed to within 1/4 inch of the protective plastic shell. When leads of reduced length are soldered, care must be taken to conduct excessive heat away from the lead seals. Otherwise, the heat of the soldering operation may crack the glass seals of the leads and damage the tube.

Under no circumstances is any device for support to be fastened to the protective plastic shell.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-II Response is shown at front of this Section









OF

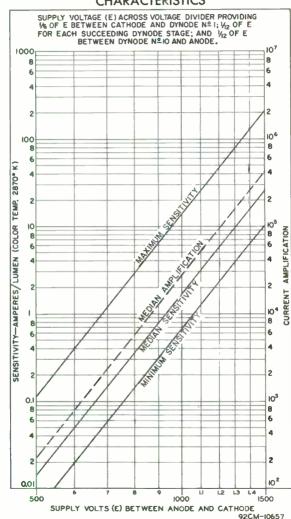
CORPORATION

Tube Division

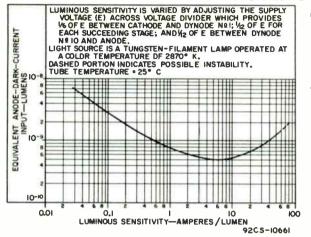
RADIO Electron Tu

92CM-10660

CHARACTERISTICS



TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC



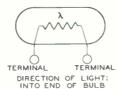
Photoconductive Cell

CADMIUM-SELENIDE, HEAD-ON TYPE

DATA

Ge	nera	ıl:

Spectral Resconse	. See Accompanying Curve
Wave'ength of Maximum Response	. 7300 ± 500 angstroms
Sensitive Surface:	
Shape,	Rectangular
Length	
Width	
Area (Average)	
Maximum Length (Excluding flexible lo	
Diameter	
Envelope	
Seals,	
Leads, Flexible	
Minimum length	
Diameter	
Operating Position	
Weight (Approx.,	



λ indicates that the primary characteristic of the element within the envelope symbol is designed to vary under the influence of light.

Maximum Ratings, Absolute-Maximum Values:

	VOLTAGE BETWEEN TERM	IN/	AL:	ŝ							
)	(DC or Peak AC)						,		100	max.	volts
	PHOTOCURRENT										μа
	POWER DISSIPATION								30	max.	mw
	AMB'ENT TEMPERATURE.										oC

Characteristics:

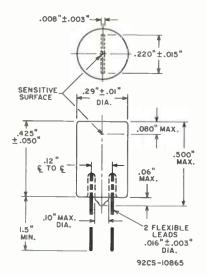
With dc voltage of 22.5 volts between terminal, and an ambient temperature of 250 C

Min Median Max.

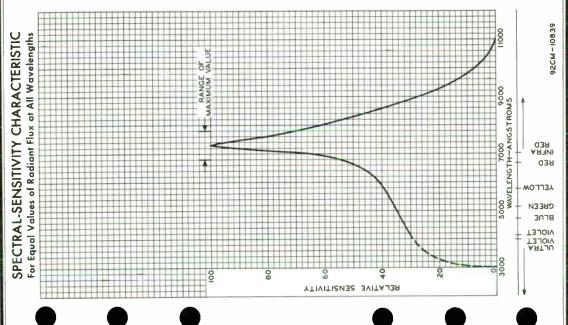
Se	n	S	i	t	i	٧	i	t	y:	
	n	_		•	_	_	À	A	٠.	

Radiant at 7300)						
angstroms				_	6550	_	a/w
Luminous*,*				_	41	_	a/lm
- Hiumination • .★.				_	500	_	μa/fc
Photocurrent♥					-	0.05	μа

- $^{\blacktriangle}$ For conditions where the incident power is 7.65 \times 10 $^{-10}$ watts.
- For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870 K.
- incldent illumination on the sensitive surface is 0.01 footcandle. Measured 20 seconds after removal of incident-illumination level of 6.01 footcandle.











Multiplier Phototube

12-STAGE, HEAD-ON, SPHERICAL-FACEPLATE TYPE HAVING ENCLOSED, IN-LINE DYNODE STRUCTURE, 1.68"-DIAMETER, SPHERICAL, SEMITRANSPARENT PHOTOCATHODE, S-II RESPONSE, HIGH CURRENT AMPLIFICATION, AND EXTREMELY SHORT RISE TIME

DATA

ne	

	Spectral Response
	Shape
	Window: Area (Projected) 2.2 sq. in.
	Minimum diameter 1.68 in.
•	Index of refraction 1.51
,	Direct Interelectrode Capacitances (Approx.):
	Anode to dynode No.12 3.8 μμf
	Anode to all other electrodes 5.7 $\mu\mu f$
	Dynode No.12 to all other electrodes 6.8 µµf
	Maximum Overall Length 6.31"
	Seated Length
	Maximum Diameter
	Operating Position Any
	Weight (Approx.)
	Bulb
	Socket Cinch Na.CX-875ª, or equivalent
	Base Small-Shell Bidecal 20-Pin
	LEDEC No. R20_102)

Basing Designation for BOTTOM VIEW .

Pin 1 - No Connection Pin 2 - Dynode No. 1

Pin 3 - Dynode No.3

Pin 4 - Dynode No. 5

Pin 5 - Dy node No. 7 Pin 6 - Dynode No.9

- Dynode No.11

Pin 8 - Anode

Pin 9 - No Connection

Pin 10 - No Connection

Pin 11 - No Connection

Pin 12 - Dynode No.12

Pin 13 - Dynode No. 10

Pin 14 - Dynode No. 8 Pin 15 - Dynode No.6

Pin 16 - Dynode No.4

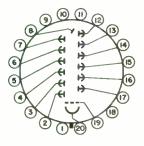
Pin 17 - Dynode No. 2

Pin 18 - No Connection

Pin 19 - Grid No. 1

(Focusing Electrode)

Pin 20 - Photocathode



DIRECTION OF LIGHT:

					-
	_				
Maximum Ratings, Absolu		77 1			
		values:			
SUPPLY VOLTAGE BETWEEN					_
CATHODE (DC)			2600 max.	volts	
SUPPLY VOLTAGE BETWEEN	DYNODE No.	12			
AND ANODE (DC)			400 max.	volts	_
SUPPLY VOLTAGE BETWEEN	COMSECUTIV		400 IIIda.	VUILS	
	COMSECUTIV	E.	200	1.	
DYNODES (DC)			300 max.	volts	
SUPPLY VOLTAGE BETWEEN	DYNOUL No.	1			
AND CATHODE (DC)			600 max.	volts	
SUPPLY VOLTAGE BETWEEN	FDCUSING			4	
ELECTRODE AND CATHODE	(DC)		600 max.	volts	
AVERAGE ANODE CURRENT ^b .			2 max.	ma	_
AMBIENT TEMPERATURE			75 max.	°C	
				0	
Characteristics Range V	alues for	Equipment De	sign:		
Under conditions with o	le eupply y	oltano (E) o	-	Idaaa	
divider providing el					
a ivider providing ei	ectrode v	ortages sno	own in la	ole t	
With E = 2300 volts (Ex	cept as not	ed) and foci	using-elec	trode	
voltage adjusted to giv	e maximum	current ampl	ification		_
	Min.	Median	Max.		
	H + 14 +	нештып	Mux.		
Sensitivity:					
Radiant, at 4400					
angstroms	**	4.8×10^{6}	_	a/w	
Cathode radiant, at					
4400 angstroms	_	0.056	_	a/w	
Luminous, at 0 cpsc.	1.4×10^{3}	6 x 10 ³	50×10^{3}	a/lm	
Cathada luai-	1.4 X 10	0 X 10-	30 X 10°	a/Im	
Cathode luminous:					
With tungsten					
light sourced	50	70	_	μa/lm	
With blue light					
source ^{e, f}	0.05	_	_	μa	
Current Amplification.	_	8.6×10^{7}	_	,	
Equivalent Anode-Dark-					
Current Inputs at					
luminous sensitiv-					
ity of 6000 a/lm		4 × 10-10	2.5 x 10 ⁻	9 1m	
	_		2.5 X 10	_	
Equivalent Noise Inputh	_	3 × 10 ⁻¹²	_	lm 🔻	
Anode-Pulse Rise Time ¹ .	_	2×10^{-9}	-	sec	
Greatest Delay Between					
Anode Pulses:					
Due to position from					
which electrons are					
simultaneously re-				_	_
leased within a circle				4	
centered on tube face				•	
having a diameter of-	-	40-10k			
1.4"	_	3 x 10-10	-	sec	
1.6"	_	3 x 10-10 ^k 5 x 10-10 ^k	_	sec	



With E = 1800 volts (Except as noted) and focusing-electrode voltage adjusted to give maximum current amplification Min

Median

	Radiant, at 4400					
	angstroms	•	-	5.1×10^5	-	a/w
	at 4400 angstroms		-	0.056	_	a/w
)	Luminous, at 0 cps ^c Cathode luminous: With tungsten	•	900	640	-	a/lm
	light sourced		50	70 9.1 x 10 ⁶	-	μa/lm
	Current Amplification Equivalent Anode-Dark- Current Input9 at luminous sensitivity	•	-	9.1 × 10 ⁶	_	
	of 160 a/lm		_	4 × 10 ⁻¹⁰	_	lm
	Equivalent Noise Inputh.		-	2.4×10^{-12}	_	lm
	With E = 1300 volts (Exc voltage adjusted to give		ximum	current amplij	ication	ctrode
						ctrode
			ximum	current amplij Median	ication	ectrode
	voltage adjusted to give Sensitivity:	та	ximum	current amplij	ication	ectrode a/w
	voltage adjusted to give Sensitivity: Radiant, at 4400 angstroms	ma.	ximum	current amplij Median	ication	
	Sensitivity: Radiant, at 4400 angstroms Cathode radiant, at 4400 angstroms Luminous, at 0 cpsc Cathode luminous:	<i>ma</i> .	ximum	Current amplij Nedian 2.9 × 10 ⁴	ication	a/w
	Sensitivity: Radiant, at 4400 angstroms Cathode radiant, at 4400 angstroms Luminous, at 0 cpsc.	<i>ma</i> .	ximum Min.	Nedian 2.9 × 10 ⁴ 0.056	fication Max.	a/w a/w

luminous sensitivity

Equivalent Moise Input^h. .

Pulse Height Resolution.

of 9 a/lm.

Sanatatuttu.

5 x 10-10

3 x 10-12

8.5

 2×10^{-9}

Ìm.

l m

%

Made by Cinch Manufacturing Corporation, 1026 South Homan Avenue, Chicago 24, Illinois.

Averaged over any interval of 30 seconds maximum.

C Under the following conditions: The light source is 4 tangsten-filament lump operated at a color temperature of 2870° K. A light input of 0.1 microlumen is used.

Under the following conditions: The light source is a tungsten-filament lamp operated at a color temperature of 2870° K. The value of input flux is 0.01 lumen and 200 volts are applied between cathode and all other electrodes connected together as anode.

Under the following conditions: Light incident on the cathode is transmitted through a blue filter (Corning C.S. No.5-58, Glass Code No.5119 polished to 1/2 stock thickness) from a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux on the filter is 0.01 lumen. A voltage of 200 volts is applied between cathode and all other electrodes connected together us anode.

For spectral characteristic of this source, see sheet SPECTRAL CHARACTERISTIC DF 2870° K LIGHT SOURCE AMO SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870° K SOURCE AFTER PASSING THROUGH INDICATEO BLUE FILTER at front of this section.

- ${\bf 9}$ Measured at a tube temperature of 25 $^{\rm O}$ C. Dark current may be reduced by the use of a refrigerant.
- Nunder the following conditions: Supply voltage (E) is as shown, 25°-C tube temperature, external shield is connected to cathode, bandwidth 1 cycle per second, tungsten light source of 2870° K interrupted at low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.
- Measured between 10 per cent and 90 per cest of maximum anode-pulse height. This anode-pulse rise time is primarily a function of transit-time variations in the multiplier stages and is measured under conditions with an incident light spot approximately 1 millimeter in diameter centered on the photocathods.
- k
 These values represent the difference in time of transit between the protocathode and dynode No.1 for electrons simultaneously released from the center and from the periphery of the specified areas.
 - Measured with supply voltage (E) = 1100 to 1800 volts; radiation source, an isotope of cesium having an atomic mass of 137 (Cs. 137); scintillation-counter crystal, a cylindrical 2° x 2° thallium-activated sodium-lodide type [Nai(Tl) type 8D8S50, Serial No.AL281, manufactured by Harshaw Chemical Company, 1945 East 97 Street, Cleveland 6, Ohlo].

TABLE I

VOLTAGE TO BE PROVIDED	BY DIVIDER
Between	6.95% of Supply Voltage (E) multiplied by
Cathode and Dynode No.1	2
Dynode No.1 and Dynode No.2	1.4
Dynode No.2 and Dynode No.3	1
Dynode No.3 and Dynode No.4	1
Dynode No.4 and Dynode No.5	1
Dynode No.5 and Dynode No.6	1
Dynode No.6 and Dynode No.7	1
Dynode No.7 and Dynode No.8	1
Dynode No.8 and Dynode No.9	1
Dynode No.9 and Dynode No.10	1
Dynode No.10 and Dynode No.11	1
Dynode No.11 and Dynode No.12	1
Dynoge No.12 and Anode	1
Anode and Cathode	14.4

Focusing electrode is connected to arm of potentiometer between cathode and dynode No.1. The focusing-electrode voltage is varied to give maximum current amplification.



OPERATING CONSIDERATIONS

The operating stability of the 7850 is dependent on the magnitude of the anode current and its duration. When the 7850 is operated at high average values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 7850 usually recovers a substantial percentage of such loss in sensitivity.

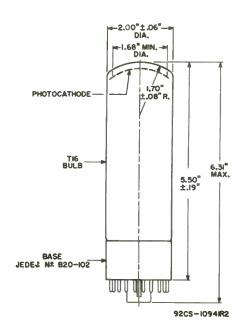
The use of an average anode current well below the maximum-rated value of 2 milliamperes is recommended when stability of operation is important. When maximum stability is required, the average anode current should not exceed 10 microamperes.

 $\it Electrostatic$ and/or magnetic shielding of the 7850 may be necessary.

Adequate light shielding should be provided to prevent extraneous light from reaching any part of the 7850-

The high voltages at which the 7850 is operated are very dangerous. Care should be taken in the design of apparatus to prevent the operator from coming in contact with these high voltages. Precautions should include the enclosure of high-potential terminals and the use of interlock switches to break the primary circuit of the high-voltage power supply when access to the apparatus is required.

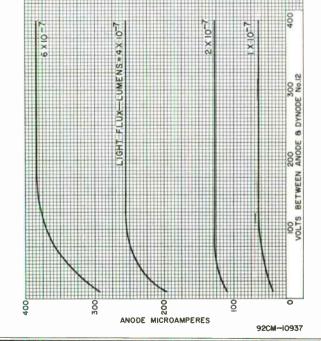
SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-II Response is shown at the front of this Section



CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN $2^{\rm O}$ IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

TYPICAL ANODE CHARACTERISTICS

DYNODE-No.I-TO-CATHODE VOLTS=250
DYNODE-No.I-TO-DYNODE-No.2 VOLTS=175
EACH SUCCEEDING-DYNODE-STAGE VOLTS=125
FOCUSING-ELECTRODE VOLTAGE ADJUSTED FOR MAXIMUM CURRENT AMPLIFICATION.
LIGHT SOURCE IS A TUNGSTEN-FILAMENT LAMP OPERATED AT A COLOR TEMPERATURE OF 2870° K.

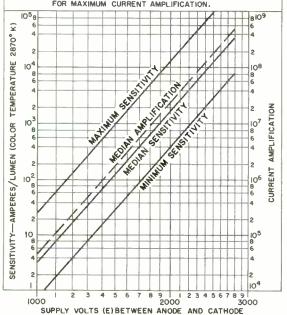


CHARACTERISTICS

THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS:

BETWEEN	6.95 % OF E
CATHODE & DY	2
DYI & DY2	1,4
DY2 & DY3	1
DY3 & DY4	1
DY4 8 DY5	l I
DY5 & DY6	1
DY6 & DY7	1
DY7 8 DY8	1
DY8 8 DY9	1
DY9 & DYIO	t t
DYIO & DYII	1
DYII & DYI2	E E
DYI2 & ANODE	1
ANODE & CATHODE	14.4

FOCUSING-ELECTRODE VOLTAGE IS ADJUSTED FOR MAXIMUM CURRENT AMPLIFICATION.



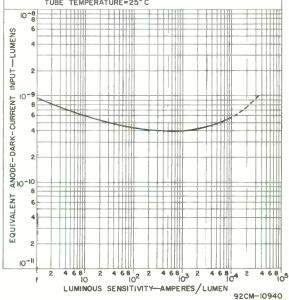
92CM-10946

TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC

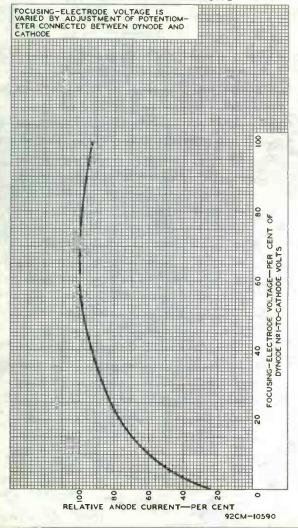
LUMINOUS SENSITIVITY IS VARIED BY ADJUSTMENT OF THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS:

BETWEEN	6.95 % OF E MULTIPLIED BY
CATHODE & DY	2
DYI 8 DY2	1.4
DY2 & DY3	1
DY3 & DY4	1
DY4 8 DY5	1
DY5 & DY6	
DY6 & DY7	
DY7 & DY8	1
DY8 & DY9	I
DY9 & DYIO	1
DYIO & DYII	l l
DYII & DYI2	1
DY12 & ANODE	1
ANODE & CATHODE	14.4

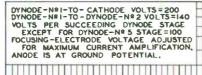
FOCUSING-ELECTRODE VOLTAGE IS ADJUSTED FOR MAXIMUM CURRENT AMPLIFICATION. LIGHT SOURCE IS A TUNGSTEN-FILAMENT LAMP OPERATED AT A COLOR TEMPERATURE OF 2870° K. TUBE TEMPERATURE=25°C

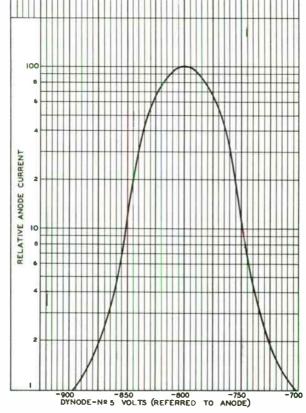


AVERAGE FOCUSING-ELECTRODE-VOLTAGE CHARACTERISTIC



TYPICAL ANODE-CURRENT CHARACTERISTIC





92CM-10959



Vidicon

1200-LINE RESOLUTION

For Broadcast Film-Pickup or Data Transmission with Color or Black-and-White TV Cameras

DATA

	General:
	Heater, for Unipotential Cathode:
	Vo'tage (AC or DC) 6.3 ± 10% volts
	Current at 6.3 volts 0.6 amp
	Direct Interelectrode Capacitance:
	Target to all other electrodes 8 µµf
	Spectral Response
	Wavelength of Maximum Response 4500 + 500 - 300 angstroms
	Photoconductive Layer:
	Maximum useful diagonal of
	rectangular image (4 x 3
	aspect ratio)
	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
	p'n. The masking is for orientation only and does not
	define the proper scanned area of the photoconductive layer.
	Focusing Method
	Deflection Method
	Focusing-Alignment Assembly Cleveland Electronics
	No.15 VFA 259, or equivalent
	Deflecting Yoke ^c
	No.15 VY 258, or equivalent
	Overail Length
	Greatest Diameter 1.59" ± 0.01"
	Weight (Approx.)
	Operating Posit on
_	Bulb
	Aldene No.208 SPEC, or equivalent
	Base Smail-Button Superditetrar 8-Pin (JEDEC No.E8-78)
	Basing Designation for BOTTOM VIEW
	pasing pesignation for bottom view

FLANGE

Pin 1 - Heater Pin 2-Grid No.1 Pin 3 - Internal Connection -Do Not Use Pin 4 - Grid No.4 Pin 5-Grid No. 2



Pin 6 - Grid No. 3 Pin 7 - Cathode Pin 8 - Heater Flange - Target Short Index Pin-Same as Pin 3

DIRECTION OF LIGHT: INTO FACE END OF TUBE Maximum Ratings, Absolute-Naximum Values:

Tax bold Ratinga, Absolute-Abaimum ratues.	
For scanned area of 0.6" x 0.8"	
GRID-No.4 VOLTAGE 1500 max. volts	
GRID-No.3 VOLTAGE 1500 max. volts	•
GRID-No.2 VOLTAGE 550 max. volts	
GRID-No.1 VOLTAGE:	
Negative-bias value 300 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	V
TARGET VOLTAGE 125 max. volts	
DARK CURRENT	
FACEPLATE:	
Illumination	_
Temperature 70 max. °C	
Typical Operation:	V
For scanned area of o.6" x o.8" and	
faceplate temperature of 30° to 35° C	
Grid-No.4 (Decelerator) Voltage ⁹ 1400 volts	
Grid-No.3 (Beam-Focus Electrodeh) 800 to 1000 volts	
Grid-No.2 (Accelerator) Voltage 300 volts	
Grid-No.1 Voltage for picture cutoff45 to -100 volts	
Average "Gamma" of Transfer	
Characteristic 0.65	
Minimum Peak-to-Peak Blanking Voltage:	
When applied to grid No.1	
When applied to cathode 20 volts	
Field Strength at center of focusing	
coil (Approx.)	
Field Strength of Adjustable	
Alignment Coil ^k 0 to 4 gausses	
Average-sensitivity operation	
Faceolate Illumination (Highlight) 8 fc	
Target Voltage ^{m, n} 20 to 50 volts	U
Dark Current P 0.02 μa	
Signal-Output Current ^q (Typical) 0.3 μα	
Minimum-lag operation	
Faceplate Illumination (Highlight) 36 fc Farget Voltage ^{m, †} 10 to 30 volts	_
Dark Current P 0.005 μa	
Signal-Output Current ^q (Typical) 0.3 μα	
This capacitance, which effectively is the output impedance of the 8051, is increased when the tube is mounted in the deflecting yoke	
8051, is increased when the tube is mounted in the deflecting yoke and focusing-alignment assembly. The resistive component of the output	
and focusing—alignment assembly. The resistive component of the output impedance is in order of 100 megohms.	
Cleveland Electronics Incorporated, 1974 East 61 Street, Cleveland, Ohio.	_
for minimum geometric distortion, the deflecting yoke should be located in its proper axial position 3/4 inch from the face of the tube.	
4	



Cinch Manufacturing Corporation, 1026 South Homan Avenue, Chicago 24, 1111nois.

- Alden Products Company, 9140 North Main Street, Brockton 64, Mass. video amplifiers must be designed properly to handle target currents of this magnitude to avoid amplifier overload or picture distortion.
- Grid-No.a vullage must always be greater than grid-No.3 voltage. For minimum "porthole" effect, grid-No.a voltage should be adjusted to approximately 1.5 times the grid-No.3 voltage value, and the focusing-alignment assembly and deflecting yoke positioned as shown in accompanying Recommended bocations of Focusing-Alignment Assembly and Deflecting
- Beam focus is obtained by the combined effect of grid-No 3 voltage, which should be adjustable over indicated range, and a focusing collihaving an average field strength of 46 gausses.

with no blanking voltage or grid No.1.

- k The alignment coil should be located on the tube so that its center is at a distance of 6 inches from the face of the tube, and be positioned so that its axis is coincident with the axis of the tube, the deflecting yoke, and the focusing coil.
 - Indicated range for each type of service serves only to illustrate the

operating target-voltage range rormally encountered.

n The target voltage for each 8051 must be adjusted to that value which

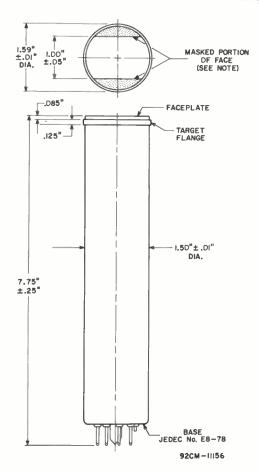
gives the desired operating dark current.

- P The deflecting circuits must provide extremely linear standing for good black-level reproduction. Dark-current signal is proportional to the scanning velocity. Any change in scanning velocity produces a black-level error in direct proportion to the change in scanning velocity.
- ¶ Defined as the component of the highlight target curren; after the dark-current component has been subtracted.

RESOLUTION CAPABILITY

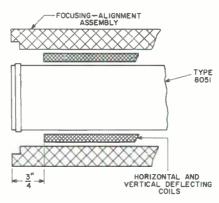
Resolution capability of the 8051 may be expressed in several ways: A typical value for Limiting Resolution is 1200 TV lines; typical Equivalent Sine-Wave Response (Ne) is approximately 270 TV lines per picture height; and typical Response to a 400 TV Line Square-Wave Test Pattern is 60 per cent.

> SPECTRAL-SENSITIVITY CHARACTERISTIC OF PHOTOSENSITIVE DEVICE HAVING S-18 RESPONSE is shown at front of this Section



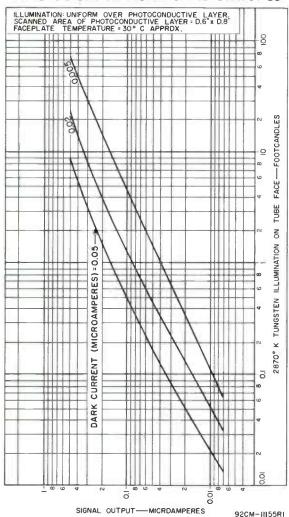
NOTE: STRAIGHT SIDES OF MASKED PORTIONS ARE PARALLEL TO THE PLANE PASSING THROUGH TUBE AXIS AND SHORT INDEX PIN.

RECOMMENDED LOCATIONS OF FOCUSING-ALIGNMENT ASSEMBLY AND DEFLECTING YOKE



92CS-III60

TYPICAL LIGHT-TRANSFER CHARACTERISTICS

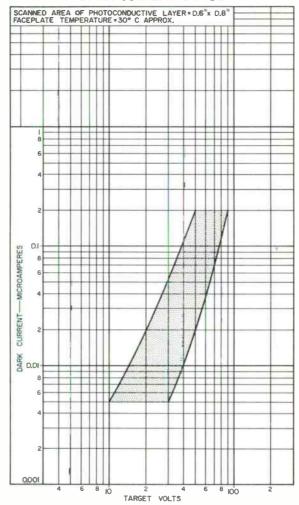


RADIO CORPORATION OF AMERICA **Electron Tube Division**

Harrison, N. J.



DARK-CURRENT RANGE



95CA-11165



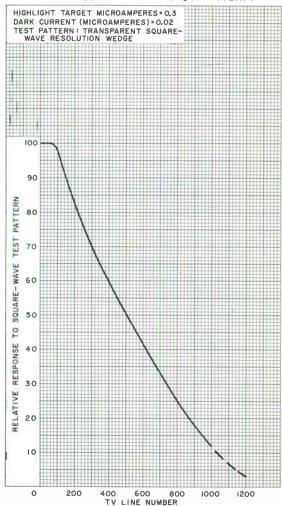
TYPICAL PERSISTENCE CHARACTERISTICS

INITIAL HIGHLIGHT SIGNAL-OUTPUT MICROAMPERES = 0.3 SCANNED AREA OF PHOTOCONDUCTIVE LAYER = 0.6" X 0.8" FACEPLATE TEMPERATURE = 30° C APPROX. SIGNAL-GUTPUT CURRENT - PER CENT OF INITIAL VALUE TIME AFTER ILLUMINATION IS REMOVED-- MILLISECONDS

92CM-11153



UNCOMPENSATED HORIZONTAL RESPONSE TO A SQUARE-WAVE TEST PATTERN



World Radio History

Multiplier Phototube

10-STAGE, HEAD-ON, FLAT-FACEPLATE TYPE HAVING VENETIAN-BLIND-TYPE DYNODE STRUCTURE, I.68° MINIMUM-DIAMETER, FLAT, CIRCULAR, SEMITRANSPARENT PHOTOCATHODE AND S-II RESPONSE

DATA

	deneral.
	Spectral Response
	Spectral Response
	Cathode, Semitransparent:
	Shape
	Window:
	Minimum area 2.20 sq. in.
	Minimum diameter 1.68 in.
_	Index of refraction 1.51
	Direct Interelectrode Capacitances (Approx.):
	Anode to dynode No.10
	Anode to all other electrodes 8.5 µµf
	Maximum Overall Length
	Seated Length
	Maximum Diameter
	Operating Position
	Weight (Approx.)
	Bulb
	Socket Cinch No.3M14 ^a , or equivalent
	Base
	(JEDEC Group 5, No. B14-38)
	Basing Designation for BOTTOM VIEW 14AA
	Pin 1 - Dynode No.1
	Pin 2 - Dynoge No.2
	Pin 3-Dynode No.3
	Pin 4 – Dynode No.4
	Pin 5 – Dynode No.5
_	Pin 6 - Bynode No.6
	Pin 7 - Dynode No.7
	Pin 8 - Dynoide No.8
	Pin 9 – Dynode No.9
	Pin 10 – Dynode No.10 (2) (13)
	Pin 11 – Anode
	Pin 12 - Internal Connec-
	tion—Do Not Use DIRECTION OF LIGHT:
_	Pin 13 - Focusing
	Electrode
	Pin 14 - Photocathode
_	THE 14 - THOUSE A CHOOSE
	Maximum Ratings, Absolute-Haximum Values:
	SUPPLY VOLTAGE BETWEEN ANODE
	AND CATHODE (DC)
_	
	AND ANODE (DC)
	SUPPLY VOLTAGE BETWEEN CONSECUTIVE
	DYNODES [DC]

General:

SUPFLY VOLTAGE BETWEE DYNODE NO.1 AND CAT SUPPLY VOLTAGE BETWEE ELECTRODE AND CATHO AVERAGE ANODE CURRENT AMBIENT TEMPERATURE.	HODE (DC) N FOCUSTI DE (DC).	NG	600 max. 2 max.	volts volts ma °C	•
Characteristics Range	Values '	for Equipment	Design:		
Under conditions with divider providing	electro	de voltages	shown in Ta	ble l	
With E = 2000 volts voltage adjusted to					
	Mın.	Median	Max.		
Sens tivity: Radiant, at 4400 Angstromsc Cathode radiant, at 4400		9.6 × 10 ⁴	_	a/w	
angstroms ^d Luminous, at	0.048	0.6	_	a/w	
O cps ^e Cathode Luminous ^f Equivalent Anode-	_	120 7.5 × 10 ⁻⁵	_	a/lm a/lm	
Dark-Current Input at 4400 angstroms9 Equivalent Noise Input at 4400 angstromsh	-	4 x 10 ⁻¹³ 5.3 x 10 ⁻¹⁵	-	w	
		-	-		
With E = 1500 volts voltage adjusted to					
vortage da justea te	Nin.	Median	Max.	- t + O n	
Constatuta	Min.	неанап	Max.		
Sensitivity: Radiant, at 4400 angstromsc Cathode radiant, at 4400	7.2 × 10 ³	1.5 × 10 ⁴	1.76 × 10 ⁵	a/w	
	0.048	0.06	-	a/w	
O cps ^e Cathode luminous ^f	_	19 7.5 × 10 ⁻⁵	-	a/lm a/lm	
Current Ampli- fication	_	2.5×10^{5}	_		
Equivalent Anode- Dark-Current Input at 4400 angstroms ¹	_	5.5 × 10 ⁻¹³ 4.4 × 10 ⁻¹⁰	9 × 10 ⁻¹³	w lm	
Equivalent Noise Input at 4400 angstroms ^h	_	3.3 × 10 ⁻¹⁵	1.3 × 10 ⁻¹⁴	w	
angstrons	_	2.7×10^{-12}	_	lm	

With E = 1250 volts (Except as noted) and focusing-electrode voltage adjusted to give maximum current amblification

portuge mujusteu	ro give	MMAIMEM CHIICHL	wmpi i j	temptou
	Min.	Median	Max.	
Sensitivity: Radiant, at 4400 angstroms ^c Cathode radiant, at 4400	-	4.8×10^3	_	a/w
angstroms ^d	0.048	0.06	_	a/w
Luminous, at 0 cps ^e Cathode luminous ^f Equivalent Anode-	_	7.5 × 10 ⁻⁵	-	a/lm a/lm
Dark-Current Input at 4400 angstroms9 Equivalent Noise	-	2.3 x 10 ⁻¹³		w
Input at 4400 angstroms ^h	-	7.45 x 10 ⁻¹⁵	-	w

Cinch Manufacturing Forporation, 1026 South Homan Avenue, Chicago 24, Illinois.

Averaged over any interval of 30 seconds maximum.

Under the following conditions: Light incident on the cathode is transmitted through a blue filter (Corning No.C.S.5-58, Glass Code No.5113 polished to 1/2 stock thickness— Manufactured by the Corning Glass Works, Corning, New York) from a tungsten-filament lamp operated at a color temperature of 2870 K. The value of light flux incident on the filter is 10 microlumens. Radiant sensitivity is determined on the basis of the S-11 Spectral Response-Characteristic curve located at the front of this Section. at the front of this Section.

Under the same conditions as shown under (c) except value of light flux incident on the filter is 0.1 lumen.

Under the following conditions: The light source is a tangsten filament lamp operated at a color temperature of $2870^{\rm D}$ K. A light input of 10 microlumens is used.

Under the following *onditions: The light source is a tungsten-filament lamp operated at a color temperature of 2870 $^{\circ}$ K. The value of light flux is 0.01 tumen and 200 volts are applied between cuthode and all other electrodes connected together as anode.

9 At a tube temperature of 25° C. Dark current may be reduced by use of

a refrigerant.

Under the following conditions: Supply voltage (E) is as shown, 25°C tube temperature, external shield is conmected to nathode, bandwidth 1 cycle per second, light source as shown under (c) interrusted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

j At a tube temperature of 25°C and with Supply voltage (E) adjusted to give a radiant sensitivity of 7200 amperes per wat. Dark current may

be reduced by the use of a refrigerant.

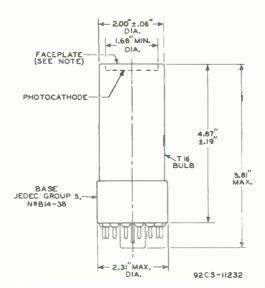
TARIF I

TABLE !		
VOLTAGE TO BE PROVIDED BY DIVIDER		
Between	8.3% of Supply Voltage (E) multiplied by	
Cathode and Dynode No.1	2	
Dynode No.1 and Dynode No.2	1	
Dynode No.2 and Dynode No.3	1	
Dynode No.3 and Dynode No.4	1	
Dynode No.4 and Dynode No.5	1	
Dynode No.5 and Dynode No.6	1	
Dynode No.6 and Dynode No.7	1	
Dynode No.7 and Dynode No.8	1	
Dynode No.8 and Dynode No.9	1	
Dynode No.9 and Dynode No.10	1	
Dynode No.10 and Anode	1	
Anode and Cathode	1.2	

Focusing electrode is connected to arm of potentiometer between cathode and dynode No.1. The focusing-electrode voltage is varied to give maximum current amplification.

SPECTRAL-SENSITIVITY CHARACTERISTIC
OF PHOTOSENSITIVE DEVICE HAVING S-II RESPONSE
is shown at the front of this section

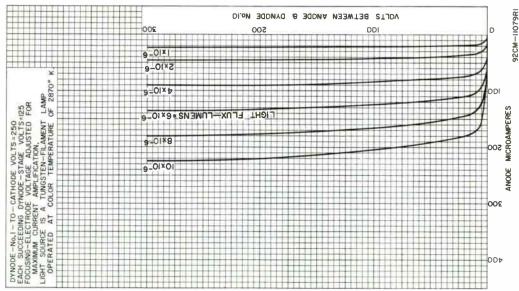




CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN 20 IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

NOTE: WITHIN 1.68" DIAMETER, CEVIATION FROM FLATNESS OF EXTERNAL SURFACE OF FACEPLATE WILL NOT EXCEED 0.010" FROM PEAK TO VALLEY.

CHARACTERISTICS ANODE





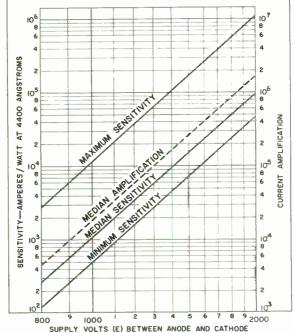
RADIO CORPORATION Electron Tube Division

CHARACTERISTICS

THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS:

BETWEEN	8.3% OF E MULTIPLIED BY
CATHODE & DY	2
DY1 8 DY2	1
DY2 & DY3	1
DY3 8 DY4	1
DY4 8 DY5	1
DY5 & DY6	1
DY6 & DY7	1
DY7 & DY8	1
DYB & DY9	1
DY9 & DYIO	1
DYIO & ANODE	1
ANODE & CATHODE	12

FOCUSING-ELECTRODE VOLTAGE IS ADJUSTED FOR MAXIMUM CURRENT AMPLIFICATION.



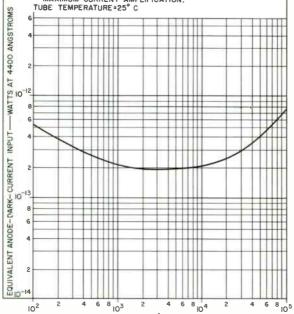
92CM-11086R1

TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC

RADIANT SENSITIVITY IS VARIED BY ADJUSTMENT OF THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS:

BETWEEN	8.3 % OF E MULTIPLIED BY
CATHODE & DY	2
DYI & DY2	1
DY2 & DY3	
DY3 8 DY4	1 (
DY4 8 DY5	1
DY5 8 DY6	- I
DY6 8 DY7	- I (
DY7 & DY8	1
DY8 & DY9	i i
DY9 & DYIO	1
DYIO & ANODE	1
ANODE & CATHODE	12

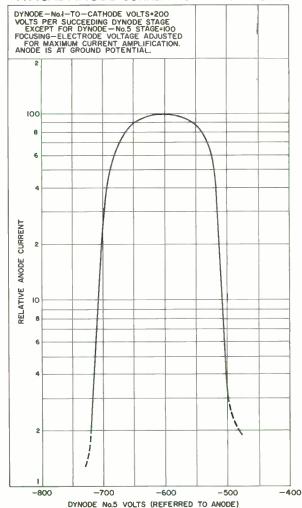
FOCUSING-ELECTRODE VOLTAGE IS ADJUSTED FOR MAXIMUM CURRENT AMPLIFICATION.



RADIANT SENSITIVITY - AMPERES WATT AT 4400 ANGSTROMS 92CM-11146

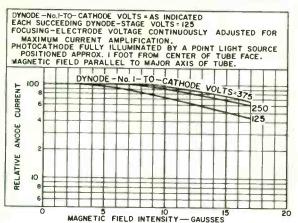


TYPICAL ANODE-CURRENT CHARACTERISTIC

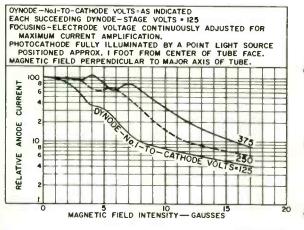


92CM-11078

TYPICAL ANODE-CURRENT CHARACTERISTICS



92CS-11235RI



92CS-II236RI



Multiplier Phototube

10-STAGE, HEAD-ON, FLAT-FACEPLATE TYPE HAVING VENETIAN-BLIND-TYPE DYNODE STRUCTURE, 2.59" MINIMUM-DIAMETER, FLAT, CIRCULAR, SEMITRANSPARENT PHOTOCATHODE AND S-II RESPONSE

DATA

	General:
	Spectral Response
	Shape
	Minimum area
	Anode to dynomic No.10
•	Pin 1 - Dynode No.1 Pin 2 - Dynode No.2 Pin 3 - Dynode No.3 Pin 4 - Dynode No.5 Pin 6 - Dynode No.5 Pin 6 - Dynode No.6 Pin 7 - Dynode No.7 Pin 8 - Dynode No.8 Pin 9 - Dynode No.9 Pin 10 - Dynode No.10 Pin 11 - Anode Pin 12 - Internal Connection—Do Not Use Pin 13 - Focusing Electrode Pin 14 - Photocathode
•	Maximum Ratings, Absolute-Maximum Palues: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE (DC)

SUPPLY VOLTAGE BETWEE			600 ma	unlts	
AND CATHODE (DC) SUPPLY VOLTAGE BETWEE	N FOCUSIN	G	. 600 max.		
ELECTRODE AND CATHO AVERAGE ANODE CURRENT AMBIENT TEMPERATURE.	ь		. 2 max.	volts ma OC	
			. 75 max.	-(
Characteristics Range		* *	-		
Under conditions with divider providing	electro	de voltages	shown in Ta	ble l	
With E = 2000 volts (voltage adjusted to					J
	Mın.	Median	Max.		
Sensitivity: Radiant, at 4400 angstromsc	_	9.6 × 10 ⁴	_	a/w	
Cathode radiant, at 4400					
angstroms ^d Luminous, at 0	0.048	0.6	-	a/w	
cps ^e	-	120	-	a/lm	
Cathode Luminous ^f Equivalent Anode- Dark-Current Input at 4400	-	7.5 × 10 ⁻⁵	-	a/lm	
angstroms Equivalent Noise	-	4 x 10 ⁻¹³	-	W	
angstromsh	-	5.3×10^{-15}	-	W	
With E = 1500 volts voltage adjusted t					
	Min.	Median	Max.		
Sensitivity:					
Radiant, at 4400 angstroms ^c Cathode radiant at 4400	7.2×10^3	1.5 × 10 ⁴	1.76 × 10 ⁵	a/w	•
	0.048	0.06	-	a/w	
O cpse	_	19 7.5 x 10 ⁻⁵		a/lm a/lm	
Current Amplification	_	2.5×10^{5}	_		
Equivalent Anode- Dark-Current					
Input at 4400 angstroms ^j {	-	5.5 × 10 ⁻¹³ 4.4 × 10 ⁻¹⁰	9×10^{-13}	w lm	
Equivalent Noise	_	7.4 X 10	_	110	
Irput at 4400 angstroms ^h {	_ _	3.3×10^{-15} 2.7×10^{-12}	1.3 × 10 ⁻¹⁴	w lm	



With E = 1250 wolts (Except as noted) and focusing-electrode voltage adjusted to give maximum current amplification

	Min.	Median	Max.	
Sensitivity:				
Radiant, at 4400 angstroms ^c Cathode radiant at	 	4.8×10^3	_	a/w
4400 angstroms ^d	 . 0.048	0.06	_	a/w
Luminous at O cps		6 _	-	a/lm
_ Cathode luminousf	 	7.5×10^{-5}	-	a/lm
Equivalent Anode-Dark- Current Input at 4400				
angstroms ⁹	 	2.3×10^{-13}	-	W
Equivalent Noise Input at 4400 angstromsh	 . –	7.45×10^{-15}	_	W

a Cinch Manufacturing Corporation, 1026 South Homan Avenue, Chicago 24, Illinois.

b Averaged over any interval of 30 seconds maximum.

Averaged over any interval of a second maximum.

Under the following conditions: Light incident on the cathode is transmitted through a blue filter (Corning No.C.S.5-58, Glass Code No.5113 polished to 1/2 stock thickness—Manufactured by the Corning Glass Works, Corning, New York) from a tunisten-filament lamp operated at a color temperature of 2870 K. The value of light flux incident on the filter is 10 microlumens. Radiant sensitivity is determined on the basis of the S-11 Spectral Response-Characteristic curve located at the front of this Section.

d Under the same conditions as shown under (c) except value of light flux

incident on the filter is 0.1 lumen.

Under the following conditions: The light source is a tungsten-filament lamp operated at a color temperature of 2670° K. A light input of 10 microlumens is used.

Under the following conditions: The light source is a tungsten-filament lamp operated at a color temperature of 28700 κ . The value of light flux is 0.61 lumen and 200 volts are applied between cathode and all other electrodes connected together as anode.

9 At a tube temperature of 25° C. Dark current may be reduced by use of a refrigerant.

h under the following conditions: Supply voltage (£) is as :.hown, 25°C tube temperature, external shield is connected to cathode, bandwidth 1 cycle per second, light source as shown under (c) interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The 'on' period of the pulse is equal to the 'off' period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

At a tube temperature of 25° C and with supply voltage (E) adjusted to give a radiant sensitivity of 7200 amperes per watt. Dark current may be reduced by the use of a refrigerant.

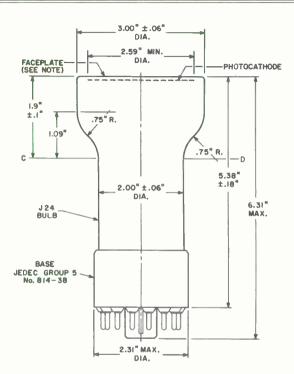
TABLE I

VOLTAGE TO BE PROVIDED	BY DIVIDER
Between	8.3% of Supply Voltage (E) multiplied by
Cathode and Dynode No.1	2
Dynode No.1 and Dynode No.2	1
Dynode No.2 and Dynode No.3 Dynode No.3 and Dynode No.4	1
Dynode No.4 and Dynode No.5	Ī
Dynode No.5 and Dynode No.6	1
Dynode No.6 and Dynode No.7	1
Dynode No.7 and Dynode No.8	1
Dynode No.8 and Dynode No.9	1
Dynode No.9 and Dynode No.10	1
Dynode No.10 and Anode	1 12
Anodé and Cathode	12

Focusing electrode is connected to arm of potentiometer between cathode and dynode No.1. The focusing-electrode voltage is varied to give maximum current amplification.

SPECTRAL-SENSITIVITY CHARACTERISTIC
OF PHOTOTUBE HAVING S-II RESPONSE
is shown at the front of this Section



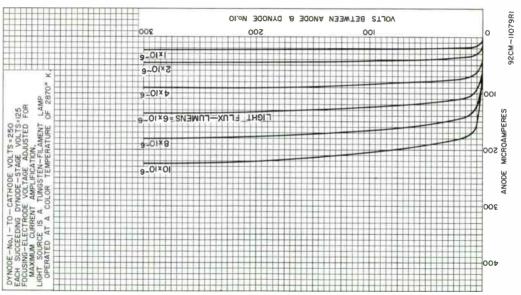


92CM - 11080RI

CENTER LINE OF BULB WILL NOT DEV ATE MORE THAN 20 IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

NOTE: WITHIN 2.59" DIAMETER, DEVIATION FROM FLATNESS OF EXTERNAL SURFACE OF FACEPLATE WILL NOT EXCEED 0.010" FROM PEAK TO VALLEY.

CHARACTERISTICS ANODE TYPICAL



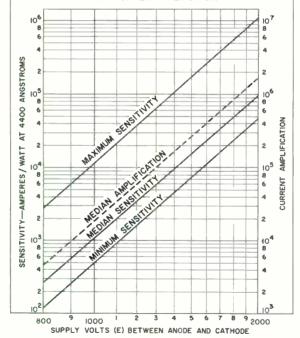


CHARACTERISTICS

THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS:

BETWEEN	8.3% OF E MULTIPLIED BY
CATHODE & DY	2
DY1 8 DY2	1
DY2 & DY3	1
DY3 & DY4	1
DY4 8 DY5	1
DY5 & DY6	1
DY6 & DY7	1
DY7 & DYB	1
DYB & DY9	1
DY9 & DYIO	4
DYIO & ANODE	1
ANODE & CATHODE	12

FOCUSING-ELECTRODE VOLTAGE IS ADJUSTED FOR MAXIMUM CURRENT AMPLIFICATION.

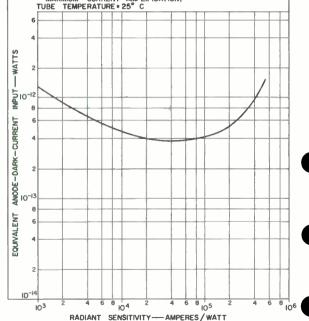


92CM-11086RI

RADIANT SENSITIVITY IS VARIED BY ADJUSTMENT OF THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS:

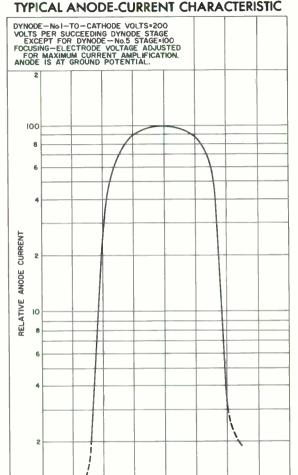
BETWEEN	8.3 % OF E MULTIPLIED BY
CATHODE & DYI	2
DYI & DY2	1
DY2 & DY3	
DY3 & DY4	1
DY4 & DY5	1
DY5 & DY6	1
DY6 & DY7	l l
DY7 & DY8	1
DY8 & DY9	1
DY9 & DYIO	1
DYID & ANODE	1
ANODE & CATHODE	12

FOCUSING-ELECTRODE VOLTAGE IS ADJUSTED FOR MAXIMUM CURRENT AMPLIFICATION.
TUBE TEMPERATURE 25° C



92CM-II082





DYNODE No.5 VOLTS (REFERRED TO ANODE)

-600

92CM-11078

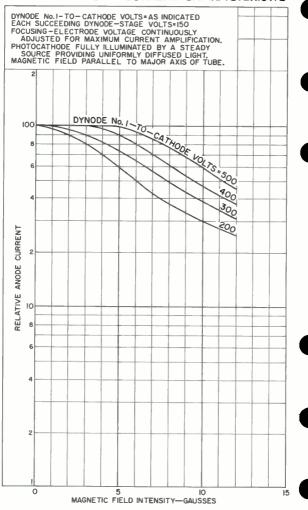
-500



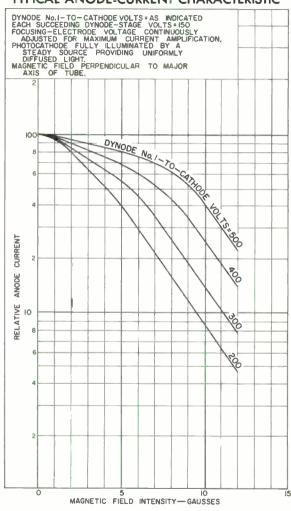
-800

-700

-400

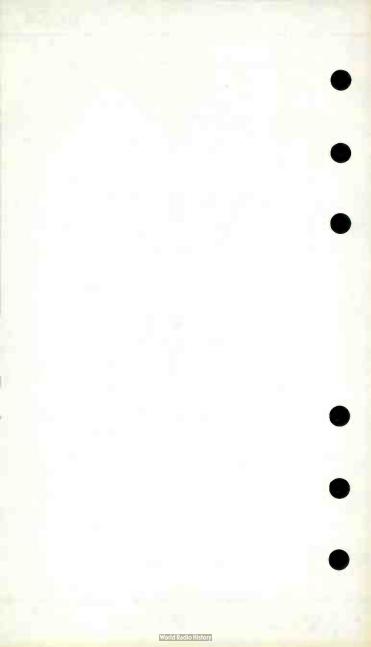


92CM-11084RI



92CM-11085RI





Multiplier Phototube

IO-STAGE, HEAD-ON, FLAT-FACEPLATE TYPE HAVING VENETIAN-BLIND-TYPE DYNODE STRUCTURE, 4.38" MINIMUM DIAMETER, FLAT, CIRCULAR, SEMITRANSPARENT PHOTOCATHODE AND S-II RESPONSE

DATA

General: Spectral Response		***************************************
Wavelength of Meximum Response		General:
Wavelength of Meximum Response	_	Spectral Response
Shape. Window: Minimum area		Wavelength of Maximum Response 4400 ± 500 angstroms
Window: Minimum area. Minimum diameter. Minimum diameter. Index of refraction. Direct Interelectrode Capacitances {Approx.}: Anode to dynode No.10. Anode to all other electrodes. Maximum Overall Length. Maximum Diameter. Operating Position. Maximum Bolameter. Operating Position. Madium—Shell Diheptal 14-Pin (JEDEC Group 5, No.B14-3B) Basing Designation for BOTTOM VIEW. It also the diameter of the provided No.B14-3B) Basing Designation for BOTTOM VIEW. Pin 1 - Dynode No.2 Pin 3 - Dynode No.3 Pin 4 - Dynode No.3 Pin 4 - Dynode No.5 Pin 6 - Dynode No.5 Pin 6 - Dynode No.6 Pin 7 - Dynode No.9 Pin 10 - Dynode No.9 Pin 11 - Anode Pin 12 - Internal Connection— tion—Do Not Use DIRECTION OF LIGHT: INTO END OF BULB DIRECTION OF BULB DIRECTION OF BULB DIRECTION OF BULB Operating Position of No.10 AND ANDE (DC). SUPPLY VOLTAGE BETWEEN ANODE No.10 AND ANODE (DC). SUPPLY VOLTAGE BETWEEN CONSECUTIVE		
Minimum diameter		Shape
Minimum diameter		
Index of refraction		
Direct Interelectrode Capacitances [Approx.): Anode to dynode No.10		
Approx.): Anode to dynode No.10	_	
Anode to dynode No.10		
Anode to all other electrodes. 8.5 Maximum Overall Length 7.69" Seated Length 6.75" ± 0.19" Maximum Diameter 5.31" Operating Position		
Maximum Overall Length		
Seated Length. 6.75" ± 0.19" Maximum Diameter . 5.31" Operating Position		
Maximum Diameter		
Operating Position		
Weight (Äpprox.) Bulb		
Bulb		
Socket		
Basing Designation for BOTTOM VIEW		
Basing Designation for BOTTOM VIEW		
Pin 1 - Dynode No.1 Pin 2 - Dynode No.2 Pin 3 - Dynode No.3 Pin 4 - Dynode No.4 Pin 5 - Dynode No.5 Pin 6 - Dynode No.5 Pin 7 - Dynode No.7 Pin 8 - Dynode No.8 Pin 9 - Dynode No.8 Pin 10 - Dynode No.10 Pin 11 - Anode Pin 12 - Internal Connection—Do Not Use Pin 13 - Focusing Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		
Pin 2 - Dynode No.2 Pin 3 - Dynode No.3 Pin 4 - Dynode No.4 Pin 5 - Dynode No.5 Pin 6 - Dynode No.5 Pin 7 - Dynode No.8 Pin 9 - Dynode No.8 Pin 9 - Dynode No.9 Pin 10 - Dynode No.10 Pin 11 - Anode Pin 12 - Internal Connection—Do Not Use Pin 13 - Focusing Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		Basing Designation for BOTTOM VIEW 14AA
Pin 2 - Dynode No.2 Pin 3 - Dynode No.3 Pin 4 - Dynode No.4 Pin 5 - Dynode No.5 Pin 6 - Dynode No.5 Pin 7 - Dynode No.8 Pin 9 - Dynode No.8 Pin 9 - Dynode No.9 Pin 10 - Dynode No.10 Pin 11 - Anode Pin 12 - Internal Connection—Do Not Use Pin 13 - Focusing Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		Pin 1 - Dynode No.1
Pin 4 - Dvnode No.4 Pin 5 - Dynode No.5 Pin 6 - Dynode No.5 Pin 7 - Dynode No.7 Pin 8 - Dynode No.7 Pin 8 - Dynode No.9 Pin 10 - Dynode No.9 Pin 10 - Dynode No.10 Pin 11 - Anode Pin 12 - Internal Connection—Do Not Use Pin 13 - Focusing Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE ((DC)		
Pin 5 - Dynode No.5 Pin 6 - Dynode No.6 Pin 7 - Dynode No.7 Pin 8 - Dynode No.8 Pin 9 - Dynode No.8 Pin 9 - Dynode No.9 Pin 10 - Dynode No.10 Pin 11 - Anode Pin 12 - Internal Connection—Do Not Use Pin 13 - Focusing Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		Pin 3 – Dynode No.3
Pin 6 - Dynode No.6 Pin 7 - Dynode No.7 Pin 8 - Dynode No.8 Pin 9 - Dynode No.9 Pin 10 - Dynode No.10 Pin 11 - Anode Pin 12 - Internal Connection—Do Not Use Pin 13 - Focusing Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		Pin 4 – Dynode No.4
Pin 7 - Dynode No.7 Pin 8 - Dynode No.8 Pin 9 - Dynode No.9 Pin 10 - Dynode No.10 Pin 11 - Anode Pin 12 - Internal Connection—Do Not Use Pin 13 - Focusing Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		
Pin 8 - Dynode No.8 Pin 9 - Dynode No.9 Pin 10 - Dynode No.10 Pin 11 - Anode Pin 12 - Internal Connection—Do Not Use Pin 13 - Focusing Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		
Pin 9 - Dynode No.9 Pin 10 - Dynode No.10 Pin 11 - Anode Pin 12 - Internal Connection—Do Not Use Pin 13 - Focusing Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		
Pin 10 - Dynode No.10 Pin 11 - Anode Pin 12 - Internal Connection—Do Not Use Pin 13 - Focusing Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)	_	
Pin 11 - Anode Pin 12 - Internal Connection—Do Not Use Pin 13 - Focusing Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		
Pin 12 - Internal Connection—Do Not Use Pin 13 - Focusing Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		
tion—Do Not Use Pin 13 - Focusing Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		Pin 12 Internal Conner
Pin 13 - Focusing Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		
Electrode Pin 14 - Photocathode Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		
Maximum Ratings, Absolute-Maximum Values: SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		
SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		Pin 14 - Photocathode
SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE((DC)		Manufacture Baddana Alice and the Manufacture
CATHODE((DC)		
AND ANODE (DC)		
AND ANODE (DC)		CAIMOUL((UC)
SUPPLY VOLTAGE BETWEEN CONSECUTIVE		
		SUPPLY VOLTAGE RETWEEN CONSECUTIVE

SUPPLY VOLTAGE BETWEEN AND CATHODE (DC) SUPPLY VOLTAGE BETWEEN			. 600 max.	volts	
ELECTRODE AND CATHOD AVERAGE ANODE CURRENT MAISIENT TEMPERATURE .	E (DC)		2 max.	volts ma °C	
AMBIENT TEMPERATURE .			. 75 max.	-0	
Characteristics Range	Values fo	r Equipment De	esign:		
Under conditions wit					
With E = 2000 volts (i voitage adjusted to					
vortage adjusted to	-		Max.	arron	
	Min.	Median	Max.		
Sensitivity:					
Radiant, at 4400 angstroms ^c	-	9.6×10^4	-	a/w	
Cathode radiant, at 4400 angstroms d.	0.048	0.06		a/w	
Luminous, at 0 cps.	-	120	_	a/lm	
Cathode luminous .	_	7.5×10^{-5}	_	a/lm	
Equivalent Anode-					
Dark-Current Input		1.7			
	-	4×10^{-13}	-	W	
Equivalent Noise					
Input at 4400 angstroms ^h		5.3 × 10 ⁻¹⁵		w	
9				• • • • • • • • • • • • • • • • • • • •	
With E = 1500 volts (1					
voltage adjusted to	_			atton	
	Min.	Median	Max.		
Sensitivity:					
Radiant, at 4400 angstroms ^c	7.2×10^{3}	1.5×10^4	1.76×10^5	a/w	
Cathode radiant,	0.040	0.00		,	
at 4400 angstroms	0.048	0.06 19	-	a/w a/lm	
Luminous, at 0 cps ^e . Cathode luminous ^f .	_	7.5 x 10 ⁻⁵	_	a/lm a/lm	
Current Amplification	_	2.5×10^{5}	_	QLZ TIII	
Equivalent Anode-		2.0 X 20			
Dark-Current Input	,	5.5 x 10 ⁻¹³	9 x 10 ⁻¹³		
at 4400 angstroms j	-	4.4 x 10 ⁻¹⁰	9 X 10 .5	w lm	
Equivalent Noise	(–	4.4 X 10	_		
Input at 4400		0.0 40-15	4 0 40-14		
angstromsh	{ -	3.3×10^{-15} 2.7×10^{-12}	1.3×10^{-14}	W	
	-			lm	
With E = 1250 volts (voltage adjusted to					
	Min.	Median	Max.		
Sensitivity:					_
Radiant, at 4400					
angstroms ^c	_	4.8×10^{3}	-	a/w	
Cathode radiant.				,	
at 4400 angstroms	0.048	0.06	-	a/w	



Luminous, at 0 cps ^e . Cathode lumincus ^f . Equivalent Amode-Dark-	_	6 7.5 x _~ 0 ⁻⁵	_	a/lm a/lm
Current Input at 4400 angstroms Equivalent Noise	AMB.	2.3 x 10 ⁻¹³	_	W
Input at 4400 angstroms ^h	_	7.45 x 10 ⁻¹⁵	_	W

Cinch Manufacturing Corporation, 1026 South Homan Avenue, Chicago 24. Illinois.

Averaged over any interval of 30 seconds maximum.

Under the following conditions: Light incident on the cathode is transmitted through a blue filter (Corning No.C.S.5-58, Glass Code No.5113 polished to 1/2 stock thickness—Manufactured by the Corning Glass Morks, Corning, New York) from a lungsten-filament lamp sperated at a color temperature of 2870 K. The value of light flux incident on the filter is 10 microlumens. Radiant sensitivity is de-ermined on the basis of an S-11 Spectral Response Characteristic curve located at front of this Section.

Under the same conditions as shown under (c) except value of light flux

incident on the filter is 0.1 lumen.

Under the following conditions: The light source is a tungsten-"ilament lamp operated at a color temperature of 2870° K. A light input of 10 microlumens is used.

Under the following conditions: The light source is a tungsten-Tilament lamp operated at a color temperature of 2870 $^\circ$ K. The value of light flux is 0.0: lumen and 200 volts are applied between cathode and all other electrodes connected together as anode.

g At a tube temperature of 25° C. Dark current may be reduced by use of a refrigerant.

Under the following conditions: Supply voltage (E) is as shown, 25°C tube temperature, external shield is connected to cathode, bandwidth 1 cycle per second, light source as shown under (c) interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

At a tube temperature of 25 $^{\circ}$ C and with supply voltage (E) adjusted to give a radiant sensitivity of 7200 amperes per watt. Dark current may

be reduced by the use of a refrigerant.

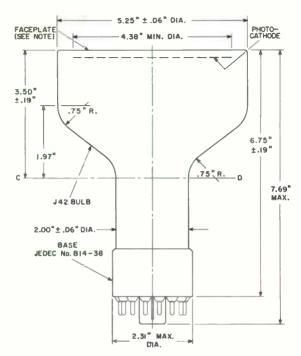
TABLE I

VOLTAGE TO BE PROVIDE	D BY DIVIDER	
B etw een	8.3% of Supply Voltage (E) multiplied by	
Cathode and Dynode No.1 Dynode No.1 and Dynode No.2 Dynode No.2 and Dynode No.3 Dynode No.3 and Dynode No.4 Dynode No.4 and Dynode No.5 Dynode No.5 and Dynode No.6 Dynode No.6 and Dynode No.7 Dynode No.7 and Dynode No.8	2 1 1 1 1 1 1 1	
Dynode No.8 and Dynode No.9 Dynode No.9 and Dynode No.10 Dynode No.10 and Anode Anode and Cathode	1 1 1 12	

Focusing electrode is connected to arm of potentiometer between cathode and dynode No.1. The focusing-electrode voltage is varied to give maximum current amplification.

SPECTRAL-SENSITIVITY CHARACTERISTIC
OF PHOTOTUBE HAVING S-II RESPONSE
is shown at front of this Section



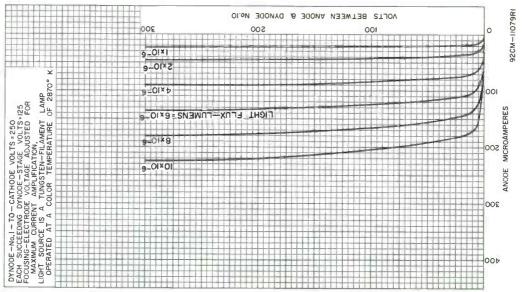


92CM-11148RI

CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN $2^{\rm O}$ IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

NOTE: WITHIN 4.38" DIAMETER, DEVIATION FROM FLATNESS OF EXTERNAL SURFACE OF FACEPLATE WILL NOT EXCEED 0.010" FROM PEAK TO VALLEY.

CHARACTERISTICS ANODE TYPICAL





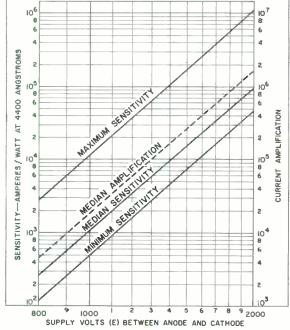
PF

CHARACTERISTICS

THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS:

BETWEEN	8.3% OF E
CATHODE & DY	2
DY ₁ & DY ₂	Ī
DY2 & DY3	4
DY3 8 DY4	1
DY4 8 DY5	1
DY5 & DY6	1
DY6 & DY7	1
DY7 & DY8	1
DY8 & DY9	1
DY9 & DYIO	1
DYIO & ANODE	1
ANODE & CATHODE	12

FOCUSING-ELECTRODE VOLTAGE IS ADJUSTED FOR MAXIMUM CURRENT AMPLIFICATION.



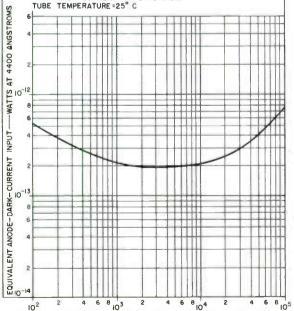
92CM-11086R1



RADIANT SENSITIVITY IS VARIED BY ADJUSTMENT OF THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS:

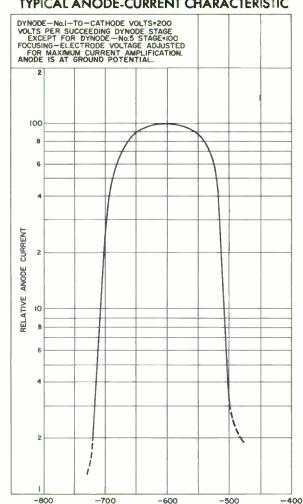
BETWEEN	8.3 % OF E MULTIPLIED BY
CATHODE & DY	2
DYI & DY2	1
DY2 & DY3	1.
DY3 8 DY4	1.
DY4 8 DY5	T I
DY5 & DY6	T.
DY6 & DY7	1
DY7 & DY8	1
DY8 & DY9	
DY9 & DYIO	1
DYIO & ANODE	L. L.
ANODE & CATHODE	12

FOCUSING-ELECTRODE VOLTAGE IS ADJUSTED FOR MAXIMUM CURRENT AMPLIFICATION.

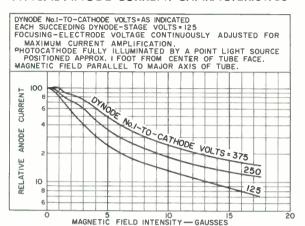


RADIANT SENSITIVITY - AMPERES / WATT AT 4400 ANGSTROMS 92CM-11146

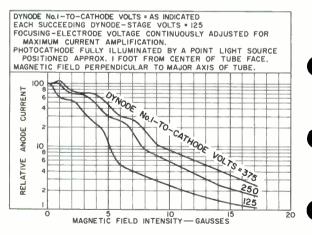




DYNODE No.5 VOLTS (REFERRED TO ANODE) 92CM-11078



92CS-III87RI



92CS-III88RI



Image Orthicon

MAGNETIC FOCUS

MAGNETIC DEFLECTION

ANTI-GHOST IMAGE SECTION

For Studio Black-and-White TV Cameras. The 8093A is Unilaterally Interchangeable with the 8093.

DATA

	General:
	Heater, for Unipotential Cathode:
	Voltage (AC or DC)
	Voltage (AC or DC) 6.3 \pm 10% volts Current at heater volts = 6.3 0.600 amp
	Direct Interelectrode Capacitance (Approx.):
	Anode to all other electrodes 12 µµf
	Target-to-Mesh Spacing (Average) 0.001"
	Spectral Response
,	Wavelength of Maximum Response 4500 ± 300 angstroms
	Photocathode, Semitransparent:
	Rectangular image (4 x 3 aspect ratio):
	Useful size of 1.8" max. diagonal
	Note: The size of the optical image focused on the
	photocathode should be adjusted so that its maximum
	diagonal does not exceed the specified value. The
	corresponding electron image on the target should
	have a size such that the corners of the rectangle
	just touch the target ring; a condition that may be
	achieved in some camera designs with a 1.6° diagonal
	image on the photocathode.
	Orientation of Proper orientation is obtained when the
	vertical scan is essentially parallel to the plane
	passing through center of faceplate and pin 7 of the
	shoulder base. The horizontal and vertical scan should
	preferably start at the corner of the raster nearest
	pin 6 of the shoulder base.
	Focusing Method
•	Deflection Method
	Overall Length
	Greatest Diameter of Bulb
	$ \begin{array}{llllllllllllllllllllllllllllllllllll$
	Deflecting-Coll Length 5"
	Focusing-Coil Length
	Alignment-Coil:
	Length
	Position on meck
	8.5" from flat area of the
	jumbo annular base.
	Photocathode Distance Inside End of Focusing Coil 1/2"
	Operating Position The tube should never be operated in a
	vertical position with the Diheptal-base end up nor in any
	other position where the axis of the tube with the base up
	makes an angle of less than 20° with the vertical.
	Weight (Approx.)

8093A

Shoulder Base . Keyed Jumbo Annular 7-Pin BOTTOM VIEW

Pin 1-Grid No.6 Pin 5-Grid No.5 P n 2 - Photocathode

Pin 6 - Target

P'n 3-Do Not Use

Pin 7 - Do Not Use

Pin 4 - Do Not Use End Base. .

Pin 1-Heater

2-Grid No.4.

3-Grid No.3

4 - Do Not Use

7 - Anode

Pin

Pin

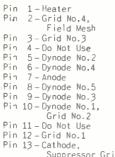
Pin

Pin

Small-Shell Diheptal 14-Pin (JEDEC Group 5, No.B14-45)

BOTTOM VIEW

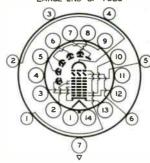
DIRECTION OF LIGHT: PERPENDICULAR TO LARGE END OF TUBE



Grid No. 2 Pin 11 - Do Not Use Pin 12 - Grid No.1

Pin 13 - Cathode, Suppressor Grid

Pin 14 - Heater



WHITE INDEX LINE

NOTE: in the tube symbol, the suppressor grid connected to the cathode, and the field-mesh grid connected to grid No.4, are intentionally without numbers to avoid upsetting industry practice of associating functional camera control knobs with specified grid numbers. For example, beam-focus control is generally associated with knob identications are suppressed to the control of t tified as Ga (Grid No. 4).

Maximum and Minimum Ratings, Absolute-Naximum Values: PHOTOCATHODE .

THO TECATHODE.				
Voltage			-550 max.	volts
Illumination			50 max.	fc
OPERATING TEMPERATURE:				
Any part of bulb			50 max.	°C
Of bulb at large end of tube				_
(Target section)			35 min.	°C
TEMPERATURE DIFFERENCE:				_
Between target section and any part				
of bulb hotter than target section.			5 max.	°C
GRID-No.6 VOLTAGE :	Ċ	Ċ		
TARGET VOLTAGE:	•	•	ooo max.	40113
			40	1.
Positive value			10 max.	volts
Negative value			10 max.	volts
GRID-No.5 VOLTAGE			150 max.	volts
GRID-No.4 VOLTAGE			300 max.	volts
GRID-No.3 VOLTAGE			400 max.	volts
GRID-No.2 & DYNODE-No.1 VOLTAGE			350 max.	volts

Gi	RID-No.1 VOLTAGE:				1.
_	Negative-bias value			125 max. 0 max.	volts volts
PI	Positive-bias value EAK HEATER-CATHODE VOLTAGE: Heater negative with			U max.	VOILS
				125 max.	volts
	respect to cathode			10 max.	volts
A	NODE SUPPLY VOLTAGEª			350 max.	volts
V	OLTAGE PER MULTIPLIER STAGE.			350 max.	volts
) T	ypical Operating Values:b				
	hotocathode Voltage (Image For rid-No.6 Voltage (Accelerator		3	25 to -475	volts
	Approx. 75% of photocathode		d2	10 to -360	volts
	arget-Cutoff Voltage®			–3 to +1	volts
G	rid-No.5 Voltage (Decelerator]		0 to 40	volts
G	rid-No.4 Voltage (Beam Focus)	с	1	40 to 180	volts
	rid-No.3 Voltagef			60 to 300	volts
	rid-No.2 & Dynode-No.1 Voltag			300	volts
	rid-No.1 Voltage for Picture ynode-No.2 Voltage			45 to -115 600	volts volts
	ynode-No.3 Voltage			800	volts
	ynode-No.4 Voltage		• •	1000	volts
	ynode-No.5 Voltage			1200	volts
	node Voltage			1250	volts
T	arget-Temperature Range			35 to 45	oC
	inimum Peak-to-Peak Blanking ield Strength at Center	Voltage		5	volts
F	of Focusing Coils	ii. I :		75 0 to 3	gausses gausses
P	erformance Data:				
	With conditions shown under	Typical	Operat	ing Value:	s and
	with camera lens set to brin				
_	stop above the "knee" of the l				stic
،		Hin	Average	Max.	
U	athode Radiant Sensitivity		0.000		. /
L	at 4500 angstroms	-	0.028	_	μa/μw
Α.	(2870° K)	30	60	- 50	μa/lm
S	node Current (DC)	_	30		μа
R	(Peak to peak)	5	_	30	μа
	Highlight Video-Signal Current to RMS Noise				
	Current for bandwidth of	4.0	45		
	4.5 Mc	40	45	-	
_	2870° K required to bring				
	picture highlights one stop				
	above the "knee" of light-				
	transfer characteristic	-	0.040	0.060	fc

8093A

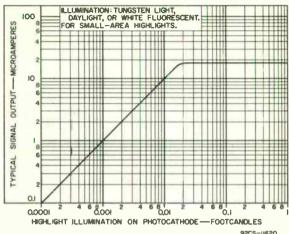
Amplitude Response at 400 TV lines per picture height					
(Per cent of large-area black to large-area white)	30	50		q.	
Limiting Horizontal)0	50		N	
Resolution	500	675	-	TV lines	
Uniformity: Ratio of shading (Back- ground) signal to high- light signal Variation of highlight	-	0.12	0.15		
signal (Per cent of maximum highlight signal) ^j	_	20	25	%	

- Oynode-voltage values are shown under Typical Operating Values.
- b with 8093A operated in RCA-TK-11 or -TK-31 camera. Other cameras may require slightly different voltage ranges.
- c Adjust for best focus.
- for minimum highlight flare or "ghost" the grid-No.6 voltage should be 73 per cent of the photocathode voltage.
- Normal setting of target voltage is *2 volts from target cutoff. The target supply voltage should be adjustable from -3 to *5 volts.
- f Adjust to give the most uniformly shaded picture near maximum signal.
- g Direction of current should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.
- h Measured with amplifier having flat frequency response.
- I variation of response over scanned area.

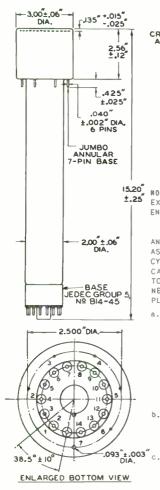
SPECTRAL-SENSITIVITY CHARACTERISTIC
OF PHOTOSENSITIVE DEVICE HAVING S-10 RESPONSE
is shown at front of this section



BASIC LIGHT-TRANSFER CHARACTERISTIC

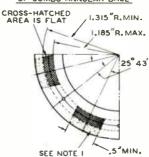


92CS-II620



92CM-8293R3

DETAIL OF BOTTOM VIEW OF JUMBO ANNULAR BASE



NOTE I: DOTTED AREA IS FLAT OR EXTENDS TOWARD DIHEPTAL-BASE END OF TUBE BY 0.060" MAX.

ANNULAR-BASE GAUGE

ANGULAR VARIATIONS BETWEEN PINS AS WELL AS ECCENTRICITY OF NECK CYLINDER WITH RESPECT TO PHOTO-CATHODE CYLINDER ARE HELD TO TOLERANCES SUCH THAT PINS AND NECK CYLINDER WILL FIT FLAT-PLATE GAUGE WITH:

- 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 450 TAPER TO DEPTH OF 0.047". ALL HOLES ARE SPACED AT AN-GLES OF 51026' ± 5' ON CIRCLE DIAMETER OF 2.500" ± 0.001".
- b. SEVEN STOPS HAVING HEIGHT OF 0.187" ± 0.001", CENTERED BETWEEN PIN HOLES TO BEAR AGAINST FLAT AREAS OF BASE.
- RIM EXTENDING OUT A MINIMUM OF 0.125" FROM 2.B12" DIAM-ETER AND HAVING HEIGHT OF 0.126" ± 0.001".
- d. NECK-CYLINDER CLEARANCE HOLE HAVING DIAMETER OF 2.200" ± 0.001".



Vidicon

LOW-POWER (0.6-WATT) HEATER

ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

For Compact, Lightweight, Transistorized TV Cameras

DATA

Ge	ne	ra	1:

)	Heater, for Unipotential Cathode: Voltage (AC or DC) 6.3 ± 10% volts
	Current at heater volts = 6.3 0.095 amp
	Direct Interelectrode Capacitance:
	Target to all other electrodes 5.0 μμf
	Spectral Response See Curve
	Photoconductive Layer:
	Maximum useful diagonal of rectangular

image (4 x 3 aspect ratio). 0.62" Orientation of quality rectangle-Proper orientation is obtained when the horizontal scan is essentially parallel to the straight sides of the masked portions of the faceplate. The straight sides are parallel to the plane passing through

the tube axis and short pin. Focusing Method Electrostatic

Deflection Method												.М	agn	etic	:
Overall Length															
Greatest Diameter										1.	125	" ±	0.	010'	1
Operating Position															
Weight (Approx.).						٠							2.	8 oz	Z
Bulb														. T8	3
Bulb Diameter										1.	025	• ±	0.	0031	۰
Deflecting Yoke .						.(216	eve	<u> 1</u> a	and	E1-	ect	ron	ics	3

No.VY 111 3, or equivalent Alignment Coil. . .Cleveland Electronics No.VA 118, gr equivalent

.Cinchc No.133 98 11 015, or equivalent

Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.3 Pin 4 - Grid No.5 Pin 5-Gr'd No.2 Pin 6-Grid No.4

FLANGE (3 SHORT

Pin 7 - Cathode Pin 8 - Heater Flange - Target Short Pin-Do Not Use

DIRECTION OF LIGHT: INTO FACE END OF TUBE

Maximum Ratings, Absolut	-Naximum Values:	
For scann	d area of 1/2" x 3/8"	
GRID-No.5 VOLTAGEd		. volts
	750 max	
GRID-No.3 VOLTAGE	200 max	
GRID-No.2 VOLTAGE	750 max	. volts
GRID-No.1 VOLTAGE:	300	alé.a
Negative-bias value . Positive-bias value .		
PEAK HEATER-CATHODE VOLT		. VOILS
Heater negative with r		. volts
Heater positive with r		
TARGET VOLTAGE		. volts
DARK CURRENT	0.2 max	
DARK CURRENT PEAK TARGET CURRENT®	0.4 max	. μa
FACEPLATE:	1000	
Illumination		
Temperature	/1 max	
Typical Operation and Pe	formance Data:	
For scanned	area of 1/2" x 3/8" and	
faceplate t	mperature of 30° to 35° C	
	Low-Voltage High-Voltage	
	Operation Operation	
Grid-No.5 (Decelerator)		
Voltage	300 500	volts
Grid-No.4 Voltage	180 300	volts
Grid-No.3 (Beam-Focus-	0	
Electrode) Voltage	0 to 60 50 to 100	volts
Grid-No.2 (Accelerator)	300 300	volts
Voltage Grid-No.1 Voltage for	300 300	VOICS
picture cutoff	-45 to -100 -45 to -100	volts
Typical Electrode	10 10 101 1010	
Currents:	,	
Grid No.5	1.2 2	μа
Grid No.4	0.015 1.5	μа
Grid No.3	0.001 0.0015	μa
Grid No.2	300 300	μ a
Lag:9 Typical	15 -	%
Maximum	20 -	~
Average "Gamma" of		
Transfer Character-		
istic for signal-out-		
put current between		
$0.02~\mu a$ and $0.2~\mu a$	0.65 -	
Minimum Peak-to-Peak		
Blanking Voltage:		_
When applied to grid No.1	75 -	volts
When applied to cathode.	20 -	volts
Limiting Resolution at	20	,0103
center of picture	600 700	TV Lines
·		

	Amplitude Response to a	
	400 TV Line Square-	
	Wave Test Pattern at	
,	center of picture 15 25	%
	Alignment Cail h	

Average-Sensitivity Operation

Under typical operating conditions specified for either low- or high-voltage operation

raceplate Itiumination			
(Highlight)		1.0	fc
Target Voltage J, k		20 to 40 vo	olts
Dark Current		0.02	μа
Signal-Output Current ⁿ .		0.2	μа

High-Sensitivity Operation

Under typical operating conditions specified for either low- or high-voltage operation?

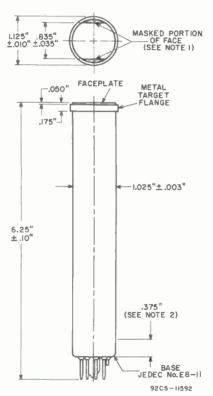
Faceplate Illumination	
(Highlight)	0. 1 fc
Target Voltage , k	30 to 60 volts
Dark Current	0.10 μα
Signal-Output Current ⁿ	0.10 μα

- This capacitance, which effectively is the output impedance of the 813% is increased when the tube is mounted in the deflecting-yoke assembly. The resistive component of the output impedance is in ordes of 10 miles. megohms.
- Cleveland Electronics Incorporated, 1974 East 61 Street, Cleveland, Ohio. This deflecting yoke and alignment coil provide proper tube operation but are not designed for min mum weight applications.
- Cinch Manufacturing Corporation, 1026 South Noman Avenue, Chicago 24, Illinois.
- d The maximum voltage difference between grids No.8 and No.5 should not exceed 300 volts.
- Video amplifiers must be designed properly to handle peak target currents of this magnitude to avoid amplifier overload or picture distortion.
- f with no blanking voltage on grid No.1.
- 9 Defined as the per cent of initial value of signal-output current 1/20 second after illumination is removed. Values shown are for initial signal-output current of 0.2 microampere and a dark current of 0.02 microampere.
- The alignment coil should be located on the tube so that its center is at a distance of 4-15/16 inches from the face of the tube, and be positioned so that its axis is coincident with the axis of the tube and the deflecting yoke.
- Indicated range for each type of service serves only to illustrate the operating target-voltage range normally encountered.
- The target voltage for each 813% must be adjusted to that value which gives the desired operating dark current.
- The deflecting circuits must provide extremely linear scanning for The deflecting circuits must provide extremely linear scanning ror good black-level reproduction. Dark-corrent signal is proportional to the scanning velocity. Any change is scanning velocity produces a black-level error in direct proportion to the change in scanning velocity.
- Defined as the component of the highlight target current after the dark-current component has been subtracted.
- Operation at this higher sensitivity level will result in a decrease in the resolution capability of the 813%.

OPERATING CONSIDERATIONS

Resolution of the 8134 is about 600 TV lines per picture height when operated with a grid-No.5 voltage of 300 volts and a grid-No.4 voltage of 180 volts. A resolution capability of over 700 TV lines is obtained when the 8134 is operated with a grid-No.5 voltage of 500 volts and a grid-No.4 voltage of 300 volts.

The target connection may be made by a suitable springfinger contact bearing against the edge of the metal ring at the face end of the tube.

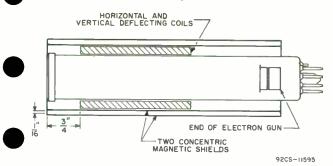


NOTE 1: STRAIGHT SIDES OF MASKED PORTIONS ARE PARALLEL TO THE PLANE PASSING THROUGH TUBE AXIS AND SHORT PIN.

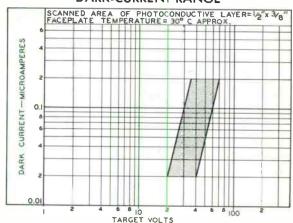
MOTE 2: WITHIN THIS DISTANCE, DIAMETER OF BULB IS 1.025" + 0.003" -0.030".

RECOMMENDED LOCATION OF DEFLECTING YOKE

For optimum geometry and optimum output-signal uniformity



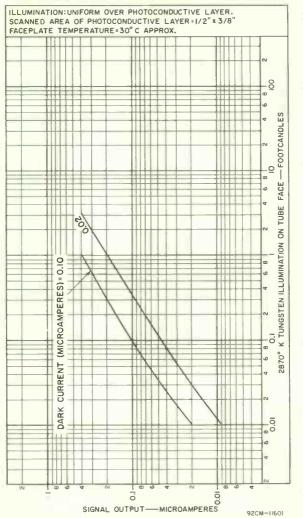
DARK-CURRENT RANGE



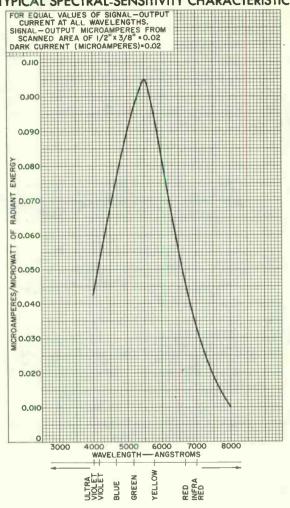
92CS-10684RI



TYPICAL LIGHT-TRANSFER CHARACTERISTICS

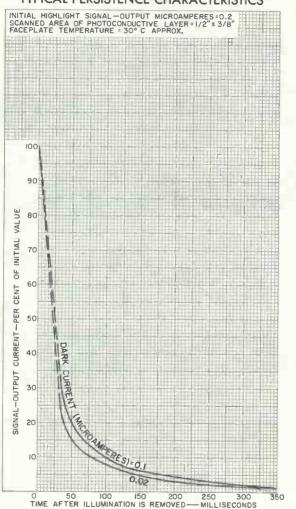


TYPICAL SPECTRAL-SENSITIVITY CHARACTERISTIC



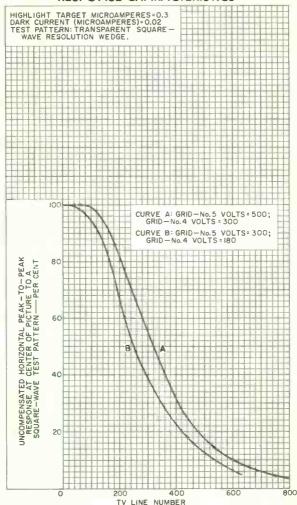
92CM-11619

TYPICAL PERSISTENCE CHARACTERISTICS

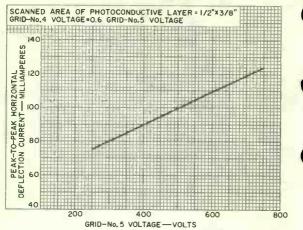


92CM-[1615

TYPICAL HORIZONTAL SQUARE-WAVE RESPONSE CHARACTERISTICS



TYPICAL HORIZONTAL-DEFLECTION-CURRENT CHARACTERISTIC



9205-11605



