931-A
MULTIPLIER PHOTOTUBE

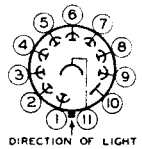
9-STAGE TYPE with S-4 RESPONSE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 angstroms
Cathode:	
Minimum Projected Length*	15/16"
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	3-11/16"
Maximum Seated Length	3-1/8"
Length, Base Seat to Center of Useful Cathode Area	1-15/16" ± 3/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Mounting Position	Any
Base	Small-Shell Submagnal 11-Pin, Non-Hygroscopic
Basing Designation for BOTTOM VIEW	11K

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



Pin 7 – Dynode No.7
Pin 8 – Dynode No.8
Pin 9 – Dynode No.9
Pin 10 – Anode
Pin 11 – Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)□	1250 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE No.9 and ANODE (DC or Peak AC)	250 max.	volts
PEAK ANODE CURRENT	10 max.	ma
AVERAGE ANODE CURRENT○	1 max.	ma
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:

With 100 volts per dynode stage and 100 volts between dynode No.9 and anode

	Min.	*Av.*	*Max.*	
DC Anode Dark Current#●	–	–	0.1	μamp

* On plane perpendicular to indicated direction of incident light.

□ Referred to cathode.

○ Average over any interval of 30 seconds maximum.

At 25°C. 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.

← Indicates a change.

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	Min.	Av.	Max.	
Sensitivity:				
At 4000 angstroms. . . .	–	18600	–	μamp/μwatt
Luminous:				
Cathode§	–	20	–	μamp/lumen
Anode▲:				
At 0 cps	4.5	20	300	amp/lumen
At 100 Mc.	–	19	–	amp/lumen
Current Amplification■ . .	–	$1x10^6$	–	
Equivalent Noise Input★. .	–	$7x10^{-12}$	–	lumen

→ **Characteristics:**

With 75 volts per dynode stage and 50 volts between dynode No.9 and anode

	Av.	
Sensitivity:		
At 4000 angstroms.	2800	μamp/μwatt
Luminous:		
Cathode§	20	μamp/lumen
Anode▲, 0 cps.	3	amp/lumen
Current Amplification■	150000	

§ For conditions the same as shown under Anode Luminous Sensitivity except that the value of light flux is 0.01 lumen and that 100 volts are applied between cathode and all other electrodes connected together as anode.

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

■ Ratio of anode sensitivity to cathode sensitivity.

★ Defined as the value where the rms output current is equal to the rms noise current determined under the following conditions: 100 volts per stage, 25°C tube temperature, ac-amplifier 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 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.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
is shown at the front of this Section

OPERATING NOTES

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.

(continued on next page)

→ Indicates a change.

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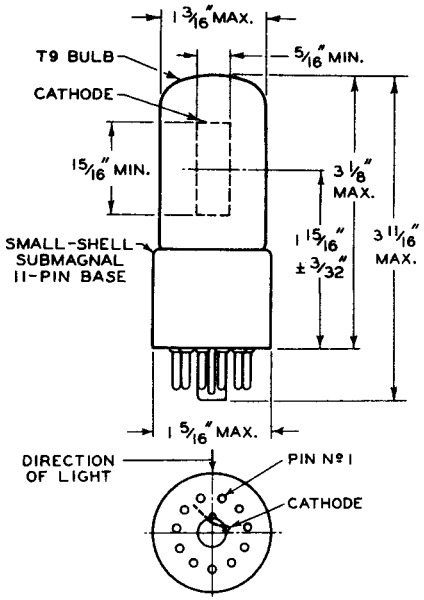
The use of an average anode current well below the maximum rated value of 1.0 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 250 microamperes.



BOTTOM VIEW

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

92CM-6264R2

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AVERAGE ANODE CHARACTERISTICS

JUNE 30, 1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6268R4

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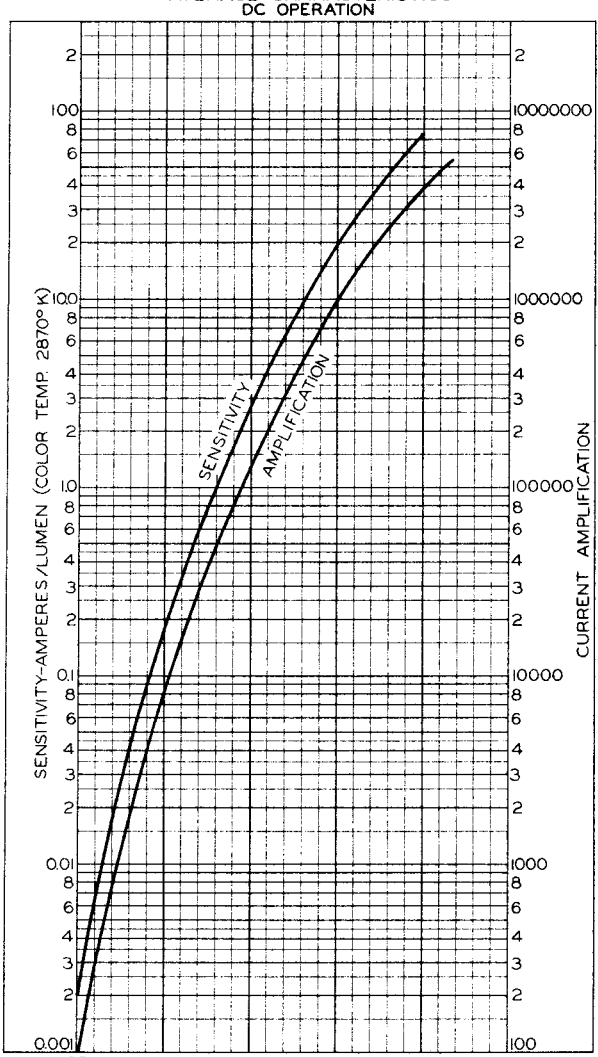
AVERAGE CHARACTERISTICS
DC OPERATION



JULY 21, 1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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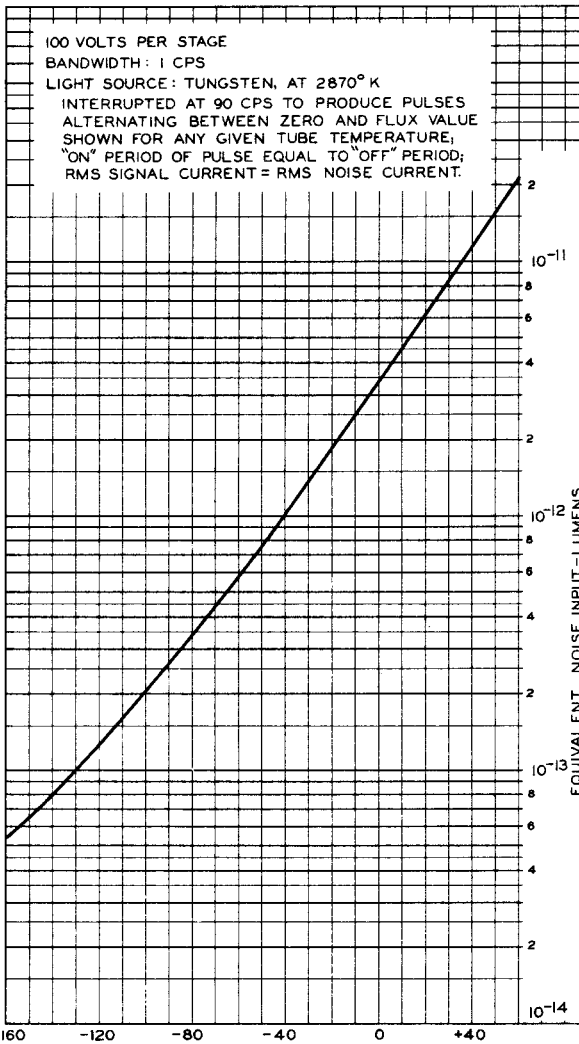
EQUIVALENT-NOISE-INPUT CHARACTERISTIC



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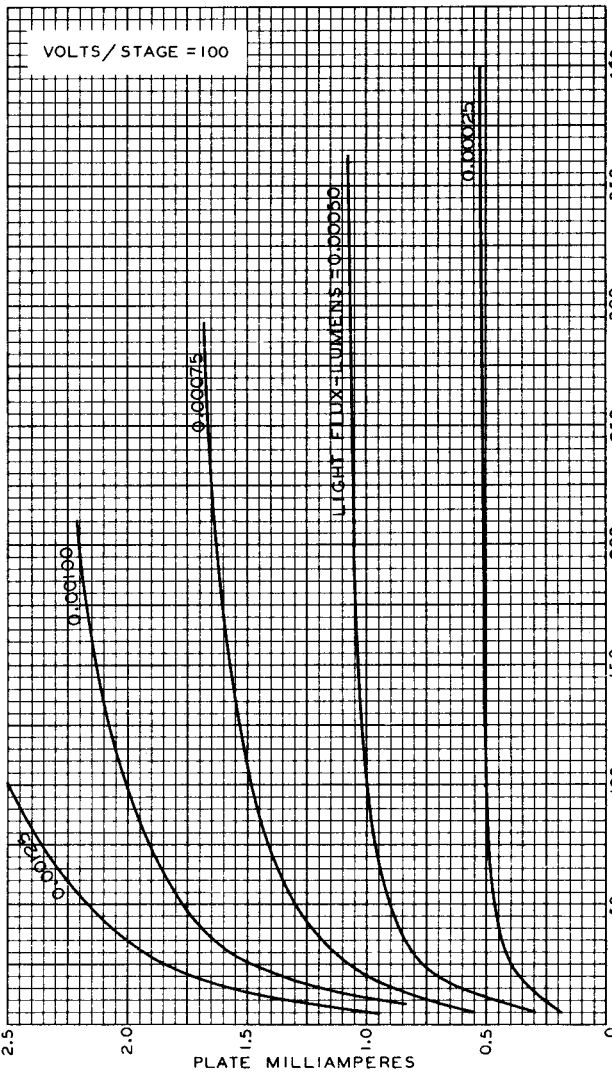
AVERAGE ANODE CHARACTERISTICS



DEC. 1, 1943

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6268R2

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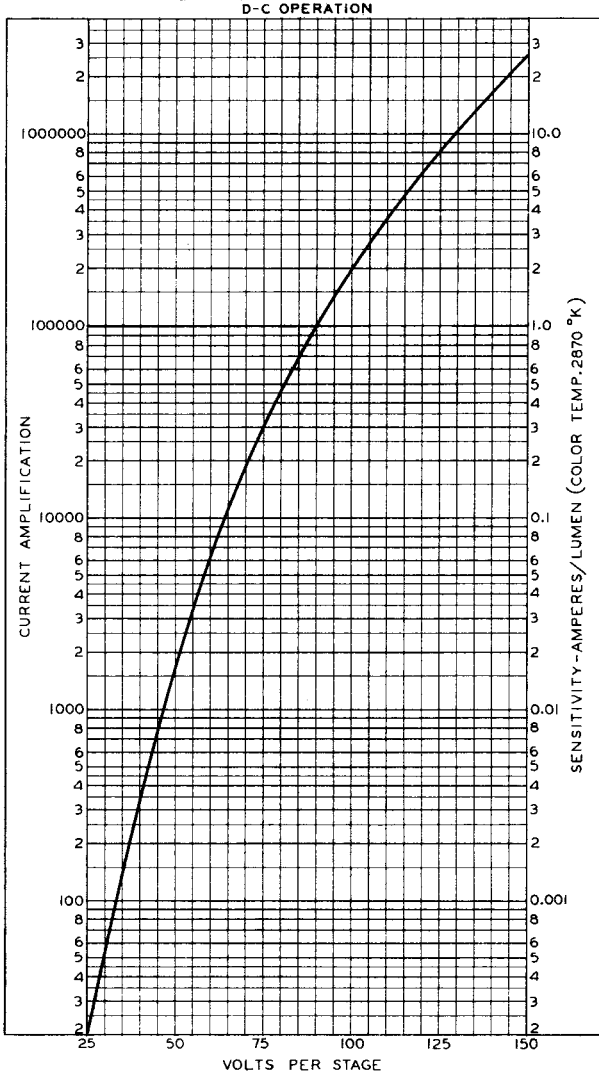
AVERAGE CHARACTERISTIC
D-C OPERATION



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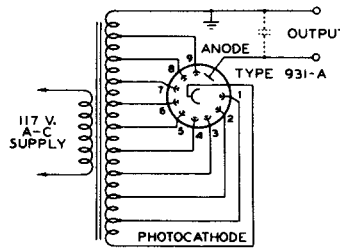
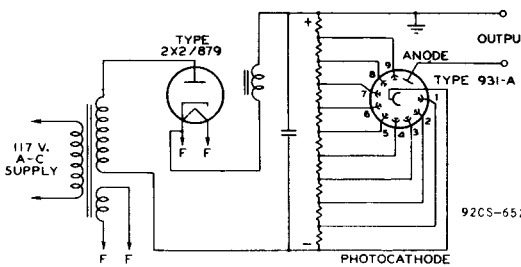
TYPICAL CIRCUITS

A-C POWER-SUPPLY CIRCUIT
with uniformly tapped transformer



HALF-WAVE POWER-SUPPLY CIRCUIT
with bleeder for supplying d-c voltages



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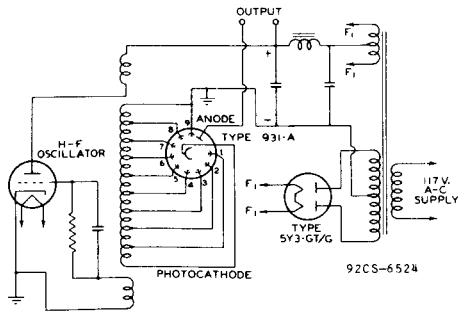
TYPICAL CIRCUITS

CIRCUIT USING H-F OSCILLATOR
for supplying a-c voltages to dynodes No.1 to No.9 and separate d-c voltage supply for the anode stage



FULL-WAVE POWER-SUPPLY CIRCUIT
with bleeder for supplying d-c voltages to dynodes No.1 to No.9 and separate d-c voltage supply for the anode stage