



ELECTRONIC TUBE REFERENCE

7046

Specialized - Photo Tube electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

PHOTOMULTIPLIER

Large fourteen-stage head-on photomultiplier for scintillation counting and low-level light measurement, with ultraviolet-transmitting faceplate.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	— / —	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Photomultiplier

No fixed ratings recorded.

Source-derived section; promoted values populated where applicable.

7046 MULTIPLIER PHOTOTUBE 4-7/16" Dia. Curved |4-Stage, Head-On, Flat-Faceplate Type I1-1/8" Max. Length Circular Semitrans- Extended S-Ii Response 5-1 /4" Max. Diameter parent Photocathode Very-Short Time-Resolution Capability Thirtyfivar 21-Pin Base TENTATIVE DATA RCA-7046 is a head-on type of multiplier sensitivity to blue-rich light and negligible phototube intended for use in scintilfation sensitivity to red radiation. Because of its counters for the detection and measurement of spectral response, the 7046 is well suited for nuclear radiation, and applications involving use with organic phosphors such as anthracene as the measurement of low-level light sources. Its well aswith inorganic materials such as thallium— activated sodium iodide. Design features of the 7046 include a semi- transparent cathode on the curved inner surface of the face end of the bulb; a minimum cathode diameter of 4-7/16 inches; a faceplate of ultra— violet transmitting glass with a flat external surface to

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1940 RCA

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1940 RCA

Section 1 · Photomultiplier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
currents having magnitudes up to 0.5 ampere with- good time resolution in measurement of short,	500 mA	currents having magnitudes up to 0.5 ampere with- good time resolution in measurement of short,
The spectral response of the 7046 covers the with a supply voltage of 2400 volts. The output	2400 V	The spectral response of the 7046 covers the with a supply voltage of 2400 volts. The output
range fromabout 2500 to 6500 angstroms, as shown current of the 7046 is a linear function of the	7046	range fromabout 2500 to 6500 angstroms, as shown current of the 7046 is a linear function of the
4200 angstroms. The 7046, therefore, has high conditions	7046	4200 angstroms. The 7046, therefore, has high conditions.
output current inpulse service than would other— Anode to dynode No.1¥	2.4 pF	output current inpulse service than would other — Anode to dynode No.1¥. 2.4 uuf
DC ANODE-SUPPLY VOLTAGE. . . 3400 max. volts	3400 V	DC ANODE-SUPPLY VOLTAGE. . . . 3400 max. volts
DC SUPPLY VOLTAGE BETWEEN DYNODE NO	1 V	DC SUPPLY VOLTAGE BETWEEN DYNODE NO 1u
AND ANODE. 400 max. volts	400 V	AND ANODE. 400 max. volts
DYNODES. Y400 max. volts	0 V	DYNODES. Y400 max. volts
AND DYNODE No.13 500 max. volts	500 V	AND DYNODE No.13 500 max. volts
OC GRID-No.2 SUPPLY VOLTAGE . . 1500 max. volts	1500 V	OC GRID-No.2 SUPPLY VOLTAGE . . 1500 max. volts

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
0C SUPPLY VOLTAGE BETWEEN GRID No	2 V	0C SUPPLY VOLTAGE BETWEEN GRID No.2
AND ANODE. PN 2300 max. volts	2300 V	AND ANODE. PN 2300 max. volts
1 FTTMAXTVALOE DC GRID-No.1 SUPPLY VOLTAGE . e . 1200 max. volts	1200 V	1 FTTMAXTVALOE DC GRID-No.1 SUPPLY VOLTAGE . e . 1200 max. volts
\ DC SUPPLY VOLTAGE BETWEEN DYNODE No	1 V	\ DC SUPPLY VOLTAGE BETWEEN DYNODE No. 1
AND GRID No.2. . . P 400 max. volts	400 V	AND GRID No.2. . . P 400 max. volts
\ AVERAGE ANODE CURRENT 2 max. ma	2 mA	\ AVERAGE ANODE CURRENT 2 max. ma
< With E = 2800 volts (except	2800 V	< With E = 2800 volts (except
Grid-No.11, and Dynode-No.11 Voltages Adjusted to Give	1 V	Grid-No.11, and Dynode-No.11 Voltages Adjusted to Give
angstroms - 0.140 - amp/	140 mA	angstroms - 0.140 - amp/
» t 4200 angstroms . . . ~ 0.046 - paf	0.046	» t 4200 angstroms . . . ~ 0.046 - paf
[At 0 cps. %0 180	1 A	[At 0 cps. %0 180 1500 amp/1umen
electrodeT ~ 108 - amp/}umen	108 A	electrodeT ~ 108 - amp/}umen
WAVELENGTH—ANGSTROMS current Amplification - 3 x	106	WAVELENGTH—ANGSTROMS current Amplification - 3 x 106 -
éutu w3 2 <4 current fnput®® _ ~ 26x10-56 fi6x1q5' watt	5 W	éutu w3 2 <4 current fnput®® _ ~ 26x10-56 fi6x1q5' watt
~ 13x1077 - watt	77 W	- ~ 13x1077 - watt
DATA With E = 3400 volts (except as noted), and with Grid-No	3 V	DATA With E = 3400 volts (except as noted), and with Grid-No.3,
General: Grid-No. 1, and Dynode- No.1 Voltages Adjusted to Give	1 V	General: Grid-No. 1, and Dynode- No.1 Voltages Adjusted to Give
wavelength of Maximum Response . 4200 + 500 angstroms Sensitivity	500	wavelength of Maximum Response . 4200 + 500 angstroms Sensitivity:

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
external surface . Ultraviolet Transmitting Glass angstroms. - 0.91 - amp/	910 mA	external surface . Ultraviolet Transmitting Glass angstroms. - 0.91 - amp/
Shape. + « v v v v v e e e e e e e .curved Circular 41200 angstroms . . . - 0.046 - pw	0.046	Shape. + « v v v v v e e e e e e .curved Circular 41200 angstroms . . . - 0.046 - pw
At 0 cps . . - 1200 - amp/lumen is measured through a filter which passes only the	1 A	At 0 cps . . - 1200 - amp/lumen is measured through a filter which passes only the
output electrodeT - amp/	1 A	output electrodeT - amp/lumen
Current Amplification. . - 20 x 106 - THICKNESS)	106	Current Amplification. . - 20 x 106 - THICKNESS)
averaged over any interval of 30 seconds maximum	30 s	averaged over any interval of 30 seconds maximum.
The load reSISistor has a value of	0.01 ohm	The load reSISistor has a value of 0.01 megohm.
200 volts are applied between cathode and all other	200 V	200 volts are applied between cathode and all other
sistor has a value of	0.01 ohm	sistor has a value of 0.01 megohm.
a tungsten- filament lamp operated at a color tempera- electrode voltages	1 V	a tungsten- filament lamp operated at a color tempera- electrode voltages.
megohm, and 200 volts are epplied between cathode and leaving the photocathode by incident radiant p	200 V	megohm, and 200 volts are epplied between cathode and leaving the photocathode by incident radiant power of a
Measured at 4200 angstroms. Luminous Sen;itivityg. The quotient of output current Dy	4200	Measured at 4200 angstroms. Luminous Sen;itivityg. The quotient of output current Dy
tivity of 500 amperes per lumen. Dark current caused photocathode current, at constant electrode vol	500 V	tivity of 500 amperes per lumen. Dark current caused photocathode current, at constant electrode voltages
supply voltage E)) below 2000 volts is recommended. flux which when modulated in a stated manner pro	2000 V	supply voltage E)) below 2000 volts is recommended. flux which when modulated in a stated manner produces an
2800 volts, 259C tube temperature, tungsten light source	259 V	2800 volts, 259C tube temperature, tungsten light source

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
to amplify signals composed of electron streams. it todynode No.14. Spacing between dynode No.	4	to amplify signals composed of electron streams. it todynode No.14. Spacing between dynode No. 4
I GRID-N22-TO-DYNODE-Ne 2 (DY2) VOLTS =212 the overall supply voltage should be reapportioned	212 V	I GRID-N22-TO-DYNODE-Ne 2 (DY2) VOLTS =212 the overall supply voltage should be reapportioned
ETC. THRU [VOLTS=I06 the anode are increased. Successive interdynode	6 V	ETC. THRU [VOLTS=I06 the anode are increased. Successive interdynode
voltages should not be more than 5/4 of the	4 V	voltages should not be more than 5/4 of the
GRID-N2 VOLTAGE, GRID-N23 VOLTAGE, AND DY,	3 V	GRID-N2 VOLTAGE, GRID-N23 VOLTAGE, AND DY,
LIGHT SOURCE IS A TUNGSTEN-FILAMENT LAMP	1	LIGHT SOURCE IS A TUNGSTEN-FILAMENT LAMP
1L LIGHT SOURCE IS A TUNGSTEN-FILAMENT LAMP	1	1L LIGHT SOURCE IS A TUNGSTEN-FILAMENT LAMP
Table 1. The voltagedistribution	1 V	Table 1. The voltagedistribution
operating voltage between dynode No.14 and anode 1.0 10 100 1000	100000 V	operating voltage between dynode No.14 and anode 1.0 10 100 1000 10000 100000
approximate range of 50 to 100 volts. Low	100 V	approximate range of 50 to 100 volts. Low
operating voltages between dynode No.1 4 and anode number of col lected photoelectrons is the primar	4 V	operating voltages between dynode No.1 4 and anode number of col lected photoelectrons is the primary
No.113, serves to minimize the effect of space apply the highest voltage to the accelerating	3 V	No.113, serves to minimize the effect of space apply the highest voltage to the accelerating
voltage is applied to the electrodes of the	7046 V	voltage is applied to the electrodes of the 7046
CATHODE & GRID N21 2 APPROX™ ally released from the cathode, by secondary	2 s	CATHODE & GRID N21 2 APPROX™ ally released from the cathode, by secondary
2 CATHODE -TO-GRID-N	1215 V	2 CATHODE -TO-GRID-N22 VOLTS=1215
GRID~-N22-TO- DYNODE - N22 (DY2) VOLTS=	212 V	GRID~-N22-TO- DYNODE - N22 (DY2) VOLTS=212

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
~ 2 VOLTS=106	106 V	~ 2 VOLTS=106
GRID-N2} VOLTAGE, GRID-N23 VOLTAGE, AND	3 V	GRID-N2} VOLTAGE, GRID-N23 VOLTAGE, AND
2 qe" A A 2 DY) VOLTAGE ADJUSTED FOR MAX. ANODE	2 V	- 2 qe" A A 2 DY) VOLTAGE ADJUSTED FOR MAX. ANODE
SUPPLY VOLTS (E)	7 V	SUPPLY VOLTS (E) 7
the voltage divider. Since the accelerating of Type	7046 V	the voltage divider. Since the accelerating of Type 7046.
the accelerating-electrode voltage may be adjusted curves in Fig.6 which show luminous sensitivity	6 V	the accelerating-electrode voltage may be adjusted curves in Fig.6 which show luminous sensitivity
in Fig.4, occurs in the approximate range of voltage --adjustment range required to take care	4 V	in Fig.4, occurs in the approximate range of voltage--adjustment range required to take care
50 to	100 V	50 to 100 volts,
[CATHODE-TO-GRID-N	1215 V	[CATHODE-TO-GRID-N22 VOLTS=1215
[GRID-N22-TO-DYNODE-N22 (DY2) VOLTS =	2 V	[GRID-N22-TO-DYNODE-N22 (DY2) VOLTS =2i2
volts. Within this range, the noise at the anode [DY;	4 V	volts. Within this range, the noise at the anode [DY;4~TO-ANODE
is produced primarily by the statistical release [GRID-N2) VOLTAGE, GRID-N23 VOLTAGE, AND DY)	3 V	is produced primarily by the statistical release [GRID-N2) VOLTAGE, GRID-N23 VOLTAGE, AND DY)
second. At voltages above 3200 volts, regenerative r POSITIVE VALUES ARE FOR LINES OF FORCE FROM	200 V	second. At voltages above 3200 volts, regenerative r POSITIVE VALUES ARE FOR LINES OF FORCE FROM
low the maximum rated value of 2 milliamperes is Current of Type	7046 mA	low the maximum rated value of 2 milliamperes is Current of Type 7046.
anode current should not exceed 100 microamperes. determined from Fig.6 for low-light-level service	6 A	anode current should not exceed 100 microamperes. determined from Fig.6 for low—light-level service.
The range of sensitivity values is dependent For example, if a sensitivity design value of	200	The range of sensitivity values is dependent For example, if a sensitivity design value of 200

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
be expected between individual tubes of a given corresponds to a supply voltage of about	3180 V	be expected between individual tubes of a given corresponds to a supply voltage of about 3180
to a supply voltage of 2340 volts. Therefore,	2340 V	to a supply voltage of 2340 volts. Therefore,
number of stages. Thus, very small variations in voltage over the range from 2340 to	3180 V	number of stages. Thus, very small variations in voltage over the range from 2340 to 3180 volts.
amplification per stage produce very large changes Electrostatic shielding of the 7046 is not	7046	amplification per stage produce very large changes Electrostatic shielding of the 7046 is not
It istobe noted that the use of an external *FOR -3400V, CURRENT IS 5.88 MA	-9373 mA	It istobe noted that the use of an external *FOR -3400V, CURRENT IS 5.88 MA. 92CS5-9373
presents a safety hazard unless the shield is Cy = 25 puf, disk ceramic, 600 volts (dc working)	600 V	presents a safety hazard unless the shield is Cy = 25 puf, disk ceramic, 600 volts (dc working)
connected through a high impedance in the order Cp, = 50 puf, disk ceramic, 600 volts (dc working)	600 V	connected through a high impedance in the order Cp, = 50 puf, disk ceramic, 600 volts (dc working)
C3 = 100 puf, disk ceramic, 600 volts (dc working)	600 V	C3 = 100 puf, disk ceramic, 600 volts (dc working)
of 10 megohms to the potential. If the shield is	10 ohm	of 10 megohms to the potential. If the shield is
Cy = 250 puf, disk ceramic, 600 volts (dc working)	600 V	Cy = 250 puf, disk ceramic, 600 volts (dc working)
not soconnected, extreme care should be observed Cs = 500 uuf, disk ceramic, 600 volts (dc working)	600 V	not soconnected, extreme care should be observed Cs = 500 uuf, disk ceramic, 600 volts (dc working)
in providing adequate safe-guards to prevent Ceç = 100 uuf, disk ceramic, 600 volts (dc working)	600 V	in providing adequate safe-guards to prevent Ceç = 100 uuf, disk ceramic, 600 volts (dc working)
personnel from coming in contact with the high Ry = 50000 ohms, 2 watts, adjustable	2 W	personnel from coming in contact with the high Ry = 50000 ohms, 2 watts, adjustable
potential of the shield. R2 = 200000 ohms,	10 W	potential of the shield. R2 = 200000 ohms, 10 watts

TUBE TINKER

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