X NOV 87. Now Eimac have added wire GAGE 30 AWG (= 0.254 mm/m Ø Cu. wire).

8281
4CX15,000A

TECHNICAL DATA

RADIAL BEAM
POWER TETRODE

The EIMAC 8281/4CX15,000A is a ceramic/metal power tetrode intended for use in audio or radio frequency applications. It features a new type of internal mechanical structure which results in higher rf operating efficiency. Low rf losses in this mechanical structure permit operation of the 8281/4CX15,000A at full ratings up to 110 MHz, and at reduced ratings, to 225 MHz.

The 8281/4CX15,000A is also recommended for radio-frequency linear power amplifier service, and for VHF television linear amplifier service.

GENERAL CHARACTERISTICS [1]

ELECTRICAL

Filament: Thoriated Tungsten	
Voltage	6.3 ± 0.3 V
Current, at 6.3 volts	160 A
Amplification Factor, average	
Grid to Screen	4.5
Direct Interelectrode Capacitances (cathode grounded): [2]	
Cin	160.0 pF
Cout	24.5 pF
Cgp	1.5 pF
Direct Interelectrode Capacitances (grid and screen grounded): [2]	
Cin	67.0 pF
Cout	25.5 pF
Cpk	0.2 pF
Maximum Frequency Ratings	
CW	110 MHz

1. Characteristics and operating values are based on performance tests. These figures may change without notice as the result of additional data or product refinement. EIMAC Division of Varian should be consulted before using this information for final equipment design.

2. Capacitance values are for a cold tube as measured in a special shielded fixture in accordance with Electronic Industries Association Standard RS-191.

MECHANICAL

Maximum Overall Dimensions:	
Length	9.375 in; 238.13 mm
Diameter	7.580 in; 192.53 mm
Net Weight	12.8 lb; 5.81 kg
Operating Position	Axis vertical, base up or down
Cooling	Forced air
Operating Temperature, maximum	
Ceramic/Metal Seals and Anode Core	250°C
Base	Special, concentric
Recommended Air System Socket	SK-300A
Recommended Air Chimney	SK-316

RADIO FREQUENCY LINEAR AMPLIFIER
GRID DRIVEN, Class AB_1

ABSOLUTE MAXIMUM RATINGS

DC PLATE VOLTAGE	10,000	VOLTS
DC SCREEN VOLTAGE	2000	VOLTS
DC PLATE CURRENT	6.0	AMPERES
PLATE DISSIPATION	15,000	WATTS
SCREEN DISSIPATION	450	WATTS
GRID DISSIPATION	200	WATTS

1. Adjust for specified zero-signal plate current.
2. Approximate value.

TYPICAL OPERATION
Peak Envelope or Modulation Crest Conditions

Plate Voltage	7,500	10,000	Vdc
Screen Voltage	1,500	1,500	Vdc
Grid Voltage [1]	-350	-370	Vdc
Zero-Signal Plate Current	1.0	1.0	Adc
Single-Tone Plate Current	4.0	4.25	Adc
Single-Tone Screen Current [2]	170	150	mAdc
Peak rf Grid Voltage [2]	330	340	v
Plate Dissipation	12.2	14.0	kW
Single-Tone Plate Output Power	20.8	28.5	kW
Resonant Load Impedance	865	1,260	Ω

RADIO FREQUENCY POWER AMPLIFIER OR OSCILLATOR
Class C Telegraphy or FM Telephony
(Key-Down Conditions)

ABSOLUTE MAXIMUM RATINGS

DC PLATE VOLTAGE	10,000	VOLTS
DC SCREEN VOLTAGE	2000	VOLTS
DC PLATE CURRENT	5.0	AMPERES
PLATE DISSIPATION	15,000	WATTS
SCREEN DISSIPATION	450	WATTS
GRID DISSIPATION	200	WATTS

TYPICAL OPERATION

Plate Voltage	7,500	10,000	Vdc
Screen Voltage	750	750	Vdc
Grid Voltage	-510	-550	Vdc
Plate Current	4.65	4.55	Adc
Screen Current [1]	0.59	0.54	Adc
Grid Current [1]	0.30	0.27	Adc
Peak rf Grid Voltage [1]	730	790	v
Calculated Driving Power	220	220	W
Plate Dissipation	8.1	9.0	kW
Plate Output Power	26.7	36.5	kW

1. Approximate value.

PLATE MODULATED RADIO FREQUENCY POWER AMPLIFIER
GRID DRIVEN Class C Telephony
(Carrier Conditions)

ABSOLUTE MAXIMUM RATINGS

DC PLATE VOLTAGE	8000	VOLTS
DC SCREEN VOLTAGE	1500	VOLTS
DC PLATE CURRENT	4.0	AMPERES
PLATE DISSIPATION	10,000	WATTS
SCREEN DISSIPATION	450	WATTS
GRID DISSIPATION	200	WATTS

TYPICAL OPERATION

Plate Voltage	6,000	8,000	Vdc
Screen Voltage	750	750	Vdc
Grid Voltage	-600	-640	Vdc
Plate Current	3.75	3.65	Adc
Screen Current [1]	0.45	0.43	Adc
Grid Current [1]	0.18	0.18	Adc
Peak af Screen Voltage [1] 100% modulation	740	710	v
Peak rf Grid Voltage [1]	800	840	v
Calculated Driving Power	150	150	W
Plate Dissipation	5.1	5.8	kW
Plate Output Power	17.4	23.5	kW

1. Approximate value.

AUDIO FREQUENCY POWER AMPLIFIER OR MODULATOR
GRID DRIVEN, Class AB_1 (Sinusoidal Wave)

ABSOLUTE MAXIMUM RATINGS (per tube)

DC PLATE VOLTAGE	10,000	VOLTS
DC SCREEN VOLTAGE	2000	VOLTS
DC PLATE CURRENT	6.0	AMPERES
PLATE DISSIPATION	15,000	WATTS
SCREEN DISSIPATION	450	WATTS
GRID DISSIPATION	200	WATTS

TYPICAL OPERATION (Two tubes)

Plate Voltage	7,500	10,000	Vdc
Screen Voltage	1,500	1,500	Vdc
Grid Voltage [1]	-350	-370	Vdc
Zero-Signal Plate Current [3]	1.00	1.00	Adc
Maximum Signal Plate Current	8.80	8.50	Adc
Maximum Signal Screen Current [2]	0.34	0.30	Adc
Peak af Grid Voltage [2]	330	340	v
Maximum Signal Plate Dissipation [3]	12.2	14.0	kW
Plate Output Power	41.6	57.0	kW
Load Resistance (plate to plate)	1,730	2,520	Ω

1. Adjust for specified zero-signal plate current.
2. Approximate value.
3. Per Tube.

TELEVISION LINEAR AMPLIFIER

Cathode Driven

ABSOLUTE MAXIMUM RATINGS

110 MHz to 225 MHz

DC PLATE VOLTAGE	6500	VOLTS
DC SCREEN VOLTAGE	1500	VOLTS
DC PLATE CURRENT	5.0	AMPERES
PLATE DISSIPATION	15,000	WATTS
SCREEN DISSIPATION	450	WATTS
GRID DISSIPATION	200	WATTS

TYPICAL OPERATION, Composite Signal Black Level Unless Otherwise Stated

Plate Voltage	5000	6000	Vdc
Screen Voltage	500	700	Vdc
Grid Voltage [1]	-160	-180	Vdc
Plate Current (zero sig.)	.500	.650	Adc
Plate Current	2.800	3.335	Adc
Grid Current	.075	.035	Adc
Screen Current	.060	.040	Adc
Peak Cath. Volt. (pk synch.)	310	345	v
Cath. Driving Power (pk. synch.)	975	1350	w
Plate Output Power (pk. synch.)	11.0	16.5	kw
Plate Load Resistance	600	600	Ω

1. Approximate value.

TYPICAL OPERATION values are obtained by calculations from published characteristic curves. To obtain the specified plate current at the specified bias, screen, and plate voltages, adjustment of the rf grid voltage is assumed. If this procedure is followed, there will be little variation in output power when the tube is replaced, even though there may be some variation in grid and screen currents. The grid and screen currents which occur when the desired plate current is obtained are incidental and vary from tube to tube. These current variations cause no performance degradation providing the circuit maintains the correct voltage in the presence of the current variations. If grid bias is obtained principally by means of a grid resistor, the resistor must be adjustable to produce the required bias voltage when the correct rf grid voltage is applied.

RANGE VALUES FOR EQUIPMENT DESIGN

	Min.	Max.	
Heater Current, at 6.3 volts	152	168	A
Interelectrode Capacitances, cathode grounded [1]			
Cin	154.0	167.0	pF
Cout	22.0	27.0	pF
Cgp	----	2.0	pF
Interelectrode Capacitances, grid and screen grounded [1]			
Cin	62.0	72.0	pF
Cout	23.0	28.0	pF
Cpk	----	0.3	pF

1. Capacitance values are for a cold tube as measured in a special shielded fixture in accordance with Electronic Industries Association Standard RS-191.

MECHANICAL

MOUNTING - The 4CX15,000A must be operated with its axis vertical. The base of the tube may be down or up at the convenience of the circuit designer.

SOCKET - The EIMAC Air-System Socket Type SK-300A is designed especially for the concentric base terminals of the 4CX15,000A. The use of recommended air-flow rates through this socket provides effective forced-air cooling of the tube. Air forced into the bottom of the socket passes over the tube terminals and through the SK-316 Air Chimney, into the anode cooling fins.

COOLING - The maximum temperature rating for the external surfaces of the 4CX15,000A is 250°C. Sufficient forced-air circulation must be provided to keep the temperature of the anode at the base of the cooling fins and the temperature of the ceramic/metal seals below 250°C. Air-flow requirements to maintain seal temperatures at 225°C in 50°C ambient air are tabulated below (for operation below 30 megahertz). This data is for the tube mounted in an SK-300A socket with an SK-316 chimney.

APPLICATION

SEA LEVEL			10,000 FEET	
Plate Dissipation * (Watts)	Air Flow (CFM)	Pressure Drop(Inches of Water)	Air Flow (CFM)	Pressure Drop(Inches of Water)
7,500	230	.7	336	1.0
12,500	490	2.7	710	4.1
15,000	645	4.6	945	7.0

*Since the power dissipated by the filament represents about 1000 watts and since grid-plus-screen dissipation can, under some conditions, represent another 600 watts, allowance has been made in preparing this tabulation for an additional 1600 watts dissipation.

The blower selected in a given application must be capable of supplying the desired air flow at a back pressure equal to the pressure drop shown above plus any drop encountered in ducts and filters.

At other altitudes and ambient temperatures the flow rate must be modified to obtain equivalent cooling. The flow rate and corresponding pressure differential must be determined individually in such cases, using rated maximum temperatures as the criteria for satisfactory cooling.

ELECTRICAL

FILAMENT OPERATION - The rated filament voltage for the 4CX15,000A is 6.3 volts. Filament voltage, as measured at the socket, should be maintained at this value to obtain maximum tube life. In no case should it be allowed to deviate by more than plus or minus five percent from the rated value.

ELECTRODE DISSIPATION RATINGS - The maximum dissipation ratings for the 4CX15,000A must be respected to avoid damage to the tube. An exception is the plate dissipation which may be permitted to rise above the rated maximum during brief periods, such as may occur during tuning.

GRID OPERATION - The 4CX15,000A control grid has a maximum dissipation rating of 200 watts. Precautions should be observed to avoid exceeding this rating. The grid bias and driving power should be kept near the values shown in the "Typical Operation" sections of the data sheet whenever possible. The maximum grid circuit resistance should not exceed 100,000 ohms per tube.

SCREEN OPERATION - The power dissipated by the screen of the 4CX15,000A must not exceed 450 watts.

Screen dissipation, in cases where there is no AC applied to the screen, is the simple product of the screen voltage and the screen current. If the screen voltage is modulated, the screen dissipation will depend upon loading, driving power, and carrier screen voltage.

Screen dissipation is likely to rise to excessive values when the plate voltage, bias voltage, or plate load are removed with filament and screen voltages applied. Suitable protective means must be provided to limit the screen dissipation to 450 watts in the event of circuit failure.

PLATE DISSIPATION - The plate-dissipation rating for the 4CX15,000A is 15,000 watts.

When the 4CX15,000A is operated as a plate-modulated rf power amplifier, the input power is limited by conditions not connected with the plate efficiency, which is quite high. Therefore, except during tuning there is little possibility that the 10,000 watt maximum plate dissipation rating will be exceeded.

HIGH VOLTAGE - Normal operating voltages used with the 4CX15,000A are deadly, and the equipment must be designed properly and operating precautions must be followed. Design all equipment so that no one can come in contact with high voltages. All equipment must include safety enclosures for high-voltage circuits and terminals, with interlock switches to open primary circuits of the power supply and to discharge high-voltage condensers whenever access doors are opened. Interlock switches must not be bypassed or "cheated" to allow operation with access doors open. Always remember that HIGH VOLTAGE CAN KILL.

X-RADIATION - High-vacuum tubes operating at voltages higher than 10 kilovolts produce progressively more dangerous X-ray radiation as the voltage is increased. The 4CX15,000A, operating at its rated voltages and currents, is a potential X-ray hazard. Only limited shielding is afforded by the tube envelope. Moreover, the X-ray radiation level can increase significantly with aging and gradual deterioration, due to leakage paths or emission characteristics as they are affected by the high voltage. X-ray shielding must be provided on all sides of tubes operating at these voltages to provide adequate protection throughout the tube's life. Periodic checks on the X-ray level should be made, and the tube should never be operated without adequate shielding in place when voltages above 10 kilovolts are in use. Lead glass, which attenuates X-rays, is available for viewing windows. If there is any doubt as to the requirement for or the adequacy of shielding, an expert in this field should be contacted to perform an X-ray survey of the equipment.

Operation of high-voltage equipment with interlock switches "cheated" and cabinet doors open in order to be better able to locate an equipment malfunction can result in serious X-ray exposure.

RADIO FREQUENCY RADIATION - Avoid exposure to strong rf fields even at relatively low frequency. Absorption of rf energy by human tissue is dependent on frequency. Under 30 MHz, most of the energy will pass completely through the human body with little attenuation or heating effect. Public health agencies are concerned with the hazard, however, even at these frequencies, and it is worth noting that some commercial dielectric heating units actually operate at frequencies as low as the 13 and 27 MHz bands.

Many EIMAC power tubes, such as the 4CX 15,000A, are specifically designed to generate or amplify radio frequency power. There may be a relatively strong rf field in the general proximity of the power tube and its associated circuitry --- the more power involved, the stronger the rf field. Proper enclosure design and efficient coupling of rf energy to the load will minimize the rf field in the vicinity of the power amplifier unit itself.

INTERELECTRODE CAPACITANCE - The actual internal interelectrode capacitance of a tube is influenced by many variables in most applications, such as stray capacitance to the chassis, capacitance added by the socket used, stray capacitance between tube terminals, and wiring effects. To control the actual capacitance values within the tube, as the key component involved, the industry and the Military Services use a standard test procedure as described in Electronic Industries Association Standard RS-191. This requires the use of specially constructed test fixtures which effectively shield all external tube leads from each other and eliminates any capacitance reading to "ground". The test is performed on a cold tube. Other factors being equal, controlling internal tube capacitance in this way normally assures good interchangeability of tubes over a period of time, even when the tube may be made by different manufacturers. The capacitance values shown in the manufacturer's technical data, or test specifications, normally are taken in accordance with Standard RS-191.

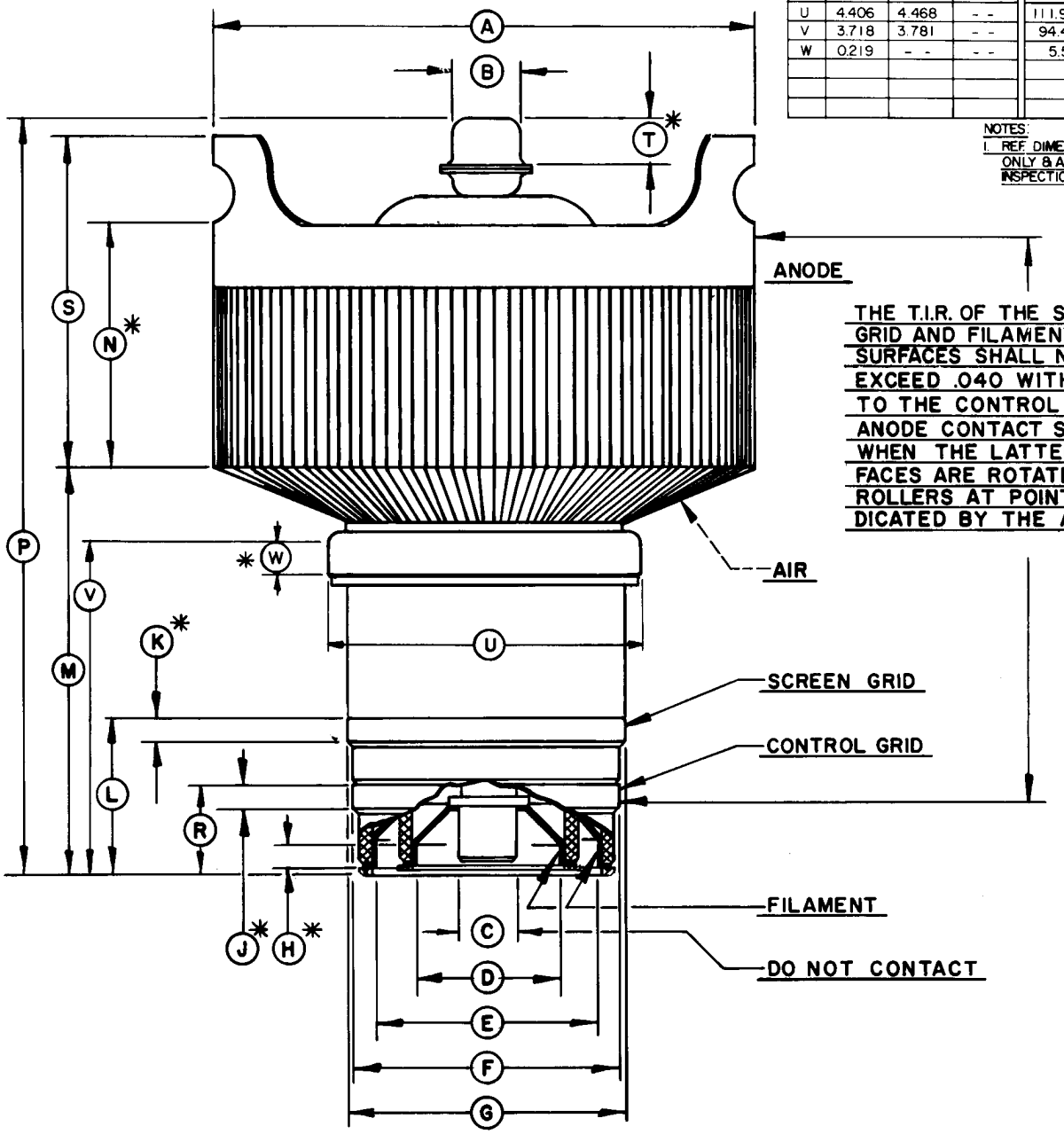
The equipment designer is therefore cautioned to make allowance for the actual capacitance values which will exist in any normal application. Measurements should be taken with the socket and mounting which represent approximate final layout if capacitance values are highly significant in the design.

SPECIAL APPLICATIONS - If it is desired to operate this tube under conditions widely different from those given here, write to the Application Engineering Dept., Power Grid Tube Division, EIMAC Division of Varian, 301 Industrial Way, San Carlos, California, 94070 for information and recommendations.

DIMENSIONAL DATA

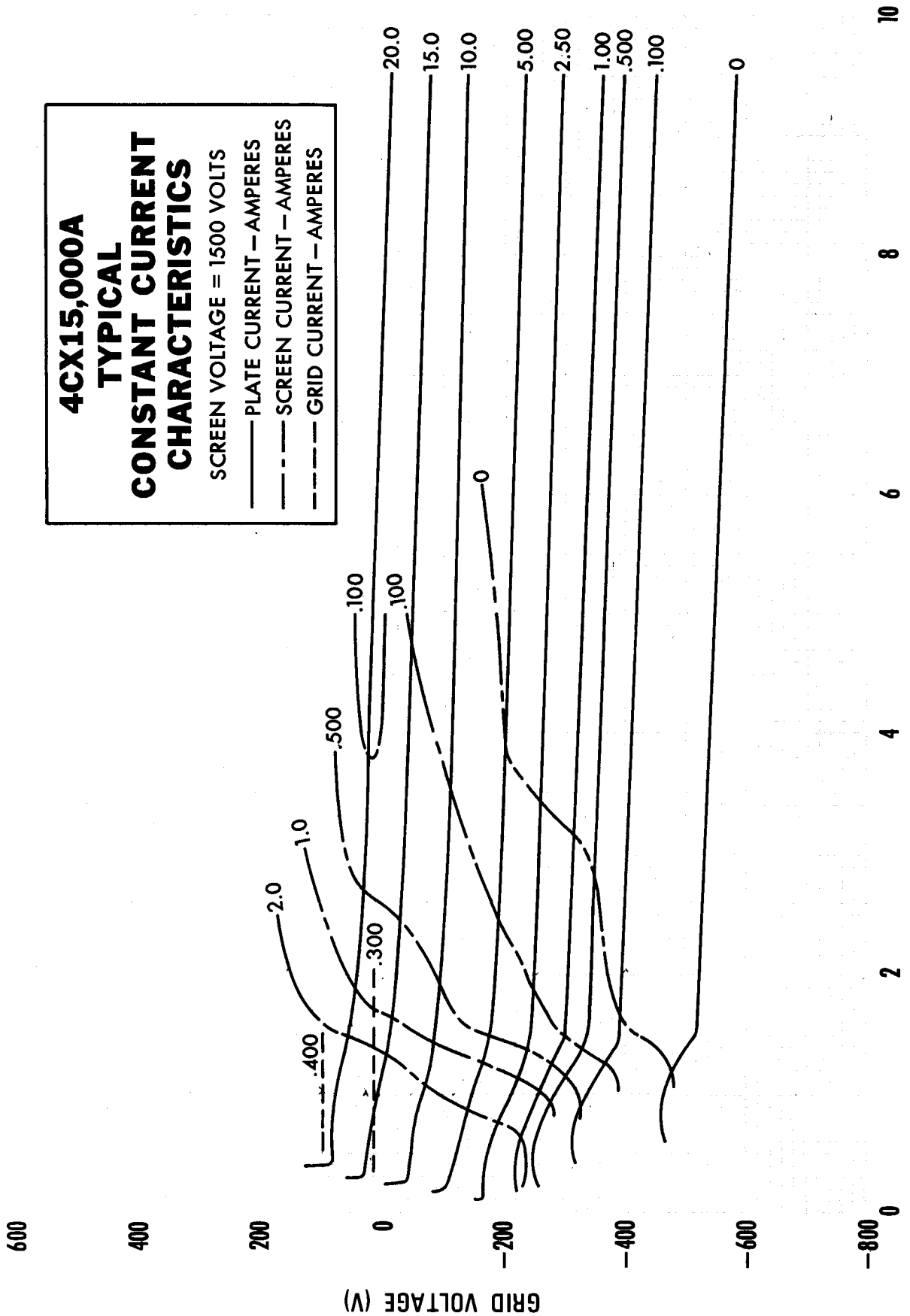
DIM.	INCHES			MILLIMETERS		
	MIN.	MAX.	REF.	MIN.	MAX.	REF.
A	7.460	7.580	- -	189.48	192.53	- -
B	0.855	0.895	- -	21.72	22.73	- -
C	0.720	0.760	- -	18.29	19.30	- -
D	1.896	1.936	- -	46.63	49.17	- -
E	3.133	3.173	- -	79.58	80.59	- -
F	3.792	3.832	- -	96.32	97.33	- -
G	3.980	4.020	- -	101.09	102.11	- -
H	0.188	- -	- -	4.78	- -	- -
J	0.188	- -	- -	4.78	- -	- -
K	0.188	- -	- -	4.78	- -	- -
L	1.764	1.826	- -	44.81	46.38	- -
M	4.659	4.783	- -	118.34	121.49	- -
N	2.412	2.788	- -	61.26	70.82	- -
P	9.000	9.375	- -	228.60	238.13	- -
R	0.986	1.050	- -	25.04	26.67	- -
S	3.560	3.684	- -	90.42	93.57	- -
T	0.375	- -	- -	9.53	- -	- -
U	4.406	4.468	- -	111.91	113.49	- -
V	3.718	3.781	- -	94.44	96.04	- -
W	0.219	- -	- -	5.56	- -	- -

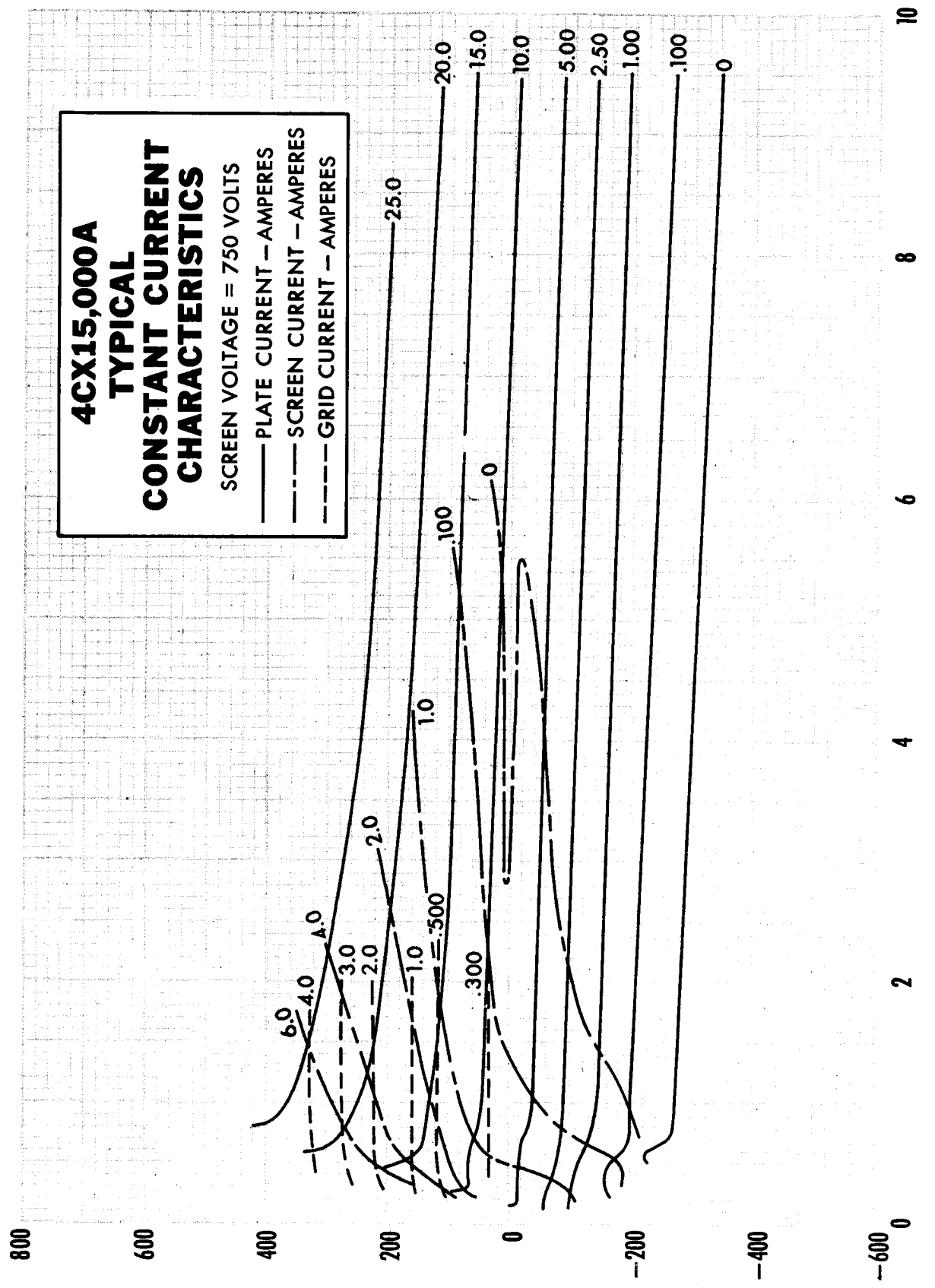
NOTES:
1. REF. DIMENSIONS ARE FOR INFO. ONLY & ARE NOT REQUIRED FOR INSPECTION PURPOSES.



THE T.I.R. OF THE SCREEN GRID AND FILAMENT CONTACT SURFACES SHALL NOT EXCEED .040 WITH RESPECT TO THE CONTROL GRID AND ANODE CONTACT SURFACE WHEN THE LATTER SURFACES ARE ROTATED ON ROLLERS AT POINTS INDICATED BY THE ARROWS

* CONTACT SURFACE


4CX15,000A
TYPICAL
CONSTANT CURRENT
CHARACTERISTICS
SCREEN VOLTAGE = 1500 VOLTS
PLATE CURRENT – AMPERES
SCREEN CURRENT – AMPERES
GRID CURRENT – AMPERES
20.0
15.0
10.0
5.00
2.50
1.00
.500
.100
0
.100
.500
1.0
2.0
.400
.300
600
400
200
0
−200
−400
−600
−800
0
2
4
6
8
10
GRID VOLTAGE (V)
PLATE VOLTAGE (kV)


4CX15,000A
TYPICAL
CONSTANT CURRENT
CHARACTERISTICS
SCREEN VOLTAGE = 750 VOLTS
PLATE CURRENT – AMPERES
SCREEN CURRENT – AMPERES
GRID CURRENT – AMPERES
25.0
20.0
15.0
10.0
5.00
2.50
1.00
.100
0
6.0
4.0
3.0
2.0
1.0
.500
.300
.100
0
2.0
1.0
4.0
800
600
400
200
0
−200
−400
−600
0
2
4
6
8
10
GRID VOLTAGE (V)
PLATE VOLTAGE (KV)

MIL-E-1/1767B
2 May 1984
SUPERSEDING
MIL-E-1/1767A(EC)
31 July 1978

MILITARY SPECIFICATION SHEET

ELECTRON TUBE, POWER

TYPE 8281

Ⓑ This specification is approved for use by all Departments and Agencies of the Department of Defense.

The complete requirements for acquiring the electron tube described herein shall consist of this specification and the latest issue of MIL-E-1.

DESCRIPTION: Tetrode, ceramic-metal
See figure 1
Mounting position: Vertical, base down or up
Weight: 12.8 pounds (5.8 kg) nominal

ABSOLUTE RATINGS: F = 110 MHz

Parameter: Unit: Maximum:	Ef V ac	Eb kV dc	Ec2 kV dc	Ec1 kV dc	Ib A dc	Pg1 W	Pg2 W	Pp kW	Anode core & seal T °C	Cooling --- (Note 1)
C Teleg:	6.3 ±5%	10	2	-1.5	5	200	450	15	250	---
C Telep: (anode mod)	6.3 ±5%	8	1.5	-1.5	4	200	450	10	250	---
Class AB:	6.3 ±5%	10	2	---	6	200	450	15	250	---
TEST CONDITIONS:	6.3	2	0.75	Adj	1	---	---	---	---	Note 2

Ⓑ GENERAL:

Qualification - Required

Ⓑ denotes changes

Method	Requirement or test	Notes	Conditions	AQL (percent defective)	Inspection level or code	Symbol	Limits Min	Limits Max	Unit
	Quality conformance inspection, part 1								
1301	Filament current	-	t = 120 ±15	0.65	II	If	152	168	A ac
1261	Electrode voltage (grid)	-		0.65	II	Ec1	-110	-146	V dc
1266	Total grid current	-		0.65	II	Ic1	---	-25	µA dc
1256	Electrode current (screen)	-		0.65	II	Ic2	---	25	mA dc
1231	Peak emission	-	eb = ec2 = ec1 = 2.5 kv	0.65	II	is	90	---	a
1266	Primary grid emission (grid)	-	Pg1 = 200 W; t = 120 max or until stable; anode and g2 floating	0.65	II	Isg1	---	-500	µA dc
1266	Primary grid emission (screen)	-	Pg2 = 450 W; Ec1 = 0 V dc; t = 120 max or until stable; anode floating	0.65	II	Isg2	---	-500	µA dc
	Quality conformance inspection, part 2								
1331	Direct-interelectrode capacitance (ground cathode connection)	-		---	---	Cin	154	167	pF
						Cout	22	27	pF
						Cgp	---	2	pF
1331	Direct-interelectrode capacitance (ground grid connection)	-		---	---	Cin	62	72	pF
						Cout	23	28	pF
						Cpk	---	0.30	pF
1372	Current division (method B, short pulse)	-	Eb = Ec2 = 2,000 V dc; Ec1 = -800 V dc; egk/ib = 19 a	---	---	egk	---	0	v
				---	---	ic2	---	3.2	a
---	Power output	6	Class AB1 amp; F = 1 MHz (min); Eb = 9 kV dc; Ec2 = 2 kV dc; Ec1/Ibo = 0.1 A dc; Eg1/Ib = 3.7 A dc; Rℓ = 1,125 ±5%; anode tank Q = 10 to 15	---	---	Po	20	---	kW (useful)

Method	Requirement or test	Notes	Conditions	AQL (percent defective)	Inspection level or code	Symbol	Limits		Unit
							Min	Max	
	Quality conformance inspection, part 3								
---	Service-life guarantee	3		---	---	---	---	---	---
1042	Shock, specified pulse	4	No voltages applied; shock = 11 ms half-sine; accel = 15 G peak (min); impacts = 6 (3 each X and Z axes)	---	---	---	---	---	---
1032	Vibration, mechanical	4	No voltages applied; accel = 2 G peak (min); F = 10 to 50 Hz, ascending only; sweep t = 3 to 8 minutes; 1 sweep each X and Y axes	---	---	---	---	---	---
---	Shock and vibration, mechanical end points:								
1261	Electrode voltage (grid)	-		---	---	Ec1	-100	-146	V dc
1266	Total grid current	-		---	---	Ic1	---	-30	µA dc
1301	Filament current	5		---	---	ΔIf	---	3	A ac

NOTES:

1. Minimum airflow requirements for incoming air at 50°C maximum at sea level, for operation under 30 MHz, are shown. Additional cooling may be required for operation above 30 MHz. In all cases of operation a socket which provides for forced-air cooling of the base must be used, such as the EIMAC SK-300A, or equivalent, used with the EIMAC SK-316 Air Chimney, or equivalent, with air flowing in a base-to-anode direction. Where long life and consistent performance are factors, cooling in excess of minimum requirements is normally beneficial. Cooling air should be applied before or simultaneously with the application of electrode voltages, including the filament, and should normally be maintained for a short period after all voltages are removed to allow for tube cool-down. The cooling data shown is for the tube in a SK-300A socket with a SK-316 Air Chimney.

Anode dissipation	Sea level		10,000 feet	
	Airflow (cfm)	Approximate pressure drop ($In.H_2O$)	Airflow (cfm)	Approximate pressure drop ($In.H_2O$)
7,500 W	220	0.4	320	0.6
12,500 W	555	2.5	810	3.6
15,000 W	775	5.0	1,130	7.3

2. In all electrical tests involving application of filament voltage an air-system socket and chimney may be used and forced-air cooling is allowable.

3. The tube manufacturer warrants the tube for 1 year from date of shipment, or 1,000 hours of filament life, whichever first elapses. This warranty applies only when the tube is operated within the maximum ratings (see "Absolute Ratings" of MIL-E-1). A defective tube shall either be replaced, or at the option of the manufacturer, a credit shall be made in the amount of the original purchase price pro rated on the basis of 1,000 hours of "filament-on" time.

4. Testing shall be performed every 6 months, with sampling as follows:

$n_1 = 4$ $c_1 = 0$

$n_2 = 4$ $c_2 = 1$;

where c_2 represents the total allowable failures for the first and second samples combined.

Separate samples may be used at the option of the manufacturer. None of the listed tests shall be considered destructive except in case of failure. In th event of failure after double sampling, that specific test shall become qualit conformance inspection, part 2; after three consecutive successful submissions, the testing may revert to the quality conformance inspection, part 3 tests.

5. Any change in filament current resulting from the vibration or shock testing (considered individually) shall not exceed the specified limit for ΔIf.

6. During this test the tube shall be operated as a Class AB1 amplifier; the control grid shall not be driven positive, as indicated by grid current flow.

Custodians:
Army - ER
Navy - EC
Air Force - 85

Review activities:
Air Force - 99
DLA - ES

User activities:
Navy - AS, OS, MC, CG
Air Force - 11, 19

Agent:
DLA - ES

Preparing activity:
Navy - EC

(Project 5960-3331)

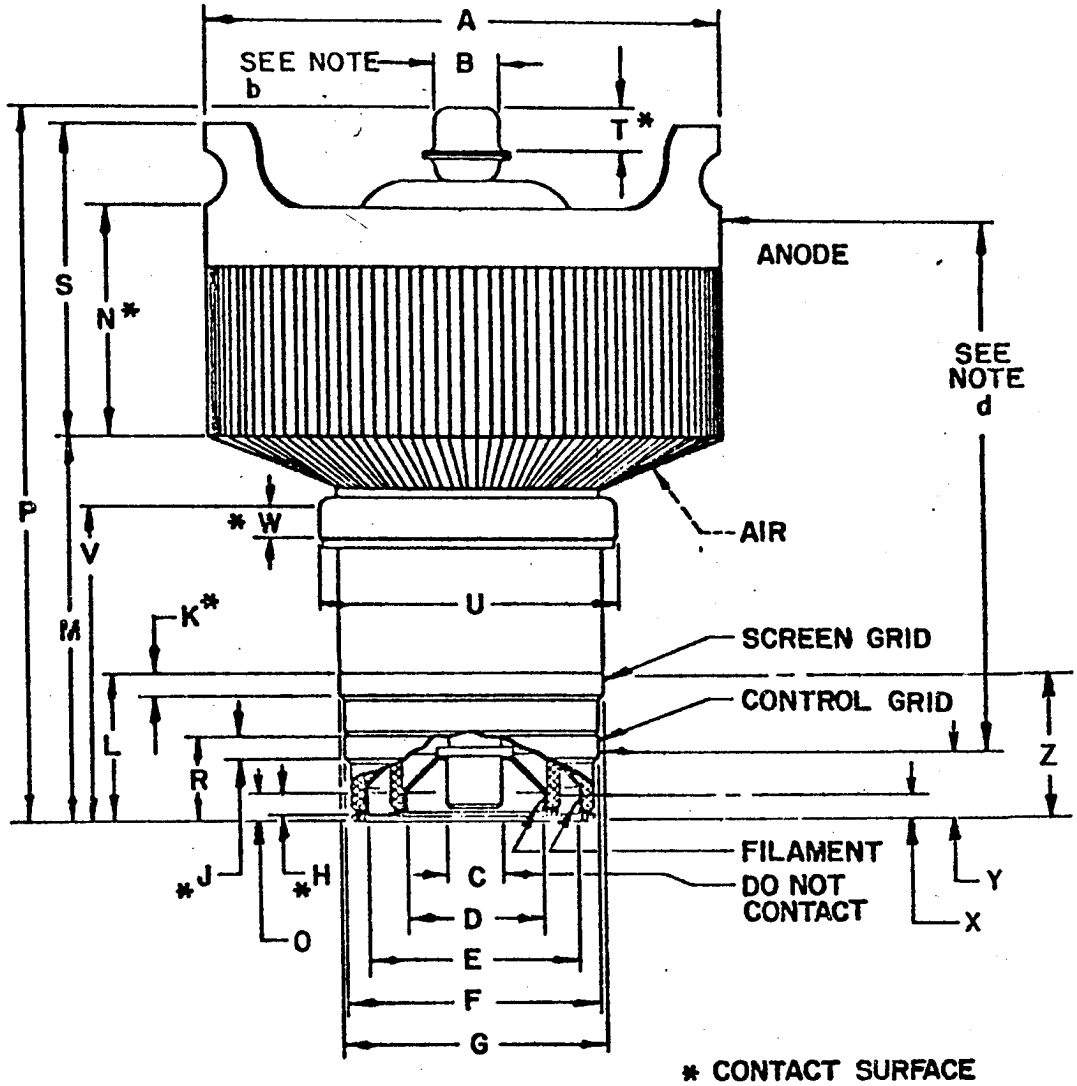


FIGURE 1. Outline drawing of electron tube type 8281.

Ltr	Dimensions in inches with metric equivalents (mm) in parentheses	
	Minimum	Maximum
Quality conformance inspection, part 2		
C	.600 (15.24)	.760 (19.30)
D	1.896 (48.16)	1.936 (49.17)
E	3.133 (79.58)	3.173 (80.59)
F	3.792 (96.32)	3.832 (97.33)
G	3.980 (101.09)	4.020 (102.11)
H	.188 (4.78)	--- ---
J	.188 (4.78)	--- ---
K	.188 (4.78)	--- ---
L	1.695 (43.05) BASIC (See note e)	
O	.355 (9.02) BASIC (See note e)	
P	9.000 (228.60)	9.375 (238.12)
R	.920 (23.37) BASIC (See note e)	
T	.375 (9.52)	--- ---
U	4.406 (111.91)	4.468 (113.49)
V	3.718 (94.44)	3.781 (96.04)
W	.219 (5.56)	--- ---
Quality conformance inspection, part 3 (See note c)		
A	7.460 (189.48)	7.580 (192.53)
B	.855 (21.72)	.895 (22.73)
M	4.550 (115.57)	4.783 (121.49)
N	2.412 (61.26)	2.788 (70.82)
S	3.560 (90.42)	3.684 (93.57)
Reference dimensions (See notes f & g)		
X	.260 (6.60)	
Y	.826 (20.98)	
Z	1.600 (40.64)	

FIGURE 1. Outline drawing of electron tubes type 8281 - Continued.

NOTES:

a. The total indicator reading (T.I.R.) (the sum of the positive and negative deflection shown by the indicator when measuring the eccentricity of the surface with respect to another, with the reference axis established) of the screen grid and filament contact surfaces shall not exceed .040 (1.02 mm) with respect to the control grid and anode contact surfaces when the latter surfaces are rotated on rollers at the points indicated by the arrows. Quality conformance inspection part 2, shall apply.

b. Top cap outline optional provided it meets requirements of dimensions B and T.

c. Dimensions shall be checked every 6 months, with sampling as follows:

$n_1 = 4$ $c_1 = 0$ where c_2 represents the total allowable
$n_2 = 4$ $c_2 = 1$; failures for the first and second samples combined.

Separate samples may be used at the option of the manufacturer. None of the listed tests shall be considered destructive except in case of failure. In the event of failure after double sampling, that specific test shall become quality conformance inspection, part 2; after three consecutive successful submissions, the testing may revert to the quality conformance inspection, part 3 tests.

d. The T.I.R. of the screen grid and filament contact surfaces shall not exceed .040 (1.02 mm) with respect to the control grid and anode contact surface when the latter surfaces are rotated on rollers at points indicated by the arrows.

e. Basic dimension is a numerical value used to describe the theoretically exact size, shape or location of a feature or datum target. It is the basis from which permissible variations are established by tolerances on other dimensions, in notes or by feature control symbols.

f. Optimum filament and grid connector heights for socket design purposes.

g. Reference or nominal dimensions are listed for information only, and are not required for inspection purposes.

FIGURE 1. Outline drawing of electron tube type 8281 - Continued.

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