# PLANAR TRIODE

## DESCRIPTION AND RATING

FOR GROUNDED-GRID OSCILLATOR, AMPLIFIER, AND FREQUENCY MULTIPLIER SERVICE

Metal and Ceramic — Pulse Rated
High Transconductance — Shock Resistant
100 Watts Plate Dissipation

The 3CX100A5 is a metal-and-ceramic, high-mu triode designed for use as a grounded-grid CW oscillator, amplifier, or frequency multiplier at frequencies as high as 2500 megacycles. In addition, it may be used as a plate-pulsed oscillator or amplifier at frequencies as high as 3000 megacycles.

Features of the 3CX100A5 include planar electrode construction, high plate dissipation capability, excellent electrode isolation, low radio-frequency losses, high transconductance, and low interelectrode capacitances.

## GENERAL

### ELECTRICAL

| | | |
|---|---|---|
| Cathode—Coated Unipotential | | |
| Heater Characteristics and Ratings | | |
| Heater Voltage, AC or DC | * | Volts |
| Heater Current at Ef = 6.0 volts | 1.0† | Amperes |
| Cathode Heating Time, minimum | 60 | Seconds |
| Direct Interelectrode Capacitances‡ | | |
| Grid to Plate: (g to p) | 2.0 | pf |
| Grid to Cathode: (g to k) | 6.3 | pf |
| Plate to Cathode: | | |
| (p to k), maximum | 0.035 | pf |

### MECHANICAL

| | | |
|---|---|---|
| Mounting Position—Any—Only Plate Flange to be Used as a Socket Stop and Clamp | | |
| Net Weight, approximate | 2.5 | Ounces |
| Cooling | | |
| Plate and Plate Seal—Conduction and Forced Air | | |
| Grid and Cathode Seals—Conduction and Forced Air | | |
| Recommended Air Flow Cowling—157-JAN | | |
| Recommended Air Flow on Plate Radiator at Sea Level | | |
| Incoming Air Temperature 25C, Plate Dissipation 100 Watts | 12.5 | Cu.Ft.PerMin. |

## MAXIMUM RATINGS

### ABSOLUTE-MAXIMUM VALUES

#### RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAPHY

Key-Down Conditions Per Tube Without Amplitude Modulation§

| | | |
|---|---|---|
| Heater Voltage* | 4.5 to 5.7 | Volts |
| Frequency | 2500 | Megacycles |
| DC Plate Voltage | 1000 | Volts |
| Negative DC Grid Voltage | 150 | Volts |
| Peak Positive RF Grid Voltage | 30 | Volts |
| Peak Negative RF Grid Voltage | 400 | Volts |
| DC Grid Current | 50 | Milliamperes |
| DC Cathode Current | 125 | Milliamperes |
| Plate Dissipation | 100 | Watts |
| Grid Dissipation | 2.0 | Watts |
| Envelope Temperature at Hottest Point | 300 | C |

#### RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEPHONY

Carrier Conditions Per Tube For Use With a Maximum Modulation Factor of 1.0

| | | |
|---|---|---|
| Heater Voltage* | 4.5 to 5.7 | Volts |
| Frequency | 2500 | Megacycles |
| DC Plate Voltage¶ | 600 | Volts |
| Negative DC Grid Voltage | 150 | Volts |
| Peak Positive RF Grid Voltage | 30 | Volts |
| Peak Negative RF Grid Voltage | 400 | Volts |
| DC Grid Current | 50 | Milliamperes |
| DC Cathode Current | 100 | Milliamperes |
| Plate Dissipation | 70 | Watts |
| Grid Dissipation | 2.0 | Watts |
| Envelope Temperature at Hottest Point | 300 | C |

#### PLATE-PULSED OSCILLATOR OR AMPLIFIER

| | | |
|---|---|---|
| Heater Voltage* | 5.7 to 6.0 | Volts |
| Frequency | 3000 | Megacycles |
| Peak Positive-Pulse Plate Supply Voltage | 3500 | Volts |
| Duty Factor of Plate Pulse # △ | 0.0025 | |
| Pulse Duration | 3.0 | Microseconds |
| Plate Current | | |
| Average During Plate Pulse △** | 3.0 | Amperes |
| Negative Grid Voltage | | |
| Average During Plate Pulse†† | 150 | Volts |
| Grid Current | | |
| Average During Plate Pulse | 1.8 | Amperes |
| Plate Dissipation △ | 27 | Watts |
| Grid Dissipation △ | 2.0 | Watts |
| Envelope Temperature at Hottest Point | 300 | C |



⊕ *Supersedes pages 1 and 2 of D & R sheet for 3CX100A5 dated 12-61*

# CHARACTERISTICS AND TYPICAL OPERATION

### AVERAGE CHARACTERISTICS

| | | |
|---|---|---|
| Heater Voltage | 6.0 | Volts |
| Plate Voltage | 600 | Volts |
| Grid Voltage§§ | | Volts |
| Amplification Factor | 100 | |
| Transconductance | 25000 | Micromhos |
| Plate Current | 70 | Milliamperes |

### RADIO-FREQUENCY POWER AMPLIFIER

| | | |
|---|---|---|
| Frequency | 500 | Megacycles |
| DC Plate Voltage | 900 | Volts |
| DC Grid Voltage | −40 | Volts |
| DC Plate Current | 90 | Milliamperes |
| DC Grid Current, approximate | 30 | Milliamperes |
| Driving Power, approximate | 6 | Watts |
| Useful Power Output | 40 | Watts |

### RADIO-FREQUENCY OSCILLATOR

| | | |
|---|---|---|
| Frequency | 2500 | Megacycles |
| DC Plate Voltage | 1000 | Volts |
| DC Grid Voltage, approximate | −22 | Volts |
| DC Plate Current | 90 | Milliamperes |
| DC Grid Current | 10 | Milliamperes |
| Useful Power Output | 17 | Watts |

### PLATE-PULSED OSCILLATOR

| | | |
|---|---|---|
| Frequency | 3000 | Megacycles |
| Heater Voltage | 5.8 | Volts |
| Duty Factor | 0.0025 | |
| Pulse Duration | 3.0 | Microseconds |
| Peak Positive-Pulse Plate-Supply Voltage | 3500 | Volts |
| Plate Current Average During Plate Pulse | 3.0 | Amperes |
| Grid Current Average During Plate Pulse | 1.8 | Amperes |
| Useful Power Output Average During Plate Pulse | 1.6 | Kilowatts |

* The equipment designer should design the equipment so that heater voltage is centered at some value within the range of 4.5 to 5.7 volts for CW operation, or 5.7 to 6.0 volts for pulse operation. Heater voltage variations about the center value should be kept as small as practical and should not, in any case, exceed ±5%. The optimum center value of heater voltage depends on the cathode current and on other parameters of circuit design and operation. For specific recommendations, contact your General Electric tube sales representative.

† Heater current of a bogey tube at Ef = 6.0 volts.

‡ Measured in a special shielded socket.

§ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

¶ For modulation factors less than 1.0, a higher d-c plate voltage may be used if the sum of the peak positive audio voltage and the d-c plate voltage does not exceed 1200 volts.

⁂ Applications with a duty factor greater than 0.0025 should be referred to your General Electric tube sales representative for recommendations.

△ In any 5000-microsecond interval.

** The regulation and/or series plate-supply impedance must be such as to limit the peak current, with the tube considered a short circuit, to a maximum of 30 amperes.

†† The maximum instantaneous value should be within the range of +250 to −750 volts.

§§ Adjusted for Ib = 70 milliamperes.

Absolute-Maximum ratings are limiting values of operating and environmental conditions applicable to any electron tube of a specified type as defined by its published data and should not be exceeded under the worst probable conditions.

The tube manufacturer chooses these values to provide acceptable serviceability of the tube, making no allowance for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration and of all other electron devices in the equipment.

The equipment manufacturer should design so that initially and throughout life no absolute-maximum value for the intended service is exceeded with any tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of the tube under consideration and of all other electron devices in the equipment.

## INITIAL CHARACTERISTICS LIMITS

| | Min. | Max. | |
|---|---|---|---|
| Heater Current | | | |
| Ef = 6.0 volts | 0.90 | 1.05 | Amperes |
| Grid Voltage | | | |
| Ef = 6.0 volts, Eb = 1000 volts, Ib = 100 ma | −2.0 | −7.0 | Volts |
| Grid Voltage | | | |
| Ef = 6.0 volts, Eb = 1000 volts, Ib = 1.0 ma | .... | −25 | Volts |
| Negative Grid Current | | | |
| Ef = 6.0 volts, Eb = 1000 volts, Ec adjusted for Ib = 100 ma | .... | 8.0 | Microamperes |
| Interelectrode Leakage Resistance | | | |
| Ef = 6.0 volts, Polarity of applied d-c interelectrode voltage is such that no cathode emission results | | | |
| Grid to Cathode at 500 volts d-c | 50 | .... | Megohms |
| Interelectrode Capacitances | | | |
| Grid to Plate: (g to p) | 1.95 | 2.15 | Picofarads |
| Grid to Cathode: (g to k) | 5.6 | 7.0 | Picofarads |
| Plate to Cathode: (p to k) | .... | 0.035 | Picofarads |

## SPECIAL PERFORMANCE TESTS

| | Min. | Max. | |
|---|---|---|---|
| Oscillator Power Output | | | |
| Tubes are tested for power output as an oscillator under the following conditions: Ef = 5.0 volts; F = 2500 MC, min.; Eb = 1000 volts; Ib = 90 ma | 15 | .... | Watts |
| Pulsed-Oscillator Power Output | | | |
| Tubes are tested for power output as an oscillator under the following conditions: Ef = 5.8 volts; F = 3000 MC, min.; epy = 3500 volts; tp = 3.0 μsec. ±10%; Du = 0.0025 ±5%; Rg adjusted for Ib = 7.5 ma; Ec = −1.5 volts, max.; Ic = 4.5 ma, max. | 4.0 | .... | Watts |
| Low Pressure Voltage Breakdown Test | | | |
| Statistical sample tested for voltage breakdown at a pressure of 54 mm Hg. Tubes shall not give visual evidence of flashover when 1000 volts RMS, 60 cps, is applied between the plate and grid terminals. | | | |

## DEGRADATION RATE TESTS

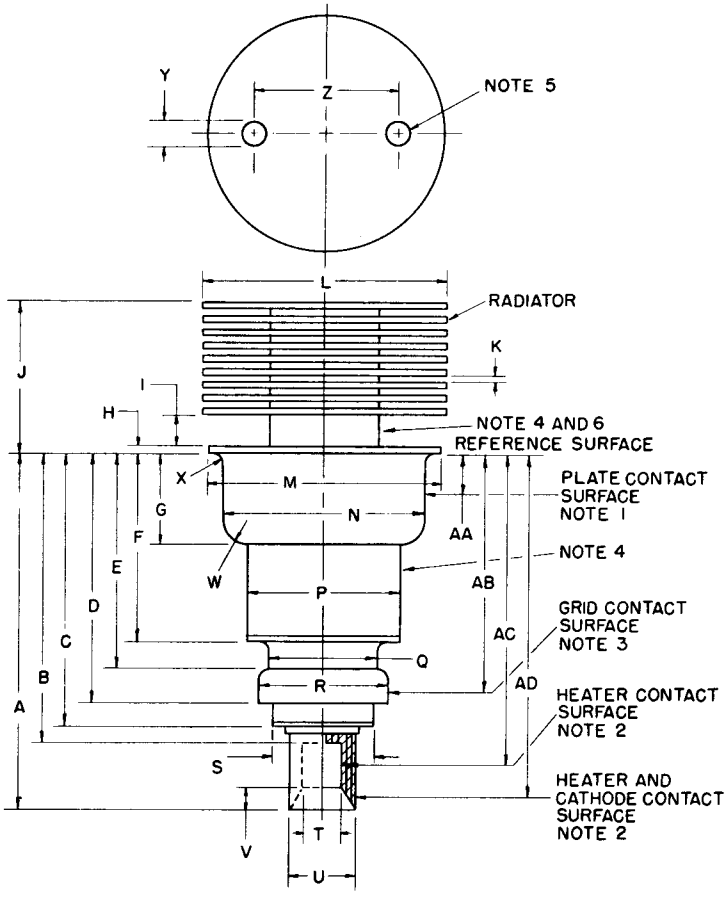
Shock

Statistical sample subjected to 5 impact accelerations of approximately 400 G and 0.5 milliseconds duration in each of three positions. The accelerating forces are applied by the Navy-type, High Impact (flyweight) Shock Machine.

500-Hour Life Test

Statistical sample operated for 500 hours as an oscillator to evaluate changes in power output with life.

## PHYSICAL DIMENSIONS




### DIMENSIONS FOR OUTLINE (INCHES)

| Ref. | Minimum | Maximum |
|---|---|---|
| A | 1.815 | 1.875 |
| B | .... | 1.534 |
| C | .... | 1.475 |
| D | 1.289 | 1.329 |
| E | 1.085 | 1.135 |
| F | .880 | .920 |
| G | .462 | .477 |
| H | .... | .040 |
| I | .125 | .185 |
| J | .766 | .826 |
| K | .025 | .046 |
| L | 1.234 | 1.264 |
| M | 1.180 | 1.195 |
| N | 1.025 | 1.035 |
| P | .772 | .792 |
| Q | .541 | .561 |
| R | .655 | .665 |
| S | .... | .545 |
| T | .213 | .223 |
| U | .315 | .325 |
| V | .... | .086 |
| W | .... | .100 |
| X | .... | .035 |
| Y | .105 | .145 |
| Z | .650 | .850 |

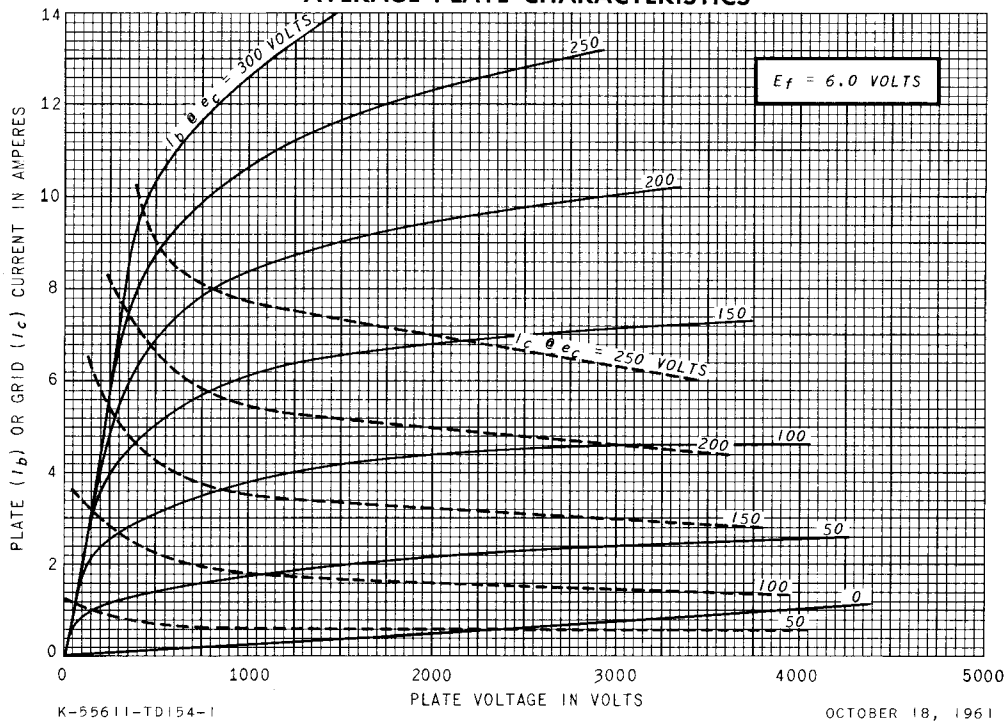
### DIMENSIONS FOR ELECTRODE CONTACT AREA (INCHES)

| Ref. | Dimension | Contact |
|---|---|---|
| AA | .198 ± .163 | Plate |
| AB | 1.225 ± .040 | Grid |
| AC | 1.631 ± .097 | Heater |
| AD | 1.645 ± .170 | Cathode |

NOTES

1. The total indicated runout of the plate contact surface with respect to the cathode contact surfaces will not exceed .020 inch.
2. The total indicated runout of the cathode contact surface with respect to the heater contact surfaces will not exceed .012 inch.
3. The total indicated runout of the grid contact surface with respect to the cathode contact surface will not exceed .020 inch.
4. Do not clamp or locate on this surface.
5. Hole provided for tube extractor through the top fin only.
6. Measure plate shank temperature on this surface.

## AVERAGE PLATE CHARACTERISTICS

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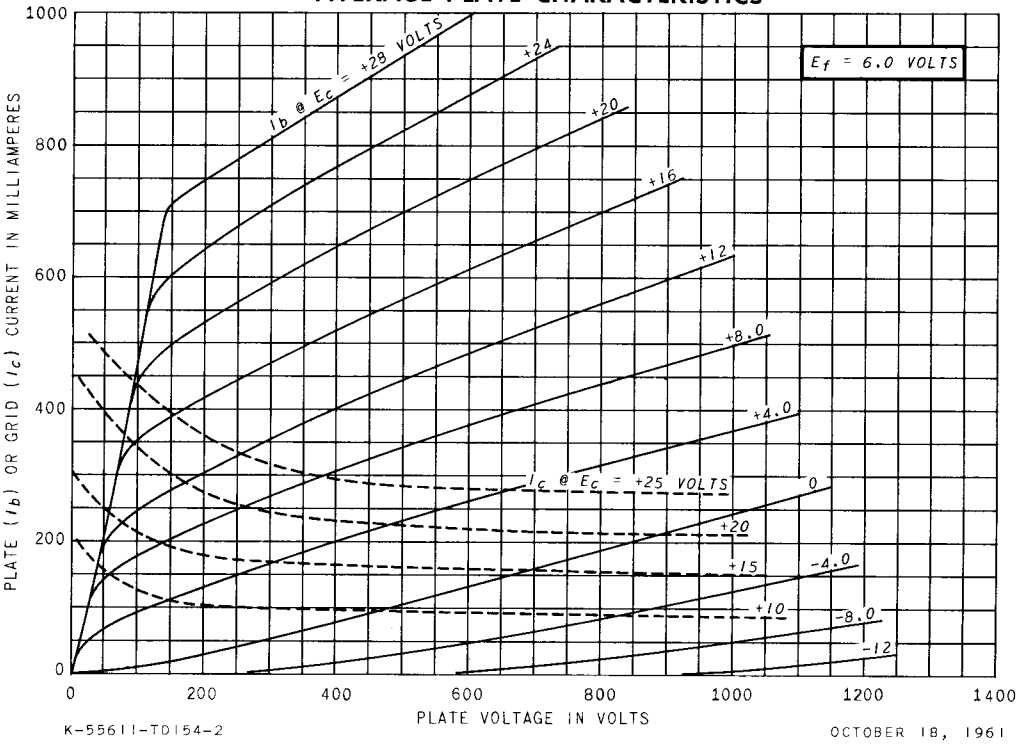
## AVERAGE PLATE CHARACTERISTICS

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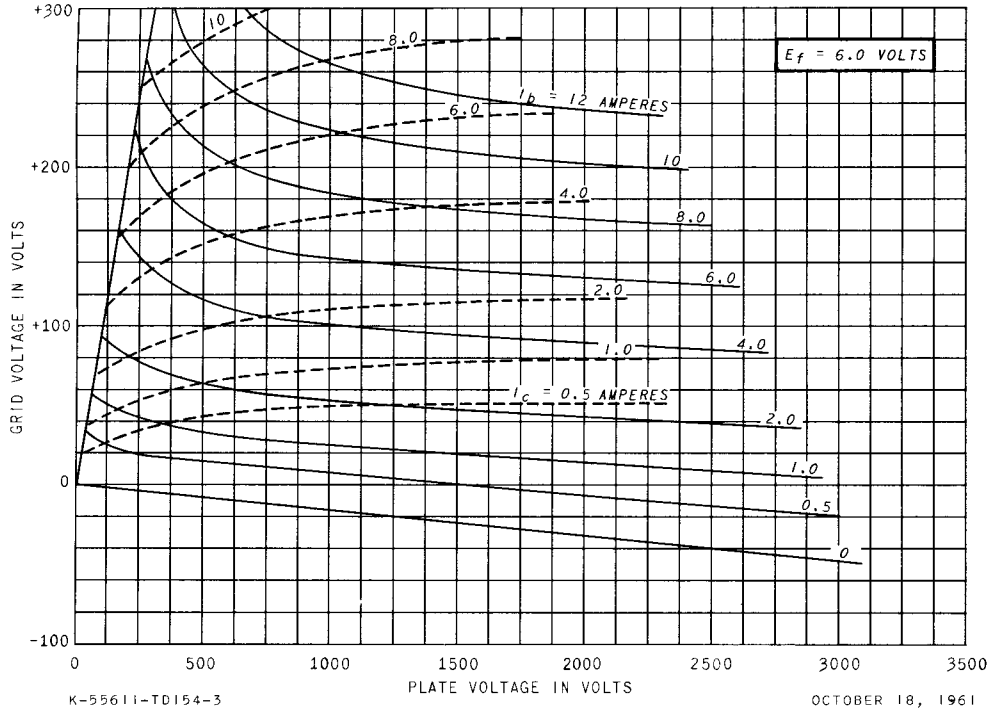
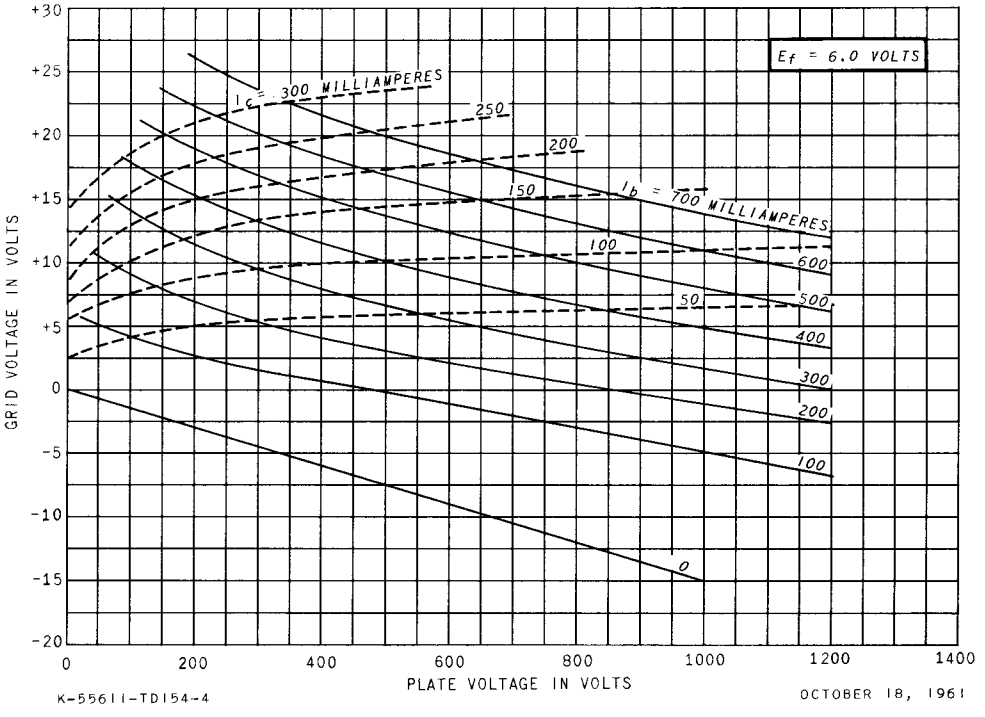
## AVERAGE CONSTANT-CURRENT CHARACTERISTICS




## AVERAGE CONSTANT-CURRENT CHARACTERISTICS




**RECEIVING TUBE DEPARTMENT**

**GENERAL ELECTRIC**

**Owensboro, Kentucky**