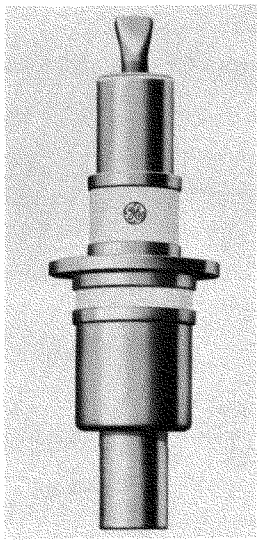
6442
PLANAR TRIODE



DESCRIPTION AND RATING

FOR GROUNDED-GRID OSCILLATOR AND AMPLIFIER SERVICE

Metal and Ceramic — Small Size

Two Kilowatts Useful Pulse Power Output

The 6442 is a high-mu, metal-and-ceramic triode intended for operation as a plate-pulsed, grounded-grid oscillator at frequencies as high as 5000 megacycles. The 6442 is also useful as a CW, radio-frequency power amplifier or frequency multiplier at frequencies as high as 2500 megacycles.

Features of the 6442 include small size, planar electrode construction with close spacing, inherent rigidity, an envelope structure convenient for coaxial circuit applications, and excellent resistance to vibration and shock.

GENERAL

ELECTRICAL

Cathode—Coated Unipotential

Heater Characteristics and Ratings

Heater Voltage, AC or DC	*	Volts
Heater Current at Ef = 6.3 volts	0.9†	Amperes
Direct Interelectrode Capacitances‡		
Grid to Plate: (g to p)	2.3	pf
Grid to Cathode: (g to k)	5.0	pf
Plate to Cathode: (p to k), max.	0.045	pf

MECHANICAL

Mounting Position—Any

Net Weight, approximate	1	Ounce

Cooling—Conduction and Convection

MAXIMUM RATINGS

ABSOLUTE-MAXIMUM VALUES

PLATE-PULSED OSCILLATOR SERVICE

Heater Voltage*	5.7 to 6.3	Volts
Cathode Heating Time, minimum	60	Seconds
Frequency	5000	Megacycles
Peak Positive-Pulse Plate Supply Voltage	3000	Volts
Duty Factor of Plate Pulse¶ ✱	0.001	
Pulse Duration	2.0	Microseconds
Plate Current		
Average ✱	2.5	Milliamperes
Average During Plate Pulse △	2.5	Amperes
Negative Grid Voltage		
Average During Plate Pulse	100	Volts
Grid Current		
Average ✱	1.25	Milliamperes
Average During Plate Pulse	1.25	Amperes
Plate Dissipation ✱	7.5	Watts
Peak Heater-Cathode Voltage		
Heater Positive with Respect to Cathode	90	Volts
Heater Negative with Respect to Cathode	90	Volts
Envelope Temperature at Hottest Point	175	C

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.

Supersedes ET-T1167B dated 3-60

MAXIMUM RATINGS (Continued)

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
Cathode Heating Time, minimum	30	Seconds
Frequency	2500	Megacycles
DC Plate Voltage	350	Volts
Negative DC Grid Voltage	50	Volts
DC Plate Current	35	Milliamperes
DC Grid Current	15	Milliamperes
Plate Dissipation	8.0	Watts
Peak Heater-Cathode Voltage		
Heater Positive with Respect to Cathode	90	Volts
Heater Negative with Respect to Cathode	90	Volts
Envelope Temperature at Hottest Point	175	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
Cathode Heating Time, minimum	30	Seconds
Frequency	2500	Megacycles
DC Plate Voltage	275	Volts
Negative DC Grid Voltage	50	Volts
DC Plate Current	35	Milliamperes
DC Grid Current	15	Milliamperes
Plate Dissipation	6.0	Watts
Peak Heater-Cathode Voltage		
Heater Positive with Respect to Cathode	90	Volts
Heater Negative with Respect to Cathode	90	Volts
Envelope Temperature at Hottest Point	175	C

CHARACTERISTICS AND TYPICAL OPERATION

AVERAGE CHARACTERISTICS

Heater Voltage	6.3	Volts
Plate Voltage	350	Volts
Grid Voltage	−4.25	Volts
Amplification Factor	50	
Transconductance	16500	Micromhos
Plate Current	35	Milliamperes

PLATE-PULSED OSCILLATOR

Frequency	3500	5000	Megacycles
Heater Voltage	6.0	6.0	Volts
Duty Factor	0.001	0.001	
Pulse Duration	1.0	1.0	Microseconds
Pulse Repetition Rate	1000	1000	Pulses per Second
Peak Positive-Pulse Plate Supply Voltage	3000	3000	Volts
Negative Grid Voltage Average During Plate Pulse	75	75	Volts
Grid-Bias Resistor	50	50	Ohms
Plate Current			
Average	2.5	2.5	Milliamperes
Average During Plate Pulse	2.5	2.5	Amperes
Grid Current			
Average	1.25	1.25	Milliamperes
Average During Plate Pulse	1.25	1.25	Amperes
Useful Power Output			
Average	2.0	0.5	Watts
Average During Plate Pulse	2.0	0.5	Kilowatts

RADIO-FREQUENCY POWER AMPLIFIER—CLASS C TELEGRAPHY

Frequency	1000	Megacycles
Heater Voltage	5.7	Volts
DC Plate Voltage	250	Volts
DC Plate Current	23	Milliamperes
DC Grid Current	6.0	Milliamperes
Driving Power	0.35	Watts
Useful Power Output	2.8	Watts

* 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 6.3 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 = 6.3 volts.

‡ Measured in a special shielded socket.

¶ Applications with a duty factor greater than 0.001 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 25 amperes.

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

INITIAL CHARACTERISTICS LIMITS

	Min.	Bogey	Max.	
Heater Current				
Ef = 6.3 volts	840	900	960	Milliamperes
Grid Voltage				
Ef = 6.3 volts, Eb = 350 volts				
Ib = 35 ma	−2.5	−4.25	−5.75	Volts
Transconductance				
Ef = 6.3 volts, Eb = 350 volts				
Ec adjusted for Ib = 35 ma	13500	16500	19000	Micromhos
Amplification Factor				
Ef = 6.3 volts, Eb = 350 volts				
Ec adjusted for Ib = 35 ma	35	50	65	
Negative Grid Current				
Ef = 6.3 volts, Eb = 350 volts				
Ec adjusted for Ib = 35 ma		.....	0.5	Microamperes
Interelectrode Leakage Resistance				
Ef = 6.3 volts, Polarity of applied d-c interelectrode voltage is such that no cathode emission results				
Grid to Cathode at 100 volts d-c	25	.....	.....	Megohms
Grid to Plate at 500 volts d-c	250	.....	.....	Megohms
Heater-Cathode Leakage Current				
Ef = 6.3 volts, Ehk = 100 volts				
Heater Positive with Respect to Cathode		.....	100	Microamperes
Heater Negative with Respect to Cathode		.....	100	Microamperes
Interelectrode Capacitances				
Grid to Plate: (g to p)	2.10	2.3	2.45	Picofarads
Grid to Cathode: (g to k)	4.60	5.0	5.45	Picofarads
Plate to Cathode: (p to k)		.....	0.045	Picofarads

SPECIAL PERFORMANCE TESTS

	Min.	Max.	
Pulsed-Oscillator Power Output Tubes are tested for power output as an oscillator under the following conditions: Ef = 6.0 volts; F = 3450 MC, min.; epy = 3000 volts; tp = 1.0 μsec. ± 10%; prr adjusted for Du = 0.001 ± 5%; Rg adjusted for Ib = 2.5 ma	1.75	.....	Watts
Pulse Emission Tubes are tested for pulse emission under the following conditions: Ef = 6.3 volts; tp = 1 to 3 μsec.; Du = 0.0005, min.; prr = 500 pps, max.; eb = ec and adjusted for is = 8 amp	....	175	Volts
Low Pressure Voltage Breakdown Test Statistical sample tested for voltage breakdown at a pressure of 250 mm Hg. Tubes shall not give visual evidence of flashover when 3000 volts RMS, 60 cps, is applied between the plate and grid terminals			
Low Pressure Voltage Breakdown Test Statistical sample tested for voltage breakdown at a pressure of 20 mm Hg. Tubes shall not give visual evidence of flashover when 500 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 1.0 milliseconds duration in each of four 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 a pulsed oscillator to evaluate changes in power output with life.

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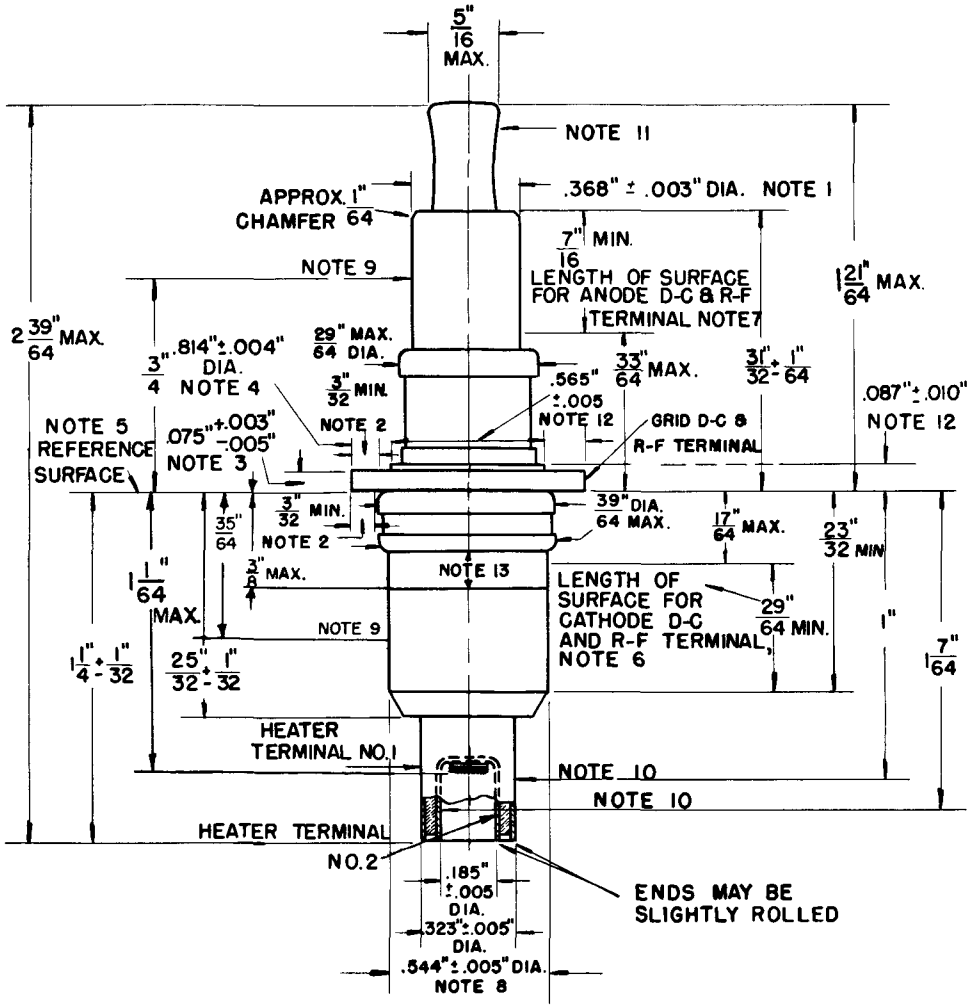
PHYSICAL DIMENSIONS



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Note 1. Applies to minimum surface for anode d-c and r-f terminal only. Other surfaces must not be used for these terminal purposes.

Note 2. Applies to minimum surface for grid d-c and r-f terminal only. Other surfaces, except for Notes 3 and 4, must not be used for terminal purposes.

Note 3. Applies to minimum surfaces for grid d-c and r-f terminal only.

Note 4. The cylindrical surface of this diameter may be used for grid d-c and r-f terminal purposes.

Note 5. The surfaces defined by Notes 2, 3, and 4 shall be the only surfaces used for tube stops and clamping purposes.

Note 6. Other surfaces shall not be used for cathode d-c and r-f terminal purposes.

Note 7. Other surfaces shall not be used for anode d-c and r-f terminal purposes.

Note 8. Applies to surface designated for cathode d-c and r-f terminal. Solder at brazed joint will not exceed the maximum diameter.

Note 9. The maximum eccentricity of the anode and cathode with respect to the grid terminal in a prescribed jig is 0.010 (or maximum total runout of 0.020) and is measured by indicators at the points designated.

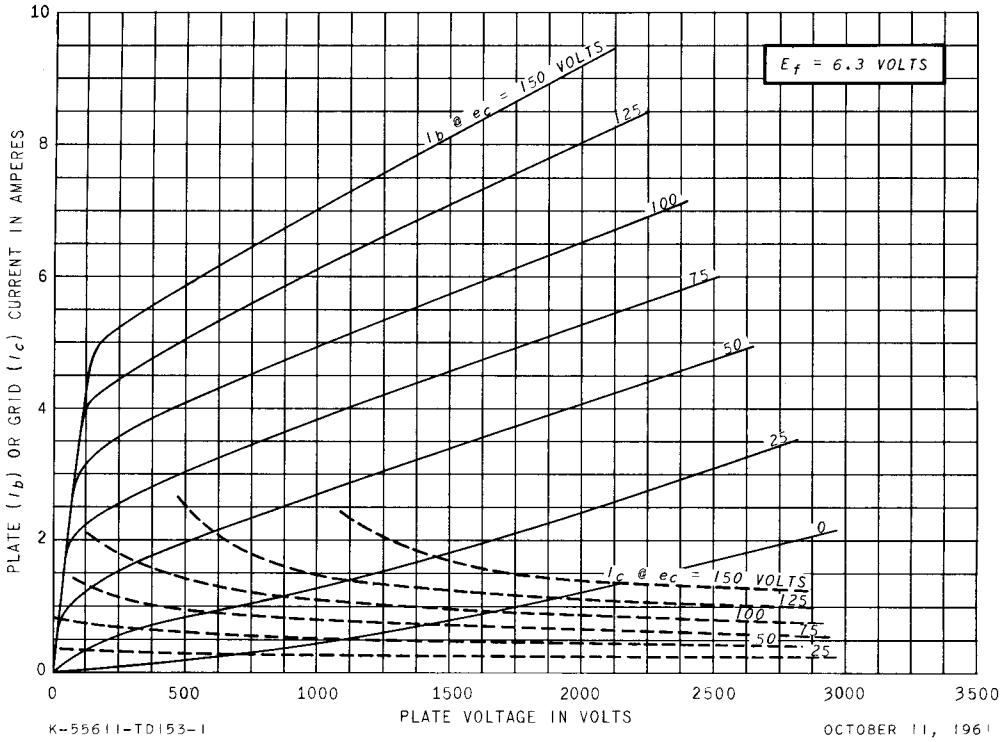
Note 10. The maximum eccentricity of heater-terminal No. 1 and heater-terminal No. 2 with respect to the grid terminal in a prescribed jig is 0.015 (or maximum total runout of 0.030) and is measured by indicators at the points designated.

Note 11. Exhaust tubulation must not be subjected to any mechanical stress.

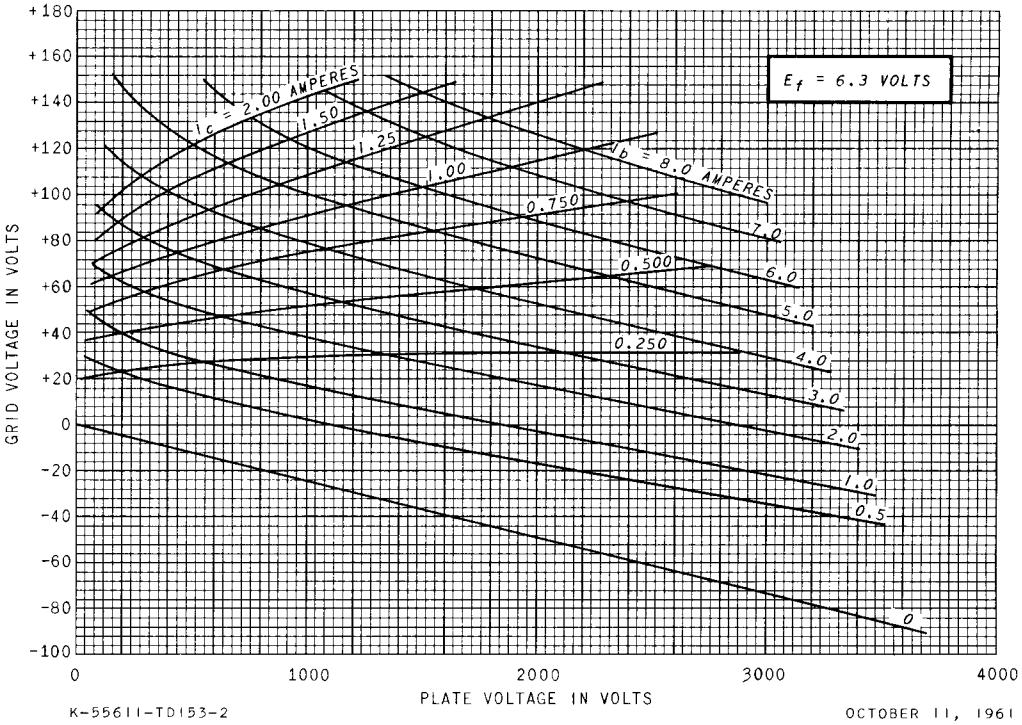
Note 12. For reference only. Dimension does not include any possible solder fillet.

Note 13. This area is reserved for tube stamping and coding.

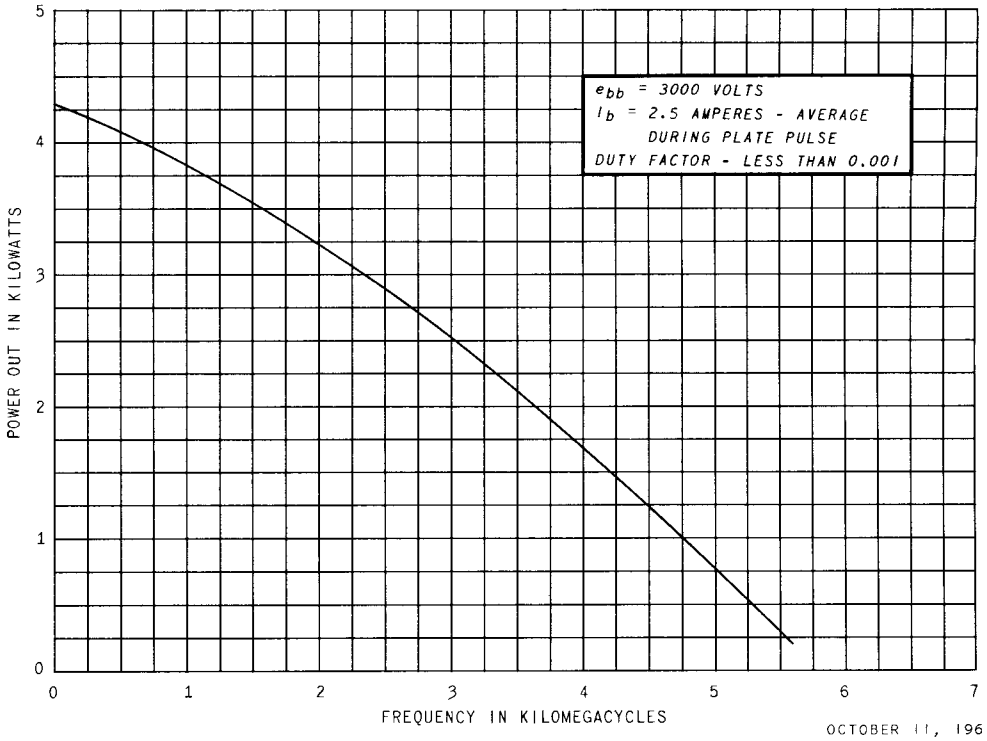
AVERAGE PLATE CHARACTERISTICS



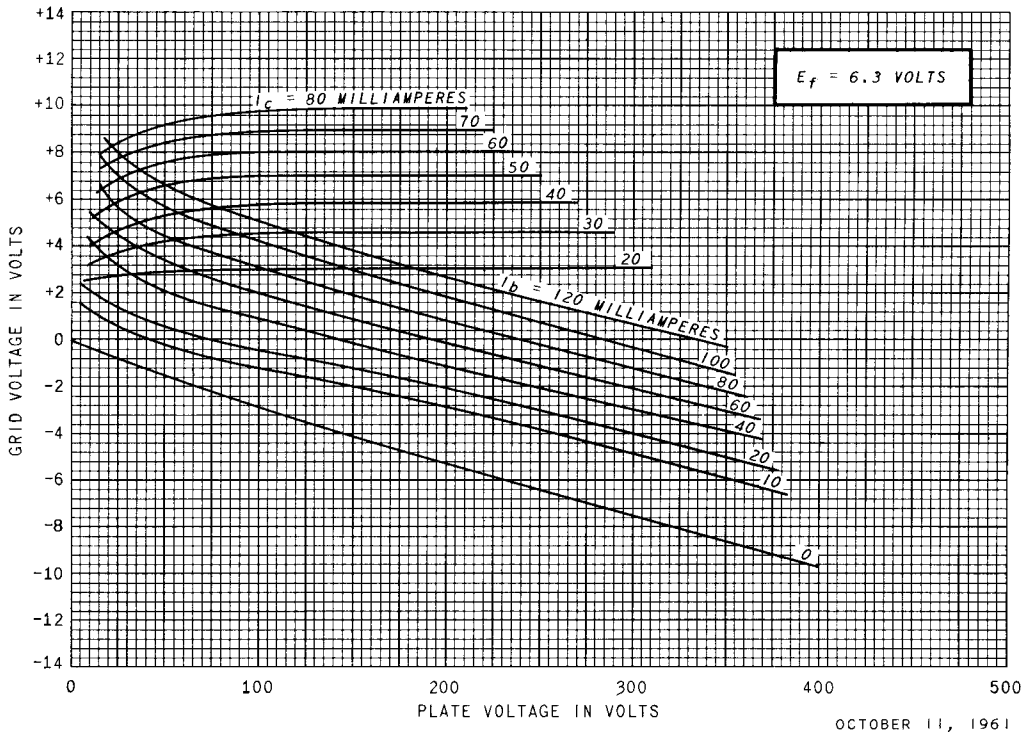
AVERAGE CONSTANT-CURRENT CHARACTERISTICS

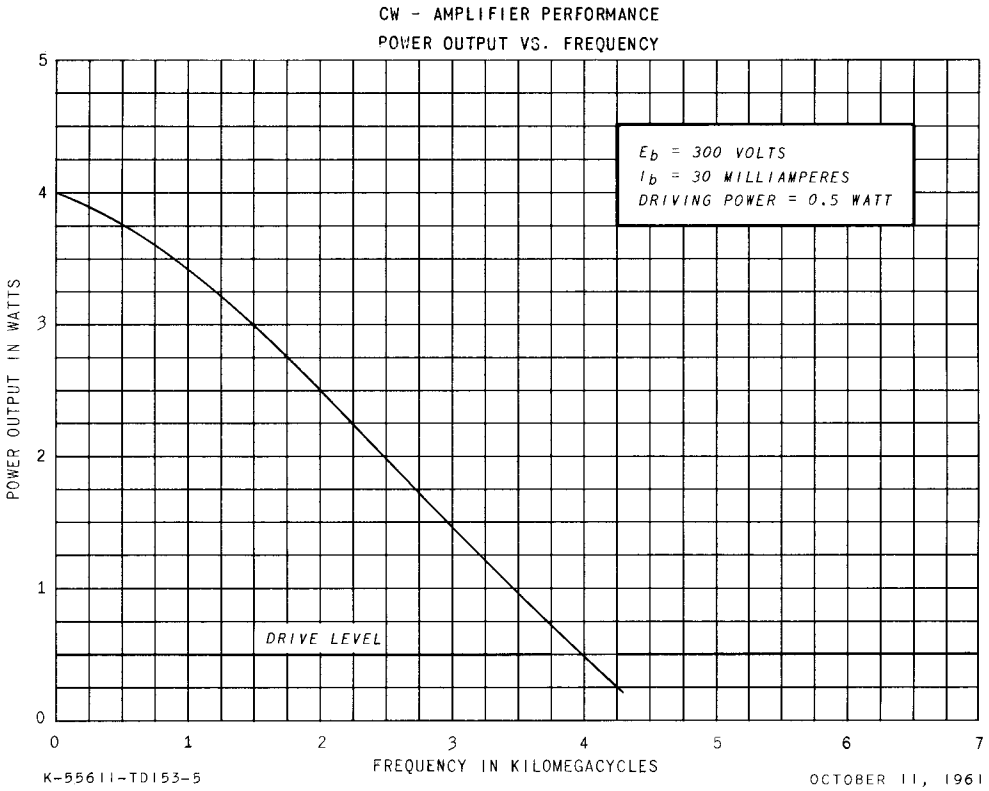


PULSED-OSCILLATOR PERFORMANCE
POWER OUTPUT VS. FREQUENCY



AVERAGE CONSTANT-CURRENT CHARACTERISTICS




CW - AMPLIFIER PERFORMANCE
POWER OUTPUT VS. FREQUENCY
E_b = 300 VOLTS
I_b = 30 MILLIAMPERES
DRIVING POWER = 0.5 WATT
DRIVE LEVEL
POWER OUTPUT IN WATTS
0
1
2
3
4
5
0
1
2
3
4
5
6
7
FREQUENCY IN KILOMEGACYCLES
K-55611-TD153-5
OCTOBER 11, 1961