



TETRODE

**ONE KILOWATT UHF TELEVISION OUTPUT
UHF TETRODE
GROUNDED-GRID CIRCUITS**

**WATER COOLED
METAL AND CERAMIC
INTEGRAL WATER JACKET**

The GL-6019 is a four-electrode transmitting tube featuring a metal-and-ceramic envelope designed for use as a power amplifier or oscillator in grounded-grid circuits with both grids maintained at radio-frequency ground potential. The output circuit is connected between the anode and the screen grid. The anode is capable of dissipating two kilowatts. Cooling is accomplished by water and forced air with the water jacket an integral part of the anode. The cathode is indirectly heated and thoriated. Maximum ratings apply up to 900 megacycles.

When used as a Class B grounded-grid broadband television amplifier this tube has a useful synchronizing peak-power output of one kilowatt

at 900 megacycles; in narrowband Class C service the output is one kilowatt of continuous power as an amplifier or oscillator. Because of its ratings, the GL-6019 is also well adapted to use in dielectric heating equipment.

The small size and close spacing of electrodes in the design of the tube combine with the ring-seal construction and the low-loss factor due to the gold-over-silver-plated external parts and the ceramic permit high operating efficiency. In addition, the grounded-grid construction eliminates the necessity for neutralization in a properly designed circuit. The small size of the GL-6019 permits compact mounting, and the integral water jacket and ring-seal construction allow quick plug-in installation.

GENERAL  ELECTRIC


Electronic
TUBE

TECHNICAL INFORMATION

GENERAL

Electrical	Minimum	Bogey	Maximum	
Heater Voltage*		6.3	6.8	Volts
Heater Current at Bogey Voltage		24		Amperes
Heater Starting Current			36	Amperes
Heater Cold Resistance		0.022		Ohm
Cathode Heating Time	1			Minutes
Amplification Factor, G_2 to G_1				
$E_b = 500$ Volts, $I_b = 0.250$ Ampere		10		
Peak Cathode Current†			4	Amperes
Direct Interelectrode Capacitances				
Cathode—Plate‡		0.03		uuf
Input, G_2 tied to G_1		16.0		uuf
Output G_2 tied to G_1 §		4.6		uuf
Mechanical				
Mounting Position—Vertical				
Water Flow				
Anode			0.6 Min	Gallon per Minute
Pressure Drop at Rated Flow			3.5	Pounds per Square Inch
Water Pressure			80 Max	Pounds per Square Inch
Outlet Water Temperature			70 Max	C
Air Flow¶				
Heater to Cathode Seals			12 Min	Cubic Feet per Minute
Screen-Grid to Control-Grid Seals			6 Min	Cubic Feet per Minute
Anode to Screen-Grid Ceramic Insulator			6 Min	Cubic Feet per Minute
Ceramic Temperature at any Point			200	C
Net Weight, approximate			1.25	Pounds

Water and air cooling to be applied before and during the application of any voltages. Water cooling may be discontinued with removal of all voltages. Air flow on heater-to-cathode seal must be maintained for one minute after removal of heater voltage.

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

RADIO-FREQUENCY AMPLIFIER—CLASS B TELEVISION SERVICE

Synchronizing-Level Conditions per Tube Unless Otherwise Specified

Maximum Ratings, Absolute Values

DC Plate Voltage	4000 Max	Volts
DC Grid-No. 2 Voltage	600 Max	Volts
DC Plate Current	0.7 Max	Ampere
Plate Input	2.5 Max	Kilowatts
Grid-No. 2 Input	25 Max	Watts
Plate Dissipation	2.0 Max	Kilowatts
Grid-No. 1 Dissipation	16 Max	Watts

Typical Operation—Grounded-Grid Circuit up to 900 Megacycles

Bandwidth 6 megacycles		
DC Plate Voltage	3500	Volts
DC Grid-No. 2 Voltage	500	Volts
DC Grid-No. 1 Voltage	—40	Volts
Peak RF Plate Voltage		
Synchronizing Level	2500	Volts
Pedestal Level	1875	Volts
Peak RF Driving Voltage		
Synchronizing Level	110	Volts
Pedestal Level	70	Volts
DC Plate Current		
Synchronizing Level	0.520	Ampere
Pedestal Level	0.360	Ampere
DC Grid-No. 2 Current (Pedestal Level)	0.035	Ampere
DC Grid-No. 1 Current		
Synchronizing Level	0.110	Ampere
Pedestal Level	0.035	Ampere

TECHNICAL INFORMATION (CONT'D)

Driving Power at Tube, approximate		
Synchronizing Level	100	Watts
Pedestal Level	25	Watts
Power Output, approximate		
Synchronizing Level π	1000	Watts
Pedestal Level π	560	Watts

PLATE-MODULATED RADIO-FREQUENCY POWER AMPLIFIER—CLASS C TELEPHONY

Carrier Conditions with a Maximum Modulation Factor of 1.0

Maximum Ratings, Absolute Values

DC Plate Voltage	3200 Max	Volts
DC Grid-No. 2 Voltage	600 Max	Volts
DC Grid-No. 1 Voltage	-120 Max	Volts
DC Plate Current	0.35 Max	Ampere
DC Grid-No. 1 Current	0.10 Max	Ampere
Plate Input	1.12 Max	Kilowatts
Grid-No. 2 Input	10 Max	Watts
Plate Dissipation	1200 Max	Watts

Typical Operation—Grounded-Grid Circuit

DC Plate Voltage	3000	Volts
DC Grid-No. 2 Voltage	500	Volts
DC Grid-No. 1 Voltage	-100	Volts
Peak RF Plate Voltage	2300	Volts
Peak RF Driving Voltage	137	Volts
DC Plate Current	0.25	Ampere
DC Grid-No. 2 Current	0.01	Ampere
DC Grid-No. 1 Current, approximate	0.047	Ampere
Driving Power, approximate ψ	38	Watts
Power Output#	565	Watts

RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAPHY

Key-Down Conditions per Tube Without Amplitude Modulation Δ

Maximum Ratings, Absolute Values

DC Plate Voltage	4000 Max	Volts
DC Grid-No. 2 Voltage	600 Max	Volts
DC Grid-No. 1 Voltage	-150 Max	Volts
DC Plate Current	0.7 Max	Ampere
DC Grid-No. 1 Current	0.10 Max	Ampere
Plate Input	2.8 Max	Kilowatts
Grid-No. 2 Input	25 Max	Watts
Plate Dissipation	2 Max	Kilowatts
Grid-No. 1 Dissipation	16 Max	Watts

Typical Operation

DC Plate Voltage	4000	Volts
DC Grid-No. 2 Voltage	600	Volts
DC Grid-No. 1 Voltage	-120	Volts
Peak RF Plate Voltage, approximate	2750	Volts
Peak RF Grid-No. 1 Voltage	195	Volts
DC Plate Current	0.550	Ampere
DC Grid-No. 2 Current	0.035	Ampere
DC Grid-No. 1 Current, approximate	0.065	Ampere
Driving Power, approximate	150	Watts
Power Output, approximate#	1200	Watts

*The cathode of the GL-6019, because of transit-time effects which raise the temperature of the cathode, is subjected to considerable back bombardment in ultra-high-frequency service. The amount of heating due to bombardment is a function of the operating conditions and frequency, and must be compensated for by a reduction of the heater input to prevent overheating of the cathode with resulting short life. For long life, the GL-6019 should be put in operation with rated heater voltage. After the circuit has been adjusted for proper tube operation the heater voltage should be reduced to a value slightly above that at which circuit performance is affected. At a frequency of 900 megacycles and with typical operating conditions the heater voltage can be reduced to approximately 5 volts. At lower frequencies, the reduction will be less. Minor circuit readjustment may be necessary after this adjustment.

TECHNICAL INFORMATION (CONT'D)

- †Represents maximum usable cathode current (plate current plus current to each grid) for any condition of operation.
- ‡Measured with a 6-inch diameter flat metal disk attached to the screen-grid ring. Control grid connected to the screen grid.
- ◆Output capacitance measured between anode and screen grid. Control grid connected directly to screen grid.
- ¶The volume of cooling air indicated for the various seals is approximate only. Distribution of cooling air will vary with the cavity configuration about the tube. For most satisfactory operation the maximum temperature of any point on the tube shall be below 200 C.
- πUseful power output including power transferred from driver stage.
- ΔModulation essentially negative may be used if the positive peak of the envelope does not exceed 115 percent of the carrier conditions.
- #Total anode power output including power transferred from driver stage.
- ψThe carrier of the driver modulated 100 percent.

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K-69087-72A464

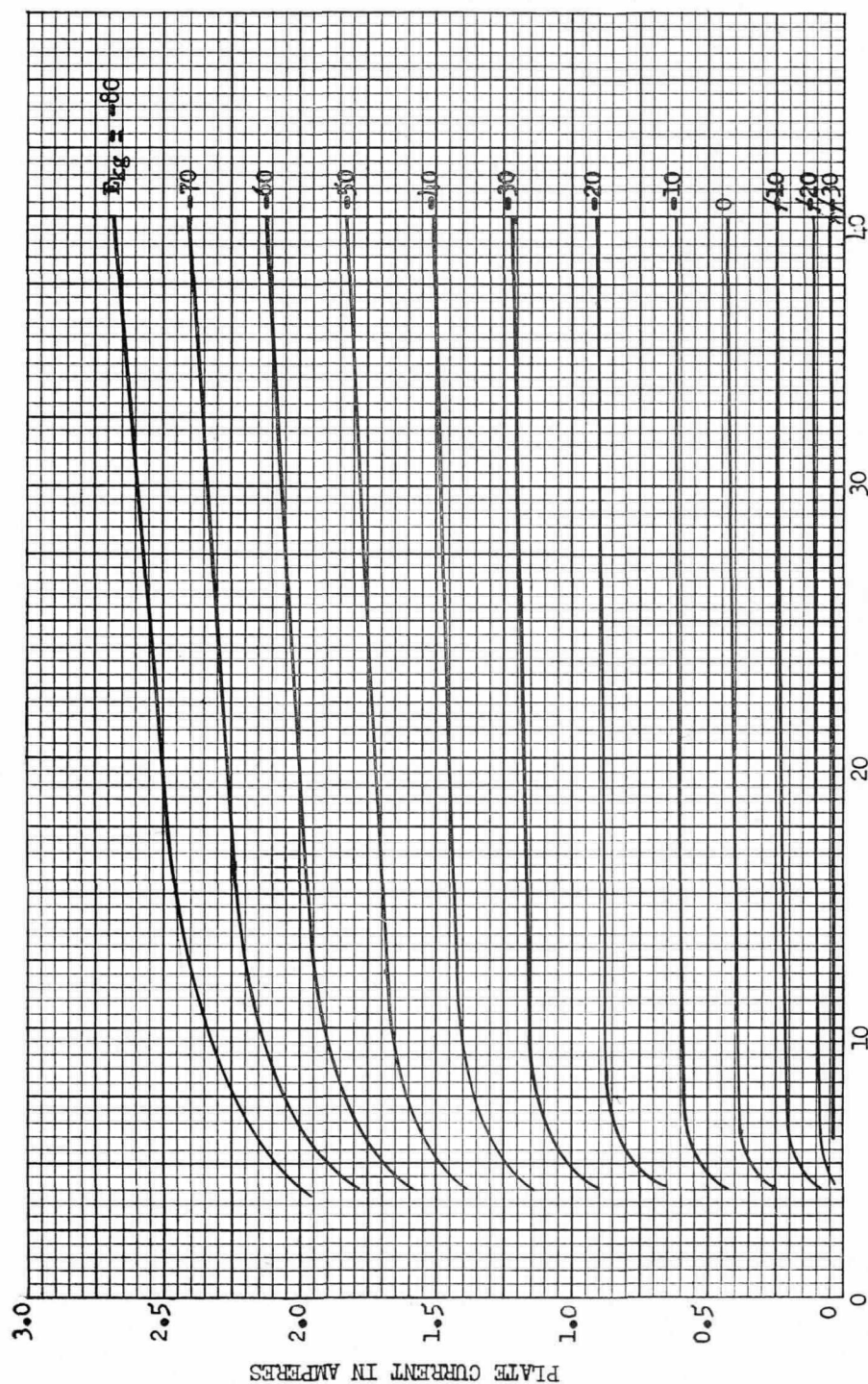


PLATE VOLTAGE IN HUNDREDS OF VOLTS

GL-6019

AVERAGE PLATE CHARACTERISTICS

 $E_f = 6.3$ VOLTS SCREEN VOLTAGE = 500 VOLTS

CONTROL-GRID GROUND ED ELECTRODE VOLTAGES MEASURED TO GROUND

GL-6019

CONSTANT-CURRENT CHARACTERISTICS

$E_r = 6.3$ VOLTS SCREEN VOLTAGE = 500 VOLTS

CONTROL-GRID GROUNDED ELECTRODE VOLTAGES MEASURED TO GROUND

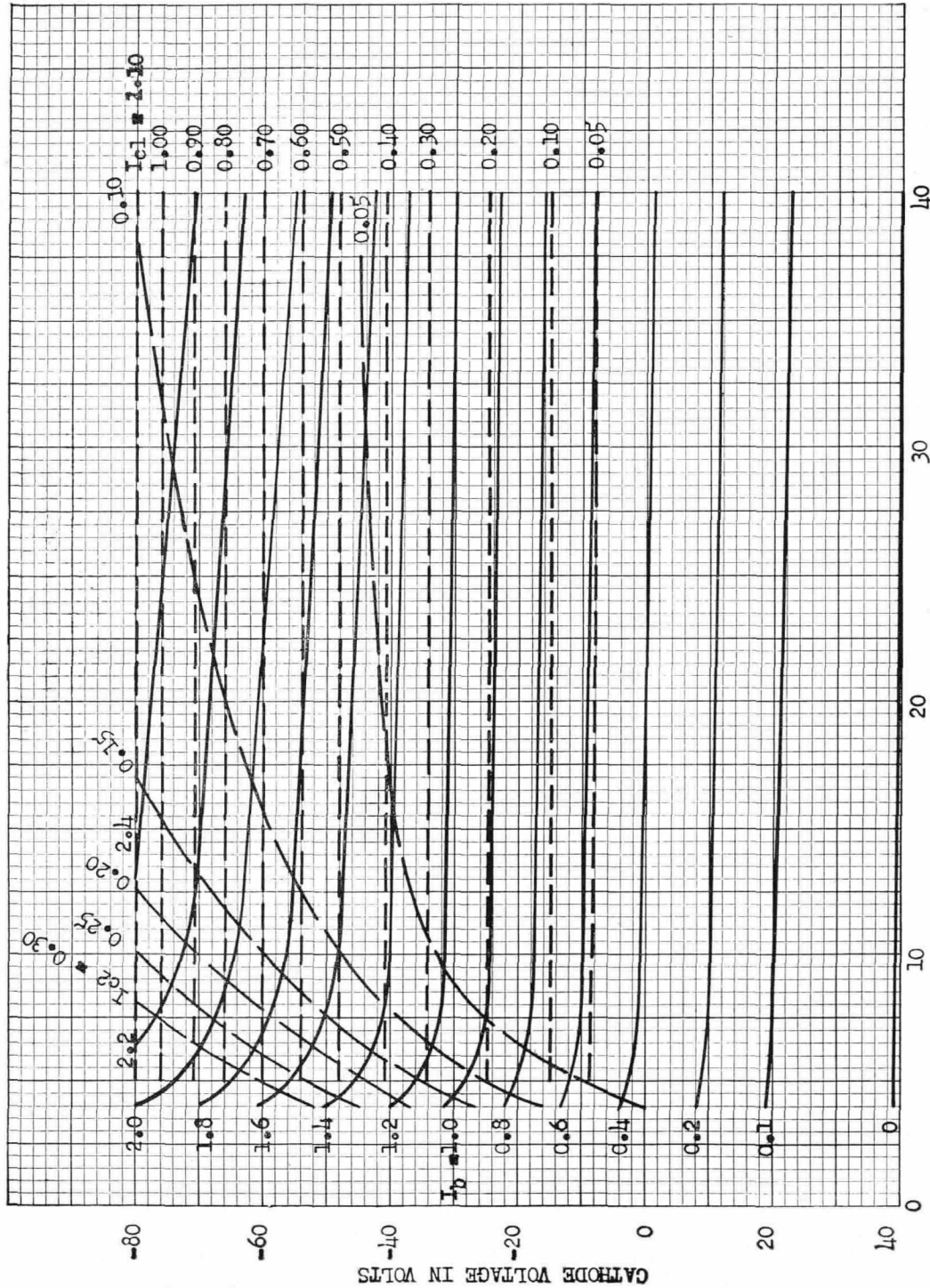
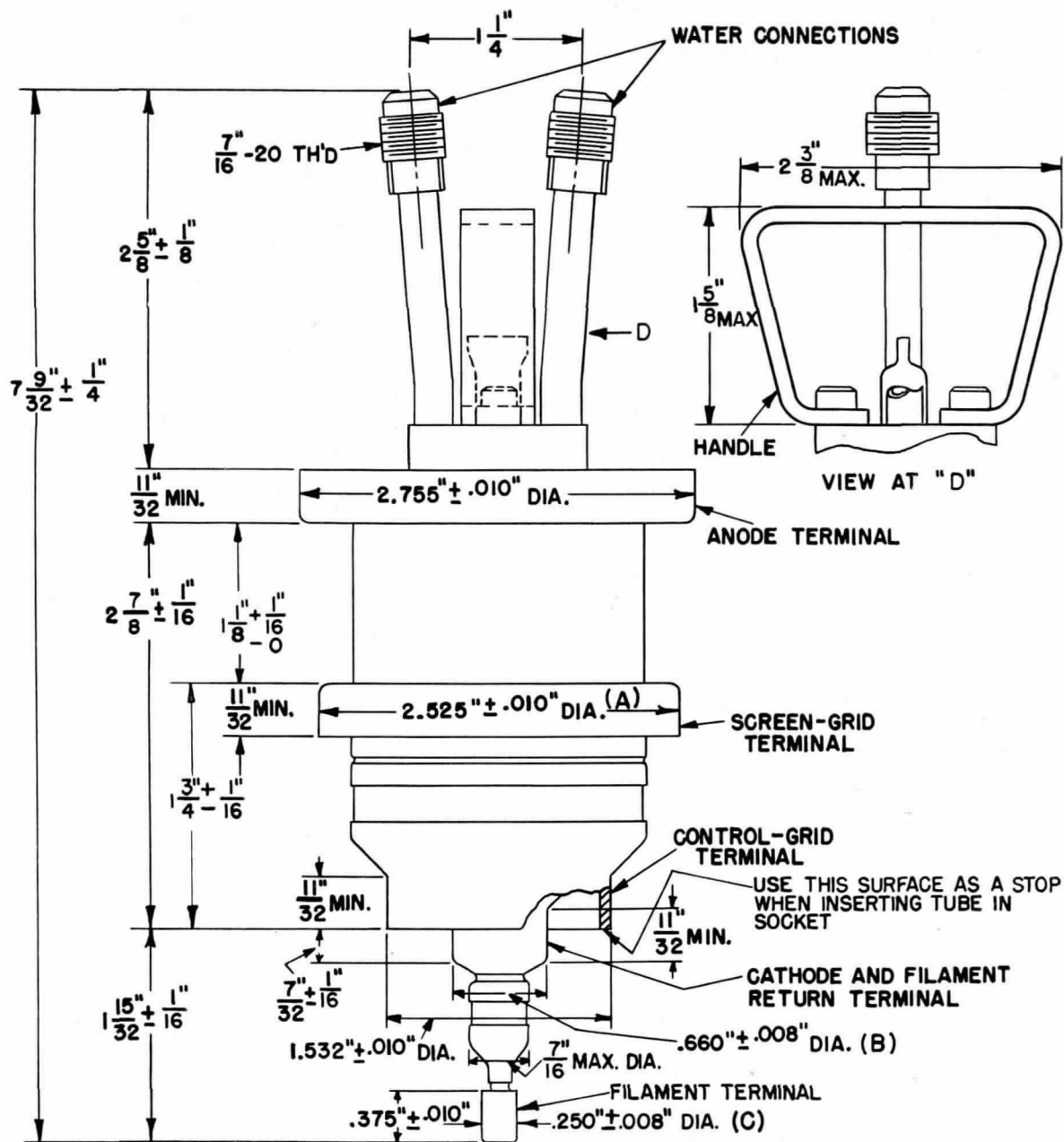


PLATE VOLTAGE IN HUNDREDS OF VOLTS

K-69087-72A458

2-21 52



(A) MAXIMUM ECCENTRICITY 0.010"
 (B) MAXIMUM ECCENTRICITY 0.015"
 (C) MAXIMUM ECCENTRICITY 0.030"
 WITH RESPECT TO CENTERLINE DETERMINED BY CENTERS
 OF ANODE TERMINAL AND CONTROL-GRID TERMINAL.

OUTLINE
 GL-6019

ELECTRONIC COMPONENTS DIVISION

GENERAL  ELECTRIC

Schenectady 5, N. Y.