

DESCRIPTION AND RATING

TRANSMITTING TUBE GL-6019

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.

TECHNICAL INFORMATION

GENERAL

Electrical Data

	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 Data

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			
Screen Grid to Control-Grid Seals	2 Min	Cubic Feet per Minute	
Heater to Cathode Seals	12 Min	Cubic Feet per Minute	
Ceramic Temperature at any Point	200 Max	C	
Net Weight, approximate	1.25	Pounds	

from RTMA releases #987, June 15, 1951 & 987A, May 26, 1952

Mechanical Data (CONT'D)

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

D-c Plate Voltage	4000 Max	Volts
D-c Grid-No. 2 Voltage	600 Max	Volts
D-c 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

Band Width 6 megacycles

D-c Plate Voltage	3500	Volts
D-c Grid-No. 2 Voltage	500	Volts
D-c Grid-No. 1 Voltage	-40	Volts
Peak R-f Plate Voltage		
Synchronizing Level	2500	Volts
Pedestal Level	1875	Volts
Peak R-f Grid Voltage		
Synchronizing Level	110	Volts
Pedestal Level	70	Volts
D-c Plate Current		
Synchronizing Level	0.520	Ampere
Pedestal Level	0.360	Ampere
D-c Grid-No. 2 Current (Pedestal Level)	0.035	Ampere
D-c Grid-No. 1 Current		
Synchronizing Level	0.110	Ampere
Pedestal Level	0.035	Ampere
Driving Power at Tube, approximate		
Synchronizing Level	100	Watts
Pedestal Level	25	Watts
Power Output, approximate		
Synchronizing Level	1000	Watts
Pedestal Level	560	Watts

Radio-frequency Power Amplifier and Oscillator - Class C Telegraphy

Key-down conditions per tube without amplitude modulation^Δ

Maximum Ratings, Absolute Values

D-c Plate Voltage	4000 Max	Volts
D-c Grid-No. 2 Voltage	600 Max	Volts
D-c Grid-No. 1 Voltage	-150 Max	Volts
D-c Plate Current	0.7 Max	Ampere
D-c 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

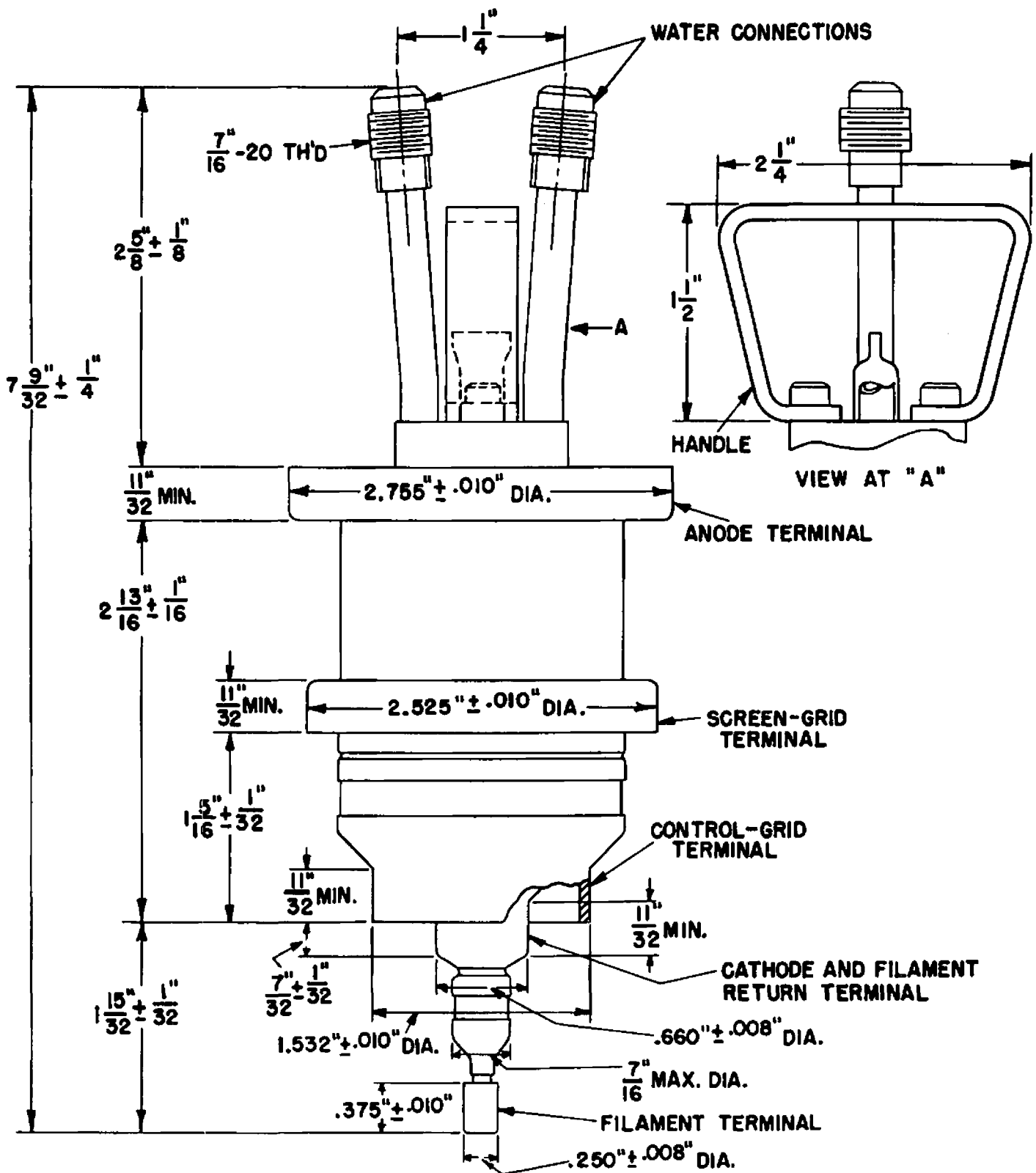
D-c Plate Voltage	4000	Volts
D-c Grid-No. 2 Voltage	600	Volts
D-c Grid-No. 1 Voltage	-120	Volts
Peak R-f Plate Voltage, approximate	2750	Volts

Radio-frequency Power Amplifier and Oscillator - Class C Telegraphy
Key-down conditions per tube without amplitude modulation^Δ (CONT'D)

Typical Operation (CONT'D)

Peak R-f Grid-No. 1 Voltage	195	Volts
D-c Plate Current	0.550	Ampere
D-c Grid-No. 2 Current	0.035	Ampere
D-c Grid-No. 1 Current, approximate	0.065	Ampere
Driving Power, approximate	150	Watts
Power Output, approximate #	1200	Watts

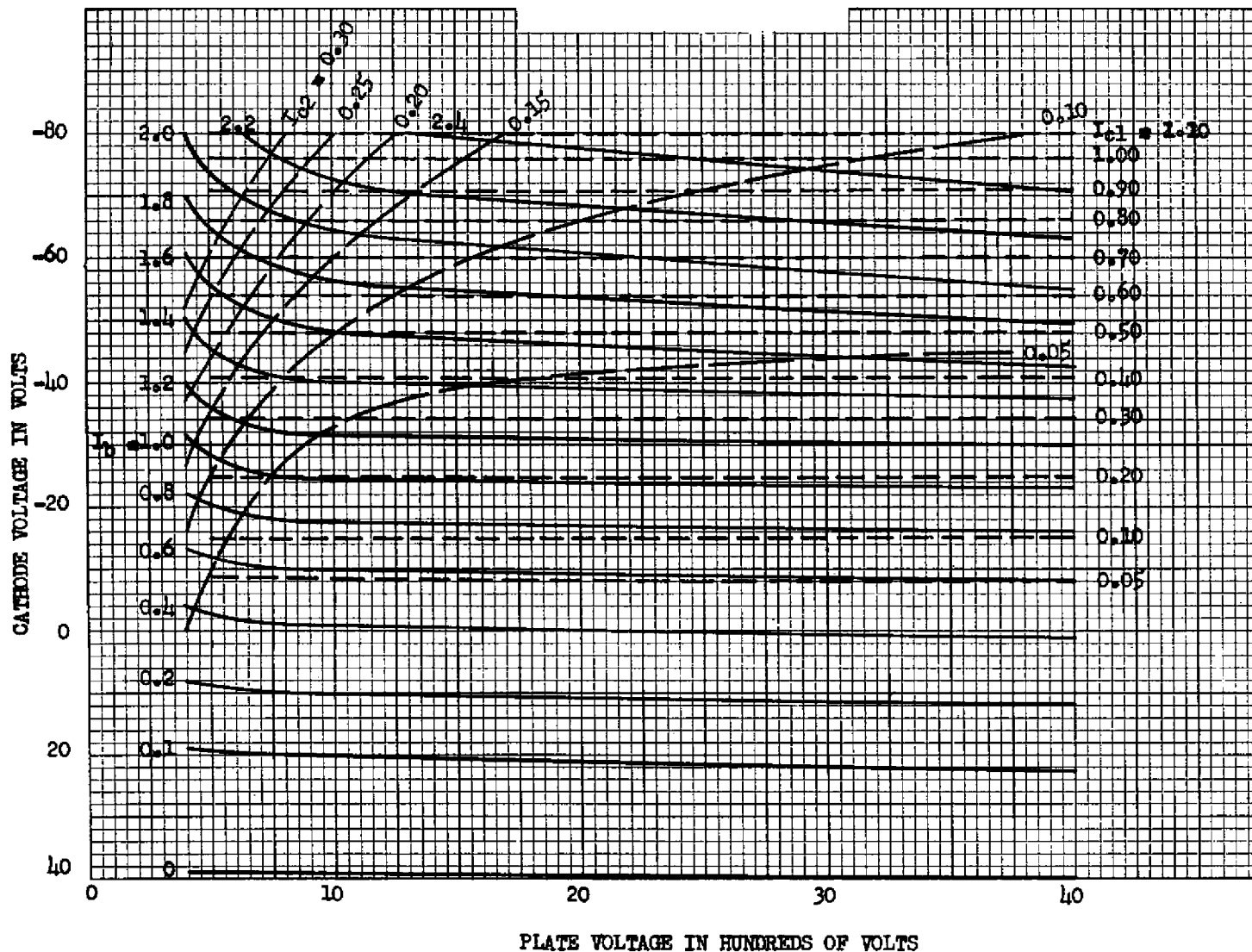
- * The cathode of the GL-6019 in ultra-high-frequency service is subjected to considerable back bombardment, due to transit-time effects, which raises the temperature of the cathode. The amount of heating due to bombardment is a function of the operating conditions and frequency and must be compensated 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 is adjusted for proper tube operation, heater voltage is adjusted to a value slightly above that at which circuit performance is affected. At 900 megacycles 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 the above adjustment.
- † 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.
- π Useful power output including power transferred from driver stage.
- Δ Modulation 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.



N20720AZ

March 15, 1951

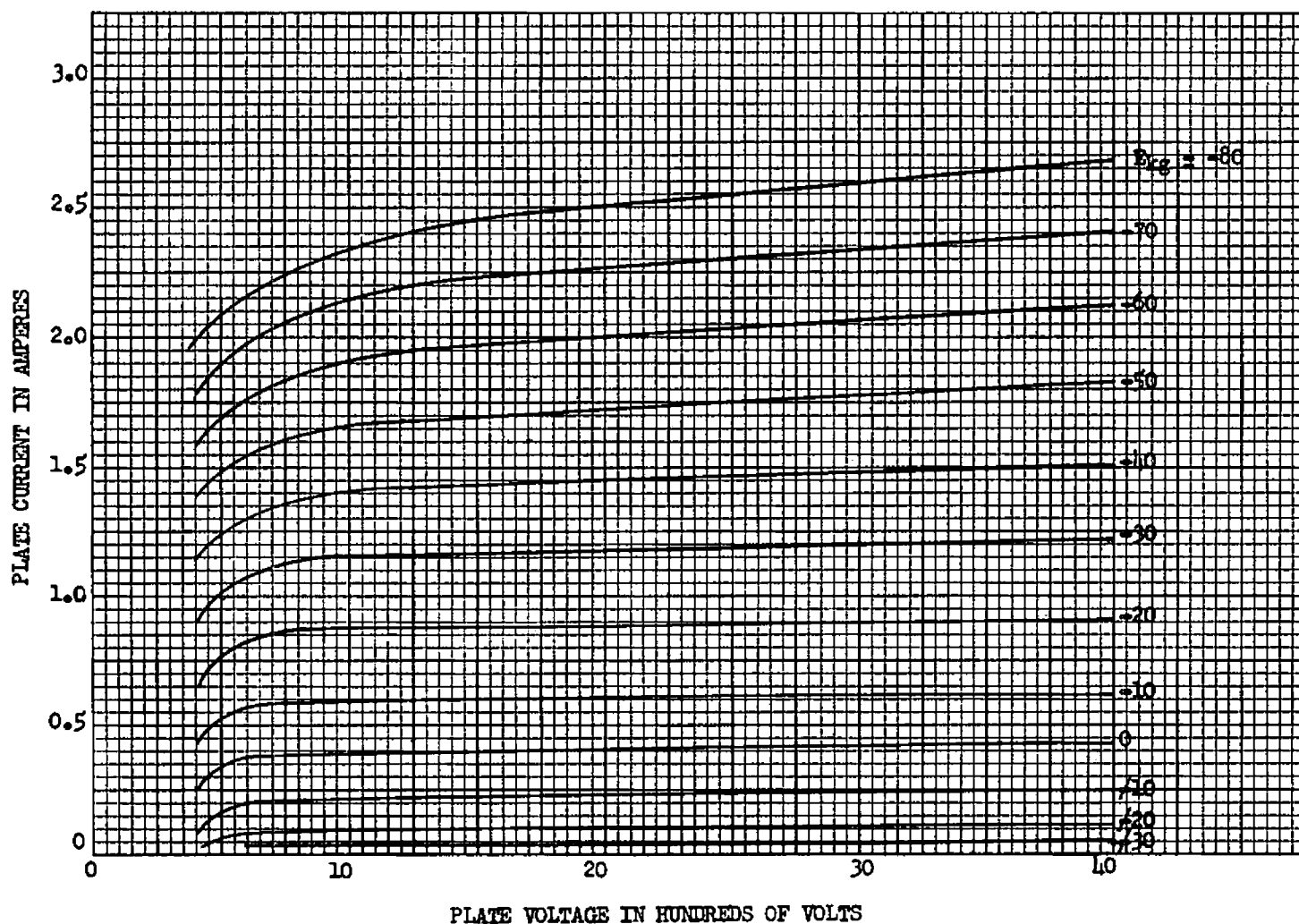
OUTLINE
GL-6019



K-69087-72A458

May 8, 1951

GL-6019
 CONSTANT-CURRENT CHARACTERISTICS
 $E_f = 6.3$ VOLTS
 SCREEN VOLTAGE = 500 VOLTS



K-69087-72A464

May 9, 1951

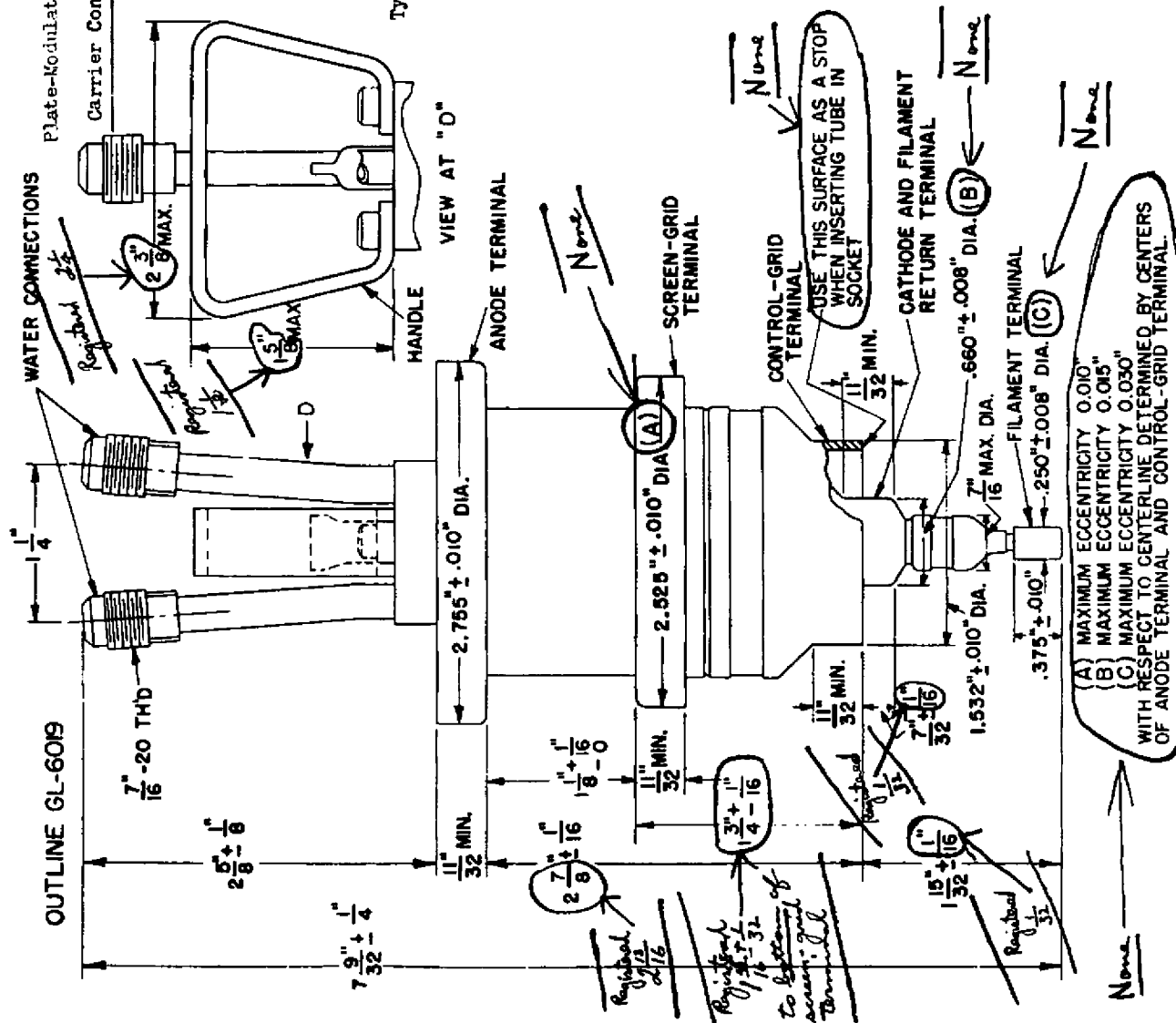
GL-6019
 AVERAGE-PLATE CHARACTERISTICS
 $E_f = 6.3$ VOLTS
 SCREEN VOLTAGE = 500 VOLTS

GENERAL  ELECTRIC
 ELECTRONICS DEPARTMENT, TUBE DIVISIONS
 SCHENECTADY, NEW YORK

ADDITIONAL CLASS OF SERVICE INFORMATION

OUTLINE GL-6019

Carrier Conditions with a Maximum Modulation Factor of 1.0



Maximum Ratings, Absolute Values		
D-C Plate Voltage	3200	max Volts
D-C Grid-No. 2 Voltage	600	max Volts
D-C Grid-No. 1 Voltage	-120	max Volts
D-C Plate Current	0.35	max Amperes
D-C Grid-No. 1 Current	0.10	max Amperes
Plate Input	1.12	max Kilowatts
Grid-No. 2 Input	10	max Watts
Plate Dissipation	1200	max Watts

Typical Operation, Grounded-Grid Circuit

D-C Plate Voltage	3000	Volts
D-C Grid-No. 2 Voltage	500	Volts
D-C Grid-No. 1 Voltage	-100	Volts
Peak R-F Plate Voltage	2300	Volts
Peak R-F Grid-No. 1 Voltage	137	Volts
D-C Plate Current	0.25	Ampères
D-C Grid-No. 2 Current	0.01	Ampères
D-C Grid-No. 1 Current, approx	0.047	Ampères
Driving Power, approximate #	38	Watts
Power Output #	565	Watts

≠ The carrier of the driver modulated 100 percent.

Includes power transferred from driver stage.