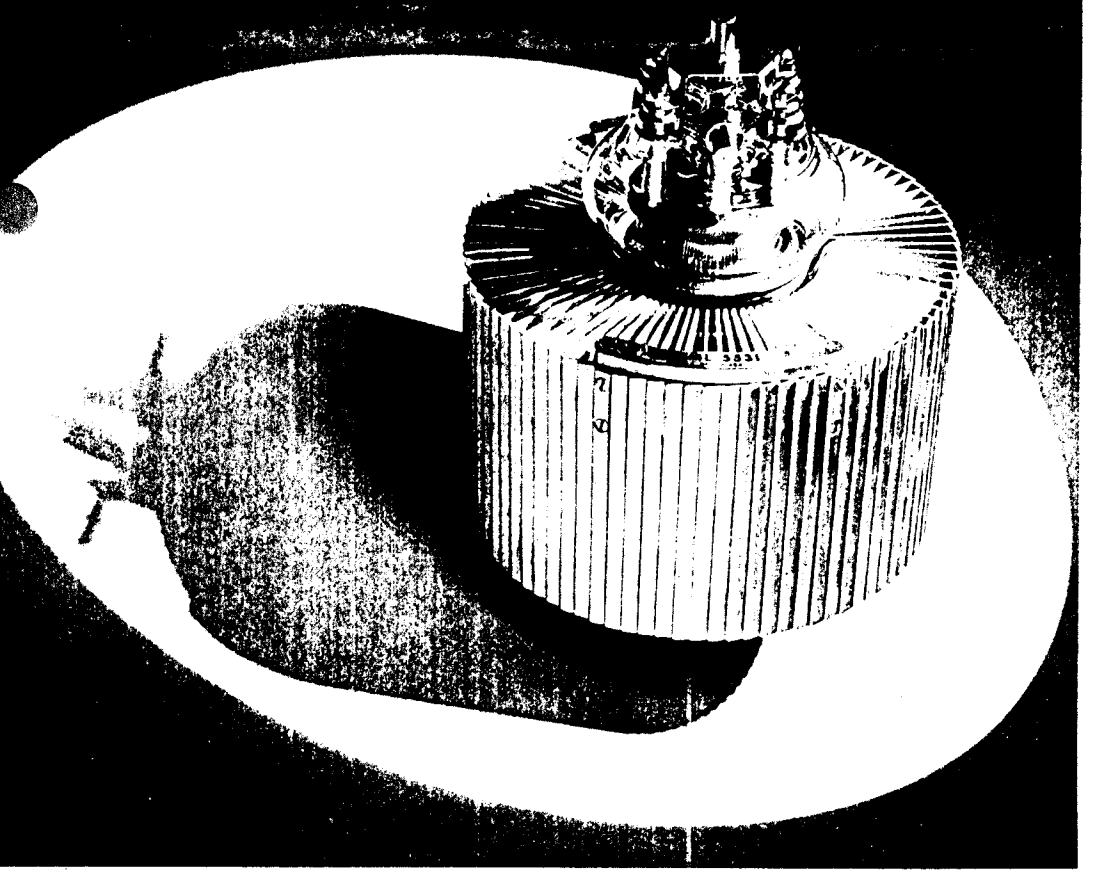


MACHLETT

ML-5531

DESCRIPTION AND RATINGS

DESCRIPTION

The ML-5531 is a three-electrode tube designed for industrial heating service and for AM broadcasting at frequencies up to 30 megacycles. The filament is oriented with respect to the grid structure to minimize the required r-f driving power. The cathode is a thoriated-tungsten filament, whose self-supporting structure employs no sliding contacts, insulators, or tension springs. A sturdy grid structure provides great mechanical strength as well as low electrical loss. Circuit inductance has been kept at a minimum in the grid as well as in all other internal connections. Kovar is used for the glass-to-metal seals. The plate fin structure is designed to provide 10 kilowatts dissipation with a forced-air flow of 600 cfm. Maximum ratings of 10.5 kVdc plate voltage and 30 kW plate input apply at frequencies up to 30 Mc.

GENERAL CHARACTERISTICS

Electrical

Filament Voltage	6.3 Volts
Filament Current at 6.3 Volts	92 Amps
Filament Starting Current, Maximum	400 Amps
Filament Cold Resistance	.0085 Ohm
Amplification Factor	24
Grid-Plate Transconductance at E_b = 4.0 kV; I_b = 3.0 amps	22000 umhos
Interelectrode Capacitances	
Grid-Plate	26 uuf
Grid-Filament	23 uuf
Plate Filament	1.5 uuf

Mechanical

Mounting Position	Vertical, anode down
Type of Cooling	Forced air
Maximum Incoming Air Temperature	45 °C
Required Air Flow on Anode	600 cfm
Static Pressure, Inches Water	0.8 inch
Maximum Bulb Temperature	160 °C
Net Weight, Approximate	30 pounds

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

(Continuous Commercial Service)

Audio-Frequency Power Amplifier and Modulator Class B

Maximum Ratings, Absolute Values	
D-C Plate Voltage	10500 volts
Maximum Signal D-C Plate Current*	3.5 amps
Maximum Signal Plate Input*	30 kW
Plate Dissipation*	10 kW
Typical Operation (Values are for two tubes)	
D-C Plate Voltage	9000 volts
D-C Grid Voltage	-350 volts
Peak A-F Grid-to-Grid Voltage	1620 volts
Peak A-F Plate-to-Plate Voltage	15400 volts
Zero Signal D-C Plate Current	1.0 amp
Maximum Signal D-C Plate Current	6.6 amps
Effective Load Resistance, plate-to-plate	2900 ohms
Maximum Signal Driving Power, approx.	490 watts
Maximum Signal Power Output, approx.	41 kW

Radio-Frequency Power Amplifier Class B

Carrier conditions per tube for use with a maximum modulation factor of 1.0.

Maximum Ratings, Absolute Values	
D-C Plate Voltage	10500 volts
D-C Plate Current	2.50 amps
Plate Input	20 kW
Plate Dissipation	10 kW
Typical Operation	
D-C Plate Voltage	9000 volts
D-C Grid Voltage	-340 volts
Peak R-F Grid Voltage	430 volts
Peak R-F Plate Voltage	3800 volts
D-C Plate Current	1.8 amps
D-C Grid Current, approx.	0.030 amp
Driving Power, approx.**	330 watts
Power Output, approx.	5.5 kW

High-Efficiency Grid-Modulated Amplifier

Carrier conditions per tube, unless otherwise specified, for use with a maximum modulation factor of 1.0.

	Carrier Tube	Peak Tube	
Maximum Ratings, Absolute Values			
D-C Plate Voltage	10500	10500	volts
D-C Grid Voltage	-1500	-1500	volts
D-C Plate Current	3.0	2.0†	amps
Plate Input	30	20†	kW
Plate Dissipation	10	10	kW
Typical Operation			
D-C Plate Voltage	10000	10000	volts
D-C Grid Voltage	-920	-920	volts
D-C Plate Current			
Carrier	1.5	0.2	amps
Modulated†	1.5	1.1	amps
Driving Power, approx.	450	——	watts
Power Output, approx.	11.0	——	kW

Plate-Modulated R-F Power Amplifier Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1.0.

Maximum Ratings, Absolute Values	
D-C Plate Voltage	8000 volts
D-C Grid Voltage	-1500 volts
D-C Plate Current	3.1 amps
D-C Grid Current	0.60 amp
Plate Input	23 kW
Plate Dissipation	7.0 kW
Typical Operation	
D-C Plate Voltage	7500 volts
D-C Grid Voltage	-1000 volts
Peak R-F Grid Voltage	1450 volts
Peak R-F Plate Voltage	6300 volts
D-C Plate Current	1.9 amps
D-C Grid Current	0.30 amp
Driving Power, approx.	415 watts
Power Output, approx.	11.3 kW

Radio-Frequency Power Amplifier and Oscillator Class C

Key-down conditions per tube without amplitude modulation.‡

Maximum Ratings, Absolute Values				
D-C Plate Voltage	10500	volts		
D-C Grid Voltage	-1500	volts		
D-C Plate Current	3.75	amps		
D-C Grid Current	0.60	amp		
Plate Input	30	kW		
Plate Dissipation	10	kW		

	Amplifier		Oscillator		
Typical Operation	Grounded-Grid	Grounded-Filament			
D-C Plate Voltage	8500	8500	7500	9000	volts
D-C Grid Voltage	-1000	-1000	-800	-900	volts
Peak R-F Grid Voltage	1640	1640	1320	1460	volts
Peak R-F Plate Voltage	6700	6700	5700	6800	volts
D-C Plate Current	3.4	3.4	2.8	3.2	amps
D-C Grid Current, approx.	0.44	0.44	0.31	0.30	amp
Driving Power, approx.	5660	700	——	——	watts
Power Output, approx.	25.3§	20.5	14	19	kW

* Averaged over any audio-frequency cycle of sine-wave form.

** At crest of audio-frequency cycle with modulation factor of 1.0.

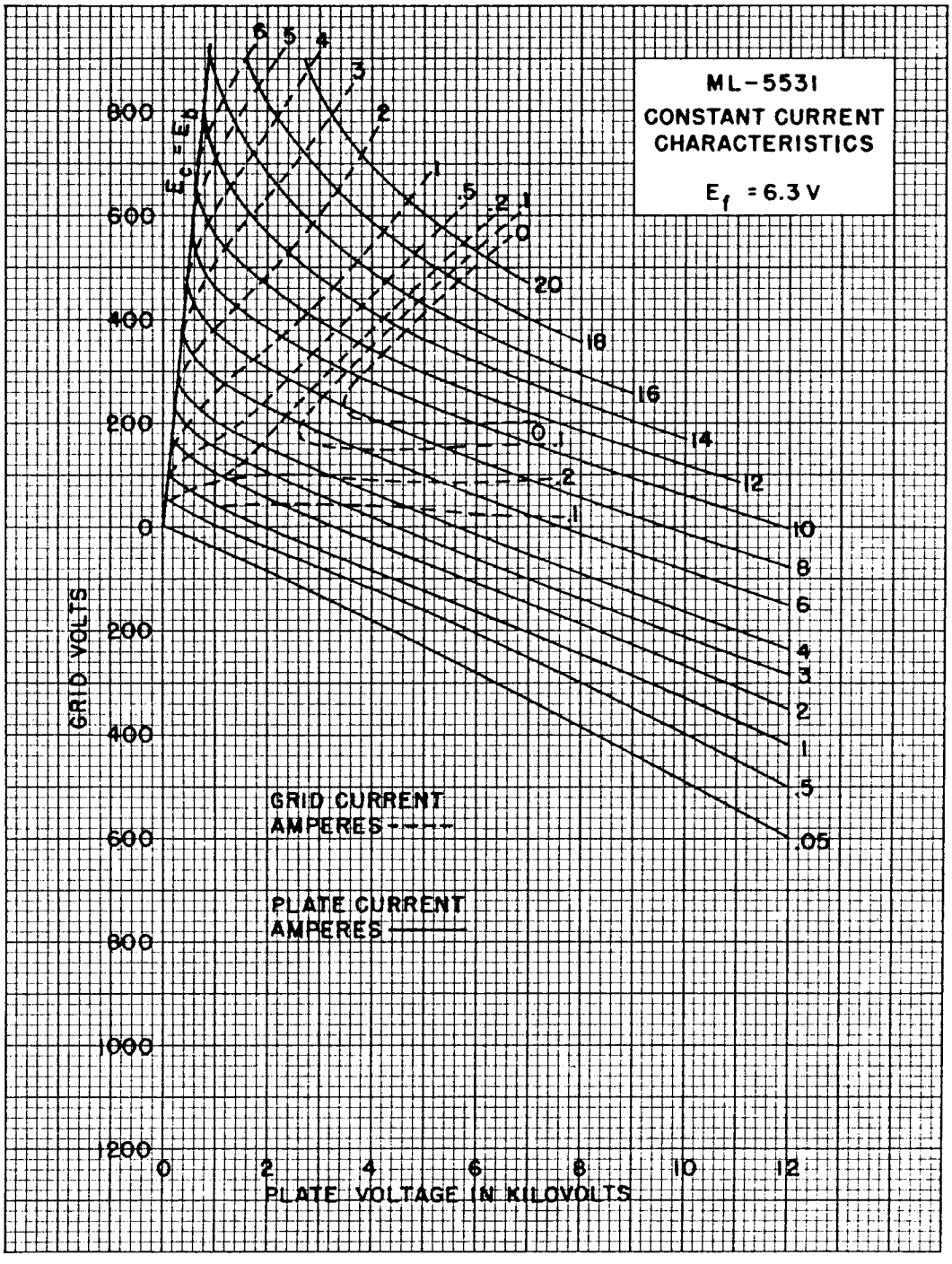
§ Includes power transferred from driver stage.

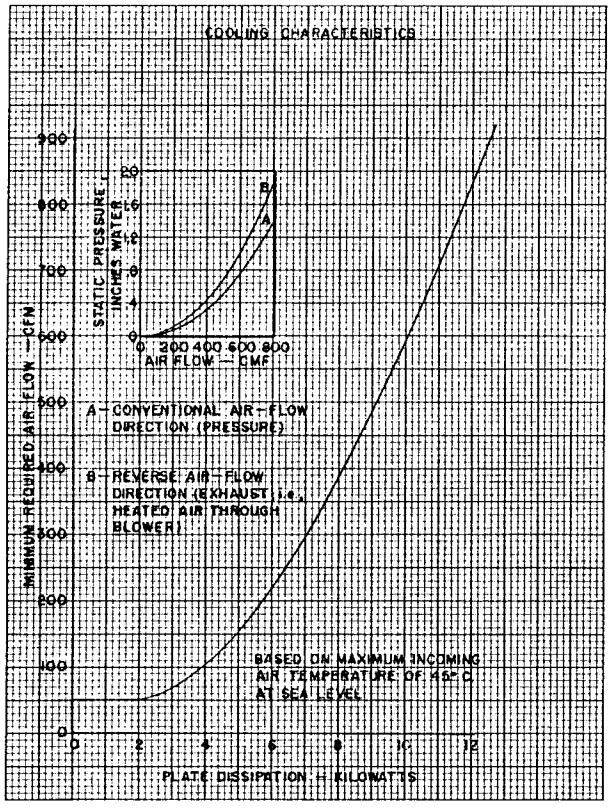
† Average value with modulation factor of 1.0.

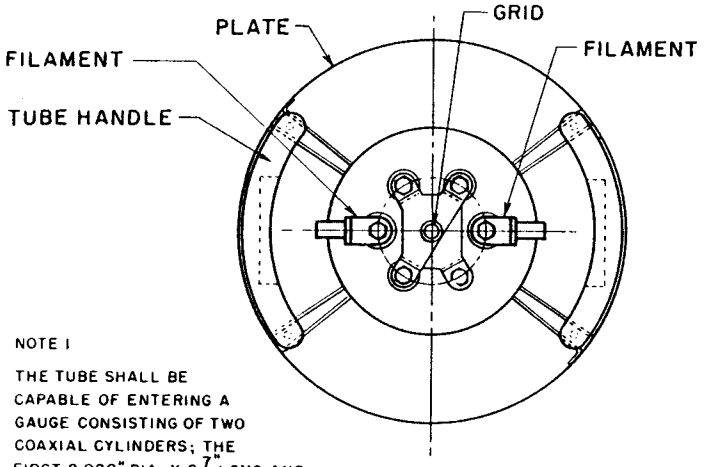
‡ Modulation essentially negative may be used if the positive peak of the envelope does not exceed 115 per cent of its unmodulated value.

CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN

Characteristics	Conditions		Limits Min.	Limits Bogey	Limits Max.
Grid Voltage	e_b = 1100 volts; i_b = 14 amps	e_c:	——	——	850 volts
Grid Current	e_b = 1100 volts; i_b = 14 amps	i_c:	——	——	7.0 amps
Plate Voltage	E_c = 0; I_b = 1.0 Adc	E_b:	1.7	2.2	2.7 kVdc
Plate Voltage	E_c = -100 Vdc; I_b = 1.0 Adc	E_b:	4.1	4.6	5.3 kVdc
Grid Voltage	E_b = 10 kVdc; I_b = 0.02 Adc	E_c:	-400	-490	-580 Vdc
Plate Power Output	E_b = 9.0 kVdc; E_c = -900 Vdc; I_b = 3.2 Adc; I_c = 0.30 Adc	P_o:	16	——	—— kW





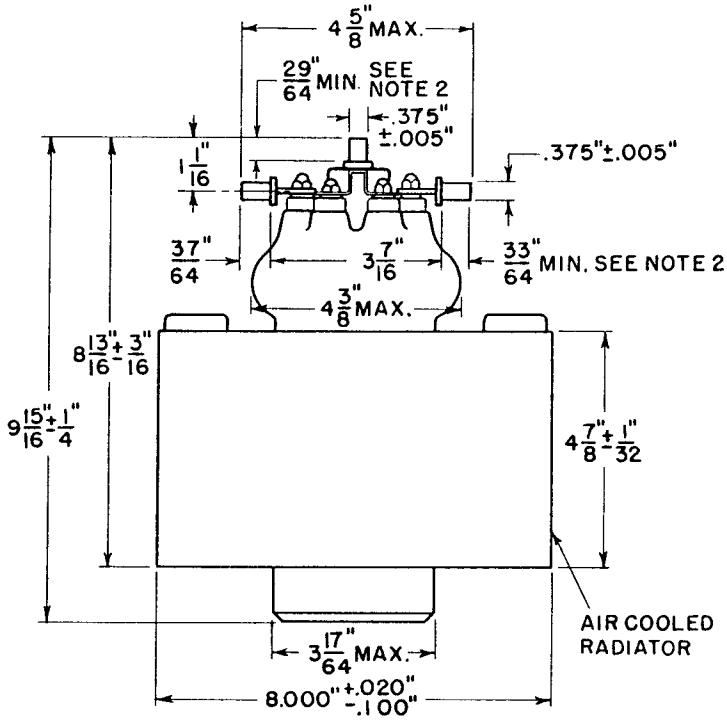


NOTE 1

THE TUBE SHALL BE CAPABLE OF ENTERING A GAUGE CONSISTING OF TWO COAXIAL CYLINDERS; THE FIRST 8.020" DIA. X $8\frac{7}{16}$" LONG AND THE SECOND .500" DIA. X $\frac{1}{2}$" LONG.

NOTE 2

LENGTH OF CONTACT SURFACE.



THE MACHLETT LABORATORIES, INC.
Subsidiary of Raytheon Company
SPRINGDALE MACHLETT CONNECTICUT
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