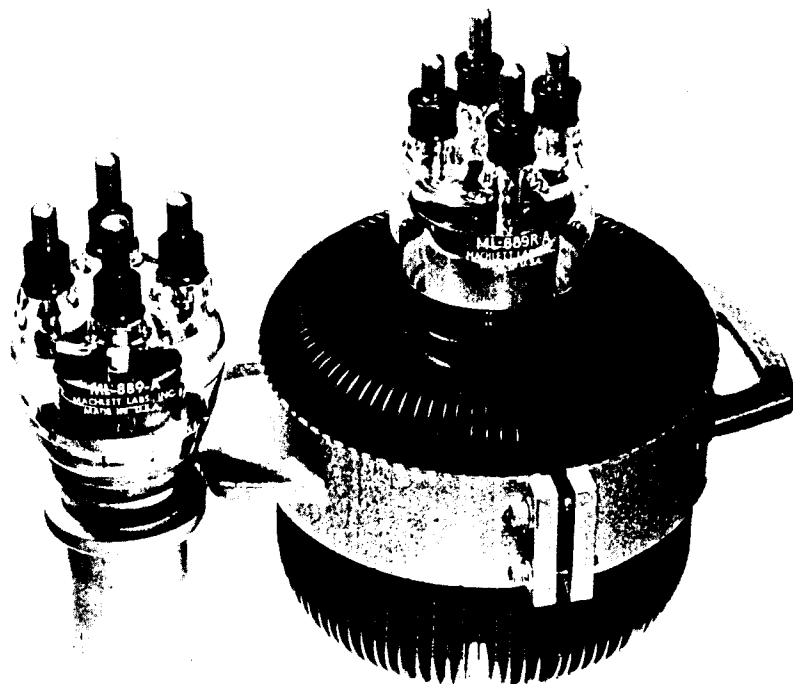




ML-889A ML-889RA

DESCRIPTION & RATINGS

DESCRIPTION

The ML-889A and ML-889RA are three electrode tubes designed specifically for use as modulators, amplifiers or oscillators in radio transmitting service. The cathode of each type is a pure-tungsten filament. The ML-889A has a water-cooled anode capable of dissipating 5 kW with 6 gpm water flow. The ML-889RA has a forced-air-cooled anode capable of dissipating 5 kW with an air flow of 500 cfm.

Maximum ratings of 8.5 kVdc plate voltage and 16 kW plate input apply at frequencies up to 50 Mc for the ML-889A and 40 Mc for the ML-889RA. These tubes are rated for service up to 150 Mc and 100 Mc, respectively, with plate voltage and plate input reduced according to the table on page 2.

GENERAL CHARACTERISTICS

Electrical

Filament Voltage	11.0	Volts
Filament Current at 11.0 volts	120	Amps
Filament Starting Current, maximum	180	Amps
Filament Cold Resistance	.008	Ohms
Amplification Factor	21	
Interelectrode Capacitances	ML-889A	ML-889RA
Grid-Plate	17.5	18.5 μf
Grid-Filament	23.3	23.3 μf
Plate-Filament	2.7	3.0 μf

Mechanical

Mounting Position	Vertical, anode down
Type of Cooling — ML-889A	Water and forced-air*
Water flow on anode, minimum for 5 kW dissipation	6 gpm
Maximum outgoing water temperature	70 °C
Type of Cooling — ML-889RA	Forced-air
Air flow on anode, minimum for 5 kW dissipation	500 cfm at 0.7" Water*
Maximum incoming air temperature	45 °C
Maximum Anode Temperature, ML-889RA	230 °C
Maximum Glass Temperature	160 °C*
Net Weight, approximate	
ML-889A	2 lbs.
ML-889RA	35 lbs.

*Auxiliary air flow of 30 cfm should be directed through a 3" diameter nozzle at the top of the glass envelope to maintain a uniform glass temperature of not more than 160°C around the circumference of the seals.

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

(Continuous Commercial Service)

VALUES APPLY TO BOTH TYPES

**A-F Power Amplifier and Modulator
Class B**

Maximum Ratings, Absolute Values

D-C Plate Voltage	8500	volts
Max.-Signal D-C Plate Current*	2.0	amps
Max.-Signal Plate Input*	12000	watts
Plate Dissipation*	5000	watts

Typical Operation (Values are for 2 tubes)

D-C Plate Voltage	5000	6000	7500	volts
D-C Grid Voltage	-180	-230	-300	volts
Peak A-F Grid-to-Grid Voltage	1460	1680	1700	volts
Zero Signal D-C Plate Current	0.4	0.4	0.4	amp
Max.-Signal D-C Plate Current	3.2	3.6	3.2	amps
Effective Load Resistance (plate-to-plate)	2520	3680	5000	ohms
Max.-Signal Driving Power, approximate	170	180	150	watts
Max.-Signal Power Output, approximate	8800	12000	15000	watts

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

**R-F Power Amplifier
Class B Telephony**

Carrier conditions per tube with a maximum modulation factor of 1.0

Maximum Ratings, Absolute Values

D-C Plate Voltage	8500	volts
D-C Plate Current	1.0	amps
Plate Input	7500	watts
Plate Dissipation	5000	watts

Typical Operation

D-C Plate Voltage	6000	7500	volts
D-C Grid Voltage	-250	-300	volts
Peak R-F Grid Voltage	460	500	volts
D-C Plate Current	0.9	0.9	amp
Driving Power, approx.†	95	80	watts
Power Output, approx.	1500	2000	watts

† At crest of a-f cycle with modulation factor of 1.0.

**Plate Modulated R-F Power Amplifier
Class C Telephony**

Carrier conditions per tube with a maximum modulation factor of 1.0

Maximum Ratings, Absolute Values

D-C Plate Voltage	6000	volts
D-C Grid Voltage	-1000	volts
D-C Plate Current	1.0	amp
D-C Grid Current	0.25	amp
Plate Input	6000	watts
Plate Dissipation	3000	watts

Typical Operation

D-C Plate Voltage	5000	6000	volts
D-C Grid Voltage	-800	-900	volts
Peak R-F Grid Voltage	1300	1420	volts
D-C Plate Current	0.9	1.0	amp
D-C Grid Current, approx.	0.12	0.10	amp
Driving Power, approx.	155	140	watts
Power Output, approx.	2750	4000	watts

**R-F Power Amplifier and Oscillator
Class C Telegraphy**

Key-down conditions per tube without amplitude modulation‡

Maximum Ratings, Absolute Values

D-C Plate Voltage	8500	volts
D-C Grid Voltage	-1000	volts
D-C Plate Current	2.0	amps
D-C Grid Current	0.25	amp
Plate Input	16000	watts
Plate Dissipation	5000	watts

Typical Operation

D-C Plate Voltage	5000	6000	7500	volts
D-C Grid Voltage	-500	-600	-800	volts
Peak R-F Grid Voltage	1200	1460	1830	volts
D-C Plate Current	1.5	1.8	2.0	amps
D-C Grid Current, approx.	0.19	0.21	0.24	amp
Driving Power, approx.	220	290	400	watts
Power Output, approx.	5000	7000	10000	watts

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

MAXIMUM FREQUENCY RATINGS

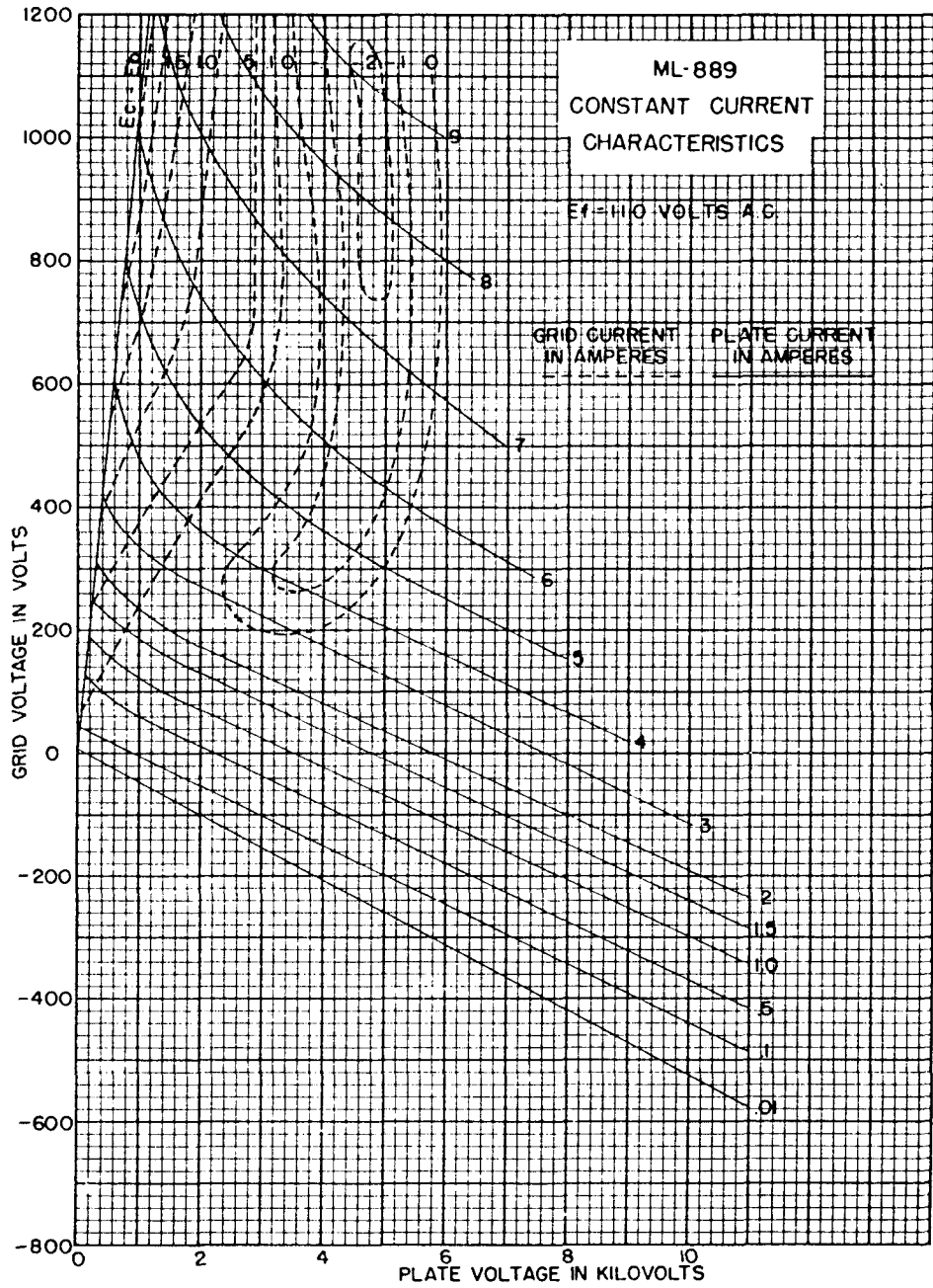
Maximum ratings apply at frequencies up to 50 Mc for the ML-889A or up to 40 Mc for the ML-889RA. The tubes can be operated at higher frequencies provided the maximum values of plate voltage and plate input are reduced in accordance with the table on the right (other maximum ratings are the same as shown above). Special attention should be given to adequate ventilation of the bulb at the higher frequencies.

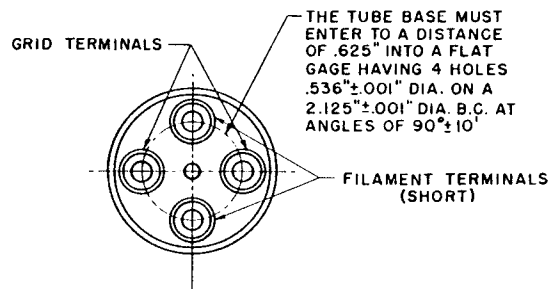
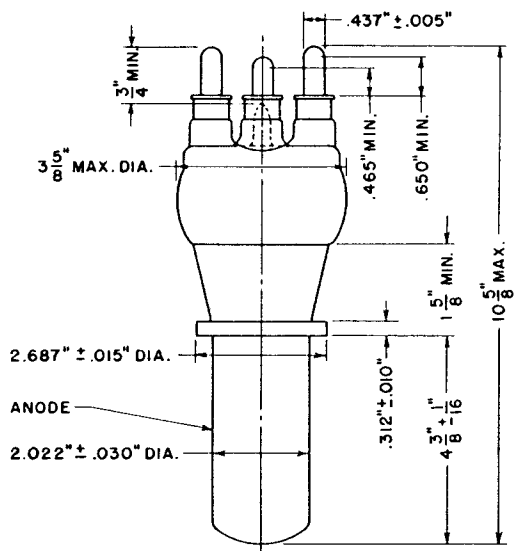
Frequencies	ML-889A			ML-889RA		
	50	100	150	40	65	100
Percentage of Maximum Rated Plate Voltage and Plate Input						
Class B	100	83	72	100	85	72
Class C Plate Modulated	100	75	60	100	78	60
Class C Telegraphy, Plate Voltage	100	78	65	100	87	65
Class C Telegraphy, Plate Input	100	70	50	100	73	50

CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN

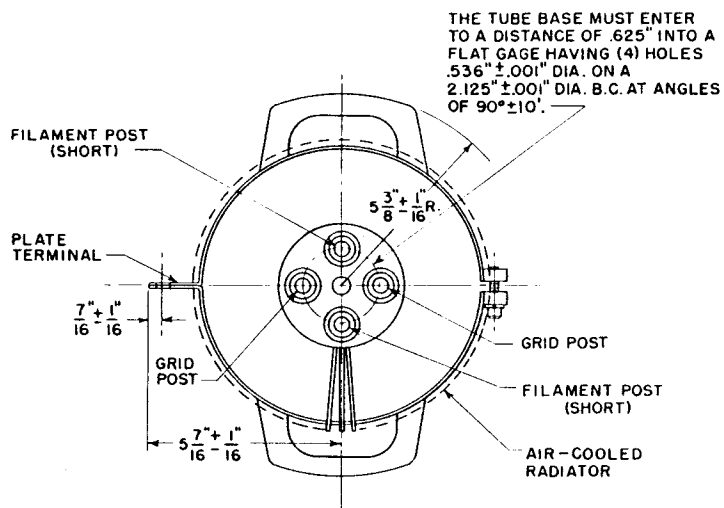
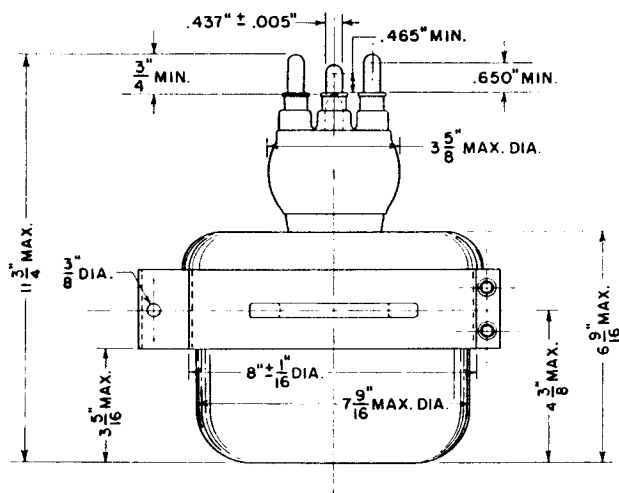
Characteristics	Conditions	Minimum	Limits Bogey	Maximum	
Grid Voltage	$e_b = 200$ volts; $i_b = 6$ amps	e_c :	—	800	volts
Grid Current	$e_b = 200$ volts; $i_b = 6$ amps	i_c :	—	1.5	amps
Plate Voltage	$E_c = 0$ Vdc; $I_b = 1.0$ Adc	E_b :	2.8	3.3	kVdc
Plate Voltage	$E_c = -200$ Vdc; $I_b = 1.0$ Adc	E_b :	6.5	7.5	kVdc
Grid Voltage	$E_b = 7.5$ kVdc; $I_b = 0.020$ Adc	E_c :	-325	-370	Vdc
Peak Cathode Current*	$E_b = 8$ kVdc; $I_b = 1.75$ Adc	i_c :	7.5	—	amps
Power Output	$E_c = -750$ Vdc; $I_c = .23$ Adc	P_o :	9.0	—	kW

* Represents maximum useable plate current plus grid current for any conditions of operation.





DIMENSIONS — ML-889A



DIMENSIONS — ML-889RA

MACHLETT LABORATORIES, INC.

SPRINGDALE



CONNECTICUT

U. S. A.