

ML-891 ML-891R

DESCRIPTION & RATINGS

DESCRIPTION

The ML-891 and ML-891R 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-891 has a water-cooled anode capable of dissipating 6 kW with moderate water flow. The ML-891R has a forced-air-cooled anode capable of dissipating 4 kW with an air flow of approxi-

mately 450 cfm. Maximum ratings of 12 kVdc plate voltage and 18 kW plate input for the ML-891 and 10 kVdc plate voltage and 15 kW plate input for the ML-891R apply at frequencies up to 1.6 Mc. Operation at 20 Mc is permissible with plate voltage and plate input reduced according to the table on page 2.

GENERAL CHARACTERISTICS

Electrical

Filament Voltage	22	Volts
Filament Current	60	Amps
Filament Starting Current, maximum	120	Amps
Filament Cold Resistance	0.031	Ohms
Amplification Factor	8.5	
Interelectrode Capacitances:	ML-891	ML-891R
Grid-Plate	27	28 $\mu\mu f$
Grid-Filament	19	19 $\mu\mu f$
Plate-Filament	2	2.5 $\mu\mu f$

Mechanical

Mounting Position	Vertical, anode down
Type of Cooling — ML-891	Water
Water flow on anode	3-8 gpm
Maximum water pressure	80 psi
Maximum outgoing water temperature	70 °C
Type of Cooling — ML-891R	Forced-air
Air flow on anode, minimum for 4 kW dissipation	450 cfm at 0.5" Water
Maximum incoming air temperature	45 °C
Maximum Glass Temperature	160 °C
Net Weight, approximate	
ML-891	3.5 lbs
ML-891R	45 lbs

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

(Continuous Commercial Services)

VALUES APPLY TO BOTH TYPES UNLESS OTHERWISE SPECIFIED

A-F Power Amplifier & Modulator

Class B

Maximum Ratings, Absolute Values	ML-891	ML-891R	
D-C Plate Voltage	15000	10000	volts
Max.-Signal D-C Plate Current*	2.0	2.0	amps
Max.-Signal Plate Input*	20000	10500	watts
Plate Dissipation*	5000	3500	watts
Typical Operation (Values are for 2 tubes)			
D-C Plate Voltage	8000	12500	volts
D-C Grid Voltage	-860	-1450	volts
Peak A-F Grid to Grid Voltage	2260	3760	volts
Zero Signal D-C Plate Current	0.5	0.4	amp
Max.-Signal D-C Plate Current	2.1	2.5	amps
Eff. Load Resistance, Plate to Plate	8000	12000	ohms
Max.-Signal Driving Power, approx.	50	245	watts
Max.-Signal Power Output, approx.	10000	22000	watts

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

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	ML-891	ML-891R	
D-C Plate Voltage	8000	8000	volts
D-C Grid Voltage	-3000	-3000	volts
D-C Plate Current	1.0	1.0	amps
D-C Grid Current	0.15	0.15	amp
Plate Input	8000	8000	watts
Plate Dissipation	4000	2500	watts
Typical Operation			
D-C Plate Voltage	6000	8000	volts
D-C Grid Voltage	-2000	-2400	volts
Peak R-F Grid Voltage	2650	3100	volts
D-C Plate Current	0.75	0.78	amp
D-C Grid Current, approx.	0.1	0.08	amp
Driving Power, approx.	260	260	watts
Power Output, approx.	3500	5000	watts

R-F Power Amplifier Oscillator

Class C Telegraphy

Key-down conditions per tube without modulation‡

Maximum Ratings, Absolute Values	ML-891	ML-891R	
D-C Plate Voltage	12000	10000	volts
D-C Grid Voltage	-3000	-3000	volts
D-C Plate Current	2.0	2.0	amps
D-C Grid Current	0.15	0.15	amp
Plate Input	18000	15000	watts
Plate Dissipation	6000	4000	watts
Typical Operation			
D-C Plate Voltage	8000	10000	volts
D-C Grid Voltage	-1800	-2000	volts
Peak R-F Grid Voltage	2400	2700	volts
D-C Plate Current	1.1	1.4	amps
D-C Grid Current, approx.	0.09	0.14	amp
Driving Power, approx.	215	375	watts
Power Output, approx.	6500	10000	watts

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

R-F Power Amplifier — Class B Telephony

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

Maximum Ratings, Absolute Values	ML-891	ML-891R	
D-C Plate Voltage	15000	10000	volts
D-C Plate Current	1.0	1.0	amps
Plate Input	10000	5500	watts
Plate Dissipation	6000	3500	watts
Typical Operation			
D-C Plate Voltage	8000	14000	volts
D-C Grid Voltage	-820	-1600	volts
Peak R-F Grid Voltage	700	1000	volts
D-C Plate Current	0.6	0.56	amp
Driving Power, approx. §	0	0	watts
Power Output, approx.	1300	2300	watts

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

MAXIMUM FREQUENCY RATINGS

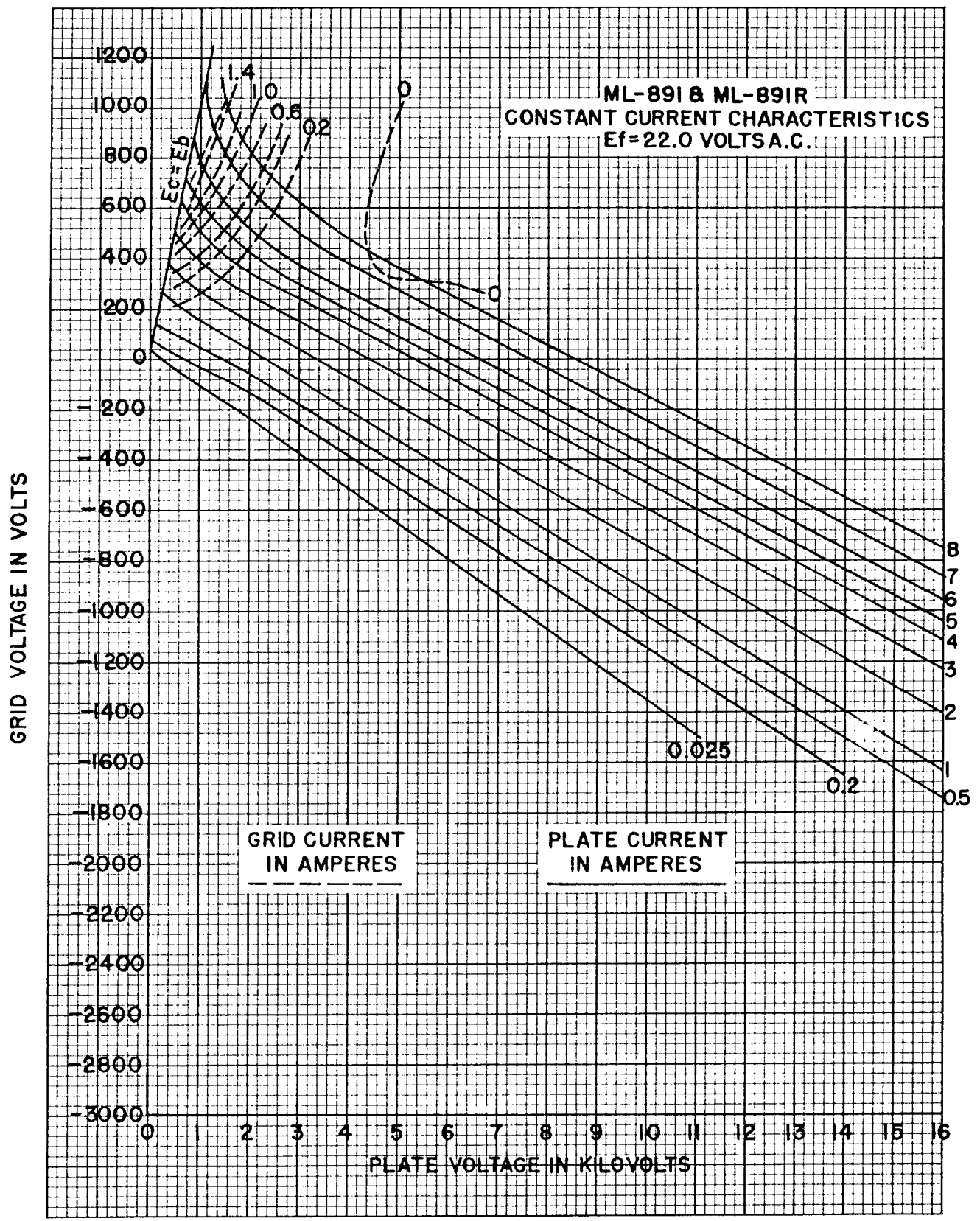
Maximum ratings apply at frequencies up to 1.6 Mc. These tubes may be operated at higher frequencies provided the maximum values of plate voltage and plate input are reduced in accordance with the table on the right (other maximum ratings are the same as shown above.)

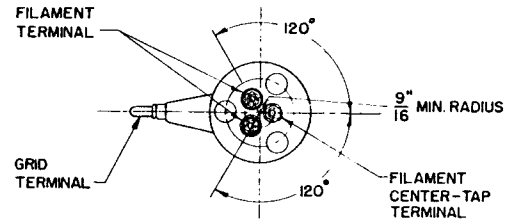
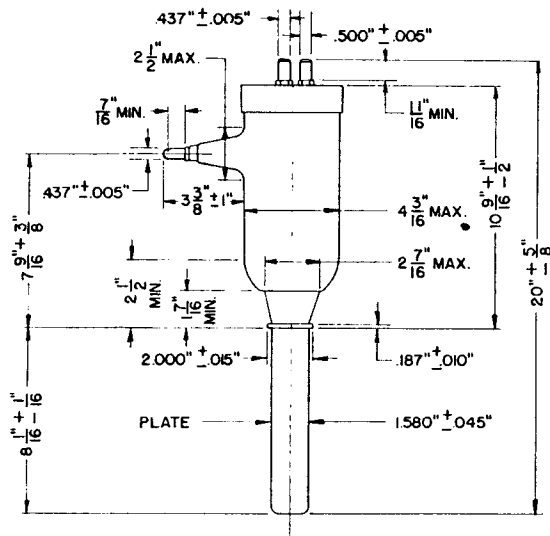
Frequency	1.6	7.5	20	Mc
Percentage of Maximum Rated Plate Voltage and Plate Input				
Class B	100	82	72	
Class C Plate Modulated	100	75	65	
Class C Unmodulated	100	75	50	

CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN

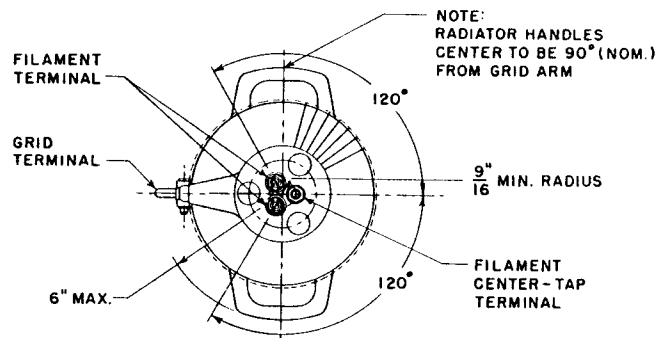
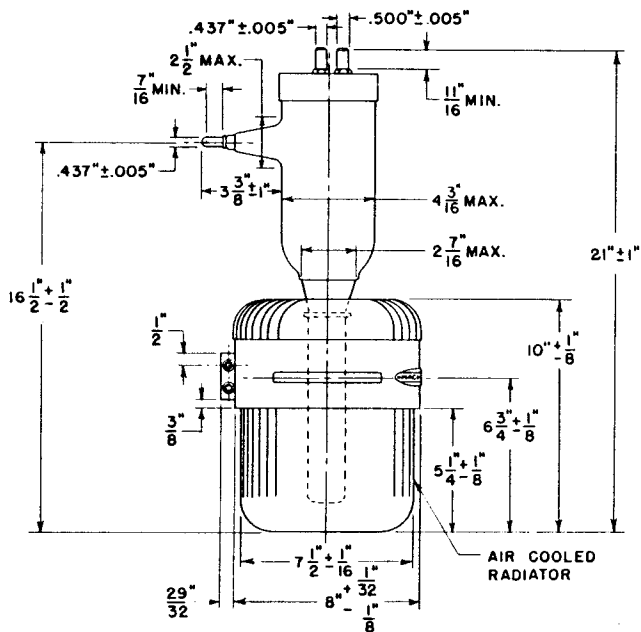
Characteristics	Conditions	Limits	
		Minimum	Bogey Maximum
Grid Voltage	$e_b = 1500$ volts; $I_b = 6.0$ amps	$e_c:$ —	875 volts
Grid Current	$e_b = 1500$ volts; $I_b = 6.0$ amps	$i_c:$ —	1.5 amps
Plate Voltage	$E_c = 0$ Vdc; $I_b = 0.45$ Adc	$E_b:$ 1.2	1.475 kVdc
Plate Voltage	$E_c = -1000$ Vdc; $I_b = 0.45$ Adc	$E_b:$ 8.8	9.8 kVdc
Grid Voltage	$E_b = 12$ kVdc; $I_b = 0.020$ Adc	$E_c:$ -1.5	-1.675 kVdc
Peak Cathode Current*		$i_k:$ 9.0	— amps
Power Output (ML-891)	$E_b = 12$ kVdc; $I_b = 1.5$ Adc; $I_c = 0.100$ Adc; $R_g = 19000$ ohms	$P_o:$ 12.0	— kW
Power Output (ML-891R)	$E_b = 10$ kVdc; $I_b = 1.4$ Adc; $I_c = 0.100$ Adc; $R_g = 19000$ ohms	$P_o:$ 10.0	— kW

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





DIMENSIONS — ML-891



DIMENSIONS — ML-891R

MACHLETT LABORATORIES, INC.

SPRINGDALE



CONNECTICUT

U. S. A.