9C21

POWER TRIODE

WATER- & FORCED-AIR-COOLED

GENERAL DATA

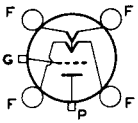
Electrical:

Filament, Multistrand Tungsten:

Excitation . . .	Single Phase AC or DC	
Voltage.	19.5	ac or dc volts
Current.	415	amp
Starting Current:	The filament current must never exceed 750 amperes, even momentarily.	
Cold Resistance. . . .	0.0042	ohm ←
Amplification Factor . .	36	←
Direct Interelectrode Capacitances (Approx.):		←
Grid to Plate.	46	μμf
Grid to Filament . . .	100	μμf
Plate to Filament. . .	2.0	μμf

Mechanical:

Terminal Connections:



F - Filament
G - Grid-Flange Terminal

P - Water-Cooled Plate Terminal

DIAMETRICALLY OPPOSITE TERMINALS MUST BE CONNECTED TOGETHER

Mounting Position.	Vertical, Filament End Up	
Maximum Overall Length	24-1/2"	
Maximum Diameter	9-1/2"	
Water Jacket	RCA MI - 19460	←
Gasket	RCA MI - 27001	←
Water Flow	15 to 20 gpm	

The water flow must start before the application of any voltages and must continue for at least 2 minutes after the removal of all voltages.

Air Flow:

To Filament Seals.	10 min.	cfm

The specified air flow directed by a nozzle of 1-1/4" diameter into the filament header is required before and during the application of any voltages to limit the temperature of the filament seals to the maximum value. ←

To Plate Seal and Bulb	250	cfm

The specified air flow at a pressure of 1.3 inches of water must be directed at and distributed uniformly around the plate seal and bulb to limit the temperature of each to its maximum value at the hottest point. ←

Outlet Water Temperature	70 max.	°C
Bulb Temperature	180 max.	°C
Seal Temperature (Filament, grid, plate) . . .	165 max.	°C ←

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum CCS* Ratings, *Absolute Values*:

DC PLATE VOLTAGE	15000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	6 max.	amp
MAX.-SIGNAL PLATE INPUT*	90 max.	kw
PLATE DISSIPATION*	40 max.	kw

* * See next page.

← Indicates a change.

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POWER TRIODE

Typical Operation:

Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	10200	14000	volts
DC Grid Voltage	−220	−300	volts
Peak AF Grid-to-Grid Voltage	850	1050	volts
Zero-Signal DC Plate Current	0.6	0.6	amp
Max.-Signal DC Plate Current	5.7	7.1	amp
Effective Load Resistance (plate-to-plate)	3600	4000	ohms
Max.-Signal Driving Power (Approx.)#	110	150	watts
Max.-Signal Power Output (Approx.)	36	61	kw

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

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

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	12500 max.		volts
DC GRID VOLTAGE	−2000 max.		volts
DC PLATE CURRENT	4 max.		amp
→ DC GRID CURRENT	1.5 max.		amp
PLATE INPUT	50 max.		kw
PLATE DISSIPATION	28 max.		kw

Typical Operation:

DC Plate Voltage	10200	12500	volts
DC Grid Voltage⊕	−1500	−1670	volts
	2000	2100	ohms
Peak RF Grid Voltage	1960	2190	volts
DC Plate Current	3.1	3.5	amp
DC Grid Current (Approx.)□	0.75	0.79	amp
Driving Power (Approx.)□	1320	1570	watts
Power Output (Approx.)	27.5	38	kw

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	17000 max.		volts
DC GRID VOLTAGE	−2000 max.		volts
DC PLATE CURRENT	9 max.		amp
→ DC GRID CURRENT	1.5 max.		amp
PLATE INPUT	150 max.		kw
PLATE DISSIPATION	40 max.		kw

Typical Operation:

DC Plate Voltage	14000	17000	volts
DC Grid Voltage▲▲	−1500	−1600	volts
	230	180	ohms
	1800	1780	ohms

●, *, #, ⊕, □, □□, ▲▲: See next page. →Indicates a change.

9C21
POWER TRIODE

Peak RF Grid Voltage	2000	2200	volts
DC Plate Current	5.8	7.9	amp
DC Grid Current (Approx.).	0.83	0.9	amp
Driving Power (Approx.).	1500	1800	watts
Power Output (Approx.)	61	100	kw

● Continuous Commercial Service.

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

The driving stage should have good regulation and should be capable of supplying considerably more than the specified driving power.

⊕ Obtained by grid resistor (2000, 2100) or by partial self-bias methods.

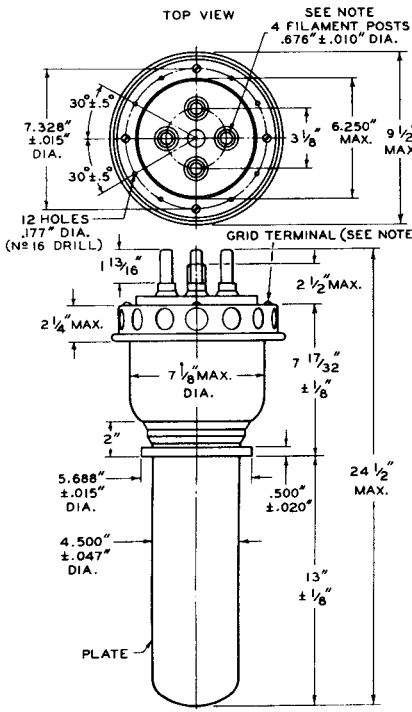
□ Subject to wide variations as explained under TUBE RATINGS in General Section.

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

▲▲ Obtained from cathode resistor (230, 180), or grid resistor (1800, 1780) or by partial self-bias methods.

Data on operating frequencies for the 9C21 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

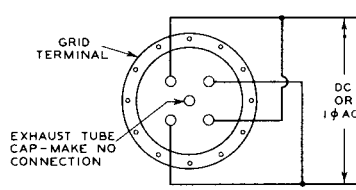
9C21
POWER TRIODE



NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

92CM-6438R1

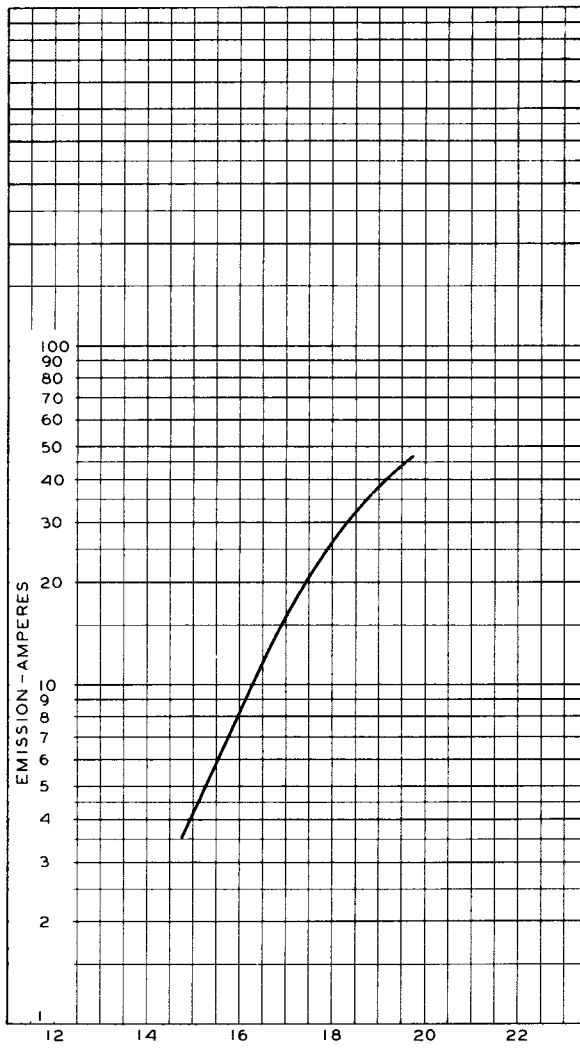
FILAMENT CONNECTIONS



92CS-6519

9C21

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



DEC. 1, 1943

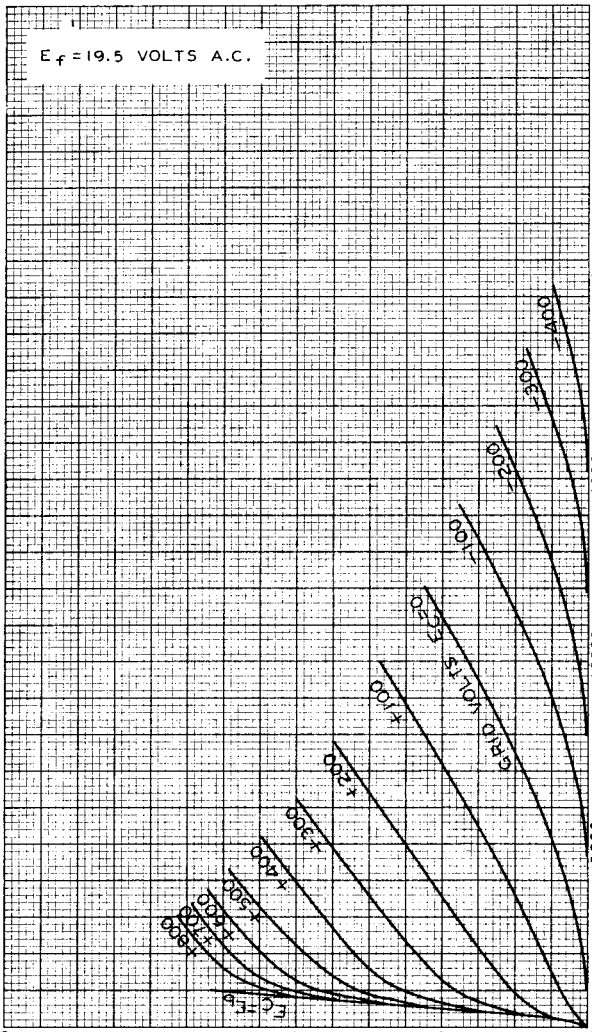
RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6458

9C21

9C21

AVERAGE PLATE CHARACTERISTICS



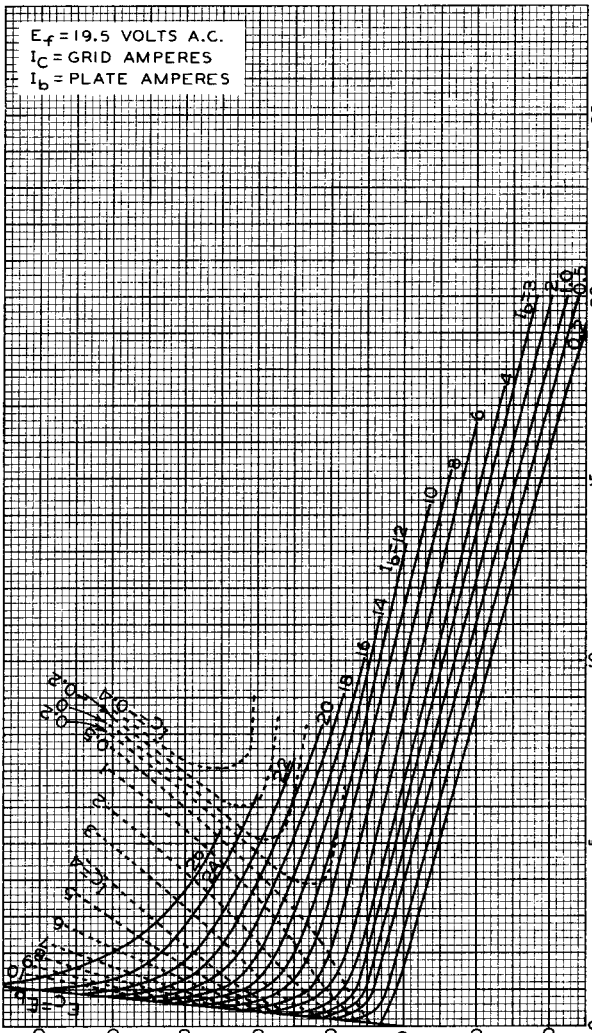
DEC. 1, 1943

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6461

9C21

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



DEC. 1, 1943

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6462

9C21

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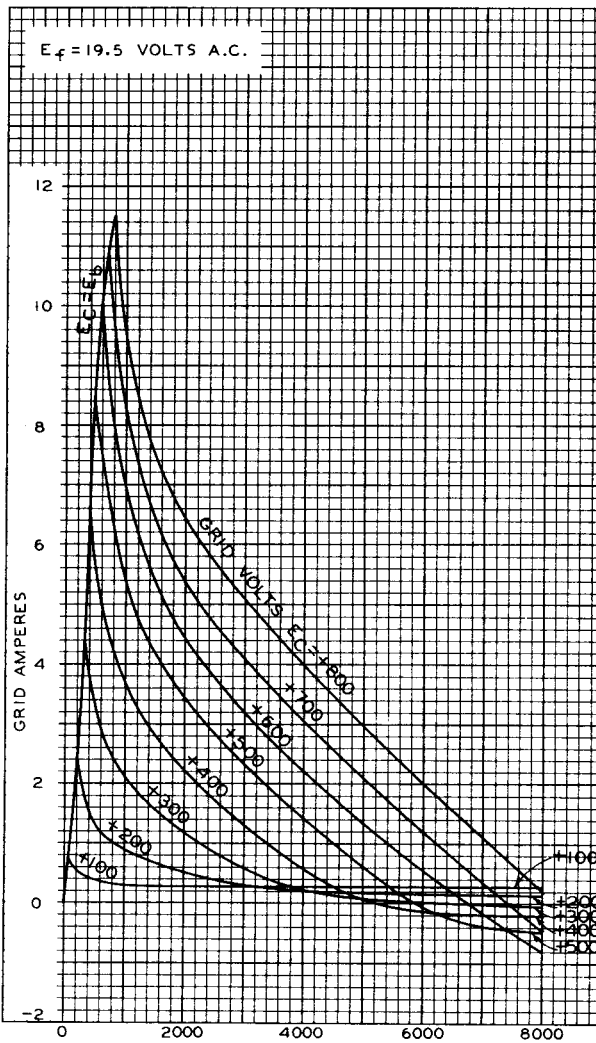
TYPICAL CHARACTERISTICS



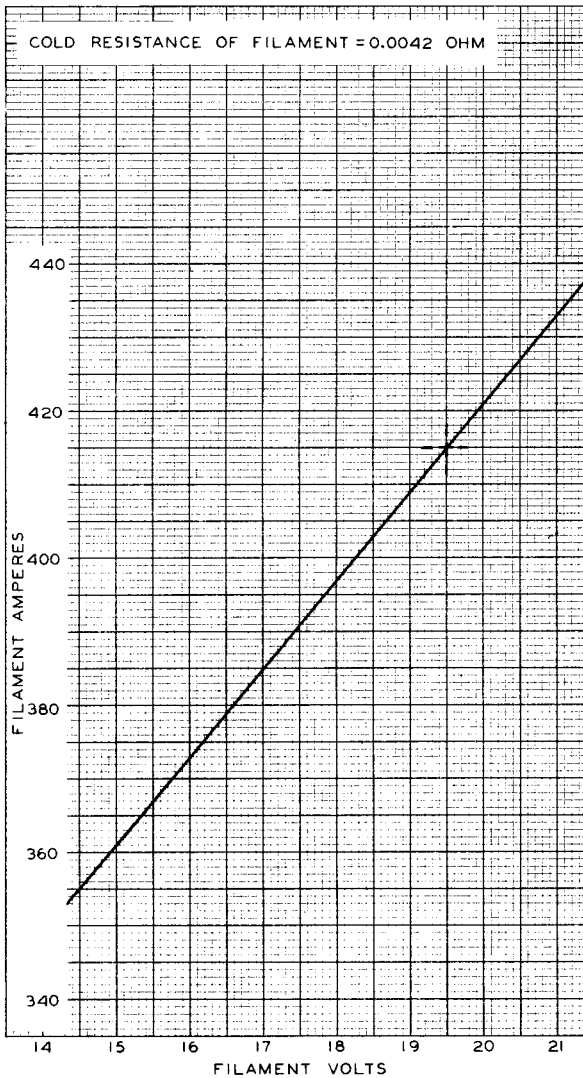
DEC. 1, 1943

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6463

9C21

AVERAGE FILAMENT CHARACTERISTIC



DEC. 1, 1943

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6457

Power Triode

WATER- AND FORCED-AIR COOLED

GENERAL DATA

Electrical:

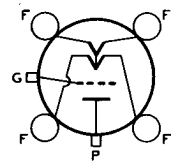
Filament, Multistrand Tungsten:		
Excitation	DC or Single Phase AC	
Voltage (AC or DC)	19.5	volts
Current	415	amp
Starting Current: The filament current should never exceed 750 amperes, even momentarily.		
Cold Resistance	0.0042	ohm
Amplification Factor	40	
Direct Interelectrode Capacitances (Approx.):		
Grid to plate	53	pf
Grid to filament	103	pf
Plate to filament	1.2	pf

Mechanical:

Operating Position	Vertical, filament end up
Maximum Overall Length	24-1/2"
Maximum Diameter	9-1/2"
Weight (Approx.)	26 lbs

Terminal Diagram (See *Dimensional Outline*):

F – Filament
G – Grid



P – Plate

DIAMETRICALLY OPPOSITE TERMINALS MUST BE CONNECTED TOGETHER

Thermal:

Water Flow . . . . . 15 to 20 gpm

The water flow must start before the application of any voltages and must continue for at least 2 minutes after the removal of all voltages.

Air Flow:

To filament seals . . . . . 10 min. cfm

The specified air flow directed by a nozzle of 1-1/4" diameter into the filament header is required before and during the application of any voltages to limit the temperature of the filament seals to the maximum value.

To plate seal and bulb . . . . . 250 min. cfm ←

The specified air flow at a pressure of 1.3 inches of water must be directed at and distributed uniformly around the plate seal and bulb to limit the temperature of each to its maximum value at the hottest point.

← Indicates a change.

Outlet Water Temperature	70 max.	°C
Bulb Temperature	180 max.	°C
Seal Temperature (Filament, grid, plate)	165 max.	°C

AF POWER AMPLIFIER & MODULATOR — Class B

Maximum CCS[a] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	15000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT[b]	6 max.	amp
MAX.-SIGNAL PLATE INPUT[b]	90 max.	kw
PLATE DISSIPATION[b]	40 max.	kw

Typical Operation:

Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	10200	14000	volts
DC Grid Voltage	-220	-300	volts
Peak AF Grid-to-Grid Voltage	850	1050	volts
Zero-Signal DC Plate Current	0.6	0.6	amp
Max.-Signal DC Plate Current	5.7	7.1	amp
Effective Load Resistance (Plate to plate)	3600	4000	ohms
Max.-Signal Driving Power (Approx.)[c]	110	150	watts
Max.-Signal Power Output (Approx.)	36	61	kw

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum-modulation factor of 1

Maximum CCS[a] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	12500 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	4 max.	amp
DC GRID CURRENT	1.5 max.	amp
PLATE INPUT	50 max.	kw
PLATE DISSIPATION	28 max.	kw

Typical Operation:

DC Plate Voltage	10200	12500	volts
DC Grid Voltage:[d]			
From a grid resistor of:			
2000 ohms	-1500	-	volts
2100 ohms	-	-1670	volts
Peak RF Grid Voltage	1960	2190	volts
DC Plate Current	3.1	3.5	amp
DC Grid Current (Approx.)[e]	0.75	0.79	amp
Driving Power (Approx.)[e]	1320	1570	watts
Power Output (Approx.)	27.5	38	kw

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy[f]

Maximum CCS[a] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	17000 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	9 max.	amp

DC GRID CURRENT	1.5 max.		amp
PLATE INPUT	150 max.		kw
PLATE DISSIPATION	40 max.		kw

Typical Operation:

DC Plate Voltage	14000	17000	volts
DC Grid Voltage:[g]			
From a grid resistor of:			
1800 ohms	-1500	-	volts
1780 ohms	-	-1600	volts
From a cathode resistor of:			
230 ohms	-1500	-	volts
180 ohms	-	-1600	volts
Peak RF Grid Voltage	2000	2200	volts
DC Plate Current	5.8	7.9	amp
DC Grid Current (Approx.)	0.83	0.9	amp
Driving Power (Approx.)	1500	1800	watts
Power Output (Approx.)	61	100	kw

[a] Continuous Commercial Service.

[b] Averaged over any audio-frequency cycle of sine-wave form.

[c] The driving stage should have good regulation and should be capable of supplying considerably more than the specified driving power.

[d] Obtained from a fixed supply, grid resistor, or a combination of both.

[e] Subject to wide variations as explained under TUBE RATINGS in General Section.

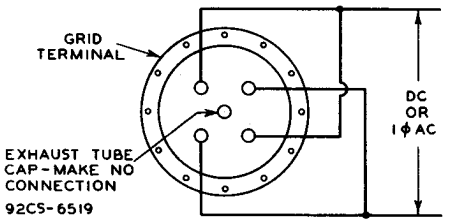
[f] Key-down conditions per tube without modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115 per cent of the carrier conditions.

[g] Obtained from a fixed supply, a cathode resistor, a grid resistor, or from a combination of a fixed supply and self-bias.

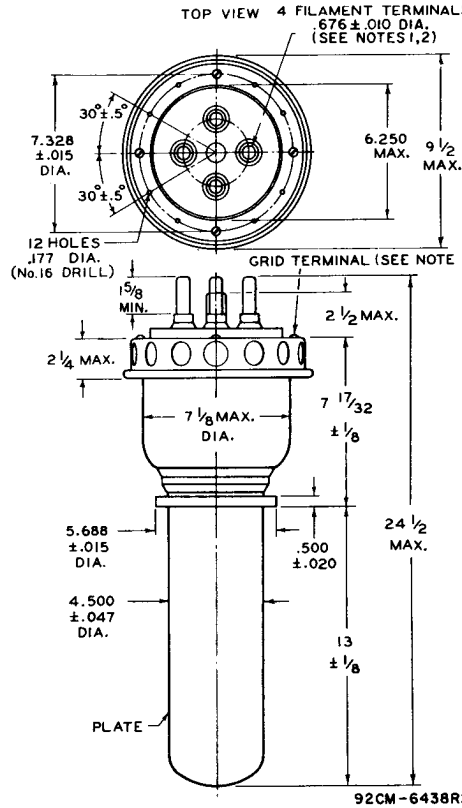
MAXIMUM RATINGS vs OPERATING FREQUENCY

OPERATING FREQUENCY Mc	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM-RATED PLATE VOLTAGE & PLATE INPUT	
	TELEPHONY	TELEGRAPHY
	Class C Plate-Modulated	Class C Unmodulated
15	100	100
20	88	82
25	81	70

FILAMENT CONNECTIONS



9C21



ALL DIMENSIONS IN INCHES

NOTE 1: FLEXIBLE CONNECTIONS ARE REQUIRED.

NOTE 2: FILAMENT-TERMINAL POSITIONS ARE HELD TO TOLERANCES SUCH THAT ENTIRE LENGTH OF TERMINALS WILL, WITHOUT UNDUE FORCE, PASS INTO AND DISENGAGE FROM FLAT-PLATE GAUGE HAVING A THICKNESS OF 1/8" AND FOUR HOLES WITH DIAMETERS OF 0.801" ± 0.001" ARRANGED AT ANGLES OF 90° ± 10' ON A CIRCLE HAVING DIAMETER OF 3.125" ± 0.001". GAUGE IS ALSO PROVIDED WITH A HOLE HAVING DIAMETER OF 1.250" ± 0.010" CONCENTRIC WITH THE FILAMENT-TERMINAL CIRCLE.