



9C22

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POWER TRIODE

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 should never exceed 750 amperes, even momentarily.

Cold Resistance 0.0042 ohm

Amplification Factor 41

Direct Interelectrode Capacitances (Approx.):

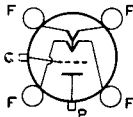
Grid to Plate 50 $\mu\mu\text{f}$

Grid to Filament 100 $\mu\mu\text{f}$

Plate to Filament 2.2 $\mu\mu\text{f}$

Mechanical:

Terminal Connections:



F - Filament
G - Grid-Flange
Terminal

P - Radiator-
Cooled Plate
Terminal

DIAMETRICALLY OPPOSITE TERMINALS
MUST BE CONNECTED TOGETHER

Mounting Position Vertical, Filament End Up

Maximum Overall Length 25"

Maximum Diameter 17"

Radiator Integral Part of Tube

Air Flow:

Through Radiator (For max. ratings) 1800 min. cfm

The specified air flow at a pressure of 2.2 inches of water should be delivered by a blower vertically upward through the radiator before and during the application of any voltages.

To Filament Seals 10 min. cfm

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

Input Air Temperature (To radiator) 45 max. °C

Radiator Temperature (Measured at core

upper end, away from incoming air) 180 max. °C

Seal Temperature (Filament, grid, plate) 165 max. °C

Fittings:

Filament Connectors RCA No. 217F1

Bracelet (For Boot) RCA No. 227F1

Plate Connector RCA No. 238F1

Air Jacket RCA No. 241F1

← Indicates a change.

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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*	60 max.	kw
PLATE DISSIPATION*	20 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.)#	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.	14 max.	kw

Typical Operation:

DC Plate Voltage	10200	12500	volts
DC Grid Voltage [⊕]	-1500	-1670	volts
From a grid resistor of	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
Tube Driving Power (Approx.) [□]	1320	1570	watts
Power Output (Approx.)	27.5	38	kw

* 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 of value shown or by partial self-bias methods.

•, □, See next page.



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POWER TRIODE

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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	8 max.	amp
DC GRID CURRENT	1.5 max.	amp
PLATE INPUT	100 max.	kw
PLATE DISSIPATION	20 max.	kw

Typical Operation:

DC Plate Voltage	14000	17000	volts
DC Grid Voltage [▲]	-1500	-1600	volts
From a grid resistor of	1800	2000	ohms
From a cathode resistor of	230	275	ohms
Peak RF Grid Voltage	2000	2050	volts
DC Plate Current	5.8	5	amp
DC Grid Current (Approx.) [□]	0.83	0.8	amp
Tube Driving Power (Approx.) [□]	1500	1450	watts
Power Output (Approx.)	61	65	kw

* Continuous Commercial Service.

□ For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—Grid Current and Driving Power 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, from grid resistor, or by partial self-bias methods.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	400	430	amp
Amplification Factor	1,2	37	45	
Grid-Plate Capacitance	-	44	56	μf
Grid-Filament Capacitance	-	82	118	μf
Plate-Filament Capacitance	-	1.7	2.7	μf
Plate Voltage	1,3	4600	5600	volts
Plate Voltage	1,4	8300	10100	volts
Grid Voltage	1,5	-295	-465	volts
Peak Cathode Current	1,6	40	-	amp
Useful Power Output	1,7	50000	-	watts

Note 1: With 19.5 volts ac on filament.

Note 2: With dc grid voltage of -50 volts and dc plate voltage adjusted to give dc plate current of 2 amp.

Note 3: With dc grid voltage of 0 volts, and dc plate voltage adjusted to give dc plate current of 2 amp.

← Indicates a change.

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POWER TRIODE

Note 4: With dc grid voltage of -100 volts, and dc plate voltage adjusted to give dc plate current of 2 amp.

Note 5: With dc plate voltage of 15000 volts, and dc grid voltage adjusted to give dc plate current of 50 ma.

Note 6: Represents the maximum useable cathode current (plate current and grid current) for the tube under any condition of operation.

Note 7: With dc plate voltage of 13000 volts, dc plate current of 6 amp; dc grid current of 0.6 to 0.8 amp., grid resistor of $2000 \pm 10\%$ ohms, and frequency of 25 megacycles/second.

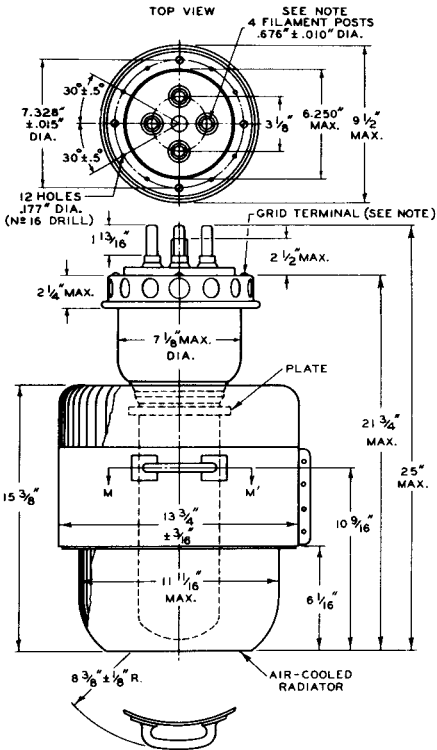
Data on operating frequencies for the 9C22 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

CURVES
for the 9C22 are the same
as those for Type 9C21



9C22

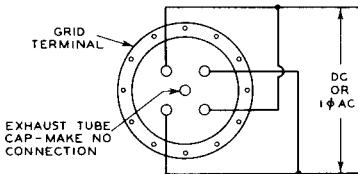
9C22 POWER TRIODE



NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

92CM-6447R2

FILAMENT CONNECTIONS



92CS-6519

Power Triode

FORCED-AIR COOLED

GENERAL DATA

Electrical:

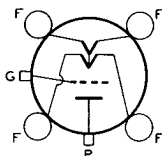
Filament, Multistrand Tungsten:

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	41	
Direct Interelectrode Capacitances (Approx.):		
Grid to plate	50	pf
Grid to filament	100	pf
Plate to filament	2.2	pf

Mechanical:

Operating Position	Vertical, filament end up
Maximum Overall Length	25"
Maximum Diameter	17"
Weight (Approx.)	130 lbs ←
Radiator	Integral part of tube
Terminal Diagram (See <i>Dimensional Outline</i>):	

F - Filament
G - Grid



P - Plate

DIAMETRICALLY OPPOSITE TERMINALS
MUST BE CONNECTED TOGETHER

Thermal:

Air Flow:

Through radiator (For maximum ratings)	1800 min.	cfm
The specified air flow at a pressure of 2.2 inches of water should be delivered by a blower vertically upward through the radiator before and during the application of any voltages.		
To filament seals	10 min.	cfm
The specified air flow directed by a nozzle of 1-1/4" diameter downward into the filament header is required before and during the application of any voltages in order to limit the temperature of the filament seals to the maximum value.		
Input Air Temperature (To radiator)	45 max.	°C
Radiator Temperature (Measured at core upper end, away from incoming air)	180 max.	°C
Seal Temperature (Filament, grid, plate)	165 max.	°C

← Indicates a change.



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	60 max.	kw
PLATE DISSIPATION ^b	20 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.	14 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
Tube 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	8 max.	amp
DC GRID CURRENT.	1.5 max.	amp
PLATE INPUT.	100 max.	kw
PLATE DISSIPATION.	20 max.	kw



Typical Operation:

DC Plate Voltage	14000	17000	volts
DC Grid Voltage: ^g			
From a grid resistor of:			
1800 ohms	-1500	-	volts
2000 ohms	-	-1600	volts
From a cathode resistor of:			
230 ohms	-1500	-	volts
275 ohms	-	-1600	volts
Peak RF Grid Voltage	2000	2050	volts
DC Plate Current	5.8	5	amp
DC Grid Current (Approx.) ^e	0.83	0.8	amp
Tube Driving Power (Approx.) ^e	1500	1450	watts
Power Output (Approx.)	61	65	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 considerable more than the specified driving power.
- d obtained from a fixed supply, grid resistor, or a combination of both.
- e For effect of load resistance on grid current and driving power, refer to TUBE RATINGS--Grid Current and Driving Power 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.

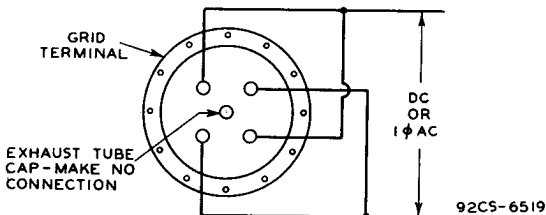
MAXIMUM RATINGS vs OPERATING FREQUENCY

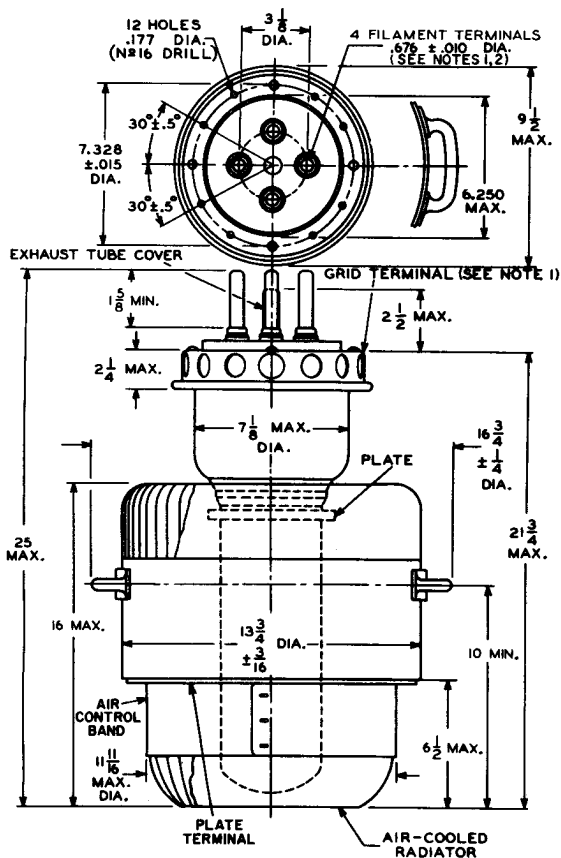
OPERATING FREQUENCY Mc	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM-RATED PLATE VOLTAGE & PLATE INPUT	
	TELEPHONY	TELEGRAPHY
	Class C Plate-Modulated	Class C Unmodulated
5	100	100
12	90	84
25	81	70

CURVES

Shown under Type 9C21 also apply to the 9C22

FILAMENT CONNECTIONS





92CM-6447R4

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.