8890

Linear Beam Power Tube

CERMOLOX® **Full Input to 400 MHz**

7000 W Peak Sync. Output through VHF-TV Band with 16 dB Gain

ELECTRICAL

Filamentary Cathode:

Type	Thoriated-Tungsten Mesh	
Voltage[a] (ac or dc)	5.7 typ.	V
	6.0 max.	V
Current:		
Typical value at 5.7 volts	125	A
Maximum value for starting even momentarily	300	A
Cold Resistance	0.005	Ω
Minimum heating time	15	s
Mu-Factor[b]		
(Grid No.2 to Grid No.1)	20	
Direct Interelectrode Capacitances:		
Grid No.1 to plate[c]	0.40 max.	pF
Grid No.1 to filament	70	pF
Plate to filament[c,d]	0.05 max.	pF
Grid No.1 to grid No.2	95	pF
Grid No.2 to plate	12	pF
Grid No.2 to filament[d]	2.5 max.	pF

MECHANICAL

Operating Position	Vertical, either end up
Overall Length	(127.3 mm) 5.01 max. in
Greatest Diameter	(116.1 mm) 4.57 max. in
Terminal Connections	See Dimensional Outline
Sockets	See footnote **p**
Radiator	Integral part of tube
Weight (Approx.)	(2.7 kg) 6.0 lb

THERMAL

Seal Temperature[e] (Plate, grid No.2, grid No.1, filament-cathode and filament)	250 max. °C
Plate-Core Temperature[e]	250 max. °C

8890

RF Power Amplifier or Oscillator — Class C Telegraphy or Class C FM Telephony[f]

MAXIMUM CCS RATINGS, Absolute-Maximum Values

	Up to 400 MHz	
DC Plate Voltage	8000 max.	V
DC Grid-No.2 Voltage[g]	1650 max.	V
DC Grid-No.1 Voltage[h]	-450 max.	V
DC Plate Current	4.0 max.	A
DC Grid-No.1 Current	500 max.	mA
Grid-No.1 Input[h]	150 max.	W
Grid-No.2 Input[g]	250 max.	W
Plate Dissipation	5000 max.	W

MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance Under Any Conditions:		
With fixed bias	5000 max.	Ω
With cathode bias	Not recommended	
Grid-No.2 Circuit Impedance	See note g	
Plate Circuit Impedance	See note j	

CALCULATED CCS OPERATION

In a grid-drive circuit at 108 MHz		
DC Plate Voltage	6500	V
DC Grid-No.2 Voltage	1000	V
DC Grid-No.1 Voltage	-50	V
DC Plate Current	2.35	A
DC Grid-No.2 Current	85	mA
DC Grid-No.1 Current	143	mA
Driver Power Output	60	W
Output Circuit Efficiency	95	%
Useful Power Output	10,000	W
In a cathode-drive circuit at 216 MHz		
DC Plate Voltage	6300	V
DC Grid-No.2 Voltage	1000	V
DC Grid-No.1 Voltage	-34	V
DC Plate Current	1.31	A
DC Grid-No.2 Current	40	mA

DC Grid-No.1 Current	40	mA
Driver Power Output (Approx.)	50	W
Output Circuit Efficiency	95	%
Useful Power Output	4500	W

RF Power Amplifier — Class B Television Service[f]

Synchronizing-level conditions per tube unless otherwise specified

MAXIMUM CCS RATINGS, Absolute-Maximum Values

DC Plate Voltage[j]	8000 max.	V
DC Grid-No.2 Voltage[g]	1650 max.	V
DC Grid-No.1 Voltage[h]	-450 max.	V
DC Plate Current	5 max.	A
Plate Dissipation	5000 max.	W
Grid-No.2 Input	250 max.	W
Grid-No.1 Input	150 max.	W

CALCULATED CCS OPERATION

In a cathode-drive circuit at 216 MHz and a bandwidth of 6.3 MHz[m]

DC Plate Voltage	5030	V
DC Grid-No.2 Voltage	1000	V
DC Grid-No.1 Voltage[n]	-30	V
DC Plate Current		
Synchronizing level	2.35	A
Blanking level	1.80	A
DC Grid-No.2 Current		
Synchronizing level	47	mA
Blanking level	27	mA
DC Grid-No.1 Current		
Synchronizing level	135	mA
Blanking level	81	mA
Input Circuit Efficiency	95	%
Driver Power Output		
Synchronizing level	145	W
Blanking level	80	W
Plate Dissipation		
Blanking level	5000	W

Output Circuit Efficiency	95	%
Useful Power Output		
Synchronizing level	7000	W
Blanking level	3940	W

a Measured at tube terminals. The filament may be subjected to rf heating as the frequency of operation is increased. It is recommended that the filament voltage be operated at the lowest voltage that will give stable performance.

b For plate voltage = 2000 V, Grid No.2 voltage = 1375 V, Peak plate current = 6.0 A.

c With external flat metal shield 8" (200 mm) in diameter having a center hole 3" (76 mm) in diameter. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid No.2.

d With external flat metal shield 8" (200 mm) in diameter having a center hole 2-3/8" (60 mm) in diameter. Shield is located in plane of the grid-No.1 terminal, perpendicular to the tube axis, and is connected to grid No.1.

e See Dimensional Outline for temperature measurement points.

m Calculated at the -1.0 dB power point of a double-tuned output circuit using two times tube output capacity.

n Adjusted for I_{bo} = 650 mA.

p Fully engineered sockets for the 8890 tube type are available in limited quantities from RCA (Type J15283), are in production quantities from Jettron Products Inc., 56 Route 10, Hanover, NJ 07936 (Type CD89 085). For effective cooling, it is recommended that the RCA "Heat Pipe" Dev. No.J15304 be used in conjunction with these sockets.

The following footnotes apply to the RCA Transmitting Tube Operating Considerations given at the front of this section.

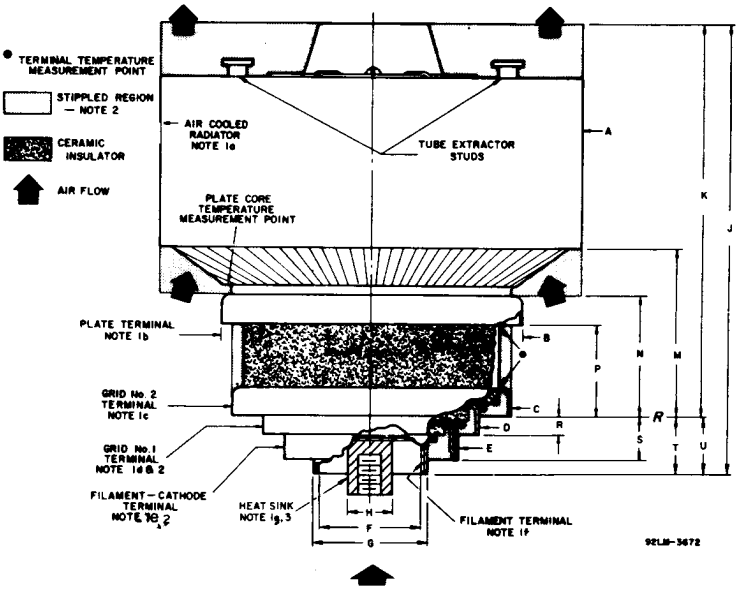
f See Classes of Service.

g See Electrical Considerations - Grid-No.2 Voltage Supply.

h See Electrical Considerations - Grid-No.1 Voltage Supply.

j See Electrical Considerations - Power Supplies and Plate Voltage Supply.

DIMENSIONAL OUTLINE



DIMENSIONAL OUTLINE

Tabulated Dimensions*

Dimension	Value	
A Dia.	4.570 max.	(116.1 max.)
B Dia.	3.235 min.	(82.17 min.)
C Dia.	3.014 min.	(76.56 min.)
D Dia.	2.307 min.	(58.60 min.)
E Dia.	1.840 min.	(46.74 min.)
F Dia.	1.210 max.	(30.73 max.)
G Dia.	1.314 min.	(33.38 min.)
H Dia.	0.620 max.	(15.75 max.)
J	4.930 ± .080	(125.2 ± 2.0)
K	4.300 ± .050	(109.2 ± 1.2)
M	1.790 ± .040	(45.47 ± 1.01)
N	1.330 ± .030	(33.78 ± .76)
P	1.005 ± .020	(25.53 ± .51)
R	0.200 ± .025	(5.08 ± .63)
S	0.475 ± .030	(12.06 ± .76)
T	0.650 ± .030	(16.51 ± .76)
U	0.800 ref.	(20.3 ref)

Note 1 – The contact distance* listed is the uniform indicated length as measured from the edge of the terminal.

		Contact Distance*
1.a	Radiator	1.930 (49.02) min.
1.b	Plate Terminal	0.210 (5.33) min.
1.c	Grid No.2 Terminal	0.200 (5.08) min.
1.d	Grid No.1 Terminal	0.175 (4.45) min.
1.e	Cathode-Filament Terminal	0.220 (5.59) min.
1.f	Filament Terminal ID	0.250 (6.35) max.
1.g	Heat Sink Terminal	0.375 (9.52) max.

Note 2 – Keep all stippled regions clear. In general, do not allow contacts to protrude into these annular regions. If special connectors are required which may intrude on these regions contact RCA Power Tube Application Engineering, Lancaster, PA.

Note 3 – Tapped 1/4-20 NC x 0.5 inch (12.7 mm) deep.

FORCED-AIR COOLING

AIR FLOW

Through radiator – Adequate air flow to limit the plate-core temperature to 250° C should be delivered by a blower through the radiator before and during the application of filament, plate, grid-No.2, and grid No.1 voltages.

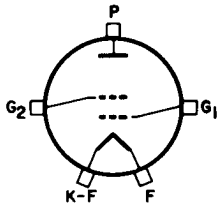
For a plate dissipation of 5000 watts and an incoming air temperature of 50° C, and air flow of 105 cfm is required in accordance with the Typical Cooling Characteristics.

To Plate, Grid-No.2, Grid-No.1, Filament-Cathode, and Filament Terminals – A sufficient quantity of air should be allowed to flow past each of these terminals so that their temperature does not exceed the specified maximum value of 250° C. In normal operation this value is approximately 40 cfm (18.8×10^3 cc/s).

During Standby Operation – Cooling air is required when filament voltage is applied to the tube.

During Shutdown Operation – Air flow should continue for a few minutes after all electrode power is removed.

TERMINAL DIAGRAM



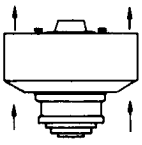
P – Plate Terminal
G_1 – Grid No.1 Terminal
G_2 – Grid No.2 Terminal
K-F – Cathode-Filament Terminal
F – Filament Terminal

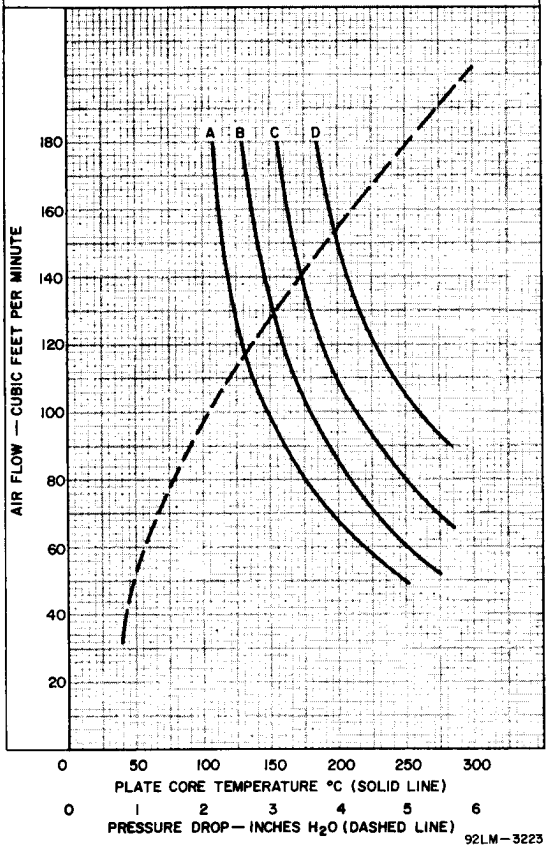
TYPICAL COOLING CHARACTERISTICS

INCOMING AIR TEMPERATURE 50° C

CURVE	PLATE DISSIPATION WATTS
A	2000
B	3000
C	4000
D	5000

DIRECTION OF AIR FLOW





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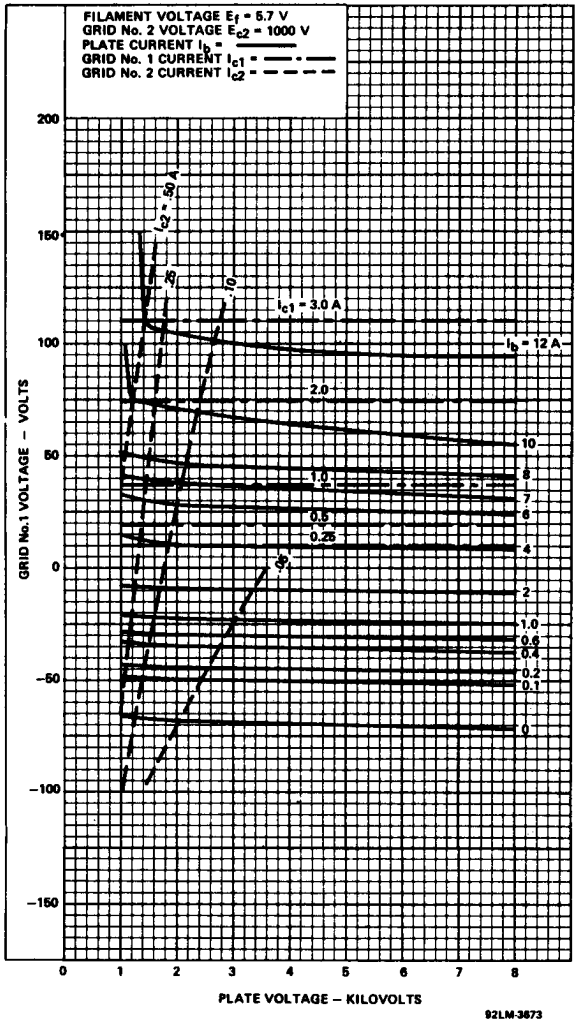
TYPICAL CONSTANT CURRENT CHARACTERISTICS



TYPICAL CONSTANT CURRENT CHARACTERISTICS