AMPEREX TUBE TYPE 5924A

The 5924A is a forced air-cooled three electrode tube designed for use as a power amplifier in TV and FM transmitters. The filament is thoriated tungsten. Maximum ratings apply up to 75 megacycles. At reduced ratings it may be operated up to 220 megacycles. All external surfaces are silver plated and the anode cooler shell is brazed to the cooler fins.

GENERAL CHARACTERISTICS

ELECTRICAL

	Min.	Bogey	Max.
Filament Voltage	12.0	12.6	13.2 volts
Filament Current at Bogey Voltage	30	33	36 amperes
Amplification Factor (Ib=1 amp, Eb=4000 volts)	26	32	38
Peak Cathode Current[1]	—	—	10 amperes
Direct Interelectrode Capacitances			
Grid to Plate	9.5	11	12.5 μμf
Grid to Filament	13	16	19 μμf
Plate to Filament	0.2	0.3	0.4 μμf

MECHANICAL

Mounting position: vertical with plate up or down
Max. Temperature of Seals . . . . . 180°C
Cooling — forced air

COOLING CHARACTERISTICS (see curves)

Plate Dissipation (kilowatts)	Altitude (feet)	Inlet Air Temperature (°C)	Min. Air Flow (cu. ft./minute)	Inlet Air Pressure (inches water)
1	0	35	106	0.32
	0	45	109	0.32
	5000	35	131	0.35
	10000	25	145	0.39
3	0	35	183	0.90
	0	45	215	1.14
	5000	35	219	1.03
	10000	25	233	1.03
5	0	35	325	2.68
	0	45	378	3.55
	5000	35	396	3.19
	10000	25	410	3.10

ACCESSORIES

Filament Connector . . . . . Amperex #S-3707
Grid Connector . . . . . Amperex #S-3706
Air Flow Chamber . . . . . Amperex #S-3705

Net Weight (approx.) . . . . . 10 pounds

[1] Represents maximum usable cathode current for any condition of operation.

5924A

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

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

Key-down conditions per tube without amplitude modulation.

Maximum Ratings, Absolute Values (per Tube)

	CCS
D.C. Plate Voltage	6000 volts max.
D.C. Grid Voltage	−1000 volts max.
D.C. Plate Current	1.5 amps max.
D.C. Grid Current	0.35 amp max.
Plate Input	9000 watts max.
Plate Dissipation	6000 watts max.

Typical Operation; Grounded-Filament Circuit

	CCS	CCS	CCS	
Frequency	75	75	75	megacycles
D.C. Plate Voltage	6	5	4	kilovolts
D.C. Grid Voltage	−400	−300	−200	volts
Peak R.F. Grid Voltage	740	640	500	volts
D.C. Plate Current	1.5	1.5	1.37	amps
D.C. Grid Current approximate	0.31	0.33	0.35	amps
Driving Power	210	190	160	watts
Power Output, approximate	6.9	5.6	4.0	kilowatts

Typical Operation, Grounded-Grid Circuit, Two Tubes

	CCS	CCS	CCS	CCS	
Frequency [1]	75	110	110	220	megacycles
D.C. Plate Voltage	6	5	4	4	kilovolts
D.C. Grid Voltage	400	-00	200	200	volts
Peak R.F. Grid Voltage	740	640	500	450	volts
D.C. Plate Current	3	3	2.75	2.5	amps
D.C. Grid Current approximate	0.62	0.66	0.70	0.40	amp
Driving Power	2240	1840	1350	760	watts
Power Output approximate [2]	15.6	12.1	8.6	5.6	kilowatts

Max. Ratings (per Tube)	Up to 75 Mc	Up to 110 Mc	Up to 220 Mc [1]	
D.C. Plate Voltage	6000	5000	4000	volts
D.C. Plate Current	1.5	1.5	1.5	amps
Plate Input	9000	7500	5000	watts

R.F. Power Amplifier - Class B

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

Maximum Ratings, Absolute Values (per Tube)

	CCS
D.C. Plate Voltage	6000 volts max.
D.C. Plate Current	1.1 amps max.
Plate Input	6600 watts max.
Plate Dissipation	6000 watts max.

Typical Operation

	CCS	CCS	
D.C. Plate Voltage	6	5	kilovolts
D.C. Grid Voltage	−180	−145	volts
Peak R.F. Grid Voltage	250	225	volts
D.C. Plate Current	0.99	0.9	amp
Driving Power, approximate [3]	140	130	watts
Power Output, approximate	1.9	1.45	kilowatts

Max. Ratings (per Tube)	Up to 75 Mc	Up to 110 Mc	Up to 220 Mc [1]	
D.C. Plate Voltage	6000	5000	4000	volts
D.C. Plate Current	1.1	1.1	0.9	amps
Plate Input	6600	5500	3600	watts

Grid-Modulated R.F. Power Amplifier Class C Television Service

Negative Modulation, Positive Synchronization

Maximum Ratings, Absolute Values (per Tube)

	CCS	
D.C. Plate Voltage	6000	volts
D.C. Grid No. 1 Voltage White Level	1000	volts
Plate current (sync.)	1.9	amps
Plate Input (sync.)	11.4	kilowatts
Plate Dissipation	6	kilowatts
Grid Dissipation	120	watts

Typical Operation in Television Service at 75 Mc and Bandwidth of 5.25 Mc at 85% Antenna Current and 8 Mc at 70% Antenna Current (Two Tubes, Push-Pull)

D.C. Plate Voltage	6000 volts
D.C. Grid No. 1 Voltage	
Synchronizing Level	−200 volts
Pedestal Level	−300 volts
White Level	−550 volts
R.F. Grid No. 1 Voltage Peak to Peak Synchronization Level	1000 volts
D.C. Plate Current	
Synchronization Level	3.8 amps
Pedestal Level	2.6 amps
D.C. Grid Current, approximate	
Synchronization Level	0.5 amp
Pedestal Level	0.35 amp
Driving Power at Synchronization Level, approximate	250 watts
Power Output, approximate	
Synchronization Level	9 kilowatts
Pedestal Level	5.35 kilowatts

Max. Ratings (per Tube)	Up to 75 Mc	Up to 110 Mc	Up to 220 Mc [1]	
D.C. Plate Voltage	6000	6000	4500	volts
Plate Current (sync.)	1.9	1.9	1.9	amps
Plate Input (sync.)	11.4	9.5	8.5	kw

[1] When using the tube above 110 megacycles, particular attention must be given to a careful design of installation, otherwise the tube may be damaged. Therefore, guarantee for tubes operating above 110 Mc can only be given after approval of the prototype circuit by Amperex.

[2] Power transferred from driving stage included.

[3] At crest of audio-frequency cycle with modulation factor of 1.0

R.F. Amplifier - Class B Television Service

Negative Modulation and Positive Synchronization

Maximum Ratings, Absolute Values (per Tube)

	CCS
D.C. Plate Voltage	6000 volts max.
D.C. Grid Voltage	−1000 volts max.
D.C. Plate Current (sync.)	1.9 amps max.
Plate Input (sync.)	11,400 watts max.
Plate Dissipation (sync.)	6000 watts max.
Grid Dissipation (sync.)	120 watts max.

pical Operation in Television Service at 75 Mc and ndwidth of 5.25 Mc at 85% Antenna Current and 8 Mc at 70% Antenna Current (Two tubes, Push-Pull)

C. Voltage	5000 volts
C. Grid Voltage	−200 volts
.F. Grid Voltage Peak to Peak	
Synchronization Level	1000 volts
Pedestal Level	800 volts
White Level	0 volt
D.C. Plate Current	
Synchronization Level	3.8 amps
Pedestal Level	3 amps
White Level	0.2 amp
D.C. Grid Current	
Synchronization Level	0.5 amp
Pedestal Level	0.22 amp
White Level	0 amp
Driving Power at Synchronization Level, approximate	250 watts
Power Output, approximate	
Synchronization Level	9 kilowatts
Pedestal Level	5.35 kilowatts

Max. Ratings (per Tube)	Up to 75 Mc	Up to 220 Mc
D.C. Plate Voltage	6000	5000 volts
D.C. Plate Current (sync.)	1.9	1.9 amps
Plate Input (sync.)	11.4	9.5 kilowatts

Typical Operation in Television Service at 216 Mc.

One tube in a coaxial cavity

(Bandwidth obtained by critical coupling to identical dummy cavity)

D.C. Plate Voltage	4000	5000* volts
D.C. Grid Voltage	−125	−140 volts
Peak R.F. Grid Voltage		
Synchronization Level	405	495 volts
Black Level	305	360 volts
White Level	0	0 volts
C. Plate Current		
ynchronization Level	1.59	1.90 amps
Black Level	1.3	1.53 amps
White Level	0.4	0.4 amps
D.C. Grid Current (approx.)		
Synchronization Level	0.35	0.35 amps
Black Level	0.125	0.125 amps
White Level	0	0 amps
Power Output (approx.)		
Synchronization Level	5.0	6.25 kilowatts
Black Level	3.0	3.53 kilowatts
Power Input		
Synchronization Level	7.15	9.50 kilowatts
Black Level	5.85	7.65

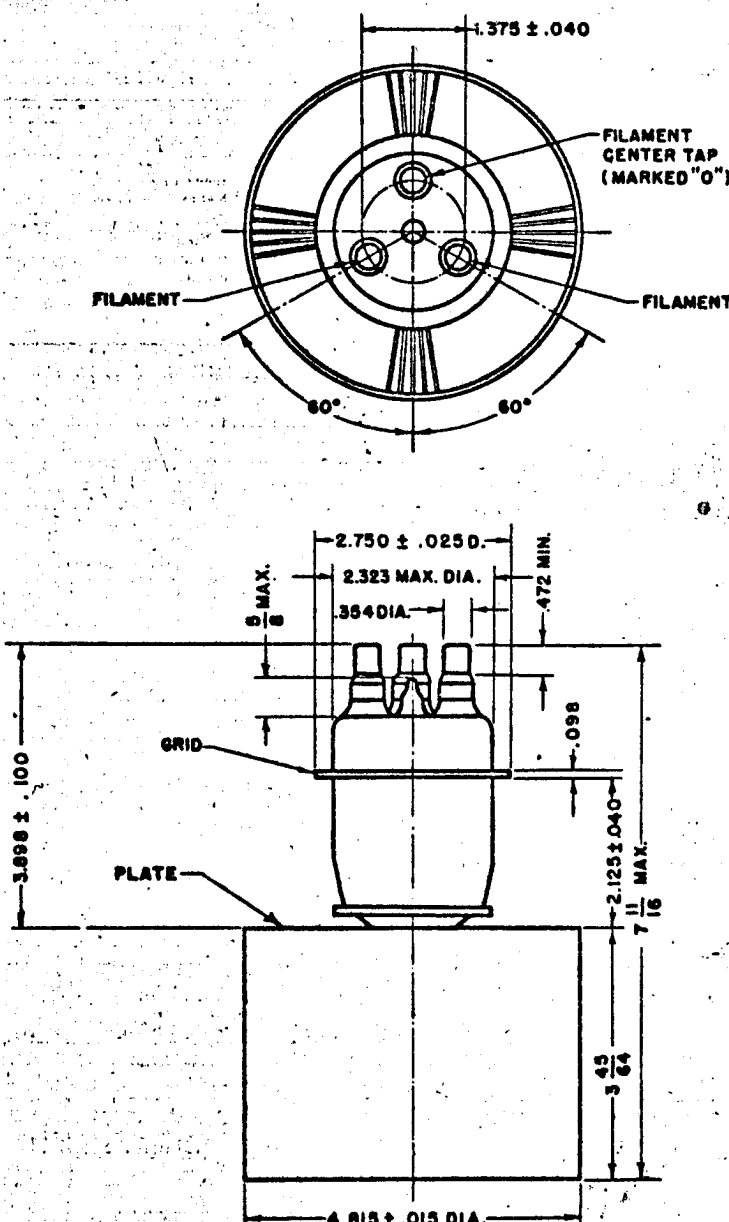
Electrical Data and Limits

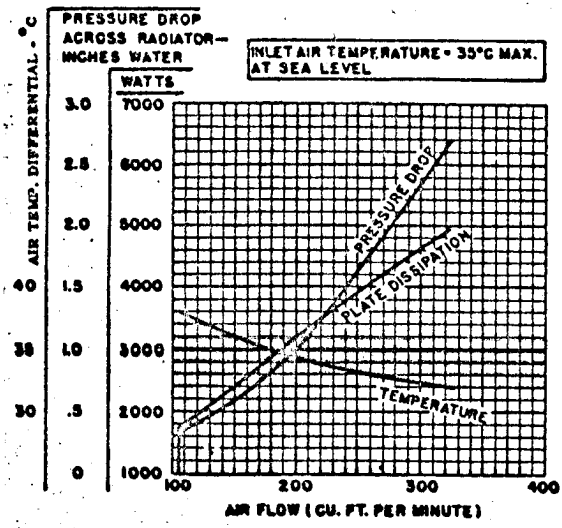
Characteristics	Description		Limits Min.	Bogey	Max.
Grid Voltage [4]	Eb = 1000 volts Ib = 6 amps	Ec:	—	——	420 volts
Grid Current [4]	Eb = 1000 volts Ib = 6 amps	Ic:	—	——	2.8 amps
Plate Current	Eb = 6000 volts Ec = −188 volts	Ib:	—	——	130 milliamps
Grid Current	Eb = 6000 volts Ib = 0.85 amp	Ic:	—	——	40 microamps
Grid Voltage	Eb = 6000 volts Ib = 0.85 amp	Ec:	67	94	121 volts
Power Output	Eb = 6000 volts Ib = 1.5 amps Ec = −400 volts Ic = 0.31 amp f = 75 mc	Po:	6	——	—— kilowatts

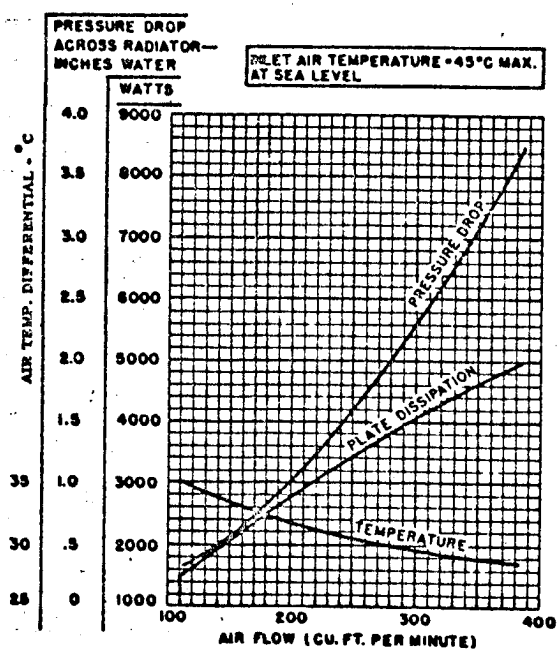
[4] This data is given only for design purposes, not for measurements.

* NOTE: Maximum TV ratings up to 220 Mc are for 25 KW peak power output with 4 tubes operating in approved cavity construction.

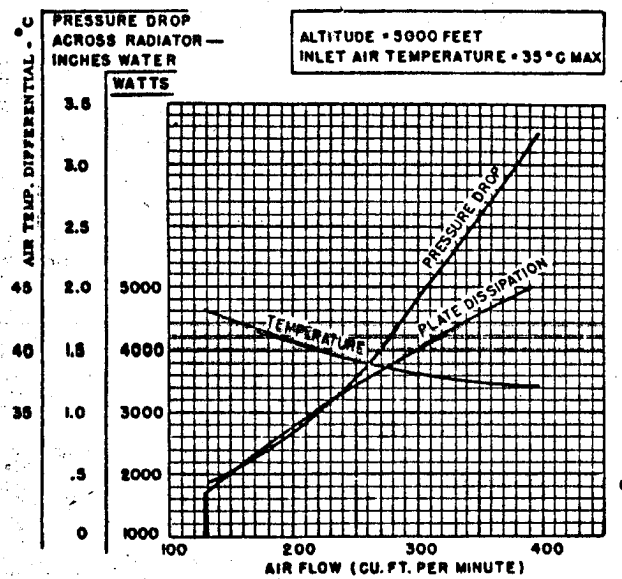
5924A

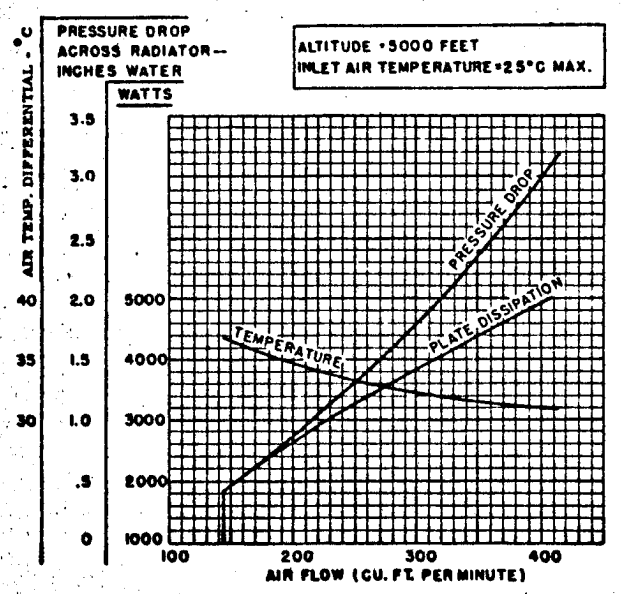

1.375 ± .040
FILAMENT CENTER TAP (MARKED "0")
FILAMENT
FILAMENT
60°
60°
2.750 ± .025 D.
2.323 MAX. DIA.
.354 DIA.
.472 MIN.
9/16 MAX.
.098
GRID
PLATE
3.898 ± .100
2.125 ± .040
7 11/16 MAX.
3 43/64
4.815 ± .015 DIA.


PRESSURE DROP ACROSS RADIATOR— INCHES WATER
WATTS
INLET AIR TEMPERATURE - 35°C MAX. AT SEA LEVEL
AIR TEMP. DIFFERENTIAL - °C
3.0
2.5
2.0
1.5
1.0
.5
0
7000
6000
5000
4000
3000
2000
1000
40
35
30
PRESSURE DROP
PLATE DISSIPATION
TEMPERATURE
100
200
300
400
AIR FLOW (CU. FT. PER MINUTE)


PRESSURE DROP ACROSS RADIATOR— INCHES WATER
WATTS
INLET AIR TEMPERATURE - 45°C MAX. AT SEA LEVEL
AIR TEMP. DIFFERENTIAL - °C
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
9000
8000
7000
6000
5000
4000
3000
2000
1000
35
30
25
PRESSURE DROP
PLATE DISSIPATION
TEMPERATURE
100
200
300
400
AIR FLOW (CU. FT. PER MINUTE)

5924A


PRESSURE DROP ACROSS RADIATOR — INCHES WATER
WATTS
AIR TEMP. DIFFERENTIAL - °C
ALTITUDE - 5000 FEET
INLET AIR TEMPERATURE - 35°C MAX
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
5000
4000
3000
2000
1000
45
40
35
100
200
300
400
PRESSURE DROP
PLATE DISSIPATION
TEMPERATURE
AIR FLOW (CU. FT. PER MINUTE)


PRESSURE DROP ACROSS RADIATOR — INCHES WATER
WATTS
AIR TEMP. DIFFERENTIAL - °C
ALTITUDE - 5000 FEET
INLET AIR TEMPERATURE - 25°C MAX.
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
5000
4000
3000
2000
1000
40
35
30
100
200
300
400
PRESSURE DROP
PLATE DISSIPATION
TEMPERATURE
AIR FLOW (CU. FT. PER MINUTE)

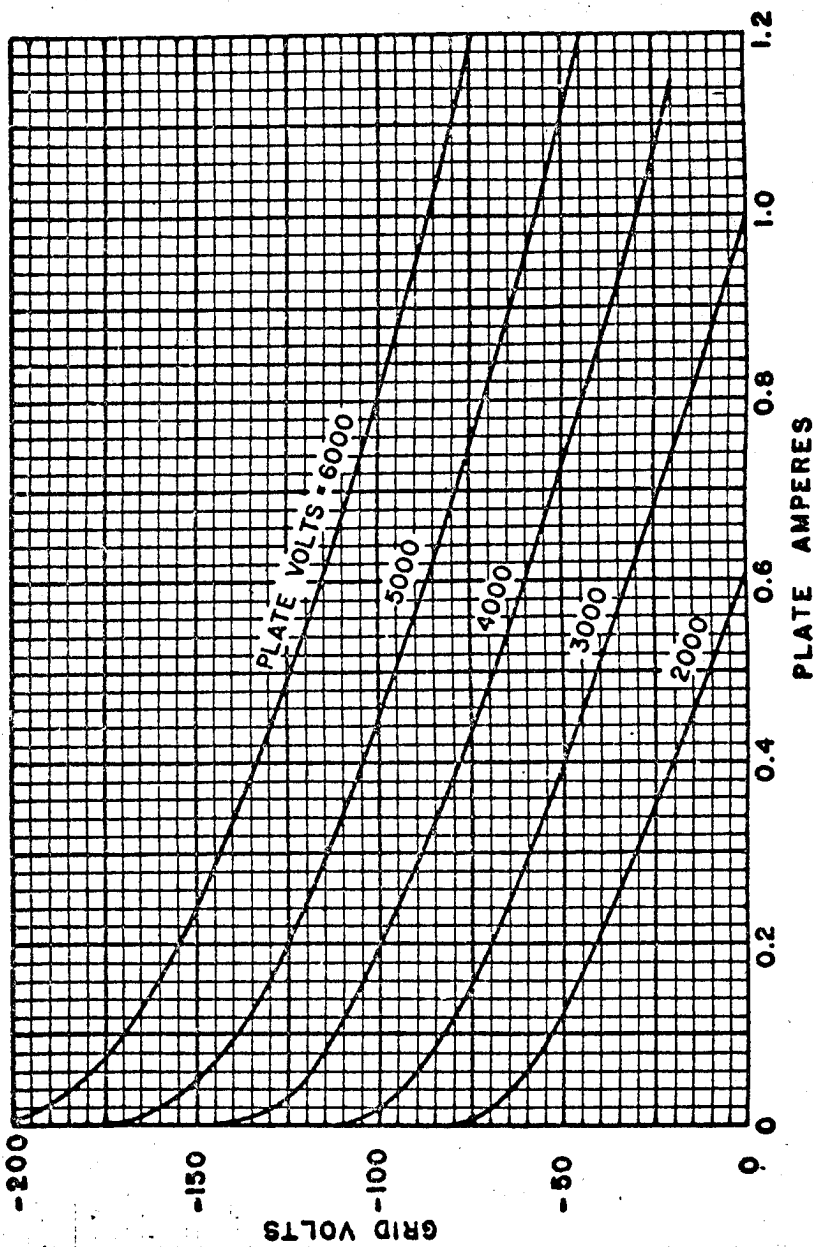
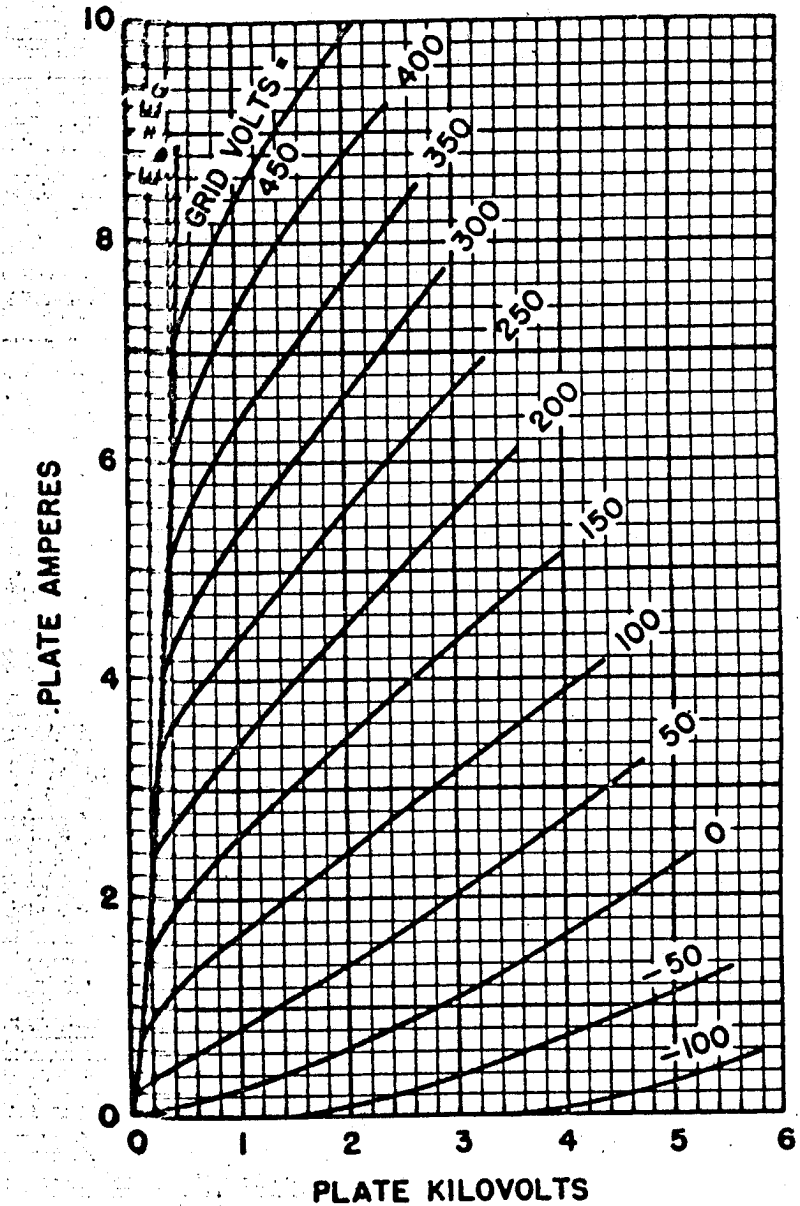
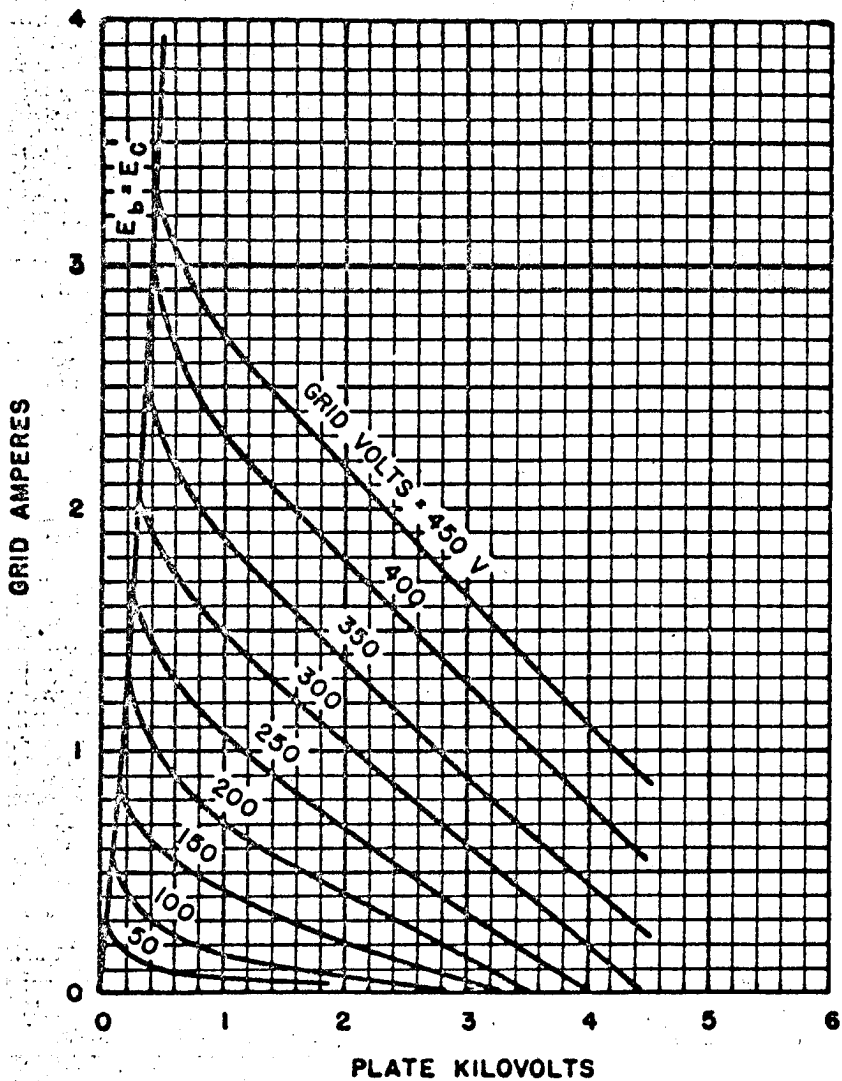


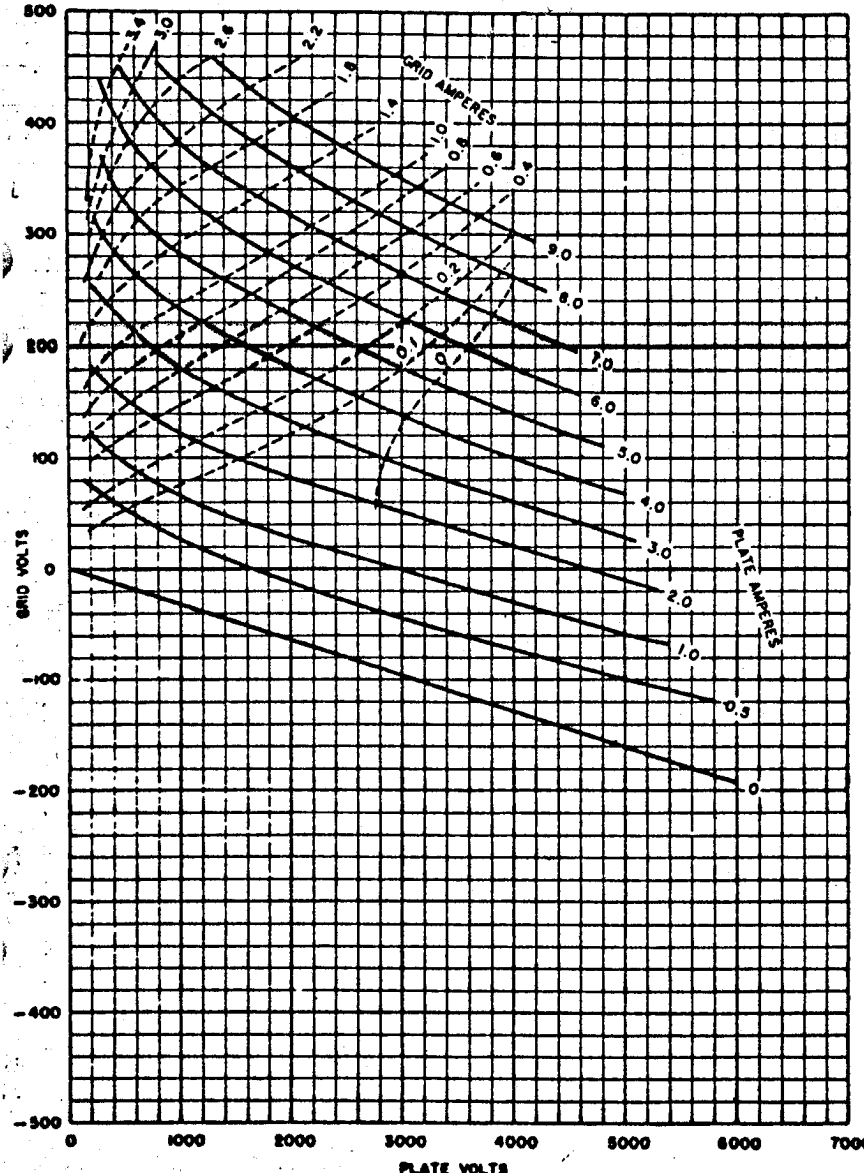
PLATE VOLTS
6000
5000
4000
3000
2000
-200
-150
-100
-50
0
GRID VOLTS
0
0.2
0.4
0.6
0.8
1.0
1.2
PLATE AMPERES

5924A

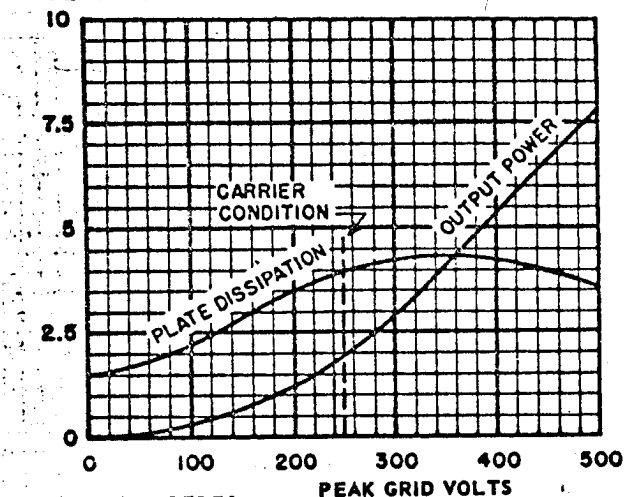

GRID VOLTS
NEG.
400
350
300
250
200
150
100
50
0
-50
-100
PLATE AMPERES
PLATE KILOVOLTS
0
1
2
3
4
5
6
8
10

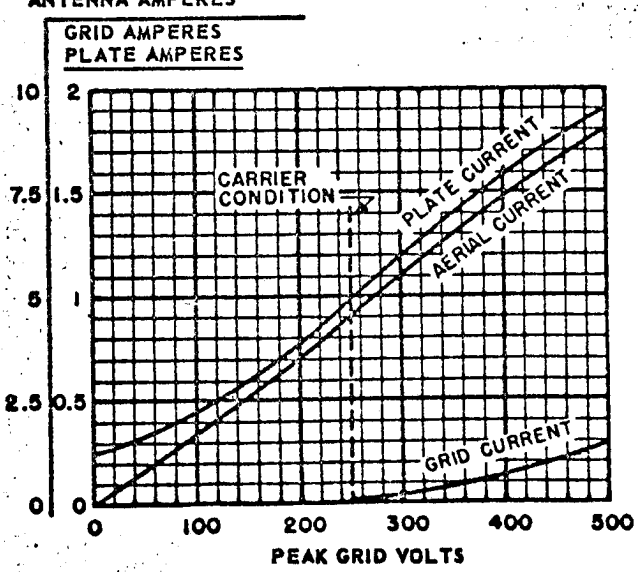

GRID AMPERES
PLATE KILOVOLTS
0
1
2
3
4
5
6
$E_b = E_c$
GRID VOLTS = 450 V
400
350
300
250
200
150
100
50

5924A


GRID AMPERES
PLATE AMPERES
GRID VOLTS
PLATE VOLTS
500
400
300
200
100
0
-100
-200
-300
-400
-500
0
1000
2000
3000
4000
5000
6000
7000
3.4
3.0
2.6
2.2
1.8
1.4
1.0
0.8
0.6
0.4
0.2
0.1
0.1
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.3
0

CLASS B TELEPHONY
FREQUENCY = 75 MEGACYCLES
PLATE VOLTAGE = 6000 VOLTS
GRID VOLTAGE = −180 VOLTS





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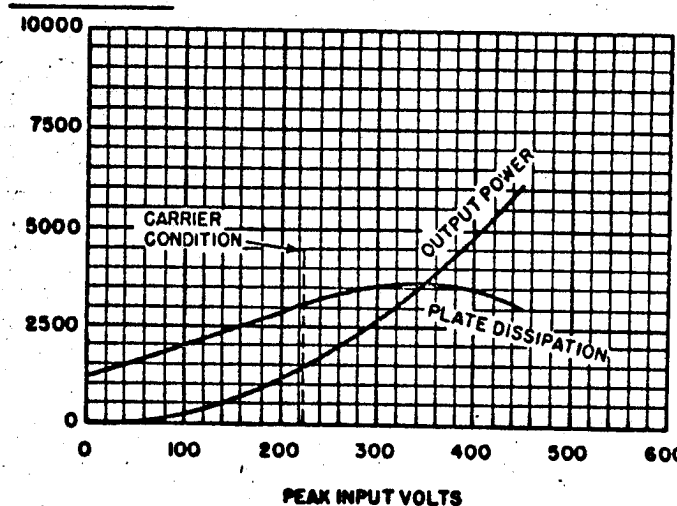
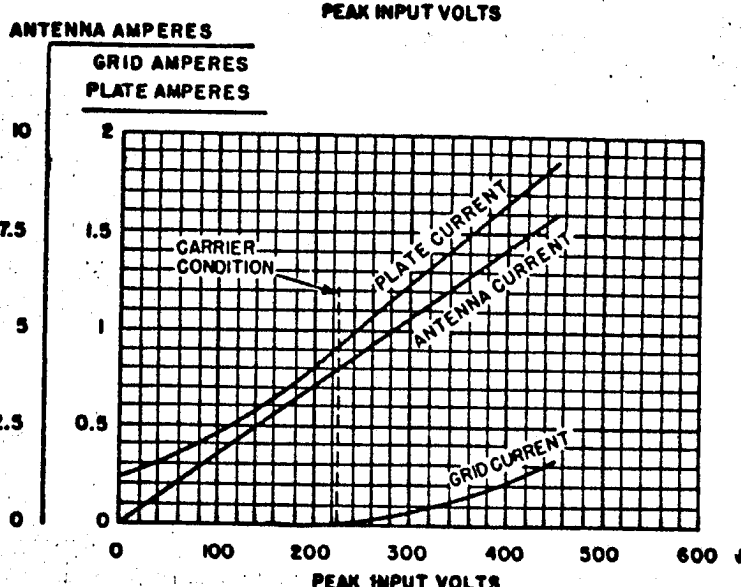
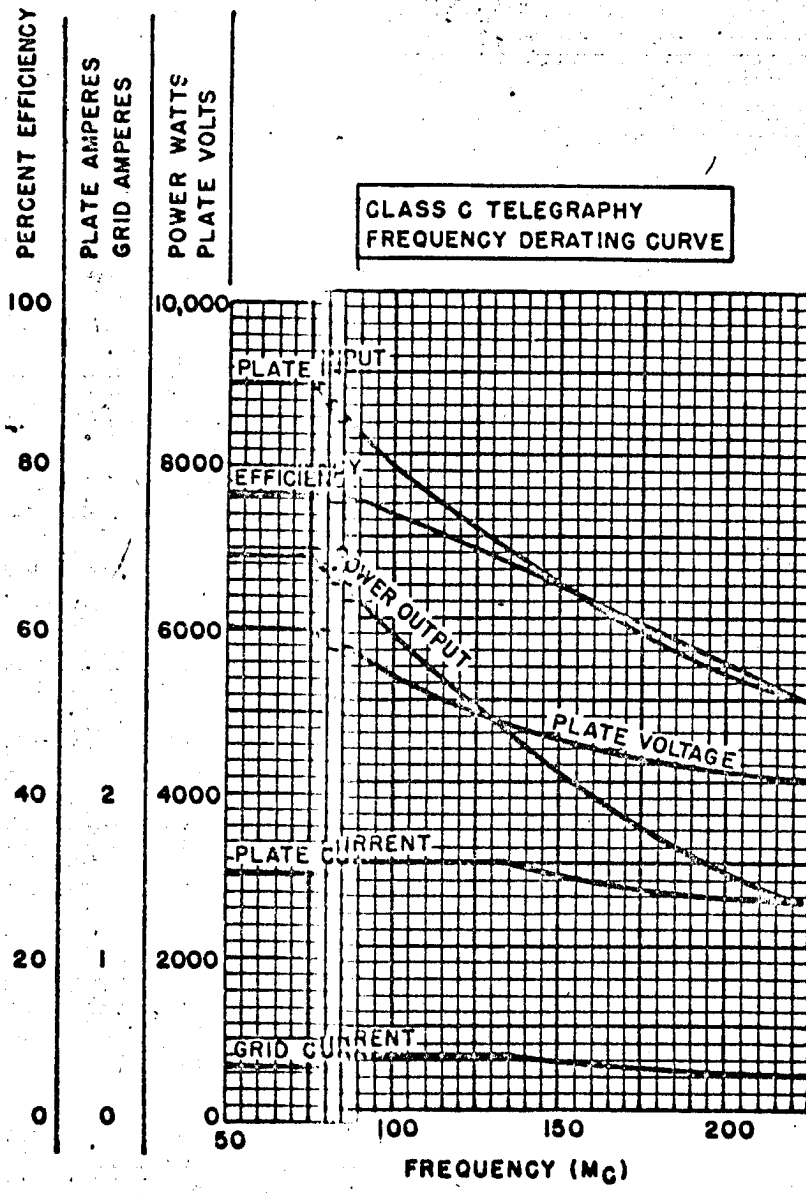
CLASS B TELEPHONY
WAVE LENGTH = 75MC/SEC
PLATE VOLTAGE = 5000 VOLTS
GRID BIAS = —145 VOLTS






CLASS C TELEGRAPHY
FREQUENCY DERATING CURVE
PERCENT EFFICIENCY
PLATE AMPERES
GRID AMPERES
POWER WATTS
PLATE VOLTS
100
80
60
40
20
0
2
1
0
10,000
8000
6000
4000
2000
0
PLATE INPUT
EFFICIENCY
POWER OUTPUT
PLATE VOLTAGE
PLATE CURRENT
GRID CURRENT
50
100
150
200
FREQUENCY (MC)