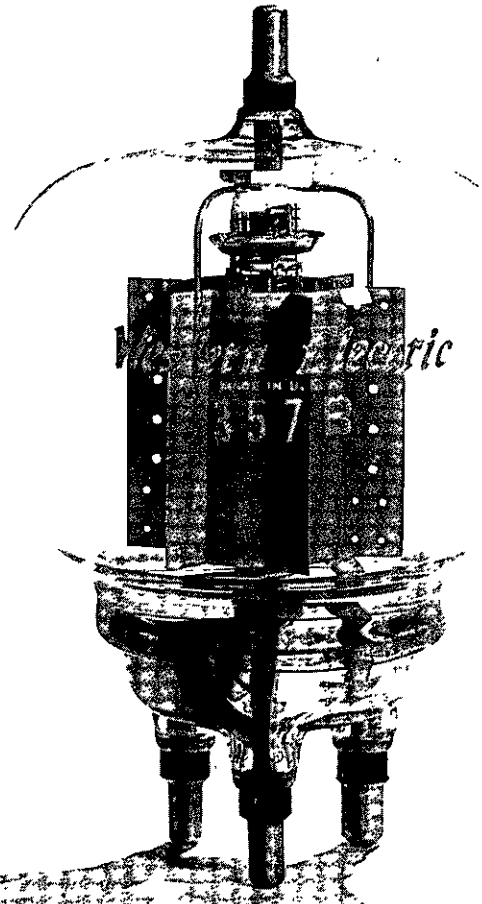


TRIODE
AMPLIFIER, OSCILLATOR OR MODULATOR

Western Electric

DESCRIPTION

The 357B is a three-electrode tube designed for use as a radio-frequency amplifier or oscillator, audio-frequency amplifier or modulator. The anode is capable of dissipating 400 watts. The tube is cooled by radiation at frequencies below 40 megacycles. Forced-air cooling of the envelope is necessary at higher frequencies. The tube is capable of operating up to 100 megacycles at maximum ratings and up to 150 megacycles at reduced ratings. The cathode is a thoriated tungsten filament.

MAXIMUM RATINGS

D-C Plate Voltage	4000 volts
D-C Plate Current	0.500 ampere
Continuous Plate Dissipation	400 watts
D-C Grid Current	0.100 ampere

GENERAL CHARACTERISTICS

ELECTRICAL DATA

	Min.	Bogey	Max.	
Filament Voltage	9.5	10.0	10.5	volts
Filament Current at Bogey Voltage	9.7	10.0	10.5	amperes
Filament Starting Current			50	amperes
Filament Resistance, Cold		0.12		ohm
Amplification Factor				
Conditions: I_b = 200 ma, E_b = 2 kv	27	30	34	
Interelectrode Capacitances				
Grid-Plate	3.5	4.25	5.0	uuf
Grid-Filament	10.0	11.5	13.0	uuf
Plate-Filament	2.0	2.5	4.0	uuf
Maximum Usable Cathode Current[1]			2.5	amperes

MECHANICAL DATA

Mounting Position	Vertical, plate terminal up
Type of Cooling[2]	Radiation or forced-air
Required Air Flow on Envelope	
When Operated Above 40 Megacycles	40 cfm
Maximum Incoming Air Temperature	45 centigrade
Maximum Glass Temperature	200 centigrade
Shock and Vibration	
Ruggedness[3] (duration of 5 milliseconds)	50 G
Natural Frequency of Elements	
Plate	100 cycles
Filament-Grid Structure	75 cycles
Net Weight, approximate	13 ounces

1. Represents maximum usable cathode current for tube as plate current plus grid current for any condition of operation.

2. Radiation cooling is adequate when the tube is operated below 40 megacycles and with a free circulation of air around the tube. If operated in a confined space or at a frequency above 40 megacycles, forced-air cooling is necessary. Satisfactory air cooling will be obtained from a blower delivering approximately 40 cubic feet of air per minute from a 2-inch diameter nozzle. The nozzle outlet should be placed approximately 3 inches from the tube and directed toward the central point of the envelope, midway between the plate and grid terminals.

   The plate terminal connector shall be of a design that will readily conduct heat from the plate terminal.

3. This test is equivalent to a JAN-1A Pendulum Bump Tester 15° test. The data given represent the maximum capabilities of the tube without electrical potentials applied and should not be construed to mean that the tube is capable of withstanding an infinite number of shocks of this magnitude.

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

AUDIO-FREQUENCY POWER AMPLIFIER AND MODULATOR—CLASS B

MAXIMUM RATINGS, ABSOLUTE VALUES

	CCS	
D-C Plate Voltage	4000	volts
Signal D-C Plate Current[4]	0.50	ampere
Signal Plate Input[4]	1100	watts
Plate Dissipation[4]	400	watts

TYPICAL OPERATION

Unless otherwise specified, values are for 2 tubes

	CCS	CCS	CCS[5]	
D-C Plate Voltage	2000	3500	3000	volts
D-C Grid Voltage	—50	—110	—85	volts
Peak A-F Grid-to-Grid Voltage	490	520	345	volts
Zero Signal D-C Plate Current	0.160	0.120	0.120	ampere
Maximum Signal D-C Plate Current	1.00	0.72	0.43	ampere
Effective Load Resistance, Plate-to-Plate	4360	11500	14700	ohms
Maximum Signal Driving Power, approximate	50.0	35.0	13.5	watts
Maximum Signal Power Output	1400	1840	850	watts

RADIO-FREQUENCY POWER AMPLIFIER—CLASS B

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

MAXIMUM RATINGS, ABSOLUTE VALUES

	CCS	
D-C Plate Voltage	4000	volts
D-C Plate Current	0.275	ampere
Plate Input	550	watts
Plate Dissipation	400	watts

TYPICAL OPERATION

	CCS	CCS	
D-C Plate Voltage	2000	3500	volts
D-C Grid Voltage	—60	—125	volts
Peak R-F Grid Voltage	135	136	volts
D-C Plate Current	0.260	0.150	ampere
D-C Grid Current, approximate	0.100	0.001	ampere
Driving Power, approximate[6]	25	8.5	watts
Power Output, approximate	175	190	watts

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

5. As high level modulator for 1000 watt transmitter. Total harmonics approximately 1.5% at full output.

6. At crest of audio-frequency cycle with modulation factor of 1.0.

PLATE MODULATED RADIO-FREQUENCY POWER AMPLIFIER—CLASS C TELEPHONY

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

MAXIMUM RATINGS, ABSOLUTE VALUES

	CCS	
D-C Plate Voltage	3000	volts
D-C Grid Voltage	—500	volts
D-C Plate Current	0.400	ampere
D-C Grid Current	0.100	ampere
Plate Input	1100	watts
Plate Dissipation	235	watts

TYPICAL OPERATION

	CCS	CCS	CCS*	
D-C Plate Voltage	2000	3000	3000	volts
D-C Grid Voltage	—310	—320	—270	volts
Peak R-F Grid Voltage	535	520	420	volts
D-C Plate Current	0.390	0.340	0.240	ampere
D-C Grid Current, approximate	0.070	0.065	0.035	ampere
Driving Power, approximate	35	35	20	watts
Power Output, approximate	550	780	550	watts

RADIO FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAPHY

Key-down conditions per tube without amplitude modulation[8]

MAXIMUM RATINGS, ABSOLUTE VALUES

	CCS	
D-C Plate Voltage	4000	volts
D-C Grid Voltage	—500	volts
D-C Plate Current	0.500	ampere
D-C Grid Current	0.100	ampere
Plate Input	1800	watts
Plate Dissipation	400	watts

TYPICAL OPERATION

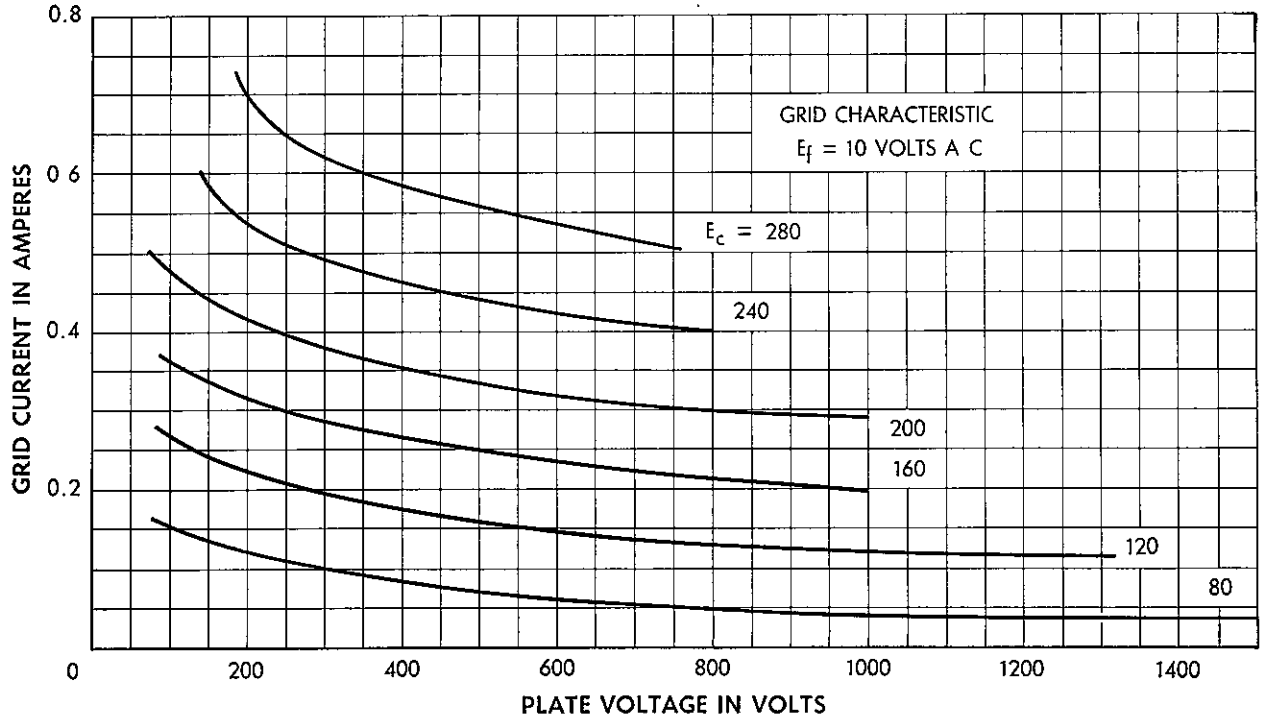
	CCS	CCS	
D-C Plate Voltage	2000	3500	volts
D-C Grid Voltage	—200	—240	volts
Peak R-F Grid Voltage	445	460	volts
D-C Plate Current	0.500	0.450	ampere
D-C Grid Current, approximate	0.085	0.070	ampere
Driving Power, approximate	35	30	watts
Power Output, approximate	780	1200	watts

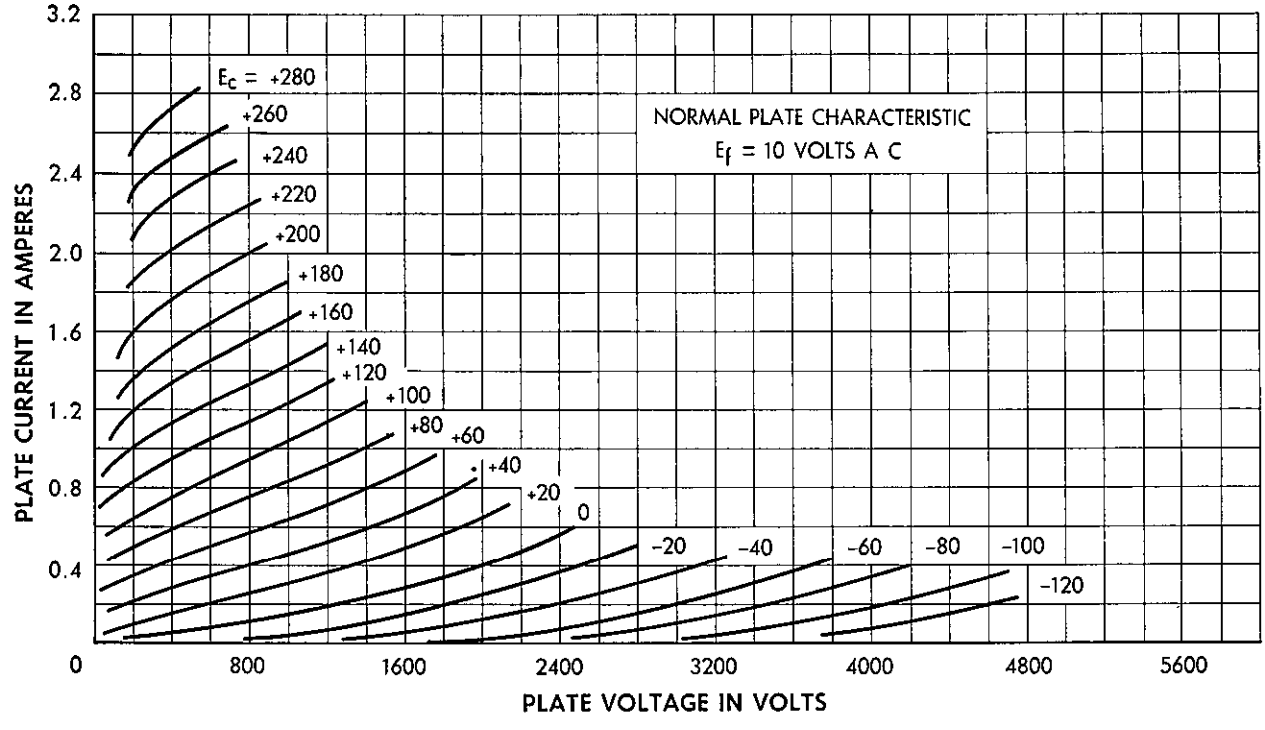
Maximum ratings apply up to 100 megacycles. The tube may be operated at higher frequencies provided the maximum values of plate voltage and plate input are reduced according to the tabulation below. Other maximum ratings are not affected. Forced-air cooling of the envelope with an air flow of approximately 40 cfm is required at these frequencies.

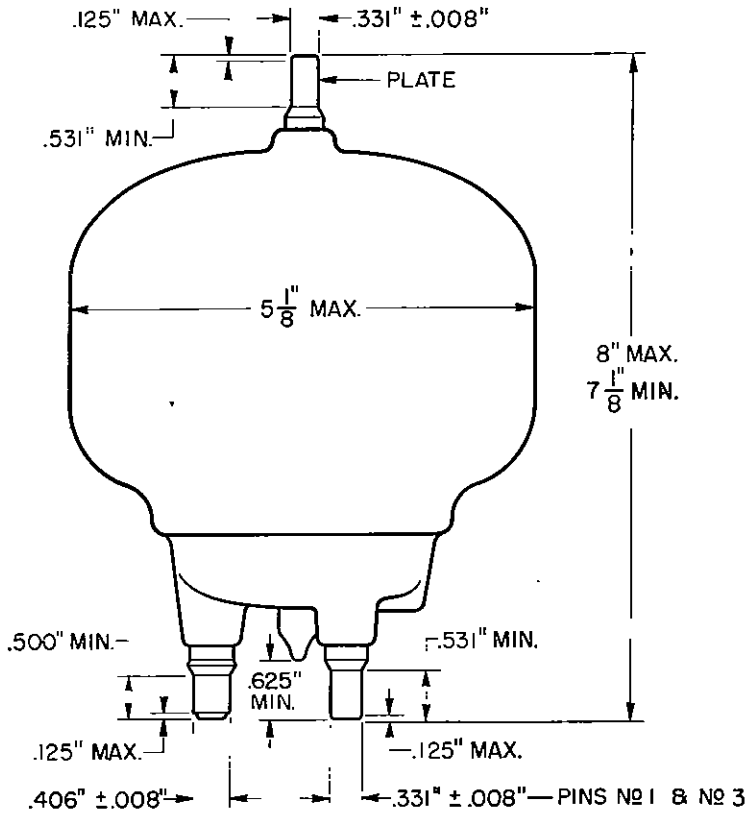
Frequency	100	125	150	megacycles
Percentage of maximum rated plate voltage and plate input.				
Class B	100	85	70	per cent
Class C, plate modulated	100	75	50	per cent
Class C, unmodulated	100	80	60	per cent

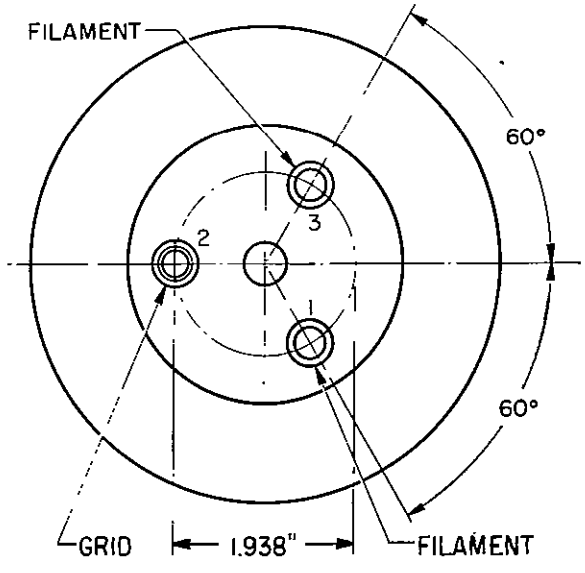
*. For 500 watt broadcast transmitter application.

8. Modulation essentially negative may be used if the positive peak of the envelope does not exceed 115 per cent of its unmodulated value.


GRID CHARACTERISTIC
E_f = 10 VOLTS A C
E_c = 280
240
200
160
120
80
GRID CURRENT IN AMPERES
0.8
0.6
0.4
0.2
0
200
400
600
800
1000
1200
1400
PLATE VOLTAGE IN VOLTS


NORMAL PLATE CHARACTERISTIC
E_f = 10 VOLTS A C
E_c = +280
+260
+240
+220
+200
+180
+160
+140
+120
+100
+80
+60
+40
+20
0
-20
-40
-60
-80
-100
-120
PLATE CURRENT IN AMPERES
3.2
2.8
2.4
2.0
1.6
1.2
0.8
0.4
0
800
1600
2400
3200
4000
4800
5600
PLATE VOLTAGE IN VOLTS





Note:
Base pin positions shall be held to tolerances such that pins will fit a flat - plate gauge having a thickness of .250" with 2 holes of .391" ± .0005" dia. and 1 hole of .469" ± .0005" dia. All holes shall be located on a 1.938" ± .0005" dia. circle at specified centers.

Western Electric A development of Bell Telephone Laboratories, the research laboratories of the American Telephone and Telegraph Company and the Western Electric Company.