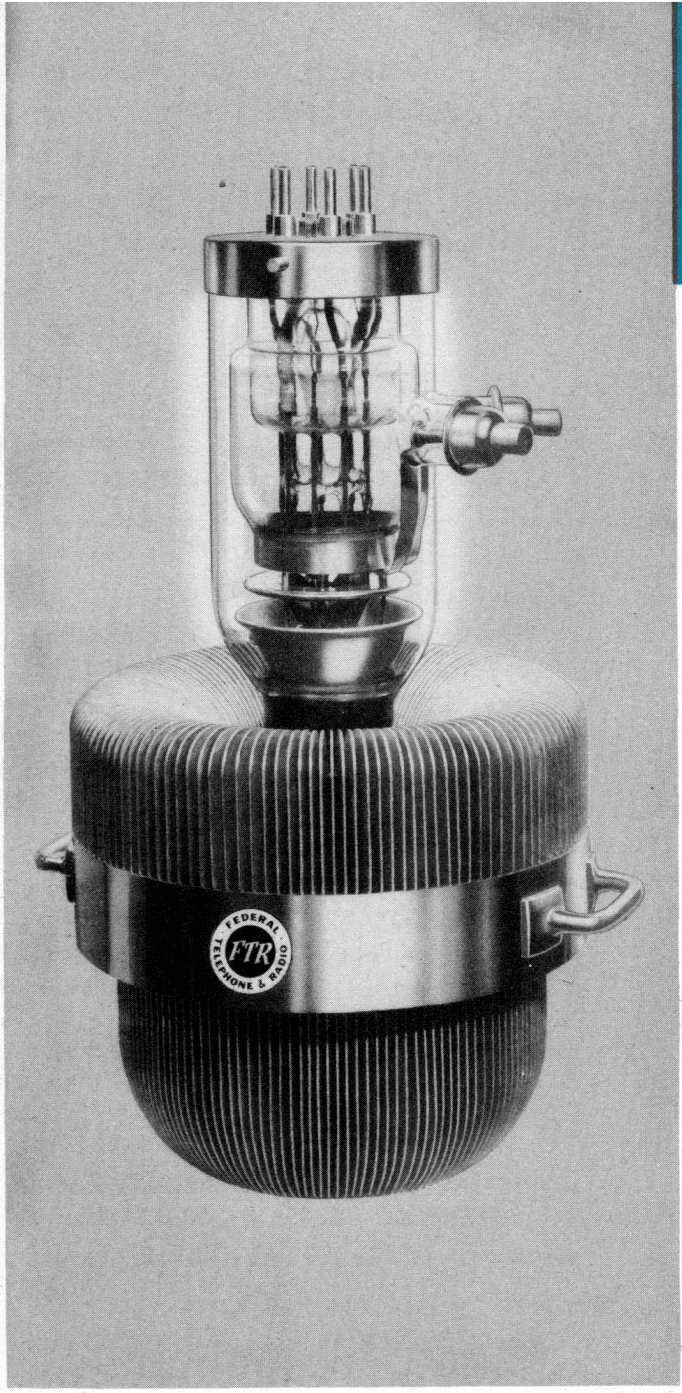
FEDERAL POWER TRIODE
Type F-9C31
20 Kilowatts Plate Dissipation



GENERAL DATA

DESCRIPTION:

Federal's F-9C31 is a three-electrode tube engineered to serve as a radio-frequency amplifier, oscillator, or as a Class B modulator. The forced-air-cooled anode is capable of dissipating 20 kilowatts. The cathode is a thoriated tungsten multi-strand filament and may be operated on direct current, single-phase, three-phase, or six-phase alternating current excitation. Maximum ratings apply up to 20 megacycles.

Electrical:

Filament Voltage§	15 Volts
Filament Current§	135 Amperes
Filament Starting Current§	200 Amperes max.
Filament Cold Resistance§	.019 Ohms
Peak Cathode Current	45 Amperes
Amplification Factor, $E_c = -200V$ $I_b = 1.6A$	40.5
Interelectrode Capacitances	
Grid-Plate	40 $\mu\mu f$
Grid-Filament	46 $\mu\mu f$
Plate-Filament	5.6 $\mu\mu f$

§Single phase excitation.

Mechanical:

Mounting Position— Vertical, Anode Down			
Type of Cooling—Forced Air			
Maximum Incoming Air Temperature			45° C
Required Air Flow on Anode			
Plate Dissipation—Kilowatts	20	16	12
Minimum Air Flow —Cubic Feet per Minute	2,100	1,600	1,200
Pressure—Inches Water	2.15	1.24	0.70
Maximum Glass Temperature			150° C
Net Weight, approximate			202 Lbs.

Federal's Type F-9C31 maintains lower operating temperatures because of its thoriated tungsten filaments. The components keep cooler, last longer.

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The low filament temperature in F-9C31 permits the designer's use of grid materials which reduce grid emission. It's *in the design* where efficient performance gets its start.

Maximum Ratings and Typical Operating Conditions

AUDIO-FREQUENCY POWER AMPLIFIER AND MODULATOR—CLASS B

Maximum Ratings, Absolute Values

DC Plate Voltage	15,000 Volts
Maximum Signal DC Plate Current†	5 Amperes
Maximum Signal Plate Input†	50 Kilowatts
Plate Dissipation†	20 Kilowatts

Typical Operation

(Unless otherwise specified, values are for two tubes)

DC Plate Voltage	10,000 Volts
DC Grid Voltage	—200 Volts
Peak A-F Grid-to-Grid Voltage	1,600 Volts
Zero Signal DC Plate Current	0.5 Amperes
Maximum Signal DC Plate Current	6.0 Amperes
Effective Load Resistance, Plate to Plate	3,750 Ohms
Maximum Signal Driving Power, approximate	360 Watts
Maximum Signal Power Output, approximate	39 Kilowatts

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

RADIO-FREQUENCY POWER AMPLIFIER—CLASS B

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

Maximum Ratings, Absolute Values

DC Plate Voltage	15,000 Volts
DC Plate Current	4 Amperes
Plate Input	30 Kilowatts
Plate Dissipation	20 Kilowatts

Typical Operation

DC Plate Voltage	14,000 Volts
DC Grid Voltage	—200 Volts
Peak R-F Grid Voltage	450 Volts
DC Plate Current	2.1 Amperes
DC Grid Current, approximate	0.00 Amperes
Driving Power, approximate‡	400 Watts
Power Output, approximate	10 Kilowatts

‡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 a maximum modulation factor of 1.0)

Maximum Ratings, Absolute Values

DC Plate Voltage	12,000 Volts
DC Grid Voltage	—3,000 Volts
DC Plate Current	4.5 Amperes
DC Grid Current	1.0 Amperes
Plate Input	54 Kilowatts
Plate Dissipation	15 Kilowatts

Typical Operation

DC Plate Voltage	12,000 Volts
DC Grid Voltage	—750 Volts
Peak R-F Grid Voltage	1,510 Volts
DC Plate Current	3.08 Amperes
DC Grid Current, approximate	0.48 Amperes
Driving Power, approximate	700 Watts
Power Output, approximate	27.2 Kilowatts

RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAPHY

(Key-down conditions per tube without amplitude modulation)¶

Maximum Ratings, Absolute Values

DC Plate Voltage	15,000 Volts
DC Grid Voltage	—3,000 Volts
DC Plate Current	8 Ampeers
DC Grid Current	1 Ampere
Plate Input	100 Kilowatts
Plate Dissipation	20 Kilowatts

Typical Operation

DC Plate Voltage	15,000 Volts
DC Grid Voltage	—900 Volts
Peak R-F Grid Voltage	1,940 Amperes
DC Plate Current	4.7 Amperes
DC Grid Current, approximate	0.75 Amperes
Driving Power, approximate	1,350 Watts
Power Output, approximate	52 Kilowatts

¶Modulation essentially negative may be used if the positive peak of the envelope does not exceed 115 per cent of carrier conditions.

An IT&T Associate

Federal's F-9C31 shows the way to new economies. Consuming less filament power, it achieves appreciable savings in operating costs.

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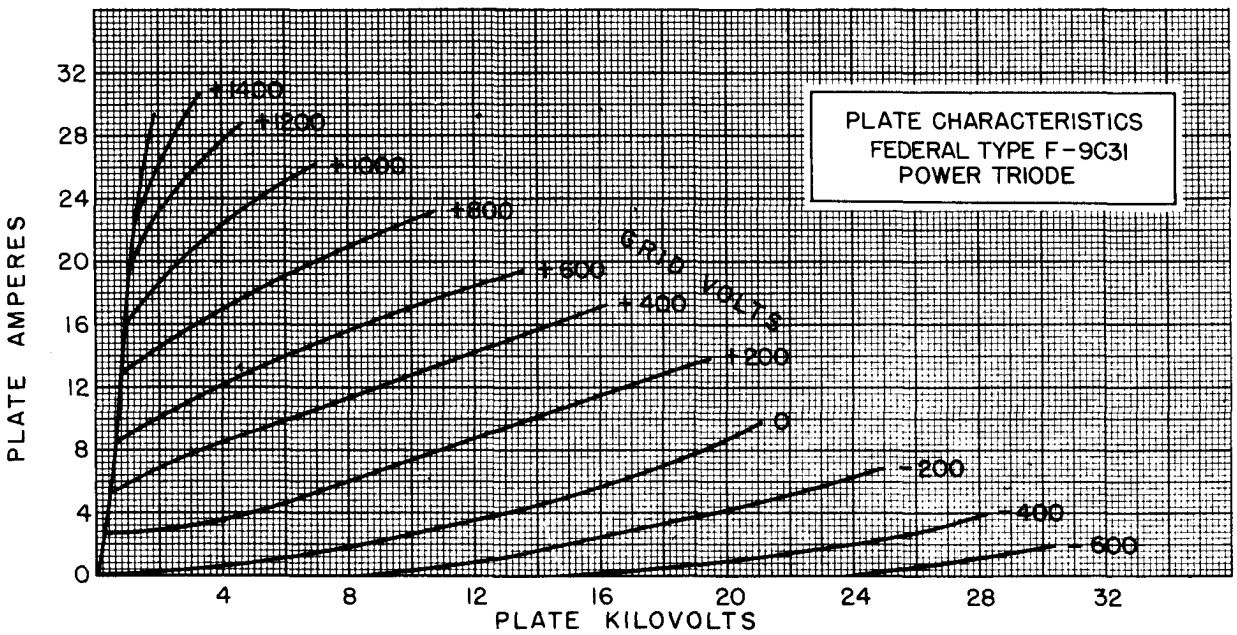

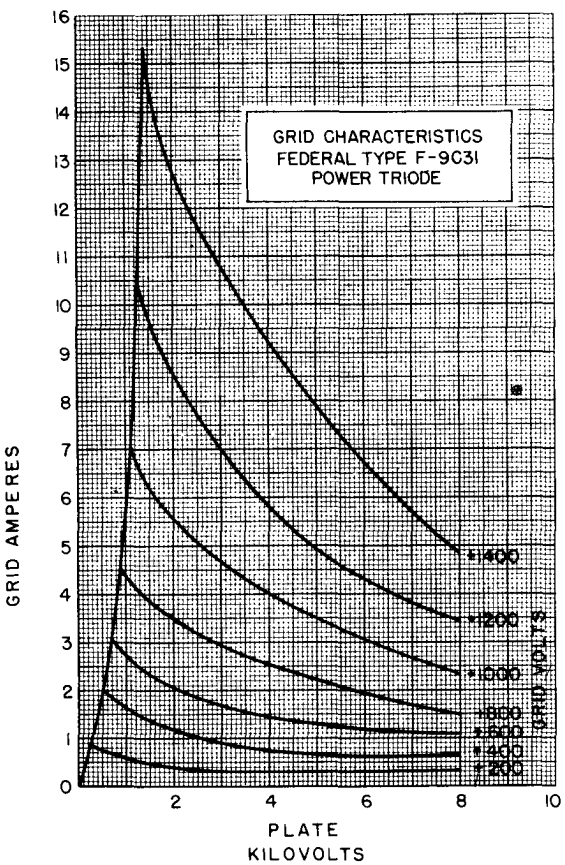

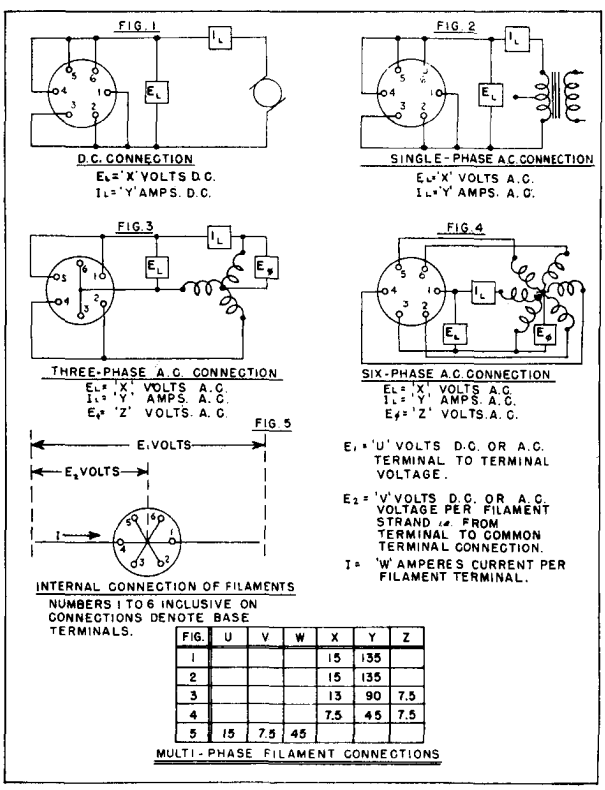

FIG.	U	V	W	X	Y	Z
1				15	135	
2				15	135	
3				13	90	7.5
4				7.5	45	7.5
5	15	7.5	45			

FEDERAL POWER TRIODE
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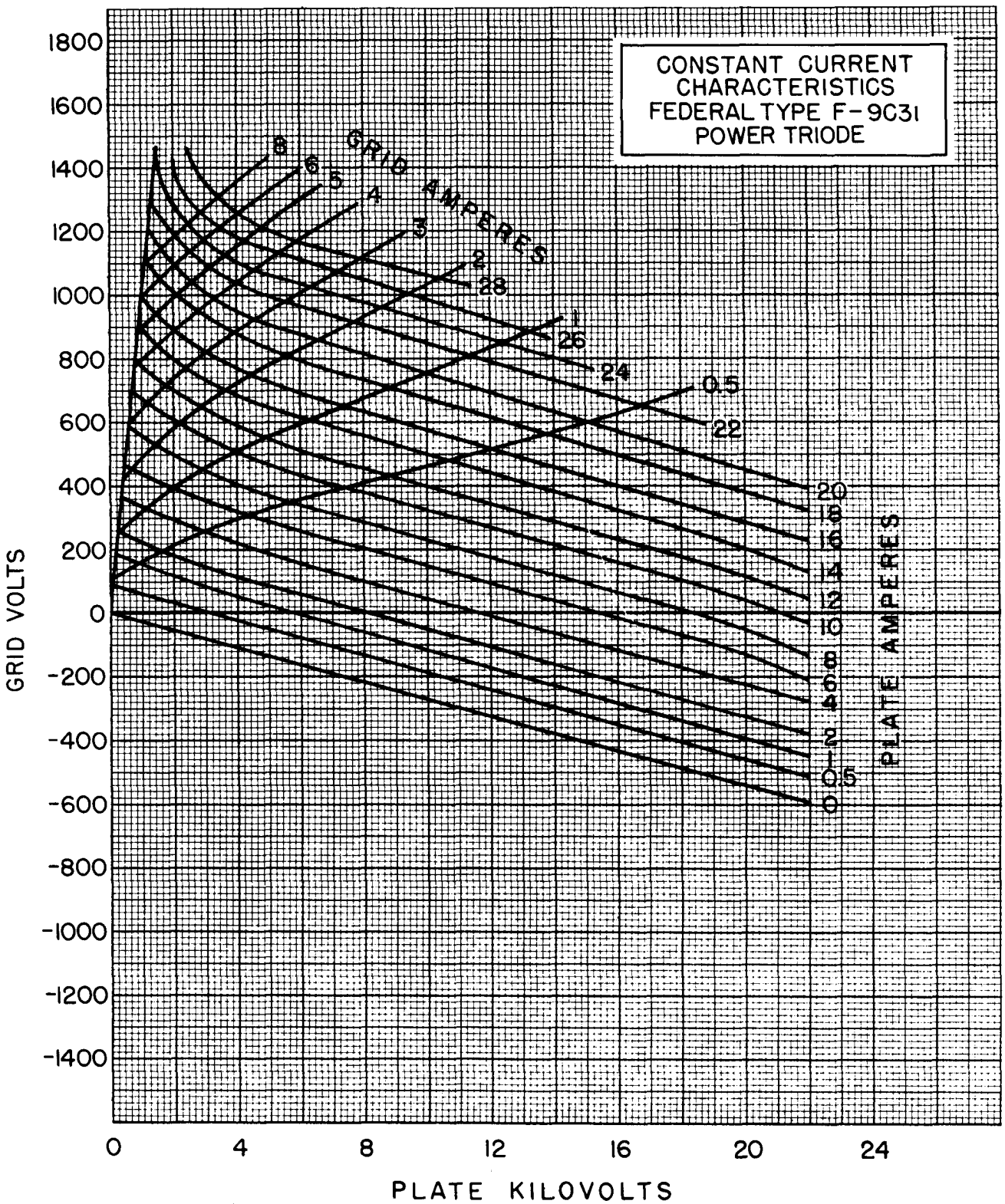
Federal's F-9C31 is designed for specific use in 50 kilowatt AM broadcast and short wave transmitters . . . custom-made for customer satisfaction.



In Federal's latest 50 Kilowatt A.M. Transmitter, the F-9C31 is used in the R.F. Amplifier, the F-9C29 in the Modulator.

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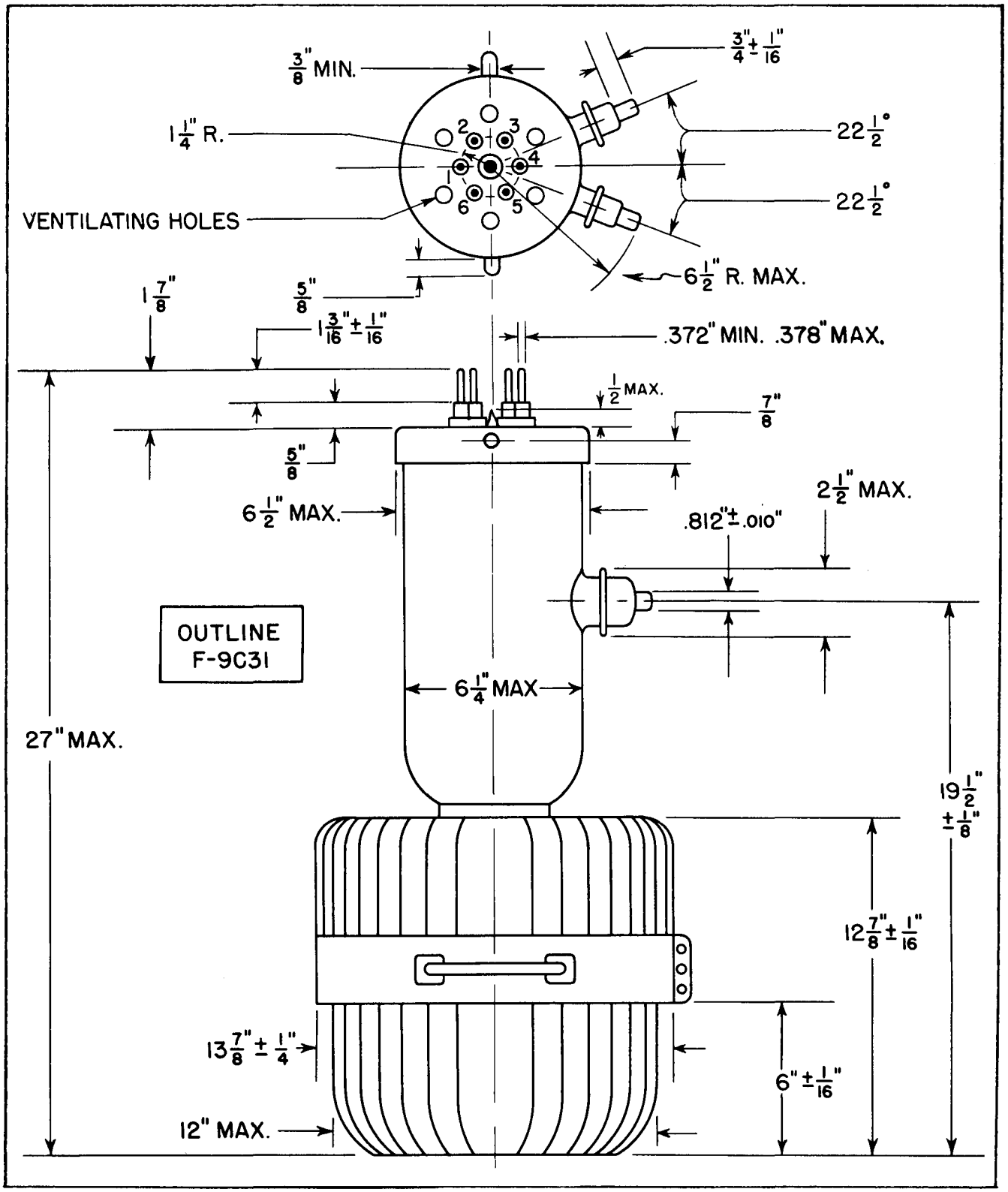

Federal Telephone and Radio Corporation
100 Kingsland Road Clifton, New Jersey

There is an extra margin of performance in every Federal tube.

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