



**ELECTRON TUBE DEPARTMENT ■ COMPONENTS DIVISION**  
INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION, CLIFTON, NEW JERSEY

F-6696  
F-6697  
POWER  
TRIODES

DESCRIPTION

The F-6696 and F-6697 are three electrode tubes designed for use as radio frequency amplifiers, oscillators or Class B modulators. The rugged coaxial stem structure provides high dissipation, low inductance r-f electrode terminals. The cathode is a thoriated tungsten filament.

The F-6696 has a water cooled, heavy wall anode capable of 60 kw dissipation. The F-6697 has a forced-air cooled copper anode-radiator assembly of brazed construction capable of 35 kw dissipation.

ELECTRICAL

|                              |       |         |
|------------------------------|-------|---------|
| Filament Voltage             | 13    | volts   |
| Filament Current             | 205   | amperes |
| Filament Starting Current    | 800   | amperes |
| Filament Cold Resistance     | .0073 | ohms    |
| Amplification Factor         | 20    |         |
| Inter-Electrode Capacitances |       |         |
| Grid-Plate                   | 55    | μuf     |
| Grid-Filament                | 76    | μuf     |
| Plate-Filament               | 2.7   | μuf     |

MECHANICAL

|                                 |                      |    |    |        |      |     |                 |
|---------------------------------|----------------------|----|----|--------|------|-----|-----------------|
| Mounting Position               | Vertical, Anode down |    |    |        |      |     |                 |
| Max. Glass & Seal Temperature * | 180° C               |    |    |        |      |     |                 |
|                                 | F-6696               |    |    | F-6697 |      |     |                 |
| Plate Dissipation               | 60                   | 45 | 30 | 35     | 25   | 15  | kilowatts       |
| Water Flow                      | 18                   | 13 | 8  | -      | -    | -   | gpm             |
| Water Jacket Pressure Drop      | 7                    | 4  | 2  | -      | -    | -   | psi             |
| Air Flow **                     | -                    | -  | -  | 1700   | 1000 | 440 | cfm             |
| Static Air Pressure             | -                    | -  | -  | 8.0    | 2.8  | .6  | inches of water |
| Net Weight, approx.             |                      | 17 |    |        | 37   |     | lbs             |

\* At the upper frequencies, special attention should be given to provide adequate cooling to the seals to limit the temperature to 180°C max.; up to 150 cfm air flow may be required.

\*\* Maximum incoming air temperature of 50°C at sea level.

# MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

## Audio-Frequency Power Amplifier and Modulator - Class B

### Maximum Ratings, Absolute Values

|                                            |       |        |           |
|--------------------------------------------|-------|--------|-----------|
| D-C Plate Voltage                          |       | 16,000 | volts     |
| Max. Signal D-C Plate Current <sup>2</sup> |       | 11     | amperes   |
| Max. Signal Plate Input <sup>2</sup>       |       |        |           |
| F-6696                                     | ..... | 120    | kilowatts |
| F-6697                                     | ..... | 110    | kilowatts |
| Plate Dissipation <sup>2</sup>             |       |        |           |
| F-6696                                     | ..... | 60     | kilowatts |
| F-6697                                     | ..... | 35     | kilowatts |

### Typical Operation

(Unless otherwise specified, values are for two tubes)

|                                           |        |        |           |
|-------------------------------------------|--------|--------|-----------|
|                                           |        | F-6696 |           |
| D-C Plate Voltage                         | 10,000 | 12,000 | volts     |
| D-C Grid Voltage                          | -450   | -600   | volts     |
| Peak A-F Grid-to-Grid Voltage             | 1,750  | 2,120  | volts     |
| Peak A-F Plate-to-Plate Voltage           | 16,000 | 19,200 | volts     |
| Zero Signal D-C Plate Current             | 3.0    | 2.0    | amperes   |
| Max. Signal D-C Plate Current             | 17.4   | 20.0   | amperes   |
| Effective Load Resistance, Plate-to-Plate | 1,170  | 1,230  | ohms      |
| Max. Signal Driving Power, approx.        | 550    | 600    | watts     |
| Max. Signal Power Output, approx.         | 110    | 152    | kilowatts |

<sup>2</sup> Averaged over any audio frequency cycle of sine-wave form

Radio-Frequency Power Amplifier - Class B

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

Maximum Ratings, Absolute Values

|                   |       |        |           |
|-------------------|-------|--------|-----------|
| D-C Plate Voltage |       | 16,000 | volts     |
| D-C Plate Current |       | 9.0    | amperes   |
| Plate Input       |       |        |           |
| F-6696            | ..... | 90     | kilowatts |
| F-6697            | ..... | 55     | kilowatts |
| Plate Dissipation |       |        |           |
| F-6696            | ..... | 60     | kilowatts |
| F-6697            | ..... | 35     | kilowatts |

Typical Operation

F-6696

|                          |        |        |              |
|--------------------------|--------|--------|--------------|
| D-C Plate Voltage        | 12,000 | 12,000 | volts        |
| D-C Grid Voltage         | -550   | -550   | volts        |
| Peak R-F Grid Voltage    | 510    | 640    | volts        |
| D-C Plate Current        | 4.3    | 6.8    | amperes      |
| Peak R-F Plate Voltage   | 5,300  | 5,300  | volts        |
| D-C Grid Current         | 0      | 0      | milliamperes |
| R-F Load Resistance      | 780    | 500    | ohms         |
| Driving Power, approx. † | 450    | 1,500  | watts        |
| Power Output, approx.    | 18     | 28     | kilowatts    |

† At crest of audio-frequency cycle  
with modulation factor of 1.0



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- 4 -

Plate-Modulated Radio-Frequency Power Amplifier - Class C Telephony  
(Carrier conditions per tube for use with a max. modulation factor of 1.0)

Maximum Ratings, Absolute Values

|                   |           |        |           |
|-------------------|-----------|--------|-----------|
| D-C Plate Voltage |           | 10,000 | volts     |
| D-C Grid Voltage  |           | -3,200 | volts     |
| D-C Plate Current |           | 8.5    | amperes   |
| D-C Grid Current  |           | 2.0    | amperes   |
| Plate Input       |           | 81     | kilowatts |
| Plate Dissipation |           |        |           |
| F-6696            | . . . . . | 40     | kilowatts |
| F-6697            | . . . . . | 23     | kilowatts |

Typical Operation

|                        |  |        |           |
|------------------------|--|--------|-----------|
| D-C Plate Voltage      |  | 9,500  | volts     |
| D-C Grid Voltage       |  | -1,600 | volts     |
| Peak R-F Grid Voltage  |  | 2,300  | volts     |
| Peak R-F Plate Voltage |  | 7,800  | volts     |
| D-C Plate Current      |  | 8.4    | amperes   |
| D-C Grid Current       |  | 0.90   | amperes   |
| R-F Load Resistance    |  | 510    | ohms      |
| Driving Power, approx. |  | 2.0    | kilowatts |
| Power Output, approx.  |  | 60     | kilowatts |

Radio-Frequency Power Amplifier and Oscillator - Class C Telegraphy  
(Key down conditions per tube without amplitude modulation) \*\*\*

Maximum Ratings, Absolute Values

|                   |           |        |           |
|-------------------|-----------|--------|-----------|
| D-C Plate Voltage |           | 16,000 | volts     |
| D-C Grid Voltage  |           | -3,200 | volts     |
| D-C Plate Current |           | 11     | amperes   |
| D-C Grid Current  |           | 2.0    | amperes   |
| Plate Input       |           | 120    | kilowatts |
| Plate Dissipation |           |        |           |
| F-6696            | . . . . . | 60     | kilowatts |
| F-6697            | . . . . . | 35     | kilowatts |

Typical Operation

|                           |        |        |           |
|---------------------------|--------|--------|-----------|
| D-C Plate Voltage         | 10,000 | 15,000 | volts     |
| D-C Grid Voltage          | -1,200 | -1,600 | volts     |
| Peak R-F Grid Voltage     | 1,900  | 2,120  | volts     |
| Peak R-F Plate Voltage    | 8,000  | 12,500 | volts     |
| D-C Plate Current         | 10     | 7.0    | amperes   |
| D-C Grid Current, approx. | 0.81   | 0.30   | amperes   |
| R-F Load Resistance       | 440    | 970    | ohms      |
| Driving Power, approx.    | 1.5    | 0.60   | kilowatts |
| Power Output, approx.     | 72     | 80     | kilowatts |

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

# MAXIMUM FREQUENCY RATINGS

Maximum ratings apply up to 30 mc except as noted. The tube may be operated at higher frequencies provided the maximum values of plate voltage and power input are reduced according to the tabulation below.

|                          |     |    |    |            |
|--------------------------|-----|----|----|------------|
| Frequency                | 30  | 50 | 70 | megacycles |
| Max. Rated Plate Voltage |     |    |    |            |
| and Plate Input: Class B | 100 | 80 | 55 | per cent   |
| Class C                  | 100 | 75 | 50 | per cent   |

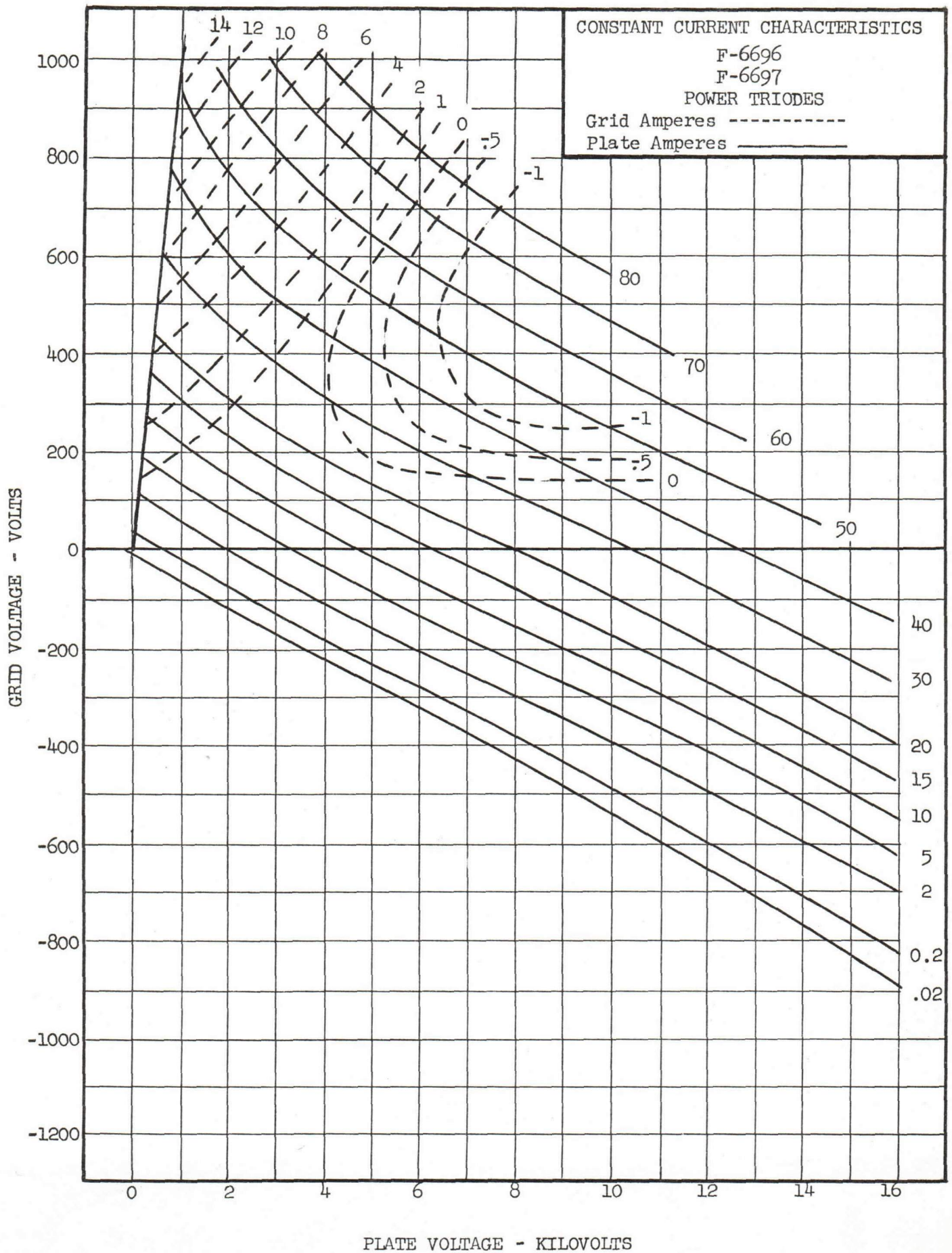
# CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN

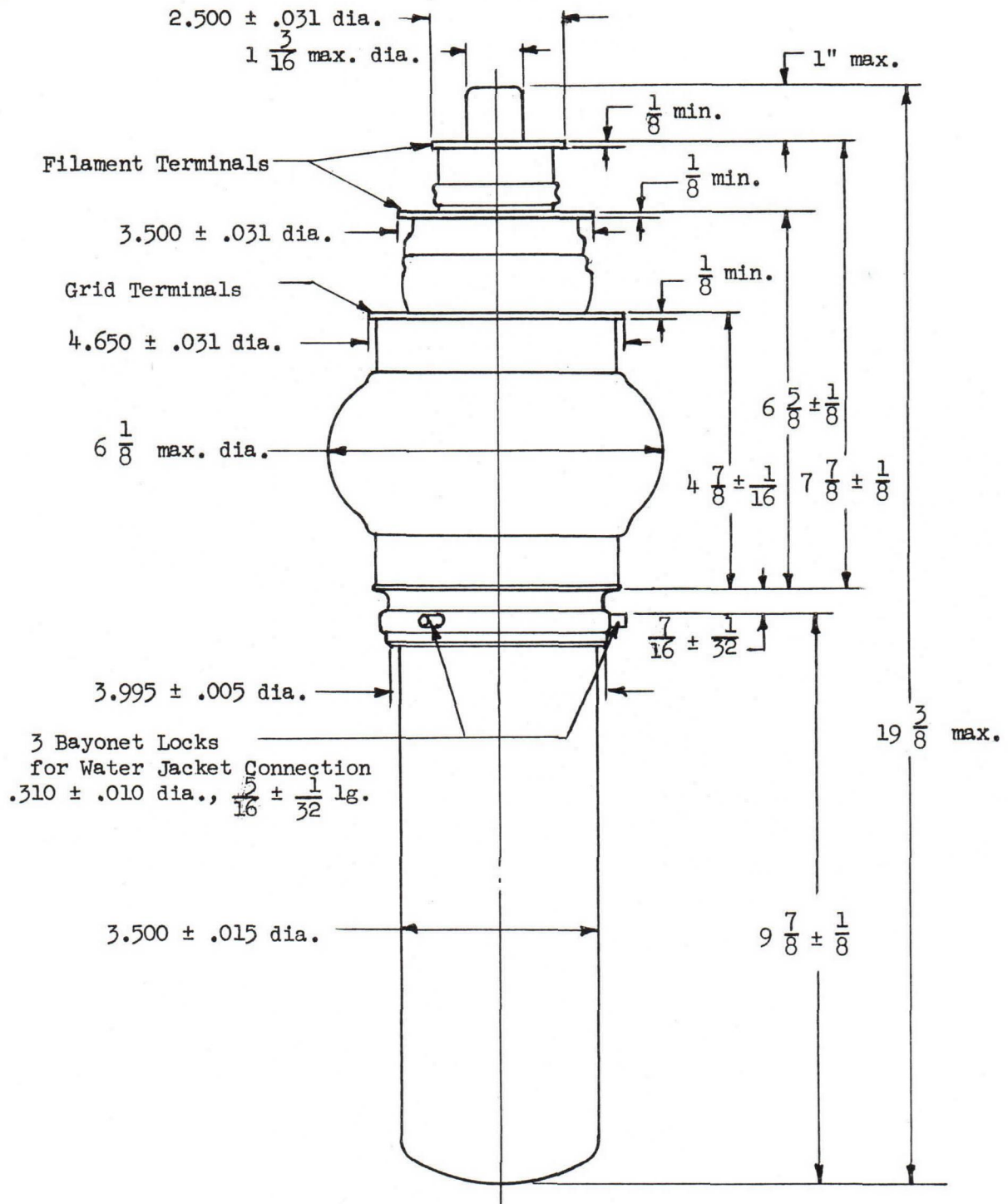
| <u>Characteristics</u> | <u>Conditions</u>                                                                        | <u>L i m i t s</u> |              |             |
|------------------------|------------------------------------------------------------------------------------------|--------------------|--------------|-------------|
|                        |                                                                                          | <u>Min.</u>        | <u>Bogey</u> | <u>Max.</u> |
| Grid Voltage           | $e_b = 1500$ volts;<br>$i_b = 48$ amps.                                                  | $e_c:$ -           | -            | 1000 volts  |
| Grid Current           | $e_b = 1500$ volts;<br>$i_b = 48$ amps.                                                  | $i_c:$ -           | -            | 15 amps     |
| Plate Voltage          | $E_c = 0$ V d-c;<br>$I_b = 3.0$ A d-c                                                    | $E_b:$ 1.9         | 2.4          | 2.9 Kv d-c  |
| Plate Voltage          | $E_c = -200$ V d-c;<br>$I_b = 3.0$ A d-c                                                 | $E_b:$ 5.6         | 6.4          | 7.2 Kv d-c  |
| Grid Voltage           | $E_b = 15.0$ Kv d-c;<br>$I_b = 0.020$ A d-c                                              | $E_c:$ -700        | -820         | -940 V d-c  |
| Plate Power Output     | $E_b = 15.0$ Kv d-c;<br>$I_b = 7.0$ A d-c;<br>$E_c = -1600$ V d-c;<br>$I_c = 0.30$ A d-c | $P_o:$ 68          | -            | - Kw        |

Additional information for specific applications can be obtained from the:

ITT Components Division  
Electron Tube Applications Section  
P. O. Box 412  
Clifton, New Jersey

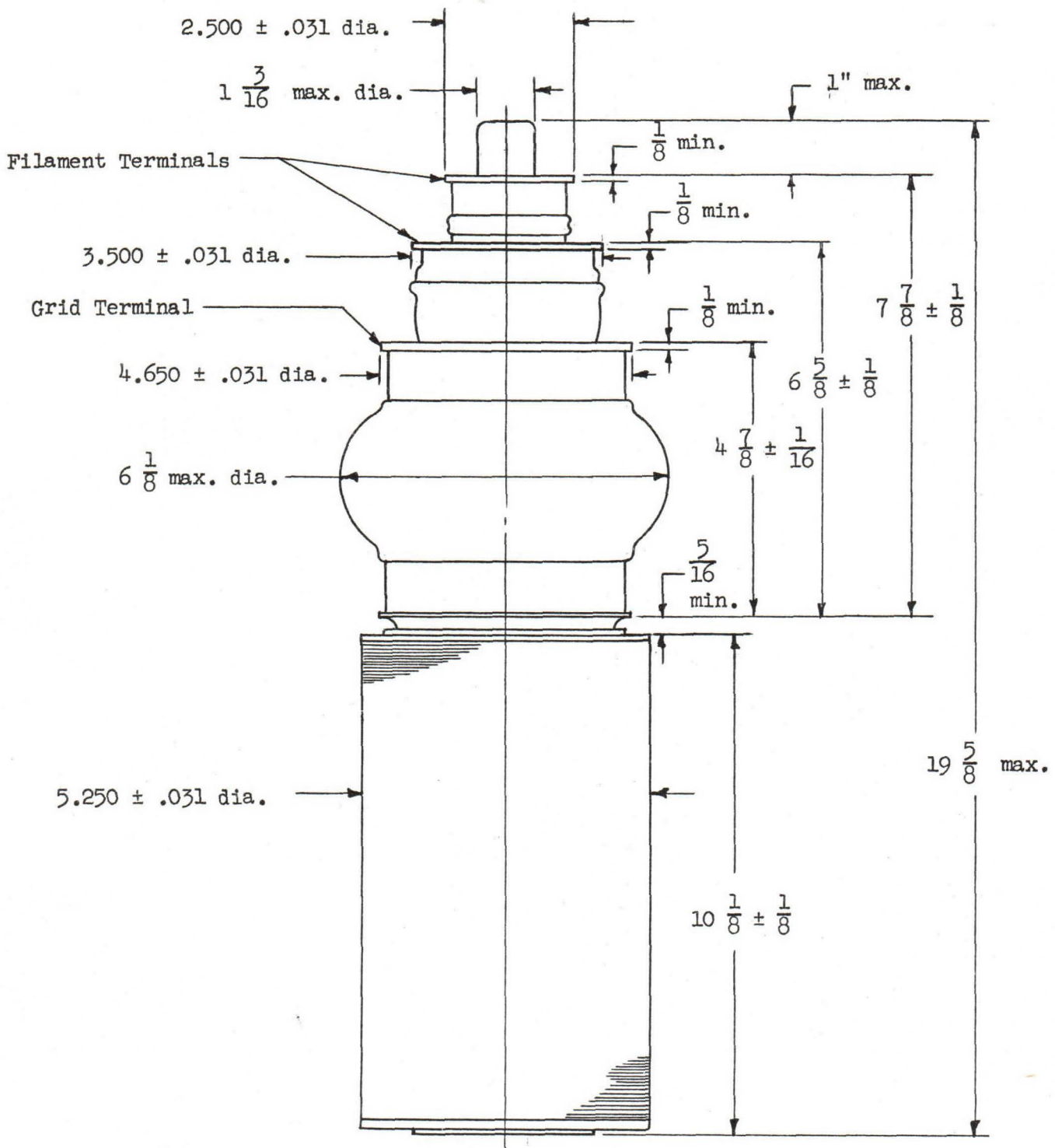






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