



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

F-8146 *
F-8147
POWER
TRIODES

Tentative Specification

DESCRIPTION

The F-8146 and F-8147 are general purpose metal and ceramic triodes for use as amplifiers, oscillators or Class B modulators under CW or pulsed conditions. The F-8146 has a water-cooled anode capable of dissipating 40 kilowatts. The F-8147 has a forced air-cooled, copper anode-radiator assembly of brazed construction capable of 20 kilowatts.

ELECTRICAL

Filament Voltage	11	volts
Filament Current	155	amperes
Filament Starting Current	500	amperes
Filament Cold Resistance	.008	ohms
Amplification Factor		
$E_c = -50$ volts; $I_b = 3$ amperes	17	
Direct Inter-Electrode Capacitance		
Grid-Plate	53	μmf
Grid-Filament	58	μmf
Plate-Filament	3.0	μmf

MECHANICAL

Mounting Position	Vertical, anode up or down						
Ceramic and Seal Temperature, max. (see Notes 1 and 2)	250° C						
	<u>F-8146</u>			<u>F-8147</u>			
Plate Dissipation	40	30	20	20	15	10	kilowatts
Water Flow	20	15	10		-		gpm
Water Jacket Pressure Drop	18	10	5		-		psi
Air Flow (Note 3)		-		1000	600	300	cfm
Static Air Pressure		-		8	3	1	inches of water
Net Weight, approx.		8.5			22		lbs.

Note 1: Auxiliary air flow of up to 120 cfm may be required to limit the ceramic and seal temperature to less than the 250°C max.

Note 2: A temperature sensitive lacquer manufactured by the Tempil Corporation, 132 W. 22nd St., New York 11, N. Y. is convenient for this measurement.

Note 3: Maximum incoming air temperature, 45°C.

* Formerly our D-1030A & B.

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MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS
(Values apply to both tubes unless otherwise specified)

Audio-Frequency Power Amplifier and Modulator - Class B

Maximum Ratings, Absolute Values

D-C Plate Voltage		11,000	volts
Maximum Signal D-C Plate Current **		8	amperes
Maximum Signal Plate Input **			
F-8146		80	kilowatts
F-8147		60	kilowatts
Plate Dissipation **			
F-8146		40	kilowatts
F-8147		20	kilowatts

Typical Operation

(Unless otherwise specified, values are for two tubes)

	<u>F-8146</u>	<u>F-8146</u>	
D-C Plate Voltage	10,500	8,500	volts
D-C Grid Voltage	-600	-520	volts
Peak A-F Grid-to-Grid Voltage	1,800	1,740	volts
Peak A-F Plate-to-Plate Voltage	16,000	14,000	volts
Zero Signal D-C Plate Current	1.8	1.2	amperes
Maximum Signal D-C Plate Current	15.2	12.8	amperes
Effective Load Resistance, Plate-to-Plate	1,330	1,400	ohms
Maximum Signal Driving Power, approx.	50	110	watts
Maximum Signal Power Output, approx.	95	70	kilowatts

Radio-Frequency Power Amplifier - Class B

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

Maximum Ratings, Absolute Values

D-C Plate Voltage		11,000	volts
D-C Plate Current		6	amperes
Plate Input			
F-8146		60	kilowatts
F-8147		30	kilowatts
Plate Dissipation			
F-8146		40	kilowatts
F-8147		20	kilowatts

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

Typical Operation

	F-8146	F-8146	
D-C Plate Voltage	10,500	8,500	volts
D-C Grid Voltage	-550	-460	volts
Peak R-F Grid Voltage	600	520	volts
Peak R-F Plate Voltage	4,000	3,500	volts
D-C Plate Current	4.5	5.7	amperes
D-C Grid Current	0	0	amperes
R-F Load Resistance	550	380	ohms
Driving Power, approx. ++	200	575	watts
Power Output, approx.	14.5	16	kilowatts

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

D-C Plate Voltage		8,500	volts
D-C Grid Voltage		-2,000	volts
D-C Plate Current		6	amperes
D-C Grid Current		.8	amperes
Plate Input		55	kilowatts
Plate Dissipation	F-8146	26	kilowatts
	F-8147	13	kilowatts

Typical Operation

D-C Plate Voltage		8,000	volts
D-C Grid Voltage		-1,400	volts
Peak R-F Grid Voltage		2,120	volts
Peak R-F Plate Voltage		7,000	volts
D-C Plate Current		5.6	amperes
D-C Grid Current		.6	amperes
R-F Load Resistance		680	ohms
Driving Power, approx.		1,250	watts
Power Output, approx.		36	kilowatts

++ At crest of audio frequency cycle
with modulation factor of 1.0



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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		11,000	volts
D-C Grid Voltage		-2,000	volts
D-C Plate Current		8	amperes
D-C Grid Current		.8	amperes
Plate Input		80	kilowatts
Plate Dissipation	F-8146	40	kilowatts
	F-8147	20	kilowatts

Typical Operation

	<u>Cathode Drive</u>	<u>Grid Drive</u>			
D-C Plate Voltage	7,500	10,500	9,500	7,500	volts
D-C Grid Voltage	-800	-1,500	-1,200	-800	volts
Peak R-F Grid Voltage	1,300	2,050	1,750	1,300	volts
Peak R-F Plate Voltage	6,000	9,000	8,000	6,000	volts
D-C Plate Current	7.5	6.7	7.8	7.5	amperes
D-C Grid Current	.45	.40	.45	.45	amperes
R-F Load Resistance	460	735	570	460	ohms
Driving Power, approx.	9,000	770	760	545	watts
Power Output, approx.	47	55	55	38	kilowatts

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

RATINGS VERSUS FREQUENCY

Maximum ratings apply up to 50 megacycles. 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 (other maximum ratings are the same above). Special attention should be given to adequate ventilation of the ceramics and seals at these frequencies.

Frequency	50	110	megacycles
Percentage of Maximum Rated Plate Voltage and Plate Input	100	70	per cent

PULSE SERVICE OPERATIONS

In pulse r-f amplifier service, it is possible to operate the tube under conditions not permissible in CW operation. Because of the wide variety of operating conditions, it is advisable that tube operation recommendations be obtained from our Engineering Department for specific conditions.

MODULATOR TUBE - PULSED OPERATION

Maximum Ratings, Absolute Values

D-C Plate Voltage	18	kilovolts
Peak Plate Voltage (instantaneous)	20	kilovolts
D-C Grid Voltage	-2500	volts
Peak Positive Grid Voltage	4000	volts
Pulse Cathode Current	220	amperes
Grid Dissipation	800	watts
Pulse Length	2000	μsec.

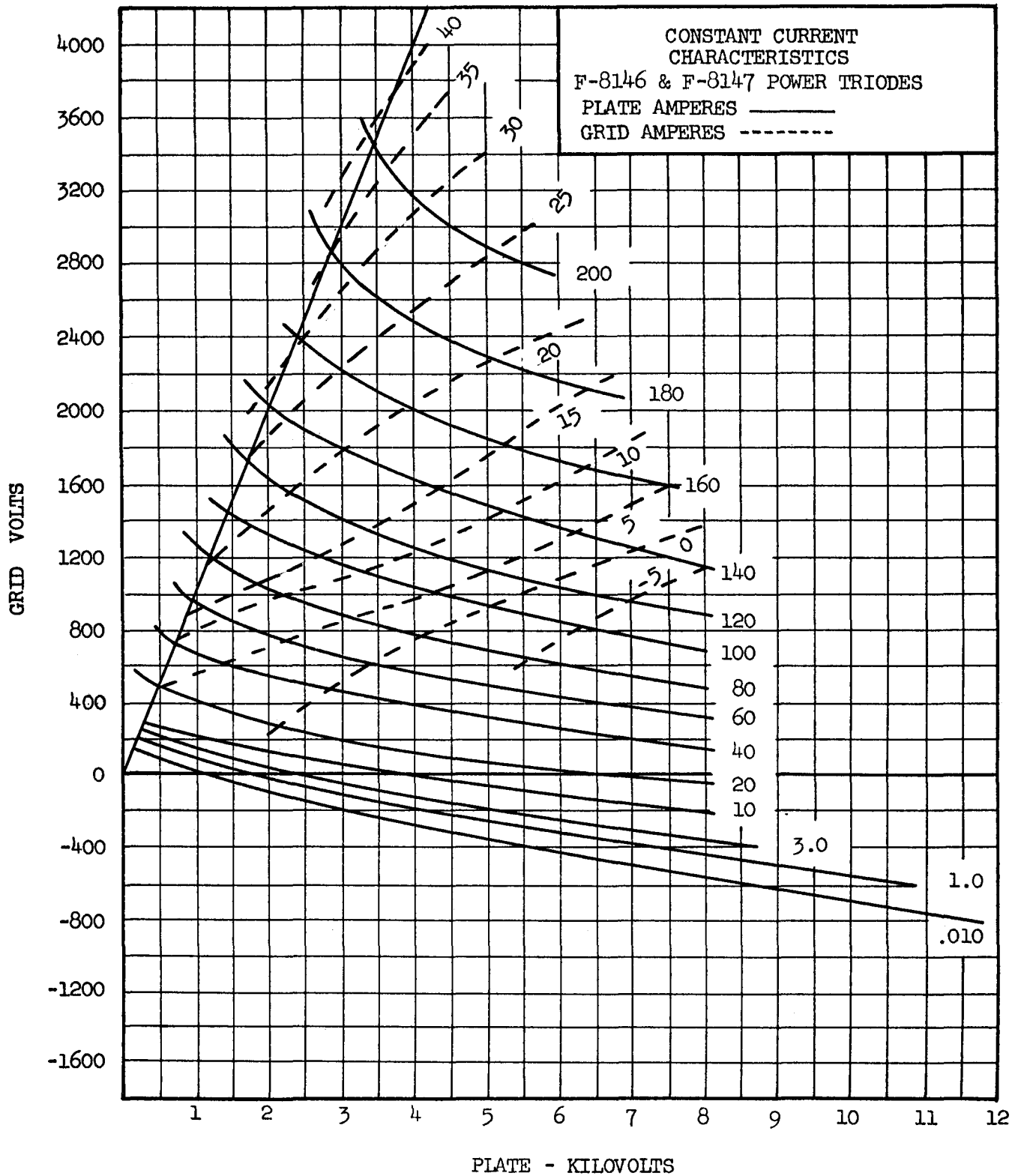
Typical Operation

D-C Plate Voltage	16	kilovolts
Pulse Plate Current	120	amperes
D-C Grid Voltage	-1500	volts
Pulse Grid Current	40	amperes
Pulse Positive Grid Voltage	2200	volts
Duty Factor	.003	
Pulse Length	10	μsec.
Plate Output Voltage	13.5	kilovolts
Pulse Output Power	1.6	mw

Additional information for specific applications can be obtained from the:

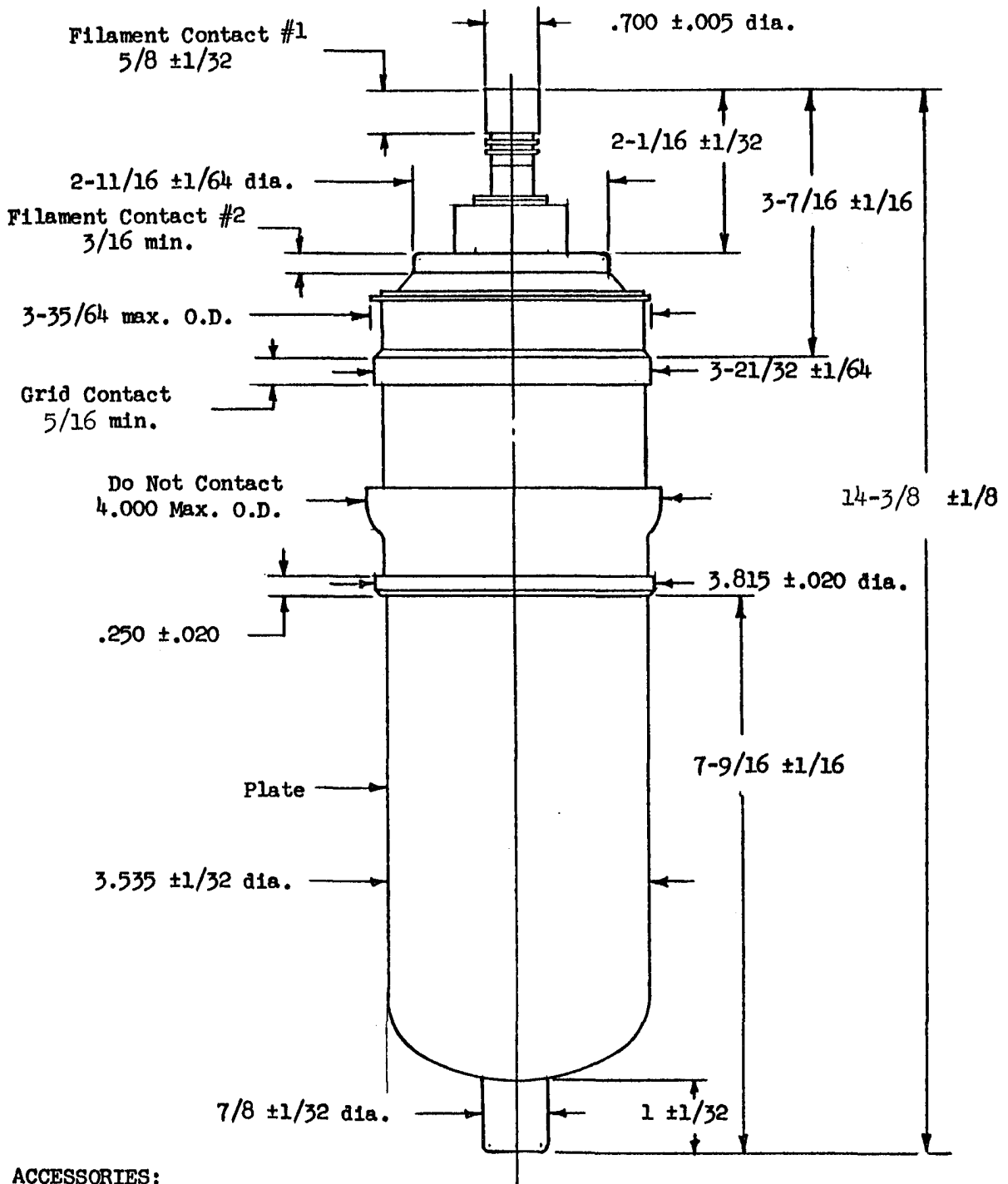
Electron Tube Applications Section
ITT Components Division
P.O. Box 412
Clifton, New Jersey





NOTE: Contact areas are to be concentric within .025".

OUTLINE
F-8146 POWER TRIODE



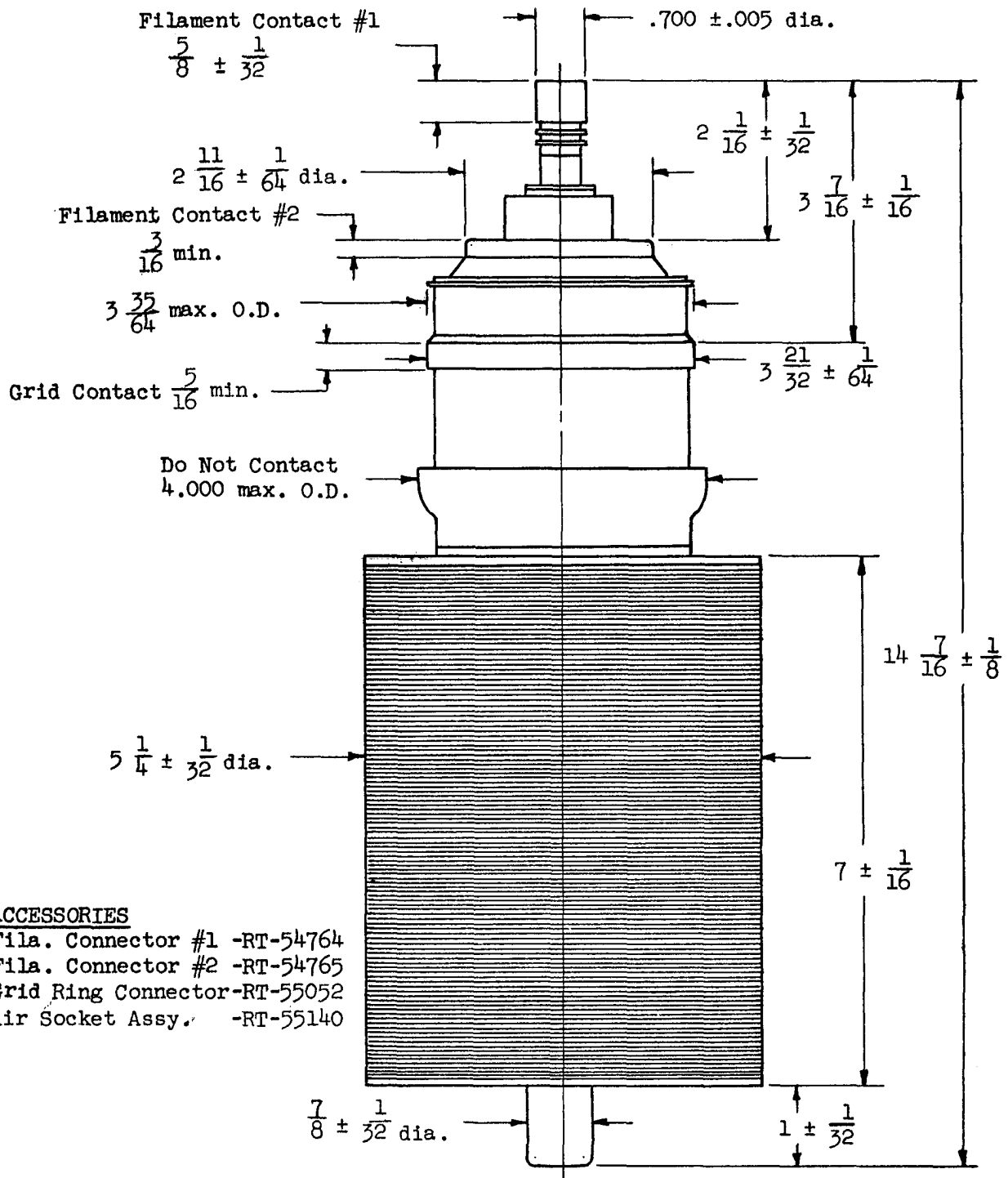
ACCESSORIES:

Filament Connector #1 - RT-54764
Filament Connector #2 - RT-54765

Grid Connector - RT-54763
Water Jacket - RT-55070



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ACCESSORIES

Fila. Connector #1 -RT-54764
 Fila. Connector #2 -RT-54765
 Grid Ring Connector -RT-55052
 Air Socket Assy. -RT-55140

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