



ELECTRONIC TUBE REFERENCE

152TH

Power - Triode electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

TRIODE

Medium-mu power triode for audio-frequency power amplification or modulation and radio-frequency power-amplifier or oscillator service.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	4
NOMINAL HEATER	10 V / 6.25 A	PARALLEL HEATER	5 V / 12.5 A
HEATING	Direct	SERIES OPERATION	Capable
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Triode	
TRANSCONDUCTANCE	0.0083 S
AMPLIFICATION FACTOR	20
MAXIMUM PLATE VOLTAGE	3000 V
MAXIMUM PLATE DISSIPATION	150 W
<i>Published Class-B/Class-C maximum ratings and characteristics promoted.</i>	

152TH — Medium-Mu Power Triode

A high-power, thoriated-tungsten filament triode designed for modulator, oscillator, and radio-frequency power amplifier applications.

Overview

The **152TH** is a medium-mu power triode designed for high-efficiency operation in transmitter and modulator stages. Developed by Eitel-McCullough, Inc. (later a division of Varian), the tube features a

thoriated tungsten filament and is capable of handling high plate voltages and currents. With a maximum plate dissipation rating of 150 watts and a maximum plate voltage rating of 3000 volts, the 152TH is rated for operation at frequencies up to 40 Megacycles (Mc) under full input conditions.

In Class-C radio-frequency (r-f) telegraphy service, a single 152TH can deliver up to 600 watts of plate output power with a driving power of approximately 27 watts. In Class-B modulator service, a pair of these tubes can deliver up to 600 to 700 watts of maximum-signal plate output power, requiring only a modest nominal driving power of 3 to 13 watts depending on the operating point.

Mechanical Design, Mounting, and Cooling

The 152TH is constructed with a glass envelope and is designed for vertical mounting, with the base oriented either up or down. The tube's physical dimensions and mechanical characteristics include:

- **Maximum Overall Length:** 7.625 to 7.63 inches.
- **Maximum Diameter:** 2.563 to 2.57 inches.
- **Net Weight:** 7 to 8 ounces.
- **Shipping Weight:** 1.25 to 2.0 pounds (average).
- **Base:** Special 4-pin, No. 5000B.
- **Basing Configuration:** RMA type 4BC.
- **Socket:** Johnson type No. 124-213 or an equivalent socket.

To ensure reliable operation and prevent damage, the plate and grid leads connected to the tube must be flexible, and the envelope must be protected from excessive vibration and shock.

Cooling Requirements

Cooling of the 152TH is accomplished primarily via convection and radiation. However, heat-dissipating connectors must be installed at the external terminals to protect the metal-to-glass seals. Specifically, an Eimac HR-5 (or equivalent) connector is recommended for the plate terminal, and an HR-6 (or equivalent) is recommended for the grid terminal.

The temperature of the plate and grid seals must never exceed 225°C. Under normal operating conditions in properly designed equipment at frequencies below 40 Mc, forced-air cooling is not strictly required. If the free circulation of air around the tube is restricted, a small fan or centrifugal blower must be utilized to provide additional cooling and maintain seal temperatures below the maximum limit. Seal temperatures can be monitored using temperature-sensitive lacquers such as Tempilaq.

Filament and Electrical Characteristics

The 152TH features a thoriated tungsten filament designed for dual-voltage operation. The filament structure consists of multiple sections that can be connected externally in either a series or parallel configuration via the 4-pin base:

- **Series Connection:** 10.0 volts at 6.25 amperes.
- **Parallel Connection:** 5.0 volts at 12.5 amperes.

Calculation of Filament Power

Using the nominal voltage (V_f) and current (I_f) inputs:

- **Power (Series):** $10.0\text{ V} \times 6.25\text{ A} = 62.5\text{ W}$
- **Power (Parallel):** $5.0\text{ V} \times 12.5\text{ A} = 62.5\text{ W}$

In both configurations, the filament consumes a nominal power of 62.5 watts. For maximum tube life, the filament voltage must be maintained within $\pm 5\%$ of its rated value.

Electrical Parameters

- **Amplification Factor (Average):** 20.
- **Transconductance (g_m):** 8300 μmhos , measured at a plate current (I_b) of 500 mA, a plate voltage (E_b) of 3000 V, and a grid voltage (E_c) of -40 V .
- **Direct Interelectrode Capacitances (Average):**
 - Grid-to-Plate (C_{gp}): 4.8 pF
 - Grid-to-Filament (C_{gf}): 5.7 pF
 - Plate-to-Filament (C_{pf}): 0.4 to 0.8 pF

Class B Audio Frequency Power Amplifier and Modulator

In Class-B audio service, two 152TH tubes are typically operated in a push-pull configuration. The maximum ratings per tube in this service are:

- **D-C Plate Voltage:** 3000 volts maximum.
- **D-C Plate Current:** 450 mA maximum.
- **Plate Dissipation:** 150 watts maximum.

Typical push-pull operating points for two tubes under sinusoidal wave conditions are detailed below, reflecting variations across different equipment designs and revisions:

Parameter	Operating Point 1	Operating Point 2	Operating Point 3	Operating Point 4
D-C Plate Voltage	1500 V	2000 V	2500 V	3000 V
D-C Grid Voltage (approx.)	-65 V	-90 V	-125 V	-150 V
Zero-Signal D-C Plate Current	133 mA	100 mA	40 mA	67 mA

Parameter	Operating Point 1	Operating Point 2	Operating Point 3	Operating Point 4
Max-Signal D-C Plate Current	535 mA	450 mA	340 mA	335 mA
Effective Load (Plate-to-Plate)	5700 Ω	9600 Ω	17000 Ω	20300 Ω
Peak A-F Grid Voltage (per tube)	—	—	195 V	—
Peak A-F Grid Input Voltage (grid-to-grid)	340 V	350 V	—	430 V
Max-Signal Nominal Driving Power	9 W (or 13 W)*	6 W (or 9 W)*	8 W	3 W
Max-Signal Plate Power Output	500 W	600 W	550 W	700 W

Note: Variations in driving power requirements reflect different design revisions, with peak driving power reaching up to 25 watts at 1500 V and 17 watts at 2000 V under certain conditions.

Radio Frequency Power Amplifier and Oscillator (Class-C)

The 152TH is highly effective in high-frequency transmitter stages. It can be operated as a Class-C Telegraphy amplifier/oscillator or as a Plate-Modulated Class-C Telephony amplifier.

Class-C Telegraphy (Key-Down Conditions, One Tube)

Maximum ratings for frequencies up to 40 Mc are:

- **D-C Plate Voltage:** 3000 volts
- **D-C Plate Current:** 450 mA
- **Plate Dissipation:** 150 watts
- **Grid Dissipation:** 30 watts

Typical single-tube operating conditions:

Parameter	1500 V Supply	2000 V Supply	3000 V Supply
D-C Plate Voltage	1500 V	2000 V	3000 V

Parameter	1500 V Supply	2000 V Supply	3000 V Supply
D-C Grid Voltage	−125 V	−200 V	−300 V
D-C Plate Current	333 to 335 mA	300 mA	250 mA
D-C Grid Current	58 mA	74 to 75 mA	70 mA
Peak R-F Grid Voltage (approx.)	265 to 267 V	334 to 335 V	410 V
Driving Power (approx.)	13 W	20 W	27 W
Plate Input Power	500 W	600 W	750 W
Plate Dissipation	150 W	150 W	150 W
Plate Power Output	350 W	450 W	600 W

Plate-Modulated Class-C Telephony (Carrier Conditions, Per Tube)

Under modulated carrier conditions, the maximum ratings are reduced to protect the tube from peak modulation voltages:

- **D-C Plate Voltage:** 2500 volts
- **D-C Plate Current:** 350 mA
- **Plate Dissipation:** 100 watts
- **Grid Dissipation:** 30 watts

Typical single-tube operating conditions:

Parameter	1000 V Supply	1500 V Supply	2000 V Supply	2500 V Supply
D-C Plate Voltage	1000 V	1500 V	2000 V	2500 V
D-C Grid Voltage	−150 V	−200 V	−300 V	−350 V
D-C Plate Current	270 mA	235 mA	220 mA	200 mA
D-C Grid Current	40 mA	28 mA	30 mA	30 mA
Peak R-F Grid Voltage	300 V	330 V	440 V	485 V

Parameter	1000 V Supply	1500 V Supply	2000 V Supply	2500 V Supply
Driving Power	12 W	10 W	12 W	15 W
Grid Dissipation	6 W	4 W	4 W	4 W
Plate Input Power	270 W	350 W	440 W	500 W
Plate Dissipation	100 W	100 W	100 W	100 W
Plate Output Power	170 W	250 W	340 W	400 W

Grid and Plate Dissipation Management

Proper thermal management of the grid and plate is critical to the longevity of the 152TH.

Grid Dissipation

The power dissipated by the grid must never exceed the absolute maximum rating of 30 watts. Grid dissipation (P_g) is calculated using the following formula:

$$P_g = e_{cmp} \times I_c$$

Where:

- P_g is the grid dissipation in watts.
- e_{cmp} is the peak positive grid voltage in volts (measured with a peak-reading voltmeter between the filament and grid).
- I_c is the d-c grid current in amperes.

In applications where the plate loading varies widely, such as r-f heating oscillators, care must be taken to ensure that grid dissipation does not exceed 30 watts under any loading condition.

Plate Dissipation

The plates of the 152TH are designed to operate at a visible red color when dissipating their maximum rated power of 150 watts (or 100 watts in plate-modulated service). Plate dissipation in excess of these maximum ratings is highly damaging and is permissible only for very short periods, such as during transmitter tuning procedures.

Bias Voltage Protection

When employing grid-leak bias, a loss of r-f excitation will cause the grid bias to drop to zero, resulting in dangerously high plate current and excessive plate dissipation. To prevent catastrophic tube failure, suitable protective circuits (such as an overload relay or cathode bias resistor) must be integrated into the

system. Additionally, the grid-leak resistor should be made adjustable to facilitate proper bias and plate current balancing across different tubes.

Technical Summary

The **152TH** is a versatile, high-power, medium-mu triode featuring a thoriated tungsten filament, a special 4-pin No. 5000B base, and an average amplification factor of 20. It is optimized for modulator, oscillator, and amplifier service at frequencies up to 40 Mc. The tube's dual-voltage filament allows operation at either 5.0 V (12.5 A) or 10.0 V (6.25 A).

With a maximum plate dissipation of 150 watts (100 watts under plate modulation) and a maximum plate voltage of 3000 volts, the 152TH can deliver up to 600 watts of r-f output in Class-C telegraphy or up to 700 watts of audio power in a Class-B push-pull modulator configuration. Safe operation requires the use of heat-dissipating connectors on the grid and plate terminals, maintaining seal temperatures below 225°C, and implementing protective bias circuitry to guard against excitation loss.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1950 Eimac Tubes

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1950 EIMAC TUBES

Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Voltage [1]	5 V	Voltage - 5 .0 or 10.0 volts
Voltage [2]	0 V	Voltage - 5 .0 or 10.0 volts
Voltage [3]	10 V	Voltage - 5 .0 or 10.0 volts
Grid-Pla te [1]	4	Grid-Pla te 4 .8 p.p.f
Grid-Pla te [2]	8	Grid-Pla te 4 .8 p.p.f
Grid-Filament	5.7	Grid-Filament 5.7 p.p.f
Plate-Filament [1]	0	Plate-Filament - 0 .8 p.p.f
Plate-Filament [2]	8	Plate-Filament - 0 .8 p.p.f
Transconductance (h,= [1]	500	Transconductance (h,=500ma., Eh = 3 0 0 0 v ., Ec =-40v.) 8300 p.mh os
Transconductance (h,= [2]	3	Transconductance (h,=500ma., Eh = 3 0 0 0 v ., Ec =-40v.) 8300 p.mh os
Transconductance (h,= [3]	0	Transconductance (h,=500ma., Eh = 3 0 0 0 v ., Ec =-40v.) 8300 p.mh os
Transconductance (h,= [4]	0	Transconductance (h,=500ma., Eh = 3 0 0 0 v ., Ec =-40v.) 8300 p.mh os
Transconductance (h,= [5]	0	Transconductance (h,=500ma., Eh = 3 0 0 0 v ., Ec =-40v.) 8300 p.mh os
Transconductance (h,= [6]	-40	Transconductance (h,=500ma., Eh = 3 0 0 0 v ., Ec =-40v.) 8300 p.mh os
Transconductance (h,= [7]	8300	Transconductance (h,=500ma., Eh = 3 0 0 0 v ., Ec =-40v.) 8300 p.mh os
Frequency for Maximum Rat ings	40 MHz	Frequency for Maximum Rat ings 40 mc
D-C Plate Vol tage [1]	1500	D-C Plate Vol tage 1500 2000 3000 3000 volts
D-C Plate Vol tage [2]	2000	D-C Plate Vol tage 1500 2000 3000 3000 volts

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
D-C Plate Vol tage [3]	3000	D-C Plate Vol tage 1500 2000 3000 3000 volts
D-C Plate Vol tage [4]	3000	D-C Plate Vol tage 1500 2000 3000 3000 volts
Max.-Signal D-C Plate Cu rrent, pe r t ube" - • • • •	450	Max.-Signal D-C Plate Cu rrent, pe r t ube" - • • • • 450 ma o
Plate Dissipation, per tube " • • • •	150 W	Plate Dissipation, per tube " • • • • 150 watts
D-C Grid Vol tage (approx,) [1]	-65	D-C Grid Vol tage (approx,) -65 -90 -150 volts
D-C Grid Vol tage (approx,) [2]	-90	D-C Grid Vol tage (approx,) -65 -90 -150 volts
D-C Grid Vol tage (approx,) [3]	-150	D-C Grid Vol tage (approx,) -65 -90 -150 volts
Peak A- F Grid Input Voltage [1]	340 V	Peak A- F Grid Input Voltage 340 350 4 30 volts
Peak A- F Grid Input Voltage [2]	350 V	Peak A- F Grid Input Voltage 340 350 4 30 volts
Peak A- F Grid Input Voltage [3]	4 V	Peak A- F Grid Input Voltage 340 350 4 30 volts
Peak A- F Grid Input Voltage [4]	30 V	Peak A- F Grid Input Voltage 340 350 4 30 volts
Zero-Signal D-C Plate Curren t [1]	133	Zero-Signal D-C Plate Curren t - 133 100 67 ma o
Zero-Signal D-C Plate Curren t [2]	100	Zero-Signal D-C Plate Curren t - 133 100 67 ma o
Zero-Signal D-C Plate Curren t [3]	67	Zero-Signal D-C Plate Curren t - 133 100 67 ma o
Ma x.-S ignal D-C Plate Curren t [1]	535	Ma x.-S ignal D-C Plate Curren t - 535 4 50 335 ma o
Ma x.-S ignal D-C Plate Curren t [2]	4	Ma x.-S ignal D-C Plate Curren t - 535 4 50 335 ma o
Ma x.-S ignal D-C Plate Curren t [3]	50	Ma x.-S ignal D-C Plate Curren t - 535 4 50 335 ma o
Ma x.-S ignal D-C Plate Curren t [4]	335	Ma x.-S ignal D-C Plate Curren t - 535 4 50 335 ma o
Max.-Signal Driving Power (approx.) [1]	9 W	Max.-Signal Driving Power (approx.) - 9 6 3 wat ts
Max.-Signal Driving Power (approx.) [2]	6 W	Max.-Signal Driving Power (approx.) - 9 6 3 wat ts

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Max.-Signal Driving Power (approx.) [3]	3 W	Max.-Signal Driving Power (approx.) - 9 6 3 watts
Effective Load , Plate-to-Plate [1]	5700	Effective Load , Plate-to-Plate - 5700 9 600 203 00 oh ms
Effective Load , Plate-to-Plate [2]	9	Effective Load , Plate-to-Plate - 5700 9 600 203 00 oh ms
Effective Load , Plate-to-Plate [3]	600	Effective Load , Plate-to-Plate - 5700 9 600 203 00 oh ms
Effective Load , Plate-to-Plate [4]	203	Effective Load , Plate-to-Plate - 5700 9 600 203 00 oh ms
Effective Load , Plate-to-Plate [5]	0	Effective Load , Plate-to-Plate - 5700 9 600 203 00 oh ms
Max.-Signal Plate Power Output [1]	500 W	Max.-Signal Plate Power Output 500 600 700 watts
Max.-Signal Plate Power Output [2]	600 W	Max.-Signal Plate Power Output 500 600 700 watts



SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1962 Eimac

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1962 EIMAC

Section 1 · Triode

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-Plate Capacitance	4.8 pF	—
Grid-Filament Capacitance	5.7 pF	—
Plate-Filament Capacitance	0.8 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Frequency for Full Ratings	40 MHz	—
Maximum Signal DC Plate Current	450 mA	ClassB

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
RF Typical Plate Voltage	3000 V	ClassC
RF Typical Plate Power Output	600 W	ClassC
AF Typical Plate Voltage	3000 V	ClassB;TwoTubes
AF Typical Plate Power Output	700 W	ClassB;TwoTubes



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1965 Eimac Tube Manual

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1965 EIMAC TUBE MANUAL

Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
The Eimac	152 W	The Eimac 152TH is a medium-mu power triode intended for use as an amplifier,
oscillator, or modulator. It has a maximum plate-dissipation rating of	150 W	oscillator, or modulator. It has a maximum plate-dissipation rating of 150 watts and a
maximum plate-voltage rating of [1]	3000 MHz	maximum plate-voltage rating of 3000 volts at frequencies up to 40 Megacycles.
maximum plate-voltage rating of [2]	40 MHz	maximum plate-voltage rating of 3000 volts at frequencies up to 40 Megacycles.
The [1]	152 W	The 152TH in class-C r-f service will deliver up to 600 watts plate output power
The [2]	600 W	The 152TH in class-C r-f service will deliver up to 600 watts plate output power
with [1]	27 W	with 27 watts driving power. Two 152TH's in class-B modulator service will deliver
with [2]	152 W	with 27 watts driving power. Two 152TH's in class-B modulator service will deliver
up to [1]	600 W	up to 600 watts maximum-signal plate output power with 8 watts nominal driving

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
up to [2]	8 W	up to 600 watts maximum-signal plate output power with 8 watts nominal driving
Current [1]	12.5 A	Current - - - 12.5 or 6.25 amperes
Current [2]	6.25 A	Current - - - - 12.5 or 6.25 amperes
Grid-Plate	4.8	Grid-Plate - - - - 4.8 uuf d
Grid-Filamen+	5.7	Grid-Filamen+ - - - - 5.7 uufd
Plate-Filam.ent	0.4	Plate-Filam.ent - - . - 0.4 u uf d
Transconductance ([b± [1]	500 mA/V	Transconductance ([b±500 rna, Eb±3000 v) - - 8300 umhos
Transconductance ([b± [2]	3000 mA/V	Transconductance ([b±500 rna, Eb±3000 v) - - 8300 umhos
Transconductance ([b± [3]	8300 mA/V	Transconductance ([b±500 rna, Eb±3000 v) - - 8300 umhos
Highest Frequency for Maximum Ratings	40	Highest Frequency for Maximum Ratings - 40mc
Maximum Temperature of Plate and Grid Seals	2250	Maximum Temperature of Plate and Grid Seals .--- 2250 C
Plate----- Eimac HR	5	Plate----- Eimac HR-5
Grid----- Eimac HR	6	Grid----- Eimac HR-6
RADIO-FREQUENCY POWER AMPLIFIER D-C Plato Voltage [1]	1500 V	RADIO-FREQUENCY POWER AMPLIFIER D-C Plato Voltage - 1500 2000 3000 volts
RADIO-FREQUENCY POWER AMPLIFIER D-C Plato Voltage [2]	2000 V	RADIO-FREQUENCY POWER AMPLIFIER D-C Plato Voltage - 1500 2000 3000 volts
RADIO-FREQUENCY POWER AMPLIFIER D-C Plato Voltage [3]	3000 V	RADIO-FREQUENCY POWER AMPLIFIER D-C Plato Voltage - 1500 2000 3000 volts
OR OSCILLATOR D-C Grid Voltage - -] [1]	25 V	OR OSCILLATOR D-C Grid Voltage - -]25 -200 -300 volts
OR OSCILLATOR D-C Grid Voltage - -] [2]	-200 V	OR OSCILLATOR D-C Grid Voltage - -]25 -200 -300 volts
OR OSCILLATOR D-C Grid Voltage - -] [3]	-300 V	OR OSCILLATOR D-C Grid Voltage - -]25 -200 -300 volts
Class-C Telegraphy (Key-down conditions, one tube) D-C Plate Current [1]	335 A	Class-C Telegraphy (Key-down conditions, one tube) D-C Plate Current - 335 300 250 rna

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Class-C Telegraphy (Key-down conditions, one tube) D-C Plate Current [2]	300 A	Class-C Telegraphy (Key-down conditions, one tube) D-C Plate Current - 335 300 250 rna
Class-C Telegraphy (Key-down conditions, one tube) D-C Plate Current [3]	250 A	Class-C Telegraphy (Key-down conditions, one tube) D-C Plate Current - 335 300 250 rna
D-C Grid Current [1]	58 A	D-C Grid Current. - 58 75 70 rna
D-C Grid Current [2]	75 A	D-C Grid Current. - 58 75 70 rna
D-C Grid Current [3]	70 A	D-C Grid Current. - 58 75 70 rna
D-C PLATE VOLTAGE Driving Power* [1]	13 V	D-C PLATE VOLTAGE Driving Power* -- 13 20 27 watts
D-C PLATE VOLTAGE Driving Power* [2]	20 V	D-C PLATE VOLTAGE Driving Power* -- 13 20 27 watts
D-C PLATE VOLTAGE Driving Power* [3]	27 V	D-C PLATE VOLTAGE Driving Power* -- 13 20 27 watts
D-C PLATE CuRRENT Plate Input Power [1]	500 A	D-C PLATE CuRRENT Plate Input Power - 500 600 750 watts
D-C PLATE CuRRENT Plate Input Power [2]	600 A	D-C PLATE CuRRENT Plate Input Power - 500 600 750 watts
D-C PLATE CuRRENT Plate Input Power [3]	750 A	D-C PLATE CuRRENT Plate Input Power - 500 600 750 watts
PLATE DISSIPATION Plate Dissipation [1]	150 W	PLATE DISSIPATION Plate Dissipation - 150 150 150 watts
PLATE DISSIPATION Plate Dissipation [2]	150 W	PLATE DISSIPATION Plate Dissipation - 150 150 150 watts
PLATE DISSIPATION Plate Dissipation [3]	150 W	PLATE DISSIPATION Plate Dissipation - 150 150 150 watts
GRID DISSIPATION Plate Output Power [1]	350 W	GRID DISSIPATION Plate Output Power - 350 450 600 watts
GRID DISSIPATION Plate Output Power [2]	450 W	GRID DISSIPATION Plate Output Power - 350 450 600 watts

TUBE TINKER

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