



ELECTRONIC TUBE REFERENCE

12K8

Voltage - Triode (with diode, heptode or hexode) electronic tube

CONSOLIDATED TECHNICAL
DATA

2 SECTIONS
CONSTRUCTION
HEXODE-TRIODE

Triode-hexode frequency changer for superheterodyne receivers. The triode supplies local oscillation while the hexode performs mixer action, combining both frequency-conversion stages within one envelope.

GENERAL CHARACTERISTICS

BASE DESIGNATION	8KV	BASE PINS	8
NOMINAL HEATER	12.6 V / 150 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION1 Triode	
MAXIMUM PLATE VOLTAGE	138 V
MAXIMUM PLATE DISSIPATION	0.83 W
<i>Published ratings/characteristics promoted where semantically applicable.</i>	

SECTION2 Hexode	
PLATE RESISTANCE	600000 Ω
TRANSCONDUCTANCE	0.00035 S
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM SCREEN VOLTAGE	150 V
MAXIMUM PLATE DISSIPATION	0.83 W
MAXIMUM SCREEN DISSIPATION	0.77 W
MAXIMUM CATHODE CURRENT	18 mA
Hexode converter section uses SectionType=Other because Hexode is not present in the locked SectionType vocabulary.	

12K8 — Triode-Hexode Converter

The **12K8** (including its glass-octal variant, the **12K8-GT**) is a metal-envelope triode-hexode converter designed to perform simultaneously the functions of mixer and oscillator in superheterodyne receivers, particularly those of the all-wave type. By combining a triode oscillator and a hexode mixer within a single envelope, the 12K8 provides efficient frequency conversion with minimized space and wiring requirements.

Physical Specifications and Basing

The 12K8 features a metal shell envelope (MT-8) with a phenolic small wafer octal 8-pin base (basing designation B8-21). The tube is designed to be mounted in any position. A miniature top cap (C1-4) provides the connection for the hexode control grid (Grid Number 3).

Physical Dimensions

- **Maximum Overall Length:** 3-1/8 inches (3.125 in)
- **Maximum Diameter:** 1-5/16 inches (1.3125 in)
- **Seated Height:** 2-7/16 inches ± 1/8 inch

Terminal Connections

The 12K8 utilizes the **8K** basing arrangement, viewed from the bottom of the base:

Pin / Cap	Connection
Pin 1	Shield
Pin 2	Heater
Pin 3	Hexode Plate

Pin / Cap	Connection
Pin 4	Hexode Grids Number 2 and Number 4 (Screen)
Pin 5	Hexode Grid Number 1 and Triode Grid (Internal Connection)
Pin 6	Triode Plate
Pin 7	Heater
Pin 8	Cathode
Cap	Hexode Grid Number 3 (Control Grid / RF Input)

The heater is designed for operation from either an AC or DC supply, with a nominal voltage of **12.6 V** and a current draw of **0.15 A**. The cathode is a coated unipotential type.

Interelectrode Capacitances

The direct interelectrode capacitances of the 12K8 are measured with the metal shell connected to the cathode:

Capacitance Parameter	Value	Unit
Hexode Grid Number 3 to Hexode Plate	0.03	μμF
Hexode Grid Number 3 to Triode Plate	0.02	μμF
Hexode Grid Number 3 to Triode Grid and Hexode Grid Number 1	0.2	μμF
Triode Grid and Hexode Grid Number 1 to Triode Plate	1.1	μμF
Triode Grid and Hexode Grid Number 1 to Hexode Plate	0.1	μμF
Hexode Grid Number 3 to All Other Electrodes (R-F Input)	6.6	μμF
Triode Plate to All Other Electrodes Except Triode Grid and Hexode Grid Number 1 (Oscillator Output)	3.2	μμF

Capacitance Parameter	Value	Unit
Triode Grid and Hexode Grid Number 1 to All Other Electrodes Except Triode Plate (Oscillator Input)	6.0	μF
Hexode Plate to All Other Electrodes (Mixer Output)	3.5	μF

Maximum Ratings

The 12K8 has maximum ratings established under both the Design Center and Absolute Maximum systems. Operating the tube beyond these limits can impair performance and shorten service life.

Parameter	Design Center	Absolute Maximum	Unit
Hexode Plate Voltage	300	330	Volts
Hexode Screen (Grids Number 2 and 4) Voltage	150	165	Volts
Hexode Screen Supply Voltage	300	330	Volts
Hexode Control-Grid (Grid Number 3) Voltage	Never Positive	Never Positive	—
Triode Plate Voltage	125	138	Volts
Hexode Screen Dissipation	0.7	0.77	Watt
Hexode Plate Dissipation	0.75	0.83	Watt
Triode Plate Dissipation	0.75	0.83	Watt
Total Cathode Current	16	18	Milliamperes

Characteristics and Typical Operation

In typical converter service, the 12K8 operates with a triode grid resistor of 50,000 ohms. The table below details the operating characteristics under two different hexode plate voltage conditions:

Parameter	Condition A	Condition B	Unit
Hexode Plate Voltage	100	250	Volts
Hexode Screen Voltage	100	100	Volts
Hexode Control-Grid Voltage	-3	-3	Volts
Triode Plate Voltage	100	100	Volts
Triode Grid Resistor	50,000	50,000	Ohms
Hexode Plate Resistance (Approx.)	0.4	0.6	Megohm
Conversion Transconductance	325	350	Micromhos
Conversion Transconductance (at -30 V Grid 3 Bias)	2	2	Micromhos
Hexode Plate Current	2.3	2.5	Milliamperes
Hexode Screen Current	6.2	6.0	Milliamperes
Triode Plate Current	3.8	3.8	Milliamperes
Triode Grid & Hexode Grid 1 Current	0.15	0.15	Milliamperes
Total Cathode Current	12.5	12.5	Milliamperes

At these operating points, the triode oscillator section operates with an oscillator plate voltage of 100 V and an oscillator plate current of 3.8 mA. The conversion transconductance is highly responsive to the control-grid bias, dropping from over 300 micromhos down to approximately 2 micromhos when the hexode control-grid (Grid Number 3) bias is increased to -30 V. This wide range of conversion transconductance allows for effective automatic volume control (AVC) in receiver designs.

Operation Characteristics and Curves

The operational characteristics of the 12K8 illustrate the relationship between the triode grid/hexode grid number 1 D-C current and key performance parameters, including conversion transconductance (S_c), total cathode current (I_k), and hexode plate resistance (r_p).

When the D-C current of the combined triode grid and hexode grid number 1 varies from 0 to 0.4 milliamperes:

- **Conversion Transconductance (S_c):** Reaches a peak of approximately 350 micromhos at around 0.1 to 0.15 mA of grid current, after which it gradually decreases as grid current increases.
- **Total Cathode Current (I_k):** Decreases steadily as the grid current increases, reflecting the self-biasing action of the triode grid resistor.
- **Hexode Plate Resistance (r_p):** Shows a corresponding variation, maintaining a high value (typically in the range of 0.4 to 0.6 megohms) under normal operating grid currents.

These curves demonstrate that optimal frequency converter performance is achieved when the oscillator section is adjusted to produce a grid current of approximately 0.1 to 0.15 mA through the 50,000-ohm grid resistor.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

195X General Electric Essential Characteristics

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

195X GENERAL ELECTRIC ESSENTIAL CHARACTERISTICS

Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Triode oscillator plate voltage	100 V	Converter
Triode oscillator plate current	3.8 mA	Converter

195X GENERAL ELECTRIC ESSENTIAL CHARACTERISTICS

Section 2 · Hexode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	Converter
Screen voltage	100 V	Converter
Grid voltage	-3 V	Converter
Plate current	2.5 mA	Converter
Screen current	6 mA	Converter

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Oscillator grid current	0.15 mA	Converter

1968 General Electric Co

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

1968 GENERAL ELECTRIC CO
Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Typical Triode Plate Voltage	100 V	—

1968 GENERAL ELECTRIC CO
Section 2 · Hexode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Typical Hexode Plate Voltage	250 V	—
Typical Hexode Screen Voltage	100 V	—

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