THYRATRON
FOR RELAY AND GRID-CONTROLLED RECTIFIER APPLICATIONS
7-PIN MINIATURE FOUR ELECTRODES
INERT-GAS TUBE NEGATIVE CONTROL CHARACTERISTICS

DESCRIPTION AND RATING

The 2D21 is a miniature, four-electrode, inert-gas-filled thyatron with negative control characteristics for use in relay and grid-controlled rectifier applications. Operating characteristics of the tube include a high-control ratio essentially independent of temperature over a wide range, low grid-anode capacitance, and very low grid current.

GENERAL

ELECTRICAL
Cathode—Coated Unipotential
Heater Characteristics and Ratings
Heater Voltage, AC or DC* .................. 6.3 ± 0.6 Volts
Heater Current† .................... 0.6 Amperes
Cathode Heating Time, minimum .......... 10 Seconds
Direct Interelectrode Capacitances, approximate‡
   Grid-Number 1 to Anode ................ 0.026 pf
   Grid-Number 1 to Cathode and Grid-Number 2 .... 2.4 pf

MECHANICAL
Mounting Position—Any
Type of Cooling—Air
Envelope—T-5½, Glass
Base—E7-1, Miniature Button 7-Pin

MAXIMUM RATINGS

Absolute-Maximum ratings are limiting values of operating and environmental conditions applicable to any electron tube of a specified type as defined by its published data and should not be exceeded under the worst probable conditions.

The tube manufacturer chooses these values to provide acceptable serviceability of the tube, making no allowance for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration and all other electron devices in the equipment.

The equipment manufacturer should design so that initially and throughout life no absolute-maximum value for the intended service is exceeded with any tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of the tube under consideration and all other electron devices in the equipment.

The tubes and arrangements disclosed herein may be covered by patents of General Electric Company or others. Neither the disclosure of any information herein nor the sale of tubes by General Electric Company conveys any license under patent claims covering combinations of tubes with other devices or elements. In the absence of an express written agreement to the contrary, General Electric Company assumes no liability for patent infringement arising out of any use of the tubes with other devices or elements by any purchaser of tubes or others.
MAXIMUM RATINGS (Continued)

ABSOLUTE MAXIMUM VALUES

Peak Anode Voltage
- Inverse ............................................. 1300 Volts
- Forward ............................................ 650 Volts

Cathode Current
- Peak .................................................. 0.5 Amperes
- Average .............................................. 0.1 Amperes
- Maximum Averaging Time ..................... 30 Seconds
- Fault .................................................. 10 Amperes
- Maximum Duration ................................. 0.1 Seconds

Negative Control-Grid Voltage
- Before Conduction ................................. 100 Volts
- During Conduction ................................. 10 Volts

Positive Control-Grid Current
- Anode Positive .................................. 10 Milliamperes
- Anode Negative .................................. 10 Milliamperes

Negative Shield-Grid Voltage
- Before Conduction ................................. 100 Volts
- During Conduction ................................. 10 Volts

Positive Shield-Grid Current
- Anode Positive .................................. 10 Milliamperes
- Anode Negative .................................. 10 Milliamperes

Heater-Cathode Voltage
- Heater Positive with Respect to Cathode .... 25 Volts
- Heater Negative with Respect to Cathode .... 100 Volts

Control-Grid Circuit Resistance ............... -75 to +90 C

CHARACTERISTICS AND TYPICAL OPERATION

AVERAGE CHARACTERISTICS
- Ionization Time, approximate .............. 0.5 Microseconds

Deionization Time, approximate
- Ebb = 125 volts d-c, Ib = 0.1 ampere d-c, Rg = 1000 ohms
  - Ecc1 = - 100 Volts DC ......................... 35 Microseconds
  - Ecc1 = - 11 Volts DC ......................... 75 Microseconds

- Anode Voltage Drop ............................ 8 Volts

- Critical Grid Current, maximum
  - Ebb = 460 Volts RMS .......................... 0.5 Microamperes

FOOTNOTES
*
The equipment designer should design the equipment so that heater voltage is centered at the specified bogey value, with heater supply variations restricted to maintain heater voltage within the specified tolerance.
† Heater current of a bogey tube at Ef = 6.3 volts.
‡ Without external shield.
AVERAGE CHARACTERISTICS
BEFORE ANODE CONDUCTION

\[ E_f = 6.3 \text{ VOLTS} \]
\[ E_{c2} = 0 \text{ VOLTS} \]

AVERAGE CHARACTERISTICS
DURING ANODE CONDUCTION

\[ E_f = 6.3 \text{ VOLTS} \]
\[ E_{c2} = 0 \text{ VOLTS} \]

DC GRID-NUMBER 1 VOLTAGE IN VOLTS

OCTOBER 17, 1953
RANGES SHOWN ARE FOR TWO VALUES OF GRID RESISTOR - 0.1 MEGOHM AND 10 MEGOHMS - AND TAKE INTO ACCOUNT INITIAL DIFFERENCES BETWEEN INDIVIDUAL TUBES AND SUBSEQUENT DIFFERENCES DURING TUBE LIFE, FOR A HEATER-VOLTAGE RANGE OF 5.7 TO 6.9 VOLTS.

$E_{CP} = 0$ VOLTS