

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
MICROWAVETR SWITCH

1B57

Specialized - Switching Tube electronic tube

Fixed-tuned ATR gas-switching tube for microwave radar service. Its discharge rapidly changes RF path conditions during transmitter and receiver intervals.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	— / —	PARALLEL HEATER	— / —
HEATING	Indirect; cold cathode	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 MicrowaveTRSwitch
No fixed ratings recorded.
Special microwave/gas-discharge section; published electrical data retained as section parameters.

1B57 — Fixed-Tuned ATR Gas Switching Tube

The **1B57** is a fixed-tuned ATR (Anti-Transmit-Receive) gas switching tube designed for operation in the *S_a* band. Sponsored by the Sperry Gyroscope Co., Inc., and registered under RMA Release Number 444 on October 5, 1945, this specialized microwave tube is designed for high-frequency radar and communication systems.

Electrical and RF Characteristics

The 1B57 is engineered to operate at a specific resonant frequency with defined electrical limits to ensure proper impedance matching and switching performance in waveguide or transmission line assemblies. Its primary electrical and radio-frequency characteristics include:

- **Resonant Frequency:** The tube is fixed-tuned to a nominal resonant frequency of **3325 Mc.** (megacycles per second) with a tolerance of $\pm 1/2\%$. This precise tuning ensures optimal performance within its designated portion of the S_a band.
- **Loaded Q (Q_L):** The maximum loaded quality factor (Q_L) is rated at **4.5**. This relatively low Q-factor indicates a broad operating bandwidth around the resonant frequency, which is typical for gas switching devices of this class.
- **Tuning Susceptance (B/Y_0):** The normalized tuning susceptance is specified within a range of ± 0.05 , ensuring minimal mismatch when integrated into the transmission system.
- **Equivalent Conductance (G/Y_0):** The maximum normalized equivalent conductance is **0.1**, representing low insertion loss and high efficiency when the tube is in its non-operating or unfired state.
- **Transmitter Peak Power:** The tube is rated to handle a minimum transmitter peak power of **20 kW**, making it suitable for high-power pulsed microwave applications.

Mechanical and Environmental Characteristics

The physical construction and environmental tolerances of the 1B57 are designed to withstand demanding operating conditions while maintaining stable electrical characteristics.

- **Ionizable Medium:** The tube utilizes **Argon** gas as its internal ionizable medium. When subjected to high-power RF energy from a transmitter, this gas ionizes to form a conductive path, facilitating the switching action.
- **Mounting Position:** The 1B57 can be operated in **any** permissible mounting position, offering flexibility in system layout and waveguide configuration.
- **Environmental Limits:** The device is rated for reliable operation across a wide ambient temperature range, spanning from **-50 to +100 °C**. This wide range ensures stability in extreme environmental conditions, such as those encountered in military or aerospace installations.
- **Physical Dimensions and Mounting:** The physical envelope of the tube includes **10-32** diameter mounting holes to facilitate secure mechanical attachment to the waveguide or system chassis.

Technical Summary

The **1B57** is a fixed-tuned S_a -band ATR gas switching tube containing an **Argon** ionizable medium. It is characterized by a resonant frequency of **3325 Mc.** *imes* **1/2%**, a maximum loaded Q of **4.5**, a tuning susceptance of ± 0.05 , and a maximum equivalent conductance of **0.1**. Capable of handling a minimum transmitter peak power of **20 kW**, the tube is designed for versatile installation in any mounting position and is rated to operate across an ambient temperature range of **-50 to +100 °C**.

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