

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
MICROWAVETR SWITCH

1B31

Specialized - Switching Tube electronic tube

Gas-filled microwave TR/ATR switching tube for pulsed transmitter/receiver duplexer service, protecting or isolating receiver and transmitter paths during radar pulses.

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.
Published ratings and characteristics promoted where applicable; additional useful values retained as parameters.

1B31 Hydrogen-Argon Spark Gap Modulator Tube

The **1B31** (also identified by the manufacturer's designation **1391XK**) is a hydrogen-argon filled spark gap modulator tube. Developed by the Western Electric Company and registered under RMA Release #688 on September 10, 1948, this specialized two-terminal envelope is designed for high-energy switching and pulse modulation.

Construction and Application

The 1B31 is constructed as a two-terminal spark gap envelope containing an anode terminal and a cathode terminal. The envelope is filled with a hydrogen-argon gas mixture, which provides the necessary medium for spark gap operation.

The primary application of the 1B31 is in pulse modulator circuits, where it serves as a pulse-triggered switch. In operation, the tube controls the rapid release of energy that has been previously stored in a pulse-shaping network. For systems requiring higher voltage handling or specific switching configurations, two or more 1B31 tubes may be operated in series.

Electrical Ratings and Operating Limits

The electrical operation of the 1B31 is defined by strict minimum and maximum limits. These maximum ratings are independent limits and do not apply simultaneously:

- **Peak Voltage:** The maximum peak voltage per gap is 4.6 kilovolts.
- **Peak Current:** The tube is rated for a minimum peak current of 30 amperes and a maximum peak current of 300 amperes.
- **Pulse Repetition Rate:** The allowable pulse repetition rate ranges from a minimum of 200 pulses per second to a maximum of 1600 pulses per second.
- **Pulse Duration:** The pulse duration must be maintained between a minimum of 0.25 microseconds and a maximum of 5.0 microseconds.

Mechanical Specifications and Physical Dimensions

The 1B31 is designed to be mounted in any position. Its physical structure is defined by the following mechanical parameters:

- **Overall Length:** $4\text{-}1/16 \pm 1/8$ inches
- **Maximum Diameter:** $2\text{-}1/4$ inches
- **Anode Terminal (Top):** Features a diameter of 0.586 ± 0.007 inches, with a minimum contact area length of $13/32$ inches and a maximum of $1/2$ inch.
- **Cathode Terminal (Bottom):** Features a diameter of 0.884 ± 0.010 inches, with an inside contact area length ranging from a minimum of $11/32$ inches to a maximum of $17/32$ inch.

To ensure proper alignment in equipment sockets, the tube is manufactured under strict eccentricity limits. The maximum bulb eccentricity is $3/64$ inches. Additionally, the terminal contact surface eccentricity is restricted to a maximum of $1/32$ inches from a centerline drawn through the center of the ends of the anode and cathode terminals.

Historical Status

At the time of its official RMA release in September 1948, the 1B31 was already classified as obsolete. The registration documentation noted that manufacturing facilities for this tube type were no longer available.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

194X Western Electric Random

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

194X WESTERN ELECTRIC RANDOM

Section 1 · MicrowaveTRSwitch

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum peak voltage per gap	4.6 kV	—
Peak current range	30–300 A	—
Pulse repetition rate	200–1600 pps	—

TUBE TINKER

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and their source documents.

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