

# OPERATION AND MAINTENANCE MANUAL FOR BIAS TEES



**Figure 1.** Model K250 Bias Tee

## 1. INTRODUCTION

This manual describes the Model K250 and V250 Bias Tee (Figure 1). It provides specifications and a list of precautions the user should observe when using the bias tees.

## 2. DESCRIPTION

The precision K250 and V250 Bias Tees were designed for applications where both dc and RF signals must be applied to a device under test. They are particularly suited for active device measurements. DC voltages of up to 30 volts at 0.5 amperes may be applied to test devices with negligible effect on RF performance. Low RF throughline loss (dB) and low return loss ensure negligible effect on measurements up to 60 GHz. An RF input dc block isolates the input port from the applied bias voltage.

## 3. SPECIFICATIONS

Table 2 provides performance specifications.

## 4. PRECAUTIONS

ANRITSU K250 and V250 Bias Tees are high-quality, precision laboratory devices and should receive the same care and respect afforded other such components. Complying with the following precautionary notes will guarantee longer component life and less equipment downtime due to connector failure. Also, such compliance will ensure that RF component failures are not due to misuse or abuse—two failure modes not covered under the ANRITSU warranty.

- a. ***Beware of Destructive Pin Depth on Mating Connectors.*** Measure the pin depth of the connector that mates with the RF component, *before* mating. Use an ANRITSU Pin Depth Gauge (Figure 2, Table 1) or equivalent. Based on RF components returned for repair, destructive pin depth on mating connectors is the major cause of failure in the field. When an RF component connector is mated with a connector having a destructive pin depth, damage will likely occur to the RF component connector. (A destructive pin

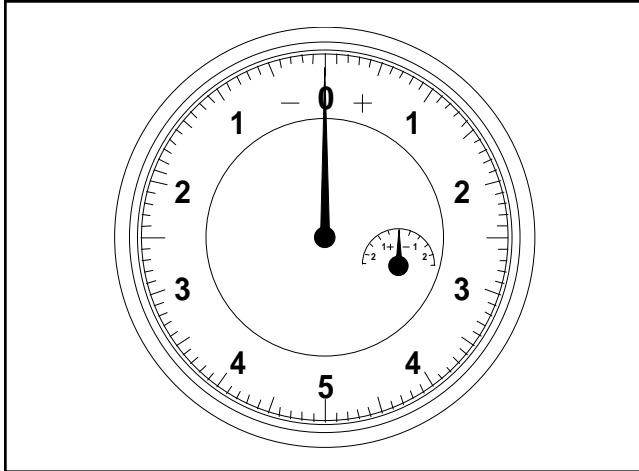
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**Figure 2.** Pin Depth Gauge

**Table 1.** Available Gauging Sets

Model	Connector Type	Gauging Set Model
V250	V	Consult Factory
K250	K	01-162

depth has a center pin that is too long in respect to the connector's reference plane.)

The center pin on an RF component connector has a precision tolerance measured in mils (1/1000 inch), whereas connectors on test devices that mate with RF components may not be precision types. Their pins may not have the proper depth. *They must be measured before mating to ensure suitability.* When gauging pin depth, if the test device connector measures out of tolerance in the "+" region, the center pin is too long. Mating under this condition will likely damage the RF component connector. On the other hand, if the test device connector measures out of tolerance in the "-" region, the center pin is too short. While this will not cause any damage, it will result in a poor connection and a consequent degradation in performance.

The pin depth for bias tee models are as shown below:

K250: 0.000 to -0.005.

V250: 0.000 to -0.003.

**b. Avoid Over Torquing Connectors.** Over torquing connectors is destructive; it may damage the connector center pin. *Never* use pliers to tighten connectors.

**c. Avoid Mechanical Shock.** RF components are designed to withstand years of normal bench handling. However, do not drop or otherwise treat them roughly. They are laboratory-quality devices and, like other such devices, require careful handling.

**d. Keep Bias Tee Connectors Clean.** The precise geometry that makes the RF component's high performance possible can be easily disturbed by dirt and other contamination adhering to connector interfaces. When not in use, keep the connectors covered. Refer to paragraph 5 for cleaning instructions.

## 5. MAINTENANCE

ANRITSU recommends that no maintenance other than cleaning be attempted by the customer. The bias tee should be returned to ANRITSU for repair and/or service when needed.

The traditional method of cleaning K Connectors with a cotton swab and alcohol can break the male connector pin on the precision connectors. The reason: the cotton swab has a larger diameter than the connector (that is, the area between the inner wall and the center pin.)

We still recommend using a cotton swab; however, you need to trim the swab before inserting into the connector.

Some precautions bias tee:

Use either the finger saver that has been provided with the bias tee or use a 5 inch-pound torque wrench when connecting to other devices. No other tools are recommended.

Always spin the coupling nut to tighten connections. Spinning the connector body causes premature wear to the connector interface.

Do not disturb connector center pin. Improper use (see above) of a cotton swab or other such probe to clean the inner connector may cause the center conductor to hinge on its bead and weaken or shear the internal connection.

**Table 2.** Performance Specifications, 1 of 2

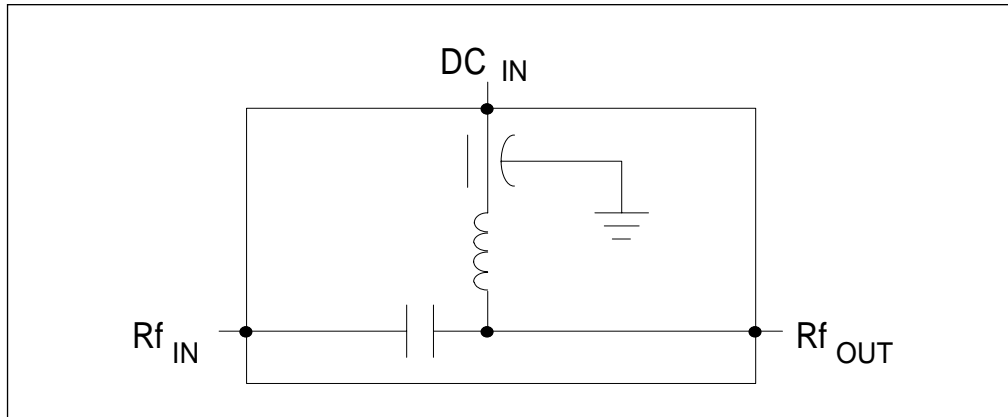
Specification	K250	V250
Frequency Range	0.1 to 40 GHz <sup>1</sup>	0.1 to 60 GHz <sup>1</sup>
Insertion Loss	1.2 dB maximum <sup>2</sup>	2.2 dB maximum <sup>2</sup>
Return Loss	15 dB minimum to 20 GHz 10 dB minimum to 40 GHz	13 dB minimum to 20 GHz 9 dB minimum to 40 GHz 8 dB minimum to 60 GHz
RF Power	1W maximum	1W maximum
DC Voltage	30V maximum	30V maximum
DC Current	0.5A maximum	0.5A maximum
DC Port Isolation	20 dB at 0.1 GHz 40 dB above 0.5 GHz	20 dB at 0.1 GHz 40 dB above 0.5 GHz
RF Connectors	Input: K Male Output: K Female	Input: V Male Output: V Female
DC Connector	SMC Male	SMC Male

<sup>1</sup> Usable between 0.04 and 0.1 GHz with degraded performance

<sup>2</sup> Typical

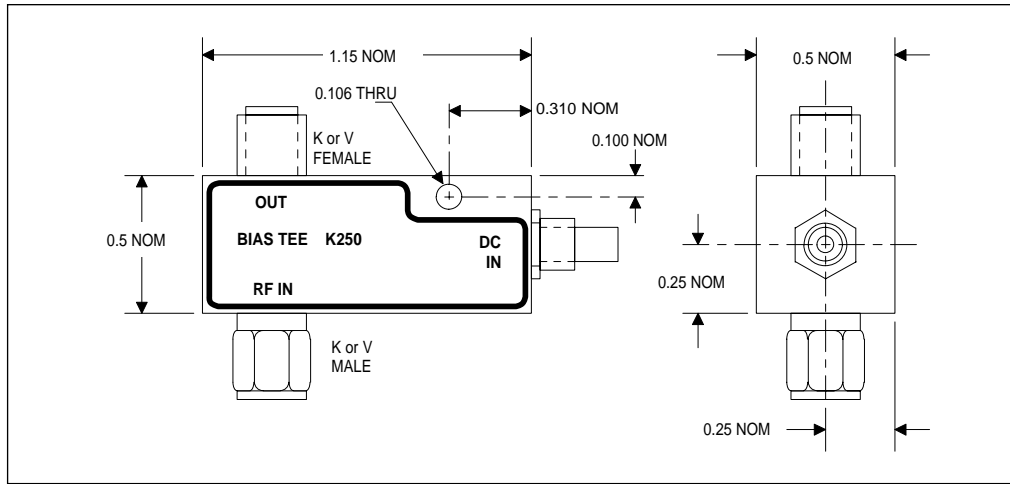
**Weight:** 57 g (2 oz.)

**Temperature Range:** -0°C to +60°C



**Schematic Diagram (K and V Connector Models)**

**Table 1. Performance Specifications, 2 of 2**



**Outline Drawing (K and V Models; Dimensions in Inches)**