

The Omega-t Antenna Noise Bridge



If you have to adjust any antenna matching sections, determine antenna resonance frequencies or cut coaxial lines $\frac{1}{4}$ or $\frac{1}{2}$ wavelength long, the new Omega-t* Antenna Noise Bridge is one of the slickest little gadgets around. When you're trying to prune an antenna or tune a gamma match with an ordinary antenna impedance bridge and grid-dip oscillator, you almost need five hands. Not so with the TE-7-01 Antenna Noise Bridge—it will fit in the palm of your hand and the only auxiliary equipment you need is a receiver.

Since the noise bridge covers the frequency range from 1 to 100 MHz, and will measure impedances from about 10 to 100 ohms, it is ideal for the 50-ohm systems used by most hams. To tune up an antenna all you have to do is connect the antenna and receiver to the bridge terminals and set the dial

near 50 ohms. Then you tune the receiver over the frequency range for which the antenna was designed looking for a null in the noise output of the noise bridge. Since noise output is more than sufficient to mask any received signals, false indications are eliminated. When there is a noise null on your receiver, either in audio level or minimum S-meter reading, the resonant frequency of the antenna may be read off the dial of the receiver.

After the resonant frequency has been determined, the noise bridge dial is adjusted for best noise null. The antenna impedance may be read directly from the dial. When the noise null is found, the potentiometer (impedance dial on the front of the bridge) may sound scratchy and noisy. This is because of the high resolution capability of the device. The balanced-bridge condition represents a ratio greater than 30 dB and measurement resolution is a small fraction of an ohm.

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Therefore, slight movements of the dial cause a large change in the noise null level.

The Antenna Noise Bridge may also be used to determine the electrical length of coaxial line—either one-half or one-quarter wavelength long (or multiples thereof). An antenna-matching system may be adjusted to the proper impedance with the noise bridge (after the antenna is tuned to the desired resonant frequency) by alternately adjusting the match and the noise bridge. Because of the effects of coaxial-line length this should be done with the noise bridge connected directly across the antenna terminals. However, if a coaxial line must be used, it should be one-half wavelength long or a multiple thereof.

The secret to the operation of the Omega-t Antenna Noise Bridge is the special quadrafilar wound toroid shown in Fig. 1. On one side of this toroid is the wideband noise generator; the antenna, receiver and calibrated potentiometer are connected to the other winding. When the noise across the resistance arm equals the noise across the antenna, the bridge is balanced and minimum noise is applied to the receiver.

The wideband noise generator is a circuit designed specifically for this job. The noise source itself is a reverse biased diode—especially selected for wideband noise output. The noise is amplified and applied to the quadrafilar transformer through a three-transistor circuit. The design is such that the noise is balanced across the generator side of the transformer.

One of the big advantages of the Antenna Noise Bridge, of course, is its size and the speed with which impedance measurements can be made. This applies to any antenna that you may use—whether it is a beam, a dipole, a quad, whip, long wire, or random length wire with an antenna tuner. The only limitation is the frequency and impedance range of the unit. For most hams using 50-ohm coax this should pose no problem.

There are several other jobs that you can do very simply with the noise bridge. If, for example, you want to know what frequency range you must operate in to limit your SWR to less than 2:1, all you have to do is run some impedance points from one end of the band to the other. For an SWR less than 2:1, your upper and lower band limits will be determined by the point where the impedance indicated by the bridge is less than 25-ohms or more than 100-ohms. For an SWR

Omega-t TE 7-01 Specifications

Frequency range:	1 to 100 MHz.
Impedance range:	0 to 100 ohms (for nominal 50-ohm coaxial systems).
Associated equipment required:	Receiver which tunes frequency of interest. S-meter useful but not required. Masks normal received signals to eliminate false indications.
Signal level:	Quadrafilar wound bridge transformer, 3 transistors, 1 special diode.
Circuit:	Antennas—quads, beams, dipoles, whips, long wires, random length wires with matching networks. Coaxial matching systems — series, shunt, gamma.
Systems which may be tested:	9-volt transistor radio battery.
Power supply:	2¼x3¼x3 inches.
Size:	\$24.95.
Price:	

of 1.5:1 or less, your points would be 33 and 75 ohms.

Another application for the Antenna Noise Bridge is checking baluns. Have you ever wondered if that balun *really* represented a step down of 4:1 (or 1:1)? Just connect a 200-ohm resistor across the output terminals of the balun (50 ohms for 1:1 baluns) and measure the input impedance with the bridge. You can also check the balun to see what frequency it is cut for—at frequencies very far off its center frequency it won't provide the desired transformation ratio. A similar check can be run on the broadband baluns that are currently on the market. Since the Antenna Noise Bridge may be used

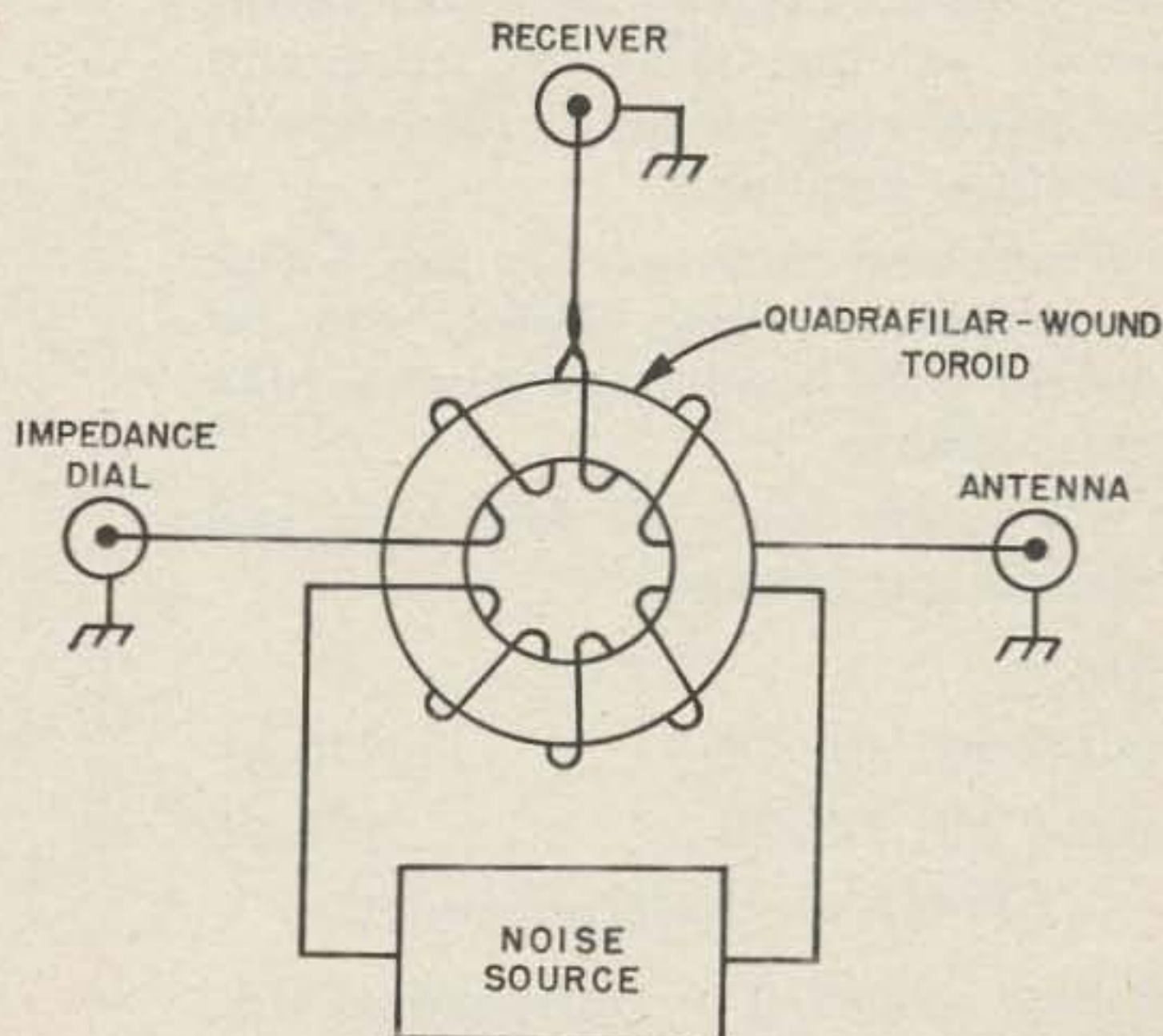


Fig. 1. Diagram of the Omega-t Antenna Noise Bridge. A wideband noise source is connected across one side of a balanced, quadrafilar wound transformer; the receiver, antenna and calibrated potentiometer are connected across the other.

from 1 to 100 MHz, it is ideal for checking wideband systems.

It may also be used for checking the resonant frequencies of trap dipoles and beams. When checking a properly adjusted three-band beam, for example, you will find three separate and distinct resonant points. If the resonant points aren't in the parts of the band where you want to operate, it's a simple operation with the antenna noise bridge to adjust the traps right on the money.

After plodding along with an old homebrew antenna impedance bridge excited by a grid-dip oscillator for a good many years, the Antenna Noise Bridge was a welcome change. For versatility, simplicity, and use, it's going to be pretty hard to beat. If you are planning on doing any antenna work in the near future, give yourself a break—the time you save will be well worth the small investment for one of the handiest gadgets I've seen in a long time—the Antenna Noise Bridge.

... WIDTY

RTTY Hints

For some unknown reason, military surplus Model 15 page printers more often than not come without paper spindles. I made a more-than-adequate substitute by wheedling the chemistry department out of two 1" tapered rubber stoppers with a center hole. When pushed on a shaft made of any rod material that will fit the machine, the stoppers do a good job of wedging the paper anywhere on the shaft.

The problem of re-inking faint ribbons is easily solved. Actually, no "re-inking" is necessary: very seldom does a ribbon, either TTY or typewriter, lose its ink—the ink dries out. Therefore, it is a simple matter to reactivate it with ordinary 3-in-1 oil. Simply remove ribbon (wound fully on one spool) and the take-up spool. Wind a turn or two on the take-up spool. Unroll about six inches of ribbon from the full spool and put a thin line of oil on the first three inches. Roll up the six inches. You will notice the oil seeping through from the oiled ribbon on the unoled part that is rolled on top of it. Follow this procedure until the ribbon has been fully wound on the take-up spool. Let the spool set at least overnight so that the oil can be absorbed evenly throughout the ribbon.

... Horton Presley KØHVK

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