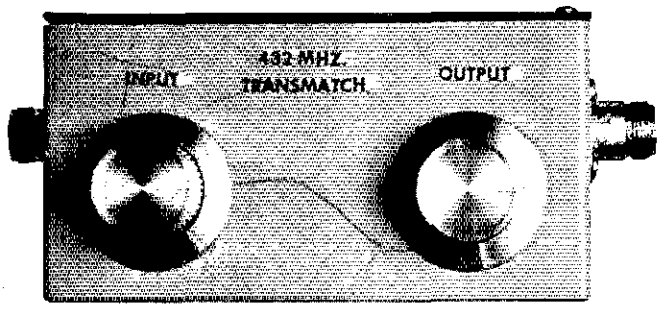
A Transmatch for 432 MHz — Why Not!



Have you been looking for a way to use 75-ohm CATV hardline in your 50-ohm, 432-MHz system? Or is a fussy solid-state rig giving you headaches? This neat little Transmatch will solve both problems.

By Carmen F. Moretti,* W2AIH

The Transmatch described here can solve a number of problems confronting the 432-MHz enthusiast. Not only will matching your amplifier to the transmission line make the final amplifier "happy," the added selectivity provided by the tuner will aid in suppressing unwanted signals in your receiving system. At the author's location a harmonic from a nearby fm broadcast station was heard in the 432-MHz band. The installation of the uhf Transmatch eliminated the unwanted signal.

I developed this circuit after discovering the SWR at my amplifier was higher than I cared to have it be. The Transmatch will cancel the reactance at the transmitter end of the feed line, and can also provide an impedance transformation. Many hams still lean toward the idea that a "match box" or Transmatch is a cure-all for every antenna problem. It is not! This belief is fostered in part by the appearance of a large number of Transmatches on the amateur market. These units range from simple, inexpensive tuners to sophisticated "ultra tuners" costing hundreds of dollars. No matter how expensive, a Transmatch cannot correct a mismatch between the antenna and the transmission line.

Circuit Description

Unlike low-frequency antenna tuners that use large-value capacitors and rotary inductors, the 432-MHz Transmatch had to be approached using uhf techniques. Fig. 1A shows the circuit of the Ultimate Transmatch as described by McCoy.[1] Fig. 1B is the author's uhf version. Note that the Ultimate circuit has the bottom, or "cold" end, of C_{in} and L grounded and uses direct coupling between the input and output circuits. In the uhf version C1 is floating and L1 is tapped at the desired point to ground. Furthermore, inductive rather than direct coupling is used between the input and output circuits.

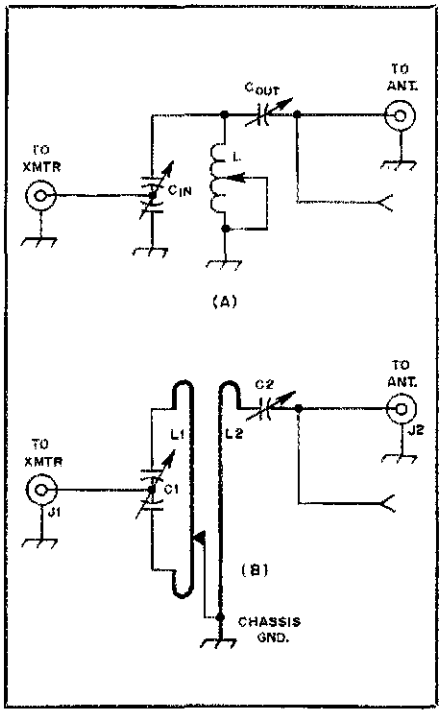


Fig. 1 — Circuit diagram of the popular Ultimate Transmatch (A) and the uhf version covering 420 to 450 MHz (B).
C1 — Dual-section variable capacitor (Johnson 167-0051-001 or equiv., with all but two stator and two rotor plates removed).
C2 — 2- to 15-pF variable capacitor (Johnson 148-1 or equiv.).
J1, J2 — Type N coaxial chassis connector.
L1 — Copper strap, 5-1/8 × 9/16 × 0.052 inches (126 × 14 × 1.3 mm) formed as shown in Fig. 2.
L2 — Copper strap, 5-3/8 × 9/16 × 0.052 inches (132 × 14 × 1.3 mm) formed as shown in Fig. 2.

Construction

Construction details are shown in Figs. 2 and 3. The input and output capacitors and associated copper-strap inductors are mounted on a 3-7/8 × 4-7/8 × 1/4-inch (95 × 119 × 6-mm) piece of Plexiglas, which is fastened inside a 4 × 5 × 2-1/2-inch (98 × 123 × 61-mm) metal enclosure. Do not make the enclosure smaller than this. I made the mistake of using a smaller box, only to discover that the input circuit wanted to function as a resonant cavity. If you do not wish to fabricate your own box, a Bud type CU-500A Minibox can, with a little ingenuity, be adapted.

To assemble the Transmatch, first form L1 as shown in Fig. 2 and solder it to the stator sections of C1. Next, form L2 and solder the "hot" end to the stator of C2, leaving the ground end unattached. Fasten the two capacitors and their inductors to the Plexiglas base, leaving a

*1619 Boulevard, Peekskill, NY 10566

[1] L. G. McCoy, "The Ultimate Transmatch," *QST*, July 1970, p. 24.

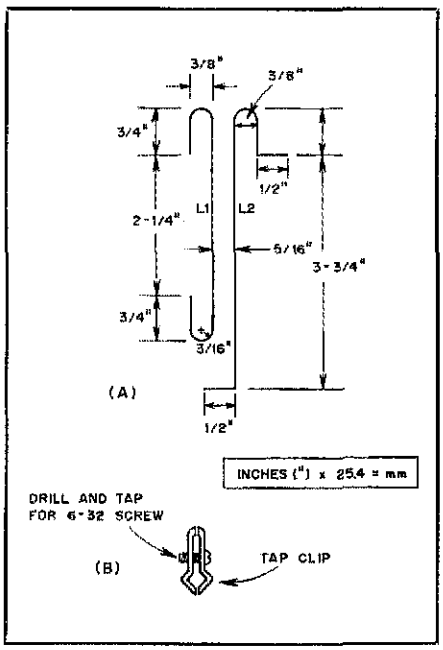


Fig. 2 — At A, the formation details for the copper-strap inductors. The tap clip, used to make the ground connection to L1, is shown at B. It is made from 3/32-inch (2.3-mm) brass stock, 1/4 × 5/8 inches (6 × 15 mm), formed as shown.

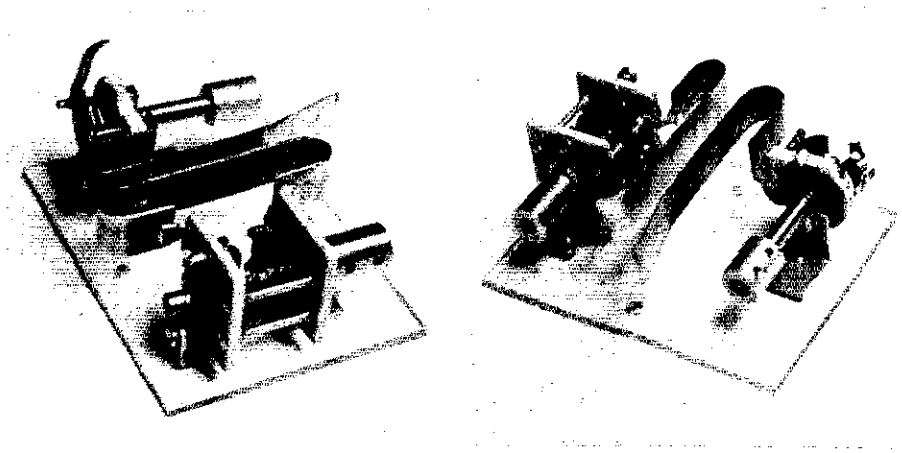


Fig. 3 — Interior views of the uhf Transmatch showing the strap inductors, L1 and L2, connected to the input and output capacitors, C1 and C2.

5/16-inch (8-mm) space between L1 and L2 (see Fig. 3). After mounting J1 and J2, the completed subassembly can be mounted on the inside bottom of the enclosure. Fasten or solder the ground end of L2 and the tap lead for L1 to the chassis. Make the connections to J1 and J2. Run two pieces of insulating rod from the capacitors to the front-panel knobs. This completes the Transmatch.

Adjusting the Transmatch

Once the construction is complete, connect the antenna feed line to J2. Connect the transmitter output, through an SWR indicator, to J1. Remove the cover from the unit and set C1 and C2 at maximum capacitance. Start with the tap on L1 set near the end closest to the grounded end of L2. Apply enough power to obtain an SWR reading and adjust C1 and C2 for minimum SWR. By moving the tap on L1 and readjusting the capacitors you should be able to obtain a proper match. With the unit adjusted you can now apply full power; this Transmatch will handle 200 to 300 watts safely. If higher power levels are desired, the plate spacing of C1 and C2 can be increased accordingly.

You will find that the input circuit tunes rather sharply while the tuning of the output circuit is quite broad. In fact, C2 could be eliminated if the coupling between L1 and L2 could be made adjustable. Because this is not very practical, I chose to use the variable capacitor. Nothing is more effective than having a proper match between your antenna and the transmission line. But let's face it: There are going to be times when the match is not exact, or the transmission line is of an impedance other than that for which the transmitter was designed. So when you don't have that proper match in your 432-MHz setup, use the uhf Transmatch. Not only will you like it, but so will your final amplifier! QST

Strays

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