Power to the People!

To hams who build this tuned input network, that is ...

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The salvaging and rebuilding of vintage amplifiers by a knowledgeable and highly motivated group of radio amateurs continues full steam ahead for reasons that remain best known to this select home-brew crowd. Their reasoning is not top secret, nor is it restricted to their eyes only; however, they are reluctant to broadcast to the world what they consider to be an ongoing good deal. It appears they would prefer to enjoy this perk for as long as possible. In a sense, their attitude can be considered a harmless conspiracy to limit the number of participants chasing a finite number of amplifier discards. What they know to be a solid fact is that the older linear decks were typically overbuilt, and that to duplicate the quality of the components today remains elusive except in the most outrageously expensive commercial products. They are equally aware that many early amplifiers currently available with reasonable prices have fallen from grace either because they are considered *old-fashioned*, because a minor component may have been smoked, or because they can't produce the super level of power perceived necessary to compete in the DX pileups.

Perhaps even more compelling is the lure of the newer generation bells-and-whistles amplifiers with their never-ending array of features, strategically unveiled over a period of time in order to create demand by making the older gear appear obsolete. These linears are continually being modified and bundled together with features that are, in fact, far in excess of practical needs. This public relations marketing strategy, coupled with Madison Avenue-type glitz, appears to be the strongest factor in separating the amateur from his savings. It's a force that's often difficult to overcome, especially when you're struggling with your better judgment to keep your hands out of your wallet.

Whatever the reasons hams use to justify the purchase of new-generation amplifiers is fine. I'll buy their old rigs all day long and do what little has to be done to bring them up to speed. It's a money-in-the-bank project even if you plan only to complete the mods and then peddle the upgraded amp for a profit. No one can fault you for turning a buck because you made a good deal.

Many hams, in order to soften the sticker shock of purchasing a new amplifier, will relegate older rigs to pasture at attractive prices. Perfectly serviceable amps are being cast aside and sold at super bargain levels.

Here's where the eagle-eyed home-brewer makes out like a bandit.

In order to learn what these astute hams already know, and to involve yourself in a fun project, take a look at the many articles describing tube retrofit projects. Power supply and RF deck upgrading are commonplace, and well-written treatises featuring Svetlana® and Eimac® tubes are yours for the asking from these sources. To catch up, simply follow the step-by-step construction directions of the tube manufacturers. Before you know it you'll be on the air with a big gun signal with that born-again ugly-duckling amplifier that nobody wanted—at minimal cost!

So what's the problem?

Many circa 1960–1980 amplifier manufacturers did not include a tuned input circuit in the typical grounded grid amplifier. Perhaps the thinking was that the losses were an acceptable tradeoff in light of the manufacturing costs and space requirements for this accessory item. The manufacturers

Photo A. *A view of the tuned input module resting comfortably atop a three-hole 813 B&W LPA-1 amplifier deck cranking out 1000 + watts into the antenna. Output has been substantially improved with the input module installed. All photos by author.*

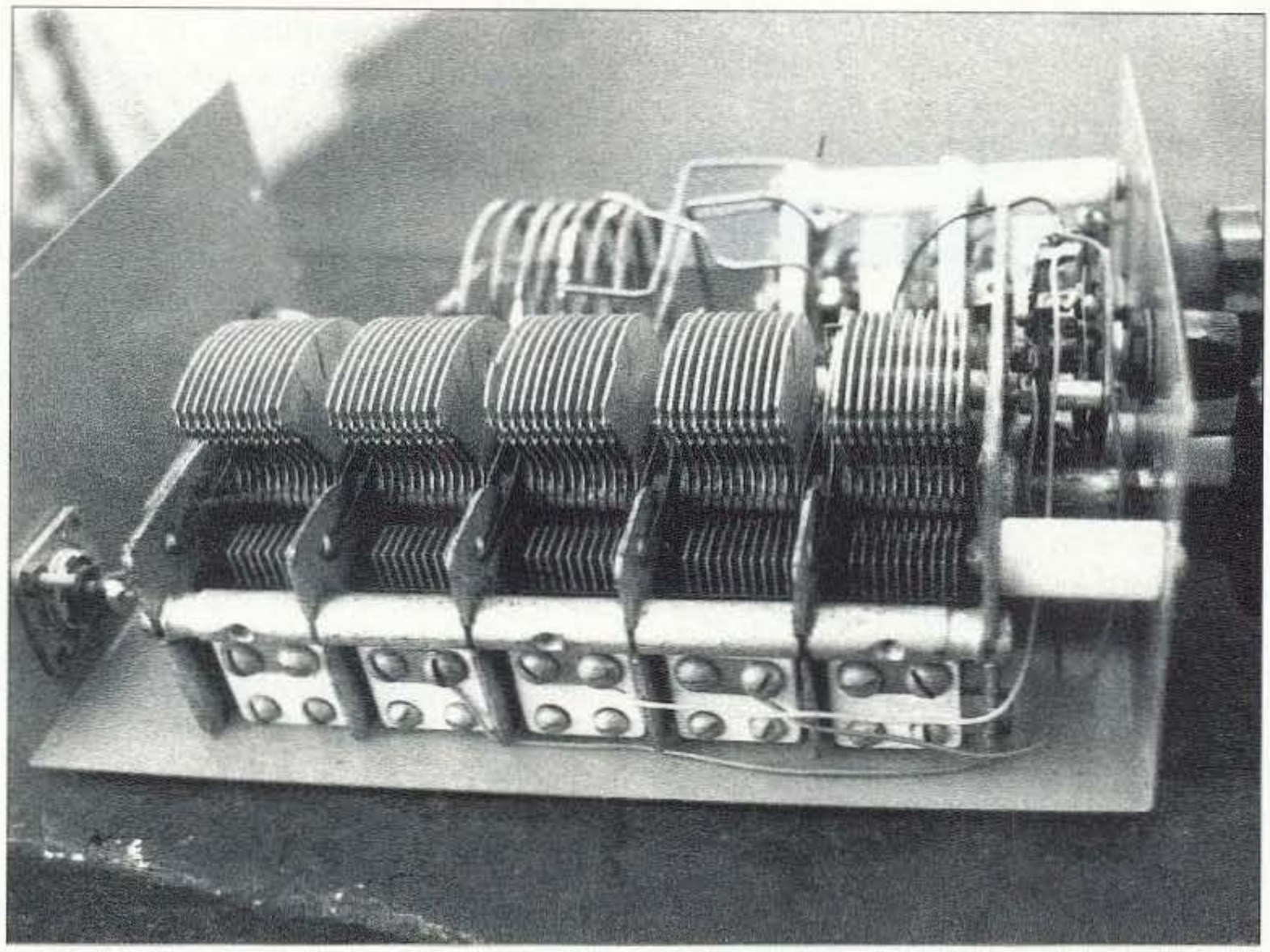

Photo B. *A view of the far side of the tuned input module. Sections one and five of the air variable have been wired permanently into the circuit. The wires reaching out to sections two through four terminate at the rotary switch and have the capability of switching those sections in and out of the circuit as needed. The SO-239 is positioned on the rear wall. A short length of 58U connects this fitting to one side of the "T" adapter on the amplifier RF input.*

were aware of the need for the matching input circuit, but they knew that many early transmitters had provisions to tune for an antenna mismatch. The majority of exciters had power to spare in order to drive the glow-in-the-dark finals at less than ideal conditions.

Obviously, times have changed! Linear amplifier power levels are up, tube amplification factors are out of sight, and excessive grid current, especially in the newer generation ceramic tubes, is critical and unforgiving. More important, exciter/amplifier matching must be more precise with the new-generation solid state transceiver. These digital-readout engineering gems have been programmed to reduce power automatically or will simply shut down when the impedance values are not to their liking.

Consequently, to get the best signal you can on the air, the tuned input circuit is no longer a luxury. The general feeling among amplifier designers is that the input circuit is a must. I haven't read a single amplifier construction or retrofit article that doesn't strongly recommend a tuned input circuit to ensure that the exciter signal linearity is preserved and maximum output is achieved from the new-generation, very expensive, legal-limit-plus amplifier tubes.

The problem is that retrofit circuits and components take up valuable space that's often not available in the typical amplifier deck refurbishing

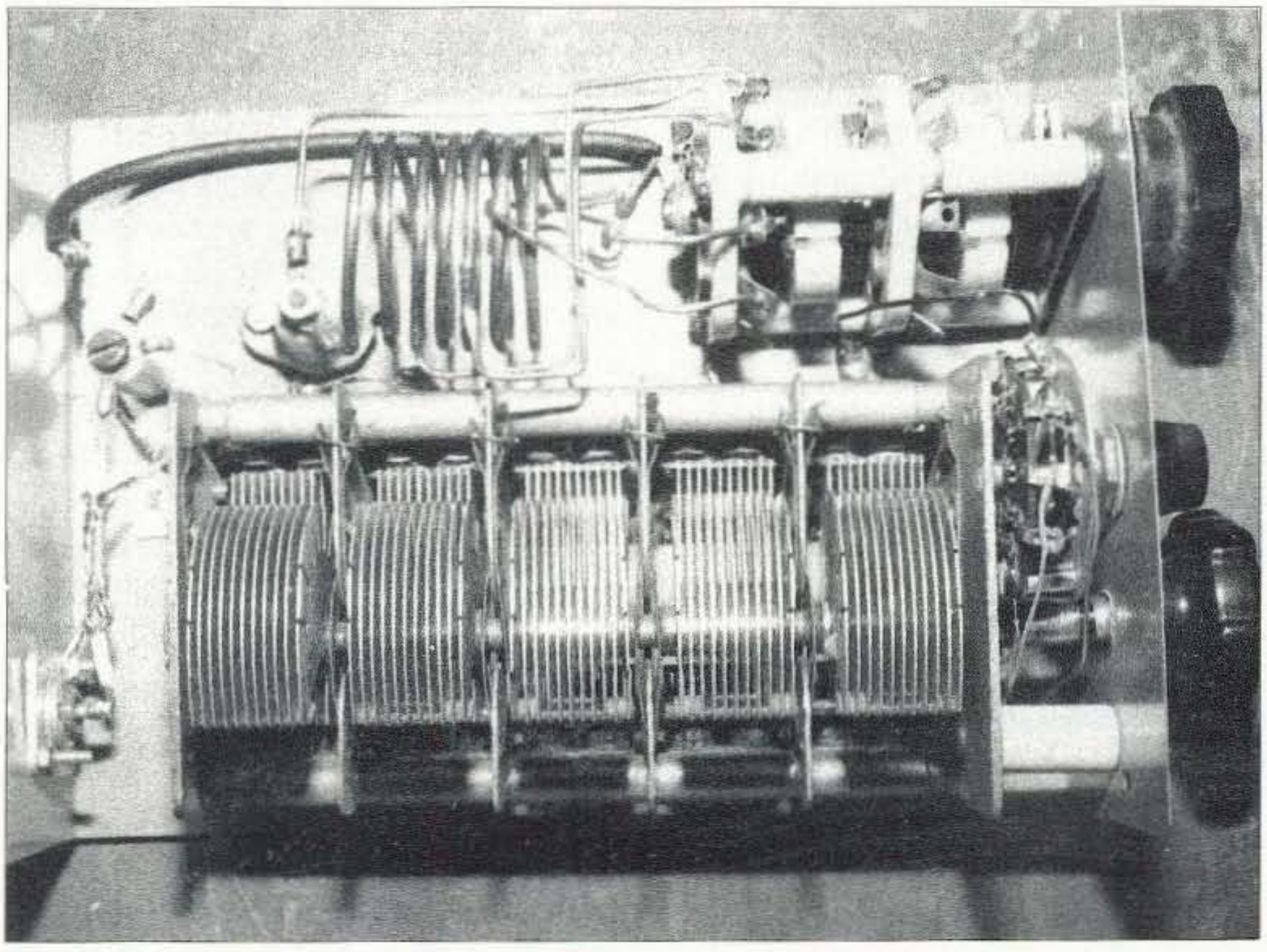

Photo C. *An aerial view of the components mounted within the metal enclosure. Note how the use of the standoffs provided space to mount the three-position rotary switch. The 10, 15, and 40 m taps are visible from this perspective. The 20 m tap is soldered to the bottom end of the coil and not clearly seen. Note that all lengths of 58U have been grounded at both ends with the copper braiding.*

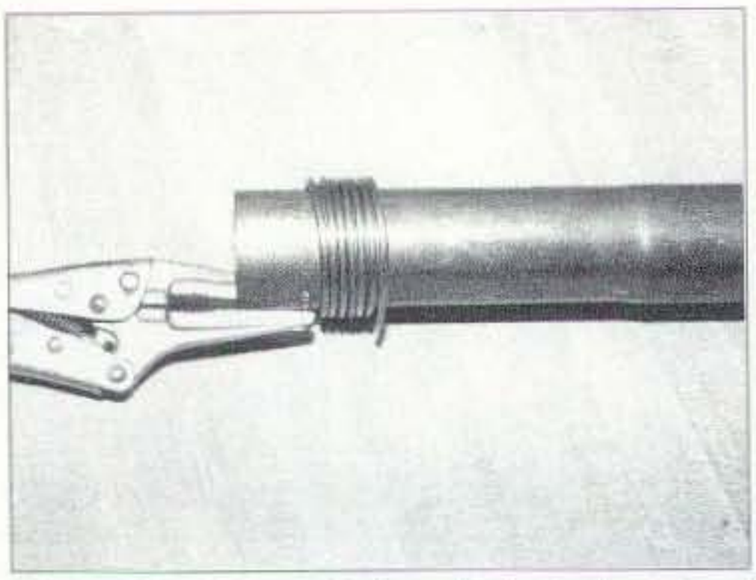

Photo D. *Close-wind a 40-inch length of #10 solid copper wire on a 1-1/2-inch OD form. I used a tailpiece from a kitchen sink drain line that measured exactly to size. The locking pliers secured one end during the winding process.*

project. Even if you were able to shoehorn in the components, linking the bandswitching with the input controls is generally impossible to accomplish without a major rebuild and extensive front panel drilling.

I faced the problem when dealing with a B&W LPA-1 amplifier rebuild (three 813s and vacuum relays). Fortunately, I managed to overcome the dilemma with a simple tuned input project (see **Photo A**) that appears to offer the best of all worlds. All the components of the matching network were mounted outboard in a self-contained enclosure I could move from amplifier to amplifier with no internal modifications. A coaxial "T" adapter and an additional short length of 58U cable were all that was needed for the hookup.

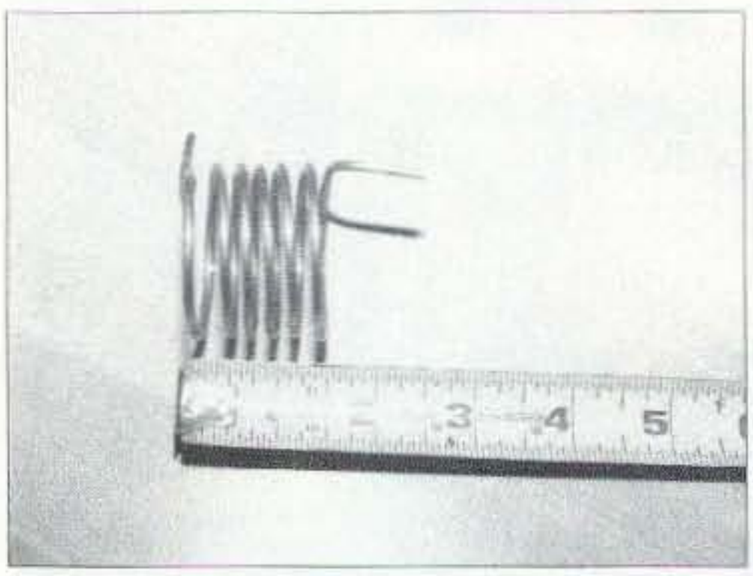

Photo E. *Uncoil the wire evenly to a length of 1-1/2 inches. Cut off any excess length but make certain to leave enough to attach solder lugs. It might be easier at his point to prepare the wire for soldering by burnishing the areas to be tapped. Keep in mind that all taps are counted from the grounded end.*

The circuit requires no power source, nor does it demand any extensive modifications to the exciter or RF deck. If that sounds like a good deal to you, check out the project details below. Then build it up, bolt it on, and broadcast away—with a signal that will do you proud. The components are easy to locate, the cost is minimal, the construction is straightforward, and the results are worth it.

The chicken or the egg?

It probably makes better sense to locate the components prior to purchasing the enclosure. There are no advantages to an overly large cabinet, so select a size that allows you to install the components in an orderly manner in the smallest space possible.

My enclosure measured 3-1/16 inches by 8-1/4 inches by 6-1/8 inches (Radio Shack #270-274) and was sufficiently large to ease the point-to-point wiring (see **Photo C**). Ideally, you'll need a broadcast-type five-section air variable totaling about 2500 pF. (A three-section with additional capacitance grafted on will work OK—Antique Radio Supply #CV264.) Locate an SP5T (nonshorting) porcelain bandswitch and an SP3T (shorting) switch (Radio Shack #275-1385) to move capacitance in and out of the circuit (depending on the band selected).

Lay out the parts and drill shaft holes to secure these components to the front panel. Don't forget to bolt the air variable to the base of the enclosure at several points for a good ground return. Using a 40-inch length of #10 AWG solid copper wire, wind a six-turn coil on a 1-1/2-inch OD form (see *Eimac Amateur Service Newsletter* #AS-10, reprint of *QST* article dated July, 1963). A short length of 1-1/4-inch brass, iron, or PVC pipe, or a closet rod will do. Trim off any excess wire and stretch it out evenly to a length of 1-1/2 inches.

Ensure an even spacing between turns (see **Photo E**). Solder ground lugs on each end of the coil. Ground the coil end closest to the bandswitch. Use a porcelain standoff to secure the far end of the coil (see **Photo F**). Tap the coil at 1-1/4 turns (10 m), 1-7/8

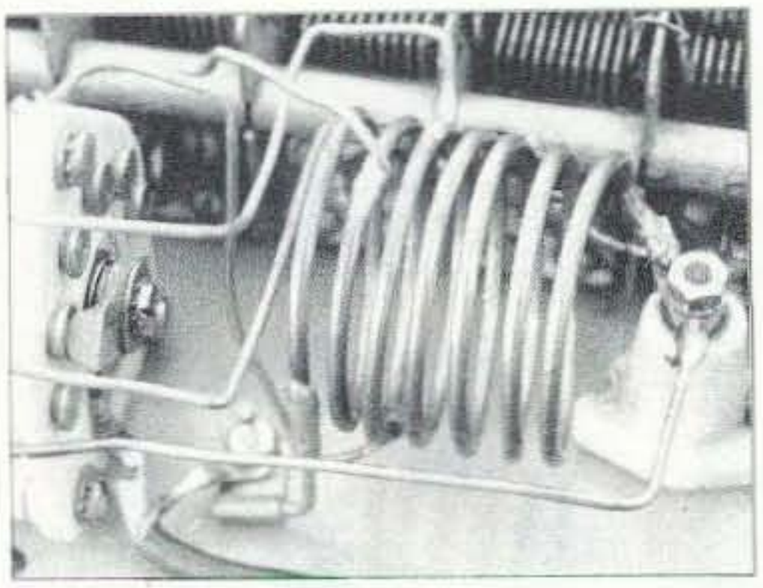

Photo F. *A close-up of the coil tapped for 10–80 m operation. Note that the 58U braid from the bandswitch is securely grounded at the coil end. The 80 m tap is taken off the porcelain standoff to the right and soldered to position five on the bandswitch.*

turns (15 m), 2-1/2 turns (20 m), and 4-1/2 turns (40 m) from the grounded end of the coil to the bandswitch using #14–16 AWG solid copper wire.

Remember that the full coil length will tune 80 m, so run a wire from the standoff to the fifth position on the switch (see **Photo G**). Two air variable sections were paralleled and permanently wired into the circuit (see **Fig. 1**). I used a small rotary shorting switch to move additional capacitance into the circuit as needed. If you prefer, replace the rotary switch with

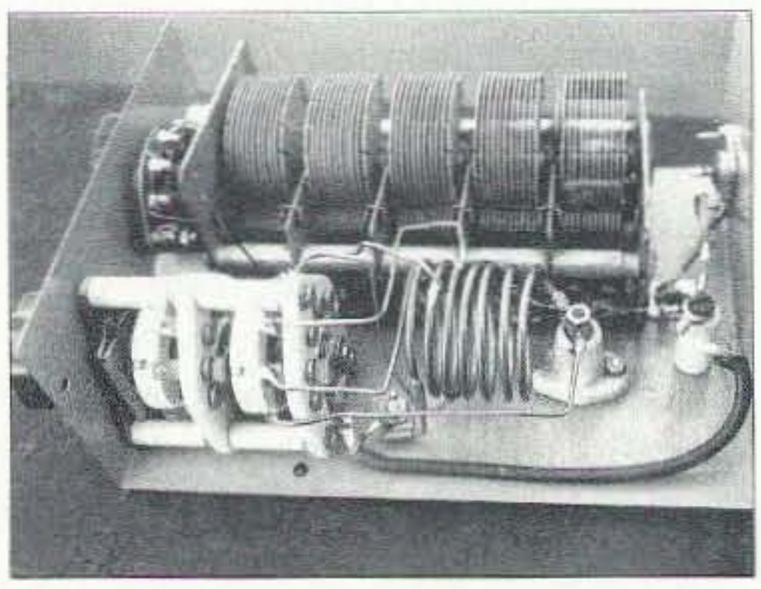

Photo G. *An overview of the parts layout. Only one pole of the porcelain junk box bandswitch is being used (Mouser #10YX025). Note that the far end of the coil is supported by the standoff insulator. The rotary selector switch adds or subtracts capacitance and is nested in front of the air variable. Two porcelain spacers were used to move the air variable back to allow room for the switch mounting. All coil taps are measured from the grounded end. The coil grounding lug is mounted a short distance from the back of the bandswitch.*

three individual SPST/SPDT toggles (RS #275-322) to accomplish the same result.

Before soldering, it may be a good idea to grid-dip the tuned circuits for resonance in order to ballpark control settings. Make certain to record the number of switches (controlling capacitance) in the circuit as well as the position of the variable capacitor knob for each band. Install an SO-239 coaxial connector to the rear of the enclosure and complete the remainder of the wiring with 58U cable. Make certain to ground both ends of the coax. To ensure a zero resistance connection between the input circuit enclosure and the RF deck, use a short length of copper braid between the circuits of both metal cabinets.

What's next?

There's not much left to do except to install the input device. Connect a coaxial "T" adapter (RS #278-198) to the RF input on the rear of the amplifier deck. Run a short length of cable from the exciter to one leg of the "T" and a second length of cable from this fitting to the input tune module. Set up your equipment (including bandswitch positions) and tune all the controls plus the air variable on the input module for maximum wattmeter output.

That's about it, except for an experiment you might find interesting. Tune for maximum amplifier output without the module in the circuit, and then repeat the process with the unit installed. You'll know immediately if the additional input tune device was worth your expenditure of time. Don't hesitate to let me know how you made out.

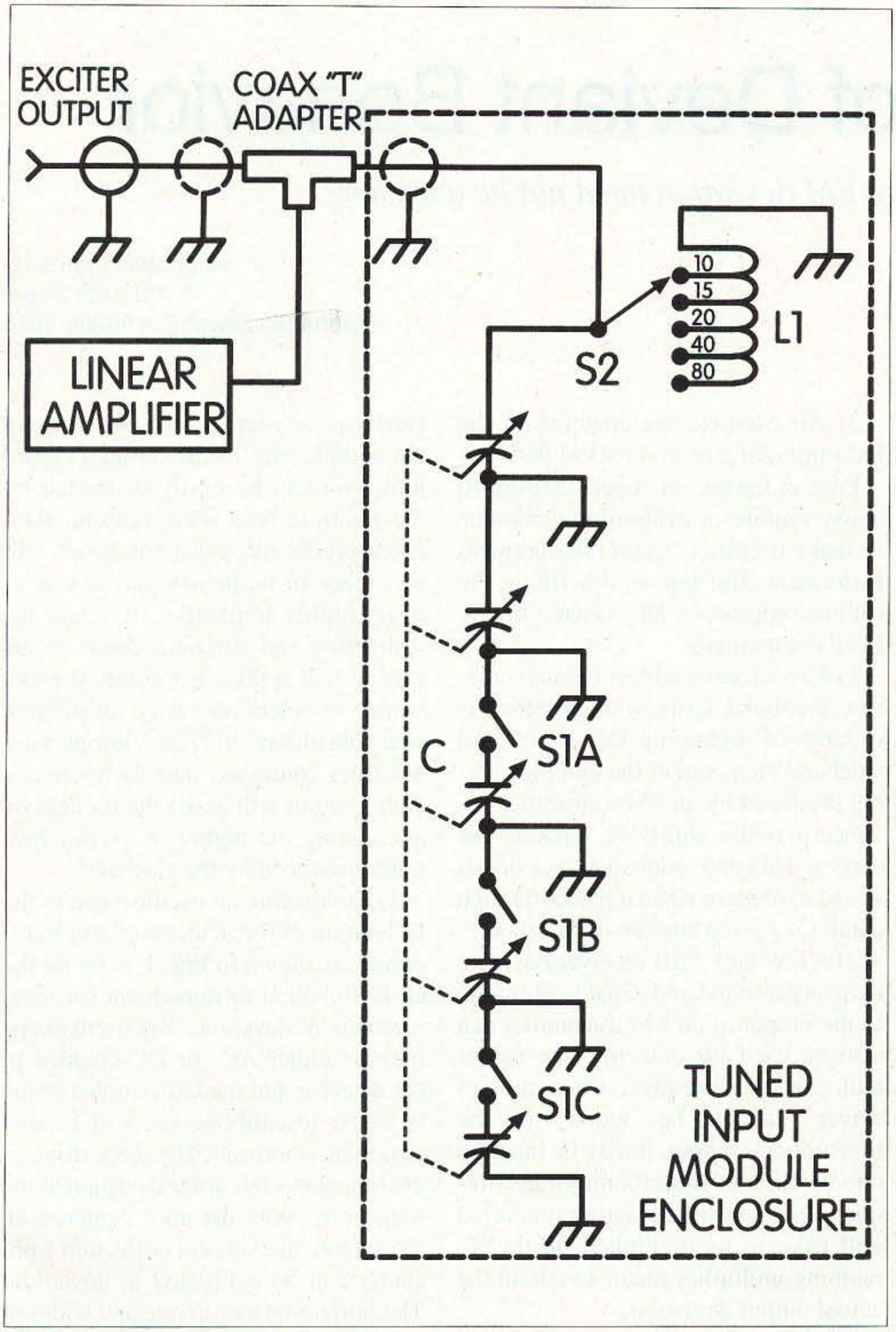

Fig. 1. Tuned input module enclosure. C1: 5-section air variable. L1: 6 turns of #10 wire 1-1/2 inches long (wound on 1-1/2-inch OD form), tapped from ground end at 1-1/4, 1-7/8, 2-1/2, 4-1/8, and 6 turns. S1: SP3T (shorting). S2: SP5T (nonshorting).

Sources of supply

Mouser Electronics
2401 Highway 287 N.
Mansfield TX 76063-4827
(800) 346-6873

Antique Electronic Supply
6221 S. Maple Avenue
Tempe AZ 85283
(800) 706-6789