

Hints and Kinks

Conducted By Larry D. Wolfgang,* WA3VIL

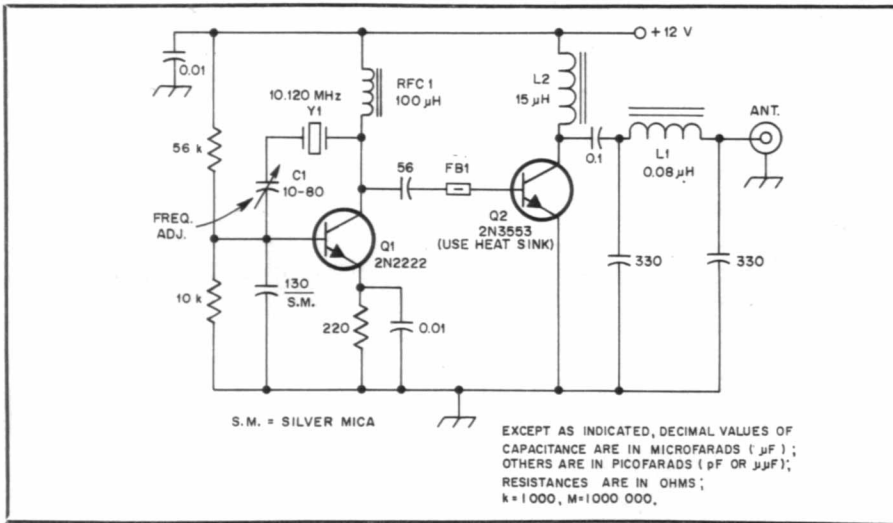


Fig. 1 — Schematic diagram of a simple 30-m transmitter built by KB4PY. Resistors are 1/4-W, carbon-composition types. Capacitors are disc ceramic, except C1.

- C1 — 10- to 80-pF mica trimmer.
- FB1 — FB43-101 ferrite bead.
- L1 — 13 turns no. 22 enameled wire on a T68-6 toroid core (yellow), 0.08 μH.
- L2 — 30 turns no. 28 enameled wire on an FT37-63 toroid core, 15 μH.

- RFC1 — 100-μH RF choke, such as Miller part no. 4632.
- Y1 — Fundamental-type crystal in FT-243 holder for any frequency in the 10-MHz amateur band.

came up with the one shown at Fig. 1. The circuit is simple and inexpensive. It uses fundamental-type crystals in FT-243 holders, which are easy to obtain from a variety of sources. The transmitter output is almost 1.5 W, and the harmonics are 34 dB down from the fundamental. With a reasonably stocked junk box the total cost for this transmitter should be under \$10.

My antenna system is a 150-ft random wire and a Transmatch.² A two-position coax switch is used to change between transmit and receive. I leave my receiver active during transmit, and it provides a nice sidetone. Keying either the positive or negative power-supply leads seemed like the easiest method to me. The keying waveform is a bit soft, but I don't believe the slight chirp is objectionable. Others may wish to experiment with alternate keying methods.

I built my rig on a piece of perf board, and mounted the circuit inside of an aluminum box, as shown in Fig. 2. An etching pattern and parts-placement diagram are shown in Fig. 3. Many of the parts are available from RADIOKIT. Circuit Board Specialists also has a PC board and a complete kit of parts available for this project.

I used an oscilloscope and frequency counter to align the circuit. Alternatively, use a calibrated

$$^2m = ft \times 0.3048, mm = in \times 25.4$$

A TWO-TRANSISTOR TRANSMITTER FOR 30 METERS

□ When I decided to become active on the 30-m band, I wanted to build a simple transmitter. I have a Yaesu FT-101E that receives WWV on 10 MHz. Others may have general-coverage receivers, and need only a transmitter. April 1983 QST described an elaborate 30-m rig.¹ But even the transmitter section is more than just a "junk box" project.

After testing a variety of other circuits, I finally

¹D. DeMaw, "Putting the '8P6 Special Hamcaton Rig' on 10 MHz," QST, April 1983, pp. 19-21.

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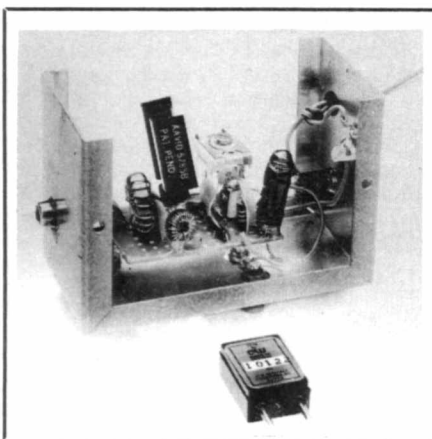


Fig. 2 — Photo showing the construction technique used by KB4PY on his 30-m QRP transmitter. Note the heat sink used on Q2.

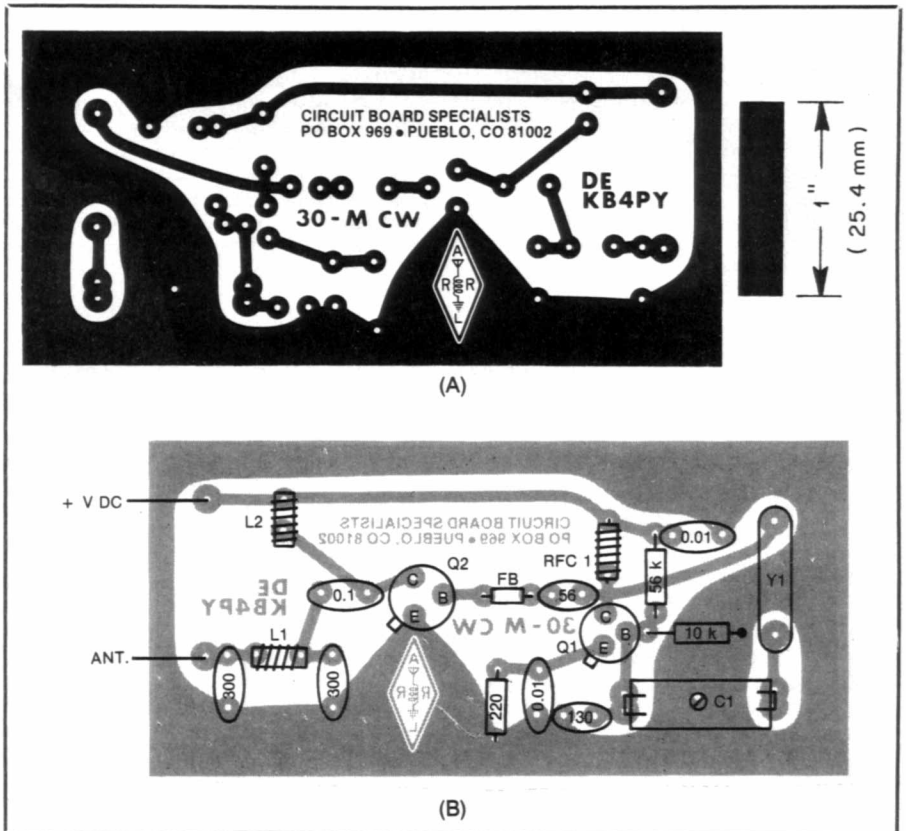


Fig. 3 — A PC-board etching pattern is given at A. Black represents unetched copper, viewed from the foil side of the board. The pattern is shown actual size. B shows a parts-placement diagram. Components are placed on the non-foil side of the board; the shaded area represents an X-ray view of the copper pattern.

receiver, and tune C1 for maximum output. I hope others have as much fun with this little rig as I have. — Paul Hoffman, KB4PY, Decatur, Alabama

IMPROVED BYPASS SWR FOR THE MFJ-984 VERSA TUNER

□ While checking out my new MFJ-984 Versa Tuner IV, I discovered a small anomaly in the operation of the COAX DIRECT (straight-through or bypass) switch position. I noted a slight increase in SWR when compared to connecting the coaxial cable directly to the transmitter. This effect was just noticeable on 20 meters, a little greater on 15 meters, and on 10 meters my readings indicated an SWR of 1.2:1 with the cable connected directly to the rig, but 1.5:1 with the cable connected through the '984. This may not make a difference in signal strengths, but I had just gone to a great deal of trouble to change my quad system to separately fed loops, complete with a remote coaxial switch. I had been especially careful to match the cable to the antennas, so I was not happy about having my efforts negated in an antenna-matching network! (My use involves bypassing the network on 10, 15 and 20 meters, and switching it in on 40 and 80 meters.)

In a phone call to the technical department at MFJ, I learned that they had also discovered the problem. They have incorporated a simple cure into later production runs, so not all of the units will need this modification. You may want to check yours to be sure.

The fix involves connecting a 47-pF, 3-kV disc capacitor between the COAX DIRECT center conductor and ground. (Although this matching network has three coaxial connectors that are switchable, only number 1 can be bypassed through it.) I did not have a single capacitor of the proper value, so I wired a 100-pF and an 82-pF unit in series. Solder one end of the capacitor to the appropriate switch wafer, mounted on an L bracket near the back of the chassis. To make the ground connection, simply remove one nut from a wafer-mounting screw and slip a solder lug over the screw. Replace the nut and solder the capacitor lead to the lug.

Before replacing the top cover, be sure to read the warning in the owner's manual. Two of the screws are a bit shorter than the others. The shorter ones *must* be used for the center of the cover sides. The two variable capacitors are mounted very close to the sides of the aluminum chassis, and using one of the longer screws in either of these holes will short the capacitor to the chassis.

The results of this modification are gratifying. Even on 10 meters, it is virtually impossible to detect the difference in SWR with the feed line bypassed through the matching unit or connected directly to the rig. — John LaFontaine, N0ADJ, Richfield, Minnesota

AN AMPLIFIER FOR THE RC ACTIVE CW FILTER

□ One of my first building projects since becoming a ham was a three-stage RC active audio filter for CW.¹ This filter has performed flawlessly, and is very useful in sorting out signals on the crowded CW bands. I have never been satisfied with the fact that I must use headphones

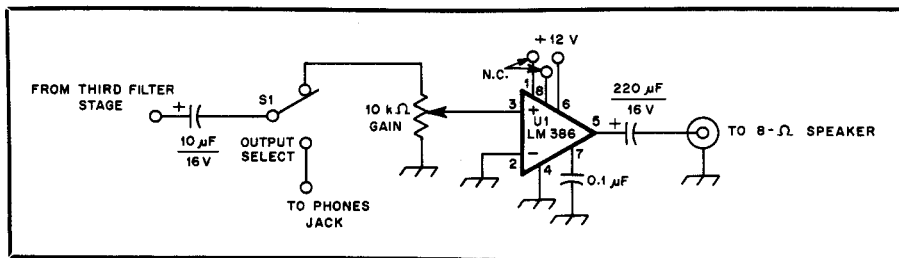


Fig. 4 — Schematic diagram of a simple audio amplifier to drive a speaker from the output of a CW filter.

U1 — LM386 Audio Amplifier (Radio Shack no. 276-1731 or equiv.).

whenever I want to use the filter, however.

I decided to build an audio amplifier that could be included after the filter to drive an 8-Ω speaker. The LM386 amplifier chip is readily available, and the associated parts fit easily on the existing filter circuit board. Fig. 4 is a schematic diagram of the circuit I built. The 10-kΩ variable resistor is optional. The gain can be controlled adequately from the receiver, but I find it helpful to have a second control. This circuit only takes a few minutes to hook up, and it is a pleasure to hear filtered CW signals through my station speaker. — David Mishoe, KF4RD, Raleigh, North Carolina

LINEAR-AMPLIFIER ANTENNA-SWITCHING RELAY PROBLEMS

□ Over time I began to experience some problems with my Dentron MLA-2500 amplifier. When switching to transmit, I could hear some internal arcing. I also noticed severe TVI during those times, along with a jump in plate current and higher SWR readings. What could the problem be?

After some extensive research and troubleshooting I discovered the cause of these symptoms. The cure is fairly simple, but serious damage can be done if you don't take action when the symptoms first develop. The problem turned out to be caused by wear on the RF relay, and could affect any amplifier.

Linear amplifiers normally use a control line from the exciter to operate a control relay. This relay in turn activates an RF relay in the coaxial cable input/output section of the amplifier. If the amplifier is off, the control relay is inoperative, and the RF relay connects the exciter to the antenna at all times. When the amplifier is on, the RF relay serves to connect the exciter output to the amplifier and the amplifier output to the antenna. On receive, the antenna switches back to the exciter.

When the exciter is turned to transmit there will be a rapid rise of RF power within the amplifier. If the amplifier produces this power before it is connected to the antenna, an instantaneous pulse of high voltage arises and with it the potential for arcing in the plate tank circuit or other parts of the amplifier. Once an arc-over occurs, an ionization path is established and the arc current can be sustained even though the potential drops below the critical value. Meltdown of elements and damage to the now-shortened final tubes can easily result.

This was exactly the problem that my rig developed. Several millimeters was vaporized off the tips of the high-voltage plate tuning capacitor. I also observed both momentary and sustained shorting between the elements of the 8875 triodes. This certainly contributed to the damage of an expensive pair of amplifier tubes.

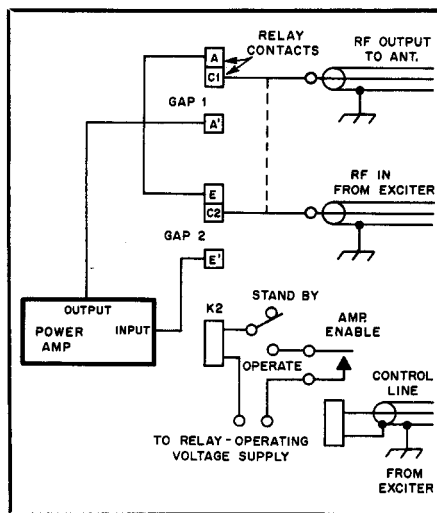


Fig. 5 — Pictorial diagram of a linear-amplifier RF relay mechanism.

Fig. 5 illustrates the operation of a DPDT relay, such as is used in many amplifiers. When the armature is pulled down, the movable contacts C1 and C2 go from A and E to A' to E'. Both the input and output circuits are broken momentarily. If GAP 1 is narrower than GAP 2, the amplifier output will be activated just after the antenna is connected to it, and no problem will occur. But if GAP 2 is smaller, the C2-E' connection is made first, and the high RF power will be applied to GAP 1. This can cause a spark to be generated between C1 and A'. The result will be a nice spark-gap transmission, a big RFI pulse, high SWR and a detuning of the linear output stage with an associated jump in plate current. Induced high voltages may lead to internal arcing and damage to the amplifier circuitry.

These undesirable conditions can arise from normal relay wear or bending of the relay elements during contact cleaning. If you notice any of the symptoms mentioned, you should look for sparks between the relay contacts or other internal arcs.

To correct the problem, I used a pair of needlenose pliers to reduce the movement required to close GAP 1. The contact arm will only have to be bent a small fraction of an inch, so be gentle! Try operating the relay by hand and observe the contact movement to ensure that contact C1 strikes A' prior to C2 closing E'. *Caution:* The high dc voltages present inside a linear amplifier are deadly! Be sure the power is disconnected and the filter capacitors discharged before attempting this procedure. — Dr. Keith W. Reiss, KB4LK, Annandale, Virginia

¹D. DeMaw, "Beating Rotten QRM — CW Filtering for the Beginner," QST, Oct. 1981, pp. 38-42.