qrp

BY DAVE INGRAM,* K4TWJ

A Low-Power Fantasy Land

I have said it before, friends, but some things still warrant repeating. Spanning long distances with low power is a thrill of the best kind! Indeed, the skill of precisely timing calls/transmissions and the expertise of copying weak signals amidst QRM and QRN is a supreme accomplishment for operators on both ends of a QRP QSO.

A shining example of that fact is the recent unplanned and unscheduled 20-meter contact between Wayne Ginther, NM3B, in St. Mary's, Pennsylvania and Dennis Meech, G4PBK, in Plymouth, England. Wayne called CQ using a classic Tuna Tin II transmitter running only 200 mw (photo A), and Dennis answered him while running 5 watts and using a G5RV antenna. The resultant QSO was also more than a short exchange of signal reports; it continued on for seven minutes.

If that doesn't blip your key, consider the remarkable QSO success of Bill Parker, W8QZA (photo B). After several years of inactivity, Bill returned to the airwaves in 1989 running a vintage Heathkit AT-1 and VFO at 5 watts. One year later, he had worked 168 countries—on 20 meters—with an AT-1. Since that time, Bill has used an Argonaut 509, Index Labs QRP Plus, and (presently) a Yaesu FT-817. He has never even owned a 100-watt transceiver (serious QRP for sure!). Bill's antennas are a three-element beam at 32 feet, an inverted-Vee at 30 feet, and a 30-meter dipole at 25 feet. He has now worked 318 countries, all on QRP, and during most of that time he was busy with a full-time practice as an ophthalmologist specializing in cataract surgery.

In reflecting on the past, Bill especially remembers contacting the first-ever DXpedition to the Penguin Islands, located off the coast of Namibia. He worked them during a confused lull of an unruly pile-up the first night the group was on 20 meters CW. The next day he heard big guns discussing how difficult working the expedition would be and the odds of success.

More recently, Bill worked FT5XO, the DXpedition to Kerguelen Island, on 30 meters, an "oppo-

*3994 Long Leaf Drive, Gardendale, AL 35071
e-mail: <k4twj@cq-amateur-radio.com>

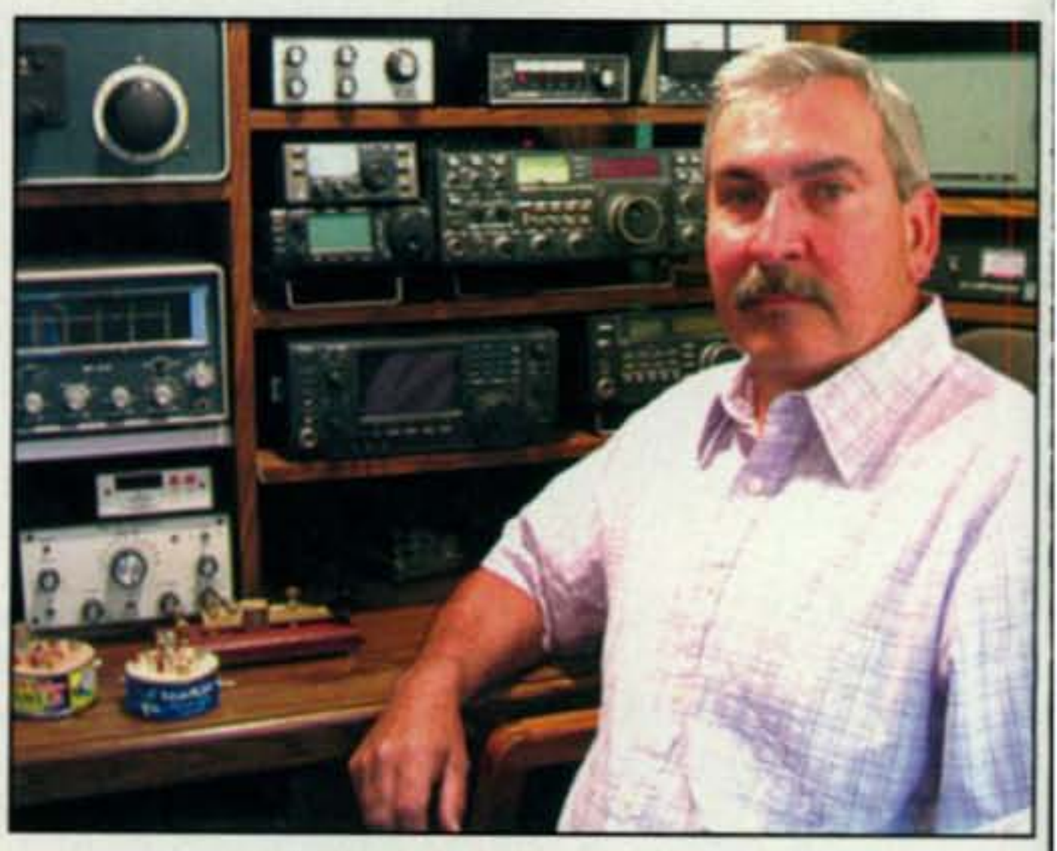


Photo A– The main items of interest/focus in this photo from Wayne Ginther, NM3B, are not the fancy big rigs, but the two little 200-mw Tuna Tin II transmitters on the desk. Wayne recently called CQ with one of them on 14.060 MHz and was answered by G4PBK in England who was running 5 watts and a G5RV antenna. It's true, friends: QRP romps! (Photo courtesy of NM3B)

Photo B– Meet long-time QRPer supreme Bill Parker, W8QZA. He has worked 302 countries on SSB, 297 countries on CW, and 92 countries on RTTY—all while using 5 watts or less and a modest antenna system. He has never even owned a 100-watt t ransceiver. Now that's what we call serious QRP! (Photo courtesy of W8QZA)

Photo C– Alex Grimberg, PY1AHD, has made over 500 DX contacts while operating personal portable with a Yaesu FT-817 and his water-tuned loop antenna shown here and described in the text. Notice the background, friends: That is a 38-meter tall statue of Christ overlooking Rio de Janeiro from atop Corcovado Mountain, which is the tallest point in the area. It is a world-famous landmark comparable to the Statue of Liberty in New York City, the Eiffel Tower, etc. (Photo courtesy of PY1AHD)

site side of the world" QSO. Bill called, but FT5XO went silent. No other stations called, but Bill sensed FT5XO was still listening. He continued calling and listening for a reply. After 15 or 20 calls, he heard "W6QZ." He sent his call six more times, then heard "W8QZ." After six more call repeats, FT5XO replied with "W8QZA." Bill says that QSO is a true example of the commitment required for serious QRP work by operators at both ends of the contact, and we fully agree. The operator(s) rather than the rig(s) makes the big difference with QRP! That's enough operating news and notes for this month. Now let's discuss gear and goodies!

PY1AHD Water-Tuned Antenna

One of the most unique portable antennas we have seen in many years is the small water-tuned loop devised by Alexandre Grimberg, PY1AHD (photos C, D, E, and F and fig. 1). Alex uses the loop with his Yaesu FT-817 for HF Pack, or "walk and talk" QRPing, and he has made over 500 DX QSOs with the antenna over the last four years. That is an impressive achievement!

What are the special attractions of a loop antenna? It is quite compact, works well at low heights, is tunable over a wide frequency range (such as 10–40 meters), and does not require a counterpoise. Many QRPers surely will want to study or homebrew a copy of the PY1AHD loop antenna. Alex agreed to share its general details with readers of this column. I should also point out the PY1AHD loop is open to a number of mods or variations, so feel free to make changes as desired to fit your needs.

The loop is 31.8 inches in diameter and comprised of a 100-inch length of RG-213 coax cable with its center conductor and shield connected together at both ends. This produces a nice highly conductive loop without the weight and expense of aluminum tubing or copper strapping as used in commercial loops. The loop can be tuned from 10–20 meters with an approximate 5–50 pFd "butterfly"-type variable capacitor connected to the "pigtail leads" from each end of the RG-213 cable's braid. A 180–pFd fixed capacitor is clip-lead-added in parallel with the variable capacitor for 40-meter operation. The tuning capacitor is the heart of this antenna's design, so more details on it follow our general overview.

The main (large) loop acquires RF energy from, or is RF excited by, a small interloop approximately one fifth the size of the main loop, or 6.3 inches diameter. Any large-size wire capable of supporting itself or holding its shape (such as a 19.75-inch length of #12 or #14 solid-copper wire) works fine here. A plastic pipe or tube approximately 35 to 40 inches long and 1 inch in diameter serves as a support for the loops and the tuning capacitor. Three plastic cable

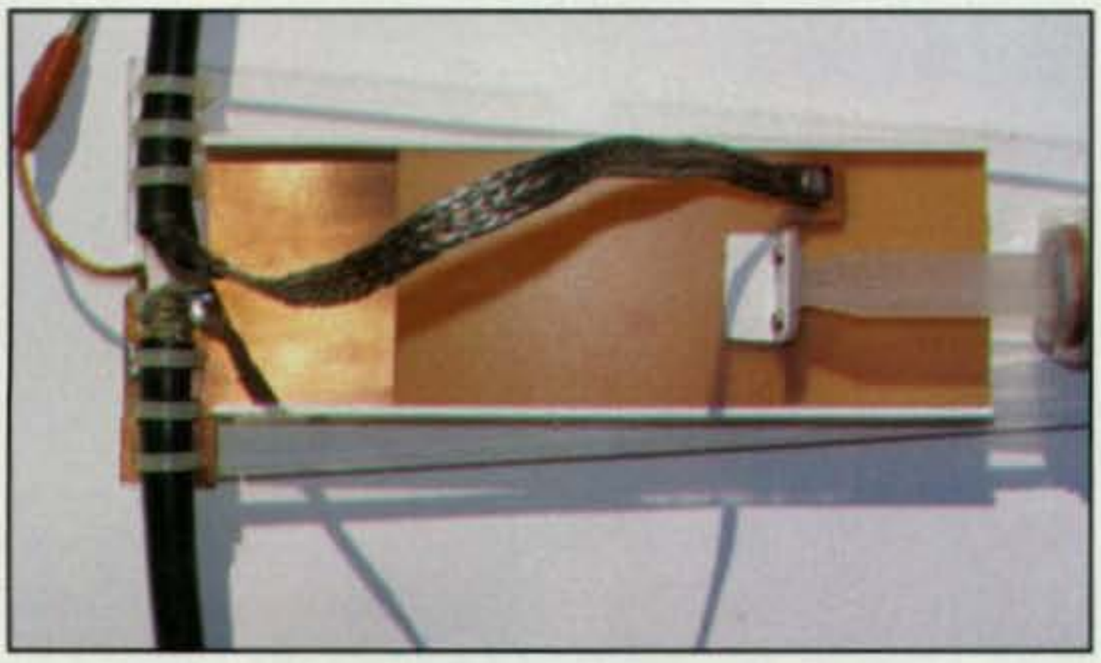


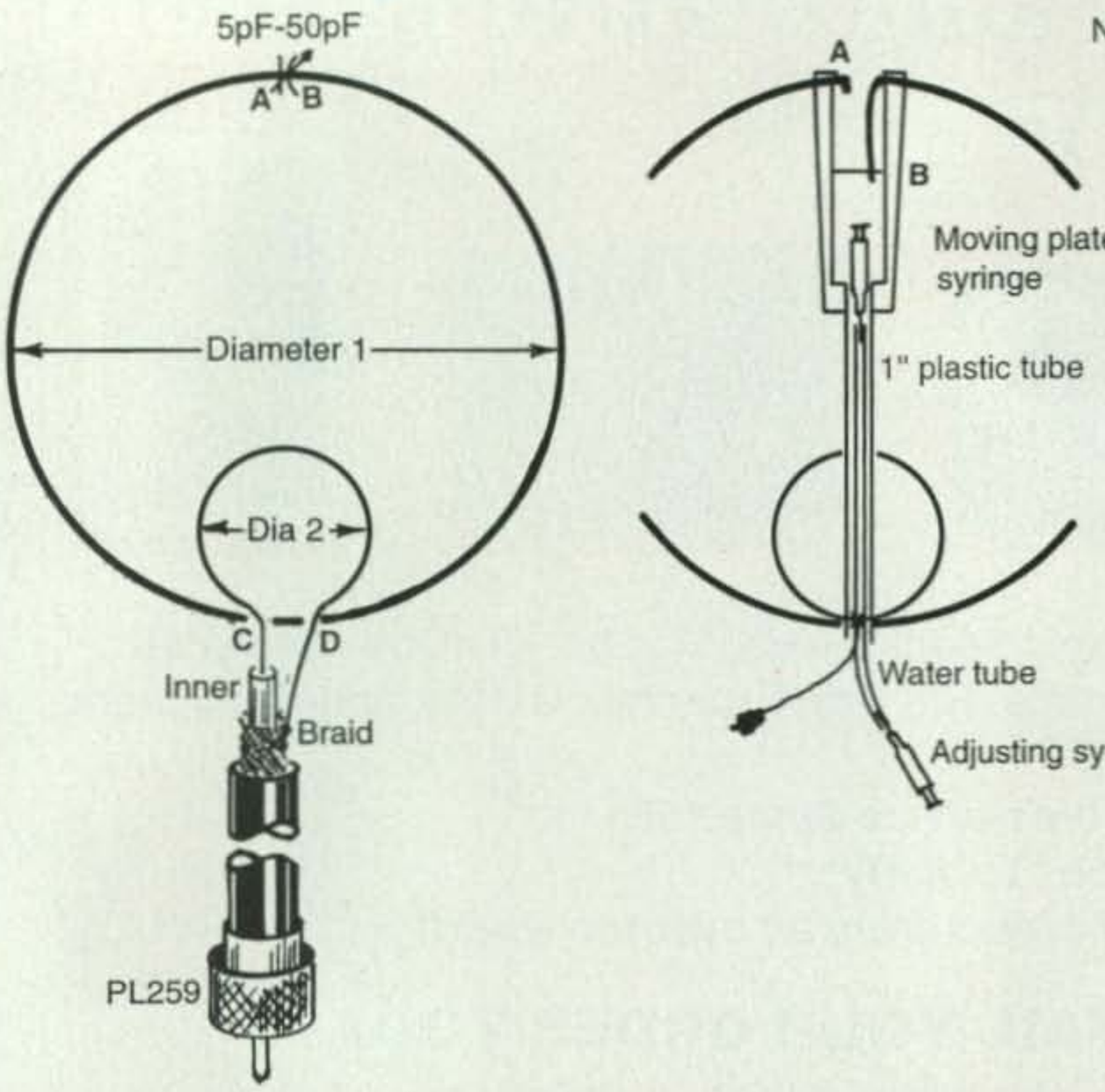
Photo D– The homebrew 5–50 pFd tuning capacitor at the top of the loop antenna is made by sandwiching two pieces of copper-clad PC-board material in plastic "U"-channel guides available from hobby stores nationwide. The shield from each end of the loop connects to each piece of PC-board material. The bottom piece is stationary; the top piece slides/remote-tunes according to the position of the syringe, as discussed in the text. (Photo courtesy of PY1AHD)

Photo E– A second syringe marked in megahertz is fitted with a belt clip and connected to the loop-mounted syringe via a plastic tube filled with water. This is the view looking down from Alex's shoulder. (Photo courtesy of PY1AHD)

ties secure the loops in place on the mast. In exchanging notes with Alex, I learned that he has made more than 30 different types of magnetic loops (he obviously has good insight to what works and what doesn't), and this one is the best of the pack.

As previously mentioned, the main loop is tuned to frequency (and minimum SWR) with a variable capacitor connected between pigtail leads from each end of the main loop. A regular, but large, tuning capacitor might be pressed into service here, but bear in mind that electrical losses will be present at the rotor's friction-fit contact point, and a capacitor with two fixed plates and no "friction-fit" point (such as a butterfly type) sidesteps that loss. Creative-minded and mechanically inclined amateurs might devise their own butterfly by using two identical 50- or 100-pFd variables with only the stator plates removed from one and mounted above the stator plates of the other. Then when the (common) rotor is moved or rotated out of mesh with one stator, it goes into mesh with the other stator by an equal amount. There is one other small hitch here: Hand capacity can affect capacitor tuning, so a remote plastic cable, a pair of selsyn motors, etc., should be included in this arrangement. PY1AHD went a couple of steps further here by fabricating his own low-loss variable capacitor with remote tuning to boot.

Details of the PY1AHD water-adjusted capacitor are included in photo D and fig. 1. It is comprised of two pieces of copper-clad PC-board material. The fixed plate is 58 mm by 180 mm, or 2.28 inche by 7.0 inches, with a short (approximately .5 inch) strip for soldering the loop's braid/shield to the end. The moving plate is 58 mm by 70 mm, or 2.8 inches by 2.75 inches, with a similar short solder strip at its back area. Two pieces of plastic "U" channel guide (Plastruct #90583 available at most hobby stores) are super-glued to each side of the fixed capacitor plate, and then the sliding/tuning plate is inserted in the U channel. An L-shaped acrylic support is also glued to the sliding plate, and the plunger end of a 20-milliliter syringe fitted onto the loop's support mast/pipe. A similar syringe with home-fabricated belt clip serves as a remote tuning aid. After the setup is filled with water, moving the belt-clipped syringe moves the remote syringe, which in turn



NOTE:

There are no electric joints between the main loop and the inner loop, only proximity (inductive coupling).

Outer loop:

Conductor length (point **A** to **B**): 100" (254 cm)

Diameter 1: 31 7/8" (80.8 cm)

Inner loop:

Conductor length (point **C** to **D**): 19 3/4" (50.2 cm)

Diameter 2: 6 5/16" (16 cm)

Fig. 1– Diagram of the physical assembly and precise dimensions of PY1AHD's loop. The homebrewed tuning capacitor has one 2.28-inch by 7-inch fixed plate and one 2.28-inch by 2.75-inch sliding plate.

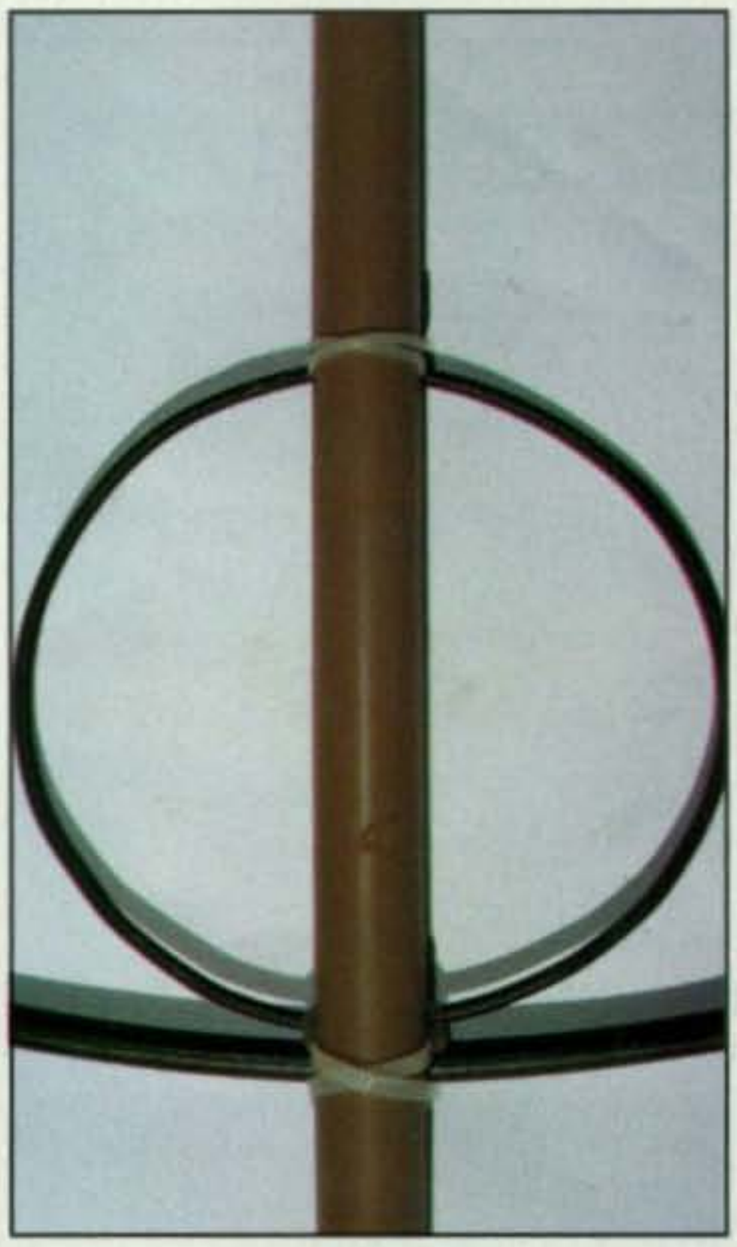


Photo F– This view shows how the small loop is secured inside the large loop with cable ties to a plastic support mast. There is no electrical connection between the loops; only inductive coupling is used. (Photo courtesy of PY1AHD)

Photo G– Some of the neat mini rigs Dennis Payton, N9JXY, built and installed in Altoids® tins. Included in this view are: the famous W7ZOI Micro Mountaineer transceiver (second from top on left), a WE6W Pixie transceiver (bottom center), an 80-meter transceiver, a 40-meter Rockmite above it, and a digitally tuned transceiver (upper right). (Photo courtesy of N9JXY)

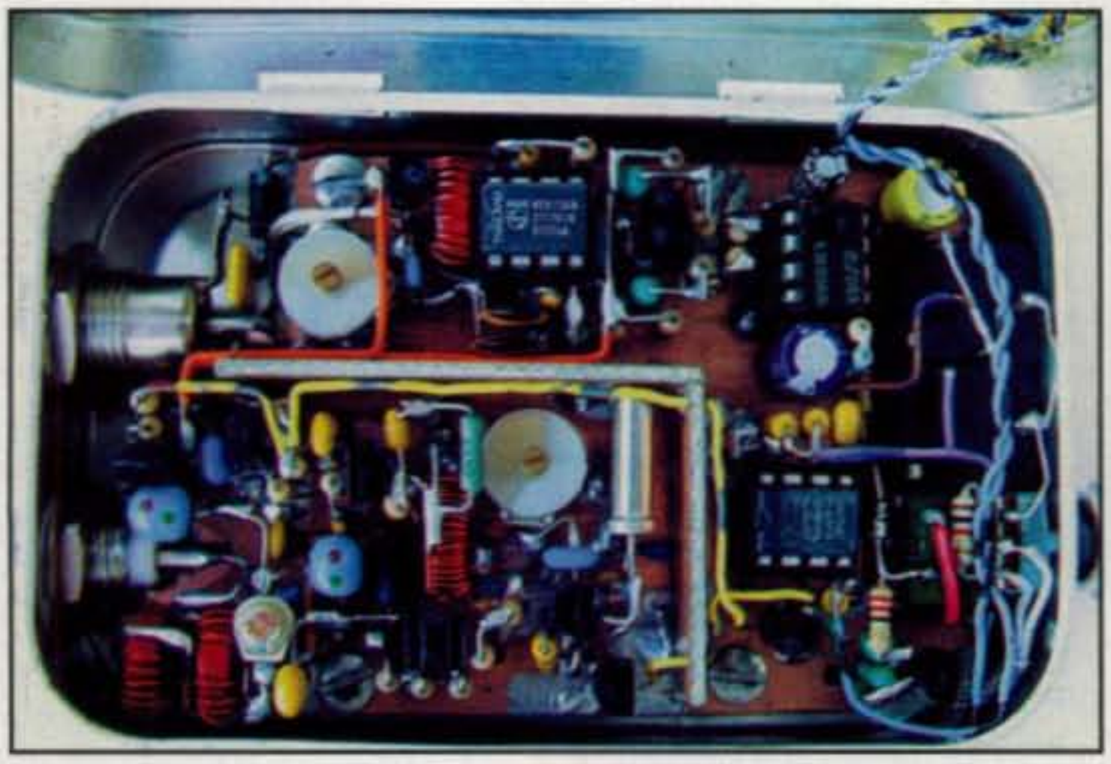


Photo H– Close-up view of N9JXY's Micro Mountaineer. Notice how every wire is precisely formed and every solder joint is perfect. It's sheer electronic art for sure,and the little rig works well to boot. (Photo courtesy of N9JXY)

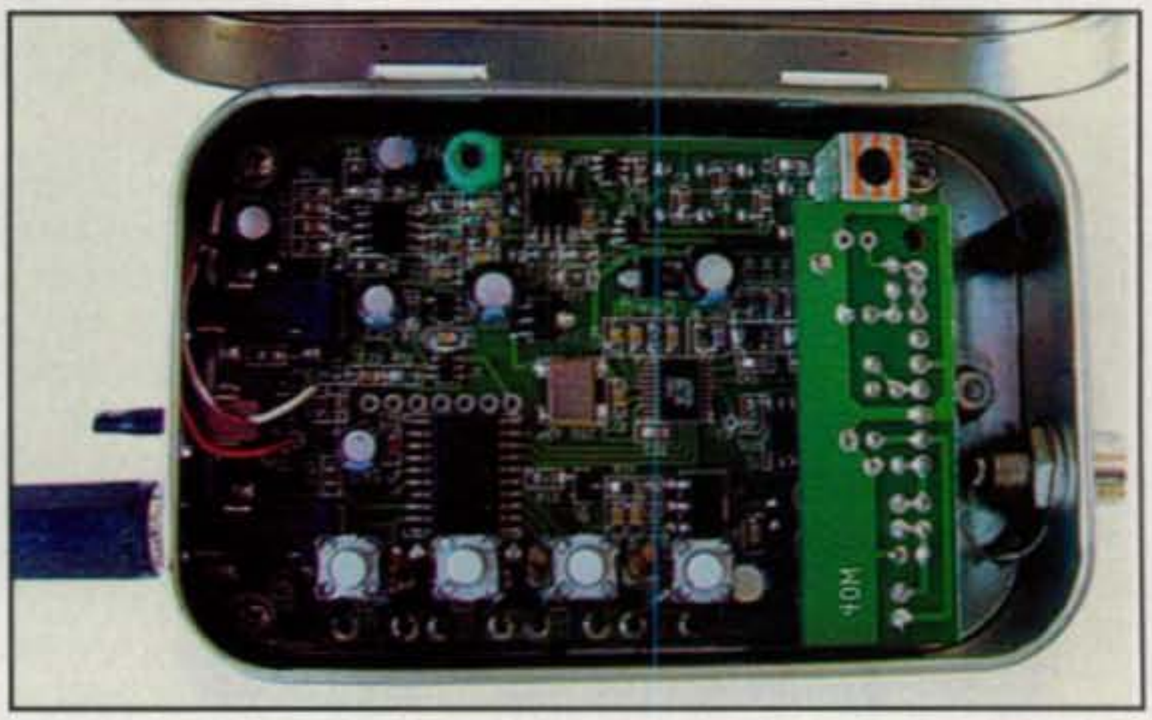


Photo I– Interior view of the digitally tuned and band-selectable transceiver shown in photo G. The four pushbuttons in the lower area are up/down tuning, RIT, and menu selections. Have you ever seen such a remarkable example of home brewing in surface mount? (Photo courtesy of N9JXY)

moves the capacitor's plate for frequency tuning. Clever!

Finally, we should point out that small magnetic loops are sharp-tuned with quite narrow bandwidth. They thus require retuning for highest receive sensitivity and lowest transmit SWR with each frequency change. On the good side, they also act like a front-end filter and preselector to reduce electrical noise and improve rejection of adjacent-frequency QRM. If you have questions or comments on this neat loop, incidentally, you can e-mail Alex at <py1ahd@ig.com.br>. We are sure he will enjoy hearing from you.

Dazzling Homebrew

One of the most popular enclosures for homebrew projects among QRPers near and far is Altoids® tins, and no one recognizes that fact more than Dennis Payton, N9JXY (photos G, H, and I). This chap has squeezed at least a dozen different mini-transceivers, keyers, antenna tuners, and SWR monitors into the little red-and-white boxes, and his handiwork is amazing. Consider, for example, the classic Micro Mountaineer Mini Transceiver shown in photo H. The original Micro Mountaineer was housed in a box as large as two Altoids tins, but Dennis shoehorned it to fit in one and even included a Jackson Harbor keyer to boot. Using the keyer's beacon mode, Dennis can operate the rig—call CQ, shift frequencies, etc.—with a single pushbutton he mounted on the tin's top. The Micro Mountaineer, as you may recall, was designed by W7ZOI, and versions for 40 and 10 meters have been featured in issues of *QST*. The rig runs 500 mw on one of two switch-selected frequencies. Dennis liked the Micro Mountaineer so much that he made four of them. The other three are enclosed in tiny black boxes and are works of art we will feature in future columns.

Another Altoids special from N9JXY is a surface-mount mini-transceiver that can be set for operation on 80, 40, 30, or 20 meters (photo I). Notice the four white-tipped pushbuttons along the circuit board's lower edge. They extend through holes in the tin's top and permit up/down frequency tuning, RIT operation, and access to the rig's menu set. My gosh, but it sounds as if we are describing a fancy new "big rig" rather than a homebrew item in an Altoids tin!

That brings us right to the closing wire, friends, but watch for views of more N9JXY delights plus details on a couple of easy homebrew treats in our December column. Meanwhile, here's hoping we meet one night soon on 30 meters. I am easy to spot. I am the one running QRP!

73, Dave, K4TWJ

Late Flash: A Halloween Bash!

Heads up, Tuna Tin 2 owners: The Black Cat operating event/party of the past is returning, and everyone can be a winner! Call or listen (closely!) for Tuna Tinners calling "CQ TT" around 7040 kHz between 6 PM and midnight EST on October 31. Make one good QSO of 300 miles or more with your TT2 and you qualify for the ARCI's (QRP Amateur Radio Club International) famous 1000 Mile Per Watt award. Another Zombie Shuffle is also scheduled for Halloween this year! Go to <www.megalink.net/~w1rex/QRPme> for Tuna Tin 2s, <www.zianet.com/QRP> for Zombie info, and <www.qrparci.org> for 1000 MPW award info. Milliwatt Magic peaks on Halloween!