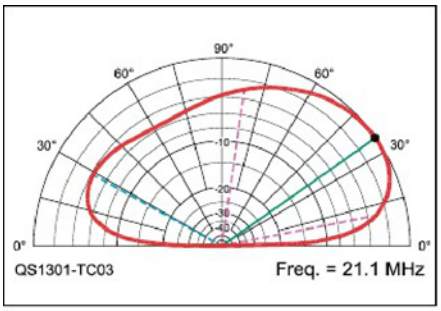

Figure 3 — The elevation pattern shows a maximum gain of 2.34 dBi at 34° elevation. This is only 0.25 dB less than if the antenna were in free space (at an infinite height above ground). It's nearly 2 dB more than if the antenna were strictly vertical (not slanted).

over a straight vertical orientation. Figure 3 is the *EZNEC* elevation plot, using the *EZNEC* "real ground model" (conductivity = 0.008 S/m, dielectric constant = 13).

It's worthwhile to keep in mind that, as mentioned in Sajid's article, this loop will also tune up nicely at twice the fundamental frequency, although with some changes in the radiation pattern. With the right length of wire, 20 meter/10 meter dual-band operation seems an attractive possibility.

I suggest this would make a nice antenna for low power operation, perhaps for Field Day or a backpacking expedition. It's quick and inexpensive, and if you have a need to rotate it, just pick up the rocks and walk it around! It is a pretty effective antenna. With the setup I've shown here, running 75 W from my location in Texas, I have worked hams in Japan, Germany and South America, besides attaining my original goal of making contacts to New England. — *73, Larry Coyle, K1QW, 167 Black Hawk Ct, Dripping Springs, TX 78620*; **k1qw@arrl.net**

Heating Ventilation Air Conditioning (HVAC) EMI Generation

In the summer of 2010 we moved to a new home with a bit more space. As I was becoming accustomed to the new place and its obstacles, one of these I was not ready for. I had chosen to establish the radio room adjacent to the utility room because it provided all the necessary items, such as space, access to the outside for the antenna coaxial runs and electrical wiring just to name a few. I was looking forward to another season of Top Band DX contesting, but that was short lived. To my surprise when I powered on my Kenwood TS-940 for the first time there was a loud hiss/whine coming from the speaker and it didn't matter where I tuned, whether it was on 1.8 MHz or right through to 30 MHz.

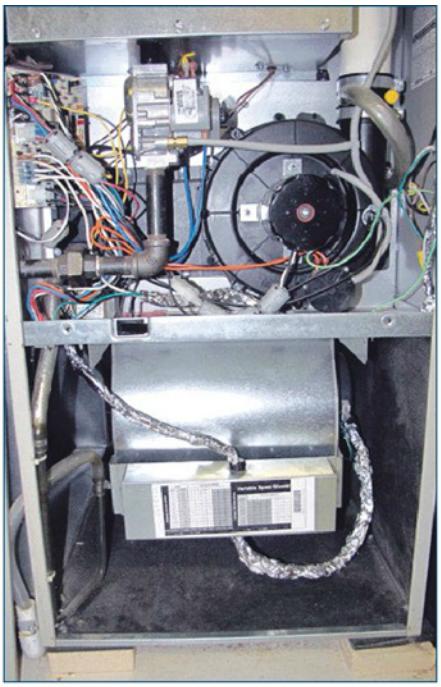

Figure 4 — This view inside of my HVAC unit shows how I wrapped some of the wiring harnesses with aluminum foil to shield the EMI that the dc control signals generate. You can also see where I placed snap-on ferrite beads over some of the wires.

The whine was found every 30 kHz while spinning the main dial.

What was the cause of all this EMI that suddenly appeared one hot afternoon just after setting up my radios in the shack for the first time? It became very apparent when I heard the HVAC system shut off, and the EMI came to an abrupt stop.

This interference was not coming from an outside source such as the house next door, but from my own home. Realizing that the EMI was coming from the HVAC unit only 3 meters away in the next room really bothered me. On further investigation, when the HVAC unit energized again the noise heard on the radio seemed to be synchronized to the sound of the variable speed blower motor as it ramped up in speed.

My new home was equipped with a more up-to-date high efficiency HVAC unit than my previous location, which had a much older mid-efficiency unit and was equipped with only a two speed blower motor that caused no EMI.

Needless to say I was not impressed with this situation. Researching solutions on the Internet only produced minimal results regarding the EMI hash that was being generated. I called the manufacturer of the unit (TAPPAN), and heard that they had never entertained this complaint before. I knew then it was up to me to resolve this problem as they would be of no help.

The variable blower speed control was created by converting the applied 120 V ac to a steppable dc voltage module mounted inside the motor itself, which when energized controlled the blower's speed from 500 to 1870 rpm.

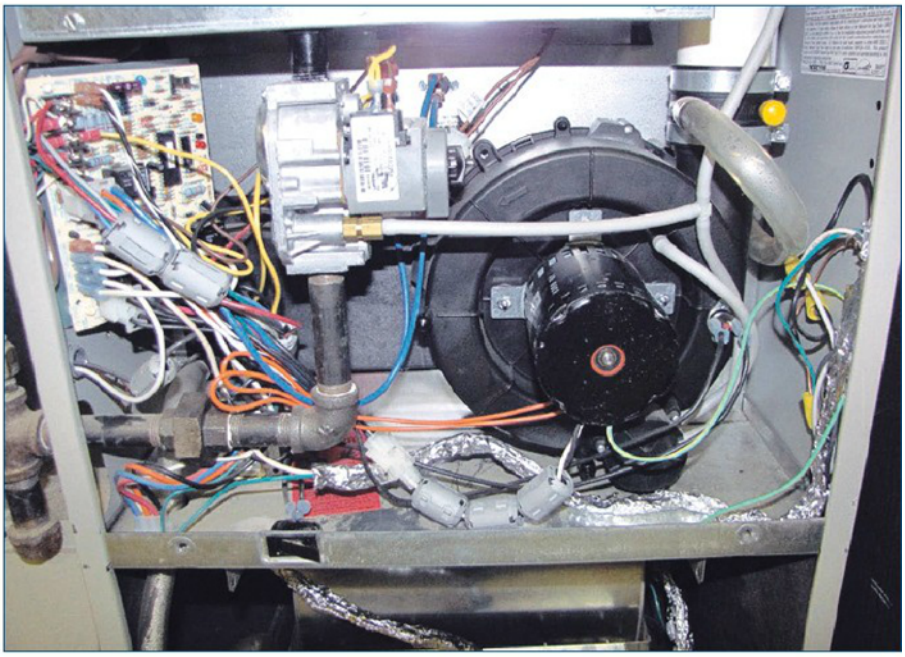

Figure 5 — This view shows more detail of the wiring in the top portion of the unit.

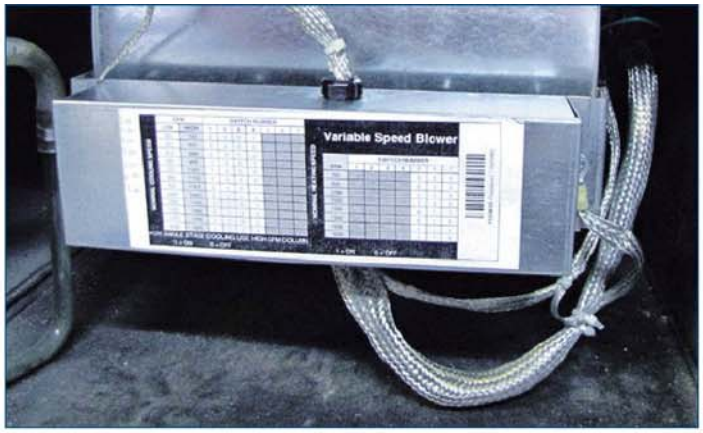

Figure 6 — After I knew that shielding the wiring harnesses would suppress the EMI, I applied braid tubing over the wires to produce a more professional looking result. Note the shield grounding strap on the right side of the unit.

After a bit more research on how to possibly suppress this EMI, I did not find any solutions on the Internet. Then I remembered that I had purchased over a dozen clamp-on ferrite RF beads, which could possibly be used as RF suppressors. After turning off the 120 V ac supply, I placed several of these RF beads on the multiple open wire harness of this variable speed motor. Alas, this did not suppress the EMI. It then occurred to me that an RF shield of some sort would be a possible solution to my problem.

I believed placing the open wire harness inside of a metal sleeve of some sort might be the answer. I was unable to locate any of my large braided shield that was big enough to use for a sleeve. It was still packed away in one of the many boxes piled up in the garage. Then another possible quick solution came to mind. I went to the kitchen to fetch some aluminum foil and took this down to the utility room to be used as a temporary shield on the HVAC unit.

As a first step, I used plastic wire ties to harness the separate motor wires together into a bundle. Then I cut off long strips of aluminum foil and carefully wrapped the foil around these now bundled wires in a temporary shielded harness. I carefully made sure that the foil did not come into contact with any of the circuit connections that would be behind the inspection panels of the HVAC unit when closed up. I added several ferrite beads in select locations that I thought might help in suppressing some of the EMI as well. See Figures 4 and 5.

Once I was satisfied that I had shielded most of the exposed wires of the blower motor as best I could, I re-applied the 120 V ac to the HVAC unit.

Now, checking my HF rig with the HVAC running there was no EMI hash being generated from the unit. Success!

I have since modified the wire harnesses by placing the bundled wires inside a more suitably appropriate braided strap that fits this application. See Figure 6.

I hope this solution will help some of you who are having EMI issues that have until now gone unresolved, possibly because of this newer methodology in controlling some ac power applications. — *73, Larry Parker, VE3EDY, 1741 Lake Shore Rd, Sarnia, ON N7X 1G1 Canada*; **ve3edy@cogeco.ca**

Technical Correspondence items have not been tested by *QST* or the ARRL unless otherwise stated. Although we can't guarantee that a given idea will work for your situation, we make every effort to screen out harmful information.

Materials for this column may be sent to ARRL, 225 Main St, Newington, CT 06111; or via e-mail to **tc@arrl.org**. Please include your name, call sign, complete mailing address, daytime telephone number and e-mail address on all correspondence. Whether you are praising or criticizing a work, please send the author(s) a copy of your comments. The publishers of *QST* assume no responsibility for statements made herein by correspondents.

At the Foundation

Mary M. Hobart, K1MMH, k1mmh@arrl.org

Calling All Students!

Have you submitted your application for an ARRL Foundation Scholarship?

The annual application period for ARRL Scholarships for FCC-licensed radio amateurs closes promptly on February 1, 2013. More than 70 scholarships valued at over $82,000 are scheduled to be awarded in the spring of 2013. There are many opportunities for qualified students to benefit from the generosity of donors who have established (and who now maintain) these scholarships over the years.

All the information about the scholarships, including selection criteria, application forms and instructions can be found on the web at **www.arrl.org/scholarship-program**. And don't forget — a current transcript is required for all applications. In addition, high school seniors who apply for the William R. Goldfarb Memorial Scholarship must submit a Free Application for Federal Student Aid (FAFSA) based on the family's most recent tax return. These documents should be submitted electronically to **foundation@arrl.org**.

If you are affiliated with an Amateur Radio club, please share this information in your newsletter and on your website.