

The American Radio Relay League

The American Radio Relay League, Inc. is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.



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"Of, by, and for the radio amateur," ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

A *bona fide* interest in Amateur Radio is the only essential qualification of membership; an Amateur Radio license is not a prerequisite, although full voting membership is granted only to licensed amateurs in the US.

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The purpose of QEX is to:

- 1) provide a medium for the exchange of ideas and information among Amateur Radio experimenters,
- 2) document advanced technical work in the Amateur Radio field, and
- 3) support efforts to advance the state of the Amateur Radio art.

All correspondence concerning *QEX* should be addressed to the American Radio Relay League, 225 Main Street, Newington, CT 06111 USA. Envelopes containing manuscripts and letters for publication in *QEX* should be marked Editor, *QEX*.

Both theoretical and practical technical articles are welcomed. Manuscripts should be submitted in word-processor format, if possible. We can redraw any figures as long as their content is clear. Photos should be glossy, color or black-and-white prints of at least the size they are to appear in *QEX* or high-resolution digital images (300 dots per inch or higher at the printed size). Further information for authors can be found on the Web at www.arrl.org/qex/ or by e-mail to qex@arrl.org.

Any opinions expressed in *QEX* are those of the authors, not necessarily those of the Editor or the League. While we strive to ensure all material is technically correct, authors are expected to defend their own assertions. Products mentioned are included for your information only; no endorsement is implied. Readers are cautioned to verify the availability of products before sending money to vendors.

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Empirical Outlook

Can You Teach an Old Dog New Tricks?

After four decades as an Amateur Radio operator, this hobby continues to amaze me. New experiences and learning opportunities abound. Field Day has always been one of my favorite ham radio events. I've participated with a number of clubs over the years, and the camaraderie and pooling of resources for a successful weekend of emergency communications practice is always wonderful. In recent years my wife, WB3IOS, and I had been holding our own Field Day operation, camping in several states and enjoying an extended weekend "vacation."

This year that wasn't going to work out, however, so I opted to do Field Day with a local Amateur Radio club. I hadn't been to Field Day with this club before, although they have been going to the same local State Forest for years. Quite a few of the club members camp overnight, so that fits right in with my idea of Field Day.

There were plenty of operating opportunities for those who wanted to be on the air, although many who came out to the site seemed content to just enjoy some ham radio conversation. Everyone seemed to have a lot of fun.

I noticed that no one had brought a digital-mode station, and that started me thinking (again) about the NUE-PSK modem kit that was sitting in a box at home, waiting for me to get the nerve to start the construction. That box has been sitting in my shack since March 2008. (The NUE-PSK modem was described in the Mar/Apr 2008 issue of *QEX*, with an overview in the Mar 2008 issue of *QST*.) I've opened the box several times to read the directions and consider the process of building the modem.

I really enjoy building projects, and consider myself to be a rather experienced builder. Still, there was something daunting about this project. Not only does the NUE-PSK modem involve soldering surface mount components, but there are several surface mount ICs. Now, some of those ICs are similar to common 8 or 16 pin DIP through-hole-mount ICs, but one is a 64 pin microcontroller that is about 1/2 inch square, with 16 leads on each side!

I decided I had put this off long enough. Although I was very reluctant to try placing that microcontroller IC on the circuit board, I was also not ready to accept defeat and send it back to the article authors, George Heron, N2APB, or Milt Cram, W8NUE, who had offered to solder at least the dsPIC IC for me.

With space cleared on my operating desk and my magnified lamp clamped to the side of the desk, it was time to go for it. I tried one of the larger ICs first, and it really wasn't all that bad. With the lighted magnifying lens I could actually see the leads very well, and it was not too difficult to line up the pins with the circuit board pads. Tack solder one corner lead, and double check to make sure the IC pins are all aligned with the pads. Then tack the opposite corner lead and check again. Yes, it looks like everything is aligned perfectly. Next I heated the row of pins and circuit pads, and just ran the solder along the board. That resulted in one blob of solder along each side, but after laying some solder wick on top of the row of leads and heating with my soldering iron, it looked pretty good. Actually, it looked very good.

I followed the same procedure for the 64 pin dsPIC, but found it was much more difficult to really see when the pins all lined up with the circuit board pads. In fact, something always looked a bit out of place along one side. The other 3 looked perfect, though, so I soldered the IC in place. After adding the surface mount resistors and capacitors, along with a few through-hole components, I was ready for the ultimate test. After carefully examining the board under the magnifying lens, and finding no shorts or other obvious problems, I connected the two 9 V batteries and turned on the power. I could see the display backlight come on, but there was no sign-on message, and no line for the frequency display.

I consulted with Milt, W8NUE, and he suggested that there were probably some pins shorted on the dsPIC, but I really could not see it well enough to decide. My dilemma was how to gain more magnification. It finally occurred to me that I might try taking a digital photo through the magnifying lens, and then enlarging that photo on my computer screen. Well, it worked! As soon as I blew up the best photo, I could see several pins that appeared to be bent, and touching the neighboring circuit board pads.

Armed with this enlarged image, I was able to heat the appropriate pins with my soldering iron and then apply some lateral pressure with a heavy straight pin to move the leads back into place. Another photo confirmed that the pins looked to be back in place, so I again applied power. Success! Oh, the joy of seeing something I built come to life for the first time. It wasn't long before I had my first PSK-31 QSO with the new modem. The next time I am faced with soldering such a small IC with so many leads, I'll tack a corner in place and take a photo. Then I'll tack another corner and take another photo. With that increased magnification, I will be able to spot any problems such as bent leads. Perhaps my "discovery" will encourage you to try building a project with surface mount ICs, too. It's fun!