Rugged Dual-Band Handheld with Quality in Mind Page 50

QST

DIGITAL EDITION

DEVOTED ENTIRELY TO AMATEUR RADIO

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The Global Fascination of DX

QST Reviews

- **Yaesu FT-65R** Dual-Band Handheld Transceiver
- **SharkRF openSPOT** Hotspot
- **SDRplay RSP2pro** Software Defined Receiver
- **W4OP** Magnetic Loop Antenna
- **Pro Audio Engineering** Kx33 Power Supply
- **EZ Hang** Square Shot Antenna Launcher

DIGITAL FEATURE

57 | See the Video Review of the **SharkRF openSPOT** Hotspot by Pascal Villeneuve, VA2PV.

Easy Headphone Cushion Repair, Circuit Board Club Badges, and APRS Image Reception

Evolving Hobby, Evolving Language

One of the meanings of the word "kink" is "a clever or unusual way of doing something," which is why it was used for this column's title. Over time, usage of "kink" in this manner has declined. Most people take "kink" to mean an obstacle ("We'll need a week to work out the kinks in the system"), or a sharp twist/turn ("The garden hose has a kink in it").

The popular use of "kink" has changed over the decades, and now may be connoting difficulties in a place where we want to be highlighting solutions. Thankfully, there's a new term that means "a clever or unusual way of doing something."

The word "hack" is currently pulling double duty with negative and positive meanings — a malicious attack on a computer system ("Amazon got hacked and 2 million credit card numbers were stolen"), and also a hint or a tip, like "life hacks" ("I watched a video that showed a great hack for turning an empty 2-liter bottle into a cereal dispenser for the pantry"). The positive meaning is newer, and is a more accurate reflection of the information this column presents.

Over time, many of the tips presented in this column have taken a turn for the digital, as modern-day builders, Makers, and "hackers" try new things with the tools available to them. Here you'll find the same hints and tips you've come to expect from this column, under a fresher name. As the world evolves, so does ham radio, and so does QST. *— Ed.*

Circuit Board Badges

Our club, the Riverside Radio Amateurs (**www.wa8rra.org**), recently adopted a logo that was designed by one of our members, Scott Beeman, NE8E. I converted the logo graphic into a printed circuit board design, and ordered a batch of circuit boards that I made into club badges.

To make the badges, I used Inkscape (which is available for free at **www.inkscape.org**) to convert Scott's original SVG file of the logo into images of the copper and solder mask layers. I imported those images into a circuit board design using *Eagle* design software, which is available at **www.autodesk.com/products/eagle**, and is also free for non-commercial use with boards up to 100 × 80 millimeters. I put a rectangular opening in the solder mask on the back side so I could solder on a pin clasp, and I added through-holes so I could make the little antenna in our logo using actual copper wires. I then generated Gerber files of the board design and sent them off to a PC board manufacturer to have the boards made.

After soldering the pin backs on and adding the antenna wires, I sprayed the front with clear enamel to secure the wires and to resist smudges. Finally, I personalized each badge with a gold-on-clear label showing the member's name and call sign (see Figure 1). Even with gold-plated traces, the total cost was under $5 per badge, including the circuit board and all materials. You can watch the whole process in my YouTube video, at **www.youtube.com/watch?v=1g1jHmrTVyc**.

— 73, Jay McClellan, K8DC, **jay@brainright.com**

Figure 1 — These WA8RRA club badges were made from printed circuit boards, converted from the club's logo design. [Jay McClellan, K8DC, photo]

More Easy-Off Connector Seals

I read the procedure for easy removal of connector seals by Evan Rolek, K9SQG, in the September 2016 edition of "Hints & Kinks." I've been using a similar method for over 30 years. I am a retired RF/microwave engineer, formerly employed by Telco.

Instead of painter's tape, I used ordinary, black electrical tape in a somewhat unconventional manner. When weatherproofing a connector, the first wrap of the tape was to wrap the connector with the black electrical tape "sticky side" out. I ensured that the tape was stretched enough to fill the low spots on the connector, then I wrapped the connector in the usual manner with the weather-seal product.

If the connection must be opened, everything peels off with a careful knife cut and no effort, and nothing sticks to the parts involved. Using black tape in this manner requires nothing new to put in your toolbox.

I've opened connectors and

Figure 2 — Nylon socks stretch over headphone earpieces for a cheap, easy cushion repair. [Ralph Phillips, KE5HDF, photo]

splices after many years using this method, and they looked as good as the day they were originally wrapped. — *73, Terry White, VE5TLW,* **twhite@sasktel.net**

Headphone Cushion Repair

When the earpiece cover of my headphones began to degrade, I looked for a supply of matching replacement covers. Finding none, I looked around the house and saw an old pair of my wife's nylon socks. They are black, soft, transparent to sound, and elastic. They stretch over the earpieces and form nicely to them (see Figure 2). They are the most comfortable (and inexpensive!) earphone covers I have found. — *73, Ralph Phillips, KE5HDF,* **ke5hdf@sbcglobal.net**

Radial Plate Reference

For the vertical antenna at my previous station, I purchased the DX Engineering stainless-steel radial plate. The plate has 60 holes for bolts to hold the radials. Using the wire at my disposal, I attached a few radials and began to use the antenna. As time passed, the radials disappeared into the turf of the lawn. I had no way of telling how long each of the radials was, or in which direction it was laid down. When more wire became available, I could not tell in which directions additional radials should best be oriented.

Upon moving to a new station location, I solved the problem. Using a protractor and a sharp marker, I drew lines through each bolt hole, starting at the corner holes at 45 degrees, with each subsequent hole six degrees different. Each time I laid down a new radial, I laid it out in the direction indicated by the marker line, and I marked the length of the radial along the marker line, as you can see in Figure 3. Since the photo was taken, I have added many radials, and it has been easy to tell in which directions radials are few or short.

If I had to do it again, I would draw the lines *before* the plate is mounted on the mast; it's hard to draw good lines while kneeling in the mud. — *73, Mike Conlon, N2EM,* **mpconlon@zoominternet.net**

APRS Image Reception

Trying to listen to your APRS signal on 144.390 MHz when the air is flooded with signals is like trying to use a magnet to find an aluminum needle in a haystack. That's the quandary I found myself in when checking out an intermittent problem with my APRS setup, a standalone assembly mounted in my trunk. Trying to use my voice transceiver in the front of the car yielded a myriad of signals — which one was mine?

Typically, you would use an attenuator to reduce the level of outside signals, but because my radio is installed in the dash, with all the coax neatly hidden away, connecting an attenuator would have been difficult. Using a little imagination, I realized I could monitor my signal via listening to the image frequency. My Kenwood TM-742 radio has low side injection of the 10.7 MHz local oscillator, meaning the local oscillator is 10.7 MHz below the frequency on the dial. [*Note: The IF frequency of a handheld or mobile transceiver can be anywhere from roughly 10 – 60 MHz, or higher. Many*

Figure 3 — I laid new radials out in the direction indicated by the marker line, and marked the length of the radial along the marker line. "80 m" indicates that the radial is ¼ wavelength long for the 80-meter band. [Mike Conlon, N2EM, photo]

newer transceivers don't publish the first IF frequency in the specifications, and the ARRL Lab has noted a few where the published IF was incorrect. Also, some receivers are direct conversion with no IF stage at all. Be sure to use a radio that can receive the image frequency for testing.— Ed.]

The image frequency, for a low side injection local oscillator, is twice the IF frequency plus the frequency of interest. In the case of APRS at 144.390 MHz, we get (10.7 MHz × 2) + 144.39 MHz = 165.79 MHz.

Usually, you want to have good image rejection to prevent the radio hearing signals that you are not tuned to. The image frequency works for this purpose because modern receivers employ image rejection filters that attenuate the receiver's image frequency from 76 to over 130 dBs. Using the image frequency essentially renders the receiver extremely insensitive to image frequency signals, hence blocking out all but the strongest signals on the frequency. Tuning to the image frequency made receiving my own signal easy while attenuating almost all the other signals on frequency.

Using the image frequency, you will probably hear only one APRS signal (yours) and then be able to hear how your signal sounds and how your system is performing, including pegging of turns. I have the APRS image frequency, 165.79 MHz, saved in a memory for ease of use. — *73, Allen Wolff, KC7O,* **kc7o@arrl.net**

"Hints and Hacks" items have not been tested by *QST* or ARRL unless otherwise stated. Although we can't guarantee that a given hint will work for your situation, we make every effort to screen out harmful information. Send technical questions directly to the hint's author.

QST invites you to share your hints with fellow hams. Send them to "Attn: Hints and Hacks" at ARRL Headquarters, 225 Main St., Newington, CT 06111, or via e-mail to **hh@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 an item, please send the author(s) a copy of your comments.

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Atlantic		
Jobst Vandrey, AC0LP	315	23-Jun-08
Edward Genoino, WA2NDA	295	10-Jul-85
James McCloskey, NS3K	280	14-Nov-94
George Brechmann, N3HBT	251	01-Apr-91
Robert Benna, N3LWP	221	21-May-97
Central		
Eldon Boehm, NK9U	283	21-Nov-86
George Greene, NE9ET	279	13-Nov-00
Allan Bukowski, N9ZD	275	01-Jun-92
Donald Hlinsky, N9IZU	270	01-Mar-91
Ed Wagner, AB9FN	270	01-Jul-02
Timothy Pechtold, AA9BV	256	01-Nov-92
Dakota		
John Schwarz Jr., AE0AL	274	26-Oct-94
Jeffrey Goodnuff, W0KF	260	17-Jun-03
Daniel Royer, KE0OR	216	01-Jul-91
Tom Wilson, NI0I	212	30-Jul-86
Dennis Ackerman, KB0OQQ	211	15-Jul-96
Delta		
Arthur Parry Jr., WB4BGX	250	01-May-91
Edward Scheufele, AB5RS	224	19-Jan-94
William Easterday, KB8FU	209	01-Mar-91
Roger Gray, N5QS	207	01-Mar-93
Glenn King, N5GK	198	05-Jun-86
Great Lakes		
David Schmidt, KI4QH	250	15-Feb-85
Charles Hall, W8HF	248	01-Jun-92
Herbert Blasberg, WA8PBW	216	06-Sep-84
Dale Pritchett, KC8HJL	215	26-Mar-98
Christian Anderson, K8VJ	208	09-Feb-90

Examiner	*Sessions*	*Accreditation Date*
Hudson		
Paul Maytan, AC2T	570	06-Sep-84
E. Drew Moore, W2OU	400	01-Aug-90
Stanley Rothman, WA2NRV	387	01-Mar-85
Gerald Miller Jr., AA2ZJ	378	05-Dec-95
Fritz Boigris, KB2O	346	26-Oct-84
Midwest		
Harry Nordman, AB0SX	640	09-Jan-02
David Bartholomew, AB0TO	636	22-Mar-02
Kevin Naumann, N0WDG	571	17-Nov-02
Roland Kramer, W0RL	470	21-Jun-01
Jeanette Nordman, AB0YX	459	21-Aug-03
New England		
Robert Beaudet, W1YRC	329	01-Aug-90
Lawrence Polowy, KU1L	316	02-Jan-85
Stefan Rodowicz, N1SR	308	20-Nov-84
James Mullen, KK1W	305	01-Mar-91
Bruce Anderson, W1LUS	301	11-Feb-88
Northwestern		
Richard Morgan, KD7GIE	448	11-Aug-00
Loren Hole, KK7M	351	06-Sep-84
George Ftikas, N7TQZ	283	01-Dec-92
David Brooks, N7HT	261	10-Jun-87
S. Riley McLean, W7RIL	244	02-Sep-99
Pacific		
Morris Jones, AD6ZH	403	27-Nov-01
Gordon Fuller, WB6OVH	271	06-Sep-84
Bill Nichols, NN7K	266	01-Sep-93
Jim Brunk, N6BHX	240	13-Jul-95
Kenneth Hall, WO6J	230	18-Mar-86

Examiner	*Sessions*	*Accreditation Date*
Roanoke		
Judy Friel, AC4RG	260	01-Feb-91
Alan Moeck, WA2RPX	234	27-Sep-94
David Snyder, W4SAR	216	01-May-93
Sheila Frank, KT4YW	206	30-Oct-96
Thomas Hill, KJ4IV	201	01-Jun-91
Rocky Mountain		
Robert Hamilton, N0RN	350	19-May-87
David Avery, N0HEQ	271	13-Jan-88
Frank Goddard, W0AJY	267	01-Feb-92
Jeffrey Weinberg, W0QO	261	01-Apr-93
Philip O'Kunewick, AB0JR	249	24-Feb-00
Southeastern		
Victor Madera, KP4PQ	423	01-Mar-92
Pablo Soto, KP4SJ	353	01-May-92
Val Jacyno, AK4MM	337	08-Nov-11
Robert Cumming Sr., W2BZY	306	29-Jan-97
Harold Prosser III, KK1B	306	22-Jan-86
Joseph Patti, N4UMB	304	01-Sep-90
Southwestern		
Bill Martin, AI0D	868	01-Nov-84
Fred Bollinger, AB7JF	476	17-Apr-95
Steve Gurley, KY7W	393	19-Apr-96
Joseph Cutitta, W0SLL	373	09-Nov-99
David Morrill, N7TWT	344	20-Jul-00
West Gulf		
Franz Laugermann, K3FL	926	01-Dec-91
Sammy Neal, N5AF	545	20-Nov-84
John Moore III, KK5NU	460	21-May-95
Gerald Grant, WB5R	409	04-Jan-85
Adolph Chris Koehler, K5VCR	404	29-Sep-95