Details on New LF/MF Ham Bands, p.20

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# CQ Amateur Radio

COMMUNICATIONS & TECHNOLOGY

JUNE 2017

## Take it to the Field Special!

From K9 QRP...

...to an Anniversary in the Islands

On the Cover:
Details on page 4.

VOLUME 73 NUMBER 6

# CQ JUNE 2017

## CONTENTS





**ON THE COVER:** Terry Joyner, W4YBV (L), and Jim Palne, N4SEC (R), activate Lazy Island, Florida as part of the North Fulton Amateur Radio League's 40th anniversary celebration. The Georgia club plans to activate 40 islands this year (see page 19). Inset: Rudy the German shepherd helps carry ham gear to the field for his human companion, Pete Friedrichs, AC7ZL (see page 10). (Main cover photo by N4SEC; Inset photo by AC7ZL)

## FEATURES/COLUMNS



## DEPARTMENTS

Is ham radio going to the dogs? AC7ZL thinks it is…and that it's a great idea for combining exercise/activity for your dog (and you) with some portable hamming. Meet Rudy…and MOLLE.

# K9 QRP: Fun with Ruff Radio

**BY H.P. FRIEDRICHS,* AC7ZL**

Life and work keep me busy, so I never seem to spend as much time with my radios as I'd like. Every once in a while, though, I find myself with a spare moment and a well-intentioned plan to get reacquainted with my Morse key. On one such occasion, I'd just turned on the set and was sweeping through the 20-meter band when I became aware of that peculiar sensation one gets when they're being stared at. I ignored it until the feeling was punctuated by a loud and impatient sigh. I turned and found Rudy, my German shepherd, standing in the doorway behind me.

Photo A. Rudy and his MOLLE vest. (All photos by the author)

"What are we doing in here?" he demanded. "It's a beautiful day! Let's go outside and have some fun!"

Now I'm no lunatic, but any dog owner will confirm that while dogs can't actually talk, they most certainly can speak. I switched off my radio, put on my boots, and grabbed Rudy's leash. It was during the subsequent walk that I conceived of an idea to integrate low-power (QRP) radio operations with quality dog-time. Correctly practiced, it would promise fresh air, exercise, adventure, and fun for all parties involved. The term I've coined to describe this idea is "K9-QRP."

As proof of concept for this idea, I envisioned creating a system by which Rudy could carry a complete QRP HF station into the field. As you'll see, while this is achievable, an endless variety of other useful and interesting configurations are possible as well.

## Meeting MOLLE

How might a dog be outfitted to safely carry radio gear? A canine backpack seemed a good idea. In fact, Rudy's been carrying his own hiking equipment — goggles, trail shoes, and water bowl — for years. Unfortunately, I've found pet-store-grade backpacks to be flimsy, fragile, and ill-fitting. To make matters worse, the shape and size of the cargo spaces in these garments don't necessarily lend themselves to radio work. No, I thought, there had to be something better.

Few institutions have as much experience with carrying large and diverse loads as the U.S. military. A 2003 Marine Corps study showed that soldiers on patrol routinely carry as much as 127 pounds of weapons, armor, ammunition, electronics, and supplies. Over recent decades, this burden has led to the development of several carry systems including LCE (Load Carrying Equipment), MLCE (Modernized Load Carrying Equipment), ALICE (All-purpose Load Individual Carrying Equipment) and the current MOLLE (MOdular Lightweight Load-carrying Equipment) system. (References to items described in this article may be found at the end of the article and/or on the author's webpage. –ed.)

From the standpoint of the ham radio operator, these systems — MOLLE in particular — are attractive because of the diversity of compatible carry-equipment and accessories available on the surplus market. In fact, MOLLE has become so ubiquitous that manufacturers now produce all kinds of MOLLE-compliant packs, pouches, containers, holsters, and other accessories specifically for non-military customers such as hunters, sportsmen, and law-enforcement officers.

In the case of humans, the core of the MOLLE system is a specially-trimmed vest, belt, or pack to which MOLLE pouches and accessories can be attached. Surprisingly, only a handful of companies manufacture MOLLE-compliant harnesses engineered specifically for dogs. After much research and numerous investigative phone calls and emails, I finally

* <http://www.hpfriedrichs.com/contactme.htm>

Photo B. The HF transceiver, foam block, and pouch.

Photo C. Foam block with radio being slid into pouch.

settled on a custom version of the COMVest (Combat vest) produced by ForceK9 for the foundation of my project (see Photo A).

ForceK9 products are handmade in the U.S., custom-fit to your dog, and fabricated from top-shelf, U.S.-made mil-spec materials. The company offers several different models of vest with virtually any option you can dream of. Specific details can be found in my 29-page technical review entitled A Review of the Force K9 MOLLE Combat Vest. It can be downloaded for free from the K9 QRP page on my website (see References for link).

## A Prototype K9 QRP HF Station

A quick thumb-through of any ham magazine presents numerous candidates for potential HF K9-QRP transceivers. Examples include the venerable Yaesu FT-817, Elecraft's KX1, Wilderness Radio's Sierra, the Youkits HB-1, MFJ's Cub transceivers and many more. If you're willing to warm up your soldering iron and scrounge for parts, you can build a nearly endless assortment of simple direct-conversion transceivers from scratch.

For my K9-QRP proof-of-concept, I used a rig already in my possession: My Elecraft K1-4. This is a 4-band QRP rig with integral tuner and battery pack weighing about a pound and a half. After some exploration on the internet I determined that the K1-4's dimensions were sufficiently modest to fit inside a 200-round SAW (Squad Automatic Weapon) pouch. I purchased two surplus pouches online and attached them to Rudy's vest.

I cut a rectangular block of closed-cell foam, sized to slide into one of the SAW pouches. I then hollowed out the center of that block so that the K1-4 can "float" in the center of

Photo D. The inverted-V HF antenna deployed.

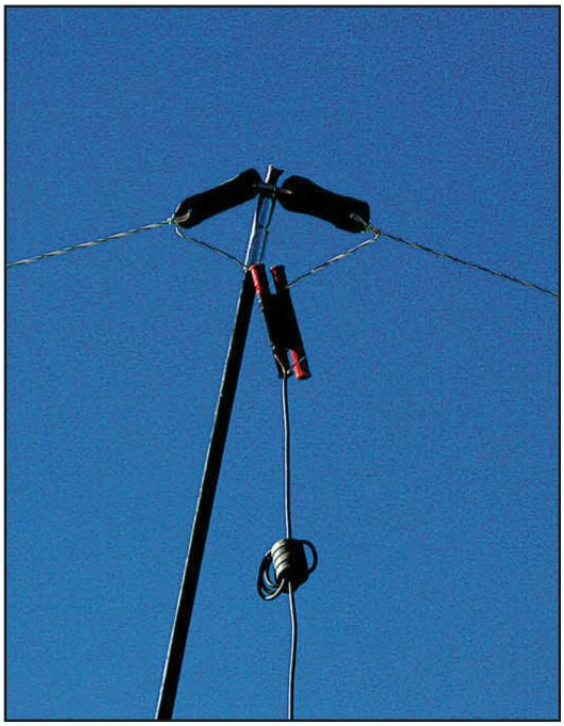

Photo E. Detail of connections at antenna feedpoint.

it (Photo B). To prepare for field operations I first place the transceiver in a plastic bag (to protect it from dust/moisture). I press the radio into the cavity in the foam block, and then insert the block (with radio inside) into Rudy's left SAW pouch (Photo C).

The right SAW pouch, by the way, is where I keep my operating accessories — earbuds, notepad and pens, spare batteries, antenna wire, and so forth. The right pouch provides more than the mere convenience of additional carry space. It is essential to properly balancing the load on Rudy's back. I'll comment more on that shortly. When Rudy and I have reached our destination and it's time to deploy the station, it only takes a few minutes to unpack and set everything up.

## HF Antennas

Antennas for HF K9-QRP operation need to be small and very lightweight. This invariably means simple wire antennas. If you operate in a part of the country that is blessed with

Photo F. An antenna insulator made from irrigation tubing. See sidebar for antenna details.

news (from page 3)

of packet radio digipeater operation on 145.825 MHz. The ARRL Letter reports that the packet station had moved to 70 centimeters after the very old Ericsson VHF handheld failed. Amateur Radio on the International Space Station (ARISS) voice contacts with schools were moved from the U.S. Columbus module to a Kenwood transceiver in the Russian Service Module. Installation of the new 2-meter HT has allowed digipeater operation to resume on VHF. It is unclear whether ARISS voice contacts have also moved back to the Columbus module.

On the subject of the ISS, current expedition Commander Peggy Whitson, ex-KC5ZTD, recently set a new record for time in space by any American astronaut, breaking the 534-day cumulative record previously set by Astronaut Jeff Williams, KD5TVQ. On a previous ISS mission, Whitson conducted numerous ham radio contacts with school groups under the ARISS program, but subsequently let her amateur license lapse.

### ARRL Prohibits "Dueling CQs" in its Contests

The ARRL has made it clear that so-called "dueling CQs" on the same band by a single station are not permitted in its contests. Technically known as "in-band interleaved CQs," the practice involves calling CQ sequentially on two or more frequencies in the same band. There is never more than one signal from a given station on the band at the same time, but the practice effectively occupies multiple frequencies and violates the spirit if not the letter of the "one signal per band" rule. The ARRL Letter reports that the League decided to "clarify" its rules to specifically prohibit the practice, which is already against the rules in all CQ-sponsored contests.

### Will 4U1UN Return to the Air?

The ARRL reports that representatives of the United Nations Headquarters Amateur Radio Club are negotiating with the world body's Department of Public Information in an effort to get amateur station 4U1UN permanently back on the air. The station operated from the U.N. Secretariat building from 1978 until 2010, when it was taken off the air to accommodate extensive building renovations. All antennas were removed from the roof and equipment was put into storage. While the renovations have been completed, a combination of logistical issues and security concerns have stymied efforts to return the station to the air, except for a brief temporary operation in 2015 to mark the U.N.'s 70th anniversary. Several options are being considered to allow the station to resume operations while satisfying the administration's concerns.

### Milestones: WØPW, WD5IVD, Silent Keys

Two amateurs well known in the VHF/UHF community became Silent Keys within days of each other in late March, the ARRL Letter reported.

Don Hilliard, WØPW, was a founding member of the Central States VHF Society and of the Microwave Update conference. He developed the first ham gear for the 902-MHz band in the 1980s and designed a VHF Yagi antenna that is still popular today. Hilliard died on March 25 following a long illness. He was 81.

Greg Jones, WD5IVD, was only 54 when he became a Silent Key on March 30. A professor at the University of North Texas, Jones served as president of TAPR — Tucson Amateur Packet Radio — from 1993 to 1999. Under his leadership, the organization expanded from its regional base to national leadership in packet radio during its period of peak popularity.

tall trees, all you really need is some light gauge stranded wire and perhaps some kite string to erect and secure a field expedient antenna.

In the desert where I live, tall trees are scarce. Pretty much anything that might be pressed into service as an antenna mast has needles growing on it. My antenna solution involves a multi-band inverted-V dipole supported by its own flyweight mast (Photo D).

The "mast" of the antenna is a segmented 11-millimeter collapsible fiberglass tent pole (purchased as surplus online). When erected, the mast supports the feedpoint of the inverted V about 10 feet off the ground (Photo E). I use kite string for guys. The strings are anchored to the ground with either gutter spikes or whatever rocks or brush happen to be at the operating site.

The arms of my dipole consist of short segments of insulated stranded wire that are mechanically linked together using small insulators made from irrigation tubing (Photo F). The ends of each segment are terminated with banana plugs. The dipole can be lengthened by joining the banana plugs of adjacent segments to achieve resonance on the band of interest. The antenna is fed with lightweight RG-174 coax with a junkbox toroid choke at its feedpoint. See the sidebar for additional construction details on this antenna.

The antenna can be set up or knocked down in a few minutes. When knocked down, the wire and guy materials wind up and fit neatly in Rudy's right-hand SAW pouch. The pole dismantles "military style" — it separates into seven foldable segments that remain linked together with short lengths of shock cord. The collapsed mast can be secured with the bungee lacing at the spine of Rudy's vest (Photo G).

Photo G. Rudy carrying a complete HF station.

## K9 QRP VHF/UHF Stations

While HF stations can be implemented as described, the K9-QRP idea really shines with VHF/UHF gear (Photo H). By nature, handie talkies are small and lightweight and at VHF/UHF frequencies the laws of physics allow tiny antennas to be effective.

You can purchase ready-made MOLLE-compliant holsters for VHF/UHF radios and simply attach them to the dog's vest. Alternately, you can "harden" a handheld by suspending it inside a military surplus pouch. I described this idea in detail (using an earlier-generation ALICE pouch) in my article Ruggedizing the FT-60R. A good MOLLE-compliant enclosure for a project like this might be the 100-Round SAW Pouch or an IFAK (Individual First Aid Kit) Pouch, both of which are readily available as surplus.

Photo I depicts Rudy carrying my Yaesu FT-60R in the aforementioned ALICE pouch attached to his vest. One of the benefits of having the dog carry the radio is that this configuration allows for the use of longer (and usually more effective) whips. Note that the radio has been fitted with a lapel microphone (black object to the left of the pouch). It is not necessary to remove the radio from the dog's vest in order to use it — if you need to transmit, you simply grab the microphone and talk.

Since side-to-side balance of the vest is essential to proper canine ergonomics, the opposite side of the vest can be fitted with a second pouch to contain additional batteries. Those batteries can be either loose spares or wired as a pack and connected to the radio to provide extended talk-time. In Photo I, the radio load has been balanced with a canteen (not visible). I can envision either setup being useful to ham operators participating in public service events, for example.

One possible objection to a dog-carried handie-talkie is that it becomes, by definition, less "handy." I see no problem using the lapel mic dangling from Rudy's vest, but if your HT has a Bluetooth option, you can operate hands-free. If you've got a radio like the Yaesu VX-8R, all you need to carry is a Bluetooth headset; the dog does the rest of the work. No Bluetooth on your radio? Frank, K7SFN's, website discusses adapting commercial products like the Jabra A-210 to give Bluetooth capability to radios that don't already have it (see References).

Photo H. A "hardened" handheld for VHF/UHF operating.

Photo I. Rudy with his VHF/UHF gear.

## Your Dog's Safety

K9-QRP is about having fun, so we don't want anyone to get hurt. This includes our four-legged friends. The nature of dogs is to please us. They will readily accept excessive burdens just to make us happy. Therefore, it is


Photo J. The author designed a "K9 QRP" patch to mark the pouches he uses for Rudy to carry his ham gear.

# The K9-QRP 4-Band Inverted V Antenna

Photo K. One leg of the antenna wound on its carry reel.

Photo L. Antenna reels stowed in their MOLLE pouch.

The HF antenna used as part of my prototype K9-QRP HF station is certainly not a fusion reactor. It's a very simple affair, but there are details of its construction that are worth sharing. Please reference the assembly diagram in Figure 1.

Normally, the legs of a simple dipole antenna are cut to a length equal to one-quarter the wavelength of the desired operating frequency. Since my transceiver is capable of operating on four bands, I designed the antenna to allow for adjustment of the radiators according to the desired band of operation.

Each leg of the dipole has been cut into segments, separated by insulators. Each segment is terminated with a (stackable) banana plug. By altering which segments are connected and which are left disconnected, it's possible to operate on 15, 20, 30, and 40 meters. Additional wire could be plugged onto the ends of the outer segments to extend operation to 80 meters, if desired.

The segment lengths were determined experimentally using an antenna analyzer. These values appear in the table on the assembly diagram in Figure 1. Segment length is measured from the hole in the insulator at one end of the wire to the hole in the insulator at the other. The flying leads dangling from the insulators are each 4 inches in length. The length of the wire comprising the knot securing it to the insulator is unspecified.

**Each leg of the dipole has been cut into segments, separated by insulators...The segment lengths were determined experimentally using an antenna analyzer.**

The insulators themselves are interesting. Extremely rugged and yet lightweight, they are fabricated from pieces of polyethylene irrigation tube (See main article Photo F). Polyethylene is a material that is easy to cut and work, it has good insulating and dielectric properties, and as formulated for irrigation tubing, it's U.V. resistant to boot. The insulators are made by cutting 2-3/4-inch lengths of 5/8-inch irrigation tubing.

One at a time, each end is carefully heated with a hot-air gun until the mouth of the tube assumes the floppy consistency of al dente pasta. Then,

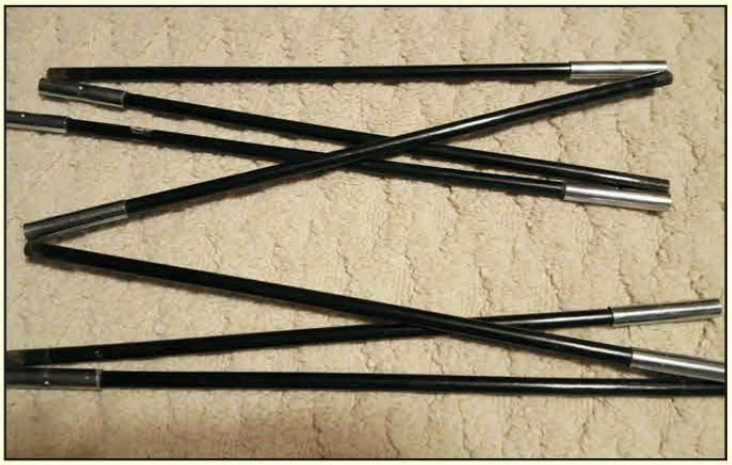

Photo M. The tent-pole antenna mast, collapsed.

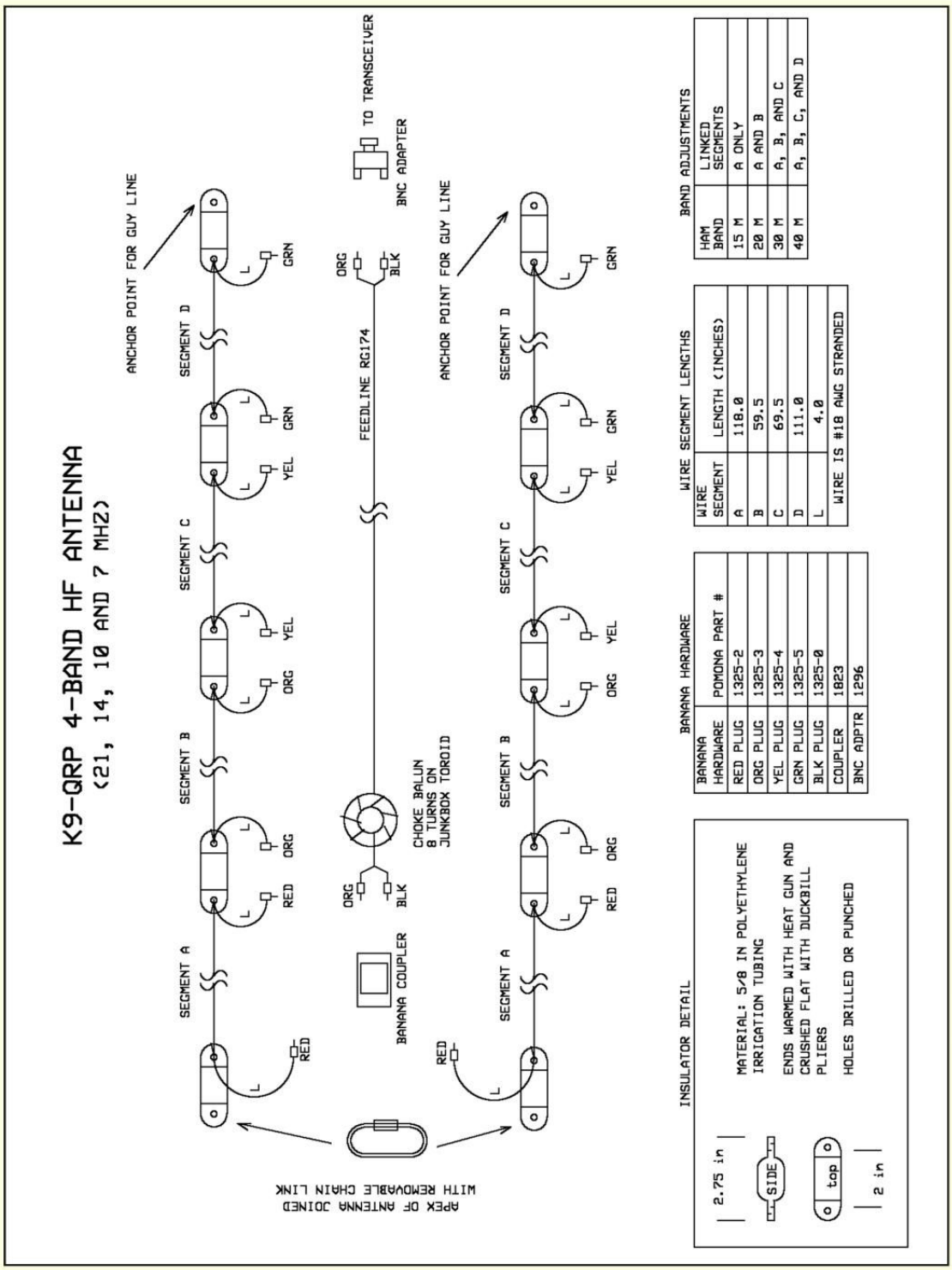


Figure 1. K9-QRP HF antenna details.

**In fact, given the wire, plugs and insulators, the entire antenna could be fabricated in the field with nothing more than a Leatherman® or Swiss Army® knife for tooling.**

before it can cool, the end is smashed with set of duck-billed pliers. This both flattens and effectively welds shut the end. Finally, the insulators are trimmed and a hole is punched in each flattened end. I used a leather (belt) punch to make the holes, and spaced them 2 inches apart.

The feedline is a length of RG-174 terminated at each end with banana plugs. A choke balun, comprised of 8 turns of coax on a junkbox toroid, appears near the antenna's feedpoint. The feedline banana plugs are coupled to the antenna wires using a Pomona banana coupler. At the radio end, a Pomona banana-to-BNC adapter allows the feed line to attach to my radio.

For those questioning the extensive use of banana hardware here, let me make the following argument: For use in a temporary and light-duty antenna installation, stackable banana plugs and jacks create excellent electrical connections that are both low-loss and mechanically strong. The "pluggable" nature of the antenna components allows for extreme flexibility and the option to swap pieces around in the event that something breaks while out in the field. The banana plugs themselves are secured with set screws, making it easy to re-terminate antenna wires and feedlines without need for a soldering iron. In fact, given the wire, plugs and insulators, the entire antenna could be fabricated in the field with nothing more than a Leatherman® or Swiss Army® knife for tooling.

The antenna wires are long and therefore prone to tangling when in storage. To prevent this, I repurposed a set of plastic reels on which cordage was sold. Each antenna leg is wound on one of two reels (Photo K). The feed line is wound on a third reel. Three reels fit comfortably inside a MOLLE 200-round SAW pouch (Photo L).

Where tall trees are available, this antenna can be suspended at any convenient height with kite string. Here in the desert, tall trees are scarce and most plants have needles. I knew I'd need some kind of mast, but it would have to be very lightweight, strong, and collapsible. A surplus fiberglass tent pole presented an almost ideal solution. The one I acquired (Photo M) is 11 millimeters in diameter and is comprised of multiple segments, which are permanently joined with elastic bungee cord. When stowed, it collapses to a small bundle. When extended and raised, the mast is inclined to flex and bow, but otherwise easily suspends the antenna feedpoint to a height of approximately 10 feet. The antenna wires slope downward from the apex, hence the "inverted V" designation for this antenna.

Given the application constraints and built as described, I would argue that this antenna performs well. My transceiver does not report an SWR worse than 1.1 on any band. I could probably operate without the tuner, if need be. Working HF on a 10-foot mast, I have no doubt that much of my signal is squandered warming the clouds above me. Nonetheless, even at QRP levels, my CW signal has successfully reached into adjacent states and beyond on all four bands.

our responsibility to see that our pets are not stressed or injured.

A dog is not a pack mule. In fact, the spines of dogs are ill-suited for carrying heavy loads. How heavy is too heavy? That depends upon who you ask, and the size, breed, temperament, age, and health of your dog. Appropriate loads are best established with the help of your dog's veterinarian. Once you've done that, I would advise that you:

- Actually weigh whatever you plan to have the dog carry. I use a digital hook scale to verify that loads are reasonable.
- Make sure loads are borne primarily at the dog's shoulders. This is where the dog's strength is greatest.
- Make sure that loads are laterally balanced (right-to-left)
- Remember to take your dog's feet into consideration. Weight in a pack translates to weight on the feet. In rough terrain with sharp or broken stone, dog shoes might be warranted.

I go into greater detail about how to protect your dog during field radio exercises in A Review of the Force K9 MOLLE Combat Vest.

## Closing Remarks

Once my HF K9-QRP system was complete, Rudy and I packed our gear and hiked over to a local park to test out the idea. After a 2.5-mile walk, Rudy took advantage of some shade and a drink from my canteen while I unpacked the transceiver and erected the new antenna. Fifteen minutes later, I was on the air making HF contacts on three bands stretching from my QTH in Tucson, Arizona to California, Texas, and Oklahoma. Not bad, not bad at all.

As with most facets of ham radio, there is great opportunity here for creativity, modification, refinement, and optimization. The smaller and lighter the hardware, the better. And, while I was able to demonstrate a functional dog-packed HF radio station, there is no need to have the dog carry everything. If loads become excessive, why not share the burden with your "best friend?" As I stated at the outset, the real purpose of K9-QRP is to foster enjoyment of our radio hobby, fresh air and the outdoors, and "man's best friend" all at once.

A parting shot: I was sufficiently enthusiastic about this idea that I thought it would be neat to design a logo and create some embroidered morale patches for my dog's pouches and equipment. An example of this can be seen in Photo J. I have a limited supply of extra patches for experimenters who'd like to outfit their dog the same way. Interested parties can inquire through my website.

**References:**


AC7ZL's website: <http://hpfriedrichs.com/>

AC7ZL's K9 QRP page: <http://bit.ly/2ortNW2>

A Review of the Force K9 MOLLE Combat Vest By H.P. Friedrichs, AC7ZL: <http://bit.ly/2oYwm2I>

Bluetooth Adapters for Non-Bluetooth Radios: <http://bit.ly/2oYD2Ou>

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ForceK9's Web site: <http://forcek9.com/>

Ruggedizing the FT-60R By H.P. Friedrichs, AC7ZL: <http://bit.ly/2oYBuDO>

Wiki Entry for the MOLLE system: <https://en.wikipedia.org/wiki/MOLLE>