

Riding the Airwaves

Want to get some good exercise, cut down your gas and car repair bills, and have some hamming fun at the same time? Why not try what KE4WMF did?—Mount your ham gear on your bike and ride to work!

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Can bicycling and amateur radio coexist as one activity? Absolutely! Bicyclists often choose to ride their bicycles in order to exercise, seek adventure, save fuel, and avoid stop-and-go traffic. Amateur radio operators often have ham radios in their automobiles for emergencies and so they may operate outside the confines of their homes. There is no reason why you can't enjoy a good bicycle ride while having the benefits of amateur radio. Here is how I integrated my two favorite pastimes:

500 Miles a Month

I joined the United States Coast Guard in 1986 and bought my first road racing bicycle in 1987. I was a licensed road racer and I've always been a fast recreational rider, averaging about 500 miles per month. Now I prefer to log my miles doing organized rides, commuting to and from work, and exploring off-road areas. I still have my old racing bike, but I mostly ride my TREK Y5 full-suspension all-terrain bicycle. Also, my wife and I ride a tandem bicycle.

I began amateur radio study while stationed aboard a Coast Guard cutter. Since I'm trained in radar, computer, and digital circuitry repair, studying for the test was not too difficult. I received my Technician class license in March 1995 and bought a Yaesu FT-11R 2-meter

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handheld transceiver (HT) to use during my morning and afternoon commutes. As spring approached, I started riding my bicycle more often. Soon, I was making the 22-mile round trip commute to and from work, just as I always had when the roads were ice-free. Then the thought occurred to me, "Why should I stop talking on the radio just because I'm on a bicycle?" I began carrying the HT with me, but the rubber duck antenna just wasn't performing well enough. That's when a series of modifications began.

Makin' Some Mods

My first modification was to upgrade the antenna. Since about 80% of my hamming is done from a bicycle, I've learned a few things about what is important when working bicycle mobile. I believe the most important element of a bicycle mobile station is the antenna, especially one that does not require a groundplane.

My primary antenna is a Larsen NMO-150 HW 1/2-wave. Copper-wire "J-poles" are great, but they're a little awkward on lightweight bicycles (especially off-road) and they take a real beating in the woods. I find the Larsen to be light and nimble, easily flexing around low tree branches and other obstacles in the woods. The Larsen does not require a groundplane, so the mount was made as small as possible. I used to use a 5/8-wave antenna (since I had one), but the 1/2-wave is far more effective, with SWR readings below 1.3:1 across the band.

The antenna is mounted to a tubular aluminum support that I fabricated from four feet of 3/16-inch solid aluminum rod to fit to the water bottle mount behind my seat. I used a vise and vise-grips to bend



The author with his bike in the woods. His ham gear is mounted for maximum protection from bumps and bounces. (All photos courtesy KE4WMF)

the mount into the desired shape. Since welding such small aluminum is very delicate work, I chose to use Goop household glue to hold the pieces together. Unlike superglue or epoxy, Goop is not rigid when dry. Therefore, the mount has held up well under various conditions. Several coats of gloss black paint finished the job and hid the glue. The antenna mount is secured to the seatpost with special aluminum mounts that are de-



Close-up view of the antenna mount. The antenna is an unmodified Larsen NMO-150HW $1/2$ -wave vertical, which does not need a ground plane. The mount is "homebrewed" from solid aluminum rod and held together with Goop household glue.

signed to hold a water bottle bracket behind the seat.

All cables follow the same routes as the brake and shifter cables. The coaxial and power cables are hardly noticeable from more than a few feet away.

Power Up!

Moving forward, I keep one or more gel-cell batteries under the seat. Currently, I prefer to carry a 6-volt, 4-Amp-hour (Ah) battery so I may operate my HT and the headlights at the same time. Obviously, I don't run the headlights full-time, so I usually have plenty of HT use available. I get 2 watts from my HT this way, and that's usually enough. When I want 5 watts *and* headlights, it's very easy to carry two 6-volt batteries and rig them for both 12-volt and 6-volt operation. When I take an all-day trip, I carry a 12-volt, 6.5-Ah battery (and a RadioShack HTA-20 30-watt amplifier as a standby if I'm riding unsupported).

Normally, though, I prefer to use 6 volts because it's the same voltage used by my headlights. Plus, the 6 volts can be put straight into my HT without using adapters. The problem with adapters on my station is that my HT operates on 9.6 volts instead of 12. Therefore, I have to use adapters which convert 12 to 10 volts. The conversion process uses more current than the HT itself...even if the radio

is turned off! For example, the adapter alone draws 30 mA, even with the HT disconnected. The HT and the adapter together draw 60 mA (squelched). And if I don't unplug the HT when it's not in use, the battery will discharge. But by plugging 6 volts directly into the HT, the current drops to 0 mA with the radio off, and only 15 mA with the radio on. There are definite current savings to be had. With 6-volt batteries, I sacrifice a few watts, but I gain the convenience of not dealing with bulky, battery-draining voltage adapters.

The HT Mount

The HT is encased by a modified P5 soft case, by The Pouch. The P5 rests in a homemade handlebar mount, created by gluing and screwing the mounting pieces of a Cateye HL-500 headlight to a small carved up RadioShack project box. Actually, any light mount will do, as long as both the piece that mounts to the light and the piece that attaches to the handlebar are available.

I used a project box that best fits my particular radio, then I carved it to fit more precisely. Then I glued and screwed the light mount to the project box. Again, Goop was used to secure the mount to the box. Initial tests revealed that superglue cracked during heavy vibrations off-road. And, as noted above, Goop has not

The TREK Y5 Bicycle



KE4WMF's bicycle-mobile station—a TREK mountain bike customized for 2-meter FM operation. That's a gel-cell battery under the seat and the radio is mounted to the handlebars.

The TREK Y5 is a full-suspension mountain bike. Made from polished aluminum, the "Y" features Shimano STX-RC components (LX drivetrain), clipless pedals, Manitou Pro front shocks with nearly 3 inches of travel, and Fox Vanilla rear suspension with 4 inches of travel. It also has a TREK Radar cyclocomputer with current speed, average speed, maximum speed, stopwatch, trip odometer, overall odometer, clock, thermometer, and workout window functions. The horn, by Delta, is mounted to the handlebars and powered by a plastic bottle air-charged to 100 psi (pounds per square inch) that rests in a bottle mount. At 115 dB, plus the fact that it's mounted high and unobstructed, it's louder than most car horns.

failed yet, even after crashes. The P5 pouch was cut to expose the keypad and display. Since I ride on rocky trails, I have reinforced the P5 by adding thick Velcro straps and special cutouts so the HT won't fall off the mount.

The final part of my ham setup is a hands-free speaker/microphone. I use an LEP-500Y boom mic by Electronic

On the Road with KE4WMF

Scott shared with us two examples of his bicycle mobile station in use: one an endurance race in which he was a participant, and the other a running event in which he helped provide public service communications.—ed.

The 1996 AFCA Tour

In April, 1996, I was one of 10 participants in the Armed Forces Cycling Association's (AFCA) Tour of the Southeast, an 1,100-mile endurance run from Miami, Florida, to Fort Eustis, Virginia. We averaged a little over 100 miles a day, and each of the 10 riders also took a turn driving one of the two support RVs.

I was the only rider using a mountain bike (with "road slicks" instead of mountain tires for easier riding), as well as the only rider with ham radio equipment. The others were all riding sleek, lightweight racing bicycles, while my mobile ham shack weighed in at 47 pounds. They all took bets on when I would start removing the heavy equipment...but they all lost. I never removed a thing! I did, however, suffer a knee injury on the second day of the tour, due to a combination of the extra weight and a seat misalignment. To recover somewhat, I took my turn driving on day three, then returned to the road on day four and rode every mile that the others did.

The only time I had trouble keeping up was on climbs. If the climb was followed by a descent, I sprinted until I caught up (one bridge yielded a 44-mph sprint!). If there was no descent, I rode in the "draft" of an RV until I caught up. (*"Draft" refers to the area of reduced air resistance directly behind another vehicle, allowing the following vehicle to travel more quickly and/or with less effort. Race car drivers often use this technique—but generally at much higher speeds!—ed.*)

The RVs had signs on them reading, "KE4WMF 146.52 MHz." I programmed my scanner to monitor .52 while my HT scanned the repeater band, stopping at active frequencies. I didn't carry a repeater book or anything because I didn't want to fidget too much with lists or radio controls while riding. I simply waited until I heard repeater activity, then dropped in my call, introduced myself, and explained the purpose of the tour. Through this "passive" operating technique, I managed to make 64 contacts along the route, two of which were on simplex with passing motorists. Most of the hams I contacted were

quite surprised to learn that I was bicycle-mobile, and that I was able to hit the repeaters from certain distances. Two of them even set up campground reservations for us (using their own credit cards) and came out to visit for a while.

We all had a good time, and one of the other riders finished the race with quite an interest in ham radio! He has since received his license and is working on putting together a bicycle-mobile station of his own. (Due to the deployment of my ship, I was unable to ride in the 1997 AFCA Tour of the Southeast. I'm hoping to be able to ride again this year, and perhaps set a new personal record for contacts made.)

1997 Falmouth Road Race

In August, 1997, I took part in the Falmouth Amateur Radio Association's support of the Falmouth Road Race, a seven-mile international running event on Cape Cod, Massachusetts. Thousands of runners participated and approximately 25 hams provided communications support.

One of the least desirable positions in any running race is that of "sweep vehicle." This vehicle follows the slowest runners to make sure that everyone finishes the race safely. Traveling for over two hours at less than idle speed in the summer heat is abusive to automobiles, and actually running the race with the radio is somewhat impractical (*There are hams who have done that in other races, but their primary concentration is on the race, not on communications.—ed.*). But my bicycle-mobile station was perfect for the job.

From my point of view, the race was fairly uneventful; however, I took my job there very seriously. In addition to keeping track of the last runners, the job of the sweep vehicle includes "protecting" them from being struck by other vehicles coming up from behind (they are well behind the main body of runners, and the roads were reopened to traffic after the "sweep vehicle" passed). Being prepared for this, I carried two red flashing beacons to warn vehicles of runners ahead, and I rode in the middle of the lane so drivers wouldn't pass the tired runners too closely.

I spent a little more than two and a half hours on the road for this event. No one was left behind...and no one was hit from behind. I look forward to future occasions where my bicycle-mobile station will be the best station for the job.

Distributors. It rests on my ear, so it does not interfere with my helmet. The PTT (press-to-talk) switch is very small so it can be mounted almost anywhere. This mic is the best I've ever used for bicycle-mobiling. I've tried handhelds, throat mics, and in-ear mics...this is better!

Putting It All Together

The finished product is a fully adjustable handlebar-mounted HT mount with the quick-release features of the HL-500 headlight system. The combined weight of the bicycle and the ham rig is

just under 35 pounds (45 pounds with the 12-volt, 6.5-Ah gel-cell and amplifier). My design's only drawback is the equipment's vulnerability to damage in a crash. Since I usually lay the bike on its side in a crash, the equipment should be adequately protected by the handlebar ends (a recent crash proved that I'm more susceptible to broken parts than the radio is).

Other equipment includes a Realistic PRO-39 200-channel programmable handheld scanner, a Cygo Lite 20-watt dual halogen headlight system, a TREK Radar multifunction cyclocomputer, and a Delta pneumatic horn (115 dB). My

goal is to take my bicycle-mobile station beyond simple conversation and into some sort of community service, such as search-and-rescue or event coordination. Even without community service, I can still report traffic accidents and other emergencies before most people can get to telephones.

Hamming On (and Off) the Road

Since being transferred to Massachusetts, I no longer commute to/from work by bicycle on a regular



Detail of the author's hi-tech handlebars. To the left of the HT is his 115-dB air horn, and over on the right is his "Radar cyclocomputer," which reads out more information than most automobile dashboards.

basis. However, I do manage to make the 33-mile one-way trip a few times a week by having a shipmate take my bike and me to work, then riding my bike home. I also ride in off-road group rides about three days a week, as well as riding off-road alone a few days a week. My HT is used mostly for entertainment and safety while riding on- or off-road. Occasionally, I'm able to use my station to help my radio club at events such as parades and sporting events where a bicycle has advantages over a car or being on foot.

Overall, I'm very happy with what I have. I'm sure I don't have the greatest station in amateur radio. I've traded some performance for weight and size. Still, I'm able to use just about any 2-meter repeater within 10 to 15 miles (my record is 65 miles with 2 watts).

I think it's interesting that I was able to take two hobbies and combine them

"I managed to make 64 contacts along the route, two of which were on simplex with passing motorists. [Two] of the hams I contacted...even set up campground reservations for us (using their own credit cards) and came out to visit for a while."

into one. Fellow cyclists agree that I am one of the safest cyclists to ride with—less for my riding skills than because help is just a quick call or telephone patch away. One thing is certain: I can't complain about the performance I'm getting from a bicycle station!

Club Spotlight Ham Clubs in Action

Bike Mobile? You're Not Alone! Join BMHA

If you enjoy operating bicycle mobile, you might want to join the more than 450 of your fellow hams who belong to the Bicycle Mobile Hams of America (BMHA). BMHA is a national, non-profit, organization of bicyclists who use pocket-sized ham radios while pedaling. BMHA's 450 members come from 46 states and six countries. Annual dues are \$10, which includes *The BMHA Newsletter*. For a sample copy of the newsletter and information about using ham radio on the road or in the wilderness, send a business-sized SASE (self-addressed stamped envelope) to BMHA, Box 4009-R, Boulder, CO 80306.

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