



## Amateur Radio Supports Urban Search and Rescue

*Jim Carr, KC4MHH*  
**kc4mhh@arri.net**

“She just walked away from our campsite.” “My father has Alzheimer’s, and he has been gone since this morning.: These are the stories we usually hear from relatives concerned about the location and well-being of their loved ones.

Even with the best intentions and the use of four wheelers and aircraft, law enforcement has a very difficult task, and the odds are not on their side. This is where volunteer Urban Search and Rescue (USAR) teams throughout the United States provide a service that does not exist anywhere else.

Using specially trained and certified dogs, these teams will many times find, in under two hours, a person whom other search teams have been seeking for several days. These canines come in two main categories — ground tracking and air scent — and each one has its own advantages.

But just like any other organization, these

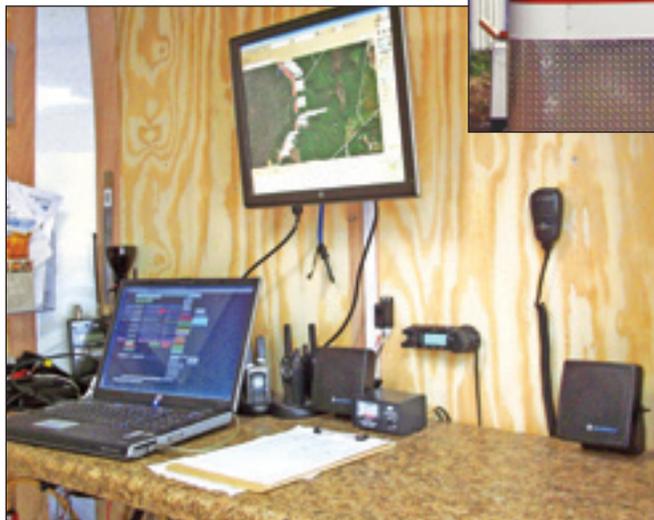
**Front view of the trailer showing the antenna mast and assembly. For purposes of the photo, the mast is only 20 feet high. The mast is capable of extending 10 feet higher.**



teams need a support system behind them, part of which includes a complete communications team including GMRS/FRS, local law enforcement, Fire Rescue, and Amateur Radio. Many of these Search and Rescue organizations even recommend or require members to be licensed radio amateurs.

Here, in Alachua County (Florida), some members of Alachua County Fire Rescue Reserves, Alachua County Community Emergency Response Team (CERT), Gainesville Amateur Radio Society, and others came together to form the local Urban Search and Rescue team to cover local counties in the Northern Florida area. Initially, command was simply operated from the front seat of my Chevy Suburban, but there had to be a better way and with more capability.

The first step was listing the systems that would support a search team in the best way. We wanted reliable communications including the use of repeaters when necessary, a communications link with law enforcement and Fire Rescue, and Automated Position Reporting System (APRS) to track the location of the teams. Also, we had to remember that we are volunteers, and the cost is out of our pocket!



**The operating console at the front of the trailer with laptop and dual monitors. The Kenwood THD-700 and Yaesu FT-857 are also visible.**



**Side view of the US Search and Rescue support trailer.**



This shows a military style backpack (with metal frame) with a  $\frac{1}{2}$  wave mobile antenna installed. This solved the communication problem in the woods by extending the radio's transmission range about four times!

### The Trailer

I found a local trailer dealer that made us a great deal. The dealer offered us \$2000 for a new 6 foot by 12 foot box trailer with side and front doors. Here was our package, and now we just had to make it happen!

After building a desk area at the front of the trailer, I installed a 12 V marine battery (in a carrier) along with a 700 W inverter. A 110 V ac shore plug and automatic transfer switch (found at a local RV dealer) was installed that would automatically disconnect the inverter and transfer to the shore plug (mounted on the front of the trailer) whenever local utilities or the 2 kW generator we carry on board was used. The internal 12 V ceiling light was rewired to operate from this battery and a 110 V ac fluorescent light was installed over the desk area. A small 12 V trickle charger was added to charge the battery when we are on shore or generator power.

For Amateur Radio voice (144 or 440 MHz) and APRS, a Kenwood TM-D700A was installed and a laptop computer capable of dual monitor output feeding a 20 inch LCD monitor on an adjustable wall mounted bracket. A commercial Kenwood radio to cover fire and forestry channels and a portable 800 MHz trunk radio for law enforcement and Fire Rescue coordinations completed the physical equipment.

Knowing that the roof mounted antenna was not going to be sufficient for simplex APRS operation, I began looking for portable, lightweight, telescoping masts. After looking at several ranging from \$500 to over \$1000 for 30 to 40 feet, a local Amateur Radio operator gave me a much less expensive alternative. I purchased a 10 foot piece of 1  $\frac{1}{2}$  inch EMT (cut to 7 inches) and inserted into it a 20 inch telescoping mast used for



The PAT (Personnel Accountability Tag) board is mounted to the inside of the front door of the trailer. This provides accountability of everyone on the scene, and it increases the proper use of resources and personal safety.



This shows the Byonics Micro-Trak 8000 installed in PVC tube with GPS and 12 V battery.

cleaning swimming pools. A simple bolt with wing nut inserted into the top of the EMT and the bottom of the telescoping mast, gave me approximately 28 feet above the ground. A lightweight dual band J-Pole antenna and coax cut to length to the front mounted firewall connector completed an

excellent working antenna arrangement. The antenna can be installed and erected by one person in less than 10 minutes.

### The Software

After researching the best software available for our purpose in Urban Search and Rescue, I settled on DMAPPER from Doodlebug Software ([www.dmapper.com](http://www.dmapper.com)). At under \$40, this software will interface between your TNC or data radio and several mapping programs and overlay your tracking data on them. DMAPPER was designed specifically for search and rescue tracking. It will allow tactical names and even display directly whether the station is moving or stationary.

After trying several mapping programs, we finally settled on DeLorme Topo USA ([www.delorme.com](http://www.delorme.com)). Not only does this software have good street and topographic maps, but it also allows one to download aerial views. Both the topo and aerial views can be displayed split-view on a single monitor, both with your track overlays.

### The Field Units

Now that we have the trailer up and working, what about the field units? The conventional way of placing APRS in the field involved a handheld radio, TNC (the least expensive of which is the Tiny Trak), and a GPS. With a cost around \$300 and up, this is a very cumbersome package to carry.

Along came Byonics ([www.byonics.com](http://www.byonics.com)) with its addition to the cause: the Micro-Trak 8000. At \$150, this unit is a complete package consisting of an 8 W, 2 meter transmitter on 144.390 MHz (also available on 144.800 MHz for European use) and a built-in

## New Look for Column

Hopefully as you started reading this column, you noticed something different. A slightly new look, but most importantly, some new areas listed. While we are remaining "Public Service," we've added "Readiness, Response and Resilience" to our focus.

We will continue to have pertinent examples of activities from the field as in past columns as space permits, but will now concentrate on developing topics applicable to the extensive field of emergency preparedness and Amateur Radio. These future columns will allow us to address individual and organizational issues surrounding our ability to serve. Our intention is to tackle issues that could be controversial, may question current practices, offer best practices from the Amateur Radio world, and allow you-the reader, to consider options in the processes you follow or techniques you employ.

You are part of this process and are invited to send ideas for future topics to me.

We plan to cover individual topics in one monthly issue, but for more detailed subjects we will spread them across multiple months as needed.

So stay tuned for this to evolve over the next few issues. — Dennis Dura, K2DCD, Manager, Emergency Preparedness and Response, [k2dcd@arrl.org](mailto:k2dcd@arrl.org)

TinyTrak 3. Just add the GPS2 at \$70 and the Micro-Trak VHF antenna at \$9, and you have a complete package. I was able to install the Micro-Trak in a 1½ inch piece of PVC with end caps just by drilling a hole through one cap for the antenna and the other end for the power and APRS wiring. I found a 12 V, 7 A battery with a Molex connector that was perfect for this application. Chargers are on board the trailer for these and all of the various handheld radios used by the teams.

### Backpacks for Carrying Equipment

Even the backpacks were modified. Operation in dense woods with a handheld is marginal at times. I modified two backpacks using truck mirror mounts and 5/8 wave antennas with coax and adapters for the Yaesu VX-170 handhelds and hand mics used for voice communications. This made a tremendous difference with an antenna that doesn't mind being beat by the brush and tree limbs.

### Personal Accountability Tags

To assure additional safety to our teams, we also follow the incident command procedures and use the personnel accountability tags (PAT Tags).

I have colored coded these tags according to their assigned duty and using inexpensive shower curtain hooks on a dry erase board. I have colored coded them as "orange" for command and operations, "yellow" for canine handlers, "blue" for EMT's and Paramedics, "green" for communicators (all are hams), and "white" for all others.

Members of the teams may have several different colors on their rings, such as Whitney Hartz, KI4NYD, our chief canine handler, who along with her canine, Amaretto, is also a medic and a communicator. Our coordinator, Mitch Coulton, KI4JYH, acts as the commander of the operation and is also a medic and communicator. Using the shower curtain hooks, it is simple to rotate the cards to display the "daily assignment" of each member, which is placed on the board with their assigned duty or team.

*Photos by the author.*

*Jim Carr, KC4MHH, has been an Amateur Extra class amateur for over 40 years. Jim formed the communications division of Alachua County Fire Rescue Reserves and then created and built the communications center for the Alachua County Emergency Management. An ARRL member, Jim is also a volunteer examiner. His duties with the team are operations, communications support, and EMS coordinator, and he assists with training new recruits. He has recently obtained a Lab puppy that will be trained as one of the search and rescue canines. For more information and photos of the Canine Search and Rescue Team, visit [www.acfr.org](http://www.acfr.org).*

## SEPTEMBER IS NATIONAL PREPAREDNESS MONTH

The ARRL is a national coalition member of National Preparedness Month in September. What is National Preparedness Month (NPM)? Let's refer to the *Ready Campaign* to find out ([www.ready.gov](http://www.ready.gov)):

"Sponsored by DHS' *Ready Campaign*, and with support from Coalition Members across the nation, NPM is held each September to increase public awareness about emergency preparedness. During the month, Americans are encouraged to participate by hosting activities and initiatives. In 2007, more than 1800 organizations joined the *Ready Campaign* as Coalition Members, making it the most successful year to date."

"*Ready* is a national public service advertising campaign designed to educate and empower Americans to prepare for and respond to emergencies including natural disasters and potential terrorist attacks. The goal of the campaign is to get the public involved and ultimately to increase the level of basic preparedness across the nation.

"*Ready* asks individuals to do three key things: get an emergency supply kit, make a family emergency plan and be informed about the different types of emergencies that could occur and their appropriate re-



sponses. Individuals can visit [ready.gov](http://ready.gov) or call 1-800-BE-READY for information about emergency preparedness."

### ARRL and Citizen Corps

The ARRL first became acquainted with National Preparedness Month through its relationship with Citizen Corps. Since June 2003, ARRL has been affiliated with Citizen Corps, an initiative within the Department of Homeland Security, to enhance public awareness and safety. Visit [citizencorps.gov](http://citizencorps.gov) for more information.

According to the *Ready Campaign*, Citizen Corps works with five national Partner Programs through partnerships with other federal agencies and national organizations. The five programs — Community Emergency Response Teams (CERT), Medical Reserve Corps (MRC), Fire Corps, USA On Watch/ Neighborhood Watch (NWP), and Volunteers in Police Service (VIPS) — provide national resources for training and exercising citizens at the state and local levels. In addition, 25 Citizen Corps Affiliate Programs and Organizations offer community resources for public education, outreach, and training; represent volunteers interested in helping to make their community safer; or offer volunteer service opportunities to support first responders, disaster relief activities, and community safety efforts.

## Subscribe to the ARES E-Letter – It's Free!

If you're interested in public service and emergency communications, subscribe to the *ARES E-Letter* at:

[www.arrrl.org/ares-letter](http://www.arrrl.org/ares-letter)

It's free to ARRL members.

