

Using Maptech Terrain Navigator for Search and Rescue

By Jack W. Peters

The four-wheel drive search and rescue team, Special Vehicles Group, for the Lane County Sheriff's Office has the same challenge that every other SAR team encounters. Obtaining detailed maps in a hurry while trying not to forget every other piece of necessary equipment needed to respond to a mission in a remote part of the county in the middle of the night. We carry state maps, Forest service maps, BLM maps, maybe someone will even bring a 1:24,000 USGS topo map for the right location. The USGS maps are ideal, but large in size and small in ground coverage. If you are lucky enough to have one that matches the search area, it's usually back in incident command, and there may not enough around for every team to have one.

A natural solution is to see what high tech alternatives might be available. Most GPS receivers have basemaps. GPS manufactures even sell topo maps on CD-ROM to download into receivers. The problem with GPS receivers is that the screens are small and they require batteries. GPS receivers, as useful as they are, will not replace paper topo maps.

"The problem is that it is nearly impossible to carry detailed paper maps for over 1,000 square miles of wilderness."



Members of Lane County's Special Vehicles Group review various maps planning a ground search.

That's where Maptech comes in. Terrain Navigator Pro provides highly detailed computer mapping. These maps are based on the 1:24,000 USGS topo maps that are scanned and appear seamlessly and sold on a state by state basis. The software allows integration with a GPS receiver allowing data to be transferred back and forth.

Map Software Features

There are a number of very practical applications for this software for SAR applications or any other outdoor adventure. Here are some examples of how the features can be applied:

Real-Time Tracking: Using a GPS receiver data cable, the system's signal is transferred to the software providing a marker indicating your position on the middle of a computer screen. As you move, a track log is recorded on the map. This instantly takes the guesswork out of trying to find your location on a paper map. This is ideal for areas with winding logging roads and routes with many turn-offs. Vehicles can constantly track their location going to and from search areas making it easier to direct other vehicles to their location.

Data Management and Transfer: Waypoints can be created instantly by moving the cursor over the map and clicking the mouse button. This is helpful to save locations of the subject's vehicle or last known position, Incident Command Posts (ICP), turn-offs allowing incoming assistance to find your location, and other important locations like helicopter landing zones. Waypoints can be titled and marked with symbols in different colors for easy recognition.

This data can be easily transferred into search team's GPS receiver allowing them to learn the area and find their way back to the ICP. Teams calling in their position in the field can be easily plotted on the map by moving the cursor until the coordinates match up. Once teams return, their track log data can be loaded into the computer and a their track log will appear on the map. This is useful because it is a way to confirm and document what area the teams actually searched.

Name Search Feature: An injured subject calls dispatch on the dying cell phone and does their best to describe their location. The word "blue" is made out. A quick search will provide every landmark called blue: Blue River, Blue Creek, Blue Water Campground, Blue Mt. Peak. With a little detective work, this feature allows you to quickly narrow your search area. This feature will also provide the closest hospitals, airports and schools that would be helpful for emergency management.

Terrain Analysis: Distance can be easily determined by clicking the mouse button on two points on

the map. Another click of the mouse provides the bearing and elevation profiling. This is important to examine how steep roads and trails are to help determine if they can be traveled based on the circumstances and conditions.

The software can also provide a unique 3-D perspective of any selected elevated area. In this mode, a mountain will appear in 3-D, and can be rotated, tilted and viewed from any bearing or elevation. Studying this topographic information is as interesting as it is practical. Besides finding the best travel route, it is ideal to assist in other logistical tasks such as locating the best location for a radio repeater or a helicopter landing zone. Carefully studying the map data will help avoid errors and reduce travel time and difficulty.

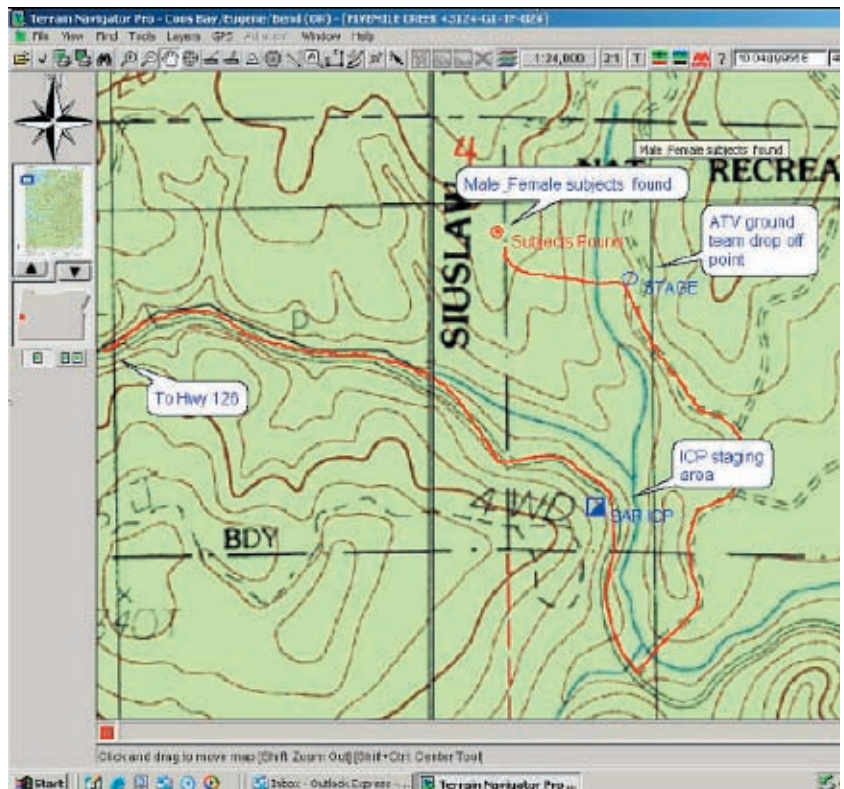
Here are some useful improvements unique to Terrain Navigator Pro:

Address Numbers: Placing the cursor on a road provides the house number.

Aerial Photographs: Aerial photo images can be downloaded into your computer hard drive allowing you to toggle back and forth between a topographic map and an aerial photograph. The computer scene can also be split to show both the map and photo at the same time.

Distance Rings: Rings can be programmed to appear at any distance from a selected center point. This is important when trying to determine a theoretical search area based on the missing subject's last known position. For example, if a person can hike three miles per hour, and they have been missing for two hours, what is the potential search area? From this formula we know it's six miles, by placing a six-mile ring on the map provides perspective of a potential search area after considering natural barriers and access points like waterways and roads.

Note Fields: Text balloons can be placed on the map. Similar to saving a waypoint, but these provide the ability to apply easy to read text. This allow you to place notes on the map around waypoints or search areas that could include what assets and personnel are in the field, or a way to reference clues or evidence found. Recording notes at specific locations is taken one step further with the new Geo-Pin feature. This allows you to place a link to word documents and photos.



This screen image shows the details of a search and rescue mission on the Oregon Coast. Text balloons make it easy to explain details on a map. In this mission a ground team was delivered into the forest from the ICP to the ATV drop off point. From there they hiked in to find a grateful couple that was glad not to spend a second night lost in the woods.

Map Printing

This technology is very useful, but it does no good unless you can get it in the hands of those who need it most. Maps can be easily printed at the command center while crews are preparing to deploy in the field. For greater efficiency, it is best to set up a mobile printer. Laptop printers are getting smaller and cheaper. They can be operated off a power inverter or a battery pack option. I use an older Canon BJC-80 color Bubble Jet with a slender battery attachment that is claimed to provide 200 copies per charge. My printer will not make that many copies, but no problem printing out a dozen maps for a full scale SAR operation. My printer set up costs around \$60.

Another advantage to printing these maps is adding north declination and coordinate grid data. Selecting the North Arrow box during print setup provides the pointers for both True North and Magnetic North as well as the degrees of declination. Both the Universal Transverse Mercator (UTM) and Lat/long grid lines can be printed as one of many data layers. Once these grids are on the printed map, specific coordinates can be plotted on the ground using a map ruler such as

the Topo Companion. The most popular coordinate system for detailed ground operations is the UTM in the 1:24,000 scale. Printing a map with these grids divides the map into 60 one-kilometer squares.



In the company Land Rover Discovery, a computer cable is plugged into a junction box that integrates the Garmin GPS and Kenwood VHF radio to the Panasonic Toughbook laptop for real-time tracking and APRS operations. Maps are printed with a Canon Bubble Jet color printer with battery pack.

Computers in the Field

No question about it, setting up a small mobile office in the field can be problematic and cumbersome. More gear to carry, they are somewhat fragile and require charged batteries and/or a power supply. This also requires the need for carry accessories and supplies like power cords, printer cable, paper and extra toner cartridges. Large zip-lock style bags work great to waterproof the maps.

I recommend a rugged laptop like the Panasonic Toughbook. These are built to military specs and are designed to take the abuse and weather for working in the field. New ones can be pricy, but there are many used ones on the market as agencies continually upgrade their equipment. I picked up a good used P2 model with a CD drive for about \$310. I picked up a two-plug power inverter to plug into the cigar lighter for \$50.

As a word of caution, do not drive and watch the computer screen at the same time. This will put you in the ditch quick, let your partner navigate for you. A laptop swivel base stand is ideal to keep the computer up and out of the way of the passenger seat. Besides, working with a laptop on your lap at 0200 will put off

enough heat to make you want to fall sleep.

Saving CD's the hard drive

When I originally loaded Terrain Navigator Pro into my laptop, I selected the option under the file menu to "Save CD to hard drive." I saved the disks I wanted, but when using the system in the field, the computer would always prompt me to insert the CD for the area I was attempting to view. This was frustrating because I do not want to take CD's into the field, or have my CD-ROM drive running while bouncing down some dirt road. Navigation trainer Rick Hood provided the solution. Under the file menu, select the option to "Share Maps Across CD." This does the trick allowing you to access all of the loaded maps your hard drive will hold, while your CD's stay back in your office warm, safe and dry were they belong.

Using this technology will definitely help you manage SAR operations. Because you are dealing with various pieces of hardware and software, setting everything up will take some patience. Do not expect to use this gear for the first time on a SAR mission. Set it up first in daylight, then incorporate its use in training missions. After a couple of test runs you'll be good to go and wonder how you ever got along with out it.

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