GPS Navigation

Ed Gurdjian & Carol Maxwell, RVTechStop.com

We all know that RVers are never lost because they are always at home. In fact, RVers are really quite good at finding their way. We have been reading maps for years. Armed with a *Rand-McNally* or *Truckers Atlas*, plus the latest *Exit Authority*, we travel the highways with ease. We even manage to find our way around cities. On one trip several years ago, Ed's mother, who was 82 at the time, was with us. Shortly after arriving in San Bernardino, I needed groceries so I put Dorothy in the car and set out to find a grocery store. I found one within a couple miles of the campground. When Do asked how in the world did I know where to go, I wasn't sure myself. I think it is that when you travel a great deal, you unconsciously note that most towns and people are very similar-you have a feel of where things ought to be.

This works out well in a car, because if you make a mistake, you can usually make a "U" or "K" turn. Roaming about in a 30'-40' recreational vehicle is another story. Aside from inconvenience, there is another factor that must be considered today. There are some areas where you do not want to be stranded. Like most people, we have made wrong turns and had to disconnect the tow car in order to maneuver, unfortunately, this may not always be safe.

The latest tools for navigation, GPS and a good software program, can avoid many of these problems and can make traveling cross-country even easier. The Global Positioning System is a satellite based navigation system operated and maintained by the U.S. Department of Defense. It is comprised of a constellation of 24 satellites that provides worldwide, 24-hour, three-dimensional coverage. It was originally developed for military needs, but it now encompasses a wide range of civilian applications. These include surveying, marine, land, aviation, and vehicle navigation, plus agricultural needs. It is unaffected by adverse weather and it is accurate within the limits of Selective Availability (SA). SA is the deliberate degradation of the signal by the military. GPS can provide precise time, speed, and course measurements.

Although GPS is a highly technical system, it can be simply described in a few short sentences. Each satellite broadcasts strings of data. Using this data and time measurements, a receiver computes distances to the satellites and can then determine exact positions on earth by triangulation. A two-dimensional position calculation, lon-

gitude and latitude, requires three satellites; and a three-dimensional position calculation, which includes altitude, requires four satellites.

We saw our first GPS application at the Sacramento FMCA convention in 1989. Bosch had a program they called "Travelsafe", but it was only available for selected large metropolitan areas. In 1993, Oshkosh (now Freightliner) asked us to evaluate a program they were considering for integration into their product line. While researching that project, we discovered *Map Expert* by Delorme Mapping. To say we were astonished would be an understatement. A single CD had nearly every road, street, and lane in the U.S. Other programs we had seen were not only incomplete but they required multiple CDs for different regions or metro areas. Each CD was sold separately for $25 to $30 each! *Map Expert* was $295 and the GPS software link was another $200.00. The antenna and receiver had to be purchased from another source and the cost was approximately $1,000.00. Software and hardware prices have been significantly reduced since 1993. The 1999 version, *Street Atlas 6* plus a GPS antenna and receiver, is only $159.95 for the complete package. In 1993, there were two basic types of programs. Mapping programs identified your location on a computer generated map with a symbol, and the symbol followed your movements across the map. Routing programs told you how to get from point A to point B. Some programs not only could determine the shortest or fastest route, but the user could insert their personal preferences to get a "preferred" route. The software programs have been constantly improved. Current versions of *Map N Go* and *Street Atlas* by Delorme combine routing and mapping, with the best features of both.. A new version of *Precision Mapping* by Chicago Map Corporation is now available that offers advanced routing and GPS mapping features. Although we have not personally used the new version, we did use an early version of this program. We also used an early version of The Rand-McNally *Tripmaker,* another popular routing program. We found it not quite as easy to use as some of the other programs, mainly because it in-

Skymap by ETAK with antenna, PMCIA receiver and remote control

sisted on taking us through Mexico to get from Yuma, Arizona, to San Antonio, Texas. We had to manually insert stops to stay in the US. It also had no user preference settings to avoid tolls, local roads, or other situations undesirable for RV travel. ETAK introduced their *Skymap* in 1998. It is a mapping program with some routing capabilities. The program is divided between an Eastern and a Western CD and you have to load regional maps on the hard drive to have a useable degree of detail.

Most of the more popular programs offer address to address routing, and a variety of search modes such as address, place name, zip code, or telephone area code. We have personally had the most success with Delorme products. One of the features we value is the routing preferences which can be set as normal or to either favor or avoid specific types of roads like toll roads, interstates, US highways, state highways, ferries, and forest roads. In the latest version of *Street Atlas 6,* Delorme incorporates the exit services from the *Exit Authority*. Another feature of *Street Atlas* is the interface with *Phone Search*, another Delorme software package that encompasses business and residential telephone numbers in all 50 states. After searching for a telephone number, the address can be located on the map. We often use this handy feature when we want to locate the nearest Radio Shack, restaurant, veterinarian, or any other type business.

GPS navigation has kept us out of difficult situations many times. Imagine traveling through a large city like Dallas, and being able to "scout ahead" to identify roads, exits, and other data. Then, with the click of the mouse, again center the map on your current position. We know when to expect our next turn and are rarely surprised. Even when new construction has changed the highways, the area street detail is so good that we have been able to find our way back to our route. For instance, we were traveling east on Maryland 155 and thought we would simply merge onto northbound US 40. We did not see the signs directing northbound traffic to the right, so we continued east and soon found ourselves on city streets. The GPS mapping software pinpointed our position and allowed us to circumnavigate back to US 40. It is hard to drive a coach and tow vehicle in cities and sometimes it is even more difficult to find a place to stop so you can ask directions.

Street Atlas 6 and self contained Earthmate antenna/receiver

Over the years, there have been several stand-alone products developed. These are devices independent of a computer to enhance navigation. Ceres, Bartizan, and the OnStar system are not user navigation programs. They track a vehicle from a central location and can dispatch emergency assistance. They are used in conjunction with a cellular phone so the user can call for directions or other assistance. Alpine Electronics has a dash mounted device that combines an FM radio, audio CD player, and navigation mapping. It requires multiple CDs and does not allow the user to "scout" ahead-you can only see your current position. You can create a route, but the route cannot extend beyond the limits of one regional CD. This device retails for approximately $3,500.00, and the nine regional CDs are sold separately for $150.00 each. Generally, we have found that programs oriented to urban automobile use have limited value to RVers.

We still prefer using computer programs. Computers are available in varying sizes and at varying prices to fit into nearly any budget and they are multi-functional. We use ours for word processing, financial management, entertainment, and navigation. Wireless modems are now available and soon Internet access and email will be available from almost anywhere. We have owned both laptop and desktop computers and we prefer the desktop, but that is purely a matter of personal choice. The computer mapping programs, with or without GPS, provide detailed street information for every city, regardless of size. This

Optional laptop power adapter cable and 12 Volt power adapter cable for the Delorme Earthmate

data is not available from any paper atlas or any other single source. We do, however, still use our other navigation aids like the paper road atlas, the *Truckers Atlas*, the *Mountain Directory*, and the *Exit Authority*. Each of these aids offers a different perspective and when you combine them, you have a powerful navigation system.

Along with the computer and software programs, an antenna and receiver are required. We use a permanently mounted roof antenna and a permanently wired receiver made by Trimble. Since it is permanently wired to a 12 V power supply, it does not have to initialize with each use. This receiver can process three different types of protocol messages so it can be used with a variety of computer programs. Many programs use NMEA protocol messages. NMEA is the National Marine Electronics Association who defines marine electronic interface standards to serve the public interest. Software programs use only some of the data, so proprietary receivers usually do not work with other software programs. ETAK does not use NMEA mode data so they have a proprietary receiver for their *Skymap* program that is connected to a computer by either a serial port or a PCMCIA card slot. Delorme uses NMEA mode data and they offer a portable receiver combined with an antenna called Earthmate, which is connected through a serial port. The Earthmate is battery powered, so it can be used with hand held computers for hiking or any other activity that requires portability. A 12V interface using a cigarette lighter jack is also available. The ETAK and the Earthmate antennae are not weather proof, so they are placed near a window inside the RV. If the RV has a fiberglass roof, the antenna can be placed almost anywhere.

GPS antenna by Trimble. It is mounted between the 3/16" roof rivets

Before we leave on a trip, we enter the primary stops on *Street Atlas 6*. Primary stops may be people or companies we are calling on to write a review article or friends and family members we are going to visit. Next we check long range weather forecasts and then Flying J fuel prices at http://www.flyingj.com. This information helps to determine the best route. After we insert the appropriate stops to our route, we run a preliminary preferred route. We then consult the *Truckers' Atlas* and the *Mountain Directory* to be sure we will not run into any low clearances, weight restricted bridges or roads unsafe for the coach. If there are any, we will adjust our route accordingly. If our route takes us through a major metropolitan area, we use the route mileage and time features to avoid rush hour traffic. The next step is to determine where we will be stopping each night. When making a cross-country run, we often spend the night at a Flying J where there is generally ample safe parking.

If necessary, we consult the *Exit Authority* to find other appropriate stops. We then run a final route. Sometimes, we print out the directions but usually we just save it on the computer where it is readily available. As we travel, the navigator will run the GPS and mapping software anytime we are in a metropolitan area or when we anticipate multiple turns or connectors. A navigator always uses the equipment. It is never safe for a driver to attempt to use any navigational equipment while driving.

Many of the programs incorporate audio turn-by-turn instructions, but we have found this feature to be of limited value in the RV application. It may be of more value in urban settings in automobile applications. For example , this is probably a great advantage in airport rental cars and helps the traveler safely navigate to their hotel. The voice instructions usually announce turns 60 seconds in advance-we believe this cannot take the place of a navigator telling the driver to move to the right lane a half mile from the turn.

There are times during the summer months when Ed has to travel alone. We follow the same procedure as above, except that we always print the directions. Additionally, each night, Ed will review his route for the next day. If there are areas where he anticipates any difficulty, he will print directions through that area and tape them to the dash.

We travel about 30,000 miles each year. By visiting the Flying J web site and planning where we buy fuel, we can save up to $500 in fuel costs annually. These savings have paid for the computer and software. Using a trip from Pennsylvania to Las Vegas as an example, we might choose to go I 70, I 40, or I 30-20-10. The choice would be influenced by weather and fuel prices. As we travel west, we know from experience that fuel prices will increase. We try to buy the bulk of our fuel before the significant price increase and when we are making a round trip, we calculate how much fuel will be needed to get back to the lower prices. Thus we can limit purchases at the higher price.

At the time we began using the GPS equipment in 1993, we knew absolutely nothing about computers. With perseverance and practice, both of us became more comfortable and even began building our own computers in 1996. We don't expect that everyone will want to spend the time and effort to do that. However, if there is a desire to use GPS navigational aids, we believe the person who does <u>not</u> do the majority of the driving is obligated to learn as much as possible about using the equipment. This is a very reachable goal, even for those with no computer experience whatsoever.

Initially, we considered the GPS another nice-to-have toy. However, when the antenna failed during the first year, we discovered just how much we depended on the system. We had become accustomed to scouting the road ahead to find our turns and then to immediately re-center the map on our current position. Without the GPS, it was impossible to re-center the map quickly. We could no longer determine exactly how far we were from our exit or turn so we could not make timely decisions about when to change lanes. Without the antenna and the GPS, the computer map became no different than the paper atlas. We could see more detail, but we could not determine exactly where we were. Without the GPS, we could no longer anticipate maneuvers and the stress and frustration of city traffic returned. We replaced the antenna as soon as possible and never again took the system for granted.

Often Ed will ask, "How far is the next _____?" Fill in the blank with "rest stop", "fuel stop", "Wal-Mart", or "Dairy Queen". I usually look in the *Exit Authority* to find the item he wants and then zoom in the map to locate the site and insert a label. The label stays visible even when I zoom out to where I can see both the target site and our current GPS location. The scale in the task bar allows me to estimate the distance. The closer we get, I can increase the magnification to increase the map detail. Again, the ability to "look" down the road and then immediately re-center on our current location allows me to tell Ed when to get ready for turns or other maneuvers. The more you use the program, the more uses you find. We now consider GPS a necessity and would never willingly travel without it.

We have used all the programs and equipment discussed in this article. We realize that we have not discussed all of the mapping programs and GPS equipment that is currently available because the cost of purchasing all of them would be prohibitive. Our GPS receiver allows us to custom configure various data strings so we have the ability to use three programs at the same time. Software or hardware manufacturers not mentioned are welcome to submit products for evaluation.
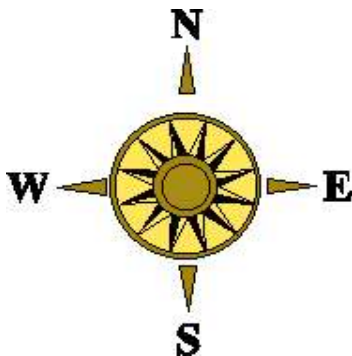
For more information contact the following:

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Alpine Electronics	800-421-2284 or http://www.alpine1.com
Chicago Map Corporation	800-257-9244 or http://www.chicagomap.com
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