Welcome

The Manifold® GPS Tools package adds Global Positioning System (GPS) capability to Microsoft® Access® database systems. GPS Tools can also set your computer system's clock to the incredibly accurate atomic clock standard used by GPS.

To Get Going Quickly:

1) Read the Installation topic to make sure you installed GPS Tools correctly.

2) Read the Using GPS Tools topic for setup and usage instructions.

3) If this is a Trial Edition, it will expire 14 days from installation. The installation will only work once, so before you run out of time, visit our **registration page** at http://www.manifold.net/gps.html to buy your fully licensed edition of Manifold GPS Tools.

More from Manifold Net

The Manifold® GPS Tools package is another fine product from your friends at **manifold.net**. See the About Manifold Net topic for information on other Manifold family products.

Installation

1. Extract the **.zip** file into any temporary directory. It unzips into a Windows InstallShield file set.
2. Double click on **setup.exe** Follow the setup instructions in the usual way.
3. By default, the installation creates a file called **MfdGPS.mda** in C:\Program Files\Manifold System\AccessAddIns, and it will **automatically** install the Add-In into Access. It will be a part of the Access system and Manifold GPS will appear on the **Tools - Add-Ins** menu.

Note: there is no need to run the Access Add-In Manager to add Manifold GPS Tools. However, if desired at some later date, Manifold GPS Tools may be added using the Access Add-In Manager by installing the **MfdGPS.mda** file located in C:\Program Files\Manifold System\AccessAddIns.

Using GPS Tools

GPS Tools may be used with an existing Access table or with a new table created by GPS tools.

Launch GPS Tools by choosing **Tools - Add-Ins - Manifold GPS**. The main **GPS** dialog will open. Buttons are arranged on the dialog to remind you of their order of use.

GPS Setup - Specify which COM port and baud rate, etc is to be used. Click **GPS Setup** to set up your GPS unit after you install GPS Tools. If you change the COM port or GPS interface characteristics, click **GPS Setup** again to set the new parameters. GPS Tools will remember settings for you, so unless you change the COM port or settings you need only run this once.

Fields - Specify which table is to receive GPS data, and what fields are to be used. You can create a new table here with all fields already set up to receive GPS data.

Current Position - Get current position information from the GPS. Often used with a laptop and portable GPS device for data acquisition in the field. Current position includes Latitude, Longitude, altitude, speed, bearing, and more.

Waypoints - Download waypoints stored in the GPS. Sometimes it's easier to store waypoint information in a portable GPS and then download an entire field session into a database back at the office.

Routes - Download route information stored in the GPS. Not all GPS units can save and download routes.

Sync Time - Set the computer system's clock to the current time reported by the GPS unit. Because GPS units must be synchronized to the atomic clock time accuracy of the satellite network, every GPS unit (no matter how humble) can report the current time to atomic clock accuracy. This is quite likely the most accurate means of setting time any one of us will ever encounter. **Note:** On NT systems, you must have Administrator privileges to do this.

GPS Setup

This dialog sets up a GPS receiver interface and data acquisition options. Manifold's GPS interface works with any **NMEA 0183 Version 2.0** compatible GPS receiver via a serial port interface.

Your GPS receiver must be set to use **NMEA 0183 Version 2.0** as its data interface. Note that some devices, such as the Garmin GPS 12XL we use as an example in this Help file, might ***not*** be set to the v2 NMEA 0183 standard by default. You may have to specify NMEA 0183 v2 as the interface in your GPS device's setup menu. Consult your GPS documentation for information on how to configure your GPS device.

GPS Receiver - Enter a name you wish to use to identify the GPS receiver you are setting up. We suggest using the manufacturer and model number, for example, "Garmin GPS 12XL". Push **Save** to add this collection of setup parameters under this receiver name. If you have previously saved a GPS receiver setup, it will appear on the menu of pull-down choices. If you wish to delete a previously saved GPS receiver setup, choose it from the pull-down menu and press the **Delete** button.

GPS Properties - Specify the interface properties. The **COM port** is determined by which serial port you use on your system to connect the interface cable. Use COM 1 through COM 4. All other parameters should be matched to the values specified by the user manual for your GPS receiver. Note that some receivers allow a choice of options for values such as **Baud rate** in their internal setup.

Test - Test the interface using the given parameters. The dialog will try to communicate with the GPS and will report if it finds a GPS receiver using the specified parameters.

Units - The **GPS Setup - Units** dialog includes conversion boxes to override the default **Speed** and **Altitude** units of measure used by GPS devices.

Speed - GPS units normally report speed as **centimeters** per **hour**. Select the units you prefer in the **Speed** box for automatic conversion to more normally used units. Choices include:

cm/h	centimeters per hour
m/s	meters per second
km/h	kilometers per hour
mi/h	miles per hour
nmi/h	nautical miles per hour ("knots")

Altitude - GPS units normally report antenna altitude as **centimeters** above the geographic datum (effectively, the datum is sea level). Select the units you prefer in the **Altitude** box for automatic conversion to other units. Choices include:

cm	centimeters
m	meters
ft	feet

Fields

This dialog allows creation and/or editing of tables and fields into which GPS information will be inserted. There are three categories of fields used for GPS import:

Fields for Current Position

Fields for Waypoints

Fields for Routes

Note: Not all GPS receivers can store and download routes and waypoints. Some older models may not have these capabilities.

Fields for Current Position

Use this dialog to specify which table and fields will be used to accept information downloaded for current position from the GPS. GPS devices typically provide eight different data items to answer each current position request. This dialog allows you to specify what database field will be used for each parameter. If you don't want to import a particular GPS parameter, leave the database field box next to it blank.

This dialog is repeated within the **Fields** button of the main **Current Position** dialog.

Table - Name of the database table to use. If you wish to use an existing table, select it from the pull-down list.

New - Create a new table to hold GPS information. A sub-dialog will prompt you for the name to use for the new table. The new table will be created with default field names and types to accept all data provided by the GPS for current position. In addition, an **ID** field will be created to autonumber each current position fix.

When you create a new table for current position fixes, the following fields will be created. If you plan on importing to an existing table with existing fields, you should have fields of the appropriate type in that table.

Default Field Name	Data Type	Field Size
ID	AutoNumber	Long Integer
Latitude	Number	Double
Longitude	Number	Double
Bearing	Number	Double
Speed	Number	Double
Time	Date/Time	
Satellites	Number	Integer
AntennaAltitude	Number	Integer
QualityIndicator	Number	Integer

Save - Save the table name and fields to use.

Note: When creating a new table, the new table will not be visible in the **Tables** tab of the Access **Tables Queries Forms …** database display window until the GPS dialog is closed and the Access database display window is updated. The Access database window is updated whenever you change tabs (click on the **Queries** tab and then back to the **Tables** tab).

GPS Fields - Database Fields - These boxes show which database field is to be used to store information from each corresponding GPS-provided current position field. If you leave a Database Field box blank, the associated GPS Field will not be imported. If you provided the name of an existing table in the **Table** box, the **Database Fields** pull-down choices will be loaded with fields from that table that are of the appropriate field type.

For example, suppose you already have a database table with latitude and longitude data to which you will add some records generated using the GPS Current Position function. Perhaps your database table already has fields named "**Lat**" and "**Lon**". You would select **Lat** in the **Database Fields** box next to the **Latitude** GPS Field.

Latitude, Longitude - Latitude and longitude in decimal degrees. West longitudes and South latitudes are indicated by negative numbers.

Bearing - Direction in which the GPS thinks it is moving, from zero to 360 degrees.

Speed - Speed at which the GPS thinks it is moving.

Time - Highly accurate precise time at the moment of the position fix.

Satellites in View - The number of satellites used by the GPS receiver.

Antenna Altitude - Altitude above the geographic datum (sea level, as a practical matter) in this location. If enough satellites are usable, most GPS units will compute not only latitude and longitude position, but also altitude in meters. This is labeled "Antenna Altitude" because many GPS units work with a remote antenna. What is actually measured is the height of the ***antenna***, which can be some meters above the location of the actual GPS instrument in the case of remotely-mounted, external antennas.

Quality Indicator - A number provided by your GPS unit stating the quality of the fix as reckoned by the GPS. **Quality** is **0**, **1** or **2** with 2 representing the highest quality. Consult your GPS documentation for your GPS device's definition of what the different quality levels mean.

Automatic Conversion

The **GPS Setup - Units** dialog includes conversion boxes to override the default **Speed** and **Altitude** units of measure used by GPS devices.

Speed - GPS units normally report speed as **centimeters** per **hour**. Select the units you prefer in the **Speed** box for automatic conversion to more normally used units. Choices include:

cm/h	centimeters per hour
m/s	meters per second
km/h	kilometers per hour
mi/h	miles per hour
nmi/h	nautical miles per hour ("knots")

Altitude - GPS units normally report antenna altitude as **centimeters** above the geographic datum (effectively, the datum is sea level). Select the units you prefer in the **Altitude** box for automatic conversion to other units. Choices include:

cm	centimeters
m	meters
ft	feet

Fields for Waypoints

Use this dialog to specify which table and fields will be used to accept waypoint information downloaded from the GPS. For each waypoint, GPS devices typically provide the name of the waypoint and its latitude and longitude position.

Table - Name of the database table to use. If you wish to use an existing table, select it from the pull-down list.

New - Create a new table to hold GPS information. A sub-dialog will prompt you for the name to use for the new table. The new table will be created with default field names and types to match the waypoint data provided by the GPS. In addition, a **WayPointID** field will be created to autonumber each waypoint.

When you create a new table for waypoints, the following fields will be created. If you plan on importing waypoints to an existing table with existing fields, you should have fields of the appropriate type in that table.

Default Field Name	Data Type	Field Size
WayPointID	AutoNumber	Long Integer
Name	Text	255
Latitude	Number	Double
Longitude	Number	Double

Save - Save the table name and fields to use.

Note: When creating a new table, the new table will not be visible in the **Tables** tab of the Access **Tables Queries Forms …** database display window until the GPS dialog is closed and the Access database display window is updated. The Access database window is updated whenever you change tabs (click on the **Queries** tab and then back to the **Tables** tab).

GPS Fields - Database Fields - These boxes show which database field is to be used to store information from each corresponding GPS-provided waypoint field. If you leave a Database Field box blank, the associated GPS Field will not be imported. If you provided the name of an existing table in the **Table** box, the **Database Fields** pull-down choices will be loaded with fields from that table that are of the appropriate field type.

For example, suppose you already have a database table with latitude and longitude data to which you will add some records generated using the waypoint function. Perhaps your database table already has fields named "**Lat**" and "**Lon**". You would select **Lat** in the **Database Fields** box next to the **Waypoint Latitude** GPS Field.

Waypoint Name - Name of the waypoint. Different GPS units differ in the length of names allowed.

Waypoint Latitude, **Waypoint Longitude** - Latitude and longitude in decimal degrees. West longitudes and South latitudes are indicated by negative numbers.

Fields for Routes

Use this dialog to specify which table and fields will be used to accept route information downloaded from the GPS. A **route** is a sequence of waypoints. Please read the **Fields for Current Position** and **Fields for Waypoints** topics before reading this topic, in order to familiarize yourself with treatment of fields in simpler cases involving only one Access table. Routes are slightly more complex because they involve two tables.

Some GPS devices cannot save routes for download. Some GPS devices can only save one route. Other GPS units can save and download more than one route. The Manifold route download dialog can handle the most complex case of more than one route.

A **Master** table (structure below) contains a list of routes, each of which has a **RouteID**. A **Detail** table lists all the waypoints associated with each **RouteID**. A relationship relates the two tables. The order in which waypoints are stored into the **Detail** table is the order in which they are encountered in the route.

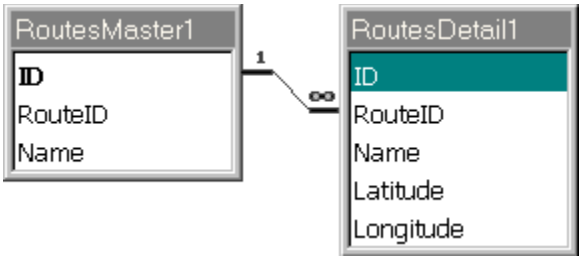
Master Table

Default Field Name	Data Type	Field Size
ID	AutoNumber	Long Integer
RouteID	Number	Long Integer
Name	Text	255

Detail Table

Default Field Name	Data Type	Field Size
ID	AutoNumber	Long Integer
RouteID	Number	Long Integer
Name	Text	255
Latitude	Number	Double
Longitude	Number	Double

Relationship Between Master and Detail Tables



You can use your own, existing database tables or have Manifold GPS tools create them for you. The above structure is what is created by default when you check the **Use default master - detail** box and click **Create New Table**.

Using the default Manifold tables

Check the **Use default Master - Detail Schema** and click **New**. Tables with the above structure and relationship will be created in the database for you. Click **Save**.

Using your own tables

Suppose you already have a set of tables, including a master table of routes that is linked to another database of waypoints. If these tables include fields of the right type to hold the above information, and if there exists a relationship between the table to be used as the **Master** and another table that is to function as the **Detail** table (ie, hold all the waypoints), you can use your existing tables. Here's how:

Select the name of the table to be used as the **Master** table in the master table pull-down box. Choose which fields in your table are to be used for **Route ID** and **Route Name**. Specify the name of the **Detail** table in the detail table pull down box. Specify which fields are to be used to in the **Details** table to store the various waypoint fields.

Click **Save** to use the specified configuration of tables and fields.

Current Position

This dialog is used to fetch current GPS position into a geographic map. It shows a view of the table you select together with control buttons.

Before running this dialog, set up the GPS interface using the **GPS Setup** button in the main **GPS** dialog. If you like, you can set up fields using the **Fields - Fields for Current Position** dialog before running **Current Position**. Alternately, the **Fields** button within **Current Position** duplicates the **Fields for Current Position** dialog.

1) Choose the Table to receive the current position data. This enables the column headings in the main table display. You'll see the column headings in your table.

2) Choose **Import/Update** or **Track** mode. If you choose **Track**, specify the **Track Interval** in seconds.

3) Click **Import** to append another current position fix to the table. This will create a new record at the bottom of the Table loaded with the GPS parameters you specified in the **Fields** dialog.

4) Click **Update** to update the currently selected record with the current position's GPS parameters as specified in the **Fields** dialog.

5) If you are in **Track** mode, click the **Track** button to turn tracking ON or OFF.

Import is straightforward. Clicking the **Import** button will add a new record to the bottom of the Table containing the field information specified in the **Fields** set up.

Update is used to add GPS data to existing database records. It will add current position GPS data into those fields specified for the record currently selected. Select a record by clicking on one of the fields. Take care to single click, as double-clicking on a field will edit that field.

Using Update

Suppose we have an existing database of bridges in Washoe County with a table called **bridges**. The database includes comments, the number of the bridge, etc. We would like to add the Latitude and Longitude location for each bridge by driving around with our laptop and GPS device to each of the bridges.

Begin by opening the bridge database and add fields called **Latitude** and **Longitude** to the table. Click on **Fields** for Current Position and specify GPS **Latitude** and **Longitude** as fields to import into these database fields. Run **Current Position**. As we drive around to each bridge, we will scroll through the table to each bridge's record, click on the record to select it and then click **Update**. The **Latitude** and **Longitude** fields will be updated with the current GPS latitude and longitude and the other fields will not be changed.

Editing Fields

Suppose we'd like to add a comment to each field? Use **Design** view in Access to add a **Comments** text field, a **Bridge Name** field or whatever to your **CurrentPosition** table. When you click the **Import** or **Update** button, double-click into the **Comments** field and add whatever text you'd like just as you would with any Access table. This is not as slick as a Form, but it is simple and direct.

In general, double-clicking on any field of a record will allow you to edit that field.

Track Mode

Tracking is fun and easy to do. Pick **Track** mode and then specify the **Track interval** in seconds. Click **Start Tracking** to begin tracking. While tracking, GPS Tools will go fetch the current position and automatically append it to the table every specified interval number of seconds, until you push the **Stop Tracking** button.

Let's say we specify 30 seconds as the **Track interval**. Every 30 seconds while tracking the system will append the current position to the table, using the fields specified in the **Field** set up. This is very handy for automatically recording the motion of a ship, aircraft, or vehicle every **n** seconds.

It's also a great way to make a map of a boundary, like a ranch boundary, especially if you are within range of a differential GPS beacon and are using a differential beacon receiver to enhance the accuracy of your GPS. Simply set the **Track Interval** to a short time and drive the boundary. Take the database of points thus produced and feed them to your favorite mapping/GIS program (we use Manifold System) to create a cool map.

Automatic Conversion

GPS units normally report speed as **centimeters** per **hour**. To convert automatically to different units, enter the **GPS Setup** dialog and click the **Units** button. Select the units you prefer in the **Speed** box for automatic conversion to more normally used units. Choices include:

cm/h	centimeters per hour
m/s	meters per second
km/h	kilometers per hour
mi/h	miles per hour
nmi/h	nautical miles per hour ("knots")

Altitude - GPS units normally report antenna altitude as **centimeters** above the geographic datum (effectively, the datum is sea level). Select the units you prefer in the **Altitude** box for automatic conversion to other units. Choices include:

cm	centimeters
m	meters
ft	feet

Notes

In the table row/column display, field columns that you have selected to receive GPS data will be shown in white with other columns shown in gray. For example, suppose in your table you have fields called **Lat** and **Lon** along with other fields such as **Comments**, **Street**, and so forth. If in the **Fields** dialog you assigned the Database Fields **Lat** and **Lon** to receive GPS Latitude and Longitude and left the other choice boxes blank, when you fetch data from the GPS you will only import data into the **Lat** and **Lon** columns. These columns will be shown in white with the **Comments**, **Street** and other columns shown in gray.

Buttons will not be enabled for use unless a GPS unit is found and is providing current position data. To check if the GPS unit is properly set up and connected, choose **GPS Setup** from the main **GPS** dialog and push the **Test** button. Your GPS unit may be correctly set up, but is not reporting position data for lack of adequate satellite acquisition, because it is indoors, etc. Check your GPS display to see if it is reporting position data.

For indoors experimental use, some GPS units have a "simulator" mode in which they act as though they are reporting data for training purposes. On some units, this may be used indoors to experiment with GPS Tools. For example, this Help file is being written on a machine attached to a Garmin GPS 12XL set to "simulator" mode. According to the Garmin simulator, we are somewhere in Texas right now.

Waypoints

This is a "batch" dialog that downloads waypoints stored in your GPS unit. Before running this dialog, set up the GPS interface using the **GPS Setup** button in the main **GPS** dialog. If you like, you can set up fields using the **Fields - Fields for Waypoints** dialog before running **Current Position**. Alternately, the **Fields** button within **Waypoints** duplicates the **Fields for Waypoints** dialog.

This dialog functions by downloading all waypoints into a temporary buffer memory. Clicking the **Import** button writes all the waypoints, in order, into the database using the fields specified by the **Fields** set up.

To download waypoints:

1) Choose the Table to receive the waypoints data. This enables the column headings in the main table display. You'll see the column headings in your table.

2) If you want to fetch all waypoints in a single **Import** operation, wait until all the waypoints are loaded. When no more waypoints are found, the progress indicator will stop. As soon as enough waypoints are found to estimate the time required to import them all, **GPS Tools** will present an estimated time to completion.

3) Click **Import** to append all of the waypoints found to the table. If you click **Import** again, you will append the same set of waypoints one more time.

Notes:

Active routes - In many GPS receivers, waypoints associated with routes cannot be downloaded unless the route involved has been marked as the ***active*** route in the GPS receiver. This means that in some GPS receivers, only one route, the active route, can be downloaded at a time.

Slow transmission - Some GPS receivers transmit waypoint information very slowly, as slow as a waypoint per second. Some will also transmit waypoints in circular order, but may start transmitting in the middle of the list of waypoints when interrogated by your computer. That's why the Manifold waypoint function begins downloading waypoints into a temporary buffer as soon as this dialog is opened. It might take a while to get them all. Also, because the GPS unit might start transmitting waypoints half way through the waypoint list, the function will fetch them all so that it can put them into proper order before writing them to the database when you push the **Import** button.

Wait for All the Waypoints - If you are in a hurry, you can press the **Import** button any time after it is enabled. This will immediately import into the table only those waypoints thus far loaded. Every time you press the **Import** button it will create records for all waypoints loaded so far. **Example:** Suppose we have thirty waypoints in the GPS. We press **Import** after only 7 have been loaded. 7 records will be created in the table. We wait until all 30 are reported found and press **Import** a second time. 30 waypoints will be imported and 30 new records will be appended to the bottom of the table for a total of 37 records.

Routes

This is a "batch" dialog that downloads routes and their associated waypoints stored in your GPS unit. Before running this dialog, set up the GPS interface using the **GPS Setup** button in the main **GPS** dialog. If you like, you can set up fields using the **Fields - Fields for Routes** dialog before running **Current Position**. Alternately, the **Fields** button within **Routes** duplicates the **Fields for Routes** dialog.

This dialog functions by first downloading all routes and waypoints into a temporary buffer memory. Clicking the **Import** button writes all the routes to the **Master** table and the waypoints, in order, into the **Detail** table using the fields specified by the **Fields** set up.

To download routes and waypoints:

1) Choose the **Master** table to use. The **Detail** table will be used based on the relationship between the **Master** and **Detail** tables. This enables the column headings in the main table display. You'll see the column headings in your **Master** and **Detail** tables.

2) Wait until all the waypoints are loaded. When no more waypoints are found, the **Import** button will be enabled.

3) Click **Import** to append all of the routes and their waypoints to the specified **Master** table and associated **Detail** table. If you click **Import** again, you will append the same set of routes and waypoints one more time.

Active routes - In many GPS receivers, waypoints associated with routes cannot be downloaded unless the route involved has been marked as the ***active*** route in the GPS receiver. This means that in some GPS receivers, only one route, the active route, can be downloaded at a time.

Slow transmission - Some GPS receivers transmit waypoint information very slowly, as slow as a waypoint per second. Some will also transmit waypoints in circular order, but may start transmitting in the middle of the list of waypoints when interrogated by your computer. That's why the Manifold waypoint function begins downloading waypoints into a temporary buffer as soon as this dialog is opened. It might take a while to get them all. Also, because the GPS unit might start transmitting waypoints half way through the waypoint list, the function will fetch them all so that it can put them into proper order before writing them to the database when you push the **Import** button.

Sync Time

The **Sync Time** dialog allows a one-click update of your computer system's clock time to the atomic-clock accuracy of the GPS system.

GPS devices work by measuring differences in the speed-of-light arrival times of signals from orbiting satellites. To do this, they must know local time to an accuracy interval of the time required to traverse a few meters at the speed of light - millionths of a second. When GPS units acquire satellites, they also acquire a time almanac that sets the devices internal clock accuracy to the satellite atomic clock time. **Sync Time** allows you to set your computer clock by this phenomenally accurate time standard.

As a practical matter, the internal system clocks of personal computers cannot be set to accuracy better than one second; however, using **Sync Time** to set your computer's clock is a far more convenient and reliable way of doing so than attempting to set your computer's clock by other means.

The **Sync Time** dialog shows your GPS unit's time and your computer's time, both in UDT ("Greenwich" time). Press the **Synchronize** button to set your computer's clock to the GPS time. If you are running NT, you must have Administrator privileges to set your computer's clock using **Sync Time**.

Tips on Using GPS

This document assumes you are familiar with GPS in general. You should also be familiar with the set up and use of your specific GPS instrument.

Multiple Routes and Route Segments

Some GPS units, such as the Garmin GPS 12XL, report only one route, the active route, when interrogated for routes and waypoints. Other GPS units will report multiple routes, or even single routes constructed as multiple segments. **Routes** will try to fetch all the routes provided by the GPS receiver. It is believed the current dialogs can handle almost all variations of naming conventions for routes and waypoints; however, there are now hundreds of different GPS receivers available for sale and it is possible that some units may transmit routes and waypoints in unexpected ways. Try changing parameters within your GPS such as whether a route is set active or not to see if this resolves any problems encountered.

Accuracy

A review of GPS information within Access or as exported to your favorite GIS program may well be the first time you have seen the true accuracy of your GPS unit compared to an accurate map. The application of Selective Availability (SA) by the US Government to artificially degrade GPS accuracy will result in poor GPS accuracy unless corrective information from a differential beacon receiver is used to defeat SA. SA results in random jumping around of positions reported by GPS, with random jumps of 100 meters or so not uncommon. Using a differential correction signal in locations where differential beacons are available will restore accuracy to as good as 3 to 5 meters.

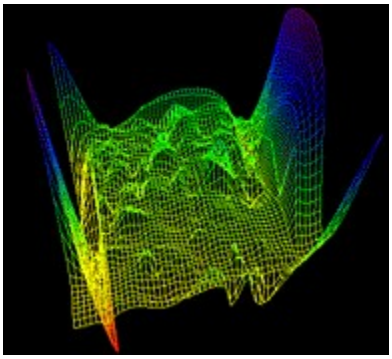
If you are not using a differential beacon receiver to fix the brain damage caused by SA, you will see the GPS location reported by your GPS receiver jumping around in strange ways. That's not Manifold… that's the Department of Defense fooling with the signal to deliberately mess up the accuracy of your GPS receiver.

Note: Not all GPS receivers are "differential ready." If you need differential corrections, we recommend using a GPS receiver that already incorporates a differential beacon receiver.

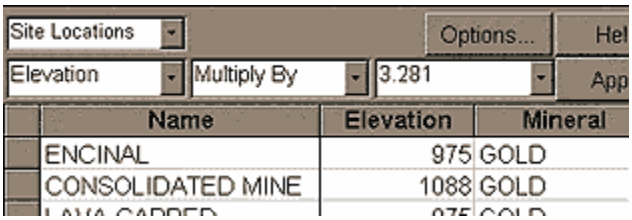
About Manifold Net

If you are using a Trial Edition of Manifold GPS Tools, buy a fully licensed copy of Manifold GPS Tools by visiting the registration page at http://www.manifold.net/gps.html

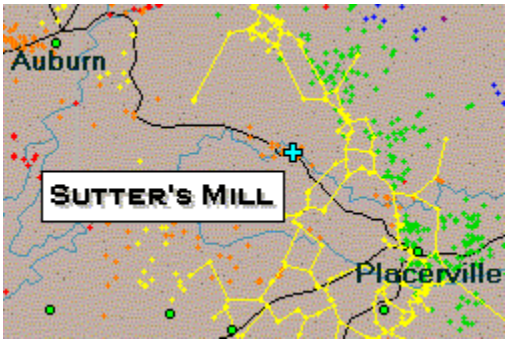
Manifold GPS Tools for Microsoft Access was created by **manifold.net**. Other fine **manifold.net** products include:



Manifold® 3d View for Access - Use any numeric fields for X, Y and Z axes and see your Access data in 3D. See solid surfaces, wireframes, points and more. Do "fly throughs" of your data using Manifold's 3d View animator or "walker." Use the floating Z plane to do "waterline" analysis, get line-of-sight or zones of sight with terrain data and much, much more. The screen shot here uses only 256 colors with a black background to keep this Help file small. The real thing runs in True Color. Visit our web site at www.manifold.net to see spectacular full color examples.



Manifold® Commander for Access - Revolutionizes data management within Access. No need to use update queries or other complex programming methods to manipulate data. Commander makes it easy to make changes to data, such as multiplying all values in a given field by 100, pulling the day of the week out of a date field and placing it in another field and more. Over 75 functions are automatically presented with context sensitivity for field types. Statistics toolbars automatically provide a "bottom line" read-out on statistics like standard deviation, median, covariance and many more. If you need to manipulate data in Access, you'll wonder how you ever got along ***without*** Manifold Commander!



Manifold® System - The coolest, most powerful GIS and mapping system you've ever seen. Manifold uses **.mdb** format for databases, so there's instant interchangeability with thousands of Access and **.mdb** compatible applications. You can buy Manifold System for ***less*** than $100, yet it provides ***more*** power than $5000 workstation packages and it is a lot ***easier*** to use. Manifold includes hundreds of geometric, proximity, networking, database logic, mathematical and statistics functions, all

encapsulated in point-and-click solvers. Manifold works great with data laid out in geographic form, such as maps, in CAD form such as facilities diagrams, or in purely abstract form such as maps of computer networks or for general purpose business intelligence. Get contouring, spatial analysis, buffer zones, spatial interpolation, spatial SQL, scripting and much, much more. Manifold includes numerous converters to allow you to use free, high resolution government maps

Manifold also includes **autodiscovery** for networks to draw maps of web sites and computer networks using SNMP, TCP/IP and other methods. If you need to visualize data that's related by location, by geography, or by networking relationships, you owe it to yourself to check out Manifold System.

The **manifold.net** team develops in NT exclusively for Microsoft Windows and Windows NT operating systems. Suggestions and constructive criticism are always welcome. Please visit the web site at www.manifold.net for the latest email addresses, telephone numbers and other contact information to use.

Buy Manifold® GPS Tools Today

If you're running the Trial Edition of Manifold GPS Tools, congratulations! You're sampling the coolest new add-in for Microsoft's Access program. We hope you enjoy your two week trial, and find lots of ways to use GPS Tools in your Access work.

Don't let the Trial Edition expire! You know how it goes, just when you discover you ***really*** need GPS Tools you find the trial version has expired. Don't let that happen to you! Now is the time to order your "live" copy of Manifold GPS Tools direct from **manifold.net**. Get your credit card (Visa, MasterCard, EuroCard, or American Express) and visit our **registration page** at http://www.manifold.net/gps.html to get your copy of Manifold GPS Tools right now.

You can download your copy of Manifold GPS Tools immediately on purchasing the product. The unlock password will be automatically sent to you by email within minutes of your purchase. You get Manifold GPS Tools right away without any shipping hassles or customs problems for International customers. Our sales servers run seven days a week and 24 hours a day for your convenience.

Take a look at the About Manifold Net topic in this helpfile for more information about our products, and visit our main web site at www.manifold.net to see what's new.

Thanks for trying Manifold GPS Tools!

License

End-User License Agreement for Manifold Net Software

IMPORTANT – PLEASE READ CAREFULLY: This End-User License Agreement (“EULA”) is a legal agreement between you (either an individual or a single entity) and Manifold Net Ltd. (henceforth “MFN”) for the MFN SOFTWARE PRODUCT which it accompanies, which includes computer software and may include associated media, printed materials, and “online” or electronic documentation (“SOFTWARE PRODUCT”). By opening product seals, installing, copying, or otherwise using the SOFTWARE PRODUCT, you agree to be bound by the terms of this EULA. If you do not agree to the terms of this EULA, do not open, install or use the SOFTWARE PRODUCT; you may, however, return it unopened to your place of purchase for a full refund.

This EULA may be repeated within SOFTWARE PRODUCT installation scripts or “online” documentation. Any such repetition is a reminder of an agreement you have already entered by opening the product package and / or commencing installation. All MFN products are packaged with a “shrink wrapped” license requiring you to review and agree to the full text of this EULA before opening product seals, before commencing download, or before otherwise acquiring product.

SOFTWARE PRODUCT LICENSE

The SOFTWARE PRODUCT is protected by copyright laws and international copyright treaties, as well as other intellectual property laws and treaties. The SOFTWARE PRODUCT is licensed, not sold.

1 .GRANT OF LICENSE. This EULA grants you the following rights:

a. SOFTWARE PRODUCT. Subject to terms and conditions herein, MFN grants to you a personal, nonexclusive license to install and use one copy of the SOFTWARE PRODUCT on a single computer. You may make a reasonable number of backup copies of the SOFTWARE PRODUCT on archival media pursuant to backups of the computer on which the SOFTWARE PRODUCT is installed; however, all such archival copies shall be solely for the purpose of restoring your computer configuration in the event of accidental loss of data or computer failure.

b. Electronic Documents. Solely with respect to electronic documents included with the SOFTWARE PRODUCT, you may make an unlimited number of copies (either in hardcopy or electronic form), provided that such copies shall be used only for internal purposes and are not republished or distributed to any third party.

c. Storage/Network Use. You may also store or install a copy of the SOFTWARE PRODUCT on a storage device, such as a network server, used only to install or run the SOFTWARE PRODUCT on your other computers over an internal network; however, you must acquire and dedicate a license for each separate computer on which the SOFTWARE PRODUCT is installed or run from the storage device. A license for the SOFTWARE PRODUCT may not be shared or used concurrently on different computers.

d. License Pak. If you have acquired this EULA in a MFN License Pak, you may make the number of additional copies of the computer software portion of the SOFTWARE PRODUCT authorized on your License Pak receipt, and you may use each copy in the manner specified above.

2. DESCRIPTION OF OTHER RIGHTS AND LIMITATIONS

a. Not for Resale Software. If the SOFTWARE PRODUCT is labeled “Not for Resale” or “NFR,” then, notwithstanding other sections of this EULA, you may not resell, or otherwise transfer for value, the SOFTWARE PRODUCT.

b. Limitations on Reverse Engineering, Decompilation, and Disassembly. You may not reverse engineer, decompile, or disassemble the SOFTWARE PRODUCT, except and only to the extent that such activity is expressly permitted by applicable law notwithstanding this limitation.

c. Separation of Components. The SOFTWARE PRODUCT is licensed as a single product. Its component parts may not be separated for use on more than one computer.

d. Rental. You may not rent, lease, or lend the SOFTWARE PRODUCT.

e. Support Services. MFN or MFN contractors may provide you with support services related to the SOFTWARE PRODUCT (“Support Services”). Use of Support Services is governed by the MFN policies and programs described in the user manual, “online” documentation, and/or other MFN-provided materials. MFN has no obligation under this Agreement to provide Support Services, and the voluntary provision of Support Services by MFN or MFN contractors shall not be construed as assuming any duty to provide Support Services to you. Any supplemental software code provided to you as part of Support Services, including any software code downloaded from MFN Internet sites, shall be considered part of the SOFTWARE

PRODUCT and subject to the terms and conditions of this EULA. With respect to technical information you provide to MFN or to MFN contractors as part of Support Services, MFN may use such information for its business purposes, including for product support and development. MFN will not utilize such technical information in a form that personally identifies you.

f. Software Transfer. You may permanently transfer all of your rights under this EULA, provided you retain no copies, you transfer all of the SOFTWARE PRODUCT (including all component parts, the media and printed materials, any upgrades, this EULA, and, if applicable, any Certificate of Authenticity or MFN hardware accompanying SOFTWARE PRODUCT) **and** the recipient agrees to the terms of this EULA. If the SOFTWARE PRODUCT is an upgrade, any transfer must include all prior versions of this SOFTWARE PRODUCT.

g. Termination. Without prejudice to any other rights, MFN may terminate this EULA if you fail to comply with the terms and conditions of this EULA. In such event, you must destroy all copies of the SOFTWARE PRODUCT and all of its component parts.

h. Trial Editions. The provisions of this paragraph shall supercede the provisions of any other paragraph of this EULA. If this SOFTWARE PRODUCT was provided by MFN as a Trial Edition, this EULA is limited as set forth by MFN in its transmission of SOFTWARE PRODUCT to you, or as set forth in the startup dialogs associated with SOFTWARE PRODUCT. Any such limitations shall supercede any other provision of this EULA. Such limitations may be (by way of example and not limitation) a limited period of authorized operation commencing from the time of installation, a limited number of invocations of SOFTWARE PRODUCT, some limitation as to the number of features enabled or processing capacity, or any combination of these or other limitations. You may NOT modify SOFTWARE PRODUCT or operate your computer system or SOFTWARE PRODUCT in a manner that defeats the limitations set forth with the Trial Edition. You may NOT remove any dialogs or other information associated with SOFTWARE PRODUCT that set forth such limitations. Trial Editions of SOFTWARE PRODUCT may NOT be copied and may NOT be transferred to any third party. If a limitation set forth with a Trial Edition specifies a licensed period of authorized operation ("Trial Edition Period") that is less than the 30 day period ("Warranty Period") set forth in the Limited Warranty provisions of this EULA, then the Warranty Period shall be reduced to the length of the Trial Edition Period.

i. No Fail-Safe Uses Authorized. The SOFTWARE PRODUCT has been created using industry standard personal computer software technology. Personal computer software technology is not fault tolerant and thus this SOFTWARE PRODUCT is not designed, manufactured, or intended for use or resale as on-line control equipment in hazardous environments requiring fail-safe performance, such as (by way of example and not limitation) in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life support machines, or weapons systems, in which the failure of the personal computer technology employed in SOFTWARE PRODUCT could lead directly to death, personal injury, or severe physical or environmental damage.

3. UPGRADES. If the SOFTWARE PRODUCT is labeled as an upgrade, you must be properly licensed to use a product identified by MFN as being eligible for the upgrade in order to use the SOFTWARE PRODUCT. A SOFTWARE PRODUCT labeled as an upgrade replaces and/or supplements the product that formed the basis for your eligibility for the upgrade. You may use the resulting upgraded product only in accordance with the terms of this EULA. If the SOFTWARE PRODUCT is an upgrade of a component of a package of software programs that you licensed as a single product, the SOFTWARE PRODUCT may be used and transferred only as part of that single product package and may not be separated for use on more than one computer.

4. COPYRIGHT. All title and copyrights in and to the SOFTWARE PRODUCT (including but not limited to any images, photographs, animations, video, audio, music, text, and "applets" incorporated into the SOFTWARE PRODUCT), the accompanying printed materials, and any copies of the SOFTWARE PRODUCT are owned by MFN or its suppliers. The SOFTWARE PRODUCT is protected by copyright laws and international treaty provisions. Therefore, you must treat the SOFTWARE PRODUCT like any other copyrighted material except that you may install the SOFTWARE PRODUCT on a single computer provided you keep the original solely for backup or archival purposes. As provided in Section 1(a), you may make a reasonable number of copies on archival media pursuant to backups of the computer on which the SOFTWARE PRODUCT is installed. You may not copy the printed materials accompanying the SOFTWARE PRODUCT.

5. DUAL-MEDIA SOFTWARE. You may receive the SOFTWARE PRODUCT in more than one medium. Regardless of the type or size of medium you receive, you may use only one medium that is appropriate for your single computer. You may not use or install the other medium on another computer. You may not loan, rent, lease, or otherwise transfer the other medium to another user, except as part of the permanent transfer (as provided above) of the SOFTWARE PRODUCT.

6. U.S. GOVERNMENT RESTRICTED RIGHTS. The SOFTWARE PRODUCT and documentation are provided with RESTRICTED RIGHTS. Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013 or subparagraphs (c)(1) and (2) of the Commercial Computer Software – Restricted Rights at 48 CFR 52.227-19, as applicable. Manufacturer is Manifold Net Ltd., 1945 North Carson Street, Suite 700, Carson City, Nevada 89701 USA.

7. EXPORT RESTRICTIONS. If the SOFTWARE PRODUCT has been delivered to you in the United States or if you are otherwise subject to United States jurisdiction, you agree that you will not export or re-export the SOFTWARE PRODUCT to any country, person, entity or end user subject to U.S.A. export restrictions, if such export or re-export is prohibited by U.S. software

export restrictions. Restricted countries currently include, but are not necessarily limited to Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria. You warrant and represent that neither the U.S.A. Bureau of Export Administration nor any other federal agency has suspended, revoked or denied your export privileges.

8. MISCELLANEOUS

If you acquired this product in the United States, this EULA is governed by the laws of the State of Nevada.

If you acquired this product in Canada, this EULA is governed by the laws of the Province of British Columbia. Each of the parties hereto irrevocably attorns to the jurisdiction of the courts of the Province of British Columbia and further agrees to commence any litigation which may arise hereunder in the courts located in the Judicial District of Vancouver, Province of British Columbia.

If this product was acquired outside the United States, then local law may apply.

9. LIMITED WARRANTY

LIMITED WARRANTY. Except with respect to data files (including all geometry, database, or other files in .mfd, .mdb, .mws, .txt, or any other format), which are provided "as is," without warranty of any kind, MFN warrants that (a) the SOFTWARE PRODUCT will perform substantially in accordance with the accompanying written materials (including "online" documentation) for a period of thirty (30) days from the date of receipt, and (b) any hardware accompanying the SOFTWARE PRODUCT will be free from defects in materials and workmanship under normal use and service for a period of thirty (30) days from the date of receipt. Some states and jurisdictions do not allow limitations on duration of an implied warranty, so the above limitation may not apply to you. To the extent allowed by applicable law, implied warranties on the SOFTWARE PRODUCT and hardware, if any, are limited to thirty (30) days.

CUSTOMER REMEDIES. MFN's and its suppliers' entire liability and your exclusive remedy shall be, at MFN's option, either (a) return of the price paid, or (b) repair or replacement of the SOFTWARE PRODUCT or hardware that does not meet MFN's Limited Warranty and that is returned to MFN with a copy of your receipt. This Limited Warranty is void if failure of the SOFTWARE PRODUCT or hardware has resulted from accident, abuse, or misapplication. Any replacement SOFTWARE PRODUCT or hardware will be warranted for the remainder of the original warranty period. **Outside of the United States, neither these remedies nor any product support services offered by MFN are available without proof of purchase from an authorized international source.**

NO OTHER WARRANTIES. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, MFN AND ITS SUPPLIERS DISCLAIM ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH REGARD TO THE SOFTWARE PRODUCT AND ANY ACCOMPANYING HARDWARE. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY HAVE OTHERS, WHICH VARY FROM STATE/JURISDICTION TO STATE/JURISDICTION.

NO LIABILITY FOR CONSEQUENTIAL DAMAGES. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT SHALL MFN OR ITS SUPPLIERS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION, OR ANY OTHER PECUNIARY LOSS) ARISING OUT OF THE USE OF OR INABILITY TO USE THE SOFTWARE PRODUCT, EVEN IF MFN HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. BECAUSE SOME STATES AND JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

Should you have any questions concerning this EULA, or if you desire to contact MFN for any reason, please contact the MFN subsidiary serving your country, or write: Manifold Net Ltd., 1945 North Carson St, Suite 700, Carson City, Nevada 89701 USA.

Si vous aves acquis votre produit MFN au CANADA, la garantie limitée suivante vous concerne:

GARANTIE LIMITEE

GARANTIE LIMITEE – Sauf pour celle du les files aux format .mfd, .mdb, .mws, et .txt, qui sont fournies "commes telles", sans aucune garantie quelle qu'elle soit, MFN garantit que (a) la performance du LOGICIEL sera substantiellement en conformité avec le(s) manuel(s) de produits qui accompagne(nt) le LOGICIEL pour un périod de trente (30) jours à compter de la date de réception; et (b) tout matériel forni par MFN accompagnant le LOGICIEL sera exempt de défault de matière première ou de vice de fabrication dans des conditions normales d'utilisation et d'entretien pour une période de trente (30) jours à compter de la date de réception. Toute garantie implicite concernant le LOGICIEL et le matériel est limitée à trente (30) jours.

RECOURS DU CLIENT – La seule obligation de MFN et votre recours exclusif seront, au choix de MFN, soit (a) remboursement du prix payé ou (b) la réparation ou le remplacement du LOGICIEL ou du matérial qui n'est pas conforme à la Garantie Limitée de MFN et qui est retourné à MFN avec une copie de votre reçu. Cette Garantie Limitée est nulle si le défault du LOGICIEL ou du matériel est causé par un accident, un traitement abusif ou une mauvaise application. Tout LOGICIEL de remplacement sera garanti pour le reste de la période de garantie initiale.

AUCUNE AUTRE GARANTIE – MFN DESAVOUE TOUTE AUTRE GARANTIE, EXPRESSE OU IMPLICITE, Y COMPRIS MAIS NE SE LIMITANT PAS AUX GARANTIES IMPLICITES DU CARACTERE ADEQUAT POUR LA COMMERCIALISATION OU UN USAGE PARTICULIER EN CE QUI CONCERNE LE LOGICIEL, LE(S) MANUEL(S) DE PRODUITS, LA DOCUMENTATION ECRITE ET TOUT MATERIEL QUI L'ACCOMPAGNENT. CETTE GARANTIE LIMITEE VOUS ACCORDE DES DROITS JURIDIQUES SPECIFIQUES.

PAS D'OBLIGATION POUR LES DOMMAGES INDIRECTS – MFN OU SES FOURNISSEURS N'AROUNT D'OBLIGATION EN AUCUNE CIRCONSTANCE POUR TOUT AUTRE DOMMAGE QUEL QU'IL SOIT (Y COMPRIS, SANS LIMITATION, LES DOMMAGES ENTRAINES PAR LA PERTE DE BENEFICES, L'INTERRUPTION DES AFFAIRES, LA PERTE D'INFORMATION COMMERCIALE OU TOUTE AUTRE PERTE PECUNIAIRE) DECOULANT DE L'UTILISATION OU DE L'IMPOSSIBILITE D'UTILISATION DE CE PRODUIT MFN, ET CE, MEME SI MFN A ETE AVISE DE LA POSSIBILITE DE TELS DOMMAGES. EN TOUT CAS, LA SEULE OBLIGATION DE MFN EN VERTU DE TOUTE DISPOSITION DE CETTE CONVENTION SE LIMITERA OU MONTANT EN FAIT PAYE PAR VOUS POUR LE LOGICIEL.

La présent Convention est régie par les lois de la province d'British Columbia, Canada. Chacune des parties à la présent reconnaît irrévocablement la compétence des tribunaux de la province d'British Columbia et consent à instituer tout litige qui pourrait découler de la présente auprès des tribunaux situés dans le district judiciaire de Vancouver, province d'British Columbia.

Au cas où vous auriez des questions concernant cette licence ou que vous désiriez vous mettre en rapport avec MFN pour quelque raison que ce soit, veuillez contacter la succursale MFN desservant votre pays, dont l'adresse est fournie dans ce produit, ou écrivez à : Manifold Net Ltd., 1945 North Carson St, Suite 700, Carson City, Nevada 89701 USA.