

## AVL FAQ

The purpose of this FAQ is to answer questions and offer trouble shooting tips concerning the AVL installation on mobile units. It is highly suggested that you carry a spare GPS device and a thumb drive loaded with the latest AVL software when checking MCT's.

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## Where can I get the latest files?

<https://vfcc.onehub.com/pcmss> is where the most up to date files are stored.

In addition, the latest GARMIN drivers and Spanner can also be downloaded directly from their website.

Garmin 18: <http://www8.garmin.com/support/collection.jsp?product=010-00321-00>

Garmin 18x: <http://www8.garmin.com/support/collection.jsp?product=010-00321-31>

## What is PCMSS?

PCMSS is the Northrop Grumman CAD Client software.



## How do I close PCMSS?

ALT+F4

## **What is the voltage required for the MCT and USB ports?**

A variety of problems can be caused by inadequate power. These requirements can be checked with a voltage meter.

Power to the back of the MCT needs to be between 12 and 13.8 volts.

The USB specification provides a 5 V supply on a single wire from which connected USB devices may draw power. The specification provides for no more than 5.25 V and no less than 4.75 V (5 V $\pm$ 5%) between the positive and negative bus power lines. Initially, a device is only allowed to draw 100 mA. It may request more current from the upstream device in units of 2 mA up to a maximum of 500 mA.

If a bus-powered hub is used, the devices downstream may only use a total of four units — 400 mA — of current. This limits compliant bus-powered hubs to 4 ports. The host operating system typically keeps track of the power requirements of the USB network and may issue a warning when a given segment requires more power than is available.

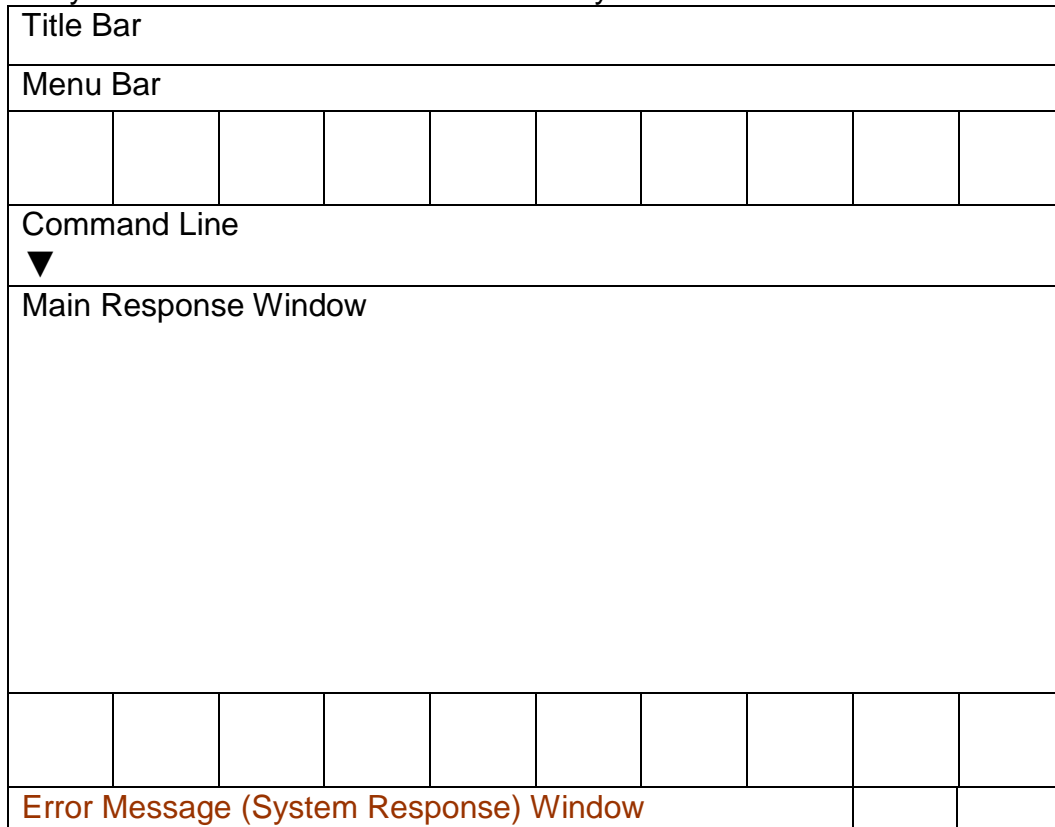
## **How do I set a different VRM or GPS COM port?**

Ports are specified in the PCMSS shortcut. There should be a shortcut on the desktop and in the startup folder (C:\Documents and Settings\All Users\Start Menu\Programs\Startup). If you make changes, change both. If vrmport is not specified, it defaults to 1:

```
C:\pcmss\VerdugoMobile\mss13.exe vfd_avl vrmport=2 AVLSEND gpsport=6
```

## Where is the error message / system response window?

The error message window, also referred to as the system response window, is located below the bottom row of buttons. This is the first place you should look to see if there are any issues with the install.



## Is there a way to see the raw data coming off the GPS?

How to use HyperTerminal for trouble shooting.

1. Close PCMS (Alt+F4)
2. Click on the Start button and then click on Run then type in hypertrm.
3. Create any name you like for the test (we don't plan on saving the file) and press Enter.
4. Then you will need to Connect to the correct COM port (Previously set in Spanner) then click Enter.
5. The COM settings (properties) will come up.
  - Bits per second 4800
  - Data Bits 8
  - Parity None
  - Stop Bits 1
  - Flow Control None
6. Then click OK.
7. You should start seeing data flow across the screen.

If you do not, use Task Manager and close (end task) all programs except Explorer, Systray and Hypertrm. If there is still nothing, try a spare GPS.

## I keep getting a PCMSS error in the System Response Window.

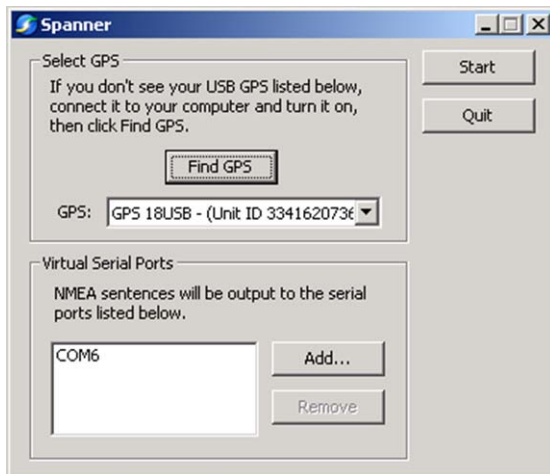
1. Delete C:\PCMSS
2. Re-run the latest CAD.EXE

If the error continues:

1. From PCMSS send the command TRACEON
2. Re-create the error or let it repeat.
3. Send the Command TRACEOFF
4. Copy the file C:\PCMSS\TR3script.log and C:\PCMSS\PCMSS.log to your flash drive.
5. Send the files and your best description of what was occurring to [JPfau@ci.glendale.ca.us](mailto:JPfau@ci.glendale.ca.us)

## What if Spanner doesn't see the GPS?

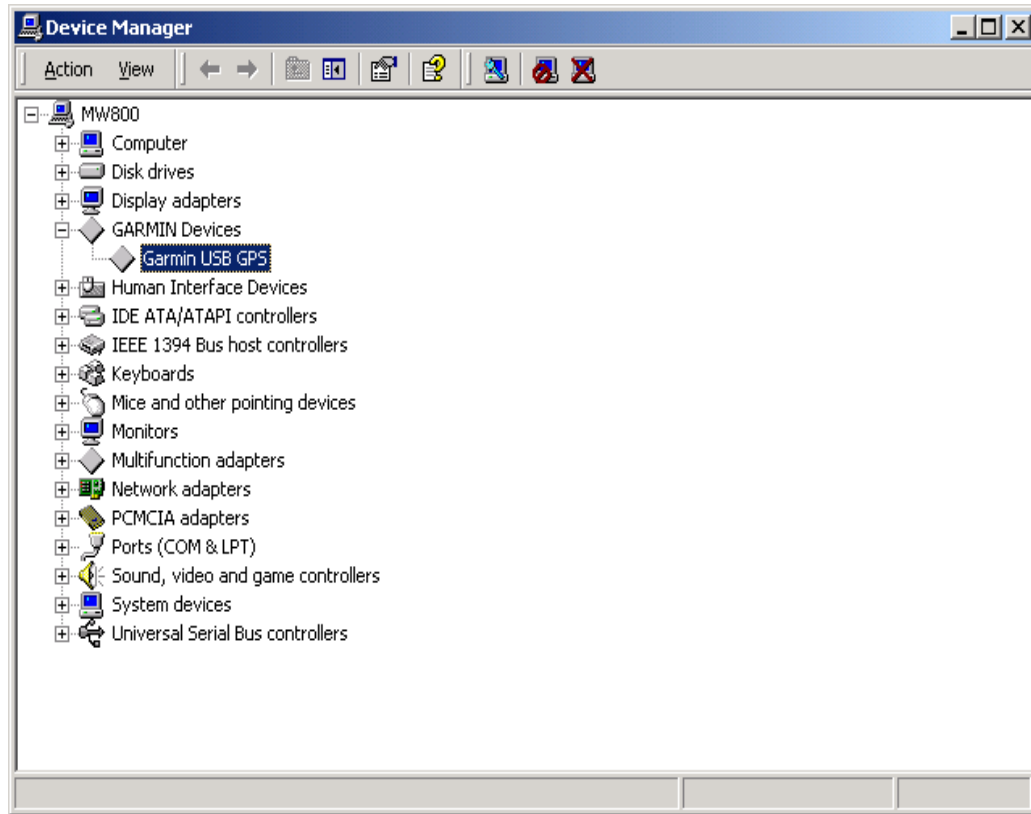
If Spanner cannot find the GPS, there is a problem with the GPS being detected by Windows. Unplug and re-plug the GPS connection, or reboot. If still unsuccessful try plugging in a spare GPS device to the same port and see if that works.



If still not detected, verify that the device is listed in Windows device manager.

Follow the steps below to locate the device manager:

1. Right click My Computer
2. Click Properties
3. Click Hardware tab
4. Click Device Manager button



### **I noticed VSP in the past. What is it used for, and is it part of Spanner?**

VSP stands for Virtual Serial Port and is the core of the Spanner software. Garmin licenses the virtual serial port technology from Constellation Data Systems, Inc. <http://www.constellationdata.com/index.asp>

### **What is Windows error code 5 or yellow highlight in Device Manager?**

The Windows error code: 5 means that the Device Manager on the computer does not recognize the USB drivers being installed correctly for the GPS unit being used. The driver for the device has basically requested a resource that Windows does not know how to handle. The solution to this error is to make sure the Garmin USB drivers are correctly installed for the Garmin GPS unit you are using.

If you go to the device manager on the computer, is the unit recognized?

With Device Manager open, look to see if you see a line entry for Garmin device, or an entry with a yellow question mark or exclamation mark, it might be under other or unknown devices. If you see a yellow highlight then follow the steps below to install the drivers:

1. Right click on the sub line with the yellow highlight
2. Click on the properties

3. Click on the tab that says driver
4. Click on update drivers
5. Select no not at this time if it asks to connect to the internet
6. Select the advanced option choose from a list
7. Make sure the little white box that states to include this location has a check mark
8. Click on browse
9. Then scroll up find my computer make sure it is expanded if not click on the plus sign
10. Click on the plus sign next to local disc "c"
11. Click the plus sign next to Garmin
12. Do a single click on USB\_Drivers file
13. Then click ok and then click next
14. This should cause the program to go to that file and load the needed drivers.

If this does not work, then right click on the sub line and click on uninstall drivers. Then unplug the unit wait a few seconds and plug it back in, when the found new hardware wizard appears go through it the same as the above steps.

One other thing to check on, if you go to the bottom of the list, you will see a line reading (universal serial bus controllers). Click on the (+) sign next to it to open the list. The lines that appear first in the list typically start with some letters and possibly some numbers: example (Intel 82801). If you see something like: (SiS, Via, OpenHCD, Ali, or Alr ), then these chipsets ARE NOT compatible with our devices and may not allow the USB Card Programmer or GPS unit to function

### **How can I verify PCMSS is receiving GPS data?**

The map button will be green or yellow. You can also open the log file C:\PCMSS\VerdugoMobile\PCMSS.log and look for GPS data.

### **Why is the map button grey?**

If the map button is grey, PCMSS never connected to the GPS device. Check for the device in Spanner and Device Manager. Verify you have the correct port specified in the shortcut.

### **Why is the map button red?**

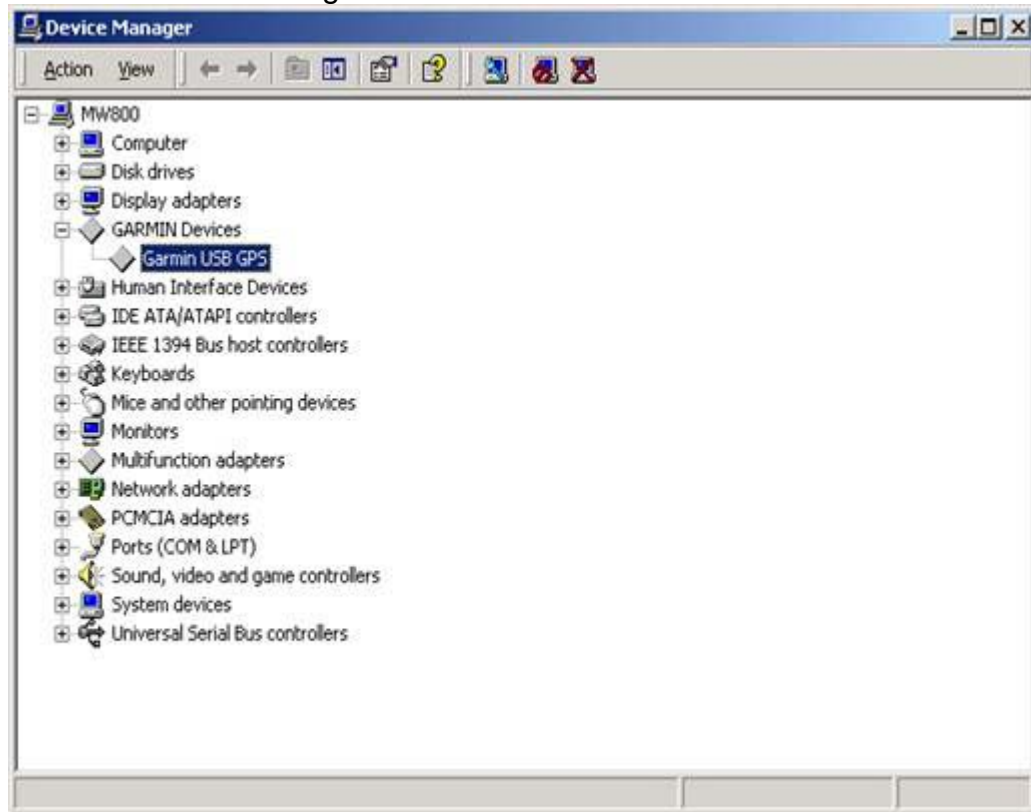
When the map button turns red, mobile PCMSS has lost its connection to the GPS device. This is usually due to a power issue or the USB plug slipping out of the port.

GPS18x devices sometimes lose connection on reboot. Rather than reboot, shut down the pc and then turn it back on.

When the map button is red, verify that the device is listed in Windows device manager.

Follow the steps below to locate the device manager:

1. Right click My Computer
2. Click Properties
3. Click Hardware tab
4. Click Device Manager button



If the device is not listed in Device Manager, it is probably dropping out because power is being lost. Check the BIOS settings in the MCT for any power saving features or “low power mode” features and turn them off. Check that the power going into the MCT is between 12 and 13.8 volts. You may want to monitor this to see if there is a power drop coinciding with the loss of the GPS device. You may also want to check with the MCT manufacturer to upgrade to the latest BIOS and see if there are any settings shutting off power to USB.

The USB specification provides a 5 V supply on a single wire from which connected USB devices may draw power. The specification provides for no more than 5.25 V and no less than 4.75 V ( $5\text{ V} \pm 5\%$ ) between the positive and negative bus power lines. Initially, a device is only allowed to draw 100 mA. It may request more current from the upstream device in units of 2 mA up to a maximum of 500 mA.

If a bus-powered hub is used, the devices downstream may only use a total of four units — 400 mA — of current. This limits compliant bus-powered hubs to 4 ports. The host operating system typically keeps track of the power requirements of the USB network and may issue a warning when a given segment requires more power than is available.

### **The map button goes red every few hours.**

If the map button is going red every few hours even with all power saving features turned off, Spanner is having an issue interacting with the USB ports. Uninstall Spanner and install Franson GpsGate. Available from the One-Hub website (<https://vfcc.onehub.com/pcmss>). Remember to enter the license key after installing or it will only work for 14 days. Inform Verdugo of the install for license tracking.

### **Why is the map button yellow?**

The map button is yellow if PCMSS is communicating with the GPS device, but the GPS device is not providing a valid location. If the Button is consistently yellow with a clear sky view, the GPS should be replaced.

### **How long does it take a unit to acquire satellites for the first time?**

A unit right out of the box could immediately pull up satellite information. However, sometimes the unit needs more time to register the satellites and process that information correctly. Initially, this could take around 15-30 minutes.

### **Why won't my unit acquire satellites?**

There are a several different factors that can cause a GPS unit to not acquire satellites:

- If your unit is indoors, it may not acquire satellites.
- If your unit is trying to acquire satellites for the first time, it is normal for it to take a while to establish its initial position.
- If you have just finished updating the software in your unit or you have performed a master reset, your unit may take longer than normal to acquire.
- If your unit has traveled a long distance while turned off or not tracking your travel, it may take a longer period of time to acquire.
- If your unit has not been used for an extended period of time, it may take a longer period of time to acquire.
- If your unit is not acquiring satellites, it is recommended that you place the unit in a stationary position where it has a clear view of the sky. As the unit receives signal from the satellites, it will begin to lock on to them individually until it has acquired enough information to establish your position.
- Ensure that it has the latest version of GPS software.

If your unit is still having trouble acquiring satellites, test with a spare GPS Device.

### What causes GPS signal errors?

Factors that can degrade the GPS signal, which can affect accuracy, include the following:

- **Ionosphere and troposphere delays:** The GPS signal slows as it passes through the atmosphere.
- **Signal multipath:** The GPS signal is reflected off objects such as tall buildings or large rock surfaces before it reaches the receiver.
- **Orbital errors:** Also known as ephemeris errors, these are inaccuracies of the satellite's reported location.
- **Poor satellite visibility:** The more satellites a GPS receiver can "see", the better the accuracy. GPS units typically will not work indoors, underwater, or underground.

### Is there a way to open up a Garmin device to check for internal issues?

Do not open a unit up to check for issues.

### How can I check that the VRM is talking to CAD?

When PCMS5 starts, after about 20 seconds, you will see a VRM Ack message in the System Response Window. If this message does not show up there is a VRM issue. Check the COM port settings and the VRM. After it appears, type and send the command WHO. Any response in the System Response Window verifies you are communicating with CAD. This will also tell you if the MCT is logged into the system.

### How do I check that the VRM is working?

Checking the VRM lights gives the fastest indication.



- PWR Solid Red
- SRVC Solid Amber
- LINK Solid Green
- TXQ Off
- RXQ Off
- BUSY Mostly Amber, Occasional Blink Off
- XMIT Mostly Off, Blink Red when you Send/Receive

## **How can I check that the VRM is sending AVL to CAD?**

MCT's only send AVL to CAD when they are logged into the system. AVL data is not sent to CAD when it is AIQ. AVL data will only be sent if the map light is green. Use the WHO command (above) to verify that the unit is logged into the system. Send the command GETAVL [unit-id] to check that cad has received AVL data. This command can also be used remotely.

## **How often is AVL data sent to CAD?**

AVL Data is sent every 600 seconds (\$140) or every 1320 Feet (\$141). It is sent on status change. It is not sent when AIQ. It is sent upon each status change. You can type DEBUG SCRIPT VAR 140 and DEBUG SCRIPT VAR 141 to check these settings.

## **Can I force a Unit to send AVL (It's AIQ and not sending)?**

QAVL [Unit] and then GETAVL [Unit]. If the unit is not receiving GPS information, this will only resend the last good GPS info it did receive. This does not make the unit start receiving GPS data.

## **How many satellites must be in view for a valid GPS signal?**

When the signals of at least three GPS satellites become stable, the device can use the signals to calculate the current location. The device is said to be "fixed" when calculations of the current location are taking place. Similarly, the phrases "obtaining a fix" or "losing a fix" speak of situations where three signals become stable or obscured, respectively.

## **Can I repair the GPS device myself?**

We will be unable to assist you in your attempts to personally repair the device. All parts within the devices are not available for individual purchase from GARMIN. The schematics and diagrams are proprietary information. Additionally, GARMIN strongly recommends that all repairs on GARMIN devices are performed by GARMIN. Repairs made by GARMIN are backed by a 90 day warranty. To set up a repair order, please call GARMIN Technical Support line at 1-800-800-1020.

## **What does all the data from the GPS mean?**

### **The GPRMC Sentence**

This sentence, known as the "Recommended Minimum" sentence, is the most common sentence transmitted by GPS devices. This one sentence contains nearly everything a GPS application needs: latitude, longitude, speed, bearing, satellite-derived time, fix status and magnetic variation.

### **Sentence Example**

```
$GPRMC,170029,A,3405.8183,N,11807.8297,W,000.0,092.7,250408,013.5,E*62
```

## Sentence Contents

The GPRMC sentence consists of twelve comma-delimited values:

### The Command Word

```
$GPRMC,170029,A,3405.8183,N,11807.8297,W,000.0,092.7,250408,013.5,E*62
```

The command word indicates that the sentence is to be interpreted as a recommended minimum message.

### Satellite-Derived Time

```
$GPRMC,170029,A,3405.8183,N,11807.8297,W,000.0,092.7,250408,013.5,E*62
```

GPS devices are able to calculate the current date and time using GPS satellites (and not the computer's own clock, making it useful for synchronization). This word stores the current time, in UTC, in a compressed form "HHMMSS.XXX," where HH represents hours, MM represents minutes, SS represents seconds, and XXX (if present) represents milliseconds. The above value represents 17:00:29 AM UTC.

### Satellite Fix Status

```
$GPRMC,170029,A,3405.8183,N,11807.8297,W,000.0,092.7,250408,013.5,E*62
```

When the signals of at least three GPS satellites become stable, the device can use the signals to calculate the current location. The device is said to be "fixed" when calculations of the current location are taking place. Similarly, the phrases "obtaining a fix" or "losing a fix" speak of situations where three signals become stable or obscured, respectively.

A value of "A" (for "active") indicates that a fix is currently obtained, whereas a value of "V" (for "inValid") indicates that a fix is not obtained.

### Latitude Decimal Degrees

```
$GPRMC,170029,A,3405.8183,N,11807.8297,W,000.0,092.7,250408,013.5,E*62
```

The latitude represents the current distance north or south of the equator. This value is in the format "HHMM.M" where HH represents hours and MM.M represents minutes. A comma is implied after the second character. This value is used in conjunction with the longitude to mark a specific point on Earth's surface. This sentence says that the current latitude is "34°05.8183'N".

### Latitude Hemisphere

```
$GPRMC,170029,A,3405.8183,N,11807.8297,W,000.0,092.7,250408,013.5,E*62
```

This indicates if the latitude is measuring a distance north or south of the equator. A value of "N" indicates north and "S" indicates south. This sentence says that the current latitude is "34°05.8183'N".

### **Longitude Decimal Degrees**

\$GPRMC,170029,A,3405.8183,N,11807.8297,W,000.0,092.7,250408,013.5,E\*62

The longitude represents the current distance east or west of the Prime Meridian. This word is in the format "HHHMM.M" where HHH represents hours and MM.M represents minutes. A comma is implied after the third character. This value is used in conjunction with the latitude to mark a specific point on Earth's surface. This sentence says that the current longitude is "118°07.8297".

### **Longitude Hemisphere**

\$GPRMC,170029,A,3405.8183,N,11807.8297,W,000.0,092.7,250408,013.5,E\*62

This indicates if the longitude is measuring a distance east or west of the Prime Meridian. A value of "E" indicates east and "W" indicates west. This sentence says that the current longitude Hemisphere is "West".

### **Speed**

\$GPRMC,170029,A,3405.8183,N,11807.8297,W,000.0,092.7,250408,013.5,E\*62

This indicates the current rate of travel over land, measured in knots.

### **Bearing**

\$GPRMC,170029,A,3405.8183,N,11807.8297,W,000.0,092.7,250408,013.5,E\*62

This indicates the current direction of travel, measured as an "azimuth." An azimuth is a horizontal angle around the horizon measure in degrees between 0 and 360, where 0 represents north, 90 represents east, 180 represents south, and 270 represents west. This indicates that the direction of travel is 092.7°, or close to East.

### **UTC Date**

\$GPRMC,170029,A,3405.8183,N,11807.8297,W,000.0,092.7,250408,013.5,E\*62

GPS devices maintain their own date and time calculated from GPS satellite signals. This makes GPS devices useful for clock synchronization since the date and time are independent of the local machine's internal clock. This value contains two-digit numbers for days, followed by months and years. In the example above, the date is April (08) 25th (25), 2008 (08). The two-digit year is added to 2000 to make a full year value.

### **Magnetic Variation**

\$GPRMC,170029,A,3405.8183,N,11807.8297,W,000.0,092.7,250408,013.5,E\*62

The magnetic variation, also known as magnetic declination, in degrees. Magnetic variation is the difference between True Bearings and Magnetic Bearings and is caused by the different locations of the Geographic North Pole and the Magnetic North Pole plus any local anomalies such as iron deposits. The GPS receiver simply calculates magnetic north based on its true position and data tables giving the current location of the North Magnetic Pole and (potentially) any local variations.

### **Magnetic Bearing**

`$GPRMC,170029,A,3405.8183,N,11807.8297,W,000.0,092.7,250408,013.5,E*62`

Magnetic Bearing is the direction of magnetic variation ("E" = east, "W" = west). In the example, the direction of magnetic variation is East.

### **The Checksum**

`$GPRMC,170029,A,3405.8183,N,11807.8297,W,000.0,092.7,250408,013.5,E*62`

The checksum is used to identify errors in the data which may have occurred during transmission. Error correction and detection in NMEA data is handled through the use of checksums. A checksum is a two-character hexadecimal number, located at the end of each NMEA sentence, representing the "two's complement" of the sentence.

In other words, each byte value between the dollar sign (\$) and asterisk (\*) is XOR'ed.

If the calculated checksum does not match the checksum in the sentence, the entire sentence is typically discarded. This is an acceptable practice because GPS receivers typically re-transmit the same kind of sentence every few seconds.