



# Ohio Geospatial Program for Agriculture and Natural Resources

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## Considerations for Handheld GPS Units, Handheld Computers and Software for Agriculture and Natural Resource Applications

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There are several important features to consider when purchasing reliable and inexpensive handheld GPS units, computers and software for agriculture and natural resource applications. The following minimum recommendations should be considered when purchasing your system.

*Note: Reference to terminology called "handheld GPS" units in this publication include self-contained GPS units like the Garmin and Magellen. Reference to handheld computers include devices commonly referred as PDAs (personal digital assistants, PocketPC, WindowsCE, etc.)*

### Selecting GPS Units

- Stand-alone and handheld GPS receivers without differential correction is useful for road navigation, hiking, and fishing and usually provides greater error (average 30 feet) for most field activities. It can be used for simple documentation purposes to get you in the right vicinity. Within the past several years, low-cost GPS receivers with WAAS differential correction have entered the market to provide suitable reception for several field data collection and operational activities. These receivers provide differential correction and are suited for collecting field boundaries, crop scouting, soil sampling, and general crop documentation. The low-cost WAAS receivers generally run between \$130-\$500 and indicate an accuracy range up to 10 feet. Some of these receivers have a higher hertz rate (5 Hz) that collects it's points of position much faster than the majority of low-cost receivers at 1 Hz. Higher hertz rated receivers should be considered for faster moving data collection operations for uses with yield monitoring and variable rate applications for seeding, lime, and chemicals. Many of the new low-cost receivers are using SiRFstarII chipsets. There may be different brand names when looking for a receiver but this is one indicator to look for in a low-cost receiver.
- Receivers that typically cost between \$1,000-3,500 are generally the most acceptable for yield mapping, marking tile lines or surface drains, variable rate technologies and guidance systems. These receivers can get you well within a few feet of accuracy. Some of these receivers can handle dual frequencies allowing differential correction signals such as WAAS, Coast Guard, or satellite subscription service. Commercial service providers should consider these

receivers for reliability and accuracy needs. Satellite subscription fees for one receiver are typically between \$600-800 per year.

### **GPS Connections and Cables**

- It is important that the unit can communicate GPS data strings. This will require the use of standard NMEA 0183 strings. Additional cabling and connectors may be needed to connect GPS receivers with external antennas and connections to other computers and controllers. Some receivers require the use of a NULL modem. Most cables are DB9 serial connections with proprietary ends to fit into a receiver, laptop, Pocket PC, PALM, or other logging unit. Additional external antennas or mounting of a receiver outside of a tractor cab or vehicle windshield can improve the accuracy of the device. Many of the handheld computers today offer clip-on GPS receivers, compact flash and PCMCIA adaptor GPS units that require no cable attachments.

### **WAAS Capable**

- When selecting GPS receivers make sure it is compatible with your intended hardware. Make sure the receiver provides differential corrections with either WAAS (Wide Area Augmentation System), Coast Guard, or Satellite subscription service. In some cases, investing in more expensive receivers that have dual frequencies and can handle multiple signal channels for differential can go along ways for reliability and guaranteed GPS service.

### **GPS Wireless Connectivity**

- Newer type GPS units are now carrying Bluetooth wireless connectivity. That means no cables needed to recording device. The recording device needs to contain Bluetooth capabilities. Add-on cards for laptops and Pocket PCs will work. Most PocketPCs being built now will consist of Bluetooth. The range for connectivity for Bluetooth is up to 33 feet. Note: Earlier low-cost Bluetooth receivers that have been built have had issues communicating to the new PocketPC 2003 operating systems. Make sure the manufacturer has addressed this problem if you intend to use it with the new operating system.

### **Data Management and Storage**

- Make sure to consider additional storage capabilities to store waypoints or reference data. Handheld GPS units can come typically with 1 to 16mb of storage for data. Some newer handheld GPS models allow for additional storage cards to be added. Personal handheld computers typically have 16 to 64 mb storage built-in. They also have various kinds for storage cards to keep track of record keeping data. It is highly recommended to provide additional storage cards for your device in case your battery runs down and you lose important data that may have been stored directly on the handheld computer.

## **Screen Quality and Size**

- A screen and keypad that has back light capabilities is helpful for ease and use in the dark. Other features that include a large screen and buttons to control the device. The handheld computers typically have a stylus pen that is used to point and click on the screen to enter data while handheld GPS units are buttons. For handheld computers consider putting on protective sleeves over the screen to reduce on wear and tear of the stylus on the screen. Some screens are best used in direct sunlight whereas others are difficult to see. Some have reflective screens and some absorb the reflection making them easier to see at different angles.

## **Battery Life**

- Battery life is essential to power handheld GPS units and computers. Additional back-up battery such as an external rechargeable camcorder battery and the ability to power unit through a cigarette or AC adapter is essential for long field usage. Take into consideration manufacturer guidelines when hooking it up to 12v battery charged systems. This may result in damage to your device if you do not have the correct power adaptor.

## **Audible Features**

- Audible alarms for reaching a specific location or indicating off-course travel are helpful when driving or navigating through the field.

## **Mobile Software Considerations**

- Consider a handheld computer and record keeping software that can work with your existing mapping and GIS desktop software. There are different kinds of handheld computers on the market and require different operating systems (i.e., Palm OS, Windows CE, PocketPC). Consider purchasing record keeping software to do all that you need to do at the same time provide flexibility in expansion for your operation. Most all handheld computer GPS agronomic software can record boundaries, points and lines. Consider the software's capabilities to use imagery, a lightbar system, run specific variable rate controllers, and other devices. Most handheld software also allows you to custom make data entry templates for your work.

## **Safety**

- Consider safety at all times when working with handheld mobile equipment while operating moving vehicles. Stop the vehicle to make changes to your equipment to prevent an accident to yourself or someone else.

## **GPS, Mobile Computing, Software, Accessories, and Other Resources**

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### **Handheld GPS Units**

The following are some suggested manufacturers and models to consider that meet some of the minimum recommendations mentioned earlier.

MAGELLAN – <http://www.magellangps.com>

(Magellan has a product comparison chart to compare their items side by side.)

- Magellan Map330M (marine version, est. \$200)
- Magellan Map330X (there is also a 330 model that does not have WAAS make sure it has the “X”, est. \$200)
- Magellan Meridian (2MB, \$240), Gold (16MB, \$330), Platinum (16MB, \$400)
- SportTrak (1 MB, \$170), SportTrak Map (4 MB, \$230), SportTrak Pro (23 MB, \$300)
- GPS Companion for the Palm M500 (\$200)

GARMIN – <http://www.garmin.com>

(Garmin's web site also has a product comparison chart where you can view their items side by side.)

- Geko 201 (\$139)
- GPSMAP 76 (\$350)
- GPSMAP 76s (S is for sensors includes barometric altimeter, electronic compass and additional memory, \$450.)
- ETrexVista (\$350 )
- GPS V (\$470)
- Rino 130 (\$375), 120 (\$270), 110 (\$190) These are FRS/GMRS integrated radios.
- GPSMAP 176 (\$700)
- StreetPilot III (\$1,000)
- GPSMAP 60C and 60CS
- iQue 3600 (Palm and Garmin)
- Garmin also makes a stand-alone WAAS receiver to be used with other equipment. This includes 17N (\$200), and GPS 18 (\$95.00) models. All are 1 hz, except the 16a, which is 5 hz.

### **Handheld Computer GPS/WAAS Receivers**

Holux - <http://www.holux-gps.com/english.htm> Star II / LP Chipset

Haicom - <http://www.haicom.com.tw/> (Taiwan product) Star II / LP Chipset

PocketXTrack – Fortuna Electronics, <http://www.fortuna.com.tw/PocketXTrack.htm>

NAVMAN, <http://www.navman.com>

Pocket CoPilot 2.0 by Travroute - <http://www.alk.com/>

Pocket GPS Navigator by Pharos - <http://www.pharosgps.com/>

Prairie Geomatics – <http://www.prairie.mb.ca/backpack.htm>

Pretec - [http://www.pretec.com/index2/product/Mobile\\_peripherals/CompactGPS.htm](http://www.pretec.com/index2/product/Mobile_peripherals/CompactGPS.htm)

Teletype Flash - <http://www.teletype.com/pages/gps/receivers.html>

### **Bluetooth Wireless Handheld Computer GPS/WAAS Receivers**

GR-230 Holux - <http://www.holux-uk.com/>

Socket Bluetooth GPS - <http://www.socketcom.com/>

Clip-on Bluetooth – Fortuna Electronics, <http://www.fortuna.com.tw>  
GPS Smart – Fortuna Electronics, <http://www.fortuna.com.tw/GPSmart.htm>  
GPS 4400 – Navman, <http://www.navman.com>  
GlobalSat - <http://www.globalsat.com.tw/>  
TomTom - <http://www.tomtom.com/>  
Crux II / BTGPS – EMTAC, <http://www.emtac.com/>  
Pocket GPS Navigator – Pharos GPS, <http://www.pharosgps.com/>  
Earthmate – Delorme, <http://www.delorme.com/>

## **Handheld Computers**

*PocketPC, Windows CE*

Panasonic Toughbook – <http://www.panasonic.com>  
HP IPAQ – <http://www.hp.com>  
Toshiba – <http://www.toshiba.com>  
Dell AXIM – <http://www.dell.com>  
CASIO (consider the Cassiopeia E-200) - <http://www.casio.com/>  
Harvest Master Allegro Field PC - <http://www.harvestmaster.com/>  
GeneSys Maximus from Xplore – <http://www.xploretech.com/>  
Trimble GeoExplorer CE - <http://www.trimble.com/geoexplorerce.html>  
Symbol - [www.symbol.com](http://www.symbol.com) (bar code features)

*Palm OS*

Palm and Handspring, palmOne – <http://www.palmone.com>  
Garmin Ique 3600 – <http://www.garmin.com>  
Symbol – <http://www.symbol.com>  
Sony CLIE – <http://www.sony.com>

## **Handheld Computer Software**

*PocketPC, Windows CE*

StarPal HGIS – <http://www.starpal.com> (\$500)  
ArcPAD – ESRI – <http://www.esri.com/arcpad> (\$495)  
Site Mate – Farm Works <http://www.farmworks.com> Basic (\$250), Scouting (\$500), VRA (\$750), Farm Trac Mate (\$250) Farm Trac Mate needs Farm Trac+ (\$300)  
AgGPS EZ-Map – Trimble [http://www.trimble.com/aggps\\_ezmap.html](http://www.trimble.com/aggps_ezmap.html)  
SST Stratus and Summit – SST Development Group, <http://www.sstdevgroup.com>  
\$600, \$100/yr support fee  
FieldRover II - SST Development Group, <http://www.sstdevgroup.com>  
PocketDlog – Delta Data Systems - <http://www.deltadatasytems.com/dlog/> (\$695)  
Anywhere Sentinel GPS - <http://www.avshop.com/avshop/anywheremap-sentinel-gps.html> (\$249.00)  
FieldWorker – <http://www.fieldworker.com/>  
Field Recon – AgRenaissance, <http://www.fielddrecon.com/>  
Total Scout – AgCode, <http://www.agcode.com/>  
Scout-Smart, from Bayer Inc. - <http://www.scout-smart.com>, (free for members of active consultant ser

## *PalmOS*

Scout-Smart, from Bayer Inc. - <http://www.scout-smart.com>, (free for members of active consultant service organization in your state.)

## **TabletPC**

Microsoft - <http://microsoft.com/windowsxp/tabletpc/>

Fujitsu – <http://www.fujitsu.com>

Panasonic Toughbook – <http://www.panasonic.com>

## **GPS Cell Phone Technology**

Axiom Navigation's X-Pak - <http://www.axiomnav.com>

CSI Wireless – <http://www.csi-wireless.com>

## **Cables, Brackets, and Such**

The Supply Net - <http://www.thesupplynet.com/>

Farmworks – <http://www.farmworks.com> – IPAQ, Dell, John Deere Cables

AgRePlan, LLC – <http://www.agreplan.com/> - Dell Axim to GPS NMEA Interface Connector

Brackets – Ram Mounts, <http://www.ram-mounts.com>

PocketPC/Palm Brackets – UniMount, <http://www.revolvedesign.com>

## **Additional Resources**

*Reviews on Handheld GPS units*

<http://www.gpsinformation.net>

<http://www.pdabuyersguide.com/>

<http://www.pocketgps.co.uk/>

*Other Web Resources*

GPS Passion - <http://www.gpspassion.com/>

PocketPC Windows - <http://www.microsoft.com/windowsmobile/products/pocketpc/>

Pen Computing - <http://www.pencomputing.com/>

PocketPC City - <http://www.pocketpccity.com/>

PocketPC Magazine - <http://www.pocketpcmag.com/>

Software Freeware/Shareware Downloads - <http://www.tucows.com>

## **Purchase Locations**

<http://www.pocketnav.com/holux.htm> - Holux Compact Flash WAAS

<http://cpubarn.com/newgps.htm> - Haicom Compact Flash WAAS

<http://www.semsons.com/gps.html> - Holux Compact Flash and External Cable WAAS

<http://www.gpscify.com/productssensor.html> - External Cable WAAS

<http://www.mobileplanet.com>

<http://www.mobileplanetcomputing.com>

<http://www.cdw.com>

<http://www.walmart.com> - Mostly Garmins a few Magellans

<http://www.gpsciv.com> - Garmins

<http://www.cabelas.com>

<http://www.navtechgps.com/supply/map76.asp>

<http://www.exploregps.com/>

<http://www.gps4fun.com>

**For more information:**

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