

Shopping for a Windows-Based Field Tablet?

Some things you should know!

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There are myriad options available when shopping for a field tablet. Choices include everything from an array of expensive ruggedized tablets to a broad array of relatively inexpensive personal tablets which can also be used in the field. Let's start with some things you should be aware of when shopping for a tablet to use in the field.

Excluding smart phones, there are basically three categories of tablets and hand-held devices being manufactured that you might consider for use in the field:

- 1) Handheld field devices based on Microsoft Windows Embedded Handheld or Windows Mobile operating systems. Examples include the Trimble Juno, certain Juniper Systems devices and so forth. These devices will not run VGS or other standard Windows applications and are excluded from this discussion.
- 2) Tablets based on "ARM" processors including iPads, Android tablets and most smart phones. Currently, VGS is not available for these devices. There are some new devices in this category designed to run standard Windows 10 applications through emulation, but they are just beginning to be market tested by the manufacturers and have not yet been tested for VGS.
- 3) Windows 7/8/10 tablets. These tablets are based on more powerful processors that support standard Windows 7, 8 or 10 operating systems and will run any software that your laptop or desktop will run such as VGS, ArcGIS and full versions of Microsoft Office applications including Access and Excel. This is the category of tablets with which we are concerned here as they offer the most flexible solution for most field needs at this time. There are several fully-rugged and semi-rugged tablets available in this category and a plethora of non-rugged machines to choose from. Most manufacturers of typical devices in this category have moved away from dedicated tablets and have focused on "2-in-1" devices which can be used like a laptop or a tablet with the keyboard and touch pad either folded out of the way or detached altogether when used in tablet mode.

"Ruggedness"

Before we get into details, let's talk a moment about "ruggedness". Tablets and laptops are marketed in basically three categories: 1) fully rugged, 2) semi-rugged - sometimes called "business rugged", and 3) non-rugged. Rugged and semi-rugged models are generally targeted at law enforcement, utility

companies, warehouse applications, hospitals and the military. These models are designed to meet minimum standards for various conditions such as temperature, dust, moisture and shock. Non-ruggedized varieties are targeted at the standard office or home user. Units from any of these categories may be used in the field, but in general you will find the following differences to consider:

“Ruggedized” models:

Pros:

- a) More resistant to damage from being dropped. I personally have dropped one out of a truck onto pavement without any issues. Of course the displays will break if dropped directly onto a rock, but many have bumped-out corners and other protections that help reduce the likelihood of a direct hit.
- b) Displays are specifically designed for use in direct sunlight (see cautions below).
- c) Components are rated for use in colder or hotter temperatures than a typical tablet or laptop. Some even have built-in heaters for use in extreme cold conditions if you have such a need.
- d) Resistant to dust and moisture. I have used these tablets in the rain without consequences. For fisheries biologists and others, there are even submersible units available.
- e) Generally have longer and more generous warranties.

Cons:

- a) Expensive!
- b) Heavier and thicker than run-of-the-mill units, though this has improved greatly in recent years.

Non-ruggedized models

Pros:

- a) Thinner and lighter.
- b) Less expensive.
- c) Longer battery life.

Cons:

- a) Generally more difficult to see the displays in the sun
- b) Many lack certain essentials discussed later – such as replaceable batteries and USB ports.
- c) Often don't include a satellite-capable GPS (usually require cell-tower signals with a broadband service subscription).
- d) Inexpensive rugged cases are available for many models, though this increases the size and weight which negates the thinner/lighter advantage. Many models do not do well with the extra heat containment by rugged cases.

Shopping Specifications

Here are things to look for or to consider when shopping for a Windows-based field tablet:

Processors

This may seem an unnecessary detail, but at a coarse level it is actually an important one to consider. VGS works adequately with any processors that run the standard Windows operating system, but if you are going to work with processing-intensive applications such as mapping and GIS software or if you want VGS to be the most responsive, you may want to avoid the slower processors. It is up to you what speed of processor you go for, but in general, the faster the processor the shorter the battery life. Again, do not get a unit with an ARM processor if you plan to use standard Windows applications including VGS.

Operating Systems

Windows 7 or Windows 10. Though VGS will run on Windows 8, I have not included it because you will want to upgrade Windows 8 machines to Windows 10 whenever possible.

Displays

There are three important considerations regarding the display:

- 1) Sunlight visibility. Models with a minimum “NIT” rating of 500 or higher work best in the field. However, only ruggedized models are typically rated this high. For non-ruggedized models, look for units rated at 400 or higher. NIT ratings are a bit like MPG ratings for cars - they are not consistent and everyone measures a bit differently. In general you may be disappointed with anything rated at less than 400-500 NITs. The higher the rating the better. It is difficult to find information on NIT ratings for non-ruggedized models, so you may need to find one you can take outside to see how it performs. In fact, my advice is always “try before you buy” even for ruggedized models! In my experience, you can’t trust the marketing material. Just because it says “sunlight” or “daylight” viewable, don’t believe it until you or someone you trust has tried it. Be aware that for the dimmer displays, you will have to turn up the screen brightness to the maximum which reduces battery life. The best displays are those that incorporate both back-lighting and “transflective” properties which use ambient light to enhance visibility, but these are few and far between – probably due to a hit on battery life.
- 2) Dual-mode screen. Tablet displays have either one or two mechanisms for input. One is touch (called capacitive displays) and the other is an “active” stylus (called digitizing displays). Touch-only computers may have a stylus also, but the stylus is not “active” which means nothing happens until you touch the screen with the stylus just the same as if you are using your finger (iPads function this way). I have found touch-only screens and styluses to be difficult to use for some aspects of data entry and especially cumbersome for mapping purposes. Therefore, my advice is that you get a “dual-mode” screen that includes both an “active” stylus (sometimes

referred to as a “digitizing” stylus or screen) and touch (preferably “multi-touch”) capabilities. Devices with both touch and active capabilities are generally not available on the least expensive devices. Some ruggedized tablet touch screens include a special ability to work with gloves which may or may not be a consideration depending on how and when you will be using the tablets.

- 3) Size and resolution. Full Windows-based devices are available with 5” displays and larger. Any size will do, as long as you can comfortably use it considering both text size and touch dexterity. For current versions of VGS, you may find you need to use the stylus on a small screen until you actually get to the data entry forms where touch is adequate. On 10” screens and up, people are using either touch or a stylus depending on their preference. A minimum screen resolution of 1064 x 768 is now required for VGS. Most newer devices have HD screens (1920 x 1080 or higher) which are great for mapping and photo applications. Most users actually prefer to use VGS at lower resolution settings in order to keep the data-entry elements larger on the screen.

Batteries

A device with a replaceable battery is ideal for field use and may be essential if you will be in the field away from charging capabilities longer than one day. Also, the expected lifetime of batteries used under the hot or cold conditions we typically expose them to in the field is reduced. Replacing an integrated battery that has gone bad is usually difficult if not impossible and removing the back of these devices will usually void the warranty.

Virtually all ruggedized tablets have replaceable batteries, but standard inexpensive tablets with a replaceable battery are far and few between. Some ruggedized models have “hot-swappable” batteries which means the main battery can be replaced without powering down the computer. Some back-country users have had success with portable solar charging systems.

Miscellaneous

- 1) USB port. Backing up data is most easily accomplished in the field via a USB port. While not a requirement, a tablet with a USB port (either standard or micro) is highly recommended. Be aware that many of the thinnest tablets do not include a USB port. There are adapters and “dual-mode” flash drives that allow you to plug into a micro USB port for backups, but the micro USB port must have OTG (“On-The-Go”) capability. If you are considering a tablet with only a micro USB port, make sure it has OTG capabilities.
- 2) Solid-state storage. Though not required, a solid-state drive (SSD) is nice primarily because it enhances battery life and is generally more reliable. Most of the non-ruggedized tablets do not have options for anything but a solid-state drive.
- 3) All other features required or beneficial for VGS (such as a speaker) are virtually standard on all tablets and so are ignored here, though some other things to consider are covered under accessories below.

Accessories

The following accessories may be considered:

- 1) Field case and harness. Protective cases are useful for their utility for carrying and working with the tablets as much as the additional protection they provide. This is especially true of the heavier ruggedized tablets for which a case you can hook to a harness is almost always required. Even the lightest tablets can become literally painful over time to carry around without a harness to relieve some of the weight, especially if you are working alone with no opportunity to sit and record with the tablet resting in your lap. For larger tablets, a hands-free 4-point harness is recommended, but even a two-point shoulder harness is helpful. For small or light-weight tablets, a hand strap that attaches to the back of the case or tablet is recommended.
- 2) Extra batteries. I always go for the longest-life batteries available, though they are usually heavier and/or bulkier than the standard batteries offered for a tablet.
- 3) External battery chargers. Get external battery chargers – one for a wall outlet and one for vehicles. Some brands offer a single charger that works for both. Some docking stations include battery charging as well. The thin, light office tablets often are charged through the USB port same as most cell phones, but charging this way in a vehicle is usually slow unless you have an inverter. Again, some backcountry users have had success with portable solar chargers.
- 4) GPS. A GPS may be useful or necessary depending on your needs. VGS supports several built-in GPS units and GPS devices connected via USB, but at this time a GPS is only for recording individual coordinates which may also be entered manually from readings taken from an external GPS. Be aware that some internal GPS units that are included with standard tablets require broadband cellular service. Consider what you will use the GPS for and the accuracy needed when deciding if a built-in GPS is necessary. Contact us for recommendations for USB or Bluetooth connected devices.
- 5) Screen protectors. I recommend using screen protectors. They can either increase or decrease reflectivity of the screen depending on the tablet and the kind of protector, so look for protectors made for use in the sun. Change them often as they easily become scratched or damaged over time which reduces visibility. Protectors may reduce touch sensitivity slightly.
- 6) Extra stylus. An extra stylus is especially important if you don't have a touch screen. It is easy to lose a stylus in the field (I prefer not to have my stylus tethered to the tablet or anything else), so have an extra handy. Get one that is comfortable to use. In general, active styluses based on the same technology are interchangeable among tablet brands (see tablet specs for the technology used). Keep a few extra tips around too as they get rough with time and will begin to scratch the screen protectors (you can also buff the tips with very fine sandpaper).
- 7) Backpack/carrying case. A backpack or other carrying case is recommended because: a) it provides a way to carry everything while hiking to a study site, and b) it keeps the computer with all of the accessories together, organized and ready to go to the field. I personally prefer a computer backpack over a regular day pack – not because the padding is needed as much as they tend to stay standing upright when you set them on the ground for easier access to the contents.
- 8) Camera. Built-in cameras are generally included on devices today, but consider the quality, focal length, light capacity and so forth of a built-in camera to make sure it truly meets your needs.

Summary

Despite the lengthy foregoing discussion, it all boils down to the following short checklist of the most critical requirements when shopping for a tablet for VGS or other Windows field applications:

- 1) Windows 7, 8 or 10 (NOT Windows RT or Windows Mobile)
- 2) Visible in direct sunlight
- 3) Digitizing/active type display and stylus preferred, but at least a multi-touch display.
- 4) Replaceable or long-life battery.
- 5) USB Port

Happy Shopping!

Information About Specific Models

Below is list of specific manufacturers and models with which we have experience. It is not exhaustive, but provides some guidance.

Ruggedized Tablets

- Panasonic
 - FZ-G1 (Recommended)
 - Get the extended battery and the hand strap/harness attachment
 - Get dual-mode display
 - CF-20 (Recommended)
 - Pay attention to battery options
 - Get dual-mode display
 - Get hand strap/harness attachment
 - FZ-M1 (Please provide feedback)
 - Smaller than FZ-G1, but otherwise similar
 - CF-19
 - Thick and heavy, but later models have great displays.
 - Still included here because you can get refurbished units for a good price

- XPlore Technologies / Motion Computing
 - Bobcat (Recommended by users)
 - XSlate Series (Please provide feedback)
 - XC6 Series - The current version of the long-available iX104C series
 - No longer recommend because there are lighter, thinner options now available, but a cheap used one would still be a viable option.

- Dell
 - Latitude 12 Rugged (Not-recommended)
 - Priced similar to the Panasonic FZ-G1 but heavier and not as responsive

- Getac
 - Several models
 - Ok, but we like the Panasonics better
 - Please provide feedback

- Juniper Systems
 - Mesa 2
 - Well-built compact unit. Display is a 7" size, so consider personal dexterity and vision before purchasing.
 - Display is multi-touch, but does not include active digitizing stylus capability.
 - Contains an "Atom" processor which we found to be quite sluggish depending on what we were doing.

- Trimble
 - Kenai (please provide feedback)
 - Yuma 2
 - The original Yuma tablet was not recommended, but this version appears to be suitable. We suggest that the Kenai would likely be a better choice among the Trimble offerings, though we have no personal experience with either.

Non-Ruggedized Tablets

There are many brands and models available – the best advice is “try before you buy”. Be aware of the following:

- Visibility in the sun is highly variable.
- Most do not have replaceable batteries.
- Few support a digitizing stylus.
- If only a micro USB port is provided, make sure it is OTG capable.

Please provide feedback for any models that you try out or end up using so we can pass on the information here. Some recent models with which we have experience include:

- Microsoft
 - Surface Pro (suitable)
- Samsung
 - Galaxy Book (10.6” or 12”) (suitable)
 - Nice digitizing stylus capable with Samsung S Pen
- Dell
 - No longer provide non-rugged dedicated tablets.
 - Please provide feedback on 2-in-1 models
- Others
 - Please provide feedback