GETAC PS535F

GPS, ALTIMETER, E-COMPASS, CAMERA, HI-RES DISPLAY MAKE THIS FULLY RUGGED WINDOWS MOBILE PDA PERFECT FOR ALL SORTS OF GPS, GIS, SURVEYING, AND RESCUE APPLICATIONS

By Conrad H. Blickenstorfer

In March of 2009, Getac announced the latest addition to its comprehensive line of rugged mobile computing solutions. The Getac PS535F handheld computer is the company's next generation, fully rugged GPS-enabled PDA. It is a significant technology upgrade to their older PS535E model that we had at our office for a long-term test. It's an attractive handheld with good industrial design as well as excellent ergonomics and adherence to Getac's corporate design language.

The Getac PS535F — Hardware

The PS535 platform is a fully rugged PDA based on the Windows Mobile platform. It was conceived to bring general purpose PDA functionality to field-based applications, with special emphasis on GPS/GIS applications. With a footprint of just 3.2 x 5.7 inches and a thickness of just over an inch, the device is small and handy enough to fit into most pockets. Weight is 10.7 ounces, including battery. What sets it apart from most rugged Pocket PC-style devices is its integrated high-sensitivity GPS receiver and a full 2GB of NAND Flash.

The new version adds significant power and functionality to the PS535 platform. Perhaps most importantly, the 3.5" touchscreen display has been upgraded to full VGA 480 x 640 pixel resolution. That translates into 228dpi (dots per inch), considerably sharper even than the Apple iPhone's 162dpi. Combined with sunlight-readable display technology, the much higher resolution dramatically enhances the viewing quality of graphic-intensive files and detailed maps, even in bright daylight or snow.

The new model also includes a built-in 3-megapixel auto-focus camera, an altimeter and an E-compass. These new features are meant to let field-based users capture a much richer, expanded range of field data on-site. Combined with the PS535F's pinpoint DGPS navigation accuracy of three to 10 feet, this rugged Getac handheld offers plenty of location-based systems functionality, which is critical with applications such as search-

and-rescue missions and similar deployments.

The PS535F is also well suited for a variety of GIS surveying applications across different sectors including utilities, oil and gas, forest patrol, and surveying and mapping of geology and mineral resources. The built-in camera enables instant visual data capture on location and its resolution and quality are high enough so that taking a separate camera along is not necessary. A Getac Bluetooth modem or mobile phone can be used to connect the PS535F to a GIS server and instantly transmit or process data in the field.

The built-in altimeter and E-compass complement GPS functionality by providing advanced navigation features such as fixed positioning of longitude, latitude and altitude, as well as the ability to provide directional relations between a target subject and the user's position. There are a lot of tools built into this unit that make new applications possible, including many that in the past required multiple devices or were not available in the field.

The Getac PS535F is powered not by one of the ubiquitous Marvell PXA XScale processors, but by the 533MHz version of Samsung's S3C2450 application processor. This is a 32/16-bit 65nm low power RISC microprocessor that was designed for general applications, including the GPS/GIS and smart-phone markets. Compared to the earlier S3C2443 chip, the 2450 was upgraded to the ARM926EJ core, has a 2D graphics accelerator, a low power mode, and embedded internal ROM/RAM for secure boot and low power audio decoding. The chip also includes an advanced camera interface, USB 2.0 capability, and SDHC and HS-SPI port support.

Software: Windows Mobile

The Getac PS535F comes with Windows Mobile 6.1. Theis is a mature version of Windows Mobile that offer instant messaging, browsing, email, easy wireless setup, enhanced security, and a nicely organized Home screen. Anyone who has ever used Windows Mobile will instantly be familiar with its functionality and the mobile versions of the major Microsoft Office apps—Word, Excel, Powerpoint, Outlook, Internet Explorer. Operations is via stylus, touch, a five-way navigation stick, and four hardware application buttons.

As with the PS236, Getac choose Windows Mobile instead of the more industrial Windows CE.
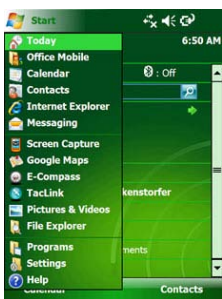
These days, Microsoft differentiates between Windows Embedded CE and Windows Mobile, where the scalable 32-bit Windows Embedded CE OS is primarily used in industrial devices whereas Windows Mobile, which is also based on Windows Embedded CE, has a more consumer-oriented look and feel. For a device like the Getac PS535F, the decision was likely a toss-up, and Getac felt that the target customers for this device would prefer the friendlier Windows Mobile platform with its wealth of general purpose apps as opposed to the sparser Windows CE platform where customers generally create their own applications.

Connectivity

For onboard connectivity there is a microphone/headphone jack, a mini-B USB port, a power jack, and a SD Card slot that is sealed with a screw-down cover. The mini-B USB port and the power jack are at the bottom of the device, hidden beneath a thick protective rubber plug.

On the wireless side, the PS535F comes with 802.11b/g WiFi and Bluetooth V2.0 with EDR (Enhanced Data Rate). Getac also offers an optional Bluetooth EDGE WWAN radio modem for high-speed data transfer when away from local wireless networks and hotspots. Since the PS535F was not designed to be a phone as well, there is no SIM slot.

Integrated 3-megapixel Camera

Like almost all cellphones, netbooks, and a increasing number of handhelds, the Getac PS535F has an integrated camera. It offers 3-megapixel resolution, which is as much as dedicated digital cameras had just a few years ago. You can pick from five white balance settings, do exposure compensation, shoot in burst mode or time delay, and record at six different resolutions ranging from a maximum of 2048 x 1536 pixels all the way down to 160 x 120 pixel. You can then view pictures, directly send them via email, beam them via Bluetooth, or assign them to a contact. The camera also seems to be able to do video. All of this is done via the standard Windows Mobile Pictures & Videos app.

An integrated camera come in handy for documenting projects in various ways. Custom apps can access the camera and do interesting things like geotagging. The 3-megapixel resolution is certainly high enough. And while integrated cameras do not have a reputation for high quality pictures, the one in the Getac PS535F does quite well (but it must be understood that in terms of quality the integrated camera cannot replace a dedicated camera).

Controls and Input

The Getac PS535F is configured as a traditional Pocket PC/PDA, which means you interact with it via touch screen and not via a keyboard or keypad. Hardware controls are minimal. There is a recessed five-way navigation stick flanked by two push

button areas to the left and right of it. On the left are Start Menu and Contacts, on the right Power and GPS applications. The three program buttons are customizable although they carry imprinted labels with their default functions. There are no other hardware controls.

Above the display are two indicator lights. The one to the left glows blue when wireless is on. The one to the right is a multifunction light that indicates battery status (green = full, red = low, amber = charging) and notifications (flashing).

For audio, there is a microphone below the navigation stick, a speaker in the back, and a headphone connector on the left.

Operation is generally via stylus, with the supplied collapsible stylus extending to 4-1/2 inches and fitting into a slot on the upper right. Touch works, but the interface is designed for a stylus.

For data entry, Windows Mobile offers a wealth of options. There is a pop-up keyboard as well as three different ways of recognizing text. They are:

■ **Block Recognizer**, which uses the special Graffiti alphabet Palm invented in the 1990s. The idea here is that almost all letters are "unistrokes," or consisting of a single uninterrupted stroke, which makes them easy to recognize for the computer. The slightly abstracted alphabet is quite easy to learn. Millions used it on Palm Pilots.

■ **Letter Recognizer**, which also recognizes individual letters instead of whole words, but uses the standard alphabet instead of the slightly modified one of the Block Recognizer. And whereas the Block Recognizer lets you shift case, the Letter Recognizer, which goes back to the "Jot" product by Communication Intelligence Corporation, has different data entry boxes for upper and lower case and numerals.

■ **Transcriber,** a full-function handwriting recognition system that also goes way back almost to the beginning of PDAs more than 15 years ago. Microsoft bought the rights to it a number of years ago and it's been part of Windows Mobile ever since.

Any of those input methods, once mastered, work very well. At the bottom of the page you can see screenshots of the onscreen keyboard, the Block Recognizer, and Transcriber.

Cordless 1D barcode and RFID readers are options for additional data capture capabilities.

GPS and Mapping
The GETAC PS535F has a 20-channel L1 C/A-code GPS receiver based on the SiRFstarIII GPS micro-

controller chipset. "L1" means it's using the 1575.42 MHz satellite frequency in coarse-acquisition mode. By using differential GPS technology (DGPS) to correct for unavoidable GPS errors, the device can get horizontal accuracy of three to ten feet. That is enough for most mapping and GPS applications.

The PS535F includes a separate altimeter, is able to determine pitch and roll, and can also detect barometric pressure. There is an e-Compass that displays direction as well as altitude, barometer reading, pitch/roll in degrees, and Azimuth Angle. The e-Compass can be set so that either the needle or the wheel rotates, and altitude can be set to GPS or the built-in altimeter.

The pictures below show the supplied TacLink utility that displays pertinent satellite data on the left, and two screens from Google Maps, a freebie download directly from the web to the PS535F device. Google Maps uses the integrated GPS and can show both maps and satellite images. You can locate yourself on the map, and—not surprisingly—the accuracy is stunning. As I walked around a building, the Getac handheld showed me *exactly* where I was (and by *exactly* I mean just that; not just in the general vicinity).

Power
In the field, battery life is always an issue, especially when the next charger is miles away. GETAC rates the PS535F's 3.7 Volt/2,400mAH Li-Ion powerpack as good for operating the device at full capacity for up to eight hours—a full shift—on a fully-charged battery. The long battery life is good as you can't simply pop a spare into the unit; the battery sits under a cover that is secured by four small Philips screws. The battery itself is a proprietary unit with a thin wire cable and a little plug as opposed to the surface contacts of most batteries.

Backlight intensity, backlight shut-off and device shutoff can all be used to optimize battery life. Since Windows Mobile devices are instant-on, it's generally good practice to have the device quickly go to sleep when it is not used. This can greatly extend battery life, though it can also be annoying to have to wake it up all the time.

Ruggedness
The PS535F is a rugged device and has been tested according to MIL-STD 810F procedures in all relevant areas. It also carries an IP54 ingress protection rating and was generally designed to operate without failure under the most extreme weather conditions, environments and everyday abuse associated with its user base. Specifically, the device is fully dust-proof and is protected from water spray from all directions. It can survive 5-foot drops onto all faces and corners onto steel, has a very wide

operating temperature range of -4 to 140 degrees Fahrenheit, and also passes the "tumble test" that calls for 1,000 1.6 foot tumble cycles.

In May of 2010, Getac announced that the PS535's ingress protection rating had been boosted to IP65. That means the device is now totally protected against dust, and can handle low pressure water jets (and not just spray) from all directions.

Summary
The Getac PS535F is a rugged handheld computer that offers a well-balanced combination of Pocket PC convenience and targeted professional features. It is running Windows Mobile 6.1, which means it comes with Office Mobile (Word, Excel, Power-Point), Internet Explorer, email, messaging, calendar, tasks, contacts and all the other goodies most of us have come to rely on. It also has Windows Live, the Windows Media player and a good complement of utilities and security features.

However, this handheld offers far more than just standard PDA functionality. For one thing, it's rugged enough to survive rain, dust, drops and all sorts of abuse. It also has a 3-megapixel camera, a very accurate GPS receiver, an electronic compass, and an altimeter. Add to that a super-sharp 3.5-inch touch display with full 480 x 640 pixel resolution, and you have a device that is ideal for all sorts of GPS, GIS and mapping applications.

As for its intended use and application, GETAC president Jim Rimay said, "*Our customers typically work in high-intensity environments and situations, which demand seamless and accurate information exchange between the main office and field workers. The PS535F is the ideal solution for any field application that requires immediate response and action such as fire and rescue teams, utilities technicians, and Park Rangers. A great example is forest patrols reporting the location and fire hazard conditions to a fire center to assist fire rescue planning. Ultimately, GETAC's PS535F handheld device improves overall operational efficiencies and productivity, which for firefighters can be a lifesaving feature.*".

—*Conrad H. Blickenstorfer, EIC RuggedPCReview*

GETAC PS535F Specs

Type: Rugged handheld terminal
Housing: ABS plastic with rubberized bumper areas
Processor: 533MHz Samsung S3C2450
OS: Windows Mobile 6.1
RAM/ROM: 128MB/2GB NAND FLASH
Slots: 1 SD/SDHC Card, sealed but externally accessible
Display: 3.5" transflective TFT with VGA (480 x 640 pixel) resolution and LED backlight
Digitizer: Resistive touch screen/1 telescopic stylus
Keyboard: Onscreen
GPS: SiRFstarIII; 5 meter accuracy autonomous, 1-3 meters SBAS (WAAS/ENGOS/MSAS); post process: sub-meter
Size: 3.2 x 5.7 x 1.2 inches
Ruggedness: -4 to 140F; IP65 sealing; shock: 26 drops from 5 ft; vibration/humidity per MIL-STD 810F; tumble: 1,000 1.6 ft./.5 m tumbles (2,000 drops)
Weight: 10.7 oz. as tested, with battery
Power: 3.7 V/2,400mAH Li-Ion "8-hour battery life"
Communication: SiRF Star III, 802.11b/g WiFi, Bluetooth V2.0 + EDR, 3.0-megapixel camera, altimeter, compass; optional cordless 1D Barcode Reader, cordless RFID reader, BT EDGE WWAN modem
Interface: USB 1.1, microphone, line-out, MMCX GPS antenna connector, power
Price: Starting at US$1,099
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