HANDHELD Algiz 7

LIGHTER AND SMALLER, THIS ULTRA-RUGGED INTEL ATOM-POWERED TABLET IS JUST RIGHT FOR MANY TOUGH JOBS IN THE FIELD (AND ELSEWHERE)

by Conrad H. Blickenstorfer

Intel's Atom processors have made possible a new generation of smaller, lighter and less expensive "netbook" computers that provide adequate performance and functionality for a wide range of applications. Likewise, we're now seeing a new generation of smaller, lighter tablet computers that use similarly targeted technology for vertical market applications. The Algiz 7 by the Handheld Group is such a product—lighter, handier and smaller than full-size tablets. This review is a detailed assessment of the Algiz 7, its features and performance, and its suitability for tough outdoors jobs.

The Algiz 7 is in many ways a rugged tablet version of a netbook. Like netbooks, it's a full Windows computer that can do everything Windows PCs can do, so there aren't any hardware or software compatibility issues. And like consumer netbooks, this Algiz tablet runs Windows 7 with surprising ease and is perfectly suited for many jobs, as long as you allow for the much smaller screen and the, compared to a Core processor, inherently more limited performance level of an Atom-based system.

How small is the Algiz 7? That'd be 9.1 x 5.5 x 1.6 inches (242 x 144 x 40 mm), which means the footprint is smaller than that of even a very compact netbook. And the Algiz 7 weighs just 2.5 pounds (1,1 kg), about half of what a standard size rugged tablet computer weighs. The smaller size and weight can make a big difference in the field where the last thing you need is another hefty piece of equipment. That said, while the Algiz 7 weighs no more than a netbook, it is considerably more rugged and built to handle the kind of abuse expected in the field. It won't mind getting dropped, bopped around a bit, or getting rained on.

The Algiz 7 is built around the efficient 1.6GHz Intel Atom Z530 processor, 2GB of RAM, and a 64GB solid state disk. Despite its small size, the Algiz 7 is a well-connected machine. You get two standard USB 2.0 ports, a serial port for legacy peripherals, an RJ45 LAN

port, audio in and out jacks, a camera, and a multi-IO port for the optional cradle. Of the unit's four PCIe slots, one or more are available for expansion, and there are two SIM card slots. The outdoor-viewable display with its resistive touch screen measures just 7 inches diagonally, but has the same 1024 x 600 pixel resolution used in tens of millions of netbooks.

For communication, there is integrated Bluetooth Class II, Version 2.0 with EDR and 802.11b/g/n WiFi. There is also a GPS receiver and you can get a Gobi 2000 WWAN module for wireless data access around the globe.

The Algiz 7 is operated via touch; a five-way navigation diamond; a multi-function key that controls brightness, volume and wireless; and three programmable function keys. The unit comes with a 5-inch (12,5 cm) tethered stylus that doubles as a screwdriver and has a secure garage on the backside of the computer.

First impressions

As the most recent of Handheld's tablets, the Algiz 7 not only had some tough acts to follow, but also had to sufficiently differentiate itself as a separate product with separate strengths and minimal overlap. It further had to live up to the "ultra-rugged" label—not an easy thing for a netbook-size tablet weighing all of 2.5 pounds.

When I unpacked the Algiz 7, my first impression neat and modern it looked. That's not a given. Low production volume often gives rugged computers a still-under-construction appearance. Not the Algiz 7. It looks and feels like a professionally designed and executed commercial product without rough edges and unfinished spots. Everything seems and fits just right, and that includes its size. Downsized machines often look toy-like or too small for use in the field. That's not the case here.

Turn the Algiz 7 on and there are more pleasant surprises. Without fan and hard disk, the tablet operates in complete silence. The display is very sharp and bright. Icons and text are easily readable. And the Algiz 7 feels quick. The membrane hardware controls along the right side of the display are perhaps a bit haphazardly placed, but they are large enough and easy to comprehend. The beige-gray plastic housing feels remarkably sturdy, and it's easy to hold and operate the tablet.

I didn't particularly care for the hard and unwieldy protective plastic/rubber plugs that cover the four port cutouts on the left and right side of the computer (especially after praising the soft and grippy ones on the Algiz 10). Also, you need to memorize the location of the ports as there are no label or icons on the plugs.

Turn the machine around and you find two Li-Polymer batteries neatly integrated into the design. They snap into place, making it very easy to replace one in the field.

So the first impressions are good. The Algiz 7 seems like a 7/8th-scale version of a full tablet, but this is no gadget or technology demonstration. It's also not simply a down-sized Algiz 8. Instead, it is a different class of machine, one made possible by the Atom chip and the wide acceptance of netbook computers, which also are not downsized notebooks, but a smaller, lighter platform that addresses different needs.

The picture below shows one of several Algiz 7 tablets mounted throughout the ship on a cruise through Stockholm's waterways that took place during Handheld's 2010 Partners Conference. The GPS-equipped Algiz 7s showed the current position of the M/S Riddarholmen as well as other pertinent data.

The hardware

Below you can see what the Algiz 7 looks like from the front and from all four sides. Note that the plastic/rubber plugs are attached to the computer with small Philips screws so that they can easily be replaced should they ever break or rip off. The very sturdy corner bumpers, on the other hand, are part of the housing, attached during an injection molding process.

Going around the unit:

■ On the bottom is a surface-mount cradle contact, and the snap-in garage for the tethered stylus. Note that the metal loops for a carry handle can be screwed on for either a portrait or a landscape handle.

■ Underneath the left protective plugs are a standard USB port and a DB9 serial port.

■ On the right side, underneath one plug you find the power jack and a second USB port, underneath the other a RJ45 LAN jack and separate speaker and microphone jacks.

■ The top of the unit is devoid of ports (inside, this is where antennas and the GPS are).

■ The front side has—in addition to the screen, navigation diamond and button controls—the microphone on the left, a speaker in the bottom right corner, and five indicator lights for power, battery status of each of the two batteries, disk activity and wireless radio status. They are small and easy to see, without being too bright.

Below you can see the Hot TAB software utility that's used to quickly call up the on-screen keyboard or perform a screen rotation (in 90 degree increments), and also to assign functions, utilities or apps to the three function buttons. Each button can perform two functions via short or long push.

A look inside

The Algiz 7 consists of two plastic halves held together by eight sturdy Philips screws. The seal between the two halves is a tongue-and-groove affair with a black rubber seal affixed to the front half. A 7.9 x 4.6 inch (20 x 12 cm) motherboard is secured to the front half as well.

Our eval machine used one of its four Mini-PCIe slots for a Gobi 2000 card with antenna. The card sits on top of a Gobi SIM card slot, so the unit can be used with voice/data networks.

A second Mini-PCIe slot was empty. It can be used for alternate comms technologies, such as Wimax. The Algiz 7, does, in fact, come with two antennas, supporting both space diversity technology and the 2.5 to 3.5GHz range.

A third one was used by a 64GB embedded PATA SSD module. These modules look like regular SODIMM memory, only with a Mini-PCIe connector. They support up to Ultra DMA mode 5, with a cycle time of 40 nanoseconds and a maximum transfer rate of 100 MB/second. The module itself is rated 50MB/second read and 40MB/second write.

Underneath the SSD module sits a second SIM slot, this one labeled "IPWireless-SIM."

The fourth and final Mini-PCIe slot is used for a 802.11b/g/n wireless card that supports theoretical data rates of up to 150 Mbps, and in the Algiz 7 uses both antennas.

A single SO-DIMM slot is populated by a 2GB PC2-5300 SODIMM module. It sits on foam rubber or neoprene and is glued in place.

The motherboard also hosts a FV-W9 GPS module made by San Jose Technology.

I/O is concentrated on either side of the motherboard. On one side, the connectors are soldered onto the motherboard. On the other they are on a separate daughterboard that contained a USB port and a DB-9 serial port. This design lends itself to easy customization, i.e. the Algiz could easily be configured with different daughterboards. The connectors on the daughterboard are sealed and form a second barrier should the primary barrier (the rubber/plastic plugs) be left open or leaking.

The same is not true for the connectors on the other side; they have no sealing and water and dust could enter into the interior of the Algiz 7 if a protective door is left open.

Overall, the board is neatly laid-out, well-labeled, with only the numerous antenna wires perhaps a bit disorganized (they are held in place with a drop of silicon glue).

The Atom CPU and chipset are mounted on the other side of the motherboard, facing the LCD case where either the board's metal frame or the LCD case serve as heat sinks.

The two 7.4 Volt/2,600mAH Li-Polymer batteries provide 19.24 watt hours each, for a total of 38.5 watts—quite a bit for an Atom-powered system. The battery connector openings are not sealed to the inside, making a potential leak. There is a rubber/plastic frame around the opening that acts as a rudimentary seal, pressing against the bottom of the battery. The two batteries are integrated into the design and also act as feet with their thick rubber inserts. They reliably snap into place and lock via a key latch. They are a bit of a fingernail buster to open and remove. Between the two batteries is an open space that is used as a service hatch, or also for customer add-ons.

Performance

Since it is the Intel Atom chip that makes small, fanless machines such as the Algiz 7 possible, a few words about Intel's low power processors.

Depending on how you look at it, Atoms are either an big success or a disappointment. The former because Atoms deliver decent performance at a fraction of the cost and power draw of an Intel Core processor, and that's been good enough to sell millions of netbooks. The latter because Atoms have definite performance ceilings and there are areas where they aren't very good (like high-def graphics). After initial reluctance to embrace Atoms, the chip's good qualities have now led almost everyone in the rugged industry to offer Atom-based solutions. That's in part due to the Atom's merits and in part to Intel moving the Core processors up-market. So the choice between offering customers an aging mobile processor, or a new Atom is easy. And Handheld correctly called it.

Now the next question is what kind of Atom processor. By now there are no fewer than six families of Atoms to pick from. By far the lion's share is the N270/N450 chip that powers the first generations of netbooks and which also does duty in many industrial systems and computer modules. The Z530, a member of the lesser known Z5xx Atoms, has become quite popular in industrial and vertical market systems, and that's the chip Handheld chose for the Algiz 7. This processor runs at 1.6GHz and uses about the same amount of power as the N270. Combined with the "Poulsbo" chipset, it makes for a very power efficient solution.

To provide an idea of the relative performance of Handheld's three Algiz tablets, we used Passmark Software's PerformanceTest 6.1 that runs about 30 tests covering CPU, 2D graphics, 3D graphics, memory, and disk and then computes scores for each category and an overall PassMark score. We also ran a second benchmark suite, CrystalMark 2004R3, for a second opinion. Note that the Algiz 8 uses a processor from the same Atom family as that in the Algiz 7, though the Z510 only runs at 1.1GHz. The Algiz 10, on the other hand, uses a popular older 1.2GHz Core Duo chip found in several leading tablets. Here are the results:

PERFORMANCE	Algiz 7	Algiz 8	Algiz 10
CPU: Intel	Atom Z530	Atom Z510	C2D U2500
CPU Clock Speed	1.60 GHz	1.10 GHz	1.20 GHz
Thermal Design Power	2.3 watts	2.2 watts	10.0 watts
CPU Mark	217.8	107.8	545.0
2D Graphics Mark	56.7	92.3	125.5
Memory Mark	208.7	128.6	202.4
Disk Mark	175.6	245.7	370.9
3D Graphics Mark	17.7	14.5	96.2
Overall PassMark	**141.6**	**116.1**	**435.2**
ALU	5050	2401	9369
FPU	3629	2318	11199
MEM	4143	1449	6181
HDD	6804	4295	5872
GDI	1866	1653	3612
D2D	976	711	3903
OGL	326	210	1070
Overall CrystalMark	**22794**	**13037**	**41206**

As expected, the 1.6GHz Z530 chip in the Algiz 7 is much quicker than the 1.1GHz version used in the original Algiz 8, but performance cannot match that of the Core processor in the Algiz 10, though that chip only runs at 1.2GHz. Note that benchmarks often yield inexplicable results, especially when compared across processor families. Overall results, however, usually correspond with subjective performance and give a good idea of where a product fits in. And that's the case here. As reviewers, we're always looking for features that differentiate a product and give it an edge, and so it would have been nice to see Handheld make some of the faster versions of the Atom Z5xx processors available at least as an option.

Also note that operating systems can make a big difference. Very modest hardware can be quick and responsive with a lean embedded operating system whereas more powerful hardware can struggle with a full-blown OS. Windows 7 is remarkably well suited for low-power hardware, and as a result, the Algiz 7 for the most part feels quick and responsive.

Battery and battery life

In addition to lower cost and complexity, a primary reasons for choosing an Atom processor is its low power draw. However, processor and chipset are only part of the package, and overall power draw depends not only on the power efficiency of components, but also on settings, workload, and proper implementation of overall system power conservation measures.

As is, the Algiz 7 packs a lot of battery power for a small tablet device in this class. Equipped with two fully charged Li-Polymer batteries, the Algiz 7 has almost 40 watt-hours, about as much as many standard notebook computers.

Our battery benchmark software, Passmark's BatteryMon, reported a battery capacity of 56 watt-hours, considerably more than the 39 watt-hours officially specified. For our Battery-Mon testing, we set the screen at low brightness and turned wireless off. That way, idle power draw was about 8.5 watts, and Battery-Mon indicated a projected battery life of about six and a half hours, pretty much in line with Handheld's estimate of a minimum of six hours. With all radios on and screen brightness up, power consumption jumped to about 11 watts. These benchmark values are decent, but not quite as good as we expected.

Do note that both the Atom processor and Windows 7 have extensive power conservation systems. With systems now going to sleep and almost instantly waking up, a battery charge can last a whole lot longer than you'd expect based on just benchmarks.

Display

When it comes to display quality, most computer screens look good indoors. That's because indoors, the average LCD backlight is plenty strong enough to handle ambient light, and there are fewer reflections and contrasts than outdoors. The situation is different out-

doors where even a strong backlight is no match for the sun, where reflections are the norm, and where ambient light mercilessly exposes display weaknesses. As a result, good outdoor display performance is mandatory for any mobile system that will be used outdoors most of the time or even part of the time. How well does the Algiz 7 display outdoors?

The basic requirement for a good outdoor-viewable display is that the screen can be comfortably and reliably viewed under virtually all lighting conditions. In the pictures below, we're showing the Algiz 7 in comparison to a popular netbook (an Acer Aspire One) that's expected to perform well under *most* lighting conditions but is optimized for indoors, whereas the Algiz 7 needs to do well under *all* conditions.

The first image below shows the two systems outdoors in the shade on a bright and sunny afternoon. The specs do not provide the brightness of the Algiz 7 backlight, but it's significantly brighter than that of the also bright Acer netbook. Both systems are perfectly viewable.

In the second picture, the computers are in a partially shady outdoor setting with contrasts and reflections. The glossy display and bezel of the netbook begin showing distracting reflections that make the display difficult to view. The optical anti-glare and anti-reflection treatment of the Algiz 7 are immune to reflection here and the display remains perfectly readable.

The next picture shows another typical outdoor situation, using the computer in a shaded area and looking at it from an angle. In this situation, the display must both control reflections and remain readable from wide horizontal viewing angles. Here, the glossy netbook display turns mirrorlike, rendering it useless. The Algiz 7 almost completely eliminates reflections and remains readable.

Note a slight degradation of the Algiz 7 display here as the anti-glare treatment makes the screen appear slightly milky while, however, preserving viewability and readability.

The next image shows the second worst

scenario, having the display facing the sun without directly reflecting it (the worst case scenario is having the sun reflected directly). No currently available display technology provides good viewability under these conditions, but displays that internally reflect as little ambient light as possible will still be able to provide a bit of contrast. Acer actually did a good job here, but the display is marred again by the glossy surface and bezel. The Algiz 7's display remains solid and somewhat readable.

Realize that computer displays remain an evolving technology. The Algiz 7 "Maxview" display does a remarkable job with being readable under virtually all viewing conditions. It's also almost immune to smudges and fingerprints, and its very wide horizontal viewing angle makes the display a pleasure to use. The vertical viewing angle, though, is not as good and has the chromatic aberrations still typical for many LCDs as you rotate the unit.

Handheld Algiz 7 Specs

Type: Ultra-rugged tablet computer

Housing: Plastic, metal chassis, rubber bumpers

Processor: 1.6GHz Intel Atom Z530 w/ 533MHz frontside bus and 512KB L2 cache

OS: Microsoft Windows 7 Ultimate

Memory: 2GB PC2-5300 in 1 SODIMM slot

Expansion slots: None externally accessible, 1-3 free internal Mini-PCIe (depending on configuration)

Display: 7-inch/1024 x 600 pixel sunlight-readable TFT

Digitizer: Resistive touchscreen

Keyboard: Onscreen keyboard + optional external

Size and weight: 9.1" x 5.5" x 1.6" / 242 x 144 x 40 mm (with rubber bumpers); 2.56 lbs. / 1,15 kg as tested (two batteries)

Ingress protection: IP65

Operating temperature: -9° to 122° Fahrenheit (MIL-STD 810G, Method 501.4, Procedure II)

Humidity: MIL-STD-810F, Method 507.4 Procedures I&II

Drop: 26 4-feet drops to concrete per MIL-STD-810G Method 516.5, Procedure IV

Vibration: MIL-STD-810G, Method 514.5 Procedures I & II, General minimum integrity and the more rigorous loose cargo test

Power: Hot-swappable dual Li-Polymer batteries 7.4V/ 2,400mAh/19.24 watt-hours each ("minimum 6 hours")

Camera: 2-mp camera with LED illuminator

Wireless: 802.11b/g/n, Bluetooth v2.0 + EDR, integrated GPS, optional WWAN Gobi 2000

Interface: 2 USB 2.0, DB9 RS-232, RJ45, audio in/out, docking connector, 1 speaker

Price: US$2,699 (WWAN model US$2,949)

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Ruggedness

Handheld calls the Algiz 7 an ultra-rugged device tough enough to work in the most challenging environments. According to its specs, the Algiz 7 can handle a very wide operating temperature range from -9 to 122 degrees Fahrenheit, meaning the device can be used in most environments where someone would be expected to work with a computer. It carries IP65 sealing where the "6" means the Algiz is totally protected from dust, and the "5" that it is protected against low pressure jets of water from all directions. Not having a hard disk helps the Algiz 7 pass the MIL-STD-810G test of 26 drops from a height of four feet to concrete, which is about the height it may fall while being used in a standing position. Here, the Algiz 7's very low weight and the protective bumpers provide excellent shock resistance.

IP65 is good sealing, but it's not IP67 (which would mean protection even against immersion into water), and so we are a bit concerned about potential leaks to the interior should the hard plastic plugs not be seated properly.

Vibration resistance was tested as described in MIL-STD-810G, Method 514.5 (probably meant 514.6) Procedures I & II, for general vibration in a fixed mounting and a loose cargo test, but there is no detailed description.

The Algiz 7 can handle operating altitudes up to 15,000 feet, and was tested according to MIL-STD-810G, Method 507.4 for humidity.

While some customers will probably want to see actual lab reports with more specific detail, the overall impression of the Algiz 7 is that it's indeed a very rugged device that will likely be able to handle a good deal of abuse.

Digitizer

For the past two decades, vertical market tablets either had resistive or electromagnetic digitizers, and sometimes a combination of both. Nothing else was available or expected. That changed when the Apple introduced multi-touch and effortless panning, dragging, rotating and zooming on iPhones and iPads with capacitive touchscreens. As a result, some tablets and convertibles are now available with multi-touch, though so far few such systems come close to what Apple offers. Also, capacitive touchscreens cannot handle gloves, and gloves are often used/required in the field.

As a result, for now the Algiz 7 comes with a conventional resistive touch screen that can be fine-tuned and configured with a set of very good utilities. You can do very precise 25-point calibration. You can set the width and height of the area that responds to touch, optimizing it for touch with a finger or with a stylus. That can make a big difference in custom applications. You can also set what part of the screen respond to touch (top, bottom, left half, right half, quarters, or custom areas). This may come in very handy for custom applications. You can configure the system to issue a beep when you touch down or terminate the touch, or both. You can even set the frequency of the tone and the duration. This may not seem important,

but it can be, depending on the application.

The touch screen itself is quick and accurate, but electronic ink doesn't go on smoothly, making it not as easy to draw, doodle and sketch as it should be, which is important in applications such as Windows Journal or handwriting recognition via the Microsoft Tablet PC Input Panel. Handheld says this would be addressed by switching from a serial to a USB digitizer interface.

We miss an active digitizer or a dual input system option for the Algiz 7, or even capacitive multi-touch, and hope Handheld—a company always eager to offer the latest technologies—will make them available at some point. As is, touch with a stylus (and also finger) works well, but this is strictly a resistive digitizer with all its pros and cons.

Summary

The Handheld Algiz 7 offers netbook size, performance and functionality in a device that weighs only about half as much as a standard tablet computer. This computer can go places where larger systems just aren't practical.

Based on an Intel Atom Z530 processor, the fanless and silent Algiz 7 has enough performance for many tasks, and feels quick and responsive in everyday use. Thanks to Atom and Windows 7 power management, the dual batteries can provide as much as six hours of operation between charges, or more.

The outdoor-viewable 7-inch resistive touch screen display is large enough for real work and offers netbook-class 1024 x 600 pixel resolution. The screen is bright and crisp, resistant to smudges and fingerprints, and controls glare and reflections well. We'd like to see a wider vertical viewing angle and a dual-input option, either resistive/electromagnetic, or electromagnetic/capacitive.

A sturdy, well designed plastic housing, excellent interior design and layout, and tough bumpers provide ruggedness and good protection (as long as all plugs are in place). The Algiz 7 offers good onboard connectivity, has WiFi, Bluetooth and GPS, and can be ordered with Gobi 2000 wireless technology.

Overall, the Algiz 7 provides full Windows 7 computing power, a reasonably large display with WSVGA resolution, good onboard connectivity, ruggedness, and long battery life in a very compact package.

— *Conrad H. Blickenstorfer*