HANDHELD Algiz XRW

A SUPREMELY COMPETENT MOBILE COMPUTER FOR ANYONE WHO'S BEEN WAITING FOR A RUGGED NETBOOK WITH FULL FUNCTIONALITY AND AN EXCELLENT DAYLIGHT-VIEWABLE DISPLAY

by Conrad H. Blickenstorfer, August 2011

When the Handheld Group introduced the Algiz XRW in late 2010, they called it a "fully rugged laptop" that features "cutting-edge technology and communication possibilities in an ultra-mobile form factor, at best value available on the market." We call it a rugged netbook. Yes, what Handheld offers with the Algiz XRW is something a lot of folks in the field have been waiting for—a fully ruggedized version of those handy little notebooks that fit anywhere and that have been selling in the tens of millions, and still do, tablets notwithstanding. In this article we're taking a detailed look at this tough little machine.

Ever since I saw a prototype of the Algiz XRW (which stands for "Xtreme Road Warrior") at the Handheld Group's 2010 Partner Conference in Stockholm I liked the look and feel of this elegant device that neatly fits into Handheld's emerging design language of light-gray/black colors and fully integrated protective rubber bumpers and protective covers. Not much changed in the final product: the look is that of an elegant, ruggedized netbook computer—precisely what a lot of people have been waiting for.

A rugged netbook? First impressions

Sweden-based Handheld Group began as a distributor of rugged handheld computers from a variety of OEMs, but over the past few years has been establishing its own brands with lines of Algiz (Windows-based tablets) and Nautiz (Windows CE/Mobile-based handhelds) products. We were initially surprised that Handheld would add a notebook to what we thought was an Algiz line of tablets. While tablets are just the right form factor for many applications and niches, almost anyone we talk to also voices a need for a more traditional notebook, and so adding that to the Algiz line made sense. And it also made sense offering something a bit different. There are plenty of full-size rugged notebooks out there, but almost nothing in the netbook class. Though consumer netbooks now have heavy competition from iPad-style media tablets, the form factor remains valid. Netbooks are smaller and more compact than the usually expensive and not very rugged "ultra-lights." They are also simpler while still offering enough size and functionality to do most notebook jobs. I like netbooks for the non-intrusive utility they provide. But the glossy, slender consumer versions are just not designed for rough work out there in the field.

How did the Handheld Group go about transforming the rough prototype into a final product, and was anything lost in the translation? They got it exactly right. The Algiz XRW is clearly a netbook in look and feel. It looks crisp and elegant, doesn't weigh much more than a consumer version, but feels substantially more solid. Often functionality and specs suffer when products are ruggedized, but not here. The XRW's 10.1-inch wide-format display is bright and legible, performance is crisp, it's got a large enough power pack so that battery life never is an issue, and it's rugged enough to provide peace of mind. No chrome or gloss here that could easily get scratched or dented.

Like most netbooks, the Algiz XRW doesn't have a touch screen (current models now have one). And the display is fixed and does not rotate to turn the XRW into a tablet. So this is not a smaller version of a convertible notebook, and also not an attempt at cashing in on the current media tablet boom. Instead, it's a much tougher version of a standard netbook. That, however is where the similarity to most consumer netbooks ends. Apart from the high 1366 x 768 pixel resolution, the display also uses Handheld's "MaxView" technology for exemplary outdoor viewability as well as glare and reflection-free operation.

First impression: the Handheld XRW is a very useful machine—small enough to go anywhere, but with enough utility to be far more than just a compromise.

The hardware

Below you can see what the Algiz XRW looks like from the front and from all four sides. All ports are sealed with rubber plugs attached to the computer with small Philips screws so that they can easily be replaced. The sturdy corner bumpers, on the other hand, are part of the housing itself, attached during an injection molding process.

- Along the left side are power, an RJ45 gigabit LAN jack, and two standard USB 2.0 ports. There are also two metal loops that can be used with a carry strap.
- The front side has two speakers, a headphone jack, a microphone jack, Line In, a SDHC Card slot, the spring-loaded on/off/sleep slider, and five indicator lights for power, battery status, wireless and Bluetooth, and disk activity. They are small and easy to see, without being too bright.

Construction and components

The Algiz XRW consists of an LCD case and a system case with the electronics and keyboard. The XRW provides good access to its inside via a sealed plastic cover. The picture below shows the XRW with the access door removed, revealing the unit's expansion slots.

On top there is a Mini-PCIe slot populated by a 64GB embedded PATA SSD module. These modules look like regular SODIMM memory, only with a mini-PCIe connector. They support up to UDMA5, 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.

In the bottom left inside the service compartment is a Gobi 2000 card with antenna occupying a second mini-PCIe slot. The card provides carrier and wireless technology independence and has been pretty much the WWAN module of choice for 3G style networks.

To the right of the slot with the Gobi 2000 card is a third mini-PCIe slot that in our tester was empty and in reserve. Conceivably it can be used for alternate comms technologies, such as WiMax. The Algiz XRW, does, in fact, come with two antennas, supporting both space diversity technology and the 2.5 to 3.5GHz

range. A SIM card slot allows the unit to be used with GSM voice/data cellular networks.

The motherboard layout is similar to that of the Handheld Algiz 7 that we also reviewed, but it is not the same board. Not visible is a single SO-DIMM slot populated by a 2GB PC2-5300 Apacer memory module. It would be nice to have external access to the memory compartment, netbooks generally do not allow that, perhaps a practice going back to the netbook memory limits imposed by Microsoft and Intel.

I/O is on the left and right side of the motherboard. One thing we did not like to see is that most of the ports rely on the external rubber plugs as the sole seal. This means that water and dust could enter into the interior of the Algiz XRW if a protective door is left open. We always suggest dual barriers/seals for any opening into the inside of a device, and this is something Handheld should consider.

At the bottom of the picture you can see the cutout where the XRW's battery fits in. The Handheld labeled rechargeable Li-Ion pack provides a beefy 57.7 watt-hours (11.1 Volts, 5,200 mAh) and slides into the back of the unit netbook-style. That's a lot of capacity for an Intel Atom-powered netbook, and much more than the Algiz 7's two batteries' 38.5 watt-hours combined. The battery connector opening is not sealed to the inside, making for a potential leak. There is a rubber/plastic frame around the opening that acts as the sole seal, pressing against the bottom of the battery, but it's hard to imagine that to be a totally reliable seal.

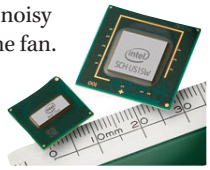
The battery itself is nicely integrated into the design and also provides stability with two rubber foot pads. It reliably snaps into place over a springloaded lever, then can be locked in place via a second manually operated one. There's a bit of play that we'd like to see gone.

To the left of the service compartment opening is a surface mount connector for dock operation. If not used, it can be protected with a supplied plastic cover.

Performance

For reasons not immediately obvious, while most consumer netbooks use the Intel Atom N270 (first generation netbooks) or the N45x/N47x (second generation), vertical and industrial market products generally use the "Silverthorne" Atom Z5xx chip.

The 1.6GHz Atom Z530, in particular, has become quite popular in industrial and vertical market products (Handheld uses it in their Algiz 7 tablet). However, netbook-style devices, and especially those with larger, higher resolution displays, are generally pushed harder than tablets and so Handheld went with the somewhat quicker and more powerful Atom Z550 instead. This chip runs at 2GHz for a theoretical 25% speed advantage but its thermal design power is still only 2.4 watts (compared to 2 watts for the Z530), much less than any Intel Core processor. This allowed Handheld to design the XRW without a noisy and potentially troublesome fan. The picture to the right shows the Atom z5xx processor together with its SCH US15W chipset.



To provide an idea of the relative performance of Handheld's Algiz products (including the now discontinued Algiz 10) 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. Note that the Algiz 7 and 8 use processors from the same Atom family as that in the Algiz XRW, though the Z510 in the first gen Algiz 8 (the second gen machine uses the 1.6GHz N270) only runs at 1.1GHz. The Algiz 10 used a popular older 1.2GHz Core Duo chip found for years in many leading rugged tablets. Here are the results:

PERFORMANCE	Algiz XRW	Algiz 7	Algiz 8	Algiz 10
CPU: Intel	Atom Z550	Atom Z530	Atom Z510	C2D U2500
CPU Clock Speed	2.00 GHz	1.60 GHz	1.10 GHz	1.20 GHz
Thermal Design Power	2.4 watt	2.3 watts	2.2 watts	10.0 watts
CPU Mark	280.4	217.8	107.8	545.0
2D Graphics Mark	80.9	56.7	92.3	125.5
Memory Mark	252.7	208.7	128.6	202.4
Disk Mark	175.9	175.6	245.7	370.9
3D Graphics Mark	23.5	17.7	14.5	96.2
Overall PassMark	**170.8**	**141.6**	**116.1**	**435.2**

The numbers are in line with what we expected. The 2.0GHz Z550 chip in the XRW is a good deal quicker than the 1.6GHz Z530 chip in the Algiz 7, which in turn is significantly quicker than the 1.1GHz version used in the original Algiz 8. But performance of the Atom-based devices cannot match that of an Intel Core processor such as the one used in the Algiz 10, though that chip only ran at 1.2GHz.

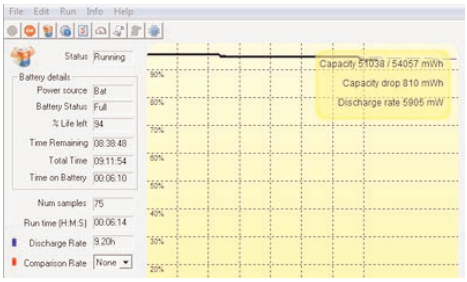
While the overall PassMark score of the Algiz XRW is modest compared to Intel Core-based devices, it feels quick in everyday use, and fast enough for most jobs, though prospective customers are advised to figure out if Atom-level performance is adequate for their application(s). Impressively, the XRW runs 1080p high definition video at what looks like full speed, something first gen netbooks could not do.

The XRW's disk benchmark seems modest, and we felt that a faster disk could improve its overall benchmark score. In general, solid state disks bench faster than almost any hard disk, but here the hard disk of the original Algiz 8 scored higher. We ran this by Handheld. The response was that "*the disk tests do not reflect real life experience. The SSD excels in reading data from a lot of files simultaneously, like starting Windows 7. They are not that good in raw read and write performance. But in real life the unit feels a lot slower with a rotating hard drive even if the test data is better.*" We accept that explanation.

Battery and battery life

Manufacturers usually resort to Atom processors primarily to lower cost, power draw and complexity. Processor and chipset, though, are only part of the full package, and overall power draw will depend on the power efficiency of *all* components, and also design, settings, workload, and how well power conservation measures are implemented.

We used our battery benchmark software—Passmark's BatteryMon—to examine the XRW's power draw. With Windows Power Options set to Power Saver and backlight brightness all the way down (which is still very viewable), but all radios on, power draw was a very low 6.8 watts, good for almost eight hours of theoretical operation. With all radios off we saw under six watt draws, good for well over eight hours.



What about maximum draw? With backlight brightness all the way up (which is VERY bright), draw jumped to about 12 watts, still good for 4.5 hours. Amazingly, when we ran 1080p video at full bright, which usually quickly drains notebook batteries, the XRW still only sipped 13 watts, still good for about four hours.

These benchmark values are excellent and exceed what we expected, especially considering the fast (for an Atom) chip, and the large, bright and high resolution display.

Note that both the Atom processor and Windows 7 have extensive power conservation measures. 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.

Keyboard

The XRW's 83-key keyboard closely follows standard netbook layout and size, but both the keyboard and touchpad are fully sealed.

There is a small space between individual white-on-black keys, and the keys themselves are not beveled as they often are in netbooks to separate one key from the other. The mask through which the keys extend is a glossy black, making for some needless reflections.

One area where we'd have liked to see Handheld depart from netbook practice is in the size of the all-important letters layout: it's only 92%-scale, meaning those used to a full-scale keyboard may trip over the narrower key spacing. The letter part of the keyboard could easily be full-scale by making the punctuation keys to the right of it a bit narrower.

Keyboard illumination is not via backlit keys, but through two small LEDs located beneath the LCD display. The illumination can be toggled on and off and through three levels of brightness via key combination.

A function key provides access to hardware functions such as radios individually on or off, brightness, volume, external displays, etc. Volume, WiFi and brightness have their own hardware buttons in addition to function keys.

The touchpad of the XRW is nicely sized, not too deeply recessed, and works well, as do the rubberized, flush-mounted left and right mouse buttons beneath bit.

Display

Where does Handheld's rugged netbook stand in terms of display performance? First and second generation consumer netbooks had displays with WSVGA 1024 x 600 pixel resolution that was just not quite enough for today's apps and websites that usually assume at least full XGA (1024 x 768 pixel). Many second generation netbooks switched to 1366 x 768 "HD basic" resolution for a much more practical user experience, and that's what the Algiz XRW comes with. This is considerably more resolution than a lot of rugged mobile tablet and laptops offer (yes, most full-size rugged notebooks still have just XGA resolution).

All modern computer displays look good indoors where the average LCD backlight is strong enough to handle ambient light, and where there are fewer reflections and sharp contrasts than outdoors. Outdoors, however, even the strongest backlight pales compared to the sun, reflections are everywhere, and broad daylight exposes a display's weaknesses. This means that any mobile system that will be used outdoors most or even part of the time must offer good outdoor display performance. How does the Algiz XRW display do outdoors?

Without going into detail on the theoretical/physical background of good outdoor-viewable displays, the basic requirement is that the screen can be comfortably and reliably viewed under virtually all lighting conditions. In the pictures below, we're showing the Algiz XRW in comparison to a standard first generation netbook (an Acer Aspire One). The Acer actually performs quite well under most lighting conditions, but it is optimized for indoors whereas a device like the Algiz XRW needs to do well under all conditions.

The first image below shows the two systems outdoors in the shade on a very bright and sunny early afternoon. The specs do not provide the brightness of the Algiz XRW backlight, but it's significantly brighter than that of the also very bright Acer netbook. The XRW is perfectly viewable whereas the Acer is slightly marred by less brightness, an (inexplicably) glossy bezel and a tendency to generate reflections off its glossy screen even in the shade.

In the second picture below, the computers are placed in a shaded area away from the sun. The XRW's display is still on full bright, and is actually almost too bright for this location. The Acer's glossy display reflects even more, to the extent where the display is no longer clearly viewable. This emphasizes the importance of good anti-reflective properties as well as polarizers. That can make a huge difference.

In the third picture below, the systems sit in extremely bright, direct sunlight. Here, even the XRW's very strong backlight is no match for the sun, and the effective contrast ratio drops, but not as much as on the standard netbook which, in addition, again has to contend with uncontrolled reflections.

Viewing a display from an angle often generates the most reflections. This is evident in the image below where the Acer display becomes mirrorlike, whereas the treated Algiz XRW display keeps reflections at a minimum.

The quest for the perfect computer display technology is still far from complete. The Apple iPad, for example, has a great display indoors, but becomes almost unreadable outdoors due to excessive reflection and visibility of every fingerprint. The Algiz XRW "MaxView" display does a remarkable job with being readable under virtually all viewing conditions. It's also almost immune to smudges and fingerprints (which can be a total nuisance outdoors), and its very wide horizontal viewing angle makes the display a pleasure to use. The vertical viewing angle, though, is not as good and you'll see the chromatic changes and aberrations typical for many LCDs as you rotate the unit.

Backlight and indicator lights can be turned completely off via a keyboard function key.

Handheld Algiz XRW Specs

Type: Ultra-rugged notebook computer

Housing: Plastic, metal chassis, rubber bumpers

Processor: 2.0 GHz Intel Atom Z550 w/ 533MHz frontside bus, 512KB L2 cache; Intel US15W integrated graphics

OS: Microsoft Windows 7 Ultimate

Memory: 2GB DDR2 expandable

Storage: 64GB SSD

Expansion slots: 1 SD Card (SDXC-compliant)

Display: 10.1-inch/1366 x 768 pixel "MaxView" sunlight-readable TFT with LED backlight

Digitizer: Resistive touchscreen

Keyboard: 83-key 90%-scale, LED illumination

Size and weight: 10.2" x 7.0" x 1.6" / 260 x 178 x 40 mm 3.3 lbs. / 1,5 kg as tested (with battery)

Ingress protection: IP65

Operating temperature: -6° to 158° Fahrenheit (MIL-STD 810G, Method 501.4, Procedure II)

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

Altitude: 15,000 feet (4572 meters)

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: Li-Polymer 11.6V, 4,800 mAh, 57.6 watt-hours, "8 hours"

Camera: 2-mp auto-focus camera

Wireless: 802.11b/g/n, Bluetooth 2.0 + EDR, GPS, optional: WWAN (HSDPA/3G, WiMax, GOBI2000)

Interface: 2 USB 2.0, 1 RS232 DB9, 1 VGA, dock, audio in/out, docking connector, stereo speakers

Price: Starting at US$2,700

Contact:

Handheld Group
www.handheldgroup.com
info@handheldgroup.com

Ruggedness

Ruggedness is what the Algiz XRW is all about. The goal here was to provide a netbook-sized machine that holds up in the field and under even the most trying environmental conditions. So how rugged is the Algiz XRW? Very.

That starts with an extremely wide operating temperature range of -6 to 158 degrees Fahrenheit. Commercial and household freezers are about zero degrees Fahrenheit, with some commercial ones as low as -10F. 158F is hotter than Death Valley, so it's safe to say that, temperaturewise, the Algiz XRW can handle more than most humans.

Computers do get dropped in the field, and so the XRW was drop-tested according to the MIL-STD-810G, Method 516.5, Procedure IV that mandates 26 drops from four feet. That's about standard for what we'd expect from a device like the XRW. Handheld also used MIL-STD-810G, Method 514.5 Procedures I & II for vibration testing (general minimum integrity and the more rigorous loose cargo test). For humidity, they used MIL-STD-810G, Method 507.4 testing (90% relative humidity in a wide temperature cycle). The machine can also handle altitudes up to 15,000 feet.

Sealing is key for a machine of this type, and the Algiz XRW carries an IP65 rating. The "6" means the device is totally sealed against dust, and the "5" that it is protected against low pressure jets of water from all directions, but with limited ingress still permitted. Ideally we'd like to see IP67 here, which would mean it could also survive a possible drop into a stream (which can happen in the field). We did use the XRW on a salt water dive deck for a full week and never had a problem. We would like, however, to see all exterior ports sealed, and not just protected by rubber plugs that may come loose or not be seated properly.

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

Handheld Algiz XRW: Summary

With the Algiz XRW, the Handheld Group offers an enhanced, ruggedized version of a netbook computer. Its small size and weight make it possible to offer the conventional notebook form factor and functionality in situations and applications where larger, heavier notebooks simply aren't practical.

Apart from its handy size, the device offers above-average computing power in this class, but without giving up excellent battery life in the full-shift range. We appreciated the 10.1-inch daylight-viewable wide-format display with its 1366 x 768 pixel resolution that's suitable for information-intensive applications and websites. We'd have liked to see a full-scale keyboard layout, though.

The Algiz XRW is rugged enough to be used in almost any environment, and its integrated bumpers protect against dents and scratches. It feels rock-solid and utterly reliable, but do make sure the protective rubber plugs are always securely in place.

The unit provides very good onboard communication both for wired connections (USB, LAN, audio, video) as well as wireless (WiFi, WWAN, Bluetooth, WiMAX, etc.)

Like most specialized vertical market computing equipment, the price is much higher than for consumer equivalents, but in terms of functionality to the job and total cost of ownership, the unit is a veritable bargain.

Overall, the Handheld Algiz XRW addresses the needs of anyone who needs netbook size and functionality in a rugged unit.