

product review

Leica Zeno 20

For the last month I have had the opportunity to extensively test the Leica Zeno 20, described by Leica as GIS device, but as I suspected and quickly confirmed, capable of performing as a rugged survey grade GNSS asset collecting tool. The more I have used the Zeno, the more I am convinced that Leica has

mis-marketed this new device. I'll explain my analysis further in this review, but first let's get down to technical specifications.

Technical Data

At 4" x 10" the Zeno 20 is the size of a large data collector. It features a crisp, color display (easily visible outside), an Android or Windows operating system, and an OEM version of ArcPad that is customizable. Because of the Windows option, a user can install third party collection software. I opted for the pre-installed Leica version of Esri's ArcPad running within Android OS, and that option will be my focus in this article.

Depending on the configuration—which is set up by the dealer—the Zeno can function as a sub-meter machine (GPS-only L1 version) or with an accuracy up to ± 1 -centimeter (cm) (GPS and GLONASS L1/L2 version). Users also have the option to toggle on BeiDou and Galileo channels. I purchased the 1-cm L1/L2 version with antenna, and consequently regularly collect data at between a 1 and 4 cm accuracy. The centimeter version uses RTK, and when the Zeno

is coupled with a Leica antenna (described below), Leica rates overall accuracy at 2 cm + 1 ppm. I regularly collect data at 1 cm, although accuracy and speed of acquisition depends on the number of satellites visible.

Primary features? The device has an IP67 dust and waterproof rating. Essentially, that means it can be dropped accidentally into a pond or river to a depth of three feet or more and retrieved quickly without effect. Or used without interruption in light rain. Although I hope to never test the waterproofing, I work in and around a lot of wetlands and found Leica's attention to quality a major attraction. The Zeno also has the ability to couple with the Leica DISTO S910, which allows a user to capture distant or inaccessible objects.

As a background orientation, the device displays either Open Street Maps or Leica's Hexagon Imagery Program. Either or both can be toggled on at file creation. I found both of these mapping overlays to be very accurate. The display has capacitive multi-touch, meaning that it works just like a smartphone—



The Zeno attaches precisely to the Leica carbon fiber pole. It has a sun-friendly display, and is protected in a typical Leica hardshell case.

and with the same finger actions. Objects can be blown up in display quickly; the overall area or even town can be viewed quickly by reducing the scale. Very neat.

In addition to functioning as a handheld unit, the Zeno can be equipped with an optional GNSS antenna, the AS10. The antenna is mounted on a slick Leica-made carbon-fiber pole. I opted for that setup as well, as accuracy increases by 3-4 cm, and the pole allows the user to precisely center the Zeno on whatever object is being collected.

Other features? There is an 8 Megapixel camera (each point collected can be photographed), WiFi, and Bluetooth. Either OS allows the Zeno to access the internet and send/receive email via cell service. Finished files can be emailed to your office. Files can also be uploaded via DropBox, which is the option I regularly use. The internal battery is a hot-swappable Li-ion. A fully charged unit lasts six hours; the Zeno has an external car battery charger, for a quick top up at lunch.

File output options are robust. The Zeno saves files as ArcGIS gdb, shapefiles (shp), dxf, dgn and dwg. At the date of this writing the dxf, dgn and dwg options are pending. A Leica national representative wrote me in June that Leica expected to implement those latter options in late summer of 2016. Consequently, I have not been able to test those standard CAD formats. Instead, I have imported shp files into QGIS and exported the files as a dxf. QGIS is free, and the process quick.

For this review I have relied on the pre-installed software Leica offers. This Android-based software is called Zeno Field. As noted earlier, it is an OEM version of ArcPad, with a number of impressive Leica modifications. Attribute collection—Leica calls attributes Layers—is highly



Here the Zeno displays a couple hours work within the proprietary Zeno Field software. Touch-sensitive collection options and control toggles are nicely arranged on the top.

customizable. Symbology, object color and size, alpha numeric designation, attributes which include photographs, accuracy and object number, are all easily modified, added and edited. Editing can be done

either before a job or on the fly. Encounter an unexpected object in the field? It takes seconds to add it to the standard attribute list. A nice touch is that a user can set a master file before

The internal GNSS antenna is housed in the upper Zeno body. The waterproof socket for an external antenna is shown on the side.

any jobs are begun that may include every imaginable attribute to be collected. That master file can be attached to any subsequent project so that attributes do not have to be recreated with each new job.

Single points can be collected, as well as continuous, linked points that might be encountered, for instance, when locating a sinuous road centerline. The implementation of survey-related options is ingenious. As a point is collected, it's a breeze to delete it, rename it, edit the attributes and double-check its accuracy.

The Zeno can also be set to do multiple readings of the same point. For instance, want to average accuracy over 10 readings of the same point? That's an option. I have my own Zeno set to do five readings per point. Add an extra half second per extra reading to determine how much longer this increased accuracy will cost you in time.



Field Use

Since purchasing the Zeno, I have used it on almost a dozen jobs, several quite large. My firm performs typical land surveys, including topographical surveys, as-builts, boundaries and resource area locations. Because we are also wetland scientists and hydrologists, we frequently delineate wetland edges, ponds and rivers. Some of the parcels we survey are large, and in the past, survey location of hundreds of points on heavily wooded sites has been complex, challenging and time consuming. The Zeno simplifies these efforts.

After weeks of trial, I have found the Zeno to be an effective tool for both subdivision as-built work and resource area surveys. The device initializes in well under a minute. Once a file is opened, the



The 8 MG internal camera lens is on the rear of the Zeno to the upper left. The package includes a soft carrying handle with a built-in pouch for the stylus.

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time to first satellite fix is about 40 seconds. Acquisition thereafter is fast, in many cases taking mere seconds. In one of my first jobs with the Leica I located four catch basins and two manholes in less than two minutes at an accuracy of about 2 cm per object. A skilled instrument person using a standard total station and data collector would have been dismayed at the speed. I collected another 15 points in under 10 minutes.

On another job I located over 150 wetland points in less than 10 hours, over two short days. Average accuracy was about 4-6 cm, far better than we normally performed using

a prism and total station. We had estimated survey time at more than four days.

I should note that, like with any GPS/GIS device, the Zeno's speed is determined by whether there are overhead obstructions, and by the number of visible satellites. Needless to say, acquisition is slower with eight satellites than fourteen. Similarly, acquisition is slower under heavy tree cover. That said, I have been pleasantly surprised at how easily the Zeno functions under dense deciduous tree cover. One of my first jobs entailed location of a small river that meandered through a dense wooded

swamp—the Zeno picked up point after point within seconds. I was using the Leica optional antenna with the L1/L2 option, which aided acquisition. Relying solely on L1 GPS—the least expensive option available—would not have been as effective under similar harsh conditions as the numbers of visible satellites would have been reduced, and triangulation far more difficult. Leica is emphatic that the L1-only option is sub-meter. It is the added GLONASS L2 option that elevates this device to survey grade.

Collection speed using the L1/L2 option, in addition to surprising accuracy, has genuinely impressed us. Because traversing is eliminated using any GPS/GIS survey grade device, acquisition is as rapid as you can walk or drive to a point. Line cutting and multiple traverses are unnecessary. We completed a subdivision as-built—locating roads, sidewalks, catch basins, manholes, utility poles, CATV boxes, water valves and gas meters—with the Zeno in far less time than we had initially estimated. This pattern of overestimation of field time, versus actual time incurred with the Zeno, has played out repeatedly.

Another plus is that post-processing is eliminated using RTK under the L1/L2 version. My firm is based in Massachusetts where we connect to the MassDOT CORS network, which is free and similar to state networks available throughout the country. The RTK option requires a machine-to-machine cell connection. Cost is roughly \$50 a month. We opted for AT&T as a provider, although other major carriers offer the same service. Our dealer included setup in the overall package.

As land surveyors we tend to become attached to tools that perform beyond our expectations. The Zeno 20 has certainly found advocates within my firm. Its initial expense has been quickly recouped. Its speed and accuracy have exceeded Leica's marketing promises. Take a look at it if your firm frequently performs medium and large scale as-builts, natural resource delineations or asset collection. If used creatively the Zeno is far more than a GIS device. ■

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The Leica GNSS antenna is compact, having a diameter measuring less than 7-inches. It fits neatly into the hardshell case.