Sokkia's GSR1700 CSX

A flexible, accurate solution for L1 GNSS surveying.

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SUGGESTED LIST PRICE:
The GSR1700 CSX receivers start at $3,250.

The GSR1700 CSX is Sokkia's new L1 GNSS receiver. It is targeted as a flexible, scalable system offering three survey configurations: static, stop-and-go and RTK surveying. Being a happy owner of the GSR2700 ISX–the dual-frequency "big brother" of this product–I was excited to try out the new product in all of its configurations.

The system comes in a padded, compact carrying case that holds everything–batteries, chargers, data collector and receivers. Opening the case, my first impression of the GSR1700 CSX was, "Wow, these are small!" They measure only 6.5 inches (16.5 cm) across and 4 inches (10 cm) deep. I was also amazed at how light they were weighing only 1.5 pounds (680 gram) each.

Depending on your desired configuration, you can use one of three data collection options: no controller (for static surveys), SDR+ S/K on a Juniper Archer (for static and stop-and-go surveys) or SDR+ Professional on a Juniper Allegro CX (for RTK surveys).

The GSR1700 CSX base receiver setup for the RTK survey.

Static Setup

Typically, static surveys help to establish accurate control within a survey project. Collecting static points was very efficient with the GSR1700 CSX since you can simply push one button to turn the receiver on and automatically start collecting static data. A controller with SDR+ S/K Edition data collection software can be added to the static survey setup to customize the file name, point number, GPS antenna details and antenna height. I liked this feature because it eliminates the need to wait to enter site names and antenna heights in the office. Instead, you can enter them right in the field.

To test the GSR1700 CSX, I occupied control points that were already established for a well-field-expansion project previously performed in my hometown of Brewster, Mass. I set up the receivers on two control points and occupied them for 20 minutes and then headed back to the office. The files downloaded to Spectrum Survey post-processing software quickly and easily using the supplied USB Bluetooth adaptor. Upon importing the files into Spectrum Survey, the point numbers, antenna heights and antenna models were automatically identified making the data processing and network adjustment quick and successful with a few mouse clicks. I exported the processed static points from Spectrum Survey using the ASCII format and imported them into an existing survey job within my CAD survey software. Cross-referencing the coordinates produced by Spectrum Survey with my control coordinates showed an impressive 0.02-foot (6 mm) difference. The entire office process took less than 10 minutes.

Stop-and-Go Kinematic Setup

Stop-and-go kinematic surveys are mainly used to measure points in high-accuracy survey and mapping applications. To test the stop-and-go configuration, I headed to the bayside town of Dennis, Mass., to measure some topographic points at a jobsite that I had worked on in the previous week. To conduct a stop-and-go survey, a static base receiver must be set up to collect data while the rover is used to measure the topographic points. I set up the base

The temperature in Dennis, Mass., was 15 F with a wind chill below 0 F the day Poole tested the instrument.

receiver on an arbitrary point in an area with an open-sky view and found it very convenient that no controller was required to start the base. All I had to do was push one button to turn the receiver on and automatically start collecting data.

After mounting the GSR1700 CSX and Archer data collector on a rover pole, I was amazed at how lightweight the setup was. I set the rover receiver on another arbitrary static point in an open-sky area and initialized the stop-and-go survey by collecting data for about 12 minutes. After this, I took a few measurements along the edge of a road by occupying each point for about 10 seconds. (The Sokkia rep later told me that three seconds after initialization would have been sufficient.) To tie my stop-and-go survey to my survey project, I crossed the road to a control point located on an iron pipe amid some pine trees and again occupied it for 10 seconds. I then measured a few more topo points and control points and closed out my GPS survey by reoccupying the initialization point for three minutes using the "known point" initialization feature in SDR+ S/K.

Downloading, importing and processing the stop-and-go survey was again very easy with Spectrum Survey. The data was downloaded wirelessly, imported with all relevant survey information and processed successfully in less than 10 minutes. Exporting the results and importing into my CAD survey project showed dead-on accuracy with no more than 0.02-foot (6 mm) difference to coordinates established in my previous survey. Comparing the coordinate of the iron pipe control point did not reveal any loss of lock, corrupted data or noticeable degradation in accuracy despite the tree-lined obstacle. However, if a loss of lock had occurred, Sokkia said that Spectrum Survey would have been able to process the data backward using the "known point" reinitialization that I performed at the end of my GPS survey.

Poole tests the stop-and-go kinematic survey capabilities of the GSR1700 CSX.

RTK Setup

The benefit of RTK was readily apparent to me after performing the static and stop-and-go surveys. Instead of having to post process raw GPS data in the office to achieve high-accuracy survey points, RTK performs this function on-the-fly giving you highly accurate survey points instantaneously in the field. RTK allows you to perform certain tasks that stop-and-go surveying cannot, such as staking out design points. The necessity of adding external radios to the setup is a slight drawback. While I would have preferred a wireless solution, the ability to use a static/static kinematic device for RTK work outweighs the inconvenience, especially since the radios run off the internal battery of the GSR1700 CSX.

To test the RTK setup, I headed to a foundation staking job that I am working on in Chatham, Mass. To begin the survey, I set up the base receiver on an arbitrary static point with an open-sky view, which took only three minutes. I then mounted the rover receiver on a range

Poole performs a stop-and-go survey with the GSR1700 CSX.

pole and started SDR+ Professional. The rover announced "RTK fixed" a few seconds later. Initially, I thought that the voice messages were fluff; however, I began to appreciate them as I continued my survey work. Audible messages like "RTK fixed" and "RTK lost" eliminated the need to constantly monitor the screen through every function, which was a huge benefit.

After initializing my RTK survey, I began to measure points around my stakeout job. Measuring points with SDR+ Professional was extremely easy, and throughout the entire survey, the GSR1700 CSX never lost its "fixed" solution–even after I had to move under a tree to locate a control point to calibrate the survey job. The test was a success since all of my RTK points checked out. Once again, the GSR1700 CSX impressed me.

A few days later, I had a perfect opportunity to use the GSR1700 CSX on a live job to locate a half-dozen gas-line flags, a water line and a couple of catch basins using a stone bound for control. I set up the GSR1700 CSX base receiver on an arbitrary open-sky point and set up the rover receiver and data collector on a rover pole. A few seconds after establishing a Bluetooth connection to the rover, I heard "RTK fixed," and I began locating my utility lines. While working, I walked under heavy tree cover and lost my RTK fix, but the GSR1700 CSX reacquired its fix seconds later. I was also very impressed with the hot-swappable battery feature of the GSR1700 CSX. An internal battery within the GSR1700 CSX temporarily powers the unit while the empty battery is replaced, which eliminates the need to power down and reinitialize your RTK solution.

To gauge the accuracy of the GSR1700 CSX, I repeated the survey with my dual-frequency GSR2700 ISX. Even though the survey was done twice, I was back in the office within an hour only to find that both surveys checked among each other. These results further boosted my confidence in the GSR1700 CSX.

A High-Performance Package

There is so much more to the GSR1700 CSX than I can begin to elaborate on in this review. The receiver proved to be a high-performance machine, especially when used for RTK work. Although it is a single-frequency device, the CSX receiver uses Glonass satellites allowing it to easily measure points without losing lock in difficult environments. The SDR+ S/K and Professional editions were intuitive even though it was my first experience with the product. Although I didn't get a chance to check the range, Sokkia reports that the RTK system is intended for short-baseline use in environments of 3 kilometers or less.

As a package, the GSR1700 CSX–in all of its configurations–yielded the results that I look for as a professional surveyor.

Donald Poole, PLS, is president of Outermost Land Survey Inc. (OLS), Brewster, Mass. He was a licensed surveyor in Tennessee, West Virginia and Kentucky before relocating back to his original hometown of Cape Cod in 1983. Poole founded OLS in 2002 after spending 18 years managing the survey department of a medium-sized engineering firm. He can be reached at dpoole@outermostlandsurvey.com.