



By Al Pepling, LS

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## CST/berger CST-Series Total Station

In this installment, I review a CST/berger CST-205 total station, which is targeted for the construction stakeout market. After spending some time with the CST-205, I have concluded that it is well suited to that task, and in addition, I believe it will find much wider acceptance and usage, based on cost as well as value.

The scope of the 30X telescope contains stadia hairs in the single hair top and right and double hair left and bottom configuration. I find the stadia hairs very useful when shooting utility poles, transformers, trees, etc., for picking out the center of these objects. The shortest sighting distance is 1.5m. The optical quality of this instrument, even with a coaxial EDM aboard, is quite good, well above average in my opinion. (My basis of comparison is the Wild T1 telescope, which does not have any EDM splitting optics aboard, but gives me a clearer, sharper view of the moon's surface than a good many telescopes I have looked through.)

The angle measurement method is termed raster incremental, which suggests a type of bar code arrangement. There are dual detectors on the horizontal angle and a single detector on the vertical angle. Minimum readings are 1" and 5" with accuracies of 2" and 5", although the specification used for these accuracies was not listed in the draft copy of the manual that I was given. It has a single axis tilt compensator with a range of  $\pm 3$  minutes. The optical plummet is located in the base of the instrument instead of in the tribrach, which is a handy feature, especially if you want to adjust your circular level bubble. I did not miss the laser plummet, or electronic leveling at all, because this is the type of



instrument I've used for most of the field work in my career.

The EDM on the 5" unit is rated at  $\pm 5\text{mm} + 3\text{ppm}$  while the 2" unit is rated at  $\pm 2\text{mm} + 2\text{ppm}$ . The instruments are coaxial, and the minimum reading in both the measuring and tracking modes is 1mm.

According to the specs, 1.6km/5249.33 feet is the range to a single prism, and 2.5km/8202 feet is the range to a triple prism under average conditions of slight haze with a visibility of about 14.6 miles.

The power is supplied by a NiMH battery that has an average working time



Figure 1

of seven hours. Two batteries are supplied with each instrument. The battery fits neatly into the instrument standard, and with its coaxial plug, provides quick and simple removal and replacement (Figure 1). It is similar to my old Leica T1001 with a little more straightforward operation (a definite plus in my book).

Another plus is the dual face display on an instrument aimed at a market where twin displays are not all that common. The alpha/numeric keypad is on the right side, with the “soft” or “F” function keys, the direction keys, the on-off key, and the enter key across the bottom. The keys are soft yet provide responsive tactile feedback combined with positive operation. Because they are the business center of this gun’s operation, the ergonomic, functional placement of the keys is no small consideration.

Five monochrome lines on the display are sharp and easy to read in bright sunlight or in the shade (Figure 2). One of my favorite patterns was the display of the slope, horizontal, and vertical distances. The “HAR” (Horizontal Angle Right) is necessary as this unit will also read angles to the left.

The designed use for this gun is with the suite of onboard software routines and the 15,000 point storage capacity. The factory defaults are set for that manner of operation. DataLinkDL01, V.2.0 software is included to accomplish data point transfers



Figure 2

for uploading to and downloading from the instrument’s storage.

An external communication port for RS232C serial communications is provided for those who would rather use their own data collectors. The soft keys must be reconfigured for external communications. For trial purposes, a DC-50 data collector was used (which I reviewed in an earlier article). This was accomplished by redefining one of the soft keys to “COMM” as outlined in section 22.3.1 on page 90 of the manual. The communication protocol is in section 25, BI-DIRECTIONAL COMMUNICATION on page 105 of the manual. The DC-50 folks sent me some files to add to their unit and with telephone guidance, bi-directional communication was established and tested. So, yes you can use an external data collector with this gun and be comfortable with the operation you are used to!

Sections 22, 23, 24, 25, and 26 of the draft manual cover how to do field adjustments to check/adjust the instrument to keep it delivering top performance. A small tool kit is included in the instrument case to perform these adjustments, as well as a lens brush and lens cleaning cloth.

The manual is liberally illustrated with photographs, sketches, diagrams, and step by step instructions. These instructions are divided into steps. The information in the well-written manual is easy to understand.

Routines include Setting-Out measurement, (Stake Out), Distance or Angle measurement, Missing Line measurement, REM measurement, Resection by two or multiple known points, Area Calculation, and Setting-Out Line. In the last routine the user defines the base line and then selects points to be staked along or offset from the defined baseline.

The motion locking clamps operated smoothly and held tightly on both the

horizontal and vertical motions. This instrument did not have a mid-range reference band on the clamp shaft. I did not miss it as there was a hole for a set screw that I used as my reference. The tribrach does have a "neutral" groove (a reference band on the motions would be a good addition). I checked a few distances against other instruments on various points I shot with my own instrument and CST-205 matched all of them within less than a hundredth of a foot, and most of them exactly.

What impressed me was the ease of navigating through the various settings necessary to operate the unit. Setting the prism offset for instance, is done by pressing the "page" key, then using the arrow keys to move to the PC line, then entering the prism constant for the prism, pressing the "enter" key, and pressing the "DIST" key to take the measurement. Just for comparison, I turned a set of angles with my own 3" gun and then with the CST-205, 5" gun and achieved the same ratio of spread values.

My experience with the CST gun very favorable and enjoyable. It is capable and



exceeded my expectations and preconceptions. I remember when some earlier imports began to make inroads into the established instrument lines here in the USA some thirty years ago, and I believe that these CST guns will repeat that

history. I'd really like to do a long-term test on the 2" model. A reflectorless version of these guns would be a savvy marketing move in my opinion. Spend some time with one of these guns and see if you don't agree. *JS*

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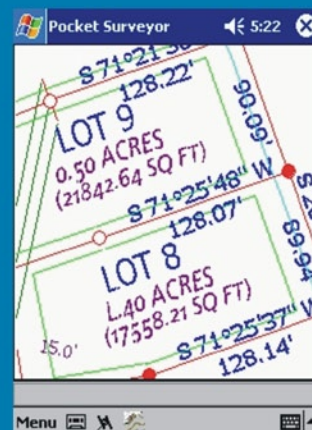
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