



By Al Pepling, LS

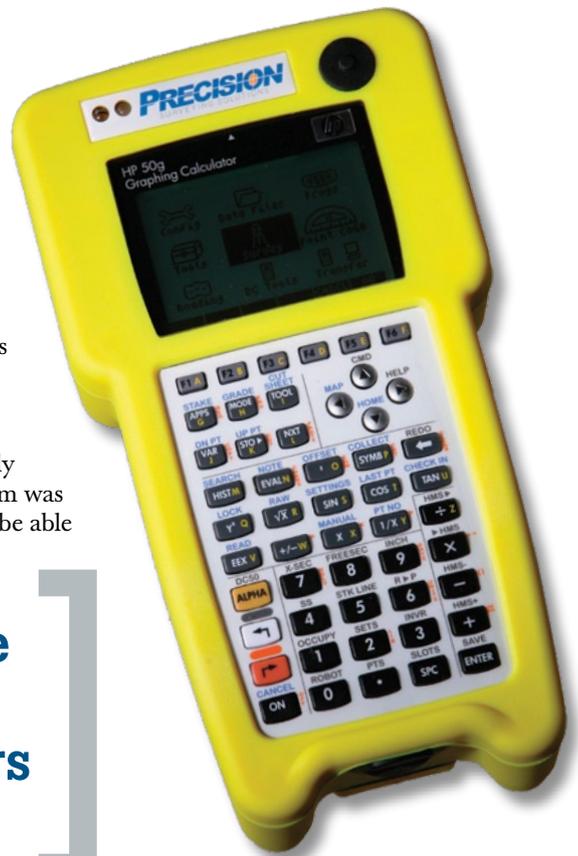
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## The DC50 & DC50 Assistant by Precision Surveying Solutions

**P**recision Surveying Solutions LLC (PSSLLC) is a relatively new kid on the block, but its DC50 data collector is the result of ongoing program development started by John Evers prior to 1990. For many years the programs evolved and grew, and by the year 2001 John Evers and his land surveying business partner Robert Martin were happily using their own programs that they had tailored to make their work flow easier and faster. It was soon announced though that the HP 48GX calculator, which their software operated on, would no longer be produced.

still using the CE or mobile PC software from Microsoft. A few tried developing for the Palm PC platform or the Psion hardware.

During those times, many practitioners kept their workflow going on the HP 48 platform and were heartened when HP announced the 49G! John was one of those surveyors who continued development of his own routines and eagerly ported them to the HP 49G+ platform. I remember those early times well. Conventional wisdom was that the 49 platform would not be able



**This software and hardware was developed by and is used by practicing surveyors on a daily basis.**

Many surveyors, John included, stocked up on the 48s as a hedge for future work. Others, myself included, looked to other platforms such as Windows CE devices and PDAs. Manufacturers embraced new hardware platforms, or designed and offered their own. Most went with the CE of Pocket PC software offerings and the “touch screen” method of data input. Others offered the touch screen and a keyboard,

to compete with the CE-based devices. Well, the HP 49G+ keyboard was a dismal failure. Even the upgraded keyboards, (and I have one) needed a five-pound sledge for reliable operation. Still John persevered. He and his partner Robert Martin were using the developing software in the daily operation of their surveying business. While this was going on, John and Tim Wessman crossed paths and the software benefitted

from tremendously from Tim’s programming skill. At about the same time, Chuck Rushton, a licensed surveyor from North Carolina with an extensive background in geodetic surveying and programming, joined the team. In late 2005 Adam Robertson, an electrical engineer with management expertise in the electronics industry, joined the team, and began the process of propelling Precision into the marketplace.



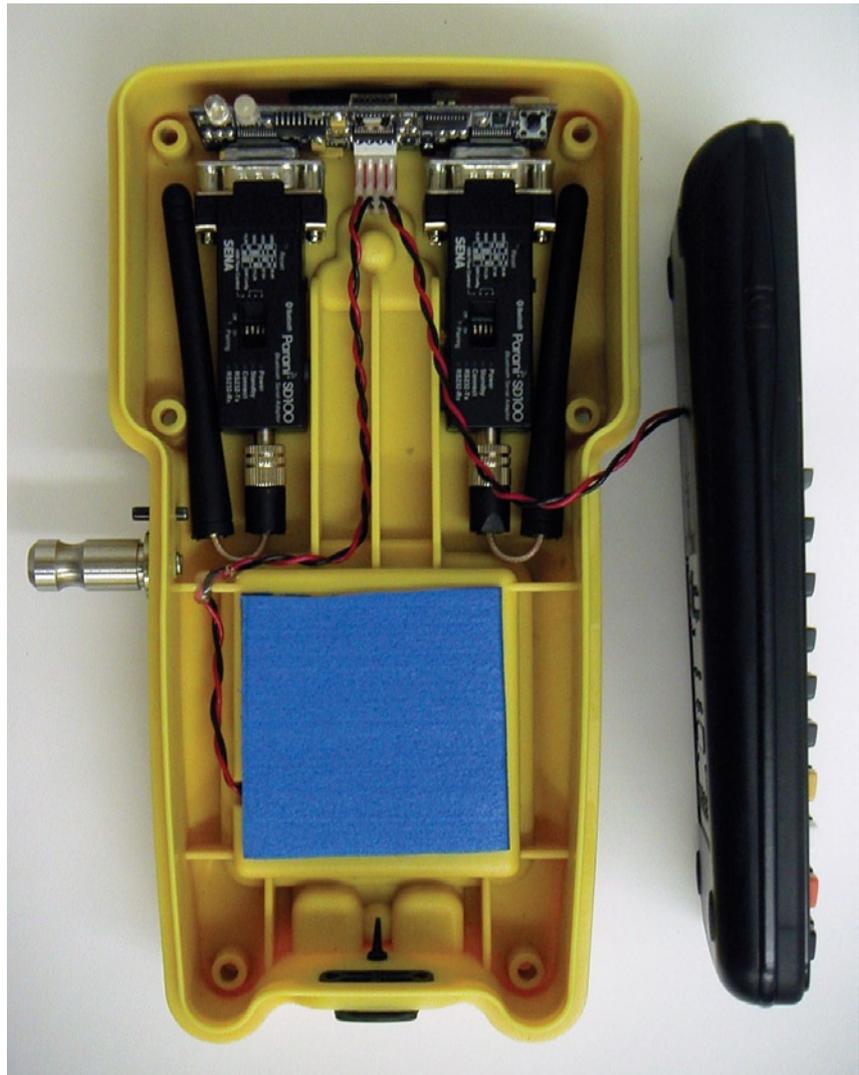
**Figure 1**

One of the issues to overcome was the communications between the total stations, (serial communications), and the HP devices with their USB and IrDA communications ports. The solution to this apparent dilemma was the creation of the DC50's communication circuit board. This unique device is actually a separate computer, and can handle very complex communication tasks without requiring the resources of the HP 50G calculator. The communication circuit board provides the DC50 with three independent comm ports, two of which are available for use with internally mounted high-power Bluetooth radios, with the third port at the top end of the DC50 for connection to devices with a traditional 9-pin serial connector.

Of course HP came out with the HP50G, which has a keyboard in the tradition of the long line of HP calculators. I can speak from personal experience as to the suitability and function of the keyboards. Take a look at **Figure 1**. There is a 15C, two 41CXs, one with a card reader, a 71B, a 42S, the well-known 48GX, and my own 50G. Some are more than 40 years old, and each one is still functioning except for one.

The 41CXs suffered from "terminal" battery corrosion caused by lack of attention. My Compaq 3835 on the Pocket PC platform has already died. My four-year-old Dell AximX30's touch screen is already exhibiting random response to the stylus in certain areas of the screen.

With all the improvements in the software, and a background including the HP 48s in an "environmental" case and a lack of cases for the HP 49G+ and the HP 50G, it was natural for PSSLLC to develop a case to compete with today's

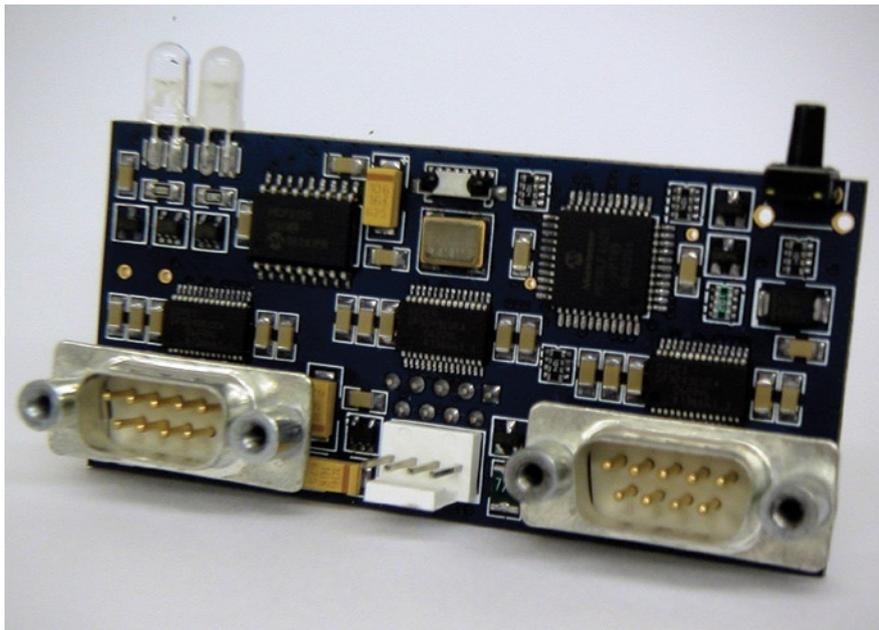


**Figure 2**

environmentally housed "dedicated" data collectors. The DC50 is the result!

The PSSLLC DC50 is unique in that you have an environmental case with a circuit board, Bluetooth Transceiver, and battery holder built in.

See **Figure 2**. A standard off the shelf HP50G fits right in. Should the 50G fail or be upgraded, you can easily replace your current one. PSSLLC upgrades the 50G with an HP authorized proprietary firmware upgrade, adds on PSSLLC



**Figure 3**

keyboard template, puts it in the case, and screws on the top. Now you've got a water and dust resistant data collector with built in Bluetooth radio, or there is a 9-pin male serial connector if you want to use a cable. See **Figure 3**.

The back of the DC50 has an elastic strap that functions as the spring for the battery compartment cover. The picture shows a development unit with a black cover, while the production units have the addition of a tripod leg hook

at the single screw end, and the battery cover is the same yellow as the rest of the case. Pull down anywhere on the bottom cover, where the three screws are, against the tension of the elastic band and use your thumb to lift up at the same time and the cover lifts right off over the center screw. It can then be removed, but is still attached to the case via the elastic band. With the cover open, you can readily replace the 4 "AA" batteries (rechargeable batteries are

recommended, but standard batteries will work just fine). Simply put the projecting lug into the slot in the case, push down, and pull the clasp toward the bottom over the center screw, it snaps into place and release the cover clamp. Believe me it takes a lot more to explain it, even with the pictures, than it takes to do it! It is the neatest, quickest, easiest, field worthy solution, of changing batteries in the field that I have ever seen in all my 66.5 years, *period!*

But that's not all. Just sliding your thumb over the rubber cover on the SD card slot of the HP 50G will not open the cover. You need to pull it off with a combination of your thumb and finger to reveal the SD card for downloading and uploading data. After data is transferred, put it back in the HP50G and then push the cover firmly back in place for protection from the elements. You can order your DC50 with a right-handed or left-handed "quick release" post for your tripod bracket, too. Or just use it in your hand if you prefer.

I'd like to share a vignette from my visit with John and company for further illustration of John's perseverance. The window over the HP 50G's display is not a flexible membrane; rather, it is a nearly indestructible polycarbonate material with a very scratch resistant finish. Early units had a thinner window that resulted in a minute "lip" caused by the case thickness in the area. When I



**Figure 4**

say “minute” I mean just that. It was not visible to my naked eye. It only became apparent when John had me drag my fingernail across the area and I could feel it. This, opined John, could result in moisture collection in the area that was not acceptable to him. New units have a thicker window to eliminate the issue. That is the clear advantage gained when the designer is not only a surveyor but also a daily user!

There are two lights on the face of to the left of the LOGO. One is to show communications and the other blinks when a shot is taken. It is very helpful in high ambient noise situations. There are also four footpads to resist sliding on sloping surfaces.

Before I get into the operation side of the DC50, we need to take a look, literally and figuratively, at the display. This is one place where my photographs do not really portray a realistic story. In **Figure 4** three units are shown side-by-side in sunlight. To the left is the DC50; in the middle is my DellAximX30 with backlighting turned on, and next, the DC50 Assistant. I did not adjust the contrast of the PSSLLC products, which could have been done. In my opinion, the clarity of the monochrome screens is much better than the color screen of the AximX30. I have used the color pocket PC device with and without the environmental case and there is no doubt that the HP50G display is much clearer and easier to read in sunlight or shadow from any angle than the color pocket PC display. The pocket PC device “washes out”

especially when viewed from the side. The HP 50G display is superior to the HP48G in my opinion, too! That also goes for the 41’s. This is due to the input of PSSLLC to the folks at HP calculators. Their feedback was responsible for a change in the production methodology of the HP50G display screen. Again, in my opinion, the HP50G display, when you adjust the contrast to suit your eyes, is viewable from any angle in bright sunlight or in shadow, even when wearing polarized sunglasses.

If you are going to use Bluetooth as your communication method, you should purchase one of PSSLLC’s modules (**Figure 5**). The advantage of the Bluetooth over the cable is that you can put a less experienced person at the instrument to aim it at the prism. With



**Figure 5**



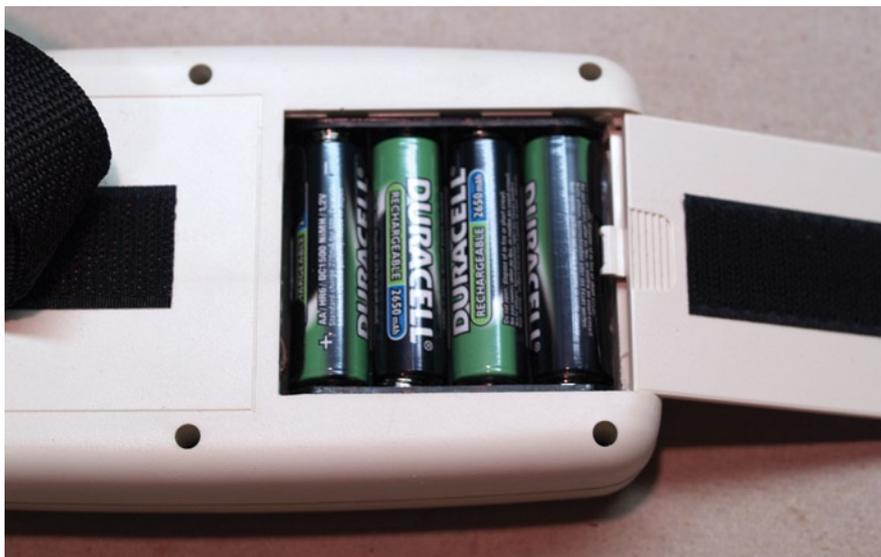
**Figure 6**

non-robotic instruments it enables you to enter the descriptor and rod heights from the rod, and also trigger the shot when you are ready. You gain control at the rod with this method on any total station, even one as old as my T1010. **Figure 6** shows the unit with its 9-pin male serial port for a cable connection to the total stations along with the “on-off” button. The Bluetooth radio communication module also runs on 4 “AA” batteries and has a Velcro strap for fastening it to the tripod legs (**Figure 7**).

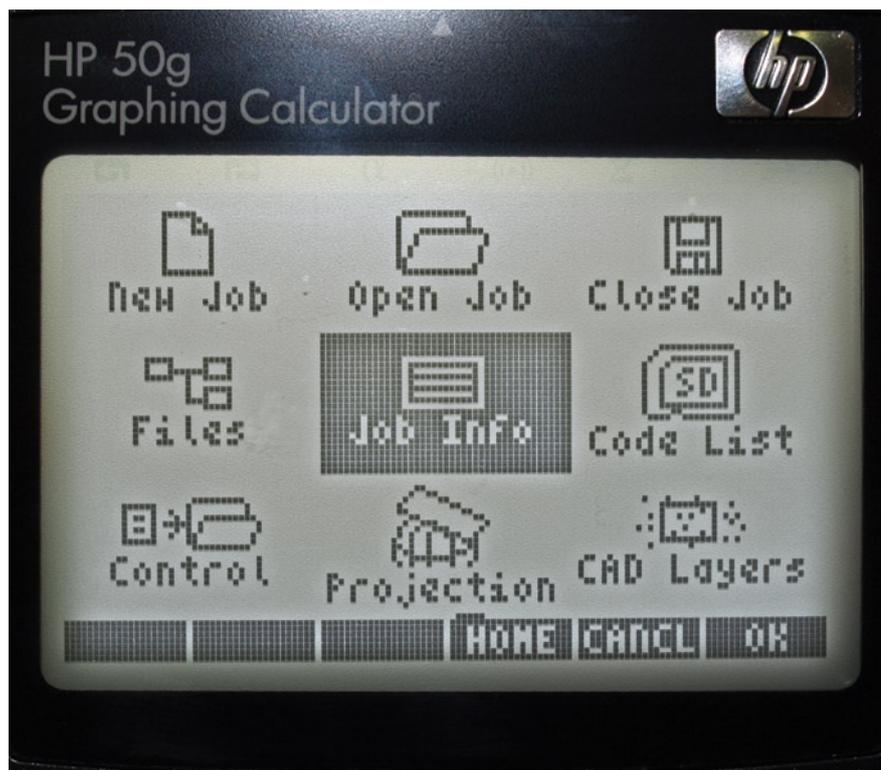
Now let’s take a look at the manual (which is being updated as improvements are made to the software). It is very well illustrated, concise, and clearly written. Chapter 3, Interfaces, is very useful to aid in your understanding and use of the software and speeding up your data collection. Chapter 4, Organization, is most helpful and enlightening, and although I know better, seems to be written for people like me who look at an icon and want more information on that particular subject while I am thinking about it. Later, when I want to skip the icons and go directly to a function, it is all there.

### Operation and Software

The “home” screen is where all your access of the program begins. The choices are Config, Data Files, User Progs, Tools, Survey, Point Cogo, Roading, DC tools, and Transfer. If you already have your job set up with



**Figure 7**



**Figure 8**

control file, layers, codes, lines, etc., just hit Survey and you are shown your present instrument point number, HI, BS station, BS circle reading, Azimuth, and HZ distance.

If your job is not already set up, choose Data Files. **Figure 8** shows the data file screen. Here is where you choose your job, old or new, associate a control file, projection and layers for the display, and list of codes. You can have a code list for private work, one for site plans, one for DOT work, or one for AIA projects. Just select the one you want from the SD card for the job you are going out to do. Supposing you are at the survey site, ready to start locating features, and you realize you did not load your code list. No problem at all, you can make up codes or add codes on the fly. How's that for flexibility?

Here is another very user friendly feature you will notice as you go through the various screens. Choose "config" from the "home" screen. Then press the "OK" soft key under the display. The "devices" icon will be highlighted. Press the "OK" soft key and the "instrument settings" screen is displayed. Three lines appear. The first is "use" from which you can choose a total station or GPS. Just above the "soft keys" is an explanation of what is being highlighted.

After selecting "total station" the second line now reads "brand" and the instruction above the "soft keys" now reads "Select Total Station Brand". The Enter Coordinate data screen is another thoughtful portion of the program that lets you know what input the programmer is expecting without you having to guess at it or go through trial and error until you get it right. Bill Gates, you could learn a lesson from this program!

From the "home" screen, use the silver arrow button to "Point Cogo" and press the "OK" soft key. You will see nine icons to choose from. Choose "Pt-Dir", press the "OK" soft key, and you are given the choice of Direction-Distance or Angle-Distance. Enter in an angle and distance to create point. Or from the home screen, choose "tools" and another 9 icons will be presented (triangle solver, geodetics, etc., allowing you to do many calculations).

PSSLLC uses GPS routinely, and one of the routines I frequently used when combining GPS with terrestrial methods is the "Inverse Grid to Ground". Enter your points and you instantly see your grid distance, ground distance, azimuth, and scale factor. This feature stems from John's experiencing in surveying many cell tower sites and is as handy as a pocket on a shirt.

On your way to the jobsite, go to the court house, get your record documents and plot up your deeds. Now combine your individual deeds into a mosaic easily by entering the point numbers of the two lines you want coincident. You are given the choice of whether to scale or not to scale your coincident lines if they do not happen to call the same distance. No translating and rotating, just input the two point numbers at the end of one line and the two point numbers of the second line with the corner you want to hold first and the deeds are now side by side.

An article such as this cannot really do justice to a software data collection package as full featured and flexible as the DC50. My main goal has been to call attention to the speed and flexibility of this software. The display is readable in bright sunlight! It is fast! It is flexible! It is full featured! The algorithms are written by and used in the field by practicing land surveyors on a daily basis. The coding is done by a gentleman who obviously knows his way around the HP50G's operating and storage systems and uses the native code to attain the highest possible execution speed. Remember those 35 years or older HP calculators that are still functioning! Bluetooth on a new robotic total station is one thing, but Bluetooth on my old Leica T1010 with the telescope mounted DI1001 is just fantastic. Visit their website, [www.pssllc.com](http://www.pssllc.com) to see their responses to user questions and feature requests and their implementation of them. You can download their manual from their website and see how you might be able to use this software.

The DC50 and DC50 Assistant are well worth more than a casual look. The folks behind this package are constantly trying and thinking of faster, better, and more durable ways to collect and process data. More important, they really enjoy the practice of land surveying! The existing environmental case and circuit board have been designed with an eye to the future. They have some things under development that I wish I had thought of, but I can tell you this much, one of them will bring about a sigh of relief and put a big smile on the faces of a lot of aspiring or already licensed and registered surveyors. When released, I would venture that a lot of you will be thinking, "Why didn't I think of that?" *A*