Surveying Solutions for the hp33s

Ted J. Kerber, *Software by D'Zign*

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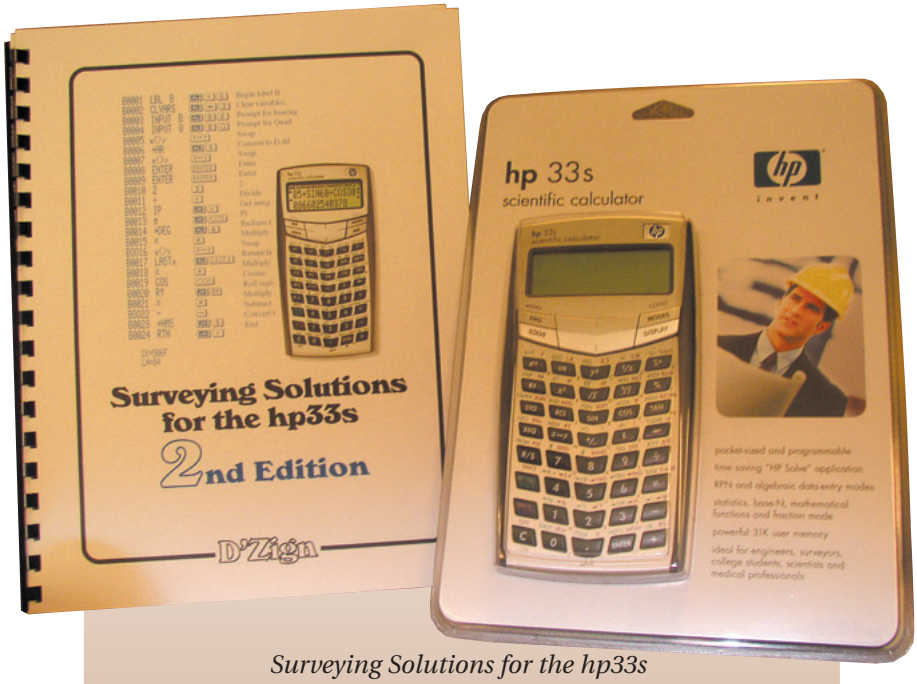

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Ted J. Kerber, Software by D'Zign
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Months ago you filled out an application, contacted your former employers and professional references, obtained transcripts, documented your working experiences, and sent the packet off to the Board of Registration. Now, in the palm of your hand, you hold their judgment, it's in THE ENVELOPE. Will the Board let you sit for the licensing exam or not? Only THE ENVELOPE knows! It holds the key to your future…well the key to your immediate future at least. Be careful of what you wish for! You rip open THE ENVELOPE and there it is: you've got six months 'till test day. Some advice: use this time wisely!

If you find yourself in this situation, or if you can see yourself faced with this situation in the not-too-distant future, you should stop, take a breath, and devise a strategy that will increase your chances of passing the examinations. Let's think about the surveying fundamentals exam for a moment. Your plan should include a thorough review of computations that are commonly used in surveying. At the least, you would do well to review a bit of algebra, trigonometry, coordinate geometry, statistics, horizontal and vertical curve, and area computations. This is good advice, as far as it goes but merely studying, in and of itself, is no grand strategy. To be most effective, studying should be a process that results in progress. If your study process lets you see the progress you've made, you'll be inspired to study more often.

On a bad day I can't tell the difference between a stop sign and a cosine, and I am afraid I must admit that if forced to recite the Law of Cosines from memory, I'll screw it up every time. Maybe you are good at memorizing formulae, but I'm not. So, when it came time for me to sit for the NCEES fundamentals exam (many years ago), I employed a strategy designed to make up for my inability to memorize mathematical formulae (or my uncanny ability to mess them up, if you prefer): I sat down with my trusty HP and my texts, and set out to write my own set of software tools for the kind of problems I figured I'd be solving on test day (and every day thereafter as it turned out). Now, there is much one can learn about a mathematical problem by writing a software program to solve it. The programming process forced me to think about things like variable definitions and units of measure and the logic of the problem at hand, as well as the mathematics of it.

In addition, the programs I wrote had to be tested (and edited) to ensure that they yielded correct results . . . every time. My process also included thorough documentation of my programs including the source of the mathematical formula, the algorithm I designed, the program code itself, variable definitions and a sample problem. But perhaps the biggest benefit I derived from this process was this: at the end of it, I had something tangible—my own software toolkit to show for my labors. This encouraged me to study more and more often. I went into the NCEES fundamentals exam well-prepared and confident of success—and I *was* successful, too!

Perhaps this sounds all well and good in theory, but what if you don't know anything at all about programming in practice? Or maybe you have discovered that the hand-held calculator you use

now has been declared illegal for the test? First of all, find out what calculators are allowed, buy one and then use it on a daily basis, even though it hurts to do so. You should be so sure of yourself that you could run "long hand" comps in the shower (cold water, please), in the dark, with your rain gear on. If you happen to choose a programmable calculator, like the popular and legal (for now) hp33s, so much the better, because there are discipline specific resources available you can consult for programming content and advice.

Ted J. Kerber, a California surveyor, calculator aficionado, and publisher has recently released a new edition of his *Surveying Solutions for the hp33s*, published by Software by D'Zign. The book provides a set of surveying software applications ranging from sexagesimal math to finding the station of a point of known elevation on a vertical curve. Included are routines for solving and staking circular curves as well as a good assortment of coordinate geometry tools: traverse, inverse, intersections, stakeout, etc. You would be well advised to approach this book as recommended by its author: It is meant as a workbook for reviewing the math problems as well as a source for the program code that solves them. If you walk into the testing room cold with this book and your hp33s, without having first familiarized yourself with both, you will fail. You will be back next year. Who needs that kind of grief?

Start by cracking the cellophane wrapper of the *User's Manual* that came with your calculator. Read and work through "Part 1: Basic Operation," to familiarize yourself with your new friend (calculator). You will be a better person for it, and it is worth the effort. You don't have to understand the all the details of programming the calculator presented in Part 2 of the manual, "Programming," because that's what Kerber provides in *Solutions,* but you will have to key-punch the programs into the machine manually—the hp33s has no magnetic cards or flash memory on which programs can be stored; nor is it equipped with infrared ports or cables that can be used to transfer programs from one machine to another. But this is a good thing, because you'll learn more about your calculator on the way. With Kerber's *Solutions* and a little effort on your part, you'll have not only built a digital toolkit for solving typical surveying problems, you'll have worked yourself though a review of basic surveying math as well. As you go, work through the sample problems provided in the book to ensure, not only that your programming was done properly, but also to familiarize yourself with the various input prompts and results that appear on the calculator's screen.

Kerber's programs are easy to use and run. The user specifies a routine to execute, provides input according to a screen prompt, and hits the Run/Stop key to either view output or to continue with additional input as required to solve the problem at hand. This approach has the advantage of consistency of operation, which, in my mind, is vastly more important in a stressful setting like a test, than would another, less linear approach to programming. Limitations of the hp33s aside (it has only 26 storage registers, so you won't be storing a land subdivision in it), it should prove to be a valuable ally in the testing room, thanks to Ted Kerber. If you take some time to review the concepts presented in his *Solutions* book, and get to know the machine and the software, you should do well. Sometimes, it *is* about the process.

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