
INTRODUCTION

HOW TO USE THIS BOOK

The **hp 33s** is a scientific calculator currently approved by the NCEES for use during the civil PE examination. This book will give you practice with the calculator's Equation mode and SOLVE function, concentrating on the types of equations and problems you are likely to encounter on the examination.

The book is in five parts. Part A, the largest, shows how to store 50 common equations in the **hp 33s**. Part B shows how to use these stored equations to solve 15 practice problems. Part C demonstrates the use of some preprogrammed functions of the **hp 33s** that can be useful on the exam. Part D is for those who prefer Algebraic mode to Reverse Polish Notation mode, and it covers the most important differences between these two modes. Finally, Part E is a quick reference section, which you may want to have handy on exam day. To make lookup faster, it contains just the information that will be useful during the exam.

A list of all 50 equations begins on page 2, organized by the discipline and session each equation is most likely to appear in. It will help you determine which equations you want to store. The steps for entering the first equation in Part A are explained in particular detail, so it's a good place to start.

The instructions in this book are generally in three columns. The left column gives the exact sequence of keystrokes to enter, and the right column contains a brief description of the purpose of each step. The middle column shows what appears on the **hp 33s** display after each step. The **hp 33s** display has two lines. Whenever only one line is shown for a step, it is the lower.

An equation stored in the **hp 33s** can only contain the letters *A* through *Z* as variables. This creates difficulties when the variables to be entered include Greek letters, names longer than one letter, or the same letter in upper- and lowercase or with different subscripts. In this book, a Greek letter is usually replaced with either the first letter of its English name (such as *B* for beta) or by a letter that resembles it (such as *W* for omega).

A common situation involves the same letter used with subscripts 1 and 2. In this book, the letter with subscript 2 drops the subscript, while the letter with subscript 1 drops the subscript and is shifted back in the alphabet one place. T_1 and T_2 , for example, are represented by S and T , respectively. You can use different variables if you prefer.

At some point, the equation being entered may become longer than the display screen. Small left and right arrows (see Annunciators later in this introduction) will appear on the display, and the large silver key just below the display can be used to scroll left and right.

After the equation has been entered, pressing and holding the SHOW key will display a checksum and the length of the entered equation. Every sequence produces a unique checksum, so these numbers can be used to confirm that the equation has been entered correctly. If you use other variables than the ones in this book, you'll get a different checksum.

In the solution process, it sometimes happens that an equation has more than one possible root. This can happen, for example, when the unknown variable is squared in the equation. When the hp 33s can't solve an equation directly, it uses an iterative process, using one estimate of the answer to derive another, closer estimate. To direct the hp 33s to the right range of possible values, you may need to begin by entering a reasonable estimate for the variable. On the PE exam, a reasonable value can usually be determined from the answer choices given. More information about this can be found beginning on page 7-7 of the User's Manual.



The hp 33s has many times enough memory to store all the equations in this book. But the more equations you store, the longer it can take you to scroll through the list and find the one you want. You may find it best to store only those equations most likely to be useful to you. Taking a practice exam with the hp 33s can help you gauge how many equations you can comfortably handle on your list.

GETTING STARTED WITH THE HP 33s

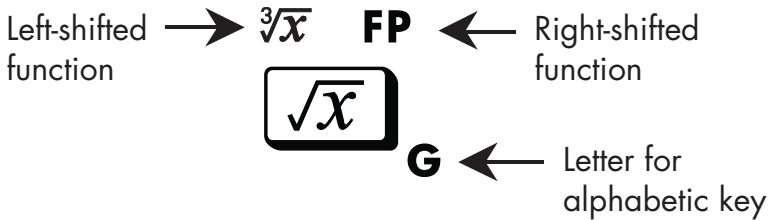
If you are already familiar with the hp 33s, then skip the rest of this introduction, head to Part A, and start storing the equations you want to have handy. Otherwise, here is a brief overview focusing on what you will need to know to use the calculator during the exam. Other specific functions will be explained as they come up in the book. If you want to learn more, Appendix G in the User's Manual defines and explains the use of each and every key and function of the hp 33s.

In Equation mode, equations are entered in algebraic notation. The usual operator precedence is followed: first operators in parentheses, then exponents,

Shifted Keys




Above each key are printed two more functions, one in green and one in purple. To use one of these functions, first press the green or purple shift key ( or ) , and then press the key for the function. Pressing a shift key a second time cancels the shift.

Some green and purple functions are grouped by field. Statistical functions are in the top row, trigonometric functions are in the third row, and probability functions are in the fourth.



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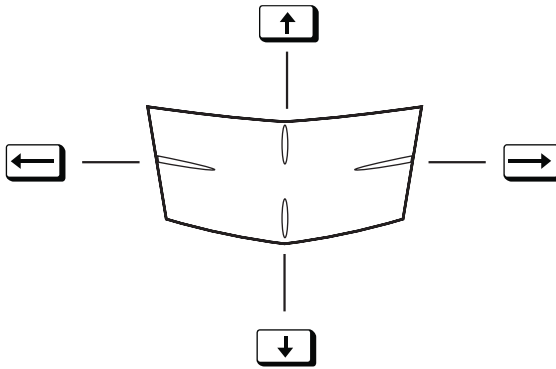
Alpha Keys

Some keys also have a letter of the alphabet printed to the lower right. Use these “alpha keys” whenever the hp 33s expects the name of a variable. Pressing   , for example, puts the current value of variable *K* into the display; the  key signals that whatever key is pressed next will name a variable. When the alpha keys are active, the small **A..Z** annunciator appears at the top of the display.

Silver Keys

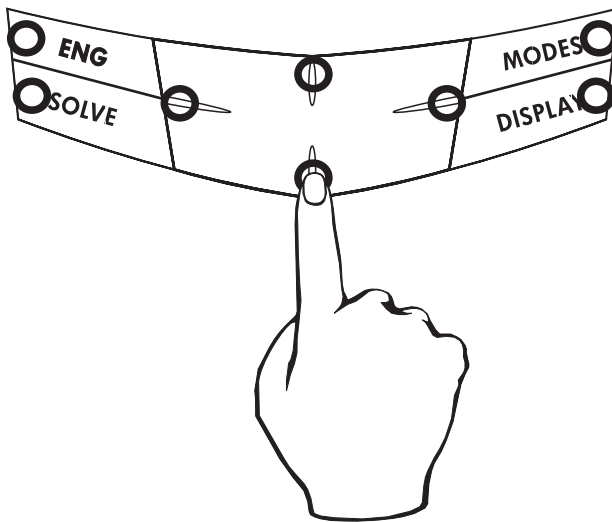
The large silver key is used to move through various lists or answers. This key can be thought of as having arrows at its indentations. Press on the top edge to scroll up, on the right edge to scroll to the right, and so on.

When there is information off the display that can be brought into view with the large silver key, small arrows will appear on the screen.



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To the sides of the large silver key are four smaller silver keys. The pressure points on the keys are shown here.



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


Annunciators

Small symbols called annunciators will appear on the display at times, usually to give information about the mode or status that the hp 33s is in. All the annunciators are shown here.




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
Correcting Errors

To correct errors, backspace with , or clear the number currently displayed with . Pressing  and then selecting VARS will reset all variables to zero. These keys are explained in more detail in the User’s Manual.

Equation Mode

To store a new question or solve one you’ve already stored, enter Equation mode by pressing .

RPN and ALG Modes

The calculator is normally in RPN mode. If it isn’t, set it in this mode by pressing . To select ALG mode, press .

EQUATION MODE VERSUS PROGRAMMING

These instructions show how to use the calculator’s Equation mode, not its real programming capabilities. Programming is covered in the User’s Manual, Chapters 12 to 17.

There are some advantages to writing programs for these equations instead of storing them in Equation mode. Programming lets you use word prompts for the variables, and allows you to retrieve an equation with a letter name instead of by scrolling through a list.

But against this are the disadvantages that programming on the hp 33s takes time and limits you to 26 equations. The aim of this book is to help you make the best use of your time in preparing for the civil PE exam, and using Equation mode is the way to do that.