
INTRODUCTION

HOW TO USE THIS BOOK

The hp 33s is a scientific calculator approved by the NCEES for use during the FE/EIT examination. This book will help you save time on the exam by giving you practice with the calculator's Equation mode and SOLVE function, concentrating on the types of equations and problems you are likely to encounter.

Faced with a problem concerning half-life, for example, you might need a couple of minutes to calculate the value of

$$N = N_0 e^{-0.0693t/\tau}$$

And you'd probably need even longer if the variable you needed to calculate was τ and not N . But if you have this equation already stored in the hp 33s, you only need to enter the values of N , N_0 , and t , and you have the value of τ in a moment.

This book will help you decide which equations to store. When you turn to page 1, you'll see a list of 38 of the most common equations on the FE/EIT exam. Next to each equation is the page number on which it appears in the NCEES *Fundamentals of Engineering Supplied-Reference Handbook*, 7th Edition. Also shown are the subject disciplines each equation is most likely to appear under during the examination. This will help you determine which equations to store.

The rest of the book is in four parts. Part A, the largest, shows you how to store each of these equations in the calculator. The steps for entering Equation 1 are explained in particular detail, so it's a good place to start if you're unfamiliar with the process.

Part B shows how to use these stored equations to save time in solving problems. Part C demonstrates the use of some preprogrammed functions of the hp 33s that can be useful on the exam. Finally, 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.

The hp 33s has sufficient memory to store all the equations in this book. However, the more equations you store, the longer it will take you to find a particular equation during the examination. You may find it best to store only those equations most expected to be useful to you. Taking a practice exam using the hp 33s can help you gauge the number of equations you can comfortably handle on your list.

In Equation mode, equations are entered in algebraic notation. The usual operator precedence is followed: first operators in parentheses, then exponents, the unary minus (changing the sign of a number), multiplication and division, and finally addition and subtraction. Multiplication by adjacent parentheses is not recognized; the multiplication symbol must be used.

After you have entered an equation, you can display a unique checksum and the length of the equation by pressing and holding the SHOW key. If the numbers shown on the calculator match the numbers in this book, the equation has been entered properly.

The display of the hp 33s has two lines. Whenever only one line is given in this book, it is the lower that is shown.



The hp 33s cannot represent variables in lower case, with subscripts, or containing multiple letters. Normally in this book a letter will be used similar to that in the NCEES equation. A Greek letter is represented either by its English transliteration (as B for β , beta), or by an English letter that resembles it reasonably closely (as P for ρ , rho). Where two variables use the same letter with subscripts 1 and 2, the preceding letter is used for the former. Thus, T is used for T_2 and S is used for T_1 .

You may use other variables if you prefer. However, if you change a variable, or a sequence of operations, the checksum will differ from that shown here.

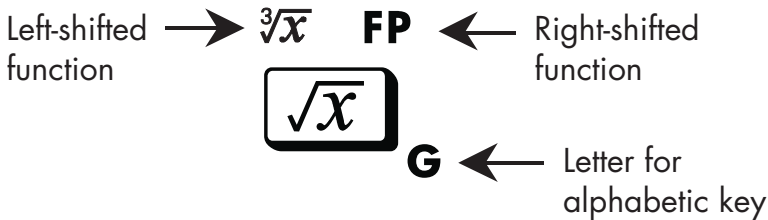
When an equation being solved has multiple roots, the calculator may return zero, find no root, or show the correct answer only after a considerable time. To avoid this, store a reasonable value in the variable of interest before solving the equation. Doing so bounds the problem. On the exam, you can determine a reasonable value from the possible answers given for a problem. See problem 3 in Part B for more information or Chapter 7 and Appendix D in the User's Manual.

When an equation being entered becomes longer than can be displayed on the hp 33s, a small arrow appears on the left side of the display (see Annunciators later in this introduction). By scrolling with the large silver key just below the display, one can view any portion of the equation desired.

Shifted Keys




Above each key are printed two more functions, one in green and one in purple. These functions are accessed by first pressing the green or purple shift key ( or ) , and then pressing the key for the function. Pressing a shift key two times in a row 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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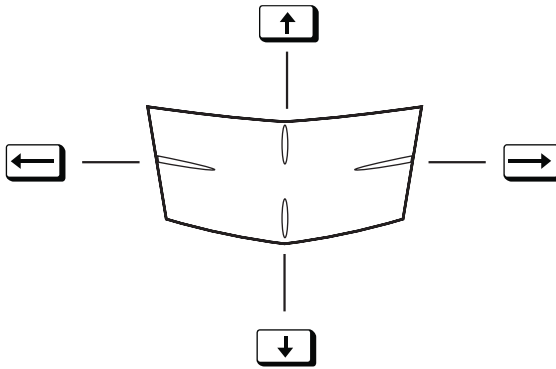
Alpha Keys

Some keys also have a letter of the alphabet printed to the lower right. Use these “alpha keys” whenever the hp 33s expects a variable (or other alphabetic label). Pressing   , for example, puts the current value of variable *K* into the display; whatever key is pressed next after the  key is treated by the HP 33s as a variable. When the alpha keys are active, the small **A..Z** annunciator appears at the top of the display.

Silver Keys

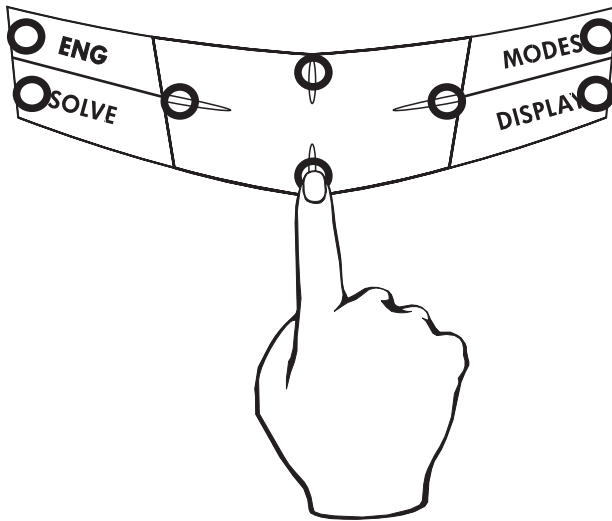
The large silver key is used to move through various lists or answers. This key can be thought of as having arrows at its indentations. Press on the top edge to scroll up, on the right edge to scroll to the right, and so on.

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.



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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.







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Correcting Errors

To correct errors, backspace with the  key, or clear the number currently displayed with the  key. These keys and the CLEAR key are explained in more detail on pages 1-5 and 1-6 of the User’s Manual.

RPN and ALG Modes

The calculator is normally in the RPN mode. If it is not, it can be set by pressing  . The ALG mode may be selected by pressing  .

EQUATION MODE VERSUS PROGRAMMING

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

Programming allows you to use word prompts, and lets you retrieve an equation with a letter name instead of by scrolling through a list. But these are small gains, and programming is time-consuming and tedious. The goal of this text is to prepare you for the exam by the most expeditious path, and that path is Equation mode.