

## Appendix B

# Understanding and Using Your TI-30X IIS Scientific Calculator



The examples of calculator use in this book are done with the Texas Instruments TI-30X IIS calculator. It is quite affordable, easy to learn, widely available and capable of doing all the calculations you will need to do. It also has many capabilities that are not needed for the purposes of this book (fractions, trigonometry, hyperbolic, rectangular and polar coordinates, statistics and probability). So don't become intimidated by all the keys; you will quickly master the few keys you need to use.

You may already have a calculator that will work very well. All you have to do is determine which keys to press on *your* calculator, based on the examples given in this book.

At the end of this Appendix is a list of where to find additional information about using your TI calculator.



**Figure B-1 — The Texas Instruments TI-30X IIS calculator is recommended for performing the calculations used throughout this book.**

the lower line of the display, and you can insert that answer into a new calculation by pressing the keys 2<sup>nd</sup> (-). There's no need to re-enter an answer if you use this handy feature.

• There are two other keys that can be real time savers. Once you enter an equation, and press the equals sign (=) to see the result of your calculation, the equation you entered is stored in a memory. To retrieve the equation, simply press the up arrow key (↑). There's no need to re-enter an equation if you use this handy feature, and then you can change a number in the equation to quickly see the

effect. Using the up arrow key and the down arrow key (↓), you can scroll through many equations you've entered recently.

- There are two keys that at first look alike. The *subtract* key, which is dark blue and has a white minus sign on it, should be used when subtracting two numbers (for example,  $7 - 4 = 3$ ). The *negation* key is white and has a black minus sign enclosed in parentheses (-) on it. Use it when entering a negative number like an exponent:  $10^{-2} = 1/10^2 = 1/100$ .
- At the top left of the keypad is a light blue key labeled 2<sup>nd</sup>. Above many other keys is a light blue label, which is a second function for that key, *if* you first press the key labeled 2<sup>nd</sup>. For example, if you want to take the square root of 16, you would press

2<sup>nd</sup> X<sup>2</sup> 1 6

since above the X<sup>2</sup> key is the square root symbol, in light blue.

- When in doubt, use parentheses to make it clear to the calculator what you're trying to do. For example, if you wanted to add 2 and 3, and then multiply the result by 4, pressing the following keys will *not* give the correct answer:  $2 + 3 \times 4$ . The calculator has a very particular order in which it performs calculations. To get the correct answer, enter  $(2 + 3) \times 4$ , and the correct answer of 20 will appear. Remember, the upper display can hold 88 characters, so a few parentheses, even if not needed, don't cause any problems. They may just help you to get the right answer.
- As you use your calculator, you'll become very proficient at making it do what you want it to. For example, instead of keying in  $(2 + 3) \times 4$ , you can leave out the  $\times$  (meaning multiply) key, and simply key in  $(2 + 3) 4$  and get the same result.
- The default mode for expressing angles is the *degree*. There are 360 degrees in a circle, and 90 degrees in a right angle. When you first turn on your calculator, or if you reset it, the mode for angles is the degree. You *could* change the angle mode to *radians* or *gradians*, if

## Information About the Calculator

- If no key is pressed for about 5 minutes, the calculator will turn itself off. When you turn it back on, all the information in the 2-line display will be there.
- If it won't turn on, replace the battery.
- If the screen goes blank, replace the battery.
- If you get results you don't expect, replace the battery.
- The calculator has a two-line display. The upper line can hold up to 88 characters including digits and mathematical operators like  $\times$  (the *multiply* symbol), but you can see only 11 at a time. The left and right arrow keys ( $\leftarrow$  and  $\rightarrow$ ) allow you to "move" anywhere on the upper line display. In **Figure B-1**, you can see the equation  $123 + 456$  in the upper line, and 579 in the lower line.
- If you perform a calculation, the answer will appear in

**Table B-1**

### Keystrokes Needed to Perform Basic Operations

Operation	Key(s) to Press
Turn the calculator on	ON
Turn the calculator off	2 <sup>nd</sup> ON
Reset the calculator	ON CLEAR (press both keys at the same time)
Reset the calculator	2 <sup>nd</sup> RESET
Fix the number of digits displayed	2 <sup>nd</sup> FIX $\rightarrow \rightarrow$ (or more) =
Delete the last character entered	DEL
Delete any character entered	DEL (put cursor on the character you want to delete)
Insert a character between 2 others	2 <sup>nd</sup> INS (put cursor on a character; the new character will be inserted to its left)
Enter Scientific Notation mode	2 <sup>nd</sup> SCI/ENG $\rightarrow$ =
Enter Engineering Notation mode	2 <sup>nd</sup> SCI/ENG $\rightarrow \rightarrow$ = (Engineering Notation is the best mode to use for all calculations in this book)

you wanted to, but for the purposes of this book, leaving degrees as the angle mode is best.

- In Figure B-1 you can see the ENG and DEG labels at the bottom of the display. These tell us that the calculator has been set to Scientific Engineering Mode, and that the Angle Mode is *degrees* (not radians or gradians — these are not needed for anything in this book). Engineering Notation is the best mode to use for all calculations in this book.

Table B-1 summarizes the keystrokes needed for basic operations.

### Examples

The following examples show how to use your TI-30X IIS calculator to solve equations.

From Unit 2, Chapter 11, on Ohm's Law:

#### Example 1

$$E = I \times R$$

$$E = 5 \text{ mA} \times 2 \text{ k}\Omega$$

$$E = 5 \times 10^{-3} \text{ A} \times 2 \times 10^3 \Omega = 10 \text{ V}$$

Calculator keystrokes:

$$5 \text{ 2nd EE } - 3 \times 2 \text{ 2nd EE } 3 =$$

[Note that the – (minus sign) key in the equation above is the *white key* under the 3 key. There is a – (subtract) key above the + (add) key. *Do NOT use the blue subtract key* when you mean to use the white minus sign key.]

The calculator's second display line shows:  $10 \times 10^{00}$



[Note that  $10^{00} = 10^0 = 1$ , so  $10 \times 10^{00} = 10 \times 1 = 10$  (volts).]

#### Example 2

$$R = E / I$$

$$R = 15 \text{ V} / 2 \text{ mA} = 15 \text{ V} / (2 \times 10^{-3} \text{ A})$$

$$R = 7.5 \times 10^3 = 7.5 \text{ k}\Omega$$

Calculator keystrokes:

$$1 \ 5 \div 2 \ \text{2nd EE} \ - \ 3 =$$

The calculator's second display line shows:  $7.5 \times 10^{03}$



From Unit 3, Chapter 15, on Frequency, Period and Examples of AC Voltages:

#### Example 3

$$f = \frac{c}{\lambda} \quad \text{(Equation 15-3)}$$

$$f = \frac{c}{\lambda} = \frac{3.00 \times 10^8 \text{ m/s}}{80.5 \text{ meters}} = 3.727 \times 10^6 \text{ Hz} = 3.727 \text{ MHz}$$

Calculator keystrokes

$$3 \ \text{2nd EE} \ 8 \div 80 \ . \ 5 =$$

The calculator's second display line shows the result:  $3.7267 \times 10^{06}$



[Note that  $10^{06} = 10^6 = 1,000,000$  so  $3.7267 \times 10^{06} = 3.7267 \times 1,000,000 = 3.7267 \text{ MHz}$ ]

### Additional Information for Your TI Calculator

The calculator comes with:

- A two-sided card in the cover of the calculator
- An information sheet explaining nearly everything about the calculator
- A sheet with examples of what each key does, and how to use it

A 5-page *Quick Reference Guide* on how to use all of the functions of the TI-30X IIS calculator may be found online:

[education.ti.com/downloads/guidebooks/scientific/30xii/30xiiqrg-eng.pdf](http://education.ti.com/downloads/guidebooks/scientific/30xii/30xiiqrg-eng.pdf)

A comprehensive *Guidebook for Teachers*, with 118 pages, may be found online:

[education.ti.com/downloads/guidebooks/scientific/30xii/teacher\\_guide/30xiitg-eng.pdf](http://education.ti.com/downloads/guidebooks/scientific/30xii/teacher_guide/30xiitg-eng.pdf)