HP 20b Business Consultant

Financial Calculator Quick Start Guide

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Contents

HP 20b Business Consultant

Keyboard Map Legend

No.	Feature	Chapter(s)	No.	Feature	Chapter(s)
1	Time Value of Money keys	4	16	Annunciator display area	1
2	Cash Flows, IRR, and NPV menus	5	15	Amortization and Depreciation menus	4,8
3	Data and Statistics menus	3	14	% key and Percent Calculation menu	2,6
4	Input	1	13	Store and Recall	1
5	Memory	1	12	Break-even menu	9
6	Up/Insert and Down/Delete keys	1	11	Backspace key and Reset menu	1
7	Shift key	1	10	Math Menu	2
8	On/Off	1	9	Mathematical functions (rows)	2

1   Basic Features

Welcome to the HP 20b Financial Calculator

This guidebook is designed to get you started with your new 20b Financial
Calculator. If you require more detailed information about calculator operation
and features, please refer to the training materials available at:
www.hp.com/go/calctraining.

Turning the Calculator On and Off

To turn on your calculator, press [ON/CE]. To turn it off, press [▭] [OFF].

Turning the calculator off does not erase any data you have stored. The
calculator automatically turns itself off after approximately five minutes to
conserve energy. If you see the low battery symbol (▭) in the display, replace
the batteries. See *Chapter 10, Warranty and Contact Information* for instructions
on replacing the batteries.

Selecting a Language

English is stored as the default language. To select a language other than
English for messages on the display:

1. Press [▭] [Mode] to access the Mode menu. *FIX=* displays on the top
line of the screen.

2. Press ▲ repeatedly until English displays on the screen.

3. Press INPUT until the desired language is displayed. The displayed language is the active setting.

4. Press ON/CE to return to the default calculator screen.

For more information on accessing menus and changing calculator settings, refer to the section below titled, *Accessing Menus*.

Adjusting the Display Contrast

To adjust the brightness of the display, press and hold ON/CE while pressing the + or − keys. Each press of the + or − keys slightly increases or decreases the brightness of the display.

Cursor

When you enter a number, the cursor (-) blinks in the display and indicates you are in *number entry* mode.

Two Line Display

There are two lines in the display screen as shown in Figure 1-1:

SIN

050

RPN

Figure 1-1 Display Screen

The top line of the screen displays operation status, operator symbols, annunciators, and abbreviations of the registers, variables, and menus. Throughout this manual, this line is referred to as the *top line*. In Figure 1-1, *SIN* and *RPN* on the far right are on the top line.

The bottom line displays numbers you have entered, or results. Throughout this manual, this line is referred to as the *bottom line*.

When no operations have been entered and no operations are pending, the bottom line of the screen displays *0*. This state of the calculator is referred to as the *default calculator screen*.

The Mode Menu: Setting Preferences

The Mode menu allows you to customize the calculator. To access the Mode menu, press �▐ Mode. Press ▲ or ▼ repeatedly to scroll through the menu starting with *FIX=2* (the number of digits displayed to the right of the decimal point). Once an item is displayed, press ▐ INPUT ▐ to cycle through the other options for that setting. To exit the Mode menu, press ON/CE. Table 1-1 below lists the items in the Mode menu.

Table 1-1 Mode Menu Settings

Setting	Display Description
FIX= 2	The current number of digits displayed to the right of the decimal point. Default is *2*. Key in the number of digits you want and press $\boxed{\text{INPUT}}$, or press $\boxed{=}$ until the number of digits you want is displayed.
Degree or Radian	The current angular mode in degrees or radians. Default is *Degree*. Pressing $\boxed{\text{INPUT}}$ toggles between these options.
Date: mm dd yyyy or dd mm yyyy	The current format for dates entered into menus: *mm dd yyyy* or *dd mm yyyy*. December 3, 2010 is entered as *12.032010* in *mm dd yyyy* format, or *3.122010* in *dd mm yyyy* format. Note the (.) in both formats separating the first and second groups. Default is *mm dd yyyy* format. Pressing $\boxed{\text{INPUT}}$ toggles between these options.
1.23 or 1,23	The current decimal separator as a decimal point or comma. Default is decimal point, *1.23* Pressing $\boxed{\text{INPUT}}$ toggles between these options.

Table 1-1 Mode Menu Settings

Setting	Display Description
Decimal or Comma	The current thousands separator. Decimal (1000.00 or 1,000.00); Comma (1000,00 or 1.000,00). Default is decimal. Pressing $\boxed{\text{INPUT}}$ cycles through these options.
Chain, Algebraic, or RPN	The current operation mode. Default is *Chain*. Pressing $\boxed{\text{INPUT}}$ cycles through these options.
English, Français, Deutsch, Español	The current language option. Default is *English*. Pressing $\boxed{\text{INPUT}}$ cycles through these options.
Actual or Cal.360	The current calendar options for bonds and date calculations. Default is *Actual* Pressing $\boxed{\text{INPUT}}$ toggles between these options.
Annual or Semiannual	The current bond type. Default is *Annual*. Pressing $\boxed{\text{INPUT}}$ toggles between these options.

Changing the Operating Mode

After viewing the default settings, suppose you want to change the operating mode from Chain to RPN. See Table 1-2.

Table 1-2 Changing the Operating Mode

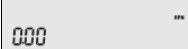| Keys	Display	Description
▢ [Mode]	FIX = ▪ ᴵᴺᴾᵁᵀ ▪ 200	Opens the Mode menu, starting with first setting option, *FIX=*, the number of digits displayed to the right of the decimal point.
[▼][▼][▼][▼] [▼] (Press five times)	Chain ᴵᴺᴾᵁᵀ	Scrolls to the current setting for the operating mode, *Chain*.
[INPUT] [INPUT] (Press two times)	RPN ᴵᴺᴾᵁᵀ ₐₚₙ	Selects *RPN* as the active setting. Note the *RPN* annunciator to the right.
[▲] or [▼]		Pressed repeatedly, scrolls through other settings in the menu. The displayed settings are the active settings.

11

Table 1-2 Changing the Operating Mode

Keys	Display	Description
ON/CE	0.00	Exits the Mode menu and returns you to the default calculator screen.

Key Presses and the Shift ▭ Key

To activate a key, press and release the desired key.

Most of the 20b's keys have two functions: the primary function and the shifted, or *secondary* function. The primary function is printed on the top of the key. The secondary function is printed on the bevel of the key.

To activate the secondary function of a key, press and release ▭ followed by the key with the secondary function printed on the bevel. Unlike the shift key on a typewriter or computer keyboard, it is not necessary to press and hold ▭ while pressing another key.

In this manual, commands with secondary key functions are represented by the shift key symbol, ▭, followed by the key with the secondary function. For example, to activate sine, press ▭ SIN .

12

When ⬜ is active, the down arrow annunciator appears on screen, indicating that the next key pressed will execute the secondary function of the key. To cancel an accidental press of ⬜, simply press ⬜ a second time.

Key commands for example problems are provided throughout the text and in tables. Key symbols are placed in the order they are to be pressed, from left to right.

Annunciators

Annunciators are symbols that appear in the display as messages, or after certain keys or key combinations have been pressed. Annunciators are special symbols indicating a specific status in the calculator. Table 1-3 lists the annunciators.

Table 1-3 Annunciator Symbols

| Annunciator Symbol	Status
(•)	The shift key has been pressed. When another key is pressed with this symbol displayed, the secondary function printed on the bevel of the key is activated.
Big (=) symbol	When displayed with an item, for example, *Price =*, it indicates the value assigned to that variable.

13

Table 1-3 Annunciator Symbols

| Annunciator Symbol	Status
Small (=) symbol	Indicates an item for which the $\boxed{=}$ key is valid. This symbol appears on the upper right of the display screen.
⬭	Battery power is low.
BEG	Begin mode is activated.
STO	Stores a number in memory.
RCL	Recalls stored numbers.
RAD	Radians setting is active.
RPN	RPN mode is active.
360	The 360-day calendar option is active.
INPUT	Input mode is activated.

The $\boxed{\text{INPUT}}$ Key

The $\boxed{\text{INPUT}}$ key is used to input values for variables and execute menu items.

The $\boxed{\text{INPUT}}$ key is also used in Reverse Polish Notation (RPN) mode to enter a number on the stack or duplicate it.

The $\boxed{=}$ Key

The $\boxed{=}$ key is used at the end of a mathematical operation to calculate the final result. For example, $\boxed{1}$ $\boxed{+}$ $\boxed{2}$ $\boxed{=}$ returns a final result of *3*.

The $\boxed{=}$ key also allows you to request a calculation for the value of an item. This request only applies to items that can be calculated.

For example, when you select the nominal interest rate (*Nom. %=*) in the Interest Conversion (Iconv) menu, pressing $\boxed{=}$ outside of a mathematical operation calculates and displays the nominal interest rate based on the stored data in the other variables in the menu.

To open the Iconv menu, press $\boxed{}$ $\boxed{\text{Iconv}}$. *Nom %=* displays on the top line, and the current value assigned to the nominal interest rate is displayed on the bottom line. At this screen, press $\boxed{1}$ $\boxed{2}$ $\boxed{\text{INPUT}}$ to enter a new current value for the nominal rate. Press $\boxed{\blacktriangledown}$ followed by $\boxed{=}$ to calculate the current value for the effective rate. See Figure 1-2.
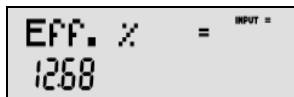

Figure 1-2

When an item for which the $\boxed{=}$ key is valid displays, the small indicator (=) is displayed on the top line at the right of the screen. Do not confuse this small annunciator (=) with the larger annunciator $(=)$ found to the right of a variable.

Editing Entries and Clearing

The On/CE $\boxed{\text{ON/CE}}$ Key

Pressing $\boxed{\text{ON/CE}}$ one time cancels current number entries, mathematical operations, or a menu selection, in that order.

Pressing $\boxed{\text{ON/CE}}$ repeatedly while performing multiple actions or operations, or with multiple operations pending, cancels one operation at a time, from the latest to the earliest.

The Reset $\boxed{}\boxed{\text{Reset}}$ Menu

The Reset menu allows you to reset some, or all, of the menu items, variables, and registers to their default values.

To open the Reset menu, press $\boxed{}\boxed{\text{Reset}}$. *TVM* displays on the top line. Press $\boxed{\blacktriangledown}$ repeatedly to scroll to a specific item. If you select the command to reset all values, *All*, you will be prompted to confirm your choice. To reset, press $\boxed{\text{INPUT}}$. At the *All Reset* message, press $\boxed{\text{ON/CE}}$ or $\boxed{\text{INPUT}}$ to exit.

Pressing $\boxed{}\boxed{\text{Reset}}$ while working within a particular menu takes you directly to the item of the Reset menu that allows you to reset that menu. Say, for example, you

16

are working in the Bond menu and you wish to reset all your entries in the Bond menu. From anywhere in the Bond menu, press ⬛ Reset. *Bond* displays on screen. At this prompt, pressing INPUT resets the Bond menu and returns you to the last item you were working with in the Bond menu.

Notes about Special Menus

The Mode, Memory, Math and Reset menus are special menus, because when you exit them by pressing ON/CE, you return to the previous menu (if any). This feature allows you to work in two or more menus simultaneously without having to exit a menu and lose your work.

Memory

The Cash Flow and Statistics menus share the same memory and are limited to a combined total of 50 memory slots.

Macros can record up to 120 keys.

Since entering data in menus can represent a significant amount of work, when the reset commands for the macro, cash flows, statistics and delete all (*Del.All?*) functions are used, you will be asked to confirm your choice. At the prompt, press INPUT to confirm, or ON/CE to cancel.

Accessing Menus and Menu Maps

Many of the 20b's functions are located within menus. To access a menu, press the key, or shift key combination for the menu in which you wish to work. To exit a menu, press $\boxed{\text{ON/CE}}$.

For example, to access the Break-even menu, press $\boxed{\quad}$ $\boxed{\text{BrkEv}}$. Once opened, you can scroll through the items in the menu by pressing $\boxed{\blacktriangle}$ $\boxed{\blacktriangledown}$ repeatedly. When you arrive at the last item in a menu, pressing $\boxed{\blacktriangledown}$ returns you to the first item. Similarly, pressing $\boxed{\blacktriangle}$ one time on the first menu item scrolls to the last item in the menu.

In this manual, diagrams called *Menu Maps* are included at the beginning of each section to assist you in navigating through the menus used for that section. For an example of a menu map, see Figure 1-3 below.
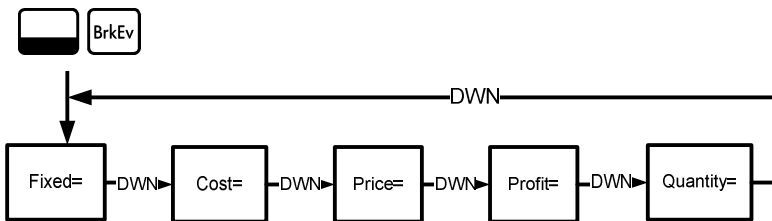

Figure 1-3 The Menu Map for the Break-even Menu

There are four types of menu items:

1. **Read/write.** Read/write menu items, such as *Price=* in the Break-even menu shown above, are easily recognizable, because when they are selected, both the *INPUT* and small (=) annunciators are lit. When lit, these annunciators indicate that entering a number and pressing ⌈ INPUT ⌉ will store the entered number in the displayed menu item. By pressing ⌈ = ⌉ (outside of a mathematical operation) you will then calculate the value for that item based on data entered elsewhere in the menu.

2. **Read-only.** Read-only items such as Internal Rate of Return (*IRR%=*) in the IRR menu are display-only; they are calculated values computed internally by the calculator.

3. **Write-only.** Write-only items, such as investment interest rate (*Inv. I%=*) in the Net Present Value (NPV) menu, are similar to read/write items in that the *INPUT* annunciator is lit when these items are selected, indicating that entering a number and pressing ⌈ INPUT ⌉ stores that number in that menu item.

4. **Special items.** Special items, such as the *Degree/Radian* option in the Mode menu, the items of the Reset menu, and the items of the Percent Calculation (%calc) menu perform an action when ⌈ INPUT ⌉ is pressed. Depending on the menu, this action can be the selection of a sub-menu in the %calc menu, changing a mode or setting in the Mode menu, or erasing data with the Reset menu.

2   Mathematical Calculations

Mathematical Functions

Mathematical functions are located:

- On keys, such as, $\boxed{+}$ $\boxed{-}$ $\boxed{\times}$ $\boxed{\div}$ etc.

- On shifted, or secondary functions, such as, $\boxed{}$ $\boxed{\text{SIN}}$

- In the Math menu $\boxed{}$ $\boxed{\text{Math}}$

Number Entry and Display

Numbers are entered by pressing:

- Numbered keys, 0-9

- The decimal point $\boxed{\cdot}$

- The $\boxed{+/-}$ key

- The $\boxed{}$ $\boxed{\text{EEX}}$ keys

To correct a number entry, press $\boxed{\leftarrow}$. Each press of $\boxed{\leftarrow}$ erases the last digit or symbol you entered.

Change how numbers are displayed on screen with the options in the Mode menu. For more information on calculator display settings, see the section titled, *The Mode Menu: Setting Preferences.*

To enter a number in the display, press the digits successively. A number can have up to 12 digits.

To change the sign of a number from positive to negative, press $\boxed{+/-}$.

Use scientific notation to enter very large and very small numbers. For example, to enter the number *12345.12^{123}* in scientific notation, first enter the mantissa, *12345,* then press $\boxed{}$ $\boxed{\text{EEX}}$ and enter the number representing the exponent, *123.* The exponent must have a value between -499 and +499.

Chain Mode

By default, calculations are performed in Chain mode. To change the calculating mode, refer to the section titled, *The Mode Menu: Setting Preferences.*

Calculations in Chain mode are interpreted in the order in which they are entered. For example, enter the following numbers and operations as written from left to right: $\boxed{1}$ $\boxed{+}$ $\boxed{2}$ $\boxed{\times}$ $\boxed{3}$. See Figure 2-1. Note how if you press an operator key, $\boxed{+}$ $\boxed{-}$ $\boxed{\times}$ $\boxed{\div}$, after $\boxed{=}$, the calculation is continued using the currently displayed value.
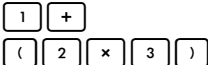
```
900
```

Figure 2-1 Calculation in Chain Mode

In Chain mode, if you wish to override the left to right order of entry, use parentheses $\boxed{(}$ $\boxed{)}$ to prioritize operations.
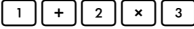
21

For example, to calculate 1+ (2 x 3), you may enter the problem as written from left to right, with parentheses to prioritize the multiplication operation. See Table 2-1 below.

Table 2-1 Simple Arithmetic Calculations in Chain Mode

Keys	Display	Description
[1] [+] [(] [2] [×] [3] [)]	) 6.00	Sets operational priority, inputs numbers, and multiplies 2 and 3.
[=]	7.00	Adds 1 to 6 and returns *7.00* on the bottom line as the final result.

Algebraic Mode

To set the calculator in Algebraic mode, refer to the section titled, *The Mode Menu: Setting Preferences.*

In Algebraic mode, multiplication and division have a higher priority than addition and subtraction. For example, in Algebraic mode, pressing [1] [+] [2] [×] [3] returns a result of *7.00*. In Chain mode, the same key presses return a result of *9.00.*

In Algebraic mode, operations have the following priority:

22

- First priority: the power function (y^x)

- Second priority: combinations and permutations

- Third priority: multiplication and division

- Fourth priority: addition and subtraction

For example, key in $1+2 \times 5$ nPr 2^2 in Algebraic mode by pressing:
$\boxed{1}$ $\boxed{+}$ $\boxed{2}$ $\boxed{\times}$ $\boxed{5}$ $\boxed{}$ $\boxed{nPr}$ $\boxed{2}$ $\boxed{}$ $\boxed{x^2}$ $\boxed{=}$. The result is 241.

Reverse Polish Notation (RPN) Mode

To set the calculator in RPN mode, refer to the section titled, *The Mode Menu: Setting Preferences.*

In RPN mode, numbers are entered first, separated by pressing $\boxed{\text{INPUT}}$, followed by an operation key.

Note: pressing $\boxed{\text{INPUT}}$ is optional after entering a number if the next key pressed is an operation.

Each time you press an operation or function key, the answer is calculated immediately and displayed. For example, suppose you wanted to add two numbers in RPN, 1 and 2. Press $\boxed{1}$ $\boxed{\text{INPUT}}$ $\boxed{2}$ $\boxed{+}$. The result, *3.00*, is calculated and displayed immediately on the bottom line along with the (+) symbol on the top line.

You do not need to enter parentheses to set the priority of your operations in RPN. Key in numbers and operations inside the parentheses first, followed by those outside of the parentheses. If a problem has more than one set of parentheses, start by working with the operations and numbers in the innermost parentheses and work out. For example, calculate: $(3 + 4) \times (5 + 6)$.

One way to calculate this problem is to key in the numbers and operations within the parentheses first, followed by the operations outside of the parentheses. See Table 2-2 below.

Table 2-2 Simple Arithmetic Calculations in RPN Mode

Keys	Display	Description
⌈ 3 ⌉ ⌈ INPUT ⌉ ⌈ 4 ⌉ ⌈ + ⌉	+ 7.00	Inputs the numbers and the operation in the first set of parentheses. Intermediate results are displayed. Note the (+) and (RPN) annunciators.
⌈ 5 ⌉ ⌈ INPUT ⌉ ⌈ 6 ⌉ ⌈ + ⌉	+ 1 1.00	Inputs the numbers and the operation in the second set of parentheses. Intermediate results are displayed. Note the (+) annunciator.

24

**Table 2-2** Simple Arithmetic Calculations in RPN Mode

Keys	Display	Description
`×`	✳ ⏤ 7700	Continues the operation with the displayed results.
`=`	7700 ⏤	Validates the final result of 77. Note the absence of the (✳) annunciator.

One-Number Functions and the Math Menu

The key presses for the one-number mathematical functions listed in Table 2-3 below apply to all modes, Chain, Algebraic, and RPN. To execute one-number functions:

1. Key in a number, x, into the display.

2. Press the key or key combination corresponding to the operation you wish to execute. The results are displayed on the bottom line.

For example, to calculate $\sqrt{6}$, press `6` `▬` `√`. A result of *2.45* is calculated immediately and displays on the bottom line. The $\sqrt{}$ symbol appears on the top line.

Note: before doing any trigonometric calculations in the Math menu, check whether the angle mode is set for degrees (*Degrees*) or radians (*Radians*). You can change the setting if the active mode is not what your problem requires. For more information on the Mode menu and calculator settings, refer to the section titled, *The Mode Menu: Setting Preferences.*

Table 2-3 lists one-number functions along with their corresponding keys.

Table 2-3 Shifted Function Mathematical Operations

Keys	Description
☐ EEX	Keys in numbers with explicit powers of 10.
☐ SIN	Calculates sine.
☐ COS	Calculates cosine.
☐ TAN	Calculates tangent.
☐ LN	Natural log.
☐ e^x	e^x. Calculates natural exponent to the power of *x*.
☐ x^2	x^2. Returns square of *x*.
☐ √	Calculates square root.

Table 2-3 Shifted Function Mathematical Operations

Keys	Description
[____] [RAND]	Executes the *Random* function. Returns a random number in the range 0 < x < 1.
[____] [!]	Calculates factorial of *x* (where $0 \leq x \leq 253$).
[____] [y^x]	y^x. Returns *y* to the *x* power.
[____] [1/x]	Reciprocal.
[____] [RND]	Rounds *x* internally to the number specified by the display format. Default is two digits to the right of the decimal point.

The Math [____] [Math] Menu

There are additional one-number functions available in the Math menu. To open
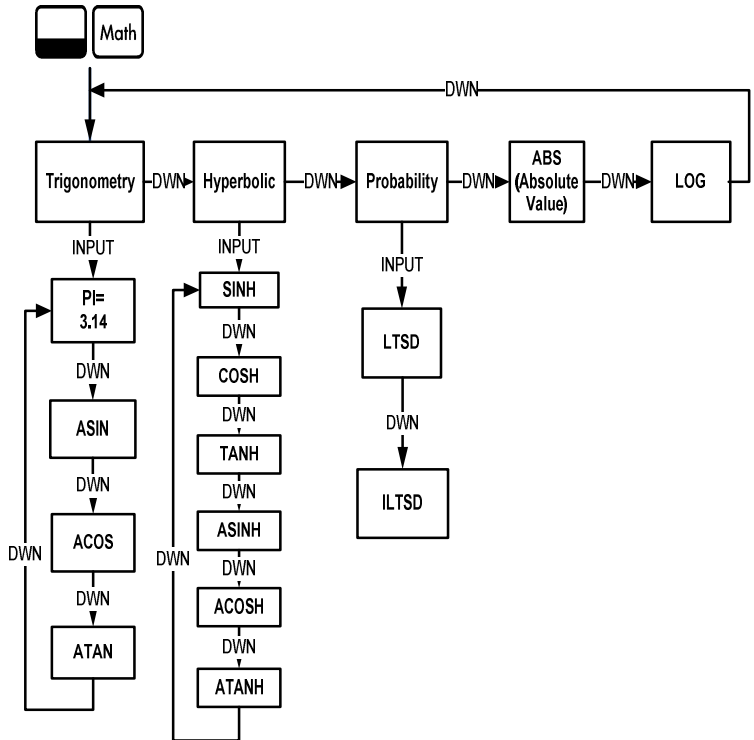the Math menu, press [____] [Math]. See Figure 2-2 for the menu map of the Math
menu.

27

Figure 2-2 The Menu Map for the Math Menu
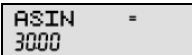
Press $\boxed{\blacktriangledown}$ to scroll through the menu items, starting with *Trigonometry*. The
Trigonometry, *Hyperbolic*, and *Probability* items have sub-menus. Press $\boxed{\text{INPUT}}$
with an item displayed to access the functions within the sub menus.

Press $\boxed{\text{ON/CE}}$ to cancel the Math menu and return to current work.

Press $\boxed{}\boxed{\text{Math}}$ to return to the top of the Math menu.

Using the Math menu, calculate Sin $^{-1}$ (0.5). See Table 2-4.

Table 2-4 Math Menu Example

Keys	Display	Description
$\boxed{\cdot}$ $\boxed{5}$ $\boxed{\text{INPUT}}$ $\boxed{}\boxed{\text{Math}}$	Trigonome ^{INPUT}	Enters 0.5 and opens the Math menu starting with *Trigonometry*.
$\boxed{\text{INPUT}}$ $\boxed{\blacktriangledown}$	ASIN = 3000	Selects the *Trigonometry* menu item and scrolls to ASIN. Note the value for Sin $^{-1}$ is calculated immediately and displayed.
$\boxed{\text{INPUT}}$ or $\boxed{=}$	3000	Validates the result.

Note: in the Math menu, *PI* does not perform calculations; it overrides the current
number by *PI*. You may start an operation, use the Math menu to execute a

29

function, and continue calculating with your original operation without losing your work.

Two-Number Functions

Apart from $\boxed{+}$ $\boxed{-}$ $\boxed{\times}$ $\boxed{\div}$, the three additional two-number functions accessible on the keyboard are:

- Y^X

- nCr

- nPr

Y^X is the power function; *nCr* stands for the number of combinations of elements, *r*, among *n*, and *nPr* stands for the number of permutations of elements, *r*, among *n*.

nCr=n!/(r!(n-r)!)

nPr=n!/(n-r)!

Perform calculations with these functions in the same way you would perform calculations with $\boxed{+}$ $\boxed{-}$ $\boxed{\div}$ and $\boxed{\times}$, but press $\boxed{}$ to access the secondary function key. For example, to calculate 15^3:

1. Press $\boxed{1}$ $\boxed{5}$.

2. Press $\boxed{}$ $\boxed{y^x}$.

30

3. Press $\boxed{3}$ $\boxed{=}$. The results are shown Figure 2-3.

```
337500
```

Figure 2-3

In RPN mode, key in the numbers first, followed by $\boxed{\text{INPUT}}$, then press the function key. For example, for the power function example above, in RPN press: $\boxed{1}$ $\boxed{5}$ $\boxed{\text{INPUT}}$ $\boxed{3}$ $\boxed{}$ $\boxed{y^x}$.

Storing and Recalling Numbers

EURO has ten calculation memories available for use during calculations. These memories are numbered from 0-9. To store numbers, press $\boxed{}$ $\boxed{\text{STO}}$; to recall them, press $\boxed{\text{RCL}}$. You can use the store and recall functions for these memories any time a number is displayed, or when you wish to enter a number. To store a number in a memory:

1. Key in a number, *x*.

2. Press $\boxed{}$ $\boxed{\text{STO}}$.

3. With *STO* displayed on the top line, key in a number, 0-9, to identify the number of the memory register where you wish to store *x*.

31

4. To recall a number, press $\boxed{\text{RCL}}$. With *RCL* displayed in the top line, key in the number of the memory you used.

You can also perform operations to stored numbers. For example, press $\boxed{5}$ $\boxed{}$ $\boxed{\text{STO}}$ $\boxed{2}$ to store *5* in memory 2. To add 12 to the value of memory 2, press $\boxed{1}$ $\boxed{2}$ $\boxed{\blacksquare}$ $\boxed{\text{STO}}$ $\boxed{+}$ $\boxed{2}$. Later on, during a calculation, you can press $\boxed{\text{RCL}}$ $\boxed{2}$ to recall memory 2. Note how the new current value is *17*, (5 +12). $\boxed{+}$ $\boxed{-}$ $\boxed{\times}$ and $\boxed{\div}$ are valid mathematical operations in the storage memories.

Recalling Stored Numbers

In RPN, typing $\boxed{1}$ $\boxed{2}$ $\boxed{\text{RCL}}$ $\boxed{+}$ $\boxed{2}$ $\boxed{=}$ adds the value of memory 2 to 12, but it will not modify the stored value of memory 2. You can also use $\boxed{-}$ $\boxed{\times}$ and $\boxed{\div}$ after $\boxed{\text{RCL}}$.

In Algebraic and Chain modes, press $\boxed{1}$ $\boxed{2}$ $\boxed{+}$ $\boxed{\text{RCL}}$ $\boxed{2}$ $\boxed{=}$.

Rounding Numbers

The 20b performs all calculations internally with 15-digit precision and rounds to 12 digits when returning the results.

When displayed, a number is rounded to the number of digits after the decimal point set by the *FIX=* item in the Mode menu. The default setting is two digits to the right of the decimal point. For more information, refer to the section titled, *The Mode Menu: Setting Preferences.*

Note: the *FIX=* setting only affects the display; it does not affect the actual numbers.

Simple Percentages

In Algebraic or Chain modes, pressing $\boxed{\%}$ divides a number by 100. For example, pressing $\boxed{2}\boxed{5}\boxed{\%}$ returns *0.25.*

To find a percentage of a given number, enter the number and multiply it by the desired percentage, followed by $\boxed{=}$ to return the result. For example, to find 25% of 200, press $\boxed{2}\boxed{0}\boxed{0}\boxed{\times}\boxed{2}\boxed{5}\boxed{\%}\boxed{=}$ to return a result of *50.*

To add or subtract a percentage of a number, enter the first number, followed by $\boxed{+}$ or $\boxed{-}$ the percentage, followed by $\boxed{\%}$. Finish your calculation with $\boxed{=}$, if desired. For example, to add 10% to 50, press $\boxed{5}\boxed{0}\boxed{+}\boxed{1}\boxed{0}\boxed{\%}\boxed{=}$ to return a result of *55.*

In RPN mode, the $\boxed{\%}$ key calculates *x* percent of the number on level two of the stack, when *x* is the number on level one of the stack. It does not modify the number on level two of the stack, allowing you to perform an addition or a subtraction after pressing $\boxed{\%}$ to add or subtract *x* $\boxed{\%}$ from the number.

For example, $\boxed{2}\boxed{0}\boxed{0}\boxed{\text{INPUT}}\boxed{2}\boxed{5}\boxed{\%}$ returns *50,* but *200* is still on level two of the stack, and pressing $\boxed{-}$ returns *150,* or 200-25%, with the (-) annunciator displayed on the top line.
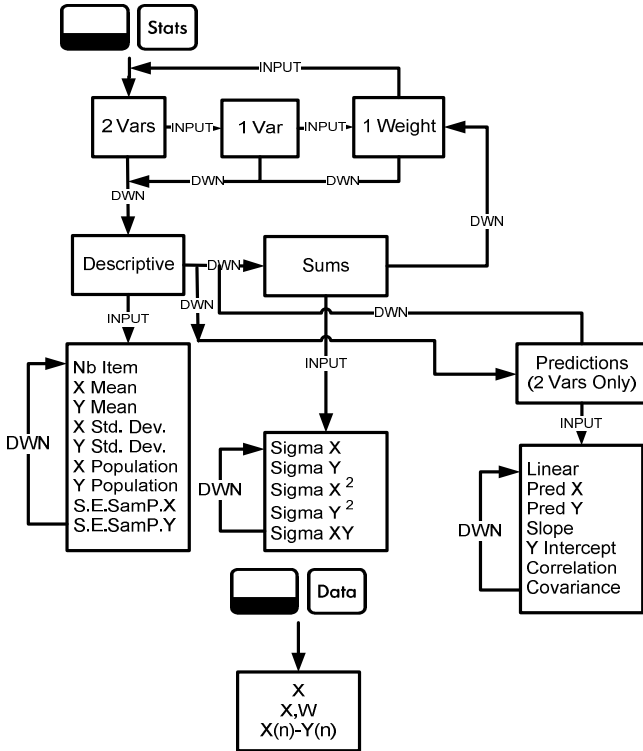
3   Statistical Operations

Figure 3-1 The Menu Map for the Data and Statistics Menus

Statistics operations require the use of two secondary function keys: ⬜ Data and ⬜ Stats. See Figure 3-1 for assistance with navigating through the menus.

Press ⬜ Data to open the Data menu. In this menu, enter a list of x values for one-variable statistics, a list of pairs, (x, w) for weighted, one-variable statistics, or a list of paired values (x, y) for two-variable statistics. To enter data, key in a number and press INPUT.

Press ⬜ Stats to analyze the data. If you attempt to open the Statistics (Stats) menu before entering data, you will be redirected to the Data menu. When opened, the menu displays *2 Vars*. Press INPUT repeatedly to scroll through the menu items, two-variable, (*2 Vars*), one-variable, *(1 Var*), and one-variable weighted, (*1 Weight*). Press ▼ with an item displayed to open the first sub-menu. To return from the sub-menu to the menu above it, press ▲.

To reset the Stats and Data menus, press ⬜ Reset. At the prompt, *Stats=*, confirm your choice by pressing INPUT.

The first sub-menu contains the following items: *Descriptions, Predictions* (*2 Vars* only) and *Sums*. Press ▲ or ▼ repeatedly to scroll through the items. With an item displayed, press INPUT to open its sub-menu. Press ▲ or ▼ repeatedly to view the results.

Note: in one-variable and one-weight items, there are no items for *y*. For an example using the Stats menu, see Tables 3-1 and 3-2. The example is shown with RPN as the active operating mode.

Sales for the last five months are represented by the pairs of values shown below, with the month number as *x*, and the sales values as *y*. Enter these into the Data menu. Using the Stats menu for *Predictions*, predict sales for month seven. What is the slope and y-intercept of the linear regression line? What is the sum of all the y values?

Table 3-1 Months and Sales Numbers

Month	Sales Values
1	150
2	165
3	160
4	175
5	170

Table 3-2 Statistics Example

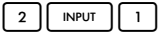| Keys	Display	Description
�then Data	X(1) = INPUT XYZ 000	Opens Data menu starting with the current value for X(1).

Table 3-2 Statistics Example
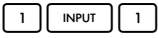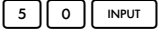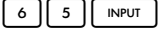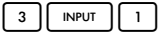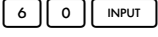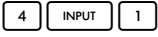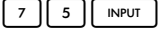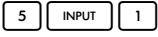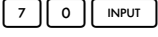
Keys	Display	Description
[1] [INPUT] [1] [5] [0] [INPUT]	X(2) = INPUT 000	Inputs current values for X(1) and Y(1). Displays current value for X(2).
[2] [INPUT] [1] [6] [5] [INPUT]	X(3) = INPUT 000	Inputs current values for X(2) and Y(2). Displays current value for X(3).
[3] [INPUT] [1] [6] [0] [INPUT]	X(4) = INPUT 000	Inputs current values for X(3) and Y(3). Displays current value for X(4).
[4] [INPUT] [1] [7] [5] [INPUT]	X(5) = INPUT 000	Inputs current values for X(4) and Y(4). Displays current value for X(5).
[5] [INPUT] [1] [7] [0] [INPUT]	X(6) = INPUT 000	Inputs current values for X(5) and Y(5). Displays current value for X(6).
[ ] [Stats]	2 Vars INPUT	Opens Stats menu.

Table 3-2 Statistics Example
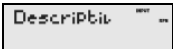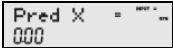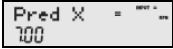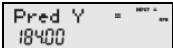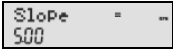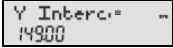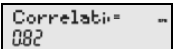
Keys	Display	Description
▼	Descriptiʋ ᵀ ⁻	Opens Descriptive sub-menu.
INPUT ▼ ▼	ȳ Mean = ⁻ 16400	Displays current value for y average.
▬ Stats ▼ ▼ INPUT	Linear ᵀ ⁻	Opens Predictions sub-menu starting with *Linear*.
▼	Pred X = ⁻ᵀ⁻ 0.00	Scrolls to current value of Prediction X.
7 INPUT	Pred X = ⁻ᵀ⁻ 7.00	Inputs current value for Prediction X (month).
▼ =	Pred Y = ⁻ᵀ⁻ 18400	Calculates predicted Y value (sales).
▼	Slope = ⁻ 500	Displays current value for slope.
▼	Y Interc⁻ᵉ ⁻ 14900	Displays current value for y-intercept.

Table 3-2 Statistics Example

Keys	Display	Description
[▼]	Correlati= 082	Displays current value for Correlation.
[⬛][Stats][▼][▼] [▼][INPUT][▼]	Σ Y = 82000	Opens Sums sub-menu. Displays current value for the sum of all y values (Sigma Y).

4   Time Value of Money

The examples in the following sections are calculated with the Mode menu preferences in their default settings, unless otherwise noted. For more information about basic features and setting preferences, see *Chapter 1, Basic Features*.
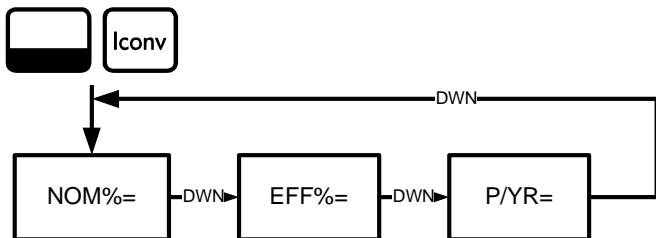
Figure 4-1 The Menu Map for the Interest Conversion Menu

Interest Conversion Menu

To open the Interest Conversion menu (Iconv) press ⬚ |Iconv|.

To reset the variables to their default values, from anywhere inside the menu, press ⬚ |Reset|. With *Iconv* displayed, press |INPUT| to reset, or |ON/CE| to cancel. To exit the menu, press |ON/CE| once again. See Figure 4-1. Table 4-1 describes the items of the Iconv menu.

Table 4-1 Interest Conversion Menu Items

Item	Description
Nom%=	The stated annual interest rate compounded periodically, such as 18% compounded monthly.
Eff%=	The rate, that compounded only once, that is, annually, would produce the same final value as the nominal rate.
P/YR=	Payments or compounding periods per year. Default is *12*.

Using the Iconv menu, find the effective rate of a 36.5% nominal rate compounded daily. See Figure 3-1 for help with navigating through the menu. This example is calculated with RPN as the active operating mode. See Table 4-2.

Table 4-2 Interest Rate Conversion Example
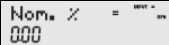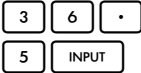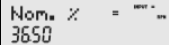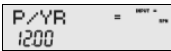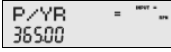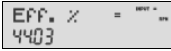
Keys	Display	Description
[ ] [Iconv]	Nom. % = 000	Opens the Iconv menu, starting with the current value of the nominal percentage rate.
[3] [6] [·] [5] [INPUT]	Nom. % = 3650	Inputs *36.5* as the current nominal percentage rate.

Table 4-2 Interest Rate Conversion Example

Keys	Display	Description
▲	P/YR = 1200	Scrolls to payments per year, *P/YR*. Default value is *12*.
3 6 5 INPUT	P/YR = 36500	Inputs *365* as the current value for the number of compounding periods or payments per year.
▲ =	Eff. % = 4403	Scrolls to the variable for the effective rate, *Eff%=*. Returns the effective rate. A 36.5% nominal rate compounded daily equals an effective rate of 44.03%.

TVM Keys and Entering Values

For a list of keys used for TVM problems along with their descriptions, see Table 4-3.

To reset the TVM variables to their default values, with any TVM variable displayed, press ▬ Reset . With *TVM* displayed, press INPUT . At the *TVM Reset* prompt, press INPUT or ON/CE .

42

To input current data, enter a number followed by the TVM key for the required item. To calculate an unknown value, enter all known values and press the key of the item you want solved. For a TVM example, see Table 4-4.

Table 4-3 TVM Keys

Keys	Description
N	Stores or calculates the number of payments or compounding periods (N).
xP/YR	Multiplies a value by the number of payments per year and stores as N.
I/YR	Stores or calculates the nominal annual interest rate as a percentage.
PV	Stores or calculates the present value (PV). To a lender or borrower, PV is the amount of a loan; to an investor, PV is the initial investment. PV always occurs at the beginning of the first period.
PMT	Stores or calculates the dollar amount of each periodic payment (PMT). Payments can occur at the beginning or end of each compounding period.
P/YR	Stores or calculates the number of payments or compounding periods per year.

Table 4-3 TVM Keys

Keys	Description
$\boxed{\text{FV}}$	Stores or calculates the future value (FV), a final cash flow. FV always occurs at the end of the last compounding period.
$\boxed{\text{Beg}}$	Sets Begin mode (Beg). Payments occur at the beginning of each compounding period.
$\boxed{\text{End}}$	Sets End mode (End). Payments occur at the end of each compounding period.

You borrow \$140,000.00 from a credit union for 30 years (360 months) at 6.5% annual interest, compounded monthly. What is your monthly payment to the credit union? Note: at the end of the 30 years, you expect to have a zero balance (*FV=0*). The example below in Table 4-4 is shown with RPN as the active operating mode.

Table 4-4 TVM Example
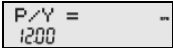
Keys	Display	Description
$\boxed{1}\boxed{2}\boxed{}\boxed{\text{P/YR}}$	P/Y = 12.00	Inputs *12* as the current value for the number of payments, or compounding periods.

Table 4-4 TVM Example

Keys	Display	Description
`3` `6` `0` `N`	N = 36000	Inputs *360* as the current value for the number of payments over 30 years.
`6` `·` `5` `I/YR`	I/YR = 650	Inputs *6.5* as the current value for the interest rate percentage per year.
`1` `4` `0` `0` `0` `0` `PV`	PV = 14000000	Inputs the present value of the loan at the time of the first payment. This value is positive (+); it is money you receive.
`0` `FV`	FV = 000	Inputs the future value of the loan (or remaining balance) as *0*.
`PMT`	PMT = -88490	Returns the monthly payment. This result is negative (-); it is money you pay out.

Amortization

Refer to Figure 4-2 for a menu map of the Amortization menu. Table 4-5 lists the keys and variables of the Amortization menu. To open the menu, press `Amort`.

The Amortization menu calculations are based on values stored in the following

TVM keys: $\boxed{N}$, $\boxed{I/YR}$, $\boxed{PV}$, $\boxed{PMT}$ and $\boxed{P/YR}$.

To enter current data for the TVM keys, enter a number followed by the key for the required item.

To reset the variables to their default values, from anywhere in the $\boxed{Amort}$ menu, press $\boxed{\ }\boxed{Reset}$. With *TVM* displayed, press $\boxed{INPUT}$. At the *TVM Reset* prompt, press $\boxed{INPUT}$ or $\boxed{ON/CE}$.

For an amortization example, see Table 4-6.
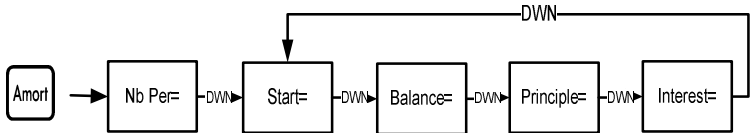
Figure 4-2 The Menu Map for the Amortization Menu

Table 4-5 Amortization Menu Items

Menu Item/Key	Description
$\boxed{Amort}$	Opens the Amortization (amrt) menu starting with *Nb Per=.*

Table 4-5 Amortization Menu Items

Menu Item/Key	Description
Nb Per=	Number of periods to group together in the amortization calculation. The default value is the number of payments per year defined by the [P/YR] key.
Start=	Period on which to start amortization. Default is *1*. If you want to amortize for the 2nd year, enter *13* (the second year starts at the 13th payment).
Balance=	The loan balance at the end of the assigned amortized period.
Principle=	Amount of the loan payment applied to the principle at the end of the amortized period.
Interest=	Amount of the loan payment applied to the interest at the end of the amortized period.

Enter the values for the TVM keys from the example below. Press [Amort] followed by [▲] or [▼] to view the amortization schedule.

You borrow $140,000.00 for 360 months at 10% interest from a credit union. Create an amortization schedule for the loan. How much interest did you pay for the first year? What is the balance of your loan after the first year? See

Table 4-6. The example below is shown with RPN as the active operating mode.

Table 4-6 Amortization Example
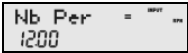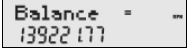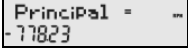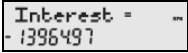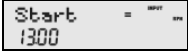
Keys	Display	Description
`1` `2` `▭` `P/YR`	`P/Y =` `1200` `▪`	Inputs current value of payments per year as *12*.
`3` `0` `▭` `xP/YR`	`N =` `36000` `▪`	Inputs *360* (30 times 12 payments per year) as the current value for the number of payments for the 30-year loan.
`1` `0` `I/YR`	`I/YR =` `1000` `▪`	Inputs *10* as the current interest rate percentage per year.
`1` `4` `0` `0` `0` `0` `PV`	`PV =` `14000000` `▪`	Inputs the current present value of the loan at the time of the first payment.
`0` `FV`	`FV =` `000` `▪`	Inputs the current future value of the loan as *0* (zero balance).
`PMT`	`PMT =` `- 122860` `▪`	Returns the result for the monthly payment.

48

Table 4-6 Amortization Example

Keys	Display	Description
[Amort]	Nb Per = INPUT 1200	Displays the current period of amortization in months. Default is *12.*
[▼]	Start = INPUT 100	Displays the number of the starting payment in first period to amortize.
[▼]	Balance = 13922177	Displays the current balance remaining after the first year.
[▼]	Principal = -77823	Displays the current amount of principle applied towards the loan for the first year.
[▼]	Interest = -1396497	Displays the amount of interest paid on the loan for the first year. The amount of your payments applied towards interest for the first year is about $14,000.00.
[▼]	Start = INPUT 1300	Displays the first payment in the next period to amortize (the 2nd year).

5   Cash Flows
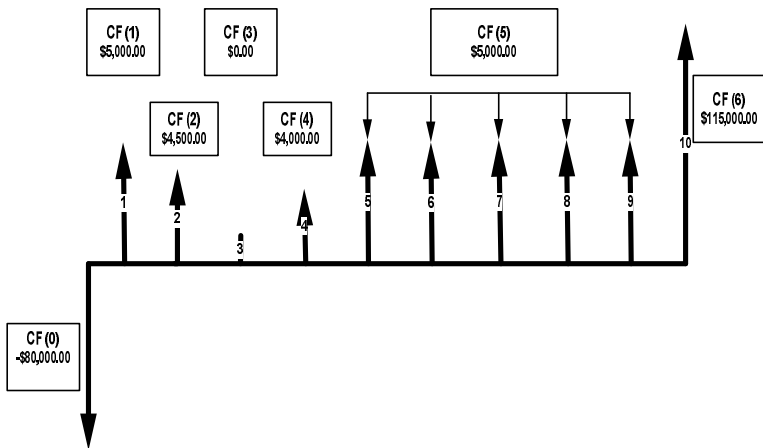
Figure 5-1 Cash Flow Diagram

A cash flow list is a set of numbered pairs, *CF(n)* and *#CF(n)*, where *n* is the index of the cash flow list. Each pair represents a single cash flow.

CF(n) represents the monetary value of the cash flow; *#CF(n)* is the number of consecutive occurrences of that cash flow. By default, *#CF(n)* is equal to *1*, as most cash flows occur only once. However, in cases where a cash flow is

repeated multiple times in a list, using *#CF(n)* instead of entering the cash flow value multiple times can save you time and memory space in the calculator.

To enter a cash flow list, press [CshFl] to open the cash flow menu.

For each cash flow item, enter the cash flow followed by [INPUT]; then enter the number of occurrences followed by [INPUT].

If a cash flow occurs once, you do not need to type [1][INPUT]; you can simply press [INPUT], as *1* is the default.

To reset a cash flow list to its default values, with any cash flow displayed, press [⬛][Reset]. The number of cash flows in the list, along with *Cash Flow=* , displays. At this prompt, press [INPUT]. You will be asked to confirm your choice. Either press [INPUT] to confirm and [ON/CE] to return to the cash flow list, or press [ON/CE] to cancel. Pressing [ON/CE] once again after you cancel the reset command also returns you to the cash flow list.

Table 5-1 lists the keys used for cash flow problems. For a cash flow example, see Table 5-2.

Table 5-1 Cash Flow Keys

Key	Description
[CshFl]	Opens the cash flow list.

Table 5-1 Cash Flow Keys

Key	Description
INPUT	Inputs current values to variables in the cash flow list as well as the Net Present Value (NPV) and Internal Rate of Return (IRR) menus.
▲ ▼	Scrolls up and down.
INS	Inserts cash flows into a cash flow list.
DEL	Removes cash flows from a cash flow list.
IRR NPV	Opens internal rate of return (IRR) and Net Present Value (NPV) menus.

After an initial investment of \$80,000.00, you expect returns over the next five years as follows: cash flow 1, \$5,000.00, cash flow 2, \$4,500.00, cash flow 3, \$0.00, cash flow 4, \$4,000.00, cash flow 5, \$5,000.00, 5 times, cash flow 6, \$115,000.00.

Given this information, calculate the total of the cash flows and the internal rate of return (IRR) of the investment. Calculate net present value (NPV) and net future value (NFV), assuming an annual investment interest rate of 10.5%. See Figure 5-1 and Table 5-2. The example below is shown with RPN as the active operating mode.

Table 5-2 Cash Flow Example
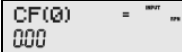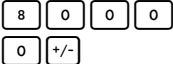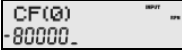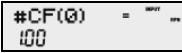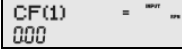
Keys	Display	Description
[CshFl]	CF(0) = INPUT ↑↓ 000	Opens the cash flow list starting with the current value of the initial cash flow, *CF(0)*.
[8][0][0][0] [0][+/-]	CF(0) INPUT ↑↓ -80000_	Keys in *-80000* as the value of the initial cash flow. Note: the sign of the cash outflow is negative.
[INPUT]	#CF(0) = INPUT ↑↓ 100	Inputs the current value of *-80000* for CF(0). Displays the current value, *1*, for the frequency of CF(0).
[INPUT]	CF(1) = INPUT ↑↓ 000	Inputs the current value of *1* for the frequency of CF(0). Displays the current value of CF(1).
[5][0][0][0]	CF(1) INPUT ↑↓ 5000	Keys in *5000* as the value of CF(1).

53

Table 5-2 Cash Flow Example
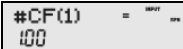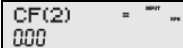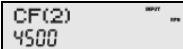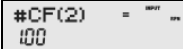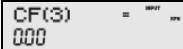
Keys	Display	Description
INPUT	#CF(1) = INPUT 100	Inputs the current value of CF(1) as *5000*. Displays the current value, *1*, for the frequency of CF(1).
INPUT	CF(2) = INPUT 000	Inputs the current value of *1* for the frequency of CF(1). Displays current value of CF(2).
4 5 0 0	CF(2) INPUT 4500	Keys in *4500* as the current value of CF(2).
INPUT	#CF(2) = INPUT 100	Inputs the current value of CF(2) as *4500*. Displays the current value, *1*, for the frequency of CF(2).
INPUT	CF(3) = INPUT 000	Inputs the current value of *1* for frequency of CF(2). Displays the current value of CF(3).

Table 5-2 Cash Flow Example

Keys	Display	Description
INPUT	#CF(3) = ᴵᴺᴾᵁᵀ ⁼⁼ 100	Inputs the current value of CF(3) as *0*. Displays the current value, *1*, for the frequency of CF(3).
INPUT	CF(4) = ᴵᴺᴾᵁᵀ ⁼⁼ 000	Inputs the current value of *1* for the frequency of CF(3). Displays the current value of CF(4).
4 0 0 0	CF(4) ᴵᴺᴾᵁᵀ ⁼⁼ 4000	Keys in *4000* as the current value of CF(4).
INPUT	#CF(4) = ᴵᴺᴾᵁᵀ ⁼⁼ 100	Inputs the current value of CF(4) as *4000*. Displays the current value, *1*, for the frequency of CF(4).
INPUT	CF(5) = ᴵᴺᴾᵁᵀ ⁼⁼ 000	Inputs the current value of *1* for the frequency of CF(4). Displays the current value of CF(5).
5 0 0 0	CF(5) ᴵᴺᴾᵁᵀ ⁼⁼ 5000	Keys in *5000* as the current value of CF(5).

Table 5-2 Cash Flow Example

Keys	Display	Description
INPUT	#CF(5) = INPUT 100	Assigns the current value of CF(5) as *5000*. Displays the current value, *1*, for the frequency of CF(5).
5	#CF(5) INPUT 5	Keys in *5* as the current value for the frequency of CF(5).
INPUT	CF(6) = INPUT 000	Inputs the current value of *5* for the frequency of CF(5). Displays the current value of CF(6).
1 1 5 0 0 0	CF(6) INPUT 115000_	Keys in *115000* as the current value of CF(6).
INPUT	#CF(6) = INPUT 100	Inputs the current value of CF(6) as *115000*. Displays the current value, *1*, for the frequency of CF(6).
INPUT	CF(7) = INPUT 000	Inputs the current value of *1* for frequency of CF(6). Ends list.

Analyzing Cash Flows

The various functions used to analyze cash flows are located in the NPV [NPV] and IRR [IRR] menus.

If you press [IRR] or [NPV] before entering cash flows, you will be redirected to the cash flow menu to enter values into the cash flow list.

The menu maps for the IRR and NPV menus are shown in Figure 5-2. Table 5-3 describes the items within these menus.
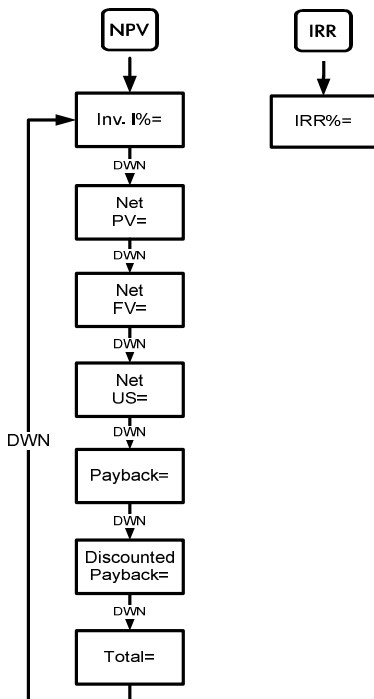
Figure 5-2 The Menu Map for the NPV and IRR Menus

Table 5-3 NPV and IRR Menu Items

Item	Description
Inv. I%=	Investment or discount rate. Enter the investment rate or discount rate for the cash flow followed by ⌈INPUT⌋.
Net PV=	Net present value. Returns the value of the cash flows at the time of the initial cash flow, discounting the future cash flows by the value set for *Inv. I%*.
Net FV=	Net future value. Returns the value of the cash flows at the time of the last cash flow, discounting the earlier cash flows by the value set for *Inv. I%*.
Net US=	Net uniform series. The per-period payment of a regular, periodic cash flow of equivalent present value to the cash flow list.
Payback=	Payback. The number of periods for the investment to return value.
Discounted Payback=	Discounted Payback. The number of periods required for the investment to return value if the cash flows are discounted using the value set in *Inv. I%*.

Table 5-3 NPV and IRR Menu Items

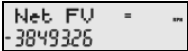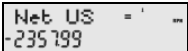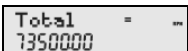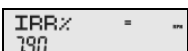| Item	Description
Total=	The sum of all the cash flows, equivalent to NPV if Inv. I% is *0*.
[IRR] *IRR%=*	Internal rate of return. This is the discount rate for the cash flow that returns a Net Present Value of *0*.

See Table 5-4 for an example of the NPV and IRR functions using the cash flow example in Table 5-2. Press [NPV] and [IRR] to open the menus. At *Inv. I%*, key in a number followed by [INPUT]. Scroll through the menus by pressing [▲] or [▼] repeatedly. The example below is shown with RPN as the active operating mode.

Table 5-4 NPV and IRR Example

Keys	Display	Description
[NPV]	Inv. I% = "" 0.00	Opens NPV menu starting with current value of *Inv. I%*.
[1][0][.] [5][INPUT]	Inv. I% = "" 10.50	Inputs *10.5* as current Inv. I%.
[▼]	Net PV = "" -14 182.80	Scrolls to current value for NPV.

60

Table 5-4 NPV and IRR Example

Keys	Display	Description
⌄	Net FV = -3849326	Scrolls to current value for NFV.
⌄	Net US = ' -235799	Scrolls to current value for Net US.
⌄	Payback = 936	Scrolls to current value for Payback.
⌄ ⌄	Total = 7350000	Scrolls to current value of cash flow total.
IRR	IRR% = 790	Returns current value for IRR.

Editing Cash Flows

In the cash flow list, you can view and modify the current values of a specific cash flow, or cash flows. Press ⌃ or ⌄ repeatedly to scroll through the list. To modify an entry, type a new number and press INPUT with a cash flow displayed. For example, to change the current value of CF(7) in the example in Table 5-2 from *0* to *200*, with *CF(7)=* displayed, press 2 0 0 and press INPUT. You can also modify the frequency of a cash flow in the same manner with the frequency, *#CF(n) =,* displayed. Pressing ▬ DEL with a cash flow displayed erases the displayed cash flow. Pressing ▬ INS inserts a cash flow into the list before the displayed cash flow.

61

6 Business Problems
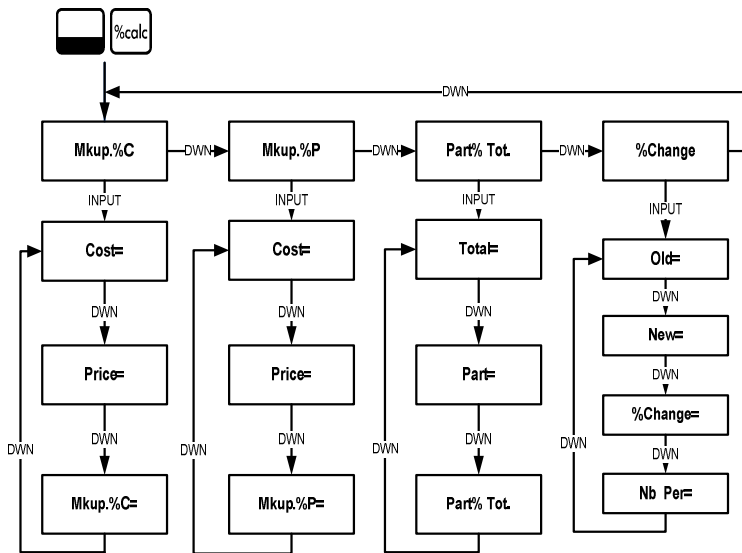
Figure 6-1 The Menu Map for the Percent Calculation (%calc) Menu

Press ⬜️%calc to open the menu. There are four items in this menu: markup as a percentage of cost (*Mkup. %C*), markup as a percentage of price (*Mkup. %P*), percent change (*%Change*), and part as a percentage of total (*Part%Tot.*). These items allow you to access sub-menus. Press ▲ or ▼ repeatedly to

scroll to the item you require. Press $\boxed{\text{INPUT}}$ with a menu item displayed to access its-sub menu. To enter data in the sub-menus, select the appropriate menu item, key in the number, and press $\boxed{\text{INPUT}}$. Press $\boxed{\blacktriangle}$ or $\boxed{\blacktriangledown}$ to select the menu item you need solved and press $\boxed{=}$ to calculate it.

To return to the menu items from within a sub-menu, press $\boxed{\text{ON/CE}}$.

Note: for business problems using 20b, margin is based on price; markup is based on cost.

To reset the menu items to their default values, from anywhere in the %calc menu press $\boxed{\quad}$ $\boxed{\text{Reset}}$. With *TVM* displayed, press $\boxed{\blacktriangle}$ or $\boxed{\blacktriangledown}$ to scroll until *%Calc* displays and press $\boxed{\text{INPUT}}$. Press $\boxed{\text{ON/CE}}$ to exit the menu. See Tables 6-1 through 6-3 for examples of calculations in the %calc menu. The examples below are shown with RPN as the active operating mode.

> 1. Find the markup on an item if the cost price is \$15.00 and the selling price is \$22.00. See Table 6-1.

Table 6-1 Markup Example
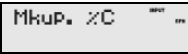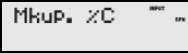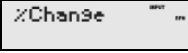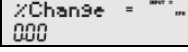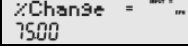
Keys	Display	Description
$\boxed{\quad}$ $\boxed{\text{\%calc}}$	Mkup. %C	Opens the %calc menu starting with *Mkup.%C.*
$\boxed{\text{INPUT}}$	Cost = 000	Displays the current value of *Cost=.*

Table 6-1 Markup Example

Keys	Display	Description
`1` `5` `INPUT`	Cost = 1500	Inputs *15* as the current value for cost.
`▼`	Price = 000	Scrolls to *Price=* and displays the current value.
`2` `2` `INPUT`	Price = 2200	Inputs *22* as the current value for price.
`▼`	Mkup. %C = 000	Scrolls to *Mkup.%C* variable. Note the (=) symbol. Displays the current value of markup.
`=`	Mkup. %C = 4667	Returns result of *46.67* for markup.

2. Find the percent change between 20 and 35 with no compounding.

64

Table 6-2 Percent Change Example

Keys	Display	Description
⬛ %calc	Mkup. %C	Opens the %calc menu starting with *Mkup.%C.*
▼ ▼ ▼	%Change	Scrolls to *%Change.*
INPUT	Old = 0.00	Displays the current value for *Old=.*
2 0 INPUT	Old = 20.00	Inputs *20* as the current value for *Old=.*
▼	New = 0.00	Displays the current value for *New=.*
3 5 INPUT	New = 35.00	Inputs *35* as the current value for *New=.*
▼	%Change = 0.00	Displays the current value for *%Change=.* Note: the (=) symbol.
=	%Change = 75.00	Calculates the current value for *%Change=.*

3. What is 30% of 80?

Table 6-3 Part % of Total Example
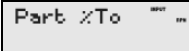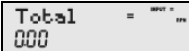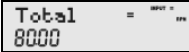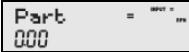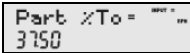
Keys	Display	Description
⬛ %calc	Mkup. %C	Opens the %calc menu starting with *Mkup.%C.*
▼ ▼	Part %To	Scrolls to the *Part %Tot.* menu item.
INPUT	Total = 000	Displays the current value for *Total=.*
8 0 INPUT	Total = 8000	Inputs *80* as the current value for *Total=.*
▼	Part = 000	Scrolls to the current value of *Part=.*
3 0 INPUT	Part = 3000	Inputs *30* as the current value for *Part=.*
▼	Part %To = 000	Scrolls to the current value for *Part % Tot.=.* Note the (=) symbol.

Table 6-3 Part % of Total Example

Keys	Display	Description
$=$	Part %To = ⁕⁕⁼ ᵖᵐ 3750	Calculates the current value of *Part % Tot.=.* 30 is 37.50% of 80.

7   Bonds
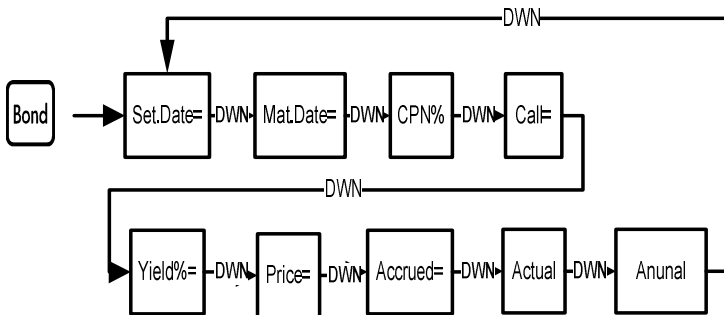
Figure 7-1 The Menu Map for the Bond Menu

Before you enter the Bond menu, be sure to check that the date format is set in the format required for your problem. The default setting is *mm.dd yyyy*, but it can be set for *dd.mm yyyy*. Bond day counts (360/365) and annual or semiannual coupon payment schedules may be set from either the Mode menu or the Bond menu. For more information on setting the preferences in the Mode Menu, see the section titled, *The Mode Menu: Setting Preferences*.

To open the Bond menu, press $\boxed{\text{Bond}}$.

Press $\boxed{\blacktriangle}$ or $\boxed{\blacktriangledown}$ repeatedly to scroll through the items shown in Figure 7-1. To input current data, with an item displayed, key in a number and press $\boxed{\text{INPUT}}$. Press $\boxed{\blacktriangle}$ or $\boxed{\blacktriangledown}$ repeatedly to scroll to an unknown item, and press $\boxed{=}$ to calculate it.

To reset the values to their default values, from anywhere in the Bond menu, press $\boxed{}$ $\boxed{\text{Reset}}$. With *Bond* displayed, press $\boxed{\text{INPUT}}$ to reset the menu or $\boxed{\text{ON/CE}}$ to cancel. Press $\boxed{\text{ON/CE}}$ again to exit the menu.

Table 7-1 lists the items in the Bond menu. For an example of calculating price and yield in the Bond menu, see Table 7-2.

Table 7-1 Bond Menu

Variable	Description
Settlement Date=	Settlement date. Displays the current settlement date in either *mm.ddyyyy* or *dd.mmyyyy* format. Note: input only.
Maturity Date=	Maturity date or call date. The call date must coincide with a coupon date. Displays the current maturity date in either *mm.ddyyyy* or *dd.mmyyyy* format. Note: Input only.
CPN%=	Coupon rate stored as an annual %. Note: Input only.

69

Table 7-1 Bond Menu

Variable	Description
Call=	Call value. Default is set for a call price per $100.00 face value. A bond at maturity has a call value of 100% of its face value. Note: Input only.
Yield%=	Yield% to maturity or yield% to call date for given price. Note: Input/Output.
Price=	Price per $100.00 face value for a given yield. Note: Input/Output.
Accrued=	Interest accrued from the last coupon or payment date until the settlement date for a given yield. Note: Input/Output.
Actual/Cal.360	Actual (365-day calendar) or Cal.360 (30-day month/360-day year calendar).
Annual/Semiannual	Bond coupon (payment) frequency.

What price should you pay on April 28, 2010 for a 6.75% U.S. Treasury bond maturing on June 4, 2020, if you want a yield of 4.75%? Assume the bond is calculated on a semiannual coupon payment on an actual/actual basis. See

Table 7-2. The example below is shown with RPN as the active operating mode.

Table 7-2 Bond Calculation Example
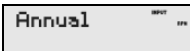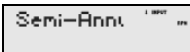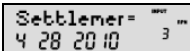
Key	Display	Description
Bond	Settlemer= INPUT 1 01 2008 2	Opens the Bond menu starting with the current settlement date.
▲	Annual INPUT	Scrolls to bond coupon (payment) frequency.
INPUT	Semi-Annu INPUT	Selects semiannual coupon payment, as required by the example.
▼	Settlemer= INPUT 1 01 2008 2	Inputs semiannual coupon payment and returns to the current settlement date.
4 · 2 8 2 0 1 0 INPUT	Settlemer= INPUT 4 28 2010 3	Inputs the current settlement date in *mm.ddyyyy* format. Note: *3* in the display represents the day of the week.

Table 7-2 Bond Calculation Example
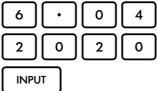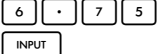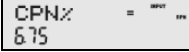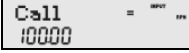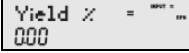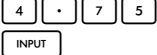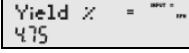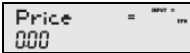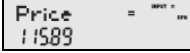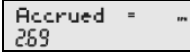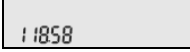
Key	Display	Description
⌄	Maturity = 1 01 2008 2	Displays the current maturity date in *mm.ddyyy* format.
6 · 0 4 2 0 2 0 INPUT	Maturity = 6 04 2020 4	Inputs the current maturity date. Note: *4* in the display represents the day of the week.
⌄	CPN% = 000	Displays the current value for *CPN%=*.
6 · 7 5 INPUT	CPN% = 675	Inputs *6.75* as current value for *CPN%=*.
⌄	Call = 10000	Displays current call value. Default is *100*. Note: if *Call=* requires another value, key in the number followed by INPUT.
⌄	Yield % = 000	Displays the current value of *Yield%=*.
4 · 7 5 INPUT	Yield % = 475	Inputs *4.75* as the current value for *Yield%=*.

72

Table 7-2 Bond Calculation Example

Key	Display	Description
▼	Price = INPUT FIX 000	Displays the current value for *Price=*.
=	Price = INPUT FIX 11589	Calculates the current value for *Price=*.
▢ STO 1	Price = INPUT FIX 11589	Stores *115.89* in memory 1.
▼	Accrued = FIX 269	Displays the current value for accrued interest.
▢ STO 2	Accrued = FIX 269	Stores *2.69* in memory 2.
ON/CE RCL 1 + RCL 2 =	11858	Returns the result for total price (value of price + value of accrued interest). The net price you should pay for the bond is $118.58.

73
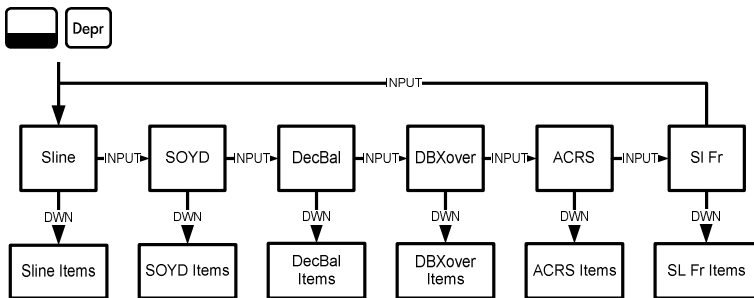
8   Depreciation

Figure 8-1 The Menu Map for the Depreciation Menu

Press ⬛ Depr to open the Depreciation menu. Press INPUT to cycle through the depreciation methods. With a depreciation method displayed, press ▲ or ▼ repeatedly to view the items of the sub-menu. To enter current data, key in a number and press INPUT.

To reset the Depreciation menu, press ⬛ Reset. With *Depreciation* displayed, press INPUT to reset the menu or ON/CE to cancel. Press ON/CE again to exit the menu.

Brief descriptions of the methods used to calculate depreciation are provided in Table 8-1. Table 8-2 describes the items found in the depreciation sub-menus. For an example calculating depreciation using the straight-line method, see Table 8-3.

Table 8-1 Depreciation Methods

Depreciation Method	Description
Sline	Straight line is a method of calculating depreciation presuming an asset loses a certain percentage of its value annually at an amount evenly distributed throughout its useful life.
SOYD	Sum-of-the-years' digits is an accelerated depreciation method based on the idea that the years of an asset's useful life are divided by the sum of the years counting backwards. For example, a five year useful life would be shown as $5 + 4 + 3 + 2 + 1 = 15$. Press 4 $\div$ 15, then press $=$ to return a 27% depreciation for the first year. In RPN, press 4 INPUT 15 $\div$.

Table 8-1 Depreciation Methods

Depreciation Method	Description
DecBal	Declining balance is an accelerated depreciation method that presumes an asset will lose the majority of its value during the first few years of its useful life.
DBXover	Declining balance crossover is an accelerated depreciation method that presumes an asset will lose the majority of its value in the first few years of its useful life, but that it will revert to a consistent depreciation during the latter part of its life, which is then calculated using the straight line method.
ACRS	Accelerated Cost Recovery System calculates the amount of tax deduction under U.S. Accelerated Cost Recovery System.
Sl Fr	Straight line French. This method of depreciation is similar to the Straight line method, except an actual calendar date in *mm.dd* format is entered in for *Start=* to indicate when the asset was first placed into service.

Table 8-2 Depreciation Menu Items

Item	Description
Life=	The expected useful life of the asset in whole years.
Start=	Start refers to the date or month in which the asset is first placed into service. Depending on the type of depreciation, this can be the month, or the actual date in *mm.dd* format.
Cost=	The depreciable cost of the asset at acquisition.
Salvage=	The salvage value of the asset at the end of its useful life.
Year=	Assigns the value of the year for which you want the depreciation.
Depreciation=	Depreciation calculation used for straight line, SOYD, and declining balance methods only.
R.Book Value=	Remaining book value.
R.Depreciable Value=	Remaining depreciable value.

Table 8-2 Depreciation Menu Items

Item	Description
Factor=	The declining balance factor as a percentage. This is used for declining balance and declining balance crossover methods only.

A metalworking machine, purchased for $10,000.00, is to be depreciated over five years. Its salvage value is estimated at $500.00. Using the straight-line method, find the depreciation and remaining depreciable value for each of the first two years of the machine's life. See Table 8-3.

Table 8-3 Straight Line Depreciation Example
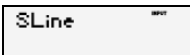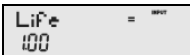
Key	Display	Description
▭ Depr	SLine INPUT	Opens the Depreciation menu starting with the straight line method.
▼	Life = INPUT 1.00	Displays the current value of the useful life. *1* is the default value.
5 INPUT	Life = INPUT 5.00	Inputs *5* as the current value for the useful life.

Table 8-3 Straight Line Depreciation Example

Key	Display	Description
▼	Start = ᴵᴺᴾᵁᵀ 1.00	Displays the current value of *Start=*. *1* is the default value.
▼	Cost = ᴵᴺᴾᵁᵀ 0.00	Displays the current value for *Cost=*.
1 0 0 0 0 INPUT	Cost = ᴵᴺᴾᵁᵀ 10000.00	Inputs the current value for cost as *10,000.00.*
▼	Salvage = ᴵᴺᴾᵁᵀ 0.00	Displays the current value for *Salvage=*.
5 0 0 INPUT	Salvage = ᴵᴺᴾᵁᵀ 500.00	Inputs the current value for salvage as *500.00.*
▼	Year = ᴵᴺᴾᵁᵀ 1.00	Displays the current year of the depreciation. *1* is the default value.
▼	DePreciat = 1900.00	Displays the current depreciation amount after year 1.
▼	R.Book V₂= 8100.00	Displays the current remaining book value after year 1.

Table 8-3 Straight Line Depreciation Example

Key	Display	Description
⬇	R.DePreci:= 760000	Displays the current remaining depreciable value after year 1.
⬇	Year = 200	Displays the current year of the depreciation.
⬇	DePreciat= 190000	Displays the current depreciation amount after year 2.
⬇	R.Book Vi= 620000	Displays the current remaining book value after year 2.
⬇	R.DePreci:= 570000	Displays the remaining depreciable value after year 2.

80
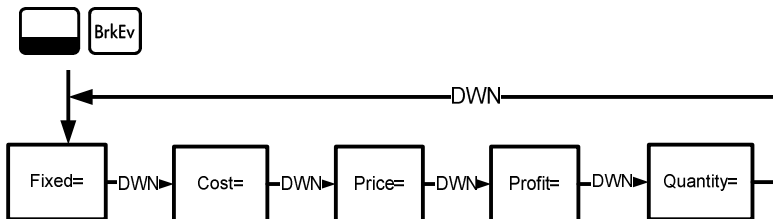
9   Break-even

Figure 9-1 The Menu Map for the Break-even Menu

Press ⬛ [BrkEv] to open the Break-even menu. Starting with *Fixed=*, input known data by entering a number and pressing [INPUT] . Scroll to the unknown variable by pressing [▲] or [▼] repeatedly. Press [=] to calculate it.

To reset the Break-even menu, from anywhere in the menu press ⬛ [Reset] . With *BrkEven* displayed, press [INPUT] to reset the menu or [ON/CE] to cancel. Press [ON/CE] again to exit the menu.

The sale price of an item is $300.00, the variable cost price is $250.00, and the fixed costs are $150,000.00. How many units would have to be sold to break even (profit = 0%)? This example is shown in Table 9-1 with RPN as the active operating mode.

Table 9-1 Break-even Example
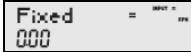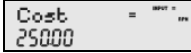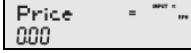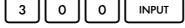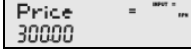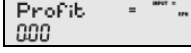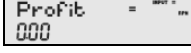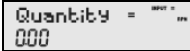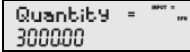
Keys	Display	Description
⬛ BrkEv	Fixed = INPUT ■ ■ RPN 0.00	Opens the Break-even menu starting with the current value for fixed costs.
1 5 0 0 0 0 INPUT	Fixed = INPUT ■ ■ RPN 150000.00	Inputs the current value for fixed costs as *150,000.00.*
▼	Cost = INPUT ■ ■ RPN 0.00	Displays the current vale for *Cost=.*
2 5 0 INPUT	Cost = INPUT ■ ■ RPN 250.00	Inputs the current value for cost as *250.00.*
▼	Price = INPUT ■ ■ RPN 0.00	Displays the current value for *Price=.*
3 0 0 INPUT	Price = INPUT ■ ■ RPN 300.00	Inputs the current value for price as *300.00.*
▼	Profit = INPUT ■ ■ RPN 0.00	Displays the current value for *Profit=.*
INPUT	Profit = INPUT ■ ■ RPN 0.00	Inputs the current value for profit as *0.*

Table 9-1 Break-even Example

Keys	Display	Description
▼	Quantity = ᴵᴺᴾᵁᵀ ⁼ ᵀᴾᴹ 000	Displays the current value for *Quantity=*.
=	Quantity = ᴵᴺᴾᵁᵀ ⁼ ᵀᴾᴹ 300000	Calculates the current value for the unknown item. 3000 units would have to be sold to return a 0% profit.

83

10   Warranty, Regulatory, and Contact Information

Replacing the Batteries

Use only fresh batteries. Do not use rechargeable batteries. EURO takes two, 3-volt CR2032 lithium batteries. To install a new battery:

1. With the calculator turned off, slide the back cover off.
2. Remove the old batteries.
3. Insert new batteries, with the positive polarity symbol facing outward.
4. Replace the back cover.

Warning! There is danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Do not mutilate, puncture, or dispose of batteries in fire. The batteries can burst or explode, releasing hazardous chemicals.

HP Limited Hardware Warranty and Customer Care

This HP Limited Warranty gives you, the end-user customer, express limited warranty rights from HP, the manufacturer. Please refer to HP's Web site for an extensive description of your limited warranty entitlements. In addition, you may also have other legal rights under applicable local law or special written agreement with HP.

Limited Hardware Warranty Period

Duration: 12 months total (may vary by region, please visit www.hp.com/support for latest information)

General Terms

HP warrants to you, the end-user customer, that HP hardware, accessories and supplies will be free from defects in materials and workmanship after the date of purchase, for the period specified above. If HP receives notice of such defects during the warranty period, HP will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or like-new.

HP warrants to you that HP software will not fail to execute its programming instructions after the date of purchase, for the period specified above, due to defects in material and workmanship when properly installed and used. If HP receives notice of such defects during the warranty period, HP will replace software media which does not execute its programming instructions due to such defects.

HP does not warrant that the operation of HP products will be uninterrupted or error free. If HP is unable, within a reasonable time, to repair or replace any product to a condition as warranted, you will be entitled to a refund of the purchase price upon prompt return of the product with proof of purchase.

HP products may contain remanufactured parts equivalent to new in performance or may have been subject to incidental use.

Warranty does not apply to defects resulting from (a) improper or inadequate maintenance or calibration, (b) software, interfacing, parts or supplies not supplied by HP, (c) unauthorized modification or misuse, (d) operation outside of the published environmental specifications for the product, or (e) improper site preparation or maintenance.

HP MAKES NO OTHER EXPRESS WARRANTY OR CONDITION WHETHER WRITTEN OR ORAL. TO THE EXTENT ALLOWED BY LOCAL LAW, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, SATISFACTORY QUALITY, OR FITNESS FOR A PARTICULAR PURPOSE IS LIMITED TO THE DURATION OF THE EXPRESS WARRANTY SET FORTH ABOVE. Some countries, states or provinces do not allow limitations on the duration of an implied warranty, so the above limitation or exclusion might not apply to you. This warranty gives you specific legal rights and you might also have other rights that vary from country to country, state to state, or province to province.

TO THE EXTENT ALLOWED BY LOCAL LAW, THE REMEDIES IN THIS WARRANTY STATEMENT ARE YOUR SOLE AND EXCLUSIVE REMEDIES. EXCEPT AS INDICATED ABOVE, IN NO EVENT WILL HP OR ITS SUPPLIERS BE LIABLE FOR LOSS OF DATA OR FOR DIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFIT OR DATA), OR OTHER DAMAGE, WHETHER BASED IN CONTRACT, TORT, OR OTHERWISE. Some countries, States or provinces do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. HP shall not be liable for technical or editorial errors or omissions contained herein.

FOR CONSUMER TRANSACTIONS IN AUSTRALIA AND NEW ZEALAND: THE WARRANTY TERMS CONTAINED IN THIS STATEMENT, EXCEPT TO THE EXTENT LAWFULLY PERMITTED, DO NOT EXCLUDE, RESTRICT OR MODIFY AND ARE IN ADDITION TO THE MANDATORY STATUTORY RIGHTS APPLICABLE TO THE SALE OF THIS PRODUCT TO YOU.

Customer Care

In addition to the one year hardware warranty your HP calculator also comes with one year of technical support. If you need assistance, HP customer care can be reached by either email or telephone. Before calling please locate the call center nearest you from the list below. Have your proof of purchase and calculator serial number ready when you call.

Telephone numbers are subject to change, and local and national telephone rates may apply. A complete list is available on the web at: www.hp.com/support.

Regulatory Information

Federal Communications Commission Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- □ • Reorient or relocate the receiving antenna.
- □ • Increase the separation between the equipment and the receiver.
- □ • Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- □ • Consult the dealer or an experienced radio or television technician for help.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

Declaration of Conformity for Products Marked with FCC Logo, United States Only

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

If you have questions about the product that are not related to this declaration, write to

Hewlett-Packard Company
P. O. Box 692000, Mail Stop 530113
Houston, TX 77269-2000
For questions regarding this FCC declaration, write to
Hewlett-Packard Company
P. O. Box 692000, Mail Stop 510101
Houston, TX 77269-2000
or call HP at 281-514-3333

To identify your product, refer to the part, series, or model number located on the product.

Canadian Notice

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Avis Canadien

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union Regulatory Notice

This product complies with the following EU Directives:

• Low Voltage Directive 2006/95/EC

• EMC Directive 2004/108/EC

Compliance with these directives implies conformity to applicable harmonized European standards (European Norms) which are listed on the EU Declaration of Conformity issued by Hewlett-Packard for this product or product family.
This compliance is indicated by the following conformity marking placed on the product:

$C\epsilon$	$C\epsilon_{XXXX*}$!
This marking is valid for non-Telecom products and EU harmonized Telecom products (e.g. Bluetooth).	This marking is valid for EU non-harmonized Telecom products . *Notified body number (used only if applicable - refer to the product label)

Hewlett-Packard GmbH, HQ-TRE, Herrenberger Srasse 140, 71034 Boeblingen, Germany

Japanese Notice

　この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準
に基づくクラス B 情報技術装置です。この装置は、家庭環境で使用すること
を目的としていますが、この装置がラジオやテレビジョン受信機に近接して
使用されると、受信障害を引き起こすことがあります。
　取扱説明書に従って正しい取り扱いをして下さい。

Disposal of Waste Equipment by Users in Private Household in the European Union

This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

Perchlorate Material - special handling may apply

This calculator's Memory Backup battery may contain perchlorate and may require special handling when recycled or disposed in California.

Table 10-1 Contact Information

Country/Region	Contact
Africa (English)	www.hp.com/support
Africa (French)	www.hp.com/support
Argentina	0-800-555-5000
Australia	1300-551-664
Austria	01 360 277 1203
Belgium (French)	02 620 00 85
Belgium (English)	02 620 00 86
Bolivia	800-100-193
Brasil	0-800-709-7751
Canada	800-HP-INVENT
Caribbean	1-800-711-2884
Chile	800-360-999
China	010-68002397

Table 10-1 Contact Information

Country/Region	Contact
Colombia	01-8000-51-4746-8368
Costa Rica	0-800-011-0524
Czech Republic	296 335 612
Denmark	82 33 28 44
Ecuador	800-711-2884
El Salvador	800-6160
Finland	09 8171 0281
France	01 4993 9006
Germany	069 9530 7103
Greece	210 969 6421
Guatemala	1-800-999-5105
Honduras	800-711-2884
Hong Kong	852 2833-1111
Hungary	www.hp.com/support

Table 10-1 Contact Information

Country/Region	Contact
India	www.hp.com/support/india
Indonesia	+65 6100 6682
Ireland	01 605 0356
Italy	02 754 19 782
Japan	81-3-6666-9925
Korea	www.hp.com/support/korea
Malaysia	+65 6100 6682
Mexico	01-800-474-68368
Middle East International	www.hp.com/support
Netherlands	020 654 5301
New Zealand	0800-551-664
Nicaragua	1-800-711-2884
Norway	23500027
Panama	001-800-711-2884

Table 10-1 Contact Information

Country/Region	Contact
Paraguay	(009) 800-541-0006
Peru	0-800-10111
Philippines	+65 6100 6682
Poland	www.hp.com/support
Portugal	021 318 0093
Puerto Rico	1-877 232 0589
Russia	495 228 3050
Singapore	6100 6682
South Africa	0800980410
South Korea	2-561-2700
Spain	913753382
Sweden	08 5199 2065
Switzerland (French)	022 827 8780
Switzerland (German)	01 439 5358

Table 10-1 Contact Information

Country/Region	Contact
Switzerland (Italian)	022 567 5308
Taiwan	+852 2805-2563
Thailand	+65 6100 6682
Turkey	www.hp.com/support
United Kingdom	0207 458 0161
Uruguay	0004-054-177
United States	800-HP INVENT
Venezuela	0-800-474-68368
Vietnam	+65 6100 6682