Infinity Softworks

FCPlus
FCPlus Professional
For the Palm Computing® Platform

Table of Contents

Getting Started

This section helps you get started using your FCPlus™ financial calculator.

Using This Manual

This manual is designed for both FCPlus and FCPlus Professional. Items that only apply to FCPlus Professional will be noted at that item. All other items are pertinent to both versions of the calculator. See the section on Functions Only in FCPlus Professional for an overview.

The Display

The FCPlus line of financial calculators has three main areas: the main calculator, the worksheets, and the input screen. The main and input screens serve as calculators which will function in either standard or RPN input mode. (To switch modes, see the Preferences section.) The worksheets perform financial and statistics computations, working with the input screen to enter variables and perform computations.

The Palm Device

This manual references certain objects of the Palm® device itself:

Applications button

Calculator button

Menu button

Power button (green button)
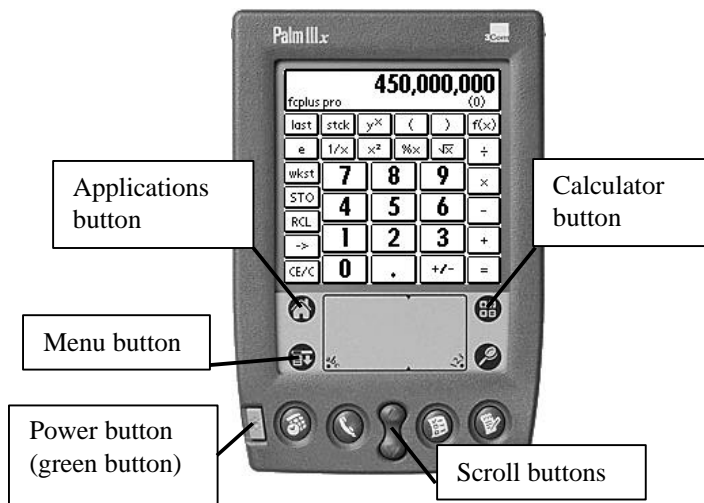
Scroll buttons

In addition, this manual will refer to scroll arrows, scroll buttons, and scroll bars. Scroll arrows appear in the lower, right-hand corner of the screen or in the pop-up list. Scroll bars appear next to the data to be scrolled. And scroll buttons are shown in the graphic above.

Setting the Default Calculator

The first time you run an FCPlus financial calculator, it will ask you if you want to set it as the default calculator. Another method for setting it as the default calculator: tap the Applications button and choose Prefs. From the pull-down list in the upper, right-hand corner, select Buttons. Next to the icon that looks like a calculator, select FCPlus or FCPlus Pro from the pop-up list.

Number Ranges

The FCPlus line of financial calculators allow for entry of numbers up to 14 digits. Numbers larger than this will display in scientific notation (i.e., 1.234e13). In addition, FCPlus Professional also allows for entry in scientific notation. Due to display restrictions, the worksheets cannot display numbers this large (in general, worksheets display 9-11 digits).

Canceling Calculations

If the calculation will take more than a second or two, a dialog that says "Calculating…" appears. While this indicator is displayed, the calculation can be cancelled by tapping the Power button located on the front of your Palm connected organizer.

Performing Arithmetic

The main calculator of FCPlus and FCPlus Professional serve as a standard calculator, which can function in either standard (algebraic) or RPN input modes. Entries made in the main calculator tie to the input screen, and vice-a-versa. Functions are available either on the screen or via the "f(x)" list. Select that button to display the list. Selecting "wkst" displays the list of available worksheets. Other buttons function as standard calculator buttons. In addition, there are also menus. Reach the menu by tapping the menu button to the lower, left of the Graffiti® input area.

Entering Numbers (0-9; ./,; +/–; →; CE/C)

To enter a number, tap the corresponding keypad button (0-9, decimal point, or sign).

To enter -356.96, for instance, do the following:

Key	Display	Comments
C/CE	0	Tap twice to clear the display
3	3	
5	35	
6	356	
. or ,	356.	Depends on the number format
9	356.9	
6	356.96	
+/–	-356.96	

The decimal point can either be displayed as a period or as a comma. This depends on the number format mode used. See your Palm device owner's manual for more details.

The following are number entry functions:

Operation	Example	Comments
Number	0-9	Number pad items
Decimal point	. or ,	Depends on the number format
Sign	+/–	
Exponent ♦	e	Exponential notation

♦ available only in FCPlus Professional.

To enter a number in **Exponential Notation**, available only in FCPlus Professional, enter the mantissa then enter the exponent.

For example, to enter -1.29e-54 do the following:

Key	Display	Comments
C/CE	0	Tap twice to clear the display
1.29	1.29	
e	1.29e	
+/–	1.29e-	
54	1.29e-54	
+/–	-1.29e-54	

The **Backspace** ($\rightarrow$) button allows for editing of numbers as they are entered. Tapping this button removes the last number entered (i.e., 54.32 becomes 54.3).

Tapping the **Clear Entry/Clear** (CE/C) button once clears only the currently entered number. Tapping it a second time clears the entire computation.

Mathematics (One- and Two-Variable Functions)

The FCPlus line of financial calculators can be used in either standard or RPN input mode. Standard input mode math is performed by alternating chains of values and operations. RPN input mode takes a chain of values followed by a chain of operations. To switch modes, see the section on Preferences.

Math functions are either one or two variable. Two-variable math, such as add, subtract, multiply and divide, take two variables to

compute. One-variable functions, such as square root and reciprocal (1/x), need only one variable to calculate.

Two-Variable Math: Standard Input Mode

To perform a computation using standard input mode, we enter alternating values and functions. For example, if we wanted to perform 27 + 3 x 8.5:

Key	Display	Comments
C/CE	0	Tap twice to clear the display
27	27	
+	27.00	
3	3	
x	30.00	
8.5	8.5	
=	255.00	

The number of decimal places displayed depends on the preference. See the section on Preferences for more information.

The following are two-variable, standard input mode examples:

Operation	Example	Keystroke	Answer
Addition	8 + 3	8 [+] 3 [=]	11.00
Subtraction	8 − 3	8 [−] 3 [=]	5.00
Multiplication	8 x 3	8 [x] 3 [=]	24.00
Division	8 ÷ 3	8 [÷] 3 [=]	2.67
Power	3^4	3 [y^x] 4 [=]	81.00
Permutations ◆	n = 5, r = 2	5 [nPr] 2 [=]	20.00
Combinations ◆	N = 7, r = 3	7 [nCr] 3 [=]	35.00

Percent	15% of 350	350 [x] 15 [%x] [=]	52.50
Percent ratio	9 is what percent of 25	9 [÷] 25 [%x] [=]	36.00
Percent add-on	22.95 + 6% sales tax	22.95 [+] 6 [%x] [=]	24.33
Percent discount	39.99 less 10%	39.99 [–] 10 [%x] [=]	35.99

♦ available only in FCPlus Professional.

Two-Variable Math: RPN Input Mode

RPN input mode uses a chain of values and than a chain of variables to perform the computations. This mode utilizes a stack, which stores numerical entries. The stack works like a pile of dishes. Entering a number is like putting a plate on top of the pile. This is called pushing onto the stack. To push a variable, enter the number than press "ENT" (**Enter**). Performing a calculation is like taking a plate off the pile of dishes. This is called popping off of the stack. To do this, press a two-variable function.

When a calculation is performed, the number at the top of the stack is the first operand while the number in the visible view window is the second. The stack can be viewed at any time by selecting the "stck" function. See the section on RPN Stack and History List for more details.

To calculate 27 + 3 x 8.5:

Key	Display	Comments
C/CE		Tap twice to clear the display
27	27	
ENT	27.00	
3	3	
ENT	3.00	
+	30.00	
8.5	8.5	
ENT	8.50	
X	255.00	

Note: the same answer can be derived by entering 8.5, 3 and 27 than adding and finally multiplying.

The following are two-variable, standard input mode examples:

Operation		Example	Keystroke	Answer
Addition		8 + 3	8 [ENT] 3 [+]	11.00
Subtraction		8 – 3	8 [ENT] 3 [–]	5.00
Multiplication		8 x 3	8 [ENT] 3 [x]	24.00
Division		8 ÷ 3	8 [ENT] 3 [÷]	2.67
Power		3^4	3 [ENT] 4 [y^x]	81.00
Permutations	♦	n = 5, r = 2	5 [ENT] 2 [nPr]	20.00
Combinations	♦	N = 7, r = 3	7 [ENT] 3 [nCr]	35.00
Percent		15% of 350	350 [ENT] 15 [%x]	52.50

Percent ratio	9 is what percent of 25	9 [ENT] 100 [x] 25 [÷]	36.00
Percent add-on	22.95 + 6% sales tax	22.95 [ENT] 6 [%x] [+]	24.33
Percent discount	39.99 less 10%	39.99 [ENT] 10 [%x] [–]	35.99

♦ available only in FCPlus Professional.

One-Variable Math

FCPlus and FCPlus Professional provide many functions that can be used as one-variable math functions, including square root, x-squared, and reciprocal. These functions use only the value in the main view window. For example, to calculate the square root of 8:

Key	Display	Comments
C/CE		Tap twice to clear the display
8	8	
√x	2.83	

The following are one-variable math examples:

Operation		Example	Keystroke	Answer
Reciprocal		1/5	5 [1/x]	0.20
Square		8^2	8 [x^2]	64.00
Square root		√8	8 [√x]	2.83
Natural Log	♦	ln(4)	4 [ln]	1.39
Natural anti-log	♦	e^2	2 [exp]	7.39
Factorial	♦	5!	5 [x!]	120.00

Random number	♦	[rand]	0.32
Round (rnd)	Rounds number to displayed decimals		
Show (show)	Shows all decimal places		

♦ available only in FCPlus Professional.

Parentheses

Parentheses are used in standard input mode to establish **order of precedence**. Any operation enclosed in parentheses are calculated before the operations outside of parentheses.

If the equation ends in a series of parentheses, use the equals (=) button to compute the final amount. To view intermediate results, tap the right parenthesis for each left parenthesis until the value in the visible view window stops changing. For FCPlus Professional users, the Parenthesis Indicator shows how many right parentheses are currently in use. This indicator is just below the value in the view window, displayed within parentheses.

Without parentheses, the problem 27 + 3 x 8 equals 240 because the calculator performs 27 + 3 = 30 x 8 = 240. To follow order of precedence rules, the problem should read 27 + (3 x 8). This forces the computation 3 x 8 (or 24) before adding 27. The total for the example with parentheses is 51.

Memory

The FCPlus line of financial calculators has ten memory locations,
plus the system clipboard. To access a memory location, use the
store (STO) and **recall** (RCL) functions. To access the system
clipboard, use **copy** and **paste** from the edit menu.

To store to a memory location, enter the number, select the STO
button, and finally the location. Locations are 0 through 9. To
recall a value, select the RCL button and then the location to recall:

Function	Key
Store 34.5 at memory location 9	34.5 [STO] 9
Recall the contents of memory location 9	[RCL] 9

To store to the system clipboard, enter the number then select copy
from the edit menu. This allows numbers to be moved from one
application to another. Recall information from the system
clipboard by selecting paste from the edit menu.

Memory Arithmetic
Memory arithmetic is also available for FCPlus Professional users.
This style of arithmetic allows for computations on a stored value
with a single operation.

Two caveats to memory arithmetic: First, it does not change the
main view window, only the memory location designated. Second,
memory arithmetic does not complete the current computation. It
uses only the value in the view window:

Performing Arithmetic

Function	Key
Add 35 to memory location 7	35 [STO] [+] 7
Subtract 15 from location 4	15 [STO] [–] 4
Multiply location 0 by 23	23 [STO] [x] 0
Divide location 2 by 2.5	2.5 [STO] [÷] 2
Raise the value in location 9 by 5	5 [STO] [y^x] 9

RPN Stack and History List

Depending on which input mode the calculator is in, selecting "stck" accesses either the **history** or **RPN stack**. When in RPN input mode, this list shows the items on the stack. When in standard input mode, it shows the history list – a stack of previous computations. Selecting outside the list closes the dialog. Selecting inside the list displays a series of functions available for working with each list item:

- **Drop** (drop): throws out the selected value.
- **Duplicate** (dup): copies the selected item into the view window.
- **Move** (mov): removes the item from its location in the list and places it in the main view window.
- **Rotate** (rot): moves the list in a clockwise direction.
- **Rotate Rvrs** (rotr): moves the list in a reverse or counter-clockwise direction.
- **Swap** (swap): swaps the selected item with the amount in the view window. This moves the selected variable into the view

window and the view window's value into the selected
variable's location.

These variables also exist in the f(x) list (for FCPlus Professional
users only) and the Stack menu. When using the programmable
buttons, the f(x) list or the menu, the FCPlus line of calculators
assumes the target value is the top item on the stack.

Another way to access the history list is to use the **last** function.
Last in standard input mode accesses the last computation. In RPN
input mode, it stores the last entered value.

A standard input mode example is $(3 + 4) \div (6 \times 2)$:

Key	Display	Comments
C/CE		Tap twice to clear the display
6 [x] 2 [=]	12.00	
3 [+] 4 [÷] [LAST] [=]	0.58	

A RPN input mode example is $(24.86 + 15.65) \div 15.65$:

Key	Display	Comments
C/CE		Tap twice to clear the display
24.86 [ENT]	24.86	
15.65 [+]	40.51	
[LAST]	15.65	
[÷]	2.59	

Input Screen

In the worksheets, FCPlus and FCPlus Professional use the input screen to enter variables and perform computations. The input screen is similar to the main screen and information entered in the main screen is the same as information in the input screen. For example, if a computation is begun in the main screen, it can be completed in the input screen.
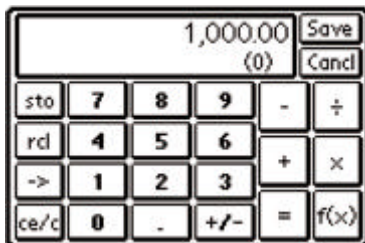
For more information on the input screen, see the section on Using the Worksheets.

Menus

The main and input screen have three menus. Access the menus
by selecting the menu button to the left of the Graffiti area.

Stack	Edit	Options
Drop		✓0
Duplicate		✓1
Move		✓2
Rotate		✓3
Rotate Reverse		✓4
Swap		✓5

This menu controls the RPN stack
or history list. See the section on
the RPN Stack and History List
for details.

Stack	Edit	Options
	Copy	✓C
	Paste	✓P
	Graffiti Help	✓G

Copy and paste to the system
clipboard, or use Graffiti Help to
learn keystrokes. See Memory
for more information.

Stack	Edit	Options
	Clear All	✓A
	Clear History	✓H
	Clear Memory	✓Y
	About FCPlus Professional	
	Error Help	✓E
	Keystroke Help	✓O
	Preferences	✓R

Use the clear functions to reset
memory used for the main screen.
Get help with the application or
product information. Change the
preferences by selecting
Preferences.

Preferences

The Preferences screen sets preferences for the main and input calculators. The worksheets have their own preferences, detailed in the section on Using the Worksheets.

FCPlus Professional and FCPlus have different sets of preferences. FCPlus allows the decimal places to be set only. FCPlus Professional also contains customizability options. In addition, FCPlus Professional's settings are based on the input mode.
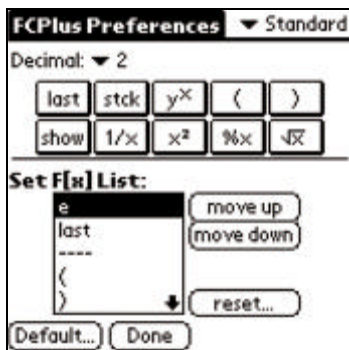
FCPlus Professional   **FCPlus**
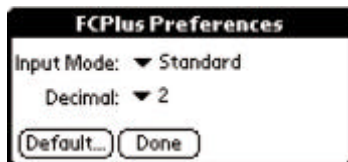
Input Mode

The input mode can be either standard (algebraic) input mode or RPN (reverse polish notation) input mode. To set the calculator's current mode, choose the mode and select the Done button. In FCPlus Professional, the decimal setting and customizable buttons are based on the current input mode.

Decimal Setting

Both FCPlus and FCPlus Professional allow for setting the displayed decimal places. There are 11 possible decimal place settings:

- **0-8**: shows that many decimal places.
- **No Setting**: shows all available decimal places.
- **One-Minimum**: always shows at least one decimal place.
- **Scientific**: displays all numbers in scientific notation.

In addition, the **show** function (available on the main and input screens) displays all available decimal places until the next entry is made. This can be used to quickly see more decimal places than the current setting.

Remember, the decimal setting is limited to the number of total digits. A 14 digit number, for example, will not show decimal places.

Programmable Buttons

In FCPlus Professional, there are ten buttons on the main screen
that can be set to any of the functions within the application. On
the main screen, these buttons appear just below the view window.
In the input screen, these buttons are the first items in the f(x)
function list. The following shows where these buttons are on the
main screen:

To set a button in the preferences screen, choose the corresponding
button and select the item from the pop-up list. Note that the list
scrolls up and down with the scroll arrows or scroll buttons.

The available items include number entry, one- and two-variable
functions, stack manipulation routines, and financial worksheets.

Returning to Preference Defaults

To return the preferences to their default settings, choose the
Default button next to Done. This resets the default decimal place
setting and programmable buttons, but not the function [f(x)] list.
To reset that list, choose Reset next to the function list. Again,

setting preferences other than decimal places is available only in
FCPlus Professional.

Setting the Function [f(x)] List

For FCPlus Professional users, the function list, which is selected
on the main and input screens by tapping the f(x) button, can be re-
arranged. This list contains additional functions available for
calculations. Although items cannot be added to the list, all items
can be moved up or down for faster access.

To move an item, select that item in the list and choose either the
move up or **move down** button. To return the list to its default
setting, select **reset**. This list is independent of the input mode.
The list order determined for standard input mode is also the same
for RPN input mode.

Using the Worksheets

The FCPlus line of financial calculators use worksheets to perform financial and statistics computations. This section details general use. See the section on each worksheet for details on that specific computation. Finally, see the appendix for information on errors.

Accessing the Worksheets

To access a worksheet, select the main screen button labeled "wkst" and choose the desired computation. This list scrolls up and down with both the scroll arrows and scroll buttons.

Worksheet Structure

All worksheets are similar in nature:

- Each worksheet has a **clear** button which sets the data back to its original state.
- To exit the worksheet, select **done**.
- Most worksheets (excluding the calculation log and memory worksheets) contain a menu with two options: about the FCPlus financial calculator with contact information, and access to the worksheet **preferences**. The worksheets maintain their own decimal place setting – worksheet preferences is where that is changed. The calculation log and memory worksheets use the main and input preferences.

The computation display for each worksheet is also similar. For most worksheets, the data is set in column form:
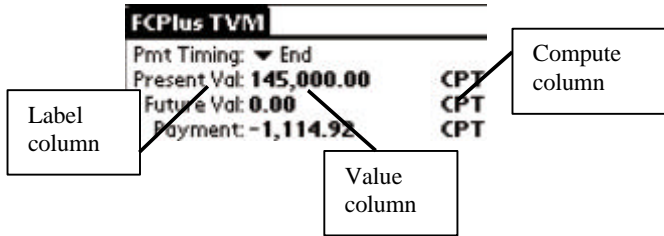
To enter a value, tap on the label or value column, enter it in the entry screen, and return. To compute a value, tap the "CPT" label next to the data to compute.

The statistics and cash flows worksheet are slightly different:
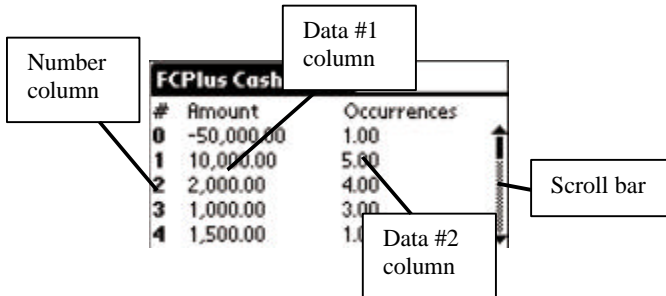
Since these worksheets require data and computations, the top half

of the worksheet allows for data entry (as shown in the picture) while the bottom half allows for computations. To enter a data point, select a location from data column 1 or 2. To **insert**, **remove**, or **clear** a data point, select the column number and a list choice. There are 30 total data sets (numbered 0 through 29). Use the scroll bar to move up and down (the scroll buttons are inactive in these worksheets). Additionally, the calculations for these worksheets may also have a scroll bar, which list additional computations.

Entering Data

In the worksheets, data is entered using the input screen, date selector or time selector, depending on the type of data requested. The date and time selectors are standard to the Palm Computing platform, used in applications such as the datebook and to do list. The input screen is native to the FCPlus line of calculators.

Input Screen
The input screen is used to enter values in the worksheets. All of the math functions available on the main calculator are also available in the input screen.

When a value is selected, that value appears in the input screen. The keyed function buttons work similar to those in the main calculator. Additionally, the f(x) button displays a list of math functions. Finally, a menu is available. This menu is the same as

the main screen's. See Performing Arithmetic for more information.

The f(x) list is organized based on the main screen's buttons and f(x) list. This list in the input screen scrolls with the scroll arrows or with the scroll buttons.
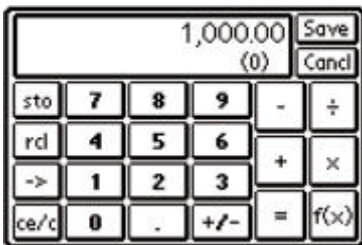
To exit the input screen, tap **save** to store the view window's value for worksheet calculations or tap **cancel** ("Cancl") to disregard the value. Some variables cannot be saved. In this case, the worksheet disregards the value whether save or cancel is selected. Remember, the computations done in the worksheet itself are automatically saved for further use within the input screen or in the main calculator. Save and cancel are specifically used for saving to the worksheet itself.

Time Value of Money

The Time Value of Money worksheet (also known as TVM or amortization) is the most commonly used worksheet. Time value of money is the process of earning interest over a period of time. There are two types of interest, simple and compound:

- **Simple interest** problems assume that interest is accumulated only once (at the time of repayment). These computations are performed in the Simple Interest worksheet.
- **Compound interest** problems assume that the interest earned also earns interest. Computations such as loans, leases, mortgages, annuities, and savings accounts are compound interest problems. These use the TVM worksheet in conjunction with the amortization worksheet to perform computations. Amortization calculations determine the amount of payments applied to principal and interest for any given period or range of periods.

As with other worksheets, the Time Value of Money and Amortization worksheets understand positive numbers to be inflows of cash (cash received) and negative numbers to be outflows (cash paid). A car loan, for instance, may have a positive present value (because money was received from the loan company) but will have a negative payment amount, since this is money that will be paid back to the loan company. See the

pictorial on Understanding Cash Flows later in this manual for more information.

The Display

The TVM display includes a series of variables and buttons:

- **Pmt Timing**: the payment timing. Payments occur at the beginning or end of the period. Payments made at the beginning of the period are called **Annuity Due**. Most leases are this kind. A payment made at the end of the period is called an **Ordinary Annuity**. Most loans are this kind.

FCPlus TVM

Pmt Timing: ▼ End
Present Val: **145,000.00**   **CPT**
Future Val: **0.00**   **CPT**
Payment: **-1,114.92**   **CPT**
Intrst/Yr%: **8.50**   **CPT**
Periods: **360.00**   **CPT**
Periods/Yr: **12.00**
Cmpnds/Yr: **12.00**

(Clear...) (Done)(xPY)(÷PY)(Amort)
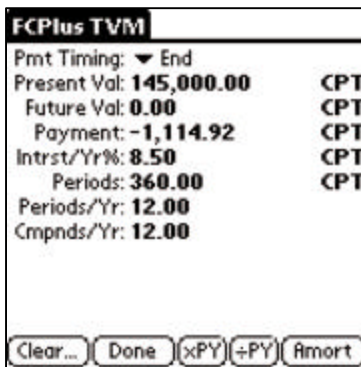
- **Present Val**: the present value.
- **Future Val**: the future value.
- **Payment**: payment amount per period.
- **Intrst/Yr%**: interest per year as a percentage. For example, 8.25% interest should be entered as "8.25".
- **Periods**: number of total periods. This number is the number of years and months times the periods per year. For example,

Time Value of Money

if the loan is 4 years with 12 payments per year (monthly payments), periods should be 48 (4 x 12).

- **Periods/Yr**: the number of payment periods per year. For example, if payments are made quarterly, periods per year should be 4.
- **Cmpnds/Yr**: the number of interest compounding periods per year. Most of the time, compounding periods per year should equal compounding periods per year. For example, if interest is compounded monthly, compounding periods per year should be 12. When periods per year is changed, compounding periods per year is also changed to match.

Additionally, there are three buttons on the screen next to the Done button:

- **xPY**: quick set button for the number of periods. This button multiplies the value in periods by the value in periods per year. For example, to convert 10 years at 12 periods per year to periods, enter 10 in periods, 12 in periods per year, and select xPY.
- **÷PY**: quick set button for the number of periods. This button divides the value in periods by the value in periods per year. For example, if the periods is 60 with periods per year equal to 12, discovering that that is five years can be don easily by selecting ÷PY.
- **Amort**: access to the amortization screen. See the section on the Amortization screen for more information.

Amortization Screen

The amortization screen displays period-by-period information for
time value of money computations. Included information is
beginning and ending balances, payment, interest and principal
amounts.

There are two amortization views: table and period. Period view is
available in FCPlus Professional only.

Table View
The table view, set when choosing "Table" from the pop-up list in
the top, right-hand corner, displays period-by-period information.

The display, from left-to-right,
shows the period being
displayed, data number one and
data number two. Either of the
data sets can display beginning
or ending balance, payment,
principal or interest. Select one
by tapping on the pop-up list
above each column. Scroll
through the list with either the
scroll arrows or scroll buttons.

FCPlus Amortization	▼ Table
▼ Principal	▼ End Balance
10:	-93.60	144,093.08
11:	-94.26	143,998.82
12:	-94.93	143,903.89
13:	-95.60	143,808.29
14:	-96.28	143,712.01
15:	-96.96	143,615.05
16:	-97.65	143,517.40
17:	-98.34	143,419.06
18:	-99.03	143,320.03
19:	-99.74	143,220.29

(Done)

Time Value of Money

Period View
The period view, available only in FCPlus Professional, can be selected by choosing "Period" from the pop-up list in the top, right-hand corner.

To calculate the values over the range of periods, enter a period for **Beg Period**, one for **End Period**, and select "CPT". The table will display information for Beg Balance, End Balance, Payment, Principal, and Interest over that range.

FCPlus Amortization	▼ Period
Beg Period: **1.00**	
End Period: **1.00**	
Beg Balance: **145,000.00**	**CPT**
Payment: **-1,114.92**	
Principal: **-87.84**	
Interest: **-1,027.08**	
End Balance: **144,912.16**	

(Done) (Max) (Next) (1yr) (Dup)

Additionally, four buttons are available at the bottom of the screen next to Done. These buttons are used to quickly enter beginning and ending period values and perform computations:

- **Max**: sets the ending balance to the maximum number of periods.
- **Next**: moves to the next set of beginning and ending periods. For example, with both set to one, selecting next moves them both to two and calculates.
- **1yr**: calculates one year from the beginning period.
- **Dup**: duplicates the beginning period in the ending period.

Examples

Car Loan: When purchasing a new car, the auto dealer has offered a 12.5% interest rate over 36 months on a $7,500 loan. What will be the monthly payment?

Key	Entry	Comments
Clear…		Sets the display to its default values
Pmt Timing	End	Loan pmt's are at the end of the period
Present Val	7500	
Intrst/Yr%	12.5	
Periods	36	3 years at 12 periods per year
Periods/Yr	12	
Cmpnds/Yr	12	

Compute payment by selecting "CPT on the Payment line. The payment will be –250.90. It is negative because it is a cash outflow.

Car Loan, Amortization 1: How much interest was paid for the first payment? (Assumes you are currently in the TVM worksheet).

Key	Entry	Comments
Amort		Goes to the amortization worksheet
Table		Select the amortization view in the top, right-hand corner.

Time Value of Money

Interest		Choose Interest from the data display 1 or 2 pop-up list

Interest for the first period is –78.13. This is negative because it is part of the payment, which is a cash outflow.

Car Loan, Amortization 2: How much principal was paid for the first year if the car was purchased in January? (Assumes you are currently in the TVM worksheet).

Key	Entry	Comments
Amort		Goes to the amortization worksheet
Period		Select the amortization view in the top, right-hand corner.
Beg Period	1	
End Period	12	

Compute by selecting "CPT" next to Beg Balance. The principal paid for the first year is –2,196.33. This value is negative because it is part of the payment, which is a cash outflow.

Retirement Annuity: With 35 years until retirement and $15,000 in the bank, it is time to think about savings. How much would have to be put aside at the beginning of each month to reach $2.5 million if an interest rate of 10% can be expected.

Key	Entry	Comments
Clear…		Sets the display to its default values
Pmt Timing	Begin	
Present Val	-15,000	Negative because cash out of hand
Future Val	2,500,000	Positive because future cash inflow
Intrst/Yr%	10.0	
Periods	420	35 years x 12 periods per year
Periods/Yr	12	
Cmpnds/Yr	12	

Compute by selecting "CPT" next to Payment. The payment amount is –525.15. It is negative because it is a cash outflow.

Savings Account: With $3,000 in a savings account and 3.75% interest, how many months does it take to reach $4,000.

Key	Entry	Comments
Clear…		Sets the display to its default values
Pmt Timing	End	
Present Val	-3,000	Negative because cash deposit to open account
Future Val	4,000	
Payment	0	
Intrst/Yr%	3.75	
Periods/Yr	12	
Cmpnds/Yr	12	

Compute periods by selecting "CPT" on the same line. To reach $4,000, it will take 92.20 periods (or 92.20 ÷ 12 = 7.68 years).

Home Mortgage: You have decided to buy a house but you only have $900 to spend each month on a 30-year mortgage. The bank has quoted an interest rate of 8.75%. What is the maximum purchase price?

Key	Entry	Comments
Clear…		Sets the display to its default values
Pmt Timing	End	Loans payments at the end of the period
Future Val	0	
Payment	-900	Negative because cash outflow
Intrst/Yr%	8.75	
Periods	360	30 years at 12 periods per year
Periods/Yr	12	
Cmpnds/Yr	12	

Compute present value by selecting "CPT" on the same line. You can afford a home with a price of $114,401.87.

Mortgage With Balloon Payment: (Continued from Home Mortgage) You realize that you will only own the house for about 5 years and then sell it. How much will the balloon payment (the repayment to the bank) be?

Key	Entry	Comments
Periods	60	5 years at 12 periods per year

Compute future value by selecting "CPT" on the same line. The balloon payment will be $109,469.92 after five years.

Canadian Mortgage: Canadian mortgages compound interest twice per year instead of monthly. What is the monthly payment to fully amortize a 30 year, $80,000 Canadian mortgage if the interest rate is 12%?

Key	Entry	Comments
Clear…		Sets the display to its default values
Pmt Timing	End	Loans payments at the end of the period
Present Val	80,000	
Future Val	0	
Intrst/Yr%	12.00	
Periods	360	30 years at 12 periods per year
Periods/Yr	12	
Cmpnds/Yr	2	

Compute payment by selecting "CPT" on the same line. The payment will be –$805.11.

Bi-Weekly Mortgage Payments: A buyer is considering a $100,000 home loan with monthly payments, an annual interest rate of 9% and a term of 30 years. Instead of making monthly payments, the buyer realizes that he can build equity faster by making bi-weekly payments (every two weeks). How long will it take to pay off the loan?

Part 1: Calculate the monthly payment

Key	Entry	Comments
Clear…		Sets the display to its default values
Pmt Timing	End	
Present Val	100,000	
Future Val	0	
Intrst/Yr%	9.00	
Periods	360	30 years at 12 periods per year
Periods/Yr	12	
Cmpnds/Yr	12	

Calculating shows payment equal to –$804.62.

Part 2: Periods when making bi-weekly payments (continued)

Key	Entry	Comments
Payment	-402.31	Recall payment in the input screen and divide it by 2
Periods/Yr	26	Bi-weekly payments mean 26 per year
Cmpnds/Yr	12	Still compounding interest monthly

Calculating shows periods equal to 567.40 periods (567.40 ÷ 26 = 21.82 years).

APR of a Loan with Fees: The Annual Percentage Rate (APR) is the interest rate when fees are included with the mortgage amount. Because the fees reduce the loan amount, the interest rate is higher. For example, a borrower is charged two points for the issuance of a mortgage (one point is equal to 1% of the mortgage amount). If the mortgage amount is $60,000 for 30 years with an interest rate of 11.5%, what is the APR?

Part 1: Calculate the actual monthly payment

Key	Entry	Comments
Clear…		Sets the display to its default values
Pmt Timing	End	
Present Val	60,000	
Future Val	0	
Intrst/Yr%	11.5	
Periods	360	30 years at 12 periods per year
Periods/Yr	12	
Cmpnds/Yr	12	

Calculating shows payment equal to –$594.17.

Part 2: Periods when making bi-weekly payments (continued)

Key	Entry	Comments
Present Val	58,800	The loan amount less 2% in fees. Calculate in the input screen with 60,000 [–] 2 [%x] [=]

Calculating shows interest per year equal to 11.76%.

Present Value of Lease with Advance Payments and an Option to Buy: With a lease, often there is an amount to be paid up-front and an option to buy at the back-end. A company is leasing a machine for 4 years. Monthly payments are $2,400; an additional $2,400 payment at the beginning of the leasing period replaces the final payment. The leasing agreement includes an option to buy the machine for $15,000 at the end of the leasing period. What is the capitalized value of the lease, assuming that the interest rate paid to borrow the funds is 18% compounded monthly?

Part 1: Find the present value of the payments

Key	Entry	Comments
Clear…		Sets the display to its default values
Pmt Timing	Beg	
Future Val	0	
Payment	–2,400	
Intrst/Yr%	18.00	
Periods	47	4 years at 12 per year less 1 advance payment

Periods/Yr	12	30 years at 12 periods per year
Cmpnds/Yr	12	

Calculating shows payment equal to $81,735.58. Recall this to the input screen and save it at memory location 0.

Part 2: Present Value of the buy option (continued)

Key	Entry	Comments
Future Val	–15,000	
Payment	0	
Periods	48	

Calculating shows present value equal to $7,340.43.

Part 3: Calculate (continued)
Recall the present value to the input screen. Add in present value of the payments stored at location 0 and $2,400 for the advanced payment. The answer is $91,476.00.

Cash Flow

The Cash Flow (cf) worksheet analyzes financial investments involving outflows and inflows of cash which occur on a regular basis but do not necessarily occur in similar amounts. FCPlus calculates cash flows in each of the three most popular methods: **Payback** (**Payback**), **Internal Rate of Return** (**IRR%**), and **Net Present Value** (**NPV**). In addition, FCPlus Professional calculates **Net Future Value (NFV)**, **Modified Internal Rate of Return (MIRR%)**, **Net Uniform Series (NUS)**, **Profitability Index (Pft Index)**, and **Total**.

FCPlus Cash Flows

#	Amount	Occurrences
0	-50,000.00	1.00
1	10,000.00	5.00
2	2,000.00	4.00
3	1,000.00	3.00
4	1,500.00	1.00

Int/Yr%: **5.00**
Prds/Yr: **1.00**
NPV: **1,402.37**   CPT
IRR%: **5.77**   CPT
NFV: **2,644.38**   CPT

[Clear...] [Done]

As with other worksheets, the Cash Flow worksheet understands positive numbers to be inflows of cash (cash received) and negative numbers to be outflows (cash paid). Note that, although the interval between cash flows must be equal, the amounts of those cash flows do not have to be the same. Cash flows generally involve some initial outflow of cash followed by subsequent inflows over a number of periods. For instance, an initial outflow (designated by **location 0**) could be followed by various amounts

paid back over five periods, each period being one year apart. Cash flows do not have to be initial outflows followed by inflows, either. Cash flows could be inflows preceded by outflows, or an initial inflow or outflow followed by some mixture of cash flows as well.

See Understanding Cash Flows for a pictorial explanation of inflows and outflows.

The Display

To perform a cash flow problem, data must be entered. The top section of the worksheet is for data entry while the bottom section is for computations. From left to right, the columns are:

- **Number (#)**: the cash flow number, 0 through 29. The 0th cash flow is the initial cash flow.
- **Amount**: the cash flow amount, whether positive or negative. Again, the 0th cash flow is the initial cash flow.
- **Occurrences**: the number of occurrences for any given cash flow. Each cash flow can occur a maximum of 999 times except the initial cash flow which can only occur once.

In addition, to perform some cash flow computations, the **interest per year (Int/Yr%)** and **periods per year (Prds/Yr)** must be entered. Interest per year is entered as a percentage. For instance, 8.25% would be entered as "8.25".

Data Entry

Solving Cash Flow problems requires three pieces of information. This section covers those three parts: the initial investment, subsequent cash flows, and supporting materials.

Initial Investment

To enter an initial investment, tap on the **Amount** for cash flow number 0 and enter the amount. Remember that outflows are negative numbers while inflows are positive ones.

Subsequent Cash Flows

Subsequent cash flows are entered after the initial cash flow. This form allows up to 29 subsequent cash flows, each occurring a maximum of 999 times. Note that the calculation time for large cash flows can be extreme.

Supporting Materials

Supporting materials include **interest per year** (**Int/Yr%**) and **periods per year** (**Prds/Yr**). Interest per year should be entered as a yearly interest rate. The Cash Flow worksheet automatically changes this to a "per period" rate based on the value of **P/Y**. For example, if the expected or industry interest rate is at 12.25%, enter "12.25". Periods per year affects the answer, as well, since interest rate answers are reported on a yearly basis.

Calculations

To calculate a cash flow problem, select "CPT" next to the cash flow method to compute in the lower, calculations list. Details about each computation are outlined below. Note that excessively large NPV problems may be interrupted.

Payback

The payback method tells at which period an initial investment will be paid back. If there is no payback, the reported answer is 0. The payback method does not take interest per year or periods per year into consideration when calculating.

Internal Rate of Return

The internal rate of return (IRR%) computes the rate at which the investment pays for itself. This can be compared against a desired rate of return. If the IRR is greater than a desired rate, the investment may be attractive. The internal rate of return method does not take interest per year into consideration when calculating. It uses periods per year, however, to report IRR on a per year basis.

The internal rate of return calculation is very complicated. Calculating IRR uses an iterative approach to solving the problem and, if there is an answer, may take quite some time to calculate. A few caveats to calculating internal rate of return exist. First, long calculations may be interrupted because an iterative limit is exceeded within the calculator itself. Errors may occur in other areas as well. If there is no sign change within the cash flow

problem, an error will occur. If the cash flow will yield a negative IRR amount, an error will occur. A negative IRR means that there is at least one negative answer and possibly multiple negative and positive answers to the same cash flow question. In these situations, the calculator will not display an answer. Finally, if there are multiple sign changes (two or more) within the same problem, there may be multiple solutions. The FCPlus line of calculators gives the IRR answer closest to 0, but extreme caution should be used in basing an investment on this type of cash flow. See the Understanding Cash Flows section for more information.

Another method for solving IRR problems is by estimating an interest per year value and calculating net present value (NPV). Internal rate of return is calculated by solving for NPV when it is equal to 0. With this in mind, by estimating an interest per year amount, you can solve for the internal rate of return. The closer to a net present value of zero, the more accurate the IRR estimate becomes.

Net Present Value
The net present value (NPV) method computes the amount gained or lost on a given investment in today's dollars. This uses a market rate of return (interest per year) to discount cash flows back to the present. Assuming an initial cash outflow, a positive NPV means the investor's assets would increase and the investment should be attractive. A negative NPV means that the investor's assets would decrease and the investment is not attractive. If NPV is zero, then

the investor would probably be neutral to the investment. If the initial cash flow is an inflow, the reverse would be true.

Net Future Value
The net future value (NFV), available only in FCPlus Professional, computes the future value of the net present value.

Modified Internal Rate of Return
The modified internal rate of return (MIRR%), available only in FCPlus Professional, is an alternative for IRR when there is more than one sign change. When IRR has multiple sign changes, IRR can have more than one answer. MIRR eliminates sign changes by using reinvestment and borrowing interest rates. MIRR uses periods per year to report an answer on a per year basis.

Net Uniform Series
The net uniform series (NUS), available only in FCPlus Professional, performs computations by taking the net present value of the cash flows if they are even and regular.

Profitability Index
The profitability index (Pft Index), also known as the benefit/cost ratio, is only available in FCPlus Professional. It shows the relative profitability of any cash flow problem, dividing the present value of the inflows by the present value of the outflows.

Total
The total is the sum of the cash flows.

Examples

Cash Flow Estimates: Your company is looking to buy a new piece of equipment to help it increase manufacturing capacity to meet demands for its largest product. The managers are wondering what the return would be if the equipment was purchased for $8,000. You can expect at least a 15% return on the investment elsewhere and are counting on the following yearly cash flows: Year #1: $2,000, Years #2-#3: $3,000 each year, Years #4-#6: $4,000 each year. What are each of the cash flow computations for comparison?

Key	Entry	Comments
Clear…		Sets the display to its default values
CF_0 – Amt	–8,000	Initial cash outflow
CF_1 – Amt	2,000	Period 1 is $2,000 inflow
CF_1 – Occ	1	CF_1 occurs once
CF_2 – Amt	3,000	Period 2 is $3,000 inflow
CF_2 – Occ	2	CF_2 occurs twice
CF_3 – Amt	4,000	Period 3 is $4,000 inflow
CF_3 – Occ	3	CF_3 occurs three times
Int/Yr%	15	
Prds/Yr	1	

Calculating shows the following answers:

- NPV = $3,985.14
- IRR% = 29.93%
- NFV = $9,217.87
- MIRR = 23.01%
- NUS = $1,053.02
- Payback = 3 periods (in this case years because periods per year is one)
- Pft Index = 1.50
- Total = $12,000

Modifying: (Continued from the previous problem.) The initial cash flow was considered incorrect by manufacturing. The new estimates are as follows: Year #1: $500 loss, Years #2-#3: $3,000 each year, Years #4-#9: $2,000 each year. What is the NPV, IRR, and NFV?

Key	Entry	Comments
CF_1 – Amt	–500	Change $2,000 to –$500
Insert a new 3rd cash flow by selecting the number labeled 3 and choosing Insert.		
CF_3 – Amt	2,000	Period 3 is $2,000 inflow
CF_3 – Occ	6	CF_1 occurs six times
Remove the 4th cash flow by selecting the number label 4 and choosing Remove.		
Calculating shows the following answers:		

- NPV = $782.91

- IRR% = 17.38%
- NFV = $2,754.20 (available only in FCPlus Professional)

Understanding Cash Flows

To further understand the cash flow model, here is an example of a timeline. Note that the FCPlus line of financial calculators treats inflows of cash as positive amounts (designated by a [+] sign) and outflows of cash as negative amounts (designated by a [–] sign).

The Cash Flow and Time Value of Money worksheets both use cash flows. The difference is in the entry and interpretation. The Time Value of Money worksheet deals with cash flows as annuities. Each of these cash flows are the same amount. The loan, lease and regular deposit examples on the next page are annuity problems solved in the TVM worksheet. The Cash Flow worksheet deals with investments where the payment is in varying amounts. An example:

Understanding Cash Flows
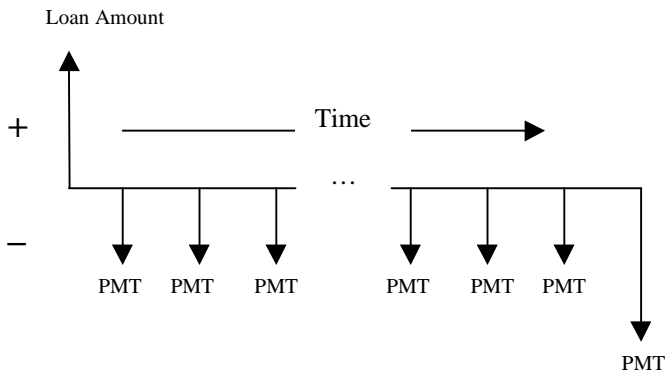
This example shows a typical loan problem, where the initial cash flow, the loan amount, is an inflow. Each of the subsequent cash flows - payments to the bank - are cash outflows.

A few items to note:
- The length between cash flows is the same. This denotes that inflows and outflows occur at regular intervals of time.
- This cash flow begins with an inflow followed by subsequent outflows of cash. The cash flow can, however, begin with an outflow and be followed by subsequent inflows of cash. Furthermore, there can be mixed inflows and outflows of cash.
- The payment amounts are the same length, meaning that each payment is the same amount. This could differ for Cash Flow worksheet problems as explained above because of the possibility for varying sized cash flows. Assume that, at the end of the series of cash flows, there was some larger payment (called a balloon payment) to pay off this loan because the last cash flow is longer than the others.

All cash flow problems can be represented in this fashion, with cash inflows and outflows viewed over some time period. The following are examples of other types of cash flow or TVM problems:

Understanding Cash Flows

Example: Leases

PMT PMT PMT PMT   PMT PMT PMT PMT

+

−

...

Initial Market
Value
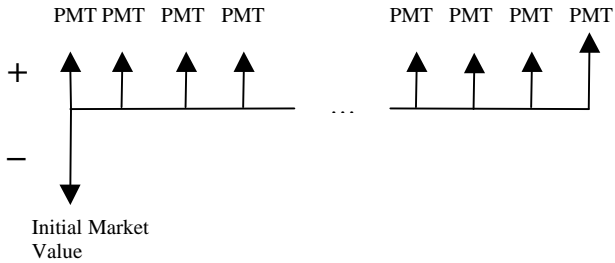
Example: Investment with regular deposits

Future
Value

+

−

...

DEP DEP DEP   DEP DEP DEP

Initial
Deposit

Understanding Cash Flows
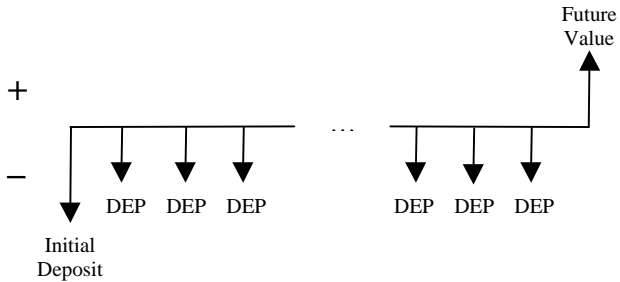
Example: Cash flow with one sign change
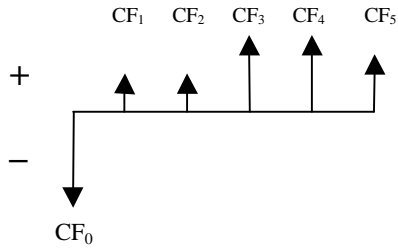
Statistics

This worksheet analyzes statistical (stat) data sets. It is useful for

forecasting and performing
market data analysis with its
ability to calculate mean,
standard deviation, and
compute regression analysis,
among other computations.
The statistics worksheet is
capable of analyzing both one
and two-variable statistical
data.

FCPlus Stats	▼ One Variable
# ×	Occurrences
0 4,500.00	3.00
1 850.00	1.00
2 4,125.00	2.00
3 3,000.00	5.00
4 7,000.00	2.00

Mean X: **3,969.23**   **CPT**
SX: **1,675.60**
Sigma X: **1,609.86**
Sum X: **51,600.00**
Sum X²: **238,503,750.0**

[Clear...] [Done]

The Display

Select a statistics computation method from the pop-up list in the
top, right-hand corner. To perform one-variable statistics, select
that choice. Linear, natural log, exponential, and power are two-
variable regression methods. Only linear is available in FCPlus.

To perform a statistics problem, data must be entered. The top
section of the worksheet is for data entry while the bottom section
is for computations. From left to right, the columns are:
- **Number (#)**: the statistics number, 0 through 29.
- **x**: the statistic's x-value.

- **Occurrences or y**: the number of occurrences or the statistic's y-value. Occurrences are for one-variable statistics. Each one-variable statistic can occur a maximum of 999 times. Y is for two-variable statistics.

For more on data entry, see Using the Worksheets.

Calculations

FCPlus Professional will calculate statistical data items based on five methods; FCPlus on two. For two-variable statistics, regression models include linear (the one available in FCPlus), exponential, natural log, and power. The fifth is one-variable.

To calculate the main statistics, select "CPT" on the top calculation line. In addition, entering a value for X' or Y' and selecting "CPT" next to the other will calculate it.

An explanation of each variable follows:

Label	Explanation	One-Var
Occ	Number of items	Yes
Mean X	Mean of x values	Yes
Sx	Sample standard deviation of x	Yes
Sigma X	Population standard deviation of x	Yes
Sum X	Sum of x	Yes
Sum X^2	Sum of x-squared	Yes
Mean Y	Mean of y values	No
SY	Sample standard deviation of y	No

Sigma Y	Population standard deviation of y	No
Sum Y	Sum of y	No
Sum Y^2	Sum of y-squared	No
A	Regression y-intercept	No
B	Regression slope	No
R	Regression correlation coefficient	No
X'	Predicted x-value	No
Y'	Predicted y-value	No

Examples

Two-Variable Statistics: Your company has five sales offices around the world and is thinking of adding a sixth. The president of the company wants to know if there is a correlation between the number of salespersons at a branch and the volume of sales per month. What volume of sales can be expected at the new sixth branch if it has 10 sales people?

Site	Number Sales People	Sales per month ($)
1	8	200,000
2	13	237,250
3	15	397,500
4	18	427,590
5	12	242,820

Key	Entry	Comments
Clear…		Sets the display to its default values
Linear		Set the calculation method in the top, right-hand corner
$Stat_0 - X$	8	
$Stat_0 - Y$	200,000	
$Stat_1 - X$	13	
$Stat_1 - Y$	237,250	
$Stat_2 - X$	15	
$Stat_2 - Y$	397,500	
$Stat_3 - X$	18	
$Stat_3 - Y$	427,590	
$Stat_4 - X$	12	
$Stat_4 - Y$	242,820	

To calculate, select "CPT" on the top line of the computations. This must be done first. Then, enter 10 for X' and compute Y'. Sales can be expected to be approximately \$219,916.79. The number of salesperson's seems to affect revenue. This is known because the correlation coefficient (R) is 0.91 (the closer to 1 or –1 the better).

Depreciation

Depreciation (dep) is an important source of revenue reduction in
businesses. FCPlus
Professional allows for
depreciation calculations
using the four most common
methods: straight-line,
declining balance, sum-of-
the-year's digits, and
declining-balance crossover.

FCPlus Depreciation
```
        Method: ▾ DB × SL
          Cost: 15,000.00
       Salvage: 2,500.00
          Life: 5.00
      Month 1: 2.00
  Dep Rate%: 200.00
          Year: 1.00
Dep Amount: 2,291.67          CPT
    Book Val: 12,708.33
      Dep Val: 10,208.33

[ Clear… ] [ Done ]
```

The Display

There are four types of
depreciation calculations that
can be performed:

- **SL**: straight-line
- **DB**: declining balance
- **DB x SL**: declining balance with crossover to straight-line.
- **SOYD**: sum of the year's digits

To choose a calculation method, select one from the pop-up list
next to the label "Method".

Additional data is as follows:
- **Cost**: the cost to purchase the asset.
- **Salvage**: the assumed value of the asset at the end of the asset's life.
- **Life**: the length of time the asset will be in service.
- **Month 1**: the first month the asset will be placed in service where January is 1 and December is 12. Entering "6.5", for example, means the asset was placed into service half way through the sixth month (approximately June 15).
- **Dep Rate%**: the declining balance rate. This is used in DB and DB x SL calculations. This is entered as a percentage. For example, 200% declining is entered as "200".
- **Year:** year to calculate depreciation.

Because an asset can begin depreciation on a date other than the first of the year, the calendar life may be greater than the amount entered for Asset Life. For instance, if an asset is expected to have a useful life of 3 years, beginning in March (the third month), the last calendar year is actually the fourth year:
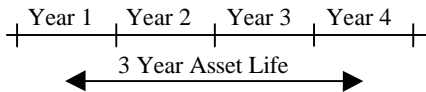
Calculation Methods

The **straight-line** (**SL**) method depreciates the same amount every year of the asset's life.

The **declining balance** (**DB**) method depreciates more in the first few year's of the assets life than in the later years. This method, along with the DB x SL method, uses the declining balance rate to calculate the depreciation value.

The **declining balance cross straight-line** (**DB x SL**) method is often used for tax purposes. In this instance, the declining balance method is used until the optimal time to switch to the straight-line method. The calculator determines this point when depreciation is higher using the straight-line method than the declining balance method. This method also uses the declining balance rate for depreciating.

The **sum of the year's digits** (**SOYD**) method, like declining balance, allocates more depreciation to the early year's of the asset's life. This method uses a complex formula based upon the number of years the asset will be in service to determine a depreciation rate.

Using one of these computation methods, the depreciation worksheet calculates three pieces of information when "CPT" next to the depreciation amount value is selected:

- **Dep Amount**: amount of depreciation for the year.
- **Book Val**: original cost of the asset less accumulated depreciation. Accumulated depreciation is the total depreciation taken through the calculated year. This is the value of the asset remaining on the company's books.
- **Dep Val**: depreciation value. This is the book value less the salvage value for the asset.

Examples

$80,000 worth of equipment was recently purchased in the middle of June. With a five-year useful life and no salvage value, these computers will be depreciated using the declining balance method at a 200% rate. What is the depreciation amount for the first year?

Key	Entry	Comments
Clear…		Sets the display to its default values
Method	DB	
Cost	80,000	
Salvage	0	
Life	5	
Month 1	6.5	Half way through the sixth month
Dep Rate%	200	

Compute the depreciation information by entering the year and selecting "CPT". The depreciation amount will be $17,333.33.

Bonds

Bond computations are used to calculate corporate or municipal
bond investments. These
computations include two
day-count methods (actual or
30/360) and two coupon per
year settings (once per year
or twice per year).

This computation is available
only in FCPlus Professional.

FCPlus Bond
Date Basis: ▼ 30/360
Pmt Basis: ▼ Annual
Sett Date: **Fri 12/31/93**
Mat Date: **Fri 7/1/94**
Cpn Rate%: **12.50**
Rdmptn Val: **100.00**
Yield%: **11.76**   **CPT**
Price: **100.00**   **CPT**
Acc Interest: **6.25**

(Clear…) (Done)

The Display

The bond worksheet includes
a series of variables:

- **Date Basis**: computations based on actual/actual month/year
  method or the 30/360 method. See Calendar – Date
  computations for more information on each of these methods.
- **Pmt Basis**: How often the coupon payments occur: once or
  twice per year.
- **Sett Date**: the settlement or purchase date.
- **Mat Date**: the maturity or call date. This date always occurs
  after the settlement date. This date is called a call date when
  the issuer can pay off the bond before the maturity date.
  Maturity date can also be called the redemption date.

- **Cpn Rate%**: the annual coupon rate as a percentage. This is the annual interest rate printed on the bond and is used to determine the coupon payment (the periodic payment of interest). This value is entered as a percentage. For example, 7.25% is entered as "7.25".
- **Rdmptn Val**: the redemption value is a percentage of the bond's par value that is paid to the owner when it is retired. If the calculation is to the maturity date, this value is 100. If the calculation is to a call date, this value varies. The par value is the value printed on the bond itself. A bond is often said to sell at a premium or discount. This is reflected in the redemption value. A bond that sells at a discount sells at less than par value. Bonds that sell at a premium are for more than par value.
- **Yield%**: the yield to maturity or redemption. This is the rate of return to the investor based on earnings from payments of principal and interest. This includes a sale at a premium or discount. To calculate yield, a value for price must be entered. This value is entered as a percentage. For example, 8.385% is entered as "8.385".
- **Price**: the dollar price. To calculate the dollar price, a value for yield must be entered.
- **Acc Interest**: the accrued interest based on $100 of par value. This value is calculated automatically when computing either yield or price.

Examples

A corporate bond matures on November 30, 1999 with a settlement date of August 14, 1996. It pays 13% coupon on a semi-annual basis, with a 30/360 day-count method. It will be redeemed at 100% of par and an annual yield of 13.75%. What is the price and accrued interest?

Key	Entry	Comments
Clear…		Sets the display to its default values
Date Basis	30/360	
Pmt Basis	Semi-Annual	
Sett Date	8/14/96	August 14, 1996
Mat Date	11/30/99	November 30, 1999
Cpn Rate%	13	
Rdmptn Val	100	
Yield%	13.75	

Compute the price by selecting "CPT" on the same line. The accrued interest computes automatically. The price is $98.01 and the accrued interest is $2.67.

Breakeven

For any company, making a profit is the key to success. By

FCPlus Breakeven

Fixed Cost: **50,000.00**		**CPT**
Var Cost: **14.25**		**CPT**
Price: **18.95**		**CPT**
Profit: **100,000.00**		**CPT**
Quantity: **31,914.89**		**CPT**

(Clear...) (Done)

analyzing the relationship between revenues and expenses, the levels at which a company has to operate in order to breakeven (BE) can be determined.

This calculation is available in FCPlus Professional only.

Breakeven is the point at which expenses equal revenues. Until that point, a company is operating at a loss.

The breakeven display includes a series of variables:

- **Fixed Cost**: the fixed costs. These are costs that are not dependent on each unit sold. An example is rent – whether 0 or 5000 units are sold, the rent will always be the same.
- **Var Cost**: the variable cost per unit. These are costs that are dependent on each unit sold. For instance, shipping costs do not occur unless a unit is sold.
- **Price**: the price per unit. This is the price at which the product is sold.

- **Profit**: the amount of profit determined or expected. Positive values are profits while negative ones are losses.
- **Quantity**: the number of units sold.

Examples

A startup company has $500,000 in operating expenses every month. It is introducing its first product which costs $115 to produce. This product will sell to distributors for $245 per unit. How many units must the company sell every month to cover its costs (breakeven)?

Key	Entry	Comments
Clear…		Sets the display to its default values
Fixed Cost	500,000	
Var Cost	115	
Price	245	
Profit	0	

Compute the quantity by selecting "CPT" on the same line. The company needs to sell 3,847 units per month.

Breakeven

Calendar

Calendar computations in FCPlus Professional include both date and time computations. In FCPlus, only date computations are included.

Date Calculations

Both FCPlus and FCPlus Professional include date computations, computed with the actual or 30/360 day-count method.

The actual date method assumes a standard calendar year. The 30/360 method assumes there are 30 days in a month and 360 days in a year.
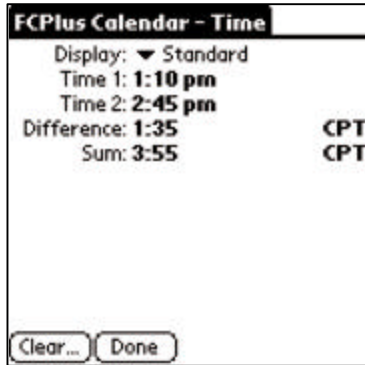
```
FCPlus Calendar – Date
  Method: ▼ Actual
  Date 1: Fri 1/1/99        CPT
  Date 2: Sat 8/14/99       CPT
Difference: 225.00          CPT




( Clear... )( Done )
```

- **Method**: the calculation method: actual or 30/360.
- **Date 1**: the date to compute from.
- **Date 2**: the date to compute to.
- **Difference**: the difference in number of days.
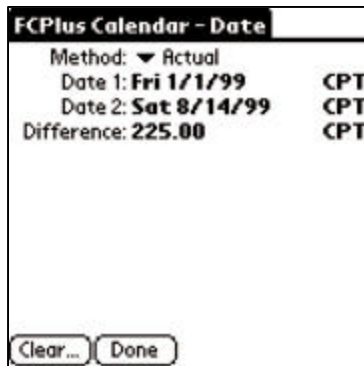
Time Calculations

Only FCPlus Professional includes time computations. Display is in either standard or decimal format. Standard format is the localized time format set in the Palm's Prefs screen. An example may be 11:05. The decimal format shows variables in decimal format with minutes displayed as a fraction of an hour. An example may be 11.08.

```
FCPlus Calendar - Time
   Display:  ▼ Standard
    Time 1: 1:10 pm
    Time 2: 2:45 pm
 Difference: 1:35              CPT
      Sum: 3:55               CPT



 (Clear...) (Done)
```

- **Display**: the display format: standard or fraction.
- **Time 1**: the beginning time set in increments of 5 minutes.
- **Time 2**: the ending time set in increments of 5 minutes.
- **Difference**: the difference between the two times. In this case, am/pm setting is important.
- **Sum**: the sum of the two times. In this case, am/pm is ignored.

The difference computation takes the difference between two times. For example, the difference between 11:00am and 12:30pm is 1 hour, 30 minutes (1:30) or 1.50 hours. In this case, the setting for am/pm (or 24 hour time) matters.

For sum, the am/pm setting no longer matters. In this case, the time 11:00 and 12:30 are treated as 11 hours and 12 ½ hours for a sum of 23 hours, 30 minutes (or 23.50 hours). In addition, 12am is treated as 0 hours for fraction of an hour computations (12:05am plus 12:10am will equal 15 minutes).

Examples

Date: Go to the Calendar – Date worksheet to compute this problem. Vacation begins on October 15, 1999. Today is August 18, 1999. How many actual days until vacation?

Key	Entry	Comments
Clear…		Sets the display to its default values
Method	Actual	
Date 1	8/18/99	Enter August 18, 1999
Date 2	10/15/99	Enter October 15, 1999

Compute the difference in days by selecting "CPT" on the same line. There are 58 days until vacation.

Time Difference: Go to the Calendar – Time worksheet to compute this problem. When billing time, the project began at 12:15pm and commenced at 4:50pm. If you bill at $30 per hour, how much did you make?

Key	Entry	Comments
Clear…		Sets the display to its default values
Display	Standard	
Time 1	12:15pm	
Time 2	4:50pm	

Compute the difference by selecting "CPT" on the same line. This project took 4 hours and 35 minutes. To calculate, recall the difference into the input screen, where it is displayed as a fraction, and multiply by 30. You made $137.50 for your work.

Time Sum: Go to the Calendar – Time worksheet to compute this problem. Your company pays for driving time. If you drove 3 hours, 15 minutes and 5 hours, how much time did you spend driving?

Key	Entry	Comments
Clear…		Sets the display to its default values
Display	Standard	
Time 1	3:15	Ignore am/pm
Time 2	5:00	Ignore am/pm

Compute the sum by selecting "CPT" on the same line. You spent 8 hours, 15 minutes driving.

Conversions

FCPlus Professional handles seven kinds of conversions: **area**, **currency** (curr), **interest** (int), **length** (len), **mass**, **volume** (vol) and **temperature** (temp). Area, length, mass, volume, and temperature are unit conversions.

Unit

Unit conversions include area, length, mass, volume and temperature computations. Each screen appears the same with only a variation in the units to convert. The area conversion worksheet is shown as an example.

- **Type #1**: the unit type to convert from.
- **Amount #1**: the amount of the first type.
- **Type #2**: the unit type to convert to.
- **Amount #2**: the amount of the second type, calculated.

FCPlus Conv - Area

Type #1: ▼ Yards²
Amount #1: **125.00**
Type #2: ▼ Centimeters²
Amount #2: **1,045,159.20**   **CPT**

(Clear...) (Done)

Currency

Currency conversion is similar to unit and temperature conversions except there is an extra field: **rate**. Rate is the conversion rate. In general, Amount #1 x Rate = Amount #2. In this case, the types are not used in the computation itself. Instead, they are used as reminders of which two currencies have been converted.

Interest

Comparing interest rates may be necessary when two investment possibilities present themselves. Investments are usually stated in terms of an annual, nominal interest rate (or annual percentage rate) but each investment often has a different number of compounding periods per year. To compare these investments, the interest rates must first be converted to an annual, effective interest rate.

- **Method**: conversion method: either continuous or periodic. With **periodic** interest conversion, there is a set number of compounding periods per year, such as quarterly (4 times per year), monthly (12), or yearly (1). With **continuous** compounding, there is no set number of periods per year.

- **Nominal%**: the annual, nominal interest rate expressed as a percentage. For example, 8.25% is entered as "8.25".

- **Effective%**: the annual, effective interest rate expressed as a percentage. For example, 8.25% is entered as "8.25".

- **Cmpnds/Yr**: the number of compounding periods per year. For example, if interest is compounded quarterly, this value would be set to "4". Compounding periods per year is used only when the method is set to periodic.
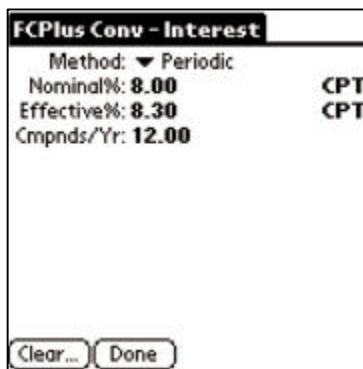
Examples

Length: Go to the Conv – Length worksheet to compute this problem. The instructions say to measure off 25 meters but you don't have a metric measure. How many feet is this?

Key	Entry	Comments
Clear…		Sets the display to its default values
Type #1	Meters	Choose from pop-up list
Amount #1	25	
Type #2	Feet	

Compute the amount of feet by selecting "CPT" on the Amount #2 line. There are 82.02 feet in 25 meters.

Currency: Go to the Conv – Currency worksheet to compute this problem. The exchange rate from US dollars to Japanese yen is 114.25. If you are exchanging $850, how much yen do you have?

Key	Entry	Comments
Clear…		Sets the display to its default values
Type #1	US Dollars	Not used in computation
Amount #1	850	
Type #2	Yen	Not used in computation
Rate	114.25	

Compute the amount of yen by selecting "CPT" on the Amount #2 line. You would receive 97,122.50 yen.

Interest: You are presented with two competing investments. The first is compounded monthly with a nominal interest rate of 9.75%. The other pays at an effective interest rate of 10%. Which investment has a better interest rate?

Key	Entry	Comments
Clear…		Sets the display to its default values
Method	Periodic	
Nominal%	9.75	
Cmpnds/Yr	12	

Compute the effective rate by selecting "CPT" on the same line. The first investment's effective rate is 10.20%. It has the better interest rate.

Simple Interest

The simple interest (simp) worksheet is only available in FCPlus

Professional. As discussed in
the section on Time Value of
Money (TVM) there are two
types of interest, simple and
compound:

```
FCPlus Simple Interest
Present Val: -5,000.00      CPT
 Future Val: 5,700.00      CPT
Intrst/Yr%: 14.00          CPT
    Periods: 365.00        CPT
Periods/Yr: 365.00



(Clear...) (Done) (xPY)(÷PY)
```

- **Simple interest** problems
  assume that interest is
  accumulated only once (at
  the time of repayment).
  These computations are
  performed in the Simple
  Interest worksheet.
- **Compound interest** problems assume that the interest earned
  also earns interest. Computations such as loans, leases,
  mortgages, annuities, and savings accounts are compound
  interest problems. These use the TVM worksheet.

The display consists of a series of variables:
- **Present Val**: the present or current value.
- **Future Val**: the future value.
- **Intrst/Yr%**: interest per year as a percentage. For example,
  8.25% interest should be entered as "8.25".

- **Periods**: number of total periods. This number is the number of years and months times the periods per year. For example, if the loan is 4 years with 12 payments per year (monthly payments), periods should be 48 (4 x 12).
- **Periods/Yr**: the number of payment periods per year.

Additionally, there are two buttons next to the Done button:
- **xPY**: quick set button for the number of periods. This button multiplies the value in periods by the value in periods per year. For example, to convert 10 years at 12 periods per year to periods, enter 10 in periods and 12 in periods per year then select xPY.
- **÷PY**: quick set button for the number of periods. This button divides the value in periods by the value in periods per year. For example, if the periods is 60 with periods per year equal to 12, discovering that that is five years can be done easily by selecting ÷PY.

Simple Interest

Examples

A good friend has asked for a 90-day loan of $2,500 to get
involved with a real estate investment. You have agreed to lend
him the money at 9% interest, calculated on a 360-day basis. What
amount will be paid back at the end of this period?

Key	Entry	Comments
Clear…		Sets the display to its default values
Present Val	–2,500	
Intrst/Yr%	9	
Periods	90	
Periods/Yr	360	

Compute the future value by selecting "CPT" on the same line.
The friend should repay $2,556.25 in 90 days.

Business Computations

In FCPlus Professional, a series of business computations exist.
Included is worksheets to perform **percent change** (%CH),
percent total (%TT), **profit margin** (PM), and **markup
computations** (MU).

Percent Change

This worksheet performs percentage change computations with
either one or more compounding periods:

- **Old**: the old value.
- **New**: the new value.
- **Change%**: the
  percentage changed. For
  example, an 8.125%
  change would be entered
  as "8.125". A positive
  value represents an
  increase while a negative
  one represents a decrease.
- **Periods**: the number of
  periods.

```
FCPlus Percent Change
       Old: 15,000.00     CPT
       New: 25,000.00     CPT
   Change%: 10.76         CPT
   Periods: 5.00          CPT



 (Clear...) (Done)
```

Percent change set to one period and markup as a percentage of
cost are identical computations.

Percent Total

This worksheets performs percent total computations:
- **Total**: the total.
- **Part**: the portion of the total.
- **Total%**: the percentage of the total. For example, an 8.125%
  change would be entered as "8.125".

Profit Margin

This worksheets performs profit margin computations:

- **Cost**: the cost to
  manufacture or
  purchase.
- **Price**: the selling or
  resale price.
- **Margin%**: the gross
  profit margin expressed
  as a percentage. For
  example, an 8.125%
  change would be
  entered as "8.125". A
  positive value
  represents an increase

  while a negative one represents a decrease.

Profit margin and markup as a percentage of price are identical.

Markup

This worksheets performs markup computations, whether as a percentage of price or cost:

- **Method**: computation based on price or cost. Profit margin computations are based on price; percent change computations are based on cost.
- **Cost**: the cost to manufacture or purchase.
- **Price**: the selling or resale price.
- **Markup%**: the markup expressed as a percentage. For example, an 8.125% change would be entered as "8.125". A positive value represents an increase while a negative one represents a decrease.

Examples

Percent Change: To perform this computation, choose Percent Change from the worksheet menu on the main screen. Over 4 years, sales increased from $45 million to $115 million. The industry average is 20% increase per year. How does your company compare?

Key	Entry	Comments
Clear…		Sets the display to its default values
Old	45,000,000	
New	115,000,000	
Periods	4	

Compute the percent change by selecting "CPT" on the Change% line. Sales have increased 26.44% per year, comparing favorably to the 20% industry pace.

Percent Total: To perform this computation, choose Percent Total from the worksheet menu on the main screen. Your division contributes 23% of the company's revenue. If total revenue is $3.15 billion, what is your division's contribution?

Key	Entry	Comments
Clear…		Sets the display to its default values
Total	3,150,000,000	
Total%	23	

Compute the part by selecting "CPT" on the same line. Your division contributes $724,500,000 in revenue.

Profit Margin: To perform this computation, choose Profit Margin from the worksheet menu on the main screen. Your division contributes $724,500,000 in revenue. The costs

associated with revenue are $580,000,000. What is the profit margin?

Key	Entry	Comments
Clear…		Sets the display to its default values
Cost	580,000,000	
Price	724,500,000	

Compute the profit margin by selecting "CPT" on the Margin% line. The profit margin is 19.94%.

Markup on Price: To perform this computation, choose Markup from the worksheet menu on the main screen. The clothing is sold at a 25% markup. What is the current price if the cost is $29.99?

Key	Entry	Comments
Clear…		Sets the display to its default values
Method	%Price	
Cost	29.99	
Markup%	25	

Compute the price by selecting "CPT" on the same line. The selling price is $39.99.

Memory and Calculation Log

The memory worksheet and calculation log help organize the computational process.

Memory Worksheet

The memory worksheet displays and allows editing to the ten

memory locations built in to FCPlus and FCPlus Professional. For FCPlus Professional users, this worksheet also allows for one-step recall of data to the main calculator.

To edit a memory location, select that location and edit it in the input screen.

To recall a value to the main screen, select the memory location's "RCL" button located along the right-hand column. This will return to the main screen and place that location's information in the view window.

For more information on how memory works in the FCPlus line of financial calculators, see the section on Memory under Performing Arithmetic.

Calculation Log

The calculation log displays computations as they are entered, which makes double-checking easier.

For standard input mode, the calculations are displayed as they are entered. In RPN input mode, the calculations are grouped, showing one computation at a time.

To scroll the list, choose the scroll arrows or scroll buttons.
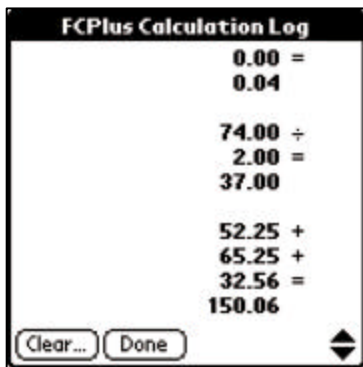
Appendix

The appendix contains additional information pertinent to the use of FCPlus and FCPlus Professional.

Graffiti

FCPlus and FCPlus Professional support Graffiti entry for both the main and input screens. To learn how to draw each character, see your Palm device user manual.

Character	Function	Character	Function
0	Zero	\<back> \<space>	Backspace
1	One	c	C/CE
2	Two	+	Add
3	Three	–	Subtract
4	Four	x *	Multiply
5	Five	/	Divide
6	Six	=	Equals
7	Seven	e	Enter
8	Eight	(	Lt Paren
9	Nine	)	Rt Paren
. ,	Decimal Pt	s	Store
p	Sign	r	Recall
n	Exponent		

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Note that the Graffiti shift indicator is in the view window both on the main and input screens. Also, certain characters are not allowed. These keystrokes and their accompanying shift indicator are ignored. For instance, capital letters are not supported so the Graffiti shift indicator for shift or caps lock is not displayed.

Functions Only In FCPlus Professional

Certain items are included only with FCPlus Professional. A list of those items follows:
- Main and input screen indicators.
- Customization of main screen buttons and main and input f(x) lists.
- The following mathematical functions are added: exponential notation, permutations, combinations, natural log, natural anti-log, factorial, random numbers.
- Supports memory arithmetic.
- One-step recall from the memory worksheet.
- The following worksheets are added: bond, breakeven, unit conversion (length, area, mass, temperature, volume), interest conversion, currency conversion, depreciation, percent change, markup, percent total, profit margin, simple interest, and calendar – time.
- Statistics: also computes power, exponential, and natural log regression.
- Cash Flow: also computes NFV, MIRR%, NUS, Pft Index, and Total.

Index

- TVM: also includes the amortization period view.

Error Cases

Error message appear when calculations cannot be successfully completed. This section documents the cases where error messages occur:

Mathematical Errors
- Overflow or underflow occurs in the calculation.
- Divide by 0.
- Reciprocal when $x = 0$.
- Square root when $x < 0$.
- Power when $y = 0$ and $x <= 0$ or $y < 0$ and x is not an integer.
- Factorial when $x < 0$, $x > 69$, or if x is not an integer.
- Natural log when $x <= 0$.
- Permutations when $n < 0$, $r < 0$, or r or n is not an integer.
- Combinations when $n < 0$, $r < 0$, or r or n is not an integer.
- Used too many levels of parentheses.
- Entered $1.0e{-}99$ or $-1e{-}99$.

Worksheets
- General math errors.

Statistics
- All x- or y-values are the same.

- R errors if Standard or Sample Deviation is an error.

Cash Flows
- NPV: interest per year $<= -100$
- NUS: interest per year $<= -100$
- NFV: interest per year $<= -100$
- MIRR: interest per year $<= -100$, no subsequent cash flows, all positive or negative cash flows.
- Payback: initial investment = 0.
- Profitability Index: interest per year $<= -100$, all positive or negative cash flows.
- IRR: all positive or negative cash flows, iterative computation with answer outside calculation bounds.

Calendar – Date
- Calculating a date when difference is greater than allowed reports the maximum date or the same date.

Markup% Cost
- Calculating markup when cost = 0.
- Calculating cost when markup is –100.

Breakeven
- Calculating quantity when price = variable cost.
- Calculating price when quantity = 0.
- Calculating variable costs when quantity = 0.

Percent Total
- Calculating percent total when total = 0.
- Calculating total when percent total is 0.

Markup% Price and Profit Margin
- Calculating markup when price = 0.
- Calculating price when markup is 100.

Time Value of Money
- Interest per year is outside the allowed range.

Bond
- yield is outside the allowed range.
- Settlement date is after the redemption date.

Contacting Infinity Softworks

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- Check Infinity Softworks web site for telephone support numbers and times.

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The FCPlus and FCPlus Professional financial calculators do not support system find functionality.

Infinity Softworks would like to acknowledge Jan Mayle of TOPS, Inc., Hewlett Packard and Texas Instruments.

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