The premier financial problem
solver for PalmPilot

Financial
Consultant

Users Guide

v2.0

LandWare
Software for Terra Firma
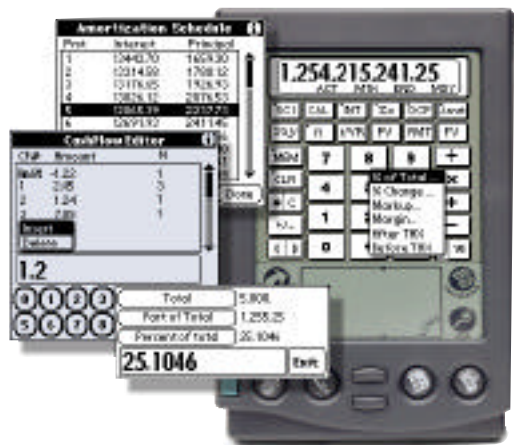
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1 WELCOME

Welcome to the Financial Consultant calculator for PalmPilot devices. This calculator has been designed specifically for real estate, retailing and business professionals who need to use their PalmPilots to make fundamental financial decisions quickly and accurately. We are confident that this software package will provide you with a rich problem solving environment that is unparalled in its ease of use, power and flexibility.

We especially welcome your feedback— so if there are new features that you would like us to consider or just general comments please feel free to contact us at the address detailed at the end of this document.

2 GETTING STARTED

Installing

To setup the Financial Consultant application on your PalmPilot, you will need to use the HotSync software and serial cable/docking cradle that came with your device. The instructions below assume you have successfully hotsynced your PalmPilot in the past.

To install the Financial Consultant:

1. Using the Memory application on your PalmPilot, check you have at least 80K of memory available and are running PalmOS v2.0 or greater.

PC Installation instructions

2 Open your desktop computer's File Manager or Explorer to locate the PILOT directory. Open the Pilot directory and locate INSTAPP.EXE. Launch the PILOT\INSTALLTOOL.EXE program.

3 From the Pilot Install Tool dialog box:
   3.1 Select your Pilot user name in the Account field.
   3.2 Click the Browse button.
   3.3 Select the floppy (a:) drive to locate the *fincalc.prc* file
   3.4 Click the *Open* button on the "Open" dialog box.
   3.5 Click *Install* on the "Pilot Install Tool" dialog box.

4 HotSync your PalmPilot. The installation is now complete.

2   Double click on the InstallApp application. This application usually resides in the same folder as your Pilot Desktop application.

3   From the Pilot Install Tool dialog box:
3.1 Select your Pilot user name in the Account field.
3.2 Click the Browse button.
3.3 Select the floppy (a:) drive to locate the *fincalc.prc* file
3.4 Click the *Open* button on the "Open" dialog box.
3.5 Click *Install* on the "Pilot Install Tool" dialog box.

4   HotSync your PalmPilot. The installation is now complete

Launching the Financial Consultant

Once installed the finCALC icon depicted to the right will appear in the application launcher. Tap the icon to launch the application.

USEFUL TIP: The built-in calculator button (next to the graffitti input area) can be configured to launch the Financial Consultant instead of the standard PalmPilot calculator.

To reassign the built-in calculator icon.
1.   Open the built-in Prefs application.
2.   Tap the popup menu in the top right hand side of the screen.
3.   Select *Buttons.*
4.   Tap the popup menu next to the Calculator icon.
5.   Select *finCALC* from the list.

3   THE CALCULATOR DISPLAY

The display shows input data, interim results and answers to calculations. It contains one row of 30 characters for displaying the X register and error messages and a row of status annunciators.
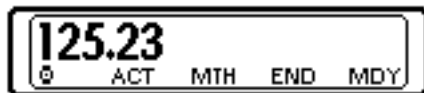
Annunciators

The display contains six annunciators that relay the status of the calculator during various operations. The annunciators are "active buttons" so they can be tapped to alter their settings.

BEG	Payments are at period start (ordinary annuity) for compound interest calculations. Tap to set END mode.
END	Payments are at period end (annuity due) for compound interest calculations. Tap to set BEG mode.
STO	Memory Store (**MEM** > **Store**) mode has been activated.
RCL	Memory Recall (**MEM** > **Recall**) mode has been activated.
360	The calculator is set to 360 day (30 day month) calendar.
365	The calculator is set to 365 day calendar. Leap years are ignored.
ACT	Actual calendar is used. Leap years are taken into account.
DMY	Dates are input and displayed in DD.MMYYYY form.
MDY	Dates are input and displayed in MM.DDYYYY from.
1YR	Payments are made Annually.
2YR	Payment are made Bi-annually.
QTR	Payments are made Quarterly.
MTH	Payments are made Monthly.
WK	Payments are made Weekly.
DLY	Payments are made Daily (using the year length setting.)
⚙	Busy icon flashes when the calculator is computing computationly intensive functions. (ie IRR)

Error messages

Any attempt to execute a calculation with an erroneous parameter (such as dividing by zero) will be trapped by the calculator and displayed on screen. You can clear error messages by pressing any key and then resume calculations.

• **Division by 0**— An attempt to divide by 0 has been made.

• **Expr too complex** — Attempt to use more than ten pending operations or levels of parentheses. (Algebraic mode only.)

• **Illegal Parameter** — Attempt to perform a math operation with improper input eg log(0), sqroot (-1) etc.

• **Invalid Date** — The number entered cannot be interpreted as a valid date. Check its format.

• **Invalid Interest** — Attempt to execute a TVM function with an illegal value stored in i/YR.

• **Invalid Payment**— Attempt to execute a TVM function with an illegal value stored in PMT

• **Invalid Period**— Attempt to execute a TVM function with an illegal value stored in n

- **Invalid Range**— Attempt to execute an Amrt function with illegal payment range specified.
- **No Cash Flows**— Attempt to execute a DCF function without first entering cash flow values.
- **No Solution**—No solution is possible using the current values stored in the TVM registers.
- **Out of Range**— The magnitude of the result has fallen outside the calculators operating range.
- **Statistics Registers**— Attempt to perform a statistics function with an invalid number of data points. Check the contents of Register 9.

Display Formats

You can control the way numbers are displayed without altering their internal full precision representation. The following formats can be selected via the Preferences window.

- **Floating**—Numbers are displayed using a floating decimal point.
- **Fixed (FIX)**— Displayed numbers are rounded to n decimal places.
- **Scientific (SCI)**— Numbers are displayed with one digit before the radix mark and multiplied by a power of 10.
- **Engineering (ENG)**— Numbers are displayed in the same format as SCI but with an exponent that is a multiple of three.

In Fixed, Scientific and Engineering modes the number of decimals displayed can also be set by the user.

4   CUSTOMIZING OPERATION

Selecting the *Preferences* command from the *Options* menu opens the preferences window allowing you to customize the calculator operation to your needs.
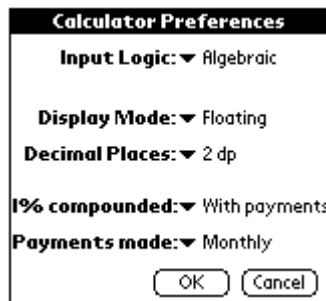
The following preferences can be set:
- **Input Logic**— The Financial Consultant provides you with a choice of input logic. Choose between Algebraic notation, Sequential Algebraic, Fixed or Dynamic stack Reverse Polish Notation (RPN). Please consult the input logic modes section on page 12 for further details.

- **Display Mode** — Select the desired format for results displayed by the calculator. See the previous section for further details.

- **Interest Compounding Frequency** — The interest compounding frequency can be specified using the i% compounded popup menu in the preferences window. Special attention should be given to this setting as it will effect all TVM answers. For the majority of circumstances it should be set to "With payments". Interest on Canadian mortgages is compounded twice a year so this preference would be set to "Bi-Annually". See page 23 for further details on this setting.

- **Payment Frequency** — The number of payments made each year can be specified using the Payments made popup menu in the preferences window or by tapping the 1/YR, 2/YR, QTR, MTH, WK, DLY annunciator. See page 23 for further details on this setting.

- **Setting Year Length** — Tap the ACT/360/365 annunciator to set the year length to ACTUAL, 360 day or 365 days. This setting effects the Date and Simple interest functions. See page 19 for further details.

- **Payment Mode** — Tap the BEG/END annunciator toggle between ordinary annuity (BEG) or annuity due (END) modes. See page 19 for further details.

- **Date Format** — The Financial Consultant automatically uses the Date order format specified in the Formats section of the Prefs application Two modes are supported: MDY as MM.DDYYYY, DMY as DD.MMYYYY. This setting effects the Date (CAL) and Simple interest functions. Page 18 provides further details on this setting.

- **Separator Symbols** — The Financial Consultant automatically uses the separator format (specified in the Formats section of the Prefs application) for the thousands and Radix marks.

Please refer to to your PalmPilot users guide for more information on the Date format and Seperator symbol settings.

5   GENERAL OPERATION

Entering numbers

The number pad is used for keying in numbers in sequence as you would on paper. Digits (including the decimal point) can also be entered using Grafitti. Erroneous digits can be corrected by tapping the ← key.

Terminating digit entry

Digit entry is completed under the following conditions:

1. An arithmetic operator is pressed.
2. A function is executed.
3. C or **CLR** > **Clear Calculation** is executed.

Negative numbers

To change the sign of a number, key in the number and then press +/-. Positive numbers will be changed to negative and vice versa. Only negative numbers are given a sign in the display.

Clearing

There are three types of clearing operations:

1. C (Clear) button deletes the number displayed in the display.
2. If the number entry has not been completed, the ← key deletes the last digit. If the number entry has been completed the ← button will clear the current number.
3. Use **CLR** > **Clear Calculation** to delete all numbers from the execution stack.

Exchanging the x and y registers

The contents of the X and Y-registers can be exchanged by using the **x⇄y** key. Exchanging the contents of the X and Y-registers can be very useful for:

• Obtaining the second result of a function that returns two values.
• Reversing the order of two operands to a two parameter function.
• Reversing the order of two operands in a non commutative function

Graffiti Input

The following graffiti characters can be directly entered within the graffiti input area.

Digits:

Backspace (Clears erroneous digit):

Exponents

Use the **SCI** > **EEX** function to enter numbers in exponent form. First key in the mantissa part, press **SCI** > **EEX** and then key in the exponent. +/- can be used to alter the sign of the exponent if required.

Example: Key in electron charge	
SAN/RPN Keystrokes	*Display*
1.602	1.602
SCI > EEX	1.602e000
19	1.602e019
+/-	1.602e-019

Order of Operations

When operating in Algebraic input mode the Financial Consultant observes the following operator precedence.

1. Functions.
2. Multiplication, Division.
3. Addition, Subtraction.

Operations with equal precedence are performed left to right. The observation of operator precedence can be disabled if required.

To disable operator precedence:

1. Tap the menu button and select Options > Preferences.
2. Tap the *input logic* popup menu and select *Sequential*
3. Tap the *OK* button.

Using Data registers

Ten general purpose storage registers (R0 - R9) are provided. These registers can be used to set aside numbers as constants or for use in later calculations. Five finance memories (n, i/YR , PV, PMT, FV) are also provided and discussed in Chapter 8. The calculator provides continuous memory so the contents of the memories are preserved after the unit has been "turned off".

IMPORTANT NOTE: The registers R4 to R9 are used by the statistics functions and will be altered if statistics calculations are made.

Storing numbers

The **MEM** > **Store** function followed by a digit 0 to 9 will copy the contents of the display into the register specified by the digit.

Example: Store 37.9 in register R_4

SAN/RPN Keystrokes	Display
37.9	37.9
MEM > Store	37.9
4	37.9

Recalling numbers

The **MEM > Recall** function followed by a digit 0 to 9 will copy the contents of the register into the display.

Example: Recall the contents of the PMT register.

SAN/RPN Keystrokes	Display
MEM > Recall	
PMT	

Clearing registers

- **Clearing a single storage register—** In most cases it is unnecessary to clear a single storage register since storing a number replaces the previous contents, however you can clear a single register by storing 0 within it.
- **Clearing all Finance registers—** Executing **CLR > Finance registers** will clear the contents of the n, i/YR, FV, PV, PMT memories.
- **Clearing all Data registers—** Executing **CLR > All Data Registers** will clear the contents of the general purpose storage registers (R0 - R9), Finance registers and cash flow entries.

Input Logic modes

The Financial Consultant provides you with a choice of four input logic options:

1. Reverse Polish Notation (RPN) with fixed stack.
2. Reverse Polish Notation (RPN) with dynamic stack.
3. Algebraic Notation with operator precedence.
4. Algebraic Notation without operator precedence (Sequential).

Reverse Polish Notation

Reverse Polish Notation (RPN) is a powerful input mechanism that has been employed by Hewlett Packard calculators for over 23 years. Fixed and dynamic stack variations of RPN are provided.

- **Fixed Stack RPN** — Earlier models of HP calculators (eg HP-12C) employ a fixed size four register stack (T, Z, Y, X).
- **Dynamic Stack RPN** — Contemporary HP calculators (eg 19BII) use RPN based around a dynamic stack. CLR > Calculation reduces the stack to one register. As you enter numbers, the stack builds in size.

Dynamic and fixed stack modes only effect the behaviour of the Roll stack functions.

Basic RPN Operation

The ENTER key is only used to separate the first two numbers in any operation that requires the entry of two numbers in sequence.

Example: Solve 2 + 3 x 4 using RPN input mode

RPN Keystrokes	Display
2 ENTER	2
3	3
+	5
4	4
x	20

Last X Register — An additional *Last x* register is also provided. Every time an operation is executed that places a new value into the X-register, the previous number gets placed in the *Last x* register. The *Last x* register can be recalled to the display using the MEM > Last X function.

Stack manipulation

Three stack manipulation functions are provided:

- ↓ (Roll stack down)— rotates the contents of the stack down one place.
- ↑ (Roll stack up)— rotates the contents of the stack up one place.
- x⇄y (Exchange X and Y registers)— exchanges the contents of the X and Y registers without affecting the other stack contents.

These three functions provide for review of all current stack contents and enable the rearranging of the stack registers in any fashion.

Algebraic Notation

Algebraic notation is a simple and widely adopted method of solving problems in the same manner as is done on paper. Two variations of Algebraic notation are provided:

- **Algebraic notation with operator precedence** — The Financial Consultant evaluates expressions based on their operator precedence. For example 2 + 3 x 2 is evaluated as 8.
- **Sequential Algebraic notation**— Expressions are evaluated in the sequential order they are entered without regard to operator precedence. e.g. 2 + 3 x 2 is evaluated as 10.

Using Parentheses in calculations

The Parentheses buttons **(** and **)** (available in Algebraic mode only) can be used to control the order in which an expression is evaluated. The portion of the expression enclosed in parentheses is evaluated first.

Example: Solve 3 x (2 + 4)	
SAN Keystrokes	*Display*
3	3.
x	3.00
(	3.00
2	2.
+	2.00
4	4.
=	18.00

The above example also illustrates that the = key closes all open parentheses. The current depth of open parentheses is detailed in the calculator display using the (((annunciator

Scientific functions

The Financial Consultant supports then following core scientific functions. All scientific functions are accessed using the **SCI** button.

- **EEX** — Enter exponent.
- **y^x** — y raised to the power of x.
- **Log x** — Common Logarithm (base 10.)
- **10^x** — 10^x Common exponential.
- **Ln** — Natural logarithm (base e.)
- **Exp** — e^x Natural exponential.
- **1/x** — Reciprocal.
- **Sqrt** — x Square root of x.
- **x!** — Factorial of x.
- **x2** — x^2
- **INTG** — Integer portion of x.
- **FRAC** — Fractional portion of x.

To execute a single parameter scientific function:
1. Enter the number.
2. Tap the SCI button.
3. Select the function from the resulting popup menu.

To execute a two parameter scientific function (RPN):
1. Enter the first parameter.
2. Tap **ENTER**.
3. Enter the second parameter.
4. Tap the **SCI** button.
5. Select the function from the resulting popup menu.

To execute a two parameter scientific function (SAN):
1. Enter the first parameter.
2. Tap the **SCI** button.
3. Select the function from the resulting popup menu.
4. Enter the second parameter.
5. Tap =

Solver Forms

The Financial Consultant also employs a forms-based metaphor to perform a wide range of calculations. A forms-based approach provides you with unparalleled ease of use and flexibility and frees you from having to remember obscure keyboard commands to perform calculations. A typical solver form is illustrated below.

Each solver form provides a framework for a set of three variables. You define values for two known values and tap to solve for the third unknown variable.

To perform a solver calculation:

1. Enter the known variables and tap their corresponding buttons.
2. Tap the button that corresponds to the variable for which you want to solve.
3. Tap *Exit* to close the form and show the calculator display.

Solver forms provide a very powerful mechanism for performing "what-if" scenarios. Simply alter the variable in question and tap the appropriate button to recalculate the new result. There is no need to re-enter or remember previously entered variables.

6 BUSINESS PERCENTAGES

The Financial Consultant provides a range of different percentage calculations which are outlined in this section. All functions are accessed via the % and   keys.

Percentage fraction

Use the % function to calculate a percentage fraction of a number.
To find 27% of 85.3:

Algebraic Keystrokes: 85.3 x 27 % =

RPN Keystrokes: 85.3 ENTER 27 %

Add-ons and Discount

Use the % function in to calculate Add-ons and Discounts thus:
To find the number that is 10% greater than 25:

Algebraic Keystrokes: 25 + 10 % =

RPN Keystrokes: 25 ENTER 10 % +

To find the number that is 1520 decreased by 13%:

Algebraic Keystrokes: 1520 - 10 % =

RPN Keystrokes: 1520 ENTER 10 % -

Percent of Total

The solver form shown below is provided for performing Percent of Total calculations. The Percent of total is expressed as a percentage of the total amount.

Total	5,000.
Part of Total	1,255.25
Percent of total	25.1046

25.1046 Exit

To calculate the percent of total:
1. Tap the   button and Select *% of Total...* from the menu.
2. Enter the Total value and tap the *Total* button.
3. Enter the sub amount value and tap the *Part of Total* button.
4. Tap the *Percent of total* button.
5. Tap *Exit* to return to the main calculator.

Percentage Change

The solver form shown below is provided for performing Percentage change from an old value to a new value. Percent change is expressed as a percentage of the old value.

Old Value	120.
New Value	150.
Percent Change	25.00

25.00 Exit

To calculate the percent change:
1. Tap the   button and Select *% Change...* from the menu.
2. Enter the Initial value and tap the *Old Value* button.
3. Enter the Final value and tap the *New Value* button.
4. Tap the *Percent Change* button.
5. Tap *Exit* to return to the main calculator.

Cost, Selling Price and Margins

The solver form shown below is provided for performing Cost, Selling Price and Margin calculations. Margins are expressed as a percentage of the selling price

Cost Price	14.25
Sell Price	28.50
Margin	50.00

50.00 Exit

To calculate the margin:
1. Tap the   button and Select *Margin...* from the menu.
2. Enter the buy price and tap the *Cost Price* button.
3. Enter the selling price and tap the *Sell Price* button.
4. Tap the *Margin* button.
5. Tap *Exit* to return to the main calculator.

Cost, Selling Price and Markups

A Solver form is provided for performing Cost, Selling Price and Markup calculations. Markups are expressed as a percentage of the Cost price.
To calculate the margin:
1. Tap the   button and Select *Markup...* from the menu.
2. Enter the buy price and tap the *Cost Price* button.
3. Enter the selling price and tap the *Sell Price* button.
4. Tap the *Markup b*utton.

Calculating the Unknown Variable

The Business percentage solver forms actually allow you to calculate any unknown variable given two others. For example you can calculate the *Initial value* given the *New value* and *Percent change* value by filling in their respective fields and then tapping the *Old value* button.

7   DATE CALCULATIONS

The CAL (Calendar) key can be used to perform the following date calculations:

- Day of the week for any date.
- Number of days between any two dates.
- Future or past date given a number of days from a specified date.

Tap the CAL key to activate the Date solver form shown below

```
┌─────────────────────────────────┐
│ ┌─────────────┐                  │
│ │ First Date  │ 1.011998         │
│ ├─────────────┤                  │
│ │ Second Date │ 5.011998         │
│ ├─────────────┴─┐                │
│ │Days between dates│ 120.         │
│ ├───────────────┴──────┐ ┌─────┐ │
│ │ 120.                 │ │Exit │ │
│ └──────────────────────┘ └─────┘ │
└─────────────────────────────────┘
```

Date entry modes

The calculator uses one of two date formats for the entry and display of dates. The date format is specified by the *Date* setting in the formats section of the PalmPilot Preferences application.

• **Month-Day-Year (M.DY)**— Dates are entered and displayed in the US format: MM.DDYYYY

Example: *Enter April 7, 1984*

SAN/RPN Keystrokes	Display
4.071984	*4.071984*

• **Day-Month-Year (D.MY)**— Dates are entered and displayed in the International format: DD.MMYYYY

Example: *Enter 7, April, 1984*

SAN/RPN Keystrokes	Display
7.041984	*7.041984*

Year length modes

The calculator uses one of three year length settings to perform date calculations. The year length is specified by tapping the ACT/360/365 annunciator in the main calculator display.
Choose between:
- **ACT** — Actual days between dates using actual calendar. Leap years are taken into account.
- **360** — 360 days between dates using the 360-day calendar. (based on 30 day months)
- **365** — 365 days between dates using the 365-day calendar. Leap years are ignored.

Number of days between dates

To calculate the number of days separating two dates according to the current year length setting:
1. Tap CAL to open the Date solver form. The current date is automatically entered.
2. Key in the the earlier date and tap the *First date* button.
3. Key in the the later date and tap the *Second date* button.
4. Tap the *Days between dates* button.

Calculation of a future or past date

To calculate a date and day that is a given number of days from a given date.
1. Tap CAL to open the Date solver form. The current date is automatically entered.
2. Enter the given date and tap the *First date* button.
3. Enter the number of days (a negative number will give you a past date) and tap the *Days between dates* button.
4. Tap the Second date button.

Determining the Day of Week for any date

To calculate the day of the week for any date.
1. Tap CAL to open the Date solver form. The current date is automatically entered.
2. Enter the date and tap the *First date* button.
3. The day of the week will be displayed next to the date.

8   TIME VALUE OF MONEY

This section details how you can use the Financial Consultant to solve various time value of money calculations. In other words calculations that involve money earning or incurring interest over time. There are two types of interest:

- **Simple interest**— the interest is expressed as a percentage of the principal value (PV) and is repaid in a lump sum. See below for an example of a simple interest calculation.
- **Compound interest**— calculations take into account that interest added to the principal at specified compounding periods also accumulate interest. eg: savings accounts, mortgages, leases etc.

Simple Interest Calculations

The **INT** > **Simple Interest** function can be used to calculate simple interest on both a 360-day and 365 day basis. The year length is set using the ACT/360/365 annunciator.

Example: *Calculate the amount of interest accrued on a 60 day loan of $450 with a simple interest rate of 7%. (accrued interest, 360 day basis)*

SAN/RPN Keystrokes	Display
7	*7*
i/YR	*7.00*
450 +/-	*-450*
PV	*-450.00*
60	*60*
INT > Simple Interest	*5.25*

Compound Interest Calculations

Compound interest calculations typically involve at least three of the following five variables:

- n — the number of payments or term in years.
- i/YR — the Annual interest rate
- PV — the present value or initial cash flow.
- PMT — the periodic payment.
- FV — the future value or final cash flow.

Compound interest calculations involve keying in the known values and then calculating the required values by pressing the corresponding keys.

The n, i/YR, FV, PV, PMT functions provide valid results for a series of cash flows (money paid out or received) where:

- The payment (PMT) amount is constant.
- The payments occur at regular intervals.

For problems that involve uneven or irregular cashflows please refer to the *Investment Analysis* section on p26.

The Compound Interest functions

n > Enter term (years) — Stores the term in years.

n > Enter # payments — Stores the total number of payments.

n > Calculate # payments— Calculates the number of payments.

n > Calculate term (years)— Calculates the term in years.

NOTE: When the Financial Consultant calculates a non-integer n the result must be interpreted carefully. Interpreting non integer results is covered in the example on page 35. Specifying a non-integer period n will produce a mathematically correct answer, however the results have no simple useful interpretation. The Financial Consultant does not support partial period payments.

i/YR Stores or calculates the annual interest rate as a percentage. Values are expressed as whole numbers. (i.e. 30% is entered as 30) IMPORTANT NOTE: The Financial Consultant automatically converts this figure to a "per period" rate based on the Interest compounding frequency setting. Refer to p 23 for further details.

PV Stores or calculates the Present Value of a series of future cash flows. This usually equates to the amount of the initial loan or investment.

FV Stores or calculates the Future Value or the amount of the final cash flow. FV always occurs at the end of the last payment.

PMT Stores or calculates the periodic payment amount. Payments can occur at the beginning or end of each period (as specified by the BEG/END annunciator setting

Amrt Provides access to the amortization functions for amortizing values stored in FV, PMT, i/YR, and PV. See page 24 for full details.

Financial memories

The Financial calculations n, i/YR, FV, PV, PMT are all performed using their own independent memories. The contents are retained after the calculator is "turned off"

VERY IMPORTANT NOTE: Ensure you clear the finance memories using **CLR > Finance Registers** before you begin finance calculations.

Separate memories are provided for the DCF cash flows. The number of entries is only constrained by available memory on the PalmPilot device.

NOTE: The contents of the DCF memories are *also* retained after you exit the program.

Storing, Recalling and Clearing the finance memories

To store an i/YR, FV, PV, PMT, or n value:

1. Enter the number into the calculator
2. Tap the corresponding finance memory key (i.e. n, i/YR etc.)

To recall an i/YR, FV, PV, PMT, or n value

1. Tap MEM > Recall
2. Tap the corresponding finance memory key (i.e. n, i/YR etc.)

To clear the i/YR, FV, PV, PMT, and n values.

1. Tap CLR > Finance Registers

Payment Type

The Payment type setting allows you to specify whether compound interest calculations are ordinary annuity or annuity due.

- **Annuity due** — payments are made at the END of each payment period. Most loans and mortgages fall into this category. For ordinary annuity set the payment type to END.

- **Ordinary annuity** — payments are made at the beginning of each payment period. Most leases fall into this category. For annuity due set the payment type to BEG.

To set the payment type:

1. Tap the BEG/END annunciator in the main calculator display to toggle between ordinary annuity (BEG) or annuity due (END) modes.

Payment Frequency

The payment frequency setting allows you to specify how often payments are made. Financial Consultant allows you to choose between Annual (1/YR), Bi-annual (2/YR), Quarterly (QTR), Monthly

(MTH), Weekly (WK) and Daily (DLY) payments.

NOTE: The number of daily payments is calculated according to the year length setting.

To set the payment frequency:

1. Tap the 1/YR, 2/YR, QTR, MTH, WK, DLY annunciator in the main calculator display to cycle between the setting options.

or

1. Tap the *menu* button and select **Options > Preferences**.
2. Tap the *Payments are made* popup menu.
3. Select the desired frequency.

Interest Compounding Frequency

The **i/YR** function always specifies interest as an nominal annual rate. Interest can be applied (or compounded) at varying frequencies. This frequency is specified using the *Interest Compounding Frequency* setting as outlined on page 9. For the majority of cases interest is compounded at the same time payments are made (and should be set to "With payments"). The Financial Consultant does however provide the flexibility to alter the compounding frequency for certain scenarios (eg Canadian mortgages).

To set the Interest compounding frequency:

1. Tap the menu button and select **Options > Preferences**.
2. Tap the *Interest compounded* popup menu.
3. Select the desired frequency.

Performing TVM Calculations.

TVM calculations are performed using the following general procedure:

1. Verify and set the following TVM conditions:
   - Payment frequency.
   - Payment mode (BEGinning or END of the period).
   - Interest compounding frequency
3. Enter the values for the four known TVM values.
4. Tap the button corresponding to the unknown value.
5. The result will be returned to the display.

Cash Flow Sign Conventions

It is important to adhere to the industry standard cash flow sign convention when entering PV, PMT and FV values ie:

- Money paid out is expressed as a negative number.
- Money received is expressed as a positive value.

It is important to keep in mind when you are entering and viewing results that money flowing from you is expressed as a negative number and money flowing to you (the best kind) as a positive number. The sign is obviously dependent on your perspective. For example if you are a borrower then PMT is negative, for lenders it is a positive value. You can use the +/- key to toggle the sign of the current number. It is also important to ensure the *payment mode* is set correctly for your particular problem. Payments can be made at the beginning or end of the period. Mortgage payments are normally made at the end of the period.

The Solutions section beginning on page 33 contains numerous TVM examples.

Amortization

The Financial Consultant enables you to amortize loans over a period of time and calculate both onscreen tabular reports and individual values. The **Amrt** key provides access to the following functions:

• **Set Range** — Specify the payment range for the amortization.
• **Balance** — Calculate the balance of the loan after the payment(s) are made.
• **Interest** — Calculate the amount of the payment(s) applied toward interest.
• **Principal** — Calculate the amount of the payment(s) applied toward principal.
• **Amort Next Group**— Advance the amortization range to calculate the next group.
• **Generate Table** — Creates a scrollable onscreen table of the currently specified amortization range.

Please note that all amounts are automatically rounded according to the internal precision of the PalmPilot device. The amounts calculated by the Financial Consultant may differ from those on the statements of lending institutions by a few cents, since different rounding methods are sometimes used.

The **Amrt** functions utilize values that have been entered and/or calculated using the TVM variables (n, i/YR, PMT, PV and FV)

Amortizing a loan
Listed overleaf are the general steps for amortizing a loan. Specific examples can be found on page 37 of this manual.

1. Clear the finance registers using **CLR > Finance Registers**.
2. Enter the Annual interest rate using the **i/YR** key.
3. Enter the amount of the loan (principal) using **PV**.
4. Specify BEG or (for most reduction loans) END mode.
5. Enter or calculate the periodic payment using **PMT**.
6. Tap **Amrt > Set Range** to open the following form.

7. Specify the range of payments to amortize:
   • Enter the initial payment and tap the *First period* button.
   • Enter the last payment and tap the *Last period* button.
   • Tap *Exit*
8. Select **Amrt>Interest**, **Amrt>Balance**, or **Amrt>Principal** to calculate individual values or **Amrt>Generate Table** to display the amortization in tabular form.

Interest rate conversions

Interest rates are normally expressed as *nominal interest rates.* A nominal interest rate is an annual rate that is compounded periodically (ie 12% per annum compounded monthly). When investments have different compounding periods (ie monthly vs quarterly) then effective interest rates are used to compare them. (eg 18% pa compounded monthly is equivalent to earning 19.56% pa compounded annually)

The **INT > Interest Conv** command activates the Interest conversion solver form shown below

This solver form allows you to convert between nominal and effective interest rates using two possible compounding methods:

- Periodic compounding (ie monthly, quarterly, yearly etc)
- Continuous compounding

To perform an interest conversion:

1. Enter the number of compounding periods per year. Enter 0 to specify continuous compounding.
2. Tap the *Compounding Periods* button.
2. Enter the known Nominal or Effective interest rates.
3. Tap the corresponding button to enter the value.
4. Tap the button that corresponds to the unknown rate.

9   INVESTMENT ANALYSIS

The DCF (Discounted Cash Flows) key provides access to a range of functions that can be used to analyze investments that involve cash flows (money paid out or received) of uneven amounts that occur at regular intervals. The following functions are provided:

- **Edit CF**— Opens the cash flow editor.
- **IRR: Internal Rate of Return**— the interest rate at which the net present value of the cash flows is 0. For conventional investments the investment is attractive if IRR is positive.
- **NPV: Net Present Value**— the present value of a series of cash flows plus the initial investment cost, calculated for a specific interest rate.
- **NFV: Net Future Value**— the future value of a series of cash flows, calculated using the NPV.
- **NUS: Net Uniform Series**— the amount that is equivalent to the series of cash flows having a PV equivalent to the NPV.
- **TOTAL**— Sum total of the cash flows.

Conventional investment

A conventional investment is considered "attractive" if the IRR% is greater than the cost of the capital. Such an investment must meet the following criteria:

- Initial cash flow is negative.
- Some cash flows are positive.
- Cash flow sequence changes sign only once.
- The sum (TOTAL) of the cash flows is positive.

Discounted Cash Flow Analysis

The Financial Consultant utilizes the Discount Cash Flow (DCF) method to perform two types of investment appraisal. Appraisals involve up to 3 phases:

- Entering of the cash flows for fixed time periods.
- Editing and checking the cash flow data.
- Evaluation of the effectiveness of an investment using the NPV, NFV, NUS, TOTAL and IRR functions.

To perform cash flow calculations:

1. Verify and set the following conditions:
   - Number of payments per year (usually set to Annual).
   - Annual interest rate (i/YR.)
2. Enter (and possibly edit) the cash flow entries as outlined below.
3. Evaluate NPV, NFV, NUS, TOTAL or IRR by selecting them from the DCF popup menu.

Entering Cash Flows

Before entering new cash flow data it is important to firstly clear the cash flow registers by using the CLR > **Cash Flows** menu command.

To enter a cash flow:

1. Execute DCF > **Edit CF** to open the cash flow editor below.

2. Tap on the previous Cashflow number in the CF# column and select *Insert* from the resulting popup menu.
3. Enter the cash flow amount and tap the corresponding cell in the Amount column to alter the value.
4. If the cash flow occurs multiple times, enter the number of occurances and tap the corresponding cell in the N column.

Editing a Cash flow entry

Individual cash flow entries maybe edited at anytime.

To edit a cash flow entry:

1. Enter the new Amount or N value.
2. Tap on the corresponding cell to alter the value.

Calculating Net Present Value (NPV)

Execute DCF > NPV to calculate the Net Present Value of a series of cash flows. One of four possible results will be displayed:

Result	Meaning
No Cash Flows	No cash flows have been entered
A positive value	Revenue target exceeded (Effective investment)
0	Revenue target met (Effective investment)
A negative value	Revenue target not attained (Ineffective investment)

Calculating Internal Rate of Return (IRR)

To calculate the Internal Rate of Return for an investment, first input the cash flows as described in the previous section and then execute the DCF > IRR function.

NOTE: IRR is a complex function which cannot be calculated analytically for a given series of positive and negative cash flow entries. There are instances where several solutions exist and sometimes no solution is possible. The Financial Consultant looks for solutions that are financially acceptable (i.e. between 0 and 200%) and returns the lowest if more than one solution exists. If no solution is found then the *No Solution* error message is displayed.

Calculating Net Future Value (NFV)

The NFV is the Future value of a series of cash flows and can be calculated by executing the DCF > NFV function.

Calculating Net Uniform Series (NUS)

The NUS represents the amount that is equivalent to the series of cash flows having a PV equivalent to the NPV.

Calculating TOTAL

The sum total of the cash flows can be easily calculated by executing the DCF > TOTAL function.

10 STATISTICS

The Statistics functions can be used in areas such as market research and financial forecasting by providing the ability to analyse one or two variable data sets using the following functions:

- **x > Enter Data** — Opens the data entry/deletion form.
- **x > Mean** — Calculates the arithmetic mean of the data set.
- **x > Std Dev** — Calculates the standard deviation of the data set.
- **x > Total** — Calculates the sum total of the data set.
- **x > Correlation** — Calculates the data set's correlation coefficient.

Performing statistical calculations involves two phases. First you enter the data points using the data entry form. The Financial Consultant accumulates intermediate statistics from this data. Statistical calculations are then performed.

Statistics registers

The statistics registers are a block of the built-in storage registers that hold the intermediate statistics accumulated from your input data. The statistics registers use registers R4 through R9 for storing the following:

Register	Contents
R4	Summation of x values x
R5	Summation of squares of x values x^2
R6	Summation of y values y
R7	Summation of squares of y values y^2
R8	Summation of products of x and y values xy
R9	Number of data points accumulated

Be aware that any user data stored in R4 to R9 will be affected when the statistics functions are used.

Recalling the statistics registers

The contents of the six statistics registers can be recalled at any time using the MEM > Recall function followed by the register number.
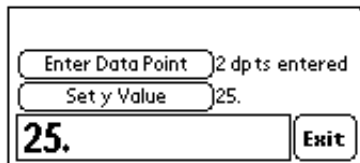
Clearing the statistics registers

Before initiating data point entry it is imperative that the statistics registers are cleared. To place zeros in all statistics registers execute the CLR > Statistics function.

Entering data points

Both single and two variable data points can be analysed.
VERY IMPORTANT NOTE: It is imperative to execute the **CLR > Statistics** function before entering new data.

To enter data:

1. Execute **x > Enter data** to open the form shown below.


```
(  Enter Data Point  ) 2 dpts entered
(     Set y Value    ) 25.
25.                      Exit
```

2. Enter the y value and tap *Set y value* (if applicable.)
3. Enter the x value.
4. Tap *Enter Data Point* button.

If your statistics problem involves a single variable only (x) instead of two (x,y) you must ensure the y value contains 'unassigned' when *Enter Data Point* is pressed.

To correct data:

1. Execute **x > Enter data** to open the above form.
2. Enter the erroneous y value and tap *Set y value* (if applicable.)
3. Enter the erroneous x value.
4. Tap *Delete Data* Point button.
5. Enter the correct value using the procedure outlined above.

Mean

The mean is the arithmetic average of the data set and can be calculated using the **x > Mean** function.

For two variable statistics **x > Mean** returns the mean of the x values. To return the mean of the y values tap the **x⇌y** key.
Normally the data is entered using the **x > Input data** function. However if required the data can be entered directly into registers R4 (x), R5 (y) and R9 (n) using the **MEM > Store** function.

Standard deviation

The standard deviation of a data set is a measure of its dispersion around the mean. The **x > Std Dev** function uses the accumulated statistical data to calculate the standard deviation for a population sample.
For two variable statistics **x > Std Dev** returns the Standard deviation of the x values. To return the Standard deviation of the y values tap the **x⇌y** key.

The standard deviation of an entire population (rather than a sample) s´ can also be calculated easily using the relationship:

$$s' = s \sqrt{(n-1) / n}$$

Since n is accumulated in register R9 when the statistical data is entered, it is very straight forward to convert the sample standard deviation to a population standard deviation.

Example: Assuming some values in the statistics registers are intact you can calculate population standard deviation thus:

SAN Keystrokes	Display	
MEM > *Recall 9*	5	
- 1	1	
=	4.0	
÷	4.0	
MEM> *Recall 9*	5.0	
=	0.8	
√	0.894427191	
x	0.894427191	
x > Std Dev	0.42863	
=	0.383378977	(population SD of x)
RPN Keystrokes	Display	
MEM > *Recall 9*	5	
1 -	4.0	
MEM > *Recall 9*	5.0	
÷	0.8	
√	0.894427191	
x > Std Dev	0.42863	
x	0.383378977	(population SD of x)

Correlation coefficient

The correlation coefficient is a measure of how closely the data fits a straight line relationship and can be calculated using the **x > Correlation** function. The correlation coefficient (r) ranges from +1 whereby the data lies directly on the straight line with positive slope to -1 where the data lies directly on a line with negative slope. A correlation coefficient of 0 means the data cannot be approximated by a straight line.

The Financial Consultant can be used to determine the payment amount, present value or number of periods of a loan which are being repaid with equal periodic payments.

Example: Car Lease payment (with purchase option)— *A $35,000 BMW is leased for 3 years with an option to purchase for $7500 at the end of the lease. Payments at beginning of month at an annual rate of 14%*

Keystrokes	Display
14 i/YR	14.00
3	3.
n > Enter term	3.00
35000 PV	35,000.00
7500 FV	7500.00
PMT	-1349.31

SECTION TWO
SOLUTIONS

Example: Affordability calculation— *You want to pay $175 per month for 24 months on a 9.5% loan. How much can you borrow?*

Keystrokes	Display
CLR > Finance registers	
175 +/-	-175.
PMT	175.00
24	24
n > Enter # payments	24.00
9.5 i/YR	9.50
PV	3,811.43

Example: Loan Period calculation— *How many months will it take to repay a $4000 loan if your monthly payments are $200 and the annual interest rates are 9.5%?*

Keystrokes	Display
CLR > Finance registers	
9.5 i.YR	9.50
200 +/- PMT	-200.00
4000 FV	4000.00
n> Calculate # periods	18.63

Compounding Amounts

Calculations can be applied to an amount of principal that has been placed into a account and compounded periodically with no further deposits.

Example: Period calculation— *Assuming an annual inflation rate of 10%, how long will it take for prices to double? (Hint: Let PV=1 and FV=2) (annual payments)*

Keystrokes	Display
CLR > Finance registers	
1 +/- PV	-1.00
2 FV	2.00
10.0 i/YR	10.00
n> Calculate # Term	7.27

Example: Periodic interest rate— *Find the rate of return on $1000 compounded quarterly if it amounts to 1500 in 5 years*

Keystrokes	Display
1000 +/-	-1000
PV	-1000.00
1500	1500
FV	1500.00
5	5.
n > Enter term	5.00
i/YR	8.19

Example: Principal calculation — *How much will you need to invest today at 5.75% compounded quarterly to have $3000 in 5 years?*

Keystrokes	Display
3000 FV	3000.00
5.75 i/YR	5.75
5	5.
n > Enter Term	5.00
PV	-2255.02

Savings Calculations

Payment, Future value or a number of time periods can be calculated for a schedule of periodic payments into a savings account.

Example: Number of payments calculation— *If you deposit 1500 dollars into a savings account that pays 8.2% annual interest, compounded annually, how long will it take to reach $3000.00 (assuming no further deposits)*

Keystrokes	Display
1500 +/- PV	-1500.00
8.2	8.2
i/YR	8.2
3000 FV	3000.00
n > Calculate term	8.79

Since the calculated value is between 8 and 9 years, it will take 9 years of annual compounding to achieve a balance of $3000. The actual balance at the end of 9 years can be calculated:

Keystrokes	Display
9	9
n > Enter Term	9.00
FV	3048.85 (Balance after 9 years)

Example: Periodic payment calculation— *You need $10,000 in 7 years. How much will you need to save each month if the annual interest rate is 6.5%?*

Keystrokes	Display
6.5 i/YR	6.5
10000 FV	10000.00
7	7
n > Enter Term	7.00
PMT	-94.3276

Example: Mortgage payment calculation—
You take out a 25 year, $180,000 mortgage on a downtown Auckland apartment at 13.5% annual interest rate. Calculate the monthly payment.

Keystrokes	Display
CLR > Finance registers	
25	25
n > Enter term	25.00
13.5 i/YR	13.50
180000 PV	180,000.00
PMT	-2098.16

Example: Payment on a Canadian Loan—
What is the monthly payment on a 30 year , $30,000 canadian mortgage with an interest rate of 12% Ensure the finance settings are set to Bi-annual interest compounding and monthly payments.

Keystrokes	Display
30	30.
n > Enter term	30.00
12 i/YR	12.00
30000 PV	30,000.00
PMT	-301.92

Example: Unpaid balance on a Mortgage —
You have a 30 yr, $65,000 Mortgage at 12.5% annual interest. Calculate the Principal balance remaining after 1 year.

Keystrokes	Display
65000 PV	65,000.00
12.5 i/YR	12.5
30	30.
n > Enter Term	30.00
700 +/- PMT	-700.00
Amrt > Balance	64708.68

Example: Mortgage amortization table —
You can obtain a 25 year $50,000 mortgage for an apartment you want to purchase at 13.25% annual interest. Monthly payments of $573.35 are paid at the end of each month. Generate an amortization schedule for the first year.

Keystrokes	Display
CLR > Finance Registers	
13.25 i/YR	13.25
50000 PV	50,000.00
573.35 +/- PMT	-573.35
Amrt > Set Range	
1	1.
Tap First Period	
2	1.
Tap Last Period	2.
Exit	
Amrt > Generate table	

Example: Internal Rate of Return *Calculate the yearly IRR for an investment in a new factory with the following data:*

Initial Investment:	*17 million*
Useful Life	*8 years*
Yearly factory revenues	*2.8 million*

Keystrokes	Display
CLR >Cash Flows	
CLR >Finance Registers	
14 i/YR	*14.*
DCF > Edit CF	
17 +/-	*-17.*
Tap the Amount cell in the Init row	
Tap the Init cash flow label	
Select Insert from the popup menu	
2.8	*2.8*
Tap the Amount cell in the newly entered row	
8	*8.*
Tap the N cell in the newly entered row	
Exit	
DCF > NPV	*-4.01*

Example: Comparing lender rates—*Which if the two following banks offer the best interest rate?*

ASB Bank: 6.7% annual interest, compounded quarterly
BNZ Bank: 6.65% annual interest, compounded continuously

Keystrokes	Display
CLR > Finance Registers	
INT > Interest Conv...	
6.7	
Tap Nominal Annual Rate	
4	
Tap Compounding periods	
Tap Effective Annual rate	*6.87022*
6.65	
Tap Nominal Annual Rate	
0 (specifies continuous compounding)	
Tap Compounding periods	
Tap Effective Annual rate	*6.87609*

BNZ offers the better rate

Example: Days between dates — *Number of days between June 3, 1983 and October 15,1984 assuming (360 day) 30 day month and MDY mode*

Keystrokes	Display
CAL	
6.031983	*6.031983*
Tap First Date	
10.151984	*10.151984*
Tap Second Date	
Tap days between dates	*492.00*

Example: Days between dates — *If you purchased an apartment with an 120 day option on 14th May 1981 what would be the expiration date (assuming DMY mode and 30 day month).*

Keystrokes	Display
CAL	
14.051981	*14.051981*
Tap First Date	
120	*120*
Tap days between dates	
Tap Second Date	*11.091981 (11th September 1981)*

Example: Day of the week — *What day of the week does the turn of the century fall on? (assuming DMY mode*

Keystrokes	Display	
CAL		
1.012000		
Tap First Date	*1.012000*	*Sat*

We thank you for purchasing Financial Consultant and are confident that you will soon find it to be an indispensable addition to your PalmPilot unit. We are committed to continually improving this product for you and welcome your feedback. If you require technical assistance or have any questions concerning this product please contact us via:

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If you are contacting us for technical support, please ensure you have the following information available:

1. Financial Consultant's version number.
2. The PalmPilot model.
3. The version number of the PalmPilot operating system
4. A detailed description of the problem.

Technical support is available via phone Monday-Friday from 9:00am-5:30pm EST

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