TEXAS INSTRUMENTS

Avigo™
Financial Calculator
User's Guide

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Financial Calculator User's Guide

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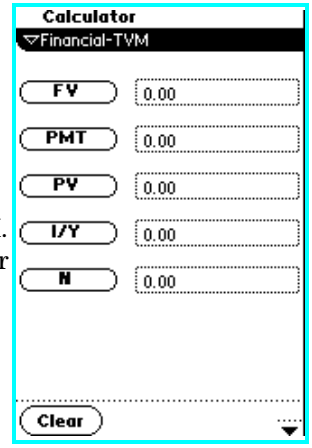
Introduction

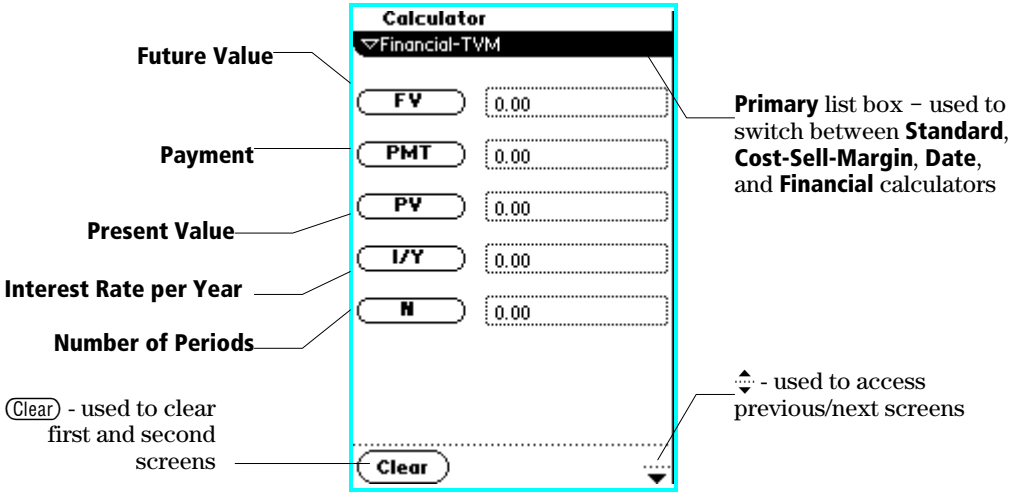
Avigo's **Financial-TVM** application is an easy-to-use tool that gives you the power you need for today's financial applications. **Financial-TVM** provides standard calculator capabilities, plus a template with built-in formulas that solve specific types of problems for you.



To access the **Financial-TVM** view, be sure you have first downloaded **Financial Calculator** from the Avigo CD-ROM. Install the **Financial-TVM** application onto your Avigo. For more information on installing the **Financial-TVM** application, refer to the *Avigo Manager online help*. Push the **open/power** button to power on the unit then tap the **calc** icon using the attached stylus. Open the **Primary** list box ▼ and choose **Financial-TVM**.

Financial Calculator View

The **Financial-TVM** application is useful in a wide range of cash flow applications in which the cash flows are equal, evenly spaced, and either all inflows or all outflows. You can use it for annuities, loans, mortgages, leases, and savings.



Notice that there are two areas for each variable: the variable name on the left and an input box area on the right. To enter a known value, tap on the input box area. Avigo displays a standard calculator. Enter your data then tap on the ☑ icon in the top right corner of the calculator to enter the data into the variable box.

To compute a value, enter the required variables, then tap on the variable name you want calculated on the left side of the screen.

The Time Value of Money/Amortization Application

The **Time Value of Money/Amortization** (**TVM**) application consists of three screens:

	Label	Meaning	Type of Variable
Top Screen	FV	Future value	Entered or Computed
	PMT	Payment	Entered or Computed
	PV	Present value	Entered or Computed
	I/Y	Interest rate per year	Entered or Computed
	N	Number of payment periods	Entered or Computed
Second Screen	**Starting payment**	Starting payment	Entered
	Ending payment	Ending payment	Entered
	Balance	Balance	Computed
	Principal	Principal paid	Computed
	Interest	Interest paid	Computed
Third Screen	APR	Annual percentage rate	Setting
	AER	Annual effective rate	Setting
	Payments/year	Number of payments per year	Entered
	Compounds/year	Number of compounds per year	Entered
	BEG	Beginning-of-period payments	Setting
	END	End-of-period payments	Setting
	Decimal place	Number of decimal places	Setting

Financial-TVM Components

On the first screen you must enter at least three variables to solve for the other unknowns. Use the first screen to determine a Future Value, a Payment Amount, or the Number of Payments.

- Enter PV, FV, and PMT as negative if outflows, positive if inflows.
- Enter I/Y as the **annual** interest rate. The **TVM** worksheet automatically divides Interest per Year by the Number of Compounding Periods per Year.
- Many **TVM** calculations involve only three of the five variables. When solving such a calculation, make sure the unused variables are set to zero.
- Clear on the first screen resets all fields to zero, and **Ending payment** and **Starting payment** to 1.

The second screen lets you determine the **Balance**, **Principal** paid, or **Interest** paid based on the **Starting** and **Ending** payments as well as the data entered on the first screen.

Clear on the second screen sets **Starting payment** to 1, **Ending payment** to 1, and all other fields on the second screen to zero.

When solving for (Balance), (Principal), and (Interest), Avigo uses the payment rounded to the number of decimal places specified by the display format you selected on the third screen. If the decimal format is set to two places, the results on the second screen reflect payments made to the penny.

When solving for (FV), however, the calculator uses the unrounded value for (PMT). Thus, a computed value for (Balance) after a specified number of payments may be slightly different than a computed value for (FV) after the same number of payments.

On the third screen you tell the **Financial-TVM** how you want the calculations to be computed. The **TVM** lets you specify whether the interest per year ((I/Y)) is an annual percentage rate ([APR]) or an annual effective rate ([AER]). The method you select depends on the transaction.

- If you select [AER], it is assumed that the number of compounding periods per year is 1 regardless of the number of payments per year.
- If you select [APR], it is assumed that the number of compounding periods per year is equal to the number of payments per year. However, when you select [APR], you can tap on the **Compounds/year** input field and set the number of compounds per year to whatever number you want, up to a maximum of 366 **Payments/year** and **Compounds/year**.

You must also indicate if you want the calculation based on payments made at the beginning ([BEG]) or at the end ([END]) of the period.

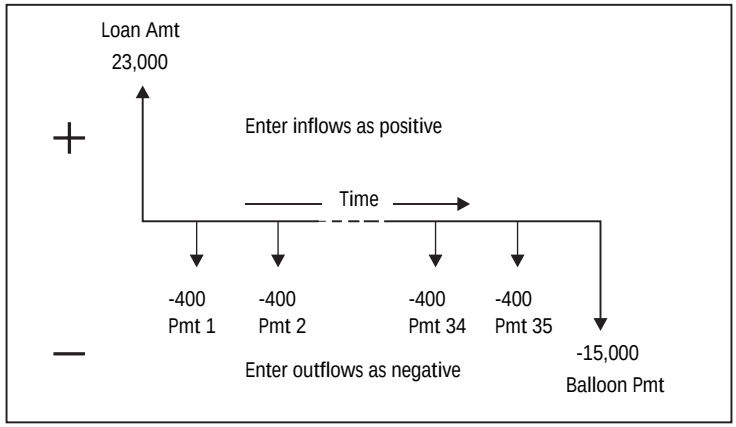
- The [BEG] and [END] options of the **TVM** application let you specify whether the transaction is an **ordinary annuity** or an **annuity due**.
- In ordinary annuities, the payments occur at the **end** of each payment period. Most loans, including mortgages, are in this category. For ordinary annuities, select the [END] option.
- In annuities due, payments occur at the **beginning** of each payment period. Most leases are in this category. For annuities due, select the [BEG] option.
- Use the **Decimal place** field to indicate how many decimal places you want to use in the calculation and display in the results.
- (Reset) on the third screen sets **Interest conversion** to [APR], **Payments/year** to 12, **Compounds/year** to 12, **Payment made at** to [END], and **Decimal place** to 2.

Time Lines

Some financial calculators treat both inflows and outflows as positive numbers. The **Financial Calculator**, however, follows the established convention of treating inflows as positive and outflows as negative.

- The calculator displays computed inflows as positive numbers and computed outflows as negative.
- You must enter inflows as positive numbers and outflows as negative.

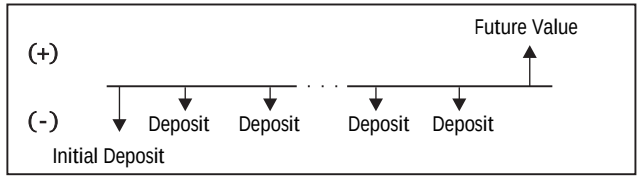
The following time line illustrates this convention.



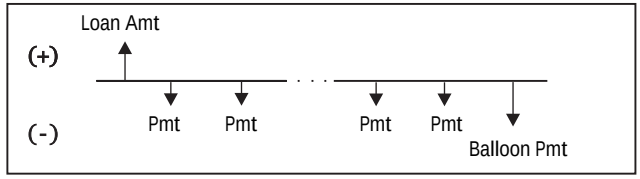
Applications

You can use the **TVM** application for many annuities (cash-flow problems in which the cash flows are even). Some examples of common applications are as follows:

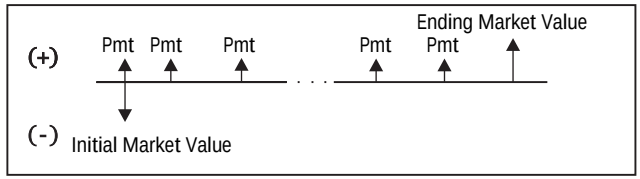
Investments with regular deposits:



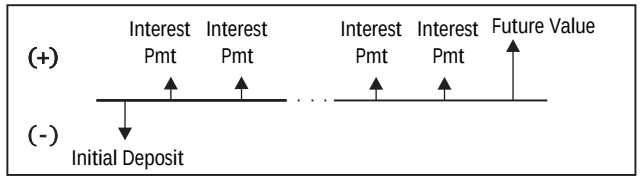
Loans and mortgages with or without a balloon payment:



Leases:



Lump-sum Investments:



Using the Financial-TVM Application

To use the **Financial-TVM** application:

1. If necessary, tap on Clear to clear the top screen.
2. Review the third screen and, if necessary, change the settings to those you need.
3. Move to the top screen and enter at least three known values. For example, you might enter values for PV, I/Y, and N.
4. Compute the unknown variable by tapping its on-screen name.

   The calculator displays and highlights the computed value.

Computing an Amortization Schedule

Remember that calculations on the second screen depend on the values entered on the first screen. If you want amortization data for a range of payments:

1. Move to the second screen.
2. Specify the range of payments by entering values for **Starting payment** (the first payment in the range) and **Ending payment** (the last payment in the range).
3. Press Balance, Principal, or Interest.

   The calculator displays the **Balance**, the **Principal**, and the **Interest** paid over the specified range.
4. To generate a complete amortization schedule, press Balance, Principal, or Interest repeatedly.

   The calculator increments both **Starting payment** and **Ending payment** to represent the next range of payments and computes **Balance**, **Principal**, and **Interest** for that range.

Example: Part 1

Using the **TVM** application, determine the monthly payment you would make for a 30-year mortgage with a loan amount of $120,000 and an annual percentage rate of 9.125%.

Note: Remember to check the settings on the third screen. Pressing (Reset) changes only the settings on this screen. In this example, select [APR] and [END], set **Payments/year** equal to 12, **Compounds/year** to 12, and **Decimal place** to 2.

Procedure	Keystrokes	Display
Select the **TVM** application.	Tap the **Primary** list box then select **Financial-TVM.**	Screen one of the **Financial-TVM**
Clear the input fields.	(Clear)	All zeros
Display the input calculator to enter the loan amount.	Tap the (PV) input box.	Standard calculator
Enter the loan amount.	120000 ☑	(PV) 120,000.00
Display the input calculator to enter the interest rate.	Tap the (I/Y) input box.	Standard calculator
Enter the interest rate.	9.125 ☑	(I/Y) 9.13
Display the input calculator to enter the number of payments.	Tap the (N) input box.	Standard calculator
Enter the number of payments.	360 ☑ (or 12 X 30 = ☑)	(N) 360.00
Compute the payment.	Tap (PMT).	(PMT) -976.36

The computed monthly payment is $976.36. Because **PMT** is an outflow, it is displayed as a negative number.

Example: Part 2

Using the data you entered in Part 1, generate an amortization schedule for the first three years of the loan. Assuming that the payments begin in the fourth month of the fiscal year, there are 9 payment periods in the first year and 12 payment periods thereafter.

Procedure	Keystrokes	Display
Move to the second screen.	▼	Second screen
Display the calculator to enter the new ending period.	Tap on the **Ending payment** input box.	Standard calculator
Change the ending period to 9.	9 ☑	Ending payment: 9
Compute the first year amortization data.	Tap on Balance (or Principal or Interest).	Balance 119,407.46 Principal 592.54 Principal -8,194.70
Change the payment range to 10 through 21.	Tap on the **Starting payment** input box, 10, ☑, **Ending payment** input box, 21, ☑.	Starting payment: 10 Ending payment: 21
Compute the second year amortization data.	Tap on Balance (or Principal or Interest).	Balance 118,551.85 Principal -855.61 Interest -10,860.71
Change the payment range to 22 through 33.	Tap on the **Starting payment** input box, 22, ☑, **Ending payment** input box, 33, ☑.	Starting payment: 22 Ending payment: 33
Compute the second year amortization data.	Tap on Balance (or Principal or Interest).	Balance 117,614.86 Principal -936.99 Interest -10,779.33

Note that the principal and interest are displayed as negative because they are outflows.

To continue re-calculating the next year's (or period's) data, simply click on Balance, Principal, or Interest repeatedly.

Example Calculations

The following three examples illustrate the procedures and keystrokes involved in producing three simple calculations.

Computing Future Value

A person has a savings account that earns 8% interest per year and is compounded monthly. At the beginning of January 1997, the account contained $100.00. The person deposits $50 into the account at the beginning of every month. How much money will be in the account at the end of March, 1999?

Procedure	Keystrokes	Display
Move to the third screen.	▼	Third screen
Select Annual Percentage Rate.	Tap on APR or accept the default.	APR is selected
Select 12 payments per year.	Tap on 12 or accept the default of 12.	Payments/year: 12
Select 12 compoundings per year.	Tap on 12 or accept the default of 12.	Compounds/year: 12
Select payments to be made at the End.	Tap on END or accept the default.	Payments made at: End
Select two decimal places.	Tap on 2 or accept the default of 2.	Decimal place: 2
Return to the first screen.	Tap on ▲ twice.	First screen
Enter a payment of $50.	Tap on the PMT input area then tap on -50, ☑.	PMT -50
Enter a present value of $100.	Tap on the PV input area then tap on -100, ☑.	PV -100
Enter an interest per year of 8%.	Tap on the I/Y input area then tap on 8, ☑.	I/Y 8.00
Enter the number of payments. (January 1997 to March 1999 = 27 months)	Tap on the N input area then tap on 27, ☑.	N 27
Solve for Future Value.	Tap on FV.	FV 1593.42

Remember that negative numbers, as used in the Financial Calculator, indicate the outflow of money and positive numbers indicate inflow. Therefore, this person will have an accumulated value of $1593.42 in the 27-month period. Now, let's look at someone who wants to save for retirement.

Computing Retirement Savings

Jo is 25 years of age and wants to retire at the age of 55. In order for Jo to save $750,000 for retirement, how much should Jo save per month? (Assume a 6.25% savings account interest rate.)

Procedure	Keystrokes	Display
Move to the third screen.	▼	Third screen
Select Annual Percentage Rate.	Tap on APR or accept the default.	APR is selected
Select 12 payments per year.	Tap on the Payments/year input box and tap on 12, ☑ or accept the default of 12.	Payments/year: 12
Select 12 compoundings per year.	Tap on the Compounds/year input box and tap on 12, ☑ or accept the default of 12.	Compounds/year: 12
Select payments to be made at the End.	Tap on END or accept the default.	Payments made at: End
Select two decimal places.	Tap on 2 or accept the default of 2.	Decimal place: 2
Return to the first screen.	Tap on ▲ twice.	First screen
Enter a future value of $750,000.	Tap on the FV input box and tap on 750000, ☑.	FV 750,000.00
Leave PMT and PV set to zero.		PMT 0.00 PV 0.00
Enter the 6.25% interest rate per year.	Tap on the I/Y input box and tap on 6.25, ☑.	I/Y 6.25
Enter the total number of payments required. ((55-25)*12)	Tap on the N input box and tap on 360, ☑.	N 360.00
Solve for Payment.	Tap on PMT.	PMT 711.63

As you can see, in order for Jo to retire at the age of 55 with the anticipated sum of money, Jo will have to save $711.63 per month for 30 years. Finally, let's look at someone with the exact opposite problem; how to spend it all.

Computing Retirement Withdrawal

Chris has just retired at age 66. Based on family history, Chris expects to live until age 93. Chris has $1.3 million in the bank earring 5.5% interest. In order to leave no money in the bank, how much should Chris withdraw from the bank per month?

Procedure	Keystrokes	Display
Move to the third screen.	▼	Third screen
Select Annual Percentage Rate.	Tap on APR or accept the default.	APR is selected
Select 12 payments per year.	Tap on 12 or accept the default of 12.	Payments/year: 12
Select 12 compoundings per year.	Tap on the Compounds/ year input box and tap on 12, ☑ or accept the default of 12.	Compounds/year: 12
Select payments to be made at the End.	Tap on END or accept the default.	Payments made at: End
Select two decimal places.	Tap on 2 or accept the default of 2.	Decimal place: 2
Return to the first screen.	Tap on ▲ twice.	First screen
Enter a future value of zero.	Tap on the FV input box and tap on 0, ☑.	FV 0.00
Leave PMT set to zero.		PMT 0.00
Enter the present value of $1,300,000.00.	Tap on the PV input box and tap on 1300000, ☑.	PV 1,300,000.00
Enter the 5.5% interest rate per year.	Tap on the I/Y input box and tap on 5.5, ☑.	I/Y 5.5
Enter the total number of payments required. ((93-66)*12).	Tap on the N input box and tap on 324, ☑.	N 324.00
Solve for Payment.	Tap on PMT.	PMT -7,710.78

Based on your calculation, Chris is going to be busy spending $7,710.78 per month for the next 27 years!