commodore

Model F4146R Financial Electronic Calculator

Owner's Manual

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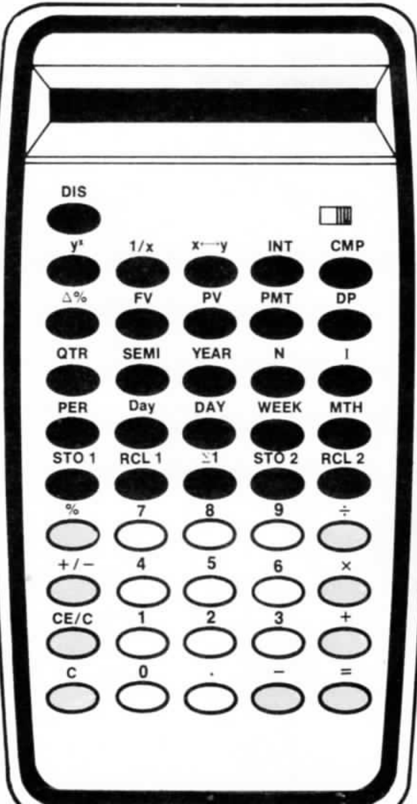
KEYBOARD



DIS
y^x
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x↔y
INT
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KEYBOARD INDEX

Description

Introduction

Your new financial calculator represents the imagination, craftsmanship and dedication of hundreds of people in every division of our company. Incorporating the latest systems architecture and the most advanced solid state technology, it is perhaps the finest achievement in the field of portable electronic computing equipment.

Programmed within its logic component are volumes upon volumes of interest and financial tables commonly used in everyday business activities. This vast amount of knowledge is now at your fingertips combined with many calculating advantages exclusive to your new machine.

Let's consider, for a moment, the "Down Payment (DP)" key. A basic example which asks, "What will a savings account with an initial deposit of $2000 be worth after 3 years if $300 monthly deposits are made to it? The account earns 7% compounded monthly" requires a preliminary calculation without the (DP) key. With it, the key sequence is an easy, direct entry operation:

Enter:

C 300 PMT 7 PER MTH I 3 × 12 N

2000 DP CMP FV

Read:

14444.88138

The result is delivered in less than a second, but more importantly, two significant features of the machine's logic are illustrated:

1. Easy, direct problem entry
2. Algebraic logic permits you to enter a problem in just about any logical sequence

We have seen how the direct entry feature is enhanced by the performance of the (DP) key. The method of addressing any problem is half the battle of solving it and the common-sense algebraic logic of your new calculator greatly increases the ease by which examples may be indexed into it.

The sequence we chose to enter the above example commanded the machine to:

Multiply monthly payment: 300 PMT by the compounded monthly interest 7 PER MTH I then by 36 months: 3 × 12 N and then multiply this by the principal or initial deposit: 2000 DP and finally compute CMP the Future Value FV 14444.88138.

The statement is: PMT I N DP CPT FV

But, remember algebraic logic? It lets you enter an example just as you would write it on paper and N PMT I DP CMP FV is just as logical a key sequence as our earlier entry. So, if you had preferred this entry mode, your result would have been the same. In this example, the compute key CMP tells the calculator to solve for future value. It must be pressed immediately before the key is entered.

Another advantage of your new machine is the **DIS** Display key. It enables you to recall any entry at any time during a problem for review.

In our original example we had entered:

300 **PMT** 7 **PER** **MTH** **I** 3 × 12 **N** 2000 **DP**. If, after having made the last entry, we now wisn to check the number of months we entered, we need only press: **DIS** **N** the display would read: 36. What was our monthly payment? Press **DIS** **PMT**, read: 300.

Display capacity is yet another outstanding feature. Your machine is able to handle results as small as $1.0 \times {}^{-99}$ (that is a 1 with 99 zeroes to its left and a decimal point at the very front of this super miniscule number, up to $9.999999999 \times 10^{99}$ (that is a number 1 followed by 99 zeroes and a decimal point at the very end. In dollars that's considerably more than the national debt).

We should not overlook the fact that your financial calculator can handle an extensive range of routine arithmetic, memory and percent calculations. And they are easy to perform. Please read this book thoroughly. Become familiar with the keyboard. Work through each application, as they have been designed to give you a complete understanding of every function. Practice. Once you discover how easy your calculator is to operate, it will become an enjoyable daily assistant in almost every area of general and business computation.

Here are just some of the many calculations you can solve with ease on your financial calculator.

- Combined Compounded Amount and annuity problems
- Mortgage Calculations
- Effective yield calculations
- Add-on interest to effective yield conversion
- Amortization (depreciation, finance charges)
- All present value, future value and effective rate calculations
- All percent calculations
- All simple and compouna interest assignments
- Depreciation calculations

. . . and more

GETTING TO KNOW YOUR CALCULATOR

Keyboard Description and Operating Fundamentals

Power "ON" Switch.
When unit is turned on the display will read:

0.

All registers are automatically cleared in preparation for the first example.

Number Keys

0 to **9** **•**

Enter digits in the very same manner as you would when writing them on paper.

Clear Keys

C

The **C** key is a CLEAR ALL key. It should be used to clear your entire machine before beginning a new example. It is important to note that the **C** key **MUST** be pressed before beginning a new financial example.
The **C** key will not clear the memory registers. Clearing the memories is an automatic process. Please refer to the explanation on, "writing over existing data," covered in the paragraph on Memory Bank operations. Also see paragraph, "To Clear Memory Registers."

CE

The **CE** key is a clear entry key. If pressed immediately after a numerical entry, it will clear or "erase" that entry so that you can correct an entry error by entering another number without beginning all over again.

If pressed twice, it will clear the entire calculator **except** for the memory register.

Working With The Memory Bank

STO 1 **STO 2**

The Storage 1 and Storage 2 keys identify the two independent memory registers.

You can use the memories for all standard computations. The unit uses them automatically when performing financial calculations.

The memory keys, **STO 1** and **STO 2** save data for future use. When pressed, the value currently on the display will be copied into the desired memory register. Any data presently being held in that memory will be automatically erased and the new data stored. This is referred to as "writing over" existing data.

RCL 1 **RCL 2**

Memory Recall 1 and Memory Recall 2 . These keys respectively serve their independent storage registers.

When pressed the recall key copies the data in memory onto the display. It does not clear that memory. Thus, the stored data is unaltered and may be recalled later.

Σ1

This key is the summation key. When pressed, it adds the number on the display to the value stored in Memory 1. In this manner you are able to accumulate either negative or positive values. It is good practice to clear the Memory 1 with the key sequence **C** **STO 1** before using the **Σ1** key, unless the value currently in Memory 1 is to be included in the summation. The summation key applies only to Memory 1. Memory 2 is not accessible for accumulation.

To Clear Memory Registers

Values stored in a memory register are not affected by either the **CE** key or the **C** key. Removal of stored data may be accomplished by "writing over" the present contents; that is, by simply storing a new number. When a machine is turned off, then on, all registers, including memories, are automatically cleared. To clear the memories without entering a new number, the key sequence is: **C** **STO 1** or **C** **STO 2** .

Arithmetic Keys

+ **−** **×** **+** **=**

These are the basic four function and result keys. Each key commands the calculator to perform its respective function. Calculations are entered and executed with common sense, algebraic logic.

Chain Calculations

Example: 4 + 5 × 6 = 54

	Enter:	Read:
a.)	4	4.
b.)	+	4.
c.)	5	5.
d.)	×	9.
	The subtotal of 4+5 is displayed and the calculator is ready to multiply it by the next entry.	
e.)	6	6.
f.)	=	54.

During chain calculations, as 4 + 5 × 6, function keys prepare the calculator for the next entry and display the running subtotal at the same time, as illustrated in step "d" above. Pressing the result key = derives the answer and automatically clears the calculator for the next example.

Inverse Key 1/x

The reciprocal or inverse function key computes the inverse of a number on the display and instantly displays the result.

Example: Find the inverse of 41.

Enter:	Read:
41	41.
1/x	2.43902439-02

The reciprocal or inverse function key instantly computes the decimal equivalent of a fraction. What is the reciprocal of 25 (or 1/25)?

Enter:	Read:
25	25.
1/x	0.04

Note any fraction multiplied by its reciprocal equals one.

Thus: .04 × 25 = 1.

Change Sign Key +/−

Changes the sign of a number in the display from + to − or − to +. If no sign is displayed, the number is positive (+). This key can only be used immediately after a numerical entry is made.

Let's raise 3 to the 15th power. $3^{15} = ?$

Enter:	Read:
3	3.
y^x	3.
15	15.
=	14348907.

Percent key **%**

Percent key displays a number entered as a percentage in decimal form. The key sequence:

1 0 **%** will be displayed as 0.1 which is the decimal equivalent of 10%.

Example: To find 6% of 112:

Enter:	Read:
6 **%** **×** 112 **=**	6.72

The percent key can be used with any of the four function keys **+** **−** **×** **÷** to accomplish mark-up and mark-down percentage calculations.

Mark up/Mark down and Tax Add-on

This calculation finds the cost of an item given the selling price and a percentage mark up or mark down.

Examples:

① A buyer is prepared to purchase a unit at 7 cents each. He is offered a 30% discount on the cost of each unit if he purchases 20,000 units per month. What is his cost per unit and his net cost per month?

Enter:	Read:	Explanation:
.07	0.07	Enter the unit price and subtract the dis-
− 30 %	0.021	counted amt. per part.
=	0.049	The total price per unit
× 20 000 =	980.	At 20,000 units per month the buyer will pay $980/mo.

② **Tax Add-On**

An automobile you are thinking of buying retails for $4980. But you are considering how much more it will cost when sales tax is added. What is the dollar amount of tax at a rate of 6% and what is the total cost of the car?

Enter:	Read:	Explanation:
4980	4980	Enter the price

+ 6 %	298.8	The dollar amount of tax is $298.80
=	5278.8	The total cost of the auto is $5278.80

Chain Discounts

As a buyer you have been offered a 30%/15%/10% discount on a 10 cent item due to the quantity you plan to purchase. What is the cost per unit after this discount?

Enter:	Read:	Explanation:
.10	0.10	Enter unit price
− 30 %	0.03	First discount amount
−	0.07	Unit price after first discount
15 %	0.0105	Second discount
−	0.0595	Unit price after second discount
10 %	0.00595	Third discount
=	0.05355	Unit price with a 30% 15%/10% discount

Percentage Difference

Δ%

The Percentage Difference key, **Δ%** calculates the percentage difference between a base, entered first, and any other number. It displays the result as a percentage (%) of the base. For example, calculate the percentage difference between 70, the base, and 350:

Enter:	Read:
70	70.
Δ%	70.
350	350.
=	400.

The percentage difference between 350 and 70 is 400%.

Example:

To determine markup as a discount from retail. A retailer sells an item for $12.00. His cost is $9.00. What is his percent of markup?

Enter:	Read:
12	12.
Δ%	12.
9.00	9.00
=	−25.

The shopkeeper's markup is 25% shown as a discount (−) from retail.
Let's check it using the add on/discount percent key

12	12.
Δ%	12.
25	25.
%	3. (dollar amount of markup)
=	9. cost

The reciprocal key not only permits us to instantly determine profit expressed as a discount from retail, it also permits computations to show the markup on cost. The latter is also the method to quickly compute a return on investment.

Example:

A man invests $9,000 in the stock market. Several weeks later he sells his stock for $12,000. What is the return on his investment?

Enter:	Read:
9000	9000.
Δ%	9000.
12000	12000.
=	33.33333333

The investor has realized a 33% return on his money.

Financial Keys

PV Present Value key, used to enter a present value or initial investment for computation. To enter a present value of $5000, the key sequence is: 5000 **PV**

FV Future Value key, used to enter a projected future value for computation. For example, to enter a Future Value of $10,000, the key sequence is: 10000 **FV**

PMT Payment key, used to enter the periodic payment amount for computation. To enter a $75 periodic payment, the key sequence is: 75 **PMT**

I Interest key, used to enter the amount of periodic interest. Interest is entered as a percentage per compounding period.

PER Per Period key. This key is used as a preface to enter a specific time key. The time key works in conjunction with the **I** key to provide quick reduction of an annual interest rate to the correct periodic payment.

Examples:

Compound Period:	**To Enter:**	**Key Sequence:**
Annually	6% compounded annually	6 **I**
Semi-Annually	6% compounded semi-annually	6 **PER** **SEMI** **I**
Quarterly	6% compounded quarterly	6 **PER** **QTR** **I**
Monthly	6% compounded monthly	6 **PER** **MTH** **I**
Weekly	6% compounded weekly	6 **PER** **WEEK** **I**
Daily (365 days)	6% compounded DAILY on a 365 day/year	6 **PER** **DAY** **I**
Daily (360 days)	6% compounded DAILY on a 360 day/year	6 **PER** **day** **I**

N **Number of periods.** Used to enter the number of compounding and/or payment periods for computation.

DP **Down Payment.** Enters a down payment or an initial balance for calculation. While financial entries may be made in any order, the **DP** key is a special entry and must always be made just prior to the compute, **CMP** key. The key sequence must be: **DP** **CMP**

INT **Dollar Amount Interest Key.** This computational key is used with the **CMP** key to perform discounted note and accrued interest calculations.

x↔y **Exchange Register Key.** This key replaces the number previously entered with the number currently on the display. It is used in financial applications which have two results. In this instance the first result is displayed and the second one is recovered by pressing the exchange key. Refer to the following calculations for application:

1. Discounted Note
2. Accrued Interest
3. Add on interest to annual percentage rate conversion.

CMP **Compute Key.** Triggers the calculation of the Present Value **PV**, Future Value **FV**, Payment **PMT**, Interest **I** or Number of Periods **N** when entered just prior to one of these keys.

DIS **Display Key.** Recalls an entry for examination. It may be pressed at any time prior to pressing the **CMP** key without disturbing previous entries.

Note: If the **DIS** key is pressed immediately **after** the **CMP** key, as in **CMP** **DIS** **PV**, it will display the earlier entry. However, to continue the calculation you must reenter the compute **CMP** key.

Note 2: Recall of prior entries **after computation has been executed** is permissible under certain conditions. Please refer to "Compounded Amount of Interest Earned," example, page 34.

IMPORTANT

1. All financial calculations automatically employ the memory registers to solve computations. Therefore, any data previously stored in memory prior to a financial calculation will be lost.

2. Your financial calculator **must** be cleared before a financial calculation is entered. Failure to clear the machine may result in an error signal "E" apppearing on the display, but more commonly yields an erroneous result. Your calculator will perform accurately and quickly when cleared properly. This is accomplished by pressing the **C** key.

REFERENCE GUIDE TO FINANCIAL APPLICATIONS

This handy key sequence summary is provided to help you recall a particular key sequence quickly. If you wish to review an application in detail, simply turn to the page indicated in the referral column.

You want to find	First press these keys . . . (In any order)*	Then, compute result	Example Page
	(Dashes in key sequence denotes numerical entries)		
Future Value of Compound Amount	— PV — I — N	CMP FV	30
Present Value of Compound Amount	— FV — I — N	CMP PV	31
Future Value of Annuity	— PMT — I — N	CMP FV	39
Future Value of Annuity with Existing Down Payment	— PMT — I — N — DP	CMP FV	45
Present Value of Annuity	— PMT — I — N	CMP PV	42

*The only exception is the DP key. When used, it must always be entered immediately before the CMP key.

You want to find	First press these keys . . . (In any order)*	Then, compute result	Example Page
	(Dashes in key sequence denotes numerical entries)		
Present Value of Annuity with Existing Down Payment	— PMT — I — N — DP	CMP PV	47
Payments on Annuity (Savings)	— FV — I — N	CMP PMT	42
Payments on Savings with Initial Deposit	— FV — I — N — DP	CMP PMT	46
Payments on Annuity (Loans)	— PV — I — N	CMP PMT	43
Payments on Loans with Initial Deposit	— PV — I — N — DP	CMP PMT	48
Deposit for Savings	— PMT — FV — I — N	CMP DP	49
Down Payment on Loans	— PMT — PV — I — N	CMP DP	50

*The only exception is the DP key. When used, it must always be entered immediately before the CMP key.

You want to find	First press these keys . . . (In any order)	Then, compute result	Example Page
	(Dashes in key sequence denotes numerical entries)		
Periods for a Compound Amount	FV PV I	CMP N	33
Compound Interest Earned (in dollars)	PV I N – DIS PV	CMP FV =	34
Interest on Annuity (Savings)	PMT FV N	CMP I	40
Interest on Annuity (Loans)	PMT PV N	CMP I	44
Rate of Interest: Compound Amt.	FV PV N	CMP I	32
Effective ↗ Nominal Interest Rate Conversion	FV I N	CMP I	37
Nominal ↗ Effective Interest Rate Conversion	PV I N	CMP I	36

You want to find	First press these keys . . . (In any order)	Then, compute result	Example Page
	(Dashes in key sequence denotes numerical entries)		
Add-On Interest Rate to Annual % Rate Conversion	— I — N	CMP INT	37
Accrued Interest ① PV I N CPT INT : This sequence displays I in dollar amount on a 360 day basis ② x←→y Displays I in dollar amount on a 365 day basis	— PV — I — N	CMP INT x←→y	51

You want to find	First press these keys . . . (In any order)	Then, compute result	Example Page
Discounted Note ① FV I N CPT INT : Displays the dollar discount amount — 360 day basis ② x←→y Displays the effective annual yield — 360 day basis ③ INT : Displays the dollar discount Displays the dollar discount amount — 365 day basis. ④ x←→y Displays the effective annual yield — 365 day basis.	FV I N	CMP INT x←→y INT x←→y	52

Financial Applications

The following calculations illustrate how easy it is to handle your financial calculator. Work through each exercise. Building confidence in your ability to handle your new machine is only a matter of practice. Verify your results with those shown on the following pages. Should your calculator fail to perform any of the examples precisely as illustrated, be certain you are keying in the problem accurately. Remember to clear your machine by pressing the C key before beginning a new example. Failure to clear the machine will cause an "E" error symbol to appear or yield an erroneous result.

Compounded Amounts

Future Value of a Compounded amount.

PV I N CMP FV

This calculation finds the future value FV of a present value PV compounded at a periodic interest rate I for N periods. Enter in any order:

PV I N CMP FV and compute the future value of your investment.

Example 1: If you invested $1000 at 7% interest compounded annually what would your investment be worth in 3 years?

Enter:

C 1000 PV 7 I 3 N CMP FV

Read: $1225.043

Example 2. Suppose the same sum is invested at 5.75% compounded daily on a 365 day/year basis, what would it be worth after 3 years?

Enter:

C 1000 PV 5.75 PER DAY I

3 × 365 N CMP FV

Read: 1188.255674

Present Value of Compounded Amount

FV I N CMP PV

This calculation finds the amount you would need to invest today to reach a desired future amount when computed at a given periodic interest rate.

Enter in any order: FV I N
and compute the present value CMP PV

Example: What sum of money must be deposited in a long term savings account at an 8% annual interest rate compounded daily on a 365 day/year basis for 3 years to accumulate $10,000?

Enter:

C 10 000 FV 8 PER DAY I

3 × 365 N CMP PV

Read: $7866.48547

Rate of Interest for a Compounded Amount

FV PV N CMP I

This calculation finds the rate of interest per period necessary to amass a desired future value from an initial investment (present value) over a number of periods, N . The annual percentage rate is found by multiplying the interest per period, the result of this calculation, by the number of periods per year.

Enter in any order: PV FV N and compute the interest rate per period CMP I

Example: What annual percentage of interest is necessary for an initial investment of $500 to grow to $1000, if the sum is compounded monthly over 3 years?

Enter:

C 500 PV 1000 FV

12 × 3 N CMP I

Read: **1.944064367,** the interest rate per mo.

× 12 =

Read: 23.3287724, the annual rate of interest necessary.

Number of Periods for a Compounded Amount

FV PV I CMP N

This calculation finds the number of periods necessary to amass a desired future value from an initial investment (present value) at a given periodic rate of interest.

Enter in any order: FV PV I
and compute the number of periods necessary

CMP N

Example: You now have $1000 in a savings account which earns 7.75% compounded daily on a 365 day/year basis. How long will it take to reach $1,000,000?

Enter:

C 1000 PV 1 000 000 FV

7.75 PER DAY I CMP N

Read: 32536.75305, days

Enter: ÷ 365 =

Read: 89.14178918, years

Compounded Amount of Interest Earned:

PV I N CMP FV − DIS PV =

This calculation finds the interest earned (actual amount) on an investment when the rate of interest and number of periods are known.

Enter in any order: PV I N
and compute the future value CMP FV
then subtract the initial value to find the total amount of interest earned − DIS PV =

Example: What is the total amount of money earned as interest on an investment of $1000 compounded annually for 3 years at an annual interest rate of 7%?

Enter:

C 1000 PV 7 I 3 N CMP FV

Read: 1225.043, total amount massed

Enter: − DIS PV =

Read: 225.043, total amount of interest accrued

Note how the DIS key is employed to recall an earlier entry. To determine the amount of interest earned we must subtract the present value from the final amount. Therefore, once the FV has been obtained, we simply press − DIS PV = and the computation is performed in logical sequence.

Nominal Rate Converted to Effective Annual Rate of Interest

PV I N CMP I

This calculation finds the effective rate of interest when the nominal annual rate of interest and the number of compounding periods are known.

Enter in any order: PV I N
and compute the effective annual rate of interest CMP I

Note: The PV key is used here purely to signal the Nominal Rate to Effective annual rate of interest; no numerical value need be entered with the PV key, though an error will not result if a number is keyed in with the PV key.

Example: What is the effective annual rate of interest on a savings account if the stated nominal rate of interest is 5.75% compounded daily?

Enter:

C PV 5.75 I 365 N CMP I

Read:

5.918047306, effective annual rate of interest

Effective annual rate of interest to nominal interest rate conversion

FV I N CMP I

This calculation finds the nominal interest rate when the effective annual rate of interest and the number of compounding periods are known.

Example: By law the maximum legal interest rate on a long term loan is 18% annually. What nominal rate of interest does this represent?

Enter:

C FV 18 I 12 N CMP I

Read: 16.66611638, % nominal interest rate

Add-On Interest to Annual percentage rate conversion

I N CMP I

This calculation finds the annual percentage rate and the monthly payment factor given an add-on interest rate and the number of periods. The monthly payment can be calculated by multiplying the principal by the monthly payment factor.

Enter in any order: **I** **N**
Compute the annual interest rate **CMP** **I**
and enter the exchange key to display the monthly payment factor **x⟷y**

Example: What is the true rate of interest on a 36 month, 7% add-on loan? What would the monthly payment be on a $3000 principal?

Enter:	Read:
C 7 I 36 N CMP I	12.82788631
x⟷y	3.361111111−02
× 3000 =	100.8333333

Answers: 12.83% Annually
.034 Monthly Payment Factor
$100.83 Monthly Payment

ANNUITIES

Future Value of an Annuity (Sinking Fund)

PMT **I** **N** **CMP** **FV**

This calculation finds the future value of an amount to be accumulated at the end of a given number of periods where the following facts are known:

Given:	Number of payment periods	N
	Value of the payments	PMT
	Periodic rate of interest	I
	Initial balance: 0	

The algebraic logic of your machine enables the N PMT and I entries to be made in any order you wish.

Example: You want to buy a house and have no money for the down payment. If you start a fund, today, in which you will save $300 per month and your savings earn 6% compounded monthly, how much will your down payment fund be worth at the end of three years?

Enter:

C 300 PMT 6 PER MTH I
3 × 12 N CMP FV

Read: 11800.8315

After three years of frugality you will have saved $11,800.83.

Rate of Interest for Sinking Fund (Savings)

PMT **FV** **N** **CMP** **I**

This application finds the rate of interest necessary for a sinking fund to amass a future value.

Given:	Desired future value	**FV**
	Number of payment periods	**N**
	Value of payment	**PMT**
	Initial balance: 0	

Example: In three years a man must repay a debt of $14,000. He is able to save $350 per month towards this debt. What annual rate of interest will he require to reach the $14,000 goal?

Note: The result will be the rate of interest per period. In this example: I per month. After we solve for I we must multiply the result by the number of periods in one year to determine the annual interest rate.

This calculation is iterative, or one which solves the problem by applying cycles of operations. For this reason, execution time requires approximately 10 to 20 seconds.

Enter:

C 350 **PMT** 14000 **FV**

3 × 12 **N** **CMP** **I**

Read: .593035837
(This is monthly rate of interest.)

Since the problem calls for the annual rate we must now multiply by 12. Thus, × 12 =

Read: 7.116430045
(This is annual rate of interest.)

Payment for Sinking Funds (Savings)

FV I N CMP PMT

This calculation finds the periodic payment necessary to reach a desired future value.

Given:	Future value	FV
	Number of payment periods	N
	Periodic interest rate	I
	Initial balance: 0	

(Remember, you may enter FV N and I in any order.)

Example: Your girl is a contemporary lady with old-fashioned values and wants a $5,000 diamond ring when you both become engaged one year from now. You plan to save each month towards the ring. The best rate available is 6% compounded monthly. How much must you save each month to buy the ring?

Enter: **Read:**

C 5000 FV 6 PER MTH I

12 N CMP PMT 405.3321485

Rounding off the displayed result reveals a monthly savings payment of $405.33.

Present Value of Annuity

PMT I N CMP FV

This calculation determines the principal of present value of an annuity.

Given:	Number of pay periods	N
	Interest rate per period	I
	Periodic payment	PMT
	Initial balance: 0	

Example: You intend to buy a car and wish to secure a three year loan to do so. You can afford to repay the loan at a rate of $150 per month. If the annual interest rate is 9% compounded monthly, how much can you afford to borrow?

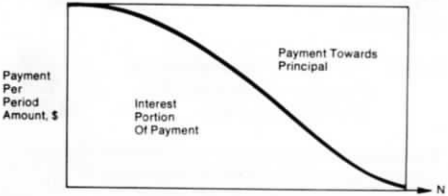
Enter: **Read:**

C 150 PMT 36 N 4717.020789

9 PER MTH I CMP PV

Periodic Payment of an Annuity.
(Direct reduction of loan)

PV **I** **N** **CMP** **PMT**



This calculation determines the periodic payment necessary to amortize a principal.

Given:	Amount of loan or present value	**PV**
	Number of payment periods	**N**
	Periodic interest rate	**I**

Example: A man takes out a $4,000 home improvement loan with an annual interest rate of 9%. The life of the loan is 2½ years. What will the monthly payments be?

Enter:

C 4000 **PV** 9 **PER** **MTH** **I**

2.5 × 12 **N** **CMP** **PMT**

Read: 149.392643

Therefore, the monthly payment is $149.39.

Interest Rate on Loans

PMT **PV** **N** **CMP** **I**

This computation finds the rate of interest per period.

Given:	Principal or present value	PV
	Number of pay periods	N
	Periodic payment	PMT

Example: What is the annual interest rate on a $4000 principal which is amortized in 36 monthly payments of $140 each?

The result obtained must be multiplied by the number of periods per year to determine the annual rate.

As in the sinking fund example which seeks to find the interest rate, this solution is also iterative using numerical analysis techniques. Thus, execution time will be several seconds.

Enter:

4000 PV 140 PMT 36 N CMP I

Read: 1.306793134

The above result is the monthly interest rate. To determine the annual rate we now multiply by 12: × 12 = 15.68151761

Therefore, the annual interest rate is: 15.68%

Future Value of Annuity

PMT **I** **N** **DP** **CMP** **FV**

In our annuity problem on Page 39 we asked for the amount of a down payment accumulated in a 3-year fund with monthly investments of $300 and earning 6% interest compounded monthly. This problem presumed that there was no initial deposit on account.

The **DP** Down Payment key permits you to compute assignments in which an initial deposit does exist without first encountering a preliminary computation.

Let us suppose that in our earlier problem there had been an existing deposit of $5000 on account. How large a down payment could you now afford if you elected to save $300 per month for 3 years and your savings earned 6% compounded monthly?

Enter:

C 300 **PMT** 6 **PER** **MTH** **I**

3 **×** 12 **N** 5000 **DP** **CMP** **FV**

Read: 17784.23412

Thus, you could now afford a down payment of $17,784.23.

Example: What annual rate of interest must be obtained to save $15,000 in three years if you have an initial balance of $1,500 and you plan to deposit $300 per month?

Enter:	Read:
C 300 PMT 15000 FV	1.795758481
3 × 12 N 1500 DP CMP I	

1.795758481 is the monthly interest rate. To obtain the annual interest rate we must continue our calculation and multiply by 12.
Therefore: × 12 = 21.54910177
An annual rate of 21.5% is what's needed.

Payments on Savings with Inital Deposit
(Savings)

FV PER MTH I N DP CMP PMT

In the last example we illustrated how, with the use of the DP key, annuity problems which began with an initial balance could be accomplished in one direct key sequence. This basic formula holds true in the case of sinking funds.

Example: A parent has a thirteen year old and wishes to save enough money to put the youngster into college four years from now. The parent has $2000 presently in his savings account and needs a total of $10,000 by the time the child is 17 years old. The account pays 7% interest compounded monthly. What are the monthly deposits required to reach this goal?

Enter:

C 10000 FV 7 PER MTH I
4 × 12 N 2000 DP CMP PMT

Read: 133.236624

Monthly deposits of $133.24 are required

Present Value of an Annuity

PMT N PER MTH I DP CMP PV

Earlier in this manual we handled a present value example in which an auto loan was required. Without any starting balance on hand, the amount of the loan determined the cost of the car you could buy.

Given: a) $150 monthly payments
b) A 3-year period of investment
c) An annual rate of 9%

You were asked to determine the present value of the loan.

If the same facts existed, but you now had $2000 with which to make a down payment, you could afford a larger loan to purchase a more expensive car. How much would you now be able to spend?

Enter:

C 150 PMT 36 N 9 PER MTH I
2000 DP CMP PV

Read: 6717.020789

Answer: $6717.02

Payments on Loans with Initial Down Payment
(Direct reduction loan)

PV MTH PER I N DP CMP PMT

Example: Mr. Jones plans to purchase a new boat for $7,000. He is prepared to make a down payment of $2000 and finance the balance at 9% over a 3-year period. What will his monthly payments be?

Enter:

C 7000 PV 9 PER MTH I
3 × 12 N 2000 DP CMP PMT

Read: 158.9986632

Mr. Jones will have to pay $159.00 per month.

Deposit for Savings

PMT FV PER MTH I N CMP DP

This calculation determines the deposit required in a savings account to accumulate a desired future amount after a certain period of time, at a given interest rate.

Given:	Future value	FV
	Periodic deposit	PMT
	Number of periods	N
	Periodic interest rate	I

Example: A man plans to go abroad in two years. The trip will cost $7500. He can afford to save $150 per month towards the trip. If his bank pays 6% interest compounded monthly, how much of an initial deposit must the man make in order to save enough to make the voyage?

Enter:

C 150 PMT 7500 FV 6 PER MTH I

24 N CMP DP

Read: 3269.462582

Answer: $3269.46

Down Payment on Loans

PV PMT MTH PER I N CMP DP

This calculation finds the down payment necessary to finance an item at a desired interest rate and monthly payment for N periods.

Given:	Present value	PV
	Periodic payment amount	PMT
	Number of payment periods	N
	Periodic interest rate	I

Example: How large a deposit must you make on a $100,000 plane to finance the balance at a 9% annual interest rate for 10 years with payments of $500 per month?

Enter:

C 100 000 PV 500 PMT 9 PER MTH I

12 × 10 N CMP DP

Read: 60529.15366

Answer: $60,529.15 down payment.

Accrued Interest

PV **N** **I** **CMP** **INT** **x⟷y**

This calculation finds the total accrued interest (dollar amount) due on a short term loan.

Given:	Present value	**PV**
	Number of periods	**N**
	Periodic interest rate	**I**

Example: What is the accrued interest on a $1000 loan at 20% annual interest rate for 100 days on a 360/365 day basis?

Enter:

C 1000 **PV** 100 **N** 20 **I** **CMP** **INT**

Read: 55.55555556

Based upon a 360 day/year the accrued interest is $55.56

Exchange key **x⟷y** $54.79452055

Based upon a 365 day/year the accrued interest is $54.79

Discounted Note

FV N I CMP INT x←→y INT x←→y

This calculation finds the discounted amount (interest) and the amount yield on a note for both 360 and 365 day basis.

Given: The future value of the bond **FV**
The number of days to maturity **N**
The annual interest rate **I**

Example: What is the discounted amount on a $10,000 note maturing in 160 days at 6%?

Enter:

C 10 000 **FV** 160 **N** 6 **I** **CMP** **INT**

Read: 266.6666667

The discounted amount on a 360 day/year is 266.67

x←→y

Effective annual yield is determined on a 360 day/year basis: 6.164% 6.164383562

CMP **INT** 263.0136986

The discounted amount on a 365 day/year is 263.01

x←→y 6.079939952

Effective annual yield determined on a 365 day/year basis: 6.08%

MORTGAGES CALCULATION:

Payments on a Mortgage: This calculation finds the monthly payments necessary to amortize a mortgage, and the total accurate dollar amount of interest paid on the mortgage.

Bob and Molly are thinking of buying a house and financing $40,000 of the purchase price. Thirty year mortgages are currently available and their real estate agent has quoted a 9% annual interest rate if they chose to finance the house through him. What will the monthly mortgage payments be and how much money will they pay in interest on the mortgage?

Enter in any order: PV I N
compute the monthly payment CMP PMT .
multiply the monthly payment by the number of months during which payment is made to find the total cost of the mortgage × — = ,
and subtract the mortgage amount from this total − DIS PV =

Enter:

C 40 000 PV 9 PER MTH I

30 × 12 N CMP PMT

Read: **321.8490468,** the monthly payment

× 30 × 12 = 115865.6568
the total cost of the mortgage

− DIS PV = 75865.65683

$75865.00 is the amount of money paid as interest on a $40,000, 30 year, 9% mortgage.

Bob knows that he can secure a 30 year 8¾ % mortgage with his bank. How much less will this mortgage cost Bob and what will his monthly payment be?

Enter:

C   40 000 PV   8.75 PER MTH I
30 × 12 N CMP PMT

Read: **314.6801623,** the monthly payment at 8.75% annually.

× 30 × 12 − DIS PV = 73284.85843
the total amount of interest paid at 8.75%

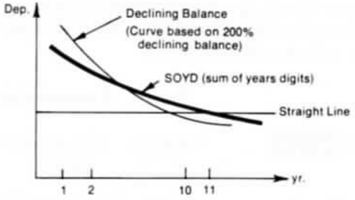
STO 1   73284.85845
store this value

75865.65683 − RCL1 =   2580.798402

Find the difference in the amount of interest paid on the mortgages.

Bob will save **$2580.80** by securing the mortgage at his bank.

Depreciation Examples



Straight-Line Method

In this method, the annual depreciation allowance is uniform throughout the life of the property and is computed as shown below:

$$\text{annual depreciation allowance} = \frac{\text{cost of property-salvage value}}{\text{useful life (in years)}}$$

Key Sequence

1. Enter depreciable amount. Depreciable amount is the cost of the property less salvage value if any. Enter STO 1
2. Press ÷ and enter the useful life (in years), then enter − to get the annual depreciation.
3. Press STO 2 RCL 1 x⇄y then − to get depreciable amount after first year.
4. Continue pressing RCL 2 − to obtain depreciable amounts for each subsequent year.

Example 1:

Calculate the depreciable value at year 1 and year 2 of a 5-unit apartment building costing $90,000 (exclusive of land) depreciated over 25 years with no salvage value.

Enter:	Read:	Explanation:
1. 90000 STO 1	90000.	Depreciable value
2. ÷ 25 −	3600.	Annual depreciation
3. STO 2 RCL 1 x↔y −	86400.	Depreciable value at year 1
4. RCL 2 −	82800.	Depreciable value at year 2

The depreciable value at the end of a particular year can be obtained without computing the balance of each preceding year.

Key Sequence

1. Enter depreciable amount. Press STO 1.
2. Press ÷ , enter useful life, then press ×
3. Press STO 2 , enter number of year for which depreciable value is desired, then press −
4. Press RCL 2 x←→y − to obtain depreciable value for given year.
5. Press RCL 2 − to obtain depreciable value for each subsequent year.

Example 2:

Using example 1 again, what is the depreciable value at year 10 and year 11?

Enter:	Read:	Explanation:
1. 90000 STO 1	90000.	Depreciable value
2. ÷ 25 ×	3600.	Annual depreciation
3. STO 2 10 −	36000.	Total depreciation for 10 years
4. RCL 1 x←→y −	54000.	Depreciable value at year 10
5. RCL 2 −	50400.	Depreciable value at year 11

Declining Balance Method

Unlike the straight-line method, this method allows for more depreciation in the earlier years and less depreciation in the later years of the property. This is done by taking a constant percentage of the depreciable amount for each year to find the depreciation.

The following examples show calculations to find the depreciation and the remaining depreciable value for each year given the following: declining factor, life expectancy, cost and salvage value.

Note: Since a factor is applied each year to the depreciable value, full or partial year holding of the asset in the first year affects the first year depreciation.

The following two examples show full first year holdings:

Key Sequence

To find depreciation and remaining depreciable value for successive years.

1. Enter declining factor

   Example: 1.5 for 150% declining balance
   2.0 for double declining balance, etc.
   Press ×, enter 100, then press ÷

2. Enter useful life, in years, press **−** **STO 2**
3. Enter cost of property. Do not deduct salvage value. Press **x⟷y** **%** to get first year depreciation.
4. Press **−** to get depreciable value at year 1.
5. Press **RCL 2** **%** to get depreciation at year 2.
6. Repeat step 4 to get remaining depreciable value for succeeding years.

Note: Since the salvage value was not deducted from the cost in the calculations , the book value is the remaining depreciable value. This is not true for the straight-line method and sum-of-the-years'—digits method of calculation. There the salvage value is deducted from the cost initially, and therefore, the book value is the sum of the depreciable value and salvage value.

Also, in the declining balance method, the book value can never go below the salvage value. When the remaining depreciable value is less than the salvage value, the previous depreciable value should be used in calculating the final year's depreciation, that is, the difference between that and the salvage value.

Example:

Calculate the depreciation and remaining depreciable value at years 1 and 2 for the 5-unit apartment building in example 1 (straight-line method section) using 200% declining (double declining) balance.

Enter:	Read:	Explanation:
1. 2 × 100 ÷	200.	200% declining balance
2. 25 − STO 2	8.	
3. 90000 x↔y %	7200.	First year depreciation
4. −	82800.	Depreciable value at year 1
5. RCL 2 %	6624.	Second year depreciation
6. −	76176.	Depreciable value at year 2

The depreciation allowance and remaining balance for a particular year can be calculated without computing values for each preceding year.

Key Sequence

1. C enter year for which depreciation and remaining balance are desired. Press − , enter 1, press N.
2. Enter declining factor, press ×, enter 100, press ÷ , enter number of years of useful life, press = STO 2
3. Press +/− I.
4. Enter cost, press PV CMP FV to obtain remaining depreciation at beginning of specified year.
5. Press − RCL 2 % to obtain depreciation for specified year.
6. Press − to obtain depreciable value at end of specified year.
7. Press RCL 2 % to obtain depreciation for successive year.
8. Repeat items 6 and 7 for values on following years.
9. To skip to another year, press = then, enter specified year, press − , enter 1, press N CMP FV.
10. Press − RCL 2 % to obtain depreciation for that year.
11. Press − to obtain remaining depreciable value.

Example 2:

Find the depreciation and remaining depreciable value at years 10, 11 and 15 for the same property in example 1.

Enter:	Read:
1. C 10 − 1 N	9.
2. 2 × 100 ÷ 25 = STO 2	8.
3. +/− I	−8.
4. 90000 PV CMP FV	42494.5227
Remaining depreciable value at year 9	
5. − RCL 2 %	3399.561816
Depreciation at year 10	
6. −	39094.96088
Depreciable value at year 10	
7. RCL 2 %	3127.596871
Depreciation at year 11	
8. −	35967.36401
Depreciable value at year 11	
9. = 15 − 1 N CMP FV	28007.35475
10. − RCL 2 %	2240.58838
Depreciation at year 15	
11. −	25766.76637
Depreciable value at year 15	

If the property is held for less than twelve months in the first year, the following key sequence must be used:

Key Sequence

1. Enter declining factor, press × , enter 100, then press ÷ .
2. Enter useful life in years, press × STO 2
3. Enter number of months held in first year, press ÷ , enter 12, press −
4. Enter cost, press x←→y % to get first year's depreciation.
5. Press − to get remaining balance at first year.
6. Press RCL 2 % to obtain second year's depreciation.
7. Repeat items 6 and 7 for successive years.

Example 3:

Find the book value of a 20 month old car originally costing $4500 using 125% declining balance. The car is held for 8 months during the first year of ownership. Expected life is 8 years.

Enter:	**Read:**
1. 1.25 × 100 ÷	125.
2. 8 × STO 2	15.625
3. 8 ÷ 12 −	10.41666667
4. 4500 x←→y % First year's depreciation	468.75
5. − Book value after first year	4031.25
6. RCL 2 % Depreciation for second year	629.8828125
7. − Book value after second year	3401.367188

Sum-of-the-Years' Digit Method

This method is similar to the declining balance method in that more depreciation is allowed in the earlier years and less depreciation in the later years of an asset's life. To compute the depreciation for a year, use the formula:

$$\frac{\text{remaining life in years}}{\text{sum of years of useful life}} \times \text{depreciable value}$$

Key Sequence

1. Press **C** , enter life in years, press **+** 1 **×** , life, **÷** 2 **x⇄y** **×** .
2. Enter depreciable value, press **STO 1** **×** **STO 2** enter life, press **=** **N** ; this gives the depreciation at year 1.
3. Press **−** **RCL 1** **x⇄y** **=** **STO 1** to obtain depreciable value after year 1.
4. Press **DIS** **N** **−** **RCL 2** **=** **N** to obtain depreciation at year 2.
5. Repeat item 3 to obtain depreciable value at year 2.
6. Continue items 4 and 5 for successive years.

Example 1:

Compare values of depreciation and depreciable values at years 1 and 2 between this method and both straight-line and declining balance.

Enter:	Read:
① 25 + 1 × 25 − 2 Sum of useful years of life.	2
② x←→y × 1/sum of year of useful life.	3.076923077-03
③ 90000 STO 1 × STO 2 Store initial value in Memory 1 and multiply by result in Step 2.	276.9230769
④ 25 Index number of useful years remaining.	25.
⑤ = N Solve for First year depreciation.	6923.076923
⑥ − RCL 1 x←→y = STO 1 Subtract Step 5 from initial value stored in Memory 1 (exchange key permits this) to obtain Depreciable Value year 1. Store this in Memory 1.	83076.92308
⑦ Dis N − RCL 2 = N Recall first year depreciation N . Subtract from data in Memory 2 to obtain second year depreciation. Store this result in N register.	6646.153846
⑧ − RCL 1 x←→y = STO 1 Same procedure as Step 6 to obtain Depreciable Value Year 2.	76430.76923

Key Sequence

1. Press **C** , enter life, press **STO 2**
2. Press **+** , enter 1, press **×** , enter life in years, press **÷** 2 **x⟷y** **×** .
3. Enter depreciable value, press **×** **RCL 2** **STO 1** enter specified year minus 1, press **+/−** **Σ1** **RCL 1** **×** . This gives the depreciation for given year.
4. Press **RCL 2** **STO 1** enter specified year, press **+/−** **Σ1** **RCL 1** **÷** 2 **=** to get remaining depreciable value.

Example 2:

Compare again for year 10 only.

Enter: **Read:** 25.

1. 25 **STO 2** — Life in years
2. **+** 1 **×** 25 **÷** 2 **x⟷y** **×**
3. 90000 **×** **RCL 2** **STO 1** 9 **+/−** **Σ1** **RCL 1** **×**

Read: 4430.769231
Depreciation at year 10

4. **RCL 2** **STO 1** 10 **+/−** **Σ1** **RCL 1** **÷** 2 **=**

Read: 33230.76923
Remaining depreciable value at year 10.

In addition to being a financial mini-computer, your F4146 is a powerful 2-memory exponential calculator with an x to the y power key, a percent key and a memory summation key.

Power Key y^x

The power key raises a base number to a power. Operating this function is simply a matter of entering the base first, then the y^x key. Next, the desired power and finally, the result key = .

The y^x key and the 1/x key are used to solve root combinations and sum-of-squares calculations.

① $\sqrt{144} = ?$

Enter:	Read:	Explanation:
144	144.	Raising a base to a fraction power is the same as taking a root of the base. (2 1/x computes the square root)
y^x	144.	
2 1/x	0.5	
=	12.	

② $\sqrt{517.3} = ?$

Enter:	Read:
517.3	517.3
yˣ	517.3
2 **1/x**	0.5
=	22.74423004

③ $\sqrt[3]{74088} = ?$

Enter:	Read:	Explanation:
74088	74088.	3 1/x computes the cube root.
yˣ	74088.	
3 **1/x**	0.333333333	
=	42.	

Sum-of-Squares

Chain calculations are possible with the **yˣ** key. Thus, solving a sum-of-squares argument as a hypotenuse calculation is an easy procedure.

① $(19)^2 + (14.1)^2 + (8)^2 = ?$

Enter:	Read:	Explanation:
19	19.	Calculate the square of 19 and prepare machine to add
yˣ 2 +	361.	
14.1	14.1	Calculate the square of 14.1, add it to the square of 19
yˣ 2 +	559.81	and prepare machine to add
8	8.	Calculate the square of 8, add it to the previous sub-
yˣ 2 =	623.81	total and determine the final result

Finding the square root of a sum-of-squares is accomplished by raising the sum-of-squares value to the power .5 (2 1/x power).

In the above example the displayed result is 623.81. To find the square root of this answer:

Enter:	Read:
yˣ 2 1/x =	24.97618866

GLOSSARY OF FINANCIAL TERMS

A

Accrued Interest Interest which has been earned but not collected.

Add-on Interest Rate In consumer finance, an expression used to describe a type of finance charge. When a loan is made a year's simple interest is "added-on" to the principal amount for each year of the life of the loan.

Amortization A planned, fixed reduction of an amount over a period of time. This expression includes a number of specific practices such as depreciation, depletion, write-off of intangibles, prepaid expenses and deferred charges.

Annuity A series of equal payments made at regular intervals, i.e., monthly, yearly.

Annual Percentage Rate (APR) True cost of a loan expressed as the annual percentage rate of the loan. This is now required by U.S. Federal Reserve truth-in-lending law.

B

Bond A long-term promissory note by a company or institution.

Book Value The book value of a company refers to the total assets that company has minus its total liabilities.

C

Chain Discount A series of discounts expressed as percentages.

Compound Interest Interest which results from the addition of simple interest to a principal amount applied at periodic intervals. The new total (Principal plus Interest) now becomes the new principal upon which the next period's interest is computed and applied.

D

Declining Balance Depreciation A means of determining the yearly charge for depreciation. Depreciation is obtained by applying a predetermined percent factor to the diminishing balance of an asset. It is the balance after subtracting the prior period's depreciation.

Declining Factor This is the determinant of the percent factor to be applied to the Declining Balance Depreciation method. The percent or rate of depreciation is found by dividing the declining factor by the asset's life in years and converting this result to a percentage. (Result × 100 = %).

Depreciation A gradual reassessment of an item to reduce its value over a predetermined period of time. (Refer to declining balance depreciation; sum-of-the-digits, amortization, declining factor.)

Direct Reduction Loan Any loan whose periodic payment is determined by calculating the interest for the period on the amount of the principal outstanding for that period. The new principal is found by subtracting the remaining amount of the loan payment that had not been designated as interest.

Discount A reduction made from a regular or list price. (See Mark Down.)

Discounted Note An instrument of future indebtedness which has been negotiated for an amount of present value less than its face value. The difference between its face value and its present value is the interest or discount payment.

E

Effective Rate The effective rate is that percentage of interest computed against the current market value of an original investment. It is commonly stated as an annual percent.

Effective Yield (See Effective Rate.)

F

Finance Charge The cost of a consumer loan expressed in dollar amount. It can be found by subtracting the amount originally borrowed from the actual amount to be repaid.

Future Value A total derived from the repeated compounding of a predetermined periodic interést rate on a present value over a specific number of periods. (See Compound Interest.)

M

Markup This is the percentage or dollar amount that is added to the cost of goods to determine a selling price.

Markdown That amount discounted from the original selling price. It may be expressed in dollars or as a percentage. (See Discount.)

Maturity Termination of the period that an obligation has to run.

Mean A value which represents the average value between two or more quantities. It is obtained by adding the quantities and dividing the total by the number of quantities.

Mean Deviation The average of the absolute values of the numerical differences between the numbers of a set (as in statistical data) and their mean.

Mortgage A conveyance of property (as security for a loan) on condition that the conveyance becomes void on payment or performance in accordance with stipulated terms.

N

Nominal Rate A rate of interest commonly divided by the number of periodic payments for compounding to thus yield a higher effective rate.

Note A written promise to pay a debt on a given date.

P

Percent (Part of a hundred) Derived by multiplying a decimal fraction by 100.

Percentage (Part of a whole expressed in hundredths) Derived from multiplying any number by a percent.

Periodic Payment The discharge of a monetary obligation through a series of payments made on a prescribed schedule.

Present Value The current worth of property, commodity or pecuniary obligation. Given a compound interest rate and the life of an obligation, the present value of future obligation can be obtained.

Principal A capital sum placed at a given interest rate; as in a debt or investment.

R

Rate (See Compound Rate, Nominal Rate, Percent)

Rule of 78's A method of computing the unearned interest or finance charges at any point in time, using sum-of-the-digits as a base. (See Sum-of-the-digits Amortization). It is generally used to compute the interest or finance charge rebate when the borrowing is repaid prior to maturity date.

S

Simple Interest A one time interest rate charged to the principal amount of a loan. (See Compound Interest.)

Sinking Fund A fund set up with money invested at regular intervals for paying off a particular debt when it falls due; i.e., the settlement date.

Standard Deviation That degree of difference around a mean. (See mean deviation.)

Sum-of-the-Digits Amortization A periodic reduction of any fixed amount based on the number of periods over which amortization is to be taken. The remaining balance at the end of each period is computed by multiplying the original amount by a fraction consisting of the sum of the total periods as the denominator and the sum of periods remaining as the numerator. Assuming a 10 year life, the annual amortization is computed using a denominator of 55 (the sum of 10, 9, 8, 7, etc.) and a numerator of 10 for the first year, 9 for the second, etc.

APPENDIX A

Rechargeable Battery

AC Operation

Connect the charger to any standard electrical outlet and plug the jack into the Calculator. After the above connections have been made, the power switch may be turned "ON." (While connected to AC, the batteries are automatically charging whether the power switch is "ON" or "OFF.")

Battery Operation

Disconnect the charger cord and push the power switch, "ON," an interlock switch in the calculator socket will prevent battery operation if the jack remains connected. With normal use a full battery charge can be expected to supply about 2 to 3 hours of working time.

When the battery is low, figures on display will dim. Do not continue battery operation, this indicates the need for a battery charge. Use of the calculator can be continued during the charge cycle.

Battery Charging

Simply follow the same procedure as in AC operation. The calculator may be used during the charge period. However, doing so increases the time required to reach full charge. If a power cell has completely discharged, the calculator should not be operated on battery power until it has been recharged for at least 3 hours, unless otherwise instructed by a notice accompanying your machine. Batteries will reach full efficiency after 2 or 3 charge cycles.

APPENDIX A

Use proper Commodore/CBM adapter-recharger for AC operation and recharging.

Adapter 640 or 707 North America

Adapter 708 England

Adapter 709 West Germany

APPENDIX B

Low Power
If battery is low calculator will:
a. Display will appear erratic
b. Display will dim
c. Display will fail to accept numbers

If one or all of the above conditions occur, you may check for a low battery condition by entering a series of 8's. If 8's fail to appear, operations should not be continued on battery power. Unit may be operated on AC power. See battery charging explanation. If machine continues to be inoperative see guarantee section.

CAUTION
A strong static discharge will damage your machine.

Shipping Instructions:
A defective machine should be returned to the authorized service center nearest you.
See listing of service centers.

Temperature Range

Mode	Temperature °C	Temperature °F
Operating	0° to 50°	32° to 122°
Charging	10° to 40°	50° to 104°
Storage	—40° to 55°	—40° to 131°

APPENDIX C

Guarantee

Your new electronic calculator carries a parts and labor guarantee for one year from date of purchase.

We reserve the right to repair a damaged component, replace it entirely, or, if necessary, exchange your machine.

If you own a portable calculator which uses an AC adapter, the adapter must be returned with your machine when service is required.

In order to receive free service under this guarantee at a Commodore Service Center, you are required to pay all postage, shipping and insurance charges when returning your calculator to the Commodore Service Center and enclose a check or money order for $2.50 to cover handling charge, return postage and insurance.

This guarantee is valid only when a copy of your original sales slip or similar proof of purchase accompanies your defective machine.

This guarantee applies only to the original owner. It does not cover damage or malfunctions resulting from fire, accident, neglect, abuse or other causes beyond our control.

The guarantee does not cover the repair or replacement of plastic housings or transformers damaged by the use of improper voltage. Nor does it cover the replacement of expendable accessories and disposable batteries.

The guarantee will also be automatically voided if your machine is repaired or tampered with by any unauthorized person or agency.

This guarantee supersedes, and is in lieu of, all other guarantees whether expressed or implied.

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