## THE KEYS TO SUCCESS ARE RIGHT AT YOUR FINGERTIPS!

## $\mathbf{H P}_{\text {CALCULATOR }}^{\text {EINANCIAL }}$



SEMINAR LEADER: CHUCK WILCOX. Over the past five years, Chuck has shown thousands the way to make money with the HP-12C. His firm, Chuck Wilcox \& Associates, conducts seminars for Realtors, Appraisers, Lenders and Investment Groups throughout the United States.

All rights reserved. No part of this tape/workbook set may be reproduced, in any way or by any means, without the express written permission of the authors.

COPYRIGHT © 1985 CHUCK WILCOX \& ASSOCIATES

Please Note:
The instructional material in this tape/workbook set is provided without warranty of any kind. Use and application of the material is voluntary, and the authors shall not be held accountable or responsible for any consequences resulting from the use of this material.

CHUCK WILCOX \& ASSOCIATES
115 E. Kilborn P. O. Box 18153
Lansing, MI 48901
(517) 484-8234


## TABLE OF CONTENTS

TAPE/SIDE PAGE
1/A Getting Acquainted with HP-12C ..... 2
1/A $1 / B$ Keys Used in Basic Functions ..... 3
1/B Basic Arithmetic/ Automatic Memory Stack:The StackRPN.4
Simple Addition. ..... 5
1/B
1/B More Basic Math ..... 6
7
1/B Four Basic Functions
1/B Chain Math Calculations ..... 8
1/B R and $\mathrm{X} / \mathrm{Y}$ Manipulating the Memory Stack ..... 9
2/A Revolving Memory Stack ..... 10
2/A Decimal Places - the "fix" key ..... 11
2/A The Percent Key. ..... 12
2/A $2 /$ B

$\square$
RCL \& The Storage Registers ..... 13
2/B 3//A Financial Registers and Functions ..... 14
2/B $3 /$ A Notes on Financial Functions ..... 15
2/B 3/A The Three Questions ..... 16
3/A FV Value of an Investment. ..... 17

## TABLE OF CONTENTS

| TAPE/SIDE |  |  | PAGE |
| :---: | :---: | :---: | :---: |
| 3/A |  | FV - Value of an Investment. | . 17 |
| 3/A | 3/B | PMT- Changing the Period. | 18 |
| 3/B |  | PMT - Changing the Interest Rate | 19 |
| 3/B | 4/A | n - How Many Payments Remaining?. | . 20 |
| 4/A |  | FV - Amount of Final Payment. | . 20 |
| 4/A |  | i - Interest Rate; Investor's Yield. | . 21 |
| 4/A |  | FV- Balloons. | . 22 |
| 4/A | 4/B | PV - Buying a Discounted Mortgage | . 23 |
| 4/B |  | Amort - Amortization. | . 24 |
| 4/B | 5/A | Adjustable Loans (AML - ARM) | . 24 a |
| 5/A |  | IRR- Internal Rate of Return. | . 25 |
| 5/B |  | Internal Rate of Return (cont) | . 25 a |
| 5/B |  | NPV - Net Present Value. | . 26 |
| 5/B |  | Lenders Yield on a Mortgage with Poin | . 27 |
| 5/B | 6/A | Wrap Around Loan. | . 28 |
| 6/A | 6/B | Blended Rate Loan. | . 28 a |
| 6/B |  | Interest Only Loans. | . 28 b |
| 6/B |  | PV - Begin; End. | . 29 |
| 6/B |  | l/x One Divided by X (Reciprocals) | . 30 |
| 6/B |  | Percent Functions | . 31 |
| 6/B |  | Day and Date with Prorations. | . 32 |
| 6/B |  | Day and Date....... | . 33 |

## GETTING ACQUAINTED WITH YOUR HP-12C

## BATTERIES

Your HP comes equipped with 3 replaceable alkaline batteries that should last 6 months, minimum. Replace batteries if asterisk in lower left corner of your display appears or is flashing. Replace batteries with alkaline or silver oxide batteries. Silver Oxide batteries are longer lasting and more costly.

## CONTINUOUS MEMORY

The HP-l2C has a continuous memory feature which allows information stored in the registers or display to be retained even if the calculator is turned off.

## AUTO OFF FEATURE

The calculator will turn itself off if left unused for a period of 5 or 10 minutes. Information stored in the display or registers will be retained and reappear when the calculator is turned on again.

## "ERROR" MESSAGES

"ERROR" messages may appear on the screen for any number of reasons. The HP Owner's Handbook, pp. 202-205 will reveal the nature of the "ERROR" message, but the problem in question should be reworked. Always clear the "ERROR" message out of the display before continuing (strike the CLX key).

## VERIFYING OPERATION

If a calculator malfunction is suspected, follow the steps outlined on p. 220 of your Owner's Handbook to verify correct operation.

THE KEYBOARD
The keyboard will be discussed on the next page. Review pp.231-234 of your Ownner's Handbook for complete descriptions of key functions.

$\square$

9
STO
RCL

## ENTER

## $\%$

$\mathrm{X} / \mathrm{Y}$
$R \downarrow$

Fixes decimal places. Shifts calculator into gold functions.

Shifts calculator into blue functions.
Enters information into storage registers.
Recalls information from storage registers and financial registers.

Copies number from X-register (display) into Y-register and prepares $X$ and $Y$ for math command.

Calculates percentages.
Exchanges information between $X$ and $Y$ registers.
"Rolldown", allows us to view information stored in $X, Y, Z$ and $T$ registers.

## BASIC ARITHMETIC AND THE AUTOMATIC HEMORY STACK

THE STACK
R.P.N.

The logic system used by the HP-l2C (R.P.N.) requires that numbers be entered into and stored in a memory stack "under" the enter bar before the,,$+- x$ or $\div$ functions can be performed on them. To better understand this, visualize the memory stack as follows:


## BASIC ARITHMETIC AND THE AUTOMATIC MEMORY STACK

COMMAND SEQUENCE FOR BASIC FUNCTIONS

1 KEY IN FIRST NUMBER
2 PRESS ENTER
3 KEY IN SECOND NUMBER
4 PRESS ARITHMETIC COMMAND $(\square, \square, \square, \square)$
Enter numbers as if the problem was written vertically.
PROBLEM: 1


KEYSTROKES DISPLAY

1 ENTER 1.00
$2+$ 3.00

WHAT HAS HAPPENED IN THE MEMORY STACK?

KEYSTROKES

1

$+$


## BASIC ARITHMETIC AND THE AUTOMATIC MEMORY STACK

PROBLEM: $3+6=9$

| KEYSTROKES | DISPLAY |
| :--- | :--- |
| $6++$ | 9.00 |

WHAT HAS HAPPENED IN THE MEMORY STACK?
KEYSTROKES MEMORY STACK

6

$+$


PROBLEM: $9 \mathrm{x} 3=27$


## THE FOUR BASIC FUNCTIONS

REVIEW: COMMAND SEQUENCE

| 1 | KEY IN FIRST NUMBER |
| :--- | :--- |
| 2 | PRESS ENTER |
| 3 | KEY IN SECOND NUMBER |
| 4 | PRESS MATH COMMAND |



| SOLVE: | KEYSTROKES | DISPLAY |
| :---: | :---: | :---: |
| $12+10=$ | 12 ENTER | 12.00 |
|  | $10 \square$ | 22.00 |
| $8-3$ | 8 ENTER | 8.00 |
|  | $3 \quad-$ | 5.00 |
| $9 \times 7=$ | 9 ENTER | 9.00 |
|  | 7 x | 63.00 |
| $50 \div 2=$ | 50 ENTER | 50.00 |
|  | $2 \div$ | 25.000 |

## CHAIN MATH CALCULATIONS

|  | KEystrokes | DISPLAY |
| :---: | :---: | :---: |
| PROBLEM: $\frac{(4 \times 3 \times 6)-51}{3}$ | 4 ENTER |  |
|  | 3 x |  |
|  | 6 x |  |
|  | 51 - |  |
|  | $3 \div$ | 7.00 |
| PROBLEM: <br> What is the square footage of each room, and the total square footage of the house, given these room sizes: | 12.5 ENTER |  |
|  |  |  |
|  | 11 x | 137.50 |
|  | 9 ENTER |  |
| $12 \mathrm{l} / 2^{\prime} \mathrm{x}$ 11' | 9 x | 81.00 |
|  |  |  |
|  | $+$ | 218.50 |
|  | 10.5 ENTER |  |
|  | 10.5 x | 110.25 |
|  | $+$ | 328.75 |
|  | 295 ENTER |  |
| Find annual income given the following rental income: | 4 x | 1,180.00 |
| 4 units 295./month | 325 ENTER |  |
| 5 units 325./month |  |  |
| 3 units 350./month | 5 x | 1,625.00 |
| Laundry income: 900./year | + | 2,805.00 |
|  | 350 ENTER |  |
|  | 3 X | 1,050.00 |
|  | $+$ | 3,855.00 |
|  | 12 X | 46,260.00 |
|  | $900 \quad+$ | 47,160.00 |

## Rゅ \& X/Y : MANIPULATING THE MEMORY STACK

KEY IN EXACTLY:
1 ENTER
2 ENTER
3 ENTER
4 (do not enter)
MEMORY STACK NOW LOOKS LIKE THIS:


|  | KEYSTROKE | DISPLAY |
| :--- | :--- | :--- |
| TEST : | $\mathrm{R} \downarrow$ | 3.00 |
|  | $\mathrm{R} \downarrow$ | 2.00 |
|  | $\mathrm{R} \downarrow$ | 1.00 |
|  | $\mathrm{R} \downarrow$ | 4.00 |

You have reviewed the contents of the four memory stack registers.

TEST:

$$
X / Y
$$

$$
3.00
$$

$$
X / Y
$$

$$
4.00
$$

REMEMBER: $X / Y$ exchanges information between the $X$ and $Y$ registers without disturbing the $Z$ or $T$ registers.

## "REVOLVING" memory stack

PROBLEM: If you put $\$ 32,000$ in a bank savings account at 4\% interest, compounded annually, how much will you have at the end of EACH of 5 years?

To determine the value of $\$ 32,000$ after one year, we must multiply \$32,000 by 1.04 (104\%).

By loading the memory stack with a factor of 1.04 , we can accomplish a "rotating" effect and save many keystrokes, as follows:

KEYSTROKES
DISPLAY
1.04

ENTER

ENTER
ENTER
(fills memory stack)

| 32000 x | $33,280.00$ | Value at EOY 1 |
| ---: | :--- | :--- |
| x | $34,611.20$ | EOY 2 |
| x | $35,995.65$ | EOY 3 |
| x | $37,435.47$ | EOY 4 |
| x | $38,932.89$ | EOY 5 |

WHAT HAS HAPPENED IN THE MEMORY STACK?


32000 x

THE MEMORY STACK "REVOLVES" EACH TIME THE COMMAND TO MULTIPLY IS GIVEN.
dectmal places and the [E "fix" key

PROBLEM: WHAT IS THE DECIMAL EQUIVALENT OF $3 / 8$ ?
KEYSTROKES DISPLAY

3 ENTER
$8 \div$

### 0.38

Is this correct? Shouldn't it be 0.375?
When we set the calculator by striking $E 2$, we told it to round to two decimal places.

## * * * * DO NOT CLEAR****

Try this:
KEYSTROKES DISPLAY
f $3 \quad 0.375$

| f | 0.38 |
| :--- | :--- |

Try another one:
KEYSTROKES DISPLAY
39.76332 ENTER 39.76
$\mathrm{f} 3 \quad 39.763$
f 4 39.7633
f 6
39.763320
f 2
39.76
f 1
39.8
$\mathrm{f} \quad 0$
40.

Nore: No matter how your display is set, internally the HP figures to 10 decimal places in all functions EXCEPT amortization.

PROBLEM: What is $36 \%$ of $\$ 832.50$ ?

| KEYSTROKES | DISPLAY |  |
| :--- | :--- | :--- |
| 832.50 ENTER |  |  |
| 36 | $\because$ | 299.70 |

PROBLEM: What is the tax, and what is the total purchase price of an item which costs $\$ 179.75$ with $4 \%$ sales tax?

| KEYSTROKES | DISPLAY |  |  |
| :--- | :--- | ---: | :--- |
| 179.75 ENTER |  |  |  |
| 4 | $\%$ | (tax amount) |  |
| $+\quad$ |  | 186.94 | (total price) |


If this was an interest only loan, what would the monthly
payment be if the interest rate is ll\%?

| 11 | 4224.00 | (Annual interest) |  |
| :--- | :--- | :--- | :--- |
| 12 | $\div$ | 352.00 | (Monthly payment) |

```
STO \& RCL \& THE DATA STORAGE REGISTERS
```

The HP has storage capacity for data in registers "under" the numbers 0-9 and .0-.9. These registers are referred to as R0, Rl, R2, R3, etc. Information stored in these registers intact even when the calculator is turned off ( f CLX clears all storage registers).

STORE OUR PHONE NUMBER IN STORAGE REGISTER 9

KEYSTROKES
5174848234
STO 9

NOW SAVE YOUR OWN PHONE NUMBER IN R $\square$ :

KEYSTROKES
(YOUR AREA CODE AND NUMBER)
STO $\cdot \cdot 9$

TO RECALL STORED NUMBERS:

KEYSTROKES
DISPLAY

| RCL 9 | $5,174,848,234$. |  |
| :--- | :--- | ---: |
| RCL | $\cdot$ | (YOUR NUMBER) |

## THE FINANCIAL REGISTERS AND FUNCTIONS

REMEMBER: The gold "f" key selects gold functions The blue "g" key selects blue functions


AMORT
12 x
i

INT
$12 \div$

PV

NPV

CFo

PMT

RND
CF j


IRR
Nj

CHS

NUMBER of periods.
Stores or computes number of periods.
Amortization function. Discussed later.
Automatically multiplies number in $X-r e g i s t e r$ by 12 and stores it in the $n$ register.

Periodic INTEREST rate.
Stores or computes interest rate or yield.
Computes simple interest.
Automatically divides number in $X-r e g i s t e r$ by 12 and stores it in the $i$ register.
$\frac{\text { PRESENT VALUE }}{\text { Value at the beginning of a period. }}$ Stores or computes value or loan balance.

Net Present Value. Present value of an uneven future cash flow.

Cash Flow zero.
Cash flow (investment) at the beginning of a period. Used in IRR and NPV.

## PAYMENT

Stores or computes a periodic payment amount made or received.

Rounds.
Periodic cash flows. Used in IRR and NPV.

FUTURE VALUE
Stores or computes ending value of a cash flow or investment, i.e., future value of an investment, balance of loan, balloon amt.

Internal Rate of Return.
Number of equal cash flows. Used in IRR and NPV.

Changes sign from positive to negative and negative to positive.

## "STEPPING ON" ENTRIES

When a number is keyed into one of the financial registers (n, i, PV, PMT, FV), it "steps on" or replaces any previous entry. Therefore, it is not normally necessary to clear the financial registers between calculations.

Any information incorrectly entered into the financial registers may be corrected by simply entering the correct number, thereby "stepping on", or replacing the incorrect number.

## RCL \& THE FINANCIAL REGISTERS

Any number stored or entered into a financial
 striking RCL and the desired register, i.e. to view the payment amount, strike: RCD PMT

ZERO OUT UNUSED REGISTERS
Any leftover data in a financial register from a previous calculation will affect the current calculation. No need to clear entire calculator; simply enter zero into the unused register.

CONVERTING ENTRIES FROM ANNUAL TO MONTHLY
Periods can be converted from years to months by prefixing the $n$ entry with the blue $g$ key.

Interest rates can be converted from annual to monthly by prefixing the $i$ entry with the blue $g$ key.

## ERROR MESSAGES

If you receive an ERROR message in your display, clear the ERROR out of the display by striking the CLx key once, before attempting to proceed with the calculation. Consult pages 202-205 in your HP Owners Handbook to determine the nature of the error.

## THE THREE QUESTIONS

1

Must be expressed in calculator language.
$n \quad$ What is the number of periods?
i What is the interest per period?
PV What is the present value?
PMT What is the payment amount per period?
FV What is the future value?
The "question" is the last keystroke in any calculation. Enter all known data into the financial registers, then strike the final "question" key. The X-register (display) will show the word "running" as the calculator computes the answer.

WHAT IS THE PERIOD?
A period $=$ the shortest length of time between occurrences. UNITY OF PERIOD: Periods of $n \& i$ i.e., if period ( $n$ ) is expressed as monthly, interest (i) must also be expressed as monthly.

IS THE NUMBER POSITIVE OR NEGATIVE?
Ask: Do I receive this money?
$\left.\begin{array}{l}\text { Is this a positive cash flow? } \\ \text { Is this money INTO MY POCKET? }\end{array}\right\}$ POSITIVE ENTRY
Or: Do I pay out this money?
$\left.\begin{array}{l}\text { Is this a negative cash flow? } \\ \text { Is this money OUT OF POCKET? }\end{array}\right\}$ NEGATIVE ENTRY

PLEASE NOTE: To avoid confusion, NEGATIVE NUMBERS WILL BE INDICATED WITH < BRACKETS > rather than a minus sign.

## SOLVING FOR FUTURE VALUE "FV : VALUE OF AN IMVESTMENT

GIVEN:

HOUSE VALUE EST. INCREASE IN VALUE (ANNUAL) HOLDING PERIOD

182,500
6 \%
5 YEARS

What is the projected value at end of year five?
KEYSTROKES DISPLAY
$5 \quad \mathrm{n}$
6
i
$182,500 \mathrm{CHS} \mathrm{PV}$
0
PMT
FV
244,226.17 (value end of year 5)

GIVEN: HOUSE VALUE IN 1930
8,800
SOLD IN 1940 FOR
14,250

What is the percent of value increase annually?

KEYSTROKES DISPLAY
10 n
8800 CHS PV
0
PMT
$14250 \quad \mathrm{FV}$
i

SOLVING FOR PAYMENT: CHANGING THE PERIOD

GIVEN: MORTGAGE AMOUNT $\$ 50,000$
INTEREST RATE
12\%
AMORTIZATION 30 YEARS
I. What is the ANNUAL payment?
II. What is the SEMI-ANNUAL payment?
III. What is the QUARTERLY payment?
IV. What is the MONTHLY payment?

I. f CLX

30 n
12 i
50000 PV
0 FV
PMT
$\langle 6,207.18\rangle$

II . 30 ENTER
2 x
60.00

12 ENTER
$2 \div \div$

PMT
<3,093.79>
III. 30 ENTER
$4 x \mathrm{x}$

12 ENTER
$4 \div \div$
PMT
$\langle 1,544.50\rangle$
IV. $30 \quad \mathrm{~g}, \mathrm{n}$

12 g i
PMT

$$
360.00
$$

1.00
<514.31>

| COMMENTS | n | i | PV | PMT | FV |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## SOLVING FOR PAYMENT: CHANGING THE INTEREST RATE

GIVEN: MORTGAGE AMOUNT: $\$ 112,600$

| INTEREST RATE: | $137 / 8 \%$ (must convert this |
| :--- | :--- |
| AMORTIZATION: | 25 YEARS to decimal value) |

I. What is the monthly payment?
II. What is the monthly payment if INTEREST RATE IS 12.5\%?
III. What is the monthly payment if INTEREST RATE IS ll\%?

KEYSTROKES
DISPLAY
I. $25 \mathrm{~g}, \mathrm{n}$

7 ENTER $8 \div 0.88$
$\mathrm{f} 4 \quad 0.875$
f 2
0.88
$13 \quad+$
13.88
g i
1.16

112600 PV
0
FV
PMT
$\langle 1,344,67\rangle$
II. 12.5 g i

PMT
<1,227.74〉
III. 11 $\square$ i

PMT
<1,103.61>

| COMMENTS | n | i | PV | PMT | FV |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

© 1985

## SOLVING FOR $n$ : HOW MANY PAYMENTS REMAINING?

SOLVING FOR FV : AMOUNT OF FINAL PAYMENT?

GIVEN: MORTGAGE BALANCE 73,850
ANNUAL INTEREST RATE 12 1/2\%
MONTHLY PAYMENT 849.00
I. How many payments remaining?
II. How many payments remaining if the payment is increased to 900.00 per month?
III. How many payments remaining if the annual interest rate is reduced to llo?
IV. How much is the final payment amount?

KEYSTROKES DISPLAY
I. $12.5 \mathrm{~g}, \mathrm{i}$

73850 PV
849 CHS PMT
$0 \quad \mathrm{FV}$
n
229.00
II. 900 CHS PMT
n
187.00
III. $11 \mathrm{~g}, \mathrm{i}$
n
153.00
IV.

105.58

<794.42>

| COMMENTS | n | i | PV | PMT | FV |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

© 1985

## SOLVING FOR in: ANNUAL INTEREST RATE INVESTORS YIELD

I. GIVEN: MORTGAGE BALANCE

MONTHLY PAYMENT
REMAINING AMORTIZATION

87,213.13
914.81

14 YEARS

WHAT IS THE ANNUAL INTEREST RATE?

KEYSTROKES DISPLAY
14 g
87213.13 PV
914.81 CHS PMT
$0 \quad \mathrm{FV}$

| i | 0.75 | (monthly interest rate) |  |
| :--- | :--- | :--- | :--- |
| 12 | x | $\mathbf{9 . 0 0}$ | (annual interest rate) |

II. GIVEN: You, as an investor, have paid $\$ 8993.00$ for a discounted mortgage which brings you payments of $\$ 133.00$ monthly for 5 years and a $\$ 10,000$ balloon at the end of year 5 .

WHAT IS YOUR YIELD (annual interest rate)?

KEYSTROKES DISPLAY
5
g n
8993 CHS PV
133 PMT
10000 FV
i
1.59
(monthly interest rate or yield)
12 x
19.10 (annual interest rate or yield)

| COMMENTS | n | PV | PMT |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## SOLVING FOR FUTURE VALUE FVU: BALLOONS

GIVEN: MORTGAGE AMOUNT: 50,000
ANN. INT. RATE: $13 \%$
AMORTIZATION: 20 YEARS
I. Determine the monthly payment.
II. What is the balloon at end of year l0?
III. What is the balloon EOY 7?

KEYSTROKES
DISPLAY
I. F CLX

50000 PV
13 g i
20 g n
$0 \quad \mathrm{FV}$
PMT
<585.79>
II. $10 \quad \mathrm{~g} \quad \mathrm{n}$

FV
$\langle 39,232,80\rangle \quad(b a l l o o n$ EOY 10)
III. 7 g FV
<44,004.16>
(balloon EOY 7, after $84 t h$ payment is made)


SOLVING FOR PRESENT VALUE PV : Buying a Discounted Mortgage

GIVEN: MORTGAGE BALANCE 49,267.27 ANN. INT. RATE $103 / 4 \%$ MONTHLY PAYMENT 492.47
I. Determine number of payments remaining.
II. How much would an investor pay for this income stream if they required a l5\% return on their investment?
III. What is the value with a $20 \%$ required yield?
IV. What is the value of the above with 20 \% yield to the investor if the mortgage balloons after 60 payments?

KEYSTROKES
DISPLAY
I.
f CLX
49267.27 CHS PV
10.75 g i
$492.47 \quad \mathrm{PMT}$
$0 \quad \mathrm{FV}$

## n

254.00
II. $15 \quad \mathrm{~g} ~ \mathrm{i}$

PV
<37,718.29>
III. 20 g

PV
<29,104.42>
IV. 60 n
10.75 g i
49.267 .27 CHS PV

FV
45,229.44
20 g i
PV
<35,364.75>

| COMMENTS | n | i | PV | PMT | FV |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

© 1985

## AMORTIZATION: INTEREST, PRINCIPAL, BALANCE

| GIVEN: | MORTGAGE AMOUNT | 66,800 |
| :--- | :--- | :--- |
|  | ANNUAL INTEREST | $12 \%$ |
|  | MONTHLY PAYMENT | 735.50 |

COMPUTE: Interest, principal and loan balance for: EOM 1 EOM 2 EOM 3 Loan balance: EOY 1 EOY 2


| COMMENTS | n | i | PV | PMT |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## CALCULATING PAYMENTS FOR ADJUSTABLE LOANS: (AML; ARM)

```
GIVEN: MORTGAGE AMOUNT: $ 73,300
    BEGINNING INTEREST RATE: 9 3/4 %
    AMORTIZATION: 30 YEARS
    CAP: 2 % PER YEAR
    MAXIMUM CAP: 5 %
```

I. What is the monthly payment year one?
II. Project the monthly payment year two.
III. Project the monthly payment year three.

| KEYSTROKES | DISPLAY |
| :--- | ---: |
| $30 \boxed{\mathrm{~g}} \mathrm{n}$ | 360.00 |
| $9.75 \mathrm{~g}) \mathrm{i}$ | 0.81 |
| 73300 PV |  |

$0 \quad \mathrm{FV}$
PMT
<629.76>
II. 12 f
(ignore result)
$29 \mathrm{~g}, \mathrm{n}$
11.75 g i
PMT
III. 12 f n
(ignore result)
$2 8 \longdiv { \mathrm { g } }$
336.00
$13.75 \quad \mathrm{~g}$ i
PMT
<849.85>
RCL PV
348.00
0.98

$$
\langle 738.39\rangle
$$

| COMMENTS | n | PV | PMT |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

© 1985

## IRR: INTERNAL RATE OF RETURN

GIVEN: AN INVESTMENT OF $\$ 36,000$ WHICH BRINGS THE FOLLOWING UNEVEN CASH FLOW:

| EOY | 1 | 6,000 |
| :--- | :--- | :--- |
| EOY | 2 | 7,200 |
| EOY | 3 | 6,500 |
| EOY | 4 | 8,000 |
| EOY | 5 | 8,000 |
| EOY | 6 | $6,000+38,220$ |

I. What is the IRR?
II. What is the IRR if cash flow in year one is $\$ 0.00$ ?
III. What is the IRR if cash flow in year one was <1200.00>?
IV. What is the IRR if the initial investment was $\$ 29,000$ ?

## COMPLETE T-BAR

| n |  |
| :--- | :--- |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 6 |  |
|  |  |
|  |  |


| COMMENTS | n | i | PV | PMT | FV |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |



## NET PRESENT VALUE

| GIVEN: | LOAN TERM: | 15 years |
| :--- | :--- | :--- |
|  | ANNUAL INTEREST | $14 \%$ |
|  | MONTHLY PAYMENT | 656.00 per month 12 years |
|  |  | 790.00 per month for remainder. |

What is the value of this income stream to an investor today?

KEYSTROKES
DISPLAY

| CLx |  |
| :---: | :---: |
| 14 g i |  |
| 656 C CFj |  |
| 72 g Nj |  |
| $\mathrm{X} / \mathrm{Y}$ CFj |  |
| $\mathrm{X} / \mathrm{Y} \mathrm{g} \mathrm{Nj}$ |  |
| 790 Cr CFj |  |
| $36 \quad 9 \mathrm{Nj}$ |  |
| E NPV | 49,996.67 |
| TRY THIS: |  |
| RCL n | 3.00 |
| RCL 1 | 656.00 |
| RCL 2 | 656.00 |
| RCL 3 | 790.00 |
| 1 n |  |
| RCL g Nj | 72.00 |
| 2 n |  |
| RCL g Nj | 72.00 |
| 3 n |  |
| RCL g Nj | 36.00 |

## LENDER'S YIELD ON MORTGAGE WITH POINTS

GIVEN: A $\$ 69,000$ loan amortized over 20 years at $15 \%$ annual interest, a balloon in seven years and 4 points charged to the borrower at closing.
I. Determine the monthly payment.
II. Determine the balloon payment amount.
III. Determine the amount of the loan with points included. IV. WHAT IS THE LENDER'S YIELD?

KEYSTROKES
DISPLAY
I.

69000 CHS ENTER
$4 \%$ STO 4 $X / Y$ (loan amount)

## PV

15 g i
20 g n PMT
II. $7 \mathrm{~g}, \mathrm{n}$
III.


RCL 4




| GIVEN: | Sale Price |
| :--- | :--- |
| Down Payment | 40,000 |
| Ann Int Rate | 10,000 |
| Monthly Pmt | 330.00 |
| Balloon | EOY 7 |

Underlying Assumable:
Mort Bal
Ann Int
Monthly Pmt
Mon $172 \%$
150.00

KEYSTROKES
DISPLAY
WRAP LOAN
$7 \mathrm{~g}, \mathrm{n}$
$11 \boxed{\mathrm{~g}}$
30000 CHS PV
STO 7
330 PMT
STO 8
$\mathrm{FV} \mathrm{FV} \quad 23,086.78$

STO 9

| UNDERLYING | 7.5 g |
| :--- | :--- |


|  | FV | <12,523.65> |
| :---: | :---: | :---: |
| EQUITY | RCL 9 | 23,086.78 |
|  | $+\mathrm{FV}$ | 10,563.13 |
|  | RCL 8 | 330.00 |
|  | RCL PMT | <150.00> |
|  | + PV | 180.00 |
|  | RCL 7 | <30,000.00> |
|  | RCL PV | 17,200.00 |
|  | PV | <12,800.00> |
|  | i | 1.29 |
|  | 12 x | 15.48 |


| COMMENTS | n | i | PV | PMT | FV |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## BLENDED INTEREST RATE LOAN

| GIVEN: | Sale Price | 62,500 | Underlying (old) Loan: |
| :--- | :---: | :---: | :---: |
| Down Payment | 12,500 | Mort Bal | 31,250 |
| Balloon | EOY 7 | Ann Int | $101 / 4 \%$ |
| Yield on added | $14 \%$ | Monthly Pmt 331.72 |  |
| Amortize added | 20 yrs |  |  |

I. What is the "Blended Rate"? (round up to nearest $1 / 4 \%$ )

|  | KEYSTROKES | DISPLAY |
| :---: | :---: | :---: |
| ADDED MONEY | 20 g |  |
|  | 14 g i |  |
|  | 18,750 CHS PV |  |
|  | 0 FV |  |
|  | PMT STO 2 | 233.16 |
|  | $7 \mathrm{~g}, \mathrm{n}$ |  |
|  | FV STO 3 | 16,712.75 |
| OLD LOAN | 10.25 g i |  |
|  | 31250 PV |  |
|  | 331.72 CHS PMT |  |
|  | FV | <23,337.79> |
| BLEND | CHS | 23,337.79 |
|  | RCL 3 | 16,712.75 |
|  | $\pm \mathrm{FV}$ | 40,050.54 |
|  | RCL PMT | <331.72> |
|  | CHS | 331.72 |
|  | RCL 2 | 233.14 |
|  | $\pm$ PMT | 564.88 |
|  | 50000 CHS PV |  |
|  | i | 0.98 |
|  | $1 2 \longdiv { x }$ | 11.71 |


|  | Beg.Bal. |  | Bal. EOY 7 |
| :--- | :---: | :---: | :---: |
| (PV) | (PMT) | (FV) |  |
| (Wrap/new) | $\langle 30,000\rangle$ | 330.00 |  |
| (Old) | 17,200 | $\langle 150.00\rangle$ |  |
| (Equity) | $\langle 12,800\rangle$ | 180.00 |  |


| COMMENTS | n | i | PV | PMT | FV |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## SOLVING FOR INTEREST ONLY LOAN PAYMENT:

## GIVEN: LOAN AMOUNT: INTEREST RATE: TERM:

 $47,900.00$ $123 / 4 \%$What is the monthly "interest only" payment?
KEYSTROKES DISPLAY

1 n
12.75 g i

47900 PV
CHS FV
PMT $\quad\langle 508.94\rangle$


```
SOLVING FOR PRESENT VALUE PV
                                    BEGIN/END
GIVEN: ANNUAL LEASE PAYMENT: 5,000.00
        DISCOUNT RATE: 10%
        TERM: }5\mathrm{ YEARS
    KEYSTROKES
    DISPLAY
    f CLX
    g BEG
5 n
10
5000 PMT
PV <20,849.33>
RESET YOUR CALCULATOR: g END
```

                                    DISCOUNTED LEASE
    | COMMENTS | n | i | PV | PMT |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

© 1985

## $1 / \mathrm{x}$ ONE DIVIDED BY X (RECIPROCALS)

GIVEN: Net Operating Income of 120,000 Debt Coverage Ratio: 1.15
I. What is the Margin of Safety? What is the maximum allowable Annual Debt Service?
II. What loan amount would this Annual Debt Service support at $12 \%, 25$ years, monthly payments?
III. What would the value be if Loan to Value Ratio is 75\%?

KEYSTROKES
DISPLAY
I. 120000 ENTER
$1.15 \quad 1 / \mathrm{x}$
x
$104,347.83$
II. $12 \quad \div$

CHS PMT
25 g
12 g i
0 FV
PV
$825,622.18$
III. . $75 \quad \div$
$1,100,829.58$

| COMMENTS | n | i | PV | PMT |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

```
PERCENT FUNCTIONS:
\begin{tabular}{|c|}
\hline\(\triangle 8\) \\
\hline\(\% \mathrm{~T}\) \\
\hline
\end{tabular}
PERCENT OF CHANGE
PERCENT OF TOTAL
```

GIVEN: NUMBER OF APARTMENT UNITS CONSTRUCTED IN:

$$
\begin{array}{ll}
1975: & 3,682 \\
1976: & 3,822 \\
1977: & 3,975 \\
1978: & 4,234
\end{array}
$$

What is the percent of change (increase) from year to year? KEYSTROKES DISPLAY

3682 ENTER
$3822 \Delta \Delta$
3.80

3822 ENTER
$3975 \triangle 8$
4.00

3975 ENTER
$4234 \triangle \triangle$

$$
6.52
$$

GIVEN: TOTAL GROSS RENTS: 63,760. VACANCY: 3,960.

What is the vacancy rate?
KEYSTROKES
DISPLAY
63760 ENTER
$3960 \quad \% \mathrm{~T}$ 6.21

## day and date function with prorations

I. Determine the number of days in 1985
II. Determine the number of days in 1984

KEYSTROKES DISPLAY
I.
f CLX
g 5

| 1.011985 | ENTER | 1.01 | (date rounded) |
| :--- | :--- | :---: | :---: |
| 1.011986 | 9 | $\triangle D Y S$ | 365.00 |
| 1.011984 | ENTER | 1.01 | (days in 1985) |
| 1.011985 | 9 | $\triangle D Y S$ | 366.00 |

GIVEN: Insurance policy cost $\$ 238.00$. Paid in advance on $6 / 1 / 84$. Closing date is $12 / 11 / 84$. Seller will assign this policy to purchaser.
I. How much will the purchaser owe to the seller at closing ?

KEYSTROKES DISPLAY
I. f CLX

238 ENTER
$365 \div$
0.65 (per diem)

STO 0
$12.111984 \quad 12.11$
$5.311985 \mathrm{~g} \triangle \mathrm{DYS} \quad 171.00$
RCL 0
X
111.50. (charge to purchaser)

## day and date punctions

I. Determine the day of the week for $1 / 2 / 86$
II. Determine the day of the week that you were born on

KEYSTROKES DISPLAY
I. f CLX

| 1.021986 ENTER | 1.02 | (date rounded) |
| :--- | :--- | :--- |
| $0 \boxed{g}$ DATE | $1,02,1986$ 4 | $(4$ th day/Thurs) |

II. (Input your birthday) Don't forget, days must be 2 digit.
0 DATE HAPPY BIRTHDAY!

Pavlik/Wilcox HP GRID

| COMMENTS | n | i | PV | $\mathrm{PM} T$ | FV |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

