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MODEL 81

HEWLETT-PACKARD

Quick Reference Guide

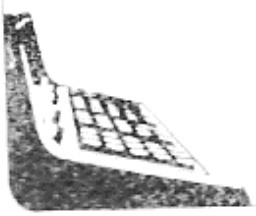
IMPORTANT

If you have just received your HP-81, please follow the instructions in Appendix A of the Operating Guide when switching the calculator ON.

For more information on each HP-81 operation, refer to the same chapter and topic in your Operating Guide.

MODEL 81

Quick Reference Guide



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BASIC INSTRUCTIONS 1

Arithmetic Operations

To solve simple arithmetic problems between two numbers:

1) Key in the **first number**, press SAVE↑
2) Key in the **second number**, press +, −, x, or ÷.

NOTE

Multiplication and division answers are printed and displayed, while addition and subtraction answers are only displayed to facilitate chain calculations. To print the current answer, press ◊.

To perform chain calculations, only the first number need be entered by pressing SAVE↑. Then each successive number can be keyed in and followed by the desired arithmetic operation.

Negative Numbers

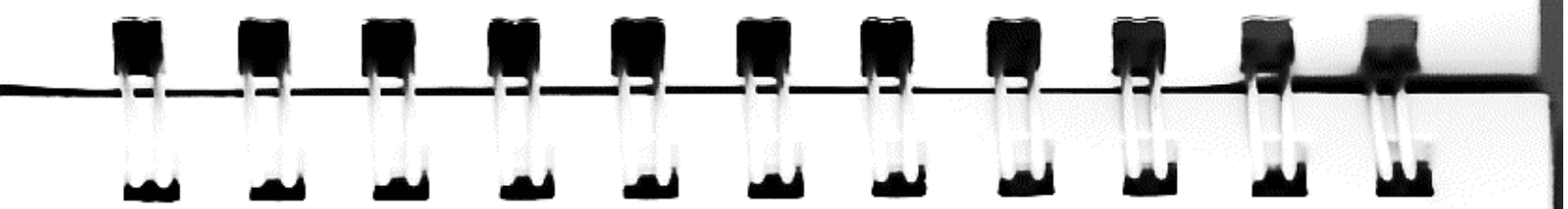
To enter a negative number, key in the **number** and press CHS
To change the sign of the current answer, press CHS.

Clearing

To erase the number just keyed in, press CE.
To erase almost everything except 'constant' storage, press CLEAR.
To erase everything, switch the HP-81 OFF and then ON.

The Key

Many HP-81 keys have an alternate function which is shown in green on the front-side of each key. To perform the alternate function, press the key before pressing the associated key; for example: y^x. Alternate functions are shown as in this Guide.



Storage Registers

The HP-81 has 20 storage registers, numbered from 0 through 19. Register 0 is *always* reserved for 'constant' storage, while all other registers are used by one or more calculator routines (see 'Storage Registers' in the Operating Guide).

For example, to store a number in registers 0 and 10, key in the number, press STO 0 and STO · 0.

To use the stored number in a problem, press RCL 0 or RCL · 0 instead of keying in the number.

To list the contents of all storage registers, press PRD.

Rounding

The HP-81 rounds numbers to two decimal places when switched ON.

To round-off printed (and displayed) numbers to another format, press [ ] followed by a numerical key between 0 and 6.

To print (and display) numbers in 'scientific notation', press [ ] followed by 7, 8, or 9.

NOTE

Round-off affects only the printer and display, *except* for payment, depreciation and amortized loan schedules, rebate calculations, and accumulated interest calculations. For those operations, each intermediate result is rounded according to the currently set format.

Automatic Decimal Point

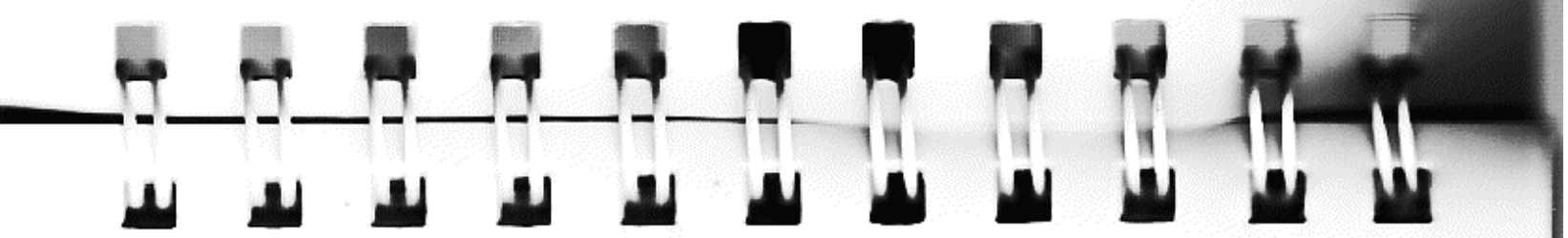
To have the calculator automatically enter a decimal point when you key in each number, leave the DECIMAL key up (on).

To switch off this automatic feature, switch the DECIMAL key down. Now decimal points must be entered manually.

Error Indication

An improper or illegal operation is indicated by a printed 'note' and a flashing display (if installed). A list of Error Notes is at the back of this booklet.

GENERAL FUNCTIONS 2



Constant Storage and Arithmetic

To store a number as a constant (K), key in the **number** and press STO 0.

To use the constant in a problem, press RCL 0 instead of keying in the number.

To multiply a number by the stored constant, key in the **number** and press [illegible] ×K.

To divide a number by the stored constant, key in the **number** and press [illegible] ÷K.

Percentage Calculations

To find the percentage amount of a number:

1) Key in the **base number**, press SAVE
2) Key in the **percentage** (as a %), press % 0.

To find the percentage difference between two numbers:

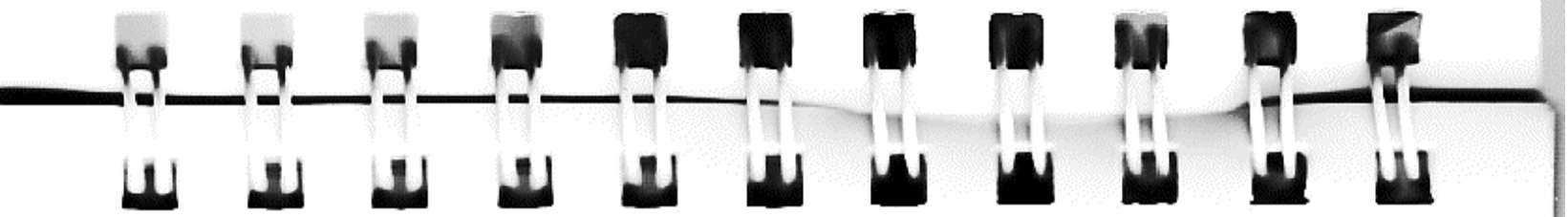
1) Key in the **base (reference) number**, press SAVE↑
2) Key in the **second number**, press Δ% ◊.

To add a series of numbers and find the percentage that each entry is of the total (up to 18 entries can be made):

1) Key in the **number of entries**, press n
2) Key in the **first entry**, press STO 1
3) Key in the **next entry**, press STO 2

(continue)

4) Key in the **tenth entry**, press STO · 0
5) Key in the **eleventh entry**, press STO · 1



6) After all entries are stored, press EXT () 9.

To find the net cost of an item:

1) Key in the **retail price**, press SAVE↑
2) Key in the **profit margin** (as a %), press % −.

To add a percentage amount to a number:

1) Key in the **base number**, press SAVE↑
2) Key in the **percentage** (as a %), press % +.

Exponentiation

1) Key in the positive **base number**, press SAVE↑
2) Key in the **power** (exponent), press Y^x.

Square Root

To find the square root of any positive number, key in the **number** and press [2nd] $\sqrt{x}$.

Logarithms

To find the common log ($\log_{10}$) of a number, key in the **base number** and press [2nd] LOG.

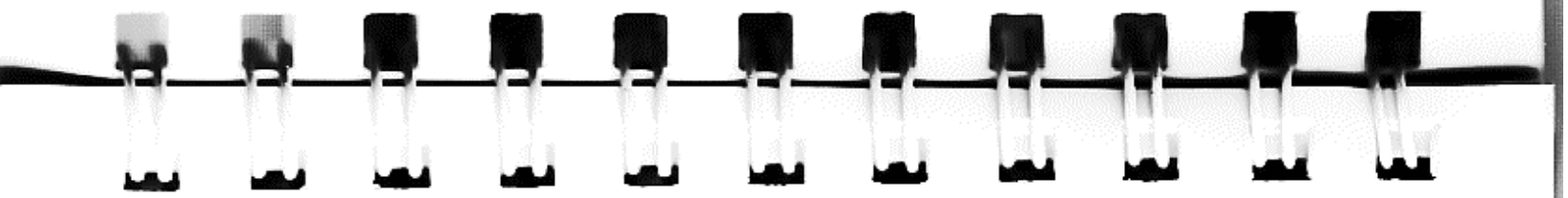
To find the antilog$_{10}$,

Press 10 SAVE↑ Key in the **$\log_{10}$ value**, press Y^x.

Calendar Functions

Date Entry Format

Enter dates in "month-day-year" sequence (i.e., mm.ddyyyy). For example, May 7, 1965 is entered as: 5.071965. Calendar range is from January 1, 1901 through December 31, 2099.



To find the number of days between two dates:

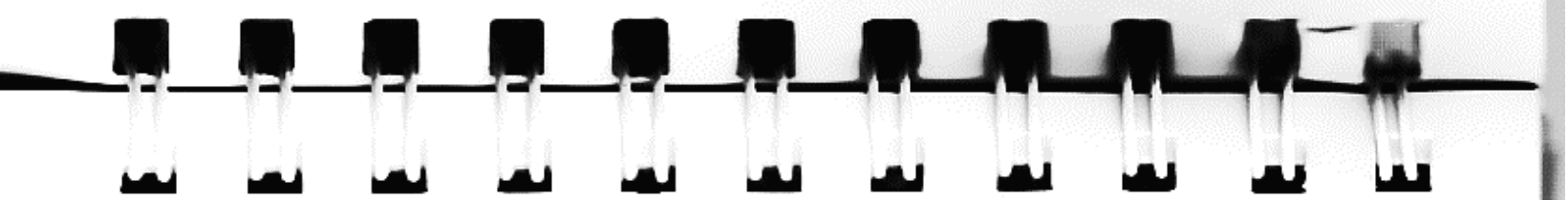
1) Specify *either* the 360-Day Mode by pressing [2nd] M() 6 *or* the 365-Day Mode by press [2nd] M() 7
2) Key in the **first date**, press SAVE↑
3) Key in the **second date**, press DAY.

To find the date and day of the week of a past or future date:

1) Specify *either* the 360-Day Mode by pressing [2nd] M() 6 *or* the 365-Day Mode by pressing [2nd] M() 7
2) Key in the **starting date**, press SAVE↑
3) Key in the **number of days between**, press [2nd] DAY.

The date is printed in 'month-day-year' format and the single-digit number printed indicates the day (1 = Monday, 2 = Tuesday, etc.).

INTEREST AND REBATE 3



NOTE

Press **CLEAR** before beginning each interest or rebate calculation.

Compounding Periods

To find the number of time periods for a compounded amount:

1) Key in **interest rate** per time period, press i
2) Key in **present value**, press PV
3) Key in **future value**, press FV, then press n

Interest Rate

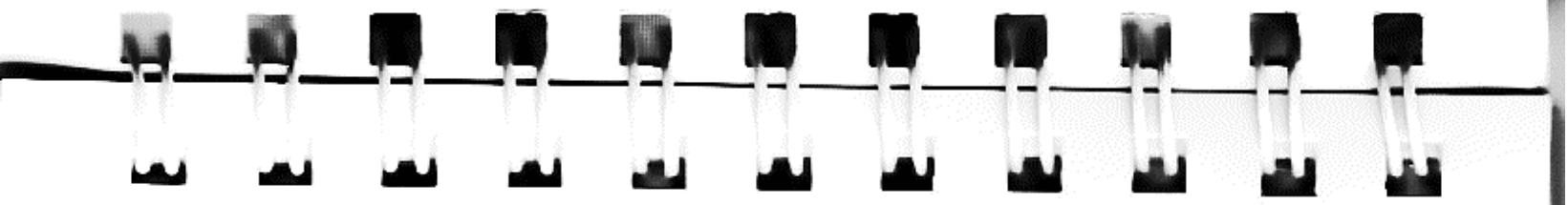
To find the interest rate per time period:

1) Key in **number of time periods**, press n
2) Key in **present value**, press PV
3) Key in **future value**, press FV; then press i.

Present Value

To find the present (principal) value of an investment:

1) Key in **number of time periods**, press n
2) Key in **interest rate** per time period (as a %), press i
3) Key in **future value** amount, press FV; then press PV.



Future Value

To find the future value of an investment:

1) Key in **number of time periods**, press n
2) Key in **interest rate** per time period (as a %), press i
3) Key in **present value** amount, press PV; then press FV.

Accrued Interest

To find the interest earned during a given time period:

1) Set the required days-per-year calculating mode (see page 62).
2) *Either* key in the **number of elapsed days** and press n *or* key in the **first date** and press SAVE↑ and then key in the **last date** and press DAY n
3) Key in the **annual interest rate**, press i
4) Key in the **payment amount**, press PV; then press INT.
5) To see the interest calculated using the alternate days-per-year mode, press RCL.

Accumulated Interest Paid Between Periods

To find the interest paid between two given payment dates and the remaining principal after the second date:

NOTE

The current rounding format will affect this routine.

1) Key in the **beginning payment number**, press STO 1
2) Key in the **last payment number**, press STO 2
3) Key in the **interest rate** per time period, press i
4) Key in the **payment amount** per period, press PMT
5) Key in the **present value** (principal), press PV; then press Σ+.

Effective Interest Rate

To find the interest rate (in %) per payment period:

1) Key in **total number of payments**, press n
2) Key in the **payment amount**, press PMT
3) Key in the **principal amount**, press PV; then press i.

To find the effective annual interest rate:

4) Key in **number of payments** per year, press X.

Effective Annual Rate Converted to Nominal Rate

To find the interest rate per period, given the effective annual rate:

1) Key in **number of payments** per year, press n
2) Key in the **annual interest rate**, press j then press EXT() Q

"Add-on" Rate Converted to Annual Rate

To find the annual interest rate, given the 'add-on' rate:

Method A:

1) Key in the **number of months** for the loan, press n
2) Key in the **'add-on' rate** (per annum), press i
3) Press i again.

(continued)

To find the monthly payment:

4) Press $x \rightleftarrows y$

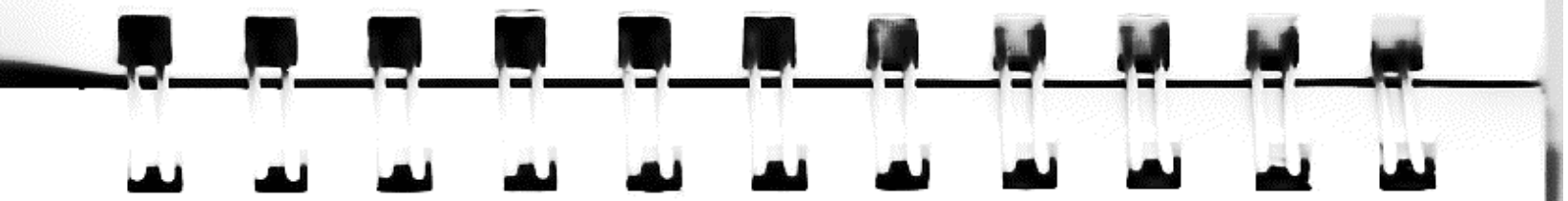
5) Key in the **principal amount**, press X.

Method B (using odd days):

1) *Either* key in **number of odd days** and press STO DAY *or* key in date of **first odd date** and press SAVE↑ and key in date of **last odd day** and press DAY

2) Key in **number of payments**, press n

3) Key in **add-on rate**, press i; then press EXT() 7.



Interest Rate When Loan Has a Balloon Payment

To find the periodic interest rate of a loan which has a final balloon payment (interest not paid on balloon amount):

1) Set **Bond Mode** by pressing M() 8

2) Set **Annual Coupon Mode** by pressing M() 2

3) Set **365-Days/Year Mode** by pressing M() 7

4) Key in **balloon payment amount** (not including regular payment), press FV

5) Key in **number of payments**, press SAVE↑ 365 X STO DAY

6) Key in **monthly payment amount**, press PMT

7) Key in **principal amount**, press PV; then press .

(continued)

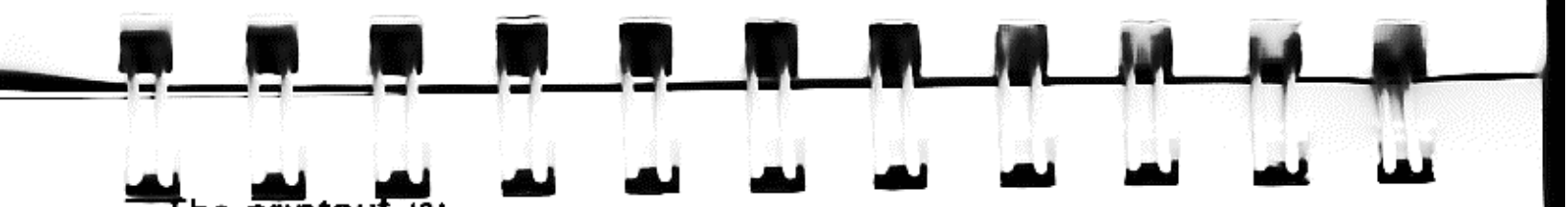
To find the annual interest rate:

8) Key in the **number of payments** per year, press X.

Interest Rebate (using rule of 78's)

To find the rebate and interest paid on the final payment of a premature loan settlement:

1) Key in **payment number at pay-off**, press STO 1
2) Key in total **number of payments**, press STO 2
3) Key in total **interest payable**, press PV ; then press SOD.



The printout is:

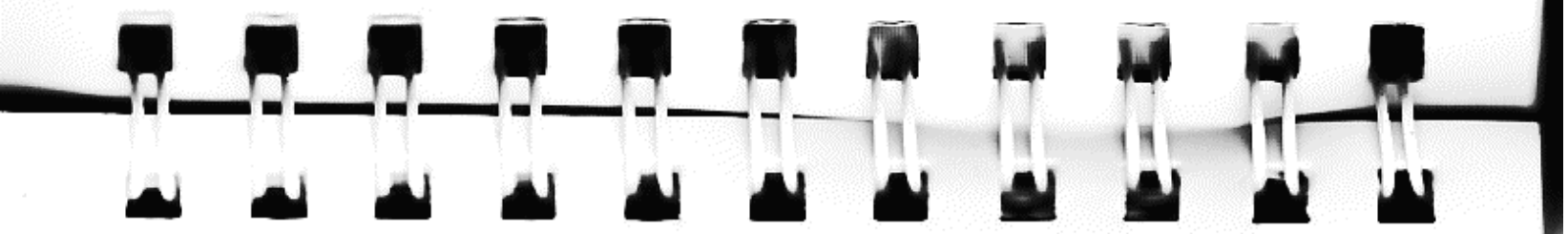
DEPR = interest paid on final payment
PV = amount of interest rebate

Interest Rebate and Loan Payoff (using rule of 78's)

To find the interest rebate and the pay-off amount for a premature loan settlement:

1) Key in the **payment number at payoff**, press STO 1
2) Key in the total **number of payments**, press STO 2
3) Key in the **payment amount**, press PMT
4) Key in the total **interest payable**, press PV
5) Key in the **principal amount**, press FV; then press EXT() 5.

ANNUITIES 4



Present Value of an Annuity

To find the principal value of a loan:

1) Key in total **number of payments**, press n
2) Key in **interest rate** per payment period, press i
3) Key in the **payment amount**, press PMT; then press PV.

Future Value of an Annuity

To find the amount of a sinking fund:

1) Key in the total **number of payments**, press n
2) Key in the **interest rate** per payment period, press i
3) Key in the **payment amount**, press PMT; then press FV.

Annuity Payment Amount

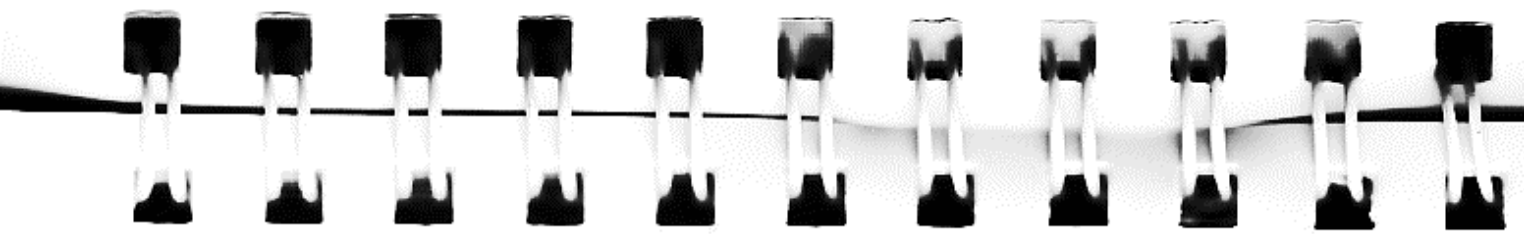
To find the payment amount for a loan:

1) Key in total **number of payments**, press n
2) Key in **interest rate** per payment period, press i
3) Key in **principal amount**, press PV ; then press PMT .

Payments Required for a Sinking Fund

To find the number of payments needed for a sinking fund:

1) Key in the **payment amount**, press PMT
2) Key in the **interest rate** per period, press i
3) Key in the **future value**, press FV ; then press n .



Payment Amount for a Sinking Fund

To find the payment amount needed for a sinking fund:

1) Key in the total **number of payments**, press n
2) Key in the **interest rate** per payment period, press i
3) Key in the **future value**, press FV; then press PMT.

Number of Payments Required

To find the number of payments required, given a present value:

1) Key in the **interest rate**, press i
2) Key in the **present value** press PV
3) Key in the **payment amount**, press PMT; then press n.

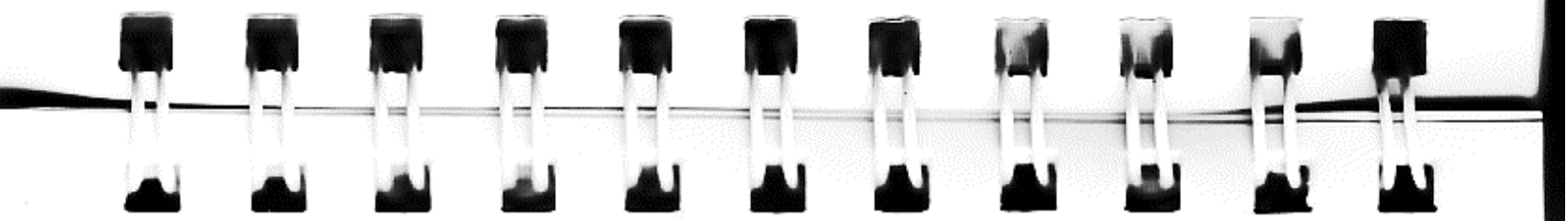
Required Interest Rate

A. To find the interest rate per payment period needed to reach a set future value:

1) Key in total **number of payments**, press n
2) Key in the **payment amount**, press PMT
3) Key in the **future value**, press FV ; then press i.

B. To find the interest rate required for a loan:

1) Key in the total **number of payments**, press n
2) Key in the **payment amount**, press PMT
3) Key in the **principal amount**, press PV ; then press i.



Amortized Loan Schedule

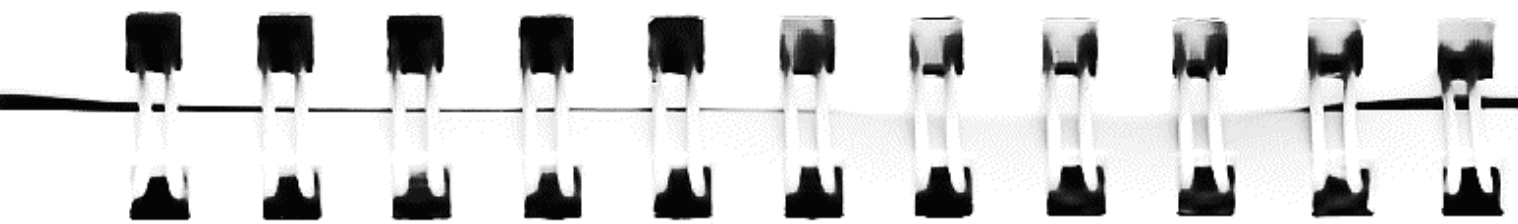
NOTE

The current rounding format will affect this routine.

To find the interest paid, principal paid, and remaining balance for any given payment periods:

1) Key in the **first payment number** in question, press STO 1
2) Key in the **last payment number** in question, press STO 2
3) Key in the **principal amount**, press PV
4) Key in the **interest rate** per payment period, press i
5) Key in the **payment amount**, press PMT ; then press EXT() 6.

DEPRECIATION 5



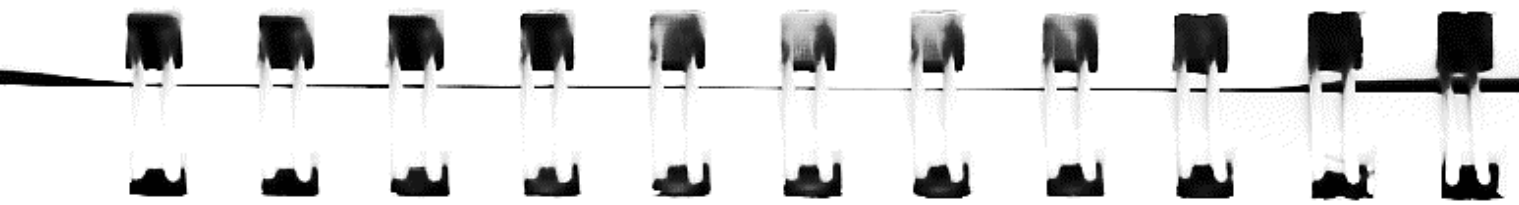
Straight Line Depreciation

1) Key in the **depreciable amount** (purchase less salvage value), press SAVE↑ SAVE↑
2) Key in the **asset life** in years, press ÷
3) To find the first year's remaining value, press STO 1 − ◊
4) Press RCL 1 − ◊ for each year's remaining value.

NOTE

The current rounding format will affect this routine.

1) Key in **first year number** of depreciation, press STO 1
2) Key in **expected life of asset** (in years), press STO 2
3) Key in **asset cost**, press SAVE↑
4) Key in **salvage value**, press −PV
5) To find the beginning year's depreciation and remaining depreciable value, press SOD
6) Repeat pressing SOD to see each successive year's depreciable amount and remaining depreciable value.



To find the depreciation and remaining value for any particular year:

7) Key in the **year number**, press STO 1 and press SOD
8) Repeat step 7 as needed.

Depreciation Schedules

NOTE

The current rounding format will affect this routine.

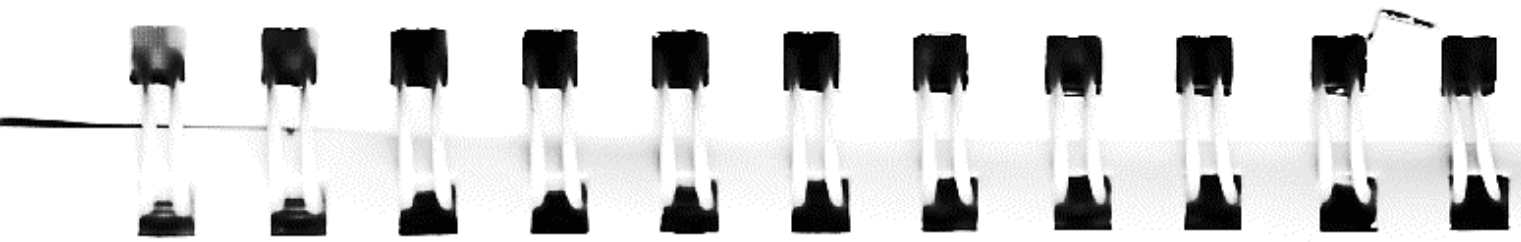
A. **Sum-of-the-Year's Digits Method:**

1) Key in the **first year number** of the schedule, press STO 1
2) Key in **life of asset** (in years), press STO 2
3) Key in **asset cost**, press SAVE↑
4) Key in **salvage value**, press − PV, then press EXT(4

B. Declining-Balance Method:

(a negligible salvage value is assumed)

1) Key in **first year number** of schedule, press STO 1
2) Key in **life of asset** (in years), press STO 2
3) Key in **asset cost**, press PV
4) Key in 'diminishing factor', press i; then press EXT() 2.



Depreciation to a Stated Salvage Value

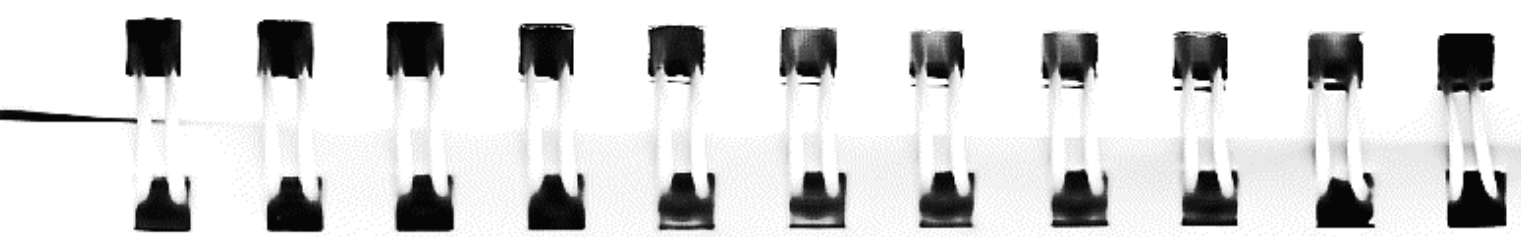
NOTE

The current rounding format will affect this routine.

To find the 'diminishing factor' and print the Declining-Balance Depreciation Schedule:

1) Key in the **first year number** of the schedule, press STO 1
2) Key in the **life of asset** (in years), press STO 2
3) Key in the **initial asset value**, press PV
4) Key in the **salvage value**, press FV; then press EXT() 3

INVESTMENT ANALYSIS 6



Discounted Cash Flow

To find the net gain or loss *beyond an expected yield* for a cash-flow investment:

1) **Press** CLEAR
2) Key in **expected yield** (in %) per period, press i
3) Key in **amount of original investment**, press CHS PV
4) Key in first **cash flow amount**, press Σ+
5) Repeat step 4 for each successive cash flow. The last number printed is the final net gain or loss.

Rate of Return for Uneven Cash Flow

To find the internal rate of return (yield, in %) of a series of cash flows:

1) Key in the **initial investment**, press CHS PV
2) Key in total **number of cash flows**, press n.

NOTE

A maximum of *nine* cash flow entries can be made. Each cash outlay must be entered as a negative number.

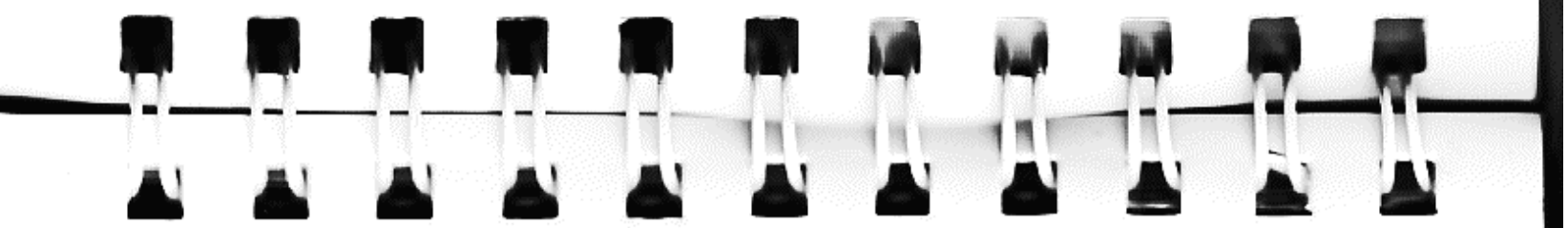
(continued)

3) Key in **first cash flow amount**, press STO 1
4) Key in **next cash flow amount**, press STO 2
5) Continue storing each successive cash flow in its corresponding storage register. The ninth (last) cash flow will be stored in register 9.
6) Press EXT() 1 to find the rate of return (the calculation may take up to two minutes).

Rate of Return for Even Cash Flow

To find the rate of return (yield, in %) of a series of equal periodic cash flows (any number of entries can be made):

1) Key in the total **number of cash flows**, press n
2) Key in the **amount of initial investment**, press PV
3) Key in the **cash flow amount**, press PMT
4) Press i to find the rate of return.



Mean and Standard Deviation

To find the arithmetic mean and standard deviation from a list of number entries:

1) **Press** CLEAR
2) Key in first **number**, press $\Sigma+$
3) Repeat step 2 for each number entry;
4) Press $\bar{x}$

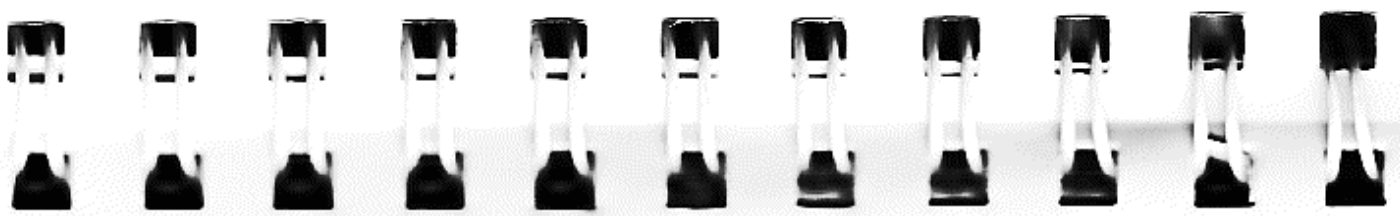
NOTE

To correct a wrong entry, key in the number again and press .

Trend Line Analysis

To calculate a linear regression using a series of equally spaced data points

1) **Press** CLEAR
2) Key in the first **data value**, press TL
3) Repeat step 2 for each data value to be entered.
4) Press TL to find the determination coefficient, slope, and Y-axis intercept point.



To find an unknown point on the trend line:

5) Key in the appropriate **time-period number** (X-value), press n
6) Press TL to print the predicted Y-value.

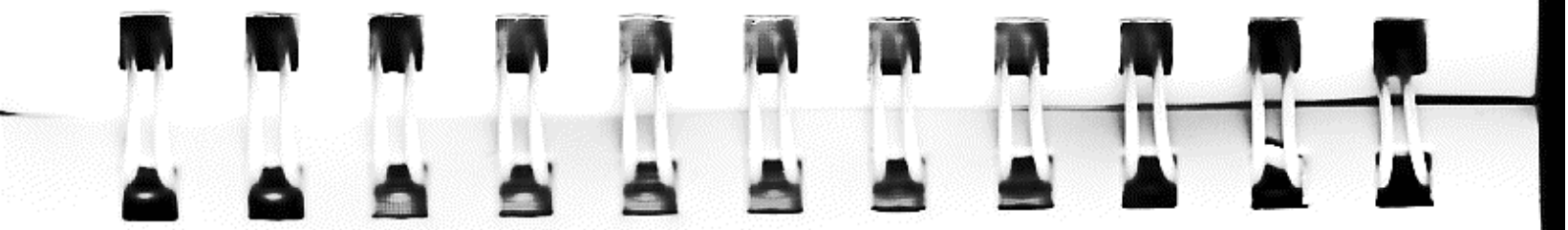
Expanded Trend Line

To calculate a linear regression using keyed-in X and Y values:

1) **Press** CLEAR
2) Key in first **X value** (first value cannot be 0), press STO TL. Key in corresponding **Y value**, press TL.
3) Repeat step 2 for each data pair.
4) Press [2nd] TL to print the determination coefficient, slope, and Y-axis intercept point.

To find an unknown point on the trend line:

5) Key in the corresponding **X value**, press n TL.



Log Trend Line

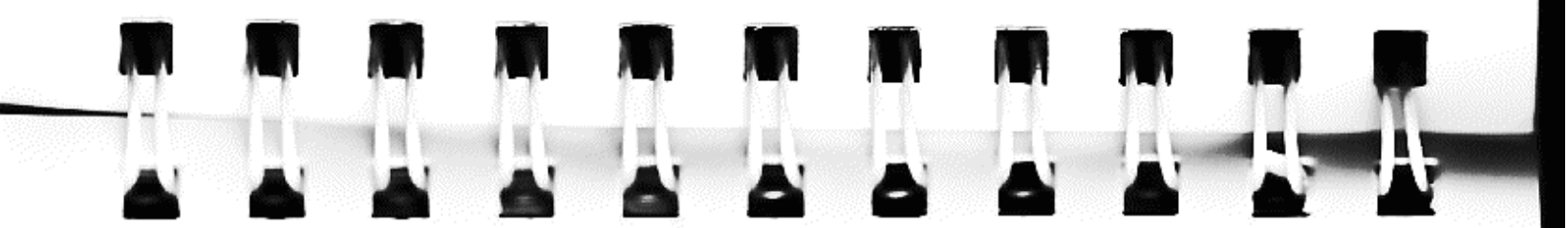
To calculate a logarithmic trend line, using either the Trend Line or Expanded Trend Line routines:

1) Find the log of each Y-value by keying in the value and pressing [2nd] LOG. *All Y_{log} values must be calculated before starting the trend line routine.*
2) Now use those Y_{log} values to perform either trend line routine.

To convert each result back to a natural number,

3) Press 10 SAVE↑
4) Key in the log result, press Y^x.

BONDS AND NOTES 8



DATE ENTRY FORMAT

Enter dates in 'month-day-year' sequence (i.e., mm.ddyyyy). For example, May 7, 1965 is entered as: 5.071965. Calendar range is from January 1, 1901 through December 21, 2099.

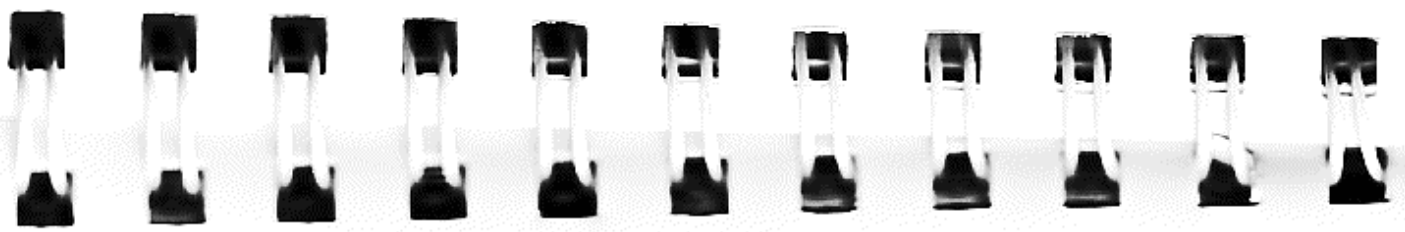
IMPORTANT

Press CLEAR before starting each Bond or Note calculation.

To verify the modes currently set, press .

Bond Price

1) See page 62 to set desired modes (Bond mode *must* be set).
2) Key in **settlement date**, press SAVE↑
3) Key in **maturity date**, press DAY
4) Key in **yield** to maturity (as a %), press i
5) Key in **coupon rate** (as a %), press PMT
6) To find the bond price, press BND.



Bond Yield-to-Maturity

1) See page 62 to set desired modes (Bond mode *must* be set).
2) Key in **settlement date**, press SAVE↑
3) Key in **maturity date**, press DAY
4) Key in **coupon rate** (as a %), press PMT
5) Key in **bond price**, press PV
6) To find the bond yield, press YTM.

Bond Price-to-Call

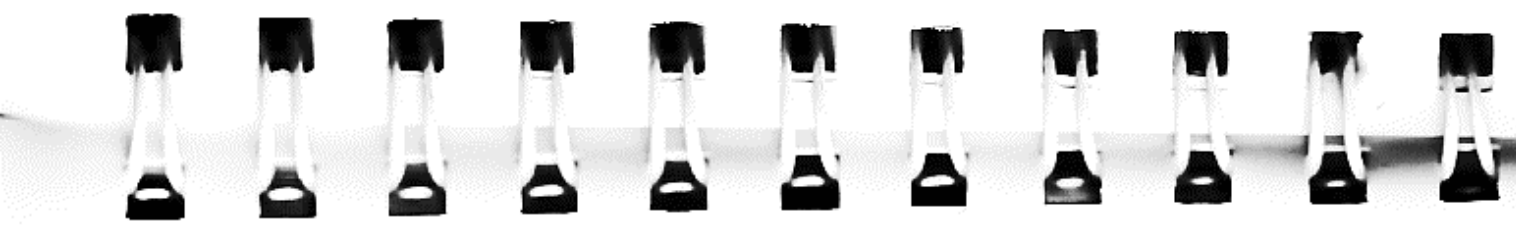
1) See page 62 to set desired modes (Bond mode *must* be set).
2) Key in the **settlement date**, press SAVE↑
3) Key in the **call date**, press DAY
4) Key in the **yield-to-call-rate** (as a %), press i
5) Key in the **coupon rate** (as a %), press PMT
6) Key in the **call price**, press FV
7) To find the price to call, press BND.

Bond Yield-to-Call Rate

1) See page 62 to set desired modes (Bond mode *must* be set).
2) Key in **settlement date**, press SAVE↑
3) Key in **call date**, press DAY
4) Key in **coupon rate** (as a %), press PMT
5) Key in **bond price**, press PV
6) Key in **price-to-call**, press FV
7) To find the yield-to-call rate, press YTM.

Note Price

1) See page 62 to set desired modes (Note mode *must* be set).
2) Key in **issue date**, press SAVE↑
3) Key in **maturity date**, press DAY and n
4) Key in **settlement date**, press SAVE↑
5) Key in **maturity date** again, press DAY
6) Key in **yield** to maturity (as a %), press i
7) Key in **interest rate** (as a %), press PMT
8) To find the price, press BND.



Note Yield Before Maturity

1) See page 62 to set desired modes (Note mode *must* be set).
2) Key in **issue date**, press SAVE↑
3) Key in **maturity date**, press DAY and n
4) Key in **settlement date**, press SAVE↑
5) Key in **maturity date** again, press DAY
6) Key in **interest rate** (as %), press PMT
7) Key in **settlement price**, press PV
8) To find the note yield, press YTM.

Discounted Note

To find the discount amount and effective annual yield of a note:

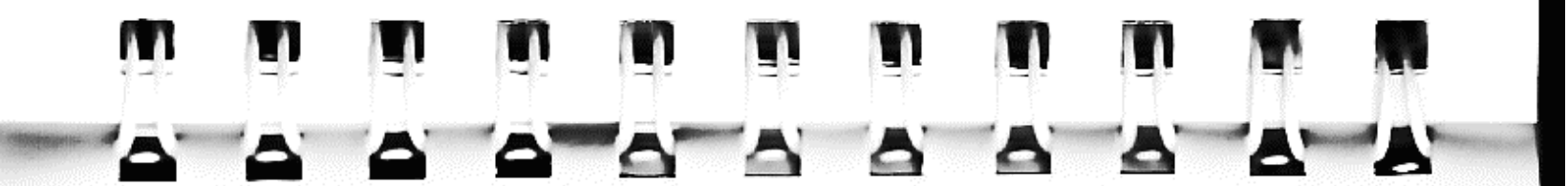
1) Set the desired days-per-year mode (see page 62).
2) Key in the **issue date**, press SAVE↑
3) Key in the **maturity date**, press DAY and n
4) Key in the **annual interest rate** (as a %), press i
5) Key in the note **face value**, press FV; then press INT.

Coupon-Equivalent Yield

To find the yield of a note, as if it were a bond selling at par with semi annual coupons:

1) Set the rounding format by pressing 4
2) Key in the **settlement date**, press SAVE↑
3) Key in the **maturity date**, press DAY
4) Key in the note **purchase price**, press PV
5) To find the note's coupon-equivalent yield, press EXT() 8.

MARKETING FUNCTIONS 9



Retail Price

To find the price of an item:

1) **Press** 1 SAVE↑
2) Key in the **profit margin** (as a decimal fraction), Press − STO 0
3) Key in **item cost**, press [redacted] K.
4) Repeat step 3 to find the cost of other items with the same profit margin.

Regular Discount

To find the discount amount and selling price of an item:

1) Key in original **price of item**, press SAVE↑
2) Key in **discount rate** (as a %), press % − ◊ .

Chain Discount

To find the selling price, based on a chain discount rate:

1) Key in the original **price of item**, press SAVE↑
2) Key in first **discount rate** (as a %), press % −
3) Repeat step 2 for each successive discount rate.
4) To print the discount selling price, press ◊.

Setting one of each pair of modes resets the other mode.

Press PRM to print a list of the modes currently set.

To set this mode:	Press:
Pre-tax*	M() 0
After-tax†	M() 1
Annual Coupon	M() 2
Semi Annual Coupon*	M() 3
30-Day Month	M() 4
Actual-Day Month*	M() 5
360-Day Year	M() 6
365-Day Year*	M() 7
Bond*	M() 8
Note	M() 9

*These modes are automatically set when the HP-81 is switched ON.

†When using the After-tax mode, the income tax rate must be stored in register 1 and the capital gains rate must be stored in register 2.

ERROR NOTES

When an error is encountered, the display (if installed) will blink continuously. Press either CE or CLEAR before correcting the error.

NOTE 1 Number beyond the range of the calculator.

NOTE 2 Insufficient or unusable data for these routines:

a. Compound Interest routines
b. Bond Yield to Maturity
c. Discounted Note
d. Accrued Interest

NOTE 3 DAY or DATE error:

a. outside the calendar range (January 1, 1901 - December 31, 2099)
b. an incorrect format
c. an improper 360 day/year calendar date

NOTE 4 Length of time-period error (with STO 1 and STO 2, where the period keyed in is less than one time-period.

NOTE 5 Math error:

a. division by zero
b. $\log_{10} X$ where X is less than or equal to zero.
c. Y^X where Y is less than or equal to zero
d. $\sqrt{X}$ where X is less than or equal to zero

NOTE 6 Cash Flow Analysis error:

a. positive initial investment
b. more than nine cash flow entries, or none at all
c. outlays mixed in with inflows
d. more than 100 individual calculations required

NOTE 7 Math error associated with Bond, Yield-to-Maturity, or Interest calculations.

NOTE 8 More than 19 entries for the Total and Percentage routine

NOTE 9 Horizontal trend line