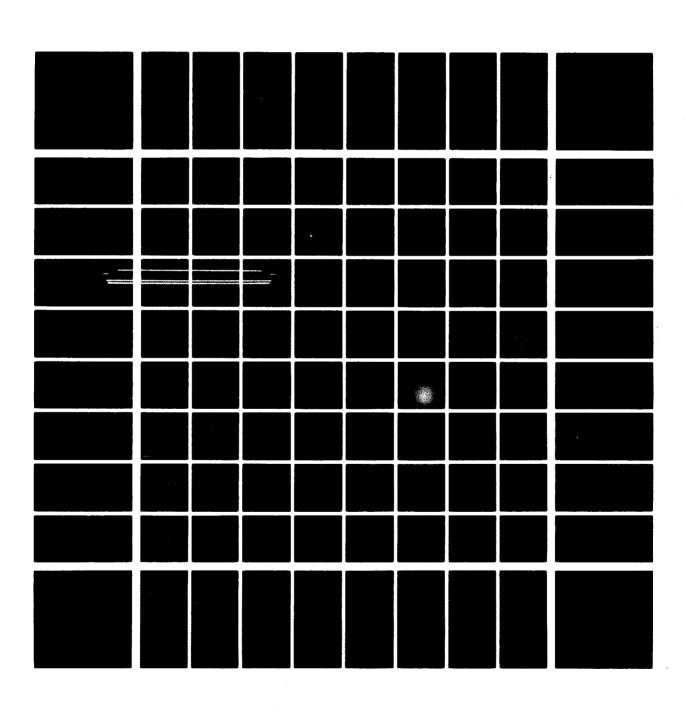
Includes har code for easy software entry

HEWLETT-PACKARD

HP-41

USERS' LIBRARY SOLUTIONS Lend/Lease/Savings



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INTRODUCTION

This HP-41C Solutions book was written to help you get the most from your calculator. The programs were chosen to provide useful calculations for many of the common problems encountered.

They will provide you with immediate capabilities in your everyday calculations and you will find them useful as guides to programming techniques for writing your own customized software. The comments on each program listing describe the approach used to reach the solution and help you follow the programmer's logic as you become and expert on your HP calculator.

KEYING A PROGRAM INTO THE HP-41C

There are several things that you should keep in mind while you are keying in programs from the program listings provided in this book. The output from the HP 82143A printer provides a convenient way of listing and an easily understood method of keying in programs without showing every keystroke. This type of output is what appears in this handbook. Once you understand the procedure for keying programs in from the printed listings, you will find this method simple and fast. Here is the procedure:

- 1. At the end of each program listing is a listing of status information required to properly execute that program. Included is the SIZE allocation required. Before you begin keying in the program, press XEQ ALPHA SIZE ALPHA and specify the allocation (three digits; e.g., 10 should be specified as 010).
 - Also included in the status information is the display format and status of flags important to the program. To ensure proper execution, check to see that the display status of the HP-41C is set as specified and check to see that all applicable flags are set or clear as specified.
- 2. Set the HP-41C to PRGM mode (press the PRGM key) and press GTO to prepare the calculator for the new program.
- 3. Begin keying in the program. Following is a list of hints that will help you when you key in your programs from the program listings in this handbook.
 - a. When you see " (quote marks) around a character or group of characters in the program listing, those characters are ALPHA. To key them in, simply press ALPHA, key in the characters, then press ALPHA again. So "SAMPLE" would be keyed in as ALPHA "SAMPLE" ALPHA.
 - b. The diamond in front of each LBL instruction is only a visual aid to help you locate labels in the program listings. When you key in a program, ignore the diamond.
 - c. The printer indication of divide sign is /. When you see / in the program listing, press 🛨 .
 - d. The printer indication of the multiply sign is \pm . When you see \pm in the program listing, press \times .
 - e. The H character in the program listing is an indication of the APPEND function. When you see H, press APPEND in ALPHA mode (press and the K key).
 - f. All operations requiring register addresses accept those addresses in these forms:

```
nn (a two-digit number)
IND nn (INDIRECT: , followed fy a two-digit number)
X, Y, Z, T, or L (a STACK address: followed by X, Y, Z, T, or L)
IND X, Y, Z, T or L (INDIRECT stack: followed by X, Y, Z, T, or L)
```

Indirect addresses are specified by pressing and then the indirect address. Stack addresses are specified by pressing followed by X, Y, Z, T, or L. Indirect stack addresses are specified by pressing and X, Y, Z, T, or L.

Display **Keystrokes Printer Listing** 01 LBLTSAMPLE LBL ALPHA SAMPLE ALPHA 01+LBL "SAM PIF" 02^TTHIS IS A ALPHA THIS IS A ALPHA 02 "THIS IS 03[™] ⊢ SAMPLE ALPHA APPEND SAMPLE 03 "HSAMPLE AVIEW ALPHA 04 AVIEW 05 6 **04 AVIEW** 6 ENTER+ 06 ENTER 1 **06 ENTER1** 2 CHS 07 - 2-2 08 / (÷) **09 ABS** XEQ ALPHA ABS ALPHA **09 ABS** 10 STO IND STO • L 10 STO IND L 11 "R3=" ALPHA R3= ARCL 03 11^TR3= 12 ARCL 03 12 ARCL 03 AVIEW AVIEW **14 RTN** ALPHA 13 AVIEW **14 RTN** RTN

			•
		,	

TABLE OF CONTENTS

1.	CONSTANT PAYMENT TO PRINCIPAL LOAN	1
2.	RULE OF 78'S	8
3•	AMORTIZATION SCHEDULE	13
4•	ADD-ON TO APR WITH ODD DAYS	21
*5•	SAVINGS PLAN	28
6.	INTEREST CONVERSIONS	37
7•	LEASE WITH ADDITIONAL PAYMENTS IN ADVANCE	+7
8.	SKIPPED PAYMENTS	54
9•	COMPOUNDING PERIODS DIFFERENT FROM PAYMENT PERIODS	50
10.	COMPOUND INTEREST SOLUTIONS	6 8

*Requires one memory module.

	1		

CONSTANT PAYMENT TO PRINCIPAL LOAN

This type of loan is structured such that the principal is repaid in equal installments with the interest added to each payment. Therefore, each periodic payment is different; it has a constant amount applied to the principal and a decreasing amount to the interest.

The first part of the program displays the payment number and calculates the payment to interest, total payment, remaining balance, and total interest. The constant payment to principal required as input data (CPMT) can be found by dividing the loan amount by the total number of payment periods. The schedule may be started at any desired payment period; that is, the value entered for K need not be 1.

The second part of the program calculates the accumulated interest between any two payments J and K. The necessary inputs are the periodic interest rate, constant payment, initial loan amount, and the numbers of the starting and ending payments in the time frame.

Equations:

$$BAL_{K} = PV - (K \times CPMT)$$

Kth payment to interest = (i) $(BAL_{K-1}) = (PMT_{i})_{K}$

Kth total payment = $CPMT + (PMT_{i})_{K}$

Total interest to payment $K = CPMT + (PMT_{i})_{K}$

$$\left[\frac{(2 - K) CPMT}{PV} + 2 \\ 2 \right] [(K - 1) (I/100) (PV)]$$

Example:

A twenty year 8% loan for \$100,000.00 is being amortized by annual payments to principal of \$5000.00 plus interest on the remaining balance. Generate a two year amortization schedule on this loan. How much interest is accumulated during years 5 to 10 inclusive?

Solution: (Keystrokes reflect a printer in the system)

10 [R/S]

Keystrokes: Display: [USER] (Set USER mode) [XEQ] [ALPHA] SIZE [ALPHA] 008 [XEQ] [ALPHA] CPMT [ALPHA] [A] **K?** 1 [R/S] INT? 8 [R/S] CPMT? 5000 [R/S] PV? 100000 [R/S] K=1.00PMT. I.=8,000.00 T. PMT.=13,000.00 BAL.=95,000.00 T. INT.=8,000.00 K=2.00PMT. I.=7,600.00 T. PMT.=12,600.00BAL.=90,000.00 T. INT.=15,600.00[R/S] [B]INT? 8 [R/S] CPMT? 5000 [R/S] PV? 100000 [R/S] B. PER. NO.? 5 [R/S] E. PER. NO.?

ACC. INT.=32,400.00

User Instructions

SIZE: 008 DISPLAY **FUNCTION INSTRUCTIONS** INPUT STEP Key in the program and set USER mode USER 1. [XEQ] CPMT 2. Initialize To generate an amortization schedule, press [A] 3. Input: first period of sched. (need not 4. INT ? [R/S] K be 1) periodic interest rate (%) INT [R/S] CPMT ? PV ? [R/S] CPMT constant payment to principal K = 1initial loan amount VP [R/S] [R/S]* PMT. I.=() Find: payment to interest T. PMT.=()[R/S]* total payment BAL.=(_)_ [R/S]* remaining balance T. INT.=()[R/S]*total interest K = (K+1)[R/S]*For the next period, press [R/S] 6. and go to step 5. To find the accumulated interest between 7. INT ? [B] any two points, press CPMT ? [R/S] Input: periodic interest rate (%) INT PV? [R/S] **CPMT** constant payment to principal B. PER. NO. ? PV[R/S] initial loan amount E. PER. NO. ? [R/S]J beginning period number ACC. INT.=() [R/S]K ending period number These steps need not be performed when there is a printer in the system.

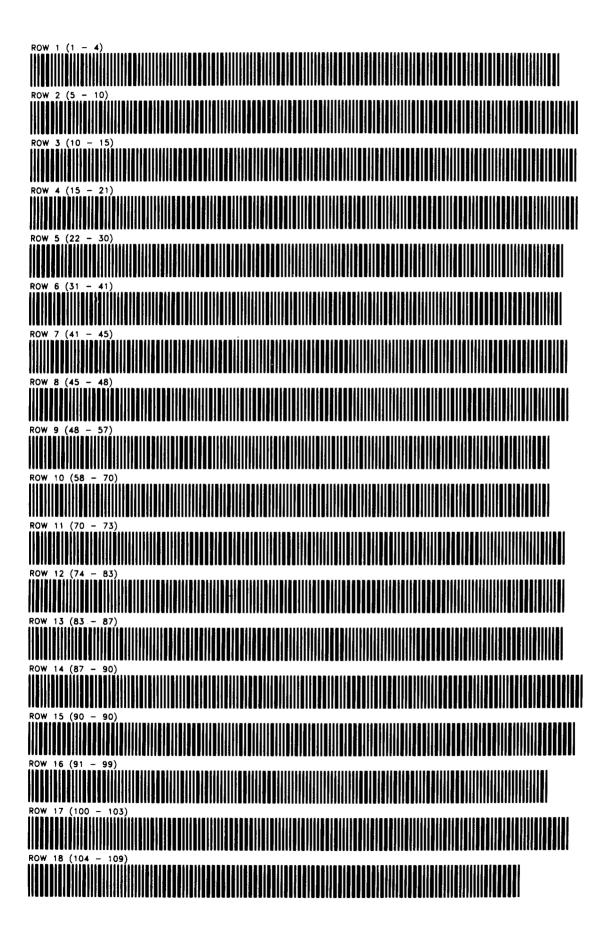
01+LBL "CPM		49 XEQ 09	
Т"		50+LBL 00	
02 STOP		51 2	
03+LBL A	İ	52 RCL 00	
04 CF 01	1	53 -	
05 "K ?"		54 RCL 02	
06 PROMPT	Prompt and		
	store data	55 *	
07 STO 00	Score data	56 RCL 03	
08+LBL 01		57 /	
09 SF 21		58 2	
10 "INT ?"		59 +	
11 PROMPT		60 2	
12 1 E2		61 /	
13 /		62 RCL 00	
14 STO 01		63 1	
15 "CPMT ?"		64 -	
16 PROMPT		65 *	
17 STO 02		66 RCL 01	
18 "PV ?"		67 *	
19 PROMPT		68 RCL 03	
20 STO 03		69 *	
21 FS? 01		70 FS? 01	
22 RTN		71 RTN	
23 RCL 00		72 "T. INT.	
24 "K"			
25 XEQ 89	0.1.	73 XEQ 09	
26+LBL E	Calc. Amort.	74 RCL 03	
27 RCL 03	sched.	75 RCL 02	loan paid off?
28 RCL 02		76 /	F
29 RCL 00	1	77 RCL 00	
30 *	1	78 X>Y?	
31 -	İ		
31 - 32 STO 04		79 RTN	
		80 ADV	
33 RCL 02		81 "K"	
34 +		82 XEQ 09	
35 RCL 01	1	83 GTO E	
36 *	1	84+LBL_B	Calc. Accumulated
37 STO 07		85 SF 01	interest
38 1		86 XEQ 01_	
39 ST+ 00		87 "B. PER.	
40 RCL 07		NO. ?"	
41 "PMT. I.		88 PROMPT	
9.5		89 STO 06	
42 XEQ 09		90 "E. PER.	
43 RCL 02		NO. ?"	
44 +		91 PROMPT	
45 "T. PMT.		92 1	
**		93 +	
46 XEQ 09	İ	94 STO 00	
47 RCL 04		95 XEQ 00	
48 "BAL."		96 STO 05	
L	1	70 310 00	

4

97 RCL 06 98 STO 00 99 XEQ 00 100 RCL 05 101 X<>Y		51	
102 - 103 "ACC. IN			
T." 104+LBL 09 105 "H=" 106 ARCL X 107 AVIEW 108 RTH 109 .END.	Display routine	60	
20		70	:
30		80	
40		90	
50		00	

REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DA	ATA REGISTERS				STA	TUS		
	K 1/100 CPMT PURBAL	50	ENG -		FIX -	7. REG 2 SCI GRA		USER MC)DE OFF
05	used J	55		NIT S/C			AGS		
	PMTi used		# S		SET I	NDICATES	,	CLEAR IND Calc.Amort. anual	Sched.
	useu			S	refer	to owner	's m	anual	<u>SCHEU.</u>
10		60					\rightarrow		
15		65					\longrightarrow		
				\Box			$\overline{}$		
20		70						i	
							-		
25		75							
							\rightarrow		
					<u> </u>				
30		80							
35		85		'				(
						ASSIGN			
40		90	FU	JNCT	TION	KEY	F	FUNCTION	KEY
							—		
45		95							<u> </u>
									
						+			+



RULE OF 78's

This program calculates the unearned interest (rebate) as well as the remaining principal due for a prepaid consumer loan using the rule of 78's.

Equations:

$$REB_{K} = (N - K) \frac{FC (N - K + 1)}{N (N + 1)}$$

$$BAL_{K} = (N - K) PMT - REBATE_{K}$$

Example:

A \$1,000 loan, with a total finance charge of \$180.00 is being paid at \$39.33 per month for 30 months. What is the unearned interest (rebate) and remaining balance after the 25th regular payment?

Solution:

Keystrokes:	Display:
[XEQ] [ALPHA] SIZE [ALPHA]	005
[XEQ] [ALPHA] RULE [ALPHA]	N ?
30 [R/S]	к ?
25 [R/S]	PMT ?
39.33 [R/S]	FC ?
180 [R/S]	REB =\$5.81
[R/S]	BAI=\$190.84

User Instructions

				SIZE: 005
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1.	Key in the program			
2.	Initialize		[XEQ] RULE	N ?
3.	Input: total no. of monthly payments	N	[R/S]	к ?
	no. of last payment made	K	[R/S]	PMT ?
	monthly payment amount	PMT	[R/S]	FC ?
	total finance charge	FC	[R/S]	
4.	Find unearned interest (rebate)			REB=()
	remaining balance		[R/S]	BAL=()
;				

Ø1+LBL "RUL		51		
E"		H +		
1		<u> </u>		
02 "N ?"	D			
03 PROMPT	Prompt and			
04 STO 00	store data	h		
05 "K ?"		┝──┤		
		<u> </u>		:
06 PROMPT				
07 STO 01				
08 "PMT ?"		<u> </u>		
09 PROMPT				
10 STO 02		60		
11 "FC ?"]]
12 PROMPT				
13 STO 03				
14 RCL 00				
15 RCL 01		<u> </u>		
16 -				
17 1		 		Į.
18 +		\vdash		
19 RCL 03	Calculate			
20 *		70		
	rebate			
21 RCL 00				
22 X12		 		
23 LASTX		\vdash	· · · · · · · · · · · · · · · · · · ·	
24 +			, 	
25 /			·	
26 RCL 00				
27 RCL 01				
28 -				
29 *				
30 STO 04		80		
31 "REB"				
	•			
32 XEQ 09		\vdash		
33 RCL 02	Calculate	\vdash		
34 RCL 00				
35 RCL 01	remaining			İ
36 -	balance			
37 *		 		
38 RCL 04				
39 -				
40 "BAL"		90		
41+LBL 09				1
42 "F=\$"	•		· · · · · · · · · · · · · · · · · · ·	
	Display routine	<u> </u>		
43 ARCL X				<u>[</u>
44 PROMPT		[
45 RTN				
46 .END.				1
TO . LITE.				ļ
		-		1
]
50		00]
	l		L	<u> </u>

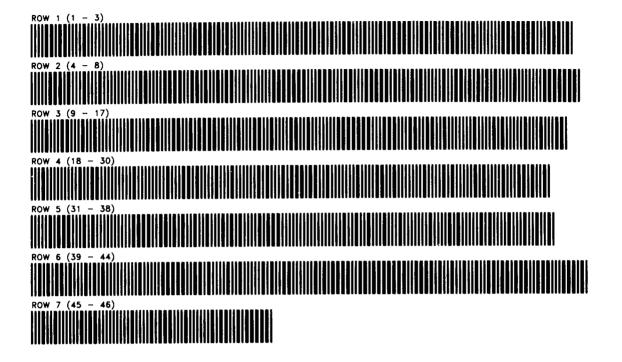
REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DA	TA REGISTERS	STATUS			
F	K PMT FC	50	SIZE SIZE OD5			
5	REB	55	FLAGS INIT # S/C SET INDICATES CLEAR INDICATES			
)		60				
		65				
		70				
		75				
		80				
		85				
+			ASSIGNMENTS			
		90	FUNCTION KEY FUNCTION KEY			
#		95				
<u> </u>						

RULE OF 78'S

PROGRAM REGISTERS NEEDED: 12

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AMORTIZATION SCHEDULE

This program finds both the total interest paid over a specified number of payment periods and the remaining balance at the end of the last specified period, given the periodic interest rate, periodic payment amount, loan amount, and the beginning and ending payment numbers for the time span being considered. The payments associated with both the beginning (J) and the ending (K) payment periods are included in the calculation.

The program can be used for loans with a balloon payment as well as loans arranged to be fully amortized provided two cautions are observed. First, the balloon payment of the loan must be at the same time as, and in addition to, the last payment. Second, care should be taken not to enter a value for K that is after the last payment since the program has no way of knowing the term of the loan.

An option is available to output the amortization schedule between payments J and K.

Equations:

$$BAL_{K} = \frac{1}{(1 + i)^{-K}} \left[PMT \frac{(1 + i)^{-K} - 1}{i} + PV \right]$$

$$INT_{J-K} = BAL_K - BAL_{J-1} + (K - J + 1) \cdot PMT$$

where:

Kth payment to principal =
$$BAL_{K-1}$$
 - BAL_{K}
Kth payment to interest = PMT - $(BAL_{K-1}$ - BAL_{K})
Total payment to interest = (K) x (PMT) - $(PV$ - BAL_{K})

Notes:

For loans scheduled to be fully amortized, the remaining balance after the last payment period may be slightly more or less than zero. This is because the program assumes that all payments are equal to the value entered for PMT. In fact for most loans, the last payment is slightly more or less than the rest.

The calculator performs all internal calculations to ten digits. If the user wishes to round the schedule to dollars and cents, the following sequence may be used:

- 1. Press [///] [GTO] · 120
- 2. [PRGM]
- 3. [XEQ] [ALPHA] RND [ALPHA]
- 4. [PRGM]

Example 1:

A mortgage is arranged such that the first payment is made at the end of October, 1978 (i.e., October is payment period 1). It is a \$20,000 loan at 9%, with monthly payments of \$167.84. What is the accumulated interest for 1978 (periods 1-3) and 1979 (periods 4-15) and what would the remaining balance be at the end of each year?

Keystrokes:	Display:
[USER]	(Set USER mode)
[XEQ] [ALPHA] SIZE [ALPHA] 009	
[XEQ] [ALPHA] AMORT [ALPHA]	INT ?
9 [ENTER †] 12 [*] [R/S]	PMT ?
167.84 [R/S]	PV ?
20000 [R/S]	Ј?
1 [R/S]	к ?
3 [R/S] [A]	INT=449.60
	BAL=19,946.08
[C]	Ј?
4 [R/S]	К ?
15 [R/S] [A]	INT=1,785.89
	BAL=19,717.88

Example 2:

Generate an amortization schedule for the first two payments of a \$30,000, 7% mortgage having monthly payments of \$200. Then jump ahead and generate the data for the 36th payment.

Solution: (Keystrokes reflect a printer in the system)

[XEQ] [ALPHA] AMORT [ALPHA]	INT ?
7 [ENTER †] 12 [÷] [R/S]	PMT ?
200 [R/S]	PV ?
30000 [R/S]	Ј?
1 [R/S]	К ?
2 [R/S] [B]	PMT NO.=1.00
	INT=175.00
	PRIN=25.00
	BAL=29,975.00
	Σ INT=175.00
	PMT NO.=2.00

INT=174.85

PRIN=25.15

BAL=29,949.85

 Σ **INT**=349.85

J ?

K ?

PMT NO.=36.00

INT=169.36

PRIN=30.64

BAL=29,001.75

 Σ INT=6,201.75

[C]

36 [R/S]

36 [R/S] [B]

User Instructions

				SIZE: 009
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1.	Key in the program and set USER mode		[USER]	
2.	Initialize the program		[XEQ] AMORT	INT ?
3.	Input: periodic interest rate (%)	INT	[R/S]	PMT ?
	periodic payment amount	PMT	[R/S]	PV ?
	initial loan amount	PV	[R/S]	J ?
	starting period no.	J	[R/S]	к?
	ending period no.	K	[R/S]	
4.	Find the total interest paid between			
	periods J and K inclusive and the balance		[A]	INT= ()
	at the end of period K - OR -		[R/S]*	BAL=()
5.	Generate the amortization schedule (J to K)		[B]	PMT NO.=()
6.			[R/S]*	INT=()
			[R/S]*	PRIN=()
			[R/S]*	BAL=()
			[R/S]*	Σ INT=()
7.	Press		[R/S]*	PMT NO.=()
	and go to step 6.			
8.	To change J and K, press	· · · · · · · · · · · · · · · · · · ·	[c]	J ?
	and input: J	J	[R/S]	К?
	and K	К	[R/S]	
9.	Go to step 4 or 5			
*	These keystrokes need not be performed			
	when there is a printer in the system.			

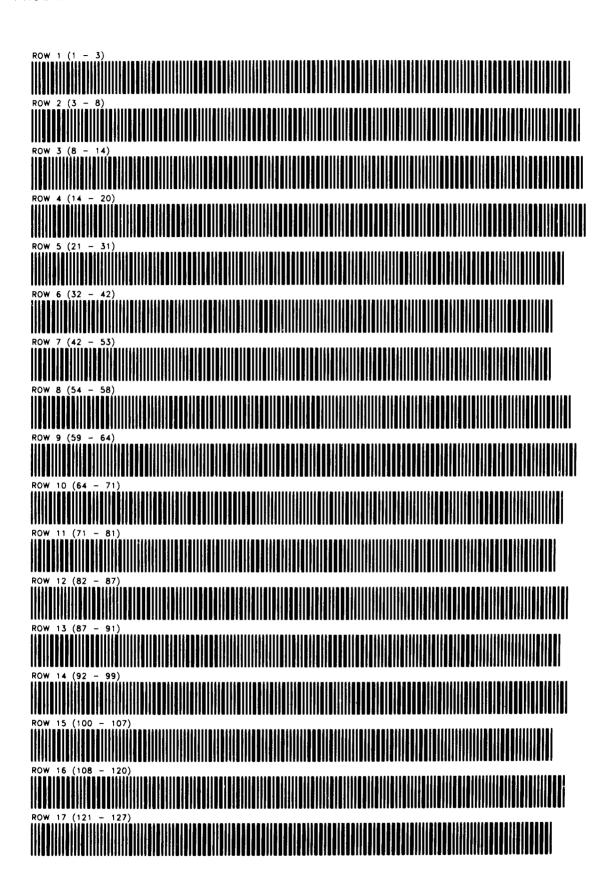
	<u></u>		
Ø1◆LBL "AMO	Initialize	51 +	
RT"		52 RCL 02	
02 SF 21		53 *	
03 "INT ?"		54 +	
04 PROMPT	Prompt and	55 "INT"	
05 1 E2	store data	56 XEQ 09	
Ø6 /	Store data	57 RCL 04	
07 STO 01		58 "BAL"	
08 "PMT ?"		59 XEQ 09	
09 PROMPT		60 STOP	
10 STO 02		61+LBL B	Generate
11 "PV ?"		62 RCL 07	Amortization
12 PROMPT		63 ADV	
13 STO 03		64 "PMT NO.	
14+LBL C		••	
15 "J ?"		65 XEQ 09	
16 PROMPT		66 1	
17 STO 07		67 RCL 01	
18 "K ?"		68 +	
19 PROMPT		69 STO 08	
20 STO 00		70 RCL 07	
21 STOP		71 XEQ 01	
22+LBL A		72 STO 04	
23 RCL 00		73 RCL 08	
24 RCL 07	Calculate total	74 RCL 07	
25 X<=Y?	interest between	75 1	
26 GTO 00	two periods and	76 -	
27 STO 00	balance at end	77 XEQ 01	
28 RDN		78 RCL 04	
29 STO 07		79 -	ļ
30+LBL 00		80 STO 06	
31 1		81 RCL 02	
32 RCL 01		82 X<>Y	
33 +		83 -	
34 STO 08		84 "INT"	
35 RCL 00		85 XEQ 09	schedule
36 XEQ 01		86 RCL 06	
37 STO 04		87 "PRIN"	
38 RCL 08		88 XEQ 09	
39 RCL 07		89 RCL 04	
40 1		90 "BAL"	
41 -		91 XEQ 09	
42 XEQ 01		92 RCL 07 93 RCL 02	J < K
43 CHS			K
44 RCL 04		94 * 95 RCL 03	1
45 +	,	95 RCL 03 96 RCL 04	
46 STO 06		96 KCL 04 97 -	
47 RCL 00		97 - 98 -	
48 RCL 07		98 - 99 "Z INT"	
49 -	ļ	100 XEQ 09	
50 1		TOO VEG 63	

101 1 102 ST+ 07 103 RCL 00 104 RCL 07 105 X<=Y? 106 GTO B 107-LBL 01 108 CHS 109 Y+X 110 STO 05 111 1 112 113 RCL 01 114 / 115 RCL 02 116 * 117 RCL 03 118 + 119 RCL 05 120 / 121 RTN 122-LBL 09 123 " 124 ARCL X 125 QVIEW 126 RTN 127 END 30 80 80				
	102 ST+ 07 103 RCL 00 104 RCL 07 105 X<=Y? 106 GTO B 107+LBL 01 108 CHS 109 Y*X 110 STO 05 111 1 112 - 113 RCL 01 114 / 115 RCL 02 116 * 117 RCL 03 118 + 119 RCL 05 120 / 121 RTN 122+LBL 09 123 "H=" 124 ARCL X 125 AVIEW 126 RTN 127 END	Display routine	60 70 80	
50				

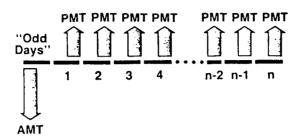
REGISTERS, STATUS, FLAGS, ASSIGNMENTS

DATA REGISTERS		STATUS				
K i/100 PMT	50	SIZE $\frac{009}{}$ TOT. REG. $\frac{40}{}$ USER MODE ENG FIX $\frac{2}{}$ SCI ON $\frac{X}{}$ OFF				
PV used		DEG RAD GRAD				
used	55	INIT FLAGS				
used		# S/C SET INDICATES CLEAR INDICA	ITES			
J		21 S refer to owner's manual				
1 + 1/100						
	60					
 						
	65					
	70					
<u> </u>						
	75					
	80					
<u> </u>						
	85					
<u> </u>						
		ASSIGNMENTS				
		FUNCTION KEY FUNCTION				
	90		KEY			
	95					
L						

PROGRAM REGISTERS NEEDED: 32



ADD-ON TO APR WITH ODD DAYS



This program calculates the monthly payment amount, total finance charge, and the Annual Percentage Rate (APR) for an add-on rate loan.

When a loan is initiated in the middle of a month, the first payment is generally not required until the end of the first full month. The number of days from the beginning of the loan to the beginning of the first month (see above diagram) are called "odd days" and decrease the APR to be quoted with the loan. The calculation of the APR considers these odd days.

Equations:

FC = AMT
$$\bullet \left(\frac{N+h}{12}\right) \bullet$$
 AIR

PMT = $\frac{AMT + FC}{N}$ = AMT $(1+i)^h$ $\left[\frac{i}{1-(1+i)^{-N}}\right]$

APR = 12i

where:

$$h = ODD \cdot 12/365$$

Example:

A 36 month car loan for \$3,500 with a 6% add-on rate is initiated such that there are 18 "odd days". Calculate the monthly payment required to amortize this loan, the total finance charge, and the annual percentage rate.

Solution:

Keystrokes:		Display:
[XEQ] [ALPHA] SIZE [ALPHA]	008	
[XEQ] [ALPHA] ADD [ALPHA]		ODD ?
18 [R/S]		N ?
36 [R/S]		AIR ?
6 [R/S]		PV ?
3500 [R/S]		PMT=115.01
[R/S]		FC=640.36
[R/S]		APR=10.89

User Instructions

				SIZE: 008
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1.	Key in the program			
2.	Initialize the program		[XEQ] ADD	ODD ?
3.	Input: "odd-days" to beginning of month	ODD	[R/S]	N ?
	no. of monthly payments	N	[R/S]	AIR ?
	annual add-on interest rate(%)	AIR	[R/S]	PV ?
	and loan amount	PV	[R/S]	
4.	Find: monthly payment			PMT= ()
	total finance charge		[R/S]	FC= ()
	and annual percentage rate		[R/S]	APR= ()
		1		
-				
				<u> </u>
		_1	<u></u>	

			·
Ø1+LBL "ADD		51 +	
	1	52 STO 06	
02 "ODD ?"	1	53 RCL 02	i
		54 CHS	1
03 PROMPT	Prompt and store		
04 STO 00	data	55 Y1X	1
0 5 12	1	56 STO 07	
06 *	1	57 -	
	!	58 RCL 00	1
		59 /	1
08 /			
09 STO 01		60 RCL 05	1
10 "N ?"		61 *	
11 PROMPT	•	62 RCL 06	Calculate f'(i)
	1	63 RCL 01	Galculate 1 (1)
12 STO 02		64 Y1X	į
13 "AIR ?"			
14 PROMPT		65 RCL 04	
15 STO 93		66 *	1
16 "PV ?"		67 -	1
		68 RCL 07	
17 PROMPT		69 RCL 06	
18 STO 04	1	-	
19 RCL 02	1	70 /	
20 RCL 01	1	71 RCL 02	
21 +		72 1	
		73 +	
22 12			
23 /			
24 RCL 03	Calculate payment	75 RCL 00	
25 *	and finance	76 *	
26 E2	1	77 1	
	charge	78 RCL 07	1
27 /			1
28 RCL 04	1	• -	
29 *	1	80 RCL 00	
30 STO 00		81 +	
31 RCL 04]	82 -	
1		83 RCL 00	
32 ±		84 X12	
33 RCL 02	1		1
34 /		85 /	
35 STO 05	1	86 RCL 05	
36 "PMT"		87 *	
		88 RCL 06	1
37 XEQ 09	†	89 RCL 01	
38 RCL 00	1		
39 "FC"		90 Y1X	
40 XEQ 09		91 RCL 06	1
41 RCL 03		92 /	
	1	93 RCL 01	
42 12 E2	1	94 X<>Y	
43 /	1	- · · · · · · · · · · · · · · · · · · ·	
44 X=0?		95 *	1
45 GTO 08		96 LASTX	1
46 STO 00	1	97 -	1
	1	98 RCL 04	1
47+LBL 01	1	99 *	1
48 1			1
49 RCL 00		100 -	1
50 1	Calculate f(i)]
	<u> </u>		

		,	
101 /		51	
102 RCL 00	$i_K = i_{K-1}$		
103 X<>Y]
104 -	$\frac{f(i)}{f'(i)}$		
105 STO 00	f'(i)		
106 LASTX			
107 ABS		 	
108 E6-	•	<u></u>	
109 X<=Y?		<u> </u>	
110 GTO 01			
111 RCL 00		60	
112 1200			
113 *			
114+LBL 08			
115 "APR"			
116+LBL 09	 To - 1		
117 "-="	Display routine		
118 ARCL X			
119 PROMPT			
120 RTN		<u> </u>	 ĺ
121 .END.		70	
			1
			1
]
		80	i
30		80	1
]
			 ţ
			 1
40	1	90	1
<u>'</u>	1		
	1		- I
	1	<u> </u>	 - I
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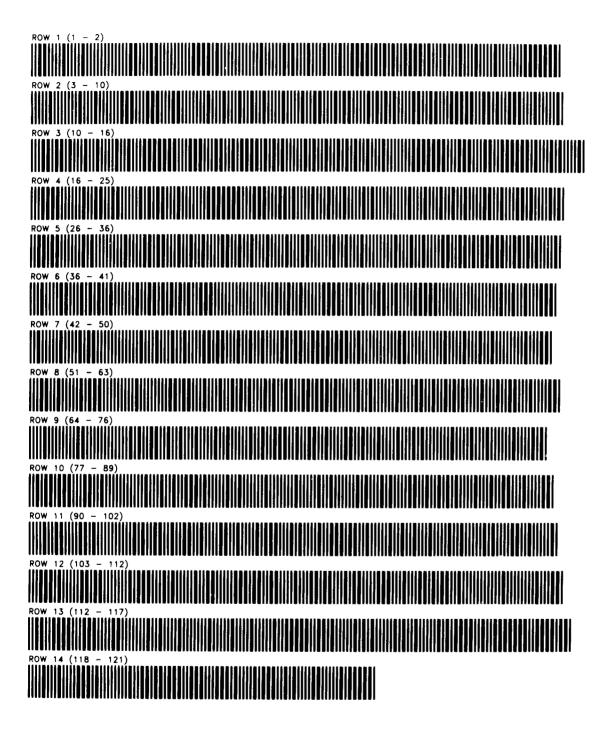
REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA	A REGISTERS				STAT	us	
00	ODD h N AIR	50	ENC	.		_ sci _	USER M	
05	PV PMT 1 + 1/100 (1+1/100) N	55	#	INIT S/C	SET INC	FLAC	CLEAR IN	DICATES
10		60						
15		65						
20		70						
25		75						
30		80			_			
35		85						
				ASSIGNMENTS FUNCTION KEY FUNCTION			KEY	
40		90						
45		95						

ADD-ON TO APR WITH ODD DAYS

PROGRAM REGISTERS NEEDED: 26

HEWLETT PACKARD SOLUTION BOOK: LENDING SAVING & LEASING



SAVINGS PLAN

This program determines interest earned on a savings account using as input the date and amount of each transaction in the period. Accomodates: a) Periodic or continuous compounding; b) 360 or 365 day convention; c) interest earned or forfeited on withdrawal date; and d) adjusts for leap years. One memory module will be required.

Equations:

For continuous compounding: r = effective annual interest rate e = constant = 2.718281828 (decimal) e = constant = 2.718281828 (

NOTE:

If the effective annual interest rate is known, rather than the nominal rate, it should be used at step 3.

References: HP-65 USERS' LIBRARY program #02063A by Keith Rumbel
HP-67/HP-97 USERS' LIBRARY program #00288D by Howard Kutner

Example:

Nominal Interest Rate - 5½% Continuously compounded Leap year Interest on withdrawal date 360 Day basis

Transaction	<u>Date</u>	Amt.
Opening balance	1/1	4377.53
Withdrawal	1/15	700.00
Deposit	3/5	425.00

Solution:

[R/S]

Keystrokes: Display: [USER] (Set USER mode) [XEQ] [ALPHA] SIZE [ALPHA] 012 [XEQ] [ALPHA] SAVE [ALPHA] INT ? 5.25 [R/S] CONT/PER ? [ALPHA] CONT [ALPHA] [R/S] LEAP/NORM ? [ALPHA] LEAP [ALPHA] [R/S] INT ON W/D DATE ? (Y/N) [ALPHA] Y [ALPHA] [R/S] INT BASIS ? (360/365) 360 [R/S] QUARTER NO. ? 1 [R/S] [A] DATE (MM.DD) ? 1.01 [R/S] DEP. AMT ? 4377.53 [R/S] NEXT TRANS. ? DATE (MM.DD) ? [B] W/D AMT ? 1.15 [R/S] NEXT TRANS. ? 700 [R/S] DATE (MM.DD) ? [A] DEP. AMT ? 3.05 [R/S]ACC. INT=\$52.36 425 [R/S] [D] BAL = \$4,102.53[R/S]

T. BAL = \$4, 154.89

User Instructions

SIZE: 012 STEP **FUNCTION** DISPLAY **INSTRUCTIONS INPUT** 1. Key in the program and set USER mode [USER] 2. Initialize the program [XEQ] SAVE INT ? 3. Input: nominal interest rate (%) INT [R/S]CONT/PER ? "CONT" continuous or periodic compounding or "PER" [R/S]LEAP/NORM ? "LEAP" or INT ON W/D leap year or normal year "NORM" [R/S]DATE ? (Y/N) INT BASIS ? interest earned on withdrawal date "Y"or"N" [R/S](360/365)interest basis 360 or 365 QUARTER NO. ? [R/S] and quarter number of year 1,2,3 or 4 [R/S] TRANSACTIONS: 4. For a deposit, press [A] DATE (MM.DD) input date MM.DD [R/S] DEP. AMT ? and amount of deposit \$ [R/S] NEXT TRANS.? DATE (MM.DD) 5. For a withdrawal, press [B] MM.DD W/D AMT ? input date [R/S] and amount of withdrawal \$ [R/S] NEXT TRANS.? AT ANY TIME [D] Display: accumulated interest ACC. INT=\$() 6. BAL=\$()[R/S]balance (without interest) T. BAL=\$() [R/S] and total balance 7. For a new case: 0 [STO] 06 a) same parameters [STO] 07 (clear accumulating registers) and go to step 4 b) entirely new case, go to step 2

01+LBL "SAV		46 ASTO X	
E"	1	47 X=Y?	1
02 "INT ?"	ł		
		48 SF 01	
03 PROMPT	Prompt and store	49 " INT	1
04 E2	data	BASIS ? "	ŀ
05 /	1	50 "F<360/3	i
06 STO 00	1	65>"	i l
07 Ø	1		1
		51 PROMPT	i
08 STO 08	, i	52 STO 10	
09 +	1	53 "QUARTER	1
10 CF 00	İ	NO. ?"	
11 CF 01	Ì	54 PROMPT	d i
12 CF 03		55 31	
13 CF 02	1		
		56 STO 01	
14 "CONT/PE	1	57 STO 02	Store No. of
R ?"		58 STO 03	E
15 PROMPT		59 CLX	days in each
16 ASTO Y		60 STO 06	month of the
17 "CONT"			quarter
		61 STO 07	ļ
18 ASTO X	!	62 +	
19 X=Y?	ł	63 STO 11	
20 GTO 09		64 3	j i
21 "NO. PER	1	65 *	
IODS ?"		66 STO 04	
22 PROMPT			
	1	67 1	
23 STO <u>0</u> 8		68 DSE 11	!
24 SF 02]	69 GTO 02	
25+LBL 09		70 RCL 02	i i
26 365		71 3	
27 STO 09			[
		72 -	
28 CF 00	 	73 FS? 0 0	
29 "LEAP/NO		74 1	1
RM ?"		75 FS? 00	!
30 PROMPT		76 +	
31 ASTO Y		77 STO 02	
32 "NORM"			
	<u>}</u>	78 GTO 07	<u> </u>
33 ASTO X		79+LBL 02	1
34 X=Y?		80 DSE 11	
35 GTO 10		81 GTO 03	1
36 SF 00]	82 ST- 01	
37 366]	83 ST- 03	
38 STO 09	1		
-	ł i	84 GTO 07	
39+LBL 10		85+LBL 03	
40 CF 01		86 DSE 11	
41 " INT O		87 GTO 04	[
N W/D DA"		88 ST- 03	1
42 "FTE ? <			1
		89 GTO 07	<u> </u>
Y/N>"	1	90+LBL 04	
43 PROMPT		91 ST- 02	1
44 ASTO Y		92+LBL 07	1
45 "Y"		93 RCL 09	1
	<u> </u>	20 KOE 02	1

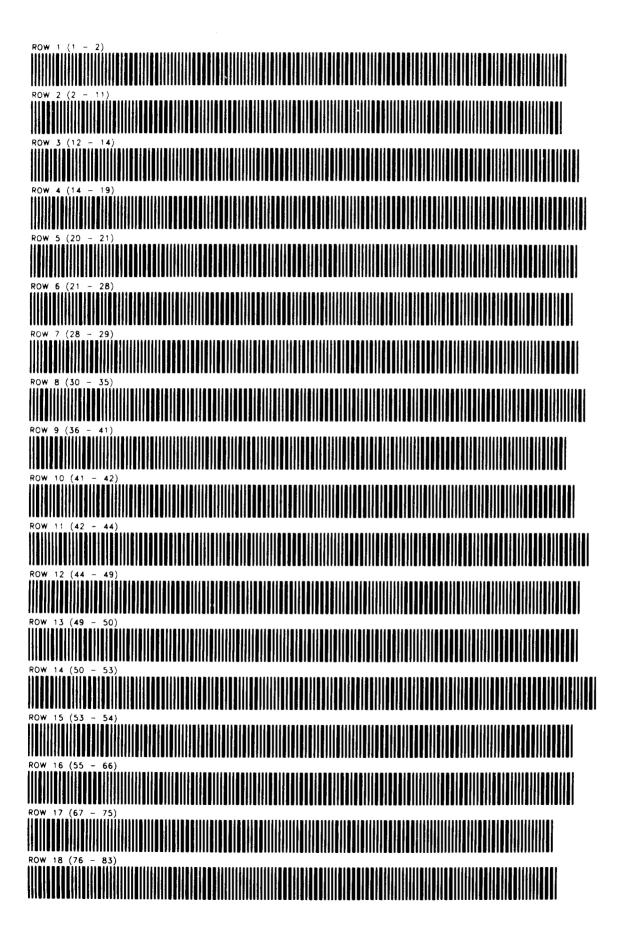
95 / 96 FS?C 02 97 GTO 08 98 98 RCL 00 99 * 146 * 147 RNB 100 1 1 101 EtX 102 X<>Y 103 YtX 104 STO 05 106 Effective rate 106 LBL 08 107 RCL 08 108 * Periodic compounding 11				
96 FS?C 02 97 CTO 08 98 RCL 00 99 * 100 1 101 1 efective rate 102 x<>Y 103 Yf x 104 STO 05 105 RTN 106-LBL 08 107 RCL 00 108 * 109 RCL 00 109 RCL 00 110 LASTX 111 / 112 1 113 + 114 X<>Y 115 STO 05 117 RTN 116 STO 05 117 RTN 116 STO 05 117 RTN 118 * 118 * 119 XEQ 13 120 "W/D AMT 7" 121 PROMPT 122 CHS 123 FS? 01 124 FS? 02 125 SF 03 126 *BL A 127 FC? 03 131 PROMPT 132 ST + 07 133 X<>Y 133 X<>Y 134 FS?C 02 135 CTO 03 137 RCL 09 137 RCL 09 138 * 139 RCL 00 131 RCL 06 132 RTN 132 FS? 01 133 X<>Y 134 FS?C 02 135 CTO 03 136 1 137 + 138 *LBL 03 139 RCL 09 140 / 141 RCL 05 141 RCL 05 145 - 147 RND 148 ST + 06 149 "NEXT TR ANS. ?" 153 PROMPT 151*-LBL 13 152 "DATE < M M.DD?" 153 PROMPT 154 FRC 155 RCL 04 157 RCL 04 158 INT 159 - 158 INT 159 - 158 INT 159 - 166 + 167 DSE 11 168 CTO 01 169 RTN 170*-LBL 01 171 RCL 02 175 RTN 170*-LBL 02 177 RCL 01 178 RTN 170*-LBL 01 171 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 188 "LB 03 139 RCL 09 144 RCL 05	94 RCL 10		143 Y1X	
97 CTO 08 98 RCL 00 99 * pounding 99 * pounding 99 * pounding 99 * pounding 148 ST+ 06 149 "NEXT TR ANS. ?" 150 PROMPT 151+1BL 13 152 "DATE <m +="" 00="" 1="" 100="" 109="" 110="" 111="" 112="" 113="" 114="" 153="" 154="" frc="" lastx="" m.dd?"="" prompt="" rcl="" x<="">Y 115 PROMPT 115 PROMPT 115 PROMPT 115 PROMPT 112 PROMPT 113 PROMPT 114 PROMPT 115 PROMPT 116 STO 01 117 RCL 02 117 RCL 02 117 RCL 01 118 RCL 06 118</m>	1			
98 RCL 00 99 * 100 1 101 Efx 102 X<>Y 103 Yfx 104 STO 05 105 RTN 106-BL 08 107 RCL 00 108 RCL 00 109 RCL 00 109 RCL 00 109 RCL 00 109 RCL 00 110 LASTX 111 / 112 1 113 + 114 X<>Y 115 Yfx 116 STO 05 117 RTN 118 +BL B 119 XEQ 13 120 PW/D AMT 7 121 PROMPT 122 CHS 123 FS? 01 124 FS 02 125 SF 03 121 PROMPT 122 CHS 123 FS? 01 124 FC 03 131 PROMPT 129 DEP. AM T 7: 130 FC? 03 131 PROMPT 132 ST+ 07 133 X<>Y 133 X<>Y 134 FS? 0 137 + 138 + LBL 03 137 RCL 09 139 RCL 09 139 RCL 09 139 RCL 09 139 RCL 09 130 RCL 06 131 RCL 06 132 RCC 17 133 X< Y 134 FS? 0 137 RCL 09 139 RCL 09 139 RCL 09 140 / 141 RCL 05 111 RTH 112 ROMPT 132 FS 01 133 RCL 09 134 FS? 02 135 GTO 03 136 GTO 03 136 GTO 03 137 RCL 09 140 / 141 RCL 05 141 RCL 05		1	145 -	
100 1 148 ST+ 06 149 "NEXT TR 149 "NEXT TR 149 "NEXT TR 150 PROMPT 151+LBL 13 152 "DATE <		1	146 *	
100 1 1 148 148 ST+ 06 160 1 161 ETX 102 X(>Y 103 YTX 104 STO 05 105 RTN 106 + LBL 08 107 RCL 00 109 RCL 00 100 RCL 00	98 RCL 00	Continuous com-	147 RND	
101 E+X 102 X(>Y 150 PROMPT 151+LBL 13 152 ***DATE	99 *	pounding	148 ST+ 06	
101 E+X 102 X<>Y 150 PROMPT 151+LBL 13 152 "DATE MN .DD>" 153 PROMPT 151+LBL 13 152 "DATE MN .DD>" 153 PROMPT 153 PROMPT 153 PROMPT 153 PROMPT 155 RCL 04 156 I 157 LRSTX 157 LRSTX 158 INT 159 - 160 + 157 LRSTX 158 INT 159 - 160 + 161 STO 11 162 RCL 03 163 R↑ 161 STO 11 162 RCL 03 163 R↑ 164 E2 165 ** 164 E2 165 ** 166 - 167 DSE 11 168 GTO 01 169 RTN 170+LBL 01 171 RCL 02 172 RTN 122 CHS 123 FS? 01 124 SF 02 125 SF 03 126+LBL 0 127 FC? 03 128 XEQ 13 126 LBL 0 127 FC? 03 128 XEQ 13 129 "DEP. AM T?" 170 PROMPT 132 ST+ 07 133 X <yy *lbl="" +="" 02="" 03="" 05="" 09="" 12="" 134="" 135="" 136="" 139="" 140="" 183="" 187="" 189+l<="" 189+lbl="" fs?c="" gto="" i="" rcl="" td="" =""><td>100 1</td><td>effective rate</td><td>149 "NEXT TR</td><td></td></yy>	100 1	effective rate	149 "NEXT TR	
102 X		1		
103 Y+X				
194 STO 05				
105 RTN		1		
106+BL 08 107 RCL 08 108 *				1
107 RCL 08 108 * Periodic compounding 110 LASTX 111 /	1 -			days
108 **		l:		
109 RCL 00		Down od to som		
## Standard				
111 / 112 1 113 + 114 X<>Y 115			_	
112 1 113 + 114 X<>Y 115 YfX 116 STO 05 117 RTN 118 LBL B 119 XEQ 13 120 "W/D AMT ?" 121 PROMPT 122 CHS 123 FS? 01 124 SF 02 125 SF 03 126 LBL A 127 FC? 03 128 XEQ 13 129 "DEP. AM T?" 130 FC?C 03 131 PROMPT 132 ST+ 07 133 X<>Y 134 FS?C 02 135 GTO 03 136 1 137 + 138 LBL 03 139 RCL 09 140 / 141 RCL 05 159 - 166 + 168 + 161 STO 11 162 RCL 03 163 R↑ 164 E2 165 * 166 - 167 DSE 11 168 GTO 01 169 RTN 170 +LBL 01 171 RCL 02 172 + 173 DSE 11 174 GTO 02 175 RTN 176 +LBL 02 177 RCL 01 178 + 179 RTN 180 +LBL D 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 +LBL 12		effective rate	_	
113 + 114 X<>Y 115 YfX 116 STO 05 117 RTN 118 LBL B 119 XEQ 13 120 "W/D AMT ?" 121 PROMPT 122 CHS 123 FS? 01 124 SF 02 125 SF 03 126 LBL A 127 FC? 03 128 XEQ 13 129 "DEP. AM T ?" 130 FC?C 03 131 PROMPT 132 ST 07 133 X<>Y 134 FS?C 02 135 GTO 03 136 I 137 + 138 LBL 03 139 RCL 09 140 / 141 RCL 05 160 + 161 STO 11 162 RCL 03 163 R↑ 164 E2 165 * 166 - 167 DSE 11 168 GTO 01 169 RTN 170 LBL 01 171 RCL 02 172 + 173 DSE 11 174 GTO 02 175 RTN 176 LBL 02 177 RCL 01 178 + 179 RTN 180 LBL D 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 12		·		
114 X<>Y 115 YfX 116 STO 05 117 RTN 118 LBL B 119 XEQ 13 120 "W/D AMT ?" 121 PROMPT 122 CHS 123 FS? 01 123 FS? 01 124 SF 02 125 SF 03 126 LBL A 127 FC? 03 128 XEQ 13 129 "DEP. AM T?" 130 FC?C 03 131 PROMPT 132 ST+ 07 133 X<>Y 134 FS?C 02 135 GTO 03 136 1 137 + 138 LBL 03 139 RCL 09 141 RCL 05 161 STO 11 162 RCL 03 163 R† 164 E2 165 * 166 - 167 DSE 11 168 GTO 01 169 RTN 168 GTO 01 171 RCL 02 172 + 173 DSE 11 174 GTO 02 175 RTN 176 LBL 02 177 RCL 01 178 + 179 RTN 180 LBL D Display results 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 BAL" 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 "T. BAL"				
115 YfX 116 STO 05 117 RTN 118 LBL B 119 XEQ 13 120 "W/D AMT ?" 121 PROMPT 122 CHS 123 FS? 01 124 SF 02 125 SF 03 126 LBL A 127 FC? 03 128 XEQ 13 129 "DEP. AM T ?" 130 FC?C 03 131 PROMPT 132 ST+ 07 133 X<>Y 134 FS?C 02 135 GTO 03 137 + 138 LBL 03 139 RCL 09 140 / 141 RCL 05 162 RCL 03 163 Rf 163 Rf 164 E2 165 * 166 - 167 DSE 11 168 GTO 01 169 RTN 170 LBL 01 171 RCL 02 172 + 173 DSE 11 174 GTO 02 175 RTN 176 LBL 02 177 RCL 01 178 + 180 LBL D 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 03 1189 LBL 12				
116 STO 05 117 RTN 118 LBL B 119 XEQ 13 120 "W/D AMT ?" 121 PROMPT 122 CHS 123 FS? 01 124 SF 02 125 SF 03 126 LBL A 127 FC? 03 128 XEQ 13 129 "DEP. AM T?" 130 FC?C 03 131 PROMPT 132 ST+ 07 133 X<>Y 134 FS?C 02 135 GTO 03 136 1 137 + 138 LBL 03 139 RCL 09 141 RCL 05 163 R1 164 E2 165 * 166 - 167 DSE 11 168 GTO 01 169 RTN 169 LBL 01 171 RCL 02 172 + 173 DSE 11 174 GTO 02 175 RTN 176 LBL 02 177 RCL 01 178 + 179 RTN 180 LBL 0 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 12	·-	1		
117 RTN 118 LBL B 119 XEQ 13 120 "W/D AMT 7" 121 PROMPT 122 CHS 123 FS? 01 124 SF 02 125 SF 03 126 LBL A 127 FC? 03 128 XEQ 13 129 "DEP. AM T?" 130 FC?C 03 131 PROMPT 132 ST+ 07 133 X<>Y 134 FS?C 02 135 GTO 03 137 + 138 LBL 03 139 RCL 09 141 RCL 05 118 Withdrawal routine 166 - 167 DSE 11 168 GTO 01 169 RTN 170 LBL 01 171 RCL 02 172 + 173 DSE 11 174 GTO 02 175 RTN 176 LBL 02 177 RCL 01 178 + 179 RTN 180 LBL D 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 12			162 RCL 03	
118+LBL B 119 XEQ 13 120 "W/D AMT ?" 121 PROMPT 122 CHS 123 FS? 01 124 SF 02 125 SF 03 126+LBL A 127 FC? 03 128 XEQ 13 129 "DEP. AM T?" 130 FC?C 03 131 PROMPT 132 ST+ 07 133 X<>Y 134 FS?C 02 135 GTO 03 136 1 137 + 138+LBL 03 139 RCL 09 141 RCL 05 Withdrawal routine 166 - 167 DSE 11 168 GTO 01 169 RTN 170+LBL 01 171 RCL 02 172 + 173 DSE 11 174 GTO 02 175 RTN 176+LBL 02 177 RCL 01 178 + 179 RTN 180+LBL D Display results 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 188 XEQ 12 187 + 188 *T. BAL" 189+LBL 12	116 STO 05		163 R↑	
119 XEQ 13	117 RTN	,	164 E2	
119	118+LBL B	778 m1 1 m 1	165 *	
120 "W/D HM1 168 GTO 01 168 GTO 01 169 RTN 169 RTN 170 LBL 01 171 RCL 02 172 + 173 DSE 11 174 GTO 02 175 RTN 176 LBL 02 175 RTN 176 LBL 02 175 RTN 176 LBL 02 177 RCL 01 178 + 179 RTN 180 LBL D 181 RCL 06 182 "ACC. IN TO 133 X<>Y 184 RCL 06 182 "ACC. IN TO 137 + 138 LBL 03 139 RCL 09 140 / 141 RCL 05 Interest calculation 189 LBL 12 189 LBL 12 189 LBL 12 189 LBL 12	119 XEQ 13		166 -	
121 PROMPT 122 CHS 123 FS? 01 124 SF 02 125 SF 03 126 LBL A 127 FC? 03 128 XEQ 13 129 "DEP. AM T?" 130 FC?C 03 131 PROMPT 132 ST + 07 133 X < > Y 134 FS?C 02 135 GT0 03 137 + 138 LBL 03 139 RCL 09 141 RCL 05 1169 RTN 170 LBL 01 171 RCL 02 172 + 173 DSE 11 174 GT0 02 175 RTN 176 LBL 02 177 RCL 01 178 + 179 RTN 180 LBL D 181 RCL 06 182 "ACC. IN T" 184 RCL 07 185 "BAL" 185 "BAL" 186 XEQ 12 187 + 187 + 188 "T. BAL" 189 LBL 12	120 "W/D AMT	routine	167 DSE 11	
121 PROMPT 122 CHS 123 FS? 01 124 SF 02 124 SF 02 125 SF 03 126 LBL A 127 FC? 03 128 XEQ 13 129 "DEP. AM T?" 130 FC?C 03 131 PROMPT 132 ST + 07 133 X < >Y 134 FS?C 02 135 GT0 03 137 + 138 LBL 03 139 RCL 09 140 / 141 RCL 05 169 RTN 170 LBL 01 171 RCL 02 172 H 173 DSE 11 174 GT0 02 175 RTN 176 LBL 02 177 RCL 01 178 + 179 RTN 180 LBL D 181 RCL 06 182 "ACC. IN T" 184 RCL 07 185 "BAL" 185 "BAL" 186 XEQ 12 187 + 187 + 188 "T. BAL" 189 LBL 12	i e		168 GTO 01	
122 CHS 123 FS? 01 124 SF 02 125 SF 03 126 LBL A 127 FC? 03 128 XEQ 13 129 "DEP. AM T?" 130 FC?C 03 131 PROMPT 132 ST+ 07 133 X<>Y 134 FS?C 02 135 GTO 03 139 RCL 09 141 RCL 05 170 LBL 01 171 RCL 02 172 + 173 DSE 11 174 GTO 02 175 RTN 176 LBL 02 177 RCL 01 178 + 179 RTN 180 LBL D Display results 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 12	121 PROMPT		-	
123 FS? 01 124 SF 02 125 SF 03 126 LBL A 127 FC? 03 128 XEQ 13 129 "DEP. AM T?" 130 FC?C 03 131 PROMPT 132 ST+ 07 133 X<>Y 134 FS?C 02 135 GTO 03 137 + 138 LBL 03 139 RCL 09 141 RCL 05 171 RCL 02 172 + 173 DSE 11 174 GTO 02 175 RTN 176 LBL 02 177 RCL 01 178 + 178 LBL 02 179 RTN 180 LBL D 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 12	:			
124 SF 02 125 SF 03 126 LBL A 127 FC? 03 128 XEQ 13 129 "DEP. AM T?" 130 FC?C 03 131 PROMPT 132 ST+ 07 133 X<>Y 134 FS?C 02 135 GTO 03 136 1 137 + 138 LBL 03 139 RCL 09 141 RCL 05 172 + 173 DSE 11 174 GTO 02 175 RTN 176 LBL 02 177 RCL 01 178 + 179 RTN 180 LBL D 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 12				
125 SF 03 126 LBL A 126 LBL A 127 FC? 03 128 XEQ 13 129 "DEP. AM T?" 130 FC?C 03 131 PROMPT 132 ST + 07 134 FS?C 02 135 GT0 03 136 1 138 LBL 03 139 RCL 09 140 / 141 RCL 05 173 DSE 11 174 GT0 02 175 RTN 176 LBL 02 177 RCL 01 178 + 179 RTN 180 LBL D 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 12				
126+LBL A 127 FC? 03 128 XEQ 13 129 "DEP. AM T?" 130 FC?C 03 131 PROMPT 132 ST+ 07 134 FS?C 02 135 GTO 03 136 1 137 + 138+LBL 03 139 RCL 09 140 / 141 RCL 05 174 GTO 02 175 RTN 176+LBL 02 177 RCL 01 178 + 179 RTN 180+LBL D 180+LBL D 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 186 XEQ 12 187 + 188 "T. BAL" 189+LBL 12				
127 FC? 03 128 XEQ 13 129 "DEP. AM T?" 130 FC?C 03 131 PROMPT 132 ST+ 07 134 FS?C 02 135 GTO 03 136 1 138 LBL 03 139 RCL 09 140 / 141 RCL 05 175 RTN 176 LBL 02 177 RCL 01 178 + 179 RTN 180 LBL D 180 LBL D 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 12				
128 XEQ 13 129 "DEP. AM T?" 130 FC?C 03 131 PROMPT 132 ST+ 07 134 FS?C 02 135 GTO 03 136 1 138 LBL 03 139 RCL 09 140 / 141 RCL 05 176 LBL 02 177 RCL 01 178 + 179 RTN 180 LBL 0 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 12				
129 "BEP. AM T ?" 130 FC?C 03 131 PROMPT 132 ST+ 07 134 FS?C 02 135 GTO 03 137 + 138*LBL 03 139 RCL 09 141 RCL 05 177 RCL 01 178 + 179 RTN 180*LBL D 180*LBL D 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189*LBL 12				
T ?" 130 FC?C 03 131 PROMPT 132 ST+ 07 134 FS?C 02 135 GTO 03 137 + 138*LBL 03 139 RCL 09 140 / 141 RCL 05 Deposit routine 178 + 179 RTN 180*LBL D 180*LBL D 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189*LBL 12			-	
130 FC?C 03 131 PROMPT 132 ST+ 07 133 X<>Y 134 FS?C 02 135 GTO 03 137 + 138 LBL 03 139 RCL 09 140 / 141 RCL 05 179 RTN 180 LBL D 180 LBL D 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 12		Deposit routine		
131 PROMPT 132 ST+ 07 133 X<>Y 134 FS?C 02 135 GTO 03 137 + 138 LBL 03 139 RCL 09 140 / 141 RCL 05 180 LBL D 181 RCL 06 181 RCL 06 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 12	1			
132 ST+ 07 133 X<>Y 134 FS?C 02 135 GTO 03 136 1 137 + 138 LBL 03 139 RCL 09 140 / 141 RCL 05 181 RCL 06 182 "ACC. IN 182 "ACC. IN 183 XEQ 12 184 RCL 07 185 "BAL" 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 12				Dieplay recults
133 X<>Y 134 FS?C 02 135 GTO 03 136 1 137 + 138 LBL 03 139 RCL 09 140 / 141 RCL 05 182 "ACC. IN T" 183 XEQ 12 184 RCL 07 185 "BAL" 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 12				probray resures
134 FS?C 02 135 GTO 03 136 1 137 + 138 LBL 03 139 RCL 09 140 / 141 RCL 05 T" 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 LBL 12				
135 GTO 03 136 1 137 + 138 + LBL 03 139 RCL 09 140 / 141 RCL 05 183 XEQ 12 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 + LBL 12				
136 1 137 + 138 + LBL 03 139 RCL 09 140 / 141 RCL 05 184 RCL 07 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 + LBL 12				
137 + 138 + LBL 03 139 RCL 09 140 / 141 RCL 05 185 "BAL" 186 XEQ 12 187 + 188 "T. BAL" 189 + LBL 12	i e			
138+LBL 03 139 RCL 09 140 / Interest 187 + 188 "T. BAL" 141 RCL 05 189+LBL 12				
139 RCL 09 Interest 187 + 140 / calculation 188 "T. BAL" 189+LBL 12			_	
139 RCL 09 140 / calculation 187 + 140 RCL 05 188 "T. BAL" 189 + LBL 12		Interest		
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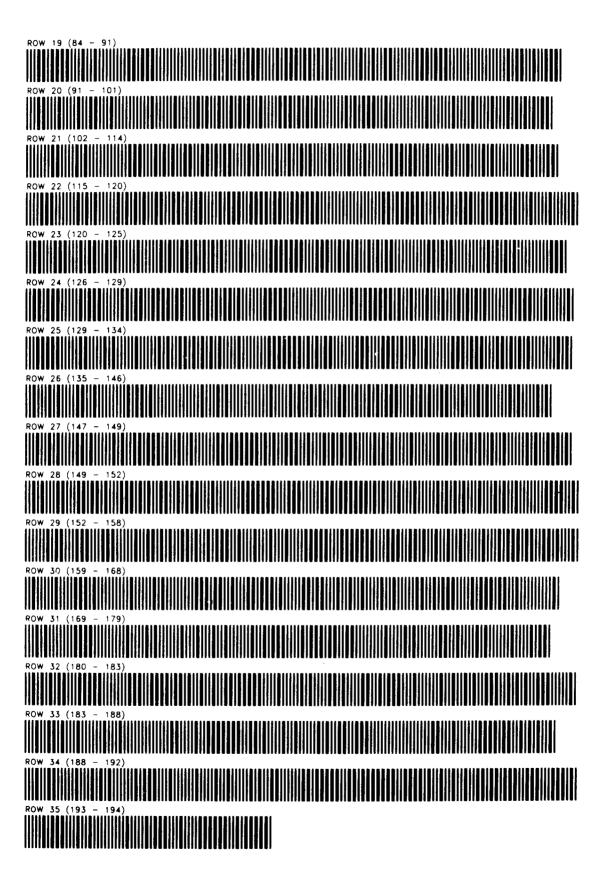
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192 PROMPT	1		
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REGISTERS, STATUS, FLAGS, ASSIGNMENTS

									
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	#days in month 2		DEG		RAD.	GR	AD		· • · · ·
	#days in month 3								
	3 times quarter#					51 /	AGS		
	l+effective int rat	<u>e</u> 55		INIT		rL/	465		
	accumulated int		#	S/C	SET I	NDICATE	s	CLEAR IN	DICATES
	accumulated balance	4	00		leap ye	ar		normal yea	ar
	#periods/yr		01		int on	W/D dat		no int on	
	#days/yr		02		periodi			continuous	s intere
10	360/365 day basis	60	03		W/D tra			deposit t	
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HEWLETT PACKARD SOLUTION BOOK: LENDING SAVING & LEASING





INTEREST CONVERSIONS

The first part of the program permits the user to solve for any variable of an accrued simple interest calculation. Given three of the four variables (number of days, annual interest rate, beginning amount, and accrued interest) the fourth is calculated. Accrued interest can be based on a 360 or 365 day year. In addition, the user may choose to add the calculated accrued interest to the initial principal to determine the final amount.

The second part deals with nominal to effective interest rate conversions, and vice-versa. By definition, an annual effective interest rate demonstrates the effect of compounding for a full year of compounding periods at a particular periodic interest rate. The periodic interest rate to be used is determined by dividing the number of compounding periods in a year into the stated annual nominal interest rate. The effect is such that if the nominal rate is held constant, as the number of compounding periods per year is increased, the annual effective interest rate will increase. The ultimate, or upper limit, in this process is to have an infinite number of compounding periods in a year, commonly called continuous compounding.

Given the number of compounding periods in a year, and one of the rates (nominal or effective), the other rate can be calculated. If for example, you require the periodic interest rate for a calculation, given the effective rate, use this program to determine the annual nominal rate first. Dividing the annual nominal rate by the number of compounding periods in a year will give the required periodic interest rate.

The third part is for continuous compounding. Given either rate, the other is calculated.

The most common and straightforward definition of effective interest rate has been implemented. Occasionally other definitions will be used and the results will not compare exactly with those calculated by these programs. For example, since the maximum annual nominal rate that savings institutions can offer is regulated by law, they may modify the process (also regulated) so that the effective rate is even higher (e.g., for daily compounding, the periodic rate may be divided by 360 and then compounding accomplished for 365 periods). It is important then, when attempting to match results, to understand the process employed.

Equations:

INT
$$360 = \frac{\text{DAYS}}{360} \bullet \text{BEG AMT} \bullet \text{RATE}$$

INT
$$365 = \frac{\text{DAYS}}{365} \bullet \text{BEG AMT} \bullet \text{RATE}$$

finite coumpounding

$$EFF = \left(1 + \frac{NOM}{C}\right) \quad C \quad -1$$

continuous compounding

$$EFF = (e^{NOM} - 1)$$

Example 1:

Calculate the accrued interest and final amount (both 360 and 365 day basis) for a \$30,000, 8%, 90 day interest at maturity note.

Keystrokes:

Display:

[USER]

(Set USER mode)

[XEQ] [ALPHA] SIZE [ALPHA] 007

[XEQ] [ALPHA] CONV [ALPHA]

[A]

INT BASIS (360/365) ?

365 [R/S]

NO. DAYS ?

90 [R/S]

INT RATE ?

8 [R/S]

BEG. AMT ?

30000 [R/S]

ACC. INT ?

[R/S]

INT=591.78

[+]

30,591.78

(Final Amount)

Example 2:

What is the nominal rate if the effective annual rate is 13% compounded quarterly?

Keystrokes:

Display:

[B]

NO. PER. ?

4 [R/S]

NOM ?

[R/S]

EFF ?

1 112

13 [R/S]

NOM = 12.41

Example 3:

A bank offers a savings plan with a 5% annual nominal interest rate. What is the annual effective rate if compounding is continuous?

Keystrokes:

Display:

[C]

NOM ?

5 [R/S]

EFF ?

[R/S]

C.EFF=5.13

Example 4:

In the above example, what is the annual effective rate if compounding is continuous on a 365/360 basis?

Keystrokes:

Display:

[D]

NOM ?

5 [R/S]

C.EFF=5.20

User Instructions

				SIZE: 007
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1.	Key in the program and set USER mode		[USER]	
2.	Initialize		[XEQ] CONV	
3.	SIMPLE INTEREST, press		[A]	INT BASIS (360/365) ?
4.	Input interest basis	360 or 365	[R/S]	NO. DAYS ?
5.	Input 3 of the following:			
	number of days	# days	[R/S]	INT RATE ?
	annual interest rate	INT	[R/S]	BEG. AMT ?
	beginning amount	BEG. AMT	[R/S]	ACC. INT ?
	accrued interest	ACC. INT	[R/S]	
6.	When prompted for the unknown variable,			DAYS=()
	press [R/S] (make no input). The unknown			RATE=()
	is automatically calculated when all the			or AMT=()
	data is input.			or INT=()
7.	(Optional) After solving for accrued			
	interest, press		[+]	XXX.XX
	to find the final amount.			
8.	Interest conversions (finite), press		[B]	NO. PER. ?
9.	Input the number of compounding periods/			
	year	NO. PER	[R/S]	NOM ?
10.	Input either one: nominal rate	NOM	[R/S]	EFF ?
	effective rate	EFF	[R/S]	NOM=()
11.	(See step 6)			or EFF=()
12.	Interest conversions (continuous), press		[C]	NOM ?
	Input either one: nominal rate	NOM	[R/S]	EFF ?
	effective rate	EFF	[R/S]	C. NOM=()
13.	(See step 6)			or C.EFF=()
14.	Calculate the continuous effective rate		···	

User Instructions

				SIZE: 007
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
(36	5/360 basis)		[D]	NOM ?
15. Inp	ut nominal rate	NOM	[R/S]	C.EFF=()
			,	
			- 10	
			···.	
	Th			
				1

01+LBL "CON		44+LBL 03	Calculate
٧		45 RCL 04	beginning amount
02 STOP		46 RCL 05	
03+LBL A	Simple interest	47 *	•
04 1.1	1	48 RCL 01	
05 STO 00		49 /	•
06 "INT BAS		50 RCL 02	•
IS <360/"		51 /	
07 "F365> ?	į	52 "AMT"	
		53 XEQ 13	
Ø8 PROMPT	Prompt and store	54+LBL 04	Calculate accu-
09 STO 05	data	55 RCL 03	mulated interest
10 CF 22	daca	56 RCL 01	muraced inceresc
11 "NO. DAY		57 RCL 05	1
S ?"		58 /	
12 XEQ 12]	59 RCL 03	
13 "INT RAT		60 *	,
E ?"		61 RCL 02	
		62 *	:
14 XEQ 12		63 "INT"	
15 "BEG. AM			
T ?"		64 XEQ 13	Nom. (-) eff.
16 XEQ 12		65+LBL B	Nom. (-) ell.
_17 "ACC. IN		66 1.1	
T ?"		67 STO 00	
18 XEQ 12		68 "NO. PER	
19 1 E2		. ?"	·
20 ST/ 02		69 PROMPT	Prompt and store
21 GTO IND		70 STO 05	data
06	i	71+LBL 14	:
22+LBL 01	Calculate no. of	72 CF 22	
23 RCL 04	days	73 "NOM ?"	
24 RCL 05	aays	74 XEQ 12	
25 *		75 "EFF ?"	!
26 RCL 03		76 XEQ 12	
27 /		77 GTO IND	
28 RCL 02		06	
29 /		78+LBL 01	Calculate nominal
30 "DAYS"		79 RCL 02	rate
31 XEQ 13		80 1 E2	
32+LBL 02	Calculate Int.	81 /	
33 RCL 05	rate.	82 1	
34 RCL 04		83 +	
35 *		84 RCL 05	
36 RCL 01		85 1/X	
37 /		86 Y1X	
38 RCL 03		87 1	
39 /		88 -	
40 1 E2		89 RCL 05	
41 *		90 *	
42 "RATE"		91 1 E2	
43 XEQ 13		92 *	
	<u> </u>		<u> </u>

93 "NOM"		144 STO IND	
94 XEQ 13		00	
95+LBL 02	Calculate	145 RCL 00	input made?
96 RCL 01	effective rate	146 FC?C 22	no, calc. this
	effective rate	147 STO 06	_
		148 ISG 00	quantity
98 1 E2			
99 *		149 RTN	
100 /		150+LBL D	
101 1		151 "NOM ?"	
102 +		152 PROMPT	Continuous
103 RCL 05		153 365	365/360 basis
104 YTX		154 *	3037300 Dasis
105 1		155 360	
106 -		156 /	
107 1 E2		157 GTO 07	
108 *		158 .END.	
100 " 109 "EFF"			
100 XEQ 13			
110 XEQ 13	Combidment		
	Continuous		
112 3.1	compounding	70	
113 STO 00			
114 GTO 14			
115+LBL 03	Calculate		·
116 RCL 04	nominal rate		İ
117 1 E2			
118 /			
119 1			
120 +			
121 LN			
122 1 E2			
123 *		80	İ
124 "C.NOM"			
125 XEQ 13			
126+LBL 04			
127 RCL 03			
128+LBL 07	Calculate		
129 1 E2	effective rate		
130 /	errective tate		
130 / 131 E†X			
		00	
133 -		90	
134 1 E2			
135 *			
136 "C.EFF"			
137+LBL 13	Display routine		
138 "⊢="			
139 ARCL X			
140 PROMPT			
141 RTN			İ
142+LBL 12	Input routine		
143 PROMPT	Tubar Toarrise	00	
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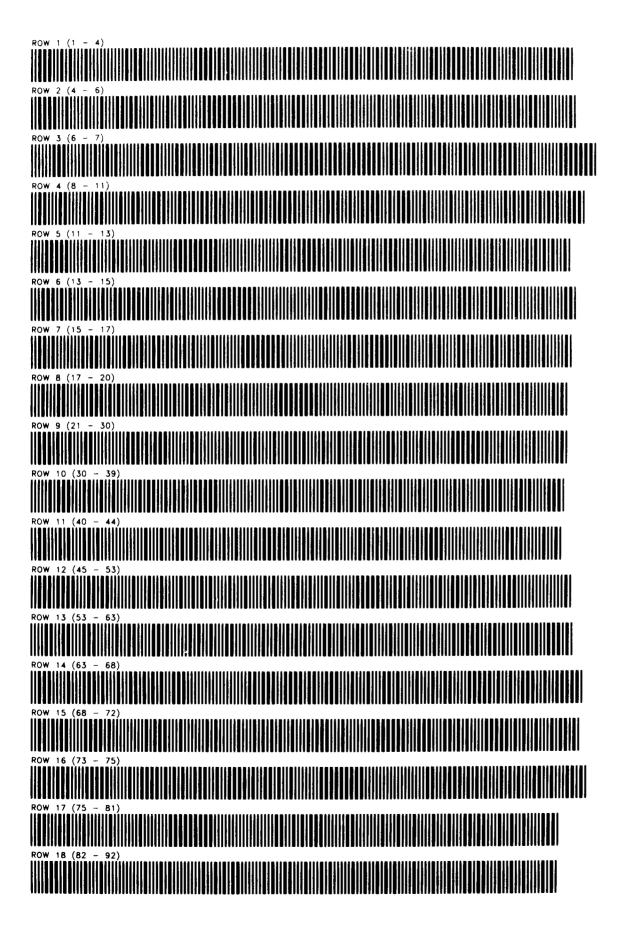
REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA REGISTERS			STATUS						
00	No. days/NOM Int rate/EFF	50		ENG	a	07 TOT. — FIX — — RAD —	2 SCI -		USER MO	OFF
05	B. AMT/CNOM ACC. INT/CEFF 360 or 365/no. per subroutine pointer	55		#				<u> </u>	CLEAR IND	
						refer L) OMITET	'S IIIau	nual	
10		60								
15		65								
20		70								
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30		80								
35		85								
				1	FUNC		ASSIGN KEY		TS	KEY
40		90								
45		95								

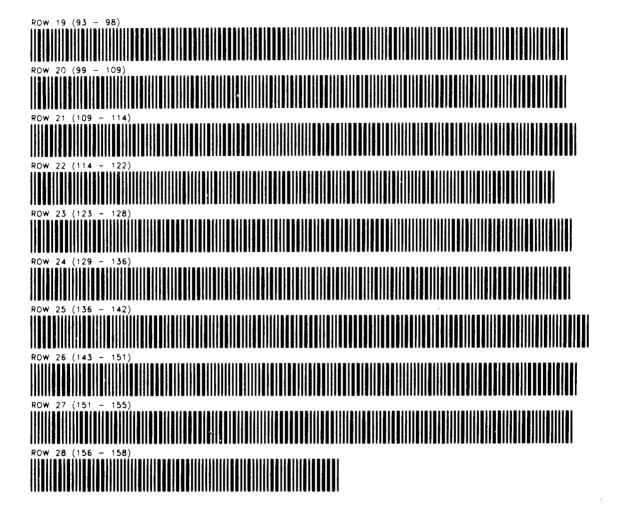
INTEREST CONVERSIONS

PROGRAM REGISTERS NEEDED: 51

HEWLETT PACKARD SOLUTION BOOK: LENDING SAVING & LEASING



HEWLETT PACKARD SOLUTION BOOK: LENDING SAVING & LEASING



LEASE WITH ADDITIONAL PAYMENTS IN ADVANCE

Payments on loans are typically made at the end of the period (in arrears). However, there are situations where payments are made in advance (leasing is a good example). Sometimes these agreements call for extra payments to be made when the transaction is closed, before the payments would normally be due. Or, the transaction has advance payments and a residual value at the end of the normal term.

This program solves for the periodic payment amount necessary to achieve a desired yield when a number of payments are made in advance. And, given the periodic payment, the program finds the yield. Either amount may be calculated when a residual value exists.

The necessary inputs are the total number of periods in the loan (n), the number of payments made in advance (A), the loan amount (PV), and either the periodic payment amount (PMT) or the periodic yield (i). The residual value at the end of the nth period (RESID) is optional.

Equations:

$$PMT = \frac{PV - RESID (1 + i)^{-n}}{\left[\frac{1 - (1 + i)^{-(n-A)}}{i} + A\right]}$$

Notes:

The value of A must be less than the value of n. A = 0 implies an ordinary annuity calculation, while A = 1 means an annuity due calculation.

Example:

A lease has been written to run for 60 months. The leased equipment has a value of \$25,000 with a \$600 monthly payment. The lessee has agreed to make 3 payments at the time of closing. What is the annual yield? (There is no residual value at the end of 60 months.)

Keystrokes:

[XEQ] [ALPHA] SIZE [ALPHA] 008

[XEQ] [ALPHA] ADV [ALPHA]

3 [R/S]

60 [R/S]

25000 [R/S]

0 [R/S]

600 [R/S]

12 [x]

Display:

NO. ADV. PMTS?

NO. PER. ?

PV ?

RESID. ?

PMT ?

INT=1.44

17.33 (annual)

User Instructions

				SIZE: 008
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1.	Key in the program			
2.	Initialize the program		[XEQ] ADV	NO. ADV. PMTS
3.	Input: no. of payments made in advance	A	[R/S]	NO. PER. ?
	no. of periods in the of loan	n	[R/S]	PV ?
	loan amount	PV	[R/S]	RESID. ?
	residual value at end of nth period	RESID	[R/S]	PMT ?
	and periodic payment	PMT	[R/S]	INT=()
	(if unknown, press		[R/S]	INT ?
	and input periodic interest)	INT	[R/S]	PMT=()

01+LBL "ADV		48 +	
		49 / 50 "PMT"	
02 "NO. ADV			
. PMTS?"	D	51 XEQ 12 52+LBL 01	
03 PROMPT	Prompt and store	52*LBL 01 53 STO 03	
04 STO 01	data	54 E-3	
05 "NO. PER		55 STO 02	Calculate inter-
. ?"		56+LBL 00	est using Newton
06 PROMPT		57 1	method
07 X<=Y?		58 RCL 02	
08 GTO 02	error	59 +	
09 CHS		60 STO 07	
10 STO 00		61 RCL 00	
11 "PV ?"		62 RCL 01	
12 PROMPT		63 +	
13 STO 04		64 Y1X	
14 "RESID.		65 1	
15 PROMPT		66 X<>Y	
16 STO 05		67 -	·
16 310 93 17 CF 22		68 RCL 02	
18 "PMT ?"		69 /	
19 PROMPT		70 RCL 01	
20 FS?C 22		71 +	
21 GTO 01		72 RCL 03	
22 "INT ?"		73 *	
23 PROMPT		74 RCL 07	
24 E2		75 RCL 00	
25 /		76 Y1X 77 RCL 05	
26 STO 02		77 RCE 93	
27 1	Calculate	79 +	
28 +	payment	80 RCL 04	
29 STO 07	• •	81 -	
30 RCL 00		82 STO 06	
31 Y1X	1	83 RCL 07	
32 RCL 05	ł	84 RCL 00	
33 * 34 RCL 04		85 RCL 01	
		86 +	
35 X<>Y 36 -		87 1	
37 RCL 07	1	88 -	
38 RCL 00		89 Y1X	
39 RCL 01		90 RCL 00	
40 +		91 CHS	
41 Y1X		92 RCL 01	
42 1		93 -	
43 X<>Y		94 *	
44 -		95 RCL 02	
45 RCL 02		96 * 97 RCL 07	
46 /		98 RCL 00	
47 RCL 01		99 RCL 01	
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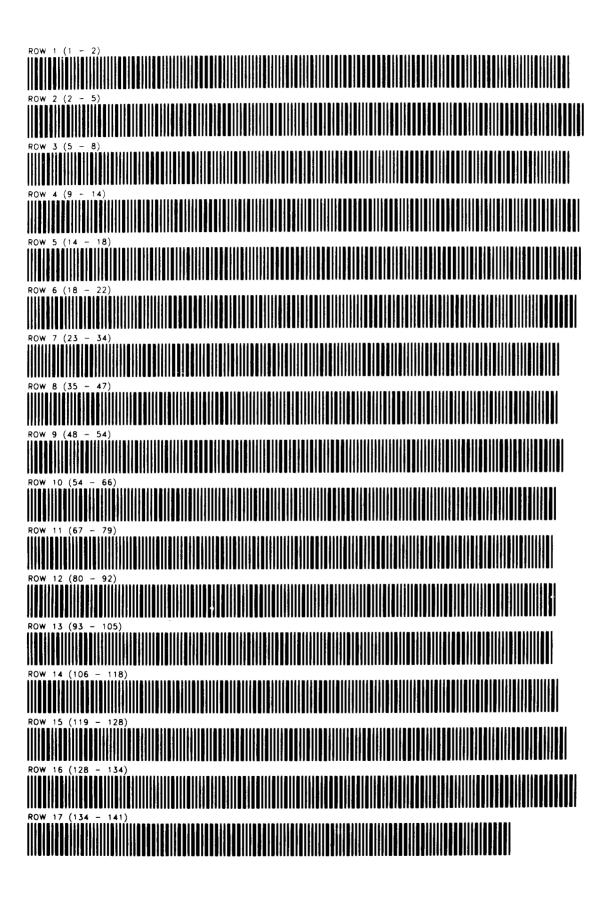
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101 Y1X				
102 1		 		
103 X<>Y				
		 		
104 -		 		
105 -				
106 RCL 02				
107 X12				
108 /				1
109 RCL 03		60		
110 *				
111 RCL 07				
112 RCL 00				
113 1	-			
114 -				
115 Y†X				
116 RCL 05		\vdash		
117 *		-		1
118 RCL 00				
119 *				
120 +		70		İ
121 RCL 06				
122 X<>Y		<u> </u>		
123 /				
123 / 124 ST- 02				
124 51- 62 125 ABS				
126 E-6				
127 X<=Y?				
128 GTO 00				
129 RCL 02		80		1
130 1 E2				1
131 *				1
132 "IHT"				
133+LBL 12	Display routine	-		
134 "⊢="				
135 ARCL X		<u> </u>		1
136 PROMPT	ļ			
137 RTN	1			
138+LBL 02	"DATA ERROR"			Į
139 0	Diffi Ballon			
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141 END]			
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REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA	REGISTERS		 		STAT	US	
00	-n A i/100 PMT	50	ENC	G	FIX -	T. REG. <u>40</u> <u>2</u> SCI — —— GRAD	USER MO	DE OFF X
05	PV RESID f(i)	55			SET	FLAC	CLEAR IND	CATES
<u> </u>	1 + i/100		22	С	refer	to owner'	s manual	
10		60						
				#				
15		65						
				 				
20		70						
25		75						
30		80						
30		00						
35		85		+				
				<u> </u>		ASSIGNM	JENTS	
				FUNC		KEY	FUNCTION	KEY
40		90						
45		95						

LEASE WITH ADDITIONAL PAYMENTS IN ADVANCE PROGRAM REGISTERS NEEDED: 32

HEWLETT PACKARD SOLUTION BOOK: LENDING SAVING & LEASING



SKIPPED PAYMENTS

Sometimes a loan (or lease) may be negotiated in which a specific set of monthly payments are going to be skipped each year. Seasonality is usually the reason for such an agreement. For example, because of heavy rainfall, a bulldozer cannot be operated in Oregon during December, January, and February, and the lessee wishes to make payments only when his machinery is being used. He will make nine payments per year, but the interest will continue to accumulate over the months in which a payment is not made.

Equations:

$$D_{END} = \frac{E}{1 - (1 + \frac{C}{A})^{-AB}}$$

$$\times \frac{\left[(1 + \frac{C}{A})^{A} - 1 \right] \frac{C}{A}}{\left[(1 + \frac{C}{A})^{A} - (1 + \frac{C}{A})^{A-K} + (1 + \frac{C}{A})^{A-L-K} - 1 \right]}$$

$$D_{BEGIN} = \frac{D_{END}}{1 + \frac{C}{A}}$$

where: A = number of payment periods per year

B = number of years

C = annual percentage rate (as decimal)

D = periodic payment amount

E = loan amount

K = number of last payment before payments close the first time

L = number of skipped payments

Example:

A bulldozer worth \$100,000 is being purchased in September. The first payment is due one month later, and payments will continue over a period of 5 years. Due to the weather, the machinery will not be used during the winter months, and the purchaser does not $w_{1\text{sh}}$ to make payments during January, February, and March (months 4 thru 6). If the current interest rate is 8 3/4%, what is the monthly payment necessary to amortize the loan?

Solution:

Keystrokes:

[XEQ] [ALPHA] SIZE [ALPHA] 008

[XEQ] [ALPHA] SKIP [ALPHA]

12 [R/S]

5 [R/S]

8.75 [R/S]

100000 [R/S]

3 [R/S]

3 [R/S]

Display:

NO. PER./YR. ?

NO. YRS. ?

INT ?

PV. ?

LAST PMT NO. ?

NO. PMTS SKIPPED ?

E. PMT=2,761.44

User Instructions

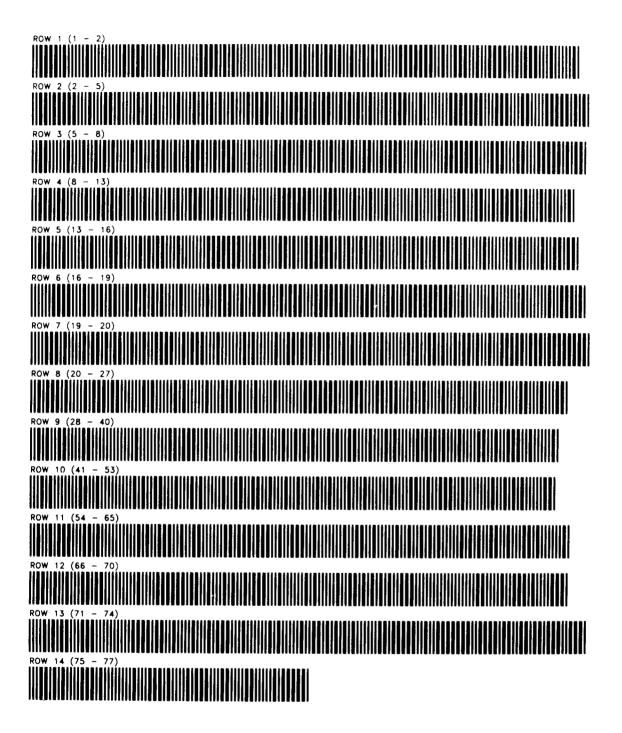
SIZE: 008 STEP **FUNCTION** DISPLAY INPUT **INSTRUCTIONS** Key in program 1. 2. [XEQ] SKIP Initialize NO. PER./YR. ? 3. Input: the number of periods/year [R/S]NO. YRS. ? NO.PER/YR INT ? number of years [R/S]NO. YRS annual interest (%) INT [R/S]PV ? loan amount [R/S] LAST PMT NO. PVNO. PMTS last payment no. [R/S]LAST PMT SKIPPED ? no. of payments skipped and [R/S] NO.SKIPPED E. PMT=C Find: payment (arrears) 4. B. PMT=C [R/S]payment (beginning) and

		· · · · · · · · · · · · · · · · · · ·	
01+LBL "SKI P" 02 "NO. PER ./YR. ?" 03 PROMPT 04 STO 00 05 "NO. YRS . ?" 06 PROMPT 07 STO 01 08 "INT ?" 09 PROMPT 10 02 13 "PV ?" 14 PROMPT 15 STO 04 16 "LAST PM T NO.?" 17 PROMPT 18 STO 05 19 " NO. PMTS SKI" 20 "HPPED ?" 21 PROMPT 22 STO 06 23 RCL 04 24 RCL 02 25 RCL 00 26 / 27 1 28 + 29 STO 07 30 RCL 01 32 * 33 CHS 31 RCL 01 32 * 33 CHS 34 Y†X 35 1 36 - 37 CHS 38 / 0. 07	Prompt and store data Calculate payment	46 * 47 * 48 RCL 00 49 / 50 RCL 07 51 RCL 00 52 RCL 05 53 - 54 Y*X 55 ST- 03 56 CLX 57 RCL 00 59 RCL 06 60 - 61 RCL 05 62 - 63 Y*X 64 RCL 03 65 + 66 / 67 "E. PMT" 68 XEQ 12 69 RCL 07 70 / 71 "B. PMT" 72*LBL 12 73 "H=" 74 ARCL X 75 PROMPT 76 RTN 77 .END.	Display routine
35 1 36 - 37 CHS		90	
38 / 39 RCL 07 40 RCL 00 41 Y1X			
42 1 43 - 44 STO 03			
45 RCL 02		00	

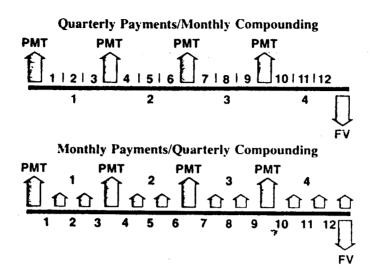
REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA	REGISTERS	· · · · · · · · · · · · · · · · · · ·		<u> </u>		STAT	rus		
00	A B C used	50		ENG	i	FIX -	2 sci	Of		
05	E	55		#	INIT S/C	SET I	FLA NDICATES		AR IND	ICATES
10		60								
15		65								
20		70								
25		75								
30		80								
35		85								
							ASSIGN			
40		90			FUNCT	ION	KEY	FUNCTI	ON	KEY
45		95	1470							

HEWLETT PACKARD SOLUTION BOOK: LENDING SAVING & LEASING



COMPOUNDING PERIODS DIFFERENT FROM PAYMENT PERIODS



Payments into a savings plan may not occur with the same frequency as the compounding frequency offered. This program solves for the number of payments, the periodic payment amount, or future value.

The diagrams above depict two of the many combinations that may be encountered. Note that payments are assumed to occur at the beginning of the payment period (annuity due).

Another assumption of this program is that payments deposited for a partial compounding period will accrue simple interest for the remainder of the compounding period. Thus, a deposit at the beginning of the 2nd month of a quarter into a savings plan that compounds quarterly is assumed to accrue two months simple interest. This is often the case, but is not true for all institutions.

Equations:

$$PMT = \frac{FV}{Z} \left[\frac{Q}{(1+Q)^{n}-1} \right]$$

when
$$P/C \le 1$$
 when $P/C > 1$ $Q = (1 + i)^{C/P} - 1$ $Q = i$ $n = \#PAY$ $n = (\#PAY)_X (C/P)$ $Z = (1 + Q)$ $Z = (P/C + 1)_X (\frac{Q}{2}) + (P/C)$

Example 1:

Quarterly deposits of \$95 are to be made into a savings account paying 5% compounded monthly. What amount will be in that account after 7 years (28 total payments)?

Keystrokes:

Display:

NO. PMT/YR ?
NO. PER./YR ?
INT ?
NO. PMTS ?
PMT ?
FV ?

Example 2:

[R/S]

In 2 years, you will need \$4000. If a savings account will pay $5\frac{1}{4}\%$ compounded quarterly, what amount must you deposit each month to accumulate the desired amount:

Keystrokes:	ζev	str	oke	s:
-------------	-----	-----	-----	----

Display:

FV=3,203.59

[XEQ] [ALPHA] CPDPP [ALPHA]	NO. PMT/YR ?
12 [R/S]	NO. PER./YR ?
4 [R/S]	INT ?
5.25 [ENTER 1] 4 [÷] [R/S]	NO. PMTS ?
24 [R/S]	PMT ?
[R/S]	FV ?
4000 [R/S]	PMT=157.78

User Instructions

SIZE: 008 **FUNCTION** DISPLAY STEP **INSTRUCTIONS** INPUT Key in the program 1. 2. Initialize the program [XEQ] CPDPP NO. PMT/YR ? 3. Input: number of payment periods per year NO. PMT/YR [R/S]NO. PER./YR ? periodic interest rate (%) NO. PMTS ? NO. PMT /YR [R/S]4. Input two of the following: total number of payments NO. PMTS [R/S]PMT ? periodic payment amount PMT [R/S]FV ? and future value [R/S] FV 5. When prompted for the unknown quantity, N=()PMT = ()press [R/S] (make no input). The unknown is then automatically calculated when all FV=() the data is input. For a new case, got to step 2 6.

01+LBL "CPD Prompt and 47 1 PP" 48 +	
PP Prompt and	
STOTE DATA	
02 1 49 LN	
03 "NO. PMT 50 RCL 05	
∠YR ?" 51 LN	
04 PROMPT 52 /	
l l	
05 "NO. PER 53 "N"	
./YR ?" 54 XEQ 13	
06 PROMPT 55+LBL 10 Cal	culate N
Cal	
1	> 1
08 STO 04 57 RCL 03	
09 X>Y? 58 *	
10 SF 00 P/C > 1 59 RCL 04	
11 "INT ?" 60 1	
12 PROMPT 61 +	
13 100 62 RCL 03	
14 / 63 2	
15 STO 03 64 /	
16 LASTX 65 *	
17 * 66 RCL 04	
18 RCL 03 67 +	
19 1 68 RCL 01	
20 + 69 *	
21 RCL 04 70 /	
22 1/X 71 1	
23 Y1X 72 +	
24 STO 05 73 LN	
25 .1 74 RCL 03	
26 STO 96 75 1	
27 CF 22 76 + ;	
28 "NO. PMT 77 LN	
s ?"	
29 XEQ 09 79 RCL 04	
30 "PMT ?" 80 *	
31 XEQ 09 81 "N"	
32 "FV ?" 82 XEQ 13	
77 450 00	
	ulate PMT
34 GTO IND 84 FS?C 00 P/C	< 1
85 GIU II 1	- •
35+LBL 00 Calculate N 86 RCL 05	
36 FS?C 00 P/C ≤ 1 87 1	
37 GTO 10 88 -	
38 RCL 05 89 RCL 05	
39 1 90 RCL 00	
40 - 91 YTX	
· - 1	
41 RCL 02 92 1	
42 * 93 -	
43 RCL 05 94 /	
44 RCL 01 95 RCL 02	
45 * 96 *	
46 / 97 RCL 05	

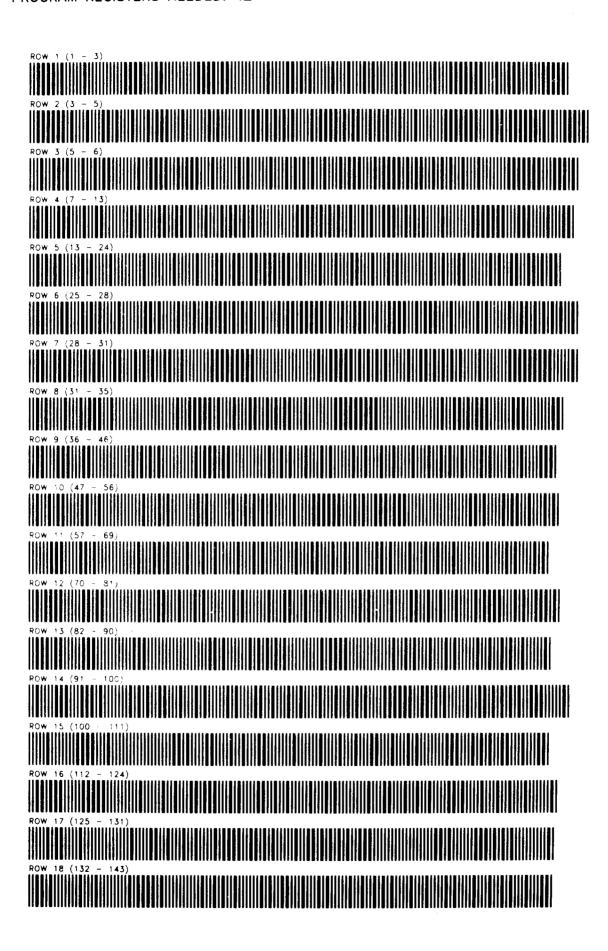
98 / 99 "PMT" 100 XEQ 13 101 LBL 11 102 RCL 04 103 1/X 104 RCL 00 105 * 106 RCL 03 107 1 108 + 109 X < > Y 111 1 112 - 113 RCL 03 114 X < > Y 115 / 116 RCL 04 117 1 118 + 119 RCL 03 120 2 121 / 122 * 123 RCL 04 124 + 125 / 126 RCL 02 127 * 128 "PMT" 129 XEQ 13 130 LBL 02 131 FS?C 00 132 GTO 12 133 RCL 05 134 RCL 00 135 Y TX 136 1 137 - 138 RCL 01 141 * 142 RCL 05 143 1	Calculate PMT P/C > 1 Calculate FV P/C < 1	149 RCL 04 150 1 151 + 152 RCL 03 153 2 154 / 155 * 156 RCL 04 157 + 158 RCL 03 159 1 160 + 161 RCL 00 162 RCL 04 163 1/X 164 * 165 Y*X 166 1 167 - 168 * 169 RCL 01 170 * 171 RCL 03 172 / 173 "FV" 174*LBL 13 175 "F=" 176 ARCL X 177 PROMPT 178 RTN 179*LBL 09 180 PROMPT 181 STO IND 06 182 RCL 06 183 FC?C 22 184 STO 07 185 ISG 06 186 RTN 187 .END.	Calculate FV P/C > 1 Display routine Input routine
141 *			
1			
145 /]
146 "FV" 147 XEQ 13			1
148+LBL 12		00	

REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA RE	GISTERS	STATUS	
	N PMT FV i/100	50	SIZE 008 TOT. REG. 49 USER MODE ENG FIX 2 SCI ON OFF DEG RAD GRAD	X
	P/C (1+i) C/P pointer	55	FLAGS INIT # S/C SET INDICATES CLEAR INDICATION	TFS
_	subroutine pointer		00 C P/C > 1 P/C < 1 22 C refer to owner's manual	
		60		
		65		
		70		
		75		
_		80		
		85		
_			ASSIGNMENTS	
		90	FUNCTION KEY FUNCTION	KEY
_		95		
_				
_				

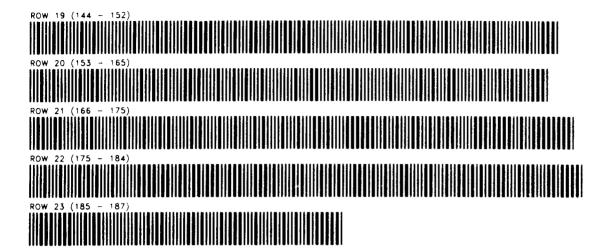
COMPOUNDING PERIODS DIFFERENT FROM PAYMENT PERIODS PROGRAM REGISTERS NEEDED: 42

HEWLETT PACKARD SOLUTION BOOK: LENDING SAVING & LEASING



COMPOUNDING PERIODS DIFFERENT FROM PAYMENT PERIODS

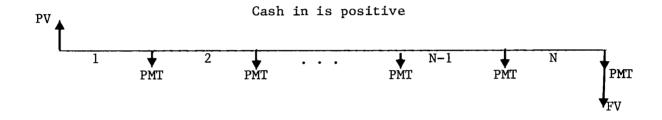
HEWLETT PACKARD SOLUTION BOOK: LENDING SAVING & LEASING



COMPOUND INTEREST SOLUTIONS

Commonly described as annuities and compound amounts, this program converts your HP-41C into a financial calculator, giving you the ability to solve complex problems involving savings, mortgages, annuities, and other financial calculations in a simple and straightforward manner. It duplicates the convenient and powerful built-in functions of the "top row keys" found on HP financial calculators. One Memory Module is needed to execute the program.

The five variables which have become standard for formatting and describing most compound interest problems can best be explained by referring to a pictorial representation called the cash flow diagram.



Cash out is negative

The diagram begins with a horizontal line called the time line. It represents the duration of a financial problem and is divided into N compounding periods of equal duration (length).

Exchange of cash is represented with vertical arrows. Money received is represented by an arrow pointing up (positive) from the time line where the transaction occured and money paid out is represented by an arrow pointing down (negative).

Payments (PMT) represent a series of cash exchanges of the same direction and amount. In the standard cash flow diagram the payments occur coincidental with the compounding periods and are equal to the number of periods. The first payment can either occur at the beginning of the first period (BEGIN) or at the end of the first period (END).

It is always necessary when working compound interest problems involving payments (PMT) to specify which of the two possible payment streams is applicable, (BEGIN)or (END). In the parlance of various industries BEGIN payments are often referred to as annuity due, or first payment in advance. END payments are referred to as ordinary annuity, payment in arrears, or immediate annuity.

A single cash flow at the start of the time line is called the present value (PV). A similar single cash flow at the end of the time line is called the future value (FV).

The fifth variable is I, the compound interest rate per period.

This program solves for any of the five standard compound interest variables:

N = the number of payments or compounding periods

I = the interest rate per period (as a percent)

PV = the initial transaction (present value)

PMT = the periodic payment coinciding with the compounding period

FV = the final transaction (future value)

When using the cash flow diagram and the cash flow sign convention to format compound interest problems the following rules always apply.

- N and I must correspond to the same period of time
- Both N and I must be present in a problem. Either both values are known, or one is known and the other is to be solved for.
- A valid financial transaction must always include at least one positive cash flow and one negative cash flow.

The cash flow diagram can be used to describe many variations of compound interest problems. Although the terminology used to describe a particular cash transaction may vary from industry to industry the cash flow diagram remains consistent. In providing a means of describing financial problems without using terminology specific to a particular segment, the cash flow diagram becomes, in a sense, a universal language.

Equations:

$$0 = PV + (1+\delta i) PMT \left[\frac{1 - (1+i)^{-N}}{i} \right] + FV (1+i)^{-N}$$

where i = I/100

$$\delta = \begin{cases} 0 & \text{in END} \\ 1 & \text{in BEGIN} \end{cases}$$

Example 1:

What monthly payment will amortize a mortgage loan of \$50,000 over 30 years at $10\frac{1}{2}\%$ interest? The first payment is made 1 month after the exchange of the initial loan amount (END).

Keystrokes: Display:

[USER] (Set USER mode)

[XEQ] [ALPHA] SIZE [ALPHA] 010

[XEQ] [ALPHA] MONEY [ALPHA] 0.00

30 [///] [A] N=360.00

50000 [C] PV=50,000.00

10.5 [///] [B] I=0.88

[D] PMT=-457.37 (Monthly payment)

Example 2:

In the previous example, what amount would be necessary to prepay the mortgage (remaining balance) at the end of the 6th year?

Keystrokes: Display:

6 [///] [A] N=72.00

[E] FV=-48,018.77 (Remaining balance)

Example 3:

How much money must be set aside in a savings account each month in order to accumulate \$4,000 in three years if the account compounds monthly at 6% per year? The deposits "begin" immediately.

Keystrokes: Display:

[///] [E] 0.00 (Clears financial data registers)

[///] [C] BEGIN (Set BEGIN mode)

4000 [E] FV=4,000.00 N=36.00

3 [///] [A] N=36.00 6 [///] [B] I=0.50

[D] PMT=-101.18 (Monthly deposit)

Example 4:

What interest rate did the bank pay (in the previous example) if the actual amount at the end of the 3 years was \$4,025.50?

Keystrokes: Display:

4025.50 [E] FV=4,025.50

[B] I=0.53

12 [X] 6.40 (Annual interest rate)

User Instructions

				SIZE: 010
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1.	Key in the program and set USER mode.		[USER]	
2.	Initialize		[XEQ] MONEY	0.00
3.	The following steps may be performed in			
	any order:			
	Multiplies the displayed number by	· · ·		
	12 and stores in N	n	[///] [A]	N = n x 12
	• Divides the displayed number by 12			
	and stores in I	i	[///] [B]	I = i/12
	• Toggles between BEGIN and END modes.			
	Flag O displayed (set) is BEGIN mode.		[///] [c]	BEGIN or END
	• List values*		[///] [D]	
	• Clear financial data		[///] [E]	0.00
4.	The following steps may be performed in			
	any order:			
	• Compute or store number of periods +		[A]	N =
	• Compute or store compound interest			
	rate	_	[B]	I =
	• Compute or store present value		[C]	PV =
	• Compute or store payment +		[D]	PMT =
	• Compute or store future value		[E]	FV =
5.	Review stored values		[RCL] [A]-[E]	
*	Press [R/S] to list successive values if			
	a printer is not being used.			
+	If an [A]-[E] key is pressed immediately			
	after keying in a value, the value will be stored. If the key is pressed after			
	previously pressing another [A]-[E] key and during which time no digit entry has been made, computation will occur.	<u> </u>		

01+LBL "MON	Initialize	51 GTO 14	
EY"		52 XEQ "PMT	
02+LBL e		11	
03 SF 21		53 GTO 14	
04 SF 27		54+LBL E	Store FV
05 CF 00		55 "FV"	Store rv
06 FIX 2		56 STO 05	:
96 FIA 2		57 FS?C 22	
		58 GTO 14	
08 STO 00		59 XEQ "FV"	
09 STO 01		60 GTO 14	
10 STO 02			
11 STO 03		61+LBL c	Begin/End
12 STO 04		62 "END"	
13 STO 05		63 0	
14 RTN	Output routine	64 STO 00	
15+LBL 14		65 FS?C 00	
16 "H="		66 PROMPT	
17 ARCL X		67 1	
18 AVIEW		68 STO 00	
19 RTN		69 SF 00	
20+LBL a		70 "BEGIN"	
21 12	12	71 PROMPT	
22 *		72+LBL d	
23+LBL A		73 ADV	List variables
24 "N"	Store N	74 FS? 00	
25 STO 01	'	75 GTO 00	
		76 "END"	
		77 AVIEW	
27 GTO 14			
28 XEQ "N"		78 GTO 01	
29 GTO 14		79+LBL 00	
30+LBL b	10.	80 "BEGIN"	
31 12	12÷	81 AVIEW	
32 /		82+LBL 01	
33◆LBL B	Store I	83 "N"	
34 "I"	50010 1	84 RCL 01	
35 STO 02		85 XEQ 14	
36 FS?C 22		86 "I"	
37 GTO 14		87 RCL 02	
38 XEQ "*I"		88 XEQ 14	
39 GTO 14		89 "PV"	
40+LBL C		90 RCL 03	
41 "PV"	Store PV	91 XEQ 14	
42 STO 03		92 "PMT"	
43 FS?C 22		93 RCL 04	
44 GTO 14		94 XEQ 14	
45 XEQ "PV"		95 "FV"	
45 AEW FV 46 GTO 14		96 RCL 05	
		97 GTO 14	
	Store PMT	98+LBL "N"	
48 "PMT"			
49 STO 04		99 RCL 02	Calculate N
50 FS?C 22	L	100 X=0?	Jaicarate II

181 GTO 83 152 STO 83 162 1 E2 153 + 154 RCL 86 155 RCL 86 155 RCL 86 155 RCL 86 155 RCL 86 155 RCL 86 155 RCL 86 155 RCL 86 155 RCL 86 155 RCL 86 155 RCL 86 166 RCL 86 168 RCL 86 168 RCL 86 168 RCL 86 168 RCL 86 168 RCL 86 168 RCL 86				
102 1 E2 103 / 104 STO 06 105 RCL 03 106 * 107 RCL 04 108 + 109 X=0? 110 GTO 04 111 XEQ 08 112 RCL 09 113 SIGN 114 X>0? 115 GTO 02 116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 119 K=RROR* 120 +LBL 04 121 **ERROR* 122 AVIEN 123 RTN 124 +LBL 03 125 RCL 04 127 + 128 RCL 04 129 / 130 CHS 131 STO 01 128 RCL 04 127 + 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 124 +LBL 03 125 RCL 04 127 + 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 133 +LBL 01 133 *RCL 04 129 / 130 CHS 131 STO 01 132 RTN 133 +LBL 01 133 *RTN 134 +LBL 08 135 XEQ 09 136 CHS 137 RTN 139 +LBL 02 141 *RCL 08 137 RTN 139 +LBL 02 141 *RCL 08 142 RCL 09 143 RCL 08 144 RCL 09 144 LBL B0 144 LBL B0 144 LBL B0 144 LBL B0 144 LBL B0 145 RCL 05 146 RCL 05 147 RCL 06 147 RCL 06 148 RCL 07 148 RCL 06 144 LBL B0 144 LBL B0 145 RCL 06 144 LBL B0 147 RCL 06 144 LBL B0 148 RCL 06 144 LBL B0 149 RCL 06 144 RCL 06 145 RCL 06 146 RCL 06 147 RCL 06 148 RCL 06 149 RCL 06 140 RCL 06 141 RCL	101 GTO 03		152 STO 03	
103 / 104 STO 06 105 RCL 03 106 * 107 RCL 04 108 + 109 X=0? 110 GTO 04 1111 XEQ 08 112 RCL 09 113 SIGN 114 X>0? 115 GTO 02 116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 119 GTO 01 119 GTO 01 110 GTO 02 116 RCL 08 117 SIGN 116 X> 118 X>0? 119 GTO 01 119 GTO 01 119 GTO 01 119 GTO 01 119 GTO 01 119 GTO 01 119 GTO 01 119 GTO 01 119 GTO 01 110 GTO 01 110 GTO 01 111 X>0? 111 X>0? 112 RCL 08 113 STO 01 120 RCL 03 125 RCL 03 125 RCL 04 127 YERROR* 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 133 LBL 01 132 RTN 133 LBL 01 133 XEQ 07 133 XEQ 07 134 RCL 08 135 XEQ 10 137 STO 01 138 RCL 04 139 LBL 02 140 RCL 08 137 STO 01 138 RCL 04 139 LBL 02 140 RCL 08 137 RTO 01 138 RCL 04 139 LBL 02 140 RCL 08 137 RCL 04 138 RCL 05 138 RCL 04 139 LBL 02 140 RCL 08 137 RCL 04 138 RCL 06 137 RCL 04 138 RCL 06 137 RCL 06 140 RCL 07 141 RCL 08 141 RCL 08 141 RCL 09 141 LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 149 RCL 05 146 RCL 05 147 RTN 148 RCL 06 144 LN1+X 149 RCL 07 149 RCL 07 140 RCL 08 140 RCL 09 141 RCL 09 141 RCL 09 141 RCL 09 141 RCL 09 141 RCL 09 141 RCL 09 141 RCL 09 144 RCL 07 145 RCL 05 146 RCL 05 147 RTN 148 RCL 05 147 RTN 148 RCL 06 144 RCL 07 147 RTN 148 RCL 07 149 RCL 07 140 RCL 07 140 RCL 08 140 RCL 05 141 RCL 05 142 RCL 05 144 RCL 07 144 RCL 07 145 RCL 07 146 RCL 07 147 RTN 148 RCL 07 148 RCL 07 149 RCL 07 140 RCL 07 141 RCL 08 141 RCL 09 141 RCL 09 141 RCL 07 141 RCL 07 141 RCL 08 142 RCL 05 144 RCL 07 144 RCL 07 145 RCL 08 145 RCL 08 146 RCL 05 147 RCL 08 148 RCL 06 148 RCL 06 148 RCL 06 149 RCL 07 140 RCL 07 141 RCL 08 141 RCL 07 141 RCL 08 1				
104 STO 06 105 RCL 03 106 * 107 RCL 04 108 + 109 X=0? 110 GTO 04 111 XEQ 08 112 RCL 09 113 SIGN 114 X>0? 115 GTO 01 118 X>0? 119 GTO 01 120 +LBL 04 121 "\$ERROR" 122 AVIEW 123 RTN 124 +LBL 03 125 RCL 05 127 + 128 RCL 05 131 STO 01 132 RTN 128 RCL 05 131 STO 01 132 RTN 129 -LBL 04 132 RTN 129 -LBL 05 131 STO 01 132 RTN 123 RTN 124 +LBL 03 125 RCL 05 127 + 128 RCL 05 131 STO 01 132 RTN 129 -LBL 04 133 RTN 139 +LBL 01 131 STO 01 132 RTN 133 STO 01 133 RTN 134 RCL 08 135 RCL 09 137 RCL 06 137 RCL 06 138 RCL 06 139 RCL 07 131 STO 01 132 RTN 133 RCL 04 133 RCL 04 134 RCL 08 135 RCL 09 137 RCL 06 138 RCL 06 137 RCL 06 138 RCL 06 139 RCL 06 137 RCL 06 138 RCL 06 139 RCL 06 131 RCL 06 131 RCL 06 132 RCL 06 133 RCL 06 134 RCL 07 135 RCL 06 137 RCL 06 138 RCL 06 139 RCL 06 141 LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 149 RCL 07 144 RCL 07 147 RCL 06 144 LN1+X 149 RCL 07 147 RCL 06 144 LN1+X 148 LBL 09 149 RCL 05 147 RCL 05 147 RCL 06 144 RCL 07 148 RCL 07 148 RCL 07 148 RCL 07 148 RCL 06 144 RCL 07 147 RCL 06 144 RCL 07 147 RCL 06 144 RCL 07 147 RCL 06 144 RCL 07 147 RCL 06 144 RCL 07 147 RCL 06 144 RCL 07 147 RCL 06 144 RCL 07 147 RCL 06 144 RCL 07 147 RCL 06 144 RCL 07 147 RCL 07 148 RCL 07 14				
105 RCL 03 106 * 107 RCL 04 108 + 109 X=0? 110 GTO 04 111 XEQ 08 112 RCL 09 113 SIGN 114 X>0? 115 GTO 02 116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 118 SY0? 119 GTO 01 119 GTO 01 118 X>0? 119 GTO 01 118 X>0? 119 GTO 01 118 X>0? 119 GTO 01 118 X>0? 119 GTO 01 118 X>0? 119 GTO 01 118 X>0? 119 GTO 01 120 LBL 04 121 "\$ERROR" 122 AVIEW 123 RTN 124 LBL 03 125 RCL 03 126 RCL 05 127 + 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 133 LBL 01 133 LBL 01 133 LBL 01 133 XEQ 10 133 STO 01 133 STO 01 133 STO 01 133 STO 01 134 RCL 08 135 XEQ 10 137 STO 01 138 RCL 04 139 LBL 02 141 LBL 08 137 STO 01 138 RCL 04 139 LBL 02 140 RCL 09 141 LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 149 LBL 09 144 LBL 09 144 LBL 09 144 RCL 09 144 CD 194 RCL 05 146 STO 01 147 RTN 148 RCL 05 146 STO 01 147 RTN 148 LBL 09 149 RCL 05 140 RCL 05 141 RCL 06 144 LN1+X 149 RCL 05 144 RCL 05 145 RCL 05 146 STO 01 147 RTN 148 LBL 09 149 RCL 05 149 RCL 05 140 RCL 05 144 RCL 05 145 RCL 05 146 STO 01 147 RTN 148 LBL 09 149 RCL 05 140 RCL 05 144 RCL 05 144 RCL 05 145 RCL 05 146 STO 01 147 RTN 148 LBL 09 149 RCL 05 140 RCL 05 144 RCL 05 145 RCL 05 146 RCL 05 147 RTN 148 LBL 09 149 RCL 05 140 RCL 05 141 RCL 05 144 RCL 05 145 RCL 05 146 RCL 05 147 RTN 148 LBL 09 149 RCL 05 140 RCL 05 140 RCL 05 141 RCL 05 144 RCL 05 145 RCL 05 146 RCL 05 147 RTN 148 LBL 09 149 RCL 05 140 RCL 05 141 RCL 05 144 RCL 05 145 RCL 05 146 RCL 05 147 RCL 05 147 RTN 148 LBL 01 149 RCL 05 140 RCL 05 141 RCL 05 141 RCL 05 142 RCL 05 144 RCL 05 144 RCL 05 145 RCL 05 146 RCL 05 147 RCL 06 144 RCL 05 144 RCL 05 144 RCL 05 145 RCL 05 146 RCL 05 147 RCL 06 144 RCL 05 144 RCL 05 145 RCL 06 144 RCL 05 145 RCL 06 144 RCL 05 145 RCL 06 144 RCL 05 145 RCL 06 144 RCL 05 145 RCL 06 144 RCL 05 145 RCL 06 146 RCL 05 147 RCL 06 147 RCL 06 148 RCL 05 149 RCL 06 140 RCL 06 141 RCL 0				
106 * 107 RCL 04 1108 + 1109 X=0? 1109 X=0? 1110 GTO 04 1111 XEQ 08 1112 RCL 09 113 SIGN 114 X>0? 115 GTO 02 116 RCL 08 117 SIGN 116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 119 GTO 01 119 GTO 01 119 GTO 01 119 GTO 01 119 GTO 01 119 GTO 01 110 RCL 08 1117 *\$ERROR" 1120 **LBL 04 1121 "*\$ERROR" 1122 AVIEW 1123 RTN 1124 **LBL 03 1125 RCL 03 1126 RCL 05 1127 + 1128 RCL 04 1129 / 1130 CHS 131 STO 01 132 RTN 133 **LBL 01 133 **LBL 01 134 RCL 08 135 XEQ 10 136 RCL 09 137 STO 01 138 RTN 139 **LBL 01 139 **LBL 02 140 **LBL 03 150 RCL 05 151 RCL 05 151 RCL 05 151 RCL 05 152 RCL 05 153 RCL 06 153 RCL 06 154 RCL 07 155 RCL 07 156 RCL 07 157 RCL 08 157 RCL 08 157 RCL 09 158 RCL 09 159 RCL 06 159 RCL 07 160 RCL 07 161 RCL 07 162 RCL 07 163 RCL 08 165 RCL 07 166 RCL 07 167 RCL 08 167 RCL 08 167 RCL 08 167 RCL 08 167 RCL 08 167 RCL 08 167 RCL 08 168 RCL 06 169 RCL 07 177 RCQ 09 178 RTN 179 **LBL "PV" 180 RCL 07 181 X=0? 181 X=0? 181 X=0? 181 X=0? 181 X=0? 181 X=0? 181 X=0? 181 X=0.06 183 RCL 06 184 RCL 06 185 RCL 06 186 RCL 07 187 RCL 04 188 RCL 06 189 RCL 07 189 RCL 07 189 RCL 08 180 RCL 07 180 RCL 08 1				
107 RCL 04 108 + 109 X=0? 110 GTO 04 1111 XEQ 08 1112 RCL 09 113 SIGN 114 X>0? 115 GTO 02 116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 11				
108 + 109 X=0? 110 GTO 04 1111 XEQ 08 112 RCL 09 113 SIGN 114 X>0? 115 GTO 02 116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 120 **				
109 X=0? 110 GTO 04 1110 KEQ 08 1112 RCL 09 113 SIGN 114 X>0? 115 GTO 02 116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 120 LBL 04 121 **ERROR** 122 AVIEW 123 RTN 124 RCL 03 125 RCL 03 126 RCL 04 127 + 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 133 **LBL 01 134 RCL 08 135 **RCL 08 137 RTN 138 RCL 06 137 RTN 139 LBL 02 140 RCL 09 141 **LBL 09 141 **LBL 09 142 LBL 04 159 RCL 06 165 RCL 07 170 RTN 180 RCL 08 181 X=0? 181 X=0? 182 RCL 04 183 RTN 184 RCL 07 185 RCL 06 187 RCL 06 187 RCL 06 188 RCL 06 187 RCL 06 188 RCL 06 188 RCL 06 187 RCL 06 188 RCL 06 188 RCL 06 188 RCL 06 188 RCL 06 188 RCL 06 188 RCL 06 188 RCL 06 189 ** 180 CL 02 Calculate PV 180 RCL 07 180 RCL 08 181 X=0? 181 X=0? 182 RCL 06 183 RTN 184 RCL 07 185 RCL 06 186 ** 187 RCL 06 187 RCL 06 188 RCL 06 199 CL 07 199 C				
110 GTO 04 111 XEQ 08 112 RCL 09 113 SIGN 114 X>0? 115 GTO 02 116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 120+LBL 04 121 "\$FRROR" 122 AVIEW 123 RTN 124 RCL 03 125 RCL 03 125 RCL 03 125 RCL 03 125 RCL 03 127 + 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 124 RCL 06 133 CHS 131 STO 01 132 RTN 133+LBL 01 133 RTN 133+LBL 01 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 138 RTN 139+LBL 02 131 STO 01 138 RTN 139+LBL 02 131 STO 01 132 RTN 133 RCL 08 137 STO 01 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 137 RCL 08 138 RCL 04 139 RCL 06 131 STO 01 134 RCL 08 135 XEQ 10 136 CHS 137 RCL 08 137 RCL 08 138 RCL 06 139 RCL 06 140 RCL 09 141+LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 145 / 146 RCL 06 144 LN1+X 147 RTN 148+LBL 09 149 RCL 03 150 ENTER† Calculate PV	108 +		159 *	
111 XEQ 08 112 RCL 09 113 SIGN 114 X>0? 115 GTO 02 116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 119 GTO 01 1120+LBL 04 121 "\$ERROR" 122 AVIEW 123 RTN 124+LBL 03 125 RCL 05 127 + 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 133+LBL 01 133 +LBL 01 133 +RCL 08 135 XEQ 10 136 RCL 08 137 STO 01 138 RTN 139+LBL 02 140 RCL 09 141 LBL 10 142 RCL 09 143 RCL 09 144 RCL 09 144 RCL 09 144 LN1+X 148+LBL 08 145 CALCUAR 147 RTN 148+LBL 09 149 RCL 06 144 RCL 06 144 LN1+X 148+LBL 09 149 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 LN1+X 148+LBL 09 149 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 RCL 07 147 RTN 148+LBL 09 149 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 RCL 07 147 RTN 199 CHS 148 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 RCL 07 147 RTN 199 CHS 190 RCL 05 191 RCL 06 191 RCL 06 191 RCL 07 192 RCL 06 194 RCL 01 195 * 196 RCL 05 197 + 197 RCL 06 197 RCL 06 198 RCL 05 199 RCL 05 190 RCL 05 191 RCL 06 191 RCL 07 194 RCL 01 195 * 196 RCL 05 197 RCL 04 197 RCL 06 198 RCL 05 197 RCL 06 198 RCL 05 197 RCL 06 198 RCL 05 197 RCL 06 198 RCL 05 197 RCL 06 198 RCL 05 199 RCL 05 197 RCL 06 198 RCL 06 199 RC	109 X=0?		160 1	
111 XEQ 08 112 RCL 09 113 SIGN 114 X>0? 115 GTO 02 116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 119 GTO 01 1120+LBL 04 121 "\$ERROR" 122 AVIEW 123 RTN 124+LBL 03 125 RCL 05 127 + 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 133+LBL 01 133 +LBL 01 133 +RCL 08 135 XEQ 10 136 RCL 08 137 STO 01 138 RTN 139+LBL 02 140 RCL 09 141 LBL 10 142 RCL 09 143 RCL 09 144 RCL 09 144 RCL 09 144 LN1+X 148+LBL 08 145 CALCUAR 147 RTN 148+LBL 09 149 RCL 06 144 RCL 06 144 LN1+X 148+LBL 09 149 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 LN1+X 148+LBL 09 149 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 RCL 07 147 RTN 148+LBL 09 149 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 RCL 07 147 RTN 199 CHS 148 RCL 06 144 RCL 06 144 RCL 06 144 RCL 06 144 RCL 07 147 RTN 199 CHS 190 RCL 05 191 RCL 06 191 RCL 06 191 RCL 07 192 RCL 06 194 RCL 01 195 * 196 RCL 05 197 + 197 RCL 06 197 RCL 06 198 RCL 05 199 RCL 05 190 RCL 05 191 RCL 06 191 RCL 07 194 RCL 01 195 * 196 RCL 05 197 RCL 04 197 RCL 06 198 RCL 05 197 RCL 06 198 RCL 05 197 RCL 06 198 RCL 05 197 RCL 06 198 RCL 05 197 RCL 06 198 RCL 05 199 RCL 05 197 RCL 06 198 RCL 06 199 RC	110 GTO 04		161 +	!
112 RCL 09 113 SIGN 114 X>0? 115 GTO 02 116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 120 +LBL 04 121 **perror* 122 AVIEW 123 RTN 124 +LBL 03 125 RCL 03 126 RCL 05 127 + 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 123 RTN 124 +BL 04 127 + 128 RCL 04 127 + 129 / 130 CHS 131 STO 01 132 RTN 133 +LBL 01 133 +RBL 01 134 RCL 08 135 XEQ 10 136 RCL 08 137 STO 01 138 RTN 139 +LBL 09 140 RCL 09 141 +LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 145 / 146 STO 01 148 RCL 05 147 RCL 05 147 RCL 06 148 RCL 06 149 RCL 06 141 LN1+X 159 RCL 05 166 * 167 + 168 / 169 RCL 06 171 CHS 172 XEQ 09 173 RTN 174 +LBL 08 175 XEQ 09 176 STO 08 177 XEQ 09 176 STO 08 177 XEQ 09 177 XEQ 09 178 RTN 179 +LBL "PV" 180 RCL 02 181 X=0? 181 X=0? 182 GTO 00 183 RTN 184 RCL 06 185 RCL 05 186 * 187 RCL 06 187 RCL 06 188 RCL 06 189 * 190 + 190 + 190 + 190 H 190 + 191 GTO 01 192 +LBL 00 194 RCL 01 195 * 196 RCL 05 197 + 197 RCL 01 199 CHS 147 RTN 198 +LBL 01 199 CHS 148 RCL 05 199 CHS 149 RCL 03 150 ENTER† Calculate PW				
113 SIGN 114 X>0? 115 GTO 02 116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 120 + LBL 04 121 "\$ERROR" Data error message 172 STO 09 122 AVIEW 173 RTN 174 + LBL 08 125 RCL 03 Calculate N if 175 XEQ 09 127 +				1
114 X>0? 115 GTO 02 116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 120+LBL 04 121 **ERROR" 122 AVIEW 123 RTN 124+LBL 03 125 RCL 03 126 RCL 05 127 + 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 133+LBL 01 134 RCL 08 135 XEQ 10 137 STO 01 138 RTN 139+LBL 02 140 RCL 09 141+LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 145 / 146 STO 01 147 RTN 148+LBL 09 149 RCL 03 150 ENTER† 166 * 166 * 167 * 168 / 168 / 168 / 168 / 168 / 168 / 168 / 168 / 168 / 168 / 168 / 168 / 168 / 168 / 168 / 168 / 168 / 168 / 168 / 171 CHS 171 CHS 172 STO 09 173 RTN 174+LBL 08 175 XEQ 09 177 XEQ 09 177 XEQ 09 177 XEQ 09 178 RTN 179+LBL "PV" 180 RCL 02 181 X=0? 181 X=0? 182 GTO 00 183 XEQ 07 185 RCL 05 186 * 187 RCL 06 188 RCL 06 189 * 190 + 191 GTO 01 192+LBL 00 141+LBL 10 193 RCL 04 194 RCL 01 195 * 196 RCL 05 197 + 198 LBL 01 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS				
115 GTO 02 116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 120*LBL 04 121 "\$ERROR" 122 AVIEW 123 RTN 124*LBL 03 125 RCL 03 126 RCL 05 127 + 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 133*LBL 01 133 RTN 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 138 RTN 139*LBL 02 140 RCL 09 141*LBL 10 143 RCL 06 144 LN1+X 148*LBL 09 149 RCL 03 150 ENTER† 166 * 167 + 168 / 169 RCL 06 170 * 169 RCL 06 170 * 169 RCL 06 170 RCL 06 171 CHS 172 STO 09 173 RTN 174*LBL 08 175 XEQ 09 176 STO 08 177 XEQ 09 177 XEQ 09 178 RTN 179*LBL "PV" 180 RCL 02 Calculate PV Calculate PV				_
116 RCL 08 117 SIGN 118 X>0? 119 GTO 01 120+LBL 04 121 "\$ERROR" 122 AVIEW 123 RTN 124+LBL 03 125 RCL 03 Calculate N if 170 STO 08 126 RCL 05 I=0 127 + 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 133+LBL 01 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 138 RTN 139+LBL 02 140 RCL 09 141+LBL 10 141+LBL 10 141 CHS 170 01 170 RTN 174+LBL 08 175 XEQ 09 175 XEQ 09 177 XEQ 09 178 RTN 179+LBL "PV" 180 RCL 02 181 X=0? 181 X=0? 182 GTO 00 183 XEQ 07 183 RTN 183 RCL 04 183 RCL 05 186 * 187 RCL 05 186 * 187 RCL 04 187 RCL 04 188 RCL 06 189 * 190 + 191 GTO 01 191 H1+LBL 10 192+LBL 00 141 LBL 10 142 LN1+X 145 / 146 STO 01 147 RTN 148+LBL 09 149 RCL 03 150 ENTER† Calculate PV 169 RCL 06 170 * 170 * 171 CHS 171 CHS 172 STO 09 173 RTN 174+LBL 08 175 XEQ 09 175 RTN 174+LBL 08 175 XEQ 09 176 RTN 189 RCL 04 187 RCL 04 187 RCL 04 187 RCL 04 187 RCL 04 189 * 190 + 191 GTO 01 192+LBL 00 192+LBL 00 192+LBL 00 193 RCL 04 195 * 196 RCL 05 197 + 198+LBL 01 199 CHS 19				
117 SIGN 118 X>0? 119 GTO 01 120+LBL 04 121 "\$ERROR" 122 AVIEW 123 RTN 124+LBL 03 125 RCL 03 126 RCL 05 127 + 128 RCL 04 129 / 129 / 130 CHS 131 STO 01 132 RTN 133+LBL 01 133+LBL 01 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 138 RTN 139+LBL 02 140 RCL 09 141+LBL 10 142 LN1+X 145 / 146 STO 01 148 RCL 06 149 RCL 09 141 RTN 148+LBL 09 149 RCL 03 150 ENTER† 168 / 169 RCL 06 170 * 169 RCL 06 171 CHS 172 STO 09 173 RTN 174+LBL 08 175 XEQ 09 176 STO 08 177 XEQ 09 177 XEQ 09 178 RTN 179+LBL "PV" 180 RCL 02 181 X=0? 181 X=0? 182 GTO 00 183 XEQ 07 183 XEQ 07 184 RCL 06 185 RCL 05 186 * 187 RCL 04 188 RCL 06 190 + 191 GTO 01 192+LBL 00 192+LBL 00 192+LBL 00 193 RCL 04 194 RCL 05 197 + 196 RCL 05 197 + 198+LBL 01 199 CHS 199 CHS 199 CHS 199 CHS 199 CALPULTE PW				
118 X>0? 119 GTO 01 120 LBL 04 121 "\$ERROR" 122 AVIEW 123 RTN 124 LBL 03 125 RCL 03				
119 GTO 01 120 LBL 04 121 "\$ERROR" 122 AVIEW 123 RTN 124 LBL 03 125 RCL 03				
120+LBL 04 message 171 CHS 121 "\$ERROR" message 172 STO 09 122 AVIEW 173 RTN 174+LBL 08 125 RCL 03 Calculate N if 176 STO 08 126 RCL 05 I=0 178 RTN 179+LBL "PV" 128 RCL 04 180 RCL 02 Calculate PV 130 CHS 131 STO 01 183 X=0? 131 STO 01 183 X=0? 132 RTN 184 RCL 07 134 RCL 08 185 RCL 05 135 XEQ 10 185 RCL 05 137 STO 01 188 RCL 06 138 RTN 189 RCL 06 138 RTN 199+LBL 09 141+LBL 10 192+LBL 00 142 LN1+X 190 HRCL 01 192+LBL 00 144 LN1+X 196 RCL 05 146 STO 01 199 CHS 199 CHS 148+LBL 01 148+LBL 09 149 RCL 03 150 ENTER↑ Calculate PV 171 CHS 172 STO 09 172 STO 09 173 RTN 174+LBL 08 175 XEQ 09 176 STO 09 177 XEQ 09 178 RTN 179 LBL "PV" 188 RCL 02 188 RCL 02 181 X=0? 182 GTO 00 183 XEQ 07 185 RCL 05 186 * 187 RCL 04 187 RCL 04 188 RCL 06 199 + 190 + 190 + 190 + 191 GTO 01 192+LBL 00 141 LN1+X 193 RCL 04 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	118 X>0?		169 RCL 06	
1204-LBL 04 121 "\$ERROR" 122 AVIEW 123 RTN 124+LBL 03 125 RCL 03	119 GTO 01	Data orrar	170 *	
122 AVIEW 123 RTN 124 LBL 03 125 RCL 03 126 RCL 05 127 + 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 133 LBL 01 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 138 RCL 04 137 STO 01 138 RCL 06 138 RTN 139 LBL 02 131 STO 01 132 RTN 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 138 RCL 06 138 RTN 139 LBL 02 140 RCL 09 141 LBL 10 142 LN1+X 148 RCL 06 144 LN1+X 146 STO 01 148 RCL 03 150 ENTERT 160 RCL 08 160 RTN 160 RCL 06 161 RCL 06 162 RCL 06 163 RCL 06 164 RCL 06 165 RCL 06 165 RCL 06 166 RCL 07 167 RCL 06 167 RCL 06 168 RCL 06 169 RCL 06 169 RCL 06 160 RCL 07 160 RCL 06 160 RCL	120+LBL 04		171 CHS	
122 AVIEW 123 RTN 124+LBL 03 125 RCL 03	121 "\$ERROR"	message	172 STO 09	
123 RTN 124 LBL 03 125 RCL 03 126 RCL 05 127 + 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 133 LBL 01 133 KBL 08 135 XEQ 10 137 STO 01 138 RCL 08 137 STO 01 138 RTN 139 LBL 02 140 RCL 09 141 LBL 10 141 LBL 10 142 LN1 + X 145 / 146 STO 01 147 RTN 148 LBL 09 149 RCL 03 150 ENTER↑ 174 LBL 08 175 XEQ 09 176 STO 08 177 XEQ 09 177 XEQ 09 178 RTN 179 LBL "PV" 180 RCL 02 181 X = 0? 181 X = 0? 182 GTO 00 183 XEQ 07 184 RCL 07 185 RCL 05 186 * 187 RCL 04 188 RCL 06 188 RCL 06 199 + 190 + 191 GTO 01 192 LBL 00 192 LBL 00 194 RCL 01 197 + 198 LBL 01 199 CHS 200 STO 03 201 RTN Calculate PV				
124+LBL 03 125 RCL 03				·
125 RCL 03				
126 RCL Ø5 I=0 177 XEQ Ø9 127 + 128 RCL Ø4 179 LBL "PV" 129 / 130 CHS 181 X=0? 131 STO Ø1 182 GTO ØØ 132 RTN 184 RCL Ø7 134 RCL Ø8 185 RCL Ø5 135 XEQ 1Ø 188 RCL Ø5 136 CHS 187 RCL Ø4 137 STO Ø1 188 RCL Ø6 138 RTN 188 RCL Ø6 138 RTN 199 + 140 RCL Ø9 191 GTO Ø1 141 LBL 1Ø 192 LBL ØØ 144 LN1+X 193 RCL Ø4 Calculate PV 143 RCL Ø6 194 RCL Ø1 if I=0 144 LN1+X 196 RCL Ø5 146 STO Ø1 197 + 198 LBL Ø1 149 RCL Ø3 190 CALCULATE PW 149 RCL Ø3 190 CALCULATE PW 149 RCL Ø3 200 STO Ø3 150 ENTER1				
127 + 128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 133*LBL 01 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 138 RTN 139*LBL 02 140 RCL 09 141*LBL 10 141*LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 146 STO 01 148*LBL 09 149 RCL 03 150 ENTER†				
128 RCL 04 129 / 130 CHS 131 STO 01 132 RTN 133 LBL 01 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 138 RTN 139 LBL 02 140 RCL 09 141 LBL 10 141 LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 145 / 146 STO 01 148 LBL 09 149 RCL 03 150 ENTER↑ Calculate PV 180 RCL 02 181 X=0? 182 GTO 00 183 XEQ 07 183 XEQ 07 184 RCL 07 185 RCL 05 186 * 187 RCL 04 188 RCL 06 188 RCL 06 199 + 190 + 191 GTO 01 192 LBL 00 161 LBL 00 172 LBL 00 173 RCL 04 174 RCL 01 175 * 176 RCL 05 177 LBL 01 177 LBL 01 177 LBL 01 177 LBL 01 177 LBL 01 177 LBL 01 177 LBL 01 177 LBL 01 177 LBL 02 177 LBL 02 177 LBL 02 177 LBL 02 177 LBL 02 177 LBL 02 177 LBL 02 177 LBL 02 177 LBL 02 177 LBL 02 177 LBL 02 177 LBL 03 177 LBL 03 177 LBL 03 177 LBL 04 177 LBL 07 177 LBL 0		I=0		
129 / 130 CHS 131 STO 01 132 RTN 133 LBL 01 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 138 RCL 05 137 STO 01 138 RCL 06 138 RTN 139 LBL 02 140 RCL 09 141 LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 145 / 146 STO 01 148 LBL 09 149 RCL 03 150 ENTER† 180 RCL 02 181 X=0? 181 X=0? 182 GTO 00 182 GTO 00 183 XEQ 07 183 XEQ 07 184 RCL 06 185 RCL 05 185 RCL 06 187 RCL 04 188 RCL 06 190 + 191 GTO 01 192 LBL 00 192 LBL 00 193 RCL 04 194 RCL 01 195 * 196 RCL 05 197 + 197 Calculate PV				
130 CHS 131 STO 01 132 RTN 133+LBL 01 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 138 RTN 139+LBL 02 140 RCL 09 141+LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 145 / 146 STO 01 148+LBL 09 149 RCL 03 150 ENTER↑ 181 X=0? 182 GTO 00 182 GTO 00 183 XEQ 07 184 RCL 07 184 RCL 07 185 RCL 05 186 * 187 RCL 04 188 RCL 06 189 * 190 + 191 GTO 01 192+LBL 00 192+LBL 00 193 RCL 04 Calculate PV 194 RCL 01 195 * 196 RCL 05 197 + 198+LBL 01 199 CHS 200 STO 03 201 RTN				Coloulata DV
131 STO 01 132 RTN 133+LBL 01 133+LBL 01 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 138 RTN 139+LBL 02 140 RCL 09 141+LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 145 / 146 STO 01 148+LBL 09 149 RCL 05 140 RCL 09 141 RCL 05 141 RCL 05 144 LN1+X 195 * 145 / 196 RCL 05 147 RTN 198+LBL 01 148+LBL 09 149 RCL 03 150 ENTER↑ 182 GTO 00 183 XEQ 07 184 RCL 07 184 RCL 07 185 RCL 04 185 RCL 04 187 RCL 04 187 RCL 04 188 RCL 06 192 LBL 00 192 LBL 00 193 RCL 04 194 RCL 01 195 * 196 RCL 05 197 + 197 RCL 05 197 RTN 198+LBL 01 198+LBL 01 198+LBL 01 198 RCL 03 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS 199 CHS	129 /		180 RCL 02	Calculate PV
132 RTN 133*LBL 01 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 138 RTN 139*LBL 02 140 RCL 09 141*LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 145 / 146 STO 01 148*LBL 09 149 RCL 03 150 ENTER↑ 183 XEQ 07 184 RCL 07 185 RCL 07 185 RCL 06 186 * 187 RCL 04 188 RCL 06 189 * 190 + 190 + 191 GTO 01 192*LBL 00 192*LBL 00 192*LBL 00 193 RCL 04 Calculate PV 194 RCL 01 if I=0	130 CHS		181 X=0?	
132 RTN 133*LBL 01 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 139*LBL 02 140 RCL 09 141*LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 145 / 146 STO 01 148*LBL 09 149 RCL 03 140 RCL 03 150 ENTER* 183 XEQ 07 184 RCL 07 184 RCL 07 185 RCL 04 187 RCL 04 188 RCL 06 189 * 190 + 190 + 191 GTO 01 192*LBL 00 192*LBL 00 192*LBL 00 194 RCL 01 195 * 196 RCL 05 196 RCL 05 197 + 197 RTN 198*LBL 01 199 CHS 200 STO 03 201 RTN Calculate PW	131 STO 01	1	182 GTO 00	
133*LBL 01 134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 138 RTN 139*LBL 02 140 RCL 09 141*LBL 10 141*LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 145 / 146 STO 01 148*LBL 09 149 RCL 03 150 ENTER↑ 184 RCL 07 185 RCL 07 185 RCL 06 186 * 187 RCL 04 188 RCL 06 189 * 190 + 190 + 191 GTO 01 192*LBL 00 192*LBL 00 193 RCL 04 Calculate PV 194 RCL 01 195 * 196 RCL 05 197 + 198*LBL 01 199 CHS 200 STO 03 150 ENTER↑			183 XEQ 07	
134 RCL 08 135 XEQ 10 136 CHS 137 STO 01 138 RTN 139 LBL 02 140 RCL 09 141 LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 145 / 146 STO 01 148 LBL 09 149 RCL 09 140 RCL 09 141 RCL 01 141 LN1+X 195 * 145 / 146 STO 01 148 LBL 09 149 RCL 03 150 ENTER† 185 RCL 05 186 * 186 * 187 RCL 04 188 RCL 04 189 * 190 + 190 + 190 + 190 + 190 + 190 + 191 GTO 01 192 LBL 00 192 LBL 00 192 LBL 00 193 RCL 05 194 RCL 05 195 * 196 RCL 05 197 + 198 LBL 01 198 LBL 01 199 CHS 199 CHS 199 CHS 190 STO 03 150 ENTER†				
135 XEQ 10 136 CHS 137 STO 01 188 RCL 06 138 RTN 139 LBL 02 140 RCL 09 141 LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 145 / 146 STO 01 148 LBL 09 149 RCL 03 150 ENTER↑ 186 * 187 RCL 04 188 RCL 04 189 * 189 * 189 * 189 * 189 * 189 RCL 06 190 + 190 + 191 GTO 01 192 LBL 00 192 LBL 00 193 RCL 04 194 RCL 01 195 * 196 RCL 05 197 + 198 LBL 01 199 CHS 200 STO 03 201 RTN Calculate PW 190 CALCULATE PW 190 CALCULATE PW 190 CALCULATE PW 190 CALCULATE PW 190 CALCULATE PW 191 GTO 04 192 CALCULATE PW 191 GTO 04 191				
136 CHS 137 STO 01 138 RTN 139 LBL 02 140 RCL 09 141 LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 145 / 146 STO 01 148 LBL 09 149 RCL 03 150 ENTER↑ 187 RCL 04 188 RCL 04 189 * 187 RCL 04 189 * 189 * 190 + 190 + 191 GTO 01 192 LBL 00 192 LBL 00 193 RCL 04 194 RCL 01 195 * 196 RCL 05 197 + 198 LBL 01 199 CHS 200 STO 03 201 RTN Calculate PV				
137 STO 01 138 RTN 139*LBL 02 140 RCL 09 141*LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 154 RCL 01 155 * 145 / 146 STO 01 148*LBL 09 149 RCL 03 150 ENTER* 188 RCL 06 189 * 190 + 190 + 190 + 190 + 191 GTO 01 192*LBL 00 192*LBL 00 193 RCL 04 194 RCL 01 195 * 195 RCL 05 196 RCL 05 197 + 198*LBL 01 198*LBL 01 199 CHS 200 STO 03 201 RTN Calculate PW 197 RTM 198*LBL 01 199 CHS 200 STO 03				
138 RTN 139*LBL 02 140 RCL 09 141*LBL 10 142 LN1+X 143 RCL 06 144 LN1+X 145 / 146 STO 01 147 RTN 148*LBL 09 149 RCL 03 150 ENTER* 189 * 190 + 191 GTO 01 191 GTO 01 192*LBL 00 192*LBL 00 192 * LBL 00 194 RCL 01 195 * 196 RCL 05 197 + 198*LBL 01 199 CHS 200 STO 03 150 ENTER*				
139*LBL 02 140 RCL 09 141*LBL 10 142 LN1+X 193 RCL 04 144 LN1+X 195 * 145 / 146 STO 01 147 RTN 148*LBL 09 149 RCL 03 150 ENTER↑ 190 + 191 GTO 01 192*LBL 00 192*LBL 00 192*LBL 00 194 RCL 01 195 * 196 RCL 05 197 + 198*LBL 01 198*LBL 01 199 CHS 200 STO 03 201 RTN 190 + 191 GTO 01 192*LBL 00 192*LBL 00 190 H 190 H 191 GTO 01 192*LBL 00 191 H=0 190 H 191 GTO 01 192*LBL 00 191 H=0 190 H 191 GTO 01 192*LBL 00 191 H=0 191 GTO 01 192*LBL 00 191 H=0 191 GTO 01 192*LBL 00 191 H=0 191 GTO 01 192*LBL 00 191 H=0 191 GTO 01 192*LBL 00 192 H=1 190 + 191 GTO 01 192*LBL 00 192 H=1 190 + 191 GTO 01 192*LBL 00 193 H=1 190 + 191 GTO 01 192*LBL 00 193 H=1 190 + 191 GTO 01 192*LBL 00 193 H=1 190 + 191 GTO 01 192*LBL 00 193 H=1 190 + 191 GTO 01 192*LBL 00 194 RCL 01 195 H=1 190 H 191 GTO 01 194 RCL 01 195 H=1 190 H 191 GTO 01 194 RCL 01 194 RCL 01 195 H=1		ł		
140 RCL 09 141+LBL 10 142+LBL 00 142 LN1+X 193 RCL 04 144 LN1+X 195 * 145 / 146 STO 01 147 RTN 148+LBL 09 149 RCL 03 150 ENTER↑ 191 GTO 01 192+LBL 00 192+LBL 00 193 RCL 04 194 RCL 01 195 * 196 RCL 05 197 + 198+LBL 01 198+LBL 01 199 CHS 200 STO 03 201 RTN Calculate PV				
141+LBL 10 142 LN1+X 193 RCL 04 143 RCL 06 144 LN1+X 195 * 145 / 146 STO 01 147 RTN 148+LBL 09 149 RCL 03 150 ENTER↑ 192+LBL 00 193 RCL 04 194 RCL 01 195 * 196 RCL 05 197 + 198+LBL 01 198+LBL 01 199 CHS 200 STO 03 201 RTN Calculate PV Calculate PV 193 RCL 04 Calculate PV 197 H 198 RCL 05 199 CHS 201 RTN				
142 LN1+X 143 RCL 06 144 LN1+X 195 * 145 / 146 STO 01 147 RTN 148 LBL 09 149 RCL 03 150 ENTER↑ 193 RCL 04 194 RCL 01 195 * 196 RCL 05 197 + 198 LBL 01 198 LBL 01 200 STO 03 201 RTN Calculate PV if I=0 190 191 195 * 196 RCL 05 197 + 198 LBL 01 198 LBL 01 199 CHS 200 STO 03				:
143 RCL 06 144 LN1+X 195 * 145 / 146 STO 01 147 RTN 198 LBL 01 148 LBL 09 149 RCL 03 150 ENTER↑ 194 RCL 01 195 * 196 RCL 05 197 + 198 LBL 01 199 CHS 200 STO 03 201 RTN Calculate PMT	141 + LBL 10			;
144 LN1+X 145 / 146 STO 01 147 RTN 198 LBL 01 148 LBL 09 149 RCL 03 150 ENTER↑ 195 * 196 RCL 05 197 + 198 LBL 01 198 CHS 200 STO 03 201 RTN Calculate DWE	142 LN1+X		193 RCL 04	Calculate PV
145 / 196 RCL 05 146 STO 01 197 + 147 RTN 198 + LBL 01 148 + LBL 09 199 CHS 149 RCL 03 200 STO 03 150 ENTER↑ 201 RTN	143 RCL 06		194 RCL 01	if I=0
145 / 196 RCL 05 146 STO 01 197 + 147 RTN 198 + LBL 01 148 + LBL 09 199 CHS 149 RCL 03 200 STO 03 150 ENTER↑ 201 RTN	144 LN1+X		195 *	
146 STO 01 197 + 147 RTN 198 + LBL 01 148 + LBL 09 199 CHS 149 RCL 03 200 STO 03 150 ENTER↑ 201 RTN				
147 RTN 198+LBL 01 148+LBL 09 149 RCL 03 150 ENTER↑ 198+LBL 01 199 CHS 200 STO 03 201 RTN Calculate DWD		İ		
148+LBL 09 199 CHS 149 RCL 03 200 STO 03 150 ENTER↑ 201 RTN				
149 RCL 03 200 STO 03 150 ENTER↑ 201 RTN Coloulete PMT				
150 ENTER↑ 201 RTN		1		
C_0				
151 X<> 05 202+LBL "PMT calculate FMT				Calculato PMT
	151 X<> 05		202+LBL "PMT	carcurate rm

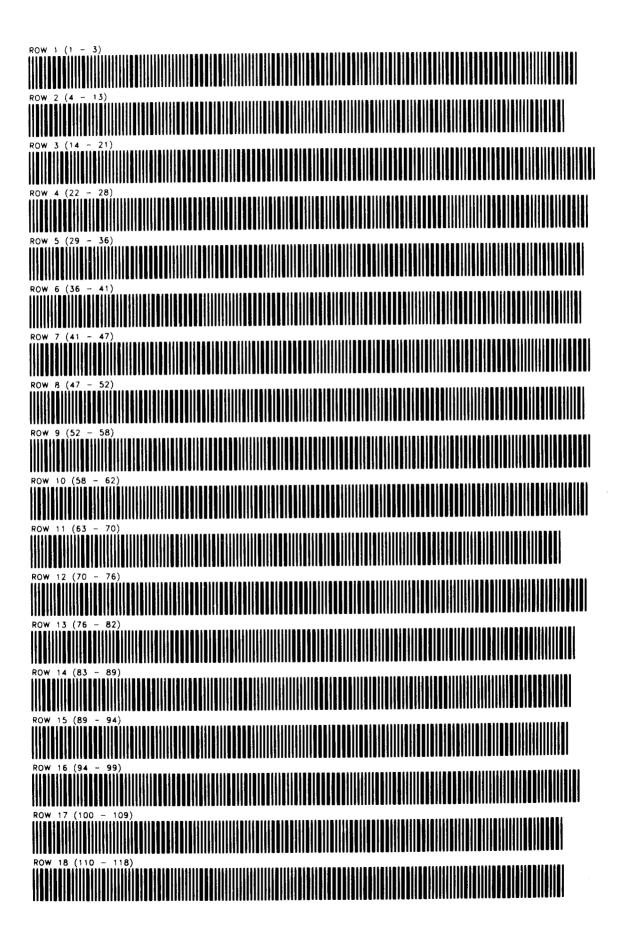
••		253 RCL 01	
203 RCL 02		254 *	
204 X=0?		255 CHS	
205 GTO 00		256 E1X	
206 XEQ 07		257 STO 07	
1 -		258 LASTX	
		— —	
208 RCL 05		259 E↑X-1	
209 *		260 CHS	
210 RCL 03		261 RCL_02	
211 +		262 1 E2	
212 RCL 06		263 /	
213 /		264 /	
214 GTO 01		265 LASTX	
215+LBL 00	Calculate PMT	266 RCL 00	
216 RCL 03		267 *	
217 RCL 05	if I=0	268 1	
218 +		269 +	•
219 RCL 01		270 *	
220 /		271 STO 06	
221+LBL 01		271 370 90 272 RTN	
<u> </u>			
222 CHS		273+LBL "*I"	Calculate I
223 STO 04		274 RCL 01	
224 RTN	Calculate FV	275 RCL 04	1
225+LBL "FV"	Carculate IV	276 *	<u> </u>
226 RCL 02		277 RCL 03	
227 X=0?		278 +	
228 GTO 00		279 RCL 05	
229 XEQ 07		280 +	
230 RCL 06		281 X=0?	I=0
231 RCL 04		282 GTO 02	
232 *		283 CF 05	
233 RCL 03		284 RCL 03	•
234 +		285 RCL 04	
1		286 RCL 00	
235 RCL 07		287 *	
236 /			
237 GTO 01		288 +	
238+LBL 00	0.11.5. 777	289 STO 06	
239 RCL 04	Calculate FV	290 LASTX	
240 RCL 01	if I=0	291 RCL 04	
241 *		292 -	
242 RCL 03		293 CHS	
243 +		294 RCL 05	
244+LBL 01		295 +	
245 CHS		296 STO 07	
246 STO 05		297 RCL 01	
247 RTN		298 1	
248+LBL 07		299 X=Y?	
248 TEL 07		300 GTO 00	
l .			
250 1 E2		301 RCL 04	1
251 /		302 X≠0?	
252 LN1+X		303 GTO 01	1

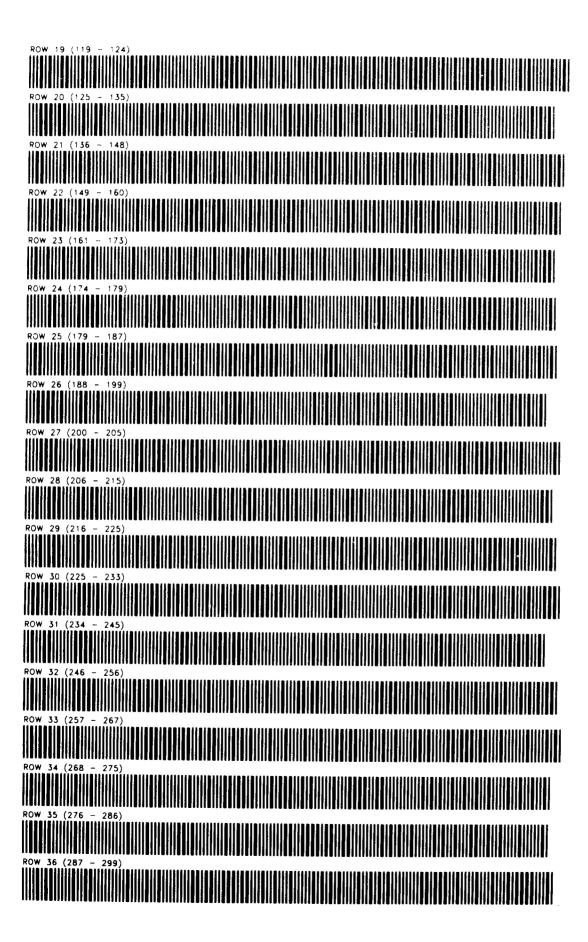
304+LBL 00	-	355 RCL 04	
305 RCL 06		356 *	
306 RCL 07	†	357 RCL 02	
307 *	1	358 RCL 01	
308 X=0?		359 Y1X	
309 GTO 04	1	360 RCL 06	
310 RCL 07	Calculate I by	361 *	
	simple formula		
311 RCL 06	1	362 +	
312 /	1	363 STO 09	
313 CHS	1	364 RCL 01	
314 RCL 01	1	365 RCL 08	
315 1/X		366 -	
316 Y1X		367 RCL 02	
317 1	İ	368 1	
318 -		369 -	
319 GTO 02		370 X=0?	
320 + LBL 01		371 GTO 00	
321 RCL 07		372 /	
322 RCL 06	<u> </u>	373 RCL 02	
323 *		374 *	
324 X>0?	ł	375 RCL 04	
325 GTO 04		376 *	
326 RCL 01		377 GTO 01	
327 1/X		378+LBL 00	
328 1		379 RCL 01	
329 +		380 1	
330 STO 02		381 RCL 01	İ
331 RCL 06		382 -	
332 RCL 04		383 *	
333 *		384 2	
334 X<0?		385 /	
335 XEQ 05	Rogin loon	386+LBL 01	·
336+LBL 12	Begin loop	387 RCL 09	
		388 RCL 01	
338 LN		389 *	
339 RCL 01		390 +	İ
340 *		391 RCL 09	
341 E1X-1		392 X<>Y	
342 RCL 02		393 /	
343 1		394 RCL 07	
344 -		395 CHS	
345 X=0?		396 RCL 09	
346 GTO 00		397 /	
347 /		398 X<>Y	
348 GTO 01		399 Y↑X	
349 + LBL 00		400 RCL 02	
350 RCL 01		401 *	
351+LBL 01		402 LASTX	
352 STO 08		403 X<>Y	
353 1		404 STO 02	
<u> 354 - </u>		405 X<>Y	
			

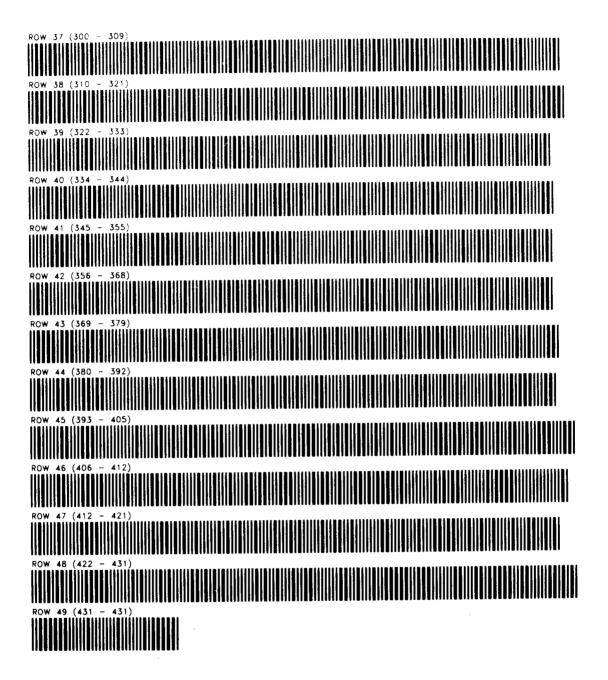
406 %CH		51		
407 ABS				
408 1 E-6	If I not small,			
409 X<=Y?	repeat loop			
410 GTO 12	_ 1			
411 FS? 05				
412 XEQ 05		·		
413 CF 05				
414 RCL 02		1		
415 1				
		60		
416 -				
417 STO 02				
418+LBL 02				
419 1 E2	Multiply by			
420 *	100 and store			
	in R ₀₂			
421 STO 02	-11 AU Z			
422 RTN				ļ
423+LBL 05				ļ
424 SF 05				1
425 RCL 02		ļ		
		70		
426 1/X				
427 STO 02				
428 RCL 07				
429 X<> 06		ļ		
430 STO 07				
431 .END.				
				
30		80		
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40		90		
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50		00		
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REGISTERS, STATUS, FLAGS, ASSIGNMENTS

DATA REGISTERS		TA REGISTERS	STATUS	STATUS			
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	I		DEG RAD GRAD	ONOFF			
	PV			····			
	PMT		FLACO				
	FV	55	INIT FLAGS				
	USED		INIT # S/C SET INDICATES	CLEAR INDICATES			
	USED		00 BEGIN				
	USED		05 Scratch in I				
	USED		21 Printer enable				
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