HEWLETT-PACKARD

## HP-41C

### USERS' LIBRARY SOLUTIONS Real Estate



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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  $\div$  .
  - d. The printer indication of the multiply sign is # . When you see # in the program listing, press 💌.
  - e. The I- character in the program listing is an indication of the **APPEND** function. When you see I-, press **APPEND** in ALPHA mode (press **APPEND** 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)

Keystrokes

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.

Printer	Listing
---------	---------

Display

01+LBL "SAM	LBL ALPHA SAMPLE ALPHA	$01 LBL^{T}SAMPLE$
PLE"	ALPHA THIS IS A ALPHA	$02^{T}$ THIS IS A
02 "IHIS IS 0 "		03T - SAMDI F
03 "HSAMPLE		
		04 AVIEW
04 AVIEW	6	05 6
05 6	ENTER+	06 ENTER 1
06 ENTER†		00 200 200 /
07 -2	2 CHS	07 -2
08 /	÷	<b>08</b> /
09 ABS	XEQ ALPHA ABS ALPHA	00 485
10 STO IND		UJ ADS
L	STO L	10 STO IND L
11 "R3="	ALPHA R3- ABCL 02	$11^{T}P3-$
12 ARCL 03		11 115-
13 AVIEW	AVIEW	12 ARCL 03
14 RTN	ALPHA	13 AVIEW
	RTN	14 RTN

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5.	WRAP-A	ROUND MORTGAGE
6.	INTERN	AL RATE OF RETURN
7.	VARI AB	LE ANALYSIS OF REAL ESTATE INVESTMENT

- \*8. REAL ESTATE INVESTMENT ANALYSIS FOR PROPERTY AND LAND...38 This program is designed to do a complete before and after tax cash flow analysis. Program considers closing costs, excess depreciation, capital gains, loan reduction and appreciation of the investment.
- 9. ELLWOOD INCOME VALUATION FOR INCOME PROPERTY APPRAISAL..44 This program is a substitute for the tables commonly used in appraising real estate income streams to derive a value for a property given a required return on equity.

\* Requires one Memory Module

#### INCOME PROPERTY ANALYSIS

Capitalization Rate	= Net Operating Income Purchase Price
Taxable Income	= Net Operating Income - Depreciation - Interest
Spendable Income	= Net Operating Income - Payments - Income Tax
Spendable Income Rate	= Spendable Income Equity
Equity Income	= Net Operating Income - Interest - Income Tax
Equity Income Rate	= Equity Income Equity
Interest	= PMT $\left[ 12 - \frac{(1+i)^{12-n}}{i} \left[ 1 - (1+i)^{-12} \right] \right]$

The above variables are the generally accepted parameters for the analysis and evaluation of income properties. This program follows the standard NIREB recommended format. Net Operating Income is gross income decreased by vacancies and operating expenses.

- Note: This program will operate with only one level of mortgage, i.e., properties with second mortgages cannot be analyzed by this program. This valuation or analysis technique is ubiquitous particularly since it takes explicit tax consequences into consideration.
- References: National Institute of Real Estate Brokers income property analysis data sheet. HP-67/HP-97 Users' Library program #00512D by Jack Buster.

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Example: Determine the performance over the next five years of an investment with the following particulars:

\$750,000.00	= Purchase price
\$635,000.00	= Loan amount
9.75%	= Interest rate
\$ 95,000.00	= Land value
\$ 7,000.00	= Monthly payment
\$112,500.00	= Net Operating Income
40%	= Income tax bracket
35 yrs.	= Building life

Use inflation/appreciation rates of: current year=7%; next year=7.5%

Note: Keystrokes assume there is a printer.

Keystrokes:	Display:
[XEQ] [ALPHA] SIZE [ALPHA] 016	
[XEQ] [ALPHA] IPA [ALPHA]	INT ?
9.75 [ENTER↑] 12 [÷] [R/S]	PMT ?
7000 [R/S]	LOAN AMT ?
635000 [R/S]	PURCH. P. ?
750000 [R/S]	NOI ?
112500 [R/S]	LIFE ?
35 [R/S]	LAND VAL. ?
95000 [R/S]	TAX BRACKET?
40 [R/S]	%CAP. RT.=15.00
	YR=1.00
	TAXABLE=32,887.48
	SPEND.=15,345.01
	RATE=13.34
	EQTY=38,446.77
	RATE=33.43
	INF/AP RATE ?
7 [R/S]	YR=2.00
	TAXABLE=43,118.33
	SPEND.=19,127.67
	RATE=10.04
	EQTY=44,585.28
	RATE=23.39

### **User Instructions**

				SIZE: 016
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Load the program			
2	Initialize the program		[XEQ] IPA	INT ?
3	Input: interest rate per period;	i	[R/S]	PMT ?
	payment per period;	PMT	[R/S]	PURCH. P. ?
	loan amount;	AMT	[R/S]	NOI ?
	net operating income;	NOI	[R/S]	LIFE ?
	ments remaining economic life of improve-	LIFE	[R/S]	LAND VAL. ?
	land value;	Val	[R/S]	TAX BRACKET
	investor's tax bracket.	TAX	[R/S]	%CAP. RT.=( )
	The capitalization rate is automatically o	utput.		
4	Press →		[R/S] *	YR=( )
5	Find: Taxable income;		[R/S] *	TAXABLE=( )
	Net spendable income:		[R/S] *	SPEND.=()
	Spendable income rate;		[R/S] *	RATE=()
	Equity income; and		[R/S] *	EQTY=()
	Equity rate.		[R/S] *	RATE=()
6	Press →		[R/S] *	INF/AP RATE 3
7	Input inflation/appreciation rate	rate	[R/S]	YR=( )
	and go to step 5			
	*These keystrokes are not necessary if			
	there is a printer in the system.			

01+LBL "IPA	Initialize	46 GTO 01	Calculate
		47 RCL 00	taxable income
02 CF 00		48 RCL 03	
03 SF 21	1	49 -	
04 0	t	50 RCL 02	
05 STO 15		51 /	
06 "INT ?"	Input and store	52 STO 02	
07 PROMPT	data	57 1	
08 STO 11		54 PCL 11	
00 0.0 11 09 "PMT 2"		54 KOL II 55 V	
10 PPOMPT		50 % E/ CTO 00	
11 CTO 12		50 510 87	
		J/ +	
		58 510 07	
1 2"		59 RCL 12	
13 PRUMPT		60 RCL 09	
14 STO 13		61 /	
15 "PURCH.		62 ENTER†	
P. ?"		63 ENTER↑	
16 PROMPT		64 RCL 13	
17 STO 00		65 -	
18 "NOI ?"		66 /	
19 PROMPT		67 LN	
20 STO 01		68 RCL 07	
21 "LIFE ?"		69 LN	
22 PROMPT		70 /	
23 STO 02		71 STO 10	
24 "LAND VA		72+LBL 01	
L. ?"		73 XEQ 00	
25 PROMPT		74 STO 06	
26 STO 03		75 RCL 02	
27 "TAX BRA		76 +	
CKET?"		77 CHS	
28 PROMPT		78 RCL 01	
29 STO 04		79 +	
30 RCL 01	Calculate	90 STO 07	
31 RCL 00	Capitalization	00 310 03 01 "TOYOR! F	
72 /	rate	BI THANDEE	
77 1 E2		00 VEN 89	
		07 PCI 04	
34 * 75 ***COP P		03 KCL 07 04 1 E2	Calculate
33 <b>%CHI :</b> K		04 1 62	spendable income
76 yeo 09		00 / 07 DCL 07	and rate
77 ODV		00 KUL 03	
JOALDI GO		07 * 00 CTO 07	
79 ANU	increment and	00 010 07 00 001 10	
37 HUY 40 1	display year	07 KUL 12 00 DC1 00	
40 I A1 CT+ 15		70 KUL 00 01 4	
41 017 10		71 T 00 CT0 14	
42 KUL IJ 47 "VD"		72 310 14 07 1	
40 IK 44 VEO 00		73 T 04 CUC	
44 AEW 07 45 E97 AA		95 RCI 01	

96 +			
07 "CDEND "	4	146 HVIEW	
77 SFERD.		147 RTN	
98 XEQ 09		148+LBL 00 Inte	erest
99 RCL 00	1	149 PCI 11 calc	rulation
100 RCL 13	•		-i
100 KOL 10	1	150 I E2 10uu	Line
101 -		151 /	
102 STU 09	1	152 STO 09	
103 /	1	157 1	
104 1 F2		153 1	
		134 +	
103 *		155 STO 05	
106 "RHIE"	1	156 12	
107 XEQ 09	1	157 STO 08	
108 RCL 07	Calculate equity		
109 PC1 06	carculate equity		
100 KCL 00	income and rate	159 118	
110 +		160 1	
111 CHS		161 X<>Y	
112 RCL 01		162 -	
113 +			
114 "FOTY"		163 KUL 03	
		164 RCL 08	
115 XEQ 09		165 RCL 10	
116 RCL 09		166 -	
117 /		167 242	
118 1 F2		100 000 00	
110 1 22		168 RUL 09	
		169 /	
120 "RHIE"		170 *	
121 XEQ 09		171 RCL 08	
122 RCL 06		172 8/38	
127 PC1 14	Adjust for in-	172 0321	
125 KCL 14	flation and	173 -	
		174 RCL 12	
125 51+ 13	prepare for next	175 *	
126 "INF/AP	year's run	176 .END.	
RATE?"			
127 PROMPT			
120 CTO 14			
129 RCL 00			
130 X<>Y	}		
131 %			
132 +			
133 310 00			
134 RUL 01		00	
135 RCL 14		30	
136 %			
137 +			
170 010 01			
139 SF 00			
140 RCL 08			
141 ST- 10			
142 GT0 02			
14741 01 00			
	Display routine		
144 "⊢="			
145 ARCL X		00	

### <sup>e</sup>REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA R	EGISTERS				STA	TUS		
00	price NOI LIFE land value	50	SIZE ENG DEG	016	TOT FIX - RAD	. REG. <u>6</u> 2 SCI GR	3  AD	USER MO ON C 	DE DFF
05	tax rate used	55		INIT		FL/	AGS		
	used		#	S/C	SET	INDICATE	S	CLEAR IND	CATES
	Тах		00	С	second	or great	ter yea	r First	year
	12		 21	S	refer t	o owner	's manu	ial	
10	used		 						
10	Loan Amort	60							
	int. rate		 						
	PMT		 						
	loan balance		 						
15	used								
15	year counter	65							
20		70							
20		10	 						
25		75							
-25									
30		80							
35		85							
						ASSIGN	MENT	S	
				UNCI	ION	KEY	FU	NCTION	KEY
40		90							
					10,772,1993, <b>9</b> 0,000, 100,000, 100,000				
45		95							

#### MORTGAGE YIELD

#### (Requires one Memory Module)

This program provides the basic tools for analysis of mortgage performance. By entering the periodic (monthly) interest rate of a mortgage, the monthly payment amount, the amount owing on the mortgage, and the purchase price of the note, the following calculations are possible:

total amortization period;

full term yield;

yield at a specified point in time;

yield at a specified prepaying balloon;

successive yields at different prepayment points; and

total amount of prepaying balloon, total amount of accumulated monthly payments, and total amount of cash paid on the mortgage.

References: HP-67 Standard Pac program SD-05A, Annuities and Compound Amounts, and HP-80 reference book, <u>Real Estate Applications</u>. HP-67/HP-97 Users' Library program #00741D by Jack Buster.

Example:

Assume you have a \$11,125 mortgage payable at \$140 per month including 8.5% interest, purchased for \$7,200 cash. Analyze the mortgage with the use of this program finding total amortization period, full term yield, yield if prepaid when remaining balance is \$5,000 and construct a chart of performance at 24 month intervals.

8

```
Keystrokes:
                                                 Display:
 [USER]
                                                                  (set USER mode)
 [XEQ] [ALPHA] SIZE [ALPHA] 017
 [XEQ] [ALPHA] MYLD [ALPHA]
                                                 INT ?
8.5 [ENTER↑] 12 [÷] [R/S]
                                                 PMT ?
140 [R/S]
                                                 PV ?
11125 [R/S]
                                                 PURCH. P. ?
 7200 [R/S]
                                                7,200.00
 [A]
                                                 T. PERIOD=117.24 (months)
 [B]
                                                 YIELD=19.96 (%)
 [C]
                                                 BAL ?
5000 [R/S]
                                                 MONTHS=75.92
 [D]
                                                 MONTHS ?
75.92 [R/S]
                                                 YIELD=20.98
 [E]
                                                BALLOON=5,000.00
[R/S]
                                                 \Sigma PMTS=10,628.80
[R/S]
                                                 C.R.=15,628.80
 [D]
                                                 MONTHS ?
24 [R/S]
                                                 YIELD=34.76
 [E]
                                                 BALLOON=9,530.16
 [R/S]
                                                 Σ PMTS=3,360.00
[R/S]
                                                 C.R.=12,890.16
 [D]
                                                 MONTHS ?
48 [R/S]
                                                 YIELD=24.25
(etc.)
```

Months from purchase	Yield	Balloon	Payments	Cash
to prepayment		Amount	Received	Received
24	34.76%	9530.16	$\begin{array}{r} 3360.00\\ 6720.00\\ 10080.00\\ 13440.00\\ 16413.60\end{array}$	12890.16
48	24.25%	7640.91		14360.91
72	21.24%	5402.92		15482.92
96	20.18%	2751.81		16191.81
117.24	19.96%	.13		16413.73

### User Instructions

				SIZE: 017
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Load the program and set USER mode		[USER]	
2	Initialize the program		[XEQ] MYLD	INT ?
3	Input: monthly interest rate;	i	[R/S]	PMT ?
	monthly payment;	pmt	[R/S]	PV ?
	amount of mortgage; and	PV	[R/S]	PURCH. P. ?
	purchase price of mortgage.	РР	[R/S]	(P.P.)
4	Calculate total amortization period $\rightarrow$		[A]	T. PERIOD=( )
5	Calculate full term yield →		[В]	YIELD=( )
6	To calculate months to specified balance, press →		[c]	BAL ?
	and input balance	balance	[r/s]	MONTHS=()
7	To calculate yield after K months, press $\rightarrow$		[ <sub>D</sub> ]	MONTHS ?
	and input number of months	K	[ <sub>R/S</sub> ]	YIELD=()
8	Calculate cash totals for step 7:			
	Balloon;		[E]	BALLOON=(
	sum of payments received; and		[R/S]	$\Sigma \text{ PMTS}=()$
	cash received.		[R/S]	C.R.=()
9	Repeat steps 7 and 8 as often as desired.			
_10	For a new case, go to step 2			
	Note: The order the calculations are			
	performed in is important. Steps 2-6 must be performed before steps			
	7-8 or the results of 4, 5 and 6 will be incorrect.			

01+LBL "MYL	Initialize and	49 STO 09	
D	store data	50 +	
02 CF 01		51 STO 07	
03 CLRG		52 RCL 11	
04 "INT ?"		53 CHS	
05 PROMPT		54 Y1X	
06 STO 12		55 STO 98	
07 "PMT 2"		56 RCL 10	
08 PROMPT		57 *	
09 STO 13		50 1	
10 "PV 2"		59 PC1 89	
11 PROMPT		59 KCL 80	
12 970 14		60 - 61 eto 04	
17 "PUPCU			
13 FURCH.		62 KUL 13	
		63 KUL 07	
		65 510 03	
		66 RUL 05	
17+LBL H	Calculate	67 *	
18 XEQ 01	Amortization	68 *	
19 "I. PERI	period	69 RTN	
0D"	F	70+LBL 03	Calculate yield
20 XEQ 02		71 0	_
21+LBL 01		72 STO 12	
22 0		73 RCL 10	
23 STO 11		74 RCL 11	
24 XEQ 00		75 RCL 13	
25 RCL 10		76 *	
26 LASTX		77 +	
27 -		78 RCL 16	
28 RCL 16		79 -	
29 LASTX		80 RCL 11	
30 -		81 /	
31 /		82 RCL 16	
32 LN		83 /	
33 RCL 07		849	
34 LN		85 X<=Y?	
35 /		86 X<>Y	
36 STO 11		87 XEQ 05	
37 RTN		88 X=0?	
38+LBL 04	Calquiato	89 RTN	
39 1	balloon omt	90+LBL 06	
40 STO 16	balloon ame.	91 XEQ 00	Calculate f(i)
41 XEQ 00		92 +	and f'(i)
42 STO 16		93 RCI 16	
43 RTN		94 -	
44+LBL 00	Calculation	95 RCL 08	
45 1	subrouting		
46 STO 05	SUDIOULINE		
47 RCL 12		98 /	
48 %			
			1

100 STO 06		150 XEQ 03	
101 RCL 04		151 12	
102 PCL 09		152 *	
107 /		157 "YTELD"	
103 /		153 (ILLD	
		104VLDL 02 155 1L-1	Display routine
103 KUL 03		100 °F-	
106 *		156 HRUL A	
107 RCL 13		157 PRUMPI	
108 *		158 RTN	
109 RCL 09		159+LBL 07	
110 /		160 RCL 02	
111 RCL 06		161 X<>Y	
112 RCL 10		162 -	
113 *		163 STO 11	
114 -		164 RCL 14	
115 /		165 STO 12	
116 CHS		166 GTO 09	
117 XEO 05		167+LBL E	Summation routine
110 DCI 12		168 SE 01	
110 KCL 12		160 DC 10	
117 /		170 "POLLOON	
120 KND 101 V200		. 170 BALLOON	
121 X∓0? 100 0∓0 07		171 450 00	
122 GIU 06		171 XEQ 02	
123 RUL 12		172 RUL 01	
124 RTN		173 RUL 13	
125+LBL 05	Convert to %	174 *	
126 E2		175 "Σ PMTS"	
127 *		176 XEQ 02	
128 ST+ 12		177 +	
129 RTN		178 "C.R."	
130+LBL D		179 XEQ 02	
131 "MONTHS	Calculate yield	180+LBL B	Calculate vield
? "	_	181 XEQ 01	Surcurate grein
132 PROMPT		182 RCL 12	
133 STO 01		183 STO 01	
134 ES2 01		184 RCL 16	
135 CTO 07		185 STO 02	
176 PCL 12		186 RCL 00	
177  CTO  14		197 STO 16	
170 VEA A1		199 XEO 03	
130 AEW 01		100 AL& 00 100 PCL 02	
137 310 02		107 KCL 02	
140 RUL 01			
		100 CTO 10	
		172 310 12	
143+LBL 07		173 KUN 104 DDU	
144 XEQ 04		194 KUN	
145 STO 10		195 12	
146 RCL 00		196 *	
147 STO 16		197 "YIELD"	
148 RCL 01		198 XEQ 02	Laiculate
149 STO 11		199+LBL C	prepayment period

200 "001 0"		<b>F</b> 4	
200 DHL :		51	
201 PROMPT			
202 STO 15	I F		1
203 XEQ 01			 4
204 510 01			 4
204 310 01			
205 RCL 16			
206 STO 02	F		4
207 PCL 15			 4
208 510 16	Ι Γ		
209 XEQ 01		60	1
210 RCL 01	i -	00	4
211 CTO 11			
211 510 11			
212 -			1
213 CHS	-		 4
214 PCL 02			
215 510 16	I F		1
216 X<>Y	F		 •
217 "MONTHS"			
210 VEO 02			
210 AEQ 02	1 F		1
219 .END.		70	1
20	4 4	70	
	1 Γ		
	1 F		
	4		4
	Ι Γ		
	1 F		
	4 -		
	4		
	1 F		
20	4	80	
30	4 4	00	
	1		
	1 F		
	4		
	Ι Γ		
	1 F		
	4		
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	1 F		1
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### **REGISTERS, STATUS, FLAGS, ASSIGNMENTS**<sup>13</sup>

	DATA RE	EGISTERS				STA	TUS		
00	price used used PMT/i	50	SIZE ENG DEG	 	TO FIX RAI	T. REG. <u>71</u> SCI D GR	AD	USER MOI ON <u>X</u> C	DE 0FF
05	used used	55	#	INIT S/C	SET		AGS	CLEAR INDI	CATES
	l+i		01	C			15	st pass th	ru "D"
	used								
10	1/100	60							
	n								
	i								
	PMT	l l	<b> </b>						
15	i Ralloon	65							
	PV								
			<b> </b>						
20		70	<b>}</b>						
20		70							
05		75	<b> </b>						
25		/5							
30		80							
		· · · · · · · · · · · · · · · · · · ·	1						
35		85	ļ						
			1			ASSIGN	IMENT	S	
				FUNCT	ION	KEY	FU	NCTION	KEY
40		90	<b> </b>		·····				
		<b>↓</b>	<b> </b>						
			<u> </u>						
45		95							
		<b>  </b>	<b> </b>						
		<b>  </b>	ł						

#### MORTGAGE PRICING

This program will calculate the price of a wrap around mortgage discounted to yield a user specified percentage. The required data input is the target yield of the wrap around and, for each mortgage, the monthly payment, interest rate (monthly), and the remaining principal balance.

Note: Only two levels of mortgage are considered; no thirds. Do not mix annual payment mortgages with monthly payment mortgages.

Reference: HP-67/HP-97 Users' Library program #00513D by Jack Buster.

Example: An investor is offered the opportunity to purchase a wrap around (second) mortgage at an annual yield of 22.5%. The first mortgage is \$125,647.00 payable at the rate of \$1,161.67 per month including 9.5% interest. The second (wrap around) mortgage is \$214,123.00 payable at \$2,300.00 per month including 10.25% interest. What will the investor pay for the mortgage?

Solution:

Keystrokes:	Display:
[XEQ] [ALPHA] SIZE [ALPHA] 021	
[XEQ] [ALPHA] MPRC [ALPHA]	I1 ?
9.5 [ENT↑] 12 [÷] [R/S]	PMT1 ?
1161.67 [R/S]	PV1 ?
125647 [R/S]	I2 ?
10.25 [ENT↑] 12 [÷] [R/S]	PMT2 ?
2300 [R/S]	PV2 ?
214123 [R/S]	YIELD ?
22.5 [ENT†] 12 [÷] [R/S]	AMORT. P.=246.00
[R/S]	AMORT. P.=186.44
[R/S]	PRICE=57,510.36

### **User Instructions**

					SIZE: 021
STEP		INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Load th	ne program			
2	Initial	ize the program		[XEQ] MPRC	I1 ?
3	Input:	first periodic interest rate;	I1	[R/S]	PMT1 ?
		first monthly payment;	PMT1	[R/S]	PV1 ?
		first principal balance;	PV1	[R/S]	12 ?
		second periodic interest rate;	i/12	[R/S]	PMT2 ?
		second monthly payment;	PMT2	[R/S]	PV2 ?
		second principal balance; and	PV2	[R/S]	YIELD ?
		periodic yield.	YIELD	[R/S]	
4	Find:	amortization period of 1st mort.			AMORT. P.=()
5		amortization period of 2nd mort.		[R/S]	AMORT. P.=()
6	and	price.		[R/S]	PRICE=( )

			t
01+LBL "MPR	Input and store	50 XEQ 02	
1 C	input and store	51 STO 02	
02 CLRG	data	52 RCL 16	
03 "11 2"		53 RCI 17	
		50 KOL 11	
05 510 06		55 510 01	
06 "PMT1 ?"		56 RCL 11	
07 PROMPT		57 STO 18	
08 STO 18		58 XEQ 02	
00 "PV1 2"		50 CTO 20	
		0 0 0	
		60 0	
11 510 19		61 STU 18	
12 "I2 ?"		62 RCL 17	
13 PROMPT		63 STO 01	
14 STO 12		64 XEQ 02	
15 "DMTO O"		65 CT+ 02	
16 PRUMPI		66 RLL 02	
17 STO 11		67 "PRICE"	
18 "PV2 ?"		68 XEQ 08	
19 PROMPT		69+LBL 09	
20 STO 10		ZO "OMORT.	Display routine
20 010 10 21 "VIELD 2			
		71+LBL 08	
22 PRUMPI		72 "F="	
23 STO 00		73 ARCL X	
24 XEQ 01		74 PROMPT	1
25 XEQ 09		75 RTN	
26 STO 17		76+LBL 02	
27 RCL 06		77 1	Pricing routine
28 STO 13		70 670 19	
27 KUL 10		17 AEQ 00	
30 510 14	Calculate price	80 +	
31 RUL 19		81 810 19	
32 STO 15		82 RTN	
33 RCL 10		83+LBL 00	
34 STO 19		84 RCL 19	Calculation
35 RCL 11		85 1	subroutine
36 STO 18		86 STO 05	
77 PCL 12	1	97 PCL 06	
70 CTO 04			
39 XEQ 01		89 510 09	
40 XEQ 09	-	90 +	
41 STO 16		91 STO 07	
42 RCL 11		92 RCL 01	
43 RCL 14		93 CHS	
44 -		94 Y1X	
45 STO 18		95 STO 08	
46 RCL 17	1	96 801 20	
47 STO 01	1	97 *	
40 00 00	4		
48 KUL 00	•		
<u> </u>		<u>99 RCL 08</u>	

100 -		51	
101 970 04			
102 RCL 18			
103 RCL 09			
104 /			
105 070 07			
103 310 03			
106 RCL 05			
107 *			
100 +			
109 RIN		60	
110+LBL 01	Calculate total		
111 0	Galearace cocar		
110 010 01	amortization		
112 310 61	period		
113 XEQ 00			
114 RCL 20			
115 LOSTX			
116 _		<b>├</b> ─── <b>├</b> ──	
110 -			
117 RCL 19			
118 LASTX		<b></b>	
119 -		70	
100 /		70	
120 /			
121 LN			
122 RCL 07			
123 I N		<b>├</b> ─── <b>├</b> ──	
124 /			
124 /			
125 STO 01			
126 RTN			
127 . ENTL.			
30		80	
	•	<b>├</b> ─── <b>├</b> ──	
		<b>├</b> ─── <b>├</b> ──	
40	1	90	
+0		30	
		<u>├</u>	
		<b>├</b> ─── <b>├</b> ──	
h		<u>├</u>	
		<u>├</u> ───	
50		00	

### <sup>18</sup>REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA RE	GIS	TERS					STA	TUS		
00	yield pay-off periods used "	50		SIZE ENG DEG		<u>1</u>	TOT. FIX RAD	REG. <u>52</u> 2 SC GR	AD	USER MO ONC	DE DFF <u>X</u>
05	11	55			INIT			FL	AGS		
	i, and in			#	S/C		SET IN	DICATE	s	CLEAR IND	CATES
	used "							- 1 <b></b>			
	11										
10	PV2	60									
	PMT2										
	i 1										
	PMT1										
15	PV1	65									
	n <sub>1</sub>										
	PV1 + PV2										
20	used	70									
							100000 Queen				
25		75									
30		80									
35		85									
							A	SSIGN	IMEN	TS	
					FUNCT	TION		KEY	F	UNCTION	KEY
40		90									
<b></b>											
45		95									
							T				

For a loan with full amortization after a stated number of years, given:

n = number of payments made i = periodic interest rate PMT = periodic payment PP = purchase price D\$ = down payment NS = net sales price

This program calculates purchase price equity EPP and net sales equity ES.

 $E = \frac{1}{(1 + i)^{-n}} \left[ PMT \frac{(1 + i)^{-n} - 1}{1} + (PP - D\$) \right]$ EPP = PP - EES = NS - EPP = \$45,000.00Example: D\$ = \$4,500.00i = 7.5% annual n = 72PMT = \$283.18NS = \$63,900.00Find EPP and ES given the above information. Solution: Keystrokes: Display: [XEQ] [ALPHA] SIZE [ALPHA] 010 N. PMTS MADE? [XEQ] [ALPHA] EQTY [ALPHA] INT ? 72 [R/S] 7.5 [ENTER↑] 12 [÷] [R/S] PMT? PURCH. P. ? 283.18 [R/S] \$ DOWN ? 45000 [R/S] 4500 [R/S] NET SALES P.? 63900 [R/S] EPP=\$7,222.35 [R/S] ES=\$26,122.35

### **User Instructions**

				SIZE: 010
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Load the program			
2	Initialize the program		[XEQ] EQTY	N. PMTS MADE
3	Input: Number of payments made;	n	[R/S]	INT ?
	Periodic interest rate;	i	[R/S]	PMT ?
	Periodic payment;	PMT	[R/S]	PURCH. P. ?
	Purchase price;	РР	[R/S]	\$ DOWN ?
	Down payment (\$);	\$D	[R/S]	NET SALES P. ?
	and net sales price.	NS	[R/S]	
4	Find purchase price equity			EPP=\$( )
5	Calculate net sales equity		[R/S]	ES=\$( )
		L	1	

01+LBL "EQT	Input and store	47 Y1X
Y "	data	48 -
02 "N. PMTS	uueu	49 RCL 06
MADE?"	1	50 /
03 PROMPT	1	51 RCI 07
04 STO 02		52 *
05 "INT 2"		
GE PROMPT		54 DCL 00
07 100		94 KCL 00
07 100		
		56 LHS
09 510 06		57 "EPP"
10 1		58 XEQ 09 Calculate ES
11 +		59 RCL 03
12 STO 09		60 RCL 04
13 "PMT ?"		61 -
14 PROMPT		62 "ES"
15 STO 07		63+LBL 09 Display routine
16 "PURCH.		64 "H=\$"
P. 2"		65 OPCL X
17 PROMPT		
10 310 00 10 ## DOUM		
17 ¥ DOMN		68 .END.
21 510 01		
22 "NET SAL		
ES P.?"		
23 PROMPT		
24 STO 03		
25 RCL 08	Calculate FPP	80
26 RCL 01		
27 -		
28 STO 00		
29 RCI 06		
70 *		
31 RCL 07		
72 /		
77 1		
34 65 21		
30 -		90
J ST LN		
38 RCL 09		
39 LN		<b> </b>
40 /		<b> </b>
41 STO 05		h
42 1		<b> </b>
43 RCL 09		<b> </b>
44 RCL 02		
45 RCL 05		
46 -		00

### <sup>22</sup>REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA R	EGIST	ERS				ST	TUS		
00	amt. financed \$ down no. pmts made NS	50		SIZE ENG DEG	 	TC FIX RA	DT. REG. <u>3</u> ( <u>2</u> SC D GF	0 I RAD	USER MO ON (	DE DFF <u>X</u>
05	E loan term	55			ΙΝΙΤ		FL	AGS		
	i DMT			#	S/C	SE	INDICATE	s T	CLEAR IND	ICATES
	purch price									
10	1+i	60								
15		65								
		++								
		++								
20		70								
		++								
25		75								
		+ +								
30										
- 30										
35		85								
		++					ASSIG	MEN	TS	
					FUNCT	ION	KEY	F	UNCTION	KEY
40		90								
15										
45		95								
		++								<u> </u>

#### WRAP-AROUND MORTGAGE

A wrap-around mortgage is essentially the same as a refinancing mortgage, except that the new mortgage is a junior lien mortgage granted by a different lender, who assumes the payments on the existing mortgage, which remains in full force. The new (second) mortgage is thus "wrapped around" the existing mortgage. The "wrap-around" lender advances the net difference between the new (second) mortgage and the existing mortgage in cash to the borrower, and receives as net cash flow the difference between the debt service on the new (second) mortgage and debt service on the existing mortgage.

This program calculates the periodic yield to the lender of a wrap-around mortgage, with or without a balloon payment. A routine to solve for the periodic payment necessary to amortize a mortgage is also available. The value of each mortgage, as well as the periodic payments, life of each mortgage (number of periods remaining), and balloon payment on the wraparound mortgage (if it exists) must be entered to calculate the yield.

$$PV_2 - PV_1 = \frac{PMT_2 [1 - (1+i)^{-1}]}{i} - \frac{PMT_1 [1 - (1+i)^{-1}]}{i} + BAL (1+i)^{-n_2}$$

Reference: HP-67/HP-97 Users' Library program #00127D

Example: A mortgage loan on an income property has a balance of \$200,000. The loan has a remaining life of 12 years, and a monthly payment of \$2030.21. A lender has agreed to "wrap" a \$300,000 second mortgage at 9.5%, with full amortization in level monthly payments over 12 years. What is the effective yield (IRR) to the lender on net cash advanced?

Keystrokes:

Display:

[USER]	(set USER mode)
[XEQ] [ALPHA] SIZE [ALPHA] 011	
[XEQ] [ALPHA] WAM [ALPHA]	N1 ?
[B]	N ?
144 [R/S]	Ι?
9.5 [R/S]	PV ?
300000 [R/S]	PMT=3,499.12
[A]	N1 ?
144 [R/S]	PMT1 ?
2030.21 [R/S]	PV1 ?
200000 [R/S]	N2 ?
144 [R/S]	PMT2 ?
3499.12 [R/S]	PV2 ?
300000 [R/S]	BALLOON ?
0 [R/S]	%YIELD=14.50

### **User Instructions**

				SIZE:011
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1.	Load the program and set USER mode.		[USER]	
2.	Initialize the program.		[XEQ] WAM	N1 ?
3.	Key in the following information from the			
	original mortgage:			
	* Number of months remaining	n 1	[R/S]	PMT1 ?
	* Monthly payment	PMT	[R/S]	PV1 ?
	* Remaining balance	PV1	[R/S]	N2 ?
4.	Key in the following information from the			
	wrap-around mortgage:			
	* Number of months	n <sub>2</sub>	[R/S]	PMT2 ?
	* Monthly payment	PMT <sub>2</sub>	[R/S]	PV2 ?
	* Total wrap-around amount	PV <sub>2</sub>	[R/S]	BALLOON ?
	* Balloon amount	Balloon	[R/S]	
	The annual yield is displayed.			%YIELD=( )
5.	To find the payment amount on wrap-around			
	mortgage		[B]	N ?
6.	Key in the following information:			
	* Total number of months	n	[R/S]	Ι?
	* Annual interest rate	i	[R/S]	PV ?
	* Loan amount	PV	[R/S]	PMT=( )
	The monthly payment is displayed.			
7.	To restart main program, press [A] and go			
	to step 3.		[A]	N1 ?

A			
01+LBL "WAM	Tanut and stars	50 STO 10	
13	input and store		
	data	51 RUL 09	
02+LBL A		52 RCL 00	
07 "N1 2"		57 *	
03 H1 :			
Ø4 PRUMPI		54 RCL 06	
05 CHS		55 ×	
04 STO 01		50	
06 510 01		J6 +	
07 "PMT1 ?"		57 RCL 05	
AS PROMPT		58 RCL 06	
		50 KC2 60	
09 510 03		59 <b>*</b>	
10 "PV1 ?"		60 -	
11 PROMPT		61 PCL 08	
12 LHS		62 RUL 01	
13 STO 05		63 *	
14 "NO 2"			•
14 112 :		64 KUL 00	
15 PROMPT		65 *	
16 CHS		66 RCL 09	
17 610 02			
17 510 62		BY RUL 02	
18 "PMT2 ?"		68 *	
19 PROMPT		69 RCL 04	
		70 *	
20 510 04		70 <b>*</b>	
21 "PV2 ?"		71 -	
22 PROMPT		72 RCL 07	
23 51+ 03		(3/	
24 "BALLOON		74 RCL 10	
2.		75 RCI 06	
		73 KCE 00	
25 PROMPT		76 /	
26 STO 00	Calculate %	77 -	
27 1 E-3	· 11	78 RCL 00	
	yleid		
28 510 06		79 RUL 02	
29+LBL 00		80 *	
70 1		21 RCI 06	
31 RCL 06		82 *	
32 1	Nouton's method	83 RCL 09	
77 +	Newcon 3 mechod	84 *	
	is used to find		
34 510 07	i	85 RUL 07	
35 RCL 02		86 /	
36 848		87 +	
37 510 09		00 /	
38 -		89 ST- 06	
79 RCI 04		90 88S	
40 m		01 1 5-6	
40 ×			
41 1		92 X<=Y?	
42 RCL 07		93 GTO 00	
		04 PCL 04	
43 RUL 01		74 KUL 86	
44 Y1X		95 12 E2	
45 STO 08		96 *	
42			Display appual
46 -		97 ATTELD	· · · ·
47 RCL 03		98 XEQ 09	yield
48 *		99+LBL B	Input and store
		100	data
44 -			uala

101 PROMPT		51	
102 510 00			
103 "I ?"			
104 PROMPT			
105 10 50			 1
105 12 62			
106 /			
107 STO 01			
108 "PV 2"			
109 PRUMPT			
110 STO 03	Calculate PMT	60	
111 RCL 01			1
112 1			
113 +			
114 RCL 00			
115 CHS			
112 040			
117 1			
118 X<>Y			
119 -			
120 RUL 01		70	
121 /			
122 1/8			
127 PCL 07			
123 KCL 03			
124 *			
125 "PMT"			
126+LBL 09			
107 "L-"	Display routine		
128 HRUL X			
129 PROMPT			
130 RTN		80	
171 END		00	
151 .Enb.	4		
	7		
	1		
	4		
	1		
	1		
	4		
	4		
40	7	90	
	-		
	4		
	_		
	1		
	4		
	4		
	1		
	4		
	4		
50		00	

### **REGISTERS, STATUS, FLAGS, ASSIGNMENTS**<sup>27</sup>

	DATA RE	GISTERS				STA	TUS		
00	Balloon/n -n <sub>1</sub> /i -n <sub>2</sub> PMT,/PV	50	SIZE ENG DEG	011	TOT FIX _ RAD	. REG. <u>42</u> 2 SCI GR	AD	USER MOI _ ON <u>X</u> O	)E FF
05	PMT <sub>2</sub> PV <sub>2</sub> -PV <sub>1</sub> i 1+i	55	#	INIT S/C	SET I		AGS	CLEAR INDI	CATES
10	$(1+i)^{-n_1}$ $(1+i)^{-n_2}$ used	60							
15		65							
20		70							
25		75							
30		80							
		95							
35						ASSIGN	IMEN	TS	
40		90		FUNCT	ION	KEY	F	UNCTION	KEY
45		95							

The interest rate that equates the present value of all future cash flows with the original investment is known as the internal rate of return (IRR, also called discounted rate of return or yield). Given a non-zero initial investment and up to 41 cash flows with no Memory Module (64 more for each additional Memory Module), this program calculates the periodic IRR.

The answer produced is the periodic rate of return. If the cash flow periods are other than annual (monthly, quarterly) the answer should be multiplied by the number of periods per year to determine the annual internal rate of return.

The program solves the following equation iteratively for IRR:

n = the number of cash flows and

$$INV = \sum_{j=1}^{n} \frac{CF_j}{(1+IRR)^j}$$

where

 $CF_i$  = the jth cash flow.

- Note: When the sign of the cash flows is reversed more than once, more than one interest rate is considered correct in the mathematical sense. While this program may find one of the answers, it has no way of finding or indicating other possibilities. Problems which involve a large number of cash flows will have long execution times.
- Example: Income property requiring a \$250,000 equity investment is to be sold in ten years and is expected to generate the "after tax" cash flows shown below. What is the expected yield or IRR?

End	of Year	Cash Flow	End of Y	<u>lear</u>	ash Flow	<u>1</u>	
	1	\$46,423	6	Ş	23,199		
	2	40,710	7		21,612		
	3	36,638	8		20,037		
	4	34,097	9		18,460		
	5	32,485	10		311,406	(property	sold)
Keystrokes:				Displa	ıy:		
[USER]						(set USER	mode)
[XEQ] [ALPHA]	SIZE [ALPH	IA] 014					
[XEQ] [ALPHA]	IRR [ALPHA	.]		CF,1 ?			
46423 [R/S]				CF,2 ?			
40710 [R/S]				CF,3 ?			
311406 [R/S]				CF,11	?		
[A]				INV ?			
250000 [R/S]				IRR=13	.98		

## **User Instructions**

				SIZE: 4+#CF's
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Load the program and set USER mode		[USER]	
2	Initialize the program		[XEQ] IRR	CF,1 ?
3	Input the cash flows for each consecutive	CFj	[R/S]	CF,j+1 ?
	period. Enter zero for periods of no cash			
	flow, negative values for cash paid out,			
	and positive values for cash received.			
4	After all cash flows have been entered in			
	step 3, press		[A]	INV ?
5	Input the initial investment.	INV	[R/S]	IRR=( )
	IRR will be displayed.			

01+LBL "IRR			49 RDN	
· ··	Infitantze	1	50 PTN	
02 LF 29			51 RCL 03	
03 FIX 0			52 STO 00	
04 CLRG			52 575 55 57 554	f(i)
			53 KUM	
05 4.1			54 RCL 02	
06 STO 00			55 RCL 01	
07+LBL 00			52 _	
	<b>D</b> . 1 .			
00 CF,	Prompt and store		57 X<>Y	
09 RCL 00	cash flows		58 /	
103			59 *	
11 -			57 * 60 ·	$\frac{1}{2}(1+i)$
			60 +	f'(1)1
12 HRUL X		1	61 LASTX	
13 "⊢?"			62 ABS	
14 PROMPT			67 1 E_6	
15 CTO IND				
13 510 140		1	64 X<=Y?	
00		1	65 GTO 05	
16 ISG 00				
17 CTO 00				
			67 RUN	1 <b></b> TDD
18+LBL Н		1	68 1	
19 "INV ?"			69 -	
20 PROMPT			70 1 50	
			70 I EZ	
21 HD3		-	71 *	
22 STO 01		-	72 FIX 2	
23 RCL 00			77 "IRR="	
24 THT			$\frac{1}{2}$	
24 187		i	74 HRUL X	
25 1		-	75 PROMPT	
26 -		-	76+LBL 05	
27 STO 00		-	77 004	
	n+3		TT RUN	
20 310 03	1115		78 RDN	
29 1		-	790	
30 ENTER1			90 510 02	
71 0			00 070 02 01 0T0 02	
	l equals the		81 610 66	
32 510 02	initial value		82 .END.	
33+LBL 06	$f_{or} 1 \perp TDD$			à
34 RCL 00				
75 7				
				1
36 X=Y?				4
37 GTO 08	-			4
38 -	<b>-</b>			]
	CF	90		
				1
00				1
40 ST+ 02				4
41 *				
42 +				1
				1
43 X< Y				4
44 ST∕ 02				
45 /				1
	1			1
46 DSE 00	1	┝		4
47 GTO 06				
48+LBL 08		00		
### **REGISTERS, STATUS, FLAGS, ASSIGNMENTS**<sup>31</sup>

	DATA RE	EGISTERS		STATUS					
00	pointer INV f(i) n+3	50	SIZE ENG DEG	4±#CI 	S'S TOT	. REG. <u>18</u> 2 SCI GR	tsize  AD	USER MOI 00	DE IFF
05	CF <sub>1</sub> CF <sub>2</sub>	55			SET		AGS		CATES
	•		# 29	C C	for pr	coper di	s splav	format	
10		60							
15		65							
20		70							
25		75							
30		80							
35		85							
				FUNCT			IMEN		KEY
40		90							
45		95							

VARIABLE ANALYSIS OF REAL ESTATE INVESTMENT

This program is designed to take tax bracket, loan interest rate and payment period of the loan as inputs plus three of the following four variables and computes the fourth: cash flow after taxes (CFAT), financed amount, depreciation, and net operating income (NOI). Cash flow before taxes (CFBT) may also be calculated.

CFBT = NOI - (principal + interest)

CFAT = NOI - (p+i) - [NOI - interest - deprec] [tax]

Reference: HP-67/HP-97 Users' Library program #01407D by Thomas Thorpe

Example: A client desires to purchase an investment property. His tax bracket is 25% and you know that a 9 1/4%, 30 year loan is obtainable. He indicates a need for a CFAT of \$1000. He expects a NOI of \$4000 per year and plans to depreciate the property at a \$2000 per year rate. What should the financed amount of the loan be to meet his requirements? What is the CFBT?

Solution:

Keystrokes:

Display:

[USER]

(set USER mode)

[XEQ] [ALPHA] SIZE [ALPHA] 015	
[XEQ] [ALPHA] VANYS [ALPHA]	TAX B. ?
25 [R/S]	INT. ?
9.25 [R/S]	TERM ?
30 [R/S]	CFAT ?
1000 [R/S]	PV ?
[R/S]	DEP. ?
2000 [R/S]	NOI ?
4000 [R/S]	PV=33,040.94
[A]	PV ?
33040.94 [R/S]	CFBT=738.16

32

## **User Instructions**

				SIZE: 015
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Load the program and set USER mode		[USER]	
2	Initialize the program		[XEQ] VANYS	TAX B. ?
3	Input: tax bracket;	TAX B.	[R/S]	INT. ?
	loan interest (annual); and	INT	[R/S]	TERM ?
	loan term (years).	TERM	[R/S]	CFAT ?
4	Input three of the following:			
	CFAT;	CFAT	[R/S]	PV ?
	Present value;	PV	[R/S]	DEP. ?
	Depreciation;	DEP	[R/S]	NOI ?
	Net operating income.	NOI	[R/S]	
5	When prompted for the unknown variable,			CFAT=()
	press [R/S] (make no input). The unknown			-or- PV=( )
	is then automatically calculated when all			-or- DEP=()
	the data is input.			-or- NOI=( )
6	To find cash flow before taxes, press $\rightarrow$		[A]	PV ?
	and input present value	PV	[R/S]	CFBT=()

Г

01+LBL "VAN	Initialize input	49 PROMPT	
YS"	and store data	50 STO 12	
02 10.1		51 XEQ 08	
03 STO 11		52 RCL 14	
04 "TAX B.		53 RCL 05	
?" 		54 -	
		55 "CFBT"	
06 1 E2		56 XEQ 07	
		57+LBL 13	
	-	58 XEQ 08	Calculate DEP
107 101. ( 10 DDOMDT		59 XEQ 05	
11 12 E2		60 RUL 14	
12 /		61 RUL 06	
14 "TERM 2"		63 KUL 00 24 w	
15 PROMPT		25 PC1 05	
16 12		22 ±	
17 *		67 RCI 14	
18 STO 02		68 -	
19 CF 22		69 RCL 10	
20 "CFAT ?"		70 +	
21 XEQ 09		71 RCL 00	
22 ISG 11		72 /	
23 "PV ?"		73 "DEP"	
24 XEQ 09		74 XEQ 07	
25 "DEP. ?"		75+LBL 14	
26 XEQ 09		76 XEQ 08	Calculate NOI
27 "NUI ?"		77 XEQ 05	
28 AEU 03 20 cto ind		78 RCL 06	
29 GIU IND		79 RCL 13	
07 70airt 10			
307EDE 10 71 XEO 08		81 RUL 00	
32 XEQ 05	Calculate CFAI		
33 RCL 14		03 UN3 04 DC1 05	
34 RCL 06		04 KUL 00 05 ±	
35 -		96 RCI 10	
36 RCL 13		87 +	
37 -		88 RCL 00	
38 RCL 00		89 1	
39 *		90 -	
40 CHS		91 CHS	
41 RCL 05		92 /	
42 -		93 "NOI"	
43 RCL 14		94 XEQ 07	
44 + 45 × 0507 ×	1	95+LBL 12	
45 "CEHT" 47 VEO 07	ł	96 E4	Calculate PV
45 AEW 07 474101 0	ł	97 STO 12	
4(▼LDL H 10 ¤DU ?"	Calculate CERT	98 XEQ 08	
40 FY (	Carcurace Orbi	_ 99 XEQ 05	

100 PCL 17		151 RCL 12	
100 KCL 13		151 662 12	
101 RCL 00		152 *	
102 4		153 STO 09	
		154 12	
103 RCL 10		104 12	
104 -		155 *	
		156 STO 05	
100 KUL 00		100 010 00	
106 1		157 KIN	
107 -		158+LBL 05	
107 -		150 DCL 12	Calculate <i>Sint</i>
108 CHS		109 KUL 12	
109 PCI 14		160 STO 08	and Aprincipal
		161 10	for vear
110 *		101 12	
111 +		162 STO 11	
		163 Ø	
112 310 00			
113 RCL 04		164 510 04	
114 DCL 04		165 STO 06	
114 KUL 00			
115 /		166 <b>4</b> 666 04	
116 1		167 RCL 01	
		120 DCL 00	
117 +		100 KCL 00	
118 RCL 00		169 *	
110		170 ST+ 06	
119 -		171 070 07	
120 RCL 05		171 510 07	
121 /		172 RCL 09	1
		177 -	
122 1/X		175	
123 STO 05		174 CHS	
		175 ST+ Й4	
124 KUL 04			
125 RCL 06		176 RUL 12	
196 /		177 RCL 04	
120 /		170 -	
127 *			
128 RCI 05		179 STU 08	
120 KOL 00		180 DSE 11	
129 +			
130 STO 03		181 610 04	
171 VEO 07		182 RTN	
101 AL& 00		197 <b>4</b> FRF Ø7	
132 "PV"			Calculate PV
133+LBL 07		184 RUL 01	
174 $1 - 9$		185 1	
134 F-	Display routine	10/ 1	
135 ARCL X		186 +	
136 PROMPT		187 RCL 02	
		198 CHS	
137 KIN			
138+LBL 08		189 118	
170 DCL 01		190 CHS	
139 RUL 01	Calculate	101 1	
140 1	principal and	171 1	
141 +	principal and	192 +	
	interest	70 179 701	
142 KUL 02		104 A	
143 CHS		194 *	
144 848		195 RCL 01	
	1	196 /	
145 CHS			
146 1		197-12	
147 1	1	198 /	
147 -	ł	100 074	
148 RCL 01		133 KIN	
149 /	1	200+LBL 09	
	ł	201 PROMPT	
150 1/X		ZOI EKONET	

202 STO IND	Stone data and	51	
11	Store data and		
207 PCL 11	select unknown		
	variable		
204 FL/L 22			
205 510 09			
206 ISG 11			
207 RTN			
200 END			
200 . CHD.			
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#### **REGISTERS, STATUS, FLAGS, ASSIGNMENTS<sup>37</sup>**

	DATA RE	GISTERS				STA	TUS	
00	tax bracket int rate term USED	50	SIZE ENG DEG	015	TOT FIX RAD	. REG. <u>63</u> SCI GR	3 USER MO   ON <u>X</u> AD	)DE OFF
05	Σ principal principal + intere	s <del>§</del> 5	<u>_</u>		CET	FL		
	used		# 22	C C	refer	to owner	's manual	ICATES
	PV used		}					
10	CFAT	60						
	pointer PV							
	DEP							
15	NOI	65						
10								
20		70						
25		75						
20		80						
30		80						
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35		85						
			1			ASSIGN		
40		90		FUNC		KEY	FUNCTION	NET
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#### REAL ESTATE INVESTMENT ANALYSIS FOR PROPERTY AND LAND

(Requires one Memory Module)

This program is designed to do a complete before and after tax cash flow analysis plus the gain or loss if the investment were sold at the end of a given year. The program considers closing costs at time of purchase and sale, excess depreciation, capital gains, loan reduction and appreciation of the investment. At the end of each year the return on investment (down payment) is computed to allow an analysis of time to sell to maximize your return. The following assumptions are made:

--closing costs at time of purchase = 3% of purchase price (line 59)
--cost of sale = 7% of selling price (line 94)
--depreciation is 85% of purchase price on a 20 year schedule (lines
66, 194, and 175)

--return on investment calculation is based on down payment amount

--a 30 year loan is assumed - 360 payments (line 136)

Land analysis is possible by entering 0.0 for the depreciation factor and income.

Note: All numbers entered must be ≥ 0. If the gain is a negative number, the return on investment calculation will produce an error indication. Press CLX and continue.

Reference: HP-67/HP-97 Users' Library program #01117D by Thomas Thorpe.

Example: You have a chance to purchase an investment property for \$52,000 with financing of 9%, 30 yr and 20% down (\$41,600 financed amount). Analysis indicates a \$6000/year income and expenses per year of \$1300. You elect to use accelerated depreciation of 125%. You are in a 28% tax bracket and expect the investment to appreciate at a 5% per year rate. If you purchase the property, how long will you have to hold it to maximize the return on investment?

Year	1	2	3	4	5	6
CFBT	683.32	683.32	683.32	683.32	683.32	683.32
CFAT	1,185.91	1,130.11	1,076.62	1,025.20	975.59	927.56
GAIN	10,038.42	13,220.34	16,531.10	19,978.04	23,568.99	27,312.26
ROI	-3.48%	12.75%	16.70%	17.73%	17.78%	17.46%

Point to sell  $\uparrow$ 

Solution:

Keystrokes:	Display:
[XEQ] [ALPHA] SIZE [ALPHA] 023	
[XEQ] [ALPHA] REI [ALPHA]	PRICE ?
52000 [R/S]	INT ?
9 [R/S]	INCOME ?
6000 [R/S]	PV ?
52000 [ENT†] .8 [x] [R/S]	EXPENSES ?
1300 [R/S]	DEP. FACT. ?
1.25 [R/S]	TAX B. ?
.28 [R/S]	APP. ?
.05 [R/S]	YEAR=1.00
[R/S]	CFBT=683.32
[R/S]	CFAT=1,185.91
[R/S]	GAIN=10,038.42
[R/S]	ROI=-3.48
[R/S]	YEAR=2.00
[R/S]	CFBT=683.32
(etc.)	

## **User Instructions**

				SIZE: 023
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Load the program.			
2	Initialize the program.		[XEQ] REI	PRICE ?
3	Input: Purchase price (dollars);	purch price	[R/S]	INT ?
	interest rate (annual);	int	[R/S]	INCOME ?
	income per year;	income	[R/S]	PV ?
	amount financed;	loan	[R/S]	EXPENSES ?
	operating expenses (annual);	expenses	[R/S]	DEP. FACT ?
	depreciation factor (as decimal);	dep	[R/S]	TAX B. ?
	tax bracket (as decimal): and	tax	[R/S]	APP. ?
	appreciation rate (as decimal).	apprec.	[R/S]	
4	Find: year of evaluation;			YR=( )
5	cash flow before taxes;		[R/S] *	CFBT=()
	cash flow after taxes;		[R/S] *	CFAT=()
	gain if sold at end of year; and		[ <u>R/S]</u> *	GAIN=()
	return on investment (%).		[R/S] *	ROI=()
6	For the next year's analysis, press $\rightarrow$		[R/S] *	YR=( )
	and go to step 5			
	*These keystrokes are unnecessary if			
	there is a printer in the system.			

01+LBL "REI		46 RC1 07	
	Initialize and		
	store data	47 RUL 03	
02 ULRG		48 12	
03 SF 21	1	49 *	
04 "PRICE 2		50 -	
ar introe :		J0 -	
		51 "CFBI"	
05 PRUMPI		52 XEQ 09	
05 STO 13		53 RCL 04	
07 "INT 2"			
		J4 -	
08 FRUMFI		55 "CFHI"	
09 1200		56 XEQ 09	
10 /		57 ST+ 17	
11 STO 16			
10 "INCOME		JO RUL 13	
12 INCOME		59 1.03	
2"		60 *	
13 PROMPT		61 RCL 14	
14 STO 19		61 KOL 1.	
15 °PV ?"		63 510 88	
16 PROMPT		64 RCL 14	
17 STO 21		65 RCI 13	
18 STO 01		CC 0425	
10 010 01		66.0420	
19 EAFENSE		67 *	
S ?"		68 RCL 02	
20 PROMPT		69 *	
21 STO 20		70 -	
22 "NEP FO		74 9/00	
		71 X\0?	
CI. ?"		72 0	
23 PROMPT		73 STO 18	
24 STO 00		74 RCL 11	
25 "TOX 8		75 1	
20 /86 0.			
		76 +	
26 PRUMPI		77 RCL 02	
27 STO 10		78 CHS	
28 "APP, 2"		79 YAX	
		00 KUL 13	
30 510 11		81 /	
31+LBL 08	Calculate	82 1/X	
32 1		83 STO 09	
33 ST+ 02	results	84 RCI 08	
34 AE& 03		83 -	
35 RCL 19		86 RCL 18	
36 RCL 20		87 -	
37 -		88.2	
38 510 07			
37 KUL 00		90 51+ 18	
40 -		91 RCL 10	
41 RCL 05		92 ST* 18	
42 -		93 RCL 09	
		04 07	
40 KUL 10		74 .73	
44 *		95 *	
45 STO 04		96 RCL 21	

		140 910 07	
97 -		140 010 00	
98 RUL 15		149 510 08	
99 +		150+LBL 02	Amortization
100 RCL 18		151 RCL 01	
101 -		152 RCL 16	schedule
102 PCL 17		153 *	
102 KCL II		154 ST+ 07	
103 +		154 517 67	
104 "GHIN"		155 RUL 03	
105 XEQ 09		156 -	
106 RCL 13		157 CHS	
107 RCL 21		158 ST+ 08	
108 -		159 RCL 01	
100 /		160 -	
		141 049	
110 128		161 013	
111 LUG		162 510 01	
112 RCL 02		163 DSE 22	
113 CHS		164 GTO 02	
114 /		165 RCL 07	
115 104%		166 RCL 08	
112 1		167 ST+ 15	
110 1		120 CTO 12	
		160 570 12 160 DDN	
118 E2		169 KUN	
119 *		170 510 06	
120 "ROI"		171 1	
121 XEQ 09		172 RCL 00	
122 GTO 08		173 X=Y?	
123+LBL Й9		174 SE 02	Depreciation
124 "+="	Display routine	175 20	schedule
		176 /	
12J HRCE A		177 CTO 07	
126 HVIEW		177 510 01	
127 RIN		178 1	
128+LBL 03		179 -	
129 RCL 21	Compute prin-	190 645	
130 RCL 16		100 000	
	cipal and	181 RCL 02	
131 *	cipal and interest for	181 RCL 02 182 ADV	
131 * 132 STO 07	cipal and interest for year.	180 CHS 181 RCL 02 182 ADV 183 "YEAR"	
131 * 132 STO 07 133 RCL 16	cipal and interest for year.	180 CH3 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09	
131 * 132 STO 07 133 RCL 16	cipal and interest for year.	180 CH3 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 ES2C 02	
131 * 132 STO 07 133 RCL 16 134 1	cipal and interest for year.	180 CH3 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02	
131 * 132 STO 07 133 RCL 16 134 1 135 +	cipal and interest for year.	180 CH3 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02 186 RCL 00	
131 * 132 STO 07 133 RCL 16 134 1 135 + 136 -360	cipal and interest for year.	180 CHS 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02 186 RCL 00 187 1	
131 * 132 STO 07 133 RCL 16 134 1 135 + 136 -360 137 Y↑X	cipal and interest for year.	180 CHS 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02 186 RCL 00 187 1 188 -	
131 * 132 STO 07 133 RCL 16 134 1 135 + 136 -360 137 Y↑X 138 1	cipal and interest for year.	180 CHS 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02 186 RCL 00 187 1 188 - 189 YTX	
131 * 132 STO 07 133 RCL 16 134 1 135 + 136 -360 137 Y↑X 138 1 139 -	cipal and interest for year.	181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02 186 RCL 00 187 1 188 - 189 Y1X 190 RCL 07	
131 * 132 STO 07 133 RCL 16 134 1 135 + 136 -360 137 Y↑X 138 1 139 - 140 CHS	cipal and interest for year.	180 CHS 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02 186 RCL 00 187 1 188 - 189 Y1X 190 RCL 07 191 *	
131 * 132 STO 07 133 RCL 16 134 1 135 + 136 -360 137 Y↑X 138 1 139 - 140 CHS 141 RCL 07	cipal and interest for year.	180 CHS 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02 186 RCL 00 187 1 188 - 189 Y1X 190 RCL 07 191 * 192 RCL 13	
131 * 132 STO 07 133 RCL 16 134 1 135 + 136 -360 137 Y↑X 138 1 139 - 140 CHS 141 RCL 07 142 ∠	cipal and interest for year.	180 CHS 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02 186 RCL 00 187 1 188 - 189 Y1X 190 RCL 07 191 * 192 RCL 13 193 *	
131 * 132 STO 07 133 RCL 16 134 1 135 + 136 -360 137 Y↑X 138 1 139 - 140 CHS 141 RCL 07 142 / 143 1/X	cipal and interest for year.	180 CHS 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02 186 RCL 00 187 1 188 - 189 Y1X 190 RCL 07 191 * 192 RCL 13 193 * 194 - 85	
131 * 132 STO 07 133 RCL 16 134 1 135 + 136 -360 137 Y↑X 138 1 139 - 140 CHS 141 RCL 07 142 / 143 1/X 144 STO 07	cipal and interest for year.	180 CHS 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02 186 RCL 00 187 1 188 - 189 Y1X 190 RCL 07 191 * 192 RCL 13 193 * 194 .85 195 *	
131 * 132 STO 07 133 RCL 16 134 1 135 + 136 -360 137 Y↑X 138 1 139 - 140 CHS 141 RCL 07 142 / 143 1/X 144 STO 03	cipal and interest for year.	180 CHS 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02 186 RCL 00 187 1 188 - 189 Y1X 190 RCL 07 191 * 192 RCL 13 193 * 194 .85 195 * 196 CTO 05	
131 * 132 STO 07 133 RCL 16 134 1 135 + 136 -360 137 Y↑X 138 1 139 - 140 CHS 141 RCL 07 142 / 143 1/X 144 STO 03 145 12	cipal and interest for year.	180 CHS 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02 186 RCL 00 187 1 188 - 189 Y1X 190 RCL 07 191 * 192 RCL 13 193 * 194 .85 195 * 196 STO 05	
131 * 132 STO 07 133 RCL 16 134 1 135 + 136 -360 137 Y↑X 138 1 139 - 140 CHS 141 RCL 07 142 / 143 1/X 144 STO 03 145 12 146 STO 22	cipal and interest for year.	180 CHS 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02 186 RCL 00 187 1 188 - 189 Y1X 190 RCL 07 191 * 192 RCL 13 193 * 194 .85 195 * 196 STO 05 197 ST+ 14	
131 * 132 STO 07 133 RCL 16 134 1 135 + 136 -360 137 Y↑X 138 1 139 - 140 CHS 141 RCL 07 142 / 143 1/X 144 STO 03 145 12 146 STO 22 147 0	cipal and interest for year.	180 CHS 181 RCL 02 182 ADV 183 "YEAR" 184 XEQ 09 185 FS?C 02 186 RCL 00 187 1 188 - 189 Y1X 190 RCL 07 191 * 192 RCL 13 193 * 194 .85 195 * 196 STO 05 197 ST+ 14 198 RTN	

### **REGISTERS, STATUS, FLAGS, ASSIGNMENTS**<sup>43</sup>

	DATA REGISTERS			STATUS						
00	Dep. factor FV year int	50		SIZE ENG DEG		3 TO FIX RAD	T. REG 2 SCI GR	073  AD	USER MO ON C	DE )FF <u>X</u>
05	income tax dep int pd.	55		#	INIT S/C	SET		AGS s	CLEAR IND	CATES
	NOI adjusted basis			02 21	C S	straig refer	ht line to owner	dep. 's m	anual	
10	tax bracket inflation rate principal paid price	60								
15	Σ Dep. Σ Principal interest rate Σ CFAT used	65								
20	income expenses PV used	70								
25		75								
30		80								
35		85								
					I	1	ASSIGN	IMEN	TS	
40		90			FUNCI	ΓΙΟΝ	KEY	F		KEY
45		95								

ELLWOOD INCOME VALUATION FOR INCOME PROPERTY APPRAISAL

Given a loan proportion to fair market value, the annual interest rate and term of the loan (payable in equal monthly installments), the projection period in years, the expected appreciation or depreciation of the property during the projection period, and the desired return on equity, the program computes the Ellwood factor. The value of the property which will give the desired rate of return on equity is then determined by dividing the level income stream by the Ellwood coefficient.

- Note: This valuation technique is ubiquitous in spite of the fact that it does not explicitly take tax consequences into account. Investors should beware of shortcut techniques such as that.
- Reference: This program is a translation of the Hp-65 Users' Library program #728A by Kelvin C. Vanderlip, Jr.
- Example: A property will produce an even cash flow before debt service of \$10,000 and is to be mortgaged at 80% of fair market value. The loan is for 19 years at a 10.2% interest rate. The property is to be sold in 5 years and is expected to depreciate 10%. What price will produce a 6.3% yield on investment?

Keystrokes:

[USER]

Display:

(set USER mode)

[XEQ] [ALPHA] SIZE [ALPHA] 009	
[XEQ] [ALPHA] ELL [ALPHA]	LOAN TERM ?
19 [R/S]	LOAN INT ?
10.2 [R/S]	LOAN PROP. ?
80 [R/S]	YRS PROJ. ?
5 [R/S]	APP. ?
10 [CHS] [R/S]	YIELD ?
6.3 [R/S]	COEF=0.11
[A]	AAI ?
10000 [R/S]	VALUE=91,042.54

44

## **User Instructions**

				SIZE: 009
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Load the program and set USER mode		[USER]	
2	Initialize the program		[XEQ] ELL	LOAN TERM ?
3	Input: loan term (years);	term	[R/S]	LOAN INT ?
	loan interest (%);	int	[R/S]	LOAN PROP. ?
	loan proportion (%);	prop	[R/S]	YRS PROJ. ?
	no. of yrs. of projection;	proj	[R/S]	APP. ?
	apprec. (+) or deprec. (-) (%);	app	[R/S]	YIELD ?
	and desired equity yield (%).	yield	[R/S]	
4	The Ellwood Coef. is displayed automatical	ly		COEF=()
5	To compute value		[A]	AAI ?
6	Input level income stream	AAI	[R/S]	VALUE=( )

		12 050 00	
01+LBL "ELL		46 XEQ 00	
,	Input and store	47 *	
02 "LOAN TE	data	48 LHSTX	
RM ?"		49 1	
03 PROMPT		50 -	
04 12		51 /	
05 *		52 12	
06 STO 03		53 *	
07 "LOAN IN		54 RCL 08	
Т ?"		55 *	
08 PROMPT		56 RCL 06	
09 LASTX		57 *	
10 /		58 1	
11 STO 01		59 +	
12 "LOAN PR		60 RCL 06	
0P. ?"		61 -	
13 PROMPT		62 RCL 05	
14 STO 06		63 RCL 07	
15 "YRS PRO		64 /	
1. 2"		65 -	
16 PROMPT		66 STO 00	
17 STO 04		67 RCL 04	
10 .000 2.		68 12	
19 PDOMPT		69 *	
20 100		70 RCL 01	
20 100		71 XEQ 00	
		72 1	
		77 -	
		74 PCI 03	
		75 DCL 01	
25 "TELD ?		76 VEO 80	
		70 72 4	
26 FRUNFI 07 100			
27 100 00 CT / 01		(8 ~ 70 /	
28 517 01			
29 517 06		80 LRS	
30 /			
31 510 62		82 +	
32 RUL 04	Calculate Coef.	83 KUL 05	
		84 *	
34 XEQ 00		80 KUL 07	
35 510 07		85 /	
36 1		87 KUL 00	
		88 + 88 pc: 80	
38 KUL 07		89 KUL 08	
39 /		90 /	
40 RCL 02		91 SIU 00	
41 /		92 "UUEF."	
42 STO 08		93 XEM NA	
43 RCL 01		94 STUP	
44 RCL 03		95♦LBL 00	
45 RCL 01		96.1	

	•			
97 +		51		
98 X 1				
99 Y1X				
100 RTN				1
1014101 0				
IUIVLOL H	Calculate value			
102 "AAI ?"				
103 PROMPT				1
104 PCL 00				
104 KCL 00				
105 /				
106 "VALUE"		60		
107+181 09	Dia 1			•
100 11 -1	Display routine			
100				
109 ARCL X				
110 PROMPT				
111 RTN				
IIZ .END.				
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30		80		
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	4			1
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	4			1
	4			4
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				]
	1		t	1
	4			4
50		00		

#### **\* REGISTERS, STATUS, FLAGS, ASSIGNMENTS**

	DATA REGISTERS		STATUS							
00	ELL. COEF. i <sub>1</sub> /12 i <sub>2</sub> n,x12	50		SIZE ENG DEG	00	9_ TC FIX RA	DT. REG. <u>3</u> (2 SC D GR	9 I AD	USER M0 - ON <u>X</u>	DDE OFF
05	n <sub>2</sub> 1+α	55			INIT		FL	AGS		
	δ used			#	S/C	SET		s	CLEAR IND	DICATES
	used									
10		60								
15		65								
20		70								
25		75								
				<b> </b>						
30		80								
35		85								
							ASSIGN		rs	
					FUNCT	ION	KEY	Fl		KEY
40		90								
45		95								

#### RESIDENTIAL ANALYSIS

#### (Rent or Buy)

This program analyzes, on a yearly basis, the investment potential of residential property by computing: increased sales value, tax savings, actual cost (cash outlay minus tax savings), and equity growth versus rental payments.

The following are definitions of the output terms:

- 1. <u>Sales Price</u>. The original sales price plus the cumulative annual growth (appreciation), the estimated market value at the end of the year indicated.
- 2. Loan Balance. The amount of the loan remaining at the end of the year indicated.
- 3. Paid on Loan. The amount of the principal for the year indicated.
- 4. <u>Property Tax</u>. The property tax paid annually, adjusted to include the same growth factor rate as used in sales price.
- 5. Interest. The total interest paid on the loan for the year indicated.
- 6. <u>Cash Outlay</u>. Total annual payments made on principal, interest and property tax (PIT).
- 7. <u>Tax Savings</u>. Based on buyer's estimated tax bracket, this figure is the actual tax savings he will receive by purchasing the house and deducting interest and property tax payments on his income tax return.
- 8. Actual Cost. The cash outlay less tax savings.
- 9. Average PIT. The cash outlay (principal, interest and taxes) divided by 12.
- 10. Average Cost. The actual cost figure divided by 12.
- 11. <u>Equity</u>. The market value less the loan balance. Equity includes down payment, payments on principal, and cumulative growth (appreciation).
- 12. Tax Savings. (same as number 7 above)
- 13. <u>Rent</u>. The cumulative amount of rent which would be paid by the buyer if the house were rented instead of purchased. It reflects the same growth factor as the sales price.

Reference: HP-67/HP-97 Users' Library program #01806D by J. Bradley Flippin.

Example:	\$65 <b>,</b> 900	List Price		
	\$50 <b>,</b> 000	Loan Balance		
	30 years	Loan Years		
	8.5%	Interest		
	6%	Growth Rate		
	22%	Buyer's Tax Bracket		
	\$800	Property Tax		
	\$ 400	Monthly Rent		

Solution:

	Year 1	Year 2	Year 3	Year 4	Year 5
Sales Price	69,854	74,045	78,488	83,197	88,189
Loan Balance	49,622	49,211	48,763	48,276	47,745
Annual					
Paid on Loan	378	411	448	487	530
Property Tax	800	848	899	953	1,010
Interest	4,235	4,202	4,166	4,126	4,083
Cash Outlay	5,413	5,461	5,512	5,566	5,623
Tax Savings	1,108	1,111	1,114	1,117	1,120
Actual Cost	4,306	4,350	4,398	4,449	4,503
Monthly					
Average PIT	451	455	459	464	469
Average Cost	359	363	367	371	375
Cumulative Sum					
Equity	20,232	24,835	29,725	34,922	40,444
Tax Savings	1,108	2,219	3,333	4,450	5,571
Rent	4,800	9,888	15,281	20,998	27,058

It is assumed that the system contains a printer.

Keystrokes:	Display:			
[XEQ] [ALPHA] SIZE [ALPHA] 014				
[xeq] [alpha] res [alpha]	LIST P. ?			
65900 [R/S]	BAL. ?			
50000 [R/S]	TERM ?			
30 [R/S]	INT. ?			
8.5 [R/S]	APP. ?			
6 [R/S]	TAX B. ?			
22 [R/S]	P. TAX ?			
800 [R/S]	RENT ?			
400 [R/S]	SPAN ?			
5 [R/S]	YR=1.			
	S.P.=69,854.			
	BAL=49,622.			
	PD.=378.			
	P. TAX=800.			
	INT=4,235.			
	C.O.=5,413.			
	T.S.=1,108.			
	A.C.=4,306.			
	A. PIT=451.			
	A.C.=359.			
	EQTY=20,232.			
	T.S.=1,108.			
	RENT=4,800.			
	YR=2.			
	(etc through year 5)			

## **User Instructions**

				SIZE: 014
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Load the program			
2	Initialize the program		[XEQ] RES	LIST P. ?
3	Input: list price;	LP	[R/S]	BAL. ?
	loan balance;	LB	[R/S]	TERM ?
	term of loan	n	[R/S]	INT ?
	interest rate (annual);	i	[R/S]	APP. ?
	appreciation rate;	app	[R/S]	TAX B. ?
	buyer's tax bracket;	ТВ	[R/S]	P. TAX ?
	property tax;	PTAX	[R/S]	RENT ?
	monthly rent; and	rent	[R/S]	SPAN ?
	span of analysis (years).	span		
4	Output: year number;		[R/S]*	YR=( )
5	sales price;		[R/S]*	S.P.=( )
	loan balance;		[R/S]*	BAL.=( )
	paid on loan;		[R/S]*	PD.=( )
	property tax;		[R/S]*	P. TAX=( )
	interest paid;		[R/S]*	INT.=( )
	cash outlay;		[R/S]*	C.O.=( )
	tax savings;		[R/S]*	T.S.=( )
	actual cost;		[R/S]*	A.C.=( )
	average PIT;		[R/S]*	A. PIT=( )
	average cost;		[R/S]*	A.C.=( )
	equity;		[R/S]*	EQTY=( )
	tax savings; and		[R/S]*	T.S.=( )
	rent.		[R/S]*	RENT=()
6	For the next year, press $\rightarrow$		[R/S]*	YR=( )
	and go to step 5			

		40 -	
01+LBL "RES	Initialize and	40 -	
	store data	49 1	
02 CLRG	store data	50 RCL 04	
03 SE 21		51 RCL 03	
Q4 WITCT D		52 CHS	
04 LIST F.		57 848	
		55 117	
Ø5 PROMPT	1	J4 -	
06 STO 01	1	55 /	
07 "BAL. ?"		56 RCL 02	
08 PROMPT		57 *	
00 0T2 02		58 STO 10	
10 UTEDM 2"		59+LBL 01	
IO TERN :		40 PCL 09	Compute results
11 PRUMPI			
12 STO 03		61 ° TR	
13 "INT ?"		62 XEQ 09	
14 PROMPT		63 RCL 05	
15 12 E2		64 ST* 01	
16 /		65 RCL 01	
17 670 04		66 "S.P."	
17 310 04		67 XEQ 09	
18 "HPP. ?"			
19 PRUMPI		60 KUL 10	
20 1 E2		69 12	
21 /		70 *	
22 STO 05		71 RCL 04	
23 "TAX B.		72 -12	
20 1111 21		73 Y†X	
		74 STO 12	
24 PROMPT		75 1	
25 1 E2			
26 /			
27 STO 06		77 RUL 10	
28 "P. TAX		78 *	
<b>7</b> "		79 RCL 04	
29 PROMPT		80 1	
70 510 07		81 -	
30 310 81 71 #05NT 3#		82 /	
31 "RENI :		83 RCI 02	
32 PRUMPI			
33 12			
34 ST* 03		85 RUL 12	
35 *		86 1/X	
36 STO 08		87 *	
37 "SPAN ?"		88 "BAL."	
79 PROMPT		89 XEQ 09	
		90 ADV	
37 1 63		91 RCL 02	
40 /		92 8238	
41 1	1		
42 ST+ 04		04	
43 ST+ 05		94 -	
44 +	1	95 "PD."	
45 STO 09		96 XEQ 09	
46 RCL 04	Calculate	97 RCL 07	
47 1	payment	98 "P. TAX"	

99 XEQ 09 100 RDN 101 - 102 STO 12 103 "INT" 104 XEQ 09 105 RDN 106 + 107 "C.O." 108 XEQ 09 109 RDN 110 +		150 ADV 151 RCL 05 152 ST* 07 153 ISG 09 154 GTO 01 155 STOP 156+LBL 09 157 "H=" 158 ARCL X 159 AVIEW 160 RTN 161 .END.	Display routine
111 RCL 06			•
113 ST+ 00			
114 "T.S."			
115 XEQ 09 116 R1			
117 X<>Y			
118 - 119 "0 C."	70		
120 XEQ 09			
121 ADV			
122 RT 123 12			
124 /			
125 "A. PIT"			
126 XEQ 09 127 RIN			
128 12	80		
129 /			
130 H.C. 131 XEQ 09			
132 ADV			
133 RCL 01			
134 KCL 02 135 -			
136 "EQTY"			
137 XEQ 09 138 RCI 00			
139 "T.S."	90		
140 XEQ 09			
141 RCL 13 142 RCL 05			
143 *			
144 RCL 08			
145 T 146 STO 13			
147 "RENT"			
148 XEQ 09 149 DTV	00		

### **REGISTERS, STATUS, FLAGS, ASSIGNMENTS**<sup>55</sup>

DATA REGISTERS				STATUS						
00	ETAX Savings LP BAL 12n	50	SIZE ENG DEG	01	4 TOT FIX - RAD	. REG. <u>6</u> 2 0 SCI GR	2  AD	USER MOI ON O 	DE FF _X	
05	l+i l+app Tax B	55	#	INIT S/C	SET		AGS	CLEAR INDI	CATES	
	P. Tax 12 x Rent Span		21	S	refer	to_ownei	's man	ual		
10	PMT Principal used	60								
15	E rent	65								
20		70								
25		75								
30		80								
35		85				ASSIGN		 S		
40		90		FUNCTION KEY		FUNCTION KEY				
45		95								

NOTES

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HEWLETT-PACKARD

## HP-41C

# USERS' LIBRARY SOLUTIONS Bar Codes Real Estate



PROGRAM REGISTERS NEEDED: 55





PROGRAM REGISTERS NEEDED: 34

HEWLETT PACKARD SOLUTION BOOK: REAL ESTATE



AMOUNT OF EQUITY AT ANY TIME

PROGRAM REGISTERS NEEDED: 21

HEWLETT PACKARD SOLUTION BOOK: REAL ESTATE



PROGRAM REGISTERS NEEDED: 32



PROGRAM REGISTERS NEEDED: 19

HEWLETT PACKARD SOLUTION BOOK: REAL ESTATE





HEWLETT PACKARD SOLUTION BOOK: REAL ESTATE


REAL ESTATE INVESTMENT ANALYSIS FOR PROPERTY AND LAND PROGRAM REGISTERS NEEDED: 51 HEWLETT PACKARD SOLUTION BOOK: REAL ESTATE





ELLWOOD INCOME VALUATION FOR INCOME PROPERTY APPRAISAL PROGRAM REGISTERS NEEDED: 31 HEWLETT PACKARD SOLUTION BOOK: REAL ESTATE







## NOTES



#### **Hewlett-Packard Software**

In terms of power and flexibility, the problem-solving potential of the HP-41C programmable calculator is nearly limitless. And in order to see the practical side of this potential, HP has different types of software to help save you time and programming effort. Every one of our software solutions has been carefully selected to effectively increase your problem-solving potential. Chances are, we already have the solutions you're looking for.

### **Application Pacs**

To increase the versatility of your HP-41C, HP has an extensive library of "Application Pacs". These programs transform your HP-41C into a specialized calculator in seconds. Included in these pacs are detailed manuals with examples, minature plug-in Application Modules, and keyboard overlays. Every Application Pac has been designed to extend the capabilities of the HP-41C.

You can choose from:

Aviation Clinical Lab Circuit Analysis Financial Decisions Mathematics Structural Analysis Surveying Securities Statistics Stress Analysis Games Home Management Machine Design Navigation Real Estate Thermal and Transport Science

### **Users' Library**

The Users' Library provides the best programs from contributors and makes them available to you. By subscribing to the HP-41C Users' Library you'll have at your fingertips literally hundreds of different programs from many different application areas.

### \* Users' Library Solutions Books

Hewlett-Packard offers a wide selection of Solutions Books complete with user instructions, examples, and listings. These solution books will complement our other software offerings and provide you with a valuable tool for program solutions.

You can choose from:

Business Stat/Marketing/Sales Home Construction Estimating Lending, Saving and Leasing Real Estate Small Business Geometry High-Level Math Test Statistics Antennas Chemical Engineering Control Systems Electrical Engineering Fluid Dynamics and Hydraulics Civil Engineering Heating, Ventilating & Air Conditioning Mechanical Engineering Solar Engineering Calendars Cardiac/Pulmonary Chemistry Games Optometry I (General) Optometry II (Contact Lens) Physics Surveying

\* Some books require additional memory modules to accomodate all programs.

# **REAL ESTATE**

INCOME PROPERTY ANALYSIS MORTGAGE YIELD MORTGAGE PRICING AMOUNT OF EQUITY AT ANY TIME WRAP-AROUND MORTGAGE INTERNAL RATE OF RETURN VARIABLE ANALYSIS OF REAL ESTATE INVESTMENT REAL ESTATE INVESTMENT ANALYSIS FOR PROPERTY AND LAND ELLWOOD INCOME VALUATION FOR INCOME PROPERTY APPRAISAL RESIDENTIAL ANALYSIS (RENT OR BUY)

