

HEWLETT-PACKARD

IHP-67/IHP-97

Users' Library Solutions
Real Estate Investment



INTRODUCTION

In an effort to provide continued value to its customers, Hewlett-Packard is introducing a unique service for the HP fully programmable calculator user. This service is designed to save you time and programming effort. As users are aware, Programmable Calculators are capable of delivering tremendous problem solving potential in terms of power and flexibility, but the real genie in the bottle is program solutions. HP's introduction of the first handheld programmable calculator in 1974 immediately led to a request for program **solutions** — hence the beginning of the HP-65 Users' Library. In order to save HP calculator customers time, users wrote their own programs and sent them to the Library for the benefit of other program users. In a short period of time over 5,000 programs were accepted and made available. This overwhelming response indicated the value of the program library and a Users' Library was then established for the HP-67/97 users.

To extend the value of the Users' Library, Hewlett-Packard is introducing a unique service—a service designed to save you time and money. The Users' Library has collected the best programs in the most popular categories from the HP-67/97 and HP-65 Libraries. These programs have been packaged into a series of low-cost books, resulting in substantial savings for our valued HP-67/97 users.

We feel this new software service will extend the capabilities of our programmable calculators and provide a great benefit to our HP-67/97 users.

A WORD ABOUT PROGRAM USAGE

Each program contained herein is reproduced on the standard forms used by the Users' Library. Magnetic cards are not included. The Program Description I page gives a basic description of the program. The Program Description II page provides a sample problem and the keystrokes used to solve it. The User Instructions page contains a description of the keystrokes used to solve problems in general and the options which are available to the user. The Program Listing I and Program Listing II pages list the program steps necessary to operate the calculator. The comments, listed next to the steps, describe the reason for a step or group of steps. Other pertinent information about data register contents, uses of labels and flags and the initial calculator status mode is also found on these pages. Following the directions in your HP-67 or HP-97 **Owners' Handbook and Programming Guide**, "Loading a Program" (page 134, HP-67; page 119, HP-97), key in the program from the Program Listing I and Program Listing II pages. A number at the top of the Program Listing indicates on which calculator the program was written (HP-67 or HP-97). If the calculator indicated differs from the calculator you will be using, consult Appendix E of your **Owner's Handbook** for the corresponding keycodes and keystrokes converting HP-67 to HP-97 keycodes and vice versa. No program conversion is necessary. The HP-67 and HP-97 are totally compatible, but some differences do occur in the keycodes used to represent some of the functions.

A program loaded into the HP-67 or HP-97 is not permanent—once the calculator is turned off, the program will not be retained. You can, however, permanently save any program by recording it on a blank magnetic card, several of which were provided in the Standard Pac that was shipped with your calculator. Consult your **Owner's Handbook** for full instructions. A few points to remember:

The Set Status section indicates the status of flags, angular mode, and display setting. After keying in your program, review the status section and set the conditions as indicated before using or permanently recording the program.

REMEMBER! To save the program permanently, **clip** the corners of the magnetic card once you have recorded the program. This simple step will protect the magnetic card and keep the program from being inadvertently erased.

As a part of HP's continuing effort to provide value to our customers, we hope you will enjoy our newest concept.

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Program Description I

1

Program Title *Mortgage Yield*

Contributor's Name *Jack B. Buster*

Address *P. O. Box 8062*

City *Anchorage*

State *Alaska*

Zip Code *99508*

Program Description, Equations, Variables *By injecting the periodic (monthly) interest rate of a mortgage (STO B), the monthly payment amount (STO C), the amount owing on the mortgage (STO D) and the purchase price of the note (STO 0), the following calculations are possible:*

Total amortization period (Press A)

Full term yield (Press B)

Yield at a specified point in time (Enter months to prepayment, press C)

Yield at a specified prepaying balloon (Enter balloon and press D) - Then C

Successive yields at different prepayment points (After C then enter months and R/S)

Total amount of prepaying Balloon, total amount of accumulated monthly payments and total amount of cash paid on the mortgage. (Press E)

This program provides the basic tool for analysis of mortgage performance and creation of desired data to be specified by the user. The field and the application of the calculations possible with this program are too widespread to be encompassed completely herein and are therefore left to the development of the user.

Operating Limits and Warnings *Label C is not totally interactive with Labels A, B, D and E. Information desired from Labels A, B and D must be obtained before going to C. After C is pressed, only the routine contained in Label E and another loop through C is possible (by pressing R/S). An attempted A, B or D calculation after a C routine is run will give meaningless information.*

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

NEITHER HP NOR THE CONTRIBUTOR MAKES ANY EXPRESS OR IMPLIED WARRANTY OF ANY KIND WITH REGARD TO THIS PROGRAM MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NEITHER HP NOR THE CONTRIBUTOR SHALL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING OUT OF THE FURNISHING, USE OR PERFORMANCE OF THIS PROGRAM MATERIAL.

Program Description II

Sketch(es)

Sample Problem(s) Given 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.

SOLUTION:

Initialize f a

Load data: $8.5 \div 12 = .71$ STO B 140 STO C 11125 STO D 7200 STO 0

Amortization period - - - Press A - - - = 117.24 months

Full Term Yield - - - - Press B - - - = 19.96% (Pressing A before B is not necessary)

Yield if prepaid when balance is \$5,000 - - - key in 5000 - - - Press D - - = 75.92 months

Press C - - - = 20.98%

Total cash paid at this point - - Press E - - 5000.00 (Balloon) - 10,628.00 (Amount received in monthly payments to this point - 15,628.00 (Total cash paid on mortgage)

Solution(s) Construct a chart of performance at 24 month intervals:

Initialize and reload data as above.

Mos from purchase to prepayment	Yield	Balloon Amount	Payments Received	Cash Received
Enter 24 [C]	34.76% Press [E]	9530.16	3360.00	12890.16
Enter 48 [R/S]	24.25% Press [E]	7640.91	6720.00	14360.91
Enter 72 [R/S]	21.24% Press [E]	5402.92	10080.00	15482.92
Enter 96 [R/S]	20.18% Press [E]	2751.81	13440.00	16191.81
Enter 117.24 [R/S]	19.96% Press [E]	.13	16413.60	16413.73

Reference(s) This program was developed from the HP-67 standard pac program L05-03, Annuities and Compound Amounts, and the HP-80 reference book, Real Estate Applications.

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[illegible]

67 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	* f LBL A	31 25 11			0	00	
	0	00			STO B	33 12	
	STO A	33 11			2	02	
	GSB 0	31 22 00		060	1	01	
	RCL E	34 15			ST I	35 33	Figure
	LST X	35 82			RCL E	34 15	Yield
	-	51	Figure		RCL A	34 11	
	RCL D	34 14			RCL C	34 13	
	LST X	35 82	Amortization		X	71	Routine
010	-	51			+	61	
	\div	81	Period		RCL D	34 14	
	f LN	31 52			-	51	
	RCL 7	34 07			RCL A	34 11	
	f LN	31 52		070	\div	81	
	\div	81			RCL D	34 14	
	STO A	33 11			\div	81	
	h RTN	35 22			.	83	
	* f LBL 4	31 25 04			9	09	
	1	01	Figure		CHS	42	
020	STO D	33 14	Balloon Amount		$x \leq y$	32 71	
	f GSB 0	31 22 00			$x \geq y$	35 52	
	STO D	33 14			f GSB 5	31 22 05	
	h RTN	35 22			$x = 0$	31 51	
	* f LBL 0	31 25 00		080	h RTN	35 22	
	1	01			* f LBL 6	31 25 06	
	STO 5	33 05	Calculation		f GSB 0	31 22 00	
	RCL B	34 12			+	61	
	f %	31 82	Routine		RCL D	34 14	
	STO 9	33 09			-	51	
030	+	61			RCL 8	34 08	
	STO 7	33 07			RCL A	34 11	
	RCL A	34 11			RCL 7	34 07	
	CHS	42			\div	81	Calculate f(i) and
	y^x	35 63			X	71	f'(i)
	STO 8	33 08		090	STO 6	33 06	
	RCL E	34 15			RCL 4	34 04	
	X	71			RCL 9	34 09	
	1	01			\div	81	
	RCL 8	34 08			-	51	
040	-	51			RCL 5	34 05	
	STO 4	33 04			X	71	
	RCL C	34 13			RCL C	34 13	
	RCL 9	34 09			X	71	
	\div	81		100	RCL 9	34 09	
	STO 3	33 03			\div	81	
	RCL 5	34 05			RCL 6	34 06	
	X	71			RCL E	34 15	
	X	71			X	71	
	h RTN	35 22			-	51	
050	* q LBL a	32 25 11			\div	81	
	CL REG	31 43	Initialize		CHS	42	
	P \geq S	31 42			f GSB 5	31 22 05	
	CL REG	31 43			RCL B	34 12	
	CL X	44		110	\div	81	
	h RTN	35 22			f RND	31 24	
	* f LBL 3	31 25 03			$x \neq 0$	31 61	

REGISTERS

0	Price	1	Used	2	Used	3	$\pm \frac{PMT}{i}$	4	$\frac{-n}{(1-(1+i))}$	5	1 or 1+i	6	$\frac{-n-1}{n(1+i)}$	7	1+i	8	$1+i^{-n}$	9	i/100
S0		S1		S2		S3	i	S4	Balloon	S5		S6		S7		S8		S9	
A	n	B	i	C	PMT	D	PV	E	Balloon	I	Used								

67Program Listing II

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STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
	GTO 6	22 06			STO 1	33 01	
	RCL B	34 12		170	RCL D	34 14	
	h RTN	35 22			STO 2	33 02	
*	f LBL 5	31 25 05			RCL 0	34 00	
	EEX	43	Convert to % and		STO D	33 14	
	2	02			f GSB 3	31 22 03	
	X	71	add to R _B		RCL 2	34 02	
120	STO + (i)	33 61 24			STO D	33 14	
	h RTN	35 22			RCL 1	34 01	
*	f LBL C	31 25 13			STO B	33 12	
	STO 1	33 01	Control routine		R ↓	35 53	
	PZ S	31 42	for prepayment	180	R ↓	35 53	
	RCL B	34 12	yield		1	01	
	STO 4	33 04			2	02	
	PZ S	31 42			X	71	
	f GSB A	31 22 11			h RTN	35 22	
	STO 2	33 02		*	f LBL D	31 25 14	
130	RCL 1	34 01			E+	21	
	-	51			f GSB A	31 22 11	Figure
	STO A	33 11			STO 1	33 01	Prepayment
	f LBL 9	31 25 09			RCL D	34 14	Period
	f GSB 4	31 22 04		190	STO 2	33 02	
	STO E	33 15			RCL E+	34 21	
	RCL 0	34 00			STO D	33 14	
	STO D	33 14			f GSB A	31 22 11	
	RCL 1	34 01			RCL 1	34 01	
	STO A	33 11			STO A	33 11	
140	f GSB 3	31 22 03			-	51	
	1	01			CHS	42	
	2	02			RCL 2	34 02	
	X	71			STO D	33 14	
	f LBL 2	31 25 02		200	x 2 y	35 52	
	R/S	84			h RTN	35 22	
	STO 1	33 01	Successive				
	RCL 2	34 02	prepayment				
	x 2 y	35 52	yield				
	-	51	loop				
150	STO A	33 11					
	PZ S	31 42					
	RCL 4	34 04					
	PZ S	31 42					
	STO B	33 12					
	GTO 9	22 09		210			
*	f LBL E	31 25 15					
	RCL E	34 15	Summation routine				
	-x-	31 84					
	RCL 1	34 01					
160	RCL C	34 13					
	X	71					
	-x-	31 84					
	+	61					
	-x-	31 84					
	GTO 2	22 02		220			
*	f LBL B	31 25 12					
	f GSB A	31 22 11					
	RCL B	34 12					

LABELS					FLAGS	SET STATUS		
A	B	C	D	E	0	FLAGS	TRIG	DISP
n	FT Yield	prepaid yield	prepay period	Summation		ON OFF		
a Initialize		c	d	e	1	0 <input type="checkbox"/> <input checked="" type="checkbox"/>	DEG <input checked="" type="checkbox"/>	FIX <input checked="" type="checkbox"/>
0 Calculate	1	2	3 i routine	4 PY routine	2	1 <input type="checkbox"/> <input checked="" type="checkbox"/>	GRAD <input type="checkbox"/>	SCI <input type="checkbox"/>
5 % routine	6 iterate	7	8	9	3	2 <input type="checkbox"/> <input checked="" type="checkbox"/>	RAD <input type="checkbox"/>	ENG <input type="checkbox"/>
						3 <input type="checkbox"/> <input checked="" type="checkbox"/>		n 2

Program Description I

Program Title *Mortgage Pricing No. 1*

Contributor's Name *Jack B. Buster*

Address *P. O. Box 8062*

City *Anchorage*

State *Alaska*

Zip Code *99508*

Program Description, Equations, Variables

This program will calculate the price of a mortgage which involves two different payment streams one of which is monthly and the other user selectable. The program will compensate for mortgages with a monthly payment too low to amortize the balance in the absence of the periodic balloon. Insertion of one step will allow the user to determine the total amortization period. Required data for input is as follows:

Interest rate of mortgage

Monthly payment amount

Present value of mortgage

Desired yield

Periodic balloon period

Periodic balloon amount

Number of months until first balloon

Operating Limits and Warnings

None known

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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Program Description II

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Sketch(es)

Sample Problem(s) Purchaser desires to purchase mortgages for 24% yield. He is asked to purchase a mortgage with a face value of \$12,000.00 payable at \$80 per month with a balloon payment of \$1,000 each June all to include 9% interest. The purchase date will be August. (10 months to first balloon payment)

Solution(s) Keystrokes:

[f] [A]	0.00	
[9] [ENTER] [1] [2] [=] [STO] [B]	0.75	(Interest rate)
[8] [0] [STO] [C]	80.00	(Monthly payment)
[1] [2] [0] [0] [0] [STO] [D]	12000.00	(Present value)
[2] [4] [STO] [E]	24.00	(Desired yield)
[1] [0] [0] [0] [STO] [0]	1000.00	(Annual balloon)
[1] [0] [STO] [1]	10.00	(Months to 1st balloon)
[A] (-1 minute 20 seconds)	7060.63	(Mortgage price)

Reference(s) Additional comments. The program operates by considering the two income streams from the mortgage separately. The first section keeps track of the number of payments until the balance is low enough to amortize on the monthly payment alone. Then a loop is established alternately decrementing the pay off period by the number of months per balloon and the balance by the balloon amount. Finally, each stream is evaluated at the desired yield and the periodic stream adjusted to mortgage purchase date.

67 Program Listing I

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STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	LBL A	31 25 11	Will note amortize without balloon? If yes skip rest. First loop?		STO 5	33 05	Compute discounted value of monthly income stream.
	RCL D	34 14			GTO 1	22 01	
	RCL B	34 12			f LBL 4	31 25 04	
	f %	31 82		060	h x ² y	35 52	
	RCL C	34 13			STO + 6	33 61 06	
	g x ² y	32 81			f LBL 1	31 25 01	
	GTO 5	22 05			RCL 6	34 06	
	F? 1	35 71 01			RCL 2	34 02	
	GTO 6	22 06			-	51	
010	-	51			STO A	33 11	
	RCL 1	34 01	Increment balloon counter. If no try again		RCL E	34 15	Hold total Compute value of periodic income stream.
	f LBL 8	31 25 08			1	01	
	X	71			2	02	
	RCL 0	34 00		070	÷	81	
	h x ² y	35 52			STO B	33 12	
	-	51			GSB D	31 22 14	
	RCL D	34 14			STO + 5		
	h x ² y	35 52			RCL E+	34 21	
	-	51			STO A	33 11	
020	STO D	33 14			RCL E	34 15	
	1	01	Compute term		STO B	33 12	Set up and compute present value of discounted periodic income stream adjusted to purchase date
	E+	21			RCL 0	34 00	
	RCL 2	34 02			STO C	33 13	
	STO + 6	33 61 06		080	GSB D	31 22 14	
	SF 1	35 51 01			RCL E	34 15	
	GTO A	22 11			1	01	
	f LBL 5	31 25 05			2	02	
	GSB E	31 22 15			÷	81	
	RCL 1	34 01			STO B	33 12	
030	STO + 6	33 61 06			h x ² y	35 52	
	RCL E+	34 21	Compute balance		STO E	33 15	GTO calculate routine Add partial totals and show price.
	f x=0	31 51			RCL 1	34 01	
	GTO 7	22 07			1	01	
	RCL A	34 11		090	2	02	
	RCL 2	34 02			÷	81	
	-	51			STO A	33 11	
	f LBL 2	31 25 02			0	00	
	STO A	33 11			STO C	33 13	
	RCL 2	34 02			q GSB d	32 22 14	
040	STO + 6	33 61 06			RCL 5	34 05	
	GSB D	31 22 14	Is balloon larger?		+	61	Calculate routine for terms and balances
	RCL 0	34 00			h RTN	35 22	
	q x ² y	32 81			f LBL 0	31 25 00	
	GTO 3	22 03		100	1	01	
	-	51			ST I	35 33	
	STO D	33 14			RCL B	34 12	
	1	01			f %	31 82	
	E+	21			STO 9	33 09	
	GSB E	31 22 15			+	61	
050	RCL 2	34 02			STO 7	33 07	
	q x ² y	32 81	Need balloon?		RCL A	34 11	
	GTO 4	22 04			CHS	42	
	-	51			y ^x	35 63	
	GTO 2	22 02		110	STO 8	33 08	
	f LBL 3	31 25 03			1	01	
	h x ² y	35 52			RCL 8	34 08	

REGISTERS

0 Balloon amount	1 mos. to 1st ball.	2 term of balloon	3 used	4 used	5 partial total	6 monthly payments	7 used	8 used	9 used
S0	S1	S2	S3	S4 balloon counter	S5	S6	S7	S8	S9
A Mortgage term	B interest rate	C monthly payment	D balance	E yield	I used				

67 Program Listing II

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS	
	-	51	Initialization routine.		RCL D	34 14	stream to present value at mortgage purchase date.	
	STO 4	33 04		170	f x=0	31 51		
	RCL C	34 13			h SF 1	35 51 01		
	RCL 9	34 09			1	01		
	$\frac{\div}{\div}$	81			h ST I	35 33		
	STO 3	33 03			RCL B	34 12		
	h RC I	35 34			f %	31 82		
120	x	71			STO 9	33 09		
	x	71			+	61		
	h RTN	35 22			STO 7	33 07		
	g LBL a	32 25 11			RCL A	34 11		
	f CL REG	31 43			180	CHS		42
	f P ₂ S	31 42	Calculation routine for term of mortgage.		h y ^x	35 63		
	f CL REG	31 43			STO 8	33 08		
	1	01			RCL E	34 15		
	2	02			x	71		
	STO 2	33 02			1	01		
130	h CF 1	35 61 01			RCL 8	34 08		
	CL X	44			-	51		
	h RTN	35 22			STO 4	33 04		
	f LBL E	31 25 15			RCL C	34 13		
	0	00			190	RCL 9	34 09	
	STO A	33 11			$\frac{\div}{\div}$	81		
	f GSB 0	31 22 00		Remaining balance routine.		h F? 1	35 71 01	
	0	00			CHS	42		
	LST X	35 82			STO 3	33 03		
	-	51			h RC I	35 34		
140	RCL D	34 14			x	71		
	LST X	35 82			x	71		
	-	51			+	61		
	$\frac{\div}{\div}$	81			STO D	33 14		
	f LN	31 52			200	h RTN	35 22	
	RCL 7	34 07						
	f LN	31 52						
	$\frac{\div}{\div}$	81						
	STO A	33 11	Calculation routine for adjusting periodic income					
	h RTN	35 22						
150	f LBL D	31 25 14						
	1	01						
	STO D	33 14						
	f GSB 0	31 22 00						
	STO D	33 14						
	h RTN	35 22						
	f LBL 6	31 25 06						
	-	51						
	RCL 2	34 02						
	GTO 8	22 08						
160	f LBL 7	31 25 07						
	RCL A	34 11						
	RCL 1	34 01						
	-	51						
	GTO 2	22 02						
	g LBL d	32 25 14						
	1	01						
	STO D	33 14						
	h CF 1	35 61 01						
LABELS				FLAGS		SET STATUS		
A	B	C	D	E	0	FLAGS	TRIG	DISP
CALCULATE			Balance	Term		ON OFF		
a initialize	b	c	d adjusted price	e	1 used	0 <input type="checkbox"/> <input checked="" type="checkbox"/>	DEG <input checked="" type="checkbox"/>	FIX <input checked="" type="checkbox"/>
0 used	1 used	2 used	3 used	4 used	2	1 <input type="checkbox"/> <input checked="" type="checkbox"/>	GRAD <input type="checkbox"/>	SCI <input type="checkbox"/>
5 used	6 used	7 used	8 used	9	3	2 <input type="checkbox"/> <input checked="" type="checkbox"/>	RAD <input type="checkbox"/>	ENG <input type="checkbox"/>
						3 <input type="checkbox"/> <input checked="" type="checkbox"/>		n

Program Description I

Program Title *MORTGAGE PRICING NO. 2*

Contributor's Name *Jack B. Buster*

Address *P. O. Box 8062*

City *Anchorage*

State *Alaska*

Zip Code *99508*

Program Description, Equations, Variables *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.*

Operating Limits and Warnings

Only two levels of mortgage are considered; no thirds.

Do not mix annual payment mortgages with monthly payment mortgages.

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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Program Description II

Sketch(es)

Sample Problem(s) *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(s)	(1) Initialize	f A	0.00
	(2) Load i for first	$9.5 \div 12$ STO B	0.79
	(3) Load pmt for first	1161.67 STO C	1161.67
	(4) Load pv for first	125647 STO D	125647.00
	(5) Load yield	$22.5 \div 12$ STO 0	1.88
	(6) Load i for second	$10.25 \div 12$ ENTER	0.85
	(7) Load pmt for second	2300 ENTER	2300.00
	(8) Load pv for second	214123	214123.
	(9) Calculate	C	<u>57510.36</u>

Reference(s)

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[illegible]

67 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001 *	f LBL A	31 25 11	Calculate total amortization period		RCL 6	34 06	housekeep
	0	00			RCL 7	34 07	
	STO A	33 11			-	51	
	GSB 0	31 22 00		060	STO A	33 11	
	RCL E	34 15			RCL 1	34 01	
	LST X	35 82			STO C	33 13	
	-	51			f P ex S	31 42	
	RCL D	34 14			GSB D	31 22 14	
	LST X	35 82			STO E	33 15	
010	-	51			0	00	
	Divide	81	Calculate price		STO C	33 13	Adjust, total and stop.
	f LN	31 52			f P ex S	31 42	
	RCL 7	34 07			RCL 7	34 07	
	f LN	31 52		070	STO A	33 11	
	Divide	81			f P ex S	31 42	
	STO A	33 11			GSB D	31 22 14	
	h RTN	35 22			STO + 2	33 61 02	
	* f LBL C	31 25 13			RCL 2	34 02	
	f P ex S	31 42			H RTN	35 22	
020	STO 0	33 00			* f LBL D	31 25 14	Pricing routine
	h ↓	35 53	pv_2 to R_{S0}		1	01	
	STO 1	33 01	pmt_2 to R_{S1}		STO D	33 14	
	h ↓	35 53	i_2 to R_{S2}		GSB 0	31 22 00	
	STO 2	33 02		080	+	61	
	f P ex S	31 42			STO D	33 14	
	GSB A	31 22 11			h RTN	35 22	
	f P ex S	31 42			* f LBL 0	31 25 00	
	STO 7	33 07			RCL D	34 14	
	RCL B	34 12			1	01	
030	STO 3	33 03			STO 5	33 05	
	RCL C	34 13			RCL B	34 12	
	STO 4	33 04			f %	31 82	
	RCL D	34 14	housekeep		STO 9	33 09	Calculation subroutine
	STO 5	33 05		090	+	61	
	RCL 0	34 00			STO 7	33 07	
	STO D	33 14			RCL A	34 11	
	RCL 1	34 01			CHS	42	
	STO C	33 13			y ^x	35 63	
	RCL 2	34 02			STO 8	33 08	
040	STO B	33 12			RCL E	34 15	
	f P ex S	31 42			X	71	
	GSB A	31 22 11			1	01	
	f P ex S	31 42	figure 2nd pay-off period		RCL 8	34 08	Initialize
	STO 6	33 06		100	-	51	
	RCL 1	34 01			STO 4	33 04	
	RCL 4	34 04			RCL C	34 13	
	-	51			RCL 9	34 09	
	STO C	33 13			Divide	81	
	RCL 7	34 07			STO 3	33 03	
050	STO A	33 11			RCL 5	34 05	
	f P ex S	31 42			X	71	
	RCL 0	34 00			X	71	
	STO B	33 12	housekeep		h RTN	35 22	
	GSB D	31 22 14		110 *	q LBL a	32 25 11	
	STO 2	33 02			CL REG	31 43	
	f P ex S	31 42			CL X	44	

REGISTERS

0 Yield	1	2 used	3 used	4 used	5 used	6	7 used	8 used	9 used
S0 pv_2	S1 pmt_2	S2 i_2	S3 i_1	S4 pmt_1	S5 pv_1	S6 n_2	S7 n_1	S8	S9
A pay-off perds.	B i_1 and i_n	C pmt & pmt_n	D pv_1 & pv_n	E used	I				

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[illegible]

Program Description I

Program Title Yearly Amortization Schedule

Contributor's Name Hewlett-Packard

Address 1000 N.E. Circle Blvd.

City Corvallis

State Oregon

Zip Code 97330

Program Description, Equations, Variables This program finds both the total interest paid over a specified number of years and the remaining balance at the end of the last specified year, given the monthly interest rate, monthly payment amount, loan amount, and the beginning and ending years being considered. An option is also available to generate a yearly amortization schedule.

All calculations assume that monthly payments occur, however the schedule generated is on an annual basis.

Operating Limits and Warnings Calculator performs all internal calculations to ten digits.

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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Program Description II

[illegible]

Sample Problem(s) Generate a yearly amortization schedule for the first 3 years of a \$30,000, 7% mortgage having monthly payments of \$200.

What is the accumulated interest for the 4th year, and what is the remaining balance at the end of that time?

Solution(s)	[f] [E]	----->	1.00
1	[ENTER+] 3[A]	----->	3.00
7	[ENTER+] 12 [÷] [B]	-->	0.58
200	[C]	----->	200.00
30000	[D]	----->	30000.00
	[f] [A]	----->	

1.00	***
2090.19	***
309.81	***
29690.19	***
2090.19	***

2.00	***
2067.79	***
332.21	***
29357.97	***
4157.97	***

```
Reference(s) _____
4 [ENTER↑] 4 [A]----->      4.00
[E] ----->      2018.02
[R/S] ----->      28619.77
```

3.00	***
2043.77	***
356.23	***
29001.75	***
6201.75	***

User Instructions

1 → Sched. YEARLY AMORTIZATION SCHEDULE P? 2

(6) Y1 ↑ Y2 i PMT PV → INT:R.B.

[illegible]

9/ Program Listing I

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STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11		057	RCL3	36 03	
002	ST01	35 01	$Y2 \rightarrow R_1$	058	x	-35	$BAL_N - BAL_{N-12}$
003	X \rightarrow Y	-41		059	+	-55	$+12(Y2-Y1+1)$
004	ST00	35 00	$Y1 \rightarrow R_0$	060	RTN	24	= INT
005	X \rightarrow Y	-41		061	RCL7	36 07	
006	RTN	24		062	R/S	51	
007	*LBLB	21 12		063	*LBL1	21 01	
008	EEX	-23		064	CHS	-22	
009	2	02	$i/100 \rightarrow R_2$	065	Y*	31	$(1+i/100)^{-N} \rightarrow R_6$
010	\div	-24		066	ST06	35 06	
011	ST02	35 02		067	1	01	
012	LSTX	16-63		068	-	-45	
013	x	-35		069	RCL2	36 02	
014	RTN	24		070	=	-24	
015	*LBLC	21 13		071	RCL3	36 03	
016	ST03	35 03	$PMT \rightarrow R_3$	072	x	-35	$PMT \frac{(1+i/100)^{-N}-1}{i/100} + PV$
017	RTN	24		073	RCL4	36 04	
018	*LBLD	21 14		074	+	-55	
019	ST04	35 04	$PV \rightarrow R_4$	075	RCL6	36 06	
020	RTN	24		076	\div	-24	$\left[\frac{1}{(1+i/100)^{-N}} \right]$
021	*LBLE	21 15		077	RTN	24	
022	1	01		078	R/S	51	
023	RCL2	36 02		079	*LBLA	21 16 11	
024	+	-55		080	RCL0	36 00	
025	ST05	35 05	$(1+i/100) \rightarrow R_5$	081	F0?	16 23 00	
026	RCL1	36 01		082	SPC	16-11	
027	1	01		083	GSB9	23 09	
028	2	02		084	1	01	
029	x	-35	$12(Y2)=N$	085	RCL2	36 02	$(1+i/100) \rightarrow R_5$
030	GSB1	23 01		086	+	-55	
031	ST07	35 07	$BAL_N \rightarrow R_7$	087	ST05	35 05	
032	RCL5	36 05		088	RCL0	36 00	
033	RCL0	36 00		089	1	01	$12(Y1)=N$
034	1	01		090	2	02	
035	2	02		091	x	-35	
036	x	-35		092	GSB1	23 01	
037	1	01		093	ST08	35 08	
038	2	02	$(Y1)12-12=N$	094	RCL5	36 05	
039	-	-45		095	RCL0	36 00	
040	GSB1	23 01		096	1	01	
041	CHS	-22		097	2	02	
042	RCL7	36 07		098	x	-35	
043	+	-55		099	1	01	$12(Y1)-12=N$
044	ST08	35 08		100	2	02	
045	RCL1	36 01	$BAL_N - BAL_{N-12} \rightarrow R_8$	101	-	-45	
046	1	01		102	GSB1	23 01	
047	2	02		103	RCL0	36 00	
048	x	-35		104	-	-45	
049	RCL0	36 00		105	ST09	35 09	
050	1	01		106	RCL3	36 03	
051	2	02		107	1	01	
052	x	-35		108	2	02	
053	-	-45		109	x	-35	
054	1	01		110	X \rightarrow Y	-41	INT $_{Y1}$
055	2	02		111	-	-45	
056	+	-55	$12(Y2-Y1+1)$	112	GSB9	23 09	PRINC $_{Y1}$

REGISTERS

0	Y1	1	Y2	2	i/100	3	PMT	4	PV	5	1+i/100	6	$(1+i/100)^{-N}$	7	BAL_N	8	$BAL_N - BAL_{N-12}$	9	PRINC
S0		S1		S2		S3		S4		S5		S6		S7		S8		S9	
A		B		C		D		E		F		G		H		I		J	

[illegible]

Program Description I

Program Title Amount of equity at any time

Contributor's Name APD

Address 19310 Pruneridge Avenue

City Cupertino

State Ca

Zip Code 95014

Program Description, Equations, Variables For a periodic repayed 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), or D% (percent down), or Ns (net sales price).

This program calculates purchase price equity Epp and net sales equity Es.

$$Epp = Ns - Es$$

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

Operating Limits and Warnings

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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Program Description II

Sketch(es)

Sample Problem(s) (1) $P_p = \$45000$, $D\$ = \4500 , $i = 7.5\%$ annual, $n = 72$, $PMT = \$283.18$, $N_s = \$63900$. What are E_s and E_{pp} ?

(2) The same as the above, but with $PMT = \$251.72$, and $D\% = 20\%$. What are E_s and E_{pp} ?

Solution(s) (1) 72 [A] 7.5 [ENT] 12 [+] [B] 283.18 [C] 45000 [D] 4500 [f] [A] 63900 [f] [D] [E]→7222.35 (Epp) [f] [E]→26122.35 (Es)

(2) 72 [A] 7.5 [ENT] 12 [+] [B] 251.72 [C] 45000 [D] 20 [f] [B] 63900 [f] [D] [E]→11420.27 (Epp) [f] [E]→30320.27 (Es)

Reference(s) This program is a translation of the HP-65 User's Library program #229A submitted by Fred Sommer.

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[illegible]

LABELS						FLAGS	SET STATUS								
A	n	B	i	C	PMT	D	p	E	→Epp	0	ON OFF		TRIG	DISP	
a	D\$	b	D%	c		d	N _s	e	→Es	1	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	DEG <input checked="" type="checkbox"/>	FIX <input checked="" type="checkbox"/>
0		1		2		3		4		2	1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	GRAD <input type="checkbox"/>	SCI <input type="checkbox"/>
											2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	RAD <input type="checkbox"/>	ENG <input type="checkbox"/>
5		6		7		8		9		3	3	<input type="checkbox"/>	<input checked="" type="checkbox"/>		n <u>2</u>

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	# pmts made $\rightarrow R_A$	057	RCLB	36 12	
002	STOA	35 11		058	=	-24	
003	RTN	24		059	RCLC	36 13	
004	*LBLB	21 12	Period interest	060	x	-35	
005	EEX	-23	rate $\rightarrow R_B$	061	F12	16 23 01	
006	2	02		062	GT00	22 00	
007	=	-24		063	RCL3	36 03	
008	STOB	35 12	$1 + \frac{i}{100} \rightarrow R_9$	064	GT01	22 01	
009	1	01		065	*LBL0	21 00	
010	+	-55		066	RCLD	36 14	
011	STO9	35 09		067	*LBL1	21 01	
012	RTN	24		068	XZY	-41	
013	*LBLC	21 13	Periodic payment	069	-	-45	
014	STOC	35 13	$\rightarrow R_C$	070	PRTX	-14	
015	RTN	24		071	SPC	16-11	
016	*LBLD	21 14	Purchase price $\rightarrow R_D$	072	RTN	24	
017	STOD	35 14		073	*LBLA	21 16 11	
018	RTN	24		074	ST01	35 01	\$ down $\rightarrow R_1$
019	*LBL E	21 15		075	CF0	16 22 00	
020	SF1	16 21 01	Purchase price	076	RTN	24	
021	RCLD	36 14	equity	077	*LBLb	21 16 12	
022	*LBL9	21 09		078	ST02	35 02	% down $\rightarrow R_2$
023	ST04	35 04	Equity subroutine	079	SF0	16 21 00	
024	RCLD	36 14		080	RTN	24	
025	F02	16 23 00		081	*LBLd	21 16 14	
026	GT08	22 08		082	ST03	35 03	Net sales price $\rightarrow R_3$
027	RCL1	36 01		083	RTN	24	
028	GT07	22 07		084	*LBL e	21 16 15	Net sales equity
029	*LBL8	21 08		085	CF1	16 22 01	
030	RCL2	36 02		086	RCL2	36 02	
031	%	55		087	GT09	22 09	
032	ST01	35 01		088	R/S	51	
033	*LBL7	21 07					
034	-	-45					
035	ST00	35 00					
036	RCLB	36 12					
037	x	-35					
038	RCLC	36 13					
039	=	-24					
040	1	01					
041	XZY	-41					
042	-	-45					
043	1/X	52					
044	LN	32		100			
045	RCL9	36 09					
046	LN	32					
047	=	-24					
048	ST05	35 05					
049	*LBL1	21 01					
050	1	01					
051	RCL9	36 09					
052	RCLA	36 11					
053	RCL5	36 05					
054	-	-45		110			
055	yx	31					
056	-	-45					

REGISTERS

0 amount financed	1 \$ down	2 % down	3 net sales price	4 Used	5 term of loan	6	7	8	9 1 + i
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A # pmts made	B i	C payment	D purchase price	E	I				

Program Description I

Program Title ELLWOOD INCOME VALUATION FOR INCOME PROPERTY APPRAISAL

Contributor's Name Hewlett-Packard Co.

Address 19310 Pruneridge Avenue

City Cupertino

State CA

Zip Code 95014

Program Description, Equations, Variables

Given a loan proportion to fair market value (δ), the annual interest rate on the loan (i_1) and the term of the loan (payable monthly in equal installments) (n_1); and given the horizon of the projection in years (n_2) and the expected appreciation or depreciation of the property at the end of n_2 years ($\pm\alpha$); and given the desired return on equity (i_2) the program computes the ELLWOOD factor by which the level income stream must be multiplied to find the value of the property which will give the desired rate of return on equity.

Value = AAI*

$$\left[\frac{\left[1 - \delta - \frac{(1+\alpha)}{(1+i_2)^{n_2}} \right] + \delta \left[\frac{i_1 (i_1/12 + 1)^{n_1(12)}}{(i_1/12 + 1)^{n_1(12)} - 1} \right] \left[\frac{(1+i_2)^{n_2} - 1}{i_2 (1+i_2)^{n_2}} \right] + \delta \left[1 - \frac{(i_1/12 + 1)^{n_1(12)}}{(i_1/12 + 1)^{n_1(12)} - 1} \right]}{(1+i_2)^{n_2} - 1} \right]$$

The actual "Ellwood" coefficient is stored in Register 0; the program produces its reciprocal which should be multiplied by the income stream.

Operating Limits and Warnings $\delta > 0$

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 this one.

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[illegible]

97 Program Listing I

COMMENTS			STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11		057 ST00	35 00	
002	1	01		058 RCL4	36 04	
003	2	02		059 1	01	
004	x	-35		060 2	02	
005	ST03	35 03		061 x	-35	
006	CLX	-51		062 RCL1	36 01	
007	LSTX	16-63		063 GSB0	23 00	
008	÷	-24		064 1	01	
009	ST01	35 01		065 -	-45	
010	R4	-31		066 RCL3	36 03	
011	ST06	35 06		067 RCL1	36 01	
012	RTN	24		068 GSB0	23 00	
013	*LBLB	21 12		069 1	01	
014	ST04	35 04		070 -	-45	
015	CLX	-51		071 ÷	-24	
016	1	01		072 CHS	-22	
017	+	-55		073 1	01	
018	ST05	35 05		074 +	-55	
019	RTN	24		075 RCL6	36 06	
020	*LBLC	21 13		076 x	-35	
021	ST02	35 02		077 RCL7	36 07	
022	RCL4	36 04		078 ÷	-24	
023	X*Y	-41		079 RCL0	36 00	
024	GSB0	23 00		080 +	-55	
025	ST07	35 07		081 RCL8	36 08	
026	1	01		082 ÷	-24	
027	-	-45		083 ST00	35 00	
028	RCL7	36 07		084 1/X	52	
029	÷	-24		085 RTN	24	
030	RCL2	36 02		086 *LBL0	21 00	
031	÷	-24		087 1	01	
032	ST08	35 08		088 +	-55	
033	RCL1	36 01		089 X*Y	-41	
034	RCL3	36 03		090 Y*	31	
035	RCL1	36 01		091 RTN	24	
036	GSB0	23 00		092 *LBLE	21 15	
037	x	-35		093 RCL0	36 00	
038	LSTX	16-63		094 RTN	24	
039	1	01		095 R/S	51	
040	-	-45				
041	÷	-24				
042	1	01				
043	2	02				
044	x	-35				
045	RCL8	36 08				
046	x	-35				
047	RCL6	36 06				
048	x	-35				
049	1	01				
050	+	-55				
051	RCL6	36 06				
052	-	-45				
053	RCL5	36 05				
054	RCL7	36 07				
055	÷	-24				
056	-	-45				

Ellwood Factor
→ R₀

Display Ellwood
Factor

REGISTERS

0 Ell. fac	1 i ₁ /12	2 i ₂	3 n ₁ x 12	4 n ₂	5 1 + α	6 δ	7 Used	8 Used	9
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A	B	C	D	E	I				

Program Description I

Program Title *INCOME PROPERTY ANALYSIS*
Contributor's Name *JACK B. BUSTER*
Address *P. O. BOX 8062*
City *ANCHORAGE* **State** *ALASKA* **Zip Code** *99508*

Program Description, Equations, Variables

$$\text{Capitalization Rate} = \frac{\text{Net Operating Income}}{\text{Purchase Price}}$$

$$\text{Taxable Income} = \text{Net Operating Income} - \text{Depreciation} - \text{Interest}$$

$$\text{Spendable Income} = \text{Net Operating Income} - \text{Payments} - \text{Income tax}$$

$$\text{Spendable Income Rate} = \frac{\text{Spendable Income}}{\text{Equity}}$$

$$\text{Equity Income} = \text{Net Operating Income} - \text{Interest} - \text{Income tax}$$

$$\text{Equity Income Rate} = \frac{\text{Equity Income}}{\text{Equity}}$$

$$\text{Interest} = \text{PMT} \left[12 - \frac{(1+i)^{12} - n}{i} \left[1 - (1+i)^{-12} \right] \right]$$

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.

Operating Limits and Warnings

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.

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Program Description II

Sketch(es)

Sample Problem(s) An investor wishes to know the performance of a large apartment complex over the next five years with respect to initial capitalization rate, taxable income, net spendable income, spendable income rate, equity income, and equity income rate. The following particulars apply:

Purchase Price	\$ 750,000.00	Inflation/Appreciation rate:
Loan Amount	635,000.00	Current year: = 7%
Interest rate	9 3/4%	Next year: = 7 1/2%
Land Value	\$ 95,000.00	Next Year: = 8%
Building life	35 years	Thereafter: = 8 1/2%
Monthly payment	\$ 7,000.00	
Net Operating Income	\$ 112,500.00	
Income tax bracket	40%	

SAMPLE SOLUTION

Cap rate = 15.00	Year 1	Year 2	Year 3	Year 4	Year 5
Taxable	32,887.48	43,118.33	54,742.55	67,955.64	82,987.43
Spendable	15,345.01	19,127.67	23,506.10	28,573.12	34,439.61
Rate	13.34 %	10.04 %	8.51 %	7.65 %	7.12 %
Equity	38,446.77	44,585.28	51,559.82	59,487.67	68,506.74
Rate	33.43 %	23.39 %	18.66 %	15.93 %	14.17 %

Solution(s) Input variables as follows:

Interest Rate	STO B (.8125)
Monthly Payment	STO C
Loan Amount	STO D
Purchase Price	STO O
N.O. INCOME	STO 1
Economic Life	STO 2
Land value	STO 3
Tax Bracket	STO 4 (40)

SOLVE AS FOLLOWS:

- (1) f A ---Initialize
- (2) Store variables
- (3) A ----Capitalization Rate
- (4) B -----Taxable Income
- (5) C -----Spendable Income ----Spendable Income Rate
- (6) D -----Equity Income----Equity Income Rate
- (7) Key in inflation rate
- (8) E -----Advances totals for one year
- (9) Return to step (4) for additional totals

Reference(s) National Institute of Real Estate Brokers income property analysis data sheet.

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[illegible]

67 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	* f LBL A	31 25 11	Figure Cap Rate		1	01	Interest Calculation Routine
	RCL 1	34 01			2	02	
	RCL 0	34 00			STO 8	33 08	
	Divide	81		060	CHS	42	
	EEX	43			y ^x	35 63	
	2	02			1	01	
	X	71			x ² y	35 52	
	h RTN	35 22			-	51	
	* f LBL B	31 25 12	Figure straight line Depreciation		RCL 5	34 05	
010	DSP 2	23 02			RCL 8	34 08	Interest Calculation Routine
	h F? 0	35 71 00			RCL A	34 11	
	GTO 1	22 01			-	51	
	RCL 0	34 00			y ^x	35 63	
	RCL 3	34 03		070	RCL 9	34 09	
	-	51			Divide	81	
	RCL 2	34 02			X	71	
	Divide	81			RCL 8	34 08	
	STO 2	33 02	Figure Loan Amortization Period		x ² y	35 52	
	1	01			-	51	
020	RCL B	34 12			RCL C	34 13	Figure Spendable
	f %	31 82			X	71	
	STO 9	33 09			h RTN	35 22	
	+	61		* f LBL C	31 25 13		
	STO 7	33 07		080	RCL 4	34 04	
	RCL C	34 13			EEX	43	
	RCL 9	34 09			2	02	
	Divide	81			Divide	81	
	Enter	41	Figure Accumulated Interest for 12 months		RCL 3	34 03	
	Enter	41			X	71	
030	RCL D	34 14			STO 7	33 07	show spendable
	-	51			RCL C	34 13	
	Divide	81			RCL 8	34 08	
	f LN	31 52			X	71	
	RCL 7	34 07		090	STO E	33 15	
	f LN	31 52			+	61	
	Divide	81			CHS	42	
	STO A	33 11			RCL 1	34 01	
	* f LBL 1	31 25 01	Figure Taxable		+	61	
	f GSB 0	31 22 00			-x-	31 84	show rate
040	STO 6	33 06			RCL 0	34 00	
	RCL 2	34 02			RCL D	34 14	
	+	61			-	51	
	CHS	42			STO 9	33 09	
	RCL 1	34 01		100	Divide	81	
	+	61			EEX	43	
	STO 3	33 03	Figure Equity Income		2	02	
	h RTN	35 22			X	71	
	* f LBL 0	31 25 00			h RTN	35 22	show equity
	RCL B	34 12		* f LBL D	31 25 14		
050	EEX	43			RCL 7	34 07	
	2	02			RCL 6	34 06	
	Divide	81			+	61	
	STO 9	33 09			CHS	42	
	1	01		110	RCL 1	34 01	
	+	61			+	61	
	STO 5	33 05			-x-	31 84	

REGISTERS

0	1	2	3	4	5	6	7	8	9
Price	N.O.I.	Life	Land val.	tax rate	used	used	tax	12	used
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A	B	C	D	E	I				
Loan Amort.	Interest Rate	Monthly PMT	Loan Balance	USED	Year counter				

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[illegible]

Program Description I

Program Title RETURN ON EQUITY RENTAL PROPERTY

Contributor's Name COLIN E. WALTON

Address 26 SIMKIN AVE, KOHIMARAMARA,

City AUCKLAND 6. State NEW ZEALAND Zip Code

Program Description, Equations, Variables

GIVEN THE PRESENT VALUE (OR ASKING PRICE) OF AN INVESTMENT PROPERTY, AND MORTGAGE DETAILS, THIS PROGRAM WILL CALCULATE NET ANNUAL INCOME (AFTER INTEREST PAYMENTS) OWNERS EQUITY AND RETURN ON EQUITY EXPRESSED AS A PERCENTAGE.

FURTHER IF A NEW INCOME (EXPECTED FUTURE INCOME) IS INPUT, A SECOND CALCULATION IS PRESENTED ONCE AGAIN SHOWING NET INCOME, EQUITY AND RETURN ON EQUITY

THIS PROGRAM CALCULATES ON THE BASIS OF A "FLAT" MORTGAGE WHERE ONLY INTEREST PAYMENTS ARE MADE - WHICH ARE COMMON IN INVESTMENT PROPERTIES.

Operating Limits and Warnings

INITIALIZATION MUST BE USED AT BEGINNING (START) BUT THERE - AFTER ALL OR ANY VALUES MAY BE CHANGED

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Program Description II

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Sketch(es)

Sample Problem(s)

A RENTAL PROPERTY IS AVAILABLE AT \$57000
 FLAT MORTGAGE IS AVAILABLE OF \$37600 @ 10%
 INTEREST
 A SECOND FLAT MORTGAGE OF \$5000 @ 13%
 INTEREST

WEEKLY INCOME FROM THIS PROPERTY IS \$125
 BUT YOU BELIEVE THIS MAY REASONABLY BE
 INCREASED TO \$160

Solution(s)

KEYSTROKES

[F] [A] (INITIALS)

→ 0.00

57000 [A] 37600 [B] 10 [C]

→ 10.00

5000 [D] 13 [E]

→ 13.00

125 [F] [B] 160 [F] [C]

→ 160.00

[F] [D]

→ 2090.00

INC

14400.00

EQUITY

14.51

% RETURN

3910.00

N-INC

14400.00

EQUITY

27.15

% RETURN

Reference(s)

67 Program Listing I

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STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	* LBLA	21 11			-	-45	
	STO 1	35 01			STD 9	35 09	
	R/S	51			RCL 6	36 06	
	* LBLB	21 12		060	RCL 8	36 08	
	STO 2	35 02			-	-45	
	R/S	51			FO?	16 23 00	IF FO SET THEN PRINT
	* LBL C	21 13			SFC	16-11	
	STO 3	35 03			FO?	16 23 00	
	R/S	51			PRTX	-14	
010	* LBL D	21 14			FO?	16 23 00	
	STO 4	35 04			GTO i	22 45	GTO(i) CAUSES PROGRAM TO BACKSTEP 222 STEPS TO MISS PSE IN PRINT MODE
	R/S	51			PSE	16 51	
	* LBLE	21 15			RCL 9	36 09	
	STO 5	35 05		070	FO?	16 23 00	
	R/S	51			PRTX	-14	
	* LBL a	21 16 11			FO?	16 23 00	
	CHRG	16-53			GTO i	22 45	
	2	02			PSE	16 51	
	2	02			÷	-24	
020	2	02			I	01	
	CHS	-22			O	00	
	STO I	35 46	SETS I REG WITH -222 FOR PROGRAM BACK STEP IN PRINT MODE		O	00	
	CLX	-51			X	-35	
	R/S	51		080	FO?	16 23 00	
	LBL b	21 16 12			PRTX	-14	
	ENT ↑	-21			FO?	16 23 00	
	5	05	CHANGES WEEKLY INCOME TO ANNUAL		GTO i	22 45	
	2	02			PSE	16 51	
	X	-35			F1?	16 23 01	
030	STO 6	35 06			GTO 1	22 01	
	R/S	51			R/S	51	
	* LBL C	21 16 13			* LBL 1	21 01	LBL 1 DOES NEW INCOME CALCULATION
	ENT ↑	-21			RCL 7	36 07	
	5	05		090	RCL 8	36 08	
	2	02			-	-45	
	X	-35			FO?	16 23 00	
	STO 7	35 07			SFC	16-11	
	SF1	16 21 01			FO?	16 23 00	
	R/S	51			PRTX	-14	
040	* LBL d	21 16 14			FO?	16 23 00	
	RCL 7	36 07			GTO i	22 45	GTO(i) CAUSES PROGRAM TO BACKSTEP 222 STEPS TO MISS PSE IN PRINT MODE
	X=O?	16-34	CHECK IF NEW INCOME INPUT - IF NO CANCEL F1		PSE	16 51	
	CF1	16 22 01			RCL 9	36 09	
	RCL 2	36 02		100	FO?	16 23 00	
	RCL 3	36 03			PRTX	-14	
	%	55			FO?	16 23 00	
	STO 8	35 08			GTO i	22 45	
	RCL 4	36 04			PSE	16 51	
	RCL 5	36 05			÷	-24	
050	%	55			I	01	
	ST+8	35-55 08			O	00	
	RCL 2	36 02			O	00	
	RCL 4	36 04			X	-35	
	+	-55		110	FO?	16 23 00	
	RCL 1	36 01			PRTX	-14	
	X≥Y	-41			R/S	51	

REGISTERS

0	1 PV	2 1ST MORT	3 1ST i	4 2ND MORT	5 2ND i	6 PRESENT ANNUAL INC.	7 NEW ANNUAL INC	8 TOT INT	9 EQUITY
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A	B	C	D	E	I	USED.			

[illegible]

Program Description I

Program Title *REAL ESTATE INVESTMENT ANALYSIS*

Contributor's Name *Bruce K. Murock*

Address *6875 Sabado Tarde Rd*

City *Goleta* State *Calif* Zip Code *93017*

Program Description, Equations, Variables This program performs the financial analysis of a real estate investment such as an apartment building. The user enters the first mortgage particulars (principal, yearly interest rate, and number of years loan runs), the second mortgage particulars (principal and yearly interest rate), the net income (gross less utilities, taxes, and services), the down payment (the buyers investment), the value of items to be depreciated at an accelerated rate, the accelerated rate, and the life in years, the yearly straight line acceleration amount, and the buyers tax bracket. A financial analysis for any year of the investment life may now be made. The year number is entered, and the program returns a financial summary that includes the down payment, the first mortgage particulars (principal value, interest rate, life, and monthly payment), the second mortgage particulars (principal value, interest rate, and monthly payment), total monthly payment, total yearly mortgage payment, interest paid to the first, and the second mortgage, total yearly interest, accelerated depreciation summary (original value, acceleration rate, lifetime, depreciation for the selected year), straight line depreciation, and total depreciation for the selected year, interest plus depreciation less income (taxable income writeoff), tax writeoff (tax bracket times taxable income writeoff), yearly cash flow (net monthly income less monthly mortgage payments times twelve), money in pocket (tax savings plus cash flow), payments to principal, and dollars returned on investment (tax savings plus cash flow plus principal payments). By dividing the dollar return on investment by the down payment, the percent return on investment is obtained. The sample calculation shows all the above information for each of the first five years of operation of a hypothetical apartment.

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Program Description I

The second mortgage payments are calculated at 10% of the yearly interest rate per month, i.e. the monthly payment for a second with 10% interest rate per year is 1% of the principal per month. This is a typical arrangement for second trust deeds, however, with any loan having a balloon payment, the monthly payments can be flexible, an extreme case is the interest only loan.

The program may be modified to allow entry of a second loan payment. The subroutine that calculates yearly interest uses as inputs, the principal, the monthly interest rate, and the payment, so only the part of the program where the second trust deed monthly payment is calculated need be changed. This section is contained under label B. The coding shown below replaces the existing section of the program under label B, and allows the user to enter the second principal, yearly interest rate as a percent, and the monthly payment. The program will then summarize, as before, the amounts paid to principal and interest each year.

```

026 *LBLB
027 ST06
028 R4
029 GSB3
030 =
031 ST05
032 R4
033 ST04
034 *LBL1
035 RCL3
036 RCL6
037 +
038 ST07
039 RTN

```

Program Description I

Program Title REAL ESTATE INVESTMENT ANALYSIS

Contributor's Name _____

Address _____

City _____

State _____

Zip Code _____

Program Description, Equations, Variables

$$\begin{aligned} 1^{\text{st}} \text{ T.O. monthly payment (pmt)} &= \frac{i_m \cdot PV_1}{1 - \frac{1}{(1+i_m)^n}} & i_m &= \frac{i_y}{12} = \text{monthly interest rate} \\ n &= \text{Total number of payments} \\ n &= 12 \times \# \text{ of years} \end{aligned}$$

1^{st} or 2^{nd} interest payments for year k , I_k

$$I_k = 12 \cdot \text{pmt} + \left(PV - \frac{\text{PMT}}{i_m} \right) \left((1+i_m)^{12} - 1 \right) (1+i_m)^{12(k-1)}$$

1^{st} T.O. payments to principal = $12 \cdot \text{pmt} - I_k$

2^{nd} T.O. monthly payment = $PV_2 \cdot i_{\text{second}} / 10$

Operating Limits and Warnings

If no first or Second loan exists, a zero principal value may be entered, but a dummy interest rate must be used like 1. Entry of a zero interest rate causes division by zero in the monthly payment calculation, and program execution stops displaying "Error".

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Program Description I

Program Title REAL ESTATE INVESTMENT ANALYSIS

Contributor's Name _____

Address _____

City _____

State _____

Zip Code _____

Program Description, Equations, Variables

$$\text{accelerated depreciation} = (\text{Bldg value}) \frac{R}{n} \left(1 - \frac{R}{n}\right)^{k-1}$$

R = acceleration rate

k = year number

n = life, yrs

$$\text{Taxable income writeoff} = (\text{Depreciation}) + (\text{interest pmts}) - (\text{net income})$$

$$\text{net income} = (\text{gross income}) - (\text{taxes}) - (\text{insurance}) - (\text{utilities}) - (\text{services}) - (\text{maintenance})$$

$$\text{Income tax reduction} = (\text{incremental tax brkt})(\text{Taxable income w/o})$$

$$\text{Cash flow} = \text{net income} - \text{mortgage payments} \quad (\text{on yearly basis})$$

$$\text{money in pocket} = \text{Income tax reduction} + \text{Cash flow}$$

$$\text{Total return on investment} = \text{money in pocket} + \text{payments to principal}$$

$$\% \text{ return on investment} = \frac{\text{Total return}}{\text{down payment}}$$

(the down payment is assumed to be the total investment by the buyer)

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Program Description II

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Sketch(es)

Sample Problem(s) A \$100,000 apartment building is to be purchased with the following financing: 1st mortgage, \$80000, 9.5%/yr, 30 years, simple interest; 2nd mortgage: 10000.@ 10%/yr. (payments 1%/mo.); down payment: \$10000. The gross yearly rent less utilities, taxes, maintenance, and services is \$7000. The building (structure) value is 80000 and is to be depreciated over 20 years at a 125% accelerated rate. The straight line depreciation items are \$500/yr (stoves, refrigerators, water heaters, carpets and drapes). Assume the buyer is in the 50% tax bracket combined federal, state, and local. (the tax bracket is the incremental percentage shown in the tax schedules). The analysis is performed for years one through five of building life (investment life).

Solution(s) See attached sheet

Reference(s)

Program Description I

PROGRAM INPUT

10000.00 GSBa	down payment
80000.00 ENT1	first principal
30.00 ENT1	first lifetime, years
9.50 GSBa	first interest rate per year
672.68 ***	output, first monthly payment
10000.00 ENT1	second principal
10.00 GSBb	second yearly interest rate
7000.00 GSBc	net yearly income
80000.00 ENT1	accelerated depreciation value
20.00 ENT1	accel. depr. lifetime, years
1.25 GSBb	accel depr. rate
500.00 GSBc	straight line depreciation per year
.50 GSBc	incremental tax bracket (state & fed)
1.00 GSBd	year number for analysis

PROGRAM OUTPUT

down payment	10000.00 ***		
first principal	80000.00 ***		
first life, years	30.00 ***		
first yearly interest	9.50 ***	(percent)	
first monthly payment	672.68 ***		
second principal	10000.00 ***		
second yearly interest	10.00 ***		
second monthly pmt.	100.00 ***		
		2.00 GSBE	3.00 GSBE
total monthly pmt.	772.68 ***		
total yearly pmt.	9272.20 ***		
first yearly int.	7578.89 ***	7529.93 ***	7476.11 ***
second yearly int.	990.57 ***	966.64 ***	944.42 ***
total yearly int.	8569.46 ***	8498.57 ***	8420.53 ***
accel depr assets	80000.00 ***	80000.00 ***	80000.00 ***
accel depr rate	1.25 ***	1.25 ***	1.25 ***
accel depr life, years	20.00 ***	20.00 ***	20.00 ***
accel depr	5000.00 ***	4687.50 ***	4394.53 ***
straight line depr.	500.00 ***	500.00 ***	500.00 ***
total depreciation	5500.00 ***	5187.50 ***	4894.53 ***
depr plus int.	14069.46 ***	13686.07 ***	13315.06 ***
net income	7000.00 ***	7000.00 ***	7000.00 ***
taxable income w/o	7069.46 ***	6686.07 ***	6315.06 ***
incremental tax rate	0.50 ***	0.50 ***	0.50 ***
income tax writeoff	3534.73 ***	3343.04 ***	3157.53 ***
yearly cash flow	-2272.20 ***	-2272.20 ***	-2272.20 ***
money in pocket	1262.53 ***	1070.84 ***	885.33 ***
payments to princ.	702.74 ***	773.63 ***	851.67 ***
\$ return in invest.	1965.27 ***	1844.46 ***	1737.00 ***
% return on invest.	19.65 ***	18.44 ***	17.37 ***

User Instructions

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REAL ESTATE INVESTMENT ANALYSIS				
down payment	Value bldg. life RATE	Straight line depr. amt/yr		Tax bracket (incremental)
first mortgage PV ₁ n ₁ %/yr	second mort. PV ₂ n ₂ %/yr	net income	Compute full analysis. enter yr #	compute abbr. analysis. enter yr #

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Load both sides of magnetic card				
2	key in first mortgage particulars				
	a mortgage value (PV ₁)	PV ₁	↑		
	b mortgage life, years	n	↑		
	c yearly interest rate, percent	i _{yr}	A		monthly pmt (printed)
3	key in Second mortgage particulars				
	a mortgage value (PV ₂)	PV ₂	↑		
	b yearly interest rate	i _{yr}	B		
4	key in net income per year	net income	C		
5	key in down payment	\$ down	f	A	
6	key in accelerated depreciation particulars				
	a amount to be depreciated	\$	↑		
	b depreciation period or life	n	↑		
	c acceleration rate, as decimal	R	f	B	
7	key in yearly straight line depreciation amount	\$ S/L	f	C	
8	key in total incremental tax rate (state & federal) as decimal	tax brkt	f	E	
9	key in year number to be analyzed	year	D		summary
10	go back to 9 for another year, or, for abbreviated printout, enter year number	year	E		summary
11	Stop or go back and change problem parameters and rerun.				

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS		
001	*LBLA	21 11	1 ST princ t #yrs t %/yr	054	*LBLb	21 16 12	Accelerated depreciation data \$ t n t rate		
002	GSB3	23 03		055	P2S	16-51			
003	÷	-24		056	ST01	35 01			
004	ST02	35 02		057	R4	-31			
005	R4	-31		058	ST00	35 00			
006	ST01	35 01		059	R4	-31	Straight line depr. per year		
007	R4	-31		060	ST02	35 02			
008	ST00	35 00		061	P2S	16-51			
009	RCL2	36 02		062	RTN	24			
010	x	-35		063	*LBLc	21 16 13			
011	RCL1	36 01	064	ST0C	35 13	abbreviated printout key in year #			
012	GSB4	23 04	065	RTN	24				
013	CHS	-22	066	*LBLd	21 15				
014	RCL2	36 02	067	GSB6	23 06				
015	1	01	068	ST0B	35 12				
016	+	-55	069	ST00	22 00	full printout, key in year #			
017	X2Y	-41	070	*LBLD	21 14				
018	Y*	31	071	ST0B	35 12				
019	1	01	072	GSB6	23 06				
020	X2Y	-41	073	RCLD	36 14				
021	-	-45	074	GSB5	23 05				
022	÷	-24	075	RCL0	36 00				
023	ST03	35 03	076	PRTX	-14		1 ST T.D. summary		
024	GSB5	23 05	077	RCL1	36 01				
025	ST01	22 01	078	PRTX	-14				
026	*LBLB	21 12	079	RCL2	36 02				
027	GSB3	23 03	080	GSB3	23 03				
028	÷	-24	081	x	-35	2 ND T.D. summary			
029	ST05	35 05	082	PRTX	-14				
030	R4	-31	083	RCL3	36 03				
031	ST04	35 04	084	GSB5	23 05				
032	*LBL1	21 01	085	RCL4	36 04				
033	RCL4	36 04	086	PRTX	-14	total mortgage pay ment summary			
034	RCL5	36 05	087	RCL5	36 05				
035	x	-35	088	GSB3	23 03				
036	1	01	089	x	-35				
037	.	-62	090	PRTX	-14				
038	2	02	091	RCL6	36 06	1 ST yearly interest			
039	x	-35	092	GSB5	23 05				
040	ST06	35 06	093	RCL7	36 07				
041	RCL3	36 03	094	PRTX	-14				
042	+	-55	095	GSB4	23 04				
043	ST07	35 07	096	PRTX	-14				
044	RTN	24	097	*LBL0	21 00				
045	*LBLC	21 13	098	SPC	16-11				
046	ST08	35 08	099	RCL2	36 02				
047	RTN	24	100	RCL3	36 03				
048	*LBLc	21 16 15	101	RCL0	36 00	2 ND yearly interest			
049	ST0A	35 11	102	GSB2	23 02				
050	RTN	24	103	ST09	35 09				
051	*LBLa	21 16 11	104	PRTX	-14				
052	ST0D	35 14	105	RCL5	36 05				
053	RTN	24	106	RCL6	36 06				
			107	RCL4	36 04				
			108	GSB2	23 02				
			109	PRTX	-14				
REGISTERS									
0 1 ST T.D. principal	1 1 ST period, years	2 1 ST interest %/mo	3 1 ST monthly payment	4 2 ND T.D. principal	5 2 ND interest %/mo	6 2 ND monthly payment	7 total mo. mortgage payments	8 net rental income	9 total yrly mort. interest
S0 bldg life, years	S1 declining balance rate	S2 bldg rate \$	S3 PV	S4 PMT	S5 i/mo	S6 1+i/mo	S7	S8	S9
A incremental tax bracket		B year #		C straight line depreciation /year		D Down payment		E	

97 Program Listing II

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STEP	KEY ENTRY	KEY CODE	COMMENTS	166	÷	-24	COMMENTS
110	ST+9	35-55 09		167	EEX	-23	
111	RCL9	36 09	Total yearly interest	168	2	02	
112	PRTX	-14		169	x	-35	% ROI
113	GSB6	23 06		170	GSB5	23 05	
114	P+S	16-51		171	*LBL6	21 06	
115	RCL2	36 02		172	SPC	16-11	
116	PRTX	-14		173	SPC	16-11	
117	RCL1	36 01		174	RTN	24	
118	PRTX	-14		175	*LBL2	21 02	yearly interest subroutine
119	RCL0	36 00		176	P+S	16-51	
120	PRTX	-14		177	ST03	35 03	
121	÷	-24		178	R↓	-31	
122	ENT↑	-21	accelerated depreciation summary	179	ST04	35 04	
123	ENT↑	-21		180	R↓	-31	
124	CHS	-22		181	ST05	35 05	
125	1	01		182	1	01	
126	+	-55		183	+	-55	
127	RCLB	36 12		184	ST06	35 06	
128	1	01		185	RCLB	36 12	
129	-	-45		186	1	01	
130	Y*	31		187	-	-45	
131	RCL2	36 02		188	GSB4	23 04	
132	x	-35		189	Y*	31	
133	x	-35		190	RCL6	36 06	
134	P+S	16-51		191	1	01	
135	PRTX	-14		192	2	02	
136	RCLC	36 13	s/l depreciation	193	Y*	31	
137	PRTX	-14		194	1	01	
138	+	-55		195	-	-45	
139	GSB5	23 05	total depreciation	196	x	-35	
140	RCL9	36 09		197	RCL3	36 03	
141	+	-55		198	RCL4	36 04	
142	PRTX	-14	total depr + interest	199	RCL5	36 05	
143	RCL8	36 08		200	÷	-24	
144	PRTX	-14	net income	201	-	-45	
145	-	-45		202	x	-35	
146	PRTX	-14	income - int & depr	203	RCL4	36 04	
147	RCLA	36 11	= income writeoff	204	GSB4	23 04	
148	PRTX	-14	incremental tax rate	205	+	-55	
149	x	-35		206	P+S	16-51	
150	PRTX	-14	income tax writeoff	207	RTN	24	
151	RCL8	36 08		208	*LBL3	21 03	"1200"
152	RCL7	36 07		209	1	01	
153	GSB4	23 04		210	2	02	
154	-	-45		211	0	00	
155	PRTX	-14	yearly cash flow	212	0	00	
156	+	-55		213	RTN	24	
157	GSB5	23 05	money in pocket	214	*LBL4	21 04	12 x
158	RCL7	36 07	= cash flow + tax sugg	215	1	01	
159	GSB4	23 04		216	2	02	
160	RCL9	36 09		217	x	-35	
161	-	-45		218	RTN	24	
162	PRTX	-14	total pmts to principal	219	*LBL5	21 05	print & space
163	+	-55		220	PRTX	-14	
164	PRTX	-14	\$ ROI	221	SPC	16-11	
165	RCLD	36 14		222	RTN	24	

LABELS					FLAGS	SET STATUS		
A 1 ST T.D.	B 2 ND T.D.	C net income	D compute full output	E compute abtr. output	0	FLAGS		
a down payment	b accelerated depreciation	c straight line depreciation	d	e incremental tax bracket	1	ON OFF	TRIG	DISP
0 abtr. printout	1 local loop destination	2 loan interest subroutine	3 1200	4 12x	2	0 <input type="checkbox"/> <input checked="" type="checkbox"/>	DEG <input checked="" type="checkbox"/>	FIX <input checked="" type="checkbox"/>
5 prt & space	6 double space	7	8	9	3	1 <input type="checkbox"/> <input checked="" type="checkbox"/>	GRAD <input type="checkbox"/>	SCI <input type="checkbox"/>
						2 <input type="checkbox"/> <input checked="" type="checkbox"/>	RAD <input type="checkbox"/>	ENG <input type="checkbox"/>
						3 <input type="checkbox"/> <input checked="" type="checkbox"/>		n 2

Program Description I

Program Title **INTERNAL RATE OF RETURN**

Contributor's Name **HEWLETT-PACKARD COMPANY**

Address **Corvallis Division**
1000 N.E. Circle Boulevard

City **Corvallis, OR 97330**

State

Zip Code

Program Description

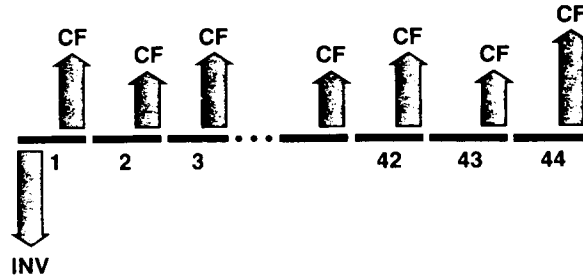


Figure 1

Note:

The above diagram is representative of diagrams which will be used in this package. The horizontal line represents the time period(s) involved, while the arrows represent the cash flows.

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 44 **positive** cash flows, this program calculates the periodic IRR. If there are negative as well as positive cash flows, the program accepts up to 22 cash flows.

If more than 44 positive cash flows are entered, all cash flows over 44 will be ignored. There will be no indication, however, that more than 44 cash flows have been entered. Likewise, if more than 22 positive and negative cash flows are entered, erroneous results will occur.

Zero should be entered for periods with no cash flow.

Operating Limits and

When more than 22 cash flows are involved (all of which must be positive), the user is asked to enter the largest cash flow in step 3 because of the storage techniques being used. This value is then used to scale all other cash flows, and depending on these values, accuracy may be reduced. Consequently, the resulting periodic rate of return should be considered accurate to within $\pm .01\%$ (.0001 decimal). This largest cash flow must be entered again in sequence in step 4. If a cash flow larger than the value entered for CF MAX is keyed in at step 4, erroneous results may occur.

The answer produced is the *periodic rate of return*. If the cash flow periods are

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Program Description I

Program Title _____

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Program Description, Equations, Variables

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.

In many instances another program may be more suitable for calculating IRR. If all cash flows are equal and equally spaced, or if all cash flows except the last are equal and equally spaced, DIRECT REDUCTION LOANS (BD-04) is a better choice. If the cash flows occur in groups of uneven amounts, IRR-GROUPS (BD-02) may be more suitable.

This program was designed for optimum operation when the interest rate being solved for is between 0 and 100%. The program will often solve for interest rates outside this range, but occasionally may halt prematurely with ERROR in the display. This is an error condition generated by an intermediate calculation, and indicates that the program cannot solve that particular problem.

The calculated answer may be verified by using DISCOUNTED CASH FLOW ANALYSIS—NET PRESENT VALUE (BD-03), to calculate the net present value. The NPV should be close to 0.

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.

Operating Limits and Warnings

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Program Description II

[illegible]

Sample Problem(s)	<h2 style="margin: 0;">PRINCIPAL EQUATIONS</h2>
<div style="border: 1px solid black; height: 100px; width: 100%;"></div>	<p>Unless otherwise stated, all interest rates (i, APR, IRR, NOM, EFF, CR, YLD, etc.) are expressed in decimal form in the equations which follow. Only symbols not defined in the program descriptions are defined here.</p>
<div style="border: 1px solid black; height: 100px; width: 100%;"></div>	<p>Program Number</p>
<div style="border: 1px solid black; height: 100px; width: 100%;"></div>	<p>1. Internal Rate of Return</p>
<div style="border: 1px solid black; height: 100px; width: 100%;"></div>	<p>Solve for IRR in:</p>
<div style="border: 1px solid black; height: 100px; width: 100%;"></div>	$INV = \sum_{j=1}^n \frac{CF_j}{(1 + IRR)^j}$
<div style="border: 1px solid black; height: 100px; width: 100%;"></div>	<p>where:</p>
<div style="border: 1px solid black; height: 100px; width: 100%;"></div>	<p>n = number of cash flows CF_j = jth cash flow</p>
<div style="border: 1px solid black; height: 100px; width: 100%;"></div>	<p>Solution(s)</p>

Reference(s) _____

Program Description II

Sketch(es)

Example 1:

Income property requiring a \$250,000 equity investment and to be sold in ten years 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 Year	Cash Flow
1	\$46,423	6	\$ 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:

250000 **A** 46423 **C** 40710 **C**

36638 **C** 34097 **C** 32485 **C**

23199 **C** 21612 **C** 20037 **C**

18460 **C** 311406 **C** **D** → 13.98 (annual IRR is 13.98%)

Outputs:

Example 2:

Property requiring a \$30,000 investment will be sold at the end of 2 years. If the investment results in the monthly net cash flows shown below, what is the IRR?

End of Month	Cash Flow	End of Month	Cash Flow
1	\$ 16	13	\$ 201
2	50	14	195
3	175	15	178
4	181	16	197
5	143	17	210
6	147	18	220
7	151	19	206
8	176	20	194
9	184	21	187
10	193	22	190
11	157	23	201
12	190	24	35,000 (property sold)

Keystrokes:

30000 **A** 35000 **B**

16 **C** 50 **C** 175 **C** 181 **C**

143 **C** 147 **C** 151 **C** 176 **C**

184 **C** 193 **C** 157 **C** 190 **C** →

201 **C** 195 **C** 178 **C** 197 **C**

210 **C** 220 **C** 206 **C** 194 **C**

187 **C** 190 **C** 201 **C** 35000 **C** →

D →

12 **X** →

Outputs:

12.00 (12 cash flows input)

24.00 (all cash flows input)

1.15 (monthly IRR)

13.79 (an annual IRR of 13.79%)

Solution(s)

Reference(s)

97 Program Listing I

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STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	Clear registers	057	RCLI	36 46	LBL fa sets up I for
002	CLRG	16-53		058	1	01	count down and keeps
003	PZS	16-51		059	0	00	track of original
004	CLRG	16-53		060	1	01	# of cash flows by
005	STOE	35 15	INV $\rightarrow R_E$	061	x	-35	storing N.N.
006	CF0	16 22 00	Clear flags	062	STOI	35 46	
007	CF1	16 22 01		063	RTN	24	
008	RTN	24	Input largest cash	064	*LBLc	21 16 15	
009	*LBLB	21 12	flow if #CF _s > 22	065	F0?	16 23 00	
010	2	02		066	GT00	22 00	Unpack double
011	x	-35		067	INT	16 34	stored cash flows
012	ST00	35 00		068	EEX	-23	
013	RCLC	36 15		069	5	05	
014	XZY	-41		070	÷	-24	
015	=	-24		071	RTN	24	
016	STOE	35 15	INV/2CMAX $\rightarrow R_E$	072	*LBL0	21 00	
017	LSTX	16-63		073	FRC	16 44	
018	SF0	16 21 00	Flag 0 indicates	074	RTN	24	
019	2	02	>22 cash flows	075	*LBLD	21 14	Set-up I
020	÷	-24		076	GSB0	23 16 11	N N
021	RTN	24		077	RCLI	36 46	
022	*LBLC	21 13		078	EEX	-23	
023	ISZI	16 26 46	If F0, pack data	079	2	02	
024	F0?	16 23 00	in registers	080	÷	-24	
025	GSB0	23 16 13		081	STOI	35 46	N.N \rightarrow I
026	ST+i	35-55 45		082	1	01	
027	XZY	-41		083	.	-62	
028	RCLI	36 46	Dispaly # of cash	084	0	00	
029	F1?	16 23 01	flows (add if >22CF)	085	1	01	1 + i ₀ $\rightarrow R_D$
030	+	-55		086	ST00	35 14	
031	RTN	24		087	*LBL4	21 04	
032	*LBLc	21 16 13		088	CF0	16 22 00	
033	2	02		089	0	00	
034	3	03		090	ST00	35 00	
035	RCLI	36 46		091	*LBL5	21 05	
036	XZY?	16-32	23rd cash flow?	092	RCLI	36 46	
037	GT00	22 00		093	INT	16 34	
038	1	01		094	F1?	16 23 01	Get j
039	STOI	35 46	Reset I	095	GSB0	23 16 14	
040	+	-55		096	RCLI	36 45	
041	CLX	-51		097	F1?	16 23 01	
042	EEX	-23	Drop stack and	098	GSB0	23 16 15	Unpack CF _j
043	5	05	clear x	099	ST+0	35-55 00	
044	ST=0	35-24 00	2CMAX/10 ⁵ $\rightarrow R_0$	100	x	-35	f(i) in R ₀
045	SF1	16 21 01		101	+	-55	
046	*LBL0	21 00		102	RCLD	36 14	
047	R4	-31		103	ST=0	35-24 00	
048	1	01		104	÷	-24	
049	-	-45		105	DSZI	16 25 46	
050	XZY	-41		106	GT05	22 05	
051	RCL0	36 00	Scale cash flow	107	F1?	16 23 01	
052	÷	-24	If CF _j , j > 22, drop	108	GT00	22 00	
053	F1?	16 23 01	fractional part	109	*LBL6	21 06	
054	INT	16 34	of CF _j	110	RCL0	36 00	
055	RTN	24		111	RCLC	36 15	
056	*LBLc	21 16 11		112	-	-45	

REGISTERS

0 Used	1 Used	2 Used	3 Used	4 Used	5 Used	6 Used	7 Used	8 Used	9 Used
S0 Used	S1 Used	S2 Used	S3 Used	S4 Used	S5 Used	S6 Used	S7 Used	S8 Used	S9 Used
A Used		B Used		C Used		D 1 + i ₀		E Used	

97 Program Listing II

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
113	XZY	-41					
114	=	-24		170			
115	RCLD	36 14	$\frac{f}{f'}(1+i)$				
116	x	-35					
117	RCLD	36 14					
118	XZY	-41					
119	+	-55	(1 + i) next				
120	STOD	35 14					
121	LSTX	16-63					
122	ABS	16 31					
123	EEX	-23					
124	CHS	-22	f(i)/f'(i)	180			
125	5	05					
126	XZY?	16-34					
127	GT07	22 07	+DONE!				
128	GSB _a	23 16 11					
129	GT04	22 04					
130	*LBL0	21 00					
131	F0?	16 23 00					
132	GT06	22 06					
133	SF0	16 21 00					
134	GSB _b	23 16 12		190			
135	GT05	22 05					
136	*LBL _b	21 16 12	Loop back for lower 22 CF _s				
137	2	02					
138	2	02					
139	RCL _I	36 46	Reset I to lower 22 CF _s				
140	+	-55					
141	STOI	35 46					
142	CLX	-51					
143	+	-55					
144	RTN	24		200			
145	*LBL _d	21 16 14	Add 22 if flag 0 clear				
146	2	02					
147	2	02					
148	F0?	16 23 00					
149	CLX	-51					
150	+	-55					
151	RTN	24					
152	*LBL ₇	21 07	Reset R _I for another pressing of [D]	210			
153	RCLD	36 14					
154	1	01					
155	-	-45					
156	STOD	35 14	R _I must contain integer here				
157	EEX	-23					
158	2	02					
159	x	-35					
160	RCL _I	36 46					
161	LSTX	16-63					
162	x	-35					
163	STOI	35 46		220			
164	XZY	-41					
165	RTN	24					
166	R/S	51					

LABELS					FLAGS	SET STATUS		
A INV	B CF MAX	C CF	D →IRR	E	0 >22 CF _s	FLAGS	TRIG	DISP
a USED	b USED	c USED	d USED	e USED	1 USED	ON OFF		
0 USED	1	2	3	4 USED	2	0 <input type="checkbox"/> <input checked="" type="checkbox"/>	DEG <input checked="" type="checkbox"/>	FIX <input checked="" type="checkbox"/>
5 USED	6 USED	7 USED	8	9	3	1 <input type="checkbox"/> <input checked="" type="checkbox"/>	GRAD <input type="checkbox"/>	SCI <input type="checkbox"/>
						2 <input type="checkbox"/> <input checked="" type="checkbox"/>	RAD <input type="checkbox"/>	ENG <input type="checkbox"/>
						3 <input type="checkbox"/> <input checked="" type="checkbox"/>		n <u>2</u>

Program Description I

Program Title **DEPRECIATION SCHEDULES**

Contributor's Name **HEWLETT-PACKARD COMPANY**

Address **Corvallis Division**
1000 N.E. Circle Boulevard

City **Corvallis, OR 97330**

State

Zip Code

Program Description, Equations, Variables

Three methods of depreciation are commonly used: straight-line, sum-of-the-years'-digits, and declining balance. This program evaluates the depreciation schedules for these three methods, and calculates the crossover point between straight line and declining balance depreciation. For the schedules, the output is the annual depreciation amount (DEP), remaining depreciable amount (RDV), remaining book value (RBV), and the total depreciation to date (TOT DEP), as well as an increment for the next year's schedule.

An option is available to output the depreciation schedule beginning at a specified year. Pressing **F E** sets and clears the print flag. Successive use of **F E** will alternately display 1.00 and 0.00, indicating that the print mode is on or off respectively.

Values for the last year of an asset with fractional years life (i.e., the 21st year's values for an asset with 20.5 years life) are calculated correctly. However, all other values represent a full year's depreciation. For this reason only integer values (whole number, 1.0, 2.0, 17.0 etc.) may be entered for YR (the **D** key). The program makes no checks on this value and generates invalid results if other than whole numbers are entered.

Straight Line Depreciation

The annual depreciation allowance using this method is determined by dividing the cost or other basis of valuation (starting book value) less its estimated salvage value by its useful life expectancy. This program develops the starting book value (SBV), salvage value (SAL), life expectancy (LIFE), and first year of the schedule (YR). (The schedule may be started at any point in the useful life.)

Fractional years life must be entered as an integer plus a fraction. Thus a life of 12 years 3 months would be keyed in as 12.25 for LIFE.

Operating Limits:

Sum of the Years' Digits Depreciation

The sum-of-the-years' digits method is an accelerated form of depreciation, allowing more depreciation in the early years of an asset's life than allowed under the straight line method. This program generates the schedule output, given the starting book value (SBV), the salvage value (SAL), expected useful life in years (LIFE), and beginning year (YR) for the schedule. (The schedule may be started at any point in the useful life.)

Fractional years asset life must be entered as an integer plus a fraction. Thus a life of 12 years 3 months would be keyed in as 12.25 for LIFE.

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Program Description, Equations, Variables

Variable Rate Declining Balance Depreciation

The variable rate declining balance method is another form of accelerated depreciation; as such it provides for more depreciation in earlier years and decreasing depreciation in later years. The program generates the depreciation schedule given the starting book value (SBV), salvage value (SAL), useful life expectancy (LIFE), the declining rate factor (FACT), and the first year of the desired schedule (YR). The schedule may be started at any point in the useful life.

The "variable rate" is indicated as either a factor or percent with equal frequency in the business community. Thus, "1.5 declining balance factor" and "150% declining balance" have the same meaning. The number to be keyed in for FACT (**E**) in this program, should be in factor form, that is 1.25, 1.5, 2, and not 125, 150 or 200.

This method of depreciation is unique in that it may generate depreciation greater than the depreciable value for some assets, while it may not generate sufficient depreciation for others. The crossover calculation (**F D**) is provided to assist in determining the best time to switch to straight line depreciation (tax laws permitting) so that an asset may be fully depreciated.

Fractional years life must be entered as an integer and a decimal. Thus, a life of 12 years 3 months would be keyed in as 12.25.

Crossover Point

As indicated in the description above, the declining balance method of depreciation may not fully depreciate an asset in the asset's lifetime. In these circumstances there is an optimum point in the useful life where a switch from the declining balance method to the straight line method should be made. This is the "crossover point", the first year in which the depreciation by the straight line method is greater than if depreciation were continued using declining balance method. (In accordance with Internal Revenue Service Publication 534, the straight line depreciation is determined by dividing the remaining depreciable value by the remaining useful life.)

Operating Limits

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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Contributor's Name _____

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Program Description, Equations, Variables

Given the starting book value (SBV), salvage value (SAL), useful life expectancy (LIFE), and declining balance factor (FACT), this routine calculates the last year that the declining balance method should be used, and the remaining life and remaining book value after this "last year" so that a switch to straight line depreciation can be made. As in the previous routine, the factor (FACT) should be entered in factor form (1.25, 1.5, 2.0), not as a percent (125, 150, 200).

The crossover routine (**f D**) may be used with the declining balance (**f C**) and straight line (**f A**) depreciation routines as follows:

1. Use **f D** to determine the "crossover point" and associated values.
2. Use **f C** to generate a declining balance depreciation schedule for the early years up to and including the year indicated as being the "last year". Since the same input values are used, only a value for YR (**D**) need be keyed in before pressing **f C**.
3. Now use **f A** to generate a straight line depreciation schedule for the remaining years. The remaining book value at the end of the last "declining balance year" is keyed in for starting book value (**A**), and the remaining life is keyed in for the asset's life (**C**). There is no need to enter the salvage value as it has been retained throughout this process.

For this portion of the depreciation schedule, the value for "total depreciation to date" will be in error by an amount equal to the amount depreciated during the declining balance calculations.

Operating Limits and Warnings

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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[illegible]

Sample Problem(s)	Depreciation Schedules
	where:
	K = value for YR
	TOTDEP _K = total depreciation for years 1 through K.
	W = integer portion of LIFE
	F = decimal portion of LIFE
	(i.e., for a LIFE of 12.25 years W = 12 and F = .25)
	Straight Line Schedule
	$DEP_K = \frac{SBV - SAL}{LIFE}$
	$DEP_K \text{ (last year)} = \left(\frac{SBV - SAL}{LIFE} \right) \cdot F$
	$TOTDEP_K = (K) \cdot \left(\frac{SBV - SAL}{LIFE} \right)$
Solution(s)	$RDV_K = (LIFE - K) \cdot \left(\frac{SBV - SAL}{LIFE} \right)$
	$RBV_K = RDV_K + SAL$

Reference(s)

Program Description II

Sketch(es)

Sample Problem(s)

Sum-of-the-Years'-Digits Schedule

$$SOYD = \frac{(W + 1)(W + 2F)}{2}$$

$$DEP_k = \left(\frac{LIFE + 1 - K}{SOYD} \right) \cdot (SBV - SAL)$$

$$TOTDEP_k = \left[1 - \frac{(W - K + 1) \times (W - K + 2F)}{2 \times (SOYD)} \right] \cdot (SBV - SAL)$$

$$RDV_k = \left[\frac{(W - K + 1) \times (W - K + 2F)}{2 \times (SOYD)} \right] \cdot (SBV - SAL)$$

$$RBV_k = RDV_k + SAL$$

Variable Rate Declining Balance Schedule

Solution(s)

$$DEP_k = SBV \cdot \left(1 - \frac{FACT}{LIFE} \right)^{k-1} \cdot \left(\frac{FACT}{LIFE} \right)$$

$$TOTDEP_k = SBV \cdot \left[1 - \left(1 - \frac{FACT}{LIFE} \right)^k \right]$$

$$RDV_k = (SBV - SAL) - TOTDEP_k$$

$$RBV_k = RDV_k + SAL$$

Crossover Point—Declining Balance to Straight Line

Reference(s)

$$SBV \left(1 - \frac{FACT}{LIFE} \right)^{k-1} \cdot \left(\frac{FACT}{LIFE} \right) > \frac{(SBV - SAL) - TOTDEP_{k-1}}{L + 1 - K}$$

where $TOTDEP_{k-1}$ is determined as shown above.

The largest integer value for K which maintains the above relationship is the "last year" to use the Declining Balance depreciation method.

Program Description II

Sketch(es)

Sample Problem(s)

Example 1:

For a starting book value of \$375,000, a salvage value of \$30,000 and an expected life of 40 years, generate the 1st year's depreciation schedule using each of the common methods. Assume a declining balance factor of 1.5. Then jump ahead to the 15th year and generate the data for that year.

Keystrokes:

375000 **STO** **A** 30000 **STO** **B**
40 **STO** **C** 1 **STO** **D**

Straight Line

f A →	1.00 (1 st year)
R/S →	8625.00 (1 st year's depreciation)
R/S →	336375.00 (remaining depreciable value)
R/S →	366375.00 (remaining book value)
R/S →	8625.00 (total depreciation to date)

Outputs:

Solution(s)

Now jump ahead to the 15th year.

Keystrokes:

15 STO D f A →	15.00 (15 th year)
R/S →	8625.00 (15 th year's depreciation)
R/S →	215625.00 (remaining depreciable value)
R/S →	245625.00 (remaining book value)
R/S →	129375.00 (total depreciation after 15 years)

Outputs:

SOYD

1 STO D f B →	1.00 (1 st year)
R/S →	16829.27 (1 st year's depreciation)
R/S →	328170.73 (remaining depreciable value)
R/S →	358170.73 (remaining book value)

Reference(s)

Program Description II

Sketch(es)

Sample Problem(s)

R/S → 16829.27 (total depreciation to date)

Jump ahead to the 15th year.

15 STO D f B → 15.00 (15th year)

R/S → 10939.02 (15th year's depreciation)

R/S → 136737.80 (remaining depreciable value)

R/S → 166737.80 (remaining book value)

R/S → 208262.20 (total depreciation 1st through 15th year)

Declining Balance

1 STO D 1.5 STO E f C → 1.00 (1st year)

R/S → 14062.50 (1st year's depreciation)

R/S → 330937.50 (remaining depreciable value)

R/S → 360937.50 (remaining book value)

R/S → 14062.50 (total depreciation to date)

Solution(s)

Keystrokes:

Now jump to the 15th year.

15 STO D f C → 15.00 (15th year)

R/S → 8235.18 (15th year's depreciation)

R/S → 181369.51 (remaining depreciable value)

R/S → 211369.51 (remaining book value)

Outputs:

R/S → 163630.49 (total depreciation 1st through 15th year)

Reference(s)

Program Description II

Sketch(es)

Sample Problem(s)

Example 2:

Having just performed the previous calculation, determine the crossover point and the associated remaining life and remaining book value. Generate the depreciation data for the declining balance "last year," and then switch to the straight line method to generate the depreciation data for the year following the declining balance "last year."

Keystrokes:

f D →

R/S →

R/S →

18 STO D f C →

R/S →

R/S →

R/S →

R/S →

188471.01 STO A 22 STO C

1 STO D f A →

R/S →

Outputs:

18.00 (last year to use declining balance)

22.00 (asset's remaining life after 18 years)

188471.01 (remaining book value after 18th year)

18.00 (18th year)

7343.03 (18th year's depreciation)

158471.01 (remaining depreciable value)

188471.01 (remaining book value)

186528.99 (total depreciation 1st through 18th year)

1.00 (1st year)

7203.23 (19th year's depreciation)

Note:

Although 1 was keyed in for YR—the first year of straight line depreciation—this is the 19th year of the asset's life.

Reference(s)

R/S → 151267.78 (remaining depreciable value)

R/S → 181267.78 (remaining book value)

etc.

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[illegible]

9 Program Listing I

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STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLα	21 16 11	Straight Line	057	-	-45	
002	F0?	16 23 00		058	X<0?	16-45	
003	SPC	16-11	k	059	GT03	22 03	
004	RCLD	36 14		060	GSB2	23 02	
005	GSB9	23 09		061	RCL7	36 07	
006	RCLA	36 11	$\frac{SBV-SAL}{LIFE} \rightarrow R_I$	062	÷	-24	
007	RCLB	36 12		063	ST04	35 04	
008	-	-45		064	RCL8	36 08	
009	RCLC	36 13		065	x	-35	
010	÷	-24	DEP	066	*LBL3	21 03	
011	ST01	35 46		067	ST06	35 06	RDV _k
012	GSB9	23 09		068	GSB9	23 09	
013	RCLC	36 13		069	RCLB	36 12	
014	RCLD	36 14	(LIFE-YR)DEP=RDV _k	070	+	-55	
015	-	-45		071	GSB9	23 09	RBV _k =RDV _k +SAL
016	RCLI	36 46		072	1	01	
017	x	-35		073	RCL4	36 04	
018	GSB9	23 09		074	-	-45	
019	RCLB	36 12		075	RCL8	36 08	
020	+	-55		076	x	-35	
021	GSB9	23 09	RBV _k	077	GSB9	23 09	TOT DEP _k
022	RCLI	36 46		078	1	01	
023	RCLD	36 14	$\left(\frac{SBV-SAL}{LIFE}\right)YR=TOT$	079	GSBD	23 14	
024	x	-35	DEP	080	RCLC	36 13	
025	GSB9	23 09		081	RCLD	36 14	k<LIFE?
026	1	01		082	X<Y?	16-35	
027	GSBD	23 14		083	GT06	22 16 12	
028	RCLC	36 13		084	RTN	24	
029	RCLD	36 14	k<LIFE?	085	*LBL2	21 02	
030	X<Y?	16-35		086	ENT↑	-21	
031	GT0α	22 16 11		087	FRC	16 44	$\frac{(1+W)(2F+W)}{2}$
032	RTN	24		088	ENT↑	-21	
033	*LBLb	21 16 12	SOYD	089	+	-55	
034	F0?	16 23 00		090	X<Y	-41	= SOYD
035	SPC	16-11		091	INT	16 34	
036	RCLD	36 14		092	+	-55	
037	GSB9	23 09	k	093	LSTX	16-63	
038	RCLA	36 11		094	1	01	
039	RCLB	36 12		095	+	-55	
040	-	-45		096	x	-35	
041	ST08	35 08		097	2	02	
042	RCLC	36 13		098	÷	-24	
043	GSB2	23 02		099	RTN	24	Declining Balance
044	ST07	35 07	$\left(\frac{LIFE+1-k}{SOYD}\right)(SBV-SAL)$	100	*LBLc	21 16 13	
045	RCLC	36 13		101	F0?	16 23 00	
046	1	01		102	SPC	16-11	
047	+	-55		103	RCLD	36 14	
048	RCLD	36 14		104	GSB9	23 09	k
049	-	-45		105	GSB4	23 04	
050	RCL7	36 07		106	RCLD	36 14	
051	÷	-24		107	1	01	
052	RCL8	36 08		108	-	-45	
053	x	-35	DEP _k	109	Y*	31	
054	GSB9	23 09		110	RCLA	36 11	
055	RCLC	36 13		111	x	-35	
056	RCLD	36 14		112	RCL8	36 08	

REGIS.

0	1	2	3	4 Used	5 Used	6 RDV _k	7 Used	8 Used	9 TOT DEP
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9

A SBV

B SAL

C LIFE

D YR

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
113	X	-35		169	R/S	51	
114	STOI	35 46		170	RTN	24	
115	GSB9	23 09	DEP _k	171	*LBL1	21 01	
116	1	01		172	PRTX	-14	
117	RCL7	36 07		173	RTN	24	
118	RCLD	36 14		174	*LBLd	21 16 14	- - - - -
119	Y*	31		175	0	00	Crossover point
120	-	-45		176	STOD	35 14	
121	RCLA	36 11	(SBV-SAL)-TOT DEP _k	177	GSB4	23 04	
122	X	-35		178	*LBL8	21 08	
123	STO9	35 09		179	RCL7	36 07	
124	RCLA	36 11		180	1	01	
125	RCLB	36 12		181	GSBD	23 14	
126	-	-45		182	1	01	
127	RCL9	36 09		183	-	-45	
128	-	-45		184	Y*	31	
129	GSB9	23 09	RDV _k	185	RCLA	36 11	
130	RCLB	36 12		186	X	-35	
131	+	-55		187	RCL8	36 08	
132	GSB9	23 09		188	X	-35	
133	RCL9	36 09	RBV _k	189	RCL7	36 07	
134	GSB9	23 09	TOT DEP _k	190	RCLD	36 14	
135	1	01		191	1	01	
136	GSBD	23 14		192	-	-45	
137	RCLC	36 13		193	Y*	31	
138	RCLD	36 14		194	RCLA	36 11	
139	X<Y?	16-35	K<LIFE?	195	X	-35	
140	GTOb	22 16 13		196	RCLB	36 12	
141	RTN	24	- - - - -	197	-	-45	
142	*LBLD	21 14	To add to register	198	STO9	35 09	
143	RCLD	36 14	D	199	RCLC	36 13	
144	+	-55		200	1	01	
145	STOD	35 14		201	+	-55	
146	RTN	24		202	RCLD	36 14	
147	*LBL4	21 04	- - - - -	203	-	-45	
148	1	01	FACT/LIFE→R ₈	204	÷	-24	
149	RCLC	36 15		205	X≠Y	-41	
150	RCLC	36 13		206	X>Y?	16-34	
151	÷	-24		207	GTOb	22 08	
152	STOb	35 08	1-FACT/LIFE→R ₇	208	RCLD	36 14	
153	-	-45		209	1	01	
154	STO7	35 07		210	-	-45	
155	RTN	24	- - - - -	211	GSB9	23 09	Last year
156	*LBLc	21 16 15		212	RCLC	36 13	
157	F0?	16 23 00	Print/pause	213	X≠Y	-41	
158	GTOb	22 08		214	-	-45	
159	SF0	16 21 00		215	GSB9	23 09	Remaining life
160	1	01		216	RCL9	36 09	
161	RTN	24		217	RCLB	36 12	
162	*LBL0	21 00		218	+	-55	
163	0	00		219	GTOb	22 09	RBV
164	CF0	16 22 00		220	R/S	51	
165	RTN	24					
166	*LBL9	21 09					
167	F0?	16 23 00					
168	GTOb	22 01					

LABELS					FLAGS	SET STATUS			
A	B	C	D Used	E	0 Print?	FLAGS		TRIG	DISP
a St.Line	b SOYD	c DEC BAL	d CROSS	e SCHED?	1	ON	OFF	DEG <input checked="" type="checkbox"/>	FIX <input checked="" type="checkbox"/>
0 Used	1 Used	2 SOYD	3 Used	4 Used	2	0 <input type="checkbox"/>	<input checked="" type="checkbox"/>	GRAD <input type="checkbox"/>	SCI <input type="checkbox"/>
5	6	7	8 Used	9 Used	3	1 <input type="checkbox"/>	<input checked="" type="checkbox"/>	RAD <input type="checkbox"/>	ENG <input type="checkbox"/>
						2 <input type="checkbox"/>	<input checked="" type="checkbox"/>		n <input type="checkbox"/>
						3 <input type="checkbox"/>	<input checked="" type="checkbox"/>		

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