HEWLETT-PACKARD

HP-67 HP-97

Users' Library Solutions Home Management



INTRODUCTION

In an effort to provide continued value to it's 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 Program Listing I** and Program Listing I and 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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DIET PLANNING . Estimates the required calories/day for an individual to maintain, gain, or lose weight based on activity levels and estimated basal metabolism.	65

Program Title INCOME TAX PLANNING - I
Contributor's Name RICHARD D. RUTTER
Address ARTHUR YOUNG & G. 780 N. WATER ST.
City MILWANKES State WI. Zip Code 53202
Program Description, Equations, Variables 1413 PAGRAN CALCULATES REGULAR, ALTERNATIVE
The AVERAGE INCOME TAKES FOR INDIVIDUALS AS SPECIFIED SY LES
MNEMONISS ARE USED IN DOCUMENTING SCHOLDER'
OTI ORDINARY TAXABLE INCOME (FORM 1040, LINE 47 - 2 CG)
CG CAPITAL GAINS (SCHEDULE D, LINE 13)
AYRTI TOTAL TAXABLE INCOME FOR PRECEDING & YEARS
(SCHEDULE G, LINE 5 (B), (C), (d), (e)
HILL EQUATIONS FOR COMPUTATIONS ARE SHOWN AS COMMENTS ON THE
PROGRAM LISTING. PROCESSING LOGIC IS SNOWN ON THE ACCOMPANYING
FLOWCHART, THIS PROGRAM REQUIRES THE USE OF ONE of MORE MAJES OF
TAX THELE DATA CARDS AS SPECIFIED IN THE ACCOMPANYING TAX TABLE
Operating Limits and Warnings TAX CALCULATIONS CANNOT BE PERFORMED PR VALUES
LESS THAN \$1,000 (IF ATTEMPTED, ERPOR CODE '9' WILL FLASH IN THE
DISPLAY), ALL INFUT DATA MUST CONFORM WITH THE FOLLOWING LIAITS:
7 YK 1 2 7 0

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 CONSEQUEN-TIAL DAMAGES IN CONNECTION WITH OR ARISING OUT OF THE FURNISHING, USE OR PERFORMANCE OF THIS PROGRAM MATERIAL.

1

Sketch(es)	(SEE ATTACHED FLOWCHART)
Samula Brahlan	() MO AND MOS SALITH WILL FILE A TOINT RETION FOR
Sample Problem	TAX YEAR 1977. THE FOLLOWING DATA ARE APPLICABLE:
	OTI \$95,000
	<u>CG</u> 10,000
	AVR 11 160,000
Solution	
	95.000 [STO][B]
	10 00 0 [STO][C]
	160000 [STO][D]
	[E] · · · · · · · · · · · · · · · · · · ·
-	REGULAR TAX \$ A5,180 Y RE
	ALTERNATIVE TRX A4,680
	AVERAGED TAX 43,020
Reference (s)	1977 U.S. MASTER TAX GUIDE

Reference (s)	1917 U.J. MASTER LAX GUIDE
	1977 INDIVIONALS' FILLED-IN TAX FORMS
	Commerce CLEARING HOUSE, INC.
	4025 W. PETERSON AVE.
	CHICAGO, ILLINOIS 60646
	-





STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
	LOAD PROGRAM CARD SIDES AND 2			
2	START BY SPECIFYING TAX TABLE CARD	lor Z	A	lorz
	OR 2 TO BE LOADED, BE SURE TO SELECT			
	THE PAIR OF TAX TABLE CARDS TO COR-			
	RESPOND TO THE TYPE OF TAX RETURN			
	(E.G. JOINT RETURN). 'I' OR 'Z' WILL			
	FLASH IN THE DISPLAY UNTIL THE			
	SPECIFIED TAX TABLE GARD HAS BEEN			
	LOADED. DURING EXECUTION THE PROGRAM			
	WILL AUTOMATICALLY REQUEST TAX TABLE			
	CARD LOADING (IF NECESSARY) BY FLASHING			
	I'OR '2' IN THE DISPLAY UNTIL THE			
	REQUIRED TAX TABLE CARD HAS BEEN LADED.			
	·			
3	STORE THE FOLLOWING DATA:	OTI	STO B	LTO
		CG	STO C	CG
		AYRTI	STO D	AYRTI
4	RUN THE PROGRAM TO CALCULATE REGULAR.		E	' 3.00'
	ALTERNATIVE, AND AVERAGED TAXES, RESULTS			REG TAX'
	ARE LEFT IN THE STACK AND MAY BE			ALT TAX'
	REVIEWED BY:		9 STK	'AVE TAX'
	NOTE: EXECUTION TIMES RANGE FROM			
	30-45 SECONDS.			
5	TAX CALCULATIONS MUST BE FOR TAXABLE			9
	AMOUNTS > \$1,000. JE A TAX			
	CALCULATION FOR A LESSER AMOUNT IS			
	ATTEMPTED, THE PROGRAM WILL NALT			
	WITH ERFOR CODE '9' IN THE DISPLAY.			

TAX TABLE CARD 1 (or 2) 1 SMARRIED-JOINT \$1,000-39,999 (or \$40,000+) 2 MARRIED-SEPARATE \$1,000-19,999 (or \$20,000+) 5 1001VIDUAL \$1,000-19,999 (or \$20,000+) 5

STEP			INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS	
	R	ECORD THE FO	LLOWING DATA				
	DA	ITA CARDS FOR	USE WITH J				
	P	ANNING JAND	I PROGRAMS.	RECORD ONLY			
	T	E TAX TABLE (S) THAT YOU W	nu use.			
	ER		-				
	151	MARRIED-JOINT	MARRIED-SEP.	INDIVIDUAL			
	Ree	CARDI					
	Ro	1.0401	1.0201	1.0201		STO O	
	R.	1.000 415	0.	0.		50	
	2,	2,0002916	ο.	ó		STO 2	
	Re	3.0004517	1.0001416	1.0001416		510 3	
	٩	4.0006219	2,0003119	2.0003119		3 70 4	
	2-	8.0013822	4,0006922	4.0006921		STO 5	
	R	12,0022625	6.0011325	6.0011124		510 6	
	R7	16.0032628	8.0016328	8.0015925		5το 7	
	R	20,0043832	10.0021932	10,0020927		510 8	
	R	24,0056636	12,0028336	12.0026329		STO 9	
						PZS	
	Rs.	28.0071039	14.0035539	14.0032 131		STO O	
	R	32.0086642	16.0043342	16.0038334		STO	
	Ro	36.0103445	18.0051745	18,0045136		510 2	
	Res	52000.	26000.	38000.		510 3	
		CARD 2				PZS WOATA	
	r	2.0402	2.0202	2.0202		STO	
	R.	40.012 1448	20.0060748	20.0052 338		STO 1	
	R.	44.0140650	22,0070350	22.0059940		50 2	
	2	52.0180653	26.0090353	26.0075945		510 3	
	R	64.0244255	32.0122155	32,0102950		310 4	
	Re	76.0310258	38.0155158	38.0132955		510 5	
	R	88.0379860	44.0189960	44.0165960		510 6	
	Ra	100,0451862	50.0225962	50.0201962		510 7	
	R	120,0575864	60.0287964	60.0263964		570 8	
	8	140.0703866	70,0351966	70.0327966		510 9	
						PZS	
	Ro	160.0835868	80.0417968	80.0393968		STO O	
	2	180.0971869	90.0485969	90.0461969		STO 1	
	R.,	200.1109870	100.0554970	100.0530970		510 2	
	R.,	52000.	26000.	380001		STO 3	
						P25 W/DATA	

67Program Listing I

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	GSB	0	31 21	2 00	TTO							1	
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		<u> </u>	1		• •		<u> </u>						

Program Title True Cost of Insurance Policy	
Contributor's Name Hewlett-Packard Company	
Address 1000 N. E. Circle Boulevard	
City Corvallis St	State Oregon Zip Code 97330
Program Description, Equations, Variables The price	per \$1,000 of insurance protection
for a given policy year may be calcula	ated by the following formula:
$\underline{YPT}_{t} = \underline{(P_{t} + V_{t} - 1) (1 + i) - V_{t} - D_{t}}$	(1)
$(F_t - V_t)$ (.001)	(1)
The rate of return on the savings elem	ment in a given policy year may
be calculated by the following formula	1:
$f = y_t + D_t + (YPT_t) (F_t - Y_t) (.00)$	01)
$P_t + V_{t-1}$	- 1 (2)
where	
YPT _t = price per \$1,000 of protect	tion in policy year t
P _t = annual premium for policy y	vear t
V_t = cash value for policy year	t
D _t = dividend for policy year t	
F_t = face amount for policy year	c t
i = rate of return on savings e	element, expressed as a
decimal (after-tax) [note that in using the pro	ogram i is expressed in percent]
Operating Limits and WarningsYou_must_assume_a_v	value for YPT _t (e.g., a low-
cost_term_policy_of_the_one-year_renew	wable type) to calculate i; visa
versa, you must assume a value for i ((e.g., the interest rate you could
earn on a one-year savings certificate	e, after tax) to calculate YPT _t .

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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Sketch(es)				

Sample Problem(s) Consider an average \$50,000 face amount cash-value policy. The annual premium of \$1,010 is due at the beginning of the year, and a dividend of \$165 is received at the end of the policy year. Cash value of \$3,302 at the beginning of the year grows to \$4,104. Using formula (1) and assuming a 6% savings rate available elsewhere, the cost per \$1,000 of insurance protection could be purchased for \$3,00 per \$1,000, the rate of return on your savings is 2,20%.

Note: even complex policies like minimum-deposit plans can be analyzed with this program. Use policy surrender values for cash-values, and the actual (after-tax) amounts for payments (premiums) and dividends.

Solution(s)	Input:	[f] [A] 50000 [A] 165 [Enter] 1010 [B]
		3302 [Enter] 4104 [C]
For th	ue cost pe	r \$1,000, input 6 [D] = 6.57
For sa	vings rate	, input 3 [E] = 2,20

Reference(s) Joseph M. Belth, Life Insurance - a consumer's handbook,
Indiana University Press, 1973, p. 234.
This program is a translation of the HP-65 Users' Library Program
#00332A submitted by Nicholas Kaiser.



Init

TRUE COST OF INSURANCE POLICY Face Dividend C.V.Beg Amount Premiums C.V.End

C.V.Beg. Int. Rate C.V.End Cost/Thou.



Cost/Thou. Int. Rate

OUTPUT INPUT STEP INSTRUCTIONS KEYS DATA/UNITS DATA/UNITS 1 Enter Program Initialize (For each new policy analyzed) f 0,00 2 Α 3 Input Face Amount (Total death benefit) of policy AMT AMT Δ 4 Input Dividend to be Received at end of 木 <u>Current Policy Year (if any)</u> DIV DIV Input annual premium paid at beginning of current policy year PREMIUM в DIV 5 Input cash (surrender) value at beginning of current policy year (if any) C.V.BEG ≮ C,V,BEG Input cash value at end of current policy year C.V.END С C.V.BEG To see the true cost per thousand of the 6 insurance purchased (i.e., ignoring the savings element - if any), input an assumed savings rate of interest which you know is safely available (in percent) INT, RATE D Cost/Thou To see the rate of interest being paid 7 on the savings element in the policy, Input the cost per thousand of insurance which you purchase (A term policy) COST/THOU Е INT. RATE 8 To rerun with a new policy go to Step 2 To rerun with changed premium, dividends, cash value figures, just reenter A, B, or C

97 Program Listing I

STEP K	EY ENTRY	KEY CODE	COMMENTS	STEP	KE	Y ENTRY	,		CO	AMENTS
881	# Blo 2	21 16 11		1	857	Priz		76 87		
002	CLRG	16-53	Initialize		Ø 58	+		-55		
003	0	00			859	RCL 1		36 81		
004	RTN	24			060	RCL2		36 82		
005	≉LB LA	21 11	Poltev face amount		861	+		-55		
006	ST05	35 05	Store in P5		062	÷		-24		
80 7	RTN	24	Store II KS		063	1		81		
00 8	≭LBLB	21 12	Premium/Dividend		064	-		-45		
00 9	ST01	35 01	Store annual		065	1		01		
010	R∔	-31	Premium in R1		066	0		88		
011	ST04	35 04			0 67	0		88		
012	RTN	24	Store dividend R4		9 68	x		-35		
013	≭LBLC	21 13	Cash Value		869	RTN		24		
614	ST03	35 Ø3	Store cash value		070	R∕S		51		
0 15	R↓	-31	(year end)				L			
016	ST02	35 <i>02</i>	Store cash value							
8 17	RTN	24	(vear beginning)							
018	≭LBLD	21 14	Calculates actual							
019	ENTT	-21	cost per thousand							
020	1	0 1	of insurance							
8 21	0	00	assuming the rate							
0 22	0	88	of return on							
023	÷	-24	savings entered							
024	1	01	in X-reg	080						
82 5	+	-55		L						
026	RCL1	36 01		L						
8 27	RCL2	36 02		L			 			
023	+	-55		L			<u> </u>			
029	X	-35								
030	RCL3	36 03			-					
031	-	-45		 			-			
032	RCL4	36 04					┣—			
033	-	-45		090						
834	RCL5	36 85		030						
835	RCL3	36 83					\vdash			
036	-	-45					-			
037	•	-62								
838	U O	00								
039	0	00 01								
040		-75			-					
041 042	^ ÷	-33								
042 047	- DTN	-24								
043 QAA	*I RI F	21 15		100						
045	FNT+	-21	calculates actual							
045 046	PCI 5	36 85								
R47	RCL3	36 03	the cost per							
Ø48	-	-45	the cost per							
R49	x	-35								
050		-62	in V-rog	·					SET STATU	S
0 51	0	00	TH V-LER	L			$\left - \right $	FLAGS	TRIG	DISP
052	0	86					Ŀ	ON OFF		
05 3	1	01		110	+		╂	0 🗆 🖾		
054	х	-35					\vdash			
055	RCL4	36 04					+	3 1 10		n.2
05 6	+	-55	REGI	STERS			L			
0	1 4	1 2Cach Ve	all3 Cash Vall4	5 Po1	icv	6		7	8	9
0	Premiu	n Beg, Yi	r. Yr, End Dividend	Face	Ămt					
S0	S1	S2	S3 S4	S5		S6		S7	S8	S9
				<u> </u>			_		<u> </u>	
A		В	c	D			E		ľ	

rogram THE AUTOMOBILE COST / TIRE COST COMPARISON ontributor's Name Hewlett-Packard ddress 1000 N. E. Circle Boulevard ity Corvallie State Oregon Zip Code 97330 rogram Description, Equations, Variables Given initial price (P_1) and fuel economy (H = MPG, Highway; C = MPG, City) and use data: Annual Mileage Percent Highway Miles $\leq K = \frac{Highway Miles}{Total Miles} \times 100$ Other inputs are length of ownership (years and tenths of years) and cost data: Annual Interest Rate 1. Cost of Fuel \$, ¢ per gallon Equation: 1) Sinking fund $PV = PMT \left[\frac{(1 + i)^n - 1}{i} \right]$ 2) Depreciation $P(N) = P(0) [.75]^n$ where n = # periods 1 = Annual interest rate FV = Final value PMT = Payment/Period P(0) = Initial price P(N) = Price at N years The program accepts price, excise tax, and estimated life (mileage) for up to 3 different tires and computes the best buy based on the number of miles expected for dollar spent. Best buy is indicated by displaying entered tire price for identification and miles per dollar as a single split display. Single tire price, miles per dollar, and four tire set price) = 4 Tire Set Price 2) <u>Estimated Life in Miles</u> = Miles/Dollar 4) Ax (Excise Tax & Tire Price) = 4 Tire Set Price 2) <u>Estimated Life in Miles</u> = Miles/Dollar 3) Best Buy = Greatest Miles/Dollar Ratio OPERATING LIMITS AND WARNINGS Percentages for highway mileage and interest rate are entered as whole numbers between 0 and 100.	8 1	_
ontributor's Name Hewlett-Packard ddress 1000 N. E. Circle Boulevard ity Corvallis State Oregon Zip Code 97330 Program Description, Equations, Variables Civen initial price (P ₁) and fuel economy (H = MFG, Highway; C = MFG, City) and use data: Annual Mileage Percent Highway Miles K = Highway Miles X 100 Other inputs are length of ownership (years and tenths of years) and cost data: Annual Interest Rate 1, Cost of Fuel \$, c per gallon Equation: 1) Sinking fund FV = PMT $\left[\frac{(1 + t)^n - 1}{t}\right]$ 2) Depreciation P(N) = P(O) [.75] ⁿ where n = # periods i = Annual interest rate FV = Final value PMT = Payment/Period P(O) = Initial price P(N) = P(N) = Price at N years The program accepts price, excise tax, and estimated life (mileage) for up to 3 different tires and computes the best buy based on the number of miles expected for dollar spent. Best buy is indicated by displaying entered tire price for identification and miles per dollar as a single split display. Single tire price, miles per dollar, and four tire set price can also be recalled for each case Equations solved are: 1) 4 X (Excise Tax & Tire Price) = 4 Tire Set Price 2] <u>Estimated Life in Miles</u> 4 Tire Set Price = Miles/Dollar 3) Best Buy = Greatest Miles/Dollar Ratio OPERATING LIMITS AND WARNINGS Percentages for highway mileage and interest rate are entered as whole numbers between 0 and 100,	Program Title AUTOMOBILE COST / TIRE COST COMPARISON	
address 1000 N. E. Circle Boulevard ity Corvallis State Oregon Zip Code 97330 Program Description, Equations, Variables Given initial price (P ₁) and fuel economy (H = MFG, Highway; C = MFG, City) and use data:	Contributor's Name Hewlett-Packard	
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<pre>rogram Description, Equations, Variables Given initial price (P₁) and fuel economy (H = MPG, Highway; C = MPG, City) and use data: Annual Mileage Percent Highway Miles</pre>	City Corvallis State Oregon Zip Code 97330	
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<pre>(H = MPG, Highway; C = MPG, City) and use data: Annual Mileage Percent Highway Miles 全 K = Highway Miles Total Miles X 100 Other inputs are length of ownership (years and tenths of years) and cost data: Annual Interest Rate 1. Cost of Fuel \$, ¢ per gallon Equation: 1) Sinking fund FV = PMT ((1 + 1)ⁿ - 1) 2) Depreciation P(N) = P(0) [.75]ⁿ where n = # periods f = Annual interest rate FV = Final value PMT = Payment/Period P(0) = Initial price P(N) = Price at N years The program accepts price, excise tax, and estimated life (mileage) for up to 3 different tires and computes the best buy based on the number of miles expected for dollar spent. Best buy is indicated by displaying entered tire price for identification and miles per dollar as a single split display. Single tire price, miles per dollar, and four tire set price can also be recalled for each case Equations solved are: 1) 4 X (Excise Tax & Tire Price) = 4 Tire Set Price 2) Estmated Life in Miles 4 Tire Set Price 2) Dest Buy = Greatest Miles/Dollar Ratio OPERATING LIMITS AND WARNINGS Percentages for highway mileage and interest rate are entered as whole numbers between 0 and 100.</pre>	Program Description, Equations, Variables Given initial price (P_{τ}) and fuel economy	
Annual Mileage Percent Highway Miles 全 X = Highway Miles Total Miles X 100 Other inputs are length of ownership (years and tenths of years) and cost data: Annual Interest Rate Cost of Fuel 1, Cost of Fuel 2, c per gallon Equation: 1) Sinking fund FV = PMT $(1 + i)^n - 1$ i 1 2) Depreciation P(N) = P(0) [.75] ⁿ Where n = # periods 1 = Annual interest rate FV = Final value PMT = Payment/Period P(0) = Initial price P(N) = Price at N years The program accepts price, excise tax, and estimated life (mileage) for up to 3 different tires and computes the best buy based on the number of miles expected for dollar spent. Best buy is indicated by displaying entered tire price for identification and miles per dollar as a single split display. Single tire price, miles per dollar, and four tire set price can also be recalled for each case Equations solved are: 1) 4 X (Excise Tax & frice Price) = 4 Tire Set Price 2) Estimated Life in Miles 4 Tire Set Price 4 Tire Set Price Miles/Dollar 3) Best Buy = Greatest Miles/Dollar Ratio OPERATING LIMITS AND WARNINGS Percentages for highway mileage and interest rate are entered as whole numbers between 0 and 100. </td <td>(H = MPG, Highway; C = MPG, City) and <u>use data</u>:</td> <td></td>	(H = MPG, Highway; C = MPG, City) and <u>use data</u> :	
Percent Highway Miles	Annual Mileage	
Other inputs are length of ownership (years and tenths of years) and <u>cost data:</u> Annual Interest Rate f. Cost of Fuel \$, ¢ per gallon Equation: 1) Sinking fund $FV = PMT \left[\frac{(1 + i)^n - 1}{i} \right]$ 2) Depreciation P(N) = P(0) [.75] ⁿ where n = # periods i = Annual interest rate FV = Final value PMT = Payment/Period P(0) = Initial price P(N) = Price at N years The program accepts price, excise tax, and estimated life (mileage) for up to 3 different tires and computes the best buy based on the number of miles expected for dollar spent. Best buy is indicated by displaying entered tire price for identification and miles per dollar as a single split display. Single tire price, miles per dollar, and four tire set price can also be recalled for each case Equations solved are: 1) 4 X (Excise Tax & Tire Price) = 4 Tire Set Price 2) Estimated Life in Miles 4 Tire Set Price = Miles/Dollar 3) Best Buy = Greatest Miles/Dollar Ratio OPERATING LIMITS AND WARNINGS Percentages for highway mileage and interest rate are entered as whole numbers between 0 and 100.	Percent Highway Miles 🗲 K = <u>Highway Miles</u> X 100 Total Miles	
Annual Interest Rate 1. Cost of Fuel \$. c per gallon Equation: 1) Sinking fund $FV = PMT \left[\frac{(1 + i)^n - 1}{i} \right]$ 2) Depreciation $P(N) = P(0) [.75]^n$ where n = # periods i = Annual interest rate FV = Final value PMT = Payment/Period P(0) = Initial price $P(N) = Price$ at N years The program accepts price, excise tax, and estimated life (mileage) for up to 3 different tires and computes the best buy based on the number of miles expected for dollar spent. Best buy is indicated by displaying entered tire price for identification and miles per dollar as a single split display. Single tire price, miles per dollar, and four tire set price can also be recalled for each case Equations solved are: 1) 4 X (Excise Tax & Tire Price) = 4 Tire Set Price 2) Estimated Life in Miles 4 Tire Set Price 3) Best Buy = Greatest Miles/Dollar Ratio OPERATING LIMITS AND WARNINGS Percentages for highway mileage and interest rate are entered as whole numbers between 0 and 100.	Other inputs are length of ownership (years and tenths of years) and cost data:	
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<pre>2) Depreciation P(N) = P(0) [.75]ⁿ where n = # periods i = Annual interest rate FV = Final value PMT = Payment/Period P(0)= Initial price P(N) = Price at N years The program accepts price, excise tax, and estimated life (mileage) for up to 3 different tires and computes the best buy based on the number of miles expected for dollar spent. Best buy is indicated by displaying entered tire price for identification and miles per dollar as a single split display. Single tire price, miles per dollar, and four tire set price can also be recalled for each case Equations solved are:</pre>	Equation: 1) Sinking fund $FV = PMT \left[\frac{(1 + i)^n - 1}{i} \right]$	
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<pre>3 different tires and computes the best buy based on the number of miles expected for dollar spent. Best buy is indicated by displaying entered tire price for identification and miles per dollar as a single split display. Single tire price, miles per dollar, and four tire set price can also be recalled for each case Equations solved are:</pre>	The program accepts price, excise tax, and estimated life (mileage) for up t	0
<pre>for dollar spent. Best buy is indicated by displaying entered tire price for identification and miles per dollar as a single split display. Single tire price, miles per dollar, and four tire set price can also be recalled for each case Equations solved are:</pre>	3 different tires and computes the best buy based on the number of miles expecte	d
<pre>identification and miles per dollar as a single split display. Single tire price, miles per dollar, and four tire set price can also be recalled for each case Equations solved are:</pre>	for dollar spent. Best buy is indicated by displaying entered tire price for	
<pre>price, miles per dollar, and four tire set price can also be recalled for each case Equations solved are:</pre>	identification and miles per dollar as a single split display. Single tire	
Equations solved are: 1) 4 X (Excise Tax & Tire Price) = 4 Tire Set Price 2) Estimated Life in Miles 4 Tire Set Price = Miles/Dollar 3) Best Buy = Greatest Miles/Dollar Ratio OPERATING LIMITS AND WARNINGS Percentages for highway mileage and interest rate are entered as whole numbers between 0 and 100. 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	price, miles per dollar, and four tire set price can also be recalled for each c	ase
1) 4 X (Excise Tax & Tire Price) = 4 Tire Set Price 2) Estimated Life in Miles 4 Tire Set Price 3) Best Buy = Greatest Miles/Dollar Ratio OPERATING LIMITS AND WARNINGS Percentages for highway mileage and interest rate are entered as whole numbers between 0 and 100, 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	Equations solved are:	
27 <u>Hitchatted Hitchatter</u> = Miles/Dollar 4 Tire Set Price = Miles/Dollar 3) Best Buy = Greatest Miles/Dollar Ratio OPERATING LIMITS AND WARNINGS Percentages for highway mileage and interest rate are entered as whole numbers between 0 and 100,	1) 4 X (Excise Tax & Tire Price) = 4 Tire Set Price 2) Estimated Life in Miles	
3) Best Buy = Greatest Miles/Dollar Ratio OPERATING LIMITS AND WARNINGS Percentages for highway mileage and interest rate are entered as whole numbers between 0 and 100, This program has been verified only with respect to the numerical example given in <i>Program Description II</i> . 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	4 Tire Set Price = Miles/Dollar	
OPERATING LIMITS AND WARNINGS Percentages for highway mileage and interest rate are entered as whole numbers between 0 and 100, This program has been verified only with respect to the numerical example given in <i>Program Description II</i> . 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	3) Best Buy = Greatest Miles/Dollar Ratio	
Percentages for highway mileage and interest rate are entered as whole numbers between 0 and 100, This program has been verified only with respect to the numerical example given in <i>Program Description II</i> . 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	OPERATING LIMITS AND WARNINGS	
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Sample Problem(s) 1, Compute the net cost difference at the end of 3 years of ownership of two candidate autos: 1) The "Wombat 1" with $P_1 = $4,000$ HWY = 25 city = 152) The "Lightfoot 2" with $P_2 = $3,000$ HWY = 30 city = 20Assume use data as follow - annual mileage 12,000 miles/year, and 50% use is HWY type. Cost data is taken as : Interest rate 6% Fuel at \$0.60/ gal 2. Find the best buy of the 3 tires below: #1 Price \$54.22; Excise Tax \$2.52; Estimated Life 36,000 Miles #2 Price \$36.57; Excise Tax \$1.96; Estimated Life 25,000 Miles #3 Price \$29.88; Excise Tax \$1.22; Estimated Life 17,000 Miles SOLUTION(S): 4000 [\uparrow] 25 [\uparrow] 15 [A] \rightarrow 3000 [\uparrow] 30 [\uparrow] 20 [B] \rightarrow 4000 1. 3000 12000 [↑] 50 [C] → 10 3 [D] → 421.88 6 [↑] 0.60 [E] → 1010.82 Enter 2.52 [ENT[†]] 2.52 2. 11 54,22 54.22 [ENT+] н 36000 [f] [A] 226.96 (4 Tire Cost) L 1,96 1.96 [ENT[†]] 36.57 [ENT+] 36.57 25000 154.12 (4 Tire Cost) [f] [B] 1,22 1.22 [ENT+] 29.88 [ENT+] 29.88 17000 [f] [c] 124.40 (4 Tire Cost) (Continued on following page)

Reference(s) This program is a modification of the Users' Library Program #04638A submitted by Robert S, Siebert.

This program is a modification of the Users' Library Program #03428A submitted by Robert A, Plack.

Sketch(es)				
Solution(s) Compute and Display	Best Buy [f Dîsplay [f	[] [D] 36,57] [E] 54.22 226.96 36.57 154.12 29.88 124.40	00162 [Tire 2 00159 Tire 1 00162 Tire 2 00137 Tire 3	2 best buy] 162 Mi./\$
Reference (s)				

1	Tire 1 AUTOMOBILE	Tire 2 COST/TIRE	Tire 3 COST	Best Buy	Display	-
	Auto 1	Auto 2	Use	Years	Cost	

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Load side 1 and side 2			
2	For automobile cost comparison, go to step 3			
	For tire cost comparison, go to step 9			
3	For automobile #1:			
	Enter price:	\$P1	ENT	
	hîghway mpg:	MPG	ENT	
	city mpg:	MPG		P ₁
4	For automobile # 2:			
	Enter price:	\$P2	ENT	
	highway mpg:	MPG	ENT	
	city mpg:	MPG	B	P ₂
5	Enter use data;			2
	annual mileage	MILES	ENT	
	percent highway	%	C	ΔGal/Mo.
	(0 < K ≤ 100)			
6	Years of service	Years	D	Future Val
7	Enter costs:			of P1-P2
	Interest rate	f	ENT	
	Fuel Cost	\$/Gal.	E	Net Cost
8	To re-run, change desired step and reenter			
	all higher numbered steps.			
9	For tire #1:			
	Enter tire excîse tax	Ś	ENT	
	single tire price	Ś	ENT ⁺	
	tire estimated life	MILES	f A	4 Tire Pr.
10	For tire #2:			
	Enter tire excise tax	\$	ENT	
	single tire price	\$	ENT	
	tire estimated life	MILES	f B	4 Tire Pr.
11	(Optional: For tire #3)			
	Enter tire excise tax	\$	ENT↑	
	single tire price	\$	ENT	
	tire estimated life	MILES	fC	4 Tire Pr.
12	Compute best buy based on miles/dollar.		fD	\$-Miles/\$
	(Read split display as follows:			
	single tire miles/\$			
	price			
	(Continued following page)			

Tire 1 AUTOMOBILE	Tire 2 COST/TIRE	Tire 3 COST	Best Buy	Display	- 7
Auto 1	Auto 2	Use	Years	Cost	

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
13	To display (Print on HP-97)		f E	Price/Mi./S
				4 Tire \$
				Pr. + Mi/\$
				4 Tire \$
	(Only if data entered for 3rd tire)			Pr.+Mi./\$
				4 Tire \$
14	To begin new calculation, go to step 9			
	·			
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				· · · · · · · · · · · · · · · · · · ·

97 Program Listing I

STEP	KEY	ENTRY	KEY CODE		COMMENTS	STEP	KE	Y ENTRY	KFY	ODF		COM	MENTS	17
6	01	*LBLA	21 11			•	057	1		01				
e	902	ST01	35 01			i	058	2		02				
8	103	-	-45				059	0		<i>00</i>				
0	104	ST02	35 0 2				060	0	i	00				
8	105	R4	-31				061	÷	-,	24				
e	906	RTN	24	Price 1	1		062	ST08	35	0 8				1
é	30 7 -	*LBLB	21 12				063	1	i	01				
e	908	ST03	35 0 3				064	+	-	55				
6	909	-	-45				065	RCL7	36	07				
e	910	ST04	35 04				066	γ×		31				
Ē	111	R↓	-31			1	067	ST×5	35-35	85				
P	112	-	-45				068	ST02	35	02				
P	113	ST05	35 85				069	1		01				
A	114	-	-45				070	-	-	45				
e e	115	PTN	24	Price	2		071	RCL8	36	88				
6	115 115 -		21 17	ritte	2		072	÷	-	24				
6	117	FLDLC	21 IJ Q1				073	x	-,	35				
с С	210	1 0	01				874	RCL5	36	95				
6	710 110	0	00 00				075	+	-	55	}			
0	117		- 24				A76	RCL 9	36	N 9				
	20		75 75 04				A77	-	-	45				
8	121	51×4	30-30 04				8 78	PCI 5	36	95 95			-	
6	122	RULZ	36 02				079	PCI 2	36	00 02	Rest	ores	5.	
8	123	X	-35				000 000	-		24 24				
8	124	RCL1	36 01				000 001	CT05	75	67 05				
e	125	+	-55				001	040	35	0J A 1				
8	026	17X	52				002	λ∔1 DTH	-	91 54	Net	Cost	Differe	nce
8	27	RCL4	36 04			:	003		21.15	29 				
8	28	RCL3	36 03				084	FLUL a	21 10	11	Init	ializ	ze	
Ø	129	÷	-55				682	USP2	-63	02				
8	130	17X	52				086	CF 1	16 22	01				
8	31	-	-45				087	SF2	16 21	62				
8	132	х	-35				088	CLRG	16-	53				
8	33	1	01				089	ST07	35	07	#1 т	'ire I	ife	
8	134	2	0 2				090	R↓	-	31	/#1 т	Hro F	Prico	
0	35	÷	-24				091	ST01	35	01	" 1		TICE	
8	36	ST06	35 06	Gallon	s/Mo.Diff		8 92	ST04	35	04	Fill	to E	revent	
ē	137	RTN	24				0 93	ST06	35	06	Div	visior	ı by Zer	:0
e	138 1	¢LBLD	21 14				094	+	-,	55	if	only	2 cases	; en.
8	139	ST09	35 09				<i>095</i>	4		04	Comp	oute 🕯	1 Tire	
A	140	1	R 1				096	x	-,	35	41	lire H	Price	
R	141	2	82				097	ST02	35	02				
	142	x	-35				098	RTN		24				
a a	147	ST07	35 AZ			1	099	≢LBLb	21 16	12				
	144	0/0/	-62				100	ST08	35	9 8	#2 I	'ire I	life	
С	45	;	02 07				101	R↓	-,	31				
	46	5	0. 05				102	ST03	35	03	#2 т	lire H	rice	
	47	Pria	76 89				103	+	-	55	Com	ute 4	2 Tire	
0	10	VX	JU U2 71				104	4		94	4 T	'ire F	rice	
0	140	PCI 5	36 DF				105	x	-	35	<u>،</u> ۱			
0	177 150	KULJ	-75				106	ST04	35	04				
0	51	стло	75 00	Remain	ing Value of		107	RTN		24				
0	52	3103 NTG	3 3 83 34	Cost 1	Oifference		108	#LBLc	21 16	13	1			
	JZ 157 -		24				109	CF2	16 22	9 2				
	133 I 154		21 1J 76 06				110	ST09	35	89	#3 T	lire I	Life	
	134 155	KULD	30 UD 75				111	R1	-	31				
U U	100	X ()//	-30				112	STOS	35	95	#3 I	lire H	Price	
0	56	XZY	-41		REGI	SILNO		0100					-	
0	1		² Used	³ Use	d ⁴ Used	⁵ P1 ·	- P ₂	⁶ ∆ MPC	G 7 #	Mo.	ε_L		⁹ Final	L Pr
		Tire C	Tire T1	TC2	TT2	TC3		TT3		,1		2	TL 3	
S0	S	61	S2	S3	S4	S5		56	57		50		39	
									ر ا			T	1	+
Α			В	С		U			E			L.		
				1		1								

17

97Program Listing II

18				7/-	iugiai				5 11			
STEP KE		KEY	CODE		COMMENTS		STEP	KE	Y ENTRY	KEY CODE	COMM	ENTS
113	+	-	55	Compu	te #3 Tire			169	SPC	16-11		
114	4	i	04	4 T1	re Price			170	F2?	16 23 02		
115	x	-	35					171	RTN	24		
116	ST06	35	0 6					172	DSP7	-63 07		
117	RTN		24					173	RCL5	36 05	#3 Price -	- Miles/\$
118	*LBLd	21 16	14	Compu	to			174	PRTX	-14		
119	RCL7	36	07	Milos	Por Dollar	~		175	DSP2	-63 82		
120	RCI 2	36	82	miles	rer Dollar	-		176	RCI 6	36 86	#2 / Time	Prico
121	ESRR	23	A A					177	PDTY	-14	#5 4 IIIe	FIICe
122	ST07	35	87					170	DTN	24		
122	CT+1	75-55	Q1					170		21 00		
123	Drio	75	00					179	#LDL0	21 00	Miles/Dol.	lar
124	RULO DCLA	30	00 QA					180	-	-24	Sub Rout:	Ine
125	KUL4 CCD0	30	04 00					181	EEX	-23		
126	6580	23	00					182	(67		
127	5108	30	68					183	÷	-24		
128	ST+3	35-55	03					184	RTN	24		
129	RCL9	36	09					185	R∕S	51		
130	RCL6	36	06							1		
131	gsbø	23	0 0					-			1	
132	ST09	35	0 9					-			-	
133	ST+5	35-55	6 5								-	
134	DSP7	-63	87				190				-	
135	RCL 9	36	8 9								-	
136	RCI 8	36	6 8								-	
177	X>Y2	16-	74								-1	
170	CT01	22	01 01								-	
170	0101 V+V	-	A 1								-1	
135	0+1	16 21	71 Ø1								_	
140	3F1	10 21	01 01					_				
141	FLULI	21	01					_			4	
142	RUL7	36	87									
143	X>Y?	16-	34									
144	GT02	22	02				200					
145	F1?	16 23	01									
146	GTO3	22	0 3									
147	RCL3	36	03	Disp:	lay Best Bu	y						
148	RTN		24									
149	#LBL2	21	0 2									
150	RCL1	36	01					-			-	
151	RTN		24					-			-	
152	#LBL3	21	83					+			-	
153	RCL 5	36	85								-	
154	RTN		24				210			+	-	
155		21 16	15	D-1	law Mode					 	-	
155	TLULE DCD7	7	97	Drsb.	ray noue						-	
130	D011	-03	Di Di	#1 5	ntes 141	~ 10				ł	4	
137	RULI DDTU	30	14	#I Pi	rice - Mile	ទ/ទុ					4	
138	FKIA DCDO	-	14 00								4	
159	U372	-63	02 00	"",							4	
160	RUL2	36	02	#⊥ 4	Tire Price		L				4	
161	PRTX	-	14									
162	SPC	16-	11	10-		1.					1	
163	RCL3	36	Ø3	#2 P:	rice - Mile	s/ Ş						
164	DSP7	-63	07				220					
165	PRTX	-	14	""								
166	RCL4	36	04	#2 4	Tire Price							
167	DSP2	-63	8 2									
168	PRTX	-	14								1	
<u> </u>				LAE	BELS				FLAGS		SET STATUS	
Auto 1	Β Δ11	to 2			D # Yeare	Ec	oste	0		FLAGS	TRIG	DISP
a	b		c	·	d _	e	5515					DIOP
Tfre 1	<u>t</u> T	re 2	ĭ Tîr	:e 3	Best	ŬDi	.splay	· [']	Used	0 🗆 🖻	DEG 🗆	FIX 🗆
⁰ Used	¹ Use	ed	² Ueo		3 11c - 1	4		2	Jsed	1 🗆 🕰	GRAD 🗆	SCI 🗆
5	6		7	<u>.</u>	8	9		- 3		− 2 □ ₫	RAD 🗆	ENG 🗆
	Ĩ		ľ		-	ľ		ľ		3 🗆 🖾		n

Program Title COMPARISON SHOPPING		
Contributor's Name Hewlett-Packard Company		
Address 1000 N. E. Circle Boulevard		
City Corvallis	State Oregon	Zip Code 97330

Program Description, Equations, Variables <u>Competing manufacturers often package their</u>
products in various weights or volumes, so that in stores that lack some
form of "unit pricing", consumers have a difficult time deciding which brand
is actually cheapest. This program overcomes that difficulty. The price
and amount of each item is entered successively. The program converts to
cost/amount, which is compared to that of the item which was cheapest up
to that point. In case erroneous input is entered, the second least expensive
item is retained along with the least. This can be recalled if the output
data cannot be associated with any product. Output data identifies the
least expensive product by its cost, amount, and gives the cost/amount.
A counter lists the number of items input so far with each new entry.
Operating Limits and Warnings None

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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Sketch(es)				

	Item	Price	Weight		
Ketc	hup 1	\$.85	16.5 oz.		
Ketc	hup 2	.69	14.75 oz.		
Catsup		.78	16.0 oz.		
tion(s)	[A]				
	.85 [Entert] 16,5 [B]			
	.69 [Enter†] 14.75 [B]			
	.78 [Entert] 16.0 [B]			
	[C]	14,75 weight			
	[R/S]	0.69 price			
	[R/S]	0,468 price/we	ight		

Reference(s) This program is a translation of the HP-65 Users' Library Program # 01258A submitted by Randal Lee O'Toole.

New Data	SHOPPING Price ↑ Amt,	Cheapest	Correct Error	

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter Program			
2	Initialize for new data		A	
3	Enter price of first item	Price	Entt	
4	Enter amount of first item	Amount	B	# Item Ent
5	For second and any further items, go to 3,			
6	To see amount of cheapest item		C	Amount
	To see price of cheapest item (optional)		R/S	Price
	To see price/amount of cheapest item (option)		R/S	Pr./Amt.
7	To begin a new series of items, go to 2			
8	If erroneous data is entered and now claims			
	to be the cheapest item, D will recall the			
	îtem prevîously considered cheapest.			

97 Program Listing I 22 STEP **KEY ENTRY KEY CODE** COMMENTS STEP **KEY ENTRY KEY CODE** COMMENTS 21 12 16 23 01 ***LBLB** Entry of data 001 002 F1? First entry is 22 00 003 GTOØ treated seperately 060 35 01 004 ST01 Amount 35 05 005 ST05 -24 006 ÷ 35 02 ST02 007 Cost/Amount 35 04 **60**8 ST04 Flag to show furthe 009 SF1 16 21 01 ent. aren't first 010 6T01 22 01 21 00 *LBL0 Second and further 011 35 03 ST03 012 entries treated -24 013 ÷ here 070 ST06 35 06 014 015 RCL2 36 02 X≦Y? 16-35 016 Comparison cost/amt 22 01 017 GTŪ1 **ST04** 35 04 018 019 RCL1 36 01 35 05 020 ST05 021 RCL6 36 06 022 **ST02** 35 02 023 RCL3 36 03 080 35 01 024 ST01 025 *LBL1 21 01 16 25 46 026 DSZI Counter of entries 027 RCLI 36 46 028 -22 CHS -63 00 029 DSPØ 030 RTN 24 21 13 031 **#LB**LC Identification of -63 02 032 DSP2 least expen. item 36 01 033 RCL1 Amount 090 034 RTN 24 Cost 035 RCL1 36 01 036 RCL2 36 02 037 х -35 038 R/S 51 039 RCL2 36 02 Cost/Amount DSP4 -63 04 840 041 R/S 51 042 *LBLA Signal new products 21 11 **Ø4**3 CF1 16 22 01 being compared 100 044 CLRG 16-53 045 CLX -51 046 RTN 24 *LBLD 047 21 14 Recalls second RCL4 36 04 048 least expensive 35 82 049 ST02 data SET STATUS 050 RCL5 36 05 FLAGS TRIG DISP 051 ST01 35 01 ON OFF 052 RTN 24 DEG 🖾 FIX 🛣 0 053 R∕S 51 GRAD SCI 1 110 RAD Π ENG 🗆 2 X n 2 3 REGISTERS Cheanest ² Cheanest ³Competine⁴ Second ⁵S 19 0 6Competine7 8 1

Amoun	t Cost/Amt	Amount	Ch CT/Amt	Second cheap amt	Cost/Amt.	8		
50 S1	S2	S3	S4	S5	S6	S7	S8	S9
A	В	c	l	D	E		I	

Program Title TIME & CHARGES RUNNING TOTAL
Contributor's Name THOMAS M. COX JR.
Address 7544 MAPLE LEAF LANE
City SACRAMENTO State CALIF Zip Code 95828
Providence Providence Variables PRAGRAM USES A TEN SECAND
LOOP TO TIME A TELEPHONE CALL. THE LOOP
PAUSES FIRST TO DISPLAY TENS OF SECONDS, then
FIVE PANSES DISPLAY MINUTE ONE IS INTO LEFT
of OECIMAL POINT AND CHARGE IN CENTS TO THE
RIGHT, then 30 "+" INSTRUCTIONS ARE USED
FOR CALIBRATION PURPOSES (FIGURE 50 MS. PER
ADD PERFORMED).
PROGRAM read NOT be MORE
ACCURATE tHAN THE MINUTE PLUS FIFTY SECONDS -
IT weeds only to tell what Minute one is
INTO FOR BILLING PURPOSES. A TIMING GAIN OF
ONE SECOND IN FIVE MINUTES IS EASILY
ACHIEVED AND DEEMED MORE THAN ADEQUATE
FOR LONG DISTANCE CALLS LASTING LESS THAN
TWO HONRS. (FIVE HOURS BEFORE DISPLAY WOULD
DE WRONG IF EACLING ON A RECIGED CONTRIP 48 STATES.)
100 IF DESIRED (AND 0 STEP 72, DSP5 STEP 5).
(See Abarre)
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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		1.005	4 2.00	192 3.0	130	••• +	MIN. TOTAL
NTER	ENTER	PArty	LST	200	3R0	nth	CALL
CH61	CH6 2	ANSWERS	MIN	MIN	MIN Eng	MIN	END
54	38	C					R/s
A	B						

Sample Problem(s) CHARGES AurinG Normal Business Hours FOR A PHONE CALL From SACRAMENTO TO New YORK eity is 54& for first minute And 38& for each succeeding minute. CAUSE THE CALCULATOR TO DISPLAY TIME AND CHARGES AFTER PARTY ANSWERS, MPDATED AT ONE MINUTE INTERVALS. Solution(s) Key Strokes ! 54 A ----- 1.0038 PAUSE, 1.0054 HALT. 38 B C - 1.0054, 2.0092, 3.0130, etc. PARTY ANSWERS Reference (s)



CHEL CHEZ RUN

5

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	LOAD SIDE 1			
2	INPUT CHARGE 1 (2 DIGIT INTEGER)	CHET	A	MIN. CHEL
3	INPUT CHARGE 2 "	CHG 2	ß	MIN. CHEL
4	WHEN PARTY CALLED ANSWERS, RUN,		C	MIN. CENTS
5	WHEN CALL ENDS, STOP.		R/5	MIN, TOTAL
	•			
	CALIBRATION ROUTINE ! TIME PROGRAM A	few		
	minutes; if fast insert "+" instru	LTION		
	AT STEP 31; IF SLOW DELETE "+	" Each		
	"+" WILL CHANGE TIMING APPROX	3 sec		
	PER MINUTE (6 × .05 = .3).			
	EXAMPLE: 1.0054 MINUTE, TEN SA	LOND		
	LOOP NUMBER L (Step 19) TIME 3:3	7:20		
	TO 15.0586 LOOP NUMBER 5 TIME	3:53:16,		
	CALCULATOR GAINED 44 SECONDS IN	13 MIN		
	56 SEC, GAINING 1/20 SEC PER SEC	OR 3		
	sec per MIN, INSERT 10 "+"			
	INSTRUCTIONS (3/.3) to OBTAIN	/ A		
	GAIN of less than I second in FIVE			
	MIMITES.			

5

Program Listing I

26			D/		8				
STEP	KEY ENTRY	KEY CODE		COMM	ENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	FLBLA	31 25 11	- 5TO	Re CHI	BL				
	STO A	33 11	- fo√	Refe	renee				_
	+ 658 I	31 22 01			• J)C				4
	STO 1	33 01	1 72.	r min		060	+	61	a count
	051 7	2304					570 3	33 03	ADDINONS COUNT
	h RTN	35 22			5 9		+158	31 34	4
	+ LBL B	31 25 12	TOTE	RE CH	3 L - Puts		NRCI	35 34	4
	STO B	33 12	+ +04	KLTC				06	4
010	+ 658 J	3/ 22 01	4				9 1795	32 21	4
010	570 2	3502			A UG		STO 2	22 02	4
	h PAUSE	55 72	2				KCL 2	34 02	4
	RCL 1	34 0/	1 10	MIN.	ene		570 + 1	35 61 01	4
	IN RTM	35 22	.			070	GTO C	22 13	- STOLISE
	FLBLC	312515	KU	N		070	T LDL I	51 25 01	
	L (#7	26.33	1					01	
	0313	57 27						00	4
	+ LDL C	31 27 02						00	4
	I DAUSP	77 57			CERONDS			00	4
020	Q/IL	27/6	1 15		7260007		– –		4
	L DAVER	27 0/	1				<u> </u>		1
	h Pause	76 77	1				-	61	4
	L. DAUSE	2672					IN RTN	35 22	1
	In POUSE	25 72				080			1
	In PAUSE	2572	t						1
	1	01							1
	ENTER	41	1						1
	ENTER	41	1						1
	ENTER	41							1
030	D	00]
	+	61]
		1	21	PAC	h]
				H CITO	•				
			"+	-		090			
	↓			struc	tions				_
	↓ ↓								1
	 								4
0.00	↓ ↓	↓							4
040		<u>├</u>							4
			ł						4
	├ ─ \	├ ─── ├ ───					 		4
	├ ─- ├ ────	·				100			4
	<u> </u>	++	1			100			4
	+	<u>├──</u>	1			 	<u> </u>	1	1
· · · ·	<u> </u>		1				<u> </u>	1	1
			1				1		1
									1
050							FLAGS		SET STATUS
							Ц°	FLAGS	TRIG DISP
							L1	ON OFF	
	↓↓	┟───┠────							
	┼───┤───	├ ── ├ ──					+ ²		
	┼───┡───	┼───┨───				 	3		n
	1	1	L		PECI	STERS			
0	1	2	3		4	5	6	7	8 9
	TIME.CI	HE MIN. CEN	rs #	ADDS					
S0	S1	S2	S3		S4	S5	S6	S7	S8 S9
^ Сна	ree 1	^b Charge 2		С		D		E	" #LooP

Program Title	Reco	oncile Checking	Account		
Contributor's	Name	Geoffrey Kidd			
Address	1514	Oxford Street	Apt #301		
City	Berk	eley,	State	CA	Zip Code 94709

Program Description, Equations, Variables This program serves as an aid in reconciling personal checkbook tallies to bank statements. Inputs are outstanding (uncancelled) checks, outstanding deposits (deposits after the statement closing date), and bank statement balance. Outputs are: final balance, which should agree with the personal checkbook tally, sum and total number of outstanding checks, and sum and number of deposits. $M_{c.}$ Formula: FB=SB+ $\sum D_i - \sum C_i$ where FB=final balance, SB=bank statement balance, D_i =Outstanding deposit number i, C_i =Outstanding check number i, m_D =Number of outstanding checks. The checkbook balance, then, is equal to the bank statement balance plus deposits made after the statement closing date.
Operating Limits and Warnings All statement service charges should be subtracted from the checkbook tally before reconciling. Also, insure that <u>all</u> checks which have been cancelled are accounted for in the checkbook tally and are not still listed as outstanding.

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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Sketch(es)	
Sample Problem(s)	an upo \$422.06
standing checks of \$47.82, \$5.63, \$25.00, \$36.47	, and \$96.02. The outstanding
deposits are \$100.00 and \$256.03. Compute the constant of outstanding checks, and total of outstanding of outst	urrent checkbook balance, total deposits.
Solution(s)	
47.82[B] 5.63[B] 25[B] 36.47[B] 96.02[B]	
_100[C] 256.03[C] [A]>	578.05 Current checkbook balance
[B]>	210.94 Total outstanding checks
[C]>	356.03 Total outstanding deposits
Reference (s)	

		Clear Out Chks	Clear Out Dep	Reconcile Checking Account	7
(hp)	Balance	Out Chks	Out Dep	Clear	./

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1.	Enter program			
2.	Initialize		D	0.00
3.	Input Statement Balance	SB		SB
4.	Repeat 4. for each check.	6,-6,	B	6 ₁ -6 ₂
5.	Repeat 5. for each deposit.	D ₁ -Dn	C	$D_1 - D_n$
6.	Compute final balance	-	A	FB
7.	Clear outstanding checks		fb	0.00
	or outstanding deposits		ſ	0.00
8.	Recall sum of outstanding checks		B	ΣCi
	or sum of outstanding deposits			Σ ^B i
0	To add additional checks go to 4			
7.	To add additional checks; go to +.			
10.	To add additional deposits, go to 5.			
11	For new case on to 2			

0			67 Program	m Lis	sting I		
STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP		KEY CODE	COMMENTS
001	FLBL D	312514	(Initialize)		1-x-	31 84	
	F CL REG	3143	Carar reg + stac	k	W. azy	3552	
	ELX EA		0	060	4 - 2 -	3187	
		71			K XZY	35 52	
		7/			NO KIN	3022	
	ET	41			A/S	87	4
	K KIN	22 25 4	(Roloma)				
	L. EZZ	25 71 02	(datance)		· · · · · · · · · · · · · · · · · · ·		
010	GTAD	122 11 02	Sprewenty,		<u>├></u>	Y	4
	PCLO	3400) saturner				
	RCL 1	34 01	Calculate FB				1
	-	51	7				
	RCL2	34 02		070			
	+	61					
	RRTN	3522					Labelo used:
	1 LBL O	312500					ABCD
	STOO	33 00	STO SB				
	& RTN	35 22	(0, a)(ba)				b.c
020	L LBL B	312512	Sum cura				~, -
	RF?3	35 71 03	Grance				0,1,2,3
	GTOI	2201	else,				
	RCL3	34 03	L Set up for display	¥			Set status
	RCLI	34 01	Ec, # checks	080			
	GTO 3	22 03					delflagooff
	FLBL 1	312301					
	570+1	336/01	augment EC,				DEG mode
	E1	41	# checks		 		TTY Jupplan
030	870 +2	22 (1 02					FIX dupping
	D. DV	35 61 03					n=2
	ROTAL	35 13			+		
	I BIC	312513	(Sum Den)				
	TR.F?3	35 71 03	almour on the	090			
	GTO2	22 02	hranch				
	RCL 4	34 04	Dolog display				
	RCL2	34 02	SD #demit	-			
	GTO 3	22 03.	CD, agains				
	1LBL2	3125 02					
040	1570+2	33 61 02	(augment 2),				
	ET	41	# deposit		_		
		0	- aquins				
	STO 74	336104	ν ν	100			
	K KV	3003		100			
	K KTN	35 22	(chan out alla)				
	4 LBL D		(Clear tout the		-		
	STA I	22 01	{ Clear 2 C)				
	STA 3	33 62	# checks		1		
050	BRTN	3522			1		
	9 IRLC	32 25 13	(Clearout dep)				
	CLX	44	Janss				
	STOZ	3302	(tol lo				
	STO 4	33 04	- Chick	110			
	K RTN	3522	$co \leftarrow b \leftarrow b$				
	17 LBL 3	12503	Kouline for display				
0	,]1	2		UISTERS	6	7	8 9
្ត ខ ខ	[ΣC.	i f Edi	"#chles "#dep	5	Ĭ	ľ	ľ
S0	S1	S2	S3 S4	S5	S6	S7	S8 S9
А		В	С	D		E	Ι
			1	1			

Program Title SAVINGS ACCOUNT COMPOU	NDED DAILY			
Contributor's Name Hewlett-Packard User	rs'librarv			
Address 1000 N.E. Circle Blvd.	5 Elbrury			
City Corvallis	State	OR	Zin C	97330
			•· • •	
			-	
Program Description, Equations, Variables	is program use	s the t	ormula	
$B_{new} = B_{old} (1 + i/36525)''$				
where B = new balance				
B _{old} = old balance				
i = interest (in %)				
N = Number of days elapsed				
N is computed using the following ca	alendar formul	a:		
D(m,d,y) = number of days since a certain fixed date in antiquity				
= d + [30.6 f(m)] + [365.2!	5 g(y,m)],			
where $f(m) = (m + 13 \text{ if } m = 1 \text{ or } 2$	g(y,m) =	y - 1	(m = 1, 2	[] = f INT
(m + 1 if m > 2		y T	m > 2	
<u> </u>		v		
N = new D - previous D.				
Dates are coded mm dd				
Occurring Limits and Warnings				
Uperating Limits and Warnings				
however the error for dates outside of this range is minute				
nowever, the error for dates outside of this range is minute.				
2. Interest rates are based on a 505 1/4-day year, which may differ slightly from				
what banks use. It should even out in the long run, nowever.				
3. Error messages are not given to	r illegal date	entrie	S.	
This program has been verified only with respect to the	numerical example	given in Pro	gram Description II.	User accepts and uses
upon any representation or description concerning the program material.				

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Sketch(es)								
Sample Problem(s) Compute interest on this account: Starting year 1976, interest 5.25% 1. July 1 deposit \$1500.00 2. September 22 deposit \$154.50 3. September 27 withdraw \$148.00 4. October 15 deposit \$133.33 5. October 16 withdraw \$15.87 6. November 5 withdraw \$180.00 7. February 12 deposit \$40.00 8. July 7 withdraw \$300.00 9. November 22 withdraw \$50.00 10. May 5 deposit \$173.21 11. October 22 withdraw \$400.00 Find the balance at the end of each transaction and the total interest at the end.								
Solution(s) 1. 1500.00 2. 1672.50 3. 1525.70 4. 1662.99 5. 1647.35 6. 1472.10	7. 1533.19 8. 1265.48 9. 1240.83 10. 1443.64 11. 1079.34 Total interest = 172.17							
Reference (s)								
	SAVINGS	ACCOUNT	COMPOL	JNDED	DAILY			7
------	---------	---------	--------	-------	-------	---------	----------	---
(hp)	Year		i		Date	Deposit	Withdraw	

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program.			
2	Clear registers.		f CL REG	
3	Enter starting year.	Ý	Α	
4	Enter interest rate.	i/in %	В	
5	Enter starting date.	mm.dd	C	
6	Deposit starting balance.	\$	D	Balance
7	Enter next transaction date.	mm.dd	С	New Balance
8	Enter all deposits and withdrawals for that			
	date.	Deposit	D	New Balance
	and/or	Withdrawal	Ε	New Balance
	Repeat steps 7 and 8 for each date.			
9	Enter final date.	mm.dd	C	Final Balance
				Buranou
	To see total interest anytime after step 5		RCL 0	Interest
	To manually change the year, perform step 3			
	before step 7. Note: As long as the period			
	between any two consecutive transactions is			
	less than a year, the year is automatically			
	changed. So it is necessary to manually change			
	the year only if the account is dormant for			
	over a year.			
	To change the interest rate, perform step 4			
	after step 7.			
	For a new account go back to step 2.			

97Program Listing I

34		EV ENTRY		7/										
		ETENIAT	RET CODE	IV	D		51EP		ETENINT	KE1	CODE	T	COMN	IEN IS
001	961	*LELA	21 11	rear	^{→ к} з			357	X∓Y		-41	m		
	002	5103	35 173	4	•		<u> </u>	3 5 8	3		03	4		
	: 8 3	Ú	66					359	Ū		86	1		
	8 0 4	ST04	35 04	Clean	r date		060	060			-62	1		
	005	RTN	24]				661	6		66			
	005	*LBLE	21 12	1				562	x		-35	1		
	807	3	03	1				0027	TNT	1E	74	1 20 0	6 m]	
	088	ŕ.	ЙЕ	1				000		10	_55		4 ± [:	0 6m]
	000	5	05 05	1				004			-00 	10 - 1	u + [3	
010	010		90 90	1			<u> </u>	665	RULZ	30	62	1	+ [3	805.25y]
	01 0	2	02	1				866	X7 Y		-41	1		
	212	0	63	1				267	STOZ	35	02	1		
	<i>8</i> 12	STOE	35 96					868	-		-45	1		
	813	÷	-24					869	CHS		-22	$J_N = c$	differ	rence
	514	1	Ø1				070	370	RCL5	36	05	IIN (1 + i/	(36525)
	815	÷	-55	1				371	X		-35	177 1	1/265	505257 525 \ N
	816	LN	32	1 IN (1 + i/3	36525)		072	_X		77	111	1/ 500	52570
-	017	ST05	35 65	1 `	· · · · ·	R		072	Ę		00 G:	1		
	010	6,66	00 00 86	1	,	``5		010	1		01 45	1		
	010	DTN	00	4				074			-43	ł		
	815	E I B	24					<i>8</i> 75	RCL1	36	E1	01d	balanc	e .
020	020	*LBLU	21 13					076	×		-35	New	intere	est
	821	RCL4	36 K4					077	ST+ð	35-55	8E	Tota	1 inte	prest
	ି 2 2	X≠Y	-41]				878	CHS		-22	Nona	to fol	llowing
	023	ST04	35 04		are da	te with		079	*! BLE	21	15	lous		nowing
	324	-	-45	Innov	ious d	ato If	080	000	CHS		- 22	LUD3		
	025	Ā	<u>a</u> R	prev				500	w DID	91	14	WITH	araw	
	326	XZY0	16-35	new	date 1	s smaller		001	#LDLU	75 55	14	1		
	207	n= / . 1	10 00 B1	add	I to y	ear.		682	51+1	30-00	01	Depo	sit	
	027		70 07	1				083	RCLI	36	61	New	baland	e
	628	KUL3	35 83					£84	RTN		24			
	029	+	-55					385	★LBLŪ	21	00			
030	030	STO3	35 03					886	RŤ	16	-31	1		
	331	3	03	1				387	6709	22	89	1		
-	832	RCL4	35 04	1			-	388	₽/S		51	1		
-	833	1	01	1				1	R ² O	1	51	1		
	974	- +	_ 55	4			090					-		
	- 004 - 075	THE	NG 74	4			030					-		
	000	191	10 34	lf m	onth i	s Jan. or				-		4		
	836	X217	16-34	Feb.	, add	12 to m						1		
	237	6100	22 00	and	subtra	ct l from								
	038	5	05]		
	239	+	-55	1.								1		
040	840	÷	-55	1								1		
	641	XIY	-41	1				+				1		
	842	1	<i>B</i> 1	ł								-		
	647	-	-45	1				-+r	FLAGS			SET S	TATUS	
	640	41 0: 0	21 60	4			100	- ta	0					
	045	ALDED DCLE	72 92	1			100	-+L	-	F	LAGS		llG	DISP
	843	RULD	30 00					I`	1				~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	
	046	×	-30					+	2	°				
	647	EEX	-23						L					
	9 4 8	2	62	J					3	2			, ,	n a
	3 4 9	÷	-24		95.7									
050	350	INT	16-34 - ¹	1 [305	.25y]						LABE	LS		
	051	RCL4	36 04	1		A Voan	В	÷	(%)) Pa	to D	Donos	i+ E	Withdraw
	352	FRC	15 44	1		rear			(//)	Da	Le	Depos	<u></u>	withuraw
	857	FFX	-23	1		a	D		C	2	a		e	
\vdash	054	250		1		0 11050	1			2	3			
<u> </u>	007	, ^c	-75	1		^o USED	!							
	200 0 5 0	^	-00	1.1		5	6		7	7	8		9	lan -Feb
	305	+		L.										
<u> </u>		L		-1-		REGI	STERS							0
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L		1		_						<u></u>		_ _		L
^			в		C		ט			E			L	
					1		1			1				

Program Title AC	CUMULATED INTEREST/REMA		
Contributor's Name	HEWLETT-PACKARD COMPANY		
Address	Corvallis Division 1000 N.E. Circle Boulevard		
City	Corvallis, OR 97330	State	Zip Code



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	<u> </u>			
Program Title				
Contributor's Name				
Address				
City		State	Zip Code	
Program Description,	Equations, Variables			ana ang ang ang ang ang ang ang ang ang
	For loans scheduled to be fu payment period may be sli program assumes that all pa fact for most loans, the las	ully amortized, the remaining ghtly more or less than zero ayments are equal to the valu- st payment is slightly more of	balance after the last b. This is because the e entered for PMT. In or less than the rest.	
	The calculator performs all to round the schedule to doll	internal calculations to ten dia ars and cents, the following se	gits. If the user wishes equence may be used:	
	1. Press GTO .113 2. Switch to PRGM mo	ode.		
	3. Press [RND] 4. Switch back to RUN	mode.		
Operating Limits and V	Varnings			

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Sketch(es) Accumulated Interest/Remaining Balance Sample Problem(s) 5. $BAL_{K} = \frac{1}{(1+i)^{-K}} \left[PMT \frac{(1+i)^{-K} - 1}{i} + PV \right]$ $Int_{J-K} = BAL_{K} - BAL_{J-1} + (K - J + 1) \cdot PMT$ where: k^{th} payment to principal = $BAL_{K-1} - BAL_{K}$ k^{th} payment to interest = PMT - (BAL_{K-1} - BAL_K) Total payment to interest = $(K) \times (PMT) - (PV - BAL_K)$ Solution(s) Reference(s)

Sketch(es)				
	Example 1:			
	A mortgage is arranged such that	the first paymer	it is made at the end of	
	With monthly payments of \$167.84.	What is the accu	13 a 20,000 loan at 9%, mulated interest for 1975	
	(periods 1-3) and 1976 (periods 4-1	5) and what wou	ld the remaining balance	
Sample Broblem(s)	be at the end of each year?			
	Keystrokes:	Outputs:		
	1 A 3 A 9 ENTER↑ 12 ÷ B			
	167.84 C 20000 D E	→ 449.60	(interest paid in 1975)	
	R/S	→ 19946.08	(remaining balance at	
	_		the end of 1975)	
	4 A 15 A E	→ 1785.89	(interest paid	
		. 10717.99	in 1976) (remaining helence at	
	n/s		the end of 1976)	
	Example 2:			
	Generate an amortization schedule for	or the first two pa	yments of a \$30,000, 7%	
	mortgage having monthly payments	of \$200. Then jur	np ahead and generate the	
	data for the 36 th payment.			
	Keystrokes:	Outputs:		
	1 A 2 A 7 ENTER♦ 12 ÷ B			
Solution(s)	200 C 30000 D f A	→ 1.00	(starting 1st period)	
	R/S	→ 175.00	(payment to interest)	
	R/S	\rightarrow 25.00 \rightarrow 29975.00	(payment to principal) (remaining balance)	
	R/S	→ 175.00	(total interest to	
			date)	
	R/S	→ 2.00	(starting 2 nd period)	
	R/S	→ 174.85	(payment to interest)	
	R/S	\rightarrow 29949.85	(remaining balance)	
	R/S	→ 349.85	(total interest to	
			date)	
	Kevstrokes:	Quitnute		
	Now let's skin ahead to the 36 th no	wment period		
Reference (s)			(starting 26th period)	
	R/S	→ 169.36	(payment to interest)	
	R/S	→ 30.64	(payment to principal)	
	R/S	→ 29001.75	(remaining balance)	
	R/S	→ 6201.75	(total interest to	
			uate)	

	J,K	1	PMT	PV	∎ •INT	;RB	
		INPUT		ουτρυτ		KEYS	
STEP		DATA/UNITS	KEYS	DATA/UNITS			
1	Load side 1 and side 2.						
2	Optional: Select print/pause						
	mode for amortization		ļ				
	schedule.		08	1.00 or 0.00			
3	Key in						
	 Starting period number 	J	A	J			
	 Ending period number 	К	A	к			
	 Periodic interest rate 	i (%)	B	i (%)			
	 Periodic payment amount 	PMT	C	PMT			
	 Initial loan amount 	PV	D	PV			
4	Compute the total interest paid						
	between periods J and K						
	inclusive, and the remaining						
	balance at the end of period K.		E	INT]{		
			R/S	BAL]{		
	OR]		
5	Generate the amortization]		
	schedule between payments J				1		
	and K inclusive. If the				1		
	print/pause mode is on (1.00),				1		
	the results are printed				1		
	automatically.		f A	J	1		
6	Calculate amount paid to				1		
	interest for period J.		R/S	PMT to INT	1		
7	Calculate amount paid to						
	principal for period J.		R/S	PMT to PRIN	1		
8	Calculate remaining balance at		1	1	1		
	the end of period J.		RS	BAL	1		
9	Calculate total interest paid		-	<u> </u>	1		
	between periods J thru K		1				
	inclusive.		RS	TOT INT	1		
10	Increment J for next period.		RS	J + 1	1		
	If $J \leq K$, go to step 6 for next			1	1		
	period's values. Otherwise.		+		1		
	stop.		†		1		
11	For a new case, go to step 2 and		1	+	1		
			+	1	1 1		

40			97 Pro	ogram	Listi	ng I	[
STEP K	EY ENTRY	KEY CODE	COMN	MENTS	STEP KI		KEY CODE	COM	MENTS
001	*LBLA	21 11			857	*LBLa	21 16 11		
002	RCLØ	36 00			0 58	RCL7	36 07		
003	ST07	35 07	J→R ₇		859	F0?	16 23 00		
004	X≢Y	-41	/		060	SPC	16-11		
005	ST00	35 00			061	GSB9	23 89		
006	RTN	24	-		8 62	1	A1		
007	*LBLB	21 12			863	RCL	36 01		
0 0 8	Е Е Х	-23			R54	+	-55		
0 09	2	82	$i/100 \rightarrow R$		865	STUB	75 AR		
010	÷	-24			866	PCI 7	36 87		
611	ST01	35 01			8 67	CSR1	27 A1		
012	LSTX	16-63			868	STUR	75 AA		
813	X	-35			950	Drio	75 80		
R14	RTN	24			003	ROLO DOLZ	30 00		
A15	#LB(C	21 13			070	KUL (30 UT		
R16	ST02	35 82			071	1	61 45		
B17	PTN	24	$PMI \rightarrow R_2$		072	-	-40		
011		21 14			873	5581	23 01		
010	\$T07	75 07			874	RCL4	36 64		
017	5103	30 83	DV->D		075	-	-45		
020		24	3		076	ST06	35 06		
621	#LELE	21 15			077	RCL2	36 02		
022	RULU	36 00			0 78	X≠Y	-41		
023	RUL7	36 07			079	-	-45		
824	XZY?	16-35			080	GSB9	23 09	U U	
825	6100	22 00			081	RCL6	36 06		
0 26	ST0 0	35 00			0 82	GSB9	23 0 9	PRINC,	
0 27	R∔	-31			0 83	RCL4	36 04	J	
028	ST07	35 07			884	GSB9	23 09	RBAL,	
029	≭ LBL0	21 00			085	RCL7	36 07	J	
03 0	1	61			886	RCL2	36 02		
031	RCL1	36 B1			087	X	-35		
032	+	-55	(1 + i/10	0)→R _a	8 88	Priz	36.03		
033	ST08	35 08	(* .,		8 89	PCIA	36 88 36 84		
034	RCL0	36 00			600		-45		
035	GSB1	23 01			050	_	-45		
836	ST04	35 04	Блёк 14		001	cena	-4J 27 00	TOT INT	
037	RCL 8	36 88			072	6363	23 07		
978	RCL Z	36 07			893	1	01 75 55 67	·	
879	1	60 81 B1			694	51+7	30-00 07		
000		-45			895	RCLU	36 00		
040	CCRI	27 01	-BAL		8 96	RCL7	36 07	1 5 12	
041	6201 CUC	23 81	J-1		097	X¥Y?	16-35	$\mathbf{U} = \mathbf{K}$	
042		72.04			8 98	GT0a	22 16 11		
043	RLL4	36 04	BAL _K - BA	$L_{1-1} \rightarrow R_{6}$	8 99	FTN	24		
844	+	-55	K	0-1 0	100	¥L€L1	21 01		
045	\$106	35 06			101	CHS	-22		
046	RCLU	36 00			102	γ×	31		
047	RCL7	36 0 7			183	STC5	35 05		
0 48	-	-45			104	1	01		
049	1	01			105	-	-45		
050	+	-55			106	RCL1	36 01		
0 51	RCL2	36 02			107	÷	-24		
05 2	х	-35	TNT		108	RCL2	36 82		
8 53	+	-55	J-K		109	x	-35		
054	RTN	24	BAL		110	RCI Z	36 87		
655	RCL4	36 04	ĸ		111	+	-55		
056	R/S	51			112	RCI 5	36 05		
	11	2	12	REGIS	IERS 112	6	17		10
ΥК	i/100) ([*] PMT	° PV	Used ⁵	Used	Used	l´ .j	°1+i/100	3
50	S1		S3	S4 G	35	S6	S7	S8	S9
Α	L IF	3		* łr)		E	 II	4
	ľ		ľ	ſ			-	-	

			9	7 Program	n List	ing H			41
STEP	KE		KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMM	ENTS
	113	÷	-24	RND may be insert	ced				
	114 115	RIN. IIRI e	24 21 16 15	nere.					
	116	FØ?	16 23 00						
	117	GTO2	22 02	Print mode optior	•				
	118 119	5F 8 1	16 21 00 At						
	120	RTN	24						
	121	#LBL2	21 82						
	122	U CF9	16 22 0 0						
	124	RTN	24		180				
	125	*LBL9 FQ2	21 09 16 23 00						
	127	GT03	22 83						
	128	R/S	51						
	129 130	RIN #IRI3	24 21 0 3						
	131	PRTX	-14						
,	132	RTN	24	-					
				1	190				
				-					
				1					
140				+					
140	+		+	1					
				{	200				
	+			-					
150				4					
	+		+	1					
				4	210				
				4					
	+			4					
160									
	+			4					
	_	·····			220				
				4					
				LABELS		FLAGS		SET STATUS	
Α	J,K	В	i ^C PM	T D PV E	INT;RB	^o PRINT?	FLAGS	TRIG	DISP
а	SKD	b	c	d e	PRINT?	1		DEG 🖬	FIX 🛛
^o Us	ed	1 U	sed 2	3 4		2			
5		6	7	8 9		3	$\begin{array}{c c} 2 & \Box & \mathbf{M} \\ 3 & \Box & \mathbf{M} \end{array}$		n_ 2

Program Title Stock Portfolio Valuat	ion			
Contributor's Name Hewlett-Packard				
Address 1000 NE Circle Blvd				
City Corvallis	State	OR	Zip Code	97330
Program Description, Equations, Variables provide initial purchase price of of any size. Valuation program p current market price and annual d 25.58. Program returns the perce user for the next stock. If more user by flashing repeditive 18's When all current prices have been total portfolio. Output includes % change in value, date original as a percent of current market va	Data cards cre a stock and t rompts user or ividend. Pric nt change of v than one data until a new da entered, user original port portfolio was lue.	eated with a the number of ne stock at ce input: 25 value of each a card is us ita card is ta card is folio value created, and	separate data f shares for a a time. User i -5/8 is inputed h stock and pro ed the program inserted. the valuation , new portfolic d annual divide	program portfolio nputs l as ompts the prompts of the value, end yield
Operating Limits and Warnings Shares se used (such shares have existed al	lling for more though rare).	than 999 do	ollars @ can no	t be

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 Sketch(es)

 Sample Problem(s)

 Sample Problem(s)

 Sample Problem(s)

 Sample Problem(s)

 Sample Atta includes the following information:

 1)

 100

 shares at 25-5/8 @, 2)

 200

 at 30-1/4, 3)

 50

 at 65-1/4

 [data is packed by data program so that register 1 contains

 100.025625]

 Date portfolio created 10.25

 100.025625]

 Date portfolio created 10.25

 101.025625]

 Date portfolio created 10.25

 101.025625]

 Date portfolio created 10.25

 101.025625]

 Date portfolio created 10.25

 102.025625]

 Date portfolio created 10.25

 103.025625]

 Date portfolio created 10.25

 103.025625]

 Date portfolio created 10.25

 103.025625

 104.025

 105.025

 105.025

 106.025

 107.025

 108.025

 109.025

 109.025

 100.025

Solution(s)	Input	Output	Input
Prompt	Α		
1	27.14 [†] 1.7 [R/S]	6.34	[R/S]*
2	33.12 [+] 2.1 [R/S]	10.74	[R/S]*
3	96.18 [+] 4.55[R/S]	6.95	[R/S]*
4	(immediately outputs a zer	[R/S]	
5	64.38 [+] 3.50[R/S]	-1.34	[B]
	Original value	45731.25	[R/S]*
	New value	46418.75	[R/S]*
Reference (s)	% change in value	1.5	[R/S]*
	total yearly dividend	2567.50	[R/S]*
	yearly dividend yield	5.53	[R/S]*
	date portfolio created	10.25 1977	
* Only neces	sary if print option not exerc	ised.	



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1.	Clear register: This procedure is not		CL REG	
	necessary if the calculator has just been		₽ŞS	
	switched on.		CL REG	
2.	Load side 1 and 2 of program			
3.	Load 1st data card			
4.	Select print option (97)			1
	Alternate presses of [E] sets (1) and unsets			
	(0) the print option			
5.	Initialize		Α	1
6.	Key in current stock price			
	27-1/4 would enter as 27.14	27.14	ENIER	27.14
7.	Key in annual dividend	1.7		
	Output is % change in this stock			6 34
				0.01
8.	Proceed with steps 6-8 until all prices are		R/S*	2
	entered.			
	If a stock has been deleted (register is			
	filled with zeros) the program displays			
	zero immediately. Continue by pressing R/S.			
	If there are additional data cards (18 stocks			
	per card), the last entry will flash 18			
	until a new card is entered.			
	* Not necessary if print option has been			
	selected			
	Continued on next page>			

1	(Price ↑ Dividends R/S)		-
S Initial	Totals	Print	

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
	After all data is entered: Old portfolio		В	\$
	total.			
	New portfolio total		R/S*	\$
	Change in portfolio value from purchase		R/S*	%
	Total annual dividends		R/S*	\$
	Portfolio dividend vield as a percent of			
	current market value.		R/S*	\$
	Date original portfolio created		R/S*	MM.DDYYYY
	 Not necessary if print option has been 			
	selected.			

Program Listing I

46			97 1 1 5 1 1 1 1 1 1 1 1 1 1				
STEP K	EY ENTRY	KEY CODE	COMMENTS	STEP K	EY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	Set I to O for	957	+I RI o	21 16 17	
002	DSP2	-63 02	portfolio register	050	#LULC MDC	16-62	
003	1	01	run	050	DCE	16 62	
004	STOI	35 46	1 dil	0.55	F 3E	16 31	
005	≭LBL1	21 81	Recall ith	000	г <i>э:</i> стоа	10 23 03	
006	RCL :	36 45	historical stock	061	6TOH	22 11	Continue prompting
007	X=0?	16-43	data & check for a	062	6100	22 16 13	with i+18 & loading
888	GT07	22 87	_deleted stock	063	#LBLB	21 12	Omiginal nontfolio
889	INT	16 34		064	KULH	36 11	value
R1R	STOE	35 15		65	6282	23 83	value
R11	LSTX	16-63	Unpack data store	066	RCLB	36 12	New portfolio value
R 12	FRC	16 44	# of shares in E,	067	6585	23 05	
817	FFY	-23	calculate and	068	ZCH	16 55	
01J 014	7	20 A7	store original	069	GSB5	23 05	Change in value
014	, v	-75	stock value in D,	070	DSP2	-63 02	
015	Ŷ	-35	and accumulate	071	RCLC	36 13	Total yearly
010	CTOD	75 14	original portfolio	072	GSB5	23 05	dividend
017	BCLA	33 14 76 11	value in A	073	LSTX	16-63	
018	KLLH	36 II FF		074	÷	-24	Total dividend
019	+	-55		0 75	1	01	
020	STUA	35 11		076	0	00	yield as a % of
021	RCLI	36 46	Prompt for current	077	0	00	current value
0 22	RCLØ	36 00		Ø 78	x	-35	
023	+	-55	input	879	GSB5	23 05	
824	F0?	16 23 00		889	P2S	16-51	
0 25	PRTX	-14		A 81	RCI 9	36 89	Data portfolio
0 26	R∕S	51		882	Pts	16-51	Date portiono
027	RCLE	36 15		883	DSP6	-63 86	Created
028	Х	-35	Accumulate total		CCP5	27 85	
0 29	RCLC	36 13	dividend in (004	630J 0003	-67 03	
030	+	-55		685	DJFZ	-03 02	
031	STOC	35 13		080	- K/3 - IDIE	JI 21 15	
832	R4	-31		887	FLULE	21 13	
033	GSBa	23 16 11	Noumaline muice	088	FØ?	15 23 00	Print/no print
034	RCLE	36 15	Normalize price	889	6104	22 04	flag set
A 35	×	-35		090	SFU	16 21 00	Thay set
936	RCLB	36 12		091	1	01	
A37	XZY	-41	Accumulate current	092	RTN	24	
978	 +	-55	value in R	093	*LBL4	21 04	
979	CTOP	75 12	varue in b	094	0	00	
840	ICTY	16-67	Calculate and	0 95	CFØ	16 22 00	
040	Prin	76 14	display % change	0 96	RTN	24	
042	KGLD V≠V	-41	in ith stocks volue	09 7	¥LBL5	21 0 5	
042	∧+1 %eu	-41 12 EE	In ILN SLUCKS VAILUE	098	F0?	16 23 00	Drint on to
043	46M	10 33		899	GT06	22 06	
044	6383 	23 83	print option	100	R∕S	51	print decision
840	¥LBLZ	21 02	Check for end of	101	RTN	24	
U4 6	1521	10 20 46	registers If	102	≭LBL6	21 06	
647	1	81	less than 18	103	PRTX	-14	
048	8	68	continue else	104	SPC	16-11	
049	RCLI	36 46	continue erse.	105	RTN	24	Print
050	X£Y?	16-35		106	R ∕S	51	
051	GT01	22 01		107	#LBL7	21 07	
0 52	CF3	16 22 03		108	RCIT	36 46	
0 53	X≠Y	-41	Data card merge	189	RCIA	36 80	Display contents
054	STOI	35 4 6	and prompt	110	+	-55	of a 0 register
85 5	RCLØ	36 00	and the surface	111	, pcr	16 51	
. 056	+	-55			T JE	10 51	L
	1.	12		5	16	7	8 9
Mult Crd	'		-+FSTOCKS		+		-+d
S0	S1	S2	S3 S4	S5	S6	S7	S8 S9
					4		Date
A	4	В		D		E	I
01d Por	t Tota	New Port T	otal Total Div	01d Sto	ck Val.	# of Shrs	. Used

97Program Listing II

STEP	KEY	ENTRY	KEY	CODE		COMMENTS		STEP	KEY ENTRY	KEY	CODE	COMM	ENTS
1	12	X≠Y	-	41									
1	13 14	- R/S CT02	22	51 A2	. .			170				4	
1	15 *	LBLa	21 16	11	Retu	rn to ential revi	ωw					1	
1	16	ENTT	-	21	sequ		CW					1	
1	17	FRC	16	44 47								4	
1	10 19	A-O? Gtob ,	22 16	43 12								1	
1	20	EEX	-	23	_							1	
1	21	1		01 75	Conv	ert CC.DN						4	
1	22 23	X TNT	16	30 34	into	CC + D/N		180				4	
1	24	LSTX	16-	63	chec	king to avo	id					1	
1	25	FRC	16	44	divi	sion by O.]	
12	26 27	÷ FFX	-	24 23								4	
1	28	1		01								4	
1	29	÷	-	24								1	
1	30 71	XZY		41 74								4	
1	31 32 *	INI LBLID J	21 16	34 12								1	
1	33	+	-	55				190				1	
1	34 75	RTN		24								4	
1.	30	K/5		51								1	
												1	
	,											1	
140												4	
												1	
								200					
								200				4	
												1	
												-	
												4	
150												1	
												4	
												1	
								210				1	
												4	
												1	
												1	
160													
100													
								220					
A		0			LAE	BELS	Ic		FLAGS			SET STATUS	
" Init	til	Summa	iry				E P	rint?	^o Print?	FL	AGS	TRIG	DISP
^a Fract	t Dec	þ		с		d	е		1		N OFF	DEG 🗆	FIX 😡
0		¹ Unpac	ck	² End	Check	³ Crd Prmpt	⁴ Pr	int	2				SCI
⁵ Print	F	6 Doint	L .	7		8	9		³ Margo				n_2_

8
Program Title Portfolio Data Card
Contributor's Name Hewlett-Packard
Address 1000 N.E. Circle Blvd.
City Corvallis State Oregon Zip Code 97330
Program Description, Equations, Variables Registers 1 through 18 are used to store historic
Les l'and quantity data on individual stocks. Each register represents one stock.
If N represents number of shares, C represents the integer dollar cost and F
prompts user for input. Number of shares and price are entered. User can lead
prices with fractions: $25-7/8$ is 25.78
Options include deleting stocks (filling a register with O's), adding stock,
and correcting erroneous entries. Register O contains the date the portfolio
was assembled. MM.DDYYYY.
·
Operating Limits and Warnings *CCC is limited to three digits. Fractions are
limited to single digit denominators.

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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Sketch(es)									
								++	
Sample Problem(s) User has a portfolio of 5 stocks which was purchased on									
October	25, 197	/7. Str	ocks ar	'e as	follo	WS;			

Stock No.	No. of Shares	Price	
]	100	25-5/8	
2	400	66	
3	50	89-7/8	
4	300	18-3/8	
5	500	65-1/4	

At a later date stock 2 and 4 are sold. Subsequent to that a new stock is purchased.

200	2	0	0
-----	---	---	---

30-1/4

Solution(s)	Prompts	Input	Output
		10.25 1977 [D]	10.25 1977
		[A]	
	1	100 [†] 25.58 [R/S]	
	2	400 [†] 66 [R/S]	
	3	50 [♠] 89.78 [R/S]	
	4	300 [†] 18.38 [R/S]	
	5	500 [¥] 65.14 [R/S]	
	6 (ignore)	[Write Data] or [W/Dat	a]

Reference(s) Later	(Enter program	and data cards)
	2 [C]	400.06600 [R/S] 0
	4 [C]	300.018375[R/S] 0
	[B]	
	200 [4] 30.14 [Write Data] o	[R/S] 200.030250 c [W/Data]

(# Shares	E↑ Price	R/S)	fE Pri	int/No Print	
NEW PORTFOLIO	ADD STOCK	DELETE STOCK#?	DATE ASSEN	CORRECT 1BLED ■ FNTRY#?	┛

STEP	INSTRUCTIONS	INPUT DATA/UNITS	к	EYS	OUTPUT DATA/UNITS
1.	<u>Clear registers - this is not necessary if</u>			CL_REG	
	calculator has just been switched on			P≶S	
				CL REG	
2.	Enter program card				
3.	If you have 97 and wish to have a printed		f		1
	record				
4.	If portfolio is being created, key in the				
	assembly or purchase date	MM.DDYYYY			
5.	If portfolio is being created				1
	a) Number of shares				Neut Deall
	<u>b) Price(25 5/8 keyed in as 25.58)</u>				Next Reg#
	Repeat a & b until all stocks are entered				
	If many than 19 stacks and heing entered the				
	IT more than to stocks are being entered, the				
	program will automatically prompt for a data				CRD
	(blank) card after the 18th entry. After the				0
	card has been entered a O appears.				10
	Press [R/S] to continue				13
	Complete all stock entries before returning to				
	make any corrections. If more than 1 data				
	card is required, re-enter the appropriate				
	card after the all the stocks have been entered				
	If only one card is used, corrections (etc.)				
	can be done after the last stock is entered.				
	Continued on next page>				

(# Shares	E↑ Price R	/S)	fE Print/N	No Print	
NEW	ADD	DELETE	DATE	CORRECT	•
PORTFOLIO	STOCK	STOCK#?	ASSEMBLED	ENTRY#?	•

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
	OPTIONS			
В	ADD STOCK - To a previously created data card			
	enter program and data cards and press \rightarrow			
	If space is available, the program will			
	prompt user with the register #. Use			
	5 a & b, then back to B for additional			
	available registers.			
С	DELETE STOCK - Key in register # and press	REG #		
	Program displays current register contents.			
	If user desires to delete press →		R/S	
	Or else go back to B,C, or E.			
E	CORRECT ENTRY # - Key in register # of reg to			
	be corrected and press →	REG #		Reg #
	then 3 a & b.			
	PRINT/NO PRINT - 1 represents print		f	
	Alternate presses of [f] [E] sets and			
	Arternate presses of [1] [1] sets and			i.
	unsets the print option.			

97 Program Listing I

52							/51 (1111		•••5				
STEP	KE	Y ENTRY	KE	Y CODE		COMN	IENTS	STEP	KEY ENTRY	()	KEY CODE		COMMENTS
Г <u></u>	101	★I Ri û	2	i 11	T			856	5 XZY		-41	—	
. a	102	+LULH β	£.	 	Ir	nitial	ize	A 57	7 FA?	16	23 88	1	
a	107	STOT	31	5 46				A58	R PRTX	••	-14	Pri	int inputed
	904	#1 RI 1	2	1 81				859	9 XZY		-41		
	105	IS7I	16 2	5 46	Se	auenti	al data	868	FA2	16	27 88	Dat	ta
0	10J 10Z	1321	10 20	7 97				000	, 10: I DDTV	10	-14	1	
0	100	6303	21	5 83	en en	try		001		27	16 19	1	
0	101	6304	23 10					002	. 8300 7 EEV	20	-27	Nor	rmalize price
9	308	6101	24	24				003	D EEA		-23		
	209	KIN		24				004	- J		0 3		
6	110	#LBLB	Ζ.					063) -		-24	Pac	ck register
U	111	1	_	01				066) + 		-55		
8	112	STOI	3	4 6	101	tializ	e	0 67	FØ?	16	23 00		N. CCCFFF
0	113	≭LBL 2	2.	02	seo	uentia	l register	068	s SPC		16-11		
8	914	GSB3	2.	303				065	9 FØ?	16	23 00		
8	915	RCL i	30	5 45	sea	rch fo	or first	076) SPC		16-11		
0	916	X=0?	16	5-43	1 700	o roai	ston	071	STO:		35 45		
0	917 -	GTOa	22 10	5 11	201	U regi	SLEI	072	? RTN		24		
0	118	ISZI	16 20	5 46				073	\$ * LBL3		21 03		
8	919	GT02	22	2 02				074	1		0 1		
0	320	RTN		24				075	58		8 8	Che	eck for end of
0	321	#LBLC	22	13				076	5 RCLI		36 46	roc	istors
ē	322	DSP6	-6	3 86				077	7 X ∠ Y?		16-35		JISCEIS
Â	123	RCIA	30	5 88	Rec	all re	gister to	A 75	RTN		24		
A	124	-		-45	ha	dalata	d and	A79	RI RI		-31		
	125	STOT	7	5 46	be	derete	a ana	013 080			16-61	l Out	tput data
0	202	DCI:	7	5 45	dis	plav		000	, N DIN 1 D		10-01		
	120	RUL I	30	5 4J 54		F · • J		001	. U D D/C		51		
0	121	K/ 3		J1 00				002	: K/Ə 7 DI		JI 71		
	128	0		60		ata (s	tore 0)	083) K∔ ⊢ DOLO		-31	1 014	oon nogistons
6	129	5101	3:	9 45	doc	igned	vorieton	884	RULU		36 88		ar registers
U	130	USP2	-6.	8 02	ues	ryneu	register	085) +		-55	and	begin loading
0	931	RTN		24				086	5 CLRG		16-53	dat	ta for subsequent
0	132	≭ LBLD	21	14				8 87	r P≠s		16-51	car	^d
0	933	DSP6	-63	306				088) CLRG		16-53		
0	34	F0?	16 23	3 80	Sto	re dat	e in	089) STOØ		35 00		
8	35	PRTX		-14	noa	ictor	10	098) GTOA		22 11		
8	336	P≓S	16	5-51	reg	ISLEI	19	091	RTN		24		
0	37	ST09	3:	5 09				0 92	*LBLb	21	16 12		
9	38	P≓S	16	5-51				8 93	B ENT†		-21	1	
0	139	DSP2	-63	3 82				094	FRC		16 44	Nor	rmalize Price
- A	140	FØ?	16 23	3 00				895	X=0?		16-43		
Â	141	SPC	11	5-11				A 96	CTOC	22	16 13		CCC.ND
A	142	PTN		24	•			097 097	FFX		-23		becomes
9	147	*I RI F	21	1 15				0071 000	2 1		Q1		CCC + N
0	143	ALDLL NCD2		7 05				000	, 1) v		-75		D
0	245	DOLO	-0.	00 00 00	C - +	T		100	, л 1т		15 74		-
0	94J M.C	RULU	38	-45	set	ı reg	ister to	100			10 34	(Av	/01ds ND = 0)
	740	- 6707	71	-4J 5 AC				101	LJIA D EDC		10-03		
	141 240	5101	27 1	/ 40 - 11	sto	re cha	nge	102	, rkl		10 44		
	748 140	630a	23 10	2 00	•			103	; .		-24		
	149	USP2	-6.	5 02				184	EEX		-23		
0	150	R/S	- · · ·	51				105	1		61		
0	51	#LBLa	21 16	5 11	Duce			106	÷		-24		
0	152	RCLI	36	5 46	Pro	mpt us	er with	107	′ X≠Y		-41		
0	53	RCLØ	30	5 00	reg	ister	Ħ	108	INT INT		16 34		
0	954	+		-55				109	*LBLc	21	16 13		
0	955	GSB5	23	3 05				110) +		-55		
├ ──── └												1	
	r	1	Го		12		REGIS	IERS	6	T	7	0	10
^o date			 -					STOCKS				-+°	
50		S1)	52		S4 6	\$5	S6		S7	58	59
			+-					ŚTOCKS –					
Δ			B			C	↓ r)					<u>т</u>
Î Î			ľ			U U	ľ			۲ <u>د</u>			USED
			1							1			

97Program Listing II

STEP	KEY	ENTRY	KEY	CODE		COMMENTS		STEP	KEY ENTRY	KEY COL	DE	COMM	ENTS
	İ11	RTN		24	T								
	112	#LBLe	21 16	15 88				170					
	113	GT04	10 23	00 04	Dudu	+ /Na Dudat							
	115	SFØ	16 21	00	Prin	t/NO Print							
	116	1		01	S	ET							
	117	RTN +I PLA	21	24									
	119	#LDL4 Ø	21	00									
	120	CFØ	16 22	00									
	121	RTN	-	24				180					
	122	*LBL5	16 27	85 66				100					
	123	6706	10 23	00 06									
	125	R∕S		51	Onew								
[126	RTN		24	oper	ationalize							
	127	#LBL6	21	06	prin	t/no print							
}	128	PKIA RZS	-	-14 51	F · · · ·	o ,							
ł	130	RTN		24									
[131	R∕S		51									
	1		t		1			190					
			 		1								
			1		1								
	_		ļ		1								
140	-		───		4								
					1								
								200					
			 		1								
			╂────										
	1		1										
					1								
150													
			 		4								
								210					
	+		 		1								
	1												
160													
					1								
			 		ł								
					1			220					
			 		ł								
					1								
	1		L		LAE	BELS			FLAGS			SET STATUS	
A St	art	^B Add		C Del	Lete	D Date	E Co	prrect	0 Print/ No Prin	t FLAGS	S	TRIG	DISP
a Us	ed	b Norm	alize	C LIG		d	e Pr	int/	1 Additio	nal ON O)FF		
0		1 Data	e	2Add	Searc	h ³ Last Reg	4 4	o Print	2 2				
5 110		Entr	<u>v</u>	Rout	ine	Check 109	Us 9	sed	3	2 0	K	RAD 🗆	
	ea	Usea		ľ		-	-		-	3 🗆 -			n

Program Title	TRUE ANNUA	L GROWTH	RATE	(DCF)	OF	INVESTMENT	PORTFO	DLIO	
Contributor's Name Address	Ken L. 2323	. Sing er Augusta D:	rive			_			
City	Housto	n		9	State	Texas	Zip Code	77057	

Program Description, Equations, Variables, etc. This program finds the true annual growth rate (discounted cash flow rate of return) of an investment portfolio or any unlimited cash flow stream. Inputs are as follows:

- 1. Evaluation date and market value
- 2. Lump-sum payments and/or withdrawals: date and amount
- 3. Series payments and/or withdrawals: starting date of series; number of payments or withdrawals in series; months between each payment or withdrawal; and amount of each payment or withdrawal

(The program can be used to find the DCF rate of return of a standard cash flow stream by treating cash flow investment outlays the same as portfolio withdrawals and cash flow revenues the same as portfolio payments; the date and amount of the initial cash flow investment is input as the portfolio evaluation date and market value.) For an investment portfolio, a dividend which is not reinvested is treated as a withdrawal. For a cash flow stream, a continuous flow can be approximated by many small series payments. For example, \$1000 received continuously over a year can be approximated by 100 revenues, received

Operating Limits and Warnings (1) Total payments cannot equal total withdrawals (including market value), i.e. zero growth rate. (2) As in any discounted cash flow analysis, if the year by year <u>cumulative</u> net cash flow (payments minus withdrawals) changes sign more than once, there <u>may</u> not be a unique rate of return. Such a case will be indicated by widely differing values of i, i_1 , and i_2 ; accordingly, the final rate will be incorrect. (3) The growth rate must be algebraically greater

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Program Title TRUE ANNUAL GROWTH B	RATE (DCF) OF INVESTMENT PORTFOLIO								
Contributor's Name									
Address									
City	State Zip Code								
)								
Program Description, Equations, Variables, etc.	(cont'd)								
at intervals of 12/100 months.	in the amount of \$1000/100 each.								
Input data are entered the	ee times. Program determines its own								
initial guess for the rate from	a the first entry of the data (Pass 1).								
The initial rate is then used t	The initial rate is then used to discount the payments/withdrawals in-								
put in the second entry, and the resulting ratio of total discounted									
withdrawals to total discounted payments is used to calculate a refined									
rate (Pass 2). In the same man	nner data are entered a third time and								
discounted using the refined ra	ate to obtain a further refined rate;								
then the initial, refined, and	further refined rates are combined to								
obtain a final rate (Pass 3).	Accuracy averages 99.999 %.								
Let: i = initial rate, %	m = 1 + (i/100)								
i ₁ = refined rate, %	$m_1 = 1 + (i_1/100)$								
$i_2 = further refined$	rate, $\%$ m ₂ = 1 + (i ₂ /100)								
ic = final rate, %									
L = "lump-sum"	S = "series"								
W = withdrawal amour	nt P = payment amount								
TW = total withdrawal	Ls TP = total payments								
Operating Limits and Warnings (cont'd)									
than -100 percent. (4) In some	e other rare instances a particular set								
of data could cause division h	r remo If this instance should occur								

of data could cause division by zero. If this instance should occur, it is suggested that the market value (portfolio) or initial investment outlay (cash flow) be changed by a very small amount; the entire program should then be rerun.

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Program Title	TRUE ANNUAL GROWTH RATE (DCF) OF INVESTMENT PORTFOLIO
Contributor's N	Name
Address	
City	State Zip Code
Program Desc	cription, Equations, Variables, etc. (cont ¹ d)
-	TDW = total discounted wdls. TDP = total discounted pmts.
	<pre>n = time (years) of payment/withdrawal (relative to evaluation date)</pre>
	n' = time (years) series payment/withdrawal starts
	I = interval (months) between series pmt./wdl. I' = I/12
	N = number of series payments/withdrawals
Pass 1:	$\bar{n} = n^{*} + (I^{*}N - I)/2$
	$x_{W} = \frac{1}{TW} \left[\sum (W_{L})(n) + \sum (W_{S})(N)(\bar{n}) \right]$
	$x_{p} = \frac{1}{TP} \left[\sum (P_{L})(n) + \sum (P_{S})(N)(\vec{n}) \right]$
	$a = x_w - x_p$ $m = (TW/TP)^{\frac{1}{2}}$
Operating Lim	its and Warnings
This program h	has been verified only with respect to the numerical example given in <i>Program Description II</i> . User accepts and uses
this program m upon any repre	naterial AT HIS OWN HISK, In reliance solely upon his own inspection of the program material and without reliance esentation or description concerning the program material.
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Program TitleTRUE ANNUAL GROWTH RATE (DCF) OF INVESTMENT PORTFOLIOContributor's Name
Address
CityStateZip CodeProgram Description, Equations, Variables, etc. $(cont^{\dagger}d)$ Pass 2: $TDW = \sum (W_L)(m^{-1}) + \sum (W_S)(\frac{m^{I^*N}-1}{m^{I^*}-1})(m^{-(n^*+I^*N-I^*)})$

$$TDP = \sum (P_{L})(m^{-n}) + \sum (P_{S})(\frac{m}{m} - 1)(m^{-(n)} + 1)(m^{-(n)} + 1)$$

$$1/b = (\log \frac{TW}{TP})/(\log \frac{TW/TP}{TDP/TDW})$$
 $m_{1} = m^{b}$

Pass 3: TDW_1 = same as Pass 2, except m_1 used instead of m TDP_1 = same as Pass 2, except m_1 used instead of m

$$1/b_1 = (\log \frac{TW}{TP})/(\log \frac{TW/TP}{TDP_1/TDW_1})$$
 $m_2 = m_1^{1/2}$

$$L_c = (m + \frac{(m_1 - m)^2}{2m_1 - m - m_2} - 1)(100)$$

Operating Limits and Warnings

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Sketch(es)	
Sample Problem(s) (1) Investment portfolio: \$2600 and \$3600 were paid into a fur 3/1/67 and 5/1/70 respectively. \$2000 was withdrawn on 4/ Five quarterly dividends of \$60 each were paid by the fund not reinvested) starting 11/1/68. Additionally, twelve mor amounts of \$100 each were invested in the fund beginning 2. What was the true annual growth rate of the fund as of 4/1, when it had a value of \$7000?	nd on 1/73. (and nthly /1/74. /76,
Solution(s) E 4.1976 7000 A	
3.1967 ↑ 2600 B	
5.1970 + 3600 B	
$4_{-}1973 = 2000 \text{ CHS B}$	
$11.1968 \uparrow 5 \uparrow 3 \uparrow 60 \text{ CHS C D} \longrightarrow 1.0425(965)$	(Pass 1)
→ 1.0420(671)	(Pass 2)
→ 1.0420(730)	
4.2072(893) pct.	(Pass 3)

Reference (s)

Sketch(es)

Sample Problem(s)											
(2) Cash flow:	(All fig	ures,	excep	t tho	se wi	th a	ster	isk,	are	lump-:	sum
at end of	year)										
Year	0	1	2 3	4	5	6	7	8			
Investr	ent 5	0	8 8	8	7	0	0	0			
Revenue	0	3	4 4	4	4	4	9*	9*			
*continuou	sly receiv	ed fro	om sta	rt of	year	to	end	of y	ear		
Solution(s) = 0.0	000 4 5 A										
	001 4 3 B										
0.0		12	4 . Ц	С							
0.0		▲ 12	↓ ∩q	C							
0.0			1.09	U.							
0.0			A 0	0110							• >
0.0	002 T 3	t 12	τo	CH2		-1.0	6310	(700)		(Pass	1)
					+	-1.0	652	(102)		(Pass	2)
						• 1.0	652	(778)			
						6.5	5280	(152)	pct.	(Pass	3)

Reference(s) (1) "Changing Times computer service: Find out how your investments are really doing", <u>Changing Times Magazine</u>, March 1970, pgs. 47-49; (2) Wild, N. H., "Return on Investment made easy", <u>Chemical Engineering Magazine</u>, April 12, 1976, pgs. 153-154



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Load sides 1 and 2			
2	Press E until 1.0000 is displayed		E	1 (Pass)
3	Initialize data entry sequence as			
	follows:			
	Enter evaluation date for investment			
	portfolio or date of initial capital			
	investment for cash flow	MM.YYYY	+	
	Enter market value of portfolio or			
	initial investment amount of cash flo	v Amount	A	Amount
4	If there are any lump-sum payments (for			
	portfolio) or revenues (for cash flow),			
	input them as follows:			
	Enter date	MM.YYYY		
	Enter amount	Amnt (A)	B	-(A)(n)
	(Repeat step 4 as necessary)			
5	If there are any series payments (for			
	portfolio) or revenues (for cash flow),			
	input them as follows:			
	Enter starting date of series	MM.YYYY	▲	
	Enter number of payments in series	N	↑	
	Enter interval (months) between			
	payments	Months	▲	
	Enter amount of each payment	Amnt (A)	C	-ANN
	(Repeat step 5 as necessary)			
6	If there are any lump-sum withdrawals			
	(for portfolio) or investment outlays			
	(for cash flow), input them as follows:			
	Enter date	MM.YYYY		
	Enter amount	Amnt (A)	CHS B	(A)(n)
	(Repeat step 6 as necessary)			
7	If there are any series withdrawals (for	•		
	portfolio) or investment outlays (for			
	cash flow), input them as follows:			
	Enter starting date of series	MM.YYYY		
	Enter number of withdrawals in series	N		
	Enter interval (months) between			
	withdrawals	Months		
	Enter amount of each withdrawal	Amnt (A)		$(\underline{A})(\underline{N})(\underline{n})$
	(nepeat step 7 as necessary)			



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
8	To calculate initial rate, press		D	1+1/100
9	Press E until 2.0000 is displayed		B	2 (Pass)
10	Repeat step 3			-Amount
11	Repeat step 4			P.Value
12	Repeat step 5			P.Value
13	Repeat step 6			P.Value
14	Repeat step 7			P.Value
15	To calculate refined rate press		D	1+1./100
16	Press E until 3.0000 is displayed			3 (Pass)
17	Beneat step 3			-Amount
18	Reneat sten 4			P.Value.
19	Beneat step 5			P.Value,
20	Repeat step 6			P. Value.
21	Repeat step 7			P.Value,
22	To calculate further refined and final			
26	To carculate further fermied and final			1+1-/100
	rates, press			+ (1)
	(If a mistake is made during data entry			1Q (2)
	and noticed before completing the ster			
	and noticed before completing the step			
	it is only necessary to start that ste			
	over agam.)			
	(If a mistake is made duning data entry			
	and neticed often completing a ston i	-		
	and noticed after completing a step, I	e		
	is only necessary to go pack to the			
	Step immediately following the "Press			
	E until at the start of the pass			
	in which the error was made.)			
	(For another problem, repeat steps			
	<u> 2-22.</u>)			
				├ ────┤
	*** pause on HP-67; print on HP-97			
	P.Value = Present (discounted) Value			

EVALUATION DATE AND MARKET VALUE (PORTFOLIO) OR DATE AND AMOUNT OF INITIAL INVESTMENT OUTLAY (CASH FLOW) DATE AMOUNT

LUMP-SUM PAYMENTS (PORTFOLIO) OR REVENUES (CASH FLOW) DATE AMOUNT



SERIES PAYMENTS (PORTFOLIO) OR REVENUES (CASH FLOW) ST. DATE NUMBER INTERVAL AMOUNT



LUMP-SUM WITHDRAWALS (PORTFOLIO) OR INVESTMENT OUTLAYS (CASH FLOW) DATE AMOUNT



SERIES WITHDRAWALS (PORTFOLIO) OR INVESTMENT OUTLAYS (CASH FLOW) ST. DATE NUMBER INTERVAL AMOUNT



67Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	g LBL fe	32 25 15	Convert date to - n		×	71	(-N)(E)
	h x=Y	35 52	Amount in y; Date in X		h LSTX	35 82	Bring back I
	^	41	MM.YYYY in X & Y Regs.		+	61	I-NI
	g FRAC	32 83	.YYYY in X Reg.	060	2	02	$(1 - N_{2})/24$
	-	51	MM		4	04	$= \frac{1}{12} + \frac{1}{12$
	h LST X	3582	Bring back . YYYY		÷	81) - (2 - N = //2
	EEX	43	l vvvv		g 658 fe	32 22 15	calculate -n'
	4	04	10		+	61	n=-n'+[(1'-N1)/2]
	X	71	Υ		RCL 6	34 06	Amnt in X; ñ in y Reg.
010	h X=Y	35 52	mm. in x; ever. in y		GTO O	22.00	Common lump sum 4 series
L	1	01	Soution of year		g LBL fa	32 25 11	Pass 2 or 3 Initialize
	2	02	= mm/12		0	00	Initialize
		81	NULLY Constan		STO 1	33 01	TOW & TOP
	+	61	TTYT. traction	070	STO 2	33 02	P
	RCL 5	34 05	Eval Date (On these is		<u>h X7Y</u>	35 52	O in y; mkt value in X
	h x=Y	35 52	{-n = (Eval. Pate) - Date			51	-mkt. value in X
	-	51	p		g LBL fb	32 25 12	Pars 2 or 3 lump sum
	h RTN	3522			<u> </u>	00	Not series
000	FLELA	31 25 11	Initialize		STO 3	33 03	
020	h F? O	35 71 00	The mark Par 1 and		+	61	Amnt in K, date in y
	GTO FA	21 31 11	Pass 1. Clear all reas.		FLBL 2	312502	Common lump sam & Serics
	FCLREG	31 43	and init. TW with		9 658 FC	32 22 15	Calen
	STO I	33 01	Value on Eval. Date	080	RCL 3	34 03	$(\Xi'N - \Xi') = 0$
	g GSB Fe	32 22 15	Convert Eval. Date			31	
	CHS	42	YV. fraction & store		RCL (I)	34 24	1 tov = = Amount
	570 5	33 05			h X=Y	35 52	$\times (1+\frac{1}{2})^{-n}$
	KCL I	34 01	Fight Date		<u>hyr</u>	25 65	
	h RTN	35 22	Eval. Daie		X	71	Part or WPh?
030	+ LOL B	51 25 12	Lump Sum		+ ×20	31 /1	WALL C. TO LEL 3
	h Fro	35 71 00	Fig. Cont Back 2 and		610 3	22.05	S PV S TOP
	GTO + D	22 31 12	Pass 1. Covt date in		510 + 2	33 61 02	Direly PV-
	g osb fe	32 22 15	YReg to -n; amount		A RTN	35 44	Display FUPAF
	f IBL C	312500	1 in X keg.	6 090	4 To ml	31 23 03	S-(PV.m) = TPW
	Y		(-WOL)(-n) or (PMT)(-n)]	Lani	35 31 01	Disalay - PV
	LISTY	35 07	Bring back PMT or WDL		A PL CO	22 2013	Process 3 Series
	f X(O	21 71	PMT OF WOL?		G LDL FC	32 04	Tame store amount
	GTO 1	22 01	WDL : GO TO LEL 1				h l
	510 + 2	33 61 02	2 PMT		1	01	
040	hRł	35.53	(-n)(PMT) to X Reg		2	07	{ /12
	510 - 4	33 51 04	Z-(-n)(PMT)		÷	81	1)
	hRTN	35 22	Display - (n) (PAT)		×	71	איד
	F LBL I	312501	WOL		STO 3	33 03	
	STO - 1	33 51 01	2 - (-WDL)	100	RCL (i)	34 24	(1+i/100) in t; I'N in y
	hRI	35 53	(-n) (-WDL) to X Req		h LST X	35 82	Bring back I'
	STO + 3	33 61 03	E(-n)(-wow)		STO - 3	33 51 03	(I'N - I') in Reg. 3
	h RTN	35 22	Display (n) (WDL)		hyx	35 63	
	FLBLC	31 25 13	Series		1	01	} A = [1 + 1/100] - 1
	h F? O	35 71 00	Test for Pass		-	51	
050	GTO FC	22 31 13	Flag O set. Pass 200	\$	h X#Y	35 52	Ainy; I'Ninx
	STO 6	33 06	Pass 1. Temp. Store and		RCL (i)	34 24	(1+ 1/100) in X; I'M in Y
	hRI	35 53	K N in X Reg, I in Y My	2	h XZY	35 52	(I+i/100) iny; I'M in X
	h X=Y	35 52) date in 2 keg.	110	hyx_	35 63	R=(1+1/2N)
	STO X 6	33 71 06					
	LUND	46	I in X ! - N in V Rea.		LYN	35 57	K I
	_ ካ አምፕ	33 3 2	REGI	STERS		<i></i>	·
0	1 TW	2 TP	3 Temp; 4	5 Eval.	6	7	8.61 9
ľ	or TOW	Or TOP	1+(12/100) Temp.	Date	TW/TP	1+(i/100)	1+(1100)
S0	S1	S2	S3 S4	S5	S6	S7	S8 S9
Α		В	С	D		E	I 7 or 8

67Program Listing II

STEP	STEP KEYENTRY K		KEY (CODE	COMMENTS		STEP	KEY ENTRY	KEY CODE	COMM	ENTS	
	÷		81		(B/A			÷	81	A/6		
	RCL 4 34 04		Amou	"+ =		170	RCL 7	34 07	D			
	X		71		S Am	ount ×(B/A)			1	01	I .	
	GTO	2	220	2	Common	lump sam \$ 500	ries		1	51	lic	-
	FLB	LD	31 2	5 14	Calcu	late Rates			+	61	$1 = \Gamma(y_{100})$) + (A/a)
	h F?	?0	35 7	1 00	Test	for pass			EEX	43		
	GTU 1	fd	22 3	114	Flag	O set. Pass ?	1.003		2	02	4)	×100
120	RCL	. 2	34	02	Pass (rate	1. Calc. mit	121		X	71		
	RCI		34	01	ſ	TP/TW			h RTN	3522	Display 10	,
			81			TPI-W			FLBLE	31 25 15	Set up ne	er pass
	STO	6	33	06	Store			180	hFIO	35 71 00	Is current	er is 2 or 3
	RCL	4	34	04	K x= 1	E(PNT=n)]/	ТΡ		GTO 8	200	Page 1. Incr	mase to 2
	RCL	. 2	34	07					h SFO	35 41 01	CLAAT PASS	5 B flag
		2	34	72	К				7	07) sat T e	en to 7
	BCI	- 3	34 0	23] = ۲	{ (WDL*n)] /	TW		h STT	35 33	for	
	+	• •	81	<u> </u>					2	02		
130	_		51		(a= x	o - Xw			h RTN	35 22	Display P	ass 2
	h 1/2	4	35	62	γ	1 > - (+=L.	12		f LBL 8	31 25 08	Current pas	s is 2or3
	hv	×	35 6	63		f(100) = CTT/TV	v)		h F?	35 71 01	Is current	pars 3?
	STO	7	33 (70	Store	1+(1100)			6T0 9	22 09	Current P	mess is 3
	hR	TN.	35 :	22	Displ	ay 1+(i/100))	190	h SF I	35 51 01	Pass 2. IV	corease to 3
	g LBL	fd	32,2	5 14	Pass	2 or 3 Rate	es 、		80	08	Set I Re	g. to 8
	RCI	L (i)	34	24	[(1 + i/10	oo) or (1+"	100)		h sti	35 33) for in	L .
	Ra	. 6	34	06	K A = 1	10a (TW/TP)			3	03		
	f LO	G	31	53					h RTN	35 22	Display P	ass 3
1.10	RCL	6	34	06)				flel 9	31 25 09	Current Pe	135 13 3
140	RCL	. 2	34	02	V	[(TW/TP)	Γ		h GF O	35 61 00	Pass 2 or	3 flag
	7		81		} B= 10	3 TTOPITO	3		hcfi	35 61 01	Clear pas	is 3 flag
	RCL	1	34	0	11		N'1		1	01	Dicalou	as I
			- 71	~-	11			200	NRIN	55 22	- Y .	
	+	06	313	>3	ľ v	▲ /a					1	
		<u>ب</u> لار	25	63		1. 2=(1+1)	14				1	
	h E	7 1	357	1 01	Test	fra Pass 3	00)				1	
	GTO	5	22	05	Flag	1 set. Pass 3	5				1	
	STO	8	33	08	Pass	2. Store (1+ 1	·/100				1	
150	hB	TN	35	22	Disple	y 1+(11/100)					1	
	f LB	115	312	5 05	Pass ?	3. Calc final	rate]	
	STO	3	33	03	Store	(1 + i2/100)						
	f ->	K-	318	4	Disp	lay 1+ (12/10	70)					
	RCL	8	34 0	28)	•		210				
	RCL	7	34 (27	l a F	$\dot{\alpha}$	$\sqrt{2}$				4	
	-		51		}	"hoo) - ("hoo	₀)]				4	
	•		41		11						4	
			71		K						{	
160	BCI	2	33	02	1						1	
	-	- 3	51	03	} B=(*	1/100) - (1/10	。)				1	
	RCL	8	34 0	28	-	(in 100) + (i. 1	. \				1	
	+		61		1) `		106 J				1	
	fx	, ‡ 0	31 (61	Åre i, i	, and iz all e	gual?	220			1	
	GTO	6	22	06	LNO. PI	roceed	•]	
	CL	.X.	44	ł	Ryen .	Set B=1					1	
			0		P						4	
	I F LB	56	512	5 06					FLACE	L	SET STATUS	
A B IC				Ε		0		SET STATUS				
Start Lump Sum Ser		ies	Calc. Rate	Ne	ext Pass	Pass 2 or 3	5 FLAGS	TRIG	DISP			
a Fues 2 . 3 b Puess 2 or 3 c Pues Stort Lumo Sum Con			203	Calc. Rate	e Co	nvert a 1 n	Pass 3		DEG 尾	FIX 🗺		
0 Pass	1 1	Pas	s 1	2 Pass	203	3 Pass 2013	4		2		GRAD	SCI 🗖
C.om		WDL		7 Com	men	WDL.	9 .	Lerant	3	2 0 0	RAD 🗆	ENG 🗆
			d	ľ		Page 2 ar 3		has I	ĭ	3 🗆 🗆		n

Program Title DIET PLANNING

Contributor's Name **Hewlett-Packard** Company

Address 1000 N.E. Circle Boulevard

City Corvallis

State Oregon

___ **Zip Code** __<u>97330</u>__

Program Description, Equations, Variables Most diet plans emphasize energy input, or counting calories in the food to be eaten, without enough regard for the individual's energy output, or the calories/day required. Since calculation of caloric needs is tedious, it is usually ignored, with reliance on some fixed-calorie diet instead. However, weight gain or loss is determined by the relationship between energy input and energy output.

This program estimates an individual's basal metabolism (energy requirement necessary to keep the body alive, at rest, with no weight change, at 20°C.) based upon height, weight, age, and sex. Next the required calories/day to maintain the current weight are estimated from the basal metabolism and the hours/day spent at each of five activity levels. Finally the required calories/day to lose (or gain) weight at the desired rate are estimated from the caloric content of body fat. Inputs may be in either English or metric units, and are automatically converted, if necessary. Knowledge of one's daily calorie requirement allows for more rational diet planning.

Fad diets may result in weight loss, but do not establish good eating habits which will allow maintainence of the desired weight. Good diets maintain a balance of food types, so that nutritional requirements are met. A balanced diet would contain at least 12 to 14% protein and not over 35% fat, with the rest being carbohydrate. (Note that protein and carbohydrate have 4 calories/gram, while fat has 9 calories/gram. Therefore 35% of a diet's <u>calories may be given by about</u> 19% by weight of fat). For best health, the carbohydrates should be primarily natural carbohydrates rather than the highly refined sugars and white flour.

The actual diet to use is left to the user. Many diet manuals have lists of the calorie content of various foods; so long as your calorie input is less than your calorie requirement, you will lose weight (and vice versa). While these calorie requirement estimates are not exact, they should help the dieter to modify diet and/or activities so as to move towards and maintain the desired weight.

Operating Limits and Warnings Individual differences may cause the estimates of basal netabolism and calorie needs to vary by ± 10% from their absolute values; however, once the deviation is established, it should remain consistent.

Age must be from 5 to 80 years, inclusive.

In this program, the term "calories" actually means "kilocalories", as is ommonly the case when referring to the energy content of foods.

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Program Title DIET PLANNING	(Cont,)	
Contributor's Name		
Address		
City	State	Zip Code
Program Description, Equations, Variables	Programmin	18
This program first calcula	ates body surface area in	n sq. meters, using the
$SA = W^{42}$	25 x H·725 x 0.007184	
Weight and height values are connecessary. The program then remeter/hour vs. age (one table if from 5 years to 80 years, Flag is selected from R6. Since bot to store only the differences if These ages were chosen to match age. The program determines in performs a linear interpolation fits. The product of the interpolation fits the BMR/hr., and multiplying by Next, to find the total rest of five levels of activity is r and accumulated. Total hours mare assumed to be at the BMR for 70 kg. body weight for the othe exercise may require over 320 consustained for one hour. Finally, if a weight chang to make the change are combined to give the desired rate of weight for the water content, Kilograms are of the set	onverted to metric units efers to tables of basal for each sex). These tab g 1 determines whether th th tables start at "49" f between the ages of 5, 10 h changes in the slope of n which interval the enter n of the BMR for the exact s data that are not reduce olated tabular value and y 24 gives the basal meta equired calories/day, the multiplied by its estimat must equal 24, or no answ or sleeping, and at 80, 1 er four levels of activit calories/hour, such exerce ge is desired, the A weig d to calculate a new tota ight change. Body fat is 4,100 calories/pound for converted to pounds, if n	before calculation, if metabolism rate (BMR)/sq. oles (in R6) cover ages he male or the female table or 5 years, it was possible 0, 20, 40, and 80 years. I the curve of BMR/m?/hr.vs. ered age lies, then the curve of BMR/m?/hr.vs. ered age lies, then the surface area gives abolism in calories/day. Thus a table calorie requirement or is given. Calories/hour 60, 240, 320 calories/hour 60, 240, 320 calories/hr./ cy. While very strenuous cise is normally not ght and the time (in weeks) a ssumed to contain 3,500 pure fat) because of its mecessary.
OPERATING LIMITS AND WARNINGS In the original reference has the exponents reversed in t	ce article, note that the the text, but has the cor	surface area equation
No. 305 of the BASIC language p	program. Also note that	in the program DATA listing,

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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<u></u>				
Sketch(es)				
	•			
			1 <u>1</u> <u>1</u> <u>1</u>	
Sample Problem(s) Calculate Diet	Planning data in	Fnglich	units for a man 7	0 inchoo
beight 170 lbs meight 25 me	- I and a land			U Inches
neight, 170 ibs. weight, 55 yea	irs old, who sleeps	o nrs.,	sits 4 hrs., stan	ds 8 hrs.,
walks 3 hrs., exercises 1 hr.,	and wants to lose	10 lbs.	in 8 weeks.	
Solution:				
Operation				
Enter Program Part 1				
Initialize	E	0.00		
Set for Male	[f] [A]	0.00		
Set for English units		0.00		
		0.00		
Ht. -70 in., wt. -170 ib.,	70, [ENTER], 170,			
Age - 35 yr.	[ENTER], 35, [A]	1708.	Basal Metab olis	m, Cal./day
Set for Total Reg. Cal./day	[0]	0.	Activity # for Hr	s, to Enter
Fator 8 brs Sloop	Q [D/C]			
	0, [K/3]	1.		
Enter 4 hrs. Sitting	4, [R/S]	2.		
Enter 8 hrs. Standing	8, [R/S]	3.	ti ti ti ti	
Enter 3 hrs. Walking		4.		H
Enter 1 hr Everates	1 [p/c]	2101	Cal /day to Mai	meader Wadah
Enter 1 nr. Exercise	1, [R/5]	3484.	cal./day to Mai	ntain weign
Diet 8 wk. for 10 lb. loss	8, [ENTER], 10,			
	[CHS], [D]	2859.	Cal.dav to Lose	Weight at
			Rate of 10 1b	in 8 tak
			Race of 10 10	. III O WK.

Reference (s)	Martin Cl. Be	attie, M.D.	"BASIC D	let Plannin	g" Interfac	e Age
	Vol. 1, No. 1	ll October	:, 1976	pp. 26-42		
This pr	rogram is a tra	anslation of	the HP-65	Users' Lib	rary Program	#05351A
submitted by Delmer D. Hinrichs.						

Male	Female	Metric	English		5
DIET PLANN	ING	_ Cal/Dav	- Diet	- Init	- 2

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Load side 1 and side 2			
2	Initialize		Е	0.00
3	Set for Male or Female: Male:		f A	
	or Female		f B	
4	Set for Metric or English unit: Metric:		fC	
	or English:		f D	
5	Enter Personal Data and Calc, Basal Metabolism			
	a) Height (centimeters or inches):	Height	ENT	Height
	b) Weight (kilograms or pounds):	Weight	ENT	Weight
	c) Age (5 to 80 years):	Age	Α	BM, Cal/day
6	Set for Required Cal,/Day for Current Weight		С	0.
7	Enter Hours for Activity No. Displayed:			
	0) Sleeping or Resting, hours/day:	Sleep	R/S	1.
	1) Sitting, hours/day:	Sitting	R/S	2.
	2) Standing or Light Activity, hours/day:	Standing	R/S	3.
	3) Walking or Moderate Activity, hrs./day:	Walking	R/S	4.
	4) Exercising or Heavy Work, hours/day:	Exercise	R/S	Req.Cal/day
	(If total hours do not equal 24, program			
	will return to Step 6 and display "0.".			
	If this occurs, reenter activity hours			
	correctly.)			
8	Enter Diet Data, to Calculate Required			
	Cal./day for desired rate of weight loss			
	(or gain):			
	a) Length of Diet Plan, weeks:	Length	ENT	Length
	b) Desired Weight Change (kilo. or pound)	& Meight	D	Reg.Cal/day
	(Δ Weight must be negative for loss,			
	positive for gain.)			
9	For a New Problem, go to Step 3.			
	<u>Notes</u> :			
	1. As required calories/day will change with	veight		
	change, results should be recalculated eac	n week		
	for new weight.			
	2. Steps (5), (6&7), and (8) may be recalcula	ted		
	as desired to see the effect of changing p	arameters.		
97 Program Listing I

STEP	KEY ENTRY	ENTRY KEY CODE COMMENTS		STEP	KE	Y ENTRY	KEY	CODE		COM	AENTS	69		
001	1 ¥LBLE	21 15	Ini	tialize	:		957	GSBB	23	12				
002	2.	-62	<. <u>–</u>				958	2		02	Tota	al Act	ivity H	rs.
003	37	07					959	4	_	04	Tot	al Hr	s. = 24	?
004	4 2	0 2					960	RCL9	36	09				
005	55	Ø5					961	X≠Y?	16	-32				
006	6 STO1	35 01	Hei	ght Exp	onent		962	GTOC	22	13	NO,	Ret.	and Try	Aga
007	7.	-62					963	R4		-31	Yes,	Reca	11 Cal/	Day
008	6 4	84					964	R+		-31				
009	92	62					060	5109	30	09				
016	95	05	Unt	aht Eva	t		000	PRIX		-14	Dia	1 D	0.1	/n_
011	1 ST02	35 02	wer	gnt Exp	onent		967 970		21	24				/Day
012	2 (67					000 020	F20	16 27	14	Valo	. Keq	Cal/Da	У
01.	3 I 1	Ø1 00					903 970	CSRA	10 23	02 04	Net I	Com	ort to	12
614	4 8 F 1	U 8					070 971	6304 X+V	23	-41	les,	Conv	ert to	10.
013	5 4 c rrv	04					872			-24	NO,	Conti	nue Vecl-	
010	5 EEX 7 /	-23					977	5		A5		unas/	week	
01/	(D 0 CHC	8 6					974	FFY		-23				
010	6 CHS	75.07	Gui	faaa Ar	an Const		975	2		A 2	}			
011 001	9 5103	ა ე წ ა იე	Sui	riace A	rea const	1	876	x		-35	∧ Ca	lorie	s/Dav	
020	0 Z	02 -63					977	RCL 9	36	89	Cal	'Dav f	or Cur.	Wt.
021	1 ·	-02					978	+		-55	Dist	olav D	iet Cal	/Day
022 023	2 J 7 A	00 84					979	PRTX		-14				
02. 02.	4 STU4	75 A4	Cen	timeter	s/Inch		980	RTN		24				
02- 02'	5 2	00 04 02			-,		981	#LBL4	21	84				
R26	5.	-62					982	RCL5	36	0 5				
R27	72	R2					983	x		-35				
828	8 ST05	35 05	Pou	n đ s/Kil	ogram		984	RTN		24				
829	9	-62		• • • •	0		985	#LBLB	21	12	Subr	outin	e to In	cre.
036	8 0	00				i 1	986	R∕S		51	hou	irs &	Calorie	s
031	1 5	05				l	987	ST+9	35-55	8 9	Disp	lay A	ctivity	No
032	26	0 6					988	X≠Y		-41	Incr	ement	Hours	
033	32	02				1	989	8		8 8				
034	4 3	83				l	<i>990</i>	0		00				
035	50	8 0				(3 91	x		-35	Acti	vity	No. X 8	0
036	67	87				l	992	RCL8	36	0 8	Weig	ght Fa	ctor	
037	7 7	67					993	X		-35				
838	8 0	00					194	×		-35	T		0-1	
039	94	84			mm /?		193	+		-22		rement	Calori	es
646	0 CHS	-22	Con	aensea	BMR/m ⁻ .		196 207			24	Calc	Rae	al Mota	h •
0 4:	1 STO6	35 06		Die for	Malorem		197 200	FLULH	21	11	Stor	- Ace	ar meta	·
042	2 ¥LBLC	21 13		1 /Der	Keq., for		770 200	3103 Di	33	-71				
04.	3 RCL7	36 87	Cu	rront W	olaht	e .	122	E20	16 27	-31 A2	Metr	tc?		
844	4 U	00	Sto	n & Dia	olav "A "	1	191	CT01	20 20	A1	Yes	Cont	inue	
84	5 K/S	51 75 90	How	re of C	leen	1	A 2	RCIS	76	A5	No.	Conve	rt to	
040	5 5109	30 09	nou		теер	-	183	-	50	-24	Kilc	grams		
04	ζ Λ∔Ϊ ο 101	-41				1	194	±IRI1	21	A1		0		
040	ö ⊼+ ○ v	-31				-	105	STOR	35	08	I			
04: 05/	2 ^ 0 1	-33 Di 1	Inc	rement	Hrs. &	1	06	RCL2	36	82]	,	(05)	
000 051		23 12	Ca	1. for	each	t	07	۲×		31	Weig	ght (•	425)	
95. 95:	2 2	A2	Ac	tivity		t	08	X≓Y		-41	I			
051 051	3 CSBR	23 12		-		1	109	F2?	16 23	0 2	Metr	1c?	.	
A24	4 3	03				1	10	GT02	22	02	res,	Cont	inue	
A 55	5 GSBR	23 12				i	111	RCL4	36	84	NO,	Lonve		
05	6 4	<u>.</u>			DECI	1	12	X		-35	Lei	ic imer	ers	
0	1	_ 2	_ 3			5, , ,	~	6 BMR/1	n² 7	BMR	8		9	
	Ht.	Exp. Wt.	Exp. SA	Factor	CM/Inch	LD./H	.	Table	Ca	1.7Hr.	Wt	. rac.	Used	
S0	S1	S2	S3		S4	S5		S6	S7		58		29	
L						D		I	TE L			I	L	
Î Î		ľ		Ĭ		-			[

60

Program Listing II

STEP K	EY ENTRY	KEY C			COMMENTS		STEP	ĸ	EY ENTRY	к	EY CODE	COM	MENTS	
113	#LBL2	21	02					169	R↓		-31	Display]	Basal	Metab
114	RCL1	36	01	I				170	*LBL6		21 06	Subrount	ine	
115	Υ×		31	Heigh	at (.425)			171	2		82			
116	RCL3	36	03	0				172	х		-35			
117	x	-	35					173	EEX		-23			
118	х	-	35					174	1		01			
119	ST07	35	A7	Surfa	ce Area. So	ј. m		175	RŤ		16-31			
120	1		A1	BMD /m	2 Tables	T.R		176	Х		-35			
121	RCLE	36	06 06		, iadies, i	IGI .		177	INT		16 34			
122	F1?	16 23	R1	Male?				178	RTN		24			
127	6103	22	83	inite.				179	*LBLa	21	16 11	Male		
124	FFY		27	No F	nter 105			180	SF1	16	21 01			
125	5		20 05	NO, 1	inter 10°			181	RTN		24			
125	+1 PI 7	21	0J 07	M 1 + -	nl	-		182	#I BL b	21	16 12	Female		
120	↓ LDLJ V	- 21	05 75	105	рту бу т от			183	CF1	16	22 81	remare		
121		10	33	105				184	PTN		24			
128	FRL	10	44 01					185	#I Ric	21	16 13	Motric		
123	4		04 00	49, F	first Tabula	ar		126	SE2	16	21 02	Metric		
130	9	1	07	BMR/	m.			100		10	21 02			
131	ENIT	-	21					101		21	15 16	D		
132	5		85	5, Fi	rst Tabula	r		100	#LDL0 CE2	10	10 14 22 02	English		
133	ENIT		21	Age				107		10	22 02			
134	≭LBL0	21	00	Loop	to Find Por	rtio		190	KIN		24			
135	CLX	-	51	of T	able to Use	е		191	K/5		51			
136	GSB5	23	05											
137	RŤ	16-	31											
138	LSTX	16-	63					_						
139	FRC	16	44											
140	R∔	-	31					_						
141	+	-	55					_		_				
142	X≠Y	-	41					_						
143	RCL9	36	0 9									1		
144	X>Y?	16-	34	Corec	t Part of 1	ГаЪ.	200	_						
145	GT00	22	00	No, F	Ret. & Try A	Agn.								
146	X≠Y	-	41											
147	-	-	45									Į		
148	LSTX	16-	63											
149	÷	-	24	Inter	polate							1		
150	GSB6	23	06					_		_				
151	x	-	35					_						
152	LSTX	16-	63					_						
153	+	-	55							_				
154	+	-	55				210							
155	RCL7	36	87	Surfa	ace Area						·			
156	x	-	35					_		_		1		
157	ST07	35	8 7	BMR,	Calories/He	our		_				1		
158	7		07									1		
159	0		0 0									ł		
160	ST÷8	35-24	88	Weigl	nt Fac. (Kg	./70	P					1		
161	CLX	-	51					_						
162	2		02											
163	4		04							_				
164	х	-	35	BM, (Calories/Da	у	220							
165	DSPØ	-63	00											
166	PRTX	-	14											
167	RTN		24					_						
168	#LBL5	21	05	L				<u> </u>	FI 4 00	<u> </u>				
	IR I		C c			IF -		-	FLAGS			SET STATU	2	
``Basal			~ Cal	L/Day	Diet		nit,	Ľ			FLAGS	TRIG	D	ISP
^a Male	^b Fe	male	^c Met	tric	^d English	е		1	Sex	T				(¬
0			2		3	4		2						
Used	Us	ed	Use	ed		<u>ľ</u> u	sed		Units		2 0 0	RAD []	EN	G 🗆
⁵ Used	6 Us	ed	7		8	9		3			3 🗆 🗆		n_	

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