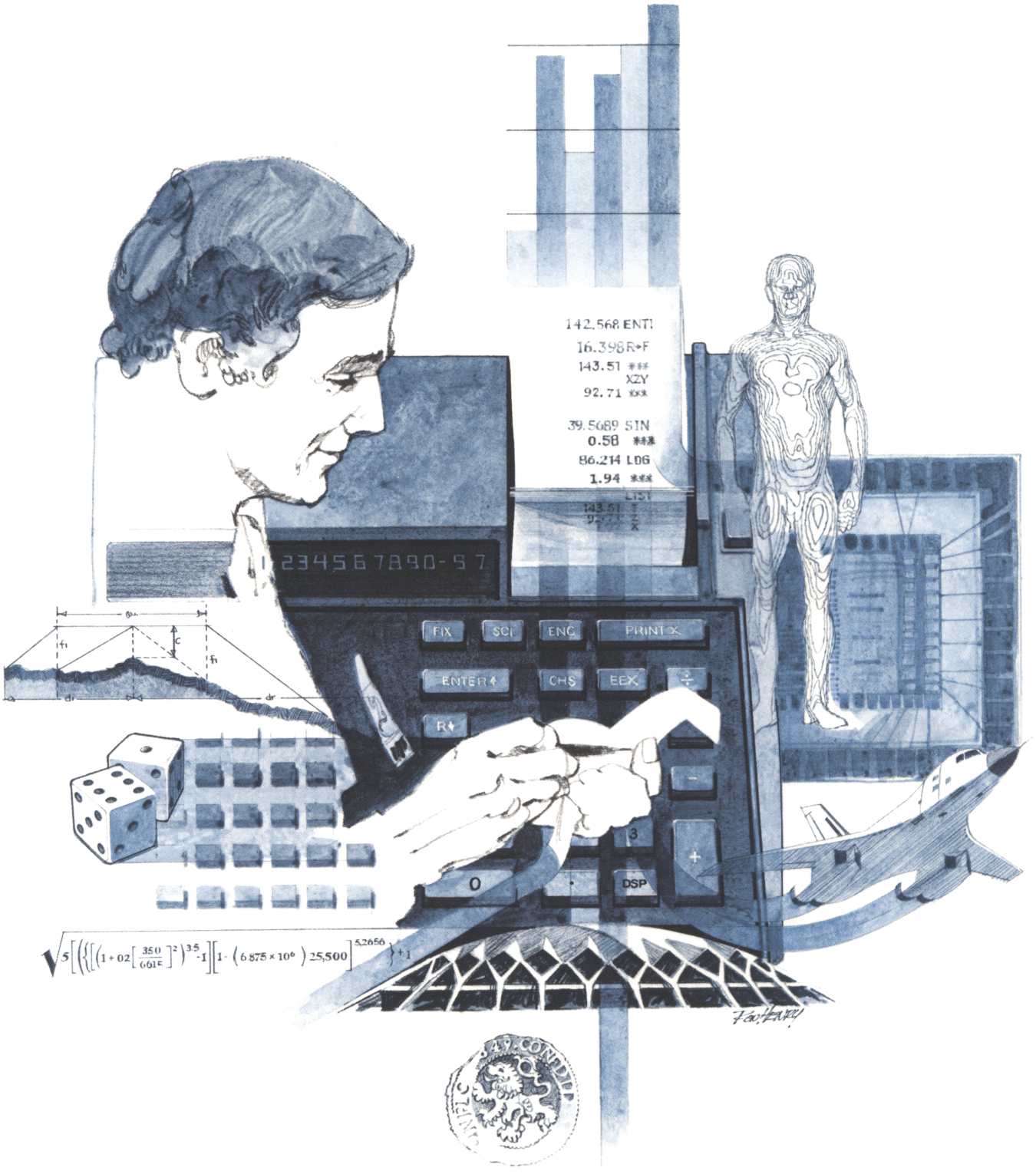
HEWLETT-PACKARD

HP-67/HP-97

Users' Library Solutions

Small Business



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 Programming Guide,** "Loading a Program" (page 134, HP-67; page 119, HP-97), key in the program from the Program Listing I and Program Listing II pages. A number at the top of the Program Listing indicates on which calculator the program was written (HP-67 or HP-97). If the calculator indicated differs from the calculator you will be using, consult Appendix E of your **Owner's Handbook** for the corresponding keycodes and keystrokes converting HP-67 to HP-97 keycodes and vice versa. No program conversion is necessary. The HP-67 and HP-97 are totally compatible, but some differences do occur in the keycodes used to represent some of the functions.

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

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

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

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

TABLE OF CONTENTS

HOURLY PAYROLL 1
Both accurate and fast, this program calculates various line entries for an hourly payroll. Includes consideration for overtime, federal tax, FICA etc.

INVOICING 11
Given # of units, list price and discount rate this program calculates net line total. When used with numerous items, a running subtotal and grand total are maintained.

ACCOUNT POSTING 15
Posts receipts to a maximum of 24 accounts.

PERCENTAGES AND PROPORTIONS WITH TABULATOR 19
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RETAIL INVENTORY MONITOR 24
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ESTIMATING INVENTORY 28
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Makes ordering point calculations using geometric weighted moving average.

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YEARLY AMORTIZATION SCHEDULE 54
Produces an annual amoritzation schedule with accumulated interest and remaining balance for end of the year bookkeeping and calculation of tax returns.

FEDERAL CORPORATE INCOME TAX 59
Calculates Federal Corporate Income Tax from years 1974 to present.

WORKING CAPITAL NEEDS - BARDAHL FORMULA 64
Determines the working capital needs of a company in conformance with the Internal Revenue Service guidelines for avoidance of tax for unreasonable accumulation of earnings.

Program Description I

Program Title 97 - Hourly Payroll
SRA Box 1346

Contributor's Name William A. McKeever
Address SRA Box 1346
City Anchorage **State** Alaska **Zip Code** 99502

Program Description, Equations, Variables Program computes: total gross, fed w/h, state w/h, FICA, ESC., union dues, total deductions, net pay, FUT, employer ESC. tax, employer union benefit contributions, total year to date gross.

G_K <=>

$G_K = S\,(R.T. + 1.5\,O.T. + 2\,D.T.)$ — G_K <=> gross pay this period

$F = X_n + (a - L_n)\,Y_n$ where $L_n < G_K < L_{n+1}$ — F <=> federal withholding

$A = (R_A)(F)$ — A <=> state withholding

$f = 0$ if $(h_f - \Sigma_1^{K-1} G) < 0$
$= (R_f)(G_K)$ if $(h_f - \Sigma_1^{K-1} G) < G_K$
$= (R_f)(h_f - \Sigma_1^{K-1} G)$ if $0 < (h_f - \Sigma^{K-1} G) < G_K$ — f <=> FICA tax

e is computed same as f — e <=> employee paid E.S.C.
E.S.C is a state tax in Alaska

$d = R_d\,(R.T. + O.T. + D.T.)$ — d <=> union dues

$N = G - (F + A + f + e + d)$ — N <=> net pay

U is computed same as f — U <=> F.U.T.

$E = (R_E / R_e)\,e$ — E <=> employer paid E.S.C.

$B = (R_B\,(R.T. + O.T. + D.T.)$ — B <=> union benefits (fringes)

R <=> tax rate (subscript identifies)

S <=> hourly wage; R.T. <=> reg. hours; O.T. <=> overtime hours; D.T. <=> double time hrs.

a^* <=> adjusted gross = G - (number of withholding allowances X allowance value)

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.

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

Program Description I

Program Title 97 - Hourly Payroll

Contributor's Name William A. McKeever
Address SRA Box 1346
City Anchorage **State** Alaska **Zip Code** 99502

Program Description, Equations, Variables

n <=> number of bracket on percentage method table *
x <=> dollar figure " " " " " " " *
y <=> percentage figure bracket on percentage method table *
L <=> lower limit of bracket *
h <=> maximum gross for FICA, E.S.C., and F.U.T

* See page 17 and page 18 I.R.S. Circular E 1976

Operating Limits and Warnings All of the above variables are stored on the employee data card. A data card written for a weekly payroll period cannot be used for a different payroll period.
Data cards remain unclipped so be careful not to scramble.
Values for X must be stored as 5 digit numbers.
e.g. $23.56 is converted to 02356 for storage in percentage method table registers.

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

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Program Description 11

TABLE 1. WEEKLY Payroll Period

(a) SINGLE person—including head of household:

If the amount of wages is:		The amount of income tax to be withheld shall be:	
Not over $25		0	
Over—	But not over—		of excess over—
$25	—$67	16%	—$25
$67	—$115	$6.72 plus 20%	—$67
$115	—$183	$16.32 plus 23%	—$115
$183	—$240	$31.96 plus 21%	—$183
$240	—$279	$43.93 plus 26%	—$240
$279	—$346	$54.07 plus 30%	—$279
$346		$74.17 plus 36%	—$346

(b) MARRIED person—

If the amount of wages is:		The amount of income tax to be withheld shall be:	
Not over $48		0	
Over—	But not over—		of excess over—
$48	—$96	17%	—$48
$96	—$173	$8.16 plus 20%	—$96
$173	—$264	$23.56 plus 17%	—$173
$264	—$346	$39.03 plus 25%	—$264
$346	—$433	$59.53 plus 28%	—$346
$433	—$500	$83.89 plus 32%	—$433
$500		$105.33 plus 36%	—$500

Sample Problem(s)

Make Employee Data Card
married, 2 deductions
hourly dues of .20
hourly benefits of 3.37
year to date gross of 2,929.08
Social Security Number of 534 58 3061
hourly scale of 13.80

```
 0.0000000  0
2929.080000 1
 0.0000000  2
 0.0000000  3
16500.65550 4
10000.00700 5
 21.0000100 6
 0.0000000  7
 0.0000000  8
4200.007000 9
 6.8571400  A
 13.8000000 B
 0.2000000  C
534583061.0 D
 3.3700000  E
 0.0000000  I
```

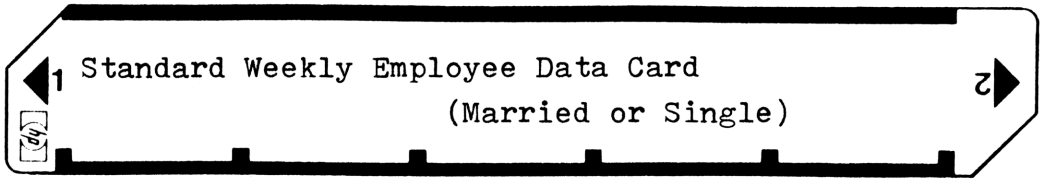
Solution(s) Load Standard Married Data Card
534583061 STO D, .2 STO C, 3.37 STO E,
13.80 STO B, f P?S, 14.4 ENTER 2 X STO 9,
f P?S, 2929.08 STO 1, f WRITE DATA

```
 0.0000000  0
 0.0000000  1
 48.1700000 2
 96.2000616 3
173.1702356 4
264.2503903 5
346.2605353 6
433.3208389 7
500.3610533 8
 28.8000000 9
 6.8571400  A
 13.8000000 B
 0.2000000  C
5345830 61.0 D
 3.3700000  E
 0.0000000  I
```

Reference(s)

IRS Circular E

User Instructions



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Load appropriate standard data card (single or married) side 1 and 2			
2	Enter year to date gross		STO 1	
3	Enter hourly wage scale		STO B	
4	Enter hourly dues rate		STO C	
5	Enter hourly union benefits rate		STO E	
6	Enter Social Security number		STO D	
7	Reverse registers		f P↹S	
8	Enter number of withholding allowances		ENTER	
9	Enter 14.4		X	
			STO 9	
10	Reverse Registers		f P↹S	
			f w/data	CRD
11	Pass Blank Card through			CRD
12	Pass side 2 through			

Program Description 11

Percentage method income tax withholding table.

Q

Payroll period	One withholding allowance
Weekly	$14.40
Biweekly	28.80
Semimonthly	31.30
Monthly	62.50
Quarterly	187.50
Semiannual	375.00
Annual	750.00
Daily or miscellaneous (per day of such period)	2.10

Tables for Percentage Method of Withholding

From IRS Circular E 1976

WEEKLY Payroll Period

(b) MARRIED person—

If the amount of wages is:		The amount of income tax to be withheld shall be:	
Not over $48		0	
Over—	But not over—		of excess over—
$48	—$96	17%	—$48
$96	—$173	$8.16 plus 20%	—$96
$173	—$264	$23.56 plus 17%	—$173
$264	—$346	$39.03 plus 25%	—$264
$346	—$433	$59.53 plus 28%	—$346
$433	—$500	$83.89 plus 32%	—$433
$500		$105.33 plus 36%	—$500

Sample Problem(s)

Payroll period ending 3-09-77

40 regular time hours

11.5 overtime hours

0 double time hours

Employee has $2,929.08 current year to date gross

Solution(s)

A

3.09 [B]

40 [ENTER]

11.5 [ENTER]

0 [E]

```
0.000000000
        3.09  ***
 534583061.   ***
     2929.08  ***

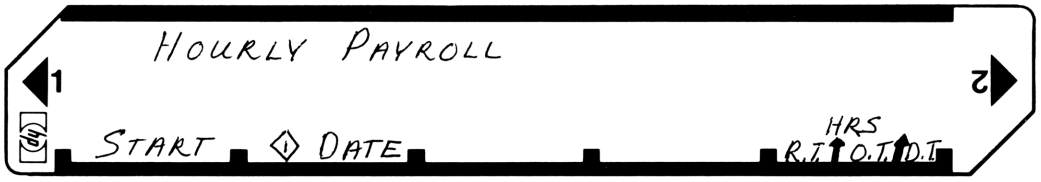
    40.00021  ***
    11.50022  ***
     0.00023  ***

   790.06001  ***
   199.38002  ***
    41.87003  ***
    46.22004  ***
     5.53005  ***
    10.30006  ***
   303.30007  ***
   486.76008  ***
     5.53009  ***
    37.92010  ***
   173.56011  ***
  3719.14012  ***
```

Reference(s)

IRS Circular E

User Instructions



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Load side 1 & side 2 of program card			
2	Load employee card side 1 & side 2			
3.	Initialize calculator		A	0.000000000
4	Imput Date	month. day	B	month. day
	verify S.S. #			social security number
	verify YTD gross before proceeding			year to date gross pay
5	Imput regular time hours	R.T. hrs	ENTER ↑	
6	Imput overtime hours	O.T. hrs	ENTER ↑	
7	Imput double time hours	D.T. hrs	E	
	R.T. hours Code # 21			xx. x0021
	O.T. hours " " 22			xx. x0022
	D.T. hours " " 23			xx. x0023
	Total gross pay " 1			xxxx. xx0001
	Federal withholding " 2			xxxx. xx0002
	State withholding " 3			xxxx. xx0003
	FICA deduction " 4			xxxx. xx0004
	E.S.C. deduction " 5			xxxx. xx0005
	Union dues " 6			xxxx. xx0006
	Total deductions " 7			xxxx. xx0007
	Net pay " 8			xxxx. xx0008
	F.U.T. " 9			xxxx. xx0009
	Employer E.S.C. " 10			xxxx. xx0010
	Employer paid union fringes " 11			xxxx. xx0011
	New year to date gross " 12			xxxx. xx0012
8	Pass side 1 of employee data card thru			CRD
9	Pass side 2 of employee data card thru			CRD
10	Go to step 2 with next employee card			
	NOTE: If a mistake is made, begin again with step 2			

Program Listing I

KEY ENTRY	KEY CODE	COMMENTS
0.000000000	0	
0.000000000	1	
0.000000000	2	
0.000000000	3	
16500.05850	4	
10000.00700	5	
21.00001000	6	
0.000000000	7	
0.000000000	8	
4200.007000	9	
6.857140000	A	
0.000000000	B	
0.000000000	C	
100.0000000	D	
0.000000000	E	
0.000000000	I	
	P#S	Married 2 deductions
	PREG	
0.000000000	0	
0.000000000	1	
48.17000000	2	
96.20008160	3	
173.1702356	4	
264.2503903	5	
346.2805953	6	
433.3208389	7	
500.3610533	8	
0.000000000	9	
6.857140000	A	
0.000000000	B	
0.000000000	C	
100.0000000	D	
0.000000000	E	
0.000000000	I	

STEP	KEY ENTRY	KEY CODE	COMMENTS
060			
070			
080			
090			
100			
110			

REGISTERS

0	1 Year To Date Gross	2	3	4 $h_f \cdot R_b$ 16500.0585	5 $h_e \cdot R_e$ 10000.007	6 R_A 21.00001	7	8	9 $h_4 \cdot R_u$ 4200.007
S0	S1 0	S2 48.17000000	S3 96.20008160	S4 173.1702356	S5 264.2503903	S6 346.2805953	S7 433.3208389	S8 500.3610533	S9(# Allow) X 14.4
A R_t/R_e 6.85714	B S Hourly Scale	C R_d Hourly Dues	D Social Security Number	F R_B Hourly Benefits	I 0				

Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001			
	0.000000000	0	
	0.000000000	1	
	0.000000000	2	
	0.000000000	3	
	16500.05850	4	
	10000.00700	5	
	21.00001000	6	
	0.000000000	7	
	0.000000000	8	
	4200.007000	9	
	6.857140000	A	
	0.000000000	B	SINGLE
	0.000000000	C	
	100.0000000	D	
	0.000000000	E	
	0.000000000	I	
		P≠S	
	0.000000000	0	
	0.000000000	1	
	25.16000000	2	
	67.20006720	3	
	115.2301632	4	
	183.2103196	5	
	240.2604393	6	
	279.3005407	7	
	346.3607417	8	
	0.000000000	9	
	6.857140000	A	
050			

STEP	KEY ENTRY	KEY CODE	COMMENTS
060			
070			
080			
090			
100			
110			

REGISTERS

0	1 Year To Date Gross	2	3	4 h_f . R_b 16500.0585	5 h_e . R_e 10000.007	6 R_A 21.00001	7	8	9 h_u . R_u 4200.007
S0	S1 0	S2 25.1600000	S3 67.2000672	S4 115.2301632	S5 183.2103196	S6 240.2604393	S7 279.3005407	S8 346.3607417	S9 (# Allow) x 14.4

A R_E/R_e 6.85714	B 5 Hourly Scale	C R_d Hourly Dues	D Social Security Number	E R_B Hourly Benefits	I 0

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	Start
002	2	02	
003	1	01	
004	STOI	35 46	
005	DSP9	-63 09	
006	0	00	
007	PRTX	-14	
008	RTN	24	
009	*LBLB	21 12	
010	DSP2	-63 02	
011	PRTX	-14	Print Date
012	RCLD	36 14	
013	DSP0	-63 00	
014	PRTX	-14	Print SS. #
015	RCL1	36 01	
016	DSP2	-63 02	
017	PRTX	-14	Print Y.T.D. Gross
018	SPC	16-11	
019	SPC	16-11	
020	RTN	24	
021	*LBLE	21 15	
022	STO3	35 03	
023	R↓	-31	
024	STO2	35 02	
025	R↓	-31	
026	STO0	35 00	
027	GSB0	23 00	Print R.T. hours
028	RCLB	36 12	
029	×	-35	
030	STO7	35 07	Compute gross
031	RCL2	36 02	
032	ST+0	35-55 00	
033	GSB0	23 00	Print O.T. hours
034	1	01	
035	.	-62	
036	5	05	
037	×	-35	
038	RCLB	36 12	
039	×	-35	
040	ST+7	35-55 07	Compute Gross
041	RCL3	36 03	
042	ST+0	35-55 00	
043	GSB0	23 00	Print D.T. hours
044	SPC	16-11	
045	SPC	16-11	
046	2	02	
047	×	-35	Compute Gross
048	RCLB	36 12	
049	×	-35	
050	ST+7	35-55 07	
051	9	09	
052	STOI	35 46	
053	RCL7	36 07	
054	P≠S	16-51	Compute Adjusted Gross: STO in S-0
055	STO0	35 00	if negative,
056	RCL9	36 09	STO 0 in S-0
057	ST-0	35-45 00	
058	RCL0	36 00	
059	0	00	
060	X>Y?	16-34	
061	STO0	35 00	
062	*LBL1	21 01	
063	DSZI	16 25 46	Test for Correct Fed W/H Bracket
064	RCL0	36 00	
065	RCLi	36 45	
066	INT	16 34	
067	X≤Y?	16-35	
068	GTO2	22 02	
069	GTO1	22 01	
070	*LBL2	21 02	
071	-	-45	
072	RCLi	36 45	
073	FRC	16 44	
074	EEX	-23	
075	2	02	
076	×	-35	
077	ENT↑	-21	Compute Fed W/H Sto in R3
078	ENT↑	-21	
079	INT	16 34	
080	R↑	16-31	
081	X≠Y	-41	
082	%	55	
083	R↑	16-31	
084	FRC	16 44	
085	EEX	-23	
086	3	03	
087	×	-35	
088	+	-55	
089	P≠S	16-51	
090	STO3	35 03	
091	1	01	
092	STOI	35 46	
093	RCL7	36 07	
094	GSB0	23 00	— Print Gross Pay
095	RCL3	36 03	
096	GSB0	23 00	— Print Fed W/H
097	STO3	35 03	
098	RCL6	36 06	Compute & Print State W/H
099	%	55	
100	GSB0	23 00	
101	ST+3	35-55 03	Compute & Print FICA
102	GSBD	23 14	
103	GSB0	23 00	
104	ST+3	35-55 03	Compute & Print Employer E.S.C.
105	GSBD	23 14	
106	STO2	35 02	
107	GSB0	23 00	
108	ST+3	35-55 03	
109	RCLC	36 13	Compute & Print Union Dues
110	RCL0	36 00	
111	×	-35	
112	GSB0	23 00	

REGISTERS

0 used	1 $\sum_1^{\kappa}{}_G$	2 used	3 used	4 $h_f \cdot R_b$ 16500. 0585	5 $h_e \cdot R_e$ 10,000. 007	6 R_A	7 used	8	9 $h_u \cdot R_u$ 4200. 007
S0 a	S1 $L_1 \cdot Y_1 \cdot X_1$ — 0 —	S2 $L_2 \cdot Y_2\ X_2$ 48. 17000000	S3 $L_3 \cdot Y_3\ X_3$ 96. 20000 816	S4 $L_4 \cdot Y_4\ X_4$ 173. 1702 356	S5 $L_5 \cdot Y_5\ X_5$ 264. 2053903	S6 $L_6 \cdot Y_6\ X_6$ 346. 2805953	S7 $L_7 \cdot Y_7\ X_7$ 433. 3208389	S8 $L_8 \cdot Y_8\ X_8$ 500. 3610533	S9 (# Allow.) x (Allow. Value)
A (R_E / R_e) (6.85714)	B S	C R_d	D Social Security Number	E R_B	I				

97 Program Listing II

STEP	KEY ENTRY	KEY CODE	COMMENTS
113	ST+3	35-55 03	
114	RCL3	36 03	
115	GSB0	23 00	
116	RCL7	36 07	
117	RCL3	36 03	
118	-	-45	
119	GSB0	23 00	
120	GSBD	23 14	
121	GSB0	23 00	
122	RCLA	36 11	
123	RCL2	36 02	
124	x	-35	
125	GSB0	23 00	
126	RCLE	36 15	
127	RCL0	36 00	
128	x	-35	
129	GSB0	23 00	
130	RCL7	36 07	
131	ST+1	35-55 01	
132	RCL1	36 01	
133	GSB0	23 00	
134	WDTA	16-61	
135	RTN	24	
136	*LBLD	21 14	
137	RCLi	36 45	
138	INT	16 34	
139	RCL1	36 01	
140	-	-45	
141	RCL7	36 07	
142	X≤Y?	16-35	
143	GTOd	22 16 14	
144	X≠Y	-41	
145	*LBLd	21 16 14	
146	RCLi	36 45	
147	FRC	16 44	
148	x	-35	
149	X<0?	16-45	
150	0	00	
151	RTN	24	
152	*LBL0	21 00	
153	DSP2	-63 02	
154	RND	16 24	
155	RCLI	36 46	
156	EEX	-23	
157	5	05	
158	ISZI	16 26 46	
159	÷	-24	
160	+	-55	
161	DSP5	-63 05	
162	PRTX	-14	
163	SPC	16-11	
164	RTN	24	
165	R/S	51	

Print Total Deductions

Compute + Print Net Pay

Compute + Print F.U.T.

Compute + Print Employer E.S.C.

Compute + Print Union Benefits

Compute + Print New Year to Date Gross

Write New Year to Date Gross Pay on Data Card

E.S.C. FICA F.U.T. Computation Sub - Routine

Display Routine

STEP	KEY ENTRY	KEY CODE	COMMENTS
170			
180			
190			
200			
210			
220			

LABELS

A START	B Enter Date	C	D Compute E.S.C. FICA F.U.T.	E Enter Hours	0
a	b	c	d Ditto ↑	e	1
0 Display Routine	1 Find W/H Bracket	2 Compute Fed W/H	3	4	2
5	6	7	8	9	3

FLAGS

SET STATUS

FLAGS	ON	OFF
0	☐	☒
1	☐	☒
2	☐	☒
3	☐	☒

TRIG	
DEG	☐
GRAD	☐
RAD	☐

DISP	
FIX	☒
SCI	☐
ENG	☐
n	5

Program Description I

Program Title INVOICING

Contributor's Name HEWLETT-PACKARD COMPANY
Corvallis Division
Address 1000 N.E. Circle Boulevard
City Corvallis, OR 97330 **State** **Zip Code**

Program Description, Equations, Variables

Given a discount rate (DISC), number of units (UNITS), and price per unit (PRICE) for each line item, this program calculates the net line total (NLT), maintains a running subtotal (ST) and grand total (GT), and determines each line total's percent of the grand total (%T). A maximum of 20 line items may be input. If more than 20 are input, ERROR is displayed.

The net line total is the number of units multiplied by the unit price, less the discount amount. Each time it is calculated (E), the value is added to both the running subtotal and the grand total. Pressing f A displays the running subtotal and clears the subtotal accumulation (grand total is not affected). Pressing f B displays the grand total (without clearing it). The grand total is not cleared (set to zero) until you START (A) a new problem.

Each line total's percent of the grand total is determined by pressing f C. If the print/pause flag is on, the percentages are output automatically. Otherwise R/S must be used. The last output is 100.00, indicating that all percentages have been calculated.

If after calculating a net line total (E) it is discovered that one of the last input values was keyed incorrectly, press f D to delete the last line total. The previous subtotal is displayed. If a prior line total was incorrect, it is necessary to input the appropriate discount, number of units, and price before f D is pressed to delete the corresponding line total.

The discount rate, number of units and unit price are retained and must only be keyed in when they change.

Pressing f E sets and clears the print/pause option. Successive use of f E will alternately display 1.00 and 0.00, indicating that the print/pause mode is on or off respectively.

Invoicing

$$\text{Net line total} = \left(\text{Price} - \text{Price} \times \frac{\text{DISC}}{100}\right) \cdot (\#)$$

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

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Program Description 11

Sketch(es)

Example 1:

The controller of a small company can take advantage of several discounts if he pays the three bills shown below. What amount should be remitted for each bill, what is the grand total to be paid, and what percentage of the grand total is each payment?

Sample Problem(s)

Bill 1 (2% discount if paid today)

Line Item	# of Units	Unit Price
1	25	$ 2.75
2	60	1.50
3	71	1.50

Bill 2 (2% discount if paid today)

Line Item	# of Units	Unit Price
1	12	$10.50
2	17	37.20

Bill 3 (3% discount if paid today)

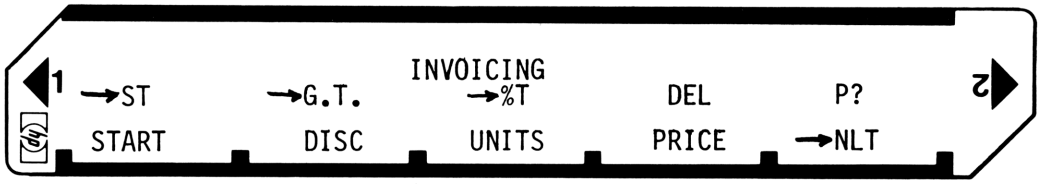
Line Item	# of Units	Unit Price
1	155	$ .28
2	38	.92
3	217	.56

Solution(s)

Keystrokes:	Outputs:	
A 2 B 25 C 2.75 D E →	67.38	
60 C 1.50 D E →	88.20	
71 C E →	104.37	
f A →	259.95	(Subtotal—Bill 1)
12 C 10.50 D E →	123.48	
17 C 37.20 D E →	619.75	
f A →	743.23	(Subtotal—Bill 2)
3 B 155 C .28 D E →	42.10	
38 C .92 D E →	33.91	
217 C .56 D E →	117.87	
f A →	193.88	(Subtotal—Bill 3)
f B →	1197.06	(Grand total)
f C →	5.63	Each net line total's percent of the grand total.
R/S →	7.37	
R/S →	8.72	
R/S →	10.32	
R/S →	51.77	
R/S →	3.52	
R/S →	2.83	
R/S →	9.85	
R/S →	100.00	

Reference(s)

User Instructions



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Load side 1			
2	Optional: Select print/pause			
	mode.		f E	1.00 or 0.00
3	Initialize (START)		A	0.00
4	Key in:			
	• Discount rate	DISC (%)	B	DISC (%)
	• Number of units	UNITS	C	UNITS
	• Price per unit	PRICE	D	PRICE
5	Calculate net line total		E	NLT
6	Optional: Display running			
	subtotal		f A	ST
7	Optional: Display running			
	grand total		f B	GT
8	Display each line total's percent			
	of the grand total		f C	% T_1
	Use R/S if print/pause mode is			
	off (0.00).		R/S	% T_2
			R/S	% T_3
			etc.	
9	If last net line total was incorrect		f D	ST
10	For additional items, same			
	grand total, go to step 4 and			
	change appropriate inputs. For			
	a new case (clear everything)			
	go to step 3.			

LABELS					FLAGS	SET STATUS		
A START	B Disc.	C Units	D Price	E Net line tot.	0 Print?	FLAGS	TRIG	DISP
a Subtotal	Grand total	c %Total	d DEL	e Print?	1	ON OFF 0 ☐ ☒ 1 ☐ ☒ 2 ☐ ☒ 3 ☐ ☒	DEG ☒ GRAD ☐ RAD ☐	FIX ☒ SCI ☐ ENG ☐ n 2
0 Used	1 Used	2 Used	3 Used	4 Used	2			
5 Used	6	7	8	9	3			

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	Clear registers & initialize R_1
002	CLRG	16-53	
003	P≠S	16-51	
004	CLRG	16-53	
005	2	02	
006	STOI	35 46	
007	0	00	
008	RTN	24	
009	*LBLB	21 12	----------
010	STOE	35 15	DISC→R_E
011	RTN	24	----------
012	*LBLC	21 13	
013	STOD	35 14	UNITS→R_D
014	RTN	24	----------
015	*LBLD	21 14	
016	STOC	35 13	PRICE→R_C
017	RTN	24	----------
018	*LBLE	21 15	
019	GSB5	23 05	Net line total→R_i
020	STOi	35 45	
021	ST+0	35-55 00	
022	ST+1	35-55 01	
023	ISZI	16 26 46	Check to see if number of inputs is ≤ 22. If not, show ERROR.
024	2	02	
025	2	02	
026	RCLI	36 46	
027	X>Y?	16-34	
028	GTO9	22 09	
029	R↓	-31	
030	R↓	-31	
031	RTN	24	
032	*LBL5	21 05	Net line total calculated.
033	RCLC	36 13	
034	ENT↑	-21	
035	ENT↑	-21	
036	RCLE	36 15	
037	EEX	-23	
038	2	02	
039	÷	-24	
040	x	-35	
041	-	-45	
042	RCLD	36 14	
043	x	-35	
044	RTN	24	----------
045	*LBLa	21 16 11	Display subtotal & clear register.
046	RCL0	36 00	
047	ENT↑	-21	
048	CLX	-51	
049	STO0	35 00	
050	X≠Y	-41	
051	GSB2	23 02	----------
052	RTN	24	Recall Grand Total
053	*LBLb	21 16 12	
054	RCL1	36 01	
055	GSB2	23 02	
056	RTN	24	

STEP	KEY ENTRY	KEY CODE	COMMENTS
057	*LBLc	21 16 13	Recall & display line total as % of Grand Total.
058	2	02	
059	STOI	35 46	
060	*LBL1	21 01	
061	RCLi	36 45	
062	X=0?	16-43	
063	GTO4	22 04	
064	RCL1	36 01	Check to recall only those registers containing line totals.
065	÷	-24	
066	EEX	-23	
067	2	02	
068	x	-35	
069	GSB2	23 02	
070	ISZI	16 26 46	
071	2	02	
072	1	01	
073	RCLI	36 46	
074	X≠Y?	16-35	
075	GTO1	22 01	
076	*LBL4	21 04	Last output is 100→ you are done!
077	1	01	
078	0	00	
079	0	00	
080	GSB2	23 02	----------
081	RTN	24	Test print/pause flag.
082	*LBL2	21 02	
083	F0?	16 23 00	
084	GTO3	22 03	----------
085	R/S	51	
086	RTN	24	Print/pause
087	*LBL3	21 03	
088	PRTX	-14	----------
089	RTN	24	
090	*LBLe	21 16 15	Print/pause flag set & unset.
091	F0?	16 23 00	
092	GTO0	22 00	
093	SF0	16 21 00	
094	1	01	
095	RTN	24	
096	*LBL0	21 00	
097	CF0	16 22 00	
098	0	00	
099	RTN	24	----------
100	*LBLd	21 16 14	Routine to delete incorrect line totals.
101	DSZI	16 25 46	
102	0	00	
103	STOi	35 45	
104	GSB5	23 05	
105	ST-0	35-45 00	
106	ST-1	35-45 01	
107	RCL0	36 00	
108	R/S	51	

REGISTERS

0 Subtotals	1 Grand Total	2 Used	3 Used	4 Used	5 Used	6 Used	7 Used	8 Used	9 Used
S0 Used	S1 Used	S2 Used	S3 Used	S4 Used	S5 Used	S6 Used	S7 Used	S8 Used	S9 Used
A Used	B Used	C Price	D Units	E Disc.	I Control				

Program Description I

Program Title ACCOUNT POSTING

Contributor's Name D. A. JEFFUS
Address P. O. BOX 60076
City FAIRBANKS **State** ALASKA **Zip Code** 99706

Program Description, Equations, Variables

Program posts to registers by line item or account number (0 thru 24). Program starts (R/S) by printing the grand total of all registers, and sets up to post to register "0". Amounts are posted (E) to any of the registers in random order by inputing the register number to be posted (A). The register selected may have as many entries as you want and it may be reselected at any time. "CHS" will cause the amount entered to reduce the amount in the last selected register.

After the last posting a printout of each register, a new grand total is given, and an updated data card is written, (B).

Operating Limits and Warnings

When the registers are listed (B), the first set of A thru I registers are not to be used as they are posted as number 20 thru 24. NOTE that the "I" register is not used for accumulating amounts but is used in the program.

"B" may be used at any time but you must then (1) Press any key to clear the "Crd" from the "X" register, (2) "GTO" .000, and (3) Key in the register number you want to post to, then (A): (These steps are needed only if you are not finished posting)

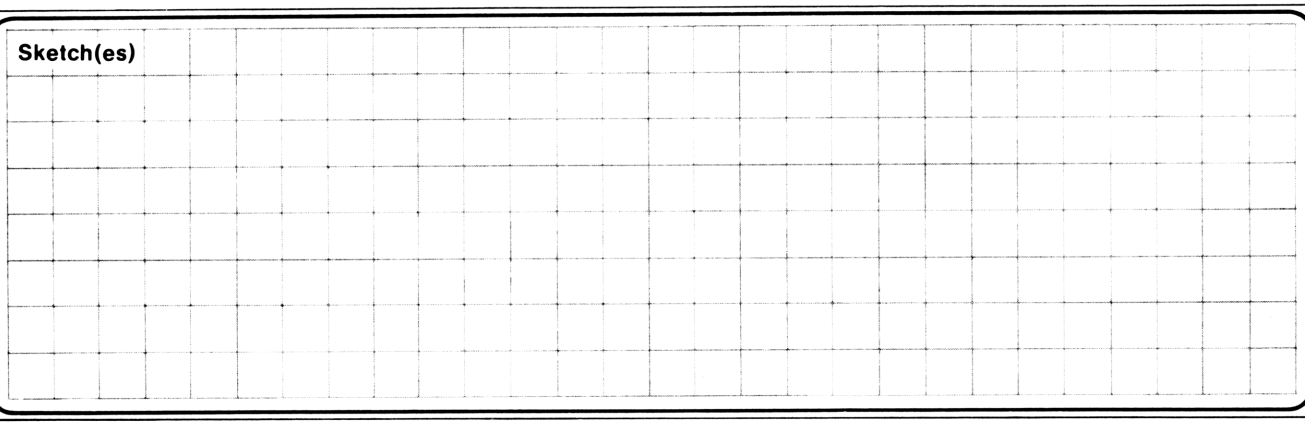
There is protection for invalid reg. num. Run with printer in manual mode.

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

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Program Description II

Sketch(es)



Sample Problem(s) If all registers are loaded with a value equal to their number (ie reg. 6 has in it the value 6.00) then the program will give the following:

```
***  ***          0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  I          0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  I      ***
300.00  ***     0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 20.00 21.00 22.00 23.00 24.00 0.00   10.00 11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 19.00 20.00 21.00 22.00 23.00 24.00 0.00   300.00
  0.00  ***
```

if "B" were keyed without posting.

If the following were then posted to register 6, you would then have:

```
300.00  *** Beginning balance (R/S)
  0.00  *** Ready to post to reg. "0"
  6.00  *** Input different reg. num.(six in this case) and (A)
 97.01  ***
 19.75  *** Three amounts posted to reg. six (E)
 12.18  ***
```

Solution(s) At the end of posting key (B) and you get the following

```
          0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  I          0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  I      ***
     0.00 1.00 2.00 3.00 4.00 5.00 134.95 7.00 8.00 9.00 20.00 21.00 22.00 23.00 24.00 0.00   10.00 11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 19.00 20.00 21.00 22.00 23.00 24.00 0.00   428.95
```

New balance Program will write the register balances on data card.

```
          25.00  *** Invalid register number
9.999999999+99  *** Given anytime register number is greater than 24.
           -1.  *** Invalid register number
  0.000000000  *** Given anytime register number is smaller than 0.
```

Reference(s)

User Instructions



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Load side 1			
2**	Read data card (side 1 and 2)			
3	Auto initialize		R/S	Grand Total Setup Reg. 0
4a*	Optional: Input reg. num. to be posted	Reg. num.	0-24	0-24
4b	" : Set to post new register number		A	0-24
5a	Input amount to be posted	Amount ±	0-9	Amount ±
5b	Post amount in "X" reg. to last step 4 reg.		E	Amount ±
6	Repeat step 5 if more data for last step 4 reg.			
7	Go to step 4 for new reg. or step 8 if finished			
8	Print all registers and grand total		B	
9	Write updated registers on data card (insert card)			X=710.77345

*This step is used only to change the register number to be posted, and is initialized at register "0".

**This step is used only after the program has been run once before and step 9 has been executed.

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	CLX	-51	
002	SF2	16 21 02	
003	GSBd	23 16 14	
004	*LBLA	21 11	Setup to post to reg. in "X"
005	STOI	35 46	
006	DSP0	-63 00	
007	PRTX	-14	
008	GSB2	23 02	
009	*LBLC	21 13	
010	R/S	51	
011	*LBLE	21 15	Post amounts to reg. last entered by LBLA
012	PRTX	-14	
013	ST+i	35-55 45	
014	GTOC	22 13	
015	*LBLB	21 12	List reg. (all)
016	SPC	16-11	
017	0	00	
018	STOI	35 46	
019	PREG	16-13	
020	P≠S	16-51	
021	PREG	16-13	
022	P≠S	16-51	
023	*LBLd	21 16 14	Add reg. for grand total
024	2	02	
025	4	04	
026	STOI	35 46	
027	RCLi	36 45	
028	ENT↑	-21	
029	*LBLD	21 14	
030	DSZI	16 25 46	
031	GTOa	22 16 11	
032	RCLi	36 45	
033	+	-55	
034	SPC	16-11	
035	SPC	16-11	
036	PRTX	-14	
037	F2?	16 23 02	
038	GTOb	22 16 12	
039	WDTA	16-61	Write data card
040	DSP5	-63 05	
041	7	07	
042	1	01	
043	0	00	
044	.	-62	
045	7	07	
046	7	07	
047	3	03	
048	4	04	
049	5	05	
050	ENT↑	-21	
051	RTN	24	
052	*LBLa	21 16 11	
053	RCLi	36 45	
054	+	-55	
055	GTOD	22 14	
056	*LBLb	21 16 12	
057	CLX	-51	
058	GTOA	22 11	
059	RTN	24	
060	*LBL2	21 02	Check register num. within 0-24
061	ENT↑	-21	
062	2	02	
063	4	04	
064	X≠Y	-41	
065	X>Y?	16-34	
066	GTO1	22 01	
067	X<0?	16-45	
068	GTO3	22 03	
069	RTN	24	
070	*LBL1	21 01	Reg. greater 24
071	9	09	
072	9	09	
073	9	09	
074	9	09	
075	9	09	
076	9	09	
077	9	09	
078	9	09	
079	EEX	-23	
080	9	09	
081	9	09	
082	DSP9	-63 09	
083	PRTX	-14	
084	R/S	51	
085	GTO2	22 02	
086	*LBL3	21 03	Reg. smaller 0
087	0	00	
088	DSP9	-63 09	
089	PRTX	-14	
090	R/S	51	
091	DSP2	-63 02	
092	GTOA	22 11	
093	R/S	51	
100			
110			

REGISTERS

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

Program Description I

Program Title: Percentages and Proportions with Tabulator

Contributor's Name: Howard B. KUTNER
Address: 370 Lexington Avenue - Rm 909
City: New York State: N.Y. Zip Code: 10017

Program Description, Equations, Variables: This program is a revision of Standard Pac Program #02A Tabulator. The principal modification enables the user to obtain automatically a list of values proportionate to the input items. All other output capabilities of the original program are maintained but input values are entered with the R/S key for operational facility and the initiation routines ("# Rows" and "Print?") have been relocated to Keys A and fa

Refer to Standard Pac Program # SD-02A for further description

Other modifications include output of % to 3 decimals; and error indicatoon displaying improper entry;

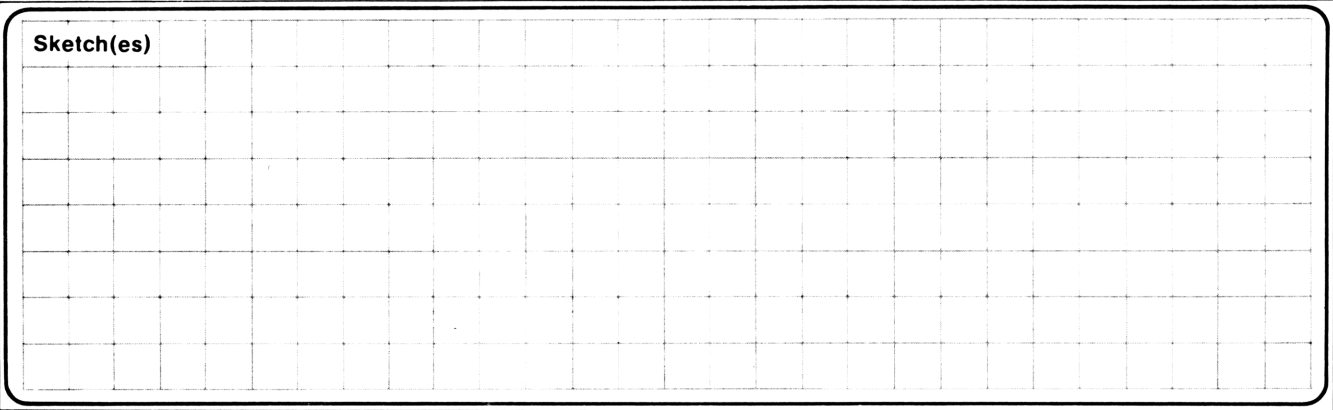
Operating Limits and Warnings: Do not neglect to enter Zero values
Make no entry when using delete key

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

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Program Description II

Sketch(es)



Sample Problem(s) Refer to Standard Pac Instruction Manual for Sample Problems in addition to the following:

Proportions

Complete the following Table

item #	value	%	Proportion
1	526.00		
2	3748.00		
3	129.63		
4	4972.48		
5	1736.37		
Totals		100.000	72000.00

Solution(s)

item #	value	%	Proportion
1		4.733	3,408.06
2		33.728	24,284.05
3		1.167	839.90
4		44.747	32,217.70
5		15.625	11,250.29
Totals		100.000	72,000.00

Reference(s) Hewlett Packard Standard Pac Program # 5D-02A

User Instructions



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	ENTER PROGRAM			
2	Initialize - Enter #of Rows (1 to 24)	#Rows	A	0.00 *
3	Optional - Select Print Input Mode		f a	1.00/0.00
4	Input Values	VAL	R/S	VAL (or CTL)
	a) Optional To correct last entry			
	Delete it	No Entry	B	
	and enter corrected Value	VAL	R/S	
5	Repeat Step 4 until all values are input			
	(Record column totals from display			
	after entry of last item in each column)			
6	Output Row Totals and Grand Total	No Entry	C	Rows
	AND/OR			
6	Output % of Grand Total for each Row Total	No Entry	D	Row %
	AND/OR			
6	Output proportion of Input for each Row Total	Input Amount	D	Proportion of Input
7	Optional Compute % of Grand Total for any Amt	Amt	E	% of GT
8	For new case Go to Step 2			
	* Error Indicator - Flashing Input			
	display will indicate input less than 1			
	or greater than 24 - Clear with R/S		R/S	Erroneous Input
	and repeat Step 2			

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	Initiate Clear Registers and Flag 2
002	CF2	16 22 02	
003	CLRG	16-53	
004	P≠S	16-51	
005	CLRG	16-53	
006	INT	16 34	
007	1	01	
008	X>Y?	16-34	Validity Test for number of Rows
009	GTO2	22 02	
010	CLX	-51	
011	2	02	
012	4	04	
013	X≠Y	-41	
014	X≤Y?	16-35	
015	GTO0	22 00	
016	GTO7	22 07	
017	*LBL0	21 00	Store # of rows + .01 (# of rows) in I
018	1	01	
019	%	55	
020	+	-55	
021	STOI	35 46	
022	0	00	Clear stack
023	ENT↑	-21	
024	ENT↑	-21	
025	ENT↑	-21	
026	*LBL8	21 08	Rest Position of Program Pointer
027	R/S	51	
028	F2?	16 23 02	If Flag 2 is set (new col.) clear stack
029	GSB1	23 01	
030	ST+i	35-55 45	Add input to row and Grand Total
031	ST+0	35-55 00	
032	X≠Y	-41	and To column total
033	R↓	-31	
034	+	-55	
035	LSTX	16-63	
036	CF3	16 22 03	Clear Flag 3 and
037	F0?	16 23 00	Print input?
038	PRTX	-14	
039	DSZI	16 25 46	If column is not full
040	GTO8	22 08	go To Rest Position
041	F0?	16 23 00	otherwise
042	SPC	16-11	
043	SF2	16 21 02	set Flag for new stack Total
044	RCLI	36 46	
045	EEX	-23	Reset Index for next column
046	4	04	
047	%	55	
048	+	-55	
049	STOI	35 46	
050	CLX	-51	
051	ENT↑	-21	Print or display column Total
052	R↑	16-31	
053	F0?	16 23 00	and
054	PRTX	-14	
055	F0?	16 23 00	
056	SPC	16-11	
057	GTO8	22 08	Go to Rest Position
058	*LBL1	21 01	Clear Stack except for last input and Return to main program
059	0	00	
060	ENT↑	-21	
061	ENT↑	-21	
062	R↑	16-31	
063	RTN	24	
064	*LBLB	21 12	If column just changed GTO 1 (below)
065	CF3	16 22 03	
066	F2?	16 23 02	
067	GTO1	22 01	
068	ISZI	16 26 46	Restore counter and Subtract display from Totals
069	-	-45	
070	LSTX	16-63	
071	ST-0	35-45 00	
072	ST-i	35-45 45	
073	F0?	16 23 00	Print Space To indicate deletion and return pointer To rest position
074	SPC	16-11	
075	GTO8	22 08	
076	*LBL1	21 01	
077	R↑	16-31	Reset Index to previous column; last value
078	RCLI	36 46	
079	FRC	16 44	
080	1	01	
081	+	-55	
082	STOI	35 46	
083	R↓	-31	Subtract display from Totals
084	-	-45	
085	LSTX	16-63	
086	ST-0	35-45 00	
087	ST-i	35-45 45	
088	F0?	16 23 00	Print Space to indicate deletion and return pointer To rest position
089	SPC	16-11	
090	GTO8	22 08	
091	*LBLa	21 16 11	Toggle Print/Pause Flag and return pointer To rest position
092	F0?	16 23 00	
093	GTO0	22 00	
094	SF0	16 21 00	
095	CLX	-51	
096	SPC	16-11	
097	1	01	
098	GTO8	22 08	
099	*LBL0	21 00	
100	CF0	16 22 00	
101	CLX	-51	
102	0	00	
103	GTO8	22 08	
104	*LBLC	21 13	clear % Flag
105	CF1	16 22 01	
106	*LBL6	21 06	Set Index to begin at First Row Total
107	SPC	16-11	
108	RCLI	36 46	
109	FRC	16 44	
110	EEX	-23	
111	4	04	
112	%	55	

REGISTERS

0 Grand Total	1 ←	2	3	4	U	S E	D →	7	8	9 →
S0 ←	S1	S2	S3	S4	U	S E	D →	S7	S8	S9 →
A ←	B	U S E D	C	D		E →		I Index		

97 Program Listing II

STEP	KEY ENTRY	KEY CODE	COMMENTS
113	X≷I	16-41	
114	DSP2	-63 02	
115	F1?	16 23 01	if % display 3 decimals
116	DSP3	-63 03	
117	*LBL4	21 04	
118	RCL i	36 45	Recall and output values - If Flag1 is set convert to % If Flag3 is set convert to proportions
119	F1?	16 23 01	
120	GSBE	23 15	
121	F3?	16 23 03	
122	GSBE	23 15	
123	PRTX	-14	
124	R↓	-31	
125	DSZI	16 25 46	If I ≠ 0 loop again
126	GTO4	22 04	
127	SPC	16-11	Output grand Total or % of grand Total or proportion of Gr. Tot.
128	RCL0	36 00	
129	F1?	16 23 01	
130	GSBE	23 15	
131	F3?	16 23 03	
132	GSBE	23 15	
133	PRTX	-14	
134	R↓	-31	Return original index to I
135	STOI	35 46	
136	R↑	16-31	
137	CF1	16 22 01	Clear Flags and Return pointer to rest position
138	CF3	16 22 03	
139	GTO8	22 08	
140	*LBLD	21 14	If data entry GTO3
141	F3?	16 23 03	
142	GTO3	22 03	
143	SF1	16 21 01	otherwise Set Flag1 for % and GTO6
144	GTO6	22 06	
145	*LBL2	21 02	error Routine
146	LSTX	16-63	
147	*LBL7	21 07	
148	PSE	16 51	
149	GTO7	22 07	
150	*LBLE	21 15	
151	R↑	16-31	
152	x	-35	
153	LSTX	16-63	
154	RCL0	36 00	
155	X≷Y	-41	
156	R↓	-31	
157	÷	-24	
158	F1?	16 23 01	if % Go To 5
159	GTO5	22 05	
~~160~~	~~F3?~~	~~16 23 03~~	(Superfluous - F3 cannot be set)
~~161~~	~~GTO5~~	~~22 05~~	
162	SF3	16 21 03	Reset Flag3 and Return to main program
163	RTN	24	
164	*LBL5	21 05	convert to % and return to main program
165	R↑	16-31	
166	÷	-24	
167	EEX	-23	
168	2	02	
169	x	-35	
170	RTN	24	
171	*LBL3	21 03	Set Flags for proportions and GTO 6
172	SF3	16 21 03	
173	CF1	16 22 01	
174	GTO6	22 06	

LABELS					FLAGS
A *Rows	B DEL	C →TOTAL	D Proportion → % Total	E Val → % Total	0 Print
a Print?	b	c	d	e	1 %
0 used	1 Col Chge	2 error	3 Flag control	4 Total	2 Col Chge
5 %	6 % Total	7 error	8 Position pointer	9	3 Entry

SET STATUS			
FLAGS	TRIG	DISP	
ON OFF			
0 ☐ ☒	DEG ☒	FIX ☒	
1 ☐ ☒	GRAD ☐	SCI ☐	
2 ☐ ☒	RAD ☐	ENG ☐	
3 ☐ ☒		n ☑	

Program Description I

Program Title Retail Inventory Monitor

Contributor's Name Hewlett-Packard

Address 1000 N.E. Circle Blvd.

City Corvallis **State** Oregon **Zip Code** 97330

Program Description, Equations, Variables Given an initial inventory of Qo units, having a wholesale value Co, and purchase data (providing the quantity Qp whose cost Cp is figures per unit Up for each transaction), and sales data (providing the quantity Qs whose cost Cs is figured per unit Us for each transaction), this program will provide:

a. Sum of Purchase Quantities ΣQp

b. Sum of Sales Quantities ΣQs

c. Perpetual Inventory Quantity $Qf = Qo + \Sigma Qp - \Sigma Qs$

d. Estimated Retail Value of Remaining Stock $\hat{RV} = Qf \dfrac{\Sigma(Qs\ Cs\ /\ Us)}{\Sigma Qs}$

e. Cost of Goods Sold

$$CGS = \left[\left(\frac{Co + \Sigma(Qp\ Cp\ /\ Up)}{(\ Qo + \Sigma Qp\ )} \right) \Sigma Qs \right]$$

f. Total Purchase Expense $PE = \Sigma(Qp\ Cp\ /\ Up)$

g. Total Gross Sales Revenue $GSR = \Sigma(Qs\ Cs/Us)$

h. Margin of Profit on Sales

$$\underset{\text{(in decimal form)}}{MP} = \left(1 - \frac{Co + \Sigma(Qp\ Cp/Up)}{\Sigma\ (Qs\ Cs/Us)} \right)$$

Operating Limits and Warnings Calculation of Estimated Retail Value of Remaining Stock prior to entry of any sales data will yield an error condition due to an undefined operation - i.e., division by zero.

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

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Program Description 11

DATA: Starting Inventory - Qo = 1000 units Co = $150,000

Purchases:	Sales:
100 units @ $100/ 1 unit	15 units @ $225/ 1 unit
25 units @ #300/2 units	100 units @ $175/ 1 unit
1 unit @ $1500/ 5 units	1000 units @ $1300/ 10 units

Sample Problem(s) Given the data provided above, compute:

a. Total Quantity of units purchased
b. Total Quantity of units sold
c. Final Inventory after transactions
d. Estimated Retail Value of Final Inventory
e. Cost of Goods Sold
f. Total Purchase Expense
g. Total Gross Sales Revenue
h. Margin of Profit on Sales

SOLUTIONS: [f] [A]

1000[ENTER↑] 150000[A]
100 [ENTER↑] [ENTER↑] 1[B]
25 [ENTER↑] 300[ENTER↑] 2[B]
1 [ENTER↑]1500[ENTER↑] 5[B]
15 [ENTER↑] 225[ENTER↑] 1[C]
100 [ENTER↑] 175[ENTER↑] 1[C]
1000[ENTER↑]1300[ENTER↑]10[C]
[D] ----------> 126 units
[R/S] ----------> 115 units
[R/S] ----------> 11 units
[R/S] ----------> $1488.45
[R/S] ----------> $162,447.38
[R/S] ----------> $14,050.00
[R/S] ----------> $150,875.00
[R/S] ----------> 0.90

Reference(s)

This program is a translation of the HP-65 Users' Library program #01281A submitted by David M. Baum.

User Instructions



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1.	Load side 1				
2.	Reset		f	A	
3.	Enter Initial Conditions: Quantity	Qo	E↑	ENT↑	
	Cost	Co	A		Qo
4.	Enter Purchase Trnasactions Data				
	Quantity	Qp	E↑		
	Cost	Cp	E↑		
	Unit of Cost	Up	B		PE
	(Repeat step #4 for each transaction)				
5.	Enter Sales Transactions Data				
	Quantity	Qs	E↑		
	Cost	Cs	E↑		
	Unit of Cost	Us	C		GSR
	(Repeat step #5 for each transaction)				
	To correct either a step #4 or #5 entry, re-				
	enter the data using the negative of the pre-				
	viously entered quantity "Q" term. Then enter				
	correct data as next step.				
6.	Computation and Output				
	Read: Quantity of units purchased		D		ΣQp
	Quantity of units sold		R/S		ΣQs
	Final Stock Quantity		R/S		Qf
	Estimated Retail Value of Qf		R/S		$\hat{RV}$
	Cost of Goods Sold		R/S		CGS
	Total Purchase Expense		R/S		ΣPE
	Total Gross Sales Revenue		R/S		ΣGSR
	Margin of Profit on Sales		R/S		MP
	FOR NEXT CASE: go to step #2				

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	
002	STO3	35 03	Store Co
003	R↓	-31	
004	STO2	35 02	Store Qo
005	RTN	24	
006	*LBLB	21 12	
007	R↓	-31	
008	X≷Y	-41	Purchase Processor
009	ST+4	35-55 04	ΣQp
010	X≷Y	-41	
011	R↑	16-31	
012	÷	-24	Calculate PE
013	x	-35	
014	ST+5	35-55 05	ΣPE
015	RTN	24	
016	*LBLC	21 13	
017	R↓	-31	
018	X≷Y	-41	Sales Processor
019	ST+6	35-55 06	ΣQs
020	X≷Y	-41	
021	R↑	16-31	
022	÷	-24	
023	x	-35	Calculate GSR
024	ST+7	35-55 07	ΣGSR
025	RTN	24	
026	*LBLD	21 14	Output Processor
027	RCL2	36 02	
028	RCL4	36 04	ΣQp
029	R/S	51	
030	+	-55	
031	RCL6	36 06	ΣQs
032	R/S	51	
033	-	-45	Display Qf
034	R/S	51	
035	RCL7	36 07	
036	x	-35	
037	RCL6	36 06	
038	÷	-24	$\hat{RV}$
039	R/S	51	
040	RCL3	36 03	
041	RCL5	36 05	
042	+	-55	
043	RCL2	36 02	
044	RCL4	36 04	
045	+	-55	
046	÷	-24	
047	RCL6	36 06	
048	x	-35	Calculate CGS
049	R/S	51	
050	RCL2	36 02	
051	RCL5	36 05	ΣPE
052	R/S	51	
053	+	-55	
054	RCL7	36 07	ΣGSR
055	R/S	51	
056	÷	-24	
057	CHS	-22	
058	1	01	
059	+	-55	Calculate MP
060	R/S	51	
061	*LBLa	21 16 11	
062	CLRG	16-53	Initialize
063	0	00	
064	RTN	24	
065	R/S	51	
070			
080			
090			
100			
110			

SET STATUS

FLAGS			TRIG	DISP
	ON	OFF		
0	☐	☒	DEG ☒	FIX ☒
1	☐	☒	GRAD ☐	SCI ☐
2	☐	☒	RAD ☐	ENG ☐
3	☐	☒		n 2

REGISTERS

0	1	2 Qo	3 Co	4 ΣQp	5 ΣPE	6 ΣQs	7 ΣGSR	8	9
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9

A	B	C	D	E	I

Program Description I

Program Title Estimating Inventory

Contributor's Name Hewlett-Packard

Address 1000 N.E. Circle Blvd.

City Corvallis **State** Oregon **Zip Code** 97330

Program Description, Equations, Variables This program estimates the cost of ending inventory using the gross profit or the retail method.

The gross profit method uses the following equations:

$$I_2 = I_1 + P - [S(1-R)]$$

where: I_2 = Ending inventory

I_1 = Beginning inventory

P = Purchases

S = Sales

R = Estimated gross profit percentage on sales

After inputting any 4 of the above 5 unknowns, the remaining one will be calculated by pressing the corresponding key.

The retail inventory method uses these equations:

$$I_{r2} = R_1 - R_2$$

$$I_{c2} = I_{r2} \times \frac{R_3}{R_1}$$

where: $R_1 = I_{r1} + P_r + M_u$

$R_2 = S + M_j + E + W_r$

$R_3 = I_{c1} + P_c + T$

and:

I_{c2} = Ending inventory at cost

I_{r2} = Ending inventory at retail

I_{r1} = Beginning inventory at retail

P_r = Purchases at retail

M_u = Markups less markup cancellations

E = Employee discounts (if not recorded on the books)

W_r = Worthless inventory at retail

I_{c1} = Beginning inventory at cost

P_c = Purchases at cost

M_j = Markdowns less markdown cancellations

S = Sales

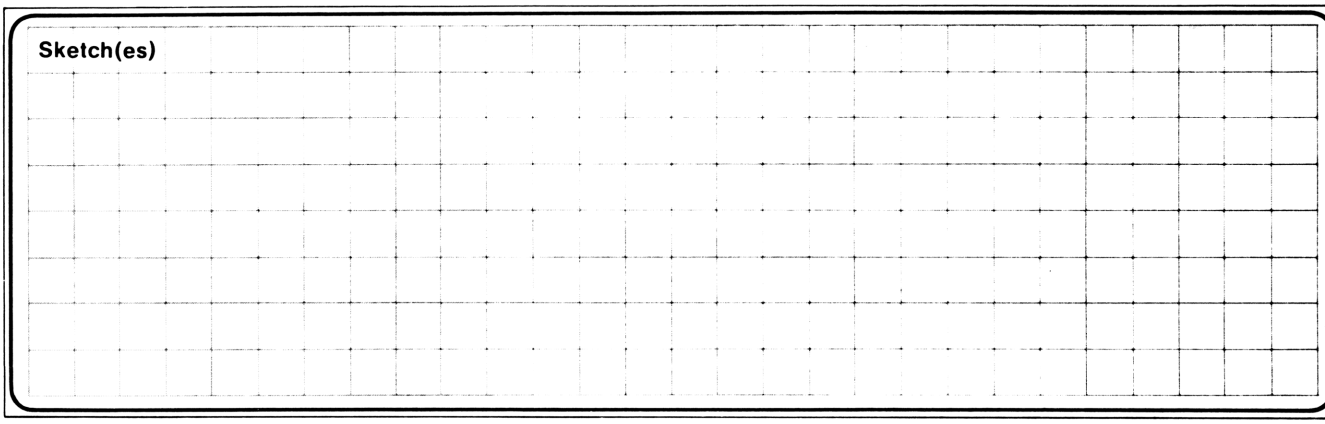
T = Transportation in

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

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Program Description II

Sketch(es)



Sample Problem(s) 1) If a company estimates its gross profit percentage on sales to be 35% and its sales for the period under review was $175,000 what would its estimated inventory be if beginning inventory was $200,000 and purchases were $55,000 using the gross profit method?

2)

	At Cost	At Retail
Beginning Inventory	$80,000.00 I_{cl}	$100,000.00 I_r
Purchases	45,000.00 P_c	50,000.00 P_r
Transportation in	2,000.00 T	
Worthless inventory		1,000.00 W_r
Employee discounts		2,500.00 E
Markups		7,500.00
Markup cancellations		2,500.00
Markdowns		8,000.00
Markdown cancellations		3,000.00
Sales		85,000.00 S

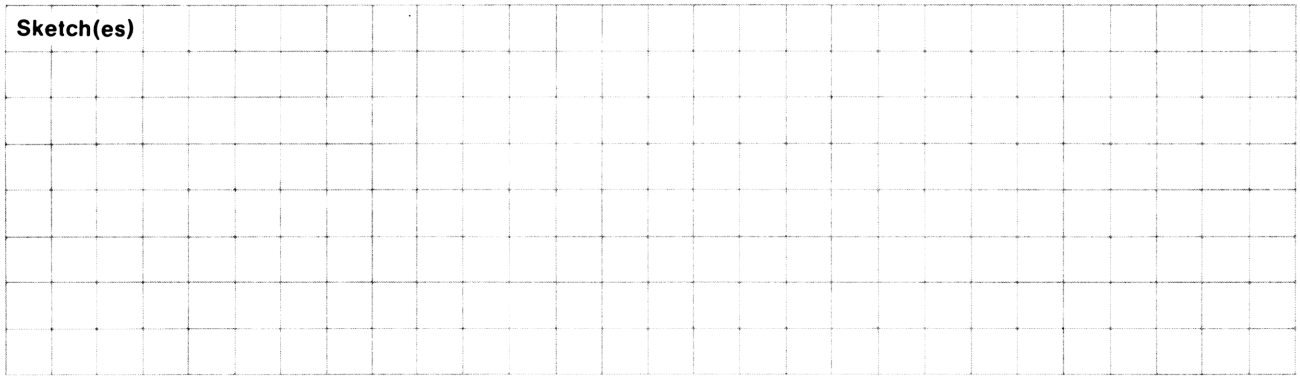
Using the retail method, what would be an estimate of the ending inventory at cost (approximates lower of cost or market)?

Reference(s) Lipkin, Lawrence; Feinstein, Irwin; Derrick, Lucille, Accountants Handbook of Formulas and Tables, pages 74-75, Prentice-Hall, Inc. 1963.

This program is a translation of the HP-65 Users' Library programs #0763A and #839A by E. Wayne Brasch.

Program Description II

Sketch(es)



Sample Problem(s)

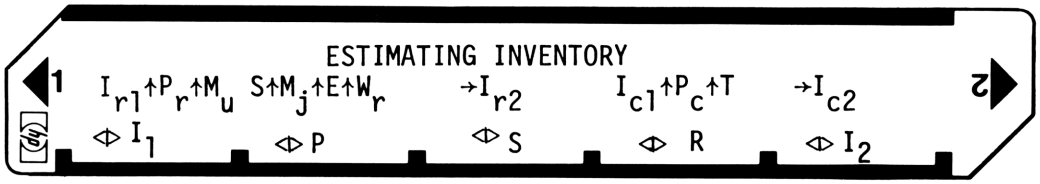
Solution(s) 1. 200000 [A] 55000 [B] 175000 [C] 35 [D] [E] ---------- 141250.00(I_2)

2. 100000 [ENTER↑] 50000 [ENTER↑] 7500 [ENTER↑] 2500 [-] [f] [A] 85000 [ENTER↑]
8000 [ENTER↑] 3000 [-] 2500 [ENTER↑] 1000 [f] [B] [f][C]------- 61500[I_{r2})
80000 [ENTER↑] 45000 [ENTER↑] 2000 [f] [D] [f] [E] ---------- 50390.32(I_{c2})

Ending inventory at cost would be $50,390.32.

Reference(s)

User Instructions



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1.	Load side 1 and side 2			
	Gross Profit Method			
2.	Input 4 of the following:			
		I_1	A	
		P	B	
		S	C	
		R	D	
		I_2	C	
3.	Calculate the unknown:			
			A	I_1
			B	P
			C	S
			D	R
			E	I_2
	Retail Method			
4.	Input: I_{r1}	I_{r1}	↑	
	P_r	P_r	↑	
	M_u	M_u	f A	R_1
5.	Input: S	S	↑	
	M_i	M_i	↑	
	E	E	↑	
	W_r	W_r	f B	R_2
6.	(Optional): Calculate I_{r2}		f C	I_{r2}
7.	Input: I_{c1}	I_{c1}	↑	
	P_c	P_c	↑	
	T	T	f D	R_3
8.	Calculate I_{c2}		f E	I_{c2}

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	
002	STOA	35 11	Gross Profit Method
003	F3?	16 23 03	
004	RTN	24	
005	RCLE	36 15	
006	RCLB	36 12	
007	-	-45	
008	1	01	Calculate I_1
009	RCLD	36 14	
010	GSB0	23 00	
011	-	-45	
012	RCLC	36 13	
013	x	-35	
014	+	-55	
015	STOA	35 11	
016	RTN	24	
017	*LBLB	21 12	- - - - - - - - - -
018	STOB	35 12	
019	F3?	16 23 03	
020	RTN	24	
021	RCLE	36 15	
022	RCLA	36 11	Calculate P
023	-	-45	
024	RCLB	36 12	
025	-	-45	
026	1	01	
027	RCLD	36 14	
028	GSB0	23 00	
029	-	-45	
030	RCLC	36 13	
031	x	-35	
032	+	-55	
033	STOB	35 12	
034	RTN	24	
035	*LBLC	21 13	- - - - - - - - - -
036	STOC	35 13	
037	F3?	16 23 03	
038	RTN	24	
039	RCLA	36 11	Calculate S
040	RCLE	36 15	
041	-	-45	
042	RCLB	36 12	
043	+	-55	
044	1	01	
045	RCLD	36 14	
046	EEX	-23	
047	2	02	
048	÷	-24	
049	-	-45	
050	÷	-24	
051	STOC	35 13	
052	RTN	24	
053	*LBLD	21 14	
054	STOD	35 14	
055	F3?	16 23 03	
056	RTN	24	

STEP	KEY ENTRY	KEY CODE	COMMENTS
057	1	01	
058	RCLA	36 11	
059	RCLE	36 15	
060	-	-45	Calculate R
061	RCLB	36 12	
062	+	-55	
063	RCLC	36 13	
064	÷	-24	
065	-	-45	
066	EEX	-23	
067	2	02	
068	x	-35	
069	STOD	35 14	
070	RTN	24	
071	*LBLE	21 15	- - - - - - - - - -
072	STOE	35 15	
073	F3?	16 23 03	
074	RTN	24	
075	RCLA	36 11	
076	RCLB	36 12	Calculate I_2
077	+	-55	
078	1	01	
079	RCLD	36 14	
080	EEX	-23	
081	2	02	
082	÷	-24	
083	-	-45	
084	RCLC	36 13	
085	x	-35	
086	-	-45	
087	STOE	35 15	
088	RTN	24	
089	*LBLa	21 16 11	Retail Method
090	0	00	Input I_{r1}, P_r, M_u
091	STO1	35 01	
092	CLX	-51	
093	1	01	
094	STOI	35 46	
095	R↓	-31	
096	GTO9	22 09	- - - - - - - - - -
097	*LBLb	21 16 12	Input S, M_j, E, W_r
098	R↑	16-31	
099	STO2	35 02	
100	CLX	-51	
101	2	02	
102	STOI	35 46	
103	R↓	-31	
104	GSB9	23 09	
105	RCL1	36 01	
106	RCL2	36 02	
107	-	-45	
108	STO3	35 03	
109	RCL2	36 02	
110	RTN	24	- - - - - - - - - -
111	*LBLc	21 16 13	I_{r2}
112	RCL3	36 03	

REGISTERS

0	1 R_1	2 R_2	3 I_{r2}	4 R_3	5 I_{c2}	6	7	8	9
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9

A I_1	B P	C S	D R	E I_2	I Index

97 Program Listing II

STEP	KEY ENTRY	KEY CODE	COMMENTS
113	RTN	24	
114	*LBL d	21 16 14	Input I_{c1}, P_c, T
115	0	00	
116	STO 4	35 04	
117	CLX	-51	
118	4	04	
119	STO I	35 46	
120	R↓	-31	
121	*LBL 9	21 09	- - - - - - - - - -
122	R↓	-31	
123	R↓	-31	Subroutine for
124	ST+ i	35-55 45	sto +
125	R↑	16-31	
126	ST+ i	35-55 45	
127	R↑	16-31	
128	ST+ i	35-55 45	
129	RCL i	36 45	
130	RTN	24	
131	*LBL e	21 16 15	- - - - - - - - - -
132	RCL 3	36 03	
133	RCL 4	36 04	I_{c2}
134	x	-35	
135	RCL 1	36 01	
136	÷	-24	
137	STO 5	35 05	
138	RTN	24	
139	R/S	51	

STEP	KEY ENTRY	KEY CODE	COMMENTS
170			
180			
190			
200			
210			
220			

LABELS					FLAGS
A Used	B Used	C Used	D Used	E Used	0
a Used	b Used	c Used	d Used	e Used	1
0	1	2	3	4	2
5	6	7	8	9 Used	3

SET STATUS

FLAGS			TRIG	DISP
	ON	OFF		
0	☐	☒	DEG ☒	FIX ☒
1	☐	☒	GRAD ☐	SCI ☐
2	☐	☒	RAD ☐	ENG ☐
3	☐	☒		n 2

Program Description I

Program Title INVENTORY ORDERING--DEMAND AVERAGE WITH ORDER POINT EXPO. SMOOTHED MAD & ORDER QUANTITY

Contributor's Name Smart, Ernest A.

Address 9260 La Colonia Ave.

City Fountain Valley **State** California **Zip Code** 92708

Program Description, Equations, Variables Program averages the given demand for X no. of periods, computes MAD: Then, given the most recent period usage, it calculates the smoothed MAD, smoothed projection for the next period, and the order point quantity required to provide a 95% service level. Subsequent periods should be calculated using the accompanying program, "Order Point Calculation".

Formulas used:

α = ARBITRARY CHOICE OF SMOOTHING CONSTANT
IN THIS PROGRAM $\alpha = .1$

avg. demand: $\bar{X} = \frac{1}{n}\sum_{i=1}^{n} X_i$

CAD = CURRENT ABSOLUTE DEVIATION.

MAD = MEAN ABSOLUTE DEVIATION.

mad: $S_x\sqrt{\frac{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}{n-1}}$

DA = DEMAND AVG., (ACTUAL USAGE)

DC = DEMAND CURRENT, (ACTUAL USAGE)

Smoothed projection: $\bar{X}: DC(\alpha) + DA(1-\alpha) = \bar{X}_{LT}$

Smoothed mad: $\overline{MAD}: CAD(\alpha) + MAD(1-\alpha) = \overline{MAD}_{LT}$

Order point quantity: $OP: \bar{X}_{LT} + \overline{MAD}_{LT} = O.P.$

Operating Limits and Warnings Program output adjustment is required where the demand periods used are not = to the lead time required.

EXAMPLE:

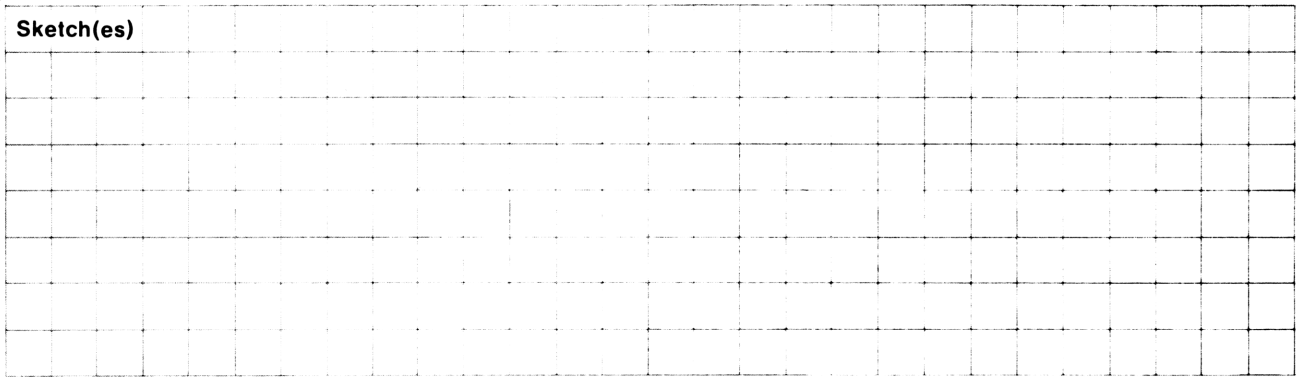
Demand period = one month.
Lead time required = two months.
Multiply output by 2.

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

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Program Description 11

Sketch(es)



Sample Problem(s) Listed are the sales data for the preceding 12 Months of a products usage.

What is the avg. usage? *

What is the mean absolute deviation? (MAD)**

What is the weighted avg. MAD.***

What is the weighted avg. projection for next period?****

What is the order point quantity for next period?*****

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
SALES:	3	6	8	7	4	4	4	6	7	6	4	5

FINAL INPUT: Current actual usage = 8

Solution(s)

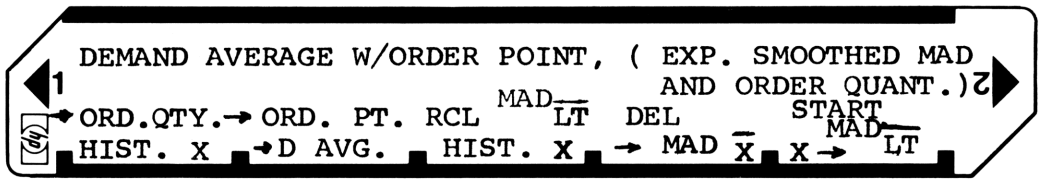
KEYSTROKES:	(f) (e)	Ø.ØØ
	3(A)6(A)8(A)7(A)4(A)4(A)4(A)6(A)7(A)6(A)	
Tot. No. of periods:	4(A)5(A)	12.ØØ
Avg. usage:	(B) *	5.33
	3(C)6(C)8(C)7(C)4(C)4(C)4(C)6(C)7(C)6(C)	
Tot. No. of periods:	4(C)5(C)	12.ØØ
MAD :	(D)**	1.33
Weighted avg. MAD:	8(E)***	1.47
Weighted avg. proj:	(f) (a)****	5.6Ø
Order point quantity:	(f) (b)*****	7.Ø7

Reference(s) Production and Inventory control Handbook....James H. Greene.. APICS....McGRAW-HILL BOOK COMPANY. Section 8-11/13. 1970

Production and Inventroy Control systems and decisions....JAMES H. GREENE....Richard D. Irwin, Inc.....Pages 96/102. 1965, revised 1974

Inventory Systems and Controls Handbook....STANLEY E. LARSON.... Prentice=Hall,Inc....Pages 134-135 1976

User Instructions



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Read side one of card			
2	Initialize program		f e	Ø.ØØ
3	Key period demand per item history	X_n	A	n
	(Repeat for each period history)			
4	Calculate and output the average:		B	$\bar{X}$
5	Repeat step 3 above	X_n	C	n
6	Calculate and output MAD		D	MAD
7	Key current damand from record:	X		
	Calculate and output smoothed MAD		E	MAD_{LT}
8	Calculate and output smoothed F/cast		f a	ORD.QTY.
9	Calculate and output new order point		f b	ORD. PT.
10	Recall smoothed MAD (MAD_{LT}) -- OPTIONAL		f c	MAD_{LT}
11	For a new case go to step 2			
	NOTES:			
	If the current demand is entered prior to step 7, the results following will be in error.			
	To correct for incorrect or for unintended data processed; Delete the last entry:		f d	n
	ORD. QTY. AND ORD. PT. MAY BE RE-CALLED BY USING THE ORIGINAL KEYS SHOWN.			

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLe	21 16 15	
002	CLRG	16-53	
003	P≠S	16-51	
004	CLRG	16-53	
005	CLX	-51	
006	ENT↑	-21	
007	ENT↑	-21	
008	ENT↑	-21	
009	R/S	51	
010	*LBLA	21 11	
011	Σ+	56	
012	R/S	51	
013	*LBLB	21 12	
014	$\bar{x}$	16 53	
015	CLRG	16-53	
016	P≠S	16-51	
017	CLRG	16-53	
018	STOI	35 46	
019	R/S	51	
020	*LBLC	21 13	
021	ENT↑	-21	
022	RCLI	36 46	
023	-	-45	
024	ABS	16 31	
025	Σ+	56	
026	R/S	51	
027	*LBLD	21 14	
028	RCLΣ	36 56	
029	P≠S	16-51	
030	RCL9	36 09	
031	P≠S	16-51	
032	÷	-24	
033	STO1	35 01	
034	RCLI	36 46	
035	STO2	35 02	
036	RCL1	36 01	
037	R/S	51	
038	*LBLE	21 15	
039	ENT↑	-21	
040	STO4	35 04	
041	RCL2	36 02	
042	-	-45	
043	ABS	16 31	
044	STO5	35 05	
045	RCL4	36 04	
046	.	-62	
047	1	01	
048	x	-35	
049	RCL2	36 02	
050	.	-62	
051	9	09	
052	x	-35	
053	+	-55	
054	STO4	35 04	
055	RCL5	36 05	
056	.	-62	
057	1	01	
058	x	-35	
059	RCL1	36 01	
060	.	-62	
061	9	09	
062	x	-35	
063	+	-55	
064	STO5	35 05	
065	RCL4	36 04	
066	+	-55	
067	STO6	35 06	
068	RCL5	36 05	
069	R/S	51	
070	*LBLa	21 16 11	
071	RCL4	36 04	
072	R/S	51	
073	*LBLb	21 16 12	
074	RCL6	36 06	
075	R/S	51	
076	*LBLc	21 16 13	
077	RCL5	36 05	
078	R/S	51	
079	*LBLd	21 16 14	
080	LSTX	16-63	
081	Σ-	16 56	
082	RTN	24	
083	R/S	51	

090

110

LABELS

A HIST.X	B →D AVG.	C HIST.X	D →MAD_X	E X→MAD_{LT}
a →ORD.QTY	b →ORD.PT.	c RCL MAD_{LT}	d DEL	e START
0	1	2	3	4
5	6	7	8	9

FLAGS

0	
1	
2	
3	

SET STATUS

FLAGS		TRIG	DISP
	ON OFF		
0	☐ ☐	DEG ☐	FIX ☒
1	☐ ☐	GRAD ☐	SCI ☐
2	☐ ☐	RAD ☐	ENG ☐
3	☐ ☐		n = 2

REGISTERS

0	1 MAD	2 D AVG.	3	4 F/CAST	5 MAD_{LT}	6 ORD.PT.	7	8	9
S0	S1	S2	S3	S4 ΣX	S5 ΣX^2	S6 ΣY	S7 ΣY^2	S8 ΣXY	S9 n
A	B	C	D	E	I				

Program Description I

Program Title ORDER POINT CALCULATION

Contributor's Name Smart, Ernest A.
Address 9260 La Colonia Ave.
City Fountain Valley **State** California **Zip Code** 92708

Program Description, Equations, Variables Program generates order control points to provide for a 95% service level by the Weighted Moving average method. Demand averaging should be accomplished first, using the accompanying program; DEMAND AVERAGE W/ORDER POINT, EXP. SMOOTHED MAD AND ORDER QUANT.

Where the data necessary for demand averaging is not available, then the required initial [illegible] input may be guessed at. Continued use of this programs results will then eventually (6 to 12 Months) provide the same effective results. FORMULAS USED:

MAD: CAD(a) + MAD(1-a) = new MAD OQ: DC(a) + DA(1-a) = OQ

OP: OQ + MAD = OP

Where: a = Arbitrary choice of exponential smoothing factor.***

CAD = Current absolute deviation.

MAD = MEAN Absolute deviation.

OQ = Order Quantity (or forcast)

OP = Order Point (or time to re-order)

***In this program a = .1...for a more rapid response to changing demand patterns "a" may be increased along with a corresponding decrease in "1-a". "a" may NOT exceed 1.00

Operating Limits and Warnings Where the demand period used is NOT = to the lead time required: Program output must be correspondingly adjusted.

EXAMPLE: DEMAND PERIOD USED = ONE MONTH

LEAD TIME REQUIRED = TWO MONTHS

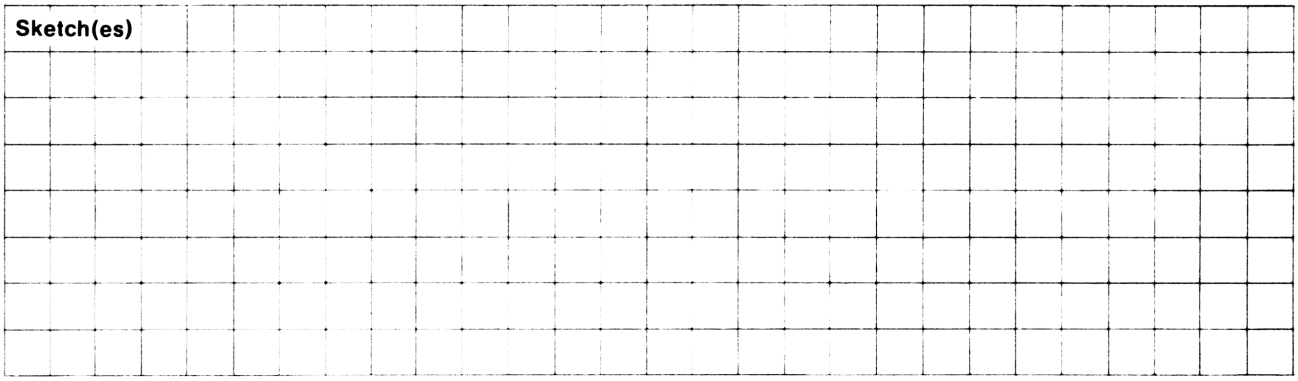
Adjust program output: MULTIPLY BY 2

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Program Description II

Sketch(es)



Sample Problem(s) Listed are the results from the sample problem given for the accompanying program.

```
MAD = 1.47
 OQ = 5.60

From current Months item record:  current actual usage = 5

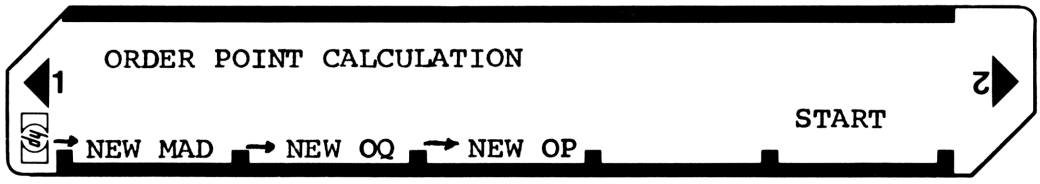
WHAT IS THE NEW MAD? *
WHAT IS THE NEW  OQ? **  (Forcast)
WHAT IS THE NEW  OP? ***
```

Solution(s)

KEYSTROKES:	(f) (e)	ø.øø
Last MAD	1.47 (ENTER ↑)	1.47
Last OQ	5.60 (ENTER ↑)	5.60
Current usage	5.	5.
New MAD	(A) *	1.38
New OQ	(B) **	5.54
New OP	(C) ***	6.92

Reference(s) PRODUCTION AND INVENTORY CONTROL HANDBOOK McGRAW-HILL BOOK COMPANY...1970...JAMES H. GREENE, APICS... Section 8, pages 11 thru 13. RICHARD D. IRWIN, INC....1965, revised 1974...PRODUCTION AND INVENTORY CONTROL SYSTEMS AND DECISIONS...JAMES H. GREENE...Pages 96 thru 102. PRINTICE-HALL, INC.... 1976...INV. SYSTEMS AND CONTROLS HANDBOOK...STANLEY E. LARSON...PAGES 134-135

User Instructions



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Read side one of card			
2	Initialize program		f e	Ø.ØØ
3	Key last MAD	MAD $\overline{X}$	ENTER ↑	MAD $\overline{X}$
4	Key last OQ	$\overline{X}$	ENTER ↑	$\overline{X}$
5	Key current actual usage	X		X
	and calculate new MAD		A	NEW MAD
6	Calculate new OQ		B	NEW OQ
7	Claculate new OP		C	NEW OP
8	For a new case go to step 2			

LABELS

A →NEW MAD	B → NEW OQ	C → NEW OP	D	E
a	b	c	d	e START
0	1	2	3	4
5	6	7	8	9

FLAGS

0
1
2
3

SET STATUS

FLAGS			TRIG	DISP
	ON	OFF		
0	☐	☐	DEG ☐	FIX ☑
1	☐	☐	GRAD ☐	SCI ☐
2	☐	☐	RAD ☐	ENG ☐
3	☐	☐		n 2

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLe	21 16 15	
002	CLRG	16-53	
003	P≠S	16-51	
004	CLX	-51	
005	ENT↑	-21	
006	ENT↑	-21	
007	ENT↑	-21	
008	R/S	51	
009	*LBLA	21 11	
010	STO3	35 03	
011	R↓	-31	
012	STO2	35 02	
013	R↓	-31	
014	STO1	35 01	
015	RCL3	36 03	
016	RCL2	36 02	
017	-	-45	
018	ABS	16 31	
019	STO4	35 04	
020	RCL3	36 03	
021	.	-62	} a
022	1	01	
023	x	-35	
024	RCL2	36 02	
025	.	-62	} (1-a)
026	9	09	
027	x	-35	
028	+	-55	
029	STO5	35 05	
030	RCL4	36 04	
031	.	-62	} a
032	1	01	
033	x	-35	
034	RCL1	36 01	
035	.	-62	} (1-a)
036	9	09	
037	x	-35	
038	+	-55	
039	STO6	35 06	
040	R/S	51	
041	*LBLB	21 12	
042	RCL5	36 05	
043	R/S	51	
044	*LBLC	21 13	
045	RCL6	36 06	
046	RCL5	36 05	
047	+	-55	
048	RTN	24	
049	R/S	51	

STEP	KEY ENTRY	KEY CODE	COMMENTS
060			
070			
080			
090			
100			
110			

REGISTERS

0	1 Last MAD	2 Last OQ	3 Curr USAGE	4 CAD	5 New OQ	6 New MAD	7	8	9
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9

A	B	C	D	E	I

Program Description 1

Program Title DEPRECIATION SCHEDULES

Contributor's Name HEWLETT-PACKARD COMPANY
Address Corvallis Division
1000 N.E. Circle Boulevard
City Corvallis, OR 97330 **tate** **Zip Code**

Program Description, Equations, Variables

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

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

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

Straight Line Depreciation

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

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

Operating Limits

Sum of the Years' Digits Depreciation

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

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

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Program Description I

Program Title

Contributor's Name

Address

City **State** **Zip Code**

Program Description, Equations, Variables

Variable Rate Declining Balance Depreciation

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

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

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

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

Crossover Point

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

Operating Limits

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Program Description 1

Program Title

Contributor's Name

Address

City **State** **Zip Code**

Program Description, Equations, Variables

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

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

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

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

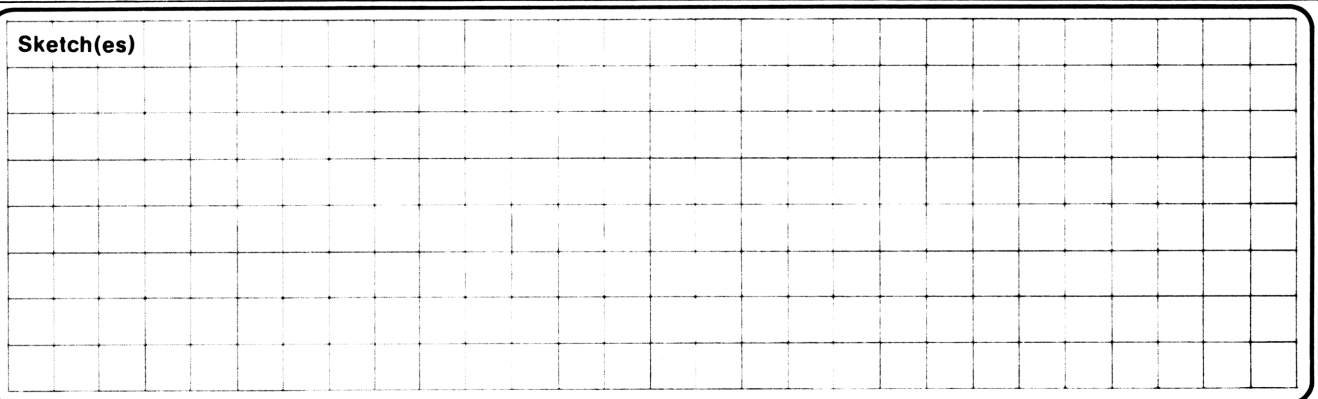
Operating Limits and Warnings

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Program Description II

Sketch(es)



Sample Problem(s)

Depreciation Schedules

where:

K = value for YR
$TOTDEP_K$ = total depreciation for years 1 through K.
W = integer portion of LIFE
F = decimal portion of LIFE
(i.e., for a LIFE of 12.25 years W = 12 and F = .25)

Straight Line Schedule

$$DEP_K = \frac{SBV - SAL}{LIFE}$$

$$DEP_K \text{ (last year)} = \left(\frac{SBV - SAL}{LIFE}\right) \cdot F$$

$$TOTDEP_K = (K) \cdot \left(\frac{SBV - SAL}{LIFE}\right)$$

Solution(s)

$$RDV_K = (LIFE - K) \cdot \left(\frac{SBV - SAL}{LIFE}\right)$$

$$RBV_K = RDV_K + SAL$$

Reference(s)

Program Description 11

Sketch(es)

Sample Problem(s)

Sum-of-the-Years'-Digits Schedule

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

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

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

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

$$RBV_K = RDV_K + SAL$$

Solution(s)

Variable Rate Declining Balance Schedule

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

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

$$RDV_K = (SBV - SAL) - TOTDEP_K$$

$$RBV_K = RDV_K + SAL$$

Reference(s)

Crossover Point—Declining Balance to Straight Line

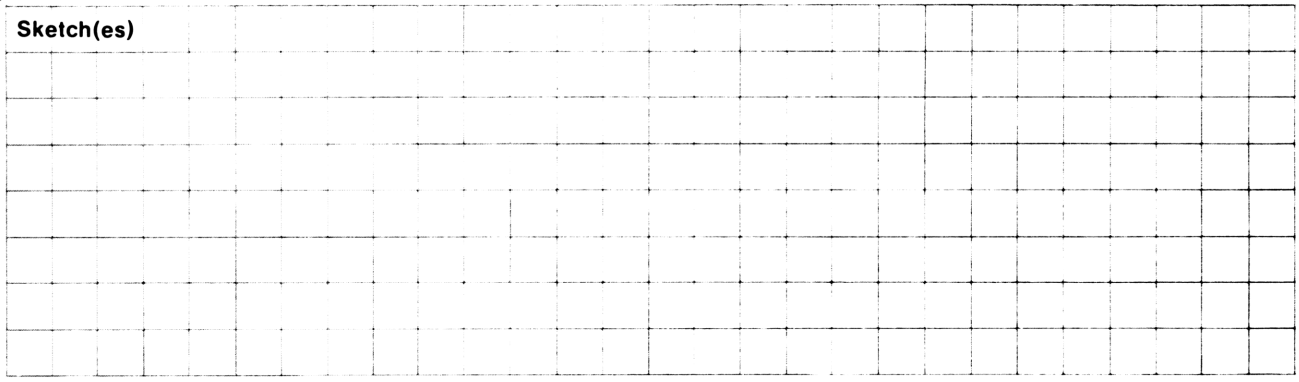
$$SBV \left(1 - \frac{FACT}{LIFE}\right)^{K-1} \cdot \left(\frac{FACT}{LIFE}\right) > \frac{(SBV - SAL) - TOT\,DEP_{K-1}}{L + 1 - K}$$

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

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

Program Description II

Sketch(es)



Sample Problem(s)

Example 1:

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

Keystrokes: **Outputs:**

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

Straight Line

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

Solution(s)

Now jump ahead to the 15th year.

Keystrokes: **Outputs:**

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

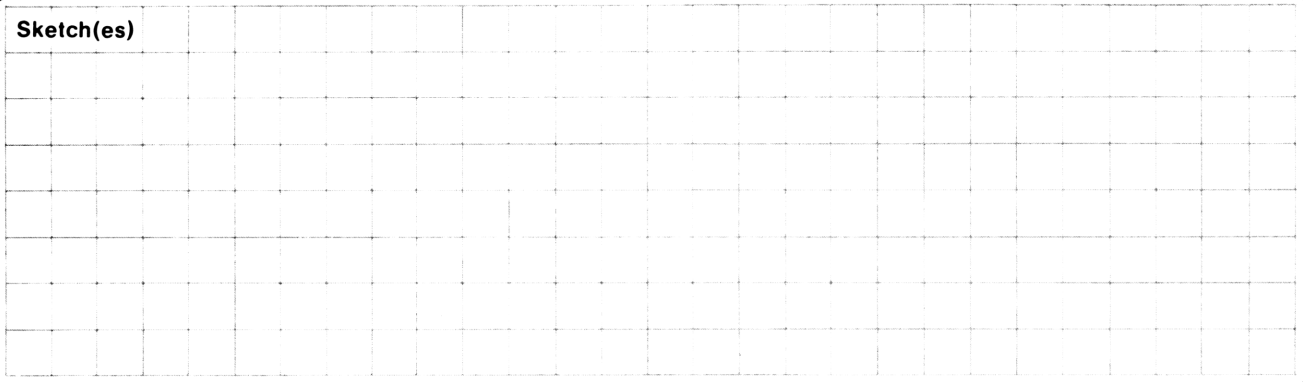
SOYD

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

Reference(s)

Program Description 11

Sketch(es)



Sample Problem(s)

R/S →	16829.27	(total depreciation to date)
Jump ahead to the 15th year.		
15 STO D f B →	15.00	(15th year)
R/S →	10939.02	(15th year's depreciation)
R/S →	136737.80	(remaining depreciable value)
R/S →	166737.80	(remaining book value)
R/S →	208262.20	(total depreciation 1st through 15th year)
Declining Balance		
1 STO D 1.5 STO E f C →	1.00	(1st year)
R/S →	14062.50	(1st year's depreciation)
R/S →	330937.50	(remaining depreciable value)
R/S →	360937.50	(remaining book value)
R/S →	14062.50	(total depreciation to date)

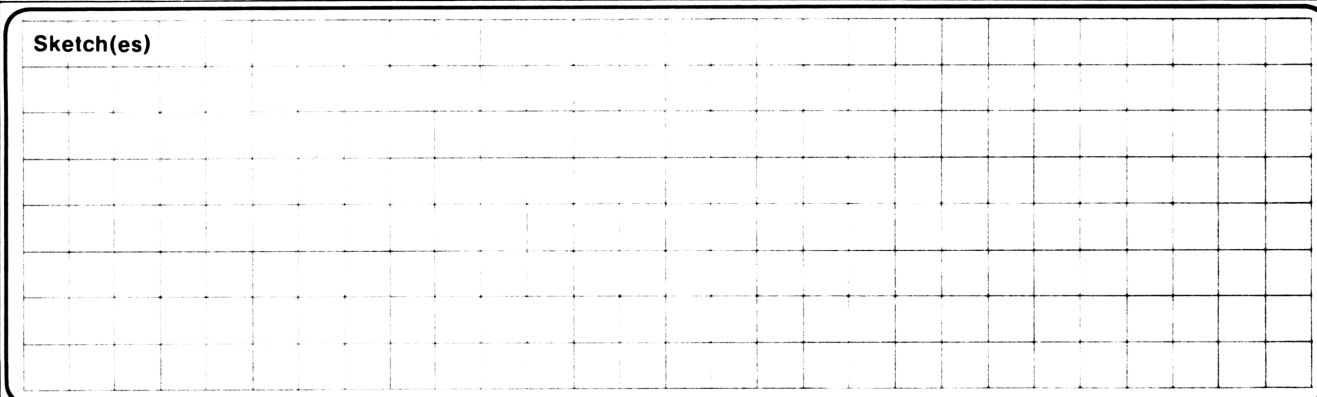
Solution(s)

Keystrokes:	**Outputs:**	
Now jump to the 15th year.		
15 STO D f C →	15.00	(15th year)
R/S →	8235.18	(15th year's depreciation)
R/S →	181369.51	(remaining depreciable value)
R/S →	211369.51	(remaining book value)
R/S →	163630.49	(total depreciation 1st through 15th year)

Reference(s)

Program Description II

Sketch(es)



Sample Problem(s)

Example 2:

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

Solution(s)

Keystrokes:	Outputs:	
f D →	18.00	(last year to use declining balance)
R/S →	22.00	(asset's remaining life after 18 years)
R/S →	188471.01	(remaining book value after 18th year)
18 STO D f C →	18.00	(18th year)
R/S →	7343.03	(18th year's depreciation)
R/S →	158471.01	(remaining depreciable value)
R/S →	188471.01	(remaining book value)
R/S →	186528.99	(total depreciation 1st through 18th year)
188471.01 STO A 22 STO C		
1 STO D f A →	1.00	(1st year)
R/S →	7203.23	(19th year's depreciation)

Note:

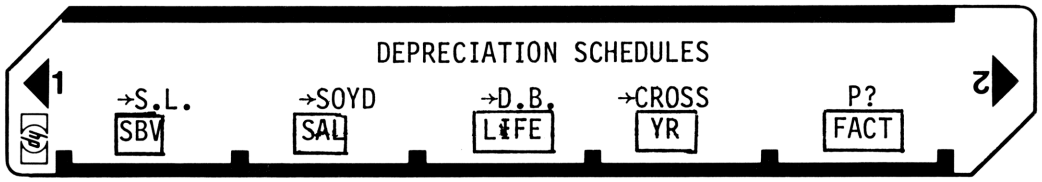
Although 1 was keyed in for YR—the first year of straight line depreciation—this is the 19th year of the asset's life.

Reference(s)

R/S →	151267.78	(remaining depreciable value)
R/S →	181267.78	(remaining book value)

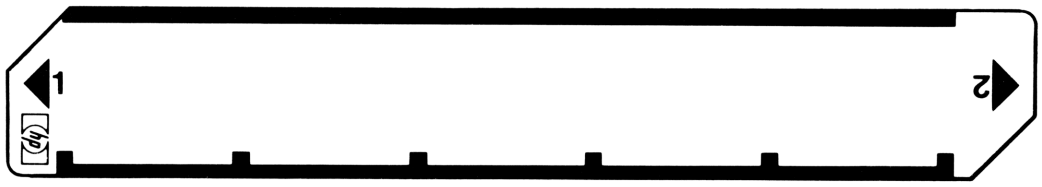
etc.

User Instructions



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Load side 1 and side 2			
2	Optional: Select print mode		f E	1.00 or 0.00
3	Key in all of the following:			
	• Starting book value	SBV	STO A	SBV
	• Salvage value	SAL	STO B	SAL
	• Life of the asset	LIFE	STO C	LIFE
4	For depreciation schedules,			
	key in:			
	• Year for which depreciation			
	is to be calculated.	YR	STO D	YR
5	To calculate straight line			
	depreciation schedule		f A	YR
			R/S	DEP
			R/S	RDV
			R/S	RBV
			R/S	TOT DEP
			R/S	YR + 1
			etc.	
	For new case go to steps 3 and			
	4 and change appropriate			
	inputs.			

User Instructions



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
6	Calculate the SOYD schedule		f B	YR
			R/S	DEP
			R/S	RDV
			R/S	RBV
			R/S	TOT DEP
			R/S	YR + 1
			etc.	
	For new case go to steps 3 and			
	4 and change appropriate			
	inputs.			
7	Calculate the declining balance			
	schedule (the appropriate			
	factor must be entered).	FACT	STO E	FACT
			f C	YR
			R/S	DEP
			R/S	RDV
			R/S	RBV
			R/S	TOT DEP
			R/S	YR + 1
			etc.	
	For new case go to steps 3 and			
	4 and change appropriate			
	inputs.			
8	To find crossover point the			
	declining balance factor must			
	be stored.	FACT	STO E	FACT
9	Calculate last year to use de-			
	clining balance method.		f D	LAST YEAR
10	Calculate remaining life.		R/S	REM LIFE
11	Calculate remaining book			
	value.		R/S	RBV

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLa	21 16 11	Straight Line
002	F0?	16 23 00	
003	SPC	16-11	
004	RCL0	36 14	k
005	GSB9	23 09	
006	RCLA	36 11	$\frac{SBV-SAL}{LIFE} \rightarrow R_I$
007	RCLB	36 12	
008	-	-45	
009	RCLC	36 13	
010	÷	-24	
011	STO1	35 46	DEP
012	GSB9	23 09	
013	RCLC	36 13	
014	RCL0	36 14	
015	-	-45	(LIFE-YR)DEP=RDV_k
016	RCL1	36 46	
017	x	-35	
018	GSB9	23 09	
019	RCLB	36 12	
020	+	-55	
021	GSB9	23 09	RBV_k
022	RCL1	36 46	
023	RCL0	36 14	$\left(\frac{SBV-SAL}{LIFE}\right)$YR=TOT DEP
024	x	-35	
025	GSB9	23 09	
026	1	01	
027	GSB0	23 14	
028	RCLC	36 13	
029	RCL0	36 14	
030	X≤Y?	16-35	k≤LIFE?
031	GTOa	22 16 11	
032	RTN	24	- - - - - - - - -
033	*LBLb	21 16 12	SOYD
034	F0?	16 23 00	
035	SPC	16-11	
036	RCL0	36 14	k
037	GSB9	23 09	
038	RCLA	36 11	
039	RCLB	36 12	
040	-	-45	
041	STO8	35 08	
042	RCLC	36 13	
043	GSB2	23 02	$\left(\frac{LIFE+1-k}{SOYD}\right)$(SBV-SAL)
044	STO7	35 07	
045	RCLC	36 13	
046	1	01	
047	+	-55	
048	RCL0	36 14	
049	-	-45	
050	RCL7	36 07	
051	÷	-24	
052	RCL8	36 08	
053	x	-35	
054	GSB9	23 09	DEP_k
055	RCLC	36 13	
056	RCL0	36 14	
057	-	-45	
058	X<0?	16-45	
059	GTO3	22 03	
060	GSB2	23 02	
061	RCL7	36 07	
062	÷	-24	
063	STO4	35 04	
064	RCL8	36 08	
065	x	-35	
066	*LBL3	21 03	
067	STO6	35 06	RDV_k
068	GSB9	23 09	
069	RCLB	36 12	
070	+	-55	
071	GSB9	23 09	RBV_k=RDV_k+SAL
072	1	01	
073	RCL4	36 04	
074	-	-45	
075	RCL8	36 08	
076	x	-35	
077	GSB9	23 09	TOT DEP_k
078	1	01	
079	GSB0	23 14	
080	RCLC	36 13	
081	RCL0	36 14	k≤LIFE?
082	X≤Y?	16-35	
083	GTOb	22 16 12	
084	RTN	24	- - - - - - - - -
085	*LBL2	21 02	
086	ENT↑	-21	
087	FRC	16 44	$\frac{(1+W)(2F+W)}{2}$
088	ENT↑	-21	
089	+	-55	
090	X≠Y	-41	= SOYD
091	INT	16 34	
092	+	-55	
093	LSTX	16-63	
094	1	01	
095	+	-55	
096	x	-35	
097	2	02	
098	÷	-24	- - - - - - - - -
099	RTN	24	Declining Balance
100	*LBLc	21 16 13	
101	F0?	16 23 00	
102	SPC	16-11	
103	RCL0	36 14	k
104	GSB9	23 09	
105	GSB4	23 04	
106	RCL0	36 14	
107	1	01	
108	-	-45	
109	Y*	31	
110	RCLA	36 11	
111	x	-35	
112	RCL8	36 08	

REGIS...

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

A SBV	B SAL	C LIFE	D YR	E FACTOR	I SBV-SAL/LIFE

97 Program Listing II

STEP	KEY ENTRY	KEY CODE	COMMENTS
113	×	-35	
114	STO I	35 46	
115	GSB 9	23 09	DEP_k
116	1	01	
117	RCL 7	36 07	
118	RCL D	36 14	
119	Y^x	31	
120	−	-45	
121	RCL A	36 11	(SBV-SAL)-TOT DEP_k
122	×	-35	
123	STO 9	35 09	
124	RCL A	36 11	
125	RCL B	36 12	
126	−	-45	
127	RCL 9	36 09	
128	−	-45	
129	GSB 9	23 09	RDV_k
130	RCL B	36 12	
131	+	-55	
132	GSB 9	23 09	RBV_k
133	RCL 9	36 09	
134	GSB 9	23 09	TOT DEP_k
135	1	01	
136	GSB D	23 14	
137	RCL C	36 13	
138	RCL D	36 14	
139	X≤Y?	16-35	K≤LIFE?
140	GTO e	22 16 13	
141	RTN	24	- - - - - - - - - -
142	*LBL D	21 14	To add to register D
143	RCL D	36 14	
144	+	-55	
145	STO D	35 14	
146	RTN	24	
147	*LBL 4	21 04	- - - - - - - - - -
148	1	01	
149	RCL E	36 15	FACT/LIFE→R_8
150	RCL C	36 13	
151	÷	-24	
152	STO 8	35 08	1-FACT/LIFE→R_7
153	−	-45	
154	STO 7	35 07	
155	RTN	24	- - - - - - - - - -
156	*LBL e	21 16 15	
157	F0?	16 23 00	Print/pause
158	GTO 0	22 00	
159	SF 0	16 21 00	
160	1	01	
161	RTN	24	
162	*LBL 0	21 00	
163	0	00	
164	CF 0	16 22 00	
165	RTN	24	
166	*LBL 9	21 09	
167	F0?	16 23 00	
168	GTO 1	22 01	
169	R/S	51	
170	RTN	24	
171	*LBL 1	21 01	
172	PRTX	-14	
173	RTN	24	- - - - - - - - - -
174	*LBL d	21 16 14	Crossover point
175	0	00	
176	STO D	35 14	
177	GSB 4	23 04	
178	*LBL 8	21 08	
179	RCL 7	36 07	
180	1	01	
181	GSB D	23 14	
182	1	01	
183	−	-45	
184	Y^x	31	
185	RCL A	36 11	
186	×	-35	
187	RCL 8	36 08	
188	λ	-35	
189	RCL 7	36 07	
190	RCL D	36 14	
191	1	01	
192	−	-45	
193	Y^x	31	
194	RCL A	36 11	
195	×	-35	
196	RCL B	36 12	
197	−	-45	
198	STO 9	35 09	
199	RCL C	36 13	
200	1	01	
201	+	-55	
202	RCL D	36 14	
203	−	-45	
204	÷	-24	
205	X≷Y	-41	
206	X>Y?	16-34	
207	GTO 8	22 08	
208	RCL D	36 14	
209	1	01	
210	−	-45	
211	GSB 9	23 09	Last year
212	RCL C	36 13	
213	X≷Y	-41	
214	−	-45	
215	GSB 9	23 09	Remaining life
216	RCL 9	36 09	
217	RCL B	36 12	
218	+	-55	
219	GTO 9	22 09	RBV
220	R/S	51	

LABELS

A	B	C	D	E
			Used	
[a] St.Line	[b] SOYD	[c] DEC BAL	[d] CROSS	[e] SCHED?
[0] Used	[1] Used	[2] SOYD	[3] Used	[4] Used
[5]	[6]	[7]	[8] Used	[9] Used

FLAGS

0	Print?
1	
2	
3	

SET STATUS

FLAGS			TRIG	DISP
	ON	OFF		
0	☐	☑	DEG ☑	FIX ☑
1	☐	☑	GRAD ☐	SCI ☐
2	☐	☑	RAD ☐	ENG ☐
3	☐	☑		n ____

Program Description I

Program Title Yearly Amortization Schedule

Contributor's Name Hewlett-Packard
Address 1000 N.E. Circle Blvd.
City Corvallis **State** Oregon **Zip Code** 97330

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

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

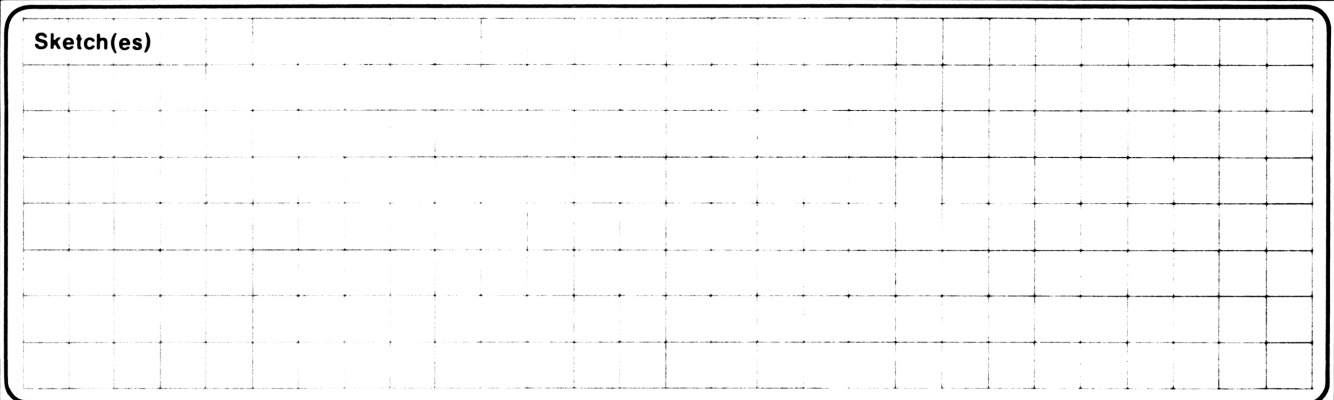
Operating Limits and Warnings Calculator performs all internal calculations to ten digits.

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

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Program Description 11

Sketch(es)



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

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

Solution(s)

[f] [E]	---------->	1.00
1 [ENTER↑] 3[A]	-------->	3.00
7 [ENTER↑] 12 [÷] [B]	-->	0.58
200 [C]	---------->	200.00
30000 [D]	---------->	30000.00
[f] [A]	---------->	

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

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

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

Reference(s)

4 [ENTER↑] 4 [A]	------->	4.00
[E]	---------->	2018.02
[R/S]	---------->	28619.77

User Instructions



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1.	Load side 1 and side 2.			
2.	Optional: Select print/pause mode for amortization schedule.		f E	1.00or0.00
3.	Key in			
	• Starting year number	Y1	↑	Y1
	• Ending year number	Y2	A	Y2
	• Monthly interest rate	i(%)	B	i(%)
	• Monthly payment amount	PMT	C	PMT
	• Initial loan amount	PV	D	PV
4.	Compute the total interest paid between years Y1 and Y2 inclusive and the remaining balance at the end of year Y2.		E	Σ INT
			R/S	BAL
	OR			
5.	Generate the yearly amortization schedule between years Y1 and Y2 inclusive. If the print/pause mode is on (1.00), the results are printed automatically.		f A	Y1
6.	Caclulate the amount paid to interest for year Y1.		R/S	PMT to INT
7.	Calculate amount paid to principal for year Y1.		R/S	PMT to PRIN
8.	Calculate remaining balance at the end of year Y1.		R/S	BAL
9.	Calculate total interest paid between years Y1 and Y2 inclusive.		R/S	TOT INT
10.	Increment Y1 for next period. If Y1≤Y2, go to step 6 for next period's values. Otherwise, stop.		R/S	Y1 + 1
11.	For a new case, go to step 2 and change appropriate input values.			

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	
002	STO1	35 01	$Y2 \rightarrow R_1$
003	X≷Y	-41	
004	STO0	35 00	$Y1 \rightarrow R_0$
005	X≷Y	-41	
006	RTN	24	
007	*LBLB	21 12	
008	EEX	-23	
009	2	02	$i/100 \rightarrow R_2$
010	÷	-24	
011	STO2	35 02	
012	LSTX	16-65	
013	x	-35	
014	RTN	24	
015	*LBLC	21 13	
016	STO3	35 03	$PMT \rightarrow R_3$
017	RTN	24	
018	*LBLD	21 14	
019	STO4	35 04	$PV \rightarrow R_4$
020	RTN	24	
021	*LBLE	21 15	
022	1	01	
023	RCL2	36 02	
024	+	-55	
025	STO5	35 05	$(1+i/100) \rightarrow R_5$
026	RCL1	36 01	
027	1	01	
028	2	02	
029	x	-35	$12(Y2)=N$
030	GSB1	23 01	
031	STO7	35 07	$BAL_N \rightarrow R_7$
032	RCL5	36 05	
033	RCL0	36 00	
034	1	01	
035	2	02	
036	x	-35	
037	1	01	
038	2	02	$(Y1)12-12=N$
039	-	-45	
040	GSB1	23 01	
041	CHS	-22	
042	RCL7	36 07	
043	+	-55	
044	STO8	35 08	$BAL_N - BAL_{N-12} \rightarrow R_8$
045	RCL1	36 01	
046	1	01	
047	2	02	
048	x	-35	
049	RCL0	36 00	
050	1	01	
051	2	02	
052	x	-35	
053	-	-45	
054	1	01	
055	2	02	
056	+	-55	$12(Y2-Y1+1)$

STEP	KEY ENTRY	KEY CODE	COMMENTS
057	RCL3	36 03	$BAL_N - BAL_{N-12} + 12(Y2-Y1+1) = INT$
058	x	-35	
059	+	-55	
060	RTN	24	
061	RCL7	36 07	
062	R/S	51	
063	*LBL1	21 01	
064	CHS	-22	
065	Y^x	31	$(1+i/100)^{-N} \rightarrow R_6$
066	STO6	35 06	
067	1	01	
068	-	-45	
069	RCL2	36 02	
070	÷	-24	
071	RCL3	36 03	$\left[PMT\frac{(1+i/100)^{-N}-1}{i/100}+PV\right]$
072	x	-35	
073	RCL4	36 04	
074	+	-55	
075	RCL6	36 06	$\left[\frac{1}{(1+i/100)^{-N}}\right]$
076	÷	-24	
077	RTN	24	
078	R/S	51	
079	*LBLa	21 16 11	
080	RCL0	36 00	
081	F0?	16 23 00	
082	SPC	16-11	
083	GSB9	23 09	
084	1	01	
085	RCL2	36 02	$(1+i/100) \rightarrow R_5$
086	+	-55	
087	STO5	35 05	
088	RCL0	36 00	
089	1	01	
090	2	02	$12(Y1)=N$
091	x	-35	
092	GSB1	23 01	
093	STO8	35 08	
094	RCL5	36 05	
095	RCL0	36 00	
096	1	01	
097	2	02	
098	x	-35	
099	1	01	$12(Y1)-12=N$
100	2	02	
101	-	-45	
102	GSB1	23 01	
103	RCL8	36 08	
104	-	-45	
105	STO9	35 09	
106	RCL3	36 03	
107	1	01	
108	2	02	
109	x	-35	INT_{Y1}
110	X≷Y	-41	
111	-	-45	$PRINC_{Y1}$
112	GSB9	23 09	

REGISTERS

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

A	B	C	D	E	I

97 Program Listing II

STEP	KEY ENTRY	KEY CODE	COMMENTS
113	RCL9	36 09	
114	GSB9	23 09	BAL
115	RCL8	36 08	
116	GSB9	23 09	
117	RCL0	36 00	
118	1	01	
119	2	02	
120	×	-35	12(Y1)•PMT-(PV-BAL)
121	RCL3	36 03	
122	×	-35	=TOT INT
123	RCL4	36 04	
124	RCL8	36 08	
125	-	-45	
126	-	-45	
127	GSB9	23 09	
128	1	01	
129	ST+0	35-55 00	
130	RCL1	36 01	
131	1	01	
132	2	02	
133	×	-35	
134	RCL0	36 00	
135	1	01	
136	2	02	
137	×	-35	12(Y1)≤12(Y2)?
138	X≤Y?	16-35	
139	GTOa	22 16 11	
140	1	01	
141	2	02	
142	÷	-24	- - - - - - - - - -
143	RTN	24	
144	*LBLe	21 16 15	Print Mode Option
145	F0?	16 23 00	
146	GTO2	22 02	
147	SF0	16 21 00	
148	1	01	
149	RTN	24	
150	*LBL2	21 02	
151	0	00	
152	CF0	16 22 00	
153	RTN	24	
154	*LBL9	21 09	
155	F0?	16 23 00	
156	GTO3	22 03	
157	R/S	51	
158	RTN	24	
159	*LBL3	21 03	
160	PRTX	-14	
161	RTN	24	
162	R/S	51	

STEP	KEY ENTRY	KEY CODE	COMMENTS
170			
180			
190			
200			
210			
220			

LABELS

A Y1↑Y2	B i	C PMT	D PV	E INT;RB	0 Print?
a Sched.	b	c	d	e Print?	1
0	1 Used	2 Used	3 Used	4	2
5	6	7	8	9 Used	3

FLAGS

SET STATUS

FLAGS			TRIG	DISP
	ON	OFF	DEG ☑	FIX ☑
0	☐	☑	GRAD ☐	SCI ☐
1	☐	☑	RAD ☐	ENG ☐
2	☐	☑		n 2
3	☐	☑		

Program Description I

Program Title 97-Federal Corporate Income Tax

Contributor's Name Samuel J. Ovenshine

Address 141 N. Seneca Road

City Oak Ridge **State** TN **Zip Code** 37830

Program Description, Equations, Variables

The program determines the proper tax bracket, and then computes the applicable tax.

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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HP-65 Users Library

Program Description II

Sketch(es)

NONE

Sample Problem(s)

Compute the following taxes:

Year	Earnings, before tax
1974	15,000
1974	83,487
1975	8,679
1975	14,695
1975	94,256
1976	267
1977	234,987

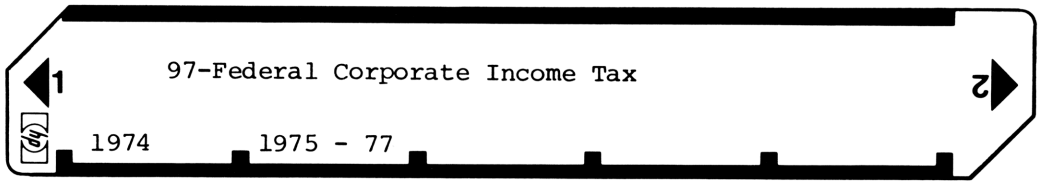
Solution(s)

1974	3,300.00
1974	33,573.76
1975	1.409.38
1975	2,732.90
1975	31,742.88
1976	53.40
1977	99,293.76

Reference(s)

US INTERNAL REVENUE SERVICE Publications

User Instructions



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Insert program			
2	Key: Net Earnings, before Tax	$, 1974	A	$ Tax
3	Key: Net Earnings, before Tax (1975 - 1977)	$, '75-'77	B	$ Tax
4	For a new problem, go to step 2, or 3.			

LABEL ASSIGNMENT

Label	Description
A	1974 Net Earnings keyed in, 1974 Corporate Income Tax Computed
B	1975 - 1977 Net Earnings keyed in, Federal Corporate Tax Computed
C	
D	
E	
a	
b	
c	
d	
e	
0	
1	Tax bracket, OVER $25,000, 1974.
2	Tax Bracket, 1975 - 1977, Over $25,000, under $50,000
3	Tax Bracket, 1975 - 1977, Over $50,000
4	
5	
6	
7	
8	
9	

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	
002	2	02	
003	5	05	
004	0	00	
005	0	00	
006	0	00	
007	X≷Y	-41	
008	X>Y?	16-34	
009	GTO1	22 01	
010	2	02	
011	2	02	
012	%	55	
013	PRTX	-14	
014	R/S	51	
015	*LBL1	21 01	
016	2	02	
017	5	05	
018	0	00	
019	0	00	
020	0	00	
021	-	-45	
022	4	04	
023	8	08	
024	%	55	
025	5	05	
026	5	05	
027	0	00	
028	0	00	
029	+	-55	
030	PRTX	-14	
031	R/S	51	
032	*LBLB	21 12	
033	2	02	
034	5	05	
035	0	00	
036	0	00	
037	X≷Y	-41	
038	X>Y?	16-34	
039	GTO2	22 02	
040	2	02	
041	0	00	
042	%	55	
043	PRTX	-14	
044	R/S	51	
045	*LBL2	21 02	
046	5	05	
047	0	00	
048	0	00	
049	0	00	
050	0	00	
051	X≷Y	-41	
052	X>Y?	16-34	
053	GTO3	22 03	
054	2	02	
055	5	05	
056	0	00	

STEP	KEY ENTRY	KEY CODE	COMMENTS
057	0	00	
058	0	00	
059	-	-45	
060	2	02	
061	2	02	
062	%	55	
063	5	05	
064	0	00	
065	0	00	
066	0	00	
067	+	-55	
068	PRTX	-14	
069	R/S	51	
070	*LBL3	21 03	
071	5	05	
072	0	00	
073	0	00	
074	0	00	
075	0	00	
076	-	-45	
077	4	04	
078	8	08	
079	%	55	
080	1	01	
081	0	00	
082	5	05	
083	0	00	
084	0	00	
085	+	-55	
086	PRTX	-14	
087	R/S	51	
090			
100			
110			

FLAGS	SET STATUS		
0	FLAGS	TRIG	DISP
1	ON OFF 0 ☐ ☐ 1 ☐ ☐ 2 ☐ ☐ 3 ☐ ☐	DEG ☐ GRAD ☐ RAD ☐	FIX ☒ SCI ☐ ENG ☐ n 2
2			
3			

REGISTERS

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

Program Description I

Program Title Working Capital Needs - Bardahl Formula

Contributor's Name Hewlett-Packard

Address 1000 N.E. Circle Blvd.

City Corvallis **State** Oregon **Zip Code** 97330

Program Description, Equations, Variables

This program determines the working capital needs of a business for advoidance of Tax on unreasonable accumulation of earnings by a corporation. Working capital needs are determined by application of the "Bardahl Formula" defined by the courts and recognized by the Internal Revenue Service. This "formula" determines the amount required to cover expenses for one operating cycle, or the time required to convert inventory to sales and sales (accts receivable) to cash.

$$\frac{I_1 + I_2}{2C} \times 365 = T_i$$

$$\frac{A_1 + A_2}{2S} \times 365 = T_A$$

$$\frac{T_A + T_i}{365} \times E = W$$

I_i = Beginning inventory

I_2 = Ending inventory

C = Cost of sales (annual)

A_1 = Beginning A/C receivable

A_2 = Ending A/C receivable

S = Sales (annual)

E = Annual operating expenses including cost of sales excluding depreciation + Inc. Taxes

T = Turnover in days

W = Working capital needs

Operating Limits and Warnings

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Program Description I

Program Title Working Capital Needs - Bardahl Formula

Contributor's Name Hewlett-Packard

Address 1000 N.E. Circle Blvd.

City Corvallis **State** Oregon **Zip Code** 97330

Program Description, Equations, Variables

Bardahl Formula Worksheet

1. Operating expense for full year including cost of goods sold $_____

   Less:

   Depreciation included in Line 1 $_____

   Federal income taxes included in Line 1 $_____

2. Operating expense for year as adjusted $_____

3. Operating business cycle

   (a) Cost of goods sold

   (b) Average inventory $_____

   Inventory at beginning of year plus Inventory at end of year Divided by 2 $_____

   (c) Line (b) divided by Line (a) Multiplied by 365 = Inventory Turnover $_____

   (d) Net sales for year $_____

   (e) Average accounts receivable

   Receivables at end of year Divided by 2 $_____

   (f) Line (e) divided by Line (d) multiplied by 365 = Accounts Receivable Turnover $_____

   (g) Add Lines (c) and (f) = days in Operating Cycle $_____

   (h) Divide Line (g) by 365 = Operating Cycle expressed as percentage of year $_____

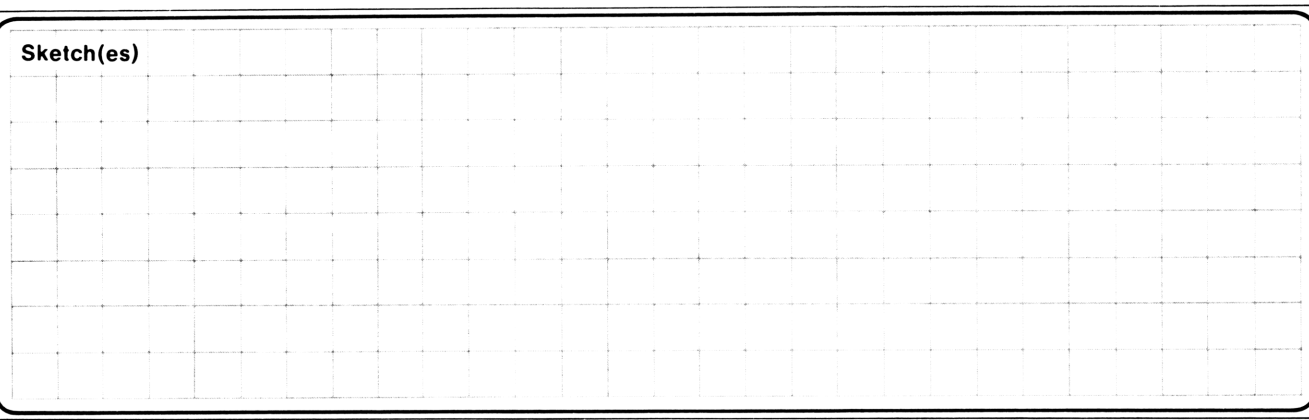
4. Multiply Line 2 by Line 3(h) - Amount of working capital needs for one cycle $_____

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Program Description II

Sketch(es)



Sample Problem(s)

Annual operating expenses	105,234
Depreciation	9,641
Taxes	4,215
Annual cost of goods sold	57,241
Annual sales	247,321
Inventory - beginning	15,123
- end	18,765
A/C Receivable - beginning	25,123
- end	29,678

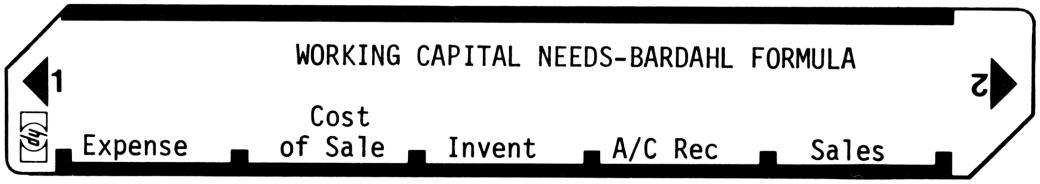
Solution(s)

```
[F] [A] 105234[A] 9641[A] 4215[A]
57241[B] 247321[E]
15123[C] 18765[C]
25123[D] 29678[D]
[F] [E] ---------------------->   37172.65    Working capital needs
[x≷y]  ---------------------->       0.41    Operating cycle - demand
[RCL] [9] ------------------->     108.04    Inventory cycle - days
[RCL] [8] ------------------->      40.44    A/C Rec. cycle - days
```

Reference(s) Internal Revenue Code Sec 531 and related regulations.

This program is a translation of the HP-65 Users' Library program #05120A.

User Instructions



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1.	Load side 1				
2.	Initialize (reset)		f	A	0.00
3.	Enter data (in any sequence)				
	a) Operating expense for year (incl. cost of sales)	Exp	A		
	Optional - Eliminate Depreciation	Deprecn.	A		
	- Eliminate Income	Tax	A		
	b) Cost of goods sold - per year	Cost	B		
	c) Inventories - beginning	Invent.-beg	C		
	- ending	Invent.-end	C		
	d) A/C receivable - beginning	A/CRec-beg	D		
	- end	A/CRec-end	D		
	e) Annual Sales	Sales	E		
4.	Calculate Working Capital Needs		f	E	Working Capital
	(Flashing Zeroes indicate missing data)				
5.	Recall calculated data				
	a) Operating cycle (as % of year)		g	x≷y	Operating Cycle
	b) Inventory cycle (Turnover period in days)		RCL	9	Inventory Cycle
	c) A/C Receivable cycle (Turnover period in days)		RCL	8	A/C Rec Cycle
6.	To change data to to step 3 a) b) c) or d)				
7.	For entirely new case go to step 2				

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	
002	STO1	35 01	
003	RTN	24	
004	*LBLA	21 11	
005	ST-1	35-45 01	Store and accumulate data
006	RTN	24	
007	*LBLA	21 11	
008	ST-1	35-45 01	
009	RTN	24	
010	*LBLB	21 12	
011	STO2	35 02	
012	RTN	24	
013	*LBLC	21 13	
014	STO3	35 03	
015	RTN	24	
016	*LBLC	21 13	
017	STO4	35 04	
018	RTN	24	
019	*LBLD	21 14	
020	STO6	35 06	
021	RTN	24	
022	*LBLD	21 14	
023	STO7	35 07	
024	RTN	24	
025	*LBLE	21 15	
026	STO5	35 05	
027	RTN	24	
028	*LBLe	21 16 15	
029	RCL1	36 01	Test for complete input data
030	X≠0?	16-42	
031	RCL2	36 02	
032	X≠0?	16-42	
033	RCL3	36 03	
034	X≠0?	16-42	
035	RCL4	36 04	
036	X≠0?	16-42	
037	RCL5	36 05	
038	X≠0?	16-42	
039	RCL6	36 06	
040	X≠0?	16-42	
041	RCL7	36 07	
042	X=0?	16-43	
043	GTO9	22 09	Error-missing data
044	RCL3	36 03	
045	RCL4	36 04	Average inventory
046	+	-55	
047	2	02	
048	÷	-24	
049	RCL2	36 02	Cost of goods sold
050	÷	-24	
051	3	03	
052	6	06	
053	5	05	
054	STO8	35 08	Inventory cycle in days
055	x	-35	
056	STO9	35 09	
057	RCL6	36 06	Average A/C Recble
058	RCL7	36 07	
059	+	-55	
060	2	02	
061	÷	-24	
062	RCL5	36 05	Sales
063	÷	-24	
064	RCL8	36 08	Recall 365
065	x	-35	A/C recble cycle in days
066	STO8	35 08	Total cycles
067	+	-55	
068	3	03	
069	6	06	Convert to decimal of year
070	5	05	
071	÷	-24	
072	ENT↑	-21	
073	ENT↑	-21	Annual operating expense
074	RCL1	36 01	
075	x	-35	
076	RTN	24	
077	*LBLa	21 16 11	
078	CLRG	16-53	
079	0	00	
080	RTN	24	
081	R/S	51	

090

100

110

SET STATUS

FLAGS	ON	OFF	TRIG		DISP	
0	☐	☒	DEG	☒	FIX	☒
1	☐	☒	GRAD	☐	SCI	☐
2	☐	☒	RAD	☐	ENG	☐
3	☐	☒			n 2	

REGISTERS

0	1 Op.exp.	2 Cost	3 Inv-beg	4 Inv-end	5 Sales	6 A/C-beg	7 A/C-end	8 Used	9 Used
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9

A	B	C	D	E	I

NOTES

NOTES

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