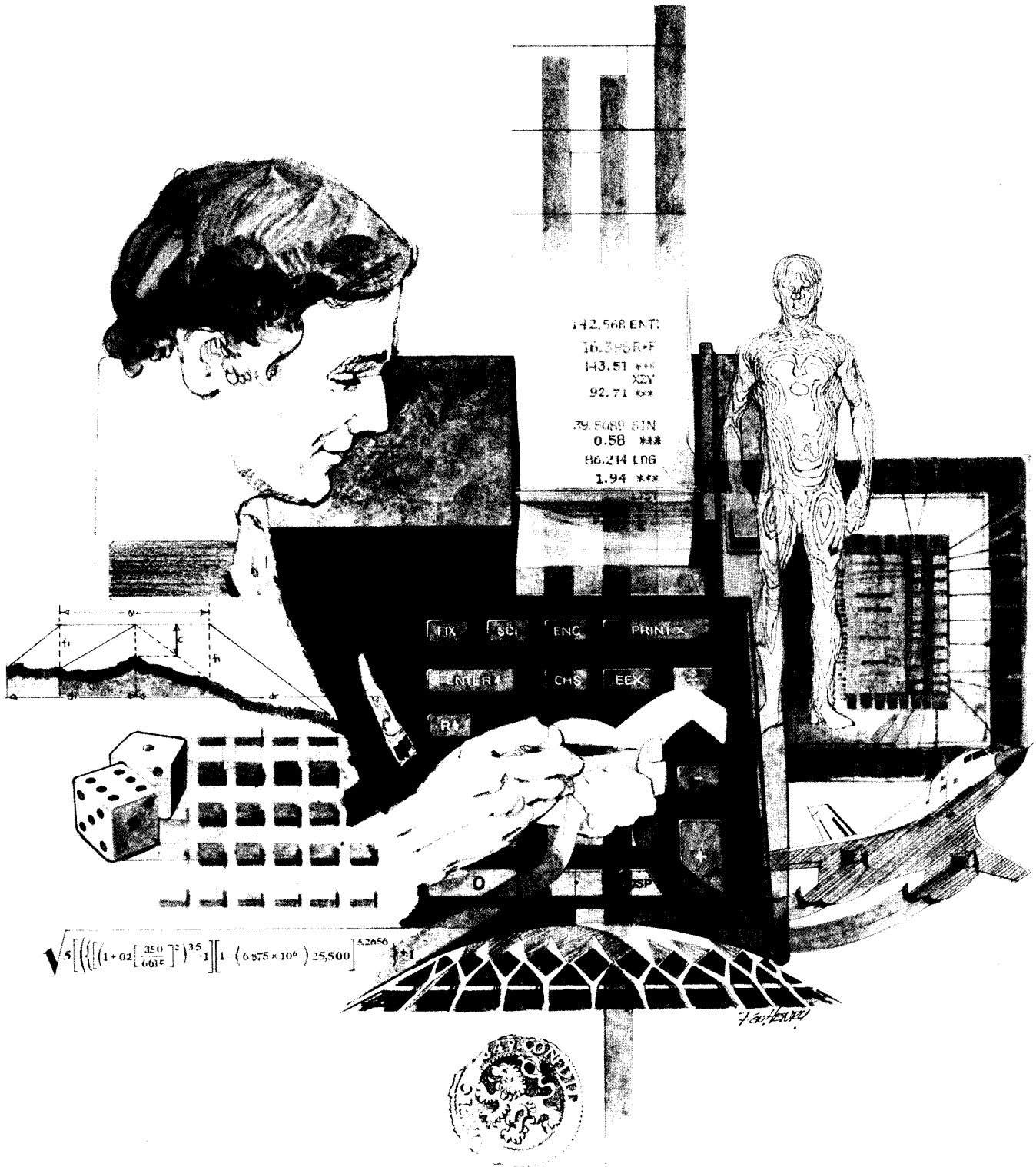# HP-67/HP-97

Users' Library Solutions

Home Construction Estimating

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

Program Description I

Program Title   CONCRETE VOLUME

Contributor's Name   Hewlett-Packard, Corvallis Division

Address   1000 N. E. Circle Blvd.

City   Corvallis   **State** OR   **Zip Code**   97330

Program Description, Equations, Variables   Given dimensions of an area of concrete to be poured in feet and/or inches computes the cubic yard volume of concrete required maintains a running sum of all concrete to be required when dimensions are complex or sub-divided.

Operating Limits and Warnings

Program Description II

Sketch(es)

Sample Problem(s) Given a footing for a building with the following dimensions:

20" wide 15" deep 78'6" long

20" wide 15" deep 54'6" long

20" wide 9" deep 64' long

24" wide 12" deep 39'3" long

Calculate the total cubic yards required

Given a slab of concrete with the following dimensions

4" deep 10'6" wide 106'10" long

Calculate the total cubic yards required

Solution(s) .20[A] .15[B] 78.06[C] [E] → 6.06 cu. yds.

54.06[C] [E] → 4.21 cu. yds.

.09[B] 64   [C] [E] → 2.96 cu. yds.

.24[A] .12[B] 39.03[C] [E] → 2.91 cu. yds.

[D] → 16.13 Total cu. yds.

[f][A].04[A]10.06[B]106.10[C] [E] → 13.85 Total cu. yds.

User Instructions

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Insert card				
2	Input				
	Depth	fff.ii	A		YY.YYY
	Width	fff.ii	B		YY.YY
	Length	fff.ii	C		YY.YY
3	Calculate		E		cu. yds.
4	Repeat step 2&3 for changes only for all areas with different dimensions.				
5	Press D for sum total of cubic yards needed		D		Σ Cu. yds.
6	To initialize for new total		F	A	
	NOTE: It is only necessary to enter only those dimensions which are different from previous dimensions in repeat calculations.				

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	Convert depth to yards from foot and inches and store in Register 1
002	ENT↑	-21	
003	FRC	16 44	
004	.	-62	
005	1	01	
006	2	02	
007	÷	-24	
008	X≷Y	-41	
009	INT	16 34	
010	+	-55	
011	3	03	
012	÷	-24	
013	STO1	35 01	
014	RTN	24	
015	*LBLB	21 12	Convert width to yards from feet and inches and store in Register 2
016	ENT↑	-21	
017	FRC	16 44	
018	.	-62	
019	1	01	
020	2	02	
021	÷	-24	
022	X≷Y	-41	
023	INT	16 34	
024	+	-55	
025	3	03	
026	÷	-24	
027	STO2	35 02	
028	RTN	24	
029	*LBLC	21 13	Convert length to yards from feet and inches and store in Register 3
030	ENT↑	-21	
031	FRC	16 44	
032	.	-62	
033	1	01	
034	2	02	
035	÷	-24	
036	X≷Y	-41	
037	INT	16 34	
038	+	-55	
039	3	03	
040	÷	-24	
041	STO3	35 03	
042	RTN	24	
043	*LBLE	21 15	Calculate cubic yards and add to total in Register 4
044	RCL1	36 01	
045	RCL2	36 02	
046	RCL3	36 03	
047	×	-35	
048	×	-35	
049	ST+4	35-55 04	
050	RTN	24	
051	*LBLD	21 14	Display contents of Register 4
052	RCL4	36 04	
053	RTN	24	
054	*LBLa	21 16 11	Initialize
055	CLRG	16-53	
056	RTN	24	

STEP	KEY ENTRY	KEY CODE	COMMENTS
057	R/S	51	
060			
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 D	2 W	3 L	4 Σ	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 LINEAR TO BOARD FEET CONVERSION AND COSTING

Contributor's Name   Hewlett-Packard, Corvallis Division

Address 1000 N. E. Circle Blvd.

City Corvallis **State** OR **Zip Code** 97330

Program Description, Equations, Variables

This program will convert linear feet to board feet for any size lumber as specified, and will compute a cost based on a specified unit cost. Conversion may be done repeatedly with several sizes of lumber, with total board feet and cost accumulated. A waste factor may be used with these totals if desired.

Multiplicative Board Feet Factor: $F = \dfrac{a \times b}{12}$

   where a and b are the two dimensions of the lumber

$\text{Cost} = \text{units} \times \dfrac{\text{cost}}{\text{unit}}$

Totals are displayed with no decimal component, as that would imply an accuracy not present in the original input.

Operating Limits and Warnings   This program does not check for negative input.

Program Description II

Sketch(es)

Sample Problem(s)

You are costing a building project that includes the following quantities of lumber, with sizes and costs as specified.

Size	Cost/BF	Quantity
2x4	$0.265	3256 LF
2x6	.257	2665
2x12	.27	339
1x5 pine	.46	850

Compute the cost and quantity sub-totals and totals. Incorporate a waste factor of 25% for all lumber.

Solution(s)

[f][A] 25[f] [B]	→	1.25 Waste Factor
2[ENT ↑] 4[A] .265[B] 3256[C]	→	2713 Board ft.
[D]	→	719 Cost
2[ENT ↑] 6[A] .257[B] 2665[C]	→	3331 Board ft.
[D]	→	856 Board ft.
2[ENT ↑] 12[A] .27[B] 339[C]	→	848 Board ft.
[D]	→	229 Cost
1[ENT ↑] 5[A] .46[B] 850[C]	→	443 Board ft.
[D]	→	204 Cost

Reference(s)

[E]		7335 Total Board feet
[R/S]		2008 Total cost

THIS PROGRAM IS A TRANSLATION OF THE HP-65 USERS' LIBRARY PROGRAM #01583A

SUBMITTED BY JAN ERIK MOLLO-CHRISTENSEN

CLEAR WASTE

◀1   a↑ b→   COST →   LF →   COMPUTE COST   COMPUTE TOTALS   2▶

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	For new series of conversions or in case of				
	erroneous input in C or D Sets waste factor		f	A	1
	to 1.				
3	Enter dimensions of lumber	a	↑		
	(example: 2x4 a=2 b=4)	b	A		
	(error: repeat w/correct data)				
4	Enter Unit Cost in dollars (23¢ = .23)	cost	B		
	(error: repeat w/correct data)				
5	Enter Linear Feet, convert to BF	LF	C		B.F.
	(error will disturb D and E)				
6	Compute cost		D		Cost
7	Return to Step 5 for conversion of				
	additional LF of same dimensions.				
or					
7	Return to Step 3 for conversion of				
	different size lumber				
or					
7	Compute totals		E		total BF
			R/S		total cost
	This step may be executed at any time				
	during a series of conversions without				
	disturbing anything.				
8	To enter a waste factor for computations.	%	f	B	
	This step must be done prior to Steps 5				
	and 6, but can be executed for each size				
	lumber.				

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	Computes BF factor				
002	x	-35					
003	1	01					
004	2	02		060			
005	÷	-24					
006	STO1	35 01					
007	DSP2	-63 02					
008	RTN	24					
009	*LBLB	21 12	Stores unit cost				
010	STO2	35 02					
011	RTN	24					
012	*LBLC	21 13	LF to BF				
013	RCL1	36 01					
014	x	-35		070			
015	RCL5	36 05					
016	x	-35					
017	ST+3	35-55 03	Accumulates				
018	DSP0	-63 00					
019	RTN	24					
020	*LBLD	21 14	Computes cost				
021	RCL2	36 02					
022	x	-35					
023	ST+4	35-55 04	Accumulates				
024	RTN	24		080			
025	*LBLE	21 15					
026	DSP0	-63 00					
027	RCL3	36 03	Total BF				
028	R/S	51	Total cost				
029	RCL4	36 04					
030	RTN	24					
031	*LBLa	21 16 11	Initialize				
032	DSP2	-63 02					
033	CLRG	16-53					
034	1	01		090			
035	STO5	35 05					
036	RTN	24					
037	*LBLb	21 16 12	Enter waste factor				
038	DSP2	-63 02					
039	1	01					
040	0	00					
041	0	00					
042	÷	-24					
043	1	01		100			
044	+	-55					
045	STO5	35 05					
046	RTN	24					
047	R/S	51					
050							
				110			

SET STATUS

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

REGISTERS

0	1 BF factor	2 unit cost	3 cum. BF	4 cum. cost	5 Waste factor	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 FRAMING BOARD FEET

Contributor's Name Hewlett-Packard, Corvallis Division

Address 1000 N. E. Circle Blvd.

City Corvallis **State** OR **Zip Code** 97330

Program Description, Equations, Variables Finds Board Feet in Standardized Dwelling. For 8, 2x4 boards 8 ft. long. The number of board ft. is $\frac{8 \times 2 \times 4 \times 8}{12}$ = 42 2/3. This formula is reduced as much as possible for each item <u>before</u> it is incorporated into the program. The program assumes the following sizes of boards: Girder, 3-2x6xL_1; Sill, 1-2x6x perimeter; rafters, 2x6 (see below); collar beams (1/3 as many as rafters), 2x6x1/2 width; joists, 2x8xwidth (see below); header, 1-2x8xL_1; Ridge board, 1-2x8xL_2; Bridging, 1-1x4x6 times L_1; Plates, 1-2x4x3 times (perimeter plus intervals); studs, 2x4x8' (see below); gable studs, 2x4 (see below).

16" spacing is assumed for rafters, joists and studs.

Rafter length, including waste, for 1/4 pitch is 1.27 of width (considers eave).

Wall studs for entire building (includes corners, doors, etc.) is assumed to be one stud per linear foot. The length of the gable studs, for 1/4 pitch, is assumed to be 1/4 of the width. The waste from one end is used for the other end.

Operating Limits and Warnings Dwelling assumed to have: One story, one-foot eaves, 1/4 pitch, rectangular configuration, and above sizes.

The program does not consider that lumber comes in lengths of multiples of 2 ft.

This is an <u>estimate only</u>. Other methods may differ slightly. For one thing, methods of determing waste differ.

Program Description II

Sketch(es)

47' — L_1

30

living space

200' Interior walls

garage

width

63' — L_2

Not to scale

Sample Problem(s)   Estimate the board feet in the frame of the above dwelling.

Solution(s)   47[A] 63[B] 30[C] 200[D]   →   9289.34

Answer: 9,289.34 BF

Reference(s)   THIS PROGRAM IS A TRANSLATION OF THE HP-65 USERS' LIBRARY PROGRAM #04577A
SUBMITTED BY CHET LANGIN.

FRAMING   BOARD   FEET

◀1   2▶

L₁   L₂   Width   Int.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	Enter L_1		A		
3	Enter L_2		B		
4	Enter Width		C		
5	Enter linear feet of interior walls for new		D		Board Feet
	problem, go to 2				
	Please note:				
	L_1 is the length excluding garage, if any				
	L_2 includes garage, if any				

12

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	Finds Board Feet for:	057	×	-35	
002	ST04	35 04		058	+	-55	
003	6	06		059	RCL6	36 06	
004	.	-62		060	GSBE	23 15	Gable studs
005	3	03	Girder, header and bridging	061	RCL6	36 06	
006	3	03		062	4	04	
007	×	-35		063	÷	-24	
008	RTN	24		064	×	-35	
009	*LBLB	21 12		065	.	-62	
010	ST05	35 05		066	6	06	
011	1	01		067	7	07	
012	.	-62	Ridge board	068	×	-35	
013	3	03		069	+	-55	
014	3	03		070	RTN	24	
015	×	-35		071	*LBLD	21 14	
016	+	-55		072	RCL7	36 07	Plates
017	RTN	24		073	+	-55	
018	*LBLC	21 13		074	ST08	35 08	
019	ST06	35 06		075	2	02	
020	RCL5	36 05	Sill	076	×	-35	
021	+	-55		077	+	-55	
022	2	02		078	RCL8	36 08	Studs
023	×	-35		079	5	05	
024	ST07	35 07		080	.	-62	
025	+	-55		081	3	03	
026	RCL6	36 06		082	3	03	
027	1	01		083	×	-35	
028	.	-62	Rafters	084	+	-55	
029	2	02		085	RTN	24	
030	7	07		086	*LBLE	21 15	Finds number of pieces of rafters, joists, and gable studs
031	×	-35		087	.	-62	
032	RCL5	36 05		088	7	07	
033	GSBE	23 15		089	5	05	
034	ST08	35 08		090	×	-35	
035	×	-35		091	2	02	
036	+	-55		092	+	-55	
037	RCL8	36 08	Collar beams	093	INT	16 34	
038	3	03		094	RTN	24	
039	÷	-24		095	R/S	51	
040	RCL6	36 06					
041	2	02					
042	÷	-24					
043	×	-35					
044	+	-55		100			
045	RCL4	36 04					
046	GSBE	23 15	Joists				
047	RCL8	36 08					
048	+	-55					
049	RCL6	36 06					
050	2	02					
051	+	-55					
052	×	-35					
053	1	01		110			
054	.	-62					
055	3	03					
056	3	03					

SET STATUS

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

REGISTERS

0	1	2	3	4 L_1	5 L_2	6 Width	7 Perimeter	8 Used	9
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A	B	C	D	E		I			

Program Description I

Program Title   LUMBER ESTIMATE

Contributor's Name   Hewlett-Packard, Corvallis Division

Address   1000 N. E. Circle Blvd.

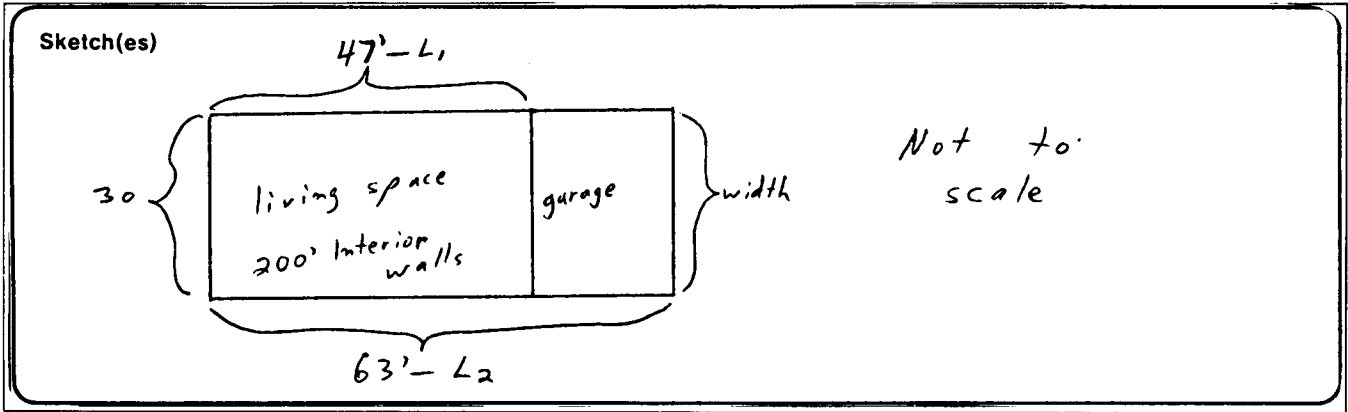**City**   Corvallis   **State**   OR   **Zip Code**   97330

Program Description, Equations, Variables   ESTIMATES MATERIAL COST, LABOR COST AND TOTAL COST OF ROUGH CARPENTRY.   USER MUST SUPPLY LOCAL LUMBER COSTS AND LOCAL LABOR RATE. ALSO DETERMINES NUMBER OF STUDS, AND JOISTS.   MAY BE USED IN CONJUNCTION WITH OTHER ESTIMATE PROGRAMS FOR ESTIMATING THE COSTS OF ALL THE ASPECTS OF A STRUCTURE.

A BOARD FOOT REPRESENTS THE VOLUME 1" x 12" x 12".

BF = (WIDTH IN INCHES X THICKNESS IN INCHES X LENGTH IN FEET) $\div$ 12

"SPACING" IS THE DISTANCE FROM THE CENTER OF A STUD, JOIST OR RAFTER TO THE CENTER OF THE ADJACENT STUD, JOIST OR RAFTER.   "PIECES" REFERS TO THE NUMBER OF STUDS, JOISTS OR RAFTERS.

PCS = [LENGTH X (12/SPACING IN INCHES)] + 1

Operating Limits and Warnings   COSTS ARE ROUNDED TO THE NEAREST DOLLAR.   LABOR HOURS ARE ROUNDED INTERNALLY TO THE NEAREST 1/2 HOUR.   THE LABOR RATE MUST BE DELETED FROM THE PROGRAM AND THE LOCAL LABOR RATE PROGRAMMED IN.   ANY ERRORS MUST BE MANUALLY SUBTRACTED FROM THE INVOLVED REGISTERS.   Does not include nails.

Program Description II

Sketch(es)

Sample Problem(s) ESTIMATE THE COST OF ROUGH LUMBER FOR THE DWELLING WITH THE
FOLLOWING DATA:

living
16 X 14

Bed
12 X 14

Stairs

Bed
8 X 10

clst

Dining
20 X 14

Bath — 5 X 10

Kitchen

Bed
12 X 14

Garage
14 X 28

10X14
10
12
Stairs

Basement
40 X 28

8 18
32
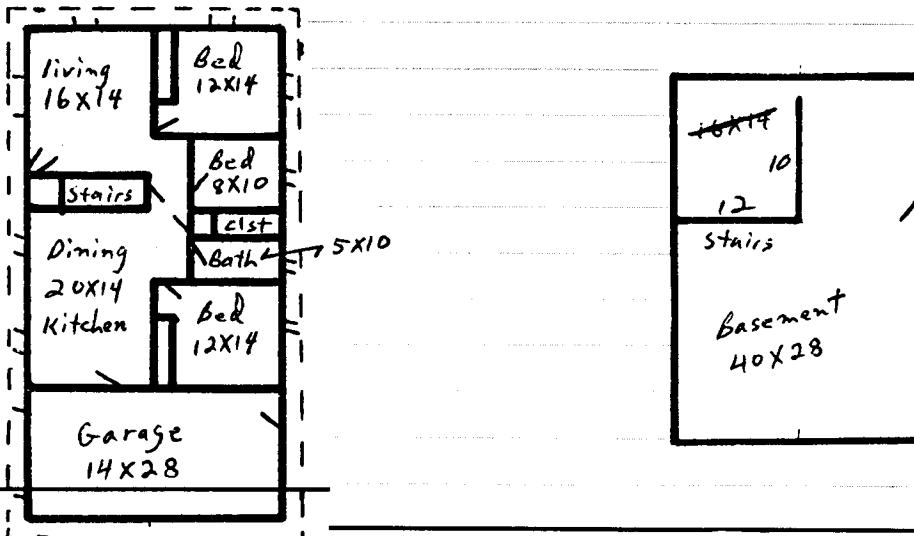
Plain gable roof

54 x 28 = 1,512 sq. ft.

40 x 28 = 1,120 sq. ft.

Circumference = 164 ft.

First floor interior walls = 177 ft.

Basement interior walls = 22 ft.

Interior walls = 199 ft.

Exterior height = 8 ft.; Interior height = 7 ft.
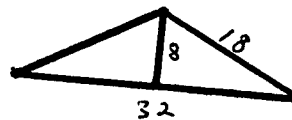
Pitch = 1/4

Eaves = 2 ft.

Reference(s) Thomas, Paul I., How to Estimate Building Losses and Construction Costs,
2nd Ed., Prentice-Hall, Inc., 1971, Chapter 9.

National Construction Estimator, 23rd Ed., 1975, Craftsman Book Co.

THIS PROGRAM IS A MODIFICATION OF THE USERS' LIBRARY PROGRAM #04056A
SUBMITTED BY CHET LANGIN.

Sketch(es)

Sample Problem(s)	BF	Cost	MAT.	Fac./Hrs.	LAB.	Total
Girder 2 x 6 x40-3		283.29		20/		
Sill 2 x 6x164-1		283.29		20/		
Floor Joists 2x8x16-		312.80		22/		
Joist Header 2x8x80-1		312.80		20/		
Bridging 1x4x240-1		251.45		80/		
Sole Plate 2x4x363-1		279.30		20/		
Wall studs 2x4x8-		279.30		25/		
Top plates 2x4x 726-		279.30		20/		
Gable Studs 2x4x8-		279.30		25/		
Ceiling Joists 2x8x16-		312.80		25/		
Rafters 2x6x18-		283.29		30/		
Ridge Board 2x8x54-1		312.80		30/		
Collar Beams 2x6x14-20		283.29		30/		

Solution(s)   Girder is 3 boards running length of basement.   Sill is 1 board around the perimeter.   Floor joists are 2 ft. longer than width.   Joist header is twice length of basement.   Bridging is 3 times length of basement times two sides.   Sole plate is length of all walls—ext. and int.   Top Plates are twice length of all walls. Ceiling joists same as floor joists.   Solve triangle for length of rafters.   Ridge board is length of structure.   Collar Beams are 1/2 width for each 2 or 3 rafters. Sizes of lumber vary for different structures.   Board lengths such as rafters, must be rounded up to be divisible by 2.

Reference(s)   Costs are for 1,000 BF.   The factors are the number of hours it takes on the average for a union carpenter to do 1,000 BF.   The labor rate for this example is $13.21/hr.

Program Description II

SOLUTION:

		BF	Mat	HRS	Lab	Tot
[f][CLREG]13.21						
[f][B]						
1440[B], 283.29[C], 20[D],[R/S][E] . . . Girder		120	34	2 1/2	33	67
1968 [B], 283.29[C], 20[D][R/S],[E] Sill		164	46	3 1/2	46	92
40[ENT↑], 16[A], 2 X . . . 62 pieces						
15872[B], 312.8[C], 22[D],[R/S], [E] . . Floor joists		1323	414	29	383	797

	BF	Mat	HRS	Lab	Tot
1280[B], 312.8[C], 20[D], [R/S], [E]. . . Joist Header	107	33	2	26	59
960[B], 251.45[C], 80[D],[R/S],[E]. . . . Bridging	80	20	6 1/2	86	106
2904[B], 279.3[C], 20[D],[R/S],[E]. . . . Sole Plate	242	68	5	66	134
54[ENT ↑], 16[A], 2 X . . . 84 pieces					
28[ENT ↑], 16[A], 2 X . . . 44 pieces					
*plus 227 = 355 pieces					
22720[B], 279.3[C], 25[D], [R/S],[E]. . . Studs	1893	529	47 1/2	627	1156
5808 [B], 279.3[C], 20[D] [R/S] [E] Top Plates	484	135	9 1/2	125	260
32[ENT ↑] 16[A] . . . . . . 25 pieces**					
1600[B] 279.3[C], 25[D], [R/S] [E] . . . . Gable Studs	133	37	3 1/2	46	83
40[ENT ↑], 16[A], 2 X . . . 62 pieces					
15872 [B], 312.8 [C], 25[D],[R/S], [E]. . . . . Ceiling J.	1323	414	33	436	850
54[ENT ↑], 16[A], 2 X . . . 84 pieces					
18144[B], 283.29[C], 30[D], [R/S], [E]. . Rafters	1512	428	45 1/2	601	1029
864[B], 312.8[C], 30[D], [R/S], [E] . . Ridge Board	72	23	2	26	49
3360[B], 283.29[C], 30[D], [R/S] [E]. . Col. Beams	280	79	8 1/2	112	191
[f][A]. . . . . Totals	7733	2260		2613	4873

*Use formula to determine number of studs on exterior walls, then add one stud for each foot of interior walls, one stud for each corner of building, and 2 studs for each exterior opening (doors and windows).

** For gable studs: The number of studs is not doubled because the waste from one end of the structure is used for the other end.

```
        TOTALS   LABOR   RATE
    1      LUMBER   ESTIMATE                              2
                                        LINE
       PCS      BF      MAT      LAB    TOTAL
```

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	ENTER PROGRAM				
2	INITIALIZE CARD				
		LABOR RATE	f	B	LABOR RATE
3	REPEAT 3-8 FOR EACH ITEM				
	(OPTIONAL: ENTER LENGTH	LENGTH	ENT ↑		
	ENTER SPACING)	SPACING	A		PCS
4	ENTER WIDTH X THICKNESS X LENGTH				
	X PIECES	WTLP	B		BF
5	ENTER UNIT COST PER 1,000 BF	COST	C		MAT.
6	ENTER LABOR FACTOR PER 1,000 BF	FACTOR	D		HOURS
7	FIND LABOR COST		R/S		LAB.
8	FIND LINE TOTAL		E		TOTAL
9	FOR TOTALS		f	A	
	BF TOTAL				BF
	MAT TOTAL				MAT
	LAB TOTAL				LAB
	MAT AND LAB TOTAL				TOTAL
10	ENTER NEXT CARD				
	OR				
	FOR NEW PROBLEM, GO TO 2				

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLA	21 11	
002	X≷Y	-41	
003	GSB0	23 00	Find number of
004	X≷Y	-41	pieces
005	1	01	
006	2	02	
007	X≷Y	-41	
008	÷	-24	
009	X	-35	
010	1	01	
011	.	-62	Internally
012	4	04	Round Up
013	+	-55	
014	GSB0	23 00	
015	RTN	24	
016	*LBL0	21 00	
017	.	-62	Internal
018	5	05	Rounding
019	+	-55	
020	INT	16 34	
021	RTN	24	
022	*LBLB	21 12	
023	1	01	Finds and stores
024	2	02	BF
025	÷	-24	
026	GSB0	23 00	
027	ST04	35 04	
028	ST+1	35-55 01	
029	RTN	24	
030	*LBLC	21 13	
031	RCL4	36 04	Finds and stores
032	X	-35	Mat.
033	EEX	-23	
034	3	03	
035	÷	-24	
036	GSB0	23 00	
037	ST05	35 05	
038	ST+2	35-55 02	
039	RTN	24	
040	*LBLD	21 14	
041	RCL4	36 04	
042	X	-35	Finds hours
043	EEX	-23	
044	3	03	
045	÷	-24	
046	2	02	
047	X	-35	
048	GSB0	23 00	Internally Rounds
049	2	02	to nearest 1/2 hr.
050	÷	-24	
051	R/S	51	
052	RCL0	36 00	Finds and stores
053	X	-35	labor cost
054	GSB0	23 00	
055	ST06	35 06	
056	ST+3	35-55 03	

STEP	KEY ENTRY	KEY CODE	COMMENTS
057	RTN	24	
058	*LBLE	21 15	
059	RCL5	36 05	Adds line total
060	RCL6	36 06	
061	+	-55	
062	RTN	24	
063	*LBLa	21 16 11	
064	RCL1	36 01	
065	RCL2	36 02	Totals
066	ENT↑	-21	
067	ENT↑	-21	
068	RCL3	36 03	
069	+	-55	
070	RCL3	36 03	
071	X≷Y	-41	
072	PRST	16-14	
073	RTN	24	
074	*LBLb	21 16 12	
075	ST00	35 00	Store labor rate
076	RTN	24	
077	R/S	51	
080			
090			
100			
110			

SET STATUS

FLAGS		TRIG	DISP
	ON OFF	DEG ☒	FIX ☒
0	☐ ☒	GRAD ☐	SCI ☐
1	☐ ☒	RAD ☐	ENG ☐
2	☐ ☒		n __2__
3	☐ ☒		

REGISTERS

0 Labor Rate	1 Total BF	2 Total MAT.	3 Total Labor	4 BF	5 MAT.	6 LABOR	7	8	9
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A	B		C		D	E		I	

Program Description I

Program Title   SHINGLE ESTIMATE

Contributor's Name   Hewlett-Packard, Corvallis Division

Address   1000 N. E. Circle Blvd.

City   Corvallis   **State**   OR   **Zip Code**   97330

Program Description, Equations, Variables   GIVEN CEILING AREA AND PITCH OF ROOF, FINDS ROOF AREA AND NUMBER OF SQUARES. ROUNDS INTERNALLY TO 1/3 SQUARE. GIVEN LOCAL COSTS AND LABOR RATES, FINDS MATERIAL COSTS, LABOR COSTS AND TOTAL COSTS. INTENDED TO BE USED IN CONJUNCTION WITH OTHER ESTIMATE PROGRAMS, BUT CAN BE USED INDEPENDENTLY.

PITCH = RISE/SPAN

TANGENT = PITCH X 2

ROOF AREA = SECANT TIMES CEILING AREA

ONE SQUARE = ONE HUNDRED SQUARE FEET

THREE BUNDLES = ONE SQUARE (SHINGLES ARE SOLD BY THE BUNDLE)
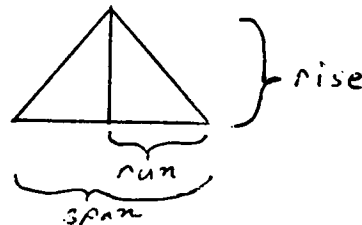
CAN ALSO BE USED TO DETERMINE RAFTER LENGTH:

RAFTER = SECANT TIMES RUN (ROUNDS TO NEAREST ONE FOOT)

Operating Limits and Warnings   ROUNDS INTERNALLY TO NEAREST $1, 1/2 HOUR, AND 1/3 SQUARE. WASTE MUST BE ADDED MANUALLY. CANNOT BE USED FOR BUILT-UP ROOFS. SHOULD NOT BE USED FOR ROLL ROOFING. THE LABOR RATE MUST BE ENTERED. ANY ERRORS MUST BE MANUALLY SUBTRACTED FROM THE INVOLVED REGISTERS.

Program Description II

Sketch(es) Dwelling size:

54' x 28'
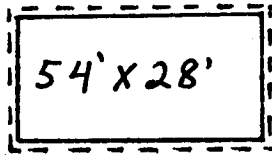
2' Eaves

plain gable roof

pitch = 1/4
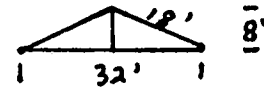
Ceiling Area = 58' x 32' = 1,856

Sample Problem(s) FOR THE DWELLING WITH THE ABOVE DIMENSIONS, FIND RAFTER LENGTH, ROOF AREA, NUMBER OF SQUARES, MATERIAL COST, LABOR COST, TOTAL COST OF ROOF, AND, CONTINUING FROM LUMBER ESTIMATE (1054D). FIND TOTAL COST AND TOTAL MATERIAL AND LABOR COSTS FOR THE ROUGH LUMBER AND ROOF.

SOLUTION: ENTER LUMBER ESTIMATE (1054D) AND FIND THE COSTS AS OUTLINED IN PROGRAM DESCRIPTION II OF THAT PROGRAM SUBMITTAL. (7,733 BF, $2,260 Material, $2,613 Labor, and $4,873 Total.) THE LABOR RATE IS $11.90/HR. FOR THIS EXAMPLE.

11.90 [f][B]	
1856 [ENT ↑], 1[ENT↑], 4[A]	ROOF AREA = 2,075 SQ. FT.
1.1 X . . .	ADD 10% WASTE = 2,282.5 SQ. FT.
[B] . . .	SQUARES = 23.00
24.45 (COST PER SQUARE)[C]. . .	MATERIAL = $562
2 (LABOR FACTOR) [D] . . .	HOURS = 46.00
[R/S] . . .	LABOR = $547
[E] . . .	TOTAL = $1,109

[f][A] . . .TOTALS INCLUDING ROUGH LUMBER: BF AND SQ. FT = 9,808 (USED LATER TO DETERMINE LBS. OF NAILS), MAT = $2,822, LAB = $3,160, TOTAL COST OF ROOF AND ROUGH LUMBER = $5,982.

RAFTER LENGTH = 16 (Run) [ENT↑] 1 [ENT↑] 4 [A] . . . 18 FT.

Reference(s) THOMAS, PAUL I., HOT TO ESTIMATE BUILDING LOSSES AND CONSTRUCTION COSTS, 2nd. Ed., PRENTICE-HALL, INC., 1971, CHAPT. 13. NATIONAL CONSTRUCTION ESTIMATOR, 1975, 23rd Ed., CRAFTSMAN BOOK CO., 542 STEVENS AVENUE, SOLANA BEACH, CA. 92075. THIS PROGRAM IS A MODIFICATION OF THE USERS' LIBRARY PROGRAM #04303A SUBMITTED BY CHET LANGIN.

User Instructions

```
TOTALS LABOR RATE
    SHINGLE   ESTIMATE
◄1          AREA      SQU        MAT      LABOR    LINE    2►
                                                   TOTAL
```

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	(Optional: Initialize series)		f	CL REG	
3	Enter labor rate for roofing	Rate	f	B	
4	Enter ceiling area	Area	ENT ↑		
5	Enter pitch	Pitch	ENT ↑	A	Area
6	Add Waste	%	X		
7	Find No. of squares		B		Squares
8	Enter unit cost per square	Cost	C		Mat.
9	Enter labor factor per square	Factor	D		Hrs.
10	Find labor cost		R/S		Lab.
11	Find cost of roof		E		Cost
12	Set for series total		f	A	
	Total BF and/or sq. ft.				BF/SF
	Total material				MAT.
	Total labor				Lab.
	Total cost of series				Total
	Enter next card				
	or				
	For new problem, go to 2				

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBL0	21 00		057	ST+3	35-55 03	
002	.	-62		058	ST06	35 06	
003	5	05	Rounds internally	059	RTN	24	Find line and column totals
004	+	-55		060	*LBLE	21 15	
005	INT	16 34		061	RCL5	36 05	
006	RTN	24		062	RCL6	36 06	
007	*LBLA	21 11	Secant times ceiling area	063	+	-55	
008	R↑	16-31		064	RTN	24	
009	R↑	16-31		065	*LBLa	21 16 11	Totals
010	X⇄Y	-41		066	RCL1	36 01	
011	R↓	-31		067	RCL2	36 02	
012	GSB0	23 00		068	ENT↑	-21	
013	ENT↑	-21		069	ENT↑	-21	
014	R↑	16-31		070	RCL3	36 03	
015	R↑	16-31		071	+	-55	
016	2	02		072	RCL3	36 03	
017	÷	-24		073	X⇄Y	-41	
018	÷	-24		074	PRST	16-14	
019	TAN⁻¹	16 43		075	RTN	24	
020	COS	42		076	*LBLb	21 16 12	Store labor rate
021	÷	-24		077	ST00	35 00	
022	GSB0	23 00		078	RTN	24	
023	ST+1	35-55 01		079	R/S	51	
024	RTN	24					
025	*LBLB	21 12	Rounds to nearest 1/3 square				
026	.	-62					
027	0	00					
028	3	03					
029	x	-35					
030	.	-62					
031	5	05					
032	+	-55					
033	GSB0	23 00		090			
034	3	03					
035	÷	-24					
036	ST04	35 04					
037	RTN	24					
038	*LBLC	21 13	Find Mat.				
039	RCL4	36 04					
040	x	-35					
041	GSB0	23 00					
042	ST+2	35-55 02					
043	ST05	35 05		100			
044	RTN	24					
045	*LBLD	21 14	Find nearest 1/2 hour				
046	RCL4	36 04					
047	x	-35					
048	2	02					
049	x	-35					
050	GSB0	23 00					
051	2	02					
052	÷	-24					
053	R/S	51	Find LAB.	110			
054	RCL0	36 00					
055	x	-35					
056	GSB0	23 00					

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

REGISTERS

0 Labor Rate	1 Sq. ft.	2 Mat. Total	3 LAB Total	4 Sqrs.	5 Mat.	6 Lab	7	8	9
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A	B		C	D		E		I	

Program Description I

Program Title WALL AND CEILING AREAS ESTIMATE

Contributor's Name   Hewlett-Packard, Corvallis Division

Address   1000 N. E. Circle Blvd.

City   Corvallis   **State** OR   **Zip Code** 97330

Program Description, Equations, Variables   Given dimensions of building and rooms and size of openings, finds ceiling area, wall area, total gross area, net wall area and total net area of each room and for the entire structure.

length times width = ceiling area

2 times length plus width times height = wall area

gross area less openings = net area

Operating Limits and Warnings   May only be used for rectangular rooms.

Program Description II

Sketch(es)

Not to scale

Windows:

7A - 2'10" X 4'8" = 13

1B - 2'2" X 3'4" = 7

1C - 4'6" X 4' = 18

Doors:

4D - 3' X 6'8" = 20

7E - 3' X 6'8" = 20

3F - 6' X 6'8" = 40

1G - 9' X 7' = 63
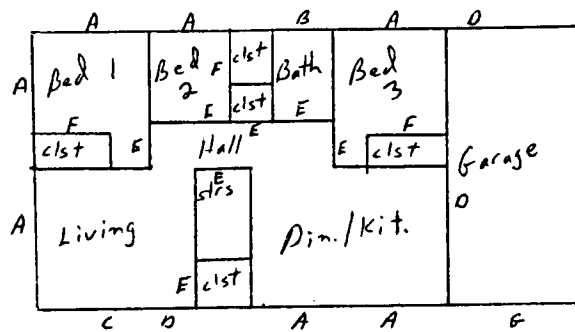
Int. height = 7' (Bath=6')

Ext. height = 8'

Sample Problem(s) For the dwelling illustrated above, after finding the cost for the framing in the program "LUMBER ESTIMATE" and the cost of the roof in the program "SHINGLE ESTIMATE," find the areas of the walls and ceilings without disturbing the essential registers in the "ESTIMATE" series. SOLUTION:

ROOM	SIZE	CEIL.	WALL	TOTAL	OPEN	WALL	TOTAL
BED1	12x14	168	364	532	86	278	446
CLST	8x3	(24)	154	(178)	40	114	(138)
BED2	8x10	80	252	332	73	179	259
CLST	3x7	21	140	161	40	100	121
CLST	3x3	9	84	93	20	64	73
BATH	5x10	50	180	230	27	153	203
BED3	12x14	168	364	532	86	278	446
CLST	8x3	(24)	154	(178)	40	114	(138)
LIV.	16x14	224	420	644	99	321	545
STRS.	4x10	40	196	236	20	176	216
CLST	4x4	16	112	128	20	92	108
HALL	16x4	64	280	344	204	76	140
D/K	20x14	280	476	756	102	374	654
GRG	14x28	392	588	980	103	485	877
S/T		1512	3764	5276	960	2804	4316
ext.	54x28	(1512)	1312	(2824)	219	1093	(2605)
tot.		1512	5076	6588	1179	3897	5409

Reference(s) THIS PROGRAM IS A MODIFICATION OF THE USERS' LIBRARY PROGRAM #04247A SUBMITTED BY CHET LANGIN.

Sketch(es)

Sample Problem(s) Solution cont. The keystrokes are as follows:

[f][E]

7[A]

12[ENTER], 14[B]168, [C]364, [E]532, 86[D]278, [E]446,

8[ENTER], 3[B]24, [R/S], [C]154, [E]178, 40[D]114, [E]138,

8[ENTER], 10[B]80, [C]252, [E]332, 73[D]179, [E]259,

3[ENTER], 7[B]21, [C]140, [E]161, 40[D]100, [E]121,

3[ENTER], 3[B]9, [C]84, [E]93, 20[D]64, [E]73,

6[A],

5[ENTER], 10[B]50, [C]180, [E]230, 27[D]153, [E]203,

7[A],

12[ENTER], 14[B]168, [C]364, [E]532, 86[D] 278, [E] 446,

8[ENTER], 3[B]24, [R/S], [C]154, [E]178, 40[D]114, [E]138,

16[ENTER], 14[B]224, [C]420, [E]644, 99[D]321, [E]545,

Solution(s) 4[ENTER], 10[B]40, [C]196, [E]236, 20[D]176, [E]216,

4[ENTER], 4[B]16, [C]112, [E]128, 20[D]92, [E]108,

16[ENTER], 4[B]64, [C]280, [E]344, 204[D]76, [E]140,

20 [ENTER], 14[B]280, [C]476, [E]756, 102[D]374, [E]654,

14 [ENTER], 28[B]392, [C]588, [E]980, 103[D]485, [E]877,

[f][A], 1512, 3764, 5276, 960, 2804, 4316,

8[A],

54[ENTER], 28[B]1512, [R/S], [C]1312, [E]2824, 219[D]1093, [E]2605,

[f][A]1512, 5076, 6588, 1179, 3897, 5409.

Reference(s) User may now continue with next program in the series, becuase the essential registers have NOT been changed.

User Instructions

```
┌─────────────────────────────────────────────────────────────┐
│  TOTALS                                    INIT              │
│◄1                                                        2►  │
│  Ⓢ  WALL & CEILING AREAS ESTIMATE                           │
│     HT.      CEILING   WALL      OPEN      TOTAL             │
└─────────────────────────────────────────────────────────────┘
```

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	Initialize		f	E	
3	Repeat 3-11 for each height				
4	Enter wall height	h	A		
5	Repeat 5-11 for all rooms of same height				
6	Enter length	l	ENTER		
7	Enter width	w	B		ceiling area
	(Optional: subtract ceiling area from				
	register if this area is included in another				
	computation.)		R/S		
8	Find gross wall area		C		gross wall area
9	Find gross ceiling and wall area		E		gross area
10	Enter area of openings	area	D		net wall area
	(Important: All openings for room must be				
	entered at once.)				
11	Find net ceiling and wall area		E		net area
12	For totals		f	A	
	Total ceiling area				
	Total gross wall area				
	Total gross area				
	Total openings				
	Total net wall area				
	Total net area				
	Enter next card of series,				
	OR				
	For new problem, go to 2				

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLe	21 16 15	
002	0	00	Initialize
003	STO6	35 06	
004	STO7	35 07	
005	STO8	35 08	
006	RTN	24	
007	*LBLA	21 11	Store height
008	STO9	35 09	
009	RTN	24	
010	*LBLB	21 12	Finds and stores
011	STO4	35 04	ceiling area
012	R↓	-31	
013	STO5	35 05	
014	R↑	16-31	
015	x	-35	
016	ST+7	35-55 07	
017	RTN	24	
018	ST-7	35-45 07	Subtracts ceiling
019	R/S	51	area from storage
020	*LBLC	21 13	Finds and stores
021	RCL4	36 04	wall area
022	RCL5	36 05	
023	+	-55	
024	2	02	
025	x	-35	
026	RCL9	36 09	
027	x	-35	
028	ST+8	35-55 08	
029	RTN	24	
030	*LBLE	21 15	Adds wall and
031	+	-55	ceiling areas
032	RTN	24	
033	*LBLD	21 14	Finds net wall area
034	ST+6	35-55 06	
035	-	-45	
036	RCL4	36 04	
037	RCL5	36 05	
038	x	-35	
039	-	-45	
040	RTN	24	
041	*LBLE	21 15	Finds net area
042	RCL4	36 04	
043	RCL5	36 05	
044	x	-35	
045	+	-55	
046	RTN	24	
047	*LBLa	21 16 11	Totals
048	RCL7	36 07	
049	PRTX	-14	
050	RCL8	36 08	
051	PRTX	-14	
052	+	-55	
053	PRTX	-14	
054	RCL6	36 06	
055	PRTX	-14	
056	RCL8	36 08	
057	-	-45	
058	CHS	-22	
059	PRTX	-14	
060	RCL7	36 07	
061	+	-55	
062	PRTX	-14	
063	RTN	24	
064	R/S	51	

SET STATUS

FLAGS		TRIG	DISP
	ON OFF		
0	☐ ☒	DEG ☒	FIX ☒
1	☐ ☒	GRAD ☐	SCI ☐
2	☐ ☒	RAD ☐	ENG ☐
3	☐ ☒		n __2__

REGISTERS

0	1	2	3	4 L	5 W	6 Open tot	7 Ceil tot	8 Wall tot	9 Ht
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A	B		C	D		E		I	

Program Description I

Program Title   WALLPAPER ESTIMATE

Contributor's Name   Hewlett-Packard, Corvallis Division

Address   1000 N.E. Circle Blvd.

City   Corvallis   **State**   OR   **Zip Code**   97330

Program Description, Equations, Variables   Given areas to be papered, size of rolls, cost of roll, finds number of rolls, material cost, number of hours, labor cost and total cost. Intended to be used with other estimate programs, but may be used separately.

Operating Limits and Warnings   Local labor rate must be entered. Prices rounded to dollars. Hours rounded to nearest one-half.

Program Description II

Sketch(es)

Bedroom # 2:
8' X 10' X 7'

Window A = 2'10" X 4'8" = 13 S.F.
Door E = 3' 0" X 6'8" = 20 S.F.
Door F = 6' 0" X 6'8" = 40 S.F.
Total Openings = 73 S.F.
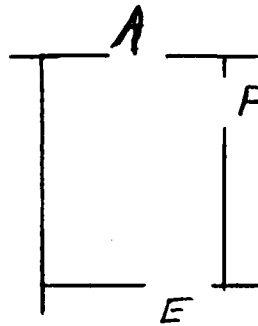
Areas:
Ceiling = 80 S.F.
Gross Wall = 252 S.F.
Net Wall = 179 S.F.
Gross Total = 332 S.F.
Net Total = 259 S.F.

Sample Problem(s) Continuing the construction estimate of the house illustrated in
Program Description II of <u>Lumber Estimate</u> (1054D), <u>Wall and Ceiling Areas</u>
<u>Estimate</u> (1056D), and <u>Shingle Estimate</u> (1055D), find the material cost of
wallpapering the walls and ceiling of Bedroom #2. Also, find the labor hours,
the labor cost, the total cost for wallpaper, and the total cost for the framing,
shingles and wallpaper. As determined in the other programs, the total board
feet and square feet of lumber and shingles is 9,808 (used later to determine
pounds of nails.) The cost of the lumber and shingles, as previously deter-
mined, is: $2,789 for material, $3,160 for labor, and $5,949 total. The areas
of the room was determined, with the areas of the other rooms of the house,
with the use of program 1056D. Use 30 square feet of wallpaper per roll.
Use $3.25 rolls on the ceiling and $6.50 rolls on the walls. Use a labor rate of
3 rolls per hour and $11.83 per hour.

Solution(s) Keystrokes: 11.83[f][B], 80[ENT ↑], 30[A]→ 3 (rolls for ceiling), 3.25
B → 10 (cost of ceiling paper), 3[C] → 1 (hour), [D] → 12 (cost of ceiling labor),
[E] → 22 (cost of ceiling), 179[ENT ↑], 30[A]6 (rolls for walls), 6.5[B]39 (cost
of wall paper), 3[C] → 2 (hours), [D]24 (cost of wall labor), [E] → 63 (cost for
wall), [f], [A] → 9808 (board feet of lumber and square feet of shingles left
undisturbed), 2838 (material cost for lumber, shingles and paper), 3196 (labor
cost for lumber, shingles and paper), 6034 (total cost for lumber, shingles and
paper.)

Reference(s) THIS PROGRAM IS A MODIFICATION OF THE USERS' LIBRARY PROGRAM #04427A
SUBMITTED BY CHET LANGIN.

User Instructions

TOTALS   LABOR RATE

WALLPEPER   ESTIMATE

◀1   2▶

ROLLS   MAT.   LABOR HR. LABOR COST   TOTAL

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	(Optional: Initialize series		f	CL REG	
3	Enter labor rate for wall papering	Rate	f	B	Rate
4	Enter net area	Area	ENT ↑		
5	Enter coverage per roll	Coverage	A		# Rolls
6	Enter cost per roll	Cost	B		Total Cost
7	Enter rolls per hour	Rolls	C		Hours
8	Find labor cost		D		Labor
9	Find labor plus material cost		E		Cost
10	Repeat 3-9 as necessary				
11	Series total		f	A	
	Total BF and/or SF				BF/SF
	Total material				Mat.
	Total labor				Lab.
	Total cost of series				Total
12	Enter next card				
	or				
	For new problem, go to 2				

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBL0	21 00	Rounds internally	057	FRST	16-14	
002	.	-62		058	RTN	24	
003	5	05		059	*LBLb	21 16 12	Store labor rate
004	+	-55		060	ST00	35 00	
005	INT	16 34		061	RTN	24	
006	RTN	24		062	R/S	51	
007	*LBLA	21 11	Finds # rolls				
008	X≵Y	-41					
009	GSB0	23 00					
010	X≵Y	-41					
011	÷	-24					
012	.	-62	Rounds up				
013	4	04					
014	9	09		070			
015	+	-55					
016	GSB0	23 00					
017	ST04	35 04					
018	RTN	24					
019	*LBLB	21 12	Finds and stores material cost				
020	RCL4	36 04					
021	x	-35					
022	GSB0	23 00					
023	ST+2	35-55 02		080			
024	ST06	35 06					
025	RTN	24					
026	*LBLC	21 13	Finds and rounds labor to 1/2 hour				
027	RCL4	36 04					
028	X≵Y	-41					
029	÷	-24					
030	2	02					
031	x	-35					
032	GSB0	23 00					
033	2	02		090			
034	÷	-24					
035	RTN	24					
036	*LBLD	21 14	Local labor rate				
037	RCL0	36 00					
038	x	-35					
039	GSB0	23 00					
040	ST07	35 07	Finds and stores labor cost				
041	ST+3	35-55 03					
042	RTN	24					
043	*LBLE	21 15	Finds labor and material total	100			
044	RCL6	36 06					
045	RCL7	36 07					
046	+	-55					
047	RTN	24					
048	*LBLa	21 16 11	Totals				
049	RCL1	36 01					
050	RCL2	36 02					
051	ENT↑	-21					
052	ENT↑	-21					
053	RCL3	36 03		110			
054	+	-55					
055	RCL3	36 03					
056	X≵Y	-41					

SET STATUS

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

REGISTERS

0 Labor Rate	1 BF/SF	2 Mat. Total	3 Labor Total	4 Rolls	5	6 Mat.	7	8	9
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A		B		C		D		E		I	

Program Description I

Program Title   DRYWALL AND INSULATION ESTIMATE

Contributor's Name   Hewlett-Packard, Corvallis Division

Address   1000 N. E. Circle Blvd.

City   Corvallis   **State** OR   **Zip Code** 97330

Program Description, Equations, Variables   Given area, item cost, and labor factor, finds material cost, labor hours, labor cost, and total cost for drywall and insulation. Intended for use with other estimate programs, but may be used separately.

Operating Limits and Warnings   Local carpenter rate and painter rate must be entered. Rounds money to nearest one dollar. Rounds labor to nearest one-half hour.
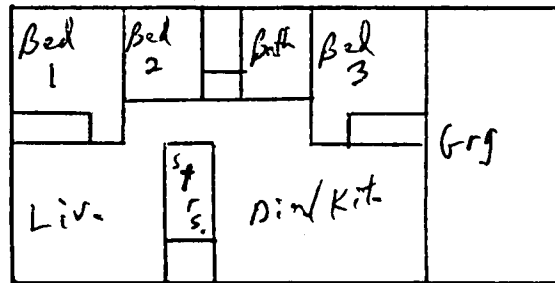
Program Description II

Sketch(es)

Note: Areas
found using
wall and
Ceiling areas
Estimate
(04247A)

Bed 1 Bed 2 Bath Bed 3

Liv. St rs. Din/Kit Grg

Gross area = 4296 S.F.
Openings = 857 S.F.
Net area = 3439 S.F.
Basement = 176 S.F.
Drywall 3615 S.F.
Wall Ins. 932 S.F.
Ceil. Ins. 1120 S.F.

Sample Problem(s) Continue estimating the construction of the illustrated house. It was found in Lumber Estimate, Shingle Estimate, and Wallpaper Estimate that the cost for those items was $6,034. Figure the cost of the drywall and insulation, adding it to the previous items, and breaking the figure up into labor and material. Use a cost of $8.70 per hundred square feet for drywall. Use a labor factor of 1.5 hours per hundred square feet at a carpenter's rate for installation. Use a factor of 1.2 hours at a painter's rate for the joint system. Use a factor of .4 hours at a painter's rate for texturing. Use a cost of $11.00 per hundred square feet for wall insulation and a cost of $20.40 for the ceiling. Use labor rates of 1.5 hours per hundred square feet for stapling the wall insulation and 1 hour for loose ceiling insulation. The painter's rate is $11.28 and the carpenter's rate is $13.21.

Solution(s) Keystrokes: 11.28 [ENT ↑] 13.21 [f][B], 3615[A], 8.7[B] → 315 (drywall cost), 1.5[C] →54 (hours), [D] → 713 (labor cost), [E] →1028 (total cost), 1.2[C] → 43.5 (joint system hours), [f][D] →491 (cost), .4[C] →14.5 (texturing hours), [f][D]→ 164 (texturing cost), 932[A], 11[B] →103 (wall insulation material cost), 1.5[C] → 14 (hours), [D] →185 (labor cost, wall insulation), [E] →288 (total wall insulation cost), 1120[A], 20.4[B] →228 (ceiling material cost), 1[C] →11 (hours), [D]145 (ceiling labor cost, [E] →373 (total ceiling insulation cost), [f], A-15475 (grand total BF/SF), 3484 (grand total material cost), 4894 (grand total labor cost), 8378 (grand total cost for lumber, shingles, wallpaper, drywall and insulation).

Reference(s) Thomas, Paul I, How to Estimate Building Losses and Construction Costs, 2nd Ed., Prentice-Hall, Inc., 1971.

This program is a modification of the Users' Library program # 04457A submitted by Chet Langin.

User Instructions

```
TOTALS          LABOR RATES              PAINT
     DRYWALL   AND   INSULATION   ESTIMATE
1                                                    2
       AREA      MAT.        LABOR HR.  INSTALL.  TOTAL
```

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	(Optional: Initialize series)		f	CL REG	
3	Enter labor rates: Paiter's rate	P. Rate	ENT↑		
	Carpenter's rate	C. Rate	f	B	P. Rate
4	Enter area	Area	A		
5	Enter cost per 100 S. F.	Cost	B		Cost
6	Enter labor factor per 100 S. F.	Hours	C		Hours
7	Find labor cost		D		Cost
8	Find material plus labor cost		E		Total
	(Optional: Enter labor factor for joint				
	system	Hours	C		Hours
	Find joint system cost		f	D	Cost
	Entering texturing labor factor	Hours	C		Hours
	Find texturing cost		f	D	Cost
	IMPORTANT--DO NOT TOTAL (KEY "E") AFTER				
	FINDING JOINT SYSTEM OR TEXTURING COST. IT				
	WOULD NOT FOWL UP THE SERIES, BUT THE ANSWER				
	WOULD BE MEANINGLESS.				
9	Repeat 2-8 as necessary				
10	Set for totals		f	A	
	Total BF/SF				BF/SF
	Total Material				Material
	Total labor				Labor
	Grand Total				Total
11	Go to next program				
	or				
	For new problem, go to 2				

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBL0	21 00	Rounds to internally	057	X≷Y	-41	
002	.	-62		058	PRST	16-14	
003	5	05		059	RTN	24	
004	+	-55		060	*LBLb	21 16 12	Store labor rates
005	INT	16 34		061	ST00	35 00	
006	RTN	24		062	X≷Y	-41	
007	*LBLA	21 11	Stores area	063	ST08	35 08	
008	ST04	35 04		064	RTN	24	
009	ST+1	35-55 01		065	R/S	51	
010	RTN	24					
011	*LBLB	21 12	Finds and store material cost				
012	RCL4	36 04					
013	EEX	-23					
014	2	02		070			
015	÷	-24					
016	×	-35					
017	GSB0	23 00					
018	ST+2	35-55 02					
019	ST06	35 06					
020	RTN	24					
021	*LBLC	21 13	Finds and rounds labor hours				
022	RCL4	36 04					
023	EEX	-23					
024	2	02		080			
025	÷	-24					
026	×	-35					
027	2	02					
028	×	-35					
029	GSB0	23 00					
030	2	02					
031	÷	-24					
032	RTN	24					
033	*LBLD	21 14	Carpenter rate	090			
034	RCL0	36 00					
035	*LBL2	21 02	Finds and stores labor cost				
036	×	-35					
037	GSB0	23 00					
038	ST07	35 07					
039	ST+3	35-55 03					
040	RTN	24					
041	*LBLd	21 16 14	Painter rate				
042	RCL8	36 08					
043	GTO2	22 02		100			
044	*LBLE	21 15	Totals item				
045	RCL6	36 06					
046	RCL7	36 07					
047	+	-55					
048	RTN	24					
049	*LBLa	21 16 11	Totals				
050	RCL1	36 01					
051	RCL2	36 02					
052	ENT↑	-21					
053	ENT↑	-21		110			
054	RCL3	36 03					
055	+	-55					
056	RCL3	36 03					

REGISTERS

0 Carpenter Rate	1 BF/SF Total	2 Mat. Total	3 Lab. Total	4 Area	5	6 Mat.	7 Lab.	8 Painter Rate	9
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A	B		C		D		E		I

Program Description I

Program Title SHEATHING AND SUBFLOOR ESTIMATE

Contributor's Name Hewlett-Packard, Corvallis Division

Address 1000 N. E. Circle Blvd.

City Corvallis **State** OR **Zip Code** 97330

Program Description, Equations, Variables Given area to be covered, size of plywood, item cost and labor factor, finds gross area, material cost, labor hours, labor cost, and total cost. Intended for use with other estimate programs, but may be used separately.

To find the gross area, divide the area to be covered by the size of the plywood (usually 32 square feet). Round the answer up to the nearest integer and multiply the integer by the size of the plywood (usu. 32). The gross area is used for the material cost and for determining the labor hours.

The labor factor is the number of hours it takes for a thousand square feet of plywood.

Operating Limits and Warnings Works only for plywood sheathing and subflooring. For boards, use Lumber Estimate. Rounds to the nearest one dollar and 1/2 hour. Local labor rate must be entered. Any errors must be manually subtracted from the involved registers.

Program Description II

Sketch(es)

2-foot eaves

Living Area
40 × 28 = 1120 S.F.

garage
14 × 28

Exterior Walls = 8'

plain gable roof
pitch ¼

8' — 32' —

Net subfloor area = 1120 S.F.
Net roof area = 2075 S.F.
Net ext. Wall area = 1093 S.F.

Sample Problem(s) Continue the construction estimate of the dwelling illustrated in Lumber Estimate, Shingle Estimate, Wallpaper Estimate, Drywall and Insulation Estimate and Wall and Ceiling Areas Estimate. The total cost from these programs is $8,378. For sheathing and subflooring, find the material cost, labor hours, labor cost, and item totals and add this to the $8,378.

Please note: The roof area of 2,075 square feet was determined in Shingle Estimate, and the exterior wall area of 1,093 was determined in Wall and Ceiling Areas Estimate.

Use labor factors of 14 for the roof, 13 for the walls and 12 for the floor. Use costs of $320 per thousand square feet for the roof plywood, $200 for the wall, and $265 for the floor. Use a labor rate of $13.21.

Solution(s) 13.21[f][B], 2075[ENT ↑] 32[A] →2080 (gross roof area), 320[B] →666 (roof mat. cost), 14[C] →29 (hours), [D] →383 (roof labor cost), [E] →1049 (total roof cost), 1093[ENT ↑], 32[A] →1120 (gross wall area), 200[B] →224 (wall mat. cost), 13[C] →14 1/2 (hours), [D] →192 (wall labor cost), [E] →416 (total wall cost), 1120 [ENT ↑], 32[A] →1120 (gross floor area), 265[B] →297 (floor mat. cost), 12[C] →13 1/2 (hours), [D] →178 (floor labor cost), [E] →475 (total floor cost), [f], [A] →19795 (grand total BF/SF), 4671 (grand total mat. cost), 5647 (grand total labor cost), 10318 (grand total cost for lumber, shingles, 5647 (grand total labor cost), 10318 (grand total cost for lumber, shingles, wallpaper, drywall, insulation, sheathing and subfloor).

Reference(s)

National Construction Estimator, 23rd Ed., 1975, Craftsman Book Co., Solano Beach, Calif.

How to Estimate Building Losses and Construction Costs, 2nd Ed., 1971, Prentice-Hall. This program is a translation of the HP-65 Users' Library program #04478A submitted by Chet Langin.

User Instructions

◀1

SHEATHING AND SUBFLOOR ESTIMATE

2▶

AREA   MAT   Labor Fact.   Labor Cost   Total

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	(Optional: Initialize series)		f	CL REG	
3	Enter labor rate	Rate	f	B	Rate
4	Enter net area	Area	ENT↑		
5	Enter plywood area	Area	A		Gross Area
6	Enter cost per 1,000 S. F.	Cost	B		Mat. Cost
7	Enter labor factor	Factor	C		Hours
8	Find labor cost		D		Lab. Cost
9	Find line total		E		Total
10	Repeat 3-9, as needed				
11	For totals		f	A	
	Board feet/square feet totals				BF/SF
	Mat. total				Mat.
	Lab. total				Lab.
	Grand total				Total
12	Go to next program				
	or				
	For new problem, go to 2				

97 Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBL0	21 00	Rounds internally	057	*LBLa	21 16 11	
002	.	-62		058	RCL1	36 01	Totals
003	5	05		059	RCL2	36 02	
004	+	-55		060	ENT↑	-21	
005	INT	16 34		061	ENT↑	-21	
006	RTN	24		062	RCL3	36 03	
007	*LBLA	21 11	Finds gross area	063	+	-55	
008	STO5	35 05		064	RCL3	36 03	
009	X≷Y	-41		065	X≷Y	-41	
010	GSB0	23 00		066	PRST	16-14	
011	X≷Y	-41		067	RTN	24	
012	÷	-24		068	*LBLb	21 16 12	Labor rate
013	.	-62		069	STO0	35 00	
014	4	04		070	RTN	24	
015	9	03		071	R/S	51	
016	+	-55					
017	GSB0	23 00					
018	RCL5	36 05					
019	x	-35					
020	ST+1	35-55 01					
021	STO4	35 04	Stores gross area				
022	RTN	24					
023	*LBLB	21 12	Finds material cost	080			
024	RCL4	36 04					
025	EEX	-23					
026	3	03					
027	÷	-24					
028	x	-35					
029	GSB0	23 00					
030	ST+2	35-55 02					
031	STO6	35 06					
032	RTN	24					
033	*LBLC	21 13	Finds labor hours	090			
034	RCL4	36 04					
035	EEX	-23					
036	3	03					
037	÷	-24					
038	x	-35					
039	2	02					
040	x	-35					
041	GSB0	23 00					
042	2	02					
043	÷	-24					
044	RTN	24		100			
045	*LBLD	21 14	Carpenter's rate				
046	RCL0	36 00					
047	x	-35					
048	GSB0	23 00	Finds labor cost				
049	STO7	35 07					
050	ST+3	35-55 03					
051	RTN	24					
052	*LBLE	21 15	Finds item cost				
053	RCL6	36 06		110			
054	RCL7	36 07					
055	+	-55					
056	RTN	24					

SET STATUS

FLAGS		TRIG	DISP
	ON OFF	DEG ☒	FIX ☒
0	☐ ☒	GRAD ☐	SCI ☐
1	☐ ☒	RAD ☐	ENG ☐
2	☐ ☒		n __2__
3	☐ ☒		

REGISTERS

0 Labor Rate	1 BF/SF Total	2 Material Total	3 Labor Total	4 Area	5 Factor	6 Material	7 Labor	8	9
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A	B		C	D		E		I	

Program Description I

Program Title   PAINTING ESTIMATE

Contributor's Name   Hewlett-Packard, Corvallis Division

Address   1000 N. E. Circle Blvd.

City   Corvallis   **State**   OR   **Zip Code**   97330

Program Description, Equations, Variables   Given area to be painted, cost per gallon coverage per gallon, and labor factor, finds material cost, labor hours, labor cost and total cost. Intended for use with other estimate programs, but may be used separately.

The labor factor is the number of square feet that can be painted in one hour.

Either the gross area method, net area method or gross plus method may be used. The gross area method includes the square foot area of an entire wall, inclusive of windows and doors.
The net area method excludes windows and doors from the wall area, then considers them separately.

The gross plus method includes windows and doors, but then considers additional items.
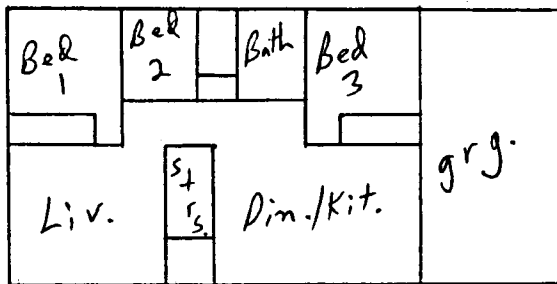

Operating Limits and Warnings   Figures rounded to nearest one dollar and 1/2 hour. Local labor rate must be entered.   Errors must be manually subtracted from the involved registers.

Program Description II

Sketch(es)

Exterior Gross Area = 1312 S.F.
Interior Gross Area = 5276 S.F.
  Less Bed 2   = 332 S.F.
  Less Bath ceiling =   50 S.F.
  Add basement   = 176 S.F.
Total Interior To Be Painted: 5070 S.F.

Sample Problem(s) Continue the construction estimate of the dwelling illustrated in Lumber Estimate, Shingle Estimate, Wallpaper Estimate, Drywall and Insulation Estimate, Wall and Ceiling Areas Estimate and Sheathing and Subfloor Estimate. The total cost from these programs is $10,318. For the painting, find the material cost labor hours, labor cost, and total cost and add this to the $10,318. Use the gross area method.

Please note: The areas near the sketch were determined from the Wall and Ceiling Area Estimate.

Use labor factors of 150 for the interior and 125 for the exterior. Use spread rates of 400 square feet per gallon for the exterior and 450 for the interior. Use costs of $10 per gallon exterior and $9.50 interior. Double the above areas for 2 coats. Use a labor rate of $11.28 per hour.

Solution(s) 11.28[f][B], 2624[ENT ↑], 400[A] →7, 10[B]→70, 125[C]→(hours),[D]→237 (ext. labor cost), [E] →307 (total ext. cost), 10140[ENT ↑], 450[A] →23 (gallons) 9.5[B] →219 (cost of int. paint), 150[C] →67 1/2 (hours), [D] →761 (int. labor cost), [E]980 (total int. cost), [f][A] →19795 (total Board Feet/Square Feet-- used later to determine lbs. of nails), 4960 (total material cost), 6645 (total labor cost), 11605 (grand total cost for lumber, shingles, wallpaper, drywall, insulation, sheathing, subflooring, and painting.)

Reference(s) National Construction Estimator, 1975, Craftsman Book Co.
         How to Estimate Building Losses and Construction Costs, Prentice-Hall.

         This program is a modification of the Users' Library program #04477A
         submitted by Chet Langin.

User Instructions

```
        TOTALS      LABOR RATE
           PRINTING  ESTIMATE

   GAL.      MAT.      LAB. HR.    LAB COST    TOTAL
```

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	(Optional: Initialize series)		f	CL REG	
3	Enter labor rate for painting	Rate	f	B	Rate
4	Enter Area	Area	ENT↑		
5	Enter coverage per gallon	Coverage	A		# Gals.
6	Enter Cost per gallon	Cost	B		Mat.
7	Enter labor factor	Labor Factor	C		Hours
8	Find labor cost		D		Lab.
9	Find Line total		E		Total
10	Repeat 2 - 9 as needed				
11	Totals		f	A	
	Total BF/SF				Total
	Total Mat.				Mat.
	Total Lab.				Lab.
	Grand total				Total
12	Go to next program				
	or				
	For new problem, go to 2				

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBL0	21 00		057	PRST	16-14	
002	.	-62	Rounds internally	058	RTN	24	
003	5	05		059	*LBLb	21 16 12	
004	+	-55		060	STO0	35 00	Labor rate
005	INT	16 34		061	X≷Y	-41	
006	RTN	24		062	STO8	35 08	
007	*LBLA	21 11		063	RTN	24	
008	X≷Y	-41		064	R/S	51	
009	STO4	35 04	Stores area				
010	X≷Y	-41					
011	÷	-24					
012	.	-62					
013	4	04					
014	9	09	Finds gallons	070			
015	÷	-55					
016	GSB0	23 00					
017	STO5	35 05					
018	RTN	24					
019	*LBLB	21 12					
020	RCL5	36 05	Finds mat. cost				
021	×	-35					
022	GSB0	23 00					
023	ST+2	35-55 02					
024	STO6	35 06		080			
025	RTN	24					
026	*LBLC	21 13					
027	RCL4	36 04	Finds labor hours				
028	X≷Y	-41					
029	÷	-24					
030	2	02					
031	×	-35					
032	GSB0	23 00					
033	2	02					
034	÷	-24		090			
035	RTN	24					
036	*LBLD	21 14					
037	RCL0	36 00	Painter rate				
038	×	-35					
039	GSB0	23 00	Finds labor cost				
040	STO7	35 07					
041	ST+3	35-55 03					
042	RTN	24					
043	*LBLE	21 15					
044	RCL6	36 06	Finds line total	100			
045	RCL7	36 07					
046	+	-55					
047	RTN	24					
048	*LBLa	21 16 11					
049	RCL1	36 01	Totals				
050	RCL2	36 02					
051	ENT↑	-21					
052	ENT↑	-21					
053	RCL3	36 03		110			
054	+	-55					
055	RCL3	36 03					
056	X≷Y	-41					

SET STATUS

FLAGS		TRIG	DISP
ON OFF		DEG ☒	FIX ☒
0 ☐ ☒		GRAD ☐	SCI ☐
1 ☐ ☒		RAD ☐	ENG ☐
2 ☐ ☒			n __2__
3 ☐ ☒			

REGISTERS

0 Labor Rate	1 SF/AF Total	2 Mat. Total	3 Lab. Total	4 Area	5 Gal.	6 Mat.	7 Lab.	8	9
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A	B		C	D	E		I		

Program Description I

Program Title   WOOD FLOOR ESTIMATE

Contributor's Name   Hewlett-Packard, Corvallis Division

Address   1000 N. E. Circle Blvd.

City   Corvallis   **State**   OR   **Zip Code**   97330

Program Description, Equations, Variables   Given net area, gross area, material unit cost and labor factor, finds material cost, labor hours, labor cost and item total. Also totals columns for material cost, labor cost and total cost when used with other estimate programs.
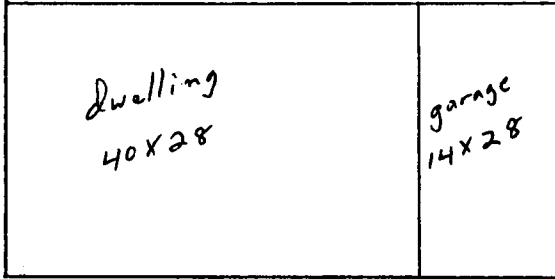
Operating Limits and Warnings   Rounds to nearest one dollar and 1/2 hour. Local labor rate must be entered. Errors must be manually subtracted from the involved registers.

Sketch(es)

Dwelling
40 x 28

garage
14 x 28

Net area 1120 Sq. Ft.
33⅓% waste 373
Gross area 1493 Sq. Ft.

Sample Problem(s) Continue the construction estimate of the dwelling illustrated in Lumber Estimate, Shingle Estimate, Wallpaper Estimate, Drywall and Insulation Estimate, Wall and Ceiling Areas Estimate, Sheathing and Subfloor Estimate, and Painting Estimate. The total cost from these programs is $11,605. For the flooring, find the material cost, labor hours, labor cost, and total cost and add this to the $11,605. Do it in four steps: One, flooring; two, sanding; three, filler; and four, seal and finish.

Use a waste factor of 33 1/3 % for 1x3 boards. Use a labor factor of 32 hours per 1,000 board feet (in this case, the same as square feet). Use a cost of $1,120 per 1,000 board feet. Use labor factors of 100 square feet per hour for sanding, 180 for filler, and 450 for seal and finish. Use spread rates of 500 square feet per gallon for filler and 400 for seal and finish. Use a cost of $7.50 per gallon for the filler and $11.00 for the seal and finish. Use a labor rate of $13.34 per hour.

Solution(s) Keystrokes: 13.34[f][B], 1493[A], 1120[B] →1672 (material cost for wood), 32[C] → 48 (hours), [D] →640 (labor cost), [E]2312 (total installation cost), 1120 [f][C], 100[C] → 11 (sanding hours), [D] →147 (sanding labor hours), 500[f][D] → 3 (gallons of filler), 7.5[f][E] →23 (cost of filler), 180[C] →6 (hours), [D] →80 (filler labor cost), [E] →103 (total filler cost),2240[f][C],400[f][D]→6(gallons of finish), 11[f][E] →66 (cost of finish), 450[C] →5 (hours), [D] →67 (finish labor cost), [E] → 133 (total finish cost), [f][A] →21288 (accumulative BF/SF), 6721 (accumulative material cost), 7579 (accumulative labor cost), 14300 (accumulative cost for lumber, shingles, wallpaper, drywall, insulation sheathing, subfloor, painting and flooring.

Reference(s) How to Estimate Building Losses and Construction Costs, 2nd Ed., by Paul I. Thomas, Prentice-Hall.
THIS PROGRAM IS A MODIFICATION OF THE USERS' LIBRARY PROGRAM #04580A SUBMITTED BY CHET LANGIN.

User Instructions

TOTALS   LABOR RATE   AREA   GAL.   MAT. FINISH

WOOD FLOOR ESTIMATE

AREA B.F.   MAT. B.F.   LABOR HR.   LABOR COST   TOTAL

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	(Optional: Initialize series)		f	CL REG	
3	Enter labor rate for hardwood floor worker	Rate	f	B	Rate
4	Enter Gross area	Area	A		
5	Enter cost per 1,000 BF	Cost	B		Cost
6	Enter labor factor	Factor	C		Hours
7	Find labor cost		D		Cost
8	Find line total		E		Total
	(Optional: For prefinished floors, skip 9-15 and go to 16				
9	Enter net area	Area	f	C	
	(Optional: For seal and finish, double net area before entering)				
10	Enter coverage per gallon 10 + 11	S. F.	f	D	# Gals.
	(Optional: For sanding, skip)				
11	Enter cost per gallon	Cost	f	E	Cost
12	Enter labor factor	Factor	C		Hours
13	Find labor cost		D		Cost
14	Find line total		E		Total
	(Optional: For sanding, skip 15. Incorrect answer will result for this item, but series will not be disturbed.)				
15	Repeat 9-15, for sanding, filler and seal and finish.				
16	Repeat 1-16, as necessary				
17	For totals		f	A	
	BF/SF grand total				BF/SF
	Mat. total				Mat.
	Lab total				Lab.
	Grand total				Total
18	Go to next program				
	or				
	For new problem, go to 2				

STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBL0	21 00	
002	.	-62	Rounds internally
003	5	05	
004	+	-55	
005	INT	16 34	
006	RTN	24	
007	*LBLA	21 11	Stores area and clear flag for flooring
008	CF1	16 22 01	
009	STO4	35 04	
010	ST+1	35-55 01	
011	RTN	24	
012	*LBLB	21 12	Finds material cost
013	RCL4	36 04	
014	EEX	-23	
015	3	03	
016	÷	-24	
017	X	-35	
018	GSB0	23 00	
019	ST+2	35-55 02	
020	STO6	35 06	
021	RTN	24	
022	*LBLC	21 13	Flooring? No, go to 1; yes, find labor hours
023	F1?	16 23 01	
024	GTO1	22 01	
025	RCL4	36 04	
026	EEX	-23	
027	3	03	
028	÷	-24	
029	X	-35	
030	2	02	
031	X	-35	
032	GSB0	23 00	
033	2	02	
034	÷	-24	
035	RTN	24	
036	*LBLD	21 14	Hardwood floor worker rate
037	RCL0	36 00	
038	X	-35	Finds + stores labor cost
039	GSB0	23 00	
040	STO7	35 07	
041	ST+3	35-55 03	
042	RTN	24	
043	*LBLE	21 15	Total
044	RCL6	36 06	
045	RCL7	36 07	
046	+	-55	
047	RTN	24	
048	*LBLa	21 16 11	Totals
049	RCL1	36 01	
050	RCL2	36 02	
051	ENT↑	-21	
052	ENT↑	-21	
053	RCL3	36 03	
054	+	-55	
055	RCL3	36 03	
056	X≥Y	-41	
057	PRST	16-14	
058	RTN	24	
059	*LBLb	21 16 12	Labor rate
060	STO0	35 00	
061	RTN	24	Store area and set flag for finish
062	*LBLc	21 16 13	
063	STO4	35 04	
064	SF1	16 21 01	
065	RTN	24	
066	*LBLd	21 16 14	Find # gallons
067	RCL4	36 04	
068	X≥Y	-41	
069	÷	-24	
070	.	-62	
071	4	04	
072	9	09	
073	+	-55	
074	GSB0	23 00	
075	STO5	35 05	
076	RTN	24	
077	*LBLe	21 16 15	Find material cost
078	RCL5	36 05	
079	X	-35	
080	GSB0	23 00	
081	ST+2	35-55 02	
082	STO6	35 06	
083	RTN	24	
084	*LBL1	21 01	Finds labor hours
085	RCL4	36 04	
086	X≥Y	-41	
087	÷	-24	
088	2	02	
089	X	-35	
090	GSB0	23 00	
091	2	02	
092	÷	-24	
093	RTN	24	
094	R/S	51	

| 100 | | | |
| 110 | | | |

SET STATUS

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

REGISTERS

0 Labor Rate	1 BF/SF Total	2 Mat.Tot.	3 Lab. Total	4 Area	5 Gal.	6 Mat.	7 Labor	8	9
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9

A	B	C	D	E	I

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HOME CONSTRUCTION

These programs will give the user the ability to estimate the costs of material and labor for basic construction jobs. The assumptions (about design) made by these programs restrict their use to estimating costs for single floor rectangular construction.

CONCRETE VOLUME

LINEAR TO BOARD FEET CONVERSION AND COSTING

FRAMING BOARD FEET

LUMBER ESTIMATE

SHINGLE ESTIMATE

WALL & CEILING AREAS ESTIMATE

WALLPAPER ESTIMATE

DRYWALL AND INSULATION ESTIMATE

SHEATHING AND SUBFLOOR ESTIMATE

PAINTING ESTIMATE

WOOD FLOOR ESTIMATE