

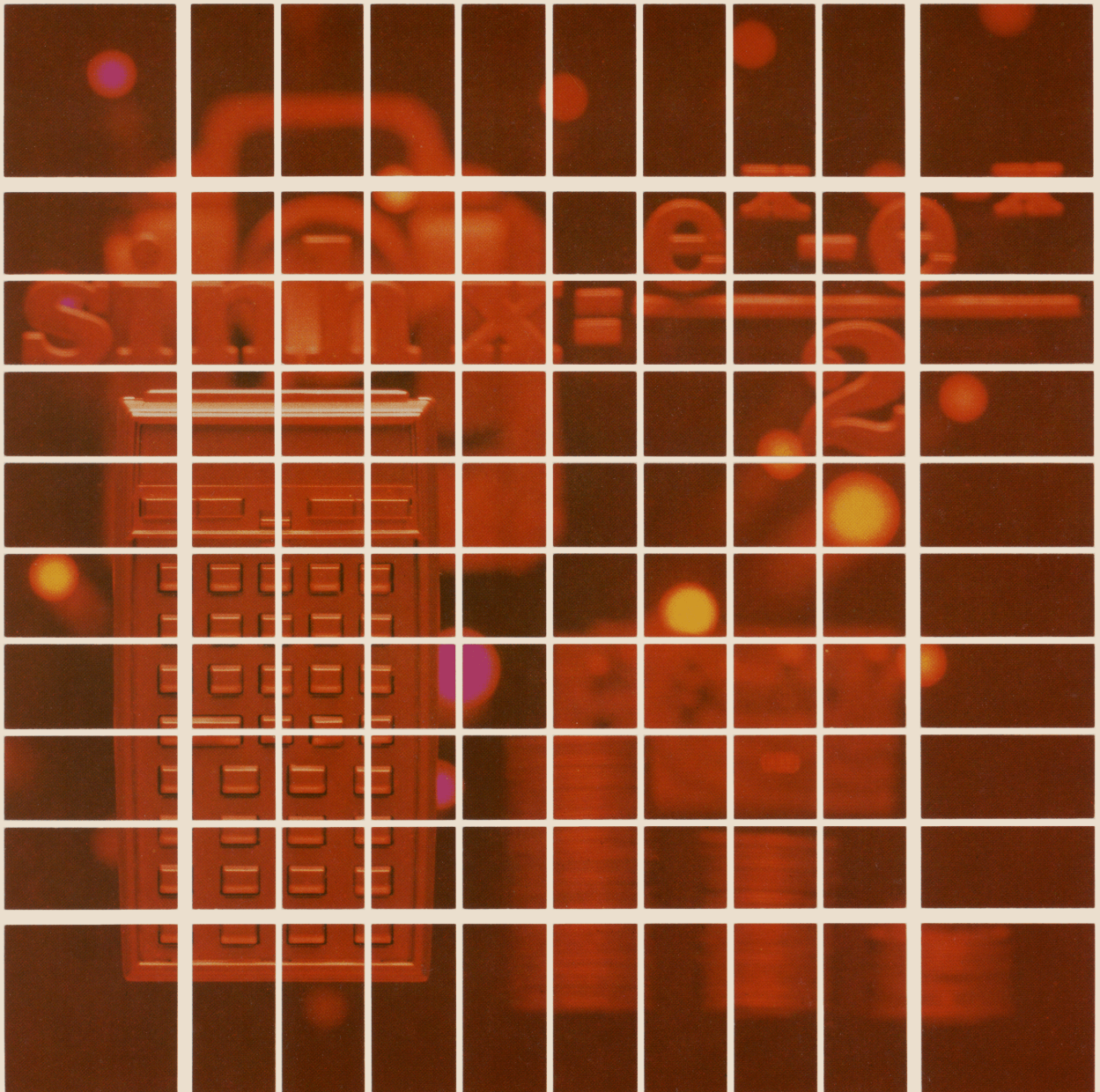
HEWLETT-PACKARD

HP-41

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# Home Construction Estimating

Includes barcode for easy software entry.



## **NOTICE**

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## INTRODUCTION

This HP-41C Solutions book was written to help you get the most from your calculator. The programs were chosen to provide useful calculations for many of the common problems encountered.

They will provide you with immediate capabilities in your everyday calculations and you will find them useful as guides to programming techniques for writing your own customized software. The comments on each program listing describe the approach used to reach the solution and help you follow the programmer's logic as you become an expert on your HP calculator.

## KEYING A PROGRAM INTO THE HP-41C

There are several things that you should keep in mind while you are keying in programs from the program listings provided in this book. The output from the HP 82143A printer provides a convenient way of listing and an easily understood method of keying in programs without showing every keystroke. This type of output is what appears in this handbook. Once you understand the procedure for keying programs in from the printed listings, you will find this method simple and fast. Here is the procedure:

- At the end of each program listing is a listing of status information required to properly execute that program. Included is the SIZE allocation required. Before you begin keying in the program, press **[XEQ] [ALPHA] SIZE [ALPHA]** and specify the allocation (three digits; e.g., 10 should be specified as 010).  
Also included in the status information is the display format and status of flags important to the program. To ensure proper execution, check to see that the display status of the HP-41C is set as specified and check to see that all applicable flags are set or clear as specified.
- Set the HP-41C to PRGM mode (press the **[PRGM]** key) and press **[GTO] [◀] [▶]** to prepare the calculator for the new program.
- Begin keying in the program. Following is a list of hints that will help you when you key in your programs from the program listings in this handbook.
  - When you see " (quote marks) around a character or group of characters in the program listing, those characters are ALPHA. To key them in, simply press **[ALPHA]**, key in the characters, then press **[ALPHA]** again. So "SAMPLE" would be keyed in as **[ALPHA] "SAMPLE" [ALPHA]**.
  - The diamond in front of each LBL instruction is only a visual aid to help you locate labels in the program listings. When you key in a program, ignore the diamond.
  - The printer indication of divide sign is /. When you see / in the program listing, press **[÷]**.
  - The printer indication of the multiply sign is  $\times$ . When you see  $\times$  in the program listing, press **[×]**.
  - The  $\uparrow$  character in the program listing is an indication of the **[APPEND]** function. When you see  $\uparrow$ , press **[APPEND]** in ALPHA mode (press **[◀]** and the K key).
  - All operations requiring register addresses accept those addresses in these forms:  
nn (a two-digit number)  
IND nn (INDIRECT: **[◀]**, followed by a two-digit number)  
X, Y, Z, T, or L (a STACK address: **[▶]** followed by X, Y, Z, T, or L)  
IND X, Y, Z, T or L (INDIRECT stack: **[◀] [▶]** followed by X, Y, Z, T, or L)

Indirect addresses are specified by pressing **[◀]** and then the indirect address. Stack addresses are specified by pressing **[▶]** followed by X, Y, Z, T, or L. Indirect stack addresses are specified by pressing **[◀] [▶]** and X, Y, Z, T, or L.

### Printer Listing

```

01♦LBL "SAM
PLE"
02 "THIS IS
A "
03 "↑SAMPLE
"
04 AVIEW
05 6
06 ENTER↑
07 -2
08 /
09 ABS
10 STO IND
L
11 "R3="
12 ARCL 03
13 AVIEW
14 RTN

```

### Keystrokes

```

[◀] [LBL] [ALPHA] SAMPLE [ALPHA]
[ALPHA] THIS IS A [ALPHA]
[ALPHA] [APPEND] SAMPLE
[◀] AVIEW [ALPHA]
6
[ENTER]
2 [CHS]
[÷]
[XEQ] [ALPHA] ABS [ALPHA]
[STO] [▶] L
[ALPHA] R3= [ARCL] 03
[◀] AVIEW
[ALPHA]
[RTN]

```

### Display

```

01 LBLT SAMPLE
02T THIS IS A
03T ↑ SAMPLE
04 AVIEW
05 6
06 ENTER ↑
07 -2
08 /
09 ABS
10 STO IND L
11T R3=
12 ARCL 03
13 AVIEW
14 RTN

```





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## CONCRETE VOLUME

Given the dimensions of an area of concrete to be poured in feet and/or inches, this program calculates, in cubic yards, the volume of concrete required. It also maintains a running sum of the volumes of concrete required for when dimensions are complex or subdivided.

Reference: HP-65 Users' Library program #01816A.

### Example:

Given a footing for a building with the following dimensions, calculate the volume of concrete required:

W		D		L
20"	x	15"	x	78'6"
20"	x	15"	x	54'6"
20"	x	9"	x	64'
2'	x	1'	x	39'3"

### Keystrokes:

```
[USER]
[XEQ] [ALPHA] SIZE [ALPHA] 004
[XEQ] [ALPHA] CONC [ALPHA]

.20 [R/S]
.15 [R/S]
78.06 [R/S]
[A]
.20 [R/S]
:
1 [R/S]
39.03 [R/S]
[R/S]
```

### Display:

```
(set USER mode)

CONCRETE VOL.
W?
D?
L?
CU. YDS.=6.06
W?
D?
:
L?
CU. YDS.=2.91
TOTAL=16.13
```



# Program Listings

01*LBL "CON C"	Initialize	51	
02 CLRG			
03 "CONCRET E VOL."			
04 AVIEW			
05 PSE			
06*LBL A	Input W, D, L		
07 .002			
08 STO 00		60	
09 "W?"			
10 PROMPT			
11 XEQ 01			
12 "D?"			
13 PROMPT			
14 XEQ 01			
15 "L?"			
16 PROMPT	Calculate volume		
17 XEQ 01			
18 RCL 01		70	
19 RCL 02			
20 *			
21 *	Display routine		
22 ST+ 03			
23 XEQ 02			
24 RCL 03			
25 SF 00			
26*LBL 02			
27 "CU. YDS ="			
28 FS?C 00		80	
29 "TOTAL="			
30 ARCL X			
31 PROMPT	Convert input to cu. yds.		
32 RTN			
33*LBL 01			
34 ENTER↑			
35 FRC			
36 .12			
37 /			
38 X<>Y		90	
39 INT			
40 +			
41 3			
42 /			
43 ISG 00			
44 STO IND			
00			
45 RTN			
46 .END.		00	



DATA REGISTERS				STATUS			
00	printer	50		SIZE <u>004</u> TOT. REG. <u>19</u> USER MODE			
	width			ENG _____    FIX <u>2</u> SCI _____    ON <u>X</u> OFF _____			
	depth			DEG _____    RAD _____    GRAD _____			
	sum						
05		55		FLAGS			
				#	INIT S/C	SET INDICATES	CLEAR INDICATES
				00		Display total vol.	Display partial vol.
10		60					
15		65					
20		70					
25		75					
30		80					
35		85					
40		90		ASSIGNMENTS			
				FUNCTION		KEY	FUNCTION    KEY
45		95					

CONCRETE VOLUME

PROGRAM REGISTERS NEEDED: 16

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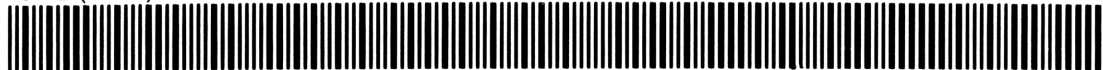
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HOME CONST. ESTIMATING

ROW 1 (1 - 3)



ROW 2 (3 - 6)



ROW 3 (6 - 11)



ROW 4 (12 - 17)



ROW 5 (17 - 25)



ROW 6 (26 - 28)



ROW 7 (29 - 34)



ROW 8 (35 - 44)



ROW 9 (44 - 46)



## LINEAR TO BOARD FEET CONVERSION AND COSTING

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 total cost accumulated. A waste factor is included in the calculations.

Reference: HP-65 Users' Library program #01583A.

Example:

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

<u>Size</u>	<u>Cost/BF</u>	<u>Quantity</u>
2x4	\$0.265	3256 LF
2x6	\$0.257	2665 LF
2x12	\$0.27	339 LF
1x5 pine	\$0.46	850 LF

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

Keystrokes:

Display:

[USER]

(set USER mode)

[XEQ] [ALPHA] SIZE [ALPHA] 002

[XEQ] [ALPHA] LIN [ALPHA]

LIN. <> B.F.

SIZE <XX.X>?

2.4 [R/S]

% WASTE ?

25 [R/S]

LINEAR FT ?

3256 [R/S]

UNIT COST ?

.265 [R/S]

B.F.=2,713.00

[R/S]

COST=718.95

[A]

SIZE <XX.X>?

2.6 [R/S]

% WASTE?

⋮

⋮

[R/S]

COST=203.78

[R/S]

TOTAL B.F.=7335.00

[R/S]

TOTAL COST=3007.75

[illegible]

01*LBL "LIN "	Initialize	46 RCL 00 47 "TOTAL B .F."	
02 CLRG		48 XEQ 10	
03 "LIN. <> B.F."		49 RCL 01	
04 AVIEW		50 "TOTAL C OST"	
05 PSE		51*LBL 10	
06*LBL A		52 "F="	
07 "SIZE <X X.X> ?"	Input dimensions	53 ARCL X	Display routine
08 PROMPT		54 PROMPT	
09 INT		55 RTN	
10 LASTX		56*LBL 09	
11 FRC		57 X<>Y	
12 *		58 10	
13 LASTX		59 /	
14 100		60 X<>Y	
15 *		61 RTN	
16 10		62 .END.	
17 MOD			
18 X=0?		70	
19 XEQ 09			
20 X<>Y			
21 .12			
22 /			
23 "% WASTE ?"	Input % waste,		
24 PROMPT			
25 .01	linear feet,		
26 *			
27 1		80	
28 +	unit cost,		
29 *			
30 "LINEAR FT. ?"	and calculate		
31 PROMPT			
32 *			
33 FIX 0	board feet,		
34 RND			
35 FIX 2			
36 "UNIT CO ST ?"	cost	90	
37 PROMPT			
38 X<>Y			
39 "B.F."			
40 XEQ 10			
41 ST+ 00			
42 *			
43 "COST"			
44 ST+ 01			
45 XEQ 10		00	



DATA REGISTERS				STATUS								
00	B.F. summation	50		SIZE	002	TOT. REG.	27	USER MODE				
	cost summation			ENG		FIX	2	SCI	ON	X	OFF	
				DEG		RAD		GRAD				
				FLAGS								
05		55		#	INIT S/C	SET INDICATES			CLEAR INDICATES			
10		60										
15		65										
20		70										
25		75										
30		80										
35		85										
40		90										
45		95										

LINEAR TO BOARD FEET  
CONVERSION AND COSTING  
PROGRAM REGISTERS NEEDED: 26

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ROW 1 (1 : 3)



ROW 2 (3 : 7)



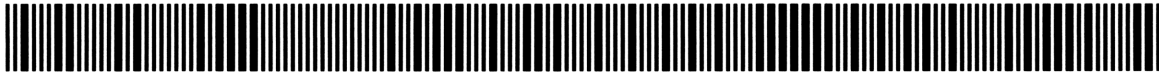
ROW 3 (7 : 8)



ROW 4 (9 : 18)



ROW 5 (19 : 23)



ROW 6 (23 : 29)



ROW 7 (30 : 30)



ROW 8 (31 : 36)



ROW 9 (36 : 39)



ROW 10 (40 : 44)



ROW 11 (45 : 47)



ROW 12 (47 : 50)



ROW 13 (50 : 56)



ROW 14 (57 : 62)



## FRAMING BOARD FEET

This program finds Board Feet in Standardized Dwellings. For 8 - 2x4 boards, 8 ft. long, the number of board feet is

$$\frac{8 \times 2 \times 4 \times 8}{12} = 42 \frac{2}{3}$$

The formula is reduced as much as possible for each item as it is incorporated in the program. The program assumes the following sizes of boards: Girder, 3 - 2x6xL<sub>1</sub>; Sill, 1 - 2x6xperimeter; rafters, 2x6 (see below); collar beams (1/3 as many as rafters), 2x6x½ width; joists, 2x8xwidth (see below); header, 1 - 2x8xL<sub>1</sub>; Ridge board, 1 - 2x8xL<sub>2</sub>; Bridging, 1 - 1x4x6 times L<sub>1</sub>; 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 ¼ 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 ¼ pitch, is assumed to be ¼ of the width. The waste from one end is used for the other end.

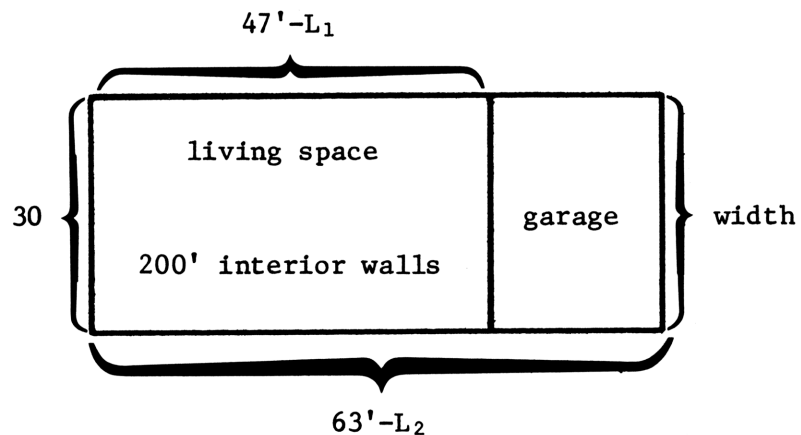
Note: The Dwelling is assumed to have: One story, one-foot eaves, ¼ pitch, rectangular configuration, and above sizes.

The program does not consider that lumber comes in lengths of multiples of 2 ft. This is an estimate only. Other methods may differ slightly, especially in determining waste.

Reference: HP-65 Users' Library program #04577A.

Example:

(not to scale)



Estimate the board feet in the frame of the above dwelling.

Keystrokes:

[XEQ] [ALPHA] SIZE [ALPHA] 005

[XEQ] [ALPHA] FRAM [ALPHA]

47 [R/S]

63 [R/S]

30 [R/S]

200 [R/S]

Display:

L1 ?

L2 ?

WIDTH ?

INTERIOR ?

9289 B.F.

SIZE: 005



# Program Listings

01♦LBL "FRA M"	Finds board feet for:	50 XEQ 14	Gable studs
02 "L1 ?"		51 RCL 02	
03 PROMPT		52 4	
04 STO 00	Girder, header, and bridging	53 /	
05 6.33		54 *	
06 *		55 .67	
07 "L2 ?"		56 *	
08 PROMPT		57 +	
09 STO 01		58 "INTERIO R ?"	
10 1.33	Ridge board	59 PROMPT	Plates
11 *		60 RCL 03	
12 +		61 +	
13 "WIDTH ?"		62 STO 04	
"		63 2	
14 PROMPT		64 *	
15 STO 02		65 +	
16 RCL 01	Sill	66 RCL 04	Studs
17 +		67 5.33	
18 2		68 *	
19 *		69 +	
20 STO 03		70 CLA	
21 +		71 FIX 0	
22 RCL 02	Rafters	72 ARCL X	
23 1.27		73 "F B.F."	
24 *		74 PROMPT	
25 RCL 01		75♦LBL 14	
26 XEQ 14		76 .75	
27 STO 04		77 *	Finds number of pieces of
28 *		78 2	rafters, joists,
29 +		79 +	and gable studs
30 RCL 04	Collar beams	80 INT	
31 3		81 RTN	
32 /		82 .END.	
33 RCL 02			
34 2			
35 /			
36 *			
37 +			
38 RCL 00			
39 XEQ 14		90	
40 RCL 04	Joists		
41 +			
42 RCL 02			
43 2			
44 +			
45 *			
46 1.33			
47 *			
48 +			
49 RCL 02		00	

DATA REGISTERS				STATUS			
00	L <sub>1</sub>	50		SIZE   005		TOT. REG.   26	USER MODE
	L <sub>2</sub>			ENG		FIX   0   SCI	ON       OFF   X
	width			DEG		RAD      GRAD	
	perimeter used						
05		55		FLAGS			
				#	INIT S/C	SET INDICATES	CLEAR INDICATES
10		60					
15		65					
20		70					
25		75					
30		80					
35		85					
				ASSIGNMENTS			
				FUNCTION		KEY	FUNCTION
40		90					KEY
45		95					

## FRAMING BOARD FEET

PROGRAM REGISTERS NEEDED: 22

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ROW 1 (1 - 2)



ROW 2 (3 - 8)



ROW 3 (9 - 13)



ROW 4 (13 - 23)



ROW 5 (23 - 32)



ROW 6 (33 - 43)



ROW 7 (44 - 51)



ROW 8 (52 - 58)



ROW 9 (58 - 65)



ROW 10 (66 - 73)



ROW 11 (73 - 78)



ROW 12 (79 - 82)



## LUMBER ESTIMATE

This program estimates material cost, labor cost and total cost for rough carpentry. User must supply local lumber costs and local labor rate. This program also determines number of studs and joists.

### Equations:

$$BF = (\text{width in inches} \times \text{thickness in inches} \times \text{length in feet}) \div 12$$

$$PCS = [\text{length} \times (12/\text{spacing in inches})] + 1, \text{ where "spacing" is the distance from the center of a stud, joist or rafter to the center of the adjacent stud, joist or rafter. "Pieces" refers to the number of studs, joists or rafters.}$$

Note: Costs are rounded to the nearest dollar. Labor hours are to the nearest  $\frac{1}{2}$  hour.

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.

HP-65 Users' Library program #04056A.

**Example:**

Perform the calculations for 2"x8"x16' floor joists spaced at 16" (note that 2 sets are needed) and a 2"x8" joist header for a 40'x28' building (floor joists are 2' longer than half the width and joist headers are twice the length of the basement). The cost per 1000 board feet of 2x8's is \$312.80 and the labor factors for joists and headers respectively are 22 and 20 hours per 1000 board feet. Use a labor rate of \$13.21/hr.

**Keystrokes:****Display:**

[USER]	(set USER mode)
[XEQ] [ALPHA] SIZE [ALPHA] 006	
[XEQ] [ALPHA] LUM [ALPHA]	LABOR RATE ?
13.21 [R/S]	WTLP ?
[B]	LENGTH ?
40 [R/S]	SPACING ?
16 [R/S]	PCS=31.00
2 [x] [A]	WTLP ?
2 [x] 8 [x] 16 [x]	15,872
[R/S]	COST/1000BF?
312.8 [R/S]	LAB./1000BF?
22 [R/S]	B.F. =1,323.00
[R/S]	MAT.=\$414.00
[R/S]	HOURS =29.00
[R/S]	LAB.=\$383.00
[R/S]	TOTAL=\$797.00
[A]	WTLP ?
2 [ENTER↑] 8 [x] 80 [x] 1 [x] [R/S]	COST/1000BF?
312.8 [R/S]	LAB./1000BF?
20 [R/S]	B.F. =107.00
[R/S]	MAT.=\$33.00
[R/S]	HOURS =2.00
[R/S]	LAB.=\$26.00
[R/S]	TOTAL=\$59.00
[C]	T. B.F.=1,430.00
[R/S]	T. MAT.=\$447.00
[R/S]	T. LAB.=\$409.00
[R/S]	T. COST=\$856.00



# User Instructions

				SIZE: 006
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Key in program and set USER mode.		[USER]	
2	Initialize the program.		[XEQ] LUM	LABOR RATE ?
3	Input labor rate	labor rate	[R/S]	WTLP ?
4	Input width (ins.) x thickness (ins.)			
	x length (ft) x pieces (see step 6)	WTLP	[R/S]	COST/1000BF?
	cost per thousand board feet	Cost	[R/S]	LAB./1000BF?
	labor factor per thousand board feet	Factor	[R/S]	
5	Calculate: board feet			B.F.= (board ft)
	material cost		[R/S]	MAT.=\$ (material)
	hours		[R/S]	HOURS=(hours)
	labor cost		[R/S]	LAB.=\$(labor)
	total labor and materials		[R/S]	TOTAL=\$(total)
6	(Optional) To calculate the number of			
	pieces:		[B]	LENGTH ?
	Input: length of building	length	[R/S]	SPACING ?
	and spacing	spacing	[R/S]	PCS=(no. of pieces)
	Press [R/S] and go to step 4.		[R/S]	WTLP ?
7	For totals:		[C]	T. B.F.=(total board feet)
			[R/S]	T. MAT.=\$( )
			[R/S]	T. LAB.=\$( )
			[R/S]	T. COST=\$( )
8	For a new item, press		[A]	WTLP ?
	and go to step 4.			

# Program Listings

01♦LBL "LUM	Initialize	47 ST+ 03	
"		48 ST+ 05	Labor cost
02 CLRG		49 "LAB."	
03 "LABOR R		50 XEQ 11	
ATE ?"	Input:	51 RCL 05	Total cost
04 PROMPT	Labor rate	52 "TOTAL"	
05 STO 00		53♦LBL 11	
06♦LBL A		54 "T=\$"	
07 "WTLP ?"	WxTxLxP	55♦LBL 10	Display routine
08 PROMPT		56 ARCL X	
09 12		57 PROMPT	
10 /		58 RTN	
11 XEQ 00		59♦LBL C	
12 STO 04		60 RCL 01	
13 ST+ 01	Cost/1000 BF	61 "T. B.F.	Display totals
14 "COST/10		"	
00BF?"		62 XEQ 10	
15 PROMPT		63 RCL 02	
16 RCL 04		64 "T. MAT.	
17 *		"	
18 1 E3		65 XEQ 11	
19 /		66 RCL 03	
20 XEQ 00		67 "T. LAB.	
21 STO 05		"	
22 ST+ 02		68 XEQ 11	
23 "LAB./10	Labor/1000 BF	69 +	
00BF?"		70 "T. COST	
24 PROMPT	Display:	"	
25 *	Board feet	71 GTO 11	
26 RCL 04		72♦LBL B	
27 "B.F. ="		73 "LENGTH	
28 XEQ 10		?"	
29 RCL 05	Material cost	74 PROMPT	Calculate number
30 "MAT."		75 XEQ 00	of pieces
31 XEQ 11		76 "SPACING	
32 LASTX		?"	
33 RCL 04		77 PROMPT	
34 *		78 12	
35 1 E3		79 /	
36 /		80 /	
37 2		81 1	
38 *		82 +	
39 XEQ 00	Round to nearest	83 XEQ 00	
40 2	½ hour	84 "PCS="	
41 /		85 XEQ 10	
42 "HOURS =	Hours	86 GTO A	
"		87♦LBL 00	
43 XEQ 10		88 .5	
44 RCL 00		89 +	Rounding routine
45 *		90 INT	
46 XEQ 00		91 RTN	

[illegible]

## LUMBER ESTIMATE

PROGRAM REGISTERS NEEDED: 39

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ROW 1 (1 - 3)



ROW 2 (3 - 7)



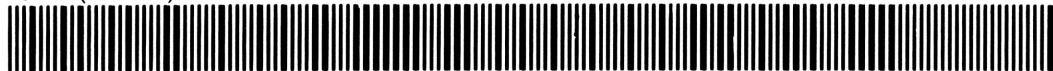
ROW 3 (7 - 11)



ROW 4 (12 - 14)



ROW 5 (14 - 20)



ROW 6 (21 - 23)



ROW 7 (23 - 27)



ROW 8 (28 - 32)



ROW 9 (33 - 41)



ROW 10 (42 - 45)



ROW 11 (46 - 50)



ROW 12 (50 - 54)



ROW 13 (54 - 61)



ROW 14 (61 - 64)



ROW 15 (64 - 67)



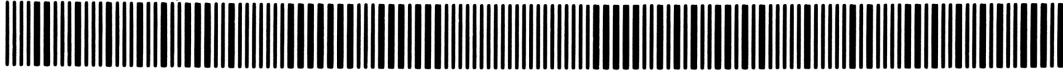
ROW 16 (67 - 70)



ROW 17 (70 - 73)



ROW 18 (73 - 76)



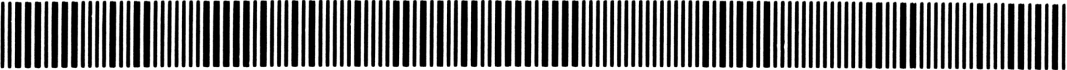
LUMBER ESTIMATE

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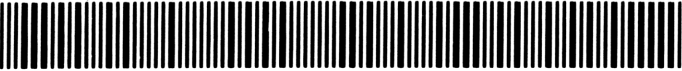
ROW 19 (76 - 83)



ROW 20 (84 - 88)

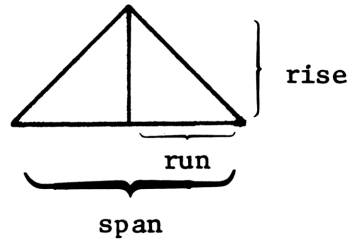


ROW 21 (88 - 92)



## SHINGLE ESTIMATE

Given ceiling area and pitch of roof, this program finds the roof area and the number of squares rounded to nearest bundle. Given local costs and labor rates, material costs, labor costs and total costs are found.



Pitch = rise/span

One Square = one hundred square feet

Three Bundles = one square (shingles are sold by the bundle)

Note: Rounds internally to nearest \$1,  $\frac{1}{2}$  hour, and  $\frac{1}{3}$  square; 10% waste is added internally; cannot be used for built-up roofs; should not be used for roll roofing.

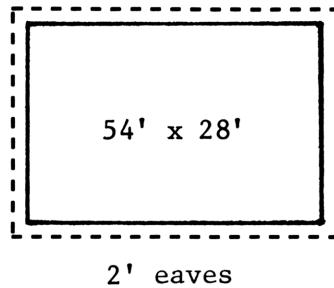
Reference(s): Thomas, Paul I., *How to Estimate Building Losses and Construction Costs*, 2nd Ed., Prentice-Hall, Inc., 1971, Chapter 13.

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

HP-65 Users' Library program #04303A.

Example:

Dwelling size:



Plain gable roof:

pitch =  $\frac{1}{4}$



ceiling area (including eaves) = 58' x 32' = 1,856

For the dwelling with the above dimensions, find the roof cost. Use a labor rate of \$11.90/hr., a labor factor of 2 hours per square, and a cost per Square of \$24.45.

Keystrokes:

Display:

[USER]

(set USER mode)

[XEQ] [ALPHA] SIZE [ALPHA] 006

[XEQ] [ALPHA] SHN [ALPHA]

11.9 [R/S]

24.45 [R/S]

2 [R/S]

58 [ENTER↑] 32 [x] [R/S]

8 [R/S]

32 [R/S]

[B]

[R/S]

[R/S]

[R/S]

LABOR RATE ?

COST/SQ. ?

LABOR/SQ. ?

AREA ?

RISE ?

SPAN ?

AREA=2,075.00

SQRS=22.67

MAT=\$554.00

LAB=\$541.00

TOTAL=\$1,095.00

[illegible]



# Program Listings

01♦LBL "SHN	Initialize	48 XEQ 10	
"		49 RCL 04	
02 CLRG		50 RCL 03	
03 "LABOR R		51 *	
ATE ?"	Input:	52 .5	
04 PROMPT	labor rate,	53 XEQ 00	
05 STO 00		54 RCL 00	
06 "COST/SQ	cost/Square,	55 *	
" ?"		56 XEQ 01	
07 PROMPT		57 ST+ 05	
08 STO 02		58 "LAB"	
09 "LABOR/S	labor factor,	59 XEQ 10	
Q. ?"		60 RCL 05	
10 PROMPT		61 "TOTAL"	
11 STO 03		62♦LBL 10	
12♦LBL A	ceiling area,	63 "F=\$"	Display routine
13 "AREA ?"		64 ARCL X	
14 PROMPT	rise, and	65 PROMPT	
15 "RISE ?"		66 RTN	
16 PROMPT		67♦LBL 01	
17 "SPAN ?"	span	68 1	
18 PROMPT		69♦LBL 00	Rounding routine
19 2		70 /	
20 /		71 LASTX	
21 /	Calculate:	72 X<>Y	
22 ATAN	roof area,	73 .5	
23 COS	and number of	74 +	
24 /	Squares	75 INT	
25 XEQ 01		76 *	
26 ST+ 01		77 RTN	
27 "AREA="		78 .END.	
28 ARCL X			
29 PROMPT			
30♦LBL B			
31 RCL 01			
32 1.1	Add 10% waste		
33 *			
34 1 E2			
35 /			
36 3			
37 1/X	Round to 1/3	90	
38 XEQ 00	Square		
39 STO 04			
40 "SQRS="			
41 ARCL X			
42 PROMPT			
43 RCL 02			
44 *			
45 XEQ 01	Calculate costs		
46 STO 05	of materials		
47 "MAT"	and labor		
		00	

DATA REGISTERS				STATUS			
00	labor rate	50		SIZE <u>  006  </u>		TOT. REG. <u>  32  </u>	USER MODE
	square feet			ENG <u>      </u>		FIX <u>  2  </u>	SCI <u>      </u>
	material cost			DEG <u>      </u>		RAD <u>      </u>	ON <u> X </u> OFF <u>      </u>
	labor cost						
	Squares						
05	labor + materials	55		<b>FLAGS</b>			
				#	INIT S/C	SET INDICATES	CLEAR INDICATES
10		60					
15		65					
20		70					
25		75					
30		80					
35		85					
				<b>ASSIGNMENTS</b>			
				<b>FUNCTION</b>		<b>KEY</b>	
40		90					
45		95					

## SHINGLE ESTIMATE

PROGRAM REGISTERS NEEDED: 27

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SOLUTION BOOK:  
HOME CONST. ESTIMATING

ROW 1 (1 - 3)



ROW 2 (3 - 6)



ROW 3 (6 - 9)



ROW 4 (9 - 12)



ROW 5 (13 - 15)



ROW 6 (15 - 20)



ROW 7 (21 - 27)



ROW 8 (27 - 34)



ROW 9 (34 - 40)



ROW 10 (40 - 47)



ROW 11 (47 - 53)



ROW 12 (54 - 59)



ROW 13 (59 - 63)



ROW 14 (64 - 74)



ROW 15 (75 - 78)



## WALL AND CEILING AREAS ESTIMATE

Given dimensions of rooms and sizes of openings, this program finds the ceiling area, net wall area, and total area of each room and totals for the entire structure.

length times width = ceiling area

2 times (length plus width) times height = wall area

gross area less openings = net area

Note: This program may be used only for rectangular rooms.

Reference: HP-65 Users' Library program #04247A.

Example:

height = 7'

<u>ROOM SIZE</u>	<u>CEIL.</u>	<u>OPEN</u>	<u>NET WALL</u>	<u>TOTAL</u>
BED1 12x14	168	86	278	446
BED2 8x10	80	73	179	259
CLST 3x7	21	40	100	121
LIV. 16x14	224	99	321	545
STRS. 4x10	40	20	176	216
HALL 16x4	64	204	76	140
D/K 20x14	280	102	374	654
GRG 14x28	392	103	485	877
TOTAL	1269	727	1989	3258

Run the program with the information given above.

Keystrokes:

Display:

[USER]	(set USER mode)
[XEQ] [ALPHA] SIZE [ALPHA] 005	
[XEQ] [ALPHA] AREA [ALPHA]	HEIGHT ?
7 [R/S]	LENGTH ?
12 [R/S]	WIDTH ?
14 [R/S]	N. WALL=278.
86 [R/S]	CEIL.=168.
[R/S]	TOTAL=446.
[R/S]	LENGTH ?
[A]	WIDTH ?
8 [R/S]	:
:	TOTAL=877.
[R/S]	T.N. WALL=1,989.
[R/S]	T.G. WALL=2,716.
[R/S]	T. CEIL.=1,269.
[R/S]	

[illegible]

# Program Listings

01*LBL "ARE A"	Initialize	"	44*LBL 11	-----
02 CLRG			45 "F="	
03*LBL B	Input:		46 ARCL X	Display routine
04 "HEIGHT	height,		47 PROMPT	
?"			48 RTN	
05 PROMPT			49 .END.	
06 STO 00				
07*LBL A	length,			
08 "LENGTH		60		
?"				
09 PROMPT	width			
10 "WIDTH ?				
"				
11 PROMPT	Calculate			
12 *	ceiling area			
13 STO 04				
14 ST+ 01				
15 LASTX				
16 /		70		
17 LASTX	Calculate gross			
18 +	wall area			
19 2				
20 *				
21 RCL 00				
22 *				
23 ST+ 02				
24 "OPENING	Input openings			
S ?"	area			
25 PROMPT		80		
26 -				
27 ST+ 03	Display results			
28 "N. WALL				
"				
29 XEQ 11				
30 RCL 04				
31 "CEIL."				
32 XEQ 11				
33 +				
34 "TOTAL"				
35 XEQ 11		90		
36 RCL 03				
37 "T.N. WA				
LL"				
38 XEQ 11				
39 RCL 02				
40 "T.G. WA				
LL"				
41 XEQ 11				
42 RCL 01				
43 "T. CEIL		00		

DATA REGISTERS				STATUS			
00	height	50		SIZE <u>005</u> TOT. REG. <u>26</u> USER MODE ENG <u>      </u> FIX <u>0</u> SCI <u>      </u> ON <u>X</u> OFF <u>      </u> DEG <u>      </u> RAD <u>      </u> GRAD <u>      </u>			
	total ceiling			<b>FLAGS</b> #    INIT S/C    SET INDICATES    CLEAR INDICATES			
	total gross wall						
	total net wall						
	ceiling						
05		55					
10		60					
15		65					
20		70					
25		75					
30		80					
35		85					
				<b>ASSIGNMENTS</b>			
40		90		FUNCTION	KEY	FUNCTION	KEY
45		95					



## WALL &amp; CEILING AREAS ESTIMATE

PROGRAM REGISTERS NEEDED: 22

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HOME CONST. ESTIMATING

ROW 1 (1 - 4)



ROW 2 (4 - 8)



ROW 3 (8 - 10)



ROW 4 (10 - 19)



ROW 5 (20 - 24)



ROW 6 (24 - 28)



ROW 7 (28 - 32)



ROW 8 (32 - 36)



ROW 9 (37 - 38)



ROW 10 (39 - 41)



ROW 11 (41 - 45)



ROW 12 (45 - 49)



## WALLPAPER ESTIMATE

Given the areas to be papered, size of rolls, and cost per roll, this program finds number of rolls, material cost, number of hours, labor cost and total cost. Intended to be used with "Wall and Ceiling Area Estimate".

Note: Output is rounded to the nearest dollar, roll, and half hour.

Reference: HP-65 Users' Library program #04427A.

### Example:

Find the number of rolls required and the material cost of wallpapering the walls and ceiling of a room. Also, find the labor hours, the labor cost, the total cost for wallpapering. The areas of the room are to be 80 sq. ft. for the ceiling and 179 sq. ft. for the walls. 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.

### Keystrokes:

### Display:

[USER]	(set USER mode)
[XEQ] [ALPHA] SIZE [ALPHA] 005	
[XEQ] [ALPHA] WPAP [ALPHA]	LABOR RATE ?
11.83 [R/S]	NET AREA ?
80 [R/S]	COVERAGE ?
30 [R/S]	COST/ROLL ?
3.25 [R/S]	ROLLS/HR ?
3 [R/S]	HOURS=1.00
[R/S]	LABOR=\$12.00
[R/S]	ROLLS=3.00
[R/S]	MAT.=\$10.00
[A]	NET AREA ?
179 [R/S]	COVERAGE ?
30 [R/S]	COST/ROLL ?
6.50 [R/S]	ROLLS/HR ?
3 [R/S]	HOURS=2.00
[R/S]	LABOR=\$24.00
[R/S]	ROLLS=6.00
[R/S]	MAT.=\$39.00
[R/S]	T. MAT.=\$49.00
[R/S]	T. LAB.=\$36.00
[R/S]	TOTAL=\$85.00

[illegible]

# Program Listings

01♦LBL "WPA P"	Initialize	46 XEQ 11	Total material,
02 CLRG		47 RCL 02	
03 "LABOR R ATE ?"		48 "T. MAT.	
04 PROMPT		49 XEQ 11	
05 STO 00		50 RCL 03	
06♦LBL A		51 "T. LAB.	Total labor,
07 "NET ARE A ?"	Input: Net area,	52 XEQ 11	
08 PROMPT		53 +	Total cost
09 XEQ 00		54 "TOTAL"	
10 "COVERAG E ?"	Coverage,	55♦LBL 11	
11 PROMPT		56 "T=\$"	Display routine
12 /		57 ARCL X	
13 .49		58 PROMPT	
14 +		59 RTN	
15 XEQ 00		60♦LBL 00	
16 STO 01		61 .5	Rounding routine
17 "COST/RO LL ?"	Cost/roll,	62 +	
18 PROMPT		63 INT	
19 *		64 RTN	
20 XEQ 00		65 .END.	
21 STO 04			
22 ST+ 02			
23 RCL 01			
24 "ROLLS/H R ?"	Rolls/hour		
25 PROMPT		80	
26 /			
27 2			
28 *	Round to ½ hour		
29 XEQ 00			
30 2			
31 /			
32 "HOURS="			
33 ARCL X	Display: Hours,		
34 PROMPT		90	
35 RCL 00			
36 *			
37 XEQ 00			
38 ST+ 03			
39 "LABOR"	Labor,		
40 XEQ 11			
41 "ROLLS="	No. of rolls,		
42 ARCL 01			
43 PROMPT			
44 RCL 04			
45 "MAT."	Total material,	00	

DATA REGISTERS				STATUS			
00	labor rate	50		SIZE <u>005</u> TOT. REG. <u>33</u> USER MODE ENG <u>      </u> FIX <u>2</u> SCI <u>      </u> ON <u>X</u> OFF <u>      </u> DEG <u>      </u> RAD <u>      </u> GRAD <u>      </u>			
	number of rolls			<b>FLAGS</b> #    INIT S/C    SET INDICATES    CLEAR INDICATES			
	$\Sigma$ material costs						
	$\Sigma$ labor costs						
	material cost						
05		55					
10		60					
15		65					
20		70					
25		75					
30		80					
35		85					
40		90		<b>ASSIGNMENTS</b> FUNCTION    KEY    FUNCTION    KEY			
45		95					

## WALLPAPER ESTIMATE

PROGRAM REGISTERS NEEDED: 29

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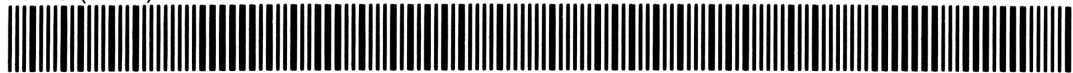
ROW 1 (1 - 3)



ROW 2 (3 - 6)



ROW 3 (7 - 9)



ROW 4 (9 - 10)



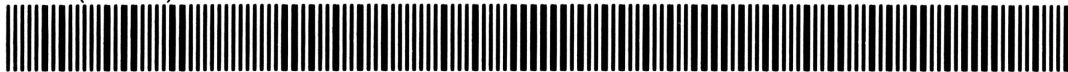
ROW 5 (11 - 17)



ROW 6 (17 - 20)



ROW 7 (20 - 24)



ROW 8 (24 - 32)



ROW 9 (32 - 37)



ROW 10 (37 - 41)



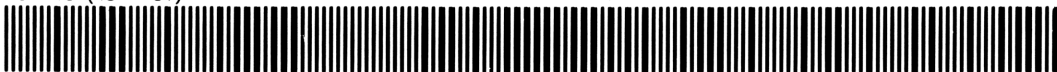
ROW 11 (41 - 45)



ROW 12 (45 - 48)



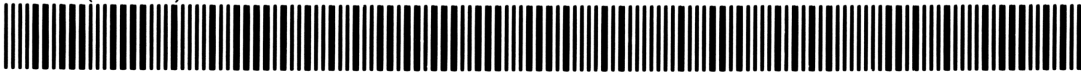
ROW 13 (48 - 51)



ROW 14 (52 - 56)



ROW 15 (56 - 65)



ROW 16 (65 - 65)



## DRYWALL AND INSULATION ESTIMATE

Given area, item cost, and labor factor, this program finds material cost, labor hours, labor cost, and total cost for drywall and insulation. (Intended for use with other estimate programs.)

Note: The program rounds to the nearest dollar, and half hour.

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

HP-65 Users' Library program #04457A.



## Example:

Given a net area of 3615 sq. ft. to be drywalled and a net area of 932 sq. ft. to be insulated (from the "Wall and Ceiling Areas Estimate" program) figure the cost of the drywall and insulation, breaking the figure up into labor and material. Use a cost of \$8.70 per hundred sq. ft. for drywall. Use a labor factor of 1.5 hours per hundred sq. ft. 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 sq. ft. for wall insulation. Use a labor factor of 1.5 hours per hundred sq. ft. at a carpenter's rate for stapling the wall insulation. The painter's rate is \$11.28 and the carpenter's rate is \$13.21.

## Keystrokes:

## Display:

[USER]	(set USER mode)
[XEQ] [ALPHA] SIZE [ALPHA] 005	
[XEQ] [ALPHA] DRY [ALPHA]	NET AREA ?
3615 [R/S]	COST/100SF ?
8.7 [R/S]	LAB./100SF ?
1.5 [R/S]	LABOR RATE?
13.21 [R/S]	HOURS=54.00
[R/S]	LAB.=\$713.00
[R/S]	MAT=\$315.00
[R/S]	TOTAL=\$1,028.00
[A]	NET AREA ?
3615 [R/S]	COST/100SF ?
0 [R/S]	LAB./100SF ?
1.2 [R/S]	LABOR RATE?
11.28 [R/S]	HOURS=43.50
[R/S]	LAB.=\$491.00
[A]	NET.AREA ?
3615 [R/S]	
:	:
[R/S]	TOTAL=\$288.00
[R/S]	T. HRS.=126.00
[R/S]	T. MAT.=\$418.00
[R/S]	T. LAB.=\$1,553.00
[R/S]	G.T.=\$1,971.00

[illegible]

# Program Listings

01♦LBL "DRY	Initialize	46 "T. MAT.	
"		"	
02 CLRG		47 XEQ 11	
03♦LBL A		48 RCL 04	
04 "NET ARE		49 "T. LAB.	
A ?"		"	
05 PROMPT	Input data and	50 XEQ 11	
06 1 E2	calculate	51 +	
07 /	results	52 "G.T."	
08 STO 02		53♦LBL 11	
09 "COST/10		54 "I=\$"	
0SF ?"		55 ARCL X	Display routine
10 PROMPT		56 PROMPT	
11 *		57 RTN	
12 XEQ 00		58♦LBL 00	
13 ST+ 00		59 .5	
14 STO 01		60 +	
15 "LAB./10		61 INT	
0SF ?"		62 RTN	
16 PROMPT		63 .END.	
17 RCL 02			
18 *			
19 2			
20 *			
21 XEQ 00	Round to ½ hour		
22 2			
23 /			
24 STO 02			
25 ST+ 03			
26 "LABOR R			
ATE?"		80	
27 PROMPT			
28 *			
29 XEQ 00			
30 ST+ 04			
31 "HOURS="			
32 ARCL 02			
33 PROMPT	Display results		
34 "LAB."			
35 XEQ 11			
36 RCL 01		90	
37 "MAT"			
38 XEQ 11			
39 +			
40 "TOTAL"			
41 XEQ 11			
42 "T. HRS.			
"			
43 ARCL 03	Display totals		
44 PROMPT			
45 RCL 00		00	

DATA REGISTERS				STATUS			
00	Σ material	50		SIZE <u>005</u> TOT. REG. <u>31</u> USER MODE ENG <u>     </u> FIX <u>2</u> SCI <u>     </u> ON <u>X</u> OFF <u>     </u> DEG <u>     </u> RAD <u>     </u> GRAD <u>     </u>			
	material			<b>FLAGS</b> #    INIT S/C    SET INDICATES    CLEAR INDICATES			
	area/100, hours						
	Σ hours						
	Σ labor						
05		55					
10		60					
15		65					
20		70					
25		75					
30		80					
35		85					
				<b>ASSIGNMENTS</b>			
40		90		FUNCTION	KEY	FUNCTION	KEY
45		95					

## DRYWALL &amp; INSULATION ESTIMATE

PROGRAM REGISTERS NEEDED: 27

HEWLETT PACKARD

SOLUTION BOOK:

HOME CONST. ESTIMATING

ROW 1 (1 - 4)



ROW 2 (4 - 7)



ROW 3 (8 - 9)



ROW 4 (9 - 15)



ROW 5 (15 - 19)



ROW 6 (20 - 26)



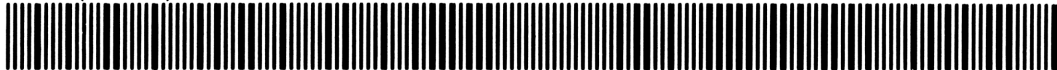
ROW 7 (26 - 29)



ROW 8 (30 - 34)



ROW 9 (34 - 38)



ROW 10 (38 - 42)



ROW 11 (42 - 46)



ROW 12 (46 - 49)



ROW 13 (49 - 52)



ROW 14 (52 - 59)



ROW 15 (59 - 63)



## SHEATHING AND SUBFLOOR ESTIMATE

Given the area to be covered, the size of plywood, the item cost, and the labor factor, this program finds gross area, material cost, labor hours, labor cost, and total cost. (Intended for use with other estimate programs.)

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. 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.

Note: Works only for plywood sheathing and subflooring. For boards, use Lumber Estimate. Rounds to the nearest one dollar and  $\frac{1}{2}$  hour.

Reference(s): *National Construction Estimator*, 23rd Ed., 1975, Craftsman Book Co., Solano Beach, California.

Thomas, Paul I., *How to Estimate Building Losses and Construction Costs*, 2nd Ed., 1971, Prentice-Hall.

HP-65 Users' Library program #04478A.

**Example:**

Find the quantities required and costs for sheathing and subflooring. A roof area of 2,075 sq. ft. was determined in the "Shingle Estimate" program and a net exterior wall area of 1,093 sq. ft. in the "Wall and Ceiling Area Estimate" program. Floor area is 40'x28'. Use 4x8 sheets of plywood and labor factors of 14 for the roof, 13 for the walls and 12 for the floor. Use costs of \$320 per thousand sq. ft. for the roof plywood, \$200 for the wall, and \$265 for the floor. Use a labor rate of \$13.21.

**Keystrokes:****Display:**

[USER]	(set USER mode)
[XEQ] [ALPHA] SIZE [ALPHA] 006	
[XEQ] [ALPHA] SHE [ALPHA]	LABOR RATE ?
13.21 [R/S]	NET AREA ?
2075 [R/S]	PLYWD. AREA ?
32 [R/S]	COST/1000SF?
320 [R/S]	LAB./1000SF ?
14 [R/S]	HRS=29.00
[R/S]	LABOR=\$383.00
[R/S]	MAT.=\$666.00
[R/S]	TOTAL=\$1,049.00
[A]	NET AREA ?
1093 [R/S]	PLYWD. AREA?
:	:
[R/S]	TOTAL=\$475.00
[R/S]	T. PCS.=135.00
[R/S]	T. MAT.=\$1,187.00
[R/S]	T. LAB.=\$753.00
[R/S]	G.T.=\$1,940.00

[illegible]



# Program Listings

01♦LBL "SHE "	Initialize	46 ST+ 03	
02 CLRG		47 "LABOR"	
03 "LABOR R		48 XEQ 11	
ATE ?"		49 RCL 05	
04 PROMPT		50 "MAT."	
05 STO 00		51 XEQ 11	
06♦LBL A		52 +	
07 "NET ARE		53 "TOTAL"	
A ?"		54 XEQ 11	
08 PROMPT	Input data and calculate results	55 "T. PCS. ="	Display totals
09 "PLYWD.		56 ARCL 01	
AREA ?"		57 PROMPT	
10 PROMPT		58 RCL 02	
11 ABS		59 "T. MAT."	
12 X<>Y		"	
13 LASTX	Round up	60 XEQ 11	
14 /		61 RCL 03	
15 .49		62 "T. LAB."	
16 +		"	
17 XEQ 00		63 XEQ 11	
18 ST+ 01		64 +	
19 *		65 "G.T."	
20 STO 04		66♦LBL 11	
21 "COST/10		67 "T=\$"	
00SF?"		68 ARCL X	Display routine
22 PROMPT		69 PROMPT	
23 1 E3		70 RTN	
24 /		71♦LBL 00	
25 *		72 .5	
26 XEQ 00		73 +	Rounding routine
27 ST+ 02		74 INT	
28 STO 05		75 RTN	
29 "LAB./10		76 .END.	
00SF ?"			
30 PROMPT			
31 RCL 04			
32 1 E3			
33 /			
34 *			
35 2	90		
36 *			
37 XEQ 00			
38 2			
39 /			
40 "HRS="			
41 ARCL X			
42 PROMPT			
43 RCL 00			
44 *			
45 XEQ 00	00		

DATA REGISTERS				STATUS			
00	labor rate	50		SIZE <u>006</u>		TOT. REG. <u>37</u>	USER MODE
	Σ pieces			ENG	<u>      </u>	FIX <u>2</u>	SCI <u>      </u>
	Σ material costs			DEG	<u>      </u>	RAD <u>      </u>	ON <u>X</u> OFF <u>      </u>
	Σ labor costs			FLAGS			
	gross area						
05	material cost	55		#	INIT S/C	SET INDICATES	CLEAR INDICATES
10		60					
15		65					
20		70					
25		75					
30		80					
35		85					
				ASSIGNMENTS			
				FUNCTION		KEY	FUNCTION
40		90					KEY
45		95					

## SHEATHING &amp; SUBFLOOR ESTIMATE

PROGRAM REGISTERS NEEDED: 32

HEWLETT PACKARD

SOLUTION BOOK:

HOME CONST. ESTIMATING

ROW 1 (1 - 3)



ROW 2 (3 - 7)



ROW 3 (7 - 9)



ROW 4 (9 - 10)



ROW 5 (11 - 18)



ROW 6 (19 - 21)



ROW 7 (21 - 27)



ROW 8 (28 - 29)



ROW 9 (29 - 37)



ROW 10 (37 - 44)



ROW 11 (45 - 48)



ROW 12 (48 - 53)



ROW 13 (53 - 55)



ROW 14 (55 - 59)



ROW 15 (59 - 62)



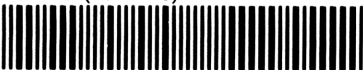
ROW 16 (62 - 67)



ROW 17 (67 - 76)



ROW 18 (76 - 76)



## PAINTING ESTIMATE

Given the area to be painted, the cost per gallon, the coverage per gallon, and the labor factor, this program finds material cost, labor hours, labor cost and total cost. (Intended to use with other estimate programs.)

Note: The program rounds to the nearest dollar, gallon, and  $\frac{1}{2}$  hour.

Reference(s): *National Construction Estimator*, 1975, Craftsman Book Co.

Thomas, Paul I., *How to Estimate Building Losses and Construction Costs*, 2nd Ed., 1971, Prentice-Hall.

HP-65 Users' Library program #04477A.

### Example:

Given a net area of 1312 sq. ft. for the exterior and a net area of 5070 sq. ft. for the interior of a house (as determined by the "Wall and Ceiling Areas Estimate" program), run the program for two coats of paint. Use labor factors of 150 for the interior and 125 for the exterior. Use spread rates of 400 sq. ft. 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.

### Keystrokes:

### Display:

[USER]	(set USER mode)
[XEQ] [ALPHA] SIZE [ALPHA] 007	
[XEQ] [ALPHA] PAINT [ALPHA]	LABOR RATE ?
11.28 [R/S]	LAB. FACTOR ?
150 [R/S]	NET AREA ?
10140 [R/S]	COVERAGE ?
450 [R/S]	COST/GAL. ?
9.5 [R/S]	HRS.=67.50
[R/S]	LAB.=\$761.00
[R/S]	MAT.=\$219.00
[R/S]	TOTAL=\$980.00
[R/S]	GALS.=23.00
[A]	LAB. FACTOR ?
125 [R/S]	NET AREA ?
2624 [R/S]	COVERAGE ?
400 [R/S]	COST/GAL. ?
10 [R/S]	HRS.=21.00
[R/S]	LAB.=\$237.00
[R/S]	MAT.=\$70.00
[R/S]	TOTAL=\$307.00
[R/S]	GALS.=7.00
[R/S]	T. GALS.=30.00
[R/S]	T. MAT.=\$289.00
[R/S]	T. LAB.=\$998.00
[R/S]	G.T.=\$1,287.00

[illegible]

# Program Listings

01♦LBL "PAI NT"	Initialize	46 +	
02 CLRG		47 "TOTAL"	
03 "LABOR R ATE ?"		48 XEQ 11	
04 PROMPT		49 "GALS. ="	
05 STO 00		50 ARCL 05	
06♦LBL A		51 PROMPT	-----
07 "LAB. FA CTOR ?"	Input data and calculate results	52 "T. GALS ."	Display totals
08 PROMPT		53 ARCL 06	
09 STO 01		54 PROMPT	
10 "NET ARE A ?"		55 RCL 02	
11 PROMPT		56 "T. MAT. "	
12 STO 04		57 XEQ 11	
13 "COVERAG E ?"		58 RCL 03	
14 PROMPT		59 "T. LAB. "	
15 /		60 XEQ 11	
16 .49	Round up	61 +	
17 +		62 "G.T."	-----
18 XEQ 00		63♦LBL 11	Display routine
19 STO 05		64 "T=\$"	
20 ST+ 06		65 ARCL X	
21 "COST/GA L. ?"		66 PROMPT	-----
22 PROMPT		67 RTN	Rounding routine
23 *		68♦LBL 00	
24 XEQ 00		69 .5	
25 ST+ 02		70 +	
26 RCL 04		71 INT	
27 RCL 01		72 RTN	
28 /		73 .END.	
29 2	Round to ½ hour		
30 *			
31 XEQ 00			
32 2			
33 /			
34 "HRS. ="			
35 ARCL X		90	
36 PROMPT	Display results		
37 RCL 00			
38 *			
39 XEQ 00			
40 ST+ 03			
41 "LAB."			
42 XEQ 11			
43 X<>Y			
44 "MAT."			
45 XEQ 11		00	

[illegible]



## PAINTING ESTIMATE

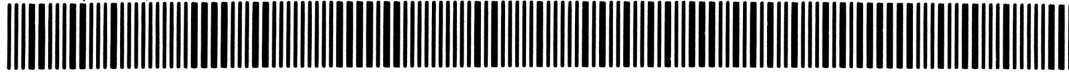
PROGRAM REGISTERS NEEDED: 32

HEWLETT PACKARD

SOLUTION BOOK:

HOME CONST. ESTIMATING

ROW 1 (1 - 3)



ROW 2 (3 - 6)



ROW 3 (6 - 7)



ROW 4 (7 - 10)



ROW 5 (10 - 13)



ROW 6 (13 - 20)



ROW 7 (20 - 21)



ROW 8 (22 - 31)



ROW 9 (31 - 36)



ROW 10 (37 - 42)



ROW 11 (42 - 47)



ROW 12 (47 - 49)



ROW 13 (49 - 52)



ROW 14 (52 - 56)



ROW 15 (56 - 59)



ROW 16 (60 - 64)



ROW 17 (64 - 73)



ROW 18 (73 - 73)



## WOOD FLOOR ESTIMATE

Given floor area, material cost, and labor factors, this program finds labor hours, material costs, labor costs, and total costs for laying and sanding hardwood floors. Use the "Painting Estimate" program to determine filler and finishing costs.

Note: The program rounds to the nearest one hour, one dollar and  $\frac{1}{2}$  hour.

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

HP-65 Users' Library program #04580A.

### Example:

Find the costs of flooring, sanding, filler, and finishing for a floor with a net area of 1120 square feet. 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 10 hours for sanding, 180 for filler, and 450 for seal and finish. Use spread rates of 500 sq. ft. 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.

Keystrokes:	Display:
[USER]	(set USER mode)
[XEQ] [ALPHA] SIZE [ALPHA] 006	
[XEQ] [ALPHA] FLOOR [ALPHA]	LABOR RATE ?
13.34 [R/S]	AREA ?
1120 [ENTER↑] 1.333 [x] [R/S]	COST/1000SF?
1120 [R/S]	LAB. FACTOR ?
32 [R/S]	HRS.=48.00
[R/S]	LAB.=\$640.00
[R/S]	MAT.=\$1,672.00
[R/S]	TOTAL=\$2,312.00 (flooring)
[A]	AREA ?
1120 [R/S]	COST/1000SF?
0 [R/S]	LAB. FACTOR ?
10 [R/S]	HRS.=11.00
[R/S]	LAB.=\$147.00
[R/S]	MAT.=\$0.00
[R/S]	TOTAL=\$147.00 (sanding)
[R/S]	T. HRS.=59.00
[R/S]	T. MAT.=\$1,672.00
[R/S]	T. LAB.=\$787.00
[R/S]	G.T.=\$2,459.00

From the "Painting Estimate" program, the respective costs of labor and materials for filler are \$80.00 and \$23.00 and for seal and finish (2 coats) are \$67.00 and \$66.00 respectively.

# User Instructions

[illegible]

# Program Listings

01♦LBL "FLO OR"	Initialize	47 PROMPT	
02 CLRG		48 RCL 02	
03 "LABOR R ATE ?"	Input data and calculate results	49 "T. MAT. "	Display routine
04 PROMPT		50 XEQ 11	
05 STO 00		51 RCL 03	
06♦LBL A		52 "T. LAB. "	
07 "AREA ?"		53 XEQ 11	
08 PROMPT		54 +	
09 STO 05		55 "G.T."	
10 "COST/10 00SF?"		56♦LBL 11	
11 PROMPT		57 "T=\$"	
12 1 E3		58 ARCL X	
13 /	Rounding routine	59 PROMPT	
14 *		60 RTN	
15 XEQ 00		61♦LBL 00	
16 ST+ 02		62 .5	
17 STO 01		63 +	
18 RCL 00		64 INT	
19 RCL 05		65 RTN	
20 "LAB. FA CTOR ?"		66 .END.	
21 PROMPT	Display results		
22 1 E3			
23 /			
24 *			
25 2			
26 *			
27 XEQ 00		80	
28 2			
29 /			
30 ST+ 04			
31 *	Display totals		
32 "HRS.="			
33 ARCL L			
34 PROMPT			
35 XEQ 00			
36 ST+ 03			
37 "LAB."		90	
38 XEQ 11			
39 RCL 01			
40 "MAT."			
41 XEQ 11			
42 +			
43 "TOTAL"			
44 XEQ 11			
45 "T. HRS. ="			
46 ARCL 04		00	

# REGISTERS, STATUS, FLAGS, ASSIGNMENTS

DATA REGISTERS				STATUS			
00	labor rate	50		SIZE 006	TOT. REG. 33	USER MODE	
	material			ENG	FIX 2	SCI	ON X OFF
	Σ material			DEG	RAD	GRAD	
	Σ labor			FLAGS			
	Σ hours			#	INIT S/C	SET INDICATES	CLEAR INDICATES
05	area	55					
10		60					
15		65					
20		70					
25		75					
30		80					
35		85					
				ASSIGNMENTS			
				FUNCTION	KEY	FUNCTION	KEY
40		90					
45		95					

## WOOD FLOOR ESTIMATE

PROGRAM REGISTERS NEEDED: 29

HEWLETT PACKARD

SOLUTION BOOK:

HOME CONST. ESTIMATING

ROW 1 (1 - 3)



ROW 2 (3 - 6)



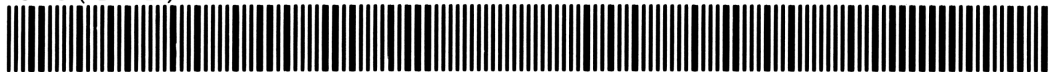
ROW 3 (6 - 10)



ROW 4 (10 - 12)



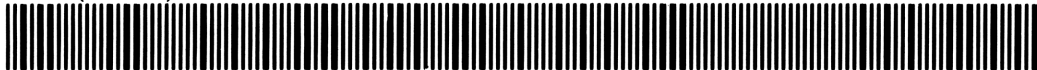
ROW 5 (12 - 20)



ROW 6 (20 - 21)



ROW 7 (22 - 30)



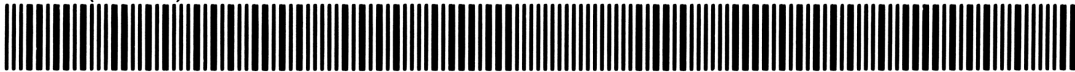
ROW 8 (30 - 35)



ROW 9 (35 - 40)



ROW 10 (40 - 43)



ROW 11 (43 - 45)



ROW 12 (46 - 50)



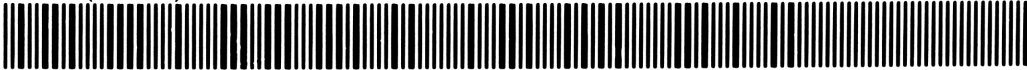
ROW 13 (50 - 53)



ROW 14 (53 - 58)



ROW 15 (58 - 65)



ROW 16 (66 - 66)



**NOTES**



## NOTES

NOTES

## **Hewlett-Packard Software**

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

## **Application Pacs**

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

You can choose from:

**Aviation (Pre-Flight Only) 00041-15018**  
**Clinical Lab 00041-15024**  
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**Structural Analysis 00041-15021**  
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**Securities 00041-15026**

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## **Users' Library**

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

## **\*Users' Library Solutions Books**

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

You can choose from:

**Business Stat/Marketing/Sales 00041-90094**  
**Home Construction Estimating 00041-90096**  
**Lending, Saving and Leasing 00041-90086**  
**Real Estate 00041-90136**  
**Small Business 00041-90137**  
**Geometry 00041-90084**  
**High-Level Math 00041-90083**  
**Test Statistics 00041-90082**  
**Antennas 00041-90093**  
**Chemical Engineering 00041-90100**  
**Control Systems 00041-90092**  
**Electrical Engineering 00041-90088**  
**Fluid Dynamics and Hydraulics 00041-90139**  
**Games II 00041-90443**

**Civil Engineering 00041-90089**  
**Heating, Ventilating & Air Conditioning 00041-90140**  
**Mechanical Engineering 00041-90090**  
**Solar Engineering 00041-90138**  
**Calendars 00041-90145**  
**Cardiac/Pulmonary 00041-90097**  
**Chemistry 00041-90102**  
**Games 00041-90099**  
**Optometry I (General) 00041-90143**  
**Optometry II (Contact Lens) 00041-90144**  
**Physics 00041-90142**  
**Surveying 00041-90141**  
**Time Module Solutions 00041-90395**

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

## **HOME CONSTRUCTION ESTIMATING**

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

