HEWLETT-PACKARD HP-41 USERS' LIBRARY SOLUTIONS Home Construction Estimating



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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 and 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:

1. 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.

- 2. Set the HP-41C to PRGM mode (press the **PRGM** key) and press **GTO** • to prepare the calculator for the new program.
- 3. 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.
 - a. 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).
 - b. 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.
 - c. The printer indication of divide sign is /. When you see / in the program listing, press \div .
 - d. The printer indication of the multiply sign is # . When you see # in the program listing, press 💌.
 - e. The I- character in the program listing is an indication of the **APPEND** function. When you see I-, press **APPEND** in ALPHA mode (press **A** and the K key).
 - f. All operations requiring register addresses accept those addresses in these forms:

nn (a two-digit number) IND nn (INDIRECT: , followed fy 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)

Keystrokes

Printer Listing

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.

Display

-		
01+LBL "SAM PLE" 02 "THIS IS	LBL ALPHA SAMPLE ALPHA ALPHA THIS IS A ALPHA	01 LBL ^T SAMPLE 02 ^T THIS IS A
A "	ALPHA APPEND SAMPLE	03 ^T ⊢ SAMPLE
03 "HSAMPLE "		04 AVIEW
04 AVIEW	6	05 6
05 6 06 ENTERA	ENTER+	06 ENTER 1
06 ENTERT 07 -2	2 CHS	07 –2
08 /	÷	08 /
09 ABS 10 STO IND	XEQ ALPHA ABS ALPHA	09 ABS
L	STO 🖸 • L	10 STO IND L
11 "R3="	ALPHA B3= ARCL 03	11 [*] R3=
12 ARUL 03 13 AVIEW		12 ARCL 03
14 RTN		13 AVIEW
	RTN	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:

;"
511
3''

Keystrokes:

Display:

1

[USER]	(set USER mode)
[XEQ] [ALPHA] SIZE [ALPHA] 004	
[XEQ] [ALPHA] CONC [ALPHA]	CONCRETE VOL.
	W ?
.20 [R/S]	D?
.15 [R/S]	L?
78.06 [R/S]	CU. YDS.=6.06
[A]	W?
.20 [R/S]	D?
:	: :
1 [R/S]	L?
39.03 [R/S]	CU. YDS.=2.91
[R/S]	TOTAL=16.13

User Instructions

				SIZE: 004
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Key in the program and set USER mode.		[USER]	
2	Initialize the program.		[XEQ] CONC	CONCRETE VOL.
				W?
3	Input dimensions: width,	W	[R/S]	D?
	depth,	D	[R/S]	L?
	and length.	L	[R/S]	CU. YDS.= (cu. yds)
	(Input format is FF.II, where F is feet			
	and I is inches, e.g., 78'6" is input as			
	78.06)			
4	To see total volume:		[R/S]	TOTAL=(cu.yds)
5	To input another section:		[A]	W?
	then go to step 3.			
6	For a new set, go to step 2.			

Program Listings

		_	
01+LBL "CON		51	
C "	Tritializo		
02 CLRG			
03 "CONCRET			
E VOL."			
04 AVIEW			
05 PSE			
06+LBL A			
07.002			
08 STO 00	Input W. D. L	60	
09 "W?"			
10 PROMPT			
11 XEQ 01			
12 "D?"			
13 PROMPT			
14 XEQ 01			
15 "L?"			
16 PROMPT			
17 XEQ 01			
18 RCL 01		70	
19 RCL 02	Calculate	/0	
20 *	volume		
21 *			
22 ST+ 03			
23 XEQ 02			
24 RCL 03			
25 SF 00			
26+LBL 02	Display routine		
27 "CU. YDS			
="			
28 FS2C 00		80	
29 "TOTAL ="			
30 ARCL X			
31 PROMPT			
32 RTN			
33+1 BI 01			
74 ENTERT			
35 ERC			
36 . 12	Convert input		
37 /	to cu. yds.		
38 X(>Y		90	
39 INT			1
40 +			1
42 /			 1
47 156 00			 1
			 1
00			 1
45 PTN			 1
46 . END.			 1
40 . En 2 .	1	00	 1

REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA REGISTERS			STATUS						
00	printer width depth sum	50		SIZE ENG DEG	004	4 TO FIX RAD	r. Reg1 _2 SC GR	.9 I AD	_ USER MOI ON _X_ C 	DE)FF
05		55		u		OFT	FL	AGS		CATES
		++		#	<u>5/C</u>	Diepla	TRUICATE	<u>vo</u> 1	Dienlay part	tal vol
							y LOLAI	VUI.	DISPIN Part	
10		60								
					-					
		 								
		+ - +								
15		65								
<u> </u>										
20		70								
		+-+								
		+								
		+								
25		75								
		↓↓								
20										
30										
		+ - +								······································
		<u>+ +</u>								
35		85								
		$\downarrow \downarrow$								
		+					ASSIGN	MEN	ITS	
		┼─┼			FUNCT		KEV		FUNCTION	KEY
40		90						1		
		+					↓	ļ		
45		95					+			
		╉──╂					+			
 		╉──╂					+			
							1			

CONCRETE VOLUME

PROGRAM REGISTERS NEEDED: 16

HEWLETT PACKARD SOLUTION BOOK: HOME CONST. ESTIMATING



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.

Size	Cost/BF	Quantity
2 x 4	\$0.265	3256 LF
2x6	\$0.257	2665 LF
2x12	\$0.27	339 LF
lx5 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>?</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>?</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

User Instructions

				SIZE: 002
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Key in the program and set USER mode.		[USER]	
2	Initialize the program.		[XEQ] LIN	LIN. <> B.F.
				SIZE <xx.X>?</xx
3	Input dimensions,*	xx.x	[R/S]	% WASTE ?
	% waste,	% waste	[R/S]	LINEAR FT. ?
	linear feet,	linear feet	[R/S]	UNIT COST ?
	and unit cost.	unit cost	[R/S]	B.F.= (board feet)
	Calculate board feet** and cost.		[R/S]	COST=(cost)
4	(Optional) Display total board feet and			
	total cost.		[R/S]	TOTAL B.F.= $(\Sigma B.F.)$
			[R/S]	TOTAL COST= (Σ cost)
5	For conversion of different size lumber:		[A]	SIZE <xx.x>?</xx.x>
	then go to step 3.			
	*Input dimensions must either be both			
	single digit numbers, or a double digit			
	number followed by a single digit. e.g.,	2. 4 and 10.	.2.	
	**Board feet are rounded to the nearest foot.			

Program Listings

01+LBL "LIN			46	RCL 00		
**			47	" TOTAL	В	
A2 CLRG	Initialize		.F."			
03 "I IN. <>			48	XEQ 10		
			49	RCL 01		
			50	"TOTOL	C	
U4 HYIEW				IOINE	0	
05 PSE		-	0517			
06+LBL A			51+	LBL 10		
07 "SIZE <x< td=""><td></td><td></td><td>52</td><td>"⊢="</td><td></td><td></td></x<>			52	" ⊢ ="		
X.X> 2"	Tanut		53	ARCL X		
AO DDAMDT	Input		54	PROMPT		Display routine
OO TNT	dimensions		55	PTN		
09 INI 10 10070			55	IDI AQ		
10 LHSTX			504	LDL UZ		
11 FRC			57	X< 21		
12 *			58	10		
13 LASTX			59	1		
14 100			60	X<>Y		
15.4			6.1	RTN		
			20	END		
16 10			02	. CAD.		
17 MOD		70				
18 X=0?						
19 XEQ 09						
20 X<>Y						
21 . 12						
22 / 07 NOCTE	Input % waste.					
23 "% WHOLE						
? "						
24 PROMPT						
25 .01	linear feet,					
26 *						
27 1		80				
	unit cost.					
20 7						
29 *						
30 "LINEHK						
FT. ?"	and calculate					
31 PROMPT						
32 *						
77 FIX Ø	board feet.					
74 DND	·····,					
34 KAD 36 610 0						
30 FIA 2						
36 "UNIT CO	cost	90				
ST ?"						
37 PROMPT						
38 X<>Y						
39 "B.F."	1					1
40 XEG 10	ł					
70 ALC 10 41 CT1 88	ł					
41 317 88	4					
42 *	ļ					
43 "COST"						
44 ST+ 01						
45 XEQ 10	1	00	l			1

REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA REGISTERS			STATUS							
00	B.F. summation	50		SIZE	002	2	тот.	REG	27	USER MO	DE
				DEG	i	F	FIX RAD	∠ SCI GR	AD	_ ON C)FF
05		55						FL/	AGS		
05		55		#	INIT S/C	S	SET IN	DICATE	S	CLEAR INDI	CATES
10		60									
15		65									
20		70									
25		75									
20		/0									
30		80									
35		85									
							A	SSIGN	IMEN	TS	
40		90		I	UNCT	ION	- 1	KEY	F	UNCTION	KEY
40		30									
45		95									

LINEAR TO BOARD FEET CONVERSION AND COSTING PROGRAM REGISTERS NEEDED: 26 HEWLETT PACKARD SOLUTION BOOK: HOME CONST. ESTIMATING



FRAMING BOARD FEET

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

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

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, $3 - 2x6xL_1$; Sill, 1 - 2x6xperimeter; rafters, 2x6 (see below); collar beams (1/3 as many as rafters), $2x6x\frac{1}{2}$ width; joists, 2x8xwidth (see below); header, $1 - 2x8xL_1$; Ridge board, $1 - 2x8xL_2$; Bridging, 1 - 1x4x6 times L₁; 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 $\frac{1}{4}$ 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 $\frac{1}{4}$ pitch, is assumed to be $\frac{1}{4}$ 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, ½ 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, 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:
 Display:

 [XEQ] [ALPHA] SIZE [ALPHA] 005
 L1 ?

 [XEQ] [ALPHA] FRAM [ALPHA]
 L1 ?

 47 [R/S]
 L2 ?

 63 [R/S]
 WIDTH ?

 30 [R/S]
 INTERIOR ?

 200 [R/S]
 9289 B.F.

User Instructions

				SIZE: 005
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Key in the program.			
2	Initialize the program.		[XEQ] FRAM	L1 ?
3	Input L_1 (length excluding garage),	L1	[R/S]	L2 ?
	L_2 (length including garage),	L ₂	[R/S]	WIDTH ?
	width,	width	[R/S]	INTERIOR ?
	linear feet of interior walls.	int	[R/S]	() B.F.
4	For a new case, go to step 2.			

Program Listings

01+LBL "FRA		50 XEQ 14	
M "	Finds board	51 RCL 02	Gable studs
02 "11 2"	feet for.	52 4	
AT DROMPT	1000 101.	57 /	
03 FKOM 1	Girder, header,	55 /	
04 310 00	and bridging	<u> </u>	
05 6.33	and bridging	55.67	
06 *		56 *	
07 "L2 ?"		57 +	
08 PROMPT		58 "INTERIO	
00 CTO 01		B 2"	
07 310 01	Ridge board	R :	
10 1.33	Ridge board	59 PRUNET	Platas
11 *		60 RCL 03	riaces
12 +		61 +	
13 "WIDTH ?		62 STO 04	
		63.2	
4.4 DDOMPT			
14 FRONF (64 *	
15 810 02		65 +	
16 RCL 01	Sill	66 RCL 04	Studs
17 +		67 5.33	
18 2		68 *	
19 *		69 +	
20 STO 03			
20 0.0 00		71 FIX Ø	
21τ			
22 RUL 02	Raiters		
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
21 0.0 $0.$		79.2	pieces of
20 *		70 +	rafters, joists.
29 +	Collar beams		and gable studs
30 RCL 04	Corrar Deams	80 INI	and gabie bedab
31 3		81 RIN	
32 /		82 .END.	
33 RCL 02			
34 2			
35 /			1
76 *			1
			4
3(T 70 DCL 88		├ ──── ├ ────	4 1
38 RLL 00			
39 XEQ 14	Joists	90	
40 RCL 04			
41 +			
42 RCL 02]
43 2		<u> </u>	1
44 +			1
45 *		<u>├</u>	4
40 *			4
40 1.33			4
47 *			1
48 +			
49 RCL 02		00	1

REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA RE	GIST	ERS	STATUS							
00	L ₁	50		SIZE	00	<u>5</u> T	TOT. F	REG2	26	USER MO	DE
	L ₂			ENG		FI	IX	<u>0</u> sci		ON O	FFX
	width			DEG		R.	RAD GRAD		AD		
	perimeter	┨──┤									
05	used	55						FL/	AGS		
-05				#	INIT S/C	SE			s	CLEAR INDI	CATES
											UNILO
10		60									
15		65									
-13											
20		70									
		├									
25		75									
25		^{/3}									
30		80									
35		85									
- 55											
				ASSIGNMENTS							
				F	UNCT	ION		KEY	I	UNCTION	KEY
40		90									
		┞──┤									
		┝──┤									
		┠───╂									
45		95									

FRAMING BOARD FEET

PROGRAM REGISTERS NEEDED: 22

HEWLETT PACKARD SOLUTION BOOK: HOME CONST. ESTIMATING



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 = (width in inches x thickness in inches x length in feet) ÷ 12
- PCS = [length x (12/spacing in inches)] + 1, 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]	D. D
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

61+LBL "LUM Initialize 47 ST+ 03 "02 CLRG Initialize 48 ST+ 05 03 "LABOR R 50 XEQ 11 Jabor cost 04 PROMPT Input: 51 RCL 05 Total cost 05 ST0 00 Labor rate 53+LBL 11 Total cost 06+LBL A 64 PROMPT St+BL 11 Total cost 07 "WTLP ?" WxTxLxP 56 ARCL X Display routine 09 12 57 PROMPT 59+LBL C 66 RCL 01 Display routine 11 XEQ 00 59+LBL C 66 RCL 01 Display routine 12 ST0 04 60 RCL 01 61 "T. B.F. Display totals 00BF?" 62 XEQ 10 63 RCL 02 64 "T. MAT. 14 "COST/10 Cost/1000 BF 67 "T. LAB. Display totals 00BF?" 63 RCL 02 64 "T. MAT. 16 RCL 04 64 "T. MAT. 17 * 1 Eabor/1000 BF 69 + 20 XEQ 00 67 "T. LAB. 21 STO 05 73 "LENGTH <t< th=""><th></th><th></th><th></th><th></th></t<>				
""" Initialize 48 ST+ 05 Labor cost 03 "LABOR R """"""""""""""""""""""""""""""""""""	01+LBL "LUM		47 ST+ 03	
62 CLRG		Initialize	48 ST+ 05	Talan
03 "LABOR R Input: 50 XEQ 11 ATE ?" Input: 51 RCL 05 04 PROMPT Labor rate 53*LBL 11 05 STO 00 Labor rate 53*LBL 11 06*LBL A 54 "F=\$" Display routine 07 "WTLP ?" WxTxLxP 56 ARCL X Display routine 08 PROMPT WxTxLxP 56 ARCL 01 Display routine 09 12 57 PROMPT 68 RCL 01 61 "T. B.F. 11 XEQ 00 Cost/1000 BF 61 "T. B.F. Display totals 06BF?" 62 XEQ 10 63 RCL 02 64 "T. MAT. 14 "COST/10 Cost/1000 BF 67 "T. LAB. Display totals 15 PROMPT Cost/1000 BF 67 "T. LAB. Display totals 19 / 65 XEQ 11 63 RCL 03 67 "T. LAB. 20 XEQ 00 69 + 69 + 21 STO 05 22 ST+ 02 68 XEQ 11 69 + 23 "LAB./10 Labor/1000 BF 69 + 24 PROMPT Display: <t< td=""><td>02 CLRG</td><td></td><td>49 "LAB."</td><td>Labor cost</td></t<>	02 CLRG		49 "LAB."	Labor cost
ATE ?" Input: 51 RCL 05 Total cost 04 PROMPT Labor rate 52 "TOTAL" Total cost 06 *LBL A Labor rate 54 "H=\$" Display routine 06 *LBL A 54 "H=\$" 55 *LBL 11 Display routine 06 *LBL A 54 "H=\$" 55 *LBL 10 Display routine 07 "WTLP ?" WXTxLxP 56 ARCL X Display routine 09 12 57 PROMPT 66 RCL 01 Display routine 11 XEQ 00 59 *LBL C 66 RCL 01 Display routine 12 STO 04 661 "T. B.F. Display totals 060BF?" 62 XEQ 10 63 RCL 02 Display totals 15 PROMPT Cost/1000 BF 67 "T. LAB." Display totals 16 RCL 04 65 XEQ 11 67 "T. LAB." Display totals 21 STO 05 67 "T. LAB." E8 XEQ 11 E8 XEQ 11 23 "LAB./10 Labor/1000 BF 69 + Goard feet 71 GTO 11 24 PROMPT Display: " " Calculate numbe of pieces 31 XEQ 11 74 PROMPT 74 PROMPT Calculate numbe of pieces 32 LAS	03 "LABOR R		50 XEQ 11	
04 PROMPT Input: 52 "TOTAL" Total cost 05 STO 00 Labor rate 53*LBL 11 Total cost 06 LBL A 53*LBL 11 Display routine 07 WTLP ?" WXTxLxP 56 ARCL X Display routine 09 12 56 ARCL X Display routine Display routine 10 / 58 RTN 56 ARCL 01 11 XEQ 00 60 RCL 01 61 "T. B.F. 13 ST+ 01 Cost/1000 BF 61 "T. B.F. 00BF?" 62 XEQ 10 63 RCL 02 14 "COST/10 BF Display totals 00BF?" 63 RCL 02 64 "T. MAT. Display totals 15 PROMPT 63 67 "T. LAB. Display totals 20 XEQ 00 67 "T. LAB. 23<"LAB./10	ATE ?"	-	51 RCL 05	
05 STO 00 Labor rate 53+LBL 11 06+LBL 6 S3+LBL 11 53+LBL 11 07 WTLP ?" S5+LBL 10 Display routine 09 12 57 PROMPT Display routine 09 12 57 PROMPT Display routine 10 // 58+LBL 10 Display routine 11 XEQ 00 S7 PROMPT Display routine 11 XEQ 00 S7 PROMPT Display routine 12 STO 04 60 RCL 01 13 ST+01 Cost/1000 BF 61 T. B.F. Display totals 00BF?" 62 XEQ 10 64 T. MAT. 18 1 E3 65 XEQ 11 19 // 66 RCL 03 67 T. LAB. 21 STO 05 68 XEQ 11 22 ST + 02	04 PROMPT	Input:	52 "TOTAL"	Total cost
06*LBL A 54"H=\$" 07 "WTLP ?" WXTxLxP 08 PROMPT 56 ARCL X 09 12 56 ARCL X 10 / 56 ARCL X 11 XEQ 00 57 PROMPT 12 STO 04 60 RCL 01 13 ST+ 01 60 RCL 01 14 "COST/10 Cost/1000 BF 00BF?" 62 XEQ 10 15 PROMPT 63 RCL 02 16 RCL 04 64 "T. MAT. 17 * 65 XEQ 10 18 1 E3 65 XEQ 11 20 XEQ 00 67 "T. LAB. 21 STO 05 " 22 ST+ 02 68 XEQ 11 23 "LAB./10 Labor/1000 BF 06BF?" 70 "T. COST 24 PROMPT Display: 25 * 80 ard feet 71 GTO 11 72 * LBL B 27 "B.F. =" 73 "LENGTH 28 XEQ 10 ?" 31 XEQ 11 74 PROMPT 32 LASTX ?" 33 RCL 04 ?7 PROMPT 34 * ?9 / 35 1 E3 ?9 / 36 / 80 / 37	05 STO 00	Labor rate	57+1 BI 11	
07 "WTLP ?" WxTxLxP 55+LBL 10 Display routine 09 12 57 PROMPT Display routine 09 12 57 PROMPT Display routine 10 - 58 RTN 59+LBL C 00 11 XEQ 00 59+LBL C 60 79+LBL C 00 12 STO 04 61 "T. B.F. 00 14 "COST/10 Cost/1000 BF 61 "T. B.F. 00 00BF?" 62 XEQ 10 63 RCL 02 00 16 RCL 04 64 "T. MAT." 00 00 00 17 * 65 XEQ 10 67 "T. LAB." 00 20 XEQ 00 67 "T. LAB." 00 00 67 "T. LAB." 21 STO 05 68 XEQ 11 69 00 00 <t< td=""><td>06+1 BL 0</td><td>Labor race</td><td>54 "L=\$"</td><td></td></t<>	06+1 BL 0	Labor race	54 "L=\$"	
08 PROMPT WXTxLxP 53% LET 18 Display routine 09 12 58 RTN 11 Structure 59+LBL C 66 RCL 01 59+LBL C 66 RCL 01 61 12 11 16 11	07 "UTLP 2"		554 6-4	
08 PROMPT 56 HRCL X Display fourthe 10 / 57 PROMPT 58 RTN 59+LBL C 60 12 STO 04 59+LBL C 60 RCL 01 61 T. B.F. 59+LBL C 60 12 59+LBL C 60 12 13 ST+ 01 61 T. B.F. 59+LBL C 60 12 14 'COST/10 05 15 15 15 16 RCL 02 64 'T. B.F. 15 15 15 16 RCL 02 64 'T. MAT. 17 16 16 16 17 16 16 16 16 16 16 16 16 16 16 17 17 17 16 16 17 16 16 16 17 16 16 16 17 16 16 17 17 16 16 17 16 16 17 17 17 17 17 17 17 17 17 17 17 17 17 17 18 17 18	OF MILT :	WxTxLxP	53¥LBL 10	Display routine
10 - 57 PROMP1	08 FRONFI		J6 HRUL A	propiny routine
10 XEQ 00 58 RTN	09 12		57 PRUMPT	
11 XEU 00 59+LBL C 60 RCL 01 12 STO 04 61 "T. B.F. 59+LBL C 66 RCL 01 14 "COST/10 Cost/1000 BF 61 "T. B.F. 59+LBL C 56 56 56 56 57 56 57 57 57 57 57 57 56 57 57 57 56 57 57 56 57 57 57 56 57	10 /		58 RTN	
12 STO 04 60 RCL 01 01 13 ST+ 01 Cost/1000 BF 61 "T. B.F. Display totals 00BF?" 62 XEQ 10 63 RCL 02 63 RCL 02 64 "T. MAT." 16 RCL 04 64 "T. MAT." 65 XEQ 11 66 "T. LAB. 67 "T. LAB. 19 / 20 XEQ 00 67 "T. LAB. 67 "T. COST 68 XEQ 11 69 + 20 XEQ 00 67 "T. COST 68 XEQ 11 69 + 69 + 20 XEQ 00 67 "T. COST 70 "T. COST 68 XEQ 11 69 + 20 XEQ 00 67 "T. COST 70 "T. COST 67 "T. COST 68 XEQ 11 21 STO 05 80 rd feet 71 GTO 11 67 "SPACING 67 "SPACING 24 PROMPT Display: " " 73 "LENGTH 25 * Board feet 71 GTO 11 " 28 XEQ 10 " 74 PROMPT 66 reces 67 "SPACING 31 XEQ 11 75 XEQ 00 76 "SPACING 67 pieces 67 pieces 33 RCL 04 77 PROMPT 78 12 79 / 36 / 31 1 38 * 90 / 81 1	11 XEU 00		59+LBL C	
13 ST+ 01 Cost/1000 BF 61 "T. B.F. Display totals 14 "COST/100 BF 62 XEQ 10 38 Status Display totals 15 PROMPT 63 RCL 02 64 "T. MAT. Display totals 16 RCL 04 65 XEQ 10 63 RCL 02 64 "T. MAT. 17 * 18 1 E3 20 XEQ 00 21 STO 05 23 "LAB. 24 PROMPT Labor/1000 BF	12 STO 04		60 RCL 01	
14 "COST/10 Cost/1000 BF =" Display totals 00BF?" 62 XEQ 10 63 RCL 02 16 RCL 04 64 "T. MAT. 64 "T. MAT. 17 * " 65 XEQ 11 19 / 66 RCL 03 67 "T. LAB. 20 XEQ 00 67 "T. LAB. " 21 STO 05 " 68 XEQ 11 23 "LAB./10 Labor/1000 BF 69 + 00BF?" 70 "T. COST " 24 PROMPT Display: " 25 * Board feet 71 GTO 11 72 * 80 ard feet 73 "LENGTH 29 RCL 05 Material cost 74 PROMPT 30 "MAT." Material cost 76 "SPACING 31 XEQ 11 77 PROMPT of pieces 32 LASTX ?" 80 / 33 RCL 04 77 PROMPT 78 12 35 1 E3 79 / 80 / 36 / 81 1 82 + 38 * 82 + 81 1 38 * 82 + 81 1	13 ST+ 01	a (1000 DB	61 "T. B.F.	
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 Board feet 72 + LBL B 27 "B.F. =" 73 "LENGTH 28 XEQ 10 ?" 30 "MAT." Material cost 31 XEQ 11 76 "SPACING 32 LASTX ?" 33 RCL 04 ?" 35 1 E3 79 / 36 / 79 / 36 / 80 / 37 2 81 1 38 * 82 + 9 VEC 00 Round to pagaret	14 "COST/10	Cost/1000 BF	= "	Display totals
15 PROMPT 63 RCL 02 16 RCL 04 64 "T. MAT. 17 * 18 1 E3 65 XEQ 11 19 20 XEQ 00 21 STO 05 22 ST+ 02 68 XEQ 11 23 'LAB./10 Labor/1000 BF 69 + 23 'LAB./10 Labor/1000 BF 69 + 24 PROMPT Display: 25 * Board feet 71 GTO 11 26 RCL 04 ?" 27 "B.F. =" 73 "LENGTH 28 XEQ 10 ?" Calculate numbe of pieces 31 XEQ 11 Calculate numbe of pieces 31 XEQ 11	00BF?"		62 XEQ 10	
16 RCL 04 64 "T. MAT. 17 * 18 1 E3 19 20 XEQ 00 21 STO 05 22 ST+ 02 23 "LAB./10 Labor/1000 BF 69 + 00BF?" 24 PROMPT Display: 25 * Board feet 71 GTO 11 72*LBL B 25 * Board feet 26 RCL 04 ?" 27<"B.F. ="	15 PROMPT		63 RCL 02	
17 * * 18 1 E3 65 XEQ 11 19 / 66 RCL 03 67 * 20 XEQ 00 67 * T LAB. 21 STO 005 68 XEQ 11 23 * LAB. 10 Labor/1000 BF 69 + 23 * LAB. 10 Labor/1000 BF 69 + 24 PROMPT Display: 25 * Board feet 71 GTO 11 26 RCL 04 ?*	16 RCL 04		64 "T. MAT.	
18 1 E3 65 XEQ 11 19 / 66 RCL 03 67 "T. LAB. 20 XEQ 00 67 "T. LAB. " 21 STO 05 68 XEQ 11 23 "LAB./10 Labor/1000 BF 68 XEQ 11 23 "LAB./10 Labor/1000 BF 69 + 68 XEQ 11 23 "LAB./10 Labor/1000 BF 69 + 69 + -	17 *			
10 10 10 60 ALE 11 19 20 XEQ 00 66 RCL 03 20 XEQ 00 67 T. LAB. 67 T. LAB. 21 STO 05 47 68 XEQ 11 23 "LAB./10 Labor/1000 BF 69 + 68 XEQ 11 23 "LAB./10 Labor/1000 BF 69 + 69 + - 24 PROMPT Display: " 70 "T. COST - <td>18 1 F3</td> <td></td> <td>45 YEQ 11</td> <td></td>	18 1 F3		45 YEQ 11	
20 XEQ 00 67 "T. LAB. 21 STO 05 67 "T. LAB. 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 *LENGTH - 27 "B.F. =" 73 *LENGTH - 28 XEQ 10 ?" - - - 29 RCL 05 Material cost 74 PROMPT Calculate numbe of pieces 31 XEQ 11 76 "SPACING - - 32 LASTX ?" - - - 33 RCL 04 77 PROMPT - - - 34 * 78 12 - - - 36 / 80 / - 80 - 37 2	19 /		22 PCL 07	
21 STO 05 22 ST+ 02 22 ST+ 02 23 "LAB./10 Labor/1000 BF 69 + 24 PROMPT Display: 24 PROMPT Display: 25 * Board feet 71 GTO 11 <td< td=""><td></td><td></td><td>66 KUL 85</td><td></td></td<>			66 KUL 85	
21 STO 053	20 764 00		67 "I. LHD.	
22 S1+ 62 68 XEQ 11 23 "LAB./10 Labor/1000 BF 69 + 24 PROMPT Display: " 25 * Board feet 71 GTO 11 25 * Board feet 72+LBL B 27 "B.F. =" 73 "LENGTH 28 XEQ 10 ?" 29 RCL 05 Material cost 74 PROMPT 30 "MAT." Material cost 75 XEQ 00 31 XEQ 11 ?" Calculate numbe of pieces 32 LASTX ?" ?" 33 RCL 04 77 PROMPT of pieces 34 * 78 12 ?" 36 80 80 80 38 * 82 + 81 1 38 * 82 + 82 + 81 1	21 510 03			
23 **LHB./10 Labor/1000 BF 69 + 00BF?" 70 **T. COST 24 PROMPT Display: " 25 * 71 GTO 11 26 RCL 04 72*LBL B 27 **B.F. =" 73 **LENGTH 28 XEQ 10 ?" 29 RCL 05 Material cost 74 PROMPT 30 **MAT." Material cost 75 XEQ 00 31 XEQ 11 ?" Calculate numbe 32 LASTX ?" 77 PROMPT 33 RCL 04 77 PROMPT 69 * 36 / 80 / 80 / 37 2 81 1 82 * 38 * Round to pearest 82 *	22 51+ 02	L 1	68 XEQ 11	
00BF?" 70 "T. COST 24 PROMPT Display: " 25 * Board feet 71 GTO 11 26 RCL 04 Board feet 72+LBL B 27 "B.F. =" 73 "LENGTH 29 RCL 05 Material cost 74 PROMPT 30 "MAT." Material cost 75 XEQ 00 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 +	23 "LHB./10	Labor/1000 BF	69 +	
24 PROMPT Display: " 25 * Board feet 71 GTO 11 26 RCL 04 Board feet 72*LBL B 27 "B.F. =" 73 "LENGTH 28 XEQ 10 ?" 29 RCL 05 Material cost 74 PROMPT 30 "MAT." Material cost 75 XEQ 00 31 XEQ 11 ?" Calculate numbe 32 LASTX ?" 73 RCL 04 34 * 78 12 ?" 36	00BF?"		70 "T. COST	
25 * Board feet 71 GTO 11 26 RCL 04 72 LBL B 27 "B.F. =" 73 "LENGTH 28 XEQ 10 74 PROMPT 29 RCL 05 Material cost 75 XEQ 00 30 "MAT." Material cost 76 "SPACING 32 LASTX ?" 73 12 33 RCL 04 77 PROMPT 6 pieces 34 * 78 12 79 / 36 / 80 / 80 / 37 2 81 1 82 + 38 * Pound to peareet 82 +	24 PROMPT	Display:		
26 RCL 04 72*LBL B 27 "B.F. =" 73 "LENGTH 28 XEQ 10 ?" 29 RCL 05 74 PROMPT 30 "MAT." Material cost 74 PROMPT 31 XEQ 11 76 "SPACING of pieces 32 LASTX ?" 73 33 RCL 04 77 PROMPT of pieces 34 * 78 12 35 1 E3 79 / 36 80 81 81 38 * 82 * 38 * 82 *	25 *	Board feet	71 GTO 11	
27 "B.F. =" 73 "LENGTH 28 XEQ 10 ?" 29 RCL 05 ?" 30 "MAT." Material cost 74 PROMPT Calculate numbe of pieces 31 XEQ 11 76 "SPACING ?" 32 LASTX ?" ?" 33 RCL 04 77 PROMPT of pieces 34 * 78 12 ?" 36 / 79 / 80 / 37 2 81 1 88 * 38 * 82 + 82 +	26 RCL 04	board reet	72+LBL B	
28 XEQ 10 ?" 74 PROMPT Calculate numbe 30 "MAT." Material cost 75 XEQ 00 of pieces 31 XEQ 11 76 "SPACING of pieces 32 LASTX ?" 77 PROMPT 78 12 33 RCL 04 77 PROMPT 78 12 34 * 78 12 79 79 79 36	27 "B.F. ="		73 "LENGTH	
29 RCL 05 Material cost 74 PROMPT Calculate number of pieces 30 "MAT." 75 XEQ 00 of pieces 31 XEQ 11 76 "SPACING of pieces 32 LASTX ?" ?" ?" 33 RCL 04 77 PROMPT	28 XEQ 10		?"	
30 "MAT." Material cost 75 XEQ 00 of pieces 31 XEQ 11 76 "SPACING of pieces 32 LASTX ?" ?" 33 RCL 04 77 PROMPT	29 RCL 05		74 PROMPT	Calculate number
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 +	30 "MAT."	Material cost	75 XEQ 00	of pieces
32 LASTX ?" 33 RCL 04 ?" 34 * 78 12 35 1 E3 79 / 36 / 80 / 37 2 81 1 38 * 82 +	31 XEQ 11		76 "SPACING	of preces
33 RCL 04 77 PROMPT 34 * 78 12 35 1 E3 79 / 36 / 80 / 37 2 81 1 38 * 82 +	32 LASTX		2"	
34 * 78 12 35 1 E3 79 / 36 / 80 / 37 2 81 1 38 * 82 +	33 RCL 04		TT PROMPT	
35 1 E3 79 / 36 / 80 / 37 2 81 1 38 * 82 +	74 *		70 12	
36 79 36 80 37 81 38 82 39 82	75 1 57		70 12	
36 / 80 / 37 2 81 1 38 * 82 + 39 VEC 68 Bound to pearest	74 /			
37 2 81 1 38 * 82 + 82 +	77 2		80 /	
			81 1	
	30 * 70 VEO 88	Round to nearest	82 +	
39 XEQ 00 Kound to hearest 83 XEQ 00	39 XEQ 00	kound to nearest	83 XEQ 00	
40 2 1001 84 "PCS="	40 2	~2 HOUL	84 "PCS="	
41 / 85 XEQ 10	41 /		85 XEQ 10	
$42 \text{ "HOURS} = _{\text{Hours}} \qquad 86 \text{ GTO A}$	42 "HOURS =	Hours	86 GTO A	
" 87+LBL 00	"		87+LBL 00	
43 XEQ 10 88.5	43 XEQ 10		88.5	Dounding mouting
44 RCL 00 89 + Kounding routin	44 RCL 00		89 +	Kounding routine
45 * 90 INT	45 *		90 INT	
46 XEQ 00 91 RTN	46 XEQ 00 🕴		91 RTN	

REGISTERS, STATUS, FLAGS, ASSIGNMENTS

DATA REGISTERS				STATUS						
00	labor rate	50		SIZE	00	б то	T. REG.	44	USER MO	DE
	total board feet			ENG		FIX	FIX <u>2</u> SCI		$-$ ON \underline{X} C)FF
	total materials			DEG	i	RAI	D GR	AD		
	total labor									
	BF	<u> </u>					EL /	۵GS		
05	mat + lab	55			INIT					
				#	S/C	SET	INDICATE	<u>s</u>	CLEAR INDI	CATES
10		60								
									· · · · · · · · · · · · · · · · · · ·	
15		65								
20		70								
25		75								
							and All Contents of the second second second second			
30		80								
25		95					an an fear an			
35		05								
								I		
				ASSIGNMENTS						
				F	UNCT	ION	KEY	F	UNCTION	KEY
40		90								
45							+			
45		95								
							+			
							+			

LUMBER ESTIMATE

PROGRAM REGISTERS NEEDED: 39

HEWLETT PACKARD SOLUTION BOOK: HOME CONST. ESTIMATING



HEWLETT PACKARD SOLUTION BOOK: HOME CONST. ESTIMATING

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, ½ hour, and 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]
                                                 LABOR RATE ?
11.9 [R/S]
                                                 COST/SQ. ?
24.45 [R/S]
                                                 LABOR/SQ. ?
2 [R/S]
                                                 AREA ?
58 [ENTER<sup>↑</sup>] 32 [x] [R/S]
                                                 RISE ?
8 [R/S]
                                                 SPAN ?
32 [R/S]
                                                 AREA=2,075.00
[B]
                                                 SQRS=22.67
[R/S]
                                                 MAT=$554.00
[R/S]
                                                 LAB=$541.00
[R/S]
                                                 TOTAL=$1,095.00
```

User Instructions

				SIZE: 006
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Key in program and set USER mode.		[USER]	
2	Initialize the program.		[XEO] SHN	LABOR RATE ?
3	Input: labor rate,	labor rate	[R/S]	COST/SO. ?
	cost per Square,	cost	[R/S]	LABOR/SO. ?
	labor factor per Square,	labor	[R/S]	AREA ?
4	ceiling area including eaves	area	[R/S]	RISE ?
	rise,	rise	[R/S]	SPAN ?
	span.	span	[R/S]	AREA=(roof area)
5	(Optional) For another section, press		[A]	AREA ?
	and go to step 4.			
6	Find: total number of Squares		ſBÌ	SQRS= (squares)
	cost of materials		[R/S]	MAT=\$ (materials)
	labor cost		[B/S]	LAB=\$(labor)
	total, labor and materials		[R/S]	TOTAL=\$ (total)
				(20241)
		-		

Program Listings

		1		
UI+LBL "SHN			48 XEQ 10	
	Initialize		49 PC1 04	
			47 KCL 04	
02 LLRG			50 RCL 03	
03 "LABOR R			51 *	
	Input:			
HIE ?	input		52.5	
04 PROMPT	labor rate,		53 XED 00	
AS STO AA				
05 510 00	10		54 RCL 00	
_ 06 "COST∕SQ	cost/Square,		55 *	
2"				
• •			26 XEQ 01	
I 07 PROMPT			57 ST+ 05	
00 CTO 02				
00 310 02			58 "LHB"	
09 "LABOR/S	labor factor,		59 XEQ 10	
0 2"				
			60 KLL 0J	
10 PRUMPI			61 "TOTAL"	
11 STO 03			COAL DL 10	
			624LBL 10	
12+LBL H			63 "+=\$"	
13 "ORFO ?"	ceiling area		CA OPCI V	Display routine
	certing area,		OF MRUL A	
14 PRUMPI			65 PROMPT	
15 "RISE ?"	rice and		CC DTM	
	rise, and		00 KIN	
16 PRUMPI			67+LBL 01	
17 "SPAN ?"	cnan		20 1	
	span			
18 PROMPT			69+LBL 00	Rounding routine
19 2			70 /	
20 /	0.1.1.1.		71 LHSIX	
21 /	Calculate:		72 8438	
22 OTON	roof area.			
22 HIHM			73.5	
23 COS	and number of		74 +	
24	Squares			
24 /	squares		75 INI 65	
25 XEQ 01			76 *	
94 CT+ 01				
20 311 01			77 RIN	
27 "AREH="	4		78 .END.	
28 ARCI X		1		
				1
29 PROMPT				4
30+181 B				
31 RUL 01				4
32 1.1	Add 10% waste			J
77 4]
33 T	1			4
34 1 E2	1			J I
75 /	1]
3.0 /				4
36 3				J
77 1/2	Bound to 1/2	90]
31 1/0				4 1
38 XEQ 00	Square			l l
39 STO 04	· ·			
	1			4 1
40 "SQRS="				J I
41 ARCL X				1
AO DROMPT	1			1 1
42 PRUMPI				j i
43 RCL 02				
			· · · · · · · · · · · · · · · · · · ·	4 1
44 *	Calculate costs			4
45 XEQ 01	of materials			
AC 610 05	UI materials			1
40 310 03	and labor			1
47 "MAT"		00		

REGISTERS, STATUS, FLAGS, ASSIGNMENTS

DATA REGISTERS			STATUS								
00	labor rate square feet material cost labor cost	50		SIZE ENG DEG		6 TOT FIX RAD	Г. REG _2 SC 0 GR	32 AD	_ USER MOI _ ON _X_ O	DE IFF	
05	Squares labor + materials	55		#		CET		AGS			
				#	3/0	361	INDICATE	3	CLEAN INDI	CATES	
10		00									
10		60									
15		65									
20		70								······	
		10									
25		75									
30		80									
25		85									
35		00									
							ASSIGN	MEN	ITS		
				1	FUNCT	ION	KEY		FUNCTION	KEY	
40		90									
							 				
45		95					ł				
							+	<u> </u>			
							1	 			

PROGRAM REGISTERS NEEDED: 27

HEWLETT PACKARD SOLUTION BOOK: HOME CONST. ESTIMATING



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'

ROOM SIZE	CEIL.	OPEN	NET WALL	TOTAL
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]	

User Instructions

				SIZE: 005
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Key in the program and set USER mode.		[USER]	
2	Initialize the program.		[XEQ] AREA	HEIGHT ?
3	Input height	height	[R/S]	LENGTH ?
4	Input length,	length	[R/S]	WIDTH ?
	width, and	width	[R/S]	OPENINGS ?
	openings.	openings	[R/S]	
	(all openings for a room must be entered			
	at once)			
5	Find: Net Wall Area;			N.WALL=()
	Ceiling Area, and		[R/S]	CEIL.=()
	Net Wall and Ceiling Area.		[R/S]	TOTAL=()
6	(Optional) Find: total net wall area,		[R/S]	T.N. WALL=()
	total gross wall area,		[R/S]	T.G. WALL=()
	total ceiling area.		[R/S]	T.CEIL.=()
7	For another room of the same height:		[A]	LENGTH ?
	and go to step 4.			
8	For another room with a different height:		[B]	HEIGHT ?
	and go to step 3.			

Program Listings

		·····		
01+LBL "ARE	Initialize	- '		
	Interatize		44+LBL 11 45 "L="	
			46 ORCI X	Display routine
	Input:	2	47 PROMPT	
2"	neight,	4	48 RTN	
05 PROMPT		4	49 .END.	
06 STO 00				
07+LBL A	length			
08 "LENGTH	rengen,	60		
?"				
09 PROMPT	width			
10 "WIDTH ?				
	Calculate			
	ceiling area			
13 310 04 14 ST+ 01				
15 LASTX		┇		
16 /				
17 LASTX		70		
18 +	Calculate gross			
19 2	wall area			
20 *				
21 RCL 00				
22 *				
23 51+ 02				
24 "OPENING	Input openings			
25 PROMPT	area			
26 -	[80		
27 ST+ 03				
28 "N. WALL	Display results			
29 XEQ 11				
30 RCL 04		├ ─── ├ ──		
31 "CEIL."				
32 XEQ 11				
34 TUTHE 75 VEO 11		90		
36 RCI 03				
37 "T.N. WA	1			
LL"				
38 XEQ 11	1			
39 RCL 02				
40 "T.G. WA				
LL"		 		
41 XEU 11		 		
42 RUL 01	•			
1 43 "I. UEIL	1	1 00 1		

REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA RE	DATA REGISTERS			STA	STATUS				
00	height total ceiling total gross wall total net wall	50		SIZE ENG DEG		2 T Fl R/	OT. REG X SC AD GR	26 I AD	USER MO 	DE)FF
05	ceiling	55		#	INIT S/C	SE		AGS s	CLEAR INDI	CATES
10		60								
15		65								
20		70								
25		75								
30		80								
35		85								
							ASSIG	MEN	TS	
40		90			FUNCT	ION	KEY	F	UNCTION	KEY
45										
45		95								
								 		

WALL & CEILING AREAS ESTIMATE

PROGRAM REGISTERS NEEDED: 22

HEWLETT PACKARD SOLUTION BOOK: HOME CONST. ESTIMATING



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

User Instructions

				SIZE: 005
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Key in program and set USER mode.		[USER]	
2	Initialize the program.		[XEQ] WPAP	LABOR RATE ?
3	Input labor rate	labor rate	[R/S]	NET AREA ?
4	Input net area	net area	[R/S]	COVERAGE ?
	coverage	coverage	[R/S]	COST/ROLL ?
	cost/roll	cost/roll	[R/S]	ROLLS/HR ?
	rolls/hour	rolls/hr	[R/S]	
5	Find: hours to install			HOURS=()
	labor cost		[R/S]	LABOR=\$()
	number of rolls required		[R/S]	ROLLS=()
	material cost		[R/S]	MAT.=\$()
6	For another section:		[A]	NET AREA ?
	and go to step 4.			
7	To find totals:		[R/S]	T. MAT.=\$()
			[R/S]	T. LAB.=\$()
			[R/S]	TOTAL=\$()

Program Listings

01+LBL "WPA			46 XEQ 11	
P"			47 RCL 02	
02 CLRG	Initialize		48 "T. MAT.	Total material,
03 "LABOR R				
OTE 2"			40 VEO 11	
			49 AEQ 11	
			50 RUL 03	
05 510 00			51 "T. LAB.	Total labor,
06+LBL A			**	
07 "NET ARE	Input:		52 XEQ 11	
Q 2"	Net area.		53 +	
08 PROMPT			54 "TOTOL"	Total cost
00 YEO 00				
			JJVLBL II	
10 COVERHG	Coverage,		56 "F=\$"	
E ?"			57 ARCL X	Display routine
11 PROMPT			58 PROMPT	
12 /			59 RTN	
13.49			60+LBL 00	
14 +			21 5	
15 850 00				Rounding routine
				8
16 510 01	Cost /roll		63 INI	
17 "CUSIZRO	COSC/1011,		64 RTN	
LL ?"			65 .END.	
18 PROMPT				
19 *				
20 XEQ 00				
21 510 04				
23 RUL 01				
24 "ROLLS/H	Rolls/hour			
R ?"				
25 PROMPT	1	80		
26 /				
27.2				
28 *	Round to ½ hour			
20 450 00				
				1
30 2	1			
31	+	·		4
32 "HOURS="				4
33 ARCL X	Display:	L		4
34 PROMPT	Hours,			
35 RCL 00		90		
36 *				1
37 XE0 00				1
70 CT+ 07				1
	Labor.			4 1
39 "LHBUK				4 1
40 XEW 11				4
41 "ROLLS="	No. of rolls.			
42 ARCL 01	,			J
43 PROMPT				
44 RCL 04				1
45 "MAT."	Total material.	00		1
			1	1

REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA RE	GIS	TERS				STA	TUS		
00	labor ratenumber of rolls Σ material costs Σ labor costs	50		SIZE ENG DEG		5 TO FIX RAI	T. REG 2 SC) GR	33 AD	USER MOI ONX_O 	DE 0FF
05	material cost	55		#	INIT S/C	SET		AGS s	CLEAR INDI	CATES
10		60								
15		<u> </u>								
15		05								
20		70								
25		75								
20		00								
30		80								
35		85								
							ASSIGN	MEN	ITS	
					FUNCT	ION	KEY	F	UNCTION	KEY
40		90								
		 					+			
15		05								
43		92								
		 								

PROGRAM REGISTERS NEEDED: 29

HEWLETT PACKARD SOLUTION BOOK: HOME CONST. ESTIMATING



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.

Keyst	t ro	kes:
-------	------	------

Display:

(set USER mode)

[USER]	(set
[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

User Instructions

				SIZE: 005
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Key in the program and set USER mode.		[USER]	
2	Initialize the program.		[XEQ] DRY	NET AREA ?
3	Input: net area,	net area	[R/S]	COST/100SF ?
	material cost/100 sq. ft.,	cost	[R/S]	LAB./100SF ?
	labor factor/100 sq. ft.,	labor	[R/S]	LABOR RATE?
	labor rate.	rate	[R/S]	
4	Find: labor hours,			HOURS=()
	labor cost,		[R/S]	LAB.=\$()
	materials cost,		[R/S]	MAT=\$()
	total cost.		[R/S]	TOTAL=\$()
5	For another item:		[A]	NET AREA ?
	and go to step 3.			
6	Find: total labor hours,		[R/S]	T. HRS.=()
	total material cost,		[R/S]	T. MAT.=\$()
	total labor cost,		[R/S]	T. LAB.=\$()
	grand total (labor and materials).		[R/S]	G.T.=\$()

Program Listings

01+LBL "DRY			46 "T. MAT.	
••	Initialize			
02 CLPC	incraitze		47 950 11	
02 CENG			47 XEQ 11	
03+LBL H			48 RCL 04	
04 "NET ARE			49 "T. LAB.	
0.2"				
AS PROMPT	Input data and		E0 VE0 11	
03 F KOM 1	calculate		50 XEQ 11	
06 1 E2			51 +	
07 /	results		52 "G.T."	
08 STO 02			57+1 BL 11	
00 "COST/10				
			J4 F-⊅	Dian 1 and manufacture
USF ?"			55 ARCL X	Display routine
10 PROMPT			56 PROMPT	
11 *			57 RTN	
12 XEO 00			50AL BL 00	
17 CT + 00			J8+LDL 00	
13 317 00			59.3	
14 STO 01			60 +	Rounding routine
15 "LAB./10			61 INT	
09F 2"			CO PTN	
1/ DDOMPT				
			63 .END.	
17 RCL 02				1
18 *				
19 2				
20 *				
20 *	Round to ½ hour			
21 XEQ 00				1
22 2				
23 /				4 1
24 STO 02				
24 010 02				
20 317 00				1
26 "LHBUR K		80		1
ATE?"				4
27 PROMPT				4 1
28 *				
20 VEO 88				
29 XEW 00				1
30 51+ 04				1 1
31 "HOURS="				4
32 ARCL 02				1
33 PROMPT	Display results			
74 "100 "				1
34 LHD.	1			1
35 XEW 11				4
36 RCL 01		90		4 1
37 "MAT"	l]
38 XE0 11				
70 +				1
37 T 40 "TOTOL"				4
40 "IUIHL"	1			4
41 XEQ 11				
42 "T. HRS.				
	1			1
47 OPCL 07	Display totals			1
43 HRUL US				4
44 PRUMPI	1			4
45 RCL 00		00		

REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA RI	EGIS	TERS				STA	TUS		
00	Σ material material area/100, hours	50		SIZE		T(FIX	DT. REG 2 SC	<u>31</u>	USER MO	DE)FF
	Σ hours									
05	Σ labor	55					FL	AGS		
				#	S/C	SE		S	CLEAR INDI	CATES
10		60						+		
15		65								
20		70								
25		75								
							alah dalah dina sarah menangan kerangan kerangan kerangan kerangan kerangan kerangan kerangan kerangan keranga			
30		80								
		 								
		+								
35		85								
		I								
							ASSIGN	IMEN	TS	
					FUNCT	ION	KEY	F	UNCTION	KEY
40		90								
						······				
45		95								
		 								
		<u> </u>								
							1			

DRYWALL & INSULATION ESTIMATE

PROGRAM REGISTERS NEEDED: 27

HEWLETT PACKARD SOLUTION BOOK: HOME CONST. ESTIMATING



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

User Instructions

				SIZE: 006
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Key in the program and set USER mode.		[USER]	
2	Initialize the program.		[XEQ] SHE	LABOR RATE ?
3	Input labor rate	labor rate	[R/S]	NET AREA ?
4	Input net area,	net area	[R/S]	PLYWD. AREA ?
	plywood area,	plywood area	[R/S]	COST/1000SF?
	cost/1000 sq. ft.,	cost	[R/S]	LAB /1000SF ?
	labor factor/1000 sq. ft.	labor	[R/S]	
5	Find: hours,			HRS=()
	labor cost,			LABOR=\$()
	material cost,			MAT.=\$()
	total cost.			TOTAL=\$()
6	For another section, press:		[A]	NET AREA ?
	and go to step 4.			
7	To find totals: total number of pieces,		[R/S]	T. PCS.=()
	total material cost,		[R/S]	T. MAT.=\$()
	total labor cost,		[R/S]	T. LAB.=\$()
	grand total (labor & mat.)		[R/S]	G.T.=\$()

Program Listings

01+LBL "SHE			46 ST+ 03	
			47 "LABOR"	
	Initialize		49 YEO 11	
AZ "LOBOR R			40 PCL 05	
OTE 2"			47 KUL 80	
HIE ?"			50 "MHI."	
04 PRUMPI			51 XEQ 11	
05 STO 00			52 +	
06+LBL A			53 "TOTAL"	
07 "NET ARE			54 XEQ 11	
0.2"	Input data and		55 "T. PCS.	
08 PROMPT	calculate			
	regulte		- F/ ODCL 01	Display totals
07 FLIMD.	resurcs		JO HRUL UI	
HREH ?"			57 PRUMPI	
10 PRUMPI			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 +				
17 450 00			27 VEO 11	
			63 AEQ 11	
18 51+ 01			64 +	
19 *			65 "G.I."	
20 STO 04			66+LBL 11	
21 "COST/10			67 "ト=\$"	
00SF?"			68 ARCL X	Display routine
22 PROMPT			69 PROMPT	1 - 9
23 1 E3			70 RTN	
24 /			71+1 BL 00	
25 *			72 5	
24 YEQ 00			77 +	
20 ACG 00 27 CT+ 02			74 181	Rounding routine
27 317 02			74 103 75 DTN	
28 510 05			75 KIN	
29 "LHB./10			76 .END.	
00SF ?"				4
30 PROMPT	•			4
31 RCL 04				4
32 1 E3				
33 /				
34 *				
35.2		90		
76 *	1			1
77 850 00	1			1
				4
30 4				4
37 /	+			4
40 "HK5="	ł			4
41 HRCL X	1			4
42 PROMPT				_
43 RCL 00	1			
44 *				
45 VEO 00	t	00		1

REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA RE	GIS	TERS				STA	TUS		
00	labor rate Σ pieces Σ material costs Σ labor costs	50		SIZE ENG DEG	006	2 TO FIX RAD	7. REG SC GR	37 AD	USER MO - ON <u>X</u> C	DE)FF
05	gross area material cost	55		FLAGS INIT # S/C SET INDICATES CLEAR IND				CLEAR INDI	CATES	
10		60								
15		65								
20		70								
25		75								
30		80								
35		85								
					I		ASSIGN	IMEN	тѕ	
40		00			FUNCT	ION	KEY	F	UNCTION	KEY
40		30								
45		95								

SHEATHING & SUBFLOOR ESTIMATE

PROGRAM REGISTERS NEEDED: 32

HEWLETT PACKARD SOLUTION BOOK: HOME CONST. ESTIMATING



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

User Instructions

				SIZE: 007
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Key in the program and set USER mode.		[USER]	
2	Initialize the program.		[XEQ] PAINT	LABOR RATE ?
3	Input labor rate	rate	[R/S]	LAB, FACTOR ?
4	Input labor factor (sq. ft./hr)	factor	[R/S]	NET AREA ?
	net area,	area	[R/S]	COVERAGE ?
	coverage/gal.,	coverage	[R/S]	COST/GAL. ?
	cost/gal.	cost	[R/S]	
5	Find: labor hours,			HRS.=()
	labor cost,		[R/S]	LAB.=\$()
	material cost,		[R/S]	MAT.=\$()
	total cost,		[R/S]	TOTAL=\$()
	number of gallons.		[R/S]	GALS.=()
6	For another guess, press:		[A]	LAB, FACTOR ?
	and go to step 4.			
7	Find: total gallons,		[R/S]	T. GALS.=()
	total material cost,		[R/S]	T. MAT.=\$()
	total labor cost,		[R/S]	T. LAB.=\$()
	grand total (labor and materials).		[R/S]	G.T.=\$()

Program Listings

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

REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA R	EGIS	TERS				STA	TUS		
00	labor rate labor factor Σ material Σ labor	50		SIZE ENG DEG	007	' T(Fl) R/	OT. REG X2_ SC AD GR	38 AD	USER MO ONXC 	DE)FF
05	area gallons Σ gallons	55		#	INIT S/C	SE		AGS s	CLEAR INDI	CATES
10		60								
15		65								
20		70								
25		75								
20										
30		80								
35		85								
							ASSIGN	IMEN	TS	
40		90			FUNCT	TION	KEY	F		KEY
45		95								

PROGRAM REGISTERS NEEDED: 32

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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 ? HRS. = 48.0032 [R/S] [R/S]LAB.=\$640.00 [R/S] MAT.=\$1,672.00 [R/S]TOTAL=\$2,312.00 (flooring) [A] AREA ? COST/1000SF? 1120 [R/S] LAB. FACTOR ? 0 [R/S]HRS. = 11.0010 [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 [R/S]

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

				SIZE: 006
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Key in the program and set USER mode.		[USER]	
2	Initialize the program.		[XEQ] FLOOR	LABOR RATE ?
3	Input labor rate	rate	[R/S]	AREA ?
4	Input area (include waste),	area	[R/S]	COST/1000SF?
	material cost/1000 sq. ft.,	cost	[R/S]	LAB. FACTOR ?
	labor factor/1000 sq. ft.	factor	[R/S]	
5	Find: labor hours,			HRS.=()
	labor costs,		[R/S]	LAB.=\$()
	material cost,		[R/S]	MAT.=\$()
	total cost.		[R/S]	TOTAL=\$()
6	For another job, press:		[A]	AREA ?
	and go to step 4.			
7	Find: total hours,		[R/S]	T. HRS.=()
	total materials,		[R/S]	T. MAT.=\$()
	total labor,		[R/S]	T. LAB.=\$()
	grand total (labor and materials).		[R/S]	G.T.=\$()

Program Listings

01+LBL "FLO			47 PROMPT	
			40 001 02	
			48 KLL 02	
02 ULRG	Initialize		49 "T. MHI.	
03 "LABOR R			•1	
ATE ?"			50 XEQ 11	
04 PROMPT			51 PCL 07	
05 CTO 00			JI KUL UU	
00 010 00			52 "I. LHB.	
06+LBL H				
07 "AREA ?"			53 XEQ 11	
08 PROMPT	Input data and		54 +	
09 STO 05	calculate		55 "C T "	
10 "COST/10				
	results		56+LBL II	
00SF?"			57 "H=\$"	Display routine
11 PROMPT			58 ARCL X	
12 1 E3			59 PROMPT	
13 /			CO PTN	
14				
			61+LBL 00	
15 XEQ 00			62.5	
16 ST+ 02			63 +	Rounding routine
17 STO 01			64 INT	
18 801 00			25 PTN	
I PROL 03			66 .END.	
20 "LHB. FH				
CTOR ?"				4 1
21 FROMPT				
22 1 E3				
27 /				
23 /				
24 *				1 1
25 2				4 1
26 *				
27 XEQ 00		80		
28.2				
29				1
30 51+ 04	1			1
31 *				4
32 "HRS.="				
33 ARCL L				
74 PROMPT	Display results			1
				1
35 XEQ 00	1			4
36 ST+ 03				4
37 "LAB."		90		1
38 XEQ 11				
39 RCL 01	I			
40 "MOT "	1			1
	1			4
41 XEQ 11	ł			4
42 +	1			
43 "TOTAL"				
44 XEQ 11]
45 "T HRS			1	1
	4			4
	Dignlaw totals			4
) 46 ARCL 04	Intertay totals	00	1	

REGISTERS, STATUS, FLAGS, ASSIGNMENTS

	DATA RI	EGIST	ERS				STA	TUS		
00	labor rate material Σ material Σ labor	50		SIZE ENG DEG	006	TO FIX RA[T. REG3 2 SC D GR	3 AD	USER MOI ONXO 	DE FF
05	Σ hours area	55		#	INIT S/C	SET		AGS s		CATES
10		60								
15		65								
20		70								
25		75								
30		80								
35		85								
					FUNCT	ION		IMEN F	TS UNCTION	KEY
40		90								
45		95								

PROGRAM REGISTERS NEEDED: 29

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NOTES
NOTES

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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.

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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.

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*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

