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Software for Computer Aided TILes DEsigning

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The corrections on this paper were never made, therefore it was not duplicated and should not be given out.

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~~~~ TILDE ~~~~

Version 1.0

Software for Computer Aided TILes DEsigning

by

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document written by Luca Marinelli

Summer 1991

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Introduction

This document has been written entirely with Geneva characters from 12 to 24 point, so if it looks "strange" on your display make sure you have this font installed.

I have been asked to write a set of macros for Excel 3.0 to accomplish these tasks:

- Help a person who wants to design a set of tiles for a calorimeter to setup the spreadsheet for the coordinate points to be fed into the Thermwood cutting machine with a user-friendly interface;
- Help that person to perform a what-if analysis with on screen drawings of the designed mechanical pieces.

Although the Thermwood is a numerically controlled cutting machine no software was available to generate the G code other than doing it by hand. Before I started working on this project, Mike Banas had designed a spreadsheet which needs only the data of the first tile and then projects the information to obtain the complete set of coordinates for each tile in a tower where the tiles retain the same shape but grow larger towards the back. This spreadsheet would then be brought to LAB 8, where the Thermwood is. Jon Blomquist designed some macros that can read these Excel spreadsheets and convert their contents into the G codes for the machine. This system represented a huge improvement in efficiency over previous hand coding methods.

The main problems in this chain, however, were that a person could not easily feed his/her data in the spreadsheet without knowing Excel 3.0 and the structure of the spreadsheet itself, and that to have a drawing of the tiles before cutting them one had to replace the Thermwood's cutting tool with an ink pen, thus transforming the Thermwood machine into a plotter.

Realizing that this still wasn't the most efficient way to work, an idea came to someone, somewhere in Wilson Hall: why not hire a summer student to get this thing a little bit better ?

It was my fate to be that summer student and this document is the result of what I have been doing for the past 6 weeks.

General description

~~TILDE~~ is the name I have given to this set of macros that run under Excel 3.0 for the Macintosh, the name stands for Tiles Designer. The macros form a very simple CAD/CAM tool that follows the standard Macintosh interface (dialog boxes, menus, ...) to be as user friendly as I could make. However there are certain operations that require the user to slightly modify the spreadsheet to fit his/her needs; these are described later on more specifically.

The hardware requirements to run this program are the usual ones for Excel 3.0 (any Macintosh with at least 2 Mbytes of RAM). However anyone would quickly thank himself/herself for using a fast Macintosh and a big screen because of the sluggishness of Excel macro language and the size of the spreadsheets.

To run ~~TILDE~~ you need the following files to be in the same folder:

- ~~TILDE~~
- Tiles_mcr
- Tiles
- Drawing

The file " ~~TILDE~~ " is the start-up file. It contains the title of the program and the auto-executing macro that loads the file Tiles_mcr, which contains the macros.
The files "Tiles" and "Drawing", are the templates for the worksheet and the spreadsheet where the drawings of the tiles are shown. All of these files need to be in the same folder because they are called from the program and if it doesn't find them it will give an error message, interrupting the execution of the macro.

The rest of this document is a user manual for TILDE. I will assume that the reader is familiar with the basic Macintosh operations, such as use of menus and dialog boxes, double-clicking, etc. if he/she is not he/she should first develop familiarity with the Macintosh and then come back to this document.

This document is divided into:

- a **tutorial** that leads the user step by step through the basic features of TILDE building a worksheet and drawing a few tiles from it;
- a **reference manual** which explains all of the structures of the user interface (menus, dialog boxes, ...). A hardcopy of the macros output is also included;
- a **programmer's guide**, which is an accurate description of the macros for any future upgrade or modification. It includes a detailed flow-chart and a printout of the Excel code.

All of the macros in Tiles_mcr except the core of "Drawing" have been written by:

Luca Marinelli
Summer Student in Fermilab Physics Dept.
University of Genova
Italy.

The core of the macro Drawing and the macros to extract the information for the Thermwood machine out of the spreadsheets have been written by:

Jon R. Blomquist
Physics Dept.
Mechanical Group
Fermilab.

The spreadsheets have been designed and realized by:

Mike J. Banas
S.D.C. Dept.
Mechanical Support
Fermilab.

Tutorial

1. Double click the MS Excel 3.0 icon to start the application (Version 3.0 is mandatory !).

2. Open the document ~~**TILDE**~~ using **Open...** under the **File** menu. **Do not use the lower part of the File menu to open this document even if you see ~~TILDE~~ there, otherwise the macros won't work.**

You should see the menu bar forming and the window "Tiles 1" should be opened in less than a minute. Now you can start building up a worksheet. Let's suppose you wanted to design a set of rectangular tiles for an electromagnetic calorimeter with a notch and a groove.

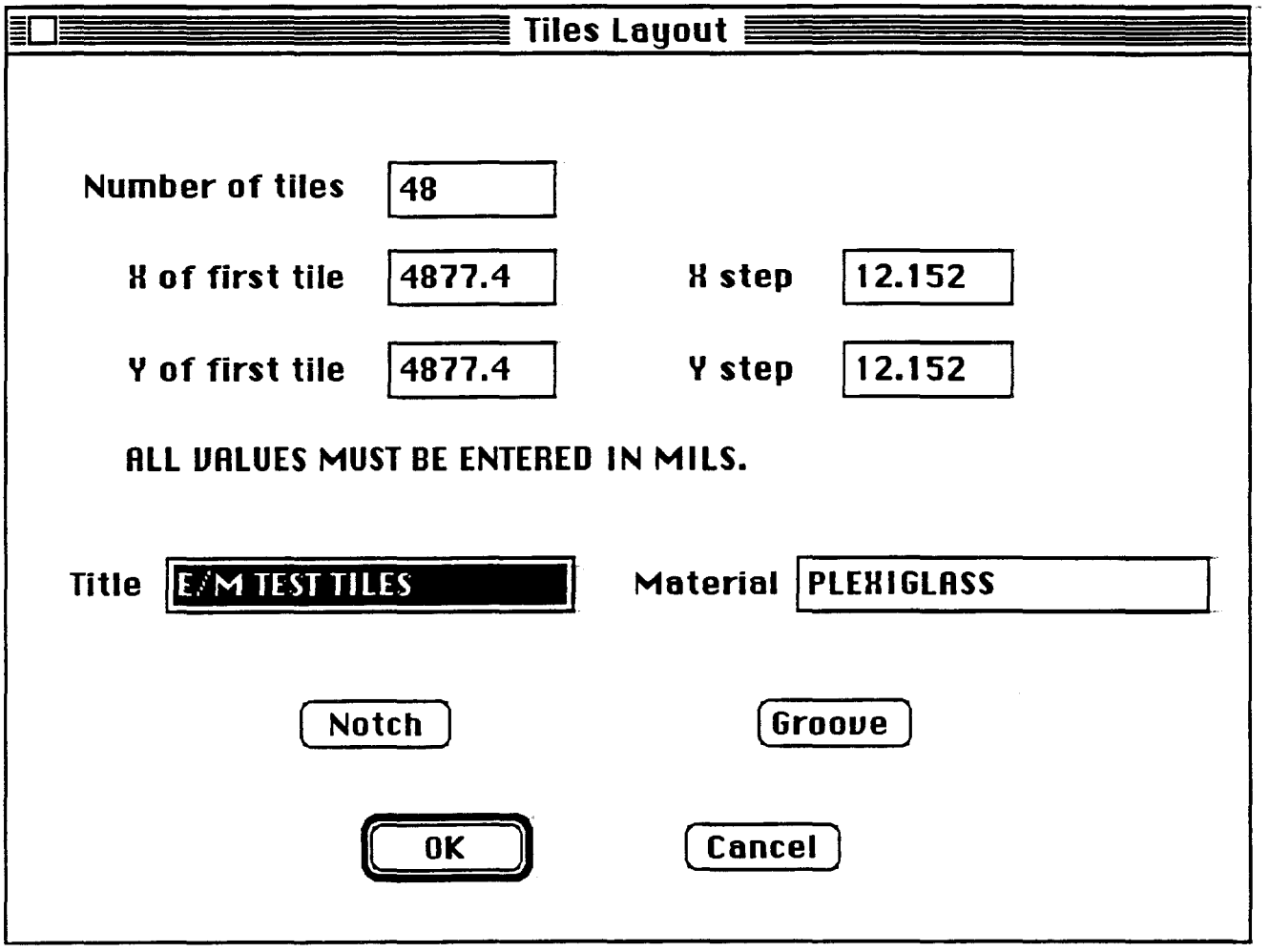
First you would have to setup the groove, let's suppose you wanted a groove whose distance to the top, left and right side of the tile is the same and its value switches among 375, 500, 625 thousandths of an inch, while the distance from the bottom is increased as the notch depth (by convention the notch is at the bottom):

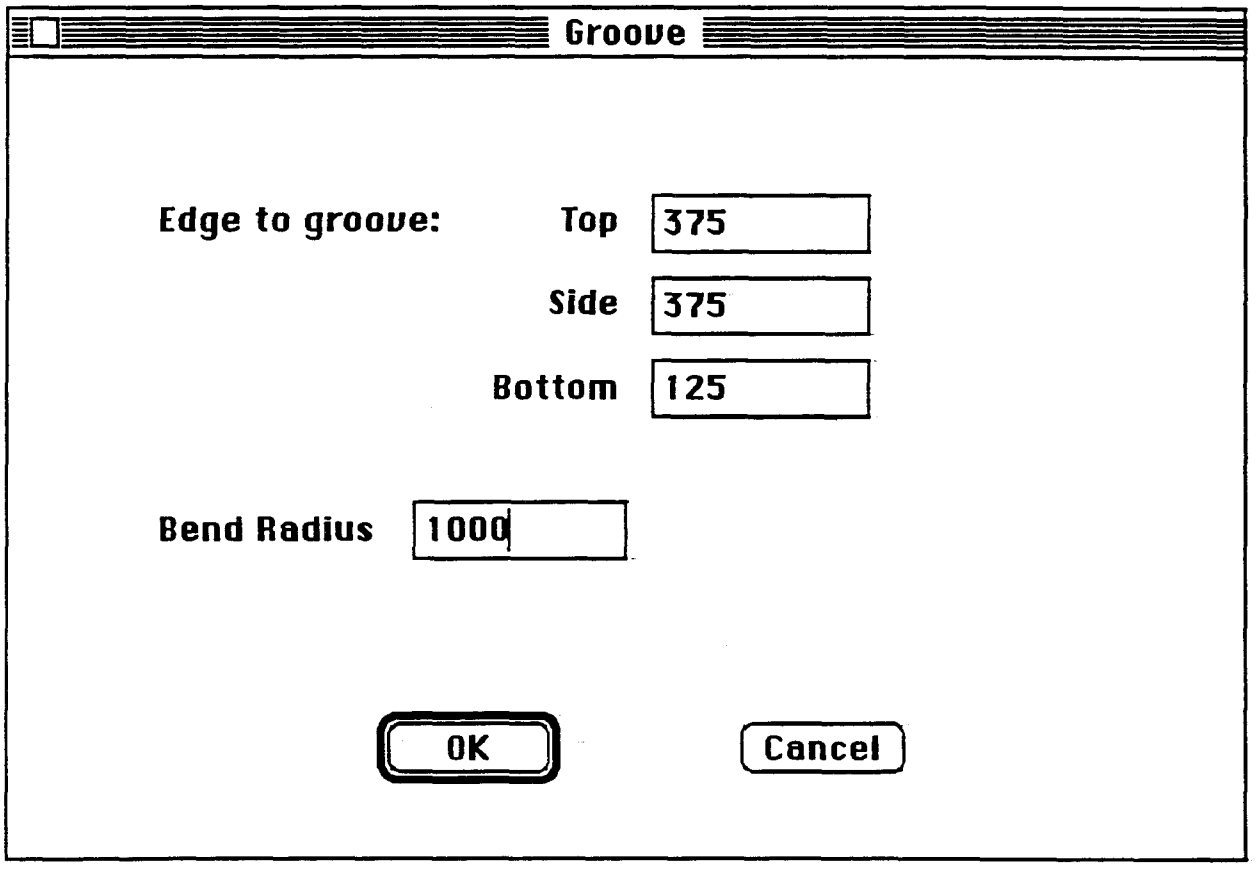
3. Select the cell D26 (Groove to Top edge) and write in the formula bar **=125*(MOD(D20+2,3)+3)**.

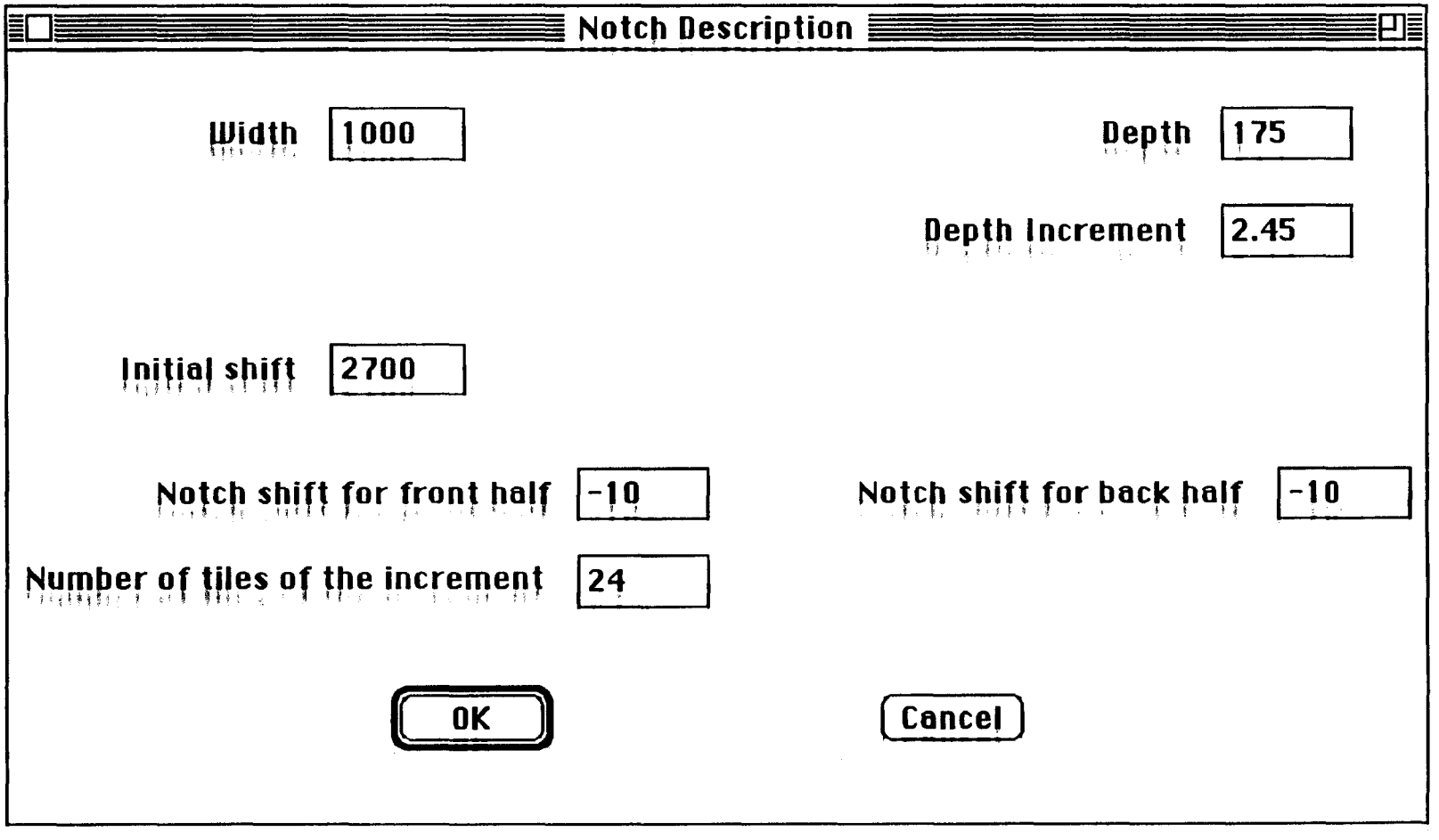
4. Select the cell D34 (Groove to side edge) and write in the formula bar **=D26**.

5. Now let's insert the data for the tiles. Open the menu **Data**, select **Insert Data...** and type the data as in the figures in the next three pages.

After you pressed RETURN you should see the worksheet being filled with numbers and in a minute or so you have your worksheet completed.


Tiles Layout
Number of tiles
48
X of first tile
4877.4
X step
12.152
Y of first tile
4877.4
Y step
12.152
ALL VALUES MUST BE ENTERED IN MILS.
Title
E/M TEST TILES
Material
PLEXIGLASS
Notch
Groove
OK
Cancel


Groove
Edge to groove:
Top
375
Side
375
Bottom
125
Bend Radius
1000
OK
Cancel


Notch Description
Width
1000
Depth
175
Depth Increment
2.45
Initial shift
2700
Notch shift for front half
-10
Notch shift for back half
-10
Number of tiles of the increment
24
OK
Cancel

You can now save your work using the **Save as...** command under the **File** menu, this file is the one that has to be given to the LAB 8 people for the actual cutting of the tiles with the Thermwood.

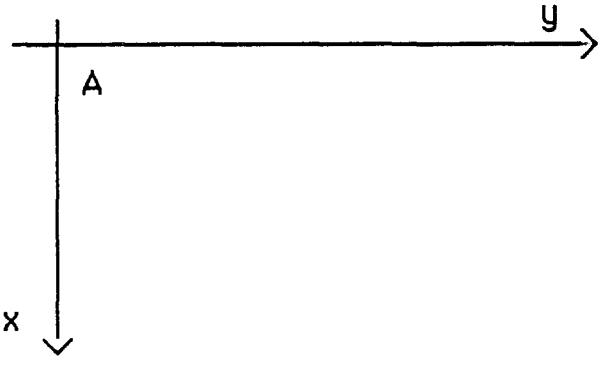
Now you are ready to go on looking at what you have designed using the drawing facilities. First of all have a look at the various parts of the worksheet.

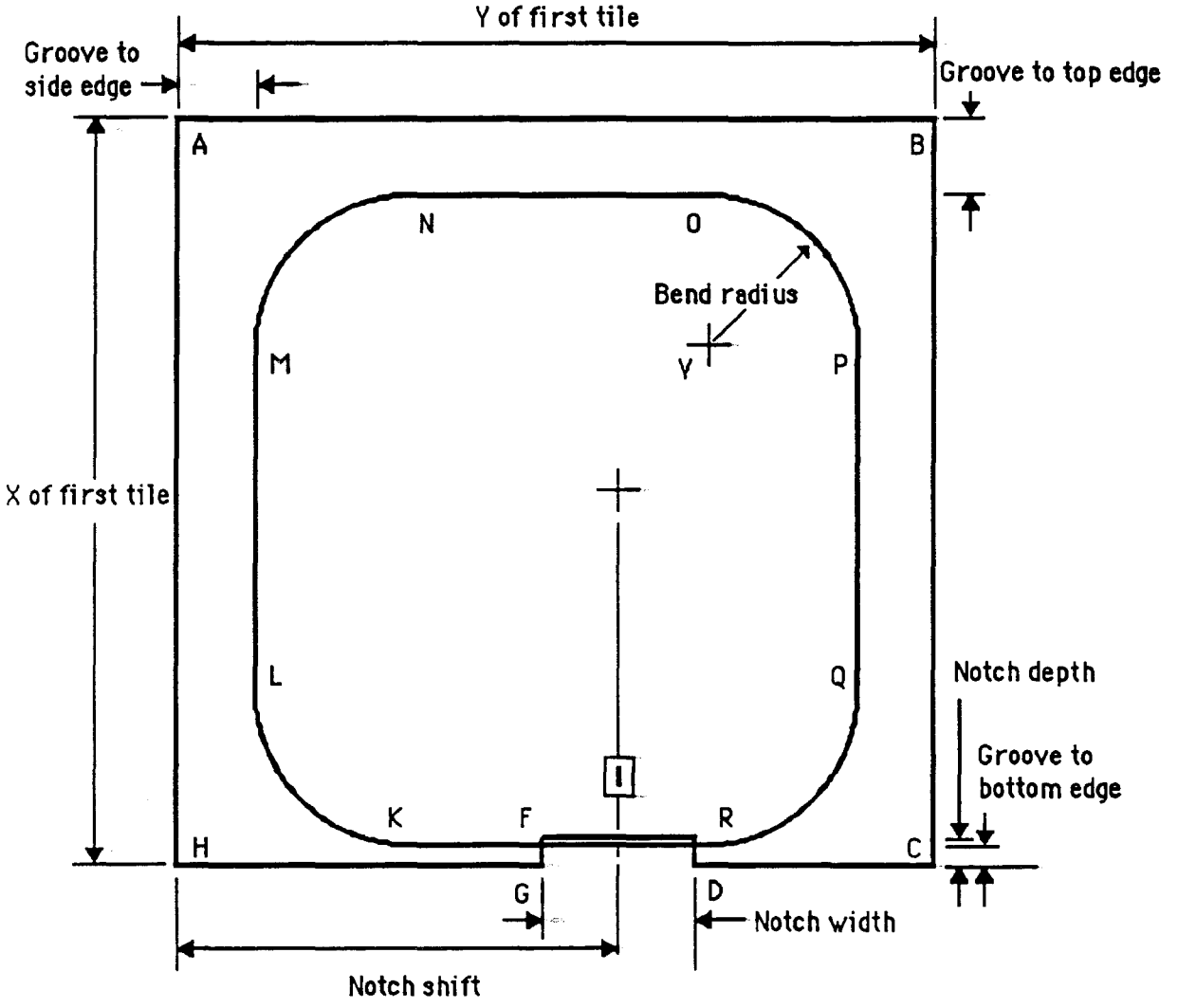
6. Use the **Goto Tile...** command under the **Data** menu to browse through the worksheet: choose which tile you want to see and which section.

It's very important that you always activate the spreadsheet from which you want to take the data to build a drawing before calling the drawing routine otherwise you will produce meaningless drawings without receiving any warning from the macro because you didn't do any kind of mistake.

7. Let's draw one of the tiles, for example tile number 10. Choose **Draw Tile...** under the **Draw** menu and insert "10" at the prompt. In a couple of minutes you should see the drawing with the dimensions and the letters completed. Isn't that easy ?

8. Print a copy of the drawing on your printer by clicking on the **Print Drawing** button and do the same for the data, if you also wish to keep the coordinates of the corner points of the drawing. Remember that the point A has always coordinates (0,0) and that the y axis is across the page, while the x axis is down the page.





What is what in the tile

9. Now save your drawing giving it a name with the **Save as...** command just as with the worksheet.

Using ~~TILDE~~ you can also overlay as many tiles as you want using the **Overlap Tiles...** command. This routine draws only the shape of the tile, without adding the dimensions, for example, to make the drawing clearer. Nonetheless I suggest you overlapped just two or three tiles at a time otherwise the drawing would become unreadable.

Let's suppose you wanted to overlap tiles number 3 and number 46. You should write the biggest tile first as will be explained on page 14.

10. Select **Overlap Tiles...** under the **Draw** menu type 46 in the first dialog box, and wait until tile number 46 has been drawn.

11. Now type 3 in the second dialog box and in another minute or so also tile 3 has been drawn.

12. Now you can click the Cancel button in the dialog box when it appears for the third time and you are done.

13. You can print the final drawing or save it if you wish using the same procedures as in 8. and 9.

The program is very slow, especially if you are using an older Mac, but on a Mac II for example you can turn color off and in this way you will gain in speed without losing clarity because colors are not used in ~~TILDE~~ (I wrote it on a Macintosh SE).

You can now give ~~TILDE~~ a try by yourself opening a new worksheet with the New Worksheet command under the File menu or modifying the one you have just created. If you feel comfortable enough with it you may even want to start reading the Reference Manual right away to see what exactly each menu command does.

Reference Manual

The File menu

New Worksheet: This command creates a new worksheet to operate on. This does not create a new drawing window, if you need that you can do **Open...** and double-click the file Drawing.

Open...: This menu item is used to open saved worksheets or drawings but can be used to open any Excel document. A more exhaustive description can be found in the MS Excel 3.0 User's guide on page 67.

Close, Save, Save As...: They are the used as the standard Macintosh commands. The dialog box which appears in the **Save As...** Command is described in the MS Excel 3.0 User's guide on page 129.

Return to Excel: This command quits ~~TILDE~~ and goes back to the MS Excel 3.0 shell building the **Full Menus** menu bar.

Quit: Quits ~~TILDE~~ and MS Excel returning the control to the Finder.

The Edit menu

Undo: This command undoes the last executed operation, if possible.

Cut, Copy, Paste: These are the standard editing commands used in any Macintosh application.

Show Clipboard: Another standard Macintosh command: it opens a window showing the content of the Clipboard.

The Data menu

Insert Data...: This menu item is the key command to build a worksheet. It shows a dialog box where you can insert the data concerning the structure of the tiles (**Number of tiles**, **X of first tile**, **Y of first tile**) and asks for the parameters of the projection (**X step** and **Y step**). From this dialog box you can access two other dialog boxes: the **Groove** and the the **Notch Description**. You don't have to open these two dialog boxes but if you do, a flag will be set telling the other macros that your tiles have a notch or a groove.

The change in the groove from tile to tile, must be set in the worksheet, as has been shown in the tutorial, while the initial values have to be set in the dialog box. The cells that have to be modified are D26 (**Groove to top edge**), D33 (**Groove to bottom edge**) and D34 (**Groove to side edge**). If you cannot find an analytic relation between the tile number and "Groove to edge" distance, you can build the worksheet and then modify the three rows (26, 33, 34) by hand, inserting the values for each tile. In addition to the distances from the tile edges, you also need a **bend radius**, which is the same for the 4 corners, and which can be set in the **Groove** dialog box. The notch is completely described by a shift from the left side of the tile (**Notch shift**), a width (**Notch width**) and a depth inside the tile (**Notch depth**). The Notch shift increment can be set to two different values so that you can move it back and forth (**Notch shift for front half**, **Notch shift for back half**, **Number of tiles of the increment**).

After the data have been inserted, this macro will perform the calculations to build the worksheet and, if you have a notch and a groove, it will also make simple checks to see if the notch crosses the groove radius and in that case it will show an alert dialog warning the user. Remember that all the data must be entered in thousandths of an inch.

Calculate Now: This is used to propagate changes throughout the document because I have switched off automatic calculation to improve the speed of the program a little bit. So if you make any change to the worksheet and you want to see how this affects the whole worksheet you have to select **Calculate Now**. For more information see the MS Excel 3.0 User's Guide on page 287.

Goto Tile...: This command is used to move quickly from one part of the worksheet to another. When invoked, it shows a dialog box prompting the user for the tile number he wants to go to and the area he/she wants to see. This can be chosen with a radio button group. This command is especially useful with very large worksheets because in that case the scrolling bars operate very slowly.

The Draw menu

Draw Tile...: This is the central menu item for the drawing utilities. It enables the user to choose which tile is to be drawn, via a simple dialog box. It is important that you do not enter the **Groove** and **Notch Description** dialog boxes if you don't have one because otherwise the drawing will be messed up, due to the fact that the dimensioning, for example, is done differently, depending whether you have a notch, or a groove, or both, or whatever. However if you do call the **Groove** or the **Notch Description** dialog box you can still press the **Cancel** button or, if it is too late to do that you can start again by choosing **Insert Data...** from the **Data** menu. After you have drawn a tile you can make a hard-copy of it by pressing the **Print Drawing** button on the Drawing window, you can also print the data used to generate that drawing by pressing the **Print Data** button on the Drawing window.

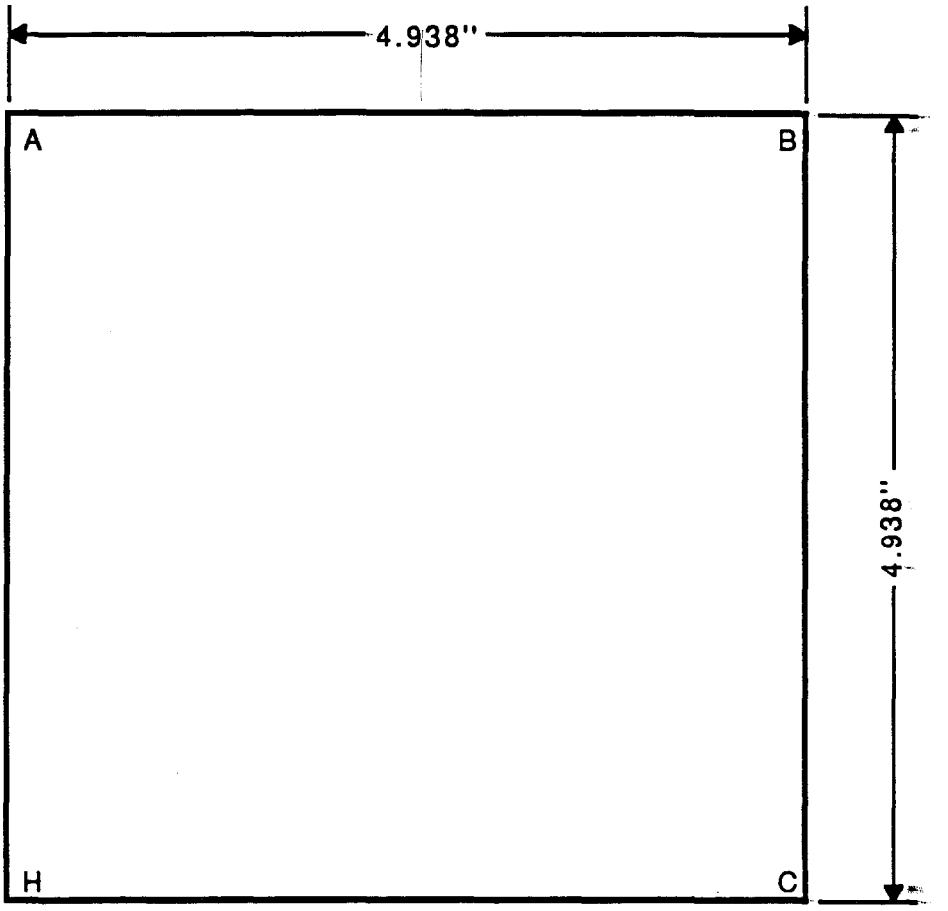
Overlap Tiles...: This command is used to draw simultaneously more than one tile in the Drawing window. It asks the user to write the number of the biggest tile he wants to be drawn; it is important that you give ~~TILDE~~ the tiles in the correct order (the first one must be the biggest, then the other tiles can be given in any order) as the program uses the data of the first tile to compute the scale factor to fit the tiles in the cell. After the first tile has been drawn, the macro will continue prompting the user for a new tile number to draw; when you are finished you just have to press the **Cancel** button. Unfortunately, I couldn't make the data of every tile be displayed one after the other so you will find only the data relative to the last tile on the Drawing window. That should be fixed by a following version.

The Window menu

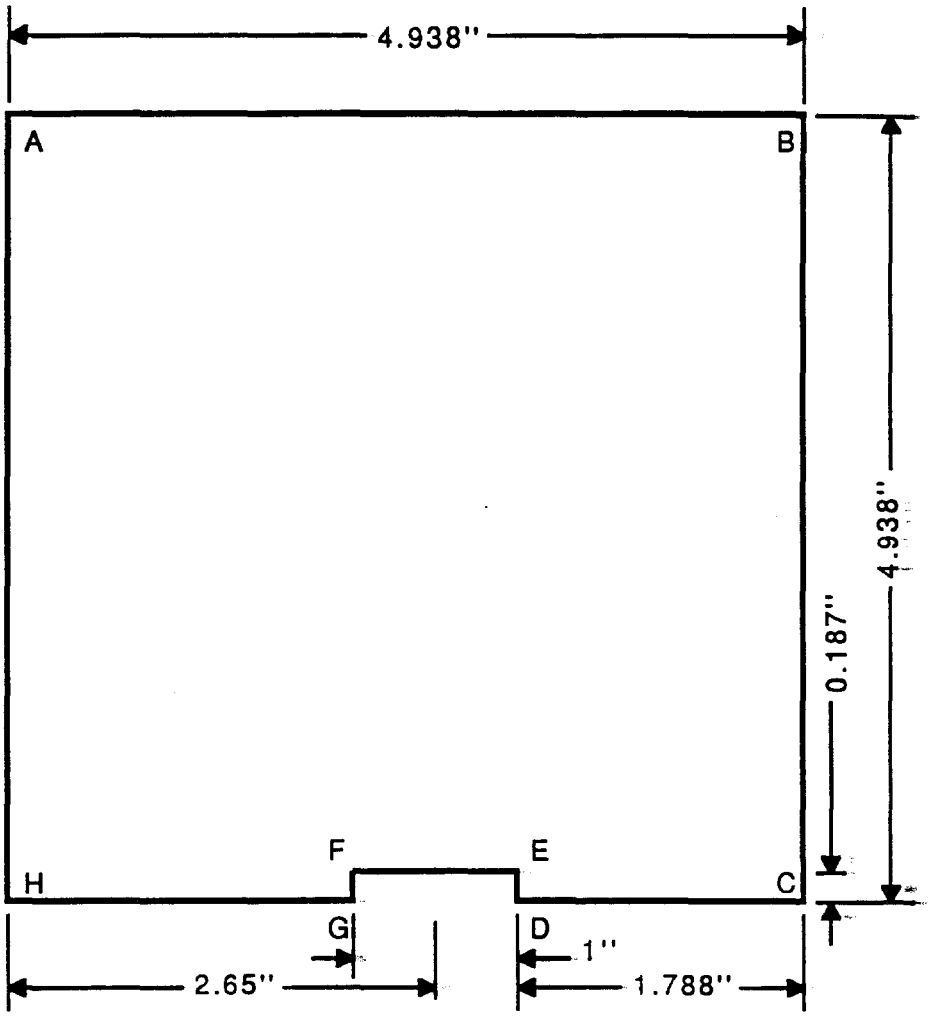
Activate next: This command is used when you are working with multiple windows documents to show the window underneath the active one. For more information you can see the MS Excel User's Guide on page 25.

Activate next worksheet, Activate next drawing: These two commands are used to activate the next worksheet or the next drawing underneath the active window. The two kind of windows are recognized looking at the height of row 1: if it exceeds 200 points then it is thought to be a drawing window, so be careful if you change the height of the first row.

IMPORTANT: These three commands should be used rather than clicking in a window to activate it because they skip automatically the macro sheet Tiles_mcr, preventing the user to do any possible damage to it. However if you do select windows clicking in them be careful not to start any operation while the macro sheet is the active window otherwise you will result in a macro stop and you will damage it. Even if this occurs, the macro sheet won't save himself when leaving ~~TILDE~~ so it shouldn't undergo any modification unless you saved it prior to quitting the application.

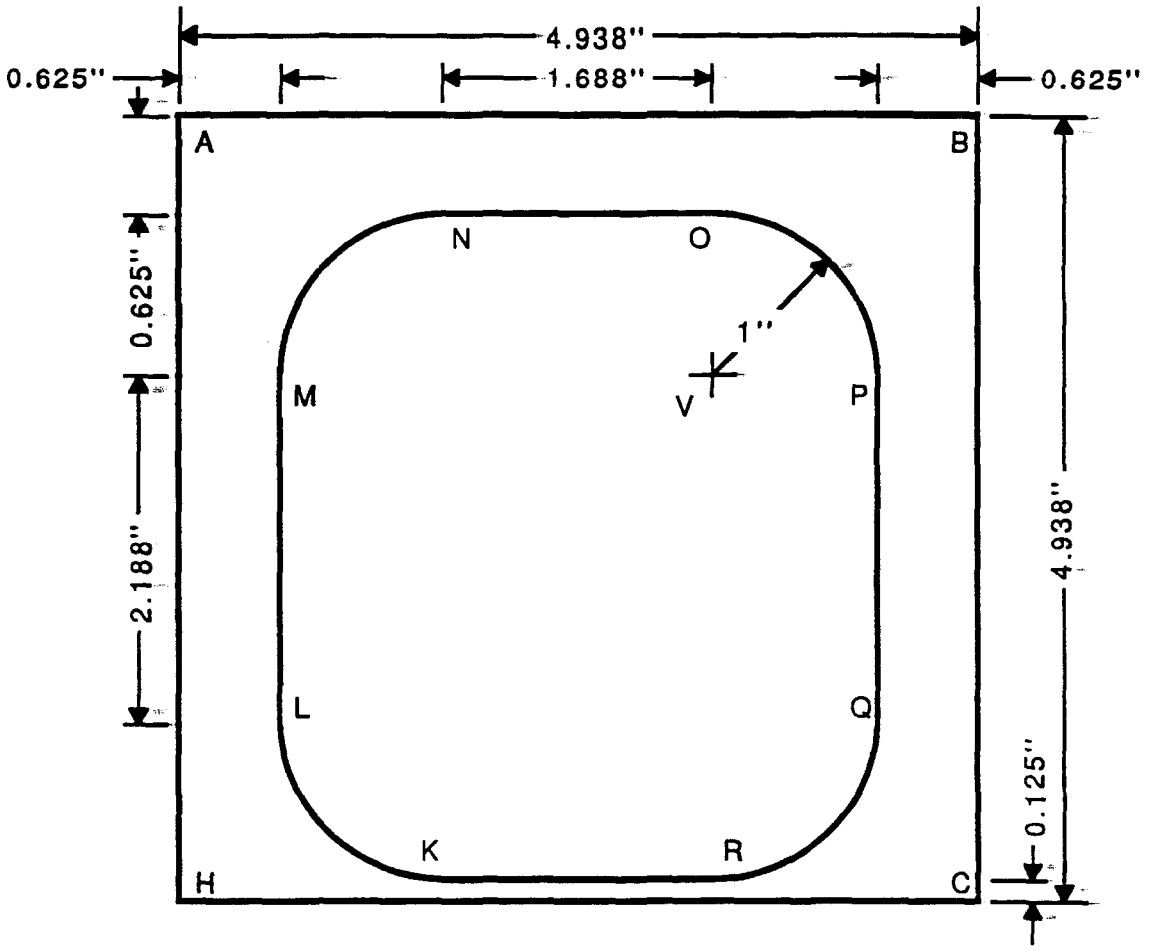


This is the simplest kind of tile you can design.

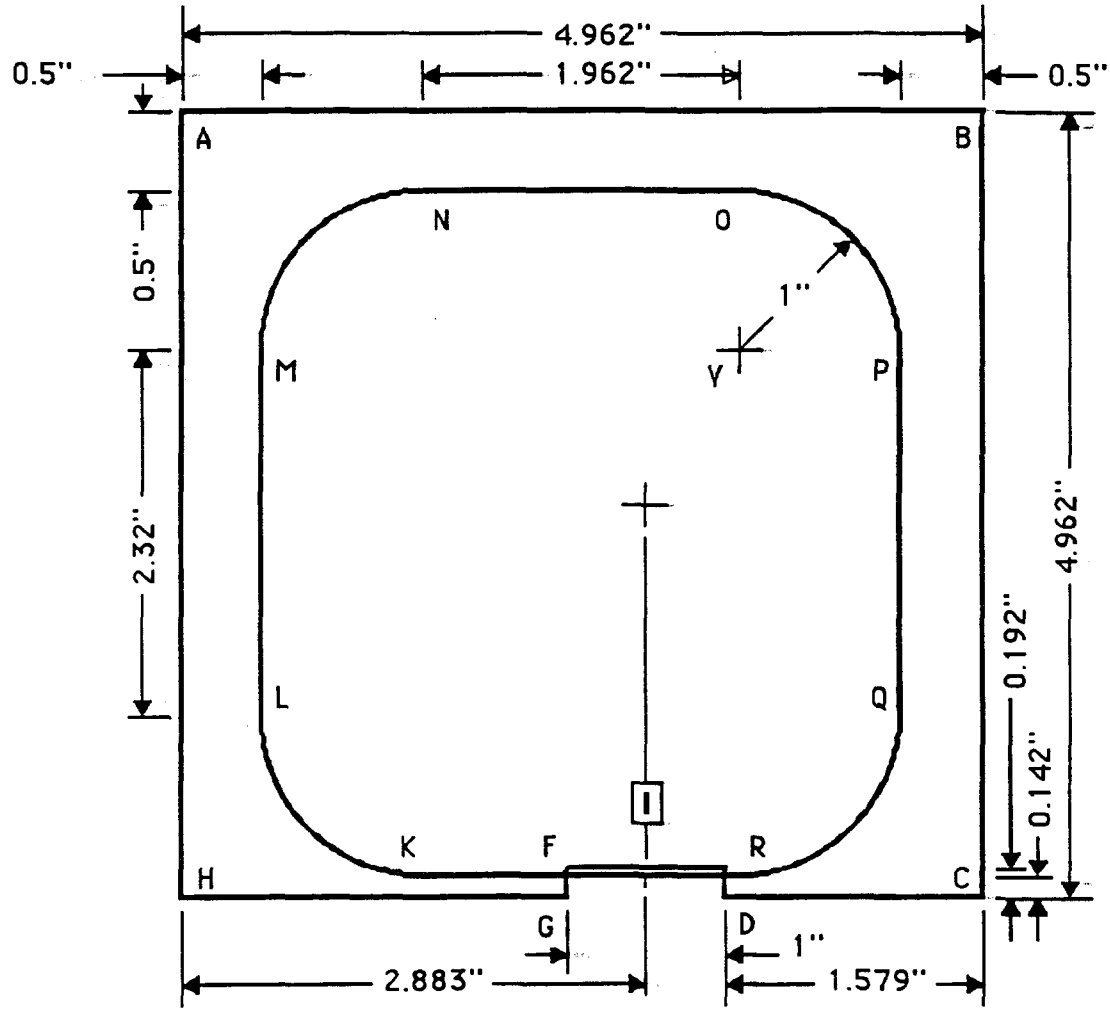


This tile has got a notch but not a groove

Note that the dimensions are drawn according to the intricacy of the tile



This tile has got a groove but not a notch.



This is the most complicate tile you can draw with ~~TILDE~~.

It has both a notch and a groove.

Keyboard Shortcuts

File

New Worksheet	Option-Cmd. n
Open...	Option-Cmd. o
Close	Option-Cmd. e
Save	Option-Cmd. s
Save As...	Option-Cmd. h
Return to Excel	Option-Cmd. r
Quit	Option-Cmd. q

Edit

Undo	Option-Cmd. z
Cut	Option-Cmd. x
Copy	Option-Cmd. c
Paste	Option-Cmd. v

Data

Insert Data...	Option-Cmd. i
Calculate now	Option-Cmd. l
Goto tile...	Option-Cmd. g

Draw

Draw Tile...	Option-Cmd. d
Overlap Tiles...	Option-Cmd. p

Window

Activate next	Option-Cmd. a

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	SDC BEAMTEST TILES.												
2													
3	THE FOLLOWING PROGRAM COMPUTES THE COORDINATES OF THE												
4	SCINTILLATING TILES FOR THE MP BEAMTEST CALORIMETER												
5	FOR MANUFACTURE ON THE THERMWOOD CNC MACHINE AT LAB 8.												
6													
7	THE TOP LEFT CORNER OF THE TILE IS (0, 0).												
8	THE "X" DIRECTION IS DOWN THE PAGE												
9	THE "Y" DIRECTION IS ACROSS THE PAGE.												
10													
11													
12													
13	**ALL VALUES MUST BE ENTERED IN MILS.**												
14													
15	X START =		0		X STEP =	0		NOTCH DEPTH					
16	Y START =		0		Y STEP =	0		INCREMENT =		0			
17													
18	TOTAL NUMBER OF TILES =			2									
19													
20		TILE	1	2									
21													
22	X =		0	0									
23	Y =		0	0									
24	NOTCH WIDTH =		0	0									
25	BEND RADIUS =		0	0									
26	EDGE-GRVE TOP=		0	0									
27	NOTCH DEPTH =		0	0									
28	MIN NOTCHSHIFT =		0	0									
29	MAX NOTCHSHIFT		0	0									
30	NOTCH SHIFT =		0	0									
31	CHECK1		0	0									
32	CHECK2		0	0									
33	EDGE-GRVE BOT=		0	0									
34	EDGE-GRVE SIDE=		0	0									
35	NOTCH SHIFT FOR FRONT HALF						0		CHECK				
36	MINIMUM NOTCH SHIFT OF FIRST TILE						0						
37	MAXIMUM NOTCH SHIFT OF MIDDLE TILE						0		APPLICABILITY				
38	NUMBER OF TILES OF THE INCREMENT						2						
39	ACTUAL NOTCH SHIFT OF MIDDLE TILE						0		FOR				
40	MINIMUM NOTCH SHIFT OF LAST TILE						0						
41	NUMBER OF TILES OF THE INCREMENT						0		THIS				
42	NOTCH SHIFT FOR BACK HALF						0						
43									SECTION				
44	IF A NEGATIVE NUMBER APPEARS IN THE CHECK,												
45	THEN THE GEOMETRY IS UNACCEPTABLE												
46	SINCE THE NOTCH CROSSES INTO THE GROOVE RADIUS.												
47													
48	**COORDINATE POINTS**												
49		TILE	1	2									
50	AX		0	0									
51	AY		0	0									
52	BX		0	0									
53	BY		0	0									
54	CX		0	0									
55	CY		0	0									
56	DX		0	0									
57	DY		0	0									
58	EX		0	0									
59	EY		0	0									
60	FX		0	0									

	A	B	C	D	E	F	G	H	I	J	K	L	M
61	FY		0	0									
62	GX		0	0									
63	GY		0	0									
64	HX		0	0									
65	HY		0	0									
66	IX		0	0									
67	IY		0	0									
68	KX		0	0									
69	KY		0	0									
70	LX		0	0									
71	LY		0	0									
72	MX		0	0									
73	MY		0	0									
74	NX		0	0									
75	NY		0	0									
76	OX		0	0									
77	OY		0	0									
78	PX		0	0									
79	PY		0	0									
80	QX		0	0									
81	QY		0	0									
82	RX		0	0									
83	RY		0	0									
84	TX		0	0									
85	TY		0	0									
86	UX		0	0									
87	UY		0	0									
88	VX		0	0									
89	VY		0	0									
90	WX		0	0									
91	WY		0	0									
92													
93													
94	UNCORRECTED CUTS			(TO - FROM)									
95													
96	TILE OUTLINE		1	2									
97													
98	AB	G01X	0	0									
99		Y	0	0									
100	BC	G01X	0	0									
101		Y	0	0									
102	CD	G01X	0	0									
103		Y	0	0									
104	DE	G01X	0	0									
105		Y	0	0									
106	EF	G01X	0	0									
107		Y	0	0									
108	FG	G01X	0	0									
109		Y	0	0									
110	GH	G01X	0	0									
111		Y	0	0									
112	HA	G01X	0	0									
113		Y	0	0									
114	X CHECK =		0	0									
115	Y CHECK =		0	0									
116													
117	CORRECTED CUTS				TOOL CORRECTION =			62.5					
118													
119	TILE OUTLINE												
120		TILE	1	2									
121	AB	G01X	0	0									

	A	B	C	D	E	F	G	H	I	J	K	L	M
122		Y(2)	125	125									
123	BC	GØ1X(2)	125	125									
124		Y	0	0									
125	CD	GØ1X	0	0									
126		Y(2)	-125	-125									
127	DE	GØ1X(0)	0	0									
128		Y	0	0									
129	EF	GØ1X	0	0									
130		Y(-2)	125	125									
131	FG	GØ1X(0)	0	0									
132		Y	0	0									
133	GH	GØ1X	0	0									
134		Y(2)	-125	-125									
135	HA	GØ1X(2)	-125	-125									
136		Y	0	0									
137	X CHECK =		0	0									
138	Y CHECK =		0	0									
139													
140	CORRECTED GROOVE												
141		TILE	1	2									
142	MOVE Ai												
143		GØ1X	63	63									
144		Y	63	63									
145	STRAIGHT CUT iK												
146		GØ1X	0	0									
147		Y	0	0									
148	ARC CUT KL ABOUT T												
149		GØ2X	0	0									
150		Y	0	0									
151		i	0	0									
152		J	0	0									
153	STRAIGHT CUT LM												
154		GØ1X	0	0									
155		Y	0	0									
156	ARC CUT MN ABOUT U												
157		GØ2X	0	0									
158		Y	0	0									
159		i	0	0									
160		J	0	0									
161	STRAIGHT CUT NO												
162		GØ1X	0	0									
163		Y	0	0									
164	ARC CUT OP ABOUT V												
165		GØ2X	0	0									
166		Y	0	0									
167		i	0	0									
168		J	0	0									
169	STRAIGHT CUT PQ												
170		GØ1X	0	0									
171		Y	0	0									
172	ARC CUT QR ABOUT W												
173		GØ2X	0	0									
174		Y	0	0									
175		i	0	0									
176		J	0	0									
177	STRAIGHT CUT Ri												
178		GØ1X	0	0									
179		Y	0	0									
180	MOVE iA												
181		GØ1X	-63	-63									
182		Y	-63	-63									

	A	B	C	D	E	F	G	H	I	J	K	L	M
183													
184													
185													
186	GROOVE CHECKS												
187	TILE		1	2									
188	X CHECK =		0	0									
189	Y CHECK =		0	0									
190	i CHECK =		0	0									
191	J CHECK =		0	0									

	A	B	C	D
1		Print Drawing Print Data		
2				
3				
4				
5				
6				
7				
8				
9				
10				
11			Tile number	
12			AX	
13			AY	
14			BX	
15			BY	
16			CX	
17			CY	
18			DX	
19			DY	
20			EX	
21			EY	
22			FX	
23			FY	
24			GX	
25			GY	
26			HX	
27			HY	
28			IX	
29			IY	
30			KX	
31			KY	
32			LX	
33			LY	
34			MX	
35			MY	
36			NX	
37			NY	
38			OX	
39			OY	
40			PX	
41			PY	
42			QX	
43			QY	
44			RX	
45			RY	
46			TX	
47			TY	
48			UX	
49			UY	
50			VX	
51			VY	
52			WX	
53			WY	

	A	B	C	D
54				
55				
56			Dimensions	
57			AB	0.000
58			BC	0.000
59			CD	0.000
60			DE	0.000
61			AM	0.000
62			DG	0.000
63			DI	0.000
64			HI	0.000
65			AN	0.000
66			PB	0.000
67			BO	0.000
68			FC	0.000
69			VP	0.000
70			ML	0.000
71			NO	0.000
72				
73				
74				
75				
76				
77				
78				
79				
80			X OFFSET	204
81			Y OFFSET	247
82			AX	
83			AY	
84			BX	
85			BY	
86			CX	
87			CY	
88			DX	
89			DY	
90			EX	
91			EY	
92			FX	
93			FY	
94			GX	
95			GY	
96			HX	
97			HY	
98			IX	
99			IY	
100			JX(not used)	
101			JY(not used)	
102			KX	
103			KY	
104			LX	
105			LY	
106			MX	
107			MY	
108			NX	
109			NY	
110			OX	
111			OY	
112			PX	
113			PY	
114			QX	
115			QY	
116			RX	
117			RY	
118			SX(not used)	
119			SY(not used)	
120			TX	
121			TY	
122			UX	
123			UY	
124			VX	
125			VY	
126			WX	
127			WY	

	A
1	
2	**Macros definition**
3	
4	
5	Tiles_Designer
6	=ECHO(FALSE)
7	=FORMULA("=FALSE",$A$23)
8	=GET.WINDOW(1)
9	=IF($A$8="Tiles_mcr")
10	= FORMULA("=TRUE",$A$23)
11	= ACTIVATE.NEXT()
12	=ELSE()
13	= CLOSE()
14	=END.IF()
15	=GET.WINDOW(1)
16	=IF(AND($A$15="Tiles_mcr",$A$23=TRUE),,GOTO($A$8))
17	=SHORT.MENUS(FALSE)
18	=Init_Work()
19	=New_Work()
20	=RETURN()
21	
22	Close check
23	=TRUE
24	
25	
26	Init_Work
27	=ADD.BAR()
28	=SHOW.BAR(Menubar)
29	=ADD.MENU(Menubar,File_mn)
30	=ADD.MENU(Menubar,Edit_mn)
31	=ADD.MENU(Menubar,Data_mn)
32	=ADD.MENU(Menubar,Draw_mn)
33	=ADD.MENU(Menubar,Window_mn)
34	=CALCULATION(3)
35	=RETURN()
36	
37	
38	ClearScreen
39	=ECHO(FALSE)
40	=NumTiles+2
41	=GET.DOCUMENT(1)
42	=IF($A$40>4)
43	= SELECT("R20C5:R34C"&$A$40&",R49C5:R115C"&$A$40&",R120C5:R191C"&$A$40)
44	= CLEAR(3)
45	=END.IF()
46	=FORMULA.GOTO($O$40:$O$71)
47	=CLEAR(3)
48	=ACTIVATE($A$41)
49	=SELECT(!$A$1)
50	=RETURN()
51	
52	
53	Drawing
54	=ARGUMENT("Draw_ck",4)
55	=ARGUMENT("Notch_ck",4)
56	=ARGUMENT("Groove_ck",4)
57	= SELECT(!$A$1)
58	= GET.CELL(5,ID80)
59	= GET.CELL(5,ID81)
60	= GET.CELL(5,ID82)
61	= GET.CELL(5,ID83)
62	= GET.CELL(5,ID84)
63	= GET.CELL(5,ID85)
64	= GET.CELL(5,ID86)
65	= GET.CELL(5,ID87)
66	= GET.CELL(5,ID88)
67	= GET.CELL(5,ID89)
68	= GET.CELL(5,ID90)
69	= GET.CELL(5,ID91)
70	= GET.CELL(5,ID92)
71	= GET.CELL(5,ID93)
72	= GET.CELL(5,ID94)
73	= GET.CELL(5,ID95)
74	= GET.CELL(5,ID96)
75	= GET.CELL(5,ID97)
76	= GET.CELL(5,ID98)
77	= GET.CELL(5,ID99)
78	= GET.CELL(5,ID100)
79	= GET.CELL(5,ID101)
80	= GET.CELL(5,ID102)
81	= GET.CELL(5,ID103)
82	= GET.CELL(5,ID104)
83	= GET.CELL(5,ID105)
84	= GET.CELL(5,ID106)
85	= GET.CELL(5,ID107)
86	= GET.CELL(5,ID108)
87	= GET.CELL(5,ID109)
88	= GET.CELL(5,ID110)
89	= GET.CELL(5,ID111)
90	= GET.CELL(5,ID112)
91	= GET.CELL(5,ID113)
92	= GET.CELL(5,ID114)

	A
93	= GET.CELL(5,ID115)
94	= GET.CELL(5,ID116)
95	= GET.CELL(5,ID117)
96	= GET.CELL(5,ID118)
97	= GET.CELL(5,ID119)
98	= GET.CELL(5,ID120)
99	= GET.CELL(5,ID121)
100	= GET.CELL(5,ID122)
101	= GET.CELL(5,ID123)
102	= GET.CELL(5,ID124)
103	= GET.CELL(5,ID125)
104	= GET.CELL(5,ID126)
105	= GET.CELL(5,ID127)
106	= GET.CELL(5,ID57)
107	= GET.CELL(5,ID58)
108	= GET.CELL(5,ID59)
109	= GET.CELL(5,ID60)
110	= GET.CELL(5,ID61)
111	= GET.CELL(5,ID62)
112	= GET.CELL(5,ID63)
113	= GET.CELL(5,ID64)
114	= GET.CELL(5,ID65)
115	= GET.CELL(5,ID66)
116	= GET.CELL(5,ID67)
117	= GET.CELL(5,ID68)
118	= GET.CELL(5,ID69)
119	= GET.CELL(5,ID70)
120	= GET.CELL(5,ID71)
121	= ECHO(FALSE)
122	=CREATE.OBJECT(1,"R1C1",$A61+$A59,$A60+$A58,"R1C1",$A63+$A59,$A62+$A58)
123	=PATTERNS(0,1,1,3,2,2,1)
124	=CREATE.OBJECT(1,"R1C1",$A63+$A59,$A62+$A58,"R1C1",$A65+$A59,$A64+$A58)
125	=PATTERNS(0,1,1,3,2,2,1)
126	=CREATE.OBJECT(1,"R1C1",$A65+$A59,$A64+$A58,"R1C1",$A67+$A59,$A66+$A58)
127	=PATTERNS(0,1,1,3,2,2,1)
128	=IF(Notch_ck=TRUE)
129	=CREATE.OBJECT(1,"R1C1",$A67+$A59,$A66+$A58,"R1C1",$A69+$A59,$A68+$A58)
130	=PATTERNS(0,1,1,3,2,2,1)
131	=CREATE.OBJECT(1,"R1C1",$A69+$A59,$A68+$A58,"R1C1",$A71+$A59,$A70+$A58)
132	=PATTERNS(0,1,1,3,2,2,1)
133	=CREATE.OBJECT(1,"R1C1",$A71+$A59,$A70+$A58,"R1C1",$A73+$A59,$A72+$A58)
134	=PATTERNS(0,1,1,3,2,2,1)
135	=ELSE()
136	=CREATE.OBJECT(1,"R1C1",$A67+$A59,$A66+$A58,"R1C1",$A73+$A59,$A72+$A58)
137	=PATTERNS(0,1,1,3,2,2,1)
138	=END.IF()
139	=CREATE.OBJECT(1,"R1C1",$A73+$A59,$A72+$A58,"R1C1",$A75+$A59,$A74+$A58)
140	=PATTERNS(0,1,1,3,2,2,1)
141	=CREATE.OBJECT(1,"R1C1",$A75+$A59,$A74+$A58,"R1C1",$A61+$A59,$A60+$A58)
142	=PATTERNS(0,1,1,3,2,2,1)
143	=IF(Groove_ck=TRUE)
144	=CREATE.OBJECT(1,"R1C1",$A77+$A59,$A76+$A58,"R1C1",$A81+$A59,$A80+$A58)
145	=PATTERNS(0,1,1,3,2,2,1)
146	=CREATE.OBJECT(4,"R1C1",$A81+$A59,$A80+$A58,"R1C1",$A83+$A59,$A82+$A58)
147	=PATTERNS(0,1,1,3,,2,1,1,2)
148	=CREATE.OBJECT(1,"R1C1",$A83+$A59,$A82+$A58,"R1C1",$A85+$A59,$A84+$A58)
149	=PATTERNS(0,1,1,3,2,2,1)
150	=CREATE.OBJECT(4,"R1C1",$A87+$A59,$A86+$A58,"R1C1",$A85+$A59,$A84+$A58)
151	=PATTERNS(0,1,1,3,,2,1,1,2)
152	=CREATE.OBJECT(1,"R1C1",$A87+$A59,$A86+$A58,"R1C1",$A89+$A59,$A88+$A58)
153	=PATTERNS(0,1,1,3,2,2,1)
154	=CREATE.OBJECT(4,"R1C1",$A89+$A59,$A88+$A58,"R1C1",$A91+$A59,$A90+$A58)
155	=PATTERNS(0,1,1,3,,2,1,1,2)
156	=CREATE.OBJECT(1,"R1C1",$A91+$A59,$A90+$A58,"R1C1",$A93+$A59,$A92+$A58)
157	=PATTERNS(0,1,1,3,2,2,1)
158	=CREATE.OBJECT(4,"R1C1",$A95+$A59,$A94+$A58,"R1C1",$A93+$A59,$A92+$A58)
159	=PATTERNS(0,1,1,3,,2,1,1,2)
160	=CREATE.OBJECT(1,"R1C1",$A95+$A59,$A94+$A58,"R1C1",$A77+$A59,$A76+$A58)
161	=PATTERNS(0,1,1,3,2,2,1)
162	=END.IF()
163	=ECHO(TRUE)
164	=ECHO(FALSE)
165	=IF(Draw_ck=TRUE)
166	=CREATE.OBJECT(1,"R1C1",$A61+$A59,$A60+$A58-5,"R1C1",$A61+$A59,$A60+$A58-40)
167	=CREATE.OBJECT(1,"R1C1",$A63+$A59,$A62+$A58-5,"R1C1",$A63+$A59,$A62+$A58-40)
168	=CREATE.OBJECT(1,"R1C1",$A63+$A59+5,$A62+$A58,"R1C1",$A63+$A59+40,$A62+$A58)
169	=CREATE.OBJECT(1,"R1C1",$A63+$A59+5,$A64+$A58,"R1C1",$A63+$A59+40,$A64+$A58)
170	=IF(Groove_ck=TRUE)
171	= CREATE.OBJECT(1,"R1C1",$A103+$A59-8,$A102+$A58,"R1C1",$A103+$A59+8,$A102+$A58)
172	= CREATE.OBJECT(1,"R1C1",$A103+$A59,$A102+$A58-8,"R1C1",$A103+$A59,$A102+$A58+8)
173	= INT(($A91-$A103)/SQRT(2))
174	= CREATE.OBJECT(1,"R1C1",$A103+$A59,$A102+$A58,"R1C1",$A103+$A59+$A173,$A102+$A58-$A173)
175	= PATTERNS(1,1,1,1,1,1,3)
176	= CREATE.OBJECT(1,"R1C1",$A85+$A59,$A62+$A58-5,"R1C1",$A85+$A59,$A62+$A58-20)
177	= CREATE.OBJECT(1,"R1C1",$A87+$A59,$A62+$A58-5,"R1C1",$A87+$A59,$A62+$A58-20)
178	= CREATE.OBJECT(1,"R1C1",$A89+$A59,$A62+$A58-5,"R1C1",$A89+$A59,$A62+$A58-20)
179	= CREATE.OBJECT(1,"R1C1",$A91+$A59,$A62+$A58-5,"R1C1",$A91+$A59,$A62+$A58-20)
180	= CREATE.OBJECT(1,"R1C1",$A63+$A59+5,$A94+$A58,"R1C1",$A63+$A59+25,$A94+$A58)
181	= CREATE.OBJECT(1,"R1C1",$A61+$A59-5,$A60+$A58,"R1C1",$A61+$A59-20,$A60+$A58)
182	= CREATE.OBJECT(1,"R1C1",$A61+$A59-5,$A86+$A58,"R1C1",$A61+$A59-20,$A86+$A58)
183	= CREATE.OBJECT(1,"R1C1",$A61+$A59-5,$A84+$A58,"R1C1",$A61+$A59-20,$A84+$A58)
184	= CREATE.OBJECT(1,"R1C1",$A61+$A59-5,$A82+$A58,"R1C1",$A61+$A59-20,$A82+$A58)

	A
185	=END.IF()
186	=IF(AND(Notch_ck=TRUE,Groove_ck=TRUE))
187	= CREATE.OBJECT(1,"R1C1",$A77+$A59-8,($A64/2)+$A58,"R1C1",$A77+$A59+8,($A64/2)+$A58)
188	= CREATE.OBJECT(1,"R1C1",$A77+$A59,($A64/2)+$A58-8,"R1C1",$A77+$A59,($A64/2)+$A58+8)
189	= MIN($A76,$A68)
190	= CREATE.OBJECT(1,"R1C1",$A77+$A59,($A64/2)+$A58+13,"R1C1",$A77+$A59,$A189+$A58-5)
191	= CREATE.OBJECT(1,"R1C1",$A77+$A59,$A94+$A58-3,"R1C1",$A77+$A59,$A94+$A58+4)
192	=END.IF()
193	=IF(Notch_ck=TRUE)
194	= CREATE.OBJECT(1,"R1C1",$A63+$A59+5,$A68+$A58,"R1C1",$A63+$A59+15,$A68+$A58)
195	= CREATE.OBJECT(1,"R1C1",$A77+$A59,$A94+$A58+9,"R1C1",$A77+$A59,$A64+$A58+35)
196	= CREATE.OBJECT(1,"R1C1",$A75+$A59,$A64+$A58+5,"R1C1",$A75+$A59,$A64+$A58+40)
197	= CREATE.OBJECT(1,"R1C1",$A73+$A59,$A64+$A58+5,"R1C1",$A73+$A59,$A64+$A58+28)
198	= CREATE.OBJECT(1,"R1C1",$A67+$A59,$A64+$A58+5,"R1C1",$A67+$A59,$A64+$A58+40)
199	= CREATE.OBJECT(1,"R1C1",$A65+$A59,$A64+$A58+5,"R1C1",$A65+$A59,$A64+$A58+40)
200	=END.IF()
201	=ECHO(TRUE)
202	=ECHO(FALSE)
203	=CREATE.OBJECT(1,"R1C1",$A61+$A59+200,$A60+$A58-30,"R1C1",$A61+$A59,$A60+$A58-30)
204	=PATTERNS(1,1,1,1,1,1,3)
205	=CREATE.OBJECT(1,"R1C1",$A61+$A59+200,$A60+$A58-30,"R1C1",$A63+$A59,$A62+$A58-30)
206	=PATTERNS(1,1,1,1,1,1,3)
207	=CREATE.OBJECT(1,"R1C1",$A63+$A59+32,$A62+$A58+100,"R1C1",$A63+$A59+32,$A62+$A58)
208	=PATTERNS(1,1,1,1,1,1,3)
209	=CREATE.OBJECT(1,"R1C1",$A63+$A59+32,$A62+$A58+100,"R1C1",$A65+$A59+32,$A64+$A58)
210	=PATTERNS(1,1,1,1,1,1,3)
211	=IF(Groove_ck=TRUE)
212	=CREATE.OBJECT(1,"R1C1",$A61+$A59-30,$A60+$A58-15,"R1C1",$A61+$A59,$A60+$A58-15)
213	=PATTERNS(1,1,1,1,1,1,3)
214	=CREATE.OBJECT(1,"R1C1",$A85+$A59+15,$A60+$A58-15,"R1C1",$A85+$A59,$A60+$A58-15)
215	=PATTERNS(1,1,1,1,1,1,3)
216	=CREATE.OBJECT(1,"R1C1",$A87+$A59+50,$A60+$A58-15,"R1C1",$A87+$A59,$A60+$A58-15)
217	=PATTERNS(1,1,1,1,1,1,3)
218	=CREATE.OBJECT(1,"R1C1",$A87+$A59+50,$A60+$A58-15,"R1C1",$A89+$A59,$A60+$A58-15)
219	=PATTERNS(1,1,1,1,1,1,3)
220	=CREATE.OBJECT(1,"R1C1",$A91+$A59-15,$A60+$A58-15,"R1C1",$A91+$A59,$A60+$A58-15)
221	=PATTERNS(1,1,1,1,1,1,3)
222	=CREATE.OBJECT(1,"R1C1",$A63+$A59+20,$A60+$A58-15,"R1C1",$A63+$A59,$A60+$A58-15)
223	=PATTERNS(1,1,1,1,1,1,3)
224	=CREATE.OBJECT(1,"R1C1",$A65+$A59+20,$A94+$A58-30,"R1C1",$A65+$A59+20,$A94+$A58)
225	=PATTERNS(1,1,1,1,1,1,3)
226	=CREATE.OBJECT(1,"R1C1",$A65+$A59+20,$A64+$A58+15,"R1C1",$A65+$A59+20,$A64+$A58)
227	=PATTERNS(1,1,1,1,1,1,3)
228	=CREATE.OBJECT(1,"R1C1",$A61+$A59-15,$A60+$A58-10,"R1C1",$A61+$A59-15,$A60+$A58)
229	=PATTERNS(1,1,1,1,1,1,3)
230	=CREATE.OBJECT(1,"R1C1",$A61+$A59-15,$A86+$A58+30,"R1C1",$A61+$A59-15,$A86+$A58)
231	=PATTERNS(1,1,1,1,1,1,3)
232	=CREATE.OBJECT(1,"R1C1",$A61+$A59-15,$A84+$A58+50,"R1C1",$A61+$A59-15,$A84+$A58)
233	=PATTERNS(1,1,1,1,1,1,3)
234	=CREATE.OBJECT(1,"R1C1",$A61+$A59-15,$A84+$A58+50,"R1C1",$A61+$A59-15,$A82+$A58)
235	=PATTERNS(1,1,1,1,1,1,3)
236	=END.IF()
237	=IF(Notch_ck=TRUE)
238	=CREATE.OBJECT(1,"R1C1",$A65+$A59+10,$A68+$A58-100,"R1C1",$A65+$A59+10,$A68+$A58)
239	=PATTERNS(1,1,1,1,1,1,3)
240	=CREATE.OBJECT(1,"R1C1",$A65+$A59+10,$A64+$A58+15,"R1C1",$A65+$A59+10,$A64+$A58)
241	=PATTERNS(1,1,1,1,1,1,3)
242	=CREATE.OBJECT(1,"R1C1",$A65+$A59-80,$A64+$A58+32,"R1C1",$A65+$A59,$A64+$A58+32)
243	=PATTERNS(1,1,1,1,1,1,3)
244	=CREATE.OBJECT(1,"R1C1",$A65+$A59-80,$A64+$A58+32,"R1C1",$A67+$A59,$A66+$A58+32)
245	=PATTERNS(1,1,1,1,1,1,3)
246	=CREATE.OBJECT(1,"R1C1",$A67+$A59+30,$A66+$A58+22,"R1C1",$A67+$A59,$A66+$A58+22)
247	=PATTERNS(1,1,1,1,1,1,3)
248	=CREATE.OBJECT(1,"R1C1",$A73+$A59-15,$A72+$A58+22,"R1C1",$A73+$A59,$A72+$A58+22)
249	=PATTERNS(1,1,1,1,1,1,3)
250	=CREATE.OBJECT(1,"R1C1",$A77+$A59-100,$A72+$A58+32,"R1C1",$A77+$A59,$A72+$A58+32)
251	=PATTERNS(1,1,1,1,1,1,3)
252	=CREATE.OBJECT(1,"R1C1",$A77+$A59-100,$A74+$A58+32,"R1C1",$A75+$A59,$A74+$A58+32)
253	=PATTERNS(1,1,1,1,1,1,3)
254	=END.IF()
255	=ECHO(TRUE)
256	=ECHO(FALSE)
257	=CREATE.OBJECT(6,"R1C1",$A61+$A59+2,$A60+$A58+2,"R1C1",$A61+$A59+14,$A60+$A58+16)
258	=TEXT.BOX("A")
259	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
260	=CREATE.OBJECT(6,"R1C1",$A63+$A59-2,$A62+$A58+2,"R1C1",$A63+$A59-14,$A62+$A58+16)
261	=TEXT.BOX("B")
262	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
263	=CREATE.OBJECT(6,"R1C1",$A65+$A59-2,$A64+$A58-2,"R1C1",$A65+$A59-14,$A64+$A58-16)
264	=TEXT.BOX("C")
265	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
266	=CREATE.OBJECT(6,"R1C1",$A75+$A59+2,$A74+$A58-2,"R1C1",$A75+$A59+14,$A74+$A58-16)
267	=TEXT.BOX("H")
268	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
269	=IF(Notch_ck=TRUE)
270	=CREATE.OBJECT(6,"R1C1",$A67+$A59+1,$A66+$A58+1,"R1C1",$A67+$A59+13,$A66+$A58+15)
271	=TEXT.BOX("D")
272	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
273	=CREATE.OBJECT(6,"R1C1",$A69+$A59+1,$A68+$A58-1,"R1C1",$A69+$A59+13,$A68+$A58-15)
274	=TEXT.BOX("E")
275	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
276	=CREATE.OBJECT(6,"R1C1",$A71+$A59-1,$A70+$A58-1,"R1C1",$A71+$A59-13,$A70+$A58-15)

	A
277	=TEXT.BOX("F")
278	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
279	=CREATE.OBJECT(6,"R1C1",$A73+$A59-1,$A72+$A58+1,"R1C1",$A73+$A59-13,$A72+$A58+15)
280	=TEXT.BOX("G")
281	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
282	=END.IF()
283	=IF(Groove_ck=TRUE)
284	=CREATE.OBJECT(6,"R1C1",$A81+$A59,$A80+$A58-5,"R1C1",$A81+$A59-12,$A80+$A58-19)
285	=TEXT.BOX("K")
286	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
287	=CREATE.OBJECT(6,"R1C1",$A83+$A59+1,$A82+$A58,"R1C1",$A83+$A59+13,$A82+$A58-14)
288	=TEXT.BOX("L")
289	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
290	=CREATE.OBJECT(6,"R1C1",$A85+$A59+1,$A84+$A58,"R1C1",$A85+$A59+13,$A84+$A58+14)
291	=TEXT.BOX("M")
292	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
293	=CREATE.OBJECT(6,"R1C1",$A87+$A59,$A86+$A58+1,"R1C1",$A87+$A59+12,$A86+$A58+15)
294	=TEXT.BOX("N")
295	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
296	=CREATE.OBJECT(6,"R1C1",$A89+$A59,$A88+$A58+1,"R1C1",$A89+$A59-12,$A88+$A58+15)
297	=TEXT.BOX("O")
298	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
299	=CREATE.OBJECT(6,"R1C1",$A91+$A59-2,$A90+$A58,"R1C1",$A91+$A59-14,$A90+$A58+14)
300	=TEXT.BOX("P")
301	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
302	=CREATE.OBJECT(6,"R1C1",$A93+$A59-2,$A92+$A58,"R1C1",$A93+$A59-14,$A92+$A58-14)
303	=TEXT.BOX("Q")
304	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
305	=CREATE.OBJECT(6,"R1C1",$A95+$A59,$A94+$A58-5,"R1C1",$A95+$A59+12,$A94+$A58-19)
306	=TEXT.BOX("R")
307	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
308	=CREATE.OBJECT(6,"R1C1",$A103+$A59-1,$A102+$A58+1,"R1C1",$A103+$A59-13,$A102+$A58+15)
309	=TEXT.BOX("V")
310	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
311	=END.IF()
312	=IF(AND(Notch_ck=TRUE,Groove_ck=TRUE))
313	=MIN($A70,$A76)
314	=CREATE.OBJECT(6,"R1C1",$A77+$A59-5,$A313+$A58-10,"R1C1",$A77+$A59+6,$A313+$A58-24)
315	=TEXT.BOX("I")
316	=PATTERNS(1,1,1,1,FALSE,1,1,1,2,FALSE)
317	=FORMAT.FONT(,,TRUE)
318	=END.IF()
319	=ECHO(TRUE)
320	=ECHO(FALSE)
321	=CREATE.OBJECT(6,"R1C1",$A59+INT($A63/2)-14,$A60+$A58-23,"R1C1",$A59+INT($A63/2)+14,$A60+$A58-37)
322	=TEXT.BOX($A106&""&"")
323	=FORMAT.TEXT(1,1,0,,TRUE)
324	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
325	=INT($A64/2)
326	=CREATE.OBJECT(6,"R1C1",$A63+$A59+23,$A62+$A58+$A325-14,"R1C1",$A63+$A59+37,$A62+$A58+$A325+14)
327	=TEXT.BOX($A107&""&"")
328	=FORMAT.TEXT(1,1,2,,TRUE)
329	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
330	=IF(Groove_ck=TRUE)
331	=INT(($A89-$A87)/2)
332	=CREATE.OBJECT(6,"R1C1",$A87+$A59+$A331-14,$A60+$A58-8,"R1C1",$A87+$A59+$A331+14,$A60+$A58-22)
333	=TEXT.BOX($A120&""&"")
334	=FORMAT.TEXT(1,1,0,,TRUE)
335	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
336	=CREATE.OBJECT(6,"R1C1",$A61+$A59-40,$A60+$A58-8,"R1C1",$A61+$A59-68,$A60+$A58-22)
337	=TEXT.BOX($A110&""&"")
338	=FORMAT.TEXT(1,1,0,,TRUE)
339	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
340	=CREATE.OBJECT(6,"R1C1",$A63+$A59+20,$A62+$A58-8,"R1C1",$A63+$A59+48,$A62+$A58-22)
341	=TEXT.BOX($A115&""&"")
342	=FORMAT.TEXT(1,1,0,,TRUE)
343	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
344	=CREATE.OBJECT(6,"R1C1",$A103+$A59+5,$A102+$A58-10,"R1C1",$A103+$A59+30,$A102+$A58-24)
345	=TEXT.BOX($A118&""&"")
346	=FORMAT.TEXT(1,1,0,,TRUE)
347	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
348	=CREATE.OBJECT(6,"R1C1",$A65+$A59+13,$A94+$A58-30,"R1C1",$A65+$A59+27,$A94+$A58-58)
349	=TEXT.BOX($A117&""&"")
350	=FORMAT.TEXT(1,1,2,,TRUE)
351	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
352	=CREATE.OBJECT(6,"R1C1",$A61+$A59-8,$A86+$A58+10,"R1C1",$A61+$A59-22,$A86+$A58+38)
353	=TEXT.BOX($A114&""&"")
354	=FORMAT.TEXT(1,1,2,,TRUE)
355	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
356	=INT(($A82-$A84)/2)
357	=CREATE.OBJECT(6,"R1C1",$A61+$A59-8,$A84+$A58+$A356-14,"R1C1",$A61+$A59-22,$A84+$A58+$A356+14)
358	=TEXT.BOX($A119&""&"")
359	=FORMAT.TEXT(1,1,2,,TRUE)
360	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
361	=END.IF()
362	=IF(Notch_ck=TRUE)
363	=INT($A77/2)
364	=CREATE.OBJECT(6,"R1C1",$A75+$A59+$A363-14,$A74+$A58+23,"R1C1",$A75+$A59+$A363+14,$A74+$A58+37)
365	=TEXT.BOX($A113&""&"")
366	=FORMAT.TEXT(1,1,0,,TRUE)
367	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
368	=CREATE.OBJECT(6,"R1C1",$A67+$A59+20,$A66+$A58+24,"R1C1",$A67+$A59+48,$A66+$A58+10)

	A
369	=TEXT.BOX($A111&""&"")
370	=FORMAT.TEXT(1,1,0,,TRUE)
371	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
372	=INT(($A65-$A67)/2)
373	=CREATE.OBJECT(6,"R1C1",$A67+$A59+$A372-14,$A64+$A58+37,"R1C1",$A67+$A59+$A372+14,$A64+$A58+23)
374	=TEXT.BOX($A108&""&"")
375	=FORMAT.TEXT(1,1,0,,TRUE)
376	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
377	=CREATE.OBJECT(6,"R1C1",$A65+$A59+4,$A68+$A58-80,"R1C1",$A65+$A59+18,$A68+$A58-108)
378	=TEXT.BOX($A109&""&"")
379	=FORMAT.TEXT(1,1,2,,TRUE)
380	=PATTERNS(2,1,1,1,FALSE,1,1,1,2,FALSE)
381	=END.IF()
382	=END.IF()
383	=SELECT("R1C1")
384	=RETURN()
385	
386	
387	
388	
389	
390	

	B	C	D	E
1				
2			Menu commands definition	
3				
4				
5	Print_drawing		File	Edit
6	=SELECT(!$A$1)			
7	=SET.PRINT.AREA()		New_Work	Undo
8	=PAGE.SETUP("&C&12&B&U&F&R&10&D",,,,,,FALSE,FALSE,TRUE,TRUE)		=OPEN("Tiles")	=UNDO()
9	=PRINT()		=RETURN()	=RETURN()
10	=DELETE.NAME("Print_Area")			
11	=RETURN()		Open	Cut
12			=OPEN?()	=CUT()
13			=RETURN()	=RETURN()
14	Print_data			
15	=ECHO(FALSE)		Close	Paste
16	=SELECT("R11C3:R71C4")		=CLOSE()	=PASTE()
17	=SET.PRINT.AREA()		=RETURN()	=RETURN()
18	=PAGE.SETUP("&C&12&B&U&F&R&10&D",,,,,1,1,FALSE,TRUE,FALSE,FALSE)			
19	=PRINT()		Save	Copy
20	=DELETE.NAME("Print_Area")		=SAVE()	=COPY()
21	=SELECT(!$A$1)		=RETURN()	=RETURN()
22	=RETURN()			
23			Save_as	Clipboard
24			=SAVE.AS?()	=SHOW.CLIPBOARD()
25			=RETURN()	=RETURN()
26				
27	Prepare_Drawing		Excel	
28	= ARGUMENT("Tile_number",1)		=ECHO(FALSE)	
29	= ARGUMENT("Name_ws",2)		=FORMULA("=FALSE",$D$49)	
30	= ARGUMENT("Name_dr",2)		=GET.WINDOW(1)	
31	= ARGUMENT("Cx",1)		=IF($D$30="Tiles_mcr")	
32	= Tile_number+2		= FORMULA("=TRUE",$D$49)	
33	= ECHO(TRUE)		= ACTIVATE.NEXT()	
34	= ECHO(FALSE)		=ELSE()	
35	= FORMULA.GOTO(Name_ws&"!R49C"&$B$32&":R91C"&$B$32)		= CLOSE()	
36	= COPY()		=END.IF()	
37	= FORMULA.GOTO(Name_dr&"!R11C4")		=GET.WINDOW(1)	
38	= PASTE.SPECIAL(3,1,FALSE,FALSE)		=IF(AND($D$37="Tiles_mcr",$D$49=TRUE),,GOTO($D$30))	
39	= IF($G$36=FALSE,FORMULA(!$D$15/2,!$D$29))		=ADD.BAR(1)	
40	= 295.075/Cx		=SHOW.BAR(1)	
41	= FORMULA.FILL("=Tiles_mcr!R40C2",!$D$82:$D$127)		=CALCULATION(1)	
42	= SELECT(!$D$12:$D$29)		=NEW(1)	
43	= COPY()		=FULL(TRUE)	
44	= SELECT(!$D$82)		=ACTIVATE.NEXT()	
45	= PASTE.SPECIAL(3,4,FALSE,FALSE)		=CLOSE(FALSE)	
46	= SELECT(!$D$30:$D$45)		=RETURN()	
47	= COPY()			
48	= SELECT(!$D$102)		Close_Check	
49	= PASTE.SPECIAL(3,4,FALSE,FALSE)		=FALSE	
50	= SELECT(!$D$46:$D$53)			
51	= COPY()		Exit	
52	= SELECT(!$D$120)		=ECHO(FALSE)	
53	= PASTE.SPECIAL(3,4,FALSE,FALSE)		=FORMULA("=FALSE",$D$68)	
54	= CALCULATE.DOCUMENT()		=GET.WINDOW(1)	
55	= RETURN()		=IF($D$54="Tiles_mcr")	
56			= FORMULA("=TRUE",$D$68)	
57			= ACTIVATE.NEXT()	
58			=ELSE()	
59	Clear_Drawing		= CLOSE()	
60	=SELECT(!$C$80:$D$127)		=END.IF()	
61	=CLEAR(3)		=GET.WINDOW(1)	
62	=SELECT(!$A$1)		=IF(AND($D$61="Tiles_mcr",$D$68=TRUE),,GOTO($D$54))	
63	=RETURN()		=ERROR(FALSE)	
64			=QUIT()	
65			=RETURN()	
66				
67			Close_Check	
68			=FALSE	
69				
70				
71				
72				
73				
74				
75			Window	
76				
77			Activate	
78			=ECHO(FALSE)	
79			=ACTIVATE.NEXT()	
80			=GET.DOCUMENT(3)	
81			=IF($D$80=3,ACTIVATE.NEXT())	
82			=RETURN()	
83				
84				
85				
86				
87			Activate_ws	
88			=ECHO(FALSE)	
89			=ACTIVATE.NEXT()	
90			=GET.DOCUMENT(3)	
91			=GET.CELL(17,!$A$1)	
92			=IF(OR($D$90=3,$D$91>200),GOTO($D$89))	

	B	C	D	E
93			=RETURN()	
94				
95				
96				
97			Activate_dr	
98			=ECHO(FALSE)	
99			=ACTIVATE.NEXT()	
100			=GET.DOCUMENT(3)	
101			=GET.CELL(17,$A$1)	
102			=IF(OR($D$100=3,$D$101<100),GOTO($D$99))	
103			=RETURN()	
104				
105				
106				
107				
108				
109				
110				
111				
112				
113				
114				
115				
116				
117				
118				
119				
120				

	F
1	
2	
3	
4	
5	Data
6	
7	Insert_data
8	=ECHO(FALSE)
9	=DIALOG.BOX(Insert_db)
10	=IF(NOT($F$9=FALSE))
11	= FORMULA.FILL("=FALSE",$G$36:$G$37)
12	= ClearScreen()
13	= FORMULA("=R9C6",$F$93)
14	= IF($F$93=12)
15	= DIALOG.BOX(Notch_db)
16	= IF(NOT($F$15=FALSE))
17	= IF($O$46>$O$9)
18	= ALERT("The number of tiles of the front increment must be smaller than the total number of tiles",3)
19	= GOTO($F$15)
20	= END.IF()
21	= FORMULA("=TRUE",$G$36)
22	= FORMULA("=Tiles_mcr!R41C15",!$C$24)
23	= FORMULA("=Tiles_mcr!R42C15",!$C$27)
24	= FORMULA("=Tiles_mcr!R43C15",!$C$30)
25	= FORMULA("=Tiles_mcr!R44C15",!$G$42)
26	= FORMULA("=Tiles_mcr!R45C15",!$G$35)
27	= FORMULA("=Tiles_mcr!R46C15",!$G$38)
28	= FORMULA("=Tiles_mcr!R47C15",!$J$16)
29	= FORMULA("=Tiles_mcr!R9C15-Tiles_mcr!R46C15",!$G$41)
30	= END.IF()
31	= END.IF()
32	= IF($F$93=15)
33	= DIALOG.BOX(Groove_db)
34	= IF(NOT($F$33=FALSE))
35	= FORMULA("=TRUE",$G$37)
36	= FORMULA("=Tiles_mcr!R59C15",!$C$26)
37	= FORMULA("=Tiles_mcr!R60C15",!$C$34)
38	= FORMULA("=Tiles_mcr!R61C15",!$C$33)
39	= FORMULA("=Tiles_mcr!R62C15",!$C$25)
40	= END.IF()
41	= END.IF()
42	= IF(OR($F$93=12,$F$93=15),GOTO($F$84))
43	= IF($O$46>$O$9)
44	= ALERT("The number of tiles of the front increment must be smaller than the total number of tiles",3)
45	= GOTO($F$84)
46	= END.IF()
47	= FORMULA(Title&", MATERIAL: "&Material,!$A$2)
48	= FORMULA("=Tiles_mcr!R9C15",!$D$18)
49	= FORMULA("=Tiles_mcr!R10C15",!$C$15)
50	= FORMULA("=Tiles_mcr!R11C15",!$C$16)
51	= FORMULA("=Tiles_mcr!R12C15",!$F$15)
52	= FORMULA("=Tiles_mcr!R13C15",!$F$16)
53	= NumTiles+2
54	= SELECT("R20C4:R34C"&$F$53&",R49C4:R91C"&$F$53)
55	= FILL.RIGHT()
56	= SELECT("R96C4:R115C"&$F$53&",R120C4:R191C"&$F$53)
57	= FILL.RIGHT()
58	= NumTlup+3
59	= FORMULA.FILL("=R30C[-1]+R42C7","R30C"&$F$58&":R30C"&$F$53)
60	= CALCULATE.DOCUMENT()
61	= IF($G$36=TRUE)
62	= SELECT("R31C"&$F$53)
63	= FORMULA("=0",$F$81)
64	= FOR("Cnt",1,NumTiles)
65	= ABS(ACTIVE.CELL())
66	= ABS(OFFSET(ACTIVE.CELL(),1,0))
67	= ACTIVE.CELL()+OFFSET(ACTIVE.CELL(),1,0)
68	= $F$65+$F$66-$F$67+$F$81
69	= FORMULA("=R68C6",$F$81)
70	= SELECT(OFFSET(ACTIVE.CELL(),0,-1))
71	= NEXT()
72	= IF($F$81>0.01)
73	= ALERT("The geometry of these tiles is unacceptable because the notch crosses into the groove radius. Please check your data and enter th
74	= END.IF()
75	= END.IF()
76	= SELECT(!$A$1)
77	=END.IF()
78	=RETURN()
79	
80	Check_counter
81	=$F$68
82	
83	Show_db
84	=DIALOG.BOX(Insert_db)
85	=IF($F$84=FALSE)
86	= GOTO($F$78)
87	=ELSE()
88	= FORMULA("=R84C6",$F$93)
89	= GOTO($F$14)
90	=END.IF()
91	
92	Dialog_number

	F
93	
94	
95	
96	Goto_tile
97	=ECHO(FALSE)
98	=DIALOG.BOX(Goto_db)
99	=IF(NOT($F$98=FALSE))
100	= IF(OR($O$68>NumTiles,$O$68<0))
101	= ALERT("Incorrect tile number. Do you want to try again?",1)
102	= IF($F$101=TRUE)
103	= GOTO($F$98)
104	= ELSE()
105	= GOTO($F$121)
106	= END.IF()
107	= END.IF()
108	= IF($O$71=1)
109	= FORMULA("=20",$F$128)
110	= ELSE.IF($O$71=2)
111	= FORMULA("=49",$F$128)
112	= ELSE.IF($O$71=3)
113	= FORMULA("=96",$F$128)
114	= ELSE.IF($O$71=4)
115	= FORMULA("=120",$F$128)
116	= ELSE.IF($O$102=5)
117	= FORMULA("=141",$F$128)
118	= END.IF()
119	= SELECT("R"&$F$128&"C"&$O$68+2)
120	=END.IF()
121	=RETURN()
122	
123	
124	
125	
126	
127	Area to reach
128	=20
129	
130	
131	
132	
133	Calculate
134	=CALCULATE.DOCUMENT()
135	=RETURN()
136	
137	
138	
139	
140	
141	
142	

	G	H
1		
2		
3		
4		
5	Draw	
6		
7	Draw_Tile	
8	=ECHO(FALSE)	
9	=GET.CELL(17,I$A$1)	
10	=IF($G$9>200)	
11	= ALERT("The active window is not a worksheet! Please activate the worksheet from where I should take the dat	
12	= RETURN()	
13	=END.IF()	
14	=INPUT("Draw tile number:",1,"Draw Tile",1)	
15	=IF(NOT($G$14=FALSE))	
16	= IF(OR($G$14<0,$G$14>NumTiles))	
17	= ALERT("Incorrect tile number. Do you want to try again?",1)	
18	= IF($G$17=TRUE)	
19	= GOTO($G$14)	
20	= ELSE()	
21	= GOTO($G$33)	
22	= END.IF()	
23	= END.IF()	
24	= GET.DOCUMENT(1)	
25	= FORMULA.GOTO($G$24&"IR54C"&$G$14+2)	
26	= GET.CELL(5)	
27	= OPEN("Drawing")	
28	= GET.DOCUMENT(1)	
29	= Prepare_Drawing($G$14,$G$24,$G$28,$G$26)	
30	= Drawing(TRUE,$G$36,$G$37)	
31	= Clear_Drawing()	
32	=END.IF()	
33	=RETURN()	
34		
35	Checks for notch and groove drawing	
36	=FALSE	
37	=FALSE	
38		
39		
40		
41		
42		
43	Overlap	
44	=FORMULA("=FALSE",$G$101)	
45	=GET.CELL(17,I$A$1)	
46	=IF($G$45>200)	
47	= ALERT("The active window is not a worksheet! Please activate the worksheet from where I should take the dat	
48	= GOTO($G$93)	
49	=END.IF()	
50	=ECHO(FALSE)	
51	=GET.DOCUMENT(1)	
52	=OPEN("Drawing")	
53	=GET.DOCUMENT(1)	
54	=ACTIVATE($G$51)	
55	=IF($G$101=FALSE)	
56	= INPUT("Insert the number of the biggest tile to be drawn. Press Cancel to exit.",1,"Insert tile number",1)	
57	= IF(NOT($G$56=FALSE))	
58	= IF(OR($G$56<0,$G$56>NumTiles))	
59	= ALERT("Incorrect tile number. Do you want to try again?",1)	
60	= IF($G$59=TRUE)	
61	= GOTO($G$56)	
62	= ELSE()	
63	= GOTO($G$93)	
64	= END.IF()	
65	= END.IF()	
66	= FORMULA.GOTO($G$51&"IR54C"&$G$56+2)	
67	= GET.CELL(5)	
68	= FORMULA("=TRUE",$G$101)	
69	= Prepare_Drawing($G$56,$G$51,$G$53,$G$67)	
70	= ELSE()	
71	= GOTO($G$93)	
72	= END.IF()	
73	=ELSE()	
74	= INPUT("Insert the number of the tile to be drawn. Press Cancel to exit.",1,"Insert tile number",1)	
75	= IF(NOT($G$74=FALSE))	
76	= IF(OR($G$74<0,$G$74>NumTiles))	
77	= ALERT("Incorrect tile number. Do you want to try again?",1)	
78	= IF($G$77=TRUE)	
79	= GOTO($G$74)	
80	= ELSE()	
81	= GOTO($G$93)	
82	= END.IF()	
83	= END.IF()	
84	= ELSE()	
85	= Clear_Drawing()	
86	= GOTO($G$93)	
87	= ACTIVATE($G$53)	
88	= END.IF()	
89	= Prepare_Drawing($G$74,$G$51,$G$53,$G$67)	
90	=END.IF()	
91	=Drawing(FALSE,$G$36,$G$37)	
92	=GOTO($G$54)	

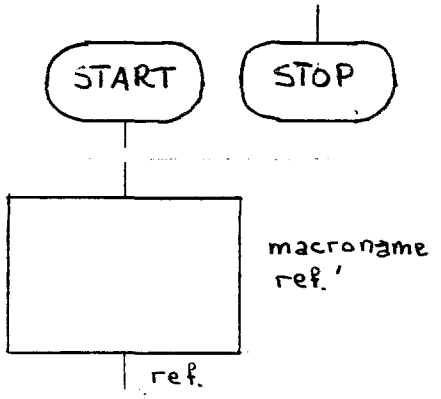
	G	H
93	=RETURN()	
94		
95		
96		
97		
98		
99		
100	insert first tile	
101	=FALSE	
102		
103		
104		
105		
106		
107		
108		

	I	J	K	L	M	N	O	P	Q
1									
2	Dialog boxes definition								
3									
4	item	x	y	width	height	text	init/result		
5									
6									
7	Tiles Layout								
8				514	391	Tiles Layout			
9	7	158	47	70		NumTiles	2		
10	8	158	87	70		X			
11	8	158	127	70		Y			
12	8	346	87	70		X step			
13	8	346	127	70		Y step			
14	5	30	50	117	25	Number of tiles			
15	5	48	90			X of first tile			
16	5	48	130			Y of first tile			
17	5	281	90			X step			
18	5	281	130			Y step			
19	5	47	170			ALL VALUES MUST BE ENTERED IN MILS.			
20	103	120	285			Notch			
21	5	258	225			Material			
22	5	25	225			Title			
23	103	310	285			Groove			
24	1	150	340	64		OK			
25	2	280	340	64		Cancel			
26	6	65	222	171		Title			
27	6	326	222	171		Material			
28									
29									
30	Notch Description								
31		70	92	635	360	Notch Description			
32	5	89	29			Width			
33	5	488	29			Depth			
34	5	409	74			Depth increment			
35	5	48	139			Initial shift			
36	5	65	199			Notch shift for front half			
37	5	6	239			Number of tiles of the increment			
38	5	379	199			Notch shift for back half			
39	1	175	300	64		OK			
40	2	390	300	64		Cancel			
41	7	144	26	60		Width			
42	7	543	26	60		Depth			
43	7	144	136	60		Initial Shift			
44	8	568	196	60		Notch shift for back half			
45	8	254	196	60		Notch shift for front half			
46	7	254	236	60		Number of tiles of the increment			
47	8	543	71	60		Depth increment			
48									
49									
50	Groove Description								
51				490	338	Groove			
52	5	60	60			Edge to groove (First Tile):			
53	5	218	60			Top			
54	5	212	95			Side			
55	5	190	130			Bottom			
56	5	60	190			Bend Radius			
57	1	150	280			OK			
58	2	290	280	64		Cancel			
59	7	255	57	85		Top			
60	7	255	92	85		Side			
61	7	255	127	85		Bottom			
62	7	160	187	85		Bend Radius			
63									
64									
65	Goto command								
66				522	291	Goto Tile			
67	5	50	55			Goto tile number:			
68	7	190	52	40		NumTile			
69	5	50	190			REMEMBER THAT ALL VALUES ARE EXPRESSED IN MILS			
70	14	275	47	180	119	Select area:			
71	11								
72	12					General Data			
73	12					Coordinate points			
74	12					Uncorrected cuts			
75	12					Corrected cuts			
76	12					Corrected Groove			
77	1	160	240	64		OK			
78	2	280	240	64		Cancel			
79									
80									
81									
82									

	R	S	T	U	V	W	X
1							
2	**Menus definition**						
3							
4	Menu/command	Names of command macr	Shortcut keys	Status bar messages	Custom help topic		
5							
6							
7	File						
8	New Worksheet	New_work	n	Creates a new worksheet			
9	-						
10	Open...	Open	o	Opens a saved worksheet			
11	Close	Close	e	Closes the active worksheet			
12	Save	Save	s	Saves the active worksheet			
13	Save As...	Save_as	h	Displays the save dialog box			
14	-						
15	Return to Excel	Excel	r	Quits the tile designing application			
16	-						
17	Quit	Exit	q	Quits Excel 3.0			
18							
19							
20							
21	Edit						
22	Undo	Undo	z	Undoes the last command			
23	-						
24	Cut	Cut	x	Removes content of selected cells			
25	Copy	Copy	c	Copies selected cells			
26	Paste	Paste	v	Pastes clipboard content			
27	-						
28	Show Clipboard	Clipboard		Shows clipboard content			
29							
30							
31							
32	Data						
33	Insert Data...	Insert_data	i	Shows dialog box to insert data			
34	Calculate Now	Calculate	l	Propagates changes throughout the document			
35	-						
36	Goto tile...	Goto_tile	g	Selects specified cell			
37							
38							
39							
40	Draw						
41	Draw Tile...	Draw_Tile	d	Draws and lets the user print a tile			
42	-						
43	Overlap Tiles...	Overlap	p	Draws a selected number of tiles one on top of the			
44							
45							
46							
47	Window						
48	Activate next	Activate	a	Activates next window			
49	-						
50	Activate next workshe	Activate_ws		Activates next worksheet			
51	Activate next drawing	Activate_dr		Activates next drawing			
52							
53							
54							
55							

How to read the flow chart

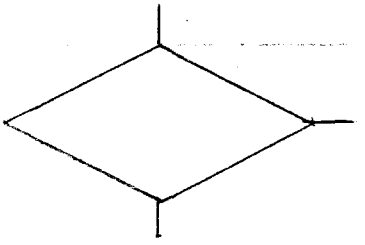
The following symbols have been used:



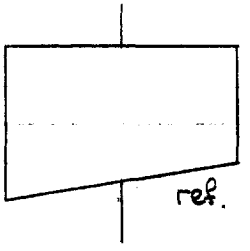
This symbol is used when the macintosh performs an action.

ref. is the line/s to whom the action is referred

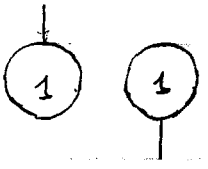
macroname ref' is the name and the reference of the macro which is eventually called



This symbol is an IF command

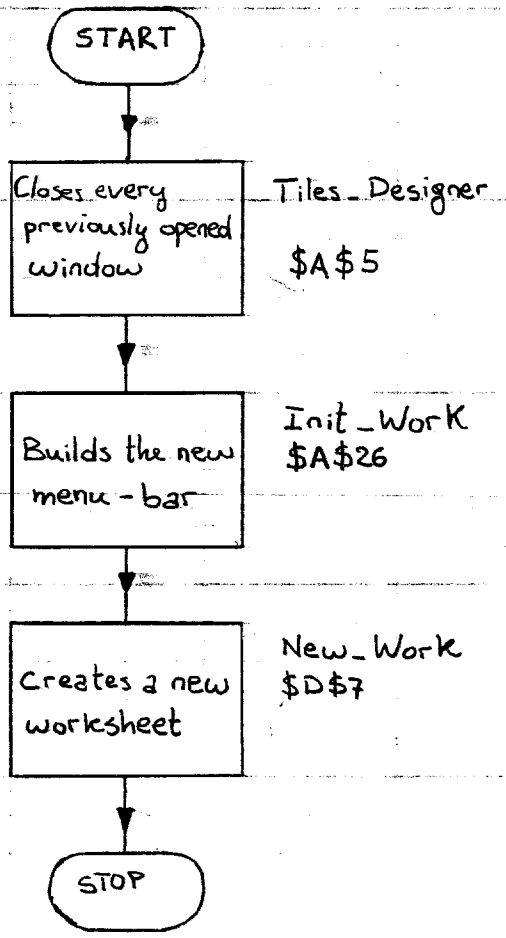


This symbol is used when the user is required to enter some information through the keyboard



These symbols are used to connect two different pages of the flow chart

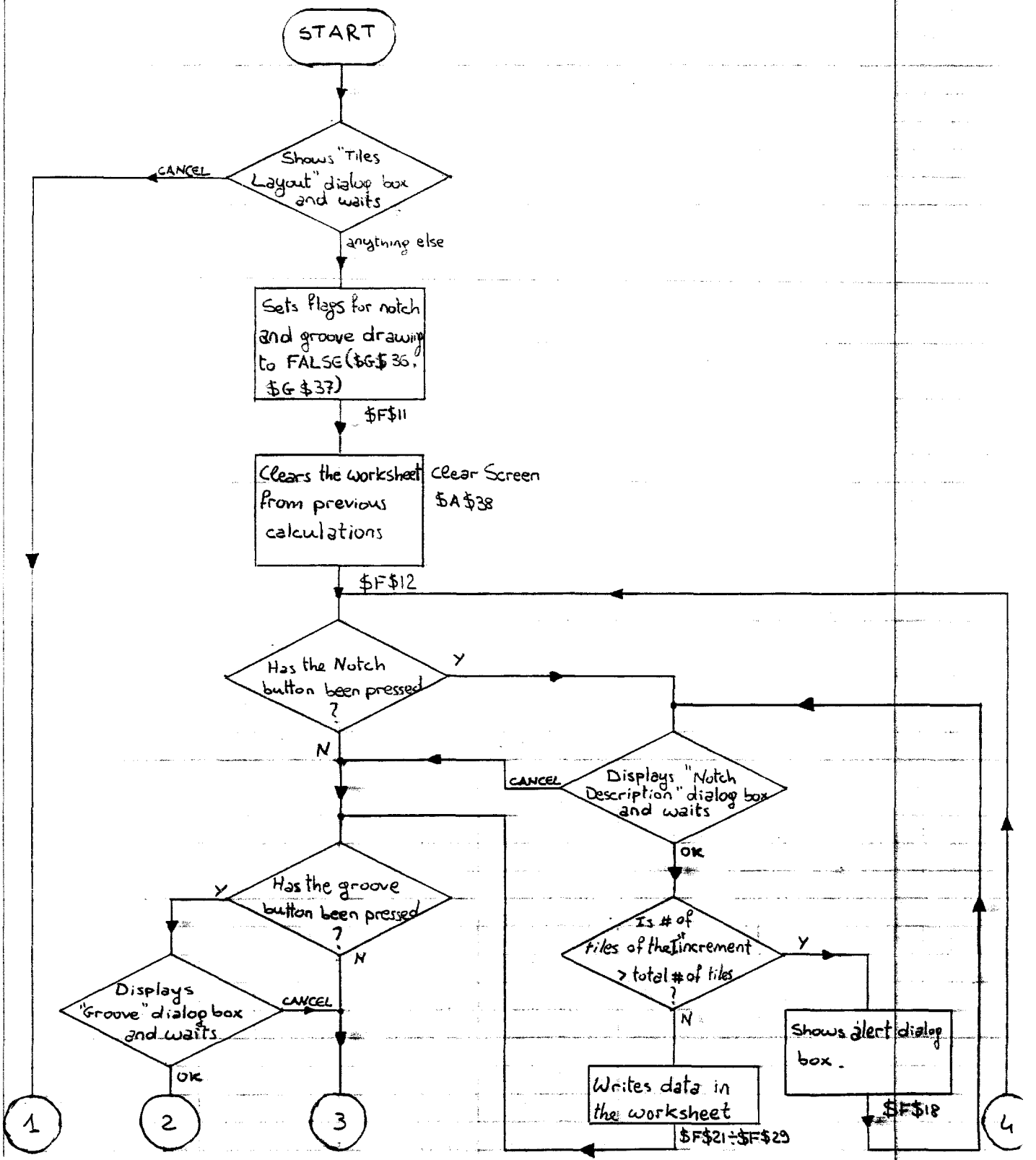
Start-Up Procedure

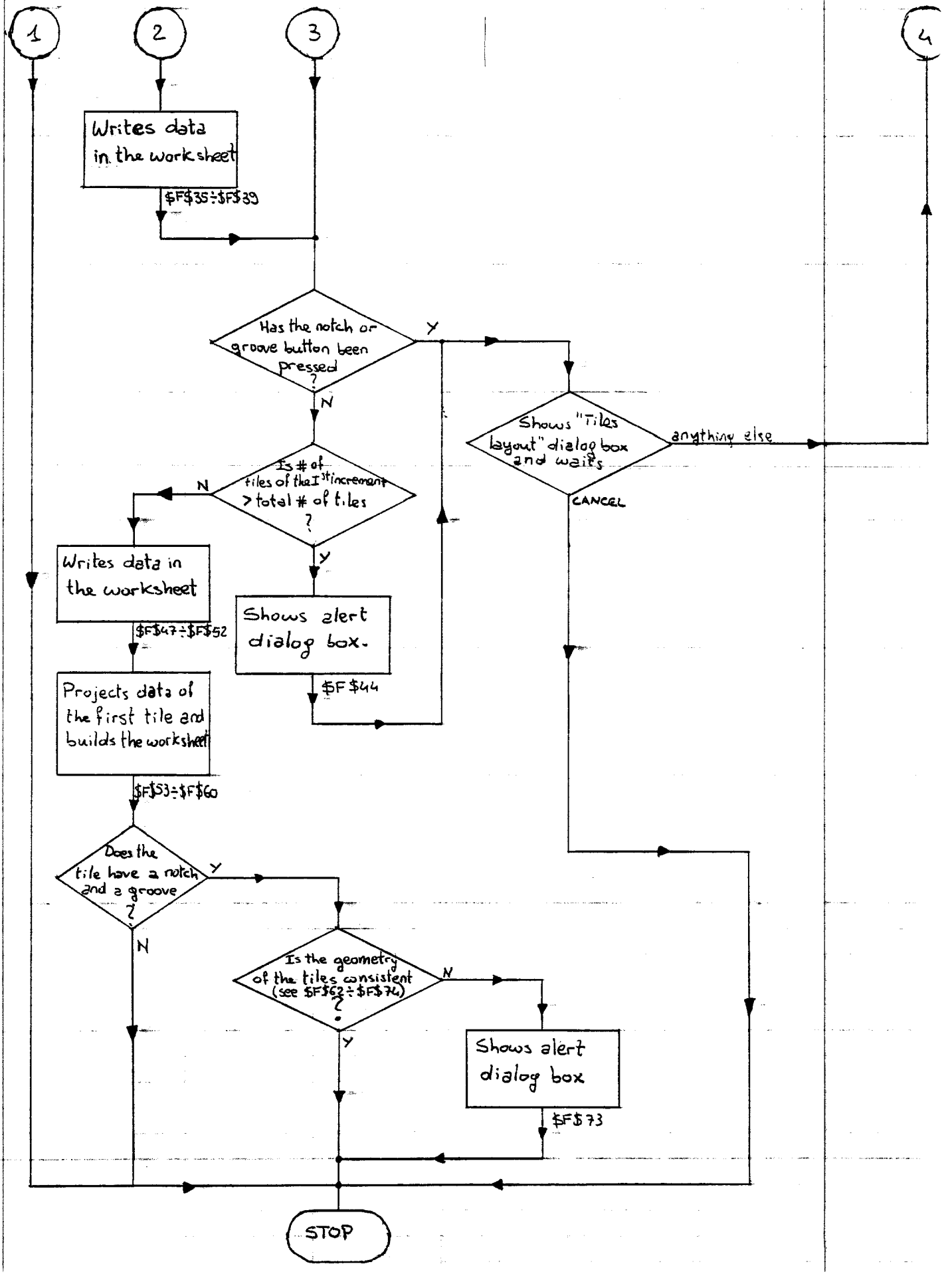


Menu : Data

Command : Insert Data...

Macro Name : Insert_data ($F$7)

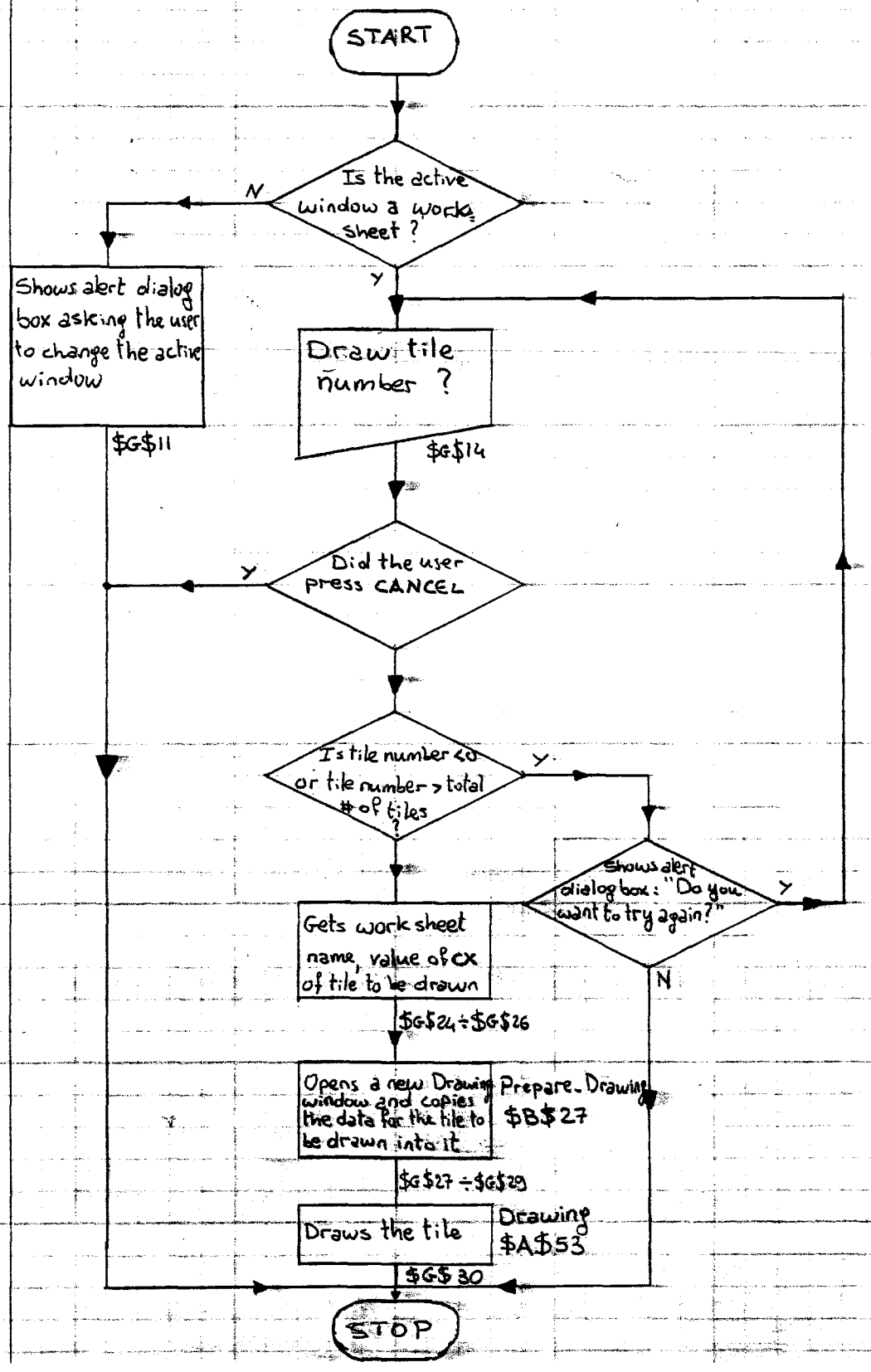



1
2
3
4
Writes data in the worksheet
$F$35÷$F$39
Has the notch or groove button been pressed ?
Y
N
Shows "Tiles layout" dialog box and waits
anything else
CANCEL
Is # of tiles of the I st increment > total # of tiles ?
N
Y
Writes data in the worksheet
$F$47÷$F$52
Shows alert dialog box.
$F$44
Projects data of the first tile and builds the worksheet
$F$53÷$F$60
Does the tile have a notch and a groove ?
Y
N
Is the geometry of the tiles consistent (see $F$62÷$F$74) ?
N
Y
Shows alert dialog box
$F$73
STOP

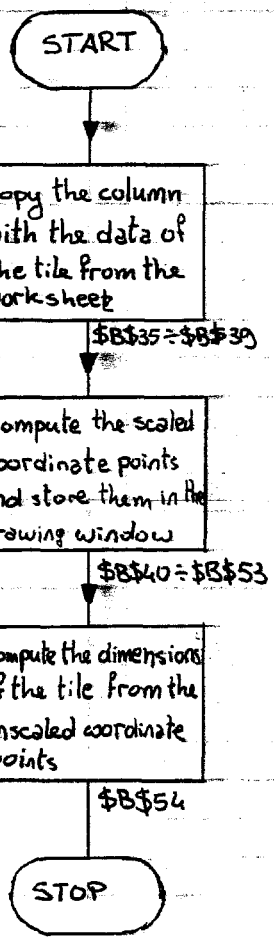
Menu: Draw

Command: Draw Tile...

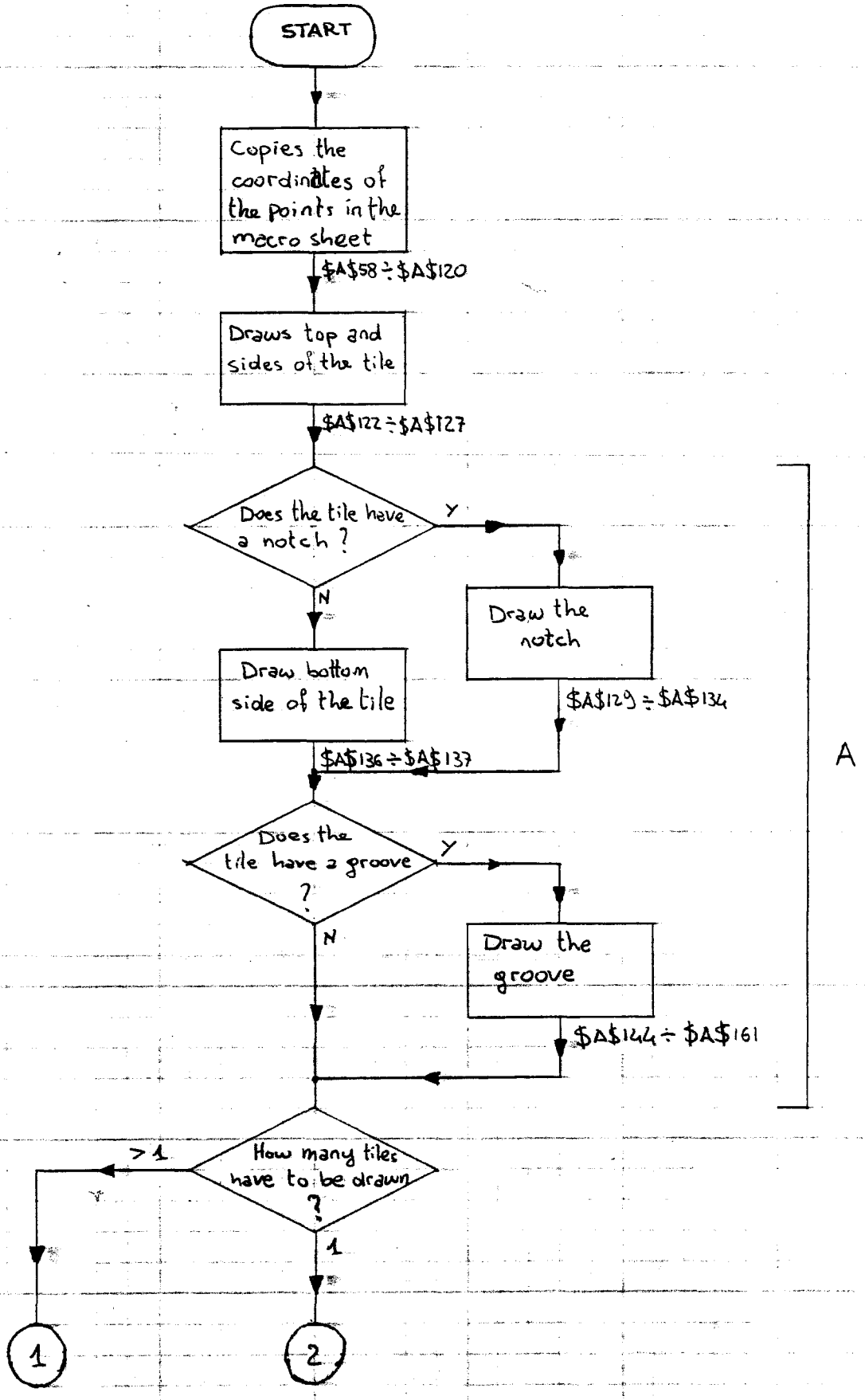
Macro Name: Draw_Tile ($G$7)

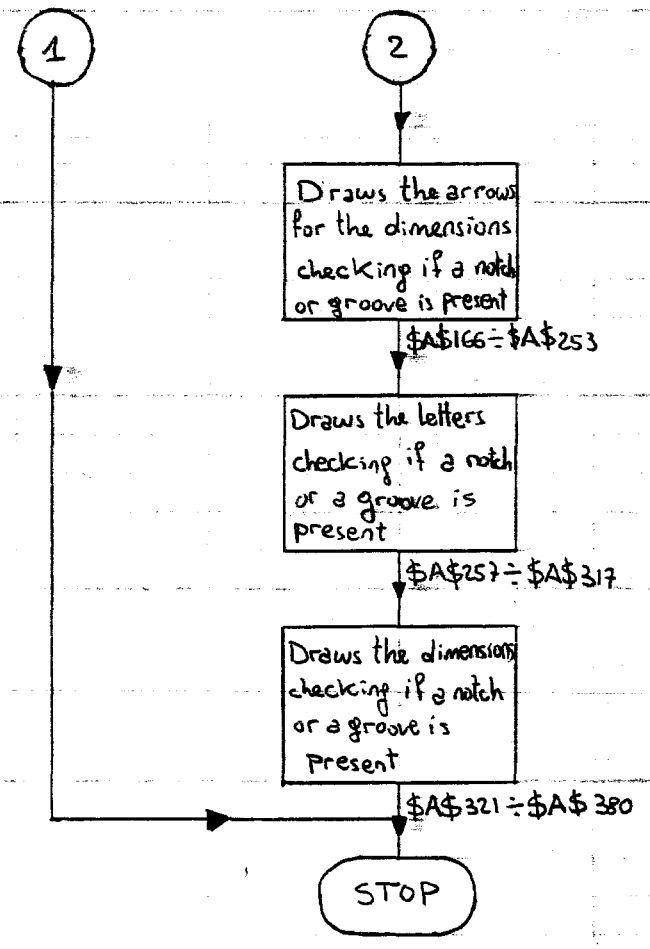


Macro Name : Prepare_Drawing $B$27



Macro Name: Drawing $A$53





Each of these actions is structured exactly as the block A on the previous page