

1. WinCircuit 2008

1.1. Instruction manual



WinCircuit is a design software of printed circuits doubles layers with automatic routing for crossing components and CMS.

© Alain MICHEL 2008

2. Tools



2.1. Tools bar

The principal window has two toolbars, one located in the lower part gathers the drawing tools, the other located in the upper part gathers the orders of management.

Tools bar of management (in top) has the following buttons:



- Tools of files
- Printing
- Selection zone
- Edition of an element
- Total delete
- Aligement of text
- Font
- Centering
- Alignment of text
- Undo, redo
- Zoom
- Help

The icon of a circuit posts the selected layer: in green and red, the **layer coppers**  and in blue and black, it **layer components** . The bar of space makes it possible to select the layer.

The window of text in bottom on the right indicates the **relative position** of the mouse since the last click (position of restocircle), which makes it possible to make measurements of sizes between the two positions, it indicates the **absolute position** of the mouse, the zero being located at the center of the window of image.

You pouver to choose the units in 1/10 inches which give 1 per 2,54 mm (menu Affichage).

Tools bar of drawing (in bottom) has the following buttons:



- Pads round
- Square pad
- Track
- Rectangular surface
- Triangular surface
- Text
- Line
- Circle
- Rectangle
- Rectangular edge
- Triangular edge
- Polygonal edge

The tools pads round, square pad, track are adjustable in sizes by a click selected right button of the mouse on the icon. A window of sizes opens and allows, using scroll bars to regulate the sizes of the tool.

Tools bar the lower includes/understands tools of routing and display:



- Connections
- Routing
- Display 2D
- Display 3D
- Scroll bar sizes in edition

A third tools bar located on the right-sided is intended for the components, it has the icons following:



- Components DIL and PLCC, integrated circuits or switches, arrows and CMS
- Crossing transistors, LED and CMS
- Crossing resistors and CMS
- Ceramic, plastic capacitors
- Diodes
- Axial chemical capacitors
- Coils
- Radial chemical capacitors
- Adjustable resistors or capacitors
- Vertical radiators
- Horizontal radiators
- Connectors
- SubD connectors
- Quartz
- Buttons

3. Placement

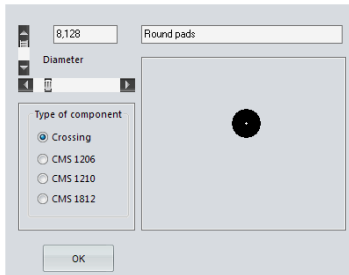
3.1. Placement of round or square pad of adjustable size



Button of placement of round pad



Button of placement of square pad



Fenestrate display of the size of the pad

Choice of the size of the pad by horizontal scroll bar

The two shapes of pad are possible, a round form and a square form. The selection is made by the choice between two buttons.

The placement of a pad is carried out by a click left button of the mouse in the window of work to the position of the point of the arrow of the mouse.

The pad is placed at the step of the grid on the point nearest to the grid. The step of the grid is modifiable in the menu grid.

The choice of the diameter or with dimensions of the pad is accessible while clicking with the right button from the mouse on this same button. A window "Sizes" opens and the choice of the diameter is carried out by the horizontal scroll bar of this window. With the top of the scroll bar, the diameter is displayed in a zone of text and the sight of the pad appears in the zone image.

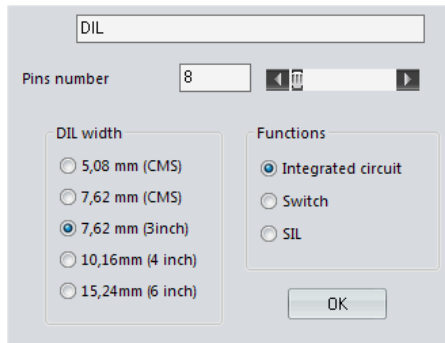
The units are into 1/10 of inch or mm following the selection made in the menu display.

The scroll bar located in bottom on the right of the principal window also makes it possible to change the sizes of a pad.

3.2. Placement of circuit SIL, or PLCC with adjustable number of pins



Button of placement of circuit SIL, DIL, PLCC.



Choice of the number of pads of the SIL, DIL, PLCC by the horizontal scroll bar.

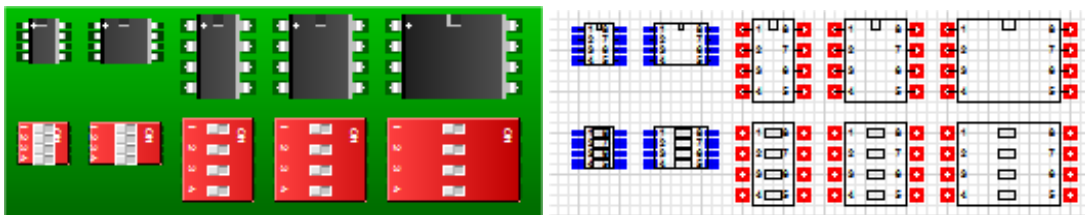
Choice of the width of the DIL, PLCC or switch by buttons of options

The placement of a circuit is carried out by a click left button of the mouse in the window of work to the position of the scroll bar. **Rotation** by angle of 90° of the circuit is carried out using the arrows of the keyboard.

The choice of the number of pads of the circuit is accessible while clicking with the right button from the mouse on this same button traced SIL, DIL or PLCC. A window "Sizes" opens and the choice of the number of pins is carried out by the horizontal scroll bar of this window. With the top of the scroll bar, the number of pads is displayed in a zone of text. From 44 pins, the print of the circuit passes in PLCC (**Side Plastic Chip Carrier**)

The width of the DIL is sélectionnable of 5,08 mm to 15,24 mm as well as the crossing type or CMS.

The numbers of the pins are displayed, which makes easier to trace it connections (netlist). It should be noted that the numbers of pins are reversed with regard to DIL CMS placed side coppers (seen in transparency with dimensions components).



Seen various possibilities of the DIL knowing that the possible number of pins is from 2 to 42 as well as the orientation of 0,90,180,270° by the arrows of the keyboard. To suffer from 44 pins, case DIL passes out of case PLCC.

It is possible to publish a component DIL already placed while choosing the tool arrow and while clicking on the component. You can then change the number of pins, move or make a rotation of the DIL (arrows of the keyboard).

The scroll bar located in bottom on the right of the principal window also makes it possible to change the number of pins of a circuit DIL or PLCC into edition.

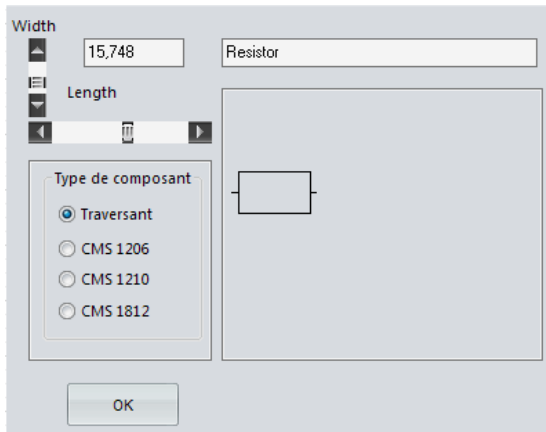


Example of a circuit PLCC

3.3. Placement of components at axial exits of adjustable size



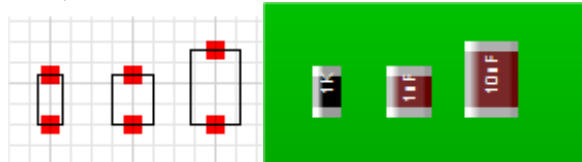
Button of placement of resistor, diode, axial capacitor (electrochemical) or coil



The Alignment of the scroll bar the scroll bar horizontal the choice length allows component.

The Alignment of the scroll bar of the scroll bar vertical the choice height allows of component.

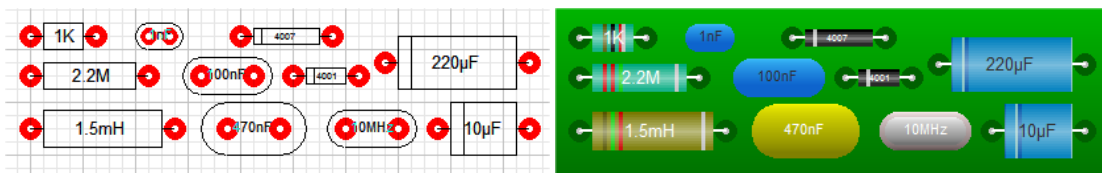
A zone of text posts the height of the component. The buttons of options allow the choice between the crossing components and three type of case CMS: 1206,1210 and 1812.



The placement of a resistor or a capacitor at axial exits is carried out by a click left button of the mouse on the window of work to the position of the scroll bar. An end of the component follows the position of the mouse. **The rotation** of the component is possible by the arrows of the keyboard.

The choice of the width and height is selected by the scroll bars horizontal and vertical located in the window "Sizes" accessible by a click from the right button of the mouse on the selected button. In this way, all the sizes of resistors or capacitors axial are possible. Beside the scroll bars, the size is displayed in a zone of text. Two pads of 2mm are placed automatically at the ends of wire.

The length of wire is modifiable in menu the options.

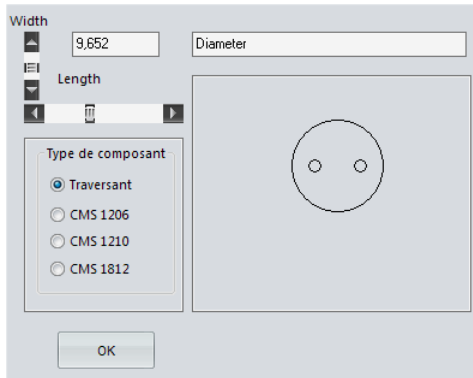


Example of crossing components knowing that their orientation is possible of 0,90,180,270°par the arrows of the keyboard.

3.4. Placement of capacitor at radial exits of adjustable size



Button of placement of radial capacitors (ceramics, plastic), of quartz and radial electrochemical capacitors.



The Aligement of the scroll bar the horizontal scroll bar the choice length of the component allows.

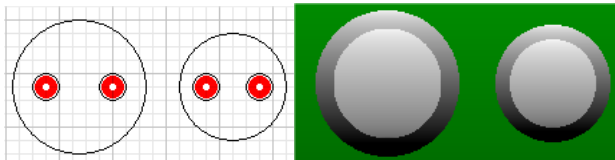
The Aligement of the scroll bar of the vertical scroll bar the choice height of the component allows.

A zone of text posts the height of the component.

The placement of this component is carried out by a click left button of the mouse in the window of work to the position of the scroll bar.

The beginning of the component is placed on the point nearest to the grid. **The rotation** of the symbol by step of 90° is possible by the arrows of the keyboard.

The choice of the width and height is selected by the scroll bars horizontal and vertical located in the window "Sizes" accessible by a click from the right button of the mouse on the selected condensing button. In this way, all the sizes of capacitors are possible. Beside the scroll bars, the sizes are displayed by a zone of text. Two pads of 2mm are placed automatically at the ends of wire.



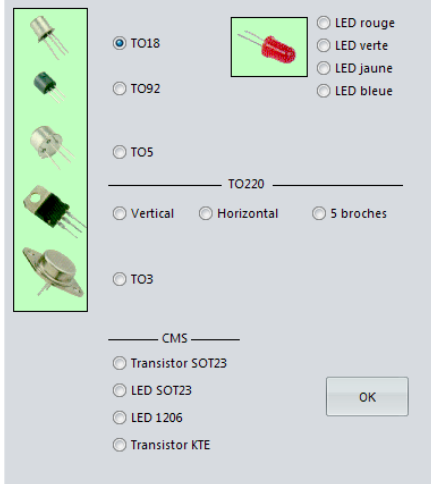
Example of radial capacitors.

3.5. Placement of transistor



Button of placement of transistors or LED

While clicking with the right button of the mouse on the button selected transistor, a window opens and allows the choice of the type of transistors. Various types of cases of transistors are available as well as a case of LED with a choice of 4 colors. Cases CMS (assembly on the surface) such as SOT23, 1206, KTE are also present.

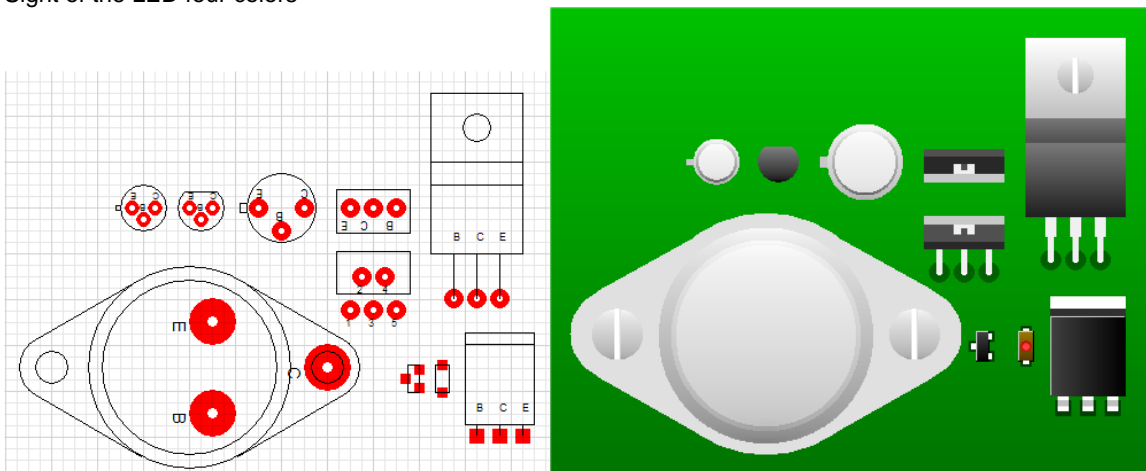


The placement of this component is carried out by a click left button of the mouse in the window of work to the position of the scroll bar. The component is traced with its serigraphy and three pads (two for the LED) of 1,27mm by default for cases TO18, TO92, LED and TO5 or 2mm by default for to220 and 5mm by default for cases TO3.

The center of the component is placed on the point nearest to the grid. **The rotation** of the symbol by step of 90° is possible by the arrows of the keyboard.



Sight of the LED four colors



Examples of transistors seen in 2D and 3D knowing that the orientation is possible of 0,90,180,270°.

3.6. *Placement of horizontal or vertical radiator*



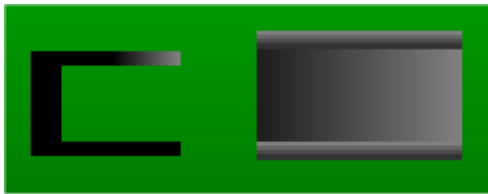
Button of placement of vertical radiator (upright)



Button of placement of horizontal radiator (flat)

The placement of a radiator is carried out like a rectangle, while pressing on the left button of the mouse on the window of work to the position of the beginning of the radiator. While leaving supported the button, the pulling of the radiator is carried out until the relaxation of the button which marks its end. The radiator is placed at the step of the grid.

The number of wings is calculated according to the size of the radiator.



3.7. Placement of connectors



Button of placement of connectors

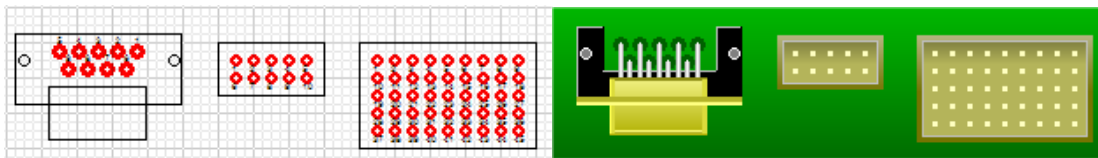
This button allows the placement of connector the multiple step of 2,54mm per default. The choice of the number of pins depends on the size on the rectangle that you to draw, this number is indicated at the time of the tracing in the window of text located in bottom of the sheet. A click of the right button of the mouse opens a control panel of the distance between the pins.

In edition, the orientation of the connector is carried out by the arrows of the keyboard.

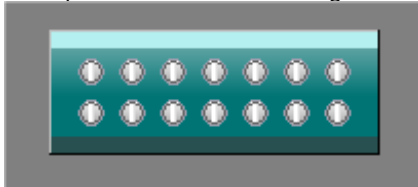


Button of placement of SubD connectors

This button allows the placement of SubD connector. If you click with the right button on this icon selected, a window opens allowing you the choice between 3 connectors, 9,15 or 25 pins.



Example of connectors knowing that rotation is possible of 0,90,180,270°.



Example of connector to the step of 5,08mm

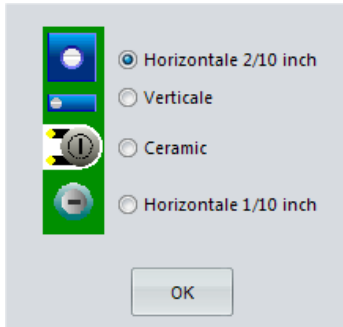
3.8. *Placement of horizontal or vertical adjustable resistor*



Button of placement of adjustable resistor

The placement of an adjustable resistor is carried out while clicking on the left button with the selected position of the mouse on the window of work. The adjustable resistor is placed with the step of the grid. The orientation of the resistor is carried out by the arrows of the keyboard.

The component is traced with its serigraphy and three pads of 1,27mm by default.



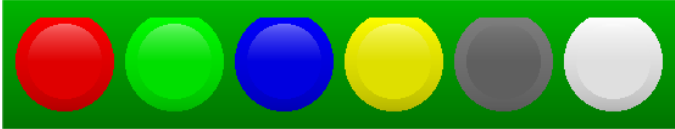
Four types of adjustable resistors are possible, horizontal (flat), vertical (upright) with the steps of 5,08mm, ceramics and horizontal with the step of 2,54mm, this last choice is also usable for the adjustable capacitors. The choice is carried out while clicking with the right button of the mouse on the button adjustable resistor selected. A window opens and four buttons radios make it possible to make the selection.

3.9. Placement of buttons 4 pins to the step of 5,08mm



Button of placement of buttons

This button allows the placement of buttons the step of 5,08mm. a click of the right button of the mouse opens a control panel of the color of the button. Six colors are available: red, green, blue, yellow, black and white. In edition and placement, the orientation of the button is carried out by the arrows of the keyboard.



Sight of the buttons in 3D

3.10. Placement of Horizontal or vertical text



Selector button of writing of text.



Button of opening of the window of the font of the text.

The characters are placed at the position of the scroll bar of the mouse. The text moves in transparency with the mouse. The end of the text input to the keyboard is validated by a click left button of the mouse.

The writing in the 4 directions is possible, the choice is carried out by the arrows of the keyboard.

The edition of the text already placed is possible by selecting the tool arrow (edition) and while clicking on the text to publish. The size, the placement and the correction of the text are possible

A click on the button choice of font opens the window of selection of the font of Windows and posts the font, the sizes and the styles available (TrueType characters only).

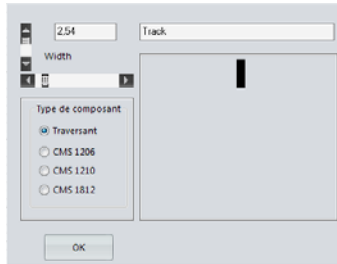


4. Drawing

4.1. Drawing of track adjustable width



Traced button of track



Choice of the width of the track by the horizontal scroll bar

The layout of a track is carried out while pressing on the left button of the mouse in the window of work to the position of the beginning of the track and while leaving supported the button, the pulling of the track is carried out until the relaxation of the button which marks its end. The track is placed at the step of the grid.

The choice of the width of the track is accessible while clicking with the right button from the mouse on this same traced button of track. A window "Sizes" opens and the choice of the width is carried out by the horizontal scroll bar of this window. With the top of the scroll bar, the width is displayed in a zone of text and the sight of the track appears in the zone image.

The units are in inch or mm following the selection made in the menu display

The scroll bar located in bottom on the right of the principal window also makes it possible to change the width of a track.

4.2. *Drawing Triangular surface*



Traced button of triangular surface.

The placement of a surface is carried out as the track, while pressing on the left button of the mouse on the window of work to the position of the top of the triangle. While leaving supported the button, the pulling of triangular surface is carried out until the relaxation of the button. If you draw to the bottom, the top of the triangle will be in top, if you draw to the top, the top will be in bottom, if you draw towards the line the top will be on the left, and vice versa if you draw towards the left.

Only the right-angled triangle is possible, to carry out another type of triangle, to join two triangles.

Triangular surface is placed at the step of the grid. The step is modifiable in the menu grid.

4.3. *Drawing rectangular surface*



Traced button of surface.

The placement of a surface is carried out as the track, while pressing on the left button of the mouse on the window of work to the position of the beginning of surface. While leaving supported the button, the pulling of surface is carried out until the relaxation of the button.

Surface is placed at the step of the grid. The step is modifiable in the menu grid.

4.4. *Drawing line*



Button traced line of serigraphy, not to confuse with a track.

The layout of a line is carried out like drawing it of a track, while pressing on the left button of the mouse on the window of work to the position of the beginning of the track. While leaving supported the button, the pulling of the line is carried out until the relaxation of the button.

The line is placed at the step of the grid. The width of the line is not modifiable.

4.5. *Drawing circle*



Traced button of circle of serigraphy

The layout of a circle is carried out by a support on the left button of the mouse on the window of work to the position of the center of the circle. While leaving supported the button, the pulling of the circle is carried out until the relaxation of the button. The center of the circle is placed at the step of the grid. The radius of the circle stops on a point of the grid.

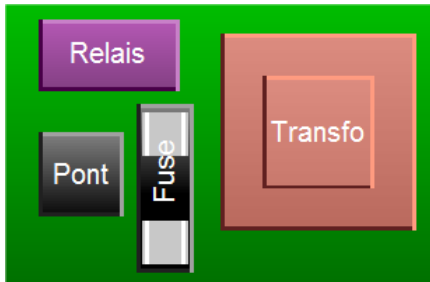
In mode display 3D, the circles of diameter 2,54mm will be represented like clamp holes.

4.6. Drawing rectangle



Traced button of rectangle of serigraphy

The placement of a rectangle is carried out while pressing on the left button of the mouse on the window of work to the position of the beginning of the rectangle. While leaving supported the button, the pulling of the rectangle is carried out until the relaxation of the button which marks its end. The rectangle is placed at the step of the grid.



It is also possible to represent in 3D the relays, transformers, transformer HF, carries fusible and bridge of diodes by registecircle in the rectangle the name of the quoted components.

4.7. *Drawing edge*



Buttons traced edge

Three types of edge are available, rectangular, circular or polygonal. You can place several edges. They appear green color.

5. Arrangement

5.1. Centering of the drawing of the circuit



Button of centering of the circuit in progress.

To move the circuit in the window, there exist three possibilities, the first with the scroll bars located on the edges of the window, the second with this button and the third with the function “to move” menu zone. When this button is selected, a click at the place chosen on the circuit places this place in the center of the window.

5.2. Selection of zone



Selector button of a zone.

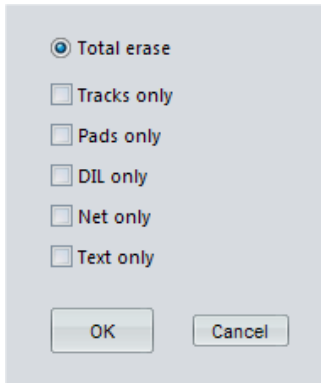
The selection of a zone is carried out while pressing on the left button of the mouse on the window of work to the position of the beginning of the selection box. While leaving supported the button, the pulling of the rectangle is carried out until the relaxation of the button which marks its end. The rectangle appears in dotted lines. The selection of a zone is associated with menu "the Zone".

5.3. Delete



Selector button of the tool for delete of the circuit.

The tool for delete makes open a window of validation of the delete. The delete can be partial (tracks, pads, connections, the text or circuits only) or total. The choice is carried out by a click on the buttons radios.



A dialog box with a light gray background. It contains a list of radio buttons for selecting deletion options. The first option, 'Total erase', is selected with a blue dot. Below it are five unselected checkbox options: 'Tracks only', 'Pads only', 'DIL only', 'Net only', and 'Text only'. At the bottom of the dialog are two buttons: 'OK' on the left and 'Cancel' on the right.

- Total erase
- Tracks only
- Pads only
- DIL only
- Net only
- Text only

OK Cancel

6. Management

6.1. Tools of files

The tools of files are repeated in a pull-down menu. This last lays out in addition to one order record-**under** which requires the name of the file.



Button of opening of files.



Button of saving of the file.

Opening of files

A click of the left button of the mouse opens the selector of files of Windows. After selection and validation by OK, the drawing of the circuit is charged and appears in the window of work.

The way of the open file is to add to the menu, one can thus add five ways and the recall of one of the files is carried out while clicking on its way.

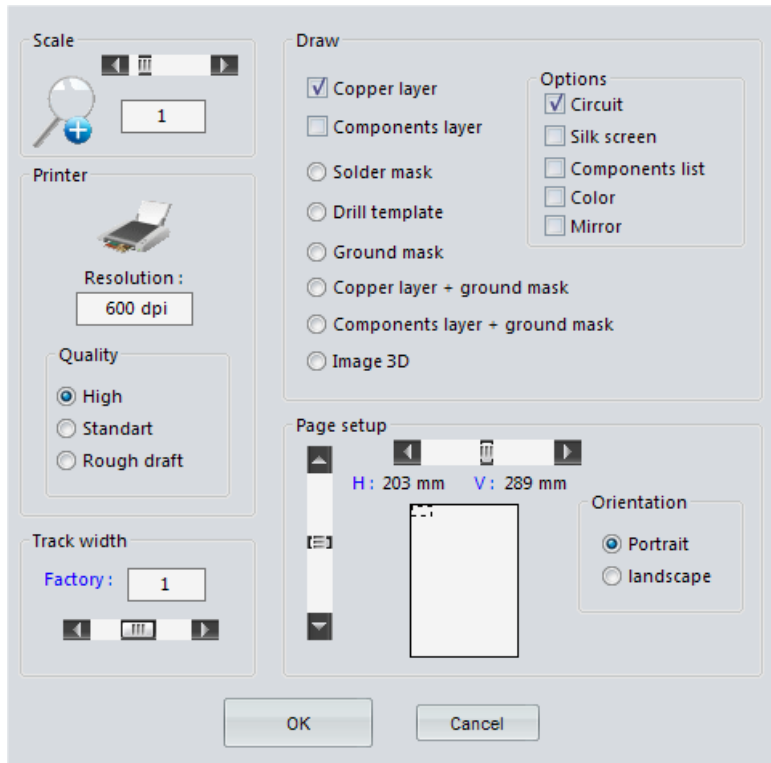
Saving of files

Record the drawing of the circuit in progress under the name chosen by the order Record-under. If no name were chosen by saving under, the name by default is circuit1.ci. The file is recorded in the form of ASCII characters, one can thus read again it using the memo pad of Windows and modify it.

6.2. Printing



Button of opening of a window of dialog of Printing.



Scale

The horizontal scroll bar regulates the scale to which will be plotted the drawings selected within the framework "tracing". The maximum scale is of 4 and the scale minimum of 1. If you have a photocopier, it is preferable to print with a scale higher than 1 in order to make a reduction on a transparency which will be your offset film.

Orientation

Two buttons radios located within the framework orientation make it possible to choose the format portrait or landscape of paper.

Quality

Three buttons radios located within the framework quality make it possible to choose the quality of the Printing. It is noted qu`in quality draft, the text will be replaced by white rectangles.

Tracing

Notched **circuit** allows the exit of one of the layers of the circuit. If serigraphy is notched, the two layers are printed one on the other.

Screen print notched allows the Printing of the two layers and serigraphy (documentation).

List components notched leaves a list the texts of the circuit and makes a sorting by counting the identical texts.

Notched **color** can be used to carry out a documentation on your circuit, the two layers will be quite visible, one in red, the other in blue.

Notched **mirror** produces a reversed tracing right/left.

Layer coppers notched will print only the layer "coppers".

Notched **layer composing** will print only the layer "component".

Layer coppers + plane of notched **mass** will print only the layer "coppers" with a plan of mass integrated.

Layer composing + plane of notched **mass** will print only the layer "composing" with a plan of mass integrated.

Solder resist notched will only print solder resist.

Plan of notched **drilling** will print only the plan of drilling. This plan can be used to make numerical statements used for a numerical drilling machine.

Plan of mass notched will print only the plan of mass.

3D image notched will print a standard image 3D synthesized image of the circuit. You will then have a sight closer to reality of the circuit.

Page layout

Two scroll bars make it possible to move space to be printed and thus to center its drawing. Of return to the workspace the drawing will not be moved.

Space to be printed is calculated according to the format of the page.

Button **OK** validates the Printing and the button **to cancel** cancels it.

Width of the tracks

A scroll bar makes it possible to change the width of the whole of the tracks. The displayed value is a multiplying factor, for a value of 0,5 the widths will be divided by 2 and for a value of 2 the widths will be multiplied by 2. The default value is 1.

Important

To carry out a printed circuit of good quality, it is necessary that the ink of transparency is in contact with the layer coppers to insulate. In the contrary case, UV are diffracted by the layer of plastic and the result is a fuzzy circuit which could be unusable.

For the drawn circuits seen of top; the Printing of the layer copper will be printed in "**normal**" mode and the layer components in mode "**mirror**".

6.3. Menu Zone

To move when it is notched, the selector button of zone (arrow) takes the function to moving of zone. After having selected a zone, to click again in the zone while letting support and move the mouse until the new site.

To copy when it is notched, the selector button of zone (arrow) takes the function of copy of zone. After having selected a zone, to click again in the zone while letting support and move the mouse until the new site of the copy.

To cross when it is notched, the selector button of zone (arrow) takes the function of delete of zone. After having selected a zone, to press on the key “**Suppr**” to erase the zone.

To record when it is notched, the selector button of zone (arrow) takes the function of saving of zone. After having selected a zone, a window of selection of file opens and makes it possible to enter the name of the file of the zone. This order is very useful to constitute a library of component or part of circuit.

To add when it is notched, the selector button of zone (arrow) takes the function of addition of zone. After having clicked a site of the zone to be charged, a window of selection of file opens and makes it possible to choose a file recorded with the preceding order.

Rotation when it is notched, the selector button of zone (arrow) takes the function of rotation of zone. The selected zone turns of 90° in the direction of the needles of a watch.

Horizontal symmetry when it is notched, the selector button of zone (arrow) takes the function of horizontal symmetry. The selected zone is reversed in the horizontal direction. The text on the other hand is not symétrisable,

Vertical symmetry when it is notched, the selector button of zone (arrow) takes the function of vertical symmetry. The selected zone is reversed in the vertical direction. The text on the other hand is not symétrisable,

Font when it is notched, the selector button of zone (arrow) takes the function of font change of the characters of the selected zone.

Pads when it is notched, the selector button of zone (arrow) takes the function of change of size of the pads of the selected zone.

Tracks when it is notched, the selector button of zone (arrow) takes the function of change of width of the tracks of the selected zone.

Zoom when it is notched, the selector button of zone (arrow) takes the function of zoom. A zoom is produced on the selected zone.

Zoom 1 when it is notched, the zoom is brought back to 1.

6.4. Menu Grid

The grid is obligatory and allows placed objects with attraction on the step of the grid. Three steps are possible: 2,54 mm, 1,27 mm or 0,254 Misters C' are the step of 1,27 mm which is chosen by default with starting or the step recorded in Circuit8.ini. The grid with the step of 0,254mm is traced only in the case of a zoom>4.

6.5. Menu display

1/10 selected **inch** gives the values of sizes and of Alignements in 1/10 of inch is 1 = 2,54 Misters.

Millimetres selected gives the values of sizes and of Alignements in millimetres = 1/10 inch is 2,54 mm.

Layer coppers selected posts the layer "coppers (red color)" and screen prints it.

Layer composing selected posts the layer "components (blue color)" and screen prints it.

Layer coppers and composing selected posts the two layers and serigraphy.

Layer coppers + plane of mass selected posts the layer "coppers" with a plan of mass integrated. Insulation between the tracks, pads and plan of mass is adjustable on the right using the horizontal scroll bar located in bottom of the principal window. This plan of mass is connected to no pad.

Layer composing + plane of mass selected posts the layer "composing" with a plan of mass integrated. Insulation between the tracks, pads and plan of mass is adjustable on the right using the horizontal scroll bar located in bottom of the principal window. This plan of mass is connected to no pad.

Connections (NetList) selected posts the connections which will be routées (green color) or after a routing, the connections which could not be routées (red color).

Screen print selected posts only serigraphy.

Plan of mass selected posts a plan of mass calculated which is negative pads. It is thus different from the plan of mass indicated previously and constitutes an additional layer. In red, the plan of mass can receive pads makes some stop the holes which are pads connected to the mass. To choose in this case of the pads whose diameter is higher than the bore.

Solder resist selected one posts solder resist calculated which is negative pads. That can be useful if you make carry out your printed circuit by a professional.

Plan of drilling selected posts a plan of calculated drilling. Each hole is displayed by a cross in X of size proportional to the diameter of the pads. The crosses of the DIL are +. That can be useful if you make carry out your printed circuit by a professional who uses a numerical drilling machine. If it is the case, not to forget to indicate the bore.

6.6. *Alignment of the text*



Button of alignment of the text

The text placed near the components is recognized and regarded as the value of these components, for example the text written on a resistor will make it possible the tracing in 3D to define the colors of the circles of the resistor. This button allows an alignment of the text for a better presentation. The text will be always centered and placed at the same position compared to the component. It should be noted that this button has also as a function to validate the rectangular name of component like transformer, relay, bridge of diodes, carries fusible.

6.7. *To cancel, restore*



Buttons to cancel to restore

These two buttons allow is to cancel an action or to restore it if it were cancelled and this for 9 actions. These functions are very useful if an erroneous action were carried out.

6.8. Zoom



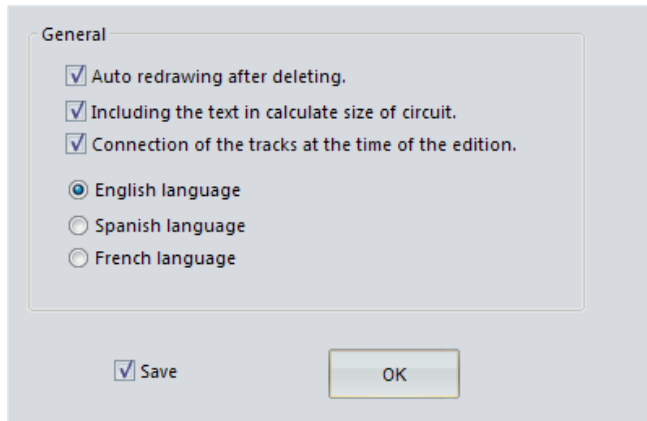
Buttons of modification of zoom and display.

A click on the button of left increases the value of the zoom and a click on the button of right-hand side decreases it. The maximum value is of 5, the value minimum is of 0,5.

An additional function of zoom exists in menu the zone.

6.9. Menu options

Preferences selected posts a dialog box including/understanding of the check boxes.



The first box determines if a retraçage is carried out after delete of an object or selection of a new tool.

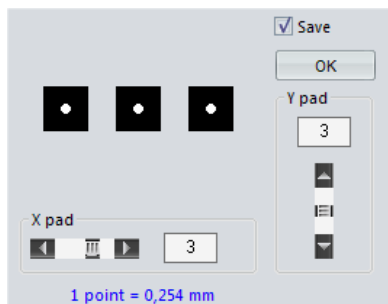
The second box determines if the text is included in the automatic calculation of edges or the surface of the circuit.

The third box determines if the segment of a track in edition (to moving) involves to moving it following segment of this same track.

The Options box allows the choice of the language.

The box to record makes it possible to safeguard the parameters in *Circuit8.ini*.

Selected **Pastilles DIL** posts a box of selection of the size of the pads of a circuit DIL. The first pad is it also modifiable. The latter is round to be easily recognizable. The box to record makes it possible to safeguard the parameters in *Circuit8.ini*.



Component wire selected posts a box of selection length of wire of the components. The value is limited to +20 to -20 (in 100e of inch). A negative value posts wire towards the interior and can represent the components such as the plastic capacitors at radial exits. The box to record makes it possible to safeguard the parameter in *Circuit8.ini*.

Length of wire

3

3 (1,524mm)

5

4 (2,016mm)

Diametre of pad

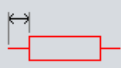
10

5 (2,54mm)

15

Save

OK



Colors selected posts a box of selection of the color of layer 1 (copper), layer 2 (components) and the color of selection of delete. The key "color" opens the window of selection of color. Selection "To record" safeguard new colors in *Circuit8.ini*.

6.10. Menu help

Help

Selected the help file opens.

In connection with


Selected, opens a window of presentation and comprises your name like your number of license.

7. Routing


7.1. Drawing connection (NetList)

(The space of routing is defined by edge of the chart. You can use edge by default which is calculated compared to the omposants placed or an edge defined by one of the three edge tools: rectangular, circular and polygonal edge.

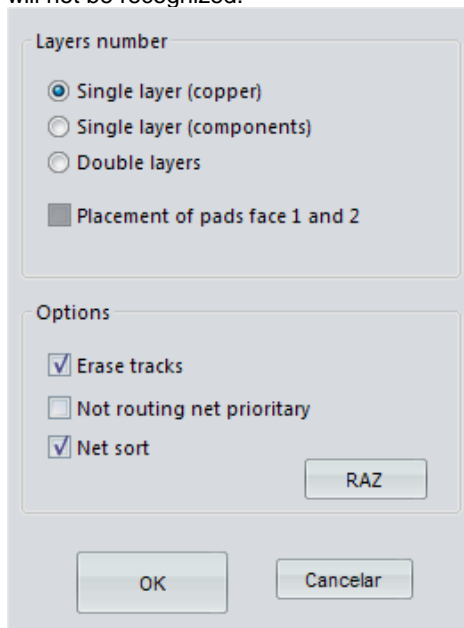
To allow an automatic routing, it is necessary to define the connections between the pads. In the jargon of the printed circuit, the term is the "NetList".

The tool of connections  makes it possible to trace a straight line between the two pads to be connected. When all the connections are traced, one obtains "Hairy what is called". Indeed, these lines which cross in all the directions make think of gotten mixed up hair.

7.2. Automatic routing

When the netlist (connections between the pads) is traced, it is enough to click now on the button of routing  to carry out alignment of the roads or tracks in an automatic way.

A dialog box opens making it possible to make the choice between a routing simple layer or double layer, the delete or not of the existing tracks, the priority or not with the tracks which were not routed previously and the sorting of the connections, shortest are routed first. The routing is not possible that with a placement of the components equal to 1,27mm or multiple of 1,27mm. To avoid placing components at the step of 0,256mm, they will not be recognized.



The dialog box is titled 'Automatic routing' and is divided into two main sections: 'Layers number' and 'Options'. In the 'Layers number' section, there are three radio buttons: 'Single layer (copper)' (selected), 'Single layer (components)', and 'Double layers'. Below these is a checkbox labeled 'Placement of pads face 1 and 2'. The 'Options' section contains three checkboxes: 'Erase tracks' (checked), 'Not routing net priority' (unchecked), and 'Net sort' (checked). At the bottom right of the 'Options' section is a button labeled 'RAZ'. At the bottom of the dialog box are two buttons: 'OK' and 'Cancel'.

The operation inevitably does not give a result equal to 100%, that depends on several parameters like complexity, space between the components, the judicious placement of those. With a little experiment one must arrive easily at 100%. If it is not the case, it is always possible to recall tracks manually.

If you choose a routing double layer, the roads located on the layer composing (in blue) will not end can be not with a pad. The program will then add automatically a pad with dimensions components. Components CMS placed layer component will be unaware of the tracks with dimensions coppers sities on same surface and vice versa. A pad will be automatically added if a track with dimensions copper arrives on a pad with dimensions composing.

If you to start again one second time the routing, the beginning and the end of each connection will be reversed, which causes a different routing and gives an additional chance to obtain with a better percentage of found roads. A third revival is identical to the first and a fourth with the second etc.

8.2. Drawing image 3D of the circuit

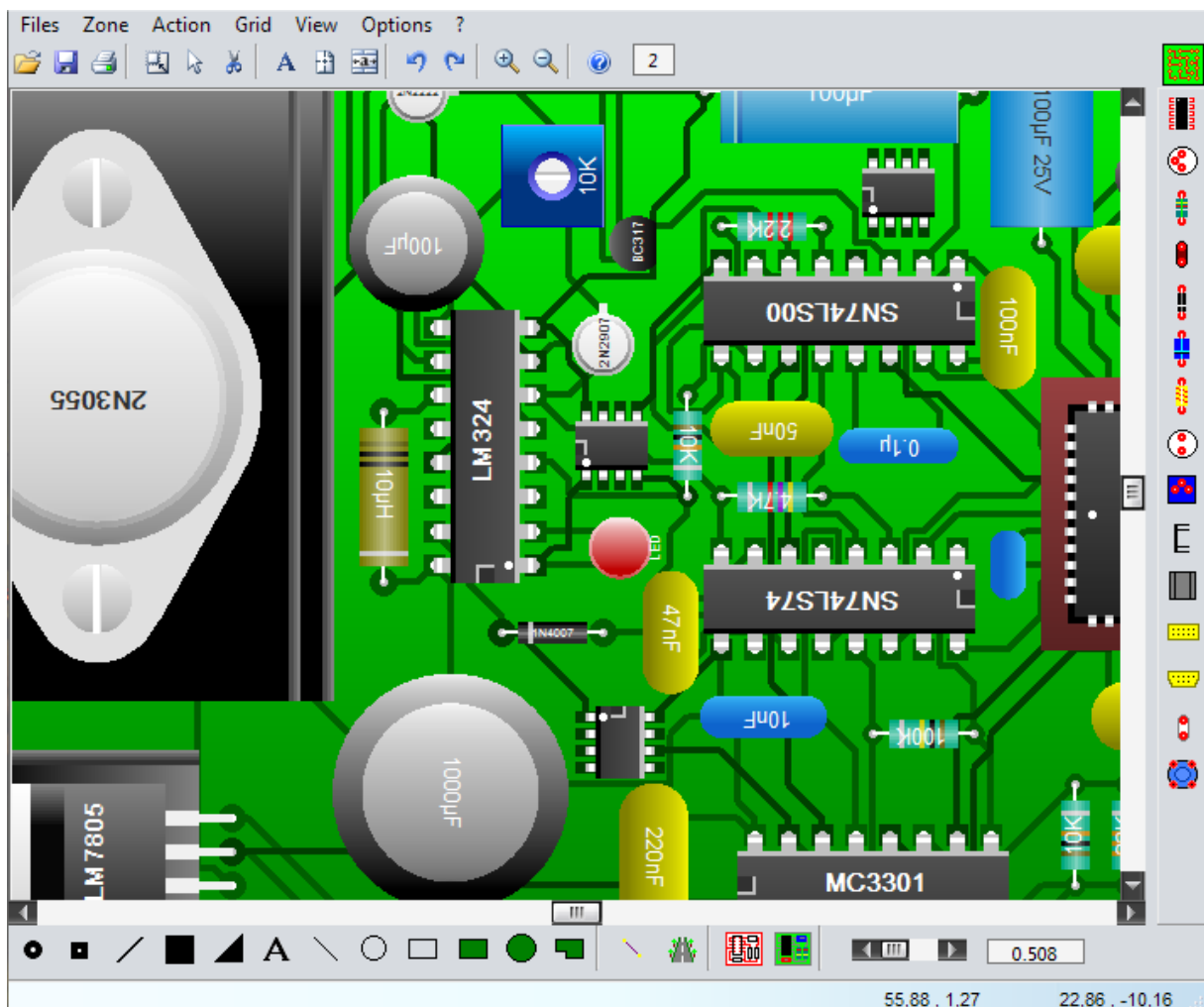


This function makes it possible to obtain a more real image of the circuit, the chart and the components are traced with effects of standard relief synthesized image. The choice of the components is then important if one wants an image close to reality; Not referred components are available, it act of the relays, bridge of diodes, carry fusible and transformers, it is necessary then placed the transformer word or transformer or relay or relay or bridge or fuse in a rectangle of serigraphy. It should be noted that the colors of the resistors are calculated, it is enough to place a value with the function text on the resistor and to click on the button replacement of text.

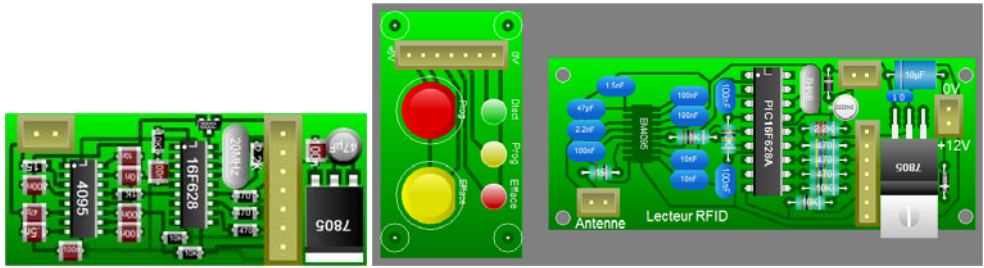
This image is normally not usable for the edition, the editor not being written for this type of image, the sight and the retraçage of the published component will not be suitable. Nevertheless the edition functions.

This image is printable (see the panel of Printing) and gives very good performances on an ink jet printer of ink color 1440 dpi.

To return to the layout 2D, to click on the button



The circuit represented Circuit above is right an example and is not functional.



Example of circuit realized with components CMS and the same circuit by combining both type of technologies. Component CMS on the circuit of right-hand side is placed with dimensions copper, it is thus seen by transparency. It should be noted that the circuit of right-hand side could still be menuer while placing the components on the two layers. The buttons are common to both examples.

9. Keyboard

9.1. Keys of the keyboard

Suppr this key is used for unobtrusive an object (pad, track etc.) after its selection.

Space the bar of space is used either to select an object to be erased/publish, or to change layer (layer coppers in red or layer components in blue).


The 4 arrows (high, low, right-hand side, left) these keys are used to carry out the rotation of a component.

F1 the F1 key is used to open a contextual help, for example if you chose the tool "pads round", the assistance will be open on this subject.

10. Edition

10.1. Edition or delete of an element

The edition of an element avoids the delete then a new placement of this element and thus removes an operation. The objects already placed can be modified (change of size, Alignment or delete) by selecting the object by

the tool of edition: . The selection of an element is carried out by a click left button of the mouse inside the space of the element to be published or remove.

If several objects are at the same place, the **bar of space** makes it possible to choose alternatively. The selected element appears in gray, it also is surrounded by menu black squares called handles.

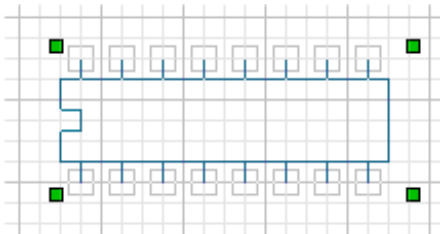
The Alignment of the mouse inside the selected element changes the shape of the scroll bar into cross with 4 arrows. While remaining supported on the left button of the mouse, one then moves the selected element. If the scroll bar of the mouse is placed inside a handle (menu squares), while pressing on the left button, one changes the sizes of the element.

Components: with regard to the DIL, capacitor, resistor and text, an additional operation exists, there acts of rotation in the 4 directions using the arrows of the keyboard.

Tracks: the width of a track can be modified using the scroll bar located in the lower bar of tool. The width is displayed in the window of text located beside this scroll bar. The unit is in millimetre or Inch according to your choice in the menu display. The Alignment of a segment of track can involve or not to moving it other segments connected, the choice is carried out in the Menu dialog box/preferences.

Pads: the size of the round or square pads can be modified either by the handles, or by the scroll bar located in bottom on the right of the principal window. The size is displayed in the window of text located beside this scroll bar. The unit is in millimetre or Inch according to your choice in the menu display.

Many pins of the DIL or PLCC: can be to modify by the handles of end of the DIL or by the scroll bar located in bottom on the right of the principal window.



Example of a DIL in edition

The delete of the selected element is carried out with the key “Suppr”

10.2. Fast scroll bar of modification



This scroll bar is located in tools bar drawing (in bottom on the right). It allows a faster modification of the sizes without having to open the window “sizes” such as:

- cut of pad,
- width of track,
- many pins of DIL,
- insulation (plane of mass/tracks, pads).
-

11. Glossary

11.1. Glossary

Scroll bar: a scroll bar is a horizontal or vertical bar having an arrow at each end and a scroll bar. The alignment of the scroll bar makes it possible to modify the value of a parameter or to move its contents of a window.

Arrows of the keyboard: the 4 keys arrows high, low, right-hand side, left of the keyboard are used to carry out rotations of elements.

Fenestrate work: it is visible space to place or trace the elements of the circuit. A horizontal scroll bar and a vertical scroll bar make it possible to move this visible space in total space. Total space is of 3000 pixels X 3000 pixels. It should be noted that there does not exist reference mark of page, this would be more one constraint than an advantage, indeed the window "Printing" has scroll bars making it possible to center its drawing compared to the format of the selected page.

Pull-down menus: the pull-down menus are windows which open from top to bottom to post a list of functions. The subjects placed in top of the principal window propose various pull-down menus.

TrueType: these words mean characters of the vectorial type. The advantage of this typestyle is that it preserves a good definition some is its size.

Screen print: it is to draw the establishment of the components on the printed circuit. It is carried out by professionals, the amateur will be satisfied to use it as documentation which will be an invaluable help at the time of the wicircle of the chart.

Plan of mass: certain printed circuits, for example used in high frequency asks for on a layer the maximum of copper connected to the mass, it is a plan of mass. The layout is calculated only for the pads.

DIL: many integrated circuits have their pins arranged into double lines or DIL for **Dual In Line**.

Solder resist: just as serigraphy, solder resist is realized by professionals. It is a layer of varnish, generally green, which recovers the printed circuit except the pads.

Plan of drilling: the plan of drilling represents the coordinates of the holes to be bored. These sites can be raised to order a numerical drilling machine.

Font : the drawing, the style, the size of the characters names the font force of the characters.

Inch: the unit always used in the electronic field is the inch which is worth 2,54 cm.

ASCII: American standard of coding of the characters. Always used in the data-processing field.

11.2. The Councils

The Councils of realization of a printed circuit

To use an ink jet printer of ink preferably and to print with more possible high-quality directly on special transparency jet of ink (Avery, Epson). In 600 dpi or better 1200 dpi (dowries per Inch), the results are excellent.

To carry out a printed circuit of good quality, it is necessary that the ink of transparency is in contact with the layer of copper to be insolated. In the contrary case, UV are diffracted by the layer of plastic and the result is a fuzzy circuit which could be unusable. The circuits are drawn seen top; the Printing of the layer copper will be printed in "normal" mode and the layer components in mode "mirror".

To carry out a precise circuit, to use iron perchloride having little been useful or better, nine. To use epoxy charts presensitized **recent**, the photosensitive varnish has one short lifespan. To use a machine to be engraved to dissolve copper. There are some with bubbles of low costs which function very well. The time of insolation is of approximately 2mn15s. The circuit must be revealed with revealing containing water and a caustic sachet of soda.