ON5FM PCB Library

Foreword

Most of the PCB design softwares -if not all- are mostly intended to help in the drawing and designing of complex logic circuits.
 For us, amateurs designing analog circuits, it's not allways convenient. The footprints we find in the included libraries don't fit well our needs. And drawing our owns aren't so easy : there is much time to involve in learning and then to drawing them.

Fortunately, CIRDCAD98 is particularly easy to do this job once you have the commands « in your fingertips ».
Circad is also well suited for the design of analog circuits. And finally, the conceptors provided us with a « demo » that is very usefull, having far less penallysing restrictions than most of the others for non professionnal usage.
In fact, with some goodwill, you can produce very satisfying jobs and let them be printed in amateur publications.

From all this, this library hasn't been made for a professionnal use in mind. So, the holes in the pads have been reduced to 0.01 inch : just what you need to precisely center your drill.
Should you need to use it for a professionnal application, you should have to modify the properties of the pads accordingly to your components for the treatment by a Gerber photoplotter.

## *The PCB footprints in general*

Most of the data has been found in different publications I had at hand. I used the units in wich they where designed : millimeters for products from Asia and Europe and inches for the others.
The reason is that it was nearly impossible (for me) to translate in mills the dimensions of the pinout from an IF transformer, for instance !
For this reason, I suggest you use a low grid snap : 5 mills or 0.1 mm. I used 0.5 mm and 1 mill for those frawings. But the it may be easier to use a lower resolution for your work.
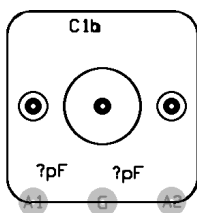
The Capacitors.

Most ot them now have a pin spacing of 0.2 inches or even 0.1. I designed a « panel » of different kinds. Choose the one that is exactly your component or just bigger than what you need. You can move its sides by grabbing its lines.
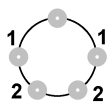
This adjustable capacitor has two sets of common pins numbered here 1 and 2.
The position of the common pins varies from a manufacturer to the other. So you may leave only the pins corresponding to your component.
NOTE : On the footprint, all of these pins are numbered « 2 ».

 Those variable capacitors, mostly found in cheap pocket radios, are often called "Polyvaricons". They are difficult to draw and use in a PC board design. The only convenient solution I found was to draw two footprints; each one corresponding to one of its capacitors. That's why the only difference is the pads. When drawing your schematic, you define each capacitor with the same number but with a "a" and a "b" suffix. When drawing your PCB, you superpose both footprints and you'll get the three pads.

I didn't do this work for the FM polyvaricon because it would have been done 4 times. If you need it, simply duplicate it four times, keeping only the two corresponding pads.

Thre is also a ''big'' polyvaricon mostly used in CB antenna tuners. Its footprint has alos been drawn.

The Resistors.

We don't allways need to put our components lying on the PC board. In fact, it's easier to bend one wire of a resistor for a 0.1inch spacing and mount the component vertically : the suppleness of the wire will allow the resistor to fit perfectly.
On the other hand, at a 0.1 inch spacing, it is far easier to place a resistor in front of two consecutive pins of an IC !

You have three choices : lying flat on the PCB, mounted vertically with a 0.1 inch (2.54mm) or 0.2 inch (5.08mm). The decision has to be taken at the moment you place it, following the requirements of the circuit board.

The « Minipot » is the miniature potentiometer found in cheap radios. It has a SPST switch. There are two kinds of terminals : eyelet or pin. The design of the footprint can cope with both of them.

The Coils.

The dimensions of the coils were found in a Toko publication. They can be considered as standard.

The IF and RF transformers : They were difficult to draw. To place the lines precisely, you will need a fine resolution : 5 mills (.1mm).

The vertically mouted air coils may, of course have a coil former. Dont forget then to place pad(s) for its fixation.
The given dimensions are for the inside of the coil. Don't forget to add the thickness of the wire if it happens to be import for your work.

The pads of the hand made coils (air or totoid) are at first put at an arbitrary place. Up to you to place them following the needs and the complexity of the coil. There are six opportunities. Suppress those you don't need.

The Transistors.
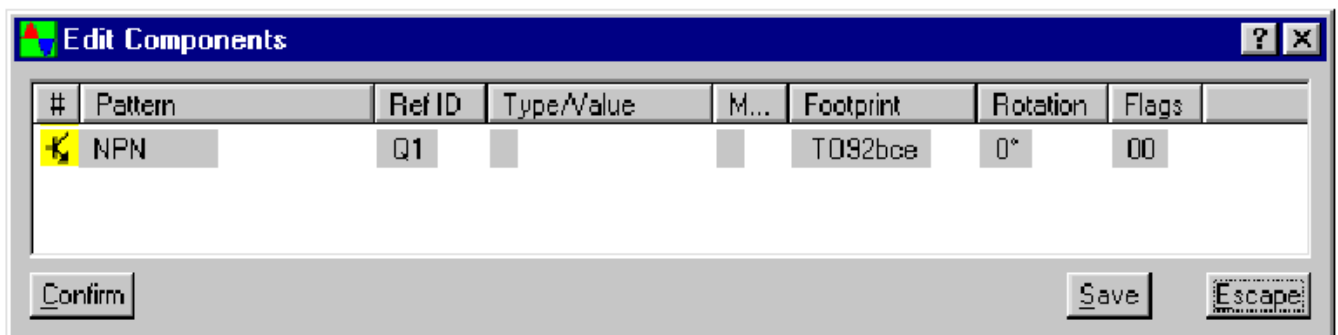
There are as much footprints as there are pinout possibilities. You should add an according « suffix » for the emitter, base and collector order (« e », « b », « c ») to the transistor case reference in your schematic component footprint definition. For example : TO92 + bce.

The TO72 : there are 4 pads. The one bearing number 1 is linked to the can of this metallic case transistor. Simply discard it if it's not of application.

Miscellanous.

Mini jack : there are plenty of cases. This one is perhaps a bit more common.

LF transformers : the most usual types, like the famous LT400.

Solder bridge : a good way to make an inexpensive one-time switch.

Slide switches : some of the most used DPDT types. In fact, you have all the pinout possibilities but the package could vary.

PCB edge female connectors : the one you find here is simply the ISA connector of our (old) computer mother boards. There are two different sizes : with 36 pins and with 64 pins

PCB edge male connectors : There are two sides named a and b. That means you must have a two layer PCB to be able to use them.

The logos :

If you want, you may add this special component to your work. A good way to reward Holophase for giving us the opportunity to use this demo software without having really annoying inconvenients...

Guy MARCHAL ON5FM
on5fm@advalvas.be
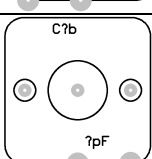
The Schematic Components.

Capacitors

Resistors

Coils

Transistors

TO39 with case grounded

TO39 case

TO92 case

TO72 case

TO220 case

TO220 case vertical

Dual gate MOS FET

Power MOS (IRF510)

IRF510

TO126 case

TO126 case vertical

TO92 case FET

TO72 case FET

Diodes

Varicaps

Volt. reg.

78

LM317

78L

Miscellanous

1/10" Spacing PCB Edge Connectors

Female Edge Connector 64 pins

P?a

P1

Female Edge Connector 36 pins

P?a

P1

LF transformers

Slide switches

HC-18/U

X? ?MHz

Solder bridge

Amidon Toroids

Moulded Choke

15mm

10mm

8mm

6mm

5mm

4mm

Air wound coils

8mm

Mini pot

T12

T25

T37

T50

T68

T80

T94

FM Polyvaricon. Use as much templates as needed (4) each with one above the other.

Polyvaricon. Use both templates one above the other.

Polyvaricon big model
Use both templates one above the other.

Sub-mini adjustable capacitor
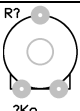
Adjustable Capacitors
Philips type

IF transformer 10mm can

IF transformer 7mm can

IF transformer 3mm can

COMPONENTS CARACTERISTICS

#	Pattern	Ref ID	Type/Value	M...	Footprint
⚡	C5mm	C?	?nF		C5_Mid
⚡	C5mmUS	C?	?nF		C5_Mid
⚡	Cadj	C?	?pF		Caj_Big
⚡	CadjUS	C?	?pF		Caj_Big
	Circad				
	Circad-big				
⚡	Coil_Air	L?	?µH		
⚡	Coil_Air_Link	L?	?µH		
⚡	Coil_Air_Link_Var	L?	?µH		
⚡	Coil_Air_Var	L?	?µH		
⚡	Coil_toroid	L?	?µH		T
⚡	Coil_toroid_link	L?	?µH		T
⚡	CpolyvarA	C?a	?pF		PolyvAMa
⚡	CpolyvarA_US	C?	?pF		PolyvAMa
⚡	CpolyvarB	C?b	?pF		PolyvAMb
⚡	CpolyvarB_US	C?	?pF		PolyvAMb
⚡	Cvar	C?	?pF		
⚡	CvarUS	C?	?pF		
⚡	FET	Q?			TO92FET
⚡	LF_Transfo	T?			
⚡	LF_Transfo_mini	T?			
⚡	MOS_2g	Q?			MOS_FET2G
⚡	MOS_N	Q?			PWR_FET
⚡	MOS_P	Q?			PWR_FET
⚡	Mould_Choke	L?	?mH		
⚡	NPN	Q?			
⚡	PNP	Q?			
⚡	Pot	R?	?Kohms		MiniPot
⚡	R	R?	?Kohms		R25H
⚡	Radj	R?	?Kohms		Raj
⚡	XTAL	X?	?MHz		XTAL

COMPONENTS REFERENCE

| FOOTPRINT	NAME	DESCRIPTION	REMARK
		Capacitors	
	C25	Capacitor. 2.5mm (.1 in) pin spacing	
	C5_Ltl	Capacitor. 5mm (.2 in) pin spacing Narrow body	
	C5_Mid	Capacitor. 5mm (.2 in) pin spacing Medium body	
	C5_Big1	Capacitor. 5mm (.2 in) pin spacing Wide boddy	
	C5_Big2	Capacitor. 5mm (.2 in) pin spacing Very wide body	
	Caj_Big	Adjustable capacitor Philips type Large capacity.	Use adequate pins for the « Common » (Choice of two pairs).
	Caj_Ltl	Adjustable capacitor Philips type Low capacity.	
	Caj_mini	Adjustable capacitor, miniature type	
	PolyvAMa	Variable capacitor as used in pocket AM receivers. Also called « Polyvaricon »	Part a
	PolyvAMb		Part b Put « Part b » over « Part a » so to have one footprint with three pads. See text for more informations
	PolyvAMbiga	Variable capacitor as used CB antenna tuners. Also Called « Polyvaricon »	Part a
	PolyvAMbigb		Part b Put « Part b » over « Part a » so to have one footprint with three pads. See text for more informations
	PolyvAFM	Variable capacitor as used in pocket AM/FM receivers. Also called « Polyvaricon »	See text.
		Resistors	
	Raj	Adjustable resistor. Horizontal mounting	Type common in Europe
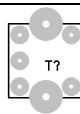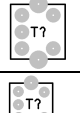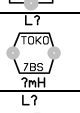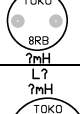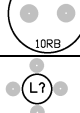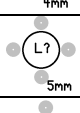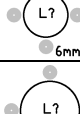
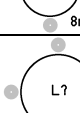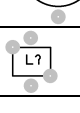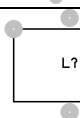|	Name	Description	Notes
	RajV	Adjustable resistor. Vertical mounting	Type common in Europe
	Raj2	Adjustable resistor.	
	Raj_mini1	Adjustable resistor.	
	Raj_mini2	Miniature adjustable resistor.	Also common in europe
	Raj_mini3	Miniature adjustable resistor	
	Raj_mini4	Sub-miniature adjustable resistor.	
	MiniPot	Mini potentiometer with switch (SPST).	Found in cheap pocket radios
	R18H	1.8mm diameter Horizontal mounting	Subminature type
	R18Vn	1.8mm diameter Vertical mounting	Narrow spacing : 2.5mm (.1in)
	R18Vw	1.8mm diameter Vertical mounting	Wide spacing : 5mm (.2in)
	R25H	2.5mm (.1in) diameter Horizontal mounting	Minature type
	R25V	2.5mm diameter Vertical mounting	Narrow spacing : 2.5mm (.1in)
	R25Vw	2.5mm diameter Vertical mounting	Wide spacing : 5mm (.2in)
	R30H	3mm diameter Horizontal mounting	
	R30V	3mm diameter Vertical mounting	Narrow spacing : 2.5mm (.1in)
	R30Vw	3mm diameter Vertical mounting	Wide spacing : 5mm (.2in)
	R52h	5.2mm diameter Horizontal mounting	
	R52v	5.2mm diameter Vertical mounting	Spacing : 5mm (.2in)

Diodes
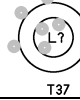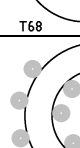
	Name	Description	Notes
	D3.4mm	3.4mm diameter Horizontal mounting	All types of diodes
	D3.4mmVn	3.4mm diameter Vertical mounting	Narrow spacing : 2.5mm (.1in)
	D3.4mmVw	3.4mm diameter Vertical mounting	Wide spacing : 5mm (.2in)

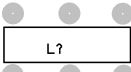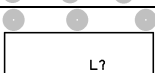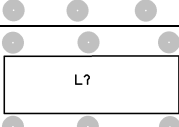|			
	D4.3mm	4.3mm diameter Horizontal mounting	All types of diodes
	D4.3mmVn	4.3mm diameter Vertical mounting	Narrow spacing : 2.5mm (.1in)
	D4.3mmVw	4.3mm diameter Vertical mounting	Wide spacing : 5mm (.2in)
	D5mm	5mm diameter Horizontal mounting	All types of diodes
	D5mmVn	5mm diameter Vertical mounting	Narrow spacing : 2.5mm (.1in)
	D5mmVw	5mm diameter Vertical mounting	Wide spacing : 5mm (.2in)
	D7.6mm	7.6mm diameter Horizontal mounting	All types of diodes
	D7.6mmVn	7.6mm diameter Vertical mounting	Narrow spacing : 2.5mm (.1in)
	D7.6mmVw	7.6mm diameter Vertical mounting	Wide spacing : 5mm (.2in)
	Varcp4mm	Varicap 4mm width	Plastic type. Also found in band switching diodes
	SOD69	High capacity Varicap Case : TO92 type	Usually used in AM receiver tuning

Coils
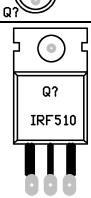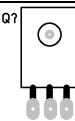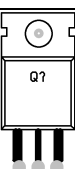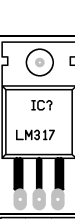
	IFt10	IF or RF transformer 10mm can	Standard IF transformer
	IFt5	IF or RF transformer 7mm can	Miniature IF transformer
	IFt7	IF or RF transformer 5mm can	Subminiature IF transformer
	7BS	Moulded Coil. Toko type : 7BS	Low inductance
	8RB	Moulded Coil. Toko type : 8RB	Low inductance
	10RB	Moulded Coil. Toko type : 10RB	High inductance or low inductance and high current
	L4V	Vertically mounted coil. 4mm diameter.	On air or coil former
	L5V	Vertically mounted coil. 5mm diameter	On air or coil former
	L6V	Vertically mounted coil. 6mm diameter	On air or coil former
	L8V	Vertically mounted coil. 8mm diameter	On air or coil former
	L10V	Vertically mounted coil. 10mm diameter	On air or coil former
	L4H	Horizontally mounted coil. 4mm	On air
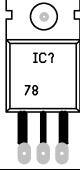
	L5H	Horizontally mounted coil. 5mm	On air
	L6H	Horizontally mounted coil. 6mm	On air
	L8H	Horizontally mounted coil. 8mm	On air
	L10H	Horizontally mounted coil. 10mm	On air
	L12H	Horizontally mounted coil 12mm	On air
	L15H	Horizontally mounted coi 16mm	On air
	MouldChH	Moulded choke horizontally mounted	
	MouldChV	Moulded choke vertically mounted	5mm (.2in) spacing
	T12	T12 Amidon toroid Horizontally mounted	Every type, FT types included See text for pads
	T25	T25 Amidon toroid. Horizontally mounted	Every type, FT types included See text for pads
	T37	T37 Amidon toroid Horizontally mounted	Every type, FT types included See text for pads
	T50	T50 Amidon toroid. Horizontally mounted	Every type, FT types included See text for pads
	T68	T68 Amidon toroid. Horizontally mounted	Every type, FT types included See text for pads
	T80	T80 Amidon toroid Horizontally mounted	Every type, FT types included See text for pads
	T94	T94 Amidon toroid. Horizontally mounted	Every type, FT types included. See text for pads
	T12v	T12 Amidon toroid Vertically mounted	Every type, FT types included See text for pads
	T25v	T25 Amidon toroid. Vertically mounted	Every type, FT types included See text for pads
	T37v	T37 Amidon toroid Vertically mounted	Every type, FT types included See text for pads

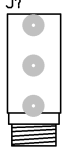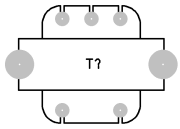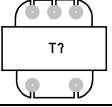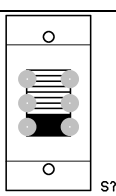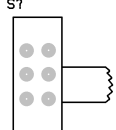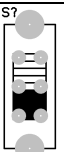|			
	T50v	T50 Amidon toroid. Vertically mounted	Every type, FT types included See text for pads
	T68v	T68 Amidon toroid. Vertically mounted	Every type, FT types included See text for pads
	T80v	T80 Amidon toroid Vertically mounted	Every type, FT types included See text for pads
	T94v	T94 Amidon toroid. Vertically mounted	Every type, FT types included See text for pads

Transistors

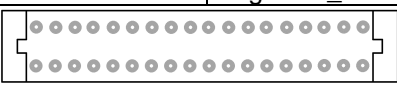|			
	TO92FETdgs	FET in TO92 case	Change the « dgs » accordingly
	TO72FETdgs	FET in TO72 case	Change the « dgs » accordingly
	MOS_FET2G	Dual gate MOS-FET	
	TO72MOSFET2G	Dual gate MOS-FET in TO72 case	Like 40673 or MPF121
	PWR_FET	Power FET in TO220 case Horizontally mounted	Like IRF510
	PWR_FETv	Power FET in TO220 case Vertically mounted	Like IRF510
	TO92ebc	Transistor in TO92 case	Change the « ebc » accordingly
	TO72ebc	Transistor in TO72 case	Change the « ebc » accordingly
	TO39ebc	Transistor in TO39 case	Change the « ebc » accordingly
	TO39ebc1	Transistor in TO39 case with pin connected to case	Change the « ebc » accordingly
	TO126bce	Transistor in TO126 case Horizontally mounted	Change the « ebc » accordingly
	TO126becV	Transistor in TO126 case Vertically mounted	Change the « ebc » accordingly
	TO220bce	Transistor in TO220 case Horizontally mounted	Change the « ebc » accordingly
	TO220bceV	Transistor in TO220 case Vertically mounted Horizontally mounted	Change the « ebc » accordingly
	LM317	LM317 variable voltage regulator Horizontally mounted	Or others with the same pinout
	LM317V	LM317 variable voltage regulator Vertically mounted	Or others with the same pinout

	78Lxx	Variable TO92 voltage regulator	Or others with the same pinout
	78xx	Variable TO220 voltage regulator. Horizontally mounted	Or others with the same pinout
	78xxV	Variable TO220 voltage regulator Vertically mounted	Or others with the same pinout

Miscellanous

X? ?MHz HC-18/U	XTAL	Quartz crystal	HC18-U type
J?	Jack35mono	3.5 mm mono jack with switch	Narrow type. Take care to the pinout. If necessary, move the pads accordingly
T?	LF_Transfo	Miniature audio transformer	
T?	LF_Transfo_mini	Sub- miniature audio transformer	
S?	Blob	Pad, split in two. May be short circuited	Act like a definitive switch
S?	SlSw1	Slide switch. DPDT	This one has two threaded holes
S?	SlSw2	Slide switch. DPDT Lateral lever	
S?	SlSw3	Slide switch. DPDT	
S?	SlSw4	Slide switch. DPDT	
	EdgeCon_a36	36 pin edge connector	The size of those of the ISA PC cards
	EdgeCon_b	64 pin edge connector	Side b. See text
	EdgeConF36	The female part of the edge connector 36 pin edge connector	As those soldered on the PC mother boards.
	EdgeConF64	The female part of the edge connector 64 pin edge connector	As those soldered on the PC mother boards.

	Circad	Logo to be added to your PCB	... If you want
Designed with CIRCAD 98 www.holophase.com	Circad-big	Big logo to be added to your PCB More readable.	... If you want