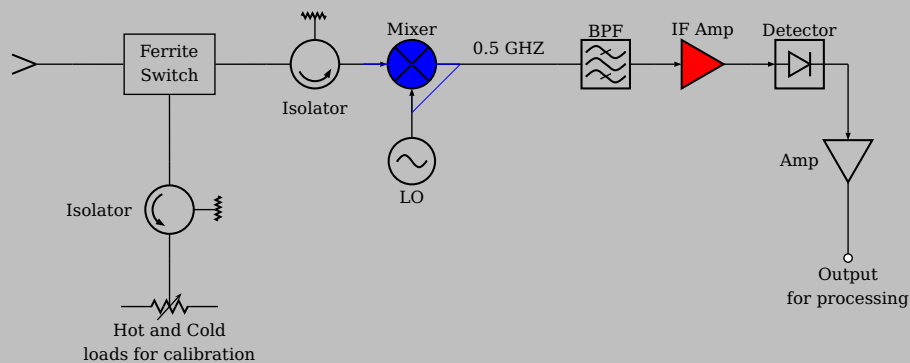


pst-circ

A PSTricks package for drawing electric circuits; v.1.56

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The package `pst-circ` is a collection of graphical elements based on `PStricks` that can be used to facilitate display of electronic circuit elements. For example, an equivalent circuit of a voltage source, its source impedance, and a connected load can easily be constructed along with arrows indicating current flow and potential differences. The emphasis is upon the circuit elements and the details of the exact placement are hidden as much as possible so the author can focus on the circuitry without the distraction of sorting out the underlying vector graphics.

`pst-circ` loads by default the following packages: `pst-node`, `multido`, `pst-xkey`, and, of course `pstricks`. All should be already part of your local $\text{T}_{\text{E}}\text{X}$ installation. If not, or in case of having older versions, go to <http://www.CTAN.org/> and load the newest version.

Thanks to:

Rafal Bartczuk, Christoph Bersch, François Boone, Jean-Côme Charpentier, Patrick Drechsler, Amit Finkler, Markus Graube, Henning Heinze, Bernd Landwehr, Michael Lauterbach, Manuel Luque, Ted Pavlic, Alan Ristow, Douglas Waud, and Richard Weissnar.

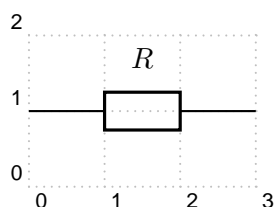
1 The basic system

1.1 Parameters

There are specific parameters defined to change easily the behaviour of the pst-circ objects you are drawing. You'll find a list in Section 5 on p. 53.

1.2 Macros

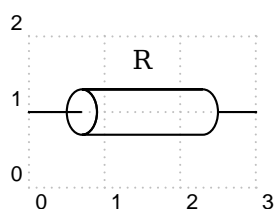
Dipole macros



```

1 \begin{pspicture}[showgrid=true](3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \resistor(A)(B){R$}
5 \end{pspicture}

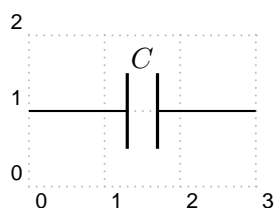
```



```

1 \begin{pspicture}[showgrid=true](3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \RFLine(A)(B){R}
5 \end{pspicture}

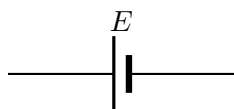
```



```

1 \begin{pspicture}[showgrid=true](3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \capacitor(A)(B){C$}
5 \end{pspicture}

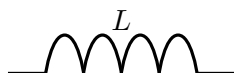
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \battery(A)(B){E$}
5 \end{pspicture}

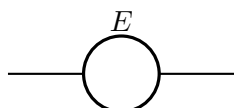
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \coil(A)(B){L$}
5 \end{pspicture}

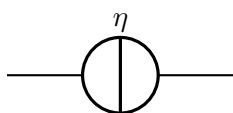
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \Ucc(A)(B){E$}
5 \end{pspicture}

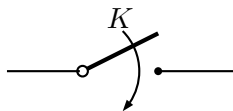
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \Icc(A)(B){\eta}
5 \end{pspicture}

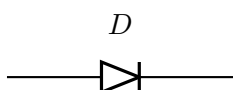
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \switch(A)(B){K}
5 \end{pspicture}

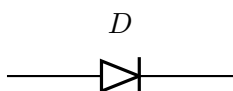
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \diode(A)(B){D}
5 \end{pspicture}

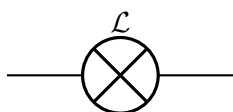
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \Zener(A)(B){D}
5 \end{pspicture}

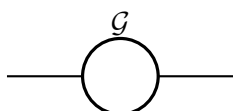
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \lamp(A)(B){\mathcal L}
5 \end{pspicture}

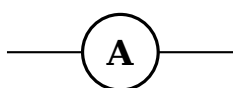
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \circledipole(A)(B){\mathcal G}
5 \end{pspicture}

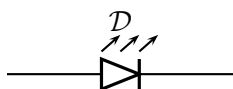
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \circledipole[labeloffset=0](A)(B){\Large\textbf{A}}
5 \end{pspicture}

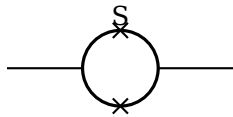
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \LED(A)(B){\mathcal D}
5 \end{pspicture}

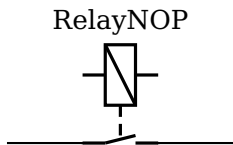
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \SQUID(A)(B){S}
5 \end{pspicture}

```



RelayNOP

```

1 \begin{pspicture}(3,3)
2   \pnode(0,0){A}
3   \pnode(3,0){B}%   Relay normally open
4   \RelayNOP[labeloffset=1.6](A)(B){RelayNOP}
5 \end{pspicture}

```



Suppressor

```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}%   Suppressor (Diode)
4   \Suppressor[labeloffset=0.5](A)(B){Suppressor}
5 \end{pspicture}

```



Arrestor

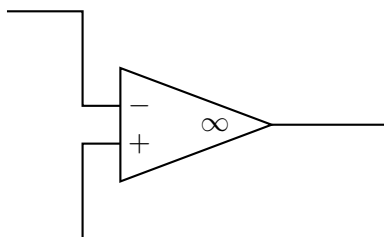
```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}%   Arrestor (Lightning protection)
4   \Arrestor(A)(B){Arrestor}
5 \end{pspicture}

```

Tripole macros

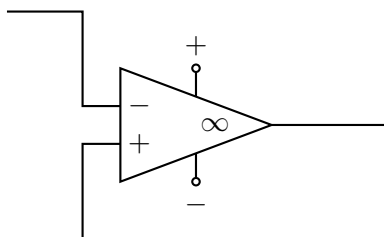
Obviously, tripoles are not node connections. So pst-circ tries its best to adjust the position of the tripole regarding the three nodes. Internally, the connections are done by the \ncangle pst-node macro. However, the auto-positionning and the auto-connections are not always well chosen, so don't try to use tripole macros in strange situations!



```

1 \begin{pspicture}(5,3)
2   \pnode(0,0){A}
3   \pnode(0,3){B}
4   \pnode(5,1.5){C}
5   \OA(B)(A)(C)
6 \end{pspicture}

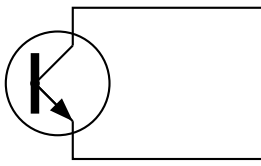
```



```

1 \begin{pspicture}(5,3)
2   \pnode(0,0){A}
3   \pnode(0,3){B}
4   \pnode(5,1.5){C}
5   \OA[0Apower=true](B)(A)(C)
6 \end{pspicture}

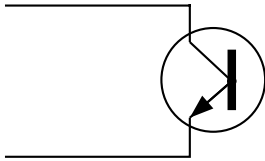
```



```

1 \begin{pspicture}(3,4)
2 \pnode(0,2){A}\pnode(3,1){B}
3 \pnode(3,3){C}
4 \transistor(A)(B)(C)
5 \end{pspicture}

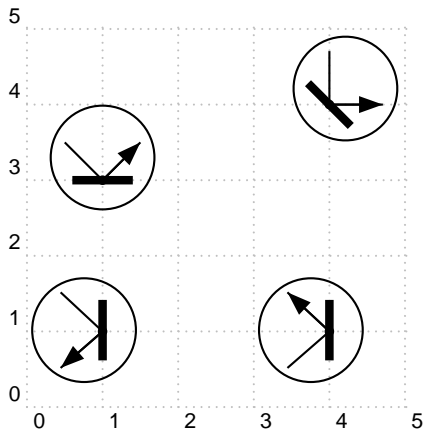
```



```

1 \begin{pspicture}(3,4)
2 \pnode(3,2){A}\pnode(0,1){B}
3 \pnode(0,3){C}
4 \transistor[TRot=180](A)(B)(C)
5 \end{pspicture}

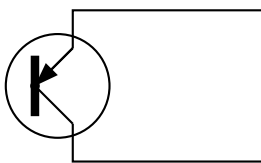
```



```

1 \begin{pspicture}[showgrid=true](5,5)
2 \pnode(1,3){b}
3 \transistor[TRot=90](b){emitter}{collector}
4 \transistor[TRot=45](4,4){emitter}{collector}
5 \transistor[TRot=180](1,1){emitter}{collector}
6 \transistor[TRot=180,transistorinvert=true]
7 (4,1){emitter}{collector}
8 \end{pspicture}

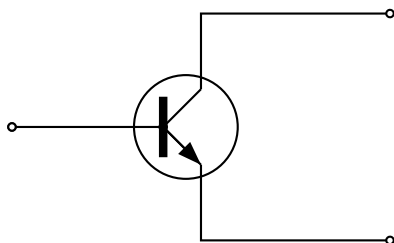
```



```

1 \begin{pspicture}(3,4)
2 \pnode(0,2){A}\pnode(3,1){B}
3 \pnode(3,3){C}
4 \transistor[transistortype=PNP](A)(B)(C)
5 \end{pspicture}

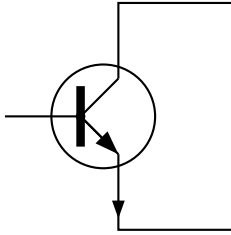
```



```

1 \begin{pspicture}(5,3)
2 \pnode(0,1.5){A}
3 \pnode(5,0){B}
4 \pnode(5,3){C}
5 \transistor[basesep=2cm,arrows=o-o](A)(B)(C)
6 \end{pspicture}

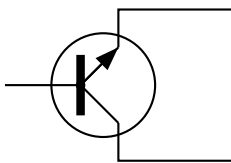
```



```

1 \begin{pspicture}(3,4)
2 \pnode(0,2){A}\pnode(3,0.5){B}
3 \pnode(3,3.5){C}
4 \transistor[transistoriemitter=true,
5   basesep=1cm](A)(B)(C)
6 \end{pspicture}

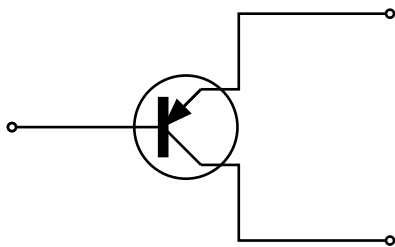
```



```

1 \begin{pspicture}(3,4)
2 \pnode(0,2){A}\pnode(3,1){B}
3 \pnode(3,3){C}
4 \transistor[transistorinvert,
5   basesep=1cm](A)(B)(C)
6 \end{pspicture}

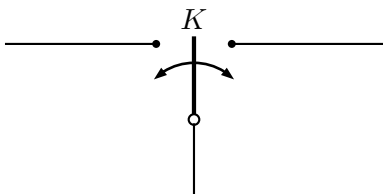
```



```

1 \begin{pspicture}(5,3)
2 \pnode(0,1.5){A}\psset{linewidth=1pt}
3 \transistor[transistortype=PNP,basesep=2cm,
4   arrows=o-o](A){Emitter}{Collector}
5 \psline{o-}(5,3)(3,3)(3,3|Collector)(Collector)
6 \psline{o-}(5,0)(3,0)(3,3|Emitter)(Emitter)
7 \psline{o-}(A)([nodesep=2]A)
8 \end{pspicture}

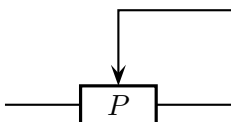
```



```

1 \begin{pspicture}(5,2)
2 \pnode(0,2){A}
3 \pnode(5,2){B}
4 \pnode(0,0){C}
5 \Tswitch(A)(B)(C){$K$}
6 \end{pspicture}

```

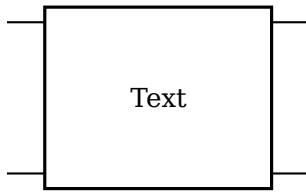


```

1 \begin{pspicture}(3,3)
2 \pnode(0,1){A}
3 \pnode(3,1){B}
4 \pnode(3,2.25){C}
5 \potentiometer[labeloffset=0pt](A)(B)(C){$P$}
6 \end{pspicture}

```

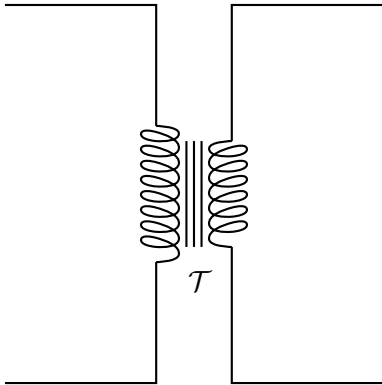

Quadrupole macros



```

1 \begin{pspicture}(5,3)
2   \pnode(0,2.5){A}
3   \pnode(0,0.5){B}
4   \pnode(4,2.5){C}
5   \pnode(4,0.5){D}
6   \quadripole(A)(B)(C)(D){Text}
7 \end{pspicture}

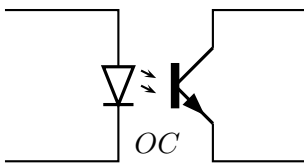
```



```

1 \begin{pspicture}(5,5)
2   \pnode(0,5){A}
3   \pnode(0,0){B}
4   \pnode(5,5){C}
5   \pnode(5,0){D}
6   \transformer(A)(B)(C)(D){\mathcal T}
7 \end{pspicture}

```



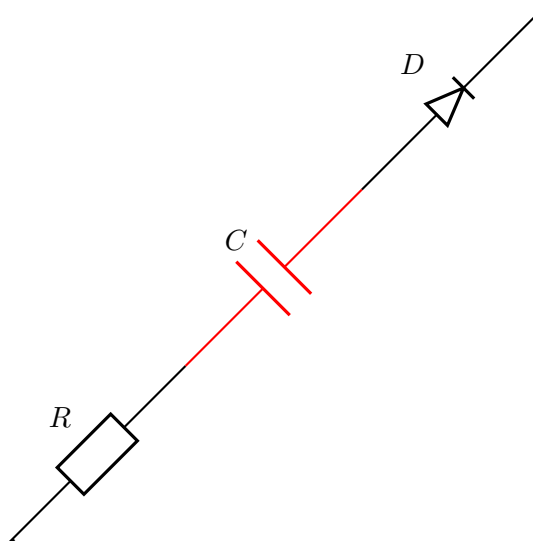
```

1 \begin{pspicture}(5,3)
2   \pnode(0,2.5){A}
3   \pnode(0,0.5){B}
4   \pnode(4,2.5){C}
5   \pnode(4,0.5){D}
6   \optocoupler(A)(B)(C)(D){OC}
7 \end{pspicture}

```

Multidipole

`\multidipole` is a macro that allows multiple dipoles to be drawn between two specified nodes. `\multidipole` takes as many arguments as you want. Note the dot that is after the last dipole.



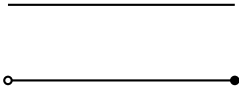
```

\begin{pspicture}(7,7)
  \pnode(0,0){A}
  \pnode(7,7){B}
  \multidipole(A)(B)\resistor{$R$}%
    \capacitor[linecolor=red]{$C$}%
    \diode{$D$}}.
\end{pspicture}

```

Important: for the time being, `\multidipole` takes optional arguments but does not restore original values. We recommend not using it.

Wire

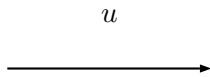


```

1 \begin{pspicture}(3,2)
2 \pnode(0,1){A}\pnode(3,1){B}\wire(A)(B)
3 \pnode(0,0){A}\pnode(3,0){B}\wire[arrows=o-*](A)(B)
4 \end{pspicture}

```

Potential

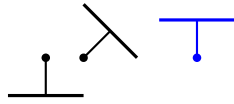


```

1 \begin{pspicture}(3,2)
2 \pnode(0,1){A}
3 \pnode(3,1){B}
4 \tension(A)(B){$u$}
5 \end{pspicture}

```

ground

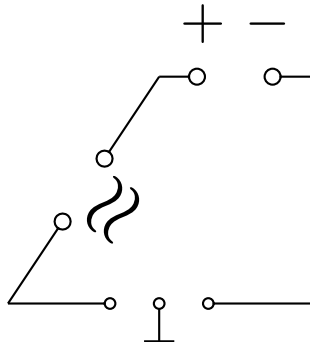


```

1 \begin{pspicture}(3,2)
2 \pnode(0.5,1){A}
3 \pnode(1,1){B}
4 \pnode(2.5,1){C}
5 \ground(A)
6 \ground{135}(B)
7 \ground[linecolor=blue]{180}(C)
8 \end{pspicture}

```

Open dipol and open tripol



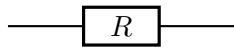
```

1 \def\Wave{\psscalebox{3}{\approx$}}
2 \def\PM{\psscalebox{2}{\${+,\,-}$}}
3 \begin{pspicture}(4,3)
4 \pnode(0,0){A}\pnode(2,3){B}\pnode(4,3){C}
5 \pnode(4,0){D}
6 \OpenDipol[radius=3pt,labelangle=:U,
7   labeloffset=-0.5](A)(B){\Wave}
8 \OpenDipol[radius=3pt,labelangle=:U](B)(C){\PM}
9 \OpenTripol(A)(D){}
10 \end{pspicture}

```

1.3 Parameters

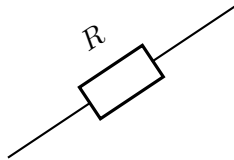
Label parameters



```

1 \begin{pspicture}(3,1)
2   \pnode(0,.5){A}
3   \pnode(3,.5){B}
4   \resistor[labeloffset=0](A)(B){$R$}
5 \end{pspicture}

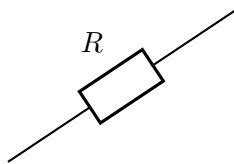
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,0){A}
3   \pnode(3,2){B}
4   \resistor[labelangle=:U](A)(B){$R$}
5 \end{pspicture}

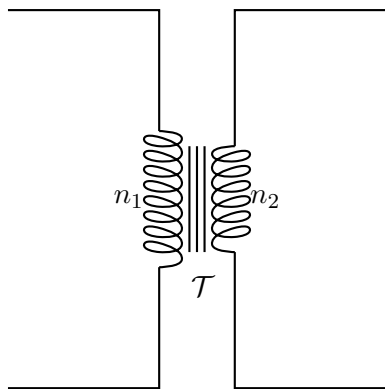
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,0){A}
3   \pnode(3,2){B}
4   \resistor[labelangle=0](A)(B){$R$}
5 \end{pspicture}

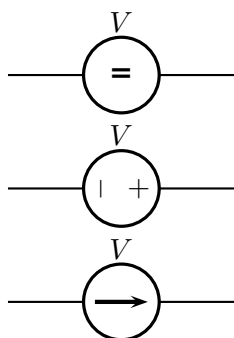
```



```

1 \begin{pspicture}(5,5)
2   \pnode(0,5){A}
3   \pnode(0,0){B}
4   \pnode(5,5){C}
5   \pnode(5,0){D}
6   \transformer[primarylabel=$n_1$,
7     secondarylabel=$n_2$](A)(B)(C)(D){$\mathcal{T}$}
8 \end{pspicture}

```



```

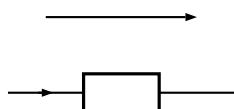
1 \begin{pspicture}(3,4.5)
2   \pnode(0,.5){A}
3   \pnode(3,.5){B}
4   \Ucc[labelInside=1](A)(B){$V$}
5   \pnode(0,2){A}
6   \pnode(3,2){B}
7   \Ucc[labelInside=2](A)(B){$V$}
8   \pnode(0,3.5){A}
9   \pnode(3,3.5){B}
10  \Ucc[labelInside=3](A)(B){$V$}
11 \end{pspicture}

```

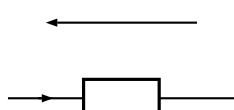
Current intensity and electrical potential parameters

If the intensity parameter is set to true, an arrow is drawn on the wire connecting one of the nodes to the dipole. If the tension parameter is set to true, an arrow is drawn parallel to the dipole.

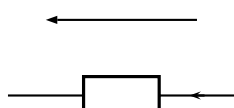
The way those arrows are drawn is set by `dipoleconvention` and `directconvention` parameters. `dipoleconvention` can take two values : generator or receptor. `directconvention` is a boolean.



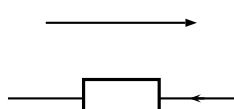
```
1 \begin{pspicture}(3,2)
2   \pnode(0,.5){A}
3   \pnode(3,.5){B}
4   \resistor[intensity,tension](A)(B){}
5 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(0,.5){A}
3   \pnode(3,.5){B}
4   \resistor[intensity,tension,
5     dipoleconvention=generator](A)(B){}
6 \end{pspicture}
```

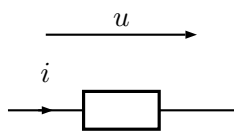


```
1 \begin{pspicture}(3,2)
2   \pnode(0,.5){A}
3   \pnode(3,.5){B}
4   \resistor[intensity,tension,
5     directconvention=false](A)(B){}
6 \end{pspicture}
```

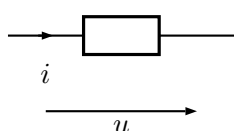


```
1 \begin{pspicture}(3,2)
2   \pnode(0,.5){A}
3   \pnode(3,.5){B}
4   \resistor[intensity,tension,
5     dipoleconvention=generator,directconvention=false](A)(B){}
6 \end{pspicture}
```

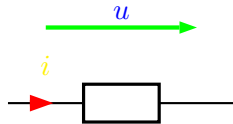
If `intensitylabel` is set to a non empty argument, then `intensity` is automatically set to true. If `tensionlabel` is set to a non empty argument, then `tension` is automatically set to true.



```
1 \begin{pspicture}(3,2)
2   \pnode(0,.5){A}
3   \pnode(3,.5){B}
4   \resistor[intensitylabel=$i$,tensionlabel=$u$](A)(B){}
5 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(0,1.5){A}
3   \pnode(3,1.5){B}
4   \resistor[intensitylabel=$i$,intensitylabeloffset=-0.5,
5     tensionlabel=$u$,tensionlabeloffset=-1.2,
6     tensionoffset=-1](A)(B){}
7 \end{pspicture}
```

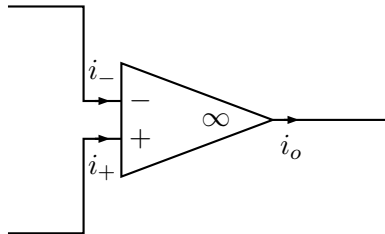


```

1 \begin{pspicture}(3,2)
2   \pnode(0,.5){A}
3   \pnode(3,.5){B}
4   \resistor[intensitylabel=$i$,intensitywidth=3\pslinewidth,
5     intensitycolor=red,intensitylabelcolor=yellow,
6     tensionlabel=$u$,tensionwidth=2\pslinewidth,
7     tensioncolor=green,tensionlabelcolor=blue](A)(B){}
8 \end{pspicture}

```

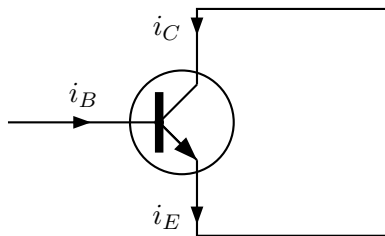
Some specific intensity parameters are available for tripoles and quadrupoles.



```

1 \begin{pspicture}(5,3)
2   \pnode(0,0){A}
3   \pnode(0,3){B}
4   \pnode(5,1.5){C}
5   \OA[OAipluslabel=$i_+$,
6     OAiminuslabel=$i_- $,
7     OAioutlabel=$i_o$](B)(A)(C)
8 \end{pspicture}

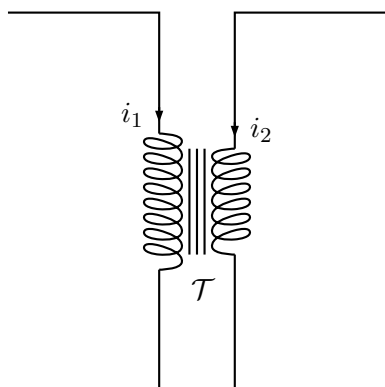
```



```

1 \begin{pspicture}(5,3)
2   \pnode(0,1.5){A}
3   \pnode(5,0){B}
4   \pnode(5,3){C}
5   \transistor[basesep=2cm,transistoribaselabel=$i_B$,
6     transistoricollectorlabel=$i_C$,
7     transistoriemitterlabel=$i_E$](A)(B)(C)
8 \end{pspicture}

```



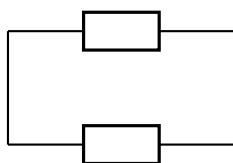
```

1 \begin{pspicture}(5,5)
2   \pnode(0,5){A}
3   \pnode(0,0){B}
4   \pnode(5,5){C}
5   \pnode(5,0){D}
6   \transformer[transformerprimarylabel=$i_1$,
7     transformerissecondarylabel=$i_2$]%(
8     (A)(B)(C)(D){$\mathcal{T}$}
9 \end{pspicture}

```

Parallel parameters

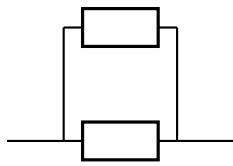
If the parallel parameter is set to true, the dipole is drawn parallel to the line connecting the nodes.



```

1 \begin{pspicture}(3,3)
2   \pnode(0,.5){A}
3   \pnode(3,.5){B}
4   \resistor(A)(B){}
5   \resistor[parallel](A)(B){}
6 \end{pspicture}

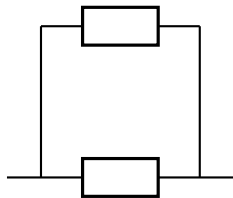
```



```

1 \begin{pspicture}(3,3)
2   \node(0,.5){A}
3   \node(3,.5){B}
4   \resistor(A)(B){}
5   \resistor[parallel,parallelsep=.5](A)(B){}
6 \end{pspicture}

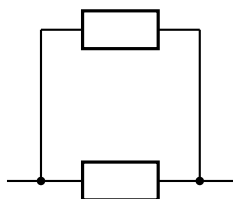
```



```

1 \begin{pspicture}(3,3)
2   \node(0,.5){A}
3   \node(3,.5){B}
4   \resistor(A)(B){}
5   \resistor[parallel,parallelsep=.3,
6     parallelarm=2](A)(B){}
7 \end{pspicture}

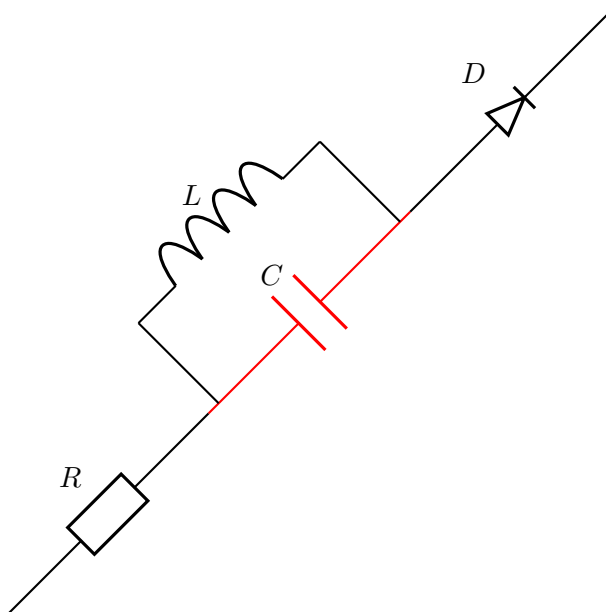
```



```

1 \begin{pspicture}(3,3)
2   \node(0,.5){A}
3   \node(3,.5){B}
4   \resistor(A)(B){}
5   \resistor[parallel,parallelsep=.3,
6     parallelarm=2,parallelnode](A)(B){}
7 \end{pspicture}

```



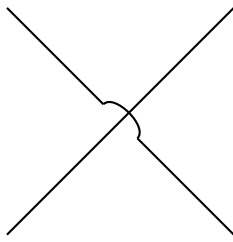
```

1 \begin{pspicture}(8,8)
2   \node(0,0){A}
3   \node(8,8){B}
4   \multidipole(A)(B)\resistor{$R$}%
5     \capacitor[linecolor=red]{$C$}%
6     \coil[parallel,parallelsep=.1]{$L$}%
7     \diode{$D$}.
8 \end{pspicture}

```

Note: When used with `\multidipole`, the `parallel` parameter must not be set for the first dipole.

Wire intersections

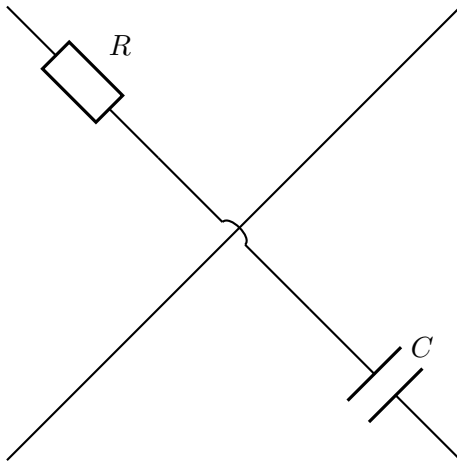


```

1 \begin{pspicture}(3,3)
2   \pnode(0,0){A}
3   \pnode(3,3){B}
4   \pnode(0,3){C}
5   \pnode(3,0){D}
6   \wire(A)(B)
7   \wire[intersect,intersectA=A,intersectB=B](C)(D)
8 \end{pspicture}

```

Wire intersect parameters work also with `\multidipole`.

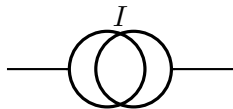


```

1 \begin{pspicture}(7,7)
2   \pnode(0,0){A}
3   \pnode(6,6){B}
4   \pnode(0,6){C}
5   \pnode(6,0){D}
6   \wire(A)(B)
7   \multidipole(C)(D)\resistor{$R$}%
8     \wire[intersect,intersectA=A,intersectB=B]%
9       \capacitor{$C$}.
10 \end{pspicture}

```

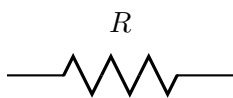
Dipole style parameters



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \Icc[dipolestyle=twoCircles](A)(B){I$}
5 \end{pspicture}

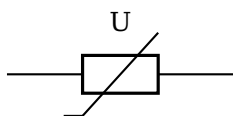
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \resistor[dipolestyle=zigzag](A)(B){R$}
5 \end{pspicture}

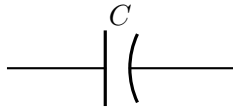
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \resistor[dipolestyle=varistor](A)(B){U}
5 \end{pspicture}

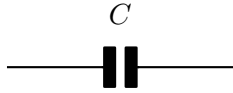
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \capacitor[dipolestyle=chemical](A)(B){$C$}
5 \end{pspicture}

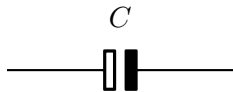
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \capacitor[dipolestyle=elektor](A)(B){$C$}
5 \end{pspicture}

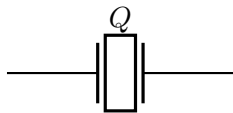
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \capacitor[dipolestyle=elektorchemical](A)(B){$C$}
5 \end{pspicture}

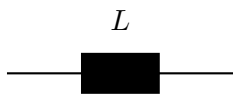
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \capacitor[dipolestyle=crystal](A)(B){$Q$}
5 \end{pspicture}

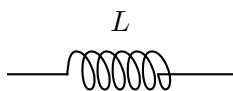
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \coil[dipolestyle=rectangle](A)(B){$L$}
5 \end{pspicture}

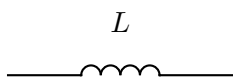
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \coil[dipolestyle=curved](A)(B){$L$}
5 \end{pspicture}

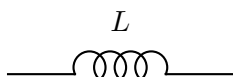
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \coil[dipolestyle=elektor](A)(B){$L$}
5 \end{pspicture}

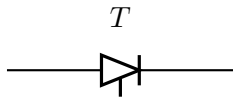
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \coil[dipolestyle=elektorcurved](A)(B){$L$}
5 \end{pspicture}

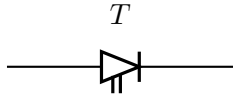
```

```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \diode[dipolestyle=thyristor](A)(B){$T$}
5 \end{pspicture}

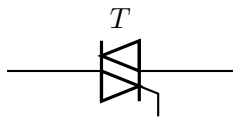
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \diode[dipolestyle=GTO](A)(B){$T$}
5 \end{pspicture}

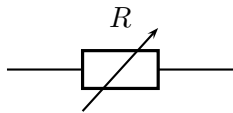
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \diode[dipolestyle=triac](A)(B){$T$}
5 \end{pspicture}

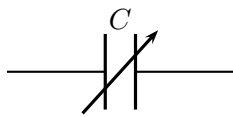
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \resistor[variable](A)(B){$R$}
5 \end{pspicture}

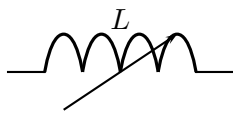
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \capacitor[variable](A)(B){$C$}
5 \end{pspicture}

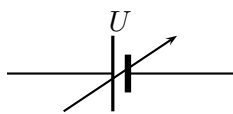
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \coil[variable](A)(B){$L$}
5 \end{pspicture}

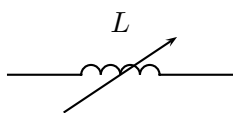
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \battery[variable](A)(B){$U$}
5 \end{pspicture}

```

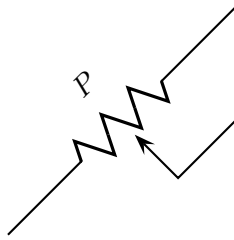


```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}
3   \pnode(3,1){B}
4   \coil[dipolestyle=elektor,variable](A)(B){$L$}
5 \end{pspicture}

```

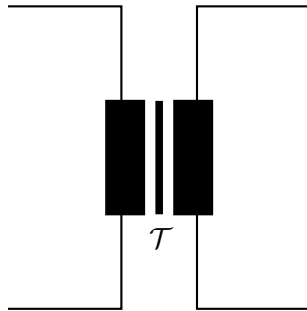
In the following example the parameter `dipolestyle` is used for a tripole and quadrupole, because the coils are drawn as rectangles and the resistor as a zigzag.



```

1 \begin{pspicture}(3,3)
2   \pnode(0,0){A}
3   \pnode(3,3){B}
4   \pnode(3,1.5){C}
5   \potentiometer[dipolestyle=zigzag,%
6     labelangle=:U](A)(B)(C){$P$}
7 \end{pspicture}

```

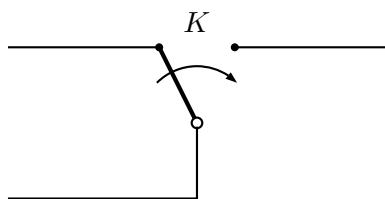


```

1 \begin{pspicture}(4,4)
2   \pnode(0,4){A}
3   \pnode(0,0){B}
4   \pnode(4,4){C}
5   \pnode(4,0){D}
6   \transformer[dipolestyle=rectangle](A)(B)(C)(D){$\mathcal{
7   T$}
\end{pspicture}

```

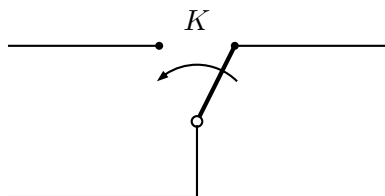
Tripole style parameters



```

1 \begin{pspicture}(5,3)
2   \pnode(0,2){A}
3   \pnode(5,2){B}
4   \pnode(0,0){C}
5   \Tswitch[tripolestyle=left](A)(B)(C){$K$}
6 \end{pspicture}

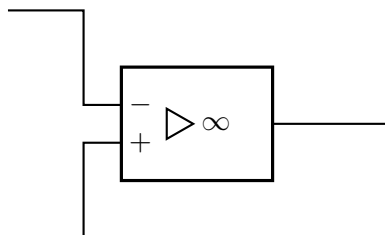
```



```

1 \begin{pspicture}(5,3)
2   \pnode(0,2){A}
3   \pnode(5,2){B}
4   \pnode(0,0){C}
5   \Tswitch[tripolestyle=right](A)(B)(C){$K$}
6 \end{pspicture}

```

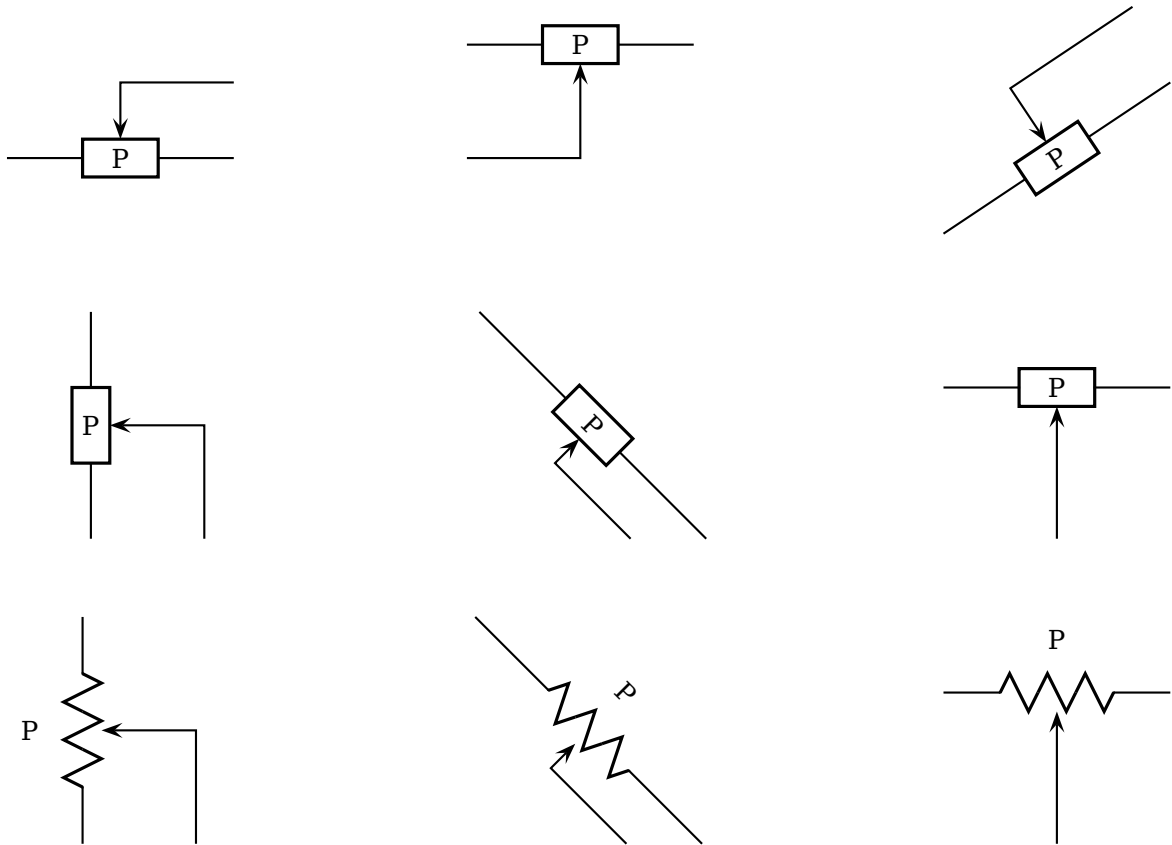


```

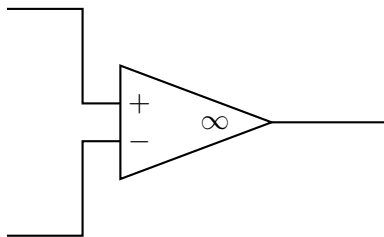
1 \begin{pspicture}(5,3)
2   \pnode(0,3){A}
3   \pnode(0,0){B}
4   \pnode(5,1.5){C}
5   \OA[tripolestyle=french](A)(B)(C)
6 \end{pspicture}

```

Potentiometer tripole



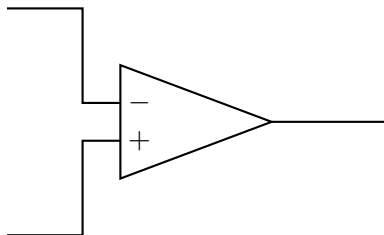
Other Parameters



```

1 \begin{pspicture}(5,3)
2   \pnode(0,0){A}
3   \pnode(0,3){B}
4   \pnode(5,1.5){C}
5   \OA[0Ainvert=false](B)(A)(C)
6 \end{pspicture}

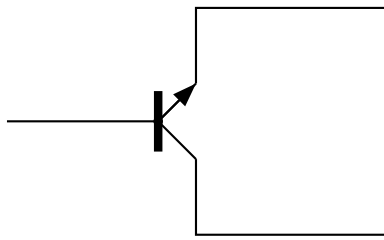
```



```

1 \begin{pspicture}(5,3)
2   \pnode(0,0){A}
3   \pnode(0,3){B}
4   \pnode(5,1.5){C}
5   \OA[0Aperfect=false](B)(A)(C)
6 \end{pspicture}

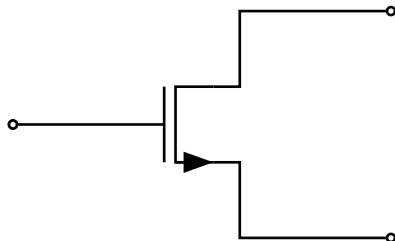
```



```

1 \begin{pspicture}(5,3)
2   \pnode(0,1.5){A}
3   \pnode(5,0){B}
4   \pnode(5,3){C}
5   \transistor[basesep=2cm,%
6     transistorinvert,transistorcircle=false](A)(B)(C)
7 \end{pspicture}

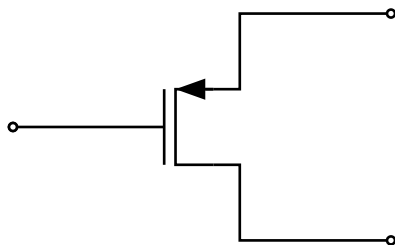
```



```

1 \begin{pspicture}(5,3)
2   \pnode(0,1.5){A}\psset{linewidth=1pt}
3   \transistor[basesep=2cm,arrows=o-o,
4     transistortype=FET](A){Emitter}{Collector}
5   \psline{o-}(5,3)(3,3)(3,3|Collector)(Collector)
6   \psline{o-}(5,0)(3,0)(3,3|Emitter)(Emitter)
7   \psline{o-}(A)([nodesep=2]A)
8 \end{pspicture}

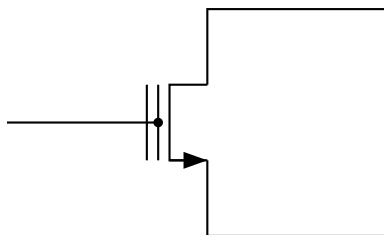
```



```

1 \begin{pspicture}(5,3)
2   \pnode(0,1.5){A}\psset{linewidth=1pt}
3   \transistor[basesep=2cm,arrows=o-o,
4     transistortype=FET,
5     FETchanneltype=P](A){Emitter}{Collector}
6   \psline{o-}(5,3)(3,3)(3,3|Collector)(Collector)
7   \psline{o-}(5,0)(3,0)(3,3|Emitter)(Emitter)
8   \psline{o-}(A)([nodesep=2]A)
9 \end{pspicture}

```



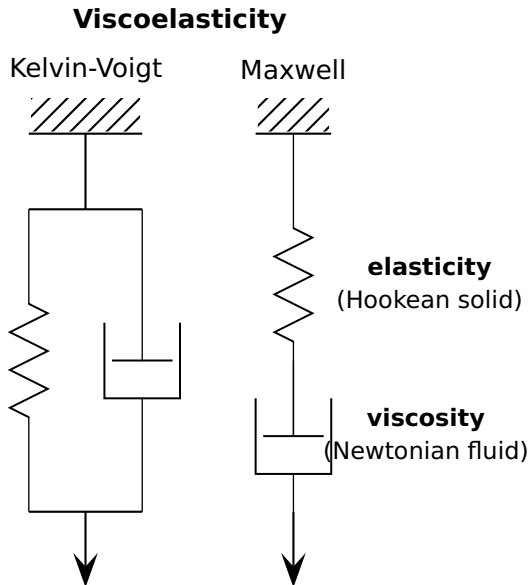
```

1 \begin{pspicture}(5,3)
2   \transistor[basesep=2cm,transistortype=FET,
3     FETmemory=true](0,1.5)(5,0)(5,3)
4 \end{pspicture}

```

1.4 Special objects

\dashpot

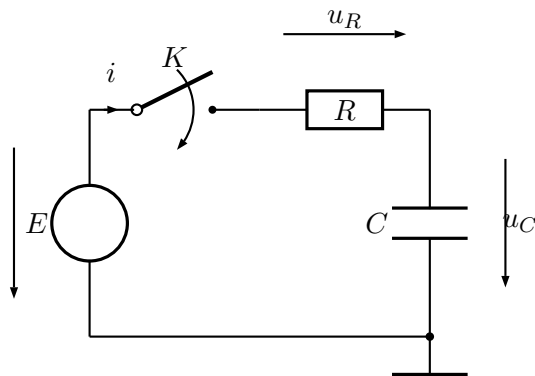


```

1 \newcommand*\pswall[3]{% ll ur lr
2   \psframe[linewidth=white,fillstyle=hlines,hatchcolor=black](#1)(#2)% (ll)(ur)
3   \psline[linewidth=black](#1)(#3)}
4 \begin{pspicture}(0.5,1)(8,10)
5   \rput(3,9.5){\sffamily \textbf{Viscoelasticity}}
6   % Kelvin-Voigt model (spring and dashpot parallel): =====
7   \rput[c](1.75,8.85){\sffamily Kelvin-Voigt}
8   \pswall{1,8}{2.5,8.5}{2.5,8}% top
9   \psline(1.75,8)(1.75,7)% top vertical line
10  % node definitions:
11  \pnode(1,7){ul1}\pnode(2.5,7){ur1} \pnode(1,3){ll1}\pnode(2.5,3){lr1}%
12  \psline(ur1)(ur1)% top line
13  \psline(ll1)(lr1)% bottom line
14  \resistor[dipolestyle=zigzag,linewidth=0.5pt](ul1)(ll1){}% spring
15  \dashpot[linewidth=0.5pt](ur1)(lr1){}% dashpot
16  \psline[arrowscale=3]{->}(1.75,3)(1.75,2)% force
17  % Maxwell model (spring and dashpot serial): =====
18  \rput[c](4.5,8.85){\sffamily Maxwell}
19  \pswall{4,8}{5,8.5}{5,8}% top
20  \pnode(4.5,8){t}\pnode(4.5,4){b}% node definitions
21  \resistor[dipolestyle=zigzag,linewidth=0.5pt,labeloffset=1.8](t)(b)% spring
22  {\sffamily\small\begin{tabular}{c}\textbf{elasticity}\\(Hookean solid)\end{tabular}}%
23    end spring
24  \dashpot[linewidth=0.5pt,labeloffset=1.8](4.5,5)(4.5,3)% dashpot
25  {\sffamily\small\begin{tabular}{c}\textbf{viscosity}\\(Newtonian fluid)\end{tabular}}
26  % end dashpot
27  \psline[arrowscale=3]{->}(4.5,3)(4.5,2)% force
28 \end{pspicture}

```

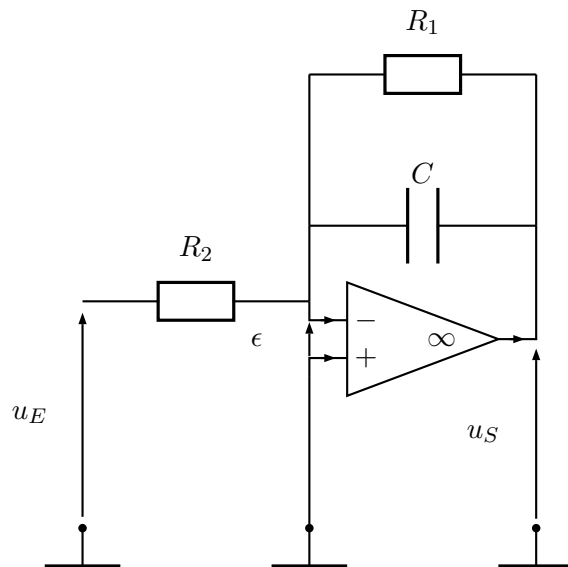
1.5 Examples



```

1 \begin{pspicture}(-1.5,-1)(6,5)
2 % [subgriddiv=1,griddots=10]
3 % Node definitions
4 \pnode(0,0){A}
5 \pnode(0,3){B}
6 \pnode(4.5,3){C}
7 \pnode(4.5,0){D}
8 % Dipole node connection
9 \Ucc[tension,dipoleconvention=generator](A)(B){$E$}
10 \multidipole(B)(C)%
11 \switch[intensitylabel=$i$]{$K$}%
12 \resistor[labeloffset=0,tensionlabel=$u_R$]{$R$}.
13 \capacitor[tensionlabel={$u_C$},
14   tensionlabeloffset=-1.2,tensionoffset=-1,
15   directconvention=false](D)(C){$C$}
16 % Wire to complete circuit
17 \wire(A)(D)
18 % Ground
19 \ground(D)
20 \end{pspicture}

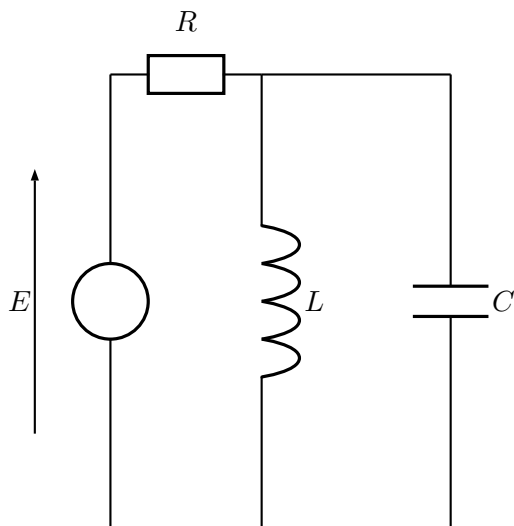
```



```

1 \begin{pspicture}(-0.5,0)(7,8)
2 % [subgriddiv=1,griddots=10]
3 % Node definitions
4 \pnode(0.5,1){A}
5 \pnode(3.5,1){B}
6 \pnode(6.5,1){C}
7 \pnode(0.5,4){D}
8 \pnode(3.5,4){Minus}
9 \pnode(3.5,3){Plus}
10 \pnode(6.5,5){S}
11 \pnode(3.5,5){E}
12 % Dipole node connections
13 \resistor(D)(Minus){$R_2$}
14 \capacitor(E)(S){$C$}
15 \resistor[parallel,parallelarm=2](E)(S){$R_1$}
16 \OA[intensity](Minus)(Plus)(S)
17 % Wires
18 \wire(Minus)(E)
19 \wire(Plus)(B)
20 % Tensions
21 \tension(A)(D){$u_E$}
22 \makeatletter % (special tricks see below)
23 \tension(C)(S@@){$u_S$}
24 \tension[linecolor=blue](Plus@@)(Minus@@){$\epsilon$}
25 \makeatother
26 % Grounds
27 \ground(A)
28 \ground(B)
29 \ground(C)
30 \end{pspicture}

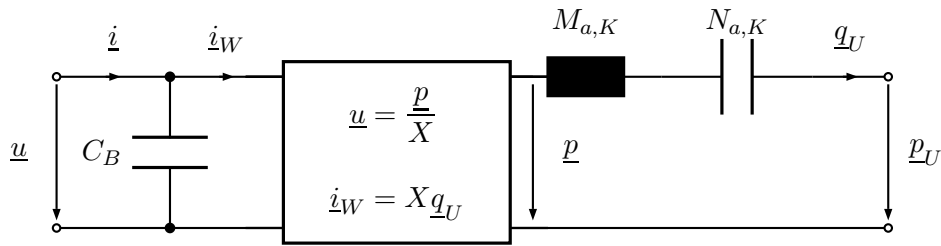
```



```

1 \begin{pspicture}(-1,0)(7,8)
2 % [subgriddiv=1,griddots=10]
3 % Node definitions
4 \pnode(1,1){A}
5 \pnode(1,7){B}
6 \pnode(3,1){C}
7 \pnode(3,7){D}
8 % Dipole node connections
9 \Ucc[tensionlabel=$E$](A)(B){}
10 \resistor(B)(D){$R$}
11 \coil(D)(C){$L$}
12 \capacitor[parallel,parallelarm=2.5](D)(C){$C$}
13 % Wire
14 \wire(A)(C)
15 \end{pspicture}

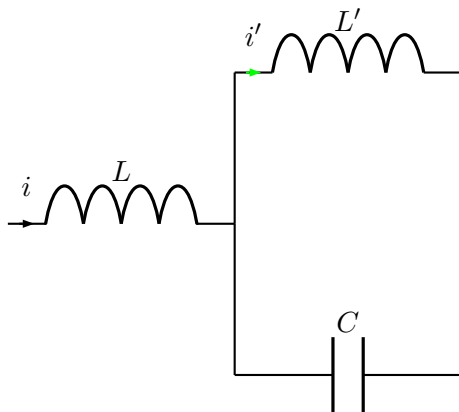
```

```

1 % \usepackage{amsmath} % example by Markus Graube
2 \begin{pspicture}(0,.5)(13,4)
3   \node(1,1){I_U} \node(1,3){I_0} \node(2.5,1){C} \node(2.5,3){D}
4   \node(4,1){K_LU} \node(4,3){K_L0} \node(7,1){K_RU} \node(7,3){K_R0}
5   \node(9,3){E} \node(7.3,3){K_R01} \node(7.3,1){K_RU1} \node(11,3){F}
6   \node(12,1){0_U} \node(12,3){0_0}
7   \tension[labeloffset=-0.5](I_0)(I_U){$\underline{u}$}
8   \wire[arrows=o-](I_U)(C)
9   \wire[intensitylabel=$\underline{i}$, arrows=o-](I_0)(D)
10  \capacitor[labeloffset=.9](C)(D){$C_B$}
11  \qdisk(C){2pt} \qdisk(D){2pt}
12  \wire(C)(K_LU)
13  \wire[intensitylabel=$\underline{i}_W$](D)(K_L0)
14  \quadripole(K_L0)(K_LU)(K_R0)(K_RU){\parbox{3cm}{%
15    \begin{align*}
16      \underline{u} &= \frac{\underline{p}}{X} \\
17      \underline{i}_W &= X \underline{q}_U
18    \end{align*}}
19  \wire(K_R0)(K_R01)
20  \tension[labeloffset=0.5](K_R01)(K_RU1){$\underline{p}$}
21  \coil[dipolestyle=rectangle](K_R0)(E){$M_{a,K}$}
22  \capacitor(E)(F){$N_{a,K}$}
23  \wire[intensitylabel=$\underline{q}_U$, arrows=-o](F)(0_0)
24  \wire[arrows=-o](K_RU)(0_U)
25  \tension[labeloffset=0.5](0_0)(0_U){$\underline{p}_U$}
26 \end{pspicture}

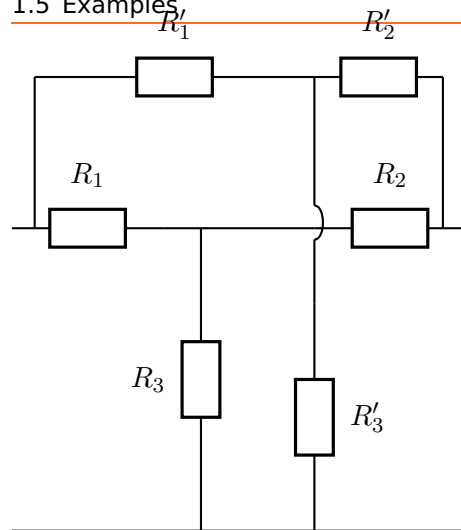
```



```

1 \begin{pspicture}(-0.25,-0.25)
2   (6,6)
3 % [subgriddiv=1,griddots=10]
4 % Node definitions
5 \node(0,3){A}
6 \node(3,3){B}
7 \node(6,3){C}
8 % Dipole node connections
9 \coil[intensitylabel=$i$](A)(B){$L$}
10 \coil[intensitylabel=$i'$,
11   intensitycolor=green,%
12   parallel,parallelarm=2](B)(C){$L'$}
13 \capacitor[parallel,parallelarm=-2](B)(C){$C$}
14 \end{pspicture}

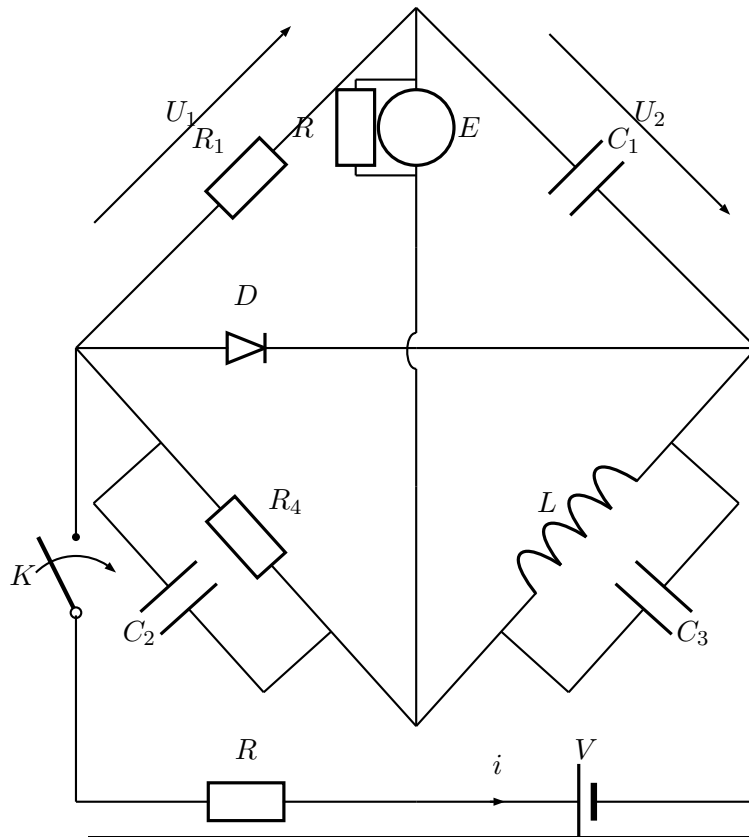
```



```

1 \begin{pspicture}(6,6)
2 % [subgriddiv=1,griddots=10]
3 % Node definitions
4 \pnode(0,0){A}\pnode(6,0){B}
5 \pnode(0.3,4){Cprime}\pnode(5.7,4){Dprime}
6 \pnode(2.5,4){Gprime}\pnode(2.5,0){Hprime}
7 \pnode(0,4){C}\pnode(6,4){D}
8 \pnode(0.3,6){E}\pnode(5.7,6){F}
9 \pnode(4,6){G}\pnode(4,0){H}
10 \multidipole(G)(H)%
11 \wire[intersect,
12   intersectA=C,intersectB=D]
13 \resistor{$R'_3$}.
14 \resistor(E)(G){$R'_1$}
15 \resistor(G)(F){$R'_2$}
16 \multidipole(C)(D)\resistor{$R_1$}%
17 \wire\resistor{$R_2$}.
18 \wire(A)(B)\wire(Cprime)(E)
19 \wire(Dprime)(F)
20 \resistor(Hprime)(Gprime){$R_3$}
21 \end{pspicture}

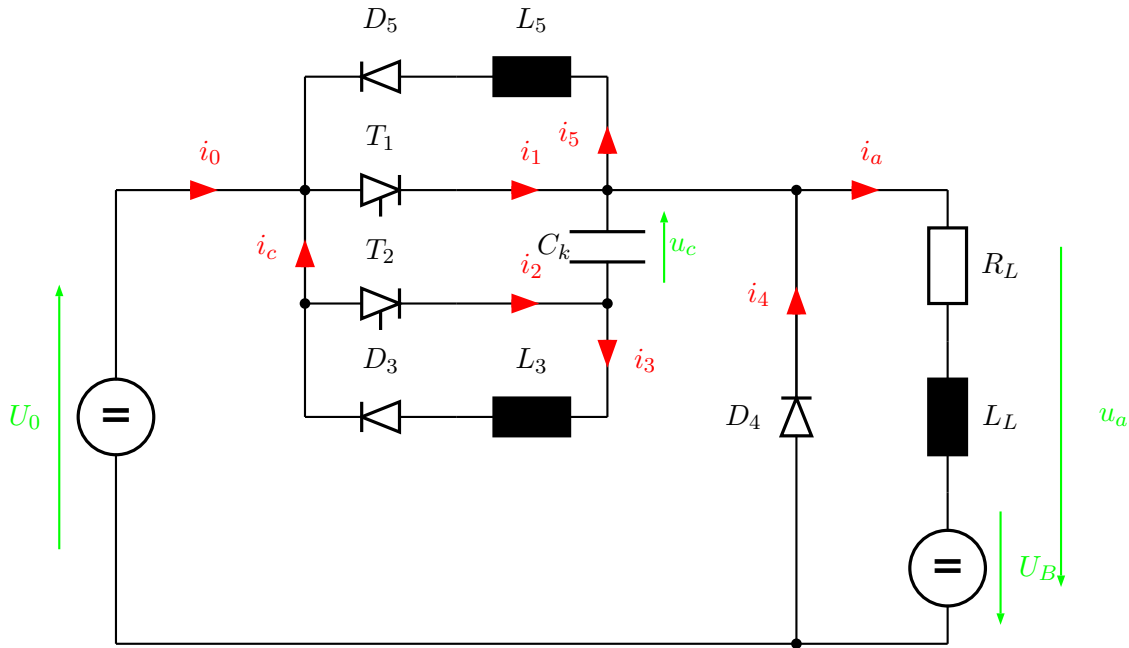
```



```

1 \begin{pspicture}(0,-0.25)(9,11)
2 % Node definitions
3 \pnode(0,0){A}\pnode(9,0){B}\pnode(0,6){C}\pnode(9,6){D}\pnode(4.5,1){E}\pnode
  (4.5,10.5){F}
4 %
5 \switch(A)(C){$K$}
6 \multidipole(A)(B)\resistor{$R$}\battery[intensitylabel=$i$]{$V$}.
7 \wire(B)(D)
8 \multidipole(C)(D)\diode{$D$}\wire.
9 \resistor[tensionlabel=$U_1$](C)(F){$R_1$} \resistor(C)(E){$R_4$}
10 \capacitor[parallel,parallelarm=1.2,parallese=1.5](C)(E){$C_2$}
11 \coil(E)(D){$L$}
12 \capacitor[parallel,parallelarm=1.2,parallese=1.5](E)(D){$C_3$}
13 \capacitor[tensionlabel=$U_2$](F)(D){$C_1$}
14 \multidipole(E)(F)\wire\wire[intersect,intersectA=C,intersectB=D]%
15 \circledipole[labeloffset=-0.7]{$E$}%
16 \resistor[parallel,parallelse=.6,parallelarm=.8]{$R$}.
17 \end{pspicture}

```

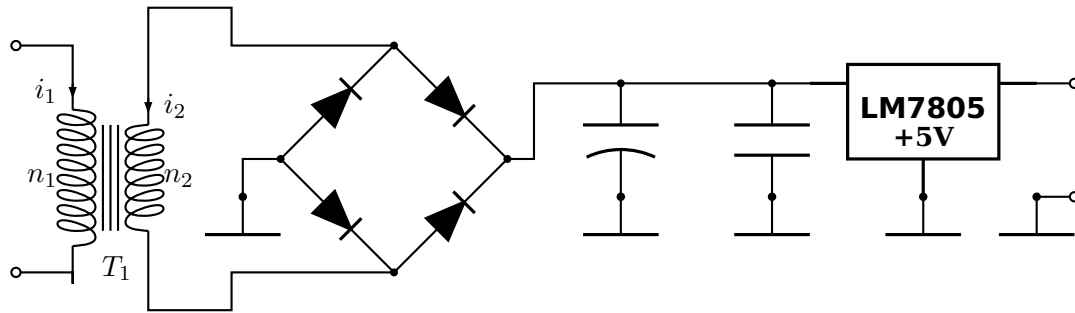


```

1 \begin{pspicture}(0,-0.2)(13,8)
2 \psset{intensitycolor=red,intensitylabelcolor=red,tensioncolor=green,
3 tensionlabelcolor=green,intensitywidth=3pt}
4 \circledipole[tension,tensionlabel=$U_0$,
5 tensionoffset=0.75,labeloffset=0](0,0)(0,6){\LARGE\textbf{=}}
6 \wire[intensity,intensitylabel=$i_0$](0,6)(2.5,6)
7 \diode[dipolestyle=thyristor](2.5,6)(4.5,6){$T_1$}
8 \wire[intensity,intensitylabel=$i_1$](4.5,6)(6.5,6)
9 \multidipole(6.5,7.5)(2.5,7.5)%
10 \coil[dipolestyle=rectangle,labeloffset=-0.75]{$L_5$}%
11 \diode[labeloffset=-0.75]{$D_5$}.
12 \wire[intensity,intensitylabel=$i_5$](6.5,6)(6.5,7.5)
13 \wire(2.5,7.5)(2.5,3)
14 \wire[intensity,intensitylabel=$i_c$](2.5,4.5)(2.5,6)
15 \qdisk(2.5,6){2pt}\qdisk(6.5,6){2pt}
16 \diode[dipolestyle=thyristor](2.5,4.5)(4.5,4.5){$T_2$}
17 \wire[intensity,intensitylabel=$i_2$](4.5,4.5)(6.5,4.5)
18 \capacitor[tension,tensionlabel=$u_c$,tensionoffset=-0.75,
19 tensionlabeloffset=-1](6.5,4.5)(6.5,6){$C_k$}
20 \qdisk(2.5,4.5){2pt}\qdisk(6.5,4.5){2pt}
21 \wire[intensity,intensitylabel=$i_3$](6.5,4.5)(6.5,3)
22 \multidipole(6.5,3)(2.5,3)%
23 \coil[dipolestyle=rectangle,labeloffset=-0.75]{$L_3$}%
24 \diode[labeloffset=-0.75]{$D_3$}.
25 \wire(6.5,6)(9,6)\qdisk(9,6){2pt}
26 \diode(9,6)(9,6){$D_4$}
27 \wire[intensity,intensitylabel=$i_4$](9,3.25)(9,6)
28 \wire[intensity,intensitylabel=$i_a$](9,6)(11,6)
29 \multidipole(11,6)(11,0)%
30 \resistor{$R_L$}
31 \coil[dipolestyle=rectangle]{$L_L$}
32 \circledipole[labeloffset=0,tension,tensionoffset=0.7,tensionlabel=$U_B$]{\LARGE\textbf{=}}.
33 \wire(0,0)(11,0)\qdisk(9,0){2pt}
34 \pnode(12.5,5.5){A}\pnode(12.5,0.5){B}
35 \tension(A)(B){$u_a$}
36 \end{pspicture}

```

The following example was written by Manuel Luque.

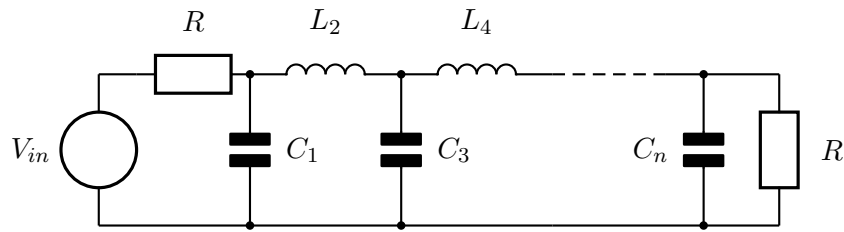


```

1 \begin{pspicture}(0,-0.5)(14,4)
2 % [subgriddiv=1,griddots=10]
3 \pnode(0,0){B}\pnode(0,3){A}
4 \pnode(2.5,3.5){C}\pnode(2.5,-0.5){D}\pnode(5,3){E}\pnode(6.5,1.5){F}
5 \pnode(5,0){G}\pnode(3.5,1.5){H} \pnode(8,2.5){I}\pnode(8,1){J}
6 \pnode(10,2.5){K}\pnode(10,1){L} \pnode(14,2.5){M}\pnode(12,1){N}
7 \pnode(3,1){H'}\pnode(14,2.5){O} \pnode(14,1){P}\pnode(13.5,1){Q}
8 \transformer[transformerprimarylabel=$i_1$,transformersecondarylabel=$i_2$,
9   primarylabel=$n_1$,secondarylabel=$n_2$](A)(B)(C)(D){$T_1$}
10 {\psset{fillstyle=solid,fillcolor=black}
11 \diode(H)(E){}\diode(H)(G){} \diode(E)(F){}\diode(G)(F){}
12 \capacitor[dipolestyle=chemical](I)(J){} \capacitor(K)(L){}
13 \REG(K)(M)(N)%
14   {\shortstack{\textsf{%
15     \textbf{\large LM7805}}\textbf{+5V}}}}
16 \ncangle{I}{F}\psline(I)(K) \ncangle{E}{C}\ncangle{G}{D}
17 \ncangle[arm=0]{P}{Q} \ncangle[arm=0]{H}{H'}
18 \ground(H')\ground(J)\ground(L)\ground(N)
19 \ground(Q)\qdisk(I){1.5pt}\qdisk(K){1.5pt}\qdisk(E){1.5pt}
20 \qdisk(G){1.5pt}\qdisk(H){1.5pt}\qdisk(F){1.5pt}
21 \pscircle[fillstyle=solid](A){0.075} \pscircle[fillstyle=solid](B){0.075}
22 \pscircle[fillstyle=solid](P){0.075} \pscircle[fillstyle=solid](O){0.075}
23 \end{pspicture}

```

The following example was written by Lionel Cordesses.

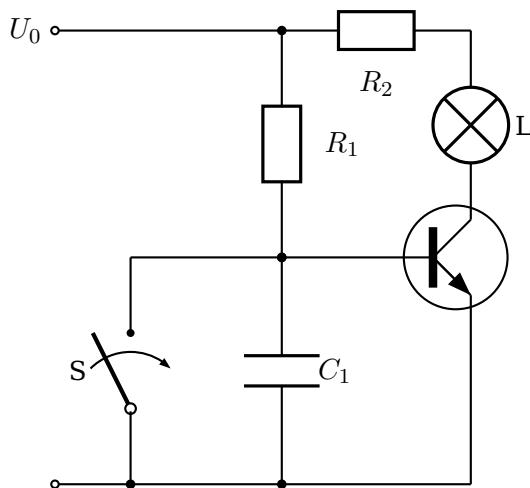


```

1 \begin{pspicture}(11,3)
2 \psset{dipolestyle=elektor}
3 \pnode(1,2){Vin}\pnode(0.5,2){S}\pnode(0.5,0){Sm}
4 \pnode(2.5,2){A}\pnode(4.5,2){B}\pnode(6.5,2){C}
5 \pnode(8,2){Cd}\pnode(8.5,2){D}\pnode(9.5,2){E}
6 \pnode(2.5,0){Am}\pnode(4.5,0){Bm}\pnode(6.5,0){Cm}
7 \pnode(8.5,0){Dm}\pnode(9.5,0){Em}
8 \Ucc[labeloffset=0.9](Sm)(S){$V_{in}$}\resistor(Vin)(A){$R$}
9 \capacitor(A)(Am){$C_1$}\capacitor(B)(Bm){$C_3$}
10 \capacitor[labeloffset=-0.7](D)(Dm){$C_n$}\resistor(E)(Em){$R$}
11 \coil(A)(B){$L_2$}\coil(B)(C){$L_4$}
12 \wire(Am)(Bm)\wire(Bm)(Cm)\wire(Cm)(Dm)\wire(Dm)(Em)\wire(D)(E)
13 \wire(Cd)(D)\psline[linestyle=dashed](C)(Cd)
14 \wire(S)(Vin)\wire(Sm)(Am)
15 \pscicle*(D){2\pslinewidth}\pscicle*(Dm){2\pslinewidth}
16 \pscicle*(A){2\pslinewidth}\pscicle*(Am){2\pslinewidth}
17 \pscicle*(B){2\pslinewidth}\pscicle*(Bm){2\pslinewidth}
18 \end{pspicture}

```

The following example was written by Christian Hoffmann.

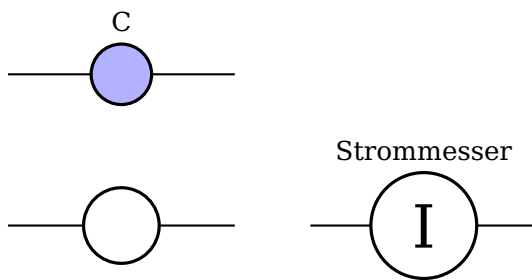


```

1 \SpecialCoor
2 \begin{pspicture}(0,-1)(7,6.5)%
3 \pnode(0,6){plus}
4 \pnode(3,3){basis}
5 \pnode([nodesep=-2] basis){schalter}
6 \pnode(0,0){masse}
7 \wire[arrows=o-*](plus)(basis|plus)
8 \uput[l](plus){$U_0$}
9 \resistor[labeloffset=.8](basis|plus)(basis){$R_1$}
10 \transistor[basesep=2cm](basis){emitter}{kollektor}
11 \wire[arrows=-*](schalter)(basis)
12 % \wire(basis)([nodesep=2] basis)
13 \wire(TBaseNode)(basis)
14 \switch(schalter|masse)(schalter){S}
15 \lamp(kollektor|plus)(kollektor){L}
16 \resistor(kollektor|plus)(basis|plus){$R_2$}
17 \wire(emitter)(emitter|masse)
18 \wire(emitter|masse)(basis|masse)
19 \capacitor(basis)(basis|masse){$C_1$}
20 \wire[arrows=-*](basis|masse)(schalter|masse)
21 \wire[arrows=-o](schalter|masse)(masse)
22 \end{pspicture}

```

Variable radius for



```

1 \begin{pspicture}(8,5)
2 \circledipole(0,1)(3,1){}
3 \pnode(4,1){A}\pnode(7,1){B}
4 \circledipole[radius=7mm,labeloffset=1cm](A)(B){Strommesser}\rput(5.5,1){\Huge I}
5 \circledipole[radius=4mm,fillstyle=solid,fillcolor=blue!30](0,3)(3,3){C}
6 \end{pspicture}

```


2 Microwave symbols

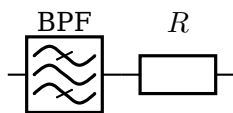
Since for microwave signal, the direction in which the signal spreads is very important, There are dipoleinput or tripoleinput or quadripoleinput and arrowinput parameters. The value of theses parameters are left or right for the first one and true or false for second one.

```

1 \ifPst@inputarrow
2   \ifx\psk@Dinput\pst@Dinput@right
3     \pcline[arrows=-C](#2)(dipole@1)
4     \pcline[arrows=->,arrowinset=0](#3)(dipole@2)
5   \else
6     \pcline[arrows=->,arrowinset=0](#2)(dipole@1)
7     \pcline[arrows=C-](dipole@2)(#3)
8   \fi
9 \else
10  \pcline[arrows=-C](#2)(dipole@1)
11  \pcline[arrows=C-](dipole@2)(#3)
12 \fi
13 \pcline[fillstyle=none,linestyle=none](#2)(#3)

```

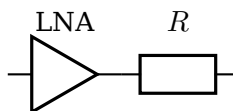
The last line is to correct some problems when I use colors (see example2) To add color in components (Monopole, tripole and Quadripole), there is a new argument. `\multidipole` also works:



```

1 \begin{pspicture}(4,2)
2   \pnode(0.5,1){A}
3   \pnode(3.5,1){B}
4   \multidipole(A)(B)\filter{BPF}%
5   \resistor{$R$}.
6 \end{pspicture}

```



```

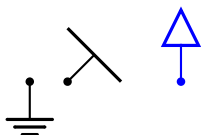
1 \begin{pspicture}(4,2)
2   \pnode(0.5,1){A}
3   \pnode(3.5,1){B}
4   \multidipole(A)(B)\amplifier{LNA}%
5   \resistor{$R$}.
6 \end{pspicture}

```

2.1 New monopole components

New ground

`groundstyle: ads | old | triangle`



```

1 \begin{pspicture}(3,2)
2   \pnode(0.5,1){A}
3   \pnode(1,1){B}
4   \pnode(2.5,1){C}
5   \newground(A)
6   \newground[groundstyle=old]{135}(B)
7   \newground[linecolor=blue,groundstyle=triangle]{180}(C)
8 \end{pspicture}

```

Antenna

antennastyle: two | three | triangle



```
1 \begin{pspicture}(3,2)
2   \pnode(1,0.5){A}
3   \antenna[antennastyle=three](A)
4 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(1,0.5){A}
3   \antenna(A)
4 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(1,0.5){A}
3   \antenna[antennastyle=triangle](A)
4 \end{pspicture}
```

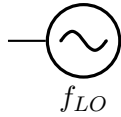
2.2 New monopole macro-components

Oscillator

output: top | right | bottom | left

inputarrow: false | true

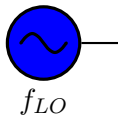
L0style: - | crystal



```
1 \begin{pspicture}(3,2)
2   \pnode(1,1){A}
3   \oscillator[output=left,inputarrow=false](A)%
4     {$f_{LO}$}{}
5 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(1,1){A}
3   \oscillator[output=top,inputarrow=true,L0style=crystal](A)%
4     {f$_{\text{L0}}$}{}
5 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(1,1){A}
3   \oscillator[output=right,inputarrow=false](A)%
4     {$f_{LO}$}{\fillstyle=solid,fillcolor=blue}
5 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(1,1){A}
3   \oscillator[output=bottom,inputarrow=false](A)%
4     {$f_{LO}$}{}
5 \end{pspicture}
```

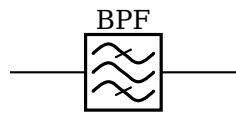
2.3 New dipole macro-components

Filters

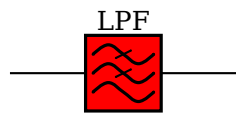
dipolestyle: bandpass | lowpass | highpass

inputarrow: false | true

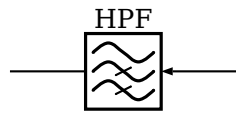
dipoleinput: left | right



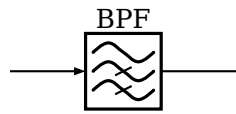
```
1 \begin{pspicture}(3,2)
2   \pnode(0,1){A} \pnode(3,1){B}
3   \filter(A)(B){BPF}
4 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(0,1){A} \pnode(3,1){B}
3   \filter[dipolestyle=lowpass,fillstyle=solid,%
4     fillcolor=red](A)(B){LPF}
5 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(0,1){A} \pnode(3,1){B}
3   \filter[dipolestyle=highpass,dipoleinput=right,
4     inputarrow=true](A)(B){HPF}
5 \end{pspicture}
```

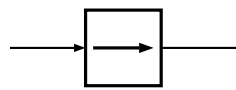


```
1 \begin{pspicture}(3,2)
2   \pnode(0,1){A} \pnode(3,1){B}
3   \filter[dipolestyle=highpass,inputarrow=true](A)(B){BPF}
4 \end{pspicture}
```

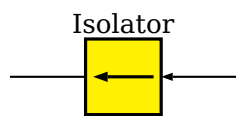
Isolator

inputarrow: false | true

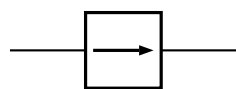
dipoleinput: left | right



```
1 \begin{pspicture}(3,2)
2   \pnode(0,1){A} \pnode(3,1){B}
3   \isolator[inputarrow=true](A)(B){}
4 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(0,1){A} \pnode(3,1){B}
3   \isolator[dipoleinput=right,inputarrow=true,
4     fillstyle=solid,fillcolor=yellow](A)(B){Isolator}
5 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(0,1){A} \pnode(3,1){B}
3   \isolator[dipoleinput=left](A)(B){}
4 \end{pspicture}
```

Frequency multiplier/divider

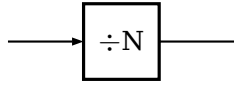
dipolestyle: multiplier | divider

value: $N \mid n \in N$

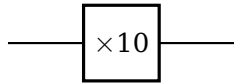
programmable: false | true

inputarrow: false | true

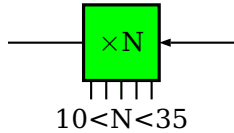
dipoleinput: left | right



```
1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}\pnode(3,1){B}
3   \freqmult[dipolestyle=divider,inputarrow=true](A)(B){}
4 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(0,1){A}\pnode(3,1){B}
3   \freqmult[dipolestyle=multiplier,value=10](A)(B){}
4 \end{pspicture}
```

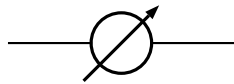


```
1 \begin{pspicture}(3,3)
2   \pnode(0,1.5){A}\pnode(3,1.5){B}
3   \freqmult[dipolestyle=multiplier,programmable=true,
4     labeloffset=-1,dipoleinput=right,inputarrow=true,
5     fillstyle=solid,fillcolor=green](A)(B){10<N<35}
6 \end{pspicture}
```

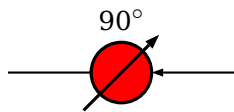
Phase shifter

inputarrow: false | true

dipoleinput: left | right



```
1 \begin{pspicture}(3,2)
2   \pnode(0,1){A1} \pnode(3,1){A2}
3   \phaseshifter(A1)(A2){}
4 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(0,1){B1} \pnode(3,1){B2}
3   \phaseshifter[inputarrow=true,dipoleinput=right,
4     fillstyle=solid,fillcolor=red](B1)(B2){90^\circ}
5 \end{pspicture}
```

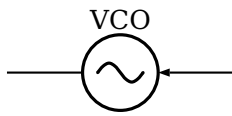
VCO

inputarrow: false | true

dipoleinput: left | right



```
1 \begin{pspicture}(3,2)
2   \pnode(0,1){A1} \pnode(3,1){A2}
3   \vco[fillstyle=solid,fillcolor=yellow](A1)(A2){}
4 \end{pspicture}
```



```

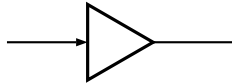
1 \begin{pspicture}(3,2)
2   \pnode(0,1){B1} \pnode(3,1){B2}
3   \vco[dipoleinput=right,inputarrow=true](B1)(B2){VCO}
4 \end{pspicture}

```

Amplifier

inputarrow: false| true

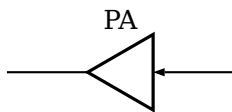
dipoleinput: left | right



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A} \pnode(3,1){B}
3   \amplifier[inputarrow=true](A)(B){}
4 \end{pspicture}

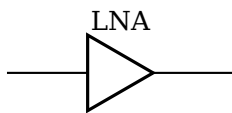
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A} \pnode(3,1){B}
3   \amplifier[dipoleinput=right,inputarrow=true](A)(B){PA}
4 \end{pspicture}

```



```

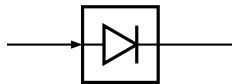
1 \begin{pspicture}(3,2)
2   \pnode(0,1){A} \pnode(3,1){B}
3   \amplifier[dipoleinput=left](A)(B){LNA}
4 \end{pspicture}

```

Detector

inputarrow: false| true

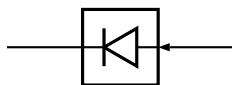
dipoleinput: left | right



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A} \pnode(3,1){B}
3   \detector[inputarrow=true](A)(B){}
4 \end{pspicture}

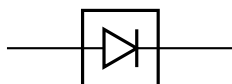
```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A} \pnode(3,1){B}
3   \detector[dipoleinput=right,inputarrow=true](A)(B){}
4 \end{pspicture}

```



```

1 \begin{pspicture}(3,2)
2   \pnode(0,1){A} \pnode(3,1){B}
3   \detector[dipoleinput=left](A)(B){}
4 \end{pspicture}

```

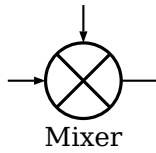
2.4 New tripole macro-components

Mixer

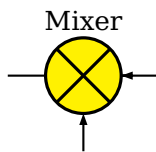
tripolestyle: bottom | top

tripoleconfig: left | right

inputarrow: false | true



```
1 \begin{pspicture}(3,2)
2   \pnode(0.5,1){A}\pnode(2.5,1){B}\pnode(1.5,2){C}
3   \mixer[tripolestyle=top,inputarrow=true](A)(B)(C)%
4     {Mixer}{}
5 \end{pspicture}
```



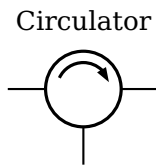
```
1 \begin{pspicture}(3,2)
2   \pnode(0.5,1){A}\pnode(2.5,1){B}\pnode(1.5,0){C}
3   \mixer[inputarrow=true,tripoleinput=right](A)(B)(C)
4     {Mixer}{fillstyle=solid,fillcolor=yellow}
5 \end{pspicture}
```

Circulator

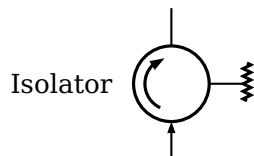
tripolestyle: circulator | isolator

inputarrow: false | true

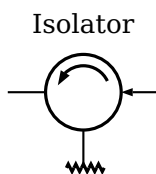
tripoleinput: left | right



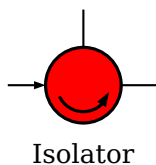
```
1 \begin{pspicture}(3,2)
2   \pnode(0.5,1){A}\pnode(2.5,1){B}\pnode(1.5,0){C}
3   \circulator{0}(A)(B)(C){Circulator}{}
4 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(1.5,0.5){A}\pnode(1.5,2.5){B}\pnode(0.5,1.5){C}
3   \circulator[tripolestyle=isolator,inputarrow=true]{90}%
4     (A)(B)(C){Isolator}{}
5 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(0.5,1){A}\pnode(2.5,1){B}\pnode(1.5,0){C}
3   \circulator[tripoleconfig=right,tripolestyle=isolator,
4     inputarrow=true,tripoleinput=right]{0}%
5     (B)(A)(C){Isolator}{}
6 \end{pspicture}
```

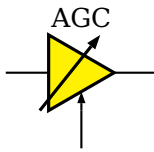


```
1 \begin{pspicture}(3,2)
2   \pnode(0.5,1){A}\pnode(2.5,1){B}\pnode(1.5,2){C}
3   \circulator[tripoleconfig=right,
4     inputarrow=true]{180}(A)(B)(C){Isolator}%
5     {fillstyle=solid,fillcolor=red}
6 \end{pspicture}
```

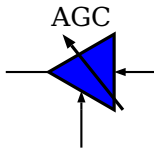
Agc

inputarrow: false| true

tripoleinput: left | right



```
1 \begin{pspicture}(3,2)
2   \pnode(0.5,1){A}\pnode(2.5,1){B}\pnode(1.5,0){C}
3   \agc(A)(B)(C){AGC}{fillstyle=solid,fillcolor=yellow}
4 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(0.5,1){A}\pnode(2.5,1){B}\pnode(1.5,0){C}
3   \agc[tripoleinput=right,inputarrow=true](A)(B)(C)%
4     {AGC}{fillstyle=solid,fillcolor=blue}
5 \end{pspicture}
```

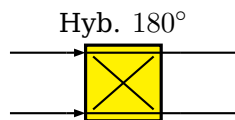
2.5 New quadripole macro-components

Coupler

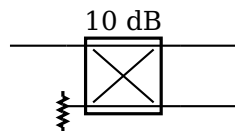
couplerstyle: hybrid | directional

inputarrow: false| true

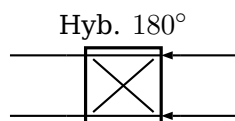
quadripoleinput: left | right



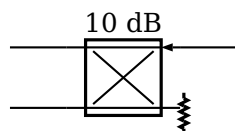
```
1 \begin{pspicture}(3,2)
2   \pnode(0,1.4){A} \pnode(0,0.6){B}
3   \pnode(3,1.4){C} \pnode(3,0.6){D}
4   \coupler[couplerstyle=hybrid,inputarrow=true](A)(B)(C)(D)%
5     {Hyb. $180^\circ$}
6     {fillstyle=solid,fillcolor=yellow}
7 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(0,1.4){A} \pnode(0,0.6){B}
3   \pnode(3,1.4){C} \pnode(3,0.6){D}
4   \coupler[couplerstyle=directional](A)(B)(C)(D){10~dB}{ }
5 \end{pspicture}
```



```
1 \begin{pspicture}(3,2)
2   \pnode(0,1.4){A} \pnode(0,0.6){B}
3   \pnode(3,1.4){C} \pnode(3,0.6){D}
4   \coupler[couplerstyle=hybrid,inputarrow=true,%
5     quadripoleinput=right](A)(B)(C)(D)%
6     {Hyb. $180^\circ$}
7 \end{pspicture}
```

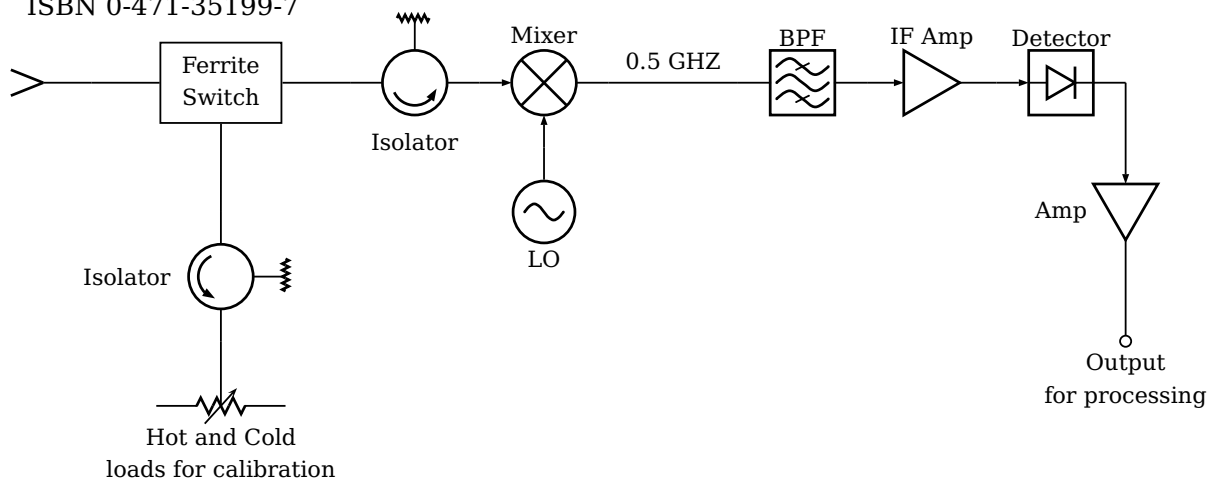


```
1 \begin{pspicture}(3,2)
2   \pnode(0,1.4){A} \pnode(0,0.6){B}
3   \pnode(3,1.4){C} \pnode(3,0.6){D}
4   \coupler[couplerstyle=directional,quadripoleinput=right,%
5     inputarrow=true](A)(B)(C)(D){10~dB}{ }
6 \end{pspicture}
```

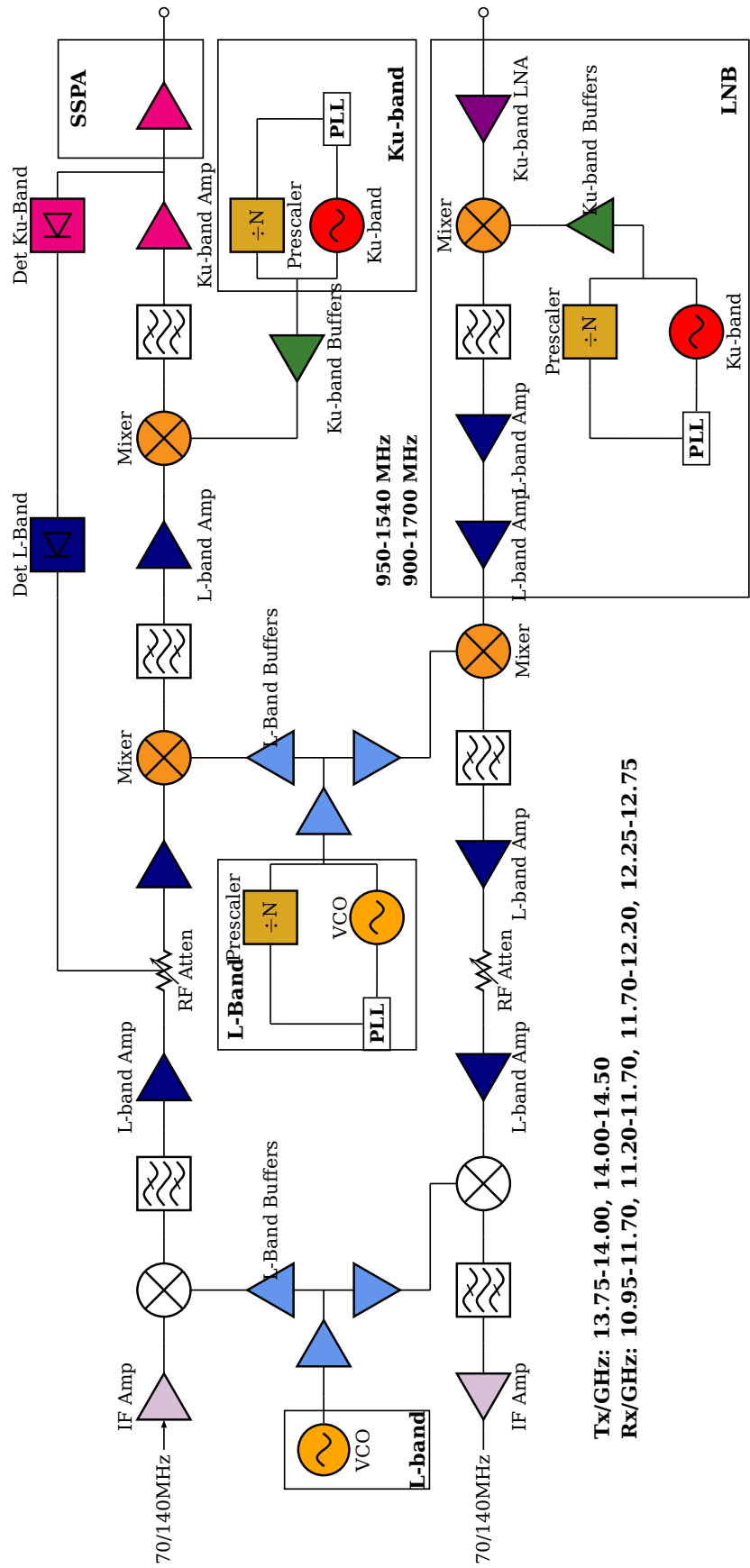
2.6 Examples

Radiometer block diagram example

From Chang, K., RF and Microwave Wireless Systems, Wiley InterScience, page 319, ISBN 0-471-35199-7



Ku-band Transceiver



Tx/GHz: 13.75-14.00, 14.00-14.50
Rx/GHz: 10.95-11.70, 11.20-11.70, 11.70-12.20, 12.25-12.75

3 Flip Flops – logical elements

The syntax for all logical base circuits is

$$\backslash\text{logic} [\text{Options}] (x_0, y_0) \{label\}$$

where the options and the origin are optional. If they are missing, then the default options, described in the next section and the default origin (0,0) is used. The origin specifies the lower left corner of the logical circuit.

xLkeywordlogicType

```
1 \logic{Demo}
2 \logic[logicType=and]{Demo}
3 \logic(0,0){Demo}
4 \logic[logicType=and](0,0){Demo}
```

The above four „different“ calls of the `\logic` macro give the same output, because they are equivalent.

3.1 The Options

| <i>name</i> | <i>type</i> | <i>default</i> |
|-------------------------------|-------------|----------------------------|
| <code>logicShowNode</code> | boolean | false |
| <code>logicShowDot</code> | boolean | false |
| <code>logicNodestyle</code> | command | <code>\footnotesize</code> |
| <code>logicSymbolstyle</code> | command | <code>\large</code> |
| <code>logicSymbolpos</code> | value | 0.5 |
| <code>logicLabelstyle</code> | command | <code>\small</code> |
| <code>logicType</code> | string | and |
| <code>logicChangeLR</code> | boolean | false |
| <code>logicWidth</code> | length | 1.5 |
| <code>logicHeight</code> | length | 2.5 |
| <code>logicWireLength</code> | length | 0.5 |
| <code>logicNInput</code> | number | 2 |
| <code>logicJInput</code> | number | 2 |
| <code>logicKInput</code> | number | 2 |

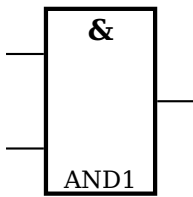
3.2 Basic Logical Circuits

At least the basic objects require a unique label name, otherwise it is not sure, that all nodes will work well. The label may contain any alphanumerical character and most of all symbols. But it is save using only combinations of letters and digits. For example:

And0
a0
a123
12
NOT123a

A_1 is not a good choice, the underscore may cause some problems.

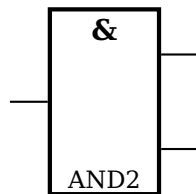
And



```

1 \begin{pspicture}(-1,0)(3,3)
2 \logic{AND1}
3 \end{pspicture}

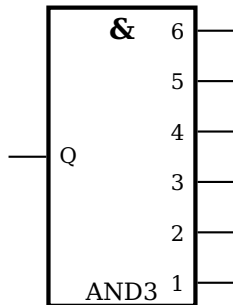
```



```

1 \begin{pspicture}(-0.5,0)(3,3)
2 \logic[logicChangeLR]{AND2}
3 \end{pspicture}

```

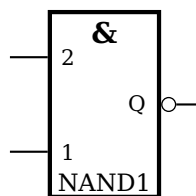


```

1 \begin{pspicture}(-0.5,0)(4,5)
2 \logic[logicShowNode,%
3   logicWidth=2,
4   logicHeight=4,
5   logicNInput=6,
6   logicChangeLR](1,1){AND3}
7 \end{pspicture}

```

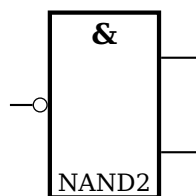
NotAnd



```

1 \begin{pspicture}(-0.5,0)(3,3)
2 \logic[logicType=nand,
3   logicShowNode]{NAND1}
4 \end{pspicture}

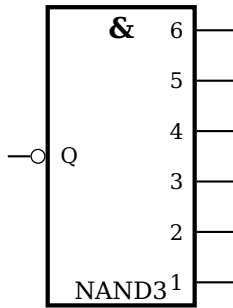
```



```

1 \begin{pspicture}(-0.5,0)(3,3)
2 \logic[logicType=nand,
3   logicChangeLR]{NAND2}
4 \end{pspicture}

```

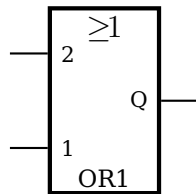


```

1 \begin{pspicture}(4,5)
2 \logic[logicType=nand,
3   logicShowNode,
4   logicWidth=2,
5   logicHeight=4,
6   logicNInput=6,
7   logicChangeLR](1,1){NAND3}
8 \end{pspicture}

```

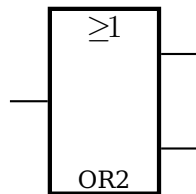
Or



```

1 \begin{pspicture}(-0.5,0)(3,3)
2 \logic[logicType=or,
3   logicShowNode]{OR1}
4 \end{pspicture}

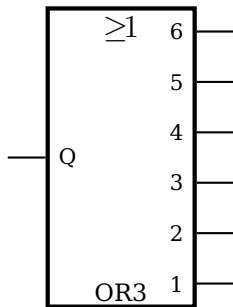
```



```

1 \begin{pspicture}(-0.5,0)(3,3)
2 \logic[logicType=or,
3   logicChangeLR]{OR2}
4 \end{pspicture}

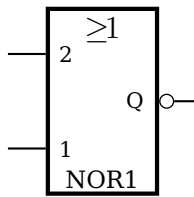
```



```

1 \begin{pspicture}(4,5)
2 \logic[logicType=or,
3   logicShowNode,
4   logicWidth=2,
5   logicHeight=4,
6   logicNInput=6,
7   logicChangeLR](1,1){OR3}
8 \end{pspicture}

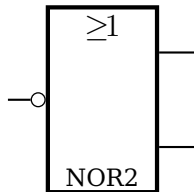
```

Not Or

```

1 \begin{pspicture}(-0.5,0)(3,3)
2 \logic[logicType=nor,
3   logicShowNode]{NOR1}
4 \end{pspicture}

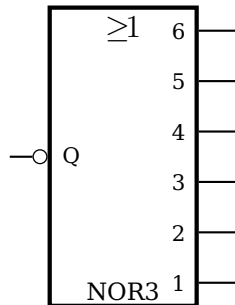
```



```

1 \begin{pspicture}(-0.5,0)(3,3)
2 \logic[logicType=nor,
3   logicChangeLR]{NOR2}
4 \end{pspicture}

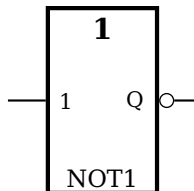
```



```

1 \begin{pspicture}(4,5)
2 \logic[logicType=nor,
3   logicShowNode,
4   logicWidth=2,
5   logicHeight=4,
6   logicNInput=6,
7   logicChangeLR](1,1){NOR3}
8 \end{pspicture}

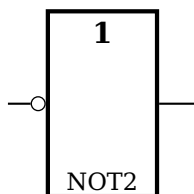
```

Not

```

1 \begin{pspicture}(-0.5,0)(3,3)
2 \logic[logicType=not,
3   logicShowNode]{NOT1}
4 \end{pspicture}

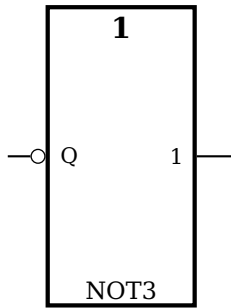
```



```

1 \begin{pspicture}(-0.5,0)(3,3)
2 \logic[logicType=not,
3   logicChangeLR]{NOT2}
4 \end{pspicture}

```

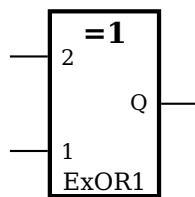


```

1 \begin{pspicture}(4,5)
2 \logic[logicType=not,
3     logicShowNode,
4     logicWidth=2,
5     logicHeight=4,
6     logicChangeLR](1,1){NOT3}
7 \end{pspicture}

```

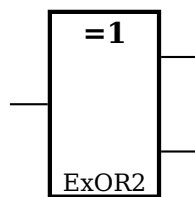
Exclusive OR



```

1 \begin{pspicture}(-0.5,0)(3,3)
2 \logic[logicType=exor,
3     logicShowNode]{ExOR1}
4 \end{pspicture}

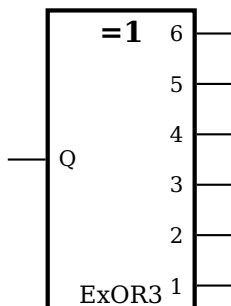
```



```

1 \begin{pspicture}(-0.5,0)(3,3)
2 \logic[logicType=exor,
3     logicChangeLR]{ExOR2}
4 \end{pspicture}

```

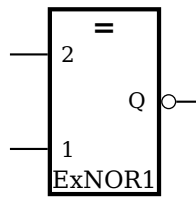


```

1 \begin{pspicture}(4,5)
2 \logic[logicType=exor,
3     logicShowNode,
4     logicNInput=6,
5     logicWidth=2,
6     logicHeight=4,
7     logicChangeLR](1,1){ExOR3}
8 \end{pspicture}

```

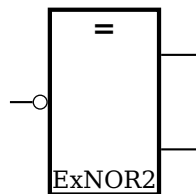
Exclusive NOR



```

1 \begin{pspicture}(-0.5,0)(3,3)
2 \logic[logicType=exnor,
3   logicShowNode]{ExNOR1}
4 \end{pspicture}

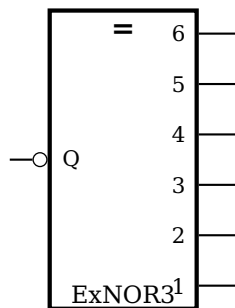
```



```

1 \begin{pspicture}(-0.5,0)(3,3)
2 \logic[logicType=exnor,
3   logicChangeLR]{ExNOR2}
4 \end{pspicture}

```

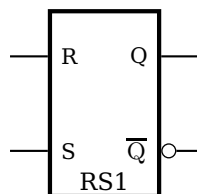


```

1 \begin{pspicture}(4,5)
2 \logic[logicType=exnor,
3   logicShowNode,
4   logicNInput=6,
5   logicWidth=2,
6   logicHeight=4,
7   logicChangeLR](1,1){ExNOR3}
8 \end{pspicture}

```

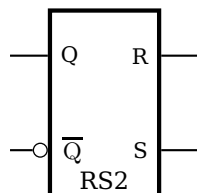
3.3 RS Flip Flop



```

1 \begin{pspicture}(-1,-1)(3,3)
2 \logic[logicShowNode,
3   logicType=RS]{RS1}
4 \end{pspicture}

```

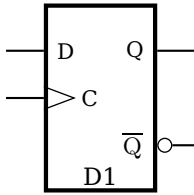


```

1 \begin{pspicture}(-1,-1)(3,3)
2 \logic[logicShowNode,
3   logicType=RS,
4   logicChangeLR]{RS2}
5 \end{pspicture}

```

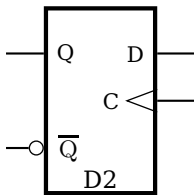
3.4 D Flip Flop



```

1 \begin{pspicture}(-1,-1)(3,3)
2 \logic[logicShowNode,
3   logicType=D]{D1}
4 \end{pspicture}

```

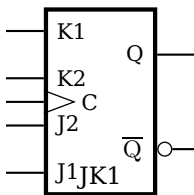


```

1 \begin{pspicture}(-1,-1)(3,3)
2 \logic[logicShowNode=true,
3   logicType=D,
4   logicChangeLR]{D2}
5 \end{pspicture}

```

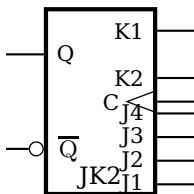
3.5 JK Flip Flop



```

1 \begin{pspicture}(-1,-1)(3,3)
2 \logic[logicShowNode,
3   logicType=JK,
4   logicKInput=2,
5   logicJInput=2]{JK1}
6 \end{pspicture}

```

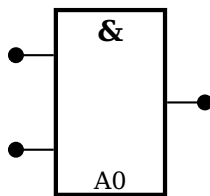


```

1 \begin{pspicture}(-1,-1)(3,3)
2 \logic[logicShowNode,logicType=JK,
3   logicKInput=2, logicJInput=4,
4   logicChangeLR]{JK2}
5 \end{pspicture}

```

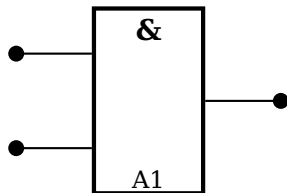
3.6 Other Options



```

1 \begin{pspicture}(-0.5,0)(3,2.5)
2 \logic[logicShowDot]{A0}
3 \end{pspicture}

```



```

1 \begin{pspicture}(-1,0)(3,2.5)
2 \logic[logicWireLength=1,
3   logicShowDot]{A1}
4 \end{pspicture}

```

The unit of `logicWireLength` is the same than the actual one for `pstricks`, set by the `unit` option.

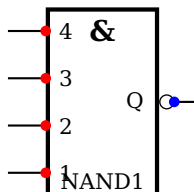
3.7 The Node Names

Every logic circuit is defined with its name, which should be a unique one. If we have the following NAND circuit, then `pst-circ` defines the nodes

NAND11, NAND12, NAND13, NAND14, NAND1Q

If there exists an inverted output, like for alle Flip Flops, then the negated one gets the appendix `neg` to the node name. For example:

NAND1Q, NAND1Qneg



```

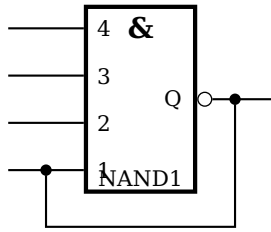
1 \begin{pspicture}(-0.5,0)(2.5,3)
2 \logic[logicShowNode=true,%
3   logicLabelStyle=\footnotesize,%
4   logicType=nand,%
5   logicNInput=4]{NAND1}
6 \multido{\n=1+1}{4}{%
7   \pscircle*[linecolor=red](NAND1\n){2pt}%
8 }
9 \pscircle*[linecolor=blue](NAND1Q){2pt}
10 \end{pspicture}

```

Now it is possible to draw a line from the output to the input

`\ncbar[angleA=0,angleB=180]{<Node A>}{<Node B>}`

It may be easier to print a grid since the drawing phase and then comment it out if all is finished.

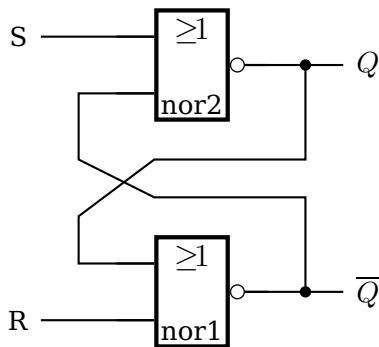


```

1 \begin{pspicture}(-1,-1)(2.5,3)
2 \logic[logicShowNode=true,%
3   logicLabelstyle=\footnotesize,%
4   logicType=nand,%
5   logicWireLength=1,%
6   logicNInput=4]{NAND1}
7 \pnode(-0.5,0|NAND1){tempA}
8 \pnode(2,0|NAND1Q){tempB}
9 \end{pspicture}
10 \ncbar[angleA=-90,angleB=0,arm=0.75,%
11   arrows=*, dotsize=0.15]{tempA}{tempB}

```

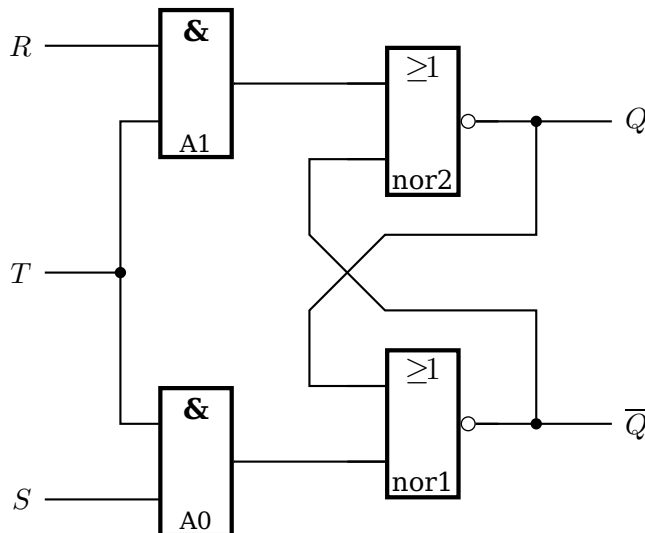
3.8 Examples



```

1 \begin{pspicture}(-1,0)(5,5)
2 \psset{logicType=nor, logicLabelstyle=\normalsize,%
3   logicWidth=1, logicHeight=1.5, dotsize=0.15}
4 \logic(1.5,0){nor1}
5 \logic(1.5,3){nor2}
6 \psline(nor2Q)(4,0|nor2Q)
7 \uput[0](4,0|nor2Q){$Q$}
8 \psline(nor1Q)(4,0|nor1Q)
9 \uput[0](4,0|nor1Q){$\overline{Q}$}
10 \psline{*-}(3.50,0|nor2Q)(3.5,2.5)(1.5,2.5)
11   (0.5,1.75)(0.5,0|nor12)(nor12)
12 \psline{*-}(3.50,0|nor1Q)(3.5,2)(1.5,2)
13   (0.5,2.5)(0.5,0|nor21)(nor21)
14 \psline(0,0|nor11)(nor11)\uput[180](0,0|nor11){R}
15 \psline(0,0|nor22)(nor22)\uput[180](0,0|nor22){S}
16 \end{pspicture}

```



```

1 \begin{pspicture}(-4,0)(5,7)
2   \psset{logicWidth=1, logicHeight=2, dotsize=0.15}
3   \logic[logicWireLength=0](-2,0){A0}
4   \logic[logicWireLength=0](-2,5){A1}
5   \ncbar[angleA=-180,angleB=-180,arm=0.5]{A11}{A02}
6   \psline[dotsize=0.15]{-}{(-3.5,3.5)(-2.5,3.5)}
7   \uput[180](-3.5,3.5){$T$}
8   \psline(-3.5,0.5)(A01)\uput[180](-3.5,0.5){$S$}
9   \psline(-3.5,6.5)(A12)\uput[180](-3.5,6.5){$R$}
10  \psset{logicType=nor, logicLabelstyle=\normalsize}
11  \logic(1,0.5){nor1}
12  \logic(1,4.5){nor2}
13  \psline(nor2Q)(4,0|nor2Q)
14  \uput[0](4,0|nor2Q){$Q$}
15  \psline(nor1Q)(4,0|nor1Q)
16  \uput[0](4,0|nor1Q){$\overline{Q}$}
17  \psline{*}{(3,0|nor2Q)(3,4)(1,4)(0,3)(0,0|nor12)(nor12)}
18  \psline{*}{(3,0|nor1Q)(3,3)(1,3)(0,4)(0,0|nor21)(nor21)}
19  \psline(A0Q)(nor11)
20  \psline(A1Q)(nor22)
21 \end{pspicture}

```

4 Adding new components

Adding new components is not simple unless you need only a simple dipole. For dipoles a macro is provided that generates all helping macros for a new component so that you need to write only the actual drawing code.

If you want to add a new dipole component, you only need the following code:

```

1 \newCircDipole{ComponentName}%
2 \def\pst@draw@ComponentName{%
3   % The PSTricks code for your component
4   % The center of the component is at (0,0)
5   \pnode(component_left_end,0){dipole@1}
6   \pnode(component_right_end,0){dipole@2}}

```

This code can be placed in the core code or somewhere in the respective document in which case it must be surrounded by `\makeatletter...\makeatother`.

If your new dipole should also work with `\multidipole` then you have to make some changes in the `\multidipole` core code. In the definition of `\pst@multidipole`, look for the last `\ifx` test

```

1 % ...
2 % Extract from \pst@multidipole
3 \else\ifx\OpenDipol #4\let\pscirc@next\pst@multidipole@OpenDipol% 27
4 \else\ifx\OpenTripol #4\let\pscirc@next\pst@multidipole@OpenTripol% 28
5 \else % Put your modification here
6 \else\let\pscirc@next\ignorespaces
7 \fi\fi\fi
8 % Extract form \pst@multidipole
9 % ...

```

and add (marked with %%)

```

1 % ...
2 % Extract from \pst@multidipole
3 \else\ifx\OpenDipol #4\let\pscirc@next\pst@multidipole@OpenDipol% 27
4 \else\ifx\OpenTripol #4\let\pscirc@next\pst@multidipole@OpenTripol% 28
5 \else\ifx\ComponentName#4\let\next\pst@multidipole@ComponentName%%
6 \else\let\pscirc@next\ignorespaces
7 \fi\fi\fi
8 % Extract form \pst@multidipole
9 % ...

```

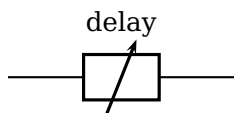
Do the same in `\pst@multidipole@`

```

1 % ...
2 % Extract from \pst@multidipole@
3 \else\ifx\OpenDipol#1\let\pscirc@next\pst@multidipole@OpenDipol% 27
4 \else\ifx\OpenTripol#1\let\pscirc@next\pst@multidipole@OpenTripol% 28
5 \else\ifx\ComponentName#1\let\next\pst@multidipole@ComponentName%%
6 \else\let\pscirc@next\ignorespaces\pst@multidipole@output
7 \fi\fi\fi
8 % Extract form \pst@multidipole@
9 % ...

```

and that's it! All you have to do then is send your modified `pst-circ.tex` to me and it will become part of the official release of `pst-circ`.



```

1 \begin{pspicture}(3,2)
2 \newCircDipole{delayline}
3 \makeatletter
4 \def\pst@draw@delayline{%
5 \psset{linewidth=1.5\pslinewidth}%
6 \psframe(-0.5,-0.3)(0.5,0.3)
7 \psline[arrows=->](-0.2,-0.5)(0.2,0.5)
8 \pnode(-0.5,0){dipole@1}
9 \pnode(0.5,0){dipole@2}}%
10 \makeatother
11 \pnode(0,1){A}\pnode(3,1){B}
12 \delayline(A)(B){delay}
13 \end{pspicture}

```

5 List of all optional arguments for pst-circ

Note: the default for booleans is always false.

| Key | Type | Default |
|----------------------|----------|--------------|
| intensity | boolean | true |
| intensitylabel | ordinary | |
| intensitylabelcolor | ordinary | black |
| intensitylabeloffset | ordinary | 0.5 |
| intensitycolor | ordinary | black |
| intensitywidth | ordinary | \pslinewidth |
| tension | boolean | true |
| tensionlabel | ordinary | |
| tensionlabelcolor | ordinary | black |
| tensionoffset | ordinary | 1 |
| tensionlabeloffset | ordinary | 1.2 |
| tensioncolor | ordinary | black |
| tensionwidth | ordinary | \pslinewidth |
| labeloffset | ordinary | 0.7 |
| labelangle | ordinary | 0 |
| labelInside | ordinary | 0 |
| dipoleconvention | ordinary | receptor |
| directconvention | boolean | true |
| dipolestyle | ordinary | normal |
| parallel | ordinary | true |
| parallelarm | ordinary | 1.5 |
| parallelsep | ordinary | 0 |
| parallelnode | ordinary | true |
| intersect | boolean | true |
| intersectA | ordinary | [none] |
| intersectB | ordinary | [none] |
| OAperfect | boolean | true |
| OApower | boolean | true |
| OAinvert | boolean | true |
| OAiplus | boolean | true |
| OAIMinus | boolean | true |
| OAIout | boolean | true |
| OAIpluslabel | ordinary | |
| OAIMinuslabel | ordinary | |
| OAIoutlabel | ordinary | |
| transistorcircle | boolean | true |
| transistorinvert | boolean | true |
| transistoribase | boolean | true |
| transistoricollector | boolean | true |
| transistoriemitter | boolean | true |

Continued on next page

Continued from previous page

| Key | Type | Default |
|----------------------------|----------|---------------|
| transistoribaselabel | ordinary | |
| transistoricollectorlabel | ordinary | |
| transistoriemitterlabel | ordinary | |
| FETchanneltype | ordinary | [none] |
| FETmemory | boolean | true |
| transistortype | ordinary | NPN |
| basesep | ordinary | 0 |
| TRot | ordinary | 0 |
| circedge | ordinary | \pcangle |
| primarylabel | ordinary | |
| secondarylabel | ordinary | |
| transformeriprimary | ordinary | true |
| transformerisecondary | ordinary | true |
| transformeriprimarylabel | ordinary | |
| transformerisecondarylabel | ordinary | |
| tripolestyle | ordinary | normal |
| variable | boolean | true |
| logicChangeLR | boolean | true |
| logicShowDot | boolean | true |
| logicShowNode | boolean | true |
| logicWidth | ordinary | 1.5 |
| logicHeight | ordinary | 2.5 |
| logicType | ordinary | and |
| logicNInput | ordinary | 2 |
| logicJInput | ordinary | 2 |
| logicKInput | ordinary | 2 |
| logicWireLength | ordinary | 0.5 |
| logicLabelstyle | ordinary | \small |
| logicSymbolstyle | ordinary | \large |
| logicSymbolpos | ordinary | 0.5 |
| logicNodestyle | ordinary | \footnotesize |
| inputarrow | boolean | true |
| programmable | boolean | true |
| connectingdot | boolean | true |
| groundstyle | ordinary | ads |
| antennastyle | ordinary | two |
| output | ordinary | top |
| L0style | ordinary | |
| dipoleinput | ordinary | left |
| value | ordinary | 0 |
| tripoleinput | ordinary | left |
| tripoleconfig | ordinary | left |
| couplerstyle | ordinary | hxbrid |

Continued on next page

Continued from previous page

| Key | Type | Default |
|----------------|----------|---------|
| quadripleinput | ordinary | left |

References

- [1] Michel Goossens, Frank Mittelbach, Sebastian Rahtz, Denis Roegel, and Herbert Voß. *The L^AT_EX Graphics Companion*. Addison-Wesley Publishing Company, Reading, Mass., 2nd edition, 2007.
- [2] Laura E. Jackson and Herbert Voß. Die Plot-Funktionen von pst-plot. *Die T_EXnische Komödie*, 2/02:27–34, June 2002.
- [3] Nikolai G. Kollock. *PostScript richtig eingesetzt: vom Konzept zum praktischen Einsatz*. IWT, Vaterstetten, 1989.
- [4] Herbert Voß. Die mathematischen Funktionen von Postscript. *Die T_EXnische Komödie*, 1/02:40–47, March 2002.
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