CadPack

Import from PCAD

Software tool for import from PACAD Cad format

Technical Info

Version : 2
Code : 81190413.104

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Contents

Introduction

CAD files are the base for the automatic generation of test program for InCircuit of any technology.

In order to generate the ICT test program in a short time and without errors, both Bed of Nails and Flying Probe testers require the circuit information available on CAD format.

The Import from PCAD CAD import driver allows to import the data present in the PCAD CAD file and convert them in the SPEA Board data format.

Conventions, symbols and abbreviations

In the document, the ⓘ symbol is used to highlight information or notes useful to the reader.

This manual can be updated in accordance with the evolution of the system and associated software.
It may contain preliminary contents or it may not be entirely updated with the latest versions used in the system.

Any remarks on errors and imperfections, or suggestions, can be addressed to:

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1. PCAD file data

With the “PCAD CAD files” words we refer to the output information generated by the PCAD CAD-CAE programs for the electrical diagrams design and PCB development, used to develop a test application (test program and adapter design).

Information stored in the “PCAD CAD files” concern an electronic board and can be used by an appropriate program to generate a test program and its test adapter design (Bed of Nails or list of movements for Flying Probes).

Information can be grouped in 4 different categories and typically concern the printed circuit:

Part List
It is the list of all used devices, it must contain: devices drawing reference, part numbers, value, tolerances, device type, etc.
Net List
It is also called wiring list, containing device interconnection data; basically it is the presentation of the electrical diagram.
Coordinate and access list
It is the list containing the devices coordinates, concerning their barycentre and pins.
Wiring and Routing list
It is the list containing the path of the Net tracks in the PCB.

For the import of the information above mentioned, SPEA has developed the specific program for the translation, stored in a specified format, to its common data bank called “Board Data”.
The name of this type of program is “CAD import driver”.

For the required information, see the list in the following paragraphs.

1.1 Part List

The Part List is an ASCII text file, containing the list of all the parts used to assemble the board; sometimes it can be called **Bill of Material** (BOM).

In the Part List all information concerning the mounted and not mounted parts must be present.
For every part the following information must be defined:

Information	Description
Drawing Reference	Reference designator (e.g. U10, R105, D23, etc.).
Part Number	Device code (e.g. 132549.012, C4QW08, 001-58-AA, etc.).
Value	Device value (e.g. 10KΩ, 10µF, 1mH, etc.).
Tolerance	Positive and negative device tolerances (e.g. 1%, 5%, etc.).
Mounting side	The legal values for this item can be: - **Top** (Component side) - **Bottom** (Soldering side) - **Not mounted Top** - **Not mounted Bottom**
Rotation	Device mounting rotation angle (e.g. 0°, 180°, etc.).
Dimensions [1]	Device dimensions.
Case code	Device package (case) code.

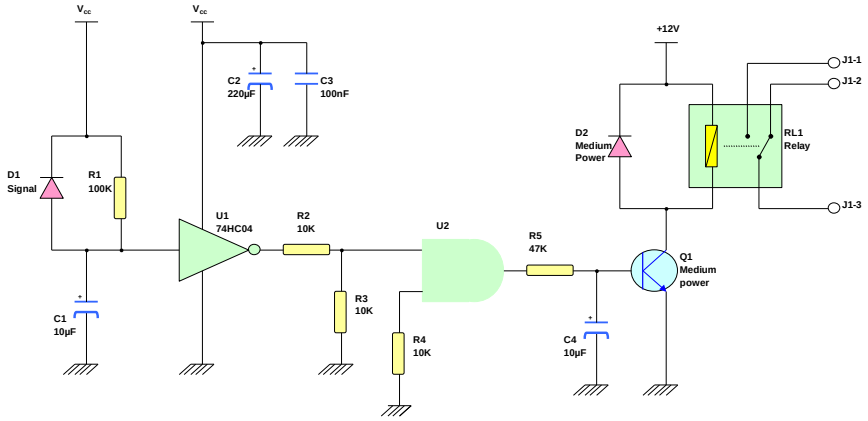
[1] **Optional data (not yet managed)**

1.2 Net List

The Net List is an ASCII text file containing the device interconnection data; it is also called wiring list.
This list must contain the interconnection between devices, including pad and via.
Basically, it is the representation of the electrical diagrams.

the following information must be defined for every net:

Information	Description
Net name	Net identifier (e.g. +5V, RESET, A01, etc.).
Drawing reference	Reference designator of the device connected to the net (e.g. U10, R105, D23, etc.).
Pin name	Name of the device pin connected to the net (e.g. 1, 15, Anode, K, Negative, etc.).
Pin access side	Access side for the device pin, legal values are: - **Top** (Device side access). - **Bottom** (Soldering side access). - **Not accessible** - **All** (both top and bottom side access)



1.3 Coordinates and access list

The Coordinates and access list is an ASCII text file containing the devices coordinates concerning their barycentre and pins. Below, the required information:

Information	Description
Drawing Reference	Reference designator of the device connected to the net (e.g. U10, R105, D23, etc.).
Pin name	Name of the device pin connected to the net (e.g. 1, 15, Anode, K, Negative, etc.).
Pin X position	Pin X-coordinate.
Pin Y position	Pin Y-coordinate.
X barycentre [1]	Device X barycentre.
Y barycentre [1]	Device Y barycentre.

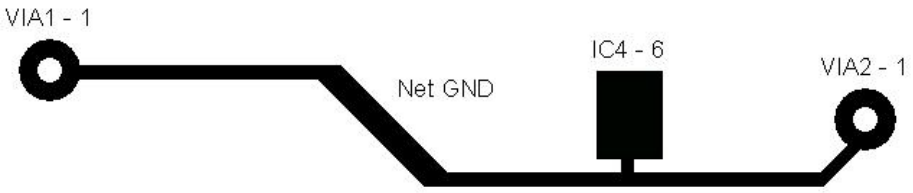
1.4 Wiring and Routing list

The Wiring and Routing list is an ASCII text file that contains all the coordinates of the Net tracks on the PCB and the link with the Net List. So the path of each net on the PCB is described in this file.

For every net the following information must be defined:

Information	Description
Net name	Net identifier (e.g. +5V, RESET, A01, etc.).
X Start	Track segment start X-coordinate.
Y Start	Track segment start Y-coordinate.
X End	Track segment end X-coordinate.
Y End	Track segment end Y-coordinate.
Width	Net segment thickness.
Layer	Layer the segment belongs to.

Example:



[1] **Optional data**

2. PCAD file generalities

2.1 PCAD file name

The PCAD Neutral file name has to have the **.PDF** extension.
It is an ASCII text file and it contains the information concerning the board, device and their connections.

There is also optinal file that has to have the **.PAR** extension. It contains value and component name.

2.2 PCAD file conversion from Unix to MS-DOS

When the diagram entry has been performed and checked on the PCAD CAD workstation, the PCAD file **.PDF** should be made available for the SPEA system.

The SPEA system is based on a PC platform operating in a Windows® environment, this means that the CAD import driver can manage ASCII Text file in MS-DOS format.

Due to the fact that the PCAD workstation typically uses the Unix operating system, the output ASCII text file has to be converted from Unix to MS-DOS format.

In order to perform the conversion, please refer to appendix A – **Note about the PCAD ASCII text file format**.

3. PCAD file format

This is a partial extract of an example of a PCAD output ASCII text file:

Demo.PDF

```
%**************************************************************************
%                                                                         *
%     Program  :   PDIF-OUT VERSION 8.5                                   *
%     Date     :   mm dd yyyy                                             *
%     Time     :   hh:mm:ss                                               *
%     File In  :   demo.pcb                                               *
%     File Out :   demo.pdf                                               *
%     Format   :   P-CAD DATABASE INTERCHANGE FORMAT                      *
%                                                                         *
%**************************************************************************

{COMPONENT brd.pcb
{ENVIRONMENT
{PDIFvrev 8.50}
{Program "PDIF-OUT Version 8.5"}
{DBtype "PC-Board"}
{DBvrev 2.09}
{DBtime "mm dd, yy         hh:mm          "}
{DBunit "CENTIMIL"}
{DBgrid 1}
{Lyrstr "PADCOM" 11 "FLCOMP" 14 "PADSLD" 13 "FLSOLD" 12 "PADINT" 9
    "FLINT" 9 "GNDCON" 11 "FLGCON" 10 "CLEAR" 12 "FLCLER" 12
    "PWRCON" 13 "FLPCON" 13 "SLDMSK" 11 "FLSMSK" 11 "DRILL" 15
    "FLDRLL" 15 "PIN" 12 "BRDOUT" 5 "FLTARG" 12 "SLKSCR" 6
    "DEVICE" 5 "ATTR" 6 "REFDES" 6 "COMP" 1 "SOLDER" 2 "INT1" 14
    "INT2" 6 "DRLGIN" 11 "DRLFIN" 6 "PINTOP" 11 "PINBOT" 3
    "MSKGTP" 13 "MSKGBT" 14 "MSKFTP" 8 "MSKFBT" 9 "PSTGTP" 1
    "PSTGBT" 2 "PSTFTP" 12 "PSTFBT" 13 "SLKTOP" 6 "SLKBOT" 5
    "DVCTOP" 1 "DVCBOT" 2 "REFDTP" 3 "REFDBT" 9 "FLTOP" 11
    "FLBOT" 9 "NUMERI" 11 "ATTR2" 12 "BARCMP" 5 "BARALL" 9
    "MISURE" 8 "BARSLD" 12 "$CONT" 3 "$DRC" 3 "$FORC" 2
    "SLKSCB" 5 "INT3" 5 "INT4" 1 "TPTOP" 9 "TPBOT" 4 "DRILL2" 15
    "BORDOB" 13 "BORDO" 9 "NOTE" 13 "MECC" 14 "MS" 12
    "FABDAT" 10 "ATTRB" 10 "ATTR2B" 11 "CASE" 14 "CASEB" 15
    "NOTEB" 8 "DEVICB" 12 "REFDEB" 5 "DOCKA" 11 "DOCKB" 12
    "DOCHA" 15 "DOCHB" 14 "GRAFIB" 10 "GRAFIT" 3 "MSA" 12
    "MSB" 15 "COLLA" 8 "COLLAB" 9 "ASSMEC" 14 "0" 12 "DEFPOI" 7
    "2" 1 "MSKFT2" 14 "SLKT2" 14 "CAVA" 9 "PINB2" 14 "MSKFB2" 13
    "FLB2" 9 "LAT1" 1 "CUTPLC" 1 "$ATT" 6 "TESTT" 6 "$$NULL" 0}
    ……
}
……
{DETAIL
……
    {NET_DEF
        {N TP6
            {DG
                [Ly "SOLDER"]
                [Ls "SOLID"][Wd 10.00]
                [Ts 50.00][Tj "LC"][Tr 1][Tm "Y"]
                {W -1111.87 -332.50  -1107.87 -328.50  -987.87 -328.50 }
                ……
                [Ly "COMP"]
                {W -1317.87 -648.50  -1337.87 -648.50  -1352.87 -633.50
                -1352.87 -618.50  -1377.87 -593.50  -1377.87 -518.50
                -1357.87 -498.50  -1332.87 -498.50  -1312.87 -478.50
```

```
               -1312.87 -403.50  -1307.87 -398.50  -1177.87 -398.50
               -1157.87 -418.50  -1157.87 -423.50  -1082.87 -423.50
               -1077.87 -418.50  -1077.87 -358.50  -1103.87 -332.50
               -1111.87 -332.50 }
               {W -1312.87 -403.50  -1322.87 -393.50  -1352.87 -393.50
               -1372.87 -373.50  -1372.87 -358.50 }
               {W -1077.87 -451.50  -1077.87 -438.50  -1077.87 -418.50 }
            }
         }
         ……
      }
}
{COMP_DEF st23bec.prt
   {PIN_DEF
      [Ly "PIN"]
      {P B {Pt 50}{Lq 0}{Ploc -40.00 -80.00}}
      {P E {Pt 50}{Lq 0}{Ploc 40.00 -80.00}}
      {P C {Pt 50}{Lq 0}{Ploc 0.00 0.00}}
   }
   {SPKG
      {Sna A}
      {Sp E 2}
      {Sp B 1}
      {Sp C 3}
      {Apn B E C}
   }

   {PIC
      [Ly "SLKTOP"]
      [Ls "SOLID"][Wd 0.00]
      [Ts 40.00][Tj "CC"][Tr 0][Tm "N"]
      {L -85.00 -115.00  85.00 -115.00  85.00 -35.00  40.00 35.00
      -40.00 35.00  -85.00 -35.00  -85.00 -115.00 }
      [Ly "NUMERI"]
      [Ts 30.00]
      {T "E" 70.00 -85.00}
      {T "B" -70.00 -90.00}
      {T "C" 30.00 20.00}
      [Ly "CASE"]
      {L -10.00 -15.00  -10.00 5.00  10.00 5.00  10.00 -15.00 }
      {L 50.00 -65.00  50.00 -85.00  30.00 -85.00  30.00 -65.00 }
      {L -30.00 -65.00  -30.00 -85.00  -50.00 -85.00  -50.00 -65.00 }
      {R -65.00 -65.00 65.00 -15.00 }
   }
   {ATR
      {IN
         {Ty 11900}
         {Smd "Y"}
      }
   }
}

{I st23bec.prt D1
   {CN TP6 TP5 TP4}
      {ATR
         {IN
            {Pl -1357.87 -728.50}
            {Ro 2}
            [Ly "REFDTP"]
            [Ts 60.00][Tj "RC"][Tr 1][Tm "N"]
            {Nl 0.00 0.00}
            {Ps "B"}
         }
         {EX
            Ly "DVCTOP"]
```

```
            [Ts 30.00][Tj "CC"][Tr 0][Tm "N"]
            {At DEVICE ST23BEC 0.00 50.00}
            [Ly "ATTR"]
            {At FP SOT23 0.00 40.00}
            [Ts 20.00]
            {At CODLT LT 0.00 -15.00}
            {At COD 0 5.00 100.00}
        }
    }
  }
}
……
{NET_DEF
  {N TP6
    {DG
      [Ly "SOLDER"]
      [Ls "SOLID"][Wd 10.00]
      [Ts 50.00][Tj "LC"][Tr 1][Tm "Y"]
      {W -1111.87 -332.50  -1107.87 -328.50  -987.87 -328.50 }
      {Poly
      {Polyap 10.00}
      {Ol 1 -1162.87 -368.50  -1167.87 -363.50  -1167.87 -298.50
        -1162.87 -293.50  -1052.87 -293.50  -1047.87 -298.50
        -1047.87 -363.50  -1052.87 -368.50 }
      }
      [Ly "COMP"]
      {W -1317.87 -648.50  -1337.87 -648.50  -1352.87 -633.50
        -1352.87 -618.50  -1377.87 -593.50  -1377.87 -518.50
        -1357.87 -498.50  -1332.87 -498.50  -1312.87 -478.50
        -1312.87 -403.50  -1307.87 -398.50  -1177.87 -398.50
        -1157.87 -418.50  -1157.87 -423.50  -1082.87 -423.50
        -1077.87 -418.50  -1077.87 -358.50  -1103.87 -332.50
        -1111.87 -332.50 }
      {W -1312.87 -403.50  -1322.87 -393.50  -1352.87 -393.50
        -1372.87 -373.50  -1372.87 -358.50 }
      {W -1077.87 -451.50  -1077.87 -438.50  -1077.87 -418.50 }
      {Poly
      {Polyap 10.00}
      {Ol 1 -1172.87 -278.50  -1037.87 -278.50  -1032.87 -283.50
        -1032.87 -368.50  -1037.87 -373.50  -1172.87 -373.50
        -1177.87 -368.50  -1177.87 -283.50 }
      }
    }
    {ATR
      {IN
        {Rats "OFF"}
      }
    }
  }
  {N TP2
    {DG
      [Ly "SOLDER"]
      [Ls "SOLID"][Wd 10.00]
      [Ts 50.00][Tj "LC"][Tr 1][Tm "Y"]
      {W -1337.87 -953.50  -1352.87 -953.50  -1357.87 -948.50
        -1357.87 -813.50  -1342.87 -798.50  -1227.87 -798.50
        -1212.87 -783.50  -1212.87 -618.50  -1142.87 -548.50
        -1142.87 -533.50  -1202.87 -473.50  -1377.87 -473.50
        -1382.87 -468.50  -1382.87 -303.50 }
      {V -1382.87 -303.50 0}
      {V -1142.87 -533.50 0}
      {V -1337.87 -953.50 0}
      [Ly "COMP"]
      {W -1382.87 -303.50  -1422.87 -343.50  -1422.87 -358.50 }
      {W -1342.87 -558.50  -1317.87 -533.50  -1277.87 -533.50
```

```
               -1262.87 -533.50  -1232.87 -563.50  -1202.87 -563.50
               -1182.87 -533.50  -1142.87 -533.50  -1077.87 -533.50
               -1077.87 -513.50  -1077.87 -501.50 }
            {W -1157.87 -473.50  -1207.87 -473.50  -1232.87 -448.50
               -1267.87 -448.50  -1277.87 -458.50  -1277.87 -533.50 }
            {W -1202.87 -563.50  -1202.87 -576.50 }
            {W -1337.87 -953.50  -1297.87 -953.50  -1277.87 -933.50
               -1217.87 -933.50  -1217.87 -913.50  -1222.87 -908.50
               -1232.87 -908.50  -1247.87 -893.50  -1252.87 -893.50
               -1262.87 -883.50  -1262.87 -868.50 }
            {W -1407.87 -843.50  -1427.87 -843.50  -1432.87 -848.50
               -1432.87 -933.50  -1412.87 -953.50  -1382.87 -953.50 }
            {Poly
            {Polyap 10.00}
            {Ol 1 -1352.87 -903.50  -1277.87 -903.50  -1252.87 -928.50
               -1252.87 -993.50  -1422.87 -993.50  -1432.87 -983.50
               -1432.87 -933.50  -1427.87 -928.50  -1377.87 -928.50 }
            }
         }
         {ATR
            {IN
               {Rats "OFF"}
            }
         }
      }
……
}
```

Demo.PAR

```
%*****************************************************************
%                                                                *
%     Program  :   PC-FORM VERSION 8.6                           *
%     Date     :   mm dd yyyy                                    *
%     Time     :   hh:mm:ss                                      *
%     File In  :   demo.pnl                                      *
%     File Out :   demo.mat                                      *
%     Format   :   P-CAD MATERIALS LIST                          *
%     Revisione:   A      DATA dd/mm/yyyy                        *
%                                                                *
%*****************************************************************

ITEM  QTY  REFERENCE-DESIGNATOR       DESCRIPTION
----  ---  --------------------       -----------

1     1    F1                         HIDE=PORTAFUSE+FUSE
                                          VA=250mA  DIM=5x20
2     2    R3                         VAL=100K CASE=2512
                                          (VARIE=OPPURE_1x220K_POT_2W)
3     1    C10                        HIDE=POLIESTERE_SCATOLINO
                                          VAL=2n2F  VA=63V
4     1    C44                        HIDE=POLIESTERE_SCATOLINO
                                          VAL=1nF  VA=100V
5     15   C59A C73 C92 C131 C128     CASE=1206 VAL=1uF
           C134 C124 C37 C136         VA=25V
           C125 C127 C133 C94 C93
           C59
6     2    C126 C132                  CASE=1206  VAL=470nF
7     1    R75                        CASE=0805  VAL=7K5_1%
8     2    R74 R93A                   CASE=0805  VAL=470K
9     32   R115 R134 R145 R108        CASE=0805  VAL=10K
           R110 R132 R131 R129
           R11 R167 R162 R144
```

```
            R142 R90 R179 R78 R123
            R120 R160 R46 R48 R128

            R82 R81 R21 R26 R22
            R23 R38 R27 R161 R100A
10    2     R136 R88                  CASE=0805  VAL=47K
11    5     R170 R152 R141 R194       CASE=0805  VAL=1K5
            R199
12    3     R97 R58 R89               CASE=0805  VAL=1M
13    2     R102 R50                  CASE=0805  VAL=680
14    5     R101 R103 R1A R137        CASE=0805  VAL=100K
            R100B
15    7     R109 R112 R9 R154 R197    CASE=0805  VAL=1K
            R202 R19A
16    3     R98 R156 R155             CASE=0805  VAL=56K
17    1     R111                      CASE=0805  VAL=560
18    2     R113 R151                 CASE=0805  VAL=1K2
```

The Import from PCAD CAD driver can correctly identify and use the following labels (identifiers):

- **LYRSTR**
- **I**
- **CN**
- **RD**
- **PL**
- **RO**
- **PS**
- **N**
- **W**
- **V**
- **COMP_DEF**
- **P**
- **SMD**
- **APN**
- **LY**
- **WD**

A short description for each label (identifier) is provided in the next paragraphs.

3.1 LYRSTR

This identifier is used to describe the Layer Structure.
This specification includes all the layers that were defined in the file; data are separated by blanks.

The “Import from PCAD” import CAD driver manages the following labels:

1. **Layer name**
2. **Layer code**

The following example shows the syntax used for the **LYRSTR** identifier:

1	2
Layer name	Layer code
PADCOM	11
SLKTOP	6

Example of LYRSTR identifier:

```
{Lyrstr "PADCOM" 11 "FLCOMP" 14 "PADSLD" 13 "FLSOLD" 12 "PADINT" 9
"FLINT" 9 "GNDCON" 11 "FLGCON" 10 "CLEAR" 12 "FLCLER" 12 "PWRCON" 13 "FLPCON" 13 "SLDMSK" 11 "FLSMSK" 11
"DRILL" 15
"FLDRLL" 15 "PIN" 12 "BRDOUT" 5 "FLTARG" 12 "SLKSCR" 6
"DEVICE" 5 "ATTR" 6 "REFDES" 6 "COMP" 1 "SOLDER" 2 "INT1" 14
"INT2" 6 "DRLGIN" 11 "DRLFIN" 6 "PINTOP" 11 "PINBOT" 3
"MSKGTP" 13 "MSKGBT" 14 "MSKFTP" 8 "MSKFBT" 9 "PSTGTP" 1
"PSTGBT" 2 "PSTFTP" 12 "PSTFBT" 13 "SLKTOP" 6 "SLKBOT" 5
"DVCTOP" 1 "DVCBOT" 2 "REFDTP" 3 "REFDBT" 9 "FLTOP" 11
"FLBOT" 9 "NUMERI" 11 "ATTR2" 12 "BARCMP" 5 "BARALL" 9
"MISURE" 8 "BARSLD" 12 "$CONT" 3 "$DRC" 3 "$FORC" 2
"SLKSCB" 5 "INT3" 5 "INT4" 1 "TPTOP" 9 "TPBOT" 4 "DRILL2" 15
"BORDOB" 13 "BORDO" 9 "NOTE" 13 "MECC" 14 "MS" 12
"FABDAT" 10 "ATTRB" 10 "ATTR2B" 11 "CASE" 14 "CASEB" 15
"NOTEB" 8 "DEVICB" 12 "REFDEB" 5 "DOCKA" 11 "DOCKB" 12
"DOCHA" 15 "DOCHB" 14 "GRAFIB" 10 "GRAFIT" 3 "MSA" 12
"MSB" 15 "COLLA" 8 "COLLAB" 9 "ASSMEC" 14 "0" 12 "DEFPOI" 7
"2" 1 "MSKFT2" 14 "SLKT2" 14 "CAVA" 9 "PINB2" 14 "MSKFB2" 13
"FLB2" 9 "LAT1" 1 "CUTPLC" 1 "$ATT" 6 "TESTT" 6 "$$NULL" 0}
……
```

3.2 SUBCOMP

The SUBCOMP section defines the used components. It specifies the parts used, their instance names, their pins and the pin connections to signal defined in the NET_DEF subsection.

The SUBCOMP section is organized into subsections. The “Import from PCAD” driver manages the following subsections:

1. **COMP_DEF**
2. **I**

3.2.1 COMP_DEF

Each COMP_DEF section defines a package. A PCAD file contains as many COMP_DEF subsections as there are used packages.

It consists of three subsections:

1. **PIN_DEF**
2. **SPKG**
3. **ATR**

Example of **COMP_DEF** subsection:

```
{COMP_DEF st23bec.prt
    {PIN_DEF
     [Ly "PIN"]
     {P B {Pt 50}{Lq 0}{Ploc -40.00 -80.00}}
     {P E {Pt 50}{Lq 0}{Ploc 40.00 -80.00}}
     {P C {Pt 50}{Lq 0}{Ploc 0.00 0.00}}
    }
    {SPKG
     {Sna A}
     {Sp E 2}
     {Sp B 1}
     {Sp C 3}
     {Apn B E C}
    }

    {PIC
     [Ly "SLKTOP"]
     [Ls "SOLID"][Wd 0.00]
     [Ts 40.00][Tj "CC"][Tr 0][Tm "N"]
     [Ly "NUMERI"]
     [Ts 30.00]
     {T "E" 70.00 -85.00}
     {T "B" -70.00 -90.00}
     {T "C" 30.00 20.00}
    }

    {ATR
     {IN
      {Ty 11900}
      {Smd "Y"}
     }
    }
   }
.....
```

3.2.1.1 PIN_DEF

The PIN_DEF subsection defines the pins in the component. It consists of one P subsection for each pin. Each P subsection gives the name and type of the pin, its logical equivalency, and its location.
Pin ordering for the component is the same as the order of the P subsections.

The “Import from PCAD” driver manages the following data:

1. Not used
2. **Pin Name**
3. Not used
4. Not used
5. Not used
6. **X offset**
7. **Y offset**

The following example shows the syntax used for the **PIN_DEF** subsection:

1	2	3	4	5	6	7
Not used	Pin name	Not used	Pin name	Not used	X offset	Y offset
P	1	{Pt 25}	{Lq 0}	{Plot	-150.00	175.00

3.2.1.2 SPKG

The SPKG subsection contains the gate name mapping information for packaged parts. Inside this subsection the “Import from PCAD” driver manages the APN identifier.

This identifier shows alphanumeric pin numbers. There is one pin number for each pin of the part. These pin numbers contain one to seven alphanumeric characters.

The following example shows the syntax used for the **SPKG** subsection:

1	2	3	n
Not used	Pin name	Pin name	Pin name
{Apn	B	E	C

3.2.1.3 ATR

The ATR subsection contains the package attributes. Inside this subsection the “Import from PCAD” driver manages the SMD identifier.

This identifier defines a part as a surface-mount device. The values are:

- "**Y**" for a surface-mount part
- "**X**" for a through-hole part

3.2.2 I

The **I** subsection describes the unique properties of each instance of a component defined in **COMP_DEF**, as well as the component-to-pin connections.

It consists of tree subsections:

1. **CN**
2. **ATR**
3. **ASG**

Example of **I** subsection:

```
{I st23bec.prt D1
   {CN TP6 TP5 TP4}
   {ATR
     {IN
      {Pl -1357.87 -728.50}
      {Ro 2}
      [Ly "REFDTP"]
      [Ts 60.00][Tj "RC"][Tr 1][Tm "N"]
      {Nl 0.00 0.00}
     { Ps "B"}
     }
     {EX
      [Ly "DVCTOP"]
      [Ts 30.00][Tj "CC"][Tr 0][Tm "N"]
      {At DEVICE ST23BEC 0.00 50.00}
      [Ly "ATTR"]
      {At FP SOT23 0.00 40.00}
      [Ts 20.00]
      {At CODLT LT 0.00 -15.00}
      {At COD 0 5.00 100.00}
     }
   }
}
```

3.2.2.1 CN

The CN subsection defines the component-to-net connectivities.
This subsection can be in one of the following two formats.

The first format includes pin names as shown below.

```
{CN
    pinname net pinname net pinname net …
}
```

Where:

- **Pinname** is the name of the pin
- **Net** is the name of the net the pin is connected to

The sequence of the pins follows the pin order defined in the **COMP_DEF** / **PIN_DEF** section for the component type.

The second format does not include pin names. This format is shown below.

```
{CN
    net net net …
}
```

Where **net** is the name of the net the pin is connected to.

The sequence of the pins follows the pin order defined in the **COMP_DEF** / **PIN_DEF** section for the component type.

3.2.2.2 ATR

This subsection defines a component's attribute. Inside this subsection the "Import from PCAD" driver manages the following identifiers:

1. **PL**
2. **RO**
3. **PS**

The **PL** identifier specifies the location of a component. The syntax for this section is:

```
{Pl x y}
```

Where:

- **x** is the X-coordinate
- **y** is the Y-coordinate

The **RO** identifier specifies the rotation of a component. The syntax for this section is:

```
{RO n}
```

Where **n** is 0 to 3:

0	No rotation
1	90 degrees
2	180 degrees
3	270 degrees

The **PS** identifier specifies the placement side for a part. The syntax for this section is:

```
{PS "S"}
```

Where "**S**" is **T** for the top side (component side) of the board and **B** for the bottom side (solder side) of the board.

3.2.2.3 ASG

This subsection specifies the packaging information of a diagram component, including its reference designator, designator location and the package pin numbers corresponding to its logical pins.

Inside this subsection the “Import from PCAD” driver manages the RD identifier. This identifier specifies the reference designator and its location. The syntax for this section is:

```
{RD "rd" x y}
```

Where:

- **rd** is the rederence designator
- **x** is the X-coordinate
- **y** is the Y-coordinate

The given location concern the component origin after any scaling, mirroring and rotation.

3.3 NET_DEF

NET_DEF describes the circuit wiring diagram, including wire graphics, signal names and attributes.

The NET_DEF section consists of a series of N subsections, one for each signal.
The N subsection is separately described.

Inside this subsection the “Import from PCAD” driver manages the following identifier:

1. **W**
2. **V**
3. **Ly**
4. **Wd**

The **W** keyword specifies a wire. The syntax for this section is:

```
{W x1 y1 x2 y2 x3 y3 …}
```

Where:

- **x** is the X-coordinate at the end of a segment
- **y** is the Y-coordinate at the end of a segment

Each **x y** defines a segment of wire.

The **V** keyword specifies the location of a via. The syntax for this section is:

```
{V x y type}
```

Where:

- **x** is the X-coordinate
- **y** is the Y-coordinate
- **type** is the type of via

The **Ly** keyword specifies the active layer where all data are placed. Another layer can be specified anywhere in the PDF file. When another layer is specified, it becomes the new active layer.
The syntax for this section is:

```
[Ly “layer”]
```

Where **layer** is the name of the layer

The **Wd** keyword specifies the line width; it is the default value for all lines. A new value can be specified anywhere in the PDF file. When a new value is specified, it becomes the default one.
The syntax for this section is:

```
[Wd n]
```

Where **n** is a number from 0 to 250.

Example of “NET_DEF” section:

```
.....
{NET_DEF
   {N TP6
    {DG
     [Ly "SOLDER"]
     [Ls "SOLID"][Wd 10.00]
    [Ts 50.00][Tj "LC"][Tr 1][Tm "Y"]
     {W -1111.87 -332.50  -1107.87 -328.50  -987.87 -328.50 }
     {Poly
      {Polyap 10.00}
      {Ol 1 -1162.87 -368.50  -1167.87 -363.50  -1167.87 -298.50
          -1162.87 -293.50  -1052.87 -293.50  -1047.87 -298.50
          -1047.87 -363.50  -1052.87 -368.50 }
     }
     [Ly "COMP"]
     {W -1317.87 -648.50  -1337.87 -648.50  -1352.87 -633.50
        -1352.87 -618.50  -1377.87 -593.50  -1377.87 -518.50
        -1357.87 -498.50  -1332.87 -498.50  -1312.87 -478.50
        -1312.87 -403.50  -1307.87 -398.50  -1177.87 -398.50
        -1157.87 -418.50  -1157.87 -423.50  -1082.87 -423.50
        -1077.87 -418.50  -1077.87 -358.50  -1103.87 -332.50
        -1111.87 -332.50 }
     {W -1312.87 -403.50  -1322.87 -393.50  -1352.87 -393.50
        -1372.87 -373.50  -1372.87 -358.50 }
     {W -1077.87 -451.50  -1077.87 -438.50  -1077.87 -418.50 }
     {Poly
      {Polyap 10.00}
      {Ol 1 -1172.87 -278.50  -1037.87 -278.50  -1032.87 -283.50
          -1032.87 -368.50  -1037.87 -373.50  -1172.87 -373.50
          -1177.87 -368.50  -1177.87 -283.50 }
     }
    }
    {ATR
     {IN
      {Rats "OFF"}
     }
    }
   }
.....
```

3.4 Part list file

If the file **.PAR** is present “Import from PCAD” driver manages the **VAL** identifier.
This identifier specifies the value of the imported components.

The “Import from PCAD” import CAD driver manages the following data:

1. Not used
2. Not used
3. Drawing reference
4. Description (VAL and another labels not used)

The following example shows the syntax used for the **Part list** file:

1	2	3	4	
Not used	Not used	Drawing ref.	Description	
			VAL	Not used
2	2	R3	100K	

Example of Part list file:

```
.....
%*****************************************************************
%                                                                *
%     Program  :   PC-FORM VERSION 8.6                           *
%     Date     :   mm dd yyyy                                    *
%     Time     :   hh:mm:ss                                      *
%     File In  :   demo.pnl                                      *
%     File Out :   demo.mat                                      *
%     Format   :   P-CAD MATERIALS LIST                          *
%     Revisione:   A      DATA dd/mm/yyyy                        *
%                                                                *
%*****************************************************************
ITEM  QTY  REFERENCE-DESIGNATOR       DESCRIPTION
----  ---  --------------------       -----------
1     1    F1                         HIDE=PORTAFUSE+FUSE
                                          VA=250mA  DIM=5x20
2     2    R3                         VAL=100K CASE=2512
                                        (VARIE=OPPURE_1x220K_POT_2W)
3     1    C10                        HIDE=POLIESTERE_SCATOLINO
                                          VAL=2n2F  VA=63V
4     1    C44                        HIDE=POLIESTERE_SCATOLINO
                                          VAL=1nF  VA=100V
5     15   C59A C73 C92 C131 C128     CASE=1206 VAL=1uF
           C134 C124 C37 C136         VA=25V
           C125 C127 C133 C94 C93
           C59
6     2    C126 C132                  CASE=1206  VAL=470nF
7     1    R75                        CASE=0805  VAL=7K5_1%
8     2    R74 R93A                   CASE=0805  VAL=470K
.....
```

4. Import setting

The options to be checked and/or modified are listed below.

Cad Type	Category		Description
PCAD	Options	Net list format	Selects the Cad file net list format.

4.1 Pin function assignment

This assignment table must be filled in order to correctly execute the CAD file import.

In order to correctly test some polarized devices such as diodes, bipolar transistors, etc., it is basic to correctly identify the pin function (i.e. anode, base, etc.) of each pin.

The fields contained in the table, are described below:

Field	Description
Device Type	Identifies the type of device (example: Resistors, Capacitors, Digital Devices, Diodes etc.).
Pin Function	Function concerning the Pin.
Pin Name	Pin reference.
Cad Pin	Pin reference in Cad file.

4.2 Drawing ref. initials/device type assignment

The PCAD file typically contains all information about the devices, such as value, tolerances and type; which are fundamental from the point of view of the test program generation.

The fields contained in the table are described below:

Field	Description
Drawing Reference	Initial letter identifying the **Device Type**.
Device Type	Identifies the type of device (example: Resistors, Capacitors, Digital Devices, Diodes etc.).
Default Tol+, Tol-	Value and tolerance of the device only if required (as for resistors).

It could happen that in the CAD file they are missing. For each drawing reference initial, the displayed table enables to define the following data default values:

- Device type
- Default positive tolerance
- Default negative tolerance

This means that if, for any reason, the CAD file does not contain the information mentioned above, the default values will be used.

4.3 Net list format

This assignment allows to choose the format to the net list as shown in **CN** paragraph for the available Cad file.

A. Note about the PCAD ASCII text file format

The PCAD CAD-CAE typically runs under Unix operating system and generates its neutral ASCII output file in Unix format.

The Unix ASCII text files use the "$0a_{hex}$"ASCII character as end of line identifier.
The Windows® (MS-DOS) operating system uses the "$0d_{hex}$" and "$0a_{hex}$" ASCII characters as end of line identifier for ASCII text files.
This means that output ASCII text files may require an ASCII format conversion (from Unix to Windows® format).

This operation can be performed using "WordPad", a standard text file editor.
Open the PCAD ASCII file with this editor and save it, this operation will automatically perform the conversion from ASCII Unix format to ASCII Windows® format.