



**NX-CV**  
User's Manual

August 1986

**p-cad**<sup>®</sup>  
PERSONAL CAD SYSTEMS INC.



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PERSONAL CAD SYSTEMS INC.

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## ABOUT THIS MANUAL

This manual describes NX-CV, a program that converts P-CAD schematic database files to a format that is compatible with the Computervision CADD5 4X element list file. This manual also describes CV-MAP, a library cross-reference utility program that facilitates transfer of schematic data from PC-CAPS through NX-CV into the Computervision system, and CV-SORT, a utility that sorts element list files for back-annotation.

**Chapter 1, INTRODUCTION**, provides an overview of NX-CV and installation instructions.

**Chapter 2, PREPARING THE SCHEMATIC DATABASE**, gives instructions for using PC-CAPS to create a schematic database to be used with NX-CV.

**Chapter 3, PREPARING THE INPUT FILES**, gives instructions for creating the files to be input into NX-CV.

**Chapter 4, USING NX-CV**, gives instructions for configuring and running NX-CV.

**Chapter 5, VIEWING THE OUTPUT FILES**, tells how to view, print, and interpret the NX-CV output files.

**Appendix A, ERROR MESSAGES**, explains error messages that may be produced during NX-CV program operation.

**Appendix B, CV-MAP**, gives complete instructions for using the CV-MAP program.

**Appendix C, CV-SORT**, gives instructions for using the CV-SORT program.

**Appendix D, SAMPLE FILES**, explains the sample designs supplied with NX-CV and shows several sample files.

## NOTATION

This manual gives step-by-step procedures and examples. To make it easy for you to follow these procedures, we use the following notation.

---

**<xxxx>** Angle brackets around lowercase letters indicate a variable name that may be entered by the system or by you. For example:

**<filename>.SCH**

**[ ]** Square brackets indicate the name of a key. For example:

**[Return]**

**[Return]** [Return] indicates the key that is used to execute a command or accept an option. This key may be labeled differently depending on your system. For example:

**[RETURN], [↵], [Enter],  
[Enter ↵], [ENTER]**

**[ ]-[ ]** Square brackets connected with a hyphen indicate keys that must be pressed simultaneously. For example:

Press **[Ctrl]-[Alt]-[Del]**.

**UPPER** Uppercase letters indicate a command or an element that must be typed as shown. For example:

Type PCPLOTS and press [Return].

**/** A forward slash separates main menu and submenu command combinations. For example:

DRAW/ARC

**\*** An asterisk in a filename or in a filename extension indicates that any character(s) can occupy that position and all the remaining positions in the filename or extension. For example, the DOS command

DIR \*.SYM

displays a list of all the filenames with the extension .SYM in the current directory.

**TESTFILE** TESTFILE is a sample filename that you must replace with the filename you intend to use. For example:

Database Filename :TESTFILE.SCH  
Netlist Filename :TESTFILE.NLT



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## CHAPTER 1. INTRODUCTION

The NX-CV interface program translates P-CAD circuit schematics to a format that is compatible with the Computervision CADD5 4X element list file. NX-CV also provides the capability to back-annotate the P-CAD schematic with packaging information entered by NX-CV and in the CV system.

The CV-MAP and CV-SORT utility programs accompany NX-CV. CV-MAP cross-references P-CAD schematic symbols with the corresponding CV library components and is described in Appendix B, "CV-MAP." CV-SORT sorts an element list file in preparation for back-annotation and is described in Appendix C, "CV-SORT."

This chapter provides an overview of NX-CV and installation instructions.

### OVERVIEW

This section explains the steps required for using NX-CV and the files involved in the process.

NX-CV, together with PC-NODES and (if needed) PC-LINK, CV-MAP, and CV-SORT, enables you to produce a CV-format element list from a schematic created with PC-CAPS and to back-annotate the schematic with packaging information entered in the CV system.

There are seven stages in this process:

1. Using PC-CAPS, you prepare the schematic design. This design consists of one or more schematic files

(<filename>.SCH), which are created by interconnecting basic schematic symbols (<filename>.SYM).

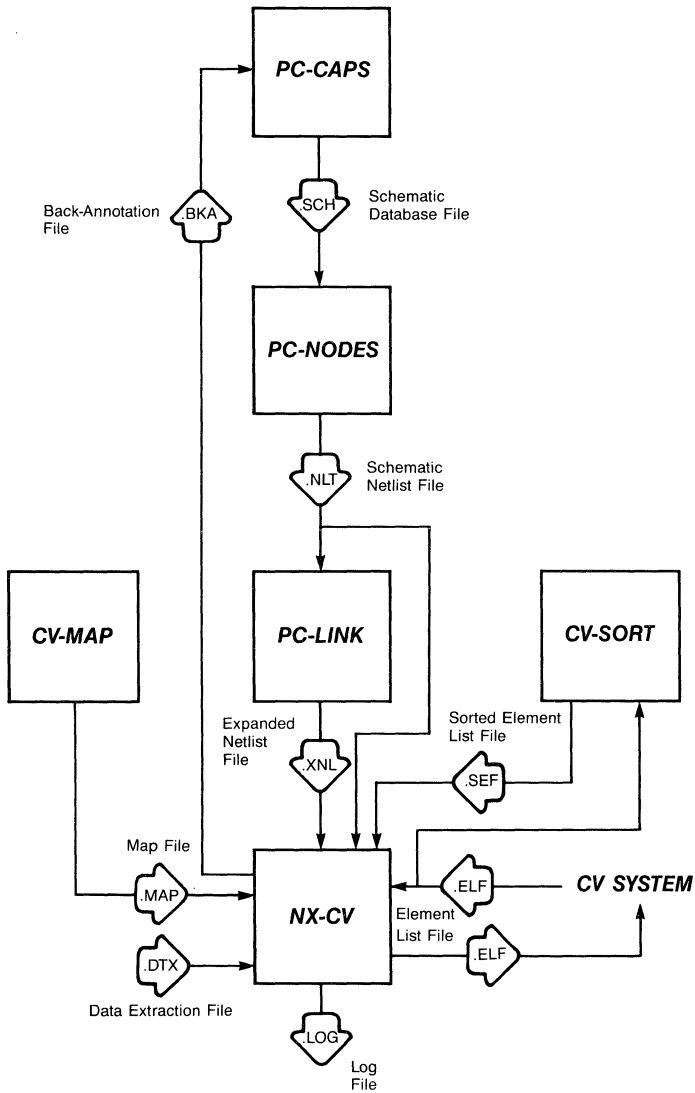
NOTE: NX-CV does not support hierarchical structure. For further explanation, refer to Chapter 2, "Preparing the Schematic Database."

2. Using PC-NODES, you extract a netlist (<filename>.NLT) from each schematic file. If a design consists of a single schematic, you can input the corresponding netlist file directly to NX-CV. In this case, you do not need to perform step 3.
3. If your design consists of multiple sheets, after you extract the netlist for each separate sheet, you must use PC-LINK to link all the netlists into a single expanded netlist file (<filename>.XNL).
4. If necessary, you use PC-CAPS and NX-MAP to create or modify the map file (<filename>.MAP).
5. If necessary, you use a text editing program to create the data extraction file (<filename>.DTX).
6. You then input the netlist or expanded netlist file to NX-CV. NX-CV uses this netlist and the map file and/or the data extraction file, if present, to produce the element list file (<filename>.ELF) and the log file (NXC.V.LOG).
7. After you use the CV system to design the PCB, you can input the revised element list file and the original P-CAD netlist file into NX-CV to produce the back-annotation file (<filename>.BKA). Then you can input the back-annotation file to PC-CAPS to update the original schematic.



**NOTE:** If you do not use the CV program to sort the element list as required for NX-CV back-annotation, you must use the CV-SORT program before producing the back-annotation file.

Figure 1-1 shows the process described above. The NX-CV input and output files are discussed below.



**Figure 1-1. NX-CV Input and Output**

## Input Files

Six types of files may be input to NX-CV.

For netlist translation, you must input either a schematic netlist file or an expanded netlist file, and you can input the optional map file and/or data extraction file.

For back-annotation, you must input either the revised CV element list file or the sorted revised element list file. You must also input the original schematic netlist file or expanded netlist file that was used to create the element list file.

This section describes all the NX-CV input files.

### *Schematic Netlist File*

The netlist file (<filename>.NLT) contains component and interconnection information for a schematic drawing. PC-NODES extracts this file from a PC-CAPS schematic database file.

### *Expanded Netlist File*

The expanded schematic netlist file (<filename>.XNL) contains the same types of information as the schematic netlist. An expanded netlist to be input to NX-CV must be produced from a multisheet design, as NX-CV does not support hierarchical structure. PC-LINK produces the expanded netlist by combining a set of netlists that together describe a schematic design.

### *Map File*

The map file (<filename>.MAP) is an optional input file. It maps P-CAD symbols to NX-CV symbols and is needed only if the P-CAD symbols used in the schematic have different pin orders than the corresponding CV symbols. The map file is produced by CV-MAP and is explained in detail in Appendix B, "CV-MAP."

### *Data Extraction File*

The data extraction file (<filename>.DTX) is an optional input file. It is used only if you want to create the output element list file in a format different from the default format. The data extraction file is an ASCII file that you create using a text editor. Chapter 3, "Preparing the Input Files," gives instructions for creating the data extraction file.

### *Element List File*

The element list file (<filename>.ELF) is input to NX-CV for back-annotation. It is output by NX-CV during netlist translation and is described in the "Output Files" section below.

### *Sorted Element List File*

The sorted element list file (<filename>.SEF) is input to NX-CV for back-annotation instead of the element list file if the element list file is not in the format required by NX-CV for back-annotation. The sorted element list file is output by CV-SORT and is described in Appendix C, "CV-SORT."

## Output Files

NX-CV outputs the element list file from netlist translation and the back-annotation file from back-annotation. It also produces the log file. This section describes these files.

### *Element List File*

The element list file (<filename>.ELF) is an ASCII file compatible with the Computervision format. It contains one record for each schematic symbol pin. Each record has seven fields of information. The default format is:

```
SEQNUM SIGNAL DEVICE REFDES PPIN LPIN  
TALLY
```

where:

**SEQNUM** is the identifier assigned by NX-CV to the schematic symbol.

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

**DEVICE** is the symbol filename or an alternate name specified in the schematic or in the map file.

**REFDES** is the reference designator of the component.

**PPIN** is the physical pin number and is present only if you preassigned packaging information to the symbol.

**LPIN** is the logical pin name and is present only if you did not preassign packaging information.

**TALLY** is the number of records in the element list file for the device type.

If you want, you can create a data extraction file to change the order of the fields, the length of each field, and the content of some of the fields.

### *Back-Annotation File*

The back-annotation file (<filename>.BKA) contains commands for back-annotating the original schematic database with packaging information entered in the CV system.

The back-annotation file includes assignment of symbols into physical packages, section and gate assignments, gate swaps, pin swaps, and changes in component names.

The back-annotation file does not include:

- Insertion or deletion of a component during PCB layout in the CV system.
- Insertion or modification of a signal name during PCB layout in the CV system.
- A component pin number that falls outside the range of pin numbers specified in the component definition.

If NX-CV encounters any of these conditions, it displays a message (which it also records in the log file) and does not process the component in question. To include these changes in the schematic, you must enter them manually using the appropriate PC-CAPS commands.

The back-annotation file is an ASCII file in standard P-CAD command file format. You can input it directly to PC-CAPS as explained in "Back-Annotating a Schematic" in Chapter 4.

### *Log File*

The log file (NXC.V.LOG) contains all messages produced during the execution of NX-CV for either netlist translation or back-annotation. This file is useful for examining any error messages that are reported by NX-CV. Note that each time you run NX-CV, the previous log file is overwritten. If you want to save a log file, you must rename it or print it out.

## **SYSTEM REQUIREMENTS**

Before you install NX-CV, your computer system must have the following minimum configuration:

- IBM PC, PC/XT, PC/AT, TI Professional, Tandy TRS 2000, or equivalent
- 640K of RAM
- P-CAD supported graphics board and monitor
- DOS 2.0 or higher operating system
- The CONFIG.SYS file in the root directory, containing a BUFFERS value of at least 12 and a FILES value of at least 15
- The PCADDRV.SYS file (created automatically when you use the P-CAD INSTALL program) in the

root directory and the appropriate loadable device driver files in the appropriate directory.

## INSTALLATION

Your NX-CV package contains two diskettes: the program diskette and the sample data diskette.

The program diskette contains the following files:

NXCV.EXE  
CVMAP.EXE  
CVSORT.EXE

The sample data diskette contains the following files:

CVDEMO example:

CVDEMO.SCH  
CVDEMO.NLT  
CVDEMO.ELF  
CVDEMO.BKA  
CVDEMO.SEF  
CVDEMO2.DTX  
CVDEMO2.CFG  
CVDEMO2.ELF  
CVDEMO3.DTX  
CVDEMO3.MAP  
CVDEMO3.MDF  
CVDEMO3.CFG  
CVDEMO3.ELF  
CVDEMO3.BKA

CVDEMO4 example:

CVDEMO4.SCH  
CVDEMO4.NLT  
CVDEMO4.CMP  
CVDEMO4.DTX  
CVDEMO4.MAP  
CVDEMO4.MDF  
CVDEMO4.CFG  
CVDEMO4.ELF

You can use the sample data to see how the program works. Appendix D, "Sample Files," provides more information about the sample data.



To install NX-CV on your hard disk, use the following procedures. These procedures assume that you are using the P-CAD directory structure.

To install the program files in your \PCAD\EXE directory, first insert the program diskette in drive A. Then change to the \PCAD\EXE directory by typing:

```
CD \PCAD\EXE [Return]
```

Copy the files by typing:

```
COPY A:*.EXE [Return]
```

Remove the program diskette.

To install the sample data files, insert the sample data diskette in drive A. Then change to your working project directory. For example, if you are using the PROJ0 directory, type:

```
CD \PCAD\PROJ0 [Return]
```

Then copy the files by typing:

```
COPY A:*. * [Return]
```



## CHAPTER 2. PREPARING THE SCHEMATIC DATABASE

Before using NX-CV, you must use PC-CAPS to create a schematic database. This chapter describes the PC-CAPS schematic structure and gives guidelines for entering the special information required to construct a CV-compatible schematic. To ensure that your database is compatible with the CV system, you should read this chapter before creating your schematic.

### SCHEMATIC DATABASE STRUCTURE

A PC-CAPS schematic consists of an interconnected group of predefined symbols. These symbols can be user-defined or can be part of a P-CAD supplied library. Each symbol is a logical and pictorial representation of a component. For example, a 7400 symbol is a single 2-input NAND gate.

Symbols are created in PC-CAPS SYMB mode as files with the .SYM filename extension. You assemble symbols into a schematic in DETL mode, producing a schematic database file with the .SCH filename extension.

NX-CV does not support hierarchical structure. It requires "flat" structure, which consists of symbols placed directly on the final schematic. Because of this, you should not use hierarchical design in a schematic if you intend to input it to NX-CV.

NX-CV does support multisheet structure, which you can use for a schematic that requires more than one file.

A multisheet schematic is created by producing a number of single-sheet schematics. Connections between sheets are indicated by giving connected wires the same net name on each sheet. When you use PC-LINK, it merges together wires that have the same name and are on different sheets.

To indicate that a given schematic is a single sheet of a multisheet schematic, assign the SHEET attribute to the sheet. In PC-CAPS SYMB mode, use the ATTR/ACOM command and enter, anywhere in the design, the following attribute:

SHEET=<sheet id>

where:

**sheet id** is one to three characters and is typically a number, with the first sheet being sheet 1 and so on. Sheet IDs in a multisheet schematic must be unique.

## SYMBOLS

You can use any PC-CAPS symbol in a schematic to be processed by NX-CV as long as you follow the conventions described in "Pin Order" and "Packaging Preassignment."

NX-CV provides flexibility in assigning symbol names and in handling connector symbols, symbols to be packaged into heterogeneous parts, and symbols to be packaged into parts with common pins. This section describes these features.

## **Pin Order**

Each symbol in your PC-CAPS schematic must have the same pin order as the corresponding CV library part in order to produce a CV element list that accurately reflects the connections in the schematic.

Many P-CAD library symbols have a different pin order than the corresponding CV parts. So that you do not have to edit each symbol, the NX-CV program package includes the CV-MAP program, which enables you to produce a map file that specifies the CV pin order for each symbol. Refer to Chapter 3, "Preparing the Input Files," and Appendix B, "CV-MAP," for instructions on using CV-MAP.

If you create your own schematic symbols, you can enter symbol pins in the order used for the corresponding CV symbol. In this case, you do not need to use CV-MAP to define pin order for the symbol.

## **Symbol Names**

NX-CV normally uses the P-CAD symbol filename as the component name in the output element list. If you want to use a different component name, assign the PNAME attribute to the symbol using the PC-CAPS ATTR/ACOM command. You can assign the attribute either in SYMB mode to the symbol or in DETL mode to an instance of the symbol.

The PNAME attribute is useful in two cases:

- When the desired name fails to meet DOS filename conventions. For example, a resistor part might be RESISTOR1.K. This name is longer than the DOS 8-character limit and contains an embedded period.

- When filename duplication would occur. For example, you might want to have two graphical representations of a 2-input NAND gate, the first using a NAND symbol and defined in the 7400.SYM file and the second using the DeMorgan equivalent and defined in the 7400E.SYM file.

In the examples shown above, the attribute assignments would be PNAME=RESISTOR1.K for the resistor and PNAME=7400 for the 7400E.SYM symbol.

NX-CV also allows you to enter component names in the map file. If you need to create a map file to assign CV pin orders, you may prefer to enter the component names in the map file so that you do not need to edit each symbol file to add the appropriate name. Refer to Chapter 3, "Preparing the Input Files," and Appendix B, "CV-MAP," for instructions on using CV-MAP.

If the PNAME attribute is assigned to a symbol and there is also an entry in the map file, NX-CV uses the name specified by the attribute.

You can change the NX-CV conventions for component names in the data extraction file. Refer to Chapter 3, "Preparing the Input Files," for information about the data extraction file.

## CONNECTORS

In order to provide flexibility in the way connectors are used, NX-CV treats them differently than logical components.

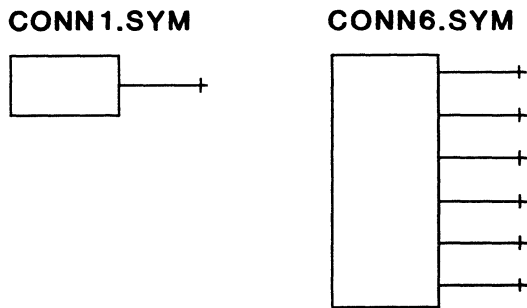
You can represent a single connector by one schematic symbol or by several symbols.

To represent a connector with a single schematic symbol, create the symbol in the same way you create a logical symbol.

To represent a connector with several symbols, create a separate symbol file for each unique symbol. You can represent a connector with as many or as few symbols as your application requires.

You can, if you wish, create generic symbols for connectors with one pin, two pins, three pins, and so on, and then use whatever combination of symbols is appropriate to represent each connector.

Figure 2-1 shows 1-pin and 6-pin connector symbols.



**Figure 2-1. Connector Symbols**

For each connector symbol, you must use the SCMD/PNLC and SCMD/PNUM commands, which are described in "Packaging Preassignment" below. When creating the symbol, use SCMD/PNLC to define the number of gates per package as 1 and to define the

number of pins per gate as the number of pins on the symbol. When placing the symbol on the schematic, use SCMD/PNUM to assign a reference designator and explicit package pin numbers.

When placing a connector on a schematic in PC-CAPS DETL mode, you must use the ATTR/ACOM command to assign the CONN attribute to each symbol in the connector. The CONN attribute identifies the symbol as a connector symbol and specifies the number of pins in the entire physical connector part. Assign the attribute in the format:

CONN=<n>

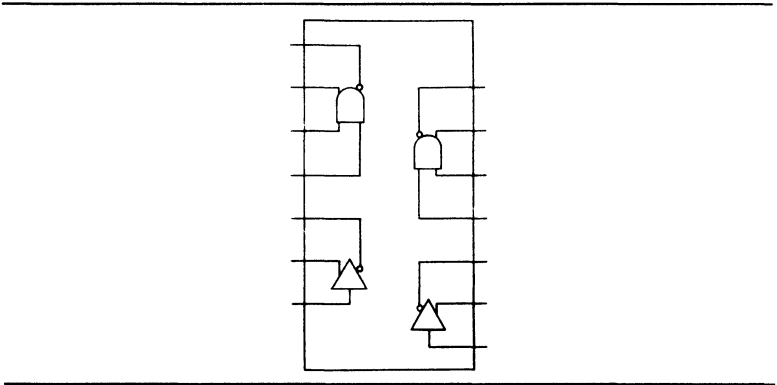
where:

**n** is the number of pins in the entire connector.

## **HETEROGENEOUS PARTS**

A heterogeneous part is composed of more than one type of gate. For example, Figure 2-2 shows the 74LS265 part, which consists of two 2-input NAND/AND gates and two buffer/inverter gates.





**Figure 2-2. Heterogeneous Part**

You must assign the MIX attribute to each symbol that is going to be packaged into a heterogeneous part. Assign this attribute in PC-CAPS DETL mode using the ATTR/ACOM command in the format:

MIX=<num>/<section>

where:

**num** is the number of gates on the part.

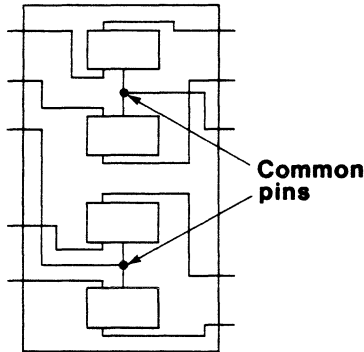
**section** is the section of the part where the component is located.

For example, MIX=4/A specifies that the symbol is section A of a four-gate part.

You must also preassign a reference designator and explicit package pin numbers to each symbol to be used in a heterogeneous part. Refer to "Packaging Preassignment" below.

## PARTS WITH A COMMON PIN

In some parts, two or more gates share one or more common pins. For example, Figure 2-3 shows the 5477 part that consists of four transmission gates in which two gates share one pin and the two other gates share another pin.



**Figure 2-3. Part With Common Pins**

For each component to be packaged into a part that has common pins, you must assign the MIX attribute, described above, and the COMM attribute, which lists the common pins for the part. Assign this attribute in PC-CAPS DETL mode using the ATTR/ACOM command in the format:

```
COMM=(<pnum> <pnum> ... )
```

where:

**pnum** is a pin number of a common pin for the part containing this component. All the common pins must be listed, with a space between pins. The

parentheses are required only if the part has more than one common pin.

For example, you might specify `COMM=1` for a part with one common pin and `COMM=(1 6 9)` for a part with three common pins.

You must also preassign a reference designator and explicit package pin numbers to each symbol to be used in a part that has common pins. Refer to "Packaging Preassignment" below.

## PACKAGING PREASSIGNMENT

Before PCB placement and routing can occur, the logical symbols used in the schematic must be assigned to physical locations in the component package that is to be placed on the PCB. CV performs this packaging, so when you create the PC-CAPS schematic, you do not need to preassign most symbols.

You must preassign packaging information for connectors, symbols to be used in heterogeneous parts, and symbols to be used in parts with common pins. You can also preassign packaging information in cases where you want to preassign several logical symbols to the same physical package or to assign a symbol to a specific gate in the package. Preassign these components using the two PC-CAPS commands described below. See the *PC-CAPS User's Manual* for more information.

**NOTE:** The element list created by NX-CV lists physical pin numbers for preassigned components and logical pin names for components that are not preassigned.

**SCMD/PNLC** (system command/pin number location) is used when defining basic symbols in SYMB mode. It lets you set the number of gates that are to be assigned to each physical package and the pin numbers that correspond to each gate location. It also allows you to specify locations for the reference designator and pin numbers. All symbols used in your schematic must have this information preassigned. All P-CAD library symbols include this information.

**SCMD/PNUM** (system command/pin number) is used in DETL mode to preassign a reference designator to a symbol in a schematic. You can use SCMD/PNUM only if SCMD/PNLC was used for the symbol in SYMB mode.

The SCMD/PNUM command also allows you to assign package pin numbers to the symbol, by assigning either a section or actual pin numbers.

For example, if you specify U3/A, U3 is the reference designator and the pins will be numbered as defined using the SCMD/PNLC command when the symbol was created.

NX-CV requires the actual pin numbers to be assigned to each symbol to be packaged into a heterogenous part or a part with a common pin and to each connector symbol when the connector is composed of more than one symbol. To assign pin numbers explicitly, use the format shown in the example below:

U3(2 4 6 8 10)

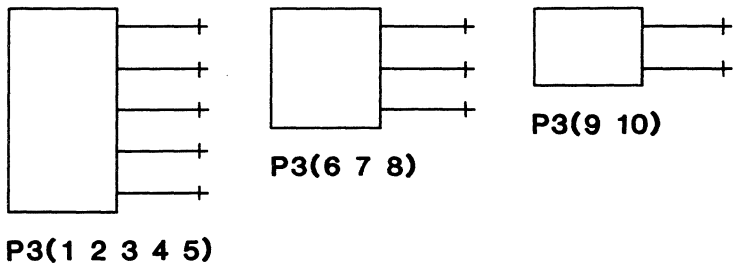
For example, if you use three 3-pin connector symbols to represent a 9-pin connector, you would use the

SCMD/PNUM command to assign the following information to the symbols:

P3(1 2 3)  
 P3(4 5 6)  
 P3(7 8 9)

NX-CV will make entries only for the pins that are entered on the schematic. For example, if the second symbol, P3(4 5 6), is not present, the element list file will not include records for pins 4, 5, and 6 of connector P3.

Figure 2-4 shows pin number assignments for three symbols that constitute a 10-pin connector.



**Figure 2-4. Connector Pin Number Preassignment**

## REFERENCE DESIGNATOR PREFIXES

NX-CV automatically assigns reference designators to components that are not preassigned. You can specify a one-character prefix for reference designators assigned by NX-CV.

The PREFIX attribute allows you to specify a reference designator prefix for a component. Assign the attribute using the PC-CAPS ATTR/ACOM command either in SYMB mode for a symbol or in DETL mode for an instance of the symbol.

NX-CV also allows you to specify reference designator prefixes in the map file. If the PREFIX attribute is assigned and there is also a prefix entry in the map file, NX-CV uses the prefix specified by the attribute.

You can change the NX-CV conventions for reference designator prefixes in the data extraction file. Refer to Chapter 3, "Preparing the Input Files," for information about the data extraction file.

## SUMMARY OF SCHEMATIC REQUIREMENTS

This section summarizes the PC-CAPS attributes and packaging commands that NX-CV requires for schematics.

You assign an attribute by using the ATTR/ACOM command and entering:

<keyword>=<value>

where:

**keyword** is the name of the attribute.

**value** is the value you specify for it. If the value contains embedded blanks, you must enclose it in quotation marks or parentheses.

With the exception of the SHEET attribute, which is assigned to an entire schematic, all the attributes used by NX-CV can be assigned to a symbol either when it is

created in SYMB mode or when it is placed on the schematic in DETL mode.

For each attribute or command, Table 2-1 describes the function and shows which symbols require this information. The following codes are used for symbols:

**conn** - connector symbol

**mix** - symbol to be packaged into a heterogeneous part

**comm** - symbol to be packaged into a part with common pins

**Table 2-1. Schematic Requirements Summary**

<b>Attribute or Command</b>	<b>Function</b>	<b>Required For</b>
<b>Attributes:</b>		
COMM	Identifies symbol used in common-pin part and gives pin number of common pin(s)	comm
CONN	Identifies connector symbol and gives number of gates for the entire connector	conn <sup>1</sup>
MIX	Identifies symbol used in heterogeneous or common-pin part, and gives number of gates in package and section number of symbol	mix, comm

**Table 2-1 Continued**

<b>Attribute or Command</b>	<b>Function</b>	<b>Required For</b>
PNAME	Component type (to be used instead of symbol filename)	as needed
PREFIX	Reference designator prefix	as needed
SHEET	Identifies multiple sheets	multisheet design
<b>Commands:</b>		
SCMD/ PLNC	Gates per package, pins per gate, reference designator location	all symbols
SCMD/ PNUM	Package pin numbers, reference designator	conn <sup>1</sup> , mix, comm <sup>2, 3</sup>

1. For connectors, gates per package must be 1.
2. Package pin numbers must be explicit for connectors and symbols used in heterogeneous and common-pin parts.
3. SCMD/PNUM is also used to preassign other symbols as needed.



## CHAPTER 3. PREPARING THE INPUT FILES

This chapter describes how to prepare the files that are to be input to NX-CV.

After your schematic is complete, you must use PC-NODES to extract the schematic netlist(s). If your schematic consists of just one schematic file, you can input the netlist directly into NX-CV. If the schematic has multiple sheets, you must use PC-LINK to combine the netlists into one expanded netlist file.

NX-CV supplies a default format for the output element list file. If you want the element list to be in a different format, you can use a data extraction file to specify your requirements. You create the data extraction file using a text editor. If you use the default format, you do not need to create a data extraction file.

NX-CV also allows you to specify CV pin order, pin names, and component identification in a map file, which you create using CV-MAP. The map file is required only if the P-CAD pin order of symbols in the schematic is different from the pin order of the corresponding CV symbols.

When you create a back-annotation file, NX-CV requires the element list file you input to be sorted into a special format.

This chapter contains instructions for extracting and expanding the schematic netlist, creating the data extraction file, creating the map file, and sorting the element list file.

## **EXTRACTING AND EXPANDING THE SCHEMATIC NETLIST**

Run PC-NODES to extract schematic netlists from each sheet of your schematic. Use the instructions in the *PC-NODES User's Manual*.

If your schematic has multiple sheets, run PC-LINK to link together the netlists. Use the instructions in the *PC-LINK User's Manual*.

**NOTE:** As explained in "Schematic Database Structure" in Chapter 2, NX-CV does not support hierarchical structure. If your schematic does use hierarchical symbols, you can extract a netlist compatible with NX-CV. However, this netlist will include only the symbols and not the subcircuits that they represent. You might use the following procedure if you want to use a subcircuit that is hierarchical (that is, it has both DETL and SYMB representations) and you do not require the detail information of the subcircuit for CV.

First, use PC-NODES to extract the netlist for the schematic. Next, ensure that the netlist files for the hierarchical symbols are not present in any directory in the library path that PC-LINK searches. Then run PC-LINK. PC-LINK reports the missing netlists as errors, but produces the expanded netlist, which includes the desired symbols but not the subcircuits.

## **CREATING THE DATA EXTRACTION FILE**

The data extraction file is an optional input file for NX-CV. It is an ASCII file that specifies the contents and format of the output element list file. You can create a data extraction file using a text editing

program. This file generally has the .DTX filename extension, but can have any extension.

If you have special requirements for the format of your element lists, you may want to create one data extraction file and use it every time you run NX-CV.

The data extraction file consists of two sections: FORMATS and FIELDS. The FORMATS section, which comes first, defines new data fields and changes in the contents of default data fields. The FIELDS section specifies the location of each field in a record. These two sections are described below.

If you do not use a data extraction file, NX-CV uses the default element list file format and contents that are also described below.

### **FORMATS Section**

The FORMATS section of the data extraction file defines the contents of the element list fields that can be modified. If a field is not defined in the FORMATS section, or if it is defined incorrectly, NX-CV uses the default field definition.

The seven element list fields are described in "Interpreting the Element List File" in Chapter 5. The fields are also listed below and briefly described; explanations of the modifications that you can make using the data extraction file are included.

**SEQNUM** - Symbol identifier. You cannot modify this field.

**SIGNAL** - Signal name for the pin. You can specify the format of this field for unnamed signals and for unconnected pins, and you can specify an alternate character for the PC-CAPS bar character.

**DEVICE** - Device type identifier. You can specify one of several formats for this field.

**REFDES** - Reference designator of the symbol. For symbols to which you preassigned reference designators in PC-CAPS, you cannot change the format for this field. You can specify the prefix used by NX-CV when it automatically assigns reference designators.

**PPIN** - Physical pin number. You cannot modify this field.

**LPIN** - Logical pin name. You cannot modify this field.

**TALLY** - The total number of records in the file for the device type. You cannot modify this field.

The format of the FORMATS section is shown below.

```
FORMATS
  <keyword> <spec>
  <keyword> <spec>
  .
  .
  .
  <keyword> <spec>
END
```

where:

**FORMATS** identifies the section and is required.

**keyword** is one of the FORMAT section keywords, which are listed in Table 3-1.

**spec** is the specification for the format of the information identified by the keyword. The specification consists of literal text and/or one or more of the variables listed after Table 3-1.

**END** indicates the end of the **FORMAT** section and is required.

A **FORMATS** section line can contain up to 80 characters. Blank lines are ignored. You can put comments into the file by using the percent sign (%). **NX-CV** ignores all text from the % to the end of the line.

Table 3-1 lists **FORMAT** section keywords and shows, for each keyword, the field of the element list it affects and its function.

**Table 3-1. FORMATS Section Keywords**

<b>Keyword</b>	<b>Field</b>	<b>Function</b>
<b>PREFIX</b>	<b>REFDES</b>	Specifies a one-character prefix for reference designators assigned by <b>NX-CV</b> . This prefix is used only for symbols without the <b>PREFIX</b> attribute or a map file prefix value.
<b>UNNAMED</b>	<b>SIGNAL</b>	Specifies signal name structure for signals that were not named in <b>PC-CAPS</b> .

Table 3-1 Continued

Keyword	Field	Function
NOCONNECT	SIGNAL	Specifies signal name structure for pins that are not connected to a net.
BAR	SIGNAL	Specifies a character to be substituted for the apostrophe (') used by PC-CAPS to place a bar over the signal name.
DEVICE	DEVICE	Specifies device type name structure.

Each **FORMAT** section specification consists of one or more text strings (characters to be used literally) and variables. Text strings are enclosed in quotation marks. The variables that can be used are listed and explained below. Words shown in uppercase must be entered literally in the data extraction file. Words shown in lowercase represent variable values that you specify.

**ATTR(atr)** - Specifies the value for the attribute **atr**. For example, **ATTR(WATT)** will cause NX-CV to include the value of the **WATT** attribute for each component to which it was assigned.

**MAP(fld)** - Specifies the value for the map file field **fld**. Valid fields are **PNAME**, **PREFIX**, and **USER**. For example, if you enter **MAP(USER)**, the element list will include the map file **USER** field value for each

component in all the pin records for that component. If the map file field is empty for a component, no information will be included in the element list record.

**FNAME** - Specifies the name of the component symbol file, not including the filename extension or directory path.

**PNAME** - Specifies the component part name. This name is the value of the PNAME attribute if it is assigned to the symbol. If the attribute is not assigned, it is the value in the map file PNAME field for the component. If neither the attribute nor the map file field is defined, it is the name of the component symbol file, not including the filename extension or directory path (that is, it is equivalent to FNAME).

**SNUM** - Specifies the sheet number of the schematic, which is a sequential number assigned by NX-CV to each sheet starting with 001. For a single-sheet schematic, this number is always 001. (This number is not the value of the SHEET attribute.)

**SHEET** - Specifies the value of the SHEET attribute assigned to the schematic.

**SHT** - Specifies the value of the SHEET attribute padded to the left with zeroes to form a three-character string. For example, if SHEET=01, SHT is 001. The SHT value is used in the element list only for pins connected to unnamed nets. It is taken from the net name assigned by PC-NODES in the format UNsssnnn, where sss is the padded sheet attribute value and nnn is a three-digit signal ID.

**SID** - Specifies the value of the signal ID, taken from the net name assigned to unnamed nets by PC-NODES as explained above. This value is used only for pins connected to unnamed nets.

If a keyword is used more than once, NX-CV uses the first specification when creating the element list. If NX-CV cannot completely create the field using the first specification, it uses the second specification instead; if the second specification also fails, it uses the third specification, and so on. If no specification creates a complete field, NX-CV uses the last partially built field. If an empty field would be created, NX-CV produces an error message.

If your FORMATS section does not contain a particular keyword or if you do not use a data extraction file, NX-CV uses the specifications of the default format shown below.

```

FORMATS
PREFIX          ATTR(PREFIX)
PREFIX          MAP(PREFIX)
PREFIX          "U"
UNNAMED        "UN" SHT SID
NOCONNECT      "NC"
BAR            "/"
DEVICE         ATTR(PNAME)  % equivalent
DEVICE         MAP(PNAME)   % to
DEVICE         FNAME        % PNAME
END
    
```

If a specification includes more than one text string and/or variable, NX-CV will concatenate the values without any intervening blank spaces. For example, the UNNAMED keyword above specifies three parts, "UN", SHT, and SID, for the SIGNAL field for unnamed signals. This specification might produce a SIGNAL field value of UN001018, where 001 is the SHT value and 018 is the SID value.

An example of the FORMATS section is shown below.



```

FORMATS
PREFIX          "X"
UNNAMED         SNUM "XS" SID
NOCONNECT      "N/C"
BAR            "-"
DEVICE         ATTR(WATT) ATTR (RES)
DEVICE         ATTR(VOLT) "-" ATTR(CAP) "UF"
DEVICE         PNAME
END

```

This example tells NX-CV to use the following format in each record in the element list:

- In the REFDES field, use the reference designator prefix X for components that do not have another prefix specified with the PREFIX attribute or in the map file.
- In the SIGNAL field, use the following convention for naming unnamed nets: the sheet number assigned by NX-CV, followed by the text XS, followed by the signal ID assigned by PC-NODES.
- In the SIGNAL field, name all unconnected pins N/C.
- In the SIGNAL field, substitute the hyphen (-) for the apostrophe used by PC-CAPS to indicate a barred net name.
- Use one of the following three formats for the DEVICE field:
  1. The value of the WATT attribute followed by the value of the RES attribute. If a component does not have both the WATT and RES attributes, use format 2 below.

2. The value of the VOLT attribute, followed by a hyphen (-), followed by the value of the CAP attribute, followed by the text UF. If a component does not have both the VOLT and CAP attributes, use format 3 below.
3. The component part name, as defined for the PNAME variable described above.

For the other fields, the default format is used.

### **FIELDS Section**

The FIELDS section of the data extraction file defines the order of the element list fields in each element list record. It also defines the position of each field in the record. Each element list record must be on one line with up to 80 columns. The FIELDS section specifies the first and last column for each field.

If the FIELDS section is incomplete or contains invalid information, NX-CV will produce an error message and will not create the element list file.

The FIELDS section contains one record each for the seven element list fields in the format shown below. Each record must be on a separate line.

```
FIELDS
  <field> <firstcol> <lastcol> <just>
  .
  .
  .
END
```

where:

**FIELDS** identifies the section and is required.

**field** is the name of the field and is required.

**firstcol** is the column number where the field begins and is required.

**lastcol** is the column number of the last column within the field and is required.

**just** is the justification within the field; it must be L for left justification, R for right justification, or P for right justification padded to the left with zeroes. If no value is specified, NX-CV defaults to left justification.

**END** indicates the end of the FIELDS section and is required.

Blank lines in the data extraction file are ignored. You can put comments into the file by using the percent sign (%). NX-CV ignores all text from the % to the end of the line.

Always start the first field at column 1. Leave room for at least one blank space between fields; that is, if one field ends at column 20, the next field must begin at column 22 or higher.

**NOTE:** If you specify Yes at the **Line Numbers ?** option on the NX-CV Configuration Screen, NX-CV will automatically add six columns to the column numbers specified in the FIELDS section. Because of this feature, if you plan to use line numbers, do not use any column numbers greater than 74.

If the information for a field is too long to fit into the field as defined here, NX-CV will truncate the information and generate an error message.

If no data extraction file is used, NX-CV uses the default record definition shown below.

```
FIELDS
SEQNUM  1    8 R
SIGNAL  10   29
DEVICE  31   50
REFDES  53   60
PPIN    62  64 R
LPIN    66   69
TALLY   72   80
END
```

A sample FIELDS section is shown below.

```
FIELDS
SIGNAL  1    10 L
SEQNUM  12   19
DEVICE  22   39
REFDES  42   45 L
PPIN    48   51 R
LPIN    54   59
TALLY   62   67 L
END
```

### CREATING THE MAP FILE

You must create a map file if any symbols in your schematic have different pin orders than the corresponding CV parts. In addition, you can use the map file to specify a component name, a reference designator prefix, and other information for each symbol. Refer to Appendix B, "CV-MAP," for instructions on creating the map file.

You can create several map files or use one map file for all schematics. You can reuse a map file whenever necessary. If you need to add symbols to a map file, you can add the necessary information to the CV-MAP input file and rerun CV-MAP to produce an updated map file.

## **SORTING THE ELEMENT LIST FILE**

The element list file input to NX-CV for back-annotation must be sorted by the component sequence number in the SEQNUM field and the SEQNUM field must be the first field in each record. You can sort the element list file when you are editing it in the CV system, or you can use the CV-SORT program supplied with NX-CV. Appendix C explains CV-SORT operation.



## CHAPTER 4. USING NX-CV

This chapter describes the required conditions and procedures for configuring and running NX-CV.

Before running NX-CV, be sure that:

- Your system is correctly configured.
- You have installed the NX-CV program file (NXC.V.EXE).
- You have assembled the schematic circuit.
- You have extracted and, if necessary, linked the netlist files.
- You have created the map and/or data extraction files if necessary.
- For back-annotation, you have transferred the element list file from your CV system to your P-CAD system and, if the element list file is not sorted by the number in the SEQNUM field, you have used CV-SORT to produce the sorted element list file.

NX-CV has three operating modes: interactive, command line, and batch. In interactive mode, NX-CV displays a series of screens and you select options and specify filenames. In command line mode, you specify filenames on the command input line when you start the program and NX-CV processes the input file automatically. In batch mode, when you start the program you specify the name of a batch file that instructs NX-CV to process several files automatically.

The following sections describe how to use interactive mode to start and configure NX-CV, translate a netlist, and create the back-annotation file; how to use command line and batch modes; and how to input the back-annotation file into PC-CAPS.

## INTERACTIVE MODE

In interactive mode, you must first start NX-CV to display the Opening Menu.

To start NX-CV, be sure you are in the appropriate project directory, then type:

```
NXCV [Return]
```

When the NX-CV Title Screen appears, press any key to continue. The system displays the Opening Menu as shown in Figure 4-1.



---

NX-CV

Options:

Configuration

>> Net List Translation <<

Back Annotation

Exit

Press: [SPACE] for next option; [RETURN] to accept

---

### Figure 4-1. NX-CV Opening Menu

This menu provides the following options.

**Configuration** - Allows you to set or change NX-CV configuration options.

**Net List Translation** - Allows you to translate the P-CAD netlist to a CV element list.

**Back Annotation** - Allows you to produce the back-annotation file.

**Exit** - Returns you to DOS.

If you want to set or change the configuration, use the procedure in "Configuring NX-CV." If you do not want to set or change the configuration, continue to "Translating a Netlist" and "Producing the Back-Annotation File."

If the NXC.V.CFG file does not already exist in the current directory, a default configuration file named NXC.V.CFG is created when you start NX-CV. If you do not specify another configuration file, this file is used each time you run NX-CV.

**NOTE:** You can load a previously created NX-CV configuration file directly from DOS by typing NXC.V followed by a space, an open parenthesis (), and then the filename (without extension) of the configuration file. For example, typing NXC.V (TESTFILE causes NX-CV to read the configuration file called TESTFILE.CFG from the current directory.

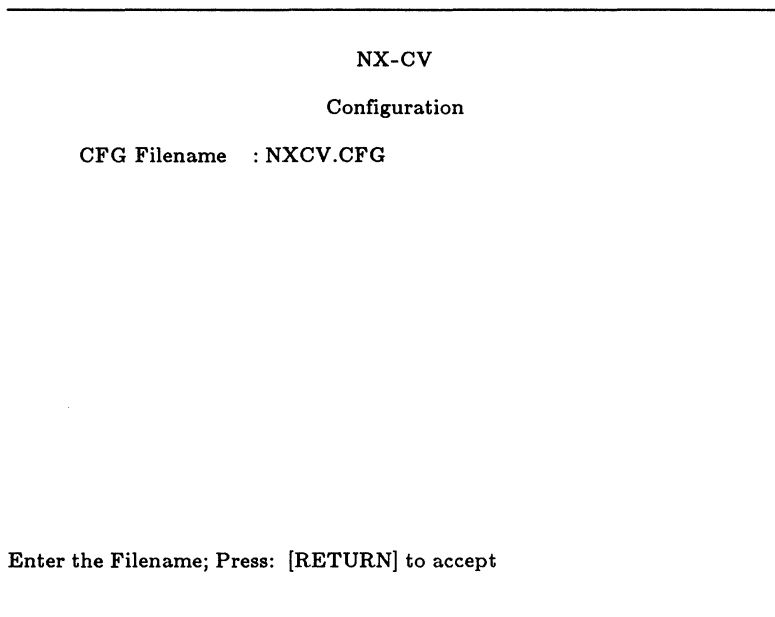
## Configuring NX-CV

NX-CV allows you to set several configuration options. You can use a configuration for just one operating session, or you can save it to a configuration file, which you can later reuse. You might want to create a configuration file for each design you process. You can add or modify a current configuration or another configuration file whenever necessary.

Select **Configuration** at the Opening Menu to select, modify, or create the configuration for a program session. **Configuration** also allows you to run NX-CV several times using different configurations without leaving the program.

To configure NX-CV, follow the steps below.

1. At the NX-CV Opening Menu, use the space bar or the cursor keys to select **Configuration**, then press [Return]. The system displays the Configuration Screen with the current configuration filename (the one you specified when starting NX-CV or at an earlier configuration session or the default NXC.V.CFG). The system prompts you to accept the current configuration or specify another configuration filename. Figure 4-2 shows the Configuration Screen.



**Figure 4-2. NX-CV Configuration Screen**

2. Type the name of the configuration file you want to create or edit and press [Return], or press [Return] to accept the default file. If you do not enter a filename extension, NX-CV adds the .CFG extension. If you enter only blanks for a filename, the configuration will be used but will not be saved to a file.

The system displays the configuration options. If the file you named already exists in the current directory, its current settings are displayed as defaults. Otherwise, NX-CV supplies default settings as shown in Figure 4-3. You can now enter the appropriate settings.

---

```
                NX-CV
                Configuration
CFG Filename   : TESTFILE.CFG
MAP Filename   : <filename>
DTX Filename   : <filename>
Line Numbers ? : No
```

Enter MAP Filename; Press [Return] to accept, [Esc] to quit

---

**Figure 4-3. Default Configuration Settings**

3. The first option is the map filename.

If you are using a map file to specify pin order and component information, type the filename and press [Return].

If you are not using a map file, just press [Return].

NOTE: At any step on this screen, you can terminate the configuration process by pressing [Esc]. The program displays the update prompt and you can go to step 6. (If you did not specify a filename, the information from this screen is used for this program session but not saved.)

4. The next option is the DTX filename.

If you are using a data extraction file to specify output file contents and format, type the filename and press [Return].

If you are not using a data extraction file, just press [Return].

5. The next option allows you to specify whether the output element list file will include line numbers. The default is "No."

Press [Return] to accept the default setting, or press the space bar to display the "Yes" setting and press [Return].

After you set the last option, the system displays the following prompt:

**Configuration File : Update**

**NOTE:** If you did not specify a configuration filename, this prompt is not displayed. In this case, configuration is complete, and the program returns to the Opening Menu.

6. Press [Return] to accept the default, "Update," or press the space bar to display "No Update" and press [Return].

"Update" saves the configuration file. "No Update" causes the configuration to be used for the current session only.

**NOTE:** Configuration files can only be read from or written to the current directory.

When configuration is complete, the system returns you to the Opening Menu.

### **Translating a Netlist**

**Net List Translation** allows you to generate element list files from your P-CAD netlist files. To translate a netlist, follow the procedure below.

1. At the Opening Menu, use the space bar or the cursor keys to select **Net List Translation** and press [Return].

The system displays the NX-CV Program Screen and prompts for the input netlist filename as shown in Figure 4-4.

---

NX-CV

Net List Filename : <filename>.XNL

Enter the filename; Press [Return] to accept or [Esc] to exit

---

**Figure 4-4. NX-CV Program Screen**

2. Type the filename of the netlist to be read by NX-CV and press [Return]. If you do not enter the filename extension, NX-CV adds the .XNL extension.

**NOTE:** At any prompt or during file processing, if you decide not to proceed with the program, you can press [Esc] to quit and return to the Opening Menu.

The system prompts for the output element list filename. The default is the input netlist filename with the .ELF extension as shown in Figure 4-5.

---

NX-CV

Net List Filename : TESTFILE.XNL  
CV Filename : TESTFILE.ELF

Enter the filename; Press [Return] to accept or [Esc] to exit

---

**Figure 4-5. Sample Program Screen**

3. Press [Return] to accept the default filename or type another element list filename and press [Return].

After you enter the output filename, NX-CV begins file processing. It displays progress reports and error messages, if any, at the bottom of the screen.

When processing is complete, the system returns you to the Opening Menu.



## **Producing a Back-Annotation File**

**Back Annotation** allows you to produce a back-annotation file that you can use to update your PC-CAPS schematic with packaging information entered in the CV system.

To successfully create the back-annotation file, NX-CV must use the same data extraction file and map file that were used to create the original element list file. Before you select **Back Annotation**, be sure the current configuration contains the appropriate filenames.

To produce the back-annotation file, follow the steps below.

1. At the Opening Menu, use the space bar or the cursor keys to select **Back Annotation** and press [Return].

The system displays the NX-CV Back-Annotation Screen and prompts for the input element list filename as shown in Figure 4-6.

---

NX-CV

CV Filename : <filename>.ELF

Enter the filename; Press [Return] to accept or [Esc] to exit

---

**Figure 4-6. NX-CV Back-Annotation Screen**

2. Type the filename of the element list file or sorted element list file to be read by NX-CV and press [Return]. If you do not enter the filename extension, NX-CV adds the .ELF extension.

The system prompts for the input netlist filename.

3. Type the filename of the netlist to be read by NX-CV and press [Return]. If you do not enter the filename extension, NX-CV adds the .XNL extension.

**NOTE:** At any prompt or during file processing, if you decide not to proceed with the program, you can press [Esc] to quit and return to the Opening Menu.

The system prompts for the output back-annotation filename. The default is the netlist filename with the .BKA extension as shown in Figure 4-7.

---

**NX-CV**

CV Filename : TESTFILE.ELF  
Net List Filename : TESTFILE.XNL  
Output Filename : TESTFILE.BKA

Enter the filename; Press [Return] to accept or [Esc] to exit

---

**Figure 4-7. Sample Back-Annotation Screen**

4. Press [Return] to accept the default filename, or type another filename and press [Return].

After you enter the output filename, NX-CV begins file processing. It displays progress reports and error messages, if any, at the bottom of the screen.

When processing is complete, the system returns you to the Opening Menu.

## COMMAND LINE MODE

Command line mode allows you to specify input and output filenames when you start NX-CV.

To use command line mode, at the DOS prompt, type the command line and press [Return].

The format of the command line is:

```
NXCV <netlist> <elf> -<bka> (<cfg>
```

where:

**NXCV** initiates the program.

**netlist** is the name of the input netlist file and is required. If you do not include the filename extension, NX-CV uses the .XNL extension.

**elf** is the name of the element list file or sorted element list file to be output in netlist translation or input for creating the final back-annotation file. This name is optional. If you specify a name with no extension, NX-CV uses the .ELF extension. If you do not specify a name, NX-CV uses the input netlist filename with the .ELF extension.

- specifies that this is a back-annotation program run. It is used only for back-annotation.

**bka** is the name of the back-annotation file to be output. This name is optional. If no extension is included, NX-CV uses the .BKA extension. If the hyphen (-) is present but no filename is included, NX-CV uses the name of the input netlist file with the .BKA extension. There can be a space between the - and the filename, but it is not required.

(, the open parenthesis, specifies that the next filename is the configuration file. It is used only when you specify a configuration filename.

**cfg** is the name of the configuration file. You do not have to enter the .CFG extension; NX-CV inserts it. This filename is optional. If no configuration file is specified, NX-CV uses the NXC.V.CFG file. There can be a space between the ( and the filename, but it is not required.

Three examples of command lines are shown below.

```
NXC.V.TESTFILE ( CONFIG
NXC.V.TESTFILE.NLT TEST
NXC.V.TESTFILE -TEST ( TESTFILE
```

The first example causes NX-CV to create an element list file from the TESTFILE.XNL file, using the CONFIG.CFG configuration file. The output file will have the default filename TESTFILE.ELF.

The second example causes NX-CV to create an element list file from the TESTFILE.NLT file and give the output file the filename TEST.ELF. The default configuration file, NXC.V.CFG, is used.

The third example causes NX-CV to create a back-annotation file named TEST.BKA from the TESTFILE.XNL netlist file and the TESTFILE.ELF

element list file, using the TESTFILE.CFG configuration file.

After you enter the command line, the program runs automatically with no further input from you. First, the NX-CV Title Screen appears, followed by the Command Line Mode Screen. Figure 4-8 shows a sample Command Line Mode Screen for netlist translation.

---

NX-CV

Netlist Filename : TESTFILE.XNL

CV Filename : TESTFILE.ELF

Press [Esc] to abort

---

**Figure 4-8. Sample Command Line Mode Screen**

NX-CV displays progress reports and error messages, if any, as it processes the files. When processing is complete, the system returns you to DOS.

## BATCH MODE

Batch mode is a variation of command line mode where the input file is a batch control file (<filename>.BCF) containing several command lines to be run consecutively without user intervention.

Use a text editor to create the batch control file. You must use a .BCF filename extension when naming the batch control file.

Each line of the batch control file has the same format as a command line without the NXCVC command. Each line contains the name of an input netlist file and can include an element list filename, a back-annotation filename, and/or a configuration filename.

**NOTE:** If you specify a configuration file on one line of a batch control file, the same configuration file will be used for the following lines until another configuration file is specified.

Figure 4-9 shows an example of a batch control file.

---

```
TEST1
TEST2.NLT NEW.ELF ( CONFIG2
TEST3 - TEST3
TEST4.NLT FINAL.SEF - ( TEST4
```

---

**Figure 4-9. Sample Batch Control File**

Note that when this batch control file is run, the CONFIG2.CFG file will be used for both the TEST2.NLT and the TEST3.XNL input files.

To run the batch control file, at the DOS prompt, type:

NXCV @<filename> [Return]

You do not need to enter the extension; NX-CV assumes it is .BCF. You can leave a space between the @ and the filename, but it is not required.

NX-CV displays the Title Screen, then the Command Line Mode Screen. NX-CV processes the files sequentially, displaying each netlist filename in turn, and displays progress reports and error messages, if any. When processing is complete, the system returns you to DOS.

Batch mode produces all the output files specified in the batch control file.

## BACK-ANNOTATING A SCHEMATIC

To back-annotate a schematic, first use NX-CV to create the back-annotation file, then follow the steps below.

1. Start PC-CAPS and select **Edit database** at the Opening Menu.

The PC-CAPS Command Menu appears.

2. Type:

/

The system prompts:

**Menu command:**



3. Type:

EXE [Return]

The system prompts:

**Exec filename:**

4. Type:

<filename>.BKA [Return]

The system loads the appropriate schematic and updates each symbol on the schematic to its new physical configuration. If the schematic is a multisheet schematic, each sheet is automatically updated and saved in turn.



## CHAPTER 5. VIEWING THE OUTPUT FILES

NX-CV has three types of output files: the CV-compatible element list file (<filename>.ELF), the back-annotation file (<filename>.BKA), and the log file (NXCV.LOG).

All these files are ASCII files that you can examine as necessary.

This chapter describes how to view and print the output files and how to interpret the element list file.

The back-annotation file is in standard P-CAD executable format, which is explained in the *PC-CAPS User's Manual*.

The log file contains error and information messages displayed during the generation of the other output files. Appendix A explains the error messages.

### VIEWING AND PRINTING FILES

To display or print an output file, use the DOS TYPE and [Ctrl]-P commands. For example, to display a file, type:

```
TYPE TESTFILE.LOG [Return]
```

or, to print a file, type:

```
TYPE TESTFILE.LOG [Ctrl]-P [Return]
```

When the file is printed, press [Ctrl]-P again to turn off the print function.

You can also use the DOS PRINT command to print a file.

## **INTERPRETING THE ELEMENT LIST FILE**

The element list file contains information about components and circuit connectivity. It consists of a series of records, one for each component pin in the schematic. Each record consists of up to seven fields of information about the pin.

The list below describes the seven fields and gives the P-CAD origin of the information.

**SEQNUM** - Identifier of the schematic symbol, generated by NX-CV from the schematic sheet number that is assigned sequentially by NX-CV starting with 001, and the order in which the symbol was entered on the sheet.

**SIGNAL** - Name of the signal associated with the pin identified by the record, assigned using the NAME/NET command. For unnamed nets and unconnected pins, NX-CV provides a default format and allows you to specify another format using the data extraction file.

**DEVICE** - Device type identifier, specified using the PNAME attribute or in the PNAME field of the map file. If neither PNAME value is present, it is the name of the symbol file without the extension. You can specify an alternate format using the data extraction file.

**REFDES** - Reference designator of the symbol, either preassigned using the SCMD/PNUM command in PC-CAPS or assigned by NX-CV.

**PPIN** - Physical pin number. This field is present only if you preassigned package pin numbers in PC-CAPS and for one-gate-per-part symbols.

**LPIN** - Logical pin name, either assigned when the symbol was created in PC-CAPS or specified in the map file. This field is empty if data is in the PPIN field.

**TALLY** - The total number of records in the file for the device type. This field is present only for the first record for a device type.

Pin records are grouped by component. Records are ordered first by device type (the **DEVICE** field), then by the component sequence number assigned by NX-CV (the **SEQNUM** field), then by pin order within each component.

**NOTE:** In the sorted element list format required for back-annotation, records are ordered only by the component sequence number.

The exact contents and format of the element list file can be controlled using the data extraction file. If no data extraction file is used, NX-CV generates the element list file in the default format. In the default format, the fields are in the order shown above. Chapter 3, "Preparing the Input Files," contains a complete description of the data extraction file and the default format. Appendix D contains sample element list files.



## APPENDIX A. ERROR MESSAGES

NX-CV displays error messages on the screen and stores them in the log file (NXC.V.LOG), which you can view or print.

This appendix lists and explains NX-CV error messages. Errors are grouped into five types: file access and system errors, data extraction file errors, netlist translation errors, back-annotation errors, and other errors. Within each group, error messages are listed in alphabetical order.

### FILE ACCESS AND SYSTEM ERRORS

Errors in this group are due to system problems. You cannot run the program until the error is corrected.

**Message:** Cannot open Configuration file <filename>

**Cause:** Your disk may be full, or there may be a system error.

**Action:** If your disk is full, delete files as necessary to make space. Be sure you have 640K of memory available. If the error persists, turn the computer off and reboot.

**Message: Cannot open input file <filename>**

**Cause:** The named file is not present, the batch control file is incorrect, or there is a system error.

**Action:** Make sure that the file is present on the current or specified directory. If you are using a batch control file, make sure that it contains no incorrect data. Be sure you have 640K of memory available. If the error persists, turn the computer off and reboot.

**Message: Cannot open output file <filename>**

**Cause:** Your disk may be full, or there may be a system error.

**Action:** If your disk is full, delete files as necessary to make space. Be sure you have 640K of memory available. If the error persists, turn the computer off and reboot.

**Message: Memory Allocation Error**

**Memory Deallocation Error**

**Cause:** The system may have insufficient memory. NX-CV requires 640K.

**Action:** Be sure you have 640K. If so, turn the computer off and reboot.



## DATA EXTRACTION FILE ERRORS

The following errors are produced during netlist translation when NX-CV reads the data extraction file.

**Message: DTX File Error**  
**<field1> and <field2> are not separated by a space**

**Cause:** The starting column number for the current field is less than two columns higher than the ending column number for the previous field. NX-CV cannot complete processing.

**Action:** Edit the column specifications in the DTX file to allow at least one blank space between the two fields.

**Message: DTX File Error**  
**Cannot build fields for component <compname>**

**Cause:** NX-CV cannot find a field value for the named component using the format specified in the data extraction file. The default format for the field is used.

**Action:** Check the output file and the data extraction file. If necessary, edit the schematic database or the data extraction file and rerun NX-CV.

**Message: DTX File Error**  
**Closing ) is missing. Skipped data: <data>**

**DTX File Error**  
**Closing " is missing. Skipped data: <data>**

**Cause:** A line in the data extraction file has an opening quotation mark or parenthesis but no closing one. The line is ignored.

**Action:** Check the line. If necessary, correct the data extraction file and rerun NX-CV.

**Message: DTX File Error**  
**Column number is zero or less for <field> field**

**Cause:** The starting or ending column number for the named field is zero or less than zero. NX-CV cannot complete processing.

**Action:** Correct the column specification in the DTX file.

**Message: DTX File Error**  
**DTX field <field> not specified**

**Cause:** The named field is not included in the FIELDS section of the DTX file.

**Action:** Add a line for the field to the FIELDS section of the DTX file.

**Message: DTX File Error**  
**Empty quotation marks line: <line>**

**Cause:** The data extraction file contains a pair of quotation marks with no text between them in the line shown. The line is ignored.

**Action:** Check the line. If necessary, correct the data extraction file and rerun NX-CV.

**Message: DTX File Error**  
**END identifier is missing**

**Cause:** The data extraction file does not contain the END identifier. NX-CV cannot complete processing.

**Action:** Correct the data extraction file and rerun NX-CV.

**Message: DTX File Error**  
**FIELDS identifier is missing**

**Cause:** The data extraction file does not contain the FIELDS identifier. NX-CV cannot complete processing.

**Action:** Correct the data extraction file and rerun NX-CV.

**Message: DTX File Error**  
**FORMATS identifier is missing**

**Cause:** The data extraction file does not contain the FORMATS identifier. NX-CV cannot complete processing.

**Action:** Correct the data extraction file and rerun NX-CV.

**Message: DTX File Error**  
**Invalid ATTR or MAP value: <value>**

**Cause:** The value in parentheses after the ATTR or MAP identifier in the data extraction file contains a nonalphanumeric character. The line is ignored.

**Action:** Check the line. If necessary, correct the data extraction file and rerun NX-CV.

**Message: DTX File Error**  
**Invalid data before FORMATS: <data>**

**Cause:** NX-CV found the specified data before the FORMATS identifier in the data extraction file. The data is ignored.

**Action:** Check the specified data. If necessary, correct the data extraction file and rerun NX-CV.

**Message: DTX File Error**  
**Invalid data between sections: <data>**

**Cause:** NX-CV found the specified data between the FORMATS and FIELDS sections of the data extraction file. The data is ignored.

**Action:** Check the specified data. If necessary, correct the data extraction file and rerun NX-CV.

**Message: \*=DTX File Error**  
**Invalid keyword entered: <error>**

**Cause:** A line in the data extraction file begins with a word that is not a valid keyword. The line is ignored.

**Action:** Check the line. If necessary, correct the data extraction file and rerun NX-CV.

**Message: DTX File Error**  
**Invalid MAP value: <value>**

**Cause:** The value in parentheses after the MAP identifier is not PNAME, PREFIX, or USER. The line is ignored.

**Action:** Check the line. If necessary, correct the data extraction file and rerun NX-CV.

**Message: DTX File Error**  
**Invalid starting or ending column for <field>**

**Cause:** The starting or ending column for the named field overlaps with the column specified for an adjacent field. NX-CV cannot complete processing.

**Action:** Edit the column specifications in the DTX file to allow at least one blank space before and after the field.

**Message: DTX File Error**  
**Left parenthesis is missing**  
**line: <line>**

**Cause:** A left parenthesis is not present in the data extraction file after the ATTR or MAP keyword in the line shown. The line is ignored.

**Action:** Check the line. If necessary, correct the data extraction file and rerun NX-CV.

**Message: DTX File Error**  
**Nonnumeric column value: <value>**

**Cause:** The FIELDS section of the data extraction file contains a starting or ending column value that is not a number. NX-CV cannot complete processing.

**Action:** Correct the data extraction file and rerun NX-CV.

**Message: DTX File Error**  
**Not enough space, data <data> is now**  
**<truncated data>**

**Cause:** The data for a component does not fit into the field length specified in the data extraction file. The data is truncated.

**Action:** Examine the output file and the data extraction file. If necessary, edit the data extraction file and rerun NX-CV.

**Message: DTX File Error**  
**Overlapping fields: <field1> - <field2>**

**Cause:** The FIELDS section of the data extraction file contains column values that overlap. NX-CV cannot complete processing.

**Action:** Correct the data extraction file and rerun NX-CV.

## NETLIST TRANSLATION ERRORS

The error messages shown below are produced when NX-CV translates a netlist. In these messages, **compname** is the name of the component symbol file without the filename extension and **location** is the X and Y coordinates of the component instance location in the PC-CAPS schematic database.

**Message: Cannot package hierarchical component  
Component <compname> at <location>**

**Cause:** The named component is hierarchical.

**Action:** The element list file is not generated. Correct your schematic then rerun PC-NODES and NX-CV.

**Message: Common pin found  
Component <compname> at <location>**

**Cause:** The same pin number has been assigned more than once for a reference designator. The component is not included in the output element list.

**Action:** Use PC-CAPS to correct the schematic. If the component is to be packaged into a part with common pins, add the COMM attribute. Otherwise, correct the pin numbers. Then use PC-NODES to extract a new netlist and rerun NX-CV.



**Message: Connector pins exceed CONN attribute for  
<refdes>  
Component <compname> at <location>**

**Cause:** The number of connector pins for the same reference designator exceeds the number specified in the CONN attribute for the specified component. The component is not included in the output element list.

**Action:** Use PC-CAPS to change the CONN attribute or to correct the component preassignment. Then use PC-NODES to extract a new netlist and rerun NX-CV.

**Message: Duplicate reference designator <refdes>  
Component <compname> at <location>**

**Cause:** The same reference designator is used more times than the number of gates per package assigned to the specified component. The component is not included in the output element list.

**Action:** Use PC-CAPS to correct the schematic. If the component is to be packaged into a heterogeneous part, add the MIX attribute to specify the number of gates in the part. Otherwise, change one or more reference designators. Then use PC-NODES to extract a new netlist and rerun NX-CV.

**Message: Error in assignment <section>  
Component <compname> at <location>**

**Cause:** Either two components have been assigned to the same section of a part or the pin number preassignment made for the component using the SCMD/PNUM command does not match the information assigned to the component using the SCMD/PNLC command. The specified component is not included in the output element list.

**Action:** Use PC-CAPS to add the MIX attribute (to specify section assignment) or correct the pin preassignment. Then use PC-NODES to extract a new netlist and rerun NX-CV.

**Message: Invalid prefix  
Reference designator: <refdes>  
Component name: <compname>**

**Cause:** The prefix you specified is blank or more than one character for the specified component. No data for the component is included in the element list file.

**Action:** Correct the PREFIX attribute or the map file, and rerun NX-CV.

**Message: Missing MIX attribute  
Component <compname> at <location>**

**Cause:** The named component has the same reference designator as another component that was assigned the MIX attribute. The component is not included in the output element list.

**Action:** Correct the schematic to add or remove the MIX attribute or to change a reference designator. Then use PC-NODES to extract a new netlist, and rerun NX-CV.

**Message: Missing SCMD/PNLC for symbol <compname>  
Processing aborted**

**Cause:** The specified symbol, which was assigned the MIX or CONN attribute on the schematic, was not assigned packaging information using the SCMD/PNLC command in PC-CAPS SYMB mode.

**Action:** Add the packaging information to the symbol definition, then replace all instances of the symbol in the schematic with the corrected symbol. Then rerun PC-NODES and NX-CV.

**Message: Number of components exceeds MIX attribute  
Component <compname> at <location>**

**Cause:** The number of components assigned to a heterogeneous part is greater than the number of gates specified in the MIX attribute for the specified part. The component is not included in the output element list.

**Action:** Correct the MIX attribute for the part or the component preassignment. Then use PC-NODES to extract a new netlist and rerun NX-CV.

**Message: Pin number not preassigned to connector  
Component <compname> at <location>**

**Cause:** The named component has the CONN attribute but does not have pin numbers preassigned. The component is not included in the output element list.

**Action:** Use the PC-CAPS SCMD/PNUM command to add pin numbers to the component. Then use PC-NODES to extract a new netlist and rerun NX-CV.

**Message: Pin number not preassigned to mixed-part component <compname> at <location>**

**Cause:** The named component was assigned the MIX attribute but was not assigned package pin numbers. The component is not included in the output element list.

**Action:** Use the PC-CAPS SCMD/PNUM command to assign package pin numbers to the component. Then use PC-NODES to extract a new netlist and rerun NX-CV.

**Message: Same reference designator for CONN/no-CONN Component <compname> at <location>**

**Cause:** The named component has the CONN attribute and has the same reference designator as another component that does not have the CONN attribute. The component is not included in the output element list.

**Action:** Correct the schematic to add or remove the CONN attribute or change a reference designator. Then use PC-NODES to extract a new netlist and rerun NX-CV.

**Message:** Same reference designator for MIX/no-MIX  
Component <compname> at <location>

**Cause:** The named component has the MIX attribute and has the same reference designator as another component that does not have the MIX attribute. The component is not included in the output element list.

**Action:** Correct the schematic to add or remove the MIX attribute or change a reference designator. Then use PC-NODES to extract a new netlist and rerun NX-CV.

## BACK-ANNOTATION ERRORS

The following messages are produced during back-annotation.

**Message:** Element List File Error  
Component definition <device> - not found in netlist

**Cause:** The specified DEVICE field value found in the element list does not correspond to the component name in the input netlist. NX-CV does not process the record.

**Action:** Check to see whether the component was substituted for another in the design in the CV system. If so, you must enter the changes manually in the schematic using PC-CAPS. If not, be sure the input netlist is the correct netlist and the DEVICE field of the element list is correct, then rerun NX-CV to produce a corrected back-annotation file.

**Message: Element List File Error**  
**Component definition not found for**  
**SEQNUM: <seqnum>**

**Cause:** The named record is for a component that is not present in the input netlist. NX-CV does not process the record.

**Action:** Check to see whether the component was added to the design in the CV system. If so, you must enter it manually in the schematic using PC-CAPS. If not, be sure the input netlist is the correct netlist and the component's SEQNUM field is the same as it was in the original element list produced by NX-CV. Then rerun NX-CV to produce a corrected back-annotation file.

**Message: Component location not found for SEQNUM:**  
**<seqnum>**

**Cause:** The input netlist has an internal error. NX-CV does not process the component.

**Action:** Rerun PC-NODES to extract a new netlist for the schematic database, then rerun NX-CV for back-annotation. If the error persists, call P-CAD.

**Message: Element List File Error**  
**Component not found for SEQNUM: <seqnum>**

**Cause:** The named record is for a component that is not present in the input netlist. NX-CV does not process the record.

**Action:** Check to see whether the component was added to the design in the CV system. If so, you must enter it manually in the schematic using PC-CAPS. If not, be sure the input netlist is the correct netlist and the component's SEQNUM field is the same as it was in the original element list produced by NX-CV, then rerun NX-CV to produce a corrected back-annotation file.

**Message: Element List File Error**  
**DEVICE field not found for SEQNUM:**  
**<seqnum>**  
**Node Name: <signal>**

**Cause:** The named record contains no data in the columns specified as the DEVICE field. NX-CV does not process any records with the specified SEQNUM value.

**Action:** Check to see whether you are using the correct configuration file. Be sure that the data extraction file has the correct column numbers. Correct the configuration file, data extraction file, or element list file if needed. Then rerun NX-CV to produce a corrected back-annotation file.



**Message: Element List File Error**  
**Different device names for the same**  
**component: <seqnum>**

**Cause:** The element list file contains records with different device names for the component with the specified SEQNUM value. NX-CV does not process the component.

**Action:** Correct the element list file, and rerun NX-CV to produce a corrected back-annotation file.

**Message: Element List File Error**  
**Different reference designators for the same**  
**component: <seqnum>**

**Cause:** The element list contains records with different reference designators for the component with the specified SEQNUM value. NX-CV does not process the component.

**Action:** Correct the element list file, and rerun NX-CV to produce a corrected back-annotation file.

**Message: Element List File Error**  
**Error in SEQNUM: <seqnum>**

**Cause:** Either the SEQNUM field is not completely within the correct columns, another field overlaps with the SEQNUM field, or the SEQNUM field contains nonnumeric characters. NX-CV does not process the record.

**Action:** Correct the element list file and rerun NX-CV to produce a corrected back-annotation file.

**Message: Element List File Error**  
**Invalid number of pins for SEQNUM**  
**<seqnum>**

**Cause:** The number of element list file records for the component with the specified SEQNUM value exceeds the number of pins allowed for the component. NX-CV does not process the component.

**Action:** Correct the element list file so that all the pins have the correct SEQNUM value. Then rerun NX-CV to produce a corrected back-annotation file.

**Message: Element List File Error**  
**Invalid physical pin: <pinnum>**  
**Node name: <nodename> SEQNUM: <seqnum>**

**Cause:** The specified PPIN value either contains nonnumeric characters or does not agree with the component preassignment defined with the SCMD/PNLC command. NX-CV does not process the component.

**Action:** Check the element list file and make sure the PPIN value is numeric and occupies the columns specified in the data extraction file. If the pin number does not agree with component preassignment, correct the element list file or the schematic database. Then rerun NX-CV to produce a corrected back-annotation file.

**Message: Element List File Error**  
**Node name <signal> - not found in netlist**

**Cause:** The specified SIGNAL field value found in the element list does not correspond to a net name in the input netlist. NX-CV does not process the component.

**Action:** Check to see whether the net was added to the design in the CV system. If so, you must enter it manually in the schematic using PC-CAPS. If not, be sure the input netlist is the correct netlist and the SIGNAL field in the element list is correct. Then rerun NX-CV to produce a corrected back-annotation file.

**Message: Element List File Error**  
**PPIN field not found for SEQNUM: <seqnum>**  
**Node Name: <signal>**

**Cause:** The named record contains no data in the columns specified as the PPIN field. NX-CV does not process the record.

**Action:** Check to see whether the record has data in the LPIN field. If so, no physical assignment has been made for the pin and you should evaluate whether you want to proceed with back-annotation or make any changes to the element list. If the record has no data in the LPIN field, check to see whether you are using the correct configuration file. Be sure that the data extraction file has the correct column numbers. Correct the configuration file, data extraction file, or element list file if needed. Then rerun NX-CV to produce a corrected back-annotation file.

**Message: Element List File Error**  
**Schematic not found for SEQNUM: <seqnum>**

**Cause:** The input netlist is not the one that corresponds to the element list or the netlist is damaged.

**Action:** Input the correct netlist. If the netlist is the correct one, rerun PC-NODES to produce a new netlist for the same schematic database, then rerun NX-CV for back-annotation. If the error persists, call P-CAD.

**Message: Element List File Error**  
**SEQNUM field not found**  
**Element list line: <line>**

**Cause:** The named record contains no data in the columns specified as the SEQNUM field. NX-CV does not process the record.

**Action:** Correct the element list file, making sure that the SEQNUM field starts in the correct column. Then rerun NX-CV to produce a corrected back-annotation file.

**Message: Element List File Error**  
**SIGNAL field not found for SEQNUM:**  
**<seqnum>**

**Cause:** The named record contains no data in the columns specified as the SIGNAL field. NX-CV does not process any records with the specified SEQNUM value.

**Action:** Check to see whether you are using the correct configuration file. Be sure that the data extraction file has the correct column numbers. Correct the configuration file, data extraction file, or element list file if needed. Then rerun NX-CV to produce a corrected back-annotation file.

**Message: Element List File Error  
Unexpected end of file for <elf>**

**Cause:** Either the specified element list file is empty or all the element list file records are in error.

**Action:** Be sure you specified the correct element list file. If you did, check the log file for errors and correct them.

**Message: Errors found in netlist <netlist>  
Exiting Back Annotation mode**

**Cause:** NX-CV found errors in the input netlist and did not process the element list file or produce the back-annotation file. The errors are noted in the log file.

**Action:** Correct the errors noted in the log file.

**Message: PNLC not defined for <compname>**

**Cause:** The information for the specified component in the netlist does not contain the information assigned using the PC-CAPS SCMD/PNLC command. NX-CV requires this information for translating a netlist, so the netlist is not the same as the one used to create the original element list file. Either you are using a different netlist file extracted from a changed schematic, or your netlist file is damaged.

**Action:** If the input netlist was the correct one, use PC-NODES to extract a new netlist from the schematic, and rerun NX-CV for back-annotation. If the error persists, call P-CAD.

## OTHER ERRORS

The remaining error messages are shown below.

**Message: Database error  
Processing aborted**

**Cause:** The input netlist is not in a format compatible with NX-CV.

**Action:** Be sure you specify the correct file and that you used your current version of PC-NODES to produce the netlist.

**Message: Component <compname> in error  
Skipped <n> records  
Component type: <compname>**

**Cause:** This message appears both in the log file and in the element list file. The specified component was not processed because of an error noted in another message in the log file.

**Action:** Correct the other error noted in the message in the log file.

**Message: Numeric part of reference designator is too large**

**Reference designator: <refdes>**

**Component name: <compname>**

**Cause: The numeric part of the specified reference designator is greater than 32767, which is the largest value allowed.**

**Action: Correct the reference designator, then rerun PC-NODES and NX-CV.**



## APPENDIX B. CV-MAP

This appendix describes the CV-MAP program, which allows you to cross-reference PC-CAPS schematic symbols and the corresponding components in the CV library.

### CV-MAP OVERVIEW

CV-MAP allows you to specify changes in pin order, pin names, and component identification when the CV conventions are different from those used in the PC-CAPS library symbols. Using CV-MAP enables you to cross-reference the components without editing each P-CAD library symbol.

There are four stages in this process:

1. Create the map library file(s) (<filename>.MLF) using PC-CAPS and PC-NODES. To create the map library file, use PC-CAPS to produce a schematic database file that contains all the symbols you want to map. Then use PC-NODES to extract the netlist from the schematic database.
2. Use a text editor and (optionally) CV-MAP batch file preparation mode to create the map batch file (<filename>.MBF), which contains information about the CV library components.
3. Input the map library file and the map batch file into CV-MAP, using update mode. CV-MAP

generates two output files: the map file and the log file.

- The map file (<filename>.MAP) contains the cross-reference information in binary format and can be input directly into NX-CV.
  - The log file (CVMAP.LOG) contains all messages displayed and all error messages generated during program operation.
4. To examine the contents of the map file, use CV-MAP dump mode to translate the map file into the ASCII-format map dump file (<filename>.MDF). If corrections are necessary, you can edit the dump file, then input it into CV-MAP to generate a corrected map file.

Once the map file is created, you can use it whenever you run NX-CV. If you need to add components, you can edit your CV-MAP input files, then rerun CV-MAP to produce an updated map file.

Figure B-1 shows the process described above.

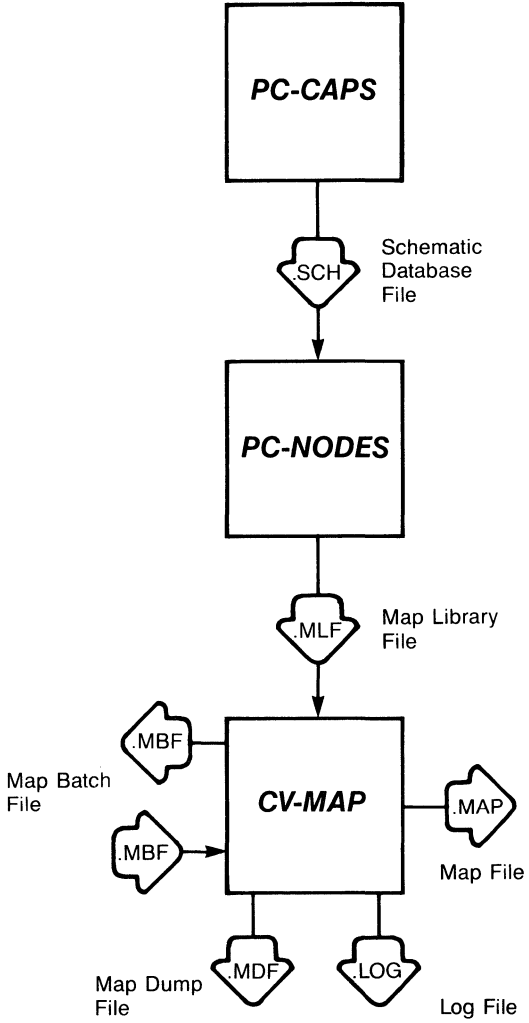


Figure B-1. CV-MAP Input and Output

## **PREPARING THE CV-MAP INPUT FILES**

Before you can run CV-MAP, you must prepare the map library file and the map batch file. This section explains how to create these files and describes in detail the format of the map batch file.

### **Creating the Map Library File**

The map library file (<filename>.MLF) provides CV-MAP with the pin order of each P-CAD symbol. It is in standard P-CAD binary netlist format.

You can input several map library files into CV-MAP to create one map file.

To create the map library file, first determine which components you need to reference. Then use PC-CAPS to create a schematic database file containing all the components. Use the ENTR/COMP command in detail mode to enter each symbol on the schematic. You can place the symbols anywhere on the schematic, and you do not need to connect them. However, you must use the ENTR/WIRE command to draw at least one wire to meet PC-NODES requirements.

Next, run PC-NODES to extract the binary netlist from the schematic. To identify the netlist as a map library file, use the .MLF filename extension.

### **Creating the Map Batch File**

The map batch file is an ASCII file that contains the information you want to add to each P-CAD symbol in the map library file. The map batch file can redefine pin order, part name, symbol name, reference designator prefix, and other information for each symbol.

You can create a map batch file using a text editing program or using the CV-MAP preparation mode. To use the preparation mode, you input the map library file into CV-MAP. CV-MAP creates a new file, which contains an entry for each symbol in the map library file and is in map batch file format. You can then use a text editor to add the necessary information to the new file. "Using CV-MAP" contains instructions for using preparation mode.

Each entry in the map batch file must have a corresponding entry in a map library file. When you run CV-MAP, you can specify any number of map batch files and any number of map library files to create a single map file. If a symbol listed in a map batch file is not present in any of the map library files, CV-MAP ignores that symbol.

The map dump file created in CV-MAP dump mode is in standard map batch file format. You can edit it and input it into CV-MAP in the same way you do for a map batch file.

The next two sections describe map batch file format and how to handle the batch file created in preparation mode.

### *Map Batch File Format*

The map batch file contains a record for each schematic symbol to be included in the map file. Each record begins with the DEFINE keyword and can take up several lines. A line can be up to 80 characters long. You can use the percent sign (%) to indicate a comment. CV-MAP ignores all text from the % to the end of the line.

Each record has several fields which contain component and pin information in the following format.

DEFINE  
<fname> <pname> <prefix> <user> <pins>

where:

**DEFINE** is the keyword that indicates the beginning of a new record. It must be on a line by itself.

**fname** is the filename of the P-CAD symbol; for example, 7400. The extension is not included. This field is required.

**pname** is the name of the physical component associated with the symbol; for example, SN7400. This name corresponds to the PC-CAPS PNAME attribute. If you do not want to specify a value, enter an asterisk (\*) in this field.

**prefix** is the reference designator prefix to be used with this component. If it is not assigned, NX-CV will assign a default prefix. If you do not want to specify a value, enter an asterisk (\*) in this field.

**user** is information you want to include for the component. You can include this information in the element list by using the MAP(USER) variable in the data extraction file. (Refer to the "FORMATS Section" in Chapter 3.)

**pins** is a list of the schematic symbol pins in the order used in the corresponding CV library component. You must make an entry for each pin defined on the symbol. You must reference each pin by its P-CAD name followed by a colon (:)

the CV name of the pin. If the pin list takes up more than one line, you must end each line to be continued with a plus sign (+).

Figure B-2 shows an example that defines the symbol in the P-CAD 7474.SYM file to have a part name of J415, a prefix of U, the user information DFF, and the pins ordered in the sequence shown.

---

```

DEFINE
7474 J415 U DFF
Q:0 Q':0 D:I CP:CLK SK:I RP:I

```

---

**Figure B-2. Sample Map Batch File Entry**

### *Preparation Mode Map Batch File*

CV-MAP preparation mode produces a file in the usual map batch file format. Each entry includes only the P-CAD information for the symbol; you must use a text editor to add the CV information.

Each entry in the file includes a comment line that lists the P-CAD pin order. You can use this line as a reference when entering the CV system pin order.

If a P-CAD symbol has the PNAME, PREFIX, or USER attribute, preparation mode inserts the attribute value into the corresponding pname, prefix, or user field. If the symbol does not have an attribute, an asterisk is used for the field. If you want to add a value for one of these fields, replace the asterisk with the corresponding value.

Figure B-3 shows an entry created in preparation mode from a symbol in the map library file. The symbol has the USER attribute assigned with a value of DFF.

---

```
DEFINE
7474 * * DFF
% D CP Q Q' SD RD
```

---

**Figure B-3. Sample Preparation Mode Entry**

## USING CV-MAP

This section describes the required conditions and procedures for configuring and running CV-MAP.

Before running CV-MAP, be sure that:

- Your system is correctly configured.
- You have installed the CV-MAP program file (CVMAP.EXE).
- You have prepared the map library file.
- You have prepared any other necessary input files.

If you are using the P-CAD recommended directory structure, run CV-MAP from the appropriate project directory.

To run CV-MAP, type:

CVMAP [Return]



When the CV-MAP Title Screen appears, press any key to continue. The system displays the Opening Menu as shown in Figure B-4.

---

### CV-MAP

Options:

```
Prepare Batch File
>> Update Map File  <<
Dump Map File
Exit
```

Press: [SPACE] for next option; [RETURN] to accept

---

### Figure B-4. CV-MAP Opening Menu

This menu provides the following options.

**Prepare Batch File** - Allows you to use the map library file to prepare a preliminary map batch file.

**Update Map File** - Allows you to create the map file.

**Dump Map File** - Allows you to produce an ASCII version of the map file.

**Exit** - Returns you to DOS.

### **Preparing a Batch File**

**Prepare Batch File** allows you to input the map library file into CV-MAP to produce a preliminary map batch file (<filename>.MBF), which you can then edit as necessary to produce the final map batch file.

To prepare a map batch file, follow the steps below.

1. At the CV-MAP Opening Menu, use the space bar or the cursor keys to select **Prepare Batch File** and press [Return]. The system prompts for the input map library filename as shown in Figure B-5.

---

**CV-MAP**

**Current Mode** : Prepare Batch File  
**Library Filename** : <filename>.MLF

Enter the filename; Press [Return] to accept or [Esc] to exit

---

**Figure B-5. CV-MAP Prepare Batch File Screen**

2. Type the name of the map library file to be read by CV-MAP and press [Return]. If you do not enter a filename extension, CV-MAP enters the default .MLF extension.

The system prompts for the output map batch filename. The default is the input library filename with the .MBF extension as shown in Figure B-6.

---

CV-MAP

Current Mode : Prepare Batch File  
Library Filename : TESTFILE.MLF  
Map Batch Filename : TESTFILE.MBF

Enter the filename; Press [Return] to accept or [Esc] to exit

---

**Figure B-6. Sample Prepare Batch File Screen**

3. Press [Return] to accept the default filename or type another name for the output map batch file and press [Return].

**NOTE:** At any prompt, if you decide not to proceed with the program, you can press [Esc] to quit and return to the Opening Menu.

After you enter the output filename, CV-MAP begins file processing. It displays status reports and error messages, if any, at the bottom of the screen.

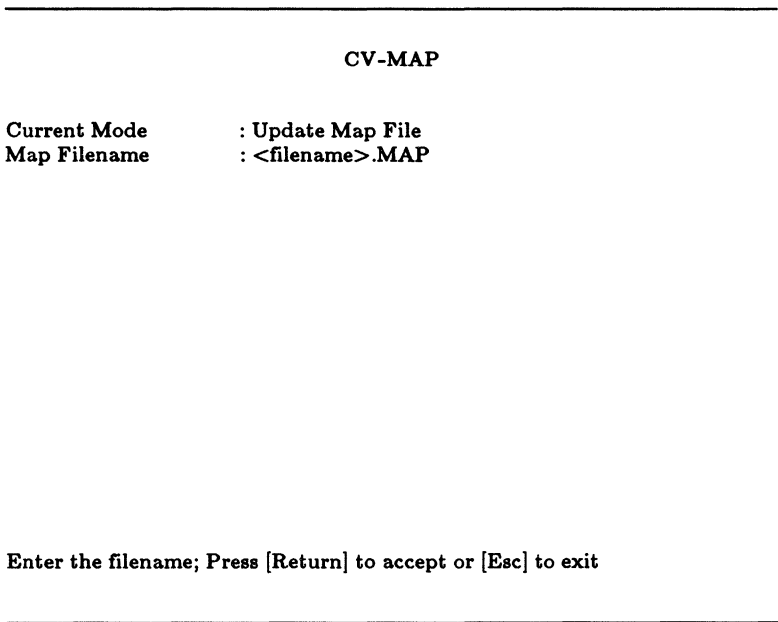
When processing is complete, the system returns you to the Opening Menu.

### Updating a Map File

**Update Map File** allows you to create or update a map file.

To update a map file, follow the steps below.

1. At the Opening Menu, use the space bar or the cursor keys to select **Update Map File** and press [Return]. The system prompts for the name of the map file as shown in Figure B-7.



**Figure B-7. CV-MAP Update Map File Screen**

**NOTE:** At any prompt, if you decide not to proceed with the program, you can press [Esc] to quit and return to the Opening Menu.

2. Type the name of the map file to be output by CV-MAP and press [Return]. If you do not enter the filename extension, CV-MAP enters the default .MAP extension.

If the filename you entered is the name of a map file that is in the current or specified directory, CV-MAP prompts:

**Map file already exists**

Press [Return] to update the existing map file with the information in the map batch file, or enter another filename and press [Return].

When the program updates an existing map file, it adds any records found in the map batch file that are not already present in the map file. If records for a symbol are present in both the existing map file and the map batch file, the program replaces the existing records with the ones in the map batch file. No records are deleted from the map file; instructions for deleting a record are given in "CV-MAP Output Files."

The system prompts for the input map library filename.

3. Type the name of the library file to be read by CV-MAP and press [Return].

The system prompts for the name of the map batch file as shown in Figure B-8.

---

**CV-MAP**

Current Mode : Prepare Batch File  
Map Filename : TESTFILE.MAP  
Library Filename : TESTFILE.MLF  
Map Batch Filename : <filename>.MBF

Enter the filename; Press [Return] to accept or [Esc] to exit

---

**Figure B-8. Sample Update Map File Screen**

4. Type the name of the map batch file to be input into CV-MAP and press [Return].

CV-MAP starts processing the files to create the map file. It displays status reports at the bottom of the screen. When the library file and the batch file that you specified are processed, the cursor returns to the library filename prompt. You can now process as many library and batch files as necessary for one map file.

5. Type the name of the next library file to process and press [Return]. Then type the name of the next batch file and press [Return].

CV-MAP processes the files and adds the results to the map file, then prompts again for additional library and batch file names.

Repeat this step until you have processed all the library and batch files for this map file. You can process as many files as necessary. You can use the same library file with several batch files and the same batch file with several library files.

6. When you have finished creating the map file, press [Esc] to exit update mode. The system displays the Opening Menu.

After the map file is created, you can check its contents. The next section describes how to produce an ASCII version of the map file that you can print out and edit if necessary.

### **Creating a Map Dump File**

**Dump Map File** allows you to produce the map dump file (<filename>.MDF), which is in batch file format and which reflects the contents of the map file.

To create a map dump file, follow the steps below.

1. At the Opening Menu, use the space bar or the cursor keys to select **Dump Map File** and press [Return]. The system prompts for the name of the map file as shown in Figure B-9.



---

CV-MAP

Current Mode : Dump Map File  
Map Filename : <filename>.MAP

Enter the filename; Press [Return] to accept or [Esc] to exit

---

**Figure B-9. CV-MAP Dump Map File Screen**

2. Type the name of the map file to be dumped and press [Return]. If you do not enter the filename extension, CV-MAP enters the default .MAP extension.

The system prompts for the output map dump filename. The default is the map filename with the .MDF extension as shown in Figure B-10.

---

CV-MAP

Current Mode : Dump Map File  
Map Filename : TESTFILE.MAP  
Dump Filename : TESTFILE.MDF

Enter the filename; Press [Return] to accept or [Esc] to exit

---

**Figure B-10. Sample Dump Map File Screen**

3. Press [Return] to accept the default filename, or type another name for the output dump file and press [Return].

**NOTE:** At any prompt, if you decide not to proceed with the program, you can press [Esc] to quit and return to the Opening Menu.

After you enter the output filename, CV-MAP begins file processing. It displays progress reports and error messages, if any, at the bottom of the screen.

When processing is complete, the system returns you to the Opening Menu.

## **CV-MAP OUTPUT FILES**

CV-MAP has four output files: the map file (<filename>.MAP), which is output in update mode; the preparation mode batch file (<filename>.MBF); the dump file (<filename>.MDF), which is output in dump mode; and the log file (<filename>.LOG), which is output in all modes.

The map file is in binary format and cannot be read by the user. The log file contains status and error messages displayed during a CV-MAP program session. Error messages are listed and explained in "CV-MAP Error Messages."

This section describes the preparation mode batch file and the dump file.

### **Preparation Mode Batch File**

The batch file output in CV-MAP preparation mode lists the P-CAD information for all the symbols in the input library file. "Preparing the CV-MAP Input Files" describes how to edit the preparation mode batch file to produce the final map batch file.

Figure B-11 shows a sample batch file created in preparation mode. Note that the P-CAD pin order is shown as a comment.

---

```
DEFINE
7400 * * *
% A B Y

DEFINE
7474 * * *
% D CP SD RD Q Q'

DEFINE
7404 * * *
% Y A
```

---

**Figure B-11. Sample Preparation Mode Batch File**

### **Map Dump File**

The map dump file is an ASCII translation of the map file. It is in the same format as the map batch file. You can examine the map dump file to be sure that the information in the map file is complete and accurate.

If you need to make corrections, you can correct the dump file and input it to CV-MAP as a map batch file to produce a corrected map file.

**NOTE:** If you edit a map dump file to use as a map batch file, check the pin lists for all the components. For each pin list that takes up more than one line, you must add the plus sign (+) at the end of the line that is continued.

To delete the record for a symbol, use the following steps.

1. Create and print the dump file.
2. Rename or delete the existing map file.
3. Edit the dump file to remove the record.
4. Run CV-MAP in update mode to create a new map file.

Figure B-12 shows a sample map dump file.

---

```

DEFINE
7400 * * *
% A B Y
Y:0 A:I B:I
DEFINE
7474 PARTNAME * DFF
% D CP SD RD Q Q'
Q:0 Q':0 D:I CP:CLK SD:I RD:I
DEFINE
7404 * U *
% Y A
A:I Y:0

```

---

**Figure B-12. Sample Map Dump File**

## CV-MAP ERROR MESSAGES

This section lists and describes CV-MAP error messages. The messages are grouped into three types: batch file errors, library file errors, and system and database errors. The messages are listed alphabetically within each group.

## **Batch File Errors**

These errors are produced when processing a batch file in update mode.

**Message: <name> has a duplicated pin**

**Cause:** The batch file lists two pins with the same name for the named symbol.

**Action:** Correct the batch file entry.

**Message: <name> has misspelled pin name <pinname>**

**Cause:** The batch file entry for the named symbol has the specified pin name, which is not present for the same symbol in the map library file.

**Action:** Correct the batch file entry.

**Message: <name> is not found in library**

**Cause:** The batch file entry for the named symbol does not have a corresponding entry in the map library file being accessed.

**Action:** Be sure you specified the correct filenames; check both files and make any necessary corrections.

**Message: Incorrect number of fields for <name>**

**Cause:** The record for the named symbol does not have the correct number of fields.

**Action:** Correct the batch file entry so that it has the correct number of pins and it contains a value or an asterisk in each of the other fields.

**Message: No record for DEFINE**

**Cause:** The batch file contains a DEFINE keyword which does not precede a symbol definition record.

**Action:** Check the batch file and correct it if necessary.

**Library File Errors**

Library file errors indicate an error in the library being accessed with CV-MAP.

**Message: Duplicated symbol <name> found in <libname>**

**Cause** The specified map library file contains two or more instances of the named symbol.

**Action:** Remove the extra symbol(s) from the schematic and regenerate the map library file.

## **System and Database Errors**

These errors can occur whenever you run CV-MAP.

**Message: Cannot open <filename>**

**Insufficient memory**

**Memory Allocation error**

**Write error : <filename>**

**Cause:** These errors are all system errors.

**Action:** Exit from CV-MAP, then turn the computer off and back on. Make sure 640K of memory is available. Make sure the specified file exists.

**Message: Database error**

**Cause:** The netlist is unusable.

**Action:** Generate a new netlist file.



## APPENDIX C. CV-SORT

This appendix describes the CV-SORT program that allows you to sort an element list file into the format required for NX-CV back-annotation.

### CV-SORT OVERVIEW

CV-SORT reads an element list file (<filename>.ELF), and then produces a sorted element list file (<filename>.SEF) and a log file (CVSORT.LOG).

The input element list must be in the same format as when it was output by NX-CV. CV-SORT also accesses the data extraction file used to create the element list file.

The output sorted element list file can be input to NX-CV for back-annotation.

### USING CV-SORT

This section describes the required conditions and procedures for configuring and running CV-SORT.

Before running CV-SORT, be sure that:

- Your system is correctly configured.
- You have installed the CV-SORT program file (CVSORT.EXE).
- You have transferred the element list file that was edited in the CV system back to your P-CAD system.

- The current configuration file contains the same settings as when you first created the element list file.
- The SORT.EXE file supplied with DOS is in a directory specified in the PATH command line of the AUTOEXEC.BAT file. (See Chapter 4, "DOS Reference," in the *PC-CAPS User's Manual* for descriptions of the PATH command and the AUTOEXEC.BAT file.)

If you are using the P-CAD recommended directory structure, run CV-SORT from the appropriate project directory.

To run CV-SORT, type:

CVSORT [Return]

When the CV-SORT Title Screen appears, press any key to continue. The system displays the Opening Menu as shown in Figure C-1.

---

CV-SORT

Options:

Configuration

>> Sort Element List File <<

Exit

Press: [SPACE] for next option; [RETURN] to accept

---

### Figure C-1. CV-SORT Opening Menu

This menu provides the following options.

**Configuration** - Allows you to set or change CV-SORT configuration options.

**Sort Element List File** - Allows you to sort an element list file into the required format. -

**Exit** - Returns you to DOS.

**NOTE:** If the CVSORT.CFG file does not already exist in the current directory, a default configuration file named CVSORT.CFG is created when you start CVSORT. If you do not specify another configuration file, this file is used each time you run CV-SORT.

## **Configuring CV-SORT**

Before you use CV-SORT, you must specify the format of the input element list. **Configuration** allows you to set the two configuration options that specify the format. You can use a configuration for just one operating session, or you can save it to a configuration file, which you can later reuse.

Select **Configuration** at the Opening Menu to create or select the configuration for a program session.

To configure CV-SORT, follow the steps below.

1. At the CV-SORT Opening Menu, use the space bar or the cursor keys to select **Configuration**, then press [Return]. The system displays the Configuration Screen with the current configuration filename (the one you specified when starting CV-SORT or at an earlier configuration session or the default NXSORT.CFG) and prompts you to accept the current configuration or specify another configuration filename. Figure C-2 shows the Configuration Screen.

---

CV-SORT  
Configuration  
CFG Filename : CVSORT.CFG

Enter the Filename; Press: [RETURN] to accept

---

### Figure C-2. CV-SORT Configuration Screen

2. Type the name of the configuration file you want to create or edit and press [Return], or press [Return] to accept the default file. If you do not enter a filename extension, CV-SORT adds the .CFG extension. If you enter only blanks for a filename, the configuration will be used but will not be saved to a file.

The system displays the configuration options. If the file you named already exists in the current directory, its current settings are displayed as defaults. Otherwise, defaults are displayed as shown in Figure C-3. You can now enter the appropriate settings.

---

```
                                CV-SORT
                                Configuration
CFG Filename      : TESTFILE.CFG
DTX Filename      : <filename>
Line Numbers ?    : No
```

Enter DTX Filename; Press [Return] to accept, [Esc] to quit

---

**Figure C-3. CV-SORT Default Configuration Settings**

3. The first option is the DTX filename. If you used a data extraction file to specify element list file contents and format, type the filename and press [Return].

If you did not use a data extraction file, just press [Return].

**NOTE:** At any step, you can terminate the configuration process by pressing [Esc]. The program displays the update prompt, and you can go to step 5. (If you did not specify a

configuration filename, the information from this screen is used for this program session but not saved.)

4. The next option asks whether the input element list file includes line numbers. The default is "No."

To accept the default setting, press [Return].

If the element list file includes line numbers, press the space bar to display the "Yes" setting and press [Return].

After you set the last option, the system displays the following prompt:

#### **Configuration File : Update**

NOTE: This prompt is not displayed if you did not specify a configuration filename. In this case, configuration is complete, and the program returns to the Opening Menu.

5. Press [Return] to accept the default, "Update," or press the space bar to display "No Update" and press [Return] to accept it.

"Update" saves the configuration file. "No Update" causes the configuration to be used for the current session only.

NOTE: Configuration files can only be read from or written to the current directory.

When configuration is complete, the system returns you to the Opening Menu.

## Sorting an Element List File

**Sort Element List File** allows you to sort the element list file into the format required for back-annotation.

To sort an element list file, follow the steps below.

1. At the CV-SORT Opening Menu, use the space bar or the cursor keys to select **Sort Element List File** and press [Return]. The system prompts for the input element list filename as shown in Figure C-4.

---

CV-SORT

CV Filename : <filename>.ELF

Enter the filename; Press [Return] to accept or [Esc] to exit

---

**Figure C-4. CV-SORT Program Screen**



2. Type the name of the input element list file and press [Return]. If you do not enter a filename extension, CV-SORT enters the default .ELF extension.

The system prompts for the output sorted element list filename. The default is the input element list filename with the .SEF extension as shown in Figure C-5.

---

CV-SORT

```
CV Filename       : TESTFILE.ELF
Output Filename   : TESTFILE.SEf
```

Enter the filename; Press [Return] to accept or [Esc] to exit

---

**Figure C-5. Sample CV-SORT Program Screen**

3. Press [Return] to accept the default filename, or type another name for the output sorted element list file and press [Return].

**NOTE:** At either of these two prompts, if you decide not to proceed with the program, you can press [Esc] to quit and return to the Opening Menu.

After you enter the output filename, CV-SORT begins file processing. It displays status reports and error messages, if any, at the bottom of the screen.

When processing is complete, the system returns you to the Opening Menu.

## **SORTED ELEMENT LIST FILE**

The sorted element list file produced by CV-SORT contains the same information as the input element list with the format changed so that the records are ordered by sequence number (the value of the SEQNUM field). Appendix D, "Sample Files," shows an example of a sorted element list file.

## **CV-SORT ERROR MESSAGES**

CV-SORT displays error messages on the screen and stores them in the log file that you can display or print.

CV-SORT can produce any of the NX-CV error messages shown in Appendix A, "Error Messages" in the sections "File Access and System Errors" and "Data Extraction File Errors." It can also produce the following error.

**Message: Element List File Error**  
**Syntax error**

**Cause:** The element list file contains at least one record with no data in the correct columns for the SEQNUM field. CV-SORT cannot sort the file.

**Action:** Be sure you are using the correct data extraction file. If necessary, edit the element list file so that the sequence number is in the correct columns in all records.

NX-CV C-12



## APPENDIX D. SAMPLE FILES

This appendix explains the sample databases supplied with NX-CV and shows several of the sample files.

You can use the sample files in several ways to become familiar with NX-CV:

- You can look at the schematics shown in this appendix and use PC-CAPS to examine the schematic database files to see how specific aspects of schematic preparation affect the output element list. A component list (CVDEMO4.CMP) output by PC-FORM is provided for further examination of components and attributes.
- You can examine the map dump files and the data extraction files to see how they affect the output element list.
- You can examine the back-annotation file to become familiar with its format.
- You can use the sample files as test input to experiment with running NX-CV.

### CVDEMO EXAMPLE

The CVDEMO example is a single-sheet schematic that consists of several 2-input 7400 NAND gates, a 7474 flip-flop, and a coupling capacitor. The input and output nets are connected to a 10-pin connector. Physical pin numbers and reference designators are assigned to the connectors and the capacitor. Each connector pin is assigned the CONN attribute with a value of 10.

For this example, three element lists were created for the design, one with default format and no map file (CVDEMO1), one with a data extraction file (CVDEMO2), and one with both a map file and a data extraction file (CVDEMO3). For CVDEMO3, a back-annotation file and a sorted element list file are also shown.

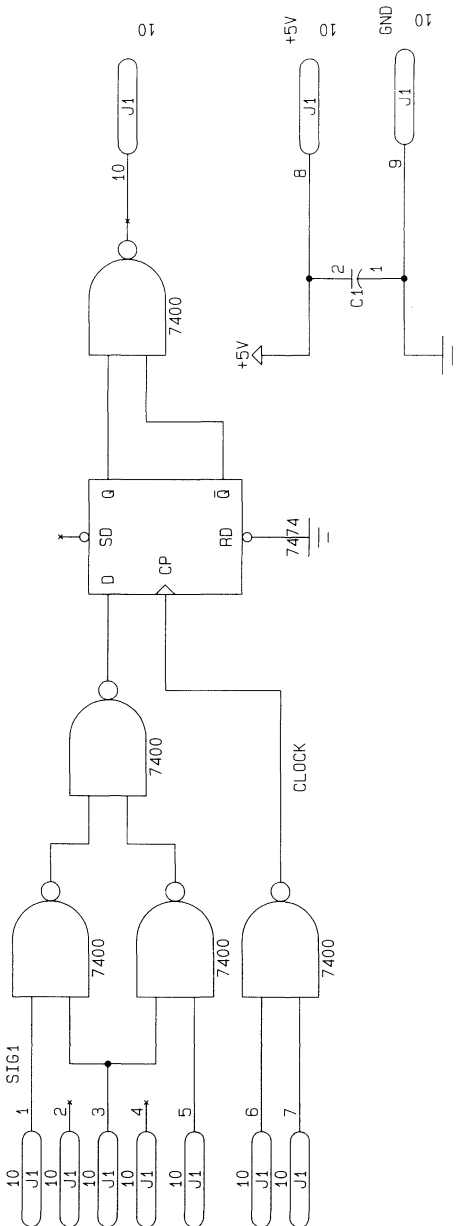
Table D-1 lists all the files in the example and the programs that created each file. Several of the files, as noted, are shown below the table.

**Table D-1. CVDEMO Sample Files**

<b>Filename</b>		<b>File Type</b>	<b>Created By</b>
CVDEMO.SCH	*	Schematic	PC-CAPS
CVDEMO.NLT		Schematic netlist	PC-NODES
CVDEMO1.ELF	*	Element list	NX-CV
CVDEMO2.DTX	*	Data extraction file	User
CVDEMO2.CFG		Configuration file	NX-CV
CVDEMO2.ELF	*	Element list	NX-CV
CVDEMO3.DTX	*	Data extraction file	User
CVDEMO3.MAP		Map file	CV-MAP
CVDEMO3.MDF	*	Map dump file	CV-MAP
CVDEMO3.CFG		Configuration file	NX-CV
CVDEMO3.ELF	*	Element list	NX-CV
CVDEMO3.BKA	*	Back-annotation file	NX-CV
CVDEMO3.SEF	*	Sorted element list	CV-SORT

\* These files are shown below.

Schematic Database: CVDEMO.SCH



Element List File: CVDEMO1.ELF

```

*****
*
*                               NX-CV ELEMENT LIST FILE
*
* NX-CV Version 1.31
* Copyright (C) 1985,1986 - Personal CAD Systems, Inc.
*
* Date       : JUL 30 1986
* Time      : 02:18 PM
* File Out  : CVDEMO1.ELF
*
*****
10001 SIG1                7400          U1          INA 15
10001 UN001010           7400          U1          INB
10001 UN001000           7400          U1          OUTY
10002 UN001010           7400          U2          INA
10002 UN001004           7400          U2          INB
10002 UN001001           7400          U2          OUTY
10003 UN001005           7400          U3          INA
10003 UN001011           7400          U3          INB
10003 CLOCK              7400          U3          OUTY
10004 UN001006           7400          U4          INA
10004 UN001007           7400          U4          INB
10004 NC                  7400          U4          OUTY
10005 UN001000           7400          U5          INA
10005 UN001001           7400          U5          INB
10005 UN001008           7400          U5          OUTY
10017 GND                 CAP          C1          1      2
10017 +5V                CAP          C1          2
10008 CLOCK              7474          U6          CP 6
10008 GND                 7474          U6          RD
10008 UN001007           7474          U6          Q'
10008 UN001006           7474          U6          Q
10008 UN001008           7474          U6          D
10008 NC                  7474          U6          SD
10006 SIG1                CONN10       J1          1      10
10007 NC                  CONN10       J1          2
10009 UN001010           CONN10       J1          3
10010 NC                  CONN10       J1          4
10011 UN001004           CONN10       J1          5
10012 UN001005           CONN10       J1          6
10013 UN001011           CONN10       J1          7
10014 UN001002           CONN10       J1          10
10015 GND                 CONN10       J1          9
10016 +5V                CONN10       J1          8

```



**Data Extraction File: CVDEMO2.DTX**

FORMATS  
PREFIX "P"  
UNNAMED SNUM SID  
NOCONNECT "NOCONN"  
DEVICE "PN" FNAME  
END  
FIELDS  
SIGNAL 1 10 L  
SEQNUM 12 19  
DEVICE 22 39  
REFDES 42 45 L  
PPIN 48 51 R  
LPIN 54 59  
TALLY 62 67 L  
END

Element List File: CVDEMO2.ELF

```

*****
*
*                               NX-CV ELEMENT LIST FILE
*
* NX-CV Version 1.31
* Copyright (C) 1985,1986 - Personal CAD Systems, Inc.
*
* Date       : APR 21 1986
* Time      : 03:22 PM
* File Out  : CVDEMO2.ELF
*
*****

```

```

*****
SIG1      10001    PN7400          P1           INA          15
1010      10001    PN7400          P1           INB
1000      10001    PN7400          P1           OUTY
1010      10002    PN7400          P2           INA
1004      10002    PN7400          P2           INB
1001      10002    PN7400          P2           OUTY
1005      10003    PN7400          P3           INA
1011      10003    PN7400          P3           INB
CLOCK     10003    PN7400          P3           OUTY
1006      10004    PN7400          P4           INA
1007      10004    PN7400          P4           INB
NOCONN    10004    PN7400          P4           OUTY
1000      10005    PN7400          P5           INA
1001      10005    PN7400          P5           INB
1008      10005    PN7400          P5           OUTY
GND       10017    PNCAP           C1           1           2
+5V      10017    PNCAP           C1           2
CLOCK     10008    PN7474          P6           CP           6
GND       10008    PN7474          P6           RD
1007      10008    PN7474          P6           Q'
1006      10008    PN7474          P6           Q
1008      10008    PN7474          P6           D
NOCONN    10008    PN7474          P6           SD
SIG1      10006    PNCONN10        J1           1           10
NOCONN    10007    PNCONN10        J1           2
1010      10009    PNCONN10        J1           3
NOCONN    10010    PNCONN10        J1           4
1004      10011    PNCONN10        J1           5
1005      10012    PNCONN10        J1           6
1011      10013    PNCONN10        J1           7
1002      10014    PNCONN10        J1           10
GND       10015    PNCONN10        J1           9
+5V      10016    PNCONN10        J1           8

```

**Data Extraction File: CVDEMO3.DTX**

```
FORMATS
PREFIX MAP(PREFIX)
PREFIX "U"
UNNAMED SNUM SID
NOCONNECT "NC"
DEVICE ATTR(PNAME)
DEVICE MAP(PNAME)
DEVICE FNAME
END
FIELDS
SEQNUM 1 10 L
DEVICE 14 29
REFDES 32 36 L
PPIN 39 44 R
LPIN 47 51
TALLY 54 59 L
SIGNAL 62 70
END
```

Map Dump File: CVDEMO3.MDF

```
*****%  
%  
%                               CV-MAP DUMPPFILE           %  
%  
% CV-MAP Version 1.31                                     %  
% Copyright (C) 1986 - Personal CAD Systems, Inc.         %  
%  
% Date      : FEB 11 1986                                 %  
% Time     : 02:59 PM                                     %  
% File In  : CVDEMO.MAP                                   %  
% File Out : CVDEMO.MDF                                   %  
% Log File : CVMAP.LOG                                    %  
%  
*****%
```

%Library Filename : CVDEMO3.MLF

```
DEFINE  
CONN10 A42 J AMP  
% A  
A:10
```

```
DEFINE  
7400 LS00 U TTL  
% INA INB OUTY  
INA:IN1 INB:IN1 OUTY:OUT
```

```
DEFINE  
7474 LS74 U TTL  
% CP RD Q' Q D SD  
CP:C RD:R Q':0 Q:0 D:D SD:S
```

```
DEFINE  
CAP CK05 C *  
% A B  
A:1 B:2
```

# Element List File: CVDEMO3.ELF

```

*****
*
*                               NX-CV ELEMENT LIST FILE
*
* NX-CV Version 1.31
* Copyright (C) 1986 - Personal CAD Systems, Inc.
*
* Date       : APR 21 1986
* Time      : 03:24 PM
* File Out  : CVDEMO3.ELF
*
*****
10006      A42          J1          1          10      SIG1
10007      A42          J1          2          NC
10009      A42          J1          3          1010
10010      A42          J1          4          NC
10011      A42          J1          5          1004
10012      A42          J1          6          1005
10013      A42          J1          7          1011
10014      A42          J1          10         1002
10015      A42          J1          9          GND
10016      A42          J1          8          +5V
10017      CK05        C1          1          2          GND
10017      CK05        C1          2          +5V
10001      LS00        U1          IN1         15      SIG1
10001      LS00        U1          IN1         1010
10001      LS00        U1          OUT         1000
10002      LS00        U2          IN1         1010
10002      LS00        U2          IN1         1004
10002      LS00        U2          OUT         1001
10003      LS00        U3          IN1         1005
10003      LS00        U3          IN1         1011
10003      LS00        U3          OUT         CLOCK
10004      LS00        U4          IN1         1006
10004      LS00        U4          IN1         1007
10004      LS00        U4          OUT         NC
10005      LS00        U5          IN1         1000
10005      LS00        U5          IN1         1001
10005      LS00        U5          OUT         1008
10008      LS74        U6          C           6          CLOCK
10008      LS74        U6          R           GND
10008      LS74        U6          0           1007
10008      LS74        U6          0           1006
10008      LS74        U6          D           1008
10008      LS74        U6          S           NC

```

**Back-Annotation File: CVDEMO3.BKA**

LOGFILE  
Command FILE  
Command LOAD  
Text CVDEMO.SCH  
Command SCMD  
Command PNUM  
B1 -60 90  
Text J1(1 )  
Command SCMD  
Command PNUM  
B1 -60 50  
Text J1(2 )  
Command SCMD  
Command PNUM  
B1 -60 10  
Text J1(3 )  
Command SCMD  
Command PNUM  
B1 -60 -30  
Text J1(4 )  
Command SCMD  
Command PNUM  
B1 -60 -80  
Text J1(5 )  
Command SCMD  
Command PNUM  
B1 -60 -150  
Text J1(6 )  
Command SCMD  
Command PNUM  
B1 -60 -190  
Text J1(7 )  
Command SCMD  
Command PNUM  
B1 1020 -10  
Text J1(10 )  
Command SCMD  
Command PNUM  
B1 1030 -300  
Text J1(9 )  
Command SCMD  
Command PNUM  
B1 1020 -200  
Text J1(8 )  
Command SCMD  
Command PNUM  
B1 910 -270  
Text C1(1 2 )  
Command FILE  
Command SAVE  
Text CVDEMO.SCH

Sorted Element List File: CVDEMO3.SEF

```

*****
*
*                               CV-SORT SORTED ELEMENT LIST FILE
*
* CV-SORT Version 1.31
* Copyright (C) 1986 - Personal CAD Systems, Inc.
*
* Date       : JUL 30 1986
* Time      : 02:24 PM
* File In   : CVDEMO3.ELF
* File Out  : CVDEMO3.SEF
*
*****

```

10001	LS00	U1		IN1	15	SIG1
10001	LS00	U1		IN1		1010
10001	LS00	U1		OUT		1000
10002	LS00	U2		IN1		1010
10002	LS00	U2		IN1		1004
10002	LS00	U2		OUT		1001
10003	LS00	U3		IN1		1005
10003	LS00	U3		IN1		1011
10003	LS00	U3		OUT		CLOCK
10004	LS00	U4		IN1		1006
10004	LS00	U4		IN1		1007
10004	LS00	U4		OUT		NC
10005	LS00	U5		IN1		1000
10005	LS00	U5		IN1		1001
10005	LS00	U5		OUT		1008
10006	A42	J1	1		10	SIG1
10007	A42	J1	2			NC
10008	LS74	U6		C	6	CLOCK
10008	LS74	U6		R		GND
10008	LS74	U6		0		1007
10008	LS74	U6		0		1006
10008	LS74	U6		D		1008
10008	LS74	U6		S		NC
10009	A42	J1	3			1010
10010	A42	J1	4			NC
10011	A42	J1	5			1004
10012	A42	J1	6			1005
10013	A42	J1	7			1011
10014	A42	J1	10			1002
10015	A42	J1	9			GND
10016	A42	J1	8			+5V
10017	CK05	C1	1		2	GND
10017	CK05	C1	2			+5V





## CVDEMO4 EXAMPLE

The CVDEMO4 example is a single sheet of a larger multisheet schematic. It contains symbols to be packaged into parts with common pins and connectors. Most of the special attributes for NX-CV are used, and you can examine them in the schematic and in the component list produced by PC-FORM.

A data extraction file and a map file were both used to translate the CVDEMO4 netlist and they are both included in the example.

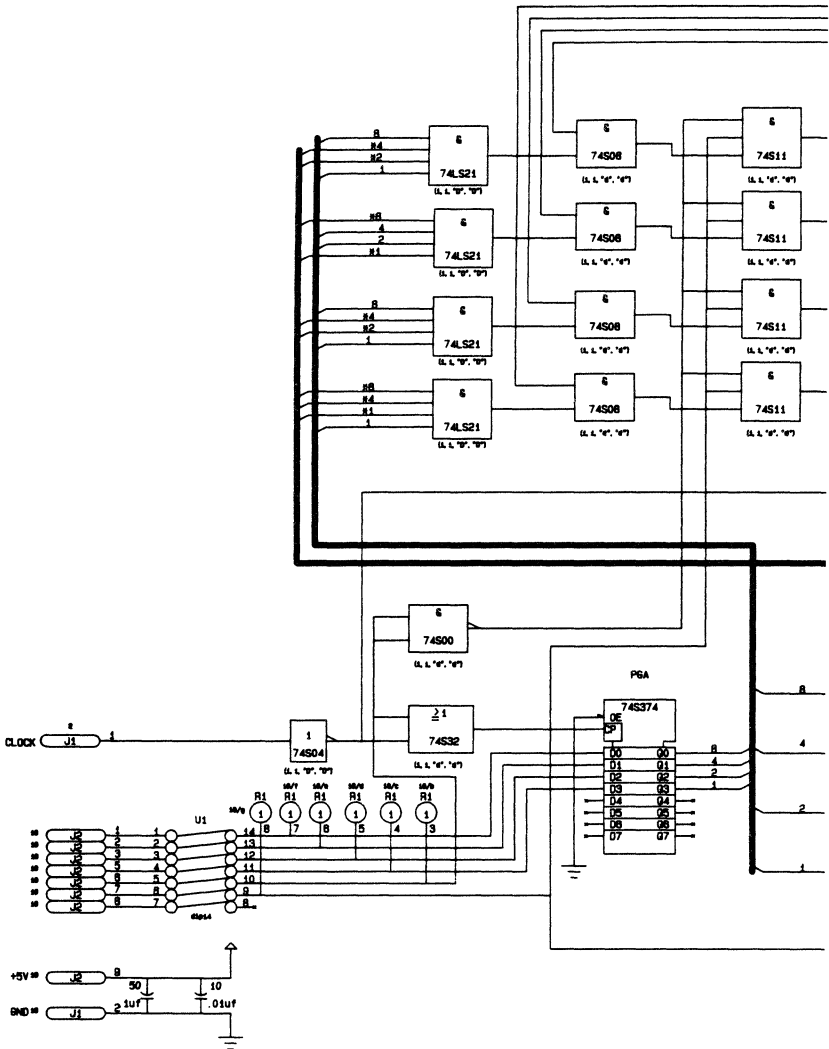
Table D-2 lists all the files in the example and the programs that created each file. Several of the files, as noted, are shown below the table.

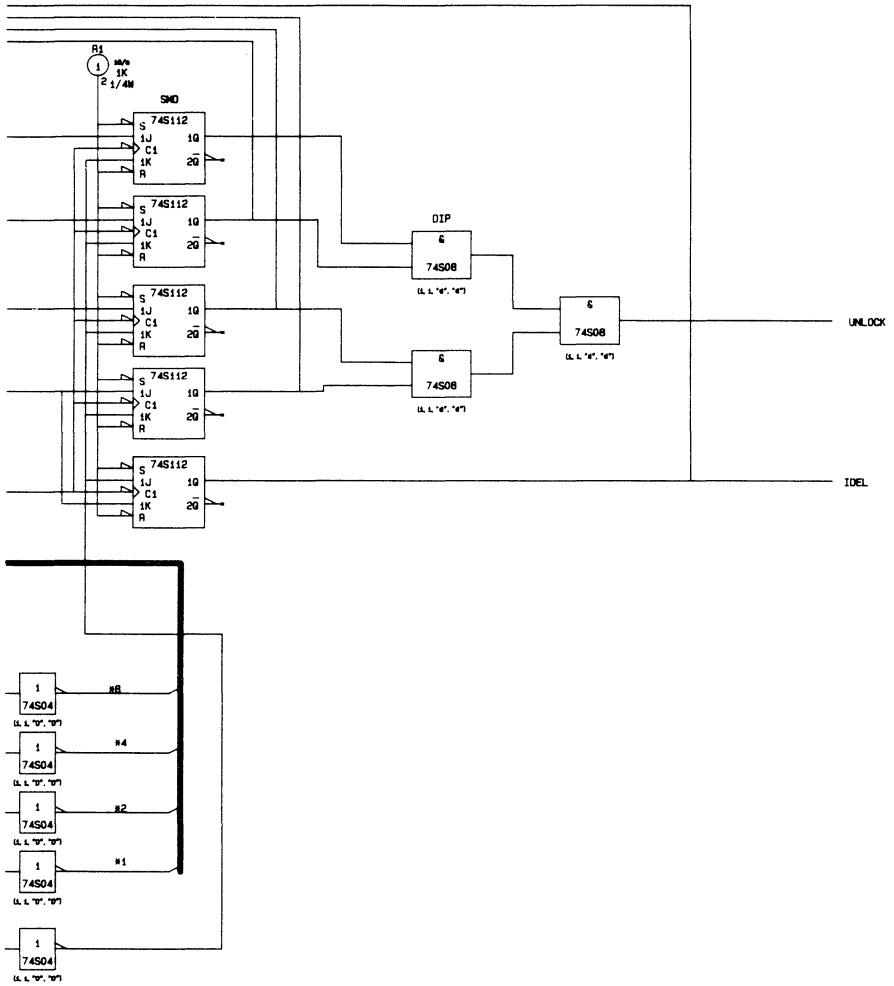
**Table D-2. CVDEMO4 Sample Files**

<b>Filename</b>		<b>File Type</b>	<b>Created By</b>
CVDEMO4.SCH	*	Schematic	PC-CAPS
CVDEMO4.NLT		Schematic netlist	PC-NODES
CVDEMO4.CMP	*	Component list	PC-FORM
CVDEMO4.DTX	*	Data extraction file	NX-CV
CVDEMO4.MAP		Map file	CV-MAP
CVDEMO4.MDF	*	Map dump file	CV-MAP
CVDEMO4.CFG		Configuration file	NX-CV
CVDEMO4.ELF	*	Element list	NX-CV

\* These files are shown below.

Schematic Database: CVDEMO04.SCH





**Component List: CVDEMO4.CMP**

```

*****
%
% Copyright (C) 1983,1986- Personal CAD Systems Inc.
%
% Program : PC-FORM VERSION 1.31
% Date : JUN 11 1986
% Time : 02:22:46 pM
% File In : CVDEMO4.NLT
% File Out : CVDEMO4.CMP
% Format : P-CAD COMPONENT LIST
%
*****
    
```

CVDEMO4( )

```

BEGIN
74S112:UC000000 ( S      =UN000015, 1J      =UN000020,
                  C1      =UN000017, 1K      =UN000016,
                  R        =UN000015, 1Q      =UN000010,
                  2Q      = )
                  [ PACK  =SMD ]
74S112:UC000001 ( S      =UN000015, 1J      =UN000019,
                  C1      =UN000017, 1K      =UN000016,
                  R        =UN000015, 1Q      =UN000032,
                  2Q      = )
74S112:UC000002 ( S      =UN000015, 1J      =UN000018,
                  C1      =UN000017, 1K      =UN000016,
                  R        =UN000015, 1Q      =UN000012,
                  2Q      = )
74S112:UC000003 ( S      =UN000015, 1J      =UN000005,
                  C1      =UN000017, 1K      =UN000016,
                  R        =UN000015, 1Q      =UN000013,
                  2Q      = )
74S112:UC000004 ( S      =UN000015, 1J      =UN000016,
                  C1      =UN000017, 1K      =UN000005,
                  R        =UN000015, 1Q      =IDEL,
                  2Q      = )
74S08:UC000005 ( INA     =UN000010, INB     =UN000032,
                  OUTY    =UN000008 )
                  [ PACK  =DIP,
                  PCL     =(1,1,"d","d" ) ]
74S08:UC000006 ( INA     =UN000012, INB     =UN000013,
                  OUTY    =UN000009 )
                  [ PCL   =(1,1,"d","d" ) ]
74S08:UC000007 ( INA     =UN000008, INB     =UN000009,
                  OUTY    =UNLOCK )
                  [ PCL   =(1,1,"d","d" ) ]
74S04:UC000008 ( OUTY    =*8,      INA     =8 )
                  [ PCL   =(1,1,"D","D" ) ]
74S04:UC000009 ( OUTY    =*4,      INA     =4 )
                  [ PCL   =(1,1,"D","D" ) ]
74S04:UC000010 ( OUTY    =*2,      INA     =2 )
                  [ PCL   =(1,1,"D","D" ) ]
    
```

```

74S04:UC000011 ( OUTY   =*1,      INA   =1 )
                [ PCL   =(1,1,"D","D") ]
74S04:UC000012 ( OUTY   =UN000017, INA  =CLOCK )
                [ PCL   =(1,1,"D","D") ]
74S04:UC000013 ( OUTY   =UN000016, INA  =UN000000 )
                [ PCL   =(1,1,"D","D") ]
74S374:UC000014 ( OE     =GND,      D0   =UN000002,
                D1     =UN000003, D2   =UN000025,
                D3     =UN000026, D4   =,
                D5     =,      D6   =,
                D7     =,      Q7   =,
                Q6     =,      Q5   =,
                Q4     =,      Q3   =1,
                Q2     =2,      Q1   =4,
                Q0     =8,      CP   =UN000004 )
                [ PACK  =PGA ]
74S32:UC000015 ( INA     =UN000007, INB  =UN000017,
                OUTY   =UN000004 )
                [ PCL   =(1,1,"d","d") ]
74S00:UC000016 ( INA     =UN000007, INB  =UN000007,
                OUTY   =UN000001 )
                [ PCL   =(1,1,"d","d") ]
74S11:UC000017 ( INA     =UN000001, INB  =UN000000,
                INC     =UN000006, OUTY =UN000020 )
                [ PCL   =(1,1,"d","d") ]
74S11:UC000018 ( INA     =UN000001, INB  =UN000000,
                INC     =UN000021, OUTY =UN000019 )
                [ PCL   =(1,1,"d","d") ]
74S11:UC000019 ( INA     =UN000001, INB  =UN000000,
                INC     =UN000022, OUTY =UN000018 )
                [ PCL   =(1,1,"d","d") ]
74S11:UC000020 ( INA     =UN000001, INB  =UN000000,
                INC     =UN000028, OUTY =UN000005 )
                [ PCL   =(1,1,"d","d") ]
74LS21:UC000021 ( INA     =*8,      INB   =4,
                INC     =2,      IND  =*1,
                OUTY   =UN000024 )
                [ PCL   =(1,1,"D","D") ]
74LS21:UC000022 ( INA     =8,      INB   =*4,
                INC     =*2,      IND  =1,
                OUTY   =UN000027 )
                [ PCL   =(1,1,"D","D") ]
74LS21:UC000023 ( INA     =8,      INB   =*4,
                INC     =*2,      IND  =1,
                OUTY   =UN000023 )
                [ PCL   =(1,1,"D","D") ]
74LS21:UC000024 ( INA     =*8,      INB   =*4,
                INC     =*1,      IND  =1,
                OUTY   =UN000029 )
                [ PCL   =(1,1,"D","D") ]
RES:UC000025 ( R       =UN000015 )
                [ RWATT  =1/4W,
                RVAL    =1K,
                MIX     =10/a,
                COMM    =1 ]

```

NX-CV D-18

```

RES:UC000026 ( R =UN000007 )
[ MIX =10/b,
  COMM =1 ]
RES:UC000027 ( R =UN000026 )
[ MIX =10/c,
  COMM =1 ]
RES:UC000028 ( R =UN00A0025 )
[ MIX =10/d,
  COMM =1 ]
RES:UC000029 ( R =UN000003 )
[ MIX =10/e,
  COMM =1 ]
RES:UC000030 ( R =UN000002 )
[ MIX =10/f,
  COMM =1 ]
SW14:UC000031 ( 1 =UN000011, 2 =UN000014,
                3 =UN000030, 4 =UN000031,
                5 =UN000033, 6 =UN000034,
                7 =UN000035, 8 =,
                9 =UN000000, 10 =UN000007,
                11 =UN000026, 12 =UN000025,
                13 =UN000003, 14 =UN000002 )
[ PNAME =dip14 ]
RES:UC000032 ( R =UN000000 )
[ MIX =10/g,
  COMM =1 ]
74S08:UC000033 ( INA =UN000032, INB =UN000027,
                OUTY =UN000006 )
[ PCL =(1,1,"d","d") ]
74S08:UC000034 ( INA =UN000012, INB =UN000024,
                OUTY =UN000021 )
[ PCL =(1,1,"d","d") ]
74S08:UC000035 ( INA =UN000013, INB =UN000023,
                OUTY =UN000022 )
[ PCL =(1,1,"d","d") ]
74S08:UC000036 ( INA =IDEL, INB =UN000029,
                OUTY =UN000028 )
[ PCL =(1,1,"d","d") ]
CONN10:UC000037 ( A =UN000011 )
[ CONN =10 ]
CONN10:UC000038 ( A =UN000014 )
[ CONN =10 ]
CONN10:UC000039 ( A =UN000030 )
[ CONN =10 ]
CONN10:UC000040 ( A =UN000031 )
[ CONN =10 ]
CONN10:UC000041 ( A =UN000033 )
[ CONN =10 ]
CONN10:UC000042 ( A =UN000034 )
[ CONN =10 ]
CONN10:UC000043 ( A =UN000035 )
[ CONN =10 ]
CONN10:UC000044 ( A =CLOCK )
[ CONN =2 ]
CAP:UC000045 ( A =+5V, B =GND )
[ CVAL =-.1uf,
  CVOLT =50 ]
CAP:UC000046 ( A =+5V, B =GND )
[ CVAL =-.01uf,
  CVOLT =10 ]
CONN10:UC000047 ( A =+5V )
[ CONN =10 ]
CONN10:UC000048 ( A =GND )
[ CONN =10 ]

```

END

**Data Extraction File: CVDEMO4.DTX**

```
FORMAT
UNNAMED "PG" SNUM "-" "SIG" SID
NOCONNECT "****"
BAR "(LO)"
PREFIX "U"
DEVICE ATTR(RVAL) ATTR(RWATT)
DEVICE ATTR(CVAL) ATTR(CVOLT)
DEVICE PNAME MAP(USER) ATTR(PACK)
END
FIELDS
SEQNUM 1 5
SIGNAL 8 27
DEVICE 30 42
REFDES 45 48
PPIN 51 59
LPIN 62 67
TALLY 70 75
END
```

Map Dump File: CVDEMO4.MDF

```

%*****%
%
%                               CV-MAP DUMPFIL
%
% CV-MAP Version 1.31
% Copyright (C) 1986 - Personal CAD Systems, Inc.
%
% Date      : APR 30 1986
% Time     : 10:11 AM
% File In  : CVDEMO4.MAP
% File Out : CVDEMO4.MDF
% Log File : CVMAP.LOG
%
%*****%

```

%Library Filename : CVDEMO4.MLF

```

DEFINE
74S08 TESTA U 14PIN
% INA INB OUTY
OINA:I1 INB:I2 OUTY:0

```

```

DEFINE
74S112 TESTB * 16PIN
% S 1J C1 1K R 1Q 2Q
S:IN3 1J:IN1 C1:CLK 1K:IN2 R:IN4 1Q:01 2Q:02

```

```

DEFINE
RES * R *
% R
R:1

```

```

DEFINE
74LS21 TESTD * 14PIN
% INA INB INC IND OUTY
INA:I1 INB:I2 INC:I3 IND:I4 OUTY:0

```

```

DEFINE
74S11 TESTE * 14PIN
% INA INB INC OUTY
INA:I1 INB:I2 INC:I3 OUTY:0

```

```

DEFINE
CAP * * *
% A B
A:A B:B

```

```

DEFINE
CONN10 * * *
% A
A:A

```



```
% INA INB INC OUTY
INA:I1 INB:I2 INC:I3 OUTY:0
```

```
DEFINE
CAP * * *
% A B
A:A B:B
```

```
DEFINE
CONN10 * * *
% A
A:A
```

```
DEFINE
SW14 dip14 SP 14P76
% 1 2 3 4 5 6 7 8 9 10 11 12 13 14
1:1 2:2 3:3 4:4 5:5 6:6 7:7 8:8 9:9 10:10 +
11:11 12:12 13:13 14:14
```

```
DEFINE
74S00 TESTF * 14PIN
% INA INB OUTY
INA:I1 INB:I2 OUTY:0
```

```
DEFINE
74S374 TESTG * 24PIN
% OE D0 D1 D2 D3 D4 D5 D6 D7 Q7 Q6 Q5 Q4 Q3 Q2 Q1 Q0 CP
OE:OE D0:D0 D1:D1 D2:D2 D3:D3 D4:D4 D5:D5 D6:D6 D7:D7 Q7:Q7 +
Q6:Q6 Q5:Q5 Q4:Q4 Q3:Q3 Q2:Q2 Q1:Q1 Q0:Q0 CP:CP
```

```
DEFINE
74S04 TESTH * 14PIN
% OUTY INA
OUTY:0 INA:I1
```

```
DEFINE
74S32 TESTI * 14PIN
% INA INB OUTY
INA:I1 INB:I2 OUTY:0
```

Element List File: CVDEMO4.ELF

```

*****
*
*                               NX-CV ELEMENT LIST FILE
*
* NX-CV Version 1.31
* Copyright (C) 1985,1986 - Personal CAD Systems, Inc.
*
* Date       : MAY 21 1986
* Time      : 09:56 AM
* File Out  : CVDEMO4.ELF
*
*****
10027 PG001012      **          R1      3          16
10028 PG001036      **          R1      4
10029 PG001035      **          R1      5
10030 PG001007      **          R1      6
10031 PG001006      **          R1      7
10033 PG001001      **          R1      8
10038 PG001017      **          J2      1
10039 PG001020      **          J2      2
10040 PG001042      **          J2      3
10041 PG001043      **          J2      5
10042 PG001045      **          J2      6
10043 PG001046      **          J2      7
10044 PG001047      **          J2      8
10045 CLOCK         **          J1      1
10048 +5V           **          J2      9
10049 GND           **          J1      2
10046 +5V           .1UF50      U2          A          2
10046 GND           .1UF50      U2          B
10026 PG001021      1K1/4W      R1      2          1
10047 +5V           .01UF10     U3          A          2
10047 GND           .01UF10     U3          B
10032 PG001017      DIP1414P76  U1      1          14
10032 PG001020      DIP1414P76  U1      2
10032 PG001042      DIP1414P76  U1      3
10032 PG001043      DIP1414P76  U1      4
10032 PG001045      DIP1414P76  U1      5
10032 PG001046      DIP1414P76  U1      6
10032 PG001047      DIP1414P76  U1      7
10032 **           DIP1414P76  U1      8
10032 PG001001      DIP1414P76  U1      9
10032 PG001012      DIP1414P76  U1     10
10032 PG001036      DIP1414P76  U1     11
10032 PG001035      DIP1414P76  U1     12
10032 PG001007      DIP1414P76  U1     13
10032 PG001006      DIP1414P76  U1     14
10007 PG001018      TESTA14PIN  U4          11          18
10007 PG001019      TESTA14PIN  U4          12
10007 PG001014      TESTA14PIN  U4          0
10008 PG001013      TESTA14PIN  U5          11
10008 PG001014      TESTA14PIN  U5          12
10008 PG001015      TESTA14PIN  U5          0
10034 PG001044      TESTA14PIN  U6          11
10034 PG001038      TESTA14PIN  U6          12
10034 PG001011      TESTA14PIN  U6          0
10035 PG001018      TESTA14PIN  U7          11

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10035	PG001030	TESTA14PIN	U7	12
10035	PG001027	TESTA14PIN	U7	0
10036	PG001019	TESTA14PIN	U8	11
10036	PG001029	TESTA14PIN	U8	12
10036	PG001028	TESTA14PIN	U8	0
10037	IDEL	TESTA14PIN	U9	11
10037	PG001040	TESTA14PIN	U9	12
10037	PG001039	TESTA14PIN	U9	0
10002	PG001021	TESTD14PIN	U10	IN3
10002	PG001025	TESTD14PIN	U10	IN1
10002	PG001023	TESTD14PIN	U10	CLK
10002	PG001022	TESTD14PIN	U10	IN2
10002	PG001021	TESTD14PIN	U10	IN4
10002	PG001044	TESTD14PIN	U10	01
10002	**	TESTD14PIN	U10	02
10003	PG001021	TESTD14PIN	U11	IN3
10003	PG001024	TESTD14PIN	U11	IN1
10003	PG001023	TESTD14PIN	U11	CLK
10003	PG001022	TESTD14PIN	U11	IN2
10003	PG001021	TESTD14PIN	U11	IN4
10003	PG001018	TESTD14PIN	U11	01
10003	**	TESTD14PIN	U11	02
10004	PG001021	TESTD14PIN	U12	IN3
10004	PG001009	TESTD14PIN	U12	IN1
10004	PG001023	TESTD14PIN	U12	CLK
10004	PG001022	TESTD14PIN	U12	IN2
10004	PG001021	TESTD14PIN	U12	IN4
10004	PG001019	TESTD14PIN	U12	01
10004	**	TESTD14PIN	U12	02
10005	PG001021	TESTD14PIN	U13	IN3
10005	PG001022	TESTD14PIN	U13	IN1
10005	PG001023	TESTD14PIN	U13	CLK
10005	PG001009	TESTD14PIN	U13	IN2
10005	PG001021	TESTD14PIN	U13	IN4
10005	IDEL	TESTD14PIN	U13	01
10005	**	TESTD14PIN	U13	02
10022	*8	TESTD14PIN	U14	IN3
10022	4	TESTD14PIN	U14	IN1
10022	2	TESTD14PIN	U14	CLK
10022	*1	TESTD14PIN	U14	IN2
10022	PG001030	TESTD14PIN	U14	IN4
10023	8	TESTD14PIN	U15	IN3
10023	*4	TESTD14PIN	U15	IN1
10023	*2	TESTD14PIN	U15	CLK
10023	1	TESTD14PIN	U15	IN2
10023	PG001038	TESTD14PIN	U15	IN4
10024	8	TESTD14PIN	U16	IN3
10024	*4	TESTD14PIN	U16	IN1
10024	*2	TESTD14PIN	U16	CLK
10024	1	TESTD14PIN	U16	IN2
10024	PG001029	TESTD14PIN	U16	IN4
10025	*8	TESTD14PIN	U17	IN3
10025	*4	TESTD14PIN	U17	IN1
10025	*1	TESTD14PIN	U17	CLK
10025	1	TESTD14PIN	U17	IN2
10025	PG001040	TESTD14PIN	U17	IN4
10018	PG001005	TESTE14PIN	U18	11

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10018	P6001001	TESTE14PIN	U18	12	
10018	P6001011	TESTE14PIN	U18	13	
10018	8	TESTE14PIN	U18	13	
10019	P6001005	TESTE14PIN	U19	11	
10019	P6001001	TESTE14PIN	U19	12	
10019	P6001027	TESTE14PIN	U19	13	
10019	8	TESTE14PIN	U19	13	
10020	P6001005	TESTE14PIN	U20	11	
10020	P6001001	TESTE14PIN	U20	12	
10020	P6001028	TESTE14PIN	U20	13	
10020	8	TESTE14PIN	U20	TESTE1	
10021	P6001005	TESTE14PIN	U21	11	
10021	P6001001	TESTE14PIN	U21	12	
10021	P6001039	TESTE14PIN	U21	13	
10021	8	TESTE14PIN	U21	TESTE1	
10017	P6001012	TESTF14PIN	U22	11	3
10017	P6001012	TESTF14PIN	U22	12	
10017	P6001005	TESTF14PIN	U22	0	
10009	*8	TESTH14PIN	U23	0	12
10009	8	TESTH14PIN	U23	11	
10010	*4	TESTH14PIN	U24	0	
10010	4	TESTH14PIN	U24	11	
10011	*2	TESTH14PIN	U25	0	
10011	2	TESTH14PIN	U25	11	
10012	*1	TESTH14PIN	U26	0	
10012	1	TESTH14PIN	U26	11	
10013	P6001023	TESTH14PIN	U27	0	
10013	CLOCK	TESTH14PIN	U27	11	
10014	P6001022	TESTH14PIN	U28	0	
10014	P6001001	TESTH14PIN	U28	11	
10016	P6001012	TESTI14PIN	U29	11	3
10016	P6001023	TESTI14PIN	U29	12	
10016	P6001008	TESTI14PIN	U29	0	
10006	P6001016	TESTA14PINDIP	U30	11	3
10006	P6001044	TESTA14PINDIP	U30	12	
10006	P6001013	TESTA14PINDIP	U30	0	
10015	GND	TESTG24PINPGA	U31	OE	18
10015	P6001006	TESTG24PINPGA	U31	D0	
10015	P6001007	TESTG24PINPGA	U31	D1	
10015	P6001035	TESTG24PINPGA	U31	D2	
10015	P6001036	TESTG24PINPGA	U31	D3	
10015	**	TESTG24PINPGA	U31	D4	
10015	**	TESTG24PINPGA	U31	D5	
10015	**	TESTG24PINPGA	U31	D6	
10015	**	TESTG24PINPGA	U31	D7	
10015	**	TESTG24PINPGA	U31	Q7	
10015	**	TESTG24PINPGA	U31	Q6	
10015	**	TESTG24PINPGA	U31	Q5	
10015	**	TESTG24PINPGA	U31	Q4	
10015	1	TESTG24PINPGA	U31	Q3	
10015	2	TESTG24PINPGA	U31	Q2	
10015	4	TESTG24PINPGA	U31	Q1	
10015	8	TESTG24PINPGA	U31	Q0	
10015	P6001008	TESTG24PINPGA	U31	CP	
10001	P6001021	TESTB16PINSMD	U32	IN3	7
10001	P6001026	TESTB16PINSMD	U32	IN1	
10001	P6001023	TESTB16PINSMD	U32	CLK	
10001	P6001022	TESTB16PINSMD	U32	IN2	
10001	P6001021	TESTB16PINSMD	U32	IN4	
10001	P6001016	TESTB16PINSMD	U32	O1	
10001	**	TESTB16PINSMD	U32	O2	