

CADImport for Windows

Installation and User Guide

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Labels	Dispensing system buttons, labels, switches or connections appear in this text style .
Buttons	Fluidmove for Windows (FMW) buttons and dialog boxes appear in this text style.
Menu Selections	All menu selections within FMW appear in this text style.
Commands	Fluidmove for DOS (FMDOS) windows, menu selections, and commands appear in this text style .
<u>Glossary Terms</u>	The first occurrence of a glossary term appears <i>italicized and underlined</i> . The definition of the term occurs in the Glossary.
FILENAME.FM2	Filenames appear in THIS TEXT STYLE .
<typed text>	Typed commands, names and values appear in this text style.
	Level 1 Safety Warning. The information following this symbol cautions you of actions that could cause minor bodily harm to the user .
 WARNING!	Level 2 Safety Warning. This symbol will appear in a highlighted text block. The information in the text block warns you of actions that could cause serious bodily harm to the user .
	Level 1 Machinery and Software Caution. The information following this symbol cautions you about actions that could cause minor damage to the machinery or software .
 CAUTION!	Level 2 Machinery and Software Caution. This symbol will appear in a highlighted text block. The information in the text block warns you about actions that could cause serious damage to the machinery or software .
 NOTE	This symbol appears next to a text block with information you must know before proceeding, or with helpful information relating to text that precedes it.
 TIP	This symbol appears next to a text block with a timesaving or technique tip.
 Help	This symbol appears next to a text block with instructions for error recovery.

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1 System Overview

Software Installation

The procedure below instructs you on the installation of the CADImport software onto your computer, the first step necessary in preparing to use the CADImport system. The process is brief and menu-driven.

To install the CADImport software on your system:

1. Load your diskettes into the drive.
 - ▶ The Welcome box appears.
2. In the Welcome box, click Next.
 - ▶ A directory box appears.
3. Select the directory on which to install the CADImport system or allow the file to load to the default directory.
4. Click Next.

Overview of CADImport Features and Options

CADImport works with CAD data from text files generated in a board layout or CAD program. The CADImport system allows you to import and reformat this data for compatibility and use with Fluidmove. You can use the features available on the Import CAD File screen to accomplish all necessary reformatting of the CAD data or to access other data format and viewing screens.

Once the CAD data is imported, the system provides you with an onscreen representation of the component layout, which you can modify. There are also options that allow you to enhance the program for faster throughput. You can switch to a Dot View screen, which enables you to modify the dispensing path. The Step and Repeat Boards feature is an option that sets up multiple boards to be dispensed with the same pattern.

The Component Library assists you in matching the imported components from your original file with components predefined by the system.

The Import CAD File Box

The Import CAD File dialog box is the main screen used for setting data conversion parameters and selecting from a variety of options. All options on this screen are discussed in this section.

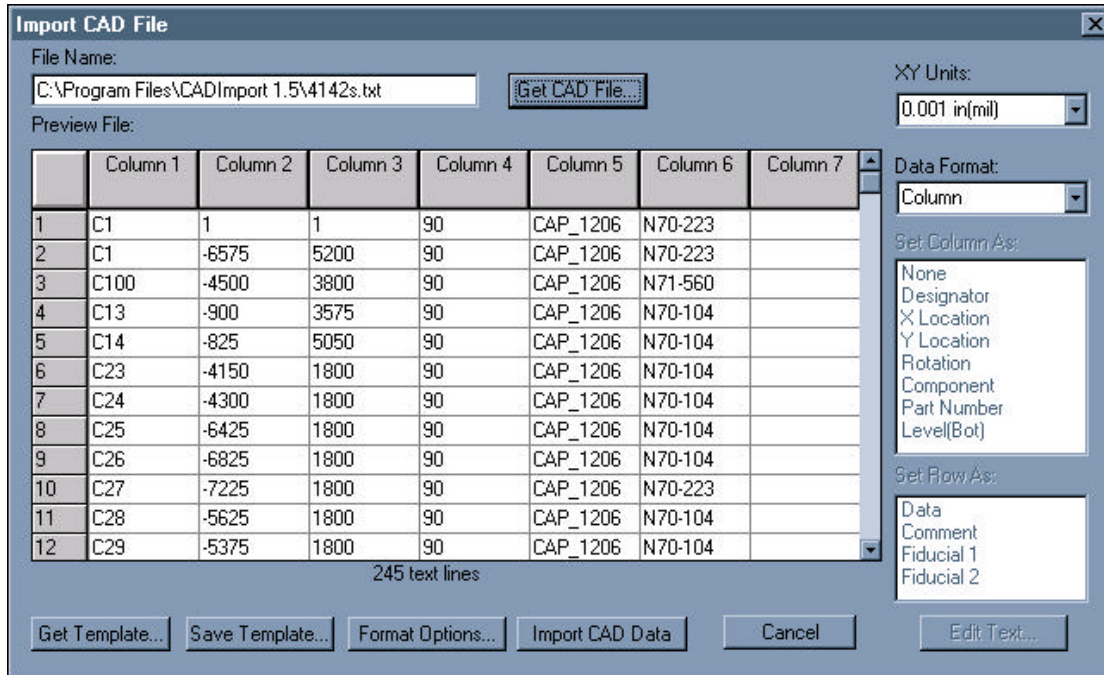


Figure 1-1 Import CAD File Box

You can use this dialogue box to:

- Choose a file to read (using the Get CAD File button)
- Choose XY coordinate units (using the XY Units option)
- Specify the data format as Delimited or Fixed Column (using the Data Format drop-down menu)
- Assign data types to columns (using the Set Column As menu)
- Mark specific rows as comments or fiducials (using the Set Row As menu)
- Apply a template to a CAD file after the file has been imported (using the Get Template button) (Get Template automatically assigns predetermined XY Units, Column Designations and Data Format options)
- Create a template by importing a CAD file and assigning attributes (using the Save Template button)
- Select from the formatting options related to each data format (using the Format Options button)
- Import data from the file (using the Import CAD Data button)
- Match the CAD component data with predefined components (mapping library components; described later in this section)

Selecting the File to be Read:

To import the desired CAD file, you must display the Import CAD File box (by selecting **Import CAD File** from the File menu in the Programming Window in Fluidmove). You then click **Get CAD File**, which brings up a directory of files from which you can select. Once you open the file, the CAD data appears in the window in columns of ASCII text. You can edit and modify the parameters of this data.

Specifying the Data Format Within Columns:

The Data Format drop-down menu allows you to format the columns in which the CAD data is presented. CADImport supports two data formats: **Delimited Column** or **Fixed**. If you are designing your own program to generate CAD files, or if you are using an application that allows you to define the data format, we recommend that you use the **Delimited Column** format. Definitions and guidelines for both formats are listed below.

Delimited column format files:

Delimiters separate columns of data. (See *Data Format Options for delimiter types*.)

- The file must contain a consistent number of data items per line with no missing data, separated by a comma, space or other character (the delimiter)
- Data items may occur in any sequence
- There is no restriction on the position and length of data items

Fixed format files:

CADImport automatically sets the column headings to predefined data types in a set order. You use **Data Format Options** to set the start and end column for each data type.

- Files may contain missing data or an inconsistent number of data items per line
- Data items may occur in any sequence
- Data items must occur at a fixed position in each row

Complete instructions and examples for both column formats, including the preset column headings for Fixed Format files, appear in Section 3 – Importing and Formatting CAD Data.

Assigning Data Types

Once you have defined the format in which the data is arranged, you must use the Set Column As menu to assign a type to each column of data. A typical CAD file contains the following information:

Table 1-1 Typical Data Types

Typical Data Types	
Designator	A unique label to define each specified location on the board within CADImport
X Location, Y Location	The location of the component on the board
Component	The type of component
Rotation	Orientation of the component on the board (in degrees)

Please note that CADImport will not import your CAD data file if you do not set a designator. You can choose a blank column for a designator if one is not indicated. Additionally, if you do not set the rotation column or do not indicate the degree of rotation, the system will default to 0° for all components in your file.

The optional data types can appear in any sequence in a CAD file. For a more complete description of the XY location in relation to the board and components, see “The Coordinate System” in Section 2 – Working with CAD Data Files.

The level is a required data type if you are importing information from a CAD file that contains data on both sides of the board. For more information on the level format and selection, see “Options That Apply to Both Data Formats” in Section 3 – Importing and Formatting CAD Data.

Table 1-2 Optional Data Types

Optional Data Types	
Level	A flag to indicate that the component is on the top or bottom level of the workpiece (for files with components on both levels)
None	CADImport ignores the selected data column. Use this option to skip a column of data or to deselect a previously assigned column.
Part Number	The component manufacturer’s part number (for internal reference)

Setting Rows as Fiducial Locations or Comments

Some files may contain rows for comments and fiducial locations. In these cases, you can use the *Set Row As* option in the *Import CAD File* menu to mark selected rows as fiducials or comments. See “To mark a row as a comment or fiducial location” in Section 3 – Importing and Formatting CAD Data for more information. You can also add fiducials directly after importing data at the *Dot Layout* screen. When you try to save the data as a .FMC file, you will be prompted to add fiducials if no fiducials are present. To add fiducials, click on *Edit* and select *Add Fiducials*.

Specifying the XY Units

When you click on *Import CAD Data*, the data from the original CAD file is imported in the same unit format in which it was created. The *XY Units* drop-down box allows you to change the units in which the imported CAD data is presented. Possible units in *CADImport 1.5* are μm , mm, cm, mil, and inches.

Templates

To avoid re-assigning data attributes to similar CAD files, you can save attributes to a template file. To do so, import the CAD file, assign data attributes, including those from the *Data Format Options* screen, and click on the *Save Templates* file. To use a template, import a CAD file which has identical or similar attributes matching one of your saved templates. Then click on *Get Template* and choose one of the *.tpl* files. Data attributes will automatically be assigned to your data, thus avoiding repetitive action of setting up your data.

Templates save the following information to a ***.tpl** file:

- Column designations
- Unit Type
- Data Format Options for Column format e.g. Delimiters including "Other"
- Data Format Options for Fixed format e.g. starting and ending data columns
- Other Data Format Options (Level selection, Level format, Origin offset, Ignore problem lines option)

Templates do not save the following information:

- Lines which are comments
- Fiducials

Importing the CAD Data

After you have set the necessary options in the Import CAD File menu, click on Import CAD Data. CADImport will read the file and issue warnings if import options have not been set properly, or if there are errors in the file. Then you will see the component list and the graphical view of the board on your screen.

The File Conversion Process:

Once you have pressed the Import CAD Data button, CADImport performs the following tasks:

1. CADImport makes an initial pass to verify that the data types in every data line are valid. When an error is detected CADImport stops and report the error type and the row number where the error occurred. If the; Ignore All Problem Lines option (under Data Format Options) is checked, CADImport will skip any lines with errors.
2. Once the file has been successfully read, CADImport builds its internal component list from the data. The component name and attributes (location, rotation, etc.) are stored in the order in which they are read from the file.
3. The component location is always stored internally in mils. However, you can set the XY Units option (in the Import CAD File dialog box) to determine the conversion units to be used for the coordinates in the raw data file. For example, if the units in the raw file are millimeters (mm), you should set the XY Units option to mm, so CADImport can perform the calculations necessary to transform the millimeter coordinates into mils.
4. While building the list, CADImport attempts to match each component with one stored in the internal Component Library. CADImport refers to the component name to create the match. Therefore, a component named C1206 will be matched with (assigned to) the library component C1206. However, a component named CAP-1206 would remain unassigned if it did not match a library component name. You can assign unmatched components using the Edit menu functions discussed in Section 4 – Menu and Screen Configurations.

The Component View Screen

After you click the Import CAD Data button, the Component View screen appears. This screen shows a graphic representation of the board and components. The graphic is an approximation only; the components and patterns displayed onscreen are 5% larger than actual size. The data origin is marked by a +. At the bottom, the status line appears, indicating the number of components and the current cursor location.

The left side of the screen displays a component list describing the attributes of each component. The toolbar includes the Board Orientation Group and View Group buttons. The component list and toolbar buttons are described in detail in the following pages.

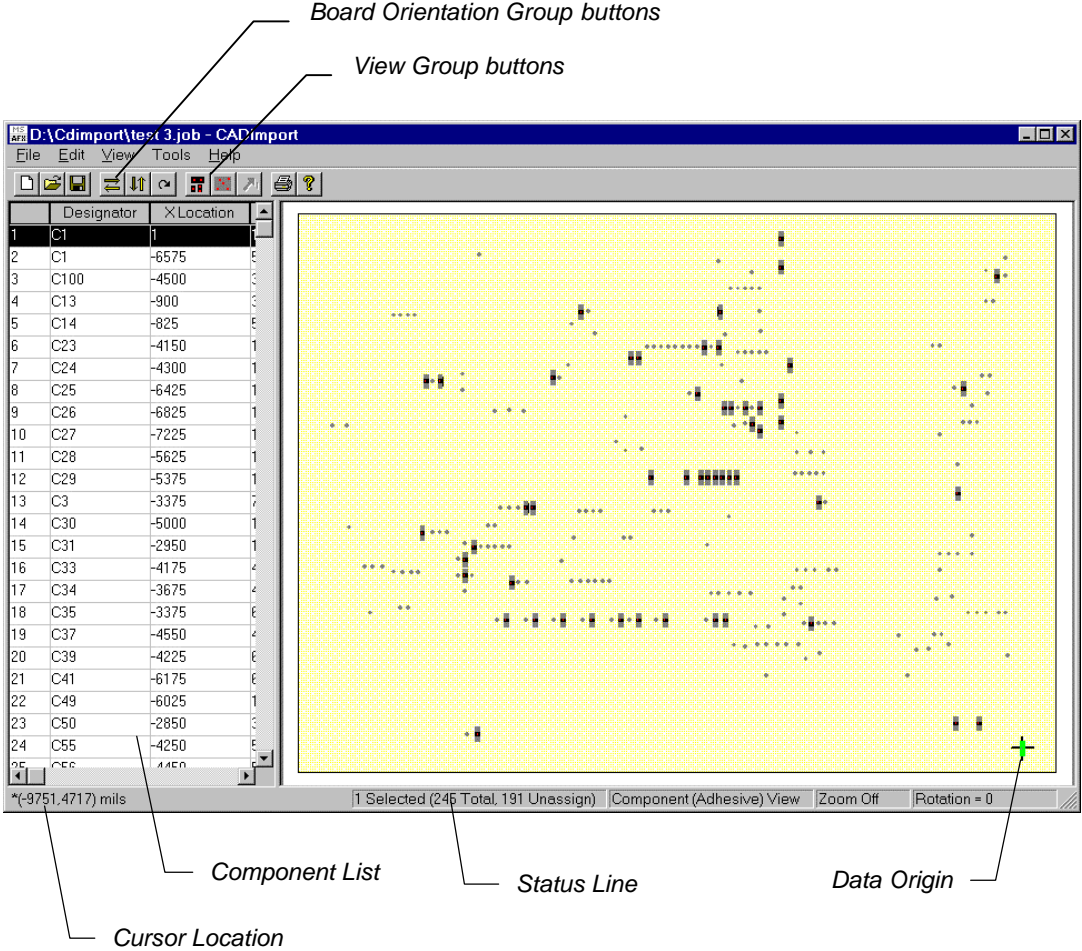


Figure 1-2 Component View Screen

CADImport defines the minimum and maximum values in the Component View Screen based on the coordinate values in the component list. If you place the cursor at each corner of the Component View screen, the minimum and maximum values of the imported CAD data appear in the cursor location.

Components that have been assigned (mapped) to library components are shown with accurate sizes, shapes and dispense locations. Unmapped components are displayed as gray dots. Component mapping is described at the end of this section and under the Edit menu options in Section 4 – Screen and Menu Configurations.

Component List

Each line in the Component List contains the component Designator (a label for each uniquely defined location on the board), the X and Y Location coordinates (in mils) and the associated data types (designator, rotation, component name, part number). CADImport attempts to map as many components to library components as possible during the import process. Unmapped component names are displayed in red. You can manually map these components by following the instructions “To format the CAD data” in Section 3 – Importing and Formatting CAD Data. For further information on component mapping and the component library, see “Mapping CAD File Components to Library Components” (later in this section), “Component Library” in Section 2 – Working with CAD Data Files, and the Component Library feature of the Tools menu in Section 4 – Menu and Screen Configurations.

Status Line

The status line at the bottom of the CADImport window (in either Component View or Dot View) shows the cursor location displayed in mils. The Select Indicator shows the number of components currently selected, the total number in the Component List and how many components are currently unassigned. Also shown is the View Type (Component View or Dot View) and Dispense Mode (Adhesive or Solder Paste), the zoom factor, and the board rotation angle. You can set these parameters by using the View menu and Tools menu options described in Section 4 – Menu and Screen Configurations.

In the example below, 245 components were read from the original CAD data file. Of these, 191 remain unassigned because the component names did not match any of the names in the component library. To learn more about manually assigning these components, see “Mapping CAD File Components to Library Components” at the end of this section.

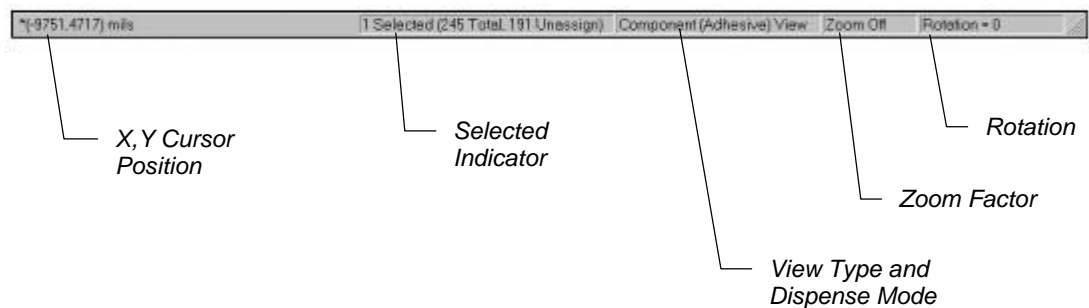


Figure 1-3 Status Line

Toolbar Buttons

The first three buttons in the toolbar provide the new file, open file, and save file commands. The last two allow you to print and access CADImport Help. The Board Orientation Group (listed below) allows you to rotate or mirror the board position. The View Group allows you to switch to the Dot View screen and to optimize the dot path. All of these functions are described in the following pages.

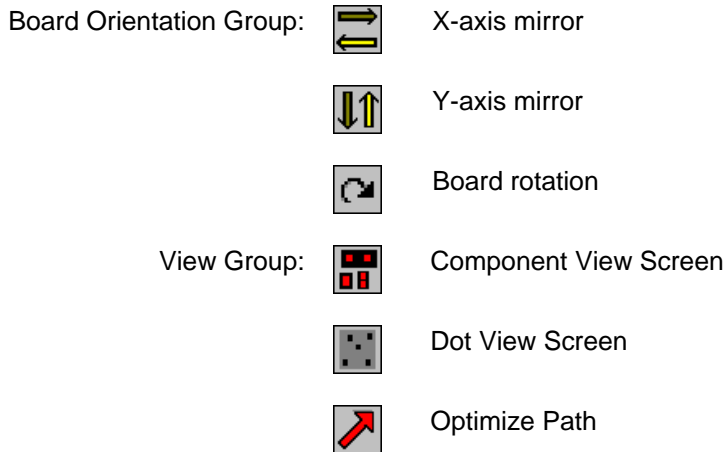


Figure 1-4 Toolbar Buttons

The Board Orientation Group buttons are enabled only when you are in Component View mode. These buttons allow you to change the orientation of the board. Clicking the X or Y-axis mirror buttons changes the X or Y coordinate sign. The use of the mirror and rotation buttons is illustrated below.

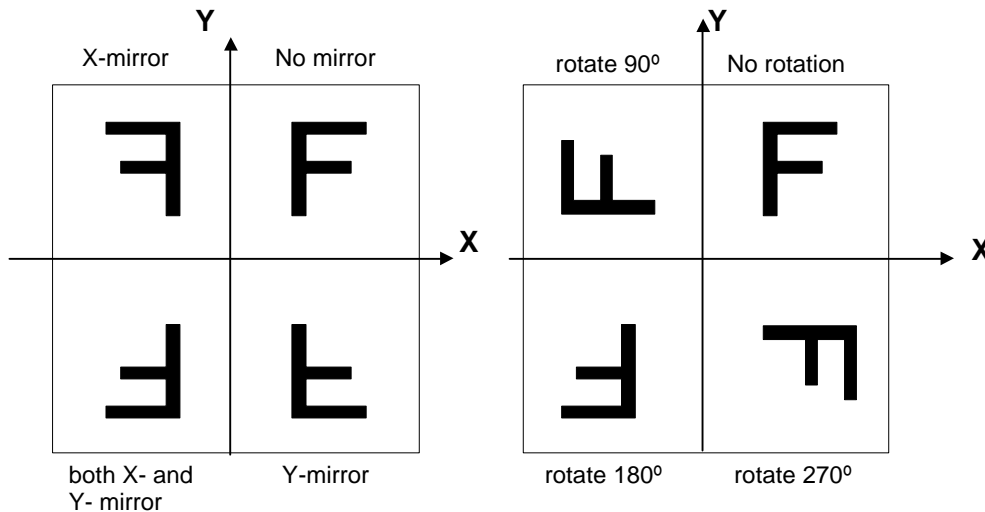


Figure 1-5 Mirroring and Rotating the Board

For example, if you wish to dispense on the back side of the board you might need to mirror the X coordinates as well as rotate the board to get the correct orientation.

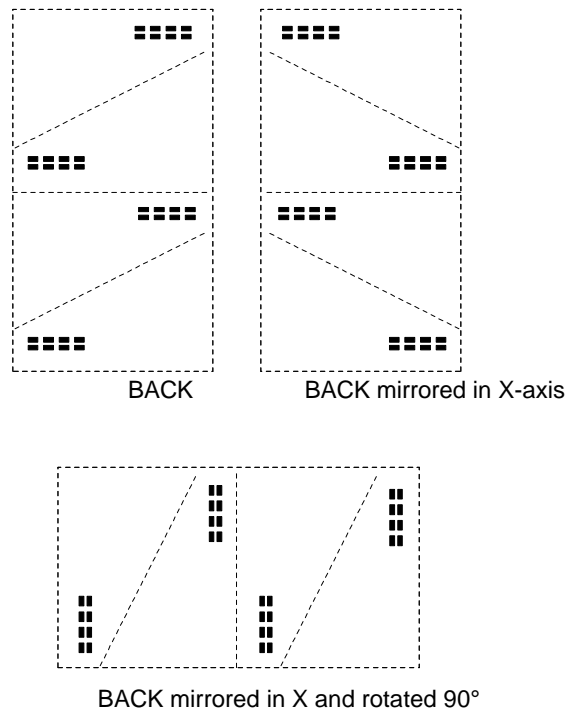



Figure 1-6 Mirroring for Dispensing on Backside of Board

Dot View Screen

When you click on the Dot View button  CADImport displays the dot pattern. The number of dots used for each component depends on the component type and the dispense mode (Adhesive or Solder Paste). Unassigned components are displayed as a single dot. The total number of dispense dots is displayed on the Status line.

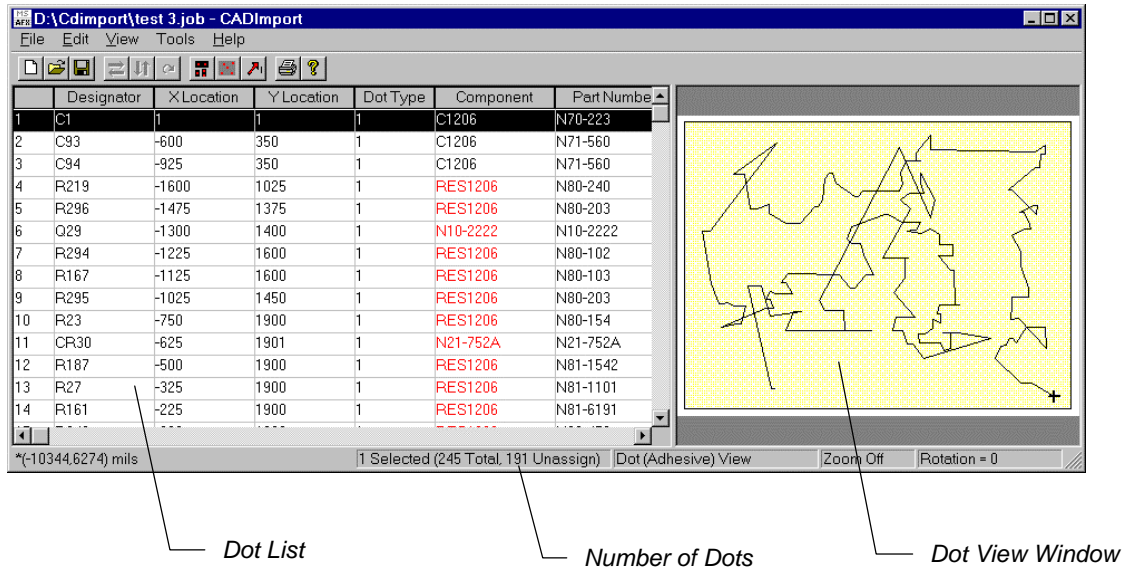


Figure 1-7 Dot View Screen

Dots are displayed in red with a black line indicating the current dispense path. Initially this path follows the order of the dots in the raw CAD file, but you can shorten the path for faster throughput by clicking the Optimize Path button or on Tools; Optimize Path). The Component View button allows you to switch back to Component View mode. For more information, see “Optimizing the Path” in Section 2 – Working with CAD Data Files.

Dot List

Each line in the Dot List contains the XY location in mils and attributes (designator, dot type, component name, part number). Unassigned components are listed in red and displayed as a single dot on the Dot View screen.

Mapping CAD File Components to Library Components

Mapping allows you to relate each imported component to a corresponding library component. Each library component has an associated dispensing pattern.

CADImport enables you to select a group of similar components by any combination of name, part number, designator or individual selection. The selected group can then be mapped to one of the library components.

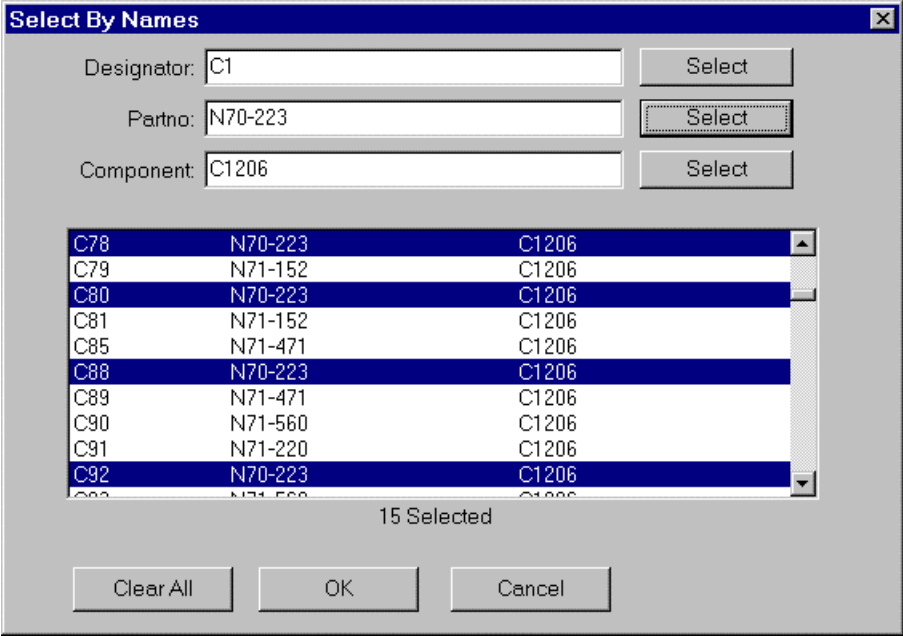


Figure 1-8 Component Select By Names Box

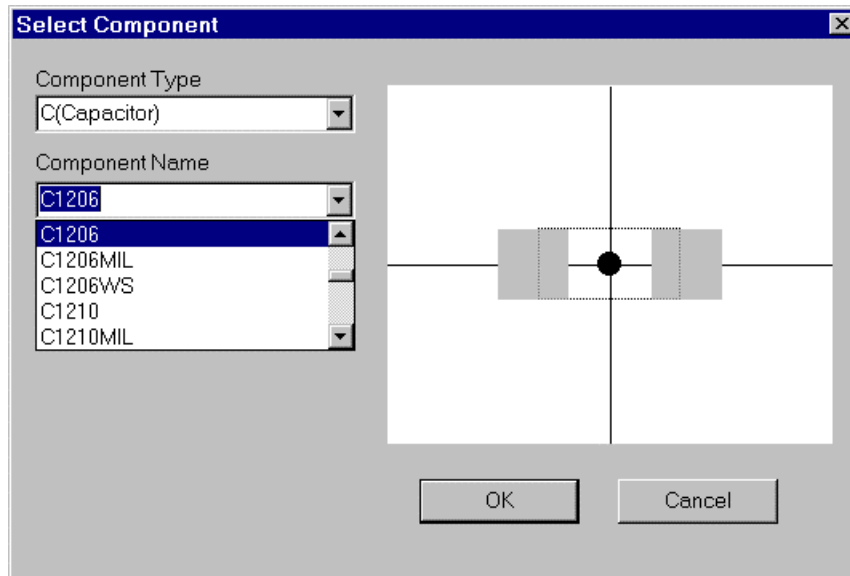


Figure 1-9 Library Component Selection Box

Unmapped components are highlighted on the screen and reported on the status line. Any unmapped components are omitted from the final Fluidmove file unless you manually map them to library components. Component mapping procedures are provided in Section 3 –Importing and Formatting CAD Data.

Step and Repeat Boards

The Step and Repeat Boards feature is optional. It allows you to use a single panel to lay out multiple boards to be printed with the same dispensing pattern. You define the number and layout of boards on the panel by making entries in the Boards (Rows x Cols) boxes. You then set the parameters for the dispensing pattern origins and board dimensions for each board.

When you have set all of the parameters and clicked OK, CADImport creates multiple copies of the components and pattern used on the first board to produce the total number of boards you defined. CADImport then generates a new Component List to include all of these component sets. Further information on this feature appears in Section 3 – Importing and Formatting CAD Data.

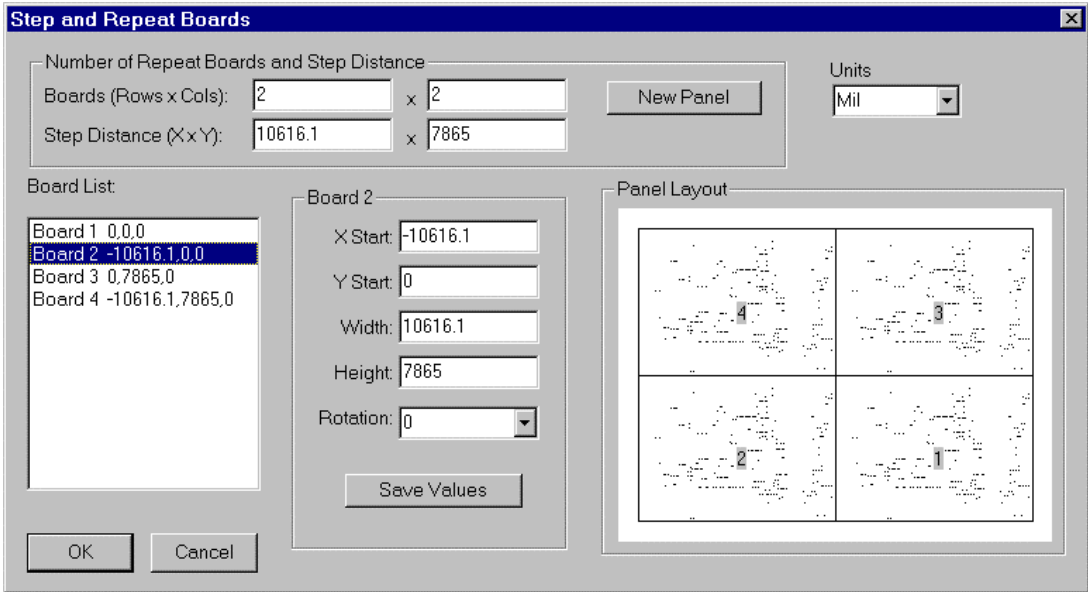


Figure 1-10 Step and Repeat Board Box

2 Working with CAD Data Files

This chapter provides a general overview of the process for creating a Fluidmove file from an existing CAD file. This chapter also describes the CADImport program interface. For the entire data import procedure, refer to Section 3 – Importing and Formatting CAD Data.

More detailed descriptions of all the options are contained in Section 4 – Menu and Screen Configurations.

Overview of CAD Data Import to Fluidmove

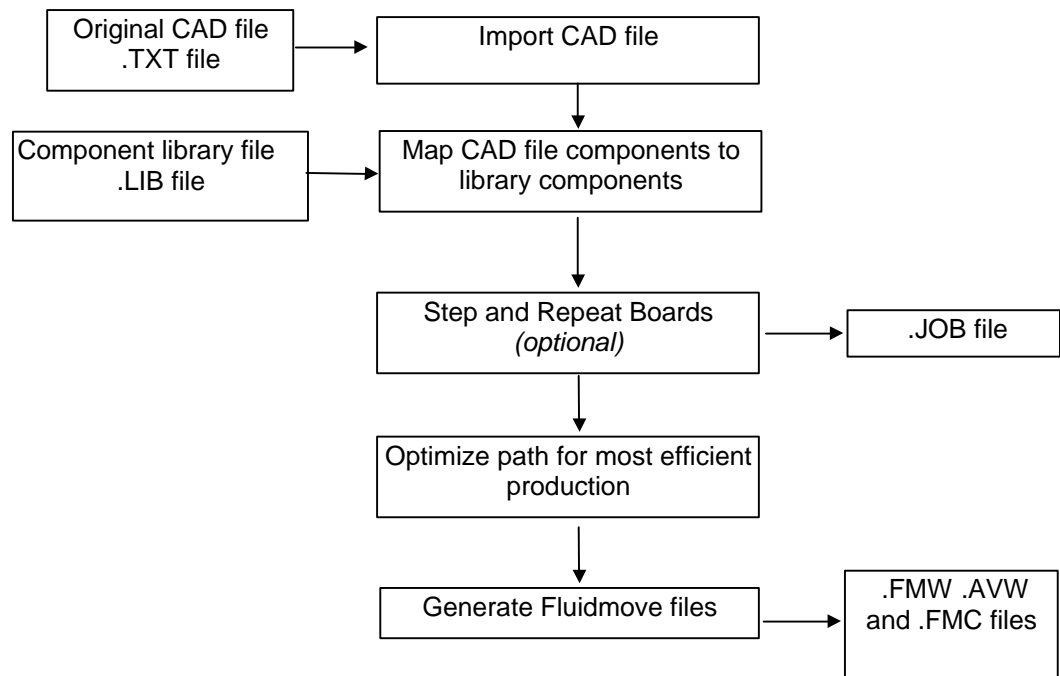


Figure 2-1 CADImport Process Flow

About CAD Files

The first and most important step in using CADImport is reading the CAD file data from the .ASC or .TXT file (see “File Types” below). While CADImport offers some flexibility in formatting, it is important to begin with a file that is compatible with CADImport’s data format options. Starting with a correctly formatted CAD file makes using CADImport quick and easy.

File Types

CADImport accommodates three types of files, which are usually used in this order during the import process.

Table 2-1 CADImport File Types

File type	Extension	Description	How created	How used
CAD files	*.ASC or *.TXT	ASCII files containing component locations and information	Board layout program or CAD program	Imported at the beginning of the CADImport job
CADImport job file	*.JOB	Contains job information specially formatted for use in CADImport.	CADImport - Save; Save As	Saved during the creation of the CADImport job
Fluidmove files	*.FMW *.AVW *.FMC	Specially formatted for the Fluidmove program. (.FMC files for FmNT version 4.0 or later)	CADImport - Save As Fluidmove File	Imported into Fluidmove

The Coordinate System

The CADImport program uses the following conventions for its coordinate system:

- Coordinates are stored internally stored as mils. You must manually specify the coordinate unit type in the XY Units box in the Import CAD File dialogue box.
- CADImport uses a standard Cartesian coordinate system.
- The origin (0,0) is indicated by a +.
- Components may be located in any of the four quadrants of the Component View and Dot View screens: +x+y, -x+y, -x-y, +x-y.
- CADImport automatically sets up the minimum and maximum XY values based on the location coordinates in the CAD data file. The size and shape of the view window are determined by these values as shown below.

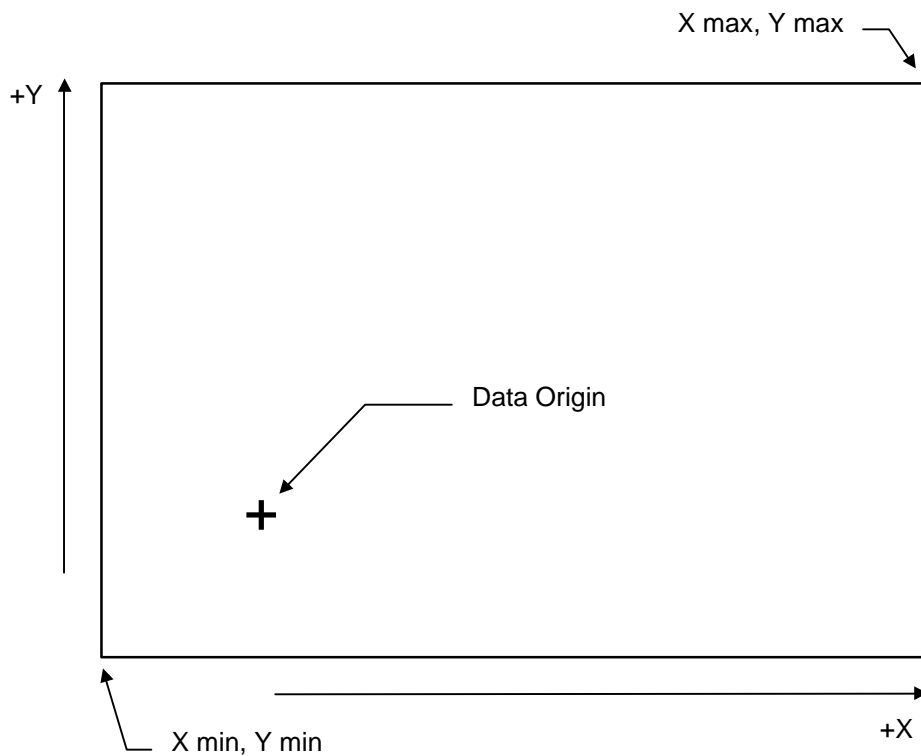


Figure 2-2 Coordinate System

Component Library

The CADImport Component Library contains approximately 300 SMT components classified into 13 Component Types. Appendix A lists the Component Types and their individual components. The component library is provided in the **Asymtek.lib** file. CADImport refers to this file to assign components from the original CAD data file to library components.

Each library component has a unique name and a specific set of properties. These include the dispense dot locations for adhesive and solder paste mode and the landpattern geometry, size and spacing information utilized for each component.

In Component View mode, CADImport displays the component body in black, the pins in gray, and dispense dots in red. In Dot View mode, only the dot locations are shown.

In this dialogue box, you can:

- See a graphic of the component and set the Dispense Mode to dispense dots in either Adhesive or Solder paste
- Edit the dispense dot locations, or add and delete dots
- Edit the component properties (landpattern width and height, pin length and width)
- Save modifications to an existing component or create a new component

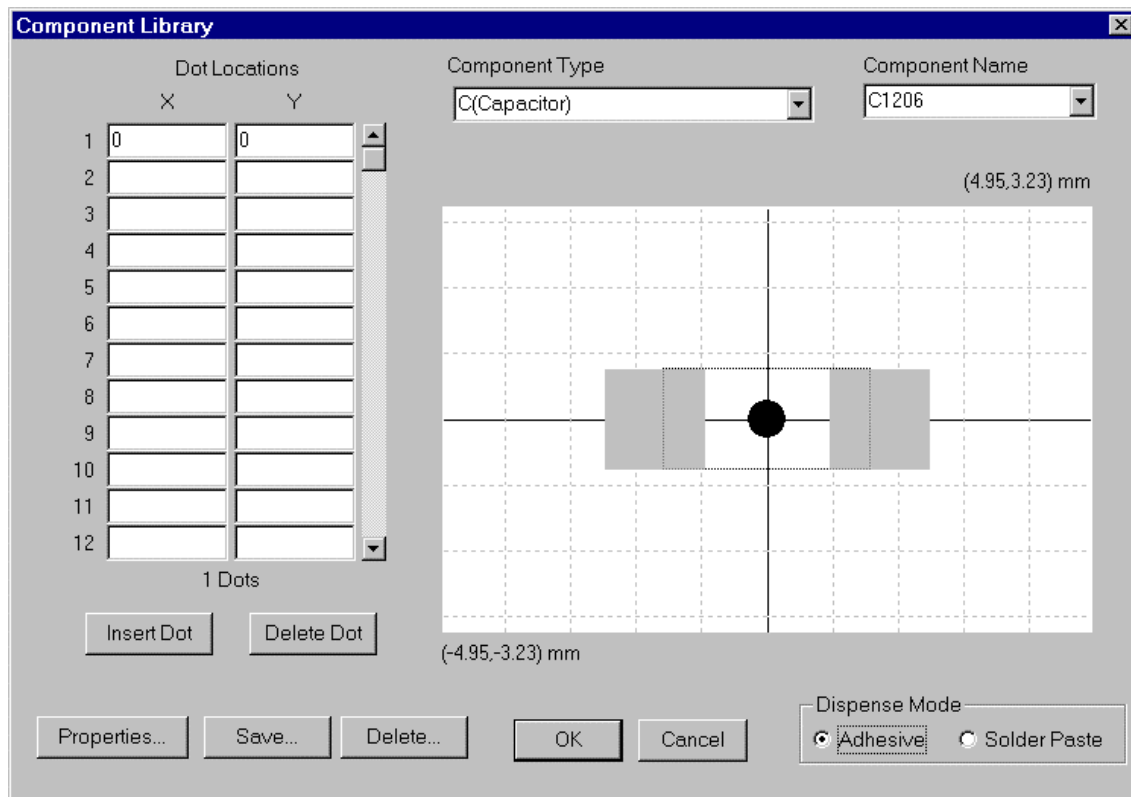


Figure 2-3 Component Library Box

Editing Dot Locations

The Dot Locations List displays the XY dot locations (in mm units) for the selected component. The window provides a graphic representation of the currently selected component with dispense dots. The dot configuration shown for the component (number and locations) is determined by the dispense mode you select: (Adhesive or Solder Paste). You can select a dot from the list or by clicking on it in the window, then enter new XY values to change the dot location.

You can also insert a new dot before the current selection in the Dot Locations list or delete a dot from the list. Instructions for each of these procedures appear in Section 3 –Importing and Formatting CAD Data.

Editing Component Properties

Click on the Component Type arrow to see a list of the component categories included in the CADImport Component Library. When you select a component type from the list, all components of that type appear in the Component Name list. You can select a specific component by clicking on its name in this list. When you change the component type or component name, the screen is updated to show the selected component.

You can edit the various parameters of the selected components by clicking on Properties in the Component Library box (Figure 2-3) to open the Component Properties box, shown below. Once you have made changes, you can replace the original component by saving it under its original name, or you can create a new component name for the modified component. Examples of these procedures and a detailed illustration of the component properties as they relate to an actual component are provided in Section 3 – Importing and Formatting CAD Data.

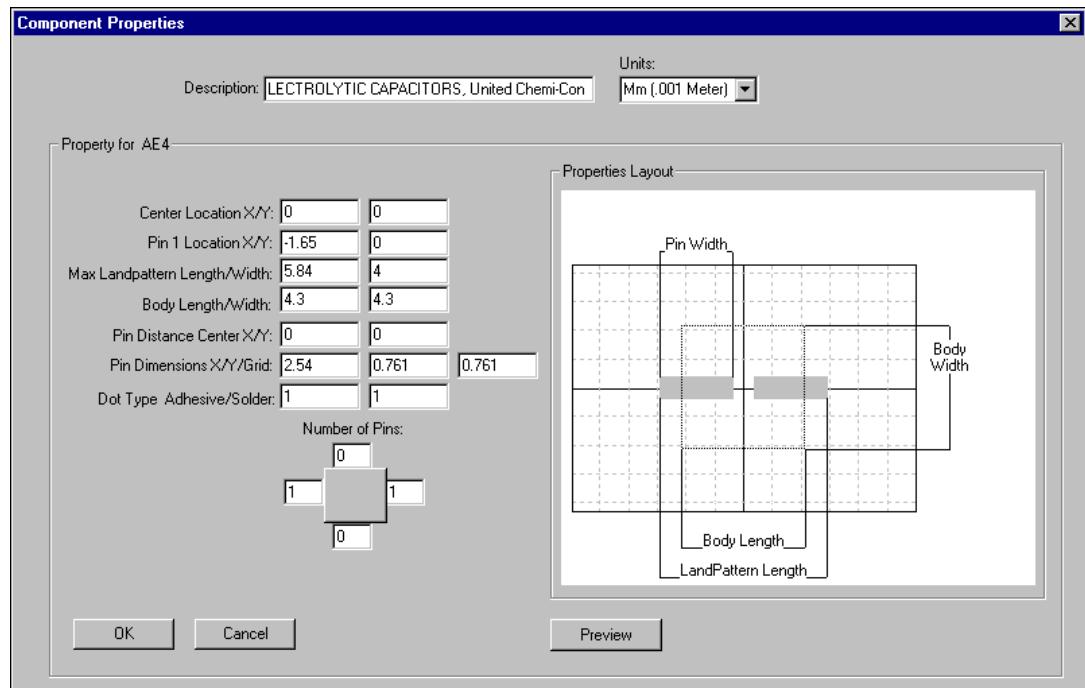


Figure 2-4 Component Properties Box

Step and Repeat Boards

The step and Repeat Boards feature is an optional step in the CAD import process. It allows you to use a single panel to lay out multiple boards to be printed with the same pattern. You define the number and layout of boards on the panel by entering the desired numbers in the Boards (Rows x Columns) boxes.

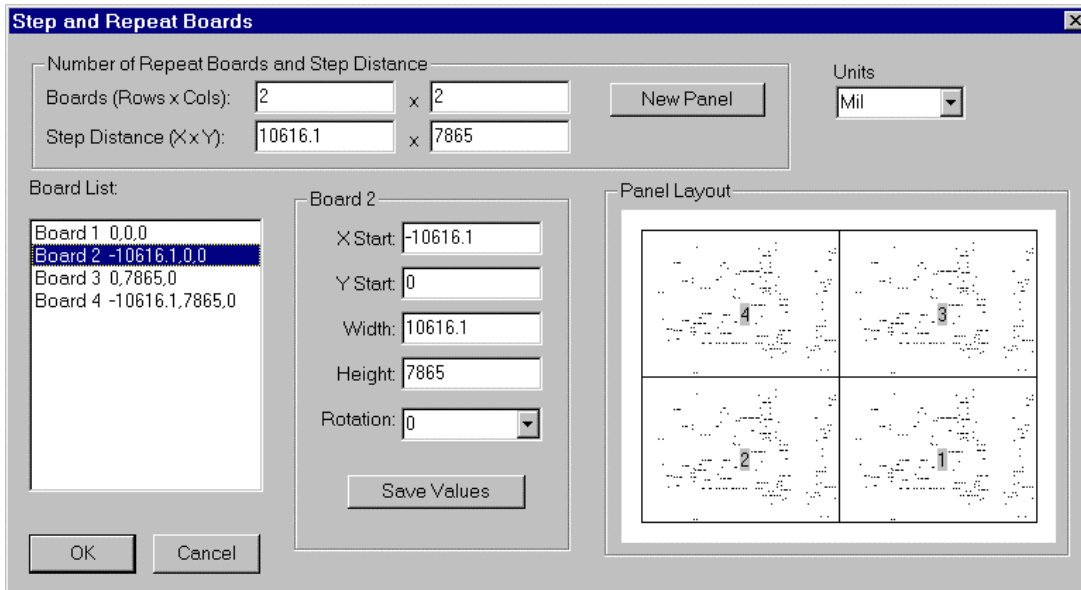


Figure 2-5 Step and Repeat Boards Box

By default, CADImport uses the minimum and maximum location values from the Component List to calculate the step distances and sets up the panel as an array of equally-spaced boards.

The Step and Repeat Boards dialogue box enables you to set all parameters necessary for arranging the boards, including the origin coordinates of the dispensing pattern on each (X Start, Y Start).

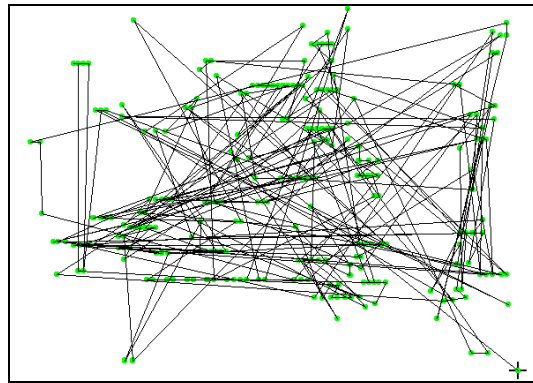
When you have set all of the parameters and clicked OK, CADImport creates multiple sets of the components on the first board to produce the total number of boards defined in the Boards (Rows x Cols) boxes. CADImport then generates a new Component List to include all of these component sets.

For complete instructions on using all features available on this screen, refer to “Laying Out Step and Repeat Boards” in Section 3 – Importing and Formatting CAD Data.

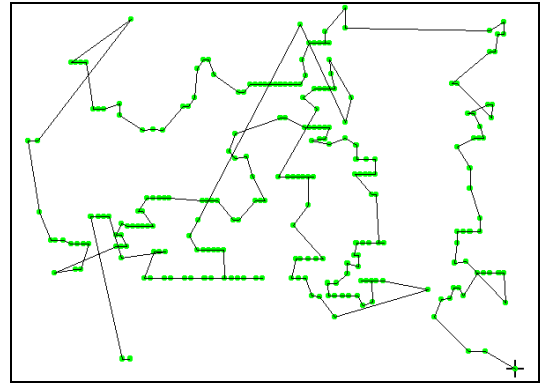
Optimizing the Path

Initially, the dispense path is generated based on the sequence of the dots as they occur in the original file. More efficient movement is produced by optimization, which shortens the dispense path using the nearest neighbor method. This is an essential step for efficient production.

The Optimize Path command reorders the dots to minimize the path length for more efficient production.



Path Before Optimization



Path After Optimization

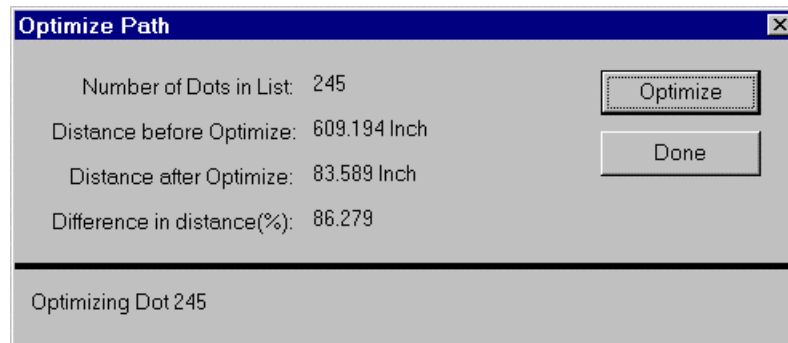


Figure 2-6 Optimizing the Dispensing Path

This option is only available in Dot View mode.

The optimizing process begins when you click on Optimize. The dots are reordered in the Dot List using the nearest neighbor method to shorten the path. This does not affect the order of the components in the Component List. When the optimization is complete, CADImport reports the new path length and difference in path distance as shown above.

Any editing changes such as re-assigning components, changing their location, or changing the board orientation (using mirror and rotate) will cause re-generation of the Dot List, so you will need to re-optimize.

If you are setting up a panel with multiple boards, you should first use the View; Step and Repeat Boards option to set up the panel, then use Optimize Path to shorten the path.

Generating a Fluidmove File

The mapped components and optimized path are formatted into Fluidmove program files (.FMW, .FMC and .AVW files).

3 Importing and Formatting CAD Data

The procedure for importing CAD files into Fluidmove is a two-step process. You must first format the raw CAD data within the CADImport system, then import the data into Fluidmove. Both procedures are described in detail below.

To format the CAD data:

1. In the initial CADImport screen, select the File menu.
2. From the File menu, select Import CAD File.
 - ▶ The Import CAD File dialogue box appears. (See Figure 3-1 below.)

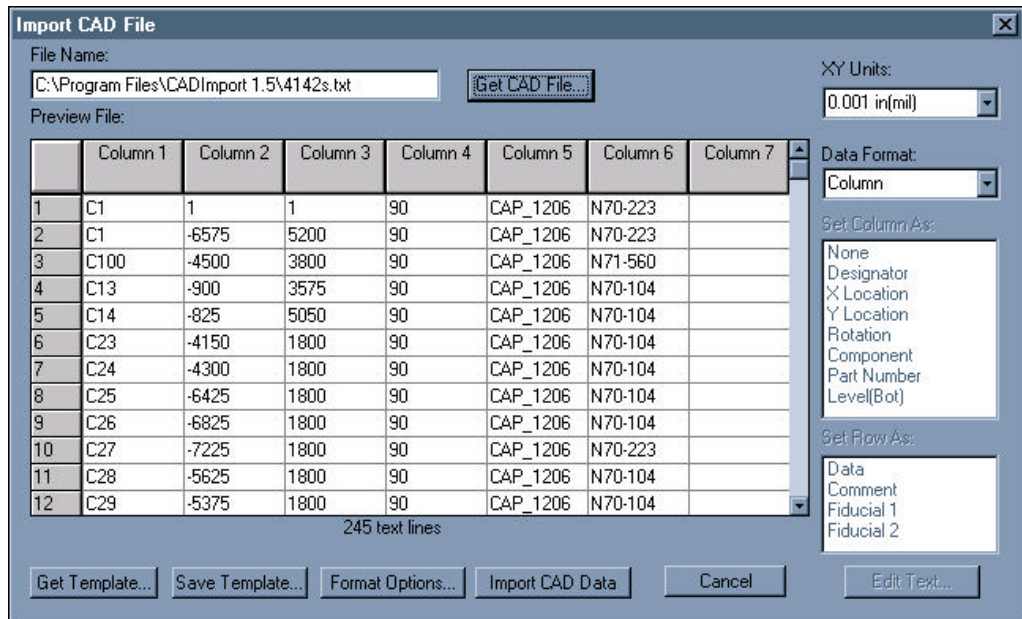


Figure 3-1 Import CAD File Dialog Box

3. Click Get CAD File.
 - ▶ A directory box appears.
4. Browse through the directory to locate the desired CAD file, select it, and click Open.
 - ▶ The CAD data appears in the window formatted into columns of ASCII characters separated by the delineator.
5. Click on the Column 1 heading so that the column is highlighted.

6. In the Set Column As box, select the data type for Column 1.
7. Repeat Steps 5 and 6 for the remaining columns of data.
8. If it is necessary to change the units of measurement of the data, click on the column heading to highlight the column.
 - ▶ The unit of measurement should be the same as the one used by the CAD designer to create the file.
 - ▶ The unit appearing in the XY Units box when the data initially appears does not necessarily apply to the data; it is a default unit.
9. In the XY Units box, select the unit of measurement to be applied to the data.
 - ▶ The data will not change until you perform Step 10.
10. Click Import CAD Data.
 - ▶ The Component (Adhesive or Solder Paste) View screen appears. A Component list appears on the left of the screen, indicating the attributes associated with each component. A representation of the board with the component pattern is shown on the right. The data origin is marked by a +. Note that this representation is 5% larger than actual size.
 - ▶ The Status Line indicates the number of components and the current cursor location is indicated to the far left in XY coordinates.

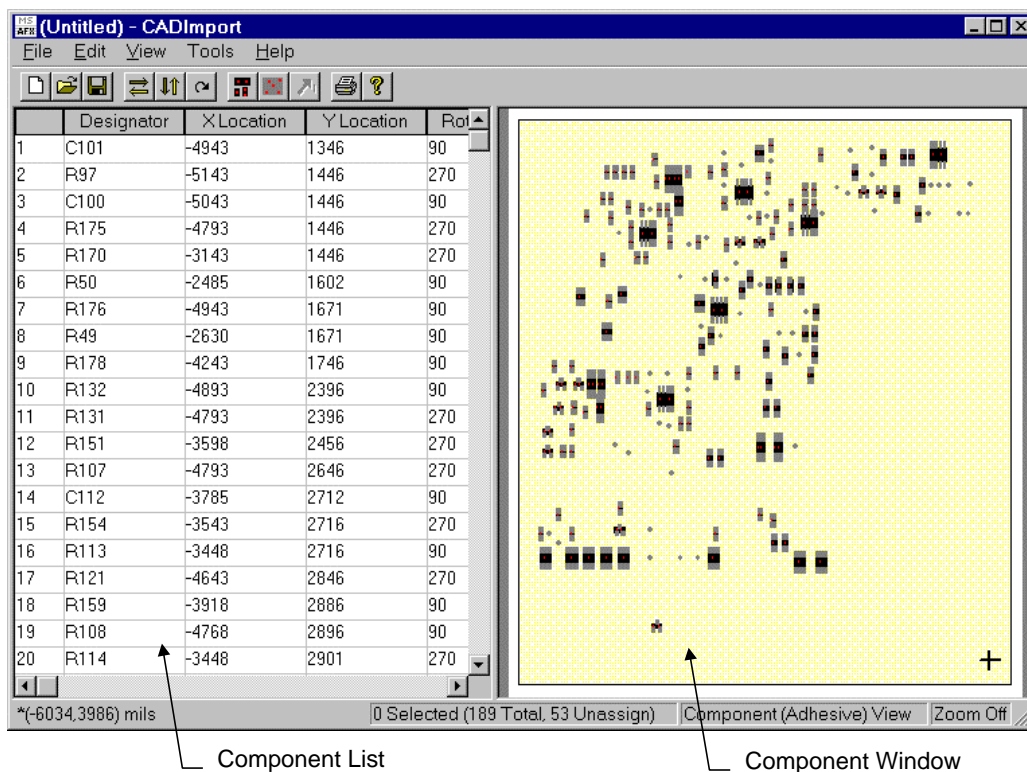


Figure 3-2 Component View Screen

11. To change a component type, select **View Type** under the **View** menu.
 - ▶ If the component type is correct, skip to Step 18.
12. From the drop-down menu, select **Component**.
13. From the **Edit** menu, choose either **Select All** (to change the type for all components) or **Select By Names** (to change only one type of component).
14. From the **Edit** menu, choose **Edit Selected**.
 - ▶ The **Component Properties** box appears.

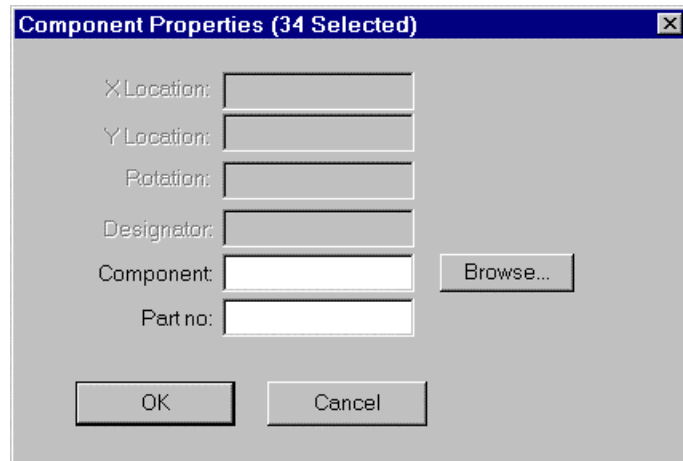


Figure 3-3 Component Properties Box

15. Click **Browse**.
 - ▶ The **Select Component** box appears.

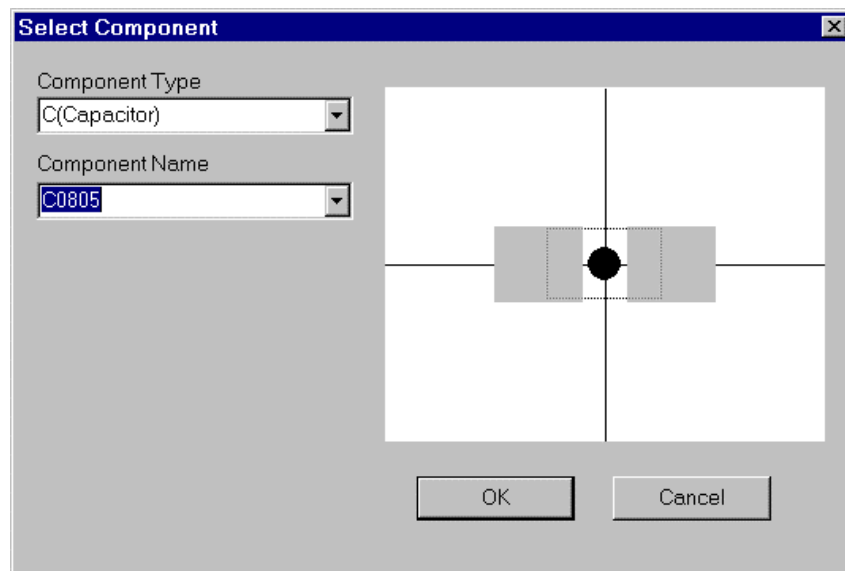


Figure 3-4 Select Component Box

16. Click on the arrow to the right of Component Type, and scroll through the Component Type list to select the component type that most closely matches the one you need.
17. Click OK.
 - ▶ The component type is changed.
18. Select View Type from the View menu.
19. From the drop-down menu, select Dot.
 - ▶ Alternatively, you can click on the View Dot button.
 - ▶ You are now provided with a full-screen view of the workpiece, with lines representing the pattern. You can select areas on the workpiece to program in the pattern. Each area changes color as it is selected.

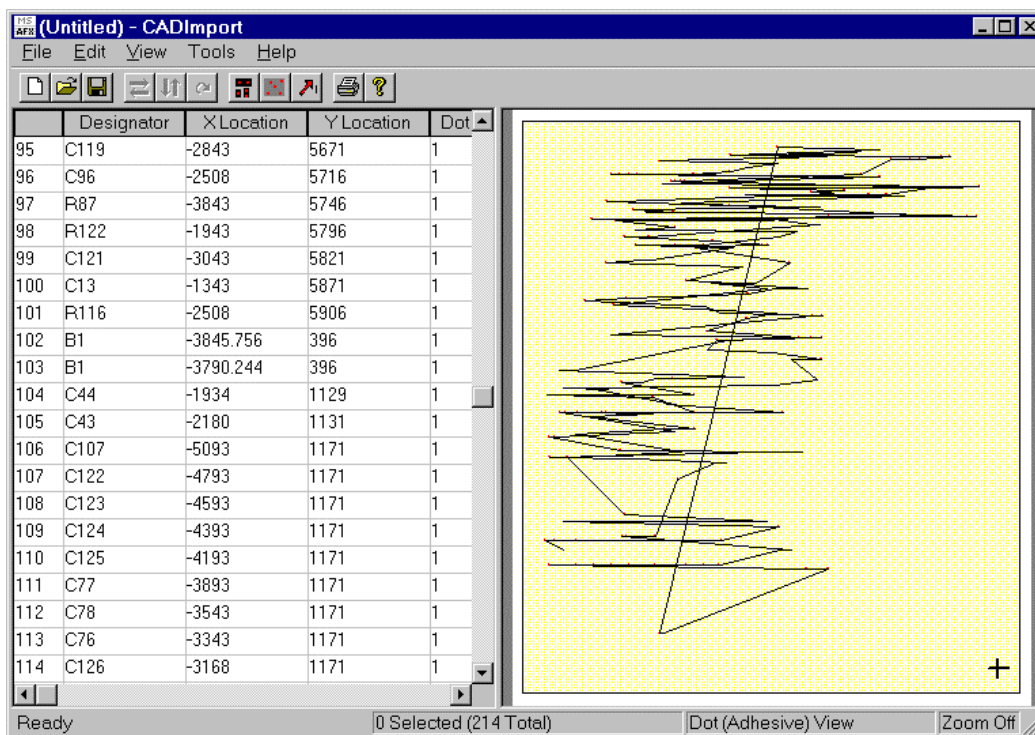


Figure 3-5 Dot View

20. From the Tools menu, select Optimize Path.
 - ▶ The Optimize Path box appears.
21. Click Optimize.
22. The system attempts to create the shortest possible path between the dots.

23. To edit the pattern, double left-click on the dot location in the component list or right-click on the dot within the pattern (on the right side of the screen).
 - ▶ If you right-click on a dot, select **Edit Selected** from the drop-down menu.
 - ▶ The **Dot Properties** box appears. You can now change the dot location, the order in which it is inserted into the pattern (**Insertion Order**), and dot type.

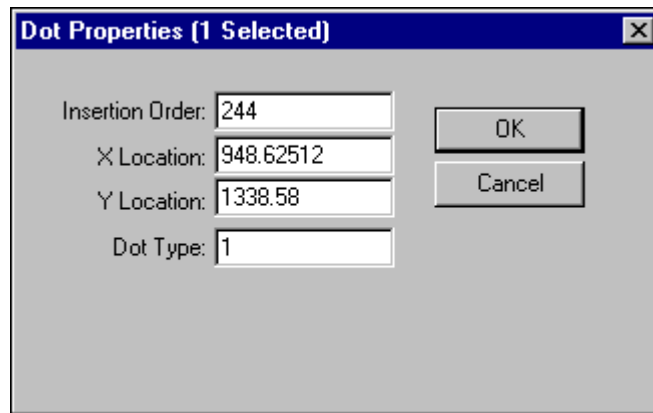



Figure 3-6 Dot Properties Box

24. From the **File** menu, select **Save As Fluidmove File**.
 - ▶ The **Export Fluidmove File** box appears.
25. Select a filename and a directory path, and click **Save**.
 - ▶ Both a **.AVW** and a **.FMC** file are created when you save. Both extensions designate Fluidmove files.
 - ▶ It is best to also save the file as a **.JOB** file, which holds the raw CAD data, for future component or pattern changes. To do this, select **Save As** from the **File** menu, then enter a filename. The **.JOB** extension is applied automatically.

To import the CAD data into Fluidmove:

1. Copy the **.AVW** and **.FMC** files onto a floppy disk.
2. Load the floppy disk into the **A** drive on the dispensing system computer.
3. Copy the **.AVW** and **.FMC** files from the floppy disk into the **Programs Folder** in the **FmNT** root directory.
4. In the **Main Window**, click **Teach a Program**.
5. In the **Programming Window**, click on **File** on the menu bar, and select **Open CAD Import File**.
 - ▶ A dialog box opens in which you can browse the directory and find the **.FMC** file you loaded earlier in this procedure.

6. Locate the desired .FMC file and click *Open*.
 - ▶ A message box opens indicating that a board must be loaded for the next step and asks you if you need to load a board.
7. Place a board at the mouth of the conveyor. Adjust conveyor width, if necessary.
8. Click *Yes*.
 -  The conveyor will move after your response.
 - ▶ The board is automatically conveyed into the dispense zone and clamped in place.
 - ▶ A Teach Window opens asking you to Teach the Workpiece Origin.
9. Use the Position Controls in the Teach Window to move the dispensing head to the Workpiece Origin. Center the camera crosshairs over the location.
10. Click *Teach*.
 - ▶ The Teach Window closes. A message box opens stating that the CAD Import process is complete. It also states that if you notice incorrect positioning during fiducial findings, adjust the “Do Workpiece AT” instruction. And if you notice incorrect positioning during dot dispensing, adjust the “Do Panel AT” instruction.
11. In the Programming Window, double click on the **Do Panel AT** command line.
 - ▶ A Teach Window opens asking you to Teach Fid 1 Manually.
12. Use the Position Controls in the Teach Window to move the dispensing head to the location of the first fiducial. Center the camera crosshairs over the location.
13. Click *Teach*.
 - ▶ You are asked to Teach Fid 2 Manually.
14. Use the Position Controls in the Teach Window to move the dispensing head to the location of the second fiducial. Center the camera crosshairs over the location.
15. Click *Teach*.
16. Click *Done*.
17. Select *Save* from the File menu, and name the file.
 - ▶ Make sure that your filename is different from the one already on the floppy disk.
 - ▶ You have now saved the file as a program containing only the workpiece origin and two fiducials.
18. Select *Save* from the File menu.

Formatting the Data into Columns

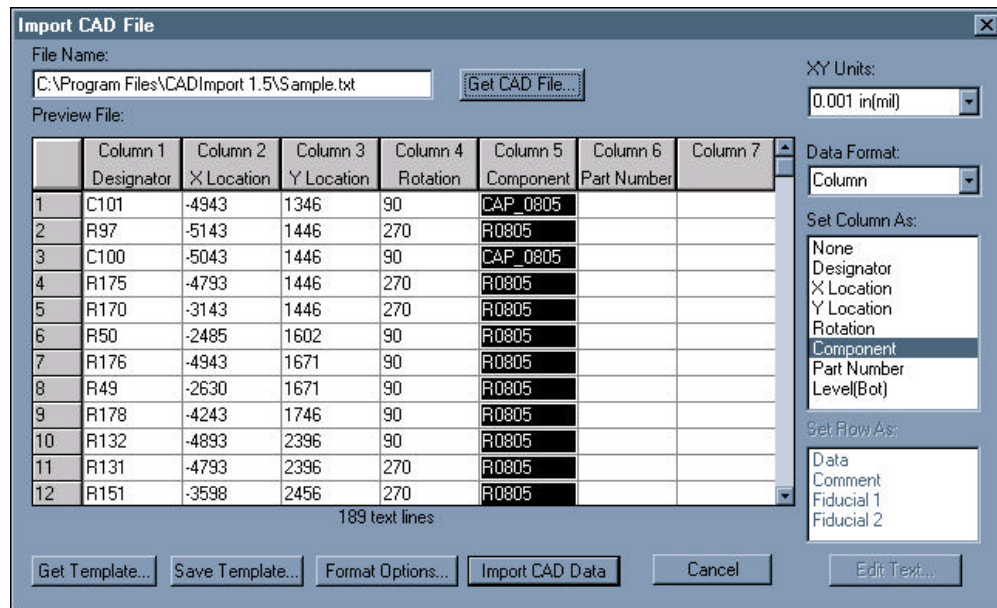


Figure 3-7 Column Heading Selected

CADImport accommodates two column formats for presenting imported CAD data: Delimited Column and Fixed Format. The Data Format drop-down menu allows you to select the format. If you are designing your own program to generate CAD files or if you are using an application that allows you to define the data format, we recommend that you use the Delimited Column format. Each format provides specific options, which are described in the following pages. Definitions and guidelines for both formats are listed below.

Delimited column format files

Columns of data are separated by delimiters.

- The file must contain a consistent number of data items per line with no missing data, separated by a comma, space or other character (the delimiter).
- Data items may occur in any sequence.
- There is no restriction on the position and length of data items.

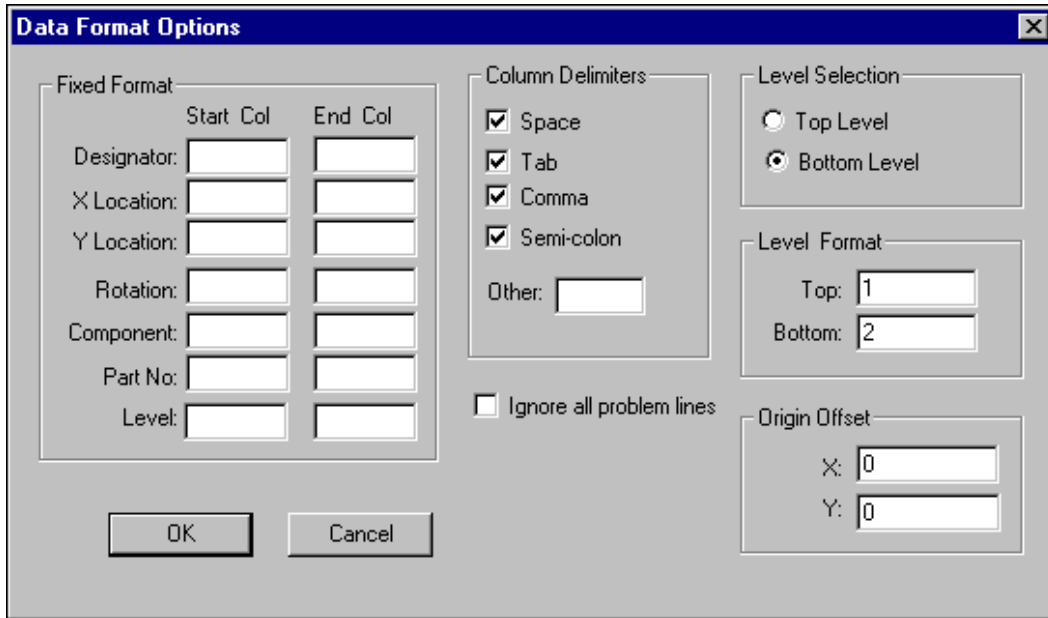
Fixed format files

Each data type starts and ends at a specified character position on the row of data. You click Data Format Options, then use the Fixed Format options in the Data Format Options box to set the starting and ending positions of the columns for each data type.

- Files may contain missing data or an inconsistent number of data items per line.
- Data items may occur in any sequence
- Data items must occur at a fixed position in each row; there are no delimiters.

Data Format Options

The Data Format Options box appears when you click the Data Format Options button in the Import CAD File box.



The screenshot shows the 'Data Format Options' dialog box with the following settings:

- Fixed Format:** A table with two columns: 'Start Col' and 'End Col'. The rows are: Designator, X Location, Y Location, Rotation, Component, Part No., and Level. All cells are empty.
- Column Delimiters:** Space, Tab, Comma, Semi-colon. Other: []
- Level Selection:** Top Level, Bottom Level
- Level Format:** Top: [1], Bottom: [2]
- Ignore all problem lines:**
- Origin Offset:** X: [0], Y: [0]

Buttons: OK, Cancel

Figure 3-8 Data Format Options Box

The options in this box that you will use depend on your Data Format selection (Delimited Column or Fixed). For Delimited Column, you will select Column Delimiters. For Fixed format columns, you will set the Start Col and End Col. These options are described in detail in the following pages.

The Level Selection, Level Format, Ignore all problem lines and Origin Offset options are applicable to both Delimited Column and Fixed format data format options. These features are discussed later in this section.

Delimited Column Format

You can use the Delimited Column format if your file contains a consistent number of data items per line. To use this option, you must set the Data Format box to Column in the Import CAD File dialog box (see Figure 3-7). You will use the Set Column As option to assign a data type to each data item (this procedure is described in detail in “To Assign a Data Type to a Column,” later in this section). You will then separate the data items with a comma, space or other character(s). The column headings can appear in any order. Unassigned columns are ignored when the file is read.

When you click Data Format Options, the Data Format Options dialogue box appears (see Figure 3-8), allowing you to set the column delimiters. Space, Tab, Comma and Semi-colon are all selected as the default delimiters. The delimiter(s) you select should correspond to the one(s) to separate the data in the original CAD file; deselect those that are unnecessary. Make an entry in the Other box if you wish to specify a different delimiter from those shown below. When you have indicated the desired delimiters, click OK.

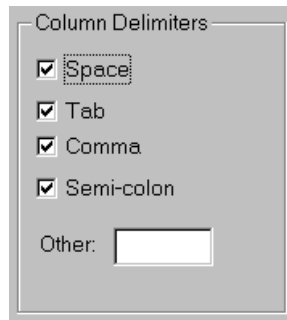


Figure 3-9 Column Delimiters

When you import the data using the Delimited Column format, CADImport scans the entire data line for each component, extracts data items between delimiters, and assigns data types according to your selection in the Set Column As box. In a Delimited Column format, data items may occur in any sequence and, unlike the Fixed format, there are no restrictions on the position and length of the data.

You may choose more than one delimiter type. If you do, all characters of the types you select will be treated as delimiters when the file is read by CADImport. In the example below, both comma and space have been selected as delimiters.

C1,	1000,	1200,	90,	C1206
Designator	Xlocation	Ylocation	Rotation	Component

For a file with the following data, you should select both the space and comma delimiters, since both have been used to separate data in this file.

```
C1  1000,2000  90 C1206
C2   500,150   90 R1206
```

This data could also occur as:

```
C1;1000;1200;90;C1206
```

where semi-colon has been chosen as the only delimiter.

If the data in your original file is separated by a delimiter that is not on the list, such as a colon, you should enter it in the **Other** field under **Column Delimiters** in the **Data Format Options** box. CADImport will use a colon to separate the data items and will read the file correctly.

```
C1:1000:2000:90:C1206
C2:500:150:90:R1206
etc
```

Fixed Format Files

The Fixed data format offers a different way to break up the information within files. Each data type occupies a defined position on the line of data and within the file. Columns of data items are separated by specific numbers of spaces that you indicate within the Data Format Options feature instead of by delimiters.

Within the Data Format Options box, define the Start Col and End Col positions for each data type (under Fixed Format Options). You must first analyze your data to determine the starting and ending positions of the columns for each data type. The Start Col and End Col fields refer to the character position in the row of data at which each column begins and ends.

In the example below, the designator starts at position 1 and ends at position 3 along the row of data, since there are three characters in the longest item in the column. Notice that the data may fill the space allocated for the three character positions, but may be shorter. The next defined column, the Xlocation field, starts at 8 and ends at 11. The Ylocation starts at 14 and ends at 17. Note that several character positions are skipped in between columns of data. The skipped positions separate the columns.

Data Items

C1	1000	3000	90	CAP1206
C23	2000	3500	0	RES1206
C3	2500	5600	90	CAP5026

123456789012345678901234567890123

Character Positions on the Row of Data

Fixed Format

	Start Col	End Col
Designator:	1	3
X Location:	8	11
Y Location:	14	17
Rotation:	21	22
Component:	27	33
Part No:		
Level:		

Fixed Format Options Portion of Data Format Options Box

For files with missing data or an inconsistent number of data items per line you *must* use the Fixed Format to allow CADImport to extract the data items for each component. The example below requires use of the Fixed Format feature.

C1	1000	2000	90		CAP1206
C23	2000	3000	0	X1	RES1206
C3	2500	4000	90	X2	CAP5026

missing data ↘

When you import a file and set the Data Format to Fixed Format, the column headings are automatically set as shown below.

Table 3-1 Preset Fixed Format Column Headings

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Designator	X Location	Y Location	Rotation	Component	Part No	Level

Unassigned columns are ignored when the file is read. In the example below, the Component and Level data types were not assigned to the file. Therefore, they do not appear.

C1	1000	2000	90	C1206
C2	1500	3000	90	C1206
C3	2500	3500	180	R5026

Designator	Xlocation	Ylocation	Rotation	Part Number
Col 1 - 2	Col 10 - 13	Col 18 - 21	Col 28 - 30	Col 35 - 39

In the example below, the Part No and Level data types were not assigned, so you should not make entries in the Start Col and End Col fields for these data types. Note that the Designator contains three characters in the largest item (C23). Therefore, it occupies positions 1 through 3. The XLocation occupies four characters, from 8 to 11, and so on.

	<i>Designator</i>		<i>XLocation</i>		<i>YLocation</i>		<i>Rotation</i>		<i>Component</i>
	C1	1000	90	CAP1206	3000				
	C23	2000	0	RES1206	3500				
	C3	2500	90	CAP5026	5600				
	123456789012345678901234567890123								

Fixed Format		Start Col	End Col
Designator:	1	3	
XLocation:	8	11	
Y Location:	30	33	
Rotation:	15	16	
Component:	21	27	
Part No:			
Level:			

Options That Apply to Both Data Formats

The Level Selection, Level Format, and Ignore all problem lines options in the Data Format box can be used for both Delimited Column and Fixed format files. Level Selection and Level Format are used in conjunction with each other and allow you to define the side of the board from which the data should be taken when the data file has components on both sides of a board. Ignore all problem lines is useful for files with extraneous comments or data that is unrelated to component data values. These options are described in detail in the following pages.

Setting the Level Format and Level Selection

Level Selection and Level Format should be used when the data file contains components on both the top and bottom levels of the board.

Since the resulting FMC file should contain components for one level only, CADImport must read in the data for one level at a time. Level Selection indicates to CADImport whether the top or bottom level of components should be read from the original CAD file.



NOTE You do not need to use these options for CAD data files with components on only one level.

Since these options apply to both data formats, you must use a separate procedure for each when setting the level selection and format. You must define the columns as follows:

Column format files	Select the column and choose Level from the Set Column As option list
Fixed format files	Set the Data Format Options: Level Start and End columns

To set the Level Format and Level Selection:

The Level Selection option acts as a filter when the raw CAD data is imported, only displaying the components that correspond to the side of the board you have selected. You must first use the Level Format option to identify indicators for the top and bottom sides of the board. You then select the side of the board to be read. Follow the procedure below. An example follows this procedure.

1. Retrieve the data file by clicking on *Get CAD Data*.
2. When the directory box opens, browse through the directory to locate the desired CAD file, select it, and click *Open*.
 - ▶ The CAD data appears in the window formatted into columns of ASCII characters separated by the delineator.
3. Click on the column heading for the column that contains the board side information.
 - ▶ This column of data contains only two instances of varying data (for example, TOP and BOT or A and B); these are the level formats (described later).
4. In the *Set Column As List*, choose *Level*.
 - ▶ Either *Level (Top)* or *Level (Bot)* is OK at this point in the procedure.
5. Click *Data Format Options*.
6. Under *Level Selection*, indicate *Top Level* or *Bottom Level*, depending on the side of the board from which you will be extracting data.

7. In the Level Format boxes, enter an indicator for each side of the board, based on those used in the original file.
 - ▶ The level identifiers can be up to 12 characters long.
 - ▶ If you are unsure which indicators are used, refer to the column of data that contains only two instances of varying data, which you selected in Step 3 (for example, TOP and BOT or A and B); these are the level formats.
8. Click OK.
 - ▶ The column heading now reflects the board level from which you have selected components to be read by CADImport.

In this example, rows 1, 2 and 4 are located on the bottom of the board (indicator = BOT). Rows 3 and 5 are on the top (indicator = TOP). If you had selected bottom as the Level Selection in Step 5 of the previous procedure, only those rows of data with the indicator BOT would be read when the data is imported.

C1	1000	2000	90	C1206	BOT
C2	1500	3000	90	C1206	BOT
P1	1000	2500	0	PLC160	TOP
C3	2500	3500	180	R5026	BOT
P2	3000	5000	0	LC160	TOP

Activating the Ignore all problem lines option

The Ignore all problem lines option can be used for either Column or Fixed format files that have numerous comments or extraneous data that is not related to component data values.

Usually when you click Import CAD Data, CADImport scans through each line in the file checking for errors. When irregular or missing data is detected, CADImport stops and reports the row number and error type for each problem.

When you check the Ignore all problem lines option, CADImport ignores any line that can not be correctly interpreted as data. CADImport continues reading the file without issuing any warnings.

1	C1	1000	2000	90	C1206
2	-----				
3	C2	1500	3000	90	C1206
4	-----				
5	C3	2500	3500	180	R5026
6	-----				

In the example above, CADImport would normally report an error on Rows 2, 4, 6, etc. You could use Set Row As to mark each of these lines as a Comment, but that approach could prove time consuming for a large file. Checking the Ignore all problem lines option allows CADImport to automatically skip these lines.

Origin Offsets

Origin Offsets is an X,Y coordinate value applied to each component so that the CAD file is centered on the screen. Figure 3-10 below is an example of a CAD file *without* Origin Offset applied. Notice the location of the pattern. Figure 3-11 shows the same CAD file *with* Origin Offset applied. In Figure 3-11, the Origin Offset of (-324,-189), changes the coordinates of the first component from (324,189) to (0,0), centering the pattern on the screen. You can also modify the Origin Offset within FMW or FmNT by adjusting the X,Y coordinates of the “Do Panel” pattern.

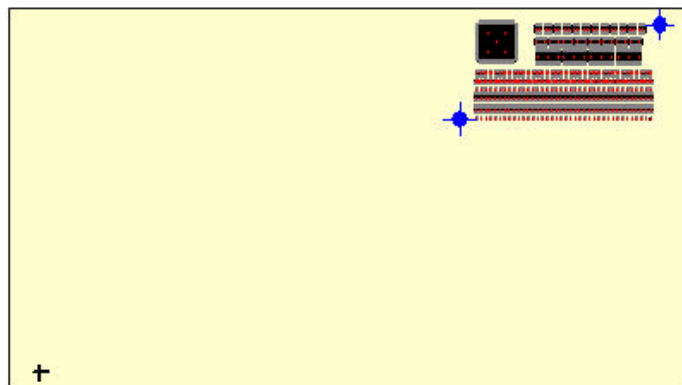
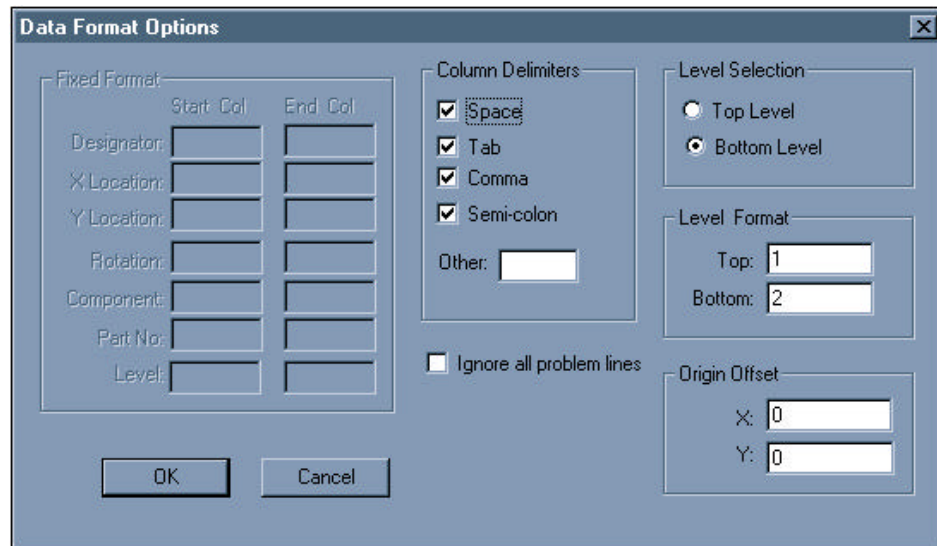


Figure 3-10 Origin Offset Not Applied

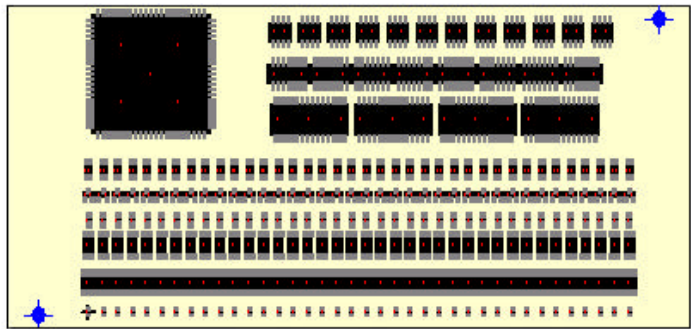
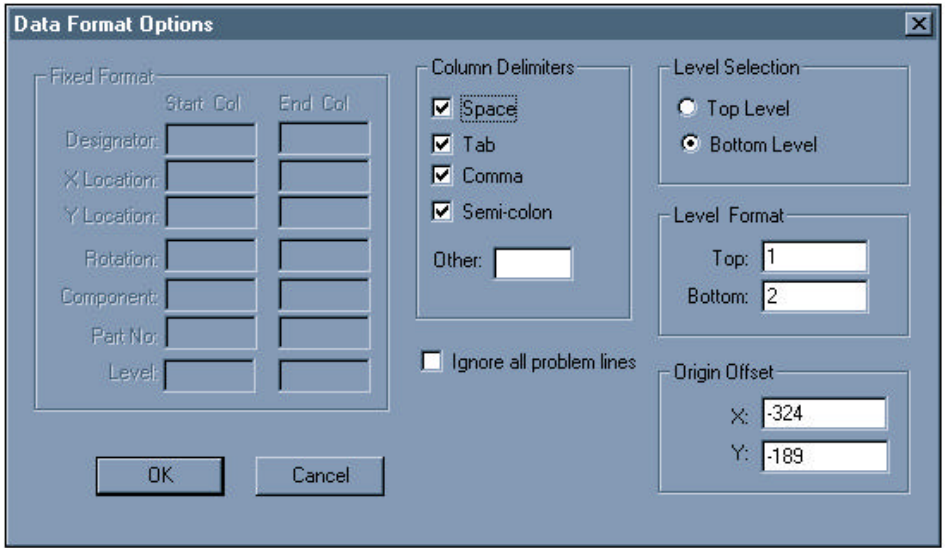


Figure 3-11 Origin Offset Applied

Column Data Types

Once you have determined the column format of the imported data, you must assign a data type to each column. The Set Column As option allows you to assign data types to each column of CAD data in a file with a Delimited Column format.

To use this option, Data Format must be set to Column. This procedure is not necessary for data in a Fixed Format file, as data types are predefined for this format.

To assign a data type to each column:

1. Click on the column heading you will be defining so that the column is highlighted.
2. In the Set Column As list, choose the data type.
3. You may now select from the following data types for the remaining columns.

Table 3-2 Available Data Types

Set Column As:	Definition:
None	CADImport will ignore the selected data column. Use this option to skip a column of data or to de-select a previously assigned column.
Designator	A unique label for that location on the board
X Location, Y Location	The centroid (center point) location of the component (see the Coordinate System section in the About CAD Files section for more details.)
Rotation	Orientation of the component on the board (0, 90, 180, or 270 degrees)
Component	Identifier for the type of component
Part Number (optional)	Component manufacturer's part number for internal reference
Level	A flag to indicate the top or bottom level of the board for files with components on both levels. See the Data Format Options dialog Level Selection and Level Format options for more information on using this flag.

Rows Marked as Comments or Fiducial Locations

Use the Set Row As option in the CADImport dialog box to mark a particular row as a comment or fiducial location. You may use this option in conjunction with both Column and Fixed format files.

To mark a row as a comment or fiducial location:

1. Click on the row or rows of data you will be marking in the CADImport dialog box.
 - ▶ To select a single row click the row number (1, 2, etc.). For a block of rows, click the first row number, hold down the shift key and click the last row number.
2. Choose the row definition from the Set Row As list.
 - ▶ Refer to the table below for available definitions.
3. Follow Steps 1 and 2 for all remaining rows to be assigned.

Table 3-3 Available Row Definitions


Set Row As:	Definition
Data	The default setting for all rows. CADImport reads the row as data. Data lines are displayed in black.
Comment	CADImport ignores comment lines. Comments are displayed in red.
Fiducial 1, Fiducial2	CADImport marks these lines as FID1 or FID2 .

Edit Text

This feature allows you to make editing changes directly to rows of CAD data before you import it (after you have clicked Get CAD File to retrieve the file). This option is only available when you select a row. A dialog box allows you to view and edit the text in the currently selected row. This option is not recommended for files that require extensive changes. It is most useful for minor editing. For files requiring extensive changes, it is advisable to return to the program in which the original CAD file was created and make corrections in that file.

In the sample file below the rotation data is missing from row 5. When CADImport reads this file, it will issue a warning about missing data in this row.

3	C1	1000	2000	CAP1206	90
4	C23	2000	3000	RES1206	0
5	C3	2500	4000	CAP5026	

missing rotation data 

The quickest way to fix this problem is to select Row 5 and use Edit Text to add the rotation data.

Changes made by text editing are preserved during the CADImport session and saved in the *.JOB and *.FMW files you create, but they are not written back to the original CAD file.

Component Mapping to CAD Library Components

When a CAD file is imported, some or all of the component names may not match those in the CADImport Component Library. These components are marked as unassigned. Unassigned components are displayed as gray dots on the Component View screen and in red in the Component List.

In Component View mode, you will typically use the Component Properties box to assign (map) a group of components to a Component type from the CADImport Component Library. You may also use this box to edit the properties for a single component. Additionally, you may change the properties of individual library components. These procedures are explained below.

To map CAD file components to the Component Library:

1. From the View menu, select View Type.
2. Select Component from the drop-down menu.
3. From the Edit menu, choose Select All (for all of the components in your file) or Select by Names (to select specific components only).
 - ▶ If you choose Select by Names, enter the component name in the Component field, and click Select next to the field. The screen will indicate the number of components selected for this name.
4. Click OK to return to the Component View screen.
 - ▶ The selected components will be highlighted in red in the Component List and displayed as green dots on the graphical view.
5. From the Edit menu, choose Edit Selected.
 - ▶ The Component Properties box appears (see Figure 3-12).
 - ▶ If you have selected a single component, you may edit any of the individual component properties in the box. Once you have made your entries, click OK. It is not necessary to continue this procedure to the end for single component editing.
 - Editing X Location or Y Location changes the component location on the board.
 - The Rotation field controls the component orientation on the board.
 - The Part no field is provided for your internal reference.
 - ▶ If you have selected more than one component (a group), you may make entries in the Component and Part no boxes only; the others will be grayed out. You may then map the group to a predefined component type in the Component Library. To do this, go to Step 6. If necessary, you can change the properties for the component type during the mapping procedure. (See Figure 3-13.)

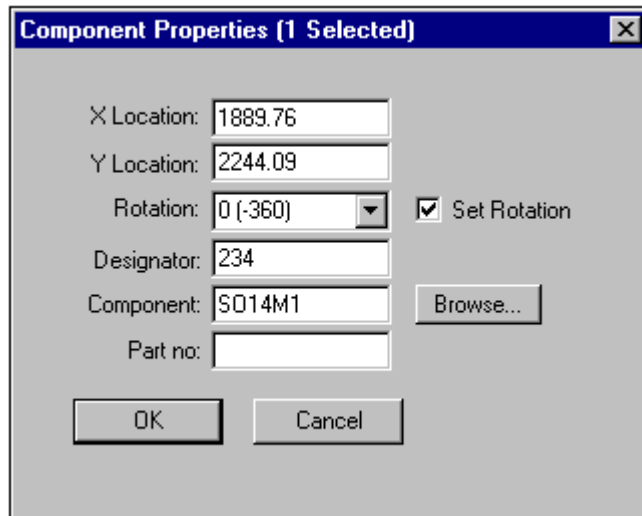


Figure 3-12 Component Properties Box; Single Component Selected

6. Click Browse.
 - ▶ The Select Component box appears. See Figure 3-13.
7. Click the arrow to the right of the Component Type field.

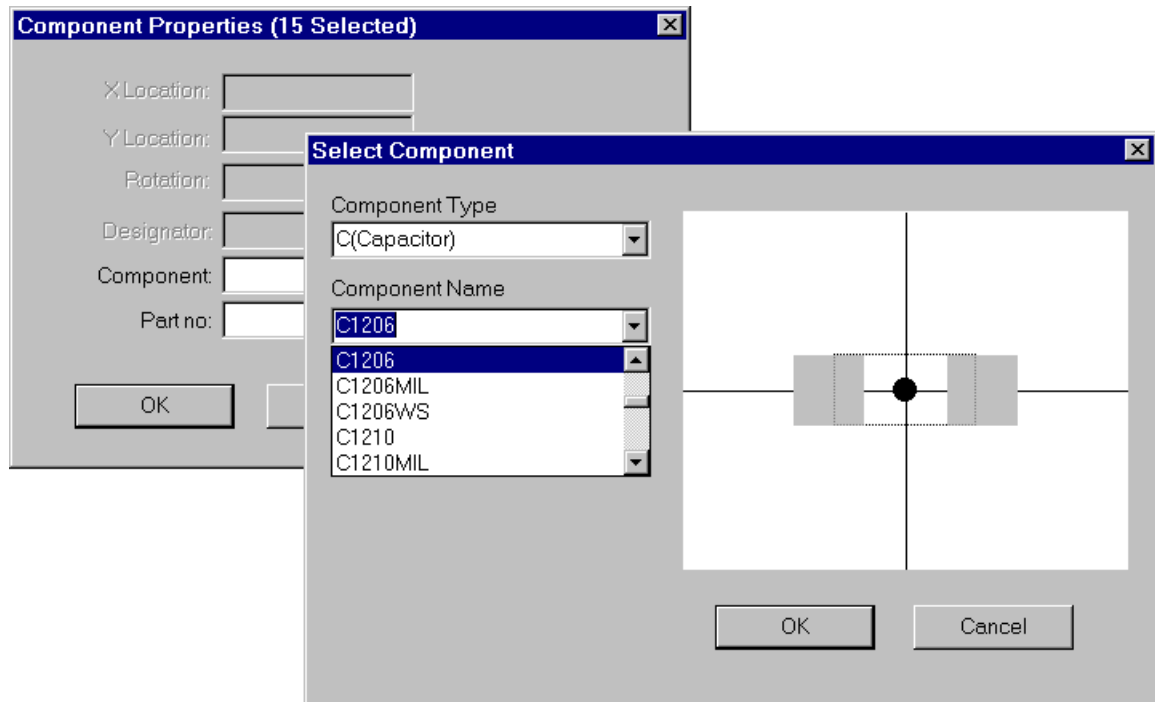


Figure 3-13 Mapping Components to a Library Type

8. Choose the class of components you wish to view from the **Component Type** list.
9. Choose a specific component type from the **Component Name** list.
 - ▶ Choose the component with properties that most closely match those you need. You can change the specific component properties later; see “Changing the Component Properties,” immediately following this procedure.
10. Click **OK**.
 - ▶ The **Component Properties** box reappears. Your component name appears in the **Component** field.
11. Click **OK** to assign all of the selected components to this library component type.
 - ▶ The **Component View** screen reappears.
 - ▶ All previously unassigned components with the component name you selected are redrawn as the chosen library component type in the **Component View** graphic and are listed in black in the **Component List** (meaning that their names are considered valid).
 - ▶ Notice that the number of unassigned components on the **Status Line** has been reduced by the number you have assigned.

Changing Library Component Properties

You can use the Component Properties box (shown below) to change any of the library component properties. Use the following procedure.

To change component properties in the Component Library:

1. Select Component Library from the Tools menu.
 - ▶ The Component Library box appears.
2. Click Properties.
 - ▶ The Component Properties box appears.
3. Make any necessary adjustments to the property fields.
 - ▶ The figure on the following page illustrates the relationship of the component land pattern values in this dialogue box in relation to the actual component.
 - ▶ The Dot Type boxes allow you to determine the dot size and dispensing characteristics such as Valve-On Time, dispense gap, settling time, etc. You may enter any value from 1 through 8. Please refer to the *Fluidmove for Windows NT^a Installation and User Guide* for detailed descriptions on dot types and their associated parameters.
4. When you are satisfied with your new component parameters, click OK.
 - ▶ You may now save the modified component as a new component or use the same name to overwrite the existing component. Refer to the procedures on the following pages for instructions on saving modified components.

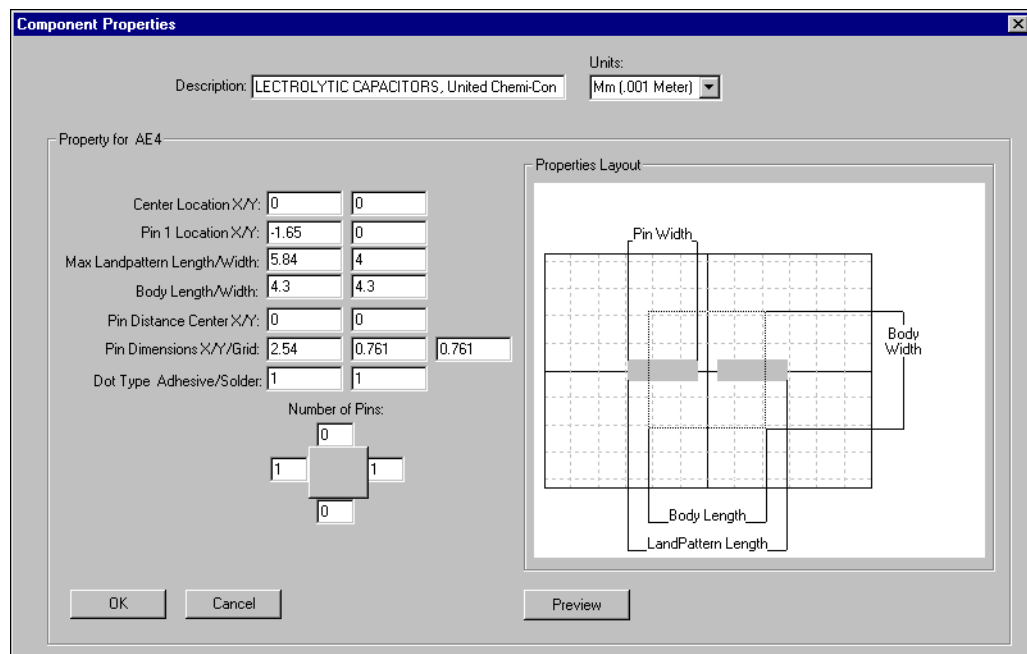


Figure 3-14 Component Properties Box

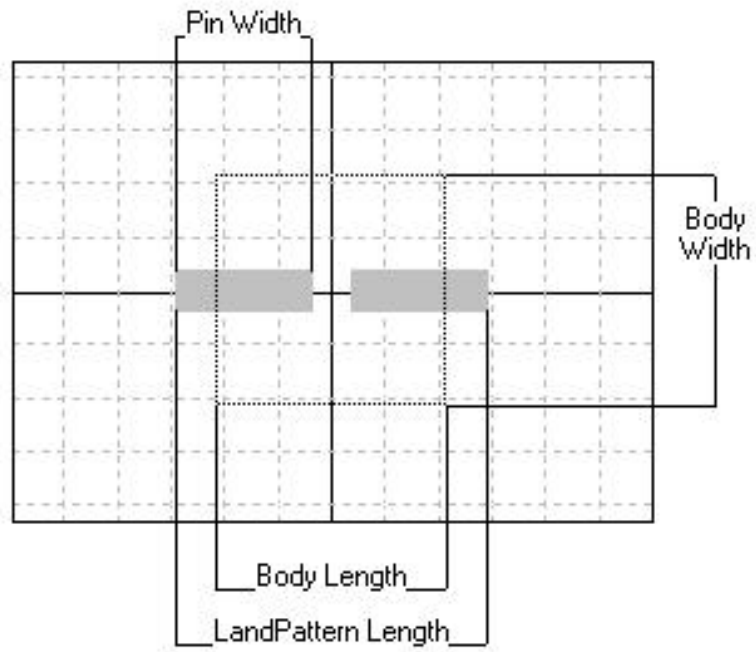


Figure 3-15 Component Properties as They Appear on Actual Component

Saving Modified Components

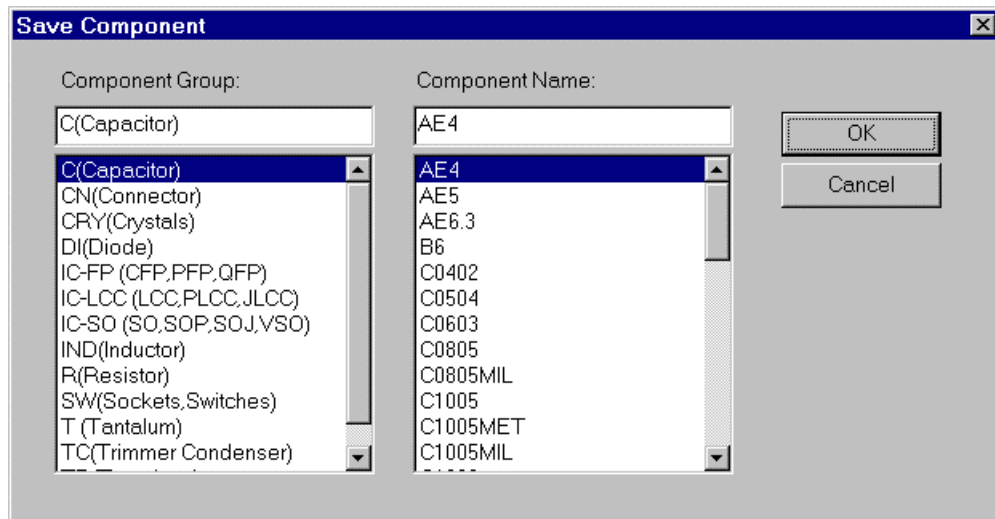


Figure 3-16 Save Component Box

The Save Component box allows you to save modifications to the existing component or to create a new component with these modified properties. Once you are satisfied with the changes you have made to a component selected from the Component Library box or the Properties box, you can save the changes by clicking Save. Clicking on Cancel will undo all changes made to the component.

To create a new component (example):

The example below creates a modified version of the BERG1-8 component from the Connectors component type group to illustrate the procedure.

1. Select Connector from the Component Type list, then select the BERG1-8 Component from the Component Name list.
2. Change the adhesive dot locations in the Dot Locations list as desired.
 - ▶ You could alternately click Properties to change other qualities of this component.
3. To save this modified component, type a new name in the Component Type text box and a new name in the Component Name text box and click OK.

Deleting Components from the Component Library

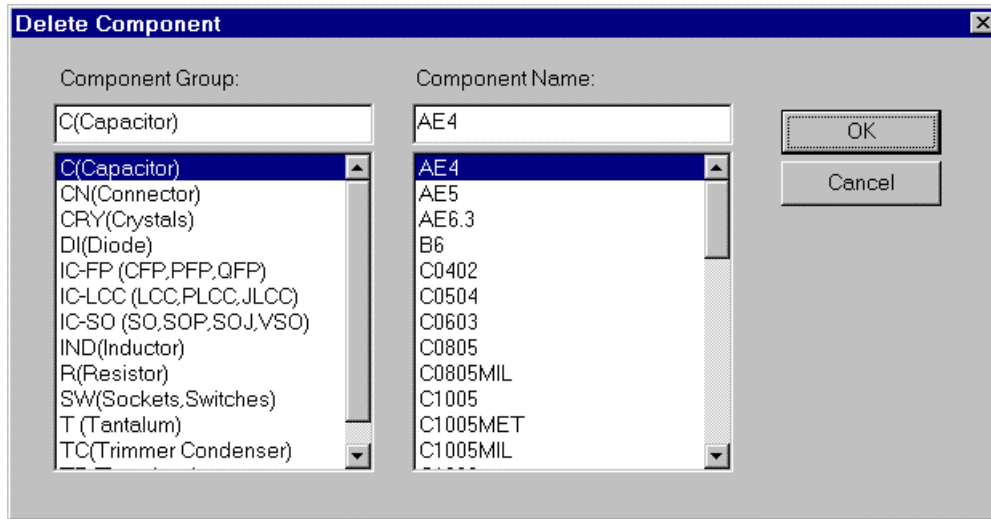


Figure 3-17 Delete Component Box

The Delete Component box allows you to remove unwanted components from the component library. To access this box, click **Delete** in the Component Library box. Use the Component Type and Component Name lists to select the component you want to delete, then click **OK**. The component will be removed from the library.

Editing Dot Locations in the Component Library

The Dot Locations list in the Component Library box displays the XY locations (in mm units) for the selected component. A graphic representation of the selected component appears to the right of the box, depicting the location of dispense dots.

If you know the coordinates of the dot you wish to modify, you can place the cursor into an X or Y location box in the list. The selected dot will appear in green in the component picture. You can then change the coordinates as necessary.

Alternately, you can click on the dot in the picture of the component in the window. If you do this, the corresponding row in the dot list will be highlighted. You can then make changes to the coordinates.

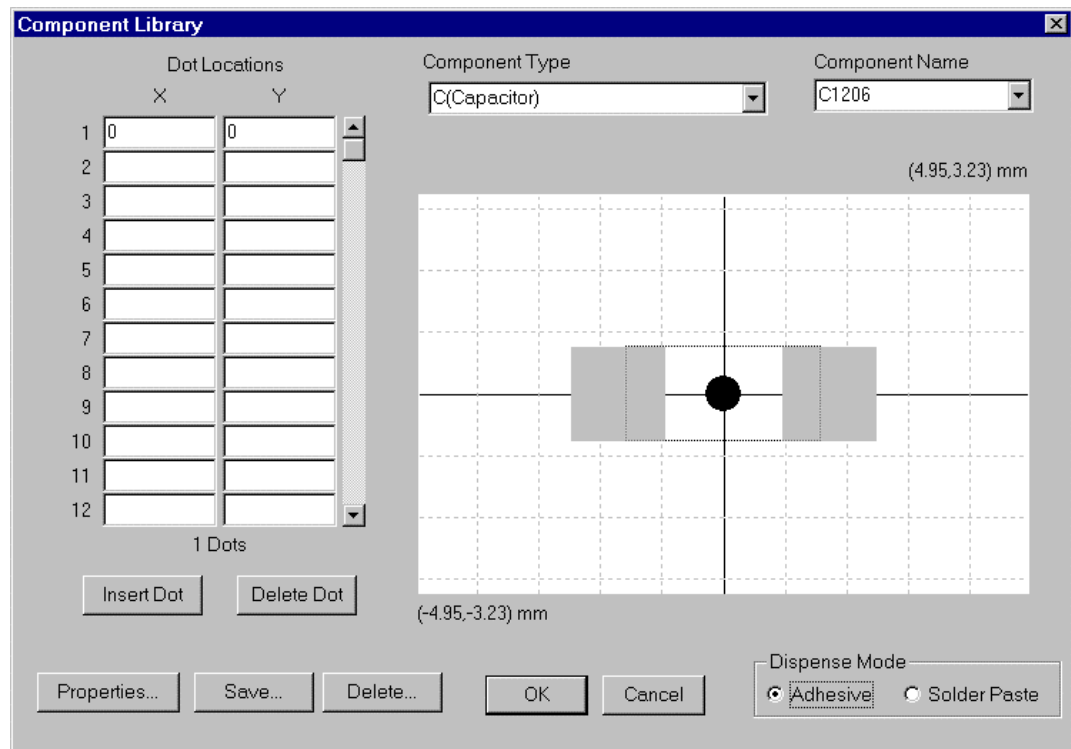


Figure 3-18 Component Library Box

Inserting and Deleting Dots

You can add a new dot to the Dot Locations list by inserting it before the currently selected line. To do this, click on the appropriate X or Y location box, then click **Insert Dot**. An empty row will appear in the list, allowing you to enter new dot coordinate data.

For example, to insert a new dot between rows 5 and 6, click on row 6 to select it. Then click **Insert Dot**. The new empty row will appear between rows 5 and 6. You can now enter the XY Location for the new dot.

To remove any dot from the list, select the dot by clicking on a coordinate in the Dot Locations list or double clicking on the graphic depiction of the dot. Then, click **Delete Dot**.

Laying Out Step and Repeat Boards

The Step and Repeat Boards feature allows you to use a single panel to lay out multiple boards to be printed with the same pattern as your original board. Once you have indicated the desired number of boards for a dispensing panel, you can modify the parameters of each.



NOTE

Once you have designated the panel layout and clicked OK, CADImport generates a new Component List by duplicating the components on the first board to accommodate the number of boards you indicated. Therefore, it is best to make all editing changes on the original (single) board before using the Step and Repeat feature.

To design the panel layout and set specifications:

1. Select Step and Repeat Board from the Tools menu in your Component View screen.
 - ▶ The Step and Repeat Boards screen appears.

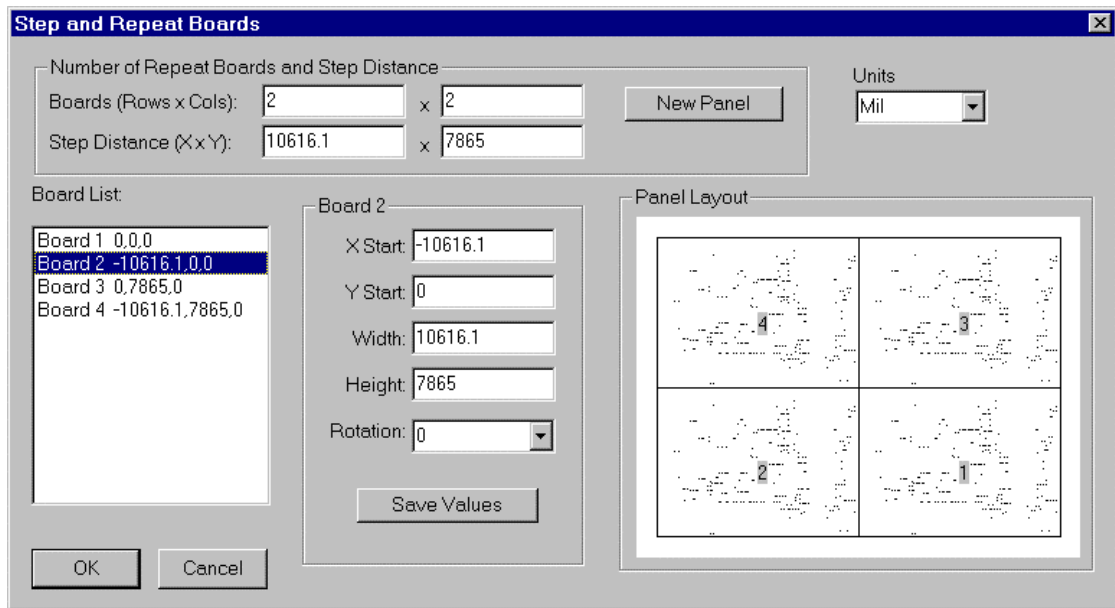


Figure 3-19 The Step and Repeat Boards Screen

2. Indicate the desired number of rows of boards (across) in the first Boards (Rows x Columns) box.
3. Indicate the desired number of columns of boards (down) in the second Boards (Rows x Columns) box.

4. Click on *New Panel* to get a preview of the panel layout you just created.
 - ▶ The step distance parameters are displayed in the *Step Distance (X x Y)* boxes. These dimensions are based on the minimum and maximum location values from the original board. The default step distance is the same as the width and height of the original board. These settings will change to reflect any changes you make to the *XStart* or *YStart* boxes.
 - ▶ The value in the *XStart* box indicates the origin of the pattern on the second board on the X-Axis (row) in relation to the 0,0 pattern origin of the first board.
 - ▶ The value in the *YStart* box indicates the origin of the pattern on the next board on the Y-Axis in relation to the 0, 0 pattern origin on the first board. The boards are equally spaced on the panel.
 - ▶ These pattern origin distances are approximations only; the area of the board displayed onscreen is 5% larger than actual size. Therefore, it is important to measure the actual pattern origin distances by hand if you need to know the exact figures for programming purposes. The distances between the dots in each pattern are, however, accurate.
5. Specify the unit type to be used for the board size and step distance in the *Units* box.
 - ▶ While these coordinates are stored internally in mils, this option allows you to work with any of the coordinate types.
6. The *Board #* list indicates the board number, *XStart*, *YStart* and *Rotation* for each board on the panel. You can change these settings as well as the board *Width* and *Height*.
 - ▶ If you change these values, click on *Save Values* to see a preview of the new board properties in the *Panel Layout* window.
7. When you are satisfied with the settings, click *OK*.
 - ▶ *CADImport* generates a new *Component List* by duplicating the components on the first board to accommodate the number of boards you indicated in the *Boards (Rows x Columns)* setting.
 - ▶ Once the new list has been generated you can use the board orientation buttons (*X mirror*, *Y mirror*, and *Rotation*) to re-orient the entire new panel as needed.

4 Menu and Screen Configurations

This section provides a reference of all features and options available on the CADImport menus. If you are unable to locate an explanation for a menu option in the other sections of this manual, refer here for a description and references to other places where the item is discussed.

The File Menu

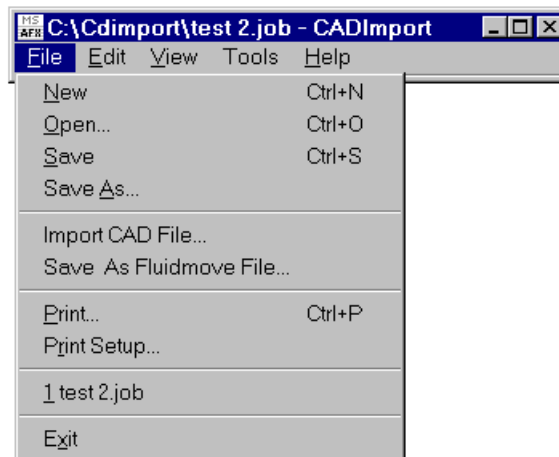


Figure 4-1 File Menu

The File menu provides all of the basic file operations, such as opening, saving and importing. The CADImport system provides various options for accessing and saving your files. These options are described in the following pages.

The New Command

This command begins a new CADImport job. If you are working on another job you will be prompted to save it before starting a new job.

The Open Command

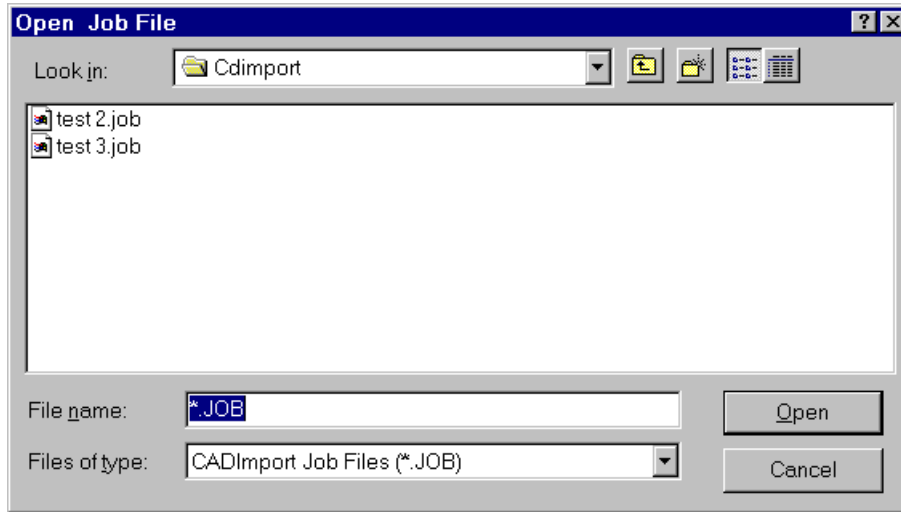


Figure 4-2 Open Job File

This command opens a previously saved CADImport Job file (*.JOB file). Enter the name of the CAD File under File Name in the Open Job File box, (or click Get CAD File in the Import CAD File box) to locate the file in your directory. CAD files usually have a **.TXT** or **.ASC** file name extension. See “File Types” in Section 2 – Working with CAD Data Files for a complete explanation of each file type.

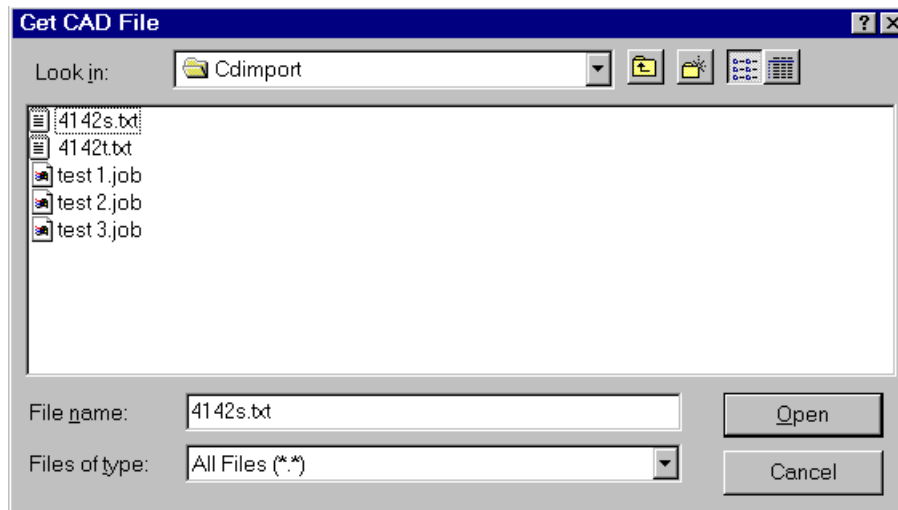


Figure 4-3 Get CAD File

Your currently selected CAD file appears onscreen in the Import CAD File box. The number of lines read from the file appears at the bottom of the screen. If it does not appear as you expect, you may need to change the data format options. You can change the options in the Import CAD File box, described later in this chapter.

The Save and Save As Commands

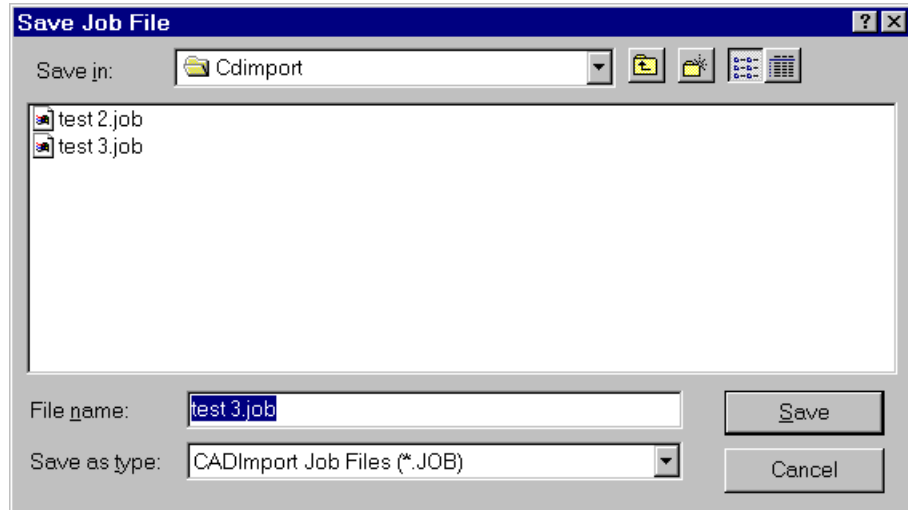


Figure 4-4 Save Job File

This command saves your current work as a CADImport CAD Job file. This file structure includes the Component List and the Dot List information currently in the program.

Import CAD File

The Import CAD File box is the main screen used for setting data conversion parameters. This box appears when you select Import CAD File from the File menu.

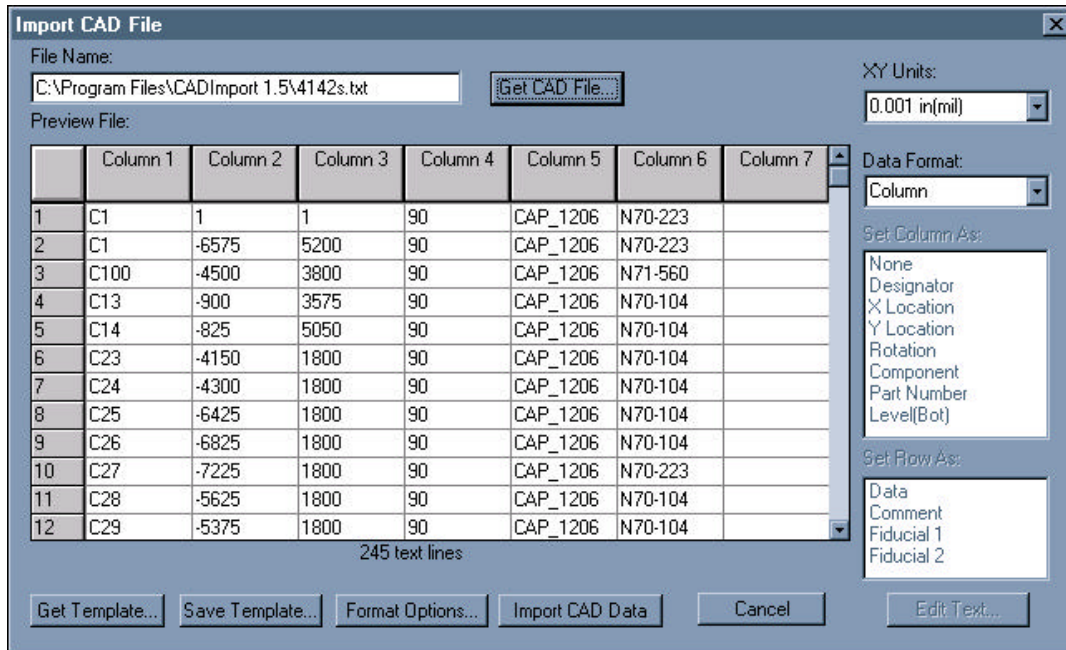


Figure 4-5 The Import CAD File Box

This box allows you to select the raw CAD data file to be imported and to modify the way the data appears onscreen. You can set the units to be used for the XY coordinates, define the format of the data within columns, set the data type for each column, and define rows as comments or fiducials. You can access various data format options, based on your selected column type. All of these options are discussed in detail in Section 1 – System Overview.

Save As Fluidmove File

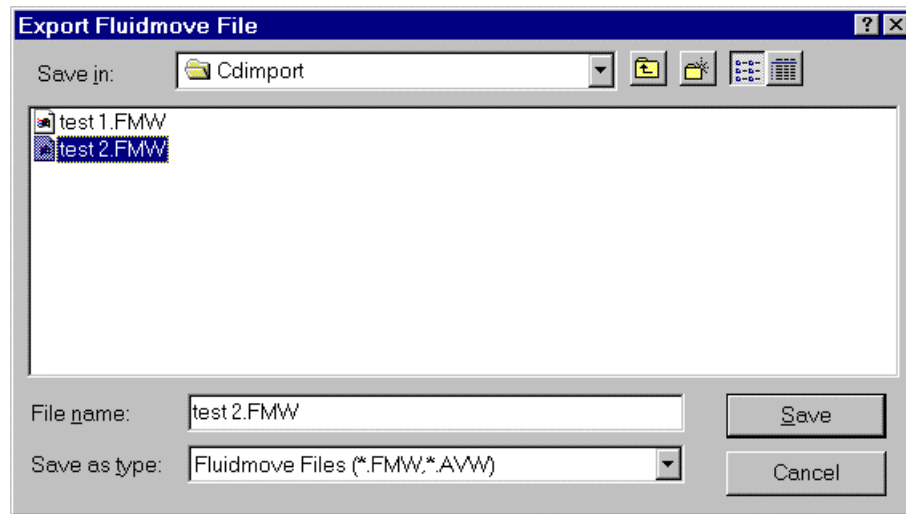


Figure 4-6 Export Fluidmove File

This will be the last step you perform in the CADImport job. You should complete all the steps as described in the Overview chapter.

You can save the job as a Fluidmove file only from Dot View mode. CADImport formats the Dot List information and save it in files that can be used by the Fluidmove program.

This command saves two Fluidmove files: a **.FMW** (for FMW) or a **.FMC** (for FmNT) file and a **.AVW** file. Both files are required by Fluidmove to start the dispense process.

The Print Command

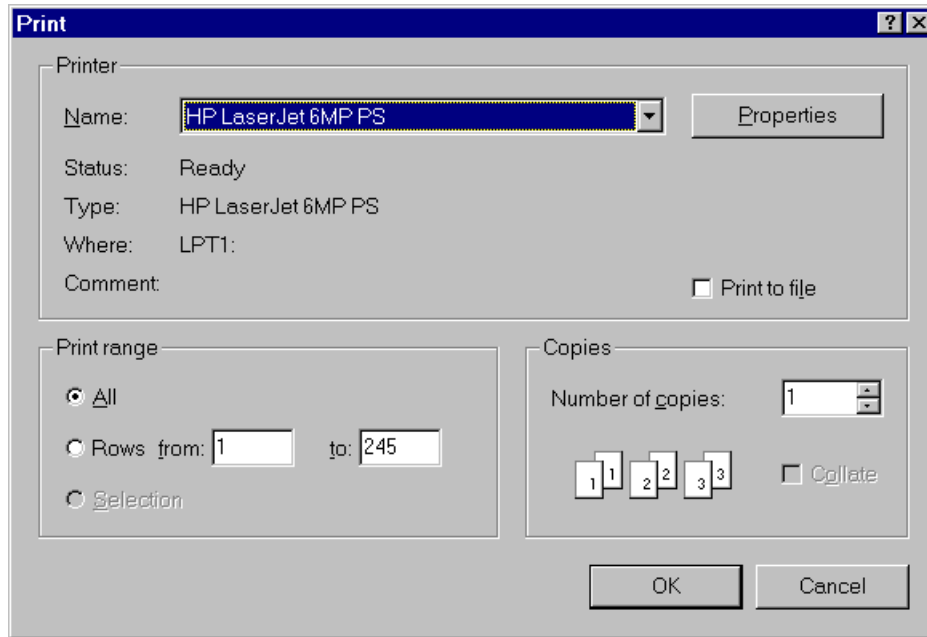


Figure 4-7 Print Command

Use this option to print a copy of your Component List to your current printer.

To choose a different printer, select from the pull-down list under the printer Name field. Click Properties to access the settings for the current printer.

You can optionally create a file on disk formatted for the current printer by enabling Print to file.

Use Print Range to print only selected rows from the file.

Print Setup

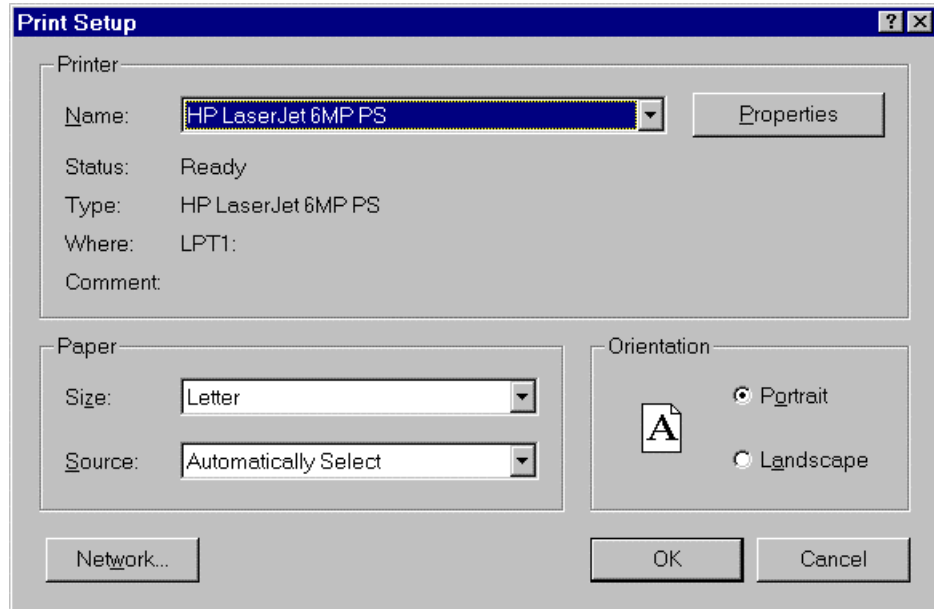


Figure 4-8 Print Setup

You can select a different printer using the Printer Name pull-down list. Click Properties to get access to the printer settings.

The Paper Size and Source lists show all of the options available for your printer. You may also choose to print in Landscape or Portrait Orientation.

The Recently Used File List

This list appears at the bottom of the File menu. It shows the last three CADImport .JOB files you opened. To open a file from the list, click on its name.

The Exit Command

When you exit CADImport you will be prompted to save your work in a CADImport .JOB file if you have not already done so.

The Edit Menu

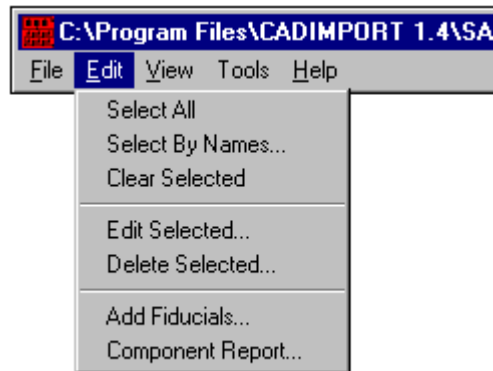


Figure 4-9 Edit Menu

The options on the Edit menu allow you to edit component properties in Component View mode or dot properties in Dot View mode. Refer to “The View menu” (later in this section) for an explanation of view types.

To edit a component or dot, you must first select the component, dot, or group of components or dots to be edited. The Edit menu provides several selection methods, which are described in the following pages. Your editing options depend on the View Type you select.

In Component View mode you can:

- Select a single component and edit its properties (such as location, rotation, designator, library component, and part number)
- Select a group of components that correlate with a specific library component.

In Dot View you can:

- Select a single component and change its properties (such as Dot List Insertion Order, Location or Dot Type)
- Select a group of dots and assign a Dot Type.

Select All

Select All lets you select all the components in the Component List or all the dots in the Dot List.

Select By Names

For component editing you will usually use Select By Names to select components. This is the quickest way to select a group with a common component name or part number. This option is only available in Component View mode and allows you to select a group of components with a particular designator, part number or component label. The procedure below instructs you in using this option.

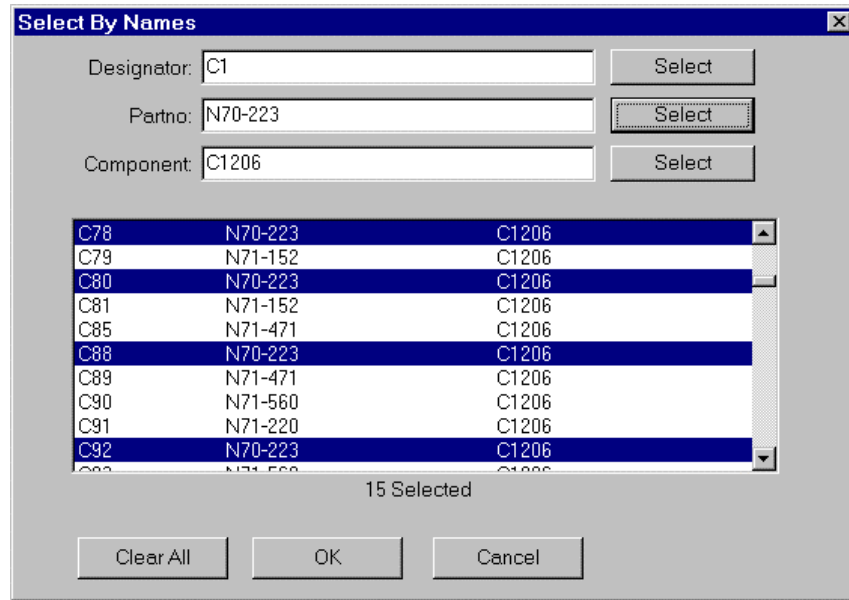


Figure 4-10 Components Selected by Part Number

To select components for editing using the Edit menu options:

1. Enter the designator, part number, or component label you want to match in the corresponding box.
2. Click Select next to the information you entered.
 - ▶ Each newly selected component or group of components is added to those you have already selected. For example if you click Select next to Part no (as shown in Figure 4-10 above), all components with the part number N70-223 will be selected. Then, if you click Select next to Component, all components named C1206 will be selected *in addition* to the first set.
 - ▶ Selected components are plotted in green in the Component View window and highlighted in the Component List.
 - ▶ To clear your current selection, click Clear All.
3. Once you have selected the desired set of components, click OK.
4. Proceed to the instructions for using the Edit Selected option on the Edit menu (later in this section) to assign CADImport library component types or change component properties.

To select individual components or dots for editing:

You can also select individual components from the Component View Window or the Component List. Refer to the chart below for commands.


To select dots instead of components, click on the Dot View button  on the toolbar (or on View; Type; Dot) to switch to the Dot View screen, then use one of the methods described in the table below, substituting “dot” for “component” to select the dots.

Table 4-1 Component and Dot Selection Methods

To select:	From the Component List:
Single component	Click on the row number of the component or double click on it in the Component List.
Adjacent group of components	Click on the row number of the first component. Hold down the Shift key, and click on the row number of the last component to select all components in between.
Non-adjacent group of components	Hold down CTRL and click the row number of each component.
To select:	From the Component View window:
Single component	Place the cursor on the component and click.
Group of components	Hold down Shift and click on the components

Clear Selected

This option clears your current selection. It functions in the same way as the Clear All button, described above.

Edit Selected

Once you have selected a group of components or dots using one of the methods described above, this command allows you to edit your selection. The available options depend on whether you are in Component View mode or Dot View mode. Refer to “View Types” under “The View Menu,” later in this section for a detailed explanation of each mode. The editing options are described in the following pages.

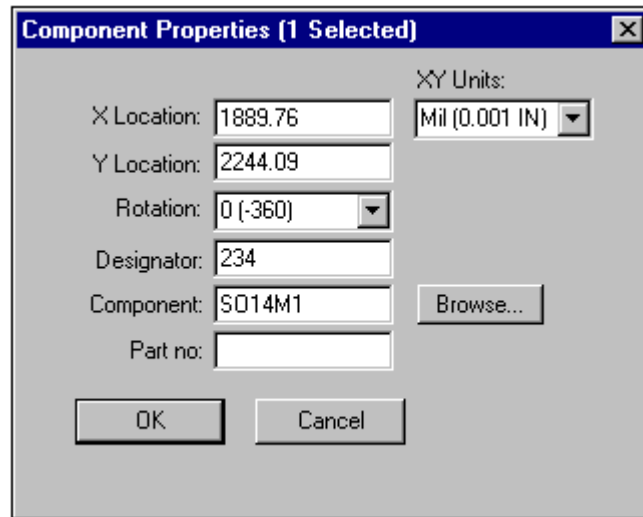


Figure 4-11 Component Properties Dialogue Box – Single Component

Editing a Single Component or a Group of Components

When a CAD file is imported, some or all of the component names may not match names in the component library. These components are marked as unassigned. Unassigned components are represented in the Component View screen by gray dots and by red text in the Component List, on the left side of the screen. In Component View mode, the Component Properties option (for a group or a single component) allows you to assign an unassigned group of components to a predefined CADImport component library type. You can access this option by double-clicking on the image of a component in the Component View screen or on a row of component information. This option also allows you to reassign a group of components you have selected and to change the properties for the group.

You may also edit the properties for a single component. When you select a single component, you may edit any of the properties in the Component Properties box, shown above. These procedures are explained in Section 3 – Importing and Formatting CAD Data.

Editing a single dot or a group of dots:

When you select a single dot, you can edit the Insertion Order, X location, Y Location, and Dot Type.

Insertion Order refers to the sequence in which each dot is dispensed in the Fluidmove pattern. When you change this value, you move the dot up or down in the sequence. Note that the View; Optimize Path option will reorder the dots to achieve the shortest path. If you want to place dots in a particular order you must do so *after* the Optimize Path step

Editing the X Location or Y Location of a dot changes the component location on the board.

The Dot Type controls the size of the dispensed dot. Dot Types are defined as part of the Fluidmove procedure. Refer to the *Fluidmove for Windows NT[®] Installation and User Guide* for detailed descriptions of dot types and their associated parameters.

When you select a group of dots, you may change only the Dot Type.

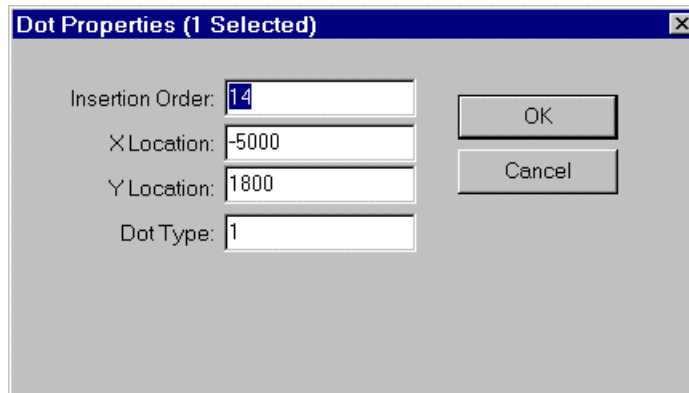


Figure 4-12 Dot Properties Box

Delete Selected

This option removes the selected component from the Component List. Note that unassigned components are not written to the Fluidmove file. This option is useful for removing unwanted components from the list.

Add Fiducials

If you try to save a newly created CAD file that has no fiducials, CADImport prompts you to add them. Use the Add Fiducials feature to add fiducials to files that have none. Clicking on Add Fiducials opens the Add Fiducials dialog box shown in Figure 4-13.

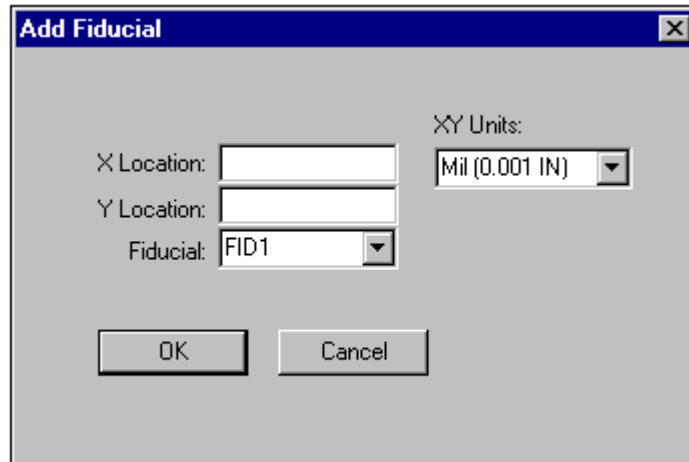


Figure 4-13 Add Fiducials Box

To add fiducials to a CAD file:

1. Type the X coordinate of the fiducial in the X Location text box.
2. Type the Y coordinate of the fiducial in the Y Location text box.
3. Click OK.
 - ▶ FmNT will move the dispensing head to the indicated X,Y Location. A Teach Window opens in which you can adjust the dispensing head position, if necessary.
4. Repeat Steps 1 through 3 for the second fiducial.

Component Report

The Component Report dialog box (shown in) shows a list of all of the components on the board, the number of each component and the total number of all components on the board. This feature is a useful way to check your CADImport data.

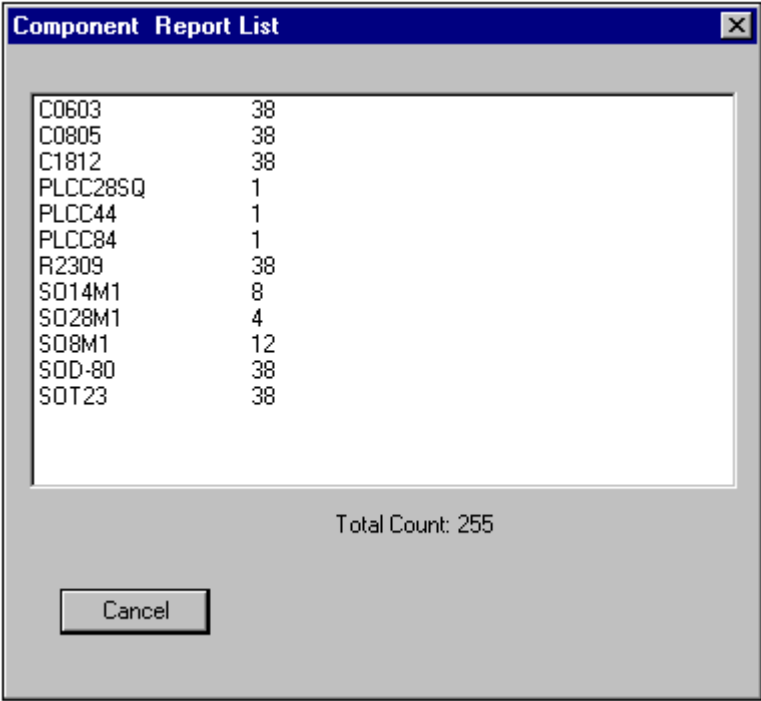


Figure 4-14 Component Report Box

The View Menu

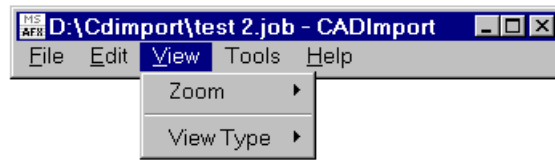
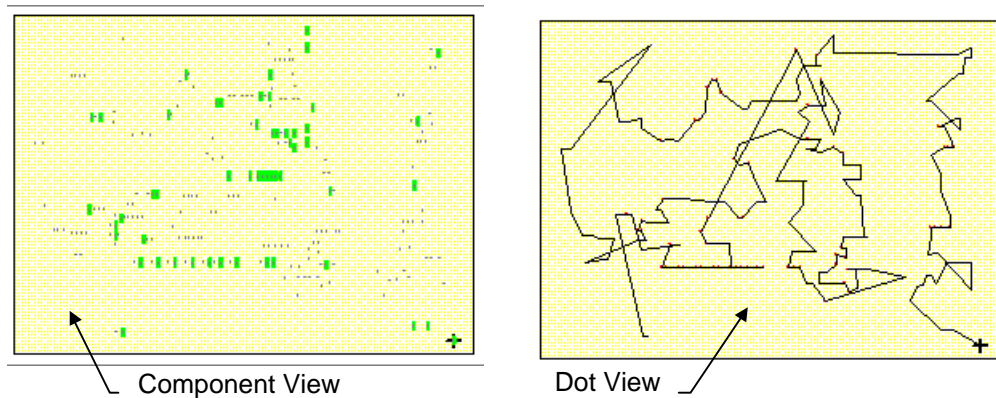


Figure 4-15 View Menu

Zoom

Use this option to set the zoom factor for the View window. You may need to zoom in to see more detail of closely spaced components or dots.

View Type



This option switches between Component View and Dot View. You can also use the toolbar buttons to switch between the two view types:



The current view type is shown on the status line at the bottom of the screen.

Component View shows the component outlines and adhesive or solder dots. You can zoom in to see the details of a particular dot. The Component List is displayed at the left side of the screen with the currently selected components highlighted. The Component View window shows the currently selected components in green.

Dot View shows the adhesive or solder dots and the path. Initially, the path follows the sequence of dots in the file. Use the View, Optimize Path option to reorder the Dot List and minimize the path length.

Certain CADImport options are only available in a particular view mode:

Table 4-2 Component/Dot View Options

Component View only options	Dot View only options
Edit; Select by names	View; Optimize Path
View; Step and Repeat Board	File; Save as Fluidmove file

The Tools Menu

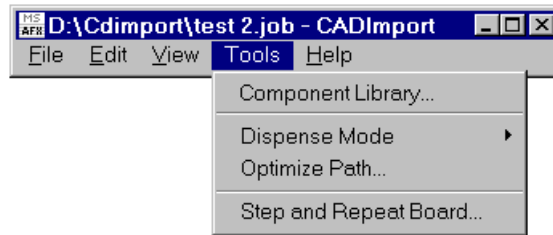


Figure 4-16 Tools Menu

Component Library

The Component Library contains approximately 300 SMD components, classified into 13 component types. These types are listed in Appendix A. Each library component has a unique name and set of properties. You can map (assign) unassigned components to a library component and change the component properties, if necessary. These procedures are explained in detail in Section 3 – Importing and Formatting CAD Data.

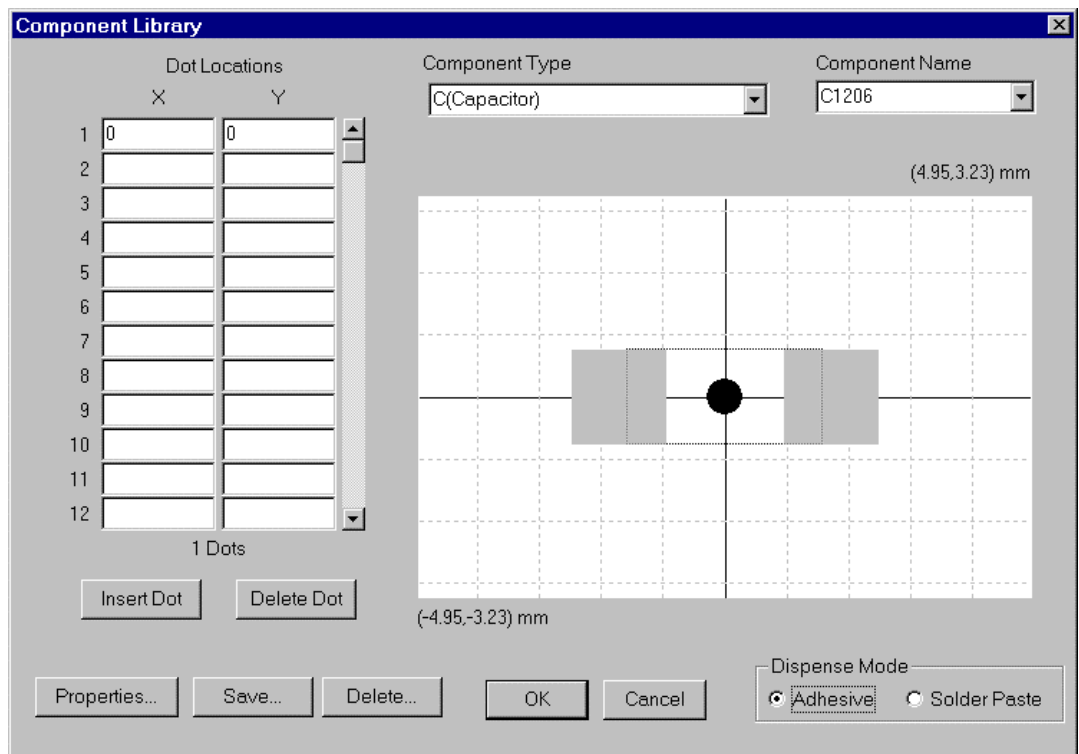


Figure 4-17 Component Library Box

Dispense Mode



Figure 4-18 Selecting Dispense Mode

This option specifies whether components are to be affixed with adhesive glue or solder paste. This setting controls the configuration of dots assigned to each component as defined in the Component Library (see the Component Library section of this chapter for details). The current dispense mode is shown on the status line at the bottom of the screen.

Optimize Path

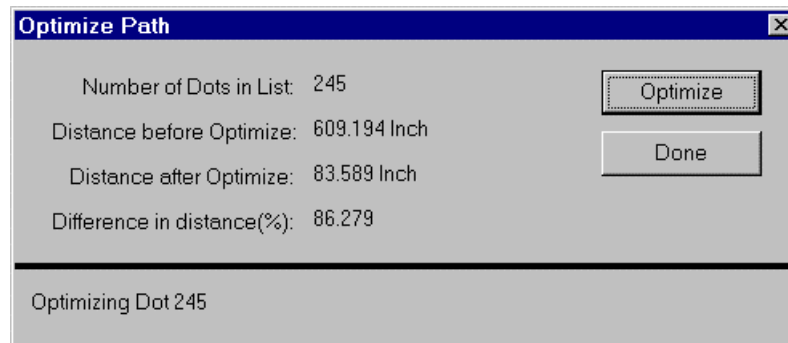


Figure 4-19 Optimize Path Box

This option is only available in Dot View mode.

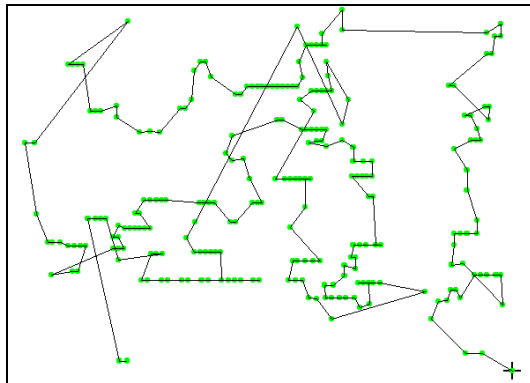
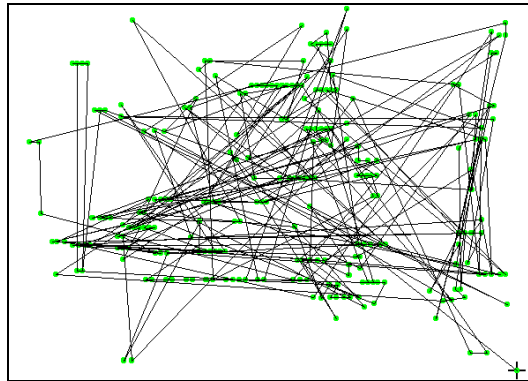
Initially, the dispense path is generated based on the sequence of the dots as they occur in the original file. The *Optimize Path* command reorders the dots to minimize the path length for more efficient production.

The optimizing process begins when you click on the *Optimize* button. The dots are reordered in the Dot List using the nearest neighbor method to shorten the path. This does not effect the order of the components in the Component List. When the optimization is complete, CADImport will report the new path length and difference in path distance as shown above.

Any editing changes such as re-assigning components, changing their location, or changing the board orientation (using mirror and rotate) will cause re-generation of the Dot List, so you will need to re-optimize.

If you are setting up a panel with multiple boards, you should first use the Step and Repeat Boards option to set up the panel, then use *Optimize Path* to shorten the path. The Step and Repeat Boards feature is discussed later in this section. Note that mirroring or rotating the boards also affect the dispensing pattern and must be completed before optimizing the path.

Path Before Optimization



Path After Optimization

Figure 4-20 Optimized Dispensing Path



NOTE

Although the dispensing head path in the optimized version contains long moves, the long moves actually take less time to complete than shorter moves. When executing long moves, the dispensing head spends more time at maximum speed that it does while executing shorter moves.

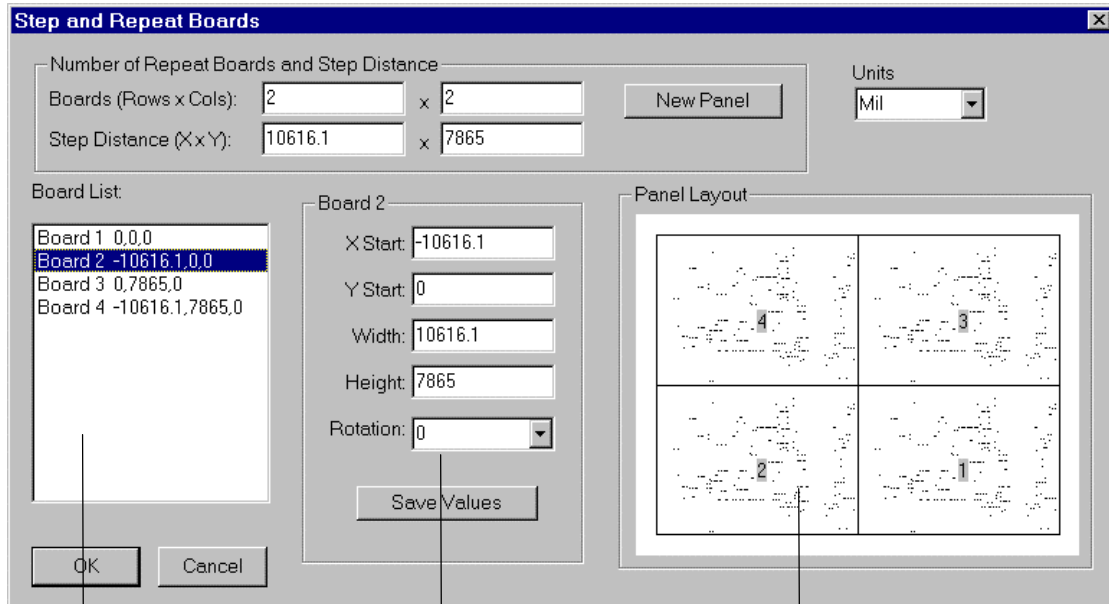


NOTE

Components with very complex dot patterns take longer to maximize than components with simpler dot patterns.

Step and Repeat Boards

This feature lets you set up multiple boards to be printed with the same pattern on a single panel. It is only available in Component View mode.



*Board List with
Board 2 Selected*

*Board Properties
for Selected
Board*

*Panel Layout Showing
Preview of Board Size
and Arrangement*

Figure 4-21 Step and Repeat Boards Screen

The Step and Repeat Boards feature allows you to lay out multiple boards, all with the same dispensing pattern, on a single panel. You can then modify the board properties of each panel. The features of the Step and Repeat Boards screen are discussed below. For a complete procedure, see “Laying Out Step and Repeat Boards” in Section 3 – Importing and Formatting CAD Data.

The Boards (Rows x Columns) boxes allow you to indicate the number and arrangement of the boards.

Clicking on *New Panel* provides you with a preview of the new panel layout with the current boards and step distance parameters.

The Units box allows you to specify the type of units used for the board size and step distance. While these coordinates are stored internally in mils, this option allows you to work with any of the coordinate types.

The default Step Distance (XxY) is the same as the board's Width and Height. By default, CADImport uses the minimum and maximum location values from the Component List to calculate the board dimensions.

The value in the XStart box indicates the origin of the pattern on the second board on the X-Axis (row) in relation to the 0,0 pattern origin of the first board. The value in the YStart box indicates the origin of the pattern on the next board on the Y-Axis in relation to the 0, 0 pattern origin on the first board. These pattern origin distances are approximations only; the area of the board displayed onscreen is 5% larger than actual size. Therefore, it is important to measure the actual pattern origin distances by hand if you need to know the exact figures for programming purposes. The distances between the dots in each pattern are, however, accurate.

The Board # list indicates the board number, XStart, YStart and Rotation for each board on the panel. You can change these settings as well as the board Width and Height. Click on Save Values to see a preview of the new board properties in the Panel Layout window.

When you click OK, CADImport generates a new Component List by duplicating the components on the first board as indicated by the Boards (Rows x Columns) setting. Therefore, it is best to make all editing changes on the original (single) board before using the Step and Repeat feature.

Once the new list has been generated you can use the board orientation buttons:



X mirror



Y mirror



Rotation

to re-orient the entire new panel as needed.

5 Tutorial

Overview

This chapter contains a tutorial that highlights several of CADImport's capabilities:

- Read in CAD data
- Map components
- Optimize path
- Save as Fluidmove file

Read in the CAD File

To open the CAD data file:

1. From the File menu, select Import CAD File.
 - ▶ The Import CAD File box appears.

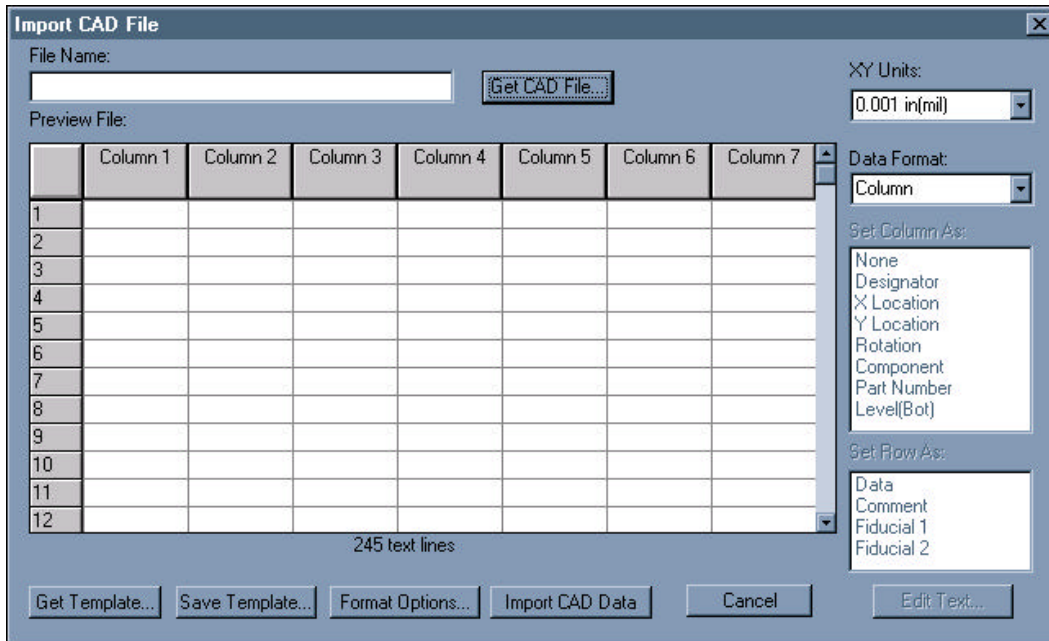


Figure 5-1 Import CAD File Box (Empty)

2. Click the Get CAD File button.

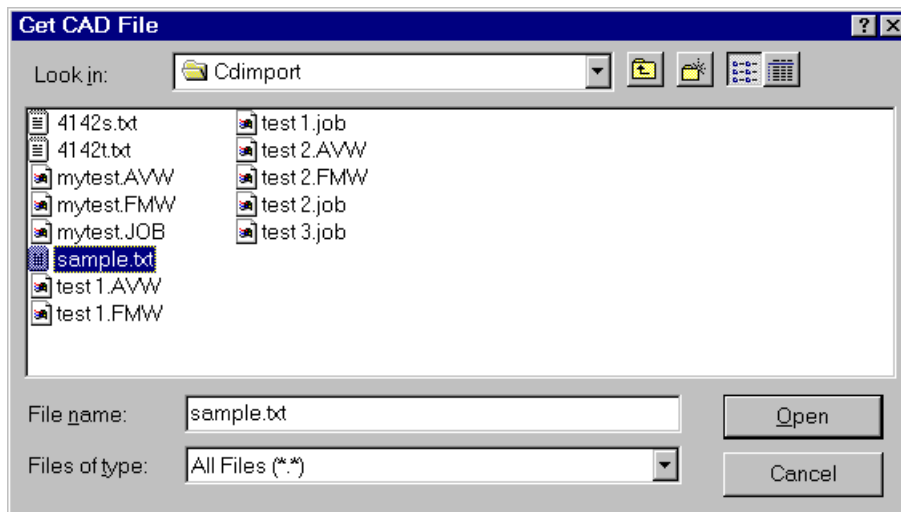


Figure 5-2 Selecting a CAD File

3. In the Get CAD File box, select the file **sample.txt** and click Open.
 - ▶ The Import CAD File box now displays the data in the window.

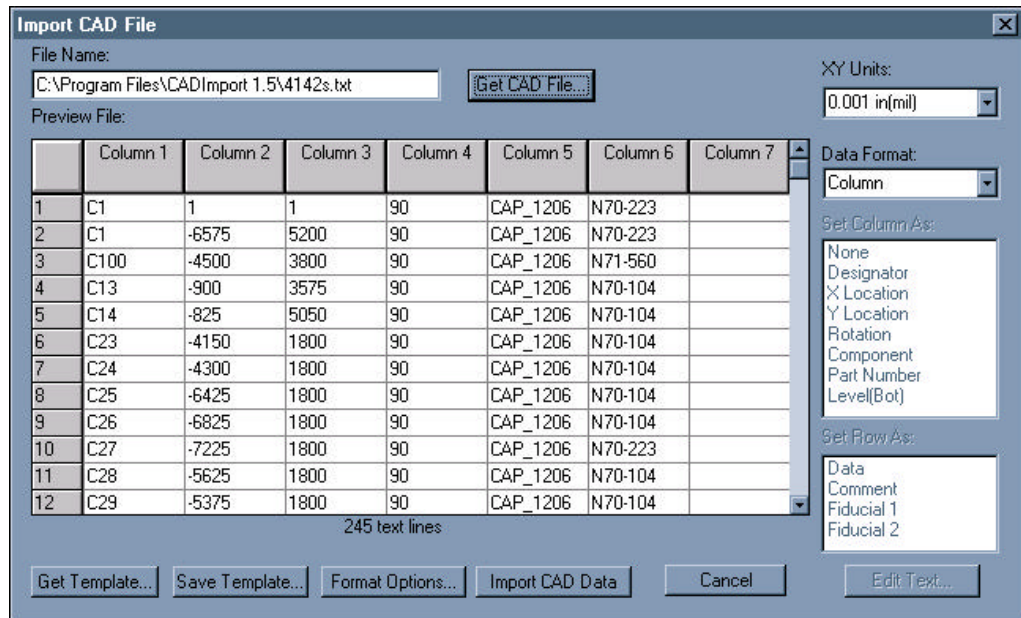


Figure 5-3 Import CAD File Box Displaying Data



NOTE

If no data is displayed in the Import CAD File box, make sure that you have chosen the correct XY Units in which to display the data.

To assign a data type to each column:

1. Click on the Column 1 heading.
2. In the Set Column As list choose Designator.
 - ▶ Continue with the selections in Table 5-1.

Table 5-1 Assigning Data Types

Click the heading:	Select from the Set Column As: list
Column 2	X Location
Column 3	Y Location
Column 4	Rotation
Column 5	Component

- ▶ When you are finished, the Import CAD File box should look like this:

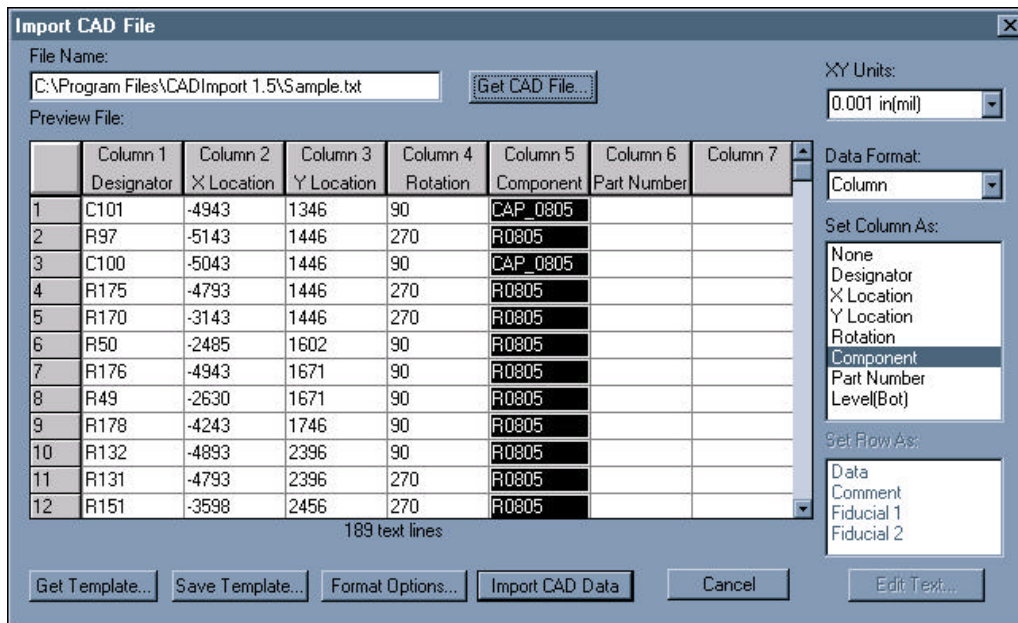


Figure 5-4 Import CAD File Box, Data Types Assigned

To import the CAD data from the file:

1. Once these selections are completed click Import CAD Data.

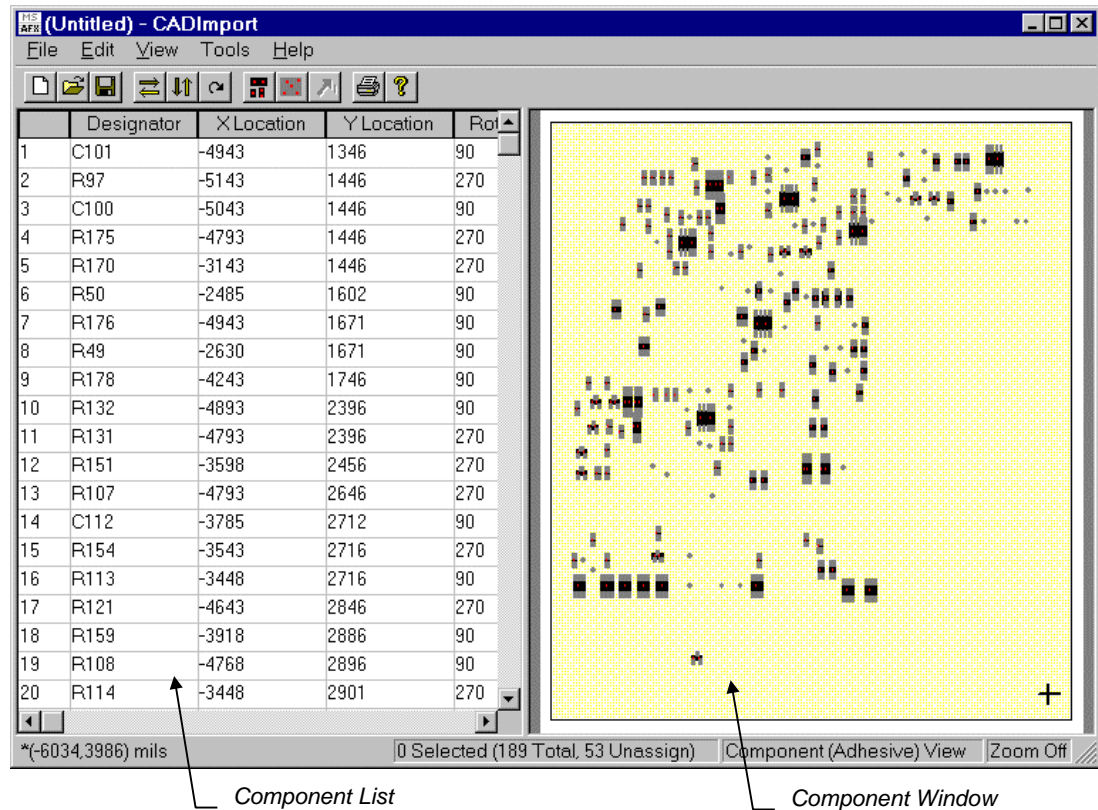


Figure 5-5 Component View Screen Displaying Imported Data

- ▶ On your screen, you will see the Component List on the left side of the screen and the Component View window showing a graphical representation of the board and components.
- ▶ The Status Line at the bottom of the screen indicates the total number of components (189) and the number remaining unassigned (53). The remaining components have been assigned to library components with names that are identical to those imported.

Map components

In order to assign the remaining unassigned components you will need to loop through the following procedure twice. Perform instructions 1 - 7 with the Step A options, then again with the Step B options.

To select a group of components:

1. From the Edit menu, choose Select By Names.
 - ▶ The Select by Names box appears.
2. In the Select By Names box, click on the following line of the file in the window.

Step	Window Text
A	C101 CAP_0805
B	C77 CAP_1206

- ▶ For step A the screen will look like this:

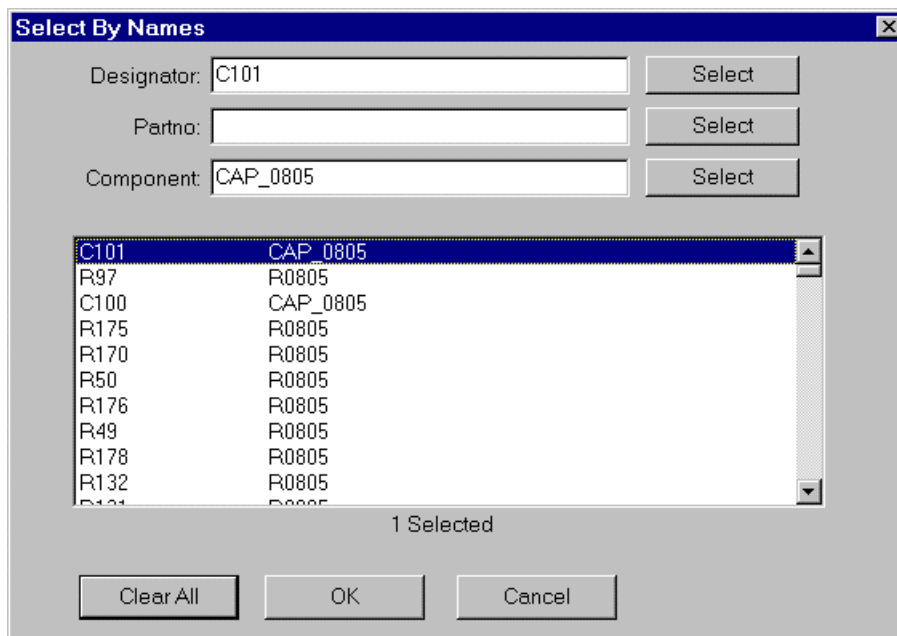


Figure 5-6 Component Selected in Select By Names Box

3. Click the Select button next to the Component field.
 - ▶ All the components with the component label shown will be selected. The status line under the file window indicates the number of components selected.
4. Click OK to return to the CADImport main screen.

To assign the selected group to a library component type:

1. From the Edit menu, choose Edit Selected.
 - ▶ The Component Properties box appears.

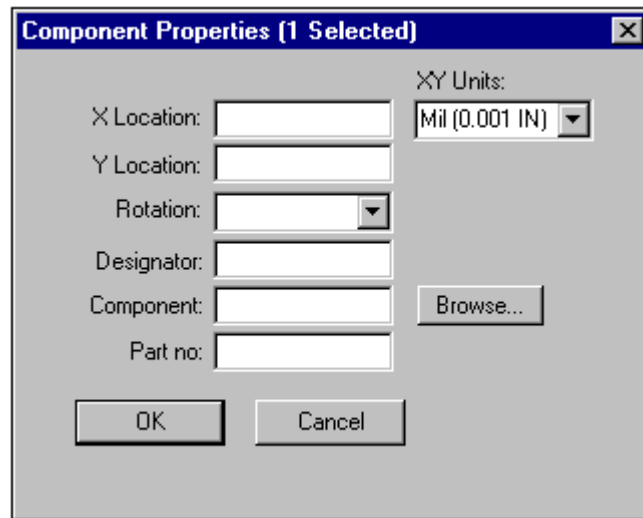


Figure 5-7 Component Properties Box, Multiple Components Selected

2. Click Browse.
 - ▶ The Select Component box appears. This box allows you to choose the library component to which you will assign the selected group.

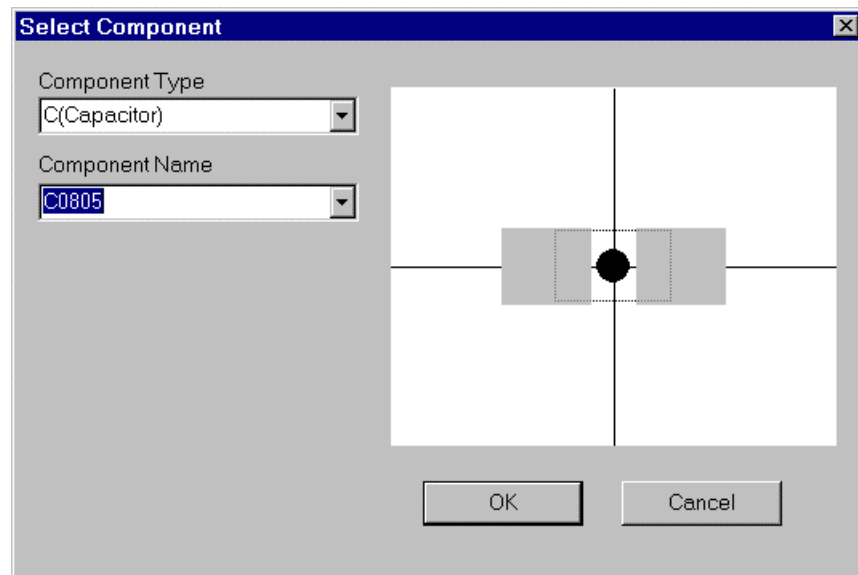


Figure 5-8 Selecting a Component

Step	In the Component Type list choose	In the Component Name list choose
<i>A</i>	C(Capacitor).	C0805.
<i>B</i>	C(Capacitor).	C1206

3. Click OK.

- ▶ All of the selected components are now assigned to the library component you have chosen.

Optimize path

Initially, the path that CADImport generates simply follows the order of the components in the CAD file. This path is random and can result in inefficient production. The Optimize Path command produces a new path of reduced length for more efficient production.

The current View Type is Component. In order for you to use the Optimize Path command, the View Type must be set to Dot.

1. From the View menu, select View Type; Dot to switch from Component View to Dot View, or click the View Dots button.
 - ▶ The CADImport main window now displays the dispense dot locations for the components and the current (random) dispense path.

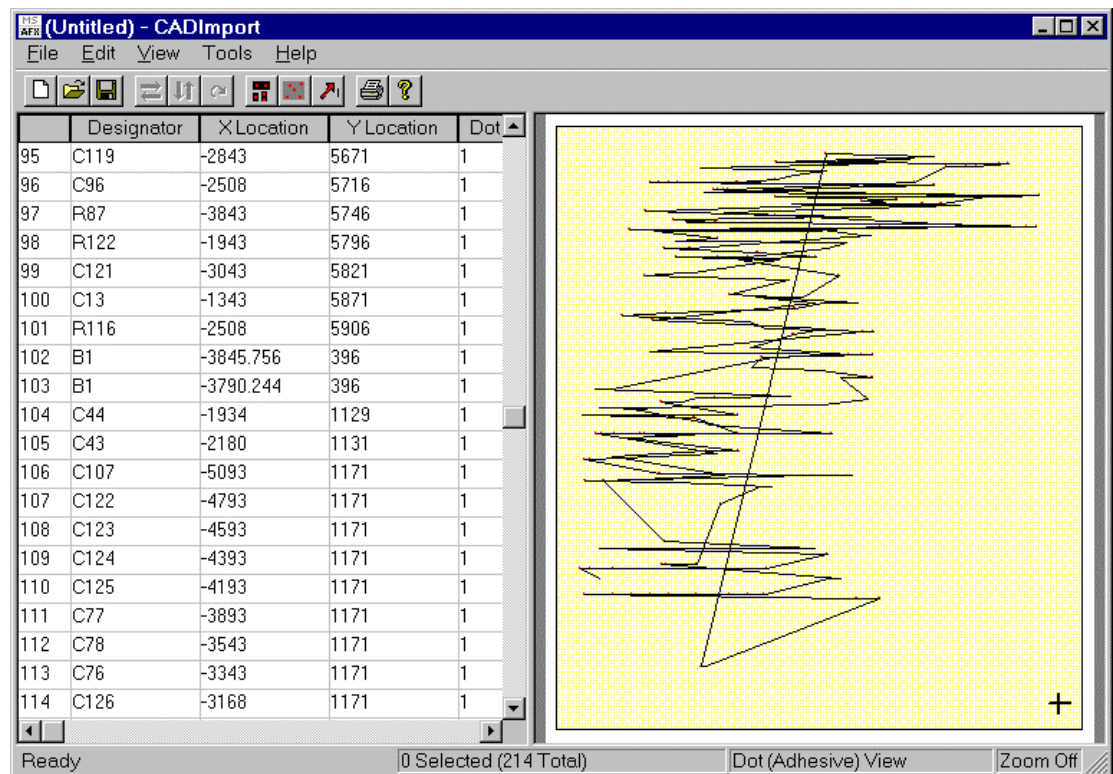


Figure 5-9 Dot View Screen Before Optimizing Path

2. From the Tools menu, select Optimize Path.
 - ▶ The Optimize Path box shows the number of components and current path length.
3. Click Optimize.
 - ▶ CADImport regenerates the path and displays the optimized path statistics in the Optimize Path box.

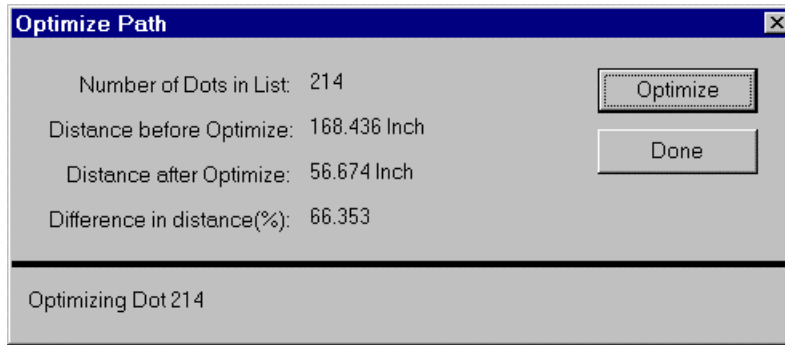


Figure 5-10 Optimized Path Information

4. Click Done.
 - ▶ The shortened path appears in the Dot view window.

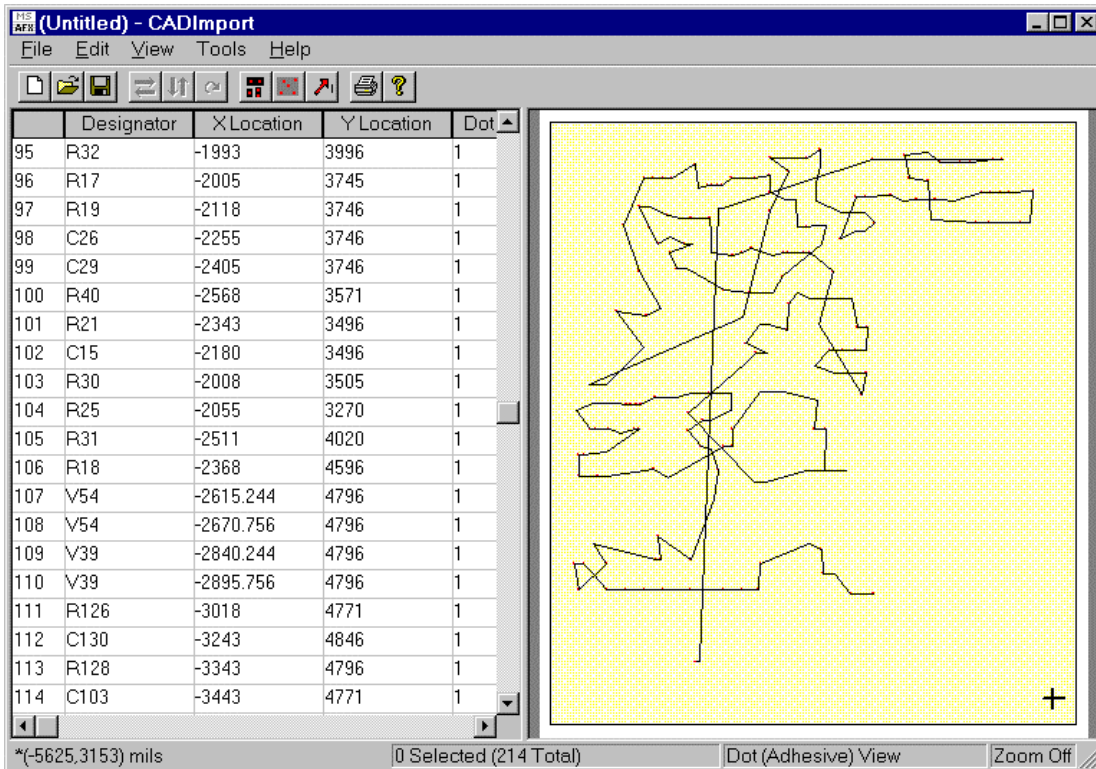


Figure 5-11 Dot View Screen After Optimizing Path

Save as Fluidmove file

Once all the components are mapped and the path has been optimized you are ready to save the CAD data as Fluidmove files. Two files are saved: a header file and a data file.

To save the CADImport data as a Fluidmove job:

1. From the File menu, select Save As Fluidmove File.
 - ▶ The Export Fluidmove File box appears.

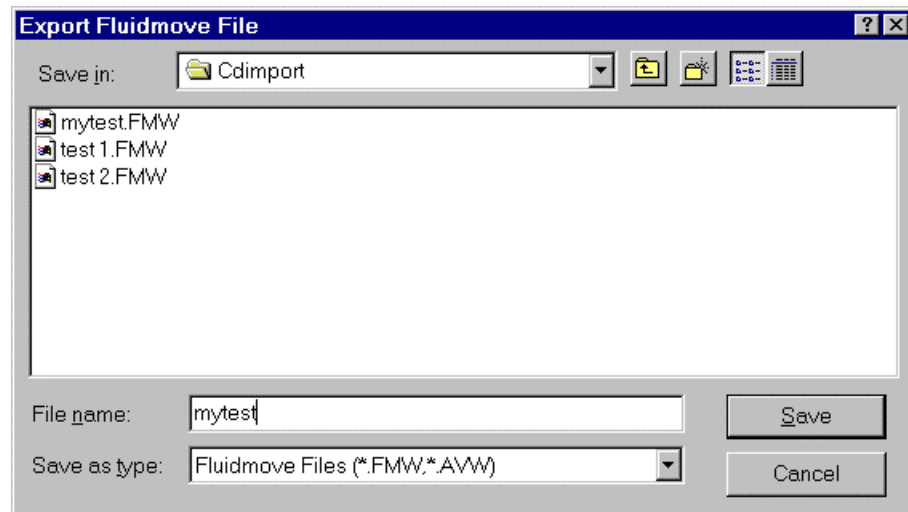


Figure 5-12 Saving As a Fluidmove File

2. In the File name entry field enter the name you want to use for the files without an extension, for example: **mytest**.
 - ▶ CADImport saves two files: **mytest.AVW** and **mytest.FMW**.

Appendix - Library Components

The following table contains a complete list of the components available in the `Asymtek.lib` file provided with the CADImport program.

CAPACITOR	
AE4	ALUMINIUM ELECTROLYTIC CAPACITORS, United Chemi-Con
AE5	ALUMINIUM ELECTROLYTIC CAPACITORS, United Chemi-Con
AE6.3	ALUMINIUM ELECTROLYTIC CAPACITORS, United Chemi-Con
B6	ALUMINIUM ELECTROLYTIC CAPACITORS, United Chemi-Con
C0402	0402, CHIP CAPACITOR
C0504	0504, CHIP CAPACITOR
C0603	0603, CHIP CAPACITOR
C0805	0805, CHIP CAPACITOR
C0805MIL	0805, CHIP CAPACITOR, FOR MILITARY USE
C1005	1005, CHIP CAPACITOR
C1005MET	1005, CHIP CAPACITOR, Metric
C1005MIL	1005, CHIP CAPACITOR, FOR MILITARY USE
C1206	1206, CHIP CAPACITOR
C1206MIL	1206, CHIP CAPACITOR, FOR MILITARY USE
C1206WS	1206, CHIP CAPACITOR, optimized for wave solder use to prevent cracking
C1210	1210, CHIP CAPACITOR
C1210MIL	1210, CHIP CAPACITOR, FOR MILITARY USE
C1210WS	1210, CHIP RESISTOR, optimized for wave solder use to prevent cracking
C1310	1310, CHIP CAPACITOR, Metric
C1608	1608, CHIP CAPACITOR, Metric
C1805	1805, CHIP CAPACITOR
C1808	1808, CHIP CAPACITOR
C1808MIL	1808, CHIP CAPACITOR, FOR MILITARY USE
C1812	1812, CHIP CAPACITOR
C1218MIL	1812, CHIP CAPACITOR, FOR MILITARY USE
C1825	1825, CHIP CAPACITOR
C2012	2012, CHIP CAPACITOR, Metric
C2220	2220, CHIP CAPACITOR
C2225	2225, CHIP CAPACITOR
C3216	3216, CHIP CAPACITOR, Metric
C3225	3225, CHIP CAPACITOR, Metric
C4532	4532, CHIP CAPACITOR, Metric
C4564	4564, CHIP CAPACITOR, Metric
C6	ALUMINIUM ELECTROLYTIC CAPACITORS, United Chemi-Con
CMLL34	MELF, MLL34, CAPACITOR
CMLL41	MELF, MLL41, CAPACITOR
D6	ALUMINIUM ELECTROLYTIC CAPACITORS, United Chemi-Con
D8	ALUMINIUM ELECTROLYTIC CAPACITORS, United Chemi-Con
ELECTAA	ELECTROLYTIC, CASE SIZE AA, MEPCO/CENTRALLAB
ELECTBB	ELECTROLYTIC, CASE SIZE BB, MEPCO/CENTRALLAB

CONNECTOR	
BERG2-1	CONNECTOR, Single Row, 2-50 Pins, BERG
BERG2-8	CONNECTOR, Double Row, 2-50 Pins, BERG
BERG3-8	CONNECTOR, Double Row, Side Entry, 3-52 Terminators per row , BERG
BERG4-8	CONNECTOR, Double Row, Side Entry, 2 Rows, 12-65 Terminators per row
ITT9	DB9 CONNECTOR, ITT CANNON
METH1-8	CONNECTOR, Double Row, 2-50 Pins, METHODE
METH2-8	HEADER, Dual Row, Vertical Entry, 2-40 Pins per row, METHODE
MOLEX1-8	CONNECTOR, Double Row, 2-150 Pins, MOLEX
MOLEX2-8	CONNECTOR, Double Row, Side Entry, 2-40 Rows, 4-80 Contacts, MOLEX
MOLEX3-8	HEADER, Double Row, Vertical Entry, MOLEX
SAM1-8	CONNECTOR, Double Row, 2-65 Leads per row, SAMTECH
SAM2-4	CONNECTOR, Single Staggered, 2-65 Leads, SAMTECH
SAM3-4	HEADER, Dual Row Staggered, 2-39 Leads, SAMTECH
SAM4-4	HEADER, Single Row, Horizontal Entry, 2-39 Pins, SAMTECH
SAM5-8	HEADER, Dual Row, Horizontal Entry, 2-39 Pins per row, SAMTECH
SAM6-8	HEADER, Dual Row, Vertical Entry, 2-39 Pins per row, SAMTECH
TEKA1-8	CONNECTOR, Double Row, 2-50 Pins, TEKA
CRYSTALS	
FCX-1	CRYSTAL, FOX
OSCDIP	CRYSTAL, SO Package with C style Leads
SOC-1	CRYSTAL, SO Package with C style Leads
DIODE	
DPAK1	DPAK STYLE, VERSION 1
DPAK2	DPAK STYLE, VERSION 2
DPAK3	DPAK STYLE, VERSION 3
SOT-D	DIODE, SOT PACK, TOSHIBA
SOT-T	DIODE, TWO TERMINAL GULLWING, ITT
IC-PF (CFP,PFP,QFP)	
BPFP100	PFP100, PLASTIC BUMP QUAD FLAT PACKAGE
BPFP132	PFP132, PLASTIC BUMP QUAD FLAT PACKAGE
BPFP164	PFP164, PLASTIC BUMP QUAD FLAT PACKAGE
BPFP196	PFP196, PLASTIC BUMP QUAD FLAT PACKAGE
BPFP244	PFP244, PLASTIC BUMP QUAD FLAT PACKAGE
BPFP84	PFP84, PLASTIC BUMP QUAD FLAT PACKAGE
CFP10-03	10 Lead Ceramic Flat Pack Type MO-003
CFP10-04	10 Lead Ceramic Flat Pack Type MO-004
CFP14-03	14 Lead Ceramic Flat Pack Type MO-003
CFP14-04	14 Lead Ceramic Flat Pack Type MO-004
CFP16-04	16 Lead Ceramic Flat Pack Type MO-004
CFP16-21	16 Lead Ceramic Flat Pack Type MO-021
CFP20-22	20 Lead Ceramic Flat Pack Type MO-022
CFP24	24 PIN CERPACK
CFP24-19	24 Lead Ceramic Flat Pack Type MO-019
CFP24-21	24 Lead Ceramic Flat Pack Type MO-021

IC-PF (CFP,PFP,QFP) <i>continued</i>	
CFP28	28 PIN CERPACK
CFP28-19	28 Lead Ceramic Flat Pack Type MO-019
CFP36-20	36 Lead Ceramic Flat Pack Type MO-020
CFP36-21	36 Lead Ceramic Flat Pack Type MO-021
CFP36-23	36 Lead Ceramic Flat Pack Type MO-023
CFP40-18	40 Lead Ceramic Flat Pack Type MO-018
CFP40-20	40 Lead Ceramic Flat Pack Type MO-020
CFP42	42 PIN CERPACK
PFP16	16 PIN FLAT PACK
PFP18	18 PIN FLAT PACK
PFP20	20 PIN FLAT PACK
PFP28	28 PIN FLAT PACK
QFP100-1	QFP 100, 16.4 x 28.6 mm, 20x30 Lead Package
QFP100-2	QFP 100, 14.0 x 20.0 mm Body, 20x30 Lead Package
QFP120	QFP 120, 32.0 x 32.0 mm, 30x30 Lead Package
QFP128	QFP 128, 28.0 x 28.0 mm Body, 32x32 Lead Package
QFP136	QFP 136, 28.0 x 28.0 mm Body, 34x34 Lead Package
QFP144	QFP 144, 28.0 x 28.0 mm Body, 36x36 Lead Package
QFP160	QFP 160, 28.0 x 28.0 mm Body, 40x40 Lead Package
QFP196	QFP 196, 32.5 x 32.5 mm Body, 49x49 Lead Package
QFP208	QFP 208, 32.258 x 32.5 mm Body, 52x52 Lead Package
QFP44-1	QFP 44, 13.5 x 14.5 mm, 11x11 Lead Package
QFP44-2	QFP 44, 12.3 x 12.3 mm, 11x11 Lead Package
QFP44-3	QFP 44, 14.4 x 14.4 mm, 11x11 Lead Package
QFP48	QFP 48, 17.3 x 17.3 mm, 12x12 Lead Package
QFP52	QFP 52, 21.3 x 21.3 mm, 13x13 Lead Package
QFP54	QFP 54, 14.4 x 14.4 mm, 13x14 Lead Package
QFP56-1	QFP 56, 13.5 x 14.5 mm, 14x14 Lead Package
QFP56-2	QFP 56, 24.0 x 20.0 mm, 14x14 Lead Package
QFP60	QFP 60, 24.0 x 20.0 mm, 14x16 Lead Package
QFP64-1	QFP 64, 17.6 x 17.6 mm, 16x16 Lead Package
QFP64-2	QFP 64, 17.6 x 17.6 mm, 13x19 Lead Package
QFP64-3	QFP 64, 18.4 x 18.4 mm, 16x16 Lead Package
QFP64-4	QFP 64, 18.7 x 24.7 mm, 13x19 Lead Package
QFP64-5	QFP 64, 22.8 x 22.8 mm, 16x16 Lead Package
QFP70	QFP 70, 16.4 x 28.6 mm, 11x24 Lead Package
QFP74	QFP 74, 23.2 x 23.2 mm, 18x19 Lead Package
QFP80-1	QFP 80, 14.0 x 14.0 mm Body, 20x20 Lead Package
QFP80-2	QFP 80, 16.0 x 20.0 mm Body, 16x24 Lead Package
QFP80-3	QFP 80, 14.0 x 20.0 mm Body, 16x24 Lead Package
QFP80-4	QFP 80, 16.4 x 28.6 mm, 16x24 Lead Package
QFP88	QFP 88, 14.0 x 20.0 mm Body, 18x26 Lead Package
QFP94	QFP 94, 23.2 x 23.2 mm, 23x24 Lead Package

IC-LCC (LCC,PLCC,PLCC)

LCC16	16 PIN RECTANGULAR Leadless Chip Carrier
LCC18	18 PIN RECTANGULAR Leadless Chip Carrier MIL-M-38510 C-10A
LCC18ECA	18 PIN RECTANGULAR Leadless Chip Carrier JEDEC ECA Package
LCC18ECB	18 PIN RECTANGULAR Leadless Chip Carrier JEDEC ECB Package
LCC20	18 PIN RECTANGULAR Leadless Chip Carrier MIL-M-38510 C-13
LCC20ECD	20 PIN Leadless Chip Carrier JEDEC ECD Package
LCC22	22 PIN Leadless Chip Carrier JEDEC ECE Package
LCC24	24 PIN RECTANGULAR Chip Carrier
LCC24SQ	24 PIN SQUARE Chip Carrier
LCC28	28 PIN SQUARE Leadless Chip Carrier MIL-M-38510 C-11A
LCC28	28 PIN SQUARE Leadless Chip Carrier MIL-M-38510 C-4
LCC32	32 PIN RECTANGULAR Leadless Chip Carrier MIL-M-38510 C-12
LCC44SQ	44 PIN SQUARE Leadless Chip Carrier MIL-M-38510 C-5
LCC52SQ	52 PIN SQUARE Leadless Chip Carrier
LCC68SQ	68 PIN SQUARE Leadless Chip Carrier
LCC80	80 PIN RECTANGULAR Leadless Chip Carrier
LCC80SQ	80 PIN SQUARE Leadless Chip Carrier
LCC94	94 PIN SQUARE Leadless Chip Carrier
LCCC68	68 PIN J LEADED CERDIP CARRIER, 17x17 Leads
LCCC84	84 PIN J LEADED CERDIP CARRIER, 21x21 Leads
LCCSQ	18 PIN SQUARE Leadless Chip Carrier MIL-M-38510 C-2A
PLCC100	PLCC100, SQUARE, 25x25 Lead Package
PLCC128	PLCC128, SQUARE, 32x32 Lead Package
PLCC18	PLCC18, RECTANGULAR, 4x5 Lead Package
PLCC18L	PLCC18L, RECTANGULAR, 4x5 Lead Package
PLCC20SQ	PLCC20, SQUARE, 5x5 Lead Package
PLCC22R	PLCC22, RECTANGULAR, 4x7 Lead Package
PLCC28R	PLCC28, RECTANGULAR, 5x9 Lead Package
PLCC28SQ	PLCC28, SQUARE, 7x7 Lead Package
PLCC32R	PLCC32, RECTANGULAR, 7x9 Lead Package
PLCC44	PLCC44, SQUARE, 11x11 Lead Package
PLCC52	PLCC52, SQUARE, 13x13 Lead Package
PLCC68	PLCC68, SQUARE, 17x17 Lead Package
PLCC84	PLCC84, SQUARE, 21x21 Lead Package

IC-SO (SO,SOP,SOJ,VSO)	
SO14M1	SO14, PLASTIC MINIFLAT PACKAGE VERSION 1
SO14M2	SO14, PLASTIC MINIFLAT PACKAGE VERSION 2
SO14MB	SO14, MEDIUM BODY, RESISTOR PACK, DALE
SO14NB	SO14, NARROW BODY
SO14WB	SO14L, WIDE BODY
SO16M1	SO16, MINIFLAT PACKAGE
SO16MB	SO16, MEDIUM BODY, RESISTOR PACK, DALE
SO16NB	SO16, NARROW BODY
SO16WB	SO16L, WIDE BODY
SO18WB	SO18, WIDE BODY
SO20M1	SO20, MINIFLAT PACKAGE VERSION 1
SO20M2	SO20L, WIDE BODY
SO20M3	SO20, MINIFLAT PACKAGE VERSION 3
SO24M1	SO24, MINIFLAT PACKAGE VERSION 1
SO24M2	SO24, MINIFLAT PACKAGE VERSION 2
SO24M3	SO24, MINIFLAT PACKAGE VERSION 3
SO24U	SO24, UNIVERSAL SRAM, used for Hitachi, SMOS & Toshiba SRAMs
SO24WB	SO24, WIDE BODY
SO28M1	SO28, MINIFLAT PACKAGE VERSION 1
SO28M2	SO28, MINIFLAT PACKAGE VERSION 2
SO28M3	SO28, MINIFLAT PACKAGE VERSION 3
SO28U	SO28, UNIVERSAL SRAM, used for Hitachi, SMOS & Toshiba SRAMs
SO28WB	SO28, WIDE BODY
SO32M1	SO31, MINIFLAT PACKAGE
SO40M1	SO40, MINIFLAT PACKAGE
SO4M1	SO4, METRIC BODY
SO6M1	SO6, METRIC BODY
SO8M1	SO8, METRIC BODY, VERSION 1
SO8M2	SO8, METRIC BODY, VERSION 2
SO8NB	SO8, NARROW BODY
SO8NBWS	SO8, NARROW BODY, optimized for wave solder use to prevent cracking
SO8WB	SO8L, WIDE BODY
SOJ14	SOJ14, PIN PLASTIC
SOJ16	SOJ16, PIN PLASTIC
SOJ18	SOJ18, PIN PLASTIC
SOJ20	SOJ20, PIN PLASTIC
SOJ20LM	SOJ20, LEAD MOLDED
SOJ22	SOJ22, PIN PLASTIC
SOJ24	SOJ24, PIN PLASTIC
SOJ24LM	SOJ24, LEAD MOLDED
SOJ26	SOJ26/20 PIN PLASTIC
SOJ28	SOJ28, PIN PLASTIC
SOJ28LM	SOJ28, LEAD MOLDED

IC-SO (SO,SOP,SOJ,VSO) *continued*

SOP24	SOP24, PLASTIC FP
SOP28	SOP28, PLASTIC FP
SOP32	SOP32, PLASTIC FP
VSO40	40 Lead Plastic VSO Package
VSO56	56 Lead Plastic VSO Package

IND(Inductor)

DIMLL34	MELF, MLL34, DIODE
DIMLL41	MELF, MLL41, DIODE
IND1	INDUCTOR, Coilcraft, VERSION 1
IND2	INDUCTOR, Coilcraft, VERSION 2
IND3	INDUCTOR, Vanguard, VERSION 1
IND4	INDUCTOR, Vanguard, VERSION 2
IND5	INDUCTOR, SFE, VERSION 1
IND6	INDUCTOR, Coilcraft, VERSION 3
IND7	INDUCTOR, SFE, VERSION 2
IND8	INDUCTOR, SFE, VERSION 3
IND9	INDUCTOR, Murata Erie, VERSION 1
IND-DEL0820	INDUCTOR, DELEVAN, DEL0820
IND-DEL103	INDUCTOR, DELEVAN, DEL103
IND-DEL1331	INDUCTOR, DELEVAN, DEL1331
IND-NL1210	INDUCTOR, TDK, NL1210
IND-NL1812	INDUCTOR, TDK, NL1812
IND-NL2216	INDUCTOR, TDK, NL2216
SOD-80	MELF, SOD-80, DIODE
SOD-87	MELF, SOD-87, DIODE

R(Resistor)

MELF1	MELF COMPONENT, Panasonic
MELF2	MELF COMPONENT, Taiyo Yuden
MLL34	MELF, MLL34 DIODE, RESISTOR OR CAPACITOR
MLL41	MELF, MLL41 DIODE, RESISTOR OR CAPACITOR
R0402	0402, CHIP RESISTOR
R0603	0603, CHIP RESISTOR
R0805	0805, CHIP RESISTOR
R0805MIL	0805, CHIP RESISTOR, FOR MILITARY USE
R1005	1005, CHIP RESISTOR, Metric
R1055MIL	1005, CHIP RESISTOR, FOR MILITARY USE
R1206	1206, CHIP RESISTOR
R1206MIL	1206, CHIP RESISTOR, FOR MILITARY USE
R1206WS	1206, CHIP RESISTOR, optimized for wave solder use to prevent cracking
R1210	1210, CHIP RESISTOR
R1210MIL	1210, CHIP RESISTOR, FOR MILITARY USE
R1210WS	1210, CHIP RESISTOR, optimized for wave solder use to prevent cracking
R1406	1406, MELF DIODE, RESISTOR OR CAPACITOR
R1505MIL	1505, CHIP RESISTOR, FOR MILITARY USE

R(Resistor) continued	
R1510MIL	1510, CHIP RESISTOR, FOR MILITARY USE
R1608	1608, CHIP RESISTOR, Metric
R1706MIL	1706, CHIP RESISTOR, FOR MILITARY USE
R2010	2010, CHIP RESISTOR
R2010MIL	2010, CHIP RESISTOR, FOR MILITARY USE
R2012	2012, CHIP RESISTOR, Metric
R2309	2309, MELF DIODE, RESISTOR OR CAPACITOR
R2512	2512, CHIP RESISTOR
R3216	3216, CHIP RESISTOR, Metric
R3225	3225, CHIP RESISTOR, Metric
R3516	3516, CHIP RESISTOR, Metric
R5025	5025, CHIP RESISTOR, Metric
R5923	5923, CHIP RESISTOR, Metric
R6332	6332, CHIP RESISTOR, Metric
RMLL34	MELF, MLL34, RESISTOR
RMLL41	MELF, MLL41, RESISTOR
SW (Sockets,Switches)	
Socket28	SOCKET, SQUARE, 28 Position, 7x7 Leads, METHODE
Socket32	SOCKET, RECTANGLE, 32 Position, 9x7 Leads, METHODE
Socket44	SOCKET, SQUARE, 44 Position, 11x11 Leads, METHODE
Socket52	SOCKET, SQUARE, 52 Position, 13x13 Leads, METHODE
Socket68	SOCKET, SQUARE, 68 Position, 17x17 Leads, METHODE
Socket84	SOCKET, SQUARE, 84 Position, 21x21 Leads, METHODE
T (Tantalum)	
T3216	TANTALUM, A CASE SIZE, 3216
T3518	TANTALUM, EXTENDED RANGE, 3518
T3527	TANTALUM, EXTENDED RANGE, 3527
T3528	TANTALUM, B CASE SIZE, 3528
T6032	TANTALUM, C CASE SIZE, 6032
T7227	TANTALUM, EXTENDED RANGE, 7227
T7243	TANTALUM, D CASE SIZE, 7243
T7257	TANTALUM, EXTENDED RANGE, 7257
T7343	TANTALUM, CASE SIZE, 7343, IPC
TNEC-B	TANTALUM, NEC B CASE SIZE
TNEC-C	TANTALUM, NEC C CASE SIZE
TNEC-D	TANTALUM, NEC D CASE SIZE
TC(Trimmer Condenser)	
TRIM1	TRIMMER, TWO LEADED ADJUSTABLE, SPRAGUE
TRIM10	TRIMMER, THREE LEADED ADJUSTABLE, Bourns
TRIM11	TRIMMER, THREE LEADED ADJUSTABLE, Bourns
TRIM2	TRIMMER, TWO LEADED ADJUSTABLE, SPRAGUE
TRIM3	TRIMMER, TWO LEADED ADJUSTABLE, SPRAGUE
TRIM4	TRIMMER, TWO LEADED ADJUSTABLE, SPRAGUE
TRIM5	TRIMMER, TWO LEADED ADJUSTABLE, SPRAGUE

TC(Trimmer Condenser) *continued*

TRIM6	TRIMMER, THREE LEADED ADJUSTABLE, VRN
TRIM7	TRIMMER, THREE LEADED ADJUSTABLE, Murata Erie
TRIM8	TRIMMER, THREE LEADED ADJUSTABLE, Murata Erie
TRIM9	TRIMMER, THREE LEADED ADJUSTABLE, Kyocera

TR(Transistor)

PD4P	ECI Component
SOT143	SOT143, PHILIPS
SOT223	SOT223
SOT23	SOT23, JEDEC Package TO-236AA, Motorola
SOT23M1	SOT23, Metric, NEC
SOT23M2	SOT23, Metric, Rohm
SOT23WS	SOT23, JEDEC Package TO-236AA, for wave solder to prevent cracking
SOT25	SOT25, Rohm
SOT89	SOT89

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