

Tutorial 2

Netlist Analyzer: Starting to Work

Introduction

The Netlist Analyzer is a graphic viewer for generating and comparing netlists during a job cycle.

This tutorial is the second in a series of tutorials which describe how the Genesis Netlist Analyzer works. The first tutorial, *Netlist Analyzer: Terms and Concepts*, explained the basic terms and concepts required for understanding the Netlist Analyzer. This tutorial explains the basic operations of the application. The final two tutorials will describe how to use the Netlist Analyzer using typical examples you may come across.





This tutorial has been designed to enable you to sit at your computer with Genesis and work through the tutorial at your own pace. This is the second tutorial in a series of four tutorials which describe the Netlist Analyzer module available with Genesis 2000.

NOTES:



- 1. Information not contained here can be found in the on-line documentation: see Doc. 0506 The Netlist Analyzer, Doc. 0107 Analysis Training Tutorial and Release Notes.*
- 2. This tutorial uses the Job **demo_design**. If you do not have access to this job, see the Appendix of this tutorial for a description about how to download it using the FTP command.*

When reading this tutorial there are a few symbols found on the left side of the page to help you navigate.

Symbol	Description
	Note: A brief comment or provides reference to further information.
	Information: This is a section where you learn about a specific topic.
	Action: This is a section where you actively work with Genesis.
	Tip: This is a point which is important to emphasize.

Objectives

This tutorial describes the basic functionality of the Netlist analyzer in order to familiarize the user with its essential features. In this tutorial you will learn:

- How to access the Netlist Analyzer
- About the Netlist Analyzer window (modes and structure)
- How to calculate and view netlists
- About netlist viewing options
- About net shapes and points
- How to compare netlists
- How to view violation results
- About additional Netlist Analyzer features.

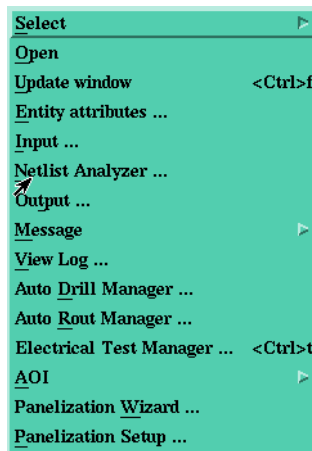
Tutorial

Accessing the Netlist Analyzer

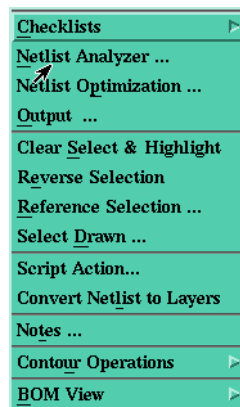


The Netlist Analyzer can be accessed from either the Engineering Toolkit or the Graphic Editor.

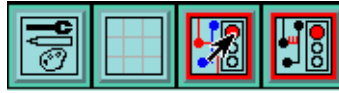
The Netlist Analyzer is accessed from the *Actions* menu in the Engineering Toolkit, by selecting the option *Netlist Analyzer*.



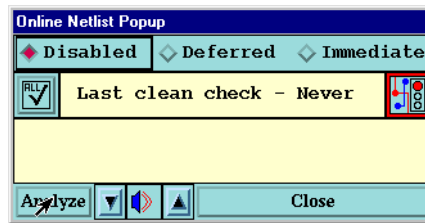
The Netlist Analyzer can be accessed in two ways from the Graphic Editor. One way is to access it from the *Actions* menu, by selecting the option *Netlist Analyzer*.



A second way is to access it from the icon tools by clicking the Online Netlist icon.



When you click the Online Netlist icon, the Online Netlist Popup is displayed.



You then click the **Analyze** button to display the Net Analyzer window.



When editing in the Graphic Editor, the Online Netlist Popup displays comparison results with the Reference Netlist. This shows whether our editing has caused netlist violations.



Accessing the Netlist Analyzer

We will now access the Netlist Analyzer from the Graphic Editor.

STEP 1: OPEN GENESIS

Open Genesis by typing your *Login Name* and *Password* in the Engineering Toolkit Login Screen and press the **Enter** key.

STEP 2: SELECT THE JOB

Type in the Job named `demo_design` in the *Entity Filter* field of the Engineering Toolkit and press the **Enter** key. The `demo_design` icon is now displayed.

STEP 3: OPEN THE JOB

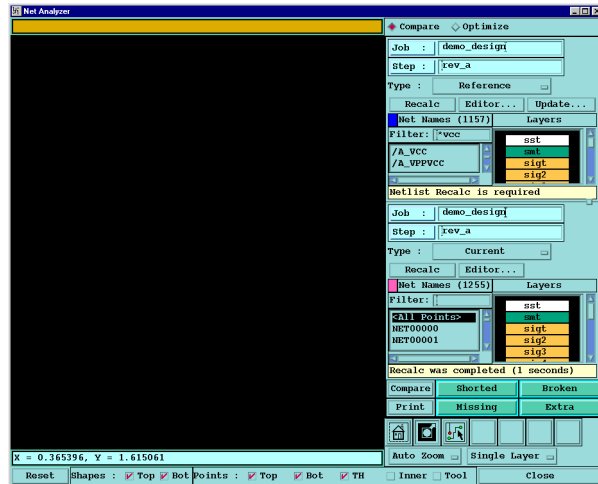
Double click on the `demo_design` icon. A dialog box is displayed requesting you to open the job. Click on the **Open** button. All of the icons for the `demo_design` job will now be displayed.

STEP 4: SELECT THE STEP

Double click on the **Steps** icon. Three step icons will be displayed. Double click on the **rev_a** icon. The Graphic Editor is now displayed.

STEP 5: ACCESS THE NETLIST ANALYZER

Click the **Actions** menu in the Graphic Editor. Click the **Netlist Analyzer** option from the menu. The Netlist Analyzer window will now be displayed.

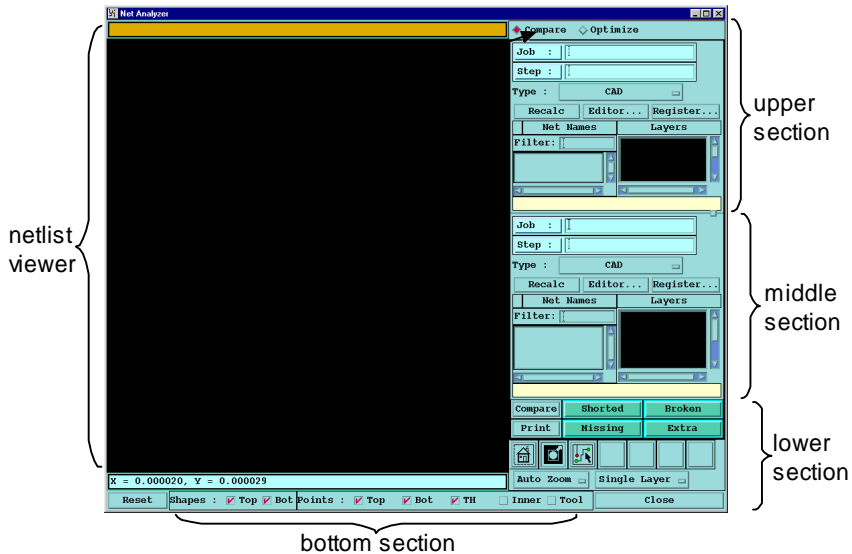


The Netlist Analyzer Window (Modes and Structure)

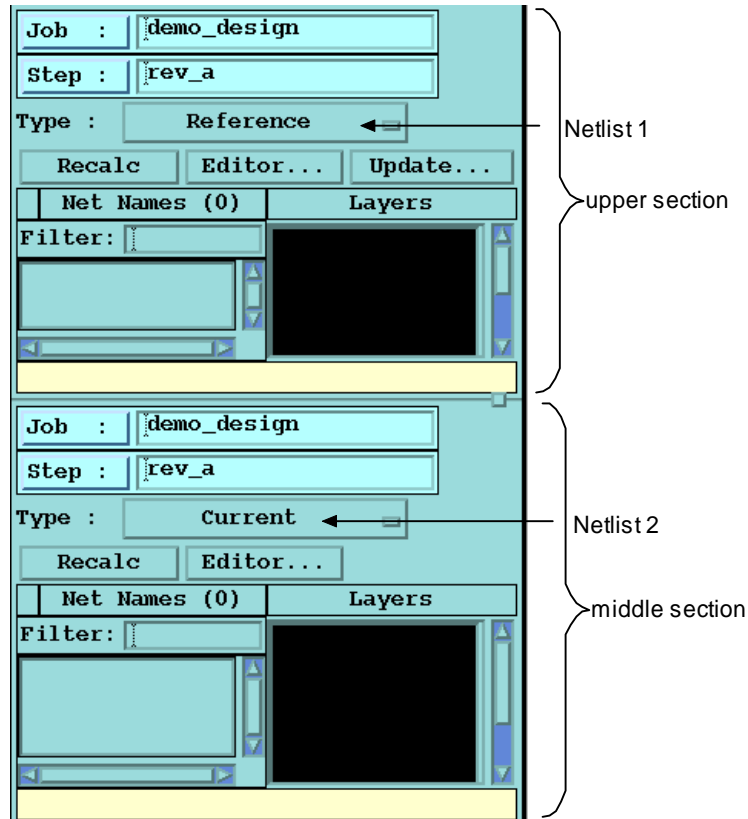


The Netlist Analyzer window has two modes: *Compare* and *Optimize*. This option is chosen in the top right panel of the Net Analyzer window. This tutorial focuses on **Compare** mode. (Optimize mode is for the Netlist Optimizer which will not be described here. See Doc. 0603 and Release Notes.)

The left side of the window is a viewer and the right side and bottom contain options which enable you to view, calculate and compare netlists.



The upper portion of the right side of the Netlist Analyzer consists of two similar sections.



Each of these sections can be used for any of four kinds of netlists: CAD, Reference, Current and Current-based CAD. However, the first time you input data, we recommend that you use the upper section for the CAD or Reference Netlist and the middle section for the Current or Current-based CAD.

Calculating and Viewing Netlists

In order to calculate and view a Netlist you must specify the relevant options. The process begins by selecting a Job and Step.

Here are the steps to start working with the Netlist Analyzer. Follow these steps using the upper section.



NOTE:

If you access the Netlist Analyzer from the Graphic Editor, then the job and step will already be set when the Netlist Analyzer is displayed.



Calculating a Netlist

Here is an example of how to calculate a netlist.

STEP 1: SELECT A JOB:

In order to select a job:

- Click the **Job** button to display the Jobs Popup.

Job :

- Select the **demo_design** job.

Job : demo_design

STEP 2: SELECT A STEP

To select a step:

- Click the **Step** button to display the Steps Popup.

Step :

- Select the **rev_a** step.

Step : rev_a

STEP 3: CHOOSE A NETLIST TYPE

Now you must choose a Type of Netlist. You can choose either a *Cad Reference*, *Current* or *Current-based CAD* Netlist.

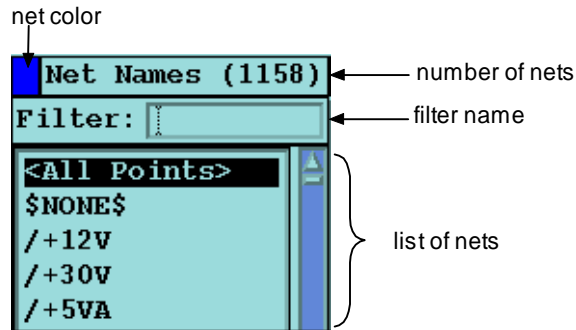
- Click the button in the *Type* field.

CAD
Reference
Current
Current based CAD



Net Names

This is a list of all the names of the nets appearing the selected netlist.



Feature	Description
net color	Indicates the color of the nets displayed in the viewing area. This color is the selection color in the upper section and the highlight color in the middle section.
number of nets	The the number displayed in the brackets is the total number of nets in this netlist.
filter name	A filter which allows you to selectively display a subset of nets in the netlist.
list of nets	This is a complete list of all the nets contained in this specific netlist.

VIEWING ALL NETS

When **<All Points>** is highlighted in the netlist, all the nets in the netlist are displayed.

VIEWING A SPECIFIC NET

In order to view a specific net, click on the net name in the netlist and it will be highlighted. A shapelist is first generated and then this specific net is displayed. In the Layer list beside the Net Names list an asterisk (*) appears next to each layer that participates in the connectivity of the currently selected net (see Layers list below).



Layers List

The layers of the select job are listed in the Layers list (stackup).

sst
smt
sig1
sig2
sig3
sig4

The layers shown here are the same layers which appear in the Job Matrix. When you choose a specific net, to view a specific layer, you click on a layer in the layer list. An asterisk (*) appears next to those layers that are included in the connectivity of the currently selected net in the Net Name list. In the example that follows there are features in *sig1* and *sig3* that participate in the netlist.

smt
* sig1
sig2
* sig3
sig4
pg5



TIP:

If you display a net and you do not see the asterisk () sign in the Layer list, then you should check if the shapes filters are turned off. The asterisk is displayed only when the Shapes filters are turned on.*

You can view either a single layer or multi layers. You choose this using the Single/Multi Layers button described in the next section.

Single/Multi Layer



The Single/Multi layer button will be displayed as either *Single Layer* or *Multi Layers* depending on what is selected. (The default is single.)

Single Layer
Multi Layers

Option	Description
Single Layer	Only features of a selected single layer can be displayed.
Multi Layers	More than one layer can be displayed at a time. (There is no limit to the number of layers which can be viewed).

Using the Zooming and Panning Options

STEP 1: USE NO ZOOM

Click on the Zoom home button.

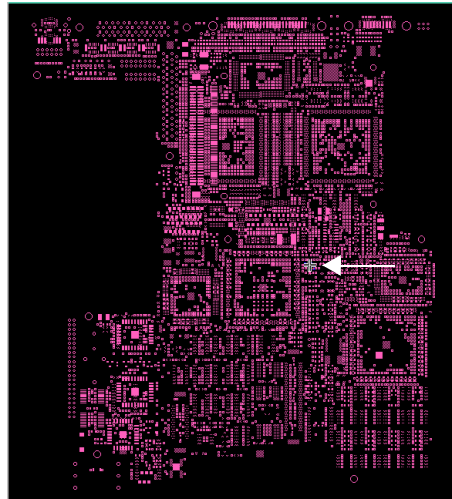


Set the zoom button to No Zoom.



In the upper section click on the net *16MHZ*.

You can see that the net is displayed in the viewing area without any zoom.



STEP 2: USE PAN ONLY

Change the Zoom button to *Pan only*.



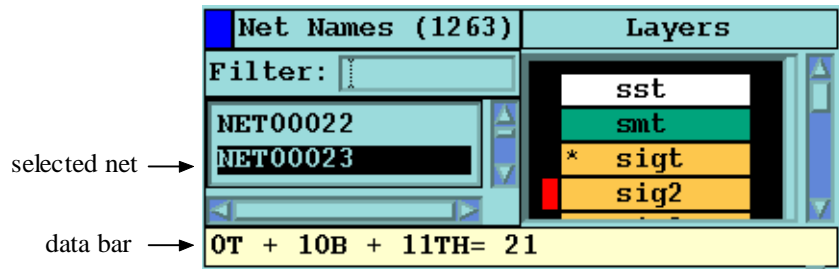
Since it is sometimes hard to understand complicated netlists, you can use the various graphic options and filters to help you. In the following section you will learn about the data bar which provides information about the net and we are going to learn about the shapes and points filter which gives you certain control over the graphic display.



Data Bar

The data bar displays details of the current net points.

T	Top. The number of net points on the top layer.
B	Bottom. The number of points on the bottom layer.
TH	Thruhole. The number of points on plated drills (via or plated through).



In the example above there are 0 top points, 10 bottom points and 11 thruhole points, with a total of 21 points in the net.



Using the Data Bar

Click on the net **16MHZ** in the Net Names list.

Look at the data bar for net 16MHZ.

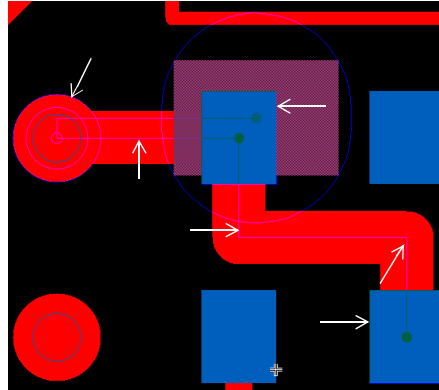
$2T + 1B + 1TH = 4$



Understanding the Shapes Outlines

STEP 1: DISPLAY THE TOP LAYER

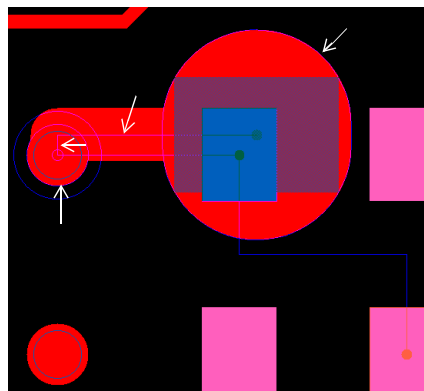
Click on the top layer **sig** in the Layer list and look at the shapes that are displayed.



You can see that the Shapes displays 2 rectangular outlines drawn for the 2 square pads in the top layer, skeleton lines for the two traces in the top layer and one rounded outline for the round pad in the top layer.

STEP 2: DISPLAY THE BOTTOM LAYER

Now click the bottom layer **sig** and look at the displayed shapes.



You can see that the shapes display contains one big oval outline for the big oval pad in the bottom layer, skeleton line for traces in the bottom layer and one smaller rounded outline for the rounded pad in the bottom layer.

STEP 2: VIEW THE BOTTOM POINTS

Click on **sigb** (bottom layer) in the Layer list. Turn on the **Bot** option in the Points filter.



Turn off the **Bot** option in the Points filter.

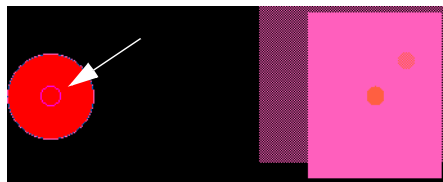


Do this several times and see how the 1 net point on the bottom layer appears and disappears.

Note that the bottom net point appears as a dashed circle in the highlight color.

STEP 3: VIEW THE TH POINTS

Click on **drill** (drill layer) in the Layer list. Turn on the **TH** option in the Points filter.



Turn off the **TH** option in the Points filter.



Do this several times and see how the 1 net point on the plated drill appears and disappears.

Note that the drill net point appears as a circle outline in the highlight color.



Comparing Netlists

The Compare function determines if two netlists have the same set of net points in terms of location and how the points are connected together.

This function determines if two netlists, the original CAD netlist and a netlist generated according to the graphics, have the same set of net points in terms of location and connections. This ensures that the connectivity built into the original design has been retained. Netlist comparison results are categorized into four types of violations: Shorted, Broken, Missing and Extra. (See the tutorial *Netlist Analyzer: Terms and Concepts* for a detailed explanation.)



Using the Compare Function

We will now go through the basic steps in using the compare function.

Any two kinds of netlists can be compared, however, we recommend that the first time you check a netlist, you compare a CAD Netlist with the Current-based CAD Netlist. You should first calculate the CAD Netlist (which is not really calculating, but actually reading it from the CAD Netlist file, e.g. IPC 356).

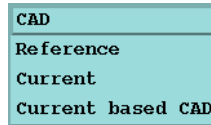
STEP 1: CALCULATE THE CAD NETLIST

Choose the Job and Step in the upper section.

Job: **demo_design**

Step: **rev_a**

Choose the type of netlist: **CAD**.



Click the **Recalc** Button to create the CAD Netlist.



When you click the upper Recalc button the CAD Netlist is displayed in the graphic display area on the left side of the window.

STEP 2: CALCULATE THE CURRENT-BASED CAD NETLIST

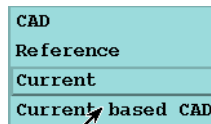
Here is how you create a Current-based CAD Netlist.

In the middle section, select the same job/step that you did for the upper section.

Job: **demo_design**

Step: **rev_a**

In the middle section choose **Current based CAD** Netlist.



This will be compared to the CAD Netlist you selected in the upper section.

To calculate the Current-based CAD Netlist, click the **Recalc** Button.

Clicking the Recalc button in the middle section generates the Current-based CAD Netlist.

STEP 3: COMPARE THE TWO NETLISTS

Click the **Compare** button to compare the two netlists: the CAD Netlist in the upper section and the Current-based CAD Netlist in the middle section.



NOTE:

If the netlist Recalc function in either the upper or middle section was not activated, then it will be automatically run when you click the Compare button.

After the Compare process is completed, if violations are found, the appropriate violation boxes will now be red.

Compare	Shorted (3)	broken (1)
Result	missing	extra



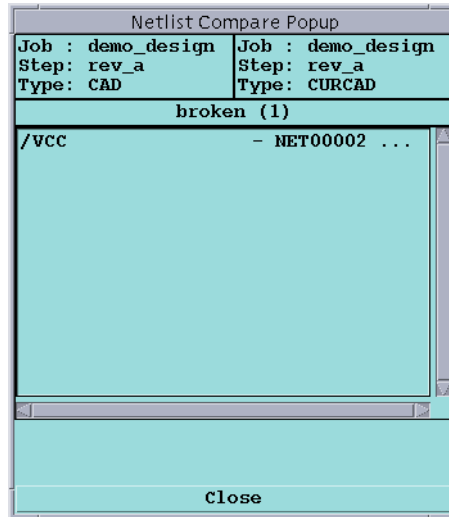
Viewing Violation Results

After completing the compare process the resulting violations (Shorted, Broken, Missing, Extra) are displayed in red, with the number of violations displayed in brackets. If there are no violations in a specific category, the box remains green. In order to view the violation results, click on a button which has turned red. The Netlist Compare Popup is displayed. This displays a list of the affected nets for the specific violation.

Click on the **Shorted** button (red) and the following popup is displayed.



Now click on the **broken** button and the following popup is displayed.



In the next tutorial we will see how we can understand which nets are shorted/broken and how we can locate the problem.

Other Features

Select by Net

When you want to select a specific net use the Net Selector icon.



First click this icon and then click on a net point in the netlist viewer. All the net points belonging to this net will be displayed and the name of this net will be highlighted in the Net Name list.

Click the **Net Selector** icon and click on a net point in the netlist viewer. See what results you get.

Printing

Print

When you click the Print button the usual print features available with Genesis are displayed.

Summary



In this tutorial you were presented with a general overview of the Netlist Analyzer. You learned about:

- How to access the Netlist Analyzer
- The Netlist Analyzer window
- Calculating and Viewing netlists
- Netlist viewing options
- Net shapes and points
- How to compare netlists
- Viewing violation results
- Additional Netlist Analyzer features.

The next tutorial will focus mainly on detecting shorts and break violations. Also it will describe what to do if the CAD Netlist is not aligned with the graphical data (registration) and you will learn how to set a netlist as a Reference Netlist.

Appendix

This section describes how to download the **demo_design** job used in this tutorial from Frontline's FTP site to your local system and how to install it in your local jobs directory. If you already have this job you can ignore this information.

Downloading demo_design.tgz by FTP

Here are the steps how to download the job by FTP.

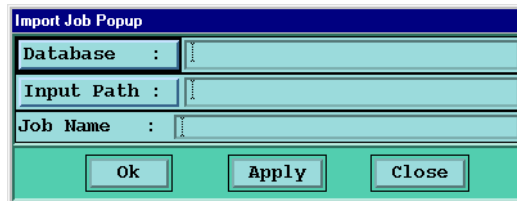
Installing the demo_design Job in your Database

Here is a description of how to take the demo_design.tgz from the local directory where it was downloaded to and install it as a job that can be read by Genesis.

- 1 Open the Engineering Toolkit.
- 2 Open the file menu and select **Import Job**.



The Import Job Popup is displayed.



- 3 Click on the Database button to display the Database Selection popup which lists your database directories.

