



# Painless Extraction NF

## User Manual

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# Overview

Painless Extraction Noise Figure allows for the extraction and analysis of noise figure and gain data from Noise Figure Meters. Data analysis is performed on both parameters to provide a wide array of statistical information. After data retrieval, the data may be saved to a file for future use.

## Key Features:

- Retrieves noise figure and gain data from Supported Noise Figure Meters.
  - Minimal user input is required to extract data after the Noise Figure Meter has been setup.
  - Extracts data across a specific, automatically generated frequency list.
- Save and load data for future recall
- A noise source ENR input table allows for ENR data to be sent to the meter.
- Large graphs and numeric displays may be manipulated to display the desired data over specified frequency ranges.
- Statistical analyses of the extracted data vs. the frequency include the following calculations: Average, Minimum, Maximum, P-P variation, RMS, Standard deviation, P-P flatness, Best Fit Line (BFL) curve fit, Slope of BFL, and P-P variation from BFL
- Script files may be created, loaded, and saved to identify pass/fail points in the selected data.
- A Test Results file may be saved to summarize the outcome of the pass/fail test.
- A Production Testing Mode makes it easy to quickly test multiple components and save their associated data files in an automated format.
- Purchase Painless Extraction NF to eliminate the hassle of noise figure measurements!



# Trial Version Limitations and System Requirements

- Trial Version
  - The trial version of Painless Extraction NF has all the features of the full version with a few limitations:
    - The ability to save data to a file is disabled.
    - The analysis frequency range is limited to 225 - 250 MHz.
  - The full version is available for purchase for \$159.99 (US Dollars). Buy now to unlock all program features.
  
- Compatible Noise Figure Meters
  - HP 8970A
  - HP 8970B
  - Agilent N897xA
  
- System Requirements
  - GPIB/HPIB Card
    - Noise Figure Meter and Computer require GPIB interfaces
    - Please Note: Software has been tested with NI GPIB-USB-B and Agilent 82357B.
  - Painless Extraction NF was designed to operate in the Windows XP, and Vista environments.



# Changes by Version

- Thank you for choosing Painless Extraction Noise Figure!
- \_\_ Current Version: 1.1.4 \_\_
- \_\_ Changes in Version 1.1.4 \_\_
- Enhanced the features to create and save .ini settings files.
- Added an Automated Mode for production testing. Users can now set up their test and enter the automated mode for a variety of options to enable automated saving of data files and test analysis files, along with options to include serial numbers, product numbers, tester information, and date information in the saved file names.
- Added a control for including the GPIB Interface Number on the Setup tab.
- The auto scaling feature on the Graphical Analysis tab has been reworked. Auto scaling is now off by default. There is a new button on the left hand side that when hit will auto scale the graph once. This should allow for consistency in user defined scaling between data extractions.
- A New Export to Excel feature was added to export the data from the Numeric Data tab to Excel.
- \_\_ Changes in Version 1.1.3 \_\_
- Added support for the Agilent N897xA meter.
- \_\_ Changes in Version 1.1 \_\_
- Added a VISA timeout for better readings when smoothing is enabled on the noise figure meter.



# Changes by Version Cont.

- Added controls for the auto scaling of the plots on both the Quick Plots tab and the Graphical Analysis tab. Disabling auto scaling when loading or extracting new data to keep the X and Y scales you have set.
- Fixed labeling errors.
- The Use Corrected Data option on the Setup tab is now enabled by default.
- The cursors on the Graphical Analysis tab are now defaulted to measured data, not the best fit line.
- \_\_ Changes in Version 1.0 \_\_
- Painless Extraction Noise Figure allows users to extract and analyze noise figure and gain data from noise figure meters.
- As always, we appreciate your feedback. We continually strive to improve our software packages based on your suggestions.
- We would like to thank you for choosing our product and for your continued support.
- Enjoy Painless Extraction Noise Figure!
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# Installing Painless Extraction NF

- To check out Painless Extraction NF for yourself, visit the R.A. Wood software download page at:  
[http://rawood.com/software\\_products/download\\_software\\_page.html#painless\\_extraction\\_nf\\_anchor](http://rawood.com/software_products/download_software_page.html#painless_extraction_nf_anchor)
- Select *Download Now!* next to the Painless Extraction NF \_ Installer.exe
- Click *Save File* to save the installer.
- After the installer download is complete, double click on the *Painless Extraction NF Installer icon* to start the installation process.
- Work through the user prompts to install Painless Extraction NF. Select *OK*.
  - Select a folder to save the Painless Extraction NF setup files to and select *OK*.
  - Select *Next>* on the Installation Wizard.
  - Browse to select a location to save the Painless Extraction NF program files to, and Select *Next>*.
  - Select *Next>* again to continue with the installation process.
  - Select *Finish* to exit and complete the installation.
- Once the installation is complete, go to *Start>>All Programs>>Painless Extraction NF* to load the program.
- An Electronic End User License Agreement will appear. Read the agreement and select *Agree* to continue.
- The Change Log will appear next. This document describes the software changes and improvements by version. Click *Continue* to start the program.
- On the start up screen, create a user name. This name will only be used for registration purposes.
  - Select *Register* to pay for the full version of Painless Extraction NF. You may pay through paypal or contact us with other arrangements.
  - Select *Continue* to use the trial version. Each time you open the trial version you will have the opportunity to register for the full version. In the trial version you are unable to save data files and the analysis frequency range is limited to 225-250 MHz.
- Click *Continue* again to use the trial version of Painless Extraction NF or enter the Registration number and click *Unlock Software* to access the full version.
- To view detailed screen shots of the installation process visit:  
<http://helprawoodsoftware.rawood.com/tiki-index.php?page=PainlessExtractionNF+Downloading+and+Installing+the+Program>

# Program Flow Diagram

**Noise Figure Meter:**

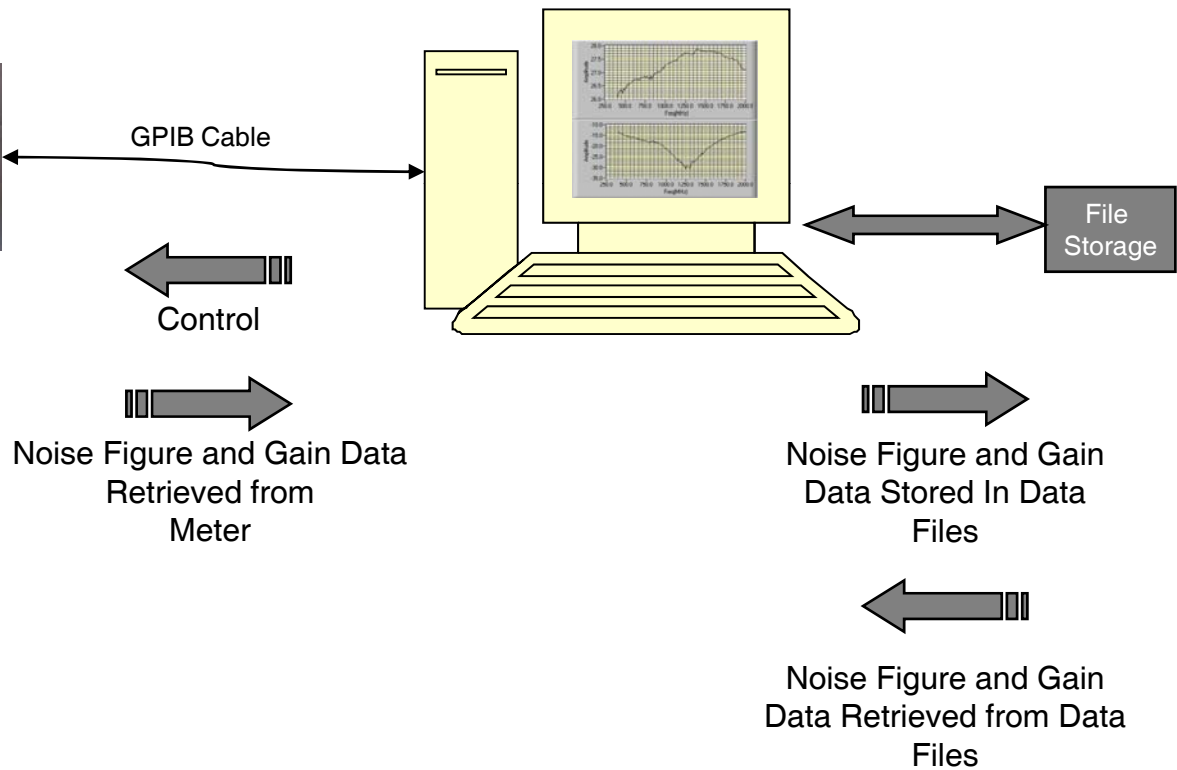
**HP 8970A**

**HP 8970B**



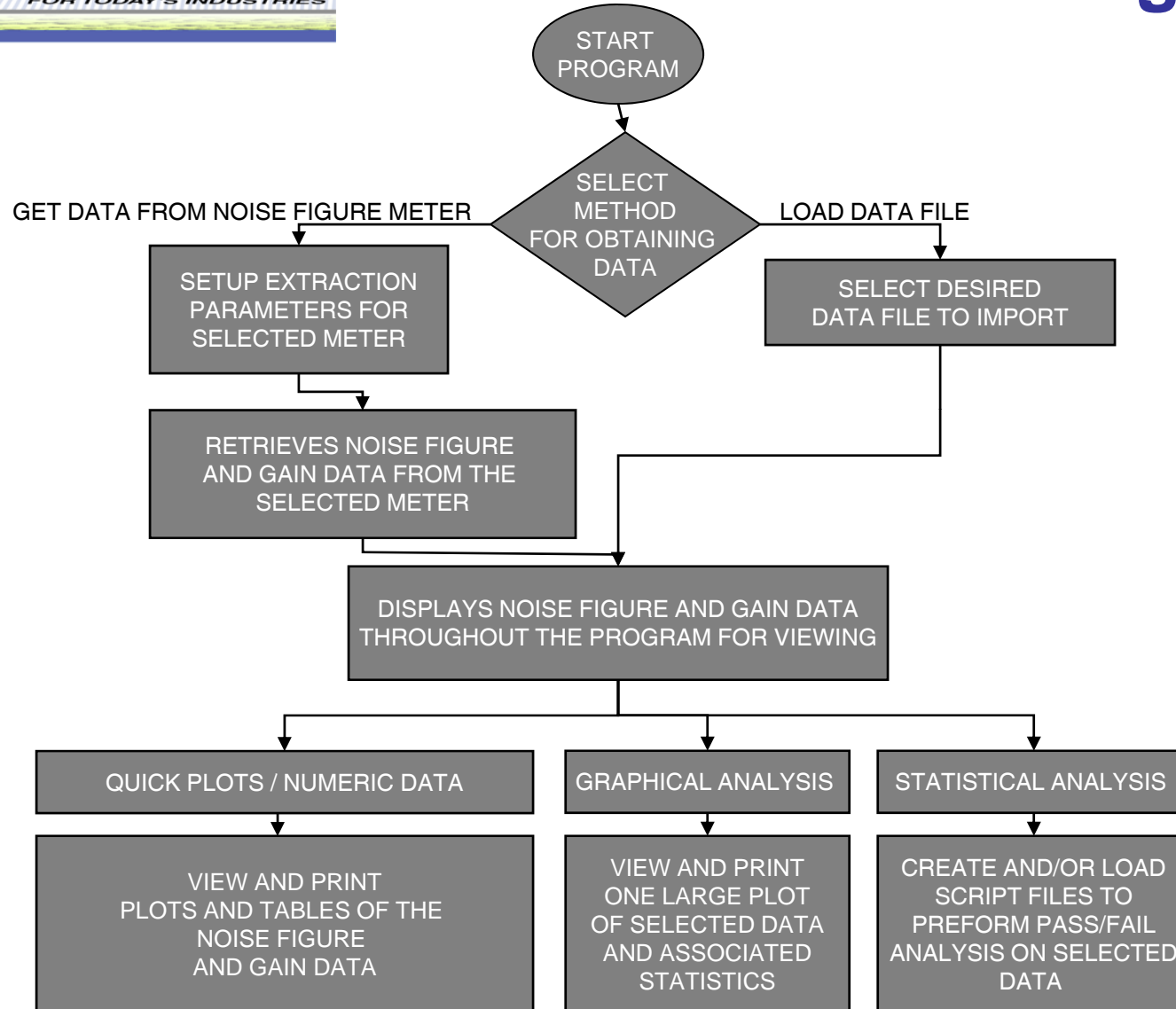
\* Picture source: <http://www.inxs-inc.com>

**PC Setup**





# Data Extraction Diagram





# Getting Started

Once Painless Extraction NF has been successfully installed and opened, the screen to the right will appear on your computer. From this location, you may get started by setting up the parameters for extracting data or select to import data from an existing file.

To import data from a file:

- A. Go to **File >> Open Data File...** or click on **Open File**

To extract data from a Noise Figure Meter:

- B. Manually setup the meter as desired for the test.
- C. Connect the GPIB cable between the meter and computer.
- D. On the Setup Tab, select the **meter model number** that you are using and fill in the associated setup parameters (*GPIB Address, Start Frequency, Stop Frequency, and Step Size*)

- E. Click on **Get Data from Meter**

To save data to a data file:

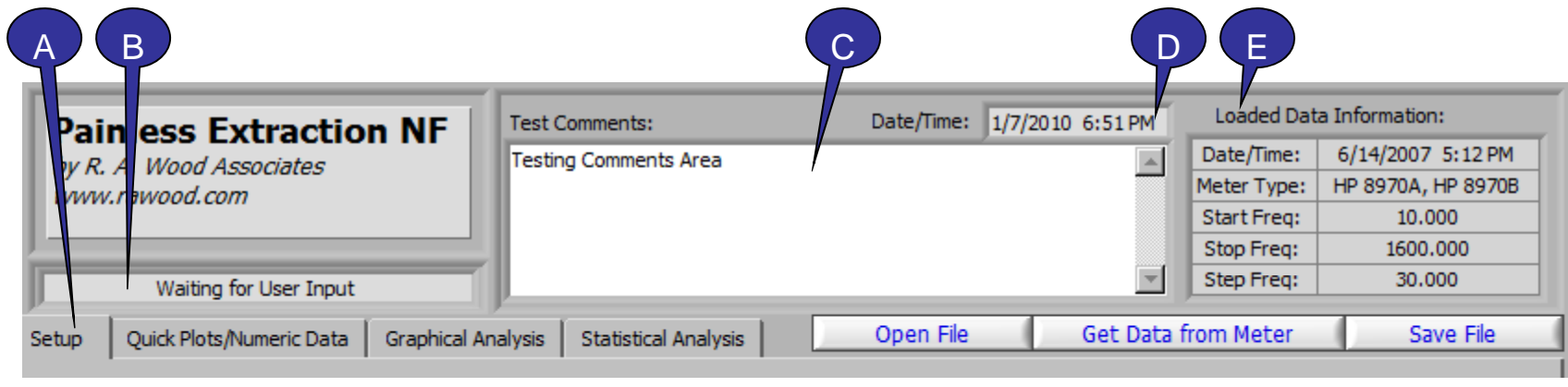
- F. Go to **File >> Save Data File...** or click on **Save File**

The screenshot shows the 'Painless Extraction NF' software interface. Callout A points to the 'Open File' button in the top toolbar. Callout B points to the 'Noise Figure Meter Series' dropdown menu. Callout C points to the 'GPIB Address of Meter' and 'GPIB Interface Number' input fields. Callout D points to the 'Start Freq (MHz)', 'Stop Freq (MHz)', 'Step Size (MHz)', and 'No. Points' input fields. Callout E points to the 'Get Data from Meter' button in the top toolbar. Callout F points to the 'Save File' button in the top toolbar. The interface also includes a 'Loaded Data Information' window, a 'Noise Source ENR Table', and a 'Data File' path at the bottom.



# Program Operation

- A. This program is divided up into four tabs for easy navigation. At any time, you may select to view the *Setup Tab*, the *Quick Plots/Numeric Data Tab*, the *Graphical Analysis Tab*, and the *Statistical Analysis Tab* by simply clicking on the associated tab.
- **Setup** - Choose the noise figure meter series, enter the setup parameters, change the channel descriptions, and select various options for the output of data.
  - **Quick Plots/Numeric Data** – View plots of Noise Figure vs. Frequency and Gain vs. Frequency as well as a data table displaying both Noise and Gain data.
  - **Graphical Analysis** - A large plot and statistical analysis of the selected data is displayed.
  - **Statistical Analysis** - Use this tab to load and/or edit script files to be used for Pass/Fail analysis of data.
- B. Throughout the program operation, the **Status Bar** displays the current status of the Noise Figure Meter and the program.
- C. Type **Test Comments** here to be added to the data file and printed with the test results.
- D. Displays the current **Date and Time**.
- E. **Latest Extraction Information** displays the setup parameters that were used during the last extraction or for the most recently opened data file.







# Setup Tab – Extract Data

To Extract Data:

- Manually setup the Noise Figure Meter for the test.
- Connect the GPIB cable between the meter and the computer.
- On the Setup Tab, enter the appropriate parameters as follows:

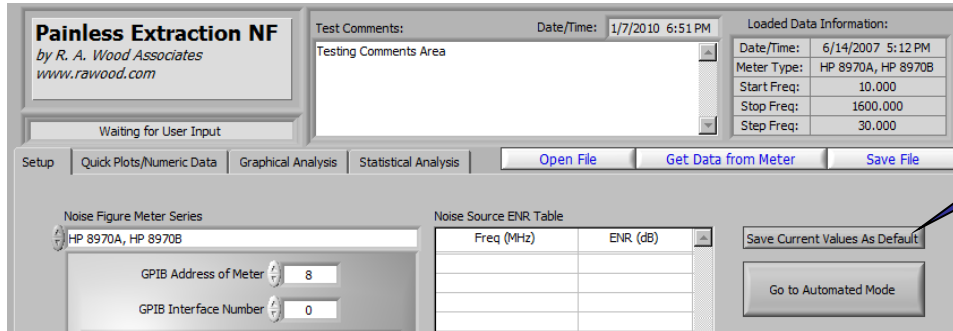
The screenshot shows the 'Setup' tab of the 'Painless Extraction NF' software. The interface includes a menu bar with 'Setup', 'Quick Plots/Numeric Data', 'Graphical Analysis', and 'Statistical Analysis'. Below the menu are buttons for 'Open File', 'Get Data from Meter', and 'Save File'. The main area is divided into several sections:

- Noise Figure Meter Series:** A dropdown menu showing 'HP 8970A, HP 8970B' (Callout A).
- GPIB Address of Meter:** A text input field containing '8' (Callout B).
- GPIB Interface Number:** A text input field containing '0' (Callout B).
- Start, Stop, and Step Frequencies:** A section with labels 'Please manually enter the Start, Stop, and Step Frequencies.' and input fields for 'Start Freq (MHz)' (10.00), 'Stop Freq (MHz)' (1600.00), and 'Step Size (MHz)' (30) (Callout C).
- Frequency List:** A table with columns 'Freq (MHz)' and 'ENR (dB)' (Callout D).
- Automatically Write Data to File after Extraction:** A checkbox that is unchecked (Callout D).
- Use Corrected Data:** A checked checkbox (Callout E).
- Change Parameter Descriptions:** An unchecked checkbox (Callout F).
- Channel Descriptions:** Two text input fields, one containing 'Noise Figure' and the other 'Gain' (Callout F).
- Buttons:** 'Save Current Values As Default' and 'Go to Automated Mode' (Callout G).
- Bottom Bar:** 'Save to File', 'Load File', and 'Send to Meter' buttons, and a 'Data File' path: 'C:\Program Files\PainlessExtractionNoiseFigure\noise\_figure\_data.txt'.

- A. Noise Figure Meter Series** - Select the appropriate meter.
- B. GPIB Address of Meter** - Enter the General Purpose Interface Bus Address of the Noise Figure Meter.
- C. Setup Parameters** – Enter the *Start Frequency*, *Stop Frequency*, and *Step Size* as it appears on the meter. The Number of Points and Frequency List will automatically update accordingly.
- D. Automatically Write Data to File After Extraction** - Saves the data to a data file after extraction.
- E. Use Correction Data** – Extracts data with the calibration correction factor.
- F. Change Channel Descriptions** – Select this option to overwrite the default channel names. These names will appear on all charts and graphs throughout the program.
- G.** When all setup parameters are set as desired, Click on **Get Data from Meter** button.



# Settings Files



Painless Extraction NF utilizes a settings file to store the default test setup that is loaded at the start of program operation. This file is stored in an \*.ini format. The following parameters are saved in the default setup file:

- **Setup Tab:** Noise Figure Meter Series, Start Freq (MHz), Stop Freq (MHz), Step Size, Automatically Write Data to File after Extraction, Use Correction Data, Change Channel Descriptions, GPIB Address of Meter, and GPIB Interface Number
- **Graphical Analysis Tab:** Parameter, Analyze Freq Start (MHz), Analyze Freq Stop (MHz)

The default settings may be overwritten to reflect the setup that you use most.

- A. Save Current Setup As Default** – Click here to save the current setup parameters as default. Default values will automatically load when Painless Extraction NF is opened, and whenever the *Reset Setup to Default* option is selected. Once the existing default values are overwritten, they may not be retrieved.





# Quick Plots - Numeric Data Tab

The Quick Plots/Numeric Data Tab is the place to go to easily view Noise Figure and Gain data across the entire frequency range. Data is displayed to the millionths place.

- A. For more detailed and editable graphs, go to the **Graphical Analysis Tab**.
- B. To change the titles of these graphs, go to the *Setup Tab* and select **Change Channel Descriptions**. The user entered channel descriptions will become the titles for all graphs and charts throughout the program.
- C. **Export Data to Excel** – The Noise Figure and Gain vs. Frequency data table may be exported to Excel by clicking this button. Please note that Excel must be installed on the computer for this option to be available. Once exported, all regular features of Excel are available.
- D. **Data File** - If a data file was loaded or saved, the file location will be displayed at the bottom of the tab.

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Date/Time: 1/7/2010 6:52 PM

Loaded Data Information:  
Date/Time: 6/14/2007 5:12 PM  
Meter Type: HP 8970A, HP 8970B  
Start Freq: 10.000  
Stop Freq: 1600.000  
Step Freq: 30.000

Waiting for User Input

Test Comments:  
Testing Comments Are

Setup Quick Plots/Numeric Data Graphical Analysis Statistical Analysis

Open File Get Data from Meter Save File

Export Data to Excel

Noise Figure/Gain Data

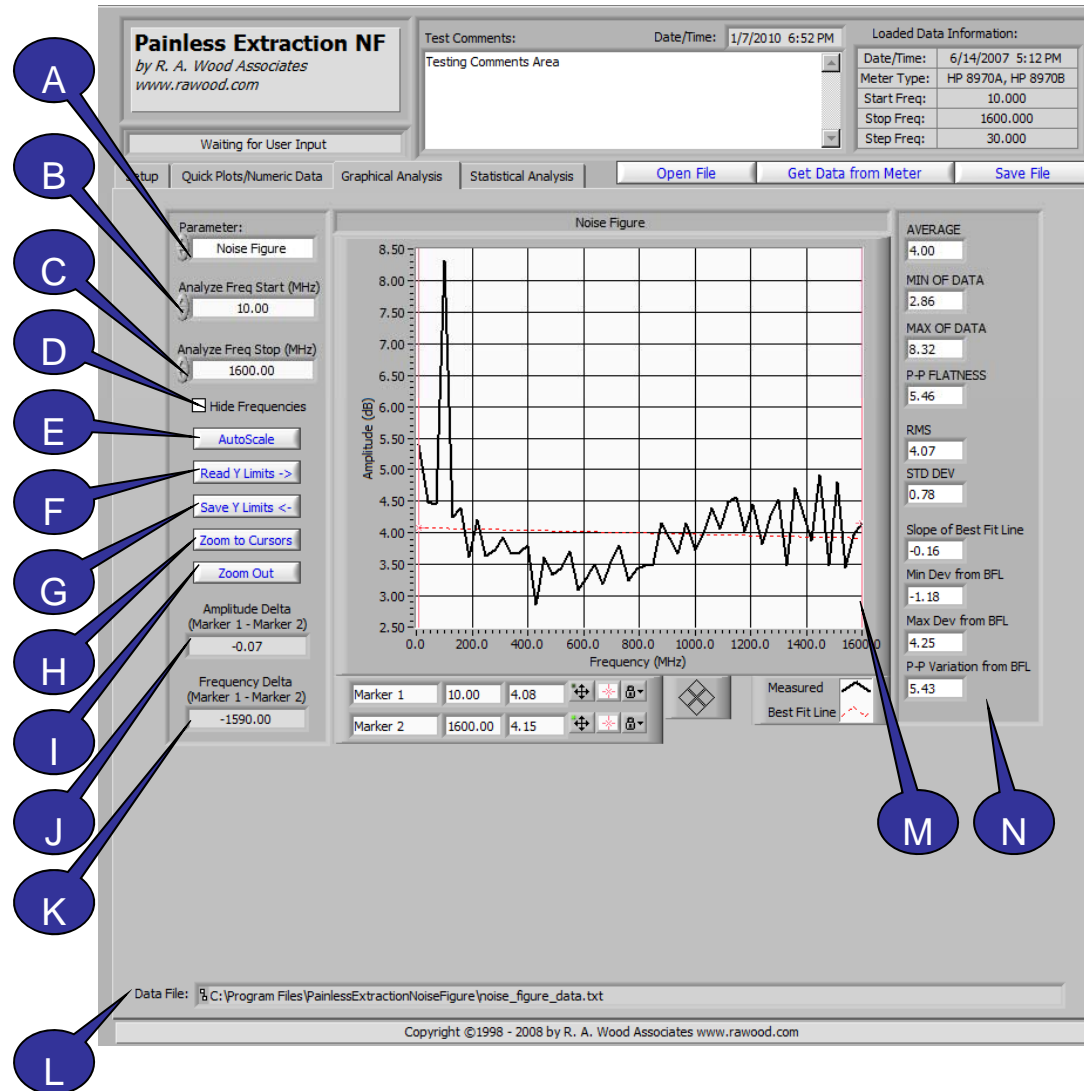
Freq (Mhz)	Noise Figure	Gain
10.000000	5.396000	11.021000
40.000000	4.494000	11.476000
70.000000	4.452000	11.761000
100.000000	8.317000	11.976000
130.000000	4.247000	11.740000
160.000000	4.387000	11.786000
190.000000	3.620000	12.327000
220.000000	4.202000	11.934000
250.000000	3.628000	12.127000
280.000000	3.733000	12.144000
310.000000	3.928000	11.881000
340.000000	3.676000	12.114000
370.000000	3.686000	12.252000
400.000000	3.809000	12.078000
430.000000	2.856000	12.509000
460.000000	3.613000	12.234000
490.000000	3.334000	12.052000
520.000000	3.452000	12.282000
550.000000	3.703000	12.258000
580.000000	3.093000	12.220000
610.000000	3.281000	11.975000
640.000000	3.496000	12.404000
670.000000	3.179000	12.070000
700.000000	3.538000	12.127000

Data File: C:\Program Files\PainlessExtractionNoiseFigure\noise\_figure\_data.txt

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# Graphical Analysis Tab



The Graphical Analysis Tab provides a large plot of the selected parameter and detailed statistical analysis.

- A. Parameter** – Select between Noise Figure and Gain data to be displayed on the graph by selecting it from the pull down menu.
- B. Analyze Start Frequency (MHz)** - Input the desired start frequency in MHz for the plot. This value does NOT have to be the same as the start frequency used to extract data.
- C. Analyze Stop Frequency (MHz)** - Input the desired stop frequency in MHz for the plot. This value does NOT have to be the same as the stop frequency used to extract data.
- D. Hide Frequencies** - Select this option to hide the frequencies on the graph. This feature may be useful for printing and presenting proprietary data.
- E. Autoscale** - Click here to automatically scale the graph to fit the data plot of the selected *Parameter*.
- F. Read Y Limits** - Click here to reset the Y Limits to the values saved with the << *Save Y Limits* button.
- G. Save Y Limits** - Click here to save the current Y Limits for future recall. To reset the graph to these saved limits, select *Read Y Limits* >>.



# Graphical Analysis Tab Continued

- H. Zoom to Cursors** – Click here to zoom in on the graph. The graph will zoom in on the section between the red marker lines. You may adjust the red marker lines by clicking and dragging them to a new location on the graph or by entering a value in the box marked marker 1 or marker 2 respectively.
- I. Zoom Out** – Click here to zoom out on the graph.
- J. Amplitude Delta** – Calculates and displays the difference between the amplitude of Marker 1 and Marker 2. Make sure that both marker lines are *Snapped To* the same line on the graph (Measured or Best Fit) to assure accuracy.
- K. Frequency Delta** – Calculates and displays the difference between the frequency of Marker 1 and Marker 2. Make sure that both marker lines are *Snapped To* the same line on the graph (Measured or Best Fit) to assure accuracy.
- L. Data File** – The path to the saved or loaded data file is displayed here. To load or save to a different location, select *Save Data File* or *Open Data File* respectively.
- M.** You may click and drag the **red marker lines** to any location on the graph or enter a numeric value for their location below. Then you may zoom to the selection between the marker lines by clicking on the *Zoom to Cursor* button.
- N.** The **statistics** for the selected parameter are displayed to the right of the graph. For a detailed description of these quantities see the following page.



# Graphical Analysis Tab Cont.

The following statistics are calculated and displayed on the *Graphical Analysis* tab based on the selected *Parameter* displayed on the graph between the *Analyze Freq Start (MHz)* and the *Analyze Freq Stop (MHz)*.

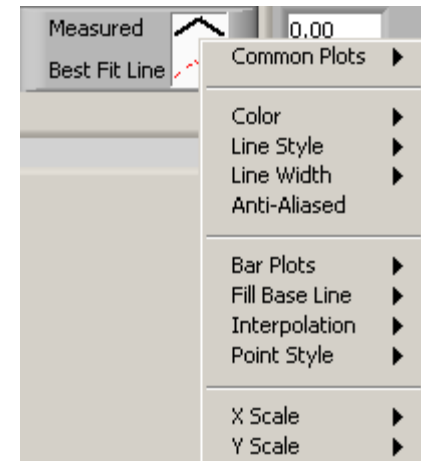
- **AVERAGE** - The value obtained by averaging the amplitude values between the *Analyze Start Freq* and the *Analyze Stop Freq*.
- **MIN OF DATA** - The Minimum amplitude value of the actual trace.
- **MAX OF DATA** - The Maximum amplitude value of the actual trace.
- **P-P FLATNESS** - The Peak to Peak Variation or the difference in amplitude between the *Min of Data* and the *Max of Data*
- **RMS** - The Root Mean Square value of the Data measured across the frequency band
- **STD DEV** - The Standard Deviation of the measured amplitude across the frequency band
- **Slope of Best Fit Line** - Measures the slope from the *Start frequency* to the *Stop frequency* of the Best Fit Line
- **Min Dev from BFL** - The value between *Min of Data* and the *Best Fit Line* at the *Min of Data* frequency point.
- **Max Dev from BFL** - The value between *Max of Data* and the *Best Fit Line* at the *Max of Data* frequency point.
- **P-P Variation from BFL** - The sum of the *Max Dev from BFL* and the *Min Dev from BFL* values.

AVERAGE	-10.89
MIN OF DATA	-20.39
MAX OF DATA	-1.23
P-P FLATNESS	19.16
RMS	12.24
STD DEV	5.58
Slope of Best Fit Line	19.24
Min Dev from BFL	-0.78
Max Dev from BFL	0.90
P-P Variation from BFL	1.68



# Line Display Options

- The color and style of the Measured and Best Fit line on the graph on the Graphical Analysis Tab may be customized. Left click on the Measured or Best Fit Line field to view an options menu.
- **Common Plots:** The *common plots* menu may be used to change the data display options. These options change the way in which the data points are connected and delineated. By default the standard line without individual data points is selected.
- **Color:** Select a custom color for the data line to make a bold presentation. By default the Measured line is black and the Best Fit line is red.
- **Line Style:** Use the *Line Style* menu to select between dashed and solid lines. By default the Measured line is solid and the Best Fit line is dashed.
- **Line width:** The *Line width* may be adjusted to accentuate the Data or Best fit line.
- **Point Size:** Use the *Point Size* menu to visually define the individual data points. Selecting any of the options in this menu will create bullets at each of the extracted frequencies on the graph
- **Other:** The remaining options (Anti-Aliased, Bar Plots, Fill Baseline, Interpolation, X Scale, and Y Scale) should be left on their default values. Although no harm will come in changing these options, they do not apply to the tests and presentation realm of PainlessExtraction NF.





# Marker Line Properties

On the graph there are two green marker lines. These lines may be used to specify a region of focus on the graph. You may move these lines to any location by clicking and dragging them to a position or by entering a coordinate (Frequency, Amplitude) in the appropriate field. You may change the color and style of the marker lines by left clicking on the green star shaped button next to the desired marker line.



- **Color:** Select a custom color for the marker lines to make them stand out or allow them to hide in the background.
- **Cursor Style:** The *cursor style* option changes the look of the marker lines. You may choose between a single vertical line, cross hairs, or a single horizontal line.
- **Point Style:** Use the *Point Size* menu to visually define the point at which the marker line crosses the data line.
- **Line Style:** Use the *Line Style* menu to select between dashed and solid lines. By default the marker lines are solid.
- **Line width:** The *Line width* may be adjusted to accentuate or deemphasize the marker lines.
- **Show Name:** The *Show Name* option will display the name of the marker line on the graph.
- **Bring to Center:** *Bring to Center* moves the marker line to the center of the graph.
- **Go to Cursor:** *Go to Cursor* shifts the graph to be centered around the current location of the marker line.
- **Lock Position:** To lock the marker lines to a fixed location, left click on the button with the lock next to the appropriate marker line.
- **Measured or Best Fit Line:** The *Measured or Best Fit Line* option determines which line the marker line will lock to. The cursor on the marker line will lock on the appropriate line.
- **Amplitude Delta and Frequency Delta:** The marker lines may be used to determine the difference in measurement between any two points. The *Amplitude Delta* and *Frequency Delta* fields display the difference in magnitude of Marker 1 - Marker 2. Make sure that both marker lines are locked to the same line on the graph (Measured or Best Fit) to assure accuracy.



# Statistical Analysis Tab

The Statistical Analysis Tab may be used to open, create, and save script files. A script file is used on this tab to perform pass/fail analysis of the data. Once the script file has been run, a test results file may be saved.

- A. Statistical Script File** - Please view the following pages for detailed information on creating a script file.
- B. Clear Table** - Click here to clear the *Statistical Script File* and the *Test Results* table. All cleared data will be lost.
- C.** To save a script file, go to **File >> Save Script File...** or click on **Save Script File**.

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Test Comments: Date/Time: 1/7/2010 6:52 PM Loaded Data Information:  
Testing Comments Area Date/Time: 6/14/2007 5:12 PM  
Meter Type: HP 8970A, HP 8970B  
Start Freq: 10.000  
Stop Freq: 1600.000  
Step Freq: 30.000

Waiting for User Input

Setup | Click Plots/Numeric Data | Graphical Analysis | **Statistical Analysis** | Open File | Get Data from Meter | Save File

**D** Open Script File | Save Script File | Clear Tables

Use this tab to load and/ or edit script files in the table below. The measured data and Pass/Fail columns will be filled in automatically. Only numeric entries are valid for the Limit Min, the Limit Max, the Stat Start Freq, and the Stat Stop Freq columns. Use the following formats for the Parameter and the Statistic Type.

Format for Parameter: f for Noise Figure, g for Gain  
Statistic Type Options: Enter only the characters in parentheses  
Average (avg) Min of data (min) Slope of Best Fit Line (slope) Min Deviation from BFL (min dev)  
RMS (rms) Max of data (max) P-P Deviation from BFL (p-p dev) Max Deviation from BFL (max dev)  
P-P Flatness (p-p) Standard Deviation (std)

**A** Test Script:

Test No	Test Label	Measured	Limit Min	Limit Max	Units	Pass/Fail	Parameter	Stat Start Freq (MHz)	Stat Stop Freq (MHz)	Statistic Type
1	Average Gain		-30	30	dB		g	225	250	avg
2	Maximum Noise Figure		-30	30	dB		f	225	250	max

Script File:

**F** Test Results:

Test No	Test Label	Measured	Limit MIN	Limit MAX	Units	Pass/Fail
1	Average Gain	12.13	-30.00	30.00	dB	PASS
2	Maximum Noise Figure	3.63	-30.00	30.00	dB	PASS

Test Results File:  **G** Save Test Results

Data File:  C:\Program Files\PainlessExtractionNoiseFigure\noise\_figure\_data.txt

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# Statistical Analysis Tab Continued

- D. To open a script file, go to **File >> Open Script File...** or click on **Open Script File**.
- E. **Statistical Script File** - This field displays the path to the location that the *Statistical Script File* has been saved to or loaded from.
- F. **Test Results** - This table displays the test results from the *Statistical Script File*. It contains the first seven columns from the table above with the *Measured* data and the *Pass/Fail* determination filled in.
- G. To save a test results file, go to **File >> Save Test Results File...** or click on **Save Test Results**.
- H. **Test Results File** - This field displays the path to the location that the *Test Results* file has been saved.
- I. **Data File** - If a data File was loaded or saved, the file location will be displayed at the bottom of the tab.



# Script File

Below is a sample Script File that was created in Painless Extraction NF and opened in Excel. This file may also be opened in Notepad, or Word Pad. The script file is used to perform Pass/ Fail analysis on the data retrieved from the meter or a data file. A script file may be loaded into Painless Extraction NF and edited, or a new file may be created within the program. To create a script file, type the desired specifications in the table on the Statistical Analysis Tab. The script file will be read line by line. If one line is left empty, the remainder of the file will be ignored. Please note that loading a script file will erase any data that is currently in the table. Save this data first.

	A	B	C	D	E	F	G	H	I	J	K
1	Test No	Test Label	Measured	Limit Min	Limit Max	Units	Pass/Fail	Parameter	Stat Start Freq (MHz)	Stat Stop Freq (MHz)	Statistic Type
2	1	Average Gain		-30	30	dB		g	225	250	avg
3	2	Maximum Noise Figure		-30	30	dB		f	225	250	max
4											





# Script File Continued

- **Test No.** - Reference Number of the Test. This is not a required field.
- **Test Label** - Description of the Test. Use descriptive labels to help troubleshooting results after the tests. This is not a required field.
- **Measured** - Value measured by the test. This will be blank in the script file. It will be filled in on the *Test Results* table.
- **Limit Min** - Minimum value to be compared with the *Measured* value. Only a numeric entry is valid. Use the units column or *Test Label* for a description.
- **Limit Max** - Maximum value to be compared with the *Measured* value. Only a numeric entry is valid. Use the units column or *Test Label* for a description.
- **Units** - Units that the test will be measured in.
- **Pass/Fail** - Determined by checking whether the *Measured* value falls between the Limit Min and Limit Max. This will be left blank on the *Statistical Script File* and automatically filled in on the *Test Results* table.
- **Parameter** - This is the type of data that will be analyzed. Only enter the characters in parentheses.
  - Noise Figure (f)
  - Gain (g)
- **Stat Start Freq (MHz)** - Starting frequency of the measurement from which statistics are obtained. Only a numeric entry in MHz is valid.
- **Stat Stop Freq (MHz)** - Ending frequency of the measurement from which statistics are obtained. Only a numeric entry in MHz is valid.



# Script File Cont.

- **Statistic Type** - This data field represents which statistic will be determined from the selected *Parameter*, within the limits of *Stat Start Freq* and *Stat Stop Freq*. Statistic Type Options (Only the characters in parentheses are valid entries):
  - Average (avg)
  - Min of Data (min)
  - Max of Data (max)
  - P-P Flatness (p-p)
  - RMS (rms)
  - Standard Deviation (std)
  - Slope of Best Fit Line (slope)
  - Min Deviation from BFL (min dev)
  - Max Deviation from BFL (max dev)
  - P-P Variation from BFL (p-p dev)



# Test Results File

Below is a sample Test Results File that was created in Painless Extraction NF and opened in Excel. This file may also be opened in Notepad, or WordPad. The top of the file contains the test date/time, text comments, and the noise figure meter setup information. After this header information, the test results table is displayed.

- This table contains the test results from the script file. It has the first seven columns from the script file table with the Measured data filled in and the Pass/Fail determination filled in.
- You may save the test results to a file by clicking on the *Save Test Results* button on the Statistical Analysis Tab or by going to *File >> Save Test Results File...*

	A	B	C	D	E	F	G
1	Mini circuits amplifier						
2	Test No	Test Label	Measured	Limit MIN	Limit MAX	Units	Pass/Fail
3	1	Average G	12.13	-30	30	dB	PASS
4	2	Maximum	3.63	-30	30	dB	PASS
5							



# Data File

Below is a sample data file that was saved using Painless Extraction NF and opened in Notepad. These files are tab delineated text files that may be opened using Notepad, Word Pad, or Excel. The top of the file contains the header information which includes the test date/time, test comments, and the setup parameters for the noise figure meter used. The rest of the file is tab separated data.

```
noise_figure_data - Notepad
File Edit Format View Help
<File Type>
Noise Figure Meter Data
</File Type>
<Header>
Date/Time:      6/14/2007  5:12 PM
Meter Type:     HP 8970A, HP 8970B
Start Freq:     10.000
Stop Freq:      1600.000
Step Freq:      30.000
Descriptions:   Noise Figure   Gain
Comments:       Testing Comments Area
</Header>
<Data>
10.000  5.396  11.021
40.000  4.494  11.476
70.000  4.452  11.761
100.000 8.317  11.976
130.000 4.247  11.740
160.000 4.387  11.786
190.000 3.620  12.327
220.000 4.202  11.934
250.000 3.628  12.127
280.000 3.733  12.144
310.000 3.928  11.881
340.000 3.676  12.114
```



# Production Testing Mode

The Production Testing Mode enables the user to quickly test multiple components and save the results to a file in an automated fashion.

Before entering the *Production Testing Mode*, setup the *Noise Figure Meter Series* parameters on the *Setup* tab, and the *Statistical Script File* on the *Statistical Analysis* tab.

- A. Click here to enter the **Production Testing Mode**. A dialog box will open in which the user can setup the production testing settings.
- B. **Save Data File** - Select this option to automatically save the data to a file after the extraction is complete. The data file will be saved in the *Save Data Directory* under the name displayed in *the File Name Preview* below.
- C. **Save Data Directory** - This field displays the path to the directory in which the data file will be saved after the extraction is complete. To select a new directory, click the file folder to the right, and browse for the desired save location. Once you have located the desired directory, click the *Current Directory* button.

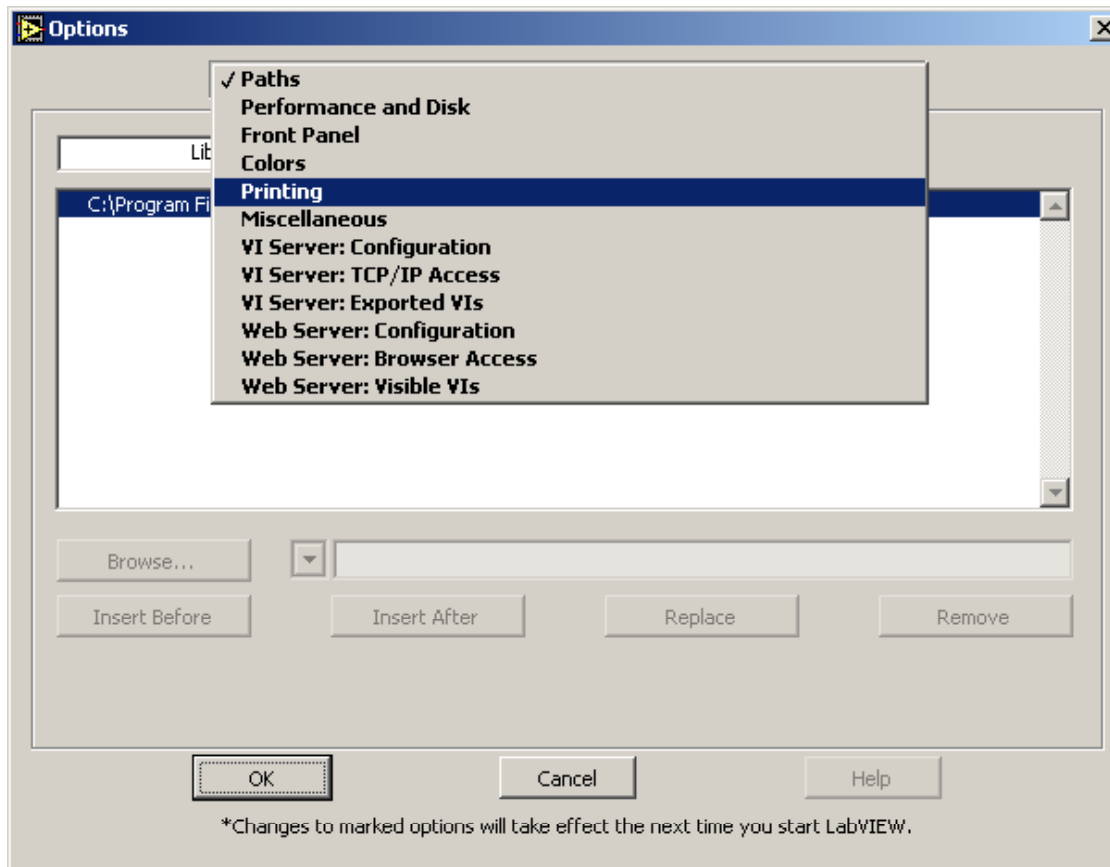


# Production Testing Cont.

- D. Save Test Results** - Select this option to automatically generate and save a test results file after the extraction is complete. The test results file is generated using the statistical script file that is open on the *Statistical Analysis* tab of PainlessExtraction NF. The script file must be opened in PainlessExtraction NF before the Production Testing may begin. The test results file will be saved in the *Save Test Results Directory* under the name displayed in the *File Name Preview*.
- E. Save Test Results Directory** - This field displays the path to the directory in which the test results file will be saved after the extraction is complete. To select a new directory, click the file folder to the right, and browse for the desired save location. Once you have located the desired directory, click the *Current Directory* button.
- F. Date/Time** - Select this option to included the current date and time in the file name for the *Data File* and the *Test Results*. Select between *Numeric Format* and *3 Letter Format* for the format of the date and time.
- G. Serial Number** - Select this option to include the *Serial Number* in the name of the *Data File* and the *Test Results File*. Enter the *Serial Number* in the field to the right.
- H. Tester** - Select this option to include the Tester's name or initials in the name of the *Data File* and the *Test Results File*. Enter the Tester's name or initials in the field to the right.
- I. File Name Preview** - This field displays the naming scheme for the *Data File* and the *Test Results File*.
- J. Part Number** - Enter the Part Number here to include it in the file name of the *Data File* and the *Test Results File*.
- K. File Name Format** - Select the desired file name format from the drop-down menu. See the *File Name Preview* to view the selected format.
- L. Start Extraction** – Click here to extract data from the Noise Figure Meter Series and perform the production testing.
- M. Exit** – Click here to exit the Production Testing Mode and return to Painless Extraction NF.

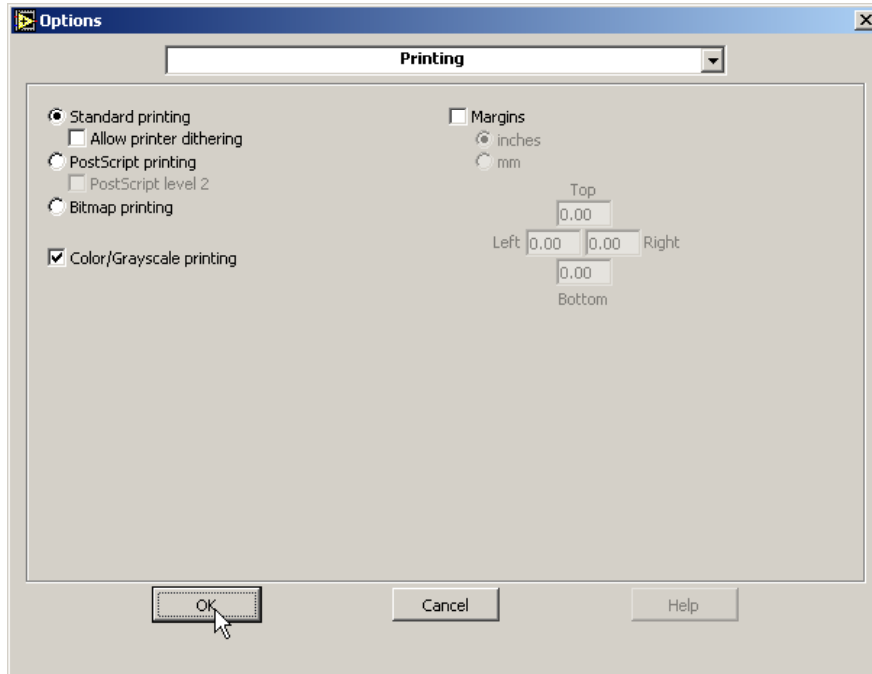
# Printing

- The default printer is set for a postscript type printer.
- To print on an ink jet printer go to **Tools>>Options**. In the pop up window, click on the arrows next to Paths and select **Printing**.

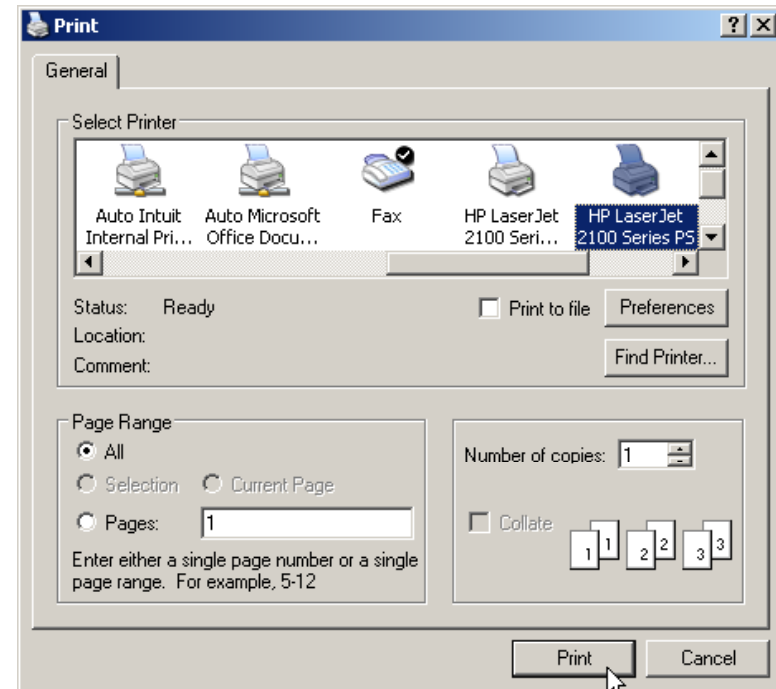


# Printing Cont.

- Set the printing options to **Standard Printing** and click **OK**.



- On the panel that you want to print, go to **File>>Print Window....** In the dialog box select the ink jet printer and click **Print**



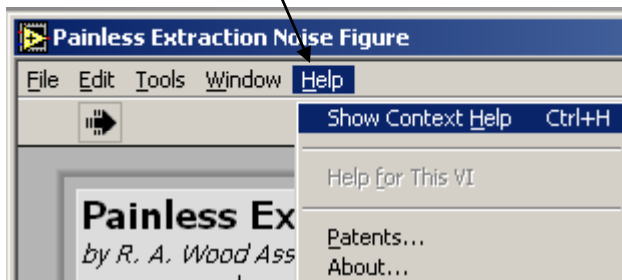




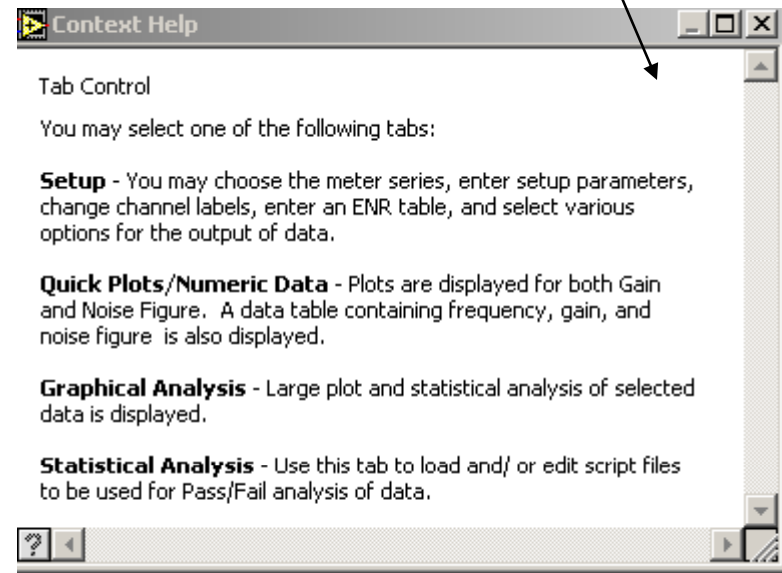
# Help Menu

- For help on functions while Painless Extraction NF is running, go to Help >> Show Context Help. This will bring up a window with helpful tips that change according to the location of your mouse. Drag your mouse over buttons, graphs, or tables to view detailed descriptions of their functions (see example below).
- For additional Help resources please visit our Software Support Forum at: <http://helprawoodsoftware.rawood.com/tiki-index.php> As always, if you run into problems, don't hesitate contact us any time at 315-735-4217 or [rawood@rawood.com](mailto:rawood@rawood.com)

Click on Show Context Help to bring up Help window.



This is an example Context Help Window that is displayed when the mouse button hovers over the Tab Control. Move the mouse to hover over different buttons, graphs, or tables to view help on other functions.





# Purchasing Information

- We currently offer several methods for purchasing our software products:
  - Select the desired method from within the program itself (recommended for single purchases)
  - Use the PayPal Forms on our software download page : [http://rawood.com/software\\_products/purchase\\_software.html](http://rawood.com/software_products/purchase_software.html) (useful for purchasing multiple programs)
  - Fill out the WWW form
  - Contact us directly so we can contact you for payment arrangements
- When purchasing, please double check that both your User Name and Registration Key are correct.

