

# Application Notes

The Use of a Computer to Process 2123/33 Disk Data





# The Use of a Computer to Process 2123/33 Disk Data

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## 1. Introduction

This application note shows how to store data on the built-in 2123/33 disk drive and how to use the stored data in commercially available IBM-PC application software such as spreadsheets or word processors.

## 2. 2123/33 File Formats

The 2123/33 is capable of storing data on its built-in floppy disk drive in various formats. The formats can be divided into two groups. One type of format is used to store data for later recall into the analyzer. Another type of format is used to transfer data from the analyzer to an IBM compatible PC using the floppy disk as the medium. The latter format is the one that is covered by this application note, and this format can be subdivided into two groups: numerical data and graphical data.

### 3. Numerical Data Format

The numerical data formats are either a single value (the cursor reading) or several values (a spectrum, a slice or a time function).

The following example shows you how to store a spectrum on disk and how to use it in connection with a spreadsheet:

1. Perform the measurement according to needs (please refer to the instruction manual for further explanation)
2. Select the frequency range you want to store, using the X-range field in the display set-up
3. Press the System Setups key and select the General Setup
4. Select Special parameter for ASCII File Format (key-in number 17) and change the setting to Comma delimited
5. Press the Display Graph Format key to return to the graph
6. Insert a formatted data disk in the disk drive

7. Press the Disc File Store key and move the cursor to the left-hand field of the command line (the field that shows either Input or Buffer)
8. Select Result Reading (key-in number 14)
9. Move the cursor to the right-hand field of the command line and key-in the file name you want to use
10. Press Command/Execute to store the data on the disk

The disk can now be inserted in a PC, and an example of a Sound Intensity file is shown in Fig. 1.

The syntax is described in the 2123/33 Instruction Manual Vol. 3 (IEEE/IEC Interface and Disc File Formats) sections 8.1 to 8.3 and Table 13.28, but the parts relevant for this figure are mentioned here:

- "R—R" means Result Reading.
- "F" means Frequency data.  
03 means 1/3 octave.
- 000000000050 means that the First Frequency is 50Hz
- 026 is the Number of Values to follow
- In the first column, "N" means Negative direction and "P" means Positive direction of the intensity.
- In the second column, "W" means valid data with Warning (in this case too short an averaging time at low frequency and too long a microphone spacer at high frequency), and "V" means Valid data.
- The last column is the intensity level in dB.

The data can now be read directly into a word processor, or (more interestingly) into a spreadsheet to perform further calculations.

The values are shown with 1 digit after the decimal point. If more digits are required, General Setup Special parameter No. 3, Reading Resolution, should be changed from Normal to Extended.

An example of a chart based on the Sound Intensity file from Fig. 1 is shown in Fig. 2. The chart was created using Quattro 1.0 from Borland, but

the method applies to almost all other spreadsheets. The finished spreadsheet looks like Fig. 3.

The spreadsheet in Fig. 3 has been created the following way:

1. Import the 2123/33 disk file (File/Import/Comma & "" delimited)
2. Column A now contains the direction information and column C the level information
3. Column D contains the frequency information which has been typed in manually
4. Column E contains all the positive directions and has been created by keying the following formula into cell E6 and then copying it down to the cells below to cover all frequencies: @IF(A6="P",A6,"")

```
"R_R"  
"F"  
03  
000000000050  
026  
"N","W",0000000036.5  
"N","W",0000000026.7  
"N","W",0000000035.0  
"P","V",0000000068.4  
"P","V",0000000055.8  
"P","V",0000000038.6  
"P","V",0000000067.4  
"P","V",0000000056.4  
"P","V",0000000051.2  
"P","V",0000000057.4  
"P","V",0000000048.1  
"P","V",0000000034.3  
"P","V",0000000035.4  
"P","V",0000000037.7  
"P","V",0000000039.2  
"P","V",0000000038.3  
"P","V",0000000039.4  
"P","V",0000000036.5  
"P","V",0000000032.6  
"P","V",0000000020.6  
"P","V",0000000022.9  
"P","W",0000000025.1  
"P","W",0000000020.7  
"P","W",0000000015.0  
"P","V",0000000059.2  
"P","V",0000000071.4
```

Fig. 1. Result Reading File format

T02853GB0



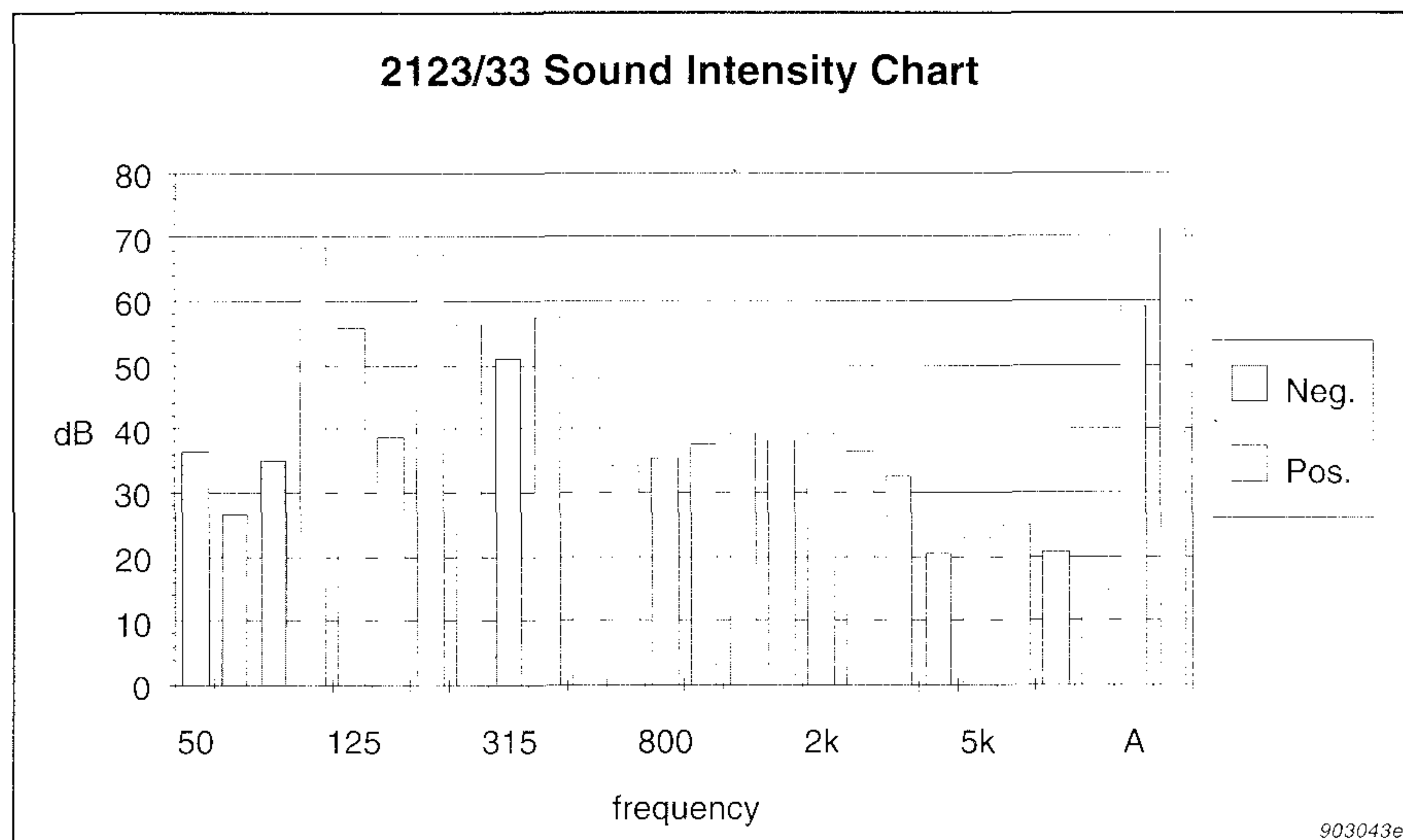


Fig. 2. Sound Intensity chart from spreadsheet

5. Column F contains all the negative directions and has been created as column E, but using the following formula: @IF(A6="N",A6,"")
6. To get the same format as in Fig. 3, the following setting has to be made:
  - a. Graph/Graph Type/Stack-Bar
  - b. Graph/X-Axis Values/D6..D31
  - c. Graph/Series Values/1st Series E6..E31
  - d. Graph/Series Values/2nd Series F6..F31
  - e. Graph/Titles/X/frequency[Hz]
  - f. Graph/Titles/Y/intensity level[dB]
  - g. Graph/Customize/Series/Patterns/1st Series/Empty
  - h. Graph/Customize/Series/Patterns/2nd Series/Filled
  - i. Graph/Customize/Series/Legends/1st Series/Pos.
  - j. Graph/Customize/Series/Legends/2nd Series/Neg.

#### 4. Graphical Data

The 2123/33 supports two different formats for storing graphical data on disk. These are Dump Plot and Pen Plot.

##### 4.1. Dump Plot

The Dump Plot command stores the current screen on disk as a binary print file. There are two different formats for the Dump Plot, which can be selected in the Plot Destination in the General Set-up. One is Brüel&Kjær 2313 Graphical Recorder and the other is Matrix Printer. Both formats let you store the current screen on disk and then later perform a print out, using the following instructions:

1. Press the System Setups key to select the General Setup
2. Verify that the Plot Destination is set to the printer on which you eventually want to perform the print
3. Press the Graph Format key to return to the graph and set the screen up so that it looks like the print you want to store.
4. Press the Disc File Store key and change the left-hand field of the command line to Dump Plot
5. Verify that the file name is acceptable (or key-in a file name), and press Command/Execute to store the screen to disk
6. Depending on whether your printer is connected directly to the 2123/33 via the IEEE-488 (like B&K 2313 or HP ThinkJet 2225A) or via a PC parallel printer port (HP Laser Jet or HP ThinkJet 2225A with Centronics interface), you have to do one of two things:
  - 7a. Printer connected to the 2123/33:
    - i. Press the System Setups key, select the Special Parameter for Digital Out Select, and set it to File Data
    - ii. Press the Disc File List key and use the file selector to select the file you want to print
    - iii. Verify that the printer connected to the 2123/33 is in listen-only mode
    - iv. Press the Digital Output key on the analyzer
  - 7b. Printer connected to a PC's parallel printer port:
    - i. Insert the disk in the PC
    - ii. Type the following command at the DOS prompt:

COPY A:<file> <port>/s

Where <file> is the file name of the file you want to print and the <port> is the printer port (usually LPT1:)

##### 4.2. Pen Plot

The Pen Plot command stores the current screen on disk as an HPGL plotter file (ASCII commands), with a layout depending on the setting in the Pen Plot setup in the System setups. The Pen Plot can later be plotted, or imported into PC software. Although the Dump Plot and the Pen Plot seem very much alike, there is a significant difference: the Pen Plot file is a series of commands that tells the plotter how to move the pen, so the resolution is not limited to the resolution of the screen (288 lines with 50Hz mains setting) but only to the resolution of the plotter.

To save a Pen Plot on disk and then later perform a plot, all you have to do is follow the instructions under Dump

	A	B	C	D	E	F
1	R_R					
2	F					
3	3.0					
4	50.0					
5	26.0			Freq.	Pos.	Neg.
6	N	W	36.5	50		36.5
7	N	W	26.7			26.7
8	N	W	35.0			35.0
9	P	V	68.4	100	68.4	
10	P	V	55.8		55.8	
11	P	V	38.6		38.6	
12	P	V	67.4	200	67.4	
13	P	V	56.4		56.4	
14	N	V	51.2			51.2
15	P	V	57.4		57.4	
16	P	V	48.1	500	48.1	
17	P	V	34.3		34.3	
18	P	V	35.4		35.4	
19	P	V	37.7	1k	37.7	
20	P	V	39.2		39.2	
21	P	V	38.3		38.3	
22	P	V	39.4	2k	39.4	
23	P	V	36.5		36.5	
24	P	V	32.6		32.6	
25	P	V	20.6		20.6	
26	P	V	22.9	5k	22.9	
27	P	W	25.1		25.1	
28	P	W	20.7		20.7	
29	P	W	15.0	10k	15.0	
30	P	V	59.2	A	59.2	
31	P	V	71.4	L	71.4	

Fig. 3. Spreadsheet based on data in Fig. 1



Plot (replacing Dump Plot under point 4 with Pen Plot).

If you want to make a plot, you can then use a laser printer with HPGL emulation and use it exactly as if it was a plotter.

The pen plot commands can be read by many PC programs, and thereby integrate the plot in reports.

Much PC application software (Word processors, Desk-top publishing, CAD and Graphical software) understands HPGL language to some extent. However, most PC software understands only the most basic commands, and is not capable of reading all the commands used by the 2123/33. Hence, if you want to read 2123/33 Pen Plot files using your favourite PC program, make sure that it fully supports HP7475 commands. If this is not the case, the solution is to convert the 2123/33 plot file to simpler commands, that most (if not all) PC software will understand. One program that will do this is DesignCAD, which, as the name implies, is a CAD program. To perform the conversion follow this procedure:

1. Run the DCIMPORT program and select the option for converting an HPGL file to a DesignCAD file. This will create a binary file that can be read directly by the DesignCAD program
2. Run the DCSETUP program, set-up DesignCAD to use an HP7475 plotter as the plotter device, and select FILE as the plot destination
3. Run the DesignCAD program and retrieve the file created above
4. Select the PLOT option and type in the file name for the plot file you want to create.

The 2123/33 HPGL file has now been converted to a new HPGL file that only contains the basic HPGL commands. A disadvantage is that the file size has increased significantly, due to the lower level of the commands.

The HPGL file from DesignCAD can now be read by most PC programs (such as WordPerfect or PageMaker). To include the HPGL file in WordPerfect 5.1, please follow this example:

1. Run the WordPerfect program and place the cursor where you want to place the chart
2. Press Graphics (ALT F9), select Figure and Create
3. Press Filename and key-in the file name of the HPGL file
4. Press Exit (F7) to return to your document

One other interesting option of the HPGL file format is that you have the ability to edit the file, and hence change the plot result. One easy way to do this is to use DesignCAD. The

procedure is to perform the editing when the file has been retrieved into the CAD program (between point 3 and 4 of the conversion procedure mentioned above). After the file has been retrieved into the CAD program, you can use all the tools that the CAD program contains to edit your plot. This can be one or more of the following examples: addition or deletion of text, lines, figures, etc.

Fig. 4 is based on a 2133 plot file without editing, and Fig. 5 is after editing with the DesignCAD program.

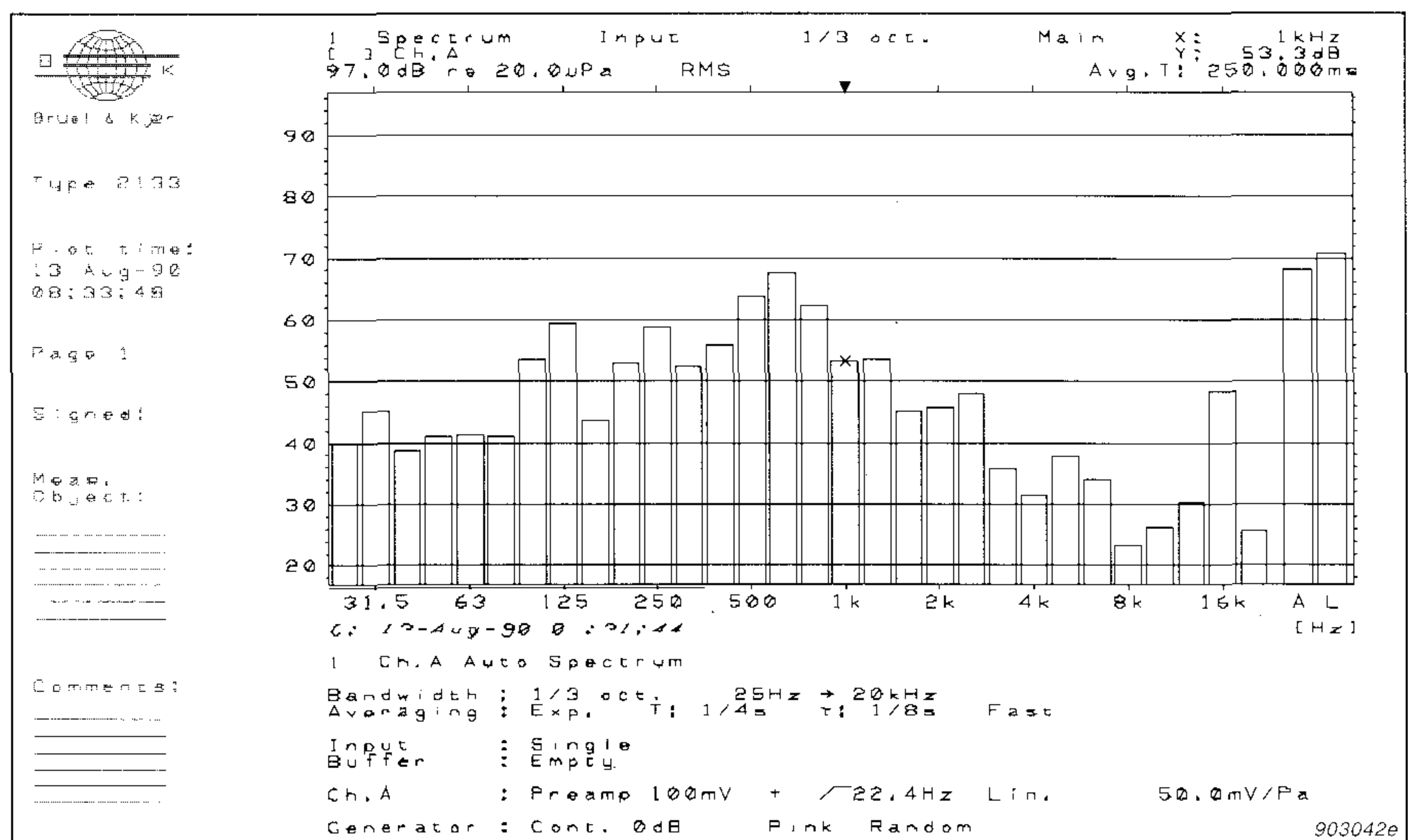


Fig. 4. Pen plot from Type 2133

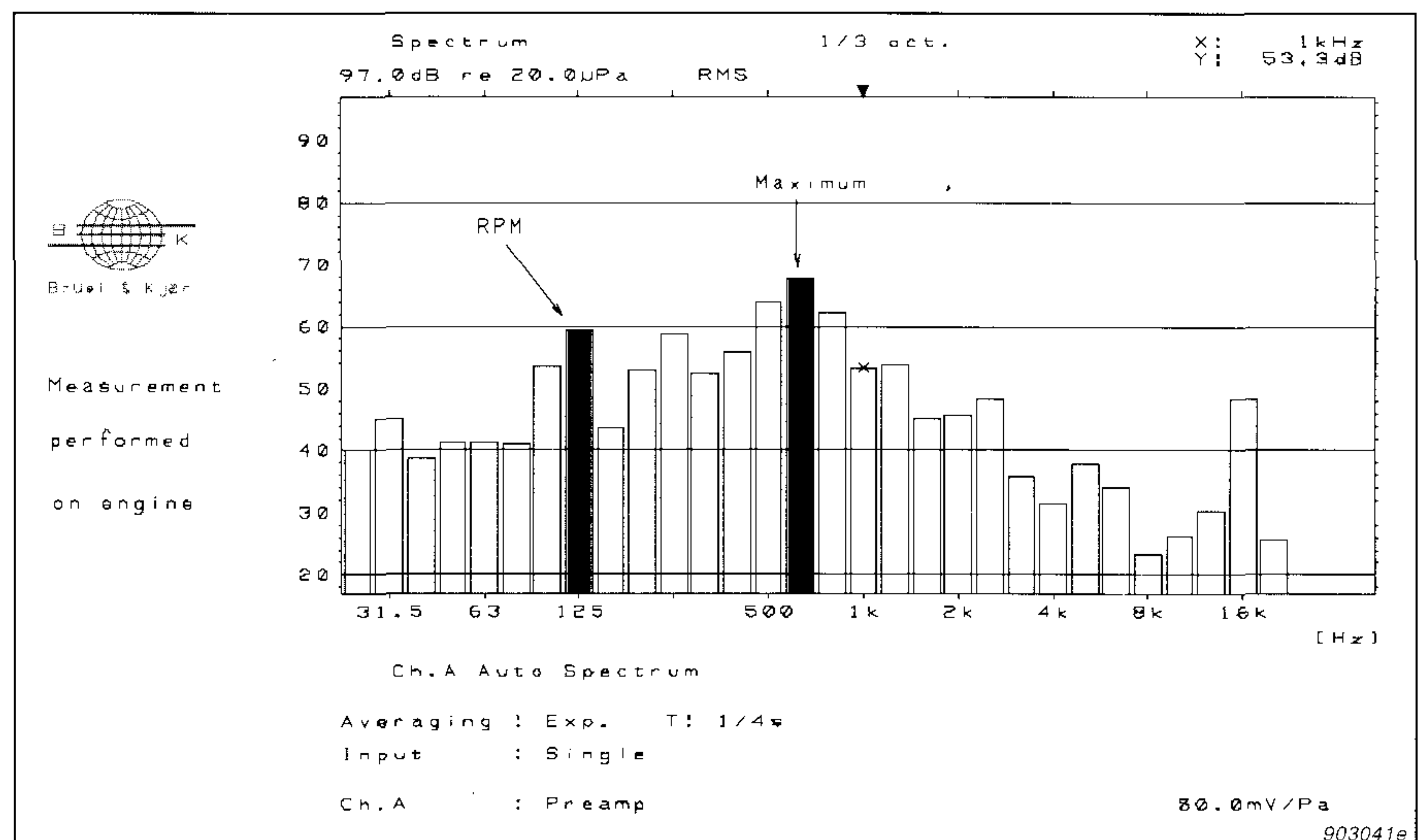


Fig. 5. Pen plot as in Fig. 4 modified by DesignCAD

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