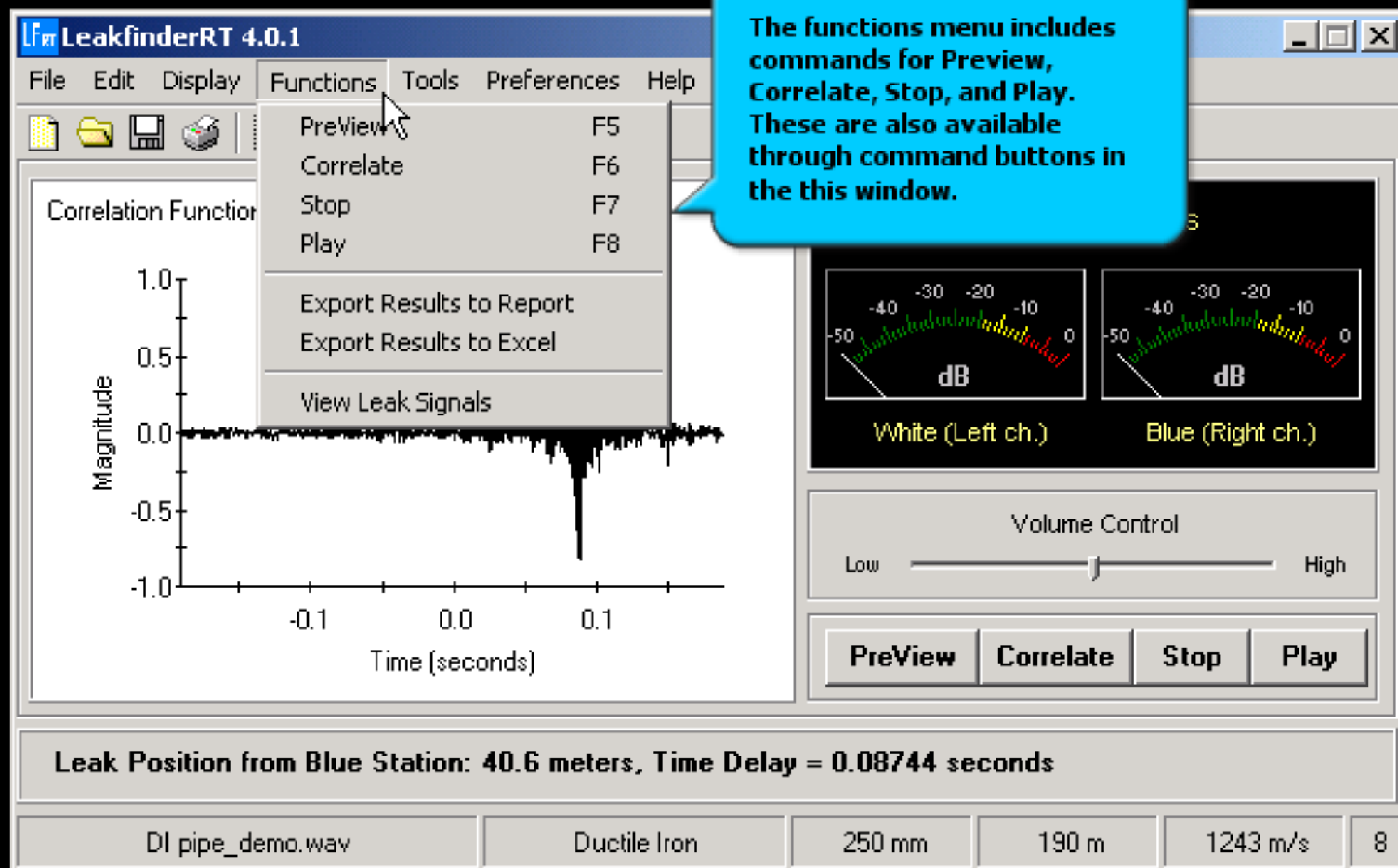
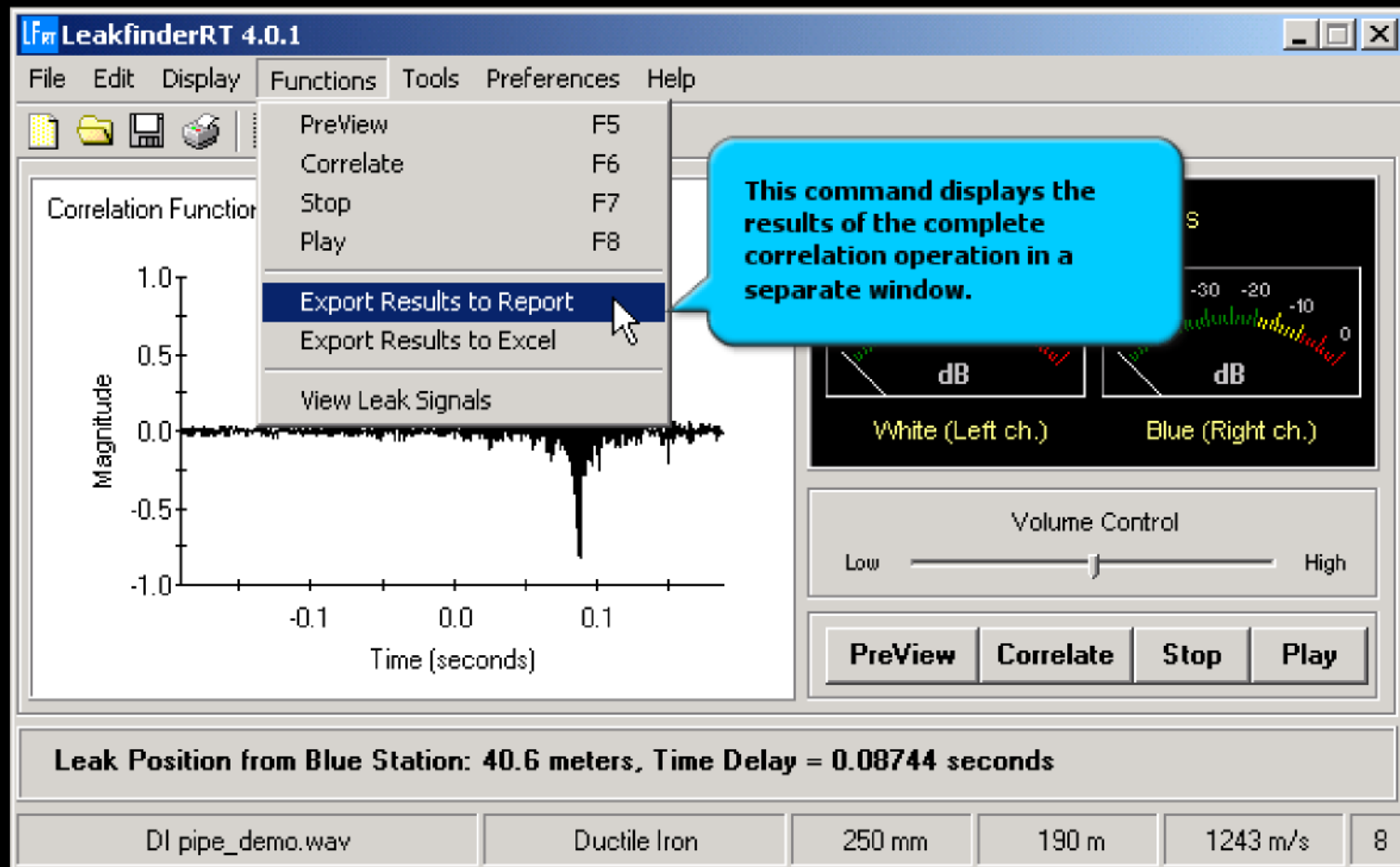


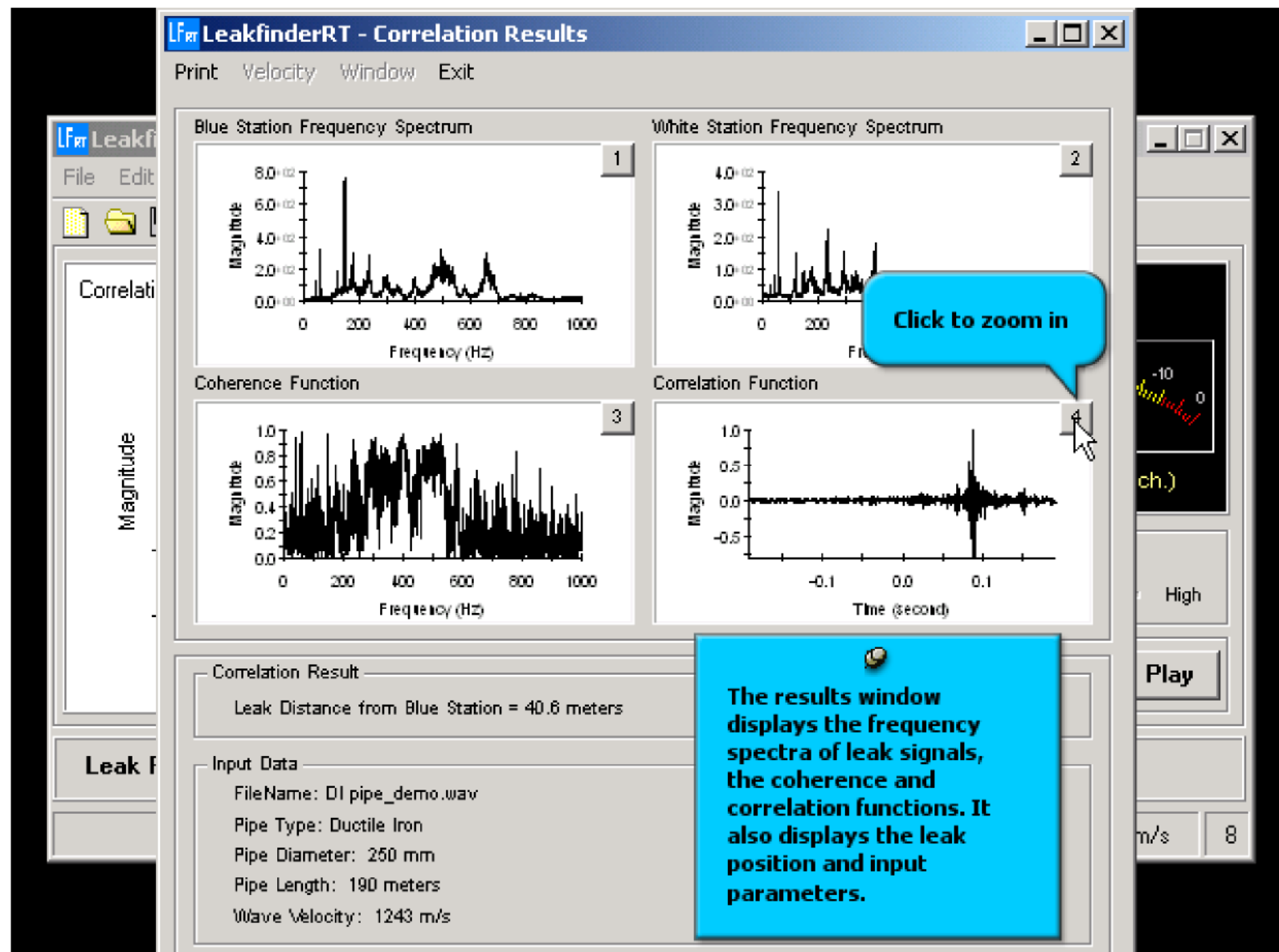
## Functions menu (Preview, Correlate, Play & Stop commands)



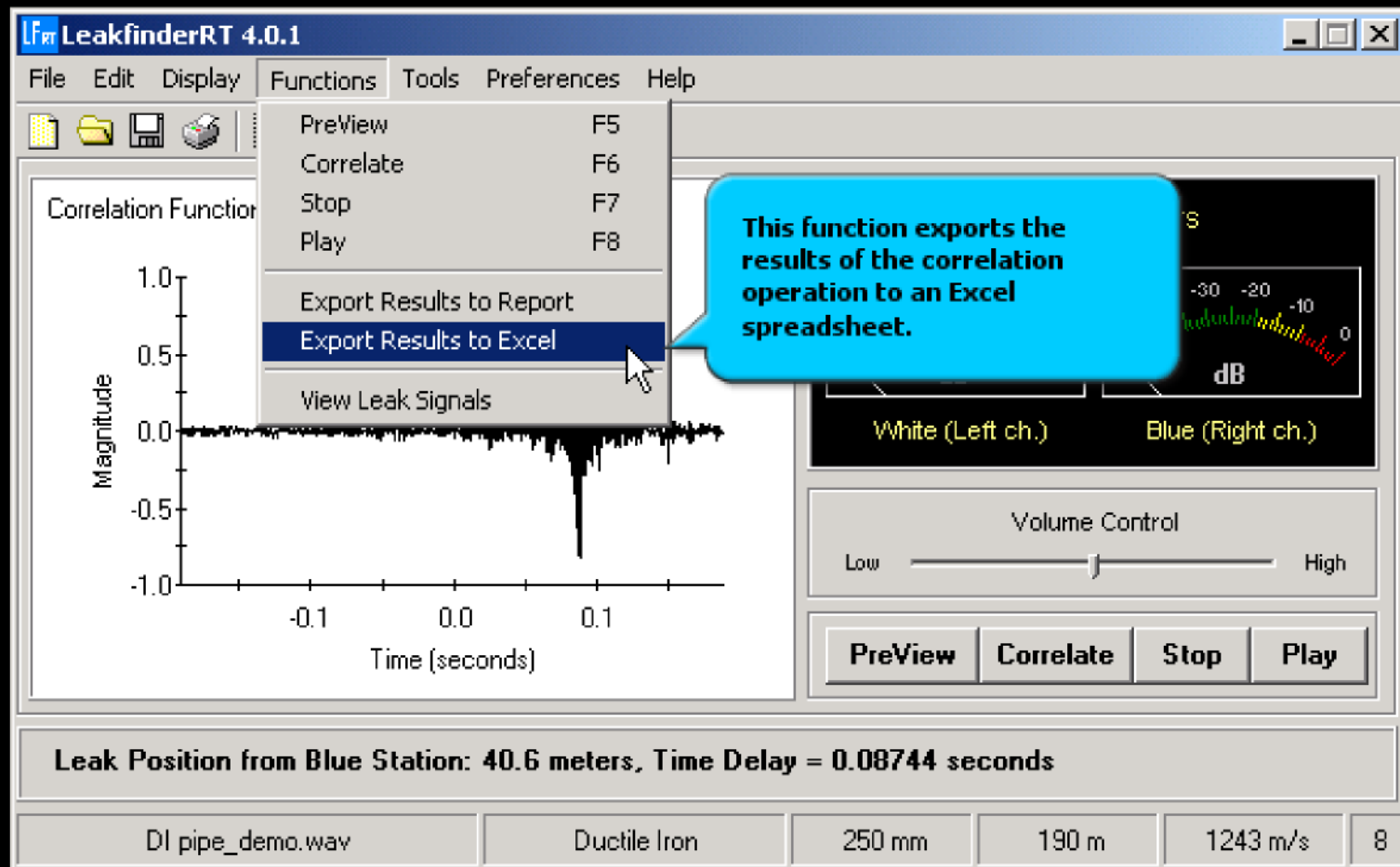
## Functions menu (Export results to report command 1)



## Functions menu (Export results to report command 2)



## Functions menu (Export results to Excel command 1)



## Functions menu (Export results to Excel command 2)

**Microsoft Excel - tempLFRTRReport.xls**

File Edit View Insert Format Tools Data Window Help

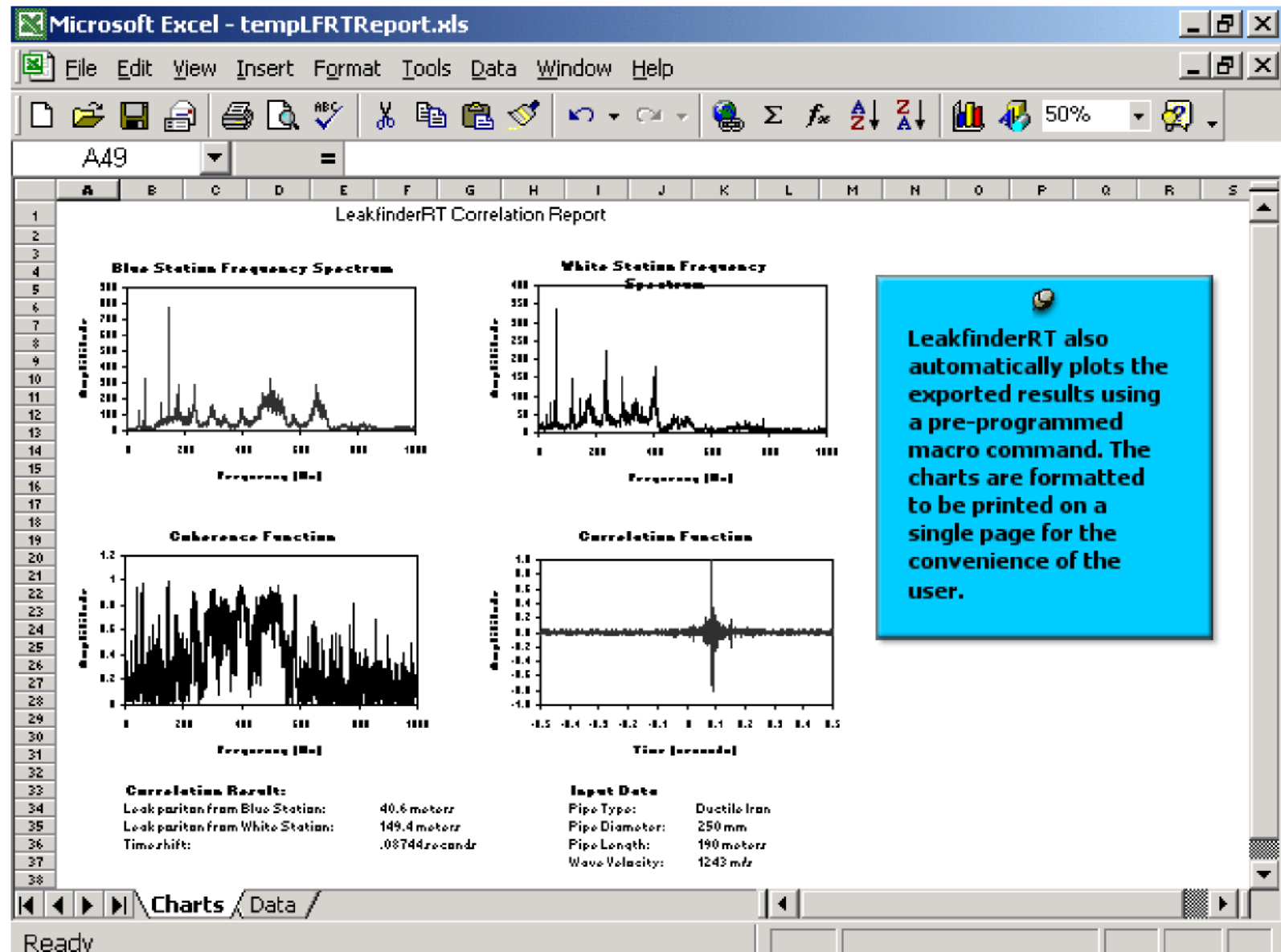
G20 =

	A	B	C	D	E	F
1	<b>LeakfinderRT Correlation Report</b>					
2						
3						
4	<b>Correlation Result:</b>					
5						
6	<b>Leak positon from Blue Station:</b>		<b>40.6 meters</b>			
7	<b>Leak positon from White Station:</b>		<b>149.4 meters</b>			
8	<b>Time shift:</b>		<b>.08744 seconds</b>			
9	<b>File Name:</b>		<b>DI pipe_demo.wav</b>			
10						
11	<b>Input Data</b>					
12						
13	<b>Pipe Type:</b>		<b>Ductile Iron</b>			
14	<b>Pipe Diameter:</b>		<b>250 mm</b>			
15	<b>Pipe Length:</b>		<b>190 meters</b>			
16	<b>Wave Velocity:</b>		<b>1243 m/s</b>			
17						
18						
19	<b>Frequency (Hz)</b>	<b>Spectrum Blue</b>	<b>Spectrum White</b>	<b>Coherence</b>	<b>Time (seconds)</b>	<b>Correlation</b>
20	0	97.72232811	89.16401253	0.994574561	-0.743038549	2.61E-03
21	0.672912598	16.29823562	14.93429732	0.778089655	-0.742947846	-3.66E-03
22	1.345825195	12.98243192	11.60782631	0.602370214	-0.742857143	-9.59E-03
23	2.018737793	13.46593489	18.60346207	4.95E-01	-0.74276644	-1.46E-02

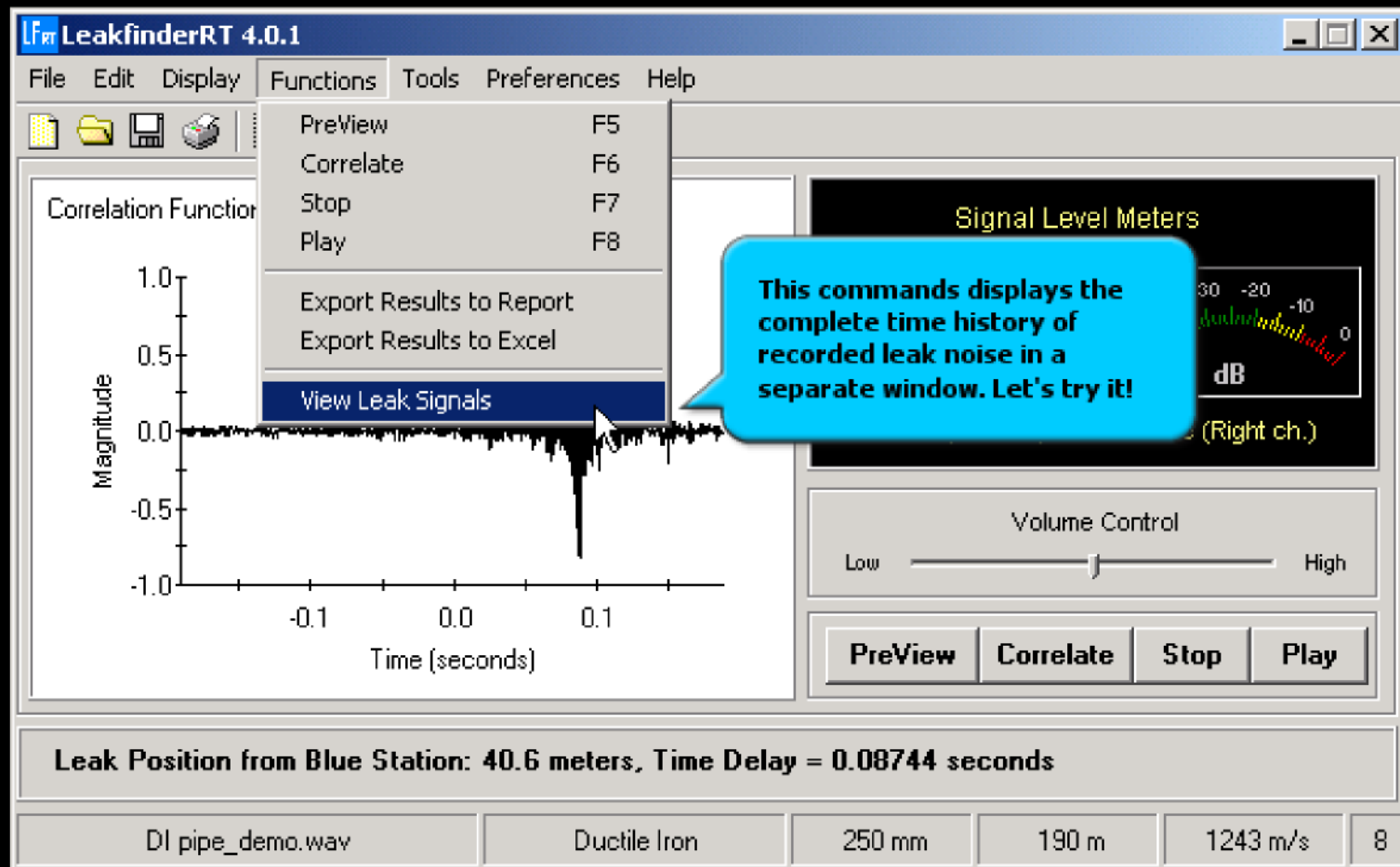
Ready

After exporting the results to Excel, LeakfinderRT opens the spreadsheet automatically. The user can copy the data and paste or plot it in other applications.

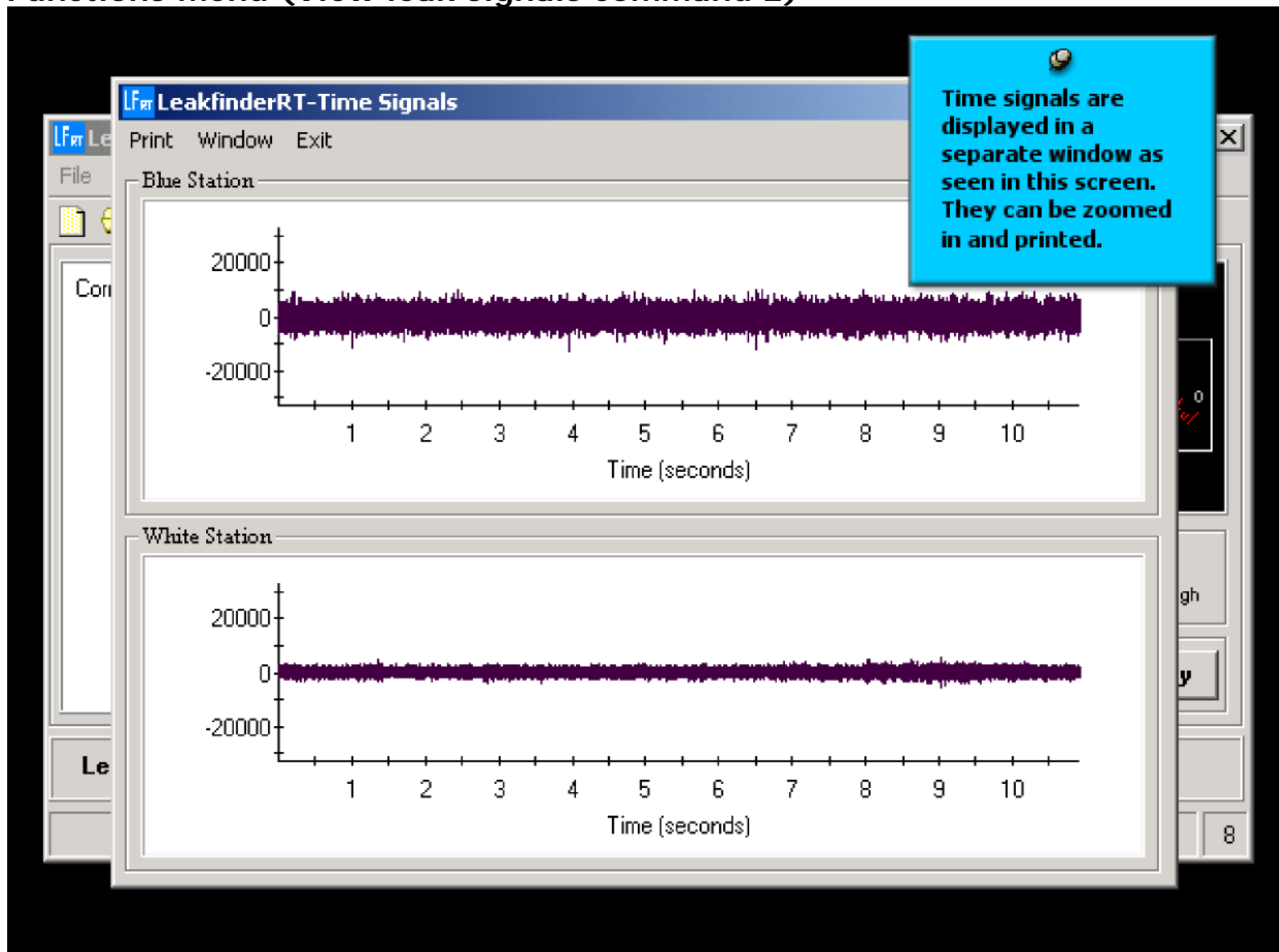
## Functions menu (Export results to Excel command 3)



## Functions menu (View leak signals command 1)



## Functions menu (View leak signals command 2)





## Tools menu (Windows sound mixer command)

The screenshot shows the LeakfinderRT 4.0.1 application window. The **Tools** menu is open, displaying the following options: **Window's Sound Mixer**, **PlayBack Speed**, **Distance Calculator** (checked), **Velocity Calculator**, **Channel Setting**, and **Current Parameter Settings**. A blue callout box points to the **Window's Sound Mixer** option with the text: "This function starts Windows Sound Mixer. As noted at the outset, use the Mixer to check that the LINE-IN port of the soundcard is selected as the recording source."

The main interface includes a **Correlation Function** plot showing **Magnitude** (from -1.0 to 1.0) versus **Time (seconds)** (from -0.1 to 0.1). The plot shows a sharp negative peak at approximately 0.08744 seconds. To the right, the **Signal Level Meters** section displays two dB meters for **White (Left ch.)** and **Blue (Right ch.)**, both ranging from -50 to 0 dB. Below these is a **Volume Control** slider from **Low** to **High**. At the bottom of the right panel are buttons for **PreView**, **Correlate**, **Stop**, and **Play**.

A status bar at the bottom of the window displays the following information: **Leak Position from Blue Station: 40.6 meters, Time Delay = 0.08744 seconds**. Below this, a series of input fields show: **DI pipe\_demo.wav**, **Ductile Iron**, **250 mm**, **190 m**, **1243 m/s**, and **8**.

## Tools menu (Playback speed command 1)

The screenshot shows the LeakfinderRT 4.0.1 software interface. The 'Tools' menu is open, and 'PlayBack Speed' is highlighted. A callout box explains that this function provides control over the speed at which leak sounds are played back. Another callout box explains that for plastic pipes, leak sound is dominated by low-frequency components that are inaudible to humans, and the software can play them back at a higher speed to shift their frequency content to an audible range. The interface also displays a 'Correlation Function' graph, two dB meters for 'White (Left ch.)' and 'Blue (Right ch.)', a 'Volume Control' slider, and buttons for 'PreView', 'Correlate', 'Stop', and 'Play'. At the bottom, it shows '6 meters, Time Delay = 0.08744 seconds' and a table of parameters.

**Tools menu (Playback speed command 1)**

**For plastic pipes, leak sound is dominated by low-frequency components that are inaudible to humans. To make such sounds audible, LeakfinderRT can play them back at a higher speed than they recorded at to shift their frequency content to an audible range. For metallic pipes, altering playback speed is not needed.**

**This function provides control over the speed at which leak sounds are played back.**

LeakfinderRT 4.0.1

File Edit Display Functions Tools Preferences Help

Window's Sound Mixer

**PlayBack Speed**

Distance Calculator

Velocity Calculator

Channel Setting

Current Parameter Settings

Correlation Function

1.0

0.5

0.0

0.1

dB

White (Left ch.)

dB

Blue (Right ch.)

Volume Control

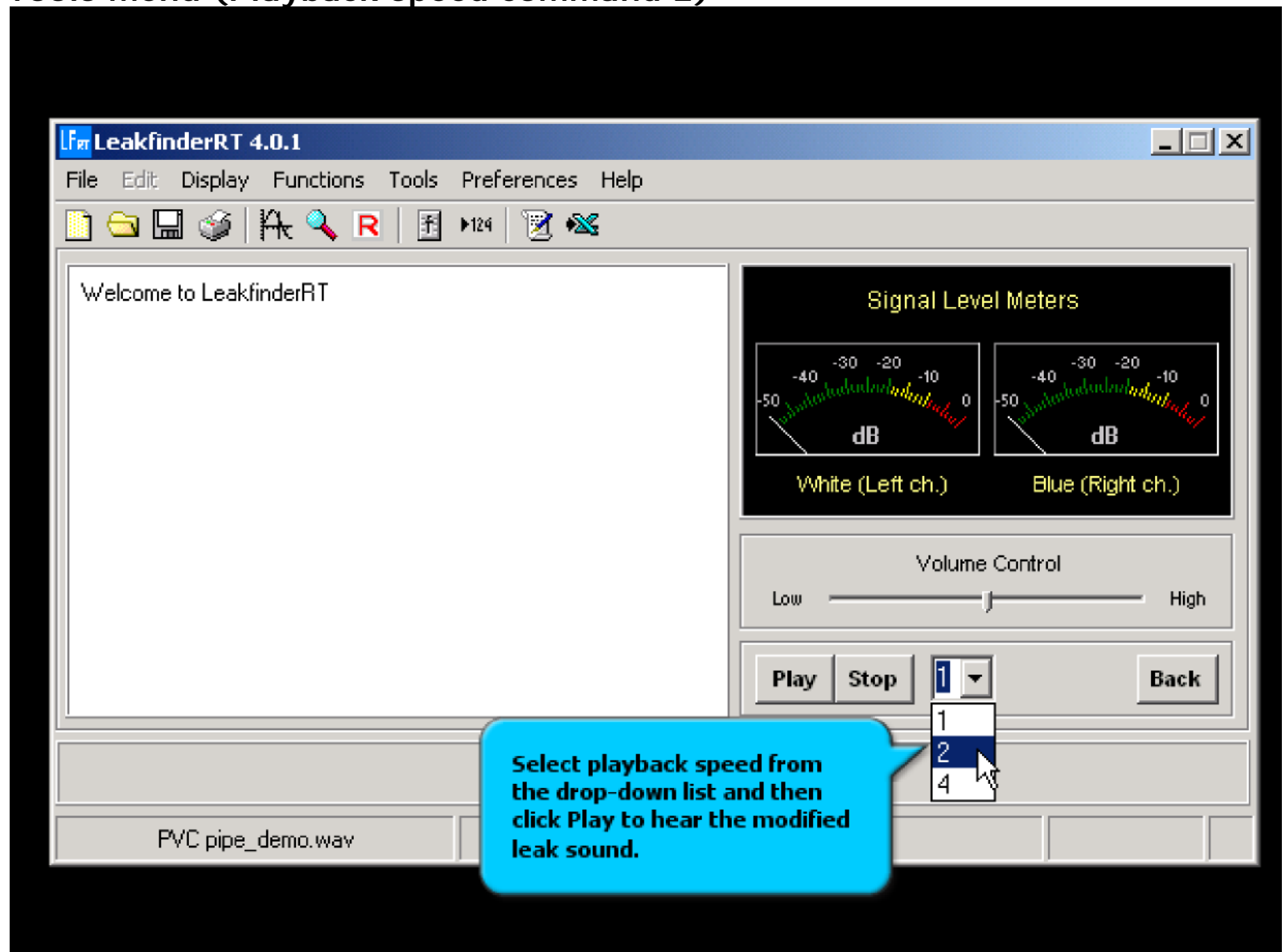
Low High

PreView Correlate Stop Play

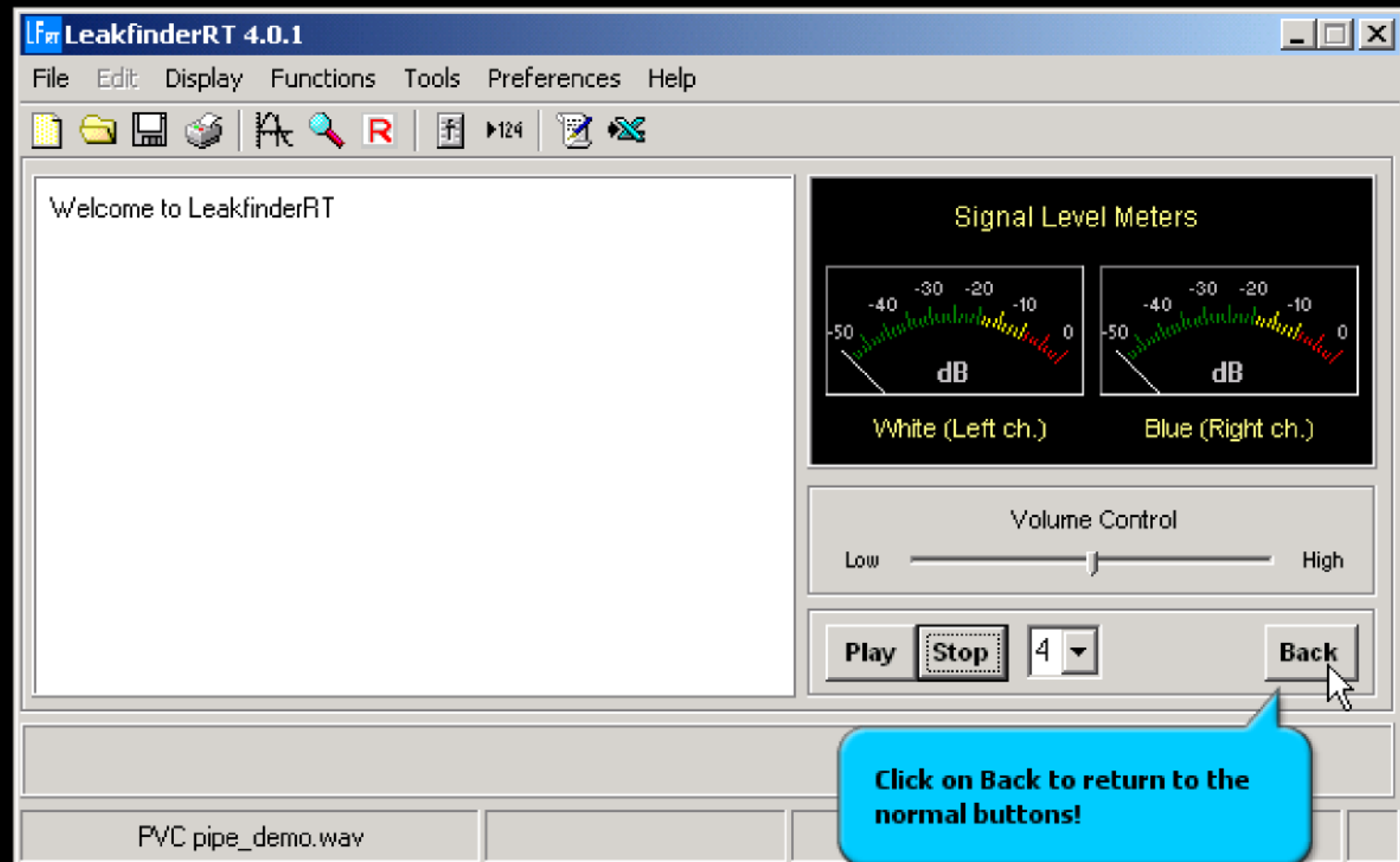
6 meters, Time Delay = 0.08744 seconds

Ductile Iron	250 mm	190 m	1243 m/s	8
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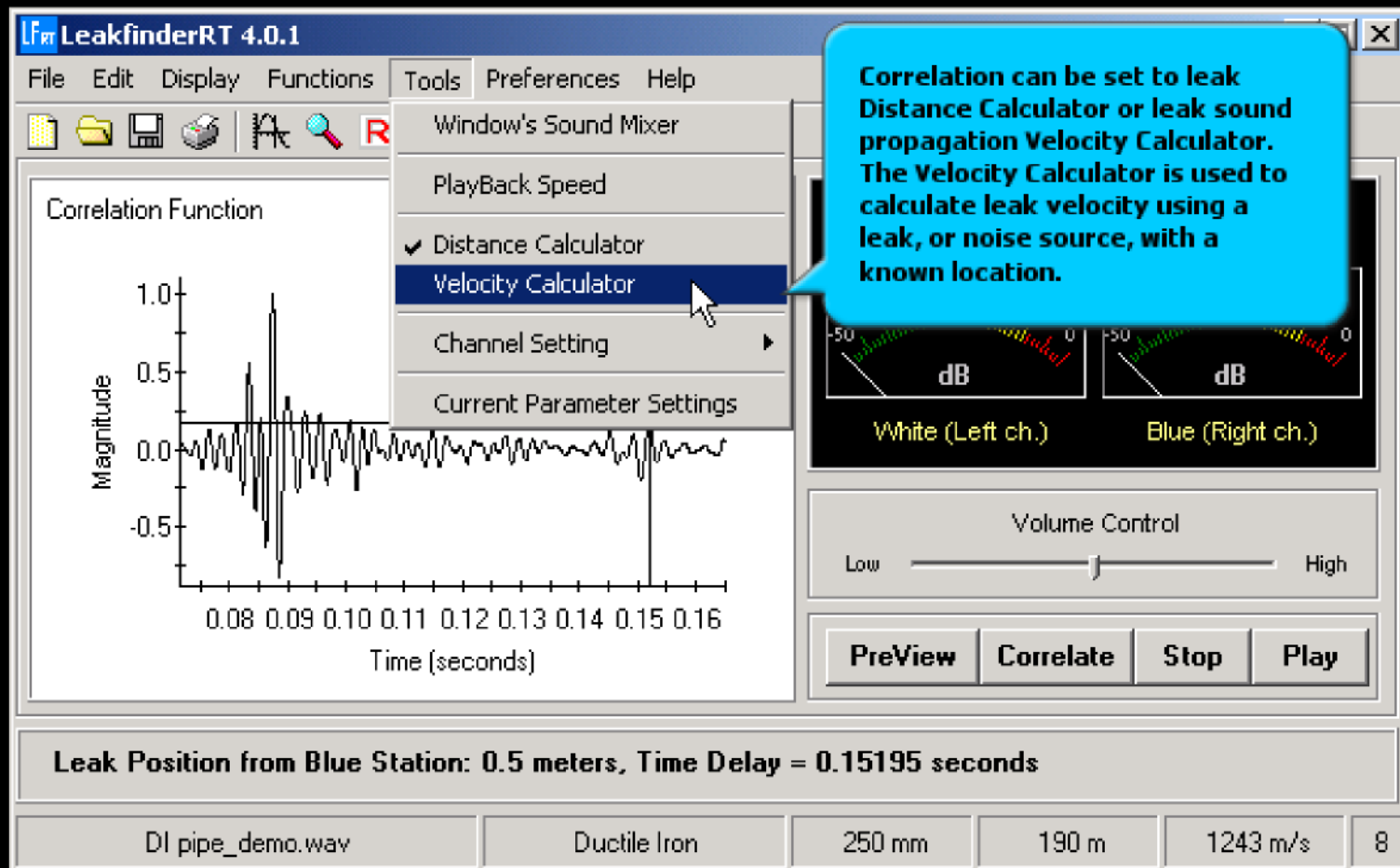
## Tools menu (Playback speed command 2)



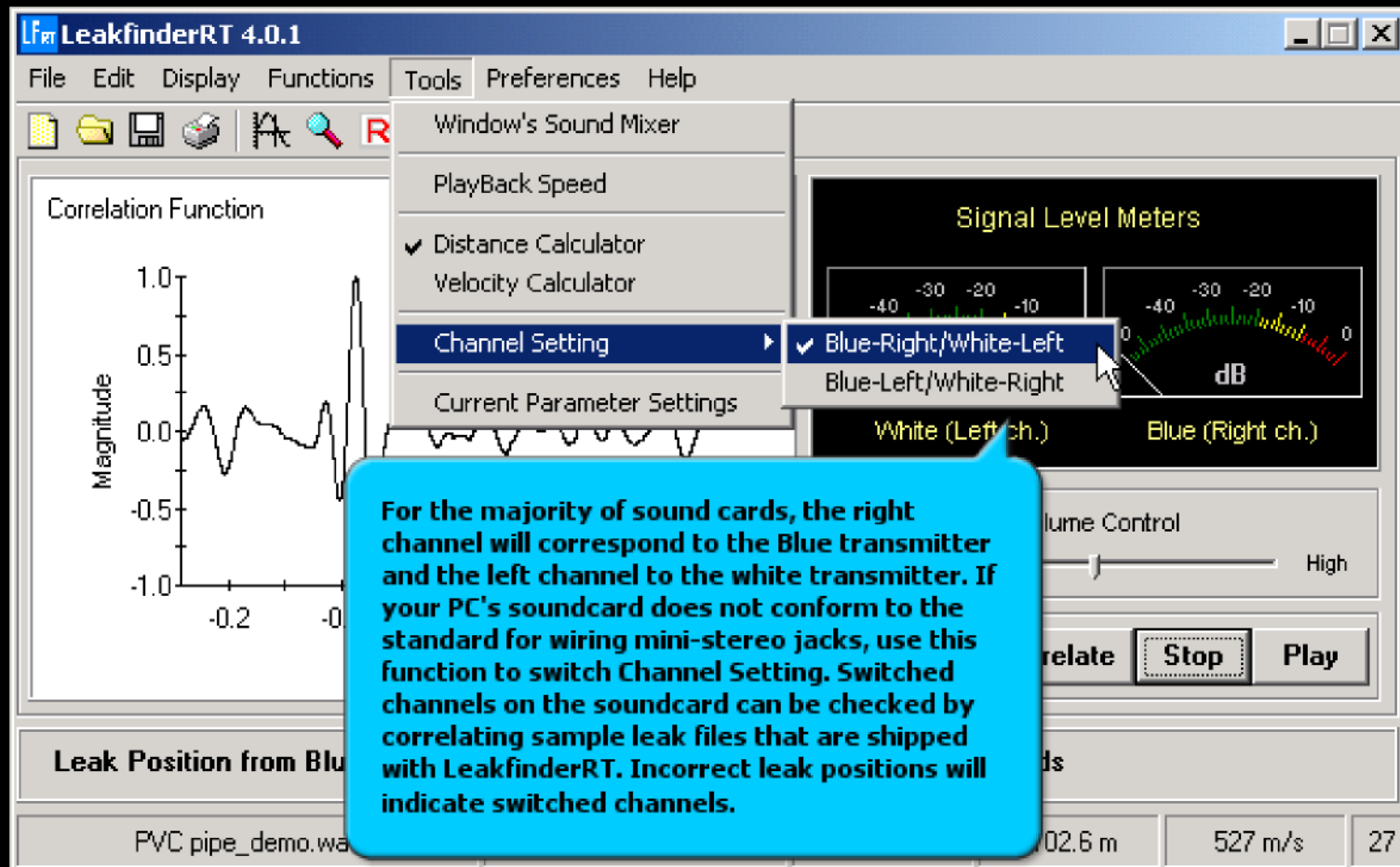
### Tools menu (Playback speed command 3)



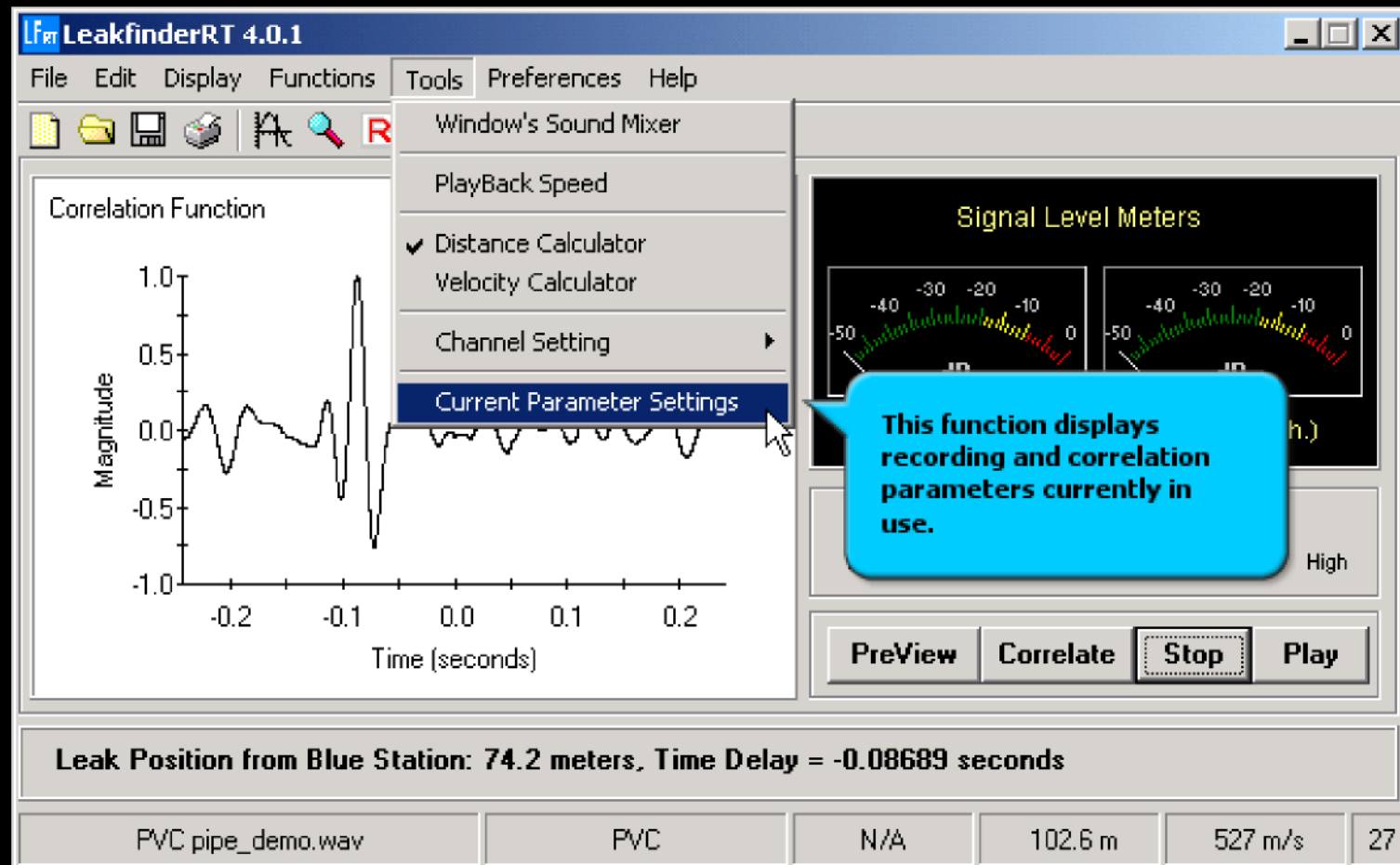
## Tools menu (Velocity calculator)



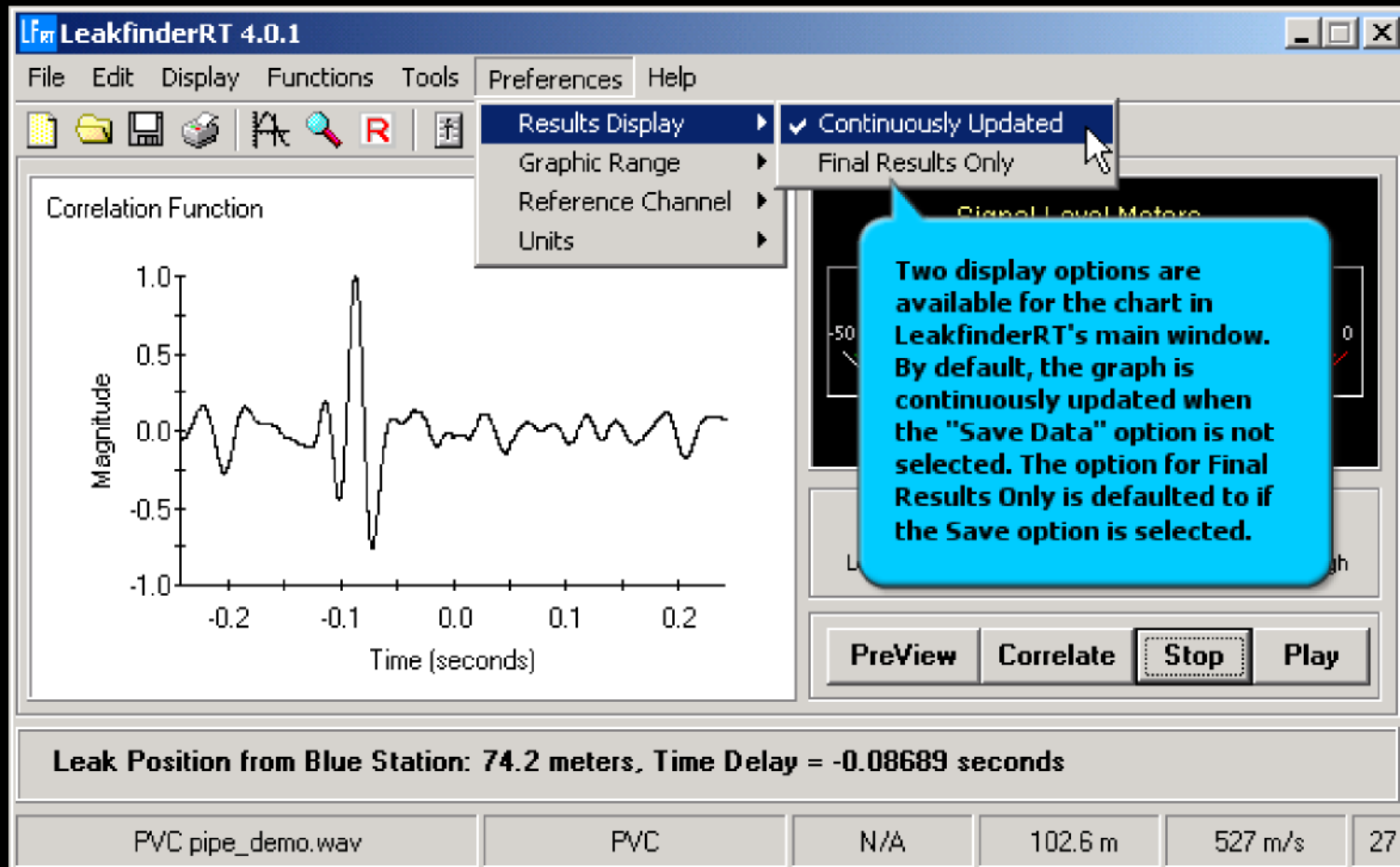
## Tools menu (Channel setting)



## Tools menu (Current parameters setting)

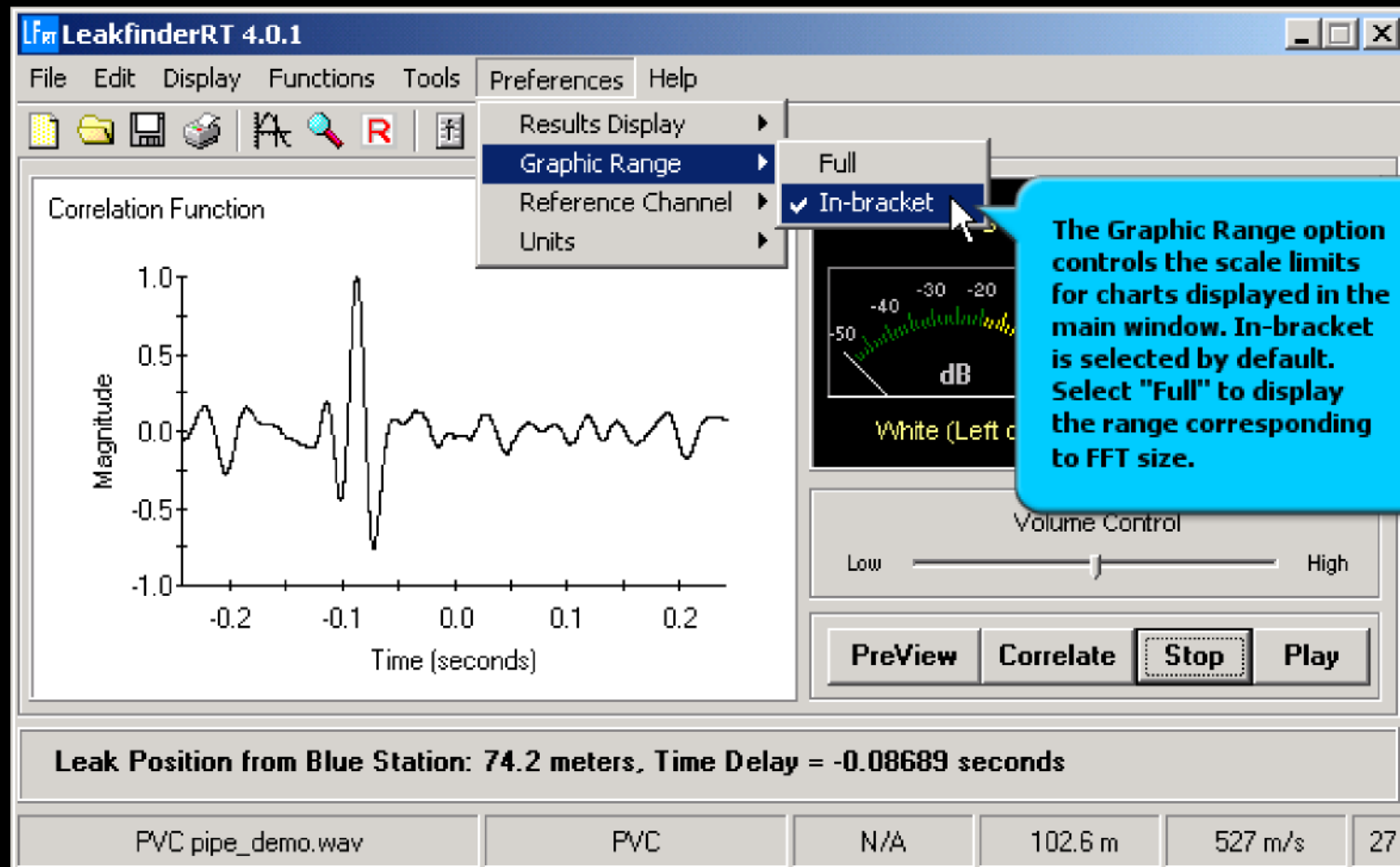


## Preferences menu (Results display)

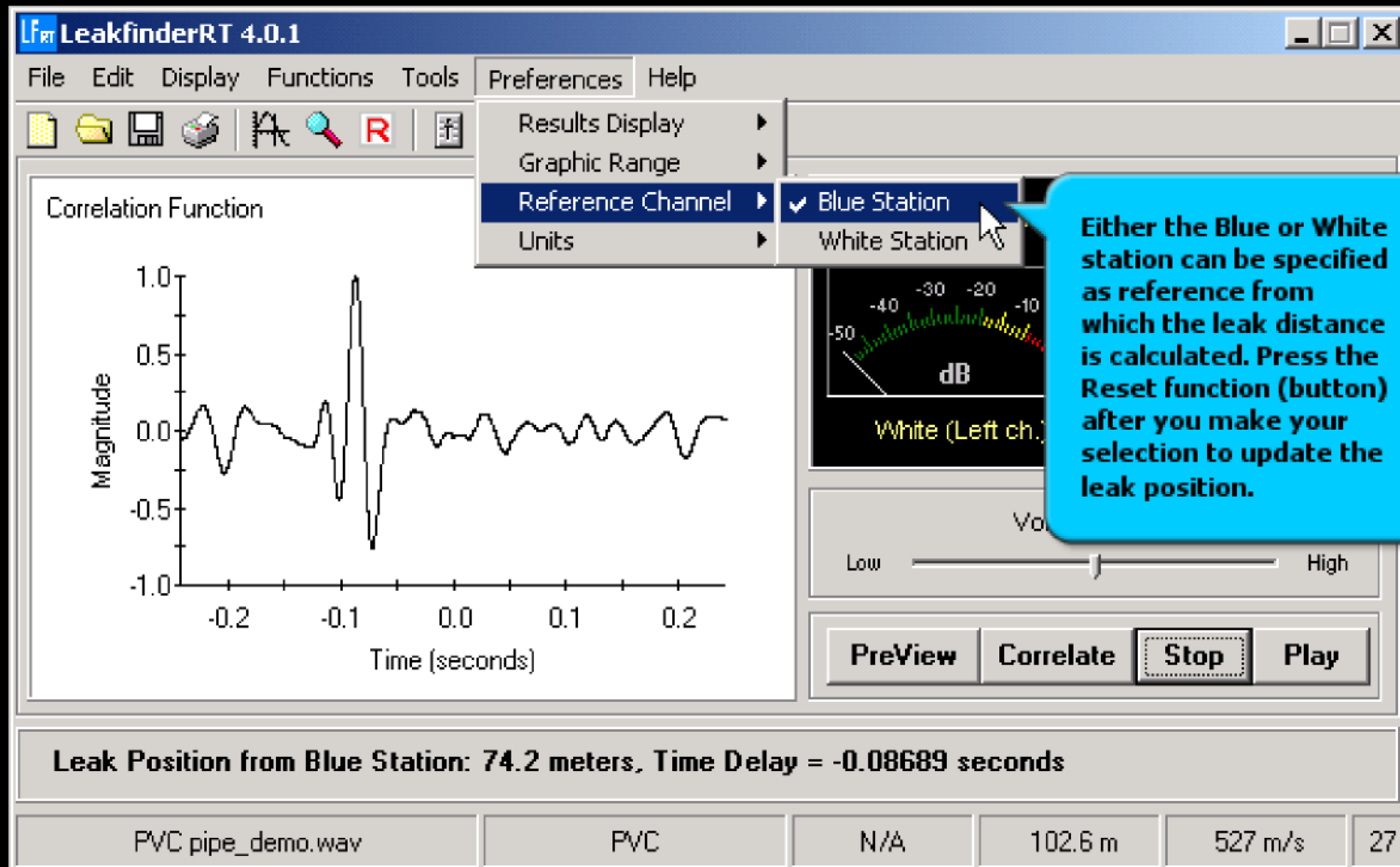




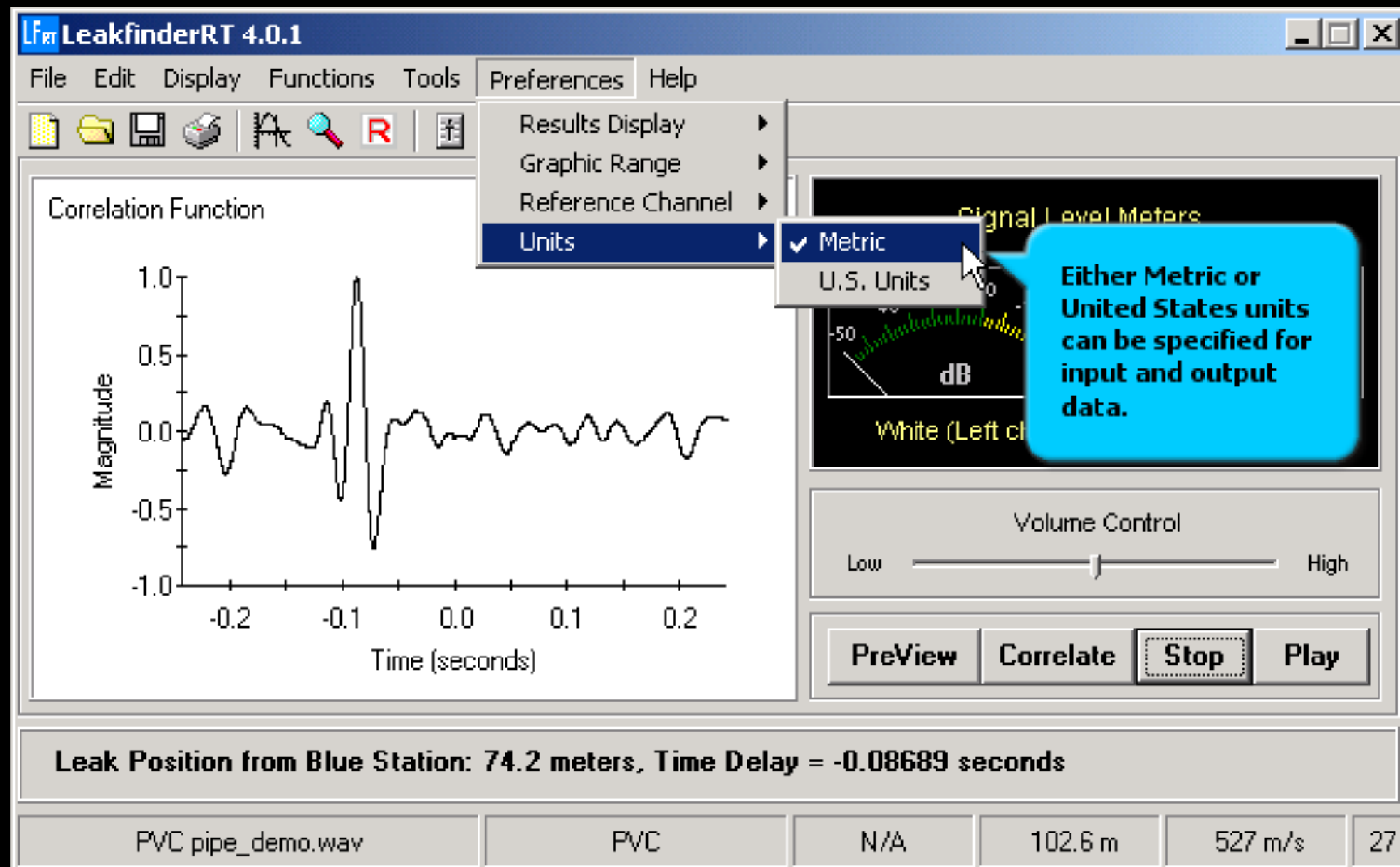
## Preferences menu (Graphic range)



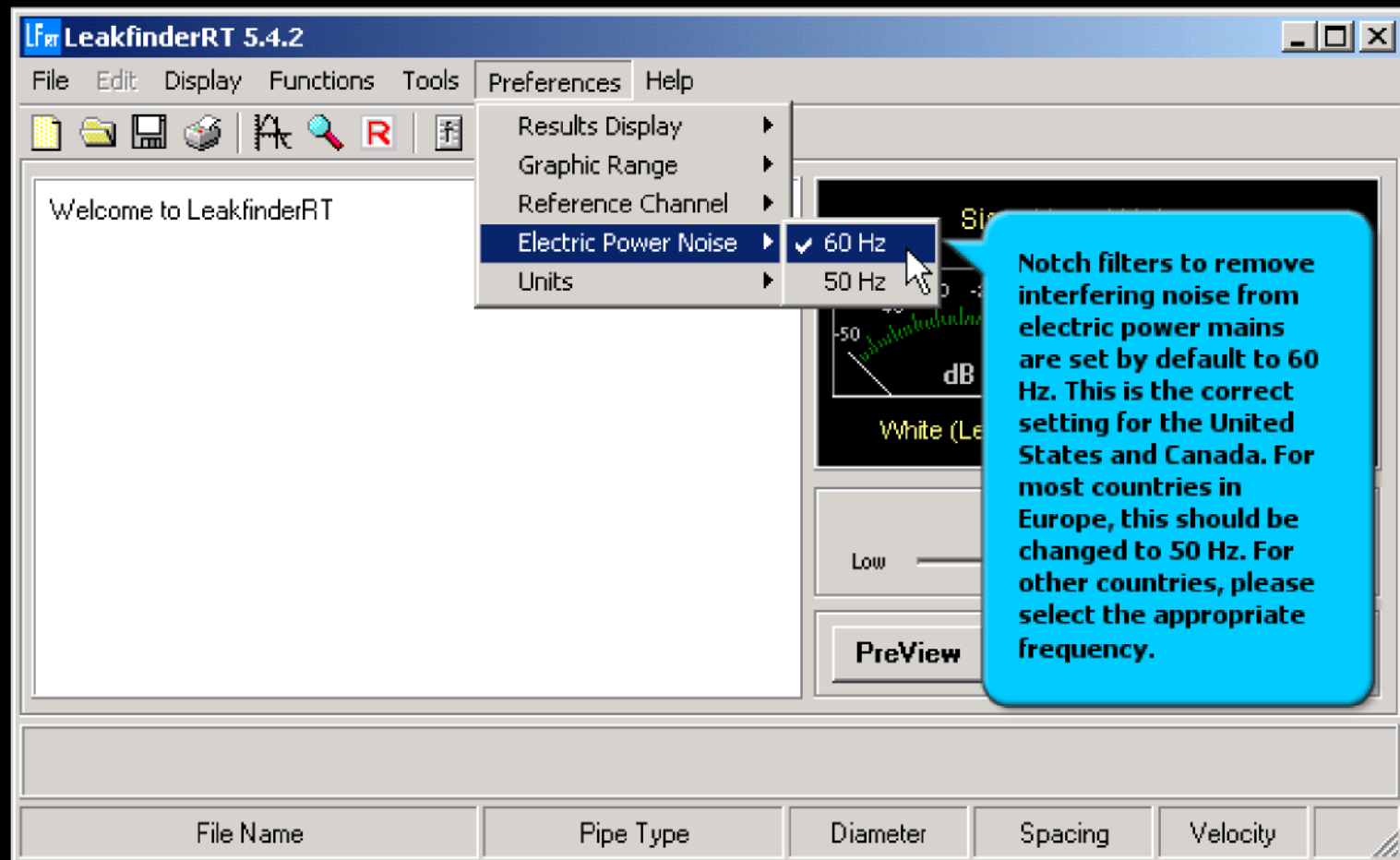
## Preferences menu (Reference channel)



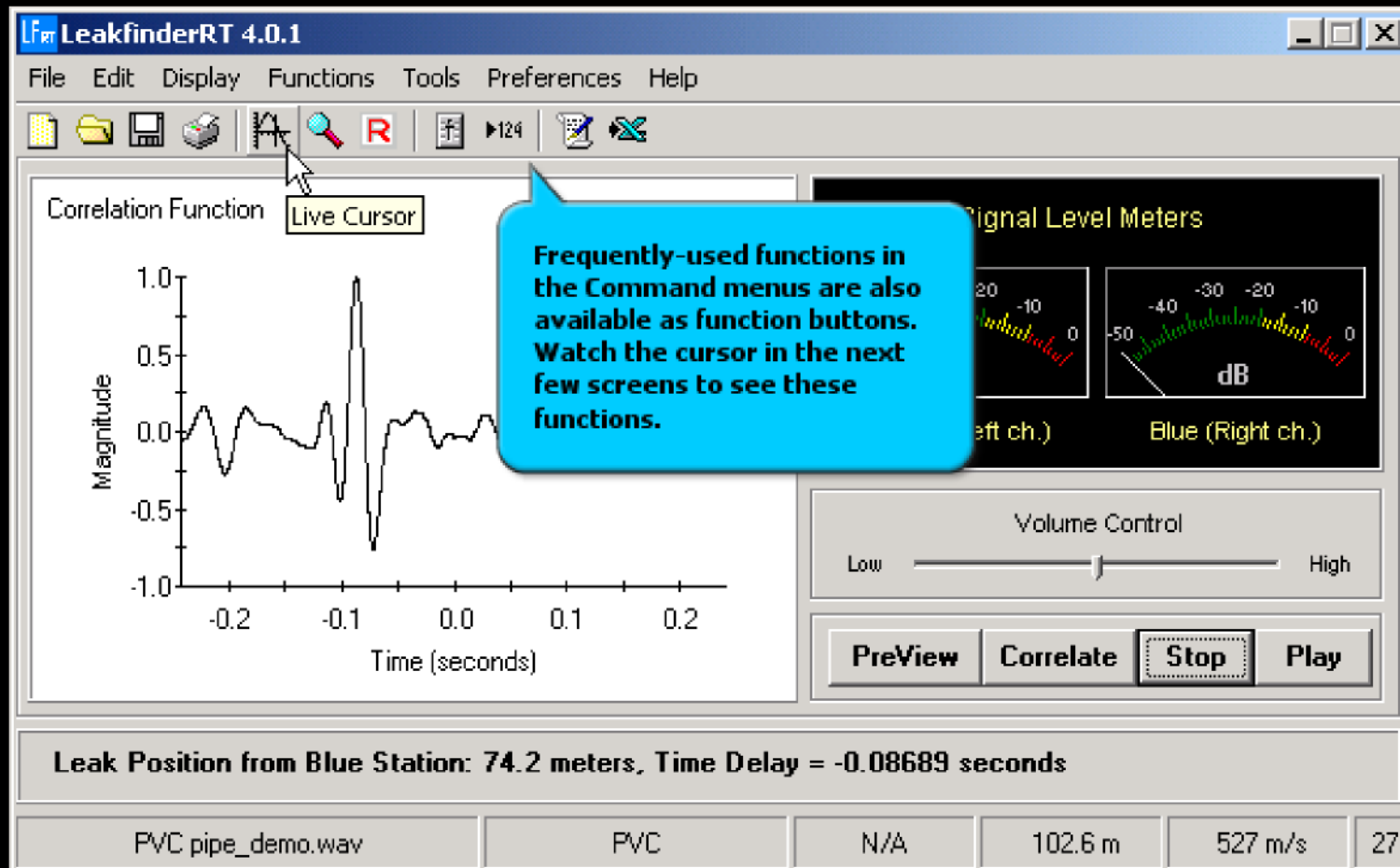
## Preferences menu (Measurement units)



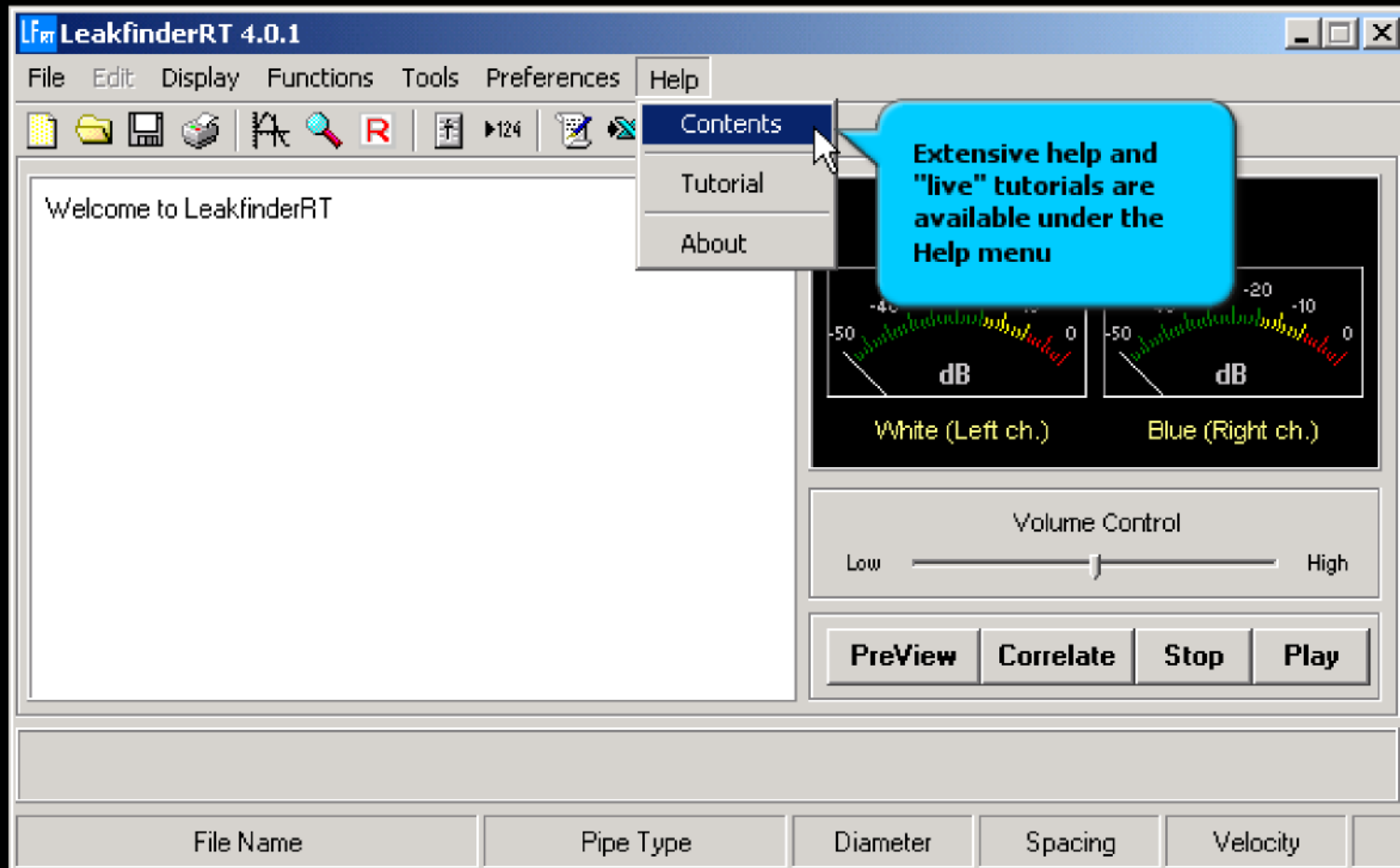
## Preferences menu (Notch filters for noise from power mains)



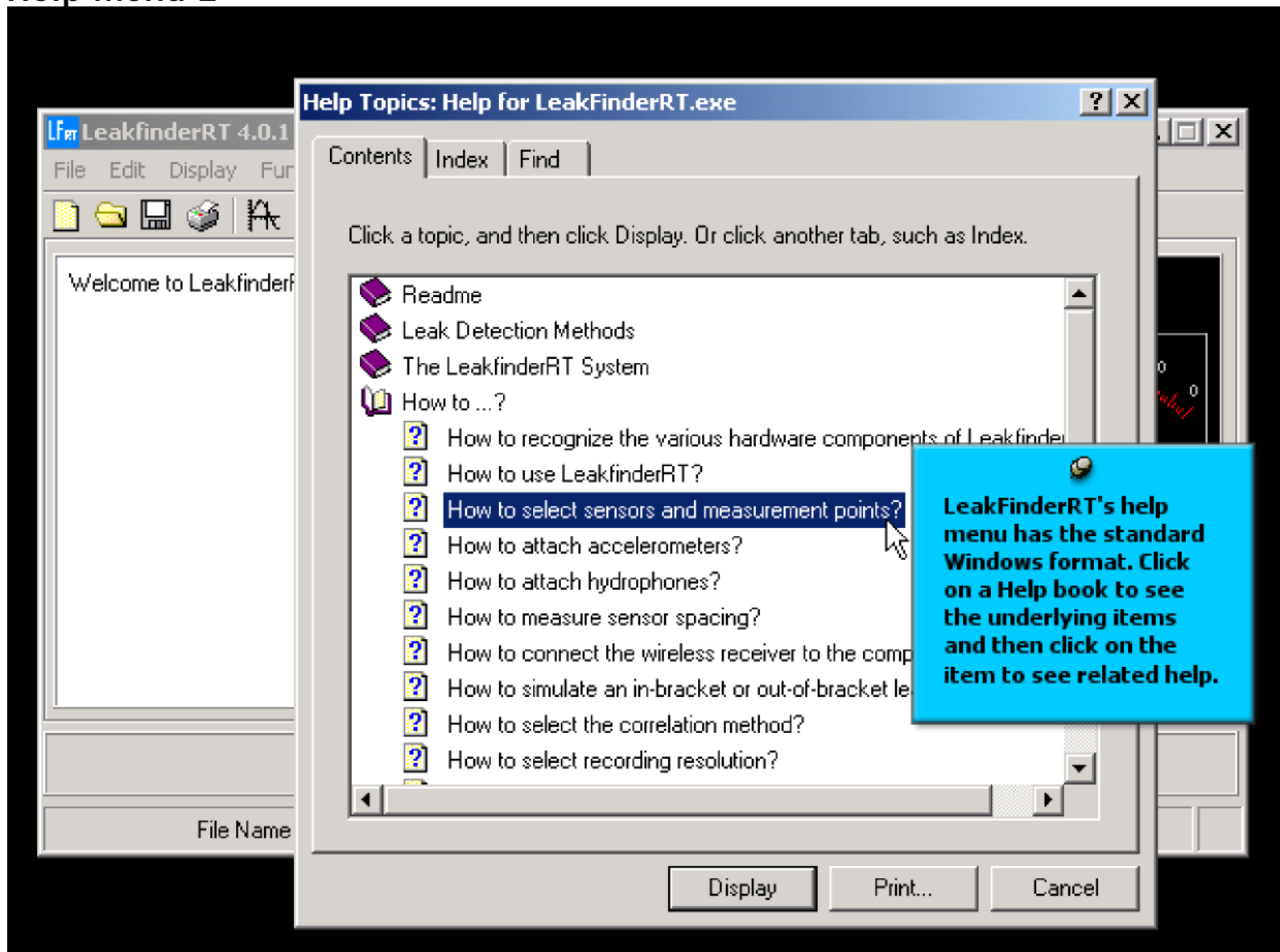
## Frequently used button commands



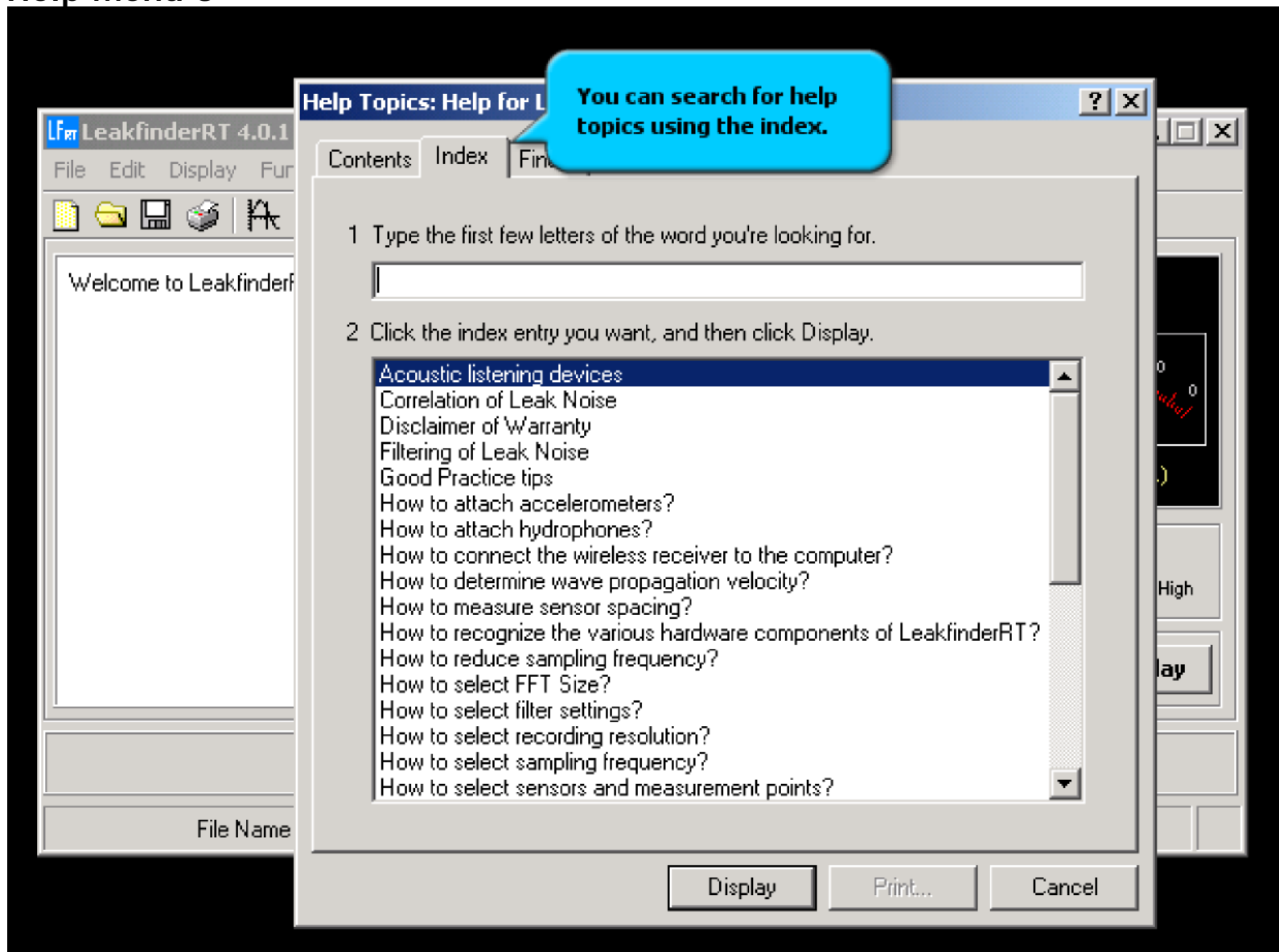
## Help menu 1



## Help menu 2

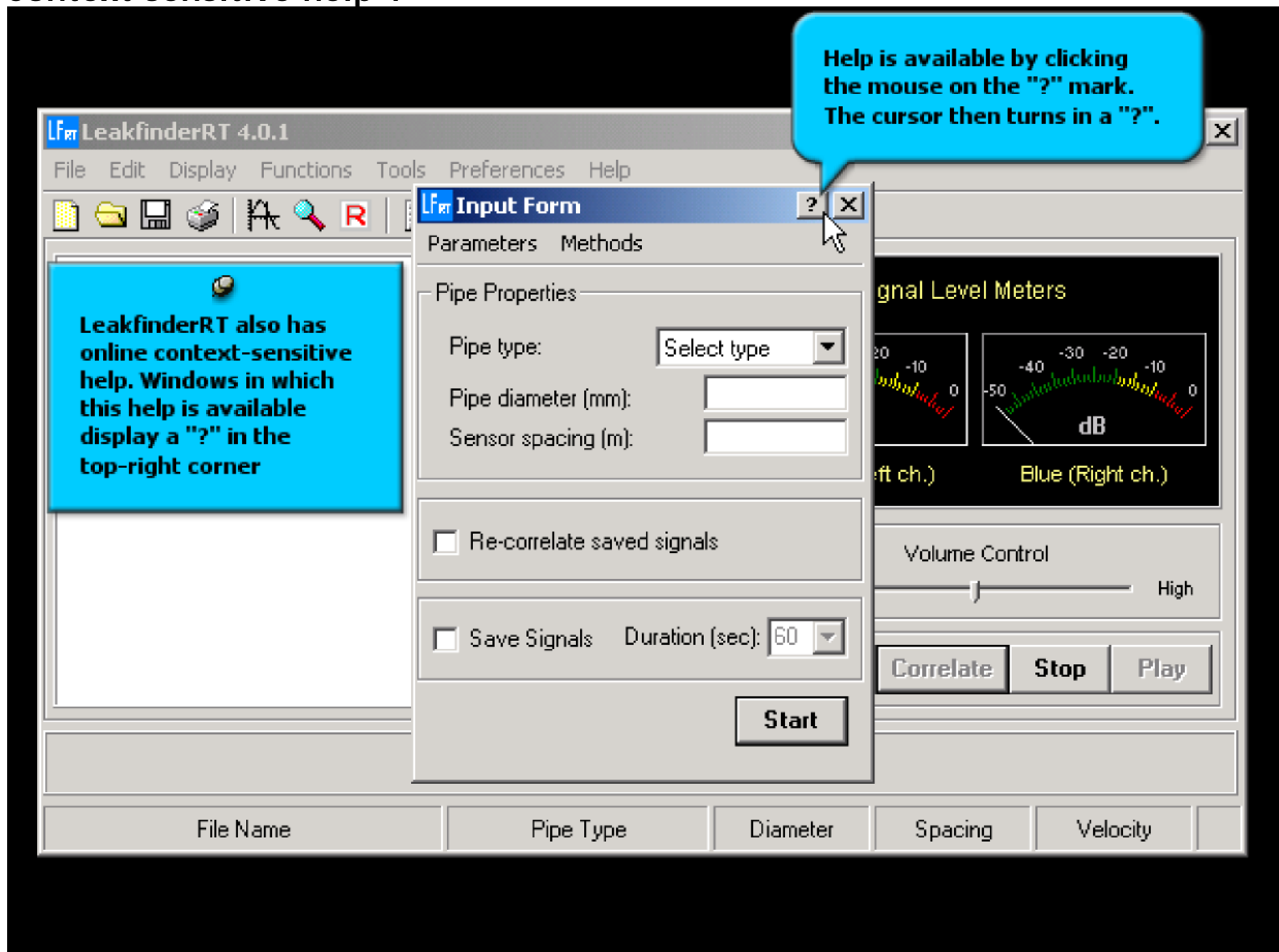


### Help menu 3

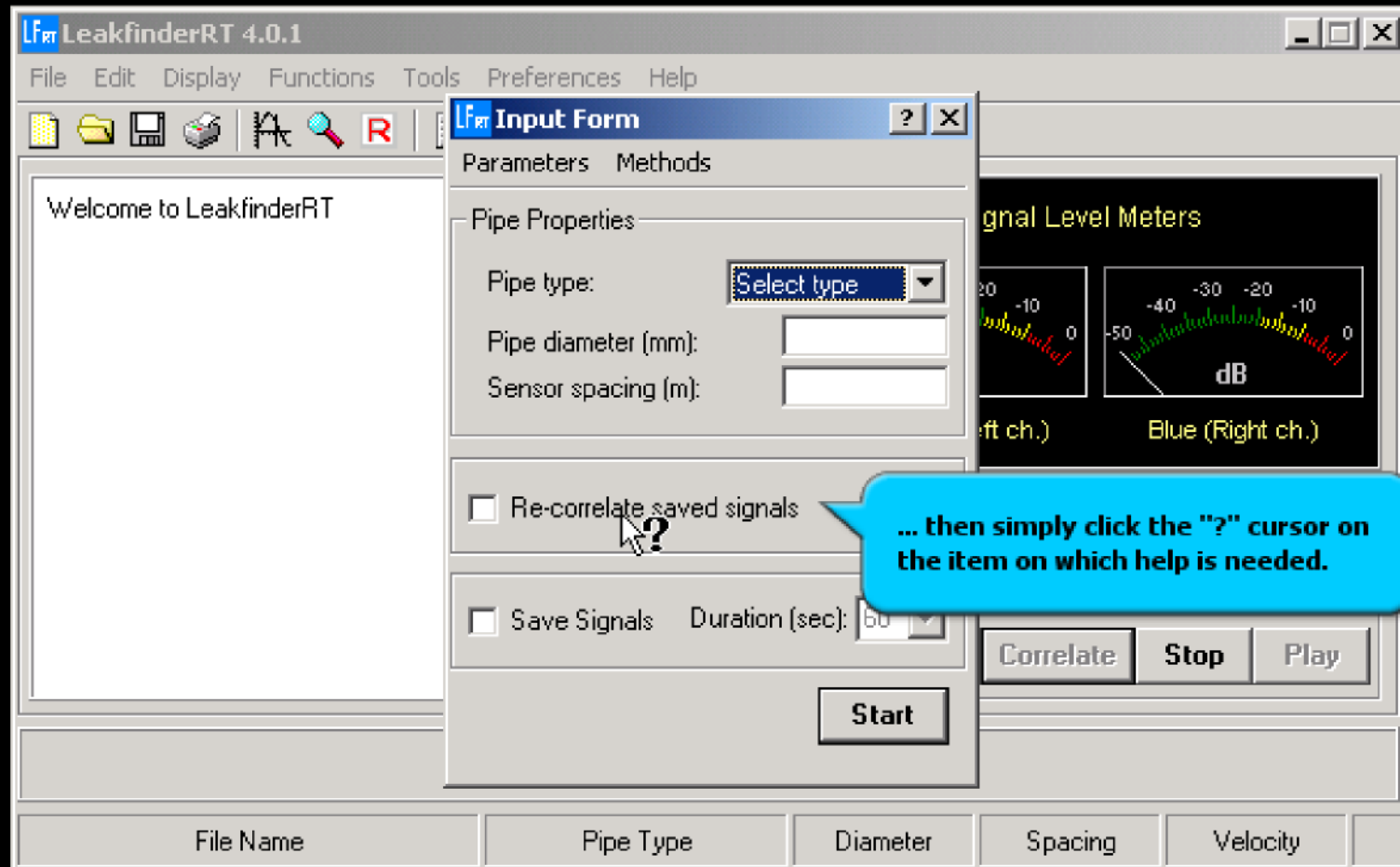




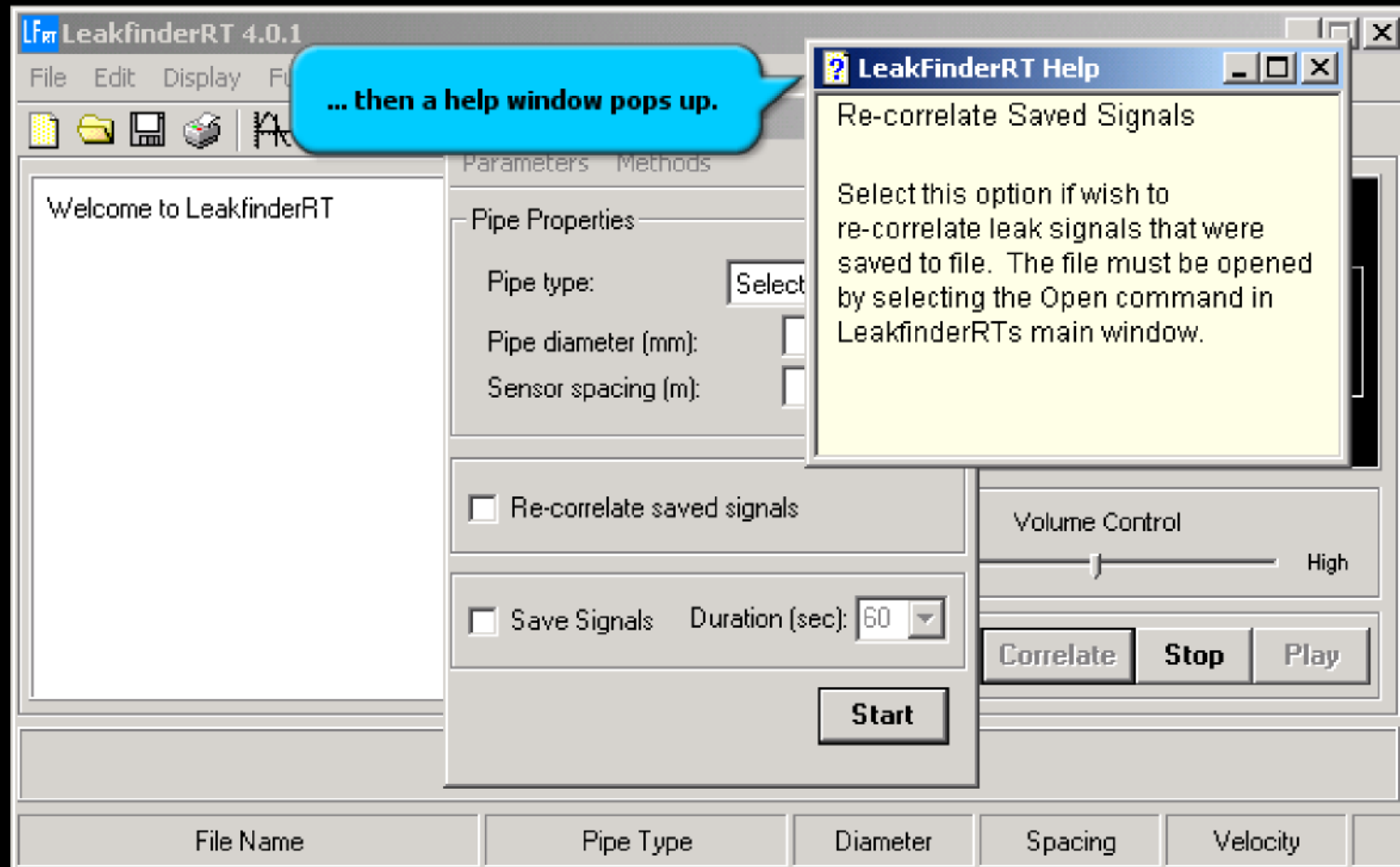
## Context sensitive help 1



## Context sensitive help 2



### Context sensitive help 3



## Technical Specifications

### Software

- 9 Enhanced and traditional correlation function
- 9 Correlation function calculated via fast Fourier transform (FFT)
- 9 Indefinite noise averaging
- 9 25 micro second minimum time resolution
- 0.1675 Hz minimum frequency resolution
- 9 Automatic or manual selection of frequency range
- 9 Propagation velocity calculator
- 10 different pipe materials
- 9 Mixed pipe sections
- 9 Arbitrary leak noise playback speed

### Accelerometers

- 9 Amplified piezoelectric sensing element
- 9 3 metres long cable having -40 to +90° C (-40 to +194° F) temperature rating

9 7.26-kg (16-lb) pull base magnet

### Wireless system

- 9 License exempt 900 MHz ISM frequency band
- 9 Automatic gain controlled sensor amplifier
- 9 Non-removable antennas
- 9 Rechargeable batteries
- 9 Low-battery indicator
- 9 Charge indicator
- 9 Very low center of gravity for improved geometrical stability
- 9 Splash proof ABS transmitter housing and aluminum receiver housing
- 9 Foil switches
- 9 Volume controlled 3.5 mm stereo headphones receiver output
- 9 10 to 15 hours of operation on fully charged battery @ 20° C (68° F)
- 9 10 to 2000 Hz frequency range (-6 dB @ 10 Hz)
- 9 500 metres (1640 ft) operating range