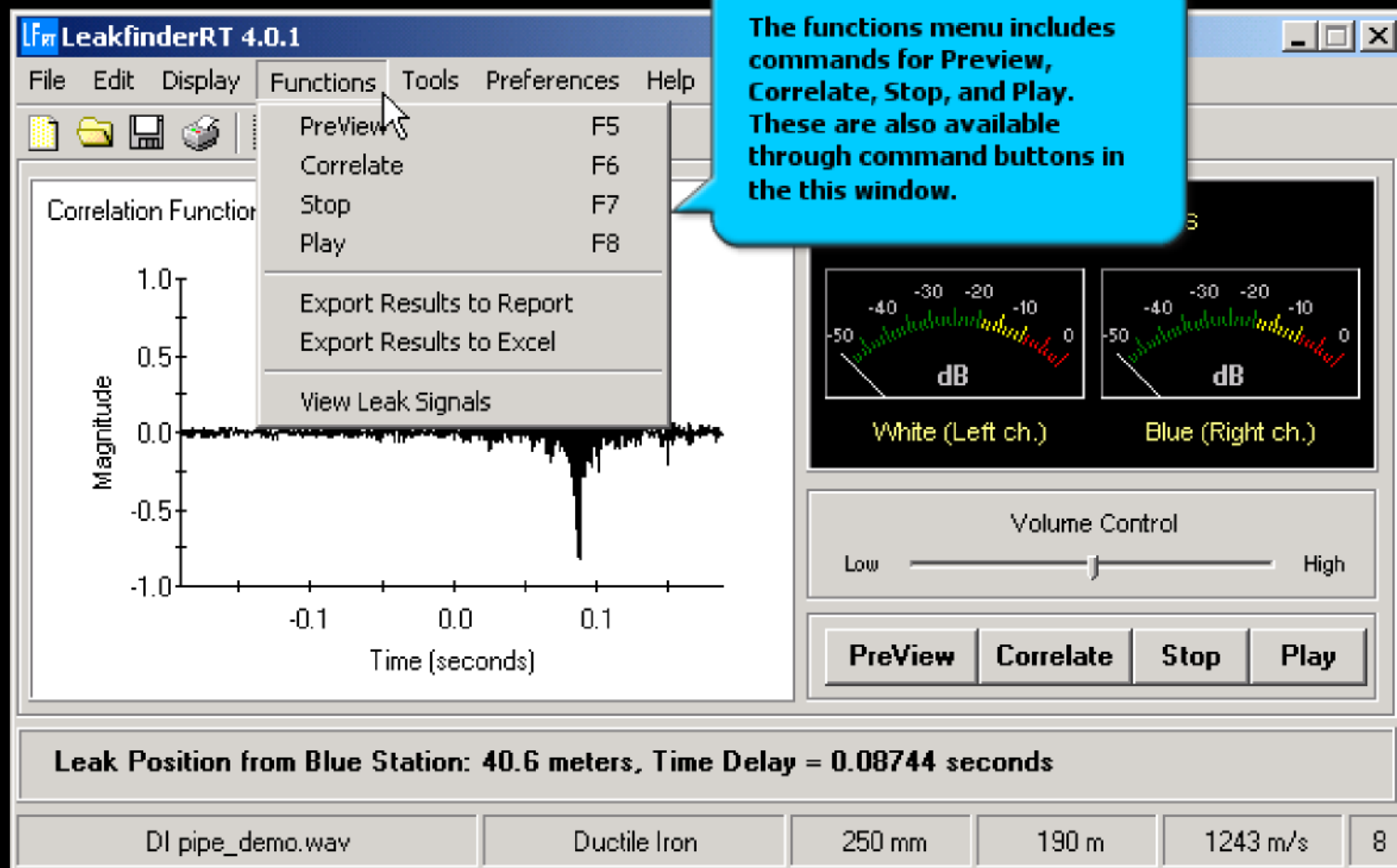
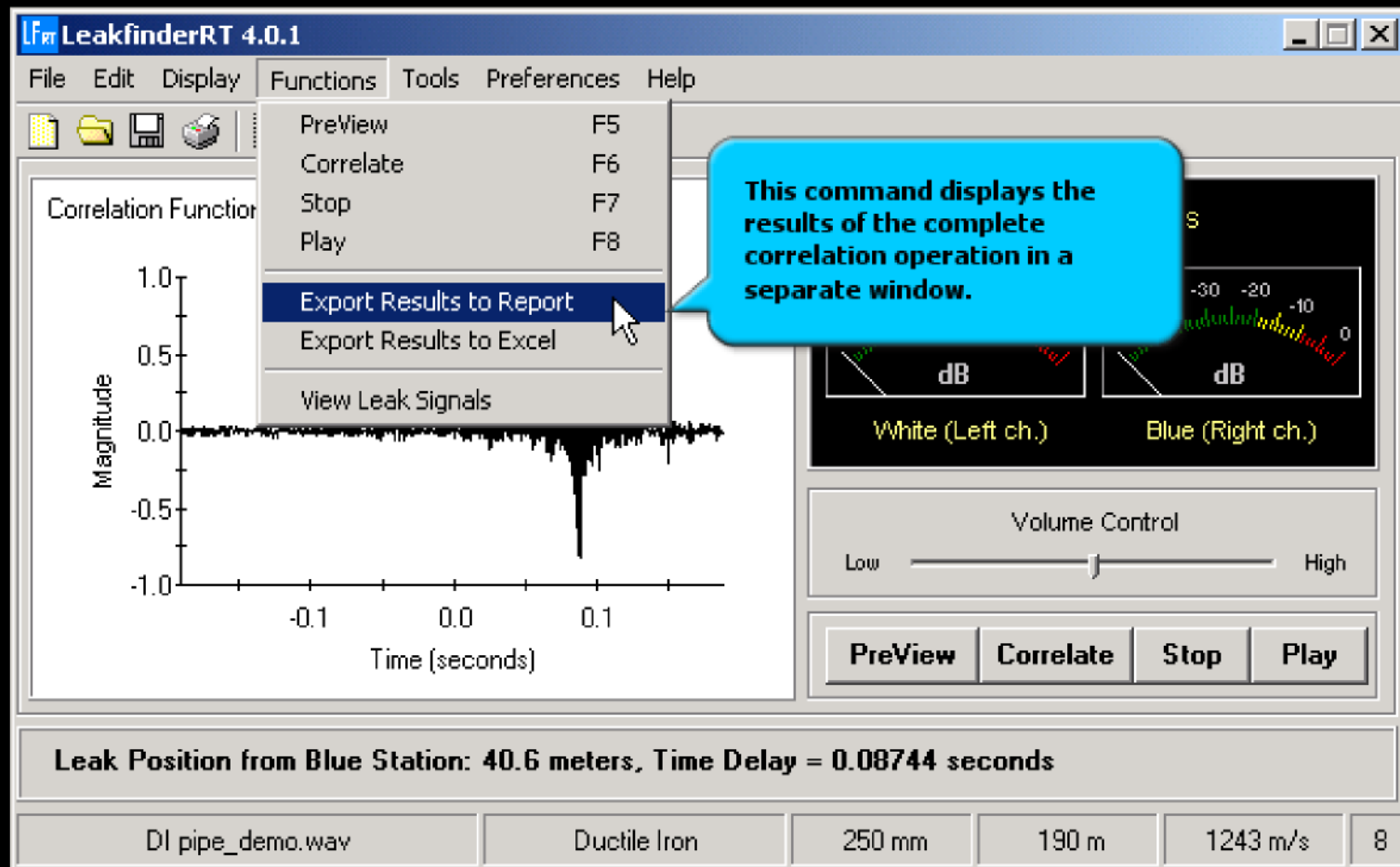


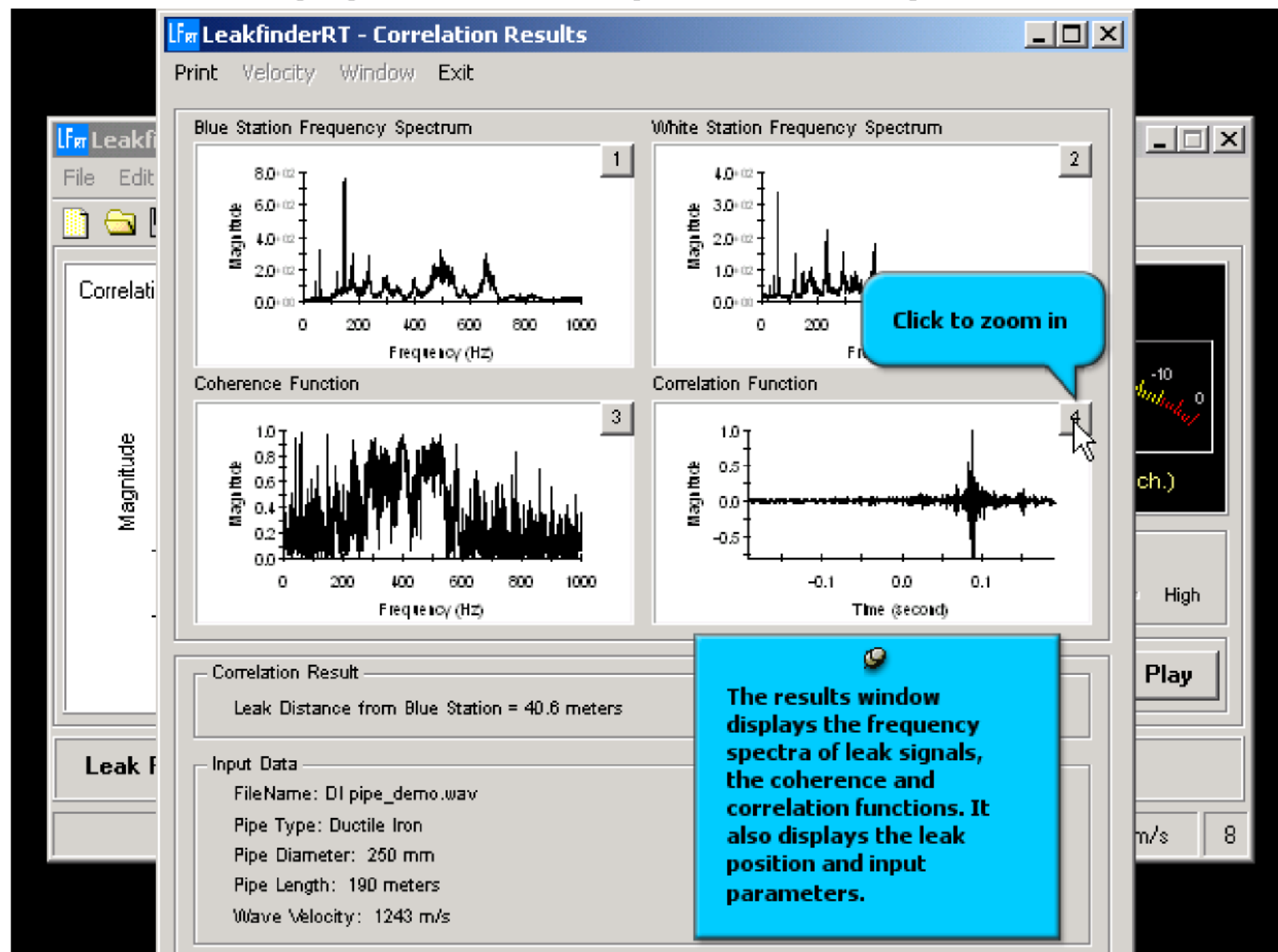
Functions menu (Preview, Correlate, Play & Stop commands)



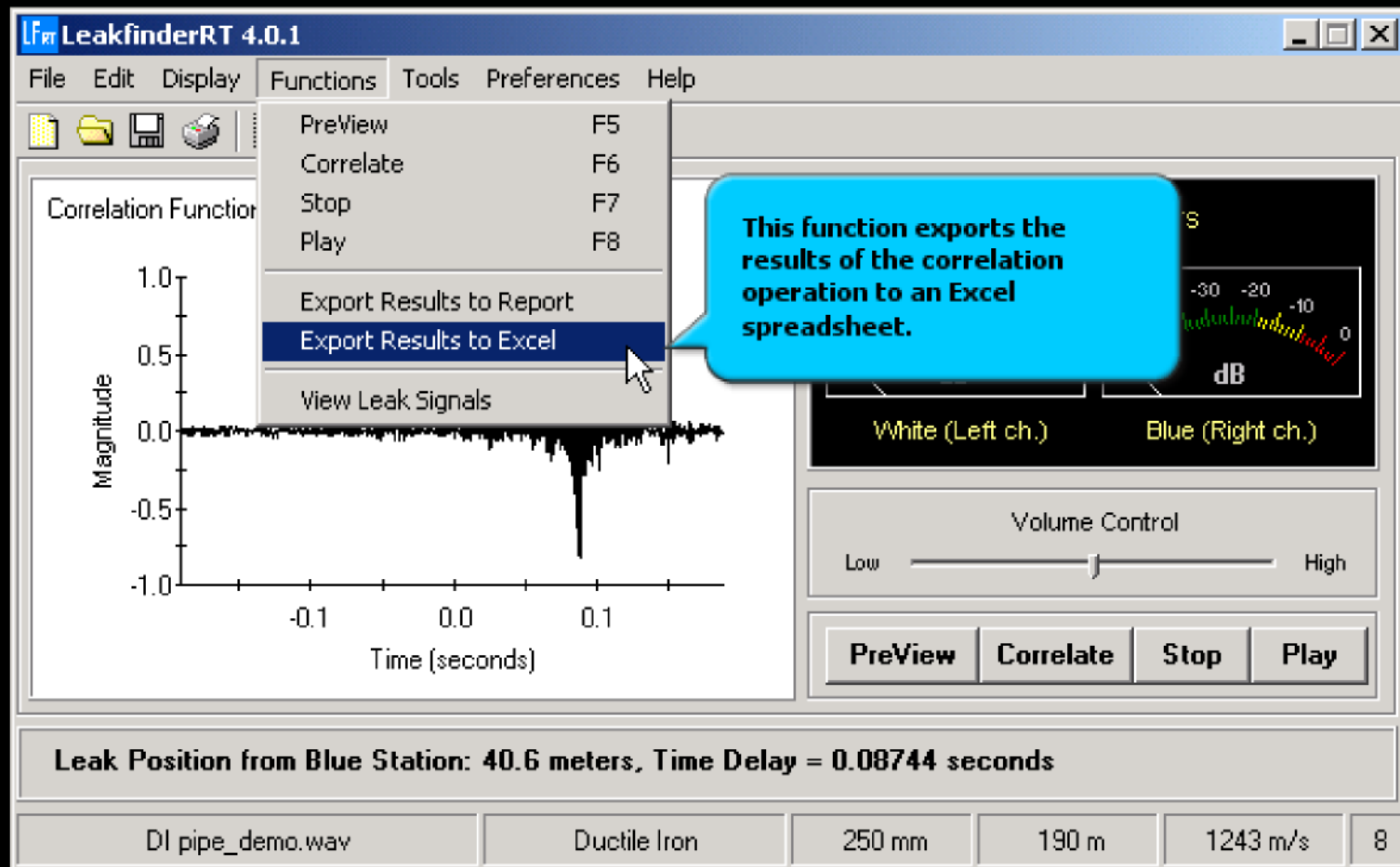
Functions menu (Export results to report command 1)



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

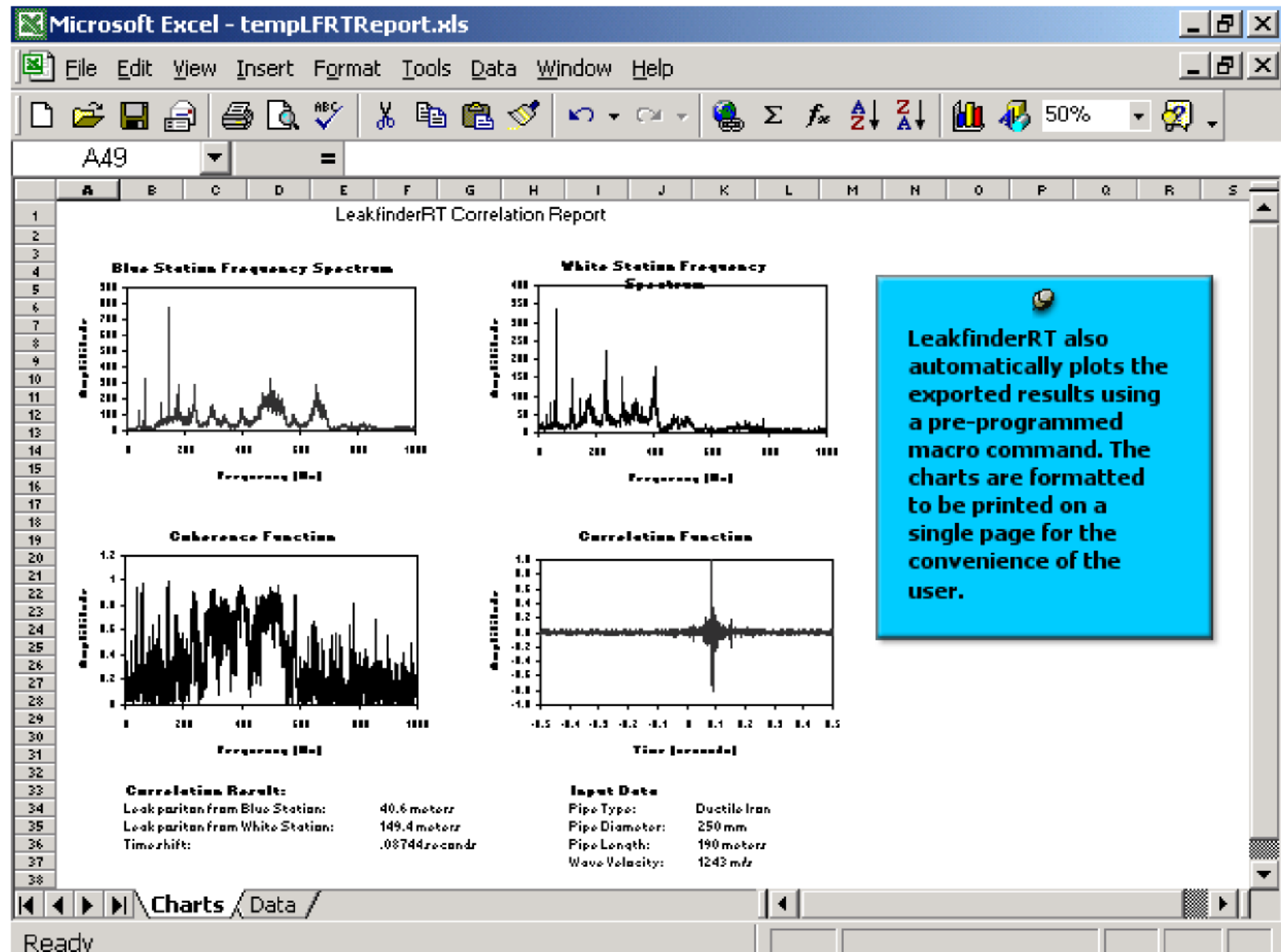
G20 =

	A	B	C	D	E	F
1	LeakfinderRT Correlation Report					
2						
3						
4	Correlation Result:					
5						
6	Leak positon from Blue Station:		40.6 meters			
7	Leak positon from White Station:		149.4 meters			
8	Time shift:		.08744 seconds			
9	File Name:		DI pipe_demo.wav			
10						
11	Input Data					
12						
13	Pipe Type:		Ductile Iron			
14	Pipe Diameter:		250 mm			
15	Pipe Length:		190 meters			
16	Wave Velocity:		1243 m/s			
17						
18						
19	Frequency (Hz)	Spectrum Blue	Spectrum White	Coherence	Time (seconds)	Correlation
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

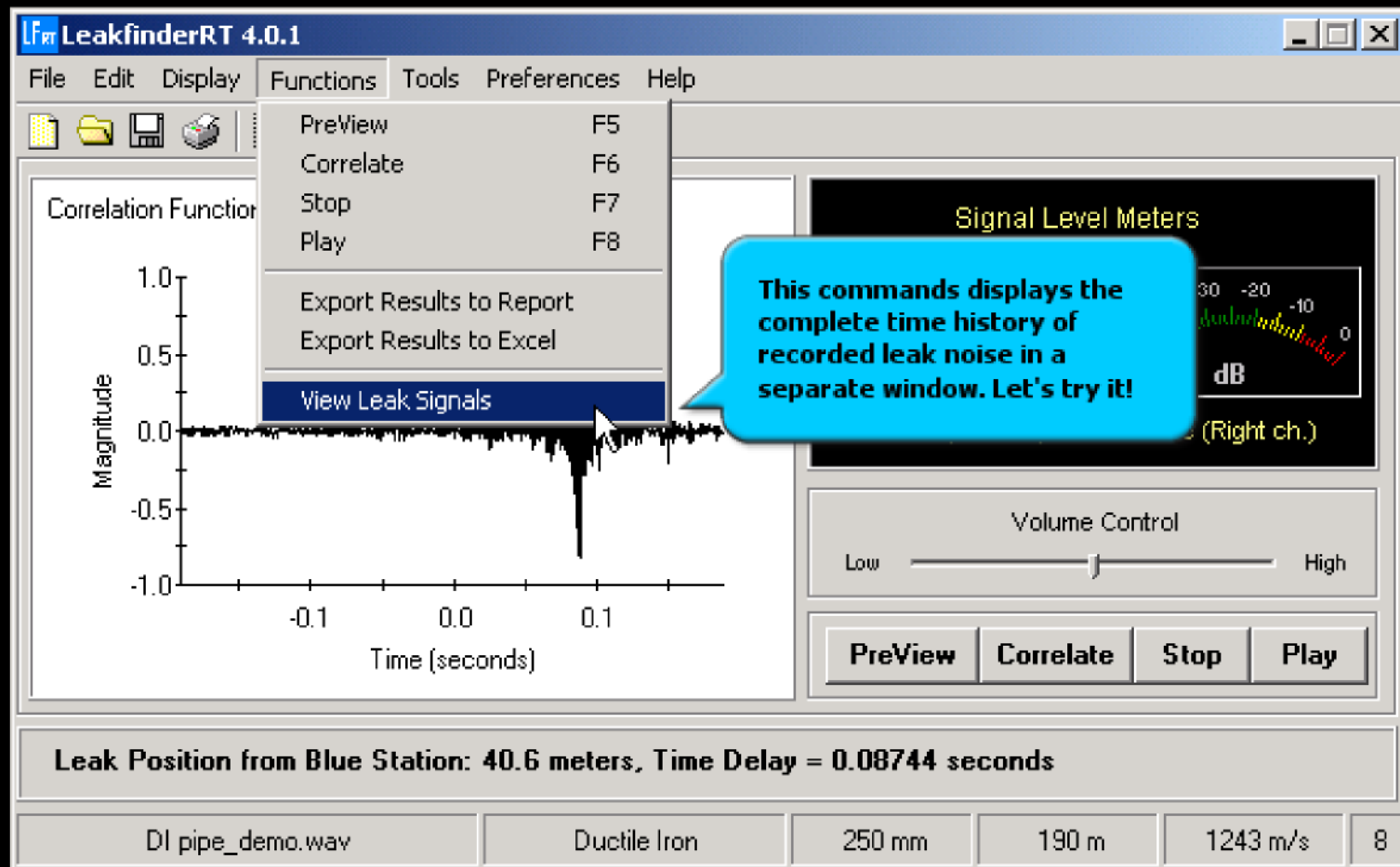
Ready

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.

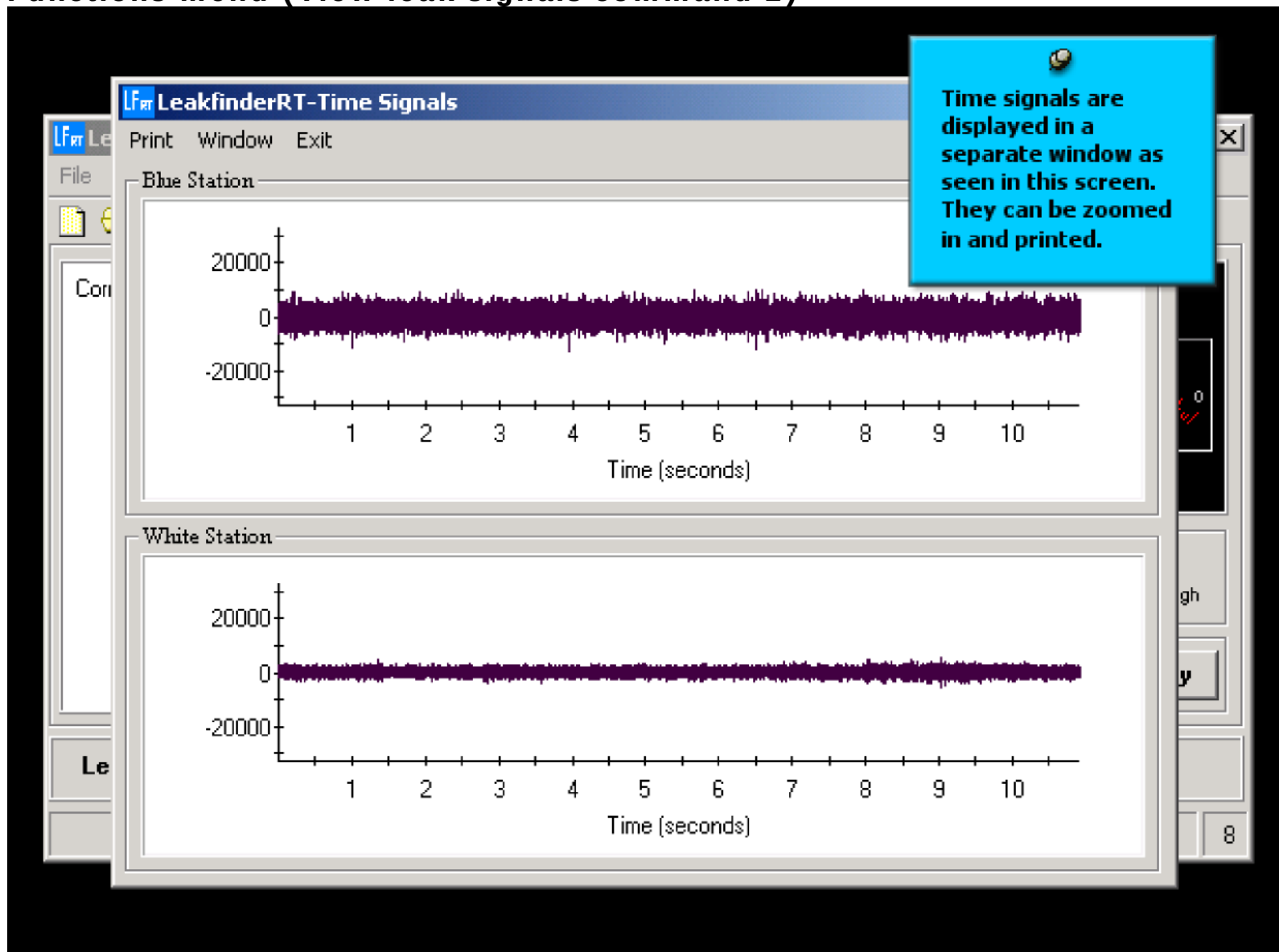
Functions menu (Export results to Excel command 3)



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' (highlighted by a mouse cursor), '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 window features a 'Correlation Function' plot on the left, showing 'Magnitude' on the y-axis (from -1.0 to 1.0) and 'Time (seconds)' on the x-axis (from -0.1 to 0.1). The plot shows a sharp negative peak at approximately 0.08 seconds. On the right, there are 'Signal Level Meters' for 'White (Left ch.)' and 'Blue (Right ch.)', each with a dB scale from -50 to 0. Below these are 'Volume Control' sliders for 'Low' and 'High'. At the bottom right are buttons for 'PreView', 'Correlate', 'Stop', and 'Play'. A status bar at the bottom displays: 'Leak Position from Blue Station: 40.6 meters, Time Delay = 0.08744 seconds'. The bottom-most bar contains fields for 'DI pipe_demo.wav', 'Ductile Iron', '250 mm', '190 m', '1243 m/s', and '8'.

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

Magnitude

Time (seconds)

Signal Level Meters

White (Left ch.)

Blue (Right ch.)

Volume Control

Low High

PreView Correlate Stop Play

Leak Position from Blue Station: 40.6 meters, Time Delay = 0.08744 seconds

DI pipe_demo.wav Ductile Iron 250 mm 190 m 1243 m/s 8

Tools menu (Playback speed command 1)

The screenshot shows the LeakfinderRT 4.0.1 software window. The 'Tools' menu is open, and 'PlayBack Speed' is selected. A callout box explains that this function controls the playback speed of leak sounds. Another callout box notes that for plastic pipes, leak sounds are 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 into an audible range. The main interface includes a 'Correlation Function' plot, two dB level meters for 'White (Left ch.)' and 'Blue (Right ch.)', a 'Volume Control' slider, and buttons for 'PreView', 'Correlate', 'Stop', and 'Play'. At the bottom, there are input fields for 'Ductile Iron', '250 mm', '190 m', '1243 m/s', and '8'.

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

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

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.

Correlation Function

1.0
0.5
0.0

0.1

dB

White (Left ch.)

dB

Blue (Right ch.)

Volume Control

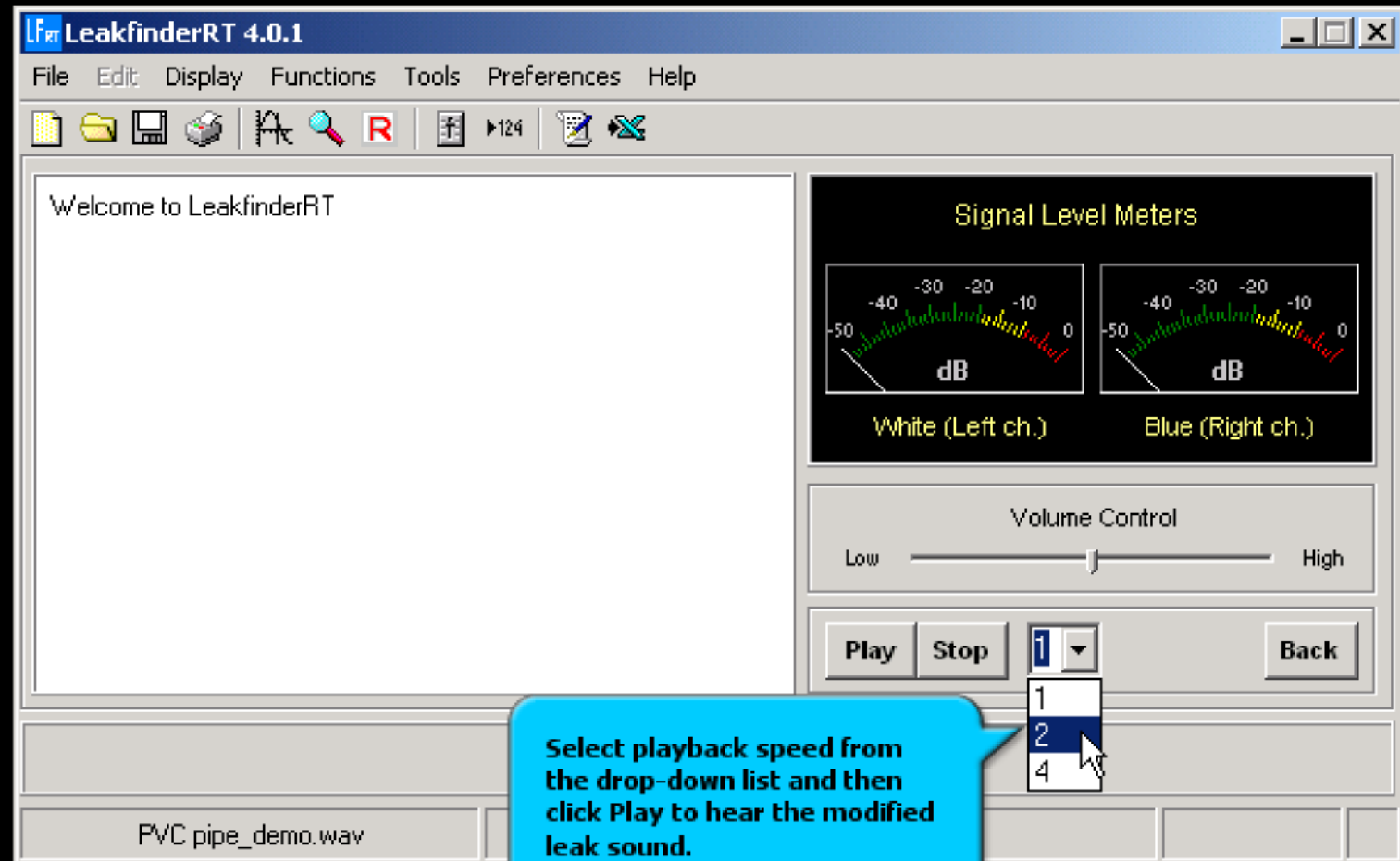
Low High

PreView Correlate Stop Play

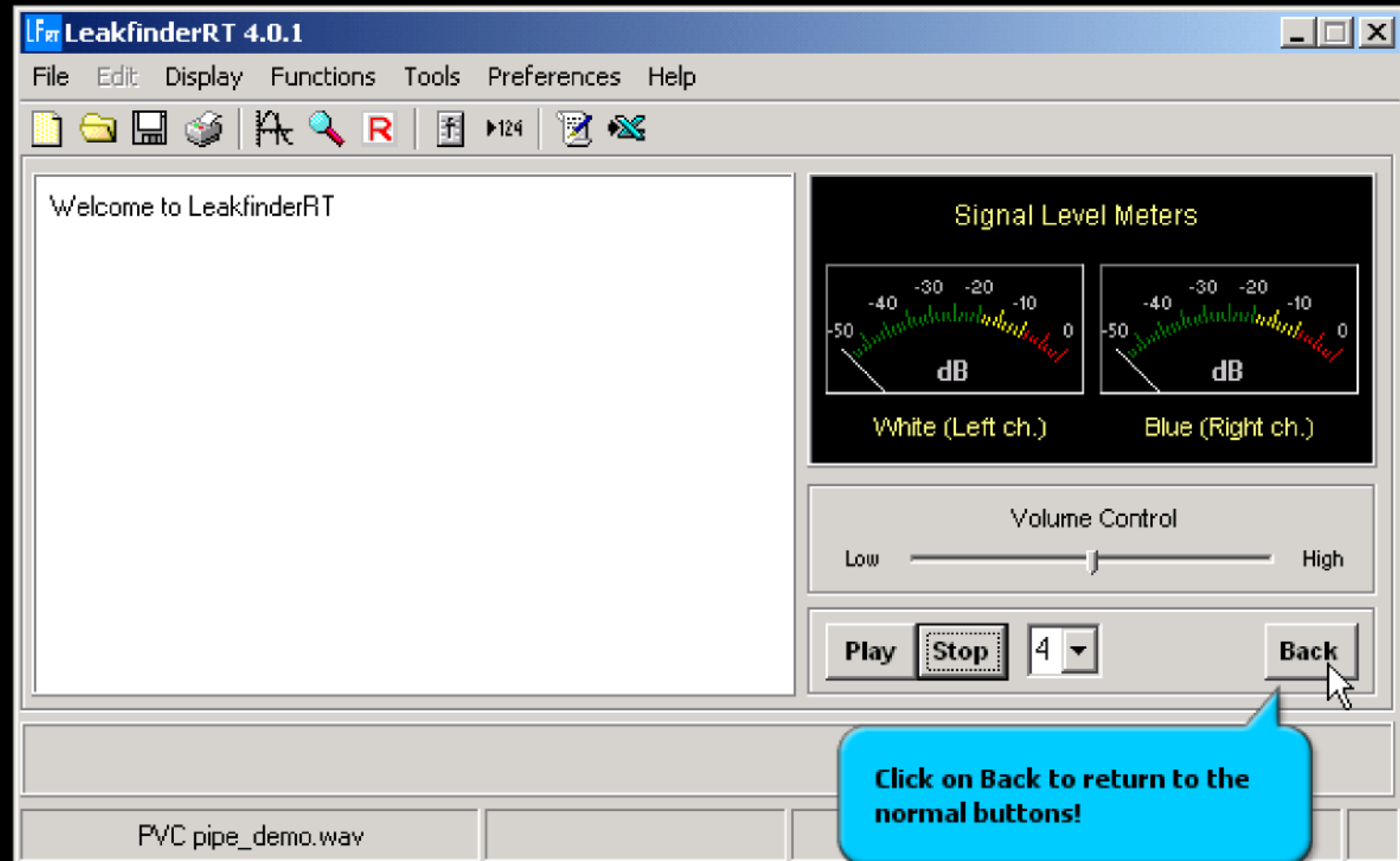
6 meters, Time Delay = 0.08744 seconds

Ductile Iron 250 mm 190 m 1243 m/s 8

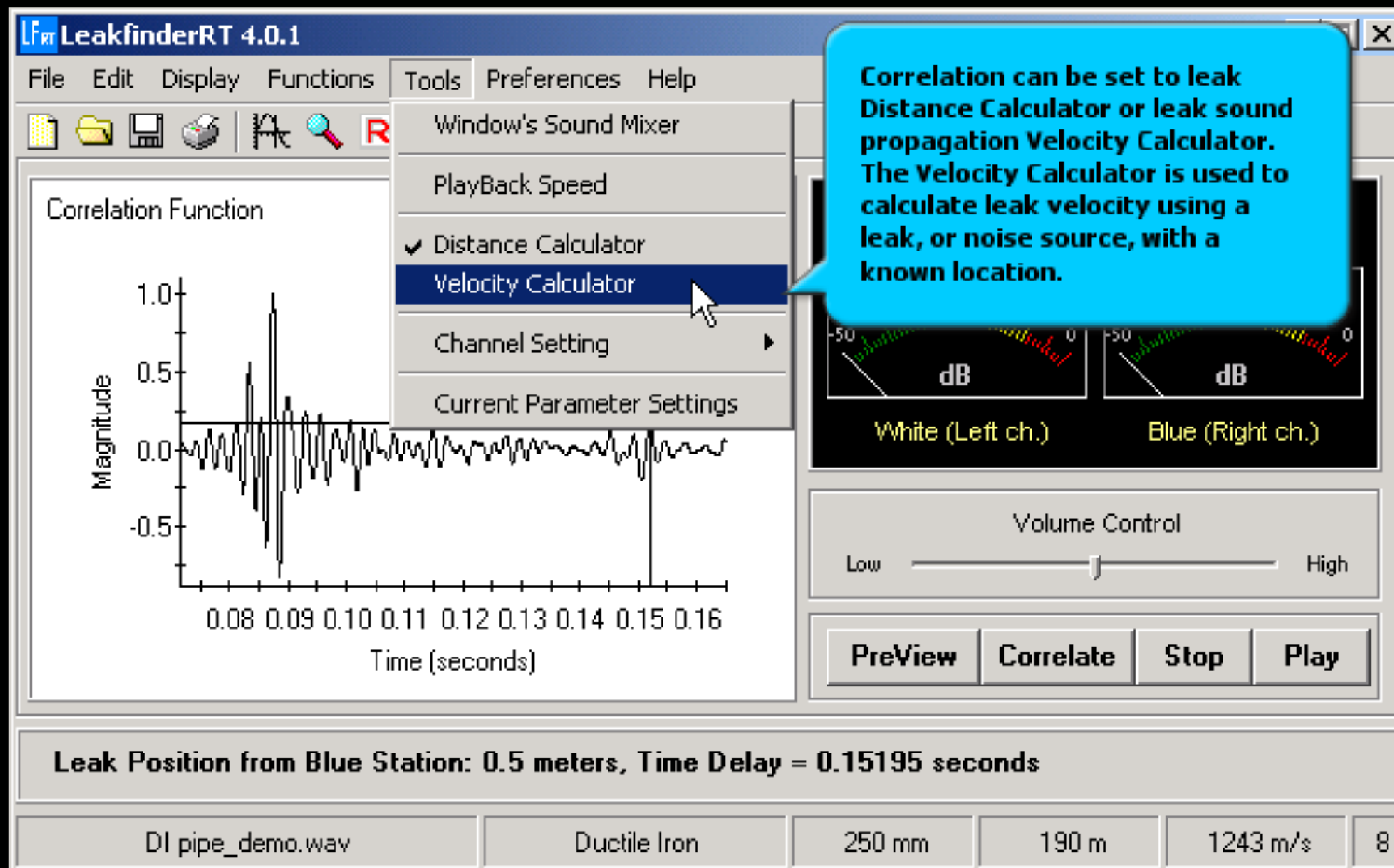
Tools menu (Playback speed command 2)



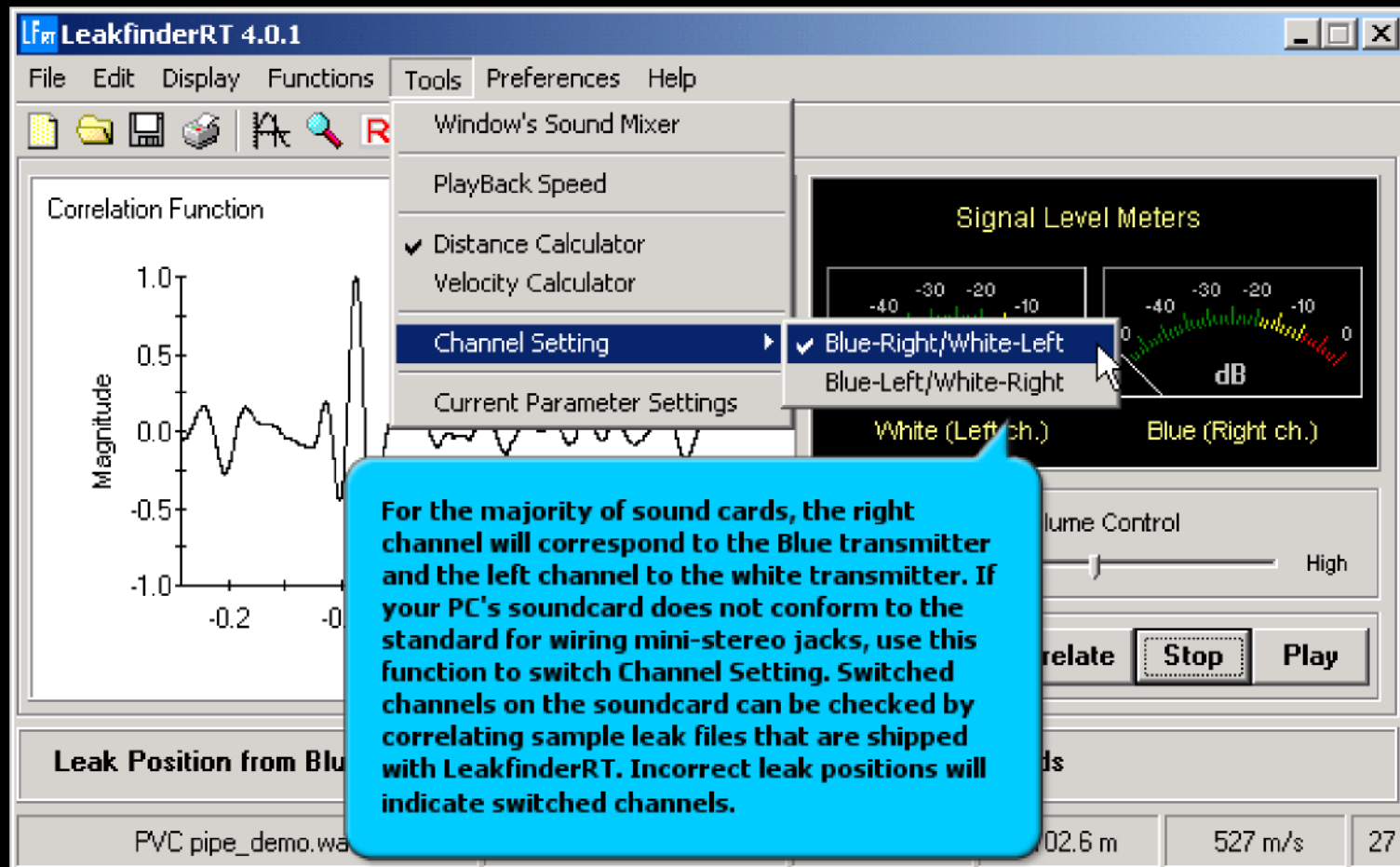
Tools menu (Playback speed command 3)



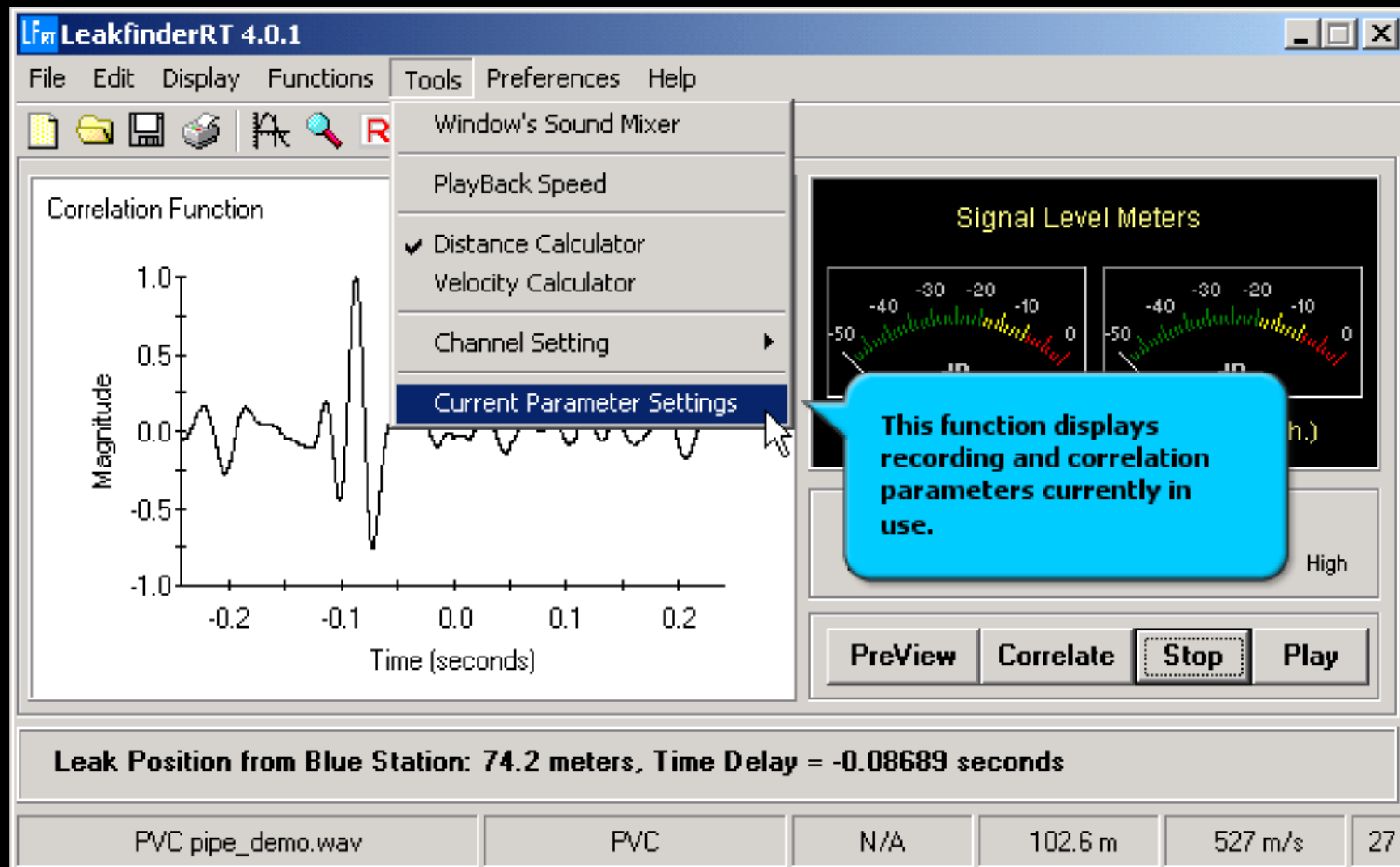
Tools menu (Velocity calculator)



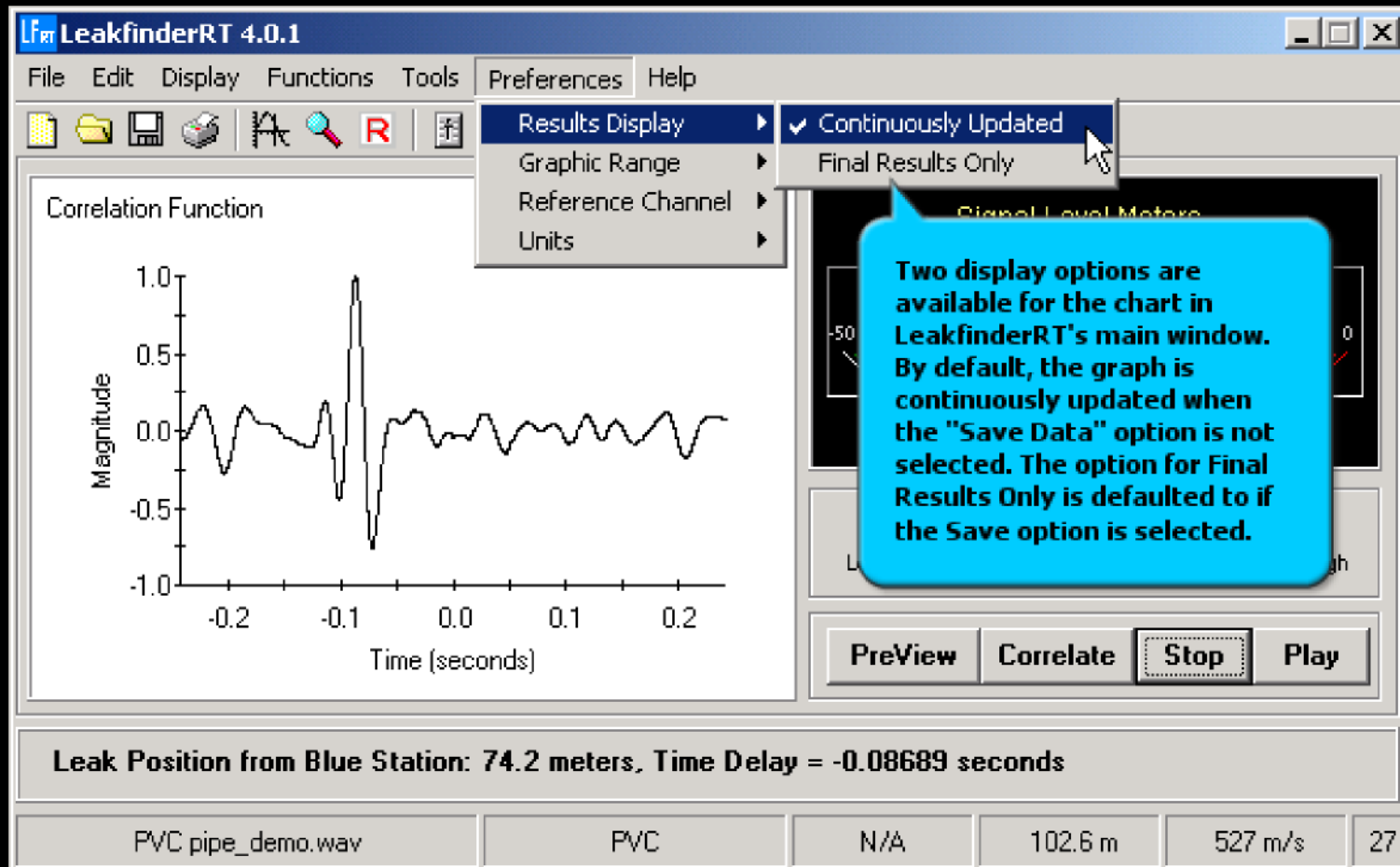
Tools menu (Channel setting)



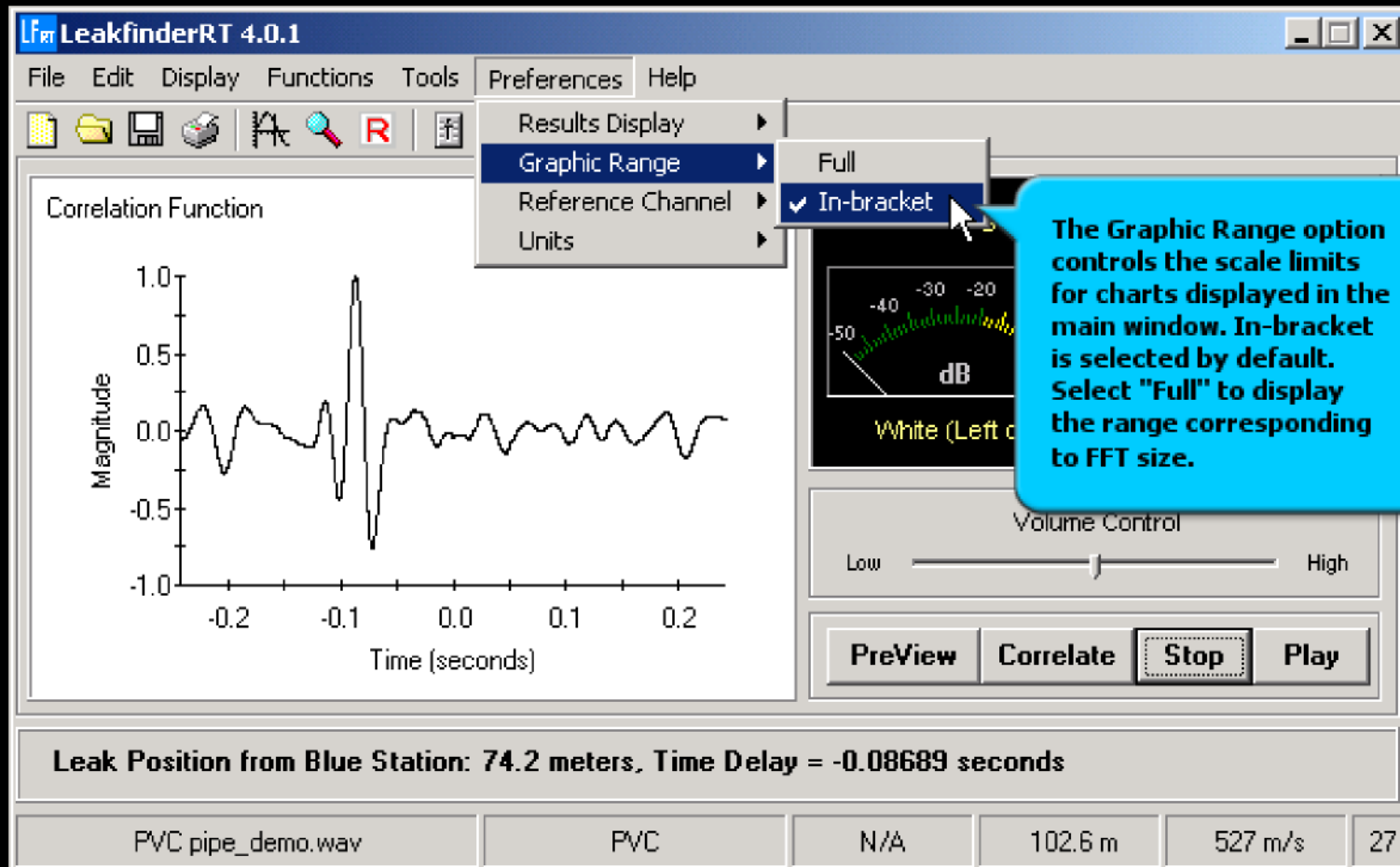
Tools menu (Current parameters setting)



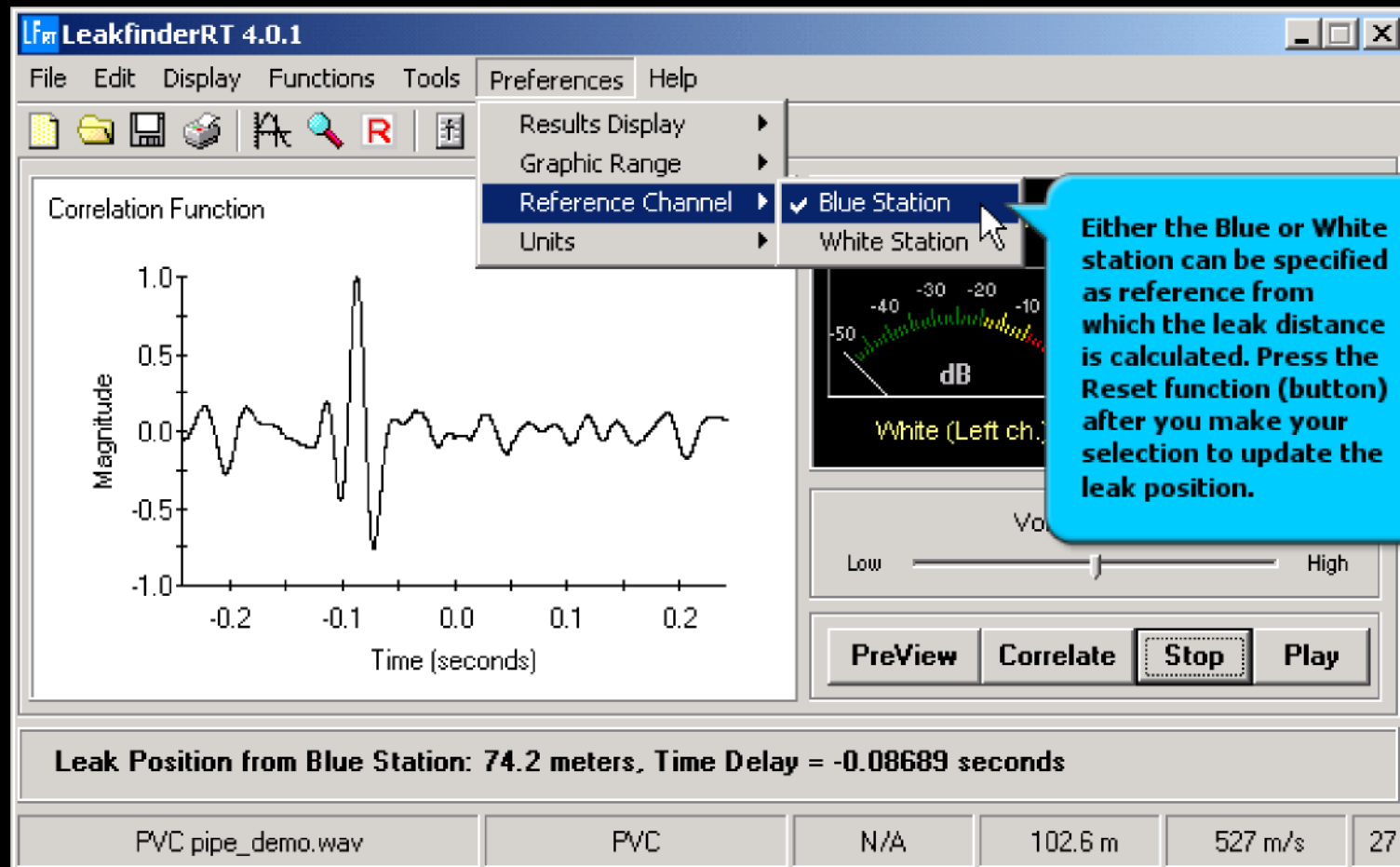
Preferences menu (Results display)



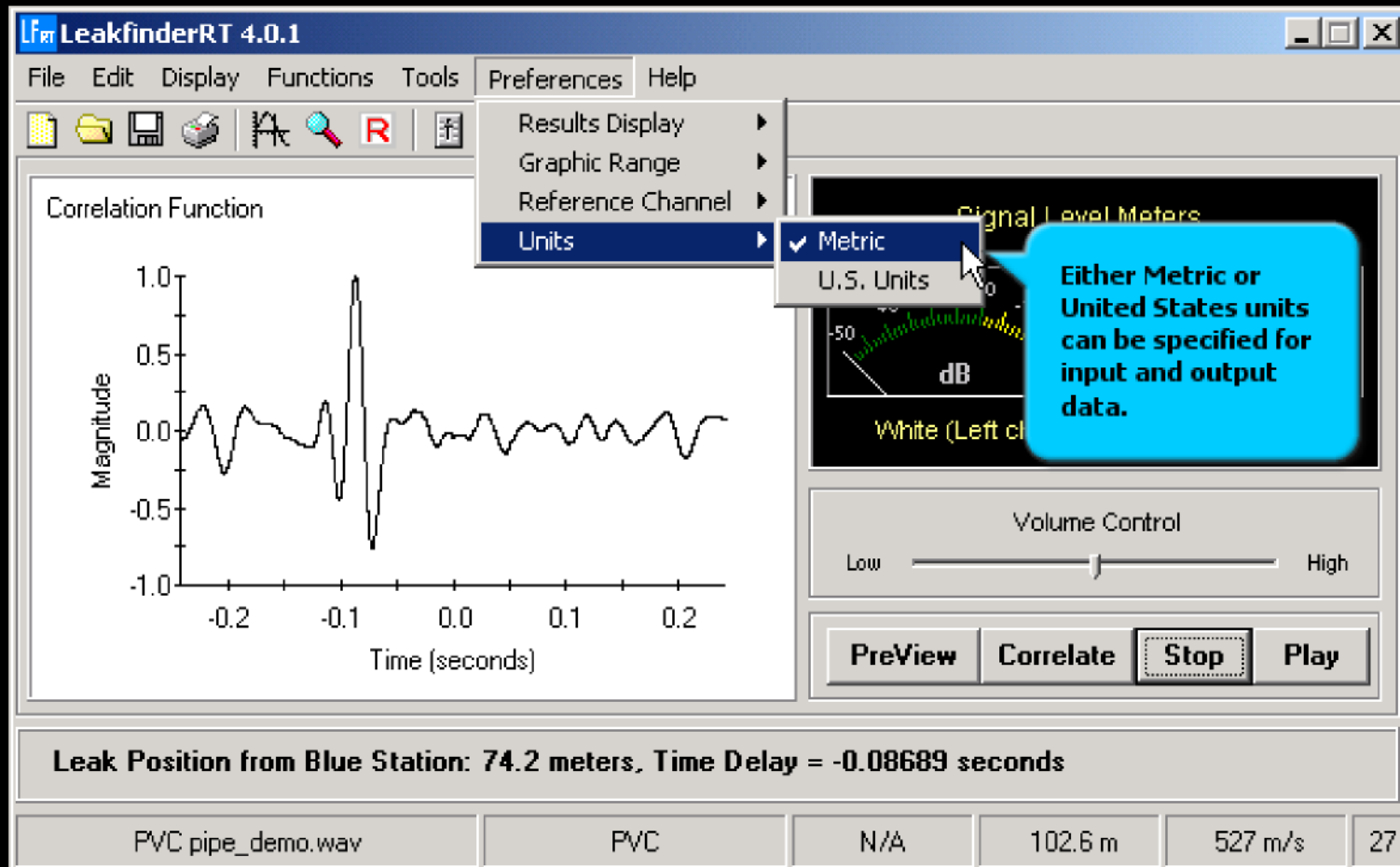
Preferences menu (Graphic range)



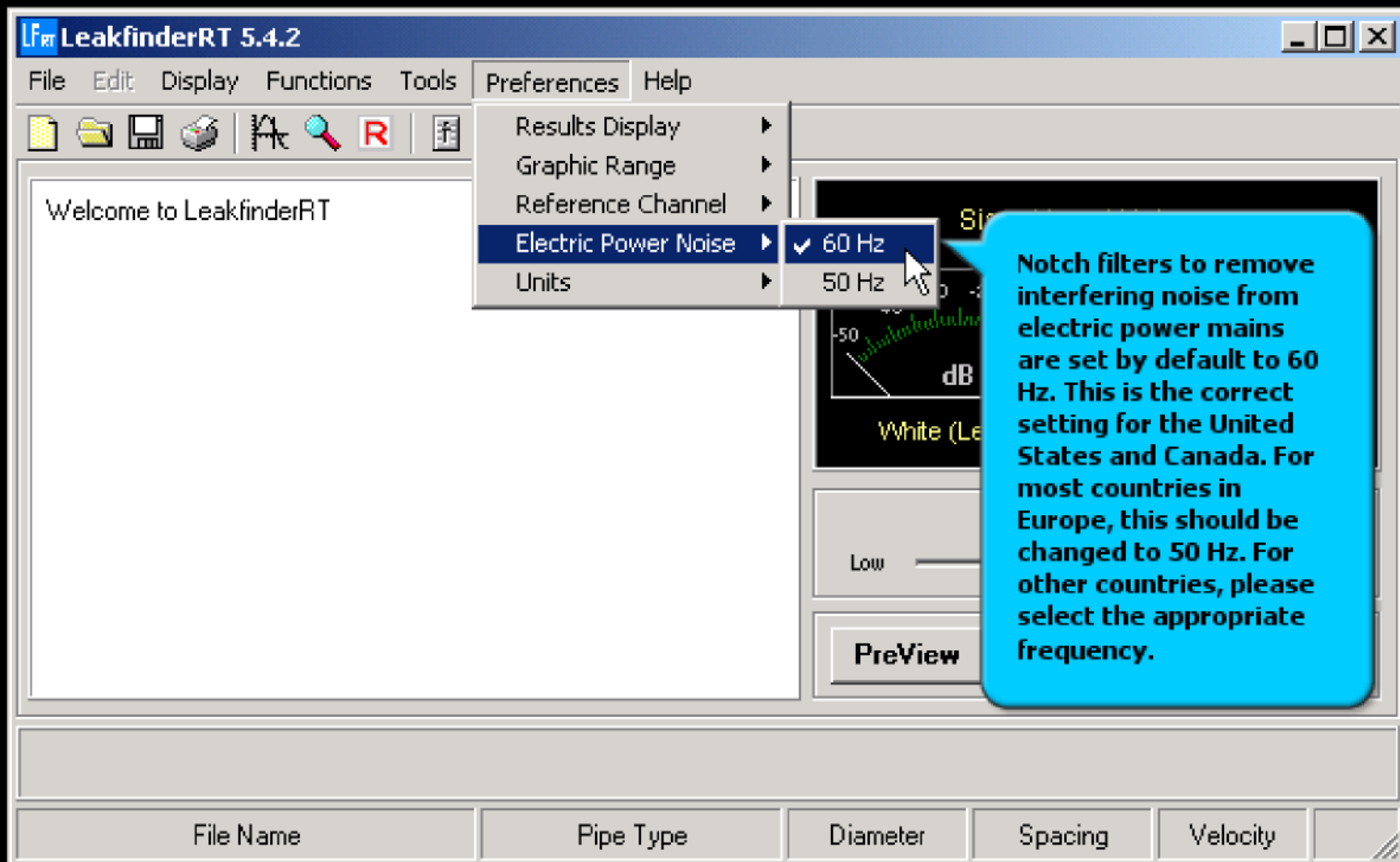
Preferences menu (Reference channel)



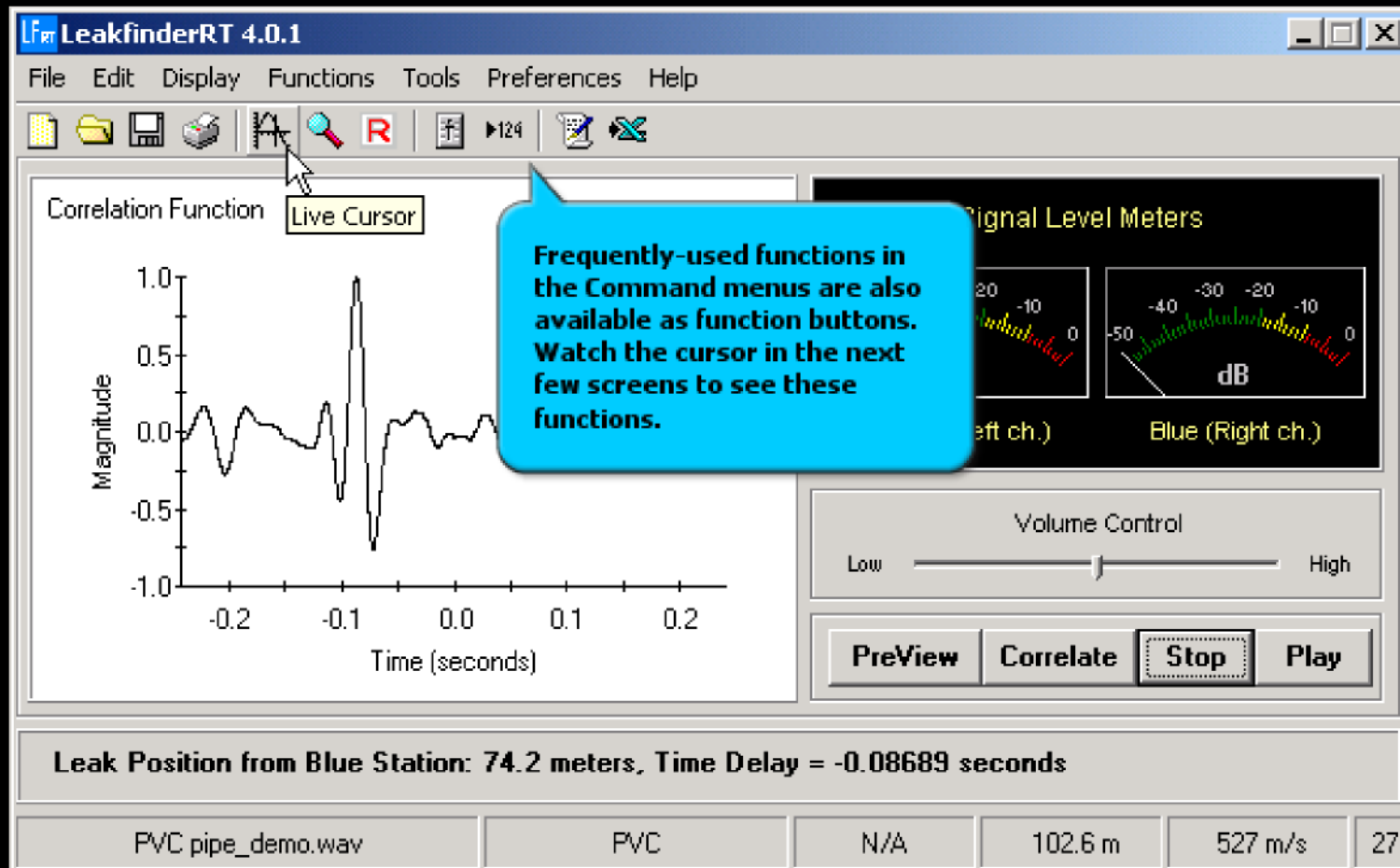
Preferences menu (Measurement units)



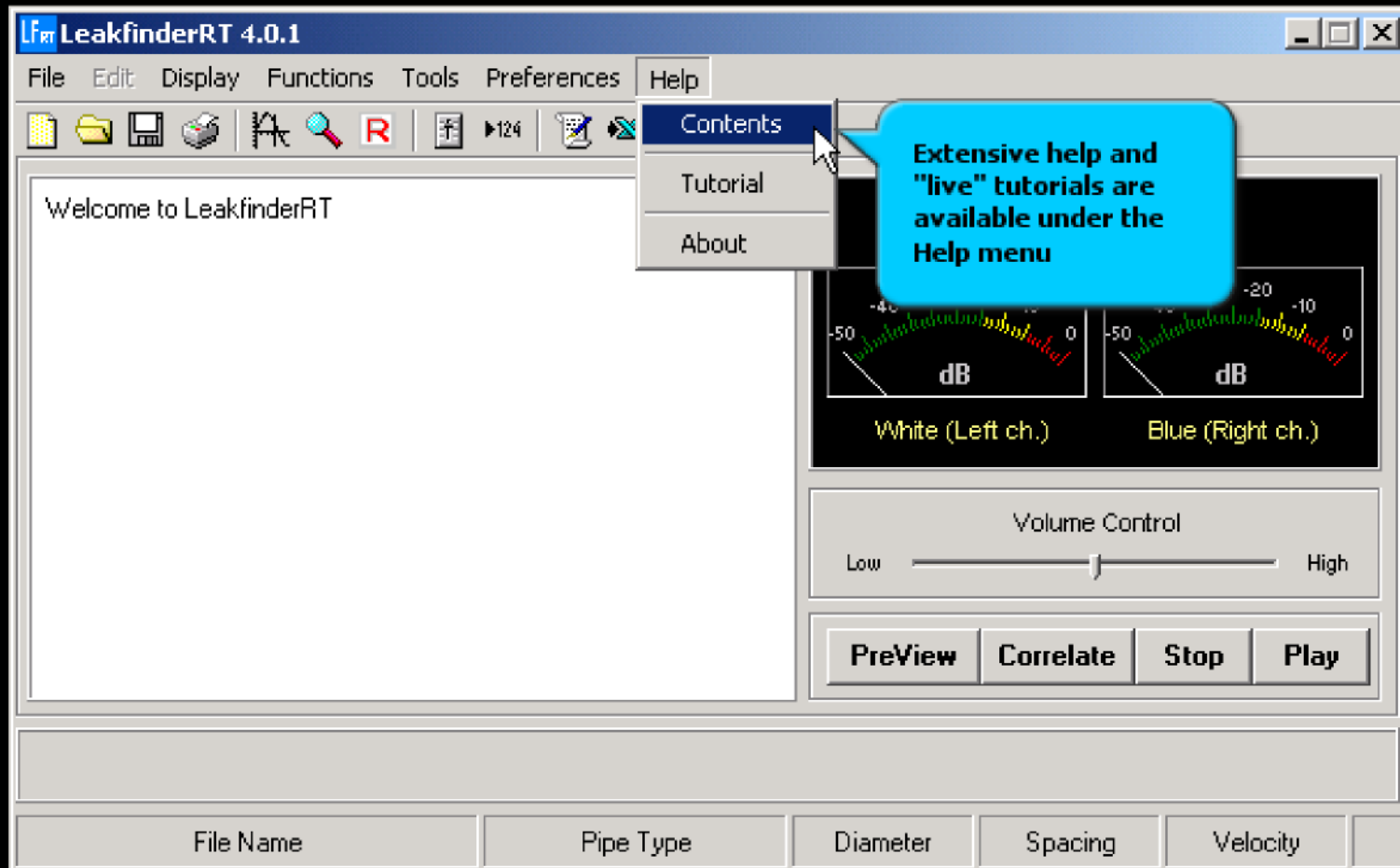
Preferences menu (Notch filters for noise from power mains)



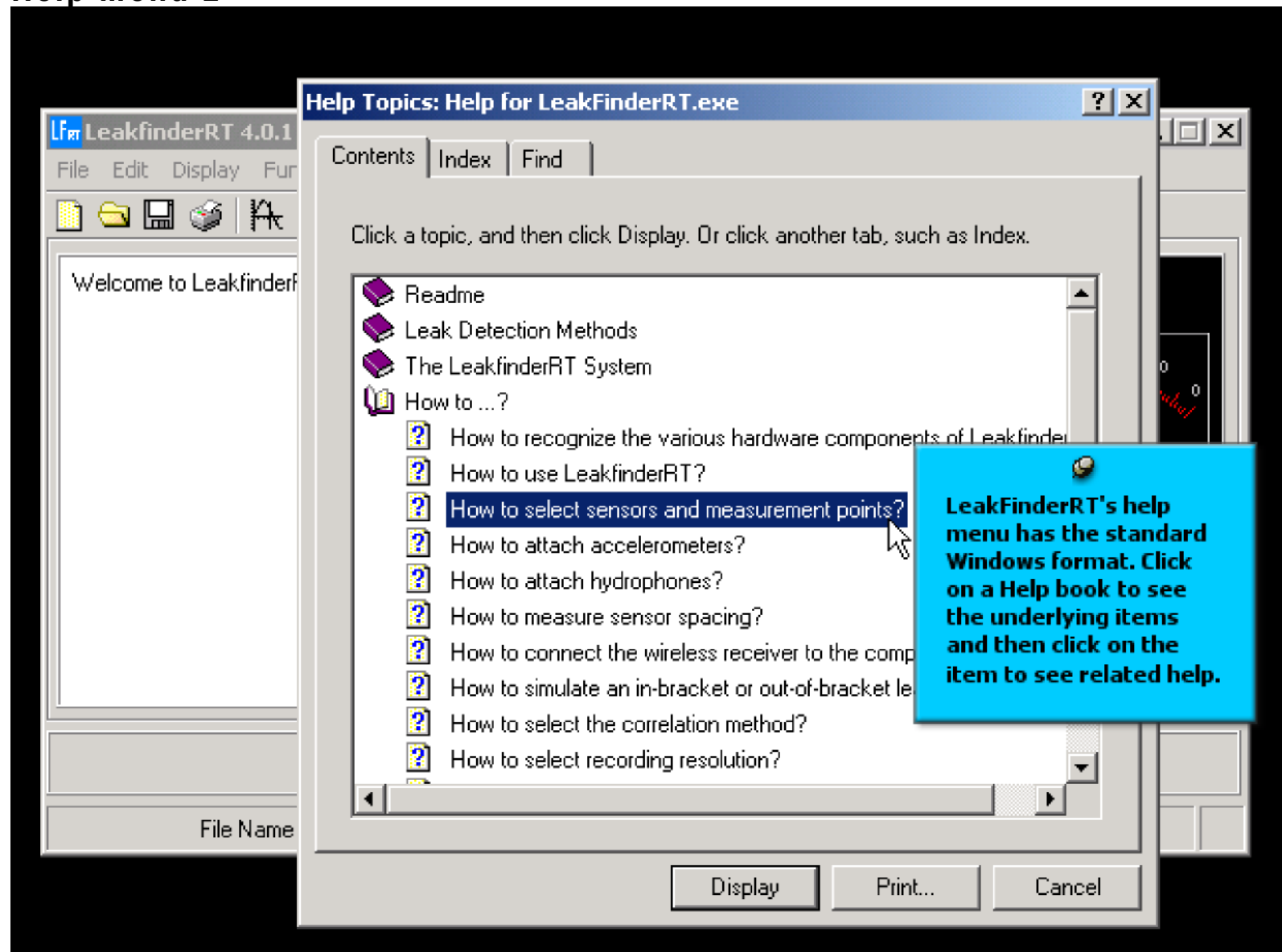
Frequently used button commands



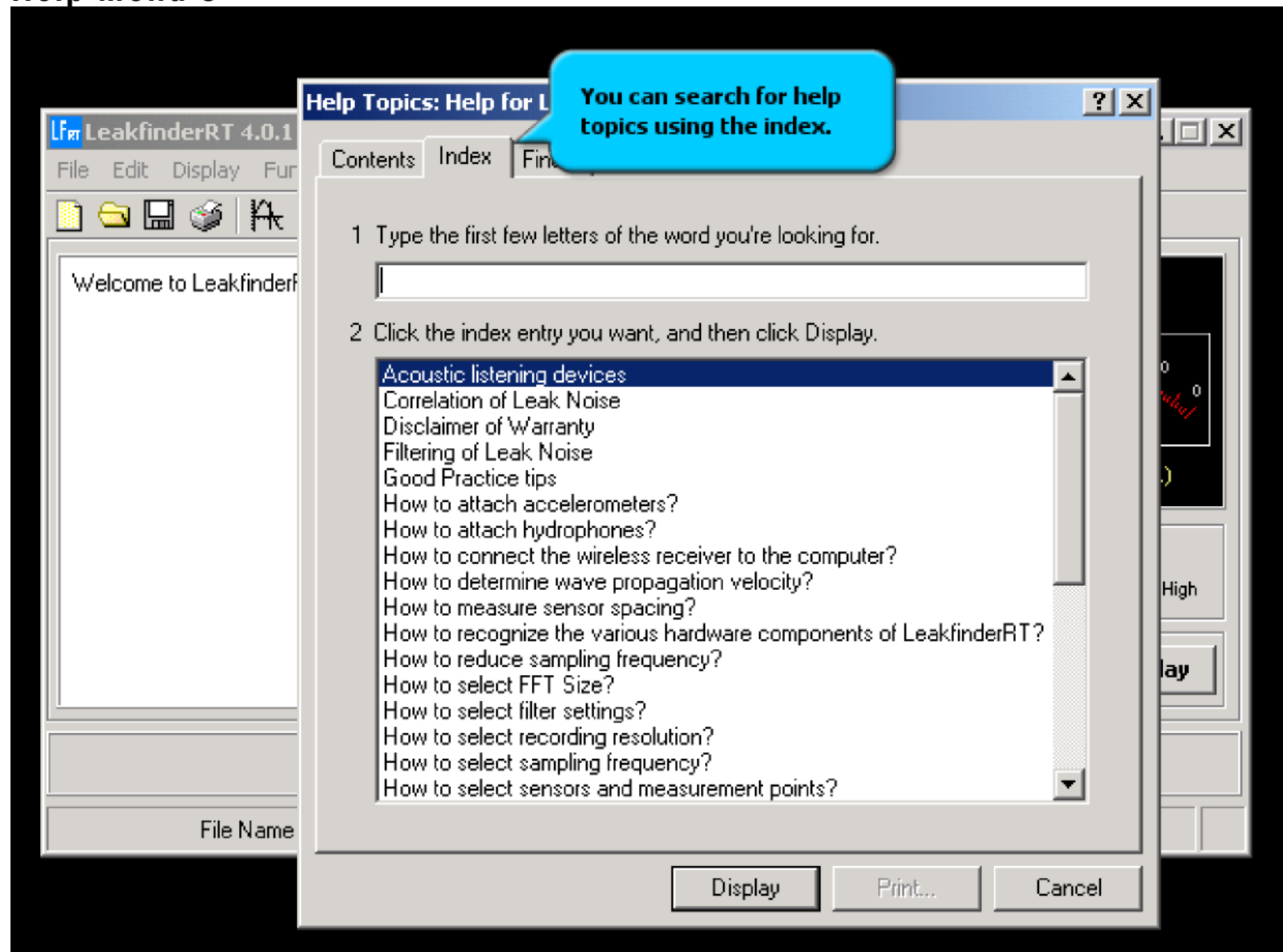
Help menu 1



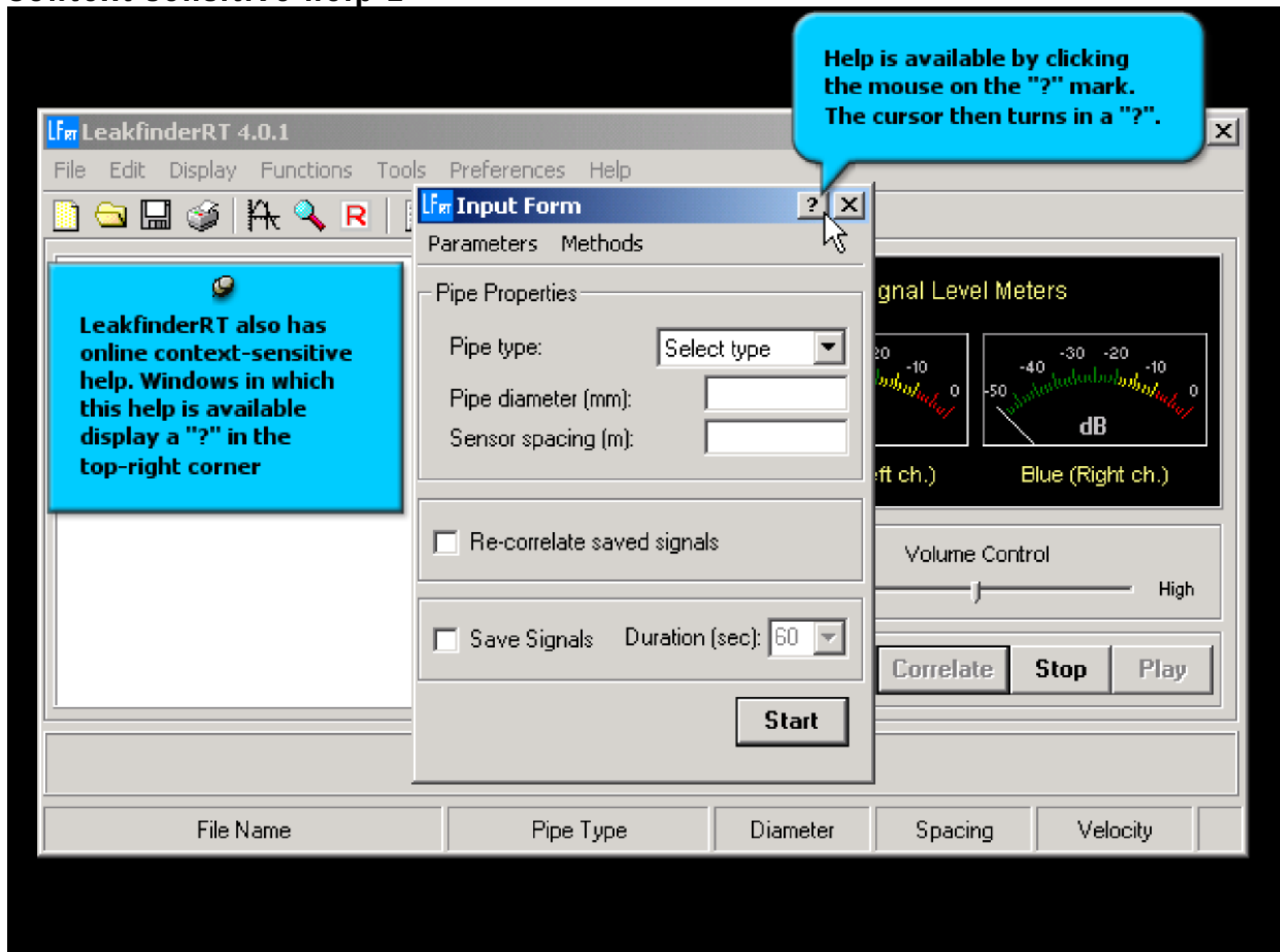
Help menu 2



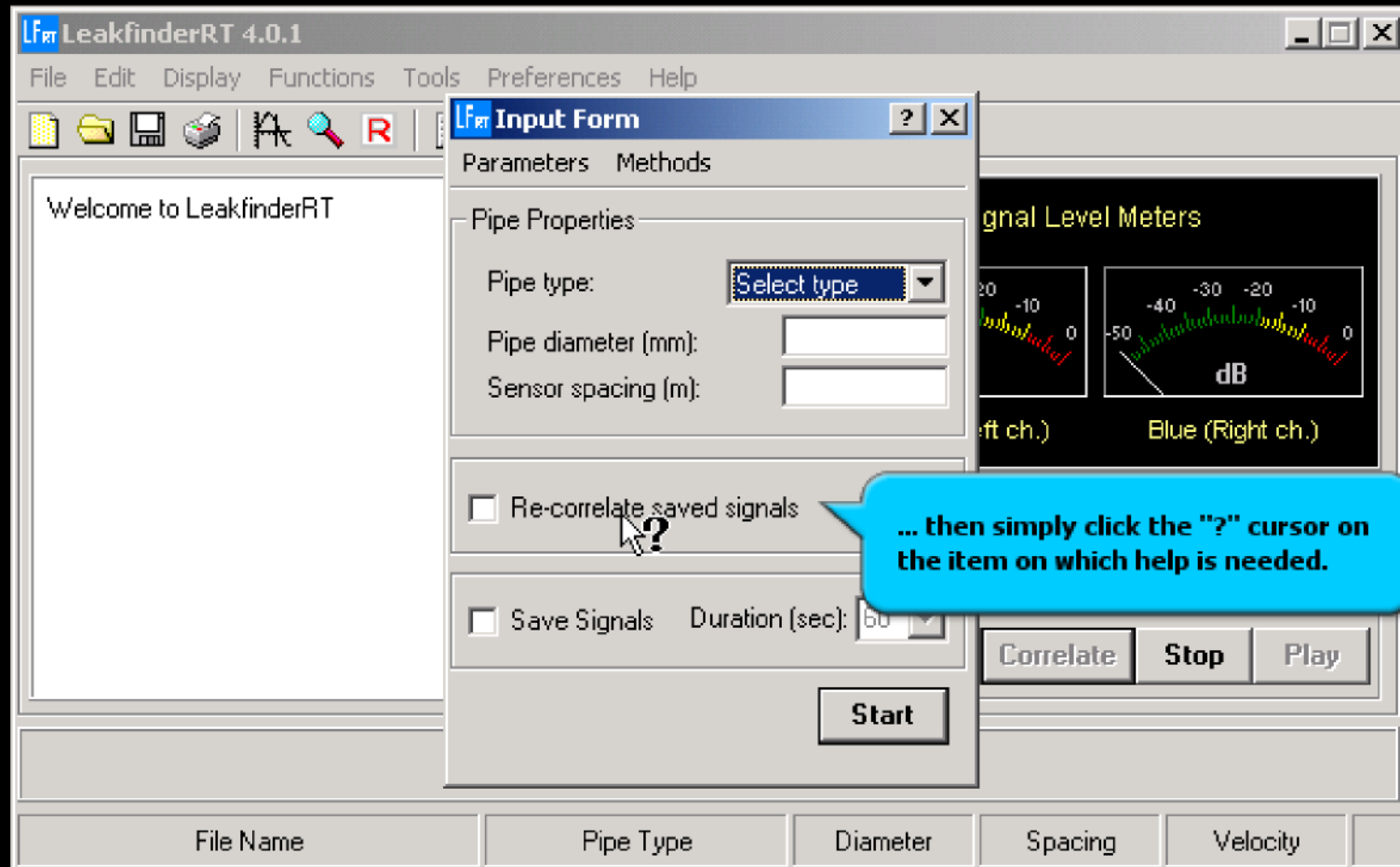
Help menu 3



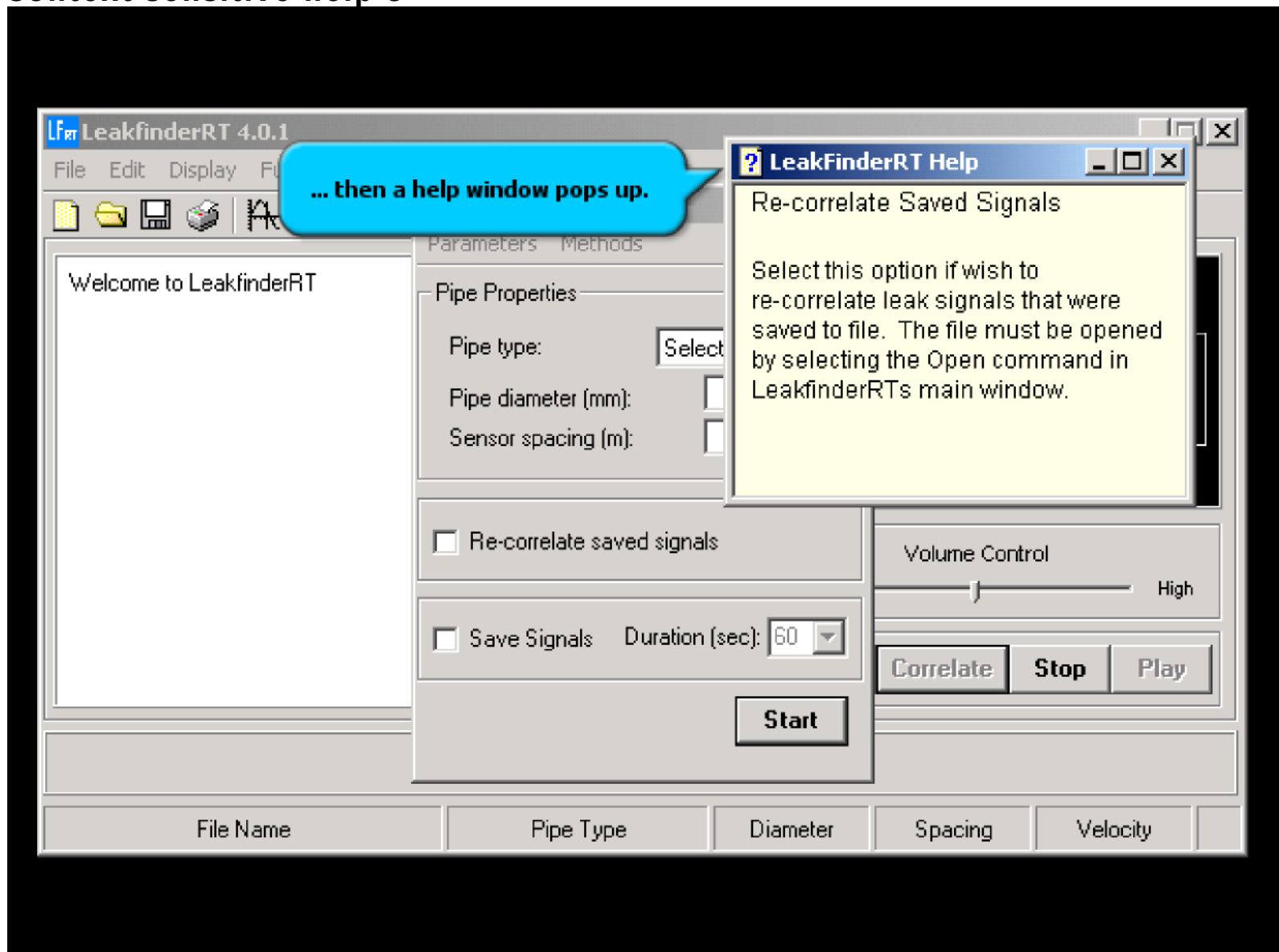
Context sensitive help 1



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