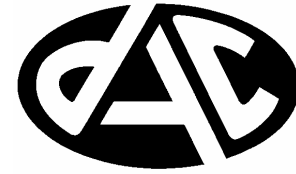


PCAP II *Plus* Test Procedure



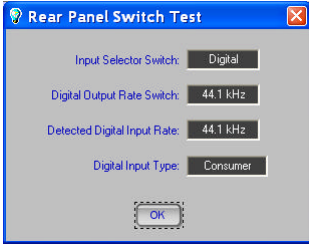
For proper test, follow the steps of this procedure in the order in which they are listed. Put a mark in the appropriate column for each test that may Pass or Fail. Some steps do not require verification and their associated Pass/Fail columns are colored to indicate that they are not used.

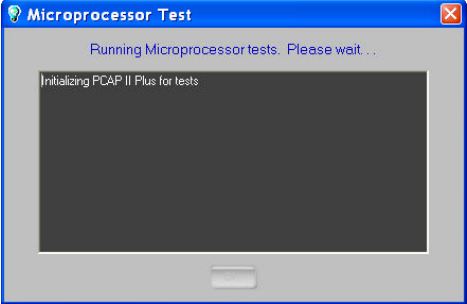
Date Performed: _____

PCAP II Plus Serial Number: _____

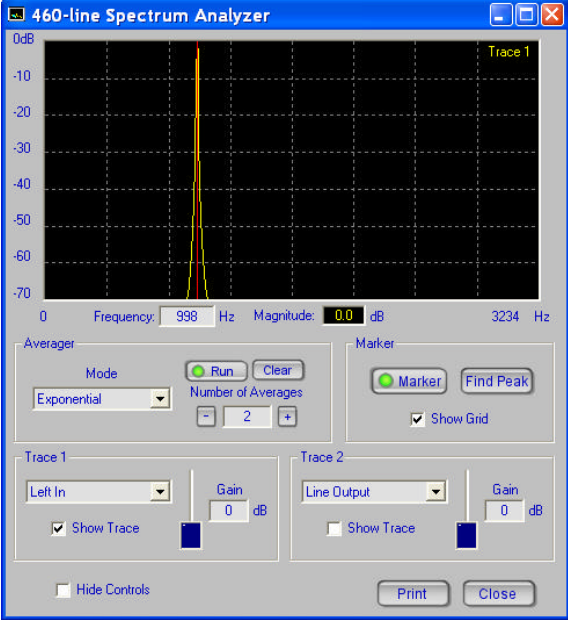
Step	Test	Pass	Fail
1	If not already installed, install PCAP II Plus Configuration Software on a compatible Windows 98 Second Edition or higher computer.		
2	Attach the power cord to the PCAP II Plus and power the unit ON. The POWER LED on the front panel should illuminate.		
3	Attach the RS-232 cable to the PCAP II Plus and to the control PC.		
	<i>RS-232 Communications</i>		
4	Run the PCAP II Plus software. If the software is configured for the correct COM Port it should connect to the PCAP II Plus. The PC CONTROL LED on the front panel of the unit will illuminate. If it is not correctly configured or if there are communication problems, an error message will be displayed by the software.		
	<i>Front Panel Switch Test</i>		
5	Configure the unit for "Mono" Input mode ¹ .		
6	From the "Settings" Menu in the PCAP II Plus Master Control Panel, select the "Enable Calibration Mode". The Calibration Mode controls will appear in place of the Equalizer Stage. <div data-bbox="548 1207 998 1354" data-label="Image"> </div> <p>The PCAP II Plus will begin outputting a 1000 Hz Sine Wave.</p>		
7	From the test selection drop-down menu, choose the "Test Front Panel Switches" option and click "Run Test". The Front Panel Switch Test window will appear. <div data-bbox="592 1501 958 1743" data-label="Image"> </div>		

¹Because all audio is internally routed via digital means within the PCAP II Plus software, Stereo-Independent and Stereo-Linked modes use the same input and output analog pathways as does Mono mode. Although these calibration tests are run only in Mono mode, the results equally apply to Stereo-Independent and Stereo-Linked modes and thus do not require additional testing in these modes for proper calibration

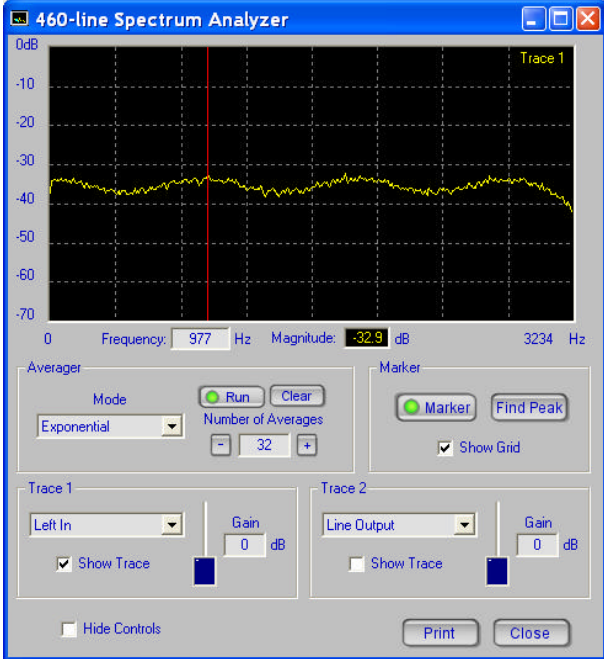
Step	Test	Pass	Fail												
8	Turn the LEFT INPUT LEVEL front panel knob all the way to the left. The level graph for the Left Input Level Control should show no level. Turn the LEFT INPUT LEVEL front panel knob all the way to the right. The level graph for the Left Input Level Control should be totally filled.														
9	Turn the RIGHT INPUT LEVEL front panel knob all the way to the left. The level graph for the Right Input Level Control should show no level. Turn the RIGHT INPUT LEVEL front panel knob all the way to the right. The level graph for the Right Input Level Control should be totally filled.														
10	Turn the STAND ALONE MEMORY Selector switch to each position (1-10). The Memory Selector Position number in the window should display the same number as the switch position.														
11	Press the CLEAR button. The Clear Switch output in the window should display “In” when the switch is depressed, and “Out” when the switch is not pressed.														
12	Press the ADAPT/FREEZE button. The Adapt/Freeze Switch output in the window should display “Adapt (In)” when the switch is depressed, and “Freeze (Out)” when the switch is not pressed.														
13	Press the PROC/BYP button. The Proc/By Switch output in the window should display “Proc (In)” when the switch is depressed, and “By (Out)” when the switch is not pressed.														
14	Press the AUX/OUT button. The Aux/Out Switch output in the window should display “Aux (In)” when the switch is depressed, and “Out” when the switch is not pressed.														
15	Click the “OK” button in the window to stop the test. The software will pause for a few moments as it resets the unit.														
	<i>Rear Panel Switch and Digital Input Test</i>														
16	Attach a single RCA cable from the Digital Input to the Digital Output on the rear panel of the unit. This will “loop” the digital output back into the digital input.														
17	From the test selection drop-down menu, choose the “Test Rear Panel Switches” option and click “Run Test”. The Rear Panel Switch Test window will appear. 														
18	Move the INPUT SELECT switch into the ANALOG position. The Input Selector Switch output should display “Analog”. Move the switch into the “DIGITAL” position. The output should display “Digital”.														
19	While the INPUT SELECT switch is in the DIGITAL” position, move the OUTPUT RATE switch through each of its three positions. Ensure that the output display corresponds to the correct switch setting. <table border="1" data-bbox="404 1728 1003 1881"> <thead> <tr> <th>Selector Switch Setting</th> <th>Digital Output Rate Switch (in window)</th> <th>Detected Digital Input Rate</th> </tr> </thead> <tbody> <tr> <td>AUTOSYNC</td> <td>AutoSync</td> <td>44.1 kHz</td> </tr> <tr> <td>44.1</td> <td>44.1 kHz</td> <td>44.1 kHz</td> </tr> <tr> <td>48</td> <td>48 kHz</td> <td>48 kHz</td> </tr> </tbody> </table>	Selector Switch Setting	Digital Output Rate Switch (in window)	Detected Digital Input Rate	AUTOSYNC	AutoSync	44.1 kHz	44.1	44.1 kHz	44.1 kHz	48	48 kHz	48 kHz		
Selector Switch Setting	Digital Output Rate Switch (in window)	Detected Digital Input Rate													
AUTOSYNC	AutoSync	44.1 kHz													
44.1	44.1 kHz	44.1 kHz													
48	48 kHz	48 kHz													

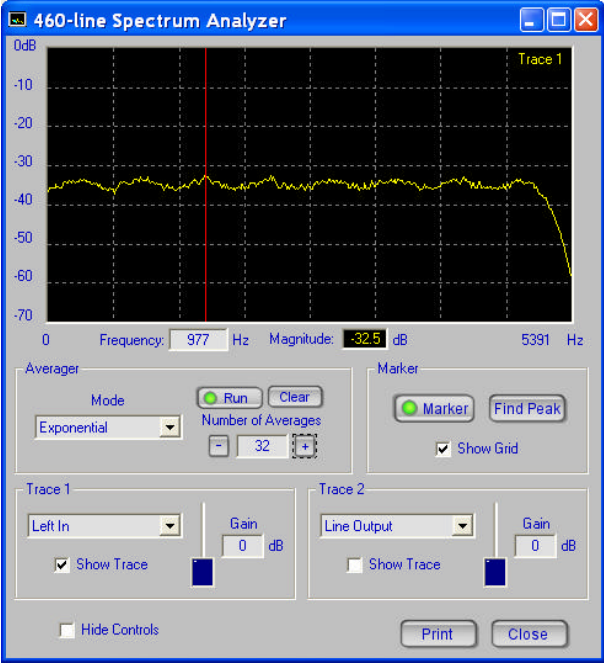
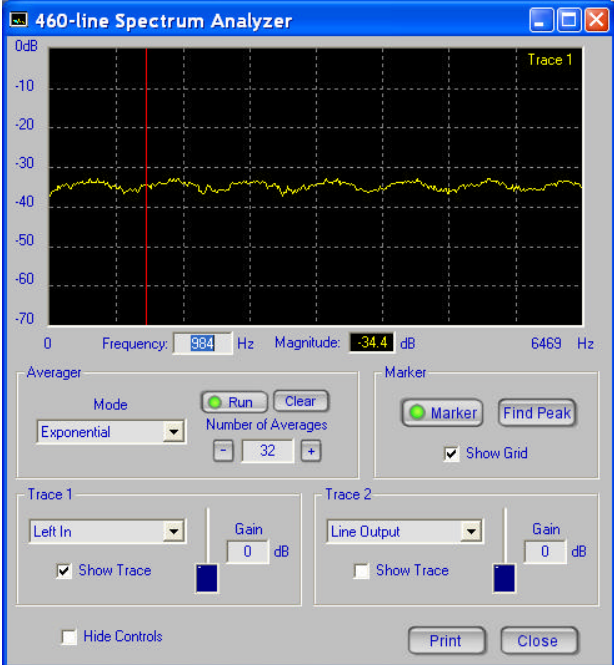
Step	Test	Pass	Fail
20	The Digital Input Type will always display “Consumer” when looping the digital output. However, if you use an external digital source, such as a DAT Player, it may display “Professional”. This indicates that the digital source has the copy protection mechanism turned on.		
21	Click the “OK” button in the window to stop the test.		
	<i>MicroProcessor Test</i>		
22	From the test selection drop-down menu, choose the “Test Microprocessors” option and click “Run Test”. The Microprocessor Test window will appear and begin to run. Each test will be displayed with the resulting value of “Passed” or “Failed”. Please copy the results for each of the four tests in their appropriate entries below. 		
23	Mainboard firmware test		
24	Stand-Alone Memory test		
25	RAM test		
26	DSP Microprocessor test		
27	Click the “OK” button in the window to stop the test. The software will pause for a few moments as it resets the unit.		
	<i>Basic Analog Input and Headphone Test</i>		
28	With the unit still in calibration mode, remove the single RCA cable from the digital input and output and attach it from the LEFT analog output to the LEFT (PRI) analog input on the back of the unit. Move the INPUT SELECT switch on the rear panel to the ANALOG position.		
29	The Left Output Level bargraph should show an output level of 0dB		
30	The Left Input Level bargraph should show an input level of 0dB		
31	Insert a pair of stereo headphones into the PHONES jack on the front panel of the unit.		
32	To test the headphones, set the MONITOR buttons in the following configuration: OUTPUT (out), LEFT (in), RIGHT (in). Adjust the VOLUME to a comfortable level. You should hear the 1000 Hz tone in both the left and right ear. The PCAP II Plus outputs the same audio to both channels in mono mode.		
33	Set the MONITOR buttons in the following configuration: OUTPUT (out), LEFT OUT, RIGHT OUT. Verify that the output to the headphones is muted.		
34	Set the MONITOR buttons in the following configuration: INPUT (in), LEFT (in), RIGHT (in). Verify that you hear the input in only the left ear.		
35	Set the left software input level on the Master Control Panel to -3dB by either using the slider control or the text entry field. Verify that the Left Input Level drops to -3dB.		
36	Set the left software input level to +3dB. Verify that the Left Input Level jumps to +3dB or OL.		

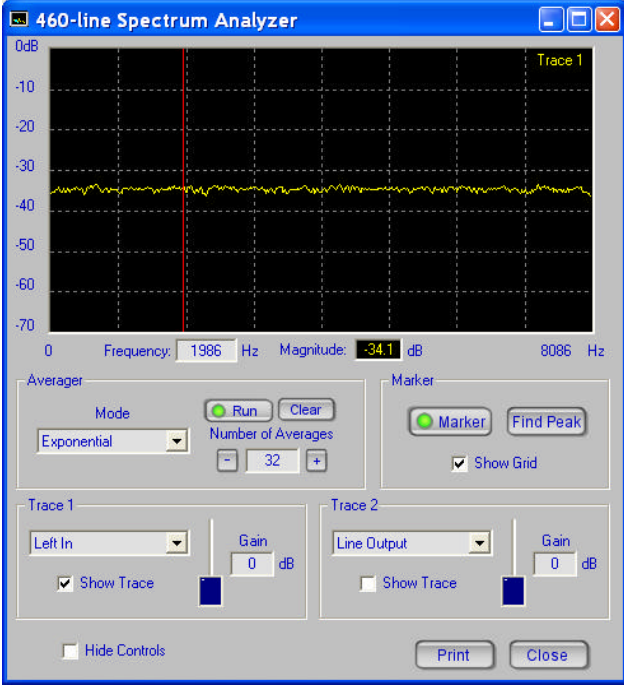
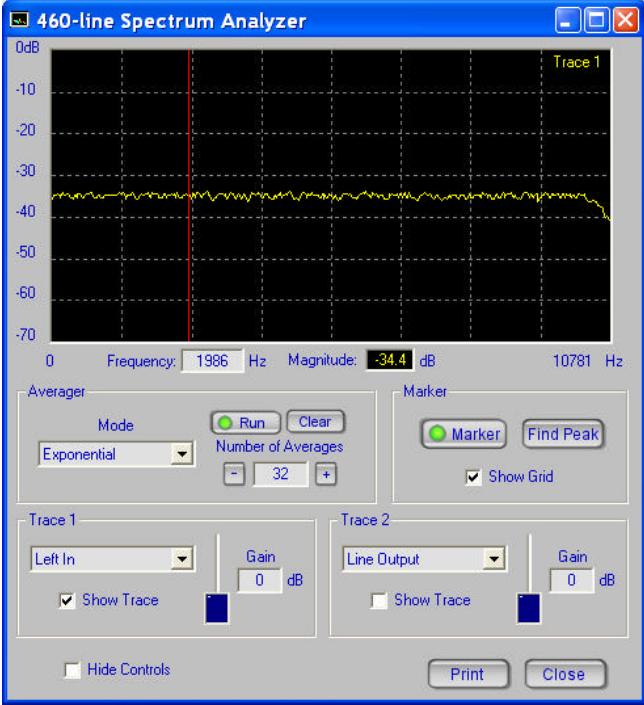
Step	Test	Pass	Fail
37	Move the left software input level slider down to its lowest level (-48db) and verify that the Left Input Level falls below -48 dB.		
38	Click the left software input level "0" button and verify that the Left Input Level returns to 0 dB.		
39	Remove the single RCA cable from the LEFT analog input and output and connect it from the RIGHT analog output to the RIGHT (REF) input.		
40	The Right Output Level bargraph should show an output level of 0dB.		
41	The Right Input Level bargraph should show an input level of 0dB.		
42	To test the headphones, set the MONITOR buttons in the following configuration: OUTPUT (out), LEFT (in), RIGHT (in). Adjust the VOLUME to a comfortable level. You should hear the 1000 Hz tone in both the left and right ear. The PCAP II Plus outputs the same audio to both channels in mono mode.		
43	Set the MONITOR buttons in the following configuration: OUTPUT (out), LEFT OUT, RIGHT OUT. Verify that the output to the headphones is muted.		
44	Set the MONITOR buttons in the following configuration: INPUT (in), LEFT (in), RIGHT (in). Verify that you hear the input in only the right ear.		
45	Set the right software input level on the Master Control Panel to -3dB by either using the slider control or the text entry field. Verify that the Right Input Level drops to -3dB.		
46	Set the right software input level to +3dB. Verify that the Right Input Level jumps to +3dB or OL.		
47	Move the right software input level slider down to its lowest level (-48db) and verify that the Right Input Level falls below -48 dB.		
48	Click the right software input level "0" button and verify that the Right Input Level returns to 0 dB.		
	<i>Bandwidth Response Test</i>		
49	Remove the single RCA cable from the RIGHT analog input and output and connect it from the Digital Input to the Digital Output on the rear panel of the unit.		
50	Move the INPUT SELECT switch on the rear panel into the DIGITAL position. Move the OUTPUT RATE switch on the rear panel into the 48kHz position.		
51	Select a System Bandwidth from the Master Control Panel of 3.2 kHz.		

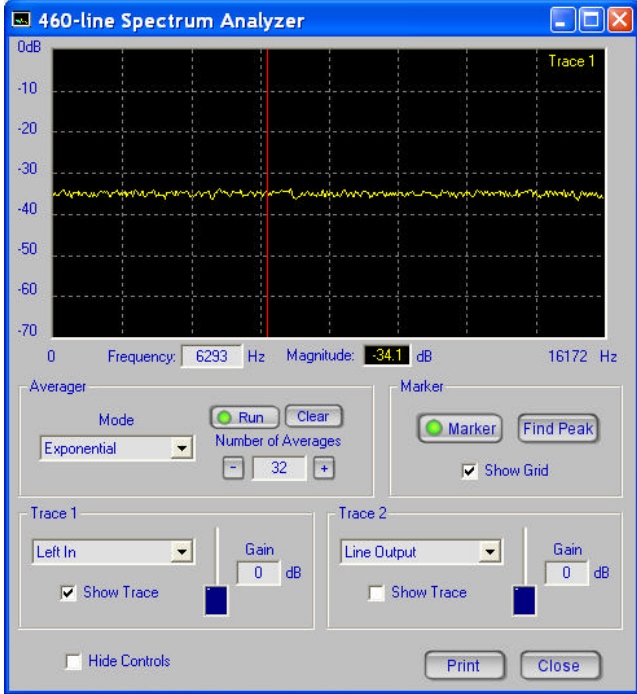

Step	Test	Pass	Fail
52	<p>Open the Spectrum Analyzer, choose to display Trace 1 as “Left In”. Verify that the a peak is displayed at 998 Hz with a value of 0 dB. Use the “Find Peak” button to quickly indentify peak. There should be no surrounding noise in any other frequency bands². See the figure below as an example of what the output should look like.</p> 		
53	<p>With the Spectrum Analyzer still displayed, select a system bandwidth from the Master Control Panel of 5.4 kHz. Again, using the “Find Peak” button, verify that the peak is at 996 Hz at approximately -1 dB (+/- 1dB).</p>		
54	<p>With the Spectrum Analyzer still displayed, select a system bandwidth from the Master Control Panel of 6.5 kHz. Again, using the “Find Peak” button, verify that the peak is at 998 Hz at approximately -2 dB (+/- 1dB).</p>		
55	<p>With the Spectrum Analyzer still displayed, select a system bandwidth from the Master Control Panel of 8 kHz. Again, using the “Find Peak” button, verify that the peak is at 1002 Hz at approximately -1 dB (+/- 1dB).</p>		
56	<p>With the Spectrum Analyzer still displayed, select a system bandwidth from the Master Control Panel of 11 kHz. Again, using the “Find Peak” button, verify that the peak is at 1008 Hz at approximately -2 dB (+/- 1dB).</p>		
57	<p>With the Spectrum Analyzer still displayed, select a system bandwidth from the Master Control Panel of 16 kHz. Again, using the “Find Peak” button, verify that the peak is at 984 Hz at approximately -2 dB (+/- 1dB).</p>		

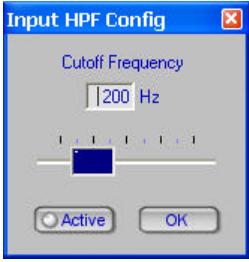
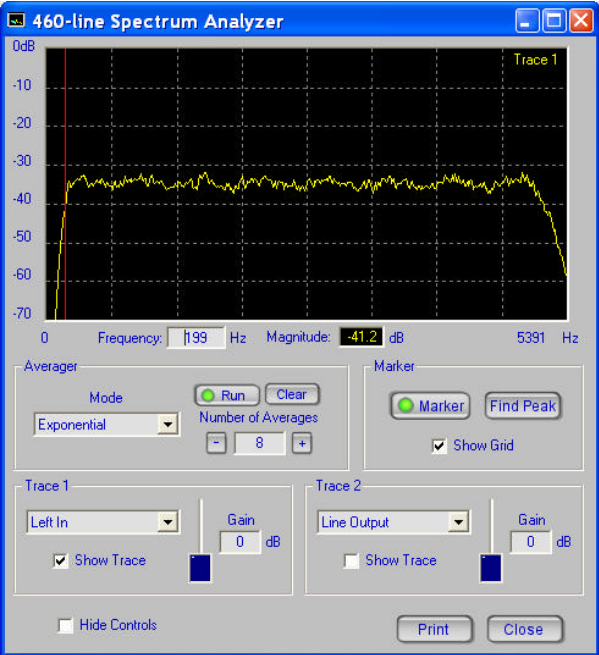
² Because of the resolution of the spectrum analyzer at each bandwidth the detected peak may not fall directly on 1000 Hz or be exactly 0 dB. This inaccuracy results from the size of the Fast Fourier Transform (FFT) used to compute the frequency domain signal that is graphed.

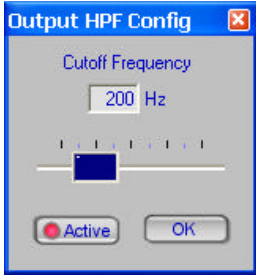
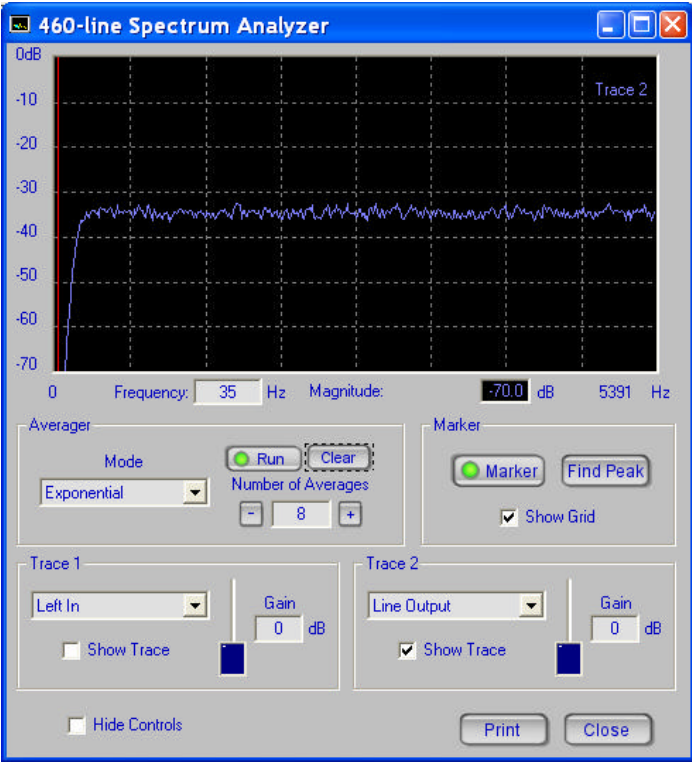
Step	Test	Pass	Fail
58	With the Spectrum Analyzer still displayed, select a system bandwidth from the Master Control Panel of 3.2 kHz. In the Calibration Mode Controls choose “White Noise” as the Signal Generator Output. The Input and Output Level should drop to approximately -6 dB.		
59	In the Spectrum Analyzer set the Average Mode to “Exponential” and Number of Averages to “32”. Ensure that only Trace 1 is displaying “Left In” with 0dB Gain.		
60	<p>Verify that the Spectrum is displaying a fairly constant spectral energy at approximately -35 dB with slight ripple (see the figure below).</p> 		

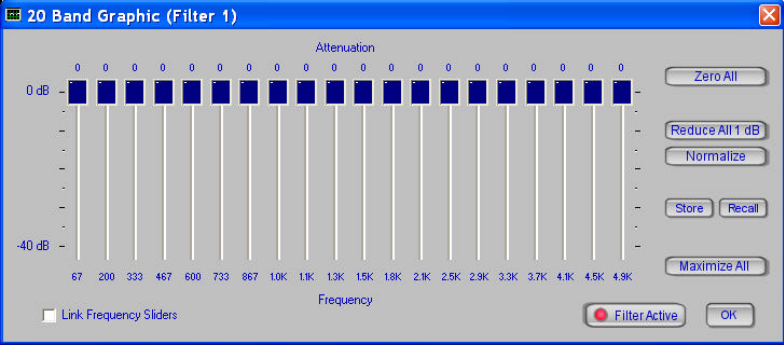
Step	Test	Pass	Fail
61	<p>With the Spectrum Analyzer still displayed, select a system bandwidth from the Master Control Panel of 5.4 kHz. Verify that the spectrum displayed is similar to the figure below.</p> 		
62	<p>With the Spectrum Analyzer still displayed, select a system bandwidth from the Master Control Panel of 6.5 kHz. Verify that the spectrum displayed is similar to the figure below.</p> 		

Step	Test	Pass	Fail
63	<p>With the Spectrum Analyzer still displayed, select a system bandwidth from the Master Control Panel of 8 kHz. Verify that the spectrum displayed is similar to the figure below.</p>  <p>The screenshot shows the '460-line Spectrum Analyzer' window. The plot area displays a yellow trace labeled 'Trace 1' on a grid. The vertical axis is labeled '0dB' at the top and '-70' at the bottom. The horizontal axis is labeled '0' on the left and '8086 Hz' on the right. A red vertical line is positioned at 1986 Hz. Below the plot, the 'Frequency' is set to 1986 Hz and the 'Magnitude' is -34.1 dB. The 'Averager' section shows 'Mode' set to 'Exponential' and 'Number of Averages' set to 32. The 'Marker' section has 'Marker' checked and 'Find Peak' button. The 'Trace 1' section shows 'Left In' selected and 'Gain' set to 0 dB. The 'Trace 2' section shows 'Line Output' selected and 'Gain' set to 0 dB. There are 'Print' and 'Close' buttons at the bottom right.</p>		
64	<p>With the Spectrum Analyzer still displayed, select a system bandwidth from the Master Control Panel of 11 kHz. Verify that the spectrum displayed is similar to the figure below.</p>  <p>The screenshot shows the '460-line Spectrum Analyzer' window. The plot area displays a yellow trace labeled 'Trace 1' on a grid. The vertical axis is labeled '0dB' at the top and '-70' at the bottom. The horizontal axis is labeled '0' on the left and '10781 Hz' on the right. A red vertical line is positioned at 1986 Hz. Below the plot, the 'Frequency' is set to 1986 Hz and the 'Magnitude' is -34.4 dB. The 'Averager' section shows 'Mode' set to 'Exponential' and 'Number of Averages' set to 32. The 'Marker' section has 'Marker' checked and 'Find Peak' button. The 'Trace 1' section shows 'Left In' selected and 'Gain' set to 0 dB. The 'Trace 2' section shows 'Line Output' selected and 'Gain' set to 0 dB. There are 'Print' and 'Close' buttons at the bottom right.</p>		

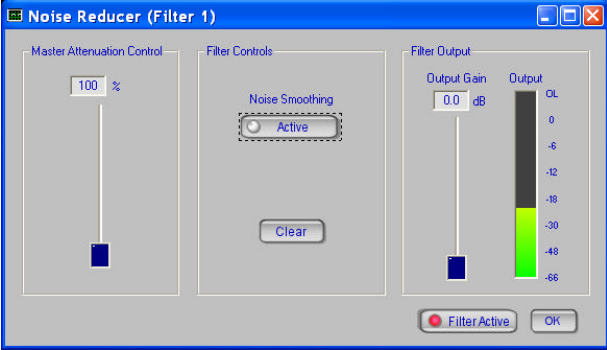
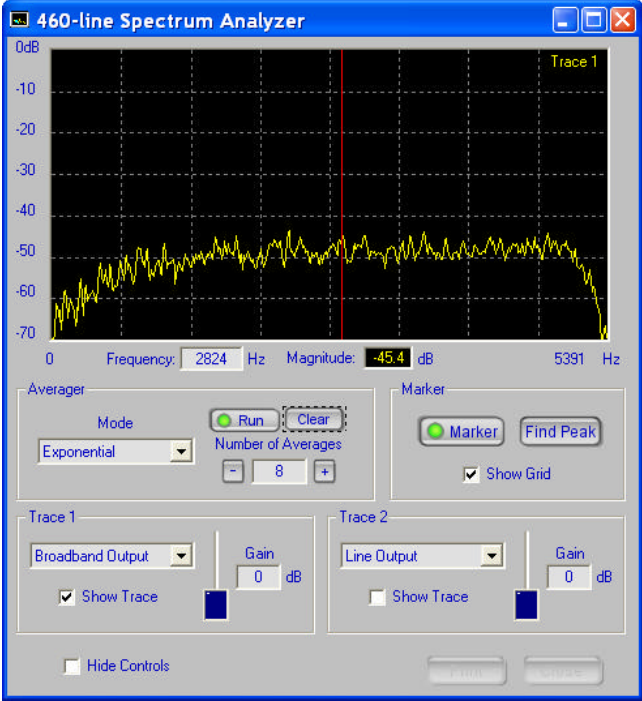
Step	Test	Pass	Fail
65	<p>With the Spectrum Analyzer still displayed, select a system bandwidth from the Master Control Panel of 16 kHz. Verify that the spectrum displayed is similar to the figure below.</p> 		
	<p><i>Limiter, Input HPF, and Output HPF Tests</i></p>		
66	<p>With the Spectrum Analyzer still displayed, select a system bandwidth from the Master Control Panel of 5.4 kHz. Click the Limiter “Config” button and set the limiter to the settings shown below:</p> 		
67	<p>Set the Limiter Active by clicking the “Active” button to illuminate the red LED and verify that the Input Level on both Left and Right input bargraphs drops below -9 dB. Set the Limiter Inactive and verify that the input levels return to approximately -6dB.</p>		

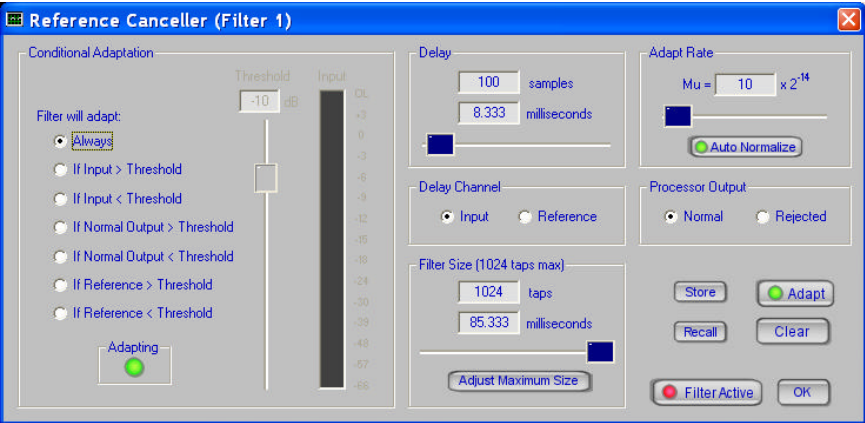
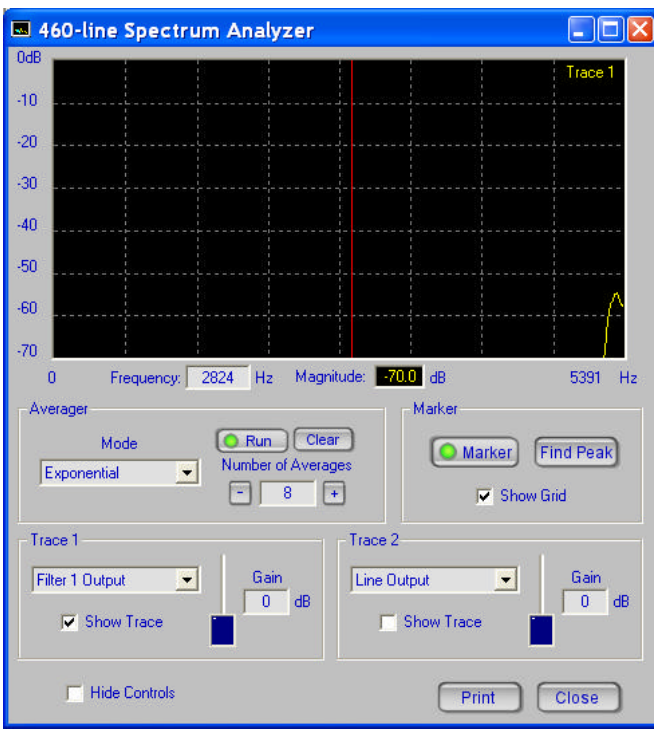
Step	Test	Pass	Fail								
68	<p>Click the Input HPF “Config” button and set the Input Highpass Filter to the settings shown below:</p>  <p>Click “OK” to close the Input HPF Config window.</p>										
69	Set the number of averages in the Spectrum Analyzer to 8.										
70	<p>Set the Input HPF Active by clicking the “Active” button to illuminate the red LED and verify that the spectrum displayed is similar to the figure below.</p> 										
71	<p>Using the Marker verify that the input level is within +/- 3dB of the levels shown in the table below:</p> <table border="1" data-bbox="581 1507 969 1612"> <thead> <tr> <th>Frequency (Hz)</th> <th>Level (dB)</th> </tr> </thead> <tbody> <tr> <td>47</td> <td>-70.0</td> </tr> <tr> <td>141</td> <td>-55.0</td> </tr> <tr> <td>199</td> <td>-40.0</td> </tr> </tbody> </table>	Frequency (Hz)	Level (dB)	47	-70.0	141	-55.0	199	-40.0		
Frequency (Hz)	Level (dB)										
47	-70.0										
141	-55.0										
199	-40.0										
72	Set the Input HPF Inactive and verify that the input levels return their previous, unfiltered levels (See the figure in step 61).										
73	In the Spectrum Analyzer, display Trace 2 by clicking the “Trace 2” checkbox and hide Trace 1 by unchecking the “Trace 1” checkbox. Ensure that Trace 2 is displaying the Line Output.										

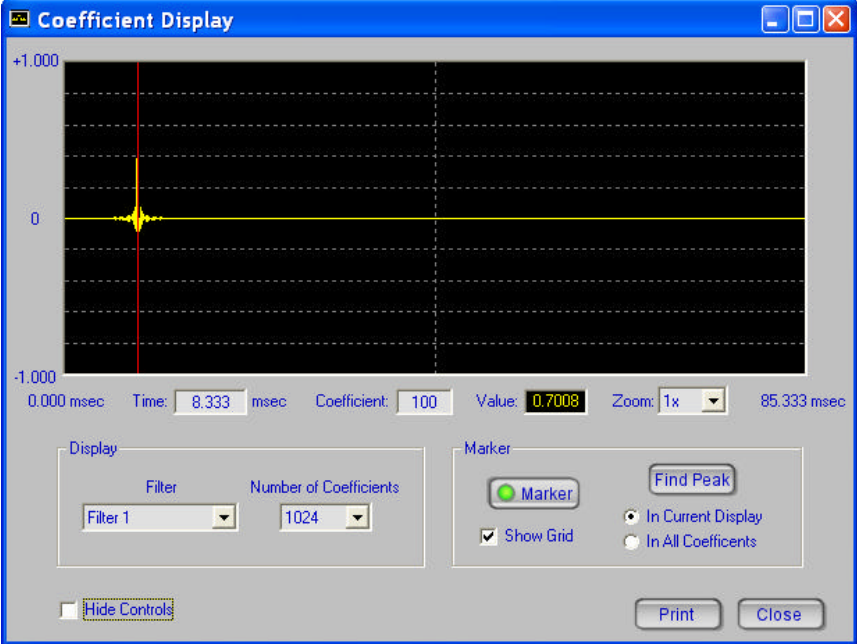
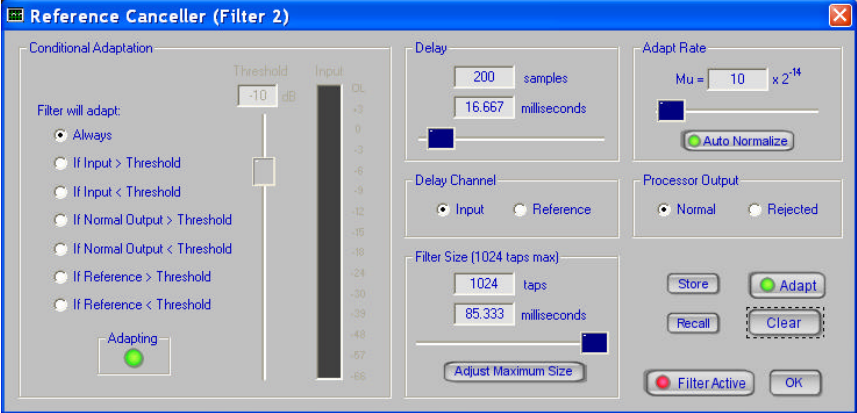
Step	Test	Pass	Fail								
74	<p>Click the Output HPF Config button and set the Output Highpass Filter to the settings shown below:</p>  <p>Click “OK” to close the Output HPF Config window.</p>										
75	<p>Set the Output HPF Active by clicking the “Active” button to illuminate the red LED and verify that the spectrum displayed is similar to the figure below.</p> 										
76	<p>Using the Marker verify that the input level is within +/- 3dB of the levels shown in the table below:</p> <table border="1" data-bbox="581 1591 967 1696"> <thead> <tr> <th>Frequency (Hz)</th> <th>Level (dB)</th> </tr> </thead> <tbody> <tr> <td>47</td> <td>-70.0</td> </tr> <tr> <td>141</td> <td>-55.0</td> </tr> <tr> <td>199</td> <td>-40.0</td> </tr> </tbody> </table>	Frequency (Hz)	Level (dB)	47	-70.0	141	-55.0	199	-40.0		
Frequency (Hz)	Level (dB)										
47	-70.0										
141	-55.0										
199	-40.0										
77	<p>Set the Output HPF Inactive and verify that the input levels return to their previous, unfiltered levels (Should look similar to the figure in step 61).</p>										

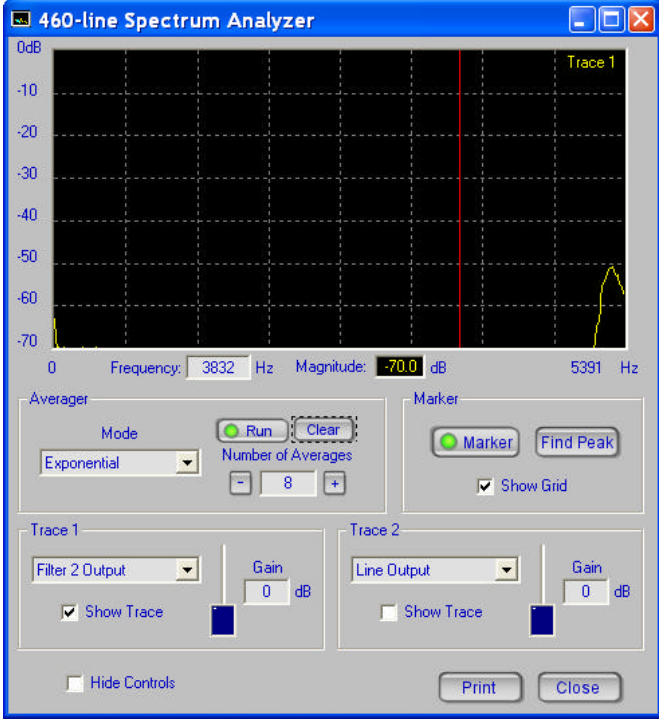
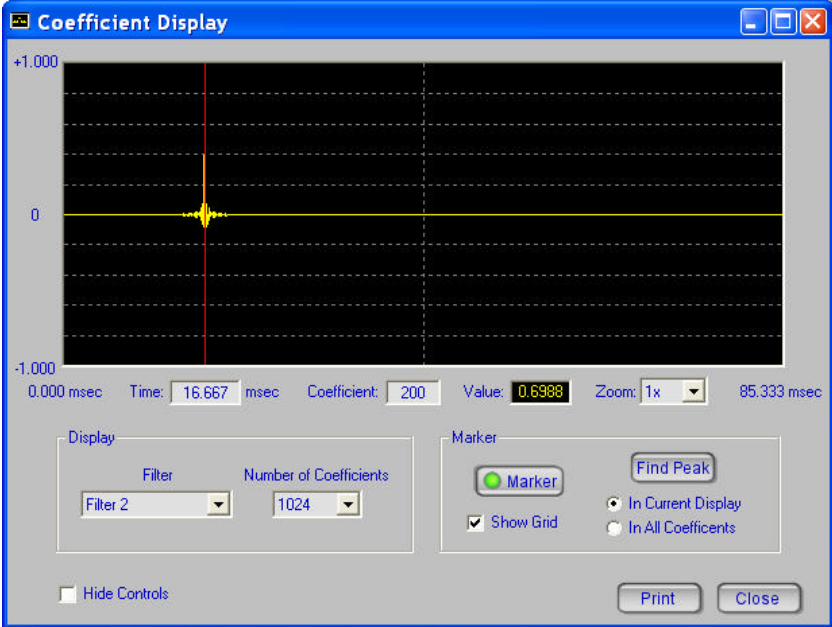
Step	Test	Pass	Fail																																																																																																									
	<i>Filter Response Tests</i>																																																																																																											
78	With the Spectrum Analyzer still displayed, select one General Filter Stage. Select in this filter stage a “20-Band Graphic” filter.																																																																																																											
79	In the Spectrum Analyzer select Trace 1 and hide Trace 2. For Trace 1 choose to display “Filter 1 Output”.																																																																																																											
80	Open the 20-Band Graphic Filter Configuration Window ³ and “Zero All” attenuators. Make sure the filter is active by clicking “Filter Active” button such that the red LED illuminates.																																																																																																											
																																																																																																												
81	Click and drag the slider for 67 Hz to its maximum value of -40 dB. Verify the affect of the filter by using the Spectrum Analyzer Marker to check the magnitude at 70 Hz. This magnitude should be approximately -66dB +/- 3dB. Return the slider to its minimum value of 0dB.																																																																																																											
82	Repeat Step 81 for each of the individual sliders to verify their operation (make sure to return each slider back to 0dB after making the measurement):																																																																																																											
	<table border="1"> <thead> <tr> <th>Slider Frequency (Hz)</th> <th>Spectrum Analyzer Frequency (Hz)</th> <th>Level (+/- 3dB)</th> <th>Pass</th> <th>Fail</th> </tr> </thead> <tbody> <tr><td>67</td><td>70</td><td>-66</td><td></td><td></td></tr> <tr><td>200</td><td>199</td><td>-67</td><td></td><td></td></tr> <tr><td>333</td><td>340</td><td>-64</td><td></td><td></td></tr> <tr><td>467</td><td>469</td><td>-67</td><td></td><td></td></tr> <tr><td>600</td><td>609</td><td>-65</td><td></td><td></td></tr> <tr><td>733</td><td>738</td><td>-67</td><td></td><td></td></tr> <tr><td>867</td><td>867</td><td>-68</td><td></td><td></td></tr> <tr><td>1.0K</td><td>996</td><td>-65</td><td></td><td></td></tr> <tr><td>1.1K</td><td>1125</td><td>-63</td><td></td><td></td></tr> <tr><td>1.3K</td><td>1266</td><td>-69</td><td></td><td></td></tr> <tr><td>1.5K</td><td>1465</td><td>-69</td><td></td><td></td></tr> <tr><td>1.8K</td><td>1805</td><td>-69</td><td></td><td></td></tr> <tr><td>2.1K</td><td>2109</td><td>-69</td><td></td><td></td></tr> <tr><td>2.5K</td><td>2508</td><td>-69</td><td></td><td></td></tr> <tr><td>2.9K</td><td>2906</td><td>-69</td><td></td><td></td></tr> <tr><td>3.3K</td><td>3305</td><td>-69</td><td></td><td></td></tr> <tr><td>3.7K</td><td>3703</td><td>-69</td><td></td><td></td></tr> <tr><td>4.1K</td><td>4102</td><td>-69</td><td></td><td></td></tr> <tr><td>4.5K</td><td>4500</td><td>-69</td><td></td><td></td></tr> <tr><td>4.9K</td><td>4910</td><td>-69</td><td></td><td></td></tr> </tbody> </table>	Slider Frequency (Hz)	Spectrum Analyzer Frequency (Hz)	Level (+/- 3dB)	Pass	Fail	67	70	-66			200	199	-67			333	340	-64			467	469	-67			600	609	-65			733	738	-67			867	867	-68			1.0K	996	-65			1.1K	1125	-63			1.3K	1266	-69			1.5K	1465	-69			1.8K	1805	-69			2.1K	2109	-69			2.5K	2508	-69			2.9K	2906	-69			3.3K	3305	-69			3.7K	3703	-69			4.1K	4102	-69			4.5K	4500	-69			4.9K	4910	-69				
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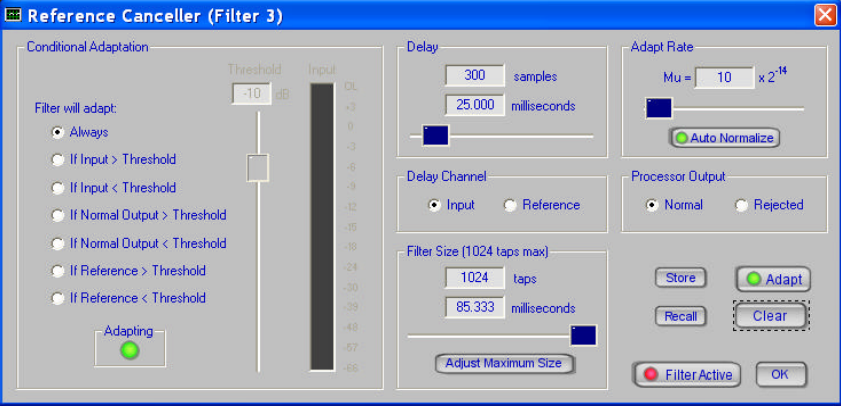
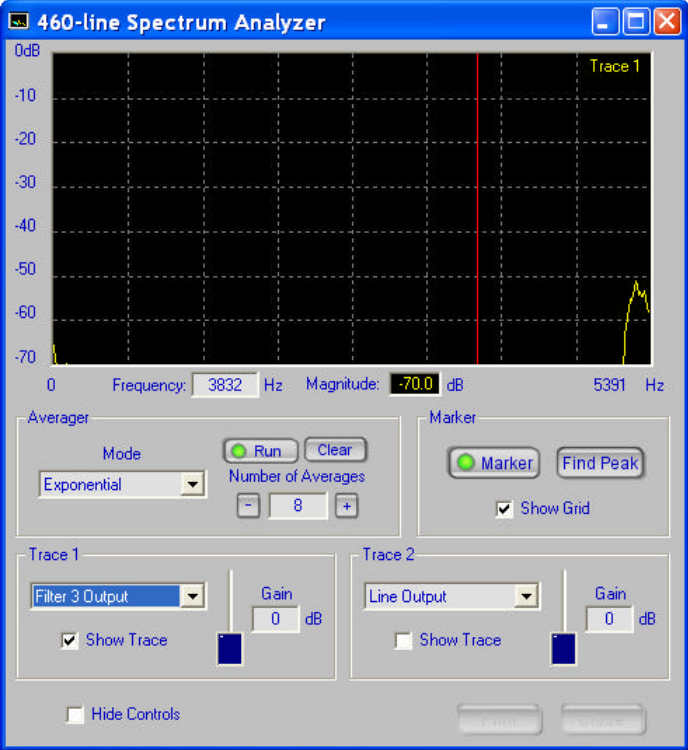
³ Since the source generator occupies the stages normally used by the Equalizer, testing a similar Equalizer filter type (such as a 20-Band Graphic Filter) in a General Filter stage will give equivalent response

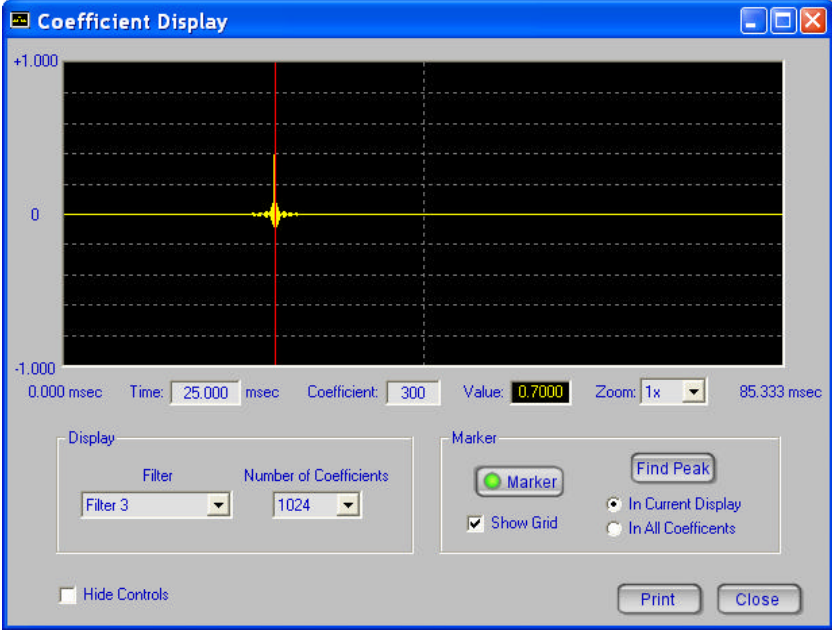
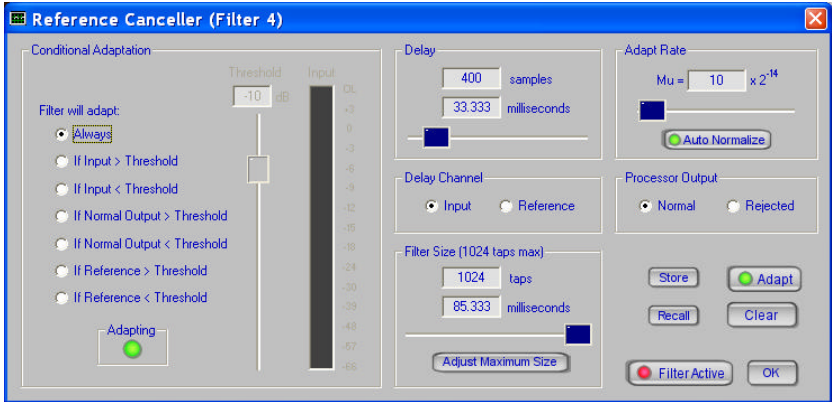
Step	Test	Pass	Fail
83	With the Spectrum Analyzer still displayed, set the 20-Band Graphic filter in Stage 1 to be Inactive and close the 20-Band Graphic filter configuration window.		
84	<p>In the Broadband Filter Stage select a “Noise Reducer”, set it active and open its configuration window to set it to the following settings:</p> 		
85	<p>In the Spectrum Analyzer, set Trace 1 to display “Broadband Output” and verify that when the filter is active that it provides across the band attenuation for random white noise of -15 dB. Its output should look similar to the following figure:</p> 		

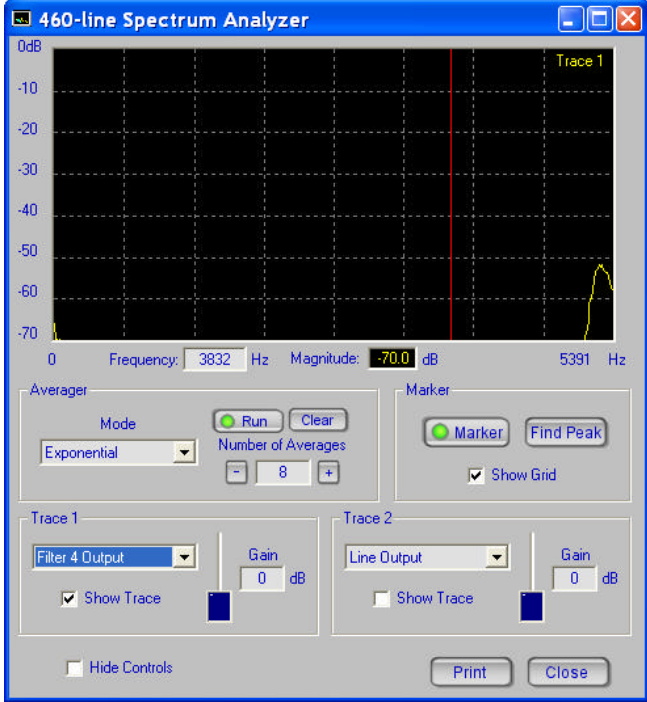
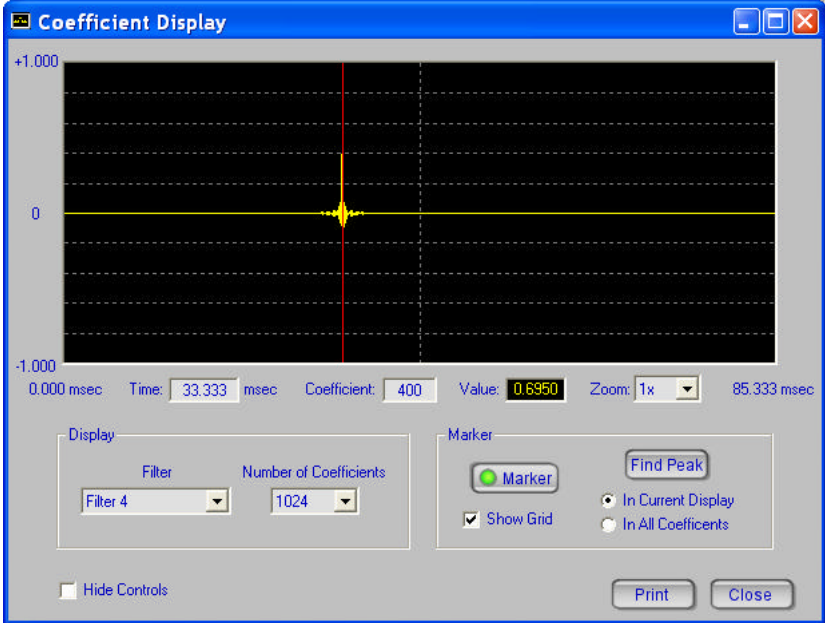
Step	Test	Pass	Fail
87	Adjust the Right Software Input Level on the Master Control Panel to add +2dB of gain by using either the slider control or the text entry area. Verify that it is approximately 2dB higher than the left channel.		
88	<p>With the Spectrum Analyzer still displayed, set the Broadband Filter Stage to be Inactive. Select a “Ref Cancellor” in the first stage of the General Filter Stages. Set the filter Active, open its configuration window, and set it to the following settings:</p> 		
89	<p>Select “Filter 1 Output” for Trace 1 in the Spectrum Analyzer. Allow the filter to adapt for approximately 30 seconds and verify that most all of the time-aligned white noise signal is cancelled as shown in the figure below:</p> 		

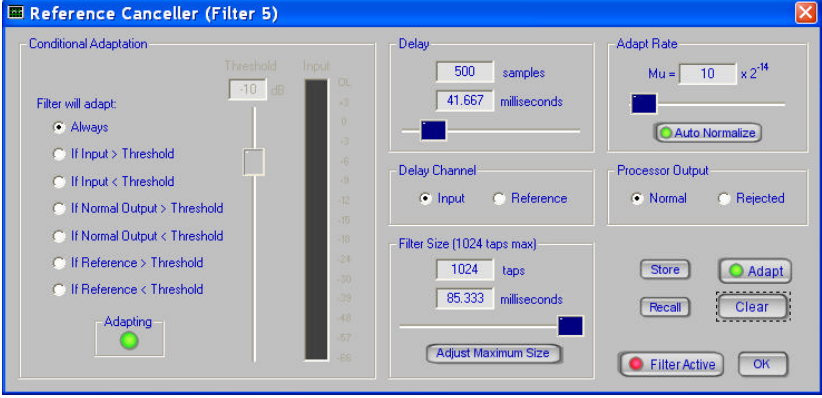
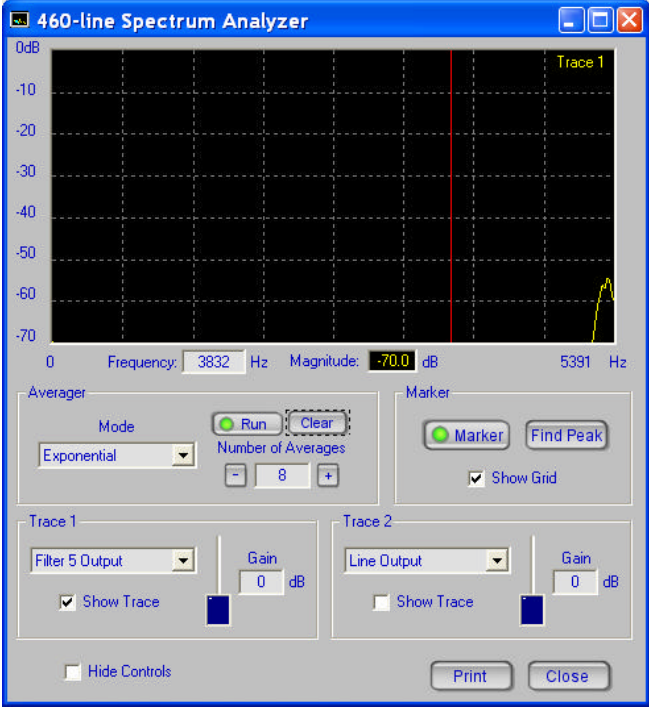
Step	Test	Pass	Fail
90	<p>Exit the Reference Canceller configuration window and open the Coefficient Display. Display all of Filter 1's 1024 coefficients. Click the "Find Peak" button and verify that the peak is at the 100th coefficient, which matches the sample delay. The Coefficient Delay should look similar to the figure below:</p> 		
91	<p>Set Stage 1 to be Inactive. Click the "2" radio button in the General Filter Stages to add an additional stage. Select a "Ref Canceller" in the second stage of the General Filter Stages. Set the filter Active, open its configuration window, and set it to the following settings (note the delay of 200 samples):</p> 		

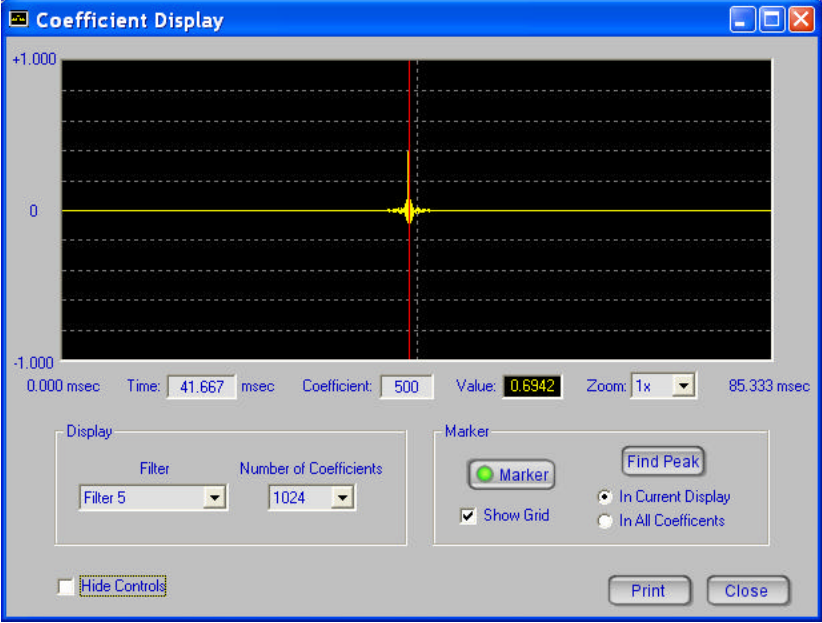
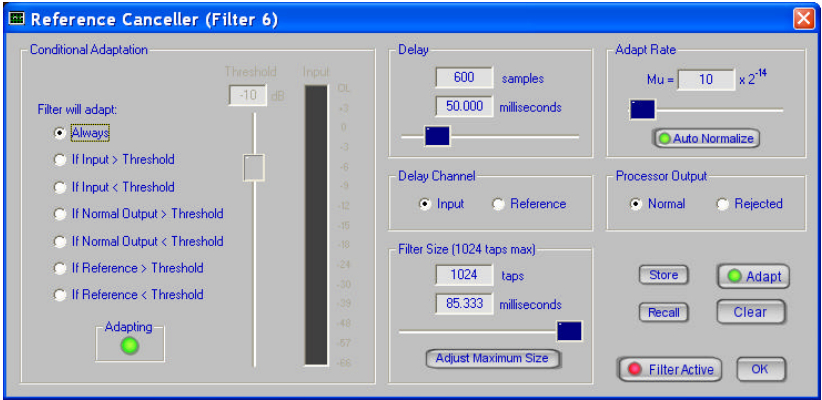
Step	Test	Pass	Fail
92	<p>Display the Spectrum Analyzer. Select “Filter 2 Output” for Trace 1 in the Spectrum Analyzer. Allow the filter to adapt for approximately 30 seconds and verify that most all of the time-aligned white noise signal is cancelled as shown in the figure below:</p> 		
93	<p>Exit the Reference Canceller configuration window and open the Coefficient Display. Display all of Filter 2’s 1024 coefficients. Click the “Find Peak” button and verify that the peak is at the 200th coefficient, which matches the sample delay. The Coefficient Delay should look similar to the figure below:</p> 		

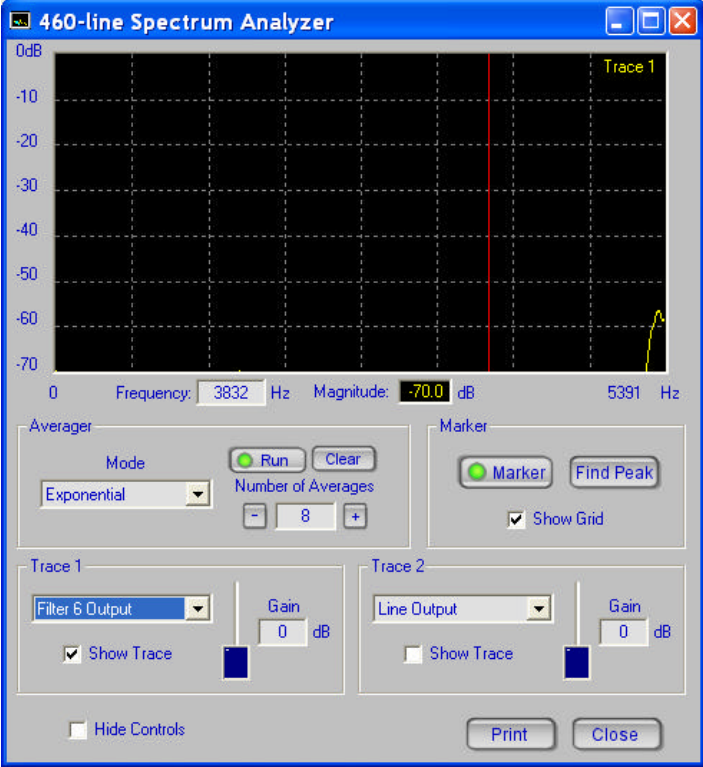
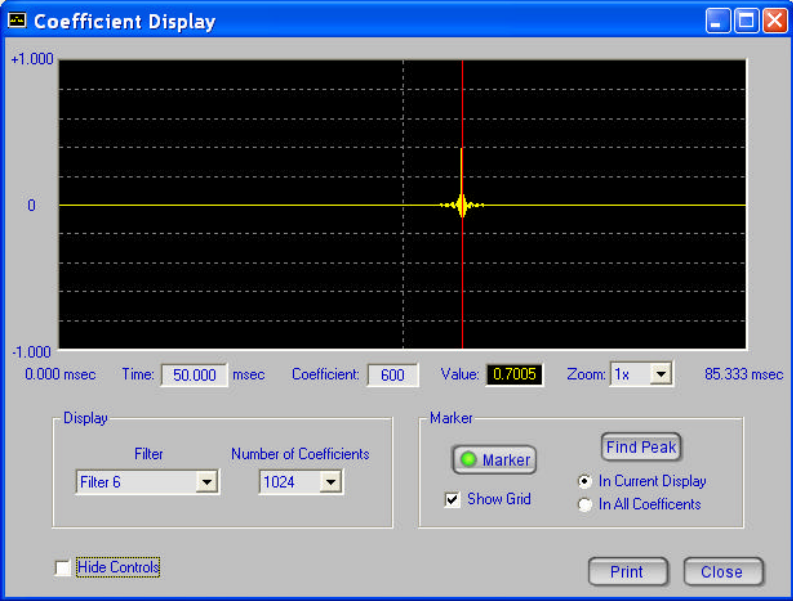
Step	Test	Pass	Fail
94	<p>Set Stage 2 to be Inactive. Click the “3” radio button in the General Filter Stages to add an additional stage. Select a “Ref Cancellor” in the third stage of the General Filter Stages. Set the filter Active, open its configuration window, and set it to the following settings (note the delay of 300 samples):</p> 		
95	<p>Display the Spectrum Analyzer. Select “Filter 3 Output” for Trace 1 in the Spectrum Analyzer. Allow the filter to adapt for approximately 30 seconds and verify that most all of the time-aligned white noise signal is cancelled as shown in the figure below:</p> 		

Step	Test	Pass	Fail
96	<p>Exit the Reference Canceller configuration window and open the Coefficient Display. Display all of Filter 3's 1024 coefficients. Click the "Find Peak" button and verify that the peak is at the 300th coefficient, which matches the sample delay. The Coefficient Delay should look similar to the figure below:</p>  <p>The screenshot shows the 'Coefficient Display' window. The main plot area has a vertical axis from -1.000 to +1.000 and a horizontal axis from 0.000 msec to 85.333 msec. A yellow waveform shows a sharp peak at 300 msec. A red vertical line marks this peak. Below the plot, the 'Coefficient' field is set to 300 and the 'Value' field shows 0.7000. The 'Display' section shows 'Filter 3' and 'Number of Coefficients' set to 1024. The 'Marker' section has 'Marker' checked and 'Show Grid' checked. The 'Find Peak' button is visible.</p>		
97	<p>Set Stage 3 to be Inactive. Click the "4" radio button in the General Filter Stages to add an additional stage. Select a "Ref Canceller" in the fourth stage of the General Filter Stages. Set the filter Active, open its configuration window, and set it to the following settings (note the delay of 400 samples):</p>  <p>The screenshot shows the 'Reference Canceller (Filter 4)' configuration window. The 'Conditional Adaptation' section has 'Always' selected. The 'Threshold' is set to -10 dB. The 'Delay' section has 'Delay' set to 400 samples and 33.333 milliseconds. The 'Adapt Rate' section has 'Mu' set to 10 x 2⁻¹⁴ and 'Auto Normalize' checked. The 'Delay Channel' section has 'Input' selected. The 'Processor Output' section has 'Normal' selected. The 'Filter Size' section has 'Filter Size' set to 1024 taps and 85.333 milliseconds. The 'Adjust Maximum Size' button is visible. The 'Filter Active' checkbox is checked.</p>		

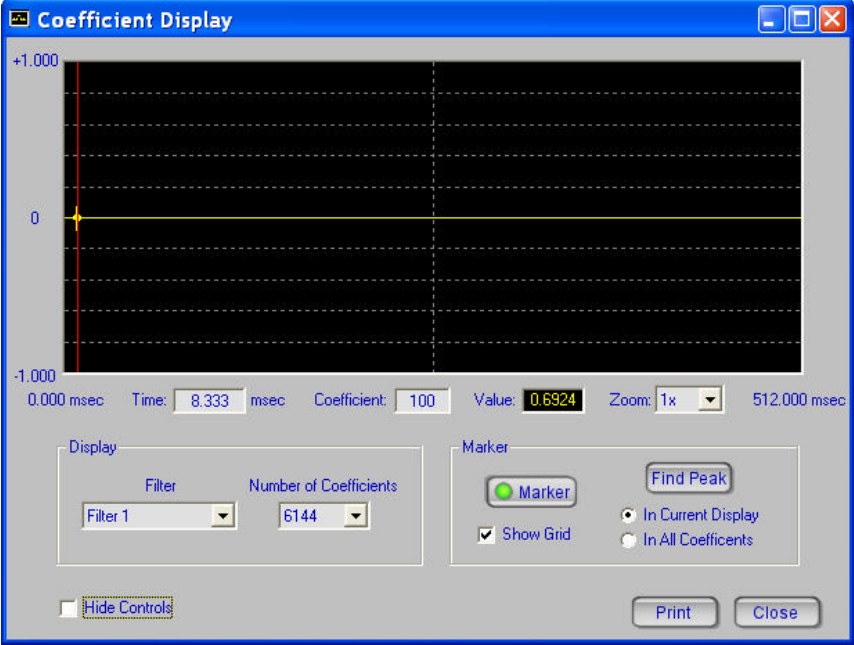
Step	Test	Pass	Fail
98	<p>Display the Spectrum Analyzer. Select “Filter 4 Output” for Trace 1 in the Spectrum Analyzer. Allow the filter to adapt for approximately 30 seconds and verify that most all of the time-aligned white noise signal is cancelled as shown in the figure below:</p> 		
99	<p>Exit the Reference Canceller configuration window and open the Coefficient Display. Display all of Filter 4’s 1024 coefficients. Click the “Find Peak” button and verify that the peak is at the 400th coefficient, which matches the sample delay. The Coefficient Delay should look similar to the figure below:</p> 		

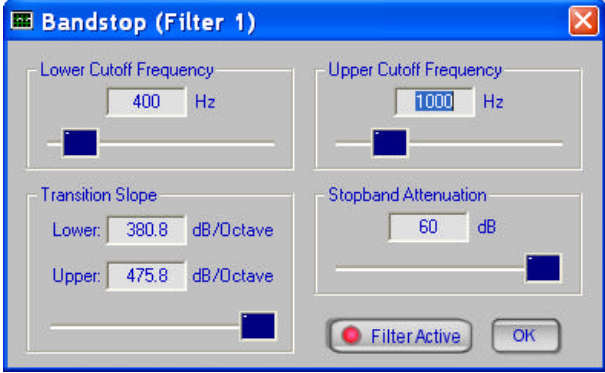
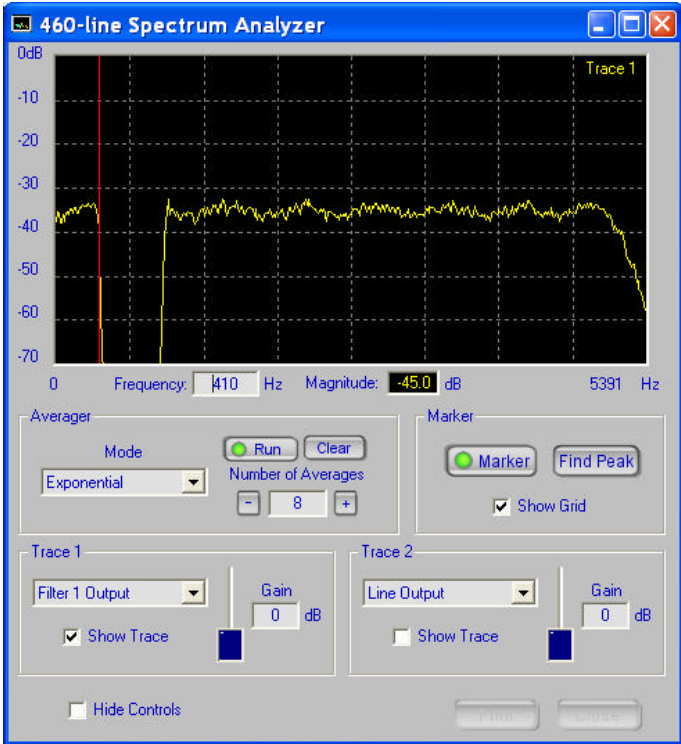
Step	Test	Pass	Fail
100	<p>Set Stage 4 to be Inactive. Click the “5” radio button in the General Filter Stages to add an additional stage. Select a “Ref Cancellor” in the fifth stage of the General Filter Stages. Set the filter Active, open its configuration window, and set it to the following settings (note the delay of 500 samples):</p> 		
101	<p>Display the Spectrum Analyzer. Select “Filter 5 Output” for Trace 1 in the Spectrum Analyzer. Allow the filter to adapt for approximately 30 seconds and verify that most all of the time-aligned white noise signal is cancelled as shown in the figure below:</p> 		

Step	Test	Pass	Fail
102	<p>Exit the Reference Canceller configuration window and open the Coefficient Display. Display all of Filter 5's 1024 coefficients. Click the "Find Peak" button and verify that the peak is at the 500th coefficient, which matches the sample delay. The Coefficient Delay should look similar to the figure below:</p>  <p>The screenshot shows the 'Coefficient Display' window. The plot area has a vertical axis from -1.000 to +1.000 and a horizontal axis from 0.000 msec to 85.333 msec. A yellow waveform shows a sharp peak at 500 msec. A red vertical line marks this peak. Below the plot, the 'Coefficient' field is set to 500 and the 'Value' field shows 0.6942. The 'Filter' dropdown is set to 'Filter 5' and 'Number of Coefficients' is 1024. The 'Find Peak' button is visible in the 'Marker' section.</p>		
103	<p>Set Stage 5 to be Inactive. Click the "6" radio button in the General Filter Stages to add an additional stage. Select a "Ref Canceller" in the sixth stage of the General Filter Stages. Set the Filter Active, open its configuration window, and set it to the following settings (note the delay of 600 samples):</p>  <p>The screenshot shows the 'Reference Canceller (Filter 6)' configuration window. The 'Conditional Adaptation' section has 'Always' selected. The 'Delay' section shows 600 samples and 50.000 milliseconds. The 'Adapt Rate' section shows $\mu = 10 \times 2^{-14}$ with 'Auto Normalize' checked. The 'Filter Size' section shows 1024 taps and 85.333 milliseconds. The 'Filter Active' checkbox is checked.</p>		

Step	Test	Pass	Fail
104	<p>Display the Spectrum Analyzer. Select “Filter 6 Output” for Trace 1 in the Spectrum Analyzer. Allow the filter to adapt for approximately 30 seconds and verify that most all of the time-aligned white noise signal is cancelled as shown in the figure below:</p> 		
105	<p>Exit the Reference Canceller configuration window and open the Coefficient Display. Display all of Filter 6’s 1024 coefficients. Click the “Find Peak” button and verify that the peak is at the 600th coefficient, which matches the sample delay. The Coefficient Delay should look similar to the figure below:</p> 		

Step	Test	Pass	Fail
	<i>Oversized Filter Test</i>		
106	<p>Select only one (1) stage in the number of General Filter Stages. Choose “Ref Canceller” in the first filter stage (if it is not already selected). Set the Filter active and open its configuration window. The filter should still have a Delay of 100 samples and an Adapt Rate of 10 from the previous tests. Click the “Adjust Maximum Size” button, select the maximum filter size of 6144 taps (coefficients), and click “OK”.</p> <div data-bbox="483 499 1060 814" data-label="Image"> </div>		
107	<p>Display the Spectrum Analyzer. Select “Filter 1 Output” for Trace 1 in the Spectrum Analyzer. Allow the filter to adapt for approximately 30 seconds and verify that most all of the time-aligned white noise signal is cancelled as shown in the figure below:</p> <div data-bbox="423 999 1122 1766" data-label="Figure"> </div>		

Step	Test	Pass	Fail
108	<p>Open the Coefficient Display. Display all of Filter 1's 6144 coefficients. Click the "Find Peak" button and verify that the peak is at the 100th coefficient, which matches the sample delay. The Coefficient Delay should look similar to the figure below:</p> 		
109	<p>Reopen the configuration window for the Reference Canceller. Click the Adjust Maximum Size button and choose the "Reduce Maximum Size at 1024 taps" option. Close the configuration window.</p>		

Step	Test	Pass	Fail
	<i>Basic FIR Filter Test</i>		
110	<p>Choose a Bandstop filter in the first filter stage. Set the Filter active and open its configuration window and set it to the following settings:</p> 		
111	<p>Display the Spectrum Analyzer. Select "Filter 1 Output" for Trace 1 in the Spectrum Analyzer. Verify that most all of the time-aligned white noise signal between 400 Hz and 1000 Hz is cancelled as shown in the figure below:</p> 		

Step	Test	Pass	Fail
	<i>Silence Output Test</i>		
112	In the Calibration Mode Controls on the Master Control Panel choose “Silence” as the Signal Generator Output. The Input and Output Level should drop below -66dB.		
113	<p>Display the Spectrum Analyzer. Select “Left In” for Trace 1 in the Spectrum Analyzer. Verify that there is no signal at any frequency.</p> <div data-bbox="451 506 1084 1192" data-label="Image"> </div> <p>The signal generator uses the stage normally used by the Equalizer. To generate “silence” the white noise generator is passed through the 20-Band Graphic Equalizer with all slider values at maximum attenuation. This silence output test verifies that the 20-Band Graphic EQ effectively attenuates all frequencies.</p>		
	<i>This completes the calibration procedure. Please contact Digital Audio Corporation if any test fails or if you have any further questions about this procedure.</i>		

Serial Number: _____

Total Tests Failed: _____

Person Conducting Calibration:

Print Name

Sign Name