MACKIE.

LP48
LAKE PROCESSOR CARD
USER'S GUIDE

Contents

Need help with your new LP48 Card?

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- **Email us at: techmail@mackie.com.**
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Part No. SW0726 Rev. A 09/08

1. Introduction

Thank you for choosing to upgrade your TT24 Digital Live Mixing Console with the LP48 Lake Processor expansion card. Dolby Laboratories designed the highly regarded Lake Contour™ Digital Loudspeaker processor, and worked with us here at Mackie to develop the first integrated Lake EQ and Lake Loudspeaker modules for a digital console.

The TT24 with an LP48 expansion card provides 10 channels of Lake Insert EQ processing, or eight channels of Lake Loudspeaker processing, or a combination of the two (five channels of EQ processing and four channels of Lake Loudspeaker processing).

The inputs to the LP48 are assigned in the TT Control software application running on your PC from virtually any point in the TT24 signal path. The loudspeaker processor outputs from the LP48 card can be routed to any physical output connector on the console or the DS3232 Digital Snake.

LP48 configuration is done within the TT Control software Setup>Expansion menu.

Insert EQ Features

The Lake EQ Mode provides ten EQ processors that can be inserted into any of the TT24 digital insert points. Each EQ processor can operate with the Lake Ideal Graphic EQ (28-bands) or the Lake Mesa EQ (parametric EQ).

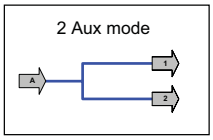
Unlike standard graphic equalizers whose adjacent filters interact and add to each other, the Lake Ideal Graphic EQ provides a frequency response curve exactly like the curve of the user interface sliders. This allows you to have more precise control over your sound. What you see is what you get!

Lake Loudspeaker Processor Features

The Lake Loudspeaker Processor Mode provides a four input by eight output speaker processor (two input by four output when in split mode). It has two DSP engines that split up the work between them.

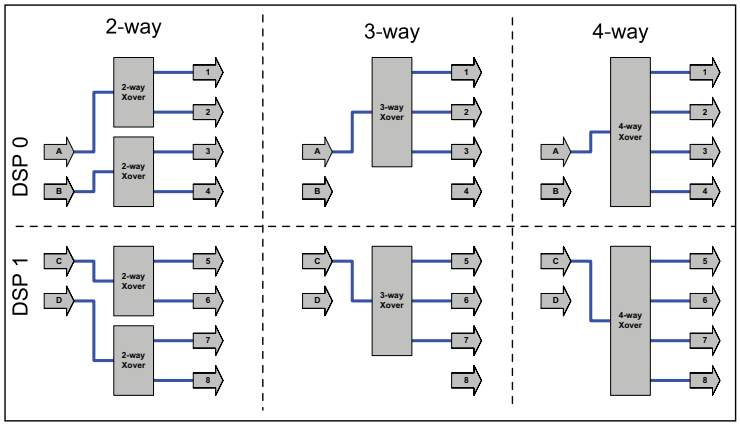
In split mode, you can configure the processor as follows:

- Two two-way crossovers
- One three-way crossover
- One four-way crossover
- Two Aux mode



When the whole card is configured in Lake Loudspeaker Processor mode, you can configure the processors as follows:

- Four two-way crossovers
- One four-way crossover and one three-way
- One four-way crossover and two two-way
- Two four-way crossovers
- Two three-way crossovers
- Two Aux mode



You can select from the following crossover types for each individual crossover filter, using filter orders from 6 dB/octave up to 48 dB/octave:

- Bessel
- Butterworth
- Linkwitz-Riley

Important default presets allow you to set up and change between the various crossover types. Presets for EAW and Mackie loudspeakers are also provided.

Getting Started

Installing the Card

The first thing to do is to install the LP48 expansion card into your TT24. See the “TT24 Expansion Card Installation Instructions” that came with your LP48 for instructions on how to install the expansion card.

Updating the Software

The next thing is to make sure you have the latest firmware for the TT24 and the latest TT Control software application for your PC. Version 1.7 or greater is required to run the LP48 card.

If you don't know the software version you are currently using, you can check your software version and build number by pressing the “HELP” button on the console, or by clicking Menu > About in the TT Control PC application.

You can find the latest version of the TT24 firmware and TT Control PC application on the Mackie website: http://www.mackie.com/products/tt24/software.html

Be sure to follow the instructions when upgrading to new software, as described in the TT24 Firmware/Software Installation guide found in the link.

It is VERY IMPORTANT that you always update the firmware in the following order:

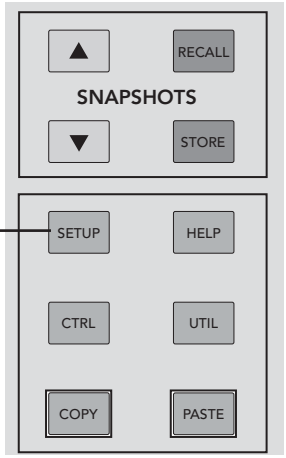
1. DS3232 Digital Snake (if present)
2. Expansion Cards (if present)
3. The TT24 Console.

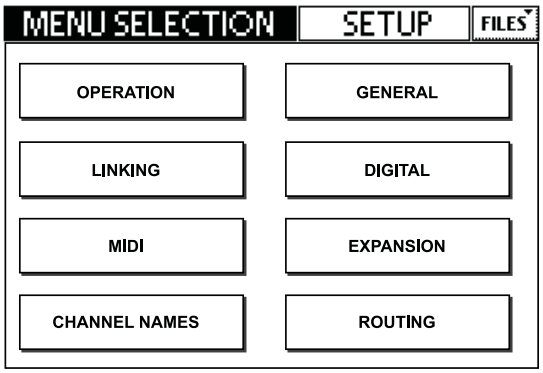
Opening the LP48 Setup Screen

Now you have installed the LP48 expansion card and updated the firmware and software, you are ready to turn on the TT24 and start configuring the LP48 Lake Processor Card.

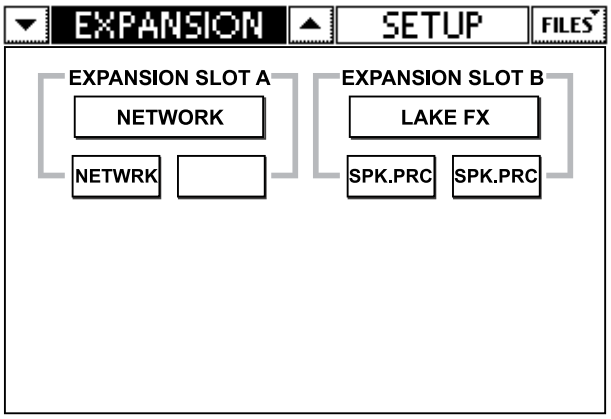
To confirm that the LP48 card is installed and properly recognized:

1. Press the SETUP button in the QuickMix area.
2. Touch the EXPANSION button in the MENU SELECTION window.





3. The EXPANSION window displays the cards installed in the two expansion slots on the TT24. That's as far as you can go on the TT24 Touchscreen. All the configurations for the LP48 are done through the TT Control PC application.



4. Connect a USB cable between the TT24 and your computer.
5. Open the TT Control PC application on your computer.
6. If the Expansion window isn't open yet, press F11 on the keyboard to open the Expansion window.
7. Click the EDIT button at the bottom of the expansion slot window.

8. This is your window into the amazing world of Lake processing, where you can access all the tools provided by this powerful software and expansion card.

Snapshots Warning

The LP48 card has its own Snapshot Backup and Snapshot Restore items available in the Menu>Expansion Card Options drop-down menu of the TT Control software.

⚠ Make sure that you backup your LP48 Card Snapshots when you backup your console, or the LP48 will not be backed up.

⚠ NOTE: The LP48 snapshot backup and snapshot recall process can take a long time, such as 30 minutes or so!!!

2. Modes of Operation

Overview

There are three Card Modes from which to choose in the Lake Card Edit window: 10 Insert Equalizers, 4x8 Speaker Processor, and 2x4 Speaker Processor with 5 Insert EQs. Select the mode of operation you want to use from the window shown below. If you make a change, you will be prompted to confirm your choice:

10 Insert Equalizers

4x8 Speaker Processor

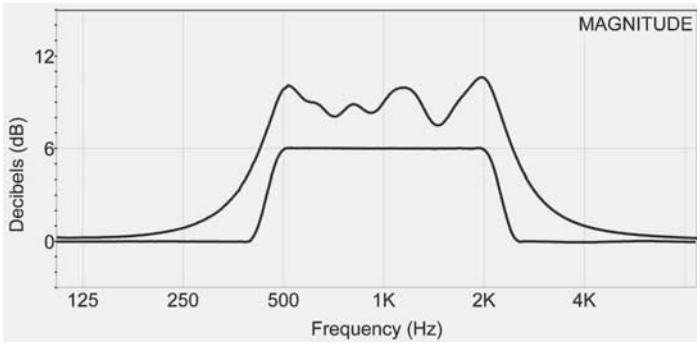
2x4 Speaker Processor with 5 Insert EQs

10 INSERT EQUALIZERS
Lake EQ Mode

When this mode of operation is selected, the LP48 supplies up to ten 1/3-octave graphic equalizers or parametric equalizers, each of which can be inserted into the pre- or post-inserts for each channel (Analog 1-24 pre or post, Digital 25-48 pre or post, card return 1-8 pre or post), the insert for an aux send (Aux Send 1-12), or the insert for the Main Left, Right, or Mono output.

The Lake Ideal Graphic EQ™ provides tighter filter control over traditional analog (and digital) graphic EQs. It features “raised cosine” algorithms that provide a frequency response that truly matches the curve established on the graphic interface.

If one were to the boost a conventional graphic equalizer by 6 dB at 500, 750, 1000, 1250, 1600, and 2000 Hz, the resulting frequency response would resemble the wavy curve in the top trace of the illustration below. The bottom trace shows that the same adjacent filters in the Lake Ideal Graphic EQ sum to a flat frequency response, providing a response curve just like the one you expect when you adjust the Graphic EQ sliders.



The Lake Mesa EQ™ offers the classic shelving and parametric filters of traditional parametric EQs. But it goes one step further by providing asymmetric filtering for independent control over upward and downward slopes of a parametric filter section. This is particularly useful when performing corrective adjustments to the asymmetric response patterns of all loudspeakers.

4x8 SPEAKER PROCESSOR
Lake Loudspeaker Processor Mode (4x8)

When this mode is selected, the LP48 provides four 1x2 crossover modules, each accepting an input from an aux send (Aux Send 1-12), Matrix Out (Matrix A-H), or the Main Left, Right, or Mono output. The crossover modules can also be configured as 1x3 (3-way) or 1x4 (4-way) crossovers, or a 1-input, 2-aux preset can be chosen.

Each input and output has a delay function for time alignment of delay stacks and drivers. In addition, each output has a limiter function to provide protection for each driver. An extensive library of presets are provided, tailored for many popular loudspeaker systems, including EAW and Mackie loudspeaker products.

2x4 SPEAKER PROCESSOR with 5 INSERT EQs
Split Mode (2x4 Lake Loudspeaker Processor with 5 Lake Insert EQs)

This mode provides a combination of the first two modes: two 1x2 crossover modules and five insert EQ modules. The features remain the same for each type, only the number of modules has been reduced by half for each type.

Refer to this manual's sections regarding Lake EQ Mode and Lake Loudspeaker Processor Mode for an explanation of each of the modes contained within Split Mode.

LP48 Card Outputs

For Inserts EQs, the processed output from the card is routed to the insert point. For Loudspeaker Processor outputs, the output from the LP48 card (either 8, or 4 in split mode) can be routed using the TT Control Routing Output screen of software version 1.7 or greater.

3. Lake EQ Mode (10 Insert Equalizers)

When this mode is selected, you can choose between a 28-band graphic EQ (Lake Ideal Graphic EQ) or a full-featured parametric EQ (Lake Mesa EQ) for each insert.

Source Assign

You must assign a source for each insert EQ. You can select from any analog input (1-24 pre/post), digital input (25-48 pre/post), card channel (1-8 pre/post), aux send (1-12 post), or the main left, right, or mono outputs (post). Since these are insert points, the processed signal is returned to the signal path at the selected insert point.

Edit

Click the EDIT button to open the EQ Edit window. This is where you select either the graphic EQ or parametric EQ, and configure the various parameters of the equalizer.

NOTE: After clicking EDIT, there may be a warning that the graphics need to be 16 bit. Usually it is OK to ignore this warning, but if you have any trouble then adjust your computer display to suit.

The parametric EQ is the default selection when you enter the EQ Edit window. The EQ Edit window consists of a graph, with the x-axis (horizontal) representing frequency, and the y-axis (vertical) representing amplitude. The icons at the top of the graph represent a low-shelf EQ, parametric EQ, Mesa EQ, and high-shelf EQ. The buttons at the bottom of the graph provide access to other EQ options.

To configure the parametric EQ, simply click one of the blue icons at the top of the graph and move it to the approximate point in the graph where you want it to be, then click again to place it.

EQ Edit Window

Frequency Lock

This button, located in the upper left corner of the graph, locks the frequency of the selected filter so it cannot be changed by clicking within the graph area. You will have to click below the graph. This is useful in graphic EQ mode as well, since you can adjust the cut or boost without accidentally moving to the next filter along.

Button Menus used in Insert EQ mode

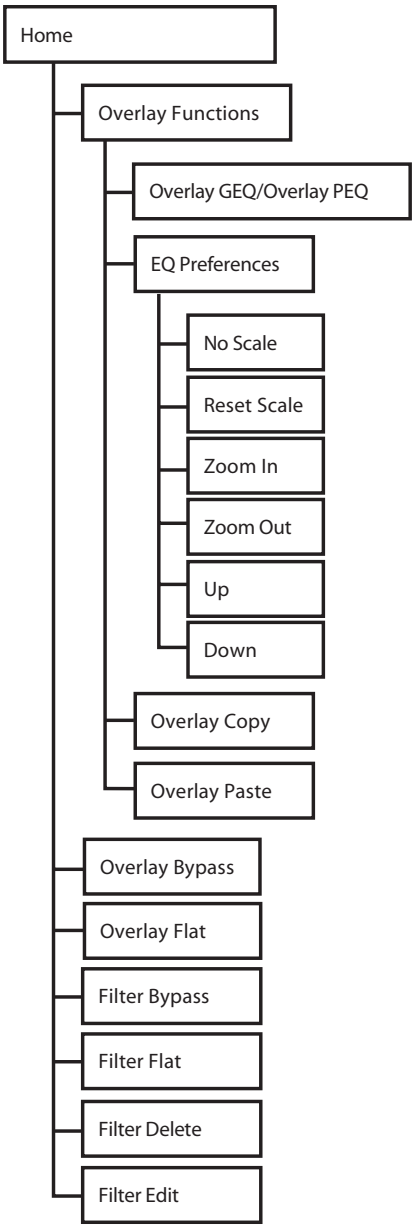
The LP48 uses a row of buttons along the bottom to choose and navigate within menu items.

This map shows the general layout of the button menus and their submenus for the Insert EQ mode. For example, clicking on the Home button takes you to the top level. Clicking on Overlay Functions takes you to another world of enchantment where you can select from graphic EQ or Parametric EQ, select EQ display preferences, or copy and paste an EQ overlay.

Selectable buttons are blue.

Buttons that lead to sub-menus turn orange when selected.

Non-selectable buttons are grey (for example Filter Delete is not selectable for the graphic EQ).

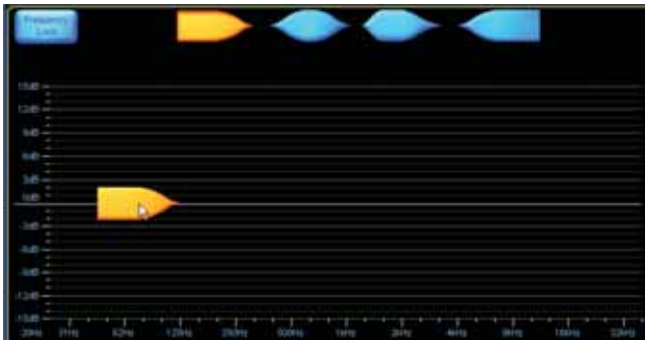


Parametric EQ

Click on Overlay Functions and select the Overlay PEQ button (if it is not already in that mode).

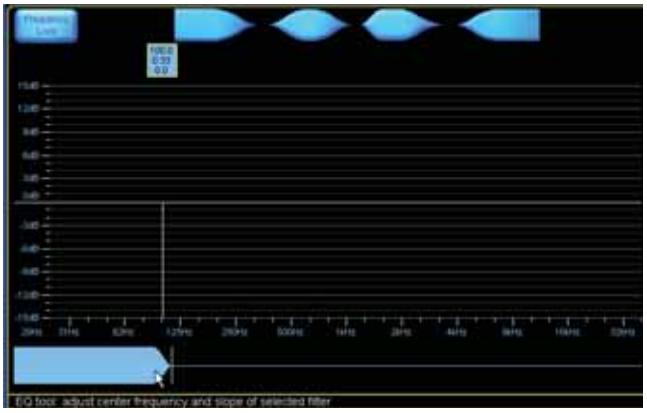
The operations that follow can be made no matter which row of buttons is displayed, even Home, but you need to get into the Overlay Functions menu to change from GEQ to PEQ.)

Low-shelf EQ

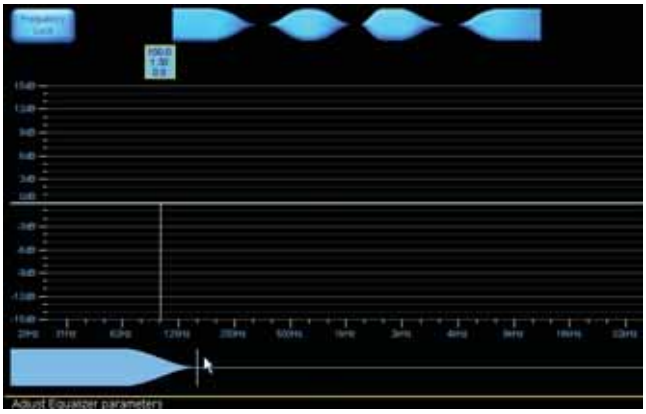


Click the low-shelf EQ icon at the top of the work area (it glows orange) and move it to the area of 0 dB, 100 Hz on the graph, then click again to place it.

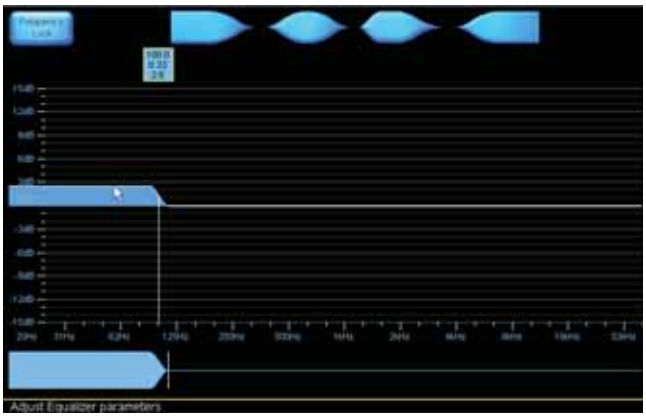
The icon appears at the bottom of the graph and the parameters appear at the top of the graph (frequency, Q, and amplitude).



Click the blue icon at the bottom of the graph and move it left or right to adjust the cutoff frequency of the filter.

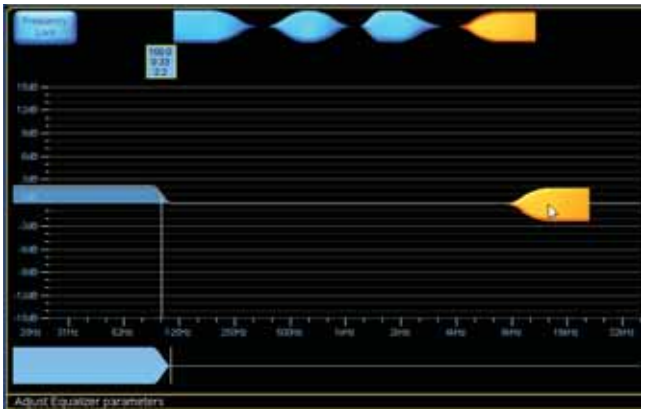


Click the vertical bar at the right tip of the icon and move it left or right to adjust the slope (Q) of the filter.



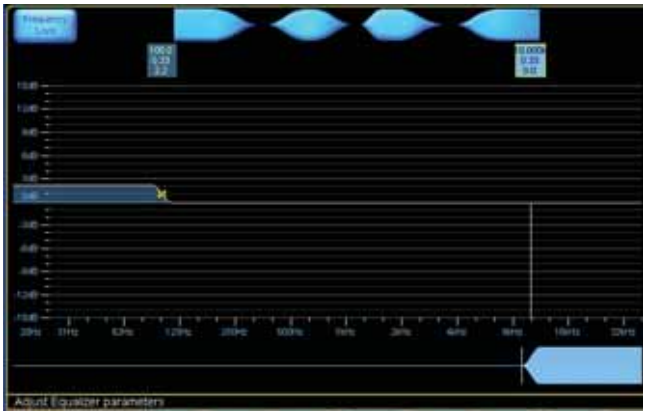
Click the horizontal bar (0 dB) in the graph and move it up or down to adjust the amplitude of the filter.

High-shelf EQ



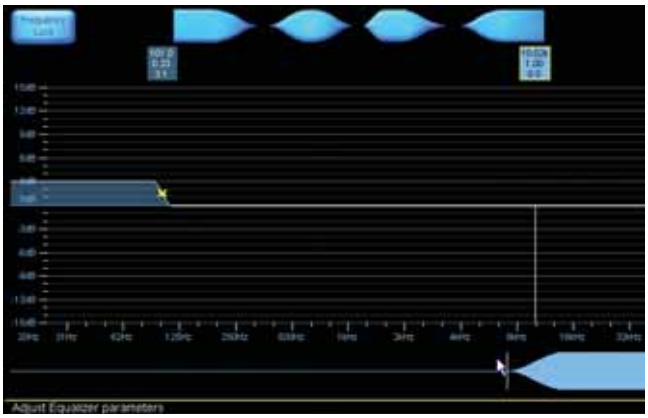
Click the high-shelf EQ icon (it glows orange) and move it to the area of 0 dB, 10 kHz on the graph, then click again to place it.

The icon appears at the bottom of the graph and the parameters appear at the top of the graph (frequency, Q, and amplitude).

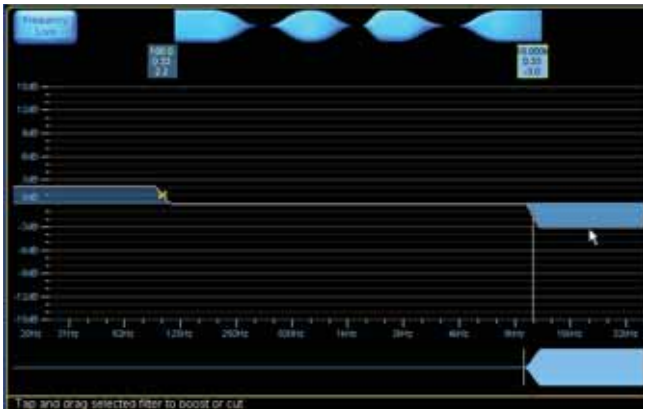


Notice that the low-shelf EQ icon disappears from the bottom of the graph, and an “X” appears in the graph. This indicates that there is a filter located at that frequency. Simply click on or below the “X” to select it or click on the blue box above the X, and readjust the parameters if desired.

Click in the blue icon at the bottom of the graph and move it left or right to adjust the cutoff frequency of the filter.

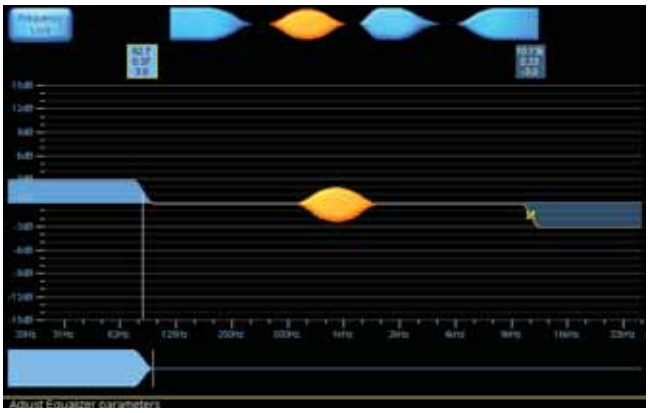


Click on the vertical bar at the left tip of the icon and move it left or right to adjust the slope (Q) of the filter.

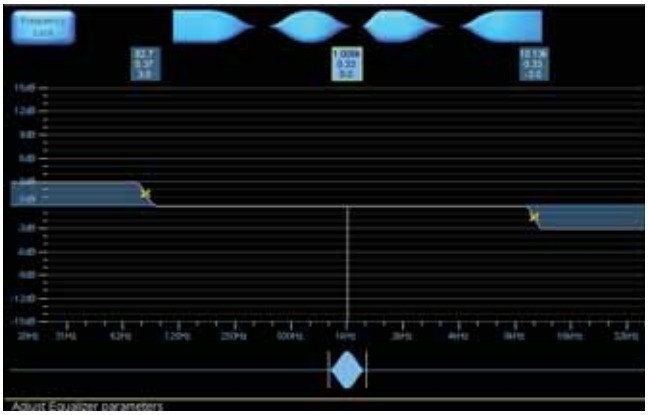


Click on the horizontal bar (0 dB) in the graph and move it up or down to adjust the amplitude of the filter.

Parametric EQ

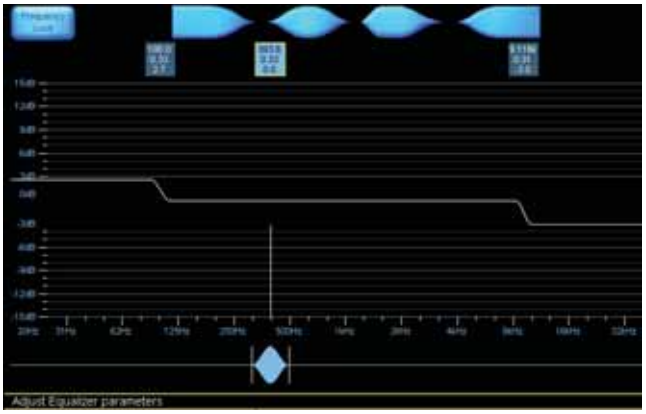


Click the parametric EQ icon (it glows orange) and drag it to the area of 1 kHz on the graph, then click again to place it.

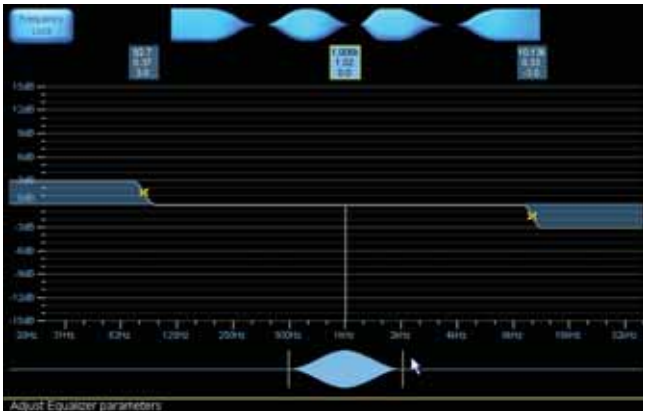


The icon appears at the bottom of the graph and the parameters appear at the top of the graph (frequency, Q, and amplitude).

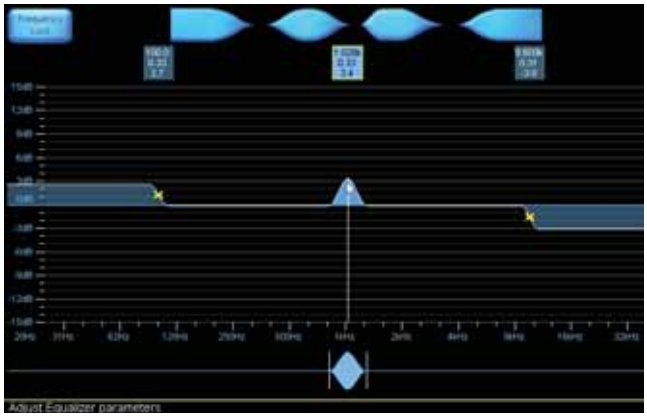
Notice that the high-shelf EQ icon disappears from the bottom of the graph, and an “X” appears in the graph. This indicates that there is a filter located at that frequency. Simply click on the “X” to select it and readjust the parameters, if desired.



Click inside the blue icon at the bottom of the graph and move it left or right to adjust the center frequency of the filter.

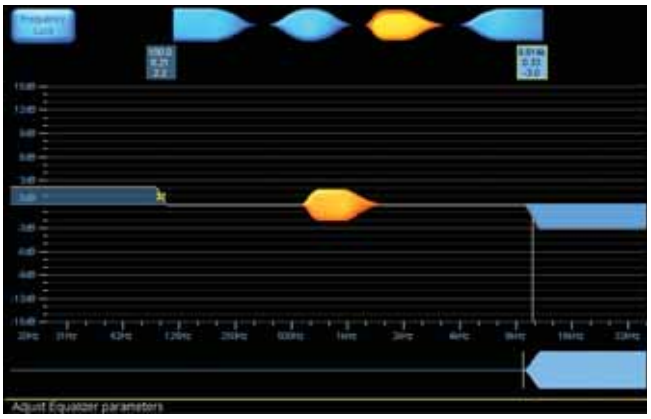


Click to the left or right of the vertical bar at either tip of the icon and move it left or right to adjust the slope (Q) of the filter. Note this adjusts the slope at both ends of the filter symmetrically.



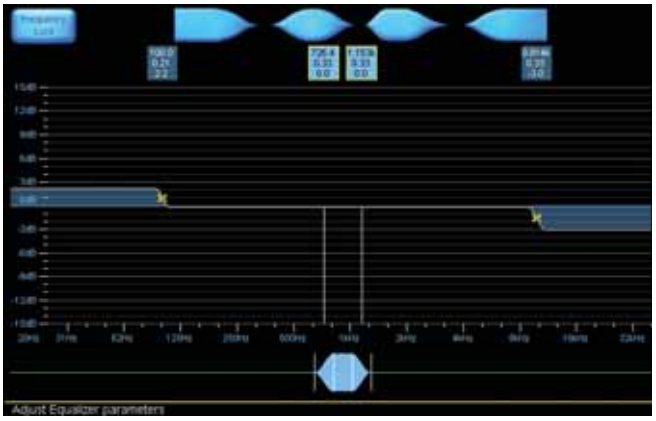
Click on the horizontal bar (0 dB) in the graph and move it up or down to adjust the amplitude of the filter.

Mesa EQ



The Mesa EQ is similar to the parametric EQ, except that the bandwidth of the filter and the slope at both sides of the filter envelope can be adjusted independently. This allows you to tailor the filter for complex frequency response corrections required for certain loudspeaker/room combinations.

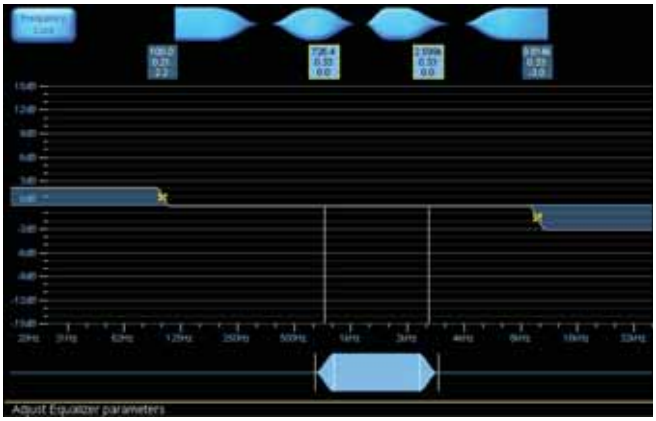
The icon appears at the bottom of the graph and the parameters appear at the top of the graph (frequency, Q, and amplitude of each end of the filter envelope).



Click inside the blue icon at the bottom of the graph and move it left or right to adjust the center frequency of the filter.

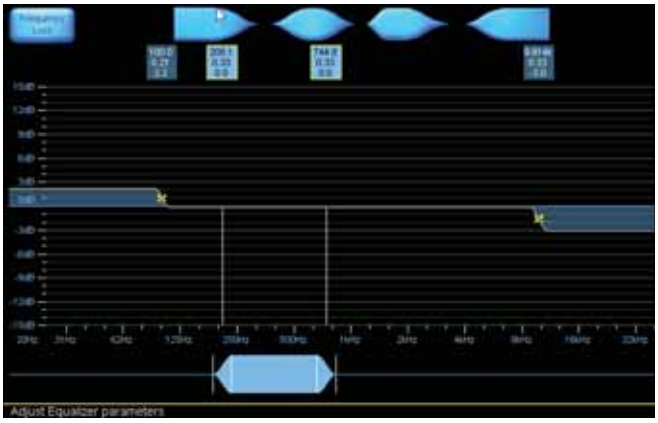
Click and move inside either tapered end of the blue icon to increase or decrease the bandwidth.

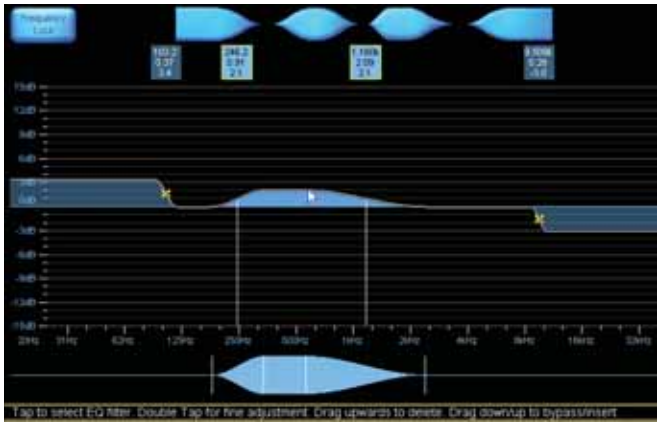
Click to the left of the left tip of the icon and move it left or right to adjust the slope (Q) of the low end of the filter.



Click to the right of the right tip of the icon and move it left or right to adjust the slope (Q) of the high end of the filter.

Click on the horizontal bar (0 dB) in the graph and move it up or down to adjust the amplitude of the filter.





Button Bar

The buttons at the bottom of the EQ Edit window provide access to EQ options.

Home

Click this button to quickly return to the default EQ Edit screen.

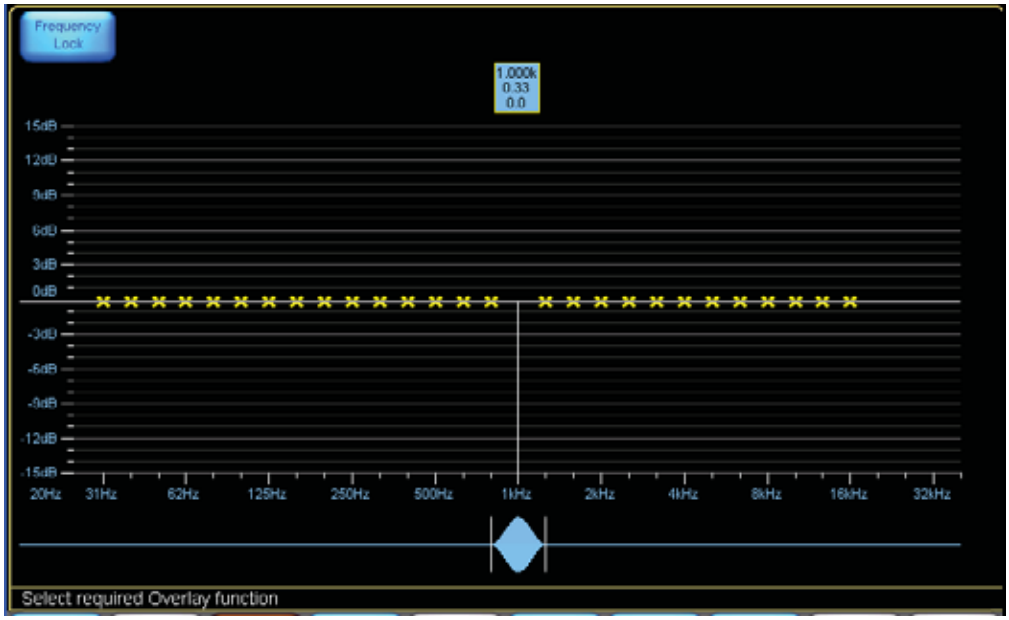
Overlay Functions

Click this button and the other buttons will change function. These options allow you to change to the 28-band Graphic EQ, to change EQ preferences, and to copy/paste EQ settings.

Overlay GEQ

Click this button to switch to a graphic EQ instead of a parametric EQ. A warning message asks you to confirm that you want to change to the graphic EQ overlay and lose the current EQ settings. Click “Yes” to switch to the graphic EQ overlay.

Note: You cannot “undo” this action.



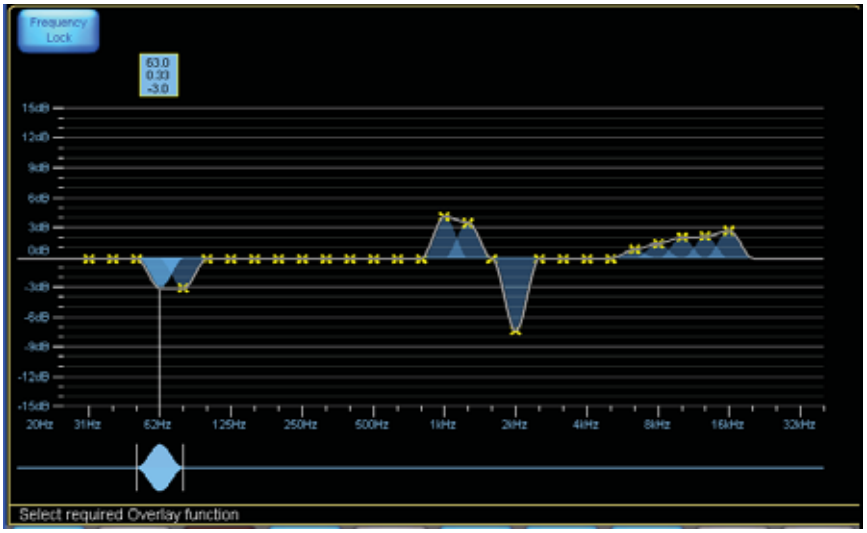
Each yellow “X” on the horizontal line (0 dB) represents a filter. You can click on an “X” to select it, or click and drag across the bottom horizontal bar to access each individual graphic EQ filter.

Click on each “X” and drag up or down to adjust the amplitude (boost or cut) for each filter. The frequency and slope for each filter are fixed, and not adjustable.

Frequency Lock

If you click this button in the top left corner, then the filters cannot be selected by clicking on, above, or below the yellow Xs. To select a different frequency, move the blue filter icon along the bottom of the screen left or right.

If this is not engaged, then filters can be selected by clicking on, above, or below the yellow Xs.



Overlay PEQ

Click this button to switch back to a parametric EQ from the graphic EQ. Once again, you will get a warning message to confirm that you want to change to the parametric EQ overlay and lose the current EQ settings. Click "Yes" to switch to the parametric EQ overlay.

Note: You cannot "undo" this action.

EQ Preferences

No Scale: Hides the horizontal lines on the graph.

Reset Scale: Resets the 0 dB line back to center in the graph, and the vertical scale back to ±15 dB.

Zoom In: Magnifies the vertical scale up to ±3 dB. This allows for fine tuning the amplitude settings.

Zoom Out: Diminishes the vertical scale up to ±60 dB in 3 dB steps. This allows you to adjust the view to see the entire frequency response curve of the graphic EQ.

Up: Shifts the 0 dB line upwards by 3 dB increments on the graph.

Down: Shifts the 0 dB line downwards by 3 dB increments on the graph.

EQ Pref EXIT: Return to the Overlay Functions selections.

Overlay Copy

This copies all the current settings for the graphic EQ to the clipboard. Use this to copy your current settings to other channels of the mixer.

Overlay Paste

This overwrites all the current settings for the graphic EQ with the settings that were last copied to the clipboard. Note that if you copy a graphic EQ and paste it, this will appear even if you are currently in the parametric EQ view, and similarly, if you copy a PEQ, and paste it, it will appear even if you are in the GEQ view.

Overlay Bypass/Overlay Insert

Click this button to bypass all the filters in the EQ section. This allows the signal to pass without processing. The button will change to “Overlay Insert” and the other buttons will grey-out and become inactive. Note: if this is a new EQ, and no EQ filters have been added, or the EQ has been made flat with the overlay flat button, then the other buttons are already greyed out.

Click the Overlay Insert button to reinsert the EQ section into the signal path.

Use this bypass/insert to do a quick A/B comparison of the signal with and without EQ.

Overlay Flat

This button returns all the filter settings to their default values. You will get a warning message to confirm that you want to flatten the EQ overlay and lose the current EQ settings. Click “Yes” to flatten the EQ overlay.

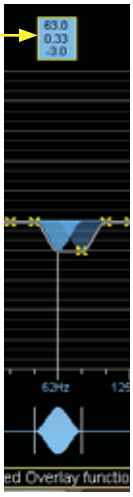
Note: You cannot “undo” this action.

Filter Bypass/Filter Insert

Click this button to bypass the selected filter in the EQ section. This allows the signal to pass without the selected filter affecting it, so you can do a quick A/B comparison of the signal with and without the selected filter. The filter boost or cut will shift to flat at 0 dB. The button changes to read Filter Insert.

Click the Filter Insert button to reinsert the selected filter into the signal path, and it will change to Filter Bypass.

Shortcut: You can quickly bypass/insert a filter by clicking on the blue box above, and dragging it down



Filter Flat

This button returns the settings for the selected filter to their default values. You will get a warning message to confirm that you want to flatten the filter. Click “Yes” to flatten the selected filter.

Note: You cannot “undo” this action.

Filter Delete

This button deletes the selected filter (applies to the parametric EQ only). You will get a warning message to confirm that you want to delete the filter. Click “Yes” to delete the selected filter.

Note: You cannot “undo” this action or delete a graphic EQ.

Filter Edit

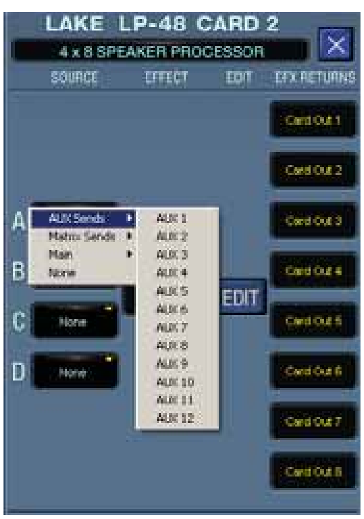
This button allows you to edit the parameters of the selected filter with an onscreen numeric keypad. When you click the button, the editable parameters for the selected filter appear as buttons at the top of the graph. Click a button to bring up the keypad, which you can use to enter a precise value for that parameter (Gain, Frequency, and BW for the parametric EQ, and Gain for the graphic EQ). Note that the computer numeric keypad cannot be used, so do not try it or you will exit out to other TT24 screens.

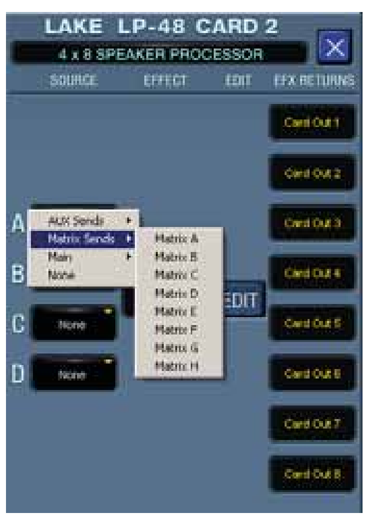
4. Lake Loudspeaker Processor Mode (4x8)

When the Lake Loudspeaker Processor mode is selected, you can choose from among a variety of configurations, including 2-way, 3-way, and 4-way crossover operation, as well as presets optimized for specific types of loudspeakers.

Source Assign

You must assign a source for each crossover module. You can select from any aux send (1-12), matrix send (A-H), or the main left, right, or mono outputs. The processed signals are sent to the outputs of the LP48 card (1-8).

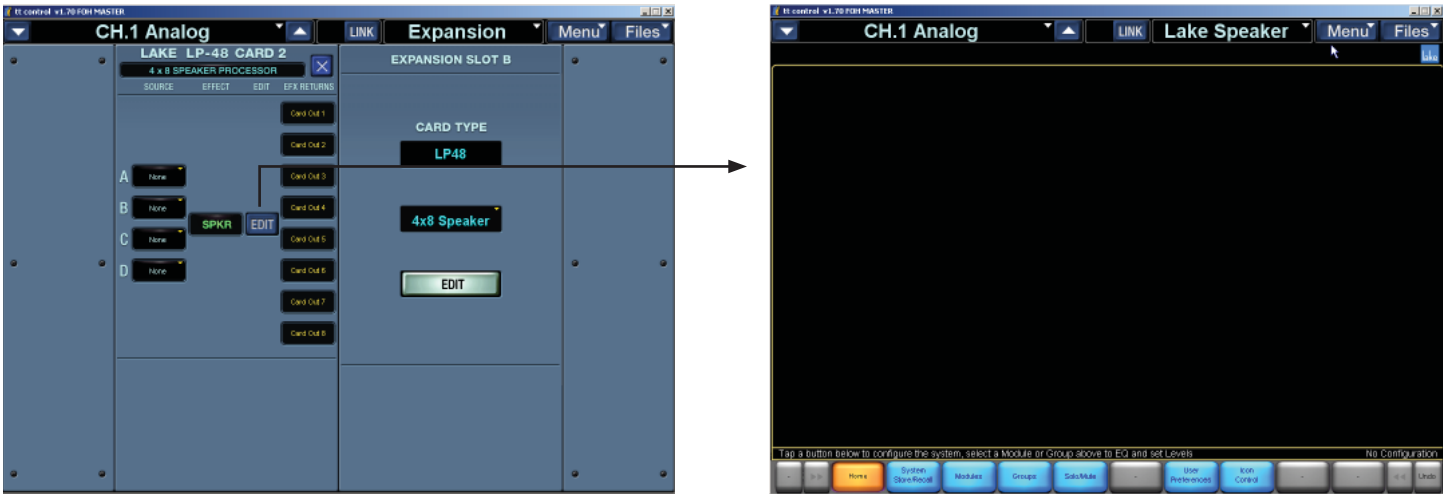




Edit

Click the EDIT button to open the Speaker Processing Edit window. This window is where you configure the types of crossovers you want to use, and add filters, delay, and limiting features.

Normally there is a short delay for the window to appear, and there may be a warning that the display should be set to 16-bit for best performance. It is usually OK to ignore this warning, but if you see any problems, set your computer graphics display to suit.



Main Buttons

The Speaker Processing Edit Window is your main work area. Below it are buttons that are described in this chapter in the following order:

- Home
- System Store/Recall
- Modules
- Groups
- Solo/Mute
- User Preferences
- Icon Control

Button Menus used in Loudspeaker Processor mode

This map shows the general layout of the button menus and their submenus for the Loudspeaker Processor mode. The buttons at the bottom of the Speaker Processing Edit window provide access to processing options. This bar updates as you go into various screens and menus.

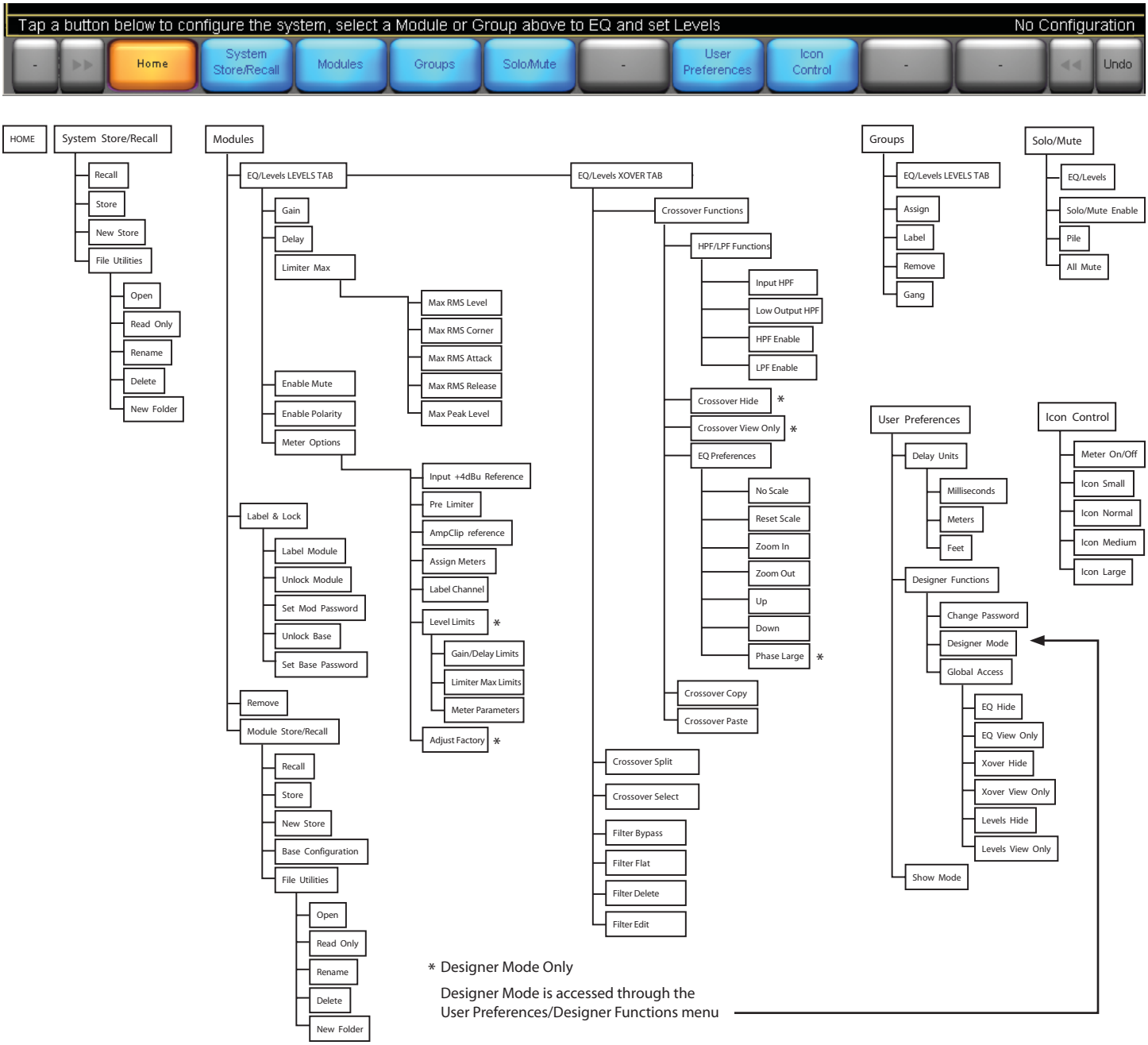
Selectable buttons are blue.

Buttons that lead to sub-menus turn orange with black text when selected.

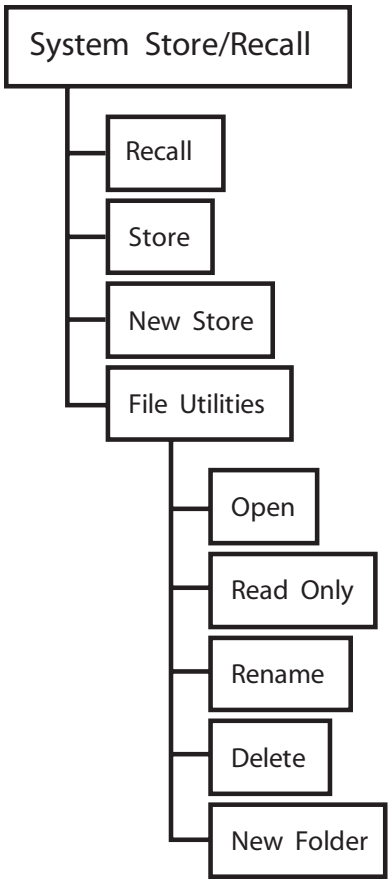
Non-selectable buttons are grey. Some will turn blue when items such as modules or groups are selected, and some will turn blue when you are in Designer Mode.

4.1 Home

Click this button to quickly return to the default Speaker Processing Edit window.



4.2 System Store/Recall



System Store/Recall Button

Click this button to store or recall a system configuration file to and from your hard drive. This includes the speaker processor library, and all modules and settings.

Recall

To recall a configuration already stored, select an existing configuration file that appears along the bottom of the edit window and click the Recall button. Alternately, you can double-click on the “My Computer” icon to locate additional files you may have saved in separate folders, then click Recall.

Store

Click the Store button to overwrite the selected file.

New Store

Click the New Store button to create a new file and store it on your computer's hard drive.

File Utilities

The File Utilities button provides access to a number of file management utilities:

Open: Open an existing folder (not a file).

Read Only: This tags a file (not a folder) so that it cannot be overwritten. This prevents a file from being changed accidentally. (A file that is read-only has an orange read-only button, and cannot be deleted.)

Rename: Allows you to rename a file or folder using the pop-up keypad.

Delete: Deletes an existing file or empty folders. Note: This operation cannot be undone.

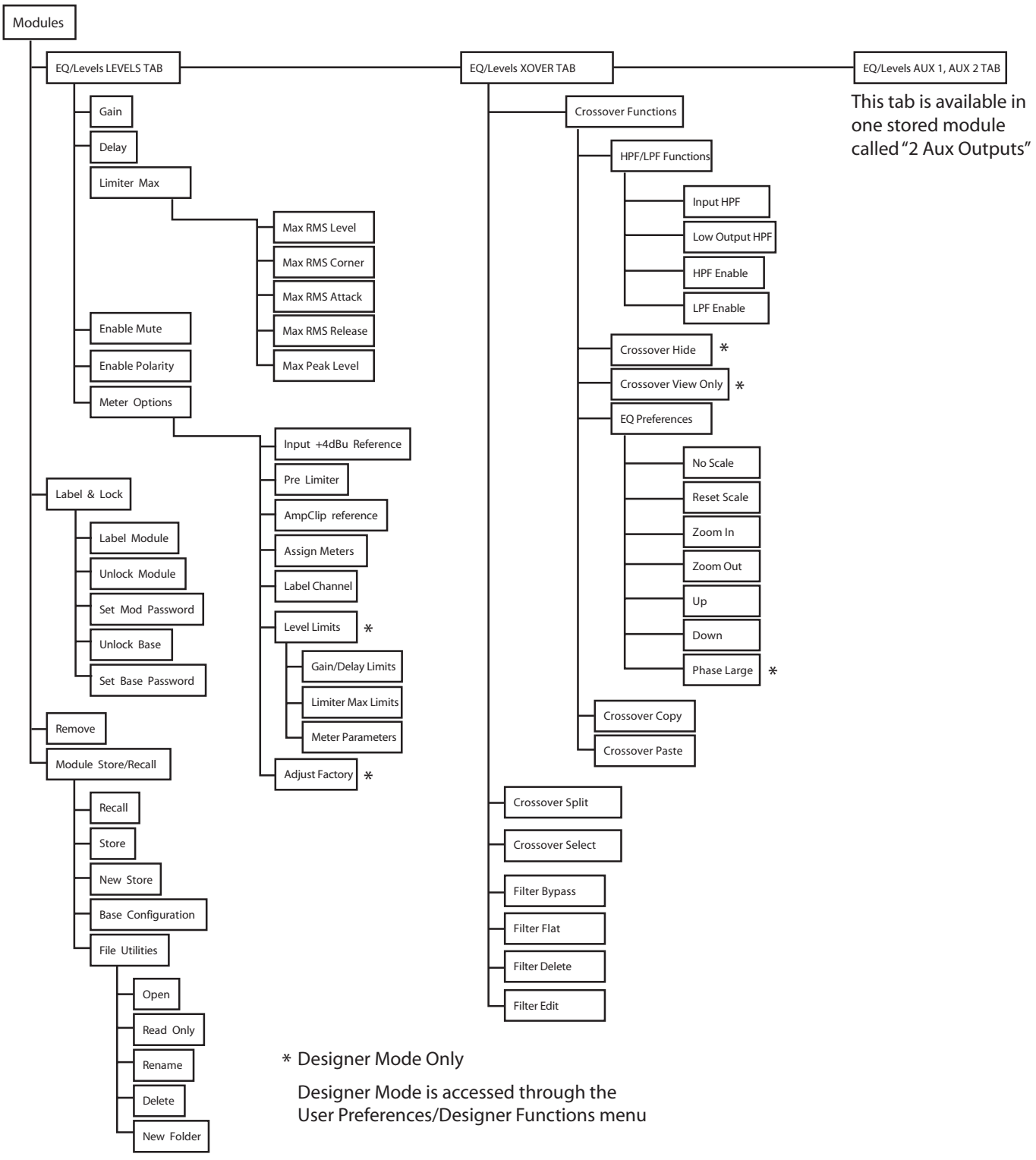
New Folder: Creates a new folder on your hard drive for storing files.

4.3 Modules

The modules section allows you to set up your crossover and EQ filters in the XOVER tab, set the levels in the LEVELS tab, label and lock, remove, store and recall modules, dispense vanilla icecream with sprinkles.

The LP48 comes with a standard 2-way, 3-way, and 4-way crossover stored in the default modules area. Select these to start with, and adjust them as required for your system. Selecting these default modules is the best way to change from one crossover design to the next. One special default module allows you to set up a one-input, 2 output aux crossover. EAW and Mackie modules are also available.

Each button is described in the pages that follow.



* Designer Mode Only

Designer Mode is accessed through the User Preferences/Designer Functions menu

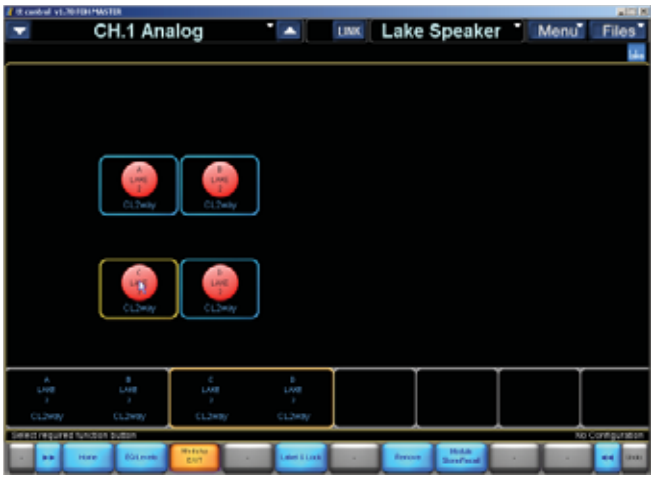
Modules Button

Click this button to access the four default crossover modules that will then appear as round purple circles in the display above the buttons. These modules represent the default configuration of four 2-way crossovers.

Click one of the pairs of modules (A and B, or C and D), move it into the window above, and click to place it.

The module icons turn red to indicate that they are muted. They are muted by default while you proceed to configure each crossover module for your application.

When you have completed the configuration, refer to page xx to see how to unmute the modules and adjust the output levels.

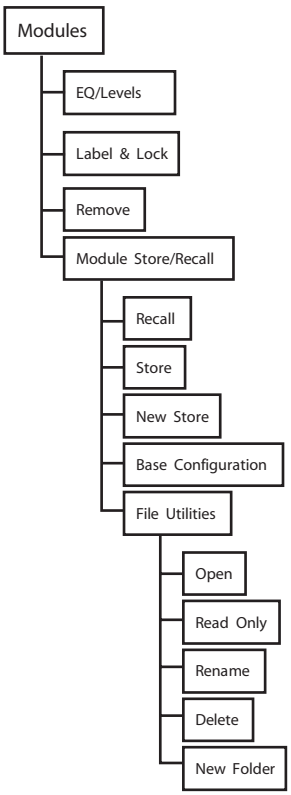


Click on one of the modules to select it, and it will be highlighted in yellow to show it is selected. Other buttons along the bottom become active: Label & Lock, Remove, and Module Store/Recall.

Module Store/Recall

This button provides access to reconfigure the crossover modules to 2-way, 3-way, or 4-way operation. The default modules, EAW modules and Mackie modules appear in the scroll bar at the bottom of the work area. Select one and click the Recall button.

Note: If you select 3-way or 4-way, then the “B” or “D” module disappears since it takes the processing power of both A and B modules to create a 3-way or 4-way crossover.



New Store

Click the New Store button to create a new module file and store it on your computer’s hard drive.

Base Configuration

A base configuration file defines a starting point for the module setup. It contains EQ and Levels settings, invisible to the user, which represent the appropriate general configuration for a particular speaker type.

EQ and Levels settings for an existing module (and crossover settings) may be saved as a base configuration for future use when configuring new modules. A system designer can also lock access to the XOVER screen or HPF/LPF screen (Mesa EQ) within the base configuration file.

The Recall/Open, Store, and New Store functions operate identically as described above, but the available files/folders in the scroll-bar change when Base Configuration is selected.

To Store/Recall a base configuration File:

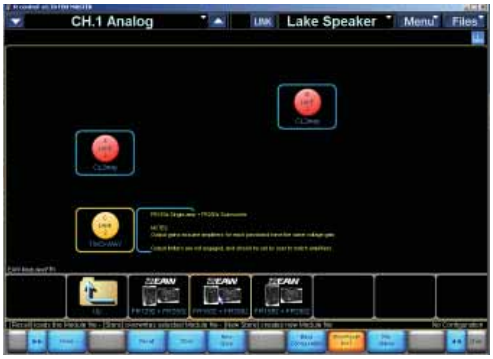
1. Select a module icon in the work area.
2. Click Module Store/Recall from the Modules menu.
3. Click Base Configuration.
4. Navigate to the desired folder/file.
5. Use the Recall/Store/New Store functions as required.

EAW and Mackie Speakers

The following example shows how to recall data for an existing EAW speaker system.

In the Modules area, select a module ball that you want to become this new configuration, and press the Store/Recall button.

Click on the EAW speakers folder.



Select a speaker system such as the FR153z single amplifier speaker and a FR250z subwoofer. Notes and warnings about different speakers may pop up.

Press Store/Recall EXIT to return to the modules area.

Press EQ/Levels to see the crossover and EQ details for this EAW system. It has been carefully designed to be the optimum two-way crossover with a tad of EQ added to the high end, and high and lows rolling off at each end.

Here is the high end, which your FR153z would receive.

Here is the low end of the EAW system, which your EAW 250z subwoofer would receive.

Here is a more complex system, a tri-amped EAW KF695z with a subwoofer.

File Utilities

The last button in the modules section, the File Utilities button provides access to a number of file/folder management utilities.

Open: This button is active only when a folder is selected. Click Open to open the selected folder.

Read Only: This tags a file so that it cannot be overwritten or delected. This prevents a file from being changed accidentally. The currently selected file's status is identified by the color of the Read Only button (orange = read only; blue = not read only).

Rename: Allows you to rename a file using the pop-up keypad.

Delete: This button is active only when a file or folder is selected, which is not designated "Read Only." Click this button to delete an existing file or folder. Note: This operation cannot be undone.

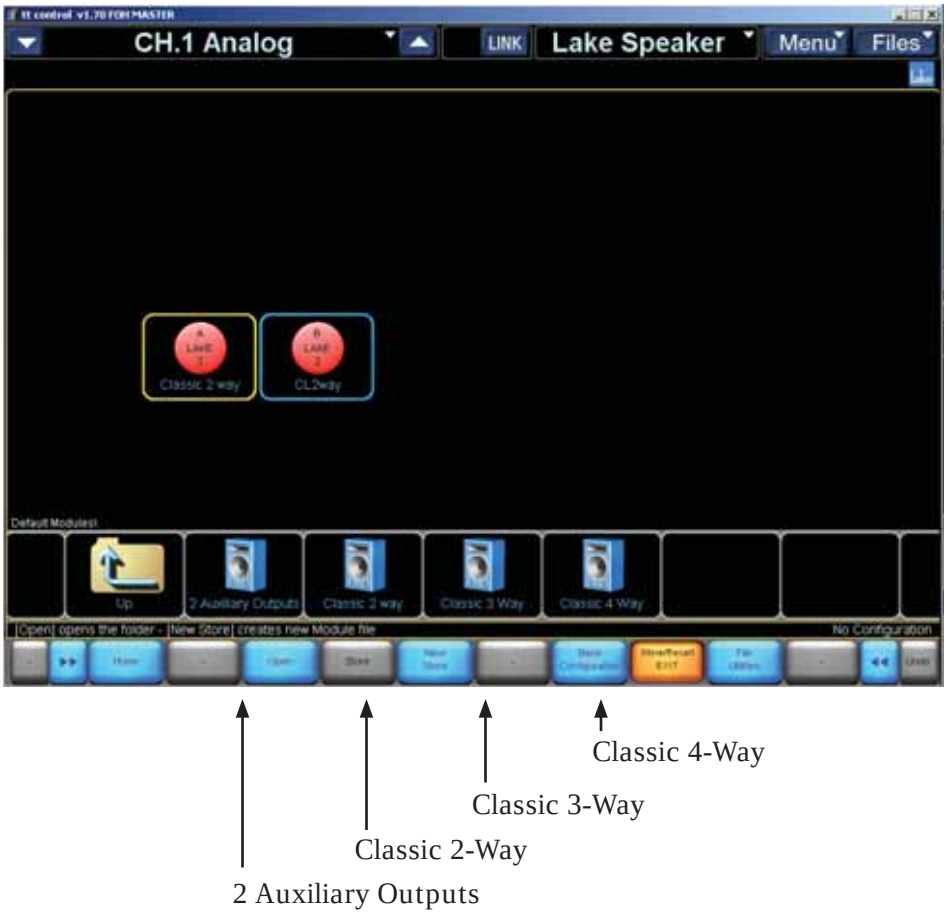
New Folder: Creates a new folder in the current directory on your hard drive for storing files. Enter the name for the new folder using the pop-up keypad.

Default Modules

Click on the default modules to bring up...well....the default modules.

These are the main gateway for you to create new modules from existing standard crossovers.

Default Modules



The four default crossovers are:

2 Auxiliary Outputs

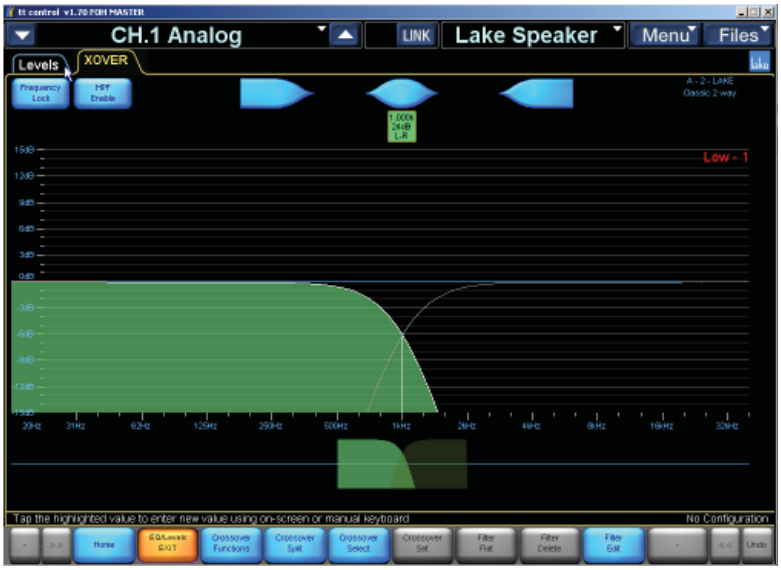
Classic 2-Way

Classic 3-Way

Classic 4-Way

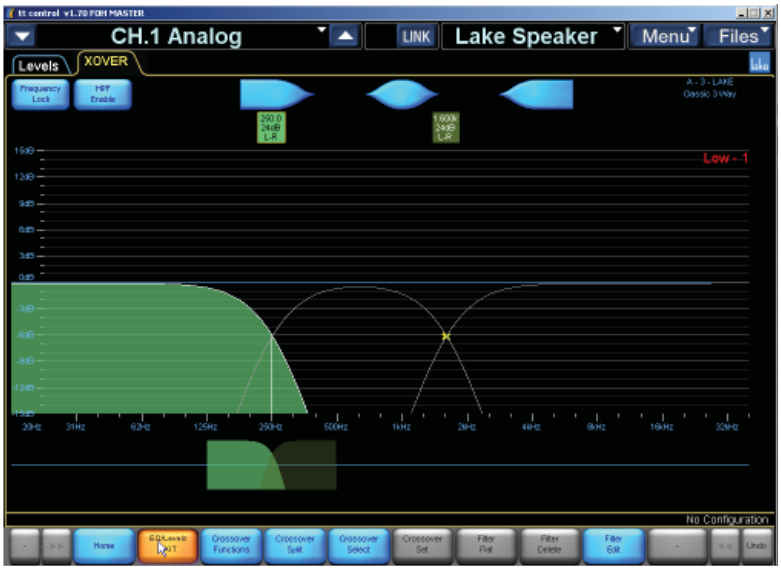
Each of these is a standard crossover that can be altered to suit your system. EQ can be added where required, filter slopes and types changed, and all sorts of fun.

The 2 Aux Outputs is a special case, and is shown on page 30.

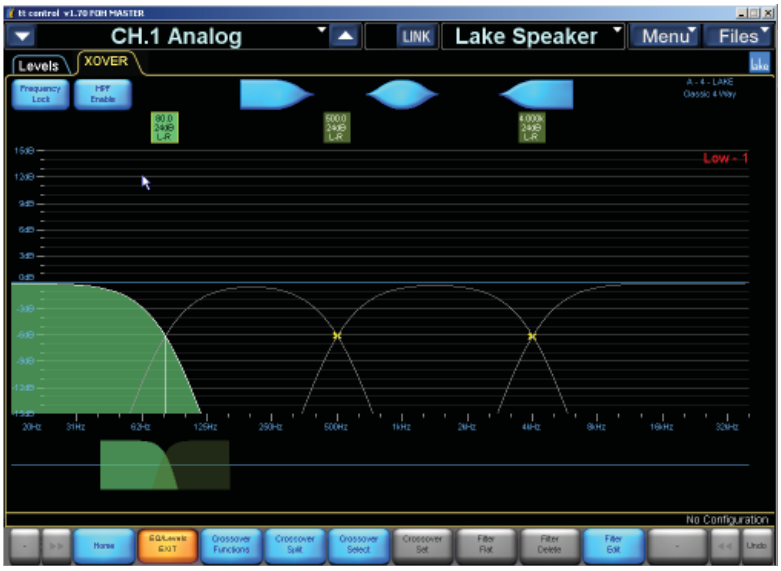


Classic Two-Way

This is the XOVER tab of the crossover graph for the two-way crossover.



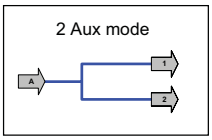
Classic Three-Way



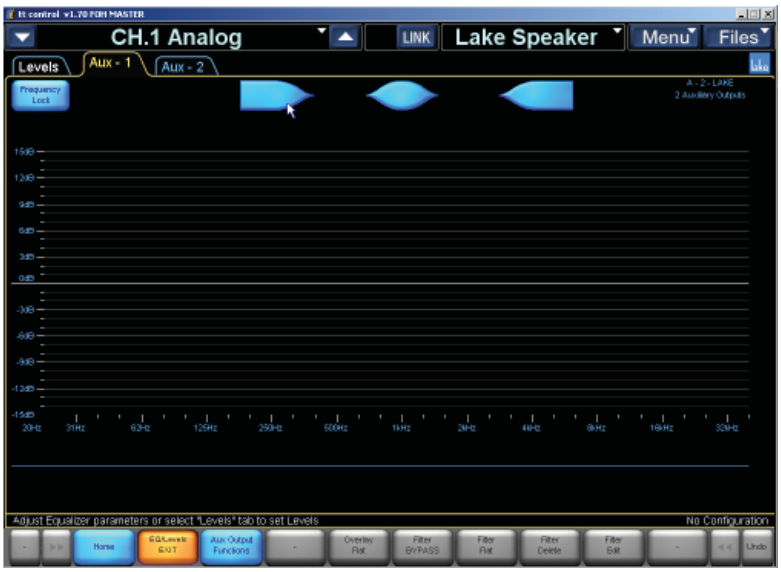
Classic Four-Way

Two Auxiliary Outputs

This special default module allows one input to feed two aux outputs. Each Aux can then be shaped with high and low-pass filters, and EQ added. The details of how this is done can be found in the XOVER tab and LEVELS tab section of this manual. The 2-aux has its own set of buttons, with similar features found in non-2-aux land.

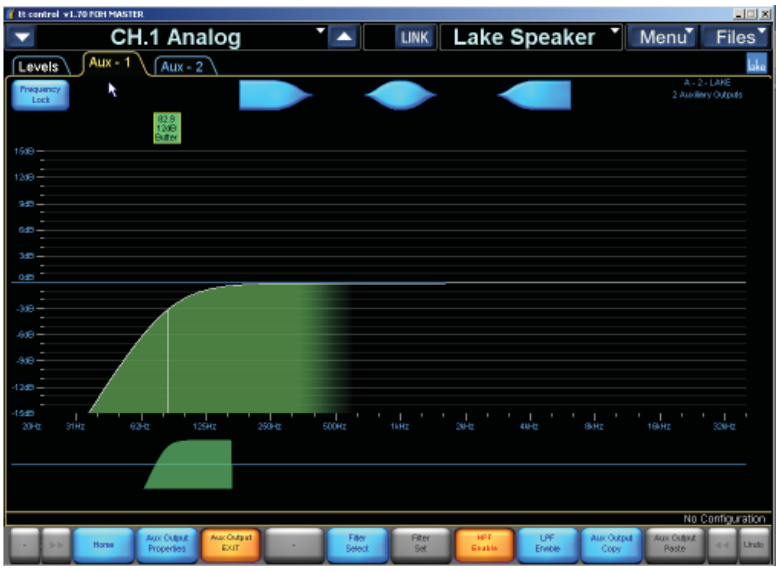


For an example of aux, suppose we have two speaker systems fed from the same source. We could shape one aux so one speaker system receives the range from 100 Hz and up, and the other speaker system receives 60 Hz and up.

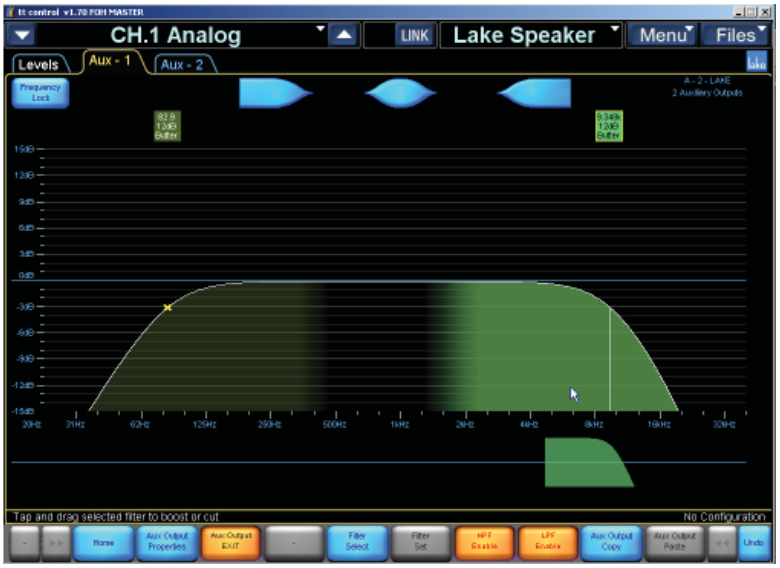


2 Auxiliary Outputs

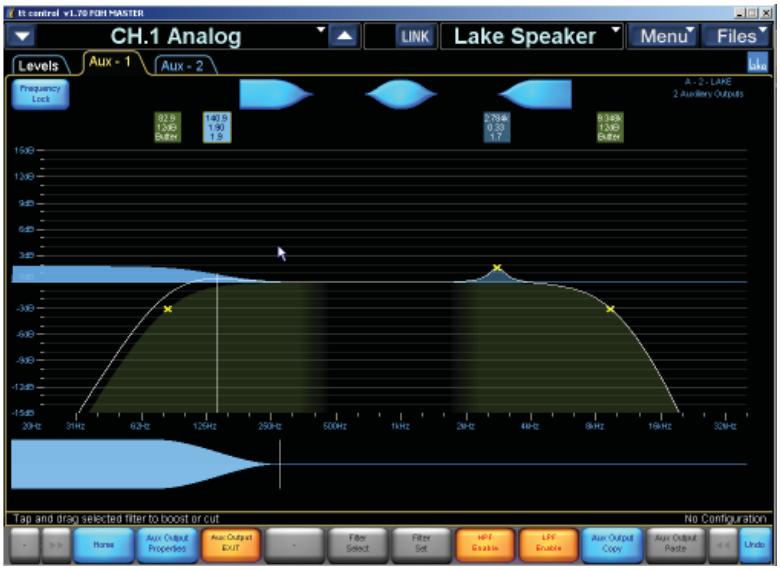
This is the Aux-1 tab of the crossover graph.



This is the Aux-1 with HPF filter added. Different filter types and slopes can be added, such as Bessel, Butterworth and L-W.



This is the Aux-1 with LPF filter added as well



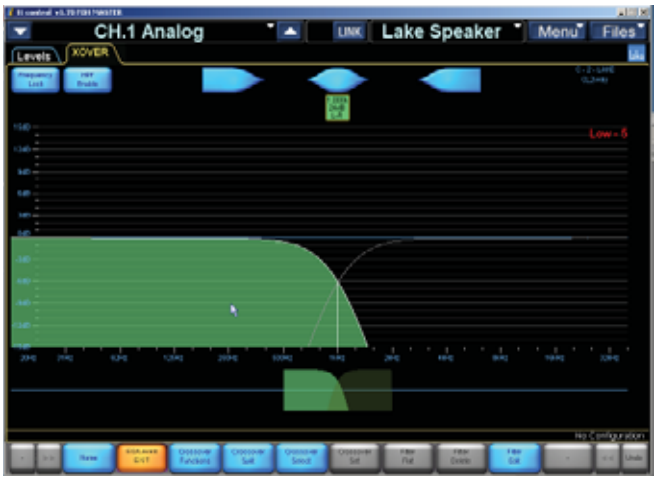
This is the Aux-1 with some EQ added

This Aux-2 with the settings of Aux-1 copied and pasted on top.

XOVER Tab

For modules that are not 2-Aux outs, the following details apply.

EQ/Levels

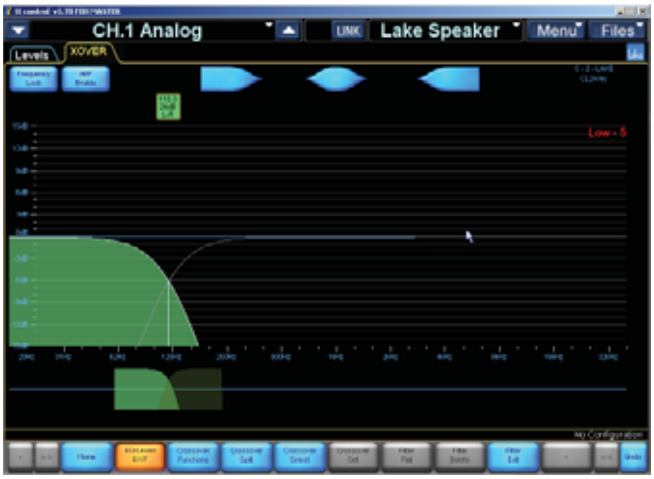


Click the EQ/Levels button to open a graphical world representing the crossover, with frequency on the x-axis (horizontal) and amplitude on the y-axis (vertical).

Each section of the crossover can be adjusted and additional EQ filters added to each.

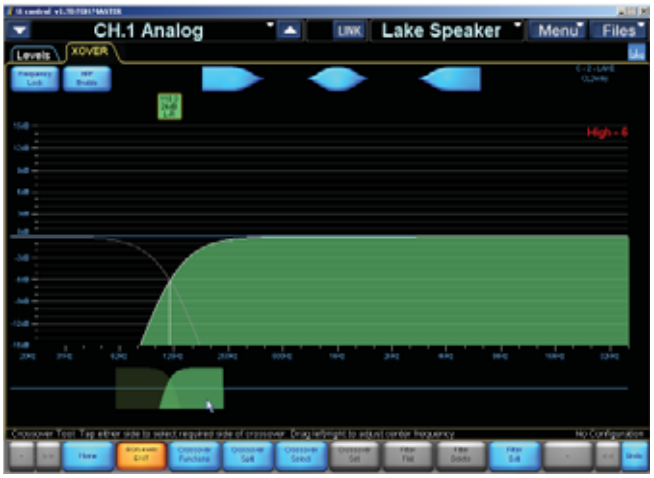
With a module selected, there are two tabs at the top of the edit window, XOVER and Levels. The XOVER tab opens by default. The buttons along the bottom also change to crossover buttons and filter buttons.

Click and drag left or right on the crossover icon at the bottom of the window to change the crossover frequency.



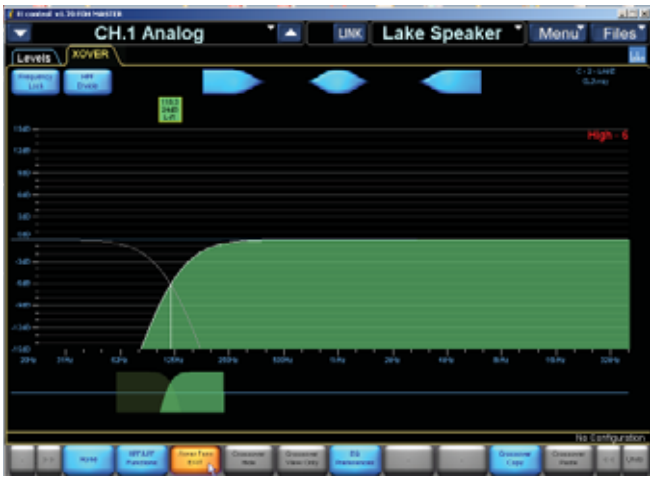
Here we have moved the crossover frequency down a few octaves. The low frequency section is highlighted in a nice shade of Pacific NorthWest fungus green. If you want to change the frequency by small amounts, double-click the small green box above the crossover point on the graph until the text inside it is greyed out. Moving the bottom crossover icon left and right will now change the frequency by smaller amounts, giving more fine control. Or, you can press the Filter Edit button in the bottom row and enter the exact frequency in the pop-up keyboard. Again, do not be tempted to use the real keyboard.

Green shapes and boxes in the graphical work area refer to crossovers, and blue refers to the EQ filters.



Click on the high frequency side of the bottom crossover icon to view and edit the high frequency section.

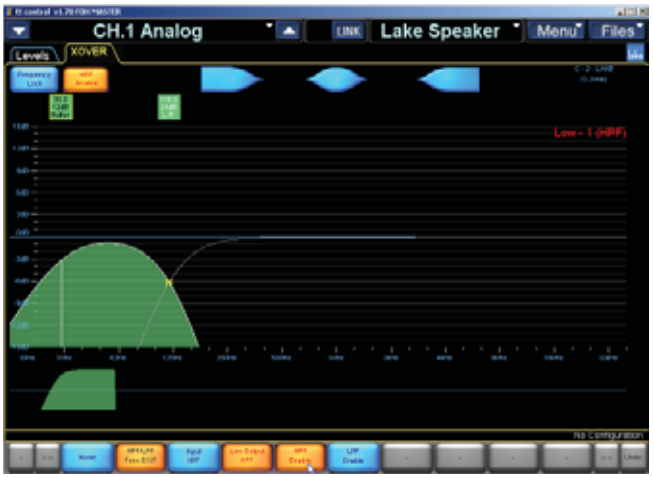
Crossover Functions



Click this button to access the HPF/LFP Filter, EQ Preferences, and Crossover Copy and Paste.

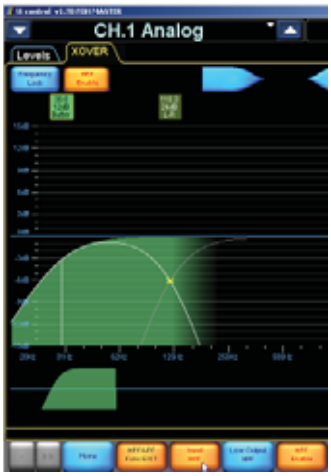
HPF/LPF Functions

Click this button to access the high-pass filter and low-pass filter functions.

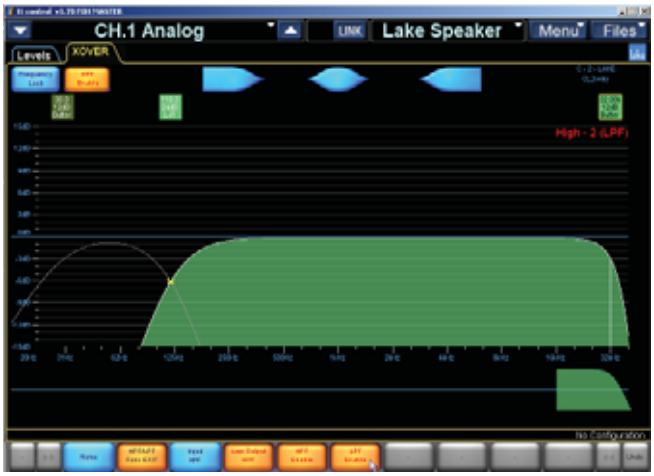


Click the HPF Enable button to insert a high-pass filter into the low-frequency output. Click and drag left and right on the LPF icon in the bottom of the window to change the cutoff frequency of the filter.

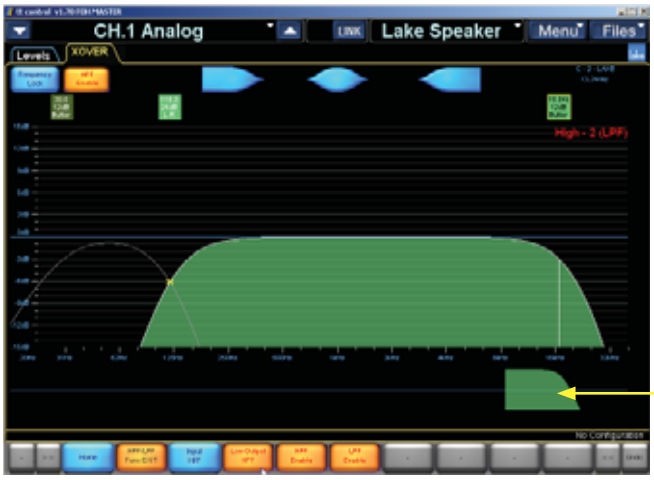
Note: This button is duplicated in the upper-left corner of the edit window.



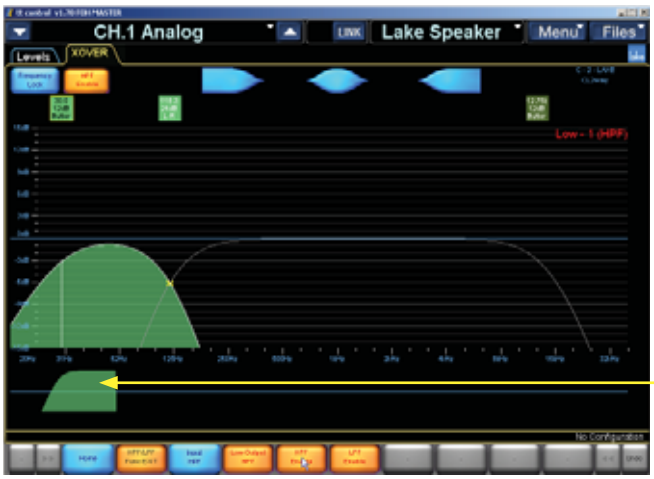
The high-pass filter is applied to the low-frequency output by default, but you can click the Input HPF button to apply the high-pass filter to the input signal, prior to the crossover filter.



Click the LPF Enable button to insert a low-pass filter into the high-frequency output.



Click and drag left and right on the HPF icon in the bottom of the window to change the cutoff frequency of the filter.



Click and drag left and right on the LPF icon in the bottom of the window to change the cutoff frequency of the filter.

Click on HPF/LPF Functions EXIT to return to the Crossover Functions buttons:

Crossover Hide

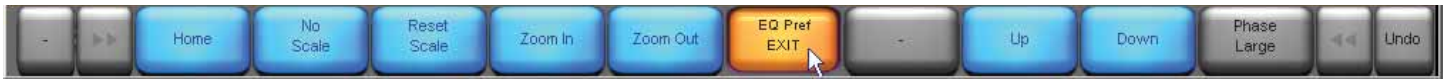
This feature is only available in Designer Mode, so you can hide the crossover display. Only the LEVELS tab will then be visible.

Crossover View Only

This feature is only available in Designer Mode, so you can view the crossover display, but cannot change it.

EQ Preferences

Click this button to access options to adjust the view in the speaker processing edit window:



No Scale: Hides the horizontal lines on the graph.

Reset Scale: Resets the 0 dB line back to center in the graph, and the vertical scale back to ±15 dB.

Zoom In: Magnifies the vertical scale up to ±3 dB. This allows for fine tuning the amplitude settings.

Zoom Out: Diminishes the vertical scale up to ±60 dB. This allows you to adjust the view to see the entire frequency response curve of the crossover.

Up: Shifts the 0 dB line upwards in 3 dB steps on the graph.

Down: Shifts the 0 dB line downwards in 3 dB steps on the graph.

Phase Large: This feature is only available in Designer Mode, where it is always shown enabled. It displays a large phase overlay on top of the crossover curve, and an extra blue icon at the top of the graph.

Click on EQ Pref EXIT to return to the Crossover Functions buttons:

Crossover Copy

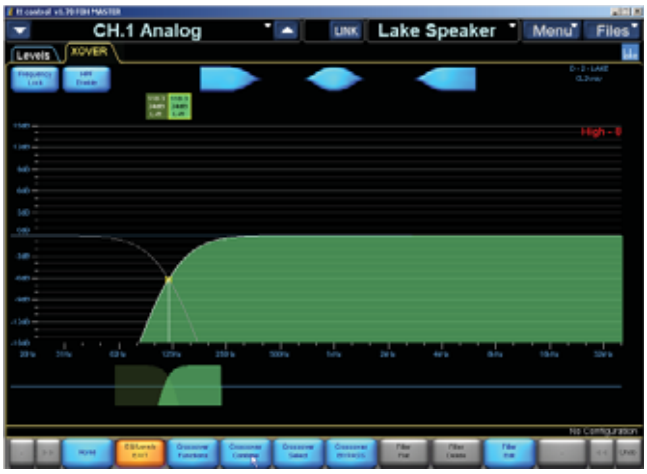
This copies all the current settings for the crossover to the clipboard.

Crossover Paste

This overwrites all the current settings for the crossover with the settings that were last copied to the clipboard. This button is highlighted in blue only when a previous crossover has been copied onto the clipboard.

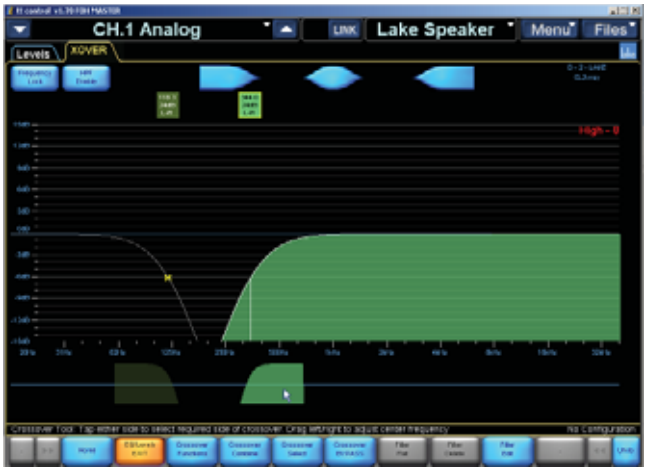
Click on Xover Func EXIT to return to the EQ/Levels buttons:

Crossover Split/Combine



Click the Crossover Split button to unlock the high-frequency output section from the low-frequency output section, and allow you to move them independently.

The small green icon boxes above the crossover point splits into two, showing the different information for each section.



Use the crossover icons at the bottom to move the two sections apart.

Click the Crossover Combine button to recombine the two output sections and lock them at the –3 dB or –6 dB point.

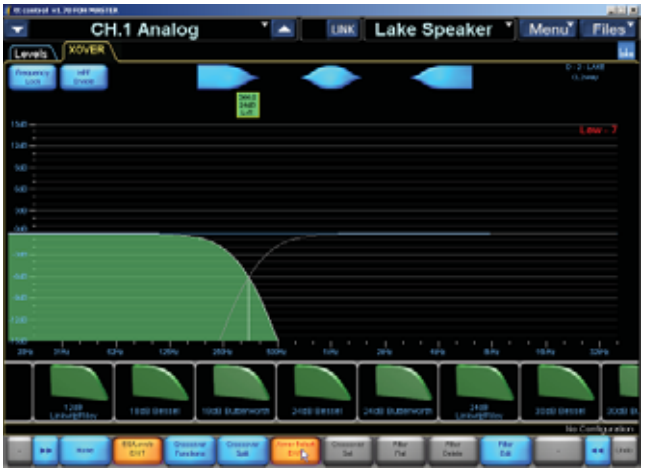
Crossover Select

This button gives you access to a plethora of crossover filters that can be applied to the beginning and/or end of each band. The filters range from 6 dB/octave to 48 dB/octave and the following designs:

Bessel
Butterworth
Linkwitz-Riley

These icons pop up in a scrolling window above the buttons. Use the >> and << buttons to move between the selections.

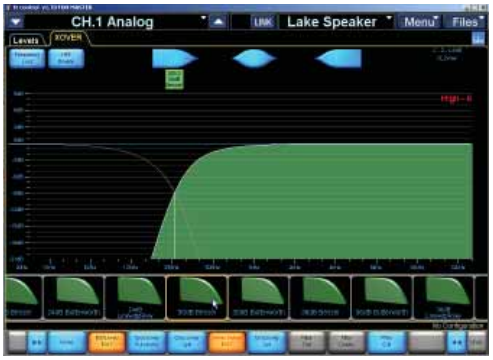
Note: The Linkwitz-Riley filter is only available in 12 dB, 24 dB, 36 dB, and 48 dB versions. The 12 dB and 36 dB Linkwitz-Riley crossovers require a polarity inversion between adjacent crossover pairs in order to maintain a constant magnitude characteristic. For example, when using a 2-way 36 dB Linkwitx-Riley crossover, invert the polarity of the high output channel. When using a multi-way crossover, invert the polarity of every other output channel.



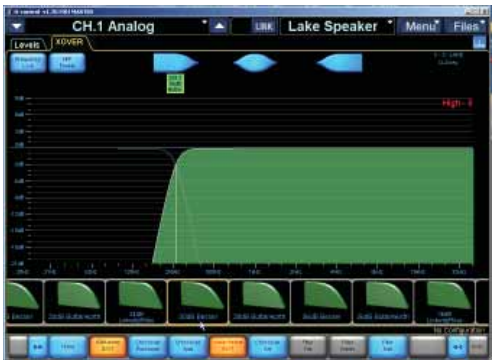
Crossover Set

This button highlights in blue when you select a crossover.

Select the crossover you want to use, and it will be highlighted with a yellow border outline. Click the Crossover Set button and the crossover choice will be applied after a short confirmation.



Here is an example with a 30 dB Bessel filter added.



Here is a 36 dB Butterworth, named after slope of the dress of the pancake-syrup lady.

Here is a 36 dB Butterworth, with the crossover split and moved apart.

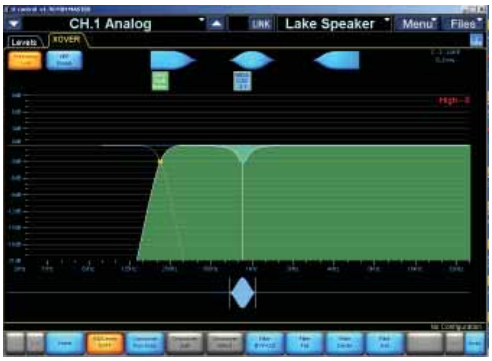
Xover Select EXIT

Click this button to return to the EQ/Levels menu.

Filter Edit

This button allows you to edit the parameters of the selected crossover filter or EQ with a numeric keypad. When you click the button, the editable parameters for the selected filter appear as buttons at the top of the graph, in this case, the frequency. Click the button to bring up the keypad, which you can use to enter a precise value for that parameter.

Equalizer



You may have noticed the shelving and parametric EQ icons at the top of the edit window. You can drag and place them onto the selected crossover section, and adjust them as described in the parametric EQ section, to provide frequency response correction to the crossover outputs. Note the Mesa filter is not available in speaker processor mode.

When an EQ filter is highlighted and added to the crossover, the FILTER buttons are highlighted in blue.

You can select the EQ filters easily by clicking on the blue boxes of information at the top of the screen. Green boxes are the crossover parameters.

If you press FREQUENCY LOCK in the top left corner, the frequency of the selected filter is locked, so you can tweak its level and Q as normal but not change its frequency from within the graph area. You have to move the lower icon at the bottom of the graph.

Filter Bypass: Select a filter and then press this button on and off a few times to judge its effect.

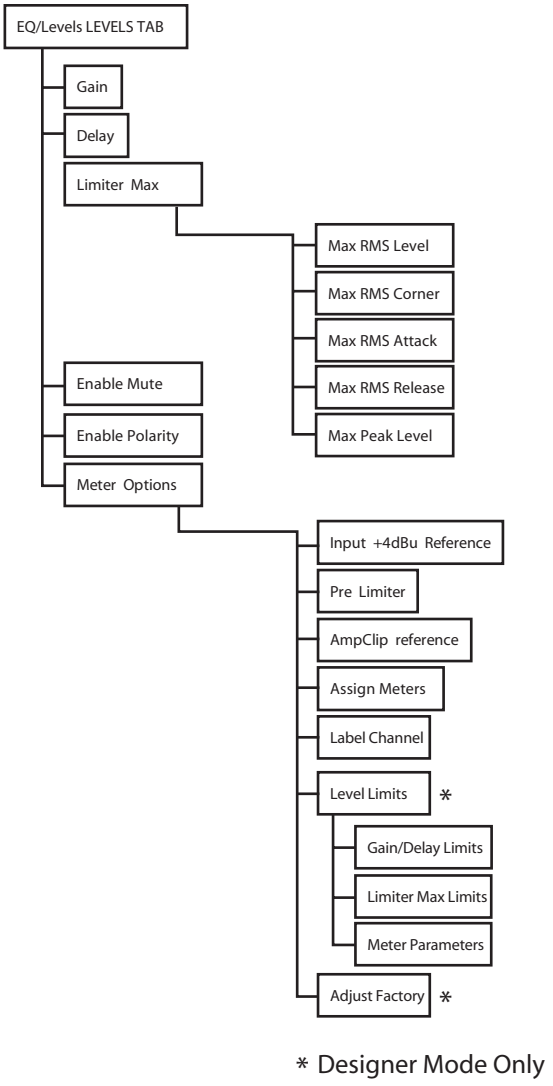
Filter Flat: Press this to set the selected filter to flat (no boost or cut). Unlike bypass, you will have to tweak its level if you want it to go back to how it was.

Filter Delete: Press this to delete the selected filter.

Filter Edit: Brings up an on-screen keypad where the filter parameters can be tweaked.

Levels Tab

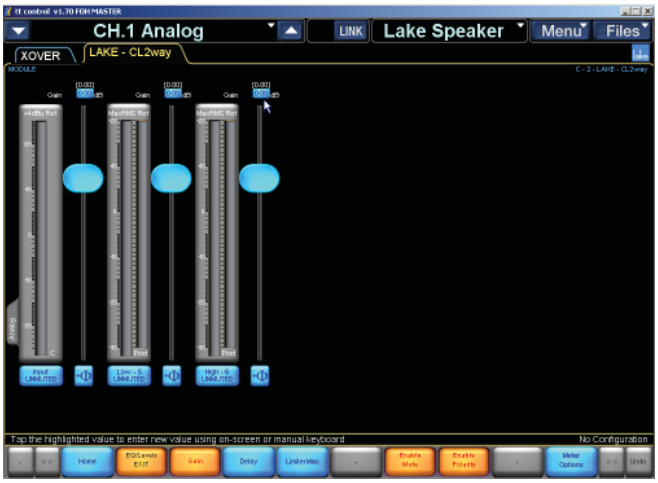
Click the Levels tab at the top of the edit window to view the input and output level controls for the selected crossover. There are a number of other useful options you can adjust in this window as well.



* Designer Mode Only

Gain

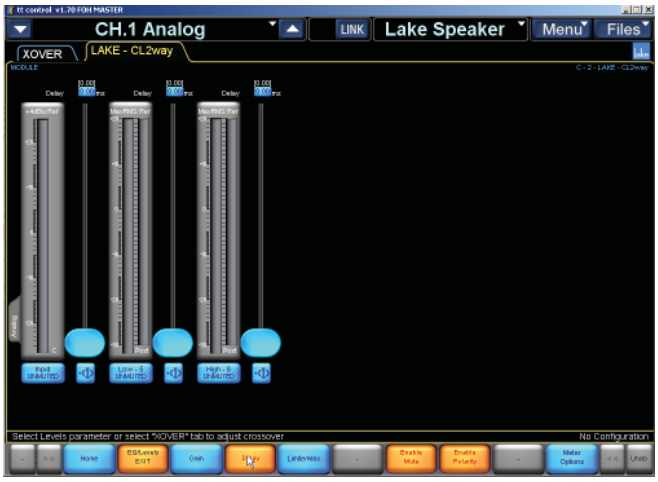
When the Gain button is selected, the faders adjust the input and output gains, and a meter next to each fader indicates the signal level for the specified input or output.



A mute button is located at the bottom of each meter. The Enable Mute button must be selected (orange) for the mute button to work.

A polarity button is located at the bottom of each fader. The Enable Polarity button must be selected (orange) for the mute button to work.

The gain setting, in dB, is indicated at the top of each fader. Click on the numeric button to open the pop-up keypad and enter an exact value for the gain.

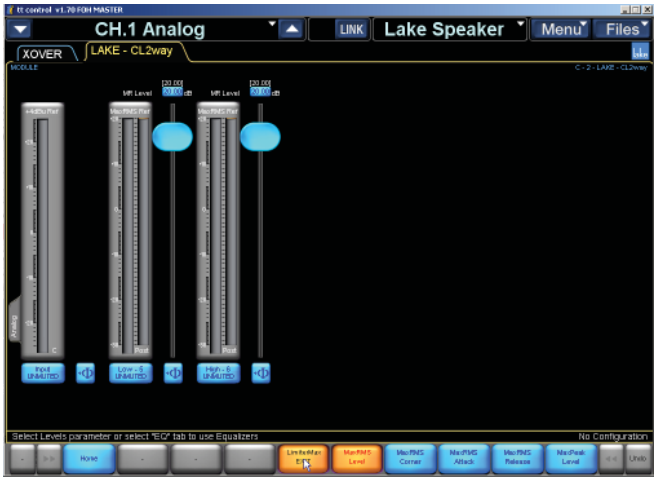


Delay

Click the Delay button to add delay to the input or outputs, up to 100 ms. The sliders change function to delay time, and can be dragged up and down to change the value.

Limiter Max

This button opens up a few options for setting the limiter display and levels:



Max RMS Level

The Limiter Max button displays the true rms limiters for each output. You can adjust the limiter to activate anywhere between -30 dB to +30 dB. This is the maximum rms value allowed at that output.

Max RMS Corner

The limiter corner setting softens the limiting action by gradually introducing limiting before hitting the maximum rms value. If the limiter is set to a maximum rms value of 20 dB, and the limiter corner is set at –6 dB, limiting begins gradually at 14 dB and increases until maximum limiting occurs at 20 dB. This function is similar to an audio compressor's "knee" function.

Limiter Attack and Limiter Release

These buttons allow you to adjust the attack and release time of the true rms limiters. In order to maintain a true rms response, the limiter's attack and release should be set to the same time constant. These functions are similar to an audio compressor's attack and release functions.

Max Peak Level

The Limiter Max button displays the peak limiters for each output. You can adjust the limiter to activate anywhere between -30 dB to +30 dB. This is the maximum peak value allowed at that output.

Press Limiter Max EXIT to return to the main levels tab.

Enable Mute

This button locks and unlocks the mute buttons directly under each meter. The mute buttons are unlocked by default. When the button is orange, the mute buttons are enabled.

Enable Polarity

This button locks and unlocks the polarity buttons directly under each fader. The polarity buttons are locked by default. When the button is orange, the polarity buttons are enabled.

Meter Options

This button provides access to meter viewing options, as well as some system design features.

Input +4 dBu Reference

Enabling this button changes the input meter's reference to +4 dBu. When the button is off, the input meter is referenced to the input clipping level.

Note: This is a global function, and affects all input meters throughout the system.

Pre Limiter

When this button is activated, the meters display the output signals before the limiter (pre), rather than after (post). The pre/post status is identified in the bottom-right corner of each output meter, just above the channel label/mute button.

Note: This is a global function, and affects all the output meters throughout the system.

AmpClip Reference

When the AmpClip Reference button is enabled, the output meter meters display the output signals with respect to the Amp Clip reference level. The Amp Clip level is used as the reference for 0 dB on the meter.

When set correctly, according to the amplifier manufacturer's sensitivity specification, the output meter will indicate the onset of clipping at 0 dB.

Note: This is a global function, and affects all the output meters throughout the system.

Assign Meters

This function is active only when a group levels page is accessed via a group icon. For metering purposes, a module may be assigned to a group. This provides an overview of the Input/Output signals for that group.

To assign a module to a group for metering purposes:

1. Access a group levels page via a group icon.
2. Click Meter Options, then click Assign Meters.

   The module scroll-bar appears displaying modules assigned to the selected group.
3. On the scroll-bar, click the module you wish to use for metering.
4. Click Assign Meters again, then Meter Options Exit to exit this mode.

Label Channel

This allows you to rename an input or an output to one that carries more meaning than the default name assigned by the system. Simply click the label/mute button below the fader and enter the new name using the pop-up keyboard. Click the Label Channel button again to exit the label channel mode.

Note: You must click on the keypad to enter the letters. The computer keyboard won't work.

Level Limits

This button is visible only in Designer Mode and is used for setting minimum and maximum values for all "Levels" attributes. For details refer to the "Designer Mode" section.

Adjust Factory

This button is visible only in Designer Mode, and is used for defining default level settings and level limit. For details refer to the “Designer Mode” section.

Meter Opts EXIT

Click this button to exit meter options mode and return to the EQ/Levels menu.

EQ/Levels EXIT

Click this button to return to the Modules menu.

Label & Lock

Click this button to rename the selected module with a more useful description than the default name (e.g., CL2way).

Label Module

Click the Label Module button to open the pop-up keypad and enter the new name.

Note: You must click on the keypad to enter the letters. The computer keyboard won’t work.

Module and Base Configuration Locking

The following functions are active only in the Designer Mode.

Module Unlocked/Unlock Module

Set Mod Password

Base Unlocked/Unlock Base

Set Base Passwor

For details refer to the “Designer Mode” section.

Label Exit

Click this button to return to the Modules menu.

Remove

This button removes the selected module from the current system configuration. The module appears back in the module scroll bar, indicating it is available for use. Audio is not affected unless the module is assigned to a group that contains settings that will affect the audio of the module.

Note: You can also remove a module by dragging the icon to the module scroll bar when in the modules menu. No warning message is displayed unless the selected module is assigned to a group. In this case, removing the module from the work area de-assigns the module from all groups it is currently assigned to (see Groups).

4.4 Groups

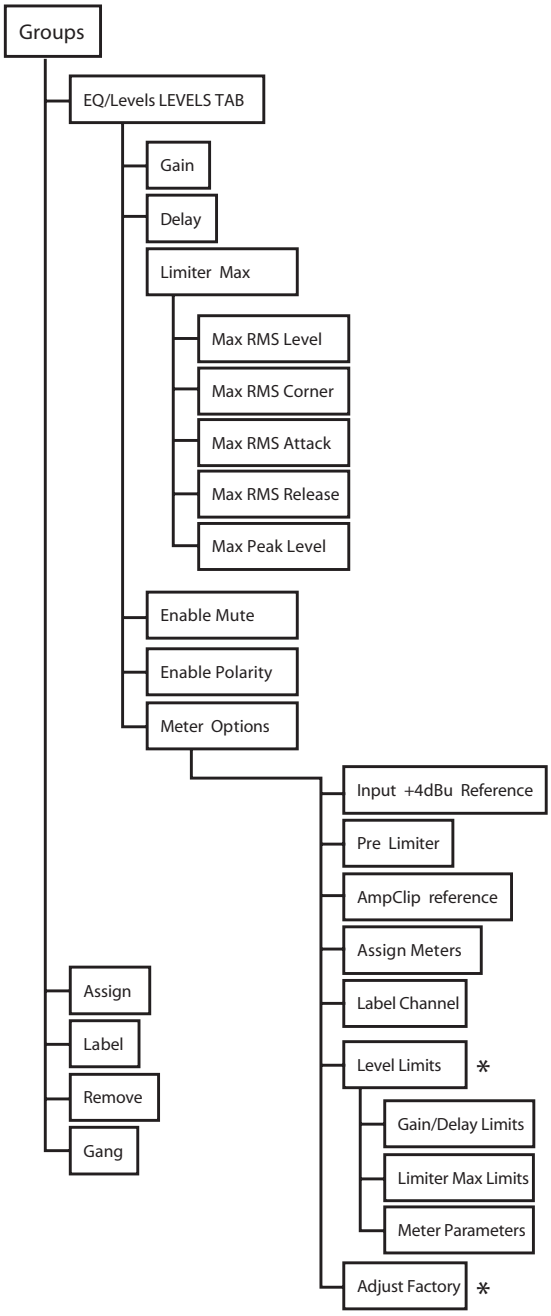
Groups provide powerful control over all modules in a system. Modules can be assigned to multiple groups, and each module can be a member of up to 28 different Groups.

Some of the functions that Groups enable include:

- Master Level, Limiter, and Delay control over an entire system or subsections (e.g. speaker clusters)
- HPF/LPF/Crossover/Auxiliary Output ganging, enabling a change to a crossover, or output specific EQ to be reflected across all modules of the same type within the group
- Simplified control over multiple speakers or zones

Once your speakers are configured, the modules that control the detailed individual response for each speaker can be protected with the access privileges and security provided by Designer Mode.

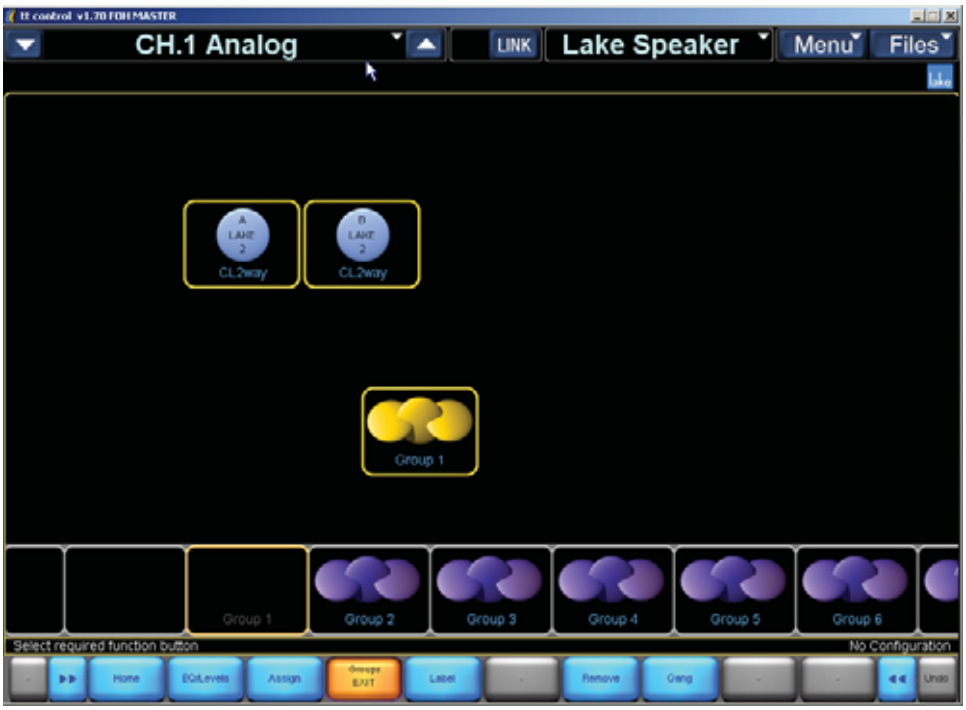
You can use multiple Groups to logically partition a large scale loudspeaker system. Group all modules driving the left loudspeaker array to create a left sub-master. Create Groups for the center cluster, the right loudspeaker array, and any side-fill, down-fill, front-fill and delay systems. Then create a single master group to enable a system-wide interface for EQ and Levels, making instant adjustments to all hardware processors on a distributed network system with a single click of your mouse.



* Designer Mode Only

Adding a Group:

Click the Groups button from the Home menu. The available group icons appear in the scroll bar. Most options in the button bar appear gray and are inactive until a group is moved from the scroll bar to the Main Page.



The Groups scroll bar and menu shows the different status of group icons while on the scroll bar.

Group 1 (empty) is being used in the current system configuration

Group 2 (gray) is assigned to a module that is not a part of the current system configuration

Groups 3 through 28 are available for use and are not currently assigned to any other modules

Click and drag the scroll-bar to the left/right or click the >> or << buttons to access additional group icons.

To add a group to your system configuration:

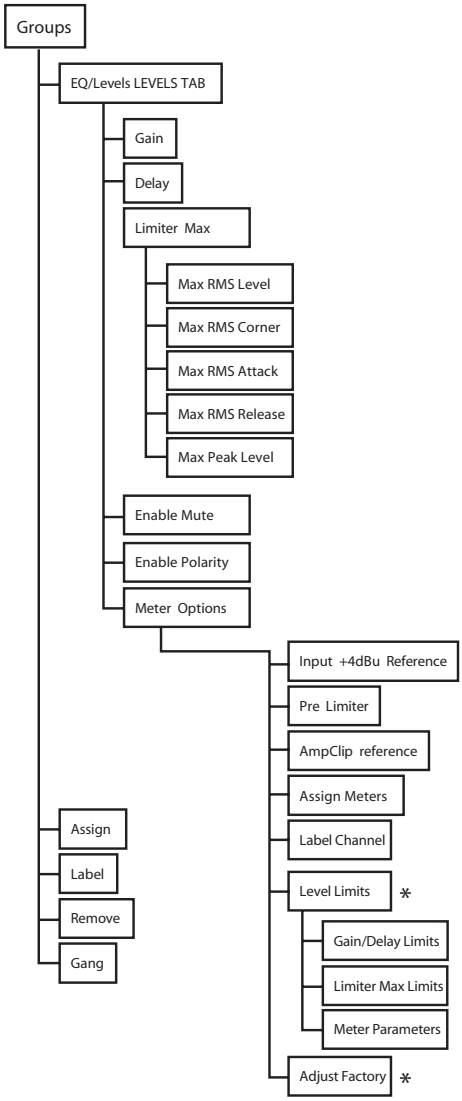
1. Click a group icon on the scroll-bar. The cursor changes to the group icon.
2. Click on the work area to add the group to your system configuration.
3. Follow the instructions below to assign modules to the Group.

EQ/Levels

Click the EQ/Levels button from the Groups menu to display the Levels screens for the selected group. This function is active only when a group is selected in the work-area.

Module level limits are always adhered to when group levels are changed. If one module in the group would exceed its level limit as a result of a change to group data, then the change will not be allowed.

Note: Level limits can be adjusted in Designer Mode.



* Designer Mode Only

Gain

When the Gain button is selected, the faders adjust the input and output gains for the selected group, and a meter next to each fader indicates the signal level for the specified input or output.

A mute button is located at the bottom of each meter.

The gain setting, in dB, is indicated at the top of each fader. Click on the numeric button to open the pop-up keypad and enter an exact value for the gain.

Delay

Click the Delay button to add delay to the input or outputs, up to 100 ms.

Limiter MaxRMS

The Limiter/MaxRMS button displays the true rms limiters for each output. You can adjust the limiter to activate anywhere between -30 dB to 0 dB, where 0 dB is referenced to the lowest MaxRMS value in the group. This is the maximum rms value allowed at that output.

Meter Options

This button provides access to meter viewing options, as well as some system design features.

Input +4 dBu Reference

Enabling this button changes the input meter's reference to +4 dBu. When the button is off, the input meter is referenced to the input clipping level.

Note: This is a global function, and affects all input meters throughout the system.

Pre Limiter

When this button is activated, the meters display the output signals before the limiter (pre), rather than after (post). The pre/post status is identified in the bottom-right corner of each output meter, just above the channel label/mute button.

Note: This is a global function, and affects all the output meters throughout the system.

AmpClip Reference

When the AmpClip Reference button is enabled, the output meter meters display the output signals with respect to the Amp Clip reference level. The Amp Clip level is used as the reference for 0 dB on the meter.

When set correctly, according to the amplifier manufacturer's sensitivity specification, the output meter will indicate the onset of clipping at 0 dB.

Note: This is a global function, and affects all the output meters throughout the system.

Assign Meters

This function is active only when a group levels page is accessed via a group icon. For metering purposes, a module may be assigned to a group. This provides an overview of the Input/Output signals for that group.

To assign a module to a group for metering purposes:

1. Access a group levels page via a group icon.
2. Click Meter Options, then click Assign Meters.

The module scroll-bar appears displaying modules assigned to the selected group.

3. On the scroll-bar, click the module you wish to use for metering.
4. Click Assign Meters again, then Meter Options Exit to exit this mode.

Meter Opts EXIT

Click this button to exit meter options mode and return to the EQ/Levels menu.

EQ/Levels EXIT

Click this button to return to the Groups menu.

Assign

Changes made to the Group EQ/Levels affect only those Modules assigned to that Group. Before assigning Modules to a Group, make sure the required Modules/Groups are in the work-area, and navigate to the Groups menu.

To assign Modules to a Group:

1. Click the Assign button to activate the function.
2. Click a Group icon. The icon illuminates yellow.
3. Click each Module icon you wish to assign to that Group. Each Module icon border illuminates yellow indicating it is assigned to the selected Group.
4. Click the Assign button again to deactivate the function.

Module/Group assignments can be verified by selecting a Group icon in the work-area. The selected Group and associated Module icons will display yellow borders.

Note: Each Module will not allow any Group, or any combination of Groups to exceed its min/max level limits. Warning messages are displayed if a Group assignment would cause the Module to exceed its level limits.

Label

The Group Label is a user-defined value at the bottom of the group icon that is useful for identifying which part of the sound system the Group communicates to (e.g., front of house, monitors, downfill, etc.).

To label a Group:

1. Click the desired Group icon.
2. Click the Label button and enter a Group label.
3. Click OK.

Remove

This function removes the selected Group from the current system configuration.

To remove a Group:

1. Click the Group icon to be removed.
2. Click Remove.
3. Confirm the action by selecting YES in the warning message.

The warning message is displayed only if the Group has Modules assigned to it. The Group icon reappears in the scroll-bar indicating it is not currently used.

Note: You can also remove a Group from the configuration and de-assign its Modules by dragging the Group icon to the scroll-bar.

Gang

Clicking this button activates a scroll bar containing all Modules currently assigned to the selected Group, along with a sub-menu.

Gang Xover/Aux

This function allows the crossovers and auxiliary output channels of the selected module in the scroll bar to be copied to all the other modules in the group. In addition, when Gang Xover/Aux is active on a Group containing Crossover Modules, the crossovers, HPF/LPF and auxiliary channels of all modules in the Group are synchronized; a change made in one Module will be reflected in all Modules of that group.

To gang the crossover of all Modules in a Group:

1. Assign Modules to a Group. All Modules must be of the same crossover type (e.g., Classic 3-Way).
2. From the Groups menu, click Gang.
3. Click the Module on the scroll-bar to select which Module's settings will be transferred to all other Modules in the Group.
4. Click Gang Xover/Aux.
5. Click YES to complete.

Note: Only the Xover/Aux/HPF/LPF/Output EQ data is ganged. Levels data and Input EQ (PEQ/GEQ) are NOT ganged. Please use the Group function for master Levels and EQ control across multiple Modules.

Gang EXIT

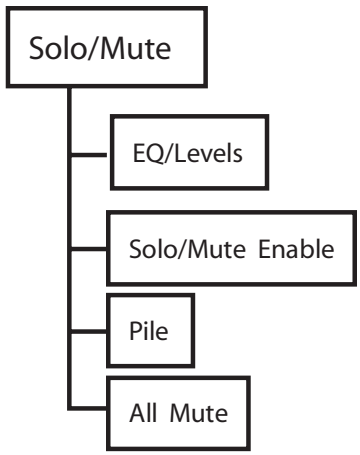
Returns to the Group menu.

Groups EXIT

Returns to the Home menu.

4.5 Solo/Mute

The Solo/Mute menu provides an invaluable tool for the sound engineer during system setup and optimization. The Solo function allows you to choose a specific Module or Group and instantly mute the rest of the system. This allows for rapid measurement and analysis, including lobe studies in large complex systems.



Click the Solo/Mute button from the Home menu to display a sub-menu with Mute and Solo functions for modules and groups.

EQ/Levels

Click the EQ/Levels button from the Solo/Mute menu to display the Parametric EQ, Graphic EQ, XOVER, and Levels screens for the selected Module or Group. This function is active only when a Module or Group icon has been selected in the Solo/Mute work-area.

Note: When Solo/Mute is enabled, EQ/Levels can only be accessed for a Module that is soloed.

The ability to access EQ/Levels from the Solo/Mute button bar is necessary because the Lake Speaker Processor will exit Solo/Mute mode when you navigate to other areas of the user interface. This is a safety feature to ensure that no modules or groups are left accidentally muted.

Additionally, context switching is also disabled to ensure that no Modules or Groups are left accidentally muted.

Solo/Mute Enable

Click the Solo/Mute Enable button to toggle the Solo/Mute functionality On (orange) and Off (blue). While the Solo/Mute function is On, icons are red when muted or green when soloed. All modules default to solo when Solo/Mute is first turned on.

Click a Module or Group icon to keep solo active on that Module (or all Modules in the selected Group) and mute all other Modules in the system. Click the same icon again to un-mute all Modules.

Pile

The Pile function allows for multiple Modules/Groups to be soloed at the same time.

1. Click the Solo/Mute Enable button from the Solo/Mute menu. The button illuminates orange.
2. Click the Pile button. The button illuminates orange.
3. Click a Module/Group icon to solo.
4. Repeat Step 3 for other Modules/Groups to solo.
5. Click Solo/Mute Enable to exit from this function.

All Mute

To mute all Modules in a system:

1. Click Solo/Mute Enable from the Solo/Mute menu. The button illuminates orange.
2. Click the All Mute button.
3. Click Solo/Mute Enable or Solo/Mute Exit to resume normal status.

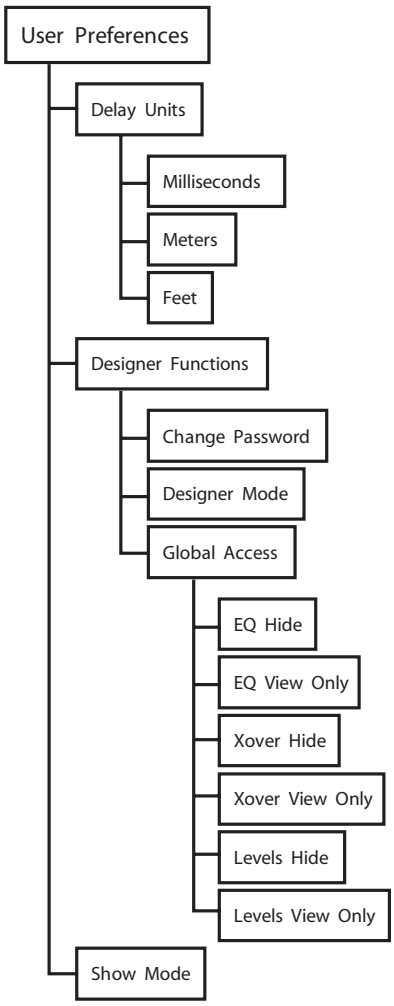
Solo/Mute EXIT

Returns to the Home menu.

4.6 User Preferences

User Preferences provides a number of functions for customizing the LP48 speaker processor to suit your particular application requirements.

Click the User Preferences button from the Home menu to display a sub-menu containing functions and various additional menus as described below. User Preferences functions change settings system-wide.



Delay Units

The units used for setting Delay levels defaults to milliseconds.

This menu provides the option for values to be entered and viewed in feet and meters. Click the relevant button to change to your required default setting.

Delay calculations in meters and in feet are performed with the speed of sound being 343.6 meters per second (1127.3 feet per second). This is the speed of sound as calculated for an ambient temperature of 20º Celsius (68º Fahrenheit). The speed of sound also depends on how fast you are playing.

Designer Functions

Designer Functions provide a gateway to Designer Mode, an advanced mode of the LP48 that provides the engineer with the ability to secure various aspects of the user interface.

Change Password

The Change Password function is active only when Designer Mode is On. It allows a system designer to password-protect access to Designer Mode.

Designer Mode

Click the Designer Mode button to toggle Designer Mode On (orange) and Off (blue). With Designer Mode On, the user can access and adjust additional functions throughout the system including:

- Global and Individual Overlay access security settings
- Crossover and HPF/LPF access security settings
- All Pass Filters
- Factory settings and Level Limits

When Designer Mode is active, the text “Designer Mode” is displayed on the status bar of the LP48 edit screen.

Note: For more information on Designer Mode, refer to Designer Mode.

Global Access

The Global Access function is active only when Designer Mode is On. It allows a system designer to hide or set to view only entire sections of the system. More detail is provided in the Designer Mode reference chapter.

Designer Func EXIT

Returns to the User Preferences menu.

Show Mode

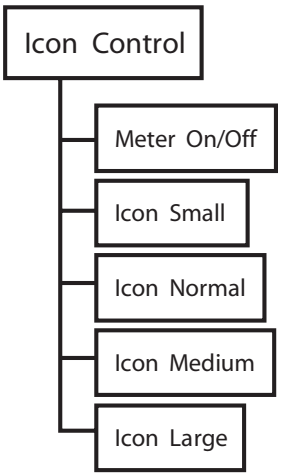
Click the Show Mode button to toggle Show Mode On (orange) and Off (blue). Show Mode should be activated during a show to prevent accidental changes.

When Show Mode is On:

- Channel Mute and Polarity buttons are disabled on all Levels screens.
- Input Mixer and Input Mute controls are disabled.
- All changes to Levels are restricted to fine adjustments.
- All Xover screens become view only.
- All Home level menu options are disabled except User Preferences and Network.

4.7 Icon Control

The Icon Control menu allows you to configure the size of icons displayed on in the work area, and can also change icons to show input and output meters. You can configure Pages to provide an overview of all modules on the network, providing a system monitoring interface including both level and limiting activity.

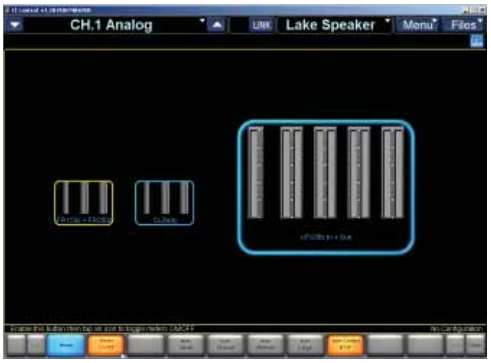


Meters On/Off

This feature is active for Modules when a Module icon is selected, and for Groups. The icon below displays input levels, output levels, limiting, clip warnings, and the module label.

To toggle meters on and off:

1. Click Icon Control from the Home menu.
2. Click Meters On/Off. The button illuminates orange.
3. Click the Module/Group icon to toggle between the Meters On/Off.
4. Click Meters On/Off again to exit this mode.



Icon Small/Normal/Medium/Large

The Icon Small, Icon Normal, Icon Medium, and Icon Large buttons described below are active only when a Module or Group icon is selected from the main work-area and the Meters On/Off mode is not selected (i.e., Meters On/Off button is blue).

Click the icon size buttons to change the size of the selected Module or Group icon. The example below shows the various sizes of icons that are available.

Icon Control EXIT

Returns to the Home menu.

5. Introduction to Designer Mode

The LP48 Loudspeaker Processor software provides two modes of operation: User and Designer Modes. This chapter describes the Designer Mode.

Some important functions that Designer Mode activates include:

1. Global Access Security
2. Individual Overlay/Screen Access Security
3. Level Limits
4. Factory Levels (Adjust Factory Mode)
5. Password Protection of Modules and Base Configurations
6. All Pass Filters

This chapter provides detailed descriptions of these functions. An example system design illustrates the utility of Designer Mode functions. A quick reference guide provides a high-level overview of Designer Mode functions.

Security Levels

Designer Mode provides three levels of password-protected security that can be applied to a system configuration.

Global

At the global level, a simple selection makes system-wide changes that affect what can be seen or adjusted in User Mode. A system designer can choose to hide any combination of EQ overlays, crossover tabs, levels, and meters. These items can also be set to View Only, allowing a User Mode operator to view, but not change certain information.

Note: Global settings are saved in the system configuration file.

Module

Individual EQ overlays and crossover tabs can be hidden or set to View Only. Additional settings normally invisible in User Mode can also be adjusted and hidden at the module level.

At the module level, changes are specific to individual Modules and Groups. Discrete password protection can be applied to Modules, providing an additional level of security.

Base Configuration

Base Configuration is the lowest level of Module security, enabling the system designer to define an underlying base EQ curve and crossover settings along with factory levels and level limits. A system designer can restrict what can be seen or adjusted and provide optional password protection to the underlying settings.

Note: The LP48 Loudspeaker Processor software is not shipped with base configuration files. These can be created if required using default module files.

Designer Mode

The functions available in Designer Mode can be used with or without password protection. By default, the Designer Mode password is empty, allowing unprotected access to Designer Mode in a new installation of the LP48 Loudspeaker Controller software.

To access Designer Mode:

1. From Home, click User Preferences.
2. Click Designer Functions.
3. Click Designer Mode.

Additional buttons on the button-bar become active, providing functions specific to Designer Mode.

When Designer Mode is active, the text 'Designer Mode' appears above the toolbar.

Password Protection of Designer Mode

Each software installation has one Designer Mode password. This password is stored on the host computer and is relevant for any system configuration.

To password-protect Designer Mode:

1. Click the Change Password button.
2. Enter a password and click OK.
3. Confirm the password and click OK.

It is important that you record the Designer Mode password in a safe place. Once the password is set, it will always be required to enter Designer Mode.

Note: If the Designer Mode password is forgotten, please contact us for details on password retrieval.

Simple Designer Mode System Security

If multiple levels of security are not required for your LP48 Loudspeaker Controller installation, exiting Designer Mode activates all security features described in this chapter without needing to lock or password-protect individual modules or base configuration files.

Designing and Protecting an LP48 Loudspeaker Processor System

This section discusses how to use Designer Mode to protect your system by developing an example system. The example includes detailed instructions to define a base configuration, lock individual module level settings, and enforce global security.

System Setup for Designer Mode Tutorial

Follow the steps below to prepare for the tutorial.

Access Designer Mode:

1. From Home, click User Preferences.
2. Click Designer Functions.
3. Click the Designer Mode button and enter your Designer Mode password if prompted. (If the Designer Mode button is orange, you are already logged in to Designer Mode.)
4. Click Home to return to the main menu.
5. Place the Modules of a factory-preset processor in the work area.

Save the system:

1. Click Home then System Store/Recall.
2. Navigate to, or create a folder in which to store the file.
3. Click New Store, enter the filename as Designer Mode Tutorial, and click OK.

Your system configuration is now ready for the following tutorials.

Designer Mode Security

Security for the Base Configuration

A base configuration file contains EQ, levels, crossover, HPF/LPF information for a particular speaker type. A base configuration file can be used to create a standard starting point for a particular make and model of speaker. This can then be used in a variety of system configurations and fine-tuned using module and group settings.

The base password is saved with the base configuration file, and is stored when loaded into the processor. This prevents access to certain data stored in the base configuration file, even if you are in Designer Mode. Using a base password allows hiding of your custom settings from any user of the LP48 Loudspeaker Controller system.

Note: The base configuration file hides EQ curves, crossovers or HPF/LPF and converts Group and Module levels to hidden 'Factory' values. The use of base configuration files is recommended only for experienced LP48 users who require this additional level of security and functionality. Module files provide additional functionality to base configuration files and can be used instead of base configuration files in most circumstances.

Crossover and Output EQ

All information in the Xover screen (Lake Contour) or HPF/LPF screen (Mesa EQ) is stored in the base configuration file, including crossover frequencies, crossover type (e.g., Bessel, Butterworth, or Linkwitz/Riley) along with any output-specific EQ, HPF/LPF settings, and crossover access status. All data in the Xover screen can be adjusted for each Module, unless the designer has applied security to the base configuration file.

A base configuration file cannot be loaded into a Module running a different DSP program. For example, a 2-way base configuration file cannot be loaded into a Module that is currently running a 3-way Module program; a 2-way Module program must be loaded first.

Levels

With the exception of Limiter Attack, Release and Limiter Corners, current Module and Group levels are combined and stored as factory levels when a base configuration file is saved. The factory levels can be viewed and adjusted in Designer Mode after activating the Adjust Factory option in the Levels/Meter Options menu.

Level Limits, also stored with a base configuration file, can be viewed and adjusted from Levels/Meter Options > Levels Limits.

Base Configuration Tutorial

This tutorial illustrates important features of base configuration files, using loudspeaker modules as the example.

Adjust Levels and Level Limits:

1. Navigate to the Gain levels page of Module A.
2. Adjust the Output 2 gain to –9 dB.
3. Click the Delay button and increase Output 3 delay to 6.00 ms.
4. Click Meter Options, then click Level Limits.
5. Select Gain/Delay Limits.
6. Click the Max Delay value highlighted in blue for the Input channel. This is located on the left of the screen, 2nd from bottom and should initially read 1800.00.
7. Enter 0 (zero) and click OK.

Setting a maximum value identical to the minimum value removes the fader when in User Mode, or when the base configuration file or module is locked.

Adjust Crossover Settings:

1. Click the XOVER tab (top-left) and select XOVER.
2. With the first output (low frequency) selected, click Crossover Select.
3. Select 36 dB Butterworth from the scroll bar.
4. Click Crossover Set then click YES to the warning message.
5. Click HPF Enable located at the top-left of the screen.
6. Click Xover Functions from the button-bar then click Crossover View Only.

This locks the crossover screen when in User Mode, or when the base configuration file or module is locked.

Add EQ:

1. Click the low-shelf filter icon at the top of the screen and drag it to the work area. Add the low-shelf filter around 80 Hz, with 3 dB of gain
2. Click Home.

Lock the base configuration:

1. Click Modules then click Module A to select it.
2. Click Label & Lock. The options are displayed.
3. Click Set Base Password, type demo, and click OK.
4. Type demo again to confirm, and click OK to message.

5. Click Base Unlocked.

This button changes to read Unlock Base and the password is now required to unlock this base configuration file. The Xover page will be displayed as View Only until it is unlocked. Any user, even a system designer, cannot adjust the settings unless they first unlock the base configuration file.

Level Limits and Adjust Factory options are locked out in both User and Designer Modes, and the input delay fader is removed when in User Mode.

Save the new base configuration file:

1. Click Label Exit then Module Store/Recall.
2. Click Base Configuration.
3. Navigate to the desired folder location or create a new folder.
4. Click New Store, enter “Base Config Test” and click OK.

The file is stored in the folder you navigated to prior to storing and the screen appears.

In addition to locking the crossover, HPF/LPF, etc., of a base configuration file, the entire file can be protected from accidental deletion.

Secure the base configuration file:

1. Click File Utilities.
2. Select the Base Config Test base configuration file from the scroll-bar.
3. Click Read Only. Notice that the Delete button is now disabled for this file.

Note: For further protection, base configuration File Utilities are disabled when in User Mode.

Load the new base configuration file into Module B of the processor:

1. Click File Util EXIT, then click the Module B icon to select it.
2. Select the Base Config Test file on the scroll-bar and click Recall.
3. Click Yes to the warning message.

All data changed during this tutorial is loaded into Module B, and because the base configuration was locked, some data is now invisible or protected. Navigate to the various sections of Module B to verify the changes made to the base configuration file.

To Check...	Navigate to...
Factory Levels are locked.	EQ/Levels -> Levels Tab -> Meter Options – the Adjust Factory button normally present is not available until the base configuration file is unlocked.
Level Limits are locked.	EQ/Levels -> Levels Tab -> Meter Options – the Level Limits button normally present is not available until the Base Configuration file is unlocked.
The Input Delay Max Level Limit is set to zero.	In Designer Mode, attempt to move the input delay fader, found under EQ/Levels ->Delay (In User Mode, this delay fader is removed)
Crossover HPF/LPF settings have been transferred and are set to view only.	EQ/Levels -> XOVER Tab

Summary

Base configuration files enable low-level security allowing control over individual aspects of the system. The system designer can fine tune a speaker configuration or system EQ and protect the settings by hiding or setting them as view only.

The base configuration files can be saved and loaded into other Modules in the same system, or in different systems. This provides a starting point from which the Module can be fine-tuned by another designer or user.

Security for Module Functions

All settings that can be protected for a base configuration can also be protected for a Module. Base configuration settings are overwritten by Module settings, unless access has been restricted in the base configuration file, in which case certain parameters will not be accessible. The base configuration file itself will not be affected by any changes made to a Module after the file is loaded.

The Module password is saved with the single module file, and is stored when loaded into a processor. This prevents access to certain data stored in the Module file, even if you are in Designer Mode in the LP48 Loudspeaker Controller. Using a Module password allows hiding of your custom settings from any user of the LP48.

The following features are available for both base configuration and module files:

- Adjust and lock factory levels
- Adjust and lock access to crossover settings
- Hide unused channels
- Adjust level limits
- Disable individual level faders or entire level sections from other designers (using Level Limits and Module Lock)

Module Tutorial

The tutorial below illustrates Designer Mode's most important features about Modules. It also includes some functions that relate to both base configuration and Module files, such as Level Limits. Use the same Designer Mode Tutorial system configuration from earlier in this chapter. Ensure you are in Designer Mode and that the base configuration is unlocked before proceeding.

Remove an unused channel meter and fader:

1. Click the Levels tab.
2. Click Meter Options then Label Channel.
3. Click the mute/label button of Output 3.
4. Type "unused" and click OK.

Change the polarity of an output:

1. From the Meter Options menu, click Enable Polarity.
2. Click the Polarity Button (to the right of the mute button).
3. Click Enable Polarity again to exit this mode.

Lock the Module:

1. Click Home, then click Modules.
2. Click the icon for Module A to select it.
3. Click Label & Lock, then Set Mod Password.
4. Type demo, then click OK.
5. Type demo again to confirm, click OK, then click OK to the message.
6. Click Module Unlocked.

Save the new Module file:

1. Click Label Exit, then Module Store/Recall.
2. Navigate to the required folder.
3. Click New Store, type demo module, and click OK.

Load the saved file into Module B:

1. Click the icon for Module B.
2. Click the demo module file on the scroll-bar.
3. Click Recall, then Yes to the warning messages.

Exit Designer Mode to see the effect of the changes on Module A (Module B is already locked following loading the Module file). All updates made previously also remain.

Summary

Modules can store and secure all data that a base configuration can.

Security for Group Functions

Groups are used to connect and adjust multiple Modules. Groups cannot be locked or password-protected. Global Access settings also apply to Groups. Security for levels and crossovers is not relevant for Groups.

A Group may contain various Modules, each with different security settings. However, Group levels are restricted by the level limits set for the Modules within the Group. For example, if changing a Group level causes one or more Modules to exceed their min/ max level limits, the action is not permitted.

Group Tutorial

Add a Group to the configuration:

1. From Home, click Groups.
2. Click Group 1 from the Groups scroll-bar and click again in the work area.
3. Click Assign, then click the Module A and Module B icons.
4. Click Assign again to exit the group assignment mode.

Summary

Crossovers are not relevant to Groups, and all security for levels is controlled via individual modules.

Security for Global Access Functions

Global Access settings affect all Modules and Groups within a system configuration.

To enable Global Access Mode:

1. From Home, click User Preferences.
2. Click Designer Functions (ensure Designer Mode is active – orange).
3. Click Global Access.

The following options are available:

Function	Result when in normal User Mode
EQ Hide	Hides all EQ Overlays for all Modules and Groups.
EQ View Only	Protects all EQ Overlays from adjustment for all Modules and Groups.
Crossover Hide	Hides all crossover screens or HPF/LPF screens for all Modules and Groups.
Crossover View Only	Protects all crossover screens or HPF/LPF screens from adjustment for all Modules and Groups.
Levels Hide	Hides all levels screens for all Modules and Groups.
Levels View Only	Protects all levels screens from adjustment for all Modules and Groups.

Global Access Tutorial

To hide all crossover, HPF/LPF, and PEQs in a system:

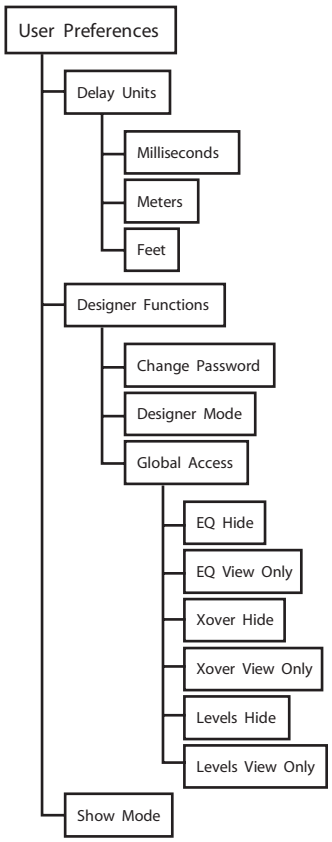
1. From Home, click User Preferences.
2. Click Designer Functions, then click Global Access.
3. Click EQ Hide, the click Xover Hide. Active buttons illuminate orange.

To activate these global settings:

1. Click Glbl Access EXIT.
2. Click Designer Mode. The button becomes blue (inactive/available) in User Mode.
3. Click Designer Func EXIT, then User Pref EXIT.
4. Click on Module 1. The XOVER tab disappears, and only the Levels tab is available.

Summary

The global access functions apply an overall security to a particular system and can be used in addition to the system security settings.



6. Functional Reference Guide

This section provides an overview of the steps required for each Designer Mode process. This can be used as a quick reference for the features described throughout the tutorial based on the procedure or function. This section describes the standard functions using the Levels and Xover screens.

Note: Designer Mode must be active to access the functions described in this section.

Crossover Functions

These functions apply to base configurations and Modules only.

To set Individual Xover screens to Hide or View only:

1. Navigate to the XOVER screen.
2. Click Crossover Functions.
3. Click Crossover View Only or Crossover Hide. The selected status is illuminated orange.

To set all Xover screens to Hide or View only:

This affects all crossover screens in the current system configuration.

1. From Home click User Preferences.
2. Click Designer Functions, then click Global Access.
3. Click Xover Hide or Xover View Only. The selected status is illuminated orange.

All Pass Filters

In Designer Mode only, the All Pass filter icon is available on the Xover screens. The Phase Large button is highlighted in orange in the Crossover Functions\EQ Preferences menu.

The filter allows 1st and 2nd Order (default) phase adjustment with variable bandwidth and frequency.

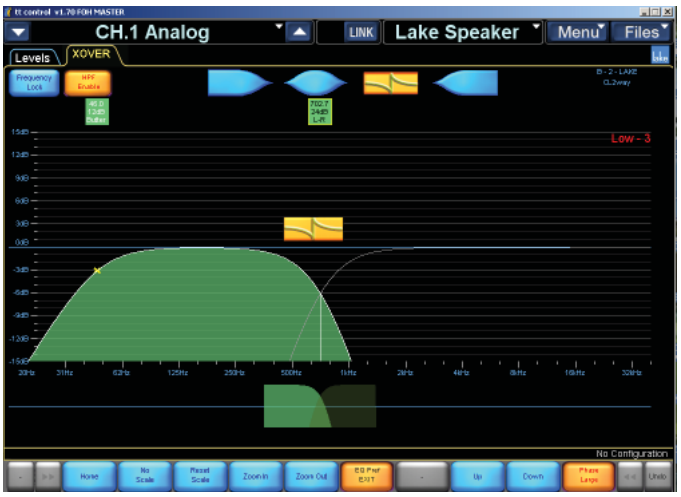
To add an All Pass filter to an output:

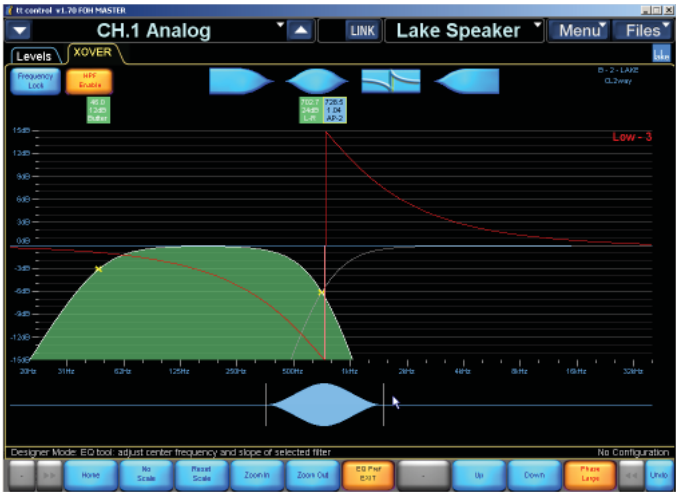
Select the Xover tab.

Click the Phase filter icon.

Click on the main part of the screen to add the filter.

Adjust the Order (1 or 2), Frequency, and Bandwidth as required. Use the Filter Edit button to edit the order. or adjust the frequency or bandwith using the blue filter icon at the bottom.





Adjust Factory

A button labeled Adjust Factory is available on the Meter Options menu from the levels page of a Module. When this button is active (orange) a label reading [ADJUST FACTORY] appears at the top of each levels page to confirm this special mode of operation. Factory levels are not applicable for Groups.

In this mode a different set of 'factory' levels are displayed for each level type. These are displayed using the same faders and meters used for the adjustment of user levels; the fader positions and gain values change to indicate the factory level instead of the user level.

Note: The sum of Factory, User, and Group levels are combined to provide the actual total. Factory levels are not included in the total level value, which is shown in brackets in user mode.

The table below shows which level types are available in Adjust Factory mode:

Level Type	Available?
Gain	Yes
Delay	Yes
Limiter Max RMS	Yes
Limiter Corner	No
Limiter Attack and Release	No
Input Headroom	No
Output Amp Clip Level	Yes

To set factory levels:

1. From the Levels page, click Meter Options, then Adjust Factory.
2. Click Meter Opts EXIT and navigate to the relevant Levels page.
3. Enter the values required using the fader or keyboard entry.
4. Click Meter Options, then Adjust Factory to exit this mode.

Note: Factory levels can be hidden from the end user by locking the Module or exiting from Designer Mode.

Restrict Level Adjustments

Level Limits are used to restrict minimum and maximum levels for a Module. Although a Group's Level Limits cannot be set, they adhere to the limits of all modules that are assigned to it. For example, if changing a Group level causes any of its modules to exceed their allowable range, the action is not permitted.

1. Navigate to module Levels, click Meter Options, then click Level Limits.
2. Click Gain/Delay Limits or Limiter/Soft Clamp Limits.
3. Click the relevant min/max level. Each channel is displayed in the same order as the channel faders (from left to right: Input, Output 1, Output 2 etc.).
4. Enter the limit and click OK.

Disable Level Adjustments

If the minimum and maximum level limits are identical for a particular channel and level type, that control is effectively disabled. The fader for the associated channel and level type is not visible in User Mode or when the Module is locked.

Set both the minimum and maximum values of a particular level output and level type to the same value. To verify that the fader has been removed and the level fixed, either lock the Module or base configuration, or switch to User Mode.

Disable Access to a Levels Function

To disable access to an entire level function (e.g., Delay), set identical minimum and maximum delay level limits for every channel for the Module. Set the minimum and maximum values of all inputs/outputs for a particular level type to the same value.

The figure above shows an example of identical min/max settings for delay. These settings disable the levels function on the EQ/Levels menu in User Mode or when the module or base configuration is locked.

Disable/Enable Unused Output Channels

To completely hide a levels meter/fader, set the name of fader to unused:

1. Navigate to the relevant Module Levels page and click Meter Options.
2. Click Label Channel, then click the mute/label button of the relevant channel.
3. Type unused and click OK.

The meter and fader will be invisible on the Levels screen. To enable the channel again, change the channel label to something other than unused.

Set Hide/View Only Status for All Levels Screens

This function affects all Levels screens in the current system configuration.

1. From Home, click User Preferences.
2. Click Global Access, then click Levels Hide or Levels View Only.

The selected button is illuminated orange.

Additional Designer Mode Functions

Switch between Designer and User Mode.

To access Designer Mode:

1. From Home, click User Preferences, then click Designer Mode.
2. Enter the password (if set) and click OK.

To switch to User Mode:

1. From Home, click User Preferences. The Designer Mode button is orange when Designer Mode is active.
2. Click Designer Mode. The Designer Mode button is now blue; Designer Mode is inactive.

To Lock and Password-Protect a Module or Base Configuration

Locking a module or base configuration enables access security (such as setting Crossover screens to view only and disabling level functions). The Label & Lock function activates security in both User and Designer modes, allowing certain settings to be protected from other system designers.

1. From the Modules menu, click a module icon to select it.
2. Click Label & Lock.
3. Click Set Password (for module) or Set Base Password (for Base).
4. Enter a password and click OK.
5. Confirm password, click OK, then click OK to the warning message.
6. Click Module Unlocked or Base Unlocked to lock the relevant settings.

To Unlock a Locked Module or Base Configuration

1. From the Modules menu, click a Module icon to select it.
2. Click Label & Lock.
3. Click Unlock Module or Unlock Base.
4. Enter the associated password and click OK.

Creating Descriptions/Assigning Graphics for Module Files

Text files (.txt) and bitmap files (.bmp) with the same filename as a module file can be placed in the data/user/modules directory of your Lake Controller installation. All the Mackie and EAW modules use this method to provide

When a text file is present with the same filename, the controller displays the text when the module file is selected on the Module Store/Recall scroll-bar. When a bitmap file is present, the graphic is displayed in place of the default module icon.

Follow the steps below to create and view module file descriptions:

1. Store a module with the filename example at the module root directory.
2. Minimize the controller and using a text editor (e.g. Microsoft Notepad) create a text file containing the text: 'Example description for Example Module.'
3. Store this text file in the directory:
   Program Files\TT24\Data\User\Modules directory as example.txt
4. Maximize the Lake Controller and navigate to Module Store/Recall.
5. Select the Module File example from the scrollbar.

The text you entered appears above the Module as shown in the figure below.

Module descriptions can be modified by editing the text file, or deleted by deleting the text file.

Note: Folder descriptions can also be created by placing a text file with the same name as the folder in the same directory as the folder.

Note: If bitmap files are used to replace the standard module graphics, these must be 24-Bit Windows format bitmaps of 80x80 pixels maximum dimension. Module name text will overwrite the bottom portion of this 80x80 bitmap.

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