Lexicon

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960L

Delays & Additional 96kHz Reverbs Package

Owner's Manual Addendum

DOCUMENTATION CONVENTIONS

This document is an addendum to the 960L Owner's Manual. It contains information about the optional Delays & Additional 96kHz Package available for Software Versions 3.0 and above. Refer to the owner's manual for general safety, installation, and operating instructions.

The following symbols are used in this document:

Note: Calls attention to information that is essential to highlight.

Hint: Calls attention to helpful operating instructions.

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ABOUT THE DELAYS & ADDITIONAL 96KHZ REVERBS PACKAGE

Delays & Additional 96kHz Reverbs is an optional package available for 960L Software Versions 3.0 and above. It includes new delay and additional 96kHz reverb algorithms.

NEW STEREO DELAY ALGORITHMS

Eight banks contain new programs that use the stereo delay algorithms listed below. Another bank contains 480L delay programs.

Stereo Delay Algorithms

- Simple Delays
- Dual Delays
- Random Delays
- Stereo Frame Delay

Additional 96kHz Reverb Algorithms

- Chamber
- Plate

NEW MULTI-CHANNEL DELAY ALGORITHMS

Five banks contain new programs that use the multi-channel delay algorithms listed below.

Multi-Channel Delay Algorithms

- Simple Surround Delays
- Random Surround Delays
- Surround Frame Delays
- Octal Frame Delays*
- Octal Zone Delays*

** 8 x 8 DSP configuration only*

New Multi-Channel Reverb Algorithms

- Surround Chamber
- Surround Plate

ENABLING INSTRUCTIONS

Before the Delays & Additional 96kHz Reverbs Package can be enabled, Software Version 3.0 or above must be installed on the 960L.

To confirm that Software Version 3.0 or above is installed on the 960L:

1. Press the CONTROL button on the LARC2 to enter Control Mode.

2. Press the SYSTEM▼ soft button to access the System Information screen shown in Figure 1 at the top of the next page. The 960L REV field indicates the software version that is installed on the 960L, and the LARC2 REV field indicates the software version that is installed on the LARC2. (Both fields are circled in Figure 1 at the top of the next page.)

   If Software Version 3.0 or above is installed, proceed to the instructions that begin on the next page. If not, Software Version 3.0 or above must be installed before the Delays & Additional 96kHz Reverbs Package can be enabled. Refer to the appropriate software installation instructions for assistance.

Note the following before proceeding to the instructions on the next page:

- Use the front panel standby button whenever the instructions call for the 960L to be powered on or off. Do not use the rear panel power switch.
- The enabling process requires the 12-digit license key that came with the Delays & Additional 96kHz Reverbs Package. Make sure this key is on hand before beginning.
- The enabling process will take about 5 minutes.

To enable the Delays & Additional 96kHz Reverbs Package:

1. Press the CONTROL button on the LARC2 to enter Control Mode.

Figure 1: System Information Screen

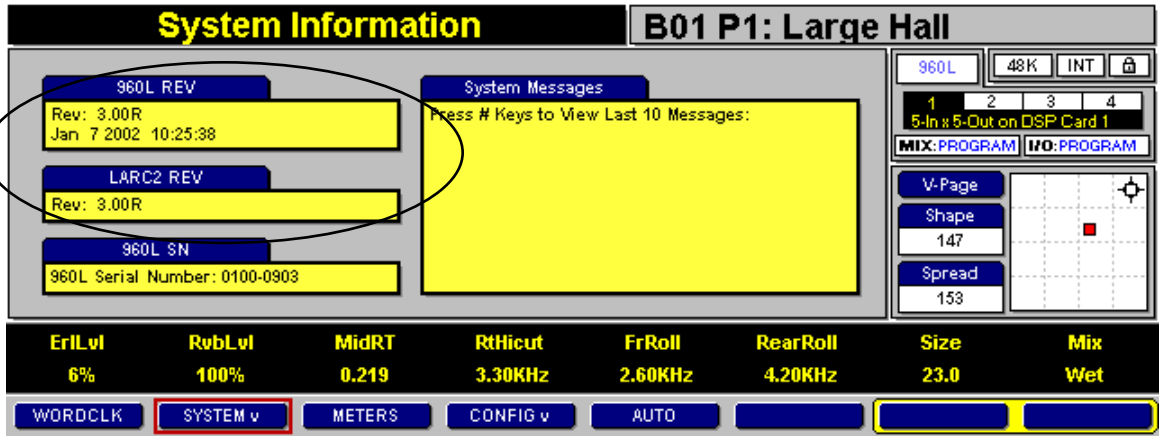
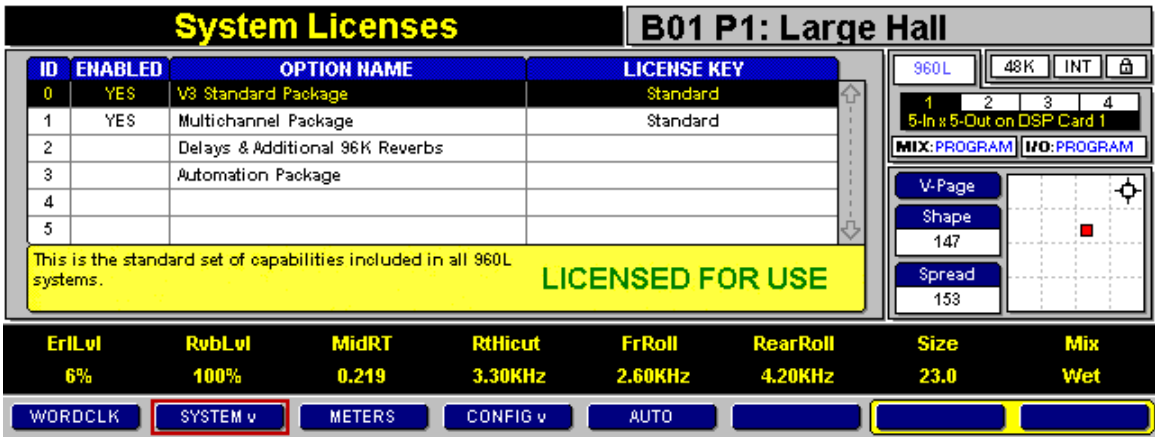
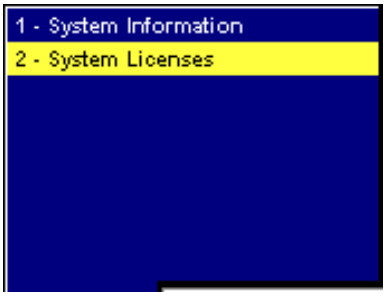


Figure 2: System Licenses Screen



2. Press the SYSTEM▾ soft button twice in succession to access the SYSTEM▾ Menu shown in Figure 3 (below).

Figure 3: SYSTEM▾ Menu

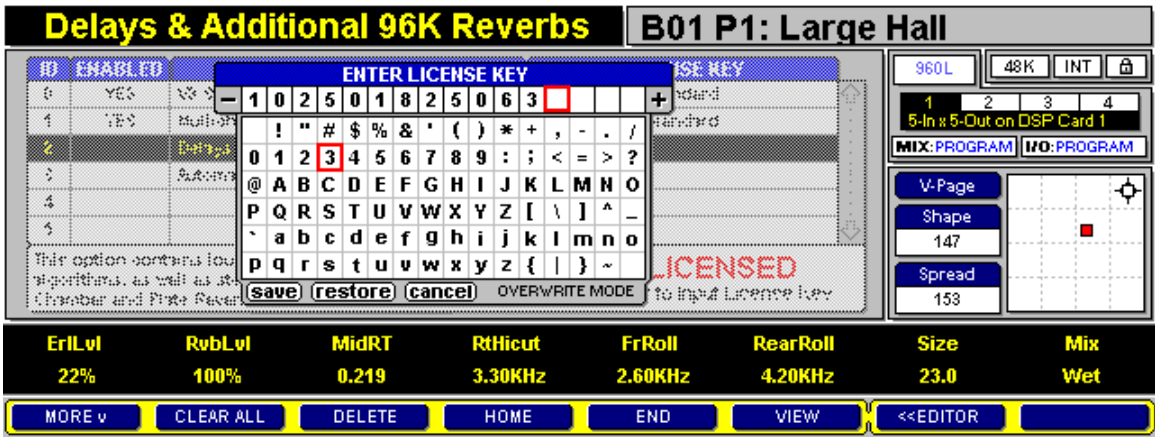


3. Select the System Licenses option to access the System Licenses screen shown in Figure 2 (above).

4. Locate Delays & Additional 96kHz Reverbs in the Option Name field. If a Yes appears to the left in the Enabled field, the Delays & Additional 96kHz Reverbs Package has been enabled. Disregard the remaining instructions, and proceed to page 7 to learn more about this package. If a No appears to the left in the Enabled field, proceed to step 5 (page 6).

. . . Enabling Instructions continues on page 6

Figure 4: License Key Entry Screen



Enabling Instructions *(continued from page 5)*

5. Use the up and down arrow keys on the LARC2 to select the Delays & Additional 96kHz Reverbs Package. Then, press the ENTER button on the LARC2 to access the License Key Entry screen shown in Figure 4 (above).

6. Use the numeric keypad on the LARC2 to enter the 12-digit license key that came with the Delays & Additional 96kHz Reverbs Package. If an incorrect digit is entered, press the – button on the LARC2 to move the cursor back to the appropriate square. Then, enter the correct digit.

7. When all 12 digits have been entered, use the down arrow key on the LARC2 to select the **save** button located at the bottom of the text editor. Then, press the ENTER button on the LARC2 to enable the Delays & Additional 96kHz Reverbs Package.

   The following message will display if a valid license key has been entered: "Delays & Additional 96kHz Reverbs has been Successfully Enabled! When all license keys have been entered, please power cycle the 960L." If this occurs, press the OK soft button that appears at the bottom of the LARC2 display. Then, proceed to step 8.

   An "Invalid package key" message will display in the top-left corner of the LARC2 diplay if an invalid license key has been entered. If this occurs, begin again with step 1 (page 5). If the problem persists, contact Lexicon Customer Service at 781-280-0300.

8. If desired, enter additional license keys at this time. Refer to the documentation enclosed with the license key for specific enabling instructions. If no additional license keys need to be entered, proceed to step 9.

9. When all license keys have been entered, use the front panel standby button to power cycle the 960L.

10. When the 960L powers on, follow steps 1 to 4 (page 5) to confirm that the Delays & Additional 96kHz Reverbs Package has been enabled. If a No appears in the Enabled field for the Delays & Additional 96kHz Reverbs Package, begin again with step 1 (page 5). If the problem persists, contact Lexicon Customer Service at 781-280-0300.

DELAY ALGORITHMS

> ***Note:***
>
> *See the parameter glossary that begins on page 8 for delay algorithm parameter descriptions. See pages 23 to 27 for delay algorithm diagrams.*

SIMPLE DELAYS

Simple Delays are basic delay algorithms that feature one delay line for each input channel. (During 5-channel operation, the center input channel is split between the left and right input channels.) Each delay line has a single output, called a "voice." Each voice has independent delay time (up to 4 seconds), output level, feedback control, filtering, and panning. The feedback path includes diffusion, as well as highpass and lowpass filters. In addition to this basic voice architecture, Simple Delays also feature diffusion control for diffusors in the input and feedback paths.

Simple Delays are available in stereo, quad, and 5-channel DSP configurations.

DUAL DELAYS

Dual Delays are similar to Simple Delays, except Dual Delays feature two delay lines for each input channel. Each delay line has a single output or "voice." Each voice has independent delay time (up to 2 seconds), output level, feedback control, filtering, and panning. The feedback path includes highpass and lowpass filters. In addition to this basic voice architecture, Dual Delays feature parameters that provide expanded diffusion controls.

RANDOM DELAYS

Random Delays provide no-holds-barred control over delays. These algorithms feature one delay line per input channel. (During 5-channel operation, the center channel is split between the left and right channels.) Each delay line has three outputs, called "voices." Each voice has independent delay time (up to 3 seconds, plus an additional second provided by the randomizers described in the next paragraph), output level, feedback control, filtering, and panning. Random Delays have the same diffusion controls as Dual Delays.

In addition to this basic voice architecture, Random Delays feature two randomizers that provide up to one second of additional delay time for each voice. Voices can be assigned to either randomizer, or to no randomizer at all. See the Rand1 and Rand2 parameter descriptions on page 9 for more information.

Random Delays are similar to Simple Delays, but are especially useful for:

- **Multitap Tape Loops**

  Feedback can be used to recirculate delays. Appropriate use of highpass and lowpass filters emulates the bandpass effects of multi-generational tape loops (hiss not included). Feedback diffusion allows emulation of azimuth misalignment – a hallmark of the sound.

- **Early Reflection Modeling**

  Although different in scope from Lexicon Ambience algorithms, Random Delays can be used to place early reflections in stereo or surround fields. The Rand1 and Rand2 parameters, which control randomization, can be used to prevent coloration that might otherwise occur with straight delays.

. . . Random Delays continues on page 8

Random Delays *(continued from page 7)*

- **Doublers**

  A number of techniques can be used to randomize short delays (10 to 50 milliseconds, depending on the material). Randomization produces a variable delay time that can be used to create a convincing doubled voice.

- **Very Strange Sounds**

  When the Wand1, Wand2 parameters are set to long times, randomization can be used to generate unpredictable delays.

Random Delays are available in stereo, quad, and 5-channel DSP configurations.

DELAY ALGORITHM PARAMETERS

Two types of parameters are available for delay algorithms: standard and delay voice parameters. Standard parameters are global, affecting the entire algorithm. Delay voice parameters affect individual voices. Both types are included in the glossary that begins below.

Standard Parameters (Global)

Ctr In

Adjusts the level of the center input channel in 5-channel DSP configurations. (This parameter has no effect in other DSP configurations.) Unless center channel audio is discrete, it is recommended to set the Ctr In parameter 6dB below the InLvl parameter.

DelMST

Controls the length of all delays. Adjustments made to the DelMST parameter will not take effect until the Hold parameter is set to OFF.

Diffus

Controls the amount of diffusion in the input and feedback paths. At a minimum, the diffusor has no effect. As diffusion increases, the signal becomes "smeared."

FbHipass

Controls the highpass filter in the feedback path.

FbkDiff

Provides control of diffusion in the feedback path. This parameter can be used to create the effect of looping echoes fading into the background, which is useful when modeling tape loops and other effects.

FbkMST

For Simple Delays, controls the level of all feedbacks. For Dual Delays, controls the level of all feedbacks and crossfeeds. Adjustments made to the FbkMST parameter will not take effect until the Hold parameter is set to OFF.

FbRoll

Controls the lowpass filter in the feedback path.

Fgrain

Controls grain for the diffusor in the feedback path. See the Grain parameter description at the top of the next page.

FsLvl

Sends the front left and right input channels to the surround left and right input channels, allowing up to 12 voices to exist for a stereo signal. This is useful when only one stereo input signal is present.

Grain

Provides extended control of diffusion in the input path. A low setting produces a tight smear pattern (perhaps only discernable with percussion). A large setting produces a more widespread pattern.

Hold

Provides infinite hold for audio in delays. Each delay loops at its delay length. When Hold is set to ON, no input signal is admitted into the delay. Voices can still be panned, and filters and gains can still be adjusted. Output adjustments made to the DelMST or Fbk parameters will not take effect until the Hold parameter is set to OFF.

For Random Delays, the Hold parameter functions as described above, except that only Voice 1 is recirculated. The output from all voices is still available.

InLvl

Controls input level. Normally, this parameter can be set to 0dB. But high levels of diffusion or strong low-frequency content may require a setting of -6dB or lower.

LvlMST

Controls the level of all delays.

Mix

Controls the wet-to-dry mix ratio.

Mod1, Mod2

Modify Randomizer 1 and Randomizer 2. The setting can be a threshold or a rate, depending on the Rand1, Rand2 parameter setting.

Rand1, Rand2

Select the randomizer type for Randomizer 1 and Randomizer 2. When set to **SloRand**, one delay voice is changed at a time at the rate specified by the Mod1, Mod2 parameter. When set to **FstRand**, all delay voices are changed at once at the rate specified by the Mod1, Mod2 parameter. When set to **Gate**, wander time is added to all delay voices whenever input level rises above the threshold specified by the Mod1, Mod2 parameter. When set to **–Gate**, wander time is added to all delay voices whenever input level falls below the threshold specified by the Mod1, Mod2 parameter.

V1Rand, V2Rand, V3Rand

Designate the randomizer that affects all Voice 1s (ones), Voice 2s (twos), and Voice 3s (threes). Voices can be assigned to Randomizer 1, Randomizer 2, or no randomizer at all.

Wand1, Wand2

Specify the amount of delay added to voices affected by Randomizer 1 and Randomizer 2. When the Rand1, Rand2 parameter is set to a gate mode, the full amount is added. When the Rand1, Rand2 parameter is set to a rand mode, the wander amount ranges between 0 and the full randomizer amount.

Delay Voice Parameters

Note:

Each delay voice has a name: L1 indicates Left 1, R2 indicates Right 2, and so on.

Delay Time

Adjusts delay length. See the Fine Adjusting Parameter Settings section that begins on page 12 for instructions to fine adjust the Delay Time setting. Be aware of the DelMST parameter setting when making adjustments to the Delay Time parameter.

Fbk

Adjusts voice feedback from positive unity gain to negative unity gain, although full-scale will probably cause accumulation or saturation, which creates distortion. A non-zero setting will feed the delay back into the input. Voices can feed back even when the Gain parameter is set to off. Be aware of the FbkMST parameter setting when adjusting the Fbk parameter. Adjustments made to the Fbk parameter will not take effect until the Hold parameter is set to OFF.

Hint:

To set the Fbk parameter to off, press and hold the FINE ADJ button on the LARC2 and lightly touch the appropriate fader.

Filt

Controls the filter of each voice. In the center position, the filter is flat. Below the center position, the filter becomes lowpass, removing more high-frequency content as the fader is lowered. Above the center position, the filter becomes highpass, removing more low-frequency content as the filter is raised. This parameter only affects voice output, not feedback.

Hint:

To set the Filt parameter to flat, press and hold the FINE ADJ button on the LARC2 and lightly touch the appropriate fader.

Gain

Adjusts voice gain from positive unity gain to negative unity gain. Be aware of the LvlMST parameter setting when making adjustments to the Gain parameter.

Hint:

To set the Gain parameter to off, press and hold the FINE ADJ button on the LARC2 and lightly touch the appropriate fader.

Pan

Adjusts voice pan. Press the JOYSTICK button on the LARC2 to engage the panner for the current voice.

Xfd

Adjusts the crossfeed control from positive unity gain to negative unity gain, injecting the delay signal into the opposite delay line. The Xfd parameter can be used to create ping-ponging effects or density buildup. Voices can be crossfed even when the Gain parameter is set to off. Be aware of the FbkMST parameter setting when adjusting the Xfd parameter.

For Surround Delays, the Xfd parameter functions as described above, except for the target. The crossfed data is set to the opposite corner (i.e. front left is sent to surround right and surround left is sent to front right.

Hint:

To set the Xfd parameter to off, press and hold the FINE ADJ button on the LARC2 and lightly touch the appropriate fader.

DELAY TOOLS

ZONE DELAYS

Zone Delays are primarily intended for use in live-sound applications. These algorithms provide up to eight independent delay channels for speaker groups. These delays can be controlled by absolute value (milliseconds) or distance (feet or meters). When controlled by distance, Temp and Hum parameters are available to control temperature and humidity. No additional signal processing occurs inside the algorithm.

Zone Delays require 8 x 8 DSP configuration.

FRAME DELAYS

Frame Delays are primarily intended for use in video post-production applications. These algorithms allow delays in audio to maintain audio-video synchronization.

Frame Delays are available in stereo, quad, 5-channel, and 8 x 8 DSP configurations.

DELAY TOOL PARAMETERS

FrDly

Indicates the number of frames by which all channels are delayed.

Hum

Sets to relative humidity of venue.

Temp

Sets to temperature of venue.

TrimL, TrimR

Trims the front left and front right input channels by an additional delay. Settings include 0, 1/4, 2/4, and 3/4 inch frames.

Type

Indicates frame format: 24, 25, 29.97, or 30 fps (frames-per-second).

Units

Controls the mode of display. When set to English, distances are shown in feet and temperatures are shown in Fahrenheit. When set to Metric, distances are shown in meters and temperatures are shown in Celsius. When set to Time, distances are shown in absolute time; the Temp and Hum parameters are not affected. When the setting is changed, the unit automatically converts English values to metric values and vice versa.

Zone1, Zone2

Controls delay time for the signal passing from Input 1 to Output 1 or Input 2 to Output 2.

USER INTERFACE ENHANCEMENTS

The 960L user interface features several enhancements designed to support the new delay algorithms. To simplify algorithm editing, parameters have been grouped into two separate edit screens: the Delay Voices Edit Screen shown in Figure 5 (page 12) and the Standard Algorithm Edit Screen shown in Figure 6 (page 13).

DELAY VOICES EDIT SCREEN

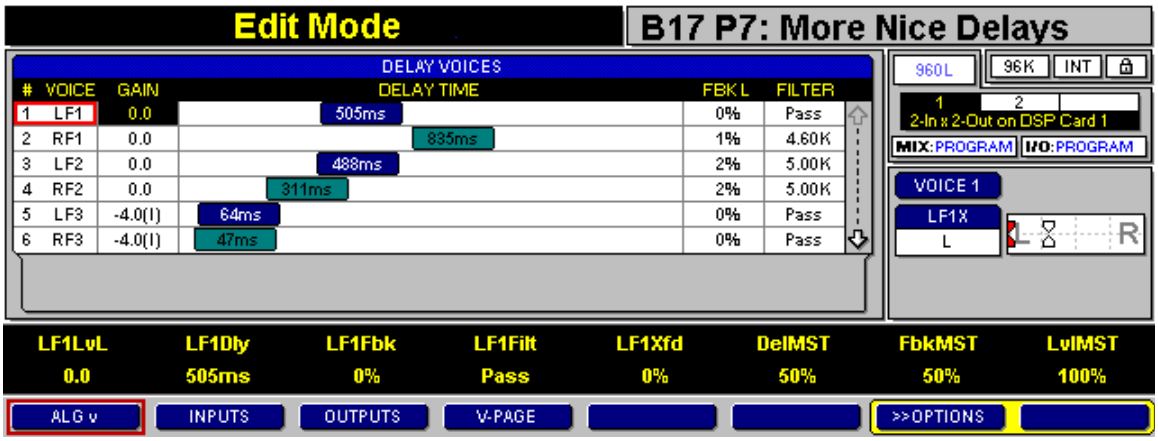
The Delay Voices Edit screen shown in Figure 5 (page 12) contains all parameters associated with the delay voices of the currently running delay algorithm.

To access the Delay Voices Edit screen:

1. Press the EDIT button on the LARC2 whenever a delay program is loaded.

. . . Delay Voices Edit Screen continues on page 12

Figure 5: Delay Voices Edit Screen



Delay Voices Edit Screen

(continued from page 11)

To edit a delay voice parameter:

1. Press the EDIT button on the LARC2 when the desired delay program is loaded to access the Delay Voices Edit screen.
2. Use the numeric keypad or arrow keys on the LARC2 to select the desired delay voice. Parameters for the selected delay voice will automatically be assigned to the faders.
3. Use the appropriate fader to adjust the desired parameter.

Delay Voice Panning

To use the joystick to position a delay voice:

1. Press the EDIT button on the LARC2 when the desired delay program is loaded to access the Delay Voices Edit screen.
2. Use the numeric keypad or arrow keys on the LARC2 to select the desired delay voice. The panner for that delay voice will automatically be assigned to the joystick on the LARC2.
3. Press the JOYSTICK button on the LARC2 to lock the joystick.
4. Move the joystick to position the selected delay voice.

Fine Adjusting Parameter Settings

To make fine adjustments to delay voice parameter settings, use one of the following methods:

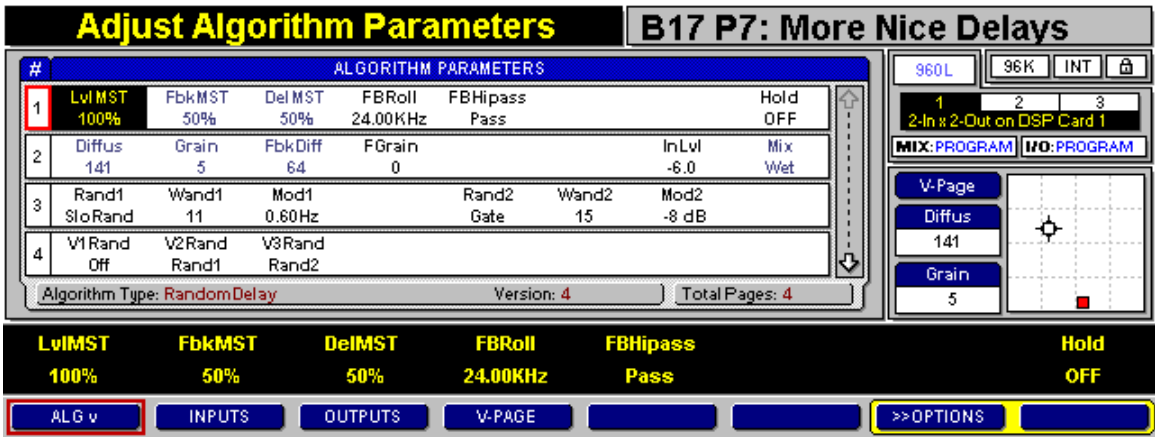
Method A:

1. Press the EDIT button on the LARC2 when the desired delay program is loaded to access the Delay Voices Edit screen.
2. Use the numeric keypad or arrow keys on the LARC2 to select the desired delay voice. Parameters for the selected delay voice will automatically be assigned to the faders.
3. Touch the appropriate fader to select the desired parameter.
4. Use the + (increase) and – (decrease) buttons on the LARC2 to fine adjust the setting of the selected parameter.

Note:

Method A cannot be used to fine adjust the FbkMST or LvlMST parameter settings.

Figure 6: Standard Algorithm Edit Screen



Method B:

1. Press the EDIT button on the LARC2 when the desired delay program is loaded to access the Delay Voices Edit screen.
2. Use the numeric keypad or arrow keys on the LARC2 to select the desired delay voice. Parameters for the selected delay voice will automatically be assigned to the faders.
3. Press the FINE ADJ button on the LARC2. The button will light to indicate that fine adjust is enabled, and the faders will automatically center.
4. Use the appropriate fader to fine adjust the setting of the desired parameter.
5. When finished, press the FINE ADJ button on the LARC2 again. The light on the button will disappear to indicate that fine adjust has been disabled, and the faders will automatically return to their set positions.

STANDARD ALGORITHM EDIT SCREEN

While the Delay Voices Edit screen contains parameters associated with delay voices, the Standard Algorithm Edit screen shown in Figure 6 (above) contains all other parameters associated with the currently running delay algorithm.

To toggle between the Standard Algorithm Edit and Delay Voices Edit screens, use one of the following methods:

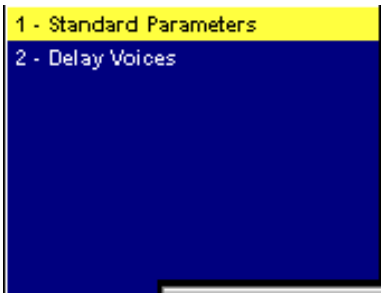
Method A:

1. When the 960L is in Algorithm Edit Mode, press the EDIT button on the LARC2 to toggle between the Standard Algorithm Edit and Delay Voices Edit screens.

Method B:

1. Press the ALG▼ soft button to access the Parameter Selection Menu shown in Figure 7 (below).
2. Select the desired option – Standard Parameters accesses the Standard Algorithm Edit screen shown in Figure 6 (above), and Delay Voices accesses the Delay Voices Edit screen shown in Figure 5 (page 12).

Figure 7: Parameter Selection Menu



NEW DELAY & 96KHZ REVERB PROGRAM BANKS

KEY
B . . . . . Stands as an abbreviation for stereo program banks, i.e. "B13" stands for Stereo Bank 13.
P . . . . . Stands as an abbreviation for program, i.e. "P1" stands for Program 1.
*B . . . . . Stands as an abbreviation for surround program banks, i.e. "*B13" stands for Surround Bank 13.

STEREO BANK 13: SIMPLE DELAYS

Simple delays

Simple Delay **B13 P1**

Simple Delay Algorithm

A simple delay. DelMST sets overall delay time. The first four faders set individual left and right taps.

Filtered Delay **B13 P2**

Simple Delay Algorithm

A filtered delay. Joystick changes voice filters.

Slap Echo **B13 P3**

Simple Delay Algorithm

A slap echo. DelMST sets overall delay time.

Inverse Delay **B13 P4**

Simple Delay Algorithm

A delay with inverse feedback. Makes interesting constructive and destructive cancellations.

Feedback **B13 P5**

Simple Delay Algorithm

A good amount of feedback. The first four faders control individual delay tap.

Boing! **B13 P6**

Simple Delay Algorithm

A short delay with lots of feedback. Like a spring reverb.

7 1/2 Tape Delay **B13 P7**

Simple Delay Algorithm

A 7 1/2 IPS tape delay. DelMST sets overall delay time.

3 1/4 Tape Delay **B13 P8**

Simple Delay Algorithm

A 3 1/4 IPS tape delay. DelMST sets overall delay time.

Infinite Hold **B13 P9**

Simple Delay Algorithm

DelMST sets hold repeat time.

Cross-Panned Delay **B13 P0**

Simple Delay Algorithm

Cross-panned outputs with mild feedback.

STEREO BANK 14: SPLIT DELAYS

Separate mono delays; left and right sides act as independent delays

Basic Short/Long **B14 P1**

Simple Delay Algorithm

A simple delay. Left is short, Right is long. The faders set individual left and right taps.

Basic Long/Tape **B14 P2**

Simple Delay Algorithm

A simple delay. Left side is a long delay with mild feedback. Right side is a tape-type delay.

1/2 : 1/3 **B14 P3**

Dual Delay Algorithm

Left side is 1/2 note feel. Right side is 1/3 note or triplet feel. Use DelMST to match desired tempo. Both sides will adjust.

Dark/Feedback **B14 P4**

Dual Delay Algorithm

Left side is a bright delay that quickly gets very dark. Right side is a nice delay with feedback.

Doubler/Basic **B14 P5**

Random Delay Algorithm

Left side is a doubler for thickening up drums, percussion, guitars, etc. Right side is a basic delay controlled by the first three faders.

1/2 : 1/4 **B14 P6**

Dual Delay Algorithm

Left side is 1/2 note feel. Right side is 1/4 note feel. Use DelMST to match desired tempo. Both sides will adjust.

Stutter/Feedback **B14 P7**

Dual Delay Algorithm

Left side is a quick stutter-type delay. Right side is a nice delay with feedback.

Bright/Dark **B14 P8**

Simple Delay Algorithm

Left side is a bright delay; right side is a dark delay.

Basic/Whispers **B14 P9**

Dual Delay Algorithm

Left side is a basic delay with controls on the faders using LF1 parameters. Right side is a whispery, airy delay.

Bathroom/Rumble **B14 P0**

Simple Delay Algorithm

Left side is a quick delay with lots of reflections. Right side is a dark, rumbling delay.

STEREO BANK 15: DUAL DELAYS

Dual delays, many rhythmic programs

1/2 Delay **B15 P1**

Dual Delay Algorithm

1/2 note feel. DelMST sets overall delay time.

1/4 Delay **B15 P2**

Dual Delay Algorithm

1/4 note feel. DelMST sets overall delay time.

1/3 Delay **B15 P3**

Dual Delay Algorithm

Triple or 1/3 note feel. DelMST sets overall delay time.

Delay Wash **B15 P4**

Dual Delay Algorithm

A blanket of delays.

Swingin' Delay **B15 P5**

Dual Delay Algorithm

A jazzy-feeling delay.

Into the Middle **B15 P6**

Dual Delay Algorithm

Taps that start on the outside and move in.

Galloping Delays **B15 P7**

Dual Delay Algorithm

Delays that sound like a large, galloping, solid-hoofed, herbivorous mammal.

Back and Forth **B15 P8**

Dual Delay Algorithm

Taps going left to right, and right to left.

. . . Stereo Bank 15: Dual Delays continues on page 16

Stereo Bank 15: Dual Delays

(continued from page 15)

Long Whispers **B15 P9**

Dual Delay Algorithm

A great subtle effect for vocals and other types of ear candy. DelMST sets delay length.

Dual Doubler **B15 P0**

Dual Delay Algorithm

A doubler with some inverse feedback and gain to create interesting sounds.

STEREO BANK 16: DELAY SPACES

The reflections of space, without the reverb

Golden Room **B16 P1**

Random Delay Algorithm

Dimensions of a room using the Golden Mean.

Tight Room **B16 P2**

Random Delay Algorithm

Tight room. Great for percussion and drums.

Slap Room **B16 P3**

Random Delay Algorithm

Ambience with a strong slap. DelMST adjusts slap time. Feedback adds liveness.

Alternate Room **B16 P4**

Random Delay Algorithm

Nice ambience for drums, voiceovers, etc. DelMST adjusts room size. FbkMST adds some liveness.

Downtown **B16 P5**

Random Delay Algorithm

Reflections off glass and brick buildings. Joystick adjusts building type. DelMST adjusts distance to buildings.

Sewer Pipe **B16 P6**

Dual Delay Algorithm

DelMST adjusts the diameter and FbkMST adjusts the length of the pipe.

Ballpark **B16 P7**

Random Delay Algorithm

Next up, up, up . . . Number 42, two, two . . . The local ballpark. DelMST adjusts size.

Hall w/o Verb **B16 P8**

Random Delay Algorithm

A hall's reflections without the reverb.

AM Radio **B16 P9**

Dual Delay Algorithm

Look Ma! . . . I'm on the radio!

Random Room **B16 P0**

Random Delay Algorithm

A good-sounding room with constantly changing reflections.

STEREO BANK 17: RANDOM DELAYS

Delays that use randomizers to create interesting effects

Nice Delays **B17 P1**

Random Delay Algorithm

Works great on anything that needs subtle, nice delays - vocals, acoustic guitar, piano, etc.

Going Inside **B17 P2**

Random Delay Algorithm

Nice early delays. Later reflections have significantly more filtering.

Smart Delay **B17 P3**

Random Delay Algorithm

Low and high input signals respond differently in this delay. When input signals are higher, longer delays come out more. Mods set crossover point.

Vocal Delay **B17 P4**

Random Delay Algorithm

A short, doubling-type delay with longer delays coming in as the level decreases (i.e. soft singing=longer delays, louder=just the doubler).

Complex Looper **B17 P5**

Random Delay Algorithm

Randomized loops. Start loop with Hold fader. DelMST sets overall delay time. FbkMST controls complexity.

Rolling Right **B17 P6**

Random Delay Algorithm

Delay taps move from left to right, getting brighter as they travel right.

More Nice Delays **B17 P7**

Random Delay Algorithm

Works great on anything that needs subtle, nice delays - vocals, acoustic guitar, piano, etc.

Bright to Dark **B17 P8**

Simple Delay Algorithm

A simple, short delay that is rolled off and diffused with each feedback pass.

Redshift **B17 P9**

Random Delay Algorithm

A quick shift from right to left, and bright to dark.

Totally Random **B17 P0**

Random Delay Algorithm

A dark, very random delay.

STEREO BANK 18: CRAZY DELAYS

Mildly strange to totally weird stereo delay programs

Smoothing Delay **B18 P1**

Random Delay Algorithm

The delay becomes more diffused with each feedback pass.

Robotix **B18 P2**

Random Delay Algorithm

Turns anything into a robot. The initial ring-mod gets delayed, and the feedback taps spread over time.

Hollow Tubes **B18 P3**

Random Delay Algorithm

Super-fast delay taps with high feedback, split off in their own directions.

Alien Encounter **B18 P4**

Random Delay Algorithm

Another heavy ring-mod based effect. Adjust DelMST time for different sound.

Spastic Delays **B18 P5**

Random Delay Algorithm

About as wild as it gets for stereo delay. Initial delay taps all converge and create a dense atmosphere.

Warm Ping-Pong **B18 P6**

Random Delay Algorithm

Odd delay taps on the right and even delay taps on the left create a ping-pong effect. Diffusion smooths it out.

. . . Stereo Bank 18: Crazy Delays continues on page 18

Stereo Bank 18: Crazy Delays

(continued from page 17)

Random EQ Delay **B18 P7**

Random Delay Algorithm

Random delay taps each have their own EQ signature. Delay taps become more randomized once the signal is over -6dB.

Crystallize **B18 P8**

Random Delay Algorithm

A cool lo-fi sound. FbkMST changes effect level. FbkDiff and Fgrain change effect sound.

The Sizzler **B18 P9**

Simple Delay Algorithm

A delay that sizzles into the background.

Panning Delay **B18 P0**

Dual Delay Algorithm

Sounds like delay taps move back and forth due to cross-feedback setup in this preset.

STEREO BANK 19: 480 DELAYS

True to the original

4-Voice Double **B19 P1**

Random Delay Algorithm

Delay voices are doubled in stereo. When added to a dry signal, it's crisp, wide, and uncluttered.

Double Delay **B19 P2**

Random Delay Algorithm

Two voices produce a double-effect. The other two voices provide a longer delay synced with the double. Cross-panned feedback ices the cake.

4-Bounce Dly **B19 P3**

Random Delay Algorithm

Very clean between left and right channels.

Pitter Patter **B19 P4**

Random Delay Algorithm

Delays are widely spaced with reiterative and cross-panned feedback.

X-Pan Double **B19 P5**

Random Delay Algorithm

Two voices are cross-panned through delays. Great for stereo background voices.

Delay Cave **B19 P6**

Random Delay Algorithm

Need we say more?

Circles **B19 P7**

Random Delay Algorithm

Long delays with cross-panned feedback create a "circular" effect.

There & Back **B19 P8**

Random Delay Algorithm

Delay starts on one channel, slaps to the other, and returns.

Soft Roller **B19 P9**

Random Delay Algorithm

Stereo echo with high-frequency cut.

On and On **B19 P0**

Random Delay Algorithm

Long echoes that pan across center.

STEREO BANK 20: TOOLS

Stereo tools

Frame Delay **B20 P1**

Stereo Frame Delay Algorithm

A stereo frame delay. Trim will adjust delay in 1/4 frame increments.

SURROUND BANK 13: *SIMPLE DELAYS

Basic surround delays

Nice Delay ***B13 P1**

Random Surround Delay Algorithm

A nice delay for surrounds. Good all around. Adds a great sense of space in surrounds.

Whispers ***B13 P2**

Random Surround Delay Algorithm

Whispers around you.

Shuffle Surround ***B13 P3**

Random Surround Delay Algorithm

A shuffle-feel delay. DelMST sets overall delay length.

Basic Surr Delay ***B13 P4**

Simple Surround Delay Algorithm

A basic surround delay. Each of the four inputs has a discrete echo tap. Faders set times and feedback. Edit page pans taps.

Front to Back X ***B13 P5**

Random Surround Delay Algorithm

Front-to-back crossing over. Changing delay times on LF1 and RF1 effects hold length.

For Tori ***B13 P6**

Random Surround Delay Algorithm

Works great on piano and vocals. DelMST sets overall delay length.

Back Heavy ***B13 P7**

Random Surround Delay Algorithm

LS and RS inputs have lots of content in this delay.

Spiral EQ Delay ***B13 P8**

Random Surround Delay Algorithm

Each delay tap pans in a circle, spreading from narrow to wide. The EQ of each tap goes from dark to bright as it spirals outward.

Roll Back ***B13 P9**

Random Surround Delay Algorithm

Stereo input moving from front to back, bright to dark. Great with sound effects or low-frequency material.

Repeating ***B13 P0**

Random Surround Delay Algorithm

A short burst of criss-crossing delays followed by another round of taps. This preset blurs into a dense atmosphere.

SURROUND BANK 14: *RANDOM DELAYS

Surround delays that use randomizers

Warm Delay ***B14 P1**

Random Surround Delay Algorithm

A surround delay with mild use of randomizers. DelMST sets overall delay time.

Smart Delay ***B14 P2**

Random Surround Delay Algorithm

Delay changes with input level. When input is over threshold set in Mod2, longer taps are created.

X-Over ***B14 P3**

Random Surround Delay Algorithm

Right front input taps migrate to the left rear, and left front migrate to the right rear.

*. . . Surround Bank 14: *Random Delays continues on page 20*

*Surround Bank 14: *Random Delays*

(continued from page 19)

Vocal Delay ***B14 P4**

Random Surround Delay Algorithm

A delay with interesting use of randomizers. When input is under threshold set in Mod2, delays get longer. When above, it's a doubler.

Subtle Delay ***B14 P5**

Random Surround Delay Algorithm

Delay taps slowly fade in, creating an interesting sense of space.

Busy Delay ***B14 P6**

Random Surround Delay Algorithm

Lots of delay taps in this one. Use when lots of delay taps are needed without getting too mushy.

Random & Stutter ***B14 P7**

Random Surround Delay Algorithm

Fast random taps create a dense, spastic environment.

Rhythmic S/H ***B14 P8**

Random Surround Delay Algorithm

A timed rhythmic delay with lots of highpass EQ. Creates an interesting-sounding delay that bounces all over the place.

Wild Echoes ***B14 P9**

Random Surround Delay Algorithm

This rhythmic preset has your source bouncing around all speakers with feedback rolled off.

Random Looper ***B14 P0**

Random Surround Delay Algorithm

Hold starts the loop. FbkMST controls some of the complexity. Good for ambient loops due to the constant randomization of the start/stop loop.

SURROUND BANK 15: *DELAY SPACES

Surround delay spaces, the reflections of a space without the reverb

Golden Room ***B15 P1**

Random Surround Delay Algorithm

The Golden Mean – 62ft wide and 100ft deep. DelMST controls size. FbkMST controls liveness.

Narrow Room ***B15 P2**

Random Surround Delay Algorithm

At maximum size, this room is 100ft long and only 25 feet wide. DelMST controls scale. FbkMST controls liveness.

Drum Room ***B15 P3**

Random Surround Delay Algorithm

A tight, randomized drum/percussion room.

Wide Room ***B15 P4**

Random Surround Delay Algorithm

At maximum size, this odd room is 100ft wide and 25ft deep. DelMST controls size. FbkMST controls liveness.

Square Room ***B15 P5**

Random Surround Delay Algorithm

Reflection pattern for a square room, 100ft at maximum size. DelMST controls size. FbkMST controls liveness.

David's Earlies ***B15 P6**

Random Surround Delay Algorithm

Early energy that reduces the harshness of close-mic'ing. Wander values over 30 may be bizarre. Raise FsLvl for stereo source material.

Around the Room ***B15 P7**

Random Surround Delay Algorithm

Not exactly a natural occurring space, but have fun with this one. Delays go around the room in a clockwise pattern. DelMST controls speed.

Hall w/o Reverb ***B15 P8**

Random Surround Delay Algorithm

The reflection characteristics of a hall, without the reverb. DelMST controls size. FbkMST controls surface reflectiveness.

Slap Room ***B15 P9**

Random Surround Delay Algorithm

A very reflective room, with lots of echoes bouncing between the back and front. DelMST controls size.

Stadium ***B15 P0**

Random Surround Delay Algorithm

Turns the space into a stadium. Input level over Mod2 creates a stronger and longer delay off the back wall.

SURROUND BANK 16: *CRAZY DELAYS

From strange to insane

Metal Landscape ***B16 P1**

Random Surround Delay Algorithm

Crazy ring-mod taps with high feedback create a metallic atmosphere. Joystick drastically changes mood.

Dispersal ***B16 P2**

Random Surround Delay Algorithm

A set of really long delay taps spread out. Each feedback loop becomes brighter until it disappears.

Linger ***B16 P3**

Random Surround Delay Algorithm

A straightforward delay with a tap that lingers in the front left speaker.

Nebula ***B16 P4**

Random Surround Delay Algorithm

Close tap groupings that spread and diffuse with each feedback pass.

Ambient Bed ***B16 P5**

Random Surround Delay Algorithm

Great for sustained sounds, taps bounce all over the place and settle into oblivion. Good sound design tool.

Attack From Back ***B16 P6**

Random Surround Delay Algorithm

Spaced taps that shoot forward and become darker with each feedback pass.

Sonic Decimate ***B16 P7**

Random Surround Delay Algorithm

A very strange effect indeed.

Open Your Mind ***B16 P8**

Random Surround Delay Algorithm

A very interesting effect with lots of things going on. Lower Mod1 to change randomization. Turn V1Rand off or pitched feedback tunable by DelMST.

Dark Hue Delay ***B16 P9**

Random Surround Delay Algorithm

Super-fast taps fly around, but it's the low frequencies that keep feeding back.

Sonic Landscape ***B16 P0**

Random Surround Delay Algorithm

Strange interactions are created in this preset with lots of crossfeed.

SURROUND BANK 17: *TOOLS

Surround Tools

Frame Delay ***B17 P1**

Surround Frame Delay Algorithm

A surround frame delay. Trim adjusts 1/4 frame increments.

8 X 8 BANK 1: TOOLS

Eight-channel tools

Octal Thru **B1 P1**

Octal Thru Algorithm

Inputs go directly to respective outputs. Like a bypass mode.

Zone Dly/Time **B1 P2**

Octal Zone Delay Algorithm

Zone delay using milliseconds as the unit.

Zone Dly/Metric **B1 P3**

Octal Zone Delay Algorithm

Zone Delay using meters as the unit.

Zone Dly/Feet **B1 P4**

Octal Zone Delay Algorithm

Zone Delay using feet as the unit.

Frame Delay **B1 P5**

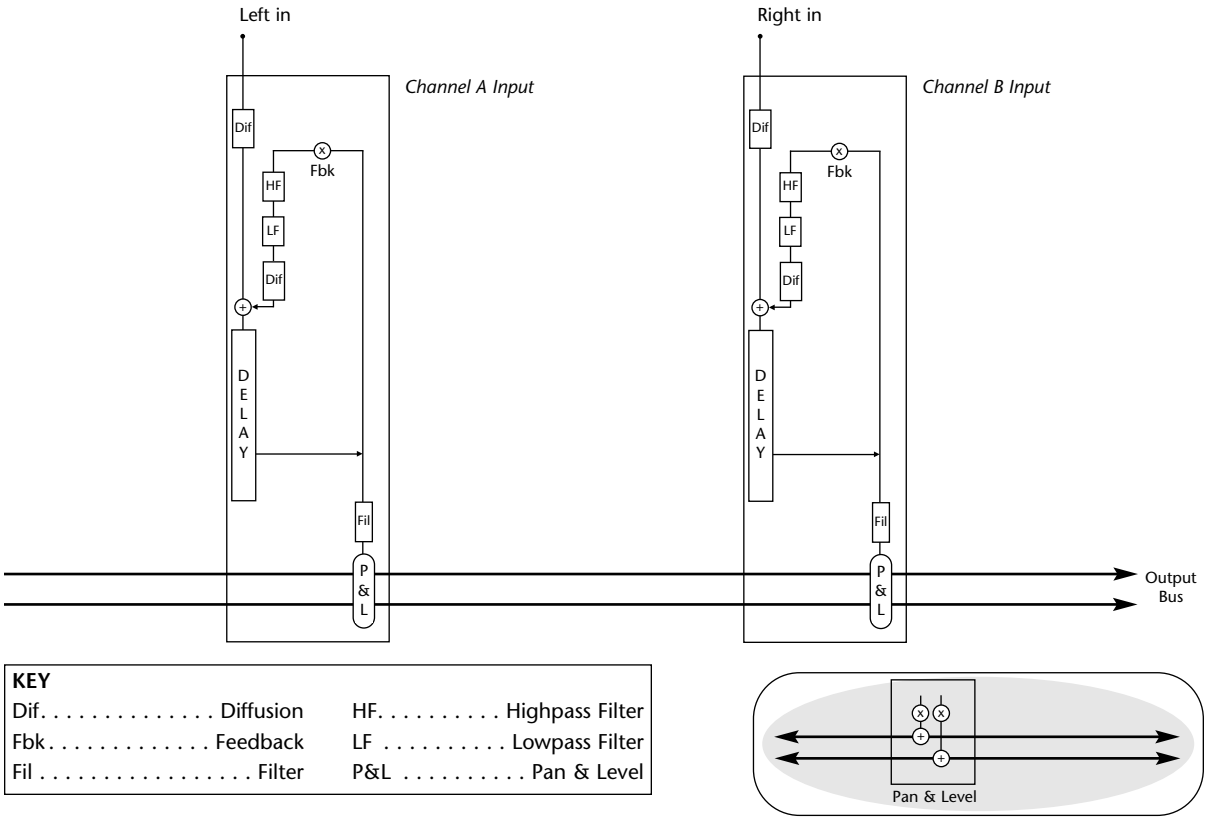
Octal Frame Delay Algorithm

Eight channels of frame delays. Each channel can be trimmed in 1/4 frame increments. Set number of frames to be delayed and speed with joystick.

ALGORITHM DIAGRAMS

SIMPLE DELAY ALGORITHM

2 Delay Channels, 1 Pannable Delay Voice per Channel, 4 second Maximum Delay



Standard Parameters (Global)

Feedback Highpass . . . . . FbHipass (page 8)
Feedback Lowpass. . . . . FbRoll (page 8)
Infinite Hold . . . . . Hold (page 9)
Input Diffusion. . . . . Diffus (page 8)
Master Delay Time . . . . . DelMST (page 8)
Master Delay Level. . . . . LvlMST (page 9)
Master Feedback . . . . . FbkMST (page 8)
Mix (not shown). . . . . Mix (page 9)

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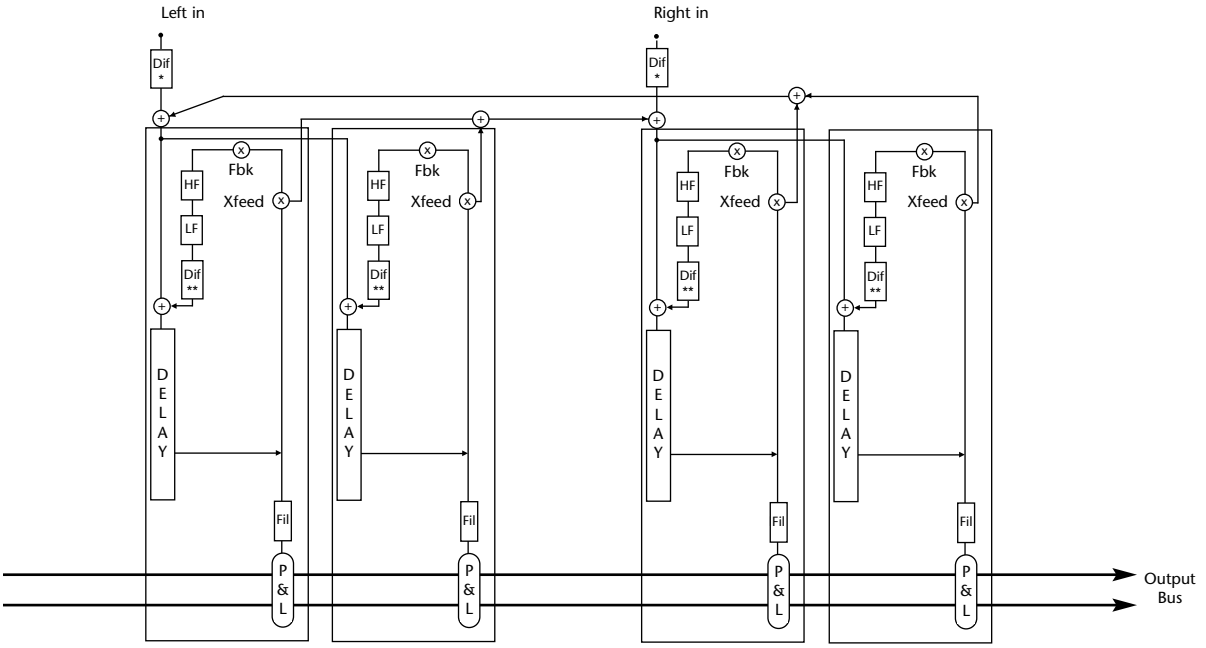
Level. . . . . Gain (page 10)
Master Delay Time (Glbl) . . DelMST (page 8)
Master Delay Level (Glbl) . . . LvlMST (page 9)
Master Feedback (Glbl). . . . FbkMST (page 8)
Pan X . . . . . Pan (page 10)

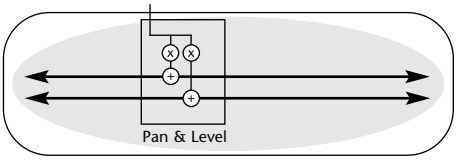
DUAL DELAY ALGORITHM

4 Delay Channels, 1 Pannable Delay Voice per Channel, 2 second Maximum Delay



KEY

Dif. . . . . Diffusion	HF. . . . . Highpass Filter
Dif* . . . . . Diffusion/Grain	LF . . . . . Lowpass Filter
Dif**. Diffusion/Grain/Feedback	P&L . . . . . Pan & Level
Fbk. . . . . Feedback	Xfeed . . . . . Crossfeed
Fil . . . . . Filter	



Standard Parameters (Global)

Feedback Diffusion. . . . . FbkDiff (page 8)
Feedback Grain. . . . . Fgrain (page 8)
Feedback Highpass . . . . . FbHipass (page 8)
Feedback Lowpass. . . . . FbRoll (page 8)
Infinite Hold . . . . . Hold (page 9)
Input Diffusion. . . . . Diffus (page 8)
Input Grain . . . . . Grain (page 9)
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Master Delay Level. . . . . LvlMST (page 9)
Master Feedback . . . . . FbkMST (page 8)
Mix (not shown). . . . . Mix (page 9)

Delay Voice Parameters

Crossfeed . . . . . Xfd (page 10)
Delay . . . . . Delay Time (page 10)
Feedback . . . . . Fbk (page 10)
Filter . . . . . Filt (page 10)
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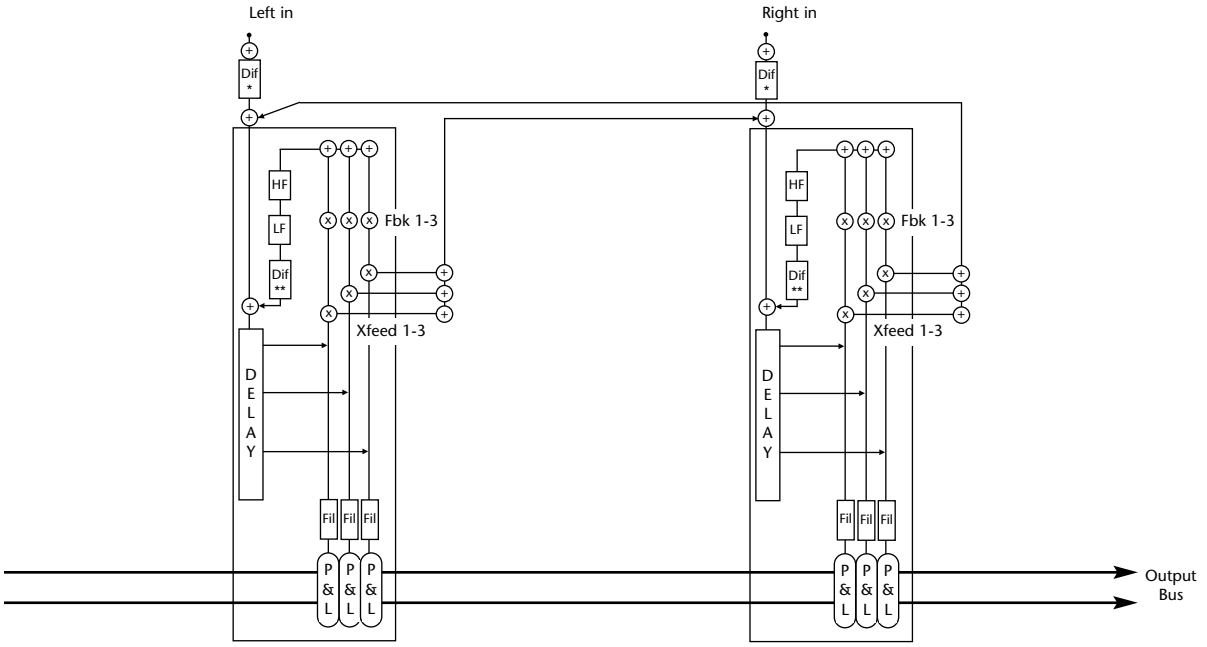
Master Feedback (Glbl). . . . FbkMST (page 8)
Pan X. . . . . Pan (page 10)

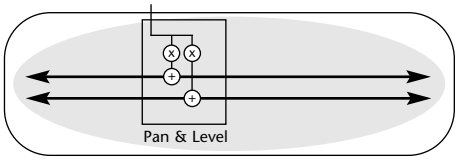
RANDOM DELAY ALGORITHM

2 Delay Channels, 3 Pannable Delay Voices per Channel, 3 second Maximum Delay



KEY

Dif. . . . . Diffusion	HF. . . . . Highpass Filter
Dif* . . . . . Diffusion/Grain	LF . . . . . Lowpass Filter
Dif**. Diffusion/Grain/Feedback	P&L . . . . . Pan & Level
Fbk. . . . . Feedback	Xfeed . . . . . Crossfeed
Fil . . . . . Filter	



Standard Parameters (Global)

Feedback Diffusion. . . . . FbkDiff (page 8)
Feedback Grain. . . . . Fgrain (page 8)
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Voice 2 Randomizer Source . V2Rand (page 9)
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**Based on the length of Voice 3.*

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Crossfeed . . . . . Xfd (page 10)
Delay . . . . . Delay Time (page 10)
Feedback . . . . . Fbk (page 10)
Filter . . . . . Filt (page 10)
Level. . . . . Gain (page 10)
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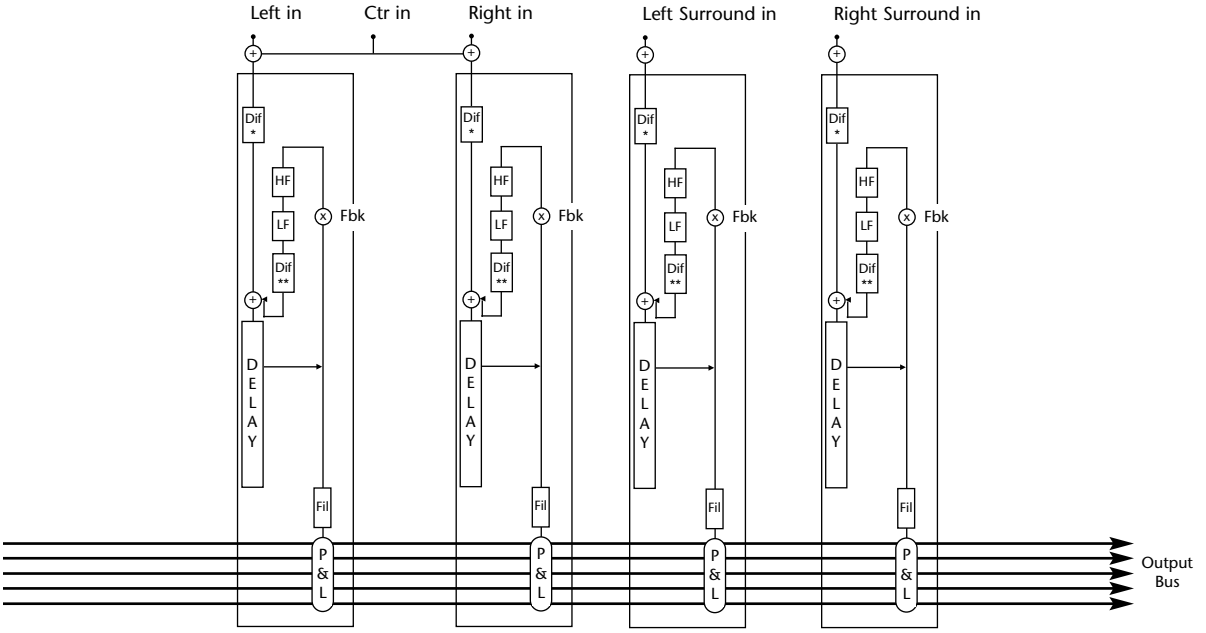
Master Feedback (Glbl). . . . FbkMST (page 8)
Pan X. . . . . Pan (page 10)

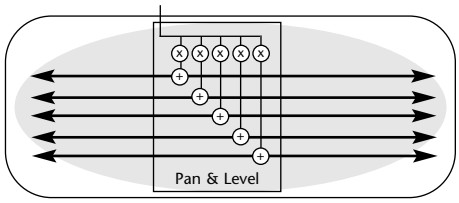
SIMPLE MULTI-CHANNEL DELAY ALGORITHM

4 Delay Channels, 1 Pannable Delay Voice per Channel



KEY

Dif. . . . . Diffusion	Fil . . . . . Filter
Dif* . . . . . Diffusion/Grain	HF. . . . . Highpass Filter
Dif**. Diffusion/Grain/Feedback	LF . . . . . Lowpass Filter
Fbk. . . . . Feedback	P&L . . . . . Pan & Level



Standard Parameters (Global)

Feedback Highpass . . . . . FbHipass (page 8)
Feedback Lowpass. . . . . FbRoll (page 8)
Infinite Hold . . . . . Hold (page 9)
Input Diffusion. . . . . Diffus (page 8)
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Master Delay Level. . . . . LvlMST (page 9)
Master Feedback . . . . . FbkMST (page 8)
Mix (not shown). . . . . Mix (page 9)

Delay Voice Parameters

Delay . . . . . Delay Time (page 10)
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Level. . . . . Gain (page 10)
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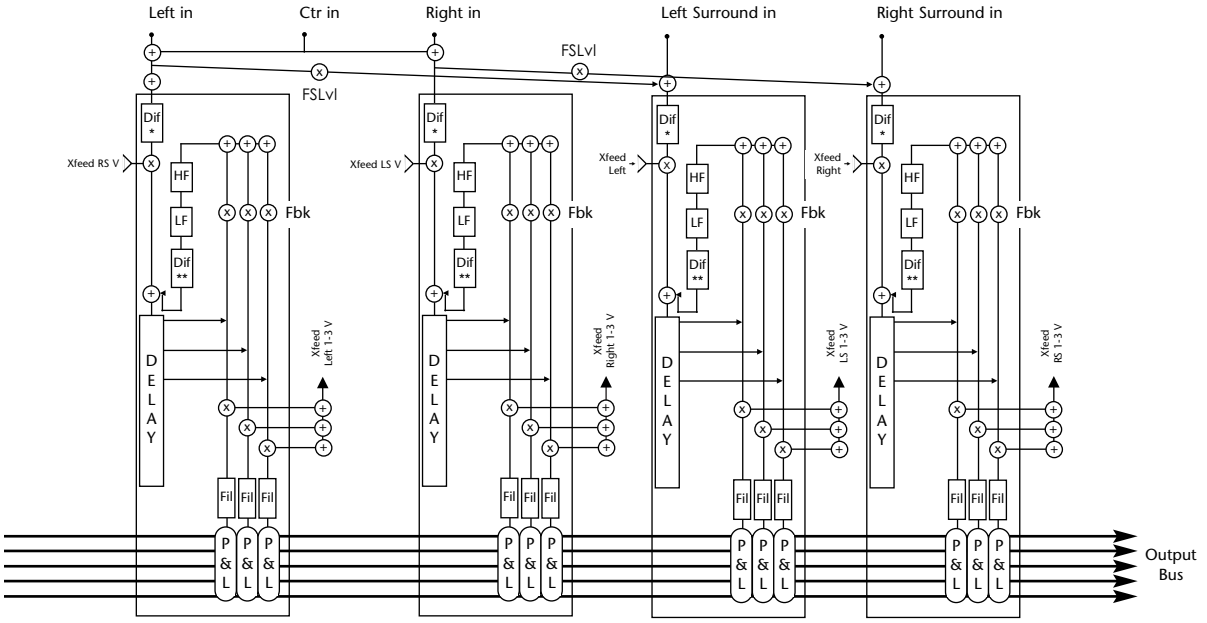
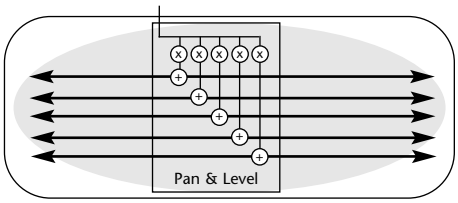
Pan X, Y . . . . . Pan (page 10)

RANDOM MULTI-CHANNEL DELAY ALGORITHM

4 Delay Channels, 3 Pannable Delay Voices per Channel



KEY	
Dif. . . . . Diffusion	FSLvl. . Fronts-to-Surrounds Level
Dif* . . . . . Diffusion/Grain	HF. . . . . Highpass Filter
Dif**. Diffusion/Grain/Feedback	LF . . . . . Lowpass Filter
Fbk. . . . . Feedback	P&L . . . . . Pan & Level
Fil . . . . . Filter	Xfeed . . . . . Crossfeed



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**Based on the length of Voice 1.*

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Pan X, Y . . . . . Pan (page 10)

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KEY
*B . . . . . Stands as an abbreviation for surround program banks, i.e. "*B13" stands for Surround Bank 13.
(Ill.) . . . . Stands for Illustration.
B . . . . . Stands as an abbreviation for stereo program banks, i.e. "B13" stands for Stereo Bank 13.
P . . . . . Stands as an abbreviation for program, i.e. "P1" stands for Program 1.

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*Delay Spaces, Surround Bank 15, 20 to 21
*Random Delays, Surround Bank 14, 19 to 20
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*B . . . . . Stands as an abbreviation for surround program banks, i.e. "*B13" stands for Surround Bank 13.
(Ill.) . . . . Stands for Illustration.
B . . . . . Stands as an abbreviation for stereo program banks, i.e. "B13" stands for Stereo Bank 13.
P . . . . . Stands as an abbreviation for program, i.e. "P1" stands for Program 1.

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