PROGRAM SUMMARY:

DYNAMIC REVERB

DESCRIPTION:

DYNAMIC REVERB is a powerful program that combines a high-quality, full- featured reverberator with a flexible noise gate/threshold detector. The detector can be used to gate the reverb *output* (giving a conventional gated reverb effect) but it can also be used to gate the *input* to the reverb, control the reverb *decay time*, or modulate the *width* of the reverb's stereo image. Parameters specify whether the gate turns on or off when the threshold is exceeded, and by how much. Applications are endless, including reverberating only peak signals, creating *dual slope* reverbs, triggered infinite sustain, compressed reverb, exploding or collapsing stereo images, impulse removal, etc.

Reverb parameters are provided to control overall decay time (RT60), front/rear position, predelay, and stereo/mono input. Parameters are also included that choose which SP2016 input to drive the threshold detector, whether the detector controls the reverb output, input, RT60, or image width, and the amount of signal delay applied before the detector input. A character on the display lights whenever the input signal exceeds the detector threshold, which can be adjusted over a 50dB range. Likewise, moving bargraphs facilitate adjustment of separate attack and release times for the gate/threshold detector by graphically displaying the detector's output.

PARAMETERS:

RT60 Reverb decay time, adjustable from .1 to 100 seconds. When controlling RT60 from the gate, completely independent RT60 values may be set for signals below the threshold (<) or above it (>).

FRONT/REAR A display character indicates the apparent position of the sound source in the room, from close (FRONT) to far (REAR).

PREDELAY Pre-reverb signal delay, adjustable from 0 to 99ms.

STEREO/MONO Determines whether the reverb signal comes from both inputs of the SP2016 (STEREO) or only the left channel (MONO). Does not affect which signal is applied to the input of the gate/threshold detector.

INPUT→GATE Selects CH1(LEFT) or CH2(RIGHT) SP2016 input signals to drive the gate/threshold detector input. Allows keying of the gate by a signal other than the one being reverberated.

GATE→CONTROL This parameter selects whether the gate/threshold controls the input signal level (GATE→INPUT), the reverb output level (GATE→OUTPUT), the decay time (GATE→RT60), or the spread of the stereo image (GATE→WIDTH). GATE→OFF turns the program into an ordinary stereo reverb.

If GATE→INPUT is selected, INPUT(<) and INPUT(>) parameters will appear in the list to individually set the reverb input levels to use when the gate input signal is less than (<) or greater than (>) the threshold. Input levels are specified from 0 to 99%. Operation is similar if GATE→OUTPUT is selected; in this case the parameters set the *output* levels to use when the gate input signal falls below or above the threshold.

If GATE→RT60 is selected, RT60(<) and RT60(>) parameters are used to specify separate reverb decay times from .1 to 100 seconds when gate input signals fall below and above the threshold.

If GATE→WIDTH is selected, WIDTH(<) and WIDTH(>) parameters are used to set the output image width corresponding to gate inputs below or above the threshold. WIDTH is specified in degrees, from 0 to 180, where 0° gives a centered, mono output image and 180° yields the complete stereo panorama.

THRESHOLD Sets the detector threshold, from -1 to -52dB. A ✳ lights on the display when gate input signals exceed the threshold, facilitating proper adjustment.

ATTACK Adjusts the attack rate (rise time) of the gate, from 1 (slow) to 50 (fast). When gate input signals exceed the detector threshold, the ATTACK controls the rate that INPUT, OUTPUT, RT60 or WIDTH parameter values change from their below-threshold value to their above-threshold value. An 8-segment bargraph dynamically displays gate attacks and releases in order to visually fine-tune the detector response.

RELEASE Analogous to ATTACK, this adjusts the release rate (fall time) of the gate. ATTACK and RELEASE values are visible simultaneously on the display (along with the moving bargraph) for easy comparison.

GATE DELAY This is a control that allows the signal to the threshold detector to be delayed *relative* to the signal at the reverb input(s), over a range of -99 to +99ms. The GATE DELAY always tracks the reverb input PREDELAY parameter, specifying the amount of time delay added to or subtracted from the reverb delay to yield the overall gate delay. This allows the opening and closing of the gate to either anticipate or lag behind the reverb input signal. For example, a GATE DELAY of 0ms and a PREDELAY of 50ms means that the gate and reverb *both* receive signals delayed by 50ms. A GATE DELAY of -10ms gives a gate signal that *precedes* the reverb input signal by 10ms; likewise a GATE DELAY of 10ms causes the gate input to arrive 10ms *after* the reverb input.

APPLICATIONS:

This program was designed as a flexible audio *tool* rather than just a canned sound effect. (One caveat: like any tool designed for skilled practicioners, DYNAMIC REVERB may take some

time to learn and to use effectively - we suggest you try the examples below to get the hang of it.) The program can be used in a variety of applications to produce a very wide range of signal processing effects. The following ideas probably represent just the tip of the iceberg:

GATED REVERB The default parameter values for this program configure it as a 'conventional' gated reverb program, with the gate following the reverb output. You'll find it far more controllable than Eventide's GATED REVERB program, however, since the THRESHOLD level and ATTACK and RELEASE parameters offer visual feedback and posess a much wider range of adjustment. In DYNAMIC REVERB, the gate is also keyed from the *input* to the reverb rather than its output, and is capable of being keyed by a different signal than the reverb input - just set the reverb input to use channel 1 (MONO(L) input mode) and and the gate input to use channel 2 (CH2(R)→GATE).

By setting a long PREDELAY and negative GATE DELAY with a fast ATTACK, you can get the reverb to open up in anticipation of signal transients like drum hits, in order to avoid missing the attack. Conversely, by using long positive GATE DELAYs and/or slow ATTACK rates, you can *eliminate* transient attacks and reverberate only the decaying portions of sounds. A different type of gated reverb can be achieved by controlling the RT60 time with the gate (GATE→RT60 - see below). This configuration allows long decays while the sound is present, cutting the decay time to near zero when it falls below the threshold.

TRIGGERED INFINITE SUSTAIN By using the GATE→RT60 mode, you can get clean, almost infinite reverberant sustain from vocals and melodic instruments, without the muddy buildup that usually accompanies extremely long reverb times. Set the above-threshold RT60(>) to a low value such as .1 second, and the below-threshold RT60(<) to a high value like 100 seconds. Choose the THRESHOLD level so that the indicator flashes easily on moderate peaks, with an ATTACK time near 30 and a RELEASE around 16. This technique also works best when the FRONT/REAR parameter is set to its most distant position.

Now each time the signal rises above the threshold (as when a guitar is plucked or a new note is sung) the RT60 will fall to .1 second, and quickly decay. As the guitar or voice dies away and falls below the threshold, however, the RT60 will quickly ramp back up to 100 seconds, providing a long sustain for the smooth trailing edge of the sound. This is the same concept that might be used for a kind of *dual-slope* reverb: short (or long) decays for loud sounds, and long (or short) decays for quieter sounds.

PEAK REVERB The idea here is to allow only the loudest peaks of the signal to be reverberated, while lower level signals are excluded from the reverb. Apply the gate to the reverb input (GATE→INPUT) and set a fairly high THRESHOLD (say, -10dB) and a long RT60 (10 sec). Setting below-threshold input levels (INPUT(<)) to 0% and above-threshold levels (INPUT(>)) to 99% creates a conventional noise gate that precedes the reverb input.

This configuration has found use in a number of applications, including adding reverb to just a snare drum after the entire drum kit had been mixed to mono! This worked because the snare was just enough louder in the mix to trigger the input gate to the reverb. By inverting the gate (ie., below-threshold INPUT(<) = 99% and above-threshold INPUT(>) = 0%) it should also be possible to reverberate only the *quietest* elements in a mono mix. GATE→INPUT mode is also the basis for impulse removal techniques.

EXPLODING/COLLAPSING STEREO IMAGE This group of techniques applies the gate signal to control the stereo image width of the reverb (GATE→WIDTH), and works best with impulsive sounds. The idea is that when a big impulse like a drum hit comes along, the reverberant image instantaneously expands to fill the stereo field and then shrinks to a centered, mono image as the reverb decays. Conversely, and just as dramatically, it can contract instantly and slowly expand back out to full stereo width as the reverb decays.

Put the program in MONO mode, CH1(L)→GATE, GATE→WIDTH, and set the THRESHOLD so that it lights only on the peaks. Try a fast ATTACK like 50, and a very slow RELEASE like 2 or 3 - the RELEASE rate will control how fast the image expands (or contracts) after the 'hit'. You'll want the sound to continue reverberating during the expansion (contraction), so use RT60 values of at least 4.0 seconds for best results. Setting a below- threshold WIDTH(<) of 0° and an above-threshold WIDTH(>) of 180° causes expansion on peak signals and contraction to mono as the sound decays - just set WIDTH(<) to 180° and WIDTH(>) to 0° to achieve the opposite effect.

first order effects

digital audio signal processing

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PROGRAM SUMMARY:

DYNAMIC DIGIPLEX

DESCRIPTION:

DYNAMIC DIGIPLEX combines a repeating stereo delay line with a threshold detector/noise gate. Its features and capabilities are extensive, and similar to those of the DYNAMIC REVERB program, with the exception that the stereo reverberator is replaced by a stereo delay line. The threshold detector/noise gate sections of the program are identical; the difference is that in place of the reverb parameters are available to adjust the delay of each channel and the overall feedback. The threshold detector output can be applied to control the input, output, or feedback of the program.

PARAMETERS:

FEEDBACK Delay line feedback percentage, adjustable from 0 to 99%. When modulating the feedback with the threshold detector (GATE→FDBACK), different feedback values may be set for above- and below-threshold signals.

L/R DELAY Independent adjustment of the lengths of the left and right channel repeating delay lines. Delays are adjustable from 0 to 700ms.

PREDELAY Initial delay length, adjustable from 0 to 99ms. Input signals pass through this delay line before being applied to the repeating delay lines. Thus *total* delay in each channel is 799ms.

STEREO MONO Determines whether the signals to be delayed come from both inputs of the SP2016 (STEREO) or only the left channel (MONO). Does *not* affect which signal is applied to the input of the threshold detector.

INPUT→GATE Selects CH1(LEFT) or CH2(RIGHT) SP2016 input signals to drive the gate/threshold detector input. Allows keying of the gate by a signal other than the one being reverberated.

GATE→CONTROL This parameter selects whether the gate/threshold controls the input signal level (GATE→INPUT), the output level (GATE→OUTPUT), or feedback (GATE→FDBACK). Operation is similar to DYNAMIC REVERB.

THRESHOLD, ATTACK, RELEASE, GATE DELAY These parameters are identical to the corresponding ones used by DYNAMIC REVERB - refer to the DYNAMIC REVERB program summary for more detailed descriptions.

APPLICATIONS:

Many of the applications for DYNAMIC DIGIPLEX are similar to those for DYNAMIC REVERB. The basic idea is that of a repeating delay line whose echoes are responsive to the dynamics of the signal. The most obvious application is to select GATE→INPUT so that only signals above the gate threshold are allowed into the delay lines. This will tend to accentuate the musical dynamics, lending the louder portions an extra sense of space.

Using a less obvious technique, a 'stutter' effect can be added to vocal or melodic tracks by doubling just the attack or just the decay of sung or performed phrases. To double the attacks, select GATE→INPUT, set the below-threshold INPUT(<) to 99% and the above-threshold INPUT(>) to 0%. Set a fast ATTACK and somewhat slower RELEASE rate (say, 50 and 35), and a very low THRESHOLD level. This produces an inverted noise gate at the input to the delay line that will turn off whenever any signal is present. The trick now is to zero the PREDELAY and set the GATE DELAY to the maximum of 96ms - this means that 96ms of signal will sneak in under the gate, causing a stutter at the attack of each new phrase. To stutter at the *end* of a phrase, set the PREDELAY to 96ms and GATE DELAY to -96ms (it will help to bump up the RELEASE rate to 40 or 50).

Using GATE→FEEDBACK with high above-threshold FEEDBACK(>) and short DELAYs yields an effect that might be termed "gated robots". A more intriguing effect can be obtained by inverting the feedback settings: adjust the above-threshold FEEDBACK(>) to 0%, and the below-threshold FEEDBACK(<) to 99%. With the THRESHOLD set low, this configuration will not affect the signal the majority of the time, but will catch only the tail the end of each phrase in the delay line and repeat it indefinitely until the next phrase comes along. Since the amount of signal repeated depends on the DELAY setting for each channel, the effect of using long delays is that of a stereo loop editor which automatically captures and replays the last thing that passed through. With very short delays, the effect is to lay a variable-pitched buzz into the empty spaces between phrases.

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