ASHLY

SC-33 STEREO NOISE GATE

OPERATING INSTRUCTIONS

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INTRODUCTION

What is a noise gate?

A noise gate is an automatic "switch" used to reduce unwanted source noise. A level-sensitive device, the noise gate can discriminate between useful audio signals and undesirable ambient noise such as hiss, buzz, and hum. Correctly adjusted, the gate will pass the audio unaltered but will automatically turn off when the incoming audio falls below a preselected level.

For example, suppose that a guitarist has recorded a solo onto a multitrack tape recorder without noise reduction, and his track is now being combined with 23 others for a final mix. In addition to his solo, the guitarist may have recorded a few other sounds onto his track, including hum from his amplifier, a repetitive swishing noise from his electronic flanger, and his voice at the end of the solo faintly asking "that okay?". Also, on the track will be a certain amount of hiss from the mixing console, and a good deal more from the tape recorder itself. A noise gate can be used here to keep the track absolutely silent up until the instant that the guitarist plays his first note, and to mute the track after his solo is finished. The dynamics of the track are not altered in any way during the solo. Any electronic or tape noise present will be passed along with the music. However, since the music will normally be much louder than the noise, the noise will be effectively masked. A dramatic improvement in signal to noise ratio can be realized.

Unlike encode/decode systems of noise reduction, which continuously adjust the dynamics of a program source through compression and (hopefully) reciprocal expansion, the noise gate has only two basic dynamic levels; full on, and full off. When the noise gate is on, music or speech appearing at the input is passed through to the output with absolutely no dynamic alteration. Thus, there can be no pumping, breathing, hunting, mistracking, subsonic noise modulation, or any of the other gain errors that people frequently complain about with compander type noise reduction systems.

In order to be useful with a wide variety of program sources, the turn-on and turn-off characteristics of the SC-33 are user adjustable by way of five front panel controls. These controls determine the level sensitivity of the gate (Threshold), the speed with which the gate turns on when an audio signal is present (Attack), the manner in which the gate turns off when audio ceases (Hold and Fade), and the degree to which the audio source is attenuated when the gate is off (Floor).

The Ashly SC-33 Noise Gate has been carefully designed to insure superlative audio performance, a wider than usual control range, and a minimum of unwanted side effects. It will find use in recording, sound reinforcement, broadcasting, live musical performance, and multi-microphone PA installations.

This manual describes in detail the applications of the noise gate, proper installation procedures, the functions of the front panel controls, and a circuit description. Please read it carefully to ensure that you are taking full advantage of the SC-33's capabilities.

UNPACKING

As a part of our system of quality control every Ashly product is carefully inspected before leaving the factory to ensure flawless appearance. After unpacking please inspect for any physical damage. Save the shipping carton and all packing materials, as they were carefully designed to reduce to a minimum the possibility of transportation damage should the unit again require packing and shipping. In the event that damage has occurred, immediatly notify your dealer so that a written claim to cover the damages can be initiated.

THE RIGHT TO ANY CLAIM AGAINST A PUBLIC CARRIER CAN BE FORFEITED IF THE CARRIER IS NOT NOTIFIED PROMPTLY AND IF THE SHIPPING CARTON AND PACKING MATERIALS ARE NOT AVAILABLE FOR INSPECTION BY THE CARRIER. SAVE ALL PACKING MATERIALS UNTIL THE CLAIM HAS BEEN SETTLED.

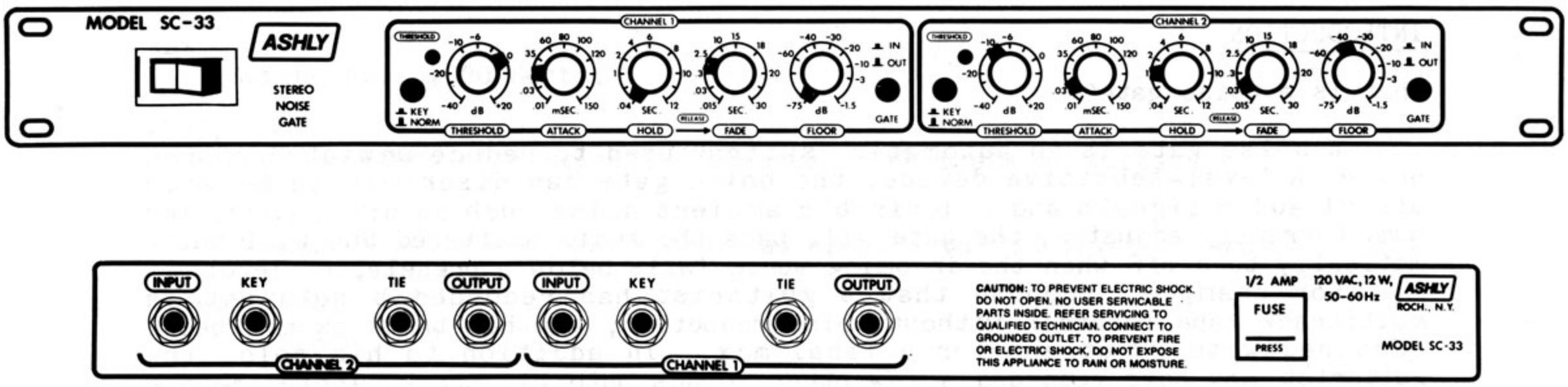


Figure 1 SC-33 front and back panels

INPUT, OUTPUT, AND POWER CONNECTIONS

This Noise Gate should be connected to a 3-wire grounded outlet supplying 120 Volts, 50-60 Hz. Power consumption is 12 watts.

The **INPUT** (Fig. 2) is a 10k ohm active balanced type on a standard stereo phone jack that will accept levels of up to +20 dBm. The (+) or in-phase connection is on the tip and the (-) or out-of-phase connection is on the ring. When feeding the compressor/limiter from unbalanced sources, connect the signal hot to the tip (+) and the signal ground to the ring (-). To use the input as a common unbalanced type, simply use a mono phone plug in the usual way. (See Definition Of Terms, "Wiring," page 19.)

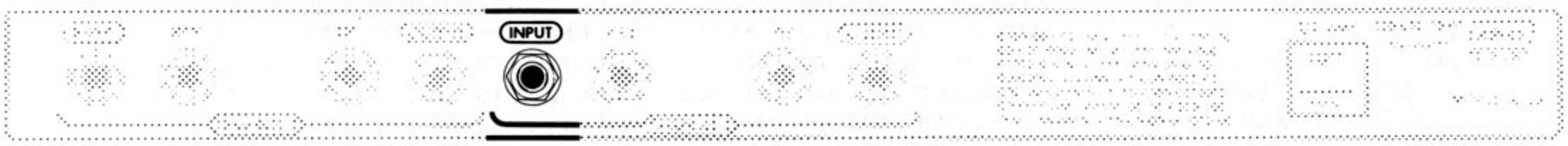


Figure 2 SC-33 Input Jack

The **OUTPUT** connection (Fig. 3) is a standard 1/4" phone jack and mates with a standard phone plug such as a Switchcraft 280. Output impedance is 50 ohms, and full headroom is realized with any load of 600 ohms or greater. For rack mounted unbalanced audio systems the output ground may be separated from the case ground by using a stereo phone plug for the output connection. The output ground is then wired to the ring of the stereo plugs rather than the sleeve. In this manner, ground loops in the rack may be eliminated. This output can be fed to a balanced input by wiring the (+) input to the tip, the (-) input to the ring, and the shield to ground.

Figure 3 SC-33 Output Jack

STEREO TIE

This patch point may be used to tie together the two channels of an SC-33, or any number of SC-33's. To link any two units, insert a patch cord between their respective TIE points. For permanent rack mount installations, this patch point may be brought out to an external patch bay, with only TIP and SLEEVE connections being necessary.

The TIE point actually connects to the control port of the VCA. When the noise gate is on (input signal present), the tip connection of the TIE jack is at ground. When the noise gate is off (no input signal), the tip connection rises to approximately 12 volts. By connecting the control ports of two or more channels together, perfect stereo tracking is assured.

Stereo operation is further discussed on page 13.

Figure 4 SC-33 Stereo Tie Jack

KEY INPUT

The key input allows the SC-33's detector to respond to a source other than the audio that is being processed. This input is a high impedance, unbalanced type. Connect signal positive to the tip, and signal ground to sleeve.

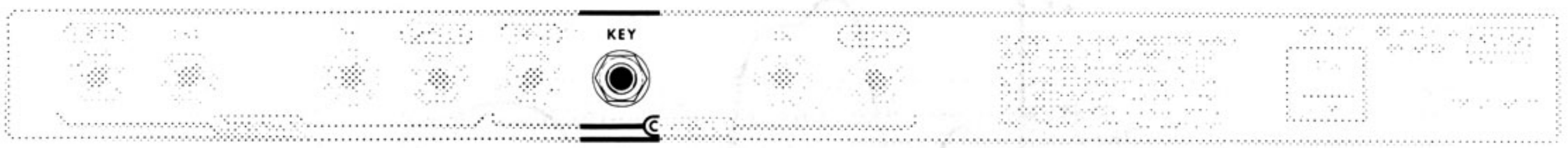


Figure 5 SC-33 Key Input Jack

THE USE OF NOISE GATES AND A DISCUSSION OF OUR CONTROLS

Noise in audio systems may be broadly classified into two types: source noise, and storage/transmission noise. A familiar example of storage noise is the hiss generated by a tape recorder. The audio fed to the recorder may be noise-free, but the replay will include the tape recorder's hiss, superimposed upon the audio. This type of noise problem is commonly attacked by using compander-type noise reduction systems, in which the audio signal is compressed before recording, and expanded upon replay. By operating the recorder within the "best" portion of its available dynamic range, signal to noise ratio of the storage medium is improved.

Although companders can largely eliminate storage noise, they do not in any way affect source noise, which is that noise that was a part of the audio signal before it was recorded. Source noise may include hiss, hum, buzz, and leakage between mics in a multi-microphone situation. A noise gate is a "replay only" noise-reduction system that is useful for reducing unwanted noise without the need for compression and reciprocal expansion. It is a level-sensitive switch that allows audio to pass when a useful signal is present, but which turns itself off when the audio ceases, thus muting undesirable background noise which would be most apparent in the absence of audio.

Manual "noise-gating" is practiced all the time by audio engineers in recording and sound reinforcement; it is common practice to turn down those faders on a mixing console which aren't in use, and to turn them up just before they are needed. In this way, system noise is reduced, resulting in a mix with better clarity and definition. Obviously, turning up a channel at just the right moment requires some careful attention, and if several inputs are involved, the whole job can get tedious. In a live concert situation, muting "unneeded" channels can be a bit risky, as anyone who has tried this approach knows. An automatic noise gate has the advantage of being able to keep an audio channel silent up until the moment it is needed, and to then turn it up almost instantaneously.

THRESHOLD CONTROL

A noise gate makes decisions about what is noise and what is useful audio by monitoring the audio input level and comparing it with a user-determined Threshold level; any audio signal which reaches or surpasses the pre-selected Threshold level will be regarded as a useful signal, and will be allowed to pass through to the gate's output. Any input signals which fall below Threshold will be regarded as noise, and these signals will not appear at the audio output. See Figure 6.

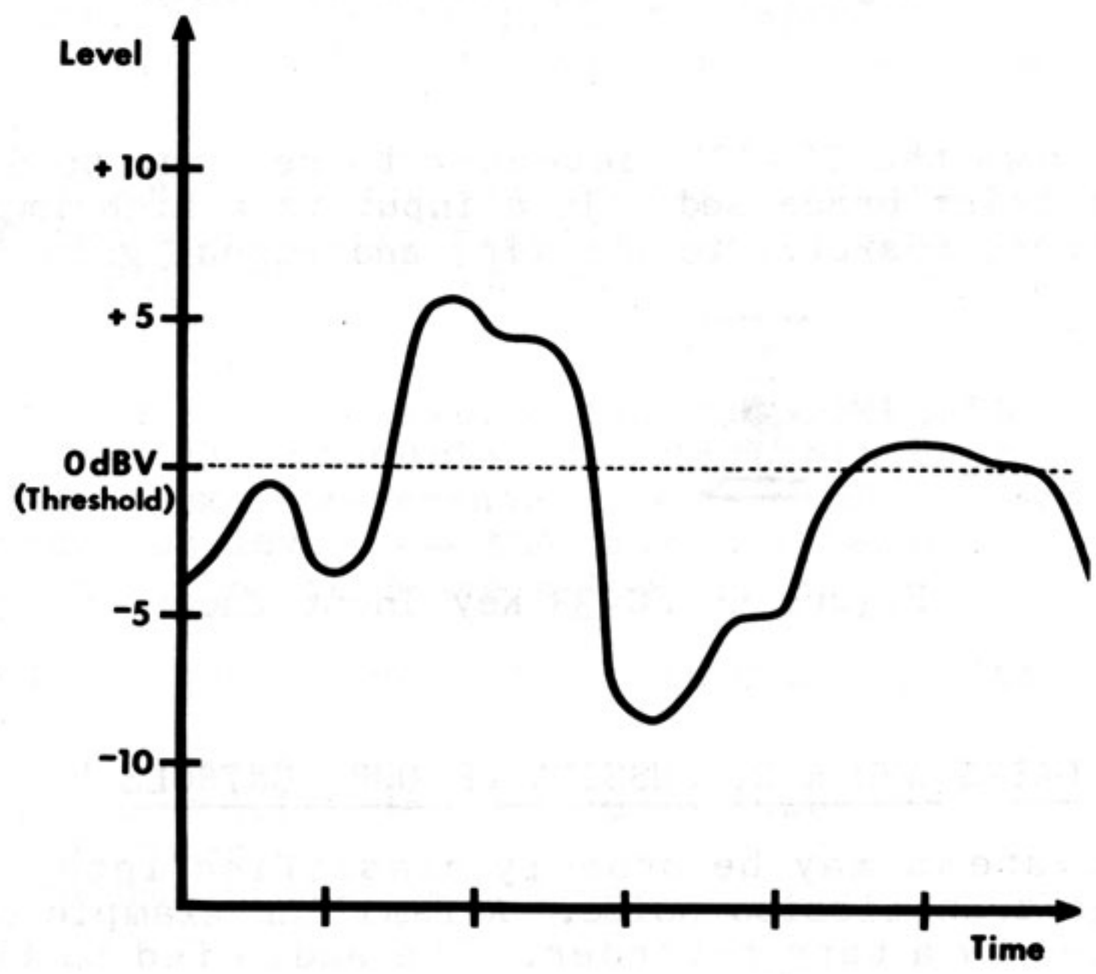


Figure 6 The changing loudness levels in a typical musical program, varying around a pre-determined Threshold level. The SC-33 will pass signals above Threshold, and mute signals which fall below Threshold.

Obviously, we are assuming that the music or speech being processed is, for the most part, louder than the accompanying background noise. If the noise is generally louder than the music, the gate will naturally respond falsely and turn on the noise instead of the music. If the noise and audio are at roughly the same level, the gate will again be triggered falsely. Fortunately, most audio sources, even noisy ones, have a sufficient signal to noise ratio to make the gate useful. In practice, a noise gate will make a relatively noisy source sound good and a relatively clean source sound spectacular.

The Threshold control (Fig. 7) is the most important adjustment you will make, since it instructs the detector circuit as to what will either be considered noise, or desirable audio. Turning the control counter-clockwise increases the sensitivity of the detector circuit, which is equivalent to lowering the threshold point, depicted with a dotted line in Figure 6. Turning the control clockwise is equivalent to raising the threshold level. A full 60 dB of adjustment range is used on the SC-33, making the unit useful for any commonly encountered signal levels, from quiet tracks recorded on semi-pro equipment to the sizzling hot level of a snare drum recorded on a 30 ips two inch tape machine.

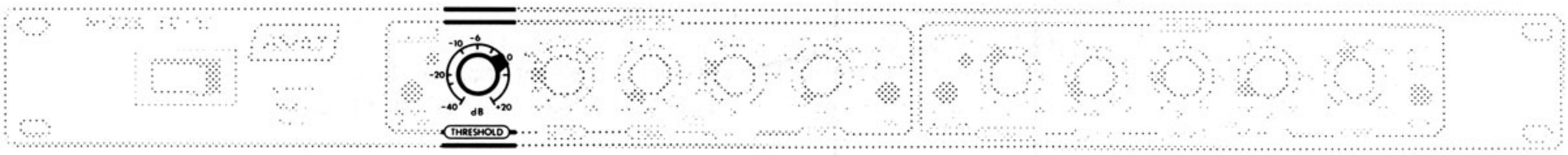


Figure 7 Threshold Control, used to adjust the sensitivity of the noise gate

In use, the Threshold control should initially be set fully counter clockwise, and slowly adjusted until noise components of the audio signal no longer turn the gate on. If the threshold is set too high, noise will still be eliminated, but important components of the program source may be eliminated as well, ie., the leading edge of transients.

If the overall level of the program source changes significantly, it will be necessary to readjust the threshold control to suit the new operating level.

ATTACK TIME CONTROL

Once the incoming audio has reached a level sufficient to trigger the noise gate, the VCA which controls output gain will be turned on. How quickly it turns on is determined by the Attack Time control, shown in Figure 8.

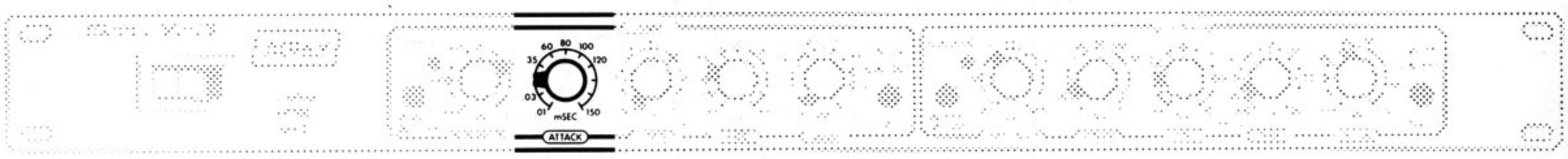


Figure 8 The Attack Time control determines how quickly the gate turns on when the input signal reaches Threshold.

While reason might suggest that you would always want the gate to turn on the audio immediately (once threshold had been reached), this turns out not to be the case in actual use. A too-fast attack time may, in certain situations, produce a turn-on click or a disturbingly abrupt change in the ambience of an overall mix. Here's why:

> A turn-on click may occur with fast attack times because the audio output of the noise gate is changing instantaneously from a condition of virtual silence (-90dB) to some higher output level (say, for example -25dB). See Figure 9.

Plotted graphically, the output level would look like this:

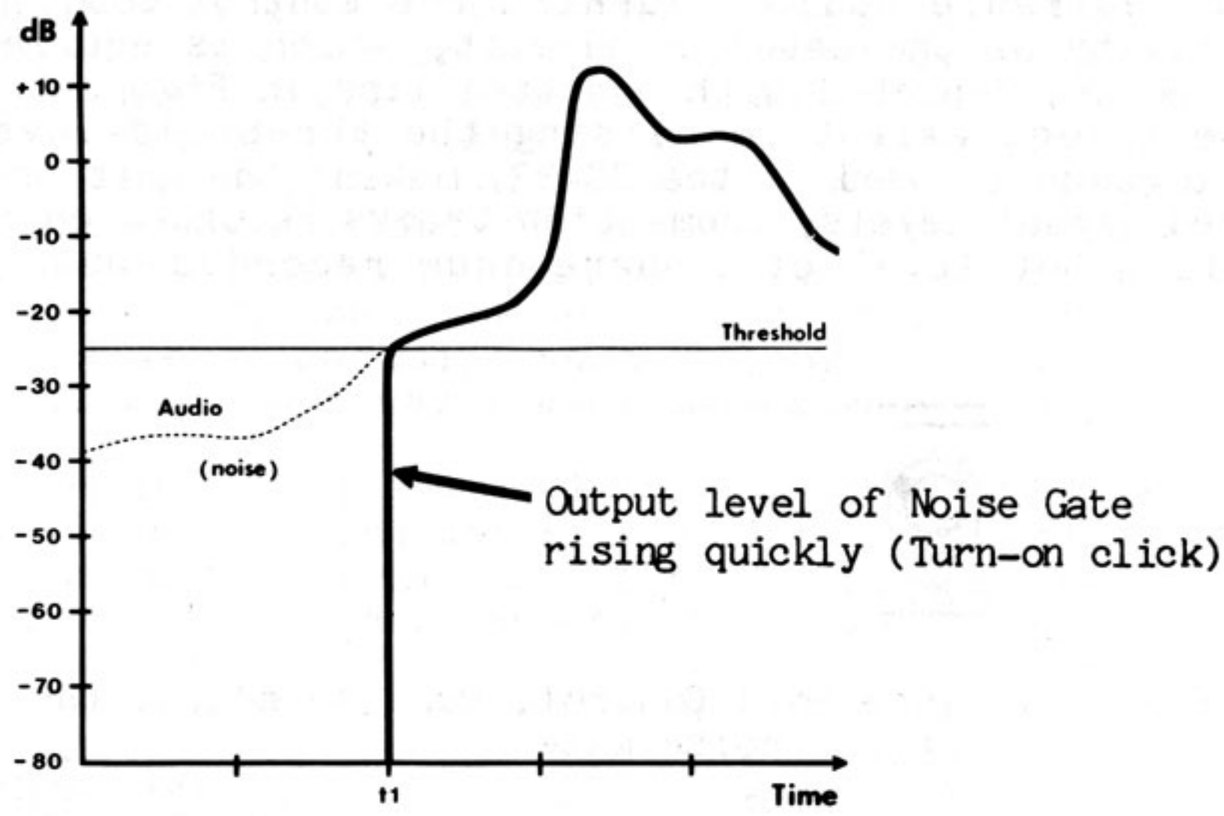


Figure 9 Output level graph depicting a rapid attack time setting applied to a waveform with an inherently slow rise time. An audible turn-on click could be expected.

Anyone familiar with the basic waveforms will instantly recognize that straight vertical line shown at t1 as a step voltage not unlike the leading edge of a square wave. This explains the turn-on click.

If the audio source itself has a fast rise time, then a step edge such as the one at t1 will blend right in, and may even compliment the music. Examples of this would be snare drums or hand claps. However, on most other material, the Attack time must be slowed down to suit the program source. Figure 10 shows the same program source as Figure 9 with the attack time slowed down.

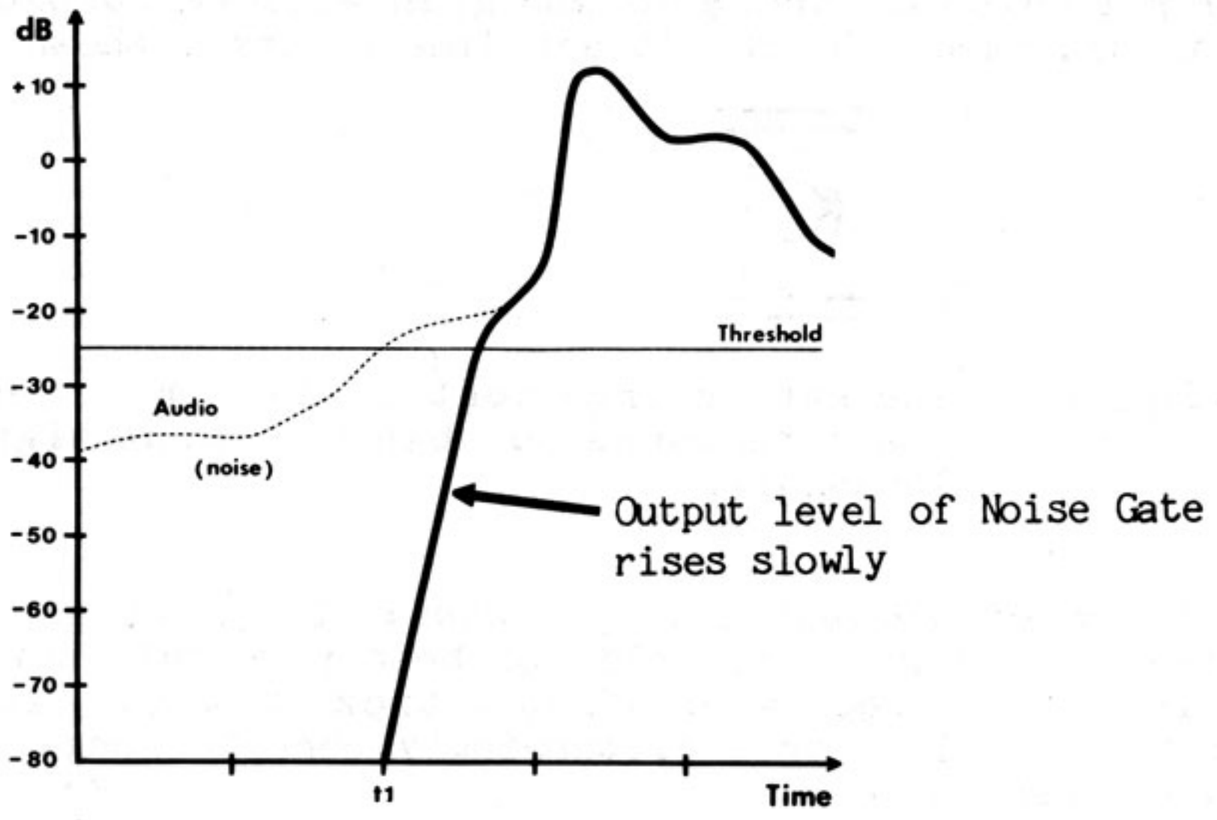


Figure 10 Example of slow attack time setting. Compared to Figure 9, the audio output level of the noise gate can be seen to rise much more slowly, "softening" the turn-on characteristic of the gate. No turn on click should be expected.

For initial set-up, it is advisable to start with the Attack control set fast (full counter clockwise), and to then adjust it so as to minimize any undesireable turn-on clicks. Note: as with many other aspects of

multichannel mixing, a turn-on click may seem like a problem when listened to alone, yet may cease to be a problem when listened to in context of a complete mix. On percussive rhythm tracks, an artificial click may actually add something to your sound, so don't slow down the gate's attack more than you really have to--unless you're aiming for some special effect.

RELEASE CONTROLS

Although a noise gate can always beat a human operator when it comes to turn-on speed, the gate lacks the ability to make sophisticated decisions about turning itself off when the input signal ceases, especially on complex and varying program sources. Most noise gates simply begin to turn off the moment that audio falls below threshold, with the fade-out rate adjustable by the operator. The SC-33 offers an additional control function as part of its release circuit, the HOLD time control. Used in conjunction with our FADE rate control, a much greater range of release characteristics are available to the operator than with other gates.

HOLD TIME

If desired, the HOLD control can keep the noise gate turned on even after the input signal has fallen below threshold, for a time period selected by the operator. During the HOLD cycle, the gain of the noise gate is constant at unity. Only after the entire HOLD time has elapsed does the gate begin to fade out. If at any time during the HOLD cycle the audio rises above threshold, the HOLD circuit is reset to its original condition and the HOLD cycle starts counting from zero again. For program material that is continuously varying around the threshold point, a long hold time will result in an output that simply stays on during quiet moments.

An example of the use of the HOLD circuit would be in gating an instrumental solo. It would be annoying to have the gate turning on and off each time a sax player paused to take a breath or wanted to leave some space in his solo. During each pause, background noise would be modulated up and down, which could be very distracting. Using a 2 second HOLD time here could insure that the track was left open until the solo was really over. In effect, the HOLD circuit is saying to the VCA, "yes, I'm aware that the audio has fallen below threshold, but wait a while before initiating any gain reduction, please".

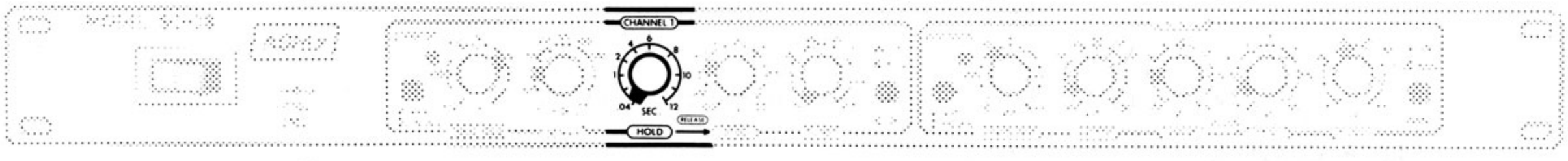


Figure 11 The HOLD control offers a wait-before-fade option.

FADE TIME

As soon as the Hold cycle has been completed, the noise gate will shut off at a rate determined by the Fade control. The SC-33's fade characteristic is extremely linear and is variable over an unusually wide range of times. It can even be used for long smooth, automatic fade-outs greater than 30 seconds.

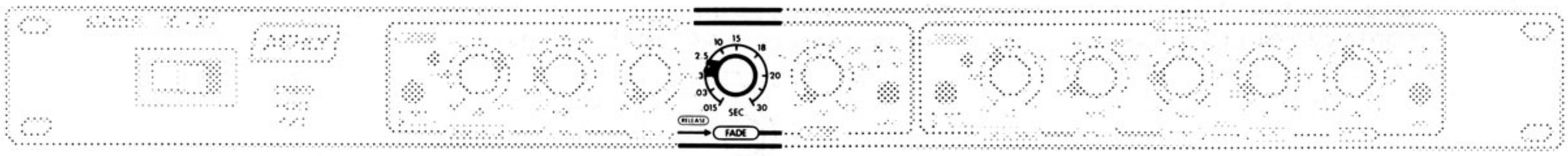
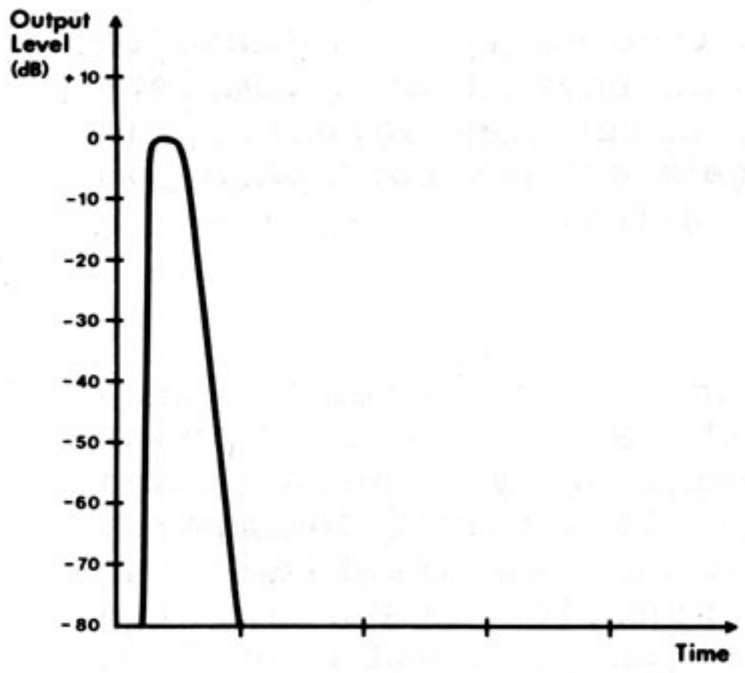
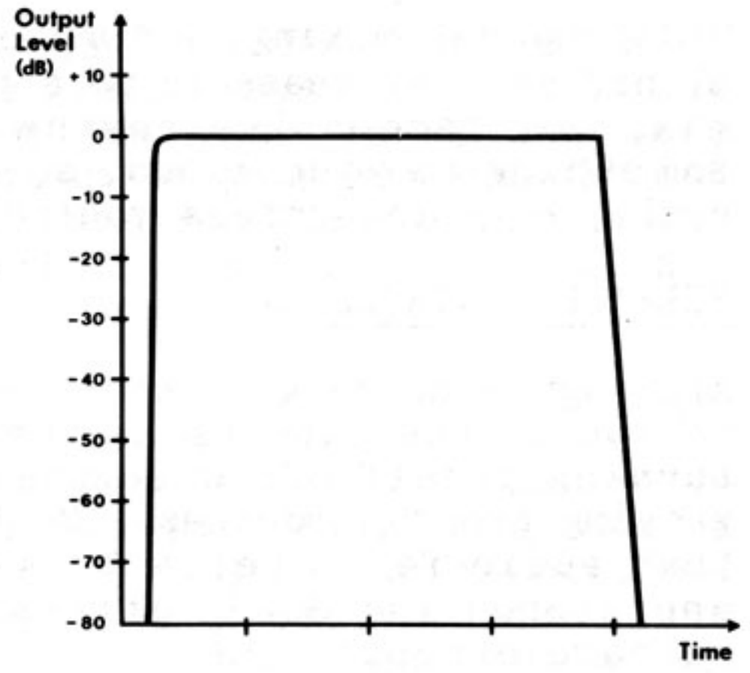


Figure 12 The Fade Control determines the fade-out rate when the input falls below threshold.

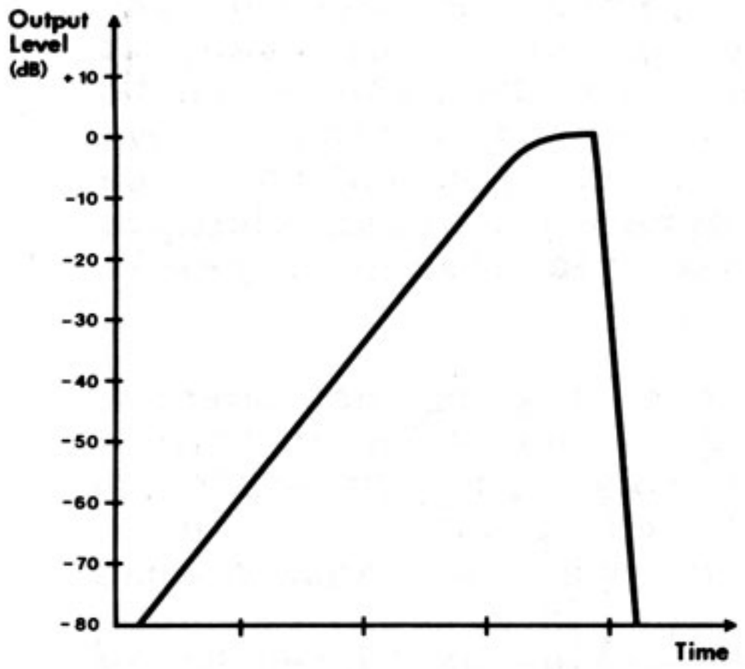
Various combinations of attack and release settings are shown in Figure 13.



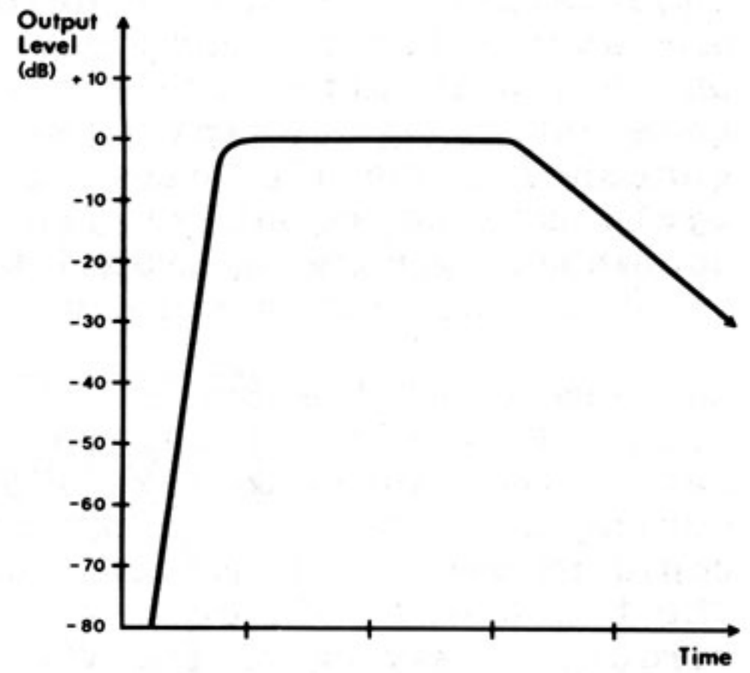
(a) Fast attack, short hold, fast fade.



(b) Fast attack, long hold, fast fade.



(c) Slow attack, short hold, fast fade.



(d) Medium attack, long hold, slow fade.

Figure 13 A few of the possible "on" cycles of the SC-33.

FLOOR CONTROL

Floor on the SC-33 refers to noise floor, and this control determines the amount of attenuation when the gate is in the off mode. It is not always desirable to mute background noise completely, since a very noisy program source, when switched quickly on and off, may be more bothersome than if it were just left on all the time. The resulting change in ambience calls attention to the noise problem. There are also situations in which it is beneficial to leave a little bit of inter-mic leakage and room ambience in a mix rather than making the mix ultra clean and possibly sterile. The Floor control of the SC-33 makes precise noise attenuation possible.

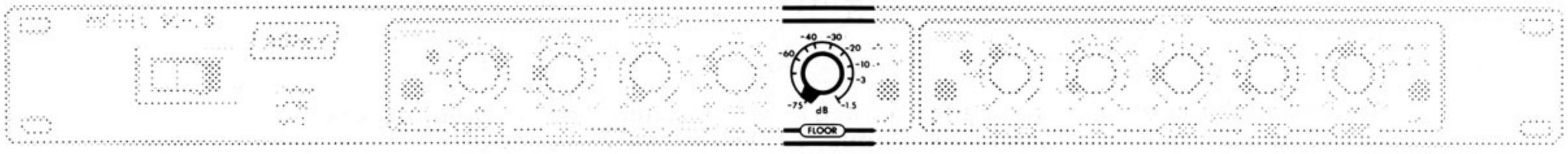


Figure 14 The Floor control determines the extent to which an audio signal is attenuated when the gate is off.

GATE IN/OUT SWITCH

This switch allows instantaneous A-B comparisons of processed and unprocessed signals. When switched to the OUT position, the SC-33's VCA is bypassed and the audio signal is routed directly from the balanced input amplifier to the output jack.

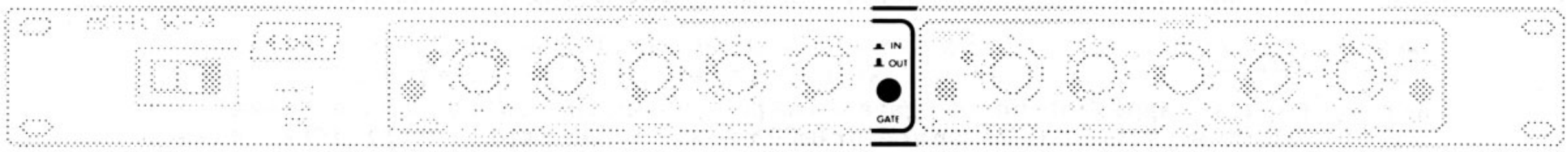


Figure 15 SC-33 Bypass switch.

KEY/NORMAL SWITCH

The Detector circuit of a noise gate is normally connected to the audio signal being gated. Under certain circumstances, you may wish to make the detector respond to an external signal instead of the normal audio input. For example; a bass drum track, connected to the key input jack, could be used to turn a synthesizer track on and off; each time the bass drum was struck, the synthesizer would be gated on, assuming that the synthesizer is connected to the regular audio INPUT jack. Another application would be frequency selective gating, described on page 12.

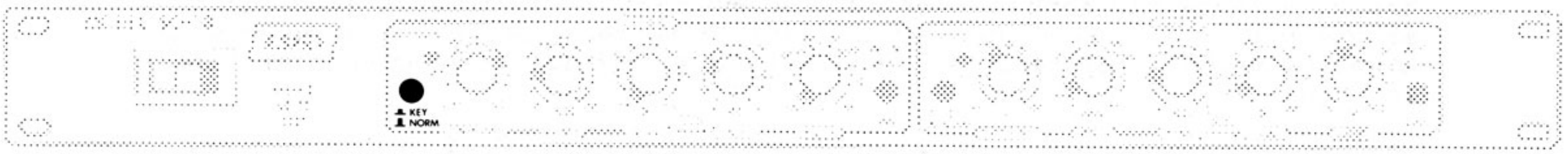


Figure 16 Use of the KEY input jack and the KEY switch allows the SC-33 detector to respond to an external keying signal.

THRESHOLD LED

This indicator lights whenever the audio source is above threshold, and is a helpful visual indicator when adjusting the Threshold control. Because it remains lit for the duration of any HOLD cycle that is used, it provides a positive indication that a FADE cycle has begun.

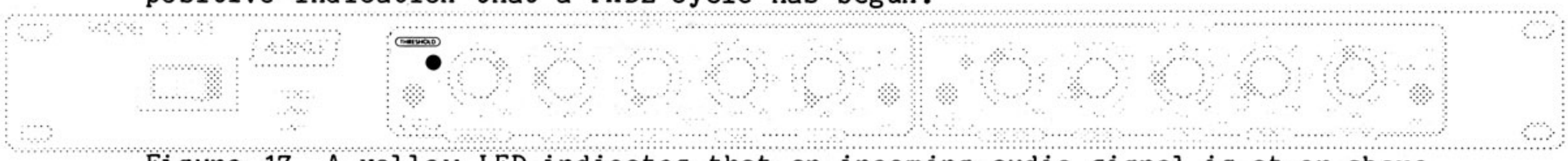


Figure 17 A yellow LED indicates that an incoming audio signal is at or above threshold, and remains lit whenever a HOLD cycle is in progress.

APPLICATIONS

RECORDING

In recording studio applications, noise gates are generally used on playback and mixdown rather than during the recording of basic tracks as a precaution against accidentally gating out something that should have been on the tape.

Automatic Muting

Many engineers make an effort to turn down faders that aren't active during a mix, to minimize the cumulative noise buildup from 16 or 24 tracks of tape. Remembering to turn the appropriate faders up and down at the right times requires a lot of concentration that would better be focused on the mix

balance. If your console is automated, the job is taken care of by a computer, but an inexpensive alternative for non-automated consoles is the noise gate. By carefully adjusting the gates for your vocal and solo instrumental tracks, these tracks will fade in and out of your mix quietly and automatically at pre-set and repeatable volume levels. Simply adjust the threshold slightly higher than the background noise level of the track, and the attack and release times to suit the material being processed.

Drum Tracks

A very popular application of gates in pop recording is to reduce leakage in multi-mic drum set-ups. A snare drum track, for example, will often have a fair amount of bass drum, hi-hat, and toms leaking into it. During mixdown, the net result of all this inter-mic leakage is a loose, muddy sound characterized by phase cancellations, excessive ringing, and spurious noise. Noise gating, especially on snare, kick, and toms, can produce a very tight, clean controlled drum mix. For this application, very fast attack times and relatively short fade times are most appropriate. The fade control will let you determine how much each drum is allowed to ring after it is struck. Varying the Floor control will allow you to mix in some leakage if that becomes desirable.

Frequency Selective Gating

If you find that the noise gate is being triggered falsely by noise on a track, such as air conditioner rumble or leakage from a kick drum, it is a simple matter to shape the response of the noise-gate's detector so that the unwanted signal component is ignored. The appropriate connections are shown in Figure 18.

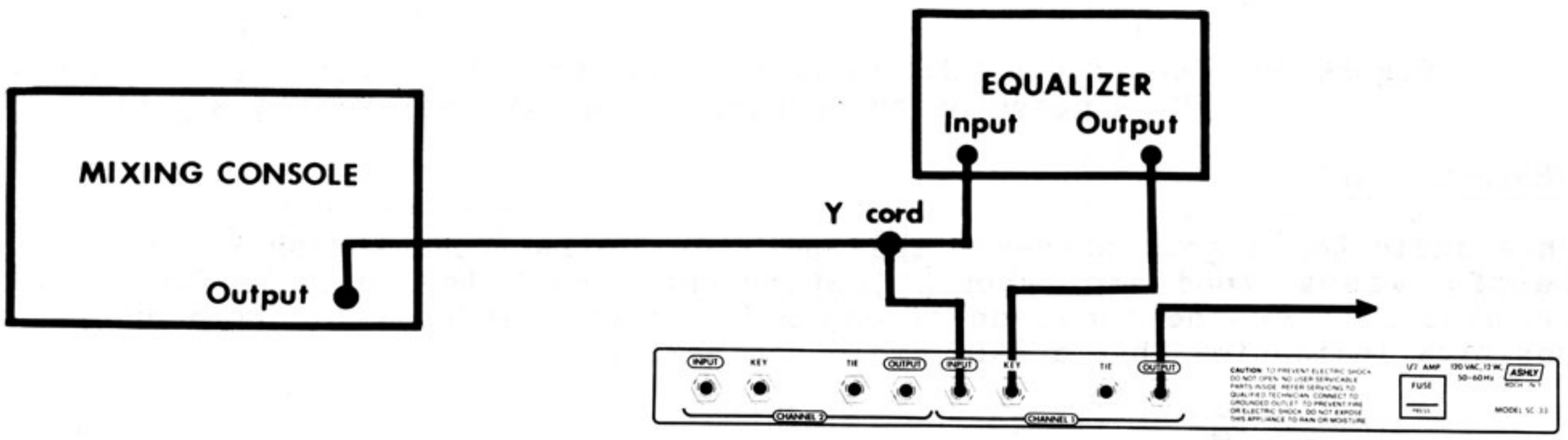


Figure 18 Frequency selective gating.

In this configuration, the audio signal which is being gated feeds both the regular audio INPUT and an equalizer. The output of the equalizer then connects to the KEY input. With the front panel KEY/NORM switch depressed to the KEY position, the SC-33's detector circuit will now respond to the equalized version of the program source. If, then, you wanted the gate to ignore any low frequency information, you would simply cut the appropriate low frequencies on the equalizer.

It is important to note that the actual audio output of the gate will not be an equalized signal; the frequency response of the music or speech you hear will be unaffected, since the program source is connected directly to the INPUT jack and has not undergone equalization. Only the detector circuit "hears" the equalized signal.

Controlling Decay Time

The SC-33 can be used to very accurately control the decay time of any musical

source, including drums, pianos, bells, or reverb systems. By varying the FADE control, the decay shape of any source can be shortened. If you gate the stereo returns of a reverb chamber, be sure to use the stereo TIE feature of the SC-33 so that the ambience of your mix does not image shift.

SOUND REINFORCEMENT

The SC-33 may be used in a variety of live applications, such as automatically muting vocal mics that aren't in use, eliminating the buzz from guitar amps between songs, and providing a tighter drum sound by gating each individual mic in a multi-mic drum setup. The danger of gating in a live situation is that you'll misjudge system headroom when a bunch of mics are gated off and have a sudden burst of feedback when several mics are suddenly opened up. Hovever, with some care and good judgement, these problems can be avoided. Connect the SC-33 to any console with individual channel sends and returns.

PA / Conference Room Use

In installations where several microphones are in use and all must be active, such as a board meeting where each of a dozen speakers has his own microphone, the ambient noise of the system can be very distracting. When each mic is individually gated, the overall system noise will be greatly reduced, improving intelligibility. For this type of use, try the following settings: 35msec. Attack time, 5 second Hold time, 2 second Fade time, 40dB Floor setting. These settings should provide a sufficiently fast turn-on time and eliminate false turn-off during conversational pauses.

BROADCASTING

Use the SC-33 on announcers' mics to silence multiple lavalier mics on panel discussions, to clean up dirty signal sources in your production studio, and to reduce telephone like noise on phone-in talk shows.

LIVE MUSIC PERFORMANCE

A noise gate can be the most important device in a contemporary musician's effects rack. With pedal and rack-mount effects devices becoming ever more popular, the need for noise reduction becomes more important. For example, a guitar player may have compressors, flangers, delays, and distortion effects cascaded prior to his amplifier, and between songs the equipment probably emits a steady drone of hum, buzz, and hiss. By inserting a noise gate as the last link in the effects chain, ambient noise can be eliminated. The gate will be similarly useful for electric bass, electronic keyboards, and any electronically amplified and processed acoustic instruments, such as violin, sax, flute, trumpet, or acoustic guitar.

SPECIAL EFFECTS

A little experimentation with the SC-33 will produce some unusual effects, notably the tight, chopped-off sound of a very fast release time, and the interesting fade-in effects obtainable with slow attack times. Guitar players can simulate a short "pedal fade" sound with slow Attack times, and the basic character of fast transient material such as snare drums can be altered, even producing a "backwards tape" sort of effect.

Interesting effects such as a kick drum triggering a synthesizer or a hand clap gating on a piano can be accomplished by using the KEY input.

STEREO COUPLING

When a patch cord is connected between any two TIE points, those two channels will track together while maintaining a true stereo image. This immediately

raises the question of which channel then determines the Attack, Release and Floor parameters of the stereo pair. If one Fade control is set short and the other is set long, which will govern the action of the two gates? The answer is that either or both channels can determine the time constants of the pair. Assuming that both channels will be seeing input signals that are above threshold, the channel reaching threshold first will determine the Attack characteristic for both channels, and this same channel may also determine the Release times for both channels unless the other channel subsequently reaches threshold and is adjusted for a longer release time than the first channel was, in which case it will become the channel that rules release. This priority system is much less confusing than it looks on paper, and a little hands-on experience will go a long way toward understanding it.

It's also possible to deliberately make one channel a "master" and all other tied gates "slaves". By depressing the KEY/NORM switches of all the slave channels to the KEY position, their detectors will be listening to their respective KEY inputs, which, if not connected to an audio source, will never reach threshold. All of the "slave" detectors will be disabled, and only the "master" channel's detector settings will then have any effect.

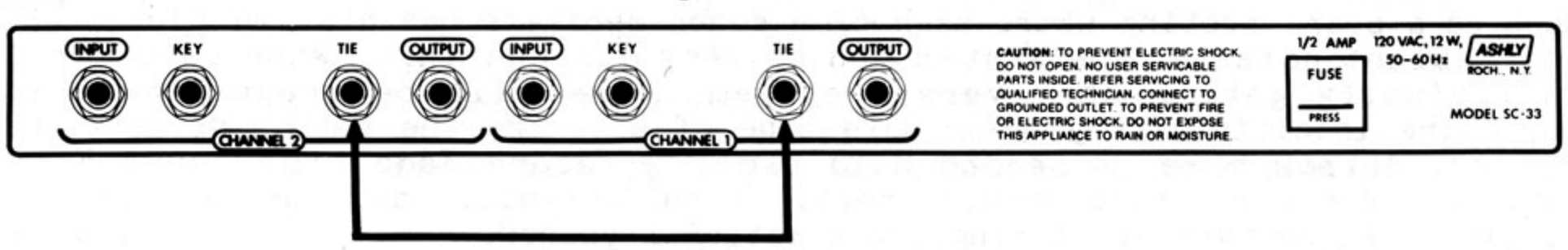


Figure 19 Any two channels of gating may be tied together by inserting a patch cord between their respective TIE points. An unbalanced cord is sufficient.

QUICK SET-UP GUIDELINES

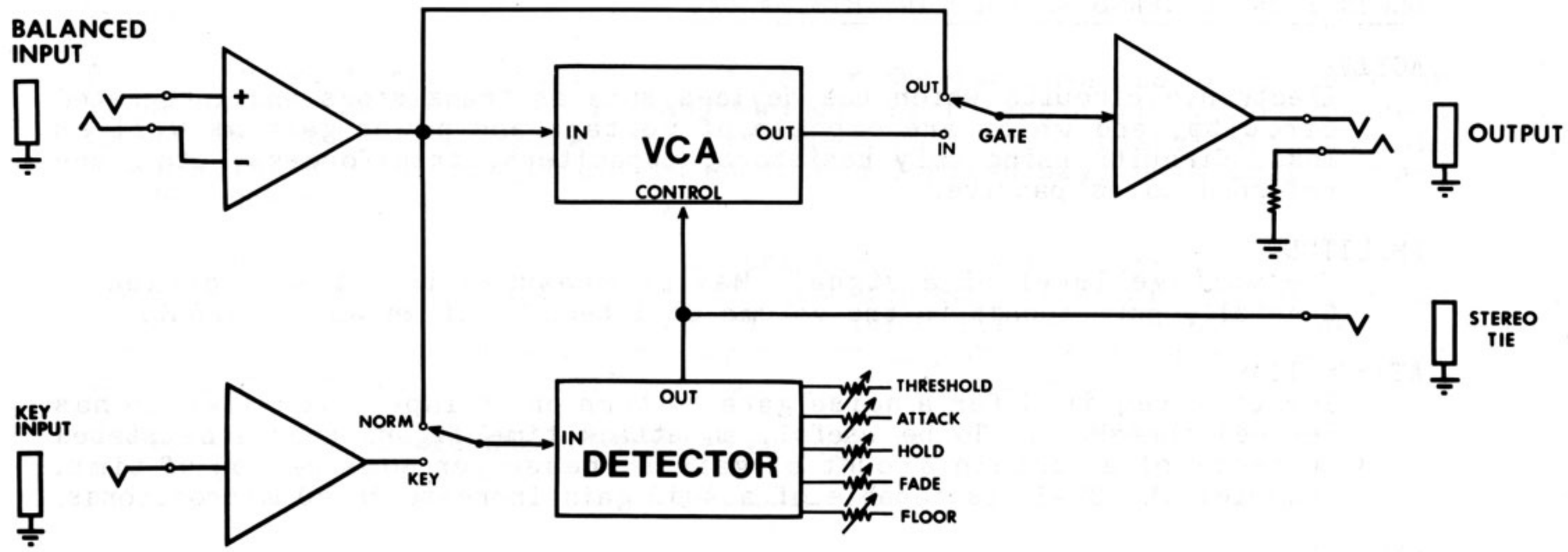
1. Start with the KEY/NORM switch set to NORM, the GATE switch IN, and all controls set fully counter-clockwise. Any audio appearing at the input should now be heard at the output, and the threshold LED should be lit.

2. Wait for a silence or pause in the program, and turn the THRESHOLD control clockwise until you find the point where the ambient noise floor no longer lights the LED. The gate's output will now be silent.

3. Moving from left to right across the front panel, adjust the ATTACK and RELEASE controls to suit the material being processed. The FLOOR control can be left at full attenuation under most circumstances, unless you deliberately want to introduce some leakage into a mix, or where drastic changes in the ambient noise level are too obvious in a final mix.

Typical Settings

Source	Attack	Hold	Fade
Voice	60msec.	2-6sec.	2.5sec.
Drums	10μsec.	40msec.	.3sec.
Bass	10msec.	.1sec.	1.5sec.
Guitar Solo	50μsec.	1.5sec.	5sec.
Reverb returns	80msec.	5sec.	15sec.
Auto Fade-out	35msec.	2sec.	30sec.



SC-33 BLOCK DIAGRAM

CIRCUIT DESCRIPTION

The SC-33's operation can be broken down into two functional building blocks: a voltage controlled amplifier (VCA) which performs the actual task of muting or passing the audio signal, and a detector circuit which is responsible for providing the control voltage that determines the gain of the VCA.

Use of a VCA as a gain control element provides several advantages in a noise gate, including superior audio fidelity, accurate tracking of two or more units tied for stereo operation, and attack/release speeds much faster than those possible with optically coupled devices. The Ashly VCA used in the SC-33 is a Class-A device exhibiting extremely low distortion, low noise, low control voltage feedthrough (turn-on click), and excellent thermal stability.

The detector circuit encompasses all of the front panel controls and generates a control voltage which gives the SC-33 its turn-on and turn-off characteristics. Through the use of unusually wide-range time constant options and a unique dual release-time circuit, a great variety of gating effects can be achieved. A very fast (10 microsecond) Attack time insures that the leading edge of fast transient material such as snare drums will never be lost, and the Fade control offers smooth, linear fade times of up to 30 seconds. The Hold control offers a "wait before fading" option to prevent premature initiation of the Fade cycle, useful when processing material that contains natural pauses, such as speech and instrumental solos. The Threshold range is greater than 60dB, making the SC-33 useful for both professional and semi-pro signal levels. Other thoughtful features include detector symmetry to within 1/4dB, a hysteresis circuit to absolutely prevent chattering near threshold, high slew-rate circuitry throughout, active balanced inputs, and a 16 gauge steel chassis.

DEFINITION OF TERMS AS USED IN THIS MANUAL

ACTIVE

Electronic circuits which use devices such as transistors and integrated circuits, and which are capable of voltage and power gain as well as loss. Circuits using only resistors, capacitors, transformers, etc., are referred to as passive.

AMPLITUDE

The voltage level of a signal. May be measured in volts or decibels. Generally corresponds to the volume or intensity of an audio signal.

ATTACK TIME

The time required for a noise gate to turn on an input signal which has reached threshold. To be useful, an attack time figure should be stated in terms of a certain amount of gain increase per some period of time. Example: the SC-33 is capable of a 40dB gain increase in 10 microseconds.

BALANCED

A 3-wire circuit arrangement in which two conductors are designated as signal lines (+ and -), and the third is a shield and chassis ground. The signal lines are of opposite polarity at any given moment, and are of equal potential with respect to ground. Balanced input amplifiers are used on all Ashly SC series products to improve hum and noise rejection. Jumpering signal minus (-) to ground provides an unbalanced input.

CHATTER

A condition occurring in some noise gate designs in which the detector becomes confused when audio signals hover right around threshold. The gate will erratically sputter on and off producing obnoxious distortion.

dB

A unit by which audio levels can be COMPARED. Often thoroughly misunderstood are the concepts that decibels represent the level of a signal compared to some reference level (15 dB cut means a certain level less than a previous level --- the absolute level of the signal need not be known), and that decibels are a logarithmic unit.

Some handy numbers to remember when dealing with decibels:

+3 dB = Double Power
+6 dB = Double Amplitude, Quadruple Power
+10 dB = 10X Power
+20 dB = 10X Amplitude, 100X Power

dBm

A unit of measurement in decibels where 0 dBm = a power level of 1 milliwatt into a 600 ohm load. Originally defined by the telephone company to measure line levels.

dBV

Decibel Volts, an update of the dBm definition where 0 dBV = the same voltage level as 0 dBm, but with no regard to power or impedance. 0 dBV = 0.778 Volts. This unit is much more appropriate for modern audio equipment with high impedance inputs and low impedance outputs.

DETECTOR

That portion of the noise gate circuit which senses the level of input audio and decides whether the gate should be turned on or off. The detector in the SC-33 also controls such parameters as Attack and Release times. The detector's output is a DC control voltage which directly feeds the control port of the VCA.

DISTORTION

Generally refers to ANY modification of an audio signal which produces new frequencies which were not in the original. Examples are harmonic distortion, where a circuit adds overtones to a fundamental signal, and intermodulation or IM distortion, where two frequencies beat together to produce sum and difference frequencies.

EQUALIZATION

Modification of the frequency response of an audio system for either corrective or enhancement purposes.

FADE TIME

The time required to fade the output of the gate to a condition of "silence". Since silence is relative, fade time should be stated in terms of a certain amount of attenuation per a certain period of time. For example, the SC-33 can be adjusted to fade its output level 40dB over a time period ranging from 10 milliseconds to 30 seconds.

FEEDBACK

Generally refers to any process where an output is in some form routed back to an input to establish a loop. Negative feedback tends to be be self stabilizing, while positive feedback causes instability.

FLOOR

An abbreviation for Noise floor. In the SC-33, this defines the residual noise level which will appear at the gate's output when the gate is in the off or attenuation mode. For example, if a 0dBV sine wave is connected to the gate's input and the Threshold control is set to +20, the gate will seek to attenuate the output. If the Floor control is set to -75dB, then that portion of the input signal which manages to leak through to the output will be at least 75dB below nominal operating level, ie., very minimal. The actual noise level of the SC-33 with no signal connected to the input is, of course, much lower, approximately -88dBV.

FREQUENCY

The repetition rate of a waveform. Frequency is measured in Hertz. One cycle per second (cps) is one Hertz (Hz). The higher a note on a musical scale, the higher its frequency.

FREQUENCY RESPONSE

Refers to relative gain and loss at various frequencies across the audio band. May be illustrated by a graph called a frequency response plot, usually graphing decibels vs. Hertz or octaves.

HEADROOM

Refers to the increase in level above normal operating level that can be obtained without clipping. Usually expressed in dB.

HOLD

A timing circuit unique to the Ashly SC-33 noise gate. It holds the gate in the "on" state even after the input signal has fallen below threshold, for a period dictated by a variable front panel control.

IMPEDANCE

Essentially the AC equivalent of resistance. It describes the drive capability of an output, or the amount of drive required for an input at any given signal level.

KEY

An external signal used to trigger the noise gate.

KHz
Kilohertz. 1,000 Hertz.

LEVEL
The magnitude of a signal, expressed in decibels or volts.

LINE LEVEL
Meaning "somewhere around 0dBV" as opposed to MIC level of around -40dBV.

MILLISECOND
1/1000th of a second

MICROSECOND
1/1,000,000th of a second

OHM
The unit of electrical resistance or impedance.

PREAMPLIFIER
The first stage of amplification, designed to boost very low level signals to line level.

SOURCE NOISE
A very general term which includes any and all noise that accompanies an audio signal as it appears at the input of some audio device. Although an audio device may contribute noise of its own, that new noise must be distinguished from the earlier noises that accompanied the signal. For example, a vocal solo is being recorded onto a tape recorder and an air conditioner is rattling in the studio during the recording. Although the tape recorder will be responsible for adding its own noise to the audio signal, ie. hiss, it is not responsible for the air conditioner noise, which is considered source noise from the perspective of the tape recorder.

THRESHOLD
An arbitrary signal level, above which a noise gate will turn on. To suit varying signal sources, the threshold level of the SC-33 is variable over a 60dB range. It is important to realize that raising the audio input level of a noise gate is equivalent to lowering the Threshold.

TRANSIENT
A sudden burst of energy in an audio signal, such as a breath blast in a microphone, the sound of a snare drum, or a deep scratch in a record. Transients frequently reach peak levels of 10 to 30 dB above standard operating level, and may cause distortion or even damage to equipment.

UNITY GAIN
Output level = Input level.

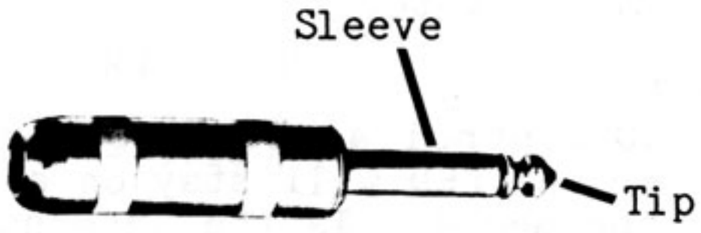
VCA
Voltage Controlled Amplifier. An amplifier capable of both gain and loss, controlled by a variable DC voltage.

WIRING, PHONE PLUG AND XLR

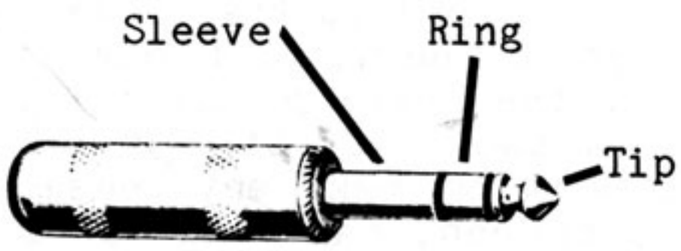
A stereo phone plug is wired + to the tip, - to the ring, and shield to the sleeve. For a mono phone plug, combine - and shield, and connect both to the sleeve.

An XLR (3 Pin) connector is wired + to pin 3, - to pin 2, and shield to pin 1.

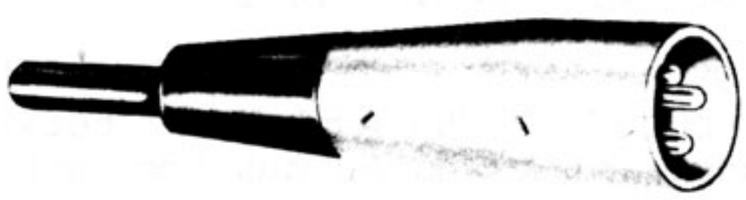
Mono Phone Plug:
(for unbalanced inputs and outputs)



Stereo Phone Plug:
(for balanced inputs and outputs)



XLR Type Connector:
(Male Shown)



TROUBLE SHOOTING TIPS

NOTE: Unshielded cables, improperly wired connectors, and cable with broken strands of wire rattling around are very common problems. Use good quality cables with good quality, correctly wired connectors.

NO OUTPUT

Check AC Power. Is the pilot light on? Check input and output connections--are they reversed? Are you sure you have an input signal?

CONTROLS HAVE NO EFFECT

Is the GATE IN/OUT switch IN? If not, the gate is completely bypassed. Is the KEY switch set correctly? It should be OUT (NORM) for normal operation of the noise gate.

LED STAYS ON ALL THE TIME

Where is the HOLD control set? If it is set anywhere other than full counter-clockwise, the LED will stay on even as the input signal crosses above and below threshold. Is the Threshold set correctly? If too low, then the ambient noise of the track will keep the gate on.

THE ATTACK OF SOME MUSICAL SIGNALS IS GETTING CHOPPED OFF

Is the Threshold control set properly? If it is adjusted too high, the gate will only respond to the loudest portion of a wave form, and musical nuances closer to the noise floor will be lost. Try a lower setting if the ambient noise level permits it. Where is the Attack control set? Try a faster attack. If that doesn't work, try a slower attack time. This doesn't seem to make any sense at first, but some program sources, particularly speech, can fool you into thinking that something in the attack is being lost when this isn't the case. A slower attack may sound more natural.

A CLICK IS HEARD WHEN THE GATE TURNS ON

Attack Time is set too fast. See page 7.

EXCESSIVE HUM OR NOISE

Hum is often caused by a "ground loop" between components. Try using the suggested balanced input and output hookups if the other pieces of equipment used in conjunction with the SC-33 have balanced inputs and outputs. See page 4. Noise can also be caused by insufficient drive levels. Make sure you are sending a nominal 0 dBV line level signal to the unit.

If you are still having problems, get in touch with your Ashly dealer, or call the factory direct toll free at (800)828-6308. In NY state dial (716)544-5191.

SPECIFICATIONS SC-33

FREQUENCY RESPONSE	5Hz to 100kHz +0, -2dB
THD, 20Hz - 20kHz, +10dBV Input	<.02%
IM DISTORTION, 20Hz - 20kHz, +10dBV Input	<.02%
CROSSTALK FROM KEY INPUT @ 1kHz	-85dB
NOISE, 20Hz - 20kHz	-85dB
GAIN	Unity
DETECTOR SYMMETRY	±0.25 dB
CONTROL VOLTAGE FEEDTHROUGH	-70 dBV typical
MAX INPUT/OUTPUT LEVEL	+20 dBV
SLEW RATE	>10 V per microsecond
INPUT IMPEDANCE	10k ohm Balanced Bridging (Active)
OUTPUT IMPEDANCE	100 ohm, terminate with 600 ohms or greater