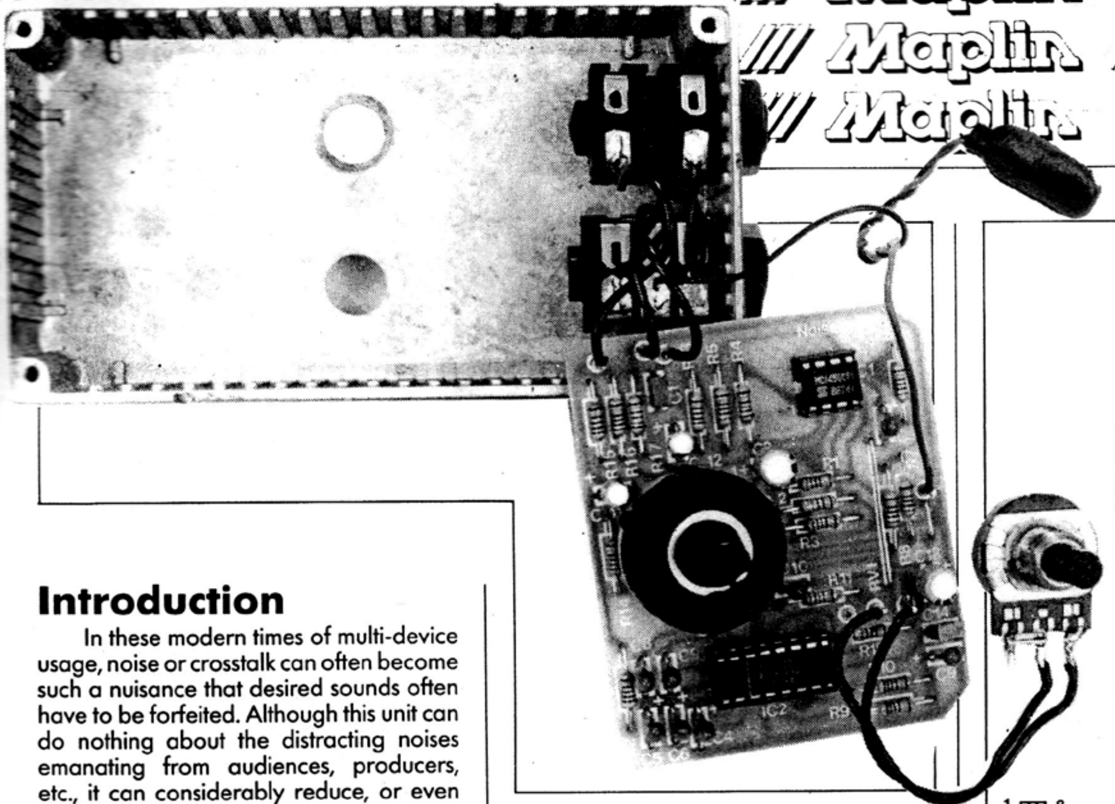

Introduction

In these modern times of multi-device usage, noise or crosstalk can often become such a nuisance that desired sounds often have to be forfeited. Although this unit can do nothing about the distracting noises emanating from audiences, producers, etc., it can considerably reduce, or even eliminate, pause noise from devices in which it is otherwise impossible to improve on signal to noise ratios.

Several types of noise gate are available for this kind of noise elimination – 'snap-off' units – programmable types – externally controlled units - low level expansion devices, etc. In order that the unit may have as wide a range of applications as possible, the low level expansion or dynamic gate has been selected. This type tends to be less critical in set-up and general use, giving a more musically acceptable sound entrance and exit than the 'sudden shutdown' units.

Having a wide range of user adjustable characteristics, it should find many a useful working place with, for example, guitar/organ/keyboards levels to mixer desk/P.A./recording levels. Not only can it be used for its main purpose, that of closing down noise or unwanted signals below a selected level, but as an effect in its own right, creating soft attack, bowing type characteristics.

Noise gates have been in use for considerably longer than most people would imagine. In fact, the first application of these devices was in the 1930's, when

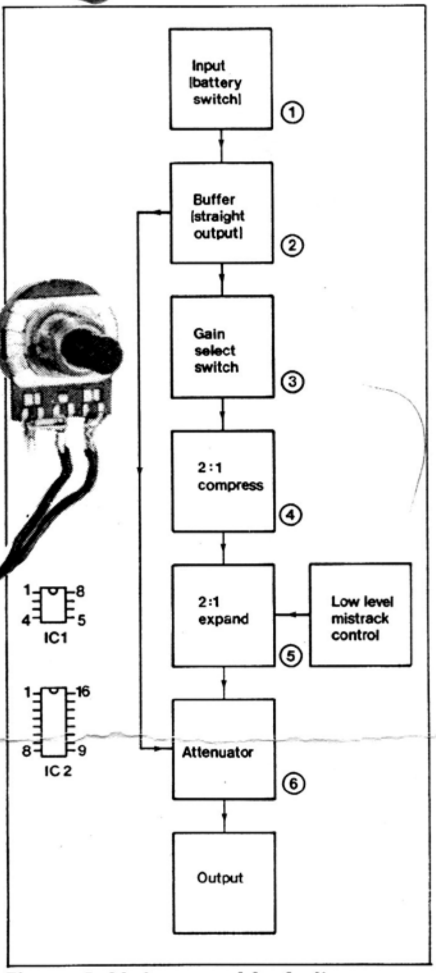

Figure 1. Noise gate block diagram.

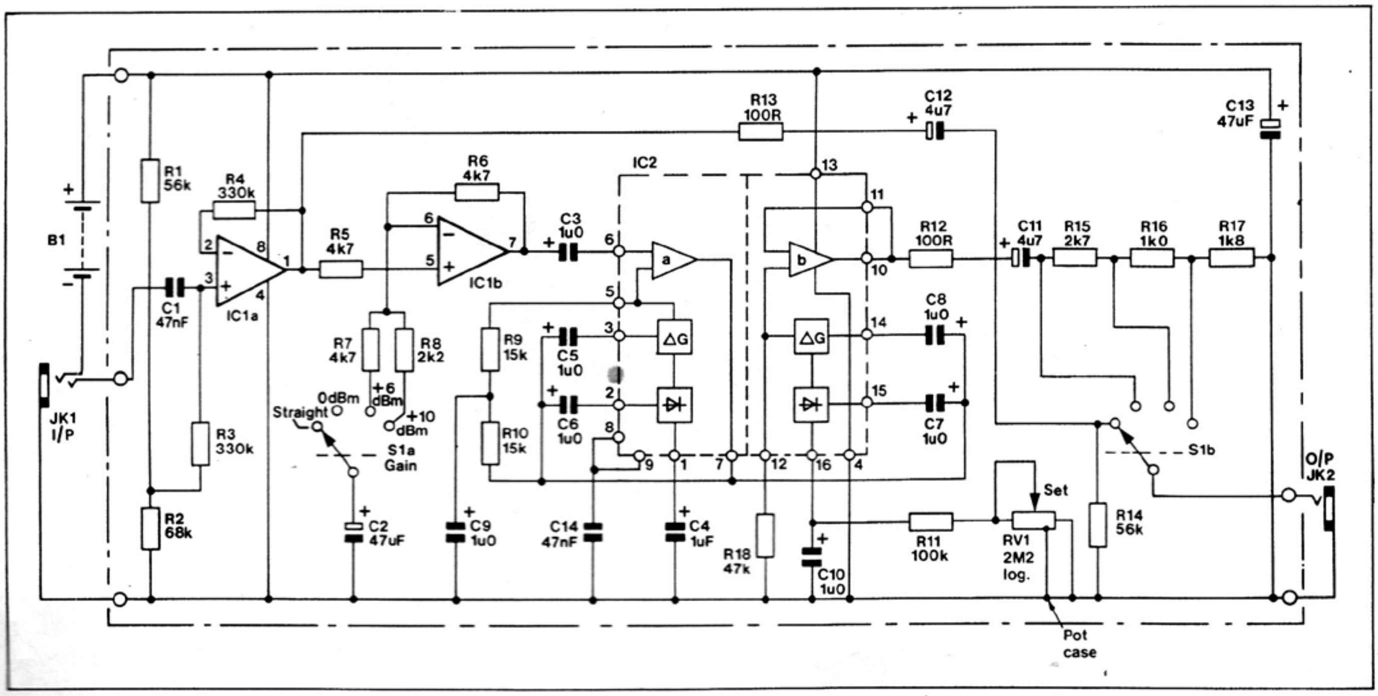

Figure 2. Circuit diagram for noise gate.

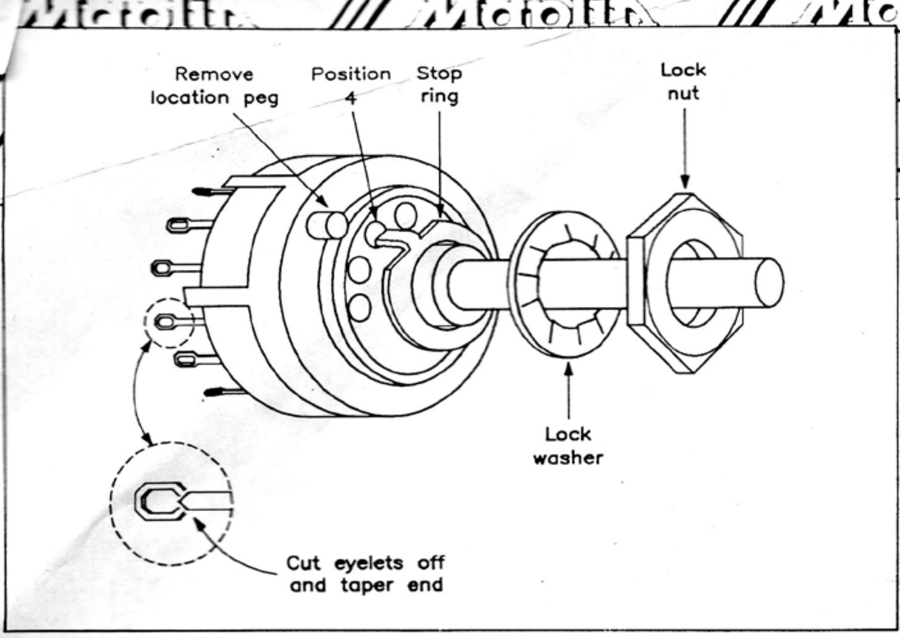

Figure 5. Switch location peg.

The rest of the construction details relate to the cased unit, for panel mounting all that is necessary is to 'flylead' the input, output and RV1 wiring. Circuit board fixing is effected by the rotary switch on which the board is mounted. PCB assembly should begin with the resistors, the offcuts from the resistors are used to make two wire links, which should be fitted next. The capacitors and ICs may now be fitted. Double-check polarised capacitor and IC orientation. Two lengths of hook-up wire are required for connection to RV1, these are made from the hook-up wire provided, remember that since RV1 is mounted above the board, components beneath it should lay flush to the board.

Solder the battery connector with the positive lead connected to the pin next to R7, and the negative lead to the centre tag of the stereo socket. See Figure 4.

Then fit the rotary switch. This switch is normally obtained with solder type eyelet tags which need simple modifications for PCB fitting. Cut these eyelets off, as close to the solder hole as possible using a pair of snips, taper the ends to assist in aligning and fitting into the board, you will also need to cut off the location peg on the switch, see Figure 5. Next, the stop ring needs to be moved, turn the switch to the furthest position anticlockwise and fit the stop ring tag in hole number 4.

Using the hook-up wire, 0V, input and output leads can be connected to the board.

After making sure all components have been fitted correctly, a few quick checks with a multimeter will verify correct basic operation. Switch the meter to the 100mA DC current range. Connect the negative lead of the meter to the battery 0V, this is identified from the symbols on the side of the battery, connect the +V terminal of the battery clip onto the battery. With the remaining meter probe, briefly touch the battery clip 0V terminal, if a reading of less than 10mA shows all is well. Remove the meter from the circuit. If you obtain a reading of more than 15mA, something is wrong! Check to see if you have any solder blobs shorting out the PCB tracks, also check to see if you have inadvertently inserted the IC's with the wrong orientation, or is there an incorrectly fitted tantalum capacitor? If a capacitor or IC has been incorrectly fitted and power applied to the circuit, replace the offending component(s) even if it still works, otherwise it may become faulty after a short time. Voltage checks on the outputs of each IC with a meter set to the 20V range will confirm correct operation of the circuit, pins 1 & 7 on IC2 should be approximately 5V and pins 7 & 12 of IC2 approximately 3·6V. (These voltages are related to internal references that remain constant, and therefore allow for battery voltage reduction.)

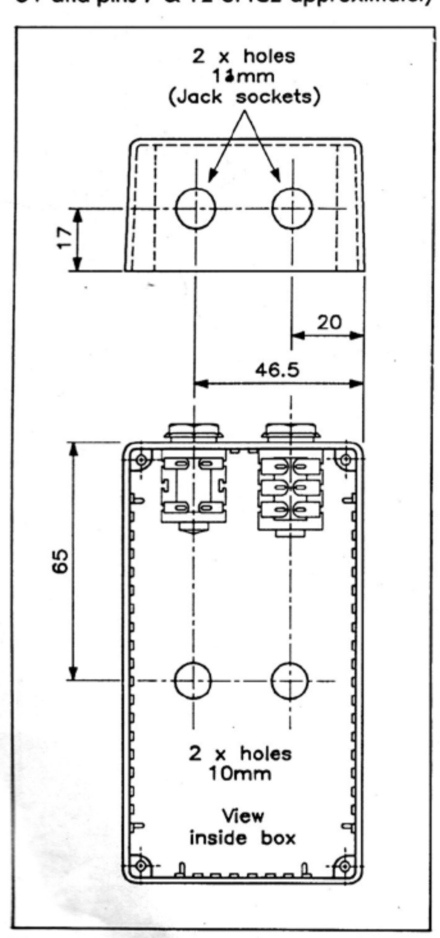

Figure 6. Drilling instructions.

All that remains now is to mount the unit in a suitable case. The metal case suggested in the parts list is ideal since it is small, easily workable, and provides good screening. Two appropriate holes in both the top and the side are all that are needed, see Figure 6 for drilling instructions. The whole assembly is then fitted into the main case body and secured by the switch, fitting the jack sockets into the case first will make assembly easier, ensure the jack sockets do not short out against the lid of the case when fitted. A wire link soldered to the body of RV1, with the other end attached to the 0V pin of the potentiometer, will provide case screening, see Figure 4.

Operation and Application

To obtain maximum usage of the unit, its functional characteristics should be fully understood. This can be achieved mainly by studying the response curves. The 1:1 gain slope (Figure 7) reference allows you to visualise the deviation from the normal input/output characteristics. The curve closest to the 1:1 gain slope shows the input/output of the device when set in any gain position with RV1 set for minimum effect (clockwise). Note that input signals or noise below −60dBm (horizontal axis) will be attenuated reducing its effective level as the output deviates rapidly away from the 1:1 gain slope towards −85dBm (vertical axis), This is the operating region of the unit. Signals above −60dBm will have a virtually normal dynamic range. The unit will completely shut down below −38dBm with RV1 set to maximum (this setting will shut off most extraneous noises).

Since the compander section uses rectified signal levels in its operation, speed of recognition of these levels becomes a compromise between several factors, one of which is the loading of the circuitry by RV1. It should, therefore, be remembered that the unit will take a finite time to attack and decay and that these items bear a direct relationship to the threshold level (that level selected at which deviation from normal characteristics occurs), and change in amplitude of the input signal. For example, with the noise gate set at 0dB gain and input levels gated from infinity to 0dBm, attack times will vary for minimum to maximum threshold settings.

Before continuing with typical applications, it is pointed out that this unit is designed for 'pause' noise reduction, and has no "magic ingredient" for reducing any noise present in actual signals.

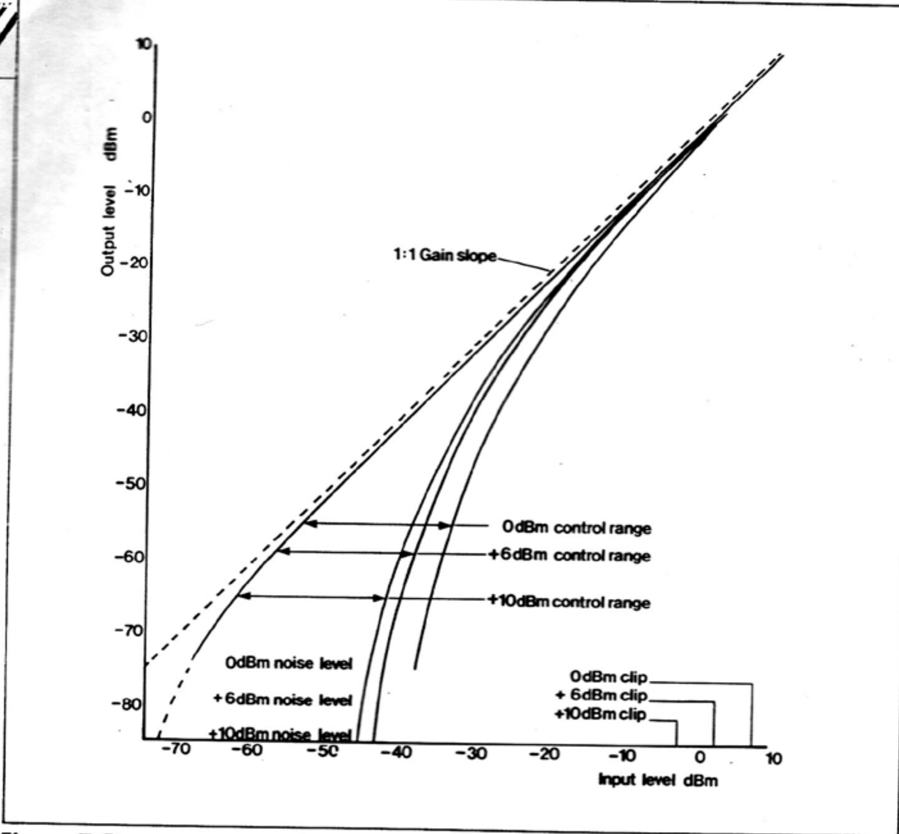

Figure 7. Response curves for noise gate.

Wherever noise exists, in-line connection of the noise gate should discriminate and further separate it from the required signal. Probably the lowest levels encountered will be from microphones and low output guitars (low Z mics will have to be transformed or the unit modified to suit). In the case of microphones, crosstalk (pick-up from sources other than that intended) will be the problem to cure. The +10dBm setting will allow maximum dynamic range with fast attack to be achieved when dealing with low level crosstalk (drum kit miking, awkward placement instrument miking, outside recording in windy conditions excluded).

Typical Applications

Guitarists working in cramped conditions may encounter induced hum from closely situated amps, especially via single coil pick-ups. This often embarrassing situation can be alleviated by using the noise gate between guitar and amplifier, adjusting the threshold control for the best overall effect. Another interesting use of the noise gate is for changing the attack characteristics of an instrument. If the threshold level is taken to extremes, soft attack type sounds can be created. Similar treatment can be applied to special effects units (Echo, Chorus, Phasing, Distortion, etc.), by using the noise gate between the last unit and its main amplification. The +6dB mode will be the norm in this application, since typical peak levels may introduce clipping.

Multi-instrument set-ups can often make the background noise unacceptable, considering that all units probably remain set at the required output level when only one or two instruments are actually being used at any time. Fitting individual noise gates to the noticeably 'noisey' instruments will automatically shut off their outputs when not in use.

Extreme levels of noise, or higher input levels, can be coped with in the 0dB mode, making this setting suitable for most line and mixer desk levels.

It is also possible to reduce fixed delay times of instruments or reverberation treatments by suitable setting of the noise gate control parameters.

NOISE GATE PARTS LIST

RESISTORS: 0·6W 1% Metal Film

R1,14	56k	2	(M56K)
R2	68k	1	(M68K)
R3,4	330k	2	(M330K)
R5,6,7	4k7	3	(M4K7)
R8	2k2	1	(M2K2)
R9,10	15k	2	(M15K)
R11	100k	1	(M100K)
R12,13	100Ω	2	(M100R)
R15	2k7	1	(M2K7)
R16	1k	1	(M1K)
R17	1k8	1	(M1K8)
R18	47k	1	(M47K)
RV1	2M2 Pot Log	1	(FW29G)

CAPACITORS

C1,14	47nF Monocap	2	(YY10L)
C2,13	47μF 16V Minelect	2	(YY37S)
C3-10	1μF 35V Tantalum	8	(WW60Q)
C11,12	4μ7F 35V Minelect	2	(YY33L)

SEMICONDUCTORS

IC1	1458C	1	(QH46A)
IC2	NE571	1	(YY87U)

MISCELLANEOUS

S1	Switch 3-Pole 4-Way Rotary	1	(FH44X)
SK1	Jack Socket Stereo ¼in	1	(HF92A)
SK2	Jack Socket Mono ¼in	1	(HF90X)
	PP3 Clip	1	(HF28F)
	Pin 2145	6 pins	(FL24B)
	DIL Socket 8-Pin	1	(BL17T)
	DIL Socket 16-Pin	1	(BL19V)
	Hook-up Wire 7/0·2mm Black	300mm	(BL00A)
	PC Board	1	(GA43W)
	Constructors Guide	1	(XH79L)

OPTIONAL (not in kit)

	Front Panel	1	(JR87U)
	Box DCM5004	1	(LH71N)
	Collet Knob Low Cost	2	(YG40T)
	LC Cap Grey	2	(QY03D)
	Stick-on-Feet Large	1 Pkt	(FW38R)

The above items, excluding Optional, are available as a kit:
Order As LK43W (Noise Gate Kit)
The following items are also available separately:
Noise Gate PCB **Order As GA43W**
Noise Gate Panel **Order As JR87U**