

DN514^{Plus}

OPERATORS MANUAL

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DN514 Plus Quad Autogate Operators Manual

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In line with the company's policy of continual improvement, specifications and function may be subject to change without notice. This Operators Manual was correct at the time of writing. E&OE.

IMPORTANT SAFETY INSTRUCTIONS



These symbols are internationally accepted symbols that warn of potential hazards with electrical products.



The lightning flash with arrowhead symbol, within an equilateral triangle is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any of the ventilation openings. Install in accordance with the manufacturers instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments / accessories specified by the manufacturer.
12. Unplug this apparatus during lightning storms or when unused for long periods of time.
13. Refer all servicing to qualified personnel. Servicing is required when the apparatus is damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

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Company Registration No: 2414018



DECLARATION OF CONFORMITY

We, **Klark Teknik Group (UK) PLC**

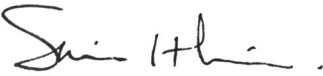
of, **Klark Teknik Building, Walter Nash Road, Kidderminster, Worcestershire, DY11 7HJ**

Declare that a sample of the following product:-

Product Type Number	Product Description	Nominal Voltage (s)	Current	Freq
DN514 Plus	Quad Auto Gate	115V AC 230V AC	200mA 100mA	50/60Hz

to which this declaration refers, is in conformity with the following directives and/or standards:-

Directive(s)	Test Standard(s)
89/336/EEC Electromagnetic Compatibility Directive amended by 92/31/EEC & 93/68/EEC 73/23/EEC, Low Voltage Directive, amended by 93/68/EEC	
Generic Standard Using EN55103 Limits and Methods	EN50081/1
Class B Conducted Emissions Pavi	EN55103
Class B Radiated Emissions Pavi	EN55103
Fast Transient Bursts at 2kV	EN61000-4-4
Static Discharge at 4kV	EN61000-4-2
Electrical Stress Test	EN60204
	UL6500-99
	EN60065:1998
	E60065-00

Signed: 

Date: 15th September 2003

Name: Simon Harrison

Authority: Research and Development Director, Klark Teknik Group (UK) PLC

Attention!

Where applicable, the attention of the specifier, purchaser, installer or user is drawn to special limitations of use which must be observed when these products are taken into service to maintain compliance with the above directives. Details of these special measures and limitations to use are available on request and are available in product manuals.

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Thank you for selecting the Klark Teknik DN514 Plus Quad Autogate. The unit continues the Klark Teknik tradition of providing superb audio performance, technical accuracy and rugged reliability.

Precautions

Do not install this unit in a location subjected to excessive heat, dust or mechanical vibration.

Voltage Selection and Power Connection

Connection is made by means of an IEC standard power socket. The rear panel text indicates the voltage range required for satisfactory operation of the unit

Before connecting this unit to the mains supply, ensure the fuse fitted is the correct type and rating is as indicated on the rear panel, adjacent to the fuse holder.

Safety Warning

This unit is fitted with a standard fused IEC mains inlet: For safety reasons the earth lead should never be disconnected.

To prevent shock or fire hazard, do not expose the unit to rain or moisture. To avoid electrical shock do not remove covers. Refer servicing to qualified personnel only.

Attention! Cables

This product should only be used with high quality, screened twisted pair audio cables, terminated with metal bodied 3-pin XLR connectors. Any other cable type or configuration for the audio signals may result in degraded performance due to electromagnetic interference.

Electric Fields

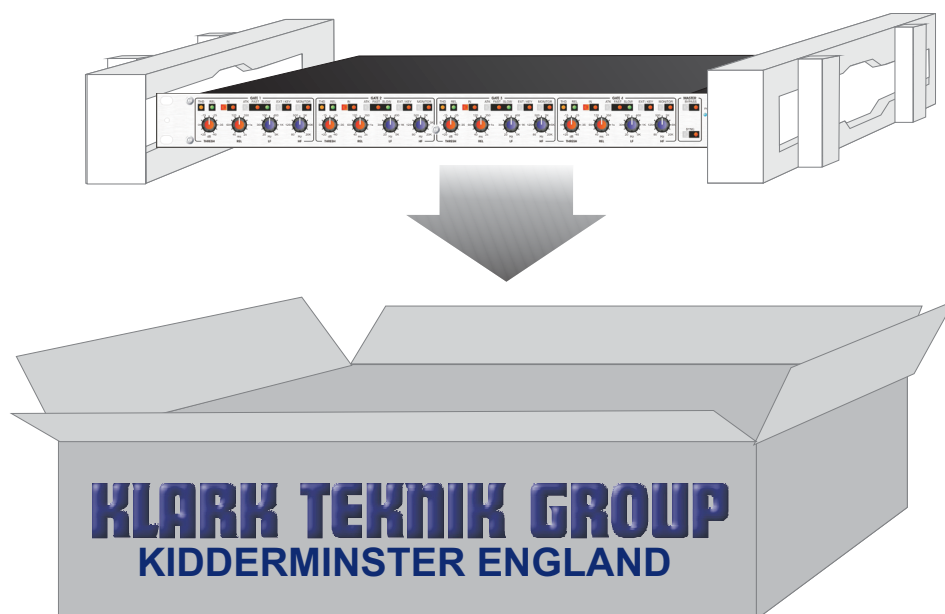
Should this product be used in an electromagnetic field that is amplitude modulated by an audio frequency signal (20Hz to 20kHz), the signal to noise ratio may be degraded. Degradation of up to 60dB at a frequency corresponding to the modulation signal may be experienced under extreme conditions (3V/m, 90% modulation).

Save all the packing materials - they will prove valuable should it become necessary to transport or ship this product.

Please inspect this unit carefully for any signs of damage incurred during transportation. It has undergone stringent quality control inspection and every possible effort has been made to ensure that it left the factory in perfect condition.

If, however, the unit shows any signs of damage, please notify the transportation company without delay. Only you, the consignee, may institute a claim against the carrier for damage during transportation.

If necessary, contact your supplier or as a last resort, your Klark Teknik importing agent, who will fully co-operate under such circumstances.



Noise gating is a powerful technique for improving the clarity of a mix, whether in music PA work, conference PA, or in the studio. But as the number of channels in multi track recording increases, and as the microphone arrangement used in live sound becomes more complex, so the noise gate rack increases in size and takes longer to set up.

The Klark Teknik DN514 Plus Quad Auto Gate has been designed to enable the studio or PA engineer to greatly improve the quality of sound achievable, by gating out unwanted background clutter or tape hiss, quickly and simply. The configuration of four gates per nineteen inch rack unit doubles the normal noise gate packing density.

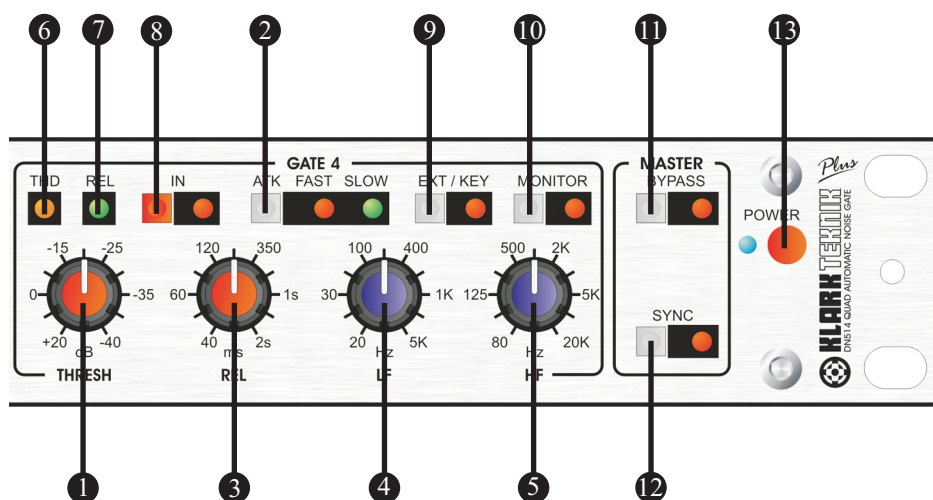
Noise gates have traditionally been difficult to set up correctly to give dependable triggering and to give optimum background noise reduction. The DN514 Plus Quad Auto Gate uses intelligent design to reduce the time spent in setting up.

Two semi automatic Attack modes, one dedicated to percussion, eliminate the need for a rotary Attack control. Hold time is scaled to the setting of the Release Time control, giving reliable gate closure without the 'jitter' that can often take careful adjustment of controls to remove.

A feature important to the live sound engineer, where microphones may be placed close to each other and pick up instruments other than the one intended, is Frequency Conscious Gating. A low frequency and high frequency rotary controls on each channel tune the keying circuitry of the gate to a precise frequency range. The gate only opens for the intended instrument and not when the microphone picks up sounds of other frequencies from neighbouring instruments.

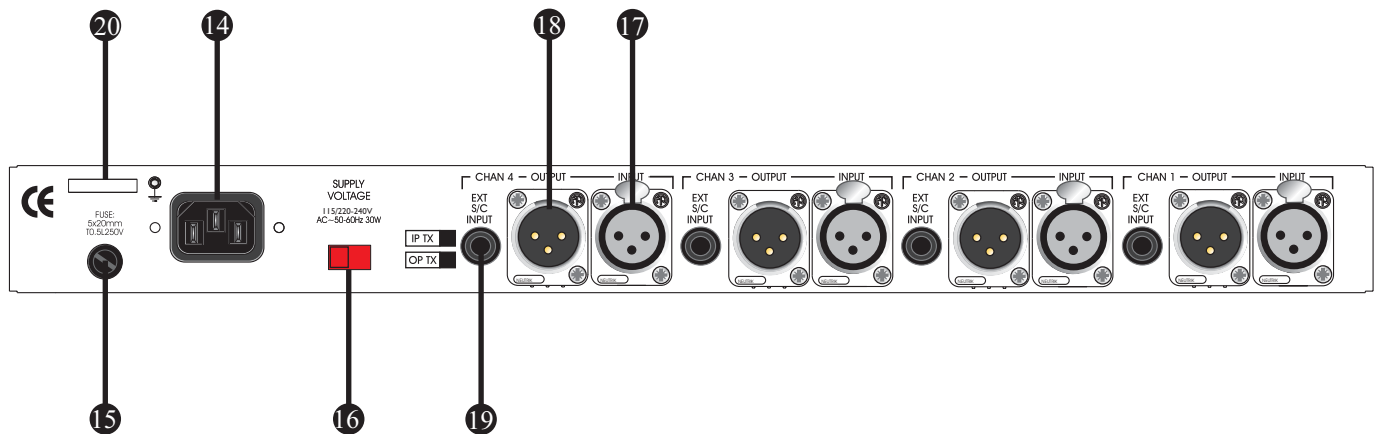
The Sync function is similar to the channel link on conventional stereo noise gates, but here it is possible to interlock the release times of four channels of gating to synchronise harmony vocals or a brass or string section. Key inputs allow gate triggering by sources other than the signal passing through the gate. A Side Chain Monitor switch allows the engineer to monitor the Key signal, whether internal or external, and to monitor the effect of the gate's filters.

Lights provide visual confirmation of gate open/closed status, and also allow monitoring of the Release profile. A gate bypass switch is provided for each channel, and also a master bypass to facilitate setting up.



The DN514 Plus Quad Auto Gate consists of four identical channels and a master control section.

1. **Threshold** determines the level at which the gate will open, variable from -40dBu to +20dBu. A light indicates when the threshold level has been exceeded and the gate is open.
2. **ATK** (Attack) is semi automatic, with switchable Slow and Fast modes. Slow mode is intended for use with most instruments and vocals. Fast is optimised for instruments with a fast attack time such as percussion.
3. **Release** is adjustable from 40 milliseconds to 2 seconds. Hold time (the time the gate will remain fully open before release) is scaled to the value of release time chosen. A light indicates via its brightness the release profile.
4. **LF** applies low frequency filtering to the side chain of the gate from 20Hz to 5kHz, with a roll-off rate of 12dB per octave.
5. **HF** applies high frequency filtering to the side chain of the gate from 20kHz down to 80Hz, with a roll-off rate of 12dB per octave.
6. **THD** (Threshold) light indicates when the gate is open.
7. **REL** shows the release profile of the gate.
8. **In** switches the gate in or out of circuit, working as a true Bypass.
9. **EXT/KEY** switches the Ext Key signal to the S/C input to allow the gate to be triggered by an external signal instead of the main signal.
10. **Monitor** switches the output of the side chain filter to the audio output of the gate, allowing the engineer to assess the effects of the LF and HF filters.
11. **Bypass** forces the VCA's of all four gates to zero attenuation, effectively switching the unit out of circuit.
12. **Sync** links the release times of all four gates. Any one gate entering release mode will cause other open gates to release at an equivalent rate, irrespective of the setting of their Release controls.
13. **Power** switches mains power on or off.



14. **Mains** is supplied via an IEC standard 3-pin connector. A compatible power cord is supplied with the unit.
15. The **mains fuse** is located next to the mains inlet connector. Always replace with the correct type and rating as indicated on the unit.
16. **Voltage selector switch.** This unit is switchable between two nominal supply voltages, 110V and 220V, via a slide switch. The switch **MUST** be set before the supply is connected. Any attempt to run the unit from a 220V supply with the switch set to 110V is liable to result in severe damage to the unit.
Note: Units for the Japanese market do not have an accessible mains voltage selector switch and are set for 100V operation only.
17. **Signal Input** is made via a female XLR type connector.
18. **Signal Output** is available on a male XLR type connector. For wiring details see page 9 of this manual.
19. **External Side Chain Input** is made via a 1/4 inch type A stereo jack connector.
20. Always quote the **Serial Number** in any correspondence concerning the unit.

Input

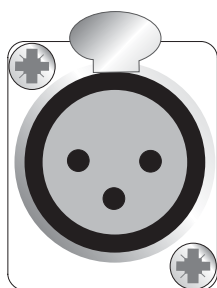
The input circuit is a transformerless, electronically balanced design which achieves a symmetry of better than -50dB from 20Hz to 10kHz.

If transformer balancing of the input is required, this must be specified at the time of order. It is not retrofittable.

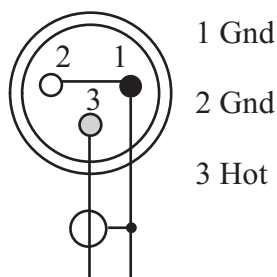
Output

The standard output is unbalanced, but balancing transformers are available and may be retrospectively fitted. Please contact your Klark Teknik representative for more information. The output circuitry is capable of driving a 600 ohm load at a level of +22dBu.

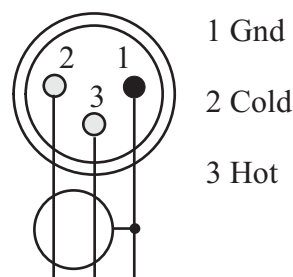
Input



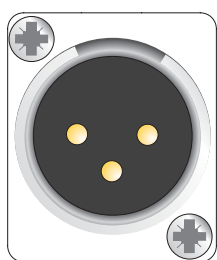
Unbalanced



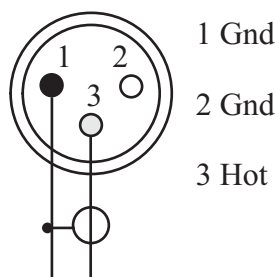
Balanced



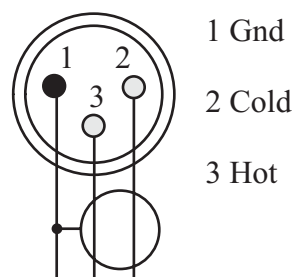
Output



Unbalanced



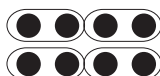
Balanced



Pin 2 / Pin 3 Hot Operation

The unit is configured for pin 3 hot operation but can be re-configured to the standard pin 2 hot XLR wiring convention. This is done by changing the internal jumpers located next to the connectors on the PCB from a horizontal to a vertical configuration, as illustrated below. Please contact your Klark Teknik service representative for further details, if required.

Pin 3 hot



Pin 2 hot

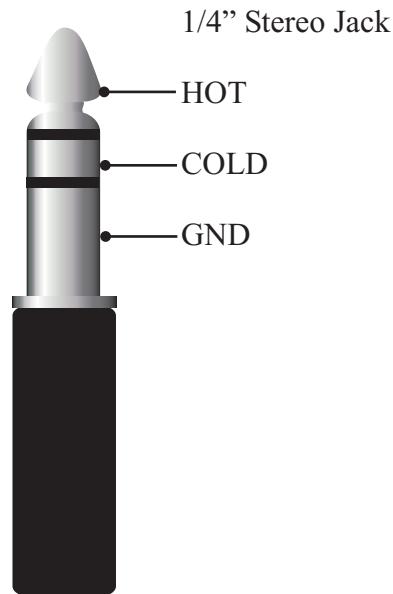


Side Chain/EXT Key Inputs

The electronically balanced Side Chain inputs are on stereo ¼ inch type A jack sockets, configured:

TIP = HOT, RING = COLD, SLEEVE = EARTH.

Inserting a mono jack plug will automatically unbalance the input.



The sockets are internally normalled so that signal continuity is maintained when there is no jack plug inserted. If the unit is wired to a patchbay, then normalling must be carried out at the patchbay.

Balanced Circuits

Transformer or electronically balanced connections have the benefit of Common Mode Rejection which eliminates externally induced interference, such as mains hum etc. Balancing is especially useful when long cable runs are used between pieces of equipment.

Transformer balanced circuits have the added advantage of being fully floating, with the earth (ground) or screen being totally isolated from the signal. In installations where a difference in earth potential is likely to occur, this isolation prevents earthing problems which can, in some cases, damage the equipment.

Even in situations where there are many interacting sound sources we seem to be able to 'tune in' on the sounds we want to hear and reject others. This sometimes known as the 'cocktail party effect' where it is possible to pick out one person's voice even at a distance from many conflicting conversations.

The microphone is less selective in its pick up, being sensitive to ALL sounds within its range and coverage angle. For example, a microphone set to pick up the snare drum of a drum kit will pick up every other drum and cymbal to some extent, and probably the bass guitarist as well. When several microphones are positioned on the kit, each one giving a good sound on its own particular drum, they will all pick up unwanted instruments as well, making the sound less clear.

One solution to this problem is to use a noise gate on each microphone. The gate will reduce the output from the microphone to almost zero when the drum is silent, yet will open practically instantaneously when the drum is played. As the sound from the drum decays, the gate will close again and reject noise from the rest of the kit.

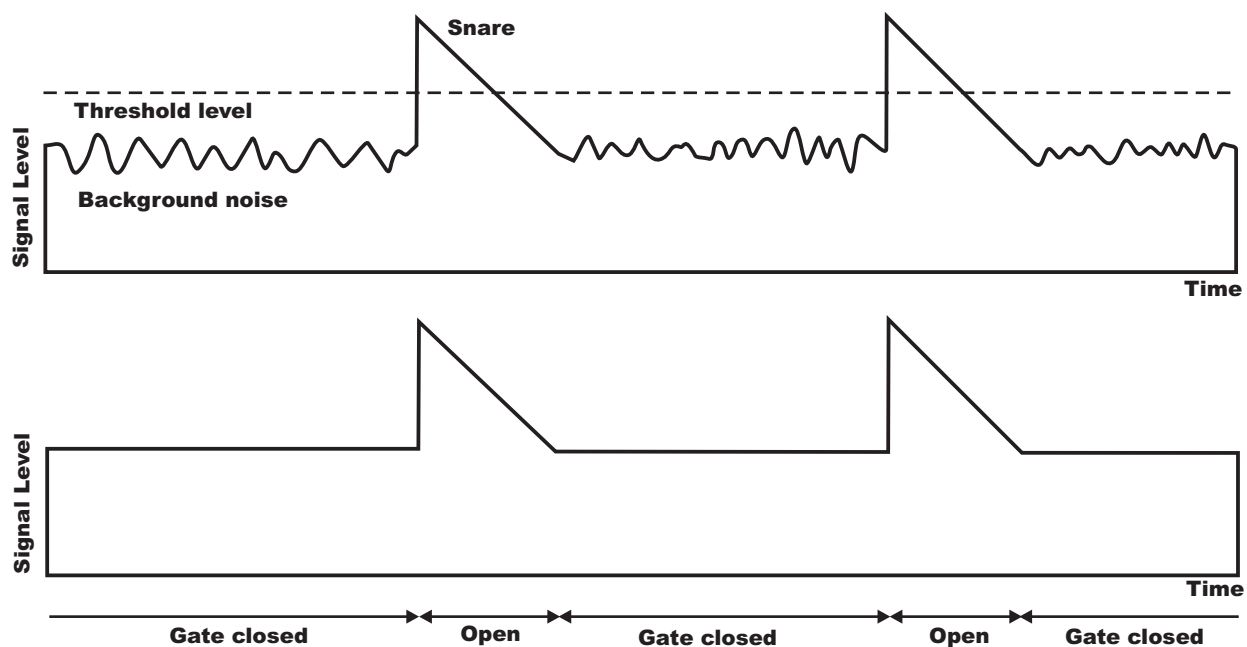


Diagram 1

The Threshold level represents the sound level at which the gate will open. Any sound exceeding the threshold triggers the gate. Sounds at lower levels leave the gate closed and the microphone will be almost completely silent.

The DN514 Plus is a high performance quad noise gate, yet its design makes operation extremely simple. Most important are the **Threshold**, **Attack**, and **Release** controls.

Threshold sets the level at which the gate will open. Turning the control clockwise lowers the threshold level and allows quieter signals through. To set the threshold level, it is best to start off with the control fully clockwise. Then turn it anti-clockwise, cutting out more and more noise, until the gate just starts to affect the signal you want to hear. Backing off around 5dB from this point will give a good threshold level for reliable triggering.

Attack is set semi automatically. A switch selects between two modes of operation, Slow and Fast.

Release sets the time it takes for the gate to close for the VCA to go from zero attenuation to almost infinite attenuation. The release time should be set to correspond with the decay of the signal. For instance, the sound from a drum decays very quickly, a sustained note on a piano takes much longer. The optimum release time is when the gate closes fast enough to prevent any noise from getting through, yet smoothly enough not to cut off the sound of the instrument prematurely.

Two lights indicate the activity of the gate. **THD** (Threshold) illuminates when the gate is open. **REL** indicates, by its level of brightness, the release profile of the gate. To help in setting up the gate, these lights illuminate even when the gate is bypassed.

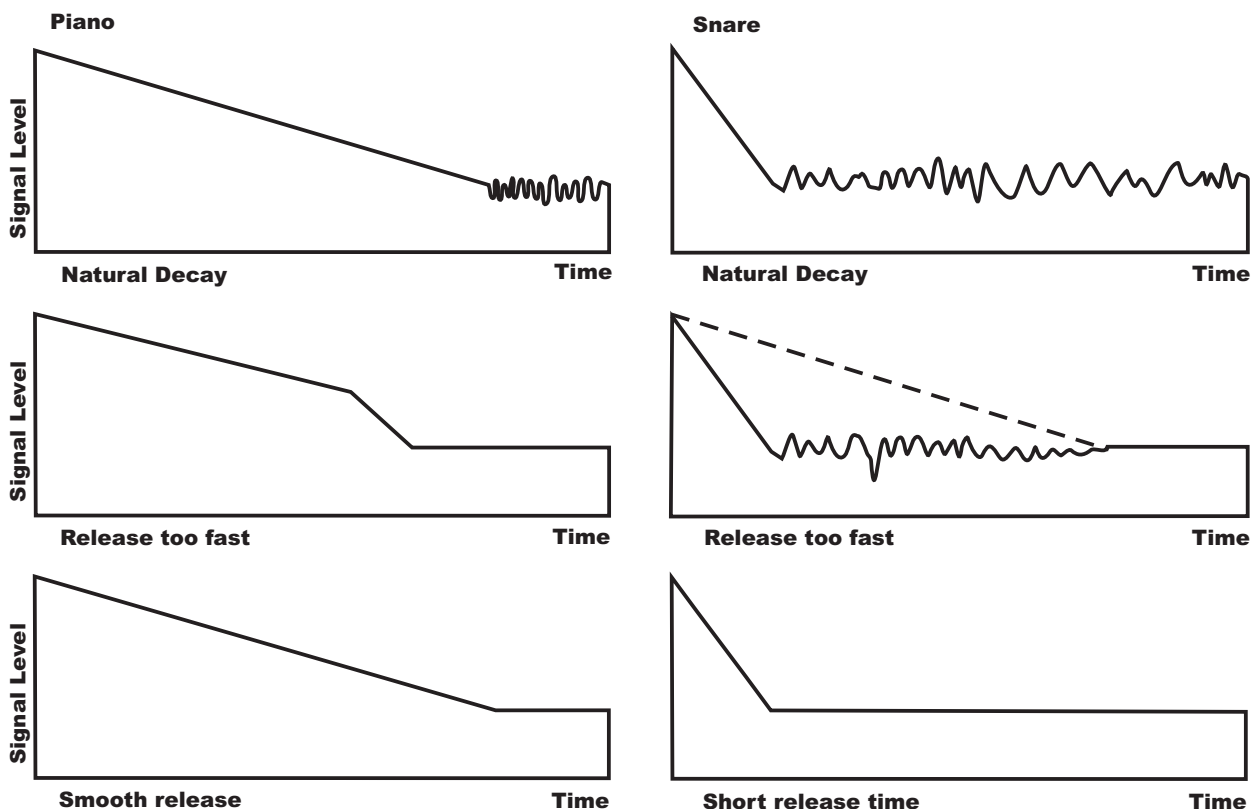


Diagram 2

It is most important for a noise gate to trigger reliably every time the instrument plays or vocalist sings, yet it should not be triggered by the occasional loud sound coming from some other instrument. In a drum kit, for instance, the snare drum and hi-hat cymbals are usually miked and gated separately, yet they may be so close that an almost equal level of signal from both instruments is being picked up by each microphone. This makes the threshold level very difficult to set correctly.

The solution to this problem is to tune the **LF** and **HF** filters of each gate to the principal band of frequencies produced by the respective instruments. The gate on the snare drum is tuned to a band of low frequencies, the gate on the hi-hat is tuned to the higher frequencies it produces :

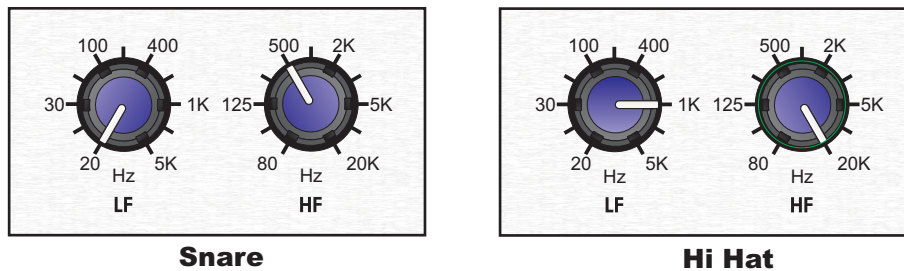


Diagram 3

For other instruments and vocals, a mid-range band of frequencies may be selected :

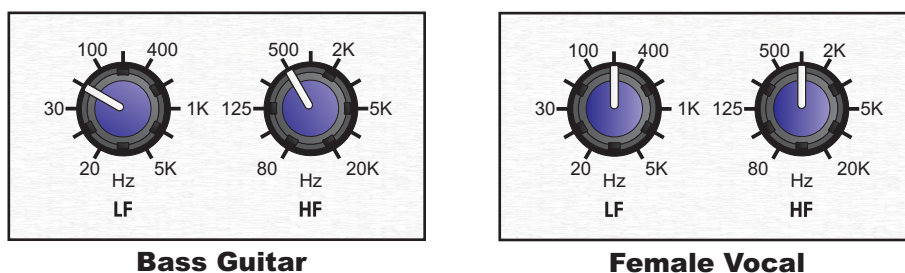


Diagram 4

In normal use, these filters affect only the triggering circuits of the gate, not the audio output. But to assist in turning the gate to the right band of frequencies, a **Monitor** facility is provided so that the engineer can hear the effect of the filters while setting up.

For most applications, the DN514 Plus is triggered by the level of the incoming signal. Sometimes it can be useful to use a different signal to trigger the gate. This is known as an **External Key**.

Particularly in the case of drums, a very reliable trigger can be obtained by taping a contact microphone to the shell of the drum and using the clean signal it produces to trigger the gate.

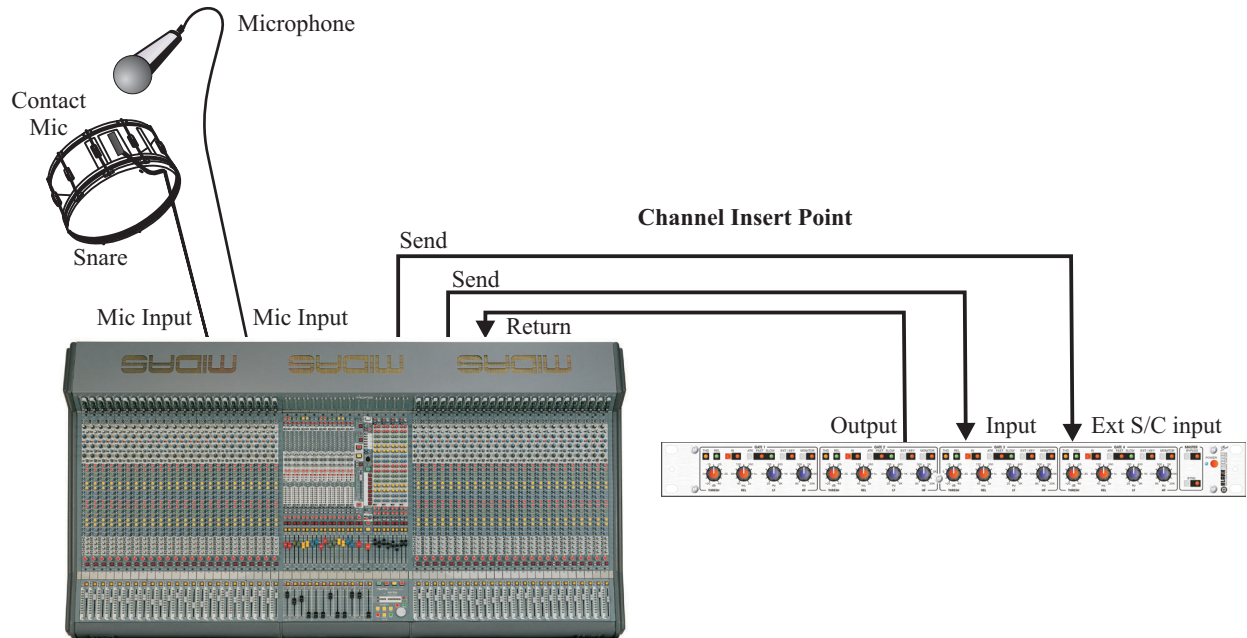


Diagram 5

In the case of harmony vocalists or a brass section, the arrangement may be improved by synchronising the release times of the four gates, using the **Sync** function.

With Sync activated, when one gate starts to release, the release times of all the other gates are locked to it :

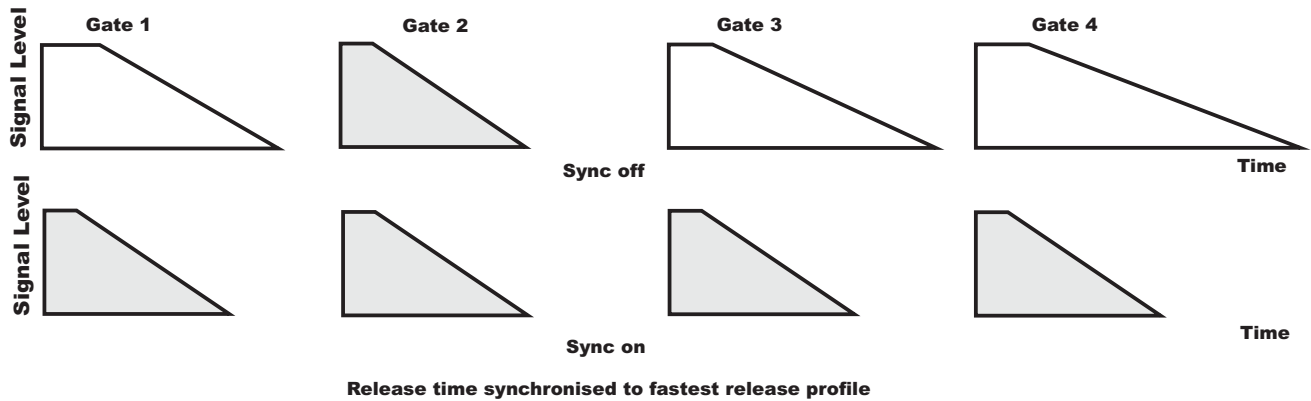


Diagram 6

This means that when one instrument of the section finishes a note, they all do. This is useful for brass 'stabs'. Further improvement to the synchronisation of the instruments may be obtained by linking the external keys of all the channels, as outlined under 'Advanced Applications'.

The Klark Teknik DN514 Plus Quad Auto Gate is optimised for use at line level, therefore to gate a microphone, the input to the DN514 Plus has to be taken from the console preferably from the channel insert point send. The output from the DN514 Plus comes back to the channel insert return. By connecting the DN514 Plus at this position in the signal chain, its operation is unaffected by the use of any of the console controls, except Input Gain.

The DN514 Plus may, if desired, be connected via an auxiliary send and return, but if the aux send on your console is post EQ, then operation of the EQ will alter the overall signal level and the Threshold level of the DN514 Plus will probably need adjustment.

Another alternative is connection to the group insert point of the console. This is useful when many inputs are mixed down to a smaller number of outputs. A given number of gates can achieve a greater coverage.

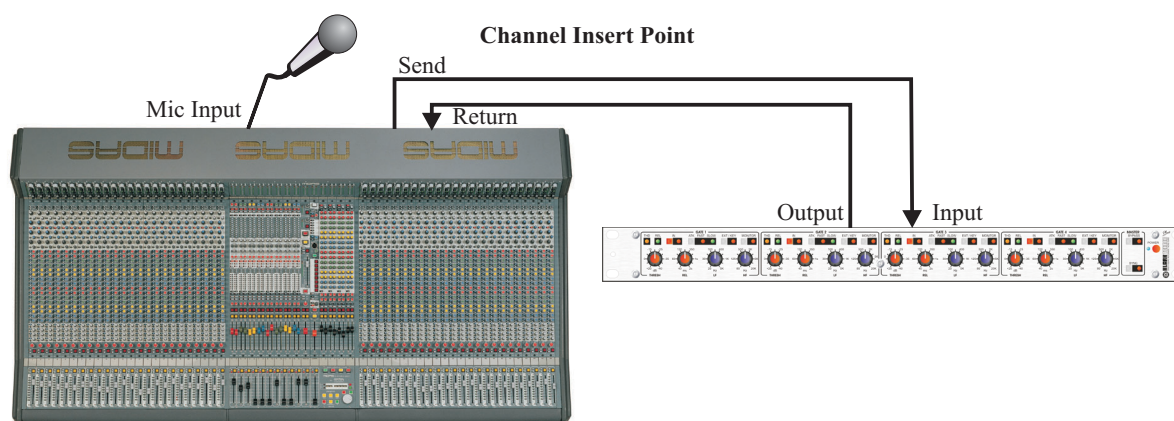


Diagram 7

Music PA

The more microphones there are in a PA system, the more background noise and stage clutter will be picked up and amplified unless noise gating is used. The most significant improvement in clarity will be obtained by gating those microphones which are used LEAST, for example the mic used only occasionally by a backing vocalist.

Microphones used at a fairly high gain setting, for example, on a string section, will pick up a lot of background noise. These should be gated too, to improve PA clarity.

As has already been mentioned, noise gates on the drum mics will also improve the sound of the kit.

Conference PA

In a conference or business presentation PA system, there may be several microphones in use simultaneously. Since each microphone is placed at some distance from the speaker's mouth, the gain setting on the console will be quite high. Background noise such as outside traffic or air conditioning will be picked up and amplified, causing a considerable reduction in the signal to noise ratio of the system. The solution is to gate each microphone individually using the DN514 Plus.

Use with Compressors

One of the most important applications of a noise gate is the reduction of noise emphasised by the action of compressors. When any signal is compressed, the highest levels are reduced, but the lowest noise levels remain the same. This effectively decreases the signal to noise ratio.

By gating the signal before it enters the compressor, the noise can be eliminated before it has chance to be exaggerated by the compressor action.

Some engineers prefer to connect the gate after the compressor. This reduces any slight noise produced by the compressor itself, but since the dynamic range of the signal is less when it leave the compressor, setting the correct threshold level may take a little longer. Alternatively, the uncompressed signal may be paralleled to the Ext S/C Input and this external key used to trigger the gate.

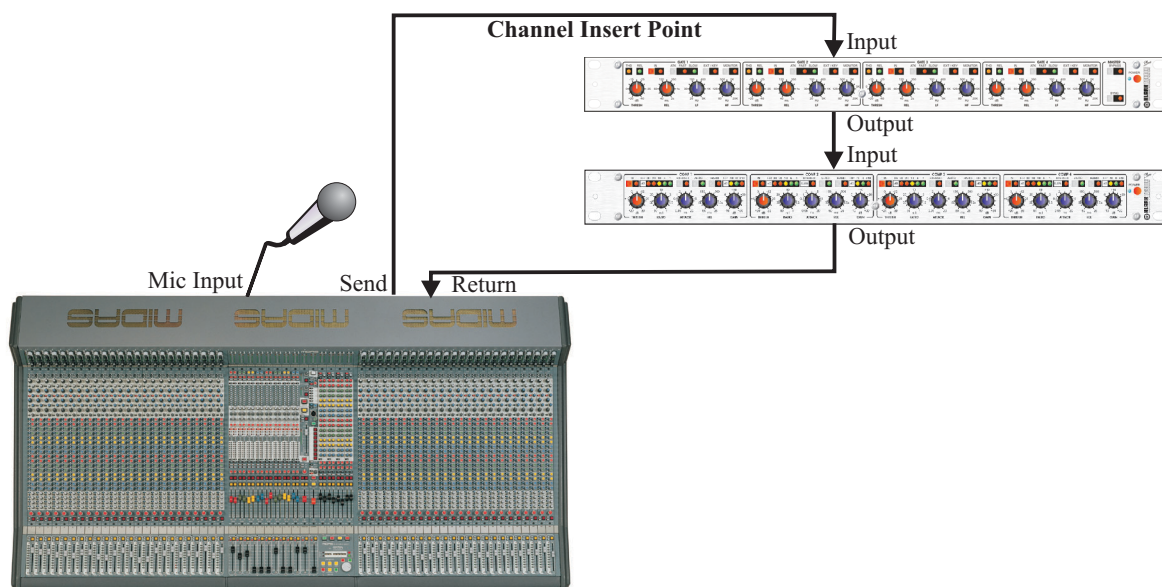


Diagram 8

Tape Noise

During mixdown from multi track tape, noise may become obvious. There are two ways in which this can be reduced using the DN514 Plus. The first is to gate the four noisiest tracks, or possibly all twenty four tracks if you are fortunate enough to have six DN514 Plus units.

Another way is to subgroup all the tracks, minus the reverb returns, and apply a pair of gates to them. Without gating, noise becomes most obvious at the end of the music, as the reverb dies away. If the tracks are subgrouped and gated, then as soon as the instruments and vocals finish, the output from the multi track tape will be muted, leaving the reverb to die away into a smooth silence.

This technique uses two channels of the DN514 Plus. The other two can be usefully employed to gate the output of the reverb unit, which itself may produce some noise, irritatingly noticeable when mixing to digital tape. For the reverb, a longer release time would be used.

MIDI Systems

Because of its compactness, the DN514 Plus will also find application in MIDI keyboard setups where multi-track tape is not used. Many synthesisers even digital ones produce a good deal of noise. Effect units do too, especially chorus units and flangers. When synthesisers are recorded on multi track tape, they can be gated individually as they are recorded. But in a pure MIDI setup, all the sound generators are active simultaneously. It is therefore necessary to use a large number of gates for optimum results. The DN514 Plus's packing density of four gates per unit of rack space makes this a practical possibility.

Gated Reverb

Gated Reverb is a popular effect where a high level of reverb is used on a signal often a snare drum and a gate is used to chop off the tail of the reverb, giving a bright punchy sound.

This can be done without artificial reverberation by using two microphones. One mic is positioned close to the drum, another is set further away, to pick up the natural reverberation of the room. The outputs of the close mic and room mic are mixed to give a good sound, and the room mic passed through one channel of the DN514 Plus.

The External Key input is used, with the close mic giving a sharp attack pulse to trigger the gate. The release time is set to give the best sounding decay on the reverb.

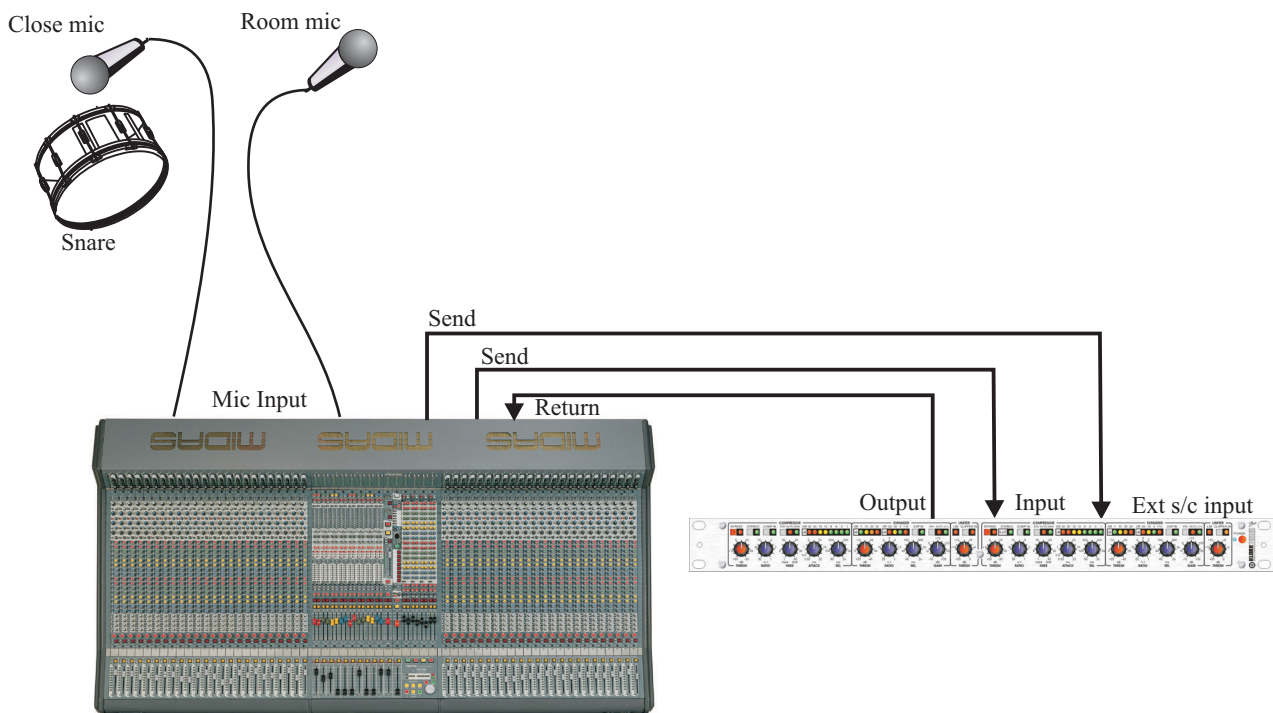


Diagram 9

Instrument Synchronisation

Sometimes it is necessary to synchronise the attack of two instruments. Often a bass guitar must be made to sync precisely to the regular beat of the bass drum. This can be done by passing the bass guitar through the gate and using the bass drum as the external key.

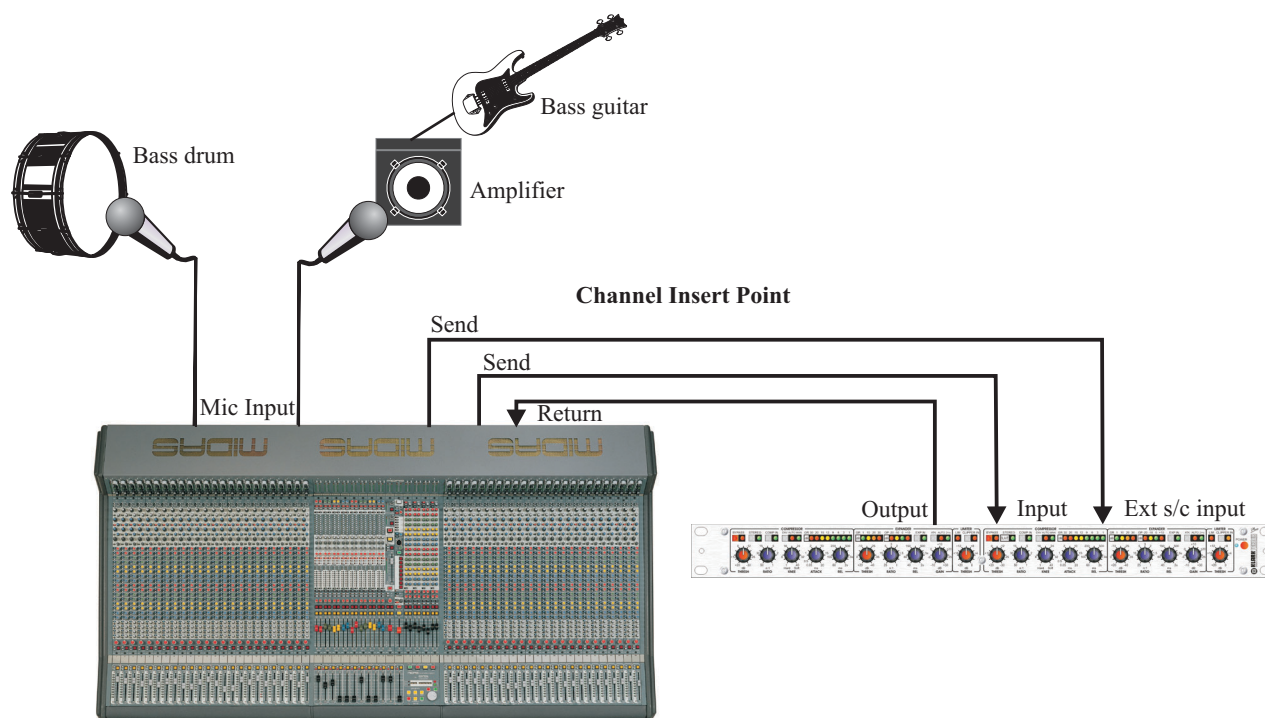


Diagram 10

Envelope shaping

A rhythmic pulse of 8th or 16th notes going all the way through a song is a common musical device. This could be a sequenced synthesiser, but a more interesting method is possible using the DN514 Plus.

The synth is set up to provide continuous sustained notes (changing according to the harmony of the song), perhaps being processed by a chorus unit before passing through the gate. A drum machine, or sequencer, is programmed to produce a regular chain of 8th or 16th notes, and is used as the key input to the DN514 Plus (an alternative source of 8th or 16th notes pulses is a live bass drum with added echo, timed to give the appropriate repeats).

By adjusting the release time, the synth will appear to play a perfectly timed sequence of notes which will add interest and rhythm to the arrangement.

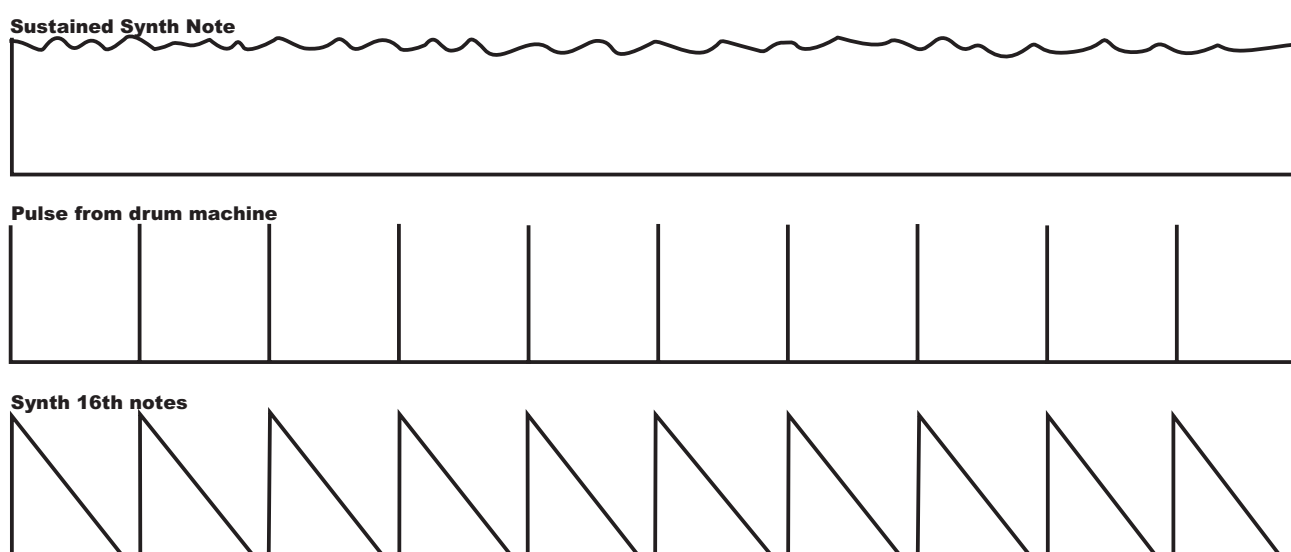


Diagram 11

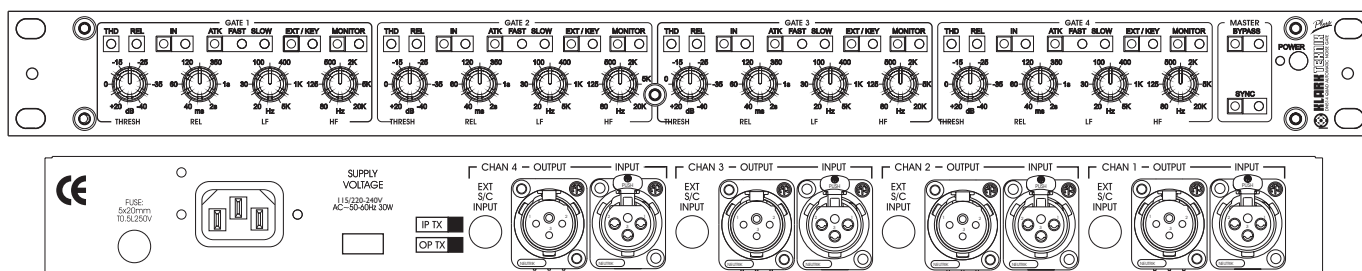
In a similar way, a bass drum may be 'beefed up' by using it to key a low frequency tone produced by a synth (or even the console oscillator) and mixing this gated tone with the original drum sound. A snare drum may be given added 'bite' by keying high frequency noise.

Gating vocals

In a recording studio, vocals usually need to be gated to remove studio ambience, headphone noise, breaths etc. This is best done after the vocal has been committed to tape, otherwise it may be possible to gate out accidentally something which should have been recorded.

If gating is carried out as the vocal is being recorded, it is important not to gate the signal before it is fed to the vocalist's headphones. Many vocalists find a gated headphone feed distracting and it makes it more difficult to find the right note to come in on.

Although the DN514 Plus Quad Auto Gate is a simple to use, high quality noise gate, it has creative potential in abundance too. Engineers will find it a reliable problem solving tool, and also a means towards enhanced musical expression.



Audio Inputs

Type

Impedance (ohms)

Balanced

Unbalanced

Four

Electronically Balanced

20k

10k

Key Inputs

Type

Impedance (ohms)

Balanced

Unbalanced

Four

Electronically Balanced

20k

10k

Audio Outputs

Type

Minimum Load Impedance

Source Impedance

Maximum Level

Four

Unbalanced

600 ohms

<60 ohms

+21dBu

Performance

Frequency Response

(20Hz - 20kHz)

Distortion (THD+N)

(@ +4dBu, 20Hz - 20kHz)

Equivalent Input Noise

(20Hz - 20kHz unweighted)

+/- 0.5dB

<0.03% @ 1kHz

<-103dBu gate closed

<-94dBu gate open

Attack

(program related, semi-automatic)

50us to 200us 'Fast'

500us to 3ms 'Slow'

Hold / Release

Variable 40ms to 2s

Threshold

Variable 40dBu to +20dBu

Attenuation

>84dB gate closed

Key Filters

High pass filter

20Hz 5kHz, 12dB / octave

Low pass filter

80Hz 20kHz, 12dB / octave

Power Requirements

Voltage

100 / 115 / 220-240V, 50/60Hz

Consumption

<30VA

Termination

Audio Inputs / Outputs

3-pin XLR

Key inputs

1/4 inch stereo jack

Power

3-pin IEC

Dimensions

Width	482mm (19 inch)
Depth	292mm (11 ½ inch)
Height	44.5mm (1 ¾ inch)

Weight

Nett	4 kg
Shipping	6kg

Options

Security Cover
Transformer Input / Output balancing*

Options

Security cover
Transformer input*/output balancing
*Input transformer balancing is non-retrofittable and has to be specified with order.

Options Ordering Information

Perspex security cover
Aluminium security cover
Output balancing transformer
Input balancing transformer

Parts Number

SCP DN514Plus
SCA.DN514Plus
BU37
BN37