

DL231

OPERATORS MANUAL

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DRAWMER DL231

Dual Expander Compressor Limiter



SAFETY CONSIDERATIONS



CAUTION - MAINS FUSE

TO REDUCE THE RISK OF FIRE REPLACE THE MAINS FUSE ONLY WITH THE SAME TYPE, WHICH MUST BE A CLASS 3, 230 VOLT, TIME DELAY TYPE, RATED AT 63mA WHERE THE MAINS INPUT VOLTAGE SWITCH IS SET TO 230 VOLTS AC. AND 125mA WHERE THE MAINS INPUT VOLTAGE IS 115 VOLTS AC.

ALL FUSES MUST COMPLY WITH IEC127-2.

THE FUSE BODY SIZE IS 20mm x 5mm.

CAUTION - MAINS CABLE

DO NOT ATTEMPT TO CHANGE OR TAMPER WITH THE SUPPLIED MAINS CABLE.

CAUTION - SERVICING

DO NOT PERFORM ANY SERVICING. REFER ALL SERVICING TO QUALIFIED SERVICE PERSONNEL.

WARNING

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.



CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN



INTRODUCTION

A compressor is a device which automatically controls the level of an incoming signal to provide a more constant output.

Even in a digital system, which has a large dynamic range, compression is necessary on some instruments and even on a final mix because the environment in which most material is heard is often noisy, to say nothing of the limited dynamic range of the reproduction equipment, e.g. portable radios and cassette players.

A well designed compressor should operate smoothly and create a minimum of distortion and noise. Such a device in use should go almost un-noticed (unless for special effects) and require a minimum of adjustment.

A limiter is essentially the same as a compressor but as its name implies, it serves to prevent the output from rising any higher than a pre-determined level.

The use of compression effectively raises low level signals, but this includes any ambient noise. For instance, vocals usually require compression, but noise from headphones, together with the taking of breath, can be a problem for the engineer. This can be overcome by the use of an expander, which will attenuate signals below a preset level, i.e. the opposite of compression.

A device which performs which performs all three functions gives all the benefits of compression and limiting without the unwanted side effects. Additional refinements can greatly increase the versatility of such a unit by automating some of the more critical control functions.

The DL231 is a dual channel Expander/ Compressor/Limiter combining ease of operation with flexible performance. Each channel consists of a compressor, having variable threshold, ratio, attack, release, and output gain controls; a peak limiter, which is required to prevent momentary overload when using gentle compression slopes and / or slow attack times and an expander / gate for the removal of unwanted ambient noise which would otherwise be 'pumped up' by the use of compression.

Although each channel is completely independent, linking is easily accomplished, which prevents image shifting when treating stereo material.

Particularly attractive features are the unique dual function displays using Tri-colour LED's, which measure input signal levels, or gain reduction.

Both expander and compressor release are semi-automatic, programme related and are adjustable via a single release control thus providing smooth operation and reducing setting up time.

The expander section is equipped with fully automatic attack, which continuously adjusts itself to match the rising envelope of the incoming signal. This feature is of enormous benefit on vocals, because they contain ever changing transient characteristic, which makes manual adjustment difficult and time consuming, with sometimes doubtful results.

Equalisation may be applied to the compressor side-chain insert points. This allows frequency conscious compression to be achieved. 'Side chain listen' facilities are provided to allow both side-chains to be monitored.

INSTALLATION

The DL231 is designed for standard 19" rack mounting and occupies 1U of rack space. Avoid mounting the unit directly above power amplifiers or power supplies that radiate significant amounts of heat. Fibre or plastic washers may be used to prevent the front panel becoming marked by the mounting bolts.

AUDIO CONNECTIONS

INPUTS and OUTPUTS: Both the input and output XLRs may be used either balanced or unbalanced, the wiring convention being: pin 1 Ground, pin 2 Hot and pin 3 Cold. For use with unbalanced systems, the Cold pin (3) must be grounded at both input and output XLRs.

If earth loop hum problems are encountered, don't disconnect the mains earth but instead, try disconnecting the signal screen on the cables connecting the DL221 to the patchbay. If such measures are necessary, balanced operation is recommended.

S/C INSERT:

The side-chain insert point is configured as a stereo jack socket wired tip return, ring send. This point is unbalanced and would normally be connected to a normalised or semi-normalised pair of patchbay contacts.

If earth loop problems are encountered, do not disconnect the mains earth but instead, try disconnecting the output signal screen at one end of the cables connecting the DL221 to the patchbay. If such measures are necessary, balanced operation is recommended.

POWER CONNECTION

The unit will have been supplied with a power cable suitable for domestic power outlets in your country. For your own safety it is important that you use this cable. The unit should always be connected to the mains supply earth using this cable

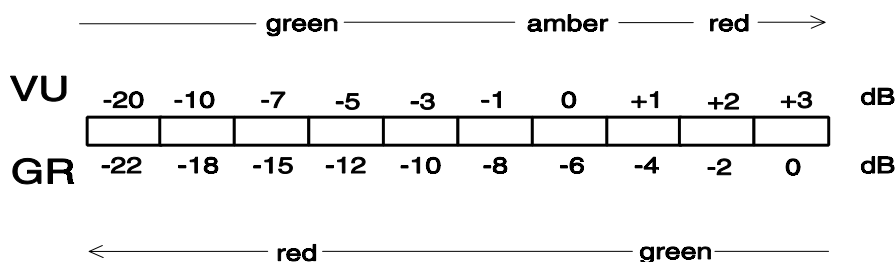
CONTROL DESCRIPTION

Both channels of the DL231 are identical and may be used completely independently or linked for stereo operation. In the linked mode, only the left hand channel controls are functional and serve as master controls, though the channel bypass switches remain independent. In linked mode, the compressor / limiters and peak limiters and expanders of the two channels track together to avoid the inevitable image shifting that occurs if the two channels of a stereo signal are treated independently.

COMPRESSOR

- THRESHOLD** (Variable -24 dB to infinity) sets the point at which gain reduction commences. Signals below threshold pass un-attenuated. NB 'Threshold' controls the signal level entering the side-chain and not the input signal level. This can usually be adjusted on preceding equipment.
- RATIO** is variable between 1:1 (zero compression) 20:1 (limit).
- ATTACK** (50 μ S to 5mS) controls the speed at which the compressor responds to a rise in input signal level. A slow attack time will allow transient peaks to escape compression, which can give an artificial percussion effect on certain signals, whilst the fastest attack time of 50 μ S allows the compressor to respond to the fastest of audio signals.
- RELEASE** (50mS to 5sec) is the time taken for the compressor to recover from gain reduction. Programme signals are complex, so a complex release characteristic is required for optimum results. Fast transients require a fast release time to avoid over limiting effects, whereas normal programme material should be user adjustable. In addition to these features, the DL231 contains circuits which prevent partial recovery between waveform peaks, thus almost eliminating low frequency distortion when using fast release times.
- OUTPUT GAIN** (-20dB to +20dB) is necessary to make up signal level which is lost during compression.
- OUTPUT SWITCH** enables the operator to select 'normal' or 'bypass' for comparison of input or output levels or 'S/C listen' for monitoring any equalisation which may be applied to the side-chain. EQ. applied in this way enables frequency conscious compression to be achieved - particularly useful for de-essing, de-popping etc.
- PEAK LIMITER** a separate switchable peak limiter, connected after the output gain control, complements the operation of the compressor section by allowing slow attack times and/or gentle compression slopes to be used, whilst giving complete protection from overload. The limiter has an internally preset threshold of +6dB (ref +4dB), fast attack (50 μ S) automatic release based on programme content and a ratio of 50:1. Gain reduction from limiting is indicated on the display along with compression, but in addition a LED located beneath the limit switch indicates the onset of limiting.

LED BAR DISPLAY is a dual function facility which measures output level (input level if bypass is selected) or gain-reduction, selectable by the display switch.



NB

- i. The VU meter and threshold controls are calibrated to show 0VU at +4dB
- ii. In the gain reduction mode, all the red LED's are very slightly illuminated at all times. This is quite normal and does not indicate a fault condition.

EXPANDER

THRESHOLD	(+10 to -40 dB) sets the point at which gain reduction takes place. Signals above threshold pass un-attenuated unless compression occurs..
RATIO	A three position switch selects ratios of 1:2, 1:5 or 1:20 provides gating characteristics. Gating can be regarded as the opposite of limiting.
ATTENUATION	(Attn) a three position switch sets the maximum attenuation of 10, 20 or 40dB.
FUNCTION	selects 'side-chain listen', normal (expander in operation) and off (expander bypassed).
ATTACK	time is completely automatic. See introduction.
RELEASE	time is semi-automatic, matched to the compressor release and is adjustable via the compressor release
VISUAL DISPLAY	is by means of three LED's arranged in a horizontal 'traffic light' configuration. Green indicates zero expansion, whilst yellow shows gain reduction of 50%, referring to the attenuated setting and red 100%.
STEREO LINK	couples the control circuits of both compressors to prevent image shifting when treating stereo material on a final mix. The peak limiters can also be used if desired but they remain independent. Operational controls should be set the same on both channels when linked.
SIDE-CHAIN EQ	may be applied to expanders and compressors via insert points at the rear of the unit. Connection are via stereo jack (Rind - send. Tip - return)

OPERATION

Having connected signal inputs and outputs as required, set the unit as follows-

Threshold, Ratio, Attack, Release	-	Anti clockwise
Output Gain	-	0 dB
Display Switch	-	VU
Output Switch	-	Bypass
Peak Limit	-	Off
Stereo Link	-	Off
Display	-	VU
Expander	-	Off

1. Adjust input signal level on preceding equipment to show 0 dB on display, peaking to +2.
2. Change output switch to 'norm' and display switch to GR. Adjust Threshold, Ratio, Attack and Release to give the required compression characteristics and read the gain reduction on the display.
3. Change output switch to VU and adjust output gain for optimum reading on the display.
4. If the Peak Limiter is required, adjust output gain so that the limiter operates on signal peaks only. It is important to remember that the peak limiter is connected after the output gain control so care should be taken to avoid 'pushing' the gain controls for more level, particularly when treating stereo signals.
5. For stereo operation, switch in the stereo link and set up as above, making sure that all controls are the same for both channels. GR. displays will show the same readings, except when excessive peak limiting occurs on either channel.
6. If ambient noise is 'pumped' up to an unacceptable degree during compression, change expander switch to 'norm' and adjust the expander threshold so that the noise is removed. The expander threshold should be set below the compressor threshold level to avoid interaction.
7. Set ratio and attenuation to suit the particular application. When used on a final mix, set threshold as low as possible but above unwanted noise. Ratio should be 1:2 and attenuation at 10 to 20 dB. This will provide a gentle expansion which will minimise drop out effects during a fade. However, drums would be better with a 1:5 or 1:20 ratio and 20 or 40 dB attenuation using a higher threshold level. For vocals, set threshold so as to remove breath and headphone noise and set ratio a 1:2 or 1:5 with attenuation of 20 or 40 dB.
In all cases, attack is automatic and release is controlled by the compressor.

These suggestions are for guidance only. The final adjustments should be made to suit the particular application and conditions.

Using the Expander alone

Disable the compressor by turning either the threshold or ratio anti-clockwise. Adjust the expander as described above but use compressor release control to adjust release time. An in-built 'hold' facility stabilises the expander against momentary gain reduction during short duration decreases in the signal level.

Frequency Conscious Expansion

This is used when unwanted noise at different frequencies to that being processed requires removal without effecting the required signal. For example, some guitar flangers, treble boosters and amplifiers emit noise at higher frequency than that being processed. Set the external equalisation by switching to 'S/C listen' and adjust to cut the offending frequencies. The expander will then only operate on the required signal (the spill from a nearby bass drum or bass guitar can be filtered in the same way). Switch to 'norm' and adjust the expander to obtain the required noise reduction.

NB The external filter will not affect the processed signal, only the control circuitry.

Frequency Conscious Compression

This can be achieved by applying EQ to the compressor side-chain access at the rear of the unit. Once again, a 'side chain listen' facility is provided to assist this operation. Set the equalisation so as to boost the offending frequencies. Switching to 'norm' and adjusting the compressor as necessary will result in the offending frequencies being attenuated, but only when they exceed the threshold level. This method allows broadband HF boost above 2 kHz to be applied to the signal before compression thus obtaining a crisp, sharp sound. The sibilants thus created can be controlled without affecting the basic tonal structure by boosting the side chain EQ at 7 to 10 KHz by 10 dB or so. By the same token, 'popping' caused by LF boost can be controlled by applying boost to the side chain at frequencies below 100 Hz. For best results, a parametric or graphic equaliser should be employed because offending frequencies often occupy narrow bands.

TECHNICAL SPECIFICATIONS

(Measurements taken at +4dBu operating level where applicable)

INPUT IMPEDANCE 20KOhm
BANDWIDTH 20Hz - 22KHz (1dB)
MAXIMUM OUTPUT LEVEL +24dBm (Electronic - floating)
+22dBm (Unbalanced)
SIDE CHAIN Send/Return Unbal, in phase input pin 2.

NOISE @ UNITY GAIN (Referred to +4dBm) Expander off.

Wideband ! 83dB
22Hz-22KHz ! 90dB
CCIR ARM ! 91dB
IEC A ! 94dB
Q. Pk CCIR ! 80dB

DISTORTION	100Hz	1KHz	10KHz
Unity gain +4dBm Input	0.025%	0.025%	0.025%
+14dBm input 10dB GR.	0.03%	0.03%	0.06%

COMPRESSOR

Threshold -24dB to infinity (ref +4dBm)
Ratio Variable 1:1 to 20:1
Attack 50µS to 5mS
Release 50mS to 5 Sec
Output Gain -20dB to +20dB

EXPANDER

Threshold -40dB to +10dB
Ratio 1:1, 1:2, 1:20 Switchable
Attenuation (Attn) 10, 20 or 40dB Switchable
Attack Fully automatic 50µS to 10mS
Release Related to compressor release and programme content.

PEAK LIMITER

Threshold +6dB (ref +4dB)
Ratio 50:1
Attack 50µS
Release Automatic

STEREO TRACKING

within 1dB to 20dB GR.
within 3dB to 40dB GR.

POWER REQUIREMENTS FUSE RATING

115Volt or 230Volt at 50-60Hz, 9 Watts
63mA for 230Volt, 125mA for 115Volt
Conforming to IEC127-2

FUSE TYPE

20mm x 5mm, Class 3 Slo-Blo, 250Volt working

CASE SIZE

482mm (w) x 44mm (h) x 200mm (d)

WEIGHT (incl packaging)

3 Kgs