

## **DRAWMER DL241 OPERATORS MANUAL**

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### **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 32mA WHERE THE MAINS INPUT VOLTAGE SWITCH IS SET TO 230 VOLTS AC. AND 63mA WHERE THE MAINS INPUT VOLTAGE IS 115 VOLTS AC. ALL FUSES MUST COMPLY WITH BS EN 60127-2:1991, SHEET III. 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.

### **INTRODUCTION**

The DL241 is a dual channel compressor/limiter designed to fulfil the needs of professional studio and live sound applications. It may be used in balanced or unbalanced systems and each channel is independently switchable between +4dBu and -10dBu operating levels. In addition to the compressor/limiter, each channel also contains an independent expander and peak limiter.

In order to maximise flexibility while simplifying set up and operation, several new design concepts have been incorporated. The compressor section combines aspects of both the traditional ratio style compressor and the soft-knee approach, making it equally adept at creative work and unobtrusive level control. The control layout resembles that of a straight ratio style unit but the transition from unity gain to gain reduction at the selected ratio is progressive and occurs over a nominal 10dB input level range.

Traditionally, soft-knee compressors have been preferable for unobtrusive level control where the original sound is to be changed as little as possible, whereas ratio type compressors are generally considered more successful in creative applications or where large amounts of gain reduction are required. By combining these two elements, the DL241 is capable of outstanding results in a very wide range of studio and live sound situations.

One of the perennial problems in using compression is that maximum system gain occurs during extremely quiet passages or during pauses which results in an increase in background noise, the

degree depending on the amount of compression being used. The accepted way of dealing with this problem is to include in the compressor, a separate expander section with its own threshold control so that a low level gating action may be applied to keep pauses clean. But the problem with simple expanders is that, even when properly set up, they may unwittingly process low level sounds as they have no means of identifying them from noise. On a vocal track, for example, this can lead to the starts or endings of words being accidentally removed, especially if the singer has a wide dynamic range.

The DL241 uses an entirely new Programme Adaptive expander circuit which varies its ratio depending on the dynamics of the signal being processed. Because the onset of expansion is progressive, those low level signals most at risk will be treated to a lower ratio of expansion while the residual noise during pauses will be subjected to a higher expansion ratio and will, in consequence, be attenuated more. The outcome is an expander that requires less stringent setting up and is more tolerant of wanted sounds that are only slightly above the residual noise floor.

A further feature of the DL241 is a peak limiter which allows the user to set an absolute output signal level that will not be exceeded. If the peak limiter threshold is exceeded for more than a few milliseconds, additional gain reduction will be applied to reduce the overall signal level to within accepted limits without distortion. Once the peak has passed, the system gain will return to normal over the period of about one second. This facility is extremely valuable both in live sound applications, for driver protection, and in digital recording where an absolute maximum recording level exists. Furthermore, when overdriven, it can be used creatively to produce deliberate level pumping effects.

## **INSTALLATION**

The DL241 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**

Both the input and output connectors may be used either balanced or unbalanced, the wiring convention being for jacks: tip hot, ring cold and sleeve ground; and for XLR connectors: pin 2 hot, pin 3 cold and pin 1 ground. The rear panel push buttons should be out for +4dBu operation or in for -10dBu operation. For use with unbalanced systems, the unit is directly compatible with mono jacks. The mono jack actually shorts the cold terminal to ground. For the DL241 units fitted with XLR connectors, unbalanced operation is achieved by shorting pin 3 of the XLR connector to ground (pin 1) at both input and output.

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 DL241 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

If for some reason the unit is to be used at a mains input operating voltage which is different to that as supplied, the following procedure must be carried out.

1. Disconnect the unit from the mains.

2. Using a number 1 size pozidrive screwdriver, remove the two self-tapping screws holding the voltage selection switch cover plate on the rear panel.
3. Remove the cover plate and slide the switch fully to its opposite end.
4. Rotate the cover plate one half turn, (180 ) and refit the two screws.
5. Replace with a correctly rated fuse for the selected operation voltage.
6. Re-connect to mains power source.

### **CONTROL DESCRIPTION**

Both channels of the DL241 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, 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.

### **EXPANDER**

**Threshold:** This control sets the level below which expansion starts to take place and may be set in the range -70dB to +20dB. When the expander starts to operate, the red status LED will come on. Note: because the expansion ratio varies with signal level, it is possible to arrive at a situation where the red expansion LED may be illuminated when little or no perceived gain reduction is taking place. This means that the expansion Threshold may need to be set a little higher than it would with a conventional expander and final setting is best done by ear. The adaptive expansion system used in the DL241 means, however, that setting up is not over-critical and the gating action is far more progressive.

**Release:** Either a fast or slow release time may be selected depending on the material being processed. Fast release is achieved with the switch out and Slow release with the switch depressed. Percussive material with little or no reverb is generally treated using the fast release setting, whereas material with slow decays or a significant amount of added reverberation will usually respond better to the longer release setting.

### **COMPRESSOR**

**Threshold:** Determines the input level above which gain reduction will be applied and may be set in the range -40 to +20dB. Soft knee compression takes place for signals exceeding the threshold level by up to 10dB above which level, conventional 'ratio' compression is applied.

**Ratio:** Sets the final compression ratio that will be applied once the 10dB 'soft-knee' region is exceeded. The ratio may be continuously adjusted from 1.2:1 to infinity:1 allowing the possibility of true hard limiting.

**Gain Reduction Meter:** An eight segment LED bargraph meter continuously monitors the gain reduction applied by the compressor/limiter over the range 0 to 30dB.

**Attack:** Sets the rate at which the compressor will respond to input signals that exceed the threshold level. This may be set in the range 0.5mS to 100mS.

**Release:** Sets the rate at which the system gain returns to normal after the input signal level has fallen below the threshold. This may be set in the range 0.05 seconds to 5 seconds.

**Auto:** When selected, Auto disables the Attack and Release controls and continually optimises the attack and release times to suit the dynamics of the material being processed. In general, this setting will produce the least obtrusive level control on signals with widely varying dynamics or

complete mixes.

**Gain:** The output level may be attenuated or amplified by up to 20dB to compensate for level changes caused by compression and limiting. This control comes before the Peak limiter detector and this fact should be taken into account when setting the Peak limiter threshold.

**Output Level Meter:** This is an 8 segment LED bargraph level meter that monitors the level of the output signal over the range -20dB to +15dB with reference to the selected (-10dBu or +4dBu) operating level.

**Bypass:** This switch causes a 'hard-wire' bypass function of all signal processing for this channel, where the input socket is routed directly to the output socket. This feature enables the unit to pass audio even with no power applied to the DL241. Normally the switch is used to compare the raw unprocessed signal verses with any expansion, compression and limiting of the audio input.

### **PEAK LIMITER**

**Level:** Sets an absolute limit to the level that the output signal will not be permitted to exceed. This limiter is very fast acting enabling it to control any peaks without audible distortion. If the output signal is so high as to cause the limiter to operate for more than 20mS, the system gain is automatically reduced to bring the signal back within range. The system gain is then returned to normal over a period of approximately one second. The compressor Gain control should be used to ensure that the peak limiter operates only rarely if at all, if it is to be used purely for peak protection. Alternatively, it may be deliberately driven into limiting to produce creative effects.

### **LINKING**

**Stereo Link:** Depressing this switch configures the unit in stereo mode where the left hand channel controls act as masters for both audio channels. The same degree of gain reduction is applied to both audio channels to prevent image shifting which would otherwise occur whenever the left and right signal dynamics varied from each other by any significant degree.

### **OPERATION**

The unit should be connected in line with the signal to be processed via suitable insert points. Ensure that the insert send and return level on your console matches the operating level set up using the rear panel push-buttons on the DL241. If not, select the appropriate operating level on the DL241.

For single channel use, each channel may be considered as being completely independent and set up accordingly. For use with stereo signals such as complete mixes or submixes, the unit should be switched to Stereo Link mode and all setting up done using the left hand channel controls.

Setting up is simpler if the Expander is initially turned off and the Peak Limiter threshold set to maximum. This allows the compressor/limiter to be set up in isolation. The ratio setting depends on how firmly the signal dynamics need controlling; as a rule, higher ratios provide a higher degree of control but also tend to be more audible in operation when high levels of gain reduction are required. The integral soft-knee feature of the DL241 renders these effects far less pronounced, but this factor should still be taken into consideration when setting up. In general, a higher compression ratio may be used than on a conventional compressor without compromising the sound quality.

If the Attack and Release controls are switched to Auto, setting up is now simply a matter of adjusting the Threshold control until the desired amount of gain reduction occurs. This is judged partly by ear and partly by observing the gain reduction meter. In general, a maximum gain

reduction of between 8dB and 12dB will be adequate. If more gain reduction appears necessary, it is worth considering applying a conservative degree of compression during recording and then further compression while mixing.

Compressing during a mix does increase the subjective level of tape and other background noises during pauses and quiet passages but, unless the noise contamination is serious, the expander section will be able to attenuate it to a very high degree without compromising the wanted signal.

At this point, the Auto control may be switched off if it is desired to set the attack and release times manually. The longer the attack time, the longer the compressor takes to respond to increases in signal level and a slow attack time is often used to accentuate the beginning of percussive or plucked sounds such as drums, basses and guitars. A fast attack time will bring the input signal under control very quickly.

The release time should be set short enough so that the system gain has returned to normal before the next peak occurs and, in general, it should be set as short as possible before audible gain pumping occurs.

Compressors are often accused of dulling the sound being processed, and a little explanation is needed to understand exactly why that is. What happens is that bass sounds, which contain most of the energy in a typical piece of music, cause the compressor to operate, and so any quieter, high frequency sounds occurring at the same time as the bass sound will also be turned down in level. That is why the cymbals and hi-hats in a heavily compressed drum track seem to dip in level whenever a loud bass drum or snare drum beat occurs.

The solution is either to use less compression or increase the attack time to allow the leading edge of the brighter sounds to pass through the compressor before the gain reduction occurs. In extreme cases, it may be necessary to add a little artificial brightness to the processed sound using equalisation or some form of exciter, though the semi-soft-knee compression system used in DL241 tends to minimise this side effect.

At this point, the expander threshold may be set up and you should try both release time settings to see which is least obtrusive in operation. For all but sharp percussive sounds, the longer setting is likely to give the best results. Set the threshold using a piece of program material that contains pauses and adjust the threshold to be as low a dB level as possible while still attenuating the noise during pauses. Listen carefully to how the sounds come in after the pauses and how cleanly they fade away again. If you can hear the expander changing the sound in an unacceptable way, then the threshold is probably set too high.

Because the expander is self-adapting to the programme dynamics, it should be possible to obtain far more satisfactory results than are possible with conventional expanders. By the same token, do not assume that because the expander threshold LED flickers during a piece of quiet but wanted material that it is having a detrimental effect. When it first comes into play, the ratio of expansion is very low so trust your ears!

Finally, set the Gain control to give the required output level using the level meter to guide you. Avoid running at very high output levels as this reduces the available amount of signal head room and could lead to distortion in extreme cases. Once the gain is correct, set the Peak Limiter Level control so that the limiter LED only lights briefly on extreme signal peaks. Alternatively, set the Peak limiter Level to the desired value and then adjust the compressor Gain control to ensure minimum limiter activity.

If required, the expander may be used on its own with the compressor and limiter functions disabled. The Peak limiter has no separate on / off control, but turning the Level control fully clockwise will prevent any unwanted limiter action. To effectively bypass the compressor section

turn the compressor Threshold up to its maximum of +20dB (fully counter-clockwise), set the Ratio to its lowest setting of 1.2:1 and adjust the Gain to approximately 0dB.

### **DL241 TECHNICAL SPECIFICATIONS**

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

**INPUT IMPEDANCE** 20KOhm

**MAXIMUM INPUT LEVEL** +20dBu

**OUTPUT IMPEDANCE** 50 Ohm (bal), 100 Ohm (unbal)

**MAXIMUM OUTPUT LEVEL** +20dBu

**BANDWIDTH** <10Hz to 22KHz -1dB

#### **NOISE AT UNITY GAIN with Expander Off**

	Wideband	22Hz - 22KHz	CCIR ARM	IEC A	Q-Pk CCIR
AV	-90dB	-95dB	-95dB	-97dB	-84dB
RMS	-88dB	-93dB	-93dB	-95dB	-82dB

#### **DISTORTION**

	100Hz	1KHz	10KHz
Unity Gain, +4dBu input	< 0.03%	< 0.02%	<0.03%
+14dBu input, 10dB Gain Red.	< 0.1%	< 0.1%	< 0.1%

**POWER REQUIREMENTS** 115Volt or 230Volt at 50-60Hz, 9 Watts

**FUSE RATING** 32mA for 230Volt, 63mA for 115Volt

CONFORMING TO BS EN 60127-2:1991 SHEET III

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

**CASE SIZE** 482mm (w) x 44mm (h) x 200mm (d)

**WEIGHT** (incl packaging) 3.2 Kgs