

P38 - Edward the Compressor User's Guide

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The P38/Edward History

The P38 is the successor to the amazing P8 'Edward the Compressor' which, although it has been a great success, a number of influential engineers made suggestions about possible refinements that could make it even better!

So the P38 retains all the features of the P8, including emulation of some classics, as well as producing the distinctive Ted Fletcher compression sound, and adds some brilliant new refinements and facilities.

The Edward the Compressor and the P38 are loaded with secrets of performance of a complete range of volume compressors from the clinical purity of the 21st century VCA/digital compressors, to quirky optical classics. The P38 can be switched to behave like four complete families of compressors.

Further to this unique 'mode' of compression, the P38 is augmented by facilities such as 'Transient release' a 'Stereo width' control and a 'Balance' control as well as the amazing 'Soft Clip' function.

Limiting and Compression

Why is the TFPRO compressor different to a modern high tech. compressor limiter? It was designed as a stereo effects compressor rather than a 'levelling amplifier' as the early compressors were called. These are the basic definitions:

A LIMITER is a device which stops the output of a signal path going above a predetermined level.

A COMPRESSOR is a device which reduces the dynamic range of programme material.

A 'perfect' compressor is an amplifier where the input/output ratio is constant: So using a 2:1 compressor, increasing the input by 2dB gives a corresponding 1dB increase in the output.

Early compressors which used variable mu thermionic tubes or photoelectric devices only approximated true compression over a limited range. They had a soft 'threshold' where compression started and held to a predictable ratio up to a certain level, then they returned to a more linear

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amplification allowing transients through. This is in stark contrast to modern VCA compressor/limiters where designers thought it 'sensible' to combine the functions of compressor and limiter and to 'stonewall' any and all signals above a certain level. The musical effect is that (I know I'm over simplifying) VCA compressors sound muddy and flat, while old compressors sound lively and retain sparkle.

IT'S HORSES FOR COURSES, a good VCA compressor limiter will do a good job making medium wave radio sound a bit louder and protecting a radio transmitter from exploding, but it is a poor tool for making a voice track stand out.

Connecting the P38

POWER

The Edward works at all mains voltages; BEFORE SWITCHING THE UNIT ON, make sure that the correct voltage is selected at the fuse holder.

**In the '115' position, the unit will operate between 95 and 125V AC.
In the '230' position, the unit will operate between 210 and 240V AC.**

The fuse can remain at 100mA for both ranges.

NOTE: The centre (ground) pin of the IEC power connector is connected to the metal chassis of the compressor. The Audio ground is also connected to chassis. The power system is double insulated throughout so that power ground may be lifted off if required without affecting safety in any way.

XLR AND JACK INPUTS AND OUTPUTS

These are optimized for +4dB 'professional line level'. Connections are as follows...

Pin 1 is ground or screen.

Pin 2 is positive phase or 'hot'

Pin 3 is negative phase (or ground for unbalanced).

The circuitry is Ted Fletcher's latest 'superbal' circuit that offers superb

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noise rejection in balanced mode, and offers no degradation of quality when used in unbalanced mode. To force the system into unbalanced mode, please make sure that pins 1 and 3 are connected together in the XLR plug attached to the unit, or that a standard 1/4 inch jack plug is used (with the ring grounded if it is a 'TRS' type).

Using the P38 for the first time

Connect the inputs and outputs and plug in the mains cable. When the unit is powered and switched on, the meters will be illuminated.

Set the controls as follows:

RATIO to 3 to 1

Compression switched in, ('SOFT CLIP' switch out)

MODEL to No 3

Width to 'STEREO'

ATTACK to fast; full anti-clockwise.

RELEASE to medium; halfway

TRANSIENT RELEASE out.

OUTPUT GAIN CONTROL set to the 'zero' mark. (2 o'clock)

Feed some programme material into the unit and set the 'INPUT GAIN' control to about number 7; this will correspond to about 0dB gain. Set the output to match the equipment being driven (Professional studio equipment is normally +4 or 0dB). Switch the meter to GR, turn up the 'COMPRESSION' (Threshold) control slowly and, if there is sufficient audio signal, the meter will start to indicate compression by the needle moving downwards.

The compressor should now be working and your ears can take over.

The P38 controls

INPUT GAIN controls the level of signal into the compressor. The range is from off to +16dB. Setting slightly over '6' is unity gain across the unit with the output gain set to '0' and the compressor off.

14dB SWITCH increases the gain of the input stage so that the P38 can handle lower operating levels and higher amounts of compression.

The 'SOFT CLIP' switch applies the clipper to the audio making higher

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volume levels possible when mastering.

The METER MODE switch selects either L/R metering **after** the output gain control, or MONO on the left meter (**before** the output gain control) and gain reduction (GR) on the right hand meter.

COMPRESSION alters the amount of 'sum' signal going to the compression sidechain. This sets the volume level at which the compression starts. The threshold is not a precise level as compression starts over a wide range, particularly when model 1 is selected.

MODEL sets the range of parameters that simulate compressor types.

1 is the softest and least obtrusive effect; it is a 'pure' compressor.

'2' corresponds to an '1176' and simulates a historic FET limiter/compressor.

3 is similar to 'LA2A' recreating the original American optical compressor.

4 is the popular optical compressor of the 1990s.

RATIO selects the compression ratio: If an additional input of 12dB gives an output increase of 4dB, then the ratio is 3:1. Ratios are in the range 1.5:1 up to 100:1. Ratios above 8:1 are effectively a limiter.

ATTACK sets the time it takes for the compressor to operate. A loud signal comes along and it takes a small fraction of a second for the compressor to 'catch' it, 'attack' sets how small the fraction is, and this will vary with the 'model' selected, from as low as 200 microseconds up to several milliseconds. The character of the sound of a compressor is affected significantly by the attack control; different types have different amounts of 'overshoot' (over compression for a fraction of a second), the balancing out of this effect produces the 'character' of the sound.

TRANSIENT RELEASE is an unusual but useful control that sets the recovery time of the compression side chain after a transient (short duration) overload. These transient signals are normal and occur all the time, but have a profound effect on the behaviour of the compressor. This control can alter the 'colour' of a compressed sound.

RELEASE sets the time that the compressor takes to recover after it has compressed something. This again varies with 'type' and can be short (on 3

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or as long as several seconds on 1. Short release times generally add 'urgency' to the sound, but the creation of good compression effect is always a careful combination of attack and release settings.

WIDTH sets the stereo width of the output, from mono to 150%. When set vertically upwards, the stereo image is the same as the program material entering the unit.

BALANCE allows a few dB variation in gain between left and right.

OUTPUT GAIN : controls the level of signal from the main outputs. This is the only control on the unit that in no way affects the sound. **CAUTION**; the compressor has gain, and a high output capability. If you hear signs of overloading, it's likely that your mixer insert/input point is being overdriven. It's very unlikely that you are overdriving the compressor: Try turning down the output volume.

NOTE : The front panel controls of the P38 give variable control of ratio, threshold, attack and release. These controls are active for all 'models', but the ranges vary so that the times shown on the controls are approximate.

The P38 MODEL settings

1 THE VCA SETTING

This setting is for purists who want accurate, controlled compression to reduce the dynamic range of single or multiple music signals. The onset of compression is gradual and closely controlled, the compression ratio remains constant over a wide dynamic range and the release follows a musical curve that does not distract the ear. The compression is transparent and very unobtrusive, similar to the very best software compressors used for dynamic control and final mixdowns.

2 THE '1176' SETTING.

The '1176' is a classic design in a family of compressor/limiters originally manufactured by Universal Audio in the USA. The original was all 'solid state' with the compression element being an FET. Clever innovations in the control circuitry made it a classic with a much sought after sound. The P8 is able to reproduce the peculiarities of the 1176 with great accuracy including the fast attack, the multi-stage release and a 'tailored' response in the compression sidechain to make the compression smooth over a wide range of material.

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3 THE 'LA2A' SETTING.

One of the most famous compressors of all time was the Teletronix LA2A. This was one of the very first optical compressors developed in the late 1940s. It worked by an electro-luminescent panel (originally designed to show up instruments in a dark environment) shining onto a simple cadmium sulphide opto-resistor, and relied on the odd attack and release characteristics of these components to get the sound. In its original form, all these characteristics were wildly non-linear; the compression ratio varied with programme material (and was to some extent selectable by a toggle switch), the release characteristic was a strange curve, with a fast initial release, then slowing in speed as the gain returned to normal. The attack was very slow by modern standards, and tended to increase in speed as the equipment warmed up! Nevertheless, in the hands of innovative record producers, the compressor sounded wonderful, enhanced by the original tube amplifiers.

The P38 uses light emitting diodes and a modern version of the cadmium sulphide opto-resistor as control elements, but uses servo control of the sidechains to imitate the 'unusual' characteristics of the LA2A, this includes shaping of both the attack and release ranges. The result is a reproduction of the warmth and attack of the LA2A.

4 THE 'Green Box' SETTING.

Introduced by Ted Fletcher in 1993, the original 'Joemeek'* SC2 compressor was an instant outstanding success. It combined the 'heat' and 'thickness' of the LA2A, but with an additional flexibility in attack and release characteristics, and a new attribute for heavy compressors; it seemed to retain the 'sparkle' that was often lost with 'Fairchild' or 'Teletronix' compressors. It caused such a stir in the audio business that opto compressors started appearing from all the other manufacturers, but without the subtleties of the SC2 sound.

**'JOEMEEK' is a registered trade mark of PMI Audio inc in the UK*

Later versions of the SC2 incorporated 'sum and difference' matrixing in order to maintain a perfect stereo image, even under heavy compression, something that had been impossible with other opto compressors. The P38 can (of course) reproduce the sound of the SC2 precisely, not only the dynamics, but also the stereo image.

The P38 - technical description

Input stages are 20Kohm impedance floating balanced line via balancing transformers operating in 'current mode'; this means that the inputs are very resistant to noise and interference, and may be operated balanced or unbalanced. The grounding system used follows latest balanced studio practice where chassis metalwork is grounded through the power plug.

Outputs are nominally 50 ohm balanced and may be operated balanced or unbalanced.

Operating level is 0dBu with a maximum balanced output level of +23dBu.

Gain at the input stage is variable from off (mute) up to +16dB.

Once past the input stage, the stereo signal is processed into 'sum and difference' signals and these are compressed through 2 identical compression channels. The sum signal is used to drive the compression sidechain where precision rectifiers create an instantaneous DC voltage proportional to the audio signal.

RATIO and MODEL switch settings alter the timings and shape of both the attack and decay; that is, the characteristics of the integral of the DC voltage; for example, in 1 (VCA) mode, the attack is fast and linear, the release is a simple linear capacitor discharge. In 4 (opto compressor) mode, the attack is fast for the first 500 microseconds, then slower. The release is highly non-linear with the first 20% fast, then a linear portion, then the last 25% speeding up again.

'TRANSIENT RELEASE' control (push button) alters the dynamics of the sharp transients in the signal; it can change the sound and effect of a track in a dramatic way.

There are further variations for the other 'MODEL' settings. The heart of the compressor is the gain-cell; this is a pair of cadmium sulphide light dependent resistors illuminated by an LED array. The LEDs get their drive from a servo amplifier capable of driving the high instantaneous current necessary to achieve the faster attack times.

The RATIO control selects a huge range of gain reduction (compression) ratios, from a relaxed 1.5 to 1 up to a 'brick-wall' 100 to 1.

Prior to the output stage there is a control that varies the sum/difference

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ratio; this alters the stereo width, which is variable from full 'mono' through normal stereo (where the control detent is) to 150% stereo. Further control is given by the 'BALANCE' control. This allows the engineer to correct for slight errors in L/R balance without going back to the mixer.

THE ELECTRONICS

THE PATH - 'Current mode' amplifiers with transformers, which eliminate cable effects on the inputs, buffer the balanced line level inputs. Once past the input gain the audio goes through a 'sum and difference' matrix circuit so that all subsequent processing is carried out in this mode. Compression is done by illuminating light dependent resistors (LDRs) that are connected across the sum and difference signal paths. A part of the 'sum' signal is filtered, forms a sidechain signal, and is processed to create the necessary attack and release characteristics. This signal then drives a precision LED via a servo amplifier. The RH analogue meter can be switched to read signal level or depth of compression.

The compression is applied to both sum and difference signals. Immediately following the compression stages, the signal is dematrixed and returns to its original L/R form, any small inaccuracies that occurred in the compression process now show up as minor errors in the stereo width information; the stereo centring remains perfect. A 'width' control gives additional engineering control of the stereo image, allowing artificial 'widening' up to 150%.

After a balance control and the stereo output gain control, parallel output amplifiers condition the signal and take it to the output jack and XLR connectors.

REGULATIONS AND SAFETY

The P38 has been designed and built to conform to all known safety requirements in the world. Within the European Union the Compressor easily meets the requirements for electrostatic and electromagnetic emissions, and conforms to all safety requirements of the European Common Market. the 'CE' symbol on the rear of the unit indicates compliance. In the United States of America the compressor complies with UL requirements and uses UL approved components in all power supply functions.

WARRANTY

In the unlikely case of a breakdown, please return the unit in its original packing through the supplier.

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This TFPRO equipment is designed and manufactured in the UK

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