



# SMAC



**Stereo Musical Audio Compressor**

# Table of Contents:

# SMAC



**1/introduction**

**2/features**

**3/controls**

**4/operation**

**5/input/output**

**6/specifications**

# 1/introduction

**SMAC** is a *Stereo Musical Audio Compressor* (or two channel mono) that uses optical gain reduction cells (two per channel or 'dual-servo') to perform quality transparent audio compression, peak limiting, and automatic audio leveling control.

Due to the dual-servo optical based design, the dynamic behavioural characteristics of SMAC lie somewhere between the classic Optical type compressors and the later VCA type compressors. Depth, image, and sonics are all preserved while the dynamics and transients of the signal can be contoured and manipulated to suit any tracking, mixing, and/or mastering requirements.

Compression can be fine tuned to be anything from 'smooth and subtle' to 'drastic and squashed'. SMAC has the ability to quickly and flawlessly handle any compression application. Compression activity and amount are totally variable. The Class-A make-up gain stage is transparent and provides ample gain to offset heavy amounts of level reduction. This gives SMAC a multitude of creative possibilities.

Extensive compression envelope flexibility is also provided via the standard fully-variable attack and release dials, as well as an incorporated envelope time factor control toggle switch called, 'norm/tight/swim'. Each of these innovative settings has a whole range of applications, from dealing with fast transients (such as drums or percussion), to dealing with slower signals (such as vocals or bass).

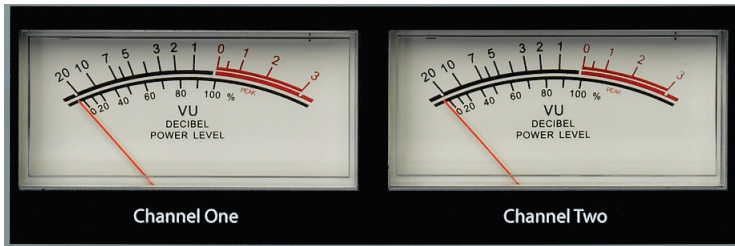
To facilitate stereo mix processing, two modes of stereo channel linking are available: '*dual-mono with channel one master*' and '*stereo link*'. These modes are ideal for any stereo mix buss or sub-group compression requirements where stereo spatial width needs to be harnessed and maintained.

SMAC also features two large VU style meters which can be individually used to monitor output level or accurate gain reduction.

Utilizing solid-state topology, the SMAC audio path is completely Class-A and discrete. For maximum headroom, all active components run on a +60v rail. This gives SMAC a wide open sound that is tight and accurate. Like all studio based Sebatron products currently available, there are no integrated circuits (or 'chips') in the design.

Whether operating in high-end professional recording studios, home recording setups, or live music venues, SMAC is designed to be the perfect quality stereo compressor.

## 2/features



- **fully-balanced** (XLR) inputs and outputs
- **dual-servo optical compression** for increased compression range, transparency, and smooth dynamic response.
- **accurate VU metering** switchable from Output to Gain Reduction
- fully-variable threshold, ratio, attack, and release
- 28dB clean output gain makeup
- **'pump'** switch for high-ratio pumpin' compression
- **'swim'** switch for extra long attack and release
- two modes of **stereo linking**
- fully **relay driven bypass**
- **external side-chain inputs/outputs** for easy connection of external EQ
- **completely discrete, Class-A circuitry.** No integrated circuits or 'chips'
- **switchable mains voltage**
- **solid metal build**

# 2/features

## **AUDIO PATH**

The SMAC audio path was designed for maximum audio transparency, leaving the emphasis on the processing time constants and compression accuracy to perform the required duties. All circuitry is Class-A operation with high voltages used throughout for an extended dynamic range and tight bottom end. Internally, the circuit is designed around all discrete, hi-quality, hi-voltage components, and is configured to be single ended throughout. All active audio and processing circuitry runs on a +60v rail for low noise, maximum headroom, fast transient response, and wide bandwidth.

## **DYNAMIC AUDIO PROCESSING**

The SMAC compression circuit uses two optical cells arranged in dual-servo configuration. This means that along with the control voltage created by the detection circuitry, an inverse control voltage is also generated by a D.C. phase splitter which controls an alternate optical cell in complementary mode to the normal cell. This has many advantages over the standard configuration of a single cell. For example, compression depth is greatly increased, and the ballistics and distortions of the LED light source are cancelled out by the complementary cell.

Being an 'Optical' audio compressor also means that the signal is less coloured than some of the other popular compression methods such as FET. Less signal is being attenuated by the cell in idle mode and therefore requires less make up gain at the aft end. Less make up gain means less noise, distortion, and other undesirable audio artifacts.

## **VU METERING**

SMAC features accurate VU output level metering as well as accurate gain reduction reading, or, in other words, the amount of compression taking place at any given time.

Gain Reduction metering is driven in the same optical way as the compression itself. This is an accurate representation of the amount of compression taking place and is expressed in negative 'dB' on the VU meter.

To monitor the input signal, simply switch SMAC into bypass and select 'output' on the VU metering switch.

# 3/controls

## BYPASS

The SMAC bypass is relay controlled so that no circuitry colours the signal in bypass mode. Should power to the unit be interrupted at any moment, the relays will relax and automatically go into a bypass mode. This is done to ensure minimum dropout to any program material running through SMAC at the time of a power failure.

## LINK

When the top link switch is set to 'un-linked', the two channels run as separate processors with no correlation between left and right channels. When the top link switch is in the 'Ch.1 master' position, the link mode is engaged and the top row of controls (or Channel One set of dials) is the master set of controls for both channels.

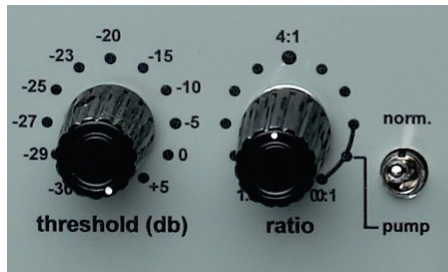
There are two modes of 'link' to choose from. One mode, known as '**dual-mono**', is the mode that runs both channels as separate processors yet driven by one set of dials (Channel One). This has many advantages over manually lining up both channels to match, as it is far more accurate (and far quicker), to achieve equally calibrated levels.

The alternate link mode, known as '**stereo link**', sums the control voltages being fed to the optical cells. It is often described as 'compression from top' (as opposed to 'the sides' in the 'dual-mono linked' mode). This has advantages in certain situations where stereo imaging must be preserved yet the undesirable effects of one channel pumping against the other are not wanted. This is valuable for compressing stereo tracks like main mixes, submixes, drum overheads, etc., where closely matched channels are of utmost importance.

In both link modes, all the dials right up to and including the Output level control are linked and driven by the Channel One set of dials. Only the VU metering switch remains independent.



# 3/controls



## THRESHOLD

Adjusts the point at which compression occurs.

Compression activity is verified by the compression activity indicator LEDs and a reading on the meter in Gain Reduction mode.

## RATIO

Adjusts the amount of compression when the signal passes the threshold. The higher the ratio, the greater the amount of compression or gain reduction. Lower ratios are subtle and transparent. As higher ratios are approached, compression becomes more apparent and obvious.

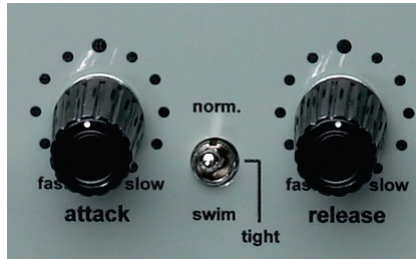
## NORMAL/PUMP

In the normal position, the SMAC ratio dial is calibrated to the conventional range with the emphasis on transparency.

When switched to the 'pump' position, the knee and ratio characteristics of the compression curves are changed. When engaged, the knee is significantly sharper and steeper and the ratio control is boosted to create a so-called over compression (or 'pump' effect) so that when set to maximum, the ratio will go beyond infinity and pull the signal back just after it hits the threshold. This effect is prominently heard only at higher ratio settings. With careful adjustment of threshold, attack, and release parameters, this can provide a whole new range of interesting compression curves and responses.

This switch/effect works in conjunction with the ratio control, so, in other words, depending on the ratio degree, the pump effect takes on more or less activity. Pump is particularly obvious in the higher ratio settings with a long attack time.

# 3/controls



## ATTACK

Defines how long it takes before compression takes place. Fast attack times are required to capture faster sounds like percussion, whereas slower times are more suited to slower sounds like vocals or bass.

## RELEASE

Defines how long it takes for the compressor to stop acting on the signal. Like the attack control, generally speaking, faster release times are more suited to drums and percussion and faster transient sounds.

## NORMAL/TIGHT/SWIM

The normal/tight/swim switch sets the attack/release factor to three different time dependant ranges.

In the **normal mode**, the range is within commonly chosen time constants. This is generally applicable in both tracking and mixing situations. Compression characteristics are smooth and unobtrusive.

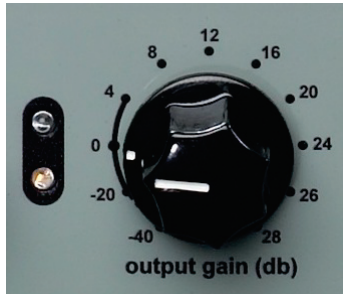
In the **tight mode**, SMAC detection operates much faster and takes on more of a 'peak limiter' attitude, with reaction times fast and aggressive in response to the incoming program material. This is very handy when trying to 'maximize' the program material in a smooth and organic way, and, in many ways, more preferable to digital brick wall limiting which can ruin the musicality of a recording by being too clinical and artificial.

The **swim** position increases the attack/release time constants so that SMAC performs more like an automatic gain controlling device that behaves in a fluid-like manner to the incoming dynamics of a signal. This function is applicable in many situations and will benefit slower dynamic program material that requires a narrower dynamic range.

Of course, there are no rules, and the only real way to see what works for you is to give yourself time to experiment.



## 3/controls



### COMPRESSION ACTIVITY INDICATORS

These two LEDs give an important insight into how the compression activity is taking place.

When properly set for average compression, *both* LEDs will flicker or light and dim depending on the attack/release settings and related toggle switch.

### OUTPUT GAIN

In order to match signals with the bypass, and to provide enough gain makeup after the attenuation of compression, SMAC features an output stage capable of up to 28dB of clean gain make up.

You can also use SMAC as a transparent, all purpose line amplifier by switching off the SMAC compressor (turn Threshold fully clockwise), and just leveling using the make up gain of SMAC as your amplifier.

### VU SELECTION SWITCH

SMAC features a VU selection switch which allows the user to choose between output signal strength (VU) or the amount of gain reduction the compressor is executing.

Gain reduction is displayed as negative dB on the VU meter.

# 4/operation

## **INPUT/OUTPUT SMAC optimal operating range**

The ideal signal operating range for SMAC to properly process audio signals is -20 dB to +10 dB. Ideally, signals should be centred around the -10dB to 0dB spot for the maximum calibrated compression range and optimum signal to noise ratio.

To get the best out of the SMAC compressor, it is recommended to adjust the threshold level so that both Red and Green compression indicator LEDs are lit up at the same time (or approximately the same time). When the Red LED lights up by itself, this indicates that the compression is at or near the end of its range, which in some creative instances may be fine, but in terms of optimum compression usage, it is recommended to back off on the threshold until both LEDs light up as described.

## **USING 'PUMP'**

As mentioned, this effect becomes more prominent as the ratio increment increases.

Using SMAC in 'Pump' mode requires careful setting up to properly hear the pump compression acting. Use attack and release settings to get an idea of how much compression is taking place, then back off until the right amount is achieved.

## **PEAK LIMITING**

Peak Limiting is at the extreme end of compression. It is most effective at squashing fast transients or peaks. Fast attack and release settings with a high ratio define 'Peak Limiting'. It is more often used in mixing and mastering than tracking, as it can heavily constrain the dynamic range which is of course, irreversible.

To achieve the so-called 'brick wall' effect of peak limiting, the 'tight' switch needs to be engaged, and time envelope parameters need to be set close to minimum, with ratio control set to maximum or close to maximum. Compression indicator LEDs should be flickering to the louder moments.

To give the peak limit more 'punch', engage the 'pump' switch and carefully adjust attack/release and ratio controls to suit. Take note of the amount of gain reduction on the meter; around 1dB to 10dB is usually the case in this mode, although more could be used for a creative effect. Use the Output Gain control at the end to compensate for any loss in signal level.

# 4/operation

## **STANDARD COMPRESSION**

Select 'norm' on the attack/release toggle switch to choose a more standard, classic compression commonly used for tracking.

Set both attack and release dials to 12 o'clock.

Set ratio to 4:1 and adjust threshold for around 3dB of gain reduction, occasionally reaching up to around 5dB or so during the louder moments.

## **AUDIO LEVELING**

Select 'swim' on the attack/release toggle switch.

Adjust Threshold control so that both compression indicator LEDs light up.

Start with a mild ratio setting with mid settings on attack and release.

## **SINGLE CHANNEL TRACKING**

To operate SMAC as two separate tracking compressors, simply disengage the link switch and set to 'un-linked'. Each channel now runs on its own set of dials, completely independent from the other channel.

## **DUAL or LINKED CHANNELS**

To process mixes, sub-groups, or stereo pairs, it is imperative that both channels receive the same amount of compression and envelope values, otherwise the stereo image will be ruined.

The SMAC link modes are designed to provide 'dial' linkage when set to 'Ch.1 master' and 'stereo link' for properly matched left/right gain reduction.

## **USING EXTERNAL SIDE-CHAIN**

With SMAC it is possible to compress the signal with an external source through the side-chain inputs.

As these inputs are actually send/return, it is also possible to use the side-chain for an external EQ to further process the nature of compression.

By accentuating the higher mids, for example, it is possible to configure SMAC as a detailed 'de-esser'.

# 5/inputs/outputs

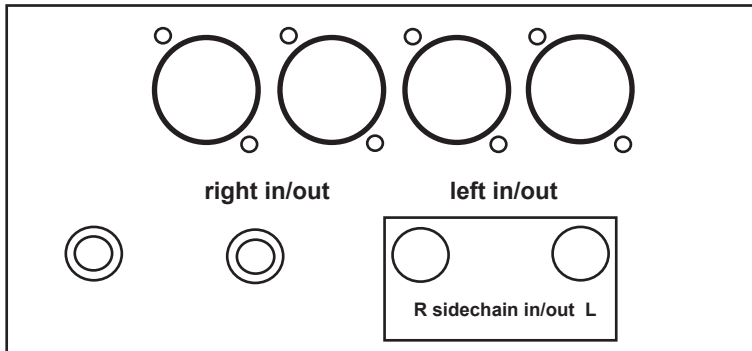
## AUDIO INPUTS/OUTPUTS

SMAC features electronically balanced, fully calibrated XLR inputs and outputs optimized for +4dB operation. When connecting to unbalanced equipment, be sure to leave any unused pins or wires floating and not connected to ground, otherwise you may damage equipment or have incorrect level readings.

## EXTERNAL SIDE-CHAIN SEND/RETURN

The external side-chain send/return operates at approximately 6dB less than the injected input through the main XLR. This is done to provide ample headroom for any EQ or processing equipment that you may have plugged into the side-chain input/outputs.

It is important to remember that the side-chain socket acts like an insert point for SMAC, or, in other words, uses a 1/4" (tip/ring/sleeve) phono plug for send/return of the side-chain.



## MAINS INPUT

SMAC accepts both 110-120 Vac and 240-250 Vac mains voltage.

A mains selection switch is accessible through a small rectangular hole in the back. When powering up for the first time, be sure to confirm the correct voltage is set for your region before you connect mains power to your SMAC unit.

# 6/specifications

Maximum input: +20dB

Maximum Output: +20dB

External side-chain input maximum input: +10dB

Compression range: 25dB

Maximum Compression with 'pump': 60dB

Maximum output makeup gain: 28dB

Ratio range: 1.5 to infinity

Minimum Attack time: 1ms

Maximum Attack time: 800ms

Minimum Release time: 20ms

Maximum Release time: 3secs.



