~Sebatron~
Innovative Australian Audio

SMAC

Stereo **M**usical **A**udio **C**ompressor

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SMAC

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 transperent 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 later VCA type compressors.Depth, sonics and image 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' if desired.SMAC has the ability to handle any compression application quickly and flawlessly. Compression activity and amount are totally variable and the Class A make-up gain stage is transperent with ample gain level to offset any 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 incorporating an envelope time factor control toggle switch called norm/tight/swim.Each setting 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*'. 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.

The SMAC audio path is completely Class A and discrete using solid state topology. For maximum headroom all active components run on a +60V rail which gives SMAC a wide open sound that is tight and accurate.Like the other studio based Sebatron products currently available , there are no intergrated circuits or 'chips' in the circuit.

SMAC is the perfect quality Stereo compressor designed to operate in any working enviroment from the high end professional recording studio , home recording set ups to live music venues and productions.

2/features
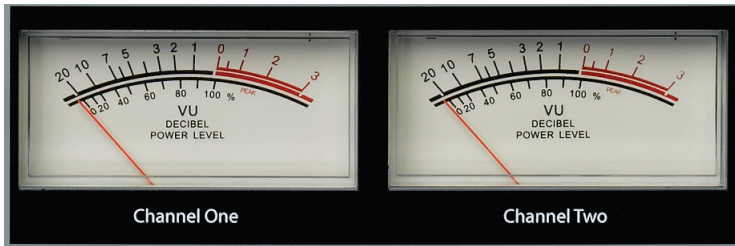
- **fully balanced** (XLR) inputs and outputs
- **dual servo optical compression** for increased compression range , transperency and smooth dynamic response.
- **accurate VU metering** switchable Output to Gain reduction
- fully variable threshold , ratio , attack and release
- 28db clean output gain 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 sidechain inputs/outputs** for easy connection of external EQ
- **completely discrete Class A circuitry** .No intergrated circuits or 'chips'
- **switchable mains voltage**
- **solid metal build**

AUDIO PATH

The SMAC audio path was designed for maximum audio transperency 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 complementry 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 complementry 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 many 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 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 be interrupted at any moment to the unit , 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 seperate 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 seperate processors yet are 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 and is often described as com-pression from top (as opposed to the sides in the 'dual-mono linked' mode). This has advantages in certain situations where stereo imaging is of importance and are to be preserved yet the undesirable effects of one chan-nel pumping against the other are not wanted.This is valuable for compressing stereo tracks like main mixes , sub mixes , drum overheads etc. .where closely matched channels are of 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 independant.

3/controls
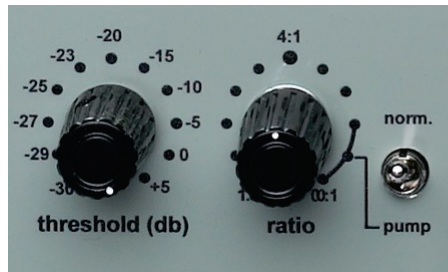
THRESHOLD

      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

      Adjust 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 transperent , 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 transperency.

      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 only prominently heard when at higher ratio
settings and with careful adjustment of threshold , attack and release
parameters 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
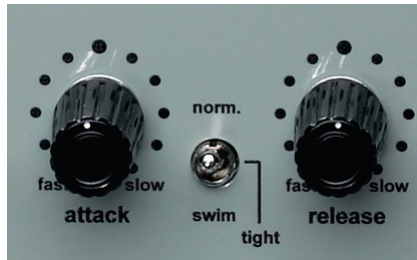
ATTACK
 Defines how long it takes before compression takes place.
Fast attack times are required to capture faster sounds like percussion
whereas slower times are more suited to slower sounds like vocals or bass.
RELEASE
 Defines how long it takes for the compressor to stop acting on the
signal.Like 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 un-obtrusive.
 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. This is very handy when trying to
 'maximize' program material in a smooth and organic way and in a lot of 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 can perform closer to 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

output gain (db)
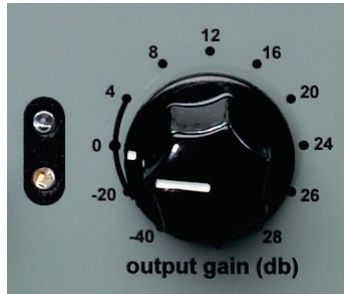
COMPRESSION ACTIVITY INDICATORS
      These two leds give an important insight into how the compression activity is taking place.
      When properly set for average compression , *both* Leds will flicker or light and dim depending on the attack release settings and related toggle switch.

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 transperent all purpose line amplifier by switching the SMAC compressor off (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 useage 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 relase 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 and is most effective at squashing fast transients or peaks.Fast attack and release settings with a high ratio define 'Peak Limiting'. More oftenly used in mixing and mastering than tracking as it can heavily constrain the dynamic range which is of course irreversable.

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 10 db 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 more 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 reachuing up to 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 seperate tracking compresses simply dis-engage the link switch and set to 'un-linked'. Each channel now runs on its own set of dials and is completely independant from the other channel.

DUAL or LINKED CHANNELS

To process mixes , sub-groups or stereo pairs , it is imperitive that both channels recieve 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 EXTERANL 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 up to un-balanced 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 SIDECHAIN SEND/RETURN

The external sidechain send/return operates at approximately six db 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 sidechain input/outputs.

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

right in/out left in/out

R sidechain in/out L
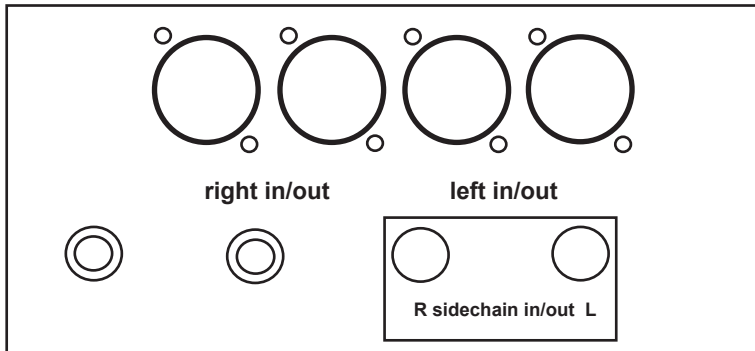
MAINS INPUT

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

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

6/specifications

Maximum input :+20db
Maximum Output : +20db
External sidechain input maximum input :+10db

Compression range : 25 db
Maximum Compression with 'pump' : 60 db
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.