~Sebatron~

Innovative Australian Audio

THORAX - operating manual

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THORAX

Valve Microphone Preamplifier with EQ and Compressor

1. Introduction

In real life acoustic situations the human voice is cable of producing sounds that cover a wide dynamic range - from a gentle whisper to an ear-piercing scream. The same can be said about electric and acoustic instruments. If these dynamics are recorded linearly there is a tendency for softer sounds to drop below the threshold of perception, particularly if the sound playback systems (amps and speakers) are not aligned to real life volume, but are instead, adjusted for listening pleasure.
This creates a need to reduce the dynamic range of a sound so that it can fit into the limited range of a playback or recording system.

This is where valves and audio compression enter the picture. The Thorax uses a transformer coupled valve preamp to subtly act on the signal and reduce dynamic range. The Class A circuitry running on High Voltage rails means that internally, the signals can have a wide voltage swing that permits all the goodness of the valve and transformer to come to the fore, shaping the signals naturally.

This preamp also features a passive EQ designed to accentuate the positive aspects of the textures and harmonics generated in the valve. The frequencies chosen are the ones that resonate best within the architecture of the circuit.

The preamp/EQ is followed by the optical compressor, there the user can further interact with the signal process and apply audio compression as needed. The dynamic range of the output can then be adjusted so that vocals, for example, sit consistently and clearly present in a mix. The quieter moments won't drop out and the louder moments won't distort or overload. Naturally this also applies to all instrumentation.

For recording signals direct from electric instruments such as synthesizer, electric guitars, Bass etc. the Thorax is also well suited as a valve D.I with the Direct Input on the front panel. This is a High Impedance direct feed to the grid of the valve and when levels are optimised will yied an excellent signal to noise ratio that is perfectly suited to digital recording.

The running of pre-recorded tracks is another process the Thorax has been designed for, signals can be fed into the Thorax and organically sculptured to suit. Signals can be injected in up to three different ways by using the preamp XLR input, preamp direct input or external line input for the compressor.

For creative applications the Compressor section of the Thorax has been designed with added features such as compression mix, as well as, two modes of compression based on where detection takes place - feedforward or feedback.

All these features, coupled with a well thought out and streamlined circuit, is what makes the Sebatron Thorax a highly desirable and practical recording tool solidly built to last a lifetime.

2. Features


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passive EQ
optical compressor
phantom
signal
+48V
pre-amp out
normal
hi cut 1
hi cut 2
flat
air 1
air 2
bright
80hz cut
120hz cut
deep 1
deep 2
fat
direct input
pad/gain (db)
threshold (db)
ratio
pump
attack
release
swim
tight
mic pre
line in
dry
comp
comp mix
comp bypass
comp in
feed forward
feed back
main out
metering
pre-amp out
level
main out
G.R
VU
DECIBEL
POWER LEVEL
~Sebatron~
made in Australia
Valve Mic Pre-amp EQ and Compressor
THORAX


passive EQ
phantom
signal
+48V
pre-amp out
direct input
pad/gain (db)


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made in Australia
VU
DECIBEL
POWER LEVEL
Valve Mic Pre-amp EQ and Compressor
THORAX

2. Features

Thorax preamp

- *Transformer coupled XLR microphone input feeding valve triode*
- *Fully balanced XLR inputs and outputs*
- *High Impedance phono Direct Input for Guitar, Bass, Keyboards or line level signals etc*
- *Six-way pad/gain control in 6db increments that sets the gain and colour of the preamp*
- *Quality 12AT7/ecc81 Valve running on a High Voltage rail providing steller musical signal amplification and enhancement*
- *Six-way High Shelf selector dealing High Frequency boost or cut*
- *Six-way Low Shelf selector dealing Low Frequency boost or cut*
- *180 degree mic input phase reversal switch*
- *+48VDC Phantom power for condenser microphones*
- *Signal indication LED indicates signal is in correct operating range*
- *Output level control for transparent control of the final output signal*

Thorax compressor

- *Fully balanced XLR inputs and outputs*
- *Switchable from Thorax mic pre or external line input*
- *Compressor 'mix' control adjustable from 100% dry to 100% wet*
- *Fully variable Threshold, Ratio, Attack, Release controls*
- *'Pump' switch for extended ratio range*
- *Tight/Normal/Smooth switch for selection of attack/release ranges*
- *Switchable feedforward or feedback compression styles*
- *Transperent Output Level/Gain Makeup*

- *External Control Voltage input to link two units in stereo*
- *External Side-chain insert for detection EQ or 'Ducking'*
- *Switchable Preamp/Main Output/Gain Reduction metering*
- *Wide swing and internally calibrated accurate VU metering*

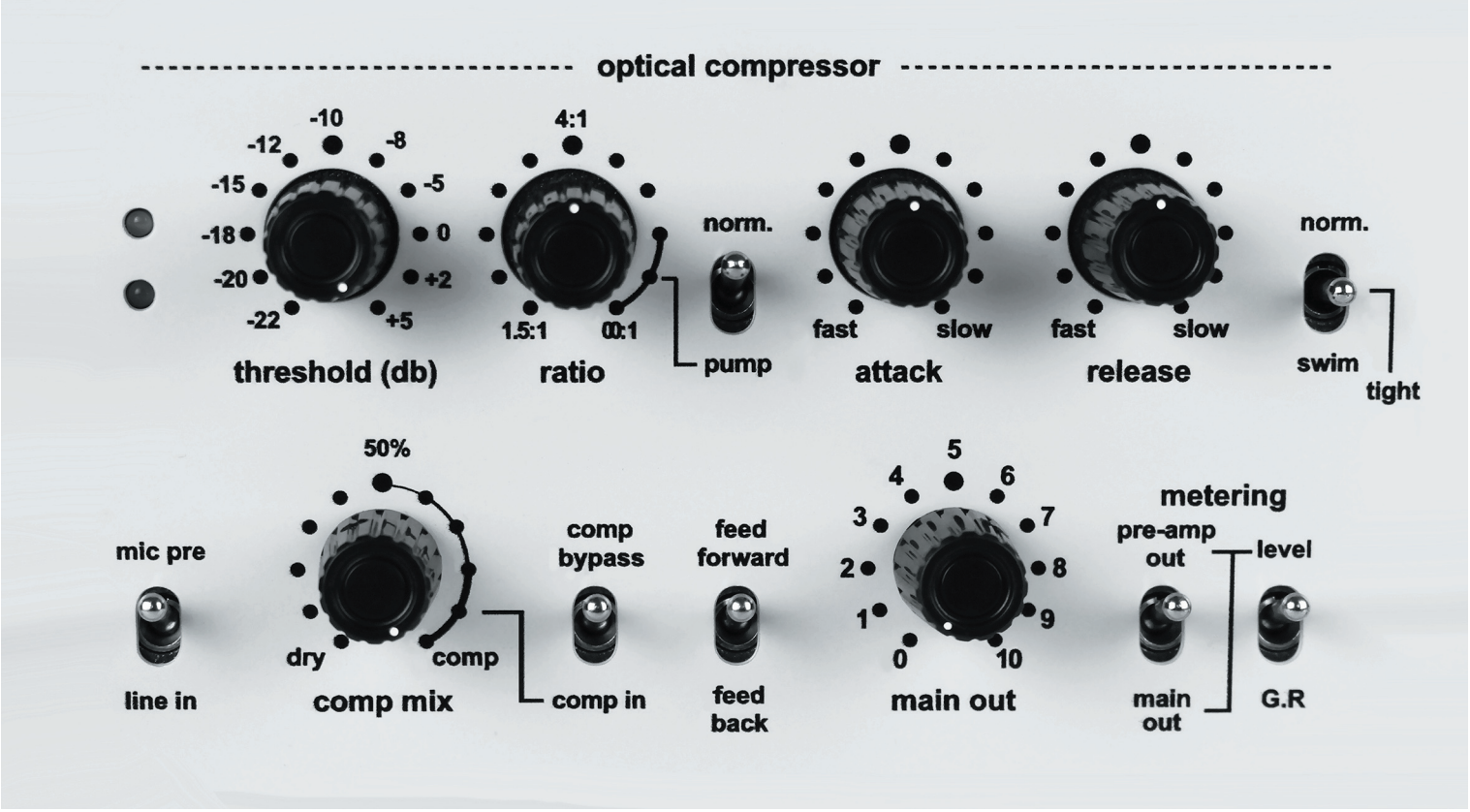
- *Wide Bandwidth and Low Noise quality Class A circuitry running on High Voltage rails*
- *Quality switches, potentiometers and components throughout*

3. Functions and Dials

(top row)
-Phantom Power Switch: Switchable +48V power for condenser microphones
-Signal LED: Illuminates when signal is present and in optimum range
-Pre-amp output control: Adjusts final output level of preamp section
-Normal/Reversed Phase Switch: Selects the phase or polarity of the signal
-Passive EQ High Selector: Six position selector switch for
High Frequency cut or boost

(bottom row)
-Direct Input: 100k High Impedence Balanced/Unbalanced Phono input for electric Bass, Guitars, Keyboards and line inputs
-Pad/Gain Selector: Acts as a pad and gain control by varying negative feedback around first stage of triode/Valve - set in 6db steps
-Passive EQ Low Selector: Six position selector switch for
Low Frequency cut or boost

3. Functions and Dials



(top row)
-Compression indicator LEDs: Indicates when compression is active
-Threshold: Sets the point at which compression begins
-Ratio: Adjusts the amount of compression when compression begins
-Normal/Pump Switch: Selects between normal and pump modes- Pump mode extends ratio range
-Attack: Adjusts attack constant of compression characteristics
-Release: Adjusts release constant of compression characteristics
-Normal/Tight/Swim: Switches between three attack/release ranges

(bottom row)
-Mic/Line input switch: Switches between mic pre (to the left) or external line input (back xlr)
-Comp mix: Adjusts the degree of balance between comp and dry signals
-Comp bypass switch: Selects between complete bypass or compressor
-Feedforward/Feedback switch: Selects where detection of compression takes place - More apparent at higher ratios
-Main Output Control: Adjusts final output level of signal when compressor circuit is switched in (not bypass)

4. Inputs and Outputs

Compressor Input/Output
Balanced XLR

Preamp Input/Output
Balanced XLR

Balanced TRS
Main Audio Ouput

Ext. CV input

Side-Chain Insert

Balanced TRS
Preamp Output

All XLR inputs and outputs are pin 2 hot.

All TRS outputs are Tip=hot, Ring=cold, Sleeve=Ground.

Ext. CV input is 0 to 12 VDC max.
*This is not an audio input/output.
Only direct current control voltages must be fed into this in/output.

External side-chain input insert is TRS but can be used with unbalanced phono cable for external trigger to detector.

4. Inputs and Outputs

Mains Power Input

Voltage Selector Switch

The Thorax can be switched between different voltages via the voltage mains selector on the back of the unit.

This switch is usually set in the factory for the appropriate voltage that the unit is destined for, however, in cases of re-sale etc. it is always recommended to check this switch before initial power up.

If Voltage Selector Switch is set to the wrong position the fuse should blow before any damage occurs.

Fuse rating is 0.8 amp @ 240/250 volts (or 1.6 amp @ 110/120 volts).

5. Operation

General Tracking with Mic or Direct Input:

1./ Turn output level control fully left, phase switch to normal, both EQ set to flat
Set Pad/Gain six way selector to default 0db setting, set VU meter to pre-out.

2./ Plug chosen vocal microphone into XLR mic input socket on back.
If the microphone is of the condenser type then activate the phantom power switch and observe phantom LED to confirm power.

3./Observe signal indication LED lit when speaking or singing into the microphone to confirm microphone signal.

4./Slowly adjust pre output level control so that signal range is around optimum on the VU meter when meter is switched to pre output level.

5./If more gain or colour is required then adjust six way pad/gain selector to suit.

6./Adjust output level to maintain optimum signal level.

Adding compression:

1./Set comp mix dial to 100% or fully right, set to feedforward, threshold fully right, ratio to mid-way or 4:1, attack and release mid-way and range selector to tight.
Select which input source you are feeding the compressor - Thorax mic pre or external line input on back.
With comp switch set to bypass confirm signal is in the right level range by switching meter switch to output and observing signal range. Adjust if necessary.

2./ Activate compressor by switching toggle to comp active.
Slowly turn threshold control to the left and confirm compression by active LED.
Notice how compressor pushes down the louder moments.
Adjust ratio, attack and release to suit material and tastes.

3./Switch to GR metering and observe how compressive action is taking place.
Adjust main output level control to suit destination level requirements.
For more dynamics turn mix control to the left slightly.

4./ Choice of feedforward or feedback compression depends on taste and requirements.
For Acoustic instruments in a classical setting we would recommend feedforward.
For Vocals and Rock instrumentaion we would recommend feedback.

5. Operation

Running pre-recorded tracks through the Thorax mic pre for colour:

Signals can be injected into either the XLR on the back or the direct input on the front panel (recommended).

1./ Turn pre-out control fully left so there is no output, plug external signal into xlr on back of unit or into direct input on front panel (recommended).
Set pad/gain control to 0db, both EQ to flat, phase normal, phantom power off
Switch metering to pre-out.

2./ With signal flowing slowly turn pre out level up and monitor signal on VU for optimum level.

3./ Adjust pad/gain selector for more or less colour and adjust pre-out level control for optimum reading on VU meter.

Linking two Thorax's together for Stereo Compression:

*IMPORTANT: If using two Thorax units for compression via external link both units must be factory matched for the compression to be accurate and symmetrical.
Please contact factory to confirm your units are factory matched.

1./ Follow instructions on 'Adding compression' (previous page) to set up both units that require stereo linking.

2./ Connect Control Voltage input/ouputs of both units by using an unbalanced cable with each end plugged into the C.V input on the back.

3./ For stereo compression to be accurate the dials of both units still need to be matched or at least very similar, this ensures information of both channels is equally combined.

All switches in the compression section also need to be in the same spot ie. feedforward/feedback, mix control etc.

Parameter information transmitted by the linking of both units is: Threshold, Ratio and Pump Switch, Attack, Release, AR factor (toggle).

6. General Maintenance

Warm up period:
For the valves to settle in and voltages to stablize
we recommend a brief warm up time of 3 to 5 minutes.

General Use:
The Thorax preamp comes stocked with brand new J.J valves. We use J.J valves because of low microphony, consistency and of course the sound which is generally regarded as neutral.

Valve life varies from valve to valve but is generally three to five years with average useage and up to ten years if used sporadically and kept in a good environment. As valves approach the end of their lifespan there usually is a rise in noisefloor (hiss-noise) and a narrowing of the sonic bandwidth.

If useage is minimal and within 10 hours a week on average, then we would recommend valve replacement around the four to five year mark. Heavier useage, twenty hours a week and upwards for example, we would recommend valve replacement within three years.

In all cases, useage is simply having the unit on, not necessarily passing signals. Even in an idle state with no signals there are still transformers and valves operating and it is recommended that for general useage that the unit be left on for periods of no longer than eight hours at a time. If longer periods are

Precautions:
- Do not operate unit in moist or wet enviroments
- Avoid moisture and excessive heat
- Do not remove lid when mains power cord is connected
- Always replace with same type of rated or recommended fuse
- Operating temperature range : 0C to +50C approx
- To prevent the risk of electric shock, do not operate with lid removed
- Do not expose to dripping or splashing and do not place objects filled with liquids, such as vases, on top of the unit
- For proper safety, the unit must be connected to a mains socket outlet with a protective earthing connection
- Unit is live even when switched off. Indicator lamp beside the on switch does not mean the apparatus is disconnected from the mains
- To disconnect completely from the mains supply cable needs to be removed from the apparatus
- The mains power disconnect device for apparatus is the appliance coupler on the rear of the apparatus and shall remain readily operable
- No user servicable parts inside. Refer service to qualified personel
- Refer to manual illustration for input and outputs connect

7. Specifications

Valve Type: 12AT7 or ECC81 (two valves required)
Prefered Valve Brand(s): J.J, Amperax, Telefunken, JAN

Frequency Response: 20Hz - 80 KHz +/- 2db (air 1)
Maximum Input level (mic): +4db
Maximum Input Level (D.I): +10db
Maximum Output Level: +30dbm balanced
Total Gain of preamp section: 68 db
Additional Compression makeup gain: 30db
Input Impedance (mic): 1K ohm
Input Impedance (D.I): 100K ohm
Output Impedance: Less than 600 ohm
Min Compression Attack Time: 1ms
Max Attack Time: 25ms-tight 1sec-swim
Min Release Time: 4ms-tight 50ms-swim
Max Release Time: 2 sec-tight 6 sec-swim

Power: Externally switchable 110/120/220/240 VAC for global useage
Build: Chassis is 1.2mm mild steel powder coated ‘Textured Black’
Front Panel: 3mm mild steel powder coated ‘Magnolia’
Modular P.C.B: Preamp for easy servicing and modifications
Topology: Discrete and Class A Valve and Solid State signal path running on +300V and +60V rails respectively
Circuitry: Class A Discrete and low noise
Two Dual Triode 12AT7/ecc81 and High Voltage Silicon Transistors

Service/Repair queries:
sebatron@sebatron.com