

TUBE-TECH CM 1A Compressor Module

DESCRIPTION.

The TUBE-TECH compressor CM 1A is based on an opto-coupler as the gain-reduction element. This non-semiconductor element has a very low harmonic distortion and none of the non-linearity problems involved when using most semiconductor elements. Furthermore there is no long-term degradation of the element thus giving it almost infinite life. This element is placed after the input-transformer and followed by an all tube-based amplifier with a gain of $-\infty$ dB to +30 dB.

Thus the signal is not fed through any semiconductor circuitry on its way to the output.

The amplifier consists of two dual triodes in push-pull configuration (one ECC 83 as the pre-amp and phase splitter, and one ECC 82 as the output stage), and an output transformer.

Both input and output are balanced (600Ω) and fully floating.
The in/out key switches the compressor in and out without clicks.
The amplifier remains in the signal path.

THE SIDECHAIN:

The side chain is the only part of the compressor that contains semiconductors. They are used for three reasons: First they do not affect the sound reproduction, second they have a high slew rate, which is of importance for the performance of the compressor and third they don't take up much room.

It contains two J-FET quad op-amps, one npn-transistor and one FET-transistor, which handles the signal for the gain-reduction element.

The compressor contains two time constants circuits:

1. Fixed attack and release times
2. Variable attack and release times

The **attack/release select** switch makes it possible to use these two circuits separately or combine their functions.

This gives a feature not normally obtained in other compressors:

In the combined (fix. /man.) state, the attack- and release controls makes it possible to obtain a complex release-time slope. (See page 4)

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COMPRESSOR INTERCONNECTION:

The Link sockets for interconnection of several compressors are located on the rear panel.

A switch (BUS SELECT) on the front selects which compressors are interconnected, and on which bus they are connected. If you e.g. have 10 compressors in a rack, you can select compressor 1,5,7 and 8 on bus 1, and compressor 2,3,6 and 9 on bus 2, leaving compressor 4 and 6 in the off position.

Compressors 1,5,7,8 are now interconnected and all four will perform the exact same compression. This applies to compressor 2,3,6 and 9 as well. Compressor 4 and 6 are independent.

The interconnection implies that the unit, which performs the most compression, is controlling the others.

To choose which one you want to control, select the attack/release time, the threshold and the ratio on that unit, and turn the threshold fully counter clockwise on the reminding compressors.

It is of course possible to have all the interconnected compressors control each other simultaneously.

NB: Remember to set the ratio control and the gain control in the same position on the "slaves". Otherwise the stereo image could be shifted during compression. The attack/release-control on the slaves will have no effect.

The input/output capability of the side chain-circuit allows up to **ten** compressors to be linked together.

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CONTROLS:

- GAIN:** The **gain** control is used to "make up" for the gain loss, which takes place when the unit is compressing. It is placed after the gain-reduction circuit and therefore has no influence on the threshold setting. The **gain**-control is continuously variable from off to +30 dB.
- RATIO:** The **ratio** control varies the ratio by which the input signal is compressed.
If the ratio selected is to 2:1, and the input signal increases 10 dB, the output signal is only increased by 5 dB. The **ratio** control is continuously variable from 2:1 to 10:1.
- THRESHOLD:** The threshold is the point where the compressor begins its action. It is defined as the point where the gain is reduced by 1 dB.
The threshold is continuously variable from +20dBU to -40 dBU.
- METER:** The LED VU-display switch has two positions:
1. **Compression**
The VU-display is reading gain reduction. Its rest position is "0 VU", and the amount of compression is shown as a decreasing deflection in dB.
 2. **Output**
The VU-meter is reading the level at the output socket.
"0 VU" is equivalent to +4 dBU.
- IN/OUT:** This leverswitch switches the compressor in and out of the signal path. The out position bypasses the compressor section, but the amplifier remains in the signal path.
- ATTACK:** The **attack** control chooses how fast/slow the compressor responds to an increase in the input signal.
The attack control is continuously variable from 0.5 to 300 milliseconds.
- RELEASE:** The **release** control chooses how fast/slow the compressor responds to a decrease in the input signal.
The release control is continuously variable from 0,05 to 10 seconds.

ATTACK/RELEASE SELECT:

This switch selects how the compressor reacts to an increase (**attack**) or decrease (**release**) of the input signal.

There are three settings of the switch:

1. Fixed.
Attack time: 1 msec
Release time: 50 msec
2. Manual.
Attack time: from 0.5 msec to 300 msec
Release time: from 0.05 sec to 10 sec
3. Fix/man.
This setting combines the release times of fixed and manual mode. The attack time is as in the fixed mode.

The fix/man mode always has a fast attack, but it is possible to obtain a release time depending on the input signal, e.g. get a fast release when the peak disappears, then superseded shortly thereafter by the release time selected by the release control.

From the time the peak disappears, until the selected release time takes over, is dependent upon the setting of the attack control.

That is, the attack control changes function from a pure attack control, to a control of delay with the same time range.

The more **CW** the attack control is turned, the longer time before the release control takes over.

The more **CCW** the attack control is turned, the shorter time before the release control takes over.

This function is valid only if the time of the peak is shorter than the setting of the attack control.

If the peak of the program is longer than the setting of the attack control, or if the attack control has reached the full **CCW** position, it will respond as in the manual mode.

The fix/man mode acts as an automatic release function with a constant fast attack time and fast release time for short peaks and a longer release times for longer peaks.

This setting is mainly intended for use on program material (overall compression).

BUS SELECT:

Interconnects several compressors on bus 1 or bus 2.
If the compressor is left in the off position, it works entirely independently.

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ADJUSTMENT PROCEDURE:

CAUTION:

Before making any adjustment let the unit heat-up at least 15 min.

Observe that the offset-voltage measured at the side chain jack socket, when the THRESHOLD is off, is not greater than +/- 15 mV DC in both position "fixed" and "manual".

(Tip is bus 1 and ring is bus 2).

If the voltage exceeds this value, replace either U1 or U2.

THE GRE SHALL BE MARKED BETWEEN 0.800-1.000

ADJUSTMENT OF BASIC GAIN:

- 1) Apply a signal of 1 kHz, -30,0 dBU into the input of the compressor.
- 2) Turn the **GAIN**-control fully clockwise.
- 3) Set the **RATIO**-control at 2:1
- 4) Adjust the pre-set **GAIN** (located on amp/psu PCB) to an output-reading of 0,0 dBU.

ADJUSTMENT OF COMPRESSION TRACKING:

- 1) Turn the **THRESHOLD**-control fully counter-clockwise.
- 2) Set the **RATIO**-control at 2:1.
- 3) Set the **BUS-select**-switch at 1.
- 4) Apply a signal of 1 kHz, 0,0 dBU into the input of the compressor.
- 5) Adjust the **GAIN**-control to an output-reading of 0,0 dBU.
- 6) Apply a DC-voltage of +250,0 mV into the side chain jack socket (tip) and observe that the output level has dropped to -10,0 dB.
- 7) If this is not the case, adjust the level with P 7, to obtain a drop of exactly -10,0 dB.

ADJUSTMENT OF THE LED DISPLAY READING "VU":

- 1) Switch the **METER**-selector to Output.
- 2) Apply a signal of 1 kHz, 0,0 dBU into the input of the compressor.
- 3) Adjust the **GAIN**-control to an output-reading of +4,0 dBU.
- 4) Adjust P10 to a LED display reading of 0 VU.
The -1 LED shall just turn off and the 0 LED shall just turn on.

ADJUSTMENT OF THE LED DISPLAY READING "COMPRESSION":

- 1) Turn the **THRESHOLD**-control fully counter-clockwise.
- 2) Switch the **METER**-selector to Comp.
- 3) Set the **RATIO**-control at 2:1
- 4) Apply a signal of 1 kHz, 0,0 dBU into the input of the compressor.
- 5) Adjust the **GAIN**-control to an output-reading of 0,0 dBU.
- 6) Adjust P 9 until the LED display is reading 0 VU.
The -1 LED shall just turn off and the 0 LED shall just turn on.
- 7) Apply a DC-voltage of +250,0 mV into the side chain jack socket and observe that the output level has dropped to -10,0 dBU. If this is not the case, adjust the compression tracking (see above)
- 8) Adjust P 8 until the LED display is reading -10,0 VU.
The -20 LED shall just turn off and the -10 LED shall just turn on.
- 9) Remove the DC-voltage from the side chain jack socket.
- 10) Repeat step 6 - 9.

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ADJUSTMENT OF THE RELEASE CONTROL:

- 1) Set the **METER** switch in position compression.
- 2) Set the **attack/release SELECT** switch in position manual.
- 3) Apply a signal of 1 kHz, 0,0 dBU into the input of the compressor.
- 4) Adjust the **THRESHOLD**-control to a reading of -10 VU of the **VU-meter**
- 5) Set the **ATTACK**-control at fast.
- 6) Set the **RELEASE**-control at slow.
- 7) Switch off the 1 kHz and observe that the VU meter moves to 0 VU in approx. 10 sec.
- 8) If this is not the case, adjust P 6, to obtain a release time of approximately 10 sec.

TECHNICAL SPECIFICATIONS CM 1A:

<u>Input impedance:</u>	600 Ohms
<u>Output impedance:</u>	< 60 Ohms
<u>Frequency-response:</u>	5 Hz - 25 kHz +0.5/-3 dB
<u>Distortion THD @40 Hz:</u>	
<u>0 dBU:</u>	< 0,15 %
<u>10 dBU:</u>	< 0,15 %
<u>maximum output (1 % THD):</u>	+26,0 dBU
<u>maximum input (1 % THD):</u>	+21,0 dBU
<u>Noise Rg=200 Ohm:</u>	
<u>Output Gain</u>	<u>0 dB</u> <u>+30 dB</u>
<u>Unweighted</u>	-85,0 dBU -75,0 dBU
<u>CCIR 468-3</u>	-75,0 dBU -65,0 dBU
<u>CMRR @ 10KHz</u>	< -60dB
<u>Gain:</u>	off to +30 dB
<u>Compressor</u>	
<u>Ratio:</u>	2:1 to 10:1
<u>Threshold:</u>	off to -30 dBU
<u>Attack:</u>	0,5mS to 300mS
<u>Release:</u>	0,05 S to 10S
<u>Tracking between interconnected compressors:</u> (0 to 20 dB compression):	< +/- 1 dB
<u>Tubes</u>	
ECC 82	1
ECC 83	1
<u>Dimensions</u>	
Height:	176 mm / 6,93"
Width:	50 mm / 1,97"
Depth:	170 mm / 6,7"
<u>Weight</u>	
Net:	1,2 Kg / 2,6 lbs
Shipping:	1,8 Kg / 4,0 lbs
<u>Power requirements</u>	12W

All specifications at RL=600Ω
Lydkraft reserves the right to alter specifications without prior notice

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