

Bedienungsanleitung

ENGLISH

# T-COMP

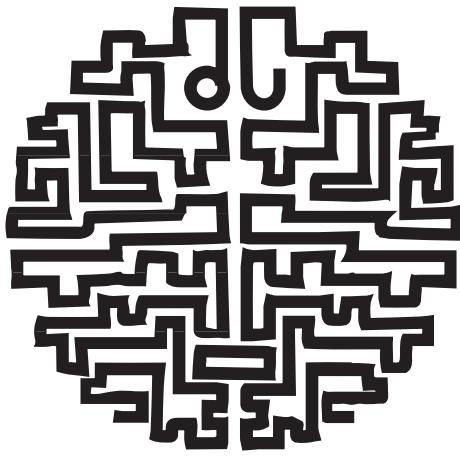
Stereo Tube Compressor



# MANUAL



**MindPrint®**  
ADVANCED RECORDING DEVICES



# MindPrint®

ADVANCED RECORDING DEVICES

Dear Recording Specialist,

We are pleased that you selected the MindPrint® T-COMP as your tool of choice in your quest for high-quality sound.

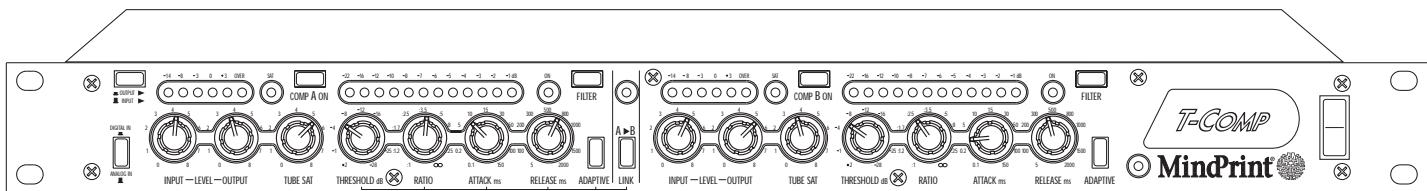
The T-COMP is a high-quality compressor featuring stereo and dual mono modes. Among the hallmarks of this device are certainly its ease of use and excellent tone. With the benefit of authentic tube circuitry, it will make your tracks come with a lavish helping of analog warmth. And with the optional digital interface, it merges seamlessly into your digital studio environment.

The engineers of the MindPrint development team are all specialists in their chosen fields, highly experienced hands at designing tube, audio, mixer and digital technology. These sound "gurus" invested all of their talents and skills to do justice to the wishes of numerous recording enthusiasts all over the world.

Modern recording equipment has achieved a very high standard over the last couple of years and prices have dropped to fairly affordable levels. Unfortunately, many studio recordings nonetheless fall short of what most consider desirable in audio sound. Generally, the problem is an absence of analog audio phenomena such as tape saturation and tube warmth.

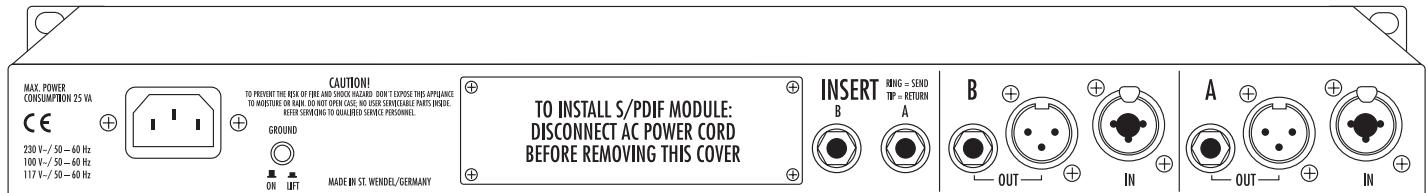
The T-COMP puts precisely these missing qualities at your fingertips—all you have to do is exploit them to make the most of your talents and recording equipment. A classic case of technology driving inspiration, you will be amazed at the difference. Get ready for a more intense, vivid and musical sonic experience.

St. Wendel, October 1999



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# 1 Layout of the T-COMP

## 1.1 Input and Output Section

Featuring both 1/4" jacks and XLR connectors, the T-COMP is equipped with balanced line inputs and outputs designed to accept standard studio levels. You can also add a digital input to the unit by installing the DI-MOD expansion module. Inserts let you patch analog devices into the T-COMP when you are using it in a digital environment, which means you don't have to invest in external converters. Sporting a dual-channel design, each channel is equipped with separate dedicated controls so that you can use the T-COMP to process a stereo signal or two separate mono signals.

Use the Input Gain knob to adjust the input level. The level meter, which can be switched to display either the input or the output, provides a good visual reference you can use to dial in suitable settings. On the one hand, you want the input signal to be as high as possible, on the other, it should not exceed + 6 dB. Please make sure that the red LED (Over) does not illuminate even at signal peaks.

The Out Level knob controls the overall volume of the processed signal. Since a compressor reduces signal levels, you may find that whenever you are compressing the signal fairly drastically, you will need to compensate for that reduction by bringing the output signal back up. To dial in the most desirable level, switch the level meter so that it indicates the output level and set the Out Level knob so that peak levels in the signal reach, but do not exceed, the + 6 dB mark. Be sure that the red LED (Over) does not flash.

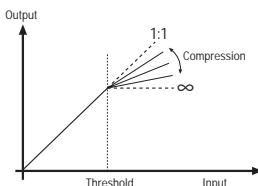
Press the Comp On button to activate the compression circuitry; the status LED On will light to confirm that the effect is working. Whenever the effect is switched off, the input signal is routed directly to the device's output. Since the Out Level knob influences the wet or processed signal exclusively—it has no influence on the dry or unprocessed signal—you can, by keeping an eye on the level meter, set both signals to the same value. The best possible way to judge how the compressor is affecting the signal is simply by switching the effects off and on and comparing the dry and wet signals.

## 1.2 Compression

You'll find that the compression which this unit delivers is impressive in its effectiveness, yet it is smooth and unobtrusive. Powered by a high-quality THAT-VCA (Voltage Controlled Amplifier) which has been fine-tuned to interact with the tube, it generates uncolored compression as well as the typical overtone structure that you would expect of a premium tube device.

The compressor kicks in whenever the signal exceeds the setting determined by the position of the Threshold knob. Adjust the compression ratio via the Ratio knob. Every signal that exceeds the threshold value is attenuated by a certain degree, namely by the ratio that you have set. This type of damping is also called gain reduction; the amount of reduction is displayed in a 12-segment LED meter located above the compressor controls.

Compressor Curve: A typical compressor curve

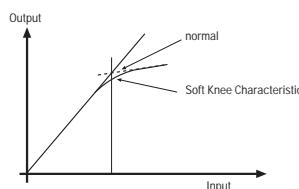


When you use the compressor to shape signals, louder signals become quieter, while softer signals remain unprocessed. After you have compressed a signal, you can tweak the level so that the louder parts of the signal, which the effect has cut, are boosted back up to their original level. The volume of the softer parts is then also amplified, which means that the entire track will seem louder. Furthermore, since the signal's dynamics are "squeezed" so that the difference in levels between loud and soft passages is not nearly as drastic, you end up with a more balanced, smoother soundscape. Many signals such as

vocals and acoustic instruments are inherently extremely dynamic, so you'll find that these won't blend nicely into the mix until you have compressed them.

To achieve compression that is as inconspicuous as possible, the T-COMP uses something called soft-knee compression. What happens here is this: as a signal's level approaches the threshold point, the compression rate is increased continuously. When the signal level finally exceeds the threshold value, it is compressed at the ratio that you have dialed in. What this means is that even when you choose to compress signals heavily, these are not "crushed" into submission, but gently "squeezed" when the signal exceeds the threshold.

Soft-Knee Curve: The curve of the T-COMP's soft-knee compression is smoother and sounds more musical.

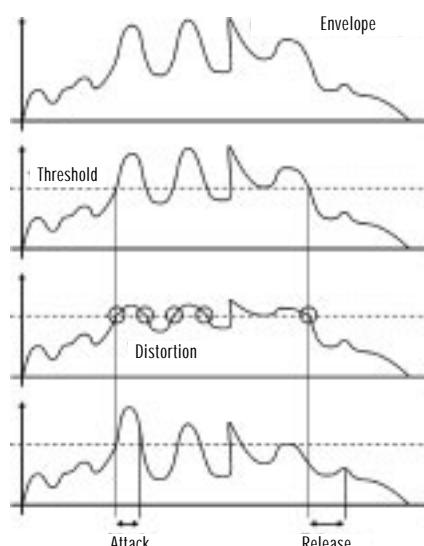


## 1.3 Attack and Release Time

Attenuating the level of a signal when it crosses a given threshold is an operation that controls the level of a signal, which is why in the past compressors were called leveling or gain control amplifiers. Here a detector monitors the audio signal at all times and controls the amplification level of the VCA accordingly.

Any type of control operation requires some amount of time to be carried out. To avoid overshooting, the time it takes for the compression to kick in should be as short as possible. On the other hand, if the compressor responds too quickly, the effect will generate distortion. The amount of time it takes for the compressor to respond to changes in level is called attack time. For many creative applications, you'll find that a long attack was selected to generate a special kind of effect, for instance to shape an envelope. In any case, selecting the right type of attack time will always entail some type of compromise, one you'll have to define anew for each different application and musical material. Much the same holds true for the release time, i.e. the amount of time it takes for the compressor to return to an amplification ratio of 1:1 after the signal level has dropped below the defined threshold. If you select too short a release time, the signal will chatter, too long a release time often produces an ugly pumping sound.

Attack and release times: Selecting the right attack and release times is crucial so that compression remains audible.



Use the Attack and Release knobs to dial in the desired times. This is the biggest problem users of conventional compressors are confronted with. To remedy it, the T-COMP works with a type of program-dependent control for the attack and release times, a feature that you can activate by pressing the Adaptive button. The attack and release times that our engineers chose are fast enough to handle percussive material. If certain parts of a signal fade in and out slowly—in other words, if it has certain passages with lengthy attack and release times—the T-COMP will adapt its attack and release times accordingly to ensure the best possible processing results.

Whereas the Adaptive circuit may at first glance resemble the automated mode of some of the more popular automatic compressors, in terms of functionality, it actually out-performs these by a considerable margin. When you're dealing with an automatic compressor, the controls governing attack and release times are disabled. With the T-COMP on the other hand, these are always enabled and at your disposal. This means that you can set the attack and release times manually so that the device will deliver exactly the kind of compression you have in mind. In addition, T-COMP automatically fine-tunes your settings to match the given musical material. The compressor gives you the best of both worlds: You have the creative leeway to define the compression as you see fit, while at the same time, the automated functionality frees you of tedious technical considerations. You can focus on the music that you're working with and the creative process of shaping it via the T-COMP.

## 1.4 Filter

The Filter button activates a certain compression mode in which the amount of compression generated by the device depends on the frequency content of the signal. A filter is inserted into the control circuit, usually called a sidechain, rather than the signal chain. It compels the compressor to respond differently to different frequencies. The filter is not in the signal path itself, and so it has absolutely no influence on the frequency response or timbre of the signal; instead it just governs how the compressor responds! While we were in the process of designing this filter, we listened carefully to the input of professional sound engineers. They made the point that in the real world, bass-heavy signals tend to evoke excessive compression. For this reason, we tuned the filter so that the compressor responds less aggressively to lower frequencies, thereby delivering results that are much closer to the way the human ear naturally "compresses" signals.

When the filter is activated, you will note that the compression seems more balanced, with silky, shimmering highs and improved top end response. The filter was optimized for vocal signals, but if you experiment with acoustic instruments, you can also come up with great results. It also works wonders for complex master mixes.

## 1.5 Tubes

The two onboard tubes definitely make up what could be called the "soul" of the compressor: they have a considerable influence on its sound. Use the Tube Sat knob to dial in variable saturation levels. This knob gives you precision control over the amount of overtones that the tubes generate. In the lower end of the control range, few overtones are generated. As you turn the knob clockwise, the overtone content increases slightly, which allows you to make extremely subtle adjustments. Once you turn the knob beyond the twelve o'clock position, the tubes really start to go to work. When you turn it wide open, you'll definitely hear some distortion in the signal. Normally, if you compress a signal heavily, its level is decreased. Lower levels don't drive the tube as hard, leaving it without the material it needs to work its magic. We compensated for this phenomenon by installing a circuit where the compressed signal, depending on the Threshold setting that you dial in, is automatically boosted back up to a suitable level.

When you dial in higher levels of saturation, keep this in mind: although the Tube Sat knob setting and threshold play a major role in determining the amount of harmonics that are generated, signal level plays a key role as well. In order to achieve a consistent overtone structure when the signal is on the verge of clipping, you should experiment with higher

compression ratios in order to "prep" the signal optimally for the tube. When you dial in the appropriate settings, compression and tube saturation mesh to a homogeneous whole, which will give your tracks just the right sheen.

The light-emitting diode located below the tube window gives you a good visual reference for the effect. When the tube enters the saturation zone, the colour of the LED will change from green to yellow. When you start pushing the tube harder, the LED will turn red. If at this point you drive the tube even harder, it will generate audible distortion.

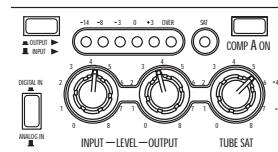
If the Ratio Knob is set to the far left position, the dynamics of the signal are not processed at all because the compression ratio remains at 1:1. In order to deactivate the compressor fully, you must also turn the Threshold knob to the far left position. Although at a ratio of 1:1, the compressor indeed has no effect on the characteristics of the signal, the circuit mentioned earlier—the one that boosts the signal before it is routed to the tube—remains active.

Obviously, the more convenient option for deactivating the compressor is to simply switch the Comp On button off. This is a good habit to get into: When you leave the settings as they are, you can switch the circuitry off and on and get a good A/B comparison between the compressed and uncompressed signals.

# 2 Control Features

With the exception of the input selector and the level meter buttons, each of the T-COMP's channels is equipped with a set of dedicated controls.

## 2.1 Input and Output Sections



Digi In: This button activates the digital input. If the optional DI-MOD digital interface hasn't been installed, the digital input is of course unavailable.

Input Gain: Adjust the input level of the T-COMP here. This knob's setting affects all inputs.

LED Ladder: This LED meter indicates the level of the input or output signal, depending on the status of the Output to Disp. button. The yellow LEDs indicate the headroom of the T-COMP, the red LEDs the amount of distortion.

Output to Disp.: This button switches the level meter so that it displays either the input or output signal.

Comp On: Turns the T-COMP's compression effect on. When you switch the effect off, the input signal is routed directly to the device's output.

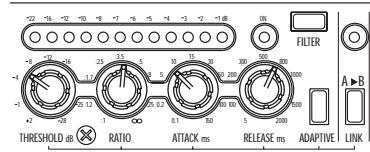
Output Level: Controls the output level of the processed signal. When the effect is switched off, this knob has no influence on the signal. Since the knob Output Level influences the wet or processed signal exclusively, you can use it to set the processed signal to the same level as the unprocessed signal. The best possible way to judge how the compressor is affecting the signal is simply by switching the effects off and on and comparing the dry and wet signals.

Tube Sat: Controls tube saturation within the compressor for all signals which exceed the threshold value. The higher this knob is turned up, the more harmonic overtones are generated.

Sat LED: This tricolor LED indicates the tube saturation status. In normal operation, it will light up green. As soon as the tube is driven hard enough so that it is slightly saturated, the LED changes its color to yellow. When driven too hard, the tube produces audible distortion and the LED turns red.

## 2.2 Compressor Section

The tube compressor gives you the best of both worlds—the precision of a high-quality semiconductor circuit with the silky sound that only vacuum tubes can deliver. Its circuitry, an entirely unique and innovative design, lets you control compression and tube saturation separately.



**Threshold:** This knob adjusts the threshold of the compressor within a range of +2 dB to -28 dB. Signals which exceed the threshold value are processed by the compressor. Depending on the threshold value that you have dialed in, the signal is also boosted before it is routed to the tube. Rotate the knob hard left to its far left position or switch the Comp On button off to deactivate the compressor.

**Ratio:** This control determines the relationship between, or "ratio" of, the input and output levels of all signals which exceed the threshold value. A setting of 2:1 means that when the level of an input signal increases by 2 dB, the output signal level increases by just 1 dB. The control range starts at a ratio of 1:1 (no compression) and can be increased infinitely. The latter is basically a limiter setting—no further increase of the output level is possible. To deactivate the compressor, rotate the knob to the far left-hand position or switch the Comp On button off.

**LED Ladder:** Indicates the amount of attenuation, or gain reduction, that the signal is being subjected to.

**On LED:** Illuminates to indicate that the device's processing circuitry is enabled. The Comp On button located in the input/output section activates the circuitry.

**Attack:** Determines the amount of time it takes for the compressor to fully attenuate the signal level once the level exceeds the defined threshold.

**Release:** Determines the amount of time that it takes for the amplification ratio to return to 1:1 once the signal level has fallen below the threshold.

**Filter:** This button switches the sidechain filter of the compressor on. When the filter is activated, frequencies lower than 300 Hz have less influence on compression, which gives you a more balanced sound in the mid and high frequency ranges.

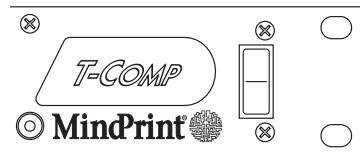
**Adaptive:** Switches the automated, signal-dependent attack and release time control feature on. The Attack and Release controls remain active and are used to shape how the automated adaptive circuit responds.

**Link:** This button switches the control circuit of the two channels to stereo mode. If you want to process stereo signals, be sure to activate this button. If you're working with mono signals, it must be deactivated.

**Link On LED:** Illuminates when the Link function is active.

## 2.3 Tube and Mains Switch

At the heart of the T-COMP are two high-quality tubes; these are responsible for the unique sound of the compressor.



**Tube:** Not only does the warm red glow of the tube add a certain visual value to the T-COMP, it is also the "secret ingredient" of its great sound. Depending on how hard you drive it, the tube (type 12AX7A) can add anything from a touch of silky analog warmth to unmistakable tube saturation to your tracks.

**Mains Switch:** In addition to switching the AC power supply on and off, the mains switch also activates the hard-wired bypass of the T-COMP. When the device is switched off, the Line In and Line Out circuits are linked directly; the signal bypasses the device completely. The hard-wired bypass is also activated automatically in case of power failure or a power supply defect. This feature definitely enhances the safety of the device, particularly in broadcasting and live applications where you can't afford to have a circuit drop out even for a moment. In the studio, the T-COMP can be removed completely from the signal path by simply switching the unit off.

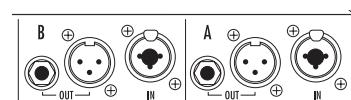
**On LED:** Illuminates to indicate the T-COMP is switched on.

## 3 Connections

All connectors are located on the processor's rear panel.

### 3.1 Inputs

The inputs feature a dual connector design to accept both balanced XLR connectors and balanced 6.3 mm (1/4") plugs. You can also connect unbalanced cables to both input jacks.

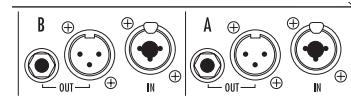


The pin assignments of the XLR connector comply with the international norm IEC 268-12. In accordance with this norm, pin 1 is connected to the ground, pin 2 carries the positive signal and pin 3 the negative. If you are using an unbalanced circuit, be sure to bridge pin 1 and pin 3.

In the stereo (tip-ring-sleeve) 1/4" jack, the positive signal is routed via the tip, the negative signal via the ring, and the ground via the sleeve. When you insert an unbalanced mono plug, the input automatically switches to unbalanced operating mode.

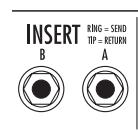
### 3.2 Outputs

For the line outputs, you also have separate balanced XLR connectors and 1/4" jacks at your disposal. When you insert an unbalanced mono plug, the input automatically switches to unbalanced operating mode.



You can access both jacks simultaneously, in which case the output of the T-COMP acts as a distributor or splitter. If you want to use both outputs, you must use balanced cables. Simultaneous use of the outputs in unbalanced operating mode is not permissible.

### 3.3 Inserts



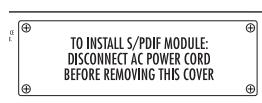
The Insert jacks allow you to insert external devices into the signal path for additional processing. The unbalanced 6.3 mm (1/4") TRS jacks accept standard insert cables, the usual type of patch cord used for mixing console inserts.

The internal signal path is interrupted when you introduce a plug into the Insert jack. Instead of continuing on through the internal busses, the signal is patched out via the tip of TRS plug (T = Tip). It is then routed through the external device that is connected to the other end of the insert patch cord. The signal is returned to the T-COMP via the ring (R) of the plug. The sleeve (S) of the plug is connected to ground.

The insert is located post-input level knob and pre-compressor. If you have installed the optional digital interface, then you can connect these inserts to additional analog devices in a digital signal chain without the need for additional digital interfaces or external converters for those devices.

## 3.4 Digital Interface

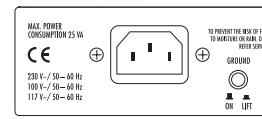
If you choose to work with digital mixers or hard disk recording systems, you have the option of retrofitting a digital interface to the expansion slot located on the rear panel of the T-COMP.



When you equip the T-COMP with the DI-Mod module, this upgrade gives you a digital input/output in state-of-the-art 24-bit format; it is also compatible with all 16, 18 and 20-bit devices. The sampling frequency can be switched between 44.1 and 48 kHz. When you synchronize devices via the input, the DI-Mod even works with every frequency between 32 and 48 kHz.

## 3.5 AC Power

The T-COMP connects to a wall outlet or mains supply via a standard power cable attached to the T-COMP's AC power socket.



Should you encounter a ground loop, the ground lift switch severs the signal ground from the device's chassis ground. A ground loop is pretty easy to identify—the device emits annoying hum. If this is the case, set this switch to the position where the noise is canceled out.

# 4 Applications

## 4.1 The Purpose of the T-COMP

The dynamics of instruments and the human voice can be too much of a good thing, often exceeding what you want and need for purposes of recording. If during mixdown you focus on loud passages, the softer parts would be submerged in the mix. If on the other hand, you dial in a level that allows the softer passages to be heard clearly, the louder parts would drown everything else out. The T-COMP remedies this problem by smoothing out the difference between loud and soft passages, giving you more manageable dynamics. This in turn makes it so much easier to integrate the processed track into the mix, with much better overall results.

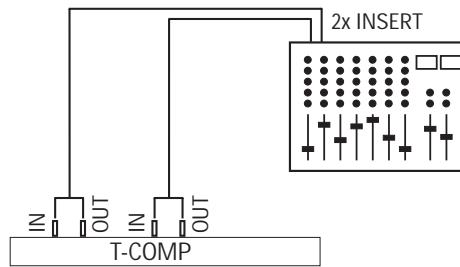
A compressed recording also sounds louder than an uncompressed track. Even though the actual level remains the same, increasing loudness creates the kind of compact sound, presence and punch which makes many professional recordings sound so good. The "secret" ingredient that enables recordists to come up with this kind of up-front, punchy sound is, in the vast majority of cases, a compressor. Not only do the pros process individual tracks with compression, they also give the stereo master signal the same treatment. The T-COMP can do both—it is designed to deal with the kind of individual mono signals that you would find in the separate channels of a mixer, as well as with the stereo signals of a master insert in stereo link mode. Not only does it process the

dynamics of signals, but thanks to its tube circuitry it also adds extremely musical analog warmth to the signal.

The T-COMP also takes on a key role in digital environments. Prices have collapsed in recent years, making digital mixers and multitrack recording systems affordable for the amateur recordist. The majority of functions featured in pro devices, astronomically expensive just ten years ago, are part and parcel of every contemporary hard disk recording program. Fortunately, more and more processing operations can be performed completely in the digital domain, which certainly enhances the quality of productions. Nonetheless, many musicians perceive a digital chill, a cold, sterile sound that is the product of analytical, high-precision systems. This is where the T-COMP comes into play. Powered by tube engineering, it delivers creamy analog tone and, with the help of the digital DI-Mod option, transports it directly to the hard disk system. In the final analysis, you can have your cake and eat it too: T-COMP delivers great analog sound and digital engineering prevents undesirable signal degradation when you post-process tracks.

## 4.2 The T-COMP in a Channel Insert

If you want to process an individual instrument, simply insert the T-COMP into the appropriate mixer channel. With its two channels, the T-COMP can work with two mixing console channels and process different mono signals simultaneously. In addition to compressing the dynamics of a signal, you can also use it to come up with an interesting overtone structure and the typically warm tone with enhanced presence that only a tube device can deliver.



Connect the input and output of the T-COMP to a mixing console channel via insert patch cables. If your mixer is not equipped with insert jacks, you can patch in the T-COMP between the line output of a recorder, sampler or synthesizer and the mixer's input. Experiment with the diverse control features to get a feel for how the T-COMP operates and responds. You'll find that it is not always desirable to dial in the shortest attack times and a high ratio to compress a signal as drastically as possible. For instance, if you're processing a rhythm guitar track, you'll often come up with better results if you choose a longer attack time to allow the instrument's natural attack to remain intact. You can attenuate the rest of the signal—the actual "body" of the sound consisting of the decay and sustain phases of the signal—via the compressor. In the mix, you'll end up hearing just the pick or fingers hitting the strings, which is a great option for making it sound less cluttered and more transparent.

## 4.3 The T-COMP in a Subgroup

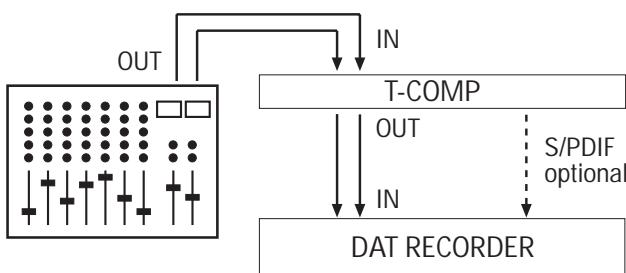
You can also use the T-COMP in a mixing console's subgroup inserts. For example, if you're using subgroups to create a stereo mix for all drums, this option will let you compress the signals of the entire drum kit.

Subgroups can also be used to patch a signal to a multitrack recorder. For this application, you can use the T-COMP to compress signals while you're recording. If your mixer is not equipped with subgroup inserts, you can patch the T-COMP in directly between the mixer and recorder.

If you choose to use this option, you should only compress the signal slightly to give you some leeway when you're shaping the signal during post-processing. You'll find that the T-COMP will again come in handy when you're ready to mix a recording down!

## 4.4 The T-COMP in a Stereo Master

Once you have compressed individual tracks, you can compress the stereo master signal for an even tighter mix. Generally, a compression rate of 2:1 and gain reduction of some 6 dB delivers great results. To use the T-COMP on the final mix, insert the T-COMP between the mixing console's output and the master recorder's input. If your master machine is a DAT recorder and you have installed the DI-Mod option, you can also work in the digital realm via S/P-DIF.



Incidentally, if you want to achieve the best possible results using this type of configuration, you shouldn't execute fades at the end of a song manually by pulling down the mixer's master fader. The reason for this is that the threshold you have dialed in via the Threshold knob will shift in response to the change in levels. Instead, create the fade-out via the master recorder's level control, or better yet, during digital post-processing. If you nonetheless prefer to use the master fader, patch the T-COMP into the mixer's master insert. Unfortunately, you won't often find this feature on most lower-priced mixers.

## 4.5 The T-COMP in a Digital Environment

If you plan to work with a digital mixer or hard disk recording system, you can also integrate the T-COMP via the S/P-DIF interface, provided of course you have installed the DI-Mod option.

Simply route the signal that you want to process via a digital interface from the digital mixer or hard disk system to the T-COMP. The processed signal will be sent back to the mixer or hard disk system in digital form via the output of the T-COMP and, once it arrives there, can be processed or recorded to another track. At the same time, the analog output is available for monitoring purposes.

When you're inserting signals via the digital interface, the T-COMP (like every other digital device) generates a slight latency—in other words, it causes a minimal delay. The delay is no more than 1.5 ms, so normally this is not a problem. However, if you are using the dry and wet versions of a given signal simultaneously or several channels for the same signal, you may encounter undesirable phasing effects generated by this delay. Should you encounter this problem, compensate for the delay produced by the T-COMP using the track delay of your hard disk system or the channel delay of your digital mixer.

## 4.6 The T-COMP in Insert Mode

By inserting external devices via the insert jacks, you can actually create a serial signal chain consisting of analog devices within a digital studio environment. You would patch these additional devices into the analog signal bus of the T-COMP, so you don't need any additional digital interfaces or external converters.

A favorite trick of experienced audio engineers is to employ an equalizer before the signal is piped through a compressor. The MindPrint PARA-Q is the ideal tool for this task—it was designed specifically to work together with the T-COMP. A truly high-quality device, it delivers remarkably musical results.

Another interesting option is to insert an analog exciter—many recordists don't like the sound of digital exciter algorithms.

## 4.7 The T-COMP in Live Applications

Although the T-COMP was primarily developed for recording purposes, it actually wears many hats—you'll find that it is an excellent tool for live applications. If you are the proud owner of a guitar rack system, you can patch it in post-preamp and pre-power amp to compress your instrument's signal. For processing vocals, you can patch the T-COMP into a mixer insert just as you would an effects device, so that the amplified sound of your voice enjoys the benefits of those desirable tube characteristics. Feel free to experiment with other instruments such as electric bass guitars.

## 5 Tips and Tricks

### 5.1 Switching noise

The T-COMP's On button is a real hardware switch. This means that, rather than just being deactivated, the processing stages are actually removed from the signal path. While removing unused electronics from the signal path enhances audio quality, these switches sometimes cause undesirable popping noises, which are produced by sudden surges in amplitude. Your best bet is to forget about switching the effect on and off while you're in the middle of recording or processing signals with the T-COMP.

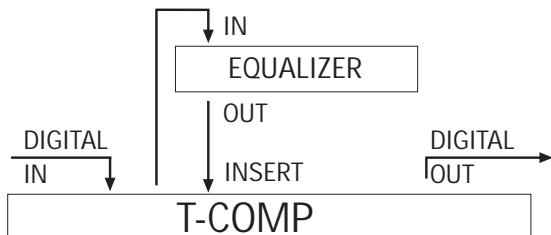
### 5.2 Over-the-top distortion

The tube compressor processes all signals that lie above the threshold value. Moreover, the level of tube saturation of course depends on the signal level. The compressor is used to keep the signal level as steady as possible. If you dial in a low threshold value and a high saturation level, the tube will be driven hard enough to produce fairly heavy distortion at signal peaks. In this case, you should increase the compression ratio to limit these signal peaks. If you don't want this type of signal processing, you'll have to dial in lower threshold and saturation values.

### 5.2 Monitoring the mix

Make a habit of monitoring the results in the context of the entire mix. Even when you're compressing the signal of a single channel, don't just judge by what you hear when you activate the Solo button on your mixer. Get adventurous and give heavier distortion a go—it might be just the thing to spice up a take. Often, a track might sound almost pathetic heard in isolation, but in the context of the mix, absolutely brilliant. For instance, a touch of tube saturation can work really well to "fatten up" harmony vocals in the chorus of a song.

## 6 Block Diagram



# 7 Technical Specifications

<b>LINE IN</b>		FILTER: Frequency:	Switchable on or off 300 Hz (Compression circuitry only affects material above 300 Hz.)
Connections: Combined XLR (pin 1 = ground; pin 2 = +; pin 3 = -) and 1/4" phone jack (tip = +; ring = -; sleeve = ground)			
Input type: electronically balanced and floating			
Input impedance: 22 kOhm			
Sensitivity: 0 dB			
Maximum input level: +20 dB			
DIGITAL IN	only with optional DI-Mod (see Option below)		
<b>LINE OUT A/B</b>			
Connections: Combined XLR (pin 1 = ground; pin 2 = +; pin 3 = -) and 1/4" phone jack (tip = +; ring = -; sleeve = ground)			
Output type: electronically balanced & floating			
Output impedance: 220 Ohm			
Maximum output level: +20 dB			
DIGITAL OUT	only with optional DI-Mod (see Option below)		
<b>INSERTS</b>			
<b>INSERT A/B</b>			
Connection:	1/4" phone jack (tip = Return; ring = Send; sleeve = ground)		
Input type:	unbalanced (Return)		
Input impedance:	4.7 kOhms with Gain control at 0		
	47 kOhms with Gain control at 10		
Sensitivity:	0 dB		
Maximum input level:	+20 dB		
Output type:	unbalanced (Send)		
Output impedance:	220 Ohm		
Maximum output level:	+20 dB		
<b>EFFECT SECTION</b>			
Switchable	on or off		
<b>TUBE SECTION</b>			
TUBE SAT			
Distortion:	adjustable between 0.1% and 10%		
Treble boost:	from 0 dB to 2 dB between 4 kHz and 22kHz (Tube Sat control)		
<b>COMPRESSOR SECTION</b>			
THRESHOLD:	adjustable from +2dB to -28 dB		
RATIO:	adjustable from 1:1 to 1:infinity		
Attack:	adjustable from 0.1 ms to 150 ms		
Release:	adjustable from 5 ms to 2000 ms		
Adaptive:	automatically sets the attack and release times, based on settings		
<b>FILTER:</b>			
Frequency:			
Effect Section off:		0.0008%, LINE IN, 10 Hz - 22 kHz @ 0 dB input / 0dB output 0.0007%, INSERT IN, 10 Hz - 22 kHz @ -10 dB input / 0dB output	
Effect Section on:		0.06%, LINE IN, 10 Hz - 22 kHz @ 0 dB input / 0dB output 0.05%, INSERT IN, 10 Hz - 22 kHz @ -10 dB input / 0dB output with TUBE SAT = 0	
<b>DISTORTION</b>			
<b>FREQUENCY RANGE</b>			
Effect Section off:		10 Hz - 22 kHz, ± 0.2 dB	
Effect Section on:		10 Hz - 22 kHz, ± 1 dB	
<b>DYNAMIC RANGE</b>			
Effect Section off:		106 dB, LINE IN, 10 Hz - 22 kHz @ 0 dB input / 0dB output 108 dB, INSERT IN, 10 Hz - 22 kHz @ -10 dB input / 0dB output	
Effect Section on:		92 dB, LINE IN, 10 Hz - 22 kHz @ 0 dB input / 0dB output 92 dB, INSERT IN, 10 Hz - 22 kHz @ -10 dB input / 0dB output All values A-weighted	
<b>BYPASS</b>			
When power is removed from the unit, LINE IN is hardwired to LINE OUT.			
<b>GENERAL SPECIFICATIONS</b>			
Versions	230-volt, 117-volt, and 100-volt, Protection Class 1		
Power supply fuse, internal: 230 volts/160 mA slo-blo 117 volts/315 mA slo-blo 100 volts/315 mA slo-blo			
max. current draw: 113 mA (133 mA with DI- MOD) max. power consumption: 31 VA			
Dimensions: 19" wide (482 mm) by 1.75" high (44 mm) by 9.4" deep (238 mm)			
Rack dimensions: 19 ", 1 U			
Depth in rack: 8.75" (222 mm)			
Protrusion of controls: 5/8" (16 mm)			
Weight: 7.6 lbs (3.44 kg); with DI-Mod installed 7.8 lbs. (3.55 kg)			
Option	DI- MOD: S/P-DIF I/O card, stereo		