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You can read the recommendations in the user guide, the technical guide or the installation guide for BEHRINGER MDX4400. You'll find the answers to all your questions on the BEHRINGER MDX4400 in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

User manual BEHRINGER MDX4400
User guide BEHRINGER MDX4400
Operating instructions BEHRINGER MDX4400
Instructions for use BEHRINGER MDX4400
Instruction manual BEHRINGER MDX4400



User's Manual

ENGLISH

Version 1.3 April 2001



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. 1.1.1 Noise As A Physical Phenomenon

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. 1.1.2 What Are Audio Dynamics?

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. 1.1.3 Compressors/Limiters ..

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77792. THE DESIGN CONCEPT

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.. 10 2.1 High Quality Components And Design ..

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.....

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.....
.....
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.....

.....
..... 10 2.

2 Inputs And Outputs

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.....
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.....
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..... 10 2.

2.1 Balanced Inputs And Outputs

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.....

.....
10 3. INSTALLATION

.....
.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

.....

.....
... 11 3.1 3.
2 3.3 3.4 Rack Mounting

.....
.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

..... 11 Mains Voltage .

.....
.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

..... 11 Audio Connections ...

.....
.....
.....

.....
.....
.....
.....

.....
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.....
.....

.....
.....
.....
.....

..... *11 Selecting The Operating Level ..*

.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

.....
.....
.....

. 12 4. CONTROLS

.....
.....
.....
.....

.....
.....
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.....

.....
.....
.....
.....

.....
.....
.....

.... 13 4.1 The Front Panel Control Elements

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.....
.....
.....

.....
.....
.....
.....

.....

.....
.....
.....

. 13 4.4 Rear Panel Control Elements Of The MULTICOM PRO

.....
.....
.....

.....
.....
.....
.....

..... 15 5. APPLICATIONS ..

.....
.....
.....

.....
.....
.....
.....

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.....
.....
.....

.....
.....
.....
.....

..... 16 5.1 Compression/Leveling/Limiting/Clipping

.....
.....
.....

.....
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.....
.....

.....
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.....
.....

..... 5.2 Compressor Section

.....
.....
.....

.....
.....
.....
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.....
.....

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.....
.....

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... 5.2.1 Initial Settings For The Compressor Section

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.....
.....

.....

.....
.....
.....

.....

.....

. 5.2.2 The MULTICOM PRO As A Sound Effects Unit ..

.....

.....

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.....

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..... 5.2.3 The Muffling Effect Of A Compressor ..

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.. 5.3.1 Initial Settings For The Peak Limiter Section .

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.....
.....

16 17 18 18 18 19 19 6. SPECIAL APPLICATIONS

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.....
.....

.....
.....
.....
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.....
.....
.....
.....

.. 20 6.1 Using The MULTICOM PRO For Recording And Cassette Duplication ..

.....
.....

.....
.....
.....

..... 6.1.1 The MULTICOM PRO In Digital Recording And Sampling ..

.....
.....
.....
.....

.....
.....
.....

6.1.2 The MULTICOM PRO In Mastering .



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... 6.2 The MULTICOM PRO as a protective device .

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. 6.2.1 Protection Of A System With A Passive Crossover ..

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.....

.....
.....
.....

6.2.2 Protection Of A System With An Active Crossover...

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6.2.3 Improving The Sound Of A Processor System

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.....

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.....
.....

. 6.3 The MULTICOM PRO In Broadcast

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.....
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..... 20 20 20 20 21 21 21 22 7. SPECIFICATIONS ..

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.. 23 8. WARRANTY

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..... 25 5 MULTICOM PRO MDX4400 1. INTRODUCTION In purchasing the MULTICOM PRO, you have acquired an extremely efficient and universal dynamics processor. The unit was particularly designed for those applications most frequently used in practice. Despite the extremely complex internal circuitry, the unit has a control surface which is clearly laid out and easy to understand.

With the MULTICOM PRO, BEHRINGER have developed an innovative and easy-to-use dynamics processor which meets the high demands that are made on such a device both in live and studio applications. The units most outstanding features are the precision and flexibility of its functions. Quad compressor/limiters are actually not a new invention. Usually, four simple compressor sections are packed into one enclosure, representing however a compromise in terms of operation and functionality. An excessive number of controls complicates the operation of the unit and a lack of control functions restricts the units range of application.

The BEHRINGER MULTICOM PRO is a compact quad compressor/limiter based on the successful BEHRINGER Interactive Technology. Integrated AUTO processors automatically derive attack and release times from the programme material and provide you with transparent and inaudible compression. In 1 RU package the unit consists of four independent high-precision compressor sections with sidechain filters and four peak limiters, each offering asting, this value is further reduced. Generally, dynamic restrictions are due to noisy storage in transmission media and also the maximum headroom of these systems. 1.

1.1 Noise As A Physical Phenomenon All electrical components produce a certain level of inherent noise. Current flowing through a conductor leads to uncontrolled random electron movements. For statistical reasons, this produces frequencies within the whole audio spectrum. If these currents are highly amplified, the result will be perceived as noise. Since all frequencies are equally affected, we term this white noise. It is fairly obvious that electronics cannot function without components. Even if special low-noise components are used, a certain degree of basic noise cannot be avoided. This effect is similar when replaying a tape. The non-directional magnetic particles passing the replay head can also cause uncontrolled currents and voltages.

The resulting sound of the various frequencies is heard as noise. Even the best possible tape biasing can only provide signal-to-noise ratios of about 70 dB, which is not acceptable today since the demands of listeners have increased. Due to the laws of physics, improving the design of the magnetic carrier is impossible using conventional means. 1.1.2 What Are Audio Dynamics? A remarkable feature of the human ear is that it can detect the most wide ranging amplitude changes from the slightest whisper to the deafening roar of a jet-plane. If one tried to record or reproduce this wide spectrum of sound with the help of amplifiers, cassette recorders, records or even digital recorders (CD, DAT etc.), one would immediately be restricted by the physical limitations of electronic and acoustic sound reproduction technology. The usable dynamic range of electro-acoustic equipment is limited as much at the low end as at the high end. The thermal noise of the electrons in the components results in an audible basic noise floor and thus represents the bottom limit of the transmission range.

The upper limit is determined by the levels of the internal operating voltages; if they are exceeded, audible signal distortion is the result. Although in theory, the usable dynamic range sits between these two limits, it is considerably smaller in practice, since a certain reserve must be maintained to avoid distortion of the audio signal if sudden level peaks occur. Technically speaking, we refer to this reserve as headroom usually this is about 10 - 20 dB. A reduction of the operating level would allow for greater headroom, i.e.

the risk of signal distortion due to level peaks would be reduced. However, at the same time, the basic noise floor of the program material would be increased considerably. 1. INTRODUCTION 7 MULTICOM PRO MDX4400 P/dB 140 120 100 80 60 40 Microphone Amplifier Power Amplifier Tape Recorder Fig. 1.

1: The dynamic range capabilities of various devices It is therefore useful to keep the operating level as high as possible without risking signal distortion in order to achieve optimum transmission quality. It is possible to further improve the transmission quality by constantly monitoring the program material with the aid of a volume fader, which manually levels the material. During low passages the gain is increased, during loud passages the gain is reduced. Of course it is fairly obvious that this kind of manual control is rather restrictive; it is difficult to detect signal peaks and it is almost impossible to level them out.

Manual control is simply not fast enough to be satisfactory. P/dB +20 0 -20 -40 Effective SNR -60 -80 Noise floor Headroom Operating level Cassette Recorder Radio Ear Clipping t Fig. 1.2: The interactive relationship between the operating level and the headroom The need therefore arises for a fast acting automatic gain control system which will constantly monitor the signals and which will always adjust the gain to maximize the signal-to-noise ratio without incurring signal distortion. This device is called a compressor or limiter. This system is a part of the BEHRINGER MULTICOM PRO.

8 1. INTRODUCTION MULTICOM PRO MDX4400 1.1.3 Compressors/Limiters By measuring the dynamic range of musical instruments in live recording situations, you will find that extreme amplitudes occur which often lead to overload in subsequent signal processing equipment. Especially in broadcasting and record cutting techniques, these signal peaks can lead to heavy distortion. To avoid this kind of distortion or, for example, to avoid loudspeakers being damaged by overload, compressors or limiters are used. The principal function used in these devices is dependent on an automatic gain control as mentioned in the previous section, which reduces the amplitude of loud passages and therefore restricts the original dynamics to a desired range. This application is particularly useful in microphone recording techniques, to compensate for level changes which are caused by varying microphone distances. Although compressors and limiters perform similar tasks, one essential point makes them different: limiters abruptly limit the signal above a certain level, while compressors control the signal gently over a wider range. A limiter continuously monitors the signal and intervenes as soon as the level exceeds a user-adjustable threshold.



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Any signal exceeding this threshold will be immediately returned to the adjusted level. A compressor also monitors the program material continuously and has a certain threshold level. With compression, in contrast to the action of a limiter, signals are not reduced in level abruptly once the threshold has been exceeded, but are returned to the threshold gradually. The signal is reduced in gain, relative to the amount the signal exceeds this point. Generally, threshold levels for compressors are set below the normal operating level to allow for the upper dynamics to be musically compressed.

For limiters, the threshold point is set above the normal operating level in order to provide reliable signal limiting, to protect subsequent equipment from signal overload. 1. INTRODUCTION 9 MULTICOM PRO MDX4400 2. THE DESIGN CONCEPT 2.1 High Quality Components And Design The philosophy behind BEHRINGER products guarantees a no-compromise circuit design and employs the best choice of components.

The operational amplifiers NJM4580 which are used in the MULTICOM PRO, are exceptional. They boast extreme linearity and very low distortion characteristics. The most important aspect of the MULTICOM PRO design is a radical VCA implementation which results in outstanding technical specification and excellent performance. To complement this design the choice of components includes high tolerance resistors and capacitors, detent potentiometers and several other stringently selected elements. For the first time, the MULTICOM PRO MDX 4400 uses SMD technology (Surface Mounted Device). These sub-miniature components known from aerospace technology allow for an extreme packing density, plus the units reliability could be improved. Additionally, the unit is manufactured under ISO9000 certified management system. 2.2 Inputs And Outputs 2.2.

1 Balanced Inputs And Outputs As standard, the BEHRINGER MULTICOM PRO is installed with electronically servo-balanced inputs and outputs. The new circuit design features automatic hum and noise reduction for balanced signals and thus allows for trouble-free operation, even at high operating levels.

Externally induced mains hum etc. will be effectively suppressed. The automatic servo-function recognizes the presence of unbalanced connectors and adjusts the nominal level internally to avoid level differences between the input and output signals (correction 6 dB). 10 2. THE DESIGN CONCEPT MULTICOM PRO MDX4400 3. INSTALLATION Your BEHRINGER MULTICOM PRO was carefully packed in the factory and the packaging was designed to protect the unit from rough handling. Nevertheless, we recommend that you carefully examine the packaging and its contents for any signs of physical damage, which may have occurred in transit. Please also take the time to complete and return the warranty card within 14 days of the date of purchase, otherwise you will lose the right to the extended warranty.

Or simply use our online registration under www.behringer.com. + If the unit is damaged, please do not return it to us, but notify your dealer and the shipping company immediately, otherwise claims for damage or replacement may not be granted. Shipping claims must be made by the consignee.

3.1 Rack Mounting The BEHRINGER MULTICOM PRO fits into one standard 19" rack unit of space (1 3/4"). Please allow at least an additional 4" depth for the connectors on the back panel. Be sure that there is enough air space around the unit for cooling and please do not place the MULTICOM PRO on high temperature devices such as power amplifiers etc. to avoid overheating.

3.2 Mains Voltage Before you connect your MULTICOM PRO to the mains, please make sure that your local voltage matches the voltage required by the unit! The fuse holder on the female mains connector has 3 triangular markers, with two of these triangles opposing each other. Your MULTICOM PRO is set to the operating voltage printed next to these markers, and can be set to another voltage by turning the fuse holder by 180°. CAUTION: this instruction does not apply to export models exclusively designed, e.g. for 115 V operation! 3.3 Audio Connections The audio inputs and outputs on the BEHRINGER MULTICOM PRO are fully balanced. If possible, connect the unit to other devices in a balanced configuration to allow for maximum interference immunity.

+ Please ensure that only qualified persons install and operate the VIRTUALIZER. During installation and operation the user must have sufficient electrical contact to earth.

Electrostatic charges might affect the operation of the MULTICOM PRO! Output Cable Input Pin 1 Ground 2 Pin 2 = (+) Signal 1 3 Shield (+) Signal + Hum (-) Signal + Hum 1 2 Positive (+)Hum + Signal 3 Negative (-)Hum + Signal 2 x Signal Pin 3 = (-) Signal RFI and Hum = Signal + 6 dB Fig. 3.1: Compensation of interference with balanced connections 3. INSTALLATION 11 MULTICOM PRO MDX4400 Unbalanced use of mono 1/4" jack plugs Tip = Signal Balanced use of stereo 1/4" jack plugs Tip = hot (+ve) Ring = cold (-ve) Sleeve = Ground / Shield Sleeve = Ground / Shield Tip Sleeve Strain relief clamp Tip Ring Sleeve Strain relief clamp For connection of balanced and unbalanced plugs, ring and sleeve have to be bridged at the stereo plug. Balanced use with XLR connectors 2 1 3 1 = Ground / Shield 2 = hot (+ve) 3 = cold (-ve) 1 2 3 Output Input For unbalanced use pin 1 and pin 3 have to be bridged Fig. 3.2: Different plug types + Never use unbalanced XLR connections with microphone cables, as this would short-circuit any phantom power transmitted over these cables! 3.4 Selecting The Operating Level With the Operating Level switch on the rear of the BEHRINGER MULTICOM PRO you can adjust the internal operating level of the unit. Thus, the MULTICOM PRO can be adapted perfectly to various levels (e.g.

both the typical home recording level of -10 dBV and the professional level of +4 dBu). @an optimum operating range of the meters will always be ensured. 12 3. INSTALLATION MULTICOM PRO MDX4400 4. CONTROLS Fig.

4.1: MULTICOM PRO front panel The BEHRINGER MULTICOM PRO has four identical channels. Each channel is equipped with 4 backlit pushbuttons, 4 rotary controls and 17 LEDs. The COUPLE switches are for stereo operation of two channels. 4.

1 The Front Panel Control Elements 7 11 8 10 1 6 2 5 3 4 9 Fig. 4.2: Control elements on the front panel 1 The THRESHOLD control sets the threshold point for the compressor section. It has a range of -40 to +20 dB. If the channel is switched to INTERACTIVE mode (Interactive Knee Adaptation), a Soft Knee characteristic is applied to the signal exceeding the threshold point by a maximum of 10 dB. Above 10 dB, the signal would experience Hard Knee compression. The RATIO control determines the ratio between the input and output level for all signals exceeding the threshold point.



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Output Threshold Gain 0 dB Ratio 2:1 Hard Knee Ratio 4:1 Limiter oo:1 IKA Curve Input Fig. 5.1: IKA characteristic of the compressor section + The new IKA (Interactive Knee Adaptation) circuit prevents aggressive compression, created by high ratios, from sounding too unnatural. This is achieved with an interactive control function, which begins above the threshold level and introduces a Soft Knee curve characteristic in the range up to 10 dB above the threshold point. Beyond this range, the signal is subjected to linear (Hard Knee) compression. With the threshold control completely turned to the right, the threshold value is +20 dB.

Since such a value will not be reached in practice, you can use it to disable the compressor section and work exclusively with the limiter circuits. 5. APPLICATIONS 17 MULTICOM PRO MDX4400 5.2.1 Initial Settings For The Compressor Section Control IN/OUT switch INTERACTIVE switch SC FILTER switch THRESHOLD control RATIO control OUTPUT control Setting IN IN OUT +20 dB 3:1 0 dB Tab.

5.1: Initial settings for the compressor section Rotate the THRESHOLD control counterclockwise until an appropriate amount of gain reduction is indicated on the GAIN REDUCTION meter. This operation will be accompanied by an audible drop in output level. The OUTPUT control should now be turned clockwise to reinstate the output level. The level of the unprocessed and the processed signal can be compared by pressing the I/O METER switch and observing the INPUT/OUTPUT LEVEL meter.

Final adjustments of the RATIO control can then be made to suit your particular requirements. The experienced user will be in a position to specify parameters while in bypass mode and thus realize the effect before the unit is actually switched into operation. This is important in live situations, where a signal needs to be managed efficiently by the engineer, without the convenience of continual A/B comparison. 5.2.2 The MULTICOM PRO As A Sound Effects Unit In the early 1960s, musicians began looking at the recording process as a way to create new sounds. The pumping effect which had been avoided by earlier engineers suddenly became fashionable and was utilized as a creative tool, laying the groundwork for many of the sounds which are now considered indispensable in contemporary music. The compressor is used in this role because you can hear it working, and control of the dynamic range is of secondary importance. The BEHRINGER MULTICOM PRO, with its extensive range of functions, is well suited to this application. Sound effects of this kind can be achieved using extreme settings.

To achieve this, set the THRESHOLD control to a fairly low level, the RATIO control to almost maximum to obtain the desired effect. Experiment with all the controls in order to get a feel of their function! 5.2.3 The Muffling Effect Of A Compressor Quite often, compressors are sometimes accused of muffling the sound, whilst at the same time reducing the dynamics. This fact should be investigated further. Bass frequencies contain most of the energy within music and therefore cause the compressor to reduce the overall dynamics. If the music also contains high frequencies along with the bass frequencies, these are also reduced in level. This is the reason why: in an extremely compressed recording of drums, the cymbals and high-hats are acoustically swamped by the sound of the snare or the bass drum. The same effect is experienced when processing reverberated or ambient sounds. The solution commonly used to this basic problem is either to reduce the compression ratio or to slow down the attack time, so that the increasing high frequency transients pass through the compressor unhindered before the compressor takes effect.

The MULTICOM PRO MDX4400 offers a solution to this problem that is by much more elegant. The SC Filter switch allows you to activate a highpass filter in the control signal path of the compressor. This filter makes sure that midrange and treble range frequencies are taken into account to a greater extent, and that a lowfrequency signal triggers less compression than a midrange/treble signal of comparable level. A major advantage of this design can be seen in the fact that the frequency response of the overall signal is not modified below the threshold adjusted with the Threshold control. 18 5.

APPLICATIONS MULTICOM PRO MDX4400 In pop music the dynamics of both kick drum and bass guitar are usually processed individually. The sidechain filter is therefore ideally suited to apply overall compression in the mixdown, to compress the music while increasing its loudness, but without having to accept the drawbacks described above. Please note that we offer a whole series of high-grade equalizers and enhancers/exciter, which are perfect tools to give any dynamics-processed signal the finishing acoustic touch. Please ask for detailed information! 5.3 Peak Limiter Section As a section of its own and independent of the remaining control functions, the peak limiter enables you to limit the maximum peak level on the MULTICOM PROs output.

It has been designed for use in combination with the compressor section. Independently of all compressor functions, you can protect subsequent devices against signal peaks, short-time overload and excess modulation (radio stations, etc.). Peak Limiting Level Program Limiting Release Input Threshold Output 5 ms 10 20 30 20 ms approx. 1 s t/ms Fig. 5.3: IGC characteristic of the limiter section The diagram illustrates the functioning of the IGC limiter. The solid graph represents the output signal, while the dashed graph above shows the input signal response. The areas between the graphs represent the amount of gain reduction (bright areas are clipping areas, i.e.

signal peaks are radically cut off, dark areas show the effect of the program limiter). The limiter is activated when the adjusted threshold is exceeded for more than 20 ms, so as to limit audible clipping to a very short moment. About 1 s after the signals has dropped below the threshold again, the reduction is set to 0 dB, so that input and output signals are identical again (unity gain). 5.3.1 Initial Settings For The Peak Limiter Section Control THRESHOLD control Setting OFF Tab. 5.3: Initial settings for the peak limiter section The THRESHOLD control of the Peak Limiter sets the threshold level, so that subsequent units are protected from overloading. If the LIM comes on regularly or is on constantly, the OUTPUT control of the compressor section must be turned down, as this control sets the level of the signal, which is routed to the Peak Limiter section. If this technique leads to an undesired drop in the overall level, it is recommended that you increase the compression: either, reduce the threshold level, or increase the compression ratio with the RATIO control.

The OUTPUT control will compensate for a renewed drop in level. 5. APPLICATIONS 19 MULTICOM PRO MDX4400 6. SPECIAL APPLICATIONS 6.1 Using The MULTICOM PRO For Recording And Cassette Duplication In the recording and duplication field the goal should always be to achieve an optimum recording level onto the recording media.



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Too low or too high recording levels lead to side effects such as noise, distortion etc. In mastering and multitrack recording, as well as in duplication, one should always take care to utilize the full dynamic range of the tape recorder, DAT recorder etc. Principally, it is possible to control the recording level by riding faders, which means with low level signals, the gain is increased, whereas the amplitude of high level signal is reduced. It is obvious that this method is insufficient because, especially in live recordings, the expected signal levels cannot be anticipated correctly. Especially with multitrack recordings, which are run under hectic circumstances, the signal level of all channels cannot be monitored and controlled at the same time.

Generally, with manual control, it is not possible to achieve satisfying recording results. An automatic gain control system achieves better and more constant results. Use the MULTICOM PRO by starting with the initial settings, and use its dynamic control functions in order to be able to drive an analogue, as well as a digital recording, up to the limit of its maximum dynamic range while remaining noise- and distortion-free. 6.1.1 The MULTICOM PRO In Digital Recording And Sampling In an analogue recording, too low recording levels lead to an increased noise level, whereas too high levels will cause a compressed and squashed sound. In extreme cases, it will cause distortion due to tape saturation. In contrast to analogue, side effects in the digital field always become extremely audible: with decreasing level, a tape previously recorded with insufficient level loses resolution: the recording sounds hard and loses atmosphere.

With excessive level, the recording sounds harsh and heavily distorted. In order to avoid these effects, the Peak Limiter section of the MULTICOM PRO should be placed before for example a sampler.

As a result of this process, a digital recording or a sampling event can be optimally set in level without any problem. 6.1.2 The MULTICOM PRO In Mastering The mastering process is one of the most critical processing steps in recording. In this production step, it is the goal to achieve a maximum level copy of the recording, without any noise or distortion. In many applications it is further required to produce a high average volume. In the field of commercial media for example, this is apparent especially with records and cassettes which are processed with high average volumes. Quite often in these cases, dynamics suffer drastically, because the program material has been compressed and limited too heavily. Using the compressor and the Peak Limiter section of the MULTICOM PRO allows you to drastically increase the overall volume, without audibly affecting the dynamics. Proceed as follows: 1.

Limit the dynamics of the program material by 6 dB using the Peak Limiter section. By softly clipping just the transients, the real audio signal will not be limited, resulting in a higher headroom. The overall gain can now be increased by 6 dB, which leads to a higher volume. More than 6 dB should not be limited, otherwise side effects could become audible. 2.

Therefore, in addition, you should also use compression. It is recommended that the compression is limited to the first 6 dB of the dynamic range only. A high threshold level in addition to the auto mode will give good results. This effect is particularly noticeable with DAT recorders, whose level indicators achieve a response time of less than 1 ms. Set the DAT recorder at unity and now reduce the LEVEL control of the peak limiter until the LIM LED starts to illuminate. The cut signal peaks cause a reduced recording level of about 6 dB, which is visible on the level indicators of the DAT recorder. Now increase the recording level of the recorder back to unity. The result is a clearly louder recording without any loss of sound. 6.2 The MULTICOM PRO as a protective device Sound system distortion is usually a result of amplifiers and loudspeakers being driven beyond their limitations by signals clipping. The signal limitations that occur lead to unpleasant distortion that is dangerous to the speakers. 20 6. SPECIAL APPLICATIONS MULTICOM PRO MDX4400 A speaker diaphragm is required to accelerate, slow down, smoothly change direction and accelerate again in normal operation. Distorted operation (clipping) leads to instant acceleration, instant stop, change of direction and instant acceleration again. Since speaker diaphragms are subject to the laws of physics, they will not take this kind of punishment for long: the diaphragm will either break up or its voice coil may overheat.

In addition to the damage caused by sustained overload, the speaker may also be damaged by an occasional high level overload, e.g. the sound of a microphone falling onto a hard floor. Even if this type of transient does not destroy a speaker outright, it may damage the speaker surround in such a way, as to cause mechanical abrasion and future failure. It is recommended that you use the BEHRINGER MULTICOM PRO in order to protect the speaker. Brick Wall peak limiters are not normally necessary for PA systems, as amplifiers and loudspeakers are tolerant of short signal peaks. Nevertheless, conventional limiters have to be generally driven far beyond the headroom limit of an amplifier, in order to limit the level and length of the transients responsible for overloading the system. The disadvantage of this principle is that the units full range cannot be completely used. If an increase in the average level of up to 3 dB is attained with the MULTICOM PROs IGC Peak Limiter, this means that you effectively double the power amplification. The MULTICOM PRO can act in this way to convert a PA system of 5,000 Watts into a distortion free 10,000 Watts system.

The following instructions will help you to integrate the unit into your system. 6.2.1 Protection Of A System With A Passive Crossover If your sound system incorporates a passive crossover network (included in the loudspeaker case), insert the BEHRINGER MULTICOM PRO between your mixing console output and the power amplifier input. It is used as the last link in the chain preceding the power amp.

Thus, you can effectively avoid the technical knockout of the midrange/tweeter range caused by high-energy bass signals! This statement, as paradox as it may seem at first, can be explained with the fact that especially low-frequency signals with high amplitudes can overload the power supplies in the amplifier(s). The resulting clipping (cutting off of signal peaks) produces high-energy distortion (upper harmonics), which is abruptly added to the midrange/tweeter signals. For this reason, weak power amps, in particular, must be protected by a limiter in their input dynamics. 6.2.

2 Protection Of A System With An Active Crossover For systems using active crossovers, there are two ways to use the BEHRINGER MULTICOM PRO. The unit may be inserted between the console output and the crossover input. In this application, the BEHRINGER MULTICOM PRO will process the entire audio frequency spectrum.



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Alternately, the MULTICOM PRO can be inserted between the output of an active crossover and the input of a power amplifier. In this application it will only affect a specific range of frequencies. This application is particularly suited to protect the most fragile components of a multi-way speaker system against harmful signal peaks. For example, when your tweeters keep on going up in smoke all the time, the entire system should be operated at lower sound pressure levels or the tweeters should be replaced by other models. Using the MULTICOM PRO in the corresponding tweeter band avoids overloading and thus damage to the speakers. 6.2.

3 Improving The Sound Of A Processor System A processor system is understood as a PA system which contains a special active crossover whose outputs are linked via separated power amplifiers to the loudspeakers. Each band has its own limiter whose task it is to limit dangerous signal peaks to a certain level. This process avoids overloading the subsequent power amplifier or destruction of the loudspeaker. In some units, the crossover frequencies in the crossover unit are further changed during high signal levels to achieve a loudness contour suited to the human hearing. But in many cases, this function leads more to a disturbance than to an improvement of the sound quality. If the MULTICOM PRO is preceding this system, the signal peaks can be eliminated before they reach the limiters of the processing system. The sound quality therefore remains natural and free of side effects caused by the changing frequencies of the crossover. 6. SPECIAL APPLICATIONS 21 MULTICOM PRO MDX4400 6.3 The MULTICOM PRO In Broadcast The main aim of processing sound recordings for commercial radio and television is to achieve a maximum transmission volume at all costs.

Owners of these radio and television stations strive to get bigger audience ratings, because principally, radio programs whose reception is louder than the average are preferred by the listener. By achieving a bigger audience, the broadcast station gains more money from the increasing number of promotion companies placing adverts. What is volume? Volume is defined as the relationship between the average level of program material to peak-to-peak level, in response to amplitude and duration. The higher the average level and the time it remains at a high level, the louder the program material will be perceived by the listener. If you want to run your broadcast station at maximum average volume, proceed as mentioned in chapter 6.

1.2 The MULTICOM PRO In Mastering. Please make sure that the maximum peak level is below the threshold of the transmitters limiter, otherwise this could lead to very hard and audible use of the transmission limiters. Keep in mind that a heavy increase in average volume by means of compression always leads to a loss in dynamics and an increased perception of side effects. The moderate use of the compressor and the Peak Limiter sections of the MULTICOM PRO result in higher average volumes, free of distortion.

22 6. SPECIAL APPLICATIONS MULTICOM PRO MDX4400 7. SPECIFICATIONS AUDIO INPUT Connectors Type Impedance Nominal Operating Level Max. Input Level CMRR AUDIO OUTPUT Connectors Type Impedance Max. Output Level SYSTEM SPECIFICATIONS Bandwidth Frequency Response Noise THD IMD Crosstalk Stereo Coupling COMPRESSOR SECTION Type Threshold Ratio Threshold characteristics Auto characteristics Auto Attack Time Auto Release Time Output PEAK LIMITER SECTION Type Threshold Ratio Stage 1 Limiter Type Attack Release Stage 2 Limiter Type Attack Release FUNCTION SWITCHES INTERACTIVE CONTOUR I/O METER IN/OUT OPERATING LEVEL COUPLE XLR and 1/4" jack RF filtered, servo-balanced input 50 kOhm balanced, 25 kOhm unbalanced +4 dBu/-10 dBV switchable +21 dBu balanced and unbalanced typ. 40 dB, >55 dB @ 1 kHz XLR and 1/4" jack Electronically servo-balanced output stage (optional transformer-balanced). 60 Ohms balanced, 30 Ohm unbalanced +21 dBu, +20 dBm balanced and unbalanced 20 Hz to 20 kHz, +0/-0.5 dB 0.35 Hz to 200 kHz, +0/-3 dB >-95 dBu, unweighted, 22 Hz to 22 kHz 0.008 % typ.

@ +4 dBu, 1 kHz, Gain 1 0.04 % typ. @ +20 dBu, 1 kHz, Gain 1 0.01 % typ. SMPTE <-100 dB, 22 Hz to 22 kHz True RMS detection IKA (Interactive Knee Adaptation) Compressor variable (-40 dB to +20 dB) variable (1:1 to oo:1) variable (Interactive or Hard Knee) Wave Adaptive Compressor typ. 15 ms at 10 dB, 5 ms at 20 dB, 3 ms at 30 dB program dependent, typ. 125 dB/s variable (-20 to +20 dB) IGC (Interactive Gain Control) Peak Limiter variable (+4 dB to OFF (+22 dBu)) oo:1 Clipper zero zero Program Limiter program dependent, typ. < 5 ms program dependent, typ. 20 dB/s Enables the Interactive Knee Adaptation characteristics. Allows for frequency dependent detection.

Switches between input and output for the Level Meter. Bypass switch. Changes the internal reference level from +4 dBu to -10 dBV. Linking channels 1&2 or 3&4 for stereo operation. Channel 1 (or 3) becomes master.

7. SPECIFICATIONS 23 MULTICOM PRO MDX4400 INDICATORS GAIN REDUCTION INPUT/OUTPUT LEVEL Peak Limiter Threshold Function switch POWER SUPPLY Mains Voltages 8 element LED display: 1/3/6/10/15/20/25/30 dB 8 element LED display: -24/-18/-12/-6/0/+6/+12/+18 dB 1 LED for Indication of Limiter function LED indicator for each Fuse Power Consumption Mains Connection PHYSICAL Dimension Net Weight Shipping Weight USA/Canada 120 V ~, 60 Hz U.K./Australia 240 V ~, 50 Hz Europe 230 V ~, 50 Hz General Export Model 100 - 120 V ~, 200 - 240 V ~, 50 - 60 Hz 100 - 120 V ~: T 630 mA H 200 - 240 V ~: T 315 mA H max. 32 W Standard IEC receptacle 1 3/4" (44.

5 mm) * 19" (482.6 mm) * 8 1/2" (217 mm) 2.2 kg 3.4 kg BEHRINGER is constantly striving to maintain the highest professional standards. As a result of these efforts, modifications may be made from time to time to existing products without prior notice. Specifications and appearance may differ from those listed or illustrated. 24 7. SPECIFICATIONS MULTICOM PRO MDX4400 8. WARRANTY § 1 WARRANTY CARD/ONLINE REGISTRATION To be protected by the extended warranty, the buyer must complete and return the enclosed warranty card within 14 days of the date of purchase to BEHRINGER Spezielle Studioteknik GmbH, in accordance with the conditions stipulated in § 3. Failure to return the card in due time (date as per postmark) will void any extended warranty claims.

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3. Warranty claims other than those indicated above are expressly excluded. § 3 RETURN AUTHORIZATION NUMBER 1. @@All inquiries must be accompanied by a description of the problem. BEHRINGER will then issue a return authorization number.

2. @3. Shipments without freight prepaid will not be accepted. § 4 WARRANTY REGULATIONS 1. @@@@2.

If the product needs to be modified or adapted in order to comply with applicable technical or safety standards on a national or local level, in any country which is not the country for which the product was originally developed and manufactured, this modification/adaptation shall not be considered a defect in materials or workmanship. The warranty does not cover any such modification/adaptation, irrespective of whether it was carried out properly or not. Under the terms of this warranty, BEHRINGER shall not be held responsible for any cost resulting from such a modification/adaptation. 3. Free inspections and maintenance/repair work are expressly excluded from this warranty, in particular, if caused by improper handling of the product by the user. This also applies to defects caused by normal wear and tear, in particular, of faders, potentiometers, keys/buttons and similar parts. 4. Damages/defects caused by the following conditions are not covered by this warranty: s misuse, neglect or failure to operate the unit in compliance with the instructions given in BEHRINGER user or service manuals. s connection or operation of the unit in any way that does not comply with the technical or safety regulations applicable in the country where the product is used. s damages/defects caused by force majeure or any other condition that is beyond the control of BEHRINGER.

5. Any repair or opening of the unit carried out by unauthorized personnel (user included) will void the warranty. 6. If an inspection of the product by BEHRINGER shows that the defect in question is not covered by the warranty, the inspection costs are payable by the customer. 7. Products which do not meet the terms of this warranty will be repaired exclusively at the buyers expense. BEHRINGER will inform the buyer of any such circumstance. If the buyer fails to submit a written repair order within 6 weeks after notification, BEHRINGER will return the unit C.O.D.

with a separate invoice for freight and packing. Such costs will also be invoiced separately when the buyer has sent in a written repair order. § 5 WARRANTY

TRANSFERABILITY This warranty is extended exclusively to the original buyer (customer of retail dealer) and is not transferable to anyone who may subsequently purchase this product. No other person (retail dealer, etc.) shall be entitled to give any warranty promise on behalf of BEHRINGER.

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