

# COMBINATOR™

The Multiband  
Compressor/Leveler/Peak Limiter  
Model MDX 8000

**E**

VERSION 2.0 February 1994

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# CONTROLS

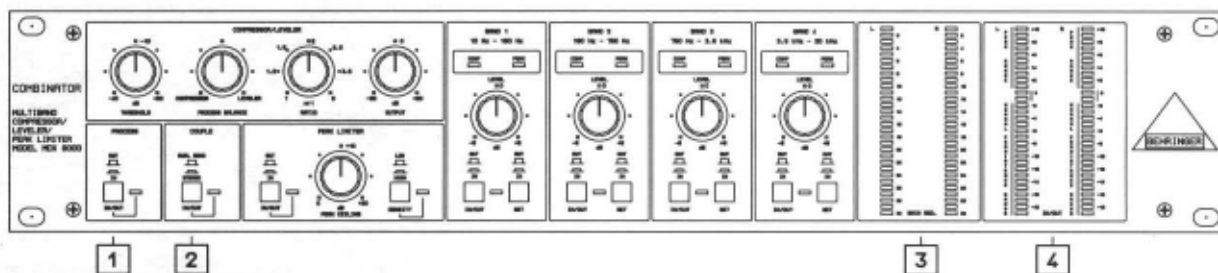


Fig. 11 Controls of the COMBINATOR

## 1 PROCESS switch

This switch activates the relays and engages both channels. The switch has a "hard-bypass" function. This means that when the switch is not depressed (OUT) or the unit is turned off, the input to output connections are direct. The IN/OUT switch is used to make direct A/B comparisons between source material and the processor's effected signal.

## 2 COUPLE switch

With the COUPLE switch depressed, the COMBINATOR works in true stereo mode, i.e. the two channels are synchronized. The channel with a higher degree of compression dominates its partner channel. In COUPLE mode, the control voltages of the four VCA's are combined to prevent the stereo basis from being displaced.

## 3 GAIN REDUCTION meter

The 30-LED GAIN REDUCTION meter indicates the current gain reduction applied by the COMBINATOR, within a range from 0 to 30 dB. If one of the SET switches is depressed, the GAIN REDUCTION meter monitors the gain reduction in the corresponding band. If several SET switches are active, the SET switch farthest left has priority.

## 4 INPUT/OUTPUT LEVEL meter

Depending on the setting of the PROCESS switch, this 30-LED meter informs you either about the input or the output level and monitors the level within a range from -20 to +10 dB. If the PROCESS switch is set to OUT, the input level is monitored, if set to IN, the meter reads the output level. The meter calibration is referenced to the operating level (-10 dBV/+4 dBu) adjusted with the OPERATING LEVEL switch on the back panel.

## 5.1 COMPRESSOR/LEVELER SECTION

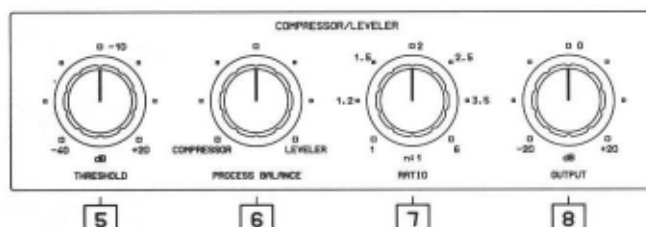


Fig. 12 Controls of the Compressor section

## 5 THRESHOLD control

This control determines the threshold point of the compressor within a range from -40 to +20 dBu. The control function corresponds exactly to the threshold function found in simple broadband devices.

## 6 PROCESS BALANCE control

This control is used to adjust the ratio between leveling and compression. For the majority of applications, this control should be set to center position; the leveler will compensate for varying levels in the programme material in order to achieve a consistent compression.

## 7 RATIO control

The RATIO control determines the ratio between the input and output level for all signals exceeding the threshold point. The control range can be adjusted from 1:1 to 6:1.

## 8 OUTPUT control

The OUTPUT control allows for the increase or decrease of the output signal by a maximum of 20 dB. Thus, a level loss due to the compression or limiting process can be compensated for.

*Please note when using the PEAK CEILING control of the Peak Limiter section, that the OUTPUT control of the Compressor section PRECEDES the Peak Limiter circuitry. If the OUTPUT control is set too high, this can result in continuous peak limiting (see item 10 "PEAK CEILING control").*

# PEAK LIMITER SECTION

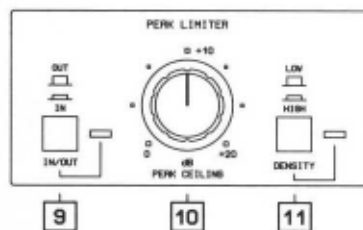


Fig. 13 Controls of the Peak Limiter section

## 9 IN/OUT switch

This switch activates the Peak Limiter section.

## 10 PEAK CEILING control

This PEAK CEILING control sets the absolute level threshold above which the output signal is not allowed to exceed. This limiter responds with "zero" attack and is able to control even the fastest peak signals without allowing any audible distortion. If the output signal is excessively high, it will cause the limiter to identify clipping. If this occurs for more than 20 msec. the overall output gain of the corresponding band will be reduced for a period of 1 second. This will avoid heavy and audible distortion.

## 11 DENSITY switch

If an extreme density of the programme material is needed, i.e. if the output level shall be constantly close to the adjusted peak ceiling limit, the release time of the programme limiter can be reduced from 1 sec. to about 100 ms using the DENSITY switch. In this way, the density function determines the ratio between Clipper and Programme Limiter.

*Please note that an "unsteady" sound can be produced in HIGH mode, because there is much more control intermodulation. Therefore, use this function for extreme signal compression only.*

## MULTIBAND SECTION

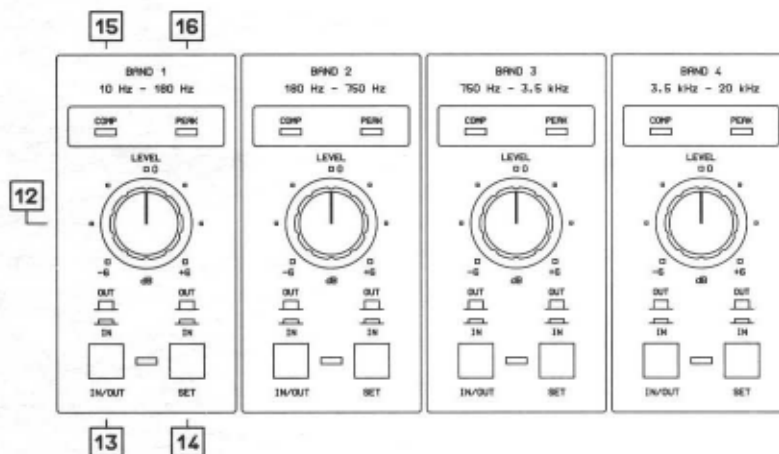


Fig. 14 Controls of the multiband section

### 12 LEVEL control

The four LEVEL controls are used to adjust the input level for each frequency band. The controls increase or attenuate the input level within a range from -6 to +6 dB, allowing both for sound variations and dynamic equalizer functions.

### 13 IN/OUT switches

The IN/OUT switches are used to activate the band-specific VCA's. Usually, all IN/OUT switches are activated. Various on/off combinations allow for compressing and/or limiting only single frequency bands (e.g. de-esser application). In this mode the clipper function can be used separately, i.e. without the programme limiter feature (IN/OUT switches to OUT position).

### 14 SET switches

The SET switches are used to monitor the gain reduction in each frequency band. If all SET switches are out, the total gain reduction of all bands is monitored; if one SET function is activated, the display reads the gain reduction in that specific band.

If several SET switches are active, the switch farthest left has priority.

### 15 COMP LED

The COMP LED indicates the onset of the compressor/leveler function in a specific frequency band.

### 16 PEAK LED

The PEAK LED indicates the onset of the band-specific clipper. As the limiter effect increases, the programme limiter is activated and reduces the overall gain of the band. The GAIN REDUCTION display visually monitors this additional gain reduction.

## BACK PANEL LAYOUT OF THE COMBINATOR

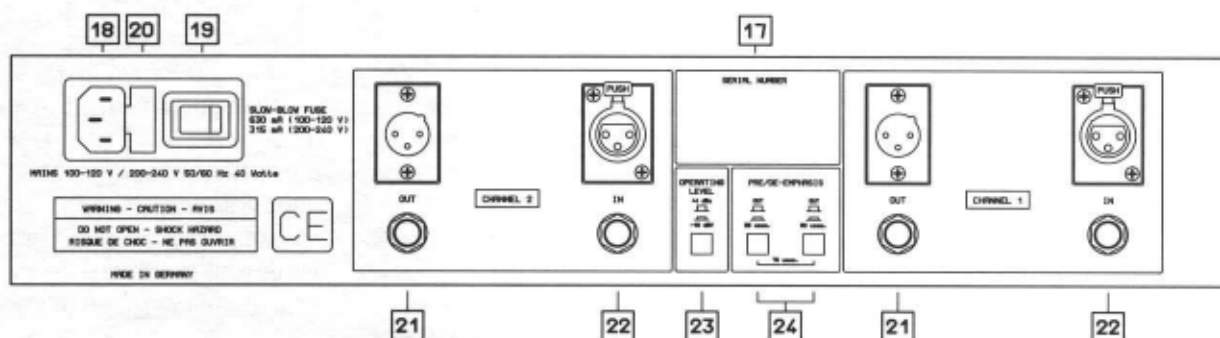


Fig. 15 The back panel layout of the COMBINATOR

### 17 SERIAL NUMBER

Please take the time to make a note of the serial number in the space provided on the enclosed warranty registration card. Put the instruction manual in a safe place and return the completed warranty registration card to us within 8 days of purchase, making sure that the dealer stamp has been acquired.

### 18 MAINS CONNECTOR

Please use the enclosed mains cable to connect the unit to the mains power supply.

### 19 MAINS SWITCH

This switch activates the mains power to the unit.

### 20 FUSE HOLDER

Please note that, depending on the mains voltage supplied to the unit, the correct fuse type and rate must be installed.

### 21 AUDIO IN

These are the COMBINATOR's audio inputs.

### 22 AUDIO OUT

These are the COMBINATOR's audio outputs.

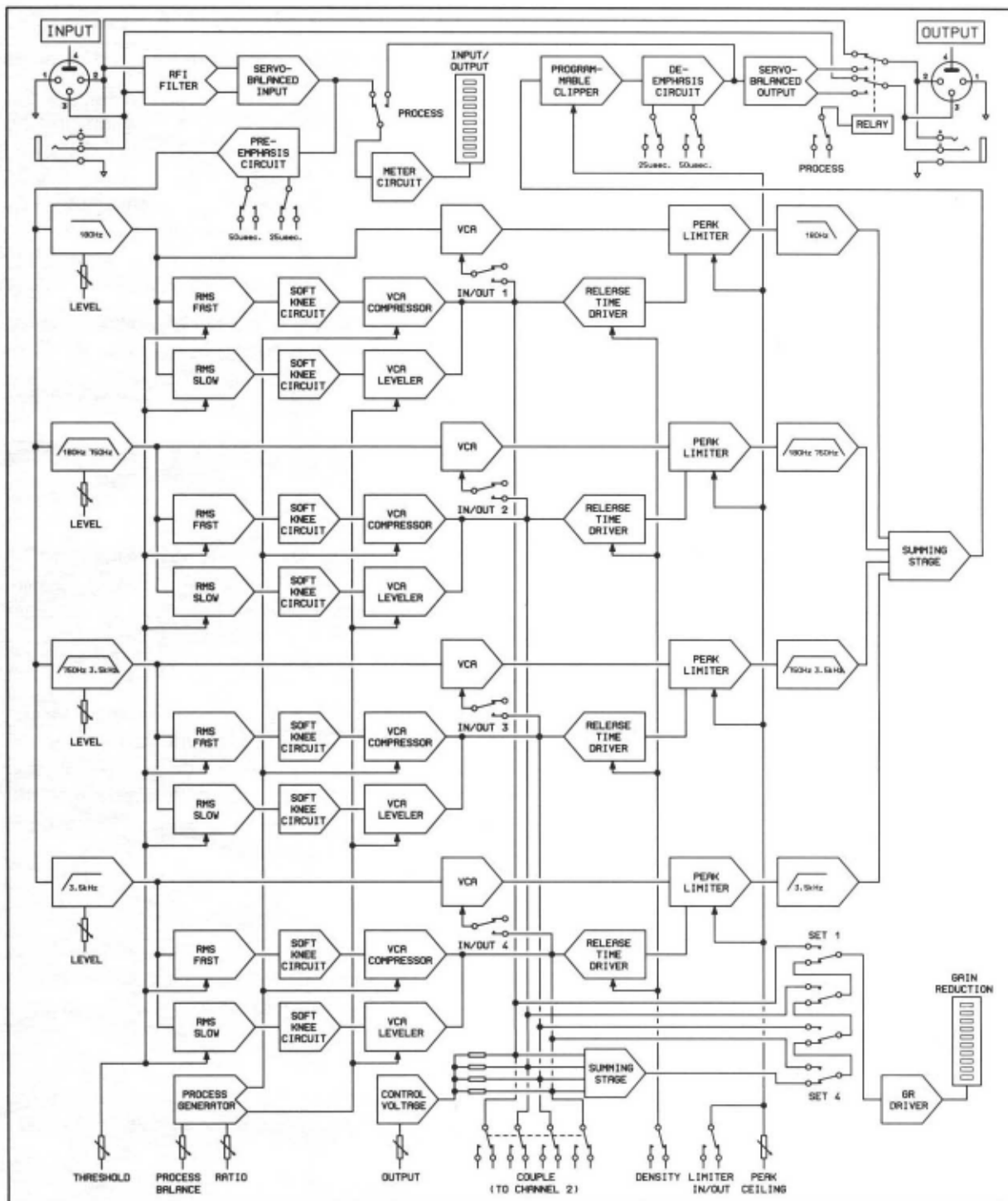
### 23 OPERATING LEVEL switch

This switch allows the COMBINATOR to be adapted to various operating levels. You can choose between the home recording level (-10 dBV) or the professional studio level (+4 dBu). This automatically changes the metering of the unit to represent the nominal levels and permits the COMBINATOR to work to its optimum dynamic range.

### 24 PRE-/DE-EMPHASIS switches

With these two switches the unit's equalization curve can be adapted to meet the international broadcast standards (25, 50 and 75 microseconds). By depressing both switches the time value is 75 microseconds.

# BLOCK DIAGRAM



# SPECIFICATIONS

## AUDIO INPUT

Type	RF filtered, servo-balanced input
Impedance	60 kOhms
Nominal Operating Level	-10 dBV to +4 dBu
Max. Input Level	+20 dBu balanced and unbalanced
CMR @ 1 kHz	+60 dB

## AUDIO OUTPUT

Type	electronically servo-balanced output stage (optional transformer-balanced). Automatic level correction for unbalanced use (correction: 6 dB).
Impedance	+40 Ohms, balanced and unbalanced
Max. Output Level	+26 dBm balanced, +20 dBm unbalanced
Bandwidth	5 Hz to 100 kHz, +0, -3 dB
THD @ +4 dBu	0.02 % typ.
THD @ +20 dBu	0.1 % typ.
IMD (SMPTE) @ +10 dBu	0.01 % typ.
Noise & Hum, unity gain	>-91 dBu (20 Hz to 20 kHz, unweighted)
Crosstalk @ 20 kHz	>-85 dBu
CMR @ 1 kHz	+60 dB

## EQUALIZER SECTION

Type	24 dB Butterworth filter
Corner frequencies	fixed (180 Hz, 750 Hz, 3.5 kHz)
Level	band specific level controls, variable (-6 to +6 dB)
In/Out	band specific in/out switches for the VCAs

## COMPRESSOR/LEVELER SECTION

Type	interactive four-band Compressor/Leveler
Threshold	variable (-40 to +20 dBu)
Process Balance	variable ("Compression" to "Leveling")
Ratio	variable (1:1 bis 6:1)
Output	variable (-20 bis +20 dB)

## PEAK LIMITER SECTION

Type	multiband IGC (Interactive Gain Control) Peak Limiter
In/Out	operating the Peak Limiter section
Peak Ceiling	variable (0 to +16 dB)
Density	fixed (Low/High)

## FUNCTION SWITCHES

Process	DC controlled "hard-bypass" relay
Couple	linking both channels for stereo operation
Operating Level	operating level switchable from +4 dBu to -10 dBV
Pre/De-Emphasis	switchable (25/50/75 $\mu$ sec.)
Set	monitoring the band specific gain reduction

## INDICATORS

30 element GAIN REDUCTION meter	1 to 30 dB
30 element IN/OUT LEVEL meter	-20 to +10 dB
LED indicator for each function switch	

## POWER SUPPLY

Mains Voltages	100-120/200-240 VAC 50-60 Hz
Power Consumption	40 Watts
Fuse	630 mA (100-120 V); 315 mA (200-240 V) slow-blow
Mains Connection	Standard IEC receptacle

## PHYSICAL

Dimension	3.5" (88mm) * 19" (482.6 mm) * 8.5" (217 mm)
Net Weight	6.5 kg
Shipping Weight	8 kg