

MODEL 360

Stereo Compressor/HUSH TM

INSTRUCTION MANUAL

May be covered by one or more of the following:

U.S. Patents #4647876, 4696044

4745309, 4538297, 4881047, 4893099.

Other patents pending.

Foreign patents pending.



ROCKTRON
STUDIO SERIES

1. INTRODUCTION

The Model 360 compressor is an extremely unique signal processing tool. While offering three simultaneous functions (compression, peak limiting and Rocktron's HUSH™ single-ended noise reduction) the Model 360 performs without compromise. Rocktron dares to call the 360 the quietest compressor available anywhere.

This operating manual will introduce you to the Model 360 and its various functions. After reading this manual carefully, keep it for future reference.

A. PRECAUTIONS

NOTE: IT IS VERY IMPORTANT THAT YOU READ THIS SECTION TO PROVIDE YEARS OF TROUBLE FREE USE. THIS UNIT REQUIRES CAREFUL HANDLING.

All warnings on this equipment and in the operating instructions should be adhered to and all operating instructions should be followed.

Do not use this equipment near water. Care should be taken so that objects do not fall and liquids are not spilled into the unit through any openings.

The power cord should be unplugged from the outlet when left unused for a long period of time.

DO NOT ATTEMPT TO SERVICE THIS EQUIPMENT. THIS EQUIPMENT SHOULD BE SERVICED BY QUALIFIED SERVICE PERSONNEL ONLY. DO NOT MAKE ANY INTERNAL ADJUSTMENTS OR ADDITIONS TO THIS EQUIPMENT AT ANY TIME. DO NOT TAMPER WITH INTERNAL ELECTRONIC COMPONENTS AT ANY TIME. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY VOID THE WARRANTY OF THIS EQUIPMENT, AS WELL AS CAUSING SHOCK HAZARD.

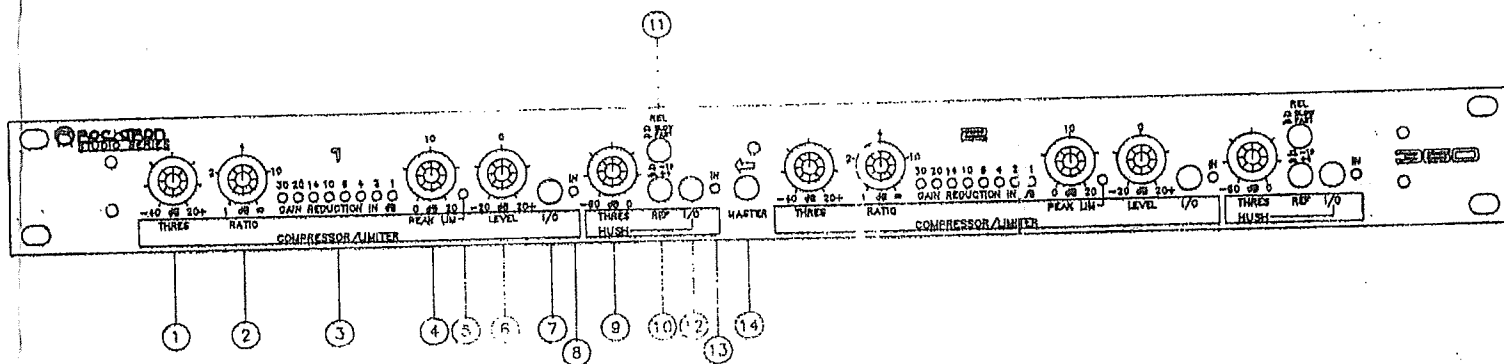
B. POWER REQUIREMENTS

This unit accepts power from the 9V AC/1500mA adaptor supplied with the unit. This 9V RMS AC voltage is internally processed by a voltage doubler, thus generating a bi-polar + & - 15V to maintain the headroom and sound quality of professional, studio quality equipment. Using an external power source such as this minimizes excessive noise and hum problems often associated with internal transformers, providing optimal performance for the user.

C. OPERATING TEMPERATURE

Do not expose this unit to excessive heat. This unit is designed to operate between 32 F and 104 F (0 C and 40 C). This unit may not function properly under extreme temperatures.

2. FRONT PANEL DESCRIPTION



The Model 360 has two identical channels. Each channel has the following controls, as well as individual channel In/Out switches and a Stereo Master switch.

(1). . .THRESHOLD control:

The Threshold Control sets the level at which compression is actuated. It is adjustable from -40dB up to +20dB.

(2). . .RATIO control:

The Ratio Control determines the degree of compression the signal will receive once it has exceeded the threshold. The ratio is the change in input level divided by the change in output level. This means that at a 2:1 setting, for a 2dB increase in input level the output will increase by only 1dB. At the infinity:1 setting, the output level will remain constant as long as the input signal level is above threshold, regardless of its dynamics.

(3). . .GAIN REDUCTION meter:

These eight LED meters display the amount of gain reduction implemented by the Model 360 for each channel.

(4). . .PEAK LIMIT control:

With this control the user may set a level which will not be exceeded at the output even with the presence of very fast transient waves of high amplitude.

(5). . .PEAK LIMIT LED:

This LED indicates when the peak limit threshold has been exceeded and the peak limiter is operational.

(6). . .LEVEL control:

The Level controls adjust the final output level of each channel of the Model 360.

(7). . .IN/OUT switch:

The In/Out switch determines whether or not the compressor circuit is in the signal path. In the IN position the compressor is active. In the OUT position the compressor circuit is bypassed and will generate only an unprocessed output.

(8). . .IN LED:

When lit shows the compressor is in the signal path.

(9). . . **THRESHOLD control:**

The Threshold control sets the threshold point at which low level expansion takes place once the signal exceeds the set threshold.

(10). . . **RELEASE switch:**

This switch allows the user to select either fast or slow release.

(11). . . **REFERENCE switch:**

This switch adjusts the sensitivity of the unit, optimizing it for either -10 or +4dB operation.

(12). . . **IN/OUT switch**

The In/Out switch determines whether or not the HUSH circuit is in the signal path. In the IN position the HUSH circuit is active. In the OUT position the HUSH circuit is bypassed and will generate only an unprocessed output.

(13). . . **IN LED:**

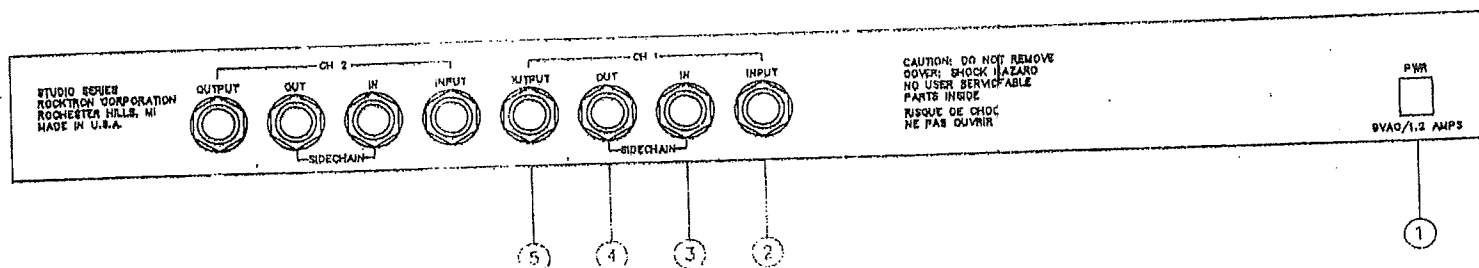
When lit shows the HUSH circuit is in the signal path.

(14). . . **STEREO MASTER switch:**

The Stereo Master switch allows the user to select for either stereo or mono applications, transforming a two mono-channeled unit into stereo. For stereo applications this switch ties the compression and HUSH circuits of both channels together for precision tuning. When the Stereo Master switch is in, except for the In/Out switches, channel one's controls are master and channel two's are inoperable.

NOTE: To avoid mis-tracking when using the stereo master mode, make sure that both channels' In/Out switches are set in the same position.

3. REAR PANEL DESCRIPTION



(1). . .POWER jack:

This unit accepts power from the 9VAC/1500mA adaptor supplied with the unit.

CHANNELS ONE AND TWO

(2). . .INPUT jacks:

This standard unbalanced 1/4" mono jack provides input to the unit. The input is high impedance. Read the specifications to determine the maximum input level. Failure to do so will overdrive the unit and may damage the internal circuitry.

(3) & (4). . .SIDECHAIN INPUT and OUTPUT jacks:

These standard 1/4" mono jacks are provided for optional use of an outboard equalizer. An outboard equalizer may be connected to the sidechain input, providing frequency dependent limiting/compression.

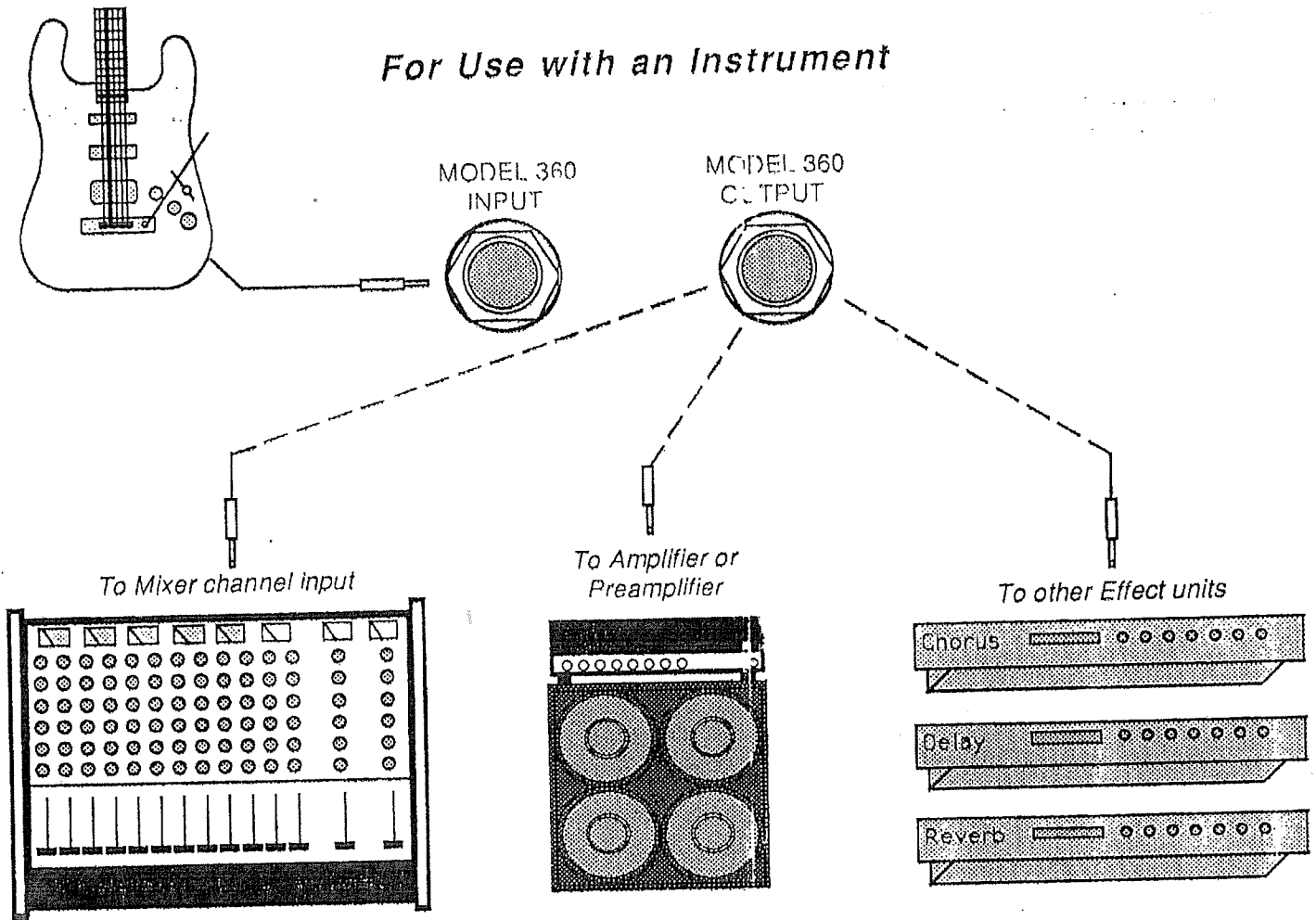
(5). . .OUTPUT jacks:

This standard 1/4" mono jack provides mono output, which may be used as Input for many external connections. Read the Connections section for more information.

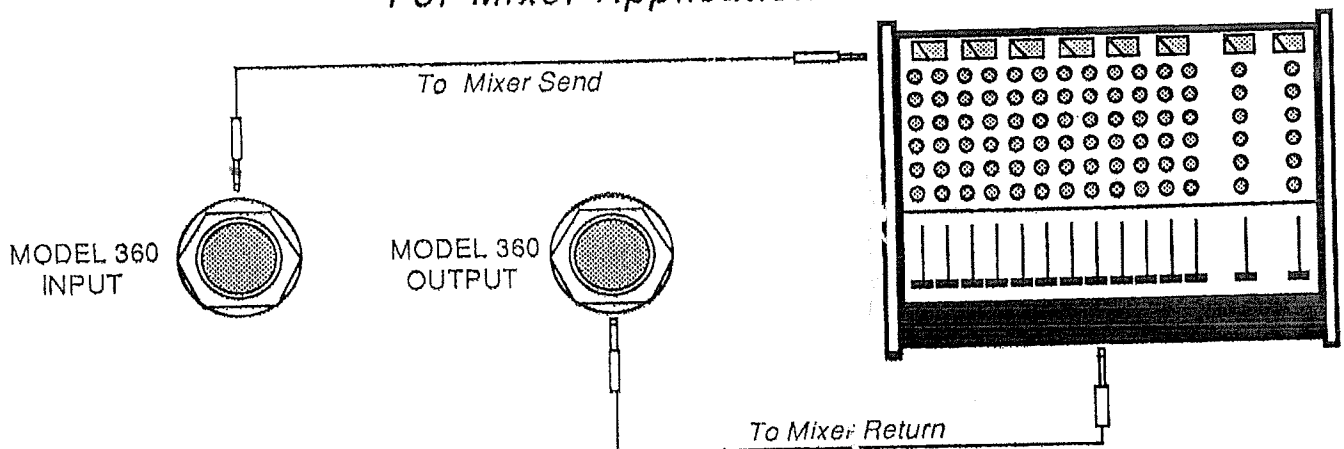
4. CONNECTIONS AND APPLICATIONS

The Model 360 can be connected to your system in many ways to achieve many different functions. The Model 360 can be used either with a mixing console, connected directly to the output of an electric or electronic instrument, or before a chain of other effects units.

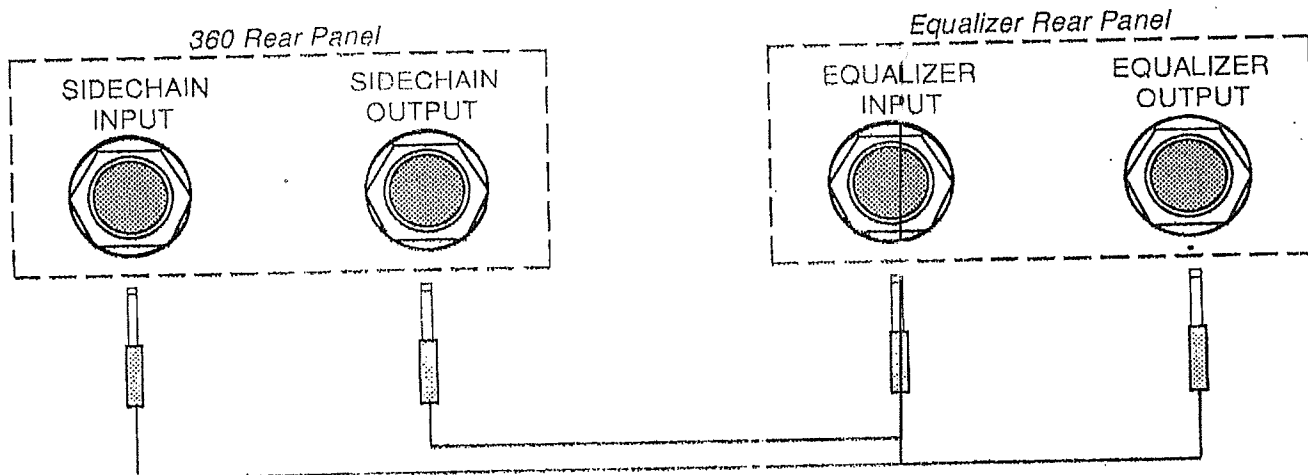
For Use with an Instrument



For Mixer Application



Using the Sidechain



The Sidechain is useful for implementing an equalizer into the threshold circuit of the compressor for de-esser and other frequency dependent capabilities. Connect the equalizer input to the sidechain output, and the equalizer output to the sidechain input.

4. OPERATION

COMPRESSION

The basic purpose of a compressor is to give the user control over the dynamic range of any given signal. The Model 360 can be used for a variety of effects from mild dynamic range reduction to limiting an extremely dynamic program.

The Model 360 threshold control selects the input level at which compression begins, i.e., if the threshold control is set for -20dB and the input signal is below -20dB, there will be no effect taking place. If the input level exceeds -20dB, the compressor will begin its action by reducing the level of the signal at the output. The amount of gain reduction in decibels will be visually indicated on the gain reduction meter.

If the threshold is set low, the entire signal may be compressed. Reducing the compression may result in a more natural sound. Experiment with different thresholds for different applications to achieve a natural sound.

Some example situations are as follows:

Instrument Mixing

Drums and bass guitars are often compressed in live and studio environments to make their levels more consistent. Guitars, strings, and horns may have their sustain increased by means of compression. In this case, a lower threshold will give more sustain.

Vocal Miking

In many instances vocalists will sing at different volumes or change their distance from the microphone throughout a single song or track causing problems in the mix. Try a moderate amount of compression to start and increase to maintain a consistent output level as necessary.

Another application of the Model 360 is as a protection circuit against damaging signal levels. In a sound reinforcement system, compression can be used on the final output to the power amplifiers for limiting the possibility of speaker failure due to excessive levels.

The sidechain is a very useful feature of the Model 360. With the introduction of a graphic or parametric equalizer in this circuit we can turn the Model 360 into an effective de-esser or simply make the compressor's threshold frequency dependent.

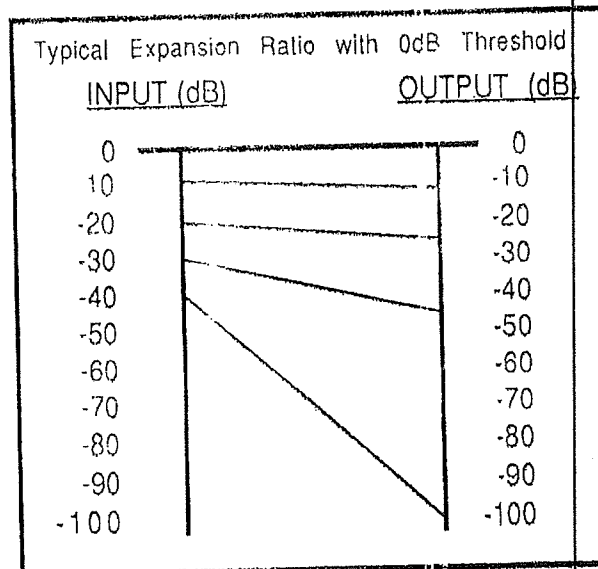
De-essing is the process of removing overbearing amounts of sibilance from vocal or other sources where it may be present. To achieve this we will boost the level of frequencies in the 6K to 10K bandwidth on the equalizer so that when there is signal present in these ranges it will cause compression, effectively lowering the level of these sibilant frequencies.

Other frequency actuated applications could include, for example, a bass guitar with an annoyingly loud overtone that is present on the playing of only one of the strings. To remedy this we would boost the equalizer at that frequency which is "ringing" so that when the signal includes that overtone, compression would be incremented, leveling the output and subduing the outstanding frequency.

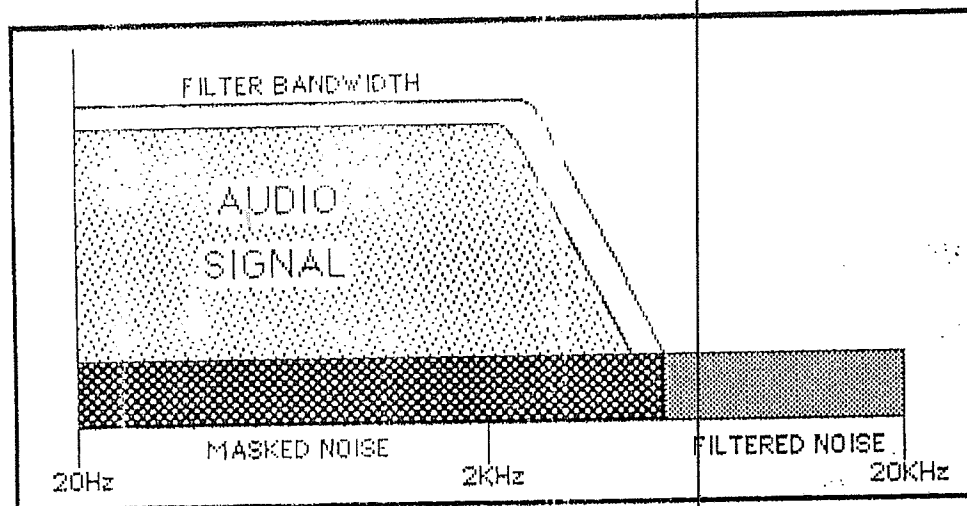
HUSH™ SECTION

The HUSH™ circuit is comprised of two parts: the expander and the dynamically controlled low pass filter.

The expander operates like an electronic volume control. The design utilizes a voltage controlled amplifier (VCA) circuit which can control the gain between the input and output from unity to 30, 40, or even 50dB of gain reduction. When the input signal is above the user pre-set threshold point the VCA circuit is at unity gain. This means the amplitude of the output signal will be equal to the input signal. As the input signal amplitude drops below the user pre-set threshold point, downward expansion begins. At this point the VCA operates like an electronic volume control and gradually begins to decrease the output signal level relative to the input signal. For example, if the input signal were to drop below the threshold point by 10dB, the output would drop approximately 12dB. As the input signal drops further below the threshold point, downward expansion increases exponentially. For example, if the input signal dropped 20dB below the threshold point, the output level would drop by approximately 30dB. A drop in the input level by 30dB would cause the output to drop by approximately 60dB, i.e. 30dB of gain reduction. In the absence of any input signal, the expander circuit will reduce the gain so that the noise floor becomes



Next, the dynamically controlled low pass filter. In the absence of any signal, the dynamic filter will close down to the factory pre-set cut-off point of 800Hz. This means the filter is only allowing frequencies of 800Hz and below to pass through. If an input signal had a bandwidth of from 20Hz to 1KHz the filter would open far enough to pass up to the 1KHz frequency and its harmonics, while reducing any noise present from approximately 2KHz to 20KHz. If a broad band signal with frequency components up to 20KHz appears at the input, the dynamic filter would open to its full extreme allowing the bandwidth to open all the way to 40KHz. In simple terms, what this means is that if a signal is present at the input which is primarily bass components, the dynamic filter will reduce any mid or high band noise. However, if the input signal has high frequency components present, the dynamic filter will open to its full extreme to pass the signal and eliminate the possibility of a loss of high end frequency response.



These two processes of downward expansion and dynamic filtering work in unison to produce the highly proficient HUSH noise reduction system.

5. SPECIFICATIONS

INPUT

Input Impedance	470K Ohms
Maximum Input Signal	+20dB
Input Jacks	1/4" Mono

COMPRESSOR

Threshold: Variable	-40 to +20dBv
Ratio	1:1 to ∞:1
Attack Time	5dB compression, 15ms 10dB compression, 5ms 30dB compression, 1ms
Release Time	120ms @ 20dB gain change
Peak Limiter Attack Time	10us

FREQUENCY RESPONSE

+0, -1/2dB 15Hz to 25KHz

DISTORTION

.007% @ 10dB compression

DYNAMIC RANGE

100dB

NOISE FLOOR

-80dB

OUTPUT

Output Impedance	Less than 100 Ohms
Maximum Output Signal	+20dB
Output Jacks	1/4" Mono
Sidechain Jacks	1/4" Mono

DIMENSIONS

19" x 1 3/4" x 6"