ROCKTRON

TECHNOLOGY FOR GUITARISTS

HUSH® PRO

PRO AUDIO MODEL

STEREO NOISE EXTERMINATOR


# Instruction Manual

*May be covered by one or more of the following: U.S. Patents #4538297, 4647876, 4696044, 4745309, 4881047, 4893099, 5124657, 5263091, 5268527, 5319713, 5333201, 5402498 and 5493617. Other patents pending. Foreign patents pending.*

CE

Your HUSH® Pro noise reduction system has been tested and complies with the following Standards and Directives as set forth by the European Union:

| | | |
|---|---|---|
| **Council Directive(s):** | 89/336/EEC | Electromagnetic Compatibility |
| **Standard(s):** | EN55013, EN50082-1 | |

This means that this product has been designed to meet stringent guidelines on how much RF energy it can emit, and that it should be immune from other sources of interference when properly used. Improper use of this equipment could result in increased RF emissions, which may or may not interfere with other electronic products.

To insure against this possibility, always use good shielded cables for all audio input and output connections. Also, bundle audio cables separately from the AC power cables. These steps will help insure compliance with the Directive(s).

For more information about other Rocktron products, please see your local dealer or one of our importers closest to you (listed on the enclosed warranty sheet).

# Introduction

Congratulations on your purchase of the Rocktron HUSH® Pro!

Designed for audio applications, the HUSH Pro utilizes the latest in our HUSH noise reduction technology combined with the latest V.I.R. (Variable Integrated Release) circuitry configured as a noise gate. This combination provides extremely effective noise reduction while playing and complete silence when not.

Although the HUSH Pro is a stereo noise reduction system, a single HUSH Threshold and Gate Threshold are used to control both channels.

Some suggested uses are displayed in this manual. However, there are many other uses for the HUSH Pro as well, here is just a partial list of other applications:

**PROFESSIONAL GUITAR PREAMP using XLR connections in a rack (pre-effects)**
**ACOUSTIC GUITAR APPLICATION (Post Acoustic Processor)**
**VOCAL GROUP SUBMIX INSERT**
**SNARE DRUM (Could also be used to create a gated reverb effect)**
**KICK DRUM**
**TOM TOM SUBMIX**
**SAXOPHONE when using a microphone**
**HARMONICA when using a microphone**
**VIOLIN when using a microphone or violin pickup**

This manual will introduce you to the various features and functions of the HUSH Pro. Please keep it for future reference.

## OPERATING 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 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.

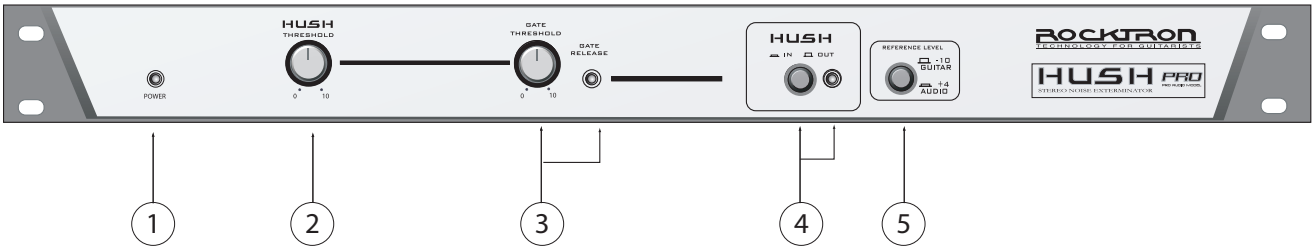
## POWER REQUIREMENTS

This unit accepts power from the 9VAC/1.5A adaptor supplied with the unit. This 9 volt RMS AC voltage is internally processed by a voltage doubler which generates a bipolar ±15 volts 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.

## 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.

# Front Panel




1 ***POWER*** **LED**

*When lit, this LED indicates that the HUSH Pro is powered and ready for operation.*

2 ***HUSH THRESHOLD*** **control**

*This control sets the point at which the downward expander and dynamic filter begin to operate.*

3 ***GATE THRESHOLD*** **control and** ***GATE RELEASE*** **LED**

*This control is used to determine the level at which the gate will begin to operate. As the input signal drops below this level, the gate will activate and downward expansion will begin.*

*When lit, the Gate Release LED indicates that the input signal has dropped below the level set by the Gate Threshold control, thus activating the gate and providing additional downward expansion.*

4 ***IN/OUT*** **switch and LED**

*This switch allows for the HUSH Pro to be bypassed when noise reduction is not required.*

*When lit, the LED indicates that the HUSH Pro is currently active in the signal path.*

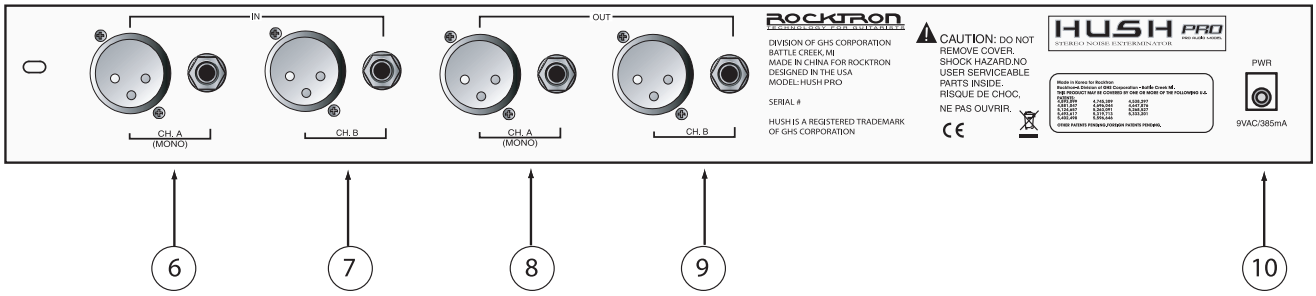
5 **REF switch**

*This switch determines the sensitivity of the HUSH Pro. When using the HUSH Pro with professional audio equipment providing a nominal output level +4dB, it is recommended that the "+4dB" setting on the unit as the Threshold adjustment will allow you to optimize noise reduction for this reference level.*

*If the "-10" setting is used and the unit is overdriven, the "+4" setting should be used.*

***The -10db setting is recommended for all instrument rigs.*

# Rear Panel




6 ***CH. A (MONO) IN* jacks**

*This XLR and ¼" mono jack provide inputs to the left channel of the HUSH Pro. Use either the XLR jack or the ¼" jack when connecting, but not both together. When using only one input use the "CH. A (MONO) XLR or ¼" jack".*

7 ***CH. B IN* jacks**

*This XLR and ¼" mono jack provide inputs to the right channel of the HUSH Pro. Use either the XLR jack or the ¼" jack when connecting, but not both together.*

8 ***CH. A* jacks**

*This XLR and ¼" mono jack provide the output from the "CH. A (MONO)" channel of the HUSH Pro.*

9 ***CH. B* jacks**

*This XLR and ¼" mono jack provide the output from the "CH. B" channel of the HUSH Pro.*

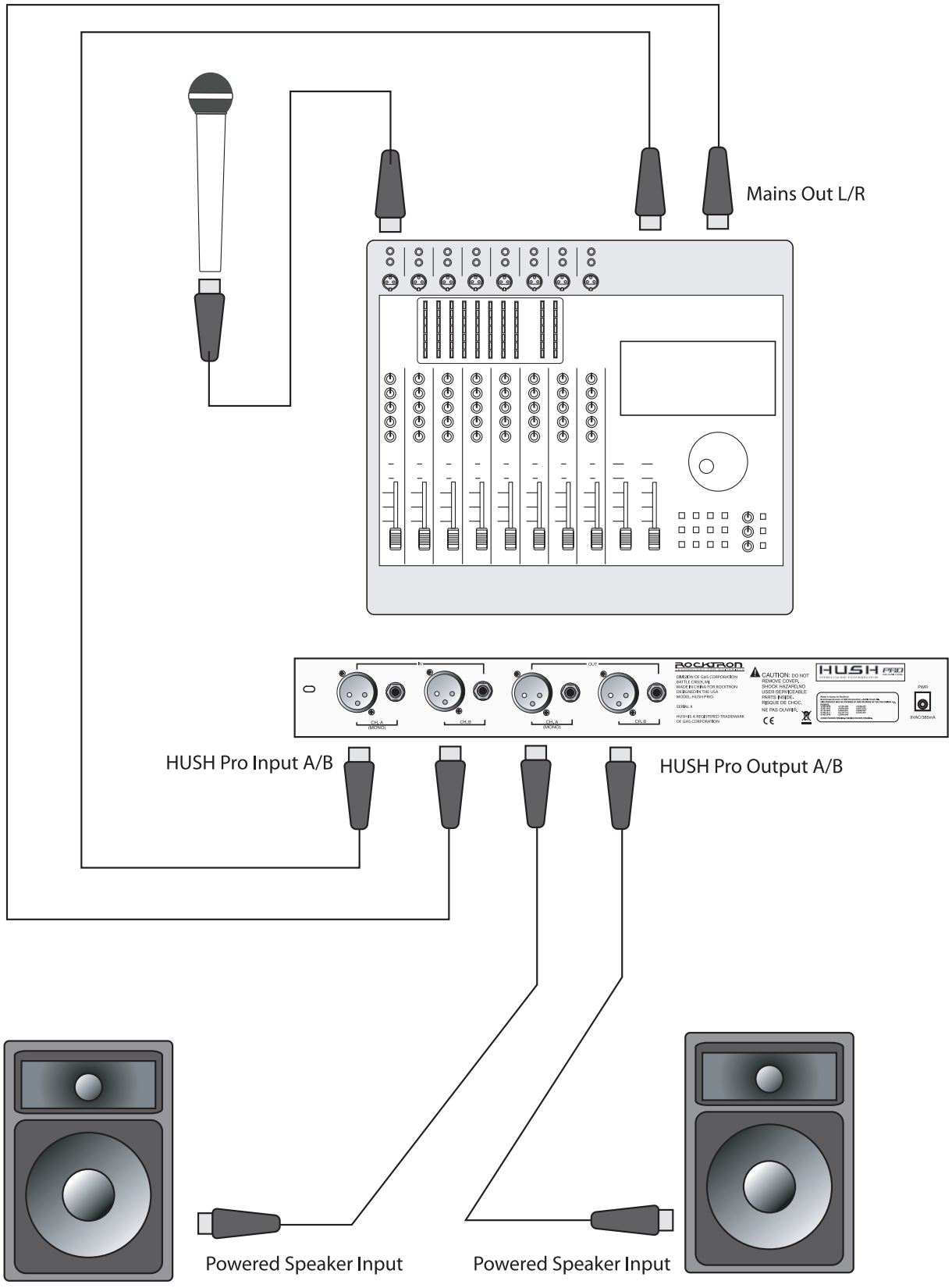
> *Note: When "CH. A" is used as a single signal source, the signal will be present in both the "CH. A" and "CH. B" outputs.*

10 ***POWER* jack**

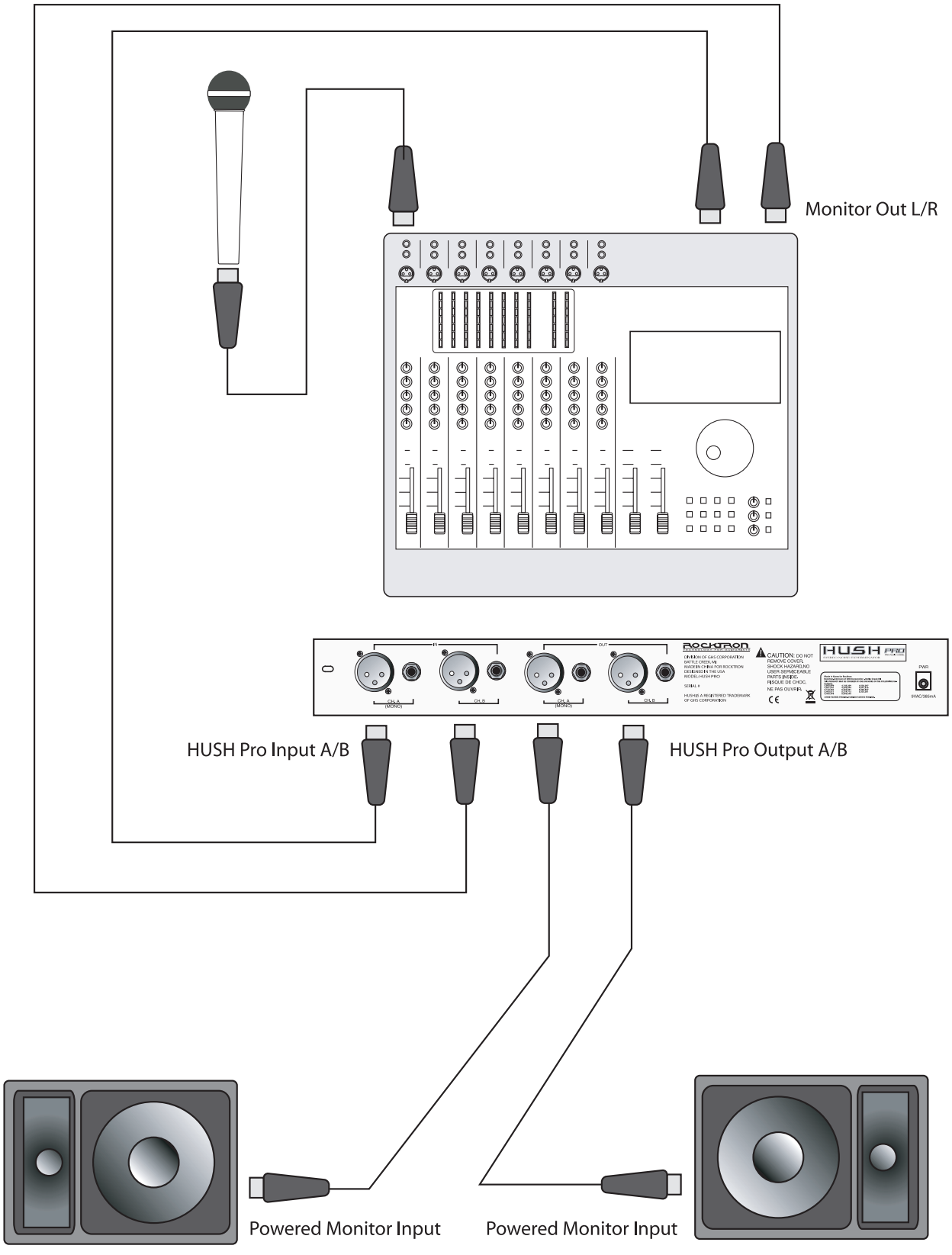
*This 2.5mm pin jack accepts power from the 9VAC adapter supplied with the HUSH Pro.*

# System Connections

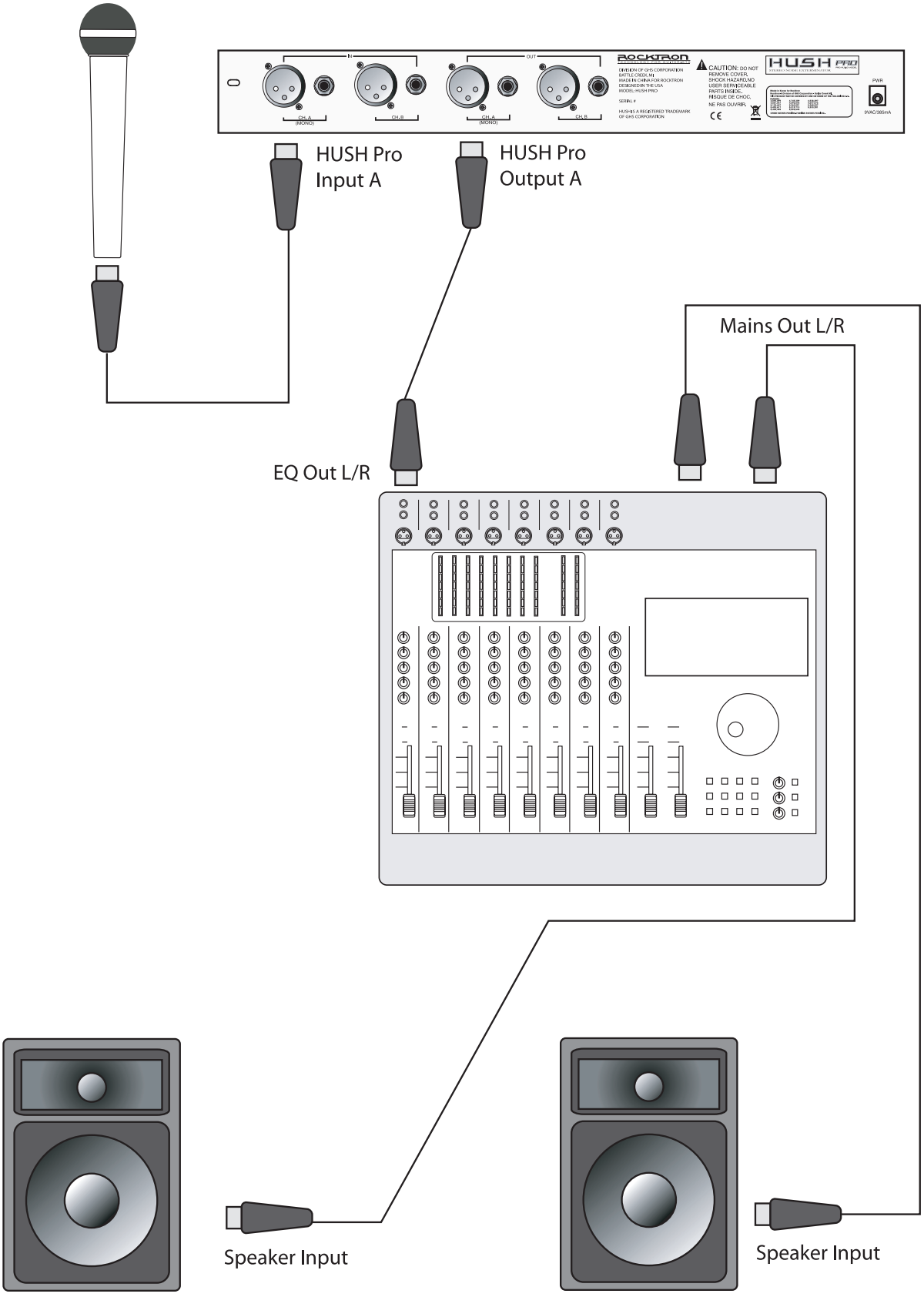
Connection mixer to powered speakers



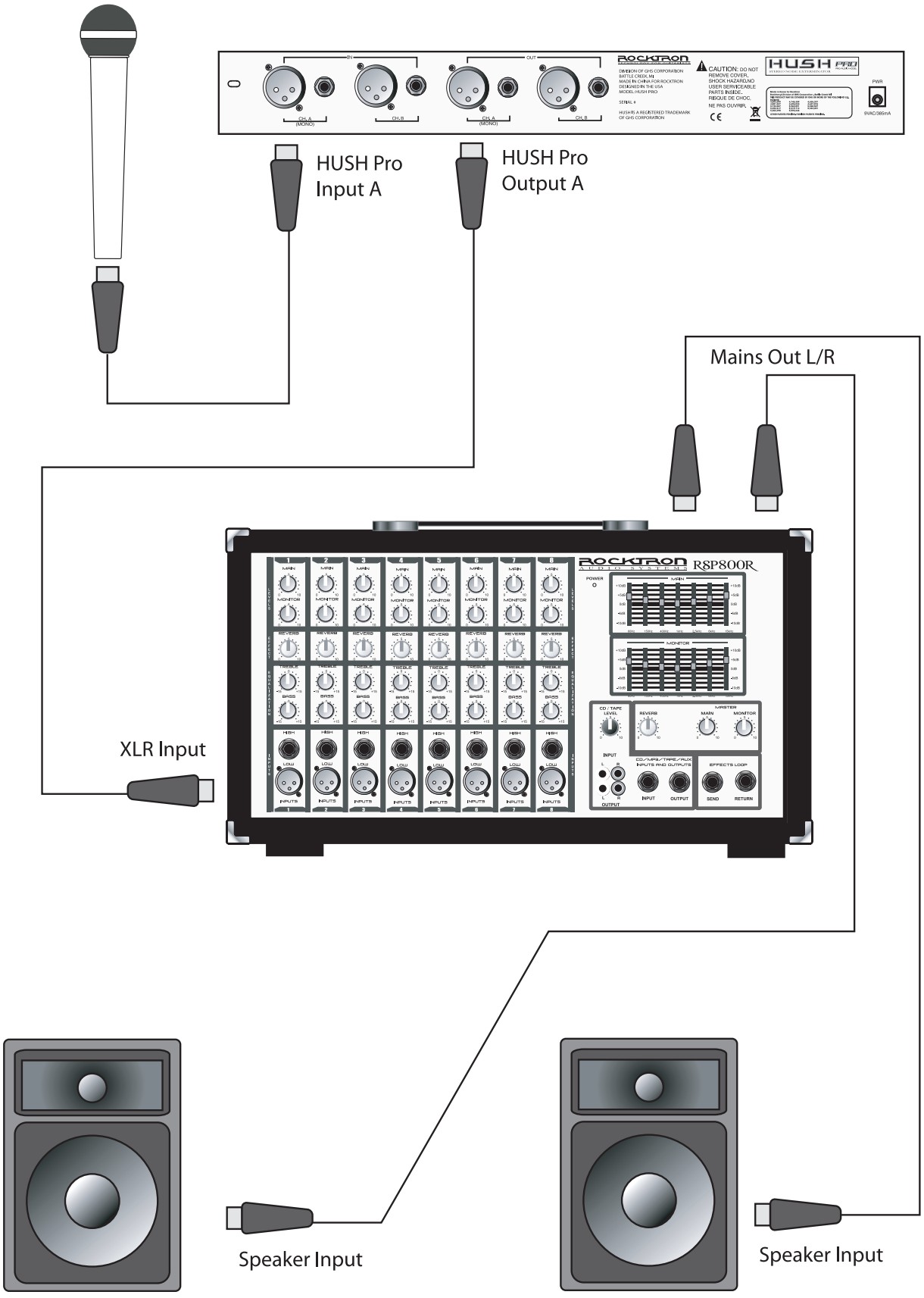
Connection mixer to powered monitors.



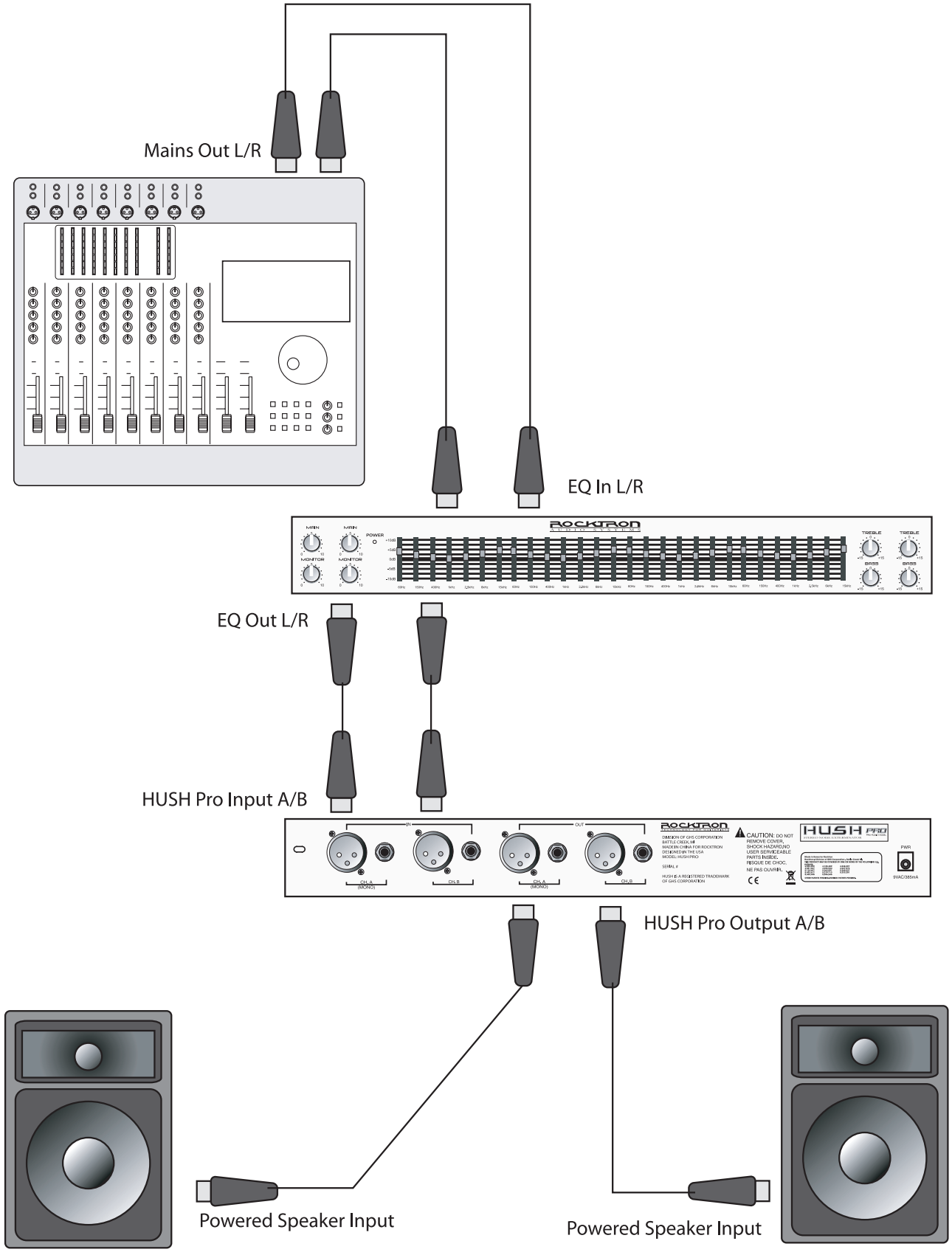
Connection direct mic plug into main input of channel.  In this application the HUSH Pro acts as a "hard gate with noise reduction" which will help curb feedback.  Can be used like this or with the HUSH Pro in the channel insert.



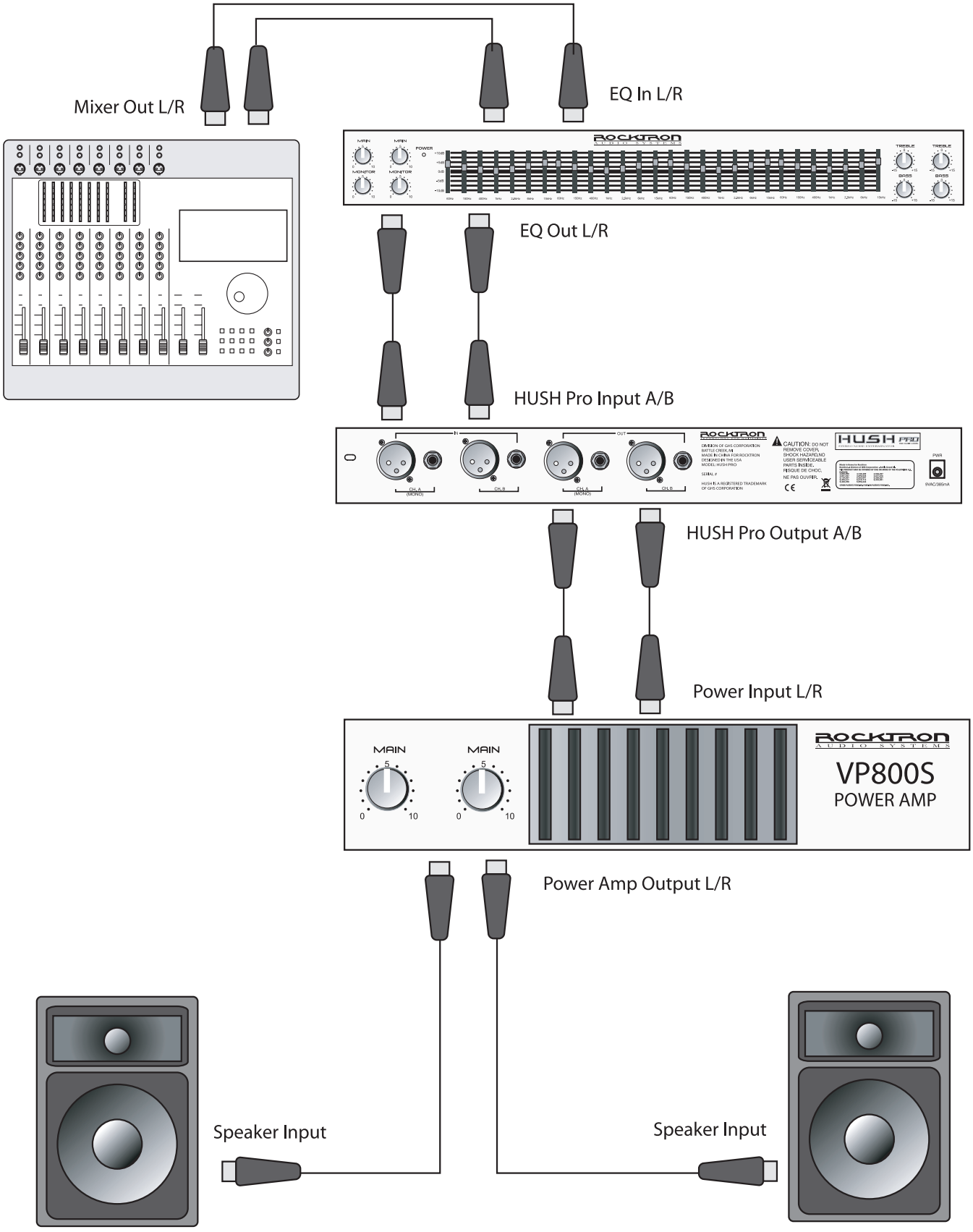
Connection powered box mixer to speakers using XLR jacks



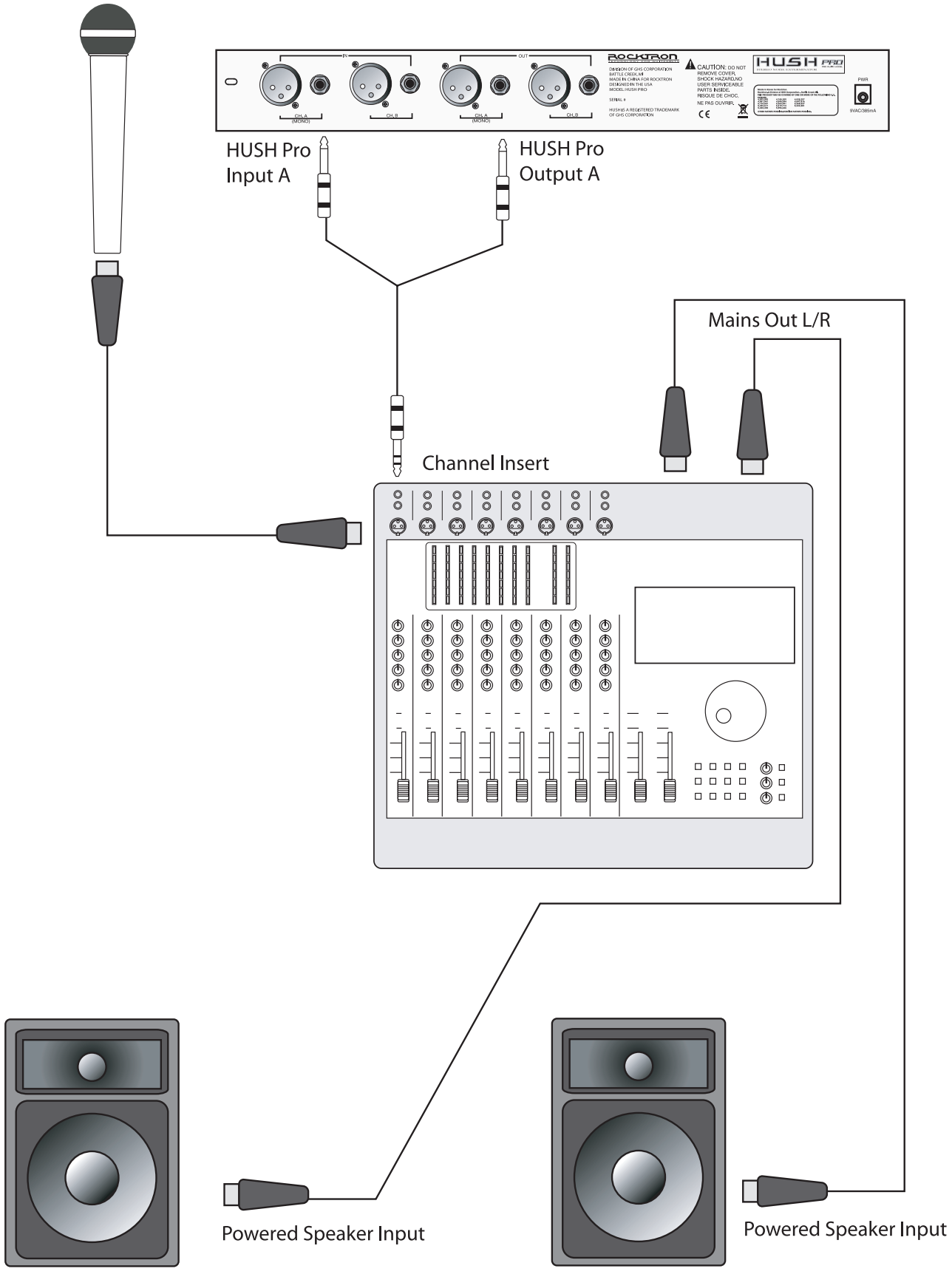
Connection mixer to EQ to powered speakers



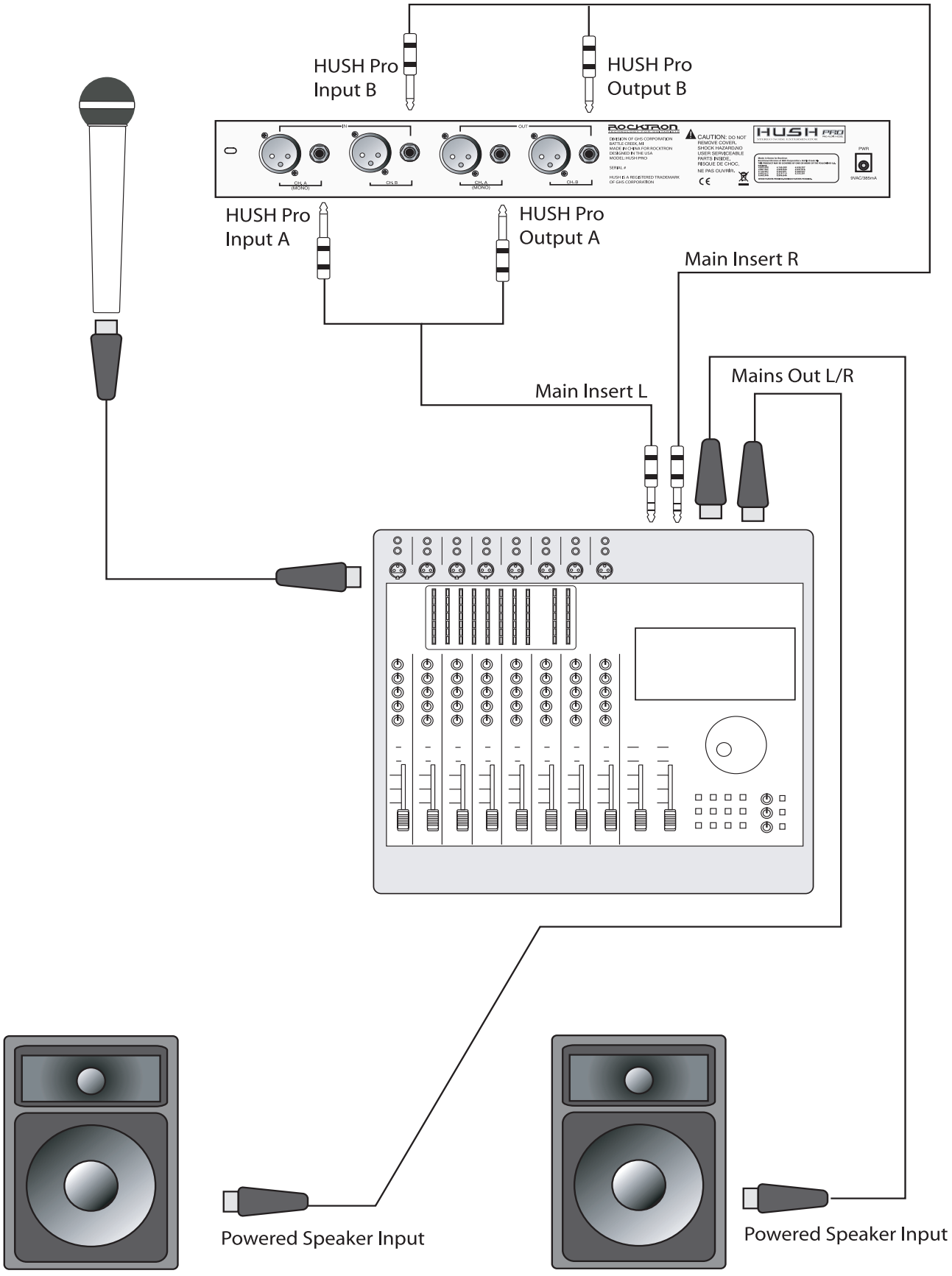
## Connection mixer to EQ and power amp to speakers



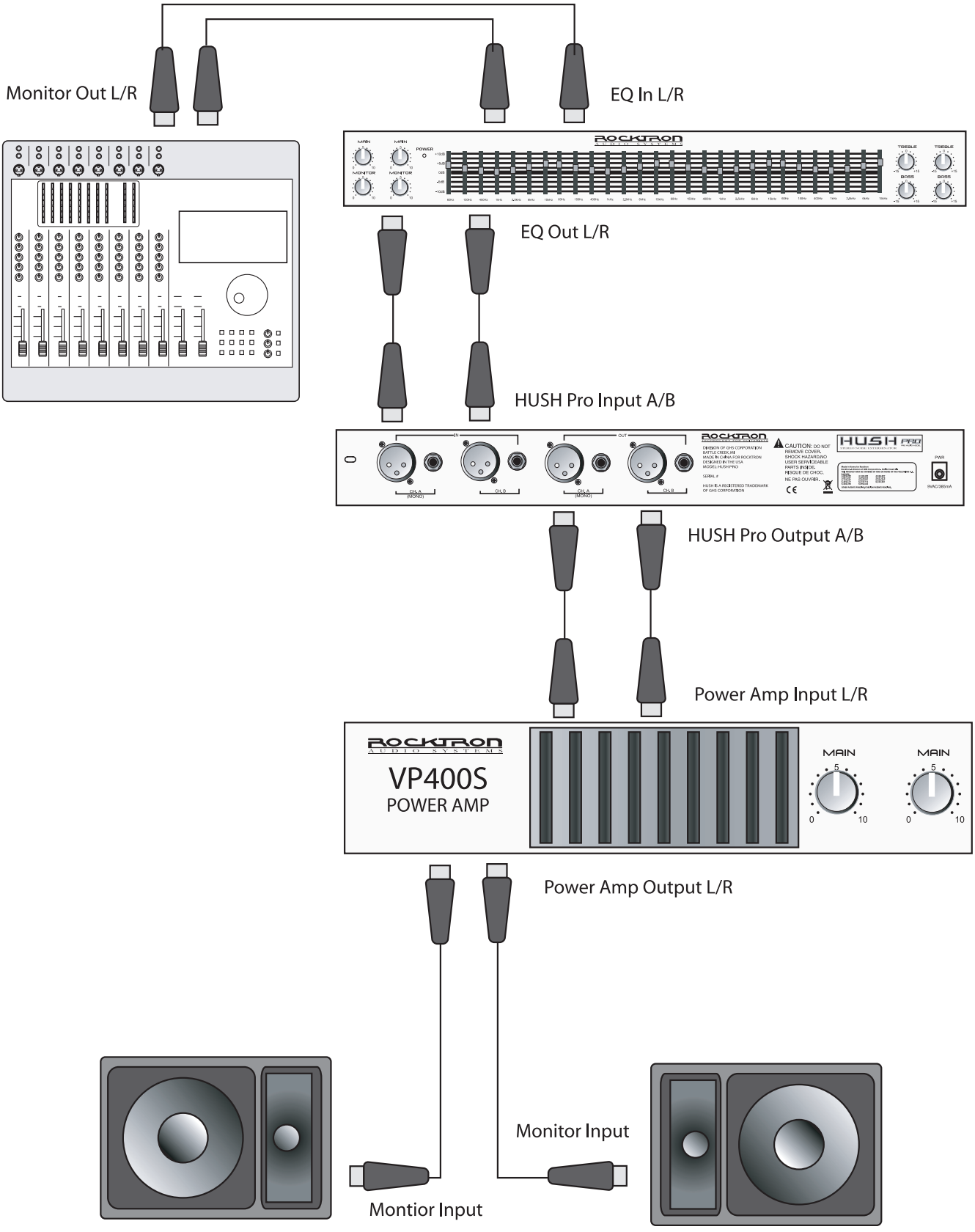
Connection mixer with HUSH Pro in the Channel Insert



Connection mixer with HUSH Pro in the Main Insert



Connection mixer to EQ and power amp to monitors



# Operation

When used properly, the HUSH Pro should be completely transparent (i.e., it should not effect the audio signal—only the noise). To maximize the performance of the HUSH Pro, it is necessary to understand its front panel controls and how they work together. By understanding how these controls work, it will be easier to correctly set up the HUSH Pro to suit any application.

The HUSH Pro front panel provides two controls which each manipulate both channels simultaneously. The *HUSH Threshold* control sets the amount of noise reduction required for a given input signal, while the *Gate Threshold* control provides additional downward expansion when increased. (The *Gate Threshold* control may also be used by itself, allowing the unit to be used as strictly a downward expander.)

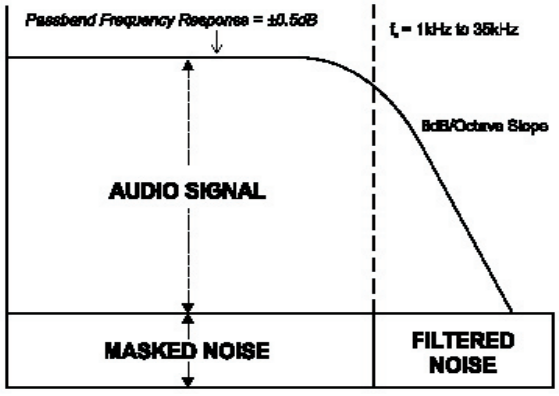
## *HUSH® Section*

Rocktron's patented HUSH noise reduction is a single-ended system that combines the principles of *dynamic filtering* and low-level *downward expansion*.

Dynamic Filtering

Dynamic filtering is achieved by dynamically-controlling a low pass filter to open and close the bandwidth of the output signal depending upon the amount of mid and high band information present in the input signal. The filter bandwidth will only open far enough to pass the highest frequency information in the input signal, thus reducing the noise above it.

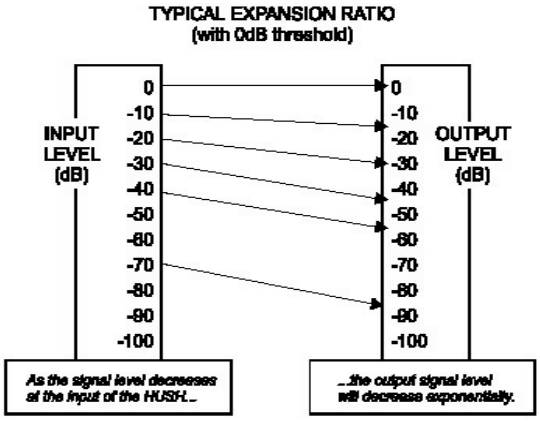
For example, if the highest frequency present in the input signal is 8kHz, the filter will open to pass up to 8kHz while the noise from 8kHz to 20kHz would be reduced. If a signal with frequency components up to 20kHz appears at the input, the dynamic filter will open to its full extreme (40kHz).



This means that if a signal is present at the input which consists of primarily bass components, the dynamic filter will reduce mid or high band noise. If no mid or high band information is present, the filter will close down to a pre-set cut-off point of 1kHz (allowing only frequencies of 1kHz and below to pass). However, if the input signal has high frequency components present, the dynamic filter will open fully to pass the signal and eliminate the possibility of a loss of high end frequency response.

Downward Expansion

The second half of the HUSH process incorporates downward expansion. The low level expander of the HUSH system operates like an electronic volume control. The HUSH system utilizes a voltage-controlled amplifier (VCA) circuit which can control the gain between the input and the output from unity to 30, 40 or even 50dB of gain reduction. When the input signal is above the user preset threshold point, the VCA circuit remains at unity gain. (This means that the output signal level is equal to the input signal level.) As the input signal level drops below the user preset threshold point, downward expansion begins. It is at this point that the expander acts like an electronic volume control and gradually begins to decrease the output signal level relative to the input signal level.




As the input signal drops further below the threshold point, downward expansion increases. A drop in the input level by 20dB would cause the output level to drop approximately 40dB (i.e., 20dB of gain reduction). In the absence of any input signal, the expander will reduce the gain so that the noise floor becomes inaudible.


The front panel *HUSH Threshold* control determines the minimum input level at which the HUSH filter and downward expander will begin to operate. Setting this control too high will result in a loss of sustain, as notes will tend to die out much faster than they should. Conversely, when set too low, the expander will close too late (if at all) and the noise floor will remain audible

## *Gate Section*

The other half of the HUSH Pro consists of a noise gate. A noise gate completely shuts off the output signal when the input signal level drops  below a prescribed threshold level (volume). On the HUSH Pro, this threshold is determined by the Gate Threshold control on the front panel. This control should be set so that it doesn't cut notes off (i.e., set too high), yet doesn't activate long after a note ends (allowing the noise floor to remain audible).


This circuit is combined with the Variable Integrated Release (V.I.R.) circuit to provide an internal variable release to the downward expander. With the V.I.R. circuit, if the guitar signal decays slowly, the downward expander will engage slowly. If the guitar signal stops quickly, the downward expander will engage quickly. The LED indicates when downward expansion is active.

# Specifications

| | |
|---|---|
| **Maximum Input Level** | +15dB (+4 Ref.)<br>+5dB (-10dB Ref.) |
| **Input Impedance 1/4" Jacks** | 470K Ohms |
| **Output Impedance 1/4 Jacks** | 100 Ohms |
| **Imput Impedance XLR Jacks** | 10k Ohms |
| **Output Impedance XLR Jacks** | 2.2k Ohms |
| **Effective Noise Reduction** | up to 72dB |
| **Frequency Response** | ±.5dB, 10Hz - 27kHz |
| **Dynamic Range** | 105dB |
| **Noise Floor** | -100dBu |
| **THD + Noise** | .041% @ 0dBu, 1kHz (typ) |
| **Current Consumption** | 405mA |
| **Dimensions** | 19" x 4" x 1¾" |

*Note: 0dBv = 0.775V RMS*

*CE Approved*

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