

HUSH[®] SUPER C

STEREO NOISE EXTERMINATOR FOR GUITAR PLAYERS

U S E R ' S M A N U A L

ROCKTRON
C O R P O R A T I O N



Your *Super C HUSH*[®] 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).

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Introduction

Congratulations on your purchase of the Rocktron HUSH® Super C™!

Designed for guitar applications, the Super C utilizes the latest in HUSH noise reduction technology (including the SSM2000 HUSH IC, available from Analog Devices) 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 Super C is a stereo noise reduction system, a single HUSH Threshold and Gate Threshold are used to control both channels.

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

About the SSM2000...

The SSM2000 is an advanced audio noise reduction system based on patented HUSH® technology. The SSM2000 is commercially available from Analog Devices, produced under the license of the HUSH patents. HUSH® combines a dynamic filter and downward expander to provide a high level effectiveness without the sonic artifacts normally associated with noise reduction systems. In addition, an Adaptive Threshold circuit detects nominal signal levels and dynamically adjusts both thresholds, thereby providing optimal results regardless of program source. Since it is a single-ended system, HUSH can be used on virtually any audio source, including audio and video tapes, radio and television broadcasts, or any other source with objectionable noise. The SSM2000 can also be used with Dolby® encoded sources with excellent results.

FEATURES:

- Up to 25dB of noise reduction from virtually any audio source without sonic artifacts
- External port available for additional attenuation— providing in excess of 85dB of noise reduction
- "Single-ended" operation eliminates need for encode-decode process
- Adaptive threshold dynamically adjusts to changing nominal signal levels
- Effectively decodes Dolby® encoded sources
- Direct VCA control port access for additional level control functionality
- Logic-controllable bypass and muting
- Flexible on-chip voltage reference
- 100dB dynamic range (noise reduction OFF)
- 0.02% typical THD+N (@ 1kHz, noise reduction OFF)
- +7V to +20V operation
- No royalty requirements

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.

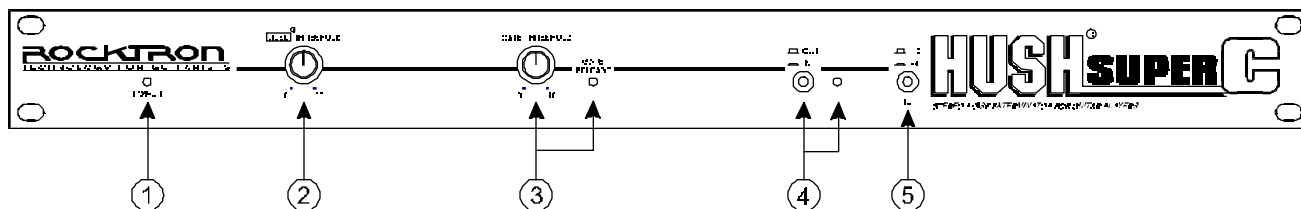
POWER REQUIREMENTS

This unit accepts power from the 9VAC/2A 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.

Super C Front Panel



❶ POWER LED

When lit, this LED indicates that the Super C is powered and ready for operation.

❷ HUSH THRESHOLD control

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

❸ 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.

❹ IN/OUT switch and LED

This switch allows for the Super C to be bypassed when noise reduction is not required.

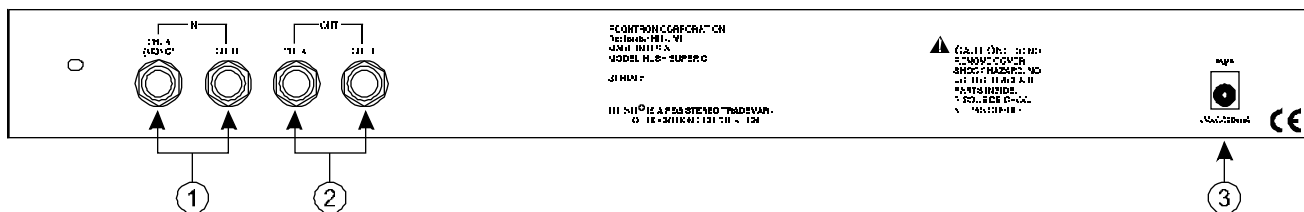
When lit, the LED indicates that the Super C is currently active in the signal path.

❺ REF switch

This switch determines the sensitivity of the Super C. When using the Super C 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.

Super C Rear Panel



1 CH. A (MONO) / CH. B IN jacks

These 1/4" mono jacks provide inputs to the left and right channels of the Super C. When using only one input, the "CH. A (MONO)" jack must be used.

2 CH. A / CH. B OUT jacks

These 1/4" mono jacks provide outputs from the "CH. A" and "CH. B" channels of the Super C.

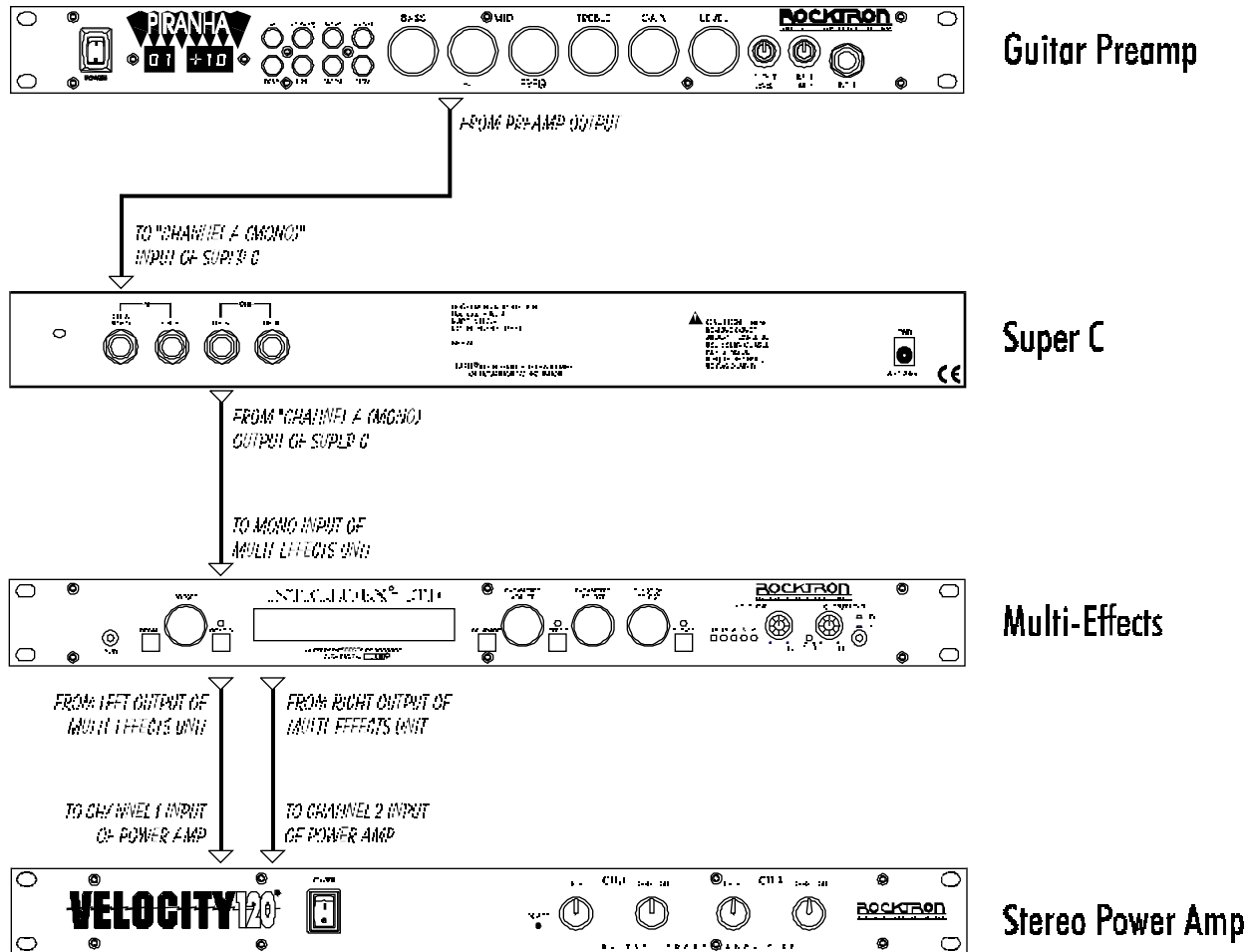
Note: When "CH. A" is used as a single signal source, the signal will be present in both the "CH. A" and "CH. B" outputs.

3 POWER jack

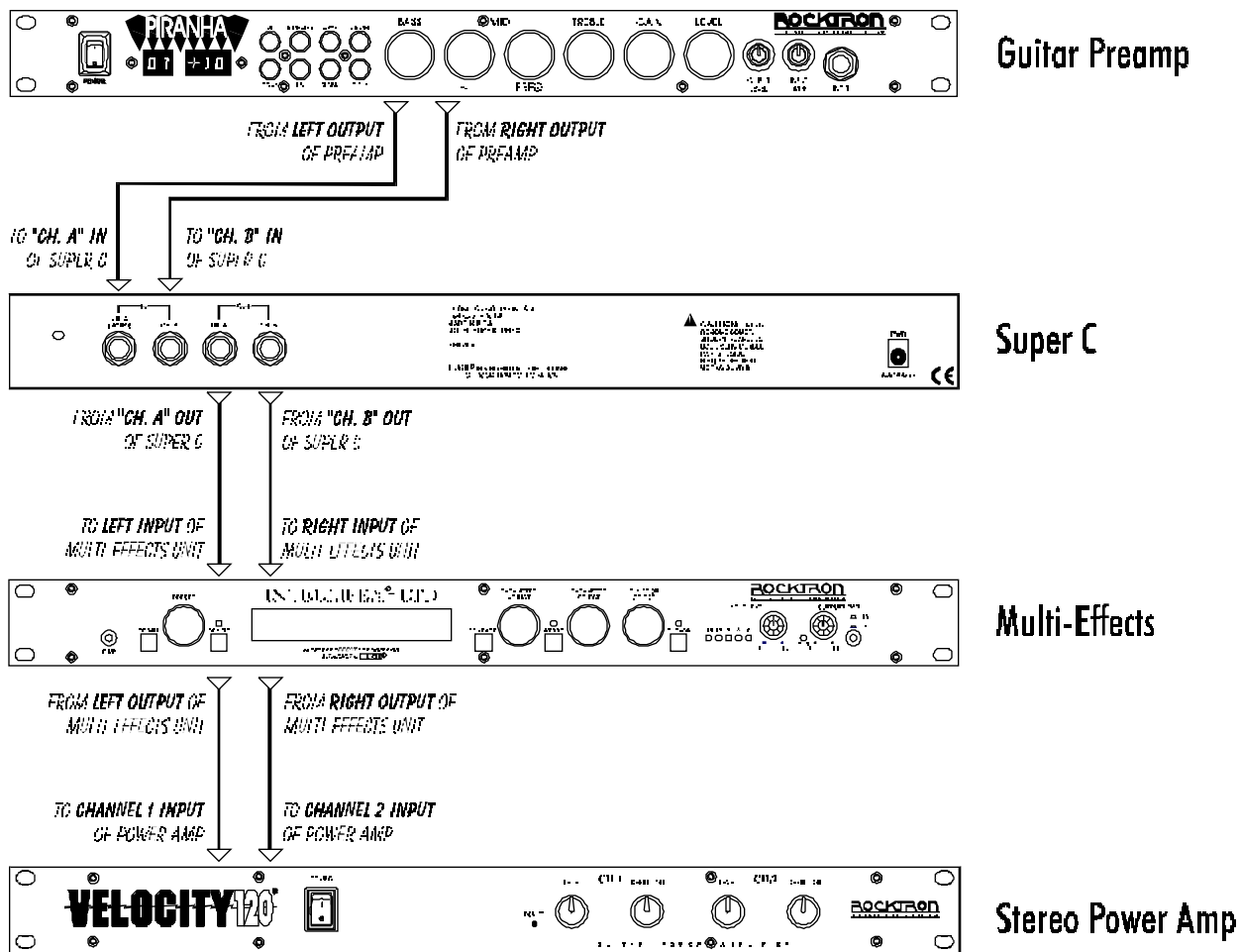
This 2.5mm pin jack accepts power from the 9VAC adapter supplied with the unit.

System Connections

Mono Applications



Stereo Applications



Guitar Preamp

Super C

Multi-Effects

Stereo Power Amp

Operation

When used properly, the HUSH® Super C should be completely transparent (i.e., it should not effect the guitar signal—only the noise). To maximize the performance of the Super C, 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 Super C to suit any application.

The Super C 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.)

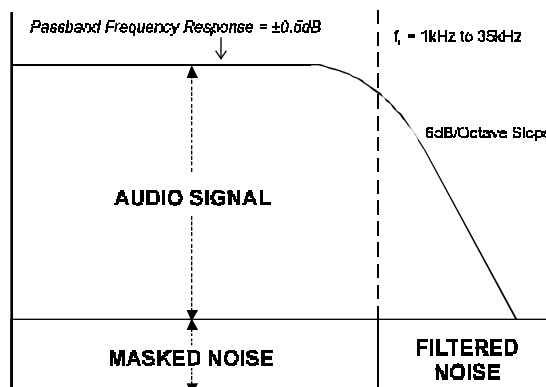
HUSH® Section

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.

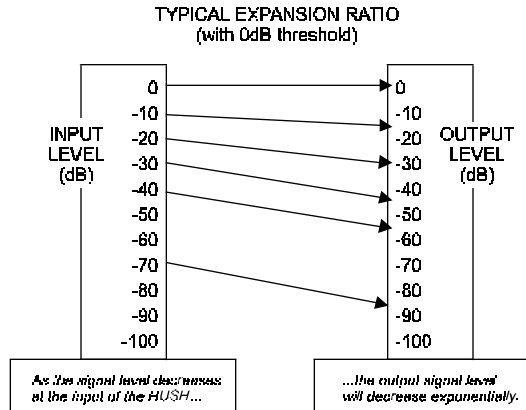
For example, if the highest frequency present in the input signal is 8kHz, the filter will open to pass up to 8kHz while the noise from 8kHz to 20kHz would be reduced. If a signal with frequency components up to 20kHz appears at the input, the dynamic filter will open to its full extreme (40kHz).



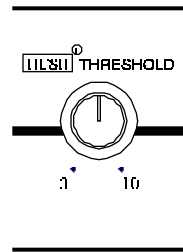
This means that if a signal is present at the input which consists of primarily bass components, the dynamic filter will reduce mid or high band noise. If no mid or high band information is present, the filter will close down to a pre-set cut-off point of 1kHz (allowing only frequencies of 1kHz and below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



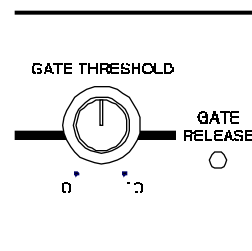
As the input signal drops further below the threshold point, downward expansion increases. A drop in the input level by 20dB would cause the output level to drop approximately 40dB (i.e., 20dB of gain reduction). In the absence of any input signal, the expander will reduce the gain so that the noise 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 Super C 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 Super C, 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 expand will engage quickly. The LED indicates when downward expansion is active.

Specifications

Maximum Input Level	+15dB (+4 Ref.) +5dB (-10dB Ref.)
Input Impedance	470K Ω
Output Impedance	less than 100 Ω
Effective Noise Reduction	72dB
Frequency Response	\pm .5dB, 10Hz - 27kHz
Dynamic Range	105dB
Noise Floor	-100dBu
THD + Noise	.041% @ 0dBu, 1kHz (typ)
Current Consumption	385mA
Dimensions	19" x 6" x 1 $\frac{3}{4}$ "

Note: 0dBv = 0.775V RMS

CE Approved

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