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Welcome!

Thank you for making Groove Tubes' SuPRE™ part of your studio. This is a truly unique product, so to take full advantage of the Super's functions and enjoy long and trouble-free use, please read this user's manual carefully.

How to Use This Manual

This manual is divided into the following sections describing the various functions and applications for the SuPRE. While it's a good idea to read through the entire manual once carefully, those having general knowledge about microphone preamplifiers should use the table of contents to look up specific functions.

Chapter 1: Quick Start. This will get you started using the SuPRE right away. It's a short guide to the essential elements of hooking it up and using it for the first time.

Chapter 2: Connection. This chapter gives detailed instructions for connecting the SuPRE to a variety of typical audio systems.

Chapter 3: About the SuPRE. This section gives detailed information on the unique technology of the SuPRE and how to use it.

Chapter 4: Microphone and Preamp Theory covers deep background information that will help you use your SuPRE, and all microphones, to their greatest capability.

Chapter 5: Troubleshooting. This chapter contains troubleshooting tips and service information should problems occur.

Helpful tips and advice are highlighted in a shaded box like this.

✓ When key information appears in the manual, an icon (like the one on the left) will appear in the left margin. This symbol indicates that this information is vital when operating the SuPRE.

Important Safety Instructions

Safety symbols used in this product



This symbol alerts the user that there are important operating and maintenance instructions in the literature accompanying this unit.



This symbol warns the user of uninsulated voltage within the unit that can cause dangerous electric shocks.

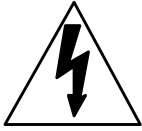


This symbol warns the user that output connectors contain voltages that can cause dangerous electrical shock.

Please follow these precautions when using this product:



1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a damp cloth. Do not spray any liquid cleaner onto the faceplate, since this may damage the front panel controls or cause a dangerous condition.
7. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.



9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. When the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

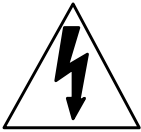
10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

11. Use only attachments or accessories specified by the manufacturer.



12. Use only with a cart, stand, bracket, or table designed for use with professional audio or music equipment. In any installation, make sure that injury or damage will not result from cables pulling on the apparatus and its mounting. If a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

13. Unplug this apparatus during lightning storms or when unused for long periods of time.



14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

15. This unit produces heat when operated normally. Operate in a well-ventilated area with at least six inches of clearance from peripheral equipment.

16. This product, in combination with an amplifier and headphones or speakers, may be capable of producing sound levels that could cause permanent hearing loss. Do not operate for a long period of time at a high volume level or at a level that is uncomfortable. If you experience any hearing loss or ringing in the ears, you should consult an audiologist.

17. Do not expose the apparatus to dripping or splashing. Do not place objects filled with liquids (flower vases, soft drink cans, coffee cups) on the apparatus.

18. **WARNING:** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

CE Declaration of Conformity



Manufacturer's Name:

Groove Tubes LLC.

Manufacturer's Address:

1543 Truman Street
San Fernando, CA 91340
USA

Declares, that the product:

Product Name:

SuPRE

Model Type:

Microphone preamplifier

Conforms to the Standards for Safety and EMC for this product listed on the Internet site:

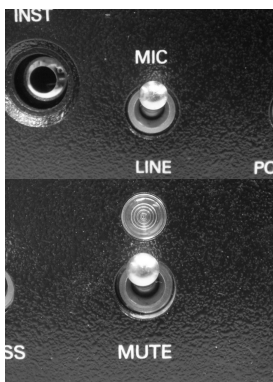
www.GrooveTubes.com

Quick Start Guide

The Groove Tubes SuPRE™ is a unique product, but its basic hookup and operation is similar to other outboard microphone preamplifiers in most respects. This chapter is a "shorthand" guide for those who want to start using the SuPRE right away. If you have questions about any of the features, don't worry – later chapters will unveil more details of the SuPRE's special features.

Hook it up

1. Pull the SuPRE out of the package, and plug it into a grounded AC power source with the supplied power cable. Make sure the available power line voltage is appropriate for the SuPRE.
2. Connect the output of a microphone to the channel 1 the MIC INPUT on the back of the SuPRE.
3. Connect the channel 1 LINE OUT of the SuPRE to a line input – *not* a microphone input – of a mixing console or recording device.
4. For now, set the channel 1 GAIN control to minimum (full counter-clockwise), and the signal feed to your studio monitor at subdued levels.



5. Move the channel 1 MIC/LINE switch upward into the MIC position. If you want to bypass the input transformer and use a lower sensitivity single-ended input, route the signal to the INST jack.

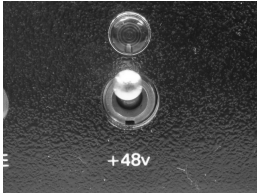
6. Move the channel 1 and 2 MUTE switches upward, into the MUTE position for now. (The yellow lights will light). Channel 2 is included here as a precaution.



7. Turn the SuPRE's POWER switch ON (the blue light will light, flash, the MUTE LEDs will come on regardless of where the

MUTE switch is positioned).

√. This is a protection circuit to allow the components to be energized and begin the warm-up process without any signal spikes that may cause damage to other equipment in the signal chain.



8. If the microphone in use requires phantom power, move the channel 1 +48 (phantom power) switch upwards. The red light will light.

WARNING - DO NOT use Phantom Power with a Ribbon Microphone unless it is designed to use or ignore the phantom supply. Otherwise serious damage to the ribbon microphone or the preamp phantom power feed circuitry may occur.



9. After 30 seconds or so, move the channel 1 MUTE switch downward (the yellow light will turn off) to release the MUTE function, once all warm-up and +48V switching transients have subsided. The MUTE relay kills both output feeds and the feed to the VU meter.

VU METER RANGE trim control

This trim has been set at the factory so that the VU meter reads 0 VU when the output voltage at the male XLR output connector is equal to 1.23 volts, or +4 dBu. The RANGE trim control serves to adjust the meter sensitivity **ONLY**, not the preamp's output level. Its purpose is to fit the preamp's 0 VU meter reading to the downstream equipment's 0 level, if need be.

Channel 1 and Channel 2 Gain controls

These are the most important controls to set in any microphone preamp. The SuPRE uses two multi-deck potentiometers, one per channel, to set the gain and preserve headroom and dynamic range. In the MIC input mode, each channel's gain control goes from 0 dB to 72 dB of gain in one continuous sweep. Typical gain settings on lead vocals range from 30 to 50 dB, but that of course depends upon the microphone and source, and the input sensitivity of the mixer or recorder connected to the SuPRE's output.

In some situations you may find that the input signal is loud enough to push the VU meter reading into the red with the gain control set at low levels, i.e., between 0 and 30 dB. In these instances, it is best to use the MIC /LINE attenuator switch, and assert the 15 or 30 dB input pad to prevent overloading the input stage.

There are two different methods commonly used to set the gain of any mic preamp. The nominal level method maximizes headroom; the peak method maximizes the dynamic range of the system by using up as much headroom as desired.

To set the gain at nominal level:

1. Make sure the VU METER trim control is set to the factory preset (0 VU = +4 dBu = 1.23 volts), or has been set so that the VU meter agrees with the downstream load's 0 VU required drive level (DAW zero level mark, etc.) More on this later.
2. With the source playing into the microphone, raise the channel 1 gain control until the VU meter of the SuPRE is peaking at "0" or just barely going "into the red". Raise or lower this control as necessary.

The average level of the output will be nominal (+4 dBu at the balanced XLR line out, -2 dBu at the balanced TRS line out) with peaks typically 8-10 dB above that. The Supre's headroom limit should be sufficient when employing this setup method.

To set the gain using the peak method:

1. Set the SuPRE's VU METER trim control as above, if needed.
2. With the source playing into the microphone, raise the channel 1 gain control until the meter of the receiving unit (the mixer or recorder the SuPRE is feeding) is nearing its maximum level.
3. Carefully raise the channel 1 gain control until the receiver's CLIP flashes briefly on peaks.
4. Back off either or both of the controls to dial in exactly the headroom you want.
5. If the Supre's VU meter is pegging, the VU METER trim may need to be adjusted to better represent the new hotter average operating level.

The SuPRE features a very short signal path and high resolution amplifier stages that permit hearing small micro-dynamic details even during macro-dynamic events. The differences in the sonic character and personality of the microphones and pre-recorded materials in your collection should be easily heard when sent through the SuPRE.

Impedance Selector

This switch is only active when the MIC/LINE switch is in the MIC position. When it is, you can experiment with any of the three impedance selections, from 300 to 1200 ohms (Ω). How this affects the sound of a mic will vary upon the microphone's actual impedance and other characteristics, but again, generally speaking, lower impedances are more suited to older microphones.

√ Small shifts in level are normal when auditioning the various positions of the impedance selector switch. The maximum observed level will generally be heard with the switch in the 300 ohm position, especially if a modern microphone is being used.

Hi-Pass

This switch is another optional control. In the MIC input mode, it rolls off the bass below 80 Hz at a rate of 12 dB per octave. The roll off rate is 6 dB per octave through the INST input. It's designed to get rid of undesirable low-frequency rumbles and noises. Note, however, that many microphones also feature high-pass filters of their own; make sure the mics filter is out if you want to hear the effect of the Supre's Hi-Pass filter only.

Polarity

This reverses the “+” and “-” of the signal at the output, and asserts a 180 degree phase reversal. Note that the term “phase” covers any angular departure from 0 degrees, including 180 degrees. Polarity, on the other hand, refers very specifically to a 180 degree phase shift or reversal.

Most of the time, you'll leave the polarity switch set in the normal or downward position. It may not make an obvious difference when listening to a single channel, but ideally the polarity should be set so that a positive pressure on the microphone generates a positive pressure from the monitor speaker. In other words, if you're miking a drum, the first transient of a drum hit should make the loudspeaker move forward, not back. Polarity also makes a difference in multi-microphone or multi-channel situations, or when miking opposite sides of a diaphragm (above and below a piano soundboard, a snare drum, etc).

The SuPRE is wired according the more modern standard of “Pin 2 = Hot”. Some older microphones were wired with Pin 3 hot (i.e., a positive pressure on the diaphragm leads to a positive voltage on Pin 3); if you're using one of these, you may need to set the POLARITY switch to REV.

About the Instrument Input

The 1/4" input on the front panel labeled "INST" is specially designed for guitar and bass pickups, and, thanks to a special attenuator tied to the jack, can also accommodate robust line-level signals from keyboards or other electronically assisted musical instruments. The SuPRE INST jack automatically detects the presence of a 1/4 inch plug. When the plug is in place, the channel will switch over to the INST input mode.

Instruments such as basses and guitars sound best if they "see" an extremely high input impedance (1/2 megohm or greater). The main INST input features an extremely high 22 megohm input, making the SuPRE not only a great mic preamp, but an incredible direct box for recording basses and guitars.

If the instrument tied to the SuPRE has active internal electronics, it may be so loud that it clips even at low settings of the GAIN controls. To address this situation, the INST input jack is equipped with a hidden 20 dB pad. To use the pad, insert the 1/4 inch jack to the "first click," instead of fully seating the plug. The INST jack is a 3 contact TRS jack, with the Ring contact connect to the TIP through a 20 dB dropping network. The input impedance of the attenuator is about 1/2 megohm. This special attenuator is intended to be used with cables fitted with two-circuit or Tip-Sleeve plugs.

The front-panel INSTRUMENT input jack does not use the input transformer, so the IMPEDANCE SELECTOR or MIC/LINE attenuator has no effect on it.

√ Alternatively, instruments capable of producing stout line-level signals may be plugged into the LINE IN jack on the back panel for a slightly different sound. The signal is attenuated and routed through the input transformer and an additional amp stage using that input. Balanced or unbalanced sources may be used at the line input jack.

Next step: Experiment

Once you have experienced the difference that the SuPRE makes on one microphone, you'll want to try every other mic in your possession with it. You'll find that each microphone reacts differently to the settings, and a whole new sonic palette will open up.

Finding the "right" setting

The SuPRE's fundamental concept is different from other kinds of studio equipment. Settings for impedance will change the "flavor" of the sound, but will vary from case to case. The changes of each interact in very subtle ways...it's not nearly as obvious as changing the settings on an equalizer or compressor/limiter. So, this manual doesn't provide a chart that lists the "right" settings for a particular microphone, because the "right" setting can only be determined by your ears.

Connections

Unpacking and Inspection

Your Groove Tubes SuPRE was carefully packed at the factory, and the shipping carton was designed to protect the unit during shipping. Please retain this container in the unlikely event that you need to return your SuPRE for servicing.

The shipping carton should contain the following items:

- SuPRE two-channel Preamp
- This instruction manual
- Power cable
- Groove Tubes Warranty card

√ It is important to register your purchase; if you have not already filled out your warranty card and mailed it back to Groove Tubes, please take the time to do so now.

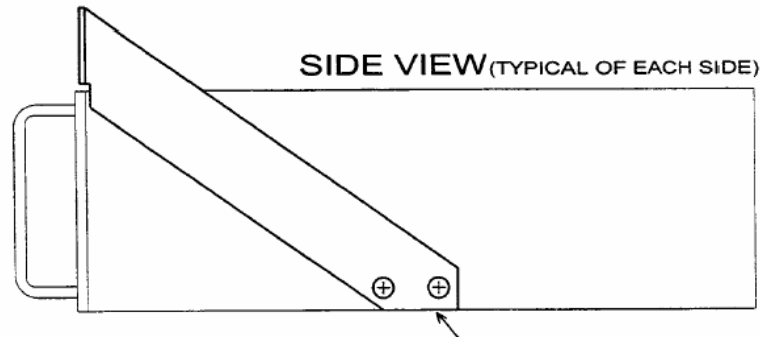
Installing in a Rack

The SuPRE may be simply set on a table, or installed in a standard 19" audio equipment rack. While the rack mounting holes are integral to the front panel, the SuPRE is unusually deep and heavy, so extra support must be provided for the rear of the unit. Before the SuPRE is installed in a rack, we recommend that you attach the reinforcing rack kit to handle the weight of the unit and provide ventilation room. The rail kit requires one free rack space above the SuPRE.

√ Since the vacuum tubes in the SuPRE generate a certain amount of heat, make sure adequate ventilation is provided in the rack.

To attach the rack kit:

The reinforcing rails should be attached to the sides of the unit. They are screwed to the sides of the preamp and extend to above the front panel. Standard rack screws are then used to fasten both the Front Panel and the Rack Kit to the Rack Rails panels as shown.



✓ Since the vacuum tubes in the SuPRE generate a certain amount of heat, make sure adequate ventilation is provided in the rack.

Power



Make sure you read the initial Important Safety Instructions chapter at the front of this manual.

The SuPRE works with a single standard line voltage and comes with a detachable AC line cord suitable for the destination to which the preamplifier is shipped. Units sold in the United States are designed for use with 110 to 120 volt AC power (nominal 60 Hz).

The line cable is an IEC-spec AC power cable designed to be connected to a grounded 3-pin outlet, with the third, round pin connected to ground. Do not substitute any other type of AC cord; IEC-spec cables of various lengths may be purchased from electronics stores or your Groove Tubes dealer.

The ground connection is an important safety feature designed to keep the chassis of electronic devices such as the SuPRE at ground potential. Unfortunately, the presence of a third pin does not always indicate that an outlet is properly

grounded. You may use an AC line tester to determine this. If the outlet is not grounded, consult with a licensed electrician. When AC currents are suspected of being highly unstable in VAC and Hz, a professional power conditioner should be used.

To connect power to the SuPRE, attach the female end of the AC power cord to the Supre's back panel and the male end to a good quality, noise-free AC power source of the proper rating.



Do not operate any electrical equipment with ungrounded outlets. Plugging the SuPRE into an ungrounded outlet, or "lifting" the unit off ground with a three-to-two wire adapter, can create a hazardous condition. Groove Tubes cannot be responsible for problems caused by using the SuPRE or any associated equipment with improper AC wiring.

Voltage conversion

If you need to use the SuPRE in a country with a different voltage, contact Groove Tubes to locate a service center in your area. Changing the voltage requires extensive modifications.



NEVER OPERATE THE SUPRE AT A DIFFERENT VOLTAGE THAN THAT MARKED ON THE UNIT. This will damage the unit.

Avoiding ground loop noise

In today's studio, where it seems every piece of equipment has its own computer chip inside, there are many opportunities for ground loop problems to occur. These show up as hums, buzzes or sometimes radio reception and can occur if a piece of equipment "sees" two or more different paths to ground. While there are methods to virtually eliminate ground loops and stray radio frequency interference, most of the professional methods are expensive and involve installing a separate power source just for the sound system. Alternatively, here are some helpful hints that professional studio installers use to keep those stray hums and buzzes to a minimum.

➤ **KEEP ALL ELECTRONICS OF THE SOUND SYSTEM ON THE SAME AC ELECTRICAL CIRCUIT.**

Most stray hums and buzzes happen as a result of different parts of the sound system being plugged into outlets of different AC circuits. If any noise generating devices such as air conditioners, refrigerators, neon lights, etc., are already plugged into one of these circuits, you then have a perfect condition for stray buzzes. Since most electronic devices of a sound system don't require a lot of current (except for power amplifiers), it's usually safe to run a multi-outlet box or two from a *SINGLE* wall outlet and plug in all of the components of your system there.

➤ **KEEP AUDIO WIRING AS FAR AWAY FROM AC WIRING AS POSSIBLE.**

Many hums come from audio cabling being too near AC wiring. If a hum occurs, try moving the audio wiring around to see if the hum ceases or diminishes. If it's not possible to separate the audio and AC wiring in some instances, make sure that the audio wires don't run parallel to any AC wire (they should only cross at right angles, if possible).

➤ **TO ELIMINATE HUM IF THE ABOVE HAS FAILED:**

- A) Disconnect the power from all outboard devices and tape machines except for the SuPRE, the mixer and control room monitor power amp.
- B) Plug in each tape machine and outboard effects device one at a time. If possible, flip the polarity of the plug of each device (turn it around in the socket) until the quietest position is found.
- C) Make sure that all of the audio cables are in good working order. Cables with a detached ground wire will cause a very loud hum!!
- D) Keep all cables as short as possible, especially in unbalanced circuits.

If the basic experiments don't uncover the source of the problem, consult your dealer or technician trained in proper studio grounding techniques. In some cases, a "star grounding" scheme must be used, with the mixer at the center of the star providing the shield ground on telescoping shields, which do NOT connect to the chassis ground of other equipment in the system.

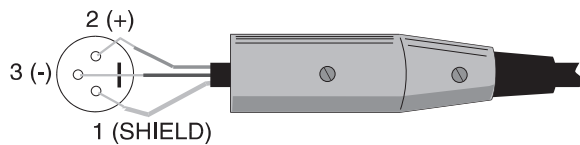
Output To a Mixing Console

Since the SuPRE channels are line-level output preamplifiers, the LINE

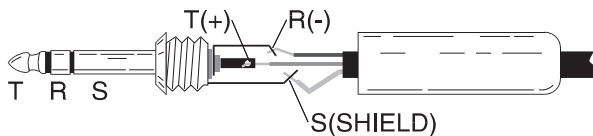
Basic Connections

OUTputs should be connected to a balanced line input of a console, not to the microphone input whenever possible.

If the console's line inputs have XLR inputs, you're in luck—simply connect a standard XLR-to-XLR cable from the SuPRE's outputs to the line inputs of the console.



However, the line input of most modern consoles is a three-conductor TRS 1/4" phone jack, as shown below:



To maintain the benefit of fully-balanced operation, you will need to get an XLR female to 1/4" male TRS adapter or cable, like this:

Important tip: Many XLR-to-1/4" adapters sold at electronics stores are NOT adapters, but transformers (and very low quality transformers at that). Don't use these on the output of the SuPRE—they're unnecessary and generally sound awful because they don't have the headroom to handle the Supre's output. Get a hard-wired adapter or cable from your professional audio dealer, or make one yourself from components.

If you must connect to a microphone input jack...

Whenever possible, the output of the SuPRE should be connected to a balanced line input of a console, designed for a nominal input of +4 dBu (1.23 volts). However, in some situations you may have no other choice than to connect to the XLR MIC IN of a console or sound system. If this is the case, to avoid clipping of the console's input:

- Set the console's input gain (which may be labeled TRIM, ATT, GAIN, or MIC) to its lowest setting.



Turn off any phantom power coming from the console if possible.

- If there is an input pad switch (labeled PAD, ATT, -20 DB, etc.), turn it on.
- With the Supre's gain set for optimum, as described in the first chapter, see if the console's input is clipping. If it is, you can either turn down the Supre's GAIN controls, or insert a line attenuator between the SuPRE and the console.
- Instead of using the SuPRE's XLR LINE OUT jack, connect the Supre's Lower Balanced 1/4" TRS output to the unit. This cuts the output level of the SuPRE by 6 dB (the difference between a +4 dBu and -2 dBu nominal level).

Connecting to a +4 dBu input on a recorder

Tip: For the cleanest possible recording, connect the SuPRE directly to the inputs of the recorder and avoid going through a mixing console entirely while tracking.

Professional recorders typically feature balanced 3-pin XLR line-level balanced inputs. This allows you to connect the LINE OUT of the SuPRE directly to the

input of the track you plan to record on. The nominal signal level of these units is +4 dBu (1.23 volts). Balanced cables between the recorder and the SuPRE can be very long, if necessary, without adding noise.

Digital Recorders. A Popular Digital Recorder features a multi-pin ELCO connector that features 8 balanced inputs and 8 balanced outputs on a single connector. To connect the Recorder directly to the SuPRE, obtain an ELCO-to- TRS multi-pair cable. This will connect from the ELCO-type connector on the Recorder on one end, fanning out to sixteen connectors (labeled INPUT 1, OUTPUT 1 and so on) on the other end. Simply plug the 1/4" TRS Input on the desired track of the Digital Recorder into the SuPRE's -2 dBV output. Using a cable assembly with 1/4" TRS to XLR allows a choice of the +4 dBm level referenced output jacks on the SuPRE. Because the SuPRE uses balanced transformer outputs, an unbalanced plug may be used with the 1/4" output jack and will automatically convert the jack and the signal from balanced to unbalanced operation with no loss of signal level.

Note that some recorders with XLRs may not be truly balanced, with pin 2 or 3 (depending on vintage) tied to ground, which may cause a ground loop. Also, depending on the characteristics of the deck, metering levels may not match between the deck and the SuPRE. Some multitracks have high/low level input switches; follow the manufacturer's instructions on setting these properly. Then run a line-up tone through the LINE inputs of the SuPRE, and adjust the gain control until the recorder's meter reads "0". Then trim the Supre's METER RANGE control until the VU meter agrees with the recorder's meter. This may not be needed if the recorder's native zero level is +4 dBu or 0 VU.

Connecting to an unbalanced device

Although it's not ideal, the SuPRE may feed an unbalanced input of a console or recorder and still provide excellent results, particularly if the cable lengths are short and the AC power distribution system feeding the aggregate of gear is not overly complicated or troubled.

The -2dBu 1/4" jack output of the SuPRE can be used for this purpose. If the receiving device has a 1/4" input jack, obtain a 1/4"-to-1/4" (mono) cable or adapter. The nominal output of this output is -2 dBu (.61 volts), at the same time that the balanced outputs on the XLR and upper 1/4" connectors are putting out +4 dBu (1.23 volts), that is, when the VU meter reads 0 VU.

If you want to use the 1/4" or XLR outputs

It is possible to use the -2 dBm balanced 1/4" TRS or +4 dBm XLR output (w/adaptor) of the SuPRE to feed an unbalanced device. Note, however, that

besides being balanced, these devices put out a hotter level that may overload the input of the receiving device.

Use an adapter similar to the one shown on page 19. The adapter may be an XLR-to-TRS or an XLR-to-1/4" mono jack; in either case, pin 3 (-) must be connected to the shield, preferably at the input to the device.

Alternatively, if there are noise problems, you may try isolating the device by building or purchasing a special cable that uses the balanced output on pins 2 and 3 of the SuPRE to feed the + and – connectors of the unbalanced receiver, leaving the ground floating (disconnected) at the receiver's end. (The shield must still be connected at the SuPRE to provide some path to ground for interference.)

Cool SuPRE Tricks; Cascading Gain Structure

The SuPRE Offers amazing flexibility and versatility. Not only can the SuPRE can be used as a stereo or dual mono preamplifier, it can also be used effectively in a single chain cascaded dual stage preamp that can offer the engineer virtual flat response with extremely low noise and up to 92dB of gain!

Here are the two optional methods to make your SuPRE perform this cool trick:

Plug any mic (or instrument) into Channel 1. Then patch Channel 1's rear panel -2 dB line output into Channel 2's instrument input on the front panel via an unbalanced 1/4" cable. Be sure to insert the plug fully into Channel 2's input socket to by pass the pad. This signal path is now; Chan. 1 (transformer and tube primary stages) driving Channel 2s transformerless input tube secondary stage. This patching method adds up to 17dB of gain for a total signal path gain of 89dB.

The second optional procedure is similar; patch the -2dB Line output of Channel 1 into the rear Line input of Channel 2 using a balanced 1/4" TRS cable. This patching method adds an additional 20dB of tube gain, for a total of 92dB!

Connecting Microphones

The balanced female XLR connector on the rear panel is intended for use by low-impedance microphones needing pre-amplification. It is wired in the standard configuration (Pin 1 shield, Pin 2 “hot”, Pin 3 “cold”) and will furnish 48-volt phantom power when the +48V phantom switch is on. (WARNING-DO NOT USE PHANTOM POWER WITH RIBBON MICROPHONES that are not designed to use or ignore the phantom power source – otherwise SERIOUS DAMAGE to the microphone MAY RESULT).

When the gain control is set to maximum and the IMPEDANCE SELECTOR is at 600 ohms, the signal at the microphone input XLR jack will be amplified by 72 dB, or about 5000 times. Conversely, when the gain control is rolled back minimum, it will be amplified 12 dB, or 4 times.

Warning about connecting line-level sources to the Supre’s XLR microphone input.

In general, it is not recommended to use the microphone XLR IN with a line-level source such as the output of a VCR, since this will cause clipping of the first pre-amplifier stage, possibly even with the ATTN switch set to 30 dB. For this reason, it’s better to connect balanced line sources to the 1/4" LINE IN jack on the rear panel using an XLR-to-1/4" TRS adapter or cable.



Never connect an electronic line input to the XLR IN jack if phantom power will be turned on. Doing this could damage the equipment and the SuPRE.

Connecting microphones with outboard power supplies.

Many high-quality microphones, such as the Groove Tubes vacuum-tube based microphone systems, feature outboard power supply boxes that connect directly to the microphone using a multi-pin connectorized cable. The power supply usually has a standard 3-pin XLR output, which should be connected to the XLR input of the SuPRE using a shielded microphone cable.

This type of microphone doesn't require phantom power from the SuPRE, so leave the +48V phantom switch on the front panel OFF.

Connecting Instruments

The SuPRE has a 1/4" jack on the front panel labeled INST for instrument input.. This is intended for inputs that "like" extremely high load impedances, such as electric guitars and basses. Simply plug an unbalanced 1/4" cable fully into the jack. The SuPRE automatically detects the presence of an input plug at the INST jack, and switches the chosen channel over to INST input mode.

Instruments such as basses and guitars generally sound best if they "see" an extremely high input impedance (1/2 megohm or greater). This input features an extremely high 22 megohm input, making the SuPRE not only a great mic preamp, but an incredible direct box for recording basses and guitars.

For that reason, it is not necessary to use a "direct box", either passive or active, between a guitar and the SuPRE. The SuPRE is itself, an extremely high-quality direct box.

If the instrument has active electronics internally, it may be so loud that it clips even at low settings of the gain control. To address this situation, the SuPRE INST input jack is equipped with a hidden 20 dB pad. To use the pad, insert the 1/4 inch plug to the "first click," of the jack, instead of fully seating the plug. The INST jack is a 3 contact TRS jack, with the Ring contact connect to the TIP through a 20 dB dropping network. The input impedance of the attenuator is just over 1/2 megohm.

The front-panel INSTRUMENT input jack does not use the input transformer, so the IMPEDANCE SELECTOR or MIC/LINE attenuator has no effect on it.

Connecting Line Inputs

On the rear panel is a 1/4" jack labeled "LINE". This jack is separate from the XLR MICROPHONE input, and has a 46 dB lower sensitivity as may be expected of line input ports. Signals presented to the LINE input TRS jack may be heard by switching the MIC/LINE switch to the LINE position. Line signal gain is indicated by the ring of gain demarcations around the perimeter of the gain controls. If you need to connect the output of a line-level device such as a signal processor, synthesizer, or recording device through the SuPRE, connect it here. It is also reasonable to connect the signals developed by very heavily driven dynamic microphones to this input, such as that SM57 riding 1 inch from the snare or kick drum head, etc.

In order to preserve the balanced input characteristics of the line input, the 1/4" BALANCED LINE IN TRS jack connects to the input transformer, but through a 46 dB pad. This preserves the full ATTN and HI PASS feature switch functions, as well as presenting a floating balanced load to the line signal source.

About the SuPRE

Why is the microphone preamplifier so important?

In today's era of high-resolution digital recording, the sonic characteristics of the microphone preamplifier have become crucial in determining the overall sound quality. Most of the gain in the recording signal path is provided by the mic preamp, and accordingly the dynamic range of the recording is set by the noise floor of the preamp. The wider availability of large-diaphragm condenser microphones, coupled with the scarcity of vintage equipment properly designed for use with those microphones has been another trend that focused attention on the preamp.

The assorted pieces of front-end production equipment and the practices used in their application generally tend to dominate the character of the audio heard and recorded. Because of this, many recording studios own large collections of mics and preamps in order to be better prepared for the needs of various artists and groups. And for good reason: the more tonal variations a recording facility can provide, the more capable the facility is of complementing the musical statements and wishes of their clientele.

The 20-bit and 24-bit digital recorders now commonly available allow engineers to capture subtleties that used to be lost in tape noise or covered up by other recording chain artifacts. Early criticism about the "harshness of digital," apart from primitive anti-aliasing filters, have been recognized for what they are: complaints about inferior microphone preamps. That are now being revealed by the accuracy of digital recording.

Moreover, the tendency for some digital recording paths to cover up details present in the audio signals meant that the microphone preamp's behavior must not contribute to that phenomenon.

To that end, each component in the signal path was carefully chosen for its sonic purity. When components were not available "off the shelf", they were custom-manufactured to Groove Tubes' exacting specifications. Even the phenolic knobs on the front panel were custom-molded. But as you will read in the rest of this chapter, the attention to detail goes well beyond the appearance of the front panel. Most importantly, unlike other "tube preamps" that feature a single vacuum tube in a largely conventional op-amp laden circuit, sometimes run cold with an LED to provide fake filament glow, the SuPRE features a specialized ultra-short signal path, for illustrating the sonic strengths of the "less is more" low- feedback audio circuit experience.

The Input Section

About the Input Transformer

The SuPRE features an exclusive nickel core input transformer a key feature is the built-in faraday shield which cuts down high frequency common mode interference.

Benefits of transformers, generally

While modern solid-state input circuitry can often deliver excellent results at very low cost, a good input transformers deliver several significant advantages:

- Greater CMRR (common mode rejection ratio): this means that noise from the cable that appears on both the + and – leads simultaneously is more likely to be rejected. Solid-state differentially-balanced circuits may have a good CMRR spec at 1 kHz, but often aren't as good at other frequencies.
- More resistance to RF (radio frequency interference): the windings of a transformer, being naturally inductive, reject ultra-high radio frequencies without requiring a capacitor in the audio path as electronically-balanced circuits do.
- Good impedance matching: it is easier to build an optimally matched low-impedance input stage using a transformer than a low-impedance transistor input (which is one of the reasons the industry went to bridging impedances in the last few decades). Thanks to a properly fit input transformer, almost all of the input power from the microphone is put to use exciting the input stage.
- A transformer is fully floating, isolating the circuit from DC offsets, and to a certain extent from surges and stray signals. You could think of this galvanic isolation as a magnetic link that keeps the circuits free from mutual electrical contamination.

For these and other reasons, the highest-level audio consoles, especially those used by touring sound companies, have always used input transformers. But good quality input transformers are expensive and cheap input transformers used in affordable consoles several decades ago gave transformers a bad name with some engineers due to their irregular frequency and phase response.

The input transformer used in the SuPRE is a totally different story. Special care is taken to shield the transformer windings from noise: a custom made ferro-magneticly active enclosure houses the transformer. The transformer itself is a nickel core type, with specially constructed internal shield layers that help cut down induced noise from the environment or nearby circuitry.

Impedance: Matching vs. bridging

In early audio devices, circuits were designed to maximize power transfer between units. This meant that input and output impedances should be matched, e.g. a 150-ohm source would be terminated by a 150-ohm load. This impedance matching maximized the power delivered to the load, at a time when every bit of power was necessary to overcome self

noise levels in primitive amplification circuits. One obvious down side to impedance matching was that a single source couldn't easily feed several inputs at once.

After the advent of high-impedance solid-state circuitry, the notion of maximum power transfer was set aside and the focus shifted to conveying signals through voltage, not power transfer. The microphone or other source generates a varying voltage, but very little current is drawn in the circuit because the load it "sees" is so high that it may as well be connected to nothing at all. Most modern audio equipment is designed to present a moderately to very high impedance load to the source. The typical input impedance of a load is designed to be 10 to 20 times the output impedance of a typical source. This is called a bridging input. (For a more in-depth explanation of the importance of impedance, see page 36.)

But what is the actual output impedance of the microphone you're plugging in? And what kind of circuit or loading was that microphone designed to "see" for optimum performance? Particularly in the case of vintage condenser and ribbon microphones, the original designs usually were set up for impedance matching, not bridging. When these microphones are plugged into the MIC IN jacks of today's moderately high input impedance solid-state mic preamps or consoles, they're seeing a very different load than that for which they were designed.

When they're plugged into the input of the SuPRE and the impedance is set to lower values, they exhibit the more open sound heard on classic recordings. Yet, other microphones may need to see a higher, closer-to-bridging load for best performance. In any case, altering the load against which the microphone has to push fundamentally alters the tone and character of the output signal of many microphones. The SuPRE gives you the best of both worlds. A key to this flexibility is the input circuit arrangements, which is the first stage the microphone "sees" when the mic signal enters the preamp housing.

What's the best input impedance?

There is no best one. Like EQ or effects, the "right" setting is the one that sounds best in a particular situation. However, it might help you to choose a setting if you understand what's going on electronically. The choice of impedance between 300Ω, 600Ω and 1200Ω on the front panel will make slight variations in equalization and residual distortion, depending upon the individual mic and its excitation levels.

For example, an early broadcast microphone like the RCA 44 will sound smoother when terminated at 300Ω. The tonal characteristics change, and the sound seems to "bloom" in a way most people have not experienced. The equalization changes slightly as well, with the entire spectrum from about 100 Hz to 15 kHz taking on a very slight tilt, typically around -1 dB at the low end, and around +1 dB at the upper registers. This is very slight when looking at individual frequencies, but the cumulative effect over the whole spectrum is unmistakable. This kind of variation would be almost impossible to recreate with any kind

of equalizer, unless the principle of a simple, uncluttered signal path is abandoned altogether.

Tip: Try matching the era with the impedance: Generally speaking, the older the microphone, the lower the load impedance. Microphones from the 1940s and '50s can handle 300Ω quite well. Mics from the '60s tend to "like" 1200Ω while those from the '70s and '80s prefer 2400Ω. New mics, since they were designed in an era when almost all consoles have high-impedance bridging inputs, may sound the way the designers intended with less tonal variation as the input impedance is changed. Remember: you can't hurt a microphone by setting the input impedance "incorrectly."

Frequently-Asked Questions

If I set the impedance too low, will it hurt the microphone?

No. Even microphones with their own power supplies are protected against a dead short.

Is there a special setting for ribbon microphones?

Vintage ribbon mics like the RCA 44 were designed in an era when impedances were supposed to be matched to give maximum power transfer. These mics are particularly suited for the Supre's 300-ohm setting. (Note: DO NOT USE PHANTOM POWER WITH RIBBON MICROPHONES unless the microphone is designed to either make use of it or is wired to ignore it. SERIOUS DAMAGE CAN RESULT)

But modern ribbon microphones (like those from Beyer and Royer) tend to be designed for higher impedances, although you can try them at any setting.

Aren't electronic inputs cleaner than transformer inputs?

Input transformers got a bum rap several decades ago, mostly because of the sound of the cheap versions used in popular consoles. There are many advantages to using a good input transformer though. For example, the common-mode noise rejection furnished by a good transformer, especially at high frequencies, is superior to that of an electronic circuit.

About Vacuum Tubes

Theory

Tubes are the first devices to be mass produced and made widely available for signal amplification, other than for “on-off” type signals as in telegraph systems. Although solid-state (transistor/ semiconductor) circuitry has replaced them in general use, there are still applications where vacuum tubes (or “valves”, in the UK) demonstrate their superior characteristics.

Driver and final stages of exotic high powered UHF, SHF and EHF radio transmitters are examples where semiconductors have no chance of competing with tubes for getting the job done. If you have a Direct TV or Dish Network system at home, you can thank these specialty tubes for getting the signal to the satellites and making the service possible. Conversely, the audio production field is another arena where the vacuum tube is a good fit for the job at hand. This may be attributed to the following characteristics of vacuum tubes:

- High inherent linearity with low negative feedback.
Permits simple circuitry with minimum of corrective feedback, perhaps 2 -6 dB per stage, rather than 40 to 80 dB of budget op-amp based designs.
- Capable of very high dynamic range, thanks to the high voltage rails and low self noise. High tension power supply rail at 300 volts, rather than 20 – 30 volt spans found in cost sensitive designs. OK, 40 volts for the “good stuff” ...
- Graceful overload characteristics, with generally benign low-order harmonic content as system or stage overload point is approached.
Will not start sounding like an overloaded pocket radio as the clipping point is approached. What harmonic content that is present is predominantly 2nd with a touch of 3rd and 4th, rapidly diminishing. There is basically no mechanism to produce higher order glary distortion in the signal path.
- Generally free of unwanted modulation of internal inter-electrode capacitances.
This phenomenon occurs within semiconductor amplifiers, and is a part of what causes the “transistor sound” depending on the circuit particulars. Once again, there is no mechanism for this to be significant in this application.

The SuPRE employs two different tube types; all fitted to PCB mounted sockets, as listed below:

- 6922 (6DJ8 equivalent) (2): pre-amplification
- 6GH8 (2): output buffer

About Class A circuitry

The SuPRE uses fully Class A topology throughout. The term "Class A" refers to a particular method of utilizing active devices (tubes or transistors) in an amplifier. Class A designs are the most linear (i.e., minimum high-order harmonic distortion) because the entire swing of the signal, positive and negative, goes through a single device. By comparison, other types of amplifiers such as Class B and Class AB switch the positive and negative halves of the waveform between different drivers (in other words, one tube goes only positive, and one tube goes only negative). Class B designs are more efficient at converting energy from the power supply into audio power, but they are inherently less linear.

Since the SuPRE's main requirement is to amplify the signal as accurately as possible, Class A was chosen for the system's circuit topology. This led to the requirement for a massive high-tension power supply, with over 60 Joules of energy storage. For a device that only needs to put out several hundred milliwatts of power, this may seem high, but it guarantees that the Supre can follow the input waveform wherever it may lead.

Care and feeding of vacuum tubes

Unlike the tubes found in guitar amplifiers, the tubes in the SuPRE should not "burn out" very often in normal use. Nor will their sonic characteristics change dramatically over time. This is because the tubes are not being operated at the extremely high plate voltages and currents typical of that required for a 100-watt amplifier connected to a loudspeaker. When they do fail in normal use, it is usually a gradual process rather than a sudden stop. The gain will be noticeably lower, or the noise floor will rise.

It is also possible for tubes to experience filament failure. Vacuum tubes have small glowing heating filaments inside them similar to those in light bulbs, except their job is to make heat instead of light. When they are hot, they are more susceptible to physical stress.

√ Avoid shaking the SuPRE when power is turned on or if still hot after having been turned off. If you're going to move the SuPRE let the unit cool off for five minutes before moving it. A hot tube filament that is mechanically shocked is more likely to fail.

Tube Replacements

The tubes used in the SuPRE are specially chosen and have each been individually tested by Groove Tubes before being used in your Supre. While replacements are available from electronics supply stores, for the highest quality replacement tubes please contact Groove Tubes. This will assure you of receiving a premium-selected tube that will give you the same performance as the original.

√ There is a single Groove Tubes 6922(A.K.A. 6DJ8 or ECC88) in the first stage of each SuPRE channel. The output section uses a single Groove Tubes selected 6GH8 to drive the output transformer.

Field replacement of tubes should only be performed by qualified electronic service technicians.

The VU Meter

VU (for Volume Unit) meters are one of the oldest, and perhaps still the best, tools for displaying the level of an audio signal. The meter for the Supre was custom-built to match the characteristics of classic meters, right down to the ivory color of the background. Compared to less-expensive LED meters, the VU meter by its nature averages out the peaks to display the average value of a signal, which is closely correlated to what people perceive as loudness. A VU meter's ballistics are intentionally designed to register the average level of a newly-applied signal within 3/10ths of a second.

VU Meter Range control

This front panel trim control is furnished as a convenient aid in lining up the VU meter with the “0” level requirements of any downstream gear. It does not change the output level of the Supre, only the sensitivity of the VU meter driver amplifier.

The meter driver amplifier is connected directly to the output XLR connector of a given channel, and will show the effects of output loading on the output signal level. The heavier the load (lower the impedance), the lower the VU meter reading will be. Notice that the minimum suggested load impedance is 1200 ohms.

The Range control spans the various popular operating levels between about -10 VU (~ 0.25 V rms) up to about +4 VU (~ 3V rms). Plan on about half these values if you plan to use the -2 dBu $\frac{1}{4}$ in TRS output jack.

A typical lineup procedure is as follows:

1. Route a test tone through the SuPRE, using any suitable and convenient channel input.
2. Send the SuPRE's output signal to the downstream gear, mixer, DAW, etc.
3. Adjust the SuPRE GAIN control until the level seen by the downstream load is adjudged to be at the correct 0 dB operating level, per the receiving equipment's level indicator.
4. Now adjust the RANGE control until the VU meter zero indication and the downstream level indicator are in agreement.

Note that using the SuPRE with systems whose zero level is above +8 dBu or +4VU is not recommended.

Note that the zero levels mentioned above are not digital 0 dB Full Scale levels, which may be 14 to 31 dB higher depending on converter or DAW setup details.

Gain Controls

Proper setting of microphone gain is one of the most crucial aspects of recording. If there's not enough gain at the preamp and you try to make up for it later by adding gain at the console, you will be amplifying noise. If there's too much gain, the sudden transients common to many types of music will drive the system into distortion. The dynamic range and clarity of the entire recording are determined at this critical stage.

The SuPREs custom gain potentiometers are located directly on each channel, keeping signal paths short and cutting the typical bandwidth-robbing effects of parasitic circuit and wiring capacitance.

While most consoles have 60 dB of mic preamp gain at best, the SuPRE boasts an impressive 72 dB of available gain. This extra 12 dB of gain is particularly valuable when miking classical instruments from a distance or using lower output microphones such as ribbons.

GAIN Setting Procedures

The best method for setting the gain will vary depending on what the output of the SuPRE is connected to, but here are some general guidelines. **See page 9 for the basic gain setting procedure.**

Start low and work up

The SuPRE has a bit more gain than most mic preamps. For this reason, use caution with the GAIN control. Start with the control at its minimum setting, and increase it step by step until the level is correct as shown on the meter of the receiving device (mixer, recorder, DAW etc.).

Check the sensitivity of the receiving device

Digital recorders

Most professional digital recorders don't have input level controls. Therefore, if you're plugging the output of the SuPRE directly into them the GAIN settings are best set while watching the recorder's meter, not the SuPRE's. For example, some popular digital recorders are calibrated for 15 dB of headroom over a nominal +4 dBu input, which means the maximum signal the recorder can accept at its balanced input connector without clipping is +19 dBu, about 8 dB less than the maximum output of the SuPRE. Most other digital recording systems have similar amounts of headroom, from 12 to 18 dB.

Set the SuPRE's GAIN controls while watching the digital recorder's meter, adjusting to get the hottest level possible while never exceeding 0 dBFS (MAX), perhaps allowing several

dB of extra headroom to allow for unexpected transients. When using digital recorders with -10dBv "0" reference use the -2 dBu 1/4" TRS output jack on the SuPRE.

Mixer/signal processor

If the output of the SuPRE is feeding a mixer or other signal processor, your options are more varied. A mixer with its own input trim controls or attenuator switches may be set up in different ways depending on the effect desired.

For the best signal-to-noise ratio, or to intentionally overdrive the SuPRE for a particular effect, you will need to decrease the input sensitivity of the mixer to avoid clipping the input section of the mixer.

For maximum dynamic range, set the mixer's input trim to its lowest level, and increase the GAIN controls of the SuPRE until the mixer's channel-clip LED begins to flash on the loudest peaks. Check to see if the mixer's input meter is clipping as well; if so, you'll have to back off the GAIN. If not, you may raise the mixer's input gain to get the desired recording level, in most cases with the channel fader and output faders set to the nominal 0 dB position.

If the SuPRE's output is too loud....

In situations where the mixer or signal processor's input doesn't have enough attenuation to handle the SuPRE's output at maximum, you may try the following:

- Insert a passive attenuator between the SuPRE and the input of the device, or
- Use the lower level -2 dBu balanced 1/4" LINE OUT of the SuPRE instead of the XLR output. This output has approximately 6 dB less level.

The Output Transformer

The SuPRE is a line-level device, and its output transformer is comparable in size to those used in 2 – 5 watt single-ended designs. This overcapacity ensures that the nonlinearities that plague less-expensive transformers are diminished, while the classic sound and other benefits of transformer coupling are gained.

If the SuPRE output encounters phantom power

The transformer output is made available as a balanced floating source, so a common 48 volt phantom voltage received on each side (pin 2 and 3) will not harm the SuPRE, but may cause problems with the gear supplying the phantom power! Be careful not to plug the LINE OUT of the SuPRE into a MIC IN whose phantom power is on, or whose sensitivity is too high to handle the line level signal. The output is best plugged into a line-level input, in any case.

Mute Switch

The MUTE switch is designed to cut off all output signal from the SuPRE when you're powering up the unit, changing microphones, making connections, or drastically changing settings. The output is muted (off) when the yellow light is ON. Use MUTE to avoid potentially damaging pops and clicks in the system.

➤ Turn the MUTE ON:

- Just before the power switch is turned on or off.
- When you're plugging in a microphone
- When you're plugging in an instrument or keyboard.
- When you're switching to any different input source and aren't sure of the level

The MUTE switch is connected to a sealed mechanical relay that switches the signal on and off at the primary side of the output transformer.

Microphone & Preamp Theory

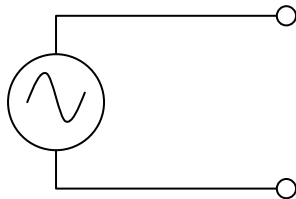
About Impedance

The importance of impedance

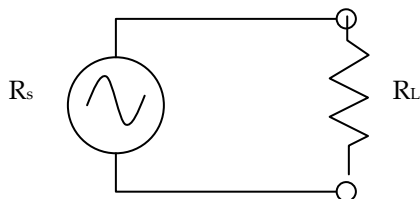
Understanding what we mean by "variable impedance preamp" is crucial to getting the most from your Supre. A quick review of some basic electronic theory, often taken for granted in today's studio, may help.

A microphone is essentially a small electrical generator trying to push voltage to its output. The input impedance of the microphone preamp is what it's pushing against. When you think of it this way, it's clear that the input impedance of a preamp can have a significant effect on the sonic characteristics of a microphone.

Let's look at three different situations between the source and its load. When sound strikes the diaphragm of a microphone, it translates that mechanical energy into electrical energy. In a dynamic microphone, a coil of fine wire is pushed back and forth in a magnetic field. Similarly, in an AC generator, several coils of wire are rotated around through magnetic fields, and the result is also a voltage potential across the output. In a schematic diagram, the symbol for a generator and its outputs is this:

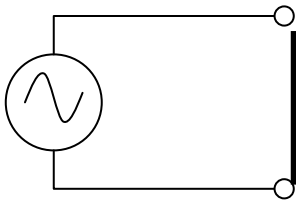


This is a source of voltage, but it is not yet a circuit. In audio terms, this "unplugged microphone" is unterminated. Note that even an unplugged dynamic microphone still generates a voltage when it "hears" audio. But since it's not in a circuit, it's not generating a current. To be useful, a voltage source must be terminated in a load, which is symbolized by the signal for a resistor like this:



where R_L is the impedance of the load in ohms. But remember those coils of wire inside the generator/microphone? They also have an impedance. This source impedance is a crucial factor in the design of the circuit. As current flows in a circle from the source to the load and back again, it expends power; some in the load, and some in the source. The symbol R_s above represents the source impedance in ohms. And if the goal is to get maximum transfer of power, R_s should equal R_L .

Consider what would happen if, instead of loading the generator/microphone with a resistor, we simply placed a straight wire across the outputs, shorting it out:



When the load impedance is zero, all the power has to be expended in the source itself. If it was a generator, this would obviously cause overheating and failure. The consequences of shorting out a microphone aren't so drastic, but between the first example of an unterminated source, and the last example of a source that's entirely shorted out, you can see the simple but crucial way the load and source interact.

In the case of the SuPRE, which is the load that the microphone or other input source "sees", a great deal of care was taken to allow for the many subtle variations between different sources, by allowing the user to set a specific load impedance that the mic will see. As explained earlier in this manual, the need for different impedances is a result of the history of the development of the audio industry, as the circuitry and capabilities of preamplifiers and consoles changed. Microphone designers usually (although not always) manufactured and tested their microphones using the circuitry of the period. Most people thought that a higher load impedance than an original design would have no effect, or even improve performance. But the slight "tilt" in frequency response when a microphone sees different impedances, coupled with other factors like distortion and small damping effects can have subtle effects that no other device in the studio can truly replicate.

About Noise

One of the primary questions people have about a mic preamp is how quiet it is. Any noise that's generated in the preamp will persist through the rest of the chain, and can't be eliminated. But when you crank up the gain of any mic preamp and hear hiss, it's usually a mistake to think that the noise is coming from the preamp. In most cases, the preamp is merely amplifying noise that's already there. And frankly, since the Supre has 10 – 20 dB more gain than other preamps you may have used, this noise will be louder when you crank

the gain up. Simply setting two competing preamps side-by-side will lead to misleading results unless you control the test very carefully. So, where does the noise come from?

Thermal Noise

Thermal noise is always present in audio circuitry. Molecules rubbing against each other in any piece of wire produce random electronic signals. In a resistor of 150 ohms at 70 degrees Fahrenheit, these random voltages are equivalent to -132.88 dBu. This, for all practical purposes, is the noise floor of the audio universe. The only way to get equipment that has no thermal noise is to freeze the circuit to absolute zero (-459° F.)...an expensive proposition.

The Equivalent Input Noise (EIN) spec of a microphone preamp is determined by plugging in a pure resistive load (or in some cases, shorting out the input), cranking up the gain to its maximum, measuring the noise voltage, and subtracting the gain. The A-weighted EIN of the Supre is -126 dBu, which is only about 6 dB above the theoretical minimum. However, even this small figure, when you amplify it by the 72 dB gain available in the Supre, becomes a signal of -54 dBu which may be audible in the control room, depending on masking by other factors.

Microphone Self-Noise

Beyond this thermal input noise, the picture changes dramatically when you plug in an actual microphone. Even the best microphones generate noise signals considerably above this theoretical thermal minimum, called self-noise. Since the microphone has to be tested in an absolutely silent space for this (with 0 dB SPL or better), the measurement is very difficult to make. Typical microphone self-noise figures are in the 9 to 22 dB range above the thermal noise floor, which means that in most cases, the microphone generates more noise than the preamp does. Those microphones with ultra low noise head amplifiers will still exhibit some noise output, caused by the thermally excited air molecules randomly hitting the mic's diaphragm.

Acoustic Noise

On top of all of this, the room the microphone is placed in is almost always noisier than either the mic or the preamp. Air conditioning fans, traffic rumbling nearby, and audience noises usually make up the true noise floor of a typical live recording. Even in recording studios, very few facilities are soundproofed well enough to have ambient sound pressure levels much below 40 dB SPL. Audio control rooms, now with computer cooling fans, hard drives and other motorized equipment, often have an ambient SPL (sound pressure level) of 50 dB or higher.

For this reason, the most effective way to improve the signal-to-noise ratio of a recording is to move the microphone closer to the source. A loud singer can generate 100 dB at 3", which in a 40 dB SPL environment gives a dynamic range of 60 dB...still notably less than the range of 16-bit digital recording, but a vast improvement over what happens if the singer is ten feet from the microphone.

Troubleshooting

Troubleshooting Index

If you experience problems while operating your SuPRE, please use the following table to locate possible causes and solutions before contacting Groove Tubes Product Support for assistance.

Symptom	Cause	Solution
No audio from outputs	No input audio	Test with a known good input.
	Bad cables	Replace the cables.
	Destination is turned down	Check the connections and the level of the mixer or amp that the Supre is connected to.
	MUTE switch or STANDBY switch is on.	Turn the switch on.
	Power is not connected	Time for a coffee break.
Buzz from outputs	Cables are crossing a power cable	Make sure that the Supre and its audio cables are kept away from power cables, other power transformers and wall warts.
	Bad cables	Replace the cable with a new, high-quality cable.

	Problem with the source	Try bypassing the Supre, by connecting the input cables to the output cables or using another preamp, and see if the problem remains.
Power LED won't go on.	Blown fuse	Correct any problem that may have caused the fuse to blow, and replace the fuse with the proper type.
Lights are low, erratic operation	Voltage set to 240 V on rear panel power module when AC is 120-volt	CONTACT GROOVE TUBES TECHNICAL SUPPORT. 800-459-5687
Fuse blows immediately on power-up	Voltage set to 120 V on rear panel where AC is 240-volt	CONTACT GROOVE TUBES TECHNICAL SUPPORT. 800-459-5687
Unit is becoming noisy, or gain is less	Tubes are wearing out (typically after several years of use)	Replace the tubes with high-quality selected pairs from Groove Tubes
AC hum	Ground loop	Use only balanced connections in the studio
		Place all equipment in the studio on a common ground (see p. 15)

Care and Maintenance

Cleaning

Disconnect the AC cord, then use a damp cloth to clean the Supre's metal and plastic surfaces. For heavy dirt, use a non-abrasive household cleaner such as Formula 409™ or Fantastik™. **DO NOT SPRAY THE CLEANER DIRECTLY ONTO THE FRONT OF THE UNIT AS IT MAY DESTROY THE LUBRICANTS USED IN THE SWITCHES AND CONTROLS!** Spray onto a cloth, then use cloth to clean the unit.

Refer All Servicing to Groove Tubes

We believe that the SuPRE is one of the best microphone preamplifiers that can be made using current technology, and should provide years of trouble-free use. However, should problems occur, **DO NOT** attempt to service the unit yourself unless you have training and experience. Service on this product should be performed only by qualified technicians. **NO USER-SERVICEABLE PARTS INSIDE.**



The unit must be totally disconnected from all sources of AC power before the unit is opened. **HAZARDOUS VOLTAGES EXIST WITHIN THE CHASSIS THAT MAY BE FATAL.** The following instructions are intended only for professionals with experience and training in servicing electronic equipment. **IF YOU DON'T KNOW WHAT YOU'RE DOING, DO NOT ATTEMPT TO REPLACE TUBES YOURSELF. HAVE THE UNIT PROFESSIONALLY SERVICED!**

How to replace the tubes

While tubes should seldom need replacement, it is possible to replace them in the field if necessary.

If you decide to open the enclosure, make sure the preamp has been turned off for about 10 minutes before removing the lid. This allows the high voltage capacitors (large black cylindrical components) inside to safely discharge before reaching inside. Place the pan-head metric lid screws in a “keeper” container.

Remove the cover, and take note of where each tube is located. Using one hand, grasp the desired tube and pull from the socket; rock with a gentle circular motion if necessary. Avoid bending the circuit board. Note that the filaments of each like pair of tube types is in series. If, for example, one of the 6922s is not installed or it's filament is burned out, the other 6922 will not light up.

Test the tubes

Test the tubes on a standard testing device, setting the parameters carefully before applying voltage. If a defective tube is found, replace it (and its pair, if applicable) with a new, military-specification replacement. Contact Groove Tubes for hand-selected and tested equivalents. Note

that the tubes inside the preamp are being run at about half of rated stress, and should give thousands of hours of service life. However, should a tube fault develop, it may be desirable to replace that type in each channel, which serves to reset the “tube-wear-clock” on each amplifier card.

Tube replacement

Make sure that the pins of the new tube are not bent if necessary. Attempting to fit a tube with bent or misaligned pins will be difficult or impossible, and may damage the socket. Avoid bending the circuit board. Be careful to install the correct tube in the target socket, since damage may result if these are mixed up.

Reassemble the unit

Carefully replace the lid and all screws after replacing the tubes in the correct sockets, after making sure nothing has fallen into the unit which could cause a short! Do not omit any lid screws since the fasteners and lid panel contribute to the dimensional stability of the enclosure. Gain control extension shafts may bind on the panel.

Obtaining Repair Service

Before contacting Groove Tubes, check over all your connections, and make sure you've read the manual.

Customers in the USA and Canada: If the problem persists, call Groove Tubes 818-361-4500 and request the Customer Service department. Make sure you have the unit's serial number with you. Talk the problem over with one of our technicians; if necessary, you will be given a return authorization (RA) number and instructions on how to return the unit. All units must be shipped prepaid and COD shipments will not be accepted.

For prompt service, indicate the RA number on the shipping label. **Units without an RA will not be accepted.** If you do not have the original packing, ship the unit in a sturdy carton, with shock-absorbing materials such as Styrofoam pellets or "bubble-pack" surrounding the unit. Shipping damage caused by inadequate packing is not covered by the Groove Tubes warranty.

Tape a note to the top of the unit describing the problem; include your name and a phone number where Groove Tubes can contact you if necessary, as well as instructions on where you want the product returned. Groove Tubes will pay for standard one-way shipping back to you on any repair covered under the terms of this warranty. Next day service is available for a surcharge. Field repairs are not authorized during the warranty period, and repair attempts by unqualified personnel may invalidate the warranty.

Service address for customers in the USA:

Groove Tubes Service Department
1543 Truman Street
San Fernando, CA 91340

Voice: 818-361-4500

Customers outside the USA and Canada:

Contact your local Groove Tubes distributor for any warranty assistance. The Groove Tubes Limited Warranty applies only to products sold to users in the USA and Canada. Customers outside of the USA and Canada are not covered by this Limited Warranty and may or may not be covered by an independent distributor warranty in the country of sale. Do not return products to the factory unless you have been given specific instructions to do so.

Internet Address: Important information and advice is available on our web site:

<http://www.groovetubes.com>

Email may be addressed to:

proaudio@groovetubes.com

Specifications

Subject to change without notice

Inputs:	MIC IN (balanced XLR, Pin 2 Hot) LINE IN (balanced 1/4") INSTRUMENT IN (front panel, unbalanced 1/4" with integral 20 dB pad).
Nominal Input Voltage: (to obtain +4 dBm out,) (with 45 dB of Gain)	MIC IN, XFMR -41 dBm MIC IN, BRIDGED, -30 dBm LINE IN -10 dBm INSTRUMENT INPUT -12 dBm INSTRUMENT INPUT (20 dB pad) +8dBm
Input impedance	
MIC IN	Switchable from 300-600-1200 Ω
LINE IN	12 k- Ω
INSTRUMENT IN	22 meg- Ω hi sensitivity, 500 k- Ω w/ 20 dB pad.

Outputs:	LINE OUT (XLR & 1/4" TRS) +4 dBm nominal LINE OUT (1/4" TRS) -10 dBV nominal
Rated Output impedance	2400 ohms LINE OUT XLR & 1/4" TRS (+4dBu referenced) 1200 ohms LINE OUT 1/4" TRS (-2 dBu referenced)
Maximum Output Level:	+27 dBu (rms volts) at XLR LINE OUT + 21 dBu (6.13 vrms volts) at balanced LINE OUT
MAX Available Gain:	72 dB MIC IN, Input impedance set to 600 Ω) 26 dB LINE IN. 19 dB INSTRUMENT IN to XLR LINE OUT 92 dB Cascaded configuration
Equivalent Input Noise (EIN):	-126 dBu (300 Ω source, "A" Weighted)
Frequency Response:	MIC / LINE input: 20-20,000Hz +/- .5 dB into 600 Ω . INSTRUMENT input:
HI PASS filter (switchable):	MIC/LINE input: -12 dB per octave below 100 Hz INSTRUMENT input: -6 dB per octave below 100 Hz
Power consumption:	60 watts Max
Fuse rating:	120 V – 1 amp slow blow 230 V - .5 amp slow blow
Size:	5.25"H x 19"W x 14.75"D (without rack kit)
Rack spaces:	3 spaces without rack reinforcing kit
Weight:	30 lbs , 13.6 kgs

All measurements done over a 20Hz-20,000Hz range with a nominal 440 Hz sine wave
Impedances are measured at 1 kHz.

Groove Tubes Limited Warranty

GROOVE TUBES CORPORATION ("GROOVE TUBES") warrants this product to be free of defects in material and workmanship for a period of one (1) year for parts and for a period of one (1) year for labor from the date of original retail purchase. This warranty is enforceable only by the original retail purchaser and cannot be transferred or assigned.

The purchaser should complete and return the enclosed warranty card within 14 days of purchase.

During the warranty period GROOVE TUBES shall, at its sole and absolute option, either repair or replace free of charge any product that proves to be defective on inspection by GROOVE TUBES or its authorized service representative. In all cases disputes concerning this warranty shall be resolved as prescribed by law.

To obtain warranty service, the purchaser must first call or write GROOVE TUBES at the address and telephone number printed below to obtain a Return Authorization Number and instructions concerning where to return the unit for service. All inquiries must be accompanied by a description of the problem. All authorized returns must be sent to GROOVE TUBES or an authorized GROOVE TUBES repair facility postage prepaid, insured and properly packaged. Proof of purchase must be presented in the form of a bill of sale, canceled check or some other positive proof that the product is within the warranty period. GROOVE TUBES reserves the right to update any unit returned for repair. GROOVE TUBES reserves the right to change or improve design of the product at any time without prior notice.

This warranty does not cover claims for damage due to abuse, neglect, alteration or attempted repair by unauthorized personnel, and is limited to failures arising during normal use that are due to defects in material or workmanship in the product.

THE ABOVE WARRANTIES ARE IN LIEU OF ANY OTHER WARRANTIES OR REPRESENTATIONS WHETHER EXPRESS OR IMPLIED OR OTHERWISE, WITH RESPECT TO THE PRODUCT, AND SPECIFICALLY EXCLUDE ANY IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY OR OTHER IMPLIED WARRANTIES. Some states do not

allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

IN NO EVENT WILL GROOVE TUBES BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL, INDIRECT OR OTHER DAMAGES RESULTING FROM THE BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, INCLUDING, AMONG OTHER THINGS, DAMAGE TO PROPERTY, DAMAGE BASED ON INCONVENIENCE OR ON LOSS OF USE OF THE PRODUCT, AND, TO THE EXTENT PERMITTED BY LAW, DAMAGES FOR PERSONAL INJURY. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

THIS CONTRACT SHALL BE GOVERNED BY THE INTERNAL LAWS OF THE STATE OF CALIFORNIA WITHOUT REFERENCE TO CONFLICTS OF LAWS. This warranty gives you specific legal rights, and you may also have other rights required by law which vary from state to state.

This warranty only applies to products sold to purchasers in the United States of America or Canada. The terms of this warranty and any obligations of Groove Tubes under this warranty shall apply only within the country of sale. Without limiting the foregoing, repairs under this warranty shall be made only by a duly authorized Groove Tubes service representative in the country of sale. For warranty information in all other countries please refer to your local distributor.

GROOVE TUBES

1543 Truman Street

San Fernando, CA91340

818-361-4500

www.groovetubes.com

PLEASE SEND IN YOUR WARRANTY CARD

for more effective service and product update notices

Groove Tubes Corporation 1543 Truman Street, San Fernando, CA91340

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