SC-1 Mic Preamp Kit

Solid State, Transformerless
DC-Servo, Balanced Mic Preamplifer

Simplicity Counts, Detail Matters.

Last Revision: July 2, 2007

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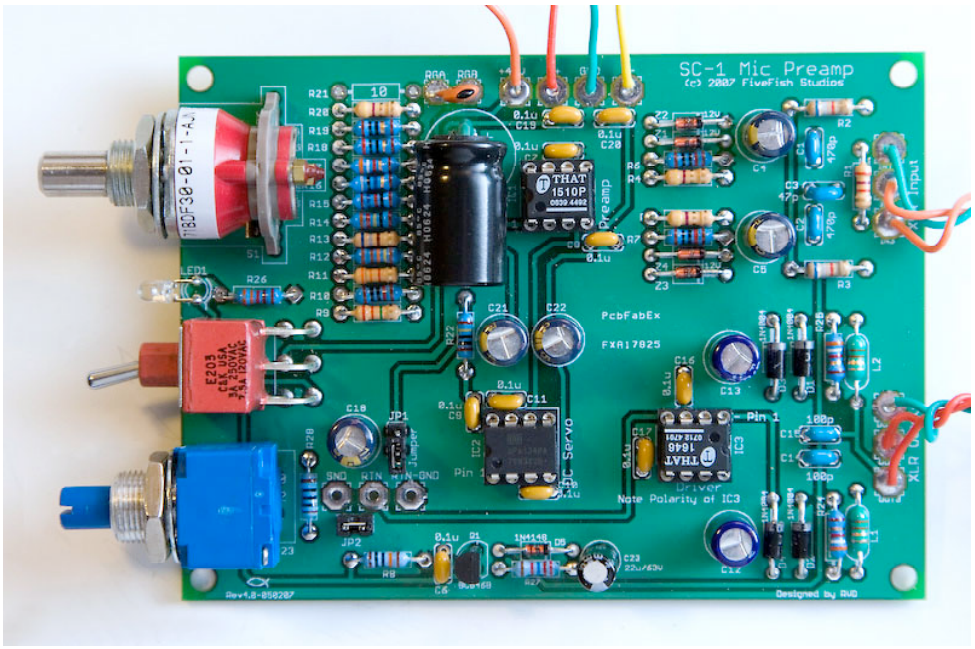
Congratulations and thank you for your purchase of the SC-1 Mic Preamp Kit.

Hundreds of hours has been spent in the design, manufacturing and packaging of this kit to deliver to you a great preamp, with features only found on some high-end boutique preamps. All at a very affordable price!

There are no special, expensive tools or techniques required to assemble this kit. All you need is the ability to follow instructions, use common sense, and the confidence in knowing that YOU can do this. **PLEASE READ THIS DOCUMENT COMPLETELY BEFORE YOU ASSEMBLE YOUR PREAMP KIT.**

I know people sometimes don't want to read manuals. But unlike software, there is NO UNDO for this project. **READ THIS DOCUMENT COMPLETELY FIRST.** Take your time, and ask questions if you are unsure of something. Work methodically and carefully. I promise you, you'll be rewarded with a great preamp when you're finished. And you'll have pride and joy when you tell others that "Yes, I built this!"



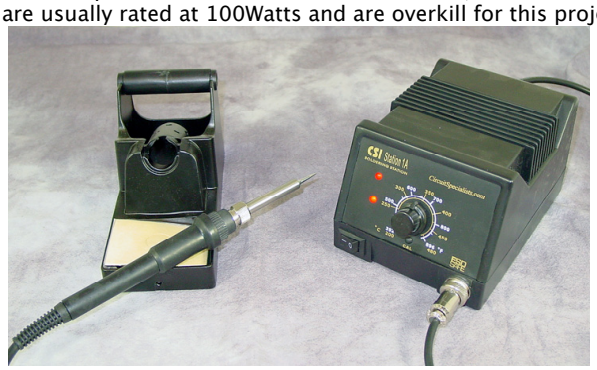
Features, Advantages and Benefits of the SC-1 Mic Preamp

- Low-Noise, transformerless, High-Quality Mic Preamp
- All solid-state design, using chipsets from THAT Corp and Burr-Brown
- Soft-start, slow ramp-on +48V phantom power
- Crystal clear Red LED indicator for phantom power
- Electronically balanced input and output stages
- 12-position Grayhill gain selector switch
- Gain range from +6 to +72dB, in 6dB increments
- Input RFI protection
- Input clamping protection
- Output surge protection circuit
- Output RFI protection
- Powered by a linear, regulated 18-0-18 Volts supply, with +48VDC for clean power delivery
- Reduced clicking and popping when changing gains
- High quality Bourns, sealed, conductive plastic potentiometer for volume control
- High quality C&K PCB Mounted switch
- Gold-plated, machined, low-profile IC sockets
- Use of high quality 1% Metal Film resistors, and high-quality ceramic and electrolytic capacitors
- Solder pads for optional INSERT jacks
- On-board jumper terminals
- Easy to assemble, easy to troubleshoot design
- Each component carefully labeled, protected and packed in separate zip bags
- Very affordable!!!

Basic Tools Required

A few basic tools are required to build this kit.

1. Soldering iron – adjustable temperature recommended, but not necessary. Your soldering iron must have a sharp conical tip. I do not recommend a "flat-head, screwdriver-type" soldering iron. DO NOT USE A SOLDERING GUN. They are usually rated at 100Watts and are overkill for this project.



2. Mini Pliers Cutter – to cut component leads, wires, strip insulation off wires (if you don't have a wire-stripper tool).
3. Mini Long Nose Pliers – to bend component leads, use as a heatsink, hold components, tighten bolts.

4. Manual Solder sucker pump – sucks up solder when you made a mistake soldering components on the PCB. Primitive operation, but it works… kind of.

5. Multitester – A simple meter/tester to measure resistance, and voltages. A digital read-out is a big help.

6. Soldering Lead – 60/40 lead or lead-free solder

7. Magnifying glass – to see what you're doing! Especially when soldering IC pins and the Grayhill selector switch.

8. Clean and well-lighted work area – Lots of good lighting, clean work area. You want to be able to leave your work-in-progress without packing everything away.

Extra Tools (Nice to have, but not required)

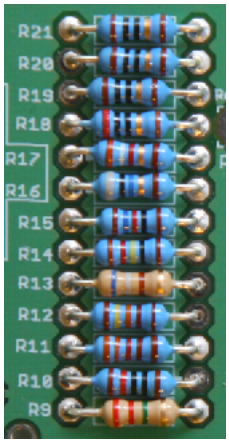
1. Vacuum desoldering pump – if you make a mistake, you need to pull out the component from the PCB
2. Component lead bender – bend component leads like resistors uniformly and evenly
3. PanaVise – to hold PCB while you're working on it
4. Tweezers – to pick tiny things
5. Masking tape – to hold components on the PCB while working
6. Wire-stripper – for cutting wires and stripping its insulation

SC-1 Parts Identification and Assembly Notes

For the newbies, this is not meant to be a full tutorial about electronics. But I want you to be able to identify components, recognize them and know what their basic functionality is.

In these section, you'd also find instructions on how to use the INSERT jacks, bypass the DC servo, and other geeky stuff. You'd also learn why I chose certain parts for this kit, even though they may be 3x more expensive than another equivalent part.

Resistors



All resistors used in the SC-1 Kit are 1/4 watt. Most of them are Metal-Film type, 1% resistors.

Resistors provide resistance, and are measured in OHMS, the unit of resistance.

1,000 OHMS = 1 KOHMS (pronounced KiloOhms, where kilo = 1,000)

If you see a resistor value marked "1K", it means 1 Kiloohm. Sometimes, you would see values written as 6K8, or 3K3.

6K8 is also the same as writing 6.8 Kohm. The decimal point position is implied by the "K" letter.

3K3 is also the same as 3.3 Kohm, or 3,300 Ohms.

I don't need to teach you how to read resistor color codes since all the SC-1 parts are already labeled for you. But if you're curious on what those bands of wonderful technicolors mean, you can go here. http://www.samengstrom.com/nxl/10116/5_band_resistor_color_code_page.en.html

Capacitors

There are many types of capacitors used in the SC-1 Mic Preamp project. Some are big, some small, some are polarized, some are non-polarized. We'll discuss the different types here.

Ceramic Capacitors

Ceramic capacitors look like the picture on the left. On the SC-1 kit, these are colored "yellow" and "blue" and are very small in size. Ceramic capacitors are non-polarized, and therefore it does not matter what orientation they go in.

They are rated in microfarads (abbreviated as "uf"). They also have a voltage rating (abbreviated as "V"). In a design, the voltage rating must not be exceeded. Otherwise, you'll ruin the capacitor. Either short it out, or blow it open.

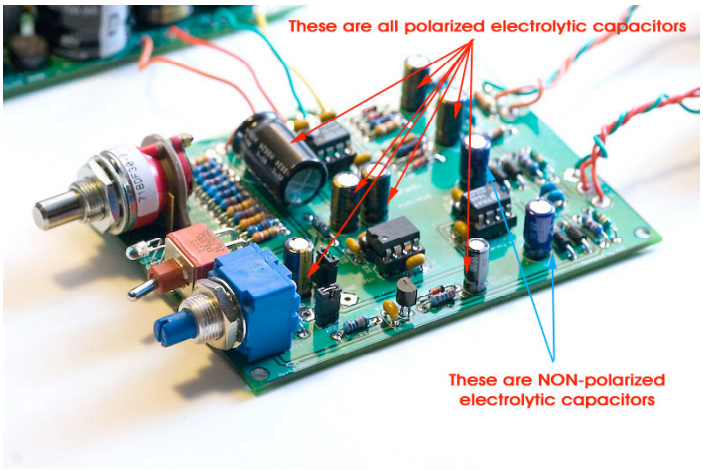
Microfarads (mF)	Nanofarads (nF)	Picofarads (pF)
0.000001	0.001	1
0.00001	0.01	10
0.0001	0.1	100
0.001	1	1000
0.01	10	10000
0.1	100	100000
1	1000	1000000
10	10000	10000000
100	100000	100000000

Capacitor parts are therefore rated with their capacitance (in microfarads, uf) and voltage... specified like this: 0.1uf 100V

Capacitance values may be expressed in microfarads (uf), nanofarad (nf) or picofarads (pf). The conversion between these units are shown on the table above.

Electrolytic Capacitors

Electrolytic capacitors are cylindrical in construction. They look like the picture on the right. Unlike ceramic capacitors, electrolytic capacitors USUALLY/MOSTLY have polarity. One side is marked with the (-) sign, also called the cathode, or negative side.



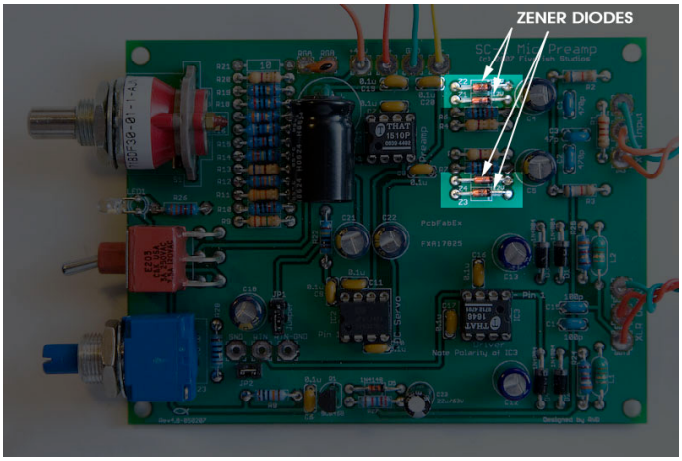
Just like ceramic capacitors, they are also measured in microfarads (uf). have a maximum voltage rating.

WARNING: It is VERY IMPORTANT not to insert them backwards, or in the wrong polarity orientation. Doing so may cause the capacitor to explode. Do not the let the small size fool you. Even a small capacitor can explode with a lot of force.

All of the electrolytic capacitors used in the SC-1 kit have polarity, except the (2) blue electrolytic capacitors, shown on the picture on the right. These (2) electrolytic capacitors, labeled C12 and C13, are non-polarized, so it does not matter how you insert them. But the rest of the capacitors in the SC-1 kit should be inserted in the proper polarity.

Diodes

Diodes are semiconductor devices that permit current flow only in one direction. Think of it as a one-way valve. One end is marked with a ring to denote the Cathode side (or negative side)... also sometimes symbolized as "K".

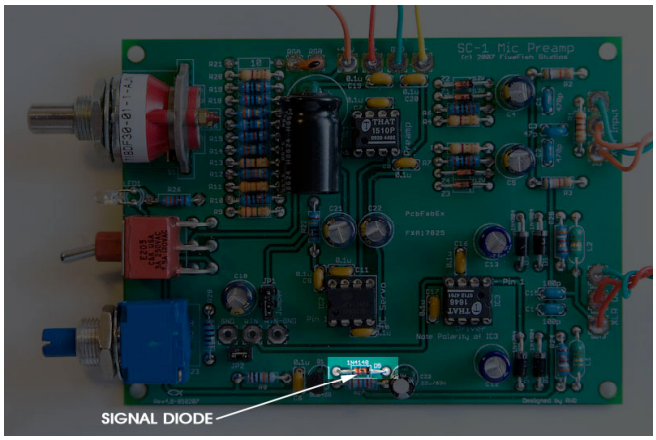


The SC-1 preamp kit uses 3 different kids of diodes.

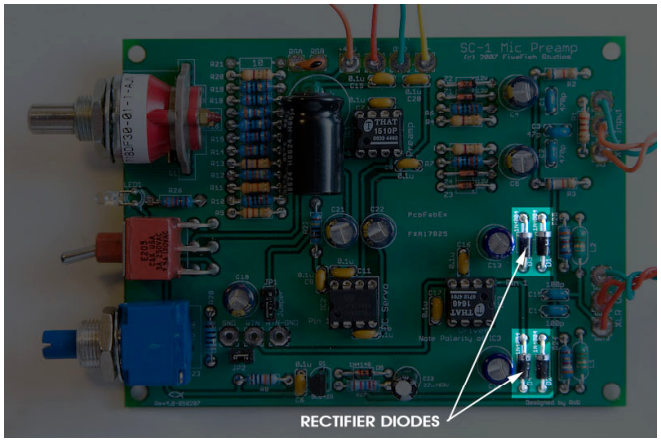
1. The first type of diode we use is the ZENER DIODE. These zener diodes are used as input protection to the mic preamp circuitry. You can find the zener diodes in the locations shown on the photo to your right.

PLEASE NOTE: Even though the SC-1 preamp uses input protection, pleae turn OFF phantom power, and wait a few seconds (5-10 seconds) before unplugging your microphone. Also, do not plug a mic while phantom power is ON. If you're using the SC-1 with TRS jacks connected to a patch bay or another gear, do not turn ON phantom power... NEVER, EVER plug a jack into a patchbay with Phantom Power turned ON. You risk of damaging any gear connected at the other end of the patch bay and may even possibly damage your preamp. In short, turn OFF phantom power before connecting/disconnecting the microphone and/or jack.

2. The second type of diode we use is the SIGNAL DIODE. They look almost exactly like the Zener diodes. Nothing to worry about, I packed the Signal Diode in a separate Zip bag for easy identification.

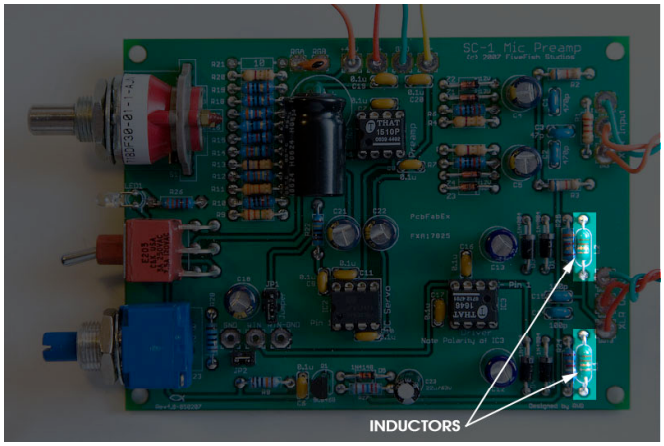


3. The third type of diode we use is the General Purpose, Rectifier Diode. They are black, with a white/silver band.



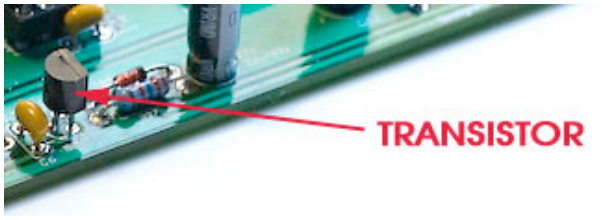
NOTE: Diodes have polarities just like electrolytic capacitors. One side is denoted as the ANODE (or positive side) and the other side is the CATHODE (or negative side). If you soldered these diodes in the wrong position, your phantom power or preamp may not work. Follow the band markings on the PCB silkscreen layout.

Inductors
The SC-1 Preamp kit also uses inductors for RFI protection at the output stage. Inductors have no polarities, and just like resistors can be inserted in either orientation. The inductors we use look like resistors, but they're not. For your convenience, they are packed in a separate zip bag and labeled.



Transistor
We're using a transistor as a switching device in the SC-1 Mic Preamp Kit. The transistor has (3) legs, the Collector, Base and Emitter terminals. Looking from the top, the transistor has a half-circle shape, like a half-moon.

Take note when inserting transistors that you do not insert them backwards. Otherwise, phantom power will not work, and possibly even ruin the transistor. The flat side should be facing to the right.



Grayhill Selector Switch

The SC-1 uses a sealed, high-performance, high-quality, 12-position, Grayhill selector switch. This is one of the most expensive items in this kit.

Some boutique preamp manufacturers also use Grayhill selector switches for their preamps. They are durable, reliable, have a nice solid feel to it, and provide good resistance to RF Interference. This switch will be the most commonly used/abused mechanical device on the SC-1 preamp. I want this part to withstand being turned and turned and turned.

DPDT Switch (Dual Pole, Dual Throw.)

The SC-1 also use a high quality, PCB mounted DPDT switch. This is another one of the expensive items in the kit. Again, since this is a mechanical device, I want it to withstand repeated use of toggling on and off.

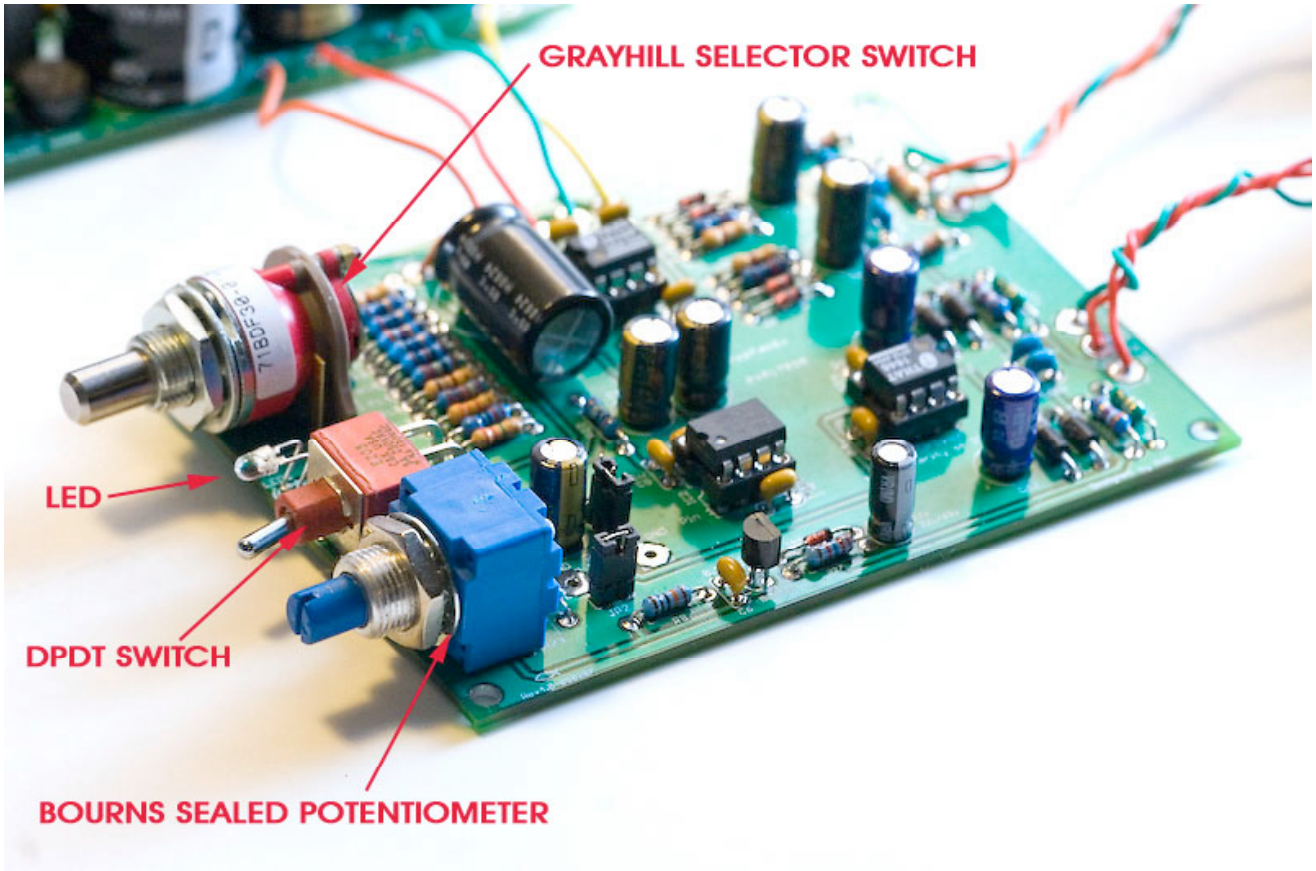
This is a special 3-position switch. (ON)-(OFF)-(OFF) You need to toggle the switch to the leftmost position (pointing to the LED) to turn on phantom power. If you mount the SC-1 PCB vertically, the switch will be turned ON pointing upwards. If you mount the SC-1 PCB horizontally, the switch will be turned ON pointing left, towards the LED.

Bourns Sealed Potentiometer

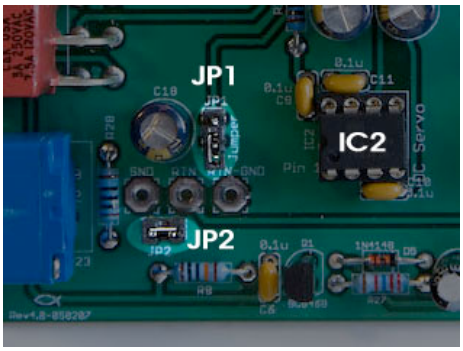
This is another high-priced item in this kit because it is another mechanical component and I want this part to withstand the use and abuse of being rotated constantly. I want it to provide a smooth feel, and not wore out easily, and become "scratchy" like a cheap, carbon potentiometer. I want it to have a longer life than plain "guitar potentiometers." This is also sealed from the elements so dirt, grime, oil, and impurities will not contaminate the resistive element and produce a "scratchy" volume control.

LED or Light Emitting Diode

The LED chosen is small in size, small in power consumption, crystal clear when OFF, but bright red when turned ON. Lower power consumption means less heat, and less current draw from the power supply. High efficiency means the LED lamp is bright even without using a lot of current. This is a little more expensive than your normal, old-style LED lamp that consumes about 20mA of power. This LED uses only 4.9mA. Just like a diode, there is a polarity orientation for it to work properly.



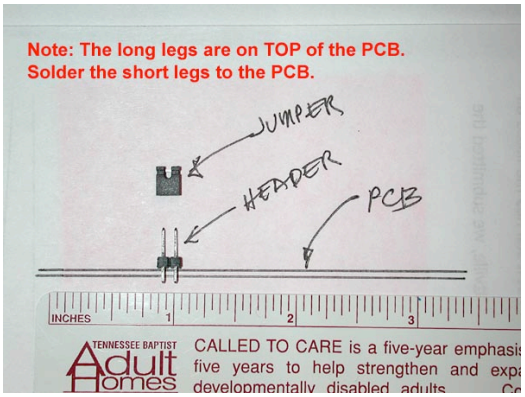
Jumper Terminals



To facilitate easy setup, jumper terminals are used in the SC-1 Mic Preamp. There are (2) jumper terminals, JP1 and JP2. In normal use, both jumper terminals must be shorted and "jumpered."

The jumper terminal nearest the electrolytic capacitor C18 is the AC coupling jumper, JP1.

By default, the SC-1 preamp uses a DC servo design. If you want to use AC coupling instead, remove the Burr Brown IC2 chip, and remove jumper JP1.

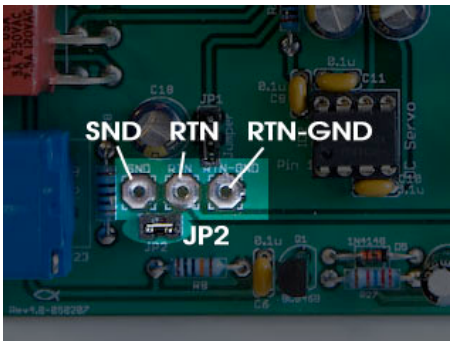


If you want to use DC servo AND AC coupling (heck, why not?), then leave IC2 plugged in, but remove JP1.

Solder the short ends of the HEADER to the PCB as shown on the photo on the right.

INSERT Solder Pads and JP2 jumper

You'll notice (3) solder pads on the PCB, behind the blue potentiometer, and near the 2 jumpers JP1 and JP2. These are the INSERT Solder Pads. They are labeled SND, RTN, and RTN-GND. (See photo on left.)



In normal operation, JP2 connects the SND solder pad to the RTN solder pad.

TROUBLESHOOTING NOTE: If you forget to put in jumper JP2, you will NOT hear any sound from your preamp. So if you're not getting any output, check that JP2 is connected and shorted with a jumper jack.

So what's the real use of the INSERT Solder Pads? I provided a TRS jack in your SC-1 preamp kit. You can wire the preamp to optionally use the INSERT Jack.

SND is the SEND signal. RTN is the RETURN signal. And RTN-GND is the GROUND signal. These 3 pads connect to a TRS jack. You must then wire the TRS jacks properly so that without any external jack plugged in, the SND and RTN makes an automatic connection. If you plug in an INSERT CABLE, the internal connection is broken and the signal is routed to the external signal processing device, and brought back to the preamp using the RTN pad.

Therefore…. If you'll be wiring the optional INSERT JACK with your SC-1 preamp, remove jumper JP2. Otherwise, leave jumper JP2 in place. See page 16.

Integrated Circuit (IC) Chips

IC1

IC1 is a THAT1510 Preamp IC. It has low noise characteristics, and an even lower noise at low gains, wider bandwidth, higher slew rate, lower distortion, and lower supply current. You can substitute a THAT1512 chip for IC1, bringing down the gain selection from +0dB to +66dB. The 1512 chip was tested and found to work. It is also pin-compatible for use with SSM2019/SSM2017/INA217/INA163. However, performance and functionality was not tested with these chipsets.

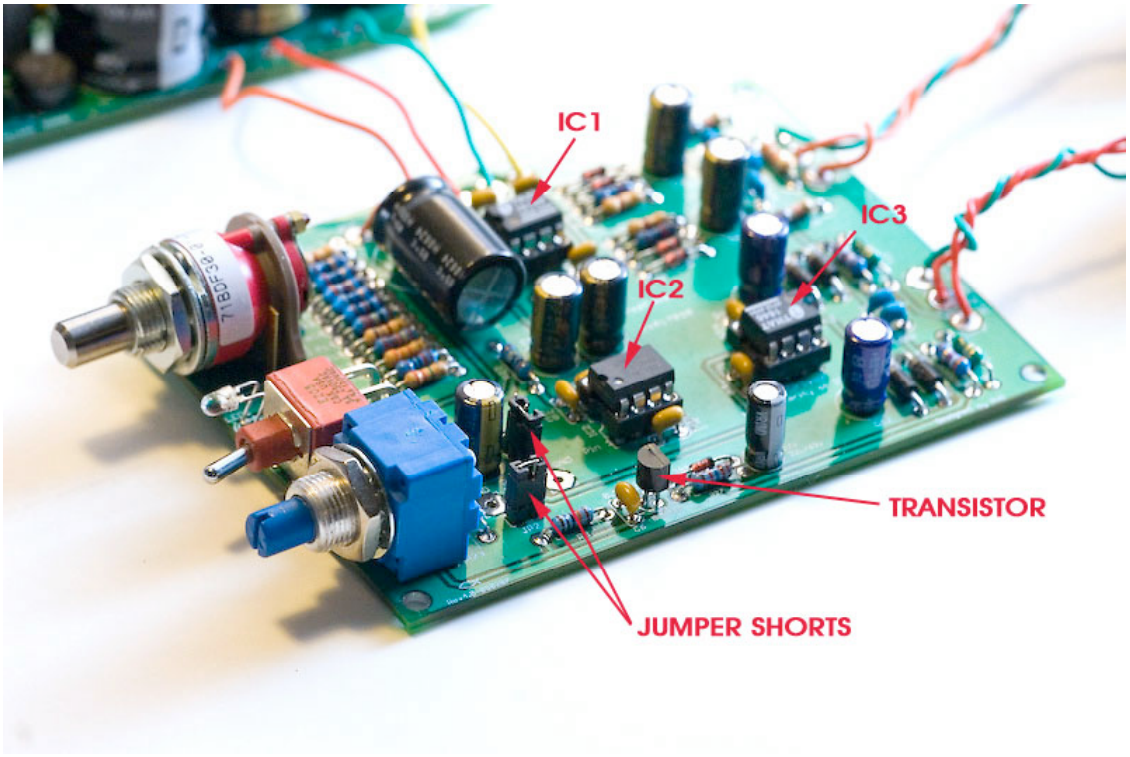
IC2

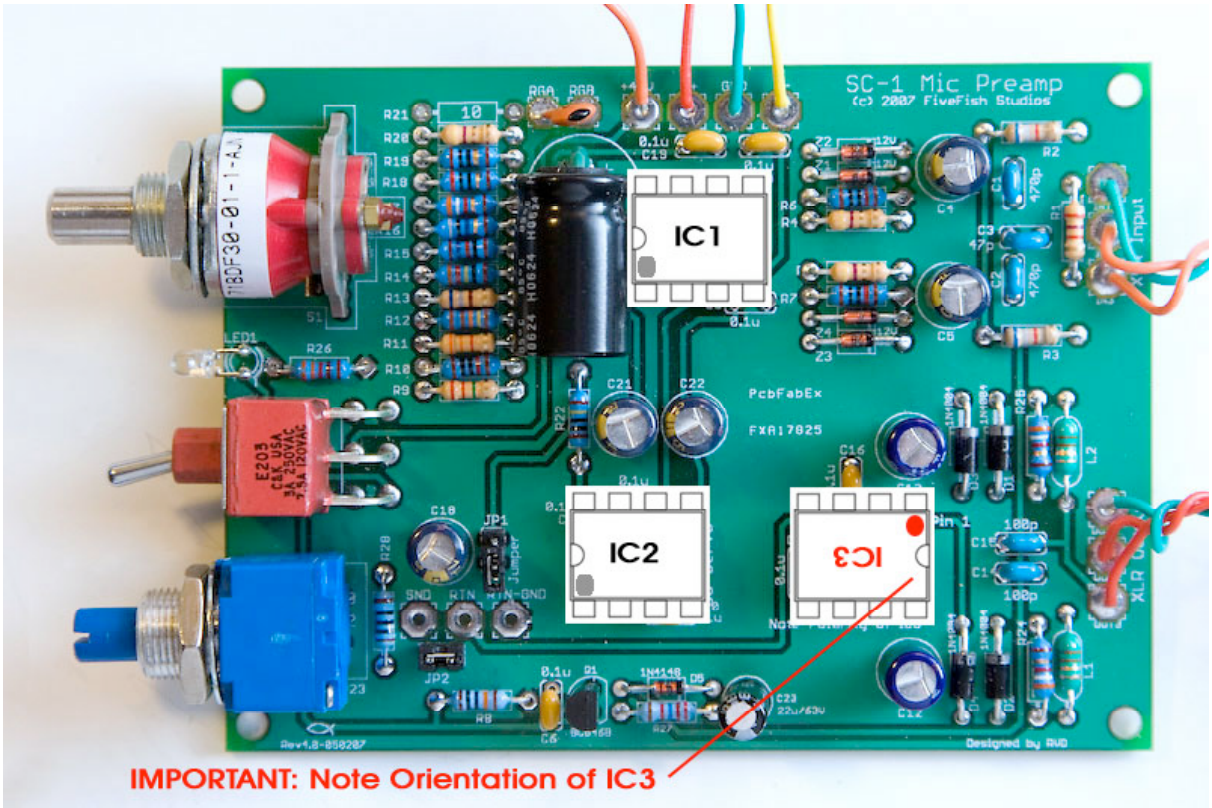
IC2 is a Burr-Brown OPA134 chip. This is another ultra-low distortion, low noise chip designed for audio applications. This FET-input chip has high output drive capability, excellent DC performance and wide output swing, capable to within +/- 1V of the power supply voltage, which allows increased headroom. IC2 is used as the DC Servo in the SC-1 Mic Preamp Design.

IC3

IC3 is a THAT1646 Balanced Line Driver output. Using OutSmarts technology, this chip is stable driving long cables and capacitive loads and is also capable of high output (18Vrms into 600 ohms according to manufacturer). Just like the Mic preamp chip, and the DC servo chip, this chip has low noise, low distortion, high slew rate and wide output swing.

Here's a photo showing the locations of IC1, IC2 and IC3. You can also see the (2) jumper shorts on the PCB, near the blue potentiometer.





IMPORTANT NOTE: This is really, really important! IC3 is mounted in a different orientation from IC1 and IC2. Please observe this precaution and avoid mounting IC3 in the wrong orientation. Otherwise, you run the risk of damaging IC3. See photo above showing the correct way of how IC1, IC2 and IC3 are mounted.

SC-1 Parts Kit

I've taken the time to individually package and label every component used in the kit. Just read the part # printed on the zip bag.

Some bags will contain 2, 3 or 5 different components. Other bags will contain just one part#. I want you to be able to build this kit, without sorting through hundreds of parts and not know what to do. This will save you a lot of time, and headaches! Some of you may not even have a multitester (buy one, okay?) so I'm assuming even if you don't have one, or don't know how to use one, you'd still be able to figure out which is the 680-ohm resistor from the 6K8 resistor. It's all labeled!

Assembly and Soldering Tips

Use a clean soldering iron tip. Heat the component lead and PCB pad, then apply the solder to the component lead while heating both with your iron. Do not apply the solder only to the iron.

Do not remove all the parts from the zip bags until you are ready to solder them. I've taken the time to sort them out; do not make a big unsorted pile out of them.

The holes on the PCB are plated through. This is also a double-sided PCB. Solder needs to make good contact inside the holes and on both sides of the PCB. Check that some solder flowed on the other side of the PCB, or that the holes are completely filled.

Be careful that you do not solder resistors in the wrong locations. For example: Resistors R9 to R21 form the gain staging resistors. It is important not to swap the locations of any of these resistors. Otherwise, your gain steps will be out of order depending on which resistors you swapped locations with each other... For Example: 6dB, 12dB, 24dB, 18dB, 30dB The resistors for the 18dB and 24dB were swapped with each other in this example.

Note the orientation of diodes, and electrolytic capacitors. There is only one correct way to mount them. There are (2) non-polarized electrolytic capacitor nearest IC3. The orientation of these (2) capacitors does not matter. But the rest of the electrolytic capacitors need to be mounted in the correct orientation. Do NOT mount electrolytic capacitors backwards.

When soldering multiple-pin devices (like IC sockets, jumper pins, Grayhill switches, DPDT, Pots) solder one leg/pin first. Then check if the device is still flushed to the board, straight and not crooked. If crooked, re-heat the leg and straighten with your fingers while the solder is still soft/melted. (DO NOT STRAIGHTEN THE PINS AFTER THE SOLDER BECOMES HARD. You'd risk ruining the PCB or breaking the part.)

I sometimes use masking tape to hold the component in place on the board, while I solder the leads on the other side. This is very useful when soldering resistors, inductors, jumper connectors, IC sockets, small parts, etc...

Use a magnifying glass when soldering. This prevents you from using too much solder and let's you see what you're doing. Also, the Grayhill switch has very fine pin spacing. You need good eyesight to solder all pins properly without shorting them together.

SC-1 Assembly Guide

The general guideline in electronics assembly is to solder the smallest/shortest component first (resistors, diodes, inductors), and solder the bigger/taller components last (ceramic capacitors, electrolytic capacitors, switches, etc).

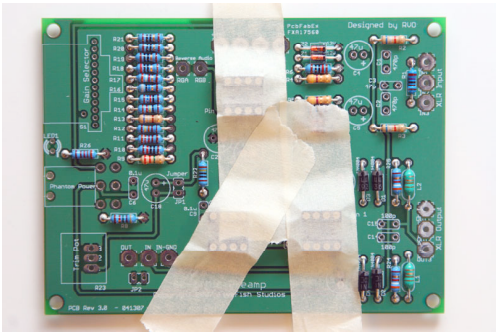
The last step is inserting the IC chips into the board. (IMPORTANT NOTE: Observe the orientation of IC3!!!)

NOTE: The photos on this Assembly guide may not match exactly the PCB you received. But the instructions are still valid.

Follow this checklist during your construction.

STEP 1. Solder all 1/4-watt resistors and inductors to the PCB. The orientation does not matter.

STEP 2. Solder the (2) inductors to the PCB. The orientation does not matter.



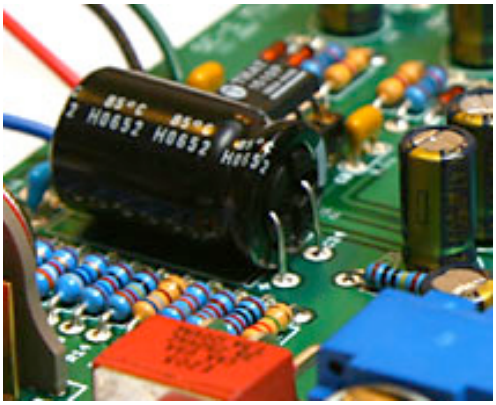
STEP 3. Solder all diodes to the PCB (except LED diode, LED1). These include Z1 to Z4, and D1 to D5. Note the orientation of the diodes. All diode bands should be pointing to the RIGHT, or pointing UPWARDS.

STEP 4: Solder all IC sockets to the PCB. Note the orientation of IC3 socket. Make sure to mount the IC3 socket in the correct orientation. (This will serve as a reminder on how IC3 chip will be inserted.) TIP: Use masking tape to hold the IC sockets in place while soldering. See photo on right.

STEP 5: Solder all ceramic capacitors to the PCB. These are the yellow and blue capacitors. The orientation does not matter.

STEP 6: Solder the two jumper connectors, JP1 and JP2. Make sure they are soldered straight up, and not crooked to the left or right. TIP: Solder one leg first. Check if it is straight. Then continue soldering the other leg.

STEP 7: Solder the Transistor. Note orientation of the transistor. The flat side should be facing to the right. You will need to bend the middle pin backwards to go through the hole.



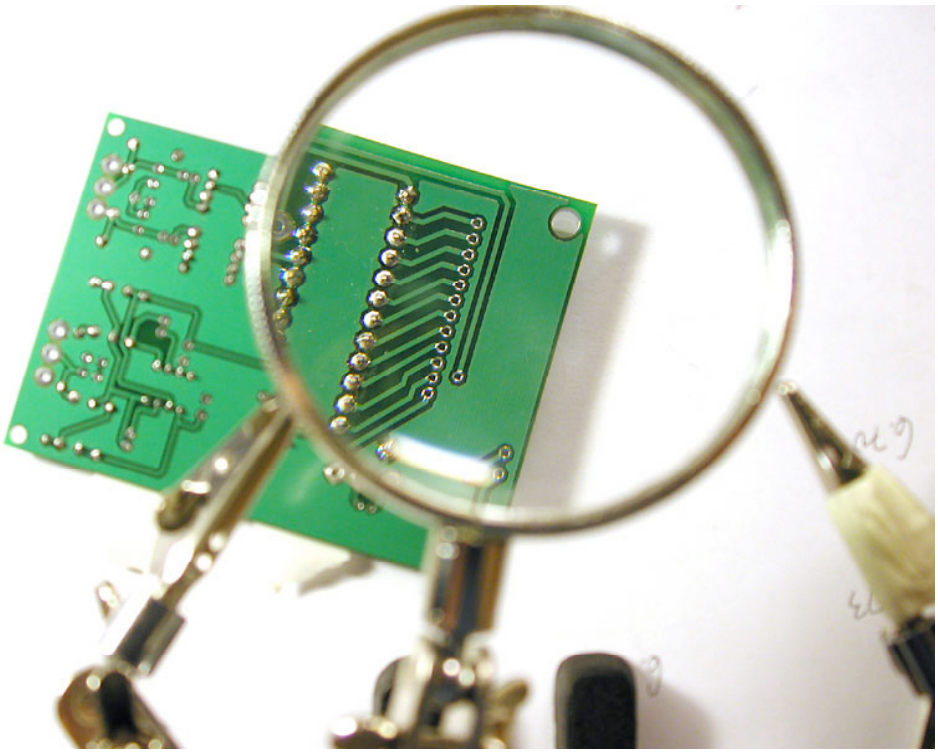
STEP 8: Solder all electrolytic capacitors. Note the orientation of where the (-) leg should be inserted. The unmarked leg of the capacitor is the (+) leg. All (+) legs are positioned either to the right, or up. Capacitors C12 and C13 are non-polarized so their orientation does not matter.

Capacitor C24 should be soldered on it's side. Bend the leads 90-degrees as shown in the photo below.

STEP 9: Solder the DPDT switch. This switch has 6 legs. You may need to adjust the legs and move them slightly left and right for them to insert properly into the PCB. All (6) legs must be properly aligned for the switch to go into the PCB. Solder one leg first; check that the switch is still flushed to the PCB. If everything is flushed, solder the remaining legs.

STEP 10: Solder the Bourns potentiometer. Make sure the component is flushed to the board. Solder the middle leg first, check alignment, and then solder the other 2 legs.

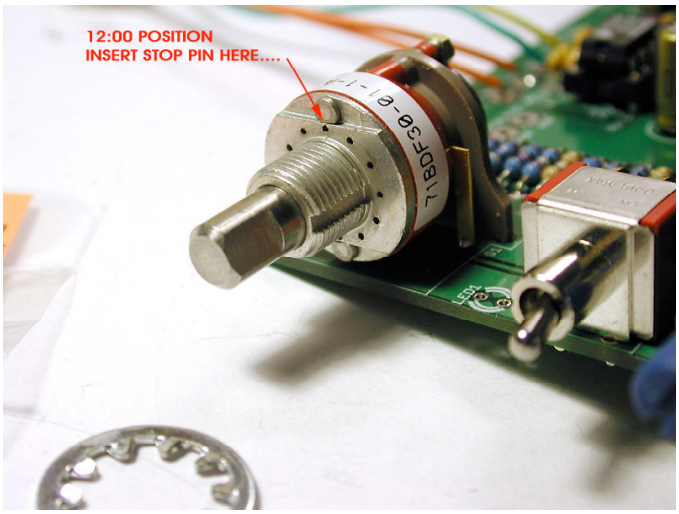
STEP 11: Solder the Grayhill selector switch. You really need a magnifying glass to make this work easy and accurate. The pins are very close together and you don't want to short these pins… otherwise, your gain dB steps will be all wrong.

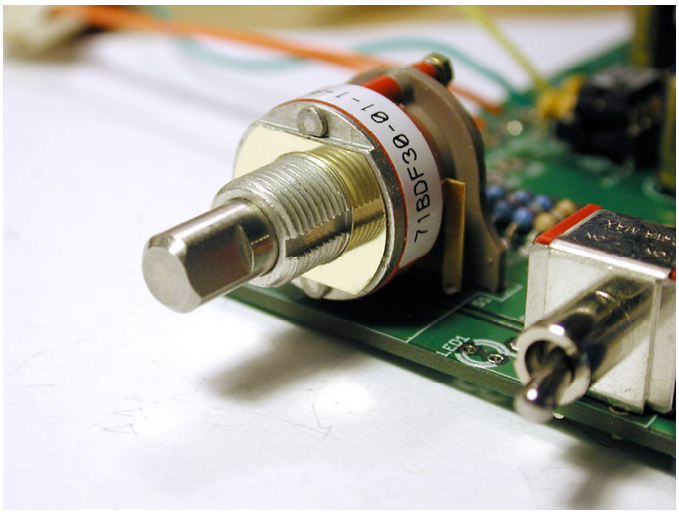


Solder one of the end pins of the Grayhill switch, and then check if the switch is still flushed to the board, straight and not crooked. . If crooked, re-heat the pin and straighten the Grayhill switch while the solder is melted. (DO NOT STRAIGHTEN THE COMPONENT AFTER THE SOLDER BECOMES HARD. You'd risk ruining the PCB or breaking the part.)

If the part is flushed and straight (look at it from all angles), then solder another pin located on the opposite side. Check if the device is still flushed and straight. If it is, then solder the remaining pins.

INSTALLING THE STOP PINS:
The Grayhill switch will come with a metal stop pin rod, and a sticker to keep this rod in place. Use tweezers to hold this pin rod and push it inside the 12:00 position hole as shown in the photo below. Then put the sticker over it. The pins may not go all the way in, that's fine. Re-attach the washer and the nut and tighten the nut by hand. This will push the pin side and the sticker will keep it in place.





STEP 12: Solder the LED to the PCB. Observe proper orientation of the LED. Otherwise, the LED lamp will not light up.

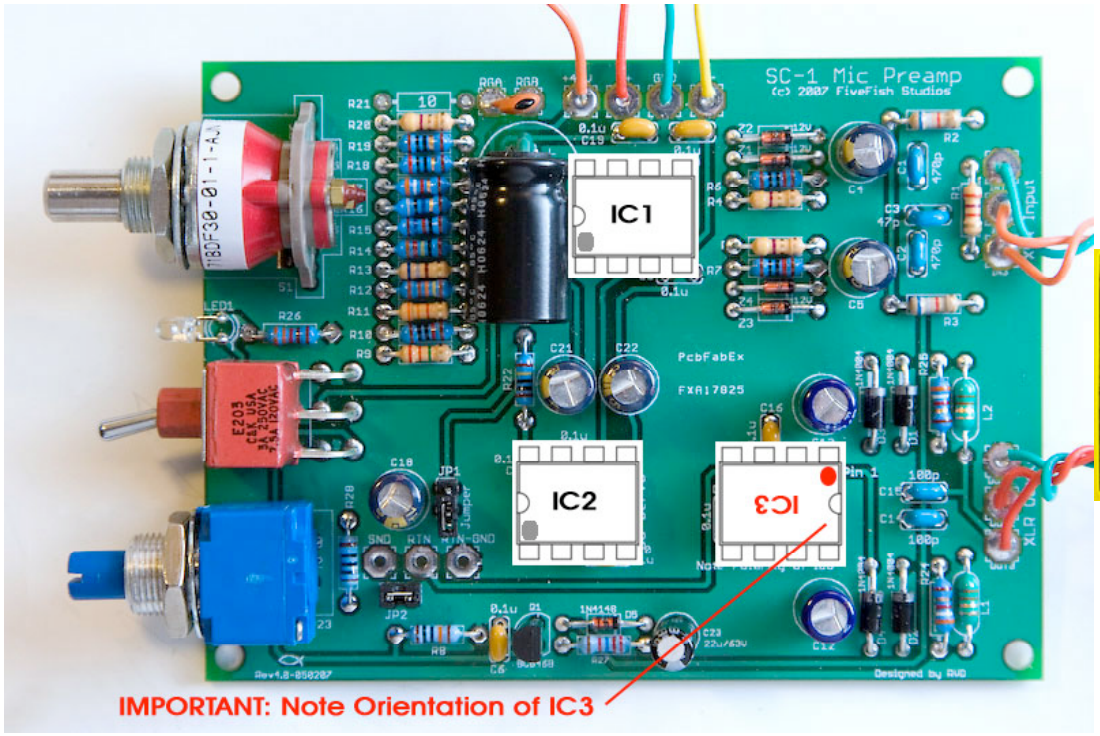
One leg of the LED will be longer than the other leg.

The LONGER leg of the LED is soldered nearest the Grayhill selector switch (i.e. long leg = top position)

You need to bend the LED leads to form a right angle as shown by the photo on the right. Set the height of the LED so it is aligned with the DPDT switch. Again, solder one leg of the LED and see if the height is correct before completely soldering the other leg.

STEP 13: Insert the IC chips, IC1, IC2 and IC3. Note the proper orientation of IC3!!!! Be careful inserting the chips, and make sure all pins go in the IC socket holes.

ANTI-STATIC WARNING: Ground yourself before handling the chips. Touch a metal gear to discharge any static electricity on your body. Avoid touching the metal pins of the IC chip. If you have a wrist groundstrap, use it.



STEP 14: Solder wires to the +48V, +18V, GND, and -18V pads. Connect the wires to your power supply (or PSU-1848 If you also bought the PSU kit).

STEP 15: Solder XLR Jacks to the PCB using hookup wires. Solder pads 1, 2 and 3 to XLR Pins 1, 2 and 3 respectively. Do the same procedure for both the input XLR and output XLR jacks.

FINISH:
And we're done! There are no "setup or adjustment" procedures. Connect a microphone, apply power, set the gain switch, adjust volume and you should hear sound come out of your preamp. If using a condenser mic, turn phantom power switch to ON position. Check to see if the LED lights up. Wait a few seconds, and your microphone should start working.

SC-1 Troubleshooting Guide

Well, hopefully you won't need this part.

"Measure twice, cut once"… as they say. Take your time assembling the kit, don't be in a hurry, work carefully and methodically and you won't need this troubleshooting guide. I've built 6 prototype preamps in the course of testing and designing the SC-1 and each one of my prototype worked on the 1st try.

So I'll try to imagine where are the "critical" areas where somebody might make a mistake.

Problem: No sound. No thump, no noise, no nothing.
Check if there is power. Check all wires of the power supply. Check that you have JP2 jumper in place. Check that IC3 is in the correct orientation. Check that volume pot is not at minimum setting.

Problem: No phantom power. My condenser mic does not work.
Check if there is 48V power. Check that the transistor is mounted correctly. Did you turn on the phantom power switch? It should be clicked fully to the left (i.e. pointing to the LED.

Problem: My condenser mic works when I switch on phantom power, but the LED is off.
Your LED is backwards. Re-orient the other way.

Problem: Sound is very faint. And very noisy. Distorted sound.
Check that all power supply wires (18-0-18) are connected to it's power source. Check that you have both +18 and -18 voltages. The THAT1510 chip is probably damaged. Replace IC1 with another THAT1510 chip and test again.

Problem: My FET condenser mic works, but the sound is very faint. I only hear the sound at the higher gains.
Check that you're feeding the SC-1 preamp with +48V. Some condenser mics will work with voltages as low as 14Volts or 18Volts. But some mics need a higher voltage than that. Measure the voltage between XLR pin2 and XLR pin1. You should be getting close to 48Volts if phantom power is switched on.

Problem: My gain settings are out of order. It will get loud, very loud, then soft, then loud.
Check there are no shorts in the Grayhill selector pins. Check that the resistors nearest the Grayhill selector are the proper values and that you did not "swap" any 2 of them.

Problem: I turn on phantom power but I don't hear a thump and it takes a few seconds before I can hear sound.
This is normal. This is due to the soft-start phantom power. It takes anywhere from 15 seconds to 30 seconds to stabilize and reach full power. I'm not applying the full 48V at full blast to your expensive mics. Rather, I feed phantom power to the mic gradually and raise the voltage gradually. It also protects your speakers from the thumping sound, and your expensive mics.

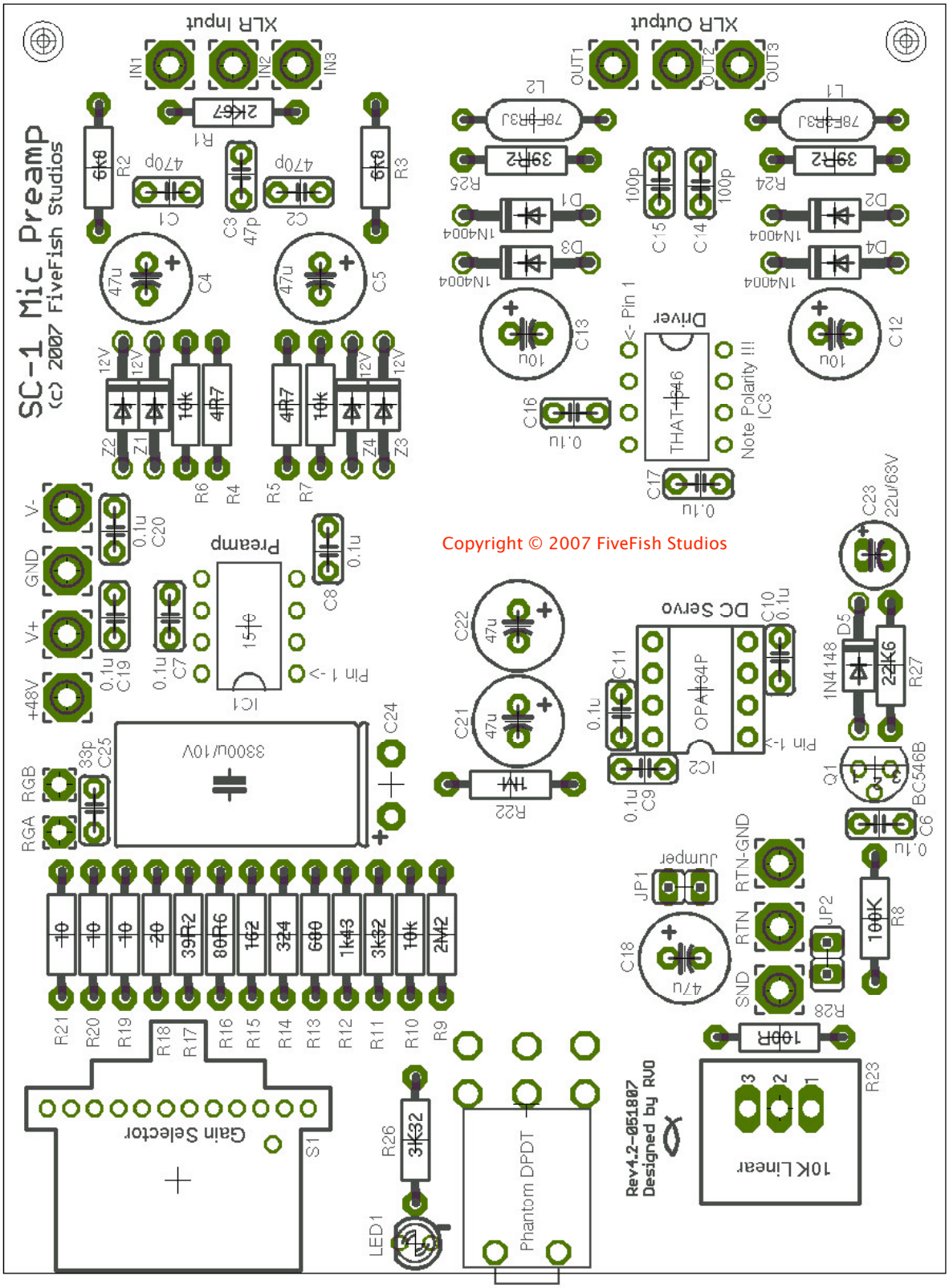
Problem: I racked the preamp, but I'm hearing hum.
Did you use a good power supply? Are you using the PSU-1848 power supply kit? Or are you using your own power supply? IS your power supply well regulated and hum-free? Did you follow good wiring practices… keeping low level mic signals away from the AC/high voltage lines? Is your rack grounded?

Problem: I don't have any mic connected, but I'm hearing hissing noise at +66dB and +72dB gain.
First, let's talk in real numbers instead of decibels (dB). A gain of 66dB is 2000x amplification. A gain of 72dB is 4000x amplification. Without any mic connected to the preamp, you're leaving the inputs unterminated. In normal use, the preamp should see a 150-ohm load at the inputs, and there will be less noise/hiss. At these high gain settings, and without any mic or load connected, what you're hearing is called "Johnson noise." You're basically hearing the random movement of electrons in the circuit. The hotter the temperature, the more the electrons are agitated, and the higher the hissing noise you'll hear. See this article in wikipedia. http://en.wikipedia.org/wiki/Thermal_noise. I've attempted to reduce this Johnson or thermal noise phenomena by using metal film instead of carbon resistors as much as possible. Another method of reducing this type of noise is cryonic freezing. Wear a warm jacket.

Problem: I want to record in stereo, but I only have (1) SC-1 preamp.
Buy another kit ☺

Problem: What do I need to power the SC-1 preamp?
You need an 18-0-18 power supply, with +48V for use by the phantom power. I recommend a regulated power supply. Using a cheap power supply, or unregulated power supply will cause hum problems. Add to the mix the high gain capability of the SC-1 and you can be amplifying problem hum by 100x, 500x, 1000x, 2000x or 4000x time. Then you have a bigger hum problem. You can purchase my PSU-1848 kit. Contact us.

SC-1 PCB Component Layout Guide

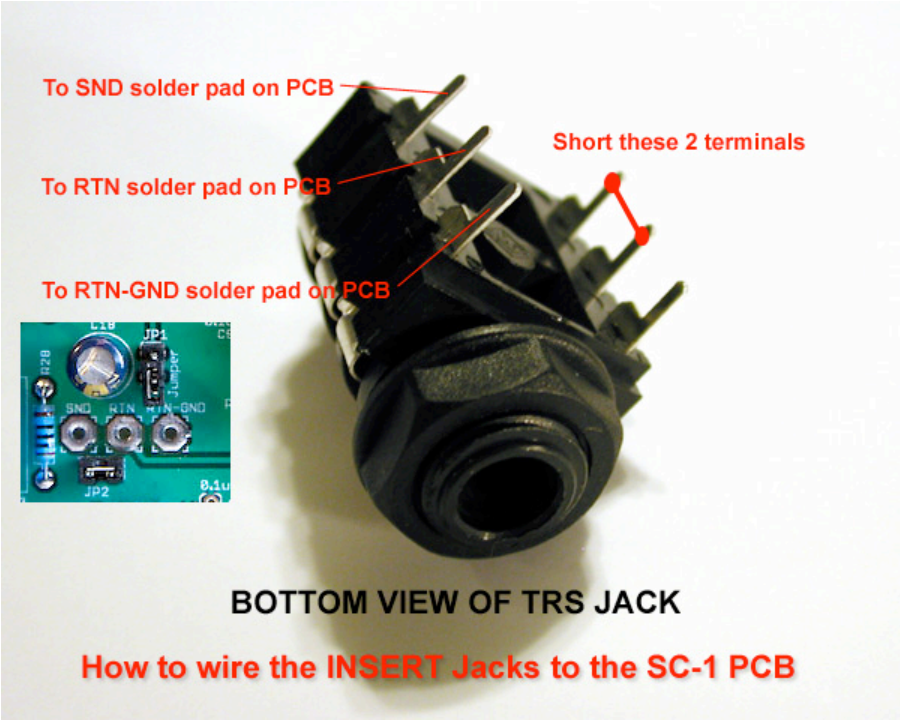


SC-1 Preamp Bill of Materials

Part#	Qty	Value	Notes/Remark
PCB	1	SC-1 Custom PCB	
C1,C2	2	470pf/50V	
C3	1	47pf/50V	
C4,C5,C18,C21,C22	5	47uf / 50V	
C6,C7,C8,C9,C10,C11,C16,C17,C19,C20	10	0.1uf / 100V	
C12, C13	2	10uf / 50V NON-POLAR	
C14, C15	2	100pf / 50V	
C23	1	22uf / 63V	
C24	1	3300uf / 10V	
C25	1	33pf / 50V	
LED1	1	LIGHT EMITTING DIODE	
Z1,Z2,Z3,Z4	4	12V ZENER, DO-41, 1.0W	
D1,D2,D3,D4	4	1N4004	
D5	1	1N4148	
IC1	1	THAT 1510	
IC2	1	OPA134P	
IC3	1	THAT 1646	
L1, L2	2	3.3uH Inductor	
Q1	1	BC546B NPN transistor	
R1	1	2K67	All resistors are 1/4Watt, most are
R2,R3	2	6K8	Metal film, 1% tolerance
R4, R5	2	4R7	
R6,R7,R10	3	10K	
R8	1	100K	
R9	1	2M2	
R11	1	3K32	
R12	1	1K43	
R13	1	680R	
R14	1	324R	
R15	1	162R	
R16	1	80R6	
R17, R24, R25	3	39R2	
R18	1	20R	
R19,R20,R21	3	10R	
R22	1	1M	
R26	1	3K3	
R23	1	10K POT, LINEAR TAPER	
R27	1	22K6	
R28	1	100R	
TRS Insert Jack	1	TRS 1/4" jack	
IC Sockets	3	8-pin IC socket .300 GOLD	
SW1	1	GRAYHILL 1-DECK, 12-POS SWITCH	
SW2	1	RIGHT ANGLE TOGGLE SWITCH, PCB MOUNTED	
JP1, JP2	2	Conn Header 2Pos 0.100 vert	
ST1, ST2	2	Conn Jumper Shorting Tin	

How to use the included TRS jack to function as an INSERT jack

This diagram explains how to wire the included TRS jack in the kit to function as an INSERT jack.



Do not forget to short the two terminals on the jacks. This connects the SND connection to the RTN connection completing the circuit if there is no TRS jack inserted.

If you insert a TRS jack, then signal flows from the SND (TIP) to the outboard gear, then back to the RTN (RING), then back to the SC-1 preamp.

RTN-GND is the "ground" connection.

Don't FORGET!!!: If you're using the INSERT jacks, don't forget to remove JP2 shorting jumper.

Construction Notes:

If you're using the INSERT jacks, please keep a couple of things in mind.

1. The Send signal is "unbalanced." Therefore, it is recommended that this cable be kept as short as possible.
2. The Return signal is also "unbalanced." Therefore, it is recommended that this cable be kept as short as possible.

The signal from the preamp will now be traveling a farther distance if you're using INSERT jacks compared to the shorter distance if JP2 is shorting the SND and RTN pads. Not only will the signal be traveling a farther distance, it will also be an "unbalanced" configuration... that means, the possibility that noise get in the system/cables/wires is big, and this noise will be returned back to the preamp for further amplification by the balanced output driver. (See block diagram of SC-1).

If you don't need the INSERT feature, you can safely just leave the TRS jack out and just use only the JP2 jumper.