

# SUSTAINIAC® STEALTH PRO TROUBLESHOOTING PROCEDURE

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### **I. NO GUITAR OUTPUT SIGNAL (no pickup signals at all)**

Even if there is no battery installed, there should be an output signal if the wires are connected properly. Even with no battery power, the *bridge pickup signal will always be present regardless of the pickup switch position*. Also, the volume control and tone control (master or bridge pickup control) should work. If not, it is likely that a wiring mistake has been made.

Check the following things, using visual inspection. If in doubt, use an ohmmeter that is set to low ohms setting. First, discharge your body of static electricity by touching a ground connection on the guitar (pot body, etc.).

1. Set volume control to *maximum volume*. (Info about volume control wiring and operation shown in the APPENDIX document.)
2. Check to make sure that the **tip** terminal of the output jack is connected directly to the volume control middle (wiper) terminal. Resistance reading from tip to wiper terminal should read zero ohms (direct wire connection). It is best to insert a mono plug into the jack, and check ohmmeter reading through the plug. If you don't know what the tip terminal is, refer to the output jack info in the APPENDIX document.
3. Ohmmeter reading between output jack tip and ground will reveal whether the pot is wired up correctly.
  - Pot turned to zero volume, full counterclockwise, (CCW) rotation: Should be zero ohms
  - Pot turned to full volume, full clockwise, (CW) rotation: Select BRIDGE PICKUP, should be slightly less than your bridge pickup resistance, somewhere between 4K and 20K ohms.  
If it reads zero ohms, a short to ground is present. Or, the pot might be wired backwards, or it might not be set to *max. volume*. Also, the Switchcraft stereo output jack has large wire terminals. Sometimes these terminals can touch the jack cavity walls. If the jack cavity is coated with a conductive shield coating, the tip or ring terminal of the jack can touch the wall, and short the output signal to ground. Bend the terminals so that they do not touch the cavity walls, or enlarge the cavity if necessary. You might have to scrape off some of the shield coating.
4. The top of the volume control (opposite end from the ground connection) should connect to the orange wire of the 8-pin connector.
5. The top of the volume control should also be connected to the "C" terminal of the pickup selector switch section that has the bridge pickup connected to it. See the CONTROLS APPENDIX pdf file for much info on the various pickup selector types, if necessary.

6. The bridge pickup HOT wire should be connected to the position #1 terminal of the pickup selector switch.
7. The white wire (8-pin connector) should be connected to the same terminal as the bridge pickup.

Review the information about *pickup selector switches* in the CONTROLS APPENDIX pdf document if you are not sure about steps (5), (6), (7) above.

## **II. NO NECK PICKUP SIGNAL**

1. Make sure that the battery voltage is above 7.5 volts. The neck pickup is the first thing to stop functioning when the battery dies. The sustainer will still function for a while at this “near-death” voltage of the battery. At 7.5 volts, the battery is dying fast and won’t last much longer.
2. *In the following steps, we work back from the electronic switch to the neck pickup preamp input.* You can read about the electronic switch and also about pickup switches in the CONTROLS APPENDIX PDF document. You can find this at the bottom of the INSTALLATION page. Connect the guitar output to an amplifier, set to a moderate level that you can easily hear. Turn up the guitar volume control to maximum volume. Discharge your body of static electricity by touching the metal shell of the guitar plug, or by touching a pot body.
3. Sustainer should be turned OFF. With the pickup selector in the NECK PICKUP position, touch the orange wire (8-pin connector) with a screwdriver blade. Hold the metal blade in your hand. You should hear a strong “buzz” as you touch the orange wire. This orange wire is (or should be) connected directly to the “top” of the volume control. If you don’t hear the buzz, there is a wiring problem.
4. Make sure that the blue wire (8-pin) is connected to the “C” terminal of the neck pickup section of the selector switch. (On Superswitch hookups, it should also connect to the “C” terminal of the middle pickup section of the switch.) Touch this blue wire (8-pin connector). You should hear a similar loud “buzz”. If no buzz is heard, the problem could be a wrong connection made here. Or, it might be a bad electronic switch on the Sustainiac circuit board (repairable by Maniac Music). The blue wire is connected to the orange wire when the sustainer is OFF by the internal electronic switch on the Stealth PRO circuit board. Sometimes, this switch gets “blown” by static discharge from the body during installation. Even a slight body charge can damage this switch.
5. The orange wire (10-pin) is the neck pickup preamp input. Make sure that this orange wire (10-pin) gets connected to the driver black wire through the ON/OFF switch when the sustainer is OFF. You should hear a buzz (not so loud as in steps 3,4) if you touch the orange wire (10-pin). If no buzz is heard, then the neck preamp input is not receiving its signal.
6. The blue wire (10-pin) is the neck pickup preamp output. Make sure that this blue wire (10-pin) is connected to the neck pickup terminal of the pickup selector switch. With the selector switch in the neck pickup position, you should hear a loud buzz when you touch the blue wire (10-pin).
7. Inspect the pickup selector switch to make sure that when the selector switch is in the neck pickup position that this blue wire (10-pin) is selected to the C terminal of the neck/middle pickup pole of the selector switch.
8. Verify by measurement that this “C” terminal does indeed connect to the blue (10pin) in the neck pickup position of the switch, and also to the middle pickup terminal of the switch in the middle pickup position of the switch.

### III. ELECTRONIC SWITCH FUNCTION

See more details about this in the CONTROLS APPENDIX PDF file. (Bottom of the INSTALLATION page) The orange wire (8-pin connector) connects to the top of the volume control on most guitars. The electronic switch inside of the Sustainiac Stealth PRO circuit board connects this orange wire to the blue wire (8-pin) when the sustainer is OFF. This orange wire connects to the white wire when the sustainer is ON. The white wire connects directly to the bridge pickup output wire. Therefore, when the sustainer is turned ON, only the bridge pickup functions.

The blue wire (8-pin) goes to the “C” terminal of the NECK/MIDDLE pickup pole on the pickup selector switch (or to both the middle and neck pickup poles on a 4-pole “Superswitch”). The white wire goes to the bridge pickup pole on the pickup selector switch.

Therefore, if the pickup switch has been wired properly, you can select all pickups when the sustainer is OFF. Only the bridge pickup is selected when the sustainer is ON.

The way to verify this is to tap on one of the polepieces of each pickup with a screwdriver blade. This test allows you to easily verify that all pickups are functioning properly in each pickup selector position.

When the battery is removed, the orange wire (10-pin) connects to *both* the white and blue wires (10-pin). Therefore, the bridge pickup is *always on* when the battery is disconnected.

### IV. NO SUSTAIN

1. Verify that you are getting +9 volts from ground to the red wire on the 10-pin connector at all times.
2. The main problem we see is that not all of the pot bodies have been connected together electrically, or that the pot bodies are not connected to *guitar ground* (string bridge and output jack shield terminal).

Use an ohmmeter to measure and verify the following ground connections:

- a) All pickup ground wires and shields
  - b) Output jack ground terminal
  - c) Black wire from the 10-pin terminal AND the battery (-) wire must be connected to the SAME PHYSICAL POINT on a pot body. Otherwise, grunge may result due to amplifier output currents).
  - d) Black wire from the 10-pin terminal and black wire from the 8-pin terminal must eventually be connected together (even though not necessary to connect them to the same point).
  - e) Tremolo spring or bridge ground wire
3. Verify that the Sustainiac green wire gets connected to ground when a mono plug is inserted into the jack, *and that it gets disconnected from ground* when the plug is removed. Many people reverse the tip/ring terminals of the jack.

You can determine whether the green wire is getting grounded/ungrounded using an ohmmeter: When performing this test, measure between ground and the green wire AT THE CIRCUIT BOARD CONNECTOR. First pull the connector away from the circuit board. Insert a #24 or #22 tinned wire into the connector (or use a resistor lead), and attach

one ohmmeter clip to this wire. Our hookup wires are #24. Attach the other ohmmeter lead to ground. Insert a mono plug. You should read zero ohms. When the green wire is connected to ground, the Sustainiac is placed in Standby condition. The neck pickup preamp now functions. This draws about 3 milliamperes from the 9-volt battery.

4. When the sustainer is turned ON, the following things are supposed to happen:
  - a) The ON/OFF switch is a two-section (two-pole) switch. The two sections are independent of each other, but both are simultaneously actuated by the push-pull action of the knob, or the toggle handle if a toggle is used. The sustainer is actually turned ON by connecting the yellow wire to ground through one pole (section) of the ON/OFF switch. This starts up the Sustainiac amplifier. *Verify that the yellow does get connected to ground.*
  - b) The other pole of the ON/OFF switch connects the driver shielded black wire to the Sustainiac amplifier output (brown wire). The connection to the output amplifier goes first through the 22uF Mix mode capacitor on the Harmonic Mode switch, or through the switch contacts that short out the 22uF when Mix mode is turned OFF. Verify these switch connection functions. (For non-standard polarity bridge pickups, like EMG and some Dimarzio, reverse the black/red driver wires.)
  - c) The other side of the driver (red) connects to the gray wire (10-pin). The driver resistance is only about 2 ohms. So, unless your ohmmeter can accurately measure very low resistance (many can't), you might think that the driver is a "short circuit"!

5. One problem we encounter from time-to-time with Strats/Ibanez (or any guitar having a crowded electronics cavity) is that the circuit board gets "squeezed" when the pickguard is mounted to the cavity. This can cause one of the control pots (whose bodies are connected to ground) pushes hard enough on some point on the circuit board as to cause a component lead of one of the circuit board components to puncture the insulation that covers the board, and short that component to ground.

## V. SQUEALING

There are several things that can cause "squealing". Squealing is an uncontrolled oscillation. If it occurs, it usually happens in Harmonic Mode, not in Normal or Mix modes. The oscillation is usually caused by either *magnetic crosstalk* from the driver to the bridge pickup, or by *electronic crosstalk* from the Sustainiac circuit board or Sustainiac output wires to one or more guitar signal wires. If it is caused by wires, you can usually isolate the offending wire (or wires) by moving them, or touching them, and noticing a change in the squealing characteristic. A distorted guitar signal when the sustainer is on can also be caused by one or both of these things.

1. ***Magnetic crosstalk***: The Sustainiac driver must radiate a pulsating magnetic field in order to cause sustained string vibration. However, if the bridge pickup receives this pulsating magnetic field, squealing can occur. The Sustainiac driver is designed so that the North and South magnetic fields that are radiated actually cancel each other out at the bridge pickup. Certain things can defeat this cancellation:

- (a) The neck pickup cavity (driver) is routed on a slant, i.e., it is not perpendicular to the strings. Such guitars are not suitable for an electromagnet sustainer.
- (b) The neck pickup cavity (driver) is too close to the bridge pickup. There must be at least 3 inches (center-to-center) between driver and bridge pickup. 3.5 inches is better.
- (c) Metal parts (non-magnetic metal, such as aluminum, copper, etc.) located near the pickups. Typical offenders are metal pickup trim rings, or pickguards with aluminum or

copper shielding on the bottom. Metallized guitar bodies are another problem. A 9-volt battery that is positioned near the bridge pickup or driver can also cause such a problem. (d) The Sustainiac can tolerate some slant of the bridge pickup. A Fender Stratocaster actually works quite well with the Stealth PRO, despite the slanted bridge pickup. You do have to remove the foil from the pickguard around the pickups, but not from the electronics cavity. A Telecaster, however, has too much slant, and Harmonic mode tends to be sluggish.

(e) Magnetic adjustment tab: When we send out a kit for Stratocasters, we always include a small magnetic adjustment tab. This tab attaches to the driver, and is positioned to the position where squeal goes away, and guitar signal distortion (“grunge”) goes away. The tab actually compensates for the bridge pickup slant, and restores magnetic balance to the system. Occasionally, a guitar with non-slanted bridge pickup might need one of these tabs. But, this is rare.

2. You can also reduce squeal by turning down the Sustainiac gain trimpot on the circuit board (next to the 8-pin connector). However, reducing sustainer gain below about 11 o’clock rotation will make the sustainer performance weak. You should be able to turn the gain trimpot up to 1 o’clock or even higher. If you can’t, then one of the problems in (1) above likely exist. You can restore gain to the sustain system by raising both the Sustainiac driver and also the bridge pickup, so that they are about 1/16 inch from the little e-string. Don’t raise them any closer than 1/8 inch from the big E-string, however, or the strings can “fight” you, making it very hard to control the instrument.

3. *Electronic crosstalk* between the Sustainiac circuit and guitar signal wires, or between Sustainiac output signal wires and guitar signal wires. See next section on “**GRUNGE**” in the guitar signal for more on this. If it is caused by wires, you can usually isolate the offending wire (or wires) by moving them, or touching them, and noticing a change in the squealing characteristic.

4. Squealing can occur if you use a very short guitar cord, such as a wireless system. In this case, it might not happen with a 20 ft. cord, but when you switch to a 10 ft. or a wireless (very short cord), it might start squealing. The only solution here is to back off the gain a little until it stops. But then, if you go back to a long cord, you might have to turn up the gain again to get it to perform in a strong manner in harmonic mode.

4. Another type of instability is "string fighting". This particularly happens in harmonic mode. The big strings want to take off too much, and even if you do hand muting, they can still take off. It is really hard to control the guitar when this happens. (The problem is rarely the small strings.) The solution here is simple. Lower both the driver and the bridge pickup under the big strings. And while you're at it, make the driver and bridge pickup as close as you can to the small strings. This will make them more responsive.

To summarize, you want the bridge pickup and driver to be lowered AWAY from the big strings, and raised CLOSE to the small strings. This makes for more even response of the sustainer.

## **VI. DISTORTION/"GRUNGE" IN THE GUITAR OUTPUT SIGNAL**

The most common cause for grunge in the output signal is "electronic crosstalk" between wires or between the Sustainiac circuit board and guitar signal wires. This can also cause unstable sustainer operation, or squealing. The installation must be wired as follows:

1. All guitar signal wires should be cut short, unless they are shielded.
2. If it is caused by wires, you can usually isolate the offending wire (or wires) by moving them, or touching them, and noticing a change in the distortion characteristic.
3. The best way to do this is to face the Sustainiac circuit board so that the 8-pin connector faces, or is close to, the pickup selector. THIS IS ULTRA-IMPORTANT.
4. The guitar output wire should be shielded. Or, routed away from the Sustainiac board.
5. Keep all guitar signal wires away from the Sustainiac circuit board.
6. Especially, keep the white and orange wires short (8-pin connector). (White is the bridge pickup signal, orange is the output signal.) Keep these away from the circuit board.
7. Be sure that the guitar tone control capacitor and wire is not close to the Sustainiac circuit board. If the wire must run next to the board, then use a shielded wire.
8. Make sure that the shield wire of the Sustainiac driver is connected to ground.
9. Keep the violet/gray HARMONIC MODE wires (8-pin) away from the orange/white, and away from all other guitar signal wires.
10. Keep the brown/gray SUSTAINER OUTPUT wires (10-pin connector) away from the orange/white, and away from all other guitar signal wires.
11. In some cases the middle pickup wire can cause squealing if it is unshielded, and passes over the bridge pickup. In this case, squealing can happen with the sustainer OFF, and either the middle or neck pickup selected.

## **VII. NO MIX MODE:**

The 22uF capacitor terminals are shorted together or a solder splash is shorting them. Or, the switch could be bad.

## **VIII. NO FUNDAMENTAL MODE (IS ALWAYS IN MIX MODE INSTEAD)**

The switch might be bad. The Mix mode capacitor must be shorted out by the switch in order for Fundamental mode to work.

## **IX. NO FUNDAMENTAL MODE (ALWAYS HARMONIC MODE)**

1. The Violet/gray wires (8-pin) are shorted together. Could be a solder splash, or a bad switch.
2. You have a bridge pickup with "reverse polarity" from normal. Reverse the RED/BLACK driver wires. This should correct the problem.