

S C I E N C E

A M P L I F I C A T I O N

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U S E R M A N U A L V . 1

Intro

Thank you for purchasing the Science Street Sweeper guitar amplifier! This manual goes over the different features of the amplifier, maintenance, tube, and warranty information as well as some general tube amp info.

Front Panel

Input jack: 1/4" for your guitar cable.

Brilliance switch: A 3-way rotary switch which adds upper frequencies and clarity to darker sounding guitars when turned clock-wise. Effect is less noticeable as the gain control is turned up.

Gain: Adjusts overall gain of the amplifier. The more the control is turned up, the more overdrive will be produced.

Treble: Adds treble frequencies when turned clock-wise.

Middle: Adds mid range frequencies turned clock-wise.

Bass: Adds bass frequencies when turned clock-wise.

Reverb Section

The Street Sweeper features two independent 2-control reverb sections that can be switched between or bypassed via the 2-button footswitch. With no footswitch plugged in, Reverb II becomes the default reverb section, while Reverb I remains inactive. (*Note: Both reverbs are voiced identically, so no functionality is lost*). To mute the the reverb entirely with no footswitch, simply turn the Reverb II's "Level" control all the way counter-clockwise.

With the footswitch plugged in, both reverbs become active. The "ON/OFF" button turns on or off both Reverb I and II, while the "Reverb Select" button switches between Reverb I and II.

Tip: The "Reverb Select" button can be switched while in "OFF" mode, allowing the user to switch back to either Reverb I or II from the OFF/bypassed mode.

Level I: Adjusts the overall amount of reverberation for Reverb I.

Color I: Adjust the tonal characteristics of Reverb I. When turned clock-wise the tone of the

reverberation will become brighter with a longer 'tail'.

Level II: Adjusts the overall amount of reverberation for Reverb II.

Color II: Adjusts the tonal characteristics of Reverb II. When turned clock-wise the tone of the reverberation will become brighter with a longer 'tail'.

Loudness: Adjusts the overall volume of the amplifier.

On/Off switch: Turns the amplifier on and off.

Standby/Play switch: With the amplifier ON, the Standby mode mutes the sound allows the tubes to heat up before applying high voltage in Play mode. Leave in this mode for 30 seconds to a 1 minute before switching into Play mode. Standby can also be used to mute the amplifier while leaving the tubes warm during short breaks. For long breaks it is best to turn the amplifier completely off.

To turn off the amplifier, follow the same turn-on procedure in reverse – allowing the amp to idle in Standby mode for about 30 seconds before powering off. While it is perfectly okay to turn the amp off immediately, idling in standby before powering off lets the filter capacitors inside the amp fully discharge. If turned off immediately, there will still be some sound as the filter caps continue to discharge.

Rear Panel

120 VAC power input: Plug in the included standard IEC power cord here. For use with 120 VAC (USA) only unless otherwise specified.

WARNING!: Use with grounded power outlet only! Discard power cord immediately if ground pin is damaged/broken. The ground connection is for your safety in case of a fault!

Footswitch jack: Plug-in included 2-button footswitch here.

Speaker Jacks and Impedance Selector

*Note: Speakers must be rated for at **least** the full rated clean output power of the amplifier (100W). Under overdrive conditions, the clean power can be exceeded by tens of watts, therefore it is preferable to use speakers whose combine power rating exceeds the clean power rating. This topic is up for debate as some speaker manufacturers rate their speakers conservatively with this knowledge of amplifier*

power ratings in mind (i.e. four 25W rated speakers may be OK for a 100W amp).

Using one speaker cabinet: With the amp OFF, match the impedance selector with the speaker cabinet's impedance. Always verify a speaker cabinets impedance before using with the amplifier. An impedance mismatch can potentially damage the amplifier.

Using two speaker cabinets: When using with two speaker cabinets, both must be the same impedance (i.e. two 8 ohm cabs), and the impedance selector should be set for half each cab's impedance. For example:

- When using two 8 ohm cabs: Set the impedance selector should be set to 4 ohms.
- When using two 16 ohm cabs: Set the impedance selector should be set to 8 ohms.
- Using two 4 ohms cabs: This configuration is not supported because there is not 2 ohm tap on the Street Sweeper's output transformer.

Footswitch

The right button switches between Reverb I and Reverb II, while the left button switches between both reverbs on and off. When no footswitch is plugged-in, the amp defaults to Reverb II (*Note: both reverbs are identical, so no functionality is lost by disabling Reverb I*).

Tip: Even when the Reverb is off, you can still silently pre-select Reverb I or Reverb II for the next time you want to use reverb.

Bias adjustments

Left bias adjustment: Controls the bias of the two left-most output tubes, V1 and V2 (See tube chart on pg. 12). The setting is locked in place by the outer locking nut. To make an adjustment, slightly loosen the outer locking nut.

Right bias adjustment: Controls the bias of the two right-most output tubes, V3 and V4 (See tube chart on pg. 12). The setting is locked in place by the outer locking nut. To make an adjustment, slightly loosen the outer locking nut.

Note: The 4 output tubes work in pairs; the left bias control adjust the bias voltage for V1 and V2, while the right control adjusts the bias voltage for V3 and V4. While the output tubes can only be adjusted in pairs, a test jack is provided for each individual tube to provide more accurate bias monitoring (e.g. trying to find a faulty tube).

Test jacks: For use with standard multimeter probes.

Black common probe jack: Plug in common meter probe here.

From left to right:

V1 red probe jack : Plug in probe to monitor V1 (See Tube Chart on pg. 12) output tube bias voltage.

V2 red probe jack: Plug in probe to monitor V2 (See Tube Chart on pg. 12) output tube bias voltage.

V3 red probe jack: Plug in probe to monitor V3 (See Tube Chart on pg. 12) output tube bias voltage.

V4 red probe jack: Plug in probe to monitor V4 (See Tube Chart on pg. 12) output tube bias voltage.

Bias procedure

WARNING! Maladjustment of the bias controls can lead to output tube failure. The bias adjustments are not fool-proof, and output tubes can be under-biased because a reasonable bias range needs to be given to account for different output tube samples. If under-biased for a sustained period output tubes will likely fail. Science Amplification is not responsible for output tube failure due to mal-adjustment of bias controls.

Please familiarize yourself with the bias procedure before making bias adjustments. If you at all feel uncomfortable making adjustments, take the amp to a qualified technician. We do, however, encourage you to bias yourself because it is completely safe. It is also easy once you get the hang of it, and can save you quite a bit of cash!

Note: A electronic volt meter (digital preferred) with a millivolt setting is needed to make bias readings/adjustments. A digital multimeter can be found cheaply at any hardware store. Here's the cheapest we've found on the web, which is totally sufficient for the job:

<http://www.harborfreight.com/7-function-digital-multimeter-90899.html>

With a speaker cabinet plugged in, turn on the amp, let it warm up for about 30 seconds, then take off Standby into Play mode (The volume can be all the way down for the test). Let the amp run for a minute or two.

Next, set the multimeter to DC millivolts (mV).

Insert the black test probe into the black jack on the rear panel, and the red probe into any of the red jacks.

Note: The 4 output tubes work in pairs; the left bias control adjust the bias voltage for V1 and V2, while the right control adjusts the bias voltage for V3 and V4. While the output tubes can only be adjusted in pairs, a test jack is provided for each individual tube to provide more accurate bias monitoring (e.g. trying to find a faulty tube).

For the correct bias range you should read between:

- 32mV to 39 mV per tube when using **EL34s**
- 39mV to 46mV per tube when using **6L6s**
- or 46mV to 53mV per tube when using **KT88s**

Anything lower settings will not harm the tubes, but anything higher than:

- 43mV and up per tube for **EL34s**
- 52mV and up for **6L6s**
- 61 mV and up for **KT88s**

will lead to shortened output tube life or imminent failure.

Remove the red probe, and insert it into the other jack to check the reading. Ideally it should be the same as the first reading, but a couple millivolts difference is negligible

Here are some situations where you may need to check the bias:

- The amp sounds thin, or abnormal in any way.
- The amp is quieter than normal.
- The amp hums more than normal.
- The bias controls are accidentally maladjusted.

If a reading is below the safe range by more than 10-15mV, then it's likely a tube has failed on that side and needs to be replaced. This will also cause the other side to be higher than normal.

Conversely, if a bias reading is unusually high and climbing erratically despite adjustment, a tube's bias may be 'running away'. This happens typically in aged tube, and is when the bias slowly climbs until the plate of the tube (largest grey metal structure inside the tube) begins to glow and orange/red, and over-dissipates it's safe power rating. If you notice this condition before the tube completely fails, remove the tube and replace that pair.

The output tube pairs will also age unequally (much like car tires), so some may adjustment may be needed through out the tubes' life to keep them in balance. Although it's not necessary to keep the pairs balanced, it will keep the amp putting out maximum output with the least amount of hum.

If adjustment is necessary, first loosen the outer lock-nuts on the bias adjustments. Make move the control with a flat-head screwdriver (a guitar pick works well too), while monitoring the number on the multimeter. You may have to adjust both controls back and forth until they are balanced because they are somewhat interactive.

Tube life and troubleshooting

Output tubes (V1, V2, V3, and V4 – See tube chart on pg. 12) generally produce a good strong sound for 6 months to a year when played regularly, then they may become dull sounding, and/or the amplifier may begin to loose some power. Output tubes may last much longer depending on how hard the amp is played. Sometimes they die gently, sometimes abruptly causing a fuse to blow, which in turn protects the amplifier from further damage. Output tubes may also become microphonic like preamp tubes.

It's sometimes possible to see which power tube(s) is damaged. If necessary, remove the output tubes to inspect them (Remove power cord, allow tubes to cool, then grab by the plastic base, and gently pulling up in a circular motion). Here are things to look for:

- Shiny silver area on top of tube turns white.
- Burned spot on the large gray structure inside the tube.

Sometimes a output tube or preamp tube will become “microphonic” when something becomes physically loose inside the tube's glass envelope. In turn, this noise then gets amplified through the speaker. The noise can be anything from static, a high-pitched ringing, or intermittent sputtering noises. This is usually exacerbated by vibration from the speaker cabinet. If you think a tube may be microphonic, try isolating the amplifier from the speaker cabinet.

Tip: If you think you have a microphonic tube, you can very gently tap on each tube with a pencil's eraser to see if the sound becomes worse or changes. All tubes will amplify the sound a little, especially preamp tubes. But for example, if you hear an intermittent ringing sound and tap each tube to find V8 is causing the ringing to start and stop, you can be sure it's the problematic tube!

In general, preamp (V6, V8), phase inverter (V5), and reverb driver (V7) tubes (see tube chart on pg. 12) can last many years, and usually become microphonic before wearing out or failing.

Changing preamp tubes

V5, V6, and V7, V8 (see tube chart on pg. 12)

To remove tubes, gently pull upward using a very slight circular motion if necessary. When re-inserting a preamp tube, mind the pin/socket orientation as they are “keyed” to insure proper installation.

Changing output tubes

V1, V2, V3, and V4 (see tube chart on pg. 12)

CAUTION!: Tubes can become extremely hot during normal operation. Make sure the amplifier is OFF, and always allow tubes to cool before handling to prevent burns.

In general, it's best to change all 4 output tubes at once (V1, V2, V3, and V4 – See tube chart on pg. 12), and preferable to buy a "matched quad" from a reputable dealer. However, because of the dual-bias system, it is possible to replace only one pair of output tubes with a "matched pair," then balancing the bias level with the old pair.

Tip: Buy “burned-in” tubes when possible for maximum stability and minimal bias drift.

To change tubes, remove the old tubes and set both bias controls all the way down (counter-clockwise). Insert the new tubes minding the “key” on the bottom of the tube, and slowly bring up both bias controls until they are equal and in the safe bias range.

If tubes are not pre-“burned-in,” check the bias after playing to see if it has drifted from the initial setting. Full burn-in may take up to 24 hours depending on the tube set. This is why burned in tubes are preferred.

Different tube types and bias ranges

The Street Sweeper can use either EL34, 6L6 tubes, or KT88 output tubes (however not mixed together). Below are the correct bias ranges for all tube types:

For the correct bias range you should read between:

- 32mV to 39 mV per tube when using **EL34s**
- 39mV to 46mV per tube when using **6L6s**
- or 46mV to 53mV per tube when using **KT88s**

Anything lower settings will not harm the tubes, but anything higher than:

- 43mV and up per tube for **EL34s**
- 52mV and up for **6L6s**
- 61 mV and up for **KT88s**

will lead to shortened output tube life or imminent failure.

Lower settings may have less bass, but will extend tube life, Higher settings may sound 'better', but tube life will decrease slightly.

It is also possible to imbalance the tube pairs to increase odd-order harmonics. Experimentation is harmless as long as either pair does not exceed the max bias range.

Fuses

WARNING: Only check/change fuses with amplifier unplugged from the wall socket!

Fuses are user-replaceable, and if a fuse needs replacement, always replace with the correct "T" type and rating. The "T" stands for "Time delay" also known as "Slow Blow." Also be sure to use the correct amperage rating (Ex. 1A = 1 Amp). These fuses are the 3AG type and are commonly available. The correct fuse values are located on the back panel of the amplifier.

If a fuse blows, it's a good thing! Fuses are put in place for safety and to protect the most expensive parts of the amplifier. Fuses can blow for various reasons, however the most common is a output tube failure. To check if a fuse is blown, push and twist counter-clockwise to remove the fuse holder and see if the small wire inside the glass is broken. There may also be a burnt area the inside of the glass.

If you replace a fuse, and it blows again, there is likely a more serious problem. Please contact us before changing the fuse again at info@scienceamps.com so we can further assist you with the trouble-shooting.

Safety

- Always use a 3-prong cable into a grounded outlet. This makes sure the amplifier is always grounded and safe in the rare occurrence the chassis should become "live" (electrified).

- Tubes become very hot during normal operation. Allow them to cool before handling to prevent burns.
- Never change tubes with the amplifier ON.
- Always make sure the amp's vents are open, allowing heat to escape and air to flow freely.
- Keep the amp away from moisture, and never put any beverages on top of the amplifier, no matter how convenient it may seem!
- Only change fuses with the amp unplugged from the wall!
- There are potentially lethal voltages present inside the amplifier. Do not open the amplifier chassis unless authorized and are a qualified technician.

Limited Lifetime Warranty

Science Amplifiers are warranted to be free from defects in workmanship for the lifetime of the original owner. Electronic components such as capacitors, resistors, transformers, jacks, and potentiometers are warranted for 5 years (not including tubes, see below). Any part determined defective by Science Amplification within the 5 year period shall be repaired or replaced by Science Amplification without charge for parts and labor provided the unit is returned and transportation costs prepaid. Science Amplification will pay return shipping costs to the original owner. Any unauthorized repair, modification, or tampering voids this warranty.

The warranty excludes:

- Normal wear and tear: worn out tubes, jacks, cosmetic damage, etc.
- Misuse and abuse: operating the amp without a speaker connected (although the amp has some built-in protection against this), operating the amp into the wrong speaker load, improper tube installation, using the wrong value fuses, maladjustment of bias controls, etc.
- Accidental damage: Dropping the amp, spilling liquid inside, etc.
- Acts of "God": Natural disasters and other non-preventable/foreseeable events that damage the amplifier.
- Tubes, unless within manufacture's warranty period of 90 days (replacements offered

at manufacturer's discretion).

- Any damage caused by authorized or unauthorized repair or modification that is not performed by Science Amplification.

Speakers carry Eminence's 7-year manufacturer's warranty. The terms can be found here:

<http://www.parts-express.com/docs/warranty/eminence-manufacturer-warranty.pdf>

If you think you have a speaker problem, please contact us first.

For warranty service, please email info@scienceamps.com for return authorization. Amplifiers must be sent back in the original packaging or equivalent packaging. The cost of return shipping to Science Amplification is to be prepaid by the owner. Science Amplification is not responsible for damage caused in return shipping. Science Amplification will pay for the return shipping after the warranty work is completed.

In general, we will be able to fix your amp for free, and help with tube changes, etc. if needed. We will also be happy to modify the amp in any way possible until the amp is perfect for you. Non-warranty repair is also available – please inquire for shop rates.

Don't hesitate to contact us!

Care and Maintenance

If plexiglass panels need cleaning, use only a soft clean, and dry 100% cotton cloth to wipe off smudges with just a little pressure to avoid scratching. If needed dampen the cloth with a little water, or use Novus brand plastic polish. Avoid harsh alcohol-based cleaning products as they may cause the acrylic to “bloom.” Also avoid the ubiquitous “microfiber” cloths, which can leave lint and/or tiny scratches the plexiglass in some cases since they vary so greatly in quality.

Periodically check the 4 mounting screws on the bottom to make sure they are tight. These screws secure the chassis to the head cabinet, and also insure contact to the aluminum RF shielding plate inside the cabinet.

If possible, move the amplifier when the tubes have had the chance to cool down for a couple minutes. Because the tubes get very hot, the elements inside become more vulnerable to physical damage until the tubes have cooled. In general, try to move the amp off stage last.

Tube Chart

Birds-eye view of the Street Sweeper's tube layout. Only replace tubes with specified types listed below:

