



®



## ***Clean Machine II Instrument Amplifier***

**V 2.0**

# **Operations Manual**

**For Clean Machine II Models (heads and combo)**

**CM-100/50 CM-50/25**

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## **A Note from Andy,**

First of all, *thank you* for purchasing a Fuchs Clean Machine II ® amplifier!

As a guitar player I designed the Clean Machine series of amplifiers to be sensitive and responsive *instruments* for musicians to create music. Each Fuchs product is precision handmade by myself and the staff at Fuchs Audio, built to extremely high standards of excellence using the highest quality components. With over two decades experience in the service, manufacturing, and design of tube audio/music equipment, we at Fuchs Audio are extremely proud of the quality and tremendous musicality of all our products, and know you'll feel the same way.

Please read this manual carefully. Doing so will allow you full understanding of your amplifier and operation, thus quickly providing you the tones & performance you want. Your Clean Machine II can only perform to its fullest glory by your full understanding of all its features.

Feel free to call or e-mail us with comments & questions about your amp, or just to find out what's new here at Fuchs Audio.

Lastly, I recommend checking out our web site:  
[www.fuchsaudiotechnology.com](http://www.fuchsaudiotechnology.com), or [www.fuchsaudioidirect.com](http://www.fuchsaudioidirect.com) for product/user updates, cool links and other info benefiting our customers.

Sincerely,

*Andy*

Andy Fuchs  
President

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# Clean Machine® Instrument Amplifiers

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# **1 Introduction to Fuchs Audio Technology Amplifiers**

## **What makes our products unique?**

The recent proliferation of "Boutique" amplifiers, allow guitarists to recognize what audiophiles have known for years, properly designed tube circuits can offer the finest musicality, detail, and sensitivity to playing subtleties of any type amplifier. Anyone who's enjoyed the sweet, responsive character of a well-built tube amplifier realizes you can't model or computer simulate the "organic" qualities, no matter how hard you try. It's like enjoying fresh food or food that's been frozen. Something gets lost in the translation.

## **We feel our designs go a few steps beyond those of other manufacturers!**

In addition to refining our circuit designs and operating points with computer "Spice" modeling, we also spend countless hours tuning our circuits through careful parts selection and refining the internal layout of our products. Details like single-point star grounding of all internal circuits, premium audiophile grade power and output transformers, high speed switching diode power supplies, regulated and buffered DC power supplies for both filaments and high voltage sources, are key elements to producing an amp that has truly unique sonic advantages. All completed amps are compared to reference samples on both test equipment by live players before they may be shipped.

Our attention to the power supply and grounding results in an amp with extremely high gain capabilities, but with a super low noise floor. This reduction in noise and increases in overall circuit clarity makes the selection of components an even more critical element to achieving good tone. While we use many time-honored component brands and features like "Orange Drop" Capacitors and/or carbon/metal film resistors, we also use Audiophile grade "Wonder Caps" and unique circuit refinements in many parts of our amplifiers as well.

It's a well-known fact that chassis materials can change the tone of the circuits built into them. We use an aircraft grade T-6 aluminum chassis, which is 1/6" thick, bent at its edges for strength, and when the front and rear panels are attached, forms a strong yet lightweight chassis. Aluminum also provides an excellent heat sink for excess tube, transformer, or regulator heat. Although we install fans in all models, our amps would dissipate plenty of heat even without a fan. The front and rear panels are attached to the chassis pan with pem-nuts, a 1/8 thick assembly formed at both the front and rear of the chassis for rigidity.

## **A combination of modern and traditional wiring methods**

Internal construction in all models is based around a central circuit board, which supports most of the power supply and the amplifiers FX loop, driver and bias circuitry. The balance of the amp is hand wired, with particular attention paid to the preamp section and low-level circuits. All tube sockets are chassis mounted for strength and ease of replacement; in the unlikely event a socket fails. This also keeps tube heat away from the other internal components in the amps.

Our amplifier power supply starts with a high voltage supply, which is rectified using high-speed switching diodes, combining the sonic attributes of a tube rectifier, with the efficiency of solid-state diodes. These produce greater voltages, a more rigid supply that doesn't 'bend' under the stress of loud playing, and they also produce zero heat. This DC supply is highly filtered, contributing to an amplifier that has a strong voice yet remains loud & clear up to its limits.

Our output stage(s) feature separate bias for each power tube. Although we use premium "matched set" tubes as standard equipment, by individually setting bias, we can obtain maximum power before clipping, extending tube life with better tone. Our power amp driver circuit uses an AC balance trim control, which adjusts the signal balance to the power stage, keeping it linear, producing a clean, strong tone. When driven to clipping, overloading is ultra- smooth, compressing in a sweet way, not at all aggressive or harsh.

## **Premium Transformers**

Our power and output transformers are designed for highest self-regulation as well as conservative operation, assuring lowest heat and highest reliability. Our output transformers are premium grade audiophile quality. We use custom built power and output transformers, as well as custom wound chokes. All amplifiers feature 4, 8 and 16 ohms outputs, grain oriented steel cores, with heavy-duty mounting bells and hardware for maximum roadworthiness.

## **Buffered FX Loop**

Our buffered FX loop features both series and parallel operation. It uses a conventional high-current biased cathode follower, which provides a low-impedance signal source, which is level adjustable and can drive from a pedal level to a rack mount unit cleanly. Two simple switches set series/parallel operation, signal levels from 0db to -20db, easily matching any and all effects, tube or solid state.

## **Studio Grade Reverb**

Our reverb sections features a Spin Technology 16-bit digital reverb design. By treating the reverb mix and the reverb itself, we have produced a quiet, dynamic and musical reverb that sounds as warm and detailed as a tube reverb, plus the reliability of digital and NON mechanical reverb pans. The reverb is not only equipped with level and decay controls, but low and high frequency controls to adjust the voice of the reverb to taste. This reverb is interfaced through the FX loop, adding warmth to the overall sound. Additional signal clarity is achieved by eliminating the common reverb mixer network used by most other manufacturers.

## **Our Preamp Circuits**

Our preamp circuits form the heart-and-soul of our amplifier tone. Any subtleties lost or masked by preamp stages are truly lost forever. By operating our low-level circuits on a regulated and passively buffered high voltage supply, using a regulated DC supply, we completely eliminate the effects of conventional power supply filtering and decoupling. Audio signals can (and do) appear on power supply sources. Despite large filter capacitors these audio signals do not belong on the pure DC that a tube circuit needs to perform properly. This subtle coupling of signals from adjacent stages can produce a masking of inner detail and potential instability in other high gain circuits. A careful selection of passive parts (resistors and capacitors), as well as the active parts (tubes and/or solid state parts), results in the unique sonic signature our amps are becoming known for. We also use regulated DC filament power supplies, for lowest practical noise floor.

## **Internal Construction**

We proudly can say our products are built better than ever. Our circuit boards are now two-sided extra thick boards, with heavy copper plating and a full solder mask. Our internal layout has been refined to minimize wire runs, lowering the noise floor to the circuit's practical limits. We still chassis mount our tube sockets for maximum strength, durability and serviceability. We hand select our tubes for lowest noise and optimal tone. Most models include a DC fan for low chassis temperatures and extended tube life. All passive parts are carefully chosen for both reliability and sonic attributes. Each and every Fuchs amplifier undergoes 20-40 hours of "burn-in" before leaving our shop. This ensures every Fuchs amp is built for the long haul.

## Please read before powering up your Clean Machine

Please see Panel Diagrams in next section **3** for assistance.

- 1) Inspect to make sure power & pre-amp tubes are intact & snugly seated in their sockets.
- 2) Make certain a speaker (load) is plugged into the correct speaker input jack on the back of the amplifier (4 or 8 ohm). Failure to have a speaker connected to the amp will result in damage to the output tubes! Your ODS is supplied with multiple speaker inputs for various impedances, select the one closest to your speaker(s) impedance.
- 3) Reduce Front PANEL controls (MASTER, GAIN, INPUT, and OUTPUT) to moderate levels (approx at 7-9 o'clock positions).
- 4) (optional) Install cable into footswitch (either standard or Artist) and then connect into rear panel input marked FOOTSWITCH. (Standard uses ¼" phone jack, Artist/Artist Plus uses 5-pin Cat-5 Connector).
- 5) Install instrument cable from guitar into front panel INPUT
- 6) Be sure both POWER and STANDBY switches (rear panel) are in DOWN position.
- 7) Install power cord to amplifier (AC POWER IN) and to AC power source.
- 8) POWER UP amplifier by: 1) flipping POWER switch UP. WAIT at least 1 minute for tubes to heat up. 2) Flip STANDBY switch UP, amplifier will now operate.
- 9) The Amplifier is now fully on and ready to use. Feel free to adjust all controls as you see fit.

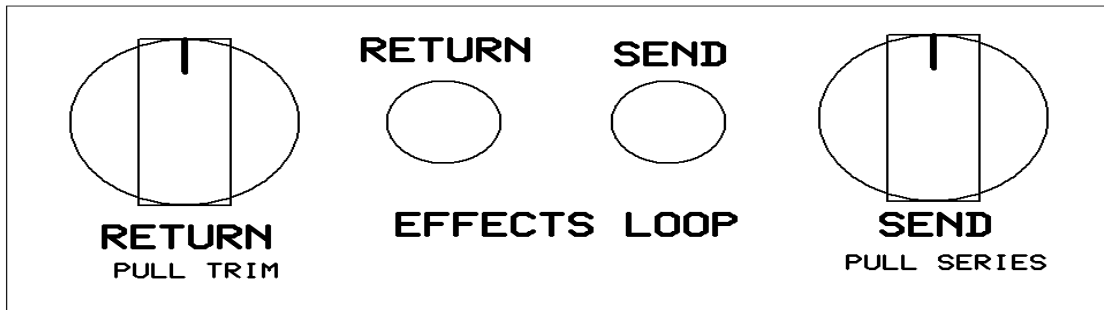
**TO PUT AMP IN STANDBY MODE**- Simply flip the STANDBY switch DOWN.

**TO PUT AMP IN PLAY MODE**- Simply flip the STANDBY switch UP.

**TO TURN AMP OFF** Flip the STANDBY switch DOWN. We then recommend (as a kindness to the output tubes) waiting at least 1 minute before flipping POWER switch DOWN hence fully shutting the amp down.



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**Rear Panel****Effects Loop**

**Input Jack(s):**

Input jack(s), are 1/4" phone plugs, designed for 1-Meg impedance, guitar-level signal. This input will readily accept pedals/effects without any loss in performance. The design of the Clean Machine amplifier is quite flexible, so we first suggest exploring its performance without any effects or pedals initially.

**Gain Control:**

The gain control sets the overall gain for the amplifier. There is no master volume. Depending on the guitar, pickups and whether you are using pedals or not, this control may be set anywhere on its rotation. Although this amp is called the Clean Machine, it can be driven into overload at high volumes. It is capable of clean output up to clipping, and usually produces more than its listed power. This control pulls for gain boost (internally adjustable), and operated on the footswitch as Gain-1.

**Brite Switch:**

The Brite switch operates with the gain control/and is active over about 1/2 of the input gain control range. From '0' to about midway, it provides a boost to highs, and the effect of the switch decreases beyond the halfway point on the gain control rotation. Center is OFF, and the up position places the boost lower into the midrange, while the down position is more subtle and higher in frequency

**Deep Switch:**

The deep switch shifts the overall tonality of the amplifier, increasing the low Frequencies. This is often useful for single-coil guitars, which sometimes need a low-frequency boost, or for jazz players who prefer the added warmth.

**EQ Switch:**

The EQ switch alters the operation of the tone controls. The upper position is Will be the highest gain, and a brighter equalization. In the downward Setting, the tone is a more neutral/linear tone. All tone controls work in both Modes, however their range and depth of operation is changed. The center position is tone stack bypass (also active by footswitch as gain-2)

**High Control:**

The High control serves 2 functions: (IN)-it adjusts high frequency spectrum. (OUT) the High control engages the mid-boost. This shifts the range of the high control downward, to include more midrange. All tone controls still operate, however the tone will be fatter. This boost is activated on the footswitch as mid-boost.

**Mid Control:**

The Mid control serves 2 functions: (IN) Acts to adjust mid frequencies. (OUT) changes the frequency of the mid boost. This warms the overall midrange tone and this can also fatten sound for Single coil pickups. Pulling the mid control moves the mid boost downward further toward the low end frequencies.

**Low Control:**

This control adjusts the low spectrum of the amp. Pulling it alters the pivot (frequency) point of both the mid and low controls for greater tonal range.



**The Reverb Controls:**

The reverb controls allow the widest range of reverb adjustment on any amp or outboard reverb unit made today. These four controls will allow you to tailor both the input level and dwell (decay), as well as low and high frequency tailoring of the reverb output. The reverb while digital (using the Spin Technology chip), is fed on both the input and output by a 12AX7 tube, which gives it warmth and analogue smoothness. It produces tones ranging from subtle and warm to a bright extreme surf style, and anything in between. It is best to start with the controls in the 12.00 position, and adjust from that point to your personal taste.

There are no "correct" Reverb settings, finding the desired tone setting depends on the guitars/pickups used, as well as your own personal tastes.

**Accent Control:**

The accent control works within the power amp section, reducing negative feedback at higher frequencies. It adds an edge to the overall amplifier tone. It's excellent for cutting through in a band or a recording mix. It can also allow greater ability to selectively make notes feed back and "sing".

**NOTE:** There are *no* internal trimmer pots, other than output tube bias and AC balance controls for the power amplifier stage. There are no internal tone altering controls in a Clean Machine II. These internal controls are best left to professional technicians, who have the proper measuring equipment to set them properly. There are hazardous voltages present in any tube amplifier, even after it has been shut off for some period of time. Please exercise extreme caution when the chassis is exposed out of the cabinet !

## 5 (A)-REAR Panel Controls, inputs/outputs, (B)-Effects Loop

### (A)-REAR panel Controls/input/output jacks



#### AC power cord input:

Using the supplied power cord. Connect AC POWER IN on amplifier and to AC power source. Please confirm your line voltage matches that of the amplifier!!!

#### AC power Fuse:

This fuse protects the amplifier if any malfunction occurs. Use ONLY stock fuse rating as supplied by factory.

#### Power On/OFF switch:

Up is ON, DOWN is OFF

#### Standby switch:

UP is ON, DOWN places the amplifier in STANDBY

#### Speaker input(s): (You must have a speaker load inputted to the ODS before powering on).

Connect using a 1/4" phone plug to either an outboard speaker cabinet. Multiple speaker inputs are installed on your ODS (4, 8, 16 ohm). Connect speaker to input jack that most closely matches your speaker(s) impedance. When using an external speaker with a combo, a Y-connector is required to split the respective output jack. Contact the factory for assistance, if required.

#### Series/Parallel Pull Switch:

When in Series Mode-the amplifier must have effects connected to the loop, or amp will not produce sound. When in Parallel-Mode amplifier will always produce sound. Parallel mixes effect signal with drive signal, which then remains in amplifier. Normal position (when not using loop) is control IN.

#### Return Trim Pull Switch:

Sets sensitivity & adjusts sensitivity of return input of the effects loop. This allows tailoring of signal of effect or rack device. If using an effect which requires more return sensitivity, pull this control out. Normal position is IN.

#### Return adjustment control:

This allows overall volume adjustment of amp (to set unity gain), thus retaining same volume with or without effect). This control sets the level coming back from your effects, also a secondary means of adjusting return of effect signal. The series parallel switch controls whether the loop is "open" (series) or "closed" (parallel).

#### Return Input jack:

Connects to OUTPUT FROM your EFFECTS

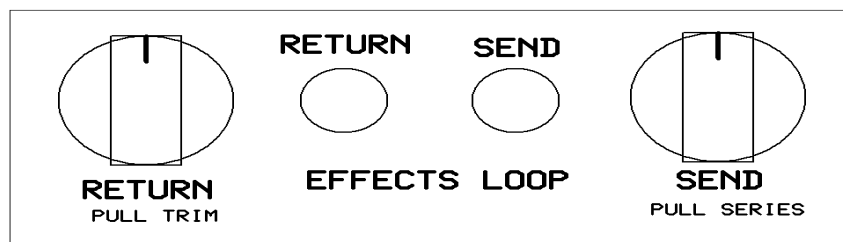
#### Send Input jack:

Connects to INPUT TO your EFFECTS.

#### Send adjustment control:

Adjusts signal level going to effect. Adjust send control so that effect receives maximum amount of signal before distorting.

## (B)-Effects Loop



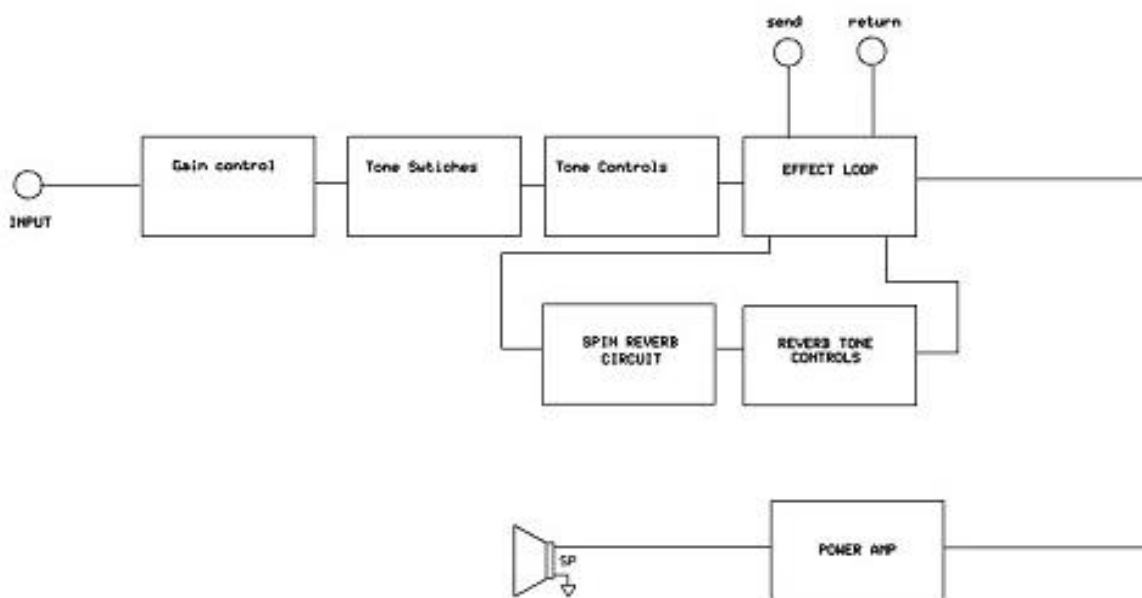
### Using the Loop:

When inserting a device like an equalizer, or perhaps a Sonic Maximizer (or similar processor), the loop should be set in series mode. The mix controls on the outboard device can be used to control all effects and the balance between clean and dirty effects. The loop is intended to interface external devices, and is intended to maintain unity gain (same level as when loop is not used), and should be adjusted as such.

### Side-Chaining Effects:

For maximum signal purity and sound quality, when using effects like digital reverbs and/or effects like an echo or tape delay, the loop can be used in parallel mode. In this case, the effects should be run fully "wet" (no non-processed signals sent through the effect). The send and returns of the loop are set for proper balance of clean/effect and the controls on the effect can be used to trim the tone. This method assures the clean (dry) non processed signal will remain in the amplifier, and not be degraded by the outboard effect. In some cases, phase cancellation may result. In this case, the effect should be adjusted for correcting the output phase (if possible) or the effect must be used in series mode only. Phase cancellation is marked by losses in bass or a thin "sucked out" quality, when effects are engaged.

### Amplifier Block Diagram:

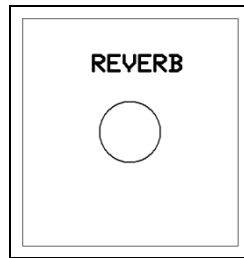


## FOOTSWITCHES:

Your Clean Machine is provided with either: a 1- button standard, 2-Button enhanced, or a 4 button "Artist" footswitch depending on your purchase selection.

### **Standard 1 or 2-Way footswitch:**

Connects via 1/4" phone cable (supplied) to rear panel input. Single button controls reverb. In a two button footswitch customer may order reverb, mid boost, gain boost, effects loop bypass or global mute functions.



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## **Biassing power tubes and other technical info**

### **Biassing and Internal Adjustments:**

Part of chassis and circuit board is shown below with the chassis sitting on its transformers, and front panel facing you. There are exposed high-voltages in this chassis, even with the amplifier shut-off! If you are not familiar with tube amplifiers and/or high voltages, do not attempt to remove the chassis from its cabinet or to attempt to service this amplifier. Refer servicing to the factory or to someone with experience servicing these types of amplifiers.

**High Internal voltages inside this amplifier can cause harm or Death!**

### **AC Balance:**

This is factory set for linear clipping at maximum power output, and is set with an oscilloscope for proper adjustment.

### **Bias Controls:**

The tube (in the 75) or each pair of tubes in the 100 and 150-W models is factory set for proper bias. measured on the one-ohm cathode resistor connected to each power tube pin 8. This should be set with the amp cold, then reset after the amp has run for about an hour. Use a reliable digital volt meter for these settings. The 75 and 150 (using 6550 tubes) are set to .040 volts (40 millivolts dc = 40 ma) per tube, and the 100 (using 6L6's) should be set to .036 volts (36 millivolts dc= 36 MA).

**DISCLAIMER:** There are exposed Internal high-voltages in this amplifier. Do not attempt to service, repair or conduct tube biasing unless you are qualified to do so. Please contact Fuchs Audio beforehand with questions in this regard. Fuchs Audio takes no responsibility or shall be held liable for any personal harm caused or damage to this amplifier as a result of unauthorized service, repair or internal adjustments made to this amplifier.



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## **8 Warranty Information**

### **The Fuchs Audio Technology-ODS Warranty**

Fuchs Audio Technology® guarantees our products to be free from defective workmanship or material failure for a period of three years from date of new purchase to the original purchaser. This does not apply to Fuchs amplifiers that have been tampered with, damaged by shipping carriers, reverse engineered, or modified. This warranty is void if the amplifier is used with power attenuator type devices (Power Soaks, Air Brakes, Hot Plates etc.). Your warranty form/information must be returned to Fuchs Audio Technology® within 30 days of purchase, or your warranty will not be in effect.

Fuchs Audio Technology® reserves the right to suspend or terminate the above warranty at our sole discretion, should damage from any of the above limitations and or exclusions be detected upon examination.

Keep the information on this page for your records.  
*Please mail-in warranty form on next page*

**FUCHS MODEL** \_\_\_\_\_

**SERIAL NUMBER** \_\_\_\_\_

**OPTIONS INCLUDED** \_\_\_\_\_

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## WARRANTY REGISTRATION FORM

**This completed form must be returned to Fuchs Audio Technology within 30 days of purchase along with a copy of your receipt from your authorized dealer.**

Please fill in all requested information on this form so we may register you for future warranty repairs or future upgrades, should they become available.

Purchasers Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ Country \_\_\_\_\_

Phone Number \_\_\_\_\_

E-Mail address \_\_\_\_\_

Model \_\_\_\_\_

Serial Number \_\_\_\_\_

Date of Purchase \_\_\_\_\_

Dealer Name \_\_\_\_\_

Comments: \_\_\_\_\_

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Please return this form to:

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