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# Sonic Farm Star TrEQ

## Dual Pentode Equalizer

# USER MANUAL



Dear Audio Professional,

Thank you for purchasing the Star TrEQ. We hope it will deliver exceptional performance for many years into the future.

Please take the time to read this manual. It describes Star TrEQ's design philosophy as well as its most important functions.

## DESIGN PHILOSOPHY

Our intention behind the Star TrEQ was to create a tube-based 5-band equalizer flexible enough to be used in all studio applications, tracking, mixing and mastering. We insisted on tubes because we wanted their non-linear characteristics to impart some color to the treated program. We also wanted to use real inductors because of their tendency to add subtle saturation, as long as they are used within their "almost linear" range. But both of those two design choices also dictated some limitations and compromises. You can skip the following paragraph if tech-talk is too tiresome for you.

The tubes needed to be a part of a circuit that limits their non-linearity to a pleasant measure. A good preamp already imparts some color to the program, so the EQ needed to color less. Ultimately, the choice fell on a hybrid OP-amp, fronted by 2 pentodes. To use the full headroom capability of the tubes, we opted for a dual 150V supply, so that the tubes actually work at their limit of 300V. The rest of the components are solid state and mainly support the tubes by adding a little gain and bringing the impedance down to drive the rest of the unit.

However, when we sat at our workbench to come up with the actual circuit, the gain tolerance of the tubes turned out to be a big issue. In a conventional, solid state discrete OP-amp (in literature: DOA), the first stage is a differential one, consisting of a matched transistor pair, which is needed for the minimal output DC offset because the whole circuit is DC-connected, with no capacitors between stages. But here we're dealing with tubes that require replacement every once in a while (approx. every 10,000 hrs. of operation), so the risk of less than perfectly matched tubes could lead to a substantial DC offset and even damage to the unit. This was the most stubborn stumbling block during the design of the Star TrEQ that kept us in our lab for almost 2 years. There was nothing out there designed like this that we could use as a starting point. Ultimately, we came up with a quite sophisticated servo circuit that eliminates the DC offset even with a pair of random, unmatched tubes. So, the stability is always there and the tubes don't need to be matched. Albeit if one uses matched tubes, the headroom is the highest possible.

The inductors are another designer's Achilles' heel. Real-world inductors don't follow mathematical models. They have a parasitic capacitance and their inductance is frequency-dependent. They pick up hum. Not to mention the wire resistance. It is ironic that in a lot of professional analog electronics literature, the recommendation for most accurate inductors is to use a gyrator simulation (active solid-state circuit). But those don't saturate, which was the whole point in using them! Furthermore, the ferrite cores also have a tolerance. Combine that with inaccurate capacitors (needed to form resonant filters) and you've got yourself some headaches. So all of this boils down to two outcomes: 1) The unit is very labor-intense; the inductors and capacitors need to be fine-tuned for each frequency, and shielding the power transformer is essential to eliminate hum. And 2) This is not a surgical EQ. If one, for instance, wants to boost 1kHz and cut 1.3kHz, you would need to use an EQ with a different design. But then you lose the beautiful sonic character that these imperfections present. So there is inevitably a trade-off. More on this in the section explaining the controls.

The rest of the circuit includes a sensitivity switch, a blend pot (Dry to wet), output level, output selector (solid-state balanced line driver or an output transformer) and a bypass switch. And a high-pass filter at the very input of the unit. More on all of that below.

## SOME REMINDERS REGARDING TUBES

Tubes work with very high supply voltages. There are points inside Star TrEQ that measure in excess of 350V DC. If touched, those voltages could be lethal!

Make sure that no pointed objects (especially metal) or liquids penetrate the inside of the unit through its cooling grilles or otherwise. If that accidentally occurs, immediately pull the plug out of the power socket and wait for the unit to discharge. Star TrEQ must not be operated if moisture penetrates inside.

Before opening the unit (to change tube, wipe off moisture, etc) one must disconnect the mains cord and then wait several minutes for the internal capacitors to discharge.

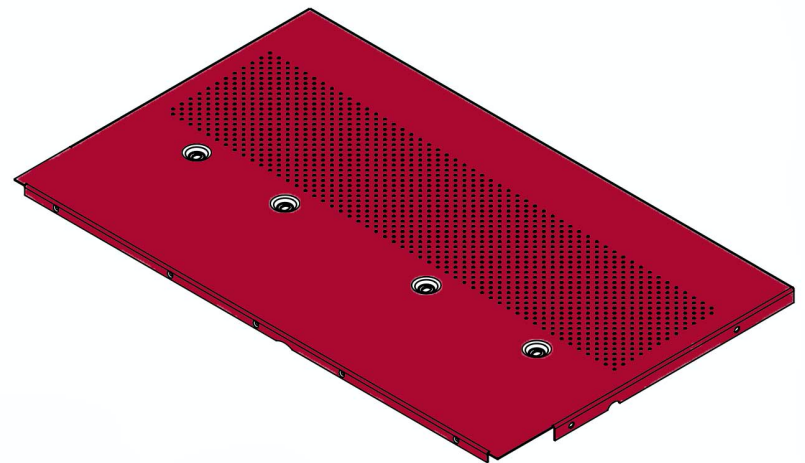
When mounting in a rack enclosure, always leave an empty space above the Star TrEQ to ensure proper cooling. Please do not replace the mains fuse with one of a higher value: use only 600mA@115V (500mA also works fine) (250 to 300mA@220-240V)

**Legal Disclaimer:** Neither Sonic Farm nor anybody associated with it can take any liability for damage to persons or property caused by either use, modification or servicing this unit.

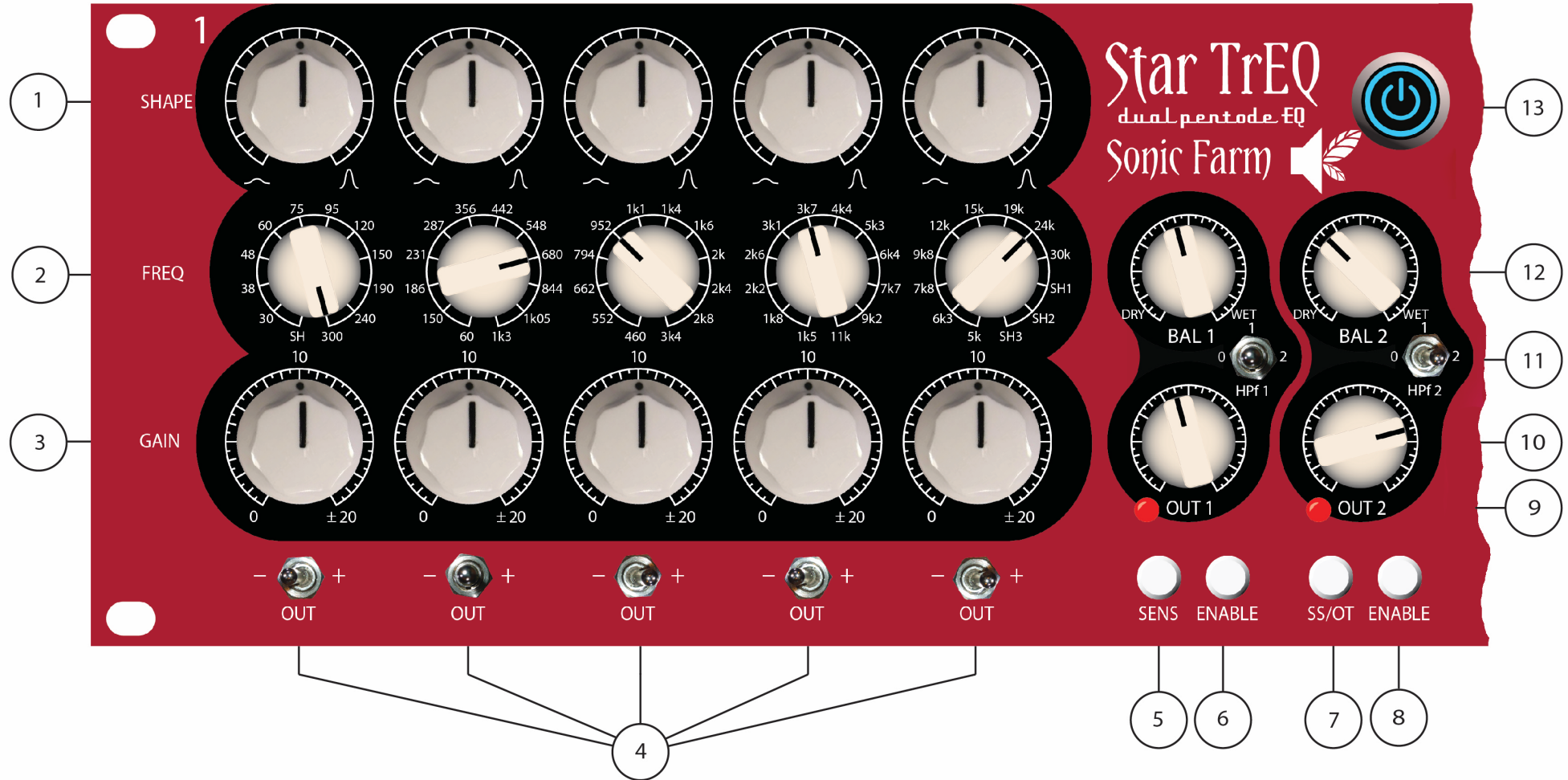
## HOW TO CHANGE TUBES

This only applies to a functional unit. Please entrust any repairs to qualified service personnel. Only an EF-86 (or equivalent, like 6267, 6CF8 or Russian 6J32P) pentode can be used. Pull out the power cord. Wait for at least 10 minutes for all the capacitors to discharge.

Remove Star TrEQ's cover by removing 4 screws on top, 3 on the rear panel, 5 on the front panel and 2 on either side. There are 2 tubes per channel; you will immediately see them when you look at the inside of the unit. Remove the old tubes one by one using small, but fast left-right motion as you pull up. The tubes are sometimes hard to remove from a tight socket. Do not bend a tube much out of the axis because you can break the pins or cause air to enter the tube and destroy it. Paying attention to the pin alignment, push the replacement tube into the socket using same motions but in the opposite direction. Make sure it goes in all the way. Due to electric shock danger, testing the preamp with the lid removed is not recommended. Screw the cover back in place and you're done.



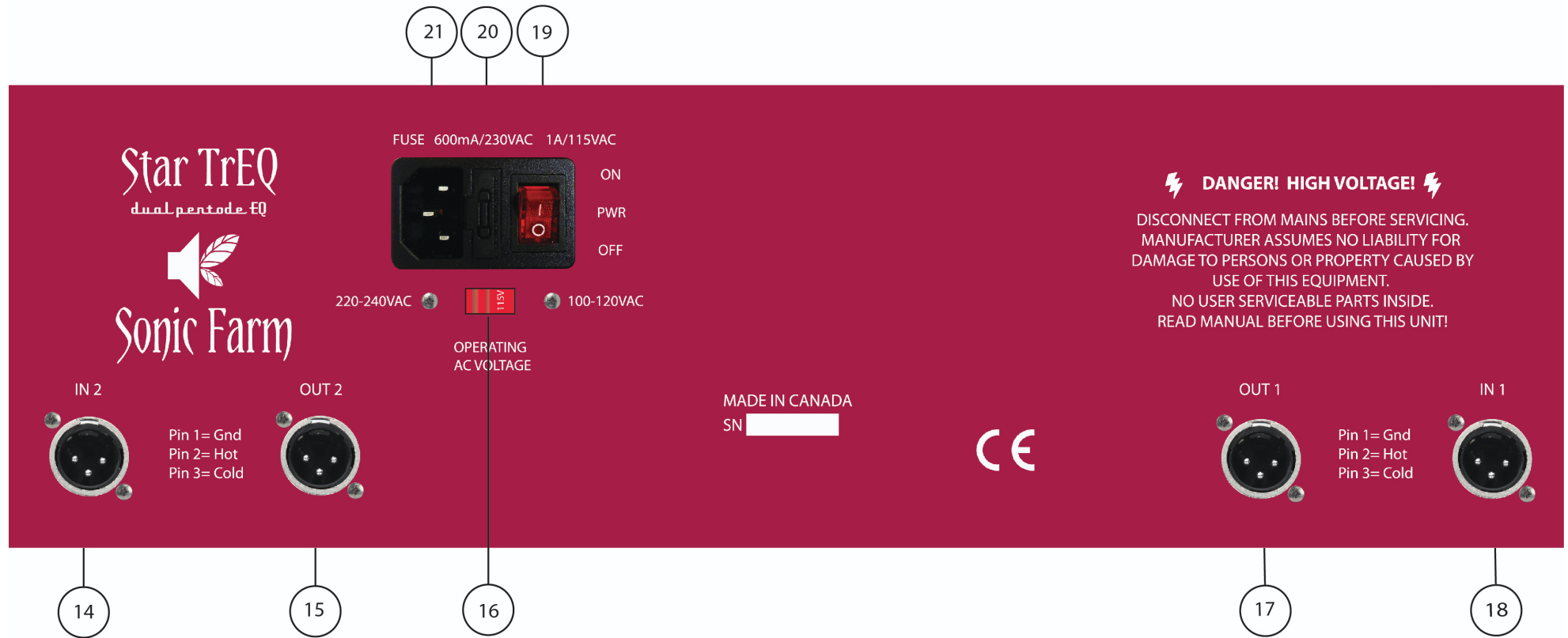
## STAR TREQ'S FRONT PANEL CONTROLS:



**1** Shape (or Q) control. The way this works is that the curve has the highest peak and is the narrowest at the CW position. Rolling it back will shave off the peak. Consequently, tweaking this control will, in addition to changing width of the bell curve, also change the level of the signal at the resonant frequency: You will get more boost or cut at the resonant frequency as you turn this pot clockwise (CW). Many surgical EQ's just make the bell curve wider or narrower while keeping the peak level the same. Not so here. If you broaden the curve, to keep the same peak (or dip, if you are cutting), you need to turn up the corresponding gain control higher. Bands 1 and 5 also have shelving options (1 vs. 3). At band 1, when you choose the low shelf, the shape control will not be active. Band 5 has 3 hi-shelves, starting at lower or higher frequencies. Here, the shape control acts as a steepness control for the shelf by adding a bell "bump" at the initial part of the shelf. For a traditional shelving response, keep the shape control at minimum (CCW). This control has 21 detents.

- 2** 12-step rotary frequency selector. Bands 2, 3 and 4 use a bell type curve. Bands 1 and 5 in addition have shelving positions (SH).
- 3** Gain pots. These regulate the amount of boost or cut desired. The mini toggle switches underneath activate either boost or cut or deactivate the band. So you have the whole rotation range for either cut or boost, giving you more precision. 21 detents.
- 4** Mini toggle switches toggle between cut (left), bypassed (middle) or boost (right). One per band.
- 5** When this switch is depressed, the boost or cut range will be increased by 6db's. Or simply push it in for more intense overall equalization. Another tip (explained in more detail down below): If you want broader but more intense eq-ing, push it in. For narrower but lower intensity eq-ing, keep this switch out.
- 6 and 8** Enable switch per channel. Only an enabled channel will be active when taken out of bypass. Otherwise always bypassed.
- 7** Output select: low-distortion discrete solid-state balanced line driver or a transformer. Choose the transformer if you want additional coloration.
- 9** Bi-color LED (green/red) signal presence/overload indicator. Red indicates clipping distortion on the tube stage. Due to a huge headroom, you will hardly ever see these LED's turn red.
- 10** Master output level controls. These offer up to about 6 extra dB's of gain to match the loudness of a bypassed signal or they can attenuate if a lot of boosting has increased the output loudness. The flat gain of 0dB is somewhere at 2 o'clock.
- 11** High pass switch, located at the very input of the unit, before the tube stage. Choose between 5, 10 and 20Hz.
- 12** Dry to wet blend pot. Why a dry to wet blend in an EQ? Trust me, you will use it quite a bit. There are no nasty phasing artifacts like with some digital units. I suggest you start in the middle (50% wet), tweak your channels to your liking and then fine tune the overall equalization by moving this either left or right off the center. But there is another reason this control was implemented. With this EQ, as you start boosting from minimum up (same is true about cutting), the boost starts as a broader bell curve, and as you boost further, the top grows narrower, finally reaching your selected "Q" at the maximum boost. This makes it hard to get a small, narrow boost because the curve is wider at low boosts. To counter this, first, choose low sensitivity. Roll off the blend pot more towards dry, and then apply your boost generously. Now, the boosted range is narrower because the gain pot is cranked up, and the resulting boost is nice and low. Experiment and you'll get the hang of it.
- 13** Soft power and bypass switch. When the hard power switch on the back of the unit is turned on, this switch will start blinking until the tubes warm up, and about 20 seconds later the light will turn solid, indicating that the unit is active (providing, of course, that both Enable switches are in). From now on, anytime you tap this switch the unit will go into bypass, and the light will go blinking. Tap it again to re-activate the unit. Press and hold to turn the unit off. If the rear switch is still on, you can now just tap to turn it back on. In general, we always recommend having a master power switch in your recording space to turn on or off all your audio gear together. Leaving all your gear on for days is not a good idea, especially for gear with tubes. You will noticeably lower their lifespan.

## STAR TREQ'S REAR PANEL CONTROLS:



**14 and 18** XLR inputs are in the corner of the unit. Balanced connection only! (XLR pin connection: 1=GND, 2=HOT, 3=COLD)

**15 and 17** Outputs. Balanced connection only! (XLR pin connection: 1=GND, 2=HOT, 3=COLD).

**16** Mains voltage selector. Push it to the right for 100-120VAC operation, or to the left for 220-240VAC. It cannot be over-emphasized that your actual mains voltage must match the selected voltage setting. Otherwise, you can damage the unit, especially by plugging it into a 220 or 240V outlet but with this switch set to 100-120VAC.

**19** Hard power switch. This must be on in order for the soft power/bypass switch to work.

**20** Mains fuse. Please replace it only with one of the same rating. (600mA@115VAC, 300mA@220-240VAC)

**21** AC power inlet. Again, make sure that the selector switch is set to the voltage of your mains outlet (115VAC or 220-240VAC).



## TECHNICAL SPECIFICATIONS:

2 channels, 5 bands per channel

Frequency response: 5Hz-50kHz +/- 3dB

Operating level: +4dBu

Gain range: Up to 26dB of boost or cut, depending on the settings. Output level knobs provide an additional 6db gain reserve if needed.

Harmonic distortion: <2% before clipping level quickly decreases if driven less.

Maximum output level: 32dBu

Minimum output load: 600Ω

Connectors: XLR line and output, balanced only

Power consumption: 40W

## WARRANTY INFORMATION

Sonic Farm gives a one-year warranty on parts and labor from the date of purchase.

Should you need to send in your unit for warranty-covered service, please contact us for an RMA number first.

We will also tell you where to send the unit.

Any Modification of the unit voids the warranty.

## CONTACT INFORMATION:



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