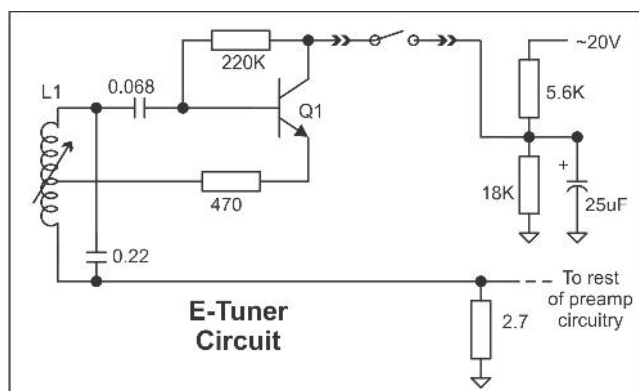


Thomas Organ added the tuner “effects” in a minor update to their amps. The tuner circuits are a natural evolution from the electronic organ operations that were Thomas' main business at the time. The tuners were a single-transistor master oscillator circuit that provided an “E” note at 323.628 Hz, the nominal pitch of the high E string on a guitar; in the bass amps, this was 195.998 Hz, the pitch of the high G string on a normally-tuned bass guitar.

The circuits were the same, varying only in the values of the tuning components.

The tuners were not integrated onto the main circuit boards. Instead, they were built onto a tagboard module holding the large tuning inductor and the other components to make the oscillator work, and this self-supporting lump of circuitry was attached at a



(more or less...) convenient place inside the wooden enclosure.

The signal was injected in an odd way. The ground connection for one of the preamps had a 2.7 ohm resistor inserted between the preamp transistors and

actual signal ground, and the tuner's power supply current returned through this resistor.

This arrangement cut the large signal voltage present in the tuner oscillator to a very small level in the preamp, and since it was injected before the volume control, gave the player a way to tune quietly, instead of at the full volume of the amplifier.

As a side note, this arrangement is a great example of how ground loops work. The supply current for the oscillator is deliberately returned through the 2.7R “ground wire” introduced into the preamp power return. The oscillator current through this high-resistance “ground wire” induces the oscillator signal into the preamp output. If the oscillator and preamp did not share that ground resistance, no oscillator signal would appear on the output of the preamp.

This approach also had a manufacturing and design advantage. The tuner modules were built as isolated circuit lumps and placed outside the preamp chassis in the wooden enclosure of the amp. It was connected into the preamp circuit with a two-position cable connector. The only change to the PCB population was to insert a 2.7R resistor in the ground return of one transistor, and to add the cable connectors for adding the E-tuner. So no new PCB design was needed, and this was expensive at the time.