

Ultra Tonic Conversion Kit Instructions

James May Engineering
12/23/17
Version 0.6

These instructions are for converting a K&K Pure Mini pickup into an Ultra Tonic Pickup.

It is assumed that you are happy with the string to string balance of your K&K installation. This conversion kit will not alter that. In our experience however, using the 3 disc Pure Mini set can sometimes result in a weak high E string. That is why we provide 4 discs with the full Ultra Tonic Pickup kit. If the high E is weak, it can be remedied by adding a fourth K&K disc to the position shown in gray in Figure 1. Note that you must use a K&K disc for this fourth position. A 12mm Ultra Tonic Disc from another UTP set will not work properly.

1. Install the feedback suppression element

Refer to Fig. 1 below. Your K&K Pure Mini will have 3 small (12mm) discs installed as shown below in solid black. To counteract a weak high E, some K&K installations may have a fourth small disc as shown below in gray. Whether there are 3 or 4, these discs will be used and later connected to the UTP circuit board. Leave them as is for now.

The large (20mm) disc provided with the conversion kit should be located at the far end of the bass side of the bridge plate, as far back as the plate will allow. With a little practice, you can do this by feel. A jig probably won't be necessary. It could overhang the end of the plate by as much as 1/8" and not be problematic.

Attach the large disc using gel superglue, generously applied so that the whole surface is covered. Press firmly and hold until the glue sets up. Alternately, 3M 254 double sided tape or equivalent may be used. Be sure the surface is clean and dry before pressing firmly into position.

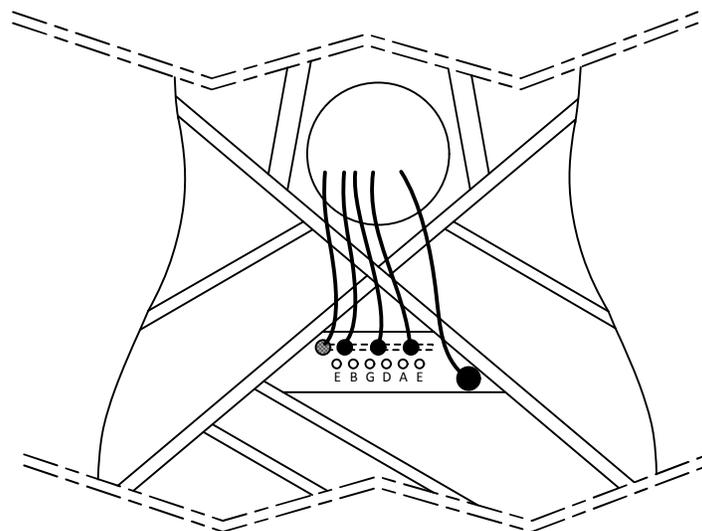


Figure 1
Location of pickups

2. Attach the K&K elements to the Ultra Tonic circuit board

Cut the 3 (or 4) shielded cables close to the existing K&K endpin jack, and set the jack aside.

See Figure 2. Strip and tin the cable ends, length about 3/8". Solder the center conductors to the Ultra Tonic circuit board top pads, positions 1 through 4. It doesn't matter which wire goes to which number, as 1 - 4 are all wired together on the circuit board. Solder the shields to the bottom of the circuit board which is a continuous ground plane.

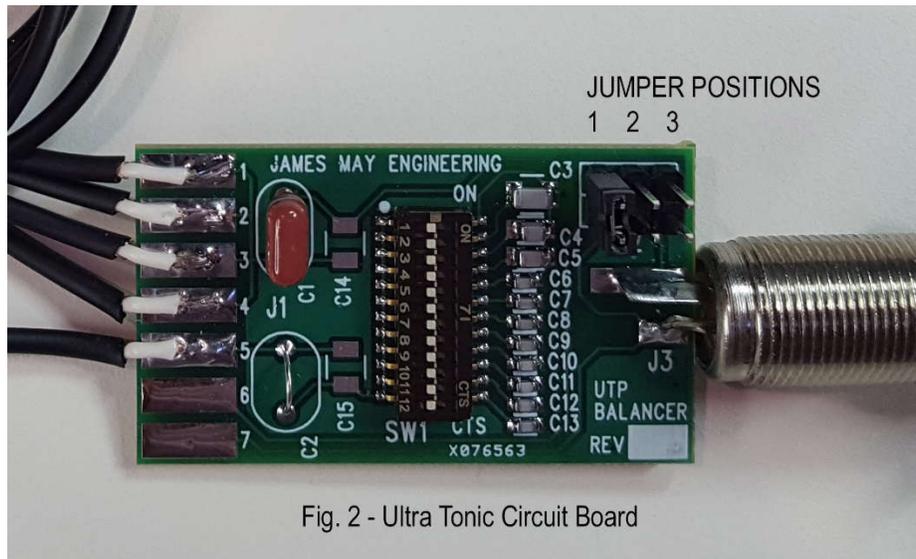


Fig. 2 - Ultra Tonic Circuit Board

3. Adjust the pickup balancing circuit for best feedback suppression

Refer to figures 3 and 4. In order to adjust the pickup balancing circuit for optimum feedback suppression, you will need a few things:

- An AC voltmeter capable of reading single digit millivolts. A 200mV full scale works well, and most modern meters can do this.
- A signal generator capable of outputting a sine wave in the 80Hz to 250Hz range. Alternately, there are many free smart phone apps that can do this.
- An amplifier capable of driving an 8ohm speaker. You could use a stereo or hi fi amp, a guitar amp, a PA amplifier, or a headphone amplifier.
- The calibration exciter, which is a kind of speaker without a speaker cone. Its role is to vibrate the top of the guitar. This is available from James May Engineering.

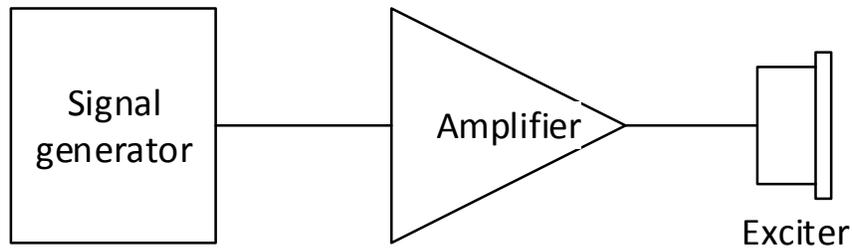


Figure 3
Balancing Adjustment Setup

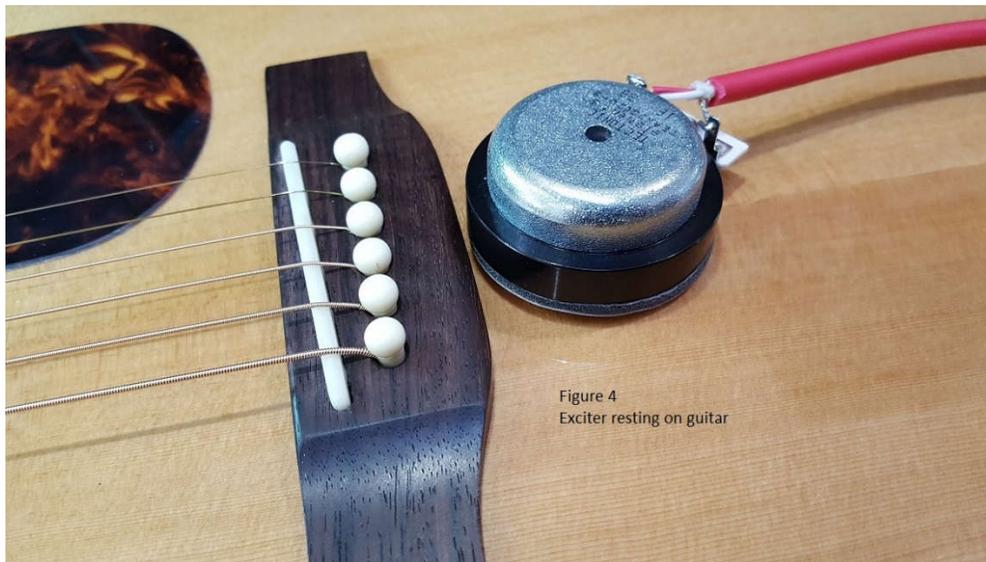


Figure 4
Exciter resting on guitar

As shown in Figure 3, connect the signal generator to your amp, and then plug the exciter into the amplifier's speaker output.

Install the jumper in position 2. Make sure all 12 switches are in the off position.

Set the exciter on top of the guitar behind the bridge, approximately in the center per Figure 4. The position is not overly critical. The exciter has enough weight to properly couple to the guitar top, and has a protective gasket to keep it from sliding and also keep it from marring the finish.

Find an adapter cable or use clip leads to connect a ¼" plug to your AC voltmeter. Polarity doesn't matter. Plug the AC voltmeter into the output jack of the Ultra Tonic circuit board.

Set the signal generator to about 85Hz, and adjust the level so the guitar top can be clearly heard. If the exciter starts to dance and wander around, it is too loud.

While observing the AC voltmeter and using your ears, slowly sweep the generator frequency up from 85Hz to about 250Hz and note where the two loudest hot spots are. These will correspond to the main chamber resonance (typically 90-110Hz) and the main top plate resonance (typically 175-240Hz). After noting which of these two hot spots is stronger, fine tune the signal generator back and forth to hone in

on it. When the meter reads highest, and it sounds loudest, then you've found it. If by chance both hot spots are about the same level, then choose the higher frequency one. A typical meter reading will be in the 30mV to 50mV range but could be higher or lower. The exact voltage reading is not critical. Leave the oscillator set at that frequency.

With a small tool such as a pencil, pen or toothpick, flip the first of the 12 dip switches (switch 1, on the far left) to the ON position and make note of the voltage meter reading for that switch. Make certain to return the dip switch you just tested to the OFF position before progressing to the next switch. Set dip switch 2 to the ON position, note its meter reading, and return it to the OFF position.

Repeat this procedure for each of the 12 dip switches. Whichever dip switch, when set to the ON position, provides the **lowest meter reading** should now be flipped ON, and all the others set to OFF. This will be the correct setting for the highest feedback suppression. Note the switch position number. Let's call that position N. This will be the tentative final setting, subject fine tuning in the next section.

4. Optional: Compare the sound of K&K to Ultra Tonic

While playing the guitar plugged into an amplifier, listen to the difference in sound between using the feedback suppression and not using it:

- Ultra Tonic: Feedback suppression on (switch position N is on)
- K&K: Feedback suppression off (all switch positions are off)

With feedback suppression off, the pickup will be exactly the same as the K&K. It will have a lot of bass and probably be somewhat muddy in the low end, and a bit dull on the high end. Try tapping on the top, and turn up the amp to get a sense of how easily the guitar feeds back.

With the feedback suppression on, the pickup should sound much clearer. The low end mud should all be gone, and the top end should sound a little brighter. Check the feedback sensitivity. Typically, it will now have at least 10dB more gain before feedback at the main chamber resonance of 90-110Hz. The top will be much less responsive, but should still be usable for tapping effects.

Next, compare the sound with switch position N engaged to the sound with nearby positions N-1, N+1, or N+2 engaged. N-1 will have somewhat less bass. N+1 or N+2 will have somewhat more bass, but a little less feedback immunity. You may prefer the sound of one of these positions if it has enough feedback immunity for your needs.

5. Wrap it up

The pickup installation can be completed three ways, depending on preference. These correspond to the three shorting jumper positions:

- Jumper position 1. An optional switch may be connected to terminal pads 6 and 7 to allow using the pickup with and without feedback suppression. In other words: as an Ultra Tonic or as a K&K. If you want to use this option, James May Engineering can supply a suitable switch and shielded connection wire for a modest charge. Or, you can rig up your own. Mount the switch next to the sound hole, with enough overhang to enable access. A dab of hot melt glue works quite well for this purpose. The pickup signal appears on TIP with respect to SLEEVE ground.

- **Jumper position 2 is the most typical installation.** The pickup always operates in Ultra Tonic feedback suppression mode, and appears on TIP with respect to SLEEVE ground.
- Jumper position 3. The feedback suppression pickup signal is brought out of the guitar on the RING pin. The K&K pickup is wired to TIP. This way, they can be combined with an external switch or even a mixer.

Install the balancing circuit with endpin jack in the end block of the guitar, in the usual way.
Enjoy your new pickup!