Squeezing More Out of a Squeezebox!

Neville Roberts

Neville Roberts describes how he took an already great-sounding Squeezebox Duet receiver to a higher level by fitting some upgraded components.

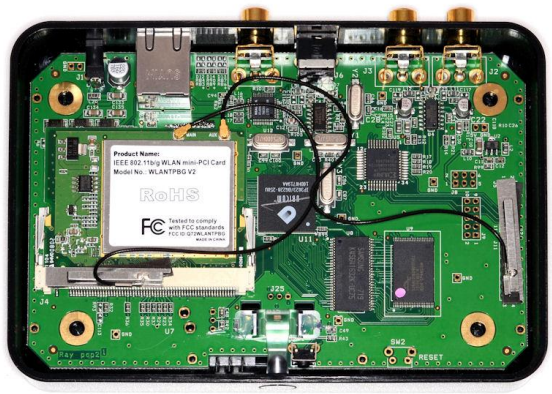
With the arrival of the Squeezebox Touch digital media player reviewed by David Price recently, there are some bargains to be had with the predecessor product; the Squeezebox Duet. Both these products are very competitively priced, but when you can pick up a Duet for under £200, you don't feel so bad about invalidating the warranty by opening the unit up and poking around with a soldering iron!

In essence, the newer model Touch is a one-box unit that has the receiver and display together and can accommodate 24bit 96kHz sampling in native mode (i.e. formats up to this resolution do not need to be transcoded down before streaming to the receiver by the Squeezebox Server software). The Duet, as the name implies, has two units: a wireless remote control display and a receiver, which can only handle 24bit 48kHz files before transcoding is required. However, this is still in excess of the Red Book CD format of 16bit 44kHz sampling so I felt that it was worth picking up a bargain and seeing what could be achieved by carrying out various upgrades.

Of course, there are many companies out there that offer an upgrade service or indeed will sell you a fully upgraded Squeezebox. However, I wanted to carry out the upgrades myself and was therefore delighted to find that Fidelity Audio are also happy to supply individual items for the avid DIYer.

Breaking In

The first task was to remove the lid from the receiver to see what was inside. Peeling back the four corners of the self-adhesive mat on the underside reveals the screws that are removed to loosen the lid. This exposed the modern circuit board (PCB), which alas sported an array of surface-mounted devices (SMDs). OK, I wasn't expecting tag strips (you can tell I'm a valve-man!) but I had hoped for a more conventional design with plated-through holes and components soldered on the underside. Removing SMDs from a PCB is somewhat challenging, but more about that later!



Inside view of an unmodified Squeezebox Duet receiver

The standard Duet receiver, being very competitively priced, has to keep discrete component count to a minimum where possible. There are only 3 electrolytic capacitors in the receiver: one 220uF for the DC input bypass and the other two are 10uF used to couple the output analogue audio from the Wolfson WM8501 DAC to the phono sockets. The remainder of the essential power supply decoupling capacitors are all low value SMDs. The 9V input power is provided by a 'wall-wart' switched-mode power supply and is dropped down to the 5V required to power the DAC by a SMD 7805 regulator on the PCB.

As with good comedy, the secret of good digital reproduction in in the timing! Therefore, the clocks were in my sights for upgrading, along with the power supply.

Fidelity Audio supply a number of clock modules, including a Micro Clock for £89, which is designed for use in the Duet receiver and features dual oscillators and split low noise 3.3V rails. They will also supply a set of six Oscon 470uF 6.3V electrolytic capacitors at £2.65 each for additional power supply decoupling, plus a Rubicon 1,000uF 16V to go across the 9VDC input.

Initial listening

Before getting totally carried away with my soldering iron, I carried out some listening tests with the unmodified receiver. I had a few digital master recordings at high resolutions and bit-rates, as well as a set of the Bach Brandenburg Concertos performed by Musica Florea. The latter recording is available as a CD from Amazon and is also available as a free download from http://www.rozhlas.cz/d-dur/download_eng/_zprava/brandenburg-concertos-free-downloads--366308 in either MP3 or best quality lossless FLAC (Free Lossless Audio Codec) 16/44 format which

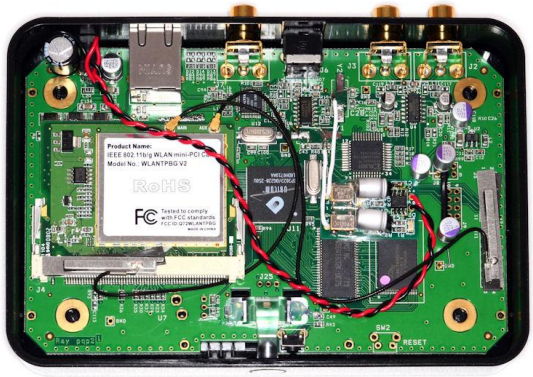
will play directly on the Duet receiver. This gives the opportunity to compare the CD with an equivalent digital source played through the Duet.

Compared to playing the CD on my PrimaLuna ProLogue Eight Mk.2 CD player, the Duet performed well and gave an excellent all-round musical performance. However, A/B tests with the CD revealed that the bass on the Duet was a tad uncontrolled and the top end noticeably harsher compared to the CD. Also, the sound-stage was somewhat two-dimensional on the Duet.

Time to heat up the soldering iron!

Out with the Old

Following the helpful instructions from Brent at Fidelity Audio, I first needed to remove four SMD capacitors and two oscillator crystals from the PCB before I could install the Micro Clock. The problem with removing SMD components is that you need to heat up the component enough to melt the solder, which unfortunately also melts the adhesive that binds the copper track to the PCB! This often means that you end up removing part of the track along with the component and thus you don't have any pad left to solder the replacement to. Furthermore, pads often have two tracks going to them, so removal of a pad breaks part of the circuit! Of course, a highly skilled professional like myself would never have these problems (cough!), but should this happen, I can confirm that you can easily scrape some spare track further along from the pad and use a tiny strand of wire to re-make any connection that have become inadvertently broken! A good magnifying glass or, better still, a jeweller's loupe eye glass is very useful here!

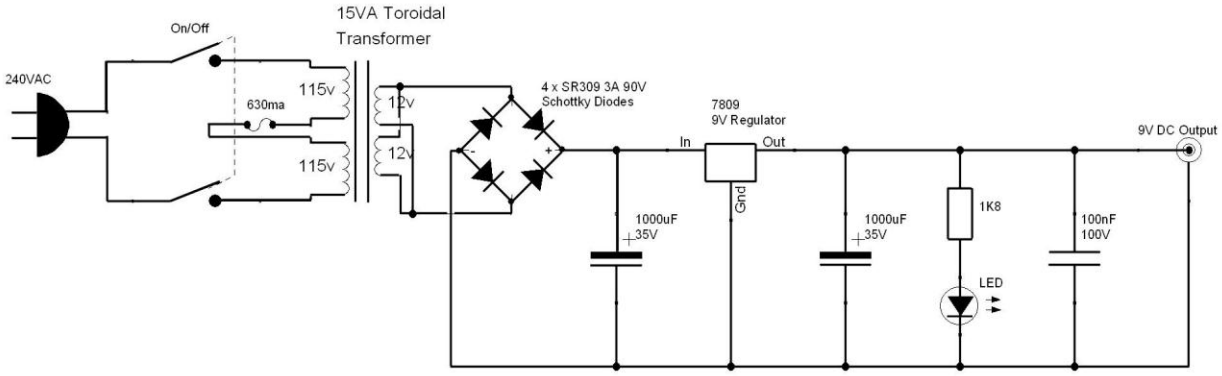


Inside view of the modified receiver

Next, two of the Oscon capacitors were fitted to the Micro Clock (they are not fitted as standard since a variant of the clock can be used in a Squeezebox Touch and there is not enough space to fit the Oscons in the Touch). The Rubicon was then fitted to the spare pads next to the power input socket and the remaining four Oscons strategically soldered into spare pads on the PCB.

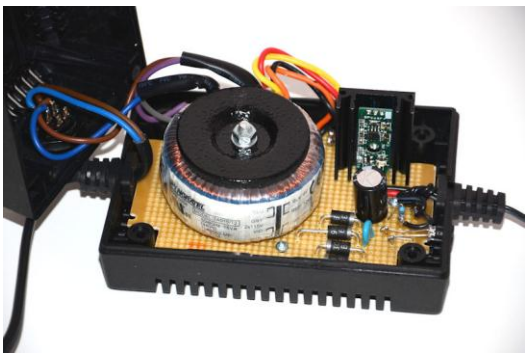
Finally, the clock was wired to two of the pads that were exposed when the crystals were removed; the power leads were connected to the power supply input socket and the clock module itself fastened to the receiver PCB with a couple of double-sided adhesive pads.

Repeating the listening tests revealed that the top end had been significantly tamed and the raspy edge to strings had completely disappeared. In fact, it was very similar to the CD. However, what was quite surprising was the improvement to the imaging. The performers had clearly moved their chairs around to fill a very three-dimensional area in my living room! In fact, I have to confess that it was now superior to the CD performance in this respect – quite an achievement.



Logitech Squeezebox
Receiver Power Supply

Encouraged by the results to far, I turned my attention to replacing the noisy 'wall-wart' 9V switched-mode power supply with a nice linear design. As can be seen from the attached circuit diagram, a handful of quality components, including a nice toroidal transformer and some Schottky rectifiers from Farnell, can be assembled into a neat case from Maplins, and all for around £35. Incidentally, if anyone is put off by the idea of building a replacement power supply from scratch, Fidelity Audio can supply their own beautifully made complete unit, utilising their Spower voltage regulator, specifically for the Duet.



I was not disappointed with the result – the previously loose bass performance had now been reigned in and I was getting lovely deep and crisp notes from the double-bass, but also drums were tight and punchy – lovely.

As a final touch, I replaced the LM7809 9V voltage regulator with an Spower regulator from Fidelity Audio – a drop-in replacement for the 7809. At £42, the Spower regulator is a lot more expensive than a 7809, but it is a worthwhile investment nevertheless. With the Spower regulator fitted, the Duet managed to extract more detail from the music – I could now hear the bowing action as the horse-hair excited the strings of the double-bass.

Conclusions

The overall result is that the Duet now out-performs the CD equivalent – that was something I was not expecting. For a relatively modest outlay, you can transform a humble Duet to out-perform a top quality CD player when fed with studio-quality digital sources. All-in-all, a highly enjoyable project yielding an outcome that exceeded expectations – what more could you ask for?!

--ooOoo—