The ProLogue One AABB Upgrade

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Having read the review of the splendid £800 ProLogue One by Dominic Todd in the August 2004 issue of Hi-Fi World magazine, I was delighted to hear from Herman van den Dungen that he had just produced an upgrade for this amplifier. Herman is the man behind the Ah! brand that gave us the amazing Njoe Tjoeb 4000 valve CD player and he is now designing and marketing valve amplifiers under the name of PrimaLuna. They are available from Ricardo Franassovici of Absolute Sounds in London (020 8971 3909). The ProLogue One is the first of the range to be produced and Dominic scored it as 'Excellent' and also good value for money. However, he did indicate that it had a few shortcomings and I was hopeful that some of these would be addressed by the upgrade.

Figure 1. The ProLogue One with the Valve Cage Fitted

The amplifier is as heavy as you would expect with quality transformers, weighing in at 35.5lb. The valve line up consists of Electroharmonix 12AX7 and 12AU7 drivers feeding a pair of EL34s running in Class AB push-pull mode to deliver the 35W output. The quality of finish of the amplifier is very high and there is a removable cage to protect the valves (see Figures 1 and 2). Of course, with this article being for the DIY Supplement, I wasn't going to stop there! I soon had the bottom cover off so I could access the screws holding the transformer cover in place and removed that as well! With reference to Figure 3, the mains transformer on the left sits behind the two large mains smoothing capacitors and the two output transformers can be seen on the right. Turning the amplifier over to expose the inside shows just how beautifully it is made (Figure 4). All the wiring is point-to-point with high quality components and cabling, as well as metal screening that is securely screwed to the main chassis. Herman achieves this level of quality in an amplifier of this price by having them built in China. The power supply uses solid state rectification, but employs a smoothing choke, which can be clearly seen on the left. The only printed circuit board used is for the fixed bias components. This is the board that will be replaced by the AABB.

Figure 2. The Cage Removed

So what exactly is an 'AABB'? This stands for Adaptive AutoBias Board and the upgrade consists of replacing the fixed bias board with this board. However, before attacking the ProLogue One with my soldering iron, I connected the amplifier into my system and settled down for some listening tests with the unmodified unit.

My initial reactions were most favourable. With no signal and my ear close to the bass unit of my somewhat inefficient transmission line loudspeakers, I could detect no hum whatsoever – quite a feat for a valve amplifier! Starting off with some baroque music, the amplifier had the distinctive 'valve' sound with a warm but clear top end. At normal listening levels, the strings sounded melodic and flowing with no harshness. Image placement was very good indeed, although there was not the depth to the sound that I was used to.

Figure 3. The Amplifier with all Covers Removed

Moving on to a full orchestra, the bass drum in the opening section of Stravinsky's The Firebird Suite was clearly there, although it did seem a little uncontrolled. Pulling out all the stops with the infamous Telarc digital recording of Tchaikovsky's 1812 Overture, the live cannons certainly packed a punch, but the clamouring of the bells in the conclusion made me feel that the amplifier was having a little difficulty in keeping up with all that was going on!

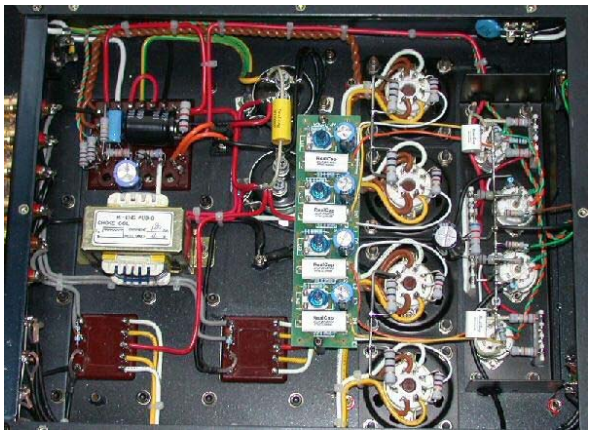

Figure 4. The Inside of the ProLogue One

On the lighter side, Thelma Houston's vocals in the Sheffield Labs direct-to-disk recording "I've Got the Music in Me" had a presence that was quite captivating and the bass was very well extended, but here again it tended to be a bit muddy if you turned the wick up.

All in all, it is a very good sounding amplifier, perhaps best suited to either rock music or small musical ensembles and for the price, it is very hard to beat.

The Adaptive AutoBias System

Now it was time to install the Adaptive AutoBias Board. Firstly, a bit of theory. According to Marcel Croese, Herman's resident technical genius, bias is mostly achieved by passive circuitry that is tied to an active part in the signal path. Generally this only works in the DC domain and passes all the delicate audio information without affecting it. For valve output stages, either fixed bias or self bias (cathode bias) is used. Fixed bias is used in the original ProLogue One as it is efficient and has a minimal affect on the signal. Self-bias requires a

large capacitor to bypass the cathode resistor and this arrangement has the potential to affect audio quality more than fixed bias and also tends to waste power. However, fixed bias has problems too as the circuitry is unable to track the valves' changing characteristics over time. It can also exhibit non-linear behaviour under standard conditions, adding distortions and unwanted signals to the audio signal.

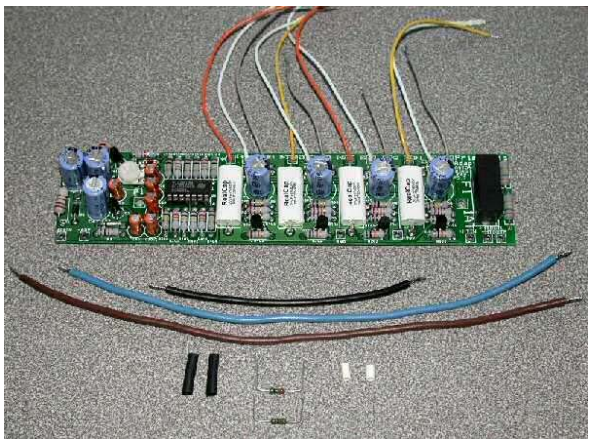

Figure 5. The Upgrade Components

In an effort to get rid of these drawbacks, Marcel and his team have developed the Adaptive AutoBias system. The system is inherently linear and presents no reactive load to the valve circuitry whatsoever. It is also completely stable under all normal temperature and voltage conditions. They have achieved this by employing high quality parts throughout the circuitry that have precisely defined temperature coefficients.

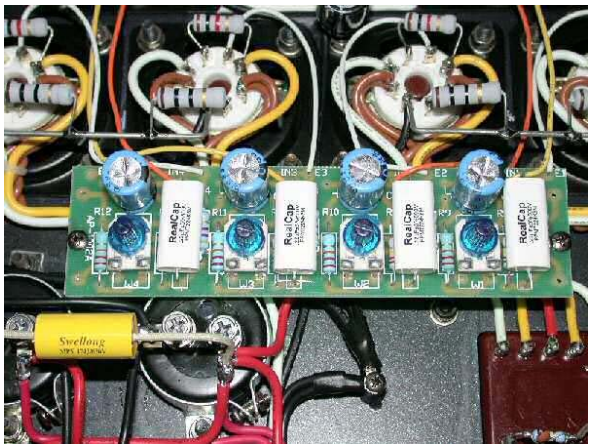

Figure 6. The Manual Bias Board Ready for Removal

The other problem to overcome is that a fixed bias system does not compensate for the valve's tendency to use the audio signal as an extra bias voltage, especially at high levels and low frequencies. The fixed bias, as the name implies, keeps on injecting a fixed voltage upon which the audio signal rides. This can result in moments of impoverishing the valves, pinching them off slightly, producing instances of rapidly elevating crossover distortion and compression, bringing a certain harshness to the sound. This could be the cause of the criticisms I found with the unmodified ProLogue One.

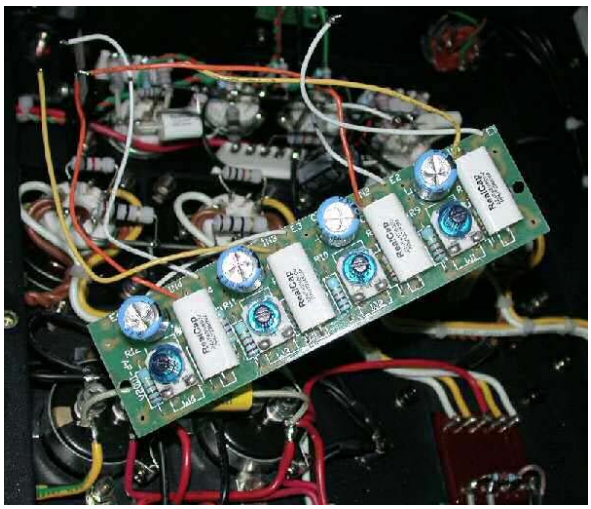

Figure 7. The Manual Bias Board Disconnected and On Its Way Out!

The Adaptive AutoBias system avoids these problems by reading the audio signal and making infinitesimal adjustments to the bias voltage which, Marcel claims, results in far superior valve behaviour and dramatically reduces distortion levels by more than half. So much for the theory, but will it work in practice?

Installing the AABB

Figure 5 shows the upgrade parts that Herman sent me from Holland. Everything was included, including a pair of resistors and

heat-shrinkable tubing to enable a small modification to the global feedback network to be made and four resistors fitted to the ends of each wire going to the EL34s to improve stability and reduce HF distortion. Plugging in my trusty soldering iron, I set to work on the ProLogue One. I had been given access to information for distributors and dealers that provided me with very clear step-by-step instructions on how to undertake the upgrade. Firstly, the power supply capacitors were checked with my multimeter to ensure they were completely discharged; otherwise a 100 ohm 9 Watt resistor applied across the terminals does the job far less painfully and more effectively than my fingers! Now the original fixed bias board could be removed (Figure 6). This entailed unsoldering 8 wires from the valve sockets, two power supply wires from the board and removing the two screws that held the board in place (Figure 7).

Now it was time to fit the new AABB (Figure 8). This was a bit more fiddly as it involved cutting, stripping and re-routing leads from the power supply to accommodate the new board - 7 connections in all. The board could then be screwed in place and finally the 12 wires from the AABB had to be connected to the appropriate valve socket pins.

Finally, the global feedback network was removed from its original location as shown in Figure 9, to allow the additional resistor to be installed in its place. As can be seen in Figure 10, a small piece of white tubing was supplied to indicate that this little modification had been carried out! The feedback network was then re-installed closer to the valve by wiring it directly onto the valve base (Figure 11). That completed the installation of the upgrade and Figure 12 shows the AABB in place.

Normally, the AABB requires no adjustment as this is undertaken in the factory. However, an upgrade board will

Figure 8. The AABB

Figure 9. Feedback Network in its Original Position

Figure 10. Feedback Network replaced with a Resistor

Figure 11. Feedback Network in its New Position

not have been installed before and so an initial adjustment is required. Once set, this will never need changing, even when replacing valves, as the circuit automatically compensates for this. There is one potentiometer on the board that sets the bias conditions for all four output valves. All that is required is to connect a multimeter set to the 2VDC range to pin 8 (the cathode) of one of the EL34s and switch on. As the amplifier warms up, the voltage should start to slowly rise to about 0.6V, then drop to around 0.2V and finally settle on 0.35V. If the voltage is too low, the potentiometer should be adjusted to set the final voltage to 0.35V. The remaining three valves can be checked to see if they behave in the same way to ensure that the board has been wired in correctly. No further adjustment of the potentiometer should be required.

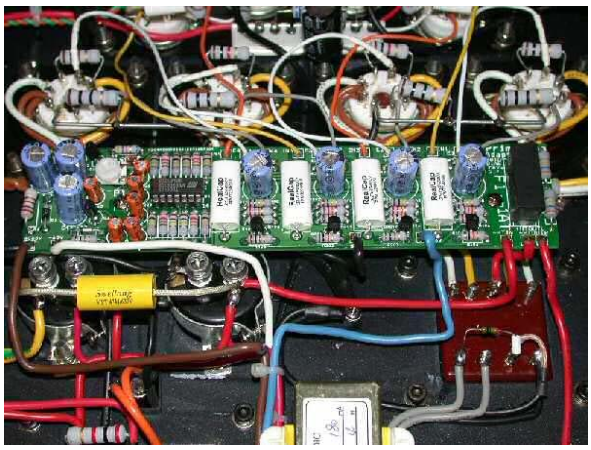

Figure 12. The Finished Upgrade

It is interesting to note the behaviour of the circuit when checking the remaining valves as this entails switching off the amplifier, moving the multimeter to the next valve's cathode and switching on again. Since the amplifier has already warmed up and given that solid-state rectifiers have been used in the power supply, one would normally expect the output valves to conduct fully for an instant at switch-on, with a fixed bias design. This would shorten the life of the valves. However, the AABB includes circuitry to compensate for this and when power is re-applied, the voltage (from the residual charge stored in the power supply capacitors) drops to zero for a couple of seconds, before slowly rising as before. All clever stuff!

Listening Tests

Now it was time to settled down to do some serious listening tests. In view of the claims made by the designer and the shortcomings I had found with the unmodified unit, I was hoping to hear improvements, such as greater clarity and tightness of bass and a reduction of harshness. I was not disappointed: the improvement was nothing short of amazing! The overall difference with the AABB installed is considerable, and almost unbelievable when you take into consideration that it was the same amplifier, but biased more intelligently.

The strings positively sparkled with clarity and had lost the harshness that I had previously detected at higher volumes. Baroque music sounds cleaner and clearer. As for the bass, it was still tuneful, but was much more controlled and tight. My recording of the 1812 Overture with live cannons was breathtaking and the clamouring of the bells in the conclusion was clear and uncluttered - no problem for this amplifier now! The bass drum had clearly been tightened up in the opening section of the Stravinsky. One criticism I had of the unmodified amplifier was that it seemed to have difficulty in coping with the complex sound of a full orchestra. The AABB had solved that problem completely. Organ music sounds superb - totally clear with clean bass registers and a transparent top end. The vocals of Thelma Houston were so much clearer, even at high volumes, and did not sound boxed in as they did previously.

The AABB will add about £100 to the cost of the ProLogue One. I would say that, at £900, this is even better value than the original ProLogue One at £800. It is beautifully made and

looks splendid, especially with the valve cover removed (who would want to keep them covered anyway?)

The upgraded ProLogue One is simply the best sounding Class AB amplifier I have ever heard, at any price. Need I say more?

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