Audio Restoration Upgrade Project: Repair B&O Bang and Olufsen BeoCenter 9300 FM AM LW receiver with integrated Cassette Tape-Deck and Philips CD Player.

This applies to BeoCenter 8000, 8500, 9000, 9500, and 9300. This was the last of the classic Jacob Jensen flat-profile model series. Although they look almost identical from the outside, under the hood there are some differences between the models.

Due unfortunately to space-saving and cost-cutting considerations, all these units do not have discrete amplifier sections, but compact Sanyo Hybrid STK power amplifier IC's.

The earlier versions used the Philips CDM-2 CD transport, and the later versions the CDM-4, CDM-12, and CD-PRO units.

Power circuits are slightly different, but there are sufficient similarities for this guide to be a good starting point for any enthusiasts to improve their units substantially.

The sound was quite flat, and uninspiring, and based on previous experience, I knew that the right touch in the power section, and the signal paths would do wonders. I also intended to replace the 4 LM4558 SMD op-amps in the preamplifier section.

After opening it up, and making a quick inspection, I was very disappointed to find that apart from a few isolated exceptions, almost the entire capacitor complement was sourced from Samwha Korea.

B&O used to be a loyal customer of Philips, whose excellent BC Components capacitor division is now part of Vishay – a real pity to observe that the former vibrant commercial partnership (and resultant high-quality) between B&O and Philips Vishay is now very much downgraded.

I decided instantly that all of these absolutely mediocre Samwha capacitors would be removed – well over 100 of them, and would be replaced by my favorites from Panasonic, Nichicon, and Wima. This obviously involved a lot more work than I had originally intended.

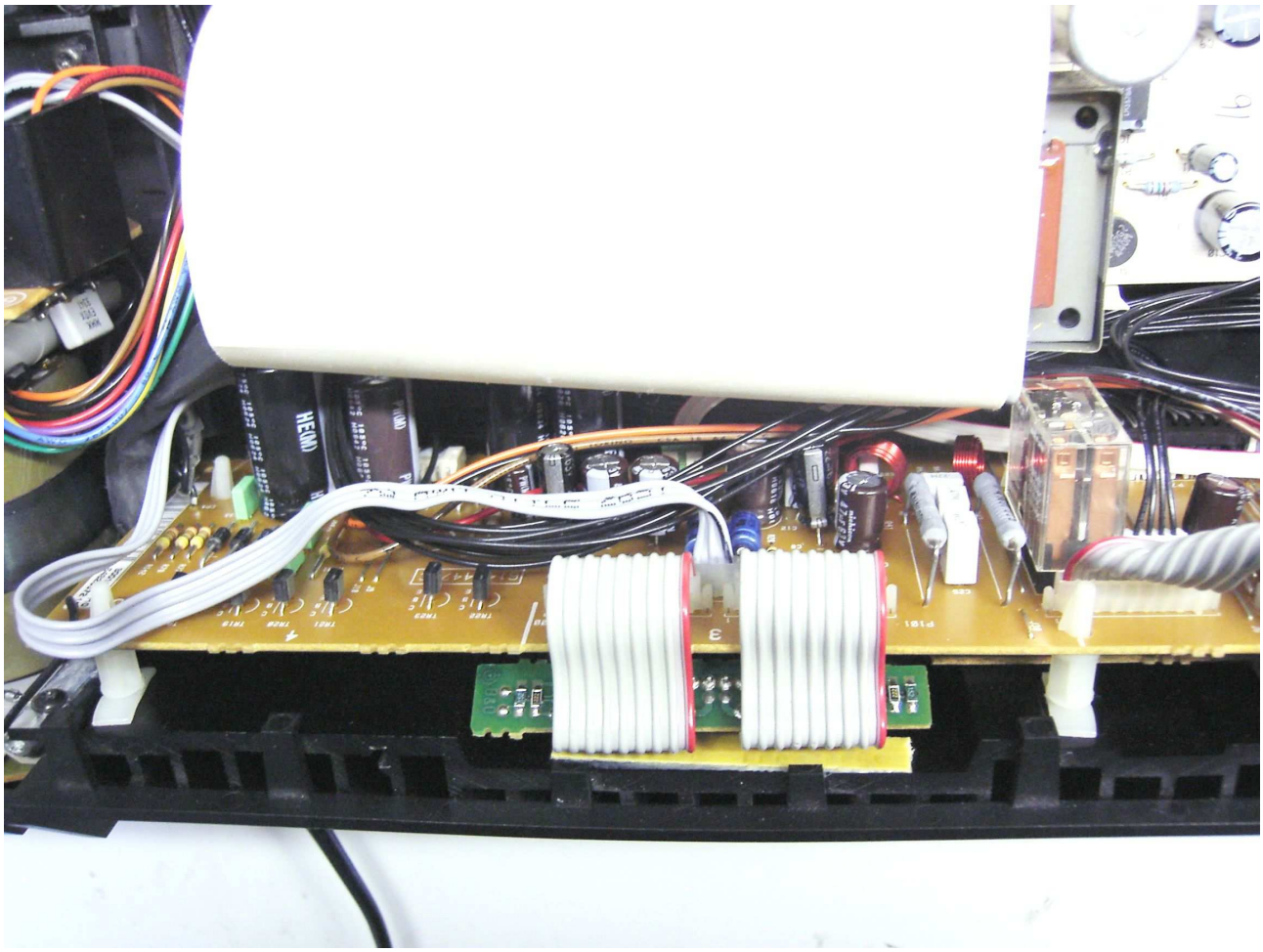
The circuit boards appear to be Pertinax-type paper-fibre, not the glass-fiber FR-4 I would have expected at this price-point. Nevertheless, they are all single-layer non-plated, which makes for relatively easy soldering technique.

1. Output Power Amplifier PCB rebuild

PCB 10 contains the output amplifier stages with the Sanyo Hybrid STK4151 IC's. I like the design very much, just a pity about the actual output being through those IC's! If one wanted to be creative, tweaking the output voltage upwards could enable their substitution with more powerful STK4201 or 4211 units.

On this PCB, I used Nichicon HE and PW decoupling capacitors, 2 Elna Silmic II coupling capacitors at C8 and C14 in the signal path, 2 new BC AML138 in place of the older dried-out ones, and 4 11DQ10 Schottky diodes to replace the 1N4002's on the bridge.

I also resoldered all the joints on this PCB, as I had noticed faint cracks on the bridge joints.



2. PreAmplifier PCB rebuild

PCB 9 is probably the most important PCB concerning sound quality. All capacitors, except one, are signal path coupling capacitors, and the 4 SMD 4558 op-amps are on the reverse side. I replaced all the coupling capacitors with Elna Silmic II capacitors (the only 85ºC capacitors I use – all others are 105ºC). The 1uF capacitors were replaced by Wima MKS2 units.

Replacing the 4 SMD 4558 op-amps with new OPA2134's was very time-consuming, and required a lot of patience to avoid damage to the extremely fragile trace-pads. Even though the OPA2134 is my hands-down favorite for audio op-amp replacement, I wanted to be absolutely sure that I was doing the right thing here. So, I replaced IC5 (CD Left channel) with an OPA2134, while leaving

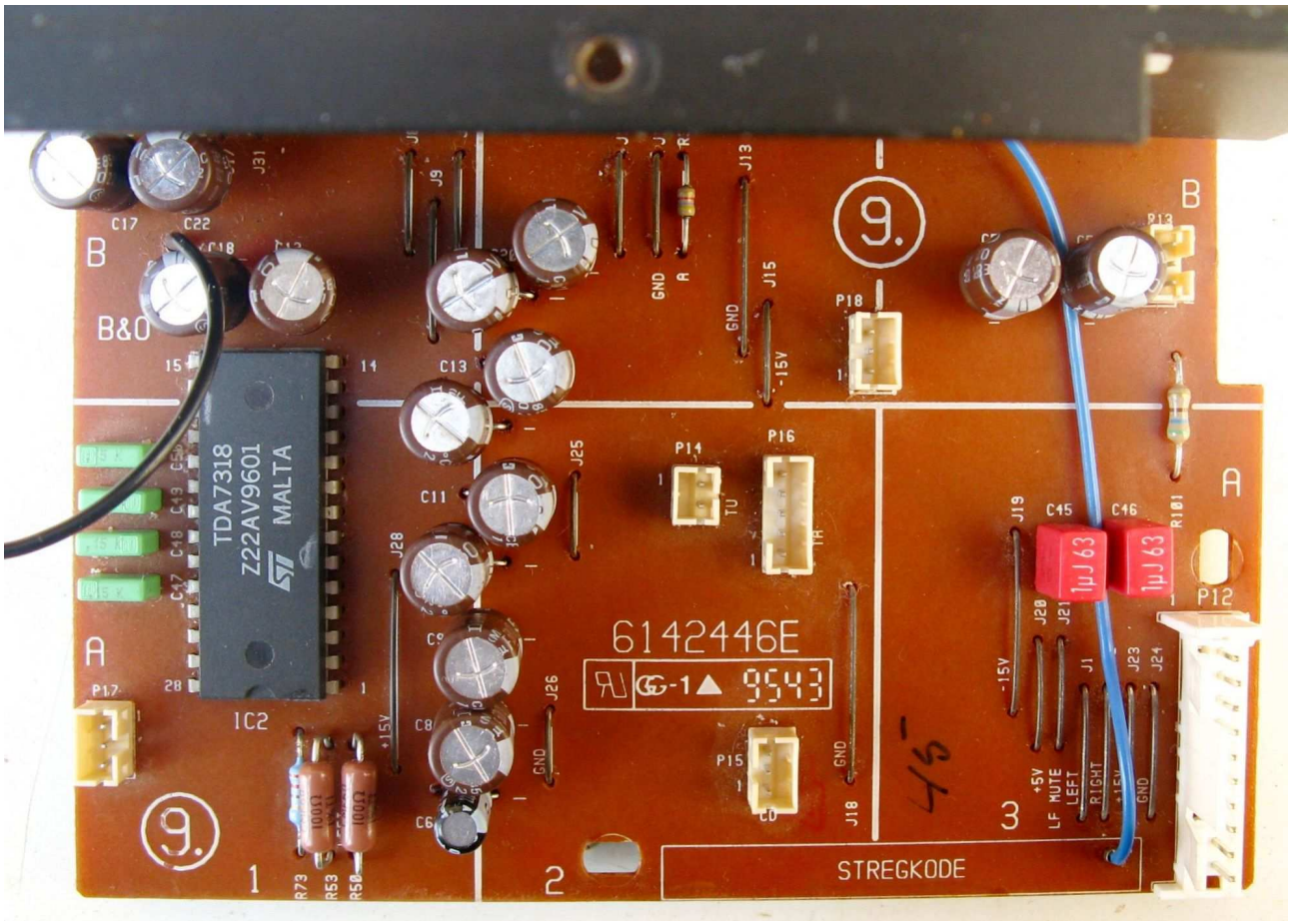
IC4 (CD Right channel) as the original 4558. The very audible difference brought a smile to my face - apart from the higher volume audible on the Left side, I heard sonic detail more clearly, which was masked on the Right side.

So once again, the OPA2134 wins for its sonic quality, and absolute ease of installation when replacing older op-amps. Here, no circuit modifications are required.

I also replaced the 2 TTH (through-the-hole) resistors with Vishay Dale RN60 resistors, which give very good audio quality.

A brief note here – don't touch metal oxide resistors when restoring audio – their audio quality is terrible. Use metal film wherever possible, and if the inductance is critical (low-ohm values), use carbon film.

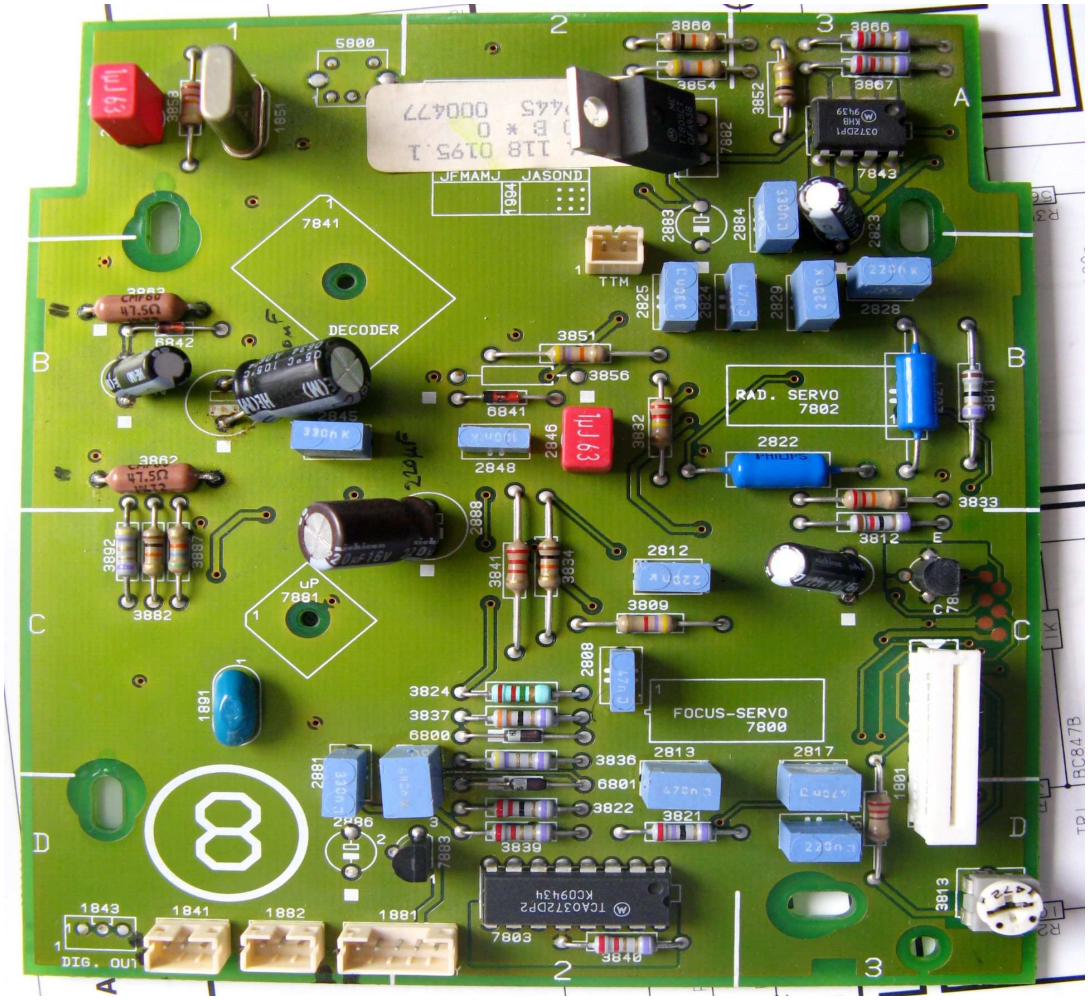
Here, I also resoldered all the DIN-5 sockets on the PCB, which were showing signs of lifting from the tracings.



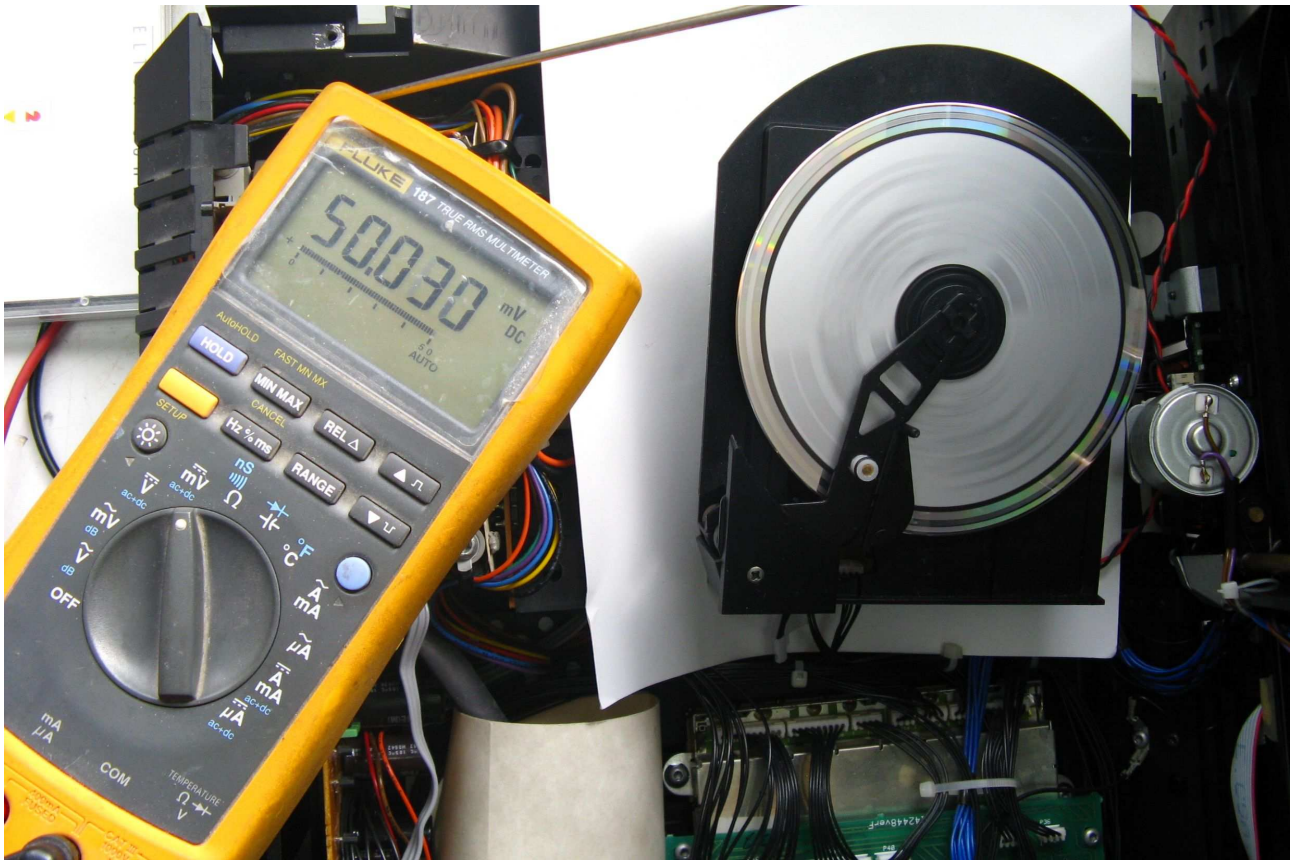
3. CDM-4 Laser-Servo PCB rebuild

PCB8 is the Servo Control for the reliable CDM-4 laser. Here I replaced all the electrolytics with Nichicon HE and Wima MKS2. C2815 and C2823 were upgraded from 33uF to 47uF, based on years of experience showing that the laser focus and motor perform far more efficiently with better stabilized current.

Notice that this CDM-4 Servo PCB has its own built-in 5-volt TO-220 regulator. This addressed one of the shortcomings of the earlier CDM-2 Servo PCB, which did not have a built-in regulator (10 Volts), and this is one of the modifications I developed for the CDM-2, details of which can be found on my website Home Page (Projects), in my Philips CD650 pdf article.



I calibrated the laser current for the factory-specified 50mV, as shown below.



4. Additional work

On the Rectifier PCB 62, I replaced the 4 1N5401 bridge diodes with 31DQ10 Schottky units.

On the Tuner PCB 1, I replaced all the electrolytics with Nichicon PW and Wima MKS2 polycaps, and C48 in the signal path with an Elna Silmic II.

This necessitated a realignment, quite simple according to the Service Manual. I use a Panasonic VP8193A Signal Generator, coupled to a Tektronix 2465B oscilloscope.

On the Tape PCB 7, all electrolytics were replaced, as well as the 3 rubber belts, sourced from Marrs Communications in Texas USA, a very reliable supplier. I checked the signals on my oscilloscope, but no adjustment appeared necessary.

5. Conclusion

The sound quality now, can best be described as "solid". The sound jumps out at the listener, instead of hiding behind a curtain. The timbre of high treble is extremely pleasing, and the punchiness of its tight bass is a welcome change from what it used to be.

Well worth it!

Parts for this restoration

Parts and advice are available for owners who wish to tackle this project by themselves.

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