

A Greek Hybrid in Blue

A conventional bipolar transistor and tubes amp project done with a Greek flavor.

PHOTO 1:
The Hybrid
Blue amp.



I needed more power, which the tubes were not able to offer—except for maybe some parallel push-pull with six or eight KT88s, heavy and very “hot” constructions I tried before consulting some Philips books. Because the climate conditions

state power stages, explaining how to improve the old diagrams such as Tiger, Ampzilla, and so on).

I made the PC board for the power stage able to drive 3+3 MJ 15024 and 15025 power transistors, both PNP and complementary NPN ones. For the power supply, I used two separate transformers (toroidal), made by my friend Tim Giatras, and two complete separate rectifiers and filters, as in “dual mono-block” constructions. The line preamplifier uses two 6H8Cs (the Russian equivalent of 6SN7), and the phono stage uses two ECC83s (12AX7). The huge metallic chassis was built by George, and the aesthetics belong to Aris. I made all the rest.

My first plan was to build an amplifier that would “move” my heavy, monstrous speakers, having very good sonic performance and combining the good bass response offered by the power transistors with the sweet tube middles. But

have changed here in Greece, I decided to use the transistors, which broke my heart. The best approach was to use MOSFETs or conventional power TO3 transistors such as the Motorola series 15.000 MF SO (credit Douglas Self, who advanced the development of solid-

DIAGRAMS

The block diagram of one channel is in Fig. 1, showing the black boxes as follows:

- the solid-state power amplifier on PC

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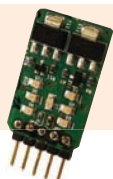
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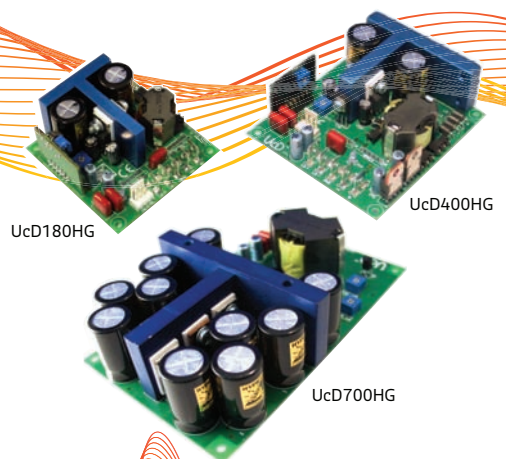
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- board
- the line preamplifier, containing one old Russian 6H8C, first working as a preamplifier, and the second as a cathode follower, to match the input of the differential amp of Mr. Self
- the RIAA phono stage (ECC83/12AX7) with a classical passive RC circuit.

Figure 2 shows one of the two power supplies, simplified.

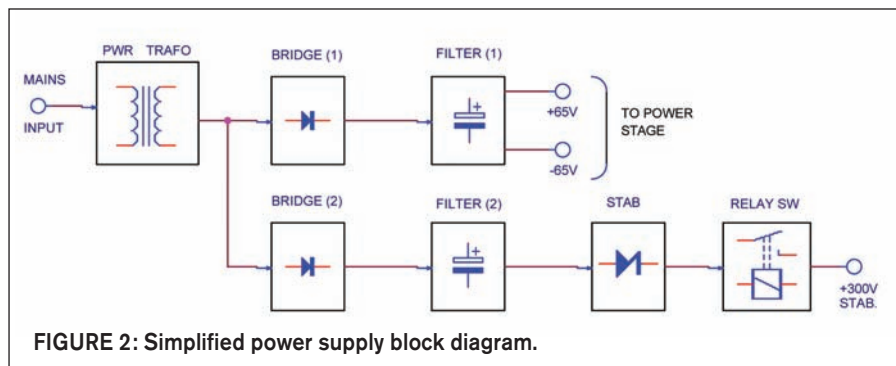
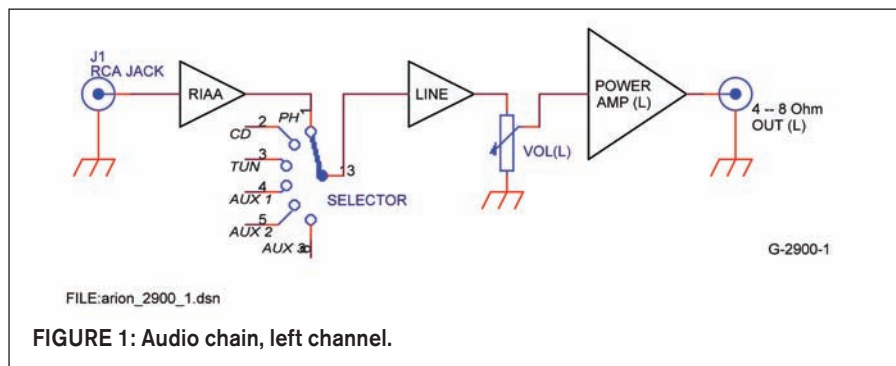
THE POWER STAGE

The setup (**Fig. 3**) included three NPN transistors MJ802 (I used MJ 15024) with their pairs PNP (MJ15025) mounted on a huge aluminum heatsink, along the left and right sides of the metallic blue chassis. This worked easily and almost cold, after I carefully adjusted the bias (10mV). I also screwed the transistor MPSA06, responsible for the bias, on the heatsink. All the stages of this power amp were working perfectly, but I preferred to build the two PC boards, just to be sure.

The amplifier worked fine at $\pm 65V$, having considerable power, on both 4

and 8Ω output charge. It was exactly 185W RMS on 8Ω and 285W RMS on 4Ω , and the spectrum was also incredibly good, ranging from about 5Hz to

about 98kHz. Of course, I carefully selected all the transistors, not to mention the rest of the parts. I would like to express my gratitude once more to Doug-



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and practical perspective. Those books made me reconsider my points of view about transistors! Of course, I would not betray my beloved glass tubes.

C1	1μF, 50V
C2, C3, C11	100N, 200V
C4, C10, C12	220μF
C5	15P
C6, C7	47μF, 50V
C8	100P, 50V
C9	1μ, 50V
D1	1N004
JP1	A
JP2	C
K1	RCA IN
L1	zobel, 10mH, 15 turns, 1.5mm copper wire
P1	1K
R7, R14, R18	1K
R1, R9-11	10K
R2, R4, R16, R19, R20	100
R3, R5	68
R6	150
R8	33
R12, R15, R21	220
R13	2K2
R17	10R
R22-27	0.22, 10W
R28, R29	10 2W
T3, T1	56
T2, T4, T9, T10	MPSA06
T5-7	MPSA56
T8	NPN MPSA56
T11	MJE340
T12	MJE350
T13, T14, T17	MJ802
T14, T16, T18	MJE4502

The line preamp (**Fig. 4**) is a double triode 6H8C (6SN7), with the first working as a class A preamplifier—classic automatic bias, and the input is con-

C1	2μ2, 250V
C2, C10	470μF, 100V
C3, C9	470N, 100V
C4, C7, C11	1μ, 400V
C5	6N8, 100V
C6	18N, 100V
C8	100μF, 100V
K1	Phono In
K2	Rec Out
P1	100K Vol. log
P2	47K Master Gain
R1, R3, R7, R12	100K
R2, R8, R11	1K5
R4	56K
R5	6K8
R6	270K
R9, R13, R16	1M
R10	120K
R14	1K
R15	47K
R17	220K
S1A	2P 6 pos, Selector
V1	12AX7 (ECC83)
V2	6SN7 (6H8C)

I built the phono stage around the ECC83—TFK type, with the classical RIAA corrector connected between the two triodes. I carefully selected and measured the parts to make sure they were of good quality. The input sensitivity permits connection to MM type heads. I also tried to use 12AX7 and the Russian 6H2P, which needed a little base change (6H2P works only with a 6.3V heater), and the differences were minimal. The RC-RIAA circuit is very simplified, but readers could try many other circuits, such as those published in *Glass Audio*.

Because I am dealing with dual monoblock construction (**Fig. 5**), I used two big toroidal power transformers, built by Tim Giatras, who has helped me for many years to make my crazy valve



dreams real. Both transformers deliver the same tensions and current in the secondaries. The power secondary is rectified with a special bridge mounted on the 5mm aluminum base, and

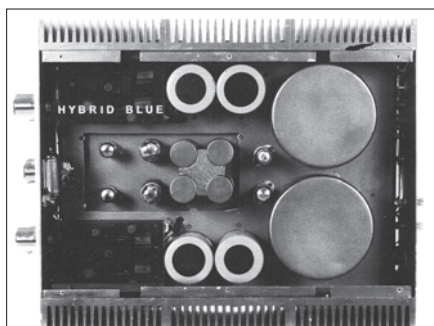


PHOTO 2: Top view.

the symmetrical tensions are filtered by two Nippon Chemicon capacitors (27,000MF), shorted with the RC (47k + 0.2MF). The second bridge will deliver the high tension necessary for the tube section, where I used a stabilizer tube (ECL82-6F3P-Russian), a triode/ power pentode (the American equivalent is 6BM8). In order to give a little

time to the tubes, I used a special relay tube, the same way Ed Dell did in his special construction issue (*Stereophile*) called "The Brute."

It worked well, and I was very sorry I could not find more of these same parts. The third bridge is used for the 6.3V DC for the heaters of all the tubes, including the relay tube. I found it unnecessary to stabilize the heaters, too. In the front panel, I mounted a magic eye (EM84) to show when the mounter is ready to kill. I did

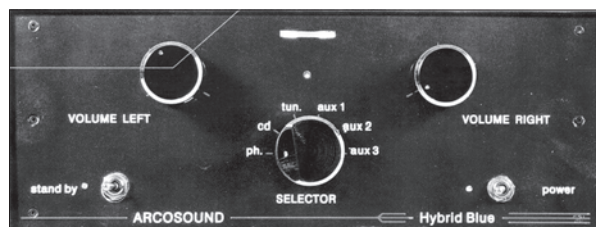


PHOTO 3: Front view.

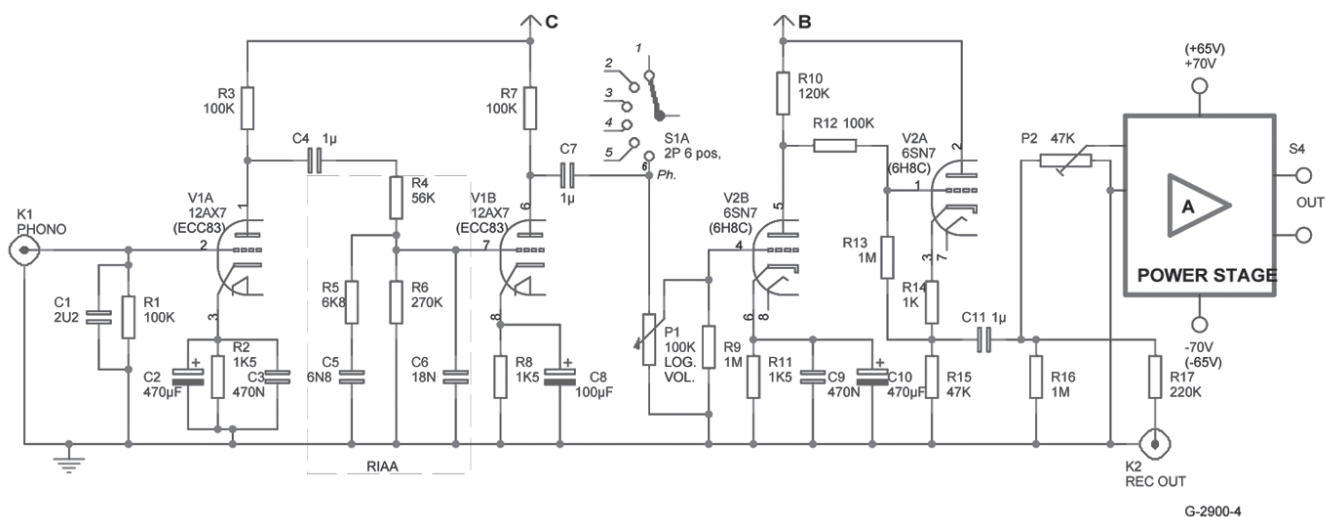


FIGURE 4: Tube preamp and power stage (one channel).

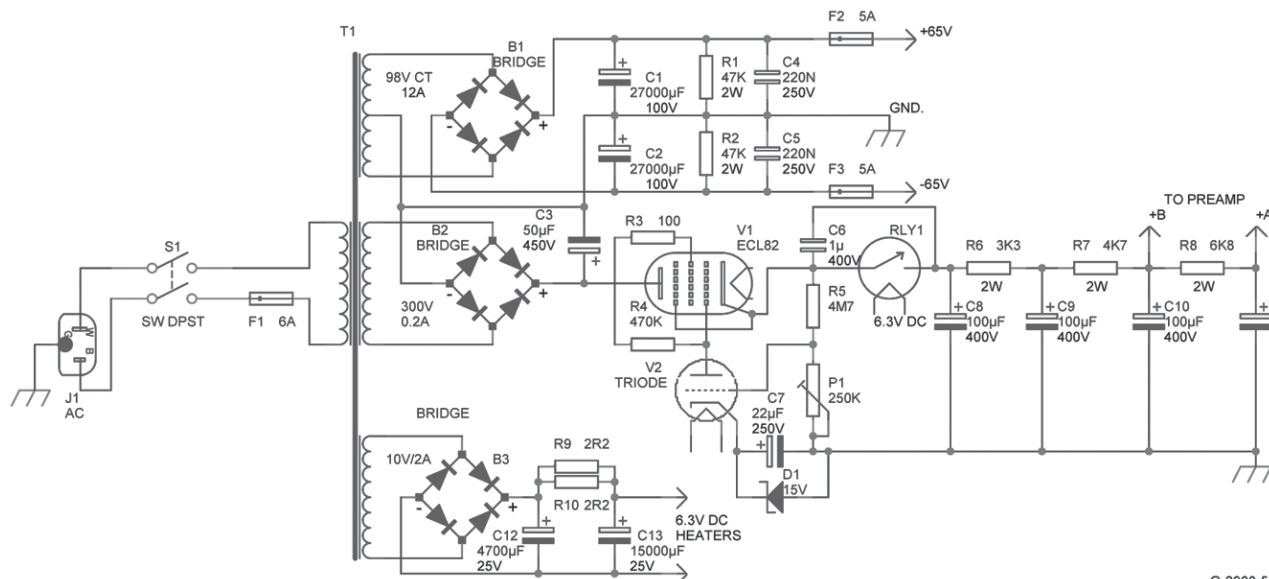


FIGURE 5: Powerw supply.

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not want to make the magic eye "dance with the music," so I did not connect the EM84 input to the speaker.

MECHANICAL MOUNTING

As you can see from the photos, the Hybrid Blue was not an easy amplifier to mount. The base of 55/40 cm/5mm aluminum contains the two transformers, the two heatsinks, the mini chassis for the preamps, with their Elko, filter capacitors. In the front on a second chassis are the two PC boards of the power solid-state amplifiers, and in the back are the stabilizers. The power transistors support is Argon soldered to the sinks, same as the heatsinks between them. The massive plexiglass (8mm) cover (engraved back side), the front panel made

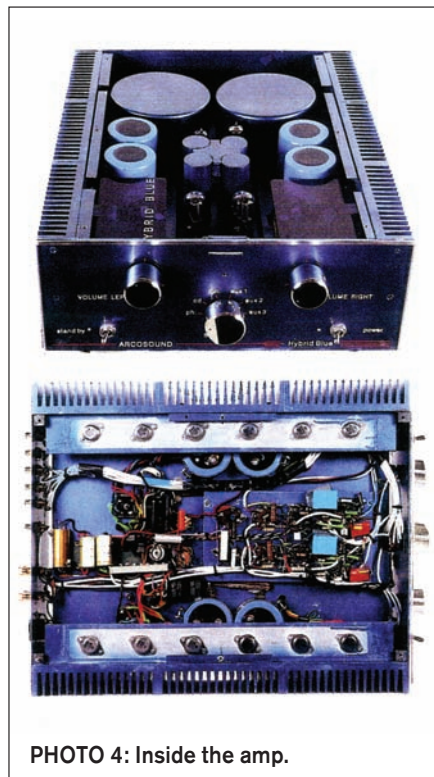


PHOTO 4: Inside the amp.

from aluminum and plexiglass (also engraved), and the custom heavy knobs complete the image of the Hybrid Blue.

PERFORMANCE

The RMS power on an 8Ω load was 185W, and 285W on a 4Ω load. The frequency response was ±0dB from 5Hz to 98kHz, and the THD was under 0.05%. The "Sound and Image" team tested Hybrid Blue, and they put it to work with the most insensitive and heavy speakers such as ATC S171—from Audio Spectrum, and TAOC-Japan, and so on, and the sonic impressions and the positive feedback were the best. If you want to find more about all our Greek amps, please contact me at arcosound@hotmail.com. *ax*

TABLE 3: Power Supply Parts List

B1-3	Bridge
C1, C2	27,000μF 100V
C3	50μF 450V
C4, C5	220N 250V
C6	1μ 400V
C7	22μF 250V
C8-11	100μF 400V
C12	4700μF 25V
C13	15,000μF 25V
D1	15V zener
F1	6A
F2, F3	5A
J1	AC Input
P1	250K Lin
RLY1	relay thermal
R1, R2	47K 2W
R3	100
R4	470K
R5	4M7
R6	3K3 2W
R7	4K7 2W
R8	6K8 2W
R9, R10	2R2 10W
S1	SW DPST
T1	98V CT
T2	10V/2A
T3	98V CT
V1	ECL82
V2	Triode

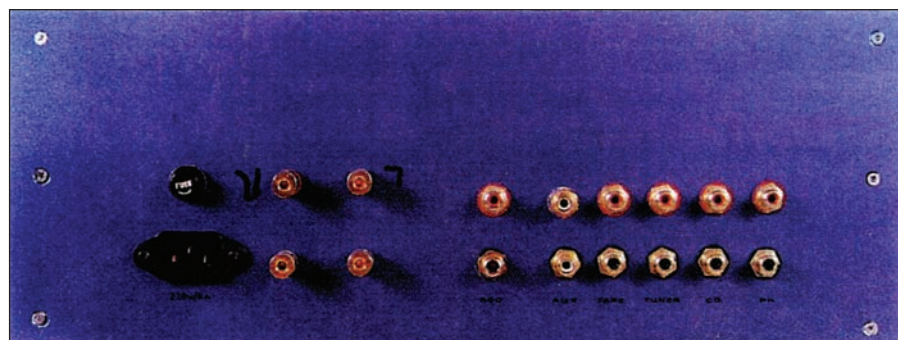


PHOTO 5: Rear view.