

Description installation, commissioning and regulating amplifier HA2012 headphone, AT clone - HA5000

Work on the above start from the holes soldering buck the system board so that it can be fixed in one side supports the heat sink, including the two holes needs to be done from the ground - which are in front of the printed circuit board (for the front define a part of the radiator) and the remaining four holes need only rozpiłować of round elongated shape. I was doing it manually using the abraded to "needle" to the metal blade designed for jigsaws BOSCH, before the existing holes dowiercićem two more, one in front and one behind them - will be easier rozpiłować. Once the holes are formed, respectively, and the plaques can be inserted into the end without any special resistance to be on the print side scrape carefully with a sharp knife a little soldermask around these holes, it's about half a larger solder for better zalutowania plaques. I at home soon uncovered copper around the holes to form solder pads with a size of 4.5 x 7mm. I recommend caution and precision, not to unnecessarily soldermask scratch, then it looks bad. The exposed copper cynujemy carefully as soon as possible, removing the excess tin extractor so that the plaque without problems slide into the holes.

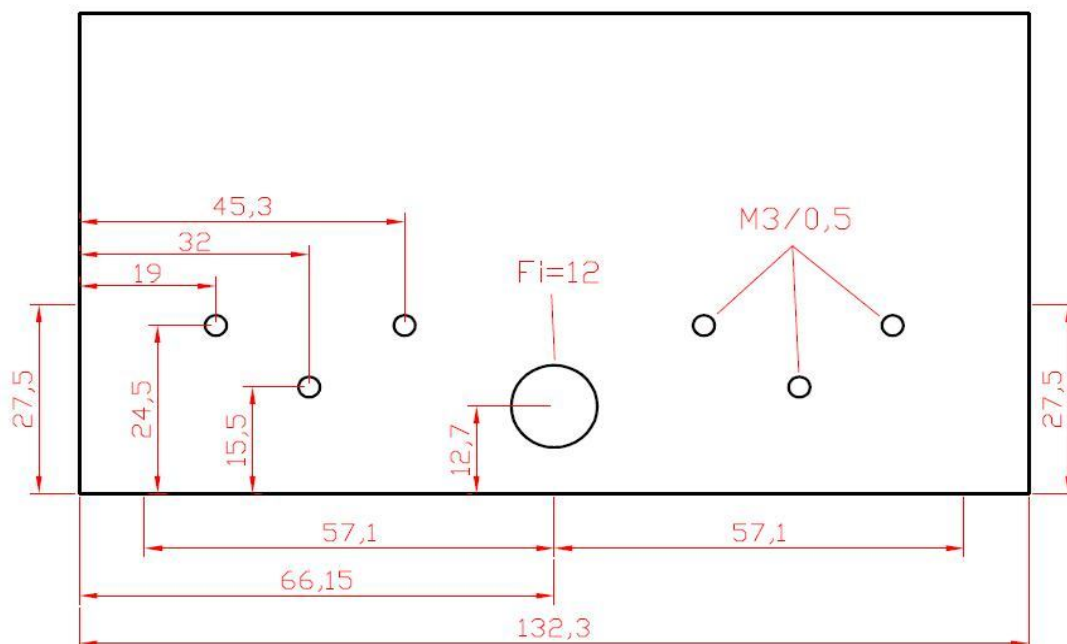
We are already behind.

Now turn to the preparation of the heat sink. Operations will discuss the example of dedicated element symbol **RAD-A52317 / 70** (eg. TME).

The heat sink is too long and we have to go from one side to the length of cut 132,3mm.

The following figure shows the proposed distance of drill holes a diameter of 2.4 - 2.5 mm. Such a tap holes then nagwintujemy M3 / 0.5. During threading remember to tap a rich wetting eg. Denatured alcohol or other alcohol, preferably kerosene. I suggest tapping same operation performed with great sensitivity, it is very easy to break the tap, thus destroying a heat sink.

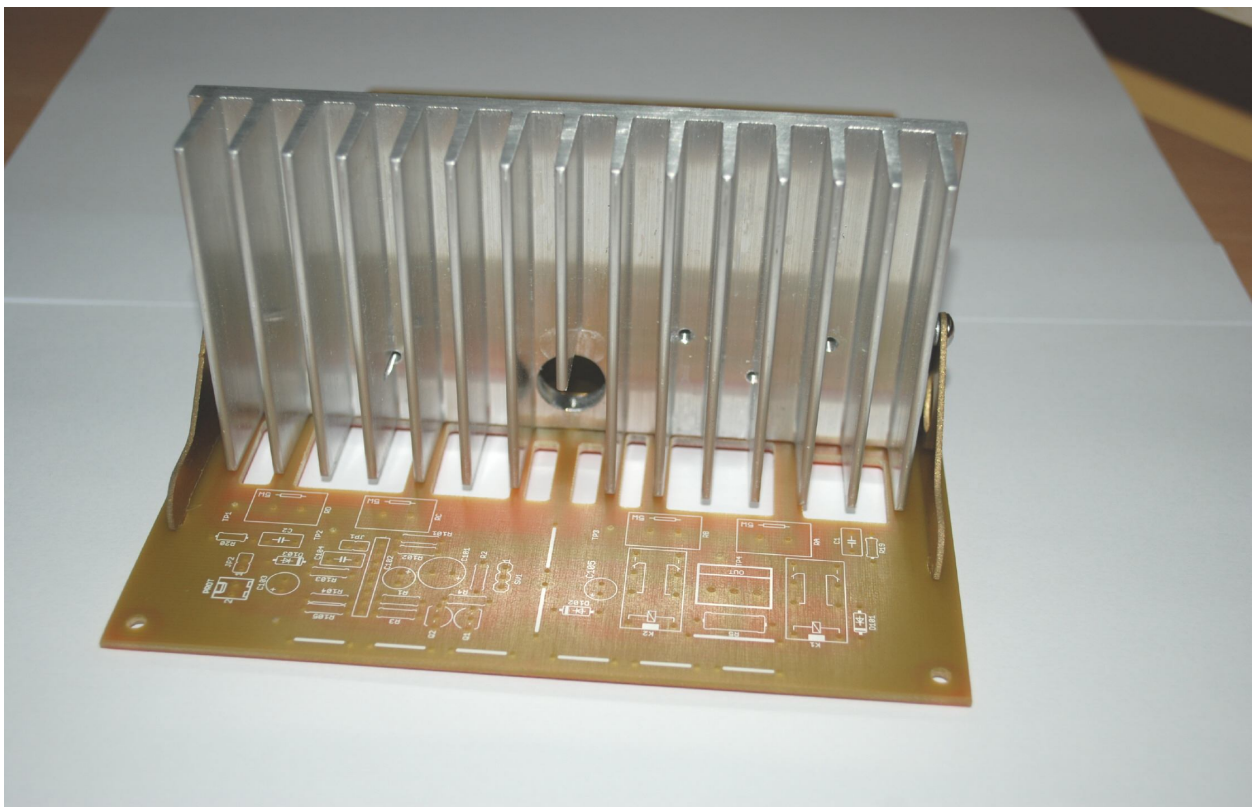
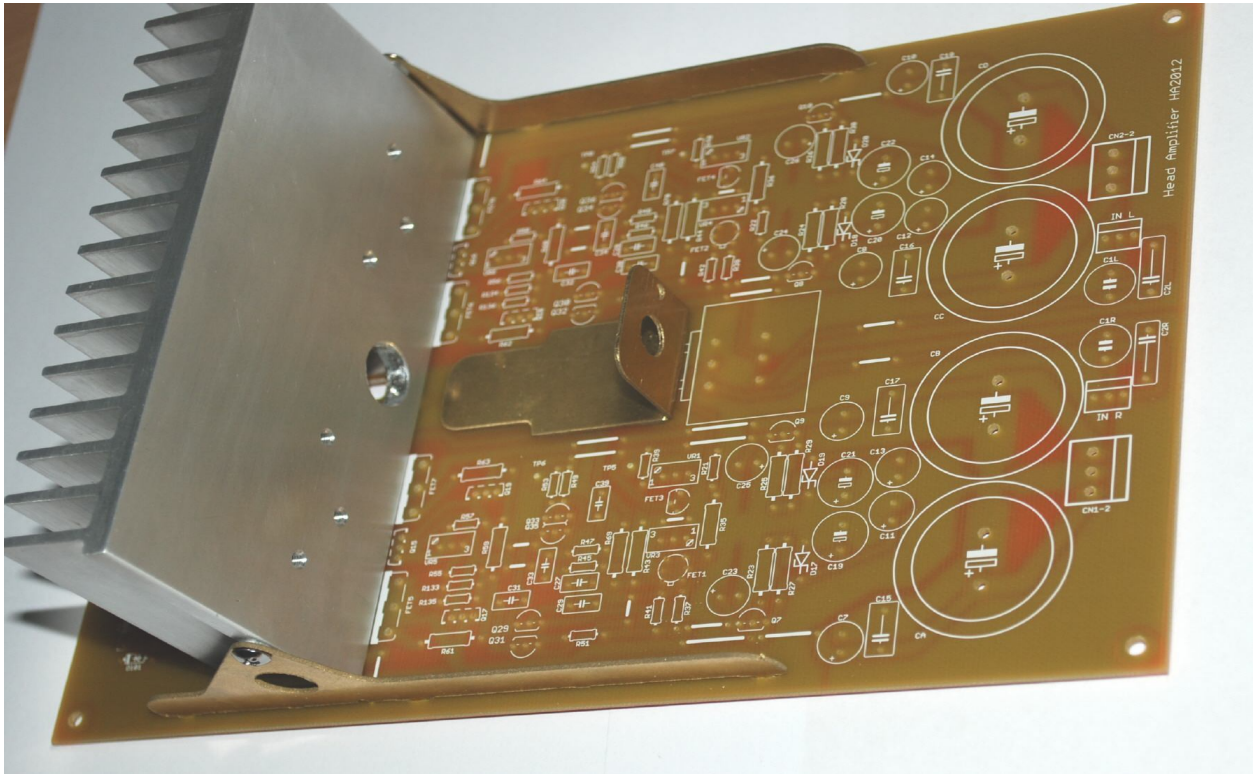
Screw the tool a little bit and go back at the same time said moistening fluid to prevent it sticking to the machining of aluminum and the blade galling it into the heat sink material.



Formed on the center of the hole with a diameter of 12mm is used to blow extension of the potentiometer volume control and requires that the drill milling of the central heat sink fins is shown in the following pictures.

After completion of drilling and tapping the heat sink can be sanded paper water on the block, I recommend granulation about 400 - 500, of course act to perform wet. Then, the heat sink can be poanodować.

Time for some photos:

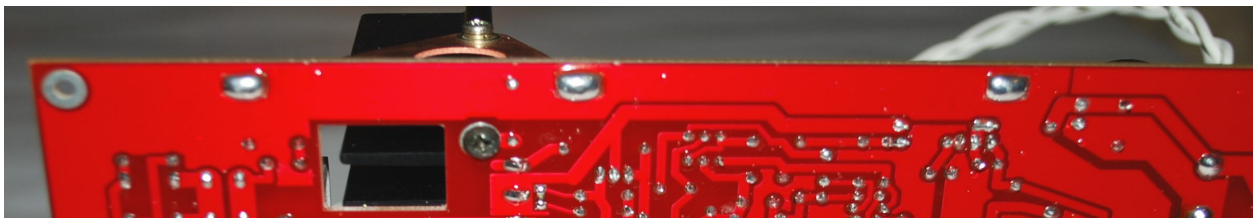




The next step is the assembly of parts on the board. We start from the jumper, then another smalls: small resistors, then larger resistors and diodes, the measuring pins (pins under test were prepared very small holes, in order to match the different elements - respectively need to drill its own). After wutowaniu small pieces soldered SCALAK uPC1237 transistors (for the moment disregard the power terminal pairs - one will be mounted at the end of the radiator), helitrimy (multiturn potentiometer), small capacitors MKP and MKT electrolytic then the connectors and relays. Instead of thermistors TH1 and TH2 can be soldered SMD resistors with a value of 180 to 240 ohms. Leaving the pads of free will lead to too much quiescent current of the transformer overload and consequently the power, while the short-circuit preventing their proper adjustment of quiescent current. It will be much lower than required 200mA.

Now I suggest you insert a plate and side plates after pressing them carefully Turn with tongs "fins" protruding from the side of the print so that permanently immobilize them.

After making sure that the plates are perpendicular to the plane of the pcb solder them to previously prepared pads, well here is to use a soldering iron with a capacity of at least 120W.



After plaques soldered resistors 5W (0,1R) and large electrolytes. Now you can sink into - mindful of their isolation washer, for example.

silicone - fasten transistors. Power transistors require insulation washers silicon or mica, while small (2SC3423) have no exposed metal parts, but for better thermal connection with a heat sink need to be greased with silicone paste, and also put on the pads of silicone, which in this case acting as a medium for better thermal contact with the heat sink plate.

WARNING! - 2SC3423 transistors on the heat sink side of the mount symbols to the heat sink - so it is also in the original HA5000.

With equally screwed heat sink transistors set in place on the pcb, while making sure that all the legs of the transistors without unnecessary stress were in their holes.

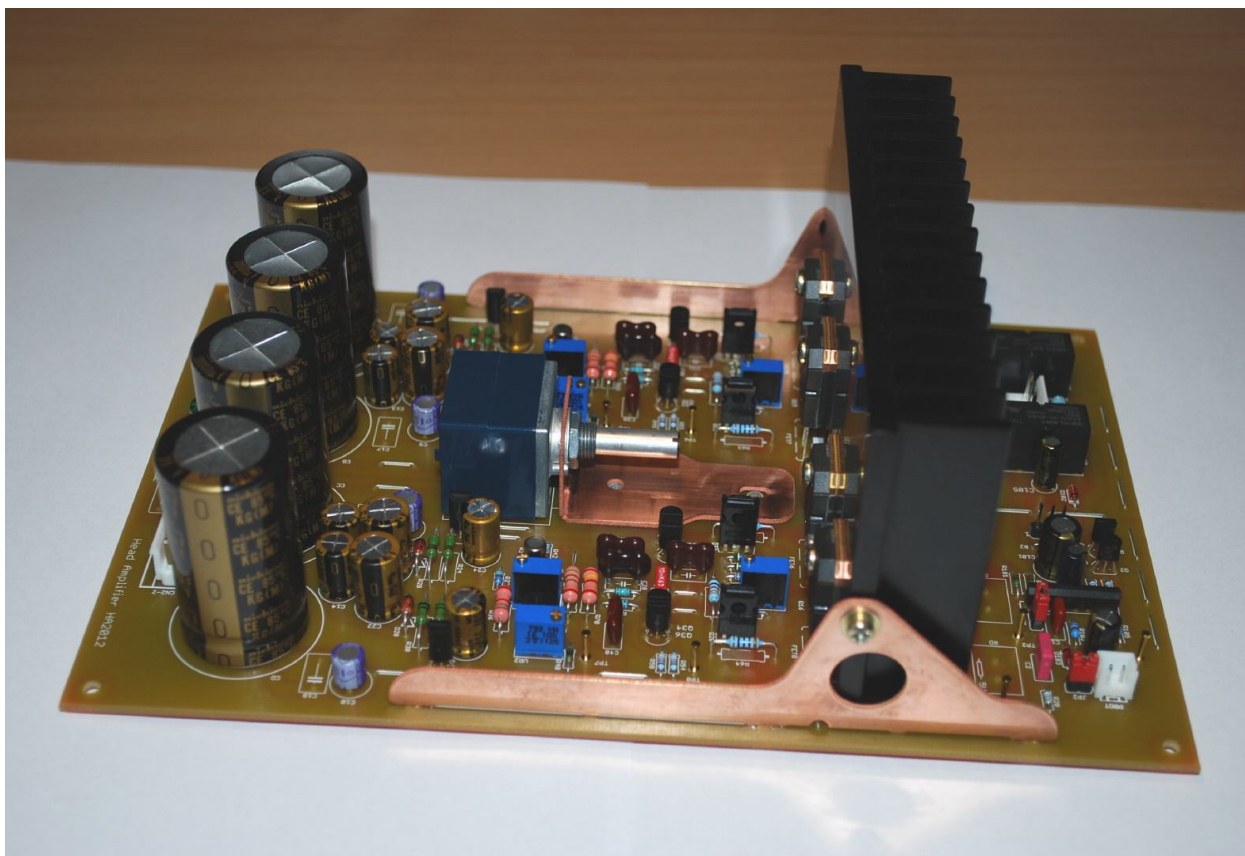
The heat sink is screwed with three screws M3 from the bottom plate, then two M3 screws into the side gills, between the blades and the heat sink should be placed metal washers for screws gr. Approx. 0.5mm.

I assume that at this stage we have on board all the parts except the volume control, right now willing can wash the whole of rosin and optionally other pollutants in isopropyl alcohol (eg. IPA), recommend the cuvette and a soft brush.

After drying, we can solder volume control with screwed previously bent badge stiffening. Lamina in the long part just before the bend is formed with a hole diameter of 3.2 mm, one can fasten the plate in addition to previously drill a hole therein similar in diameter.

So if someone will act, first let the whole screw it, and only then brazed legs potentiometer.

Below pic assembled plate wzmaka:



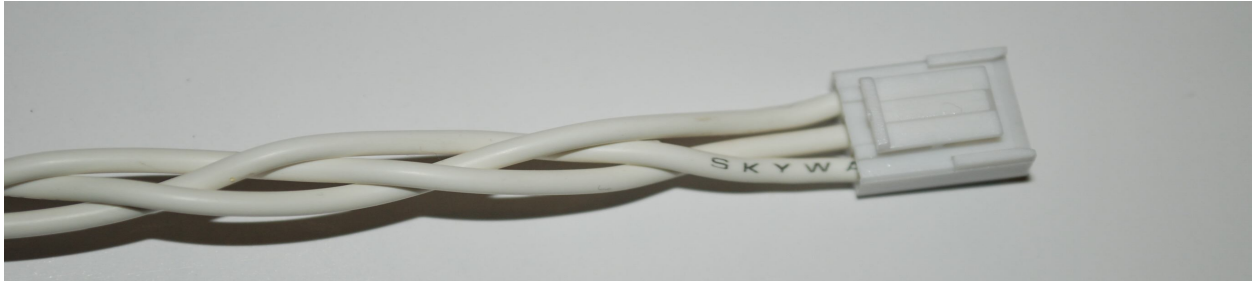
Now the important part of the job - watching everything carefully paying special attention to the polarity of diodes, electrolytic capacitors, transistors and circuit if there is no short circuit from both the print and components.

Ohmmeter's see whether the badge of one of the power transistors there is no galvanic connection with the heatsink.

As already we check all check it again, but now twice!

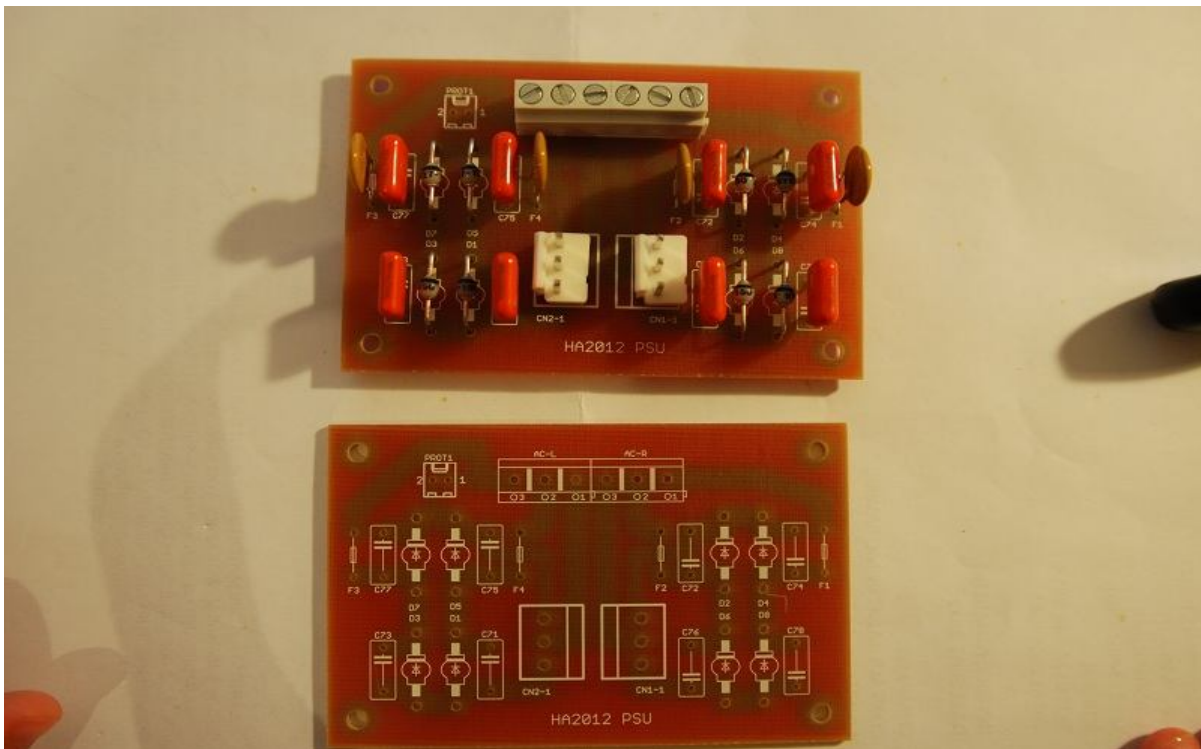
Meanwhile zmontujmy umyjmy plate and the power supply and the plate seats headphone (no at least one base).

The next step is wiring. I suggest not so much to tighten isolated parts konektorkach cables in which solder them. Tighten the most you can, but the part where there is isolation. Those who have already exercised such activities know how much it requires precision. It should, however, make it solid, and even destroy a pair konektórków for training.



Please pay special attention to the connection system, scheme and its analysis of plates in their hands are indispensable here. Anyone can use other connectors, and some probably not being convinced to want everything solder joints.

Let me just (as Jeremy) pay attention to the power connector - left and right channel are combined uniformly, and taking out the random replacement of these connectors (power left and right channel) will cause polarity reversal, in order to avoid this, the power supply board to be rotated 180 degrees CN2-1 connector, i.e. the power connector of the left channel amplifier. So one solder according to the artwork on the plate, and the second rotated. Unless someone here will release wires soldered without connectors and terminated with only the other side, to the motherboard.



The above image shows the proposed method of soldering joints. (Fig. Jeremy)

Generally we combine CN1-1 connector on the power supply board connector on the CN1-2 and by analogy, the PCB connector CN2-1 on the power supply board CN2-2 connector on the PCB. When we have the connector soldered in accordance with the graphics, and only one (CN2-1) reversed assemble cables with connectors so no. interlacing.

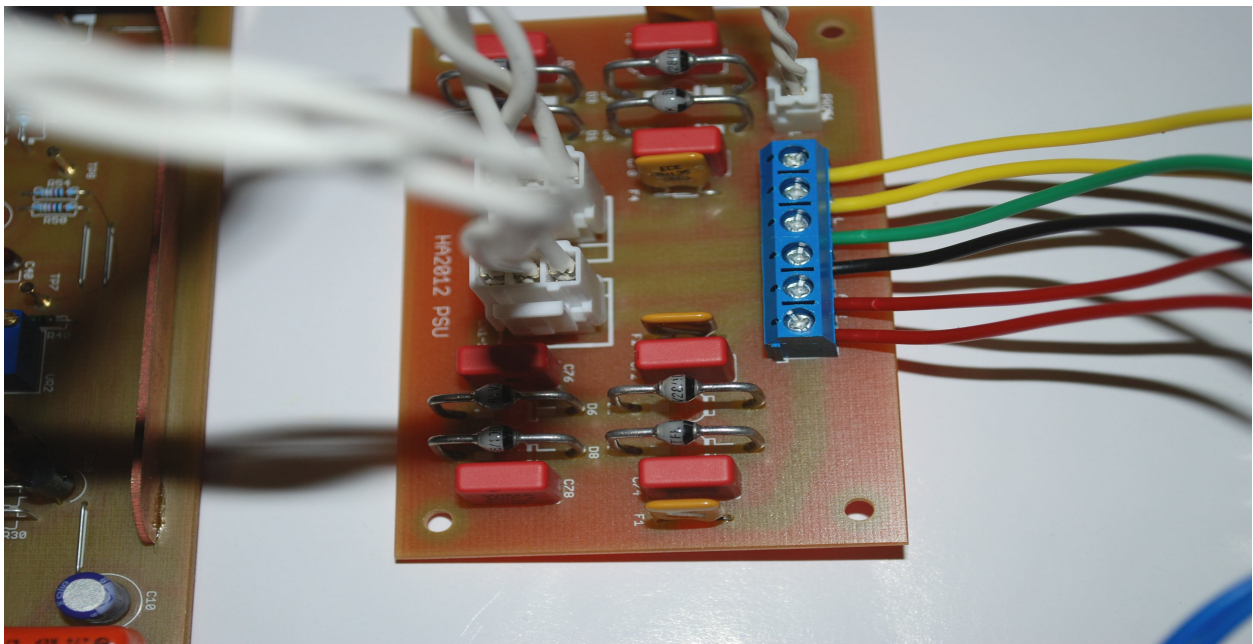
As for the power to do it is another connection, the connection PROT1 slot on the power supply board PROT socket on the motherboard amplifier.

We can use a much thinner wires. We combine 1 pin connector on PROT1 the power supply board with one connector pin on the motherboard PROT, and one connector pin 2 to pin 2 of a second connector.

SV1 connector to connect the two-color LED with common cathode - see scheme. While the connector JP2 jumperkiem shorts. Instead, one can connect the jumper attached to the heat sink thermal switch - disconnect the headphones at an excessive heat sink temperature. This connector was created a little prophylactically, we do not know whether it makes sense to use it.

JP1 connector - if it is open the amplifier off and will require power is restored after tripping headphones. While the connector JP1 jumper shorted will automatically re-activate headphone output after the termination of the cause of the disconnection. So you can freely configure this feature.

Having finished wiring everything now join together ,. Next connect the mains transformer, but only to the connector AC-L! - the first three of the top terminals, according to the following picture:



The transformer is connected to the network as follows:
From the top - the two yellow wires to the ends of the windings 29V, green wire is the center tap. So we have two windings connected in series to the 14,5V.

Next - black wire is the middle tap of the next winding 29V, which also consists of two windings connected in series 14,5V. The last two terminals - red wires - this is extreme output windings. Graphically this can be represented as follows:



Time for measuring voltages. We become digital voltmeter

Measurement range is set to a DC voltage (VDC-DMM) in the middle and once one extreme and a second extreme time pad CN2-1 power connector located on the power supply board. Measurements should show voltages with values in the range of about 17.5 to about 19,5V. (remember that the measurement is made plate having a power supply connected to the amplifier PCB).

After finding the appropriate supply voltage can measure voltages stabilized for the left channel. Here, one probe DMM-V amplifier put on the weight (eg. Radiator), and the other at the measuring point TP8 - measurement should indicate the connection from about - 14 to about -15V. Similar tension, but of opposite polarity should get between the mass and the jumper located next to the electrolytic capacitor C24.

If the voltages are normal and do not connect other output smokes mains transformer to the AC terminal-R (see figure above).

As before, we measure voltages, this time at the interface CN1-1 power supply, if the standard (+/- about 17.5 to about 19,5V) to take a voltage measurement is stabilized with the right channel. Thus, one probe DMM-VDC radiator, the second test point TP6 - measurement should indicate a voltage of about - 14 to about -15V. Similar tension, but of opposite polarity should get between the mass and the jumper located next to the electrolytic capacitor C23.

We move on to the next stage - regulation. These activities require the volume control at all times remain turned to the minimum.

At the start of the probes we DMM-V measurement points on the left TP7 and TP8 channel. Turn on the power and read the voltage value we bring shaking helitrimem VR2 to the value of 0.7V.

We turn off the amplifier and translate probe test points TP1 and TP2. By turning helitrimem VR6 bring to indicate 0,020V to 0,023V (20mV to 23mV) corresponding to the resting current of 200 to 230mA.

The next step is the so-called value adjustment. DC "0", that is, to bring amplifier to work with minimum DC voltage headset.

For this purpose, connect one probe DMM-DC amplifier to ground, or eg. heat sink and the other focus on the measurement point TP2, now turning helitrimem VR1 bring to display the minimum value of the DC voltage.

If you have not heard the clicking of the relay, after these regulations, in a few seconds after power should hear the thud, and if we connected a dual LED should change its color - it proves correct operation of the switching delay headphone output.

Turn of the adjustment of the second channel. For all the steps right channel We carried out analogously as described above for the left channel.

So we adjust the voltage VR1 by means between the measuring points TP5 and TP6 to the value of 0.7V, then VR5 between test points TP3 and TP4 on the value of 20mV to 23mV - let's set the same value as the left channel and the end of the measuring point TP between 4 and ground using the VR3 helitrimu strive to 0V.

Now let's wait until the amplifier to warm up properly - min. 30 minutes and repeat all the regulations again.

In principle, one could already connect the audio source and the headphones and listen to music, but ...

But better yet let's check the security system response headphones the emergence of DC voltage at the amplifier output.

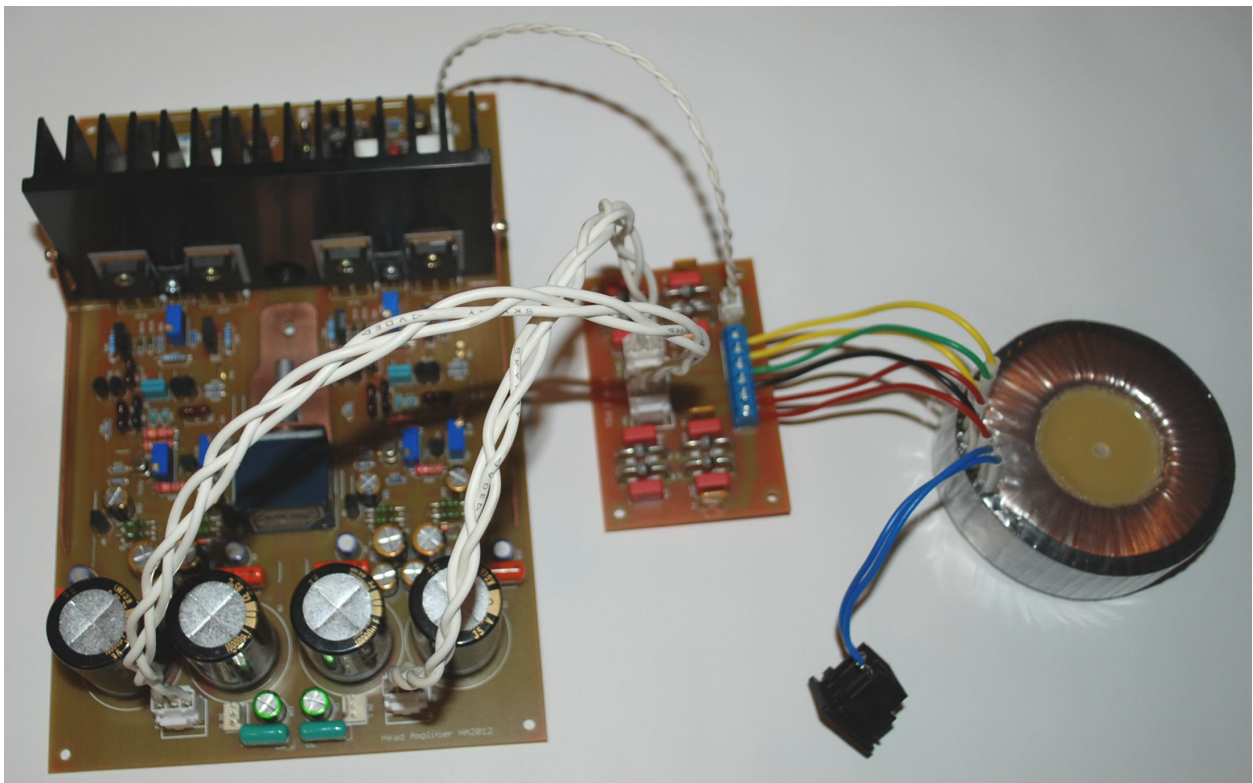
To do this, connect the battery, for example. 1.5V downside to the ground, and the positive pole signal input terminal of the left channel, that is, IN terminal L to the pin nearest to the edge of the pcb. Now connect the DMM-VDC to ground and measuring point TP2.

Turn on the power amplifier and observing the DMM slowly Pump up the volume. DC voltage at the output will grow, at some point the system should react to security and the relay for the positive voltage value measurement should not exceed 1.5V. Now invert the polarity of the batteries and make the same measurement for negative voltage. For the relay, the output voltage should not exceed 1,3V.

If left channel scored positively this test, identical measurements for the right channel.

Positive outcome of the test is the ability to secure 100% headphones.

So's do the wiring for the headphone jack and input signal. The latter are trójpinowe pin from the capacitors 10000uF the mass, the center pin is separated input capacitors, and closer to the edge of the plate pin is input directly, bypassing capacitors. This last entry allows you to get the best sound quality, but only when given him the signal capacitor is already separated at the source of the signal or if the signal source electronic design ensures no DC component in the supplied audio signal.



Join now so the audio signal from the source of our wzmacniaczem to exit Switching on the handset and the device podkręćmy little volume.

Is music playing? I hope so!

Robertinus

Parts list below:

	Value	Quantity	Type / manufacturer / power	Housing
C1,2	820pF	2	MKT	R 5 =
C1L, C1r	100uF / 25V	2	Nichicon Muse ES Non-Polar R = 3.5, f = 8	
C2L, C2R	47nF	2	MKP	R = 10
C7,8,9,10	10uF / 25V	4	Sanyo Os-Con	R = 3.5, f = 8
C11,12,13,14,23,24,25,26	47uF / 25V	8	Nichicon Fine Gold	R = 3.5, f = 8
C15,16,17,18	47nF	4	MKP	R = 7.5
C19,20,21,22	100uF / 25V	4	Nichicon Fine Gold	R = 5, f = 10
C27,28	27pF	2	Silver Mica	5mm
C29,30,31,32	15pF	4	Silver Mica	5mm
C33,34	10nF	2	MKT	5mm
C39,40	6PF	2	Silver Mica	5mm
C71,72,73,74,75,76,77,78	100nF	8	MKP	R = 7.5
C101	100uF / 25V	1	any	R = 3.5, f = 8
C102	4,7uF / 50V	1	any	R = 2.5, f = 6
C103	47uF / 25V	1	any	R = 2.5, f = 6
C104	22nF	1	any	R 5 =
C105	10uF / 25V	1	any	R = 2.5, f = 6
CA, CB, CC, CD	10000uF / 35	4	Nichicon KG	R = 10, f = 30
D1,2,3,4,5,6,7,8	BYV27-100	8	interchangeably BYV28-100	
D17,18,19,20	15V / 1W	4		R = 7.5
D101,102,103	1N4148	3		R 7 =
F1,2,3,4	1.35	4	U135	R = 7.5
FET1,2	LSK389B	2	alternatively 2 x 2sk170BL	IS-71
FET3,4	2SK246GR	2		
FET5,6	2SK2955	2	2SK1529 interchangeably	
FET7,8	2SJ554	2	2SJ200 interchangeably	
IC1	uPC1237	1		
Q1	BC550	1	BC547 interchangeably	
Q2	BC560	1	BC557 interchangeably	
Q7,8	2SD667	2		
Q9,10	2SB647	2		
Q29,30,31,32	2SA970GR	4		
Q33,34,35,36	2SC2240GR	4		
Q15,16,17,18	2SC3423Y	4		
Q19,20	2SA1360Y	2		
R1,3	330K	2	0.25W	R 7 =
R2,4	2K2	2	0.25W	R 7 =
R5	47 Ohm	1	1W	R = 12
R19,20	510 Ohm	2	0.25W	R 7 =
R21,22	1M	2	0.6W	R 7 =
R23,24,25,26,27,28,29,30	1K	8	1W	R = 12
R35,36	1K5	2	eg. DALE 0.5W / 1W	R = 12
R37,38,41,42	1K5	4	0.25W	R 7 =
R39,40	620 Ohm	2	0.25W	R 7 =
R43,44	510 Ohm	2	eg. DALE 0.5W / 1W	R = 12
R45,46,47,48	150k	4	0.25W	R 7 =
R51,52	150 Ohm	2	0.25W	R 7 =
R49,50,53,54	330 Ohm	4	0.25W	R 7 =
R55,56	2K7	2	0.25W	R 7 =

R57,58	820 Ohm	2	0.25W	R 7 =
R59,60	330 Ohm	2	0.6W	R = 12
R61,62,63,64	100 Ohm	4	0.6W	R = 12
R69,70	2K4	2	eg. DALE 0.5W / 1W	R = 12
R101,102,104	47K	2	0.25W	R 7 =
R103	8K2	1	0.25W	R 7 =
R105	6K2	1	0.25W	R 7 =
R133,134,135,136	9K1	4	0.25W	R 7 =
RA, RB, RC, RD, RH1, RH2, RH3, RH4	0.1 Ohm	8	5W	R 5 =
VR1,2,5,6	1k	4	64W - 201 Vishay	
VR3,4	200 Ohm	2	64W - 102 Vishay	
ALPS	50K	1	ALPS_RK27	
TH1, TH2	470 Ohm	2	EPCOS B57421V2 ...	SMD 805
K1,2	COIL 9V	2	ZETTLER AZ822-2C-9DSE	
Radiator	RAD-A52317 / 70	1		
Transformer	4 x 14.5 - 15V	1	Torpid 50	
LD1	LED	1	<u>Two-color, common cathode</u>	