

# **WARWICK SERVICE MANUAL**

## **BASS AMPLIFIERS WA600**

**Warwick<sup>®</sup>**

*Basses, Amps & Rock'n Roll.*





## Troubleshooting

Depending on what is the problem with device, you should perform a few electronic tests in proper order to solve your problem. Each time when one of tests is failed, you should exchange or repair necessary parts, run again that test that was failed before and, if this time test is approved, connect all device parts back together and try if unit is now working properly. If not, run next test from the list.

### No LED, no sound:

1. Check voltage in you AC outlet, check power cord of amp.
2. Disassembly amp.
3. Perform transformer test.
4. Perform power supply test.

### LED ok, but no sound:

1. Try to use different instrumental cable and/or different guitar. Try to unplug guitar and touch tip of cable, you should hear noise in speaker.
2. Take short instrumental cable, insert it to the Send and Return jacks on the rear panel. Try also to connect guitar to the return input instead of normal inputs (in that case only Volume potentiometer works). If any of this helps, then you should perform preamp test.
3. Disassembly amp.
4. Perform power supply test.
5. Perform power amp.
6. Perform preamp test.

### Volume level seems to be not enough:

1. Disassembly amp.
2. Perform power supply test.
3. Perform power amp test.

### Sound quality is poor:

1. Try to use different instrumental cable and/or different guitar.
2. Disassembly amp.
3. Try to use different speaker and high frequency driver.
4. Perform preamp test.
5. Perform power amp test.

### Sound is distorted:

1. Try to use different guitar.
2. Disassembly amp.
3. Perform power amp test.
4. Try to use different speaker and high frequency driver.
5. Perform preamp test.

### **Sound is sometimes disappearing:**

1. Try to use different instrumental cable and/or different guitar.
2. Try to move jack plug while it's inserted in preamp jack inputs (passive and active) and listen if sound depends on cable movement. If it does then preamp needs to be exchange.
3. Try to move each of potentiometers and listen if sound is disappearing, or you hear any unwanted noises on this movement. If it does then preamp needs to be exchange.
4. Disassembly amp.
5. Perform ribbon cable test.
6. Connect all parts back together, turn on the amp, try to move ribbon cable close to the both endings and listen if sound depends on cable movement.
7. Perform all other tests. Pay attention during each test if any movement (of components, connectors, electronic boards) affects test results.

### **Some of the controls on the front panel aren't working properly:**

1. Disassembly amp.
2. Perform preamp test.

## Disassembling of amplifier



12 screws are holding top chassis of WA600



Inside of the amp



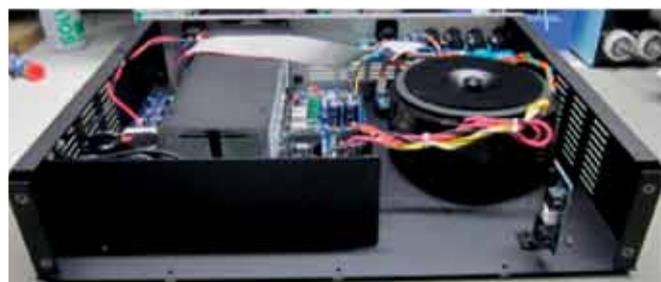
7 screws (3 on the bottom of chassis) are holding pre-amp with front chassis



Potentiometer knobs and switches nuts removed



Preamp board



Chassis without front preamp board



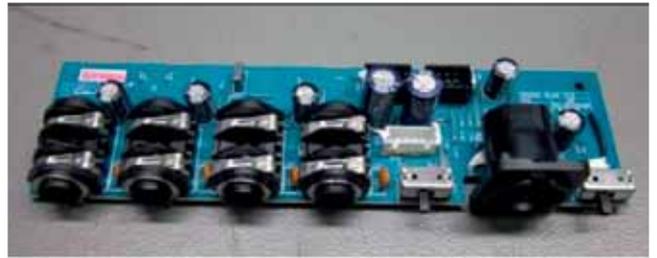
6 screw are holding metal board with power amp board



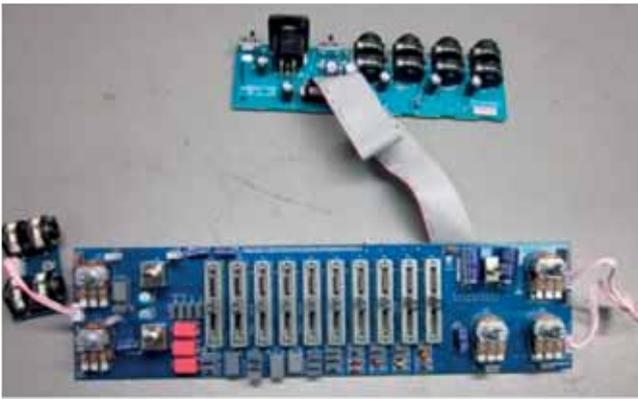
Power amp board with metal board



Power amp with metal board removed



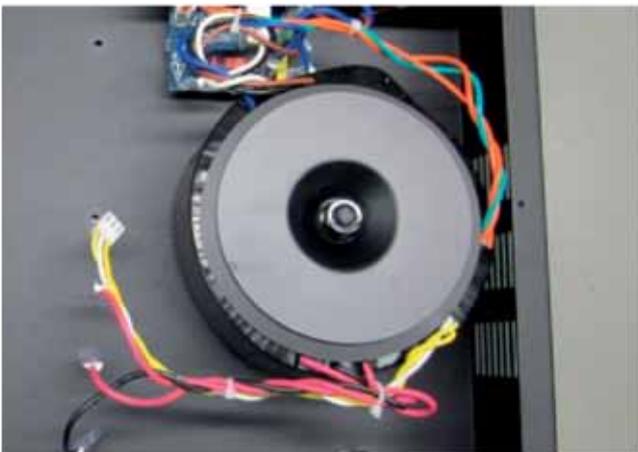
Backboard



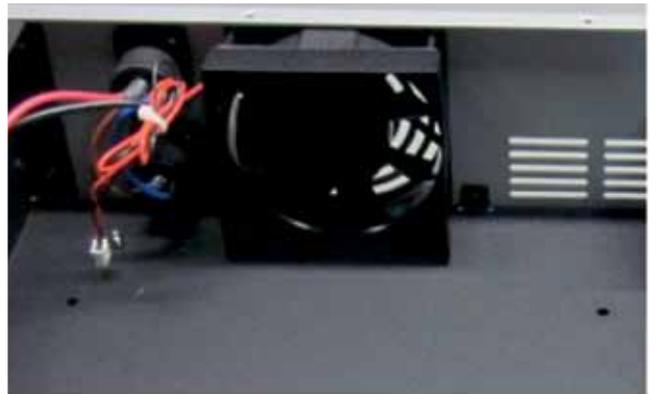
Preamp board and backboard



Chassis with transformer, soft start board and metal board for power amp



Transformer with soft start board

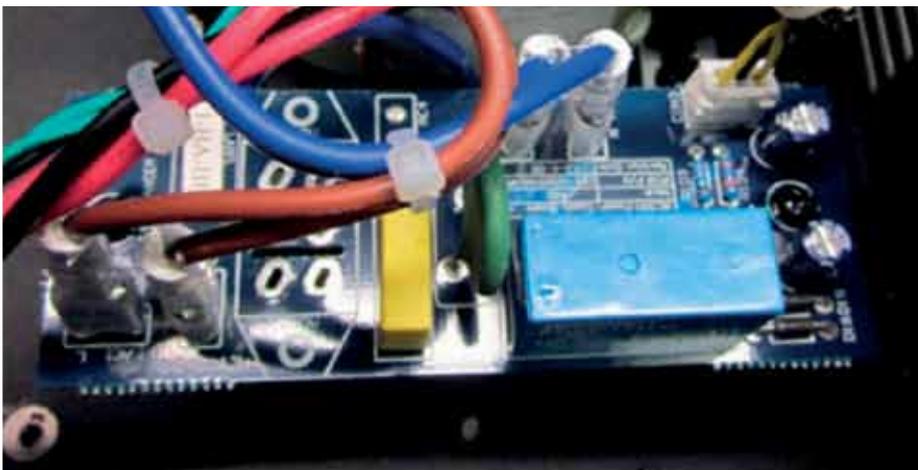
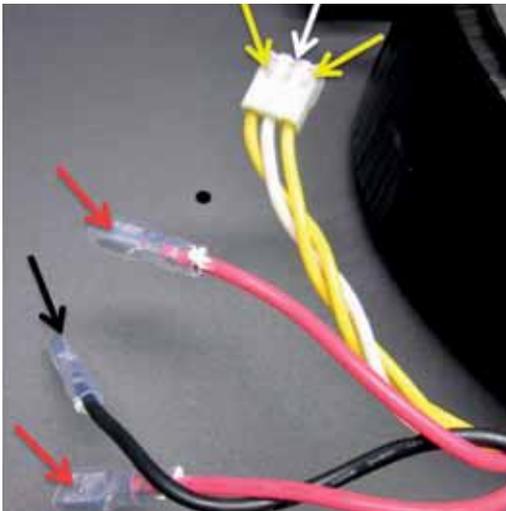


FAN

## Amplifier tests

### 1. Transformer test

Necessary tools: voltmeter (AC), ohmmeter



1. Make sure that you are using proper voltage for testing transformer
2. Disconnect power amp board from transformer
3. Connect power cable, turn on the power switch

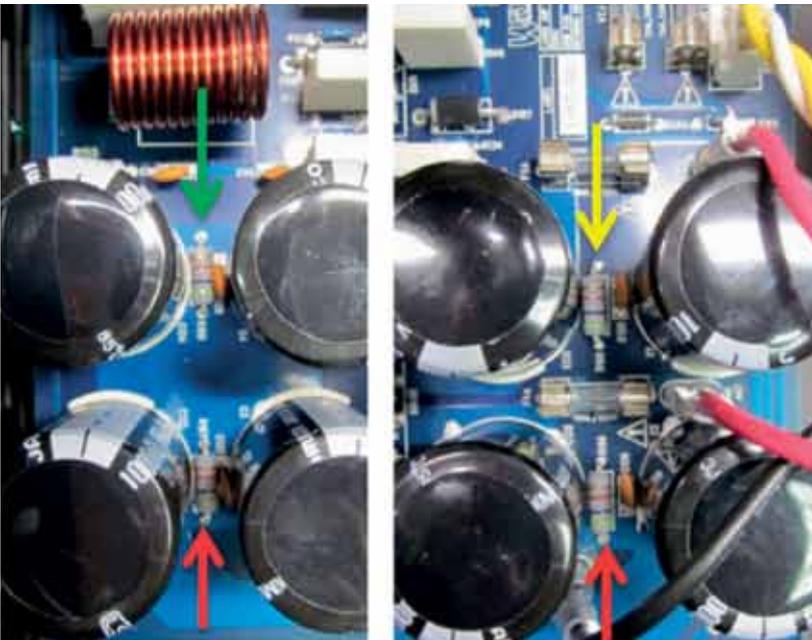
4. Measure AC voltage between red cables and black cable. Voltage values should be 102V between red cables and 51V between black cable and each of red cables. Next measure AC voltage on white 3 pin connector. Voltage values should be 36V between green cables and 18V between black cable and each of green cables.

5. If there is no voltage at all, check with ohmmeter if fuse is ok. If new fuse immediately burns after switching on the power then transformer is damaged and need to be exchange. Also check if power switch is working properly and if there is good connection between power connector and transformer. To do this you have to remove plastic isolation of switch and power connector. Also make sure that soft start board is working properly and relay is switching on 1-2 seconds after power is on. If all is ok then transformer need to be exchange.
6. If measured voltages are different than given values (tolerance is  $\pm 10\%$ ) or one of measured voltages is equal zero then also transformer need to be exchange.

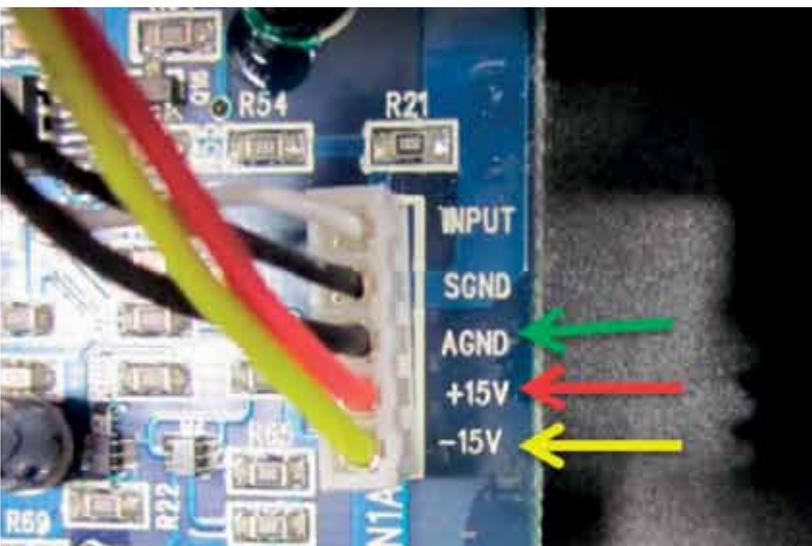
## 5. Power supply test



1. Make sure that you are using proper voltage for testing transformer
2. Disconnect backboard and preamp board.
3. Check the fuses F2A, F3A with ohmmeter. When fuse is broken exchange it only with same type (2A/250V). Do the same with F4A, F5A (8A/250V). If new fuse immediately burns after switching on the power then power supply with power amp is damaged and need to be exchange.
4. Connect power cable, turn on the power switch



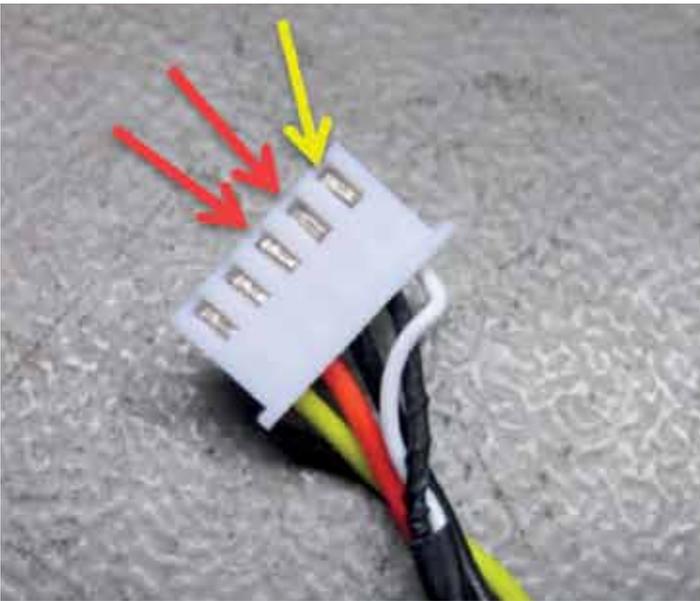
5. Measure DC voltage on resistors shown on pictures on the left. Voltage values should be +90V between yellow and red point, and -90V between green and red point. Those values are correct only without any load on the speaker output. It can drop to  $\pm 77V$  when power amp is fully driven.



6. Measure DC voltage on the connector. Voltage values should be +15V between red and green AGND point, and -15V between yellow and green AGND point. Output load should not change those voltages.
7. If transformer is ok (checked in transformer test) but measured voltages are different than given values (tolerance is  $\pm 10\%$ ) or one of measured voltages is equal zero then power amp with power supply need to be exchange.

### 3. Power amp test

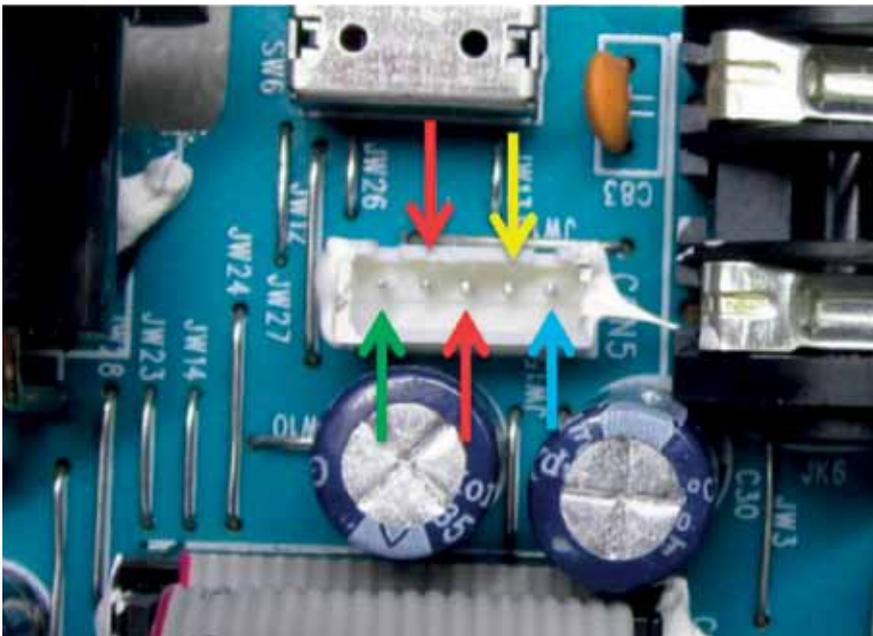
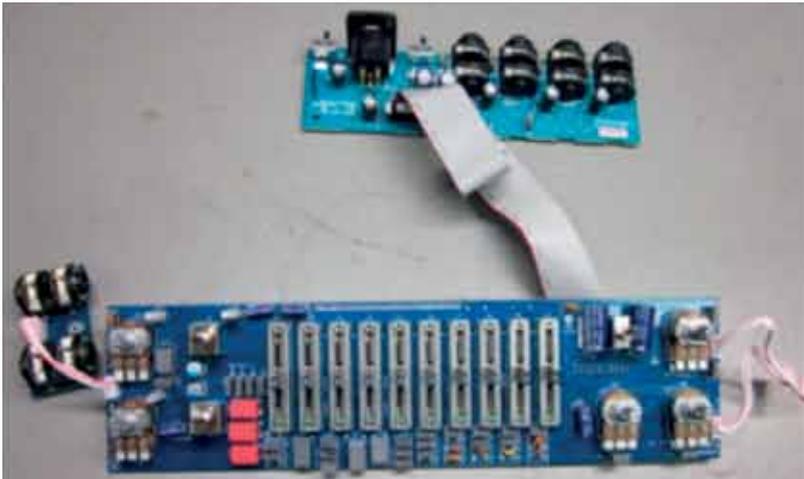
Necessary tools: sine wave generator, oscilloscope



1. Disconnect backboard and preamp board
2. Connect speaker output to the power amp board
3. Connect external signal generator (suggested setting: sine wave 1kHz/0V) to the input of power amp (pin marked on yellow is input, pin marked on red is GND). CAUTION! You need to connect to each other both GND pins marked on red. Without this connection power amp safety circuit will not turn on the relay switch.
4. Connect 4ohm load (at least 600W) to speaker output on the back of the amp
5. Connect oscilloscope probe to signal output. Make sure that oscilloscope ground is connected with generator ground (GND) or red GND point.
6. Connect power cable, turn on the power switch and start to increase generator voltage. You should see increasing clean sine wave on the scope. While input voltage reaches 4Vpp, output voltage should reach 140Vpp. At this point increasing signal input will not increase signal output (built in limiter starts to work)
7. If you don't see sine wave on the scope or you see the sine which is highly distorted or clipped at much lower voltage, then power amp with power supply need to be exchanged.

## 4. Preamp test

Necessary tools: external power supply (symmetrical  $\pm 15V$ ) with current meter (or additional current meter), oscilloscope, sine wave generator, 6.3mm male jack plug with cable



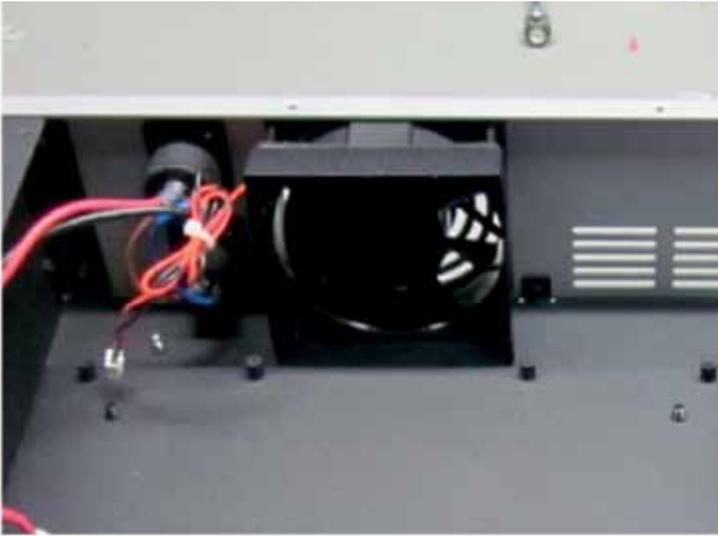
1. Connect preamp board with backboard using ribbon cable
2. Connect your external power supply to backboard. Use pins marked red (GND), yellow (+15V) and blue (-15V). Connect current meter if it's necessary.
3. Turn on your power supply. Current value on each line (-15V, +15V) should be approximately 150-170mA. Perform this check without input signal.
4. Turn treble and bass potentiometer to the middle position (12 o'clock), all toggle switches to the upper position, gain potentiometer to the middle, volume to zero.
5. Connect external signal generator (suggested setting: sine wave 1kHz/1Vpp) to the input of preamp. Use for that jack plug and connect it to the passive input.
6. Connect oscilloscope probe to green pin. Make sure that oscilloscope ground is connected with generator ground (GND) or one of red GND points.
7. Start to increase volume potentiometer to the maximum value. You should see clean sine wave on the scope. While voltage on passive input is 1Vpp, output voltage should be approximately 4Vpp. When you switch now to the active input voltage on the output should drop to approximately 1.25Vpp.

8. Try treble, bass and gain potentiometers, if movement of each of them is changing output signal on the scope. Next observe if wave is changing while you turn compressor on and also if compressor potentiometer is working properly. Next try if mute switch is working properly by turning output signal off. And finally turn 10 band equalizer on and check if all sliders are working properly. To do this you it's recommended to change generator frequency accordingly to the values of each slider (35Hz, 70Hz, 140Hz, 210Hz and so on...)

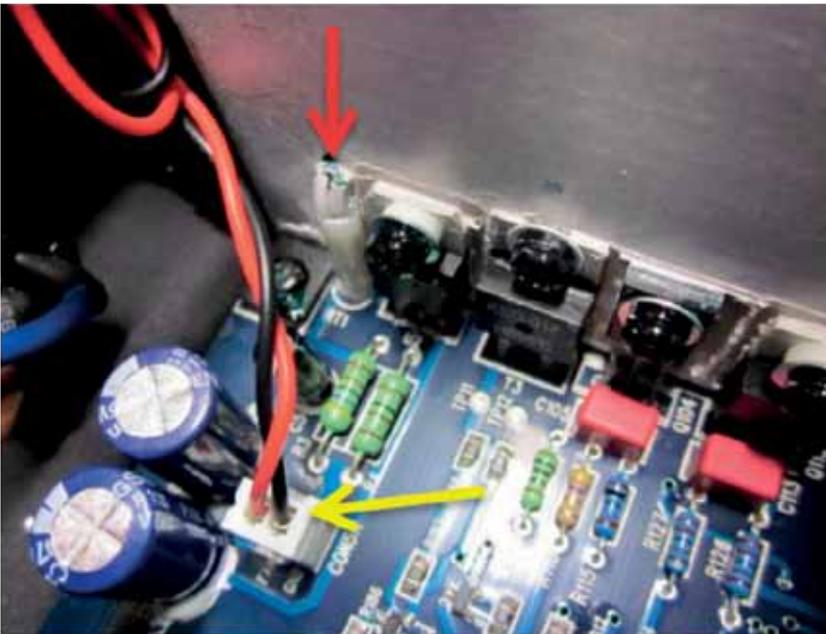
9. If you don't see sine wave on the scope, try to use different ribbon cable and/or different backboard. If it helps then you should exchange ribbon cable or backboard.
10. If you anyway don't see sine wave on the scope, you see the sine which is highly distorted, some of potentiometers or switches doesn't change output signal or they do but with visible 'glitches' or noise then preamp need to be exchanged.

## 5. FAN test

Necessary tools: hot air gun, voltmeter



1. Connect power supply and transformer.
2. Connect power cable, turn on power.



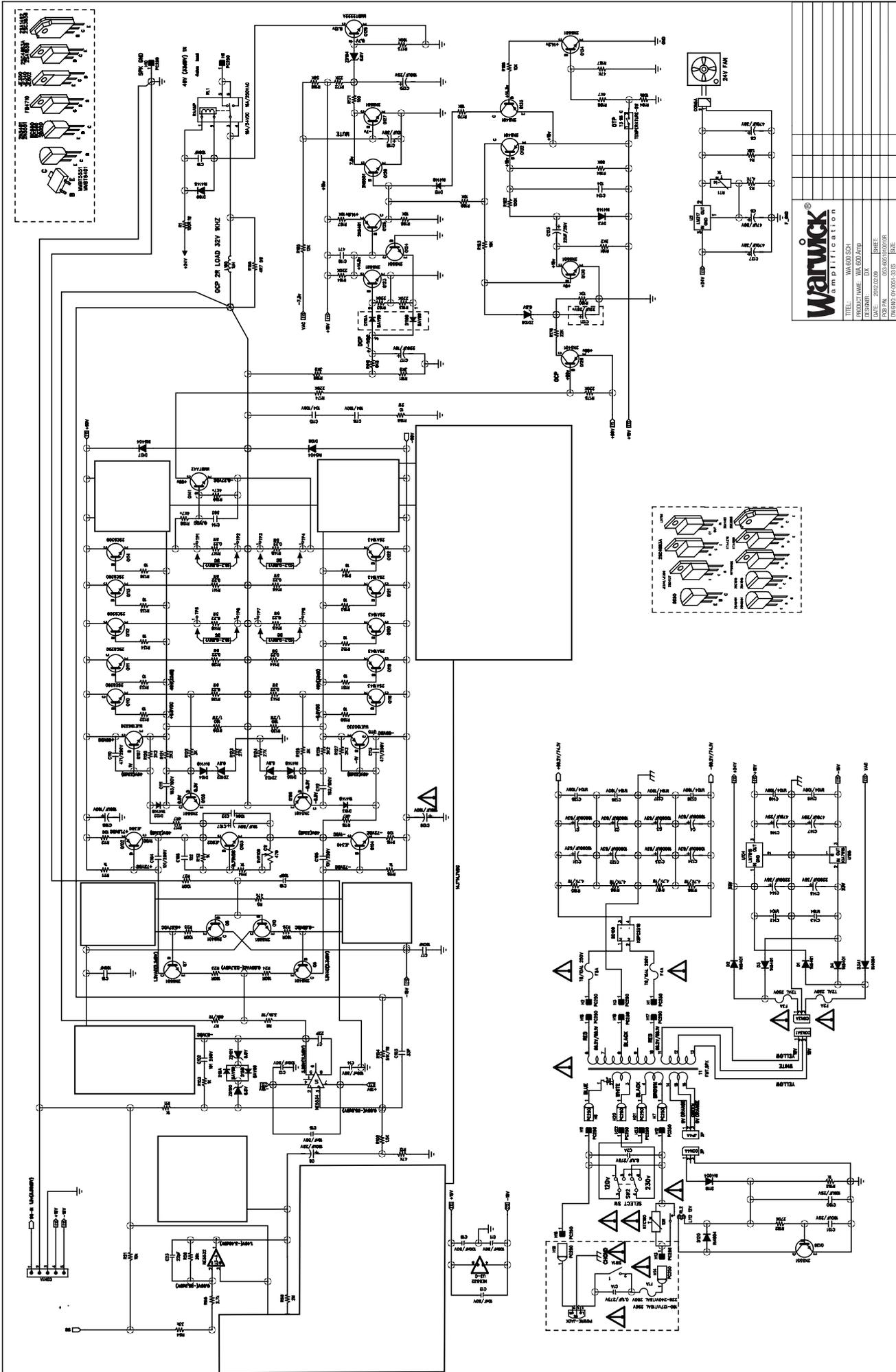
3. Use hot air gun to heat temperature sensor marked on red. After few seconds you should hear FAN speeding up. CAUTION! It is not recommended to use solder iron in that test, it can damage temperature sensor, use only hot air.
4. If FAN doesn't work then disconnect connector marked on yellow and measure DC voltage on connector. It should increase from 7V (sensor is cold) to 23V when sensor is heated. If that's correct then you should exchange FAN. If there no voltage on connector or voltage values are different than 7V and 23V then power amp with power supply board is damaged and needs to be exchange.

**List of available electronic spare parts:**

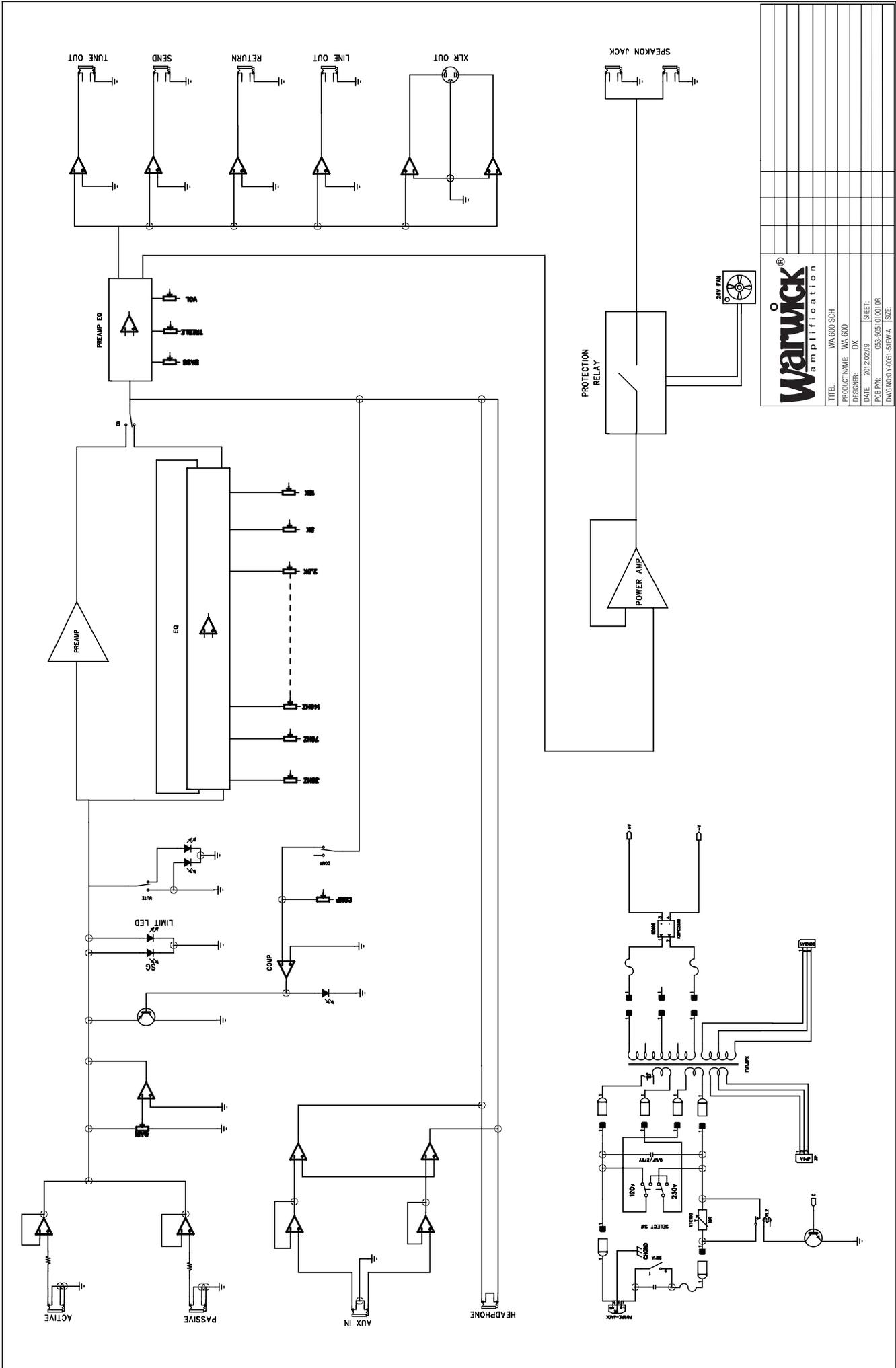
BC300/WA300/WA600 Preamp PCBA	330*80*1.6 double side board FR-4(blue oil white word) 1oZ,A01
WA600 Power amp PCBA+mains board	256*248*1.6MM FR4 20Z with Heat sink
WA600 backboard PCBA A01	single side 173*112*1.6MM CEM-1 20Z J15 blue oil white word
Cable for Power amp PCB footprint: CON1A	5P PH=2.54mm L=180MM UL1533 #26*1C+S+UL1007#24*3PCS
Preamp cable	flat cable 3PIN 2.54mm 70mm 26# ROHS
cable for preamp to backboard	20Pin gray flat cablePH=1.27mm 28AWG
WA600 Transformer	Mains input 115V/230V
Power socket	3pins
Power switch	
Voltage selector	
Speaker connector	1/4"+Speakon
FAN	DC FAN:24V 0.2A 80*80*25 L=300mm

# Technical data

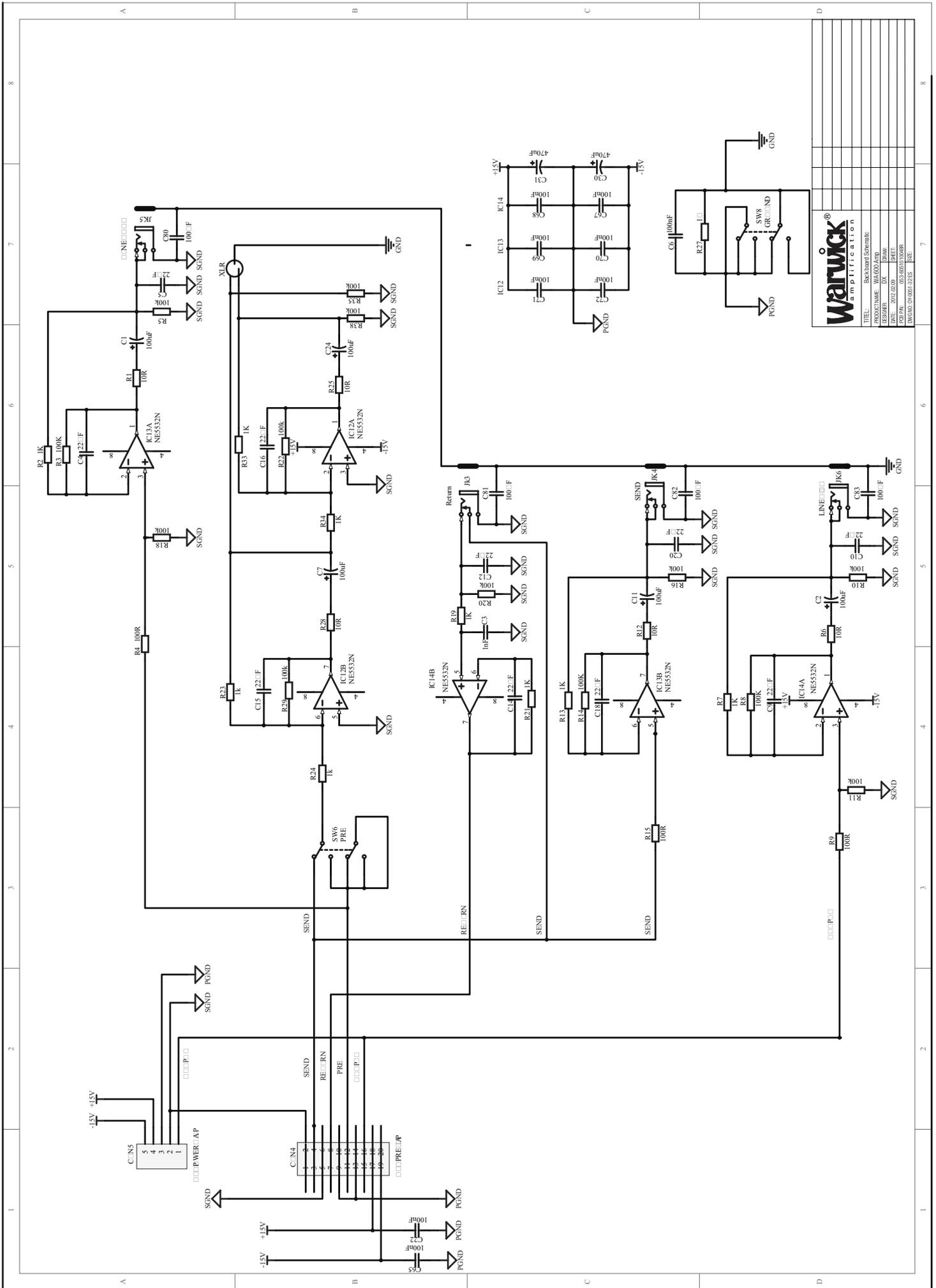
## 1. Power amp and power supply



## 2. Block schematic



### 3. Backboard



**Warwick**  
Amplification

TITLE: Backboard Schematic  
 PRODUCT NAME: WA600 AMP  
 DESIGNED BY: DK  
 DATE: 2017-02-09  
 SHEET: 03 OF 03  
 DRAWN BY: JAC  
 DATE: 2016-09-03







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