TEST PROCEDURE FOR NSS 0.3 LOUDSPEAKER ELECTRONICS

NSS and its Affiliates assume no responsibility for the safe application of these procedures. These procedures expose the user to potentially hazardous voltages. It is solely the responsibility of the user to observe safe electrical practices and to know the proper use of test equipment.

Perform the tests in the order shown, observing all precautions and test equipment requirements. Refer to the diagrams for locations of circuit points.

For all tests, the amplifier and ESL panel should be disconnected from the electronics. When called for, the power must also be disconnected, and all residual voltages must be discharged from the power supply. Discharging may be done by momentarily connecting an insulated test lead from the High Voltage Ground to the High Voltage Output.

If only one speaker is not working (which is usually the case), it is often helpful to make comparison measurements on the known good speaker. This will provide the expected measurements under your particular conditions of supply voltage and test equipment.

I. LOW-VOLTAGE BIAS POWER SUPPLY MEASUREMENTS

The following measurements may be performed with any AC voltmeter capable of measuring at least 400 volts.

1. Transformer Input Voltage

For units equipped with a 230 volt input transformer:
Measure the voltage at the Transformer Input. The voltage should equal your local mains voltage: 220 – 240 volts AC. If ok, proceed to "Transformer Output". If not, check to make sure the speaker is connected to a "live" electrical outlet. Also check the mains cord for faulty connections or blown fuse(s).

For units equipped with a 12 volt input transformer:
Measure the voltage at the Transformer Input. The voltage should be approximately 12 – 15 volts AC. If ok, proceed to "Transformer Output". If the voltage is very low or zero, check to make sure the wall transformer is connected to a "live" electrical outlet. Or, the wall transformer or its cord may be defective.

2. Transformer Output Voltage

Measure the voltage at the Transformer Output. The voltage should be approximately 300-350 volts AC. The exact value will vary with mains voltage, and wall transformer (if used). If the measured voltage is anywhere near this value, proceed to High Voltage Measurements. If the measurement is very low or zero, then the bias transformer is defective.

II. HIGH-VOLTAGE BIAS POWER SUPPLY MEASUREMENTS

This section will test the bias voltage multiplier, consisting of six diodes and six capacitors. This circuit multiplies the incoming voltage to the several thousand volts necessary for ESL operation. A significant deviation from the desired voltage at a given stage will generally indicate that that stage is bad. The associated capacitor is usually the defective component, although the diode is sometimes at fault. Two different methods of measurement are presented:

1. High Voltage Probe Method (Preferred)

The following measurements must be performed with a special 1000:1 High-Voltage Probe, in conjunction with a battery-operated DC voltmeter with high input impedance (typically 10 Megohms). Most good quality digital multimeters meet the criteria. Due to large differences in input impedance among different brands of probes, the values measured may be different.

Connect the ground lead of the High Voltage Probe to the High Voltage Ground. Probe each of the multiplier stages and measure the voltages as follows:

Stage 1 495 volts DC
Stage 2 990 volts DC
Stage 3 1480 volts DC
Stage 4 1970 volts DC
Stage 5 2450 volts DC
Stage 6 2900 volts DC

If ok, proceed to High Voltage Output (Preferred Method). The actual measured values may be different, but they should be proportional to those shown. The important point is to observe the progression of increasing voltages along the bias multiplier. If the voltage measured at any stage is very low, then the capacitor of that stage is likely defective, or possibly the diode.

2. Minimum Test Equipment Method (Alternate)

The following measurements must be performed with a battery-operated DC voltmeter with high input impedance (typically 10 Meg Ohms). Most good quality digital multimeters meet the criteria. DO NOT attempt to measure the High Voltage Output or make any measurements with respect to ground with this type of meter. Doing so can cause meter damage and/or personal injury.

Measure the voltage across each capacitor (C4 – C9):

C4 890 volts DC
C7 475 volts DC
C5 775 volts DC
C8 820 volts DC
C6 690 volts DC
C9 730 volts DC

The actual measured values may be different, but they should be proportional to those shown. If ok, proceed to High Voltage Output (Alternate – Resistor Check). If the voltage measured across any of the capacitors is very different from shown, then that capacitor is likely defective, or possibly the diode of the corresponding stage.

3. High Voltage Output (Preferred Method)

DO NOT attempt to measure this voltage with a conventional DC meter. A High Voltage Probe is required. Connect the ground lead of the High Voltage Probe to the High Voltage Ground. Probe the High Voltage Output. The voltage should be slightly less than was measured at Stage 6 above (about 2800 volts DC). If ok, then the Bias Power Supply is functioning properly. If not, then one of the 10-megohm resistors is open and should be replaced.

4. High Voltage Output Measurement (Alternate – Resistor Check)

The 10-megohm resistors may be checked with an ohmmeter capable of measuring at least 10-megohms. Power must be off and the residual voltage discharged. If both resistors measure ok, then the bias power supply is functioning properly. If either of the two resistors measure significantly different than 10 megohms, then it must be replaced.

III. AUDIO TRANSFORMER DC RESISTANCE MEASUREMENTS

The audio transformer's primary and secondary windings may be checked with an ohmmeter having a low-ohms scale (R x 1). Power must be off and the residual voltage discharged.

To measure the primary, one of the primary leads must be unsoldered from the printed circuit board. The primary leads are the thin silver wires: disconnect either one. Measure the resistance between the two silver wires: it should be about 1.5 ohms. If the measurement is significantly different than this, the primary is bad, and the transformer must be replaced.

To measure the secondary, it is not necessary to disconnect any wires. Measure the resistance between the yellow and white wires: it should be about 72 ohms. Repeat the measurement between the blue and white wires: it should be about 72 ohms. If either of these measurements is significantly different, then the secondary is bad, and the transformer must be replaced.

Note that the DC resistance measurements are only a basic check of the transformer's functionality. These tests do not verify its audio or high-voltage characteristics.

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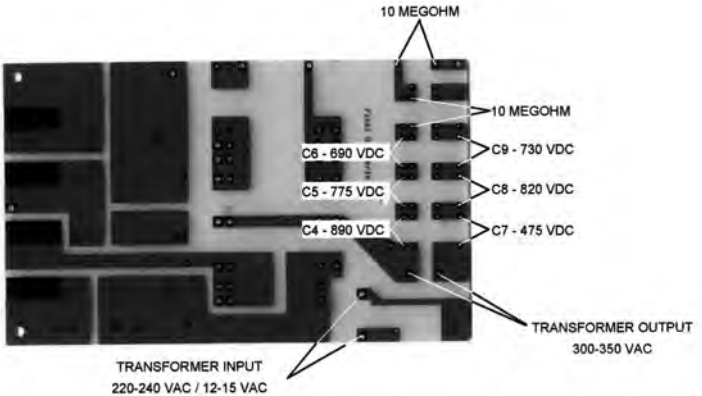

NSS TEST PROCEDURE

TEST POINTS FOR MEASUREMENTS WITH DIGITAL MULTI-METER

VIEW FROM FOIL (SOLDER) SIDE OF PRINTED CIRCUIT BOARD

AJS 01-01-03
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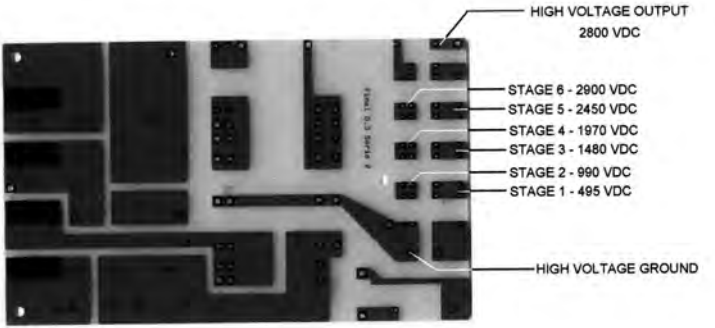

NSS TEST PROCEDURE

TEST POINTS FOR MEASUREMENTS WITH HIGH VOLTAGE PROBE

VIEW FROM FOIL (SOLDER) SIDE OF PRINTED CIRCUIT BOARD

AJS 01-01-03
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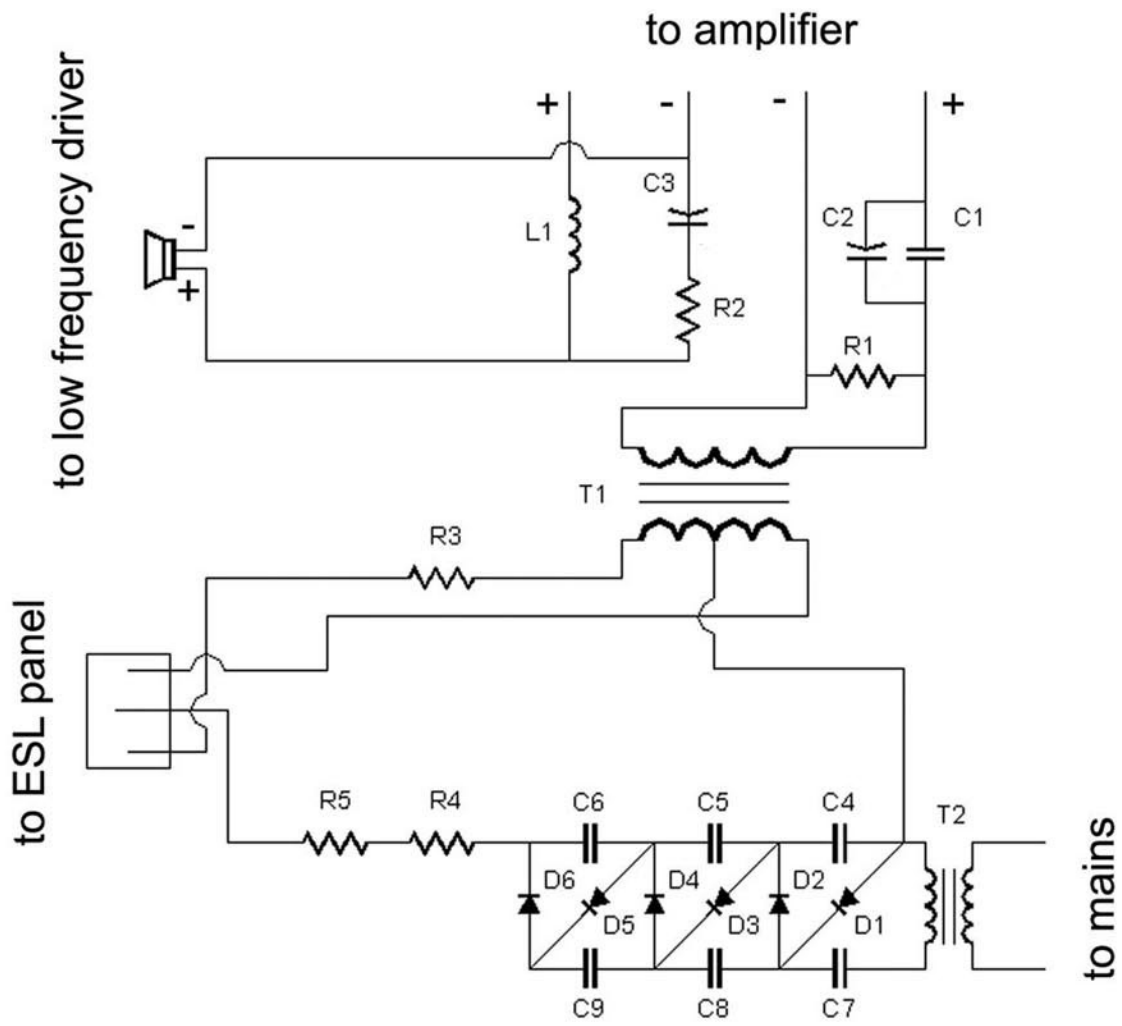

T1	audio transformer
T2	transformer 12/230V or 230/230V
C1	capacitor 1 uF/250V
C2	capacitor 33 uF/100V
C3	capacitor 220 uF/63V
C4...9	capacitor 22nF/630V
D1...D6	diode 1N4007
R1	resistor 10R/5W
R2	resistor 2R7/5W
R3	resistor 1 kOhm
R4, R5	resistor 10mOhm
L1	2.2mH 0.95 mm

SCHEMATIC FOR NSS 0.3

Date: 04-11-2001
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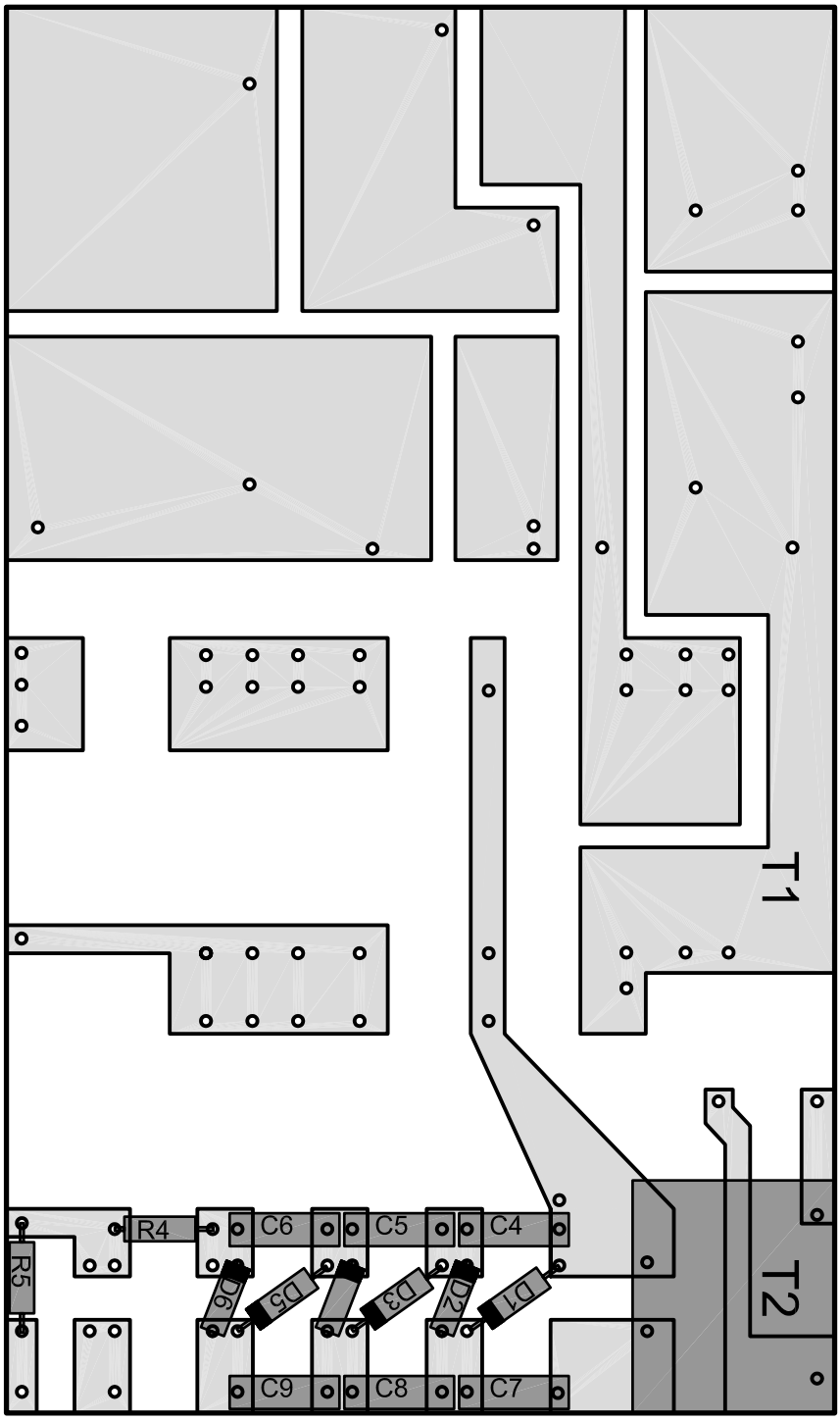
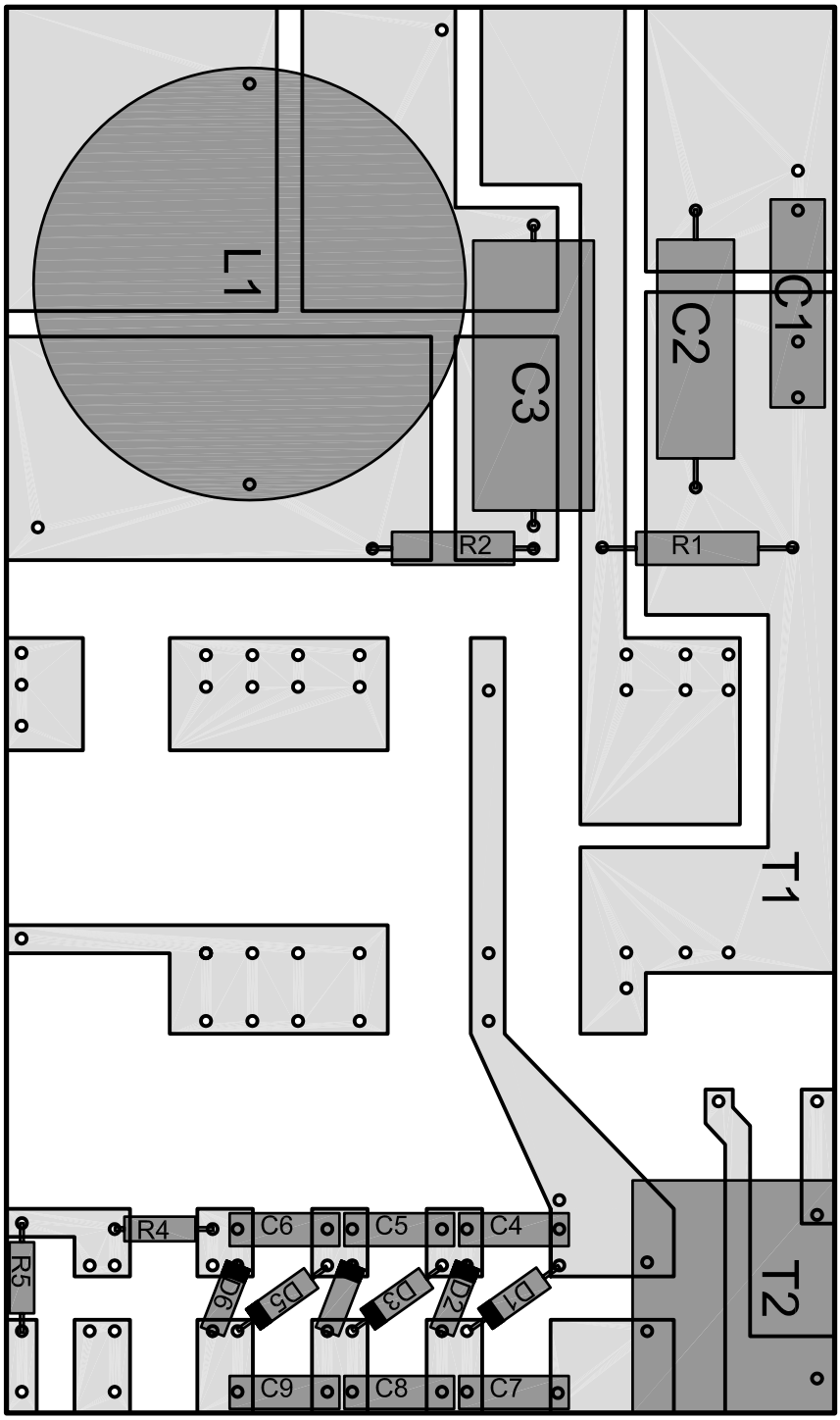
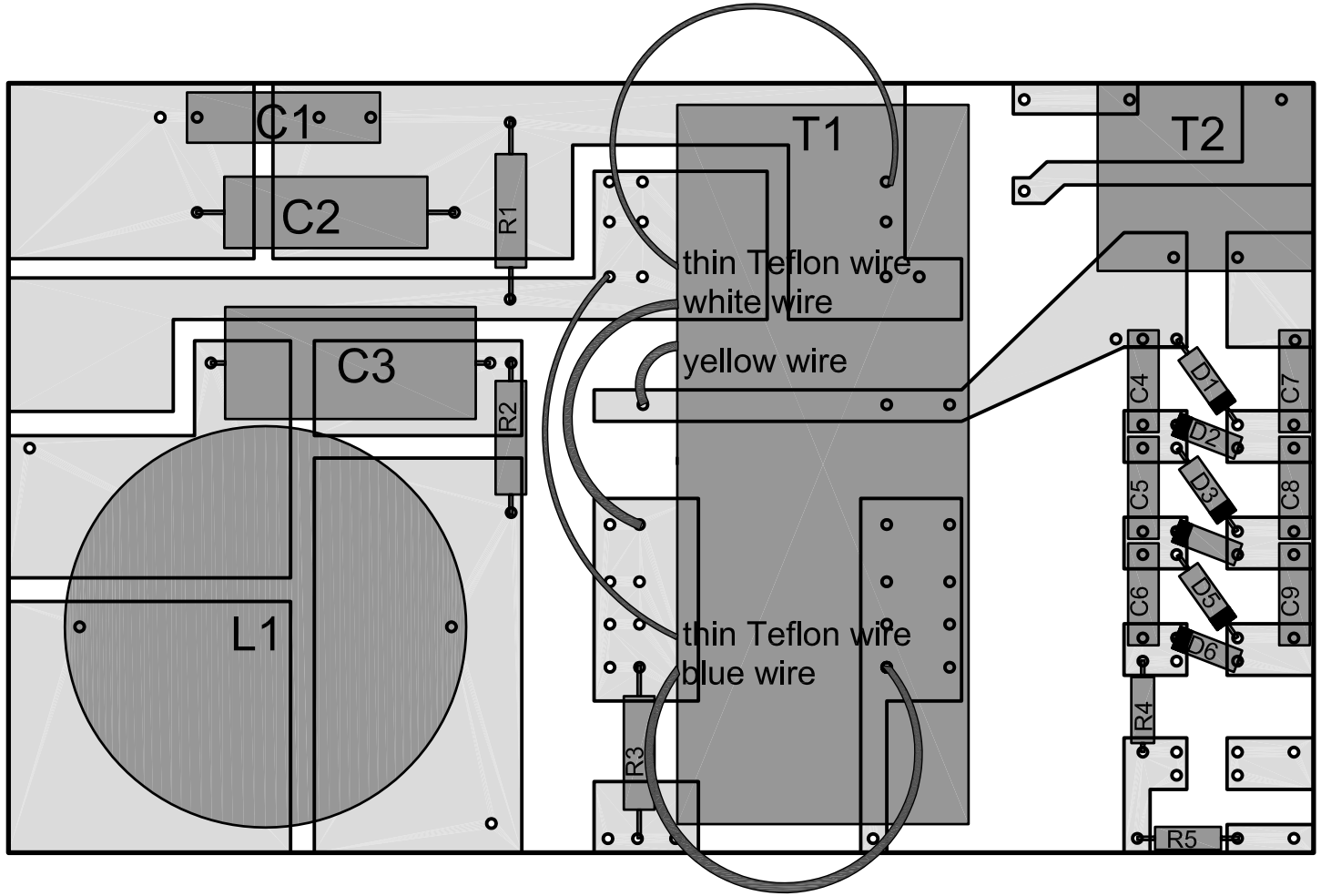
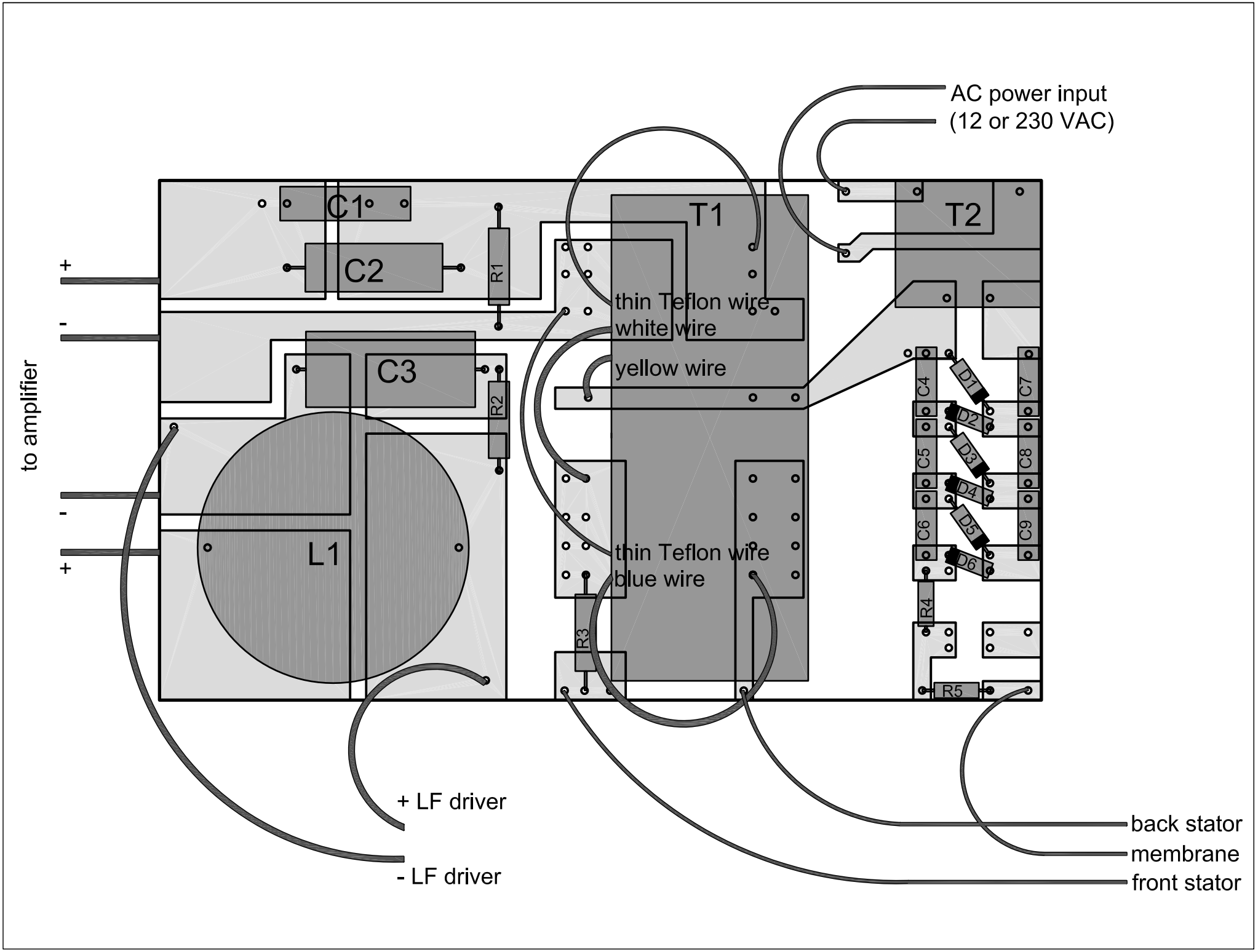
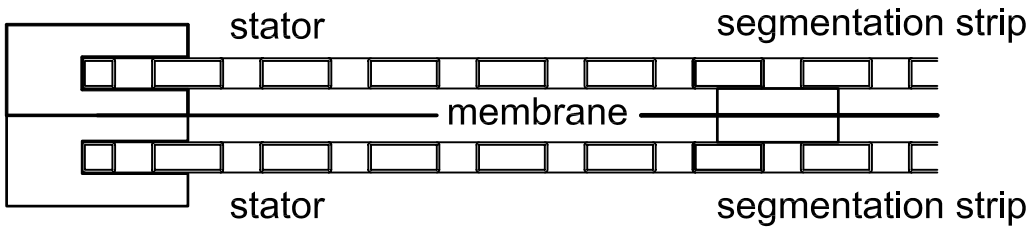
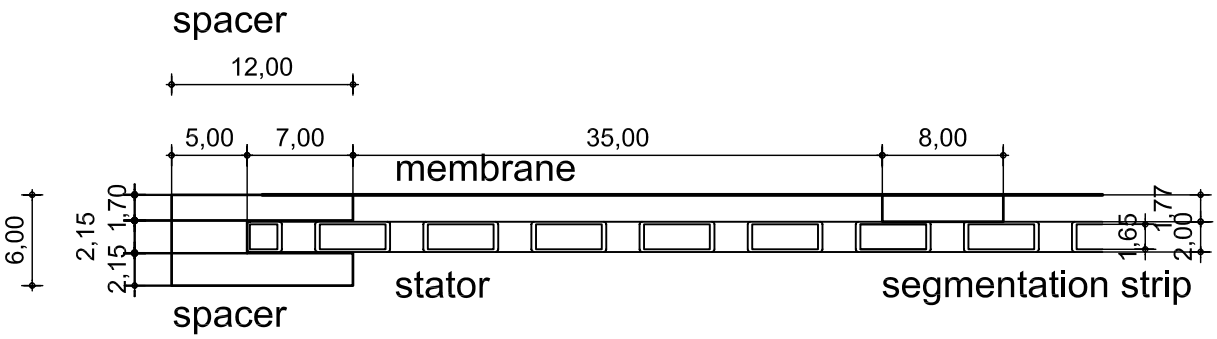

T1
T2
R4
R5
C6
C5
C4
C9
C8
C7
D6
D5
D4
D3
D2
D1

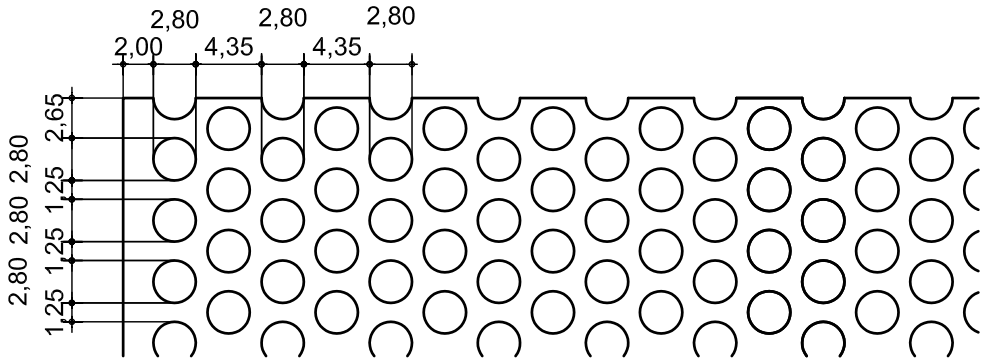

L1
C3
C2
C1
R2
R1
T1
T2
R4
C6
C5
C4
R5
D6
D5
D3
D2
D1
C9
C8
C7


C1
C2
C3
L1
R1
R2
R3
T1
T2
thin Teflon wire
white wire
yellow wire
thin Teflon wire
blue wire
C4
C5
C6
C7
C8
C9
D1
D2
D3
D5
D6
R4
R5

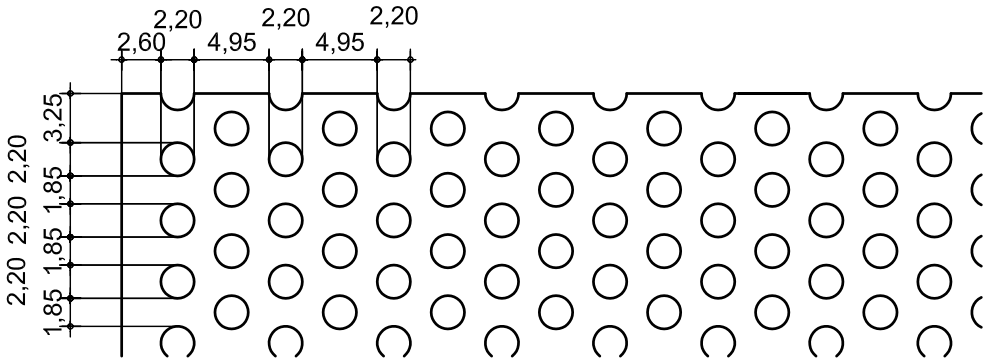

AC power input
(12 or 230 VAC)
C1
C2
C3
R1
R2
T1
T2
thin Teflon wire
white wire
yellow wire
thin Teflon wire
blue wire
L1
R3
R4
R5
C4
C5
C6
C7
C8
C9
D1
D2
D3
D4
D5
D6
+
-
-
+
to amplifier
+ LF driver
- LF driver
back stator
membrane
front stator







stator unpainted



stator painted

The ESL Circuit

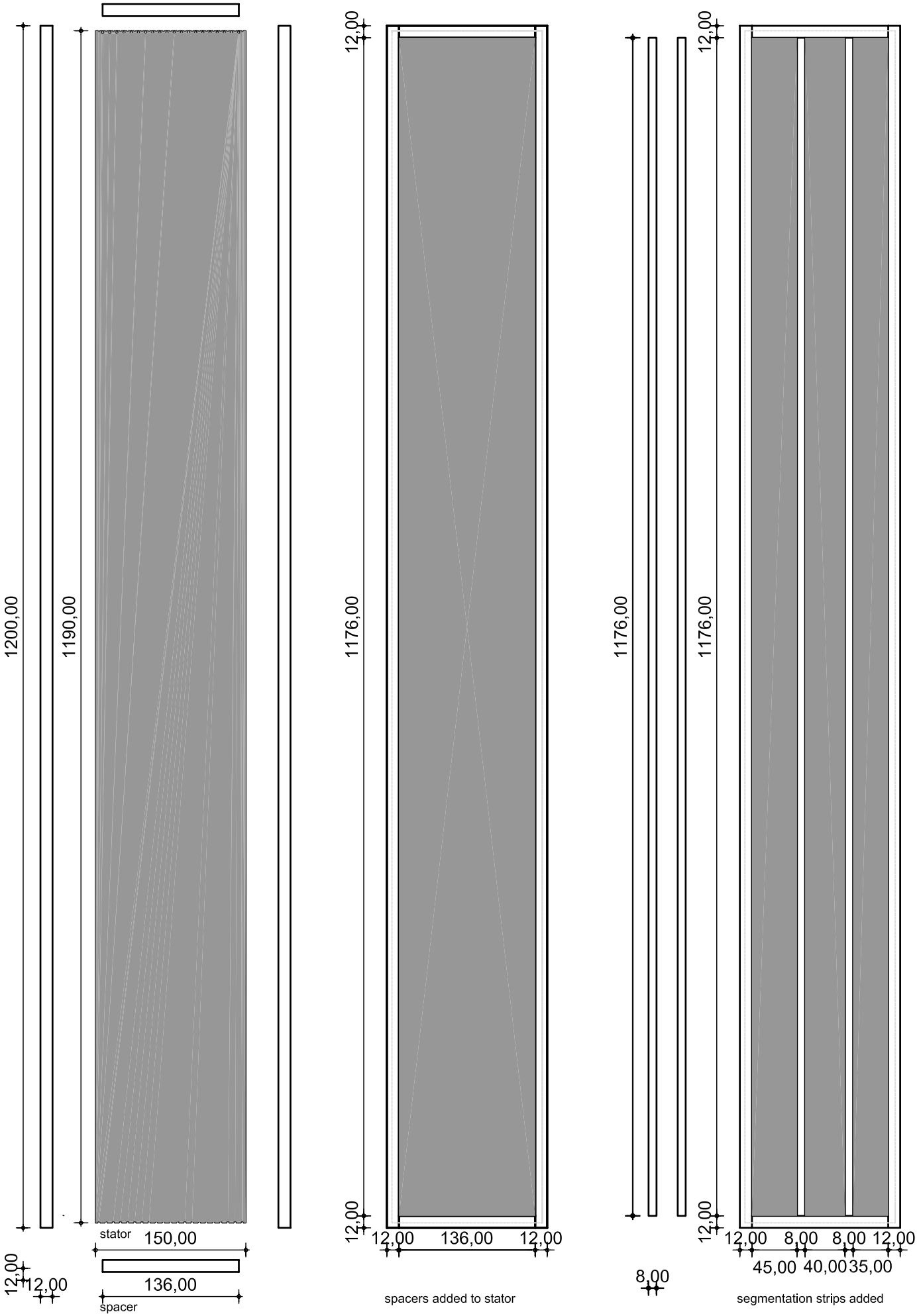
(member of TAC, The Audio Circuit)

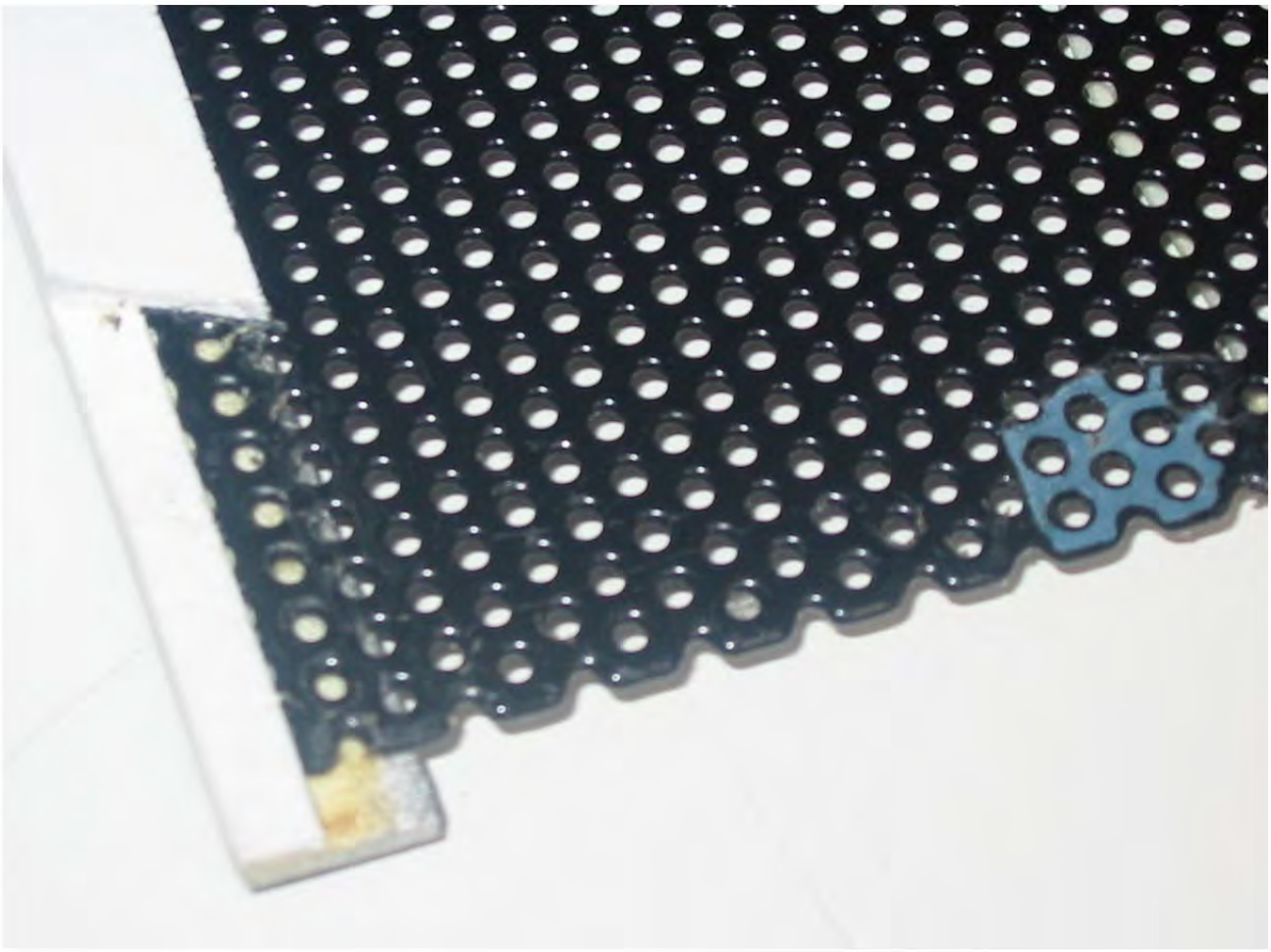
4e Donk 3, 5233 XH, Den bosch, the Netherlands
Tel: +31 (0) 73 641 52 48
E-mail: webmaster@audiocircuit.com
Web Site: www.audiocircuit.com

Newton Sound Systems, NSS 0.3

Get. Wijz. Datum

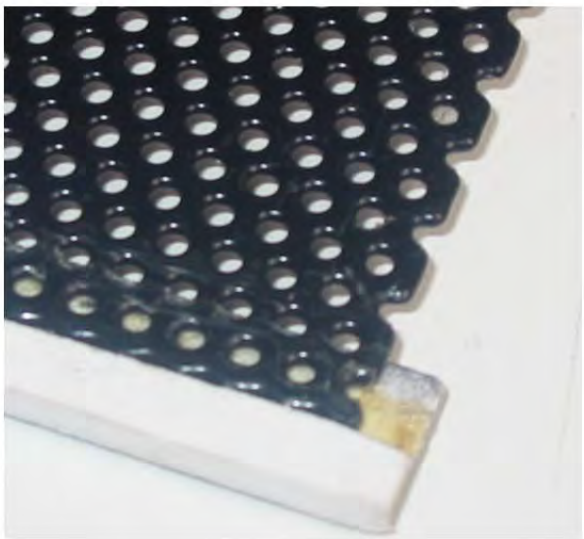
File: 9041CMNSS-OV-07.01 Getekend door: ADMINISTRATOR Datum geplot: 30-04-2003	Project 9041CMNSS	Tekeningnummer MNSS-OV-07.01	Schaal 1:1	Datum 30-04-2003

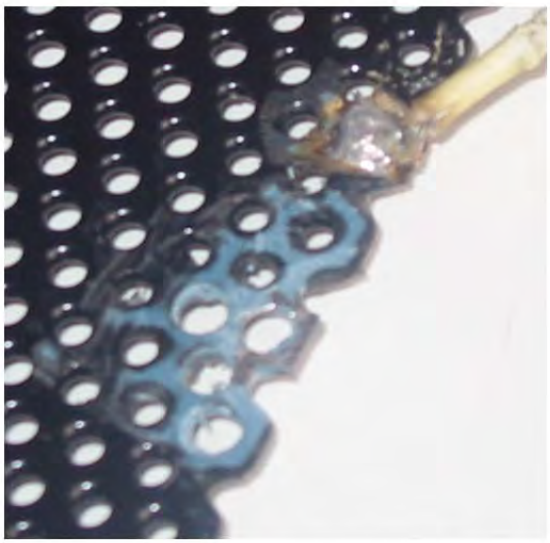

1200,00
1190,00
stator
150,00
12,00
12,00
136,00
spacer
12,00
1176,00
12,00
12,00
136,00
12,00
spacers added to stator
1176,00
8,00
12,00
1176,00
12,00
12,00
8,00
8,00
12,00
45,00
40,00
35,00
segmentation strips added



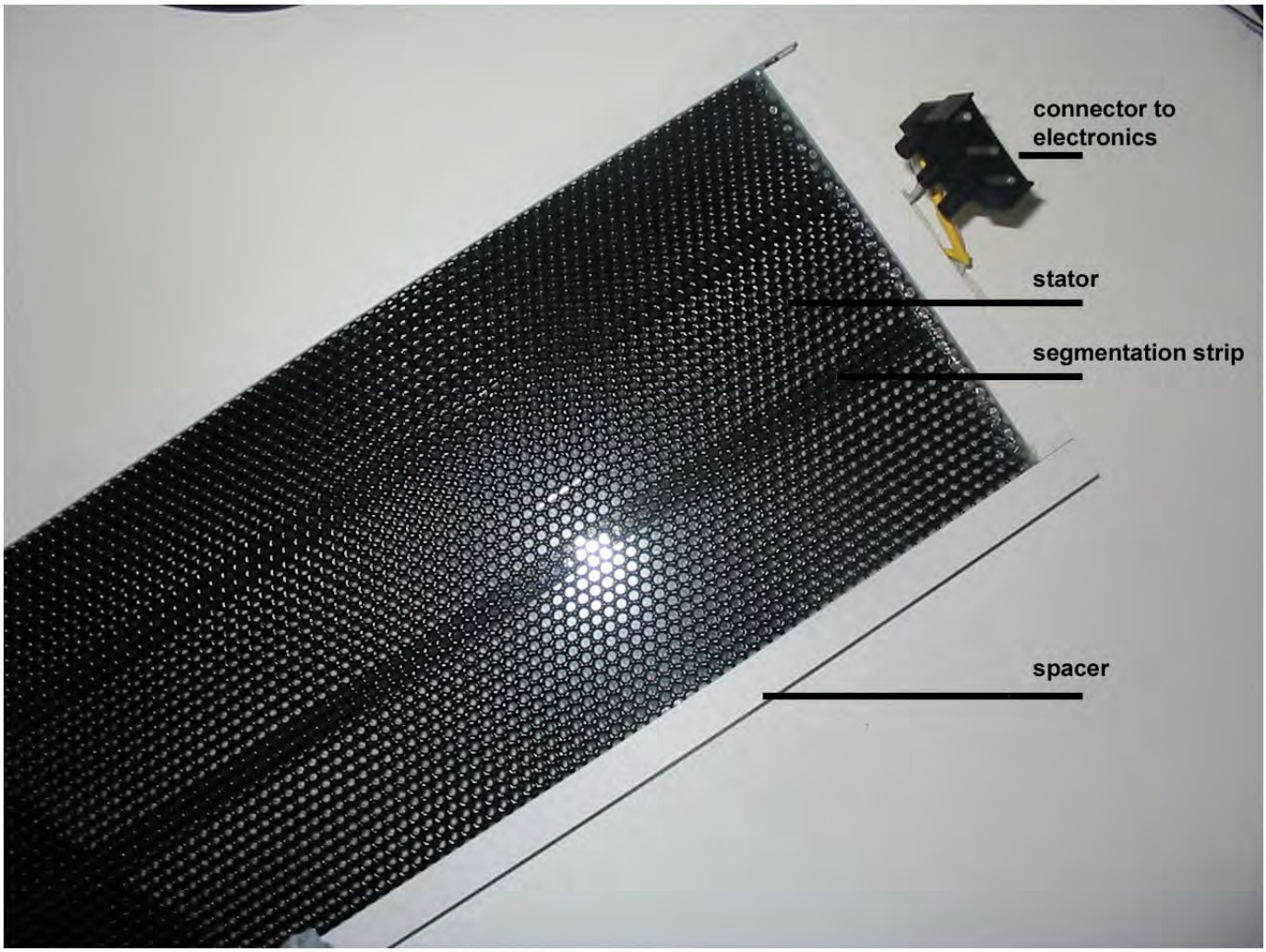
Detail of an open stator. A part of the spacer is cut away to give an idea how its made.

On the right the paint is cut away. The blue material is the primer. The paint is applied about with a thickness of about 0.12mm. Around the holes there is more paint. A unpainted hole has a width of 2.8mm. After applying the paint the hole size is reduced to 2.2mm.





Here you can see the wire connection to the stator.


connector to
electronics
stator
segmentation strip
spacer