TOROIDAL TRANSFORMER

For MARANTZ models 2500/2600

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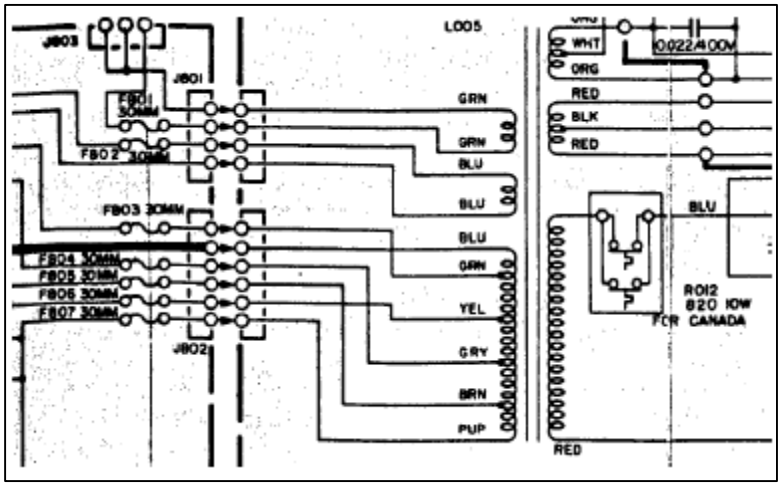
Marantz 2600 and Sansui G9000 (from my collection)

Service manuals for Marantz receivers are famous for their lack of information, or providing information that is incorrect and/or incomplete. In the specific case of Marantz models 2500 and 2600, the manuals additionally contain misleading information about the capacity and positioning of some electrolytic capacitors, and they do not contain important data on voltage and current for the toroidal transformers accompanying the products. These transformers were also famous for burning out, which presented problems in the construction of new units.

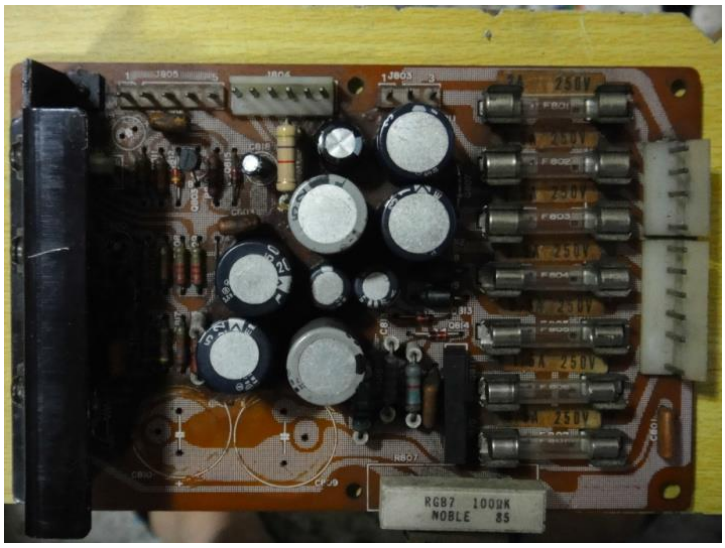
The purpose of this text is to allow electronic technicians, or even Marantz 2500/2600 owners with dead toroidal transformers, to recover your receivers. Although my training is in Civil and Mechanical engineering, my hobby is recovery and restoration of electronic equipment, especially equipment considered "vintage". I do not work as an electronic technician, nor do I provide maintenance services for electronic equipment. This, as I've said, is just a hobby, although I've been involved in it for over 40 years. So, I take no responsibility for the information provided here, however I have successfully utilized it in the recovery of my own devices.

A POSSIBLE ERROR DETECTED IN SERVICE MANUAL

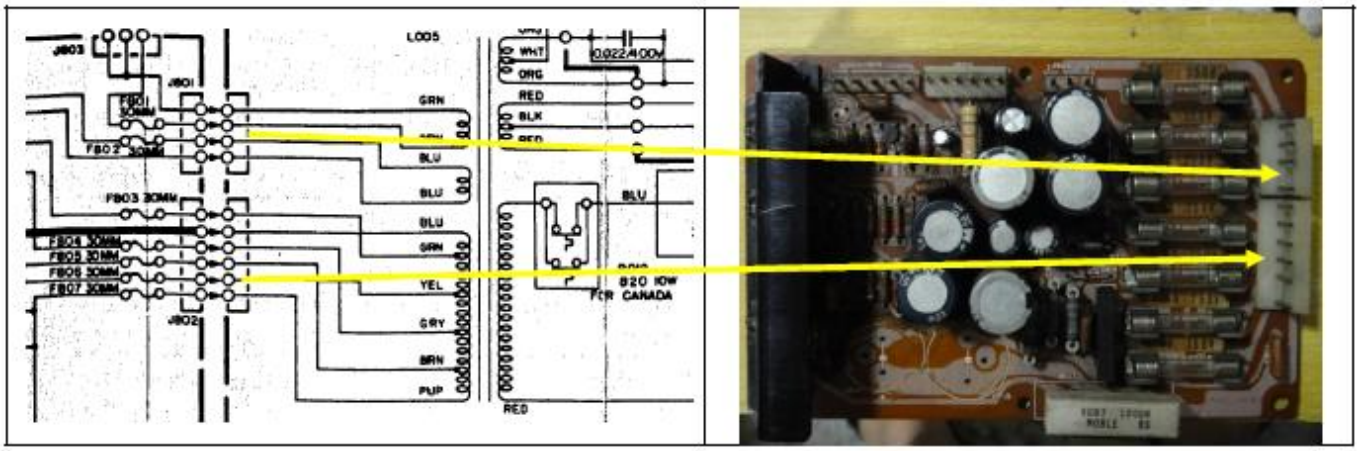
The Marantz 2500 and 2600 service manuals display the following diagram for connecting the toroidal transformer:



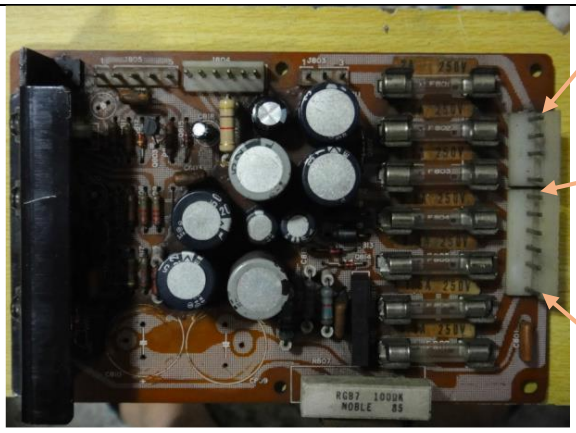
In the above schematic, the toroidal transformer has two secondaries for supplying the power amplifiers (one for each channel) and three additional windings to supply the other components, which are connected to the P800 board. Below is a photo of this board:



Note that this board has its original capacitors, as they hadn't yet been replaced at the time of the photo. In the circuit shown in the Service Manual, the transformer is connected to the board using the two connectors below:

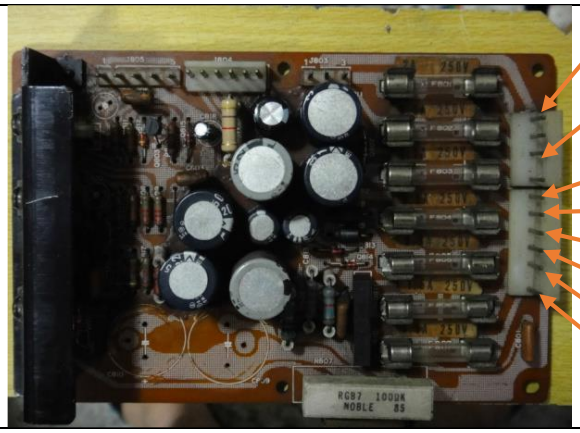


If the schematic was correct, then the connections would have the color sequence indicated below:

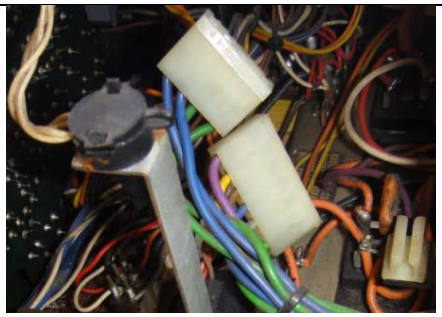


Green
Green
Blue
Blue
Blue
Green
Yellow
Gray
Brown
Purple
Colors in the sequence

However, I have two machines, a 2600 and a 2500 - both came with the following color sequence installed:

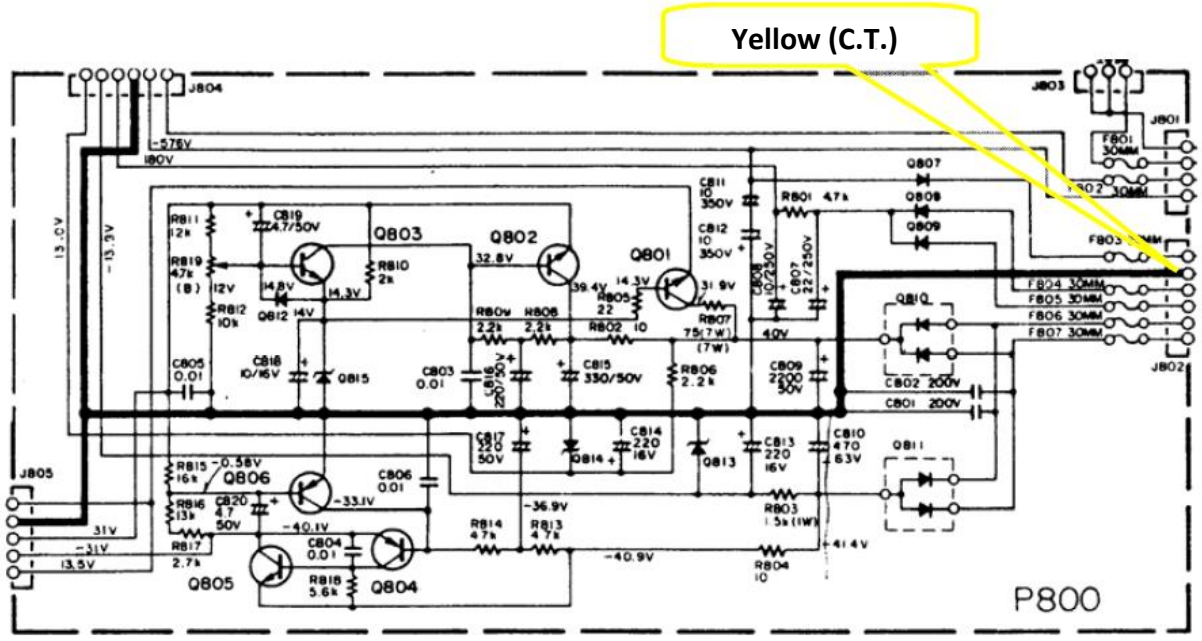


Blue
Blue
Green
Green
Purple
Yellow
Brown
Blue
Gray
Green

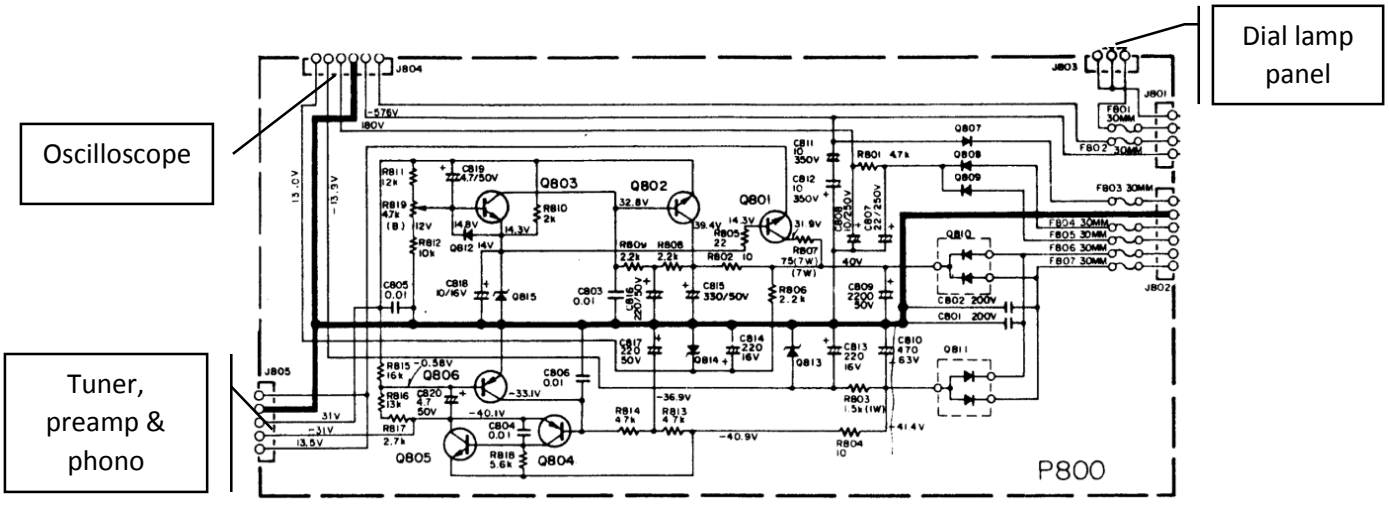


A quick search on the Internet shows the colors in this same sequence.

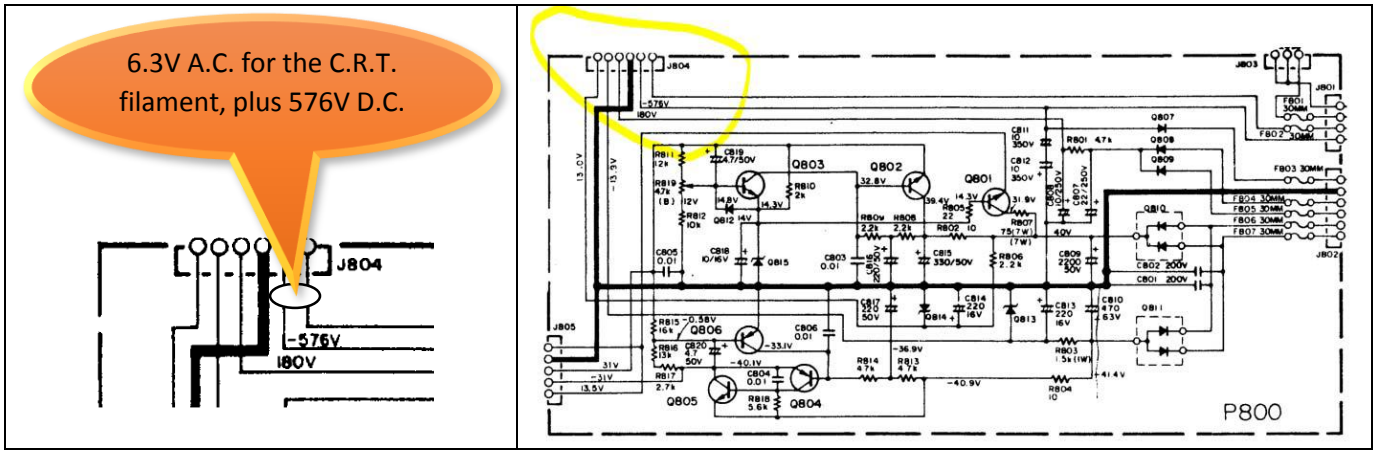
Considering the colors on the connectors and the power circuit of the P800 board, it is easy to see that the yellow wire is connected to "Ground" (earth) and therefore will now be considered the CT (Center Tap) of this side:



The P800 board provides DC (direct current) and AC (alternating current) for all components of the receiver, except for the power amplifier, which has its own side for each channel (L and R). The circuits are shown below:

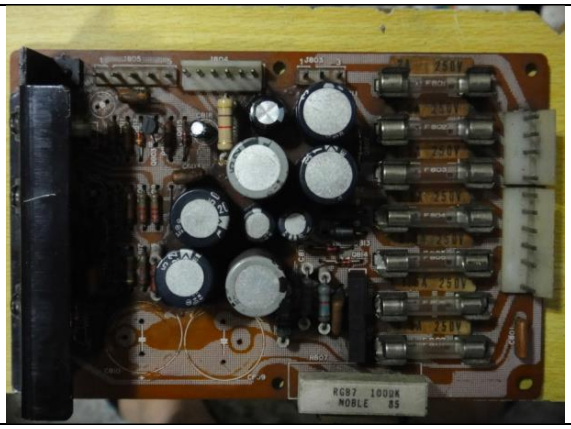


In this circuit (P800), there is no indication of full voltage. The J804 connector provides DC and AC currents to the oscilloscope, as shown below:



In the above schematic, the conclusion is that the J801 connector provides 7V AC for filaments (in green) and 8V AC (blue), for the panel lights.

The J802 connector must therefore provide AC voltages to be rectified and generate 576V in DC, as well as 180V and 41.4V DC supplies. Therefore, the pinout is as follows (all voltages in AC):



Blue	8V
Blue	
Green	6.3V
Green	
Purple	430V
Yellow	C.T.
Brown	160V
Blue	160V
Gray	30V
Green	30V

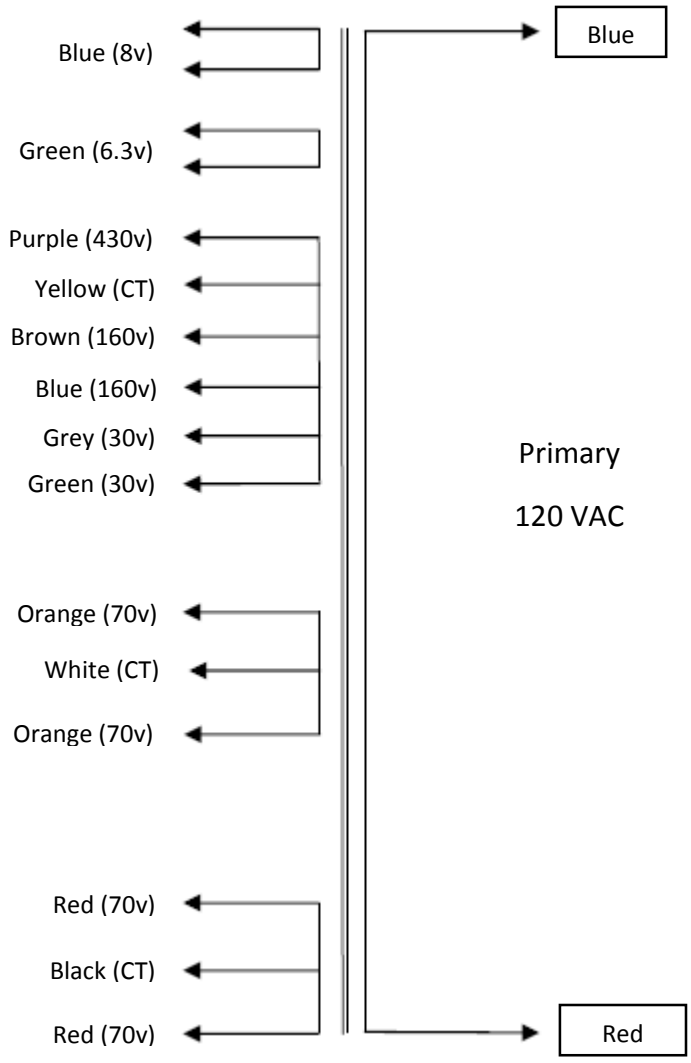
The 180V circuit is used to adjust the focus of the oscilloscope, ranging from 50V to 250V. This circuit is derived from the Marantz 4400.

The current of each circuit is indicated on the board. Thus, the analysis is complete this side of the toroidal transformer. For the amplifier, the currents and the voltages are listed on the next page:

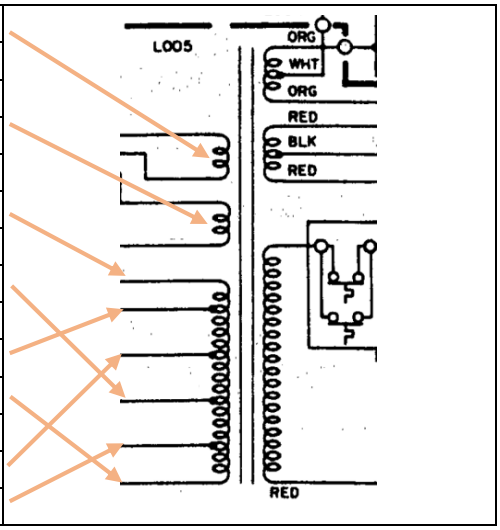
Toroid Specifications – Marantz 2600

Color		AC	DC	A
Blue	Lamps	8	-	2.0
Green	Filament	6.3	-	0.5
Purple	Oscilloscope	430	-576	0.5
Yellow		CT		
Brown	Oscilloscope	160	180	0.5
Blue	Oscilloscope	160	180	0.5
Grey	Receiver	30	+/-40	1.5
Green	Receiver	30	+/-40	1.5

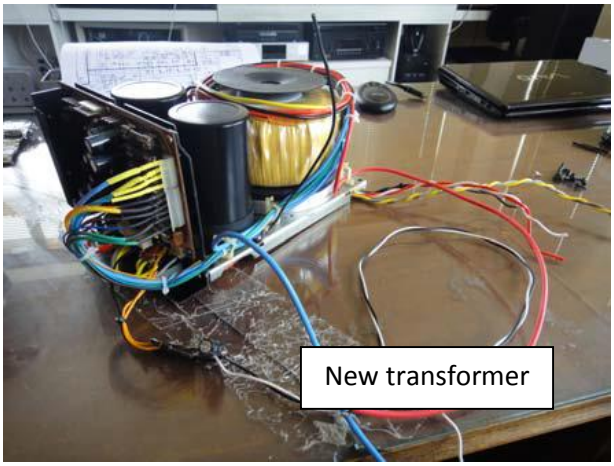
Color	AC	DC	A
Amplifier			
Orange	70	94.2	10
White	CT		
Orange	70	94.2	
Red	70	94.2	10
Black	CT		
Red	70	94.2	



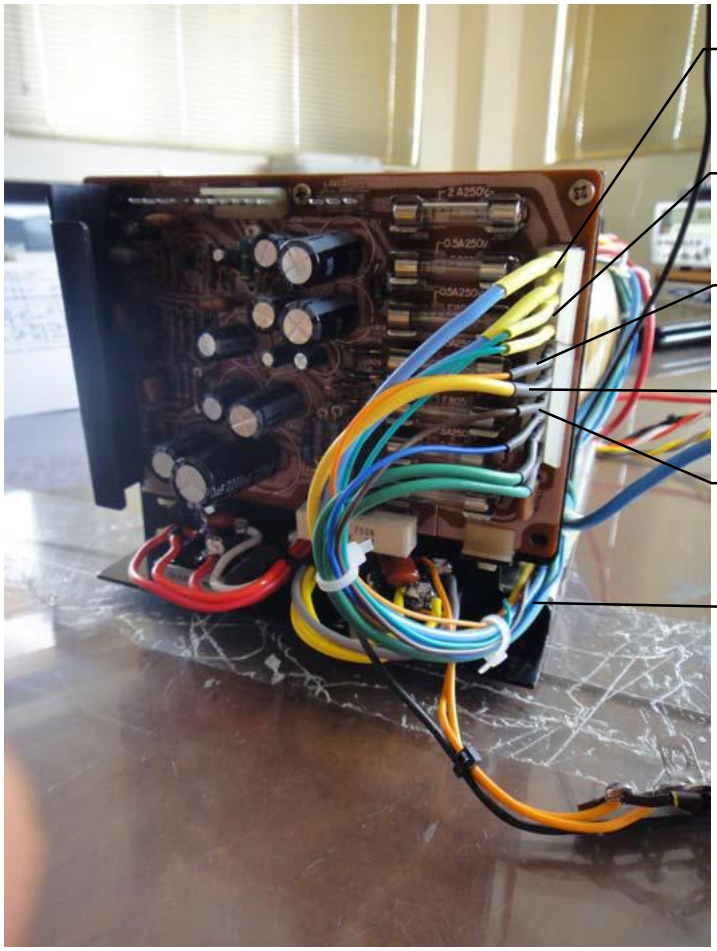
8v	Blue
	Blue
6.3v	Green
	Green
430v	Purple
C.T.	Yellow
160v	Brown
160v	Blue
30v	Grey
30v	Green



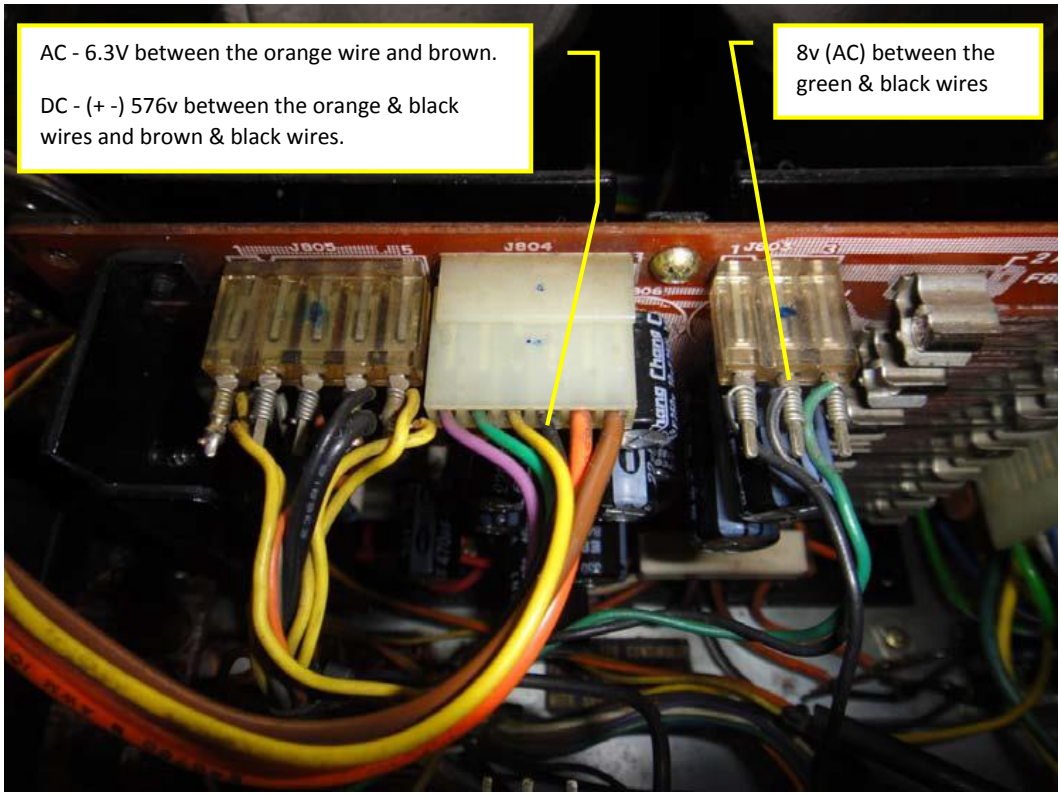
Now that our toroid specifications are ready, we have two options: rewind the original transformer or have a new one built. Both options have their advantages and disadvantages. Rewinding the old transformer requires a good technician who knows toroidal transformers, and is careful and be patient enough to remove the existing resin and reuse the same core and housing. The advantage is to keep the original look. The second option is simpler because the current techniques for the construction of these transformers are widely known and depend only upon finding a company to manufacture one. The disadvantage is in no longer having an original appearance. The second option was the one chosen. Below is a photo of the new transformer already mounted:



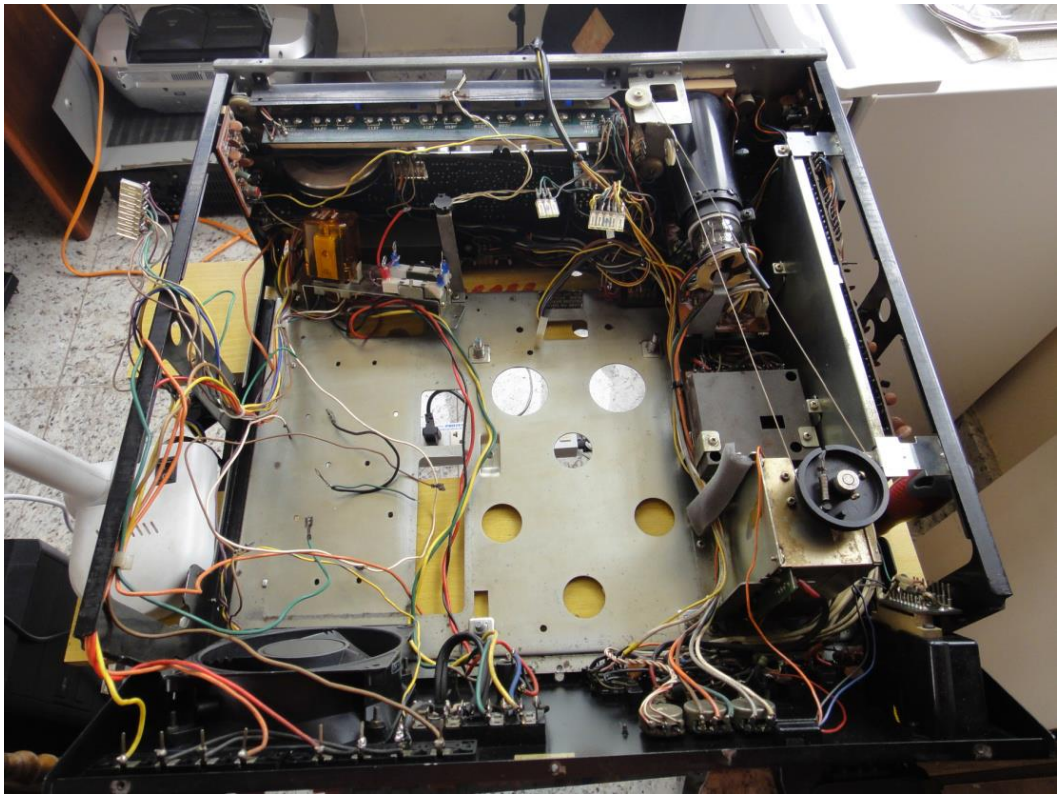
Here are new photos indicating the voltages:



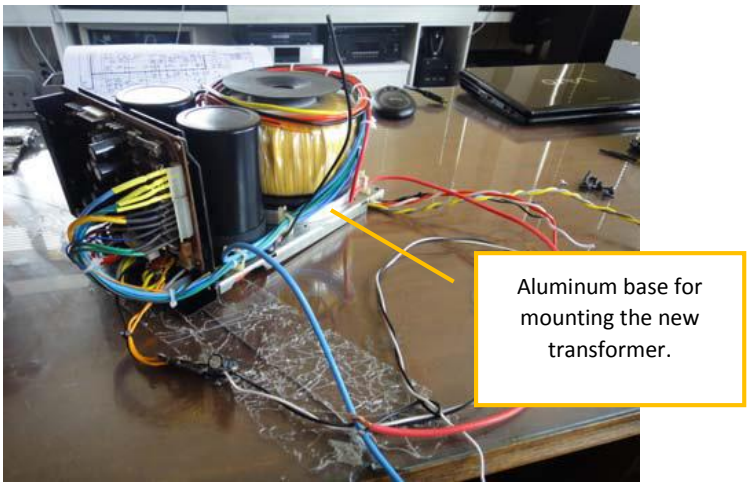
Now begins the final part of the process. The reassembly of the apparatus and measurements of voltages, both in AC and in DC. Measurements should be taken at the points indicated below:



Reassembly continues with the base of the transformer and the power module:



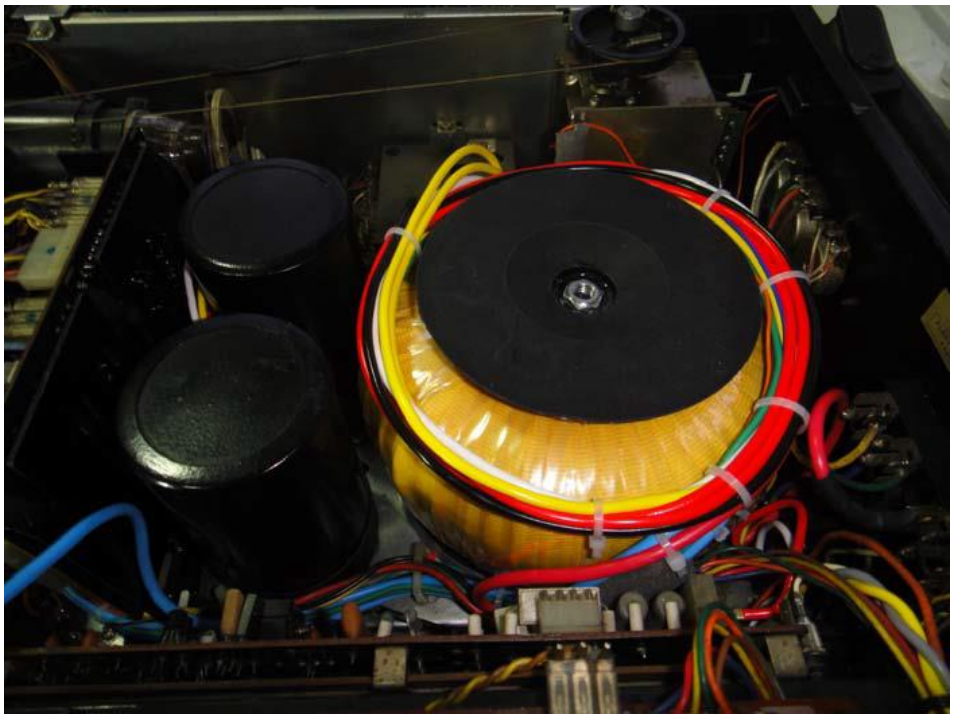
View of the new transformer and electrolytic capacitors of the power module, connected to the P800 board:



The transformer base is reattached to the receiver, using the same screws and connections, plus the aluminum base for the new transformer:

Finalizing the connections (soft start and thermostats):

Last check before pressing the "Power" button: *(now a nervous moment - will there be a burning smell? Will we "roast" a component?)*



Now comes the crucial moment: *"May destiny be kind! Time to close the eyes and connect ... "*

As the French would say, 'Voilà'. It worked... now we'll check the other circuits.

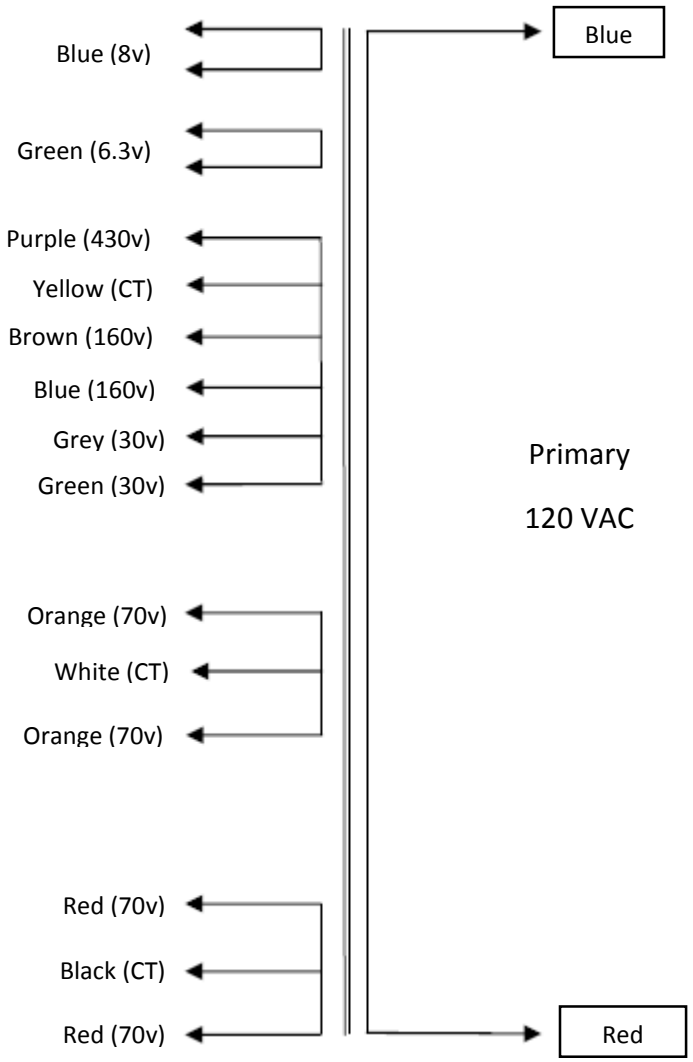
Tuning FM Radio:

Turning on the oscilloscope and making final adjustments. Everything appears to be in order.

For the Marantz 2500, just change the voltage of the amplifier outputs. The transformer schematic is below:

Toroid Specifications - Marantz 2500

Color		AC	DC	A
Blue	Lamps	8	-	2.0
Green	Filament	6.3	-	0.5
Purple	Oscilloscope	430	-576	0.5
Yellow		CT		
Brown	Oscilloscope	160	180	0.5
Blue	Oscilloscope	160	180	0.5
Grey	Receiver	30	+/-40	1.5
Green	Receiver	30	+/-40	1.5



Color	AC	DC	A
Amplifier			
Orange	65	87.6	10
White	CT		
Orange	65	87.6	
Red	65	87.6	10
Black	CT		
Red	65	87.6	

And photos of my Marantz 2500 recovery: