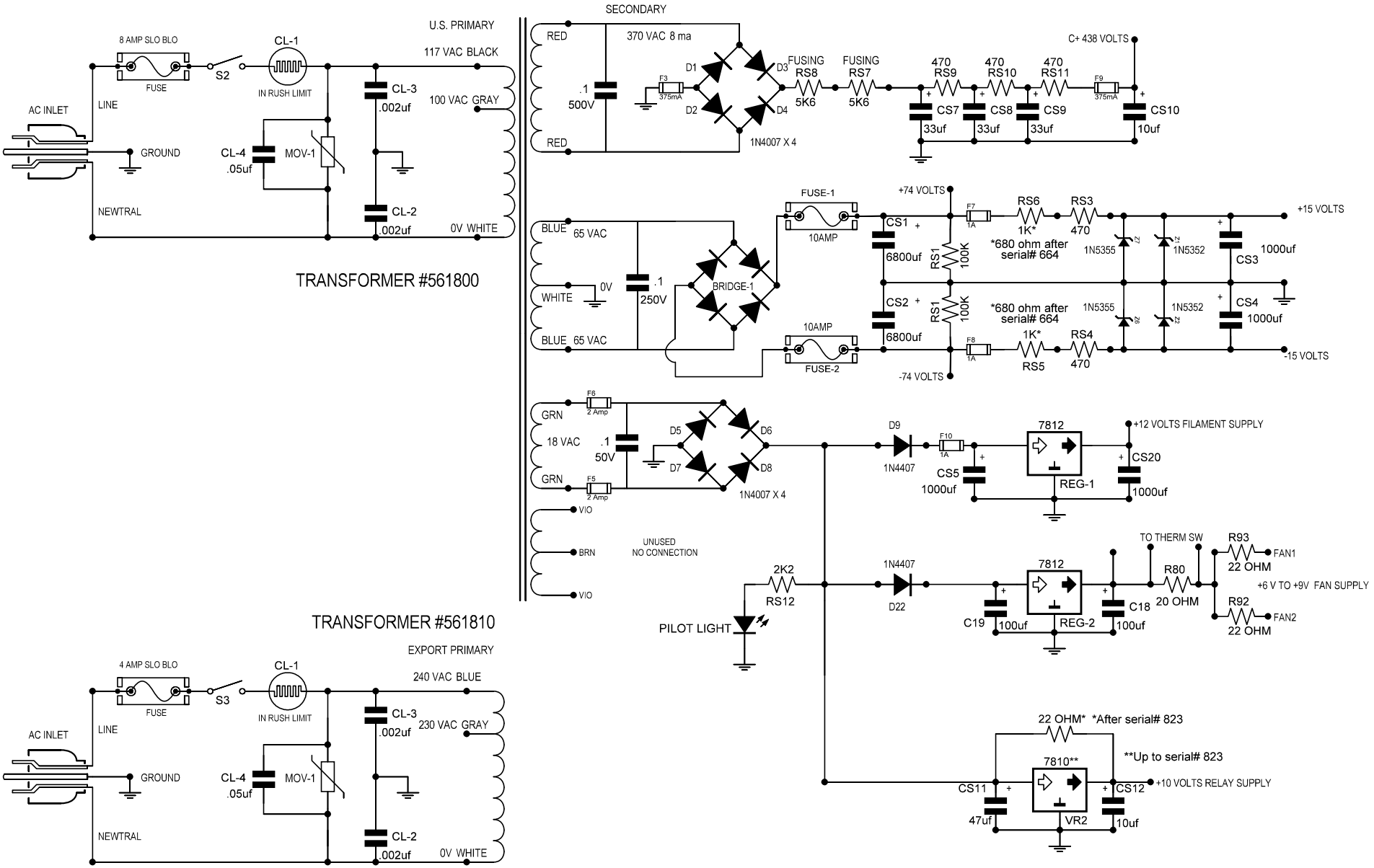
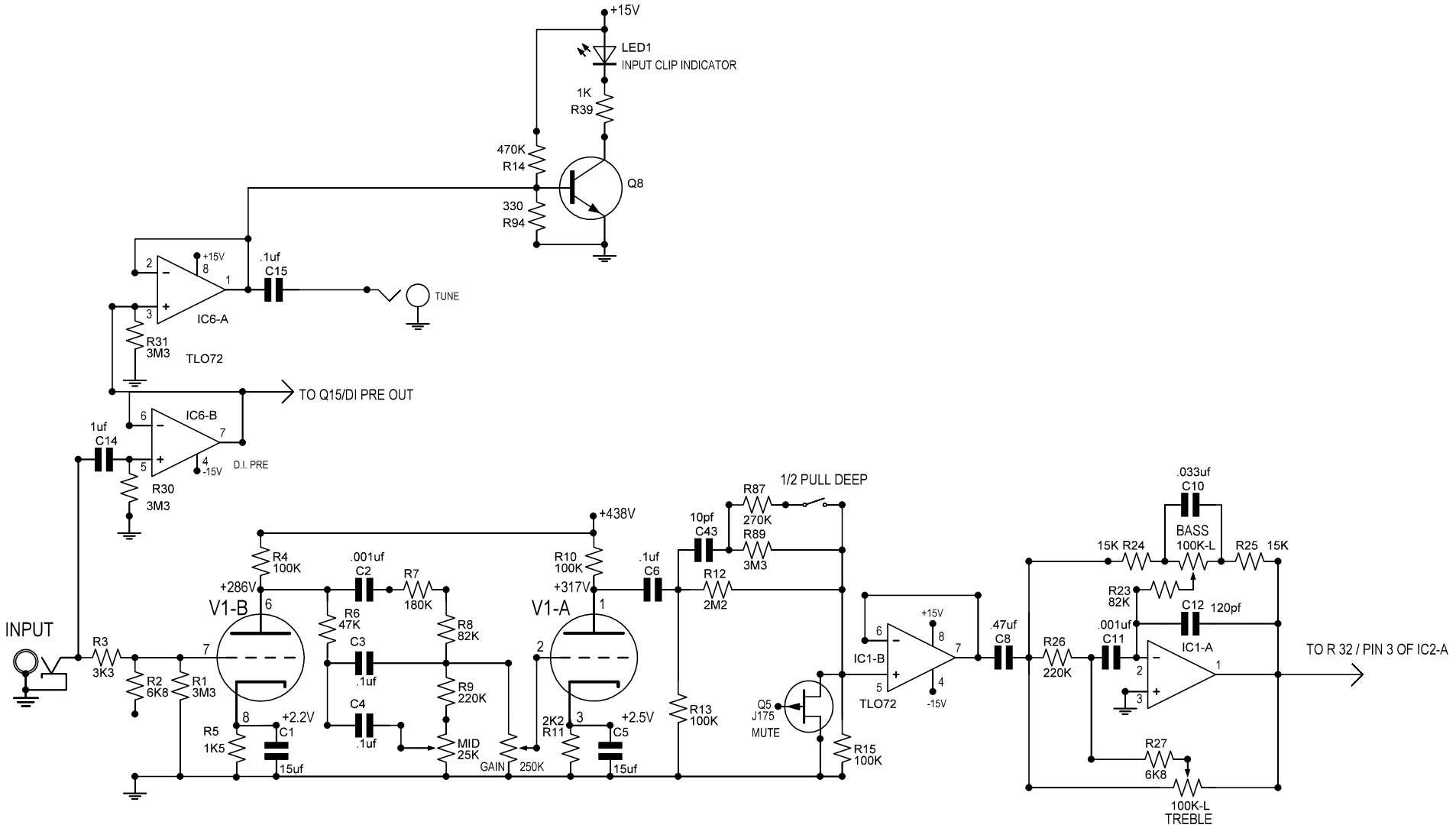


MESA / ENGINEERING Copyright 2009		
DESCRIPTION		M3-CARBINE POWER SUPPLY
DRAWN BY		DAN VAN RIEZEN
REVISION	3	PAGE 1
DATE	11-02-2010	OF



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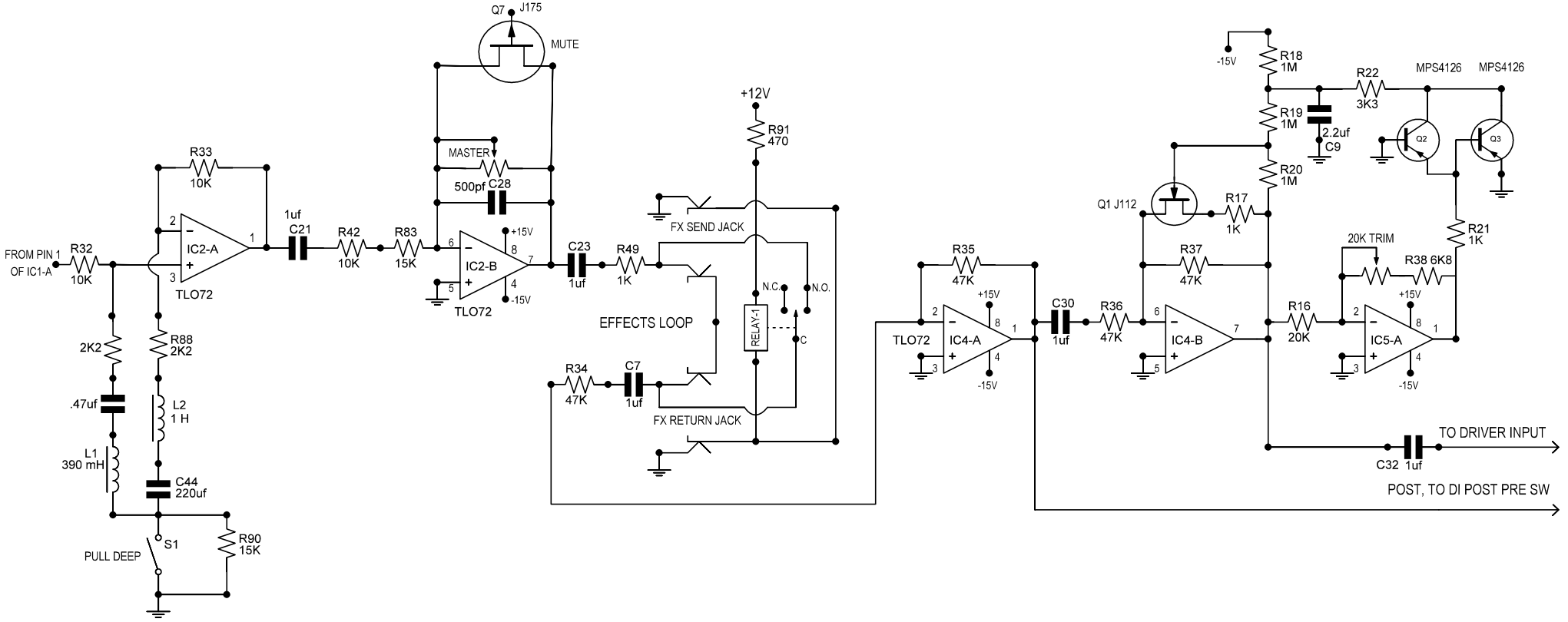
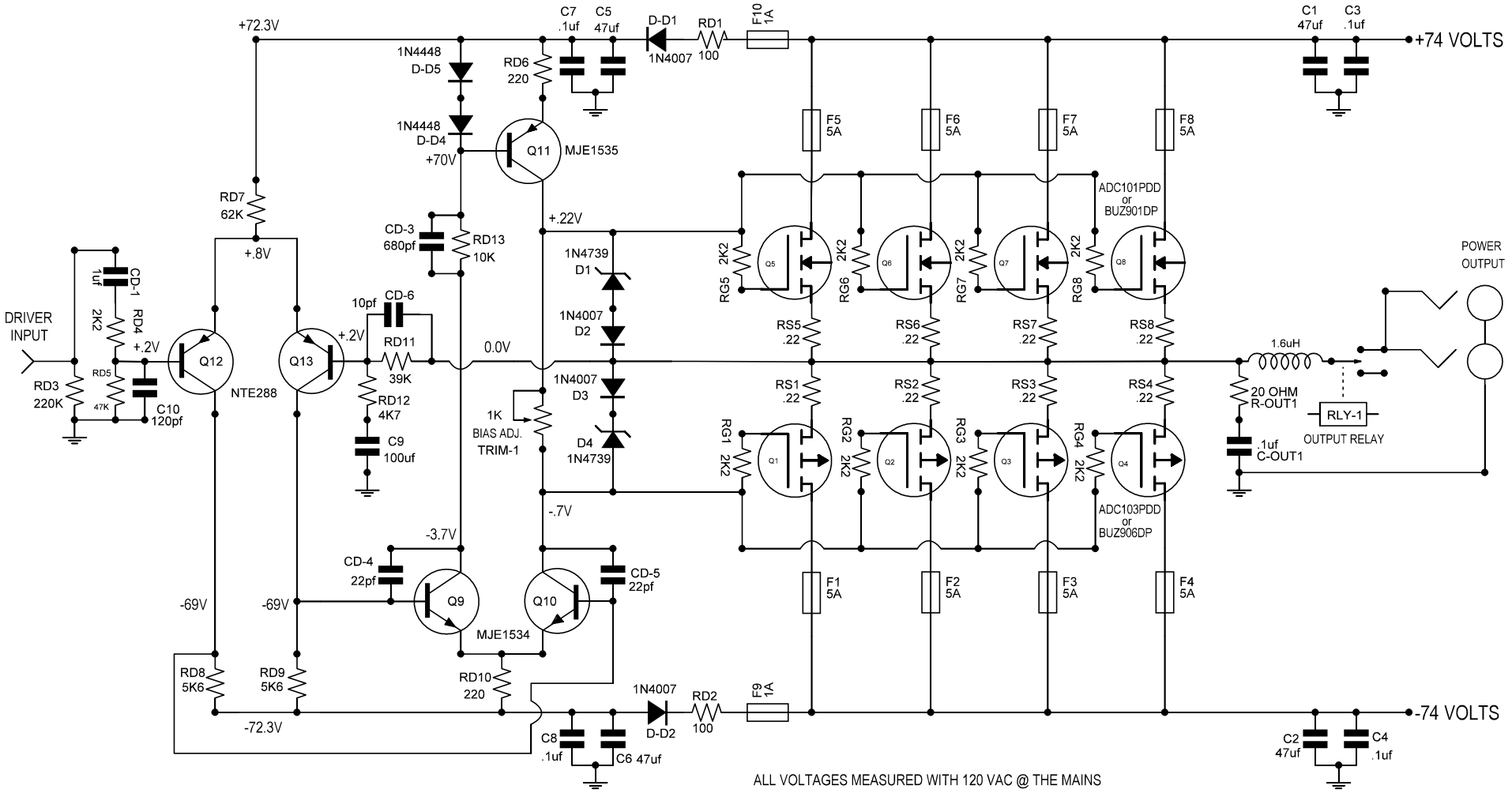
DRAWN BY		DAN VAN RIEZEN
REVISION	3	PAGE 2
DATE	11-02-2010	OF



MESA / ENGINEERING Copyright 2009		
DESCRIPTION		M3-CARBINE EFFECTS LOOP
DRAWN BY		DAN VAN RIEZEN
REVISION	3	PAGE 3
DATE	11-02-2010	OF



ALL VOLTAGES MEASURED WITH 120 VAC @ THE MAINS
USING CHASSIS GROUND AS REFERENCE

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DESCRIPTION		M3 CARBINE DRIVER/POWER OUT
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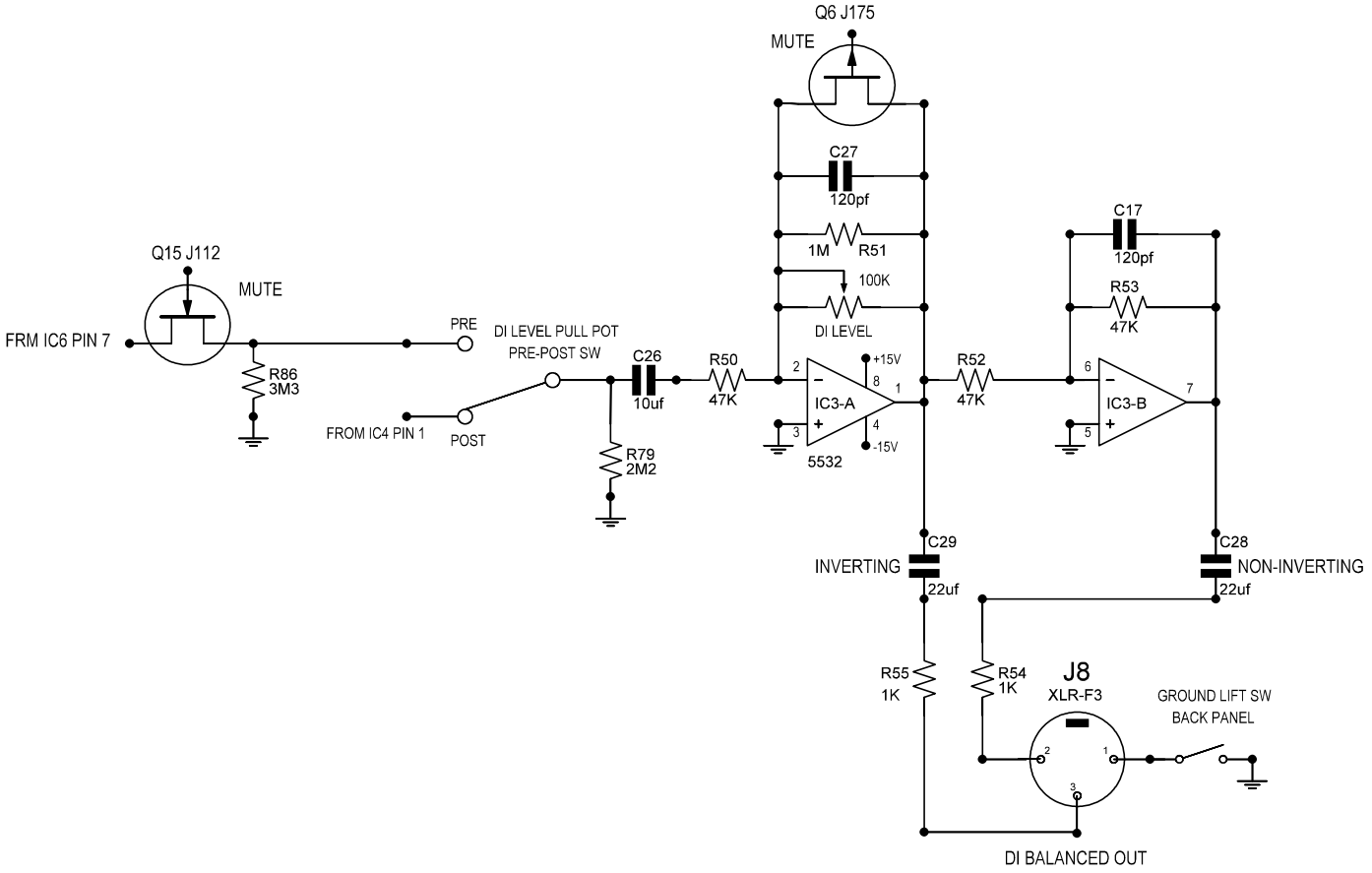
REVISION	3	PAGE 4
DATE	11-02-2010	OF



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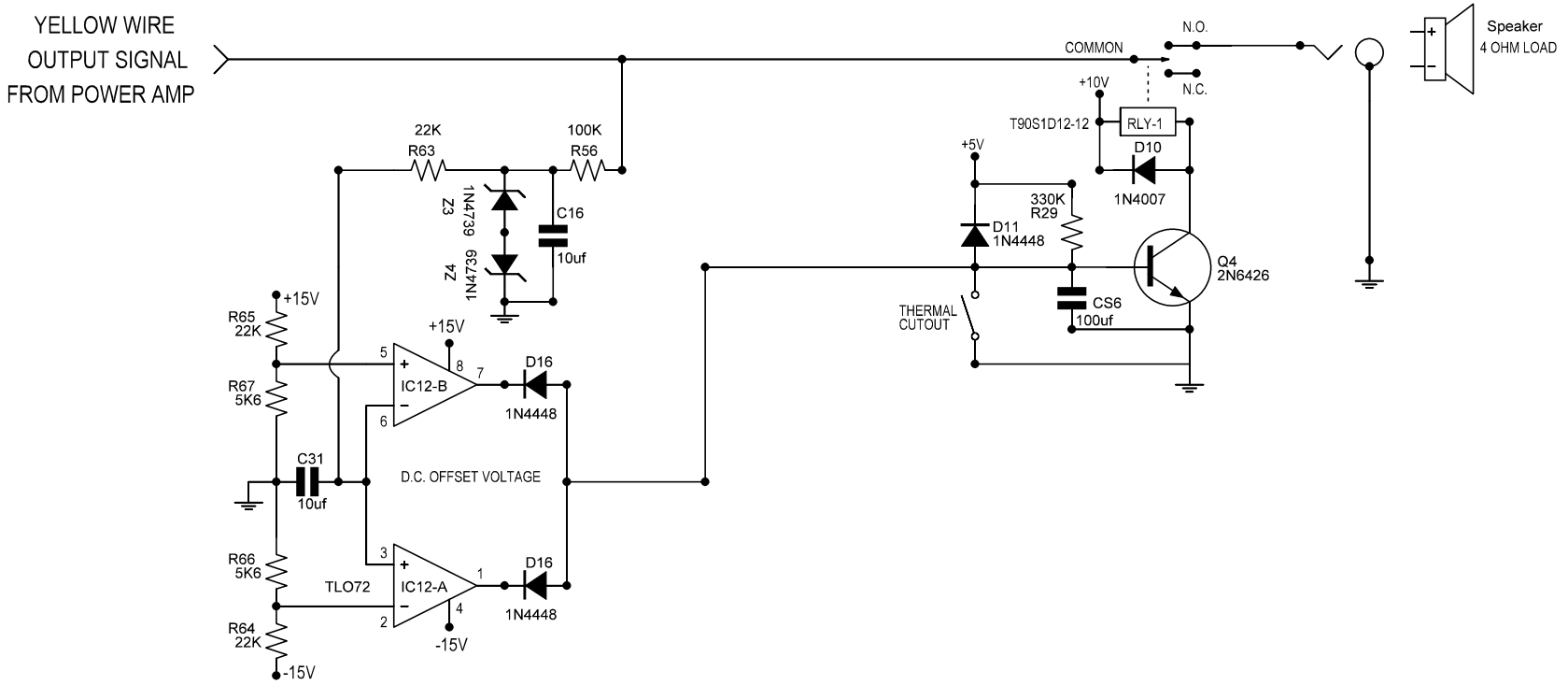
DESCRIPTION		M3 CARBINE DI OUTPUT
DRAWN BY		DAN VAN RIEZEN
REVISION	3	PAGE 5
DATE	11-02-2010	OF



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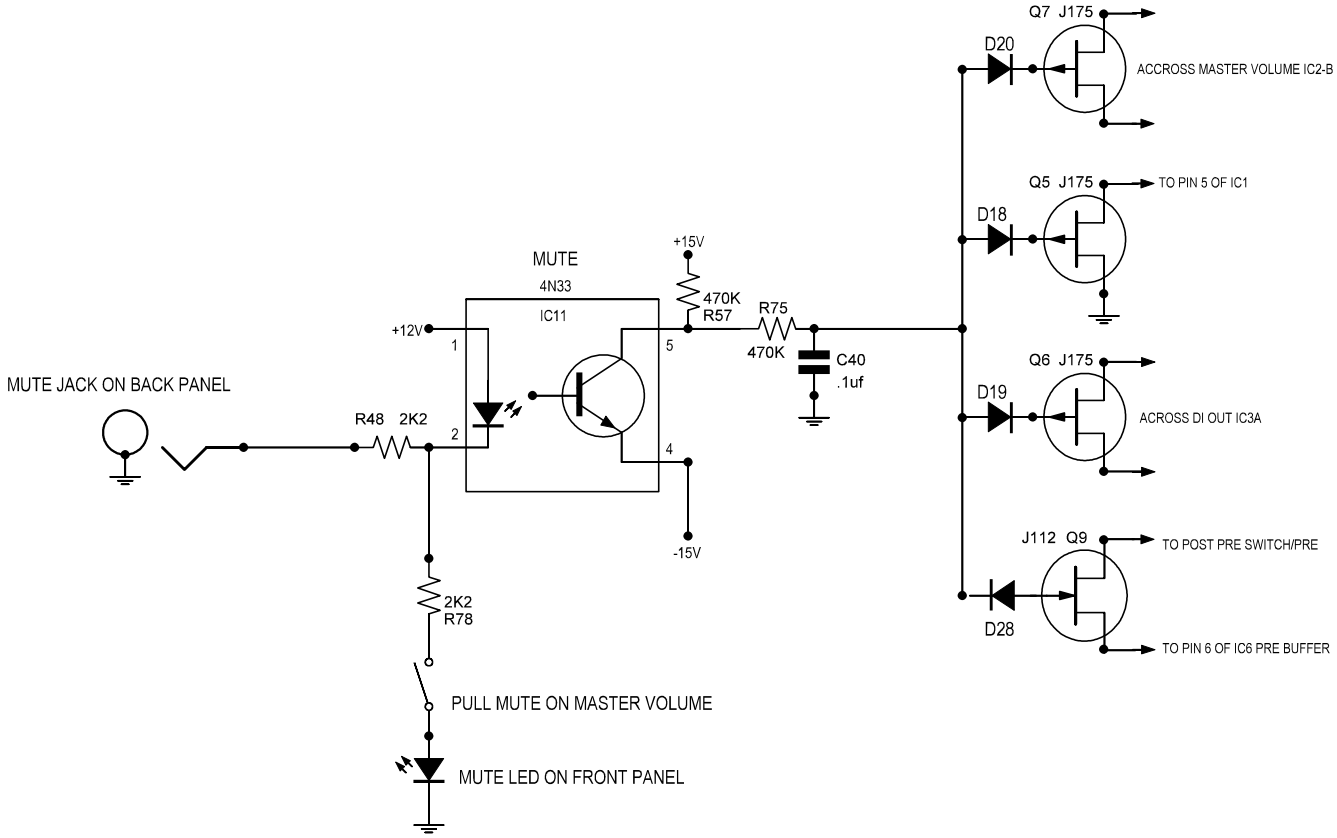
DESCRIPTION		M3 CARBINE DC OFFSET & OUTPUT RELAY
DRAWN BY		DAN VAN RIEZEN
REVISION	3	PAGE 6
DATE	11-02-2010	OF

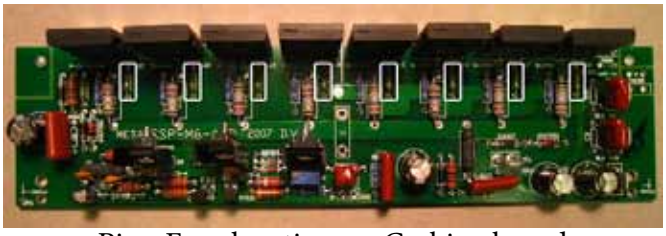


MESA / ENGINEERING Copyright 2009		
DESCRIPTION		M3 CARBINE MUTE CIRCUIT
DRAWN BY		DAN VAN RIEZEN
REVISION	3	PAGE 7
DATE	11-02-2010	OF

Recommended Service Procedure for MOSFET Powered Bass Amps

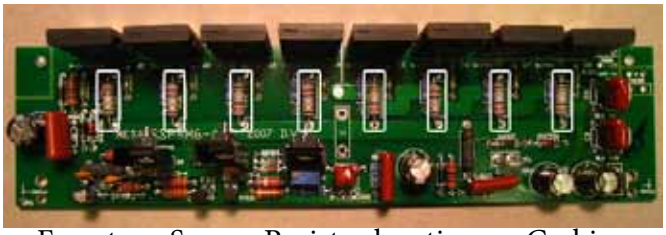
Mesa has incorporated fuse-type Source Resistors in it's MOSFET power amp designs and in Carbine models (M3, M6 & M9), individual 5 amp Pico-fuses are also added in series with each MOSFET's drain and it's positive or negative voltage supply rail for additional protection and troubleshooting isolation.

The Pico-fuses appear as small, green cylindrical parts stamped "5A" near each MOSFET's drain element.



Pico-Fuse location on Carbine board

The .2 ohm/2 watt Source Resistors for each MOSFET have been changed to a fusing-type resistor that will open should excess current flow. The NEW fusing type resistors have a whitish/grey body with color code stripes as opposed to the black conformal type used in previous MOSFET power block versions.



Fuse-type Source Resistor location on Carbine

These new parts simplify the troubleshooting procedure and isolation of bad MOSFETs and eliminate any collateral damage possibly caused by MOSFET failures.
When beginning a repair on any Mesa MOSFET powered bass amp with complaints that appear MOSFET oriented, first identify whether the model is equipped with fused components. This will speed up the repair process and help Mesa provide the appropriate parts needed to complete the repair for the amp in front of you.

Once failed components have been isolated and when ordering replacement parts, technicians are asked to identify whether the part is either "N" or "P" channel specific and also, to provide the failed components alphabetical letter code hand-written on the part. Mesa will provide an appropriately matching part from the letter code's match group (although the part you receive may not be the exact same letter code as your request).

Amplifiers currently produced with newly added fused MOSFET protection:
Walkabout
M-Pulse600
Big Block 750
M3, M6 & M9 Carbine

Mesa Part numbers related to this procedure:
790305 - 5amp Pico-fuses
516405 - .2Ω /2w fusing resistors
519190 - P-Channel MOSFET
519192 - N-Channel MOSFET

Please contact Service Manager Rich Duvall (ext. 324) with any questions or to place an order for any parts related to this advisory. The Mesa factory is open Monday through Thursday, 9AM-5PM, Pacific Time. 707 778 6565

MESA BOOGIE M3 CARBINE
OUTPUT RELAY UPDATE

applies to serial numbers up to #823

This addresses issue of +10v DC supply to output relay coil being too low and relay not closing, therefore no output

1. Locate VR1, 7810 10v regulator, on power supply board. Located in front of H4, 7 pin ribbon cable header.

2. Remove 7810 regulator and clear pads.

3. Install and solder 22 ohm 1/2 watt resistor between left and right pads. (input to output)

This brings the relay supply up to approx. 12v DC and ensures output relay will close.

INSTRUCTIONS FOR REPLACING A MOSFET

One advantage of a power MOSFET when it blows in comparison to a Bipolar transistor is that the MOSFETS in parallel with the blown or shorted MOSFET are most often still very good parts. When a Bipolar transistor blows it usually has a cascading effect that will take out and blow all of the other transistors in parallel with it, and thus cause the need to replace all of the other transistors.

Blown or shorted MOSFETS tend to protect the other adjacent paralleled MOSFETS because when they short they clamp their gates to their sources and cause all the other MOSFETS to have their gates clamped as well. This protects their gates from any over voltage.

This is why the manufacture of the MOSFETS that we use suggests replacing only the bad or shorted MOSFETS if possible.

Field Effect Transistors are not that difficult to test with a multimeter, and "fortunately" when a power MOSFET blows, it blows big time: all their leads will show in short circuit. 99% of bad MOSFETs will have *Gate-Source, Gate-Drain and Drain-Source shorted*. In other words - everything will be connected together.

Note: *When measuring a MOSFET don't touch the metal parts of the test probes with any of the other MOSFET's terminals until needed. Do not allow a MOSFET to come in contact with your clothes, plastic, etc. because of the high static voltages they can generate. Make sure that you are grounded and all static has been discharged from your body before handling the MOSFET.*

To isolate the bad MOSFET from the good MOSFETs in the circuit it may be necessary to lift one side of the .2 Ohm source resistor that is in series with each MOSFET. This way you can very easily measure which MOSFETs are shorted or bad and which MOSFETs are good.

You'll know a MOSFET is **good** when the Gate has *infinite resistance* to both Drain and Source. Exceptions to this rule are FETs with protection circuitry - they may act like there is a diode shunting GS - a diode drop for gate reverse bias. Connecting the Gate to Source should cause the Drain to Source to act like a diode.

Test procedure: When testing the MOSFET set the meter to the resistance position or the diode test position of the meter, and then connect the multimeter's negative lead to the source of the MOSFET. Touch the MOSFET's Gate with the meter's positive lead. Move the positive probe to the Drain - you should get a low resistance reading as the MOSFET's internal capacitance on the Gate has now been charged up by the meter and the device is turned-on. With the meter's positive lead still connected to the Drain, touch the source and gate with your finger, or better yet use a jumper to short the gate to the source. The Gate will be discharged and the reading should go to a high resistance, indicating a non-conductive **good** device! This simple test is usually very adequate to determine if the part is still good.

Once you have determined which MOSFETs are shorted and which MOSFETs are good you will need to remove the bad MOSFET and replace it with a matching part. We match our MOSFETs so

that they will share current evenly when they are used in parallel. We give each MOSFET a letter code designating which parts that it should be matched with. Replacing the MOSFET will require you to remove the Heat Sink that the power MOSFET circuit board is mounted on.

Steps to remove the Heat Sink:

1. Very carefully unplug the quick connect red, white, and black power connectors from the circuit board that is mounted to the heat sink.

2. Unplug the yellow quick connector from the circuit board that is mounted to the heat sink, (this is the audio connection to the output).

3. Unscrew the two thermosters and remove them from the heat sink.

4. Unsolder the shielded audio input cable that is connected to the circuit board mounted to the heat sink. It is best to unsolder this shielded cable at the main preamp circuit board and leave it soldered to the Driver and power MOSFET circuit board that is mounted to the heat sink.

5. Unplug the two ribbon connectors that go over the heat sink from the main preamp circuit board to the back panel.

6. Unbolt the heat sink by removing the two 6-32 hex nuts located on either end on the heat sink.

7. The heat sink can now be removed by very carefully lifting it out of the main chassis.

8. Once out of the chassis you can unbolt the bad MOSFET by using a # 6 hex nut driver and removing the #6-32 screw from the MOSFET.

9. By very carefully bending the bad MOSFET back and forth a few times from the circuit board you will be able to remove it from the circuit board leaving only the MOSFETs pins remaining in the circuit board. Be sure not to damage the thermafilm insulation that is used to isolate the MOSFET from the heat sink in this process.

10. Using your soldering iron and needle nose pliers remove the three pins that were left in the circuit board and very carefully clean and remove the solder from the three holes on the circuit board.

11. You can now insert the new replacement matched MOSFET. Reverse the disassembly process to mount the heat sink back into the chassis and complete all the connections to the circuit board.