The following is just a cut and paste that I have sent to the Hams who have been building this unit.

You need to know your way around the radio and some electronics knowledge to do this mod. You will have to compare my circuit to the circuit of your radio to determine what has to be changed and added.

C12 and C2 should be changed from 0.1 to 1uf to cure an instability problem with some LM317 IC's.

The MJE 5003's replace the existing transistors. The TIP 52 is bolted to the heat sink. There was plenty of room on mine as the TIP52 is a flat-pack and only needs one hole.

NOTE the PCB is available from a supplier, it's listed at http://www.farcircuits.net/

J1 goes to a push button for the reset.

The TS930 PSU should have the reset switch easily accessible. I mounted mine on the side of the metal heat-sink fan cover near the top outside edge; make sure it clears the top cover when you put it on. The Power supply sometimes will not start if the rig is turned on and off quickly, a push of the reset button is all it takes to turn it on, this is due to the single power supply in the TS930s driving the rig and the protection circuit.

Any SCR rated at 20amps or more should l be fine. I have never looked up a part; I just chose something from a local supplier at the time.

With my design, the over voltage AND current limit are both tripped if an over voltage condition occurs. So the SCR normally doesn't have to dump the considerable stored energy of the filter caps however if there is a short, this energy is dumped via the existing 0.05 ohm 10 watt resistor which helps the SCR survive repeated tripping.

The TIP 52 is such a common part. VCE is 300 Volts and 3A collector current @ 100 watts. Mouser has an NTE394 replacement.
http://au.mouser.com/Semiconductors/_/N-5gcb?Keyword=tip52

MJE5003 is a 20 ampere 140 volt device rated at 250 watts. A quick search revealed that it is also known as MJ15003 and MJ15003G. Mouser also have these.

You really want to get something rated over 100 volts here, the original was rated at around 60 volts so it’s very easy to go above the SOAR.

The pots are common miniature PCB mounts. If you look at the board overlay you can see them mounted on the board. They are both linear curves and if you wanted to you could fit a 5 or 10 turn pot for V1 as that is a bit touchy to adjust, however I have used a standard unit in 3 PCB's and have had no problems with final adjustment.

The 0.05 ohm 10 watt is already on the heat sink.
L1 and L2 are taken from the existing PCB along with socket J6, these are wired as per the original TS930 circuit.

The bypass caps are either 50v or 100v.
The Reset switch is a normally open, momentary make, push button.

The chokes L1 and L2, sockets J6, J2, J1 and C7 are from the old PCB.
On the circuit any diode not marked is an IN4148.

The 20A fuse is currently soldered on the old PCB, This is shifted to a convenient location, mine is placed near the big 22,000 uf chassis mounted filter caps and is mounted on a tag strip near the SCR.

The wiring going from the old PSU to the heat sink should also be tidied up. This new layout will allow you do drop the heat-sink back without disconnecting anything. Only the Bridge rectifier bolt has to be removed to do this.

To adjust the over voltage circuit without destroying the SCR or the PA.

1: The Supply to the RF PA stage should NEVER be connected until adjustment has been finished and working.

2: Put around a 15 ohm 5W resistor in place of the 20A fuse. Set the over-voltage trip to around 30 to 31 volts.

RV1 = Set output voltage.
RV2 = Set over voltage trip point.
RV3 = Set Current trip value.

Turn the regulator pot up and down to check the voltage trip point and then reset to the correct voltage. In all testing I never blown anything, even with shorting, I used a 2 ohm resistor to do some real tough over current testing; it has never failed to this day, including when I accentually left the rig keyed down until it partly shutdown.

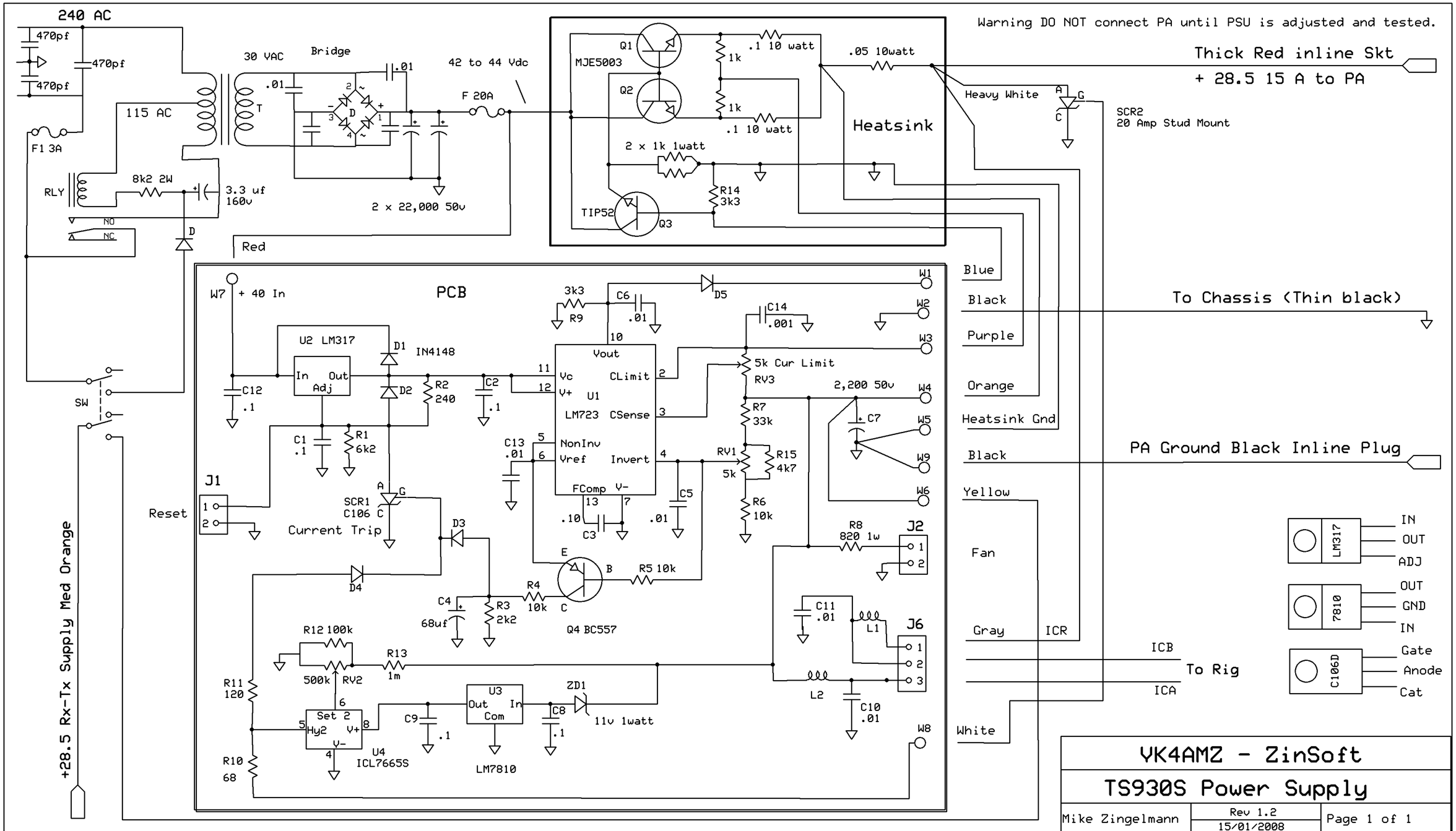
Loading 28 volt line with a resistive load that draws a bit more than the rig gives you a chance to repeat the test over and over until you are was happy with everything.160m will normally draw the most current, so as a final test just do a CW key-down and see if it trips and adjust accordingly.

The fan now runs continuously but, at a reduced speed (very quite). Connect the fan wires so that the fan blows air "onto" the heat-sink.

As a final note, if you use an external speaker then a PC muffin fan will mount in place of the internal speaker and use the same mounting holes, by making this fan blow outwards (suck) you will remove almost all residual heat from the digital PCB and chassis, the unit runs really cool this way and is silent if you use a 5W resistor to drop the voltage to the fan accordingly.

Mike - VK4AMZ

The new PCB mounts in exactly the same place as the old PCB. If rewired correctly this PCB allows the heatsink to be lowered for service.
The external circuit and components outside of the PCB and Heatsink are already in the RIG with the excption of the 20A SCR
The Heatsink is modified with higher rated transistors and emitter resistors are added. The driver transistor is also mounted on the heatsink
The LM317 needs a small heatsink. The existing lead going to the new J6 is left unchanged. The sockets for J6, J1, J2 are from the old PCB
MJE5003 is also known as MJ15003 or MJ15003G (Mouser Electronics) TIP52 or NTE394 also from Mouser. Email for setup instructions if unsure



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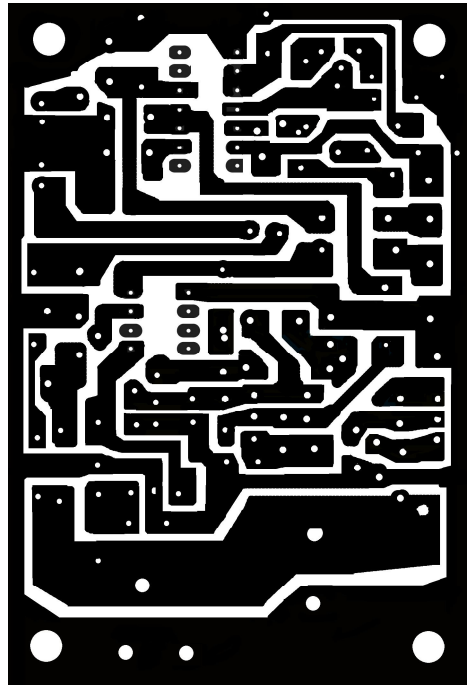

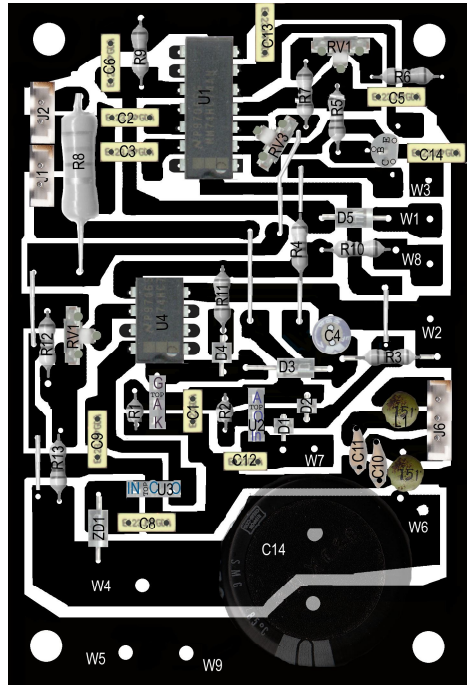
C13
RV1
C6
R9
U1
R6
C5
J2
C2
R7
R5
C3
RV2
C14
J1
R8
W3
D5
W1
R4
R10
W8
U4
R11
W2
R12
RV1
C4
D4
R3
D3
G
A
K
R1
C1
R2
A
K
J2
D1
J6
C9
C11
R13
C12
W7
C10
IN
OUT
W6
C8
ZD1
C14
W4
W5
W9