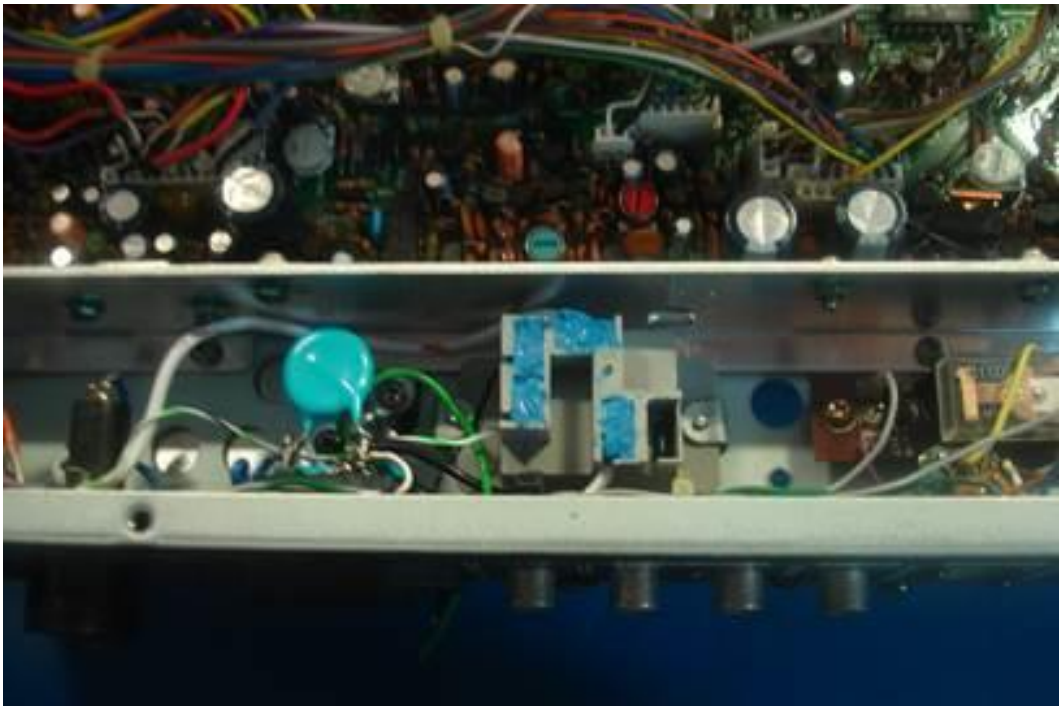
DAVE'S 20/26-AMP PHOENIX CONVERSION – FIRST EFFORT

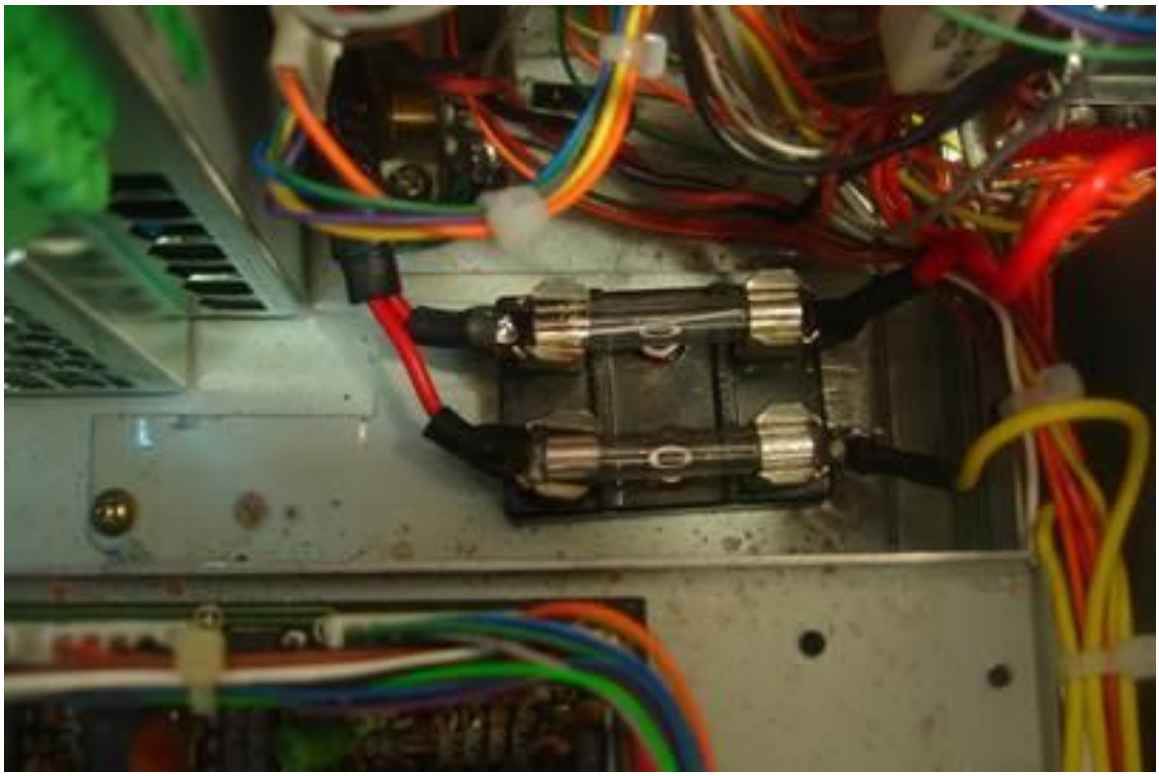
As I mentioned in the beginning of this compendium, Phoenix Contact makes a 20 amp model with 26 amps in Boost mode that will fit in the TS-930S. It's tight, but Dave Phillips decided to do it. Here's his story:

KB7JS: The power in/out of this supply is on the opposite end, so I chose to mount the supply this way and feed input power from a 30 Amp sealed relay mounted under the chassis where the variable input voltage switch was located.

The relay connection tabs were designed for quick disconnect tabs, but they would not fit, so I soldered the leads and protected them with Blue RTV.



The 20 Amp supply is about twice the size of the 10 Amp model, so when mounted aligned with the edge of the chassis, the area between the PS and the LPF cage, where the AVR board mounts, is pretty tight. The tight clearance caused interference with the vertical connectors on the AVR board, so I had to change them to right angle connectors. I also repurposed the bottom plate of the old capacitor housing as a mounting plate for the twin fuse holder.

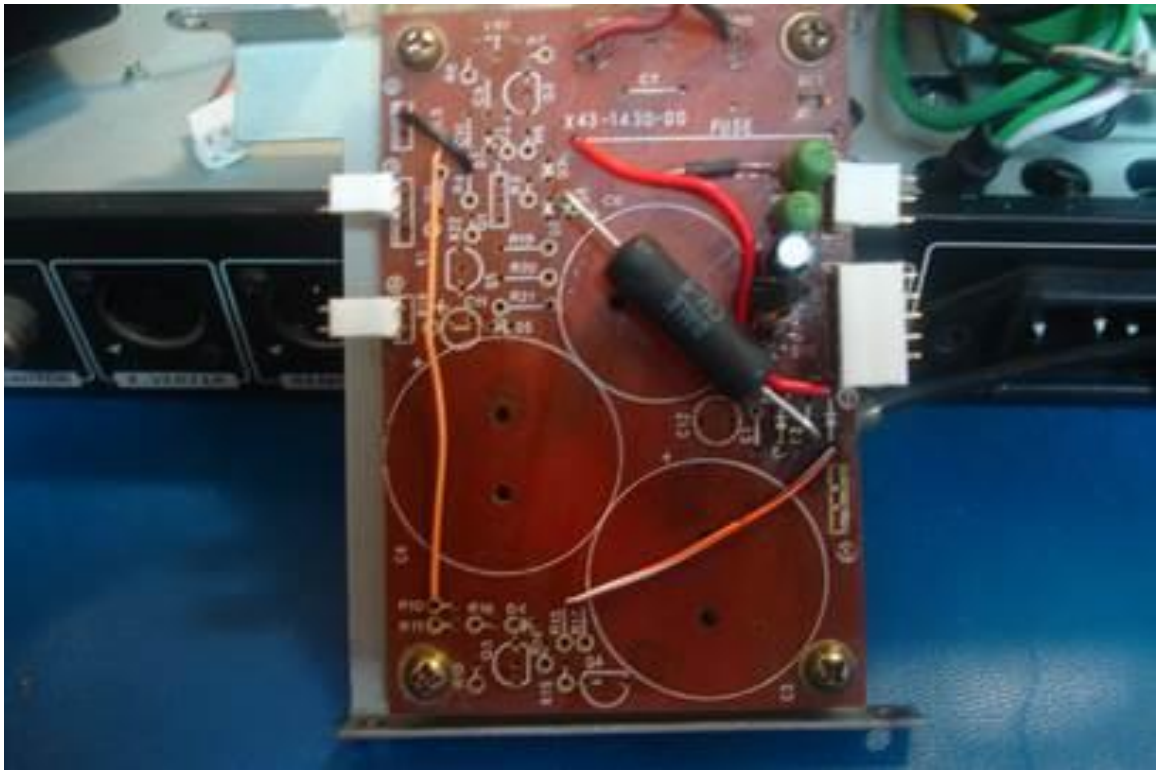


Again, since the fit is so tight, I chose to hard mount the supply to the chassis. This was easy for the rear side since there are so many holes available; I just used two of the holes for bottom plate screws on the supply.

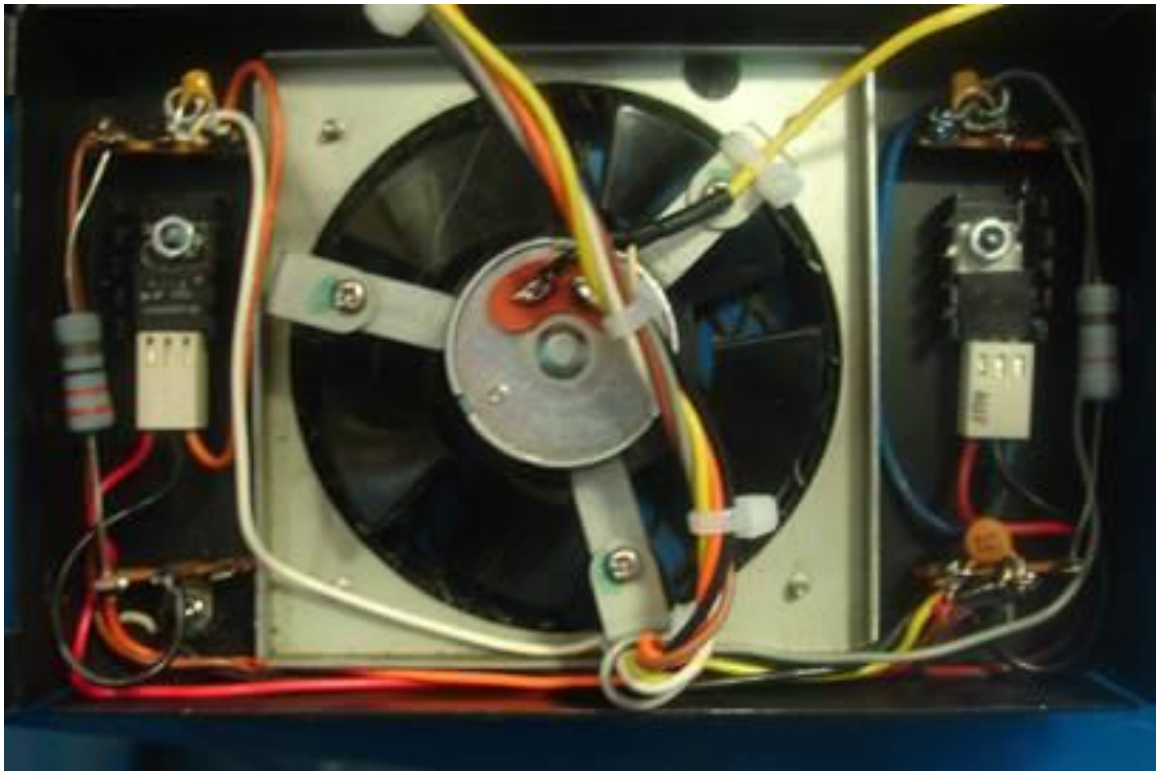
The front was a challenge since I did not want to disassemble the whole radio just to drill a hole or two, so I found a very nice T-shaped bracket in my junk box already drilled to countersink flat head screws.

I used it to tie the top of the supply to the speaker frame. I had originally planned to put the 21.7 Volt pass transistor on the chassis directly behind the PS next to the fan, but that was a real squeeze. Then I realized the front bracket also provided an ideal mounting place for the 21.7 V Pass Transistor. Mounted there with a heat sink, it is positioned directly in front of the PS, so it will get good air flow.

I also chose to use a pair of two pin edge connectors for the PS and PA fan's, which are powered from 28V on the AVR in series after the 250 Ohm resistor.



I mounted the 7815 and 7808 regulators with heat-sinks on the fan housing. This made them easy to wire in as replacements for the Zener/Resistor set they replaced.



DAVE'S 20/26-AMP PHOENIX CONVERSION – SECOND EFFORT

KB7JS

Technical Summary

Kenwood TS-930 Repair and Refurbishment

Technical Details

The following photos and text describe the latest revised modification and repair steps.

Disassembly and removal of Kenwood Power Supply

The original Kenwood Power Supply Transformer, Heat Sink, and AVR Board, and Filter Capacitor cage are removed.

Figure 1 - TS-930 Power Supply

Figure 2 - TS-930 AVR Board Removal

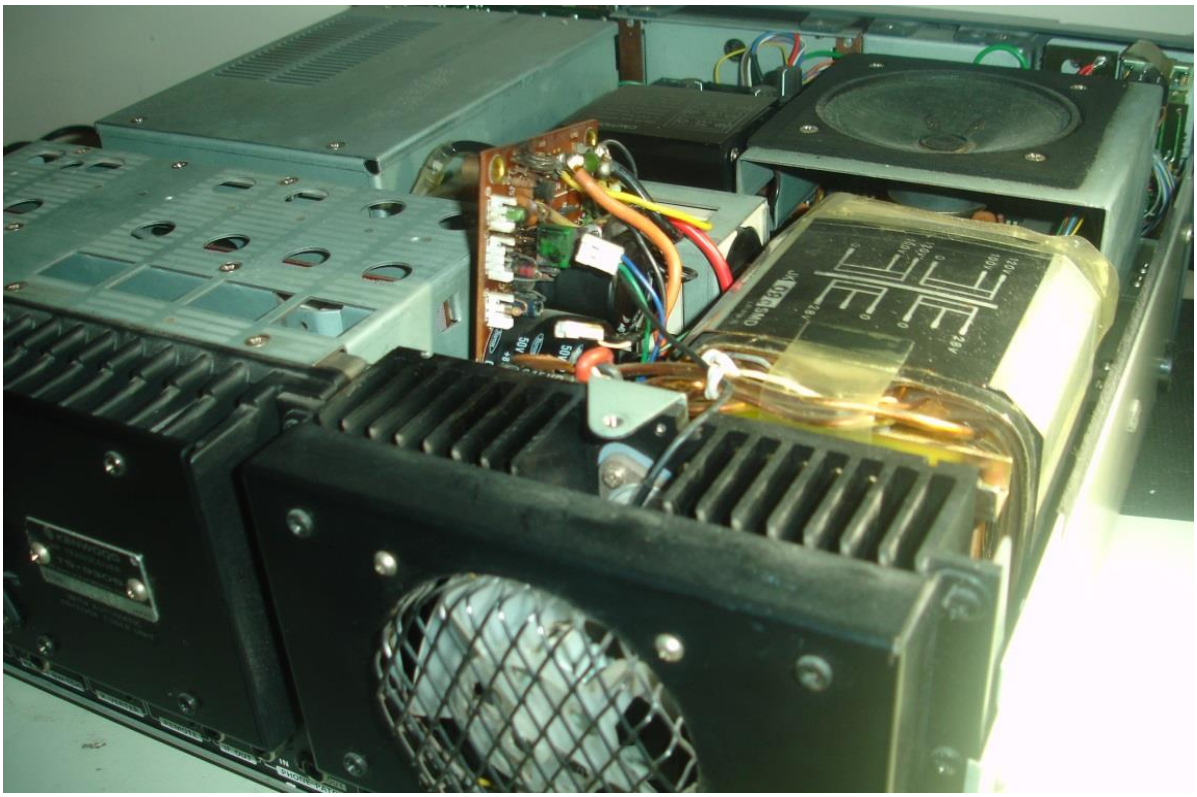


Figure 3 TS-930 AVR Board Damage – Typical TS-930 Failure

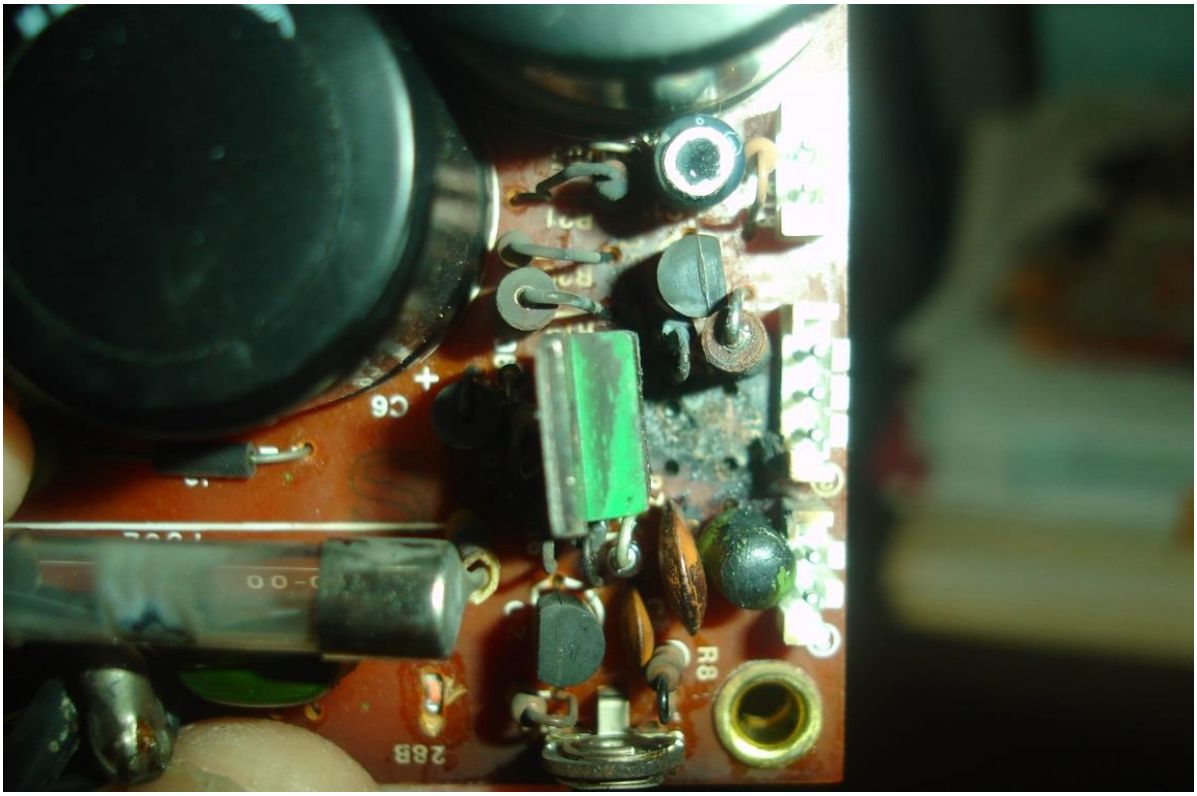


Figure 4 TS-930 Power Supply Heat Sink

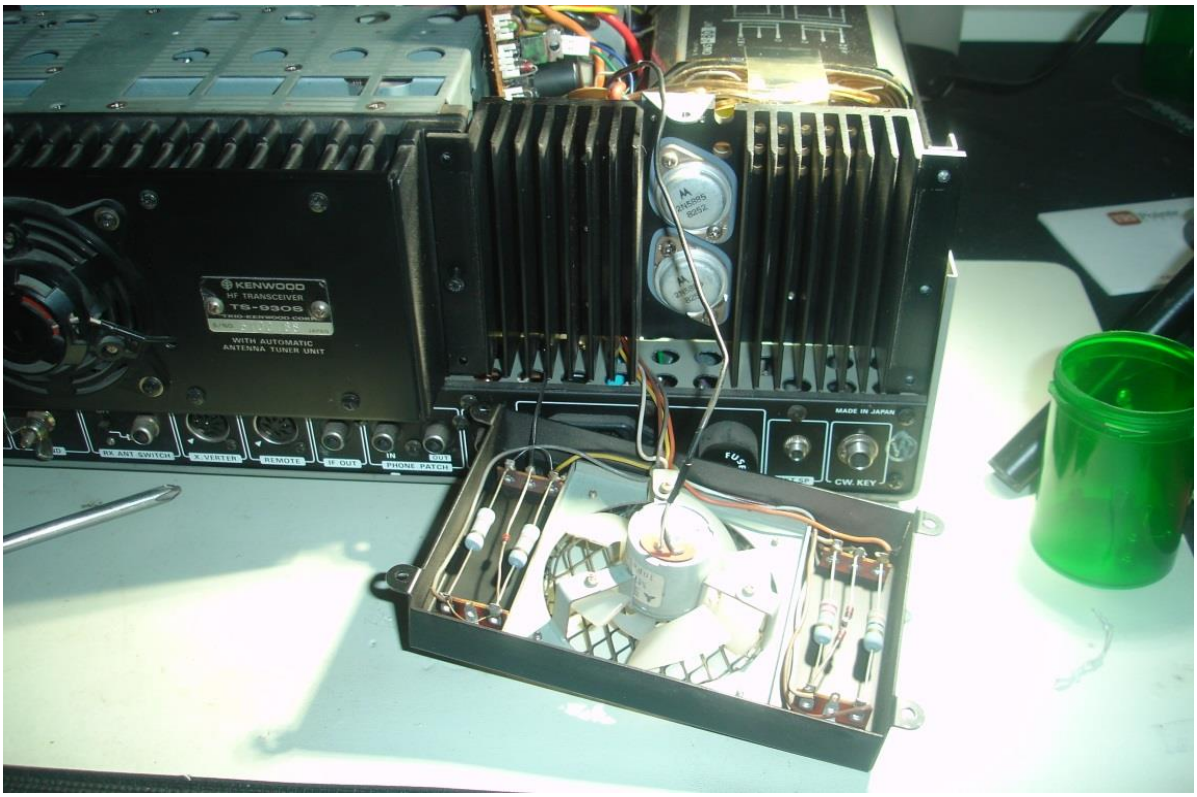
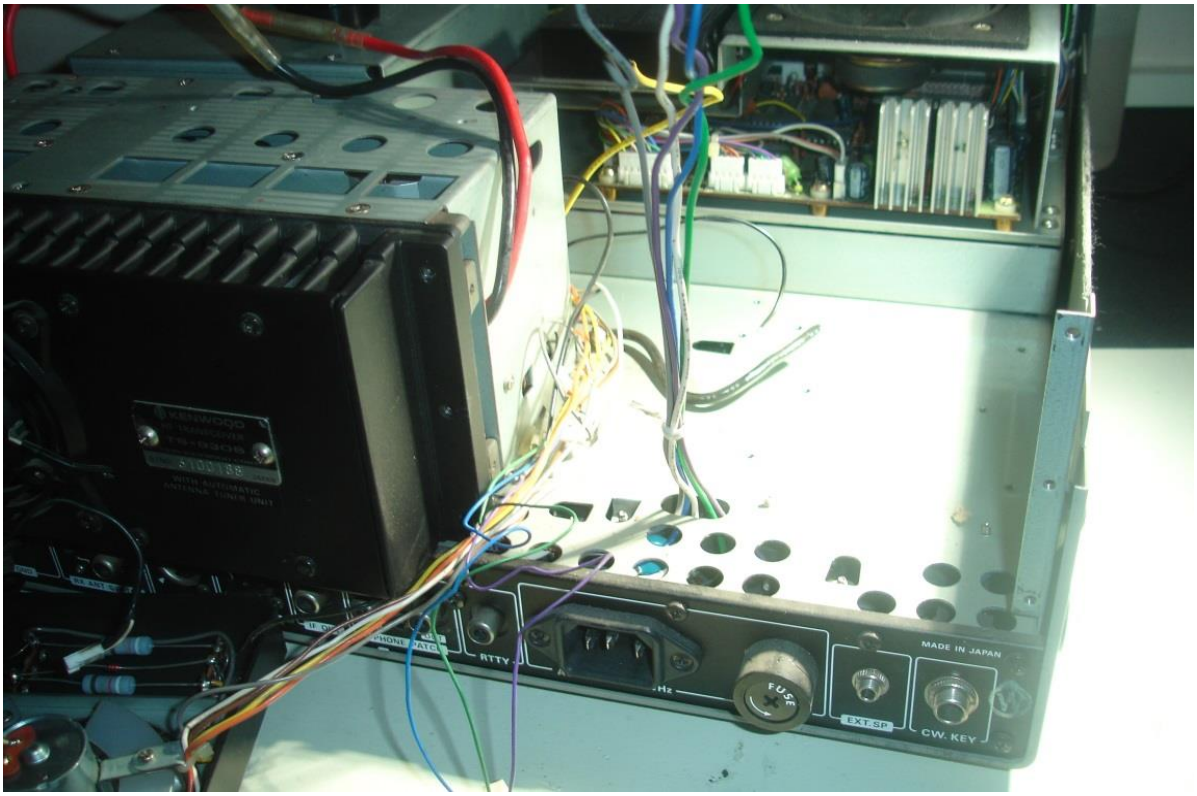
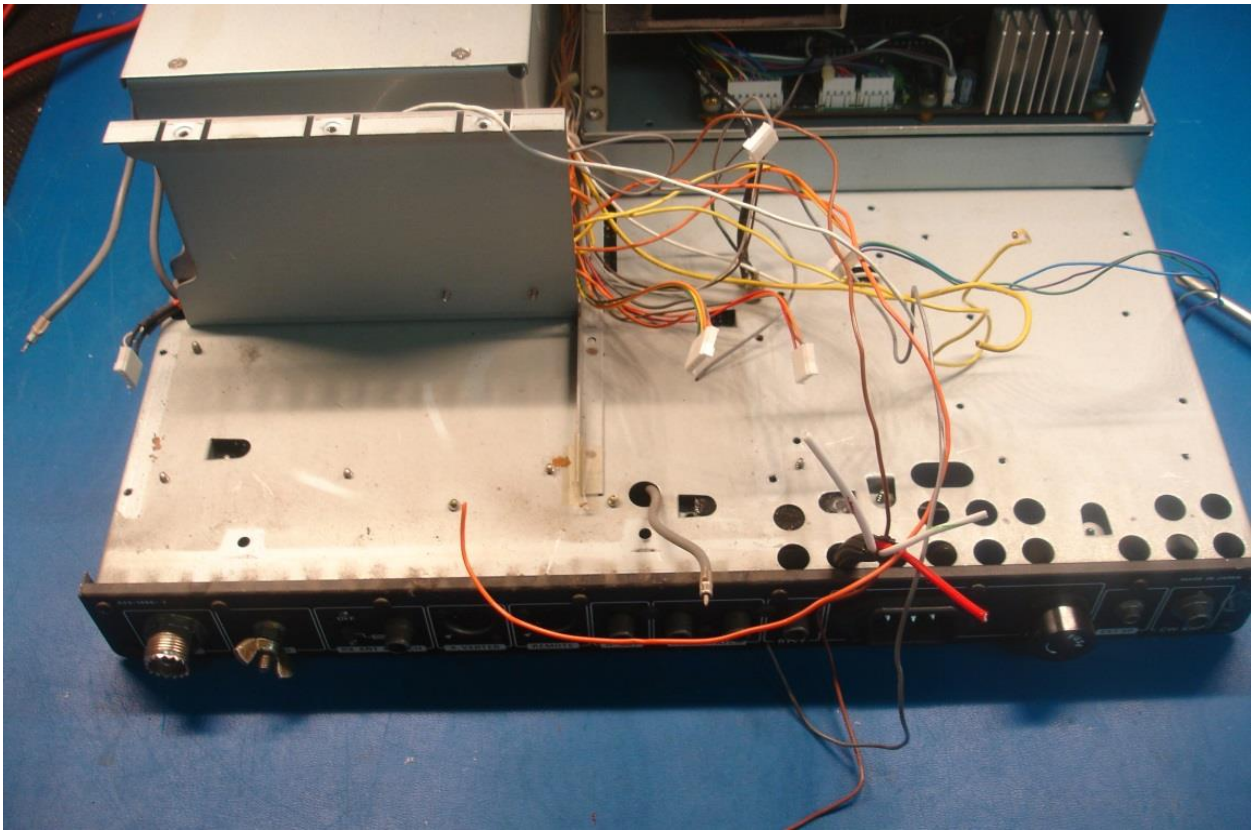


Figure 5 TS-930 Power Supply Removed



Removal of PA and LPF

The PA and LPF are removed for repair and to facilitate rework.



NOTE from W3AFC: Yikes! When Dave tears down a radio, he really tears it down, doesn't he?

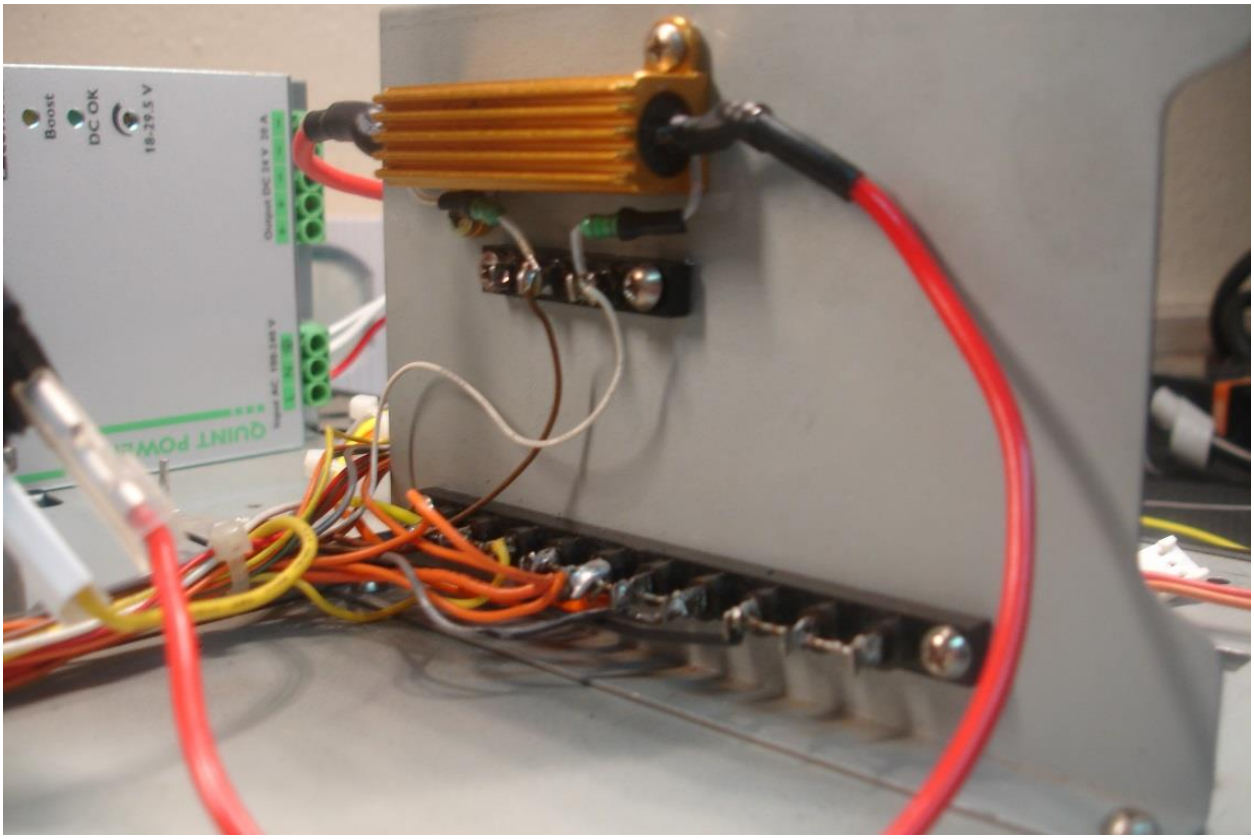
Modification and Upgrades

Current Sense Load Resistor

The rear panel of the LPF cage is modified to accommodate the replacement current sensing resistor for the PA Current meter display. The original .05 Ohm 5 Watt resistor was mounted on the Power Supply heat sink. This resistor is a commercial encapsulated wire-wound .05 Ohm sensing load resistor. At the same time, the original 3-pole power distribution terminal strip is replaced with a 10-pole unit, and then re-purposed to provide a mounting point for the two 150uH RF chokes at the input/output of the current sense load. These were originally L1/L2 on the AVR board.

The 10 pole terminal strip was retrieved from the resistor bank cage of an early model TS-930. These are very rare, so might not be a viable option, but any terminal strip with 4-5 poles will suffice.

Figure 6 TS-930 UPGRADE - PA Current Sensor



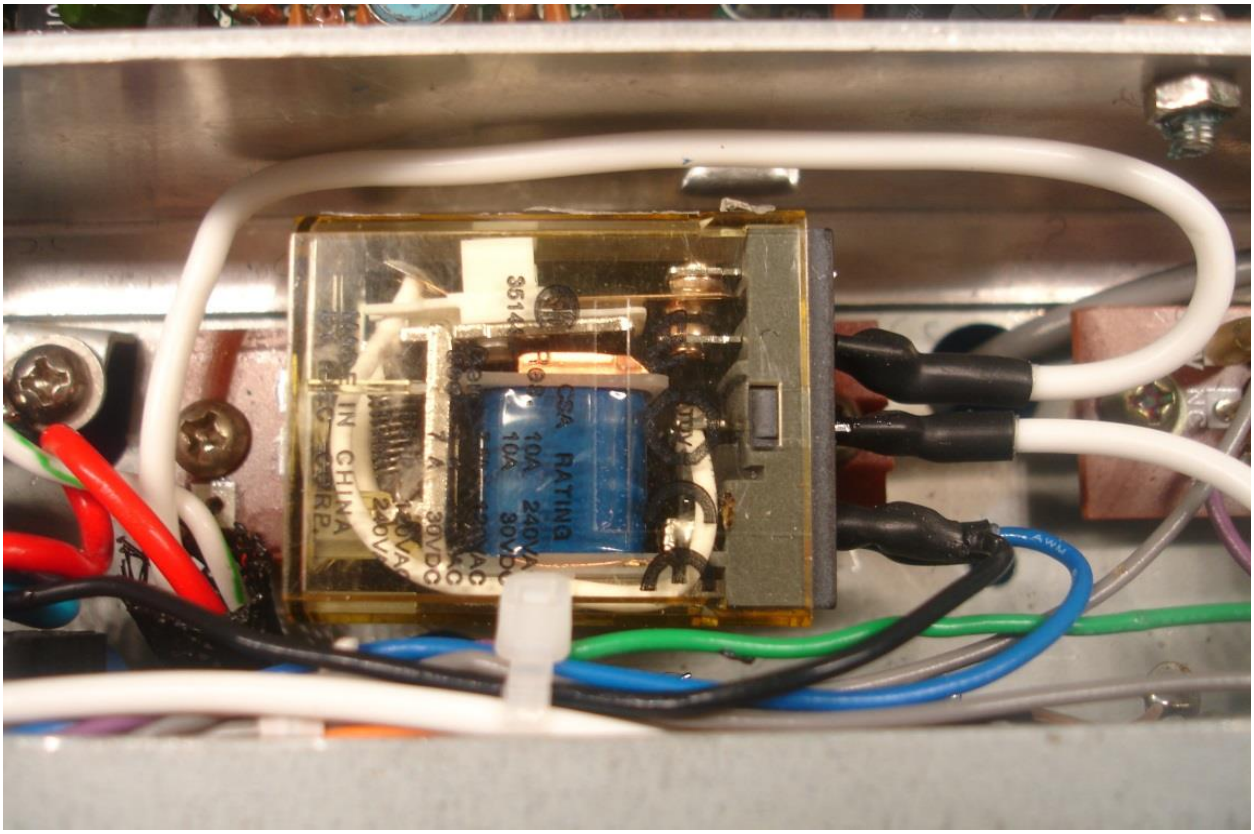
AC Power Relay

The original Kenwood power supply employed a 24Volt DC relay powered by a tap on the power transformer that was always hot. The removal of the transformer necessitates another method of providing power switching for the QUINT supply. For this upgrade, a 120VAC relay is added in the same location as the original Kenwood relay under the bottom chassis near the rear panel. The original relay board is stripped of components, and the new relay is attached to it using Velcro.

NOTE:

Late production TS-930's do not have the original relay, and switch the AC Neutral line directly from the front panel switch instead. This high current load (<> 10 Amps) can lead to premature switch failure, so the use of a relay is highly recommended. The relay can be mounted to the chassis using Velcro, or to a fabricated mounting plate attached to the existing chassis mounting tabs.

Figure 7 TS-930 UPGRADE - AC Main Power Relay

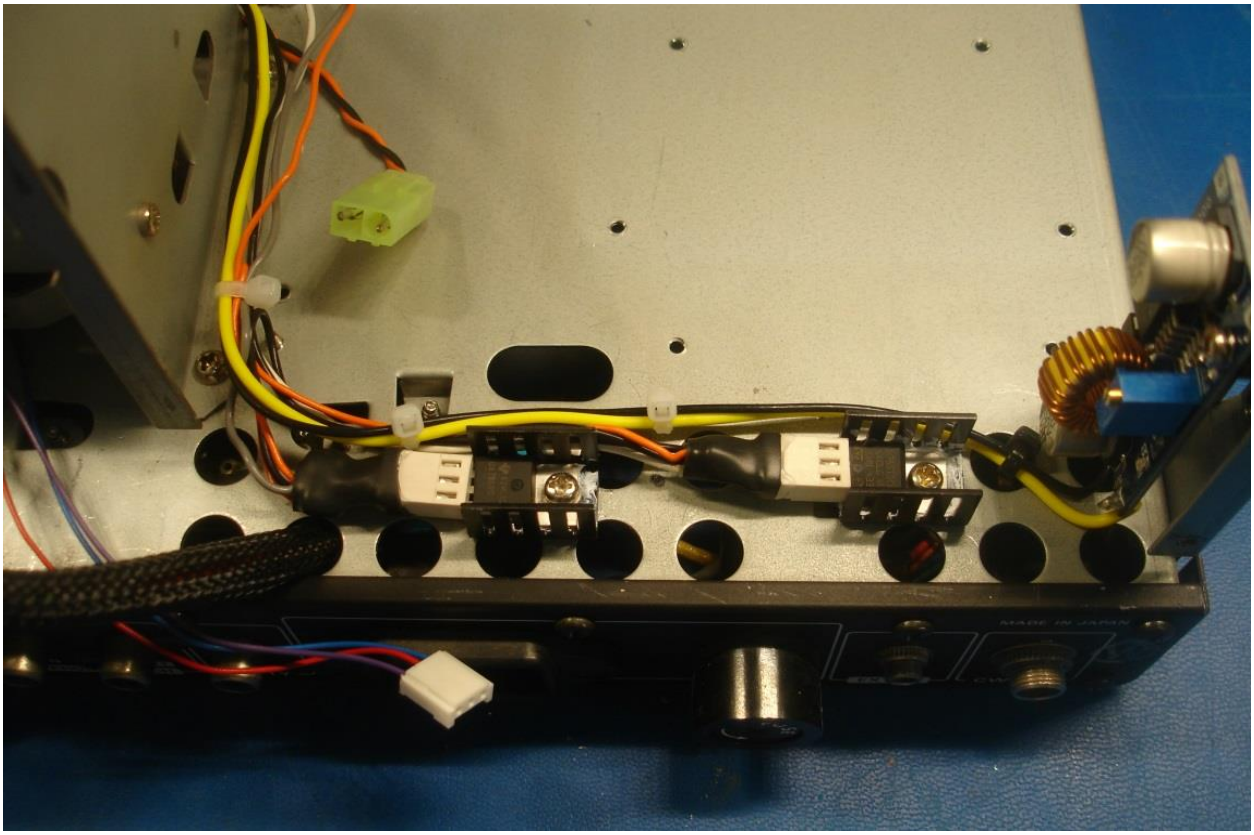


Linear DC Voltage Regulators

The 21.7 V supply is provided by a DC-DC converter mounted to the rear chassis cabinet support bracket on the right rear of the chassis in the air flow path of the Power Supply fan. This converter is powered by 28V from the fused QUINT output.

The original voltage dropping resistors mounted in the Power Supply fan cage are removed and replaced with a pair of linear DC voltage regulators (7808 and 7815). These regulators are powered by the 21.7 V supply from the DC-DC regulator, and are mounted on the rear apron of the chassis in the air flow path of the Power Supply fan.

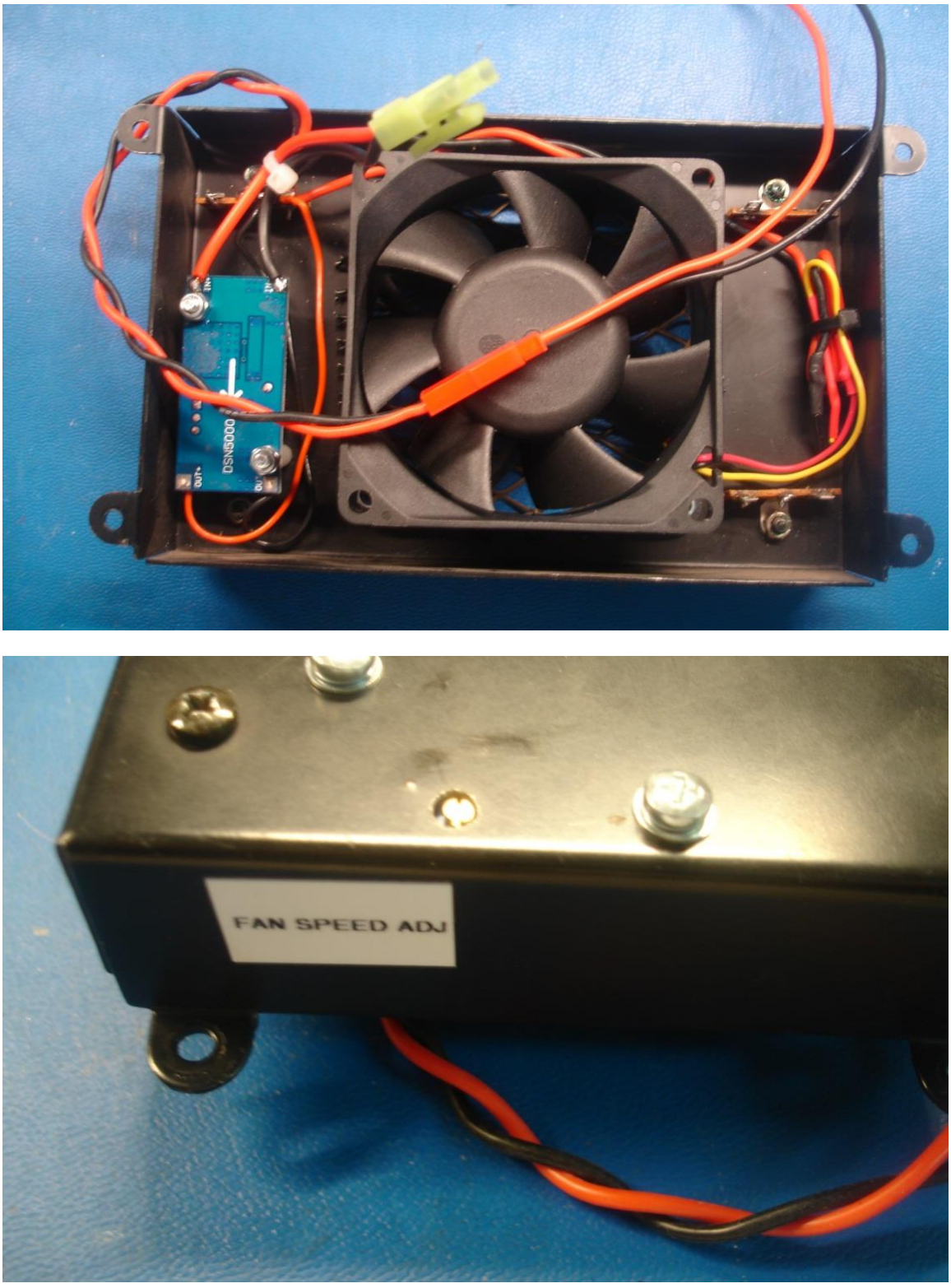
Figure 8 TS-930 DC Voltage Regulators



Power Supply Fan

The new 70mm Nexus Silent Power Supply fan is mounted inside the Power Supply fan cage, replacing the original Kenwood 60 MM fan. The second DC-DC converter that provides Fan Power is mounted inside the fan cage. The entire fan cage can be removed by disconnecting the 28V line (yellow connector). A second connector (red) is provided for the PA fan power as well. The adjustment for this converter is provided through a hole in the rear of the fan cage to allow selection of the optimum fan speed.

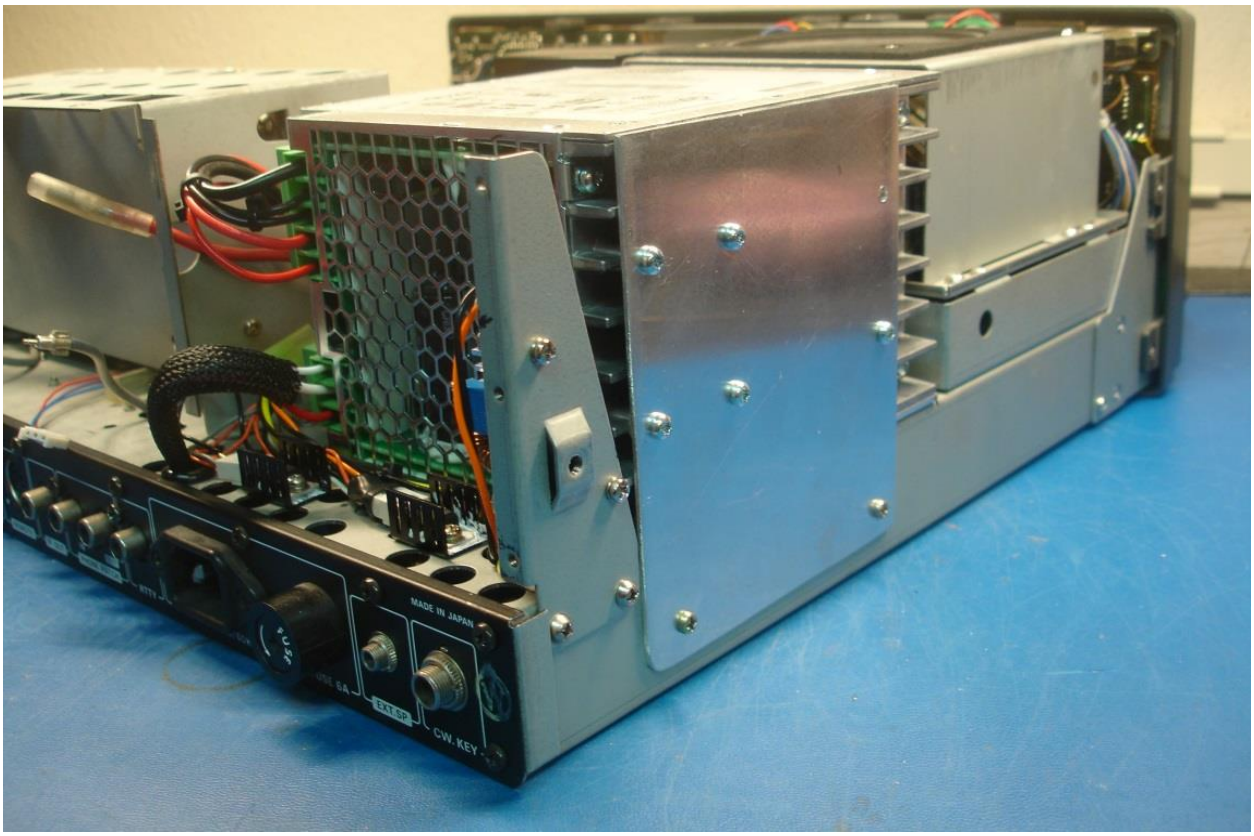
Figure 9 TS-930 PS Fan Upgrade



QUINT Power Supply

The QUINT power supply is mounted on the chassis using a rigid plate attached to the side of the chassis. This allows the supply to be anchored firmly without need of through-chassis screws from the bottom. The mounting plate is attached to the quint using the DIN Rail mounting bracket attachment point. The screws for this attachment utilize spacers. Another bracket is added on the opposite of the supply to prevent flexing of the supply against the chassis bracket.

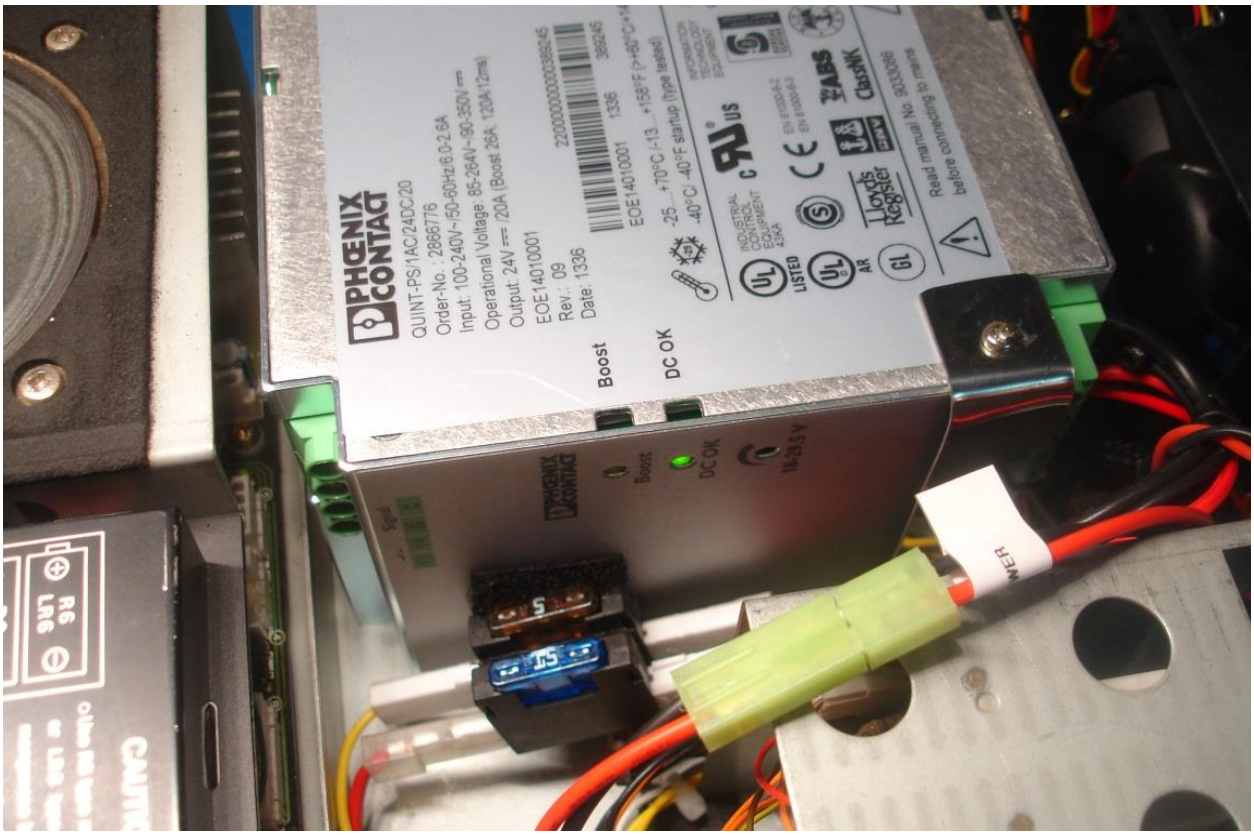
Figure 10 TS-930 UPGRADE QUINT Power Supply Mounting



28V Supply Fuse Protection

A pair of fuse holders, standard automotive type, is provided on the 28V supply line from the QUINT supply. Although these are not technically necessary since the QUINT provides output short protection, safety is always a good addition. The primary 28V supply line for the PA unit uses a 15 Amp fuse, while the 28V supply for the Signal Unit, Antenna Tuner, Digital Unit, 21.7V DC-DC converter, and front panel uses a 5 Amp fuse.

Figure 11 TS-930 UPGRADE 28V FUSE BLOCKS



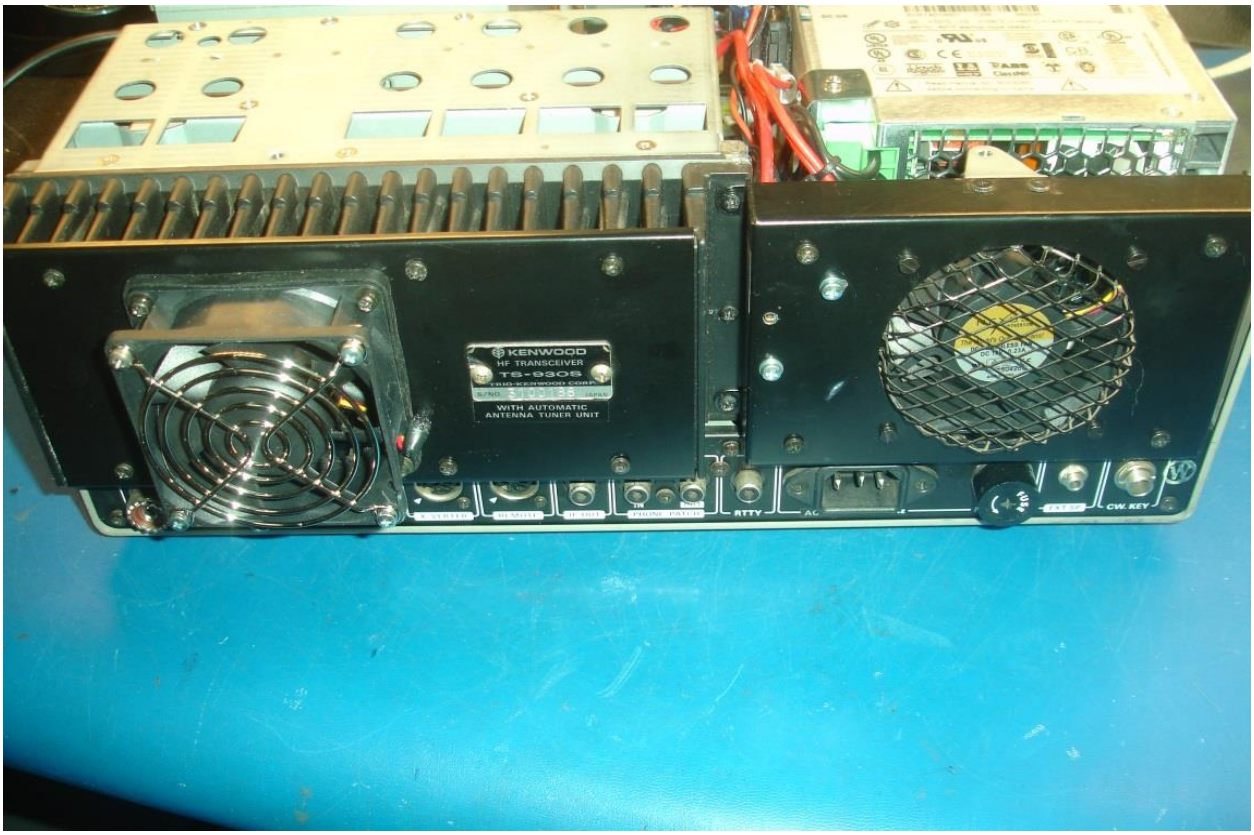
Also visible in this photograph is the 28V source (Yellow Connector) for the DC-DC converter on the power supply fan cage.

PA Fan Upgrade

The original PA fan is replaced with a second Nexus silent fan, which is mounted on the outside of the PA heat sink cage due to limited space inside the enclosure. This fan is configured to blow air into the PA heatsink, which spreads out under pressure and provides uniform air flow, which exits from the top of the cabinet.

Note also that the original top cabinet screw mounting device from the old PS Heat Sink has been re-purposed here to provide an anchor for the cabinet screw. The original bracket is carefully flattened to remove the right angle bend, then attached to the top of the fan housing, positioned to mate with the top cover. I used counter-sunk 4mm flat head screws with matching lock nuts, but this could also be accomplished with rivets.

Figure 12 TS-930 UPGRADE PA Fan Replacement



Auxiliary PA Fan Power Connector

The temperature sensing fan power connector for the PA Fan is provided for optional use.

Figure 13 TS-930 UPGRADE - PA Fan Temperature Sense Power