A GUIDE TO UPGRADING THE POWER SUPPLY IN YOUR KENWOOD TS-930S TRANSCEIVER
(MOST OF WHICH SHOULD APPLY TO THE TS-940S AS WELL)

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Contributors (To date, in order of appearance)

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Special thanks to Paul Groothoff, PA2VC, for his groundbreaking work on replacing the OEM power supply with a modern Phoenix Contact supply.

This will be a “Living Document”, meaning that it will grow as the work from new contributors is added in. For now, these are the sections that are contained herein. It is assumed that the reader is more interested in regaining the radio’s functionality, rather than restoring it to an OEM state.

APPENDIX

This section will have additional photos, parts information, unedited copies of papers written by some of the contributors, etc.

Additional thanks to Mike Hutchins, ZL1MH, for his experiment in which he tore apart the power supplies of two, working TS-930S rigs. He has three of them. He left one stock. He converted the second one to the Phoenix system described herein, and for the third, he modified the OEM supply using the method described by VK4AMZ, which uses some of the original components but adds overvoltage and over current protection, plus more durable regulators. He then tested all three rigs against one another and sent me an email with his findings. His email is in the APPENDIX.
INFORMATION

Ninety percent of the problems with the TS-930S appear to center around the transformer-based linear power supply. Many have found ways to improve it using more modern components, but those solutions fail to address the heat and sheer physical weight that it adds to the radio. So the solutions offered here involve replacing the old with the new – a modern industrial switching power supply. This conversion appears to have been pioneered, or at least advanced, by Paul Groothoff, PA2VC, whose post in the QRZ TS-930S review forum is shown below:

“I already repaired a few TS-930SAT’s by replacing the one and only weakness of this design: the power supply. By overloading or prolonged use, the power supply fails, blowing up and delivers over 40 Volts to the rig instead of 28.5 Volts DC. In this case also the two Motorola driver transistors (MRF 485) in the RF power amplifier are unfortunately blown up and expensive to replace. The two Motorola final power transistors can handle this 40 Volts, so they will survive the attack. To replace the Motorola driver transistors please check your Kenwood dealer. Some series of the MRF 485 transistors do have a too high gain (hFE).

I used a high quality Phoenix Contact, industrial switching power supply, type QUINT, 24 VDC - 28.5 VDC adjustable, delivers output current 10 Amps and 15 Amps boost. Code manufacturer: 2938604, EAN code: 4017918890537 and is available worldwide. In the Netherlands available at Phoenix Contact B.V. and Technische Unie Netherlands. This power unit fits exactly on the place of the present power transformer, after removing the unnecessary parts in the new situation.

So here is an opportunity to repair or improve your Kenwood TS-930SAT by replacing the power supply.

Conversion of the power supply TS-930SAT in short steps.

1. Disconnect and removal from top side: power transformer with primary and secondary wiring, regulator circuit board X43-1430-00 (desolder on this circuit board L1 and L2 to use in new situation), case with large capacitors’, power transistors on heat sink, resistor (supply to RF power amplifier) on heat sink (to use in new situation) and temperature sensor (resistor) on heat sink (no use in new situation).

2. Disconnect and removal from bottom side: circuit board with miniature relay with primary wiring from the euro plug 230 Volts AC to the voltage selector switch and wiring to the power switch of the set.

3. Installation of the Phoenix switched power module: this power module is suitable for DIN rail mounting, but I removed this DIN rail clip. Mount the power supply to the original Kenwood heat sink by drilling holes in the heat sink, primary wiring from the euro plug 230 Volts AC by applying the present fuse holder and the power switch to enter the set.

The voltage selector switch is not used in the new situation (AC input between 85 Volts and 264 Volts), but remain it for the external shielding. Desolder the red and orange wire (28 Volts DC) from the main power switch in the front of the Kenwood, connect them together by soldering the two wires and isolate them, it’s not necessary to switch the secondary 28.5 Volts DC. Connect primary wires (phase and zero) to the front of the Kenwood, double-pole main switch and to the new power module.

The red and yellow wires in the area of the power supply are +28.5 Volts DC, this red and yellow wire both I have separately provided with fuse holders. The red wire is +28 Volts DC to RF power amplifier (10 Amps car fuse) and the yellow wire is approximately 2 Amps (glass fuse) to the electronic circuit boards. Check the connections and wiring of the coils L1 and L2 and write it down on paper, because it is important to connect the proper wire to the proper coil. Coil L1 and L2 are not the same value!

4. Remove coils L1 and L2 from the regulator circuit board X43-1430-00 of the power supply, they are used for measuring voltage and current measurement on the meter in the set, the wires are white and brown (coils L1 and L2). Coils L1 and L2 can be directly connected and soldered to the resistor (+28 Volts DC to RF power amplifier), which previously was mounted on the heat sink.

This resistor can be placed on the base between the digital unit and automatic antenna tuner, also can be placed on the side of the automatic antenna tuner case. Isolate all connections to this resistor and coils.

After performing the work, please check all connections to the power supply, the wiring to the RF power amplifier, resistor, coils and electronic circuit boards. I have the power supply adjusted at 28.0 Volt (but it is adjustable to 28.5 Volts) and the output RF power is about 120 Watts. I did not connect the fan on the heat sink, the new power supply stays pretty cool, because it has a very high efficiency.
If you need to replace the Motorola driver transistors MRF 485, be sure you got a low hFE gain. If a green, blue or other high rank hFE is used the MRF 485 may become faulty after one hour of continuous transmission. Check the bias current after replace. Transmit for about one hour without modulating SSB or heat the heat sink with a hairdryer and ensure that the bias current does not exceed 300 mA. If the bias current exceeds 300 mA in the original radio, change R16 from 1.2K to 2.2K. The bias should be set to 70 mA.

If you have any questions about this replacement, need schematics or the Service Manual, don’t hesitate to contact me. I like to hear improvements!

I also can mail you the pictures that I have made in the new situation. This Kenwood rig is worth to repair! I wish you very much fun with this masterpiece!"

I read the above posting after I calmed down following an event in which my beloved 930S went up in smoke, almost triggering the fire alarm system in our home. It took me three or four days to get over that.

I investigated three modern power supplies:
- An Acopian 28-volt, 14 amp continuous (392 Watts) “Gold Box” W28MT14 power supply,
- A 28-volt, 300-watt Nao Technologies open-frame robotics switching power supply, and
- Two Phoenix Contact Quint models with outputs that are adjustable from 24 to 28.5-volts or more.

The Acopian and Nao-Tech supplies would not fit without modifying the 930S, so after some research, measuring, and tinkering, I settled on the Phoenix Quint power supply. This is a high-quality noise-free industrial supply used in factories, traffic signal cabinets, etc. As PA2VC stated, it is rated at 10 amps nominal, but it has a 15-amp boost mode, and the Quint’s data sheet states that at temperatures of up to +40°C (104°F) the boost mode reserve is available continuously. At higher temperatures it is available for “around” ten minutes. But boost mode would not be needed that long, even in FSK mode. The Kenwood TS-930S owner’s manual warns that output power should be reduced by 50% to prevent PA damage under those conditions.

There are two Quint 10-amp models that fit, and work well in the 930S. One is the original that PA2VC used, model # 2938604. There’s also a shorter version, part # 2866763. In addition, there is a new 20/26-amp Quint that also fits, although it’s tight. That model number is 2866776.

A quick eBay search turned up a couple NOS surplus units for about $70 with shipping. The model I chose is the 2866763, shown below. This version has four sets of output terminals, all in parallel, which makes it easy to hook the existing wires in. But I only ended up using two of them, so the 2938604 model which has two sets of outputs would work just as well. Both come with a rail mount on one side, which is easy to remove.
**STEP 1: Remove the old power supply.** This is the hardest part for most people if their OEM PS still works. The entire system can be removed as one unit. Cut the wires carrying the AC voltage to the transformer primary windings at the transformer. This is what you will have, except yours should have the Automatic Voltage Regulator (AVR) board still attached, and the 10-guage red, orange, and black wires that connect that AVR to the regulators on the heat sink.

Note that the AC input switch combines individual primary windings and taps in the transformer to match the “120, 220, or 240” voltage settings. You will need to connect only two of the five wires that went to the transformer to your Quint, probably the green and blue. To be safe, use a meter to verify which two wires to use. A schematic of this circuit, from Kenwood Service Bulletin #881, is in the APPENDIX. I’ve marked the wire colors on the schematic.

**NOTE:** PA2VC removed everything associated with the old power supply system, including the voltage selector switch and 120-Volt power relay near the voltage selector switch. Kenwood left that relay out in later models, but most have it.

I removed mine also, but Kenwood ran very fine wires up to the front panel power switch, since they only had to carry the low current needed by the relay coil. Now they will have to provide about 3.5 amps to handle the 360 watts output. I decided to run heavier wires up to my switch, but I would leave in that relay system if it’s already there. You can just use the two wires that went to the 120-volt transformer winding and remove the others, since the Quint can operate on 85-265 VAC. Contributor Dave Phillips (KB7JS) encountered a 930S that lacked that relay so he found a compatible one and installed it to protect the front switch. Photos of his solution are in the APPENDIX.
Step 2: **Decide how you will mount your Quint.** Once you have the old parts out, you can start deciding how you will orient the new Phoenix power supply, and how you will mount it. I don’t recommend drilling new holes in the chassis, because stray metal shavings can cause damage. This is what your space should look like now.

The best orientation is with the Quint vent openings in line with the fan air flow. That also places the connectors on the 10/15-amp Quint in the most convenient location. Since my 763 Quint is shorter than the 604 one PA2VC used, I was able to use the original transformer bracket as a mount. The width is just right. I used 3M snap lock fasteners to hold the PS in the bracket so that I could remove it to mount the components for the meter. If I take my 930S on the road, I’ll put a pair of 18-inch plastic zip ties around the ends of the Quint and that bracket. But the snap fasteners are so strong and the Quint is so light that any impact that would shake it loose would destroy the rest of the rig as well. You may have to shorten the top cover screw next to the Quint if it hits. Mine did.
Here’s a closer look at how I mounted my Quint. With the transformer bracket turned 90 degrees the air vents are in line with the heat sink fan. You can set the Quint right up against the back of the fan motor. The 0.5 ohm dropping resistor for the power out function on the panel meter isn’t as close as it looks here.

Detailed photos with notes on how I connected my wires can be found in the APPENDIX.
NOTE: The older 2938604 model has the same foot print but it’s almost an inch taller so you can’t use the transformer bracket. The power supply will be too high for the top half of the case to fit. One quick yet safe option is to mount it directly to the chassis with the 3M fasteners, and then put self-stick rubber or felt pads on top so that when the top case half is screwed in place, the Quint is lightly “sandwiched” between the chassis and the top. It will never work loose.

Above photo by Marcel, ON7DY. He later removed the old heat sink to improve air flow.

HAMS can get quite creative once they plunge into a project like this. I found this photo on the web. It’s turned 90 degrees to the airflow, but the workmanship looks factory issue. This might be PA2VC’s radio.
Step 3: **Decide how you will mount your meter drive components.** This is where the widest variation in this process occurs. It shows how many different ways there are to “skin a cat”.

Some HAMs who have performed this modification have removed the parts they need from the AVR board and mounted them on a terminal strip. Being impatient, I just gutted the board, leaving on the connectors for the fans, as well as the two small green inductors for Ic and Vc at the front panel meter. That also gave me a place to mount a 250-ohm dropping resistor (red) to run the cooling fans at reduced speed whenever the rig is on. I used wire jumpers to the fan connectors because the foil traces were burned off my board. The two diodes and disc capacitors circled on the board are not necessary, so you can remove them on yours. A complete explanation on using the AVR board is in the next section..

If your radio has the 21.7-volt regulator circuit on it, you can still do what I did. Details are in the APPENDIX.

Since I used my AVR board, fan connectors, and other parts, assembly was fast and easy. Those fuse holders are held down with 3M double-sided foam tape. The resistor strip is screwed into one of the capacitor bank bracket holes.

I wanted to get the receiver part back online as soon as possible, and I also wanted to make sure that the other boards in the rig were not trashed, and I was wasting my time and money. But others have gone far beyond…..
Here’s how Marcel, ON7DY, mounted his fan resistor and meter drive components. He used a Velleman P1823 regulator board for the 21.7-volt sub-circuit. Since this is fed by a regulated and filtered switching PS, capacitor C4 on the P1823 board is not necessary.

More details of how he mounted his meter drive components.
Marcel found, as I did, that it’s best to toss the old PS heat sink, as it obstructs the fan’s airflow. Unfortunately, that “orphans” the left rear case screw, so I used a nut to secure the screw to retain a “stock” look.

When it came to splitting out the individual voltages Gary, N6BIZ carried the sub-voltage division to new heights. He used little Chinese-made voltage regulators for all of the branch circuits. A bag of five was only $6 on eBay. He even sent a bag to me in case my resistor bank fails someday. I used one to provide 9-volts at Pin 5 of the microphone connector on my rig so that I could use a TS-940S condenser/electret had mike.

PS. Mike Hutchins emailed me in May 2015 to say he did the same thing as Gary, and so far everything works great. He now has TWO 930S rigs with Phoenix power supplies. I may convert my resistor bank someday, and add photos and info for that to this Guide.
Stripping and rebuilding the AVR Boards

I’ve received some requests for suggestions on stripping the AVR boards and populating them with the 250-ohm resistor, and other parts. So, here’s some info!

Single-voltage AVR Boards – Radio serial numbers 3,100,000 and earlier

Remove everything except the two green inductors that provide power to the meter circuits, and three jacks for the existing plugs. One of the two-pin jacks, labeled “BS” will now be used for one of the cooling fans. Your board should look like this once it’s stripped. The two green inductors at the 3-pin meter drive jack and the jumper J2 will restore the voltage and Ic measurement functions on your meter. J2 is actually a piece of plain wire with a ferrite cover on it (“ferrite bead”).

With all those foil traces, there are many different ways to wire the board. I connected the three main power foils that were for electrolytic capacitors C3, C4, and C6, so I could add other circuits later. One such circuit is an 8-9 volt Zener diode regulated supply for pin 5 of the 8-pin microphone connector so that I can use later model condenser microphones with my early model rig. The TS-940S and some later versions of the 930S already have that feature.

By the way, the procedure describe above works with the split-voltage AVR board used on the later Kenwood rigs. The ONLY difference is that you will have a small transistor, an electrolytic capacitor, and some other parts next to the two green inductors for the meter, and of course, the power tab regulator shown in the section that follows on rebuilding the later model board. But again, jumper J2 will do all the work of restoring the front panel meter voltage and Ic functions for you once you feed the 28-volts from your Quint to the positive foil that once connected to C6. Plus, your board will have the jack next to the meter jack for the regulator plug. The procedure is outlined in the next section.
This is how I wired my AVR board. The red lines represent positive jumpers with red insulation, and the black ones are negative. I actually only had to connect the positive foils, because the negative ones for C3, C4, and C6 are already linked together. I needed one piece of black wire for the second fan. Note that I wired my fans in series. My logic was that if one fan jammed the other would run faster and I would notice. Or if one opened, the silence would catch my attention.

Another way of wiring the fans is in parallel. That way if one fan jams or the motor winding opens, both won’t be disabled. The fans will be louder and faster, so you might want to increase the resistor to 270-300 ohms. Here’s the parallel wiring:
You COULD save time by connecting the fan resistor across the positive foils for C4 and C6, leaving C3 out of the picture. But as I said, I plan to create a drive circuit for a condenser mike some day, using my AVR board. Right now, I’m using a little Chinese-made regulator as a test (plus I can adjust the voltage to see what works best).

If you look at the way I did the later model AVR board (next section), you will see that I used the C4 and C6 foils, so the resistor sits an angle, which makes no difference electrically.

**One issue to address right now is this:** If you plug the fans into the connectors on the AVR board the way they were keyed, both fans will be blowing out. I prefer to have my PA fan blowing IN against the heat sink, but my PS cooling fan pulling air OUT. That way, power supply heat (and dust from behind the rig) will not be blown back into my case. The only way to make that work is to slide the plastic retainer for the PA fan jack on the AVR board off and reverse it, or trim off the plastic tabs on the plug so you can insert the plug in either direction. I chose the latter solution, because the plastic jack piece was stuck down firmly to the AVR board, possibly because the pins hold it in place, or the heat from my AVR board catching fire melted the bottom of the retainer to the board.
APPENDIX
This is the only schematic of the TS-930S voltage selector switch and relay system that I have found. It is on the Kenwood USA web page as part of TS-930S Service Bulletin #881. The actual bulletin addresses surge suppression to prevent relay chatter and contact welding, but it also shows how the voltage selector switch works. Note that in the above drawing, the switch selector is set to the 120-volt position. Kenwood did not identify the colors of the wires to the transformer primary in the schematic, but based on my photos, and those of other contributors, I have added what I believe are the correct colors. If anyone finds an error, please send an email to me at w3afc@aol.com.
If you have a later model 930S with the dual-output AVR board and you don’t want to use the board, eBay sellers offer solutions: Small adjustable converter boards that typically reduce 3-40 volts down to 1.5-35 volts. I used one to provide 9 volts to my mic connector so I can use condenser microphones. There are some that resemble scaled-down versions of the Phoenix Quint. Many can handle 4-5 amps without a heat sink.

Phoenix Contact even sells a Quint-Series DC-DC converter that has the same 125mm x 130mm length and width as either of the Quint power supplies discussed above. Its depth is 32mm, so if you mount a “big Quint” directly to the 930S chassis using the 3M snap-lock fastener system, the smaller Quint could sit on top using 3M double-sided tape and you could even line the terminals up so that the two could be removed as a package for service. The Phoenix Quint converter handles 5 amps. The part number for it is 2320034. It lists for $267, but no doubt you could find it on eBay for a lot less.

Or, you can do what I did and strip the original AVR board down, and reuse it. The strip-down procedure for this board is pretty much the same as with the older AVRs. You just need to leave on Q6 and its associated components, and keep the TO-220 regulator Q3. If you toss the OEM PS heat sink, you will need to mount Q3 to the chassis or some other heat sink using a mica insulator and shoulder washer. THIS is what your board will look like after it’s stripped.

The jumper mentioned in the above picture is actually a “ferrite bead” - basically a piece of wire with a tight-fitting ferrite covering to block RF from reaching a DC circuit. It’s labeled “J2” on the board.

From a diagrammatic standpoint, your board will look like the “Pre-3,100,XXX AVR board, except for the connector and parts for the 21.7-volt sub-system. (next page). Again, there are many ways to wire the AVR board since you have so many holes to choose from. My way is not necessarily the best, but it works.
You will need to jumper the foil that was used for C3 to the C6 foil to provide power to Connector 7, and the 21.7-volt sub-system components, as shown below:

Note from the schematic on the next page that the 21.7-volt sub-system is literally stand-alone. It’s fed 28-volts DC through the power switch from terminal 28B into pin 1 of the connector, while pin 5 receives 28 volts DC from a separate circuit via diodes D1 and D2. I used jumpers to the 28-volt line from the Quint instead of D1 and D2, and everything works fine. Be sure to leave on the ferrite bead jumper and the green inductors for the panel meter circuit.
The Dual-Voltage AVR Board with the pertinent circuits highlighted

Kenwood Switches the neutral in this rig.

AC IN - neutral
Switched AC Neutral

AC "Hot"

AC from transformer tap

28 V out

21.7 V out.

The actual wire is yellow, but yellow doesn't show here
Here is the later model AVR board, ready to reinstall. For this conversion, I ran the 250-ohm resistor directly from the C4 foil to the C6 one. Remember to install the regulator transistor using an insulating mica washer or the original rubber piece, and use a shoulder washer to insulate the screw. Otherwise, you will short the 28 volt B+ line right to ground.

It doesn’t hurt to test everything before putting the board back in the rig. A load resistor will be needed or the voltage will “float” up to 22 or 23 volts. I used a 70-ohm resistor for this test.
ADDITIONAL PHOTOS WITH NOTES, SHOWING MY POWER SUPPLY CONNECTIONS

(Remember, my radio is an older "Pre-3,100,xxx model)
These two wires were added by me. The thick one goes to the PA fuseholder. The other goes to a fuseholder for the heavier yellow wire and the red wire from the AVR board.

I "split" the red and black wires from the AVR board and ran the black one to the quint. The red goes to the same fuseholder as the yellow receiver wire.

This thick black wire goes to a negative terminal on the quint.

Connect a 16-18 gauge black ground wire from the negative foil on the AVR board to a ground or minus terminal on the quint.

This positive wire (you add this) goes from a positive foil on the AVR board to the 3-amp fuseholder. (see text) 16-18 gauge works well.

This red wire goes to the other side of the 10 amp fuseholder. Connect it to one of the + output terminals on the quint.

This red wire has a push plug on it. It goes to the matching connector to the power amp.

This orange wire went to the 28-volt output on the AVR board. Connect it to the end of the PA fuse holder.
DAVE’S 20/26-AMP PHOENIX CONVERSION

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:

From Dave, 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.
After operating my 930S for a few days, I had to see if the Quint power supply was entering boost mode when operating at full power, so I pulled the cover and watched while I talked. I was most interested in SSB, but I also tried AM and CW modes. This is what I discovered:

On strong SSB voice peaks where the PEP reached 100W or more, the yellow boost light came on. (See photo below) On CW it came on full brightness every time I keyed down. But it stayed dark on AM, probably because AM output is limited to 30W. This suggests that the Nao Tech 28-volt, 10.7 amp power supply that I was considering in the beginning would not have had enough power to run this radio. But the Acopian 14-amp supply should have worked perfectly, had it fit.

One year later: How does it compare?

Since performing this mod, this has been my everyday “go-to” rig for everything from ragchewing to all-day contesting. Even after a full day of contesting or other use, the top of the rig is barely warm. The only part that generates any heat is the resistor bank assembly in front of the Low Pass Filter assembly. If I buy another 930S, or even a 940S, I’ll install a Phoenix supply immediately, even if the OEM power supply still works.

PARTS INFORMATION

Phoenix Quint Power Supplies: eBay. They are on there all the time. You can find them NOS or surplus with a 14-30 day return period for $50-$75. Don’t pay much more unless you’re really in a rush.
**TESTIMONIALS**

So, how does it work? Here’s what Mike, who tore two of his working 930S radios apart to modify the power supplies, had to say. He installed the Phoenix supply in one.

"Hi John - yesterday I finished my VK4AMZ power supply & put into my #3 930 & all is fine! I wired the whole power unit, heat sink & fan casing, so I can remove the 3 parts & lay them all behind the rig for checks etc., without unsoldering anything. I changed the rearmost transformer mounting clamp from a 'U' to a flat, this gave enough space to mount a 2-way connector (we call them 'chocolate blocks', guess you know what I mean!) on top of the rearmost transformer windings, with the transformer secondary into the block & flexible wires coming out to the rectifier.

To be honest, I regard the mod using the 'Quint' to be quicker & tidier, and I can't see any performance differences between the 3. Plus, like you said before, the 930 with the Quint is a LOT easier to lift!!!

Hope all is well at your end!
73 de Mike, zl1mh."

**W3AFC:** Here’s my testimonial – it’s my baby, back in full service. I run it all weekend during contests without a glitch. It doesn’t even get warm. I wouldn’t use a 930S with the old power supply. I like fireworks, but not in my shack!