Upgrade Kit AL811 and AL811H amplifier

Rev3A 4/3/2024

Please be aware MFJ has made multiple changes in the AL811 series. While some are good, some are bad. The following are known improvements as of this date:

1.) A string of bias diodes has been added. This helps tube life, although even more bias would have been better
2.) Two cube relays replaced the single open frame relay. This speeds relay switch time from ~12 mS to ~8 mS
3.) Some GDTs were added

The following changes are detrimental and are covered in this instruction set:

1.) The fan was changed to a Cooltron fan. In the 811 cabinets on 60Hz mains, the Cooltron fan produces less than 10 cfm airflow. It is worse at 50 Hz. This is about 1/3 of the necessary airflow for (4) 811 tubes in normal SSB/CW use. Any Cooltron fan must be changed. We offer a verified fan replacement kit
2.) MFJ has changed output coax grounding in later amplifiers that have green circuit boards. The coax shield grounds to the input board. This must be corrected or amplifier stability is compromised
3.) MFJ increased the filter capacitance and reduced the capacitor test or foil voltage rating
4.) MFJ slightly decreased the 160/80-meter tank coil size. This changes the loading range and also prevents proper tuning on the low end of 160M

Thank you for purchasing one of our kits (and/or this modification manual). These kits and this technical manual are intended to help fellow Hams understand AL811 amplifier weak points and reduce expensive damage. This technical instruction manual and kits bring 811 series amplifiers up to the latest revisions. With basic hand tools and soldering skills anyone should be able to upgrade or service their own amplifier.

Please order via email links on **https://www.ctrengineeringinc.com/ameritron-811-811h-upgrade-kits/** or email order query only to **orders@ctrengineeringinc.com**

This modification manual is also the result of feedback, questions, and suggestions by fellow Hams. More suggestions are always welcome. The overriding philosophy is everything reasonably possible should be done to prevent expensive or annoying damage, especially to expensive radios. An amplifier should work as well as possible for the cost.

These kits come in two basic forms with one add-on:

(Power Supply rebuild) 811KS

1.) four better-sized higher-voltage much longer-life 5000 hours 105c rated electrolytics
2.) four improved bleeder/equalizer resistors
3.) one large 6A grid meter protection diode
4.) Two 1 Meg ohm 1% 1kV rated two-watt temperature stable meter multiplier resistors. (Note: from parts supplier issues, we may substitute four 499k 1% resistors. The value is printed on the resistors.)

(Protection Kit) 811KP

1.) three application-tested GDT tubes (one can be a spare, primary protection is at the sockets)
2.) one large 6A meter protection diode
3.) one 100k 2-watt resistor (standby noise)
4.) two 3.9V 5-watt Zener diodes (bias)
5.) 10-ohm 9-watt CCS 10kV rated fault resistor (arc limiting)

Add on part:

811R200K

200-ohm 25-watt non-inductive TO-220 case load resistor kit with hardware and grease (reduce gain and add stability in 3 tube 811 models). This also can make the AL811H more compatible with 100W radios, reducing power overshoot in rigs like the ICOM 7300.

Overview

I designed the AL811 series many years ago. It was intended to be a minimal cost-reasonable power level ***SSB and CW-only*** amplifier. The initial design request was for just two tubes, but that obviously would have been inadequate. As a result, I added a third tube as a bare minimum cost amplifier and pushed to have a better but still not too expensive four-tube amplifier. The better version became the AL811H.

The initial schematic circulating for these amplifiers was hand drawn on a drafting table by pencil around 1990!

This instruction manual and the 811 kits result from direct feedback from servicing several dozens of amplifiers. Read these instructions thoroughly before you start working on your amp. Make sure you understand every step to avoid errors or omissions.

AL811 Stability

Tubes with long thin grid leads and large internal structures sometimes have significant anode-to-cathode feedthrough. This can destabilize amplifiers at upper HF. 811 and 572 tubes are particularly bad about this.

The three-tube 811 model is not neutralized. As with two unneutralized 572B tubes, three 811A tubes are marginally stable at upper HF. The AL811 should have a 200-ohm cathode swamping resistor, or even lower swamping resistance. Kit PN **811R200K** ***has one chassis mount RF-rated 25W resistor, one 0.01uF coupling capacitor, and necessary hardware. In addition to standard hand tools, you will need a 0.113 to 0.125" (1/8") drill to add one or two holes for 4-40 machine screw clearance.***

AL811H

The four-tube model is neutralized. Four 811 tubes, regardless of layout, become unstable someplace above 15 meters and behave poorly on ten and fifteen meters when not neutralized. ***Any swamping resistance is optional; it just makes neutralization less critical and closer matches drive level to 100W exciters. With bias changes the swamping is not required.***

> **Warning:** No matter what you see other places, do *NOT* run long grid leads to a common ground. The longer and thinner grid lead path to the chassis, the more feedthrough and less stable the amplifier will become. Grids should be directly grounded to the chassis with the shortest possible leads.

NOTE: *I find many amplifiers that have NOT been properly neutralized from the factory. This is not from a variation in tubes. The only time tubes might require neutralization is when 572B's are swapped in. To equipment operators, poor neutralization is most easily noticed by a fairly large 10-meter input SWR variation as the amplifier is tuned.*

A second neutralization indicator is exciter power varying as the amplifier is tuned past the 10M grid current peak.

A third and by far least dependable identification method is observed by plate current dip not coinciding with maximum output power or maximum grid current.

Neutralization

I neutralize 811s by activating the relay system with an external low voltage DC supply of about 14-18 volts positive applied to where meter lamp positives connect. The antenna relays are activated by grounding the RLY jack. Feed an antenna analyzer into the RF input or output jacks, and listen with a radio on the other port.

With the amplifier on 10 or 15 meters adjust the analyzer and receiver to the same frequency. Adjust the PLATE and LOAD for maximum signal. Now you can safely vary flapper plate positioning for minimum signal level. The best flapper setting is the compromise between 10 and 15M nulls, with 10M having priority.

Caution: Do not neutralize before grounding grids directly to the chassis at sockets! The amplifier must be functioning normally with grids properly grounded to neutralize.

Arc Major Concerns

There have been dozens of instances of hard faults in tubes damaging radios. This has been blamed on many things by many people, including ALC voltage or relay line spikes. The actual damage to radio RF sections is from gas or debris arcs in tubes, or tube anodes warped so badly by excessive heat the anode contacts the tube grid. Radio damage comes from the tube arc energy making it out of the amplifier's RADIO or INPUT coax connector, through that coax, and into the radio. I'm 100% positive of this! While this happens infrequently, radio damage can be anything from minor to catastrophic. In this case, adding a few dollars of components to potentially save damage to a $1000 or more radio is well worth it.

Tube arcs range from minor flashovers that clear the fault low energy to hard solid faults that dump full high voltage on the tube cathode and grid. In light faults, with a directly grounded grid, the grid can divert most of the arc energy harmlessly to the chassis ground. Only the most sensitive radios are damaged by minor flashovers.

With hard faults, an ionized path occurs through and around the grid. This transfers a great deal of energy to the tube filament. These arcs can be devastating to amplifier components and to the radio. Hard anode-to-filament arcs produce a very sharp edge high voltage spike on the filament. The filament, if unprotected, reaches well over 1000 volts in microseconds. This arc is very much like a miniature lightning surge. The filament choke has significant common mode series impedance. Along with bypass capacitors, this forms a low-pass filter, only passing arc frequencies below ~100 kHz through the filament winding to the bias and relay circuit. It takes a very hard sustained arc to damage this path.

The second more troublesome path is through parallel 0.01 µF filament coupling capacitors to the tuned input. The tuned input circuit, being a low-pass, rings. This stretches the pulse out into a several mS-long series of lower-level oscillations below the band selected. The pulse can then make it through the tuned input much like a brief high-power transmitter of a few hundred watts into the radio. Worst worst-case peak voltage level is an arc while on ten meters, while the worst-case pulse length occurs at 160 meters.

The red line is the primary damaging high-frequency arc path. The path goes through tubes, and out through the filament coupling capacitors. It then travels through the tuned input circuits to the RF input, and that is where your radio is connected. The arc path is NOT out through the relay control line; a relay line isolation device will not prevent or reduce arc damage. The arc path is NOT out through ALC; using or not using ALC will not affect radio damage.

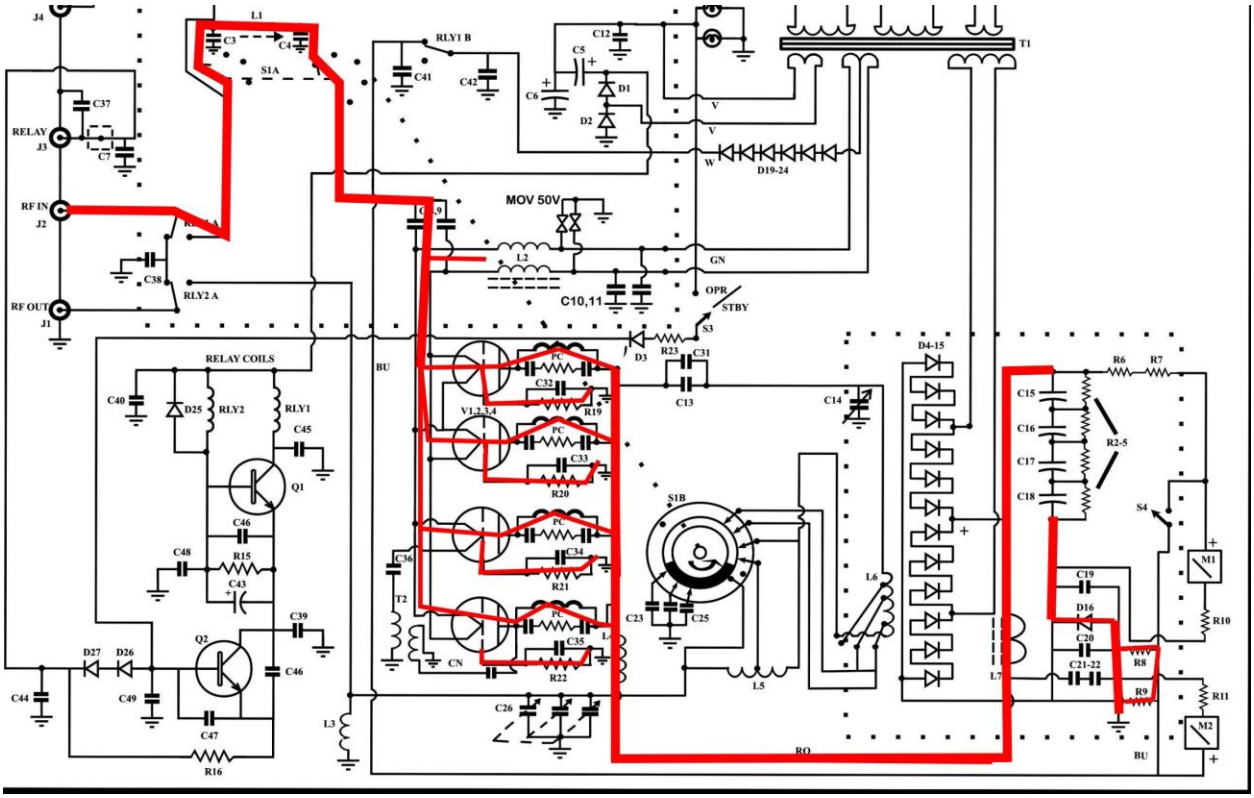

Figure 1 primary arc path

The 811KP Arc Protection Kit does the following:

1.) Adds two 150-volt Gas Discharge Tubes from the filament directly to the chassis at the tubes. These parts limit transients to about 200 volts absolute peak. Any substitute GDTs should be vetted for performance. GDTs do not clamp. GDTs ionize at a certain voltage, becoming a near-short once ionized. This effectively stops surges from reaching your radio if a tube has a hard arc

2.) Instructs you to directly ground grids in older versions that had grid equalizing resistors. This is a critical update! Grid pins should always be directly grounded. THIS IS A MUST-DO in any grounded grid amplifier that floats grids from the chassis.

3.) Increases or adds bias. Bias improves tube life and efficiency without noticeably hurting IMD with 3.9-volt 5-watt Zener bias diodes. If your amplifier has a string of bias diodes, found on the lower edge of the back panel circuit board, you add only ONE of these diodes in series with the white center tap. If your amplifier does not have a string of 1N5408 bias diodes on the input board, both Zener diodes are used. The goal is to be around 10-20mA quiescent current per tube. This would be a 30-60mA zero signal keyed idle current in the AL811, and 40-80mA idle in the AL811H

4.) Add a higher surge-rated negative rail clamp diode. This diode protects the grid and plate meters and shunts. The original diode is a small 1N4001 series diode. The kit diode is much stronger and fails far less often. This reduces the aggravation of protection diode failures

5.) Add a 100k resistor from filament to ground, or to a place I provided in later AL811s that Ameritron for some reason never used. This prevents a weak "popping" noise in your receiver from intermittent gas tube ionization with some GDT's and tubes

6.) Supplies an additional GDT if you want to further clamp the RF input line to the input circuit

7.) You ***should*** remove MOVs if they are defective or if they are readily accessible. MOVs do not add anything worthwhile in protection and MOVs are failure prone. They are too far downstream and beyond the choke to do any good for your exciter. If MOVs fail, they can cause problems

The AL811 three-tube model normally does not require dropping the back panel unless it has defective MOVs to service. The 811H back panel almost always has to be dropped. This is not a big deal if your particular unit was wired correctly from the factory. *It is a little more work if the transformer wires have been cut too short.*

Always make sure the amplifier is unplugged and the capacitors are discharged before starting this modification procedure. Never attempt to make any repair on the amp with it powered up and the cover disconnect overridden. There are LETHAL VOLTAGES present inside the amplifier.

In all cases be careful and work slowly.

811KP (arc protection kit)

All common grounded grid amplifiers should have grids directly grounded with the shortest possible leads. 811H amplifiers with the terminal strips and resistors, as shown below in figures 2 and 3, ***must*** be upgraded for safety.! Use of grid resistors, long grid leads, or grid chokes increase chances internal tube arcs might to continue to the filament and out to the radio. A hard tube short will almost always damage or open the grid resistors, causing operational issues.

Figure 2 remove these resistors if present

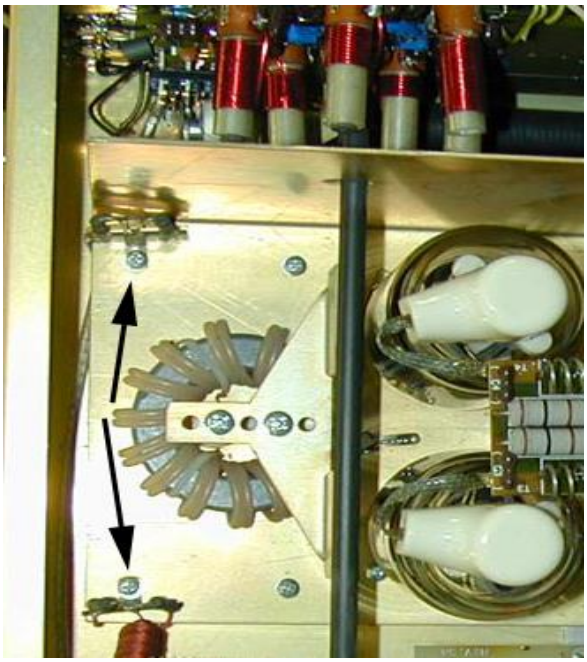

Figure 3 remove terminal strip mounting screws

If you plan on dropping the back panel, do the input shaft removal step below first. The AL-811 three-tube does not require dropping the back panel just to install GDTs or to do most changes.

GDTs in the AL811 three tube are installed as shown on the outermost tube. GDT ground connections can safely share one ground lug. The picture shows two lugs for connection clarity:

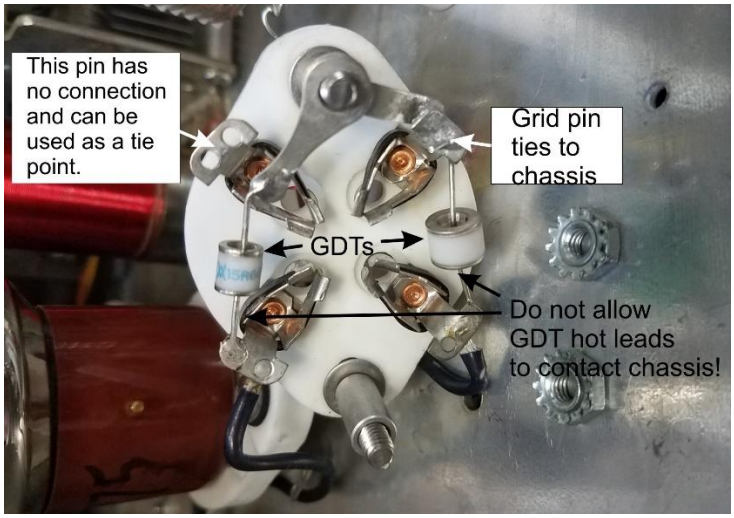

Figure 4 GDTs remove outer tube socket add lug(s) and GDT AL 811 only

Input Switch Shaft

Remove the input switch shaft by ONLY removing the very front screw of the coupling! The front screw will be a small hex or Philips's screw. Remember to remove the front screw ONLY! If you remove the rear screw you will have to re-index the rear switch wafer. Refer to Fig. 4.

Figure 5 band switch shaft

Remove the side rails on each side. (Fig 6)

Remove the screws and pull the rear panel off the shaft. Do not damage or rotate the blue plastic input switch on the input circuit board. Once you have the panel back and off the shaft lay the panel down as in Fig. 6. You can now remove the shaft from the chassis.

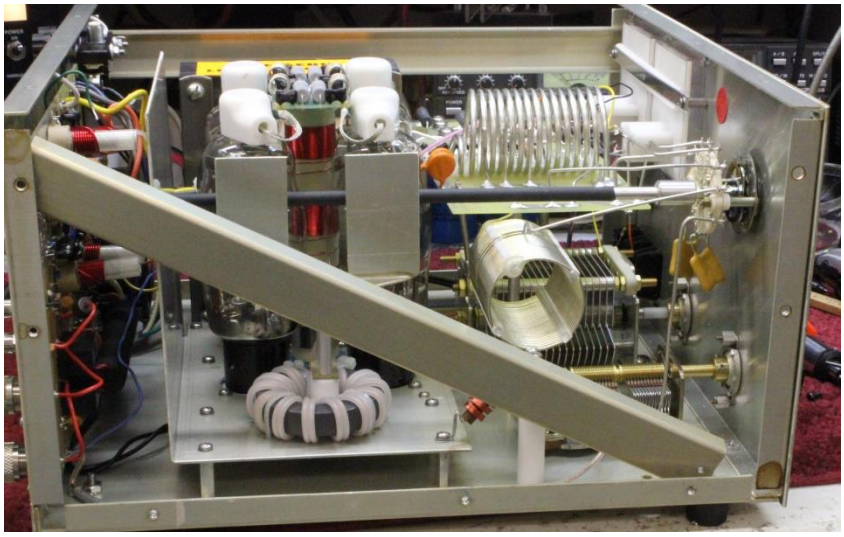

Figure 6 remove siderails

To remove the tube chassis and work underneath it freely, the back panel must be dropped. Wiring in amplifiers unfortunately is sometimes inconsistent. Properly wired the back panel will drop just like Fig. 7, only removing small screws in side rails and the rear bottom panel lip. With the front shaft coupling screw and side rails loose, pull the back panel straight back off the shaft.

This is a properly wired panel, which saves you considerable time. Correctly wired panels have long transformer leads that allow rear panels to drop without removing any wiring, with the exception of output coax:

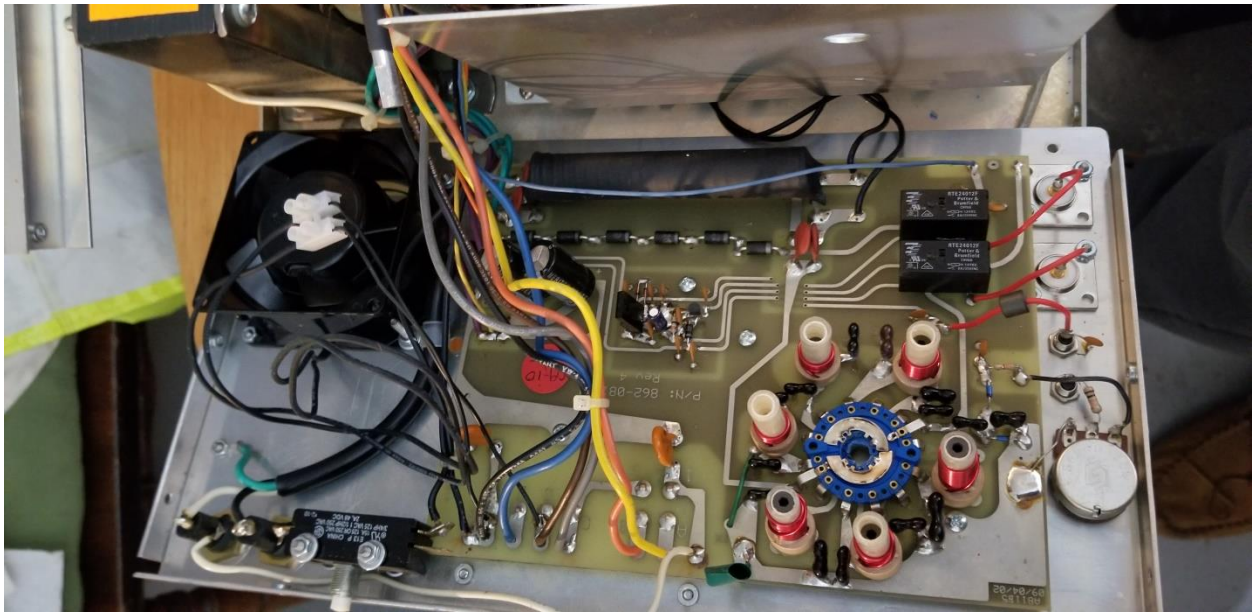

Figure 7 properly wired back panel dropped

Note: *Incorrectly wired panels will not drop without unsoldering multiple transformer wires, and perhaps coax and other leads. It's advisable to take a picture of the panel with wires attached to aid in the reassembly of the panel. Be careful unsoldering leads. Leads are accessible through a plate on the back of the back panel. Use a large iron, and have a solder sucker or solder wick handy! Use a large hot solder-wetted tip on the wire ends that stick through the boards, so you can get on and off the solder joint quickly. Do not linger and overheat the printed circuit board foil while waiting for the wire to melt free. You do not want to lift foil pads off the boards from excess heat. Heat the wire end with a wetted tip flat against the wire, do not heat the foil.*

This is an incorrectly wired panel. The transformer leads are too short to allow the panel to fully lay down and must be unsoldered for input board or tube chassis service. Figure 8.

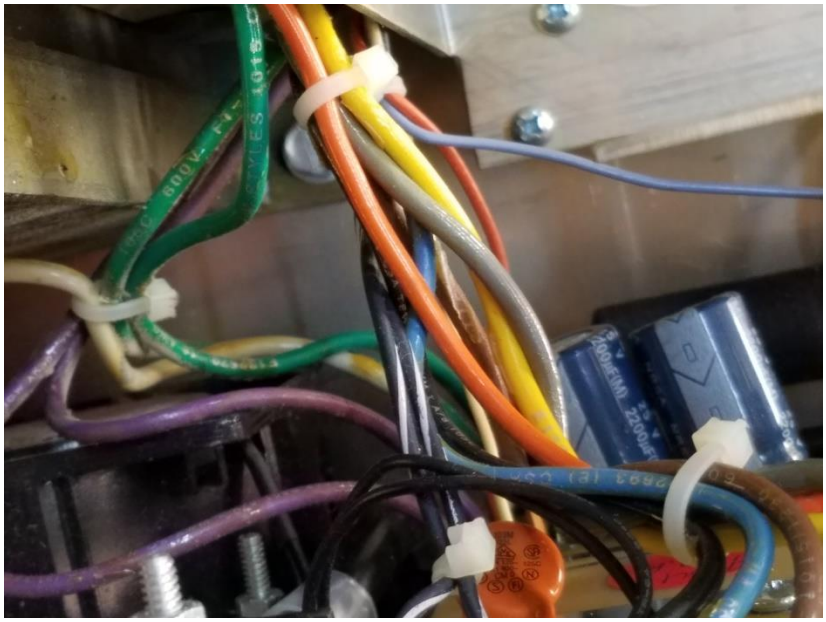

Figure 8 wires too short

After rear panel removal, remove any MOV's. They will be located on the circuit board right down by the fan. MOV's are sometimes blue. They will be present along with capacitors. Refer to Figs. 9, 10, & 11 to help identify MOV's.

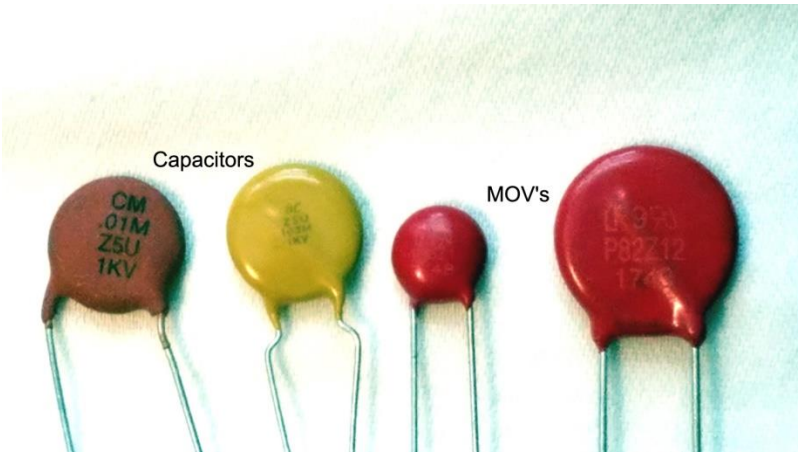

Figure 9 Capacitors and MOVs

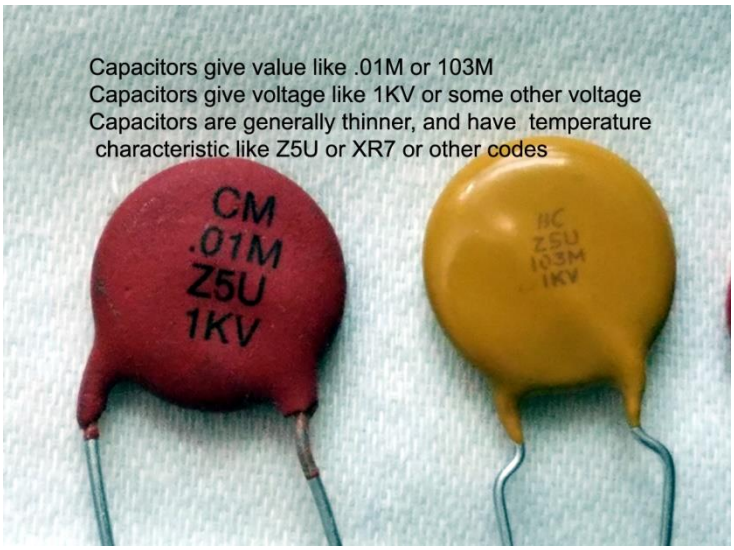

Figure 10 capacitors

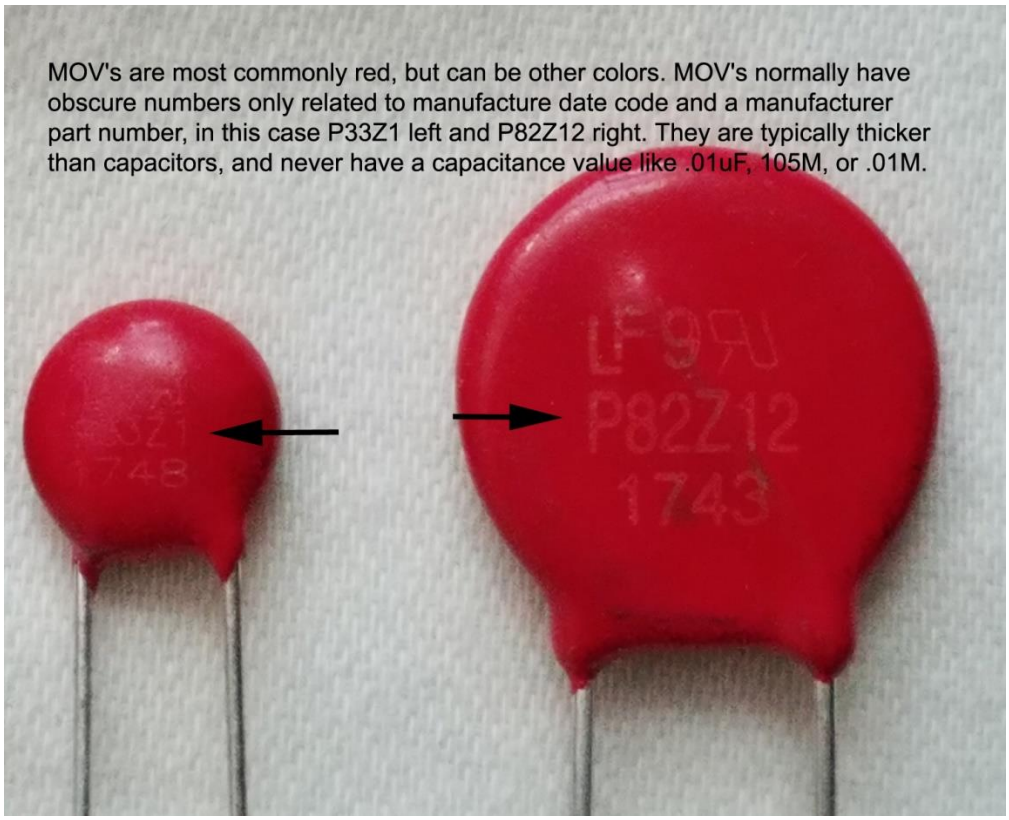

Figure 11 MOVs

Remove MOV's, do not remove capacitors.

Generation I board:

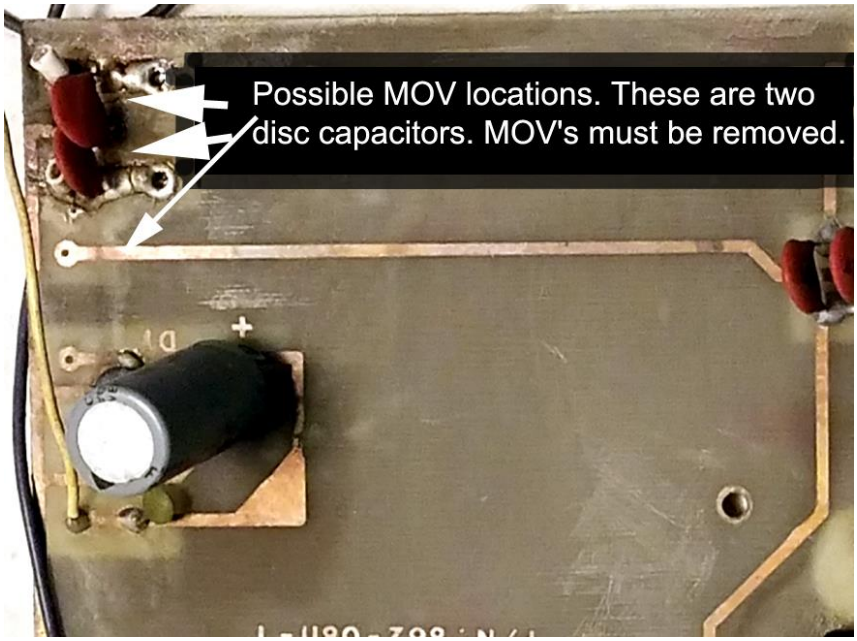

Figure 12 Generation I input board

The Generation I board does NOT have the 24V bias point for the 100K resistor. In these amplifiers the 100K 2-watt resistor goes from anyplace on the filament system to chassis ground.

Gen II board:

Look for the small capacitor near dual relays (Fig. 13) and remove it, if installed. The string of 6 large forward connected rectifier diodes adds about 4 volts of bias.

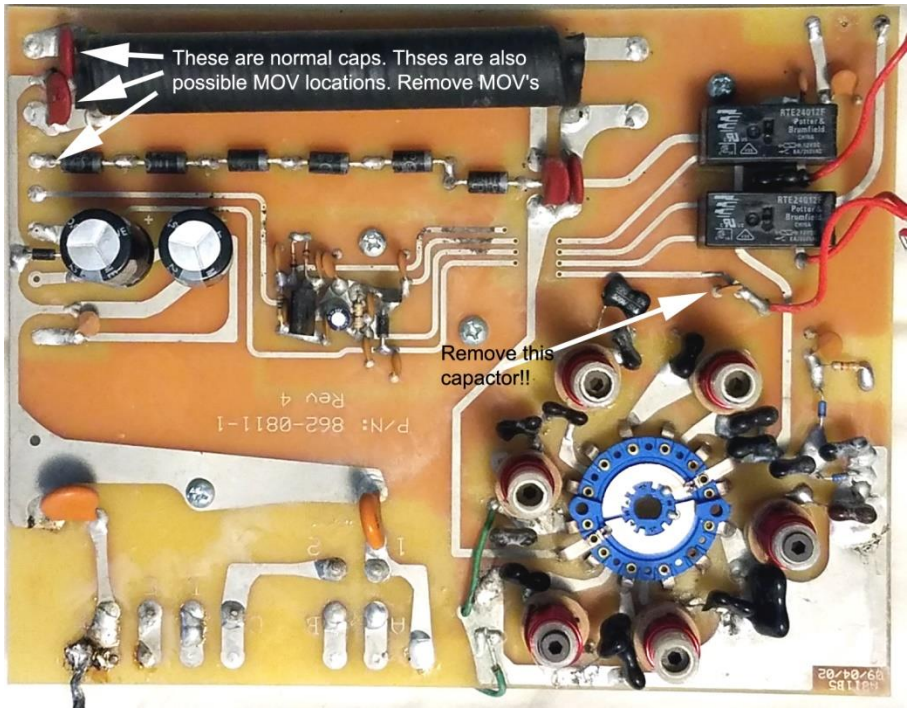

Figure 13 Gen II input board

Gen III board around 2012

This board das GDT pads and does not have the problem relay line capacitor near the relays.
Note: this generation is after I recommended omitting all MOVs. Production boards may or may not have MOVs

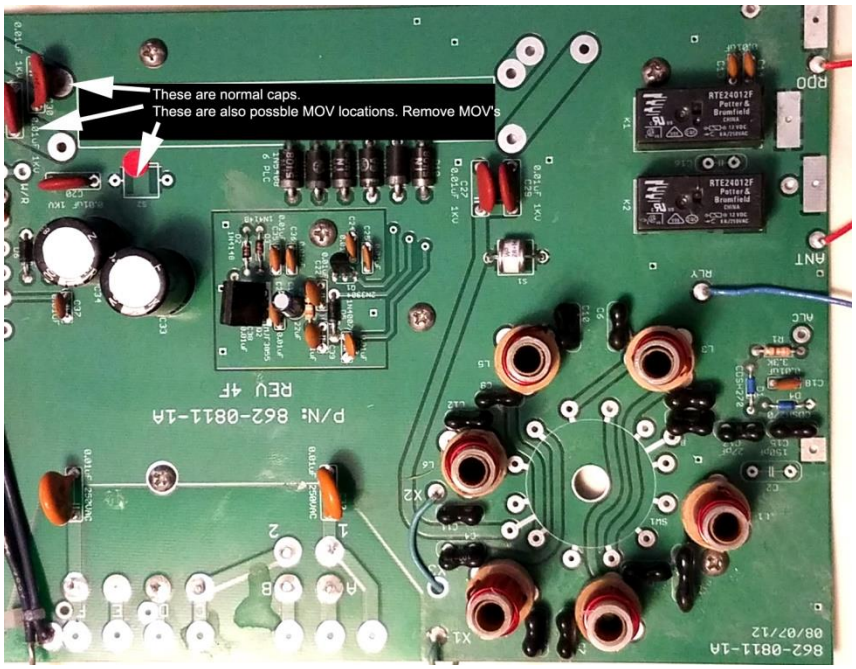

Figure 14 Gen III and later input boards

This is the ideal working position for all back panels. This is a correctly wired back panel. The back panel easily slips backwards off the switch drive without any wire removal. This is a two-relay board (the two black relays to the right side). Notice the string of rectifier diodes used for bias running along the black filament choke.

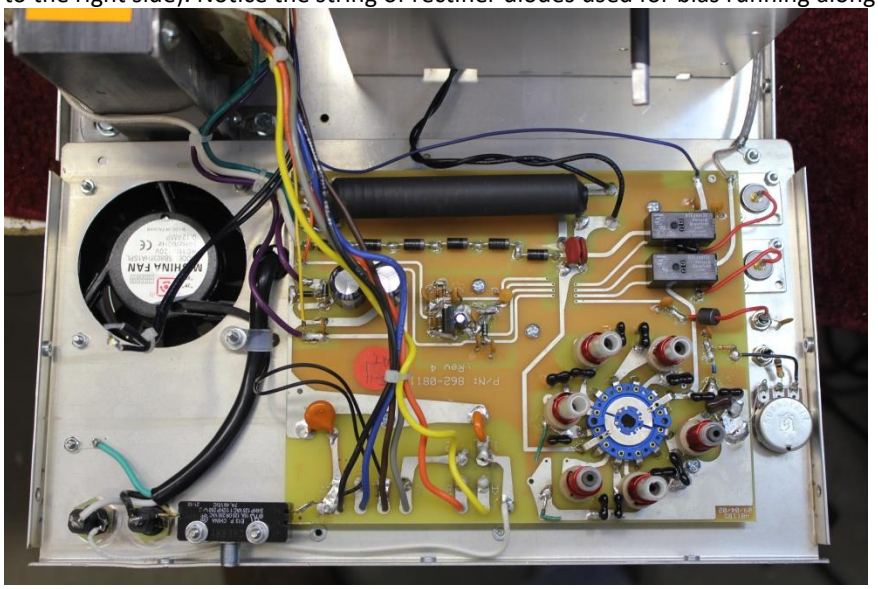

Figure 15 All units rear panel down

The rear of the input switch shaft is exposed. The sharp rear shaft edges should be filed or sanded to break the edge into a taper or radius. This significantly helps when slipping the shaft back into the rear switch. A few minutes tapering the edges can prevent switch damage and prevent expensive broken switches.

Figure 16 All units break or radius shaft rear edge

Remove the tubes, the terminal strips, and lugs in these locations, and disconnect the two orange 1000 pF high-voltage blocking capacitors that go between the RF parasitic board and plate choke. Unsolder these capacitors at the end that solders to circuit board above the Plate Tune capacitor. See figure 17

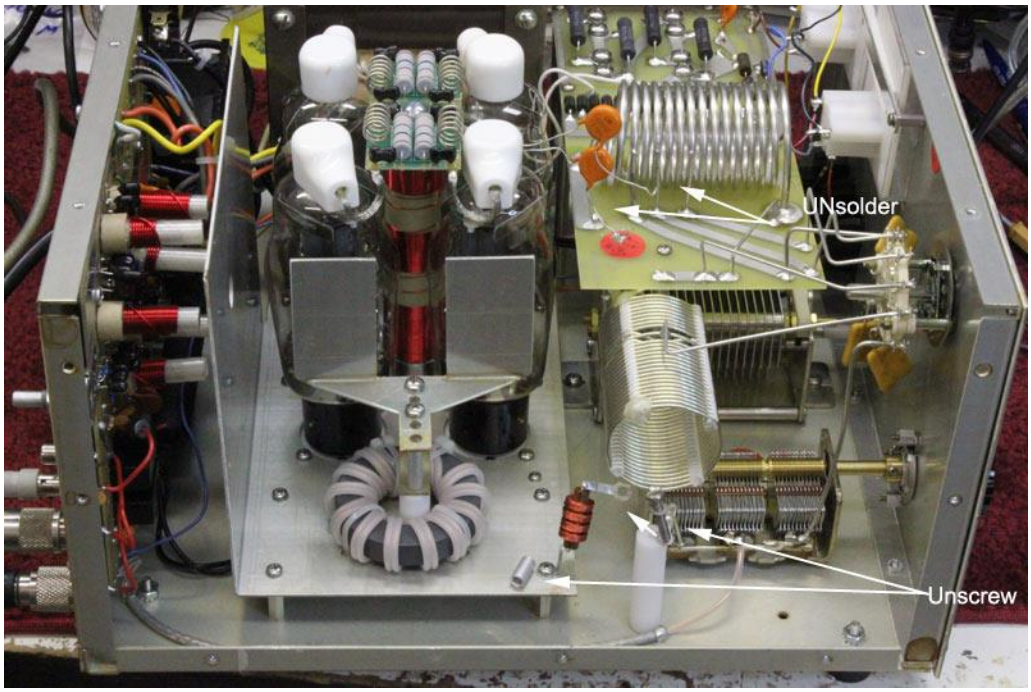

Figure 17 811H only unsolder and unscrew

Flip the unit carefully on its side and remove the following screws:

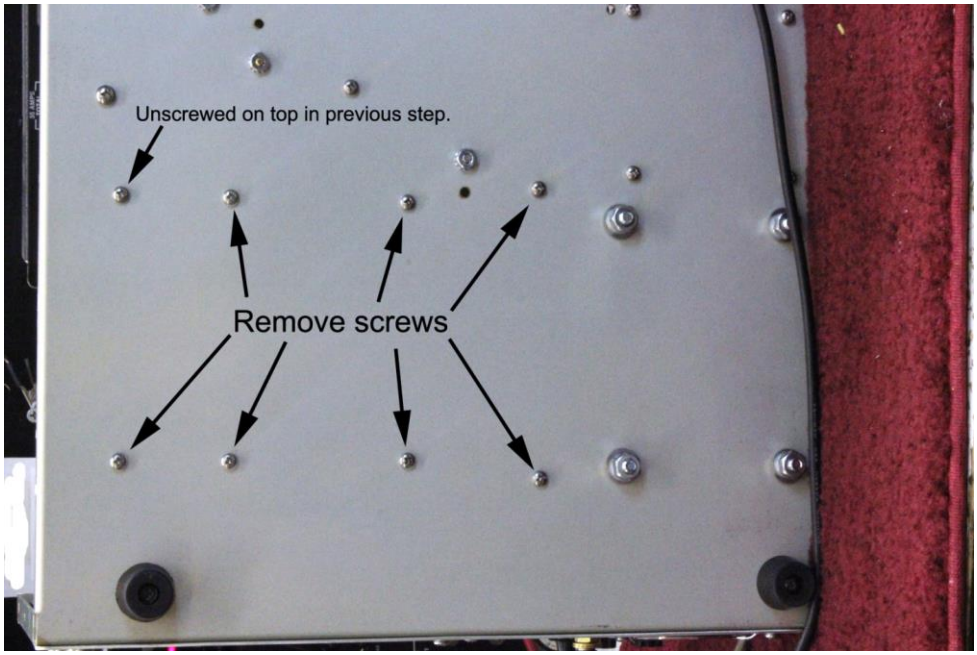

Figure 18 811H remove bottom screws

Lay amplifier down and maneuver tube chassis to reach all sockets. Depending on wiring, the filament leads or red HV choke lead could require removal. The filament leads are supposed to be loosely twisted as in Fig 18. The *optional* 200-ohm 25-watt resistor requires drilling a #4 clearance hole, deburring the hole, and using heatsink compound and proper hardware (4-40 machine screw with lock washer and nut) to mount the resistor. The resistor connects across the neutralizing capacitor. Fig. 19 Ground the tube grids directly using solder lugs provided in the kit and solder the GDT's in Fig. 18.

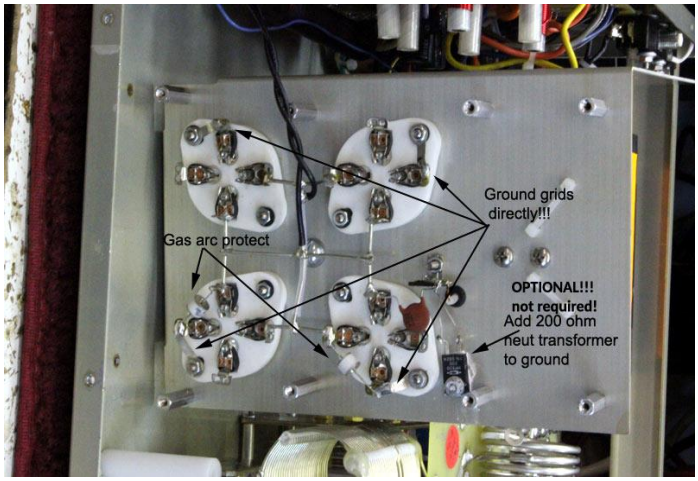

Figure 19 add GDTs AL811H only (811 was in fig 4)

200-ohm Swamping Resistor 811R200K

The 200-ohm swamping resistor helps stabilize the amplifier, broadens the tuned input slightly, makes

neutralization less critical, and more closely matches the 811 amplifiers to 100-watt radios. This resistor reduces ALC overshoot in troublesome radios, like the IC7300.

The 200-ohm padding or swamping resistor requires drilling a single hole. Mounting screw size is #4-40, which is about .110-inch diameter. A standard 1/8th inch is good enough. Remove the tubes before drilling. Be sure to not leave burrs. Supplied compound goes between the resistor and chassis. The AL811H does not need an isolation capacitor, the AL811 does need the supplied isolation capacitor.

Figure 20 AL811H 200-ohm Pad

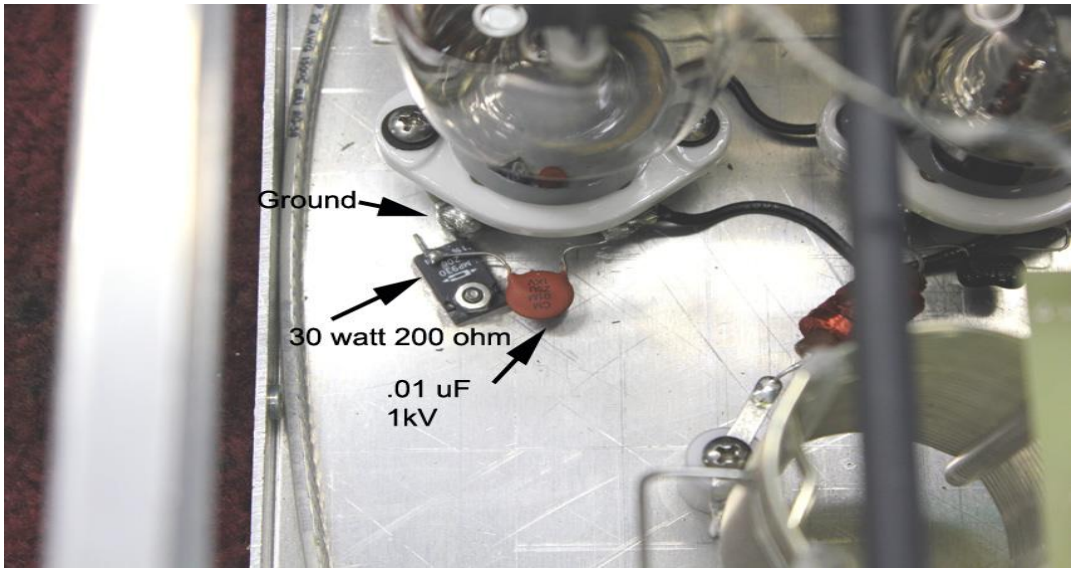

Figure 21 AL811 200-ohm swamping resistor and capacitor

Plate Choke Inspection

Check all the solder connections carefully. Inspect the plate choke. If the plate choke has loose or overlapped wires it needs to be put back in a single tight wrap and “re-glued”. Q-dope can be made from a mix of lacquer thinner or Xylene and pure white Styrofoam “peanuts” used for packing. Dissolve the white packing peanuts or other pure Styrofoam (do not use anti-static peanuts) in thinner until it is a thick paste. Paint the paste on the coil to hold the windings in position. Allow time to dry. A dot of Gorilla Glue is fairly good end-glue at winding ends.

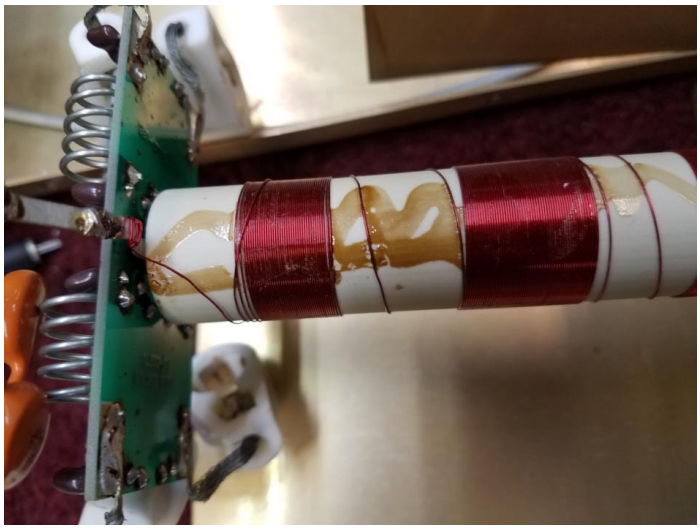

Figure 22 reglue choke all units

811KS Power Supply Kit

If your amplifier has tan or sand color bleeder resistors they should be changed. The sand or tan bleeders have proven to be failure prone. When a resistor fails all four electrolytic filter capacitors are damaged. A 50k to 100K higher reliability resistor of suitable wattage must be used. Suitable resistors along with superior filter capacitors are included in the 811KS power supply kit.

The small meter protection diode on the very center far right below the ferrite bead gets changed to a larger diode that is supplied in the kit with all kits.

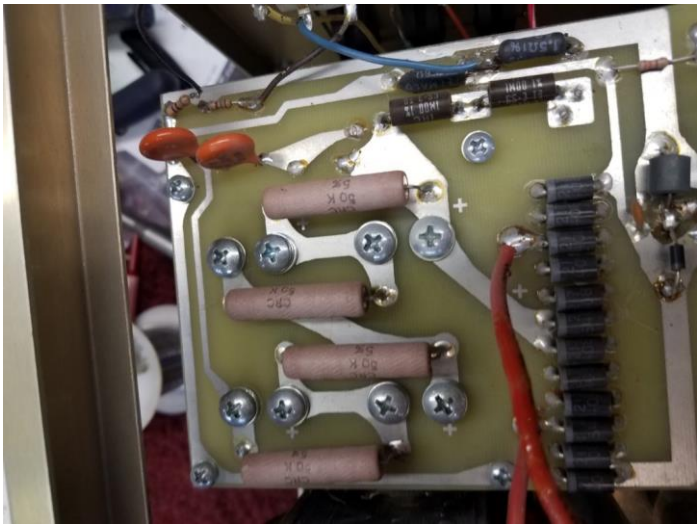

Figure 23 Replace sand color bleeders. Replace diode.

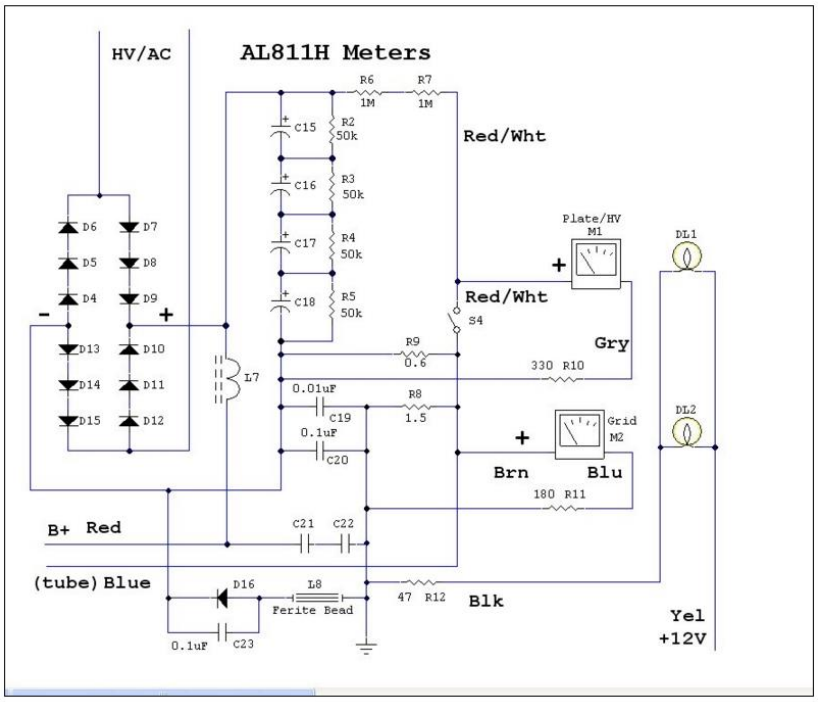

Figure 24 Metering and power supply

D16 can be mounted any physical way you like so long as the diode anode is at the center pad and the striped cathode end is toward the rectifier bank and filter capacitor bank negative. This diode allows the any arc energy to get from the chassis to the capacitor bank negative, harmlessly bypassing meters. There is plenty of room to solder. The large rectifier diode in this kit replaces D16. D16 is located near the tank coil. The kit diode has thick leads. It can lay-solder on top of the board. It does not need to fit through holes. Refer to Figures 25 and 26.

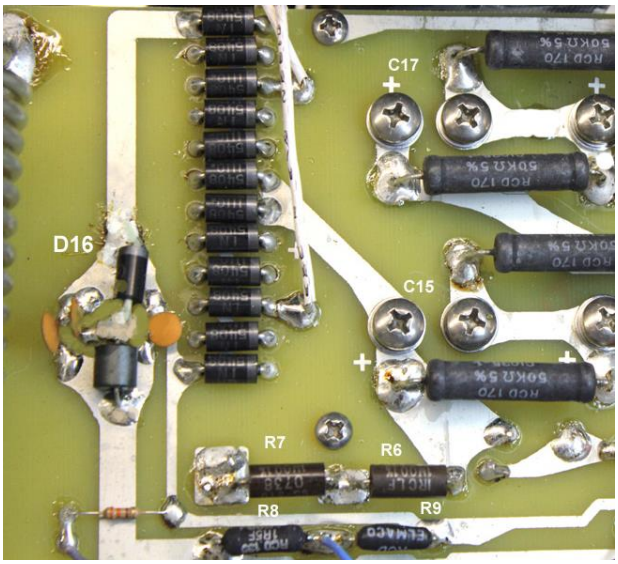

Figure 25 Meter and HV Component Locations

For easy soldering, pre-form D16 leads as shown. Also, pre-tin the leads with a generous amount of fresh solder:

Figure 26 D16 form leads

Zener Diode Bias

There is no question that using as much positive cathode bias as possible, within limits of IMD, makes the tubes run cooler. These graphs from AL811H amplifier tests show increased bias reduces tube anode heat far more than reducing power can reduces tube heat:

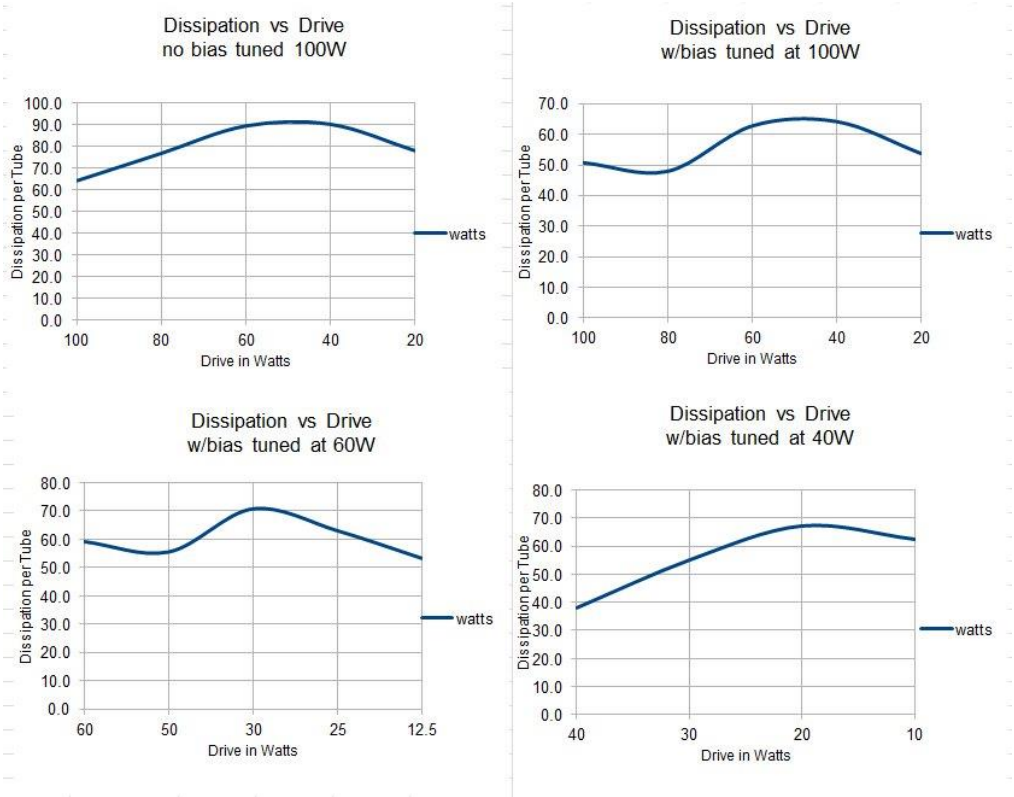

Figure 27 Drive vs. Dissipation for various conditions

Kit **811KP** includes two Zener bias diodes. These diodes are conservatively rated when installed in the airstream of the fan. The **811KP** Zener diodes connect in series with the transformer white center tap lead. The banded or striped diode end connects toward the transformer Fig. 32, since they are Zener diodes. Each Zener diode is rated at 5-watts and adds 3.9 volts of bias. The Zener's are safe to 1.3 amperes continuous duty when in open air.

I suggest you use one Zener diode in addition to the six rectifiers used by Ameritron for a total of about 7.3 volts, or two Zener diodes in series if your amplifier does not have the bias rectifier string.

There will not be any noticeable increase in IMD from the additional bias, and the tubes will run a lot cooler. Please look at this dissipation graph. Anything over 65W is over the ICAS tube rating.

The diodes can be soldered in by cutting the white wire near the fan. Strip both ends, slide large heat shrink over the white wire well away from the diode(s). Make hook leads in the diodes. Crimp and solder them to make connections. Use either one or two diodes as required.

Figure 28 preparing and connecting Zener's

This kit also includes a small 100K 2–3-watt metal oxide resistor. ***There are multiple points this resistor can be connected; without a great deal of operational change.*** This resistor can go from any tube pin to chassis or from any point on any filament wire to ground. You can even attach it to the Zener mod as shown, since this is a convenient place. This resistor is necessary to keep GDT's from "ticking" or "clicking" on receive on some bands with some tubes. The 100K resistor's position on the Zener is meaningless so long as the other lead can reach a ground point. The resistor can also go underneath the amplifier tube chassis, or on the input board.

In order my preferred places would be Fig. 30 or 31 and lastly just to chassis depending on the board's generation.

1.) Between a +24V pick point and the filament center tap or filament lead (shown below in figs 30 and 31)

2). Near the filament CT (white lead) that is accessible, such as on the Zener's

3.) Between a filament pin and ground on a tube socket

This would be a suitable alternative resistor location on the Zener's prepped for installation when the resistor is not in the preferred location. (Remember one Zener for amplifiers that have a string of bias diodes.)

Figure 29 Zener's with 100k (avoid dropping back panel or early Gen I board)

> **Warning:** Ameritron has some transformers that are out-of-spec on the LV control winding. The LV control winding was specified to produce 12-14 Vdc output from a capacitor input filter system. Due to transformer errors, so later unit can have DC voltages almost 50% beyond the specified voltage. I am trying to get an idea how many bad transformers are out in the field. Please contact me if you have one.

There was an intention in revised boards to supply +24 to +30 Vdc as a standby bias offset reference. There is a pick point for this reference on the later boards. The 100K 2W resistor connects between that 24+ point and any nearby easiest accessible point of the filament winding.

The tap point I provided for bias or accessory use can be identified by looking for two small rectifier diodes near one of two small electrolytic capacitors. If you have the back panel down

and can access these points, they are a slightly better point for the 100K resistor. This is NOT a mandatory point; it was just an intended production point when we were having problems with some early Chinese early 811 tubes.

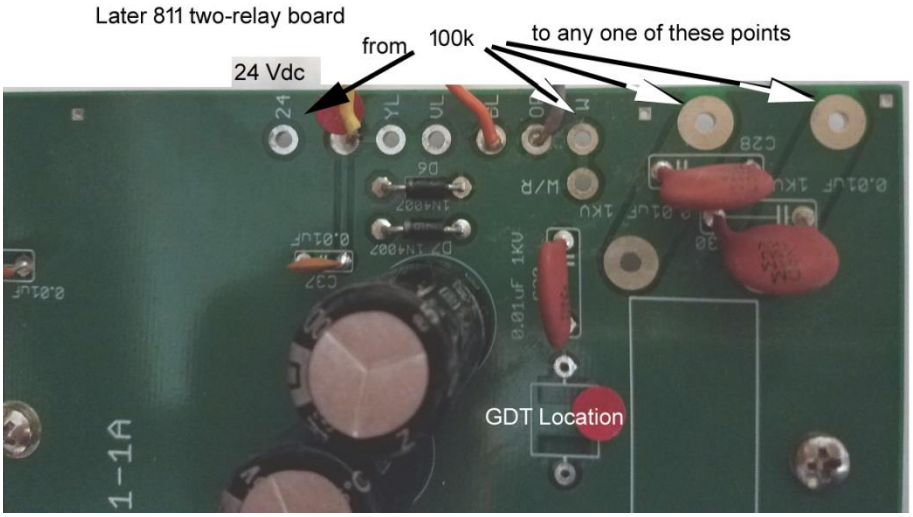

Figure 30 100K 2W resistor location A

Early two-relay board with +24V point for resistor

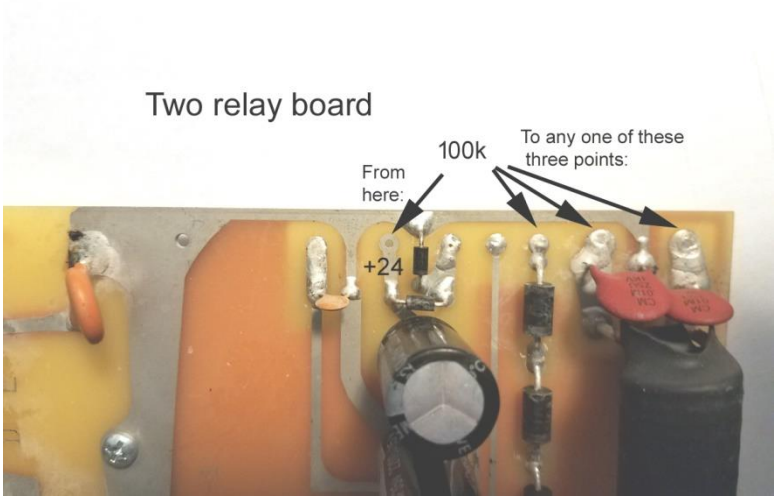

Figure 31 100K 2-watt resistor location B

Figure 30 Zener location. Note Zener band is toward the transformer, diode is in the cooling fan air stream. This unit has the 100K resistor elsewhere:

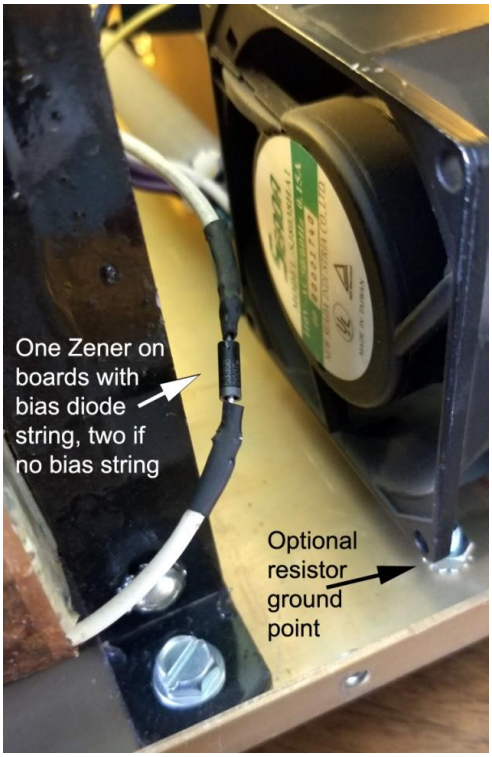

Figure 32 Zener location in fan airstream

811KP Surge Kit Glitch Resistor

The large resistor in the surge kit is a special 10-ohm 10kV+ surge rated resistor. It replaces the small ferrite bead wound with wire.

It adds an additional ten-ohms of surge resistance over the ~8 ohms of the RF plate choke and ~4 ohms of the filter capacitors. This resistor provides almost 50% reduction in worst case current surge.

The small ferrite core choke must be removed to install the surge resistor, since that resistor's inductance replaces the ferrite choke in RF function.

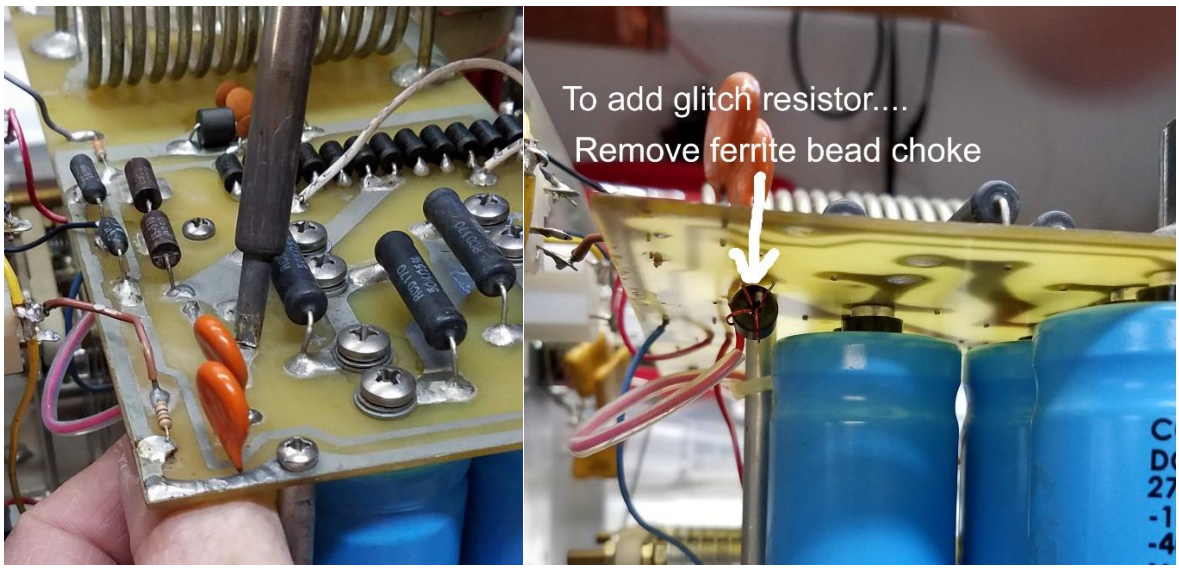

Figure 33 remove bead choke

Install the glitch resistor as shown below by surface soldering. Remember it replaces the ferrite bead HV choke.

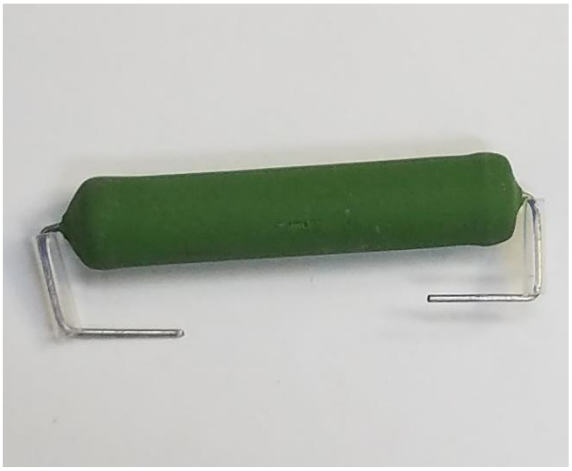

Figure 34 form resistor leads to surface solder

See the supply kit below for resistor mounting, whether you have the supply kit or not.

The 811**KS** supply kit that has solder-in 500V long life high temperature capacitors. These capacitors are more than enough capacitance to get over the voltage filtering and regulation

knee. They also add considerable margin to the voltage rating and reduce the time duration of surges. See kit 811KS below.

Supply Rebuild Kit 811KS Filter Capacitors

This kit provides new bleeders, meter protection diode, filter capacitors, and meter multipliers. All of the kit parts offer an improvement over factory parts.

I suggest surface soldering parts. As long as you make a good solid electrical joint with properly flowed solder, the joint will have more than enough mechanical strength to hold components.

To install the capacitors and resistors “clear the board” of all the original parts you intend to replace. Clear any holes where you want to mount with the lead through the hole:

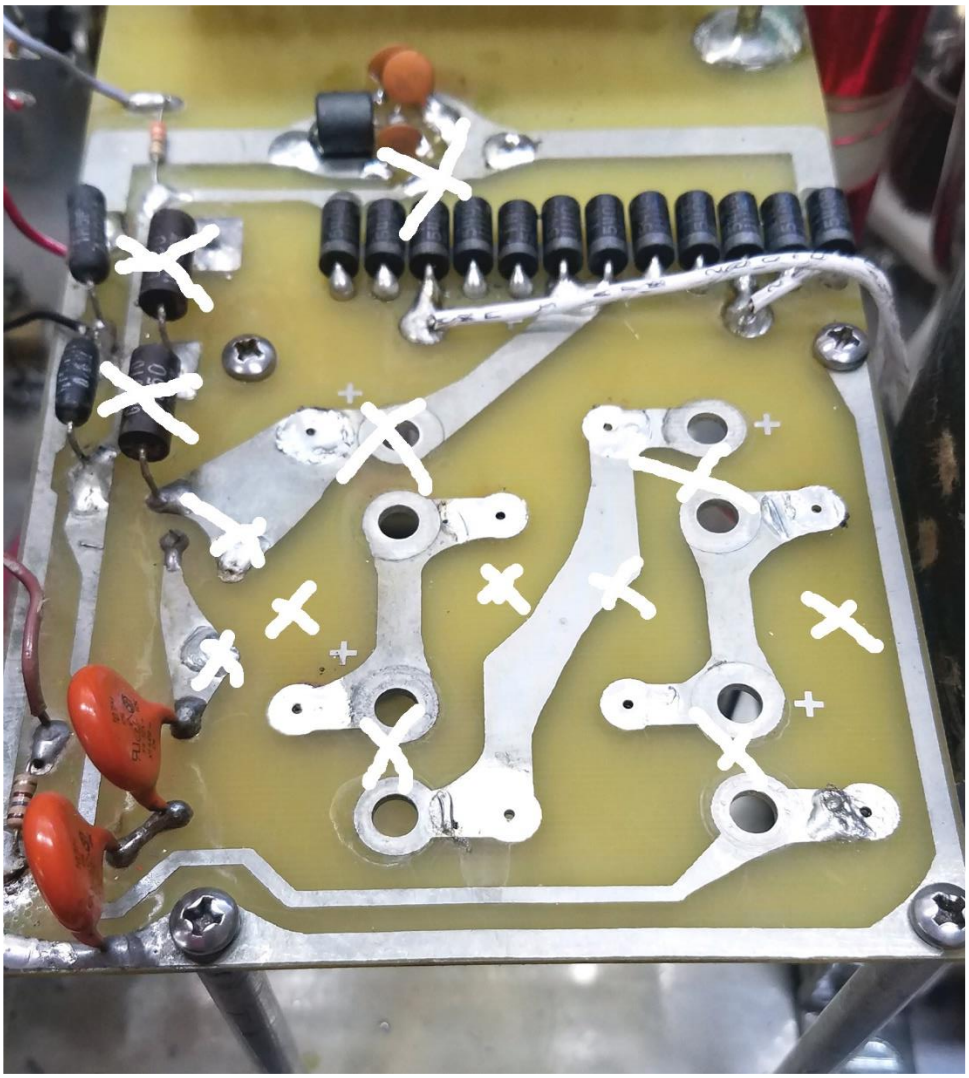

Figure 35 clean off board

Install new parts. Watch for shorts or accidental close contact. This is high voltage.

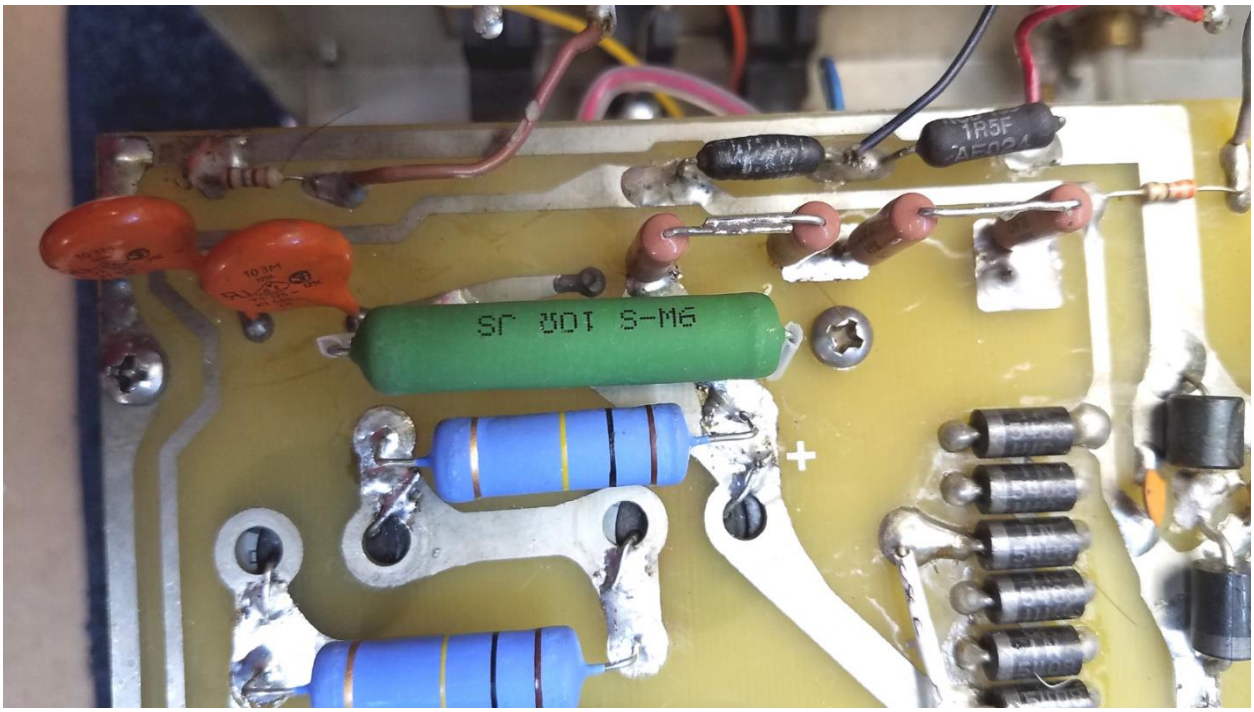

Figure 36 install new PS parts

Most parts need preformed or prepared lead lengths and bends. See the following suggestions: (Some kits use two 1M ohm, instead of four 499k. The 1M fit normally. The substitution is necessary because of supplier parts shortages.)

Figure 37 Pre-form and pre-tin leads

Pre-tinning leads aids soldering, but be careful pre-tinning through hole leads. Through hole leads may need hot-wiped of excess solder using a wet paper towel. (Note: Due to supplier parts shortages, we may substitute a different appearing resistor!)

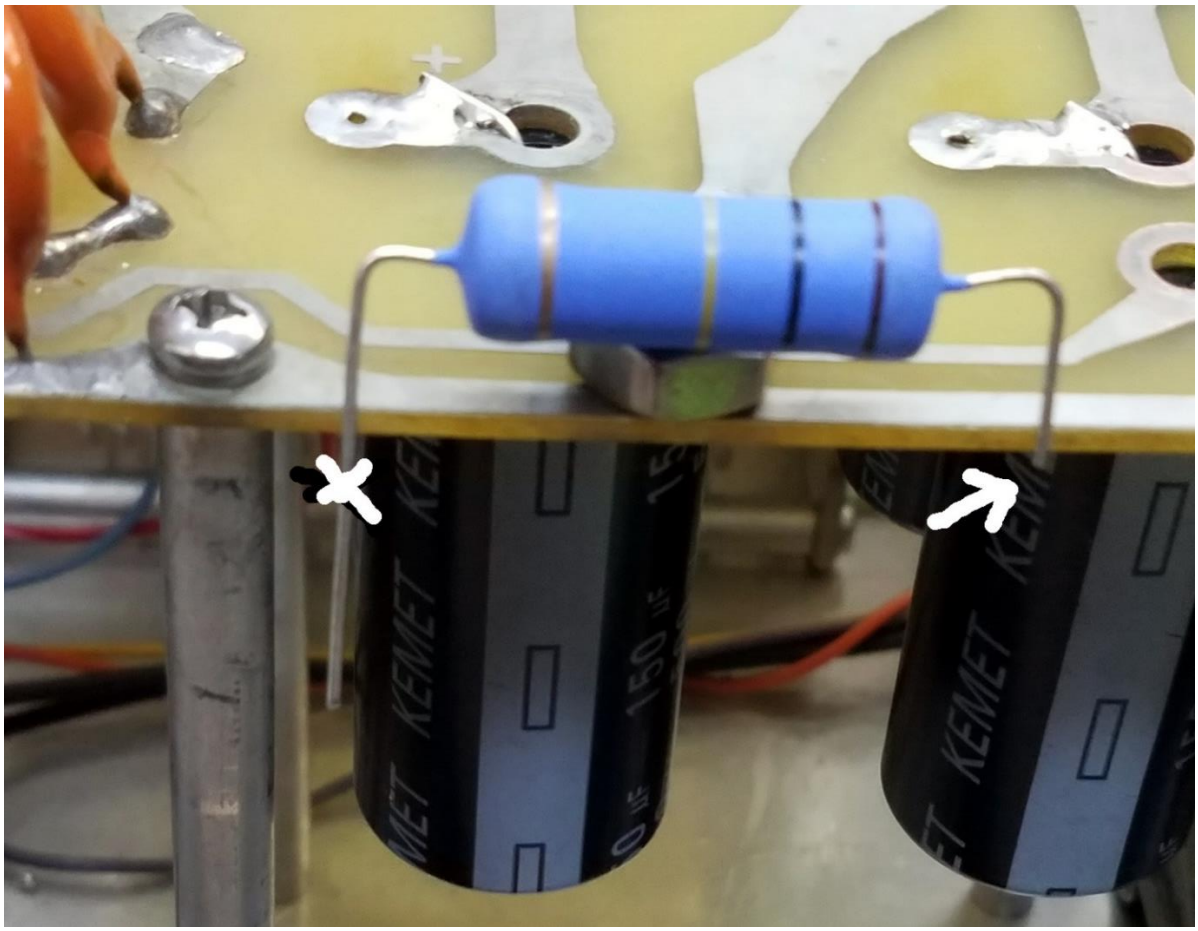

Figure 38 Cut and preform leads

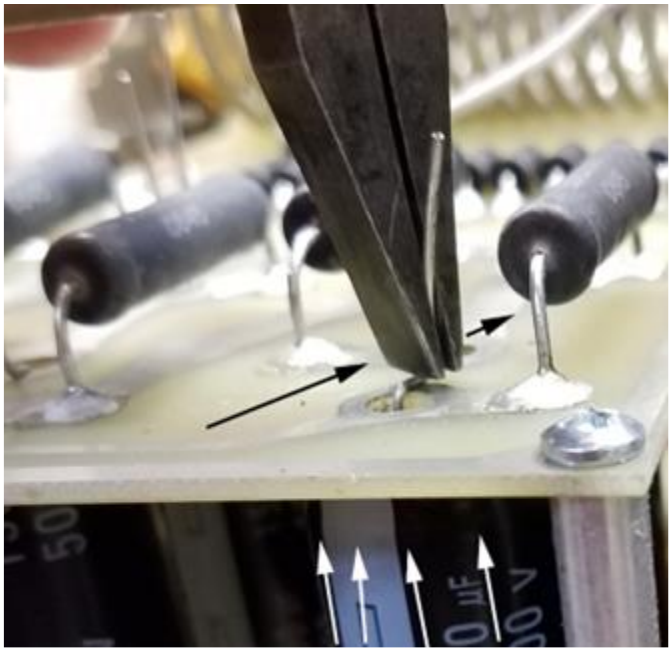

Figure 39 form leads to hold capacitors snugly

Cut and form the high-power resistor leads to proper lengths to space the resistors up off the board. This allows air to circulate and prevents accidental arcing.

Be sure you have the filter capacitor + wire to the board + hole. Hold the capacitor up against the board and bend the leads over to hold it in place. Snip the leads only after you are satisfied

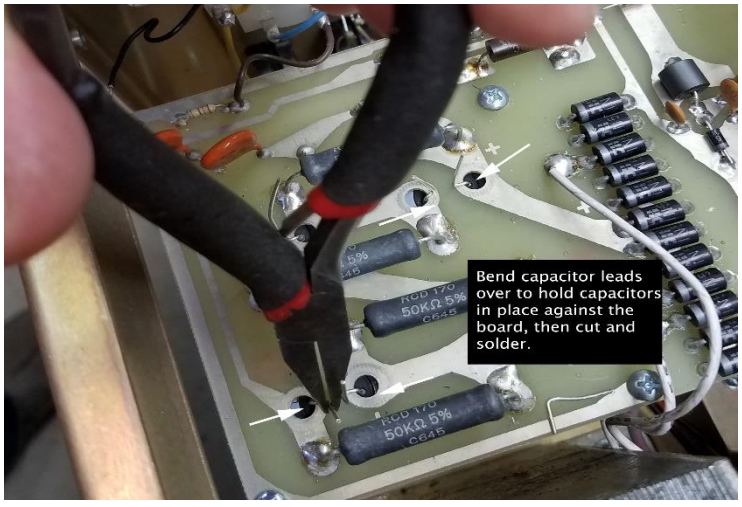

Figure 40 Form leads to hold parts snugly

with the mounting position. Remember + capacitor goes to + board. The – capacitor is marked with a stripe and -.

Bend to hold. Solder only when you are satisfied with the fit.

200-ohm Swamping Resistor 811R200K

The 200-ohm swamping resistor helps stabilize the amplifier, broadens the tuned input slightly, makes neutralization less critical, and more closely matches the 811 amplifiers to 100-watt radios. This resistor reduces ALC overshoot in troublesome radios, like the IC7300. This resistor is **required in the AL811.** This resistor is generally not ***required*** in the AL811H, but adding this resistor does help limit exciter overshoot and also makes neutralization less critical.

The 200-ohm padding or swamping resistor requires drilling a single hole. Mounting screw size is #4-40, which is about .110-inch diameter. A standard 1/8th inch is close enough. Remove the tubes before drilling. Be sure to not leave burrs. The supplied compound goes between the resistor and chassis. The ***AL811H does not need*** an isolation capacitor. The AL811H uses the existing blocking capacitor for the neutralizing system.

The ***AL811 does need*** the supplied isolation capacitor. Note the resistor is on the transformer side in the AL811H. This resistor must always have a capacitor between it and the filament wire. The AL811H already has that capacitor, as seen in *Figure 41 AL811H 200-ohm Pad*

Figure 41 AL811H 200-ohm Pad

As with GDTs, adding the R200K in the AL811 three-tube is much easier. There is no tube sub-chassis in the AL811, the sockets are open to work. Some AL811 amplifiers may already have

the 200-ohm. This was a back-and-forth problem with MFJ using it for a while and then, for no known reason, stopping use.

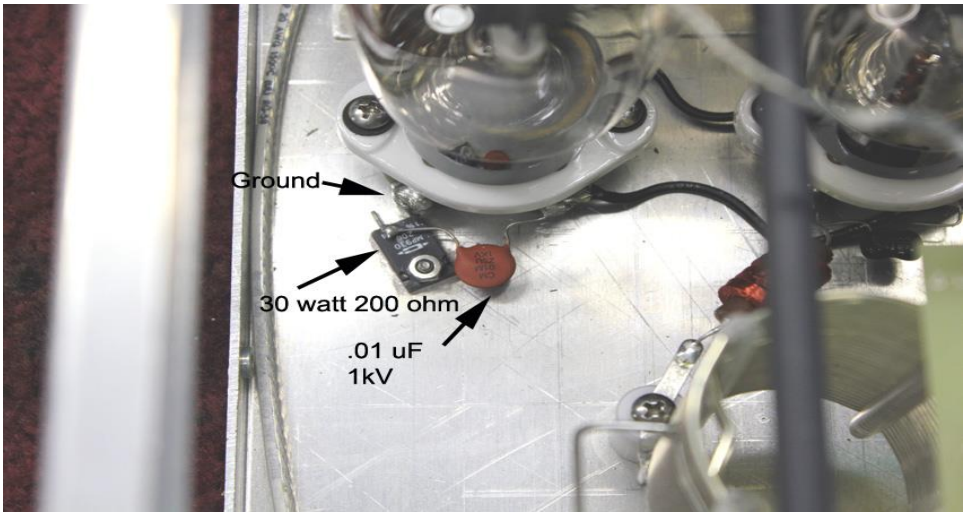

Figure 42 AL811 200-ohm swamping resistor and capacitor in AL811

Plate Choke Inspection

Check all the solder connections carefully. Inspect the plate choke. If the plate choke has loose or overlapped wires it needs to be put back in a single tight wrap and "re-glued." Q-dope can be made from a mix of lacquer thinner or Xylene and pure white Styrofoam "peanuts" used for packing, or purchased on Amazon under the name "Super Corona Dope" from M&G Chemicals. I have tested and validated use of Super Corona Dope in this application.

Dissolve the white packing peanuts or other pure Styrofoam (do not use anti-static peanuts) in thinner until it is a thick liquid or thin paste. Paint the paste on the coil to hold the windings in position. Allow time to dry. A small dot of Gorilla Glue or T-6000 is a fairly good end-glue at winding ends.

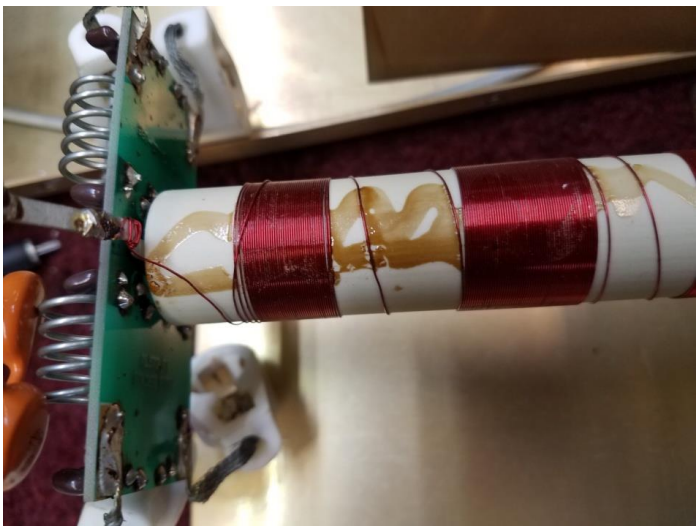

Figure 43 re-glue the plate choke if required (all units)

Coax Grounding

At some point, I believe when the green back panel board change was made, MFJ started grounding the coax shield to the input circuit board. The input board should never be used as

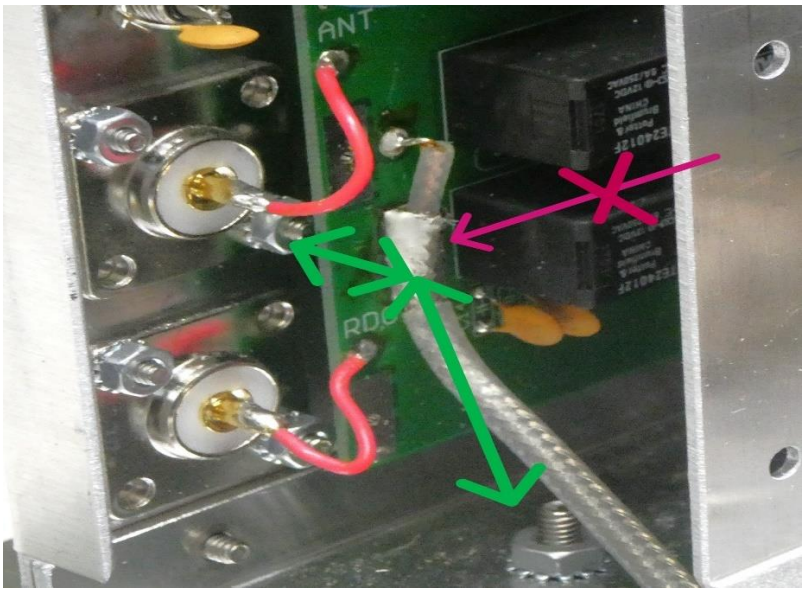

Figure 44 output ground loop

the output shield ground. The coax shield carries the same current as the center conductor, and the input board is not directly grounded to the output connector. The output current flows back along the input board ground foil to the metal spacers and then to the panel and back to the output connector. This causes a ground loop that can hurt ten meters and hurt neutralization. The two ways to correct this are either to ground the shield (green arrows) either directly to the output connector mounting screw (in which case the shield can also stay

on the board) or directly to the rear foot mounting screw and not to the input board as was originally done.

Picture Index