AL-811H Reliability Modifications

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Modification to AL-811H

Since the AL-811H amplifier was initially designed, vacuum tube construction has become less reliable. Tubes these days have much more tendency to arc from anode to grid.

This modification improves reliability of the amplifier by directly grounding the grids. Amplifiers produced after early in year of 2011 have this modification. If your amplifier has resistors mounted on terminal strips near the tube, it could use this modification. This is an important modification to the AL-811H. This modification removes the grid resistors and bypass capacitors, and directly grounds the grids.

Remove capacitors C32 ~ C35 and resistors R19 ~ R22, that are between the grids and chassis and directly ground the grids to the chassis with a short heavy lead in the AL-811H.

In addition install two 150-volt ~ 170-volt gas voltage protectors, GT1 and GT2, one from each filament line at each tube socket to ground at the socket.

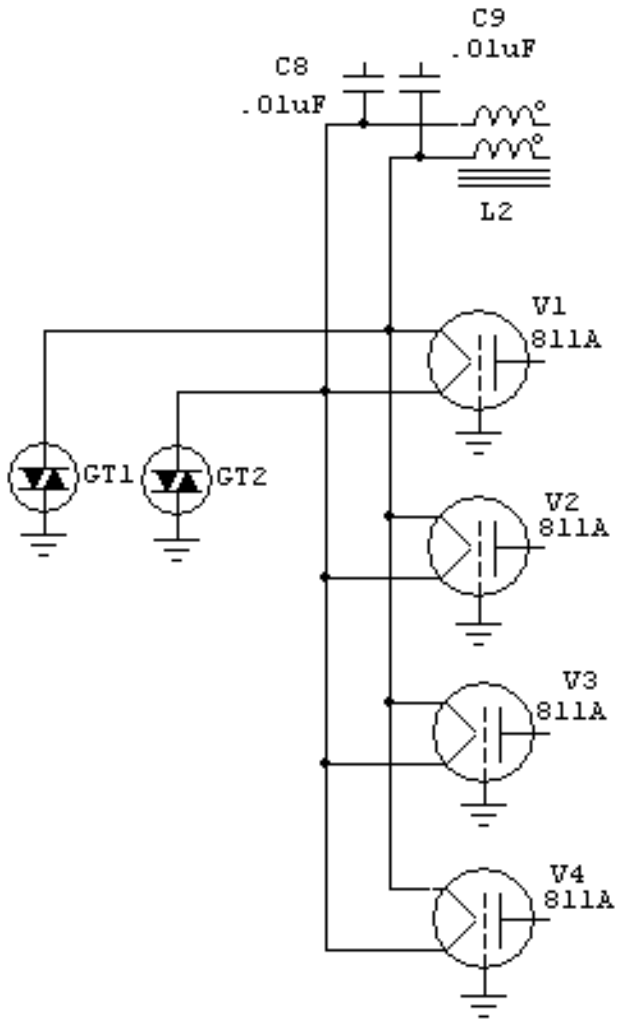
This modification prevents:

1.) Relay damage

2.) Exciter damage

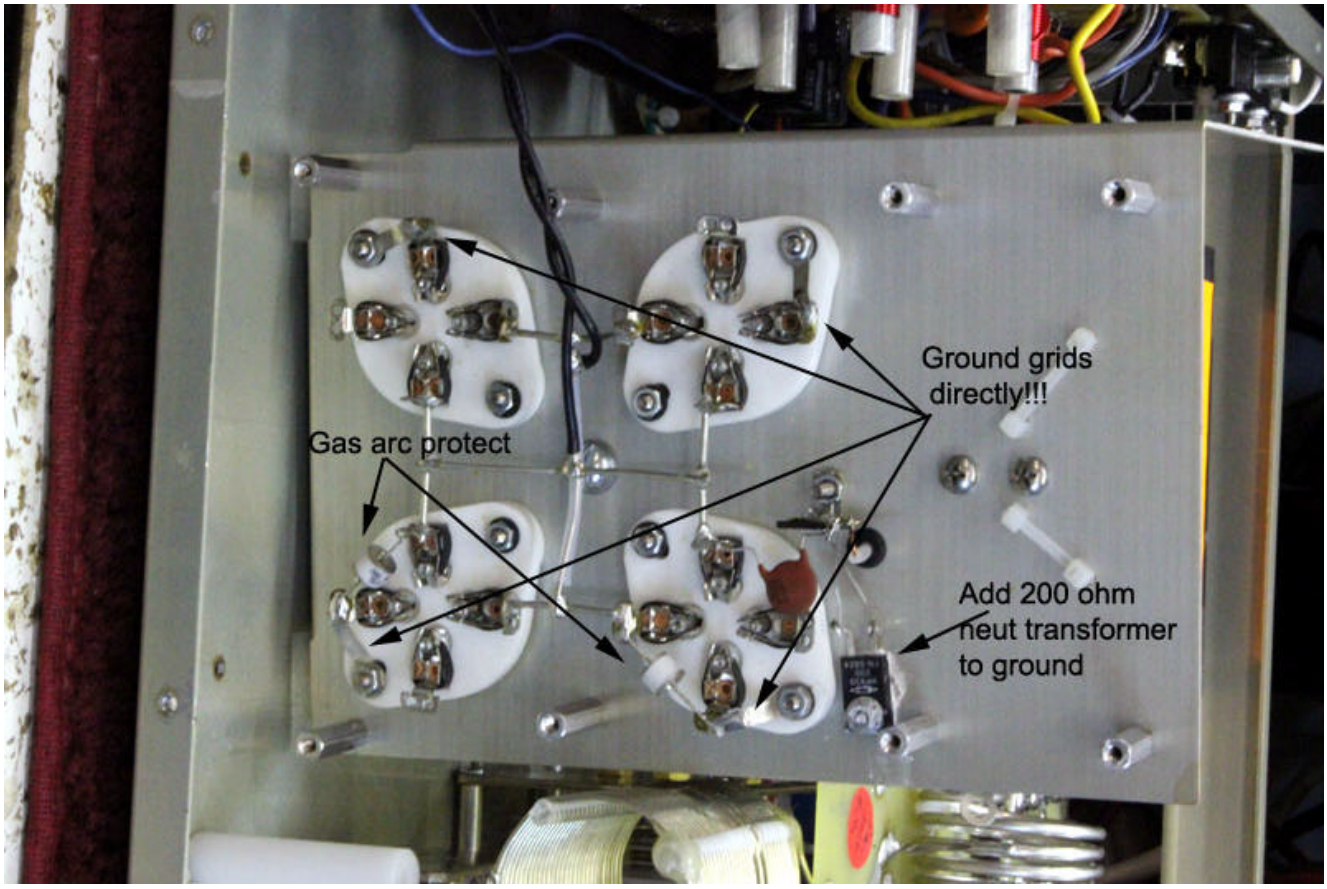
3.) Grid resistor failure

A 200-ohm non-inductive 25-watt resistor is fully across the neutralizing transformer, from the .01uF capacitor to ground. This resistor is optional, and really just slightly increases drive power requirements to more closely match the AL-811H to 100-watt radios.



Schematic of circuit after modification

The reason for this modification is that in the original design the capacitors C32 ~ C35 and resistors R19 ~ R22 were initially used to equalize tube load sharing more, but because newer tubes tend to arc more (poor pumping and poorer materials, cleanliness and quality control at the tube manufacturers) it is safer and more reliable to eliminate these components.



Picture of tube sockets after modification is complete

Some AL-811H Myths on Internet

A few common but false myths are:

811A tubes are critical for grid current

Factually, the largest number of field failures is damage to anodes from excessive anode heating and low filament emission from poor tube manufacturing quality. Grid related failures are nearly non-existent. The most common cause of operational or customer induced tube failure is *excessive anode dissipation over time. Heat is a function of duty cycle and short-term average dissipation. The 30-second or longer time-period dissipation (dissipation is not the same as output power) must be kept below 60 watts.* For short periods (IVS service) dissipation can be much higher.

Less anode voltage will extend life of 811A tubes

Anode voltage, within reasonable limits, has nothing to do with tube life or tube arcing. Virtually no tube failures relate to anode voltage.

Life of 811A tubes are extended by more airflow

811A tubes are designed to be natural convection cooled. Anodes, which produce most of the heat, and the other heat sources, are inside a sealed glass envelope in a vacuum. There is very little heat conduction to the envelope. The vast majority of heat is removed via infrared radiation and radiated to tube surroundings. The only thing the air does is cool the glass enough to prevent damage to seals or the glass envelope itself. External airflow does not measurably improve anode cooling, and anode temperature is the limiting parameter.

The AL-811H pushes the 811A tubes far beyond ratings

Absolutely true, if you consider operation in ICAS or CCS and not IVS. Keep in mind however the 811H does *not* "push" the tubes any "harder" than Collins did in the 30L1, or Heath did in the Warrior. It has been a long standing tradition to run 811A tubes at about 250 watts dc plate input, which is about 150 ~ 175 watts RF on the anode, per tube. This is why the Collins 30L1 was marketed as a "kilowatt" amplifier. This is over 600 watts output carrier. The problem is not exceeding the 65-watt dissipation for short periods; the problem is exceeding it with enough duty cycle to overheat the anode. The real problem today, other than operator error, is quality and design of tubes.

Advantages of Ameritron AL-811H and AL-572
Over the Dentron Clipperton-L

AL-811H (811A) and AL-572 (572B)

1. Input coupling Pi Network for each band
2. Neutralizing Circuit for the four 811A / 572B Vacuum Tubes
3. Negative Feed Back Circuit for the four 811A / 572B Vacuum Tubes
4. Sufficient Load Capacitance for good output coupling to a load on 160 Meters

CLIPPERTON-L

1. No input coupling Pi Network for any bands
2. No Neutralizing Circuit for the four 572B Vacuum Tubes
3. No Negative Feed Back Circuit for the four 572B Vacuum Tubes
4. Insufficient Load Capacitance for good output coupling to a load on 160 Meters