AL572B Updates and Error Corrections

Rev0A 11/3/22 W8JI

Relay System

AL80B, AL572, and AL800 amplifiers all share a common basic frame and power supply layout. This amplifier group originally used open frame relays for both step-start (12Vdc SPDT) and antenna relay. Original antenna relays were 100mA 12Vdc coil 3-pole relays. The outer two signal poles are traditional double throw, the center pole is a unique single throw normally open. Removal of the center normally closed pole increases contact pressure on the receive pass through signal poles, increasing receive reliability.

Original open frame Rx/Tx transmit switch time is less than 12mS, a 10-13mS radio TX delay should be more than enough with these large open frame relays. Early open frame relay systems behave well, requiring only normal care. Unless abused by improper cleaning or other damage the relay will last decades.

At some point someone at MFJ modified the relay system to use two plastic case miniature cube relays. MFJ-modified systems using two relays have both relay timing and keying line impedance (sensitivity) problems. The small cube or enclosed DIP relays themselves switch and settle in 6mS or less. However, MFJ circuit design errors needlessly extend relay closure into the 20-30mS region. The system should actually be in the 6mS area. Making matters worse, the relay return-to-receive is very unreliable due to major relay control line impedance errors.

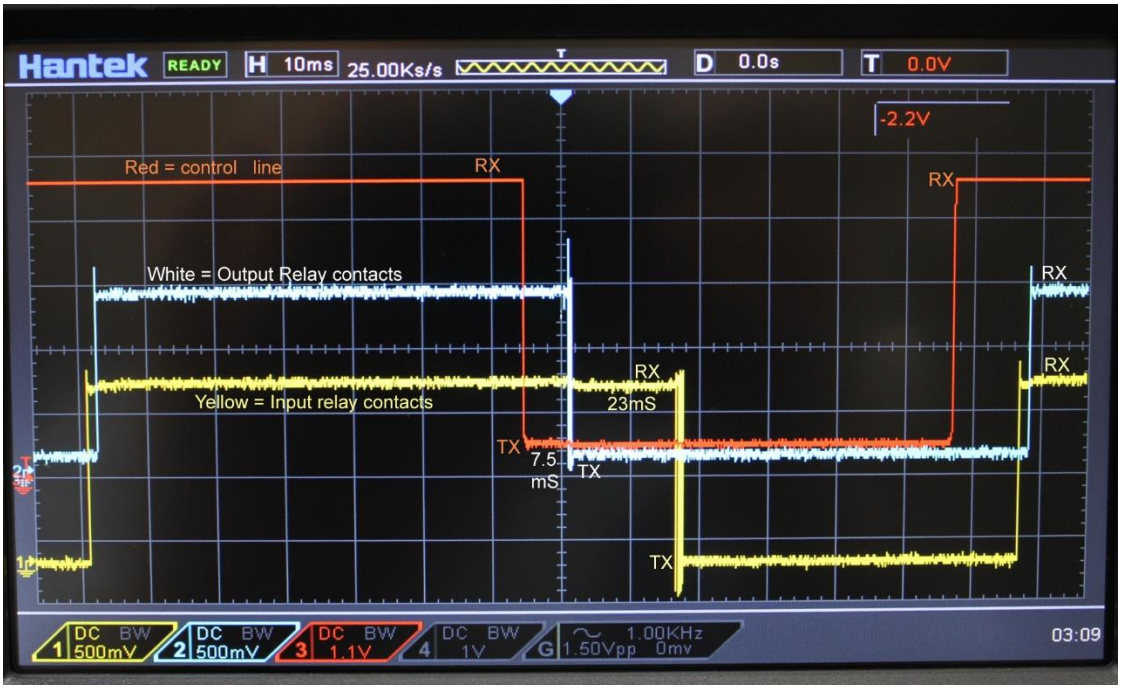

Figure 1 stock timing dual relay

Factory circuit errors in all “AL8B frames” using small enclosed relays cause shortened relay life, unreliable receive return, and grossly excessive TX delay time requirements. The basic dual relay keying circuit design is very poorly planned, but a few simple patches will make it workable.

Relay System Modifications (Dual Cube Relays of all models and dates)

Parts Required:
(1) 2.2k ¼-watt or larger resistor
(1) 5-volt to 6-volt small (1/2 watt or larger) Zener diode
(1) .33uF to .47uF capacitor

The switch to transmit time is the critical time that must be programmed into the radio. Unless the radio has a severe design defect this is the only window causing hot switching, and the only window of concern. This is the leading-edge (RX-to-TX) result of these changes (other issues not shown that improve relay life and receive recovery time are also corrected):

Figure 2 corrected relay timing

Note: Components on this board have the leading digit omitted. In addition there are some label and schematic errors. I will point out any errors.

1.) Remove D116 (board omits the leading 1 and says “D16”). D116 needlessly slows input relay return time. D116 is near the center panel rear. Plug-in relay units will need the relay board removed. Just snip either end of D116 with small cutters. There is no reason to remove D116 entirely so long as it is disabled by snipping a lead. D116 is the diode with zero ohms continuty from Q106 emitter to D116 striped end (cathode).

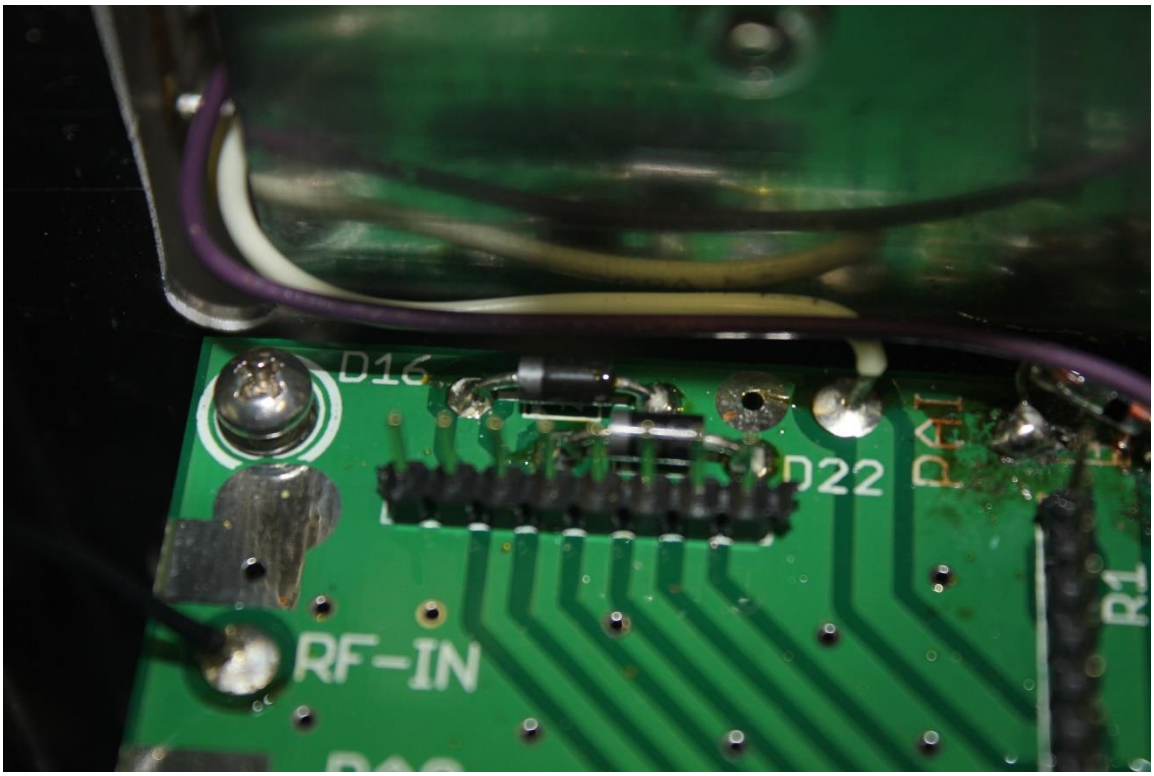

Figure 3 (plug-in relays) D116 location

2.) Unsolder and lift the ***RLY jack end*** of R137 4.7k from the circuit board pad. It is a good idea to first re-wet or reflow that solder connection with regular 60/40 solder. Be careful to not overheat the pad and lift it.

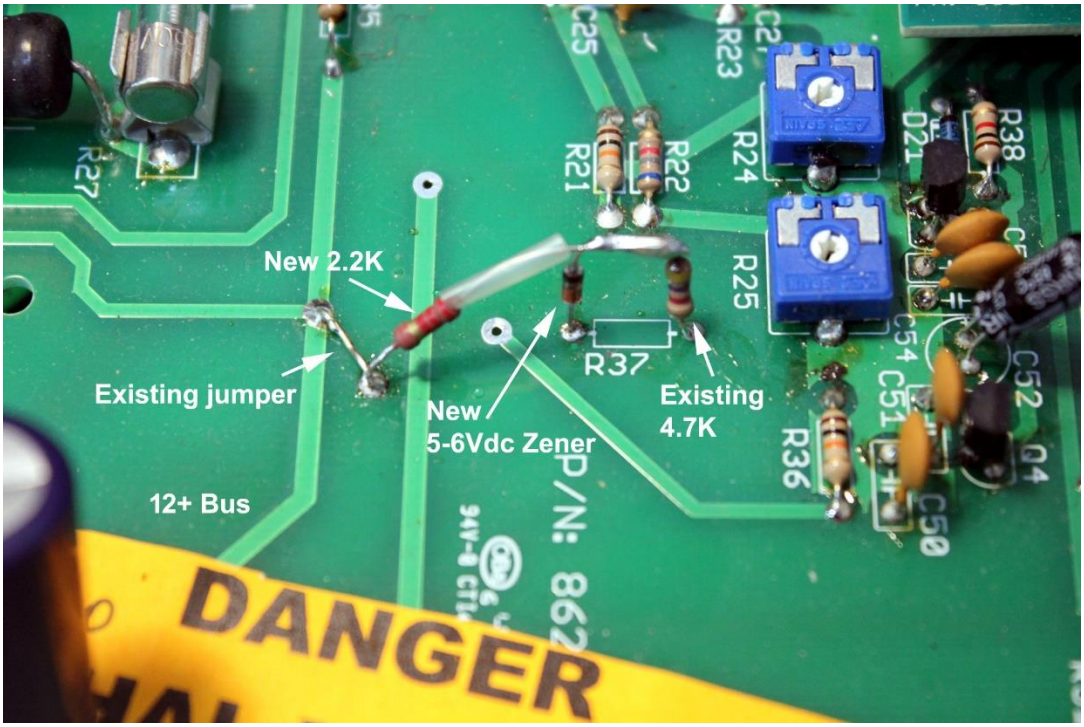

Figure 4 Zener and resistor mod

3.) Referring to figure 4, the new Zener connects banded end up to the end of the 4.7k lifted in step 1. This makes the threshold voltage on the relay control jack more reasonable at normal logic levels.

4.) A new 2.2K resistor bridges from the ~12Vdc control line voltage bus to the junction of the Zener banded end and the lifted end of R137. This resistor reduces the relay control line impedance to a more reasonable level of a few thousand ohms, making receive return more consistent.

5.) Radial lead 10uF C152 (sometimes listed in parts as C153 while labeled C52) needs removed and replaced with a .33uF to .47uF capacitor. This capacitor causes the big transmit timing problem in dual relay amplifiers.

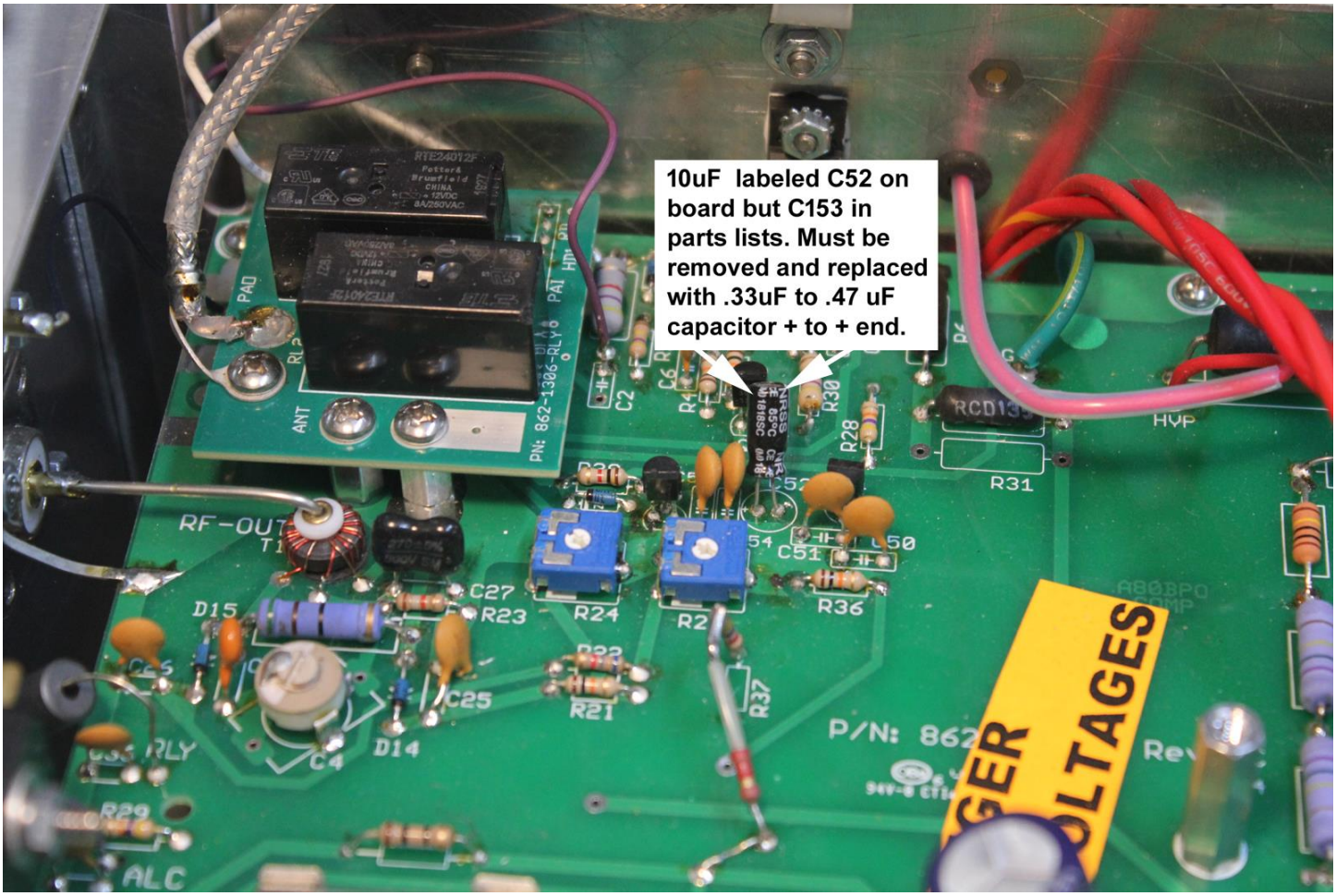

Figure 5 Dual Relay mods

The reworked relay system now looks like this (note that D121 is drawn backwards in some or all MFJ schematics, although D121 is the correct direction as mounted in the circuit board):

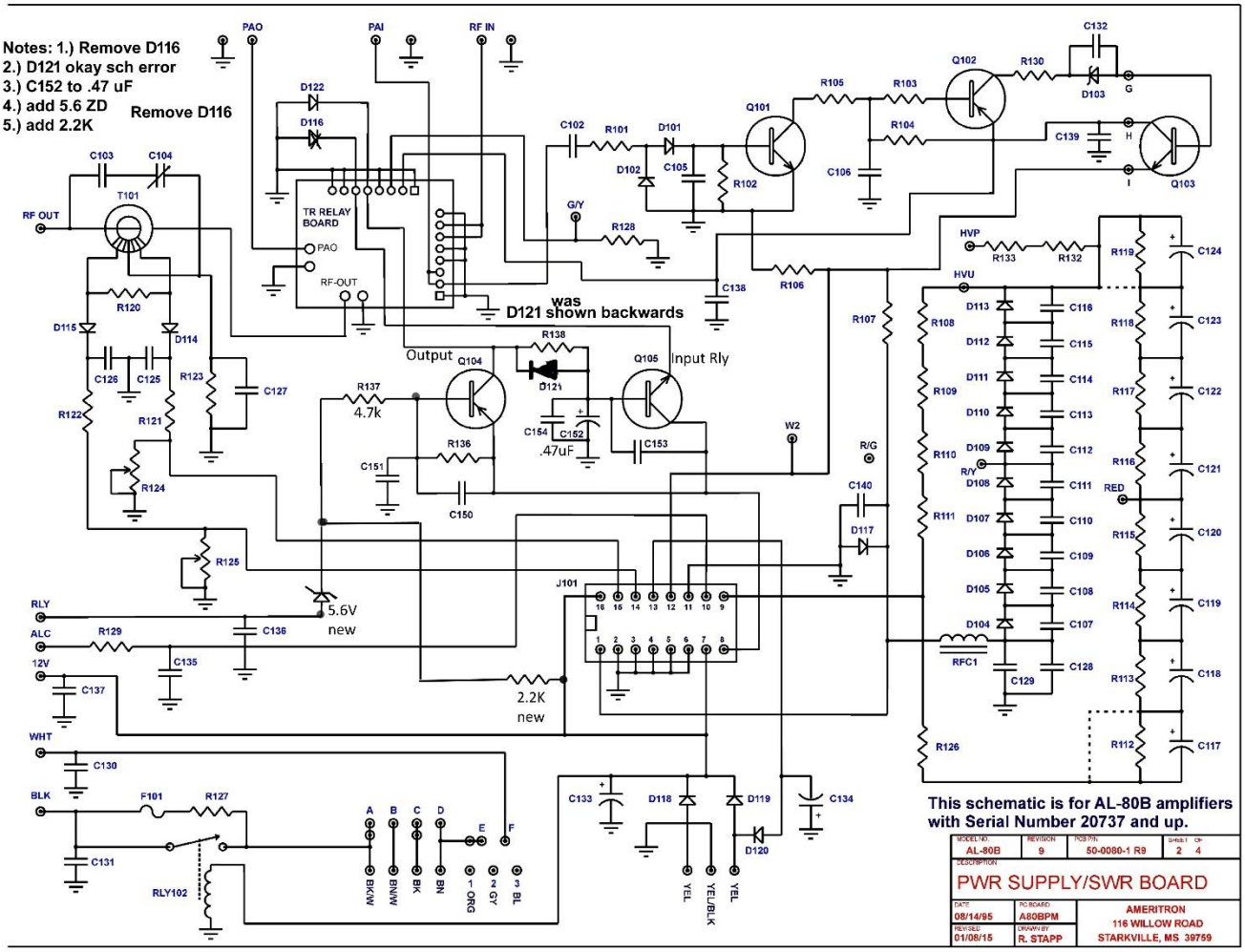

Figure 6 modified schematic

The relay system with these simple mods is now about 6mS receive-to-transmit turn over time. Any exciter TX delay setting beyond 7mS will be more than enough.

NOTE: NONE of these changes, including TX delay settings, affect ALC overshoot! ALC overshoot is not related to relay switching times. ALC overshoot is an exciter (radio) design problem.

Electronic Bias Modifications (all units)

Parts Required:
(1) 9.6Vdc Zener diode

(1) .47uF capacitor

(1) .1 uF capacitor

The electronic bias system in the AL8B frame amplifiers went through one authorized change very early in production. This change was relocating the sample point from the T/R relay tuned input contact to the output side of the tuned input. This was accomplished by adding a violet jumper wire directly from the input switch wafer to C102. I have never seen this corrected in schematics, but this correction must be made.

1.) Add 9.6V Zener diode from either side of R130 to collector (middle terminal) of Q103, banded end to Q103. The Zener can sit up in the air a little.

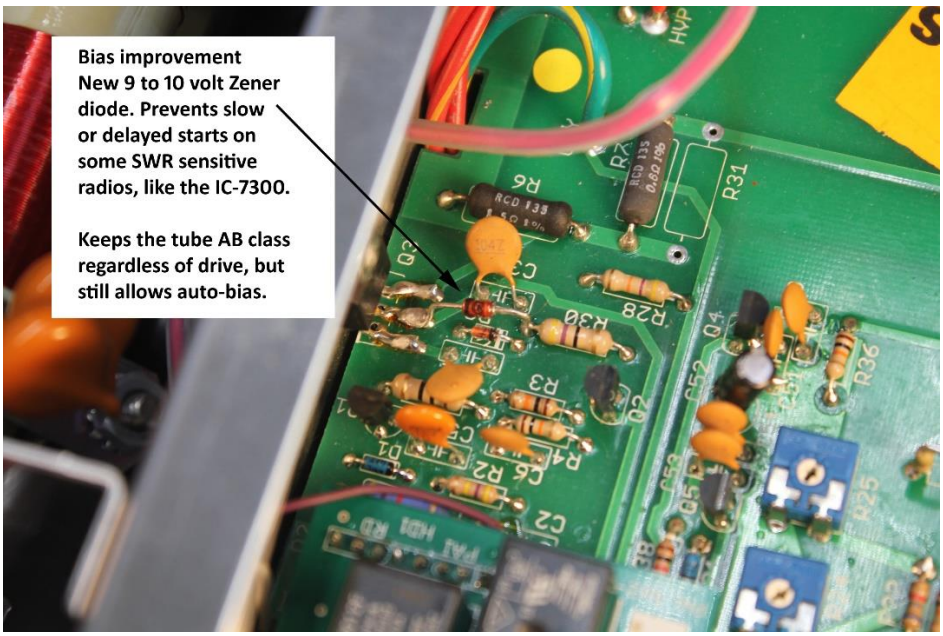

Figure 7 bias system mods

2.) Tack in a new 0.1uF from junction of R103, 104, 105, and C106 to ground. You may want to clean up some of the MFJ soldering while working on the amplifier. This one has not been

cleaned up!

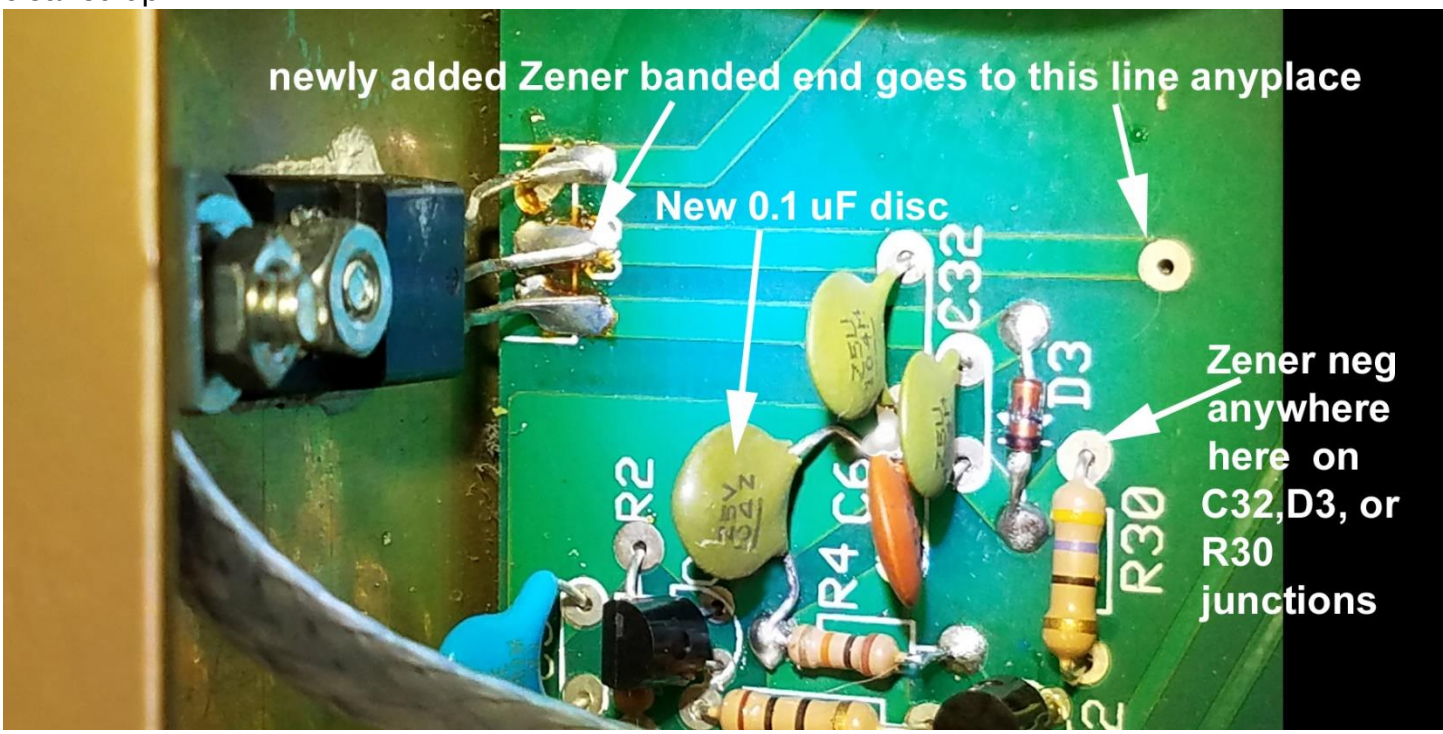

Figure 8 Bias system

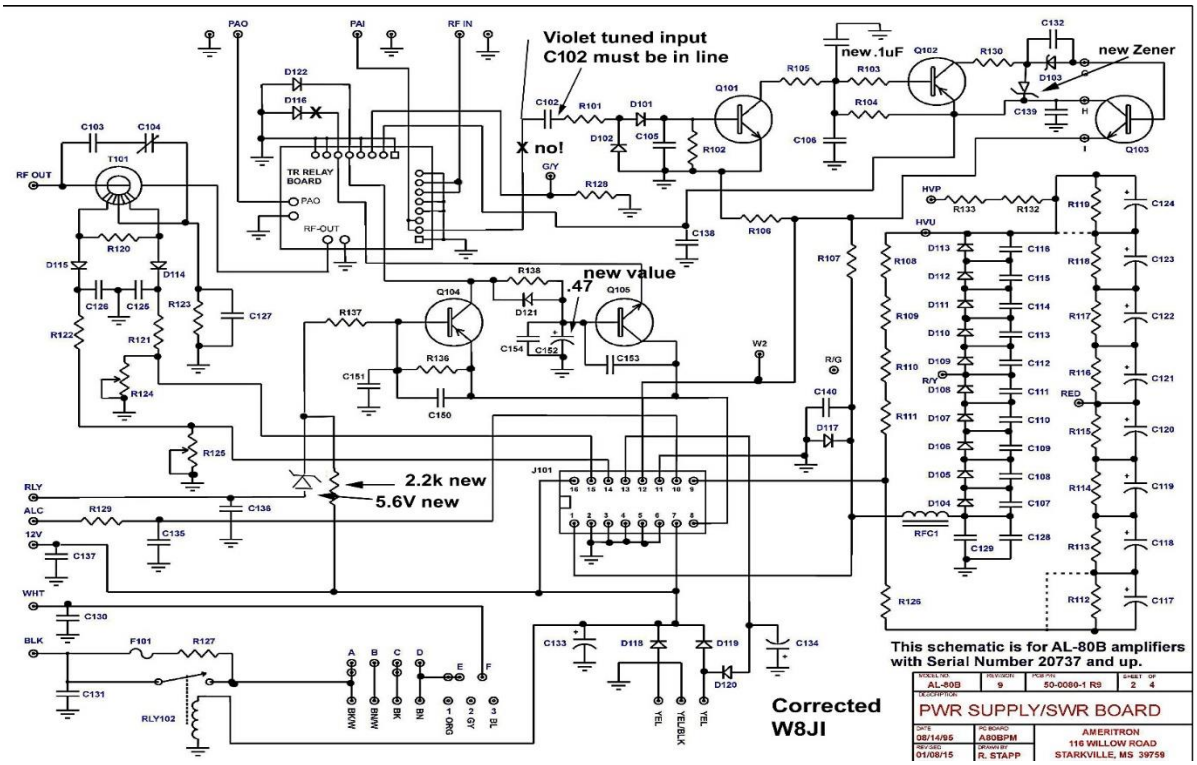

Figure 9 PS schematic corrected

12Vdc Bus System Errors

The AL8X frame amplifiers were designed to have a 13 to 14 Vdc nominal 12V bus voltage. The positive bus appears at the rear 12V jack. Either a small trace link is used on the board, or a 10-ohm ¼-watt metal film resistor is used for short circuit protection. We replace those with a 900mA thermal reset PTC thermistor for fusing.

The 12V bus system originally used a 21Vac CT transformer winding. Something happened over time and some A8X frames, including the AL80B, AL800, AL800H, and AL572, now might have grossly excessive bus voltages. The bus rails are both dc negative and positive, and these dual polarity rails feed a metering/ALC op-amp rated at 30-32Vdc maximum supply differential. Depending on the op-amp used and the rail voltages, the op-amp can fail and stop providing power meter and ALC functions.
I strongly suggest using bucking diodes or dropping diodes to get voltage to rated voltages if the positive bus exceeds 15Vdc.

If your amplifier has a 10-ohm resistor or a fuse link they can be replaced with a thermal auto reset fuse. We included one auto reset fuse in the kit. We can also supply bucking diodes.

Arc Protection and Control Grids

Parts Required:
(1) length of braiding or wire for grounding

(2) 150V GDT arc suppressors

Grid pins of 572 tubes must be directly grounded and GDTs should be added to the filaments. This is easy to do because the tube chassis is a tinned circuit board without solder masking. You can solder directly to the ground plane of the board without any lugs. Follow these pictures and make sure you make good connections by using enough heat to flow solder.

1. Remove old resistors and capacitors from all grid pins. Clean up any bad soldering and tighten all screws.

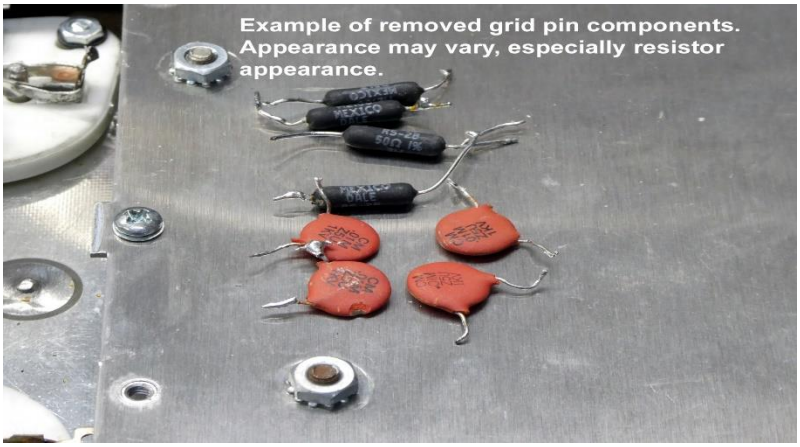

Figure 10 removed grid bypasses and resistors

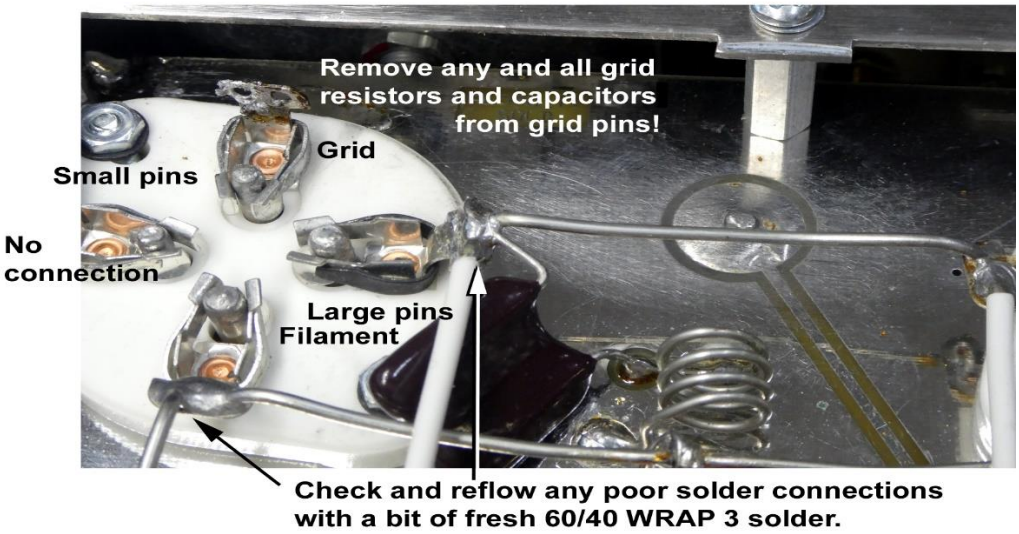

Figure 11 grid mods AL572

2. Add foil, braiding, or at least #18 stranded wire directly from grid pin to printed circuit chassis ground plane.
3. Add two GDT's, one from each side of filament system anywhere convenient, to ground plane of board.

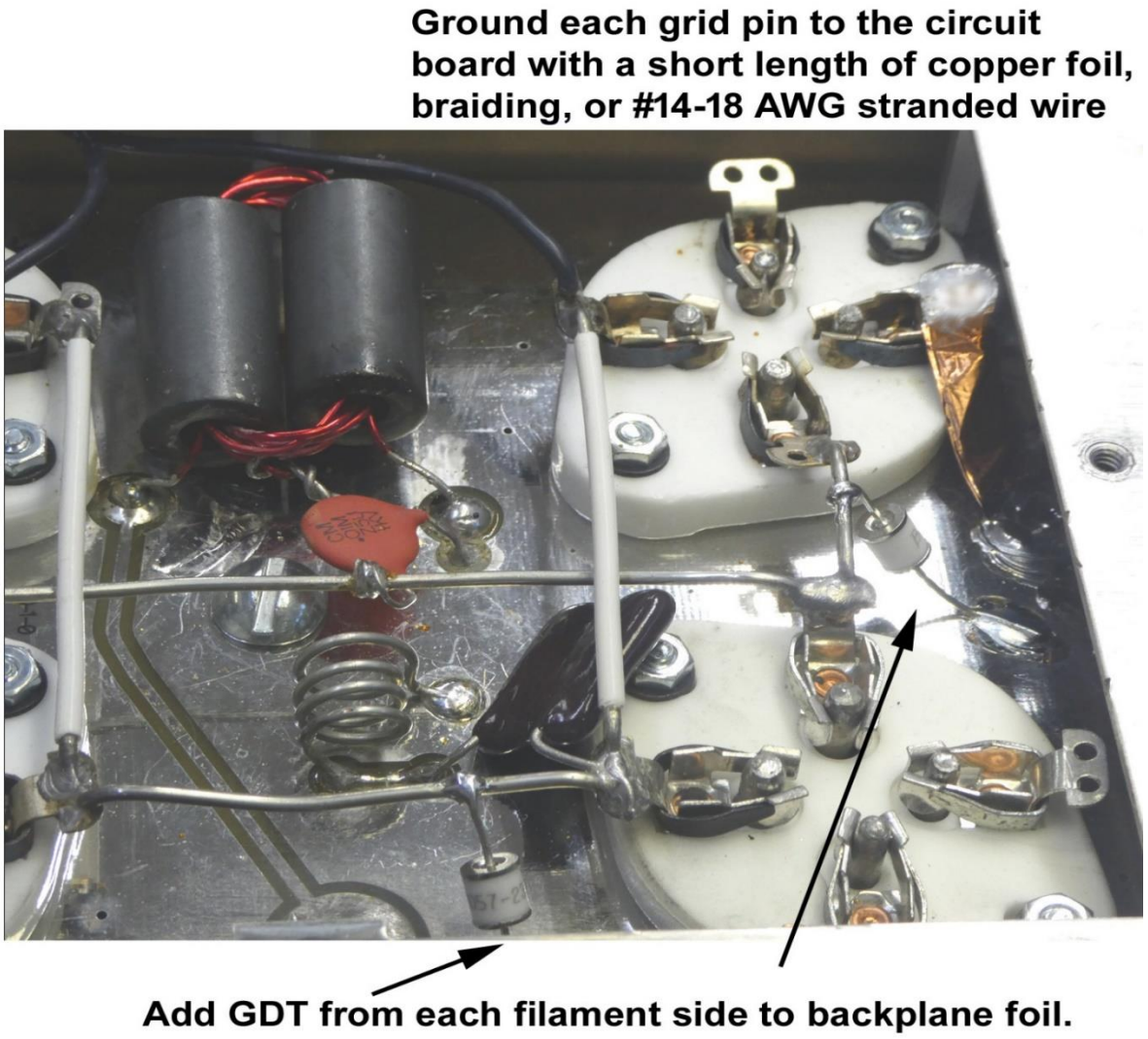

Figure 12 finished grid mods